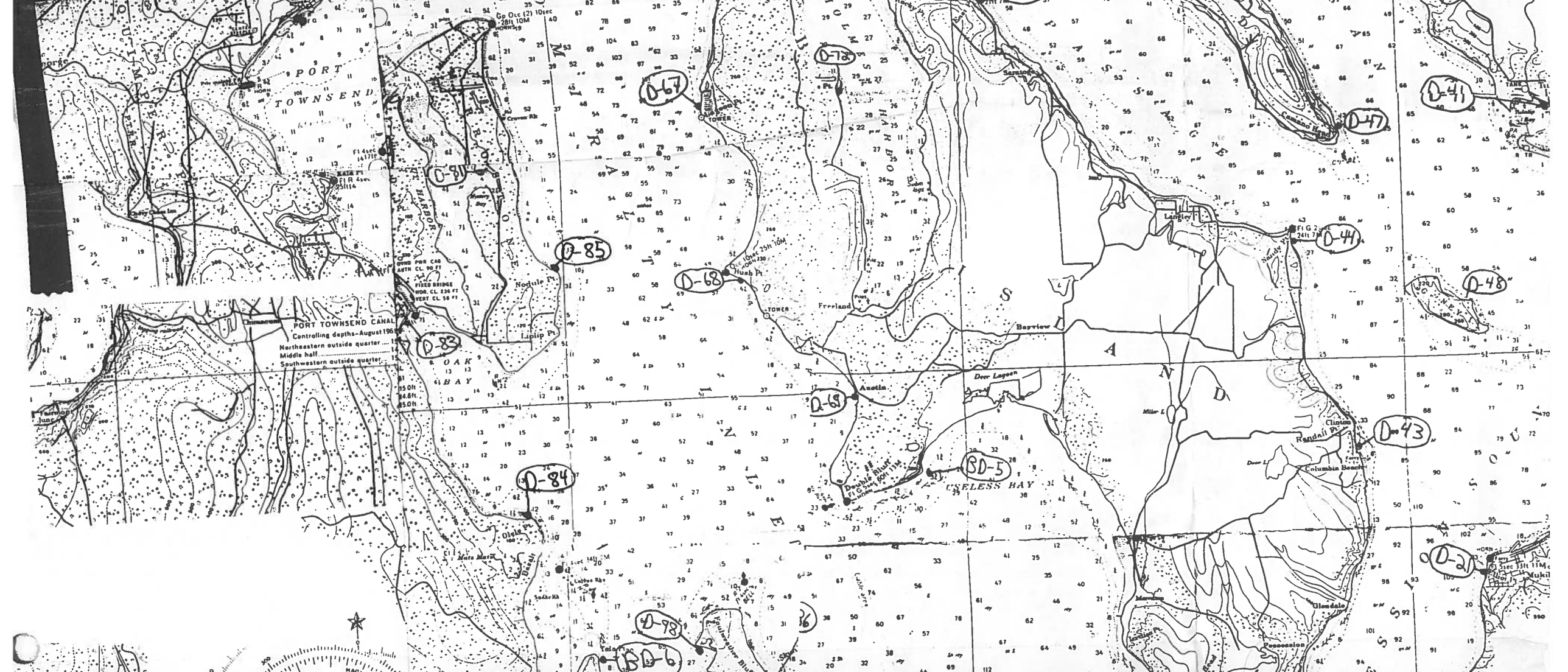
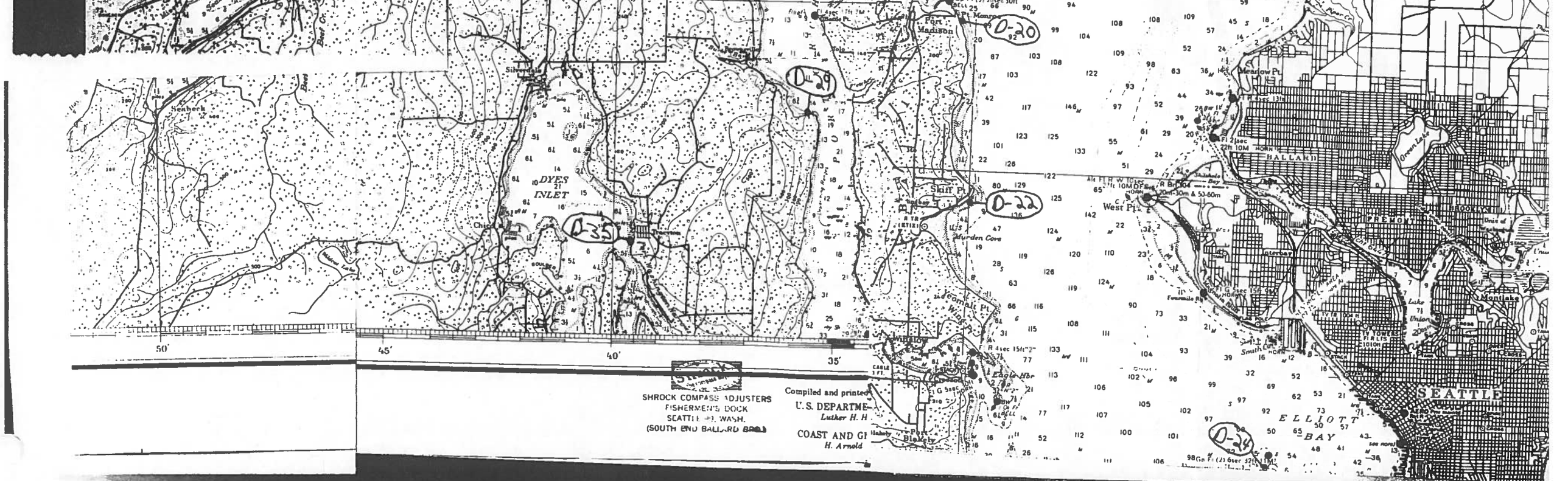
Phillips R. 1962-1963. Original notes from shallow subtidal surveys by scuba and snorkel at sites in Puget Sound for Seattle Pacific College and University of Washington. Scanned by WA DNR Nearshore Habitat Program.


SKAGIT BAY
PUGET
CRESCENT HARBOR
PENN COVE
COUPEVILLE
ADMIRALTY BAY
Oak Harbor
Strawberry Pt
Pt Polnell
Hasty Lake
Partridge Point
Smith Prairie
Ebey Lake
Admiralty Head
Keystone Harbor
Port Townsend
Pt Wilson
Midchannel
North Bluff
Deception Pass
Dennett Pt
Livingston Bay
Tranquil Cove
Elger Bay
Stanwood
Florence
Cedarhouse
Warm Beach
Lake Martha
Lake Howard
Lake Goodwin
Lake Shoecraft
Kayak Pt
Lake Ketchum
RESTRICTED AREA
207.750 (see note A)
D-68
D-70
D-71
D-72
D-73
D-74
D-75
D-76
D-91
D-92
D-93
D-94
D-42


PORT TOWNSEND CANAL
Controlling depths–August 1965
Northeastern outside quarter
Middle half
Southwestern outside quarter
PORT TOWNSEND
OAK BAY
USELESS BAY
Freeland
Langley
Austin
Barview
Double Bluff
Point No Point
Glendale
Possession
Columbia Beach
Randall Pt
Nodule Pt
Lizzie Pt
Olele Pt
Hunh Pt
Talcott Rk
Deer Lagoon
D-67
D-78
D-81
D-85
D-68
D-83
D-84
D-69
BD-5
D-41
D-47
D-44
D-48
D-43
D-21
BD-6
D-78


LOCAL MAGNETIC DISTURBANCE
Differences of more than 2° from the normal variation have been observed in Hood Canal at Point Hannon
HOOD CANAL BRIDGE
FIXED EAST SPAN
HOR CL 220 FT.
VERT CL 30 FT
PONTOON CENTER SPAN
AUTH HOR CL 600 FT
FIXED WEST SPAN
HOR. CL. 220 FT
VERT CL 30 FT
Port Ludlow
Hood Head
Squamish Harbor
Case Shoal
Port Gamble
Point No Point
Pilot Pt
Edon
Thorndike Bay
Hansville
Foulweather Bluff
Kingston
Apple Cove Pt
Appletree Cove
Edmonds
Edwards Pt
Norma Beach
Meadowdale
Picnic Pt
Richmond Beach
Indianola
President Pt
Spring Beach
Island Lake
Lone Lake
Tekiteko Pt
Hazel Pt
D-87
D-88
D-89
D-90
D-91
D-97
D-28
D-25
D-13
D-8
BD-4
BD-8
BD-3
BD-7
P U G E T S O U N D
K I T S A P P E N I N S U L A
M A D I S O N


D-20
D-29
D-35
D-22
D-24
DYES INLET
Port Madison
Silverdale
Chico
Keyport
Port Orchard
Bremerton
Manchester
Port Blakely
Skiff Pt
West Pt
Meadow Pt
Shilshole Bay
Salmon Bay
Lake Union
Portage Bay
Eagle Harbor
Winslow
Agate Pass
Foss Waterway
Smith Cove
Harbor Island
SEATTLE
ELLIOTT BAY
BALLARD
FREMONT
Alki Pt
Duwamish Head
50'
45'
40'
35'
SHROCK COMPASS ADJUSTERS
FISHERMEN'S DOCK
SEATTLE 1, WASH.
(SOUTH END BALLARD BRG.)
Compiled and printed
U.S. DEPARTME
Luther H. H
COAST AND GI
H. Arnold

Just north of Alki Pt. – along Municipal Beach – up to 100 yards offshore. Puget Sound. BD-1

DIVING LOG SHEET
Department of Botany
University of Washington

Date 15 April 1962

Diver Ronald Phillips Accompanied by Y-Divers

Equipment used SCUBA Air Consumption ca. 10

Maximum depth 50 feet Duration 25 minutes Visibility ca 20 feet Water temp. 48- Temperature ca. 50°

Bottom type Gray muddy sand Dominant plant cover Zostera

Dive details and remarks: Tide – neap – LQ – between LQ and full moon – 1 day close to LQ than to to full moon.

Time – 1000 – 1030.

Tidal Data for Day

HHT – 0232 – 10.8 feet
LHT – 1417 – 8.4 feet
HLT – 0843 – 4.2 feet
LLT – 2020 – 2.2 feet

Tide flooding at time of collection.

