EXHIBIT A

ENVIRONMENTAL ASSESSMENT OF PROPOSED GEODUCK HARVEST ALONG THE EASTERN SHORELINE OF ELD INLET AT THE ELD INLET EAST GEODUCK TRACT (#17150)

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 annual 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 six 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 eastern shoreline of Eld Inlet is described below.

Proposed Harvest Dates: 2016 - 2017

Tract name: Eld Inlet East tract (Tract #17150)

Description: (Figure 1, Tract vicinity map)

The Eld Inlet East geoduck tract is a subtidal area with a proposed harvest area of approximately 64 acres (Table 1) along the eastern side of Eld Inlet the South Puget Sound Geoduck Management Region. The northern boundary of the tract is approximately 153 yards northwesterly of Cooper Point. The tract extends southwesterly along the shoreline for approximately 1,653 yards (Figure 1). The commercial tract area lies between the -18 and -70 foot (MLLW) water depth contours.

The tract harvest area is bounded by a line projected southwesterly from a point on the -18 foot (MLLW) water depth contour in the most northeasterly portion of the tract at 47°08.838' N. latitude, 122°55.605' W. longitude southwesterly along the -18 foot (MLLW) water depth contour to a point at 47°08.151' N. latitude, 122°56.202' W. longitude; then northwesterly to a point on the -70 foot (MLLW) water depth contour at 47°08.232' N. latitude, 122°56.415' W. longitude; then northeasterly along the -70 foot (MLLW) water depth contour to a point at 47°08.895' N. latitude, 122°55.668' W. longitude; then southeasterly to the point of origin (Figure 2).

This estimate of the tract boundary is made using Geographic Information System (GIS) data layers that were generated from NOAA soundings. All contours are corrected to mean lower low water (MLLW). The shoreline data is from DNR, digitized at 1:24,000 scale in 1999. The -70 foot (MLLW) water depth contour is used for the deep water boundary, and the shallow water boundary is defined by the -18 foot contour (MLLW). The latitude and longitude positions are reported in decimal minutes to the closest thousandth of a minute. Corner latitude and longitude positions are generated using GIS, and have not been field verified to determine consistency with area estimates, landmark alignments, or water depth contours. 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 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 water currents. Water currents tend to be weak and variable in the vicinity of the Eld Inlet East tract. Currents reach an estimated maximum flood velocity of 1.8 knots and maximum ebb velocity of 1.0 knots (Tides and Currents software; station #1861; Eld Inlet entrance; projected time frame from September 15, 2016 to September 15, 2017).

Substrates types vary greatly across this tract (subsurface substrates from dig samples found in Table 2) with sand being the predominant surface substrate type on 25 out 39 transects (Table 3, Figure 3). Mud was the dominant substrate on 14 transects in mostly the southern portion of the tract. Other substrate types observed includes pea gravel and shell.

Water Quality:

There is a wide range of conditions affecting water movement in Eld Inlet. Water movement at this tract is affected by the relatively shallow and confined embayment. The following data on water quality has been provided by the Washington Department of Ecology (DOE) for the Puget Sound Main Basin: Eld Inlet- Flapjack Point (ELD001) at 47.1067° North latitude; 122.9483° West longitude. The DOE latitude and longitude positions are reported by DOE in decimal degrees. For 2010 and 2011 (most recent complete data years available) at water depths between -18 to -70 feet, the mean reported dissolved oxygen concentration is 8.9 mg/l with a range from 6.3 to 13.2 mg/l. The mean salinity at this station was 28.3 ppt with a range from 27.2 to 29.4 psu. The mean water temperature at this station was 10.7°C with a range from 6.9 to 16.0 °C.

This area is classified as "Approved" by the Washington Department of Health (DOH) for commercial shellfish harvest (annual shellfish growing area review, 12/31/15) in the 2015 list of classified growing areas. DNR will verify the health status of the Eld Inlet East tract prior to any state sanctioned geoduck harvest.

Biota:

Geoduck:

The Eld Inlet East geoduck tract is approximately 64 acres and contains an estimated 349,962 pounds of geoducks (Table 1). The geoduck biomass estimate at this tract is based on a 2015 Squaxin Tribe survey. On all 4 dig stations (n=40 geoducks), geoducks were considered commercial quality (Table 2). Geoduck dig station difficulty ratings ranged from "very easy" to "difficult" to dig. Factors contributing to digging difficulty on station #2_5 were the presence of gravel and shell in the substrate.

The geoduck density on this tract is low, averaging 0.042 geoducks/sq.ft. compared to a Puget Sound average density of about 0.160 geoducks/sq.ft. The geoducks at the Eld Inlet East tract are large with an average weight of 3.0 pounds compared to the Puget Sound average geoduck weight of 2.1 pounds. The lowest average whole weight is 2.65 pounds per geoduck at station #2_5 and the highest average whole weight is 3.27 pounds per geoduck at station #8_3 (Table 4). Squaxin Tribe transect line start and end positions are listed in Table 5.

The Eld Inlet East geoduck tract was surveyed by WDFW in 1969, 1989, and 1996. In 1996 a tract biomass estimate of 310,500 pounds was made. The tract was harvested and 453,168 pounds of geoduck were landed. One scenario where the landings could exceed the biomass estimate is where a nearby tract is open and buyers misreport the tract number on fish tickets. In fact, the Eld Inlet West tract (#17200) was often open simultaneously with the Eld Inlet East tract (#17150), and some cross-reporting may have occurred. In 2004, a post-harvest survey was conducted by the Squaxin Tribe and the tract biomass estimate from the survey was 222,966 pounds. In 2015 the Squaxin surveyed this tract (39 transects) and the tract density had recovered to pre-fishing levels. The tract area estimate changed to 64 acres and the recovered biomass estimate was 624,004 pounds. A total of 274,042 pounds of geoducks have been landed on this tract since the 2015 survey, resulting in a current biomass estimate of 349,962 pounds.

