

EXHIBIT A

ENVIRONMENTAL ASSESSMENT OF CONTINUED GEODUCK HARVEST ALONG THE NORTHEASTERN SHORELINE OF HOOD CANAL AT THE PORT GAMBLE GEODUCK TRACT (#20000)

Commercial geoduck harvest is jointly managed by the Washington Departments of Fish and Wildlife (WDFW) and Natural Resources (DNR) and is coordinated with treaty tribes through harvest management plans. Harvest is conducted by divers from subtidal beds between the -18 foot and -70 foot water depth contours (corrected to mean lower low water, hereafter MLLW). Harvest is rotated throughout Puget Sound in five geoduck management regions. The fishery, its management, and its environmental impacts are presented in the Puget Sound Commercial Geoduck Fishery Management Plan and Final Supplemental Environmental Impact Statement (WDFW & DNR, May 2001). The proposed harvest along the northeastern shoreline of Hood Canal is described below.

Proposed Harvest Year(s): 2011-12

Tract name: Port Gamble tract (Tract #20000)

Description: (Figure 1, Tract vicinity map)

The Port Gamble geoduck tract is a subtidal area (between the -25 to -70 foot water depth contours, corrected to MLLW) of approximately 190 acres (Table 1) along the northeastern shoreline of Hood Canal at the mouth of Port Gamble Bay, in the Hood Canal Geoduck Management Region. The south end of the tract starts approximately 1165 yards northerly of the geographic landmark Point Julia and continues northerly approximately 5405 yards. The commercial tract area is deeper than and seaward of the -25 foot (MLLW) water depth contour, to provide for Pacific herring spawning habitat buffer.

The tract is south of and adjoins the Coon Bay 1-4 geoduck tract (#19900) and is north of and adjoins the Point Julia geoduck tract (#20020). Herring spawning occurs along the shoreline of this tract, therefore the shallow boundary of this tract is -25 feet (MLLW) to protect herring spawning habitat. Additional area and depth restrictions occur on a seasonal basis in response to recommendations to protect spawning herring and their habitat (see Biota, Fish section of this report). The Port Gamble tract is bounded by a line projected from a point on the -25 foot (MLLW) water depth contour in the northeastern corner of the tract at 47°52.760' N. latitude, 122°34.725' W. longitude southerly along the -25 foot (MLLW) water depth contour to a point at 47°51.877' N. latitude, 122°34.579' W. longitude; then projected due west to a point on the -70 foot (MLLW) water depth contour at 47°51.877' N. latitude, 122°35.128' W. longitude; then northerly along the -70 foot (MLLW) water depth contour to a point at 47°52.744' N. latitude, 122°34.907' W. longitude; then easterly to the point of origin (Figure 2).

This estimate of the tract boundary is made using GIS and field data (transformed to **WGS84 dataset** in 2010, Table 2). All contours are corrected to mean lower low water (MLLW). Contour GIS layers from Dale Gombert (WDFW) were generated from NOAA soundings. Shoreline data was from DNR, digitized at 1:24000 scale in 1999. The -70 foot (MLLW) water depth contour was used for the deep water boundary, and the shallow water boundary was defined by the -25 foot (MLLW) water depth contour (due to herring spawning habitat found shoreward of the tract). During herring spawning season (January 15 – April 15) the tract will either be closed to geoduck harvest or opened to geoduck harvest with a -35 foot (MLLW) nearshore boundary.

For purposes of determining tract area the -70 foot (MLLW) contour is used. The maximum allowable fishing depth during harvest is -70 feet (MLLW). The delineation of the tract boundary will be field verified by DNR prior to any geoduck harvest. Any variance to the stated boundary will be coordinated between WDFW and DNR prior to geoduck harvest.

Substrate:

Geoducks are found in a wide variety of sediments ranging from soft mud to gravel. The most common sediments where geoducks are harvested are sand with varying amounts of mud and/or gravel. The specific sediment type of a bed is primarily determined by the water current velocity. Coarse sediments are generally found in areas of fast currents and finer (muddier) sediments in areas of weak currents. The major impact of harvest will be the creation of small holes where the geoducks are removed. The holes fill in within a few days to several weeks and have no long-term effects. The substrate holes refill in areas with strong water currents much faster than in areas with weak currents. Water currents are moderate to strong at the Port Gamble tract. "Tides and Currents" nautical software predicts a maximum ebb current velocity of 1.8 knots at Hood Canal - South Point Station (ID#6030) which is based on Admiralty Inlet (off Bush Point) station at North latitude 48° 02', West longitude 122 ° 38'. Strong water currents at this location may increase turbidity and decrease the underwater visibility of a diver.

The surface substrates at the Port Gamble tract consist of sand, mud, or mixtures of these substrate types. In 2007, WDFW conducted a supplemental biological survey of the Port Gamble tract, including 35 standard geoduck transects. On this survey, sand was the predominant substrate type on 19 out of 35 transects, mostly in the southern portion of the tract. Mud was predominant on 8 transects, mostly in the north central portion of the tract. On 8 transects, including 6 transects in the northern portion of the tract, sand and mud are roughly in equal proportions. There were no observations of other substrate types during the 1996 and 2007 surveys.

Water Quality:

Water quality is good in the vicinity of the Port Gamble tract. Geoduck tracts at northern Hood Canal are subject to the mixing of rich, clean water passing through the mouth of Hood Canal.

The Washington Department of Health (DOH) has classified this area as approved for commercial shellfish harvest. Bacterial levels are below acceptable limits, and the geoducks are safe for human consumption and harvest (DOH, 5/31/2007). DNR will verify the health status of the Port Gamble tract prior to any state-supervised, nontreaty geoduck harvest.

The following data on water quality has been provided by the Washington Department of Ecology (DOE) for the Port Gamble station (PGA001) at north latitude 47° 50' 24" and west longitude 122° 34' 48". At the 33 foot water depth from March through December 2001 (most recent data year available), the mean reported dissolved oxygen (DO) concentration was 9.1 mg/l with a range from 6.9 mg/l (11/27/01) to 12 mg/l (5/21/01). The lower value in this range is well above a critical DO threshold of approximately 3 mg/l. Persistent DO below 3 mg/l is thought to have a detrimental effect on many marine animals. The mean salinity at this station was 29.77 PSU with a range from 28.31 PSU (12/28/01) to 30.48 PSU (10/09/01). The mean water temperature at this station was 51.7°F with a range from 46.8°F (12/28/01) to 57.1°F (7/18/01).

Biota:

Geoduck:

The Port Gamble geoduck tract is approximately 190 acres (between the -25 to -70 foot water depth contours, corrected to MLLW) and contains an estimated 3,270,023 pounds of geoducks (Table 1). This estimate is based on the pre-fishing survey done in 1996 by PNPTC tribal biologists minus geoduck landings reported on fish receiving tickets and harvest monitor reports. The tribal survey did not include information about commercial quality of geoducks sampled. However, geoducks are considered commercial quality on 5 out of 5 dig stations done in 2007 (Table 3A). Most stations were rated as easy to dig on the PNPTC survey (Table 3B). Only one station was rated as difficult and one station rated as moderately difficult to dig (Table 3B). During the 2007 survey only dig station, #1, was rated as moderately difficult to dig with a gravel layer, some shell, and moderate turbidity noted as factors contributing to this rating (Table 3A). The estimate of geoduck density on this tract is moderate, averaging 0.22 geoducks/sq.ft. The average density range from the 2007 survey is 0.025 geoducks/sq.ft. at stations #35 to 0.677 geoducks/sq.ft. at station #23. This compares with a 1996 pre-fishing density range of 0.019 geoducks/sq.ft. at station #38 to 1.193 geoducks/sq.ft. at station #68 (Table 4). The

weight of geoducks at the Port Gamble tract average 1.78 pounds in the 1996 pre-fishing survey and 2.08 pounds in the 2007 survey, compared to a Puget-Sound-wide average weight of 2.10 pounds. From the PNPTC pre-fishing survey, the lowest average whole weight is 1.31 pounds per geoduck at dig station #1 and the highest average whole weight is 2.51 pounds per geoduck at station #6 (Table 5A). From the 2007 survey, the lowest average whole weight is 1.19 pounds per geoduck at dig station #1 and the highest average whole weight is 2.50 pounds per geoduck at station #3 (Table 5B).

The Port Gamble geoduck tract was originally surveyed by WDFW in 1975. Harvest occurred from 1976 through 1978 and 1,821,000 pounds were landed. The tract was re-surveyed in 1986 by WDFW (80 transects) and 1996 by the PNPTC (72 transects on tract are deeper than -25 ft. (MLLW), Figure 3 and Table 6). A supplemental survey was done by WDFW in 2007 (35 transects). The results of the 1996 and 2007 surveys are used in the preparation of this environmental assessment. Commercial geoduck harvest on this tract since the 1996 survey totals 5,367,238 pounds, as of April 19, 2011.

Geoducks are managed for long term sustainable harvest. No more than 2.7% of the fishable stocks are harvested (total fishing mortality) each year in each management region throughout Puget Sound. The fishable portion of the total Puget Sound population is located in waters deeper than -18 feet (MLLW) and shallower than -70 feet (MLLW). Other geoducks which are not harvestable are found inshore and offshore of the harvest areas. Observations in south Puget Sound show that major geoduck populations continue to depths of 360 feet. Additional geoducks exist in polluted areas and are also unavailable for harvest, but continue to spawn and contribute to the total population.