At time of visit – water level is 4.9 feet above mean lower low water.

Tidal Data for area – mean tidal range – 7.6 feet
Diurnal tidal range – 11.3 feet
mean tidal level – 6.6 feet

Current –
Maximum flood at 1119 – but observed current was negligible. Predicted maximum flood was 0.5 knots.

Zostera at a depth of 12-20 feet in a zone. One plant/3
4 inches. Leaves about 1 foot long. (Ca. 16 plants/ft
9 mm. wide.

Sea pens – zone from 20 – 40 feet deep. 1/3 feet.
Star fish – reddish – bright – so red it appeared purple – at 10-15 feet.

Metridium – white – on wreck at 50 feet.

White nudibranchs –

Dewamish Head, Puget Sound, at Pier. BD-2

DIVING LOG SHEET
Department of Botany
University of Washington

Date 24 April 1962

Diver Ronald C. Phillips Accompanied by Ecology class - SPC

Equipment used Intertidal collecting Air Consumption X

Maximum depth Intertidal Duration 1 hour Visibility — Temperature —

Bottom type Gray muddy sand. Dominant plant cover —

Dive details and remarks:

Time - 1100-1200.

Tide - ebb.

Moon Phase - LQ - one day closer to LQ than FM.

HHT - 2059 - 10.7 feet
LHT - 0625 - 9.8 feet
HLT - 0137 - 6.2 feet
LLT - 1342 - -0.7 feet

At time of visit - water level is 0.5 feet above mean lower low water.

Tidal Data for area

Mean Tidal Range - 7.6 feet
Nominal Tidal Range - 11.3 feet
Mean tide level - 6.6 feet

Current - weak to variable.

All intertidal organisms:

Zostera marina - 2 small patches seen - leaves up to 8 inches long - up to 3 mm. wide - on gray muddy sand.
Plants only 2 inches above water level - awash when wa
capse across - but tide will get lower.
Plants out of water up to 2 hours and 42 minutes b
a slack low - 0.7 foot tide.

BD-2

All algae on rock

Gracilaria furcata

Ulva lactuca

Enteromorpha

Bangia fuscopurpurea

Polysiphonia collinsii

Porphyra perforata

Rhodomela larix

Animals - Hermit crab - Pagurus sp. - in shells.

Periwinkle - Littorina sp. - on rock.

Barnacles - Balanus sp. - on rock.

Mussel - Mytilus edulis - on rock.

Northern kelp crab - Pugettia producta

Rock crabs - Cancer productus - under rocks

Rough anemone - Anthopleura xanthogrammica - on undersurface of rocks.

Chiton - Mopalia sp. - on rock.

Cryptochiton sp. - on rock.

Limpet - Acmaea sp. - on rock.

Sand dollar - Dendraster excentricus - on sand

Off Possession Pt.- extreme southern tip of Whidbey Island, Puget Sound. BD-4

Not a diving trip.

DIVING LOG SHEET
Department of Botany
University of Washington

Date 6 May 1962

Diver Ronald C. Phillips Accompanied by Dwight Robinson

Equipment used — Air Consumption —

Maximum depth 4-7 feet Duration _____ Visibility ~~over bottom~~ Temperature ___

Bottom type muddy sand Dominant plant cover Zostera marina

Dive details and remarks: Time of collection - 1100.

Tidal data for day - HHT - 1912 - ~~10.8~~ feet

LHT - 0503 - ~~9.9~~ feet

HLT - 2349 (Friday night) - ~~4.7~~ feet.

LLT - 1204 - ~~-2.2~~ feet

Zostera dense in patches on muddy sa in 4-7 feet deep.

Tidal data for area -

Mean tidal range - 6.7 feet

Diurnal tidal range - 10.4 feet

Mean tidal level - 6.1 feet.

Tide at collection - nearing low ti

Moon phase - N M 2 days after.

Currents - weak in area.

At time of visit - water level is ~~[illegible]~~ at -1.4 ft. level). below MLLW).

Not a dive

Useless Bay, southern tip of Whidbey Island, Puget Sound.

BD-5

DIVING LOG SHEET
Department of Botany
University of Washington

Date 6 May 1962

Diver Ronald C. Phillips Accompanied by Dwight Robinson

Equipment used ——— Air Consumption ———

Maximum depth 6 feet Duration ——— Visibility Can see bottom Temperature ———

Bottom type muddy sand Dominant plant cover Zostera.

Dive details and remarks: Time of collection - 1200. Currents weak.

Tide during collection - slack low tide.

Moon phase - NM. 2 days after NM.

Zostera very dense in patches. Blooming. Plants up to 4 feet long on muddy sand in 2-6 feet of water.

Tidal data for day - HHT - 1912 - 10.8 feet

LHT - 0503 - 9.8 feet

HLT - 2349 (Friday night) - 4.7 feet

LLT - 1204 - -2.2 feet

Tidal data for area - Mean tidal range - 6.7 feet

Diurnal tidal range - 10.4 feet

Mean tidal level - 6.1 feet

At time of visit - water level is at mean lower low water.

Hood Canal-north end- west shore - just south of Sala Pt.

BD-6

Not a dive

DIVING LOG SHEET
Department of Botany
University of Washington

Date 6 May 1962

Diver Ronald C. Phillips Accompanied by Dwight Robinson

Equipment used ——— Air Consumption ———

Maximum depth 4 feet Duration ——— Visibility can see bottom Temperature ———

Bottom type Black muddy sand Dominant plant cover Zostera

Dive details and remarks: Time of collection - 1300.
Tide at collection - [redacted] still outgoing.
Moon phase - NM. 2 days after NM.

Tidal data for day - HHT - 1901 - 10.30 feet.
LHT - 0452 - 9.5 feet
HLT - 2347 (Friday night) - 4.5 feet
LLT - 1202 - - 2.24 feet

Tidal data for area -

mean tidal range - 6.4 feet
diurnal tidal range - 9.9 feet
Mean tide level - 5.9 feet

(Bright sunny day).

Predicted slack water - 1317.

Area gets: Maximum flood - 0.6 knot (average velocity)
Maximum ebb - 1.0 knot (average velocity).

At time of visit -

water level is [redacted]

[redacted].

([redacted] - 1.74 ft. level).

1. Intertidal plants - exposed - patch
Essentially - single plants comi
off rhizomes. Leaves narrow
up to 4 mm. wide, up to 12 inch
long. Sterile. Exposed for severe
hours.
2. Submerged plants - 1-4 feet dee
Dense growths. Tide outgoi
but these plants will not be
exposed.
a. Vegetative plants - leaves up
3 feet long - up to 8-10 mm
wide. Single plants com
off rhizome.
b. Flowering plants - different
the stalk off the rhizome
is terete and thin. This

Flowering shoot is [illegible]

BD-6

branched and up to 4-5 feet high. Each leaf of each branch forms a flowering spathe. Spathe and spadix in middle of normal appearing leaf.

Only submerged plants are flowering.

Is lowers bisexual - species monoecious.

Ovary and anther orientation opposite - one upright - the other pendulous.

Zostera not flowering several weeks ago - recent production shows a tremendous production in a short time - up to 4-5 feet high with many branches with flowers.

One spathe noted in water with styles extruded - ready for fertilization Proterogyny. Anthers immature - I crushed one the contents were jelly-like; demonstrates that pollen is not developed at this time.

Conclusion - possibly a temperature effect - water warms due to insolation in shallow water as sun moves north over equator at vernal equinox. I have no data but possibly the temperature might not explain the effect because of the current and tidal flows are so strong here.

Needed - temperature data in an area at high and low tide - compare to water temperature data offshore from same area at same tide stage - do on seasonal basis. Get a month of year when temperature significant. Is there a critical stage influencing flowering?

Likely - photoperiodic effect - we are approaching summer solstice

Problem - separate light from temperature effects.

Question - does Zostera in deep water flower along with Zostera in shallow water - at same time?

Carkeek Park, Puget Sound. BD-7

DIVING LOG SHEET
Department of Botany
University of Washington Date 2 June 1962

Diver Ronald C. Phillips Accompanied by Carmen Casucci

Equipment used Snorkel Air Consumption ——

Maximum depth 20 feet Duration —— Visibility ca. 8 feet. Temperature ——

Bottom type Sandy mud-Rock Dominant plant cover Zostera inshore; none offshore.

Dive details and remarks:

Time of diving – 1115-1230.
Weather – 20-25 mph south; 1-2 ft. waves.
Tide – low. Lowest tide of the year.
Moon Phase – NM.

Possibly area regularly receives turbulent water which causes murky water. Might influence depth of Zostera growth

Predicted currents weak or variable

Tidal Data for Day – HHT – 1744 – 11.7 feet
LHT – 0330 – 11.2 feet
HLT – 2303 – 5.9 feet
LLT – 1035 – – 2.4 feet

Tidal Data for area – Mean tidal range – 7.6 feet
Diurnal Tidal Range – 11.3 feet
Mean Tide Level – 6.6 feet.

At time of visit – water level is at –2.1 feet below mean lower low water at 1115.
at 1230 – water level is at [illegible] mean lower low water

Zostera in a very dense bank in 2-3 feet of water. Beyond the plants are highly scattered to a depth of 16 feet. (This observation made at 1115) None seen in areas offshore deeper than this. Beyond 2-3 feet deep – get scattered patches of grass formed by a single rhizome, but beyond 10 feet up to 16 feet deep, grass, where found, occurs as a single plant and is very rare.

(Observation made at 1215)

Grass vigorous, wide bladed, up to 8-9 mm. wide; plants much branched. Leaves covered with epiphytes.

One patch of plants exposed to air in one area – seemingly not normally exposed to air. (Observation made at 1115) (Plants wide-bladed – not narrow & short like typical intertidal plants)

BD-7

Animals –

Sea pens very abundant. First occur in 3 feet deep and were still present in abundance in 20 feet of water. Were very scattered up to 6 feet deep - deeper than this they were very abundant. At least one/meter^2, on out to 20 feet deep.

Peculiar - in shallow water, 3-6 feet deep, most sea pens were retracted, but over 6 feet deep animals were relaxed and extended. Explanation suggested - either a hydrostatic effect (retract under reduced water pressure at low tide?) or due to surf in shallow water.