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 includes geoducks that are found in water deeper than -18 feet and shallower than -70 feet (corrected to mean lower low water - 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. Recent surveys in South Puget Sound indicate that the rate of tract recovery may have changed dramatically in the last decade, possibly due to lower recruitment, increased mortality, or a combination of both factors. Though the recovery in Eld Inlet is relatively rapid, with an 11 year span between the post-harvest survey and the 2015 survey. 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 many fish species, 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 in Eld Inlet during the survey at the Eld Inlet West tract were various species of flatfish (sand dabs, starry flounders, and a skate), sculpins, and a bay pipefish (Table 6). Fish species were not reported as part of the Squaxin Tribe survey of the Eld Inlet East tract. It is assumed that the species observed on Eld Inlet West tract represent a good proxy for the species presence on nearby Eld Inlet East tract given similar habitat and shared waters.

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 WDFW 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. No eelgrass has been observed along this tract below a depth of -16 feet (MLLW). The Eld Inlet East nearshore tract boundary will be along the -18 foot (MLLW) water depth contour to provide a vertical buffer between eelgrass beds and geoduck harvest.

There are no Pacific herring spawning grounds documented along the shoreline of Eld

Inlet in the vicinity of the Eld Inlet East tract (Figure 4). However, a herring prespawner holding area has been identified off the northwestern shoreline of Cooper Point. With a horizontal separation from known herring fish spawning sites, a nearshore geoduck harvest restriction of -18 feet or deeper and lack of eelgrass beds within the tract, geoduck harvest on the Eld Inlet East tract should have no detrimental impacts on herring spawning.

There is no sand lance spawning documented along the northeastern shoreline Eld Inlet Inlet (Figure 4). Sand lance populations are widespread within Puget Sound, the Strait of Juan de Fuca and the coastal estuaries of Washington. They are most commonly noted in areas such as the eastern Strait and Admiralty Inlet. However, 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. Sand lance spawning 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 (-18 ft. to -70 ft., MLLW). Geoduck harvest on the Eld Inlet East tract should have no detrimental impacts on sand lance spawning.

There is one area of surf smelt spawning habitat that has been identified shoreward of the Eld Inlet East 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 (-18 to -70 feet, MLLW). Geoduck harvest on the Eld Inlet East tract should have no detrimental impacts on surf smelt spawning.

NOAA Fisheries Service announced on April 27, 2010 that it was listing canary and yellow eye rockfish as "threatened" and bocaccio as "endangered" under ESA (federal Endangered Species Act). The listings 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. Recently NOAA recommended de-listing of canary rockfish and the comment period on this recommendation ends on September 6, 2016. Geoduck fishery managers are tracking these processes 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. The Eld Inlet East tract is outside of the critical habitat range for Hood Canal summer run chum salmon.

Critical habitat for Puget Sound chinook salmon includes 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.

Major streams or tributaries near the Eld Inlet East geoduck tract that support Fall chinook salmon include the Deschutes River (approximately 7.2 miles from the tract) and Moxlie Creek (approximately 7.1 miles from the tract), both of which drain into Budd Inlet; and Woodard Creek (approximately 9.0 miles from the tract measured along waterways). The Deschutes River escapement of Fall chinook salmon ranged from 318 to 2023 between the years 2007 and 2011, below optimal levels for stock sustainability. This specific run is not listed since the ESA technical recover team did not find evidence of an independent population historically in the Deschutes River. The same is true for the closely associated Moxlie Creek stock and Woodard Creek stock.

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, the 2 foot vertically from elevation of the 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. Steelheads 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 Eld Inlet that support steelhead stocks. The horizontal separation between tributaries that support steelhead runs and the Eld Inlet East tract will assure that geoduck harvest will likely have no impact on steelhead populations.

Green sturgeons 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 [pdf] (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 Eld Inlet East 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 in Eld Inlet, including anemones, bivalves, cnidarians, crab, cucumbers, gastropods, bryozoans, nudibranchs, sea stars, shrimp and annelid worms (Table 6). 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.

There is on-going interest from recreational and commercial crab fishers about interactions between geoduck harvest activity and Dungeness crab populations. Dungeness crab were not observed on any transects done on the Eld Inlet West tract during a 2013 survey (used as a proxy for crab abundance on the Eld Inlet East tract). Dungeness crab were observed at a very low abundance during a survey in Eld Inlet in July 1996. This area may be at the edge of the range of distribution of Dungeness crab in

Puget Sound. 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 California Department of Fish and Wildlife suggest that coastal Dungeness crab can be found in waters as deep as 750 feet (www.dfg.ca.gov/marine/pdfs/response/**crab**.pdf). Jensen (2014) and WDFW information (personal comm. WDFW Biologist Don Velasquez, 7/23/15) confirm a similar vertical distribution in Puget Sound, though the highest densities are found between the 0 to 360 foot water depth contours.

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 -360 foot (MLLW) water depth contour (Figure 5, Potential crab habitat map). The entire crab habitat along this tract is approximately 396 acres. There are about 208,192 harvestable geoducks on this tract, from the 2015 survey estimate. With a harvest of 85 percent, the total number harvested would be 176,963 geoducks. Approximately 1.18 square feet of substrate is disturbed for every geoduck harvested, so 176,963 x 1.18 = 208,816 square feet of substrate. This equals about 4.79 acres. This is about 1.2 percent of the total available crab habitat in the vicinity of this tract.

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. Based on historic low abundance of Dungeness crab in Eld Inlet, the low amount of disturbance, and the lack of effects observed at the Thorndyke Bay study, we conclude that any effects on Dungeness crab populations 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 (Table 7) during the Eld Inlet West geoduck survey (used as a proxy for plants likely to be observed on the Eld Inlet East tract) include:

> Laminarian algae; Ulva (sea lettuce); small and large foliose red algae; diatoms, and Desmarestian algae.

John Boettner and Tim Flint, from the WDFW Habitat Division, have stated that as long as geoduck fishing was restricted seaward of the eelgrass beds they have no concerns about the fishing. This was confirmed by WDFW Habitat Division who stated that the existing conditions in the fishery SEIS are sufficient to protect fish and wildlife habitat and natural resources. 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. An eelgrass survey done by the Squaxin Tribe in 2015 and no eelgrass was documented below a depth of -16 feet (MLLW). The shoreward boundary of this tract will be no shallower than the -18 foot water depth contour (MLLW), which will provide a vertical buffer of at least 2 vertical feet between any eelgrass beds in the vicinity of the tract and geoduck harvest activity.

