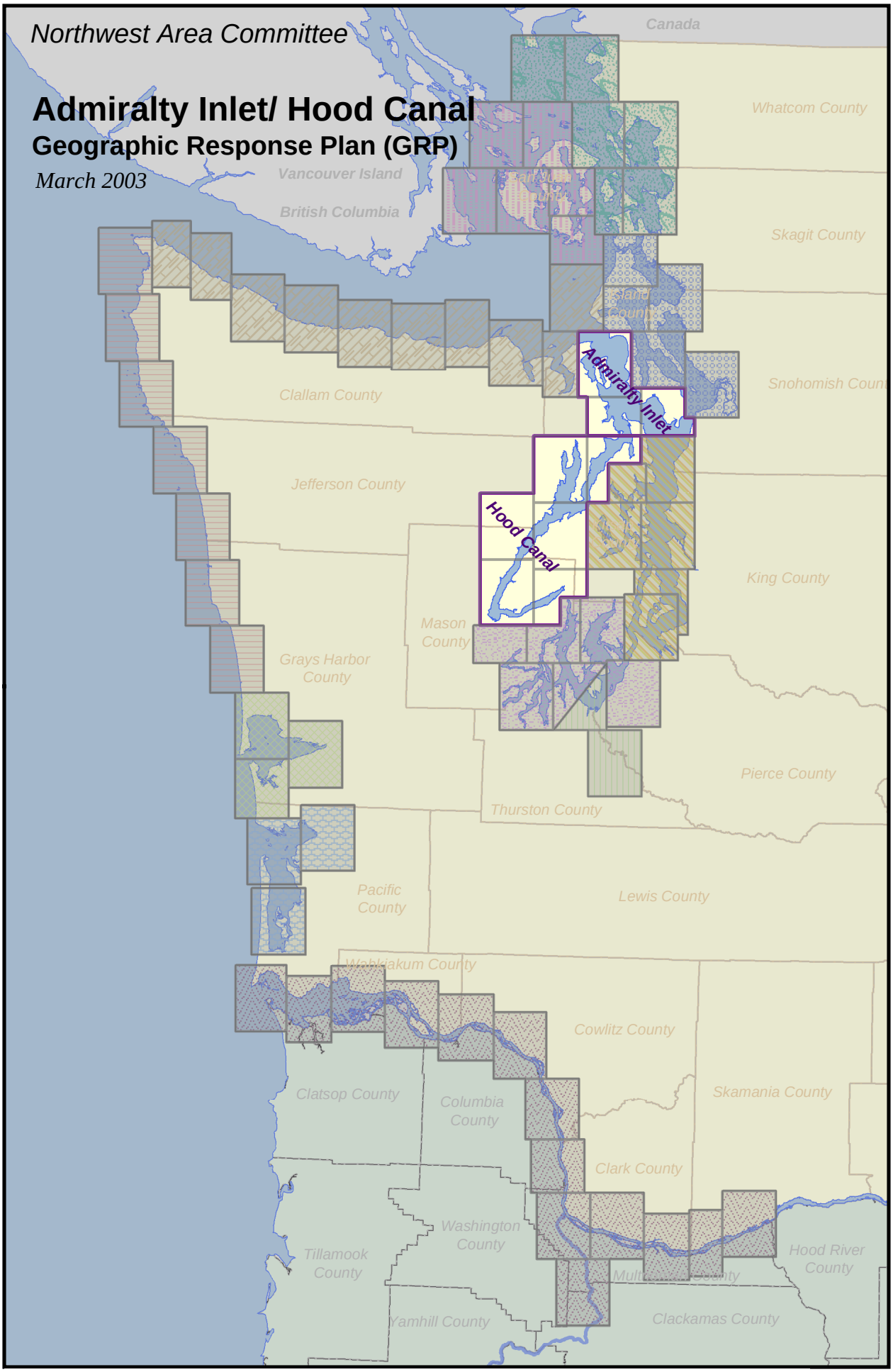
Washington State Department of Ecology Publication No. 94-204 (Rev. 3/03)



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SPILL RESPONSE CONTACT SHEET

Required Notifications For Hazardous Substance or Oil Spills

USCG National Response Center ..... **(800) 424-8802**
In Oregon:
Department of Emergency Management ..... **(800) 452-0311**
In Washington:
Emergency Management Division ..... **(800) 258-5990**
Department of Ecology Northwest Regional Office ..... **(425) 649-7000**
Department of Ecology Southwest Regional Office ..... **(360) 407-6300**

U.S. Coast Guard

National Response Center	**(800) 424-8802**
Marine Safety Office Puget Sound:	
Watchstander	**(206) 217-6232**
Safety Office	(206) 217-6232
Marine Safety Office Portland:	
Watchstander	**(503) 240-9301**
Safety Office	(503) 240-9379
Pacific Strike Team	**(415) 883-3311**
District 13:	
MEP/drat	(206) 220-7210
Command Center	(206) 220-7001
Public Affairs	(206) 220-7237
Vessel Traffic Service (VTS)	**(206) 217-6050**

Environmental Protection Agency (EPA)

Region 10 Spill Response	**(206) 553-1263**
Washington Ops Office	(360) 753-9083
Oregon Ops Office	(503) 326-3250
Idaho Ops Office	(208) 334-1450
RCRA/ CERCLA Hotline	(800) 424-9346
Public Affairs	**(206) 553-1203**

National Oceanic Atmosphere Administration

Scientific Support Coordination	(206) 526-6829
Weather	(206) 526-6087

Canadian

Marine Emergency Ops/Vessel Traffic	(604) 666-6011
Environmental Protection	(604) 666-6100
B.C. Environment	(604) 356-7721

Department of Interior

Environmental Affairs	(503) 231-6157
	(503) 621-3682

U.S. Navy

Naval Shipyard	**(360) 476-3466**
Naval Base Seattle	(360) 315-5440
Supervisor of Salvage	**(202) 695-0231**

Army Corps of Engineers

Hazards to Navigation	(206) 764-3400

Port Gamble S'Klallam Tribe

Tribal Office	(360) 297-2646
After Hours Emergencies	**(360) 297-6333**

Skokomish Tribe

Tribal Office	(360) 426-4232
After Hours Emergencies	**(360) 426-4232**

Federal O.S.R.O./ State Approved Response Contractors

All Out Indust. & Env. Services	(360) 414-8655
Certified Cleaning Services, Inc.	(253) 536-5500
Clean Sound Cooperative, Inc.	**(425) 783-0908**
Cowlitz Clean Sweep, Inc.	(360) 423-6316
FOSS Environmental	**(800) 337-7455**
Global Diving and Salvage	(206) 623-0621
Guardian Industrial Services, Inc.	(253) 536-0455
Island Oil Spill Association	(360) 378-5322
Matrix Service, Inc.	(360) 676-4905
MSRC	(425) 252-1300
National Response Corporation	(206) 340-2772

Washington State

Department of Ecology Headquarters	(360) 407-6900
Southwest Region	**(360) 407-6300**
Northwest Region	**(425) 649-7000**
Central Region	**(509) 575-2490**
Eastern Region	**(509) 456-2926**
Department of Fish and Wildlife	**(360) 534-8233**
Emergency Management Division	(360) 438-8639
	(800) 258-5990

State Patrol

Bellevue	(425) 455-7700
Tacoma	(253) 536-6210
Bremerton	(360) 478-4646

Oregon State

Department of Environmental Quality	(503) 229-5733
Emergency Management	**(503) 378-6377**
	(800) 452-0311

*** Boldface type are 24 hour numbers**

HOW TO USE THIS GEOGRAPHIC RESPONSE PLAN

Purpose of Geographic Response Plan (GRP)

This plan prioritizes resources to be protected and allows for immediate and proper action. By using this plan, the first responders to a spill can avoid the initial confusion that generally accompanies any spill.

Geographic Response Plans are used during the emergent phase of a spill which lasts from the time a spill occurs until the Unified Command is operating and/or the spill has been contained and cleaned up. Generally this lasts no more than 24 hours. The GRPs constitute the federal on-scene coordinators' and state on-scene coordinators' (Incident Commanders) "orders" during the emergent phase of the spill. During the project phase, the GRP will continue to be used, and the planned operation for the day will be found in the Incident Action Plan's Assignment List (ICS Form 204). The Assignment List is prepared in the Planning Section with input from natural resource trustees, the Incident Objectives (ICS Form 202), Operations Planning Worksheet (ICS Form 215), and Operations Section Chief.

Strategy Selection

Chapter 4 contains complete strategy descriptions in matrix form, response priorities, and strategy maps. The strategies depicted in Chapter 4 should be implemented as soon as possible, following the priority table in Section 2 with the "Potential Spill Origin" closest to the actual spill origin. These strategy deployment priorities may be modified by the Incident Commander(s) after reviewing on scene information, including: tides, currents, weather conditions, oil type, initial trajectories, etc.

It is assumed that control and containment at the source is the number one priority of any response. If, in the responder's best judgment, this type of response is infeasible then the priorities laid out in Chapter 4, Section 2 take precedence over containment and control.

It is important to note that strategies rely on the spill trajectory. A booming strategy listed as a high priority would not necessarily be implemented if the spill trajectory and booming location did not warrant action in that area. However, the priority tables should be followed until spill trajectory information becomes available, and modifications to the priority tables must be approved by the Incident Commander(s).

The strategies discussed in this GRP have been designed for use with persistent oils and may not be suitable for other petroleum or hazardous substance products. For hazardous substance spills, refer to the Northwest Area Contingency Plan, Chapter 7000.

Standardized Response Language

In order to avoid confusion in response terminology, this GRP uses standard National Interagency Incident Management System, Incident Command System (NIIMS, ICS) terminology and strategy names, which are defined in Appendix A, Table A-1 (e.g. diversion, containment, exclusion).

Admiralty Inlet / Hood Canal

Geographic Response Plan

Record of Changes

Date	**Change Number**	**Summary of Changes**	Initials of person making change
May 11, 1994	Original Release	N/A	N/A
February 1, 1995	1st Change	Replacement of document - includes new chapters and revised Chapter 4 based on field verification.	
March 2003	2nd Change	Update of Chapter 4 using GIS based maps, and new priority tables based on trajectory modeling.	D Davis

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Admiralty Inlet / Hood Canal, Washington

GEOGRAPHIC RESPONSE PLAN

1. INTRODUCTION: SCOPE OF THIS PROJECT

Geographic Response Plans are intended to help the first responders to a spill avoid the initial confusion that generally accompanies any spill. This document serves as the federal and state on-scene-coordinators "orders" during a spill in the area covered by this GRP (see Chapter 3 for area covered). As such, it has been approved by the U.S. Coast Guard Marine Safety Office and the Washington State Department of Ecology Spills Program. Changes to this document are expected as more testing is conducted through drills, site visits, and actual use in spill situations. To submit comments, corrections, or suggestions please refer to Appendix C.

GRPs have been developed for the marine and inland waters of Washington, Oregon, and Idaho. They are prepared through the efforts and cooperation of the Washington Department of Ecology, Washington Department of Fish and Wildlife, Oregon Department of Environmental Quality, Idaho State Emergency Response Commission, the U.S. Coast Guard, the Environmental Protection Agency, tribes, other state and federal agencies, response organizations, and local emergency responders.

GRPs were developed through workshops involving federal, state, and local oil spill emergency response experts, response contractors, and representatives from tribes, industry, ports, environmental organizations, and pilots. Workshop participants identified resources which require protection, developed operational strategies, and pinpointed logistical support. A similar process has been used for major updates.

Following the workshops, the data gathered was processed and reproduced in the form of maps and matrices which appear in Chapters 4 through 6. The maps in Chapters 5 and 6 were generated using Canvas. Maps for Chapter 4 were generated using ArcView GIS. The matrices were created using MS Excel, and the balance of each GRP was produced using MS Word.

The first goal of a GRP was to identify, with the assistance of the Washington State Natural Resource Damage Assessment Team, resources needing protection; response resources (boom, boat ramps, vessels, etc.) needed, site access and staging, tribal and local response community contacts, and local conditions (e.g. physical features, hydrology, currents and tides, winds and climate) that may affect response strategies. Note that GRPs only address protection of sensitive **public** resources. It is the responsibility of private resource owners and/or potentially liable parties to address protection of private resources (such as commercial marinas, private water intakes, and non-release aquaculture facilities).

Secondly, response strategies were developed based on the sensitive resources noted, hydrology, and climatic considerations. Individual response strategies identify the amount of boom necessary for implementation. The response strategies are then applied to Potential Spill Origins and trajectory modeling, and prioritized, taking into account factors such as resource sensitivity, feasibility, wind, and tidal conditions.

Draft strategy maps and matrices were sent out for review and consideration of strategy viability. Field verification was conducted for some strategies, and changes proposed by the participants were included in a semi-final draft, which was offered for final review to all interested parties and the participants of the field verification.

Finally, the general text of the GRP was compiled along with the site description, reference maps, and logistical support.

Items included in Logistical Support:

- Location of operations center for the central response organization;
- Local equipment and trained personnel;
- Local facilities and services and appropriate contacts for each;
- Site access & contacts;
- Staging areas;
- Helicopter and air support;
- Local experts;
- Volunteer organizations;
- Potential wildlife rehabilitation centers;
- Marinas, docks, piers, and boat ramps;
- Potential interim storage locations, permitting process;
- Damaged vessel safehavens;
- Vessel repairs & cleaning;
- Response times for bringing equipment in from other areas.

2. SITE DESCRIPTION

Admiralty Inlet and Hood Canal are located in the northwest corner of Washington State. Admiralty Inlet extends from eastern Strait of Juan de Fuca to Foulweather Bluff, and Hood Canal separates the Olympic Peninsula from the Kitsap Peninsula. Local economies are based primarily on natural resource use and tourism.

This plan is divided into two regions, Admiralty Inlet and Hood Canal. Admiralty Inlet is comprised of the area north of the Hood Canal Bridge to Port Townsend. It is also a biologically rich area with several types of fisheries resources, clams and marine birds. Dall porpoise and harbor seals also frequent the area. Salmon pass through the Inlet enroute to Hood Canal and Puget Sound in early fall. [1]

Hood Canal is bounded by Hood Canal Bridge to the north and continues southward to Belfair. The canal supports significant populations of groundfish, clams, shrimp, Dungeness Crab, as well as several other fish resources. It is also a major marine habitat for river otters and species of marine birds.

Refer to Chapter 6 for detailed resource information.

2.1. Physical Features

The shorelines of Hood Canal are generally characterized by sand and cobble beaches, sand and gravel beaches, tidal flats, and marshes. Admiralty Inlet, not as sheltered as Hood Canal, also has many sand and cobble beaches, and sand and gravel beaches.
Hood Canal and Admiralty Inlet includes the following shoreline habitats:[2]

Sheltered rocky shores
Pocket beaches
Wave cut platforms
Sand and cobble beaches
Sand and gravel beaches
Exposed tidal flats
Sheltered tidal flats
Marshes

Traffic in Admiralty Inlet is primarily commercial and ferry vessels using the traffic separation zone from the Strait of Juan de Fuca to Puget Sound. Naval bases are located at Bangor and Indian Island. Hood Canal has many state parks along its shores and small rivers leading to the Canal.

2.2. Hydrology

Admiralty Inlet and Hood Canal are generally a two-layer system. There is a net southerly flow from surface to bottom along the west side of Whidbey Island to the head of Admiralty Inlet. Net surface currents generally flow seaward and exit through Admiralty Inlet.

Hood Canal surface water is less saline than Admiralty Inlet due to runoff from rivers, however, there is vertical mixing in both areas. Surface water, with freshwater input from land, has net seaward movement, while deeper waters flow landward. Because of mixing, some of the seaward-flowing surface water is entrained with the landward net flow, and it returns toward land. Therefore, instead of flowing

[1] Evans-Hamilton, Inc. and D.R. Systems, Inc, Puget Sound Environmental Atlas, vol. 1 (1987).
[2] National Oceanic and Atmospheric Administration, Environmental Sensitivity Index, Central & Southern Puget Sound (Seattle: 1984).

towards sea, pollutants could remain in both Hood Canal and Admiralty Inlet, and may even flow in toward Puget Sound.[3]

2.3. Currents and Tides

The mean tidal range (MHW-MLW) for Admiralty Inlet is 5.2 to 6.0 feet, and the diurnal tidal (MHHW-MLLW) range is 8.4 to 9.4 feet. Hood Canal mean tidal ranges are slightly greater, 6.4 to 8.04 feet, and diurnal tidal range is 9.9 to 12.11 feet.[4]

The currents between Point Wilson and Bush Point are strong, between 1.6 and 3.4 knots on the flood and 2.6 and 3.5 knots on the ebb. The currents begin to weaken at Foulweather Bluff where the average flood is 0.7 knots and the average ebb is 0.9 knots. The currents gradually weaken further into Hood Canal, becoming weak and variable south of Dabob Bay. The currents increase in strength at the Great Bend off Sisters Point.[5]

Tides and currents may vary with seasonal runoff and lunar cycles in localized areas. Spill responders should consult tide and current tables for their particular location.

2.4. Winds

The winds in this area are a direct result of diverse topography including the Cascade and Olympic Mountains. The westerly winds from the Pacific appear to flow to the north and south around the Olympics, causing what is commonly known as the "Puget Sound Convergence" on the eastern side.

From October through March, winds are generally southeast to southwest at 0 to 9 mph in Admiralty Inlet. At 10 to 20 mph, Hood Canal has a history of stronger winds during the winter. During spring and summer, the winds are usually from the northwest at 0 to 9 mph.[6]

2.5. Climate

The area has a maritime climate with cool summers and mild winters. Annual precipitation is between 18 and 50 inches. Fog is also very common throughout the entire Hood Canal and Admiralty Inlet area during autumn and winter months.

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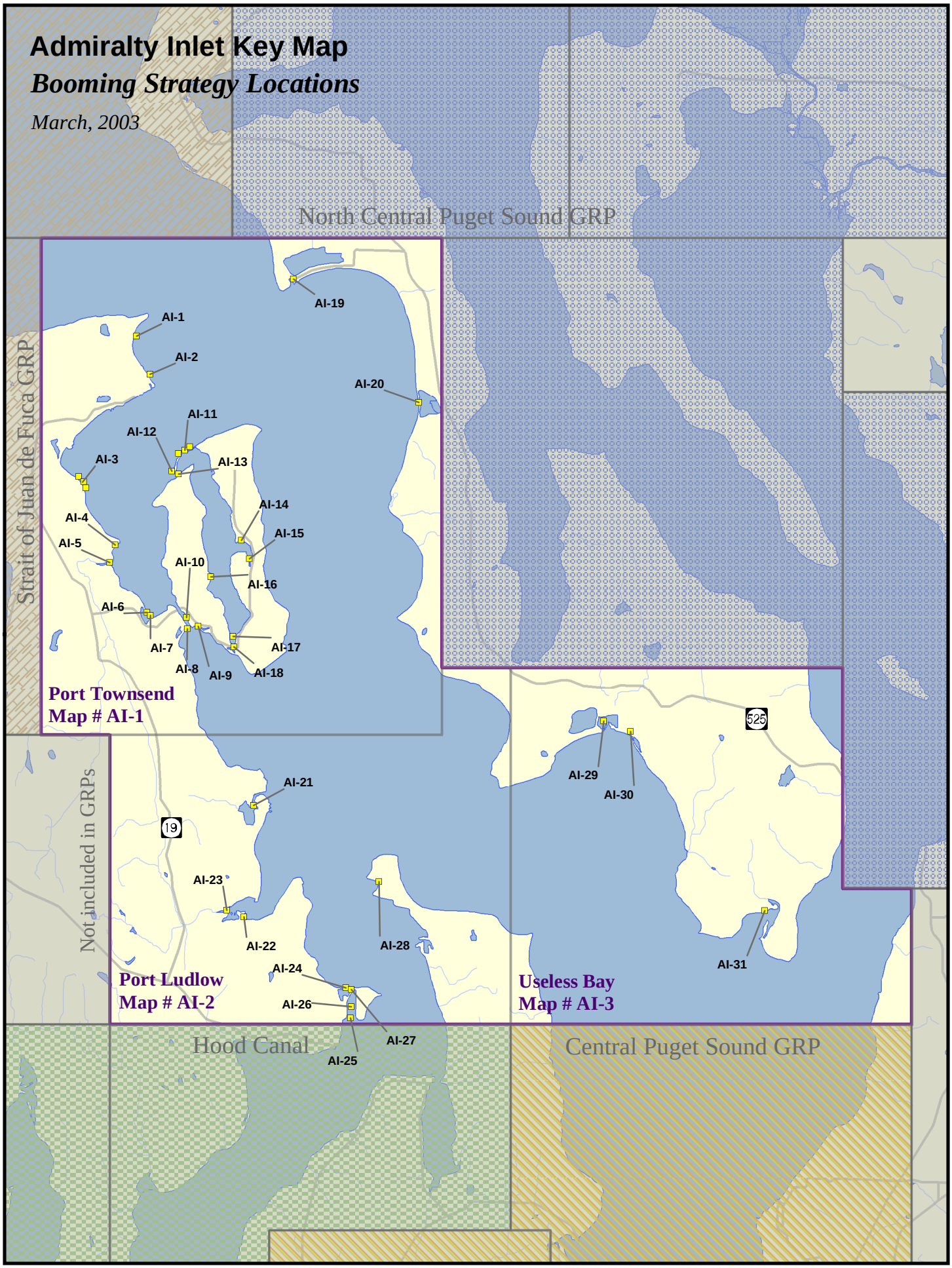
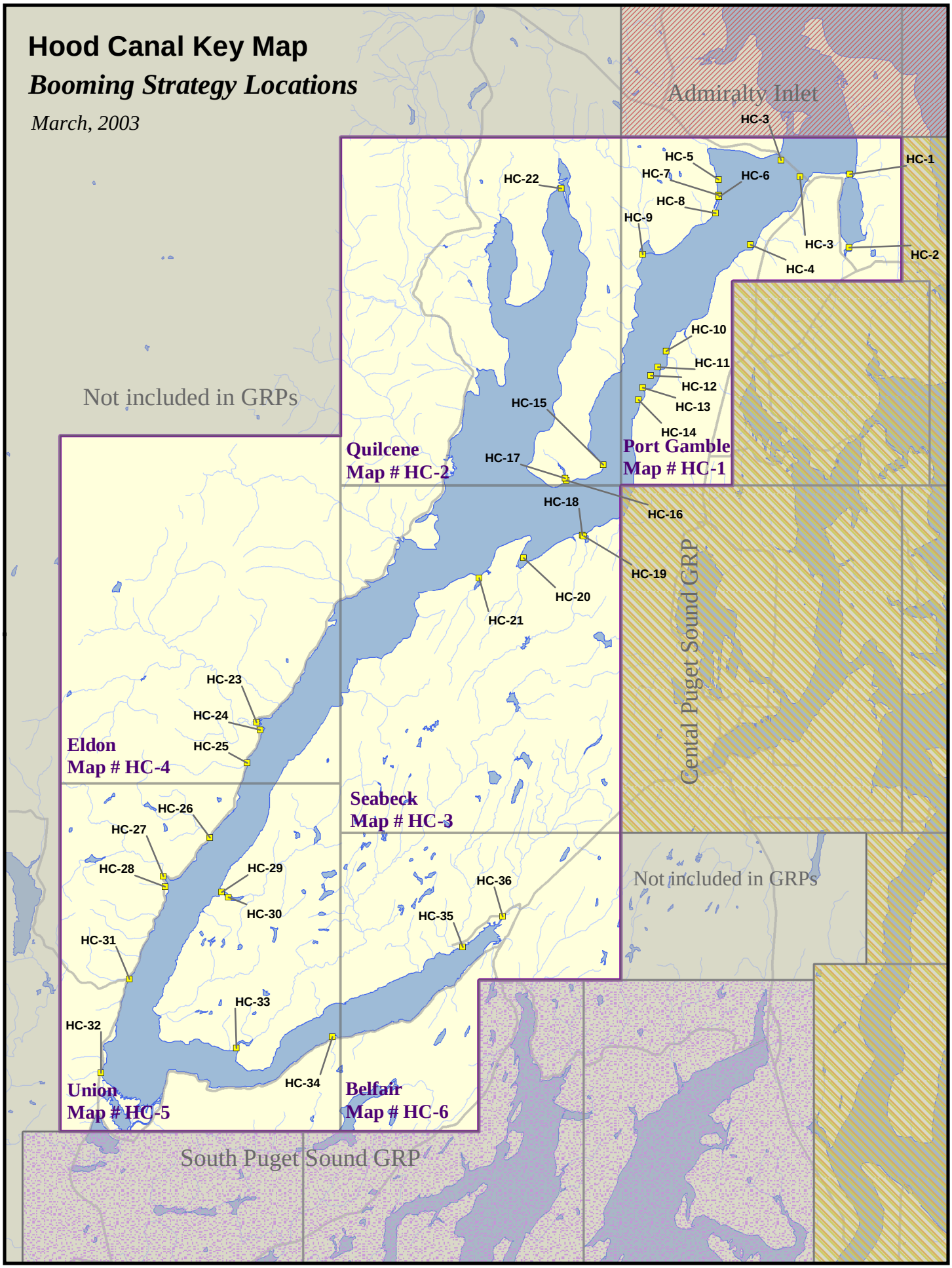
[3] Evans Hamilton, Inc. and D.R. Systems, Inc, Puget Sound Environmental Atlas, vol. 1. (1987) 122..
[4] National Oceanic and Atmospheric Administration, Tide Tables West Coast of North and South America (1994).
[5] National Oceanic and Atmospheric Administration, Tidal Current Tables Pacific Coast of North and South America (1994).
[6] State of Washington Department of Natural Resources, Washington Marine Atlas, South Inland Waters, vol. 2 (1972).


Admiralty Inlet Key Map
Booming Strategy Locations
March, 2003
North Central Puget Sound GRP
Strait of Juan de Fuca GRP
Not included in GRPs
Hood Canal
Central Puget Sound GRP
AI-1
AI-2
AI-3
AI-4
AI-5
AI-6
AI-7
AI-8
AI-9
AI-10
AI-11
AI-12
AI-13
AI-14
AI-15
AI-16
AI-17
AI-18
AI-19
AI-20
AI-21
AI-22
AI-23
AI-24
AI-25
AI-26
AI-27
AI-28
AI-29
AI-30
AI-31
Port Townsend
Map # AI-1
Port Ludlow
Map # AI-2
Useless Bay
Map # AI-3
19
525


Hood Canal Key Map
Booming Strategy Locations
March, 2003
Admiralty Inlet
HC-3
HC-5
HC-7
HC-6
HC-1
HC-22
HC-8
HC-9
HC-3
HC-2
HC-4
HC-10
HC-11
HC-12
HC-13
HC-14
Not included in GRPs
HC-15
Quilcene
Map # HC-2
Port Gamble
Map # HC-1
HC-17
HC-18
HC-16
HC-19
HC-20
HC-21
Cental Puget Sound GRP
HC-23
HC-24
HC-25
Eldon
Map # HC-4
Seabeck
Map # HC-3
HC-26
HC-27
HC-28
HC-29
HC-30
HC-36
Not included in GRPs
HC-35
HC-31
HC-33
HC-32
HC-34
Union
Map # HC-5
Belfair
Map # HC-6
South Puget Sound GRP

4. GENERAL PROTECTION/COLLECTION STRATEGIES

4.1. Chapter Overview

This chapter details the specific response strategies and resources to protect as outlined by the participants of the GRP workshop for the Admiralty Inlet / Hood Canal area. It describes the strategies determined for each area and the prioritization of those strategies. Note that GRPs only address protection of sensitive **public** resources. It is the responsibility of private resource owners and/or potentially liable parties to address protection of private resources (such as commercial marinas, private water intakes, and non-release aquaculture facilities).

Maps & Matrices

The maps in this chapter provide information on the specific location of booming strategies. They are designed to help the responder visualize response strategies. Details of each booming strategy are listed in corresponding matrix tables. Each matrix indicates the exact location, intent and implementation of the strategy indicated on the map. The "Status" column describes whether the strategy has been visited or tested in the field, and the date of the visit/test. Most strategies include a number for the corresponding shoreline photo, which is available on the Washington Department of Ecology's internet site at http://www.ecy.wa.gov/apps/shorephotos/.

Major Protection Techniques

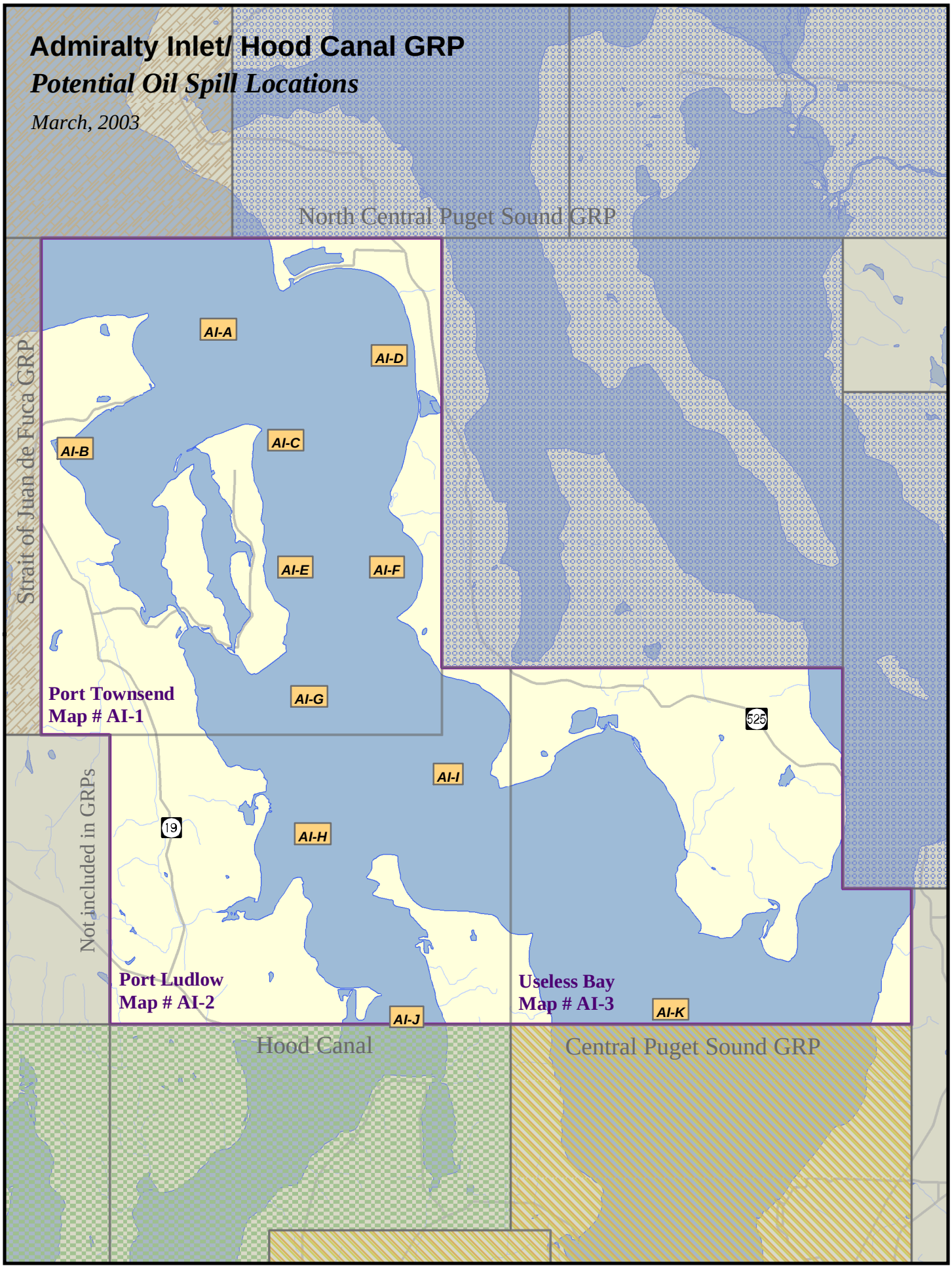
All response strategies fall into one of three major techniques that may be utilized either individually or in combination. The strategies listed in Section 4.2 are based on the following techniques, and are explained in detail in Section 4.3:

Dispersants: Washington State Policy currently does not allow use of dispersants in this area. Certain chemicals break up slicks on the water. Dispersants can decrease the severity of a spill by speeding the dissipation of certain oil types. Their use will require approval of the Unified Command. Dispersants will only be used in offshore situations under certain conditions, until further determinations are made by the Area Committee and published in the Area Contingency Plan.

In Situ Burning: Approval to burn in this area is unlikely due to the proximity of population to a potential burn site. Burning requires the authorization of the Unified Command, who determine conformance of a request to burn with the guidelines set forth in the Area Plan. This option is preferable to allowing a slick to reach the shore provided that population areas are not exposed to excessive smoke. Under the right atmospheric conditions, a burn can be safely conducted in relative close proximity to human population. This method works on many types of oil, and requires special equipment including a fire boom and igniters.

Mechanical Recovery and Protection Strategies: If a spill is too close to shore to use In Situ burning or dispersants, the key strategies are skimming and use of collection, diversion, or exclusion booming to contain and recover the oil, and prevent it from entering areas with sensitive wildlife and fisheries resources. These options are described in detail in Appendix A. Specific skimming strategies are not listed in the maps and matrices, but skimming should be used whenever possible and is often the primary means of recovering oil and protecting resources, especially when booming is not possible or feasible.

Priorities: The strategy priority tables (Section 4.2.) were developed using specific locations where spills are likely to occur. Trajectory modeling was used for each of these "Potential Spill Origins" to identify sensitive resources that would likely be impacted within the initial hours of the spill. A booming strategy priority table was developed for each of the "Potential Spill Origins" based on the sensitivity of resources, feasibility, etc. **Booming strategies should be deployed following the priority table for the "Potential Spill Origin" closest to the actual spill origin.** The map on page 4-2 shows the locations of all Potential Spill Origins for the Admiralty Inlet / Hood Canal GRP (no tables were developed for Hood Canal). The booming strategies indicated in the priority tables are explained in detail in the Maps & Matrices section (Section 4.3.). It is implied that control and containment at the source is the number one priority of any response. If in the responder's best judgment this is not feasible, then the priorities laid out in the priority tables take precedence over containment and control.