Depths not indicative of normal depth conditions owing to very low tide. At normal lower low water, depths would be one foot higher. At high tide depths would be up to 10 feet higher.

Seemingly plants and animals are zoned.

Ulva and Porphyra are loose over the bottom – very abundant. Nereocystis scattered.

Just north of Edmonds ferry dock, off point at south edge of Browns Bay., Puget Sound. BD-8

Not a dive

DIVING LOG SHEET
Department of Botany
University of Washington

Date 9 June 1962

Diver Ronald C. Phillips Accompanied by ———

Equipment used ——— Air Consumption ———

Maximum depth 10 feet Duration 0930-1000 Visibility ~~Can't see bottom~~ Temperature ———

Bottom type ~~Sandy mud rock inshore~~ Dominant plant cover Nereocystis inshore; Zostera offshore.

Dive details and remarks: about 30 yards offshore.

Tide - high - possibly flooding.

Moon Phase - FQ, day before FQ.

Weather - 18-20 mph SW → WIN cloudy.

Tidal data for day - HHW - 2306 - 11.1 feet
LHT - ~~0730 - 0.8 feet~~ 0910 - 7.1 feet
HLT - 0449 - 5.3 feet
LLT - 1546 - 1.9 feet

At time of visit - water level is 6.7 feet above mean lower low water.

Tidal data for area - mean Tidal Range - 7.6 feet.
Nominal Tidal Range - 11.3 feet
mean Tide Level - 6.6 feet

Predicted currents - weak or variable.

Nereocystis - Cystoseira association on rocks from 3-8 feet deep.

Offshore in 10 feet deep is Zostera on muddy sand bottom. Growth dense. Densely flowering.

Flowers not as mature here as those in Hood Canal - seen on 6 May 1962. Possible - water deeper here - colder and suggestion is that Hood Canal area gets more sunshine than Edmonds area.

Check on this →

Vegetative leaves up to 4 feet long. All leaves densely covered with Smithsonia ← Smithora

BD-8

2 organisms on leaves:

1. Isopod - olive green isopod -

Idotea wosnesenskii

2. Amphipod - Skeleton shrimp.

Caprella kennerlyi

Zostera found and noted

D-1 (Ca. ¼ mile SE of Alki Point, Puget Sound, Washington).

DIVING LOG SHEET
Department of Botany
University of Washington

Date 7 September, 1962

Diver Ronald C. Phillips Accompanied by Tom Rogers

Equipment used Scuba Air Consumption 2100 lbs - RC 1400 lbs

Maximum depth 26 ft Duration 1 hr 15 min Visibility 15 ft Temperature 17°C.

Bottom type Gray sandy mud Dominant plant cover Ulva - Laminaria - Enteromorpha

Dive details and remarks: Air Temperature – 75°F. (23.9°C). Sky - dark high. Entered water on shore at 1215. Left water at 1330. °C. surface 17°, bottom – 17°C.

Zostera marina growth in patches - began at depth of 8 feet. Density here 19 plants / ft.² (one square foot)

Bottom - gently sloping, only 26 feet deep a little over ¼ mile offshore, a broad shallow flat, much space in area to support Zostera growth.

Zostera density at 10 feet deep – 80 plants / ft.² (one square foot). Leaves ca. 14 inches long and 6 mm. wide.

Zostera density at 14 feet deep – 11 plants / ft.² (one square foot) Zostera meet maximum at this depth - largest one washed [illegible] up to 2 feet long and 10-12 mm wide.

Sat.: 47°35' N.
Long.: 122°26' W.

Weather: clear, sunny, 10-12 mph - SE wind.

Zostera density at 20 feet deep – 7 plants / ft.² (one square foot)

Moon phase – day off first quarter

Tidal data – slack high tide at 1143 - level of 8.9 feet above mean lower low water.

No bottom at 26 feet – gray muddy sand bottom – still found Ulva and Laminaria forma Enteromorpha

Maximum current speed - [illegible] off [illegible] ing over at 1234 - calculated current speed would be 0.08 knots. Slack water at 1139.

Typical bed density when recorded density

Gray sandy mud bottom throughout as far as we went. Ulva + Laminaria throughout as deep as we went. Blue algae even found covering and within grass beds.

Check to see if this is known for all Pt.

surface – 31.2
bottom – 31.1

D-1

Zostera found from 3 feet deep to 20 feet deep; Zostera seemed to grow best in water, zone from 11-13 feet deep at mean high tide. It was extremely dense and luxuriant in patches from 14-15 feet deep.

A few red flowering stalks found on plants at depth of 2 feet. No flowers found but did find stalks.

~~Possibly, these are young plants~~

Found some plants - single shoots - washed from beds - are these a result of germinating seeds or clumps whose rhizomes had been ruptured?

Overall - Zostera dense in patches over bottom in zone of growth most of bottom in 3-20 feet deep in low water mark

Found that 1 ft.^{2} was smaller unit - 4 ft.^{2} is smallest unit to record plant density. Use 1 meter^2 to record plants in

Cymodocea common.

at Time of visit -
water level is 8.8 feet above mean lower low water at 1215.
at 1330 water level is 8.3 feet above mean lower low water.

In area: mean tidal ~~range~~ range - 7.6 feet
diurnal tidal level - 11.3 feet
mean tidal level - 6.6 feet.

Tidal range on this day.
HHT - 2144 - 9.1 feet
LHT - 1143 - 8.9 feet
HLT - 1652 - 6.6 feet - 1.2 ft
LLT

(D-2) Off So. tip of Lincoln Park, near [redacted] Ferry Dock.

DIVING LOG SHEET
Department of Botany
University of Washington

Date 11 September 1962

Diver Ronald C. Phillips Accompanied by Jim Regnier

Equipment used SCUBA Air Consumption Rcp- 800 / TR- 800

Maximum depth 35 feet Duration 1015-1100 Visibility 15 ft. Temperature S- 15.
B- 14.

Bottom type Coarse shelly sandy mud Dominant plant cover Agardhiella coulteri

Dive details and remarks:

Bottom gently sloping - only 35 feet deep ca. ¼ mile offshore.

Weather - partly cloudy, calm, sunny.

Tide - flood (slack low at 0816) (-0.6 ft. tide)

Calculated current - slack water at [redacted] maximum flood at 1135. (Alki Point) = 0.09

Depth - up to 35 feet.

Moon phase - going into full moon

Sat. - [redacted] 47°31'06" N.

Long. - [redacted] 122°22'01"W.

‰ - S- 30.
B- 30.

pH - S- [redacted] 8.1
B- 7.9

Bottom water samp taken at 25 fe deep.

Zostera starts at 9 feet. Most abundant from 9-11 feet. Seen down to 20 ft. Single plants only - long rhizomes but only single plants coming off. Growth sparse - only occasional. Didn't take any density readings as growth was not dense enough. Leaves up to 1 meter long up to 10 mm. wide.

Agardhiella - from 10 - 28 feet - abundant. Neorogatia in a zone at 10 feet deep (one 6 feet long at 35 feet deep).

area - flat but steep - got in 23 feet of water quickly.

Sea pens at 20 feet and deeper - we stopped at 35 feet - sea pens deeper than this. Many tiny sea pens - time of reproductio (only about ½ - 1 inch high)

Metridium on rocks - get it wherever rocks or firm substrate occurred. One anemid 20 inches long.

Definite temperature change at 35 feet - definitely, also. In 1.-11

(probably colder deeper than this)

D-2

Many tiny zostera plants nearshore (definitely intertidal - in 1½ feet of water - sparse overall. ~~Plants connected~~
Leaves up to 15 inches long (one leaf this 2 feet leaf (mostly 10-12 in. long).
up to 3 mm. wide.

Cyanea common.

In area - mean tidal range - 7.6 feet
diurnal tidal range - 11.3 feet
mean tidal level - 6.6 feet.

At time of visit -
water level is 1.3 feet above mean lower low water at 1015.
at 1100 water level is 2.8 feet above mean lower low water level.

Tidal data for day:

HHT - 1529 - 11.0 feet
LHT - 0104 - 9.3 feet
HLT - 2104 - 5.5 feet
LLT - 0816 - -0.6 feet

D-3 Immediately east of Pulby Pt., Puget Sound.

DIVING LOG SHEET
Department of Botany
University of Washington

Date 11 September 1962

Diver Ronald C. Phillips Accompanied by Jim Regnier

Equipment used SCUBA Air Consumption RCP-1350 lbs. TR-850 S-16.0 B-15.5

Maximum depth 88 ft. Duration ½ hr. Visibility ca. 20 ft. only 8-10 ft. at 88 ft. Temperature

Bottom type Grey muddy sand Dominant plant cover Occasional Nereocystis and Laminaria saccharina

Dive details and remarks:

Bottom water sample taken at 25 feet

pH - S - 7.88
B - 7.9

‰ - S - 31.4
B - 30.9 !

Time - 1230-1300

Moon Phase - going into full moon

Current - chart reads - weak or variable. On our way down the slope there was no current (& leaves stood upright), but at 60 feet down a strong current started (est. - 2 knot current which was present even in 8-10 feet of water when we got back to shore. This current started instantly and was strong where there was no current before. Current caused leaves to be bent parallel to surface.

Tide - lower low water at 0829 (level of −0.6 feet). Water flooding [redacted] room. High tide at 1539 (level of 11.0 feet).

Lat. - 47° 27.02" N.

Long. - [redacted] 122° 22' 04" W.

Bottom - steep grade - estimate a 30% grade into deep water - no interruption at all from shore.

(One observation)

Dense patch of Zostera in 8 feet of water. Density - 13 plants/ft.². Leaves up to 32 inches long, up to 8 mm. wide (conspicuously wider overall than those in next reading).

Patch of Zostera in 9 feet deep. Density - 21 plants/ft.² (one observation) Leaves up to 33 inches long, up to 5 mm. wide.

Many small patches about 8 feet square. Patches run parallel to shore - in single file only. On a very narrow restricted depth zone. Only in 8-9 feet. Patches ca. 15 feet apart - no rhizomes connect patches (I dug to discover this). Patches in regular order - ca. 15 feet apart.

Red algal growth stops at 50-55 feet deep.

In 88 feet deep - 2 plants each of Nereocystis and Laminaria saccharina were attached. Nereocystis about 7 feet high

D-3

A band of loose starfish of 3-4 species in 35-60 feet deep. Few areas para here- a few small young ones here. Natridium wherever solid substrate found.