The low rate of harvest is due primarily to geoduck's low rate of natural recruitment. WDFW has studied the regeneration rate of geoducks on certain previously harvested tracts scattered throughout Puget Sound. The estimated average time to regenerate a new crop of geoducks after removal of 100 percent of the original geoducks is 39 years. The longest regeneration time is 73 years, and the shortest regeneration time is 11 years. In actual fishing 100 percent of the geoducks are never removed. The average percentage removal of the tracts mentioned above was 69 percent. The regeneration research to empirically analyze tract recovery rates is continuing.

Fish:

Geoduck beds are generally devoid of rocky outcroppings and other relief features that attract and support fish, such as rockfish and lingcod. The bottoms are relatively flat and composed of soft sediments which provide few attachments for macroalgae, which also is associated with rockfish and lingcod. The fish observed during the surveys at the Port Gamble tract (Table 7) were various species of flatfish (including starry flounders, rock soles, sand dabs, and C-O soles), skates, skate egg cases, sculpins, poachers, and

tubesnouts.

WDFW marine fish managers were asked of their concerns of any possible impacts on groundfish and baitfish that geoduck fishing would have. Greg Bargmann of the WDFW Fish Management Program stated that geoduck fishing would have no long-term detrimental impacts and may have some short term benefits to flatfish populations by increasing the availability of food. Dan Penttila of the WDFW Fish Management Program recommended that eelgrass beds within the harvest tract should be preserved for any spawning herring. The Port Gamble nearshore tract boundary will be along the -25 foot (MLLW) water depth contour to provide year-round protection to Pacific herring spawning habitat and provide a vertical buffer between eelgrass beds and geoduck harvest.

There are Pacific herring spawning grounds along the shorelines of Port Gamble and in the general area of northern Hood Canal. A prespawner holding area is located outside of Port Gamble Bay (Figure 4). The Port Gamble stock is considered the second largest Pacific herring spawning stock in Washington (2008 Washington State Baitfish Stock Status Report). Along the shorelines in the vicinity of Port Gamble, herring spawning timing is reported to occur from January 15 through April 15. Based on a nearshore tract boundary of -25 feet (MLLW), geoduck fishing on the Port Gamble tract should have no detrimental impacts on herring spawning.

Surf smelt spawning habitat has been identified along the shoreline in the vicinity of the Port Gamble tract (Figure 4). Surf smelt deposit adhesive, semitransparent eggs on beaches that have a specific mixture of coarse sand and pea gravel. Inside Puget Sound, surf smelt spawning is thought to be associated with freshwater seepage, where the water keeps the spawning gravel moist. Eggs are deposited near the water's edge in water a few inches deep, around the time of the high water slack. There is substantial vertical separation between surf smelt spawning (slack high tide) and geoduck harvest activity (-25 ft. to -70 ft., MLLW).

Sand lance spawning has been documented along this tract. Sand lance populations are widespread within Puget Sound, the Strait of Juan de Fuca and the coastal estuaries of Washington. WDFW plankton surveys and ongoing exploratory spawning habitat surveys suggest that there are very few if any bays and inlets in the Puget Sound basin that will not be found to support sand lance spawning activity. Spawning of sand lance occurs at tidal elevations ranging from +5 feet to about the mean higher high water line. After deposition, sand lance eggs may be scattered over a wider range of the intertidal zone by wave action. The incubation period is about four weeks. Sand lances are an important part of the trophic link between zooplanktons and larger predators in the local marine food webs. Like all forage fish, sand lances are a significant component in the diet of many economically important resources in Washington. On average, 35 percent of

juvenile salmon diets are comprised of sand lance. Sand lances are particularly important to juvenile Chinook salmon, where 60 percent of their diet is comprised of sand lance. Other economically important species, such as Pacific cod (*Gadus macrocephalus*), Pacific hake (*Merluccius productus*) and dogfish (*Squalus acanthias*) feed heavily on juvenile and adult sand lance. There is substantial vertical separation between sand lance spawning (+5 feet to mean higher high water) and geoduck harvest activity (-25 ft. to -70 ft., MLLW). Geoduck fishing on the Port Gamble tract should have no detrimental impacts on sand lance spawning.

NOAA Fisheries Service announced on April 27, 2010 that it is listing canary and yelloweye rockfish as “threatened” and bocaccio as “endangered” under ESA (federal Endangered Species Act). The listing became effective on July 27, 2010. Historic high levels of fishing and water quality are cited as reasons that these rock fish populations are in peril and have been slow to recover. Geoduck fishery managers are tracking this process and will take actions necessary to reduce the risk of “take” of any listed rockfish species that could potentially result from geoduck harvest activity.

Two salmon populations, Puget Sound Chinook salmon and Hood Canal summer run chum salmon, were listed by the National Marine Fisheries Service on March 16, 1999 as threatened species under the federal Endangered Species Act. Critical habitat for summer run chum salmon populations include all marine, estuarine, and river reaches accessible to the listed chum salmon between Dungeness Bay and Hood Canal and within Hood Canal. The timing for summer run chum spawning is early September to mid-October. Out-migration of juveniles has been observed in Hood Canal during February and March, though out-migration may be as late as mid-April.

Critical habitat for Puget Sound Chinook salmon include all marine, estuarine and river reaches accessible to listed Chinook salmon in Puget Sound. WDFW recognizes 27 distinct stocks of Chinook salmon; 8 spring-run, 4 summer-run, and 15 summer/fall and fall-run stocks. The existence of an additional five spring-run stocks is in dispute. The majority of Puget Sound Chinook salmon emigrate to the ocean as subyearlings.

Streams near the Port Gamble tract are Shine Creek which empties into Squamish Harbor (approximately 5.1 miles from the tract) and Thorndyke Creek (approximately 8.9 miles from the tract). The geographic separation (horizontal) of this tract from known spawning tributaries and vertical separation of geoduck harvest (deeper and seaward of the -18 ft. (MLLW) contour) from juvenile salmon rearing areas and migration corridors (upper few meters of the water column) reduces or eliminates potential impacts to salmon populations. Charles Simenstad of the University of Washington School of Fisheries stated that the “exclusionary principle of not allowing leasing/harvesting in water shallower than -18 ft. MLLW and a 2 ft. vertically from elevation of lower eelgrass margin, and within any regions of documented herring or forage fish spawning, should

under most conditions remove the influences of harvest induced sediment plumes from migrating salmon.” Geoduck harvest should have no impact on salmon populations.

On May 7, 2007 NOAA Fisheries Service announced listing of Puget Sound steelhead as “threatened” under ESA. This listing includes more than 50 stocks of summer- and winter-run steelhead. Steelhead share many of the same waters as Puget Sound Chinook salmon, which are already protected by ESA, and will benefit from shared conservation strategies. There are no identified streams or rivers in the vicinity of the Port Gamble tract that support steelhead stocks. The horizontal separation between tributaries that support steelhead runs and the Port Gamble tract reduces the risk that geoduck harvest will have any impact on steelhead populations.

Green sturgeon have undergone ESA review in recent years, due to depressed populations. NOAA Fisheries Service produced an updated status review on February 22, 2005 and reaffirmed that the northern green sturgeon Distinct Population Segment (DPS) warranted listing as a Species of Concern, however proposed that the Southern DPS should be listed as Threatened under the ESA. NMFS published a final rule on April 7, 2006 listing the Southern DPS as threatened (71 FR 17757), which took effect June 6, 2006. The green sturgeon critical habitat proposed for designation includes the outer coast of Washington within 110 meters (m) depth (including Willapa Bay and Grays Harbor) to Cape Flattery and the Strait of Juan de Fuca to its United States boundary. Puget Sound proper has been excluded from this critical habitat designation. The Port Gamble geoduck tract is outside of the critical habitat range of green sturgeon and geoduck harvest at this location will have no adverse effects on ESA recovery efforts for green sturgeon populations.

Invertebrates:

Many different kinds of invertebrates were observed which are frequently found on geoduck beds were observed on this tract. The most common and obvious of these include: [1] mollusks (horse clams, truncated mya clam, false geoducks, nudibranchs, and geoducks); [2] echinoderms (sea cucumbers, sunflower stars, short-spined stars, sand stars, and sun stars); [3] cnidarians (sea pens, sea whips, plumed anemone, and striped anemone); [4] arthropods (Dungeness crabs, red rock crabs, graceful crabs, sharp-nosed crabs, hermit crabs, decorator crabs, and ghost shrimps); [5] annelids (sabellid, terebellid and chaetopterid tube worms); and [6] ascidians (tunicates). Geoduck harvest has not been shown to have long-term adverse effects on these invertebrates. Geoduck harvest can depress some benthic invertebrates, however most of these animals recover within one year.

WDFW and DNR have studied the effects of geoduck harvest on the population of Dungeness crab at Thorndyke Bay in Hood Canal. The results of 4.6 years of study have

shown no adverse effects on crab populations due to geoduck fishing. Dungeness crab are found in this tract in moderate numbers. Dungeness crab were observed on 5 of 35 transects (900 sq. ft./transect) during the 2007 survey.