Marine Mammals:

Several species of marine mammals, including seals, sea lions, and river otters may be observed in the vicinity of this geoduck tract. Killer whales (*Orcinus orca*) were frequently observed in the vicinity of this tract in 2015, (B. Sizemore personal observation and reported at http://www.thurstontalk.com/2015/02/06/orcas-visiting-olympia/). The Southern Resident stock of killer whales resides mainly in the San Juan Islands throughout spring and summer, but incursions south into Puget Sound occur more frequently during winter months (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 common in Puget Sound and in the general vicinity of this tract. The most significant of these are guillemots, murres, murrelets, grebes, loons, scoters, dabbing ducks, black brant, mergansers, buffleheads, cormorants, gulls, and terns. Blue heron, bald eagles, and osprey are regularly observed. Geoduck harvest does not appear to have any significant effect on these birds or their use of the waters where harvest occurs. A study by DNR and the 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 geoduck clam harvest is unlikely to have any adverse impacts on bald eagle productivity.

Other uses:

Adjacent Upland Use:

The upland property along the Eld Inlet East tract have Thurston County Shoreline Environmental Designations of Rural and Conservancy. To minimize possible disturbance to adjacent residents, harvest vessels are not allowed within 200 yards of the ordinary high tide line (OHT) or shallower than -18 feet (MLLW) whichever is farther seaward. Harvest is only allowed during daylight hours, and no harvest is allowed on Saturdays, Sundays, or state holidays.

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

Fishing:

This area is not a prime sportfishing area, however, some recreational salmon fishing could occur seasonally in proximity to the geoduck bed. The WDFW 2016/2017 Sport Fishing Rules pamphlet describes additional seasons, size limits, daily limits, specific closed areas, and additional rules for salmon and other marine fish species. A few small-scale commercial fisheries may take place in the area. 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 southern Puget Sound treaty tribes through annual state/tribal harvest management plans. The non-Indian geoduck fishery should not be in conflict with any concurrent tribal fisheries.

Navigation:

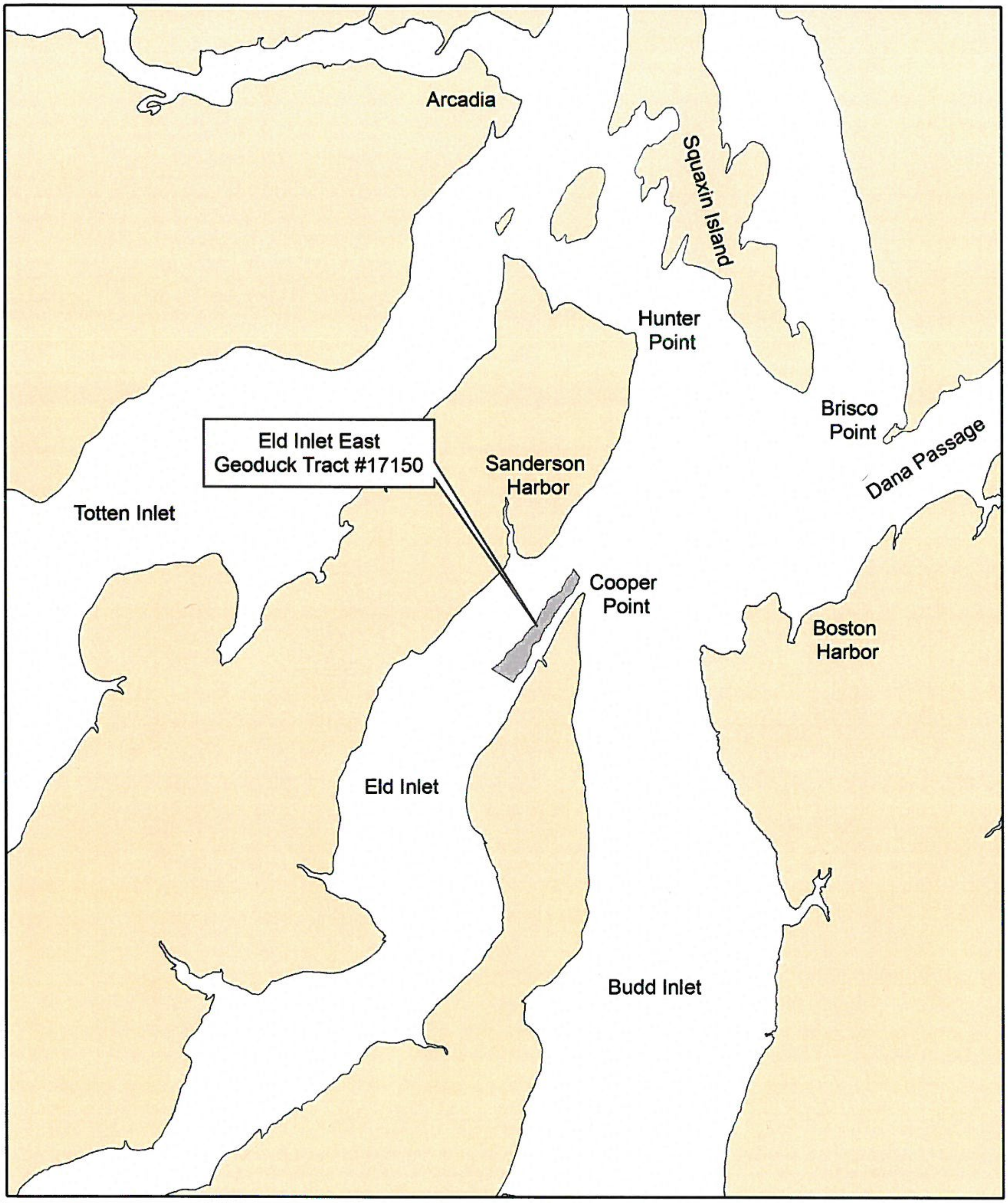
Eld Inlet experiences a moderate amount of recreational vessel traffic, with seasonal fluctuations. The Eld Inlet East tract is not within a major traffic lane and areas close to shore are used primarily by small shoal draft boats. Geoduck harvesting at this site should not result in any significant navigational conflicts. The Department of Natural Resources will notify the local boating community prior to harvests.