Cyanea common.

In area: mean tidal range- 8.0 feet
diurnal tidal range- 11.7 feet
mean tide level- 6.8 feet

Tidal data for day:

HHT - ~~1500~~ 1532 - 11.4 feet
LHT - 0107 - 9.7 feet
HLT - 2113 - 5.5 feet
LLT - 0825 - -0.6 feet

at time of visit -
water level is 6.6 ft. above mean lower low water (at 1230).

at 1300 - water level is 7.8 feet above mean lower low water.

D-4 between Potlatch and Hoodsport, Washington. Hood Canal.

DIVING LOG SHEET
Department of Botany
University of Washington

Date 12 Sept. 1962

Diver Ronald C. Phillips Accompanied by Linda Ranney

Equipment used SCUBA Air Consumption RCP- 550 lbs/ LB- 850

Maximum depth 32 feet. Duration 25 minutes Visibility 8 feet. Temperature S - 14.7 B - 14.

Bottom type Rock over sandy mud Dominant plant cover Sargassum + D. munda - from 10-32 feet

Dive details and remarks: Time in water - 1615-1640

Tide - high tide predicted for 1554 - for 11.8 feet.

pH - S - 8.0 B - 8.12 (deepen & deepen)

‰ - S - 18.5 B - 28.7

Current - none (algae at all depths stands straight up in water). Bottom sample taken in 25 feet

Moon phase - full moon

Weather - cloudy, rain, no wind.

Lat: 47°24'00" N.

Long: 123°08'04" W.

At time of collection tide still at slack high. Intertidal went way offshore - indicated by Fucus and Salicornia ammersed to a depth of 4-10 feet. Tide extremely high.

Only 4 plants of Zostera seen in this area - only seen in 21 feet. Leaves ca. 8 mm. wide, up to 44 inches long.

Starfish - 2 species - abundant

Stichopus - 1 seen

3 Natiduminsean - orange.

In area

mean tidal range - 8.0 feet

diurnal tidal range - 11.7 f

mean tide level - 6.8 feet

At time of visit - water level is 11.7 feet above mean lower low water.

Tidal Data for day:

HHT - 1612 - 11.8 feet
LHT - 0218 - 10.2 feet
HLT - 2152 - 4.5 feet
LLT - [illegible]

0909 0.8 ft

D-5 off Potlatch, Washington, Hood Canal.

DIVING LOG SHEET
Department of Botany
University of Washington

Date 12 Sept. 1962

Diver Ronald C. Phillips Accompanied by Linda Ramsen

Equipment used SCUBA. Air Consumption RCP-550 lbs./in LB-850 S-15.0° B-14.9°C

Maximum depth 35 ft. Duration 30 minutes Visibility 5 feet Temperature

Bottom type soft-mud (Rock)-some sand Dominant plant cover

Dive details and remarks:

Time - 1730-1800

pH- S-7.82 B-7.6

‰ S-28.3 B-28.7

Bottom sample taken in 20 fe

Sat. 47°22'07" N.

Long. [redacted] 123° 08' 09" W.

Moon - full moon

Tide - High tide predicted for 1554 at 11.8 feet, but is dead high tide at time of collection.

Current - predicted maximum eff at 1825. Predicted current is 0.05 knot (negligible).

Weather - cloudy, rain, no wind.

In area: mean tidal range - 8.0 feet
diurnal tidal range - 11.7 feet
mean tide level - 6.8 feet

Tidal data for day:
HHT - 1612 - 11.8 feet
LHT - 0218 - 10.2 feet
HLT - 2152 - 4.5 feet
LLT - 0909 - -0.8 feet

Grasses lean toward shore but current eddies in this area, so that this observation does not hold good for direction.

Zostera growth extremely dense starts at 15 feet. Leaves up to 6 mm. wide, up to 44 inches long.

Flowers abundant at this location - many immature ones.

Growth thins out at 22 feet. From 15-22 feet, there is a dense unbroken band of growth. Plants most dense in this depth zone. Plants estimated at 10-14 plants/ft.^{2} - look dense but leaves are so long that plants appear dense.

From 22-28 feet Zostera plant growth is patchy. From 28-32 feet Zostera plants occur singly and are rare. No plants at 35 feet.

at time of visit -
at 1730 water level is 10.8 [redacted] feet above mean lower low water
at 1800 water level is 9.9 [redacted] feet above mean lower low water.

Remainder Tides to 11.8 feet above mean lower low tide (still grass on 2 feet below that mean lower low tide).

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

19 September 1962

State: Washington

Diving No.: D-6

County: King

Locality: Poverty Bay, near Zenith - Puget Sound.

Lat.: 47°23'00" N.

Long.: 122°19'05" W.

Diver: R.C. Phillips

Accompanied by: Tim Regnier

Equipment Used: Scuba

Air Consumption: a. R.C.P. - 1700 lbs./in.²
b. T.R. - 1500

Bottom wi
sample tak
at 24 fe
deep.

Maximum Depth: 35 ft.

Duration: 1 hr.

Visibility: ca. 20 ft.

Water Transparency: clear

Water Temperature: a. Surface - 14.0°C.
b. Bottom - 13.5°C.

Air Temperature: 66°F.

Bottom Type: Gray muddy sand

Dominant Plant Cover: Zostera, Ulva.

Sediments finer at 20 feet than at 9 feet deep.

Moon Phase: Last quarter (day before).

Tide: 0920 is slack high tide - 10.6 ft. above mean lower l
water. Water ebbing at time of collection.
Weaker variable current predicted.

Current Speed: 0957 - slack water
1247 - maximum ebb

Water Salinity: a. Surface - 31.4‰
b. Bottom - 31.3‰

Water pH: a. Surface - 7.82
Bottom - 7.82

Time in Water: 1050 - 1150

Weather Conditions: No wind, cloudy.

Depth where Grass: a. Begins - 9 ft.
b. Ends - 25 ft.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Zostera - a. Start at 9 feet deep. Leaves up to 2½ mm. wide, 12 inches long. Stunted; much leaf kill (intertidal at some very low tides). Patchy growth - common but not abundant. Patches in a definite depth zone inshore. (just offshore from Fucus, Porphyra, and Enteromorpha on submerged intertidal rocks).

b. at 10 feet deep - leaves up to 4½ mm. wide, up to 22 inches long. Increase in size over 9 ft. zone of plants is conspicuous.

c. Dense in scattered patches at 12 feet.

d. Growth luxuriant in patches (dense in patches) in 20 feet deep.

In area:

mean tidal range - 8.0 feet

diurnal tidal range - 11.7 feet

mean Tide level - 6.8 f

Tidal data for day:

HHT - 2025 - 10.7

LHT - 0920 - 10.6 f

HLT - 1500 - 5.0 fe

LLT 0236 - -0.1

at time of visit - water level is 9.7 feet above mean lower low water at 1050. at 1150 water level is 8.4 feet above mean lower low water.

K observation: about kelp is cutoff

D-6

f. Dense and luxuriant growth in patches in 24 feet.

g. Densest, most luxuriant growth from 20-25 feet deep. Growth ends at 25 feet. In some spots there is a continuous dense carpet of grasses from 20-25 feet. Abundant Ulva lactuca in bed.

Leaves at latter depth zone 8 mm. wide; 36 inches long.

h. Plants 15/ft.^{2} in 21 feet deep.

Below Zostera is a dense sea pen growth. Sea pens from 25 feet to beyond 35 feet where observations stopped. White nudibranchs abundant at 30-35 feet.

In depths shallower than 20 feet, growth is dense in patches.

Cyanea seen commonly.

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

19 September 1962

State: Washington

Diving No.: D-7

County: King

Locality: off Elliot on Vashon Island, Puget Sound

Lat.: 47°25'01" N.

Long.: 122°26'00" W.

Diver: Ronald C. Phillips

Accompanied by: Tim Hagmeier

Equipment Used: SCUBA

Air Consumption: a. RCP - 400 ft.³
b. TR - 300 ft.³

Maximum Depth: 40 ft.

Duration: 15 min.

Visibility: 40 feet (see bottom from surface at depth).

Water Transparency: clear

Water Temperature: a. Surface - 14.8°C.
b. Bottom - 13.9°C. (at 40 feet deep)

Air Temperature: 66°F.

Bottom Type: light colored muddy sand.

Dominant Plant Cover: Zostera,

Moon Phase: day before last quarter

Tide: 0920 is slack high tide, 10.6 ft. above mean lower low water. Water ebbing at time of collection.

Current Speed: Predicted weak or variable. 1247 - maximum ebb current. 0947 - slack water.

Water Salinity: a. Surface - 30.9 ‰
b. Bottom - 30.2 ‰

Water pH: a. Surface - 7.82
Bottom - 7.75

Time in Water: 1315-1330.

Weather Conditions: No wind, cloudy.

Depth where Grass: a. Begins - 5 ft.
b. Ends - 20 ft.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

In area -

mean tidal range - 8.0 feet

diurnal tidal range - 11.7 feet.

mean tide level - 6.8 feet.

Tidal data for day:

HHT - 2025 - 10.7 feet
LHT - 0920 - 10.6 feet
HLT - 1500 - 5.0 feet
LLT - 0236 - -0.1 feet

a. Zostera - a few patches in 5-7 feet. Much leaf fall. Leaves 2 mm. wide; up to 7 inches long (intertidal growth - at some very low tides).

b. at 7 feet deep - leaves 3 mm. mostly wide, up to 14 inches long. Growth abundant but not continuous - still patchy.

c. At 9 feet deep - growth dense but not continuous. Leaves 6 mm. wide, to 18 inches long.

d. at 10 feet deep - growth is dense and continuous like a carpet - only at this specific depth.

at time of visit - water level was 5.9 feet above mean lower low water.

D-7

e. Deeper than 10 feet, growth is patchy but is still luxuriant. (Still with leaves 10 mm. wide and 42 inches long).

f. Zostera ends at 20 feet in depth.

Below 20 feet the gradually sloping shelf suddenly slopes downward and drops sharply into deep water.

Zone 10 feet deep quite wide - estimate - 60 feet.

Bottom water sample taken at 40 feet deep.

Cymea abundant.