Admiralty Inlet/ Hood Canal GRP
Potential Oil Spill Locations
March, 2003
North Central Puget Sound GRP
Strait of Juan de Fuca GRP
AI-A
AI-B
AI-C
AI-D
AI-E
AI-F
AI-G
AI-H
AI-I
AI-J
AI-K
Port Townsend
Map # AI-1
Port Ludlow
Map # AI-2
Useless Bay
Map # AI-3
19
525
Not included in GRPs
Hood Canal
Central Puget Sound GRP

4.2.2 BOOMING STRATEGY PRIORITY TABLES

Table 4-1

Potential Spill Origin: AI-A - Point Wilson			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-1	4-8	
2	AI-2	4-8	
3	AI-11	4-8	
4	AI-12	4-8	
5	AI-13	4-8	
6	AI-16	4-8	If strategies AI-11, 12, and 13 can be successfully deployed, skip to booming priority # 11. Deploy strategies AI-14 thru AI-18 only if strategies AI-11, 12, and 13 cannot be deployed.
7	AI-14	4-8	
8	AI-15	4-8	
9	AI-18	4-8	
10	AI-17	4-8	
11	AI-19	4-8	
12	AI-20	4-8	
13	STR-41	4-16	Refer to Strait of Juan de Fuca GRP for STR strategies

Table 4-2

Potential Spill Origin: AI-B - Port Townsend Paper			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-3	4-8	
2	AI-4	4-8	
3	AI-5	4-8	
4	AI-11	4-8	
5	AI-12	4-8	
6	AI-13	4-8	
7	AI-2	4-8	
8	AI-1	4-8	

Table 4-3

Potential Spill Origin: AI-C - Northeast corner of Marrowstone Island			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-1	4-8	
2	AI-2	4-8	
3	AI-19	4-8	

Table 4-4

Potential Spill Origin: AI-D - Admiralty Bay			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-19	4-8	
2	AI-20	4-8	

Table 4-5

Potential Spill Origin: AI-E - Marrowstone Island			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-1	4-8	
2	AI-2	4-8	
3	AI-11	4-8	
4	AI-12	4-8	
5	AI-13	4-8	
6	AI-18	4-8	
7	AI-9	4-8	
8	AI-10	4-8	
9	AI-8	4-8	
10	AI-19	4-8	
11	AI-21	4-9	
12	AI-28	4-9	

Table 4-6

Potential Spill Origin: AI-F - Bush Point			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-19	4-8	
2	AI-20	4-8	

Table 4-7

Potential Spill Origin: AI-G - Oak Bay			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-28	4-9	
2	AI-1	4-8	
3	AI-2	4-8	
4	AI-18	4-8	
5	AI-24	4-9	
6	AI-21	4-9	
7	AI-9	4-8	
8	AI-10	4-8	
9	AI-8	4-8	
10	AI-19	4-8	
11	AI-11	4-8	
12	AI-20	4-8	

Table 4-8

Potential Spill Origin: AI-H - Mats Mats Bay			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-24	4-9	
2	AI-27	4-9	
3	AI-25	4-9	
4	AI-26	4-9	
5	AI-21	4-9	
6	AI-28	4-9	
7	AI-18	4-8	
8	AI-9	4-8	
9	AI-10	4-8	
10	AI-8	4-8	
11	AI-1	4-8	
12	AI-2	4-8	
13	AI-23	4-9	
14	AI-22	4-9	

Table 4-9

Potential Spill Origin: AI-I - Double Bluff			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-19	4-8	
2	AI-20	4-8	

Table 4-10

Potential Spill Origin: AI-J - Hood Canal, North of Port Gamble			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	HC-1	4-18	Refer to the Hood Canal GRP for HC strategies
2	AI-27	4-9	
3	AI-25	4-9	
4	AI-26	4-9	
5	AI-24	4-9	
6	AI-28	4-9	
7	HC-6	4-18	Refer to the Hood Canal GRP for HC strategies
8	HC-7	4-18	
9	HC-5	4-18	
10	HC-4	4-18	
11	HC-8	4-18	

Table 4-11

Potential Spill Origin: AI-K - Southwest of Cultus Bay			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	AI-31	4-10	
2	AI-29	4-10	
3	AI-30	4-10	

PORT TOWNSEND

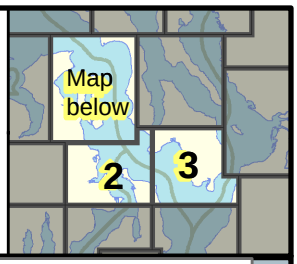
Proposed Booming Strategies

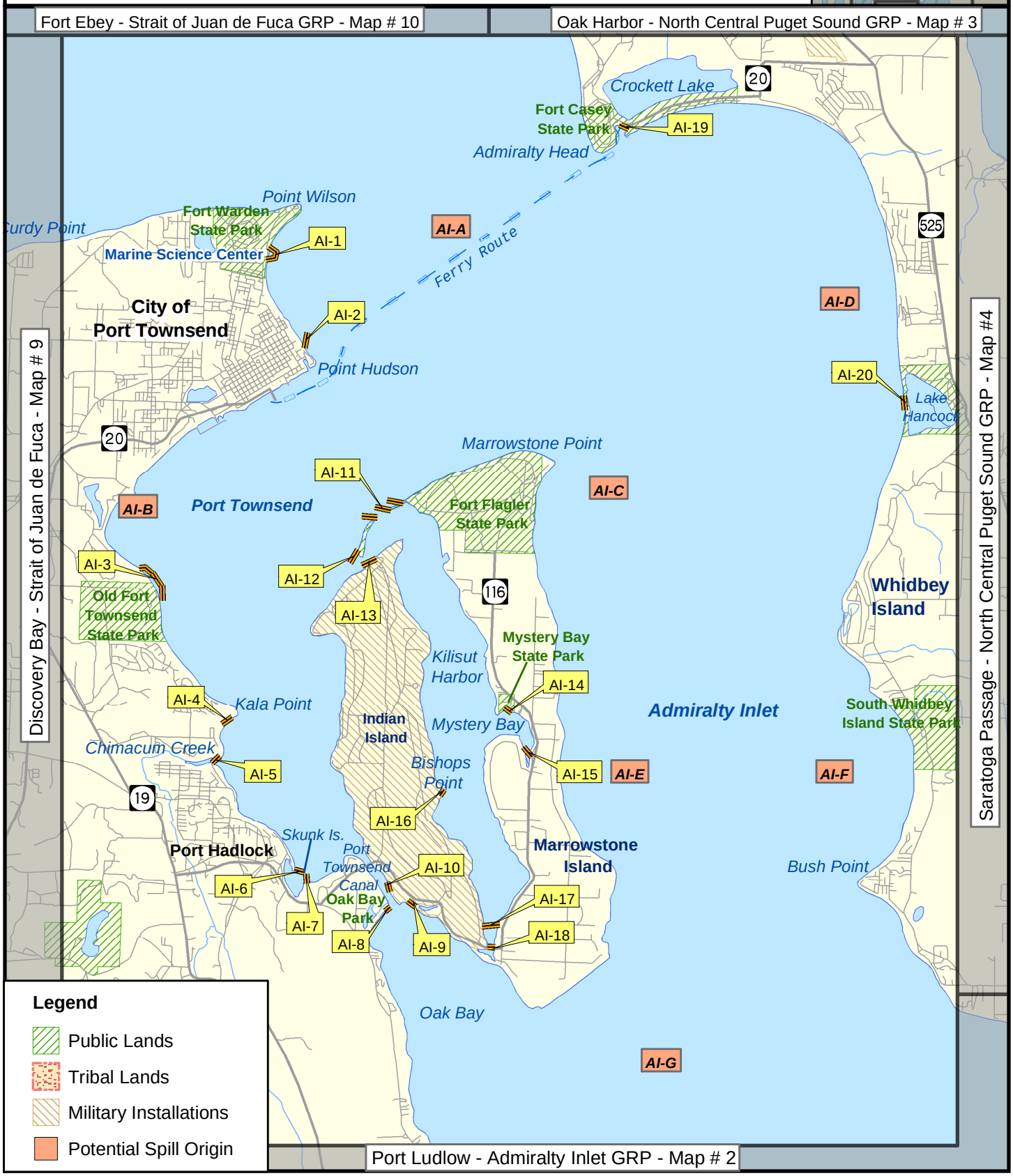
February, 2003

Admiralty Inlet GRP

MAP # 1

0 0.5 1 2 Miles





PORT LUDLOW

Proposed Booming Strategies

February, 2003

Admiralty Inlet GRP

MAP # 2

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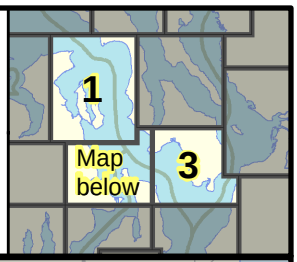

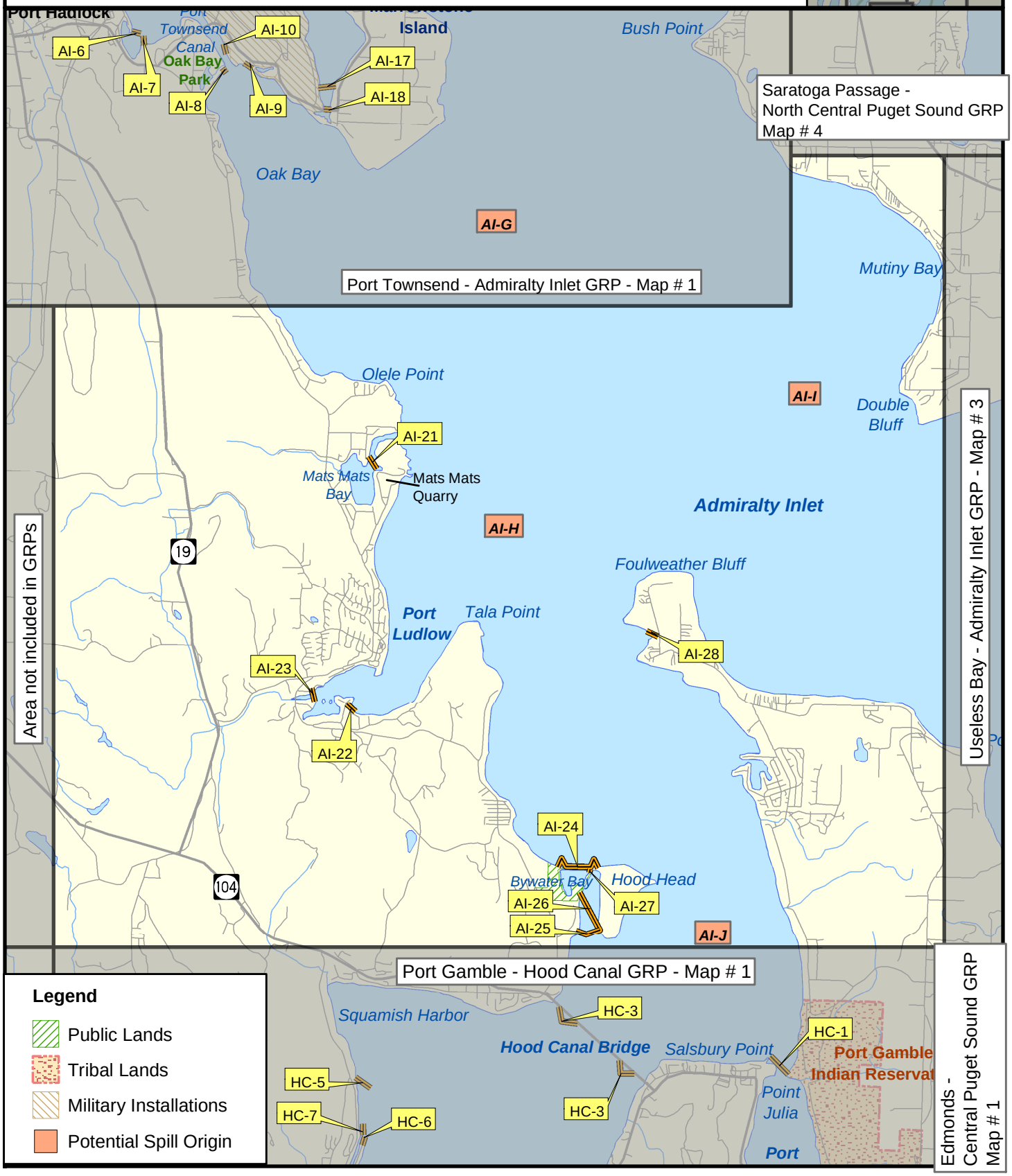

USELESS BAY

Proposed Booming Strategies

February, 2003

Admiralty Inlet GRP

MAP # 3

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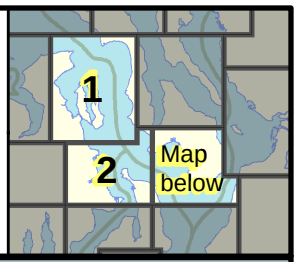


City of Langley

Sandy Point

Saratoga Passage - North Central Puget Sound GRP - Map # 4

Gedney Island

Everett - North Central Puget Sound GRP - Map # 5

Port Ludlow - Admiralty Inlet GRP - Map # 2

AI-29

AI-30

Deer Lagoon

Useless Bay

Whidbey Island

525

Clinton

Admiralty Inlet

Dave Mackie County Park

Mukilteo State Park

AI-31

Cultus Bay

Possession Sound

Point No Point

Possession Point

AI-K

Picnic Point

Edmonds - Central Puget Sound GRP - Map # 1

Area not included in GRPs

Meadowdale

Legend

- Public Lands
- Tribal Lands
- Military Installations
- Potential Spill Origin

4.3.1.2 Proposed Booming and Collection Strategies: Matrices - ADMIRALTY INLET

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
AI-1		Port Townsend Marine Science Center JEF0611 48º-8.131' N 122º-45.633' W	Exclusion - Protect Science Center pier.	1200'	Enclose science center pier, protect water intakes.	Science Center Pier.	Road access to Science Center, boat ramp adjacent to Science Center.	Science Center marine life.
AI-2		Beach north of Point Hudson JEF0604 48º-7.166' N 122º-45.097' W	Deflection/ collection - Keep oil from moving into Port Townsend.	1000'	Deploy boom at position where vac truck access is possible for shore-side collection.	Fort Worden State Park.	Port Townsend Marina or Fort Worden State Park.	Protect waterfowl and seabird concentrations.
AI-3		Old Port Townsend State Park JEF0588 48º-4.766' N 122º-47.172' W	Deflection - Keep oil away from park.	3200'	Set up series of overlapping deflection booms parallel to shore north of park. Old pilings along the shore may help hold the boom in place.	Stage at the park or from Port Townsend.	By boat from the Port Townsend Marina.	Sensitive nesting species; significant smelt spawning area.
AI-4		Kala Point - Marsh, south side JEF0579 48º-3.352' N 122º-46.120' W	Exclusion - Keep oil out of marsh.	200'	Place boom across entrance to marsh area south of the spit. Can be deployed from land.	Stage from Port Townsend.	By boat from Port Townsend. Vehicle access from north side of spit.	Protect sensitive marsh habitat.
AI-5		Chimacum Creek Mouth JEF0570 48º-2.943' N 122º-46.332' W	Exclusion - Keep oil out of creek.	300'	Deploy boom at an angle across the creek mouth. Can be deployed from land with a jon boat.	Stage from the Evergreen Logging Company on the south side of the creek.	Vehicle access from the Evergreen Logging Company on the south side of the creek.	Waterfowl concentration, salmonids.

4.3.1.2 Proposed Booming and Collection Strategies: Matrices - ADMIRALTY INLET

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
AI-6	Field tested 12/94	Port Hadlock Tidal Marsh JEF0561 48º-1.827' N 122º-44.965' W	Exclusion - Keep oil out of marsh.	600'	Deploy boom from west side of Skunk Island directly west to shoreline on sand spit.	Stage from Port Hadlock.	By boat from the Port Hadlock ramp, or from Port Townsend.	Waterfowl concentration, sensitive marsh.
AI-7	Field tested 12/94 MSRC/ Foss	Port Hadlock Tidal Marsh JEF0561 48º-1.749' N 122º-44.880' W	Exclusion - Keep oil out of marsh.	800'	Deploy boom from southeast side of Skunk Island directly south to shoreline west of marina.	Stage from Port Hadlock.	By boat from the Port Hadlock ramp, or from Port Townsend.	Waterfowl concentration, sensitive marsh.
AI-8		Oak Bay - tidal marsh on SW side of Port Townsend Canal JEF0421 48º-1.468' N 122º-43.571' W	Exclusion - Keep oil out of wetlands.	100'	Place boom along entrance to backwater area adjacent to west side of dike/jetty. Access requires the use of a jon boat.	Stage from the Oak Bay Co. Park.	Oak Bay Co. Park ramp/road, ramp may be blocked by drift logs.	Wetland habitat, seabird and waterfowl concentrations.
AI-9		Oak Bay - tidal marsh on SE side of Port Townsend Canal JEF0426 48º-1.532' N 122º-43.236' W	Exclusion - Keep oil out of marsh.	200'	Place boom at marsh outlet south of road, will need a jon boat at high tide.	Stage from the Day park off Marrowstone Island Road.	By land at day park off Marrowstone Island Road, or by water.	Salicornia salt marsh, seabird and waterfowl concentrations.
AI-10		Oak Bay - tidal marsh on SE side of Port Townsend Canal JEF0425 48º-1.699' N 122º-43.583' W	Exclusion/ Deflection - Keep oil out of marsh.	200'	Place boom at outlet to small marsh area, boom needs to be tended to deflect the oil away from the marsh opening depending on the direction of the current in the canal.	Stage from the Day park off Marrowstone Island Road.	By boat in canal; also day park 1/4 mile walk on Marrowstone Island Road.	Salicornia salt marsh, seabird and waterfowl concentrations.

4.3.1.2 Proposed Booming and Collection Strategies: Matrices - ADMIRALTY INLET

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
AI-11	Field tested 8/20/96	Kilisut Harbor - North entrance JEF0476 48º-2.515' N 122º-43.875' W	Deflection - Keep oil out of harbor.	3000'	Deploy three overlapping booms 1000' long each to deflect the oil past the entrance to the harbor. Current through the harbor entrance is very strong. Likely to work only with 12" fast water boom.	Fort Flagler State Park or Mystery Bay Boat Ramp.	By boat from Fort Flagler or Mystery Bay. Shoreline is U.S. Navy property, need permission for access.	Fish & wildlife resources in Kilisut Harbor. Marine mammal haulout.
AI-12	Field tested 8/20/96	Kilisut Harbor - South entrance JEF0539 48º-5.120' N 122º-44.200' W	Deflection - Keep oil out of harbor.	1000'	Deploy boom from south end of sand spit at south entrance to the harbor to deflect oil away from entrance. Current through the entrance is very strong. May only work with 12" fast water boom.	Fort Flagler State Park or Mystery Bay Boat Ramp.	By boat from Fort Flagler or Mystery Bay. Shoreline is U.S. Navy property, need permission for access.	Fish & wildlife resources in Kilisut Harbor. Marine mammal haulout.
AI-13	Field tested 8/20/96	Kilisut Harbor - South entrance JEF0539 48º-5.060' N 122º-43.950' W	Collection - Keep oil out of harbor.	1000'	Deploy boom from shore on Indian Island at angle to the west. Boom angle will need to be sharp due to strong current through entrance. Deploy boom at position where vac truck access is possible for shore-side collection.	Fort Flagler State Park or Mystery Bay Boat Ramp.	By boat from Fort Flagler or Mystery Bay. Shoreline is U.S. Navy property, need permission for access.	Fish & wildlife resources in Kilisut Harbor. Marine mammal haulout.
AI-14		Mystery Bay JEF0490 48º-3.530' N 122º-41.850' W	Exclusion - Keep oil out of marsh.	100'	Deploy boom at entrance to salt marsh on N.E. shore.	Stage from the Mystery Bay State Park.	By land from Mystery Bay State Park, or by boat from ramp at park.	Salicornia salt marsh, waterfowl concentrations, sensitive nesting species.
AI-15		Mystery Bay JEF0497 48º-3.080' N 122º-41.520' W	Exclusion/ Deflection/ Collection - Keep oil out of marsh/ mud flats.	1000'	Deploy boom from east shore of bay at an angle to the west shore for collection.	Stage from the Mystery Bay State Park.	By boat from the ramp at Mystery Bay State Park.	Salicornia salt marsh, waterfowl concentrations, sensitive nesting species.

4.3.1.2 Proposed Booming and Collection Strategies: Matrices - ADMIRALTY INLET

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
AI-16		Bishops Point - east shore of Indian Island JEF0524 48º-2.725' N 122º-42.760' W	Exclusion - Keep oil out of marsh on point.	100'	Deploy boom at entrance to salt marsh.	Stage from the Mystery Bay State Park.	By boat from the ramp at Mystery Bay State Park.	Salicornia salt marsh, waterfowl concentrations, sensitive nesting species.
AI-17		Kilisut Harbor - south end JEF0512 48º-1.390' N 122º-42.025' W	Exclusion - Keep oil out of marsh.	1200'	Place at northern most edge of salt marsh - low tide deployment.	Stage from the Mystery Bay State Park.	By boat from ramp at Mystery Bay State Park.	Salicornia salt marsh; waterfowl concentrations; marine mammal haulout; sensitive nesting species.
AI-18		Kilisut Harbor - South culverts JEF0431 48º-1.095' N 122º-42.000' W	Exclusion - Keep oil out of marsh.	100'	Close tide gates; place boom across outlets on north side of road if gates can't be closed. Could also use plywood and sand bags to close off the culvert.	Stage from the Mystery Bay State Park.	Road access at Highway 116.	Salicornia salt marsh; waterfowl concentrations; marine mammal haulout; sensitive nesting species.
AI-19		Crocket Lake ISL0400 48º-9.560' N 122º-40.280' W	Exclusion - Keep oil out of lake.	100'	Place boom around culvert or use plywood to prevent oil from flowing into the lake. High tide strategy only.	Stage from the Fort Casey State Park.	Road access at Highway 20.	Waterfowl and shorebird concentrations.

4.3.1.2 Proposed Booming and Collection Strategies: Matrices - ADMIRALTY INLET

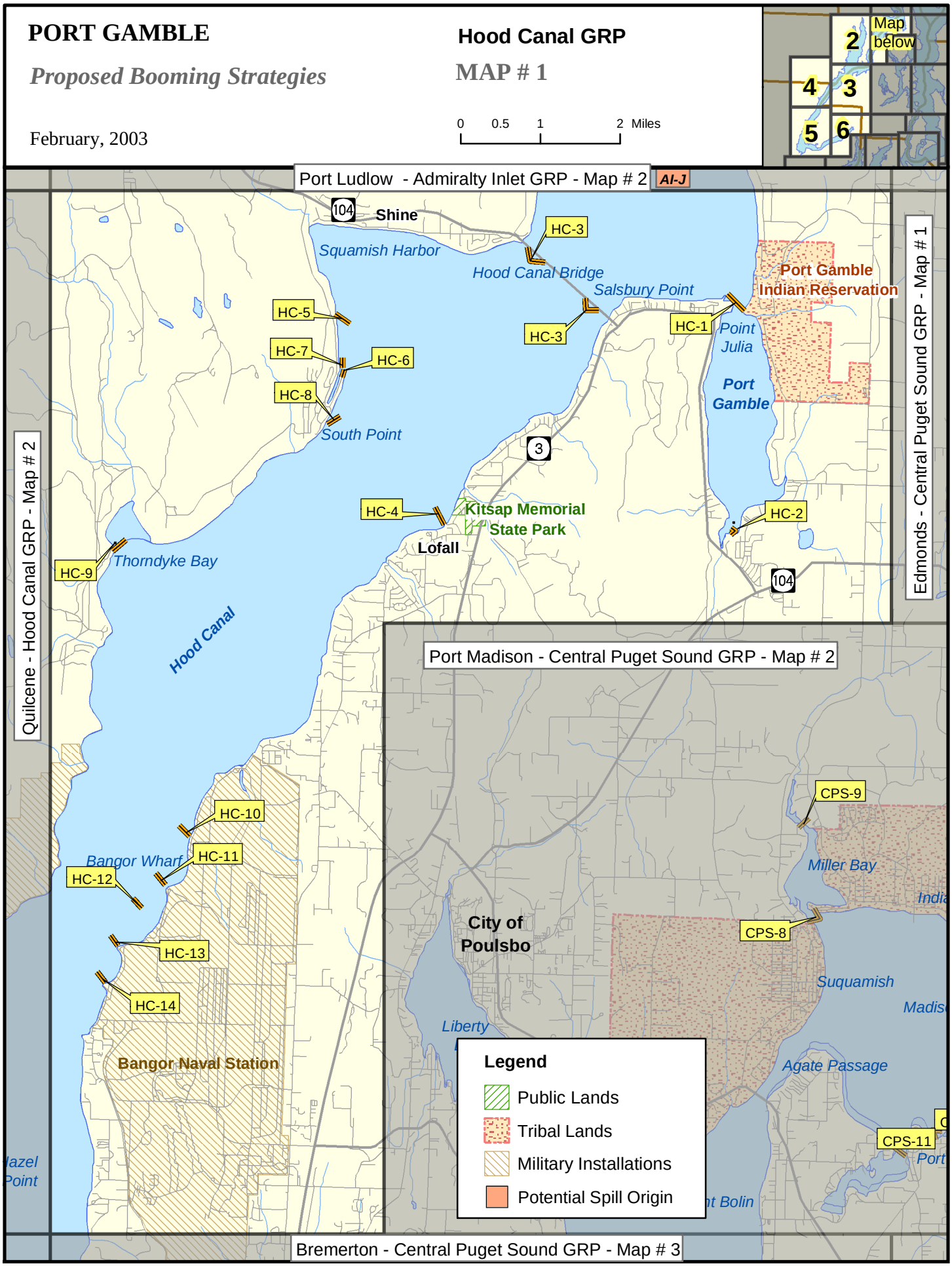
Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
AI-20		Lake Hancock - wetlands ISL0424 48º-6.800' N 122º-35.900' W	Exclusion - Keep oil out of wetlands.	200'	Deploy boom in a chevron configuration across the entrance to the lake. If current through the entrance is too high for boom, block entrance with sand bags as an alternative. Use of sand bags will require an emergency HPA permit from WDFW. Position of entrance is variable and there may be more than one entrance.	Stage from the Fort Casey State Park.	Road access from Highway 525, small road north of lake leads to beach.	Waterfowl concentrations.
AI-21		Mats Mats Bay JEF0384 47º-57.450' N 122º-41.170' W	Exclusion/ Diversion/ Collection - Keep oil out of bay.	1000'	Deploy boom from west side of channel into the bay to shore south of gravel barge slips, and divert oil into cove for barge slips and collect with vac trucks.	Stage from the boat ramp at south end of Mats Mats Bay.	Boat ramp at south end of Mats Mats Bay.	Sensitive nesting species.
AI-22		Port Ludlow tidal marsh - SE corner of bay JEF0358 47º-54.945' N 122º-41.400' W	Exclusion - Keep oil out of marsh.	100'	Deploy boom across entrance to marsh.	Stage from the Port Ludlow Marina (JEF0370).	By boat from Port Ludlow Marina.	Waterfowl and shorebird concentrations, marsh habitat.
AI-23		Port Ludlow mud flats - NW corner of bay JEF0364 47º-55.065' N 122º-41.975' W	Exclusion - Keep oil out of mud flats.	600'	Deploy boom across inlet mouth.	Stage from the Port Ludlow Marina (JEF0370).	By boat from Port Ludlow Marina.	Waterfowl and shorebird concentrations.

4.3.1.2 Proposed Booming and Collection Strategies: Matrices - ADMIRALTY INLET

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
AI-24		Bywater Bay (spit on north end) JEF0331 47º-53.375' N 122º-37.860' W	Exclusion/ Diversion - Keep oil out of bay.	4000'	Place 2 chevrons (500' each leg) in front of E and W low points on the spit. String 2000' between the chevrons.	Stage from the boat ramp north of Hood Canal bridge on west shore (JEF0311).	By boat from the ramp at the Hood Canal Bridge, possible access by ATV.	Sensitive nesting species, eelgrass, shellfish and baitfish.
AI-25		Bywater Bay at Hood Head JEF0330 47º-52.700' N 122º-37.655' W	Exclusion - Keep oil out of bay.	2500'	Place chevron at mouth of bay, 1000' west leg, 1500' east leg.	Stage from the boat ramp north of Hood Canal bridge on west shore (JEF0311).	By boat from the ramp at the Hood Canal Bridge, possible access by ATV.	Sensitive nesting species, eelgrass, shellfish and baitfish.
AI-26		Bywater Bay at Hood Head JEF0330 47º-52.915' N 122º-37.675' W	Deflection/ Collection - Deflect oil to west side of bay for collection.	2000'	Angle boom behind the chevron from Hood Head to the back of bay, collect any entrained oil in the NW corner of bay.	Stage from the boat ramp north of Hood Canal bridge on west shore (JEF0311).	By boat from the ramp at the Hood Canal Bridge, possible access by ATV.	Sensitive nesting species, eelgrass, shellfish and baitfish.
AI-27		Bywater Bay at Hood Head JEF0330 47º-53.340' N 122º-37.655' W	Exclusion - Keep oil out of bay/ mud flats.	200'	Place 200' between Bywater bay and small bay/ mud flats to the west.	Stage from the boat ramp north of Hood Canal bridge on west shore (JEF0311).	By boat from the ramp at the Hood Canal Bridge, possible access by ATV.	Sensitive nesting species, eelgrass, shellfish and baitfish.
AI-28		Northspit - tidal marsh south of Foulweather Bluff KIT0385 47º-55.790' N 122º-36.805' W	Exclusion - Keep oil out of marsh.	100'	Deploy boom across entrance to marsh at SE corner of spit.	Stage from the Salsbury Point County Park (KIT0435).	By boat from ramp at park.	Waterfowl and shorebird concentrations, marsh habitat.

4.3.1.2 Proposed Booming and Collection Strategies: Matrices - ADMIRALTY INLET

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
AI-29		Deer Lagoon ISL0489 47º-59.500' N 122º-29.175' W	Exclusion/ Diversion/ Collection - Keep oil out of lagoon.	700'	Angle boom from west side of lagoon entrance to a collection point on the east shore.	Stage from the Dave Mackie County Park (ISL0508).	By boat from ramp at Dave Mackie County Park (high tide only).	Waterfowl and shorebird concentrations; sensitive nesting species.
AI-30		Tidal marsh southeast of Deer Lagoon ISL0496 47º-59.290' N 122º-28.300' W	Exclusion - Keep oil out of marsh.	200'	Deploy boom across entrance to marsh at west end, will need a jon boat.	Stage from the Dave Mackie County Park (ISL0508).	Road access off road to Deer Lagoon from Bay View Road.	Waterfowl and shorebird concentrations.
AI-31		Cultus Bay ISL0522 47º-55.260' N 122º-23.630' W	Exclusion - Keep oil out of inner bay.	1500'	Deploy boom from the north end of the residential area on the sand spit at the Cultus Bay marina (private) and run the boom directly north to the nearest shoreline where there is access for vac trucks to set up a collection point.	Stage from the Possession boat ramp parking lot (ISL0003) or the Mukilteo State Park.	By boat from Possession ramp or Mukilteo State Park.	Waterfowl and shorebird concentrations; sensitive nesting species.


PORT GAMBLE
Proposed Booming Strategies
February, 2003
Hood Canal GRP
MAP # 1
0 0.5 1 2 Miles
Map below
2
4
3
5
6
Port Ludlow - Admiralty Inlet GRP - Map # 2
AI-J
Quilcene - Hood Canal GRP - Map # 2
Edmonds - Central Puget Sound GRP - Map # 1
Port Madison - Central Puget Sound GRP - Map # 2
Bremerton - Central Puget Sound GRP - Map # 3
104
Shine
Squamish Harbor
Hood Canal Bridge
Salsbury Point
Port Gamble Indian Reservation
Point Julia
Port Gamble
South Point
3
Kitsap Memorial State Park
Lofall
Thorndyke Bay
Hood Canal
HC-1
HC-2
HC-3
HC-4
HC-5
HC-6
HC-7
HC-8
HC-9
HC-10
HC-11
HC-12
HC-13
HC-14
Bangor Wharf
Bangor Naval Station
City of Poulsbo
Liberty
Miller Bay
Suquamish
Agate Passage
CPS-8
CPS-9
CPS-11
Legend
Public Lands
Tribal Lands
Military Installations
Potential Spill Origin

QUILCENE

Proposed Booming Strategies

February, 2003

Hood Canal GRP

MAP # 2

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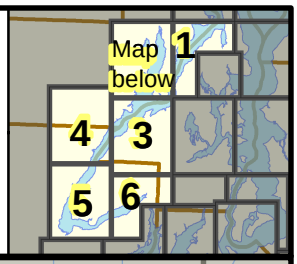

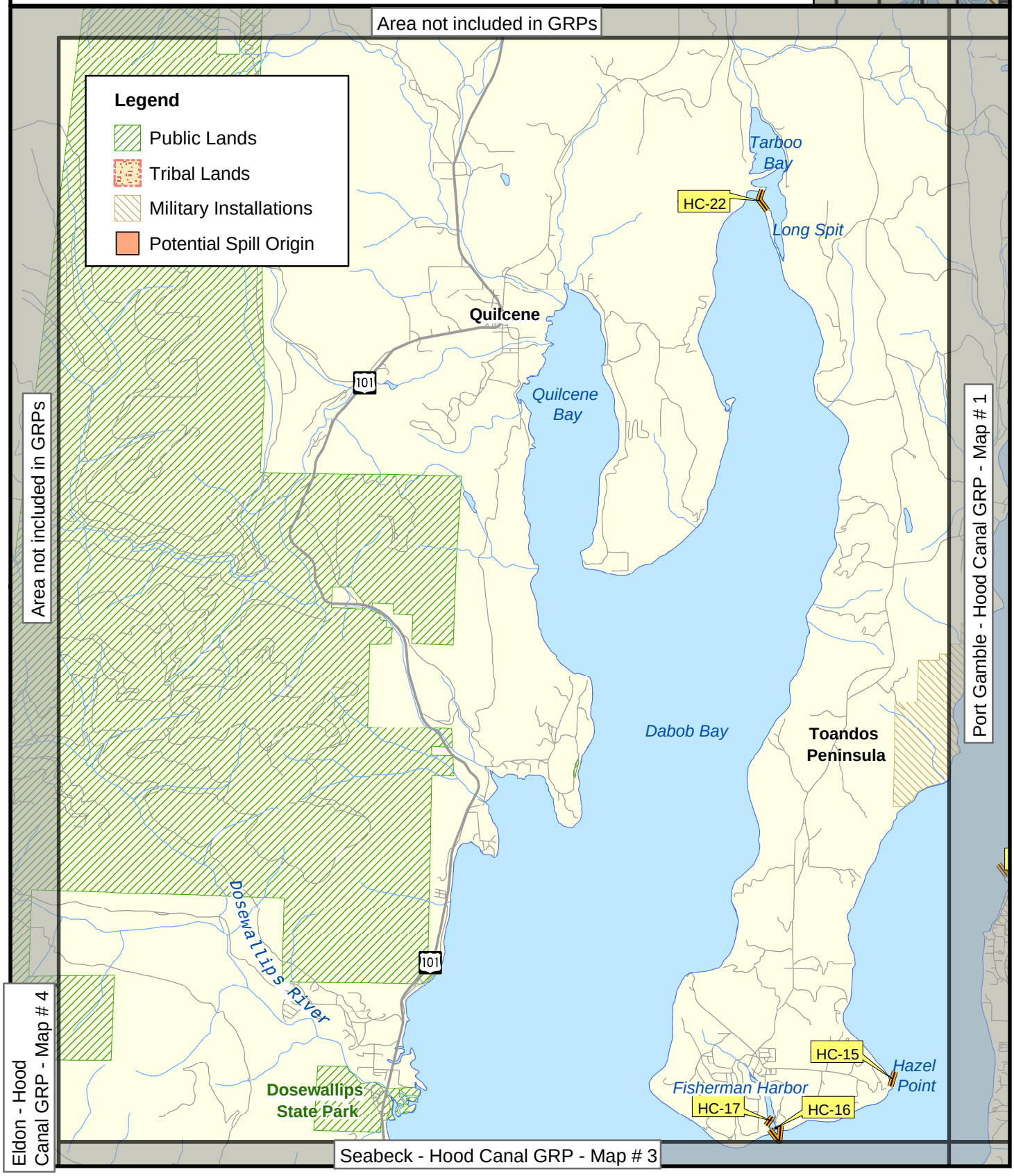

SEABECK

Proposed Booming Strategies

February, 2003

Hood Canal GRP

MAP # 3

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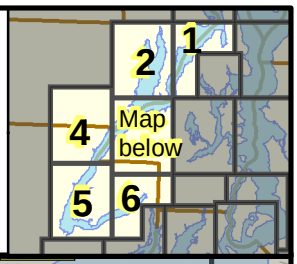
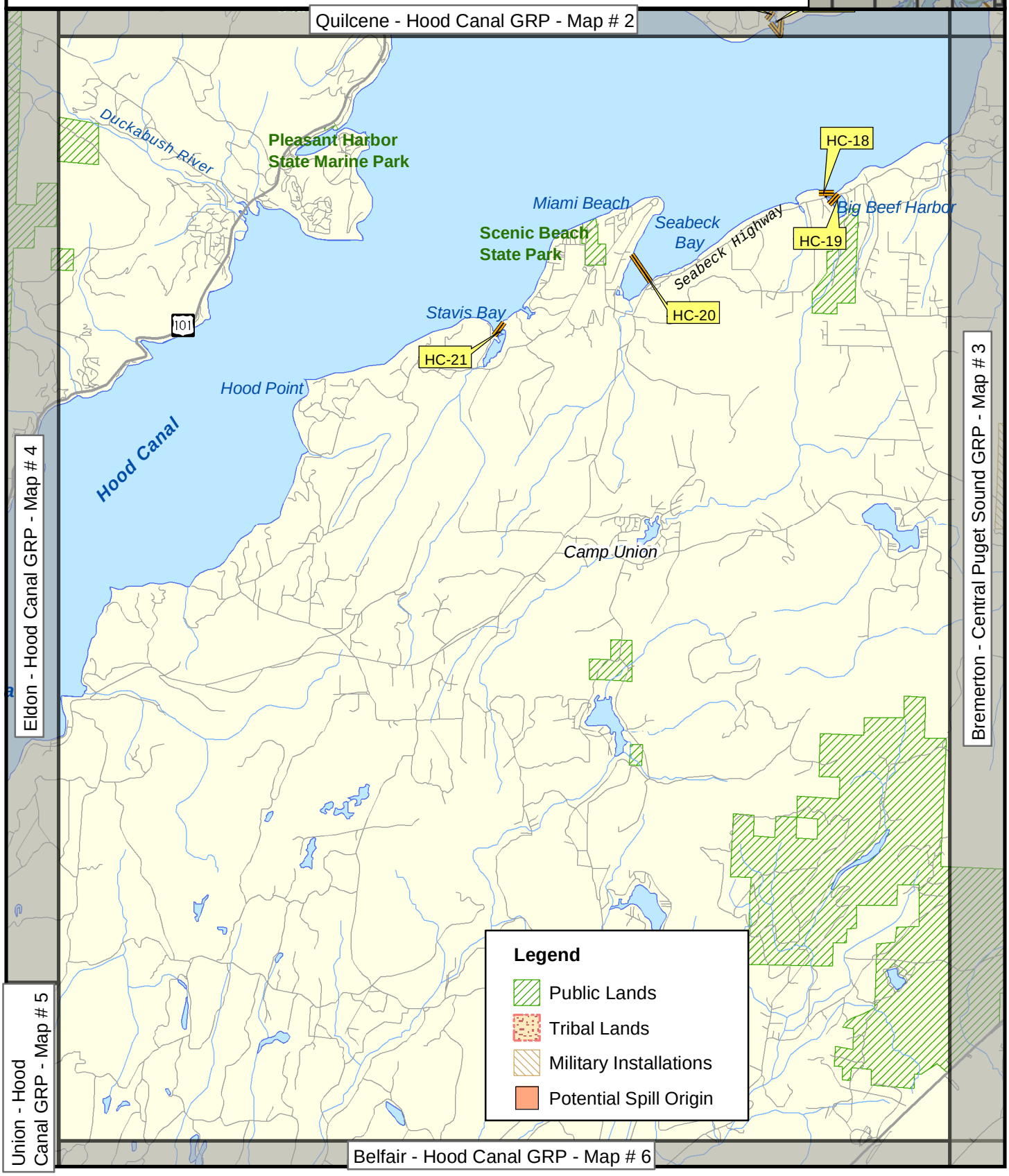




ELDON

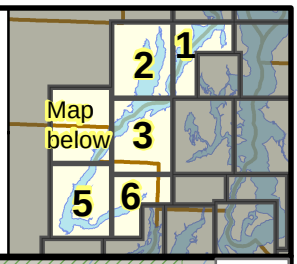
Proposed Booming Strategies

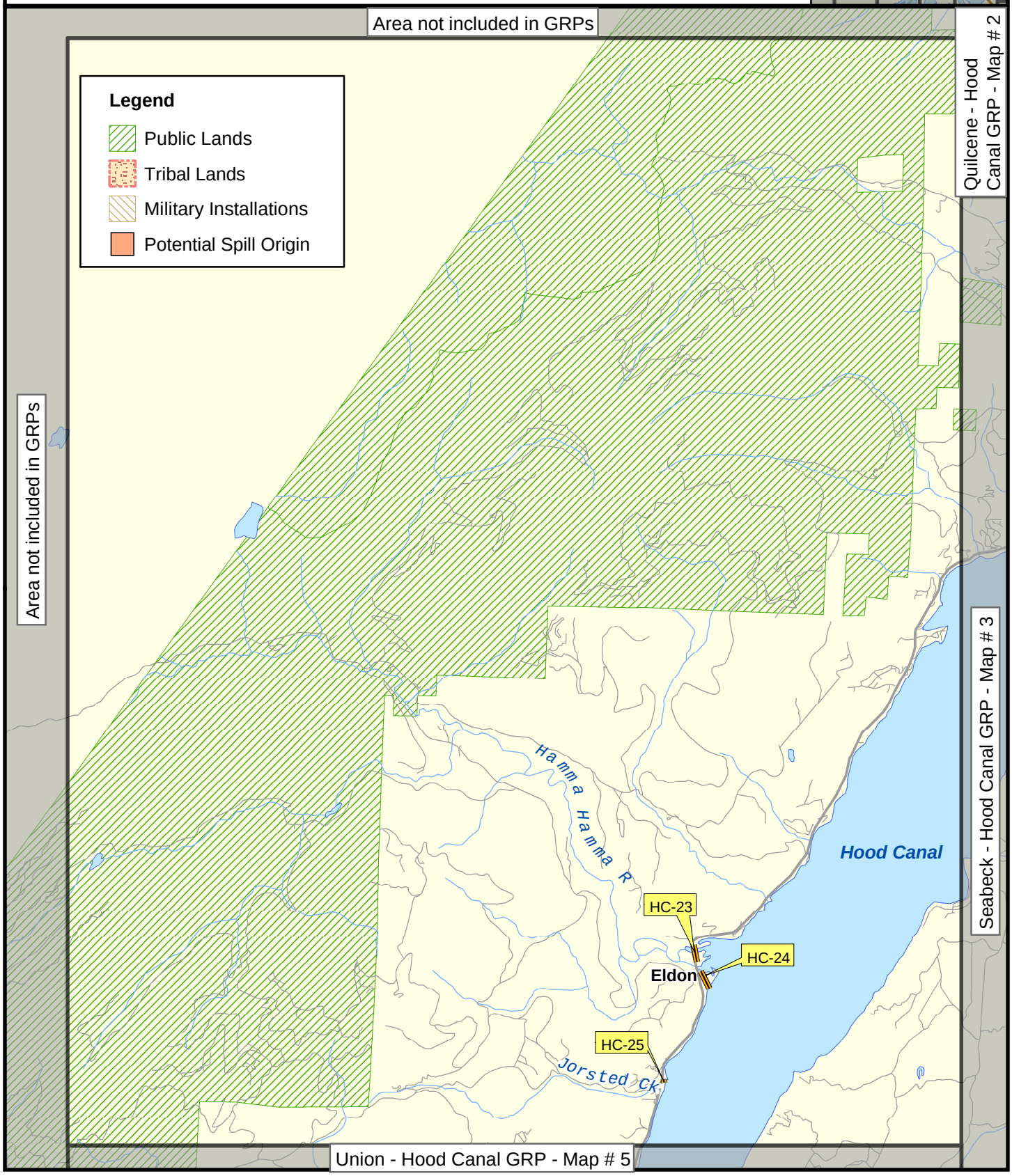
February, 2003

Hood Canal GRP

MAP # 4

0 0.5 1 2 Miles





UNION

Proposed Booming Strategies

February, 2003

Hood Canal GRP

MAP # 5

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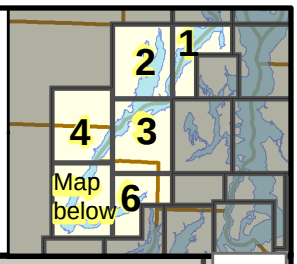