To determine the potential impacts to Dungeness crab, the percentage of substrate disturbed during fishing was calculated and compared to the entire crab habitat within the tract and shoreward of the tract to the +1 foot level and seaward out to the mid-channel of Port Gamble Bay (Figure 5, Potential crab habitat map). Dr. Dave Armstrong at the University of Washington has determined that Dungeness crab utilize Puget Sound bottoms from the +1 foot level out to the minus 330 foot level. The entire crab habitat along this tract is approximately 942 acres. There were about 5,057,848 harvestable geoducks in this tract from the 1996 pre-fishing survey estimate. With a harvest of 85 percent, the projected total number harvested is estimated to be 4,299,171 geoducks. Approximately 1.18 square feet of substrate is disturbed for every geoduck harvested, so $4,299,171 \times 1.18 = 5,073,022$ square feet of substrate. This equals about 116.46 acres. This is about 12.4 percent of the total available crab habitat in the vicinity of this tract. This is a moderate to high amount of disturbance, however based on the lack of effects observed at the Thorndyke Bay study we conclude that any negative effects on Dungeness crab will be very minor, if they occur at all.

Aquatic Plants:

Large attached aquatic plants are not generally found in geoduck beds in large quantities. Light restriction often limits plant growth to areas shallower than where most geoduck harvest occurs. Aquatic plants observed during geoduck surveys (Table 8) include:

Laminarian algae; small foliose red algae; Ulva (sea lettuce); large red algae; and Desmarestiales algae.

Eelgrass was observed to a depth of -18 feet (MLLW) along the nearshore boundary of the Port Gamble tract.

John Boettner and Tim Flint, of the WDFW Habitat Division, stated that as long as geoduck fishing was restricted seaward of the eelgrass beds they have no concerns about the fishing. This conclusion has undergone recent review and has not been altered by the WDFW Habitat Division. The shallow boundary of geoduck harvest is set at least two vertical feet seaward of the deepest eelgrass to protect all eelgrass from harvest activities. The shoreward boundary of this tract will be no shallower than the -25 foot (MLLW) water depth contour, which should provide sufficient buffer for any eelgrass beds in the vicinity of the tract.

Marine Mammals:

Several species of marine mammals; including seals, sea lions, and harbor porpoise; are observed in the vicinity of this geoduck tract. There have also been sporadic reports of gray whales feeding in northern Hood Canal. Killer whales (*Orcinus orca*) may also be observed in the vicinity of this tract. The Southern Resident stock of killer whales resides mainly in the San Juan Islands throughout spring and summer (Brent Norberg, NOAA, pers. comm. 5/15/06). The Southern Resident stock of killer whales was listed as "endangered" under the federal Endangered Species Act (ESA) by the National Marine Fisheries Service on November 15, 2005. This is in addition to the designation of this stock in May 2003 as "depleted" under the Marine Mammal Protection Act. More information and a draft conservation plan for this stock can be found at the NOAA website (<http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/ESA-Act-Status/Listing-Final.cfm>). Hand pick shellfish fisheries, like geoduck harvesting, are considered Category III under the Marine Mammal Authorization Program for Commercial Fisheries. This means that there is a "rare or remote" likelihood of marine mammal "take," (Brent Norberg, NOAA, pers. comm. 5/15/06). Precautions should be taken by commercial divers, when marine mammals are in the area, to be aware of marine mammal movements and behavior to eliminate the remote risk of entanglement with diver hoses and lines.

Birds:

A variety of marine birds are observed in Hood Canal. The most significant of these, relative to geoduck harvest, are pigeon guillemots, which are reported to nest near the Hood Canal Bridge. Various other marine birds such as murrelets, grebes, loons, scoters, dabbling ducks, mergansers, buffleheads, cormorants, and gulls are common. Blue heron are also common along the shores of this area and osprey are regularly observed. Geoduck harvest does not appear to have any effect on these birds or their use of the waters where harvest occurs. Bald eagles are also present in the area of the tract. A study by DNR and WDFW was conducted at northern Hood Canal to learn the effects of geoduck fishing on bald eagles (Watson et. al., 1995). A significant conclusion of this study is that commercial harvest of geoduck is unlikely to have any adverse impacts on bald eagle productivity.

Other uses:

Adjacent Upland Use:

The upland properties adjacent to the tract are primarily designated as semi-rural shoreline environmental designations.

To minimize possible disturbance to adjacent residents, harvest vessels are not allowed shoreward of the 200 yards seaward of the ordinary high tide line (OHT). Harvest is allowed only during daylight hours and no harvest is allowed on Saturday, Sunday, or state holidays.

The only visual effect of harvest is the presence of the harvest vessels on the tract. These boats (normally 35-40 feet) are anchored during harvest and all harvest is conducted out of sight by divers. Noise from boats, compressors and pumps may not exceed 50 dB measured 200 yards from the noise source, which is 5 dBA below the state noise standard.

Fishing:

The waters in the vicinity of this geoduck tract (in Marine Area 9) are not prime sport fishing areas, and fishing for salmon is closed from July 16 through August 31. Sport fishing is open year round for surfperch. Rockfish fishing is closed in this area. Lingcod can only be taken May 1-June 15 by hook and line or May 21 to June 15 by spearfishing. The WDFW 2011/2012 Sport Fishing Rules pamphlet describes additional seasons, size limits, daily limits, specific closed areas, and additional rules for salmon and other marine fish species. The fishing which does occur should not create any problems for the geoduck harvesting effort in the area.

Geoduck fishing on this tract is managed in coordination with the Hood Canal treaty tribes through state/tribal geoduck harvest management plans. The non-Indian geoduck fishery should not be in conflict with any concurrent tribal fisheries.

Navigation:

The Port Gamble area is used by recreational and commercial vessels traveling in Hood Canal. Geoduck harvesting at this site should not result in any significant navigational conflicts. The Washington Department of Natural Resources will notify the local boating community prior to any harvest.

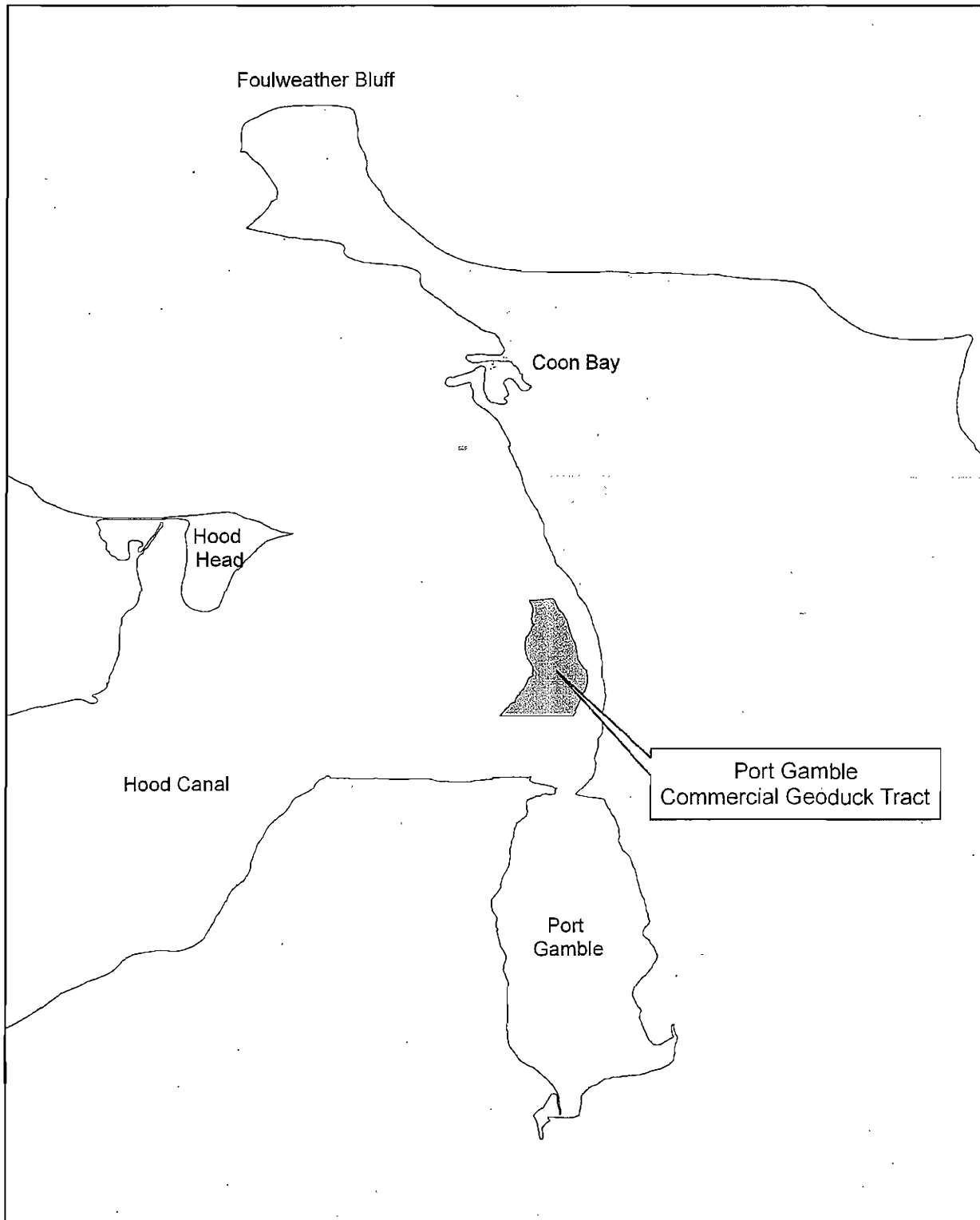
Summary:

The continued commercial geoduck harvest is proposed for one tract along the northeastern shoreline of Hood Canal. The tract was surveyed in 1996 by the PNPTC Tribes and in 2007 by WDFW (Figure 6). The current tract biomass estimate of 3,270,023 pounds is based on the 1996 survey and reported landings of about 5,367,238 pounds since 1996. The commercial tract is classified by DOH as "Approved." The anticipated environmental impacts of this harvest are within the range of conditions discussed in the 2001 Final Supplemental Environmental Impact Statement for this commercial fishery. To reduce the possible impacts to herring and eelgrass, the harvest will be seaward of the -25 foot (MLLW) water depth contour along the tract. The

Port Gamble tract nearshore boundary will be the -35 foot (MLLW) water depth contour from January 15 through April 15 of each year, to avoid impacts to spawning herring. No significant impacts are expected from this harvest.