DIVING LOG SHEET 21 September 1962

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-8

County: King Locality: off 194th Place, Richmond Beach - Puget Sound

Lat.: 47°46'1" N. Long.: 122°23'96" W.

Diver: Ronald C. Phillips Accompanied by: Erin Regnier

Equipment Used: SCUBA Air Consumption: a. RCP- 2100 lbs./in.²
b. TR- 1600

Maximum Depth: 45 ft. Duration: 1 hr. 15 min. Visibility: 35 ft.

Water Transparency: clear Water Temperature: a. Surface - 13.5°C.
b. Bottom - 13.0°C.

Air Temperature: 64°F. Bottom Type: Fine gray muddy sand. Dominant Plant Cover: Zostera patches.

Moon Phase: LQ - tropic - north Tide: 1151 is high tide - level of 10.1 feet above mean lower low water - t
flooding at time of collection.

Current Speed: predicted slack water at 1116 - little current predicted but a rather strong current experienced a
as we came to a

Water Salinity: a. Surface - 30.3 ‰ Water pH: a. Surface - 7.85
b. Bottom - 30.5 ‰ Bottom - 7.40

Time in Water: 1000 - 1115 Weather Conditions: cloudy, no wind

Depth where Grass: a. Begins - 8 feet.
b. Ends - 28 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Zostera - 1. Starts in 8 feet deep. Present are highly isolated patches about 6 feet square. Leaves up to 4 mm. wide, up to 14 inches long.

2. Frequent patches on gray muddy sand at 12 feet deep. Leaves 10 mm. wide, up to 44 in. long.

3. 12-13 feet deep is a Nereocystis zone.

4. Zostera ends at 20 feet (not true - premature observation).

5. Scattered single Zostera: 25-28 feet deep. Leaves as luxuriant as 12-20 ft. (cont'd)

At time of visit

at 1000 - water level was 8.4 feet above mean lower low water.

at 1115 water level was 10.0 feet above mean lower low water.

In area: mean tidal r
7.7 feet
diurnal tidal ra
11.4 feet
mean tide level -
6.6 feet

Tidal data for day -

HHT - 1151 - 10.1 f
LHT - 2216 - 9.0 fee
HLT - 1719 - 6.3 feet
LLT - 0424 - 0.3 feet

D-8

6. No Zostera over 28 feet deep.

Zostera most abundant and luxuriant in 12-20 feet.
Patchy in depth but some patches 60-80 feet square.

Area is a wide shallow flat. Estimated- up to 3/8 mile offshore only 45 feet deep- very gradual slope.

Little grass in overall area. A rather narrow grass growth zone.

Only extremely rare tiny sea pens at 30 feet deep - 32 feet deep.
White nudibranchs at 32-40 feet.

35-45 feet- a zone of small, growing Neoscyptis.

25-45 feet- above desert except for scattered rocks on which algae occur.

Several Cypraea capillata seen.

3 genera of nudibranchs seen - one was common but Dirona was rare (only 2 seen).

Turricata common.

Many fish seen - restricted mostly to grass bed (sole, rock cod, ling cod, sea bass). Same true for all trips.

29 September 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: I D-9

County: Pierce Locality: Immediately east of pier at Dash Pt., near Tacoma.

Lat.: 47° 19' 02" N. Long.: 122° 25' 02" W.

Diver: Ronald C. Phillips Accompanied by: Glenn Dick + Carmen Cavanaci

Equipment Used: SCUBA Air Consumption: a. RCP- 1750 lbs./in.²
b. CC - 1700 lbs/in.²

Maximum Depth: 107 feet. Duration: 45 minutes. Visibility: Water very clear - see bottom in 35-40 feet

Water Transparency: Clear. Water Temperature: a. Surface - 14.5°C. Bottom sa
b. Bottom - 14.5°C. in 29-f
of wate

Air Temperature: ca. 62°F. Bottom Type: gray muddy sand- fine sediments. Dominant Plant Cover: Zostera ins
Ulva in Zostera and dee

Moon Phase: NM- one day after new moon - moon in apogee. Tide: slack low tide at 1113. Ebb at start of dive. Slack low during
at end. (Slack low tide is +2.5 ft. above mean low water)

Current Speed: little, if any. Predicted currents - weak or variable. Slack water 1225 (predicted).

Water Salinity: a. Surface - 28.8 ‰ Water pH: a. Surface - 7.75
b. Bottom - 31.3 ‰ Bottom - 7.78

Time in Water: 1045-1130 Weather Conditions: Clear, sunny; offshore wind.

Depth where Grass: a. Begins - 2 feet.
b. Ends - 18 feet.

In area - mean tidal range - 8.1 feet
diurnal tidal range - 11.8 feet
mean tide level - 6.8 feet.

Tidal data for day:

HHT - 1722 - 11.2 feet
LHT - 0513 - 10.4 feet
HLT - 1113 - 2.5 feet
LLT - 2340 - 1.7 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

From shore to 12 feet d
there was a shallow
grade down; over 12 f
deep, the grade steepe
and became an unbroke
25-30 % grade.

At about 45-50 feet,
water temperature
became suddenly
terribly cold.

At time of visit - water level was 2.5 feet above mean lower low water.

0-9) Zostera: 1. 2 feet deep - rare patches - patches ca. 6 inches square. Leaves 2-3 mm. wide; up to 10 inches long (typical intertidal growth).

2. In 4 feet - large, more abundant patches - but still scattered. Leaves 6 mm. wide; up to 2 feet long. Probably just beyond intertidal (not typical intertidal growth).

Conspicuous size increase between 4 to 5 feet

3. In 5 feet growth continuous - plants very luxuriant. Leaves 10 mm. wide; up to 2 feet long.

6. In 6-12 feet plants with leaves 10-11 mm. wide; up to 44-46 inches long.

Zostera most abundant and luxuriant from 6-12 feet deep. Rather a narrow zone but abundant.

7. In 7 feet deep - plants 11/ ft.^{2} (one observation).

8. Much Ulva lactuca throughout grass bed.

9. Plants become more sparse below 12 feet deep (still with luxuriant leaves). End at 18 feet deep.

Laminaria and sea pens (latter abundant) beyond Zostera growth. Some nudibranchs (some on Zostera leaves). The white large one is common from 25-40 feet on bare sandy mud. Many Stichopus at 25-35 feet.

Agaribelia coutteri at 20-30 feet deep.

Hermit crab at 30 feet.

Ulva plants are very small at 50 feet.

Red algal material seems to stop at 50 feet.

Many crabs and Cyanea in area (most abundant inshore in Zostera).

Tube worms abundant from 50-80 feet.

Water very clear - ca. 15 feet visibility at 107 feet. Bottom sea pens to 107 feet. Still went

At 90-95 large wreck found - many

October 6, 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-10

County: Pierce Locality: Owen Beach, Pt. Defiance, NE section; near Tacoma. Puget Sound.

Lat.: 47°18'08" N. Long.: 122°31'06" W.

Diver: Ronald C. Phillips Accompanied by: Glenn Dick and Carmen Cassucci

Equipment Used: SCUBA Air Consumption: a. RCP - ca. 600 lb./in.²
b. CC - ca. 500 lb./in.²

Maximum Depth: 35 feet. Duration: 25 min. Visibility: ~~xx~~ bottom from surface in 20 ft.

Water Transparency: Relatively clear. Water Temperature: a. Surface - ~~xxxx~~ 14.0°C.
b. Bottom - ~~xxxx~~ 14.0°C.

Air Temperature: 52°F. Bottom Type: very coarse - rock on surface - gray muddy sand below. Dominant Plant Cover: dense Ulva, Zostera, and agardhiella.

Moon Phase: day of first quarter Tide: Slack high tide at 1113.

Current Speed: none (~~xxxxx~~ and algae upright in water). Slack water predicted at 1137.

Water Salinity: a. Surface - 30.2‰
b. Bottom - 30.4‰

Water pH: a. Surface - 7.85
Bottom - 7.85 Bottom rubbing in 18 feet

Time in Water: 1120-1145

Weather Conditions: Clear, wind offshore.

Depth where Grass: a. Begins - 18 feet
b. Ends - 30 feet

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Zostera: 1. Density at 18 feet - 21 plants/ft.²

2. Growth - in patches in 18-19 feet.

3. Plants most abundant and luxuriant from 18-26 feet.

4. From 27-30 feet, plants thin out and get very sparse. Still as luxuriant, but very sparse.

Bottom is a steep grade - beyond Zostera zone it becomes a 30% grade. Zostera is patchy but quite abundant in a rather narrow zone

at time of visit - water level was 10.5 feet above mean lower low water.

In area:

mean tidal range - 8.1 feet

diurnal tidal range 11.8 feet

mean tidal level - 6.8 feet

Tidal data for day -

HHT - 1113 - 10.5 feet
LHT - 2104 - 9.1 feet
HLT - 1649 - 6.9 feet
LLT - 0340 - 0.6 feet

D-10

Ulva starts on rocks at 7 feet. This growth extends to 18 feet. This area is solid Ulva. Then the Zostera zone is present; beyond the Zostera zone get Ulva again and Agardhiella on rocks. This is only a moderate amount of Ulva and Agardhiella in among Zostera (Agardhiella and Ulva on rocks at substrate surface; Zostera in muddy sand under rocks).

Lot much Smithora on older Zostera leaves

Zostera leaves up to 8-10 mm. wide.
up to 36 inches long.

6 October 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-11

County: Pierce Locality: Normandy Island Yacht Club (on mainland) - immediately south Fillon Beach, near Seattle Puget Sound.

Lat.: 47°14'07" N. Long.: 122°33'04" W.

Diver: Ronald C. Phillips Accompanied by: Stanwich and Carmen Casacci.

Equipment Used: SCUBA Air Consumption: a. RCP - ca. 600 lbs./in.2
b. CC - ca. - 500 lbs./in.2

Maximum Depth: 35 feet Duration: 20 min. Visibility: ca. 15 feet.

Water Transparency: Turbid Water Temperature: a. Surface - X (see previous dive D-10
b. Bottom - X

Air Temperature: 55° F. Bottom Type: soft black mud. Dominant Plant Cover: Zosters, less Agardhiella.

Moon Phase: day of FQ Tide: slack high tide at 1123. 2.8ft tide at time of collection.