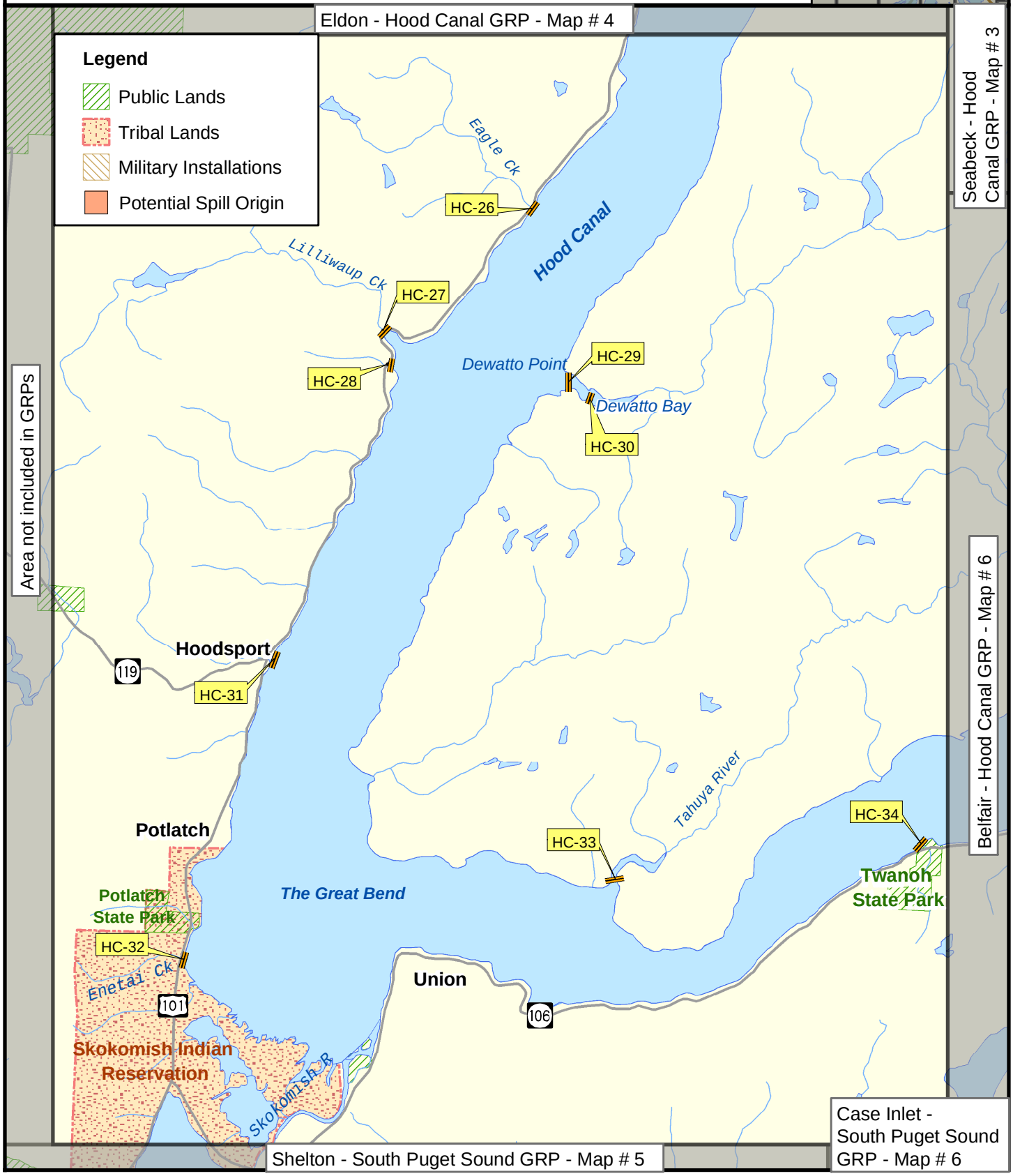

BELFAIR

Proposed Booming Strategies

February, 2003

Hood Canal GRP

MAP # 6

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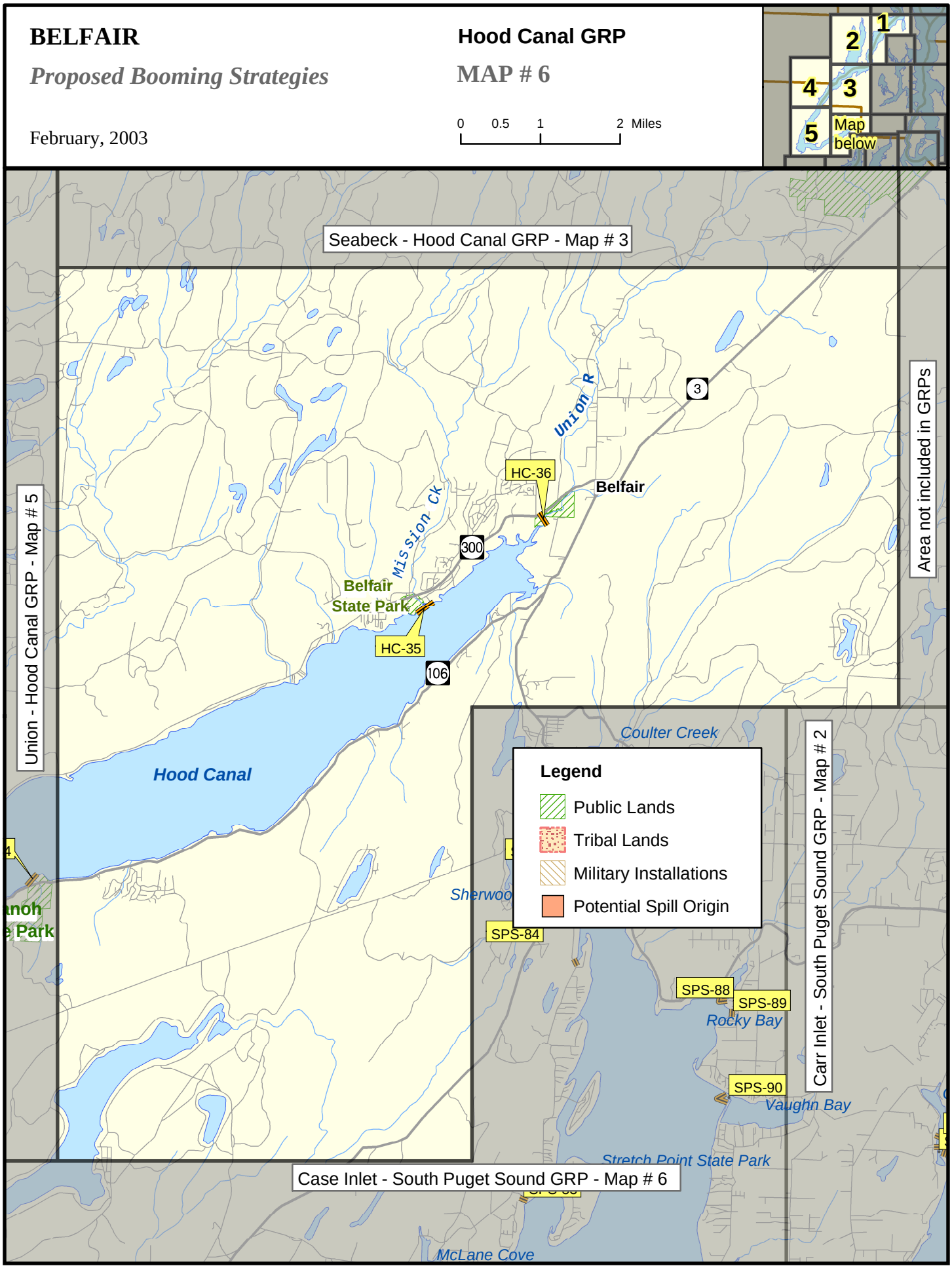


4.3.2.2 Proposed Booming and Collection Strategies: Matrices - HOOD CANAL

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
HC-1		Port Gamble KIT0430 47º-51.360' N 122º-34.670' W	Deflection/ Collection - Keep oil out of Port Gamble.	1800'	Angle boom from Rip-Rap breakwater just North of Mill to pier at Pt. Julia. Collect oil with vac trucks at pier.	Stage from Port Gamble.	Boat, road access from Port Gamble mill and Port Gamble Indian Reservation (need permission).	Sensitive nesting species, seabird concentrations, baitfish spawning beaches, and marine mammal haulout.
HC-2		Port Gamble, south end KIT0421 47º-48.880' N 122º-34.675' W	Exclusion - Keep oil out of mud flats at south end of Port Gamble.	200'	Deploy boom across narrowest opening at east end of spit.	Stage from Port Gamble.	By boat from Port Gamble Indian Reservation (need permission).	Waterfowl and shorebird concentrations, mudflat habitat.
HC-3		Hood Canal Bridge KIT0436 and JEF0311 47º-51.585' N 122º-37.455' W	Enhanced Skimming - Keep oil out of Hood Canal.	2200'	Place boom at openings in Hood Canal bridge to funnel oil to skimmers w/ boom legs in "V" configuration (high priority strategy).	Stage from Salsbury Point County Park.	By boat, ramps on each side of bridge, some access from bridge.	Sensitive Hood Canal resources.
HC-4		Kitsap Memorial Park - North of Lofall KIT0446 47º-48.925' N 122º-39.359' W	Diversion/ Collection - Keep oil out of Hood Canal.	1000'	Angle boom from pier at old ferry dock to divert oil for collection. Will be necessary only when a west wind pushes the oil to this shore.	Stage from the South Point Ferry Dock old ferry building parking lot, Lofall Pier.	By boat, ramps on each side of the Hood Canal bridge, Kitsap Memorial Park.	Protect fish and wildlife resources.
HC-5		South end of Squamish Harbor N of South Pt. JEF0292 47º-51.034' N 122º-41.071' W	Exclusion - Keep oil from entering tidal marsh.	1200'	Deploy boom across north entrance to tidal marsh/ mud flats.	Stage from Port Gamble.	By boat from Termination Pt., Squamish Harbor, or Shine Tidelands.	Marsh habitat and associated fish & wildlife.

4.3.2.2 Proposed Booming and Collection Strategies: Matrices - HOOD CANAL

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
HC-6		South end of Squamish Harbor N of South Pt. JEF0286 47º-50.523' N 122º-40.989' W	Exclusion - Keep oil from entering tidal marsh.	300'	Deploy boom across entrance to private marina to prevent oil from entering marsh behind breakwater.	Stage from Port Gamble.	By boat from Termination Pt., Squamish Harbor, or Shine Tidelands.	Marsh habitat and associated fish & wildlife.
HC-7		South end of Squamish Harbor N of South Pt. JEF0286 47º-50.581' N 122º-41.029' W	Exclusion - Keep oil from entering tidal marsh.	500'	Deploy boom from breakwater to the sand spit to the north.	Stage from Port Gamble.	By boat from Termination Pt., Squamish Harbor, or Shine Tidelands.	Marsh habitat and associated fish & wildlife.
HC-8		South Point JEF0283 47º-49.945' N 122º-41.242' W	Diversion/ Collection - Keep oil out of Hood Canal.	1000'	Angle boom to divert oil into collection area near old ferry dock. Need boat to tend end of boom. Will be necessary only if an east wind pushes the oil to this shore.	Stage from the South Point Ferry Dock old ferry building parking lot, Lofall Pier.	Shine Tidelands and other access point south of Lofall owned by the Navy - contact COMNAVBASE Seattle.	Protect fish and wildlife resources.
HC-9		Thorndike Bay JEF0267 47º-48.585' N 122º-44.653' W	Exclusion - Prevent oil from entering inner mouth of bay.	200'	Boom across gap in spit, anchor to shore. Water breaches spit at extreme high tide.	Stage from Lofall or Bangor.	By boat from Bangor or Lofall; vehicle access to spit from S Point - Thorndyke Road.	Sensitive nesting species, waterfowl concentrations.
HC-10		Bangor KIT0463 47º-45.302' N 122º-43.304' W	Diversion/ Collection - Collect oil at pier.	500'	Place collection boom at Explosive Handling wharf.	On site; gyms/mess facilities on base (5-7 miles from water).	Roads available from Bangor - contact COMNAVBASE Seattle.	Protect fish and wildlife resources.

4.3.2.2 Proposed Booming and Collection Strategies: Matrices - HOOD CANAL

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
HC-11		Bangor KIT0464 47º-44.867' N 122º-43.679' W	Diversion/ Collection - Collect oil at pier.	500'	Place collection boom at Service Pier.	On site; gyms/mess facilities on base (5-7 miles from water).	Roads available from Bangor - contact COMNAVBASE Seattle.	Protect fish and wildlife resources.
HC-12		Bangor KIT0465 47º-44.625' N 122º-44.020' W	Diversion/ Collection - Collect oil at pier.	500'	Place collection boom at Delta Pier.	On site; gyms/mess facilities on base (5-7 miles from water).	Roads available from Bangor - contact COMNAVBASE Seattle.	Protect fish and wildlife resources.
HC-13		Bangor KIT0467 47º-44.176' N 122º-44.418' W	Diversion/ Collection - Collect oil at pier.	500'	Place collection boom at Marginal Pier.	On site; gyms/mess facilities on base (5-7 miles from water).	Roads available from Bangor - contact COMNAVBASE Seattle.	Protect fish and wildlife resources.
HC-14		Bangor KIT0468 47º-43.770' N 122º-44.635' W	Diversion/ Collection - Collect oil at pier.	500'	Place collection boom at KB docks.	On site; gyms/mess facilities on base (5-7 miles from water).	Roads available from Bangor - contact COMNAVBASE Seattle.	Protect fish and wildlife resources.
HC-15		Hazel Point JEF0234 47º-41.594' N 122º-46.271' W	Diversion/ Collection - Keep oil out of Hood Canal.	1000'	Angle boom from shore to divert oil to collection area near houses. Need to tend end of boom w/ boat. Use land anchor or chain bridle on Rip Rap.	Stage from Lofall or Bangor.	By boat from Bangor or Seabeck; road access from Dabob - Coyle Rd (dirt road access - difficult for vac. trucks) may need to bring in portable skimmers.	Sensitive nesting species; other Hood Canal resources.

4.3.2.2 Proposed Booming and Collection Strategies: Matrices - HOOD CANAL

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
HC-16		Fisherman Harbor JEF0229 47º-41.142' N 122º-48.007' W	Exclusion - Keep oil out of harbor.	600'	Place chevron in front of harbor entrance. Low potential for oil to enter harbor.	Stage from Seabeck at Pleasant Harbor.	By boat from Seabeck or Bangor.	Shellfish, crabs & salmonids.
HC-17		Fisherman Harbor, backup JEF0229 47º-41.218' N 122º-48.091' W	Exclusion - Keep oil out of harbor.	600'	If strategy at harbor entrance cannot be deployed, move back behind sand spit.	Stage from Seabeck at Pleasant Harbor.	By boat from Seabeck or Bangor.	Shellfish, crabs & salmonids.
HC-18		Big Beef Harbor (east of Seabeck) KIT0486 47º-39.351' N 122º-47.163' W	Exclusion - Keep oil out of harbor.	100'	Deploy boom across entrance to harbor at road crossing.	Stage from Seabeck or Scenic Beach State Park.	From the bridge at Seabeck Highway.	Sensitive nesting species; shorebird concentration; hatchery.
HC-19		Big Beef Harbor, backup KIT0486 47º-39.309' N 122º-47.052' W	Exclusion - Keep oil out of harbor.	400'	If strategy at bay entrance fails, move back behind bridge, will need a small boat or skiff.	Stage from Seabeck or Scenic Beach State Park.	From the bridge at Seabeck Highway.	Sensitive nesting species; shorebird concentration; hatchery.
HC-20		Seabeck Bay KIT0492 47º-38.405' N 122º-50.471' W	Exclusion/ Diversion/ Collection - Keep oil out of bay.	2000'	Anchor boom to shore just south of marina at rip-rap and run to opposite side of bay at an angle to collect at the road. A north wind is likely to push any oil from the north into Seabeck Bay.	Stage from Seabeck or Scenic Beach State Park.	By boat from the ramp at Miami Beach or at Seabeck; vehicle access from the Seabeck Highway.	Waterfowl concentrations and baitfish spawning.
HC-21		Stavis Bay KIT0507 47º-37.858' N 122º-52.083' W	Exclusion - Keep oil out of bay.	200'	Place boom across entrance to marsh area. Can be deployed from land, may need a jon boat at high tide.	Stage from Seabeck.	By boat from Miami Beach or Seabeck; vehicle access from private property.	Salmon and marsh habitat.

4.3.2.2 Proposed Booming and Collection Strategies: Matrices - HOOD CANAL

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
HC-22		Tarboo Bay (upper) JEF0161 47º-50.594' N 122º-48.773' W	Exclusion - Keep oil out of bay.	1500'	Deploy boom in chevron from Long spit to opposite shore. High tide strategy, area becomes a mud flat at low tide.	Stage from Quilcene Marina, Seabeck or Pleasant Harbor.	By shallow draft boat from Quilcene; potential vehicle access from Carl Johnson Rd.	Marine mammal haulouts, waterfowl and crab.
HC-23		Hamma Hamma Estuary MAS0637 47º-32.903' N 123º-2.609' W	Exclusion - Keep oil out of tidal marsh.	500'	Deploy boom across entrance to tidal marsh at bridge on highway 101. Can be depolyed from land, may need a jon boat.	Stage from the Hamma Hamma Oyster Co.	From Highway 101.	Waterfowl concentrations; sensitive nesting species.
HC-24		Hamma Hamma River MAS0637 47º-32.729' N 123º-2.533' W	Exclusion - Keep oil out of river.	300'	Deploy boom across river at bridge on highway 101. Can be deployed from land, may need a jon boat.	Stage from the Hamma Hamma Oyster Co.	From Highway 101 and dirt road on northeast side of bridge.	Waterfowl concentrations; sensitive nesting species, salmon.
HC-25		Jorsted Creek MAS0631 47º-31.560' N 123º-3.023' W	Exclusion - Keep oil out of creek mouth.	200'	Deploy boom at angle across creek mouth. Unlikely to enter creek mouth except on high spring tide. Can be deployed from land.	Stage from the Hamma Hamma Oyster Co.	From Highway 101. Private Property adjacent to creek.	Salmon.
HC-26		Eagle Creek MAS0620 47º-29.087' N 123º-4.676' W	Exclusion - Keep oil out of creek mouth.	100'	Deploy boom at angle across creek mouth. Unlikely to enter creek mouth except on high spring tide. Can be deployed from land.	Stage from the Hamma Hamma Oyster Co.	From Highway 101.	Salmon.
HC-27		Lilliwaup Creek Estuary MAS0611 47º-27.802' N 123º-6.836' W	Exclusion - Keep oil out of creek and estuary.	300'	Deploy boom at angle across river at bridge on Highway 101. Can be deployed from land, may need a jon boat.	Stage from the parking area near the bridge over Lilliwaup Creek.	From Highway 101.	Waterfowl and shorebird concentrations; salmon.

4.3.2.2 Proposed Booming and Collection Strategies: Matrices - HOOD CANAL

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
HC-28		Small creek south of Lilliwaup Creek MAS0607 47º-27.447' N 123º-6.768' W	Exclusion - Keep oil out of creek.	100'	Deploy boom at angle across creek mouth. Unlikely to enter creek mouth except on high spring tide. Can be deployed from land.	Stage from the parking area near the bridge over Lilliwaup Creek.	From Highway 101.	Salmon.
HC-29		Dewatto Bay MAS0410 47º-27.237' N 123º-4.036' W	Exclusion - Keep oil out of inlet & river.	1500'	Deploy boom from Dewatto Pt. north to opposite shore.	Stage from the Hamma Hamma Oyster Co. or Hoodsport WDFW hatchery.	Vehicle access from the Dewatto - Holly Road on the south side of the bay; by boat from Hoodsport on the north side.	Protect eelgrass beds at mouth of bay; sensitive nesting species; shorebird concentrations; salmonids in river.
HC-30		Dewatto Bay MAS0413 47º-27.116' N 123º-3.731' W	Exclusion - Keep oil out of inlet & river.	800'	Backup for HC-29. Deploy boom from spit on north shore to closest point on opposite shore. May need a shallow draft boat, area becomes a mudflat at low tide.	Stage from the Hamma Hamma Oyster Co. or Hoodsport WDFW hatchery.	Vehicle access from the Dewatto - Holly Road on the south side of the bay; by boat from Hoodsport on the north side.	Protect eelgrass beds at mouth of bay; sensitive nesting species; shorebird concentrations; salmonids in river.
HC-31		Hoodsport MAS0593 47º-24.386' N 123º-8.313' W	Exclusion - Prevent oil from impacting WDFW hatchery.	100'	Boom off fish weir on S side of hatchery (high tide strategy). Can be deployed from land.	Stage from the WDFW hatchery.	By vehicle on the road to the hatchery.	WDFW hatchery.
HC-32		Enetai Creek MAS0580 47º-21.288' N 123º-9.556' W	Exclusion - Prevent oil from impacting Tribal hatchery.	100'	Deploy boom across creek south of Potlatch State Park. Can be deployed from land.	Stage from the Tribal hatchery or Potlatch State Park.	From Highway 101.	Tribal hatchery, salmon.

4.3.2.2 Proposed Booming and Collection Strategies: Matrices - HOOD CANAL

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
HC-33		Tahuya River MAS0452 47º-22.242' N 123º-3.088' W	Exclusion - Keep oil out of river.	400'	Deploy boom across narrowest point of river mouth.	Stage from the Twanoh State Park.	By boat from the Potlatch State Park or Union; vehicle access from private property off the North Shore Road.	Salmonids and shellfish habitat; seabird, waterfowl, and shorebird concentration areas.
HC-34		Twanoh State Park MAS0534 47º-22.715' N 122º-58.472' W	Exclusion - Protect creek at State Park.	100'	Deploy boom across creek mouth at Twanoh State Park. Can be deployed from land.	Stage from the Twanoh State Park.	From Highway 106 to theTwanoh State Park.	State Park and salmon.
HC-35		Mission Creek MAS0489 47º-25.850' N 122º-52.370' W	Exclusion - Keep oil out of creek.	100'	Deploy boom across the mouth of the creek. Can be deployed from land.	Stage from the Belfair State Park.	Vehicle access from the Belfair State Park, off the North Shore Road.	State Park and salmon.
HC-36		Union River MAS0499 47º-26.755' N 122º-50.435' W	Exclusion - Prevent oil from moving into river.	200'	Deploy boom across river at first access point in river mouth. Necessary at high tide only, river flow at low tide will prevent oil from moving upstream. Can be deployed from land with a jon boat.	Stage from the Belfair or Twanoh State Park.	Vehicle access from the North Shore Road.	Waterfowl concentrations, sensitive nesting species, wetlands, salmon.

5. Shoreline Information

5.1. Shoreline Types and Sensitivity

The type of shoreline, degree of exposure to waves and currents, and biological sensitivity are the main criteria for selecting appropriate treatment techniques. Each shoreline type has particular properties (including vegetation types) which facilitate or resist the penetration and persistence of oil. Areas of comparatively uniform sediment type and grain size experience a deeper penetration of oil. Grain size definitions are:

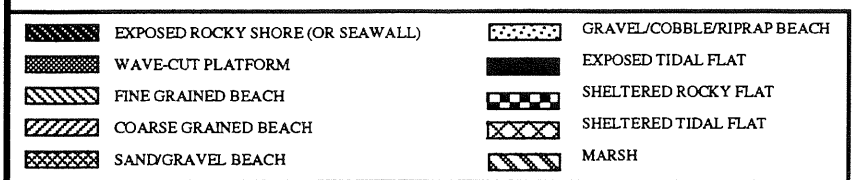
Mud	<0.0625 mm
Fine Sand	0.0625 - 2 mm
Medium to Coarse Sand	2 -4 mm
Pebble/Cobble	4 - 256 mm

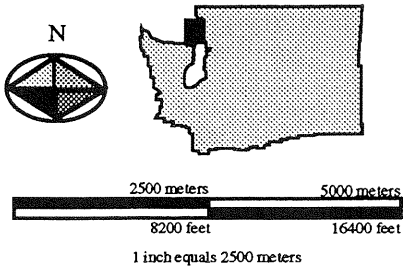
Persistence of oil in a particular area is directly related to the intensity of wave action, tides, and currents. Based on numerous oil spill studies of shoreline characteristics, treatment, and oil impact, the matrices in Chapter 6 were formulated following the basic prototype of the Environmental Sensitivity Index Atlas.

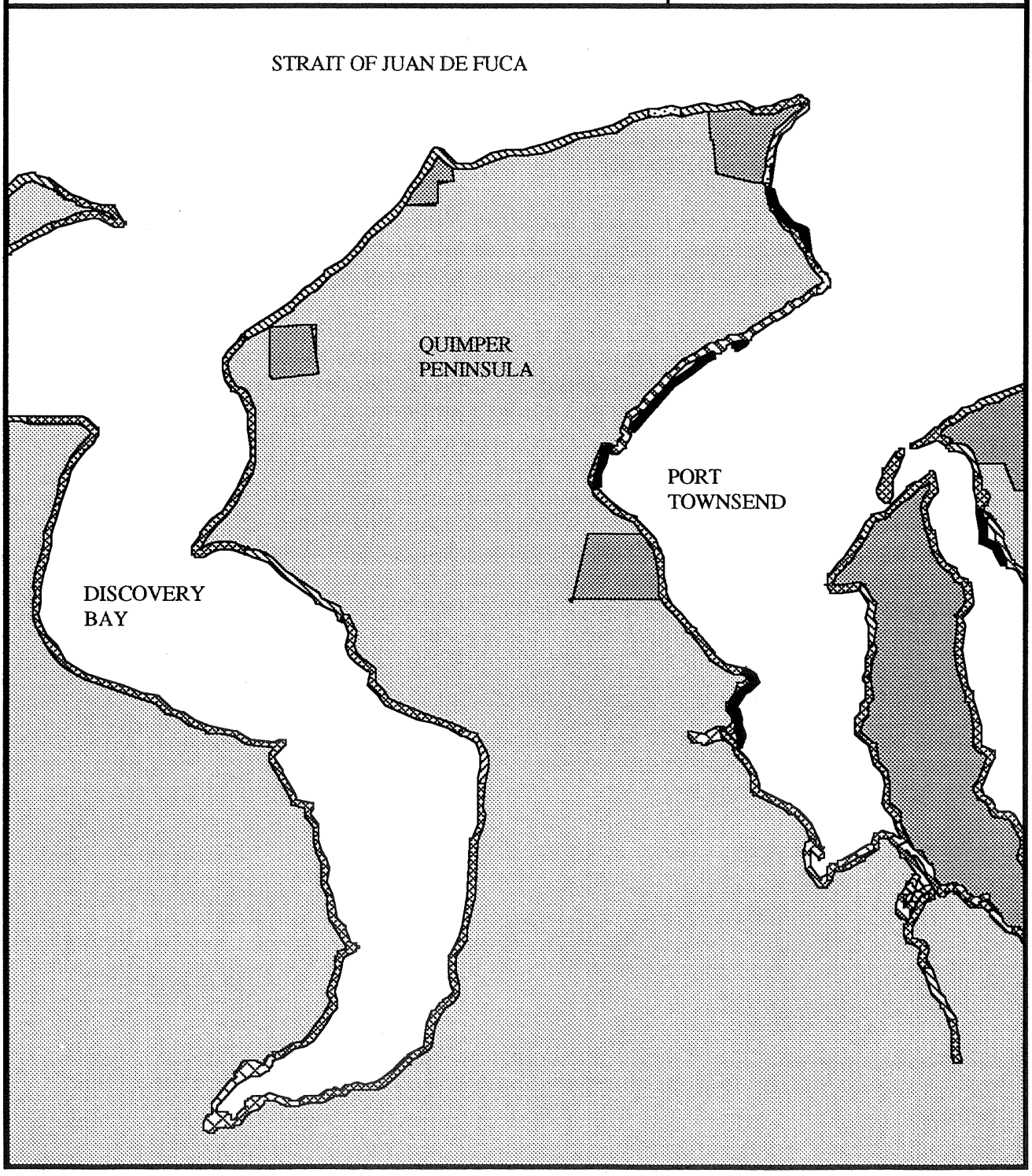
The environmental sensitivity index (ESI) system ranks coastal environments on a scale of 1-10 or 11 (less sensitive to more sensitive) with respect to oil spill sensitivity and potential biological injury is being used for mapping extensive areas of the coastline of the U.S.. Generally speaking, areas exposed to high levels of physical energy, such as wave action and tidal currents, rank low on the scale while sheltered areas have the highest ranking. The shoreline types used in this manual are a combination of the two similar systems used for the Delaware/Pennsylvania/New Jersey ESI Atlas, and the Maryland and Virginia atlases. The numbering system for the Countermeasure Manual Shoreline Types does not correspond exactly to either atlas; however, the corresponding shoreline types can be identified easily from the ESI maps and reassigned the appropriate number (after field verification.) The shoreline ranking system provides a useful first step in the design of contingency plans because it identifies the priority areas that require maximum effort for protection and cleanup. Strike teams and contractors with this document can focus their activities on environmental priorities, particularly during the first few hours and days of the spill.[7]

[7]Regional Response Team III. Draft, *Shoreline Countermeasures Manual*. (Departmentof the Interior, March 22,1991).

PORT TOWNSEND
SHORELINE TYPES

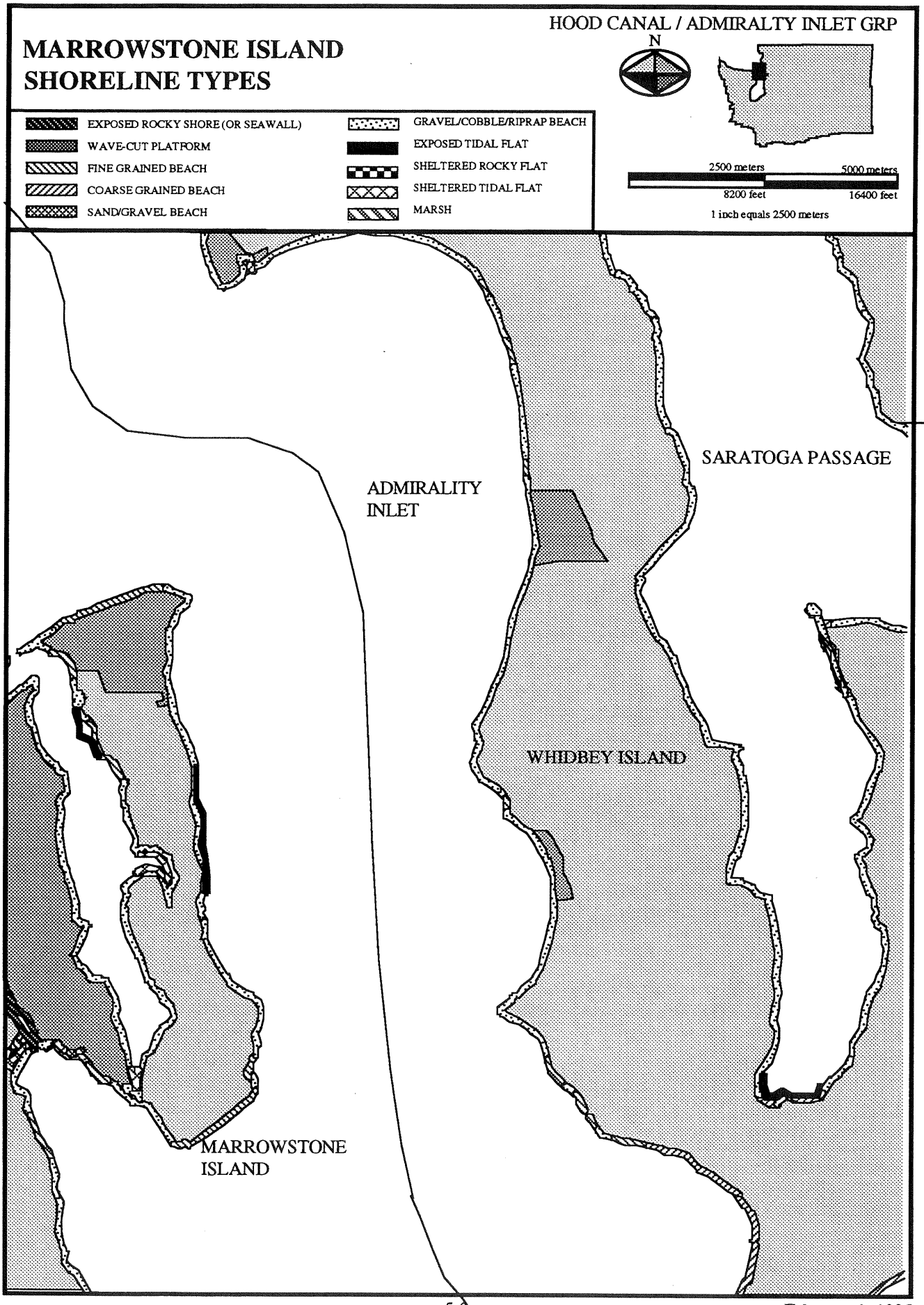


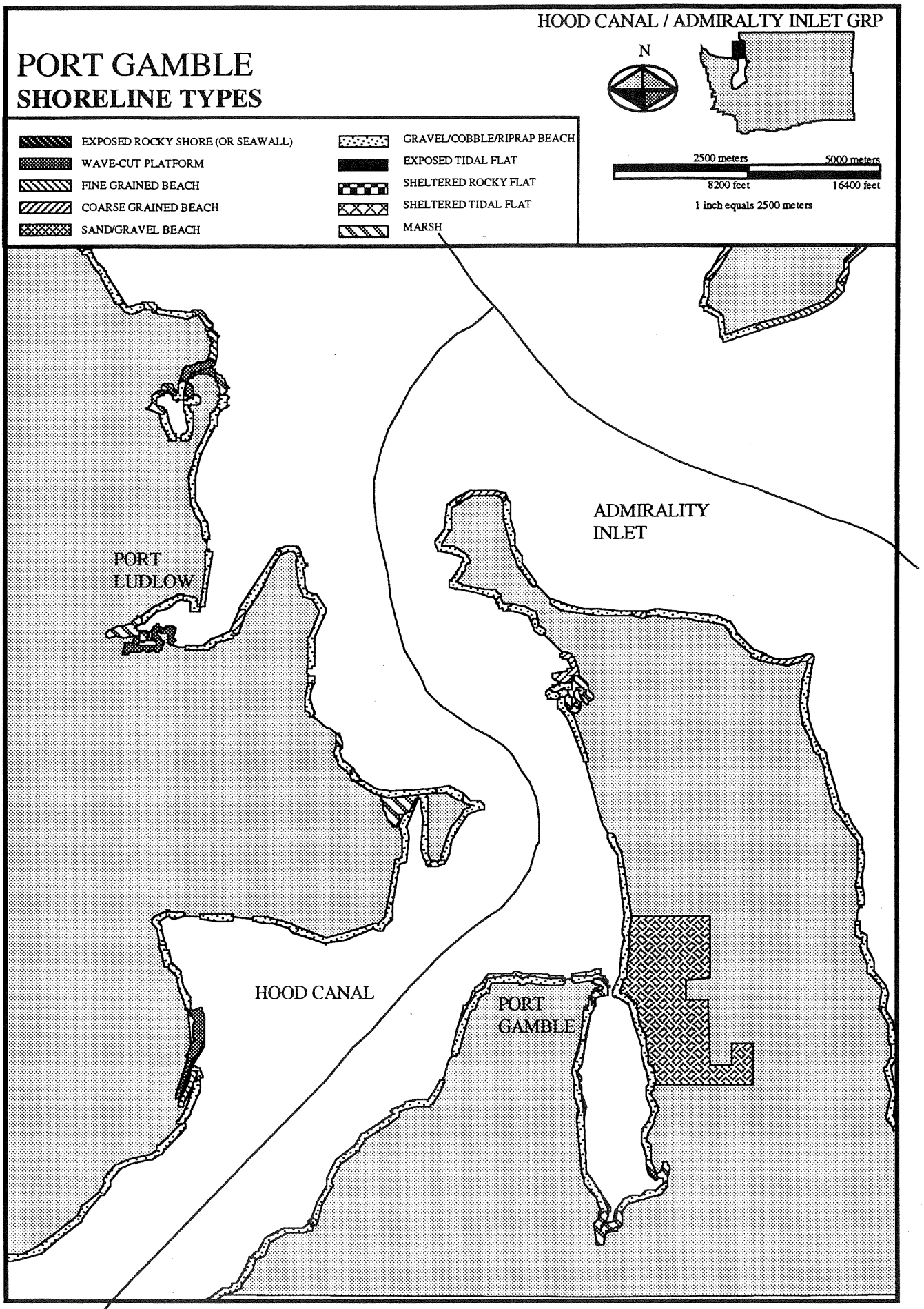




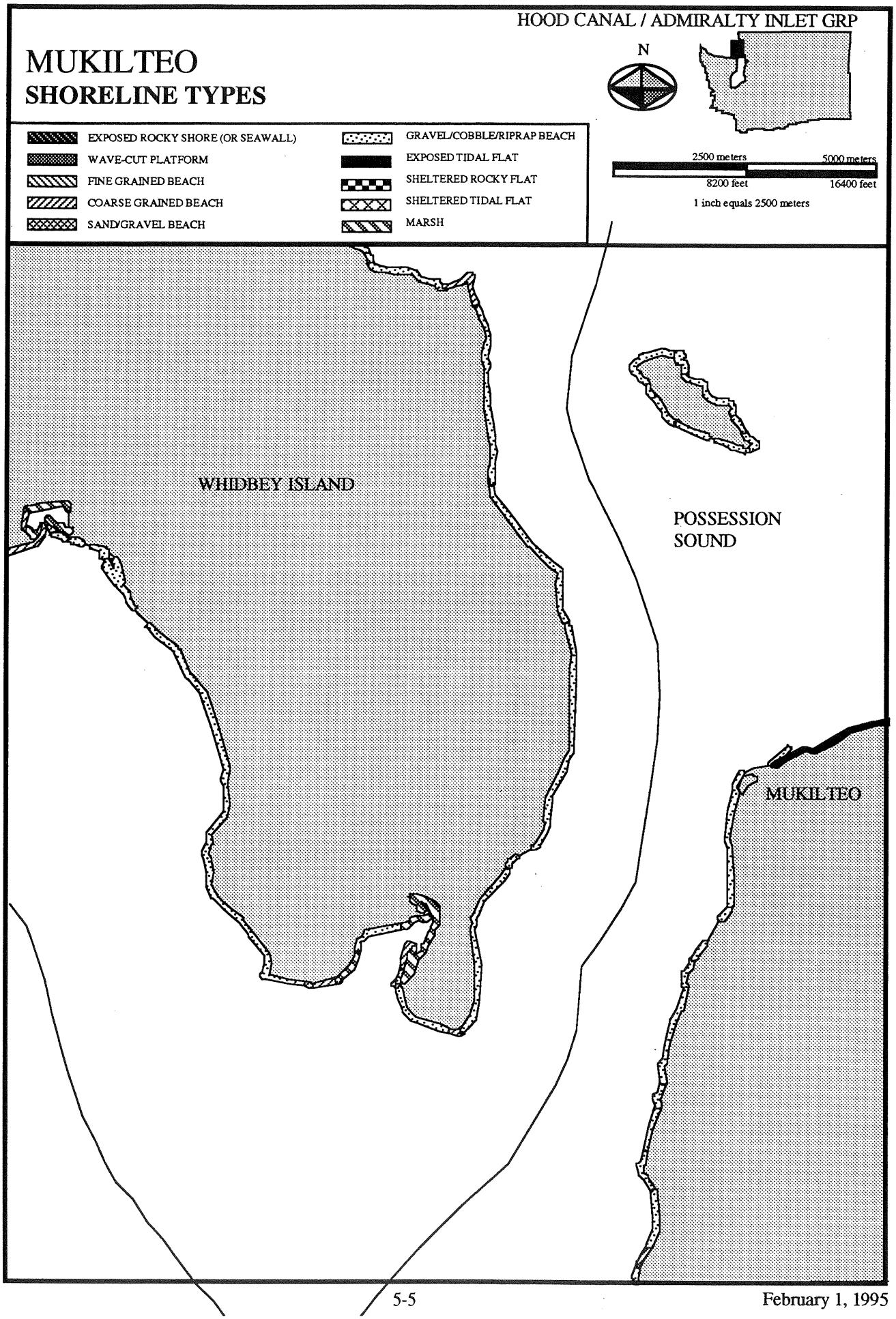
MARROWSTONE ISLAND SHORELINE TYPES

HOOD CANAL / ADMIRALTY INLET GRP



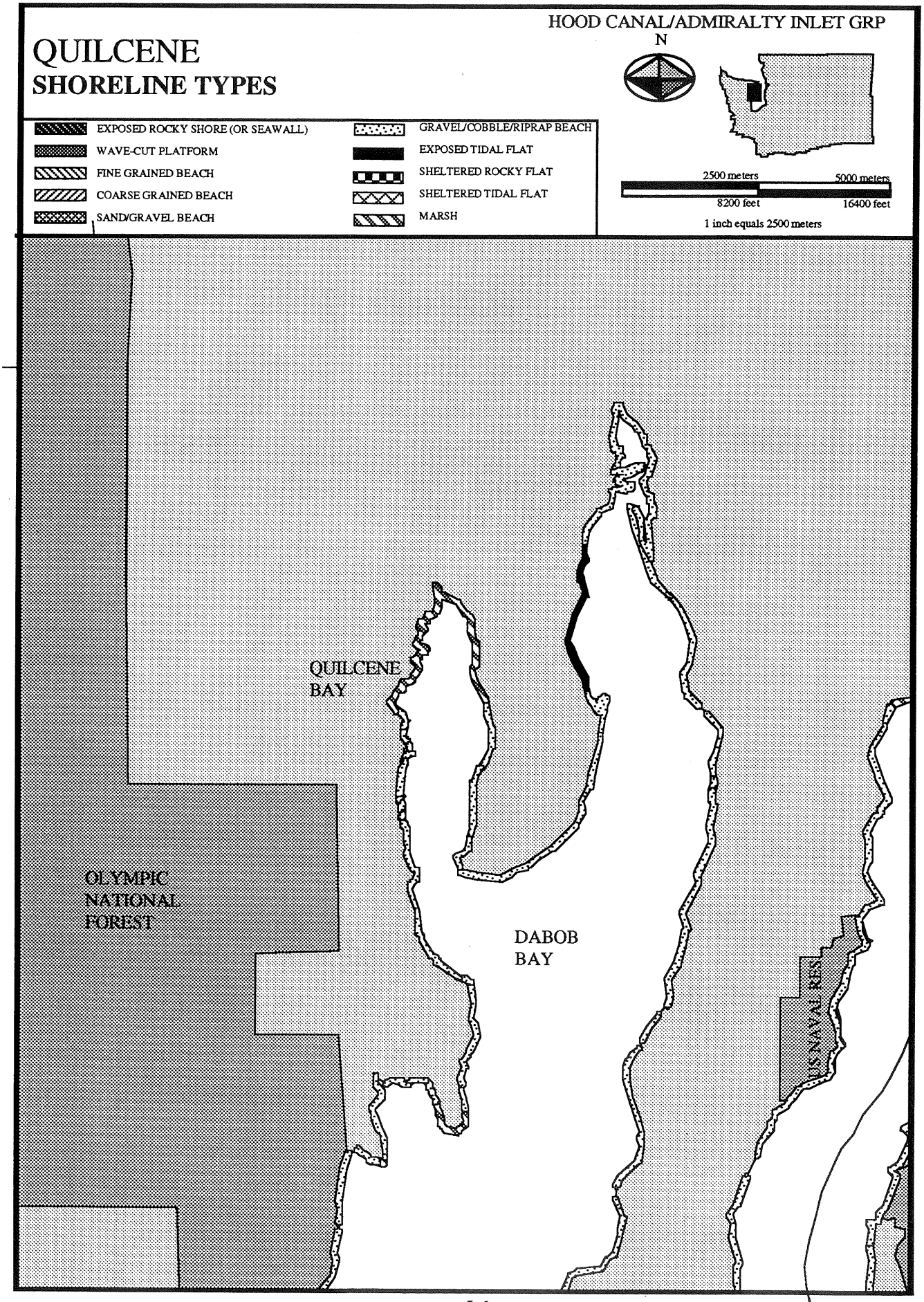

HOOD CANAL / ADMIRALTY INLET GRP
PORT GAMBLE
SHORELINE TYPES
EXPOSED ROCKY SHORE (OR SEAWALL)
WAVE-CUT PLATFORM
FINE GRAINED BEACH
COARSE GRAINED BEACH
SAND/GRAVEL BEACH
GRAVEL/COBBLE/RIPRAP BEACH
EXPOSED TIDAL FLAT
SHELTERED ROCKY FLAT
SHELTERED TIDAL FLAT
MARSH
N
2500 meters
5000 meters
8200 feet
16400 feet
1 inch equals 2500 meters
PORT LUDLOW
ADMIRALITY INLET
HOOD CANAL
PORT GAMBLE