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Figure 1. Vicinity Map, Port Gamble Commercial Geoduck Tract #20000



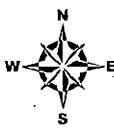
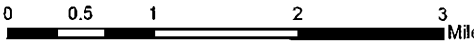

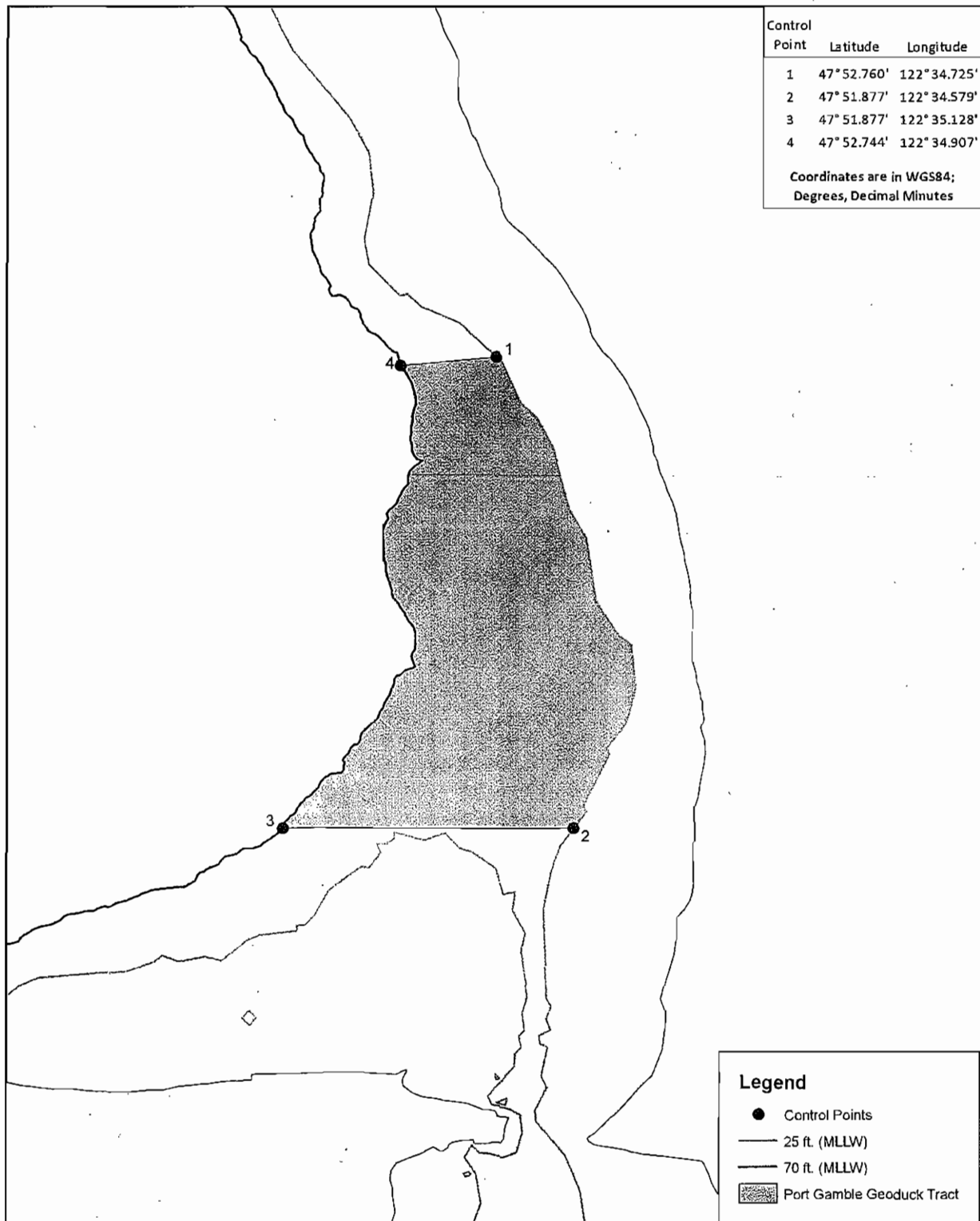
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Figure 2. Control Point Map, Port Gamble Commercial Geoduck Tract #20000



Legend

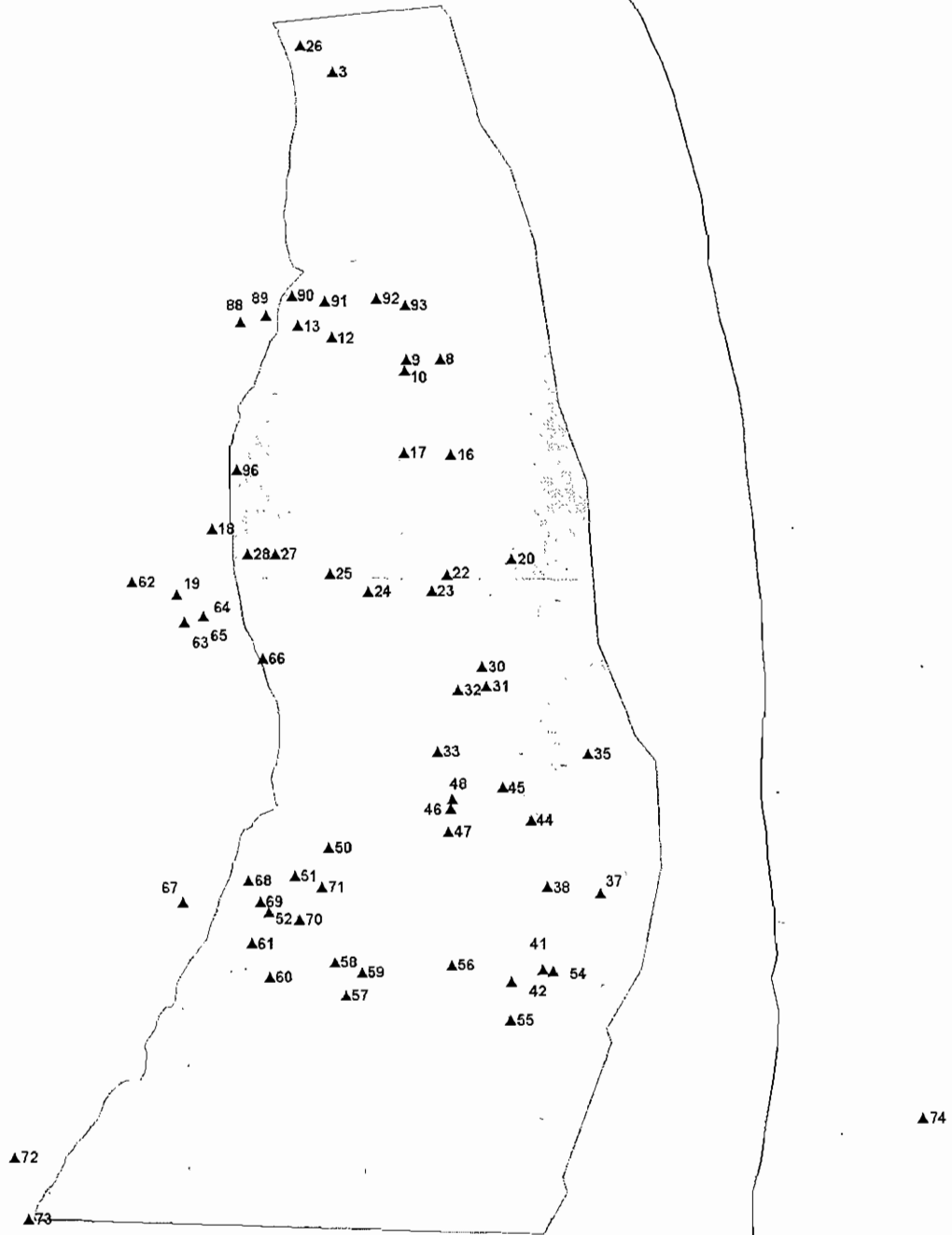
- Control Points
- 25 ft. (MLLW)
- 70 ft. (MLLW)
- ▨ Port Gamble Geoduck Tract

1:20,000
1 inch = 0.32 miles

Data Sources:
 Projection for data is GCS_Washington Geographic System 1984,
 Units: Meters. Coastline layer is from DNR, 1: 24,000 scale, created
 09-20-99. Contours are from NOAA soundings.

Map Date: July 15, 2010
 Map Author: O. Eveningsong
 File: Data\Ocean\Geoduck

Figure 3. Transect Survey Map for Port Gamble Geoduck Tract # 20000



Transect locations are from the 1996 PNPTC survey. Transect locations are estimates, due to dithering of GPS signals. Dithering introduces errors in locations from 50-100 meters, and took place until the year 2000. Dithering causes transects to appear to fall outside of the tract or to not line up with other transects. In addition, the starting GPS position was not taken for all transects.