Summary:

Commercial geoduck harvest is proposed for the Eld Inlet East geoduck tract located along the northeastern shoreline of Eld Inlet. The tract was most recently surveyed in the year 2015. The tract biomass estimate is based on the 2015 survey and recent geoduck landings. The anticipated environmental impacts of this harvest are within the range of conditions discussed in the Final Supplemental Environmental Impact Statement (2001) for the commercial geoduck clam fishery. To reduce possible impacts to baitfish and eelgrass, harvest will be deeper and seaward of the -18 foot (MLLW) water depth contour. No significant impacts are expected from this harvest.

Last revised: September 2, 2016.

Figure 1. Vicinity Map, Eld Inlet East Commercial Geoduck Tract #17150



N
W E
S

1:70,000

1 inch = 1.1 miles

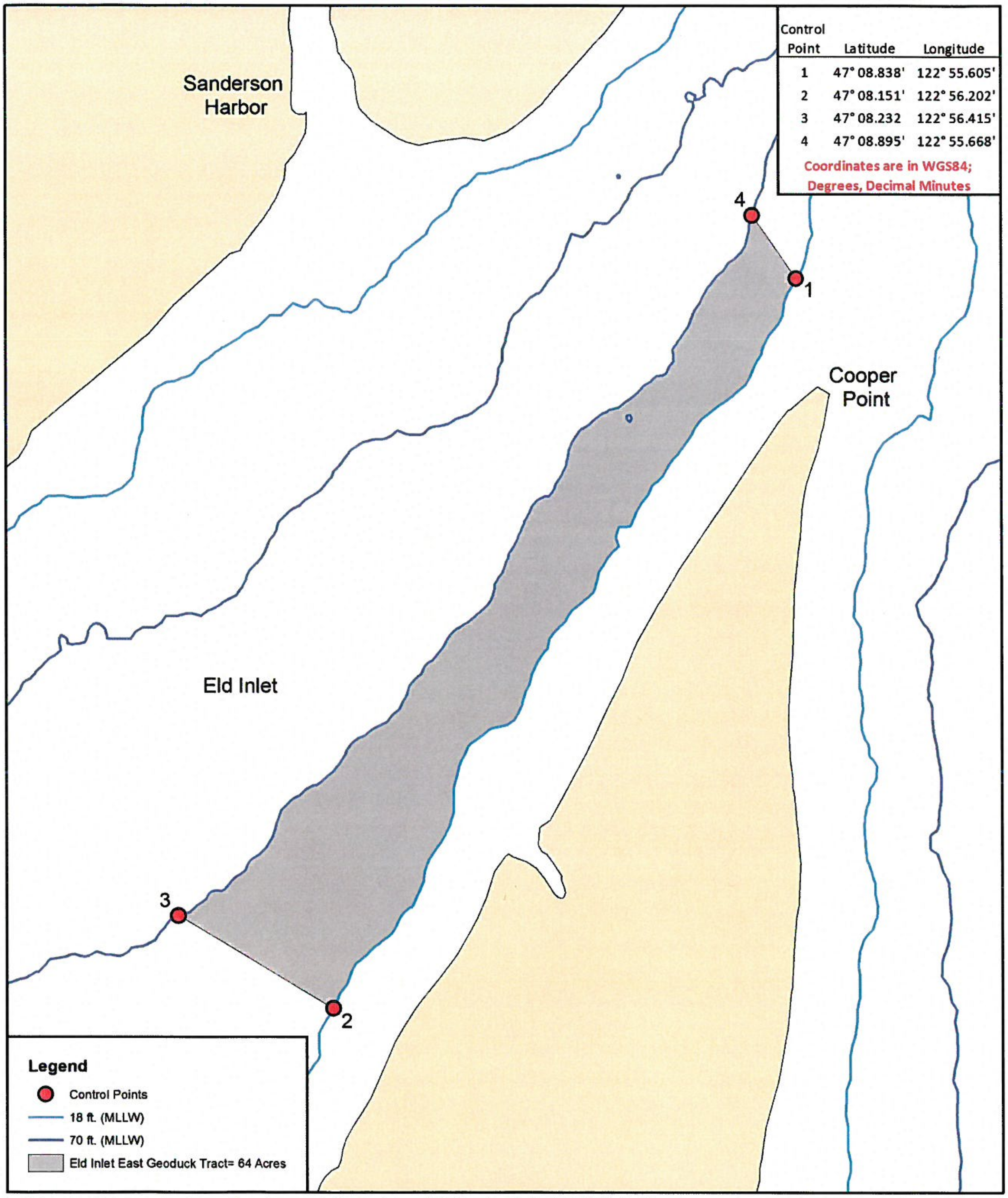
Data Sources:
Projection for data is GCS_Washington Geographic System 1984, Units: Meters. Coastline layer is from DNR, 1: 24,000 scale, created 09-20-99. Contours are from NOAA soundings.

0 0.375 0.75 1.5 2.25 Miles

Washington Department of FISH and WILDLIFE

Map Date: July 24, 2015
Map Author: O. Eveningsong
File: Data\Ocean\Geoduck

Figure 2. Control Points Map, Eld Inlet East Commercial Geoduck Tract #17150



Control Point	Latitude	Longitude
1	47° 08.838'	122° 55.605'
2	47° 08.151'	122° 56.202'
3	47° 08.232	122° 56.415'
4	47° 08.895'	122° 55.668'

Coordinates are in WGS84; Degrees, Decimal Minutes

N W E S

1:10,000

1 inch = 0.16 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.