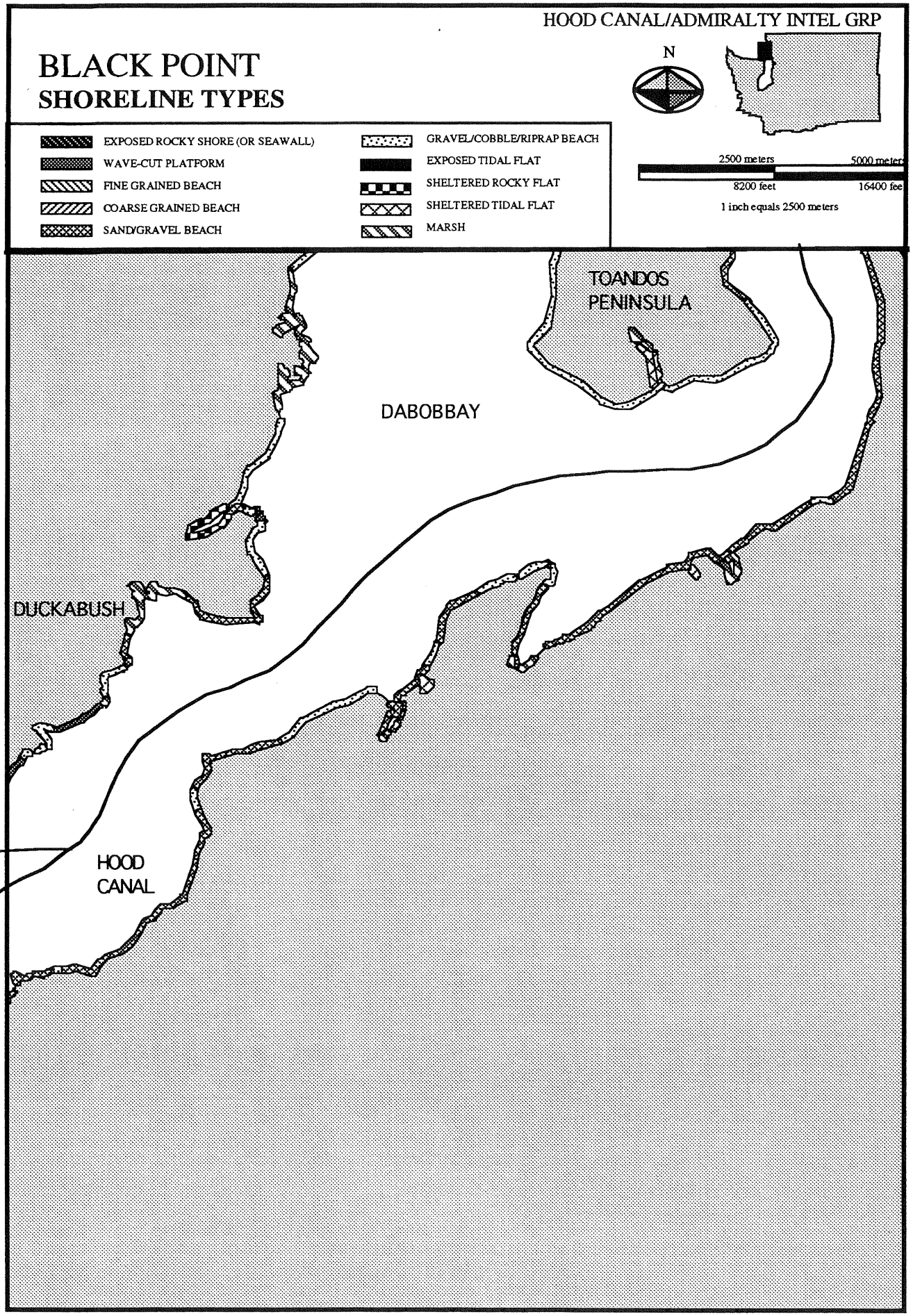
MUKILTEO
SHORELINE TYPES

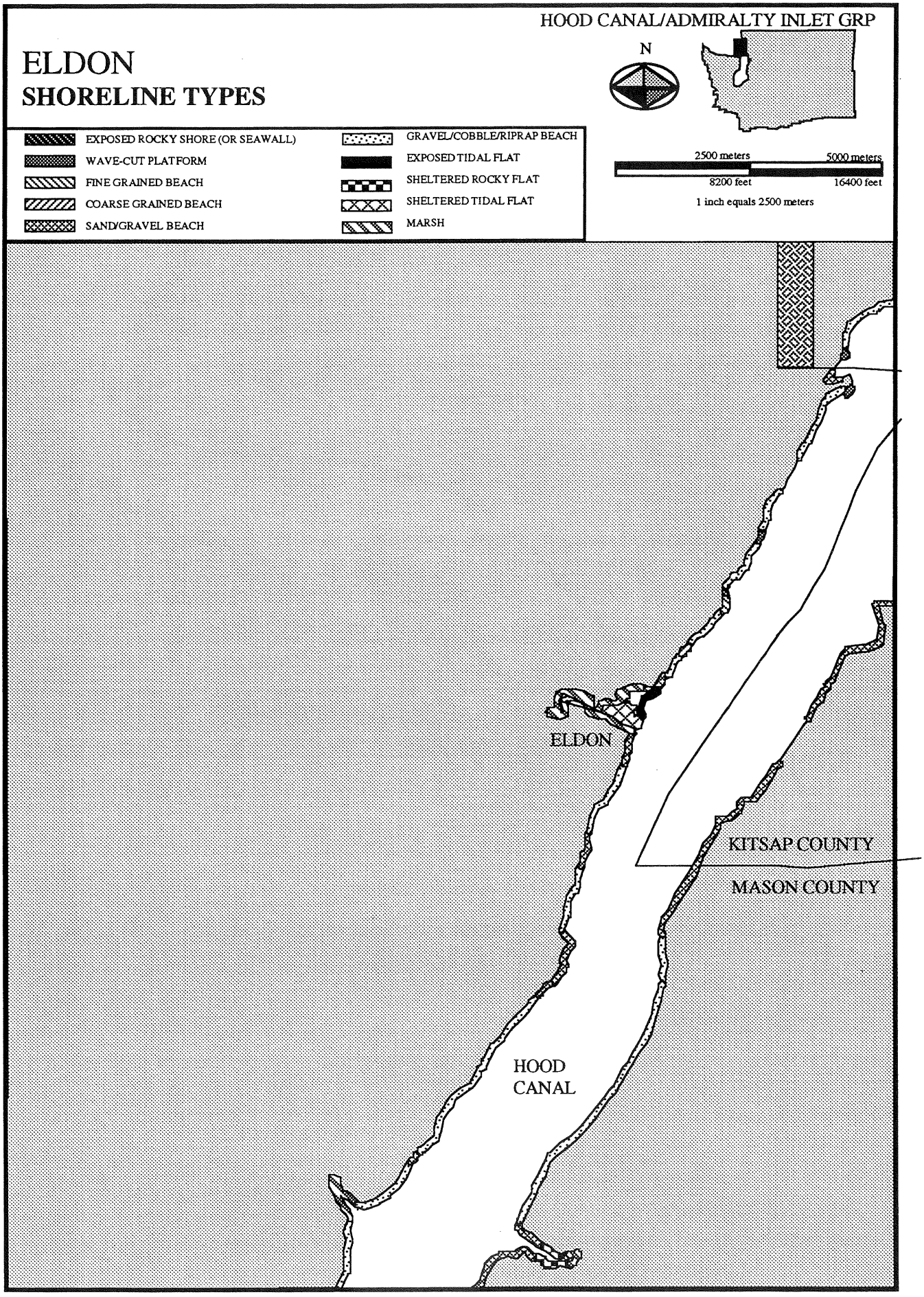


QUILCENE
SHORELINE TYPES

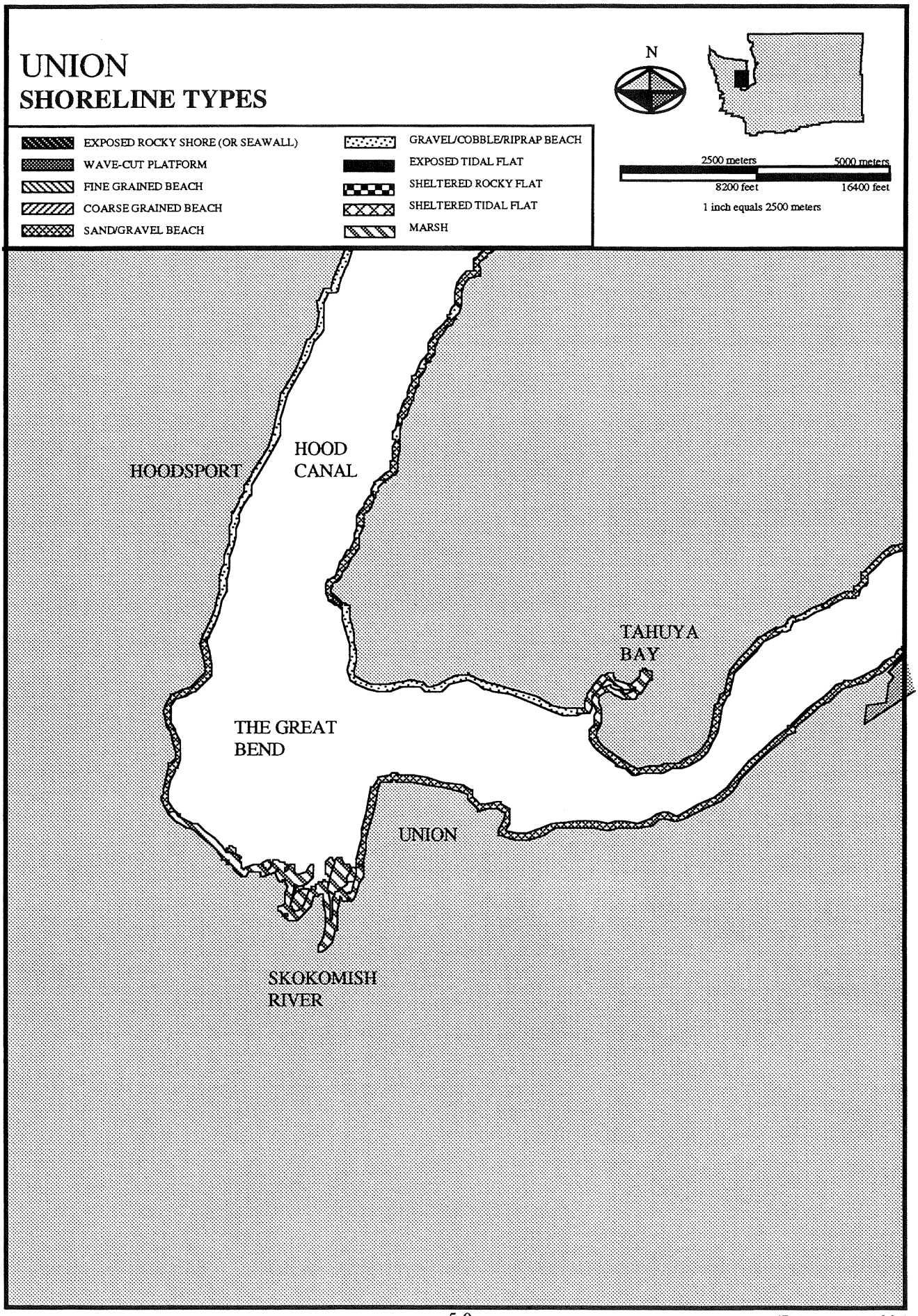
HOOD CANAL/ADMIRALTY INLET GRP



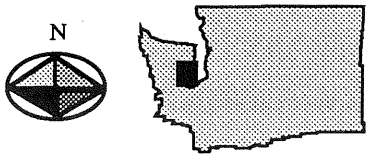

HOOD CANAL/ADMIRALTY INTEL GRP
BLACK POINT
SHORELINE TYPES
N
EXPOSED ROCKY SHORE (OR SEAWALL)
WAVE-CUT PLATFORM
FINE GRAINED BEACH
COARSE GRAINED BEACH
SAND/GRAVEL BEACH
GRAVEL/COBBLE/RIPRAP BEACH
EXPOSED TIDAL FLAT
SHELTERED ROCKY FLAT
SHELTERED TIDAL FLAT
MARSH
2500 meters
5000 meters
8200 feet
16400 feet
1 inch equals 2500 meters
TOANDOS PENINSULA
DABOBBAY
DUCKABUSH
HOOD CANAL


HOOD CANAL/ADMIRALTY INLET GRP
ELDON
SHORELINE TYPES
N
EXPOSED ROCKY SHORE (OR SEAWALL)
WAVE-CUT PLATFORM
FINE GRAINED BEACH
COARSE GRAINED BEACH
SAND/GRAVEL BEACH
GRAVEL/COBBLE/RIPRAP BEACH
EXPOSED TIDAL FLAT
SHELTERED ROCKY FLAT
SHELTERED TIDAL FLAT
MARSH
2500 meters
5000 meters
8200 feet
16400 feet
1 inch equals 2500 meters
ELDON
KITSAP COUNTY
MASON COUNTY
HOOD
CANAL

UNION
SHORELINE TYPES



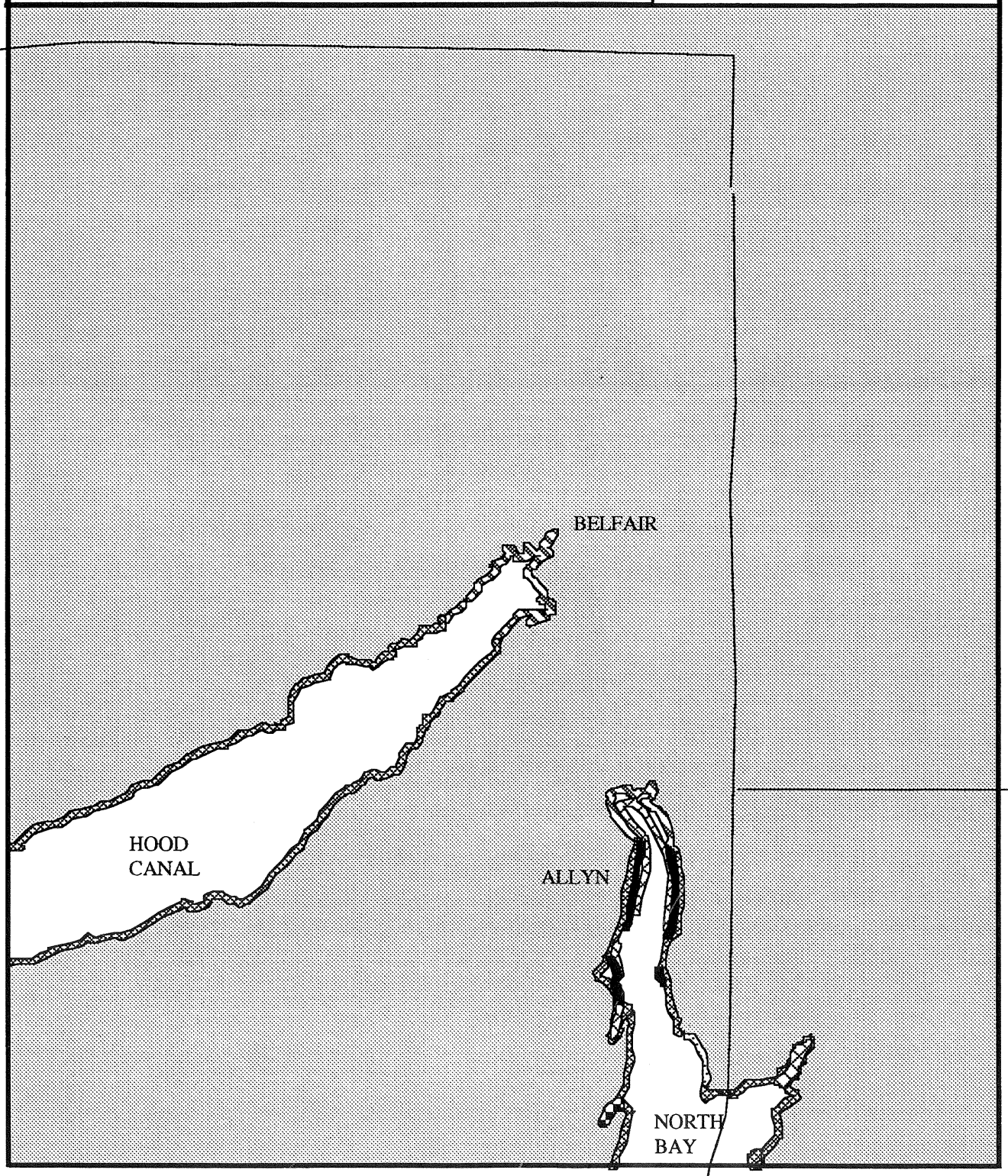
BELFAIR
SHORELINE TYPES



N

2500 meters 5000 meters
8200 feet 16400 feet
1 inch equals 2500 meters

- EXPOSED ROCKY SHORE (OR SEAWALL)
- WAVE-CUT PLATFORM
- FINE GRAINED BEACH
- COARSE GRAINED BEACH
- SAND/GRAVEL BEACH
- GRAVEL/COBBLE/RIPRAP BEACH
- EXPOSED TIDAL FLAT
- SHELTERED ROCKY FLAT
- SHELTERED TIDAL FLAT
- MARSH



5.3 Shoreline Countermeasure Matrices

The matrices included here show which shoreline countermeasure techniques have been considered for the fourteen shoreline types described in Chapter 2 of the “Shoreline Countermeasures Manual & Matrices”, Northwest Area Plan, Chapter 9650, Page 9-37. Four matrices have been constructed for the major categories of oil (heavy, medium, light, very light).

Countermeasure methods are described in Chapters 3 and 4 of the manual. Countermeasures in Chapter 3 are traditional or conventional techniques that the OSC can use without any additional concurrence. However, the cutting of vegetation countermeasure should be used only during specific seasonal windows under specific conditions and with landowner approval. Countermeasures in Chapter 4 are described under a separate section called “Shoreline Countermeasure Methods Using Alternative Technology” may be useful in certain situations. These methods are considered more experimental and controversial in their application and potential impacts and require more formal review and consultation before implementing. The exact requirements are spelled out in the National Contingency Plan and the Northwest Area Plan. The Shoreline Countermeasures Matrices are a particularly dynamic component of the manual and should continue to be revised as the existing techniques are used and evaluated, and as both old and new techniques are refined.

Each matrix has a written explanation of how it is to be used as a countermeasure advisability matrix. The matrices are only a general guide for removing oil from shoreline substrates. They must be used in conjunction with the entire “Shoreline Countermeasures Manual” plus field observations and scientific advice. The countermeasures listed are not necessarily the best under all circumstances, and any listed technique may need to be used in conjunction with other techniques (including ones not listed herein). The Federal On-Scene Coordinator (FOSC) or the State OSC operating with the FOSC's authorization has the responsibility for and authority to determine which countermeasure(s) are appropriate for the various situations encountered.

Selection of countermeasure techniques to be used in each spill is based upon the degree of oil contamination, shoreline types, and the presence of sensitive resources. Extremely sensitive areas are generally limited to manual cleanup methods. It is important to note that the primary goal of countermeasure implementation is the removal of oil from the shoreline with no further injury or destruction to the environment. The three categories of guidance used in the matrices are defined as follows:

R	Recommended	May be the preferred method that best achieves the goal of minimizing destruction or injury to the environment
C	Conditional	Viable and possibly useful but may result in limited adverse effects to the environment
	Shaded	Not applicable or not generally recommended.

SHORELINE COUNTERMEASURES MATRIX

Heavy Oil (Heavy Crude Oils, Intermediate Fuel Oils, Bunker C & Heavily Weathered Medium Crudes)

- Heavy oils with little or no evaporation or dissolution
- Water-soluble fraction likely to be <10ppm
- Heavy contamination of intertidal areas likely
- Severe impacts to waterfowl and fur-bearing mammals (coating and ingestion)
- Long-term contamination to sediments possible
- Weathers very slowly
- Dispersion seldom effective
- Shoreline cleanup difficult under all conditions

SHORELINE TYPES CODES

1- Exposed rock shores and vertical, hard man-made structure (e.g. seawalls)
2 - Exposed wave-cut platforms
3 - Fine to medium grained sand beaches & steep unvegetated river banks
4 - Course grained sand beaches
5 - Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material
6A - Gravel beaches - pebbles to cobble
6B - Gravel beaches - cobbles to boulders
6C - Exposed rip rap
7 - Exposed tidal flat
8A- Sheltered vertical rock shores and vertical, hard man-made structures (e.g. seawalls, docks, bulkheads)
8B - Sheltered rubble slope
9A - Sheltered sand and mud flats
9B - Sheltered vegetated low bank
10 - Marshes

SHORELINE TYPES

COUNTERMEASURES	1	2	3	4	5	6A	6B	6C	7	8A	8B	9A	9B	10
CONVENTIONAL METHODS														
No action	C	C	C	C	C	C	C	C	R	C	C	R	C	R
Manual removal of oil	C	R	R	R	R	C	C	C		R	R		C	C
Passive collection of oil	R	R	R	R	R	R	R	R	C	R	R	C	R	R
Oiled debris removal	C	R	R	R	R	R	R	R	C	R	R	C	R	C
Trenching/recovery wells			C	C	C									
Oiled sediment removal			C	C	C	C		C					C	
Ambient water flooding (Deluge)			C	C	C	R	R	R		R	R		C	C
Amb water flush <50 psi	C	C			C	R	C	R		C	C		C	C
Amb water flush <100 psi	C	C					C	C		C	C			
Warm water flush <90°F	C						C	C		C				
Hot water flush >90°F	C									C				
Vacuum removal of oil	C	C	C	C	C	C	C	C		C	C		C	C
Sediment reworking			C	C	C	C								
Sediment Removal-cleaning-replacement			C	C	C	C		C						
Cutting oiled vegetation							C	C		C	C		C	C
ALTERNATIVE METHODS*														
In-situ burning on shore														
Chemical stabilization, protection, cleaning														
Nutrient enhancement			C	C	C	C	C	C						C
Microbial addition														

R Recommend - May be Preferred Alternative
C Conditional (Refer to NW Shoreline Countermeasures Manual)
Shaded areas are Not Applicable or Not Generally Recommened
***** Follow approved process defined in NCP and NW Area Plan

This countermeasure advisability matrix is only a general guide for removal of oil from shoreline substrates. It must be used in conjunction with the entire Shoreline Countermeasures Manual plus field observations and scientific advice. The countermeasures listed are not necessarily the best under all circumstances, and any listed technique may need to be used in conjunction with other techniques (including ones not listed herein). The Federal On-Scene Coordinator (FOSC) or the state OSC operating with the FOSC's authorization has the responsibility for and the authority to determine which countermeasure(s) are appropriate for various situations encountered. Selection of countermeasures is based on the degree of oil contamination, the shoreline type, and the presence of sensitive resources.

SHORELINE COUNTERMEASURES MATRIX

Medium Oil (Most Crude Oils & Some Heavily Weathered Light Crudes)

- About 1/3 will evaporate within 24 hours
- Maximum water-soluble fraction is 10-100ppm
- Oil contamination of intertidal areas can be severe and long-term
- Impact to waterfowl and fur-bearing mammals can be severe
- Chemical dispersion is an option within 1-2 days
- Cleanup most effective if conducted quickly

SHORELINE TYPES CODES

1- Exposed rock shores and vertical, hard man-made structure (e.g. seawalls)
2 - Exposed wave-cut platforms
3 - Fine to medium grained sand beaches & steep unvegetated river banks
4 - Course grained sand beaches
5 - Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material
6A - Gravel beaches - pebbles to cobble
6B - Gravel beaches - cobbles to boulders
6C - Exposed rip rap
7 - Exposed tidal flat
8A- Sheltered vertical rock shores and vertical, hard man-made structures (e.g. seawalls, docks, bulkheads)
8B - Sheltered rubble slope
9A - Sheltered sand and mud flats
9B - Sheltered vegetated low bank
10 - Marshes

SHORELINE TYPES

COUNTERMEASURES	1	2	3	4	5	6A	6B	6C	7	8A	8B	9A	9B	10
CONVENTIONAL METHODS														
No action	C	C	C	C	C	C	C	C	R	C	C	R	C	R
Manual removal of oil	C	R	R	R	R	C	C	C		R	R		C	C
Passive collection of oil	R	R	R	R	R	R	R	R	C	R	R	R	R	R
Oiled debris removal	C	R	R	R	R	R	R	R	C	R	R	C	R	C
Trenching/recovery wells			C	C	C									
Oiled sediment removal			C	C	C	C							C	
Ambient water flooding (Deluge)			C	C	C	R	R	R		R	R		C	C
Amb water flush <50 psi	C	C			C	R	C	R		R	R		C	C
Amb water flush <100 psi	C	C					C	C		C				
Warm water flush <90°F	C						C	C		C				
Hot water flush >90°F	C									C				
Vacuum removal of oil	C	C	R	R		C	R	R		C	C		C	C
Sediment reworking			C	C	C	C								
Sediment Removal-cleaning-replacement			C	C	C	C		C			C			
Cutting oiled vegetation							C	C		C	C		C	C
ALTERNATIVE METHODS*														
In-situ burning on shore														
Chemical stabilization, protection, cleaning														
Nutrient enhancement			C	C	C	C	C	C			C			C
Microbial addition														

R Recommend - May be Preferred Alternative
C Conditional (Refer to NW Shoreline Countermeasures Manual)
Shaded areas are Not Applicable or Not Generally Recommened
***** Follow approved process defined in NCP and NW Area Plan

This countermeasure advisability matrix is only a general guide for removal of oil from shoreline substrates. It must be used in conjunction with the entire Shoreline Countermeasures Manual plus field observations and scientific advice. The countermeasures listed are not necessarily the best under all circumstances, and any listed technique may need to be used in conjunction with other techniques (including ones not listed herein). The Federal On-Scene Coordinator (FOSC) or the state OSC operating with the FOSC's authorization has the responsibility for and the authority to determine which countermeasure(s) are appropriate for various situations encountered. Selection of countermeasures is based on the degree of oil contamination, the shoreline type, and the presence of sensitive resources.

SHORELINE COUNTERMEASURES MATRIX

Light Oil (Diesel, No 2 Fuel Oils, Light Crudes)

- Moderately volatile; will leave residue (up to 1/3 of spilled amount)
- Moderate concentrations of toxic (soluble) compounds
- Long-term contamination of intertidal resources possible
- Potential for subtidal impacts (dissolution, mixing, sorption onto suspended sediments)
- No dispersion necessary
- Cleanup can be very effective

SHORELINE TYPES CODES

1- Exposed rock shores and vertical, hard man-made structure (e.g. seawalls)
2 - Exposed wave-cut platforms
3 - Fine to medium grained sand beaches & steep unvegetated river banks
4 - Course grained sand beaches
5 - Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material
6A - Gravel beaches - pebbles to cobble
6B - Gravel beaches - cobbles to boulders
6C - Exposed rip rap
7 - Exposed tidal flat
8A- Sheltered vertical rock shores and vertical, hard man-made structures (e.g. seawalls, docks, bulkheads)
8B - Sheltered rubble slope
9A - Sheltered sand and mud flats
9B - Sheltered vegetated low bank
10 - Marshes

SHORELINE TYPES

COUNTERMEASURES	1	2	3	4	5	6A	6B	6C	7	8A	8B	9A	9B	10
CONVENTIONAL METHODS														
No action	R	R	C	C	C	C	C	C	R	C	C	R	C	R
Manual removal of oil			C	C	C	C	C	C		R	R		C	
Passive collection of oil	C	R	R	R	R	R	R	R	C	R	R	C	R	R
Oiled debris removal	C	C	R	R	R	R	R	R	C	R	R	C	C	C
Trenching/recovery wells			C	C	C									
Oiled sediment removal			C	C	C	C								
Ambient water flooding (Deluge)			C	C	C	R	R	R			C			C
Amb water flush <50 psi		C			C	C	C	C		R	C			C
Amb water flush <100 psi														
Warm water flush <90°F														
Hot water flush >90°F														
Vacuum removal of oil							C	C						C
Sediment reworking			C	C	C	C								
Sediment Removal-cleaning-replacement			C	C	C									
Cutting oiled vegetation							C	C		C	C		C	C
ALTERNATIVE METHODS*														
In-situ burning of shore														
Chemical stabilization, protection, cleaning														
Nutrient enhancement			C	C	C	C	C	C						C
Microbial addition														

R Recommend - May be Preferred Alternative
C Conditional (Refer to NW Shoreline Countermeasures Manual)
Shaded areas are Not Applicable or Not Generally Recommened
***** Follow approved process defined in NCP and NW Area Plan

This countermeasure advisability matrix is only a general guide for removal of oil from shoreline substrates. It must be used in conjunction with the entire Shoreline Countermeasures Manual plus field observations and scientific advice. The countermeasures listed are not necessarily the best under all circumstances, and any listed technique may need to be used in conjunction with other techniques (including ones not listed herein). The Federal On-Scene Coordinator (FOSC) or the state OSC operating with the FOSC's authorization has the responsibility for and the authority to determine which countermeasure(s) are appropriate for various situations encountered. Selection of countermeasures is based on the degree of oil contamination, the shoreline type, and the presence of sensitive resources.

SHORELINE COUNTERMEASURES MATRIX

Very Light Oil (Jet fuels, Gasoline)

- Highly volatile (should all evaporate within 1-2 days)
- High concentration of toxic (soluble) compounds
- Result: Localized, severe impacts to water column and intertidal resources
- Duration of impact is a function of the resource recovery rate
- No dispersion necessary

SHORELINE TYPES CODES

1- Exposed rock shores and vertical, hard man-made structure (e.g. seawalls)	6B - Gravel beaches - cobbles to boulders
2 - Exposed wave-cut platforms	6C - Exposed rip rap
3 - Fine to medium grained sand beaches & steep unvegetated river banks	7 - Exposed tidal flat
4 - Course grained sand beaches	8A- Sheltered vertical rock shores and vertical, hard man-made structures (e.g. seawalls, docks,
5 - Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material	8B - Sheltered rubble slope
6A - Gravel beaches - pebbles to cobble	9A - Sheltered sand and mud flats
	9B - Sheltered vegetated low bank
	10 - Marshes

COUNTERMEASURES	SHORELINE TYPES													
	1	2	3	4	5	6A	6B	6C	7	8A	8B	9A	9B	10
CONVENTIONAL METHODS														
No action	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Manual removal of oil														
Passive collection of oil			C	C	C	C	C	C						
Oiled debris removal	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Trenching/recovery wells			C	C	C									
Oiled sediment removal														
Ambient water flooding (Deluge)														C
Amb water flush <50 psi														
Amb water flush <100 psi														
Warm water flush <90°F														
Hot water flush >90°F														
Vacuum removal of oil														
Sediment reworking			C	C	C	C								
Sediment Removal-cleaning-replacement														
Cutting oiled vegetation														
ALTERNATIVE METHODS*														
In-situ burning on shore														
Chemical stabilization, protection, cleaning														
Nutrient enhancement														
Microbial addition														

R Recommend - May be Preferred Alternative
C Conditional (Refer to NW Shoreline Countermeasures Manual)
Shaded areas are Not Applicable or Not Generally Recommened
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This countermeasure advisability matrix is only a general guide for removal of oil from shoreline substrates. It must be used in conjunction with the entire Shoreline Countermeasures Manual plus field observations and scientific advice. The countermeasures listed are not necessarily the best under all circumstances, and any listed technique may need to be used in conjunction with other techniques (including ones not listed herein). The Federal On-Scene Coordinator (FOSC) or the state OSC operating with the FOSC's authorization has the responsibility for and the authority to determine which countermeasure(s) are appropriate for various situations encountered. Selection of countermeasures is based on the degree of oil contamination, the shoreline type, and the presence of sensitive resources.

Purpose of Chapter 6

The information presented in this chapter highlights some of the more significant environmentally sensitive areas within the GRP region that could be impacted as a result of an oil spill. Consistent with the overall purpose of the GRP's, this information is only intended to provide a level of detail required during the initial phase of spill response. During an actual event, additional resource information will be available from the resource trustee agencies supporting the Environmental Unit in the Planning Section. Specific resource concerns for areas that already have designated protection strategies in Chapter 4 of the GRP may be found in the "Resources Protected" column in the matrix describing the individual strategies.

The information provided in Chapter 6 is intended for use in:

- Preparing an initial ICS 232 form (Resources-at-Risk summary) for Incident Command
- Identifying those sites where it may be necessary to implement Flight Restriction Zones in order to prevent disturbance/injury to sensitive wildlife species.
- Identifying sensitive shoreline habitats to assist SCAT teams in their initial assessments and to help personnel in the Environmental Unit in developing appropriate cleanup strategies.

Chapter 6 consists of two sets of maps and tables - one for wildlife and the other for fish, shellfish and selected sensitive marine habitats. These data are presented separately, both for ease of reading and because each of the two data sets has slightly different applications within the context of spill response.

The wildlife maps and tables present information on the location and seasonal sensitivity of key wildlife resources. Types of data included here are concentration areas for waterfowl, marine birds and shorebirds; seabird colonies; nesting areas for sensitive species such as eagles, herons and falcons; and marine mammal haulout sites. This information is intended for the rapid identification of areas where significant wildlife oiling impacts could be anticipated and to denote areas where flight restriction zones may be required to protect sensitive wildlife. Each site depicted on these maps is identified by a unique number in order to facilitate the process of communicating Flight Restriction Zone recommendations to the Operations Section in ICS. The tables accompanying the wildlife maps present information on the season(s) during which sites may be particularly sensitive to disturbance.

The fish/shellfish/marine habitat maps present general information on the location of baitfish spawning beaches, herring spawning areas, streams used by anadromous salmonids, hardshell clam concentrations, and kelp and eelgrass beds. This information will be most useful to personnel involved in assessing initial risks to fish and shellfish resources and to those conducting initial beach reconnaissance, pending availability of more detailed resource information and the formation of SCAT teams.

Because the operational uses of this information differ from those of the wildlife data, individual site identification numbers have not been assigned. Tables associated with these maps will identify the seasonal sensitivity of each resource. In addition, notes accompanying each table will provide information on the general distribution and seasonal sensitivity of those resources that are not mapped but may occur anywhere in the GRP region (ex. juvenile salmonids in shallow nearshore waters).

6. Sensitive Resource Description *

6.1. Marine Mammals

6.2. Birds

6.3. Flight Restriction Zones

Flight restriction zones have been designated in the GRP to minimize disturbance to certain wildlife species. An identified location could represent a marine mammal haulout site, a seabird or heron colony, or the individual nest of a sensitive species such as bald eagle. While some zones may be restricted year around, others will be in effect only during the months listed in the matrix.

The no-fly bubble is the area within a 1,500 foot radius and below 1,000 feet in altitude around the location.