1:9,000
1 inch equals 750 feet

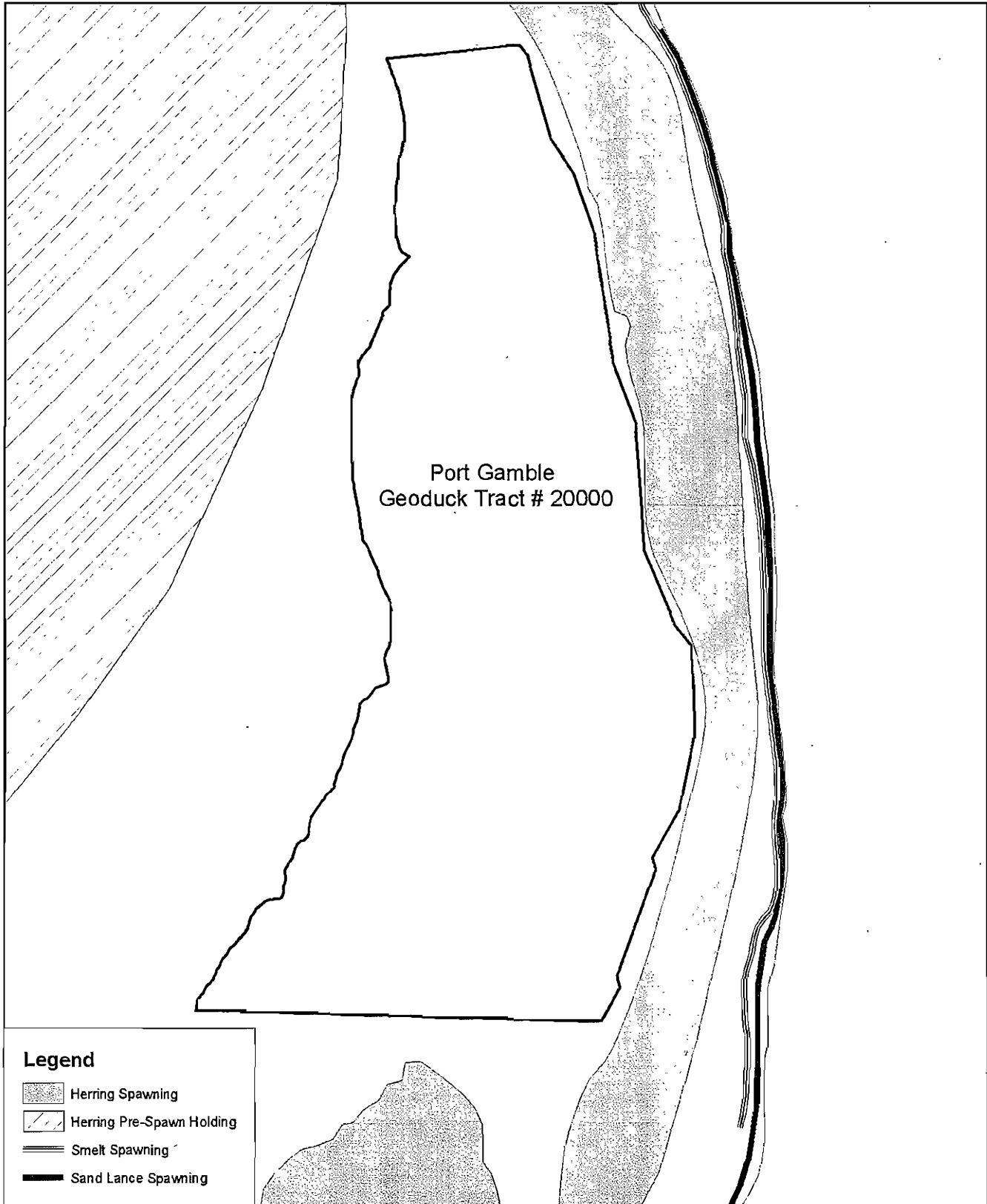
Data Sources:

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




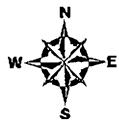
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Map Author: T. Blewett
File: EAmaps.mxd

Figure 4. Baitfish Spawning Map for Port Gamble Geoduck Tract # 20000



Legend

-  Herring Spawning
-  Herring Pre-Spawn Holding
-  Smelt Spawning
-  Sand Lance Spawning



1:9,000
1 inch equals 750 feet

Data Sources:

Projection for data is Stateplane, Washington Zone South, units feet, Datum NAD 27. Coastline layer is from DNR, 1: 24,000 scale, created 09-20-99. Contours are from NOAA soundings. Baitfish spawning data are from WDFW maintained GIS layers.

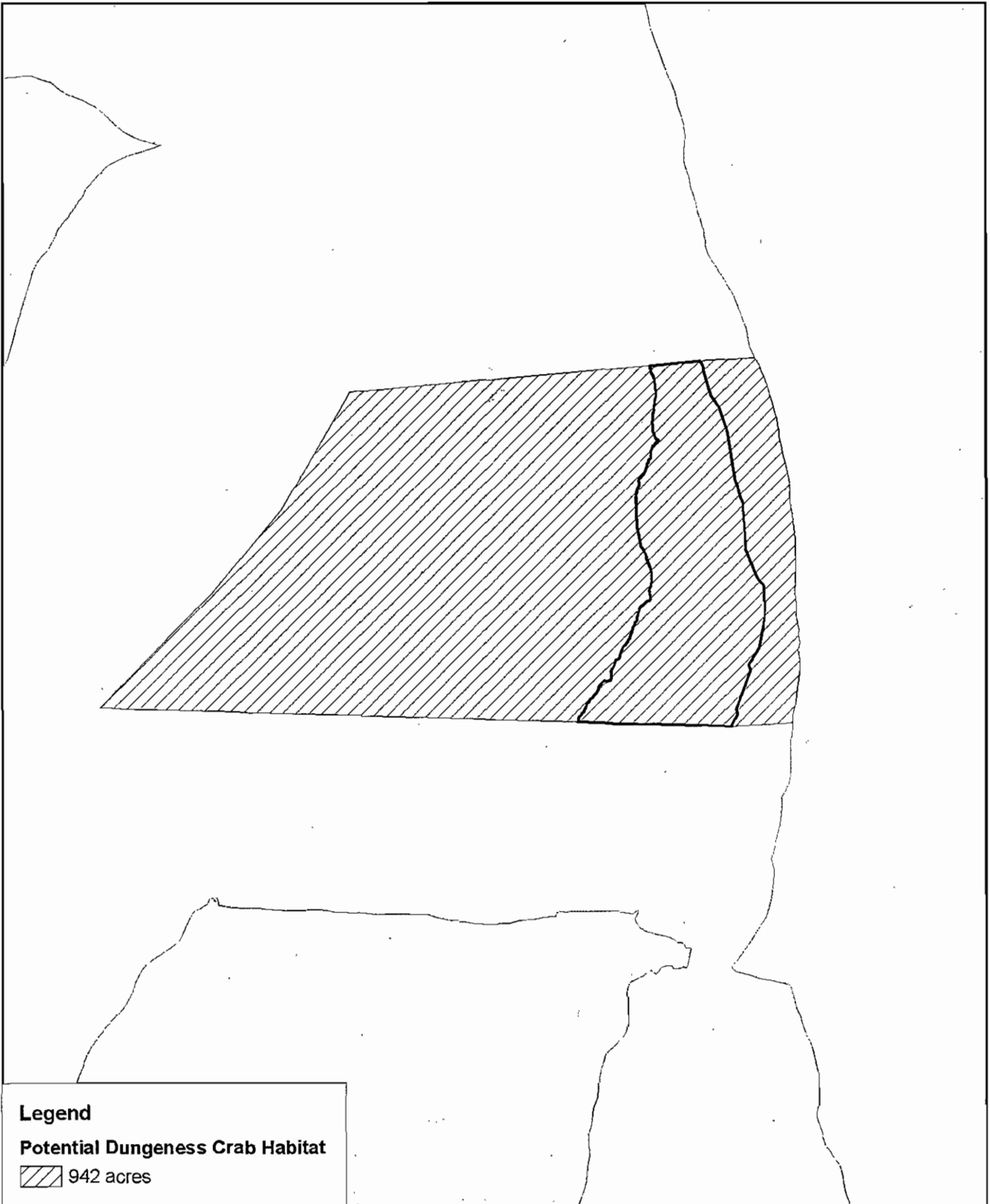
0 350 700 1,400 2,100 Feet



Washington
Department of
**FISH and
WILDLIFE**


Map Date 06-11-07
Map Author T. Blewett
File: EAmaps.mxd

Figure 5. Potential Crab Habitat Map for Port Gamble Geoduck Tract # 20000



Legend

Potential Dungeness Crab Habitat

 942 acres



1:24,000
1 inch equals 2,000 feet

Data Sources:

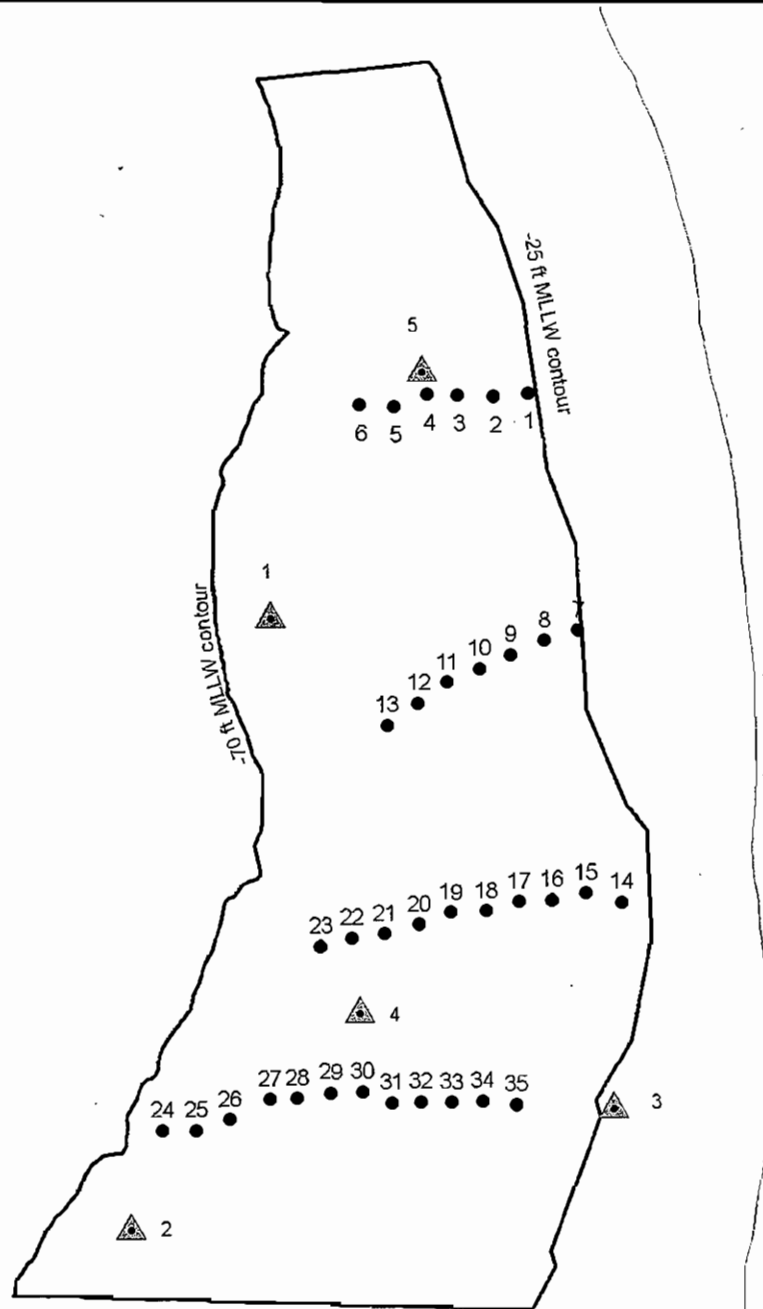
Projection for data is Stateplane, Washington Zone South, units feet, Datum NAD 27. Coastline layer is from DNR, 1: 24,000 scale, created 09-20-99. Contours are from NOAA soundings.



Washington
Department of
**FISH and
WILDLIFE**

Map Date: 06-11-07
Map Author: T. Blewett
File: EAmaps.mxd

Figure 6. WDFW 2007 Supplementary Survey Map
for Port Gamble Geoduck Tract # 20000



Legend

WDFW 2007 Supplementary Survey

- ▲ Dig Station
- Transect

These transects were completed by WDFW in 2007 to supplement the 1996 PNPTC survey for substrate, plant, and animal observations for the 2007 environmental assessment. Transects or digs were between the -25 ft MLLW and -70 ft MLLW water depth contours. Appearance to the contrary on the map is a result of inconsistencies in GIS layers.



1:9,500
1 inch equals 791.7 feet

Data Sources:

Projection for data is Stateplane, Washington Zone South, units feet, Datum NAD 27. Coastline layer is from DNR, 1: 24,000 scale, created 09-20-99. Contours are from NOAA soundings.



Map Date: 06-13-07
Map Author: T. Blewett
File: EAmaps.mxd

EXPLANATION OF SURVEY DATA TABLES

The geoduck survey data for each tract is reported in eight tables. These tables contain specific information gathered from transect and dig samples, diver observations, and geographic information system (GIS) summaries. The following is an explanation of the headings and codes used in these tables.

Geoduck Tract Summary

This table is a general summary of survey information for the geoduck tract including estimates of *Tract Size* in acres, average geoduck *Density* in animals per sq.ft., *Total Tract Biomass* in pounds with statistical confidence interval, and *Total Number of Geoducks* within the tract. Mass estimators are reported in average values for *Whole Weight* and *Siphon Weight* in pounds. Geoduck siphon weights are also reported in *Siphon Weight as a percentage of Whole Weight*. Mass estimates may exclude samples that have been damaged during digging, if it is determined that mass of the sample is reduced as a result. Biomass estimates are adjusted for any harvest that may occur subsequent to the pre-fishing survey.

Geoduck Tract Boundary Control Points

Geoduck tract areas are described as two dimensional surface area polygons, with nearshore and off-shore boundary lines following water depth contours and with "side boundaries" described as straight lines between control points. Control points are represented as latitude and longitude positions that connect these lines, to form a continuous tract boundary polygon. These control points are often referred to as the tract "corners." Prior to 2010, tract control points were described using North American Datum 1927 (NAD-27), since this was the industry standard and the most common navigation chart datum used when the geoduck fishery began. In 2010, geoduck fishery managers agreed to begin using World Geodetic System 1984 (WGS-84) as reference datum for geoduck tracts. The International Civil Aviation Organization (ICAO) specifies the WGS-84 reference datum. During the transition from NAD-27 to WGS-84 reference datum, both NAD-27 and NAD-27 transformed to WGS-84 latitude/longitude control points will be listed in this table. These positions may be updated as these positions are field verified against known navigation markers, permanent buoys, and water depth contours.

Digging Difficulty

This table presents a station-by-station evaluation of the factors contributing to the difficulty of digging geoduck samples with a 5/8" inside nozzle diameter water jet. Codes for the overall subjective summary of the digging difficulty are given in the *Difficulty* column. An explanation of the codes for the dig difficulty follows:

<u>Code</u>	<u>Degree of Difficulty</u>	<u>Description</u>
0	Very Easy	Sediment conducive to quick harvest.

1	Easy	Some barrier(s) exist in substrate to inhibit digging.
2	Some difficulty	Substrate may be compact or contain gravel, shell or clay; most geoducks still easy to dig.
3	Difficult	Most geoducks were difficult to dig, but most attempts were successful.
4	Very Difficult	It was laborious to dig each geoduck. Unable to dig some geoducks.
5	Impossible	Divers could not remove geoducks from the substrate.

Abundance refers to the relative geoduck abundance; a zero (0) indicates that geoducks were very sparse, a one (1) indicates that they were moderately abundant and a two (2) indicates that they were very abundant. *Depth* refers to the depth that the geoducks were found in the substrate. A zero (0) indicates that they were shallow, a one (1) indicates that they were moderately deep and a two (2) indicates that they were very deep. The columns labeled *Compact*, *Gravel*, *Shell*, *Turbidity* and *Algae* refer to factors that contribute to digging difficulty by interfering with the digging process. A zero (0) in one of these columns indicates that the factor was not a problem, a one (1) indicates that the factor caused moderate difficulty and a two (2) indicates that the factor caused a significant amount of difficulty when digging. *Compact* refers to the compact or sticky nature of a muddy substrate. *Gravel* and *Shell* refer to the difficulty caused by these substrate types. *Turbidity* refers to the turbidity within the water near the dig hole caused by the digging activity. High turbidity makes it difficult to find the geoduck siphon shows or causes frequent moving of diver into the current. The difficulty of digging associated with turbidity varies with the amount of tidal current present. Therefore, the turbidity rating refers only to the conditions occurring when the sample was collected. *Algae* refers to algal cover, which also makes it difficult for the diver to find geoduck siphon shows. Because algal cover varies seasonally, this value only applies to the conditions when the sample was collected. The *Commercial* column gives a subjective assessment of whether or not it would be feasible to harvest geoducks on a commercial basis at the given station. Commercial may also be a subjective evaluation of geoduck appearance. Geoducks with highly deformed shells, very dark or wrinkled periostracum (outside layer analogous to skin), or many pustules on the siphon may be assigned a non-commercial rating.

Transect Water Depths, Geoduck Densities and Substrate Observations

This table reports findings for each transect. *Start Depth* and *End Depth* (corrected to MLLW) are given for each transect. *Geoduck Density* is reported as the average number of geoducks per square foot for each 900 square foot transect. *Substrate Type* and *Substrate Rating* refer to evaluations of the substrate surface. A two (2) rating indicates

that the substrate type is predominant. A one (1) rating indicates the substrate type was present. A blank cell indicates that the substrate type was not observed.

Geoduck Size and Quality

This table summarizes the size and quality of the geoducks at each of the stations where dig samples were collected. Weight values for any geoduck dig samples that were damaged during sampling to the extent that water loss occurred, are excluded from calculations. The *Number Dug* column lists the number of geoducks collected. The *Avg. Whole Weight (lbs.)* column gives the average sample weight of whole geoduck clams for each dig station. The *Avg. Siphon Weight (lbs.)* column gives the average weight of the siphons of the geoducks for each dig station. The percentage of geoducks greater than two pounds is given in the *% Greater than 2 lbs.* column.