Current Speed: 1127 slack water (predicted current speed at collection time would be 1.17 knots

Water Salinity: a. Surface - 30.2‰ Water pH: a. Surface - 7.91
b. Bottom - 31.2‰ Bottom - 7.92

Time in Water: 1245-1310 Weather Conditions: Clear, wind offshore.

Depth where Grass: a. Begins - 18 feet
b. Ends - 33 feet

Current - strong - grasses and Nereocystis bent parallel to ground.

Zosters: 1. Zosters extremely luxuriant in 18 feet; extremely dense.

2. Most abundant and luxuriant from 18-27 feet - almost a continuous growth.

3. From 27-33 feet the zosters begins to thin out and the leaves get definitely shorter.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

In area:

mean tidal range - 9.

diurnal tidal range -

mean tide level - 7.4 feet.

Tidal data for day:

HHT - 1129 - 11.7 fe

LHT - 2120 - 10.3 fe

HLT - 1719 - 6.9 fe

LLT - 0410 - 0.6 fe

at time of visit - water level was 11.1 feet above mean low

D-11

Most luxuriant Zostera: 1. leaves up to 10-12 mm. wide up to 52 inches long.

Much rock on bottom - get Nereocystis
Laminaria saccharina.
Agardhiella.

Many plants in 20 feet - have young flowers.

The slope in this area is gradual the zone of Zostera growth is very broad.

27 October 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-12

County: Island Locality: Beach - south end - off Camp Casey.

Lat.: 48°09'07" N. Long.: 122°40'09" W.

Diver: R.C. Phillips Accompanied by: Carmen Casucci

Equipment Used: SCUBA Air Consumption: a. RCP - 900 lbs.
b. CC - 1000 lbs.

Maximum Depth: 35 feet. Duration: 30 min. Visibility: 12 feet.

Water Transparency: slightly murky Water Temperature: a. Surface - 10°C.
b. Bottom -

Air Temperature: 15°C. Bottom Type: rocky and swept clean. gray coarse sand. Dominant Plant Cover: Nereocystis and red algae

Moon Phase: New Moon - day before. Tide: Slack and incoming

Current Speed: Slack current predicted for 0944 (actually flood tide begins at 0944) -

Water Salinity: a. Surface -
b. Bottom -

Water pH: a. Surface -
Bottom -

Time in Water: 1015 - 1045

Weather Conditions: clear, no wind

Depth where Grass: a. Begins - 12 feet.
b. Ends - 12 feet.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

In area:

Mean tidal range - 5.2 feet

Diurnal tidal range - 8.4 feet

Mean tide level - 5.1 feet

Tidal Data for Day:

HHT - 1503 - 7.7 feet
LHT - 0344 - 6.8 feet
HLT - 0915 - 3.6 feet
LLT - 2200 - 1.1 feet

~~Slack tide predicted for 0944~~
~~Slack current predicted for 0944 -~~

1115 - current tremendous - ~~slowed~~ a 4-4.5 knot current - all grasses, Nereocystis, and algae bent parallel to ground. ~~existed current~~ - (1206 - maximum flood) - less than 1 hour before max. flood) -

Current at 1015-1045 - ~~Observed~~ ca. 2 knot current - ~~existed current~~ - (1206 - maximum flood - only 1 hr. 21 minutes before max. flood) -

Area subject to a tidal rip current.

At time of visit - water level at 4.3 feet above mean lower low water.

No Zosters

Very fast current – bottom swept free of debris.

Ulvaria with sporophylla on rocks in 4 feet of water.
Low tide line on out. Highest of kelps. Most dense at 7 feet.

Saccharina saccharina – a few plants in 7 feet.

Pterygophora – on rock abundant on out – start in 10 feet.

Nereocystis – abundant – starts in 12 feet – 35 feet (where observations stopped).

Desmarestia – much of this – very big – on rocks – intertidal on out (not in neap low tide level).

Cymathere triplicata

a lot of red algae from 5 feet to 35 feet (deep as we went). Most abundant throughout area where rocks were.

Few fish seen – 1 large (15 inch) ling cod under Nereocystis.

a few limpets on rock.

a few tiny anemones – not Metridium.

Very abundant Gonium.

Occasional Henricia.

Polychaeta – extremely abundant wrapped up in Phyllospadix rhizomes.

Isopods abundant on algae and on seagrass leaves – slingers.

a few decorator crabs entangled in algal mat.

a few snails on rock.

Constantinea – 2 plants seen – small.

Rhodoglossum – 2 plants seen in 35 feet.

Savoiea stipitata – very abundant

Agarophilla – ♀ – occasional

Articulate corallines – abundant.

Antithamnion – abundant – on rocks.

Odonthalia – abundant.

Polyneura – rare

Gigartina – occasional.

Other foliose and divided reds I don't recognize.

2 or three species of Ceramiales.

Ulva – rare.

Phyllospadix scouleri – abundant on rocks in 12 feet – only in this depth. Some leaves up to 5 feet long. Rhizomes robust.

(cont'd)

Very few animals that were not attached or sessile forms. Most found were either substrate dwellers or sessile forms & [illegible] (a few forms took refuge in mat [illegible] & dead mat). Crabs probably under rocks.

Ulva – some. Also the tips of the Phyllospadix – indicate of range of tide.

Bryozoan – encrusting – sessile forms – ? no fish

Urchins – abundant – algae with spines

3 November 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-13

County: Snohomish Locality: Adjacent to north side of Edmonds ferry dock.

Lat.: 47°48'08" N. Long.: 122°23"00' W.

Diver: R.C. Phillips Accompanied by: Linda Ranna

Equipment Used: SCUBA Air Consumption: a.
b.

Maximum Depth: 25 feet Duration: 35 minutes Visibility: clear, see bottom from surface in 25 feet.

Water Transparency: Clear. Water Temperature: a. Surface - 12.0°C.
b. Bottom - 11.5°C.

Air Temperature: 55°F. Bottom Type: tan-muddy sand Dominant Plant Cover: Zostera

Moon Phase: LQ (2 days before day of LQ). Tide: ebbing (3 hours after HHT).

Current Speed: Predicted - weak or variable. Observed - weak but variable - often runs parallel to substrate.

Water Salinity: a. Surface - } 30.3‰ - taken between surface and 10 feet dep.
b. Bottom - }

Water pH: a. Surface - } > 7.65 (taken between surface and 10 feet).
Bottom - }

Time in Water: 1245-1320 Weather Conditions: Partly sunny - 15 mph - S wind.

Depth where Grass: a. Begins - 6 feet
b. Ends - 25 feet

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day

HHT - 0935 - 11.2 feet
LHT - 2031 - 8.9 feet
HLT - 1522 - 7.0 feet
LLT - 0203 - -0.4 feet

Tidal data for area

mean Tidal Range - 7.6 feet
Diurnal Tidal Range - 11.3 feet
Mean Tid. level - 4.6 feet.

at time of visit -

at 1245 - water level at 8.8 feet above mean lower low water.

at 1320 - water level at 8.0 feet above mean lower low wate

D-13

Zostera - starts in 6 feet deep - leaves 3 mm. wide; up to 10 inches long. Rare scattered patches - plants probably intertidal at LLW. Patches due to plants off single rhizome.

In 7 feet - leaves 6-7 mm. wide - up to 2 feet long. Patches more common - plants denser in patches.

In 10 feet - growth continuous, leaves 8 mm. wide, leaves up to 44 inches long.

Density at 10 feet - 38 plants/ft.²
23 plants/ft.² (this density more typical of density at this depth).

Best Zostera growth from 10-20 feet.

At 12 feet - leaves 10 mm. wide, up to 4 feet long. Continuous growth.

There are bare sandy patches in growth from 10-20 feet deep, but plant presence predominates and where found is extensive.

Bed begins to thin out at 20 feet deep - density - 15 plants/ft² to 3 plants/ft.² (latter much more typical of growth at this depth).

Last plants seen at 25 feet. Leaves here still 10 mm. wide and to 4 feet long.

~~Leaves that light at deeper depths decreased~~

Needed - weight measurements of plants from ① lower littoral, ② sublittoral, and ③ lower edge of growth.

Neoagardhiella - scattered in 7 feet on out. Dense bed beyond Zostera.

Ulva - in Zostera bed to 20 feet.

Many Enteromorpha - only in grass. Mostly hand. Many also.

Many Codium - several in 25 feet.

Gonium flabellatum (10 Grands Rochers)

Many decorator crabs in Zostera beds and also (Cancer and on Neoagardhiella fronds).

Several king crabs seen - Pycnopodium seen.

10 November 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-14

County: Thurston Locality: Off Dickerson Pt., near Olympia.

Lat.: 47° 09' 09" N. Long.: 122° 50' 09" W.

Diver: R.C. Phillips Accompanied by: Linda Banner

Equipment Used: SCUBA Air Consumption: a. RCP - 1800 lbs./in.²
b. L.B. - regular leaked

Maximum Depth: 30 feet Duration: 1 hour Visibility: murky - about 12 feet.

Water Transparency: murky. Water Temperature: a. Surface - 10.5°C.
b. Bottom - 11.0°C.

Air Temperature: 52° F. Bottom Type: Rocky and muddy sand. Dominant Plant Cover: Red algae - Agardhiella coulteri and Laminaria.

Moon Phase: FM (day before) - at perigee Tide: flood

Current Speed: slack water - 1604; maximum flood at 1245 (1.8 knots); predicted current at 1445 is 0.8 knots.

Water Salinity: a. Surface - 30.6 ‰
b. Bottom - 30.0‰
} flood tide

Water pH: a. Surface - 7.75 pH
Bottom - 7.75 pH

Time in Water: 1400 - 1500 Weather Conditions: Cloudy, rain, so. winds 20 mph.

Depth where Grass: a. Begins -
b. Ends - No grass

Tidal data for day

Tidal range of 15 feet today

HHT - 1328 - 14.6 feet
LHT - 0352 - 13.0 feet
HLT - 0950 - 3.7 feet.
LLT - 2231 - -0.4 feet.

Tidal data for area -

Mean Tidal Range - 10.0 feet
Diurnal Tidal Range - 14.0 feet
Mean tide level - 8.0 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Observed current was very strong - estimated at 2 knots, at least, all algae level with ground, bottom swept clean of detritus and algae detached washed quickly away.

Area - shallow flat to at least ½ mile offshore.