All aircraft, including those from the government, contractors or media, are expected to avoid these zones when restrictions are in effect. In the event that one of these zones must be entered during a spill response, clearance must be obtained from the Washington Department of Fish and Wildlife (WDF&W) and the United States Fish and Wildlife Service (USFWS), or when marine mammals other than sea otters are concerned, the National Marine Fisheries Service (NMFS). Sea otters are managed by the United States Fish and Wildlife Service.

During oil spills, pilots are also asked to avoid disturbing any large concentrations of birds and other wildlife. By keeping a safe distance or altitude, pilots can prevent the accidental hazing of unaffected wildlife into oiled areas and minimize the risk of aircraft/ bird collisions.

6.4. Hazing

Hazing or directed harassment, is a method used to drive or herd wildlife out of an area where they are at risk of becoming oiled. Hazing techniques include the use of visual and audio devices, personnel for herding, vessels and aircraft. In the right circumstances it can be an effective tool for protecting some wildlife species. In other cases it can be disastrous as unaffected wildlife can be driven into oiled areas, or forced to abandon nests or young.

National Marine Fisheries Service staff or their designees will perform all hazing of marine mammals other than sea otters. Before hazing can begin for all other species of wildlife, clearance must be obtained from the Washington Department of Fisheries and Wildlife and the United States Fish and Wildlife Service. All hazing efforts during a spill will be directed by these agencies. The deliberate harassment of wildlife without first securing permission from these agencies is a violation of Federal and State laws.

The following information must be provided for a determination on whether hazing might be authorized in a given situation.

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* Generated for the GRP by the Spill Response and Resource Protection Team of the Washington Department of Fish and Wildlife

1. Description of the situation where hazing authorization is being sought
2. Location to be hazed
3. Species of wildlife to be hazed and number of animals
4. Methods and equipment used
5. Date and time of hazing
6. Name, phone number, radio frequency, pager number and the amount of hazing experience of the individual requesting permission

The responsible agencies will evaluate each request on a case by case basis. All hazing of marine mammals, threatened and endangered species, and all hazing by aircraft will be performed only under authority and general supervision of WDF&W, USFWS, NMFS or persons designated by these agencies. Representatives of these agencies can be contacted through the planning section of the Unified Command System during the spill event.

5.5. Flight Restriction Zones/ Sensitive Wildlife

PORT TOWNSEND FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

Map Page18441

Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Restriction	Flight and Ground Entry Restrictions * PERIOD OF SENSITIVITY: Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WAI-9	Port Townsend		Yes	Yes				No												
WAI-10	Marrowstone Pt.					Yes		Yes												
WAI-10A	Kilisut Hrbr Spit				Yes			No												
WAI-11	Glen Cove					Yes		Yes												
WAI-12	Kilisut Harbor			Yes	Yes	Yes		Yes												
WAI-14	Kala Point			Yes				Yes												
WAI-15	Hadlock			Yes				Yes												

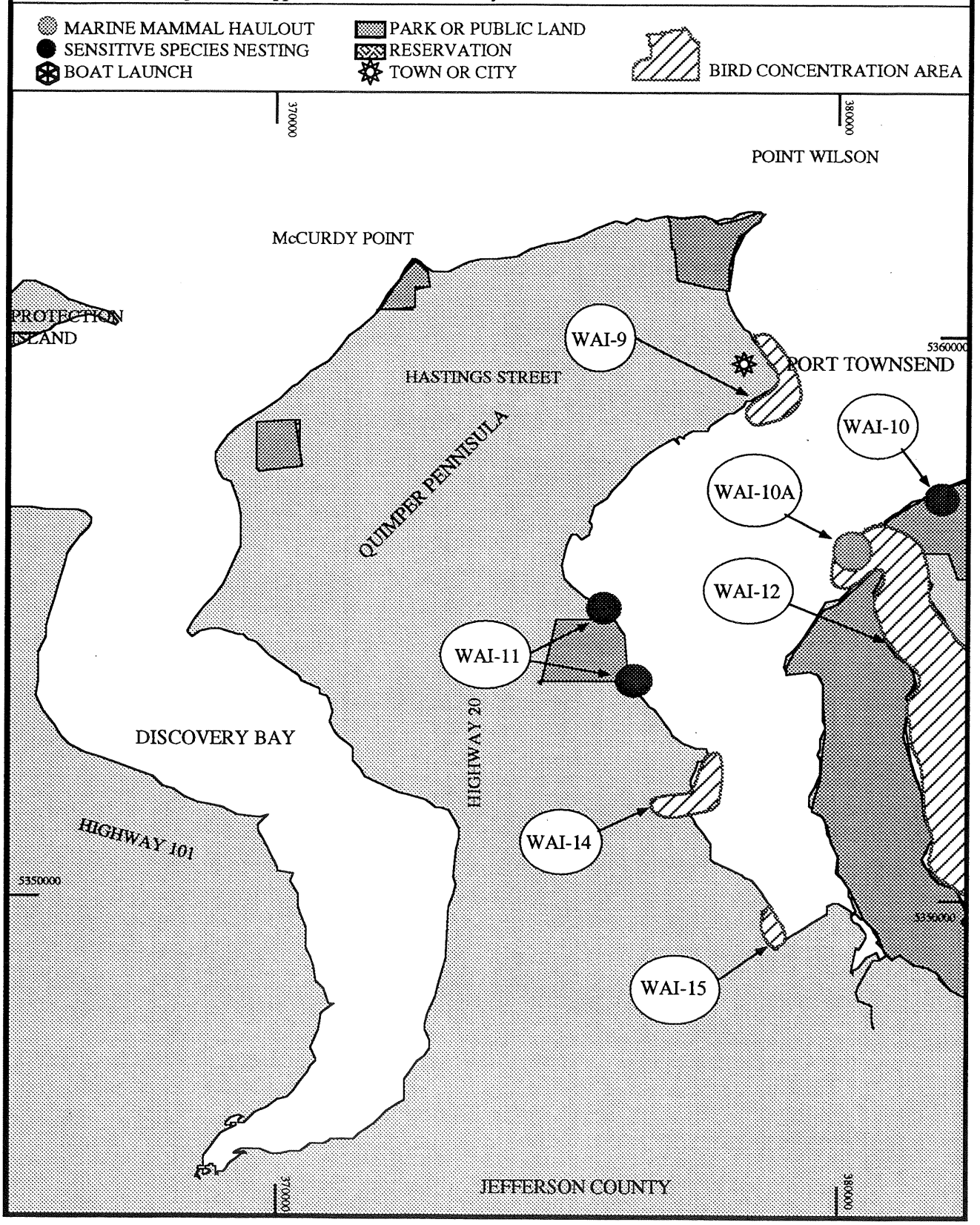
* FLIGHT AND GROUND ENTRY RESTRICTIONS

Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

PORT TOWNSEND
FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.



MARROWSTONE ISLAND FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

Map Page18441

Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Exclusion	Flight and Ground Entry Restrictions * PERIOD OF SENSITIVITY: Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WAI-1	Crockett Lake			Yes			Yes	Yes												
WAI-2	Lake Hancock Wtlds			Yes				No												
WAI-3	Lagoon Point			Yes				No												
WAI-4	Bush Point					Yes		Yes												
WAI-10	Marrowstone Point					Yes		Yes												
WAI-10A	Kilisut Harbor Spit				Yes			No												
WAI-12	Kilisut Harbor			Yes	Yes	Yes		Yes												
WAI-13	Nodule Point					Yes		Yes												
WAI-13A	E. Marrowstone I.				Yes			No												
WAI-16	Upper Oak Bay		Yes	Yes				No												
WAI-17	Kinney Point					Yes		Yes												
WAI-18	Olele Point					Yes		Yes												
WNC-10	Baby Island				Yes			Yes												
WNC-11	Freeland					Yes		Yes												
WNC-14	North Bluff					Yes		Yes												

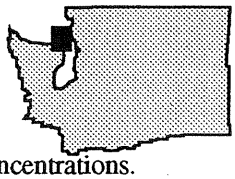
* FLIGHT AND GROUND ENTRY RESTRICTIONS

Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

MARROWSTONE ISLAND

HOOD CANAL / ADMIRALTY INLET GRP



FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.

MARINE MAMMAL HAULOUT
SENSITIVE SPECIES NESTING
BOAT LAUNCH
PARK OR PUBLIC LAND
RESERVATION
TOWN OR CITY
BIRD CONCENTRATION AREA

FORT CASEY STATE PARK
WAI-1
SARATOGA PASSAGE
WAI -10A
WAI-10
WAI-2
WNC-14
WAI-3
FORT FLAGER STATE PARK
WAI-12
WHIDBEY ISLAND
WNC-10
JEFFERSON CO
ISLAND CO
U.S. NAVAL RES
WAI-13A
WAI-4
HIGHWAY 525
MARROWSTONE ISLAND
WAI-13
PUGET SOUND
WAI-17
WAI-16
WNC-11
WAI-18
5330000
5320000
520000
530000

PORT GAMBLE FLIGHT RESTRICTION ZONES / SENSTIVE WILDLIFE

Map Page18441

Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Restriction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
									Flight and Ground Entry Restrictions * PERIOD OF SENSITIVITY											
WAI-5	Double Bluff					Yes		Yes												
WAI-6	Deer Lagoon			Yes		Yes	Yes	Yes												
WAI-18	Olele Point					Yes		Yes												
WAI-19	Klas Point				Yes			Yes												
WAI-20	Clovos Rocks				Yes			Yes												
WAI-20A	Tala Point				Yes			No												
WAI-21	Mouth of Hood Canal		Yes					No												
WAI-22	Skunk Bay					Yes		Yes												
WAI-23	Point No Point					Yes		Yes												
WAI-23A	Pilot Point					Yes		Yes												
WAI-24	Coon Bay Area					Yes		Yes												
WAI-24A	Coon Bay area			Yes				No												
WAI-25	Point Hannon					Yes		Yes												
WAI-25A	Hood Head					Yes		Yes												
WAI-26	Port Gamble		Yes			Yes		Yes												
WAI-26A	Teekalet Bluff					Yes		Yes												
WAI-26B	Port Gamble					Yes		Yes												
WAI-26C	Port Gamble					Yes		Yes												
WAI-26D	Port Gamble					Yes		Yes												
WAI-26E	Port Gamble				Yes			Yes												
WAI-27	Apple Cove Point					Yes		Yes												

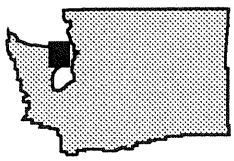
* FLIGHT AND GROUND ENTRY RESTRICTIONS

Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

PORT GAMBLE

HOOD CANAL / ADMIRALTY INLET GRP



FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.

MARINE MAMMAL HAULOUT
SENSITIVE SPECIES NESTING
BOAT LAUNCH
PARK OR PUBLIC LAND
RESERVATION
TOWN OR CITY
BIRD CONCENTRATION AREA

WAI-19
WAI-20
WAI-18
WAI-5
WAI-6
WAI-22
WAI-20A
WAI-23
WAI-24
WAI-21
WAI-24A
WAI-23A
WAI-25
WAI-25A
WAI-26A
WAI-27
WAI-26
WAI-26E
WAI-26B
WAI-26D
WAI-26C

530000
5310000
5360000
5300000
5300000

ISLAND CO
JEFFERSON
KITSAP
ADMIRALTY INLET
PORT LUDLOW
HIGHWAY 104
HOOD CANAL BRIDGE
HOOD CANAL
PORT GAMBLE
PORT GAMBLE INDIAN RES

MUKILTEO FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

Map Page 18441		Seabird	Seabird	Waterfowl	Marine Mammal	Sensitive	Shorebird	Flight	Flight and Ground Entry Restrictions* PERIOD OF SENSTIVITY											
Code	Location	Colony	Conc	Conc	Haulout	nesting species	concentration	Exclusion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WAI-6	Deer Lagoon			Yes		Yes	Yes	Yes												
WAI-7	Cultus Lake			Yes		Yes	Yes	Yes												
WAI-8	Possession Point		Yes					No												
WAI-8A	Possession Point					Yes		Yes												
WNC-2	Picnic Point					Yes		Yes												
WNC-3	Possession Point S.					Yes		Yes												
WNC-4	Possession Point N.					Yes		Yes												
WNC-5	Glendale					Yes		Yes												
WNC-34	Mukilteo "Rip"		Yes					No												
WNC-35	Possession Pt. "Rip"		Yes					No												

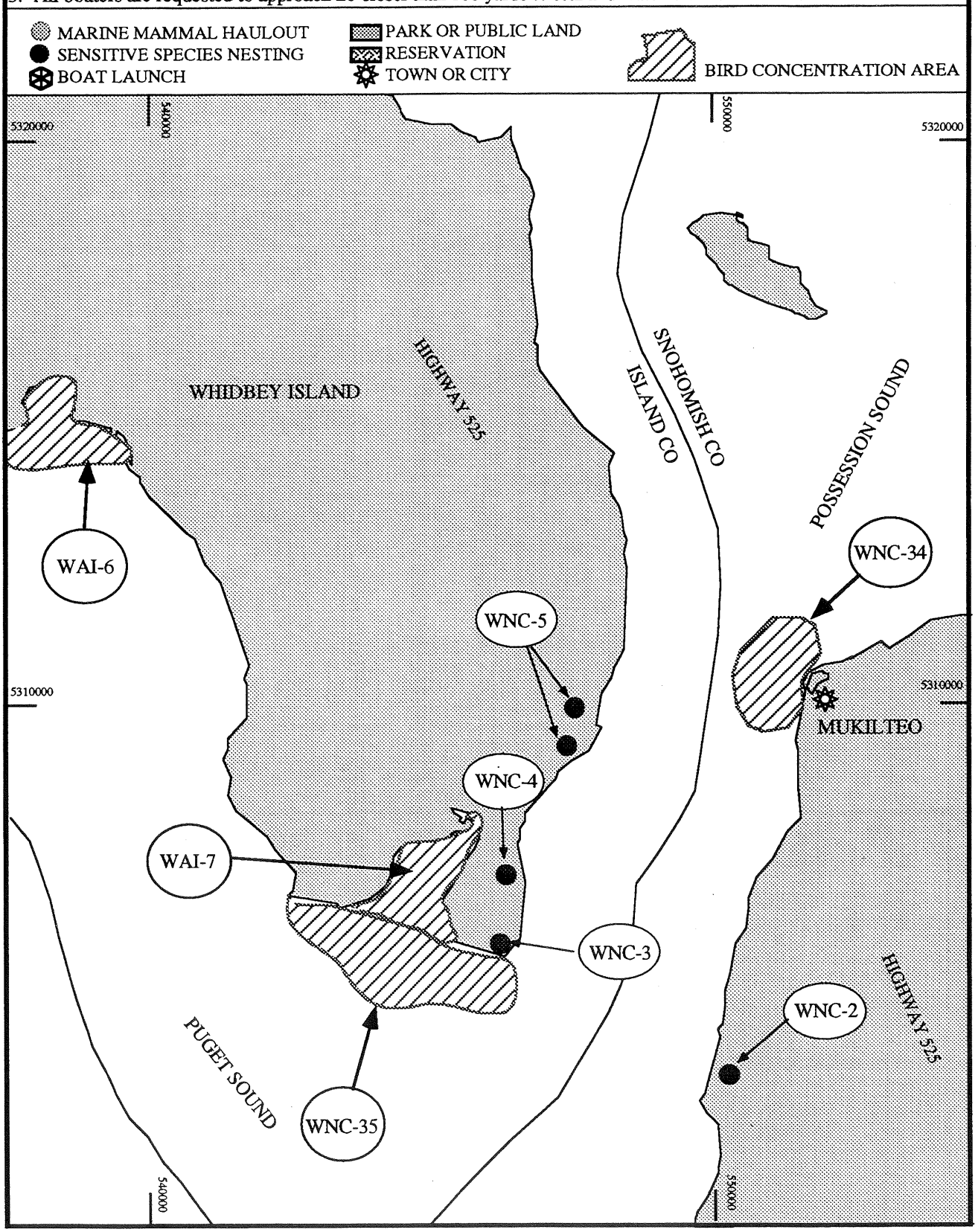
* FLIGHT AND GROUND ENTRY RESTRICTIONS

Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

MUKILTEO
FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.



QUILCENE FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

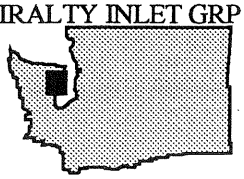
Map Page 18441

Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Restriction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
									Flight and Ground Entry Restriction * PERIOD OF SENSITIVITY											
WHC-1	South Pt.					Yes		Yes												
WHC-2	Thorndyke Bay			Yes		Yes		Yes												
WHC-3	Brown Pt.					Yes		Yes												
WHC-4	Dabob Bay, Long Spit				Yes			No												
WHC-5	Dabob Bay					Yes		Yes												
WHC-6	Dabob Bay					Yes		Yes												
WHC-7	Dabob Bay, Broad Spit				Yes			No												
WHC-8	Dabob Bay, Broad Spit					Yes		Yes												
WHC-9	N. Tabook Pt.					Yes		Yes												
WHC-10	Tabook Pt.					Yes		No												
WHC-11	Quilcene Bay					Yes		Yes												
WHC-12	Quilcene Bay					Yes		Yes												
WHC-13	Quilcene Bay				Yes			Yes												
WHC-14	Quilcene Bay				Yes			Yes												
WHC-15	Quilcene Bay			Yes				Yes												

* FLIGHT AND GROUND ENTRY RESTRICTIONS

Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

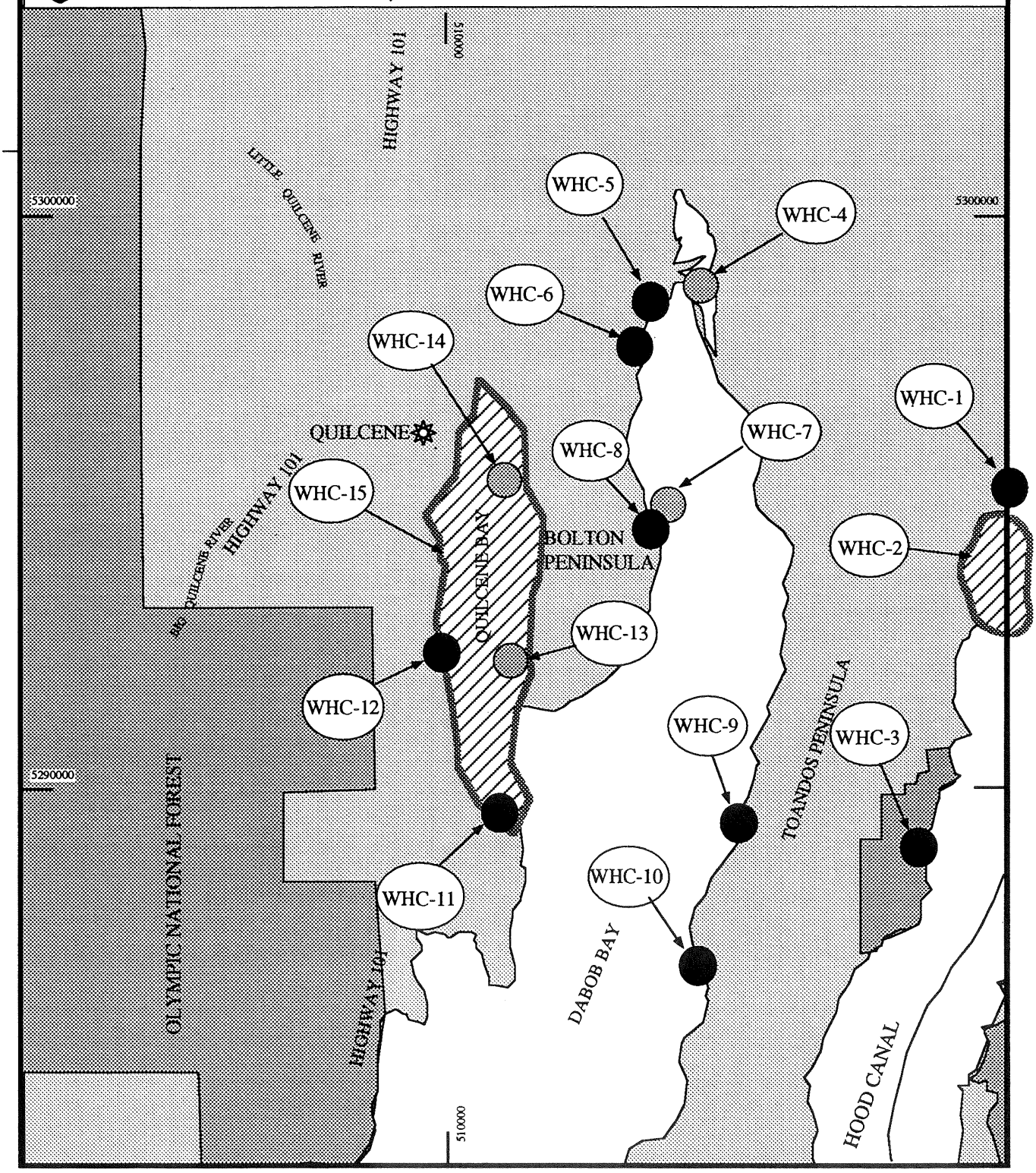
Sensitive season - Minimize overflight disturbance



QUILCENE
FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.

MARINE MAMMAL HAULOUT
SENSITIVE SPECIES NESTING
BOAT LAUNCH
PARK OR PUBLIC LAND
RESERVATION
TOWN OR CITY
BIRD CONCENTRATION AREA



BLACK POINT FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

									Flight and Ground Entry Restrictions * PERIOD OF SENSITIVITY											
Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Exclusion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WHC-16	Dosewallips Rvr Delta				Yes			Yes												
WHC-17	Dosewallips Rvr Delta		Yes	Yes		Yes	Yes	Yes												
WHC-18	Duckabush Rvr Delta				Yes			Yes												
WHC-19	Duckabush Rvr Delta			Yes		Yes		Yes												
WHC-20	Big Beef Harbor					Yes		No												
WHC-21	Big Beef Harbor						Yes	No												
WHC-22	Hazel Pt.					Yes		Yes												

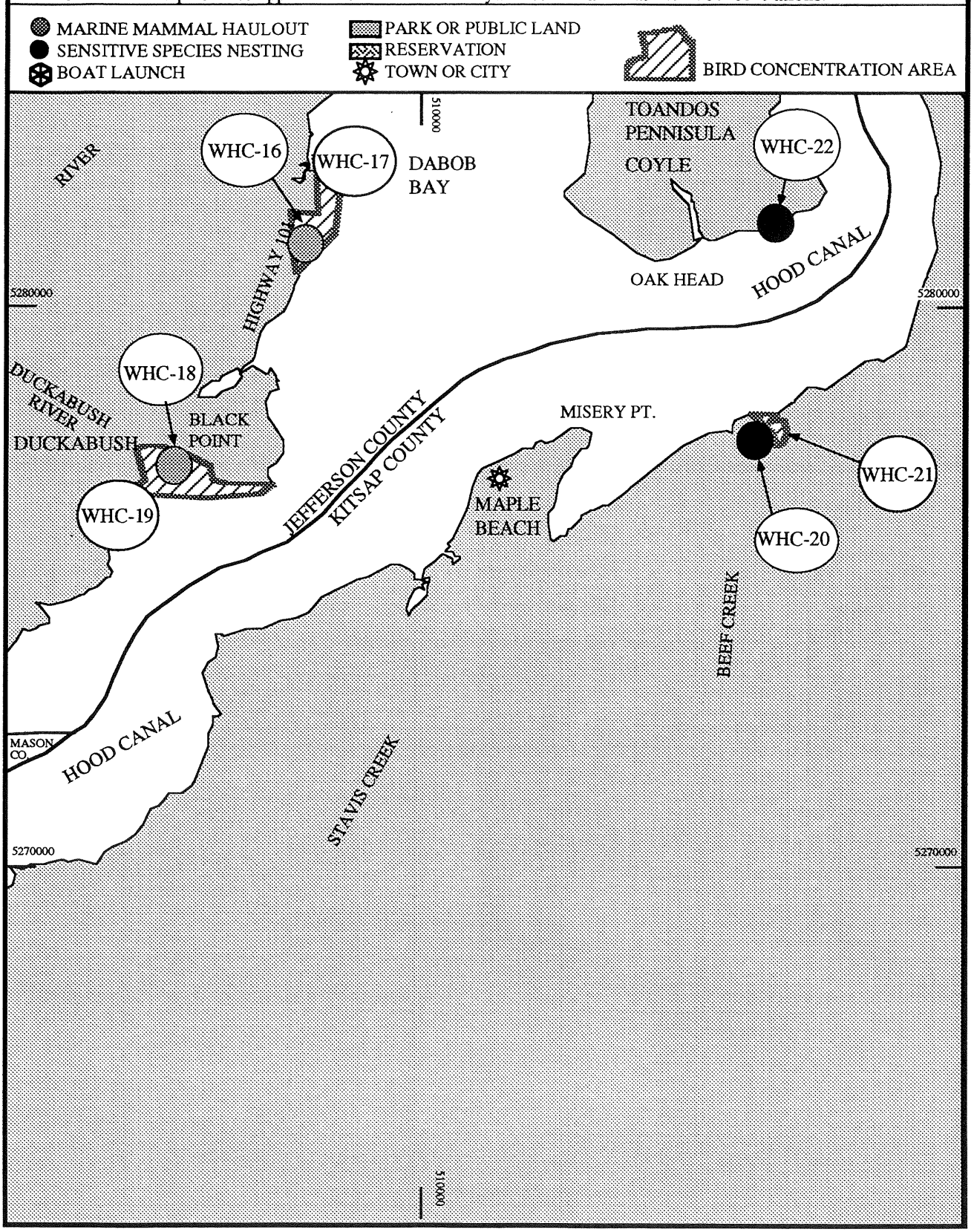
* FLIGHT AND GROUND ENTRY RESTRICTIONS

Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

BLACK POINT
FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.



ELDON FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

Map Page 18448									Flight and Ground Entry Restrictions * PERIOD OF SENSITIVITY											
Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Exclusion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WHC-23	Hamma Hamma River Delta			Yes	Yes	Yes		Yes												
WHC-24	Dewatto Bay					Yes	Yes	Yes												
WHC-25	Lilliwaup Bay			Yes			Yes	No												

* FLIGHT AND GROUND ENTRY RESTRICTIONS

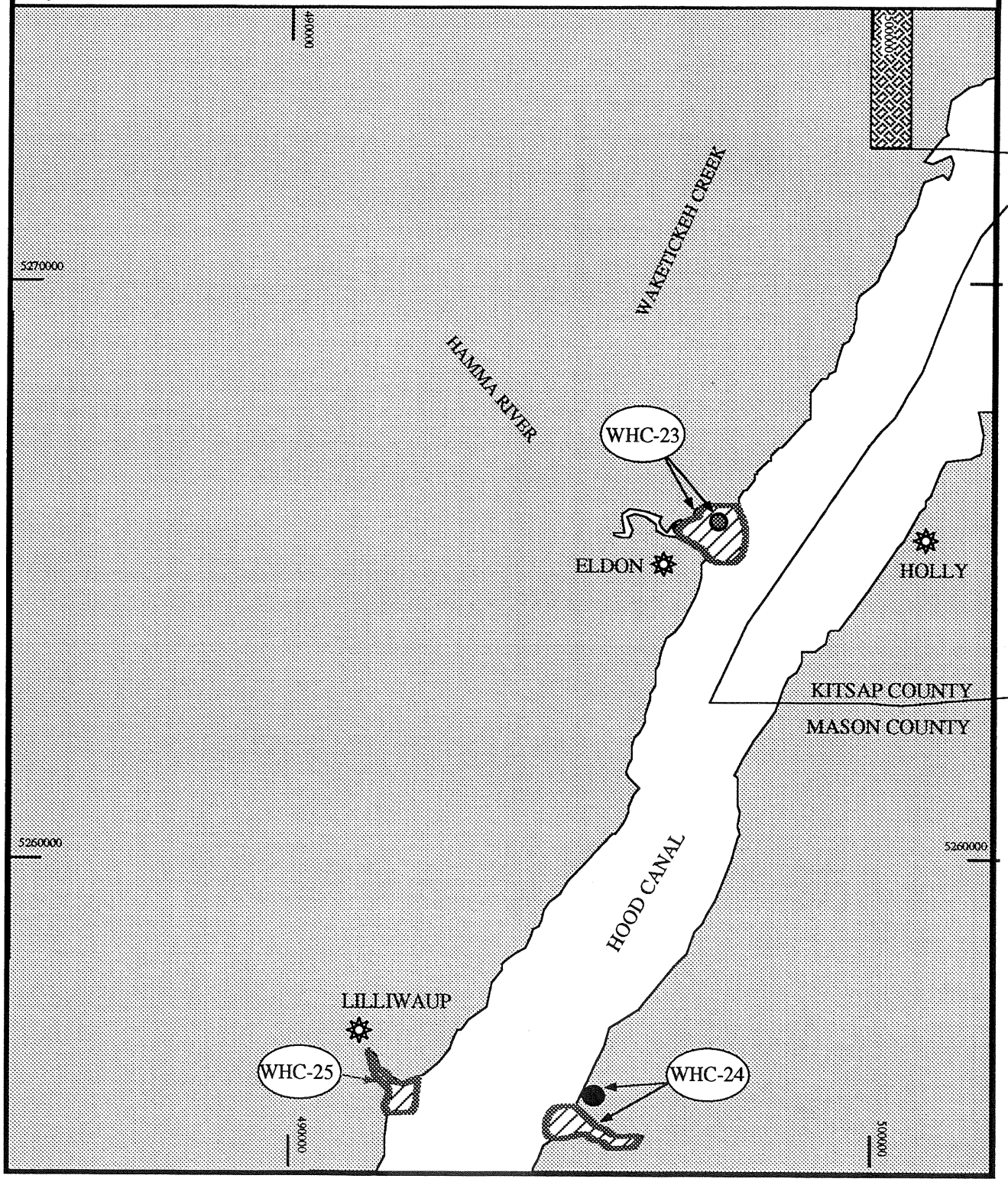
Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

ELDON
FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.

MARINE MAMMAL HAULOUT
SENSITIVE SPECIES NESTING
BOAT LAUNCH
PARK OR PUBLIC LAND
RESERVATION
TOWN OR CITY
BIRD CONCENTRATION AREA



UNION FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

Map Page 18448

Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Exclusion	Flight and Ground Entry Restrictions * PERIOD OF SENSITIVITY											
									Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WHC-26	Skokomish River Delta			Yes	Yes	Yes	Yes	Yes												
WHC-27	Hood Canal - Anna's Bay to Lynch Cove		Yes	Yes			Yes	No												

* FLIGHT AND GROUND ENTRY RESTRICTIONS

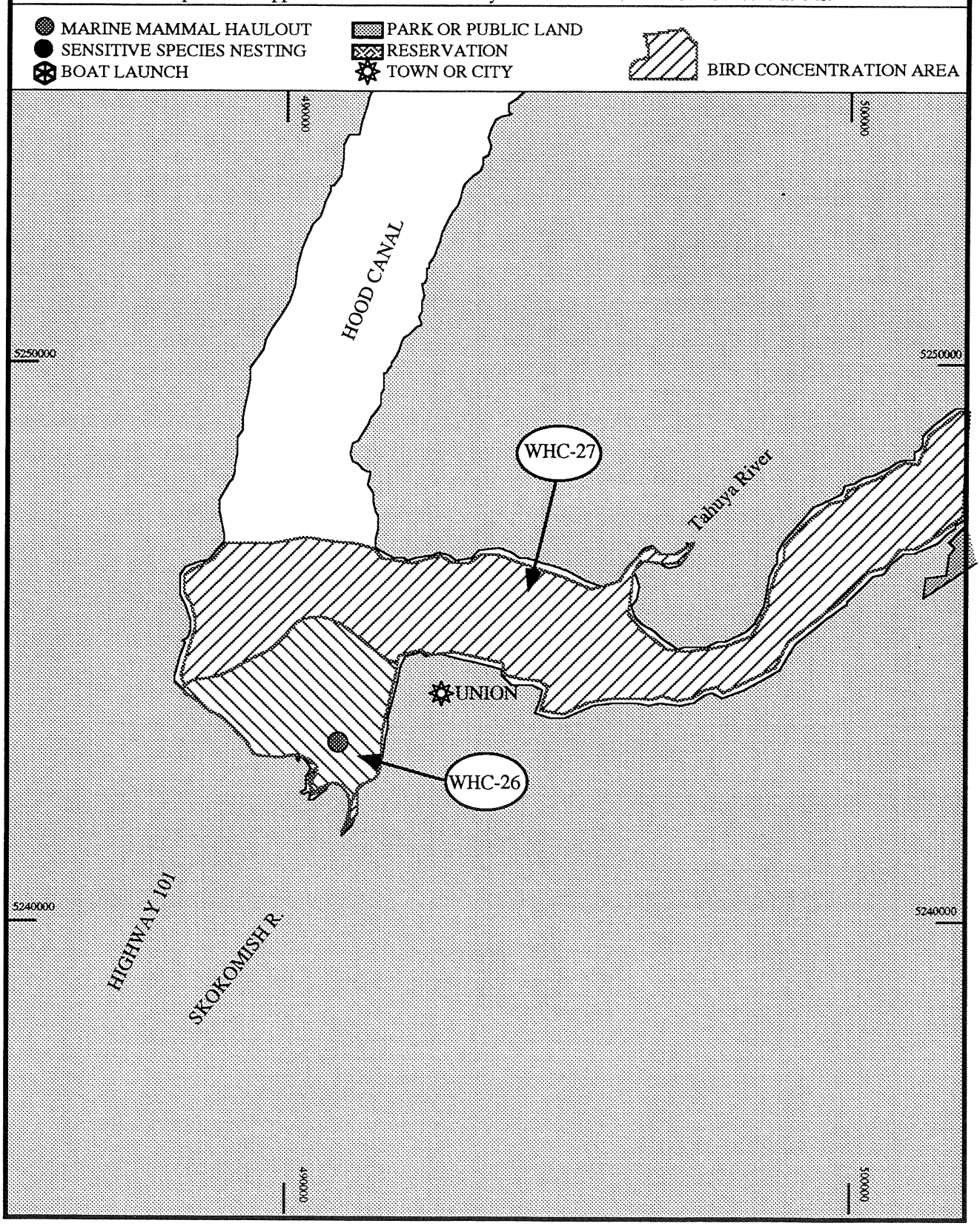
Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

UNION

FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.



BELFAIR FLIGHT RESTRICTION ZONES / SENSITIVE WILDLIFE

Map Page 18448

Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive nesting species	Shorebird concentration	Flight Exclusion	Flight and Ground Entry Restrictions * PERIOD OF SENSITIVITY											
									Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WSP-24	Case Inlet		Yes					No												
WHC-27	Hood Canal - Anna's Bay to Lynch Cove		Yes	Yes			Yes	No												
WHC-28	Lynch Cove			Yes		Yes		No												

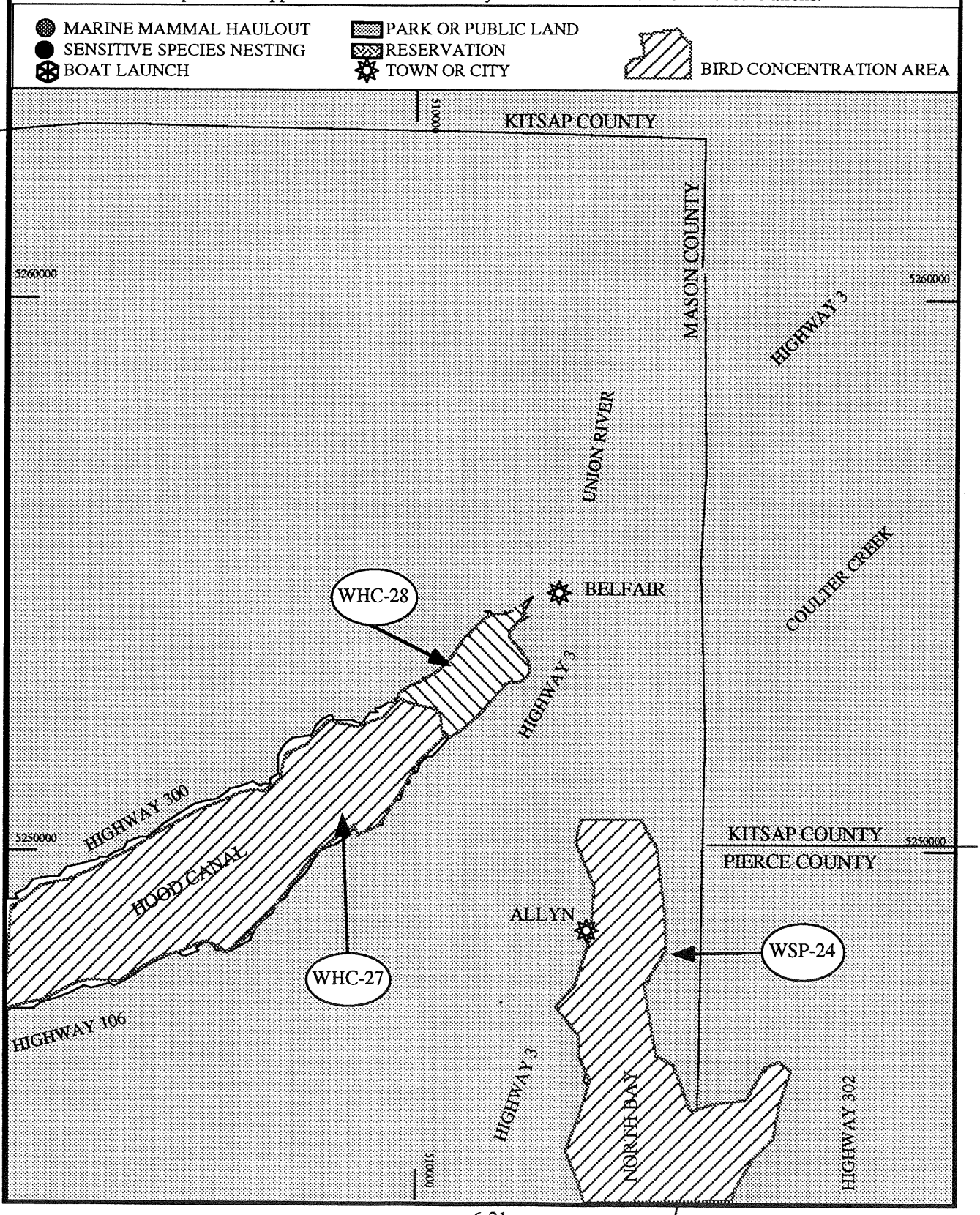
* FLIGHT AND GROUND ENTRY RESTRICTIONS

Flights below 1000 feet require clearance: See appendix on Flight Restriction Zones

Sensitive season - Minimize overflight disturbance

BELFAIR
FLIGHT RESTRICTION ZONES FOR SENSITIVE WILDLIFE SPECIES

1. Pilots refer to the chapter on Flight Restriction Zones.
2. All ground entry within 100 yards of sensitive nesting species is restricted.
3. All boaters are requested to approach no closer than 100 yards to seal and waterfowl concentrations.



Geographic Response Plan

Hood Canal and Admiralty Inlet

Sensitive Species Information

The following maps (draft) represent the current knowledge of some of Washington Department of Fisheries' (WDF) trust resources. The maps focus on nearshore resources of high commercial, recreational, or ecological value. **Adult and juvenile life stages of a number of ecologically and economically important species including salmon, marine fish, baitfish, and shellfish as well as the plankton community are considered to be ubiquitous in distribution and therefore, are not displayed on maps.** Pertinent information on many of these species can be found in the habitat association and timing tables which include information on temporal and spatial distribution, preferred habitat, and relative abundance of various life history stages. This information must be considered in resource protection and damage assessments efforts.

Additional areas of resource occurrence are continually being documented. The extent of intertidal spawning habitat represented in the baitfish maps for surf smelt and Pacific sand lance is updated annually as new spawning areas are documented.