0 0.05 0.1 0.2 0.3 Miles

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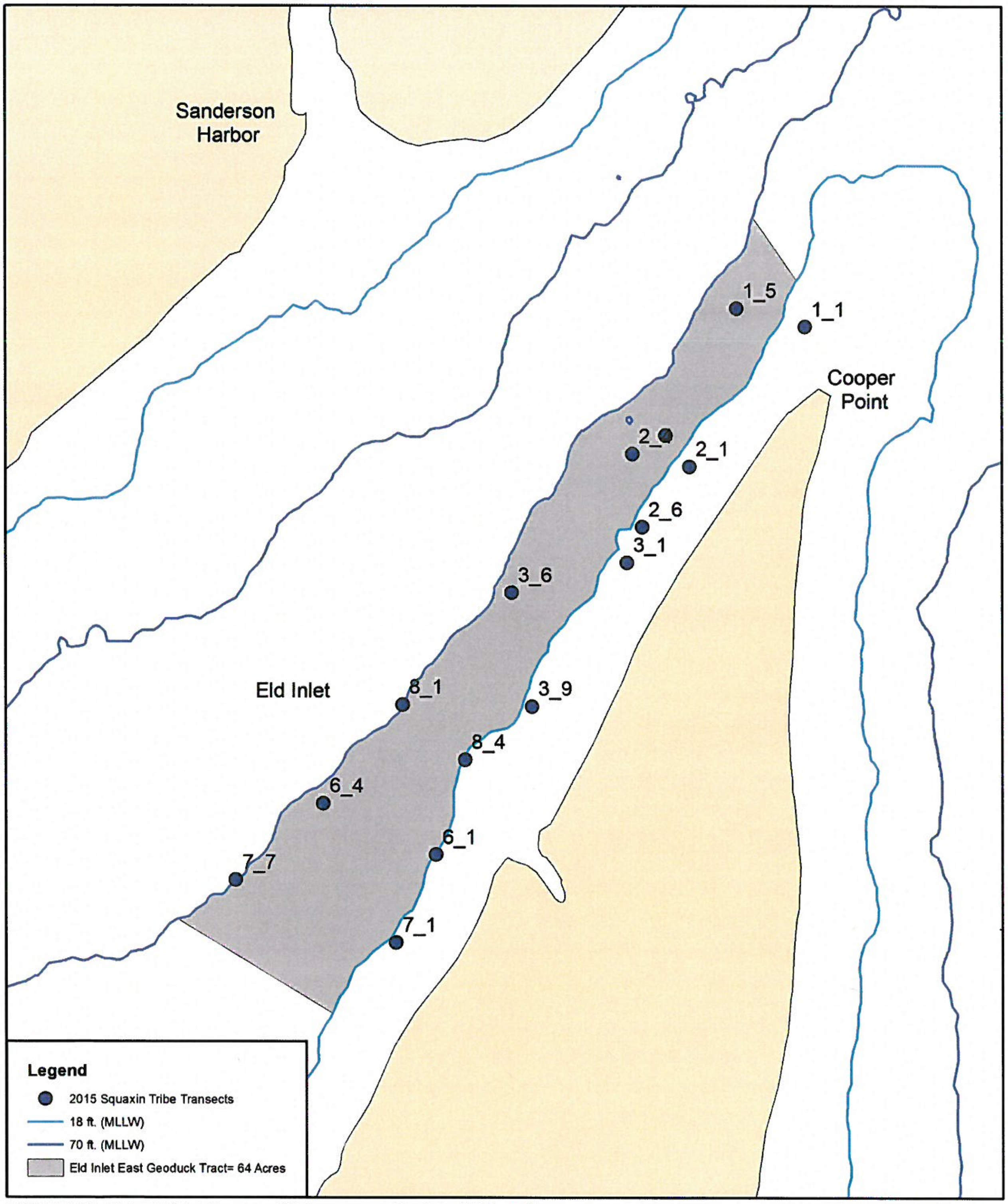
Map Date: July 24, 2015
Map Author: O. Eveningsong
File: Data\Ocean\Geoduck