All algae ceased in 20-30 feet.

Animals - glass isopods on algae.

Stichopus - many in 20-25 feet.

Synaptes - many in 20-25 feet.

Pisaster - occasional - wrapped around clam - stomach extended thru umbo of shell. - 20-25 feet.

Pycnopodia - occasional - 20-25 feet.

Few fish - rock cods, flat fish } that's all.

Decorator crabs - common.

Hermit crabs - abundant.

Small shrimp.

Sea pens - start at 30 feet - common.

Sand dollars inshore - intertidal - but under water now.

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algae - on rocks 20-30 feet

Sargassum - 20-30 feet.

Laminaria -

Nereocystis - ceased in sand at 30 feet.

Rhodymenia pertusa

Rhodoptilum

Agardhiella - most abundant.

Costaria - occasional.

Ceramium - common.

Antithamnion - abundant on rocks.

Gigartina - on rocks.

Inshore to 20 feet deep - Ulva first then short Ulva and Agardhiella associated; at 20 feet - bigger Ulva and Agardhiella associated.

20-30 feet - much red algal growth. Red algae small adapt for foliose & which are

Foliose reds abundant. large

Bottom - inshore to 15 feet deep was a ~~muddy sand~~ firm sandy bottom.

15-30 feet - rock solid over bottom.

at 30 feet bottom becomes more muddy sand - rock scattered.

12 November 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-15

County: Pierce

Locality: Off Ferry Dock, Steilacoom, Puget Sound.

Lat.: 47°10'04" N.

Long.: 122°36'01" W.

Diver: R.C. Phillips

Accompanied by: Jim Satterwhite

Equipment Used: SCUBA

Air Consumption: a. RCP - 1800 lbs./in.² 18-take
b. in 23 f

Maximum Depth: 57 feet

Duration: 1 hour

Visibility: 15 feet at most.

Water Transparency: murky.

Water Temperature: a. Surface - 10.0°C.
b. Bottom - 10.0°C. (even to 57

Air Temperature: 8.5°C.

Bottom Type: Black silty muddy sand

Dominant Plant Cover: Agarhiella cottoni.

Moon Phase: FM (day after).

Tide: flooding.

Current Speed: Slack water - 1201; maximum flood at 1635 - predicted at 0.54 knots. Observed ½ knot at time of visit

Water Salinity: a. Surface - } 31.7 ‰
b. Bottom - }

Water pH: a. Surface } 7.65 pH
Bottom - }

Time in Water: 1310 - 1410

Weather Conditions: cloudy, no wind

Depth where Grass: a. Begins - 18 feet.
b. Ends - 30 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Fucus - up to 2 feet above water level at 1310.

Enteromorpha - on rocks - and Ulva - in water 2-4 feet deep at 1310.

Porocystis - in 5 feet of water at 1310 - Antithamnion on stipe - observed perch nibbling on it.

Zostera - starts at 18 feet - (1315 hours) -
at 23 feet - leaves up to 5 feet long and 10 mm. wide.
at 30 feet - leaves up to 18 inches long; 8 mm. wide.

Tidal Data for Day -

HHT - 0540 - 1

LHT - 1638 - 0

HLT - 1126 - 4.9

LLT - 2346 -

Tidal Data for Area -

mean Tidal Range - 9

Diurnal Tidal Range -

mean tide level - 7.5

At time of visit -

at 1310 - water level at 7.0 feet above mean

at 1410 9.7 ft above

D-15

Nowhere here are the plants abundant – they occur singly or in small clusters of a terminal turion with its two lateral branches or of two terminal turions with their lateral branches.

Dug up one cluster of 3 plants – consisted of terminal turion with 2 lateral branches and a long bare rhizome which is up to 1 foot in length – decayed at farthest end.

Never more abundant in one cluster than 6 plants.

Bottom inshore is rock – up to 14 feet deep.

Muddy sand starts at 14 feet deep or deeper to about 30 feet deep. Some rock scattered.

Over 30 feet deep – scattered rock occurs.

Agarophilla abundant on rocks – occasional Rhodoptilum.

Some Ceramium on rocks. Some Callophyllis.

Laminaria saccharina on rocks to 40 feet.

Animals

Cyanea – occasional – floating

Stichopus – abundant from 35-45 feet.

Octopus – beautiful – mottled – at 50 feet. Ca. 3 feet across.

Sea pens scattered at 50 feet – 2 species – Acanthoptilum gracile (1 seen) and Stylatula elongata.

Star fish abundant – Pisaster – ~~abundant~~ herissimus

Henricia – occasional

Pycnopodia – 1 seen.

~~Patiria miniata 2 seen.~~

Evasterias troschelii – most abundant.

Dermasterias imbricata – 2 seen.

Nudibranchs – abundant at 55-57 feet (Plocamopherella californica).

Small shrimp seen over bottom.

Hold crabs abundant

Pisaster brevispinus – 4 feet long one to shore – diverging a small midbranch – about 1 inch long (Plocamopherella californica).

23 November 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-16

County: Kitsap Locality: Decatur Reef, off Restoration Pt., Bainbridge Island.

Lat.: 47°35'02" N. Long.: 122°28'08" W.

Diver: R.C. Phillips Accompanied by: Glenn Dick

Equipment Used: SCUBA Air Consumption: a.
b.

Maximum Depth: 35 feet Duration: 20 minutes Visibility: 15 feet.

Water Transparency: Murky Water Temperature: a. Surface - X
b. Bottom - 9.5°C. (taken at 33 feet)

Air Temperature: 8.5°C. Bottom Type: Rock Dominant Plant Cover: Red algae.

Moon Phase: Exactly midway between 1st and NM. Tide: Flood.

Current Speed: Strong, ca. 2 knots. Maximum flood at 1119. Predicted currents for area are weak, but actually were strong at dive site at time of dive.

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1200-1220 Weather Conditions: Clear, so. 15 mph wind

Depth where Grass: a. Begins - No zostera
b. Ends -

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

In area: Tidal data for day -

HHT - 1412 - 11.1 feet
LHT - 0254 - 9.1 feet
HLT - 0805 - 4.9 feet
LLT - 2101 - 1.3 feet

Tidal data for area:

mean tidal range - 7.8 feet
diurnal tidal range - 11.5 feet
mean tide level - 6.7 feet

At time of visit - water 9.6 feet above mean lower low water.

Observations: From 5 feet kelp - intertidal - Fucus on rocks.
In 10 feet to 30 feet - reds predominate -
Rhodoptilum
Callithamnion
Rhodymenia pertusa
Odonthalia
Gigartina exasperata
Polyrama - small plants.
Iridaea
Iota of Carrageen.

At 30 feet brown or kelps predominated
- Pterygophora in 30 feet
- Samnicina in 30 feet
- Cotonia in 30 feet

Nereocystis band-attached - in 20 feet.

Rock bottom - little silt in places but it is a shelly - sand silt.

Many kelp crabs in area.
Stichopus at 30 feet.
Cyanea floating
Jellyfish - not Sonnia.
Shrimp on bottom.
Large fish in algae.

23 November 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-17

County: Kitsap Locality: South shore - Bobby Harbor, Bainbridge Island

Lat.: 47°35'05" N. Long.: 122°30'02" W.

Diver: No dive Accompanied by:

Equipment Used: Air Consumption: a.
b.

Maximum Depth: 15 feet. Duration: Visibility:

Water Transparency: Water Temperature: a. Surface -
b. Bottom -

Air Temperature: Bottom Type: silty mud. Dominant Plant Cover: No plants.

Moon Phase: exactly between 1Q and 1M. Tide: flood.

Current Speed:

Water Salinity: a. Surface -
b. Bottom -

Water pH: a. Surface -
Bottom -

Time in Water: 1240 Weather Conditions: Clear, Sa wind 15 mph.

Depth where Grass: a. Begins - No grass.
b. Ends -

No plants on bottom in harbor.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

23 November 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-18

County: Kitsap Locality: North side of Blake Island

Lat.: 47°32'07" N. Long.: 122°29'02" W.

Diver: R.C. Phillips Accompanied by: Glenn Dick

Equipment Used: SCUBA Air Consumption: a.
b.

Maximum Depth: 20 feet Duration: 55 min. Visibility: 15 feet.

Water Transparency: Murky. Water Temperature: a. Surface - X 18 in 20 ft deep.
b. Bottom - 9.5°C.

Air Temperature: 8.5°C. Bottom Type: silty mud and sand mixture Dominant Plant Cover: zostera marina

Moon Phase: nearly between LQ and NM. Tide:

Current Speed: observed - estimated 2 knots.

Water Salinity ‰ a. Surface - X
b. Bottom - 30.6 ‰

Water pH: a. Surface - X
Bottom - 7.79 pH

Time in Water: 1300-1355

Weather Conditions: Clear, So. wind 15 mph.

Depth where Grass: a. Begins - 5 feet.
b. Ends - 12 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal Data for day:

Seattle
HHT - 1411 - 11.2 feet
LHT - 0253 - 9.2 feet
HLT - 0812 - 4.9 feet
LLT - 2108 - 1.3 feet

Tidal Data for area

Mean Tidal Range - 7.9 feet
Diurnal Tidal Range - 11.6 feet
Mean Tide Level - 6.7 feet

at time of visit - water level is 10.6 feet above mean lower low water at 1300.

A visit made on 25 April 1963 at 1200 - at time of -2.0 foot tide. Saw zostera exposed on beach to a vertical height of about 6 feet above water level. This would be about 4 feet above MLLW. Somewhat unburn

Zostera: 1. Starts in 5 feet - scattered patches about 10 feet square. Plants extremely dense in patches - between 80-90/ft.^{2} leaves 1½-2½ mm. wide, up to 12 inches long with much fish evident.

Only terminal plants of rhizomes have leaves 2½ mm. wide and to 12 in. long. Most plants (lateral (branches) have leaves 2 mm. wide and 7-10 inches long). The lateral branches farthest from the terminal plant have the shortest and narrowest leaves - many more than terminal leaves!

2. At 7 feet - plants in patches - leaves 3 mm. wide, up to 15 inches long.

3. At 10-12 feet leaves up to 4.5 mm. wide, up to 24 inches long.

4. From 10-12 feet deep the plants are in a continuous bed - bed of growth.

Zone about 40-50 feet wide.