Transect - Corrected Geoduck Count and Position Table

This table reports the diver *Corrected Count*, the geoduck siphon *Show Factor* used to correct the count, and the *Latitude/Longitude* position of the start point of each survey transect. Raw (observed) siphon counts are “corrected” by dividing diver observed counts for each transect with a siphon “show” factor (See WDFW Tech. Report FPT00-01 for explanation of show factor) to estimate the sample population density. Transect positions are reported in degrees and decimal minutes, to the thousandth of a minute. Transect data taken prior to 2010 is datum NAD-27. Transect data taken from 2010 forward is datum WGS-84. This table should footnote reference datum used for transect positions.

Most Common and Obvious Animals Observed

This table summarizes the animals, other than geoducks, that were observed during the geoduck survey, and reports the total number of transects on which they were present (*# of Transects Where Observed*). This is qualitative presence/absence data only, and only animals that can be readily seen by divers at or near the surface of the substrate are noted. The *Group* designation allows for the organization of similar species together in the table. Whenever possible, the scientific name of the animal is listed in *Taxonomer*, and a generally accepted *Common Name* is also listed. Many variables may make it difficult for divers to notice other animals on the tract, including but not limited to poor visibility, diver skill, animals fleeing the divers, animal size, or cryptic appearance or behavior (in crevasses or under rocks).

Most Common and Obvious Plants Observed

This table summarizes marine plants observed during the geoduck survey, and reports the total number of transects on which they were seen (*# of Transects Where Observed*). This is qualitative presence/absence data only, and only for macro algae, with the exception of diatoms. At high densities diatoms form a “layer” on or above the substrate surface that is readily visible and obvious to divers. Other types of phytoplankton are not sampled and are rarely noted by divers. Whenever possible, the scientific name or a general taxonomic grouping of each plant is listed in *Taxonomer*.

Table 1. TRACT SUMMARY

Port Gamble geoduck tract # 20000.

Tract Name	Port Gamble
Tract Number	20000
Tract Size (acres) ^a	190
Density of geoducks/sq.ft ^b	0.22
Total Tract Biomass (lbs.) ^b	3,270,023
Total Number of Geoducks on Tract ^b	1,841,978
Confidence Interval (%)	12.9%
Mean Geoduck Whole Weight (lbs.)	1.78
Mean Geoduck Siphon Weight (lbs.)	0.39
Siphon Weight as a % of Whole Weight	22%
Number of 900 sq.ft. Transect Stations	72
Number of Geoducks Weighed	211

^a Tract area is between the -25 ft. and -70 ft. (MLLW) water depth

^b Biomass is based on the 1996 Point No Point geoduck survey pre-fishing biomass of 8,637,261 pounds, minus total harvest of 5,367,238 pounds through April 19, 2011

Generation Date: April 19, 2011
Generated By: O. Eveningsong
File: Data\Geoduck\EAs

Table 2: GEODUCK TRACT BOUNDARY CONTROL POINTS IN WGS84 AND NAD27 DATA

Port Gamble geoduck tract # 20000.

Tract Boundary Control Points	WGS84 latitude positions ^a		WGS84 longitude positions ^a		NAD27 latitude positions ^a		NAD27 longitude positions ^a		Water Depth Contour
	Degrees	Decimal Minutes	Degrees	Decimal Minutes	Degrees	Decimal Minutes	Degrees	Decimal Minutes	
1	47°	52.760'	122°	34.725'	47°	52.772'	122°	34.651'	-25 ft. (MLLW)
2	47°	51.877'	122°	34.579'	47°	51.889'	122°	34.504'	-25 ft. (MLLW)
3	47°	51.877'	122°	35.128'	47°	51.889'	122°	35.054'	-70 ft. (MLLW)
4	47°	52.744'	122°	34.907'	47°	52.757'	122°	34.833'	-70 ft. (MLLW)

^a Positions are reported in degrees and decimal minutes. WGS84 positions should be used in 2010 after being field verified

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Generated By: O. Eveningsong, WDFW
File: C:\Data\Ocean\Geoduck\EAs\2010

Table 3A: DIGGING DIFFICULTY TABLE

Port Gamble geoduck tract # 20000, 2007 WDFW supplemental survey.

Dig Station	Difficulty (0-5)	Abundance (0-2)	Depth (0-2)	Compact (0-2)	Gravel (0-2)	Shell (0-2)	Turbidity (0-2)	Algae (0-2)	Commercial (Y/N)
1	3	2	0	0	2	1	1	0	Yes
2	1	1	2	0	0	0	1	0	Yes
4	2	1	1	0	1	0	1	0	Yes
3	1	2	1	0	0	0	1	0	Yes
5	1	2	1	1	0	0	1	0	Yes

Generation Date: 10 April, 2009

Generated By: O. Eveningsong

File: Data\Ocean\Geoduck\EAs.xls

Table 3B: DIGGING DIFFICULTY TABLE

Port Gamble geoduck tract # 20000, 1996 PNPTC pre-fishing survey.

Dig Station	Difficulty (0-5)	Abundance (0-2)	Depth (0-2)	Compact (0-2)	Gravel (0-2)	Shell (0-2)	Turbidity (0-2)	Algae (0-2)	Commercial (Y/N)
1	4	No additional data is available from the 1996 PNPTC survey.							
2									
3									
5	1								
6	2								
7	2								
8	2								
9	1								
10	1								
11									
12	2								
13	2								
14	2								
15	3								
16	1								
17	1								
18	1								
19	1								
20	1								
22	1								

Generation Date: 10 April, 2009
Generated By: O. Eveningsong
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Table 4: TRANSECT WATER DEPTHS, GEODUCK DENSITIES, AND SUBSTRATE OBSERVATIONS

Port Gamble geoduck tract # 20000, 1996 PNPTC pre-fishing survey.

Transect ^a	Start depth (ft.) ^b	End depth (ft.) ^b	Geoduck Density (no. / sq. ft.) ^c	Substrate
3	30	40	0.160	No substrates available from the 1996 PNPTC survey
4	40	51	0.452	
5	51	60	0.545	
8	33	40	0.397	
9	40	44	0.570	
10	44	47	0.665	
11	47	50	0.693	
12	50	57	0.684	
13	57	63	0.723	
16	33	40	0.400	
17	40	43	0.367	
18	52	59	0.880	
19	59	69	0.397	
20	27	36	0.190	
22	36	44	0.384	
23	44	46	0.554	
24	46	45	0.593	
25	45	44	0.644	
26	44	45	0.751	
27	45	48	0.692	
28	48	52	0.653	
30	34	43	0.172	
31	43	41	0.302	
32	42	39	0.579	
33	39	39	0.584	
35	35	40	0.080	
37	27	37	0.130	
38	37	40	0.019	
39	40	40	0.108	
41	25	36	0.021	
42	36	39	0.024	
43	39	39	0.024	
44	40	43	0.111	
45	43	38	0.364	
46	38	37	0.570	
47	37	37	0.547	
48	37	37	0.721	
49	37	38	0.661	
50	41	44	0.730	
51	44	47	1.056	
52	47	50	0.877	
54	35	40	0.059	
55	40	35	0.102	
56	35	28	0.301	

Table 4: Continued

Transect ^a	Start depth (ft.) ^b	End depth (ft.) ^b	Geoduck Density (no. / sq. ft.) ^c	Substrate
57	36	38	0.590	No substrates available from the 1996 PNPTC survey
58	38	40	0.594	
59	40	43	0.856	
60	43	47	0.841	
61	47	54	1.012	
62	68	58	0.707	
63	58	53	0.599	
64	53	48	0.933	
65	48	47	0.927	
66	47	46	0.917	
67	64	51	0.981	
68	51	43	1.193	
69	43	38	1.138	
70	38	34	1.067	
71	34	32	0.864	
72	63	50	1.037	
73	50	32	0.687	
74	32	27	0.370	
88	68	59	0.676	
89	59	51	0.822	
90	51	47	0.850	
91	47	44	0.759	
92	44	39	0.664	
93	39	31	0.327	
96	46	45	0.527	
97	45	44	1.101	
98	44	43	0.827	
99	43	42	0.883	

^a 26 transects were excluded because they fell shallow of -25 ft. (MLLW), or were off-tract. Transect 61 had an area of 300 sq. ft. according to the 1996 data. We assumed this was an error, and calculated the density of this transect using an area of 900 sq. ft.

^b All depths are corrected to mean lower low water (MLLW)

^c Densities were calculated using a daily siphon show factor

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Table 5A: GEODUCK SIZE AND QUALITY

Port Gamble geoduck tract # 20000, 1996 PNPTC pre-fishing survey.

Dig Station	Number Dug	Avg. Whole Weight (lbs.)	Avg. Siphon Weight (lbs.)	% of geoducks on station greater than 2 lbs.
1	10	1.31	0.26	10%
2	12	2.24	0.52	83%
3	9	1.41	0.27	11%
5	10	1.99	0.46	40%
6	10	2.51	0.53	90%
7	11	1.69	0.30	9%
8	12	1.70	0.36	17%
9	12	2.05	0.46	58%
10	15	1.46	0.31	7%
11	10	1.68	0.41	30%
12	10	1.50	0.44	20%
13	10	2.39	0.54	90%
14	10	1.62	0.34	10%
15	10	1.83	0.46	40%
16	10	1.61	0.40	20%
17	10	1.53	0.35	0%
18	10	1.91	0.40	30%
19	10	1.42	0.27	0%
20	10	2.29	0.52	70%
22	10	1.40	0.32	20%

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Table 5B: GEODUCK SIZE AND QUALITY

Port Gamble geoduck tract # 20000, 2007 WDFW supplemental survey.