Figure 3. Transect Map, Eld Inlet East Commercial Geoduck Tract #17150



N W E S

1:10,000

1 inch = 0.16 miles

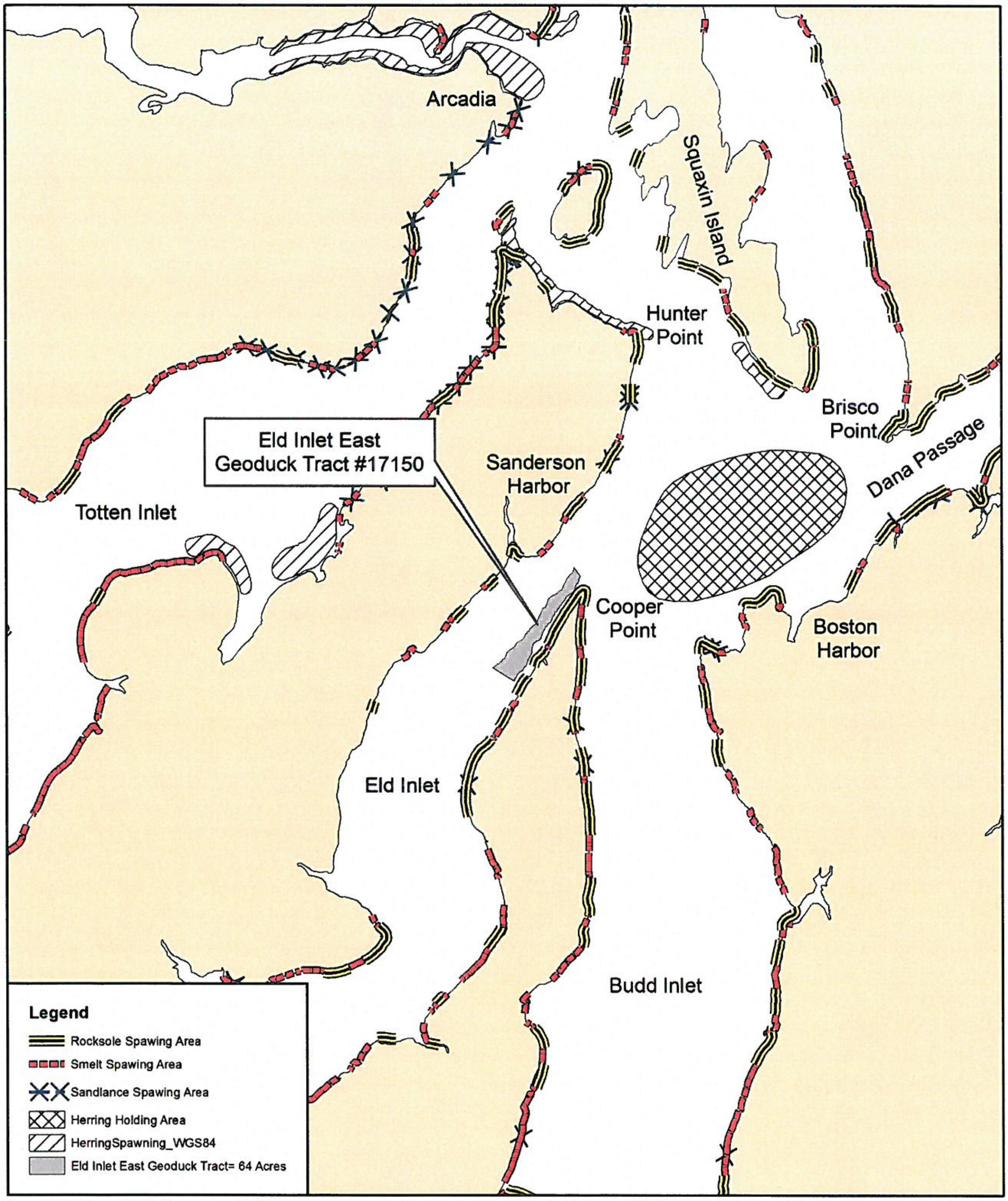
Data Sources:
Projection for data is GCS_Washington Geographic System 1984, Units: Meters. Coastline layer is from DNR, 1: 24,000 scale, created 09-20-99. Contours are from NOAA soundings.

0 0.05 0.1 0.2 0.3 Miles

Washington Department of FISH and WILDLIFE

Map Date: July 24, 2015
Map Author: O. Eveningsong
File: Data\Ocean\Geoduck

Figure 4. Fish Spawning Areas Near the Eld Inlet East Commercial Geoduck Tract #17150



N W E S

1:70,000

1 inch = 1.1 miles

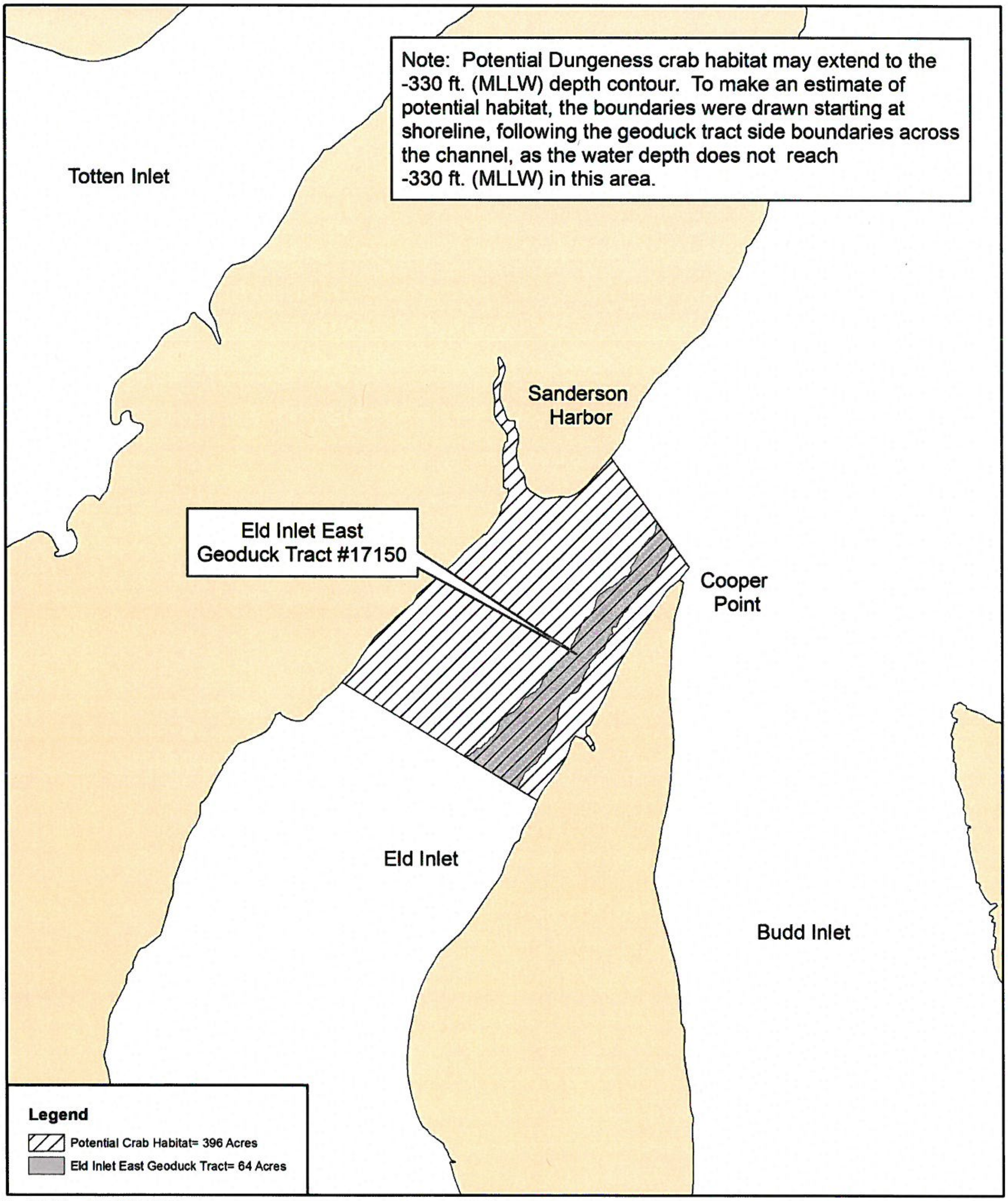
Data Sources:
Projection for data is GCS_Washington Geographic System 1984, Units: Meters. Coastline layer is from DNR, 1: 24,000 scale, created 09-20-99. Contours are from NOAA soundings.