The shellfish maps do not offer complete information on intertidal and subtidal shellfish resources. Surveys run by WDF have been oriented to locating beds that could be commercially harvested. Many intertidal areas are privately owned tidelands upon which WDF has not undertaken a comprehensive inventory of the naturally produced or cultured shellfish resources. No attempt has been made on these maps to differentiate between areas which have not been surveyed and those in which shellfish were not found in commercial quantities.

Due to a combination of new data and incomplete data it is not safe to assume that blank areas on the maps are not of concern. If you have any questions regarding this information please contact the WDF Spill Response and Damage Prevention Unit at 206-902-2570.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Salmon: chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), sockeye (*O. nerka*), chum (*O. keta*), pink (*O. gorbuscha*), and steelhead (*O. mykiss*).

Resource Information Mapped: None.

Resource Use: Human; extensive commercial and recreational fisheries. Non-human; the list of predators on the various life history stages of salmon is extensive and includes several species of birds (bald eagle), fish, marine mammals, and terrestrial mammals.

General Location or Habitat Association of Resource: Salmon spawn and rear in all major Washington watersheds and in many of the smaller tributaries. Numerous salmon culture facilities are located throughout the Puget Sound basin. Salmon are anadromous in that they begin life in fresh water, spend the largest portion of their life in salt water, then return to fresh water to spawn. There is a broad range of life history types both between and within the species. Both juvenile and adult salmon are present year-round throughout this region. It is the primary migratory pathway for salmonids leaving and returning to the Puget Sound basin.

Seasonal Sensitivity: Varies with species, stock, and river system. See habitat association and timing table.

Stock Sensitivity: White River spring chinook, which are listed by the State as critical, are year-round residents in this region. Additionally for each of the species present in the region the following number of stocks are listed as depressed or critical. Chinook - 7 depressed, 1 critical; Chum - 1 critical; Coho - 11 depressed; Pink - 1 depressed; Sockeye - 3 depressed; Steelhead - 7 depressed, 1 critical.

Recommended Protection Strategy: In the estuaries contain and recover oil in the main channels as close to the entrances as possible or divert to shore based recovery points. Keep oil off of the intertidal flats. Where oil cannot be excluded from the beach use clean up techniques which do not force oil into beach substratum or transport it into the lower intertidal or subtidal zones. Boom the river and stream mouths where extensive tidal influence is present.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory (SASSI). Olympia, Washington. 212 pp.

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Herring (*Clupea harengus pallasi*)

Resource Information Mapped: Adult prespawning holding areas and spawning areas.

Resource Use: Human; sport bait fishery targets juvenile fish. Non-human; one of the most important components of the marine food chain; they provide the link between primary production and upper level predators. All life history stages utilized as food by various predators including salmon, rockfish, lingcod, halibut, birds, marine mammals, etc.

General Location or Habitat Association: The primary adult prespawning holding area is located in the northern end of Hood Canal. In this region herring spawning occurs in Port Townsend Bay, Kilisut Harbor, the eastern shoreline of northern Hood Canal, and Port Gamble. Herring deposit their eggs on marine vegetation, such as eel grass or algae, within the shallow subtidal and intertidal zones.

Seasonal Sensitivity or Occurrence: Adult herring congregate in relatively distinct areas during December through June prior to spawning. Exposure of pre-spawning adults to oil can result in the accumulation of hydrocarbon compounds in the yolk of maturing eggs. Metabolism of these compounds during embryonic and larval stages can result in lethal and sublethal genetic, cellular and morphological injuries. Spawning occurs from mid-January through early April. Eggs hatch after approximately 10 days. Larvae and subsequent juvenile fish are found in nearshore areas throughout the following summer. Eggs and larvae are highly susceptible to injury (lethal) from oil exposure.

Recommended Protection Strategy: Utilize open water and nearshore containment and collection techniques to keep oil off of the spawning substrate throughout the region. Use exclusion boom where feasible (Kilisut Harbor and Port Gamble).

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Surf Smelt (*Hypomesus pretiosus*)

Resource Information Mapped: Intertidal surf smelt spawning areas.

Resource Use: Human - commercial and recreational harvest. Non-human - important component of the marine food chain; smelt provide the link between primary production and upper level predators. All life history stages are utilized as food by various predators including salmon, rockfish, lingcod, halibut, birds, marine mammals, etc.

General Location of Sensitive Resource: Surf smelt deposit their eggs in the uppermost intertidal zone on gravel generally having a grain size from 1 to 7 mm. Incubation takes 2 - 4 weeks. Larvae are found in adjacent nearshore surface waters for several weeks following hatching. Spawning areas exist in Port Townsend Bay and Kilisut Harbor. Other undocumented spawning areas are suspected in the region.

Seasonal Sensitivity or Occurrence: Surf smelt spawning occurs in this region from mid-September through March. Eggs and larvae are highly susceptible to injury (lethal) from oil exposure.

Recommended Protection Strategy: Keep oil off of spawning beaches regardless of season. Utilize aggressive open water and nearshore containment and collection techniques to keep oil off of the spawning substrate. Use protection or exclusion boom where feasible (Kilisut Harbor).

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Sand Lance (*Ammodytes hexapterus*)

Resource Information Mapped: Documented intertidal spawning areas and larval rearing areas.

Resource Use: Human - sand lance are used as bait by recreation fishers. Non-human - important component of the marine food chain; sand lance provide the link between primary production and upper level predators. All life history stages are utilized as food by various predators including salmon, rockfish, lingcod, halibut, birds, marine mammals, etc.

General Location or Habitat Association of Resource: Pacific sand lance spawn from November through February and deposit their eggs on upper intertidal sandy-gravel beaches. Documented spawning areas Port Townsend Bay, Kilisut Harbor, NE Marrowstone Is., Point No Point, Bywater Bay, and Port Gamble. Not shown on the map is 10.8 miles of newly documented spawning habitat in Port townsend Bay and Kilisut Harbor. Sand lance larvae are widespread in the regions near-surface waters from January through March. It is suspected that additional spawning and larval habitat exists within the region. Adult sand lance are found in nearshore habitats throughout the region.

Seasonal Sensitivity: The highest sensitivity is during the spawning and larval stages from October through March. Eggs and larvae are highly susceptible to injury (lethal) from oil exposure.

Recommended Protection Strategy: Keep oil off of spawning beaches regardless of season. Utilize aggressive open water and nearshore containment and collection techniques to keep oil off of the spawning substrate. Use protection or exclusion boom where feasible (Kilisut Harbor and Port Gamble).

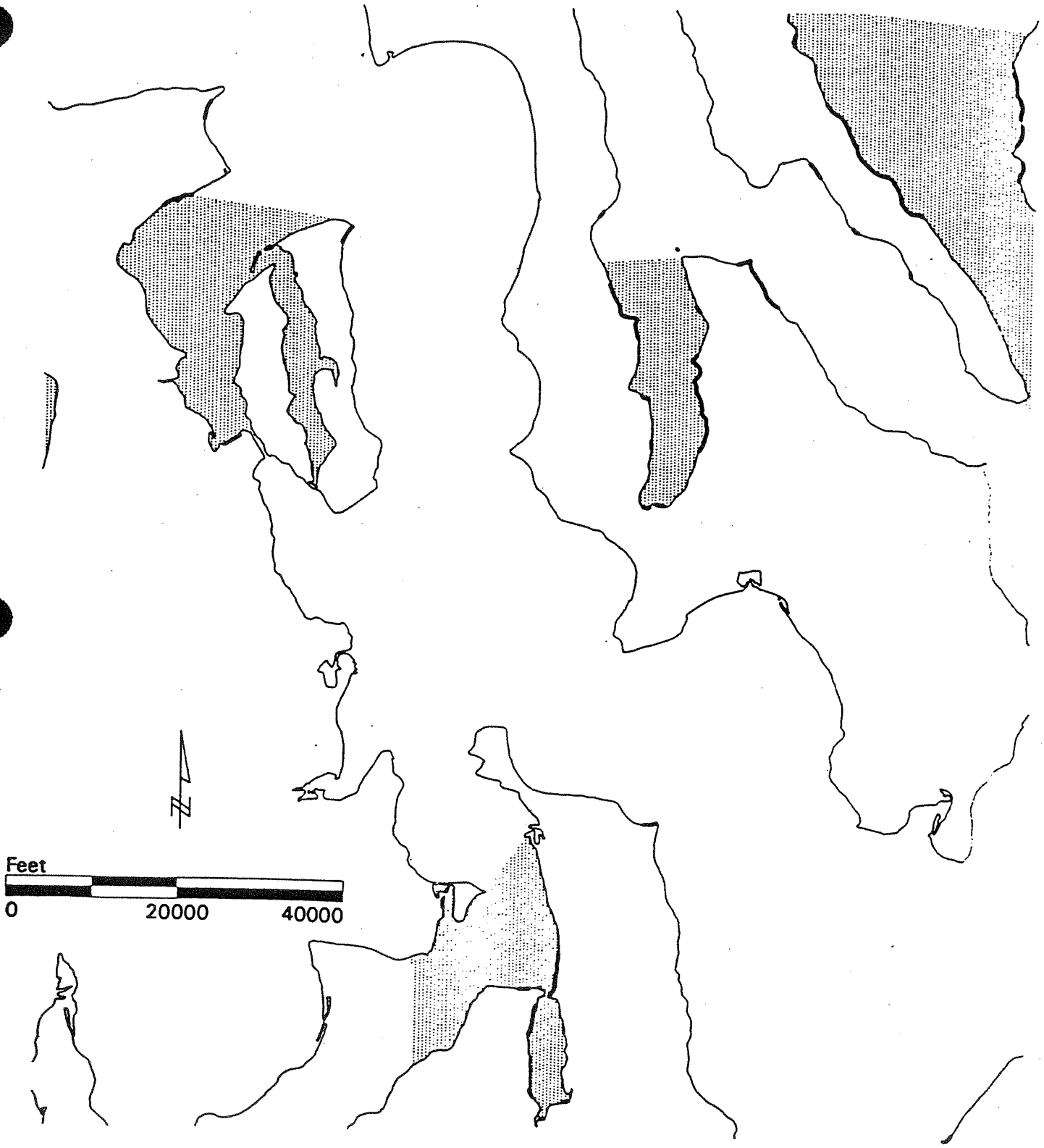
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Admiralty Inlet Baitfish Resources



Sand Lance Spawning

Sand Lance Larvae

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Intertidal and subtidal hardshell clams and intertidal softshell clams.

Resource Information Mapped: Hardshell species include the native littleneck (*Protothaca staminea*), the Manila littleneck (*Tapes philippinarum*), butter clams (*Saxidomus giganteus*), piddock clams (*Zirfaea pilsbryi*), horse clams (*Tresus capax* and *T. nuttallii*), and cockles (*Clinocardium nuttali*). The only softshell species is the eastern softshell clam (*Mya arenaria*).

Resource Use: Human; commercial and recreational harvest. Non human; as a group clams are feed upon by a wide variety of organisms including snails, sea stars, Dungeness and rock crabs, several species of commercially and recreationally import fish, sea otters, raccoons, scoters and other birds.

General Location or Habitat Association of Resource: Clams are found throughout the region with higher concentrations Kilisut Harbor, Oak Bay, Bywater Bay, Port Gamble, Double Bluff/Useless Bay, and Point No Point. Clams are found from approximately +2 m MLLW in the intertidal zone to subtidal depths of -21 m MLLW.

Seasonal Sensitivity: Due to their sessile lifestyle in the intertidal zone clams are at high risk of exposure throughout the year. Sensitivity would be elevated during the spawning and larval period which can extend from April through October.

Recommended Protection Strategy: Utilize protective and exclusion booming where possible (Kilisut Harbor, Port Gamble) and aggressive open water collection techniques elsewhere. Where oil cannot be excluded from the beach use clean up techniques which do not force oil into beach substratum.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

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Admiralty Inlet Shellfish Resources

Intertidal Hardshell Clam
Subtidal Clam
USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Cancer Crab

Resource Information Mapped: Dungeness (*Cancer magister*) and red rock (*C. productus*) crab distribution. Map depicts primarily adults but does cover some juvenile areas.

Resource Use: Human - large commercial and recreational harvest. Non-human - all life history phases are utilized as food by numerous fish species (eg. Pacific herring, lingcod, rockfish, coho and chinook salmon, halibut, English sole and cabezon), octopus, sea otters, harbor seals, sea lions, and gulls.

General Location or Habitat Association of Resource: Cancer crab are found in Port Townsend Bay, Kilisut Harbor, Oak Bay, Bywater Bay, NE Hood Canal, Useless Bay and Point No Point. Adults are found from the intertidal to -90 m MLLW and prefer sandy substrates. Juveniles are found intertidally and typically associated with eelgrass, ulva, bivalve shells, or some form of cover, from +3 to -15 m MLLW. Larvae and megalopae are planktonic. Megalopae are typically found in nearshore waters where they settle to the bottom and metamorphose into juveniles during summer. Females carry incubating eggs beginning in the fall and hatching occurs between February and April.

Seasonal Sensitivity: Larvae/megalopae - planktonic - March through July. Juveniles - epibenthic intertidal - year-round.

Recommended Protection Strategy: Protect nearshore juvenile habitat, particularly eelgrass beds. Utilize protective booming where possible and aggressive open water collection techniques elsewhere.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

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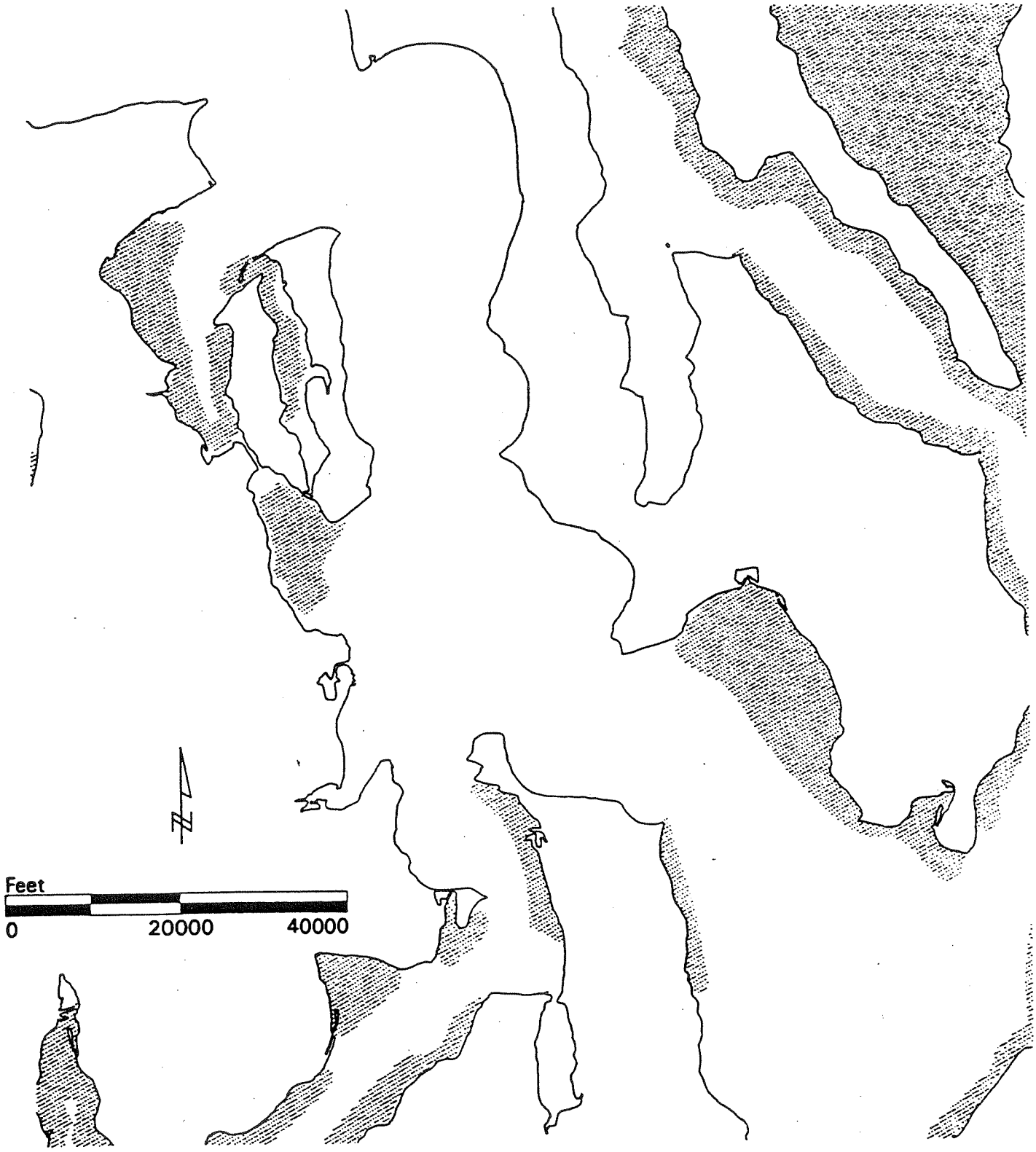
Admiralty Inlet Shellfish Resources



Cancer Crab

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Geoduck Clams (*Panope abrupta*)

Resource Information Mapped: Geoduck clam distribution (commercial quantities).

Resource Use: Human; Geoducks support a large commercial and recreational fisheries. Non human; Geoducks are fed upon by snails, pandalid shrimp, rock crab, English sole, sand sole, rock sole, starry flounder, starfish, and sea otters.

General Location or Habitat Association of Resource: High concentrations of geoducks are found throughout the region. They inhabit depths from +1 to -110 m MLLW and prefer a stable mud and sand substrate.

Seasonal Sensitivity: Sensitivity would be highest during the spawning and larval period from April through August (peak May - July).

Recommended Protection Strategy: Utilize beach clean up techniques which do not transport oil into the subtidal zone.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Admiralty Inlet Shellfish Resources

Geoduck

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Oyster (*Crassostrea gigas*)

Resource Information Mapped: Oyster beds, primarily cultured.

Resource Use: Human - recreational and commercial harvest. Non-human - Oyster beds provide important habitat for juvenile dungeness crab. Juvenile and adult oysters are preyed upon by dungeness and red rock crab, several starfish species, and surf and white-winged scoters.

General Location or Habitat Association of Resource: Pacific oysters are found in the lower intertidal and shallow subtidal zones in Kilisut Harbor, Mats Mats Bay, Bywater Bay and Port Gamble.

Seasonal Sensitivity: Due to their sessile lifestyle in the intertidal zone oysters are at high risk of exposure throughout the year. Relative to their habitat function for juvenile dungeness crab the most sensitive period would be June through December.

Recommended Protection Strategy: Utilize protective booming where possible and aggressive open water collection techniques elsewhere.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

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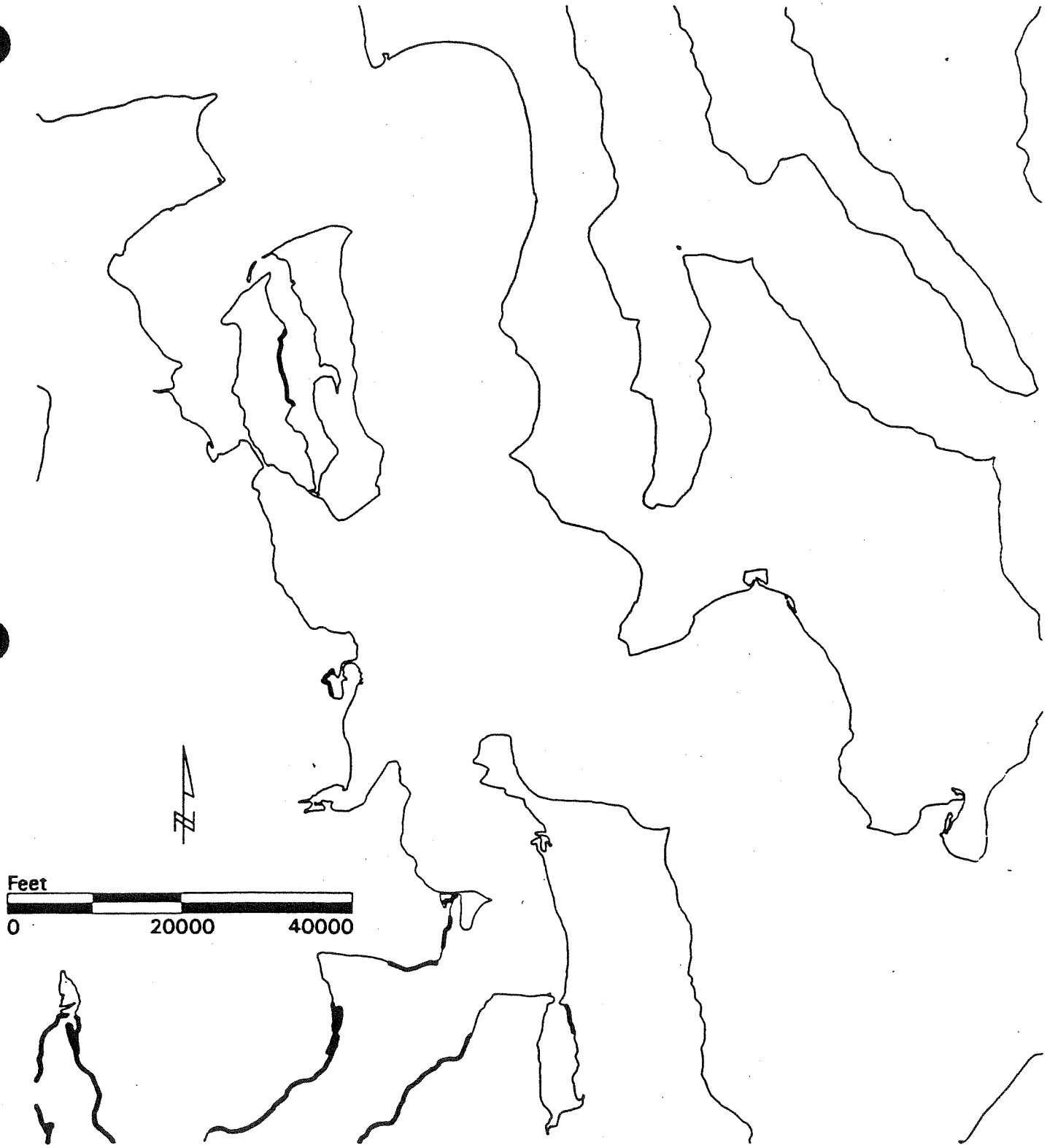
Admiralty Inlet Shellfish Resources



Oyster

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Scallops; rock scallop (*Crassadoma gigantea*), pink scallop (*Chlamys rubida*), and spiny scallop (*Chlamys hastata*).

Resource Information Mapped: Resource presence based on WDF dive surveys.

Resource Use: Human; rock scallop - recreational harvest; pink and spiny scallop - recreational and commercial harvest.

General Location or Habitat Association of Resource: Rock scallops are found from the shallow subtidal to -50 m attached to rocky substrates. Pink and spiny scallops are found from -1 m to -300 m depth. Pinks prefer sandy/muddy substrates while spinys prefer sandy/rocky substrates. Pink and spiny scallops spawn in the fall and summer respectively. Larvae are planktonic for four to five months. Both species have the ability to free swim but will set and remain in an area. Rock scallops are found at northern Marrowstone Is., Lagoon Pt., Mats Mats, and Termination Pt. Pink and spiny scallops are found at Pt. Wilson, NE Marrowstone Is., Mats Mats, Termination Pt., Foulweather Bluff, Point No Point, Possession Pt., and Admiralty Bay.

Seasonal Sensitivity: Summer and fall due to reproductive cycle.

Recommended Protection Strategy: Utilize beach clean up techniques that do not transport oil into shallow subtidal area.

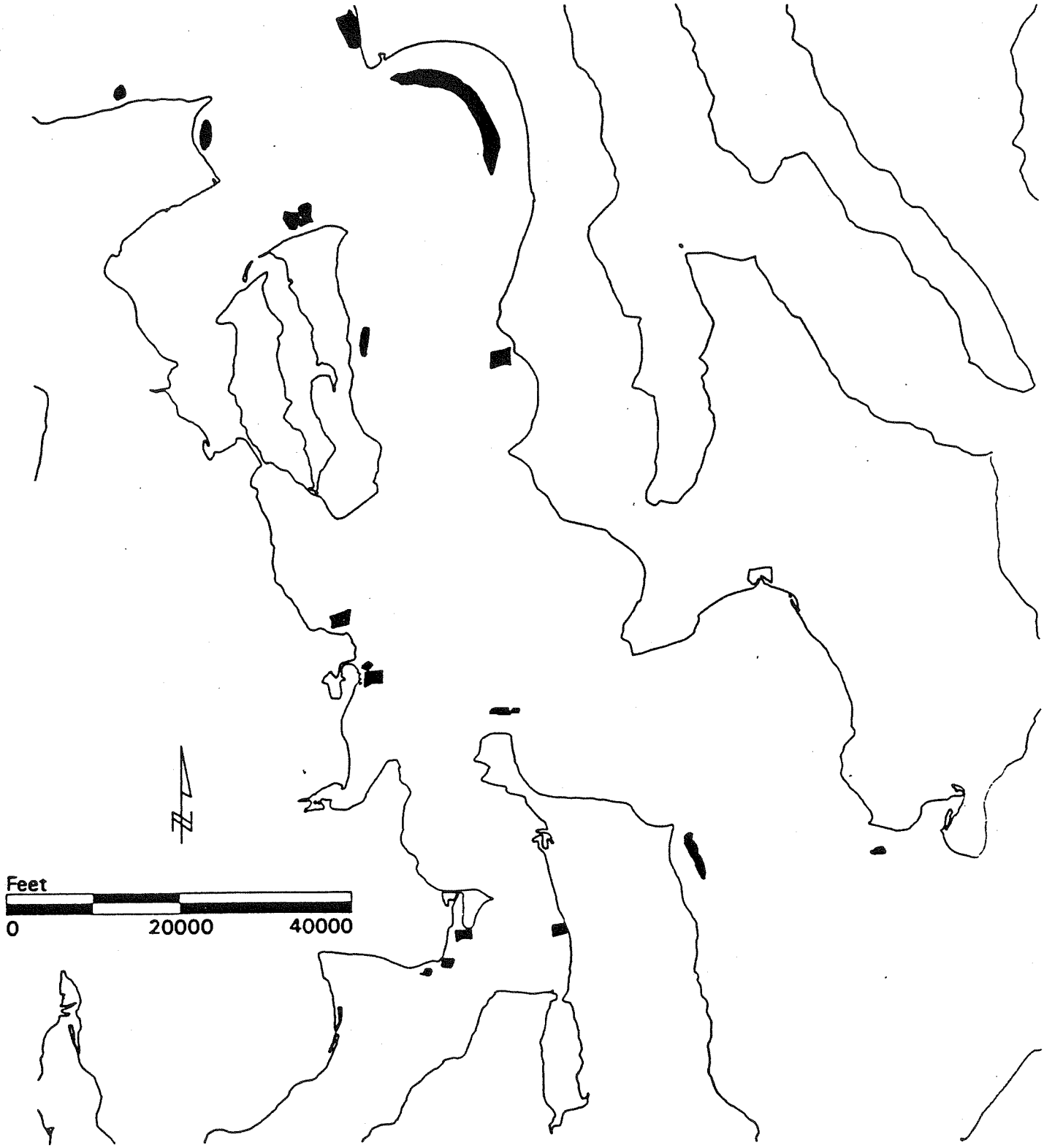
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Siezemore, B. WDF Shellfish Program, personal communication.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Admiralty Inlet Shellfish Resources



Pink and Spiny Scallops

Rock Scallop

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Admiralty Inlet Geographic Response Plan Workshop
Data Recording Sheet

Resource: Octopus (*Octopus dofleini*)

Resource Information Mapped: Documented octopus habitat.

Resource Use: Harvested in commercial, recreational, and subsistence fisheries.

General Location or Habitat Association of Resource: Octopus live in caves or dens from the lower intertidal to the subtidal zones. Octopus have been observed at Pt. Wilson, eastern Marrowstone Is., Mats Mats, NW Hood Canal, Point No Point, and possession Point. Octopus undoubtedly inhabit other areas within the region.

Seasonal Sensitivity: The portion of the population inhabiting the lower intertidal and shallow subtidal zone would be subject to exposure during extreme low tides throughout the year. Octopus are also susceptible to exposure via contaminated prey, particularly clams and crab.

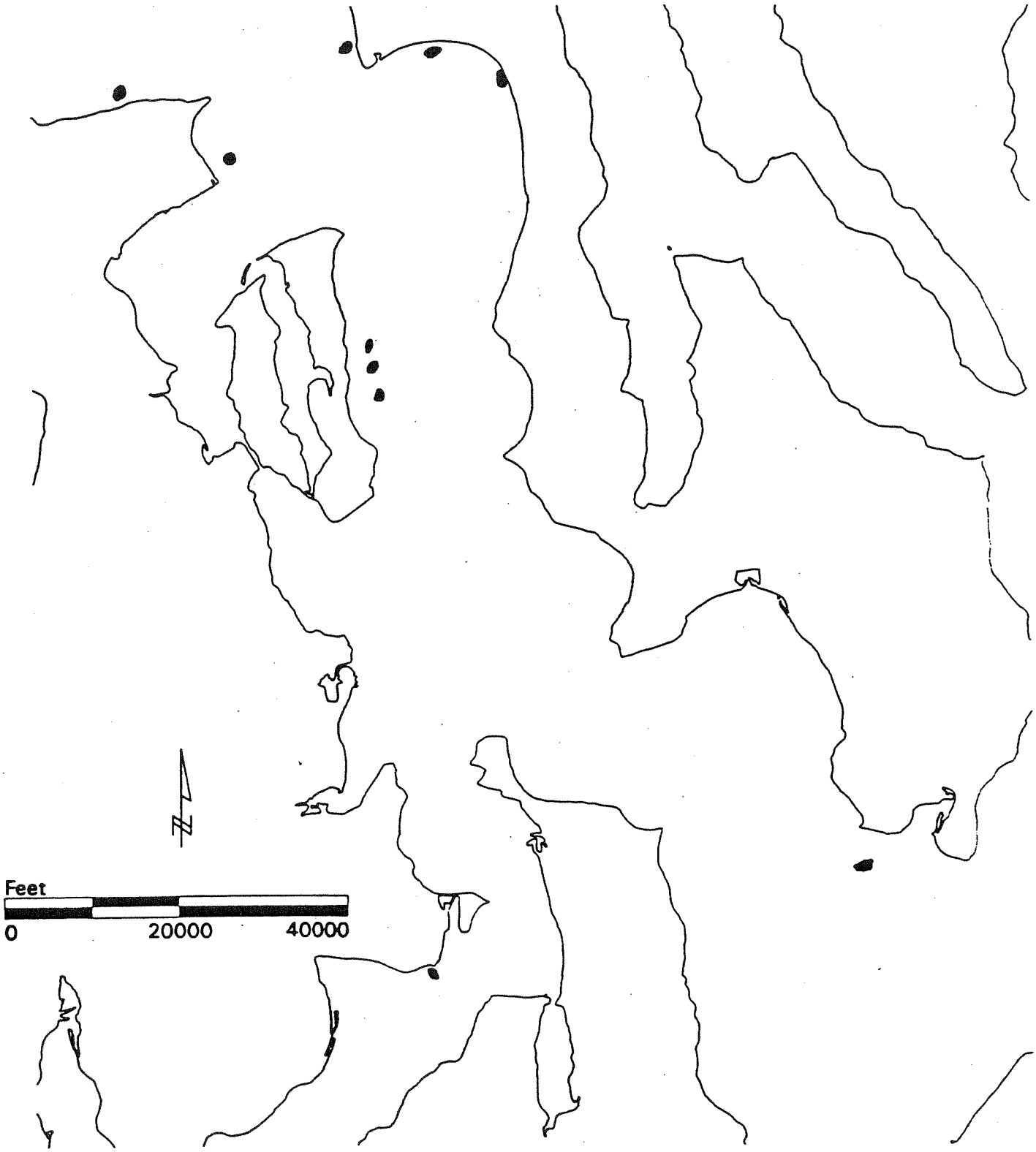
Recommended Protection Strategy: Utilize beach clean up techniques that do not transport oil into shallow subtidal area.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Admiralty Inlet Shellfish Resources



Octopus

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - February 2, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Salmon: chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), sockeye (*O. nerka*), chum (*O. keta*), pink (*O. gorbuscha*), and steelhead (*O. mykiss*).

Resource Information Mapped: Major anadromous streams and salmon culture facilities. This map does not include numerous smaller and very productive streams.

Resource Use: Human; extensive commercial and recreational fisheries. Non-human; the list of predators on the various life history stages of salmon is extensive and includes several species of birds (bald eagle), fish, marine mammals, and terrestrial mammals.

General Location or Habitat Association of Resource: Salmon spawn and rear in all major Washington watersheds and in many of the smaller tributaries. Numerous salmon culture facilities are located throughout the Puget Sound basin. Salmon are anadromous in that they begin life in fresh water, spend the largest portion of their life in salt water, then return to fresh water to spawn. There is a broad range of life history types both between and within the species. Both juvenile and adult salmon are present year-round throughout this region.

Seasonal Sensitivity: Varies with species, stock, and river system. See habitat association and timing table.

Stock Sensitivity: Attached is a list of the Hood Canal stocks, their parent streams, stock type and status. In summary, for each of the species present in the region the following number of stocks are listed as depressed or critical. Chum - 1 critical; Coho - 5 depressed; Pink - 1 depressed; Steelhead - 5 depressed.

Recommended Protection Strategy: In the estuaries contain and recover oil in the main channels as close to the entrances as possible or divert to shore based recovery points. Keep oil off of the intertidal flats. Where oil cannot be excluded from the beach use clean up techniques which do not force oil into beach substratum or transport it into the lower intertidal or subtidal zones. Boom the river and stream mouths where extensive tidal influence is present.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

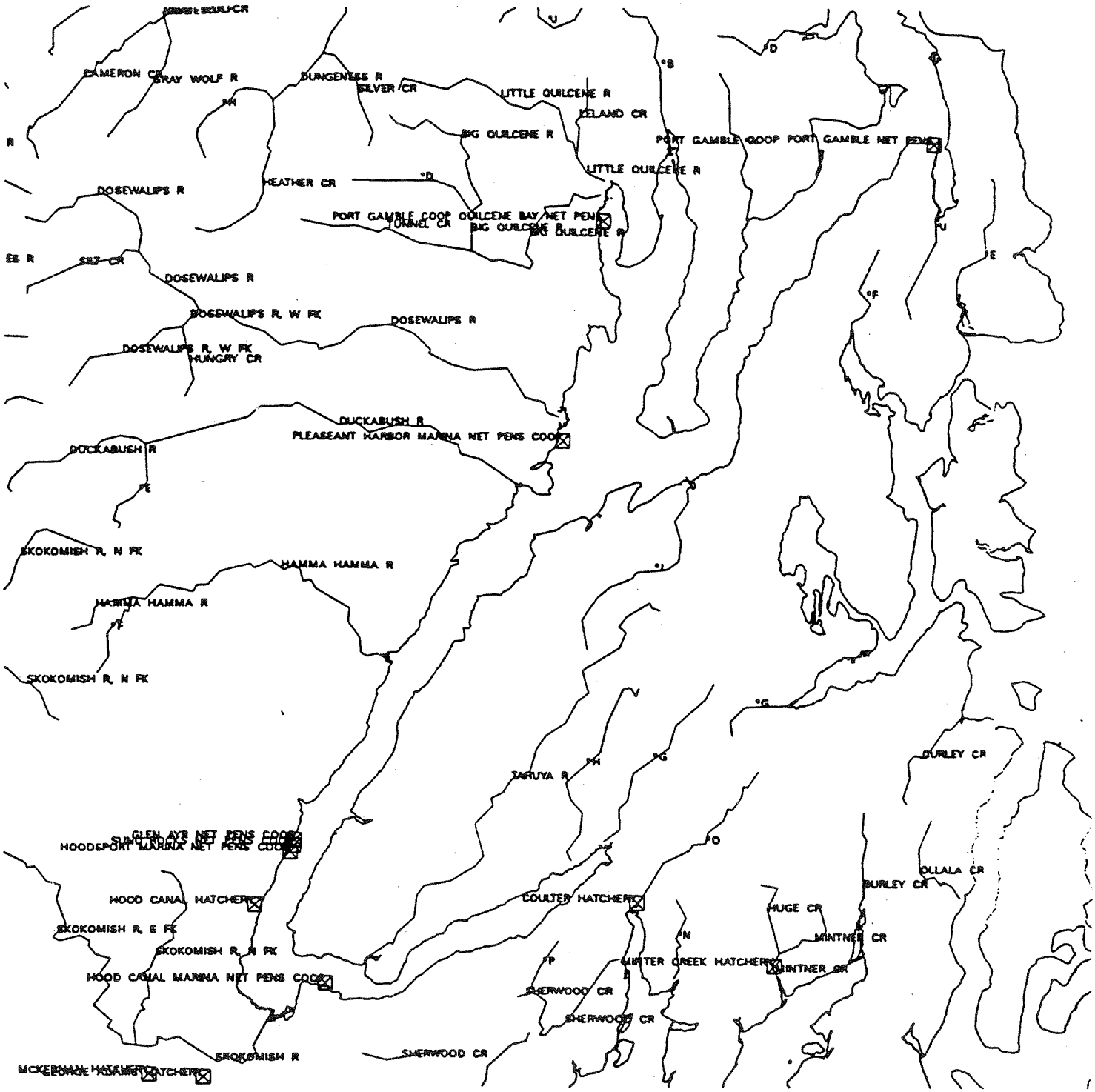
References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory (SASSI). Olympia, Washington. 212 pp.

Hood Canal Anadromous Streams and Salmon Culture Facilities



Source: Washington Department of Fisheries
This map does not portray the smaller and very productive anadromous streams.

Feet
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February 1, 1995

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Herring (*Clupea harengus pallasi*)

Resource Information Mapped: Adult prespawning holding areas and spawning areas.

Resource Use: Human; sport bait fishery targets juvenile fish. Non-human; one of the most important components of the marine food chain; they provide the link between primary production and upper level predators. All life history stages utilized as food by various predators including salmon, rockfish, lingcod, halibut, birds, marine mammals, etc.

General Location or Habitat Association: The adult prespawning holding areas are located in the northern end of Hood Canal near Port Gamble and the southern end near Union. Herring spawning occurs in Squamish Harbor, Salsbury Pt., Quilcene Bay, Whitney Pt., Pleasant Harbor, Quatsap Pt., Seabeck Bay, Stavis Bay, and the southern end of the canal near Lynch Cove. Herring deposit their eggs on marine vegetation, such as eel grass or algae, within the shallow subtidal and intertidal zones.

Seasonal Sensitivity or Occurrence: Adult herring congregate in relatively distinct areas during December through June prior to spawning. Exposure of pre-spawning adults to oil can result in the accumulation of hydrocarbon compounds in the yolk of maturing eggs. Metabolism of these compounds during embryonic and larval stages can result in lethal and sublethal genetic, cellular and morphological injuries. Spawning occurs from mid-January through mid-April. Eggs hatch after approximately 10 days. Larvae and subsequent juvenile fish are found in nearshore areas throughout the following summer. Eggs and larvae are highly susceptible to injury (lethal) from oil exposure.

Recommended Protection Strategy: Utilize open water and nearshore containment and collection techniques to keep oil off of the spawning substrate throughout the region. Use exclusion boom where feasible (Pleasant Harbor).