Plants in 12 feet deep - 83/ft.^{2} - density.

Plants 10-12 feet deep - narrow leaves - short leaves - much more so than I have ever seen for this depth. Plants even below MLLW - are very delicate - rhizomes small - shoots succulent and delicate appearing.

Some wide bladed plants mixed in (up to 9 mm. wide) but very few of these.

Plants extremely dense.

Mud samples - 1 inch of mud - to depth of rhizome growth taken at 10 feet - one in Zostera bed; one on bare bottom.

5. Beyond Zostera - from 12 feet deeper - bottom suddenly rocky - no Zostera; get Laminaria zone - and attached Laminaria and reds (Gigartina, Callithamnion, etc.)

X 1. Bottom - very soft inches deep
X 2. Water shaded inches from strong current very tall Pseudotsuga trees. Even in middle of day, the water in area of Zostera is shaded.
3. Tides - plants up to 18 feet deep are in intertidal - and even up to 12 feet deep are exposed at minus tides.
4. Consider all the Critical Tide factors to explain increase in leaf width and length at various depths.

In 10-12 feet - only terminal plants have leaves up to 4½ mm. wide and up to 24 inches long. Most plants (lateral branches) with leaves 3 mm. wide and up to 13 inches

19 December 1962

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-19

County: Kitsap Locality: Decatur Reef, off Restoration Pt., Bainbridge Island

Lat.: 47°35'01" N. Long.: 122°28'08" W.

Diver: R.C. Phillips Accompanied by: J. Powell + R. Vadas

Equipment Used: SCUBA Air Consumption: a.
b.

Maximum Depth: 33 feet Duration: 35 minutes Visibility: ca. 25 feet.

Water Transparency: clear Water Temperature: a. Surface - 9.5°C.
b. Bottom - 9.2°C.

Air Temperature: ca. 48°F. Bottom Type: Coarse shelly muddy sand Dominant Plant Cover: Algae on a 3-4 inch layer over rock.

Moon Phase: last quarter Tide: ebb -

Current Speed: variable - slight over Zostera - ca. 1.5 knots over algae on raised rocky reef.

Water Salinity: a. Surface - X
b. Bottom -

Water pH: a. Surface - X
Bottom -

Time in Water: 1055 - 1130

Weather Conditions: overcast, dark, 7 mph. So. wind

Depth where Grass: a. Begins - 30 feet
b. Ends - 33 feet.

Zostera - 1. In one patch - large - about 40 feet square - from 30-33 feet deep. On a coarse shelly muddy sand bottom - silt only 3-4 inches thick over rocky walls of reef. Leaves 7-9 mm. wide, up to 36 inches long. In 30 feet - plants are about 6-10/ft.². Not this abundant in 33 feet. Joe Powell said there is another patch of comparable size near the one we dove on - in same depth.

Zostera - ca. 18-21 feet below MLLW.

Marine Soil Texture: (weight in grams)

20.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal Data for Day:

HHT - 1122 - 11.7

LHT - None Today

HLT - 1821 - 3.7

LLT - 0420 - 3.5 ft

Tidal Data for Area:

Mean tidal range - 7.8

Diurnal tidal range - 11

Mean tide level - 6.7 fe

Dark wood predicted 1112 (wi was mo at this ti

At t...

D-19

There was a strong (1.5 knot estimated) current over the rocky fingers of the reef. No silt accumulated on the reef - much exposed rock was evident and a heavy algal growth was on rock. Mostly red algae.

But between reef fingers - was a good accumulation of sand and sometimes some silt in it. The Zostera was growing on such a silty sand patch - no current in depression. Evidently silt and sand accumulated and current swept over sand and didn't dip onto it.

Saw a 6 foot octopus against reef.

Eels in rocky reef.

Green sea urchins on reef.

Shrimp on bottom.

Anemones on rock (on shallowest rocks - would be out of water at MLLW or LLLW).

Rock cod - 5-6 lbs. abundant.

Perch abundant - 2-3 lbs.

5 January 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-20

County: Kitsap Locality: Immediately south of Pt. Monroe, Puget Sound side, NE tip of Bainbridge Island.

Lat.: 47°42'02" N. Long.: 122°30'04" W.

Diver: R.C. Phillips Accompanied by: Glenn Dick.

Equipment Used: SCUBA Air Consumption: a. RCP - 1150 lbs./in.²
b. GD - 1000 lbs./in².

Maximum Depth: 29 feet Duration: 45 min. Visibility: 8 feet maximum

Water Transparency: very murky Water Temperature: a. Surface - 7.8°C.
b. Bottom - 7.8°C.

Air Temperature: 42°F. Bottom Type: Rock mudded sand in zostera Dominant Plant Cover: Zostera
No algae.

Moon Phase: FQ (2 days after). Tide: 1206 - slack high tide

Current Speed: slight seaward - very little; too weak or variable to be predicted.

Water Salinity: a. Surface - 22.3 ‰ Water pH: a. Surface - 7.85 pH
b. Bottom - 26.3 ‰ Bottom - 8.0 pH

Bottom sample taken in 25 feet d

Time in Water: 1140-1225 Weather Conditions: cloudy, fog, no wind

Depth where Grass: a. Begins - 10 feet
b. Ends - 29 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

No algae seen - diatoms on rocks - several plants of Ulva on rocks (plants only ca. ½ inch high). Photo all !!.

Zostera !!. Sand bottom started in 10 feet (inshore was rock of intertidal). Zostera first seen in 10 feet - black muddy sand. In patches - patches occasional, but not too infrequent. Leaves 2-3 mm. wide; up to 35 cm. long - mostly 15-27 cm. long (lab measurements).

2. Offshore from Zostera was again a rocky bottom - no Zostera.

3. Offshore from rocky bottom

Tidal Data for Day

HHT - 12.1 feet at 120
LHT - 9 feet at 0110
HLT - 5.7 feet at
LLT - -0.1 feet at 19

Tidal Data for area -

Mean Tide Range - 7.7 fee
Diurnal Tide Range - 11.4 fe
Mean Tide Level - 6.6 fee

1). At time of visit the water level w

bottom - zostera found again. This occurred in 11 feet. Leaves same size but patches much more frequent.

4. From 12-20 feet - zostera leaves a little larger than in 10 feet - plants also denser. Leaves - some of them - 3-5 mm. wide - same length as before (a few longer - up to 45 cm. long - mostly 20-30 cm. long).

5. In 20 feet deep - one patch of leaves - 8-10 mm. wide - only to 12 inches long (quite short).

6. Zostera ended at 29 feet.

Conclusions: 1. In 10 feet - leaves only 2-3 mm. wide on all plants - terminal and side shoots.

2. In 12-29 feet - except for one patch of plants - terminal plants with leaves 3-5 mm. wide and up to 45 cm. (mostly 20-30 cm. long), but side shoots with leaves only 2-3 mm wide and up to 35 cm. long (as in 10 feet).

3. Best growth of plants - most abundant - from 12-25 feet - most dense and frequent.

4. Plants at 29 feet same size as plants more shallow.

5. At 29 feet - plant growth stopped suddenly - a definite line of growth stoppage.

At 25-29 feet - there is very little light for growth - water is murky and day is cloudy - it is very dark at the depth; how can plants survive at the very low light intensities that prevail at those depths for so much of the year? Does this affect the leaf length or size?

Could smaller leaves throughout be due to a local environmental phenomenon, a result of the very cold water temperature, or could this be a

12 January 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-21

County: Snohomish

Locality: On south side of Elliot Pt., immediately south of ferry dock. Mukilteo, Wash.

Lat.: 47°56'08.5" N.

Long.: 122°18'06" W.

Diver: Ronald C. Phillips

Accompanied by: Glenn Dick

Bottom sample taken at 27 feet.

Equipment Used: SCUBA

Air Consumption: a. RCP-1900 lbs/in.² b.

Maximum Depth: 110 feet

Duration: 45 minutes

Visibility: ca. 25 feet at surface; 1 foot bel to 50 feet

Water Transparency: clear

Water Temperature: a. Surface - 6.8°C. b. Bottom - 6.8°C. at 27 feet.

Air Temperature: −1.5°C.

Bottom Type: muddy sand-silt

Dominant Plant Cover: 8.0°C. a Zostera. 85 feet

No algae (a few plants of Agardhiell Coulteri in 10 feet - very few - thats all

Moon Phase: FM (full day after). Tide: ebbing.

Current Speed: slight current.

Water Salinity: a. Surface - 27.6‰ b. Bottom - 28.3‰

Water pH: a. Surface - 8.0 pH. Bottom - 8.05 pH.

Time in Water: 1100-1145

Weather Conditions: Cold, clear, sunny, brisk north wind.

Depth where Grass: a. Begins - 10 feet b. Ends - 19 feet.

Marine Soil Texture: (weight in grams)

20.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day -

HHT - 0713 - 12.2 (

LHT - 1730 - 9.5 fe

HL

[redacted] T - 1249 - 6.4 feet

LLT - ——

Tidal data for area -

Mean tide range - 7.4 feet

Diurnal tide range - 11 feet

Mean tide level - 6.4 fe

Zostera: 1. Close to shore rock - to 6 feet.

2. Zostera in 10-19 feet deep - (below LLLW). All plants seem to have equal size).

Plants in a narrow band - zone of growth about 20 feet wide. Band runs parallel to shore - inshore and offshore limits of growth very sharp.

3. Bottom from shore on down steep - at least a 45° angle.

4. Leaf size - older plants on rhizome - leaves; ca. 6-8 mm. wide - up to

at time of visit the water level was 7.9

D-21

on younger side shoots – leaves only 2-3 mm. wide to 15 inches long.

Suggest – that cold water hinders leaf growth in width and length (plants all below LLLW – same size restrictions as plants in same zone of D-20 in cold water).

Suggest – leaf size depends on tidal zone and temperature of water. Still seems to be a leaf size gradient in winter, even with leaves reduced.

Bet smaller plants on same rhizome as terminal large size plant.

Went to depth of 110 feet – found Zostera trash on bottom as far down as we went – mostly dead leaves, but also saw whole green plants, even as deep as 60 feet – but were not attached.

Animals – many, many starfish – large patch of Pycnopodia
Pisaster giganteus
Pisaster brevispinus
Henricia
One other form – bright red – 5 arms form (most