0 0.375 0.75 1.5 2.25 Miles

Washington Department of FISH and WILDLIFE

Map Date: July 24, 2015
Map Author: O. Eveningsong
File: Data\Ocean\Geoduck

Figure 5. Dungeness Crab Habitat Map, Eld Inlet East Commercial Geoduck Tract #17150



N W E S

1:30,000

1 inch = 0.47 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.

0 0.15 0.3 0.6 0.9 Miles

Washington Department of FISH and WILDLIFE

Map Date: July 24, 2015
Map Author: O. Eveningsong
File: Data\Ocean\Geoduck

EXPLANATION OF SURVEY DATA TABLES

The geoduck survey data for each tract is reported in seven computer-generated tables. These tables contain specific information gathered from transect and dig samples and diver observations. The following is an explanation of the headings and codes used in these tables.

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, and *Total Number of Geoducks*. 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.* Biomass estimates are adjusted for any harvest that may occur subsequent to the pre-fishing survey.

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:

Code	Degree of Difficulty	Description
0	Very Easy	Sediment conducive to quick harvest.
1	Easy	Significant barrier 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. 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.

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.

Geoduck Weights and Proportion Over 2 Pounds

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, datum WGS84.

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. Whenever possible, the scientific name or a general taxonomic grouping of each plant is listed in *Taxonomer*.

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Table 1. GEODUCK TRACT SUMMARY

Eld Inlet East geoduck tract # 17150.

Tract Name	Eld Inlet East
Tract Number	17150
Tract Size (acres)[a]	64
Density of geoducks/sq.ft.[b]	0.042
Total Tract Biomass (lbs.)[b]	349,962
Total Number of Geoducks on Tract[b]	116,761
Confidence Interval (%)	24.4%
Mean Geoduck Whole Weight (lbs.)	3.00
Mean Geoduck Siphon Weight (lbs.)	N/A*
Siphon Weight as a % of Whole Weight	N/A*
Number of Transect Stations	39
Number of Geoducks Weighed	40

[a.] Tract area is between the -18 ft. and -70 ft. (MLLW) water depth contours

[b.] Biomass is based on the 2015 Squaxin Tribe Pre-fishing geoduck survey biomass of 624,004 lbs minus harvest of 274,042 lbs. through August 9, 2016

*Siphon wieghts were not taken

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Table 2: DIGGING DIFFICULTY TABLE

Eld Inlet East geoduck tract #17150, 2015 Squaxin Tribe pre-fishing geoduck 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_7	1	2	0	0	0	0	1	1	Y
2_5	3	2	0	0	1	1	0	0	Y
3_6	1	2	0	0	0	0	0	0	Y
8_3	1	2	0	1	0	1	0	0	Y

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Table 3: TRANSECT WATER DEPTHS, GEODUCK DENSITIES, AND SUBSTRATE OBSERVATIONS

Eld Inlet East geoduck tract #17150, 2015 Squaxin Tribe pre-fishing geoduck survey

Transect	Start Depth (ft) [a]	End Depth (ft) [a]	Geoduck Density (no. / sq ft) [b]	Substrate [c] mud	sand	peagravel	shell
1_1	18	32	0.0433		2		
1_2	32	49	0.0508		2	1	
1_3	49	66	0.1075	1	2		
1_4	66	66	0.1165	2	1		
1_5	66	60	0.1344	2	1		
1_6	60	59	0.1643	2	1		
1_7	59	62	0.1269		2		
1_8	62	37	0.0747		2	1	
1_9	37	18	0.0284		2	1	
2_1	18	32	0.0410		2	1	
2_2	32	51	0.1172		2	1	
2_3	51	68	0.1191	1	2		
2_4	68	49	0.1855	1	2		
2_5	49	29	0.1406		2	1	
2_6	29	18	0.0234		2	1	
3_1	18	30	0.0352		2	1	1
3_2	30	39	0.1241		2	1	1
3_3	39	41	0.1315	2	1		
3_4	41	60	0.1185	2	1		
3_5	60	69	0.1222	2	1		
3_6	69	57	0.1815	2			
3_7	57	46	0.0907	1	2		
3_8	46	30	0.0852	1	2	1	
3_9	30	22	0.0138	1	2	1	
6_1	18	34	0.0124	1	2		
6_2	34	49	0.0979	1	2		
6_3	49	59	0.0372	2			
6_4	59	66	0.0083	2			
7_1	18	35	0.0285		2		
7_2	35	47	0.0516	1	2		
7_3	47	49	0.0027	2			
7_4	49	48	0.0027	2			
7_5	48	49	0.0041	2			
7_6	49	57	0.0027	2			
7_7	57	68	0.0041	2			
8_1	18	36	0.0459		2		
8_2	36	52	0.0948		2		
8_3	52	68	0.0800	1	2		
8_4	68	67	0.0607	1	2		

Table 3. Continued
Eld Inlet East geoduck tract #17150, 2015 Squaxin Tribe pre-fishing geoduck survey

[a.] All depths are corrected to mean lower low water (MLLW)
[b.] Densities were calculated using a daily siphon show factor
[c.] Substrate codes: 1 = present ; 2 = dominant

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Table 4: GEODUCK SIZE AND QUALITY
Eld Inlet East geoduck tract #17150, 2015 Squaxin Tribe pre-fishing geoduck survey

Dig Station	Number Dug	Avg. Whole Weight (lbs.)	Avg. Siphon Weight (lbs.)*	% of geoducks on station greater than 2 lbs.
1_7	13	2.69	N/A	92%
2_5	10	2.65	N/A	90%
3_6	8	3.37	N/A	100%
8_3	12	3.27	N/A	92%