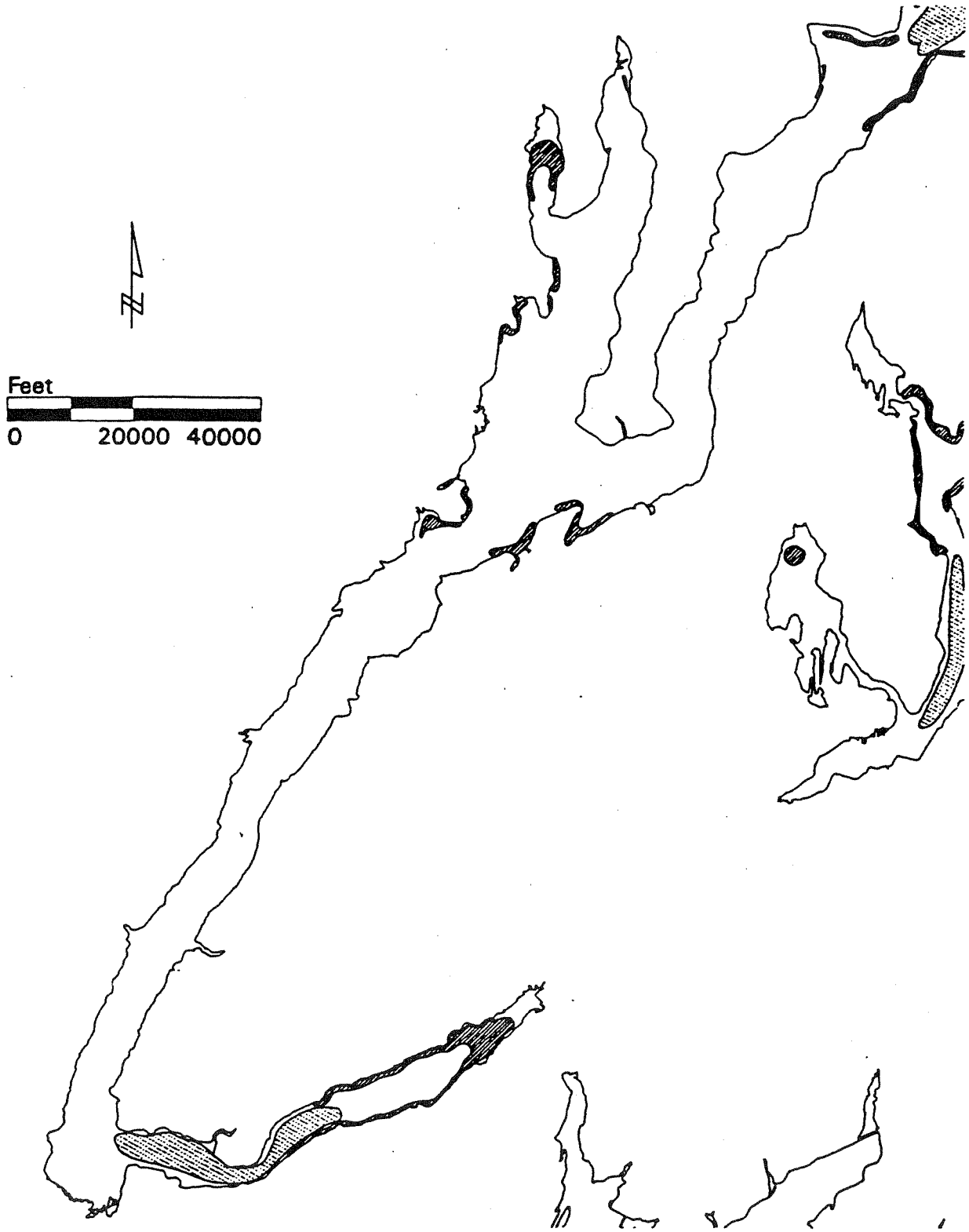
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Hood Canal Baitfish Resources



Herring Spawning

Herring Holding

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Surf Smelt (*Hypomesus pretiosus*)

Resource Information Mapped: Intertidal surf smelt spawning areas.

Resource Use: Human - commercial and recreational harvest. Non-human - important component of the marine food chain; smelt provide the link between primary production and upper level predators. All life history stages are utilized as food by various predators including salmon, rockfish, lingcod, halibut, birds, marine mammals, etc.

General Location of Sensitive Resource: Surf smelt deposit their eggs in the uppermost intertidal zone on gravel generally having a grain size from 1 to 7 mm. Incubation takes 2 - 4 weeks. Larvae are found in adjacent nearshore surface waters for several weeks following hatching. Spawning areas exist along nearly all the shoreline east of the Great Bend, the entire southeast shoreline of Quilcene Bay (not mapped) and scattered sites around northern Dabob Bay (not mapped). Other undocumented spawning areas are suspected in the region.

Seasonal Sensitivity or Occurrence: Surf smelt spawning occurs in this region from mid-September through February. Eggs and larvae are highly susceptible to injury (lethal) from oil exposure.

Recommended Protection Strategy: Keep oil off of spawning beaches regardless of season. Utilize aggressive open water and nearshore containment and collection techniques to keep oil off of the spawning substrate. Use protection or exclusion boom where feasible.

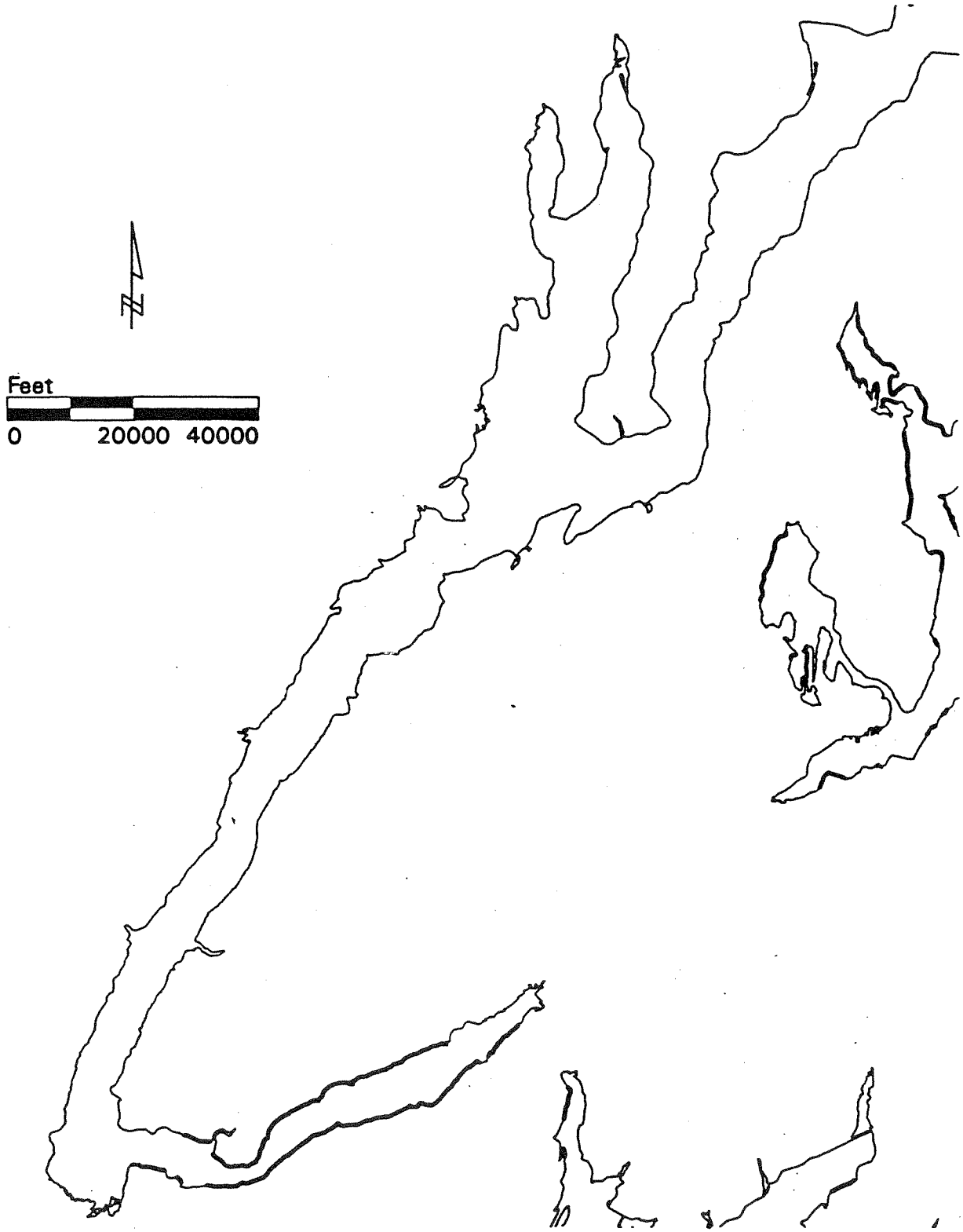
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Hood Canal Baitfish Resources



Smelt Spawning

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Sand Lance (*Ammodytes hexapterus*)

Resource Information Mapped: Documented intertidal spawning areas and larval rearing areas.

Resource Use: Human - sand lance are used as bait by recreation fishers. Non-human - important component of the marine food chain; sand lance provide the link between primary production and upper level predators. All life history stages are utilized as food by various predators including salmon, rockfish, lingcod, halibut, birds, marine mammals, etc.

General Location or Habitat Association of Resource: Pacific sand lance spawn from November through February and deposit their eggs on upper intertidal sandy-gravel beaches. Documented spawning areas shown on the map include Union and Musqueti Pt. Those not shown include scattered sites in Quilcene Bay and northern Dabob Bay, Pleasant Harbor, and Scenic Beach State Park. Sand lance larvae are widespread in the regions near-surface waters from January through March. It is suspected that additional spawning and larval habitat exists within the region. Adult sand lance are found in nearshore habitats throughout the region.

Seasonal Sensitivity: The highest sensitivity is during the spawning and larval stages from October through March. Eggs and larvae are highly susceptible to injury (lethal) from oil exposure.

Recommended Protection Strategy: Keep oil off of spawning beaches regardless of season. Utilize aggressive open water and nearshore containment and collection techniques to keep oil off of the spawning substrate. Use protection or exclusion boom where feasible (Pleasant Harbor).

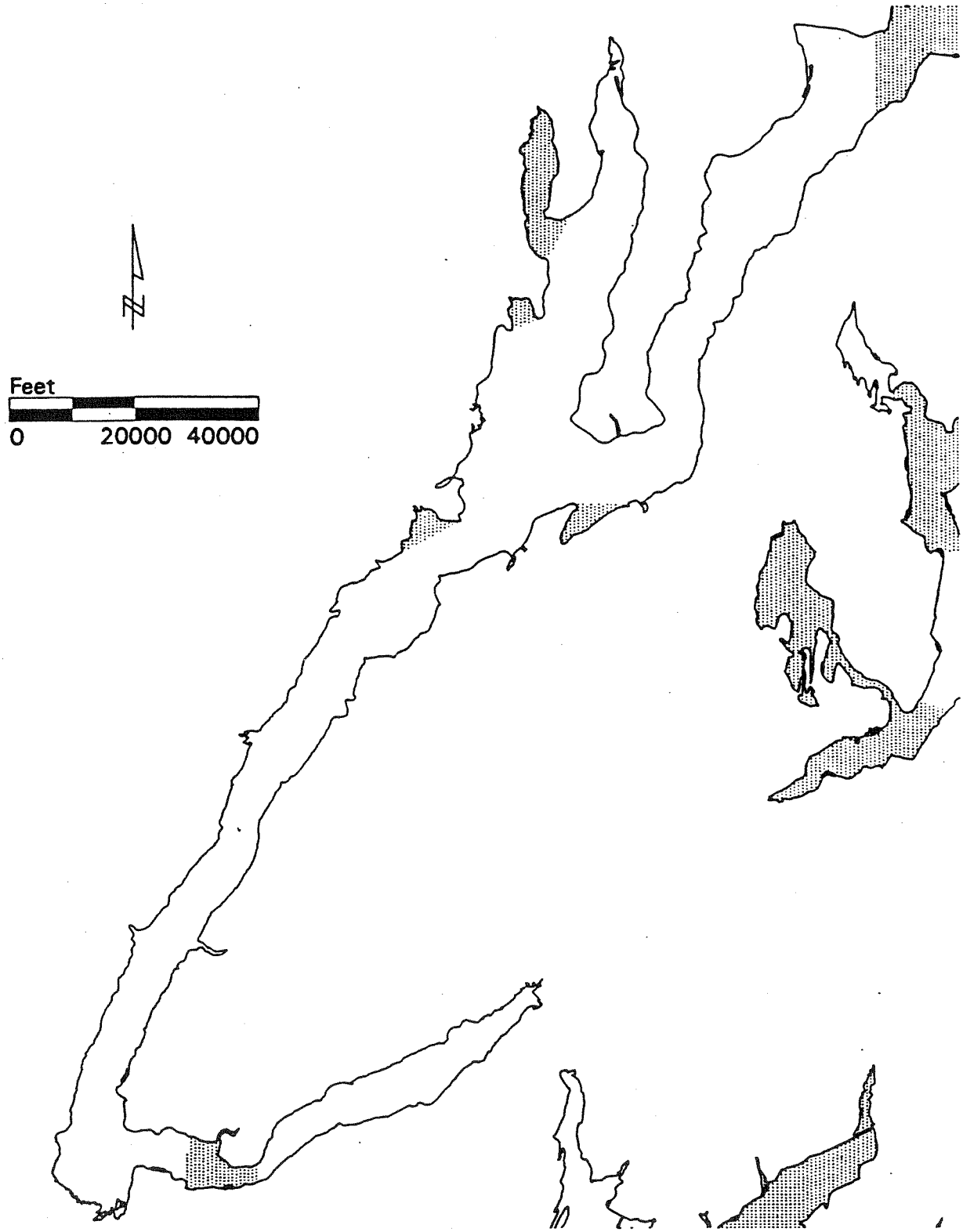
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Hood Canal Baitfish Resources



Sand Lance Spawning

Sand Lance Larvae

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Cancer Crab

Resource Information Mapped: Dungeness (*Cancer magister*) and red rock (*C. productus*) crab distribution. Map depicts primarily adults but does cover some juvenile areas.

Resource Use: Human - large commercial and recreational harvest. Non-human - all life history phases are utilized as food by numerous fish species (eg. Pacific herring, lingcod, rockfish, coho and chinook salmon, halibut, English sole and cabezon), octopus, sea otters, harbor seals, sea lions, and gulls.

General Location or Habitat Association of Resource: Cancer crab are found throughout Hood Canal. Priority areas include Quilcene Bay, the Dosewallips, Duckabush and Hamma Hamma River mouths, Lilliwaup, Annas Bay, Tahuya, and Seabeck Bay. Adults are found from the intertidal to -90 m MLLW and prefer sandy substrates. Juveniles are found intertidally and typically associated with eelgrass, ulva, bivalve shells, or some form of cover, from +3 to -15 m MLLW. Larvae and megalopae are planktonic. Megalopae are typically found in nearshore waters where they settle to the bottom and metamorphose into juveniles during summer. Females carry incubating eggs beginning in the fall and hatching occurs between February and April.

Seasonal Sensitivity: Larvae/megalopae - planktonic - March through July. Juveniles - epibenthic intertidal - year-round.

Recommended Protection Strategy: Protect nearshore juvenile habitat, particularly eelgrass beds. Utilize protective booming where possible and aggressive open water collection techniques elsewhere.

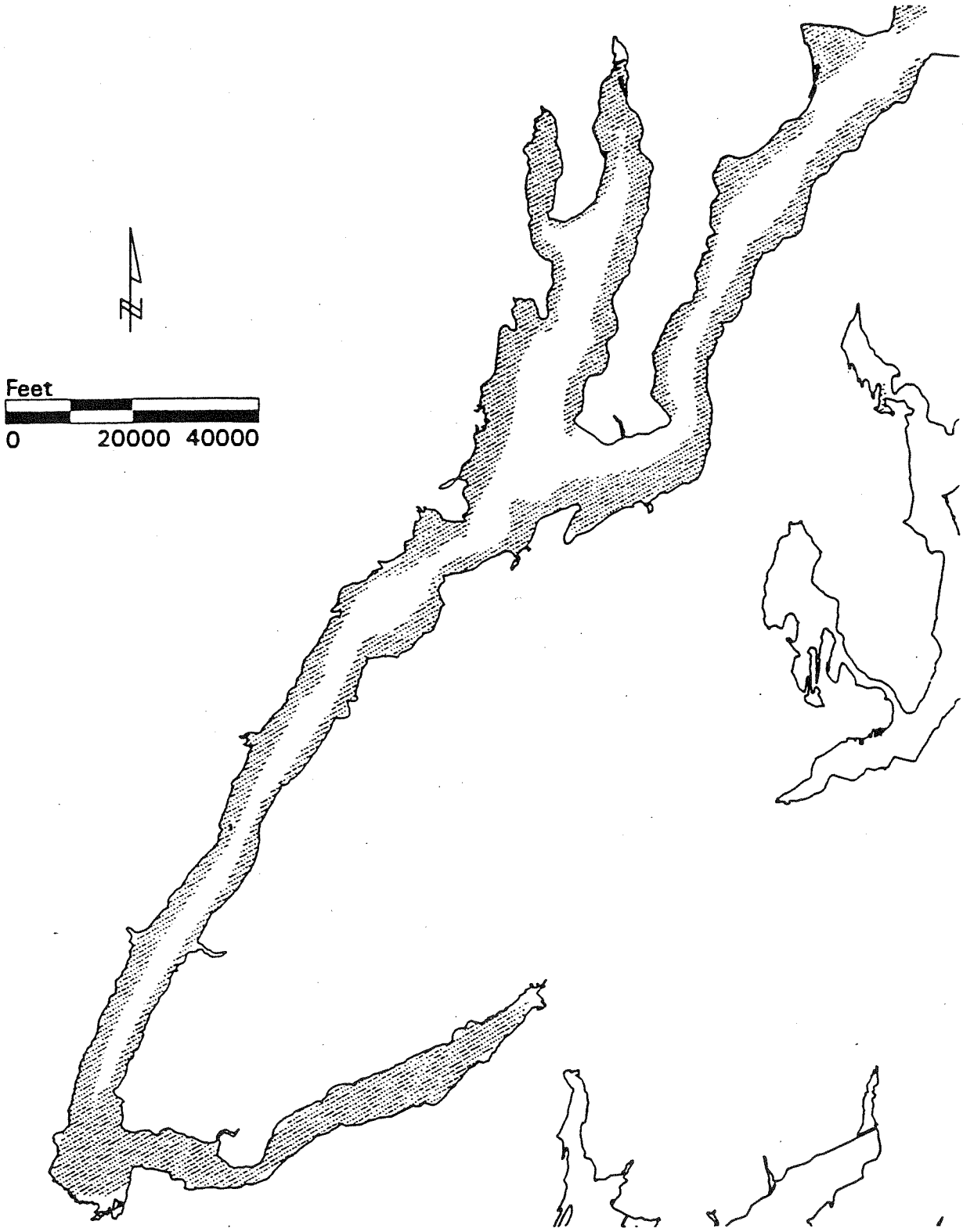
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Hood Canal Shellfish Resources



Cancer Crab

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pandalid Shrimp

Resource Information Mapped: Harvest areas for four species of shrimp including; pink (*Pandalus jordani* and *P. borealis*), coonstripe (*P. danae*), and spot prawn (*P. platyceros*).

Resource Use: Human - commercial and recreational fisheries. Hood Canal supports the largest recreation shrimp fisheries in the state. Non-human - food organism for many fish species including rockfish, cabezon, and perch.

General Location or Habitat Association of Resource: Most harvest occurs in waters 100 to 220 m deep, however, the coonstripe and spot prawn are found as shallow as the lower intertidal zone. Pandalid shrimp are found throughout Hood Canal.

Seasonal Sensitivity: Planktonic larval phase from February through July.

Recommended Protection Strategy: Utilize beach clean up techniques that do not transport oil into shallow subtidal area.

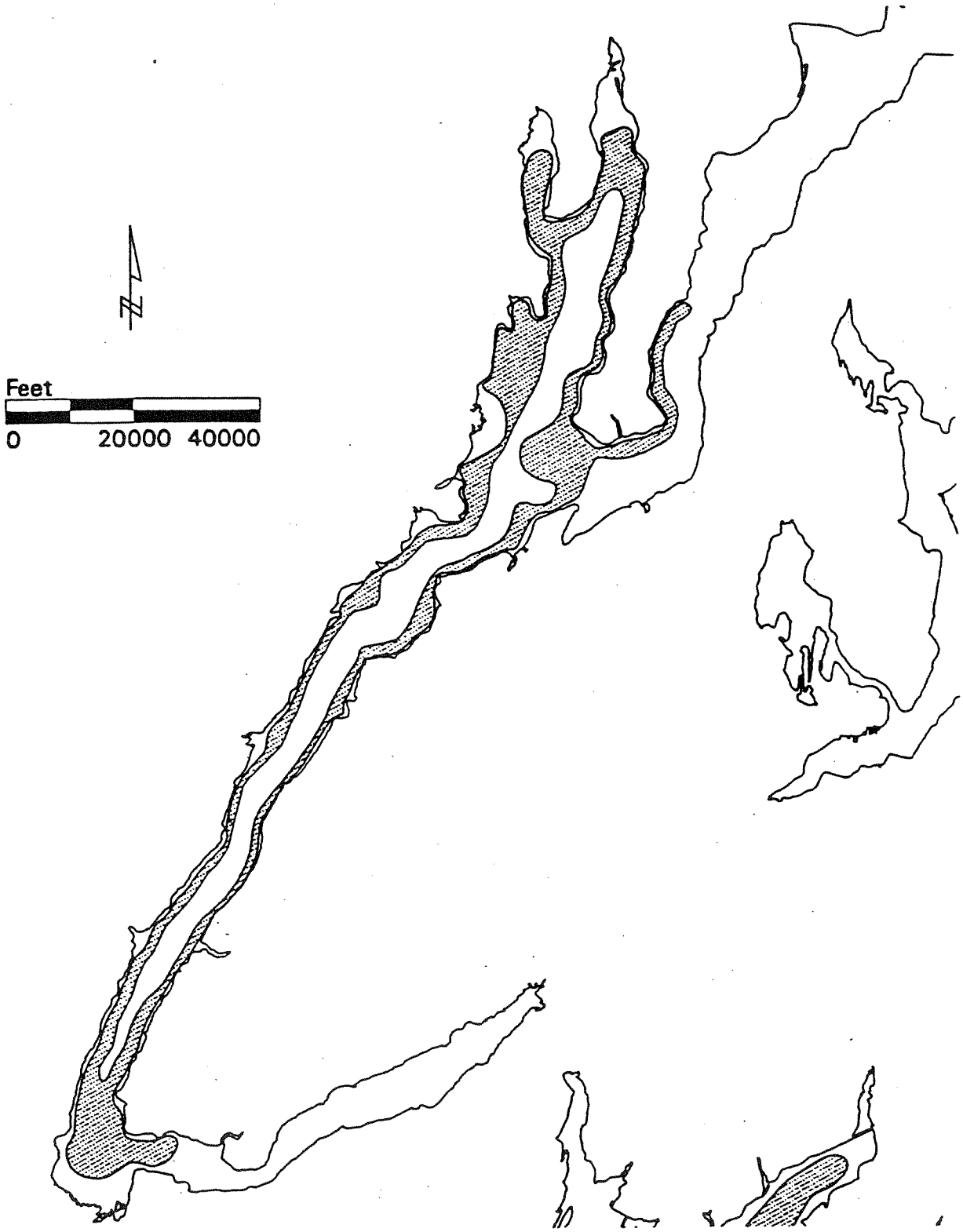
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Hueckel, G.J. 1980. Foraging on an artificial reef by three Puget Sound fish species. Wa. Dept. Fish. Tech. Rpt. 53. 110 p.

Hood Canal Shellfish Resources



Pandalid Shrimp

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Intertidal and subtidal hardshell clams and intertidal softshell clams.

Resource Information Mapped: Hardshell species include the native littleneck (*Protothaca staminea*), the Manila littleneck (*Tapes philippinarum*), butter clams (*Saxidomus giganteus*), piddock clams (*Zirfaea pilsbryi*), horse clams (*Tresus capax* and *T. nuttallii*), and cockles (*Clinocardium nuttali*). The only softshell species is the eastern softshell clam (*Mya arenaria*).

Resource Use: Human; commercial and recreational harvest. Non human; as a group clams are feed upon by a wide variety of organisms including snails, sea stars, Dungeness and rock crabs, several species of commercially and recreationally import fish, sea otters, raccoons, scoters and other birds.

General Location or Habitat Association of Resource: Clams are found throughout the region with higher concentrations in Squamish Harbor, Dabob Bay, Quilcene Bay, Triton Cove, Eldon, Lilliwaup, Annas Bay, Twanoh, and Dewatto Bay north to Chinom Pt. Clams are found from approximately +2 m MLLW in the intertidal zone to subtidal depths of -21 m MLLW.

Seasonal Sensitivity: Due to their sessile lifestyle in the intertidal zone clams are at high risk of exposure throughout the year. Sensitivity would be elevated during the spawning and larval period which can extend from April through October.

Recommended Protection Strategy: Utilize protective and exclusion booming where possible and aggressive open water collection techniques elsewhere. Where oil cannot be excluded from the beach use clean up techniques which do not force oil into beach substratum.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Pacific Oyster (*Crassostrea gigas*)

Resource Information Mapped: Oyster beds, primarily cultured.

Resource Use: Human - recreational and commercial harvest. Non-human - Oyster beds provide important habitat for juvenile dungeness crab. Juvenile and adult oysters are preyed upon by dungeness and red rock crab, several starfish species, and surf and white-winged scoters.

General Location or Habitat Association of Resource: Pacific oysters are found in the lower intertidal and shallow subtidal zones along almost the entire shoreline of Hood Canal. Priority areas include Squamish Harbor, Dabob Bay, Quilcene Bay, Whitney Pt., Wawa Pt. to Duckabush, Triton Cove, Eldon, Lilliwaup, Annas Bay, Twanoh, Lynch Cove,Musqueti Pt., and Dewatto Bay north to Chinom Pt

Seasonal Sensitivity: Due to their sessile lifestyle in the intertidal zone oysters are at high risk of exposure throughout the year. Relative to their habitat function for juvenile dungeness crab the most sensitive period would be June through December.

Recommended Protection Strategy: Utilize protective booming where possible and aggressive open water collection techniques elsewhere.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

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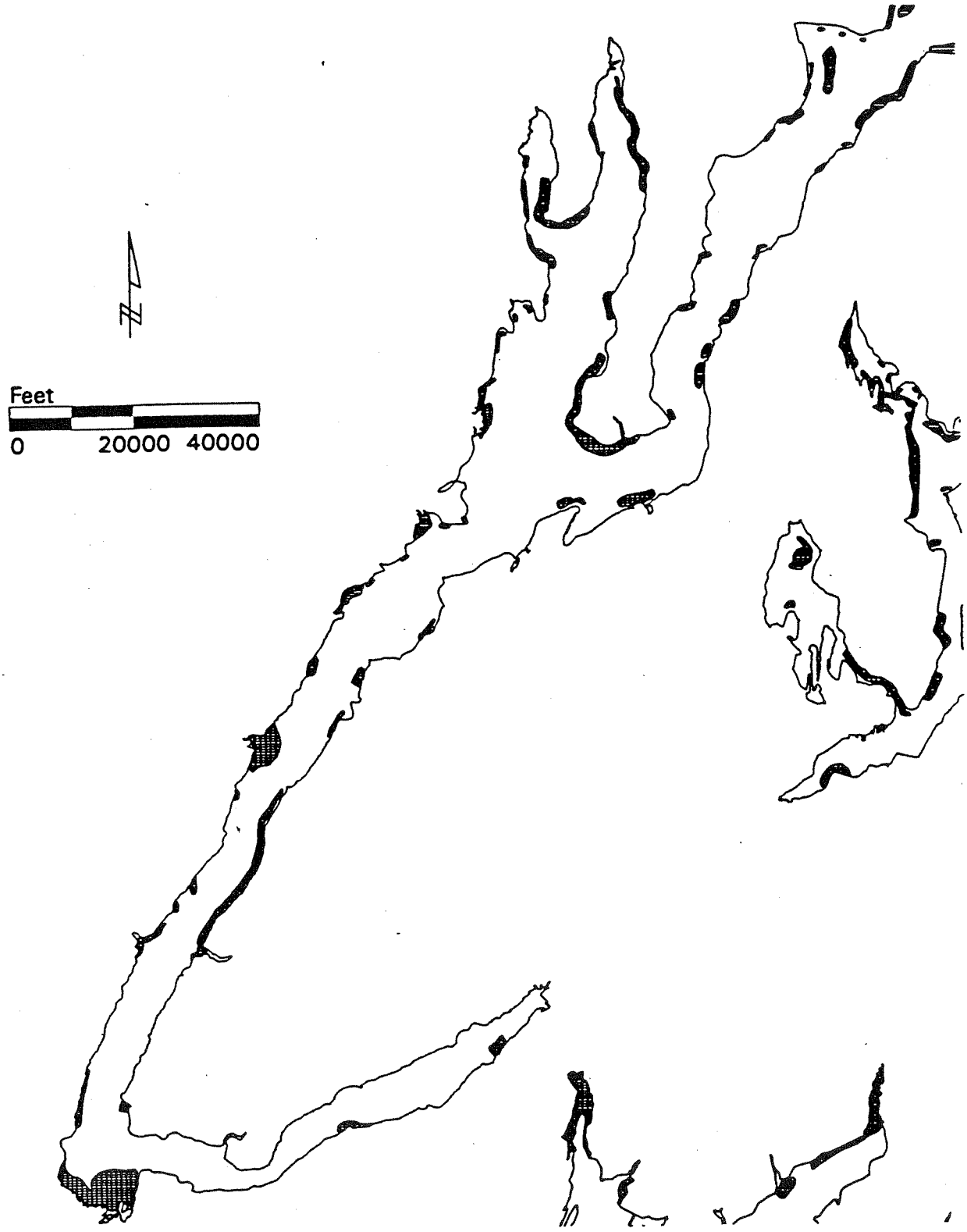
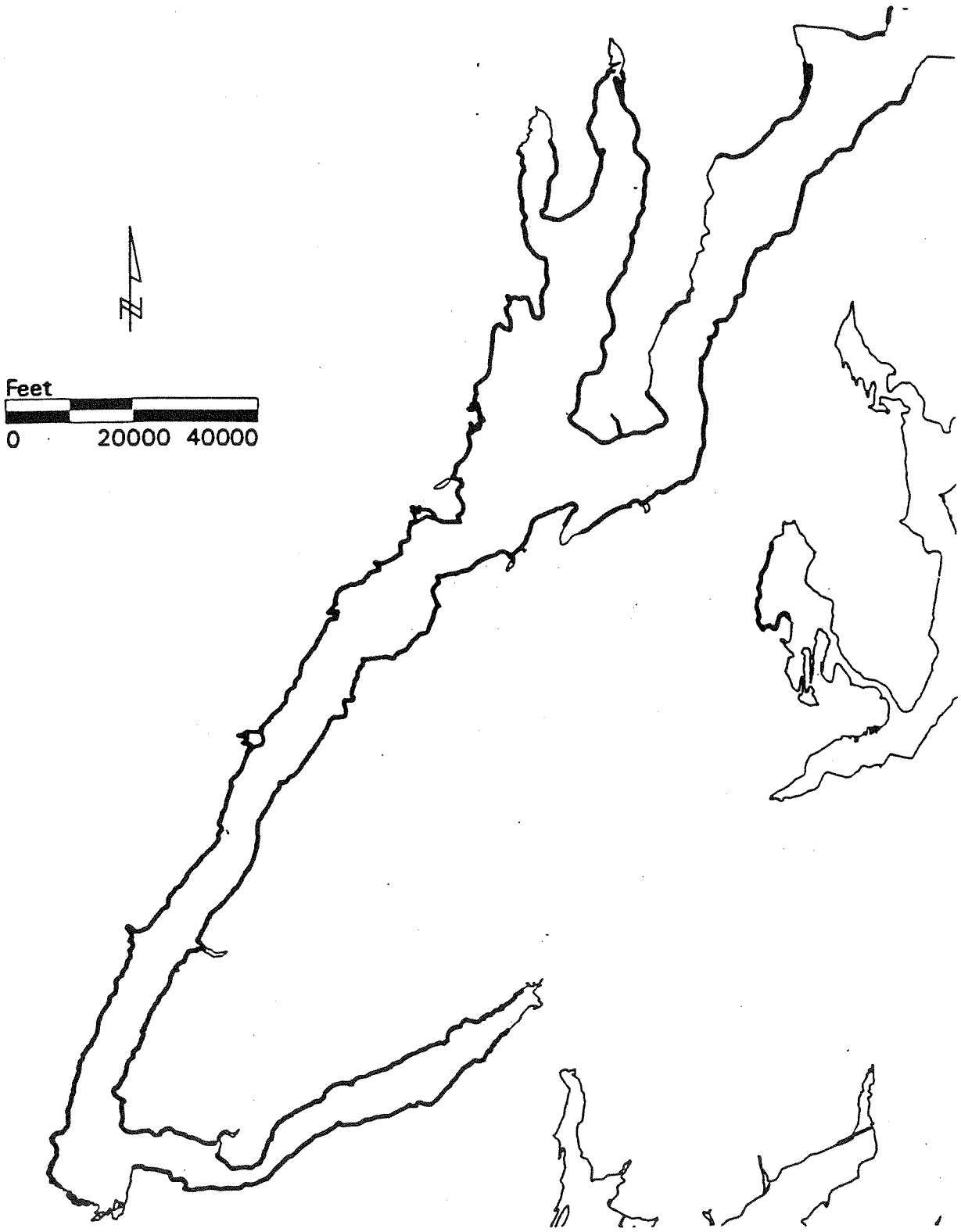
Hood Canal Shellfish Resources



Intertidal. Hardshell Clam
Subtidal Clam
USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Hood Canal Shellfish Resources



Oyster

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Geoduck Clams (*Panope abrupta*)

Resource Information Mapped: Geoduck clam distribution (commercial quantities).

Resource Use: Human; Geoducks support a large commercial and recreational fisheries. Non human; Geoducks are fed upon by snails, pandalid shrimp, rock crab, English sole, sand sole, rock sole, starry flounder, starfish, and sea otters.

General Location or Habitat Association of Resource: High concentrations of geoducks are found throughout the region. They inhabit depths from +1 to -110 m MLLW and prefer a stable mud and sand substrate.

Seasonal Sensitivity: Sensitivity would be highest during the spawning and larval period from April through August (peak May - July).

Recommended Protection Strategy: Utilize beach clean up techniques which do not transport oil into the subtidal zone.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries; Volume II: species life history summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 p.

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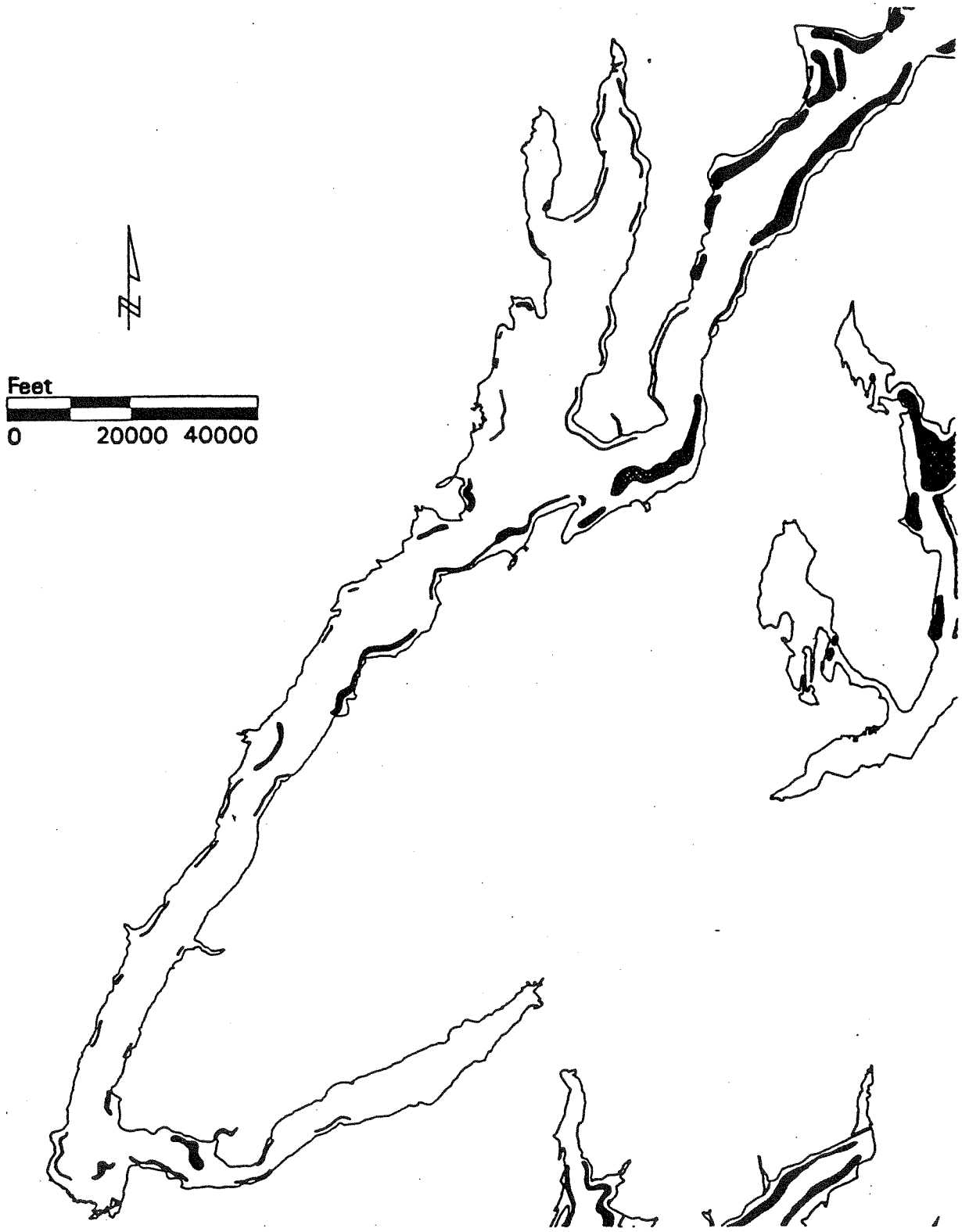
Hood Canal Shellfish Resources



Geoduck

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Scallops; rock scallop (*Crassadoma gigantea*), pink scallop (*Chlamys rubida*), and spiny scallop (*Chlamys hastata*).

Resource Information Mapped: Resource presence based on WDF dive surveys.

Resource Use: Human; rock scallop - recreational harvest; pink and spiny scallop - recreational and commercial harvest.

General Location or Habitat Association of Resource: Rock scallops are found from the shallow subtidal to -50 m attached to rocky substrates. Pink and spiny scallops are found from -1 m to -300 m depth. Pinks prefer sandy/muddy substrates while spiny scallops prefer sandy/rocky substrates. Pink and spiny scallops spawn in the fall and summer respectively. Larvae are planktonic for four to five months. Both species have the ability to free swim but will set and remain in an area. Rock scallops are found at Termination Pt. Pink and spiny scallops (not mapped) are found near Termination Pt. and in Dabob Bay.

Seasonal Sensitivity: Summer and fall due to reproductive cycle.

Recommended Protection Strategy: Utilize beach clean up techniques that do not transport oil into shallow subtidal area.