Dig Station	Number Dug	Avg. Whole Weight (lbs.)	Avg. Siphon Weight (lbs.)	% of geoducks on station greater than 2 lbs.
1	11	1.19	0.24	9%
2	9	2.43	0.50	78%
4	10	2.50	0.51	70%
3	9	2.11	0.43	56%
5	9	2.34	0.37	89%

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Table 6: TRANSECT CORRECTED GEODUCK COUNT AND POSITION TABLE

Port Gamble geoduck tract # 20000, 1996 PNPTC pre-fishing survey.

Transect#	Corrected Geoduck Count per 900 sq. ft. Transect	Geoduck Siphon Show Factor ^a	Latitude ^b		Longitude ^b	
			Degrees	Decimal Minutes	Degrees	Decimal Minutes
3	144	0.75	47°	52.722'	122°	34.766'
4	407	0.75			Not Taken	
5	491	0.75			Not Taken	
8	357	0.75	47°	52.518'	122°	34.641'
9	513	0.75	47°	52.517'	122°	34.678'
10	599	0.75	47°	52.509'	122°	34.679'
11	624	0.75			Not Taken	
12	616	0.75	47°	52.531'	122°	34.759'
13	651	0.75	47°	52.539'	122°	34.796'
16	360	0.75	47°	52.449'	122°	34.626'
17	331	0.75	47°	52.450'	122°	34.677'
18	792	0.75	47°	52.391'	122°	34.883'
19	357	0.75	47°	52.343'	122°	34.918'
20	171	0.75	47°	52.375'	122°	34.559'
22	345	0.75	47°	52.363'	122°	34.627'
23	499	0.75	47°	52.351'	122°	34.643'
24	533	0.75	47°	52.349'	122°	34.711'
25	580	0.75	47°	52.361'	122°	34.753'
26	676	0.75	47°	52.374'	122°	34.802'
27	623	0.75	47°	52.374'	122°	34.814'
28	588	0.75	47°	52.374'	122°	34.844'
30	155	0.75	47°	52.297'	122°	34.587'
31	272	0.75	47°	52.283'	122°	34.582'
32	521	0.75	47°	52.28'	122°	34.612'
33	525	0.75	47°	52.235'	122°	34.632'
35	72	0.75	47°	52.236'	122°	34.470'
37	117	0.75	47°	52.136'	122°	34.453'
38	17	0.75	47°	52.139'	122°	34.510'
39	97	0.75			Not Taken	
41	19	0.75	47°	52.078'		34.502'
42	21	0.75	47°	52.070'		34.546'
43	21	0.75			Not Taken	
44	100	0.75	47°	52.187'	122°	34.530'
45	328	0.75	47°	52.210'	122°	34.561'
46	513	0.75	47°	52.194'	122°	34.616'
47	492	0.75	47°	52.177'	122°	34.618'
48	649	0.75	47°	52.201'	122°	34.615'
49	595	0.75	47°	52.000'	122°	34.000'
50	657	0.75	47°	52.163'	122°	34.747'
51	951	0.75	47°	52.142'	122°	34.782'
52	789	0.75	47°	52.116'	122°	34.809'
54	53	0.75	47°	52.079'	122°	34.513'
55	92	0.75	47°	52.042'	122°	34.546'
56	271	0.75	47°	52.081'	122°	34.610'
57	531	0.75	47°	52.057'	122°	34.724'

Table 6: Continued

Transect#	Corrected Geoduck Count per 900 sq. ft. Transect	Geoduck Siphon Show Factor ^a	Latitude ^b		Longitude ^b	
			Degrees	Decimal Minutes	Degrees	Decimal Minutes
58	535	0.75	47°	52.081'	122°	34.737'
59	771	0.75	47°	52.074'	122°	34.707'
60	757	0.75	47°	52.069'	122°	34.807'
61	911	0.75	47°	52.093'	122°	34.827'
62	636	0.75	47°	52.351'	122°	34.967'
63	539	0.75	47°	52.323'	122°	34.909'
64	840	0.75	47°	52.328'	122°	34.889'
65	835	0.75	47°	52.328'	122°	34.889'
66	825	0.75	47°	52.299'	122°	34.824'
67	883	0.75	47°	52.121'	122°	34.902'
68	1073	0.75	47°	52.138'	122°	34.832'
69	1024	0.75	47°	52.123'	122°	34.819'
70	960	0.75	47°	52.111'	122°	34.776'
71	777	0.75	47°	52.135'	122°	34.752'
72	933	0.75	47°	51.934'	122°	35.076'
73	619	0.75	47°	51.890'	122°	35.059'
74	333	0.75	47°	51.980'	122°	34.098'
88	608	0.75	47°	52.540'	122°	34.858'
89	740	0.75	47°	52.546'	122°	34.831'
90	765	0.75	47°	52.561'	122°	34.803'
91	683	0.75	47°	52.557'	122°	34.767'
92	597	0.75	47°	52.560'	122°	34.711'
93	295	0.75	47°	52.556'	122°	34.680'
96	475	0.75	47°	52.434'	122°	34.858'
97	991	0.75				Not Taken
98	744	0.75				Not Taken
99	795	0.75				Not Taken

^a 26 transects were excluded because they fell shallow of 2-5 ft. (MLLW), or were off-tract

^b Daily siphon show factor was used to correct combined geoduck counts

^c Latitude and longitude are in NAD27, degrees and decimal minutes, and have not been converted to WGS84 datum

Generation Date: 10 April, 2009
 Generated By: O. Eveningsong
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Table 7: MOST COMMON AND OBVIOUS ANIMALS OBSERVED

Port Gamble geoduck tract # 20000, 2007 WDFW supplemental survey.

# of Transects where Observed	Group	Common Name	Taxonomer
18	ANEMONE	STRIPED ANEMONE	<i>Urticina</i> spp.
7	ANEMONE	PLUMED ANEMONE	<i>Metridium</i> spp.
17	ASCIDIAN	SESSILE TUNICATE	Unspecified tunicate
28	BIVALVE	HORSE CLAM	<i>Veneridae</i> spp.
8	BIVALVE	TRUNCATED MYA	<i>Mya truncata</i>
2	BIVALVE	FALSE GEODUCK	<i>Panomya</i> spp.
35	CNIDARIA	SEA PEN	<i>Ptilosarcus gurneyi</i>
34	CNIDARIA	SEA WHIP	<i>Stylatula elongata</i>
20	CRAB	HERMIT CRAB	Unspecified hermit crab
18	CRAB	DECORATOR CRAB	<i>Oregonia gracilis</i>
15	CRAB	GRACEFUL CRAB	<i>Cancer gracilis</i>
9	CRAB	RED ROCK CRAB	<i>Cancer productus</i>
5	CRAB	DUNGENESS CRAB	<i>Cancer magister</i>
2	CRAB	SHARP-NOSED CRAB	<i>Scyra acutifrons</i>
8	CUCUMBER	SEA CUCUMBER	<i>Parastichopus californicus</i>
3	CUCUMBER	BURROWING CUCUMBER	Unspecified burrowing Holothurian
26	FISH	SANDDAB	<i>Citharichthys</i> spp.
9	FISH	FLATFISH	Unspecified flatfish
6	FISH	FISH	Unspecified fish
4	FISH	SCULPIN	Unspecified Cottidae
2	FISH	C-O SOLE	<i>Pleuronichthys coenosus</i>
2	FISH	POACHER	Unspecified Agonidae
2	FISH	ROCK SOLE	<i>Lepidopsetta bilineata</i>
1	FISH	SKATE	Unspecified Raja spp.
1	FISH	STARRY FLOUNDER	<i>Platichthys stellatus</i>
1	FISH	TUBESNOUT	<i>Aulorhynchus flavidus</i>
3	FISH EGGS	SKATE EGG CASE	Raja spp. egg case
3	GASTROPOD	NUDIBRANCH	Unspecified nudibranch
1	MISC	ARTHROPOD	Unspecified Arthropod
27	NUDIBRANCH	ARMINA	<i>Armina californica</i>
1	NUDIBRANCH	HERMISSENDA	<i>Hermisenda crassicornis</i>
1	NUDIBRANCH	ROSY TRITONIA	<i>Tritonia diomedea</i>
19	SEA STAR	SUNFLOWER STAR	<i>Pycnopodia helianthoides</i>
9	SEA STAR	SHORT-SPINED STAR	<i>Pisaster brevispinus</i>
7	SEA STAR	SAND STAR	<i>Luidia foliolata</i>
3	SEA STAR	SUN STAR	<i>Solaster</i> spp.
17	SHRIMP	GHOST SHRIMP	Unspecified ghost shrimp
28	WORM	SABELLID TUBE WORM	<i>Sabellid</i> spp.
20	WORM	ROOTS	<i>Chaetopterid</i> polychaete tubes
13	WORM	WORM	Unspecified Annelid worm
4	WORM	TEREBELLID TUBE WORM	<i>Terebellid</i> spp.

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Table 8: MOST COMMON AND OBVIOUS PLANTS OBSERVED

Port Gamble geoduck tract # 20000, 2007 WDFW supplemental survey.

# of Transects where observed	Taxonomer
33	<i>Laminaria</i> spp.
23	Small Red Algae
21	<i>Ulva</i> spp.
15	Large Red Algae
6	<i>Desmarestia</i> spp.

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