*Siphon wieghts were not taken

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Table 5: TRANSECT CORRECTED GEODUCK COUNT AND POSITION TABLE

Eld Inlet East geoduck tract #17150, 2015 Squaxin Tribe pre-fishing geoduck survey

Transect	Corrected Geoduck Count per 900 sq. ft. Transect	Geoduck Siphon Show Factor [a]	Latitude [b]	Longitude [b]
1_1	39	0.74	47° 8.795	122° 55.592
1_2	46	0.74		
1_3	97	0.74		
1_4	105	0.74		
1_5	121	0.74	47° 8.810	122° 55.686
1_6	148	0.74		
1_7	114	0.74		
1_8	67	0.74		
1_9	26	0.74	47° 8.691	122° 55.777
2_1	37	0.57	47° 8.663	122° 55.744
2_2	105	0.57		
2_3	107	0.57		
2_4	167	0.57	47° 8.673	122° 55.821
2_5	127	0.57		
2_6	21	0.57	47° 8.606	122° 55.805
3_1	32	0.60	47° 8.573	122° 55.824
3_2	112	0.60		
3_3	118	0.60		
3_4	107	0.60		
3_5	110	0.60		
3_6	163	0.60	47° 8.542	122° 55.978
3_7	82	0.60		
3_8	77	0.60		
3_9	12	0.81	47° 8.438	122° 55.946
6_1	11	0.81	47° 8.299	122° 56.069
6_2	88	0.81		
6_3	33	0.81		
6_4	7	0.81	47° 8.343	122° 56.223
7_1	26	0.82	47° 8.217	122° 56.119
7_2	46	0.82		
7_3	2	0.82		
7_4	2	0.82		
7_5	4	0.82		
7_6	2	0.82		
7_7	4	0.82	47° 8.270	122° 56.338
8_1	41	0.75	47° 8.436	122° 56.120
8_2	85	0.75		
8_3	72	0.75		
8_4	55	0.75	47° 8.387	122° 56.034

Table 5. Continued
Eld Inlet East geoduck tract #17150, 2015 Squaxin Tribe pre-fishing geoduck survey

[a.] A daily siphon show factor was used to correct combined geoduck counts
[b.] Latitude and longitude are in WGS84 datum, degrees and decimal minutes

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Table 6: MOST COMMON AND OBVIOUS ANIMALS OBSERVED

Eld Inlet East geoduck tract #17150, data from 2013 WDFW Eld Inlet West (17200) pre-fishing geoduck survey

# of Transects where Observed	Group	Common Name	Taxonomer
12	ANEMONE	BURROWING ANEMONE	*Pachycerianthus fimbriatus*
5	ANEMONE	PLUMED ANEMONE	*Metridium* spp.
14	ANEMONE	STRIPED ANEMONE	*Urticina* spp.
1	BIVALVE	HEART COCKLE	*Clinocardium nuttalli*
17	BIVALVE	HORSE CLAM	*Tresus* spp.
3	BIVALVE	TRUNCATED MYA	*Mya truncata*
14	CNIDARIA	SEA PEN	*Ptilosarcus gurneyi*
13	CNIDARIA	SEA WHIP	*Stylatula elongata*
12	CRAB	DECORATOR CRAB	*Oregonia gracilis*
26	CRAB	GRACEFUL CRAB	*Cancer gracilis*
18	CRAB	HERMIT CRAB	Unspecified hermit crab
15	CRAB	RED ROCK CRAB	*Cancer productus*
2	CUCUMBER	BURROWING CUCUMBER	Unspecified burrowing Holothurian
7	CUCUMBER	SEA CUCUMBER	*Parastichopus californicus*
1	FISH	BAY PIPEFISH	*Syngnathus leptorhynchus*
10	FISH	SANDDAB	*Citharichthys* spp.
11	FISH	SCULPIN	Unspecified Cottidae
1	FISH	SKATE	Unspecified *Raja* spp.
2	FISH	STARRY FLOUNDER	*Platichthys stellatus*
3	GASTROPOD	MOON SNAIL	*Polinices lewisii*
9	GASTROPOD	MOON SNAIL EGGS	*Polinices lewisii* egg case
2	MISC	BRYOZOAN COLONY	Unspecified Bryozoan
5	NUDIBRANCH	ARMINA	*Armina californica*
3	SEA STAR	FALSE OCHRE STAR	*Evasterias troschelli*
6	SEA STAR	LEATHER STAR	*Dermasterias imbricata*
20	SEA STAR	ROSE STAR	*Crossaster papposus*
18	SEA STAR	SHORT-SPINED STAR	*Pisaster brevispinus*
2	SEA STAR	SLIME STAR	*Pteraster tesselatus*
7	SEA STAR	SUN STAR	*Solaster* spp.
12	SEA STAR	SUNFLOWER STAR	*Pycnopodia helianthoides*
7	SHRIMP	SHRIMP	Unspecified shrimp
5	WORM	SABELLID TUBE WORM	*Sabellid* spp.
2	WORM	TEREBELLID TUBE WORM	*Terebellid* spp.

Note: Using plant and animal data from 2013 WDW Pre-fishing survey of the Eld Inlet West geoduck tract (#17200). Due to the proximity of the two tracts, it is reasonable to assume that the plants and animals present at the Eld Inlet East tract are very similar.

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Table 7: MOST COMMON AND OBVIOUS PLANTS OBSERVED
Eld Inlet East geoduck tract #17150, data from 2013 WDFW Eld Inlet West (17200) pre-fishing geoduck survey

# of Transects Where Observed	Taxonomer
2	*Desmarestia* spp.
5	Diatoms
19	*Laminaria* spp.
18	*Ulva* spp.
17	Small red algae

Note: Using plant and animal data from 2013 WDW Pre-fishing survey of the Eld Inlet West geoduck tract (#17200). Due to the proximity of the two tracts, it is reasonable to assume that the plants and animals present at the Eld Inlet East tract are very similar.

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