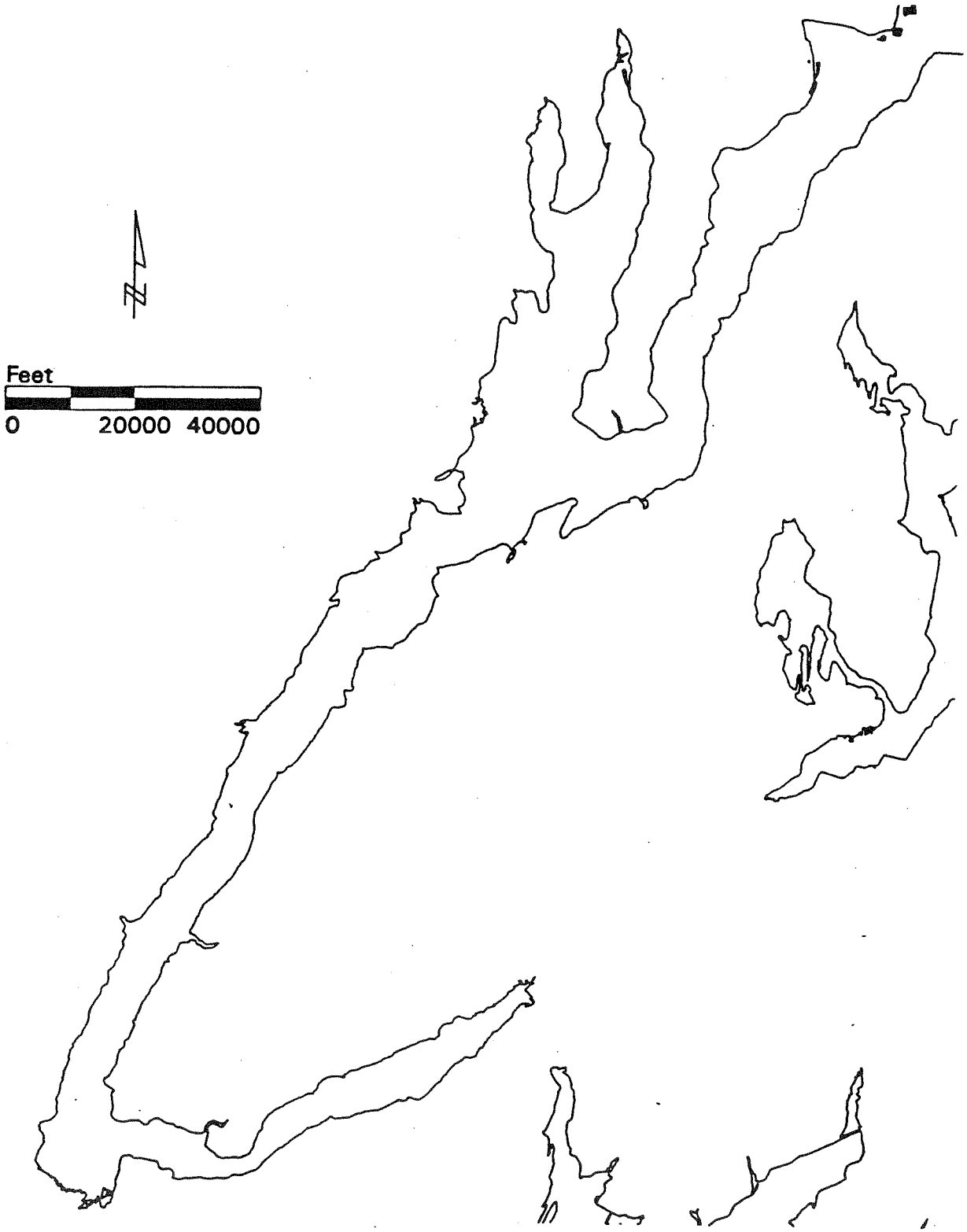
Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Siezemore, B. WDF Shellfish Program, personal communication.

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

Hood Canal Shellfish Resources



Pink and Spiny Scallops

Rock Scallop

USGS Shoreline

Source: Washington Department of Fisheries
This map does not offer complete information on fish and shellfish resource distribution. Comprehensive surveys have not been conducted along all shorelines.

Draft - January 28, 1994

Hood Canal Geographic Response Plan Workshop
Data Recording Sheet

Resource: Octopus (*Octopus dofleini*)

Resource Information Mapped: No map provided.

Resource Use: Harvested in commercial, recreational, and subsistence fisheries.

General Location or Habitat Association of Resource: Octopus live in caves or dens from the lower intertidal to the subtidal zones. Octopus are found throughout Hood Canal.

Seasonal Sensitivity: The portion of the population inhabiting the lower intertidal and shallow subtidal zone would be subject to exposure during extreme low tides throughout the year. Octopus are also susceptible to exposure via contaminated prey, particularly clams and crab.

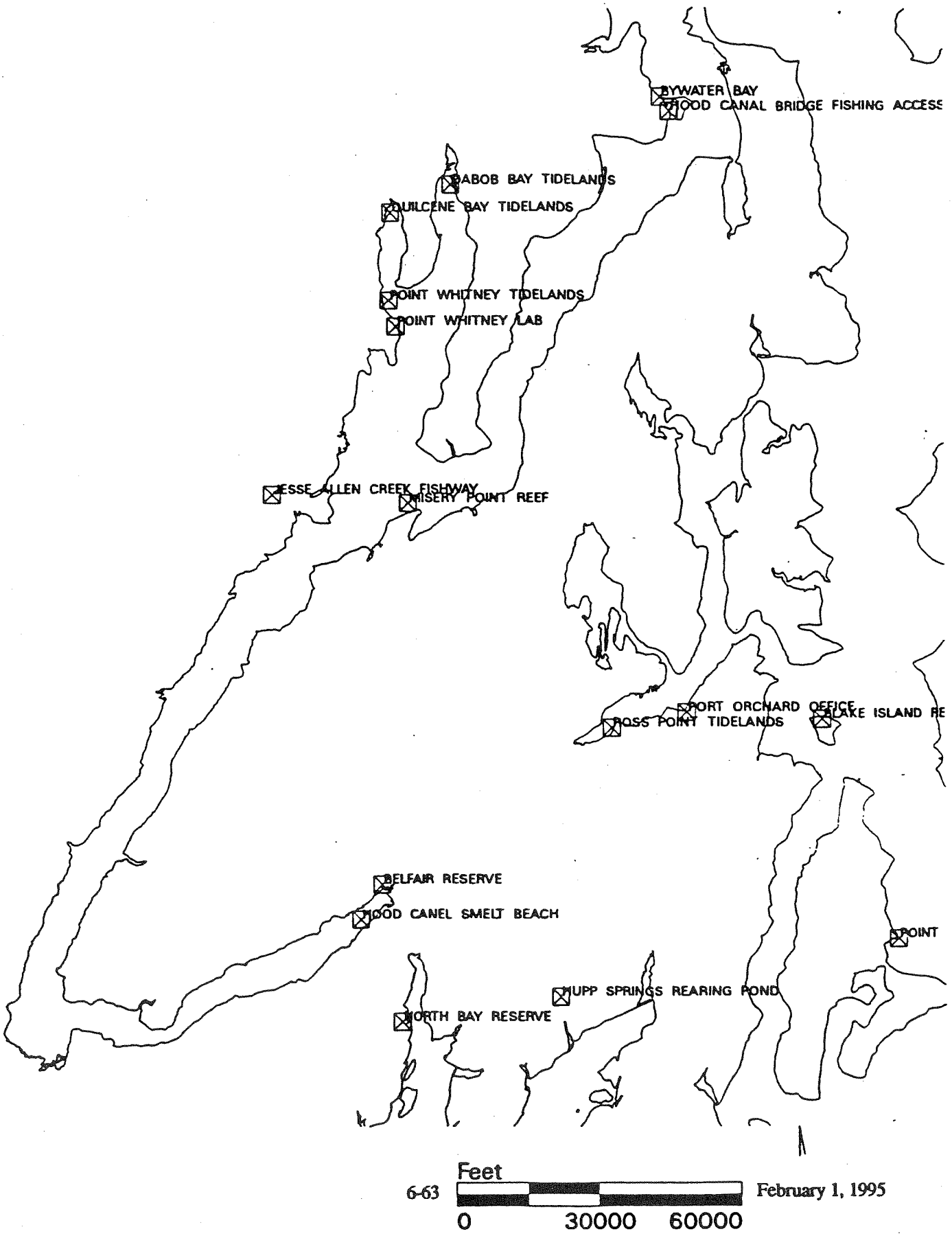
Recommended Protection Strategy: Utilize beach clean up techniques that do not transport oil into shallow subtidal area.

Information Recorder: WDF - Oil Spill Response and Damage Prevention Unit

References:

Washington Department of Fisheries. 1992. Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters. Wa. Dept. Fish. Tech. Rpt. 79. 70 p.

WDF Hood Canal Facilities



February 1, 1995

Hood Canal Salmon/Steelhead Populations

I. Salmonid Stocks present in the Canal.

Stock	Origin	Production Type	Status
Hood Canal Summer/Fall Chinook	Mixed	Composite	Healthy
Escapement is generally strong in the Skokomish system but very weak in the Dosewallips, Duckabush, Hamma Hamma, Dewatto, Tahuya & Union systems.			
Hood Canal Summer Chum	Native	Wild	Critical
Very low escapements into tributaries such as the Quilcene, Dosewallips, Duckabush, Hamma Hamma, Dewatto & Tahuya Rivers.			
Union R. Summer Chum	Native	Wild	Healthy
NE Hood Canal Fall Chum	Mixed	Composite	Healthy
Found primarily in Anderson, Big Beef, Seabeck & Stavis Creeks.			
Dewatto R. Fall Chum	Mixed	Composite	Healthy
SE Hood Canal Fall Chum	Mixed	Composite	Healthy
Found in lower Hood Canal streams including Stimson, Big and Little Mission, Twanoh, Alderbrook, Rendsland, and Caldervin Creeks; also the Union and Tahuya Rivers.			
Lower Skokomish R. Fall Chum	Mixed	Composite	Unknown
Upper Skokomish R. Late Fall Chum	Native	Wild	Healthy
West Hood Canal Fall Chum	Mixed	Composite	Healthy
Found in most accessable smaller west-side tributaries from the Hoodsport area north to about the vicinity of Fulton Creek.			
Hamma Hamma R. Late Fall Chum	Native	Wild	Healthy
Duckabush R. Late Fall Chum	Native	Wild	Healthy
Dosewallips R. Late Fall Chum	Native	Wild	Healthy
Quilcene Late Fall Chum	Mixed	Composite	Healthy
Spawning occurs in the Big and Little Quilcene Rivers, Marple and Spencer Creeks, and Wolcott Slough.			

NE Hood Canal Coho	Mixed	Wild	Depressed
Found in all accessible east-side tributaries from Port Gamble to Anderson Creek and in Thorndyke & Shine creeks on the western shoreline.			
Dewatto R. Coho	Mixed	Wild	Depressed
SE Hood Canal Coho	Mixed	Wild	Depressed
Found in the Tahuya, Mission and Union drainages and in other small streams in this area.			
Skokomish R. Coho	Mixed	Composite	Healthy
SW Hood Canal Coho	Mixed	Wild	Healthy
Found in independent drainages from the Skokomish to the Hamma Hamma R.			
Hamma Hamma Coho	Mixed	Wild	Healthy
Duckabush R. Coho	Mixed	Wild	Depressed
Dosewallips R. Coho	Mixed	Wild	Healthy
Quilcene/Dabob Bay Coho	Mixed	Composite	Depressed
Spawning occurs in all accessible tributaries to Quilcene & Dabob Bays.			
Hamma Hamma Pink	Native	Wild	Healthy
Duckabush Pink	Native	Wild	Healthy
Dosewallips Pink	Native	Wild	Depressed
Skokomish Summer Steelhead	Unresolved	Unresolved	Unknown
Duckabush Summer Steelhead	Unresolved	Unresolved	Unknown
Dosewallips Summer Steelhead	Unresolved	Unresolved	Unknown
Dewatto R. Winter SH	Unresolved	Unresolved	Depressed
Tahuya R. Winter SH	Unresolved	Unresolved	Depressed
Union R. Winter SH	Unresolved	Unresolved	Unknown
Skokomish Winter SH	Unresolved	Unresolved	Depressed
Hamma Hamma Winter SH	Native	Wild	Unknown
Duckabush Winter SH	Unresolved	Unresolved	Depressed
Dosewallips Winter SH	Unresolved	Unresolved	Depressed

Quilcene/Dabob Bay
Winter Steelhead Unresolved Unresolved Unknown
Spawn in tributaries to Quilcene and Dabob Bays, including the Big and Little Quilcene Rivers and Tarboo Creek.

Summary - Present status of Hood Canal Salmon/Steelhead Stocks:

	Total No. of stocks	Total critical/ depressed status	
Summer/Fall Chinook	1	0	
Summer Chum	2	1	
Fall Chum	10	0	(1 unknown status)
Coho	9	5	
Pink	3	1	
Summer Steelhead	3	0	(all unknown status)
Winter Steelhead	8	5	(3 unknown status)
Total:	36	12	(but 7 unknown status also)

II. Hood Canal Salmon/Steelhead Streams.

A. Hood Canal Basin, WRIA 16, streams originating on the Olympic Peninsula and entering Hood Canal on its western shoreline.

Stream	WRIA No.	Cat. Page No.	Salmonid populations & recent juvenile plants
Skokomish R.	16.0001	102	Hood Canal summer/fall chinook Lower Skokomish fall chum Upper Skokomish late fall chum Skokomish coho Skokomish summer steelhead Skokomish winter steelhead Hatchery plants: fall chinook, chum, coho
Enetai Cr.	16.0217	102	Hatchery plants: fall chinook & chum
Hoodsport Area independent tributaries.			
Hill Creek	16.0221	502	West Hood Canal fall chum Southwest Hood Canal coho
Finch Creek	16.0222	502	Hatchery plants: spring & fall chinook, chum, pinks & coho.
Clark Creek	16.0224	502	West Hood Canal fall chum Southwest Hood Canal coho
Miller Creek	16.0225	502	West Hood Canal fall chum Southwest Hood Canal coho
Sund Creek	16.0226	502	West Hood Canal fall chum Southwest Hood Canal coho Hatchery plants: fall chinook
Little Lilliwaup Cr.	16.0228	502	West Hood Canal fall chum Southwest Hood Canal coho
Lilliwaup Cr.	16.0230	502	West Hood Canal fall chum Southwest Hood Canal coho Hatchery plants: fall chinook & chum
Eagle Creek	16.0243	502	West Hood Canal fall chum Southwest Hood Canal coho Hatchery plants: fall chinook & chum
Jorsted Cr.	16.0248	502	West Hood Canal fall chum Southwest Hood Canal coho

Hamma Hamma River	16.0251	602	Hood Canal summer/fall chinook Hood Canal summer chum Hamma Hamma late chum Hamma Hamma coho Hamma Hamma pinks Hamma Hamma winter steelhead Hatchery plants: fall chinook & chum

Eldon area independent tributaries.

Waketickeh Creek	16.0318	702	Chum, coho (?-shown in Stream Catalog but no recent WDF surveys)
Schaerer Creek	16.0326	702	Chum, coho (?-shown in Stream Catalog but no recent WDF surveys)
Fulton Cr.	16.0332	702	West Hood Canal fall chum Duckabush coho Hatchery plants: chum
McDonald Cr.	16.0349	702	Chum, coho (?-shown in Stream Catalog but no recent WDF surveys)
Duckabush River	16.0351	802	Hood Canal summer/fall chinook Hood Canal summer chum Duckabush late chum Duckabush coho Duckabush pinks Duckabush summer steelhead Duckabush winter steelhead Hatchery plants: fall chinook & chum
Dosewallips River	16.0442	1002	Hood Canal summer/fall chinook Hood Canal summer chum Dosewallips late chum Dosewallips coho Dosewallips pinks Dosewallips summer steelhead Dosewallips winter steelhead Hatchery plants: fall chinook
Walcott Slough	16.0558	1002	Quilcene late fall chum (Quilcene Hatchery planting location)

B. Quilcene and Dabob Bay tributaries, Quilcene Basin, WRIA 17

Marple Cr.	17.0001	102	Quilcene late fall chum Quilcene/Dabob coho
Spencer Cr.	17.0004	102	Quilcene late fall chum Quilcene/Dabob coho

Big Quilcene River	17.0012	102	Quilcene late fall chum Quilcene/Dabob coho Quilcene/Dabob winter steelhead Hatchery plants: spring chinook, chum, coho
Little Quilcene R.	17.0076	202	Quilcene late fall chum Quilcene/Dabob coho Quilcene/Dabob winter steelhead Hatchery plants: coho
Donovan Cr.	17.0115	202	Quilcene/Dabob coho
Tarboo Cr.	17.0129	302	Quilcene late fall chum Quilcene/Dabob coho Quilcene/Dabob winter steelhead Hatchery plants: fall chinook, chum, coho
Thorndyke Creek	17.0170	302	Quilcene late fall chum Northeast Hood Canal coho Hatchery plants: chum
Shine Cr.	17.0181	302	Northeast Hood Canal coho

C. Streams draining the west side of the northern Kitsap Peninsula and flowing into the east side of Hood Canal, Kitsap Basin, WRIA 15.

Port Gamble - Seabeck independent drainages

Gamble Cr.	15.0356	802	Northeast Hood Canal coho
Little Anderson Cr.	15.0377	802	Northeast Hood Canal coho Northeast Hood Canal fall chum
Big Beef Cr.	15.0389	902	Northeast Hood Canal fall chum Northeast Hood Canal coho Hatchery plants: fall chinook
Little Beef Creek	15.0399	902	Northeast Hood Canal fall chum Northeast Hood Canal coho
Seabeck Cr.	15.0400	902	Northeast Hood Canal fall chum Northeast Hood Canal coho
Stavis Cr.	15.0404	902	Northeast Hood Canal fall chum Northeast Hood Canal coho
Boyce Cr.	15.0407	902	Northeast Hood Canal coho
Unnamed	15.0408	902	Northeast Hood Canal fall chum Northeast Hood Canal coho

Anderson Cr.	15.0412	1002	Northeast Hood Canal fall chum Northeast Hood Canal coho Hatchery plants: chum
Dewatto R.	15.0420	1002	Hood Canal summer/fall chinook Hood Canal summer chum Dewatto River fall chum Dewatto coho Dewatto winter steelhead Hatchery plants: fall chinook

Ayres Point independent drainages

Rendsland Cr.	15.0439	1102	Southeast Hood Canal fall chum Southeast Hood Canal coho
Caldervin Cr.	15.0445	1102	Southeast Hood Canal fall chum Hatchery plants: chum
Tahuya River	15.0046	1202	Hood Canal summer/fall chinook Hood Canal summer chum Southeast Hood Canal fall chum Southeast Hood Canal coho Tahuya winter steelhead Hatchery plants: fall chinook & chum
Shoofly Cr.	15.0478	1202	Southeast Hood Canal fall chum
Stimson Cr.	15.0488	1202	Southeast Hood Canal fall chum Southeast Hood Canal coho Hatchery plants: chum
Little Mission Cr.	15.0493	1302	Southeast Hood Canal fall chum Southeast Hood Canal coho
Big Mission Creek	15.0495	1302	Southeast Hood Canal fall chum Southeast Hood Canal coho
Union River	15.0503	1302	Hood Canal summer/fall chinook Union River summer chum Southeast Hood Canal fall chum Southeast Hood Canal coho Union River winter steelhead Hatchery plants: fall chinook & chum

D. Hood Canal Tributaries South of Union River, Shelton Basin, WRIA 14.

Twanoh Cr.	14.0134	602	Southeast Hood Canal fall chum Hatchery plants: chum
Alderbrook Creek	14.0138	602	Southeast Hood Canal fall chum

III. Net pen locations in Hood Canal

Hood Canal Net Pens - Sund Rocks, west side of Canal, just north of Hoodsport. 200,000 fall chinook.

Glen Ayr Pen - Glen Ayr Trailer Park N. of Hoodsport. 6,500 fall chinook.

Hoodsport Marina. 5,000 fall chinook.

Hood Canal Marina @ Union. 25,000 fall chinook.

Port Gamble Coop (Tribal facility), two locations - one on the SW side of Quilcene Bay, about 1000 ft N of Fisherman's Point, and one about 2000 ft S of Pt. Julia in Port Gamble Bay. 760,000 coho combined production.

Pleasant Harbor Marina. 15,000 fall chinook.

Puget Sound Fish and Shellfish Habitat Association Table - Key

Life Stages -
- eggs
- larvae
- juveniles
- spawners/spawning
- parturition (birth)
- adults

Timing -
- --- common
- +++ abundant
- *** highly abundant

Salinity Range -

tidal fresh	0.0 - 0.5	ppt
mixing	0.5 - 25.0	ppt
seawater	>25.0	ppt

Habitats -

intertidal	0-3 m
subtidal	3-10m

Data Source -

Monaco, M.E. et al. 1990. Distribution and abundance of fishes and invertebrates in west coast estuaries. Vol. I: Data summaries. ELMR Rept. 4. Strategic Assessment Branch, NOS/NOAA, Rockville, MD

Emmett, R.L. et al. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries. Vol. II: Species Life History Summaries. ELMR Rept. 8. Strategic Assessment Branch, NOS/NOAA, Rockville, MD

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Fish Habitat Association in Puget Sound

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal Fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine Veg	Marine Veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal Flat
Spring Chinook Salmon	J F M A M J J A S O N D																			
juveniles	------++++++++++++++---	X	X	X		X	X	X								X	X	X	X	X
adults	--++++++++++--	X	X	X		X	X	X								X	X	X	X	X
Fall Chinook Salmon	J F M A M J J A S O N D																			
juveniles	--------+++++++++++-----	X	X	X		X	X	X								X	X	X	X	X
adults	------++++++---	X	X	X		X	X	X								X	X	X	X	X
Sockeye Salmon	J F M A M J J A S O N D																			
juveniles	----++------	X	X	X									X			X	X	X	X	X
adults	--++++----	X	X	X		X	X									X	X	X	X	X
Coho Salmon	J F M A M J J A S O N D																			
juveniles	----++++--------	X	X	X		X	X									X	X	X	X	X
adults	---- ----++++-	X	X	X		X	X									X	X	X	X	X
Chum Salmon	J F M A M J J A S O N D																			
juveniles	--++++**++----------	X	X	X									X			X	X	X	X	X
adults	++------ --++****+	X	X	X		X	X									X	X	X	X	X

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Fish Habitat Association in Puget Sound (cont.)

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine Veg	Marine Veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal flat
Pink Salmon	J F M A M J J A S O N D																			
juveniles	++++****++----------	X	X	X									X			X	X	X	X	X
adults	--++**++--	X	X	X		X	X									X	X	X	X	X
Surf Smelt	J F M A M J J A S O N D																			
eggs	****** **********		X	X		X								X						
larvae	++++++++ ++++++++++++		X	X		X								X						
juveniles	++++++++++++++++++++++		X	X									X			X	X	X	X	X
spawners	****** **********		X	X		X								X						
adults	++++++++++++++++++++++		X	X									X			X	X	X	X	X
Herring	J F M A M J J A S O N D																			
eggs	**********		X	X							X	X		X	X					X
larvae	**********++++		X	X									X			X	X	X	X	X
juveniles	++++++++**********+++++		X	X									X			X	X	X	X	X
spawners	**********		X	X							X	X		X	X					X
adults	**++++++++++++++++++++*		X	X									X			X	X	X	X	

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Fish Habitat Association in Puget Sound (cont

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal Fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine Veg	Marine Veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal Flat
Longfin Smelt	J F M A M J J A S O N D																			
eggs						X											X			
larvae	-------- ---	X	X	X		X										X	X	X	X	
juveniles	----------		X	X									X			X	X	X	X	
adults	-------- ---	X	X	X									X			X	X	X	X	
Anchovy	J F M A M J J A S O N D																			
eggs	--		X	X									X			X				
larvae	----		X	X									X			X	X	X	X	
juveniles	----------		X	X									X			X	X	X	X	
spawners	----		X	X									X			X				
adults	----------		X	X									X			X	X	X	X	
Sand Lance	J F M A M J J A S O N D																			
eggs	*******++ ++*		X	X		X								X	X	X	X			
larvae	++********++		X	X		X										X	X			
juveniles	++++++++++*******+++++++		X	X		X								X	X	X	X			
spawners	*******++ ++*		X	X		X								X	X	X	X			
adults	----------		X	X		X								X	X	X	X			

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Fish Habitat Association in Puget Sound (cont.)

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal Fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine Veg	Marine Veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal Flat
English Sole	J F M A M J J A S O N D																			
eggs	****** +			X									X							
larvae	++++**++		X	X	X								X			X	X	X		
juveniles	**********		X	X	X	X					X	X		X	X		X	X	X	X
spawning	++++++++++ +		X	X	X	X									X					
adults	++++++++++++++++++++++		X	X	X	X					X	X			X		X			
Starry Flounder	J F M A M J J A S O N D																			
eggs	--------			X									X			X				
larvae	--------		X	X									X			X	X			
juveniles	--------+++++++++++++---	X	X	X	X	X					X	X		X	X		X	X	X	X
spawning	--++----			X		X														
adults	++++++++++++++++++++++		X	X	X	X					X	X		X	X		X	X		
Ling Cod	J F M A M J J A S O N D																			
eggs	---------- -			X					X	X				X	X					
larvae	----------		X	X									X			X				
juveniles	----------		X	X	X	X			X	X	X	X		X	X		X	X	X	
spawning	------ -			X					X	X				X	X					
adults	----------			X					X	X		X		X	X					

Fish Habitat Association in Puget Sound (cont.)

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal Fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine Veg	Marine Veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal Flat
Shiner Perch	J F M A M J J A S O N D																			
juveniles	++++++******	X	X	X	X	X					X		X		X	X	X	X	X	X
parturition	--++++--		X		X	X					X		X				X	X	X	X
adults	**********		X	X	X	X					X		X		X	X	X	X	X	X
Perch	J F M A M J J A S O N D																			
juveniles	+++******++	X	X	X	X	X					X					X	X	X	X	X
parturition	--+++++++--		X	X	X	X					X						X	X	X	X
adults	--++++++++++--		X	X	X	X					X					X	X	X	X	X
Pacific Tomcod	J F M A M J J A S O N D																			
larvae	--------		X	X									X				X	X	X	
juveniles	----------++++++++++-		X	X	X	X					X	X			X		X	X	X	
adults	++++++++++++++++++++++		X	X	X	X									X		X	X	X	

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Shellfish Habitat Association in Puget Sound (cont.)

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal Fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine Veg	Marine Veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal Flat
Pacific Gaper Clam	J F M A M J J A S O N D																			
eggs	++++++++++		X	X									X			X	X	X	X	X
larvae	+++++++++++++		X	X									X			X	X	X	X	X
juvenile	++++++++++++++++++++++++		X	X	X	X								X	X		X	X	X	X
spawning	++++++++++		X	X										X	X		X	X	X	X
adults	++++++++++++++++++++++++		X	X	X	X								X	X		X	X	X	X
Horse Clam	J F M A M J J A S O N D																			
eggs	--------												X			X	X	X	X	X
larvae	----------		X	X									X			X	X	X	X	X
juvenile	++++++++++++++++++++++++		X	X	X	X								X	X		X	X	X	X
spawning	--------													X	X		X	X	X	X
adults	++++++++++++++++++++++++		X	X	X	X								X	X		X	X	X	X
Little Neck Clam	J F M A M J J A S O N D																			
eggs	************												X			X	X	X	X	X
larvae	**************												X			X	X	X	X	X
juveniles	************************		X	X	X	X	X	X						X	X		X	X	X	X
spawning	************												X	X	X		X	X	X	X
adults	************************		X	X	X	X	X	X						X	X		X	X	X	X

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Shellfish Habitat Association in Puget Sound

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal Fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine veg	Marine veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal Flat
Dungeness Crab	J F M A M J J A S O N D																			
eggs	----------																			
larvae	----------		X	X									X			X	X	X		
juveniles	----------++****++---		X	X	X	X	X				X			X	X		X	X	X	X
mating	------													X	X					
adults	++++++++++++++++++++++		X	X	X	X	X							X	X		X	X	X	
Blue Mussel	J F M A M J J A S O N D																			
eggs	++++*******++++		X	X									X			X	X	X	X	X
larvae	++++*******++++		X	X									X			X	X	X	X	X
juveniles	**********		X	X				X	X	X				X	X		X	X	X	X
spawning	++++*******++++		X	X									X	X	X		X	X	X	X
adults	**********		X	X				X	X	X				X	X		X	X	X	X
Softshell Clam	J F M A M J J A S O N D																			
eggs	++++++++++		X	X									X			X	X	X	X	X
larvae	++++++++++++		X	X									X			X	X	X	X	X
juvenile	++++++++++++++++++++++		X	X	X	X								X	X		X	X	X	X
spawning	++++++++++		X	X									X	X	X		X	X	X	X
adults	++++++++++++++++++++++		X	X	X	X								X	X		X	X	X	X

Shellfish Habitat Association in Puget Sound (cont.)

Species	Timing	Salinity Range			Substrate Preference									Habitats						
														Type			Area			
		Tidal Fresh	Mixing	Seawater	Mud/Silt/Clay	Sand/Granule	Pebble	Cobble	Boulder/Riprap	Rocky Outcrop	Estuarine Veg	Marine Veg	None	Benthic Intertidal	Benthic Subtidal	Pelagic	Mainstem Channel	Subsidiary Channel	Channel Edge	Intertidal Flat
Manila Clam	J F M A M J J A S O N D																			
eggs	**********												x			x	x	x	x	x
larvae	**********		x	x									x			x	x	x	x	x
juveniles	**********		x	x	x	x	x	x						x	x				x	x
spawning	**********												x	x	x				x	x
adults	**********		x	x	x	x	x	x						x	x				x	x
Pacific Oyster	J F M A M J J A S O N D																			
eggs													x			x	x	x	x	x
larvae													x			x	x	x	x	x
juveniles	**********		x	x	x	x	x	x	x	x				x	x		x	x	x	x
adults	**********		x	x	x	x	x	x	x	x				x	x		x	x	x	x
Geoduck Clam	J F M A M J J A S O N D																			
eggs	++++++++		x	x									x			x	x	x	x	x
larvae	++++++++++		x	x									x			x	x	x	x	x
juveniles	++++++++++++++++++++++		x	x	x	x								x	x		x	x	x	x
spawning	++++++++		x	x									x	x	x		x	x	x	x
adults	++++++++++++++++++++++		x	x	x	x								x	x		x	x	x	x

7. Logistical Information

The following is not a complete list of logistical resources - for more information please refer to the Area Contingency Plan, Summary of Area Resources Chapter 6. The subject headings which have an asterisk (*) are being developed; please consult local DEM officials (phone numbers listed on pages 6-53 to 6-55 of the ACP) for specific information.

To submit data for this section, please use Comments/ Corrections/ Suggestions (Appendix C).

7.1. Logistical Information

Subject	Name	Characteristics	Contact	Phone #
Command Posts *				
Communications				
See Pages 6-41 to 6-42				
Equipment Cache Locations				
See Pages 6-2 to 6-45				
Inventory of Local Support Equipment *				
Helicopter Support/Air Support	Sanderson Field	Mason County	Shelton, WA 98584	(206) 426-1151
Access Points *				
Property Access Information and Contacts *				
Staging Areas *				
Recreational Activities which could interfere *				
Tribal Resources	Point-No-Point Treaty Council	Kitsap County	7999 NE Salish Lane Kingston, WA 98346	
	Port Gamble Community Council	Kitsap County	Kingston, Wa 98346	(206) 297-2646
	Native American Spill & Environmental Protection	King County	7575 44th Ave. SW / Seattle, WA 98136	(206) 938-3550
	Skokomish Tribal Council	Mason County	North 80 Tribal Center Road Shelton, WA 98584	(206) 426-4232

Subject	Name	Characteristics	Contact	Phone #
	Squaxin Island Tribal Council	Mason County	West 81, Hiway 108 Shelton, WA 98584	(206) 426-9781
	Suquamish Tribal Council	Kitsap County	Suquamish, WA 98392	(206) 598-3311
Key Local Elected Officials*				
Fire Department				
See Pages 6-60 to 6-66				
Local Support Personnel	Mason County DEM	Mason County	Mason County Courthouse Shelton, WA 98548	
	Jefferson County DEM & Sheriff	Jefferson County	81 Elkins Road Port Hadlock, WA 98339	
Volunteers *				
Wildlife Rehab Facilities	St. Edward State Park	King County	14445 Juanita Dr. NE/ Bothell	Joe Pillers @ (206) 823-2992 or Don Simmons @ (206) 931-3907
Marinas/Port Docks	Point-No-Point Sling	Kitsap County	Town of Hansville on Admiralty Inlet	
	Salsbury Point Ramp	Kitsap County	Southeast side of Hood Canal Bridge	
	Hood Canal Bridge Ramp	Kitsap County	Northeast side of Hood Canal Bridge	
	Twanoh State Park Ramp	Mason County	8 miles south of Belfair	
	Summertime Resort & Marina	Mason County	15 miles south of Belfair in Tahuya	
	Coleman Powerhouse Ramp	Mason County	North of Potlatch State Park, Hiway 101	
	Rest Awhile Boathouse	Mason County	North of Hoodsport on Hiway 101	
	Mike's Beach Resort	Mason County	Midway between Hoodsport and Lilliwaup	
	Quilcene Ramp	Jefferson County	2 miles south of Quilcene	
	Point Whitney Ramp	Jefferson County	At Point Whitney Shellfish Lab	
	Seabeck Marina Sling	Kitsap County	Town of Seabeck	
	Mats Mats Bay Ramp	Jefferson County	1 mile north of Port Ludlow	

Subject	Name	Characteristics	Contact	Phone #
Housing/Feeding/Response Community Support	Airlift Northwest	King County	6987 Perimeter Road/ Seattle	1-800-426-2430
Interim Storage/Permits *				
Fishing Fleets & Affiliated Organizations	Puget Sound Gillnetters Assoc.	King County	Fisherman's Terminal/ Seattle	
Boat Cleaning Capability	Airo Services	Pierce County	4110 East 11th St./ Tacoma	(206)383-4916 24 hr. number
	Foss Environmental	King County	660 West Ewing St./ Seattle	1-800-337-7455 24 hr. number
Safe Havens *				

APPENDICES

Appendix A: Summary of Protection Techniques

Protection Techniques	Description	Primary Logistical Requirements	Limitations
ONSHORE			
Beach Berms	A berm is constructed along the top of the mid-inter tidal zone from sediments ex-cavated along the downgradient side. The berm should be covered with plastic or geo-textile sheeting to minimize wave erosion.	• Bulldozer/Motor grader -1 • Personnel - equipment operator & 1 worker • Misc. - plastic or geotextile sheeting	• High wave energy • Large tidal range • Strong along shore currents
Geotextiles	A roll of geotextile, plastic sheeting, or other impermeable material is spread along the bottom of the supra-tidal zone & fastened to the underlying logs or stakes placed in the ground.	• Geotextile - 3 m wide rolls • Personnel - 5 • Misc. - stakes or tie-down cord	• Low sloped shoreline • High spring tides • Large storms
Sorbent Barriers	A barrier is constructed by installing two parallel lines of stakes across a channel, fastening wire mesh to the stakes & filling the space between with loose sorbents.	Per 30 meters of barrier • Wire mesh - 70 m x 2 m • Stakes - 20 • Sorbents - 30 m^2 • Personnel - 2 • Misc. - fasteners, support lines, additional stakes, etc.	• Waves > 25 cm • Currents > 0.5 m/s • Tidal range > 2 m
Inlet Dams	A dam is constructed across the channel using local soil or beach sediments to exclude oil from entering channel.	• Loader - 1 • Personnel - equipment operator & 1 worker or several workers w/shovels	• Waves > 25 cm • Tidal range exceeding dam height • Freshwater outflow

NEARSHORE			
Containment Booming	Boom is deployed in a "U" shape in front of the oncoming slick. The ends of the booms are anchored by work boats or drogues. The oil is contained within the "U" & prevented from reaching the shore.	For 150 meters Slick: • Boom - 280 m • Boats - 2 • Personnel - boat crews & 4 boom tenders • Misc. - tow lines, drogues, connectors, etc.	• High winds • Swells > 2 m • Breaking waves > 50 cm • Currents > 1.0 m/s
Exclusion Booming	Boom is deployed across or around sensitive areas & anchored in place. Approaching oil is deflected or contained by boom.	Per 300 meters of Boom • Boats - 1 • Personnel - boat crew & 3 boom tenders • Misc.- 6 anchors, anchor line, buoys, etc.	• Currents > 0.5 m/s • Breaking waves > 50 cm • Water depth > 20 m
Deflection Booming	Boom is deployed from the shoreline away from the approaching slick & anchored or held in place with a work boat. Oil is deflected away from shoreline.	Single Boom, 0.75 m/s knot current • Boom - 60 m • Boats - 1 • Personnel - boat crew + 3 • Misc. - 3 anchors, line, buoys, recovery unit	• Currents > 1.0 m/s • Breaking waves > 50 cm
Diversion Booming	Boom is deployed from the shoreline at an angle towards the approaching slick & anchored or held in place with a work boat. Oil is diverted towards the shoreline for recovery.	Single Boom, 0.75 m/s knot current • Boom - 60 m • boats - 1 • Personnel - boat crew + 3 • Misc. - 3 anchors, line, buoys, recovery unit	• Currents > 1.0 m/s • Breaking waves > 50 cm
Skimming	Self-propelled skimmers work back & forth along the leading edge of a windrow to recover the oil. Booms may be deployed from the front of a skimmer in a "V" configuration to increase sweep width. Portable skimmers are placed within containment booms in the area of heaviest oil concentration.	Self-propelled (None) Towed • Boom - 200 m • Boats - 2 • Personnel - boat crews & 4 boom tenders • Misc. - tow lines, bridles, connectors, etc. Portable • Hoses - 30 m discharge • Oil storage - 2000 liters	• High winds • Swells > 2 m • Breaking waves > 50 cm • Currents > 1.0 m/s

Appendix B: Original Geographic Response Plan Contributors

Local Representatives
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Industry and Response Contractors
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Office of Marine Safety
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Gus Gustafson
Mike Ramsey

Tribal Representatives
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Ted George, S'Klallam Tribe

Other
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Appendix C: Geographic Response Plan Comments/Corrections/Suggestions

If you have any questions regarding this document or find any errors, please notify one of the following agencies: or use tear out sheet (page C-3)

- Washington Department of Ecology, SPPR program, Natural Resources Unit
- USCG Marine Safety Office Puget Sound, Planning Department
- USCG Marine Safety Office Portland
- Oregon Department of Environmental Quality
- Idaho Emergency Response Commission
- Environmental Protection Agency Region 10

Phone Numbers:

Washington DOE	(360) 407-6972
USCG MSO Puget Sound	(206) 217-6213
USCG MSO Portland	(503) 240-9307
Oregon DEQ	(503) 229-5774
Idaho ERC	(208) 334-3263
EPA	(206) 553-6901

Bulletin Board System (BBS):

USCG MSO Puget Sound	(206) 217-6216
USCG MSO Portland	(503) 240-9308

Internet/E-mail Address:

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USCG MSO Portland	mwilcox@pacnorwest.uscg.mil
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Portland, OR 97217-3992

Washington Department Of Ecology
SPPR Program
Natural Resources Unit
P.O. Box 47600
Olympia, WA 98504-7600

Oregon Department of Environmental Quality
Water Quality Division
811 SW Sixth Avenue
Portland, OR 97204

Office Of The Governor
Idaho Emergency Response Commission
1109 Main
Statehouse
Boise, ID 83720-7000

Environmental Protection Agency
Emergency Response Branch
1200 Sixth Avenue
Seattle, WA 98101

Geographic Response Plan

Comments/Corrections/Suggestions

Directions:
Fill in your name, address, agency, and phone number. Fill in the blanks regarding the location of information in the plan being commented on. Make comments in the space provided. Add extra sheets as necessary. Submit to: Dale Davis
Department of Ecology
Spills Program
300 Desmond Drive
P.O. Box 47600
Olympia, WA 98504-7600
dald461@ecy.wa.gov

Name: _____ Title:_____ Agency:_____

Address:_____

City: _____ State/Province:_____ Zip/Postal Code:_____

Phone: (____) _____ E-Mail:_____

GRP:_____Page Number:_____

Location on page (chapter, section, paragraph) (e.g. 2.1, paragraph 3):_____

Comments:_____

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Northwest Area Committee
c/o Washington Department of
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Natural Resources Unit - GRP
Corrections
P.O. Box 47600
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