# 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.

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**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.

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**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.

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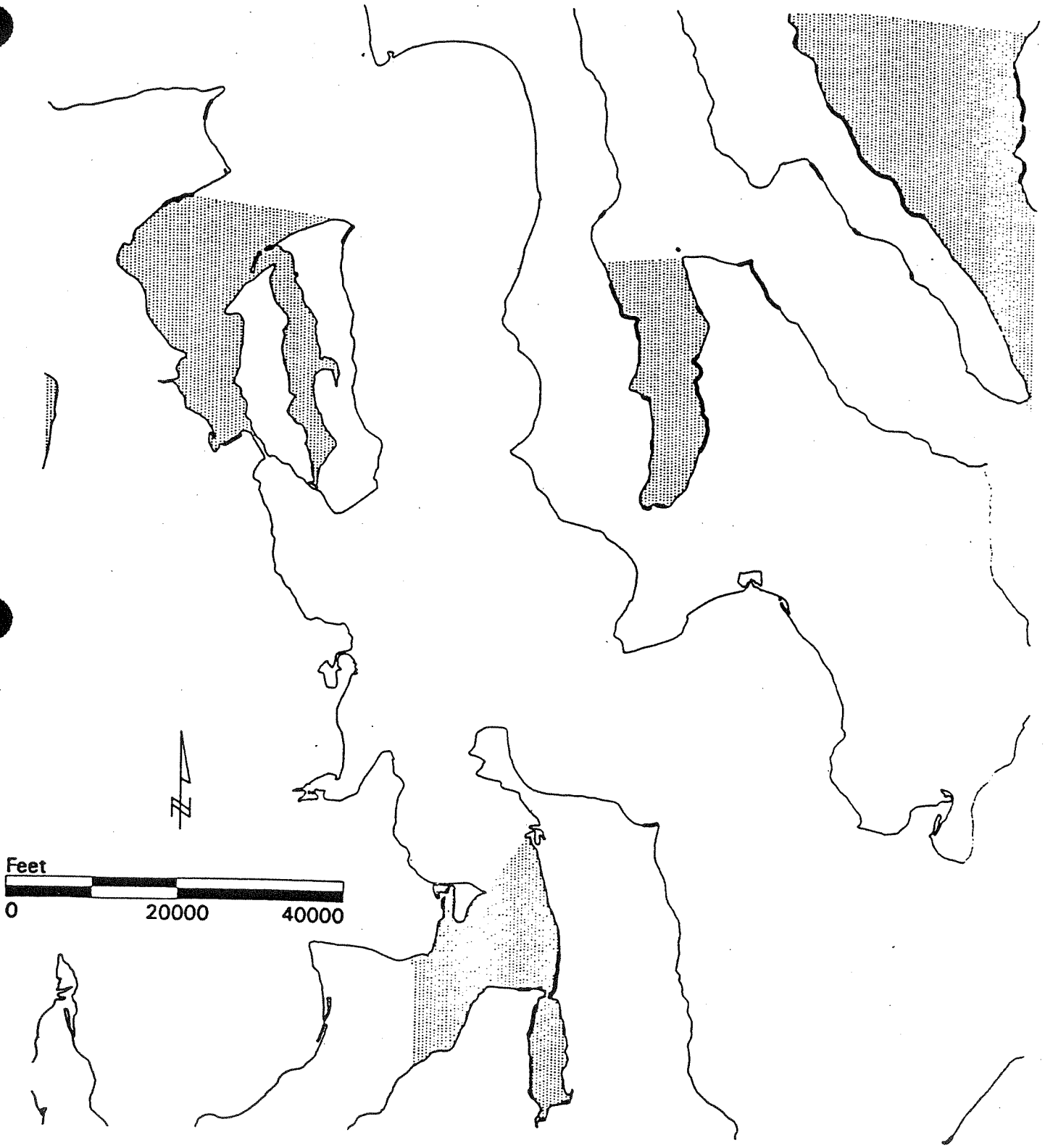
# Admiralty Inlet Baitfish Resources




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.

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**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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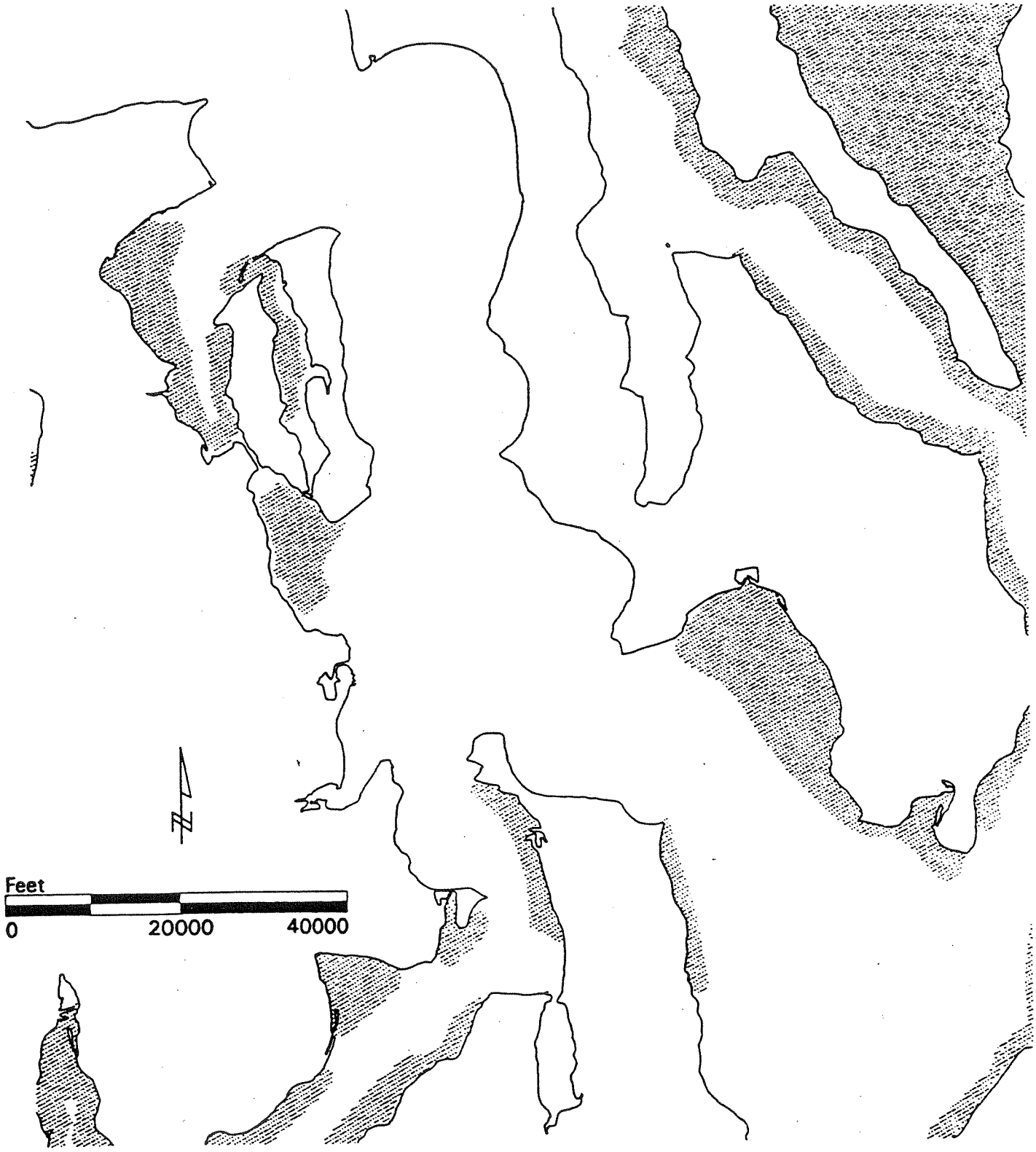
# Admiralty Inlet Shellfish Resources




Cancer Crab

USGS Shoreline

Source: Washington Department of Fisheries
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**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.

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# Admiralty Inlet Shellfish Resources

Geoduck

USGS Shoreline

Source: Washington Department of Fisheries
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**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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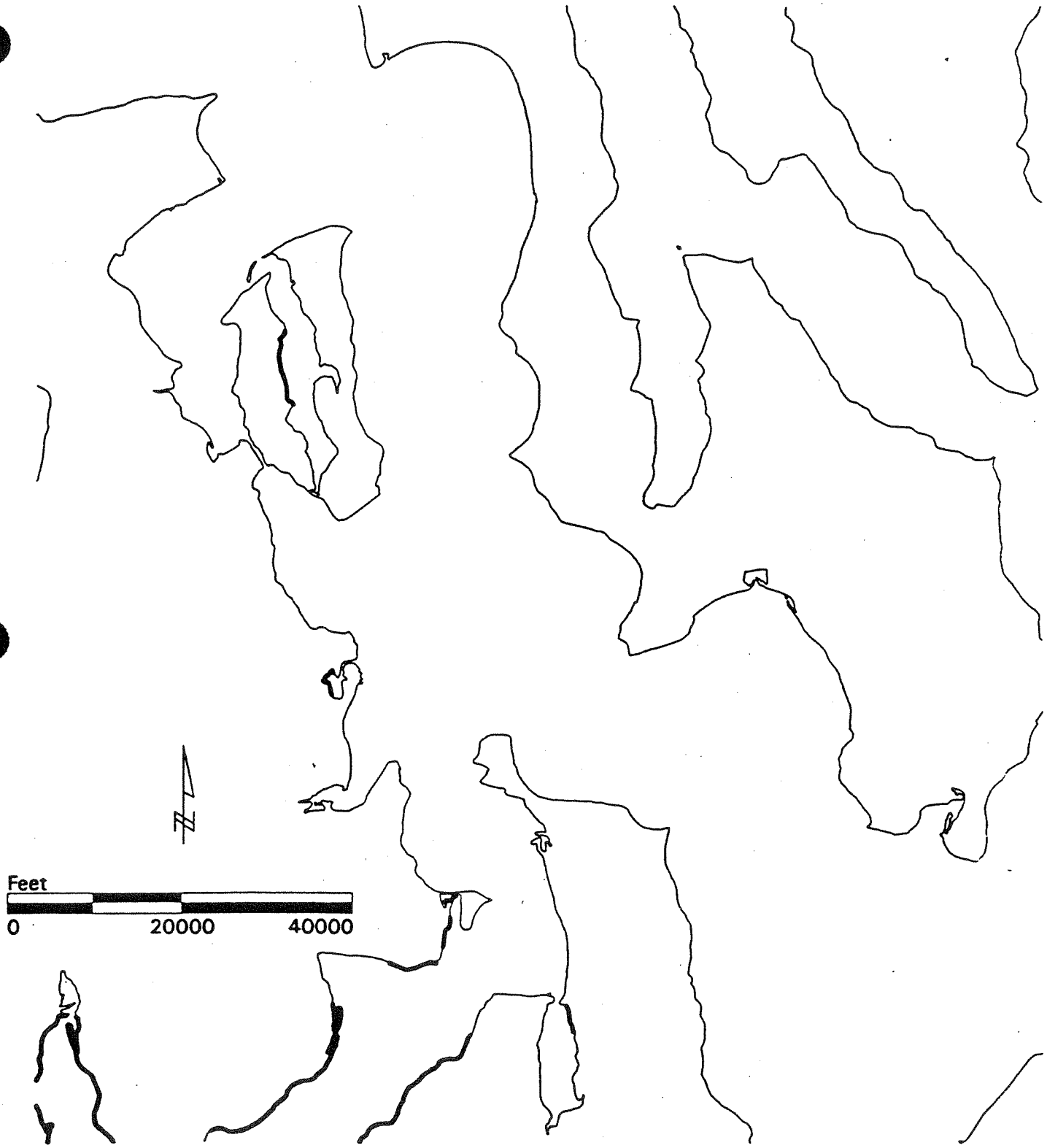
# Admiralty Inlet Shellfish Resources




Oyster

USGS Shoreline

Source: Washington Department of Fisheries
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**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.

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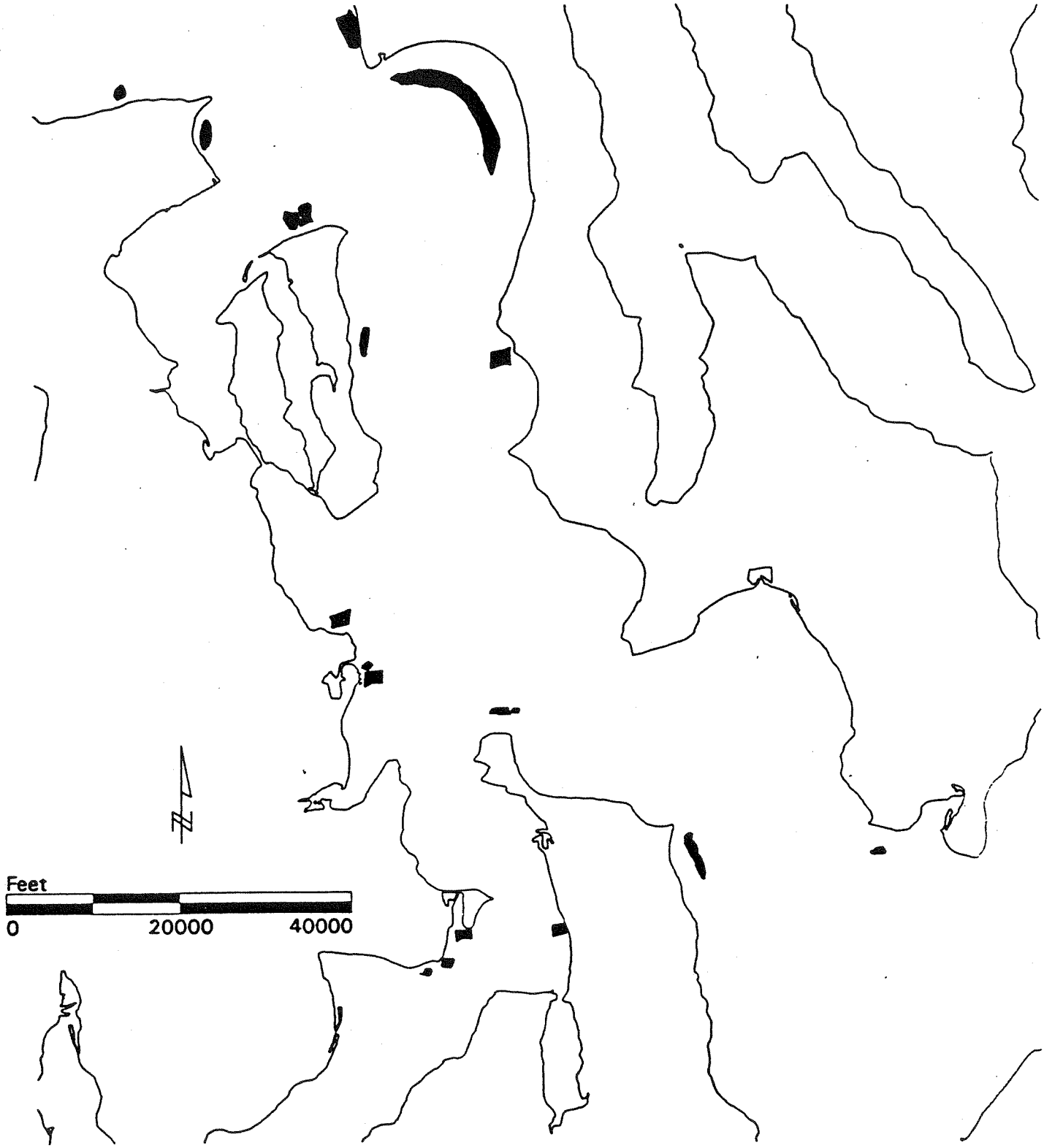


Pink and Spiny Scallops

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.

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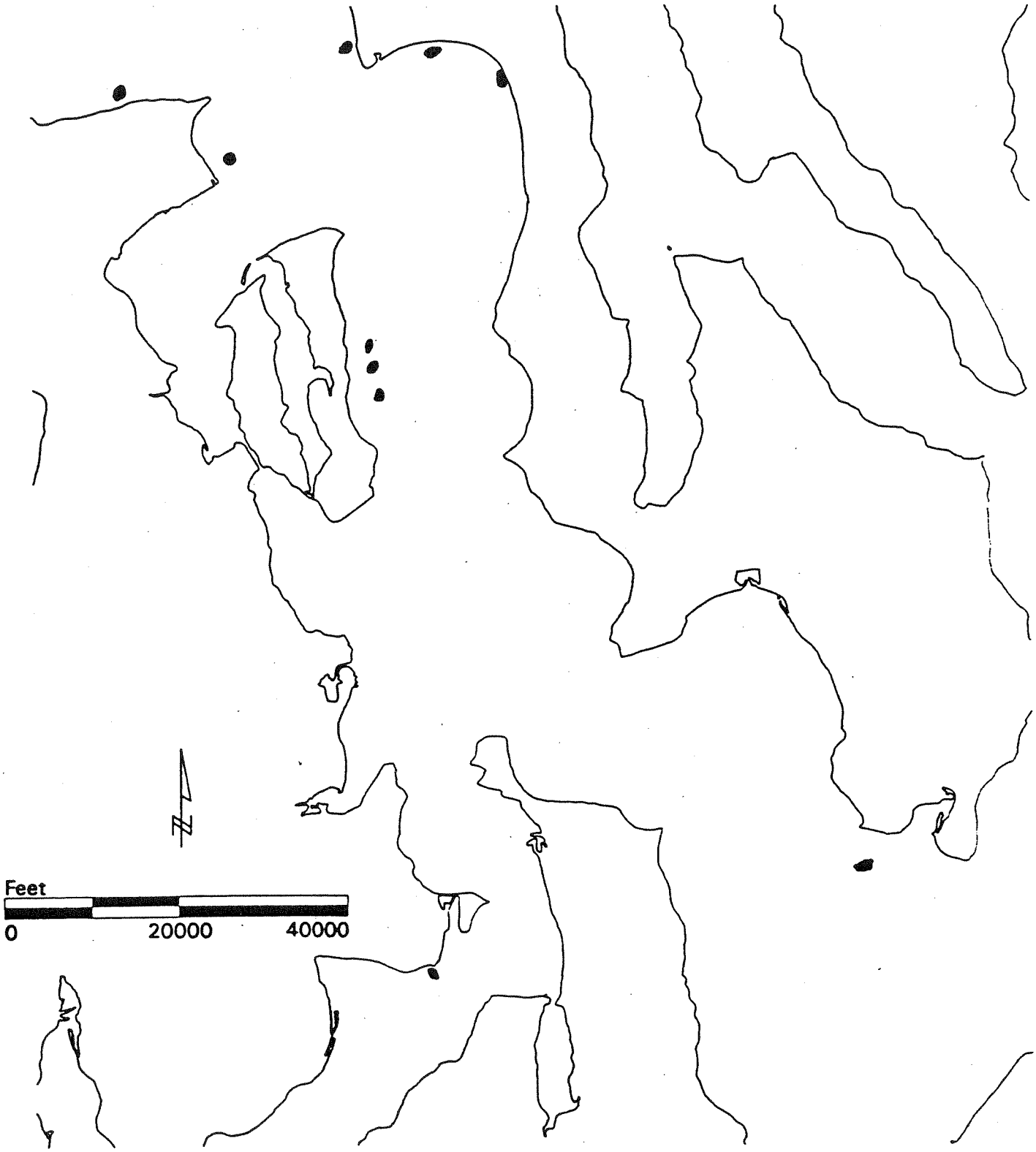


Octopus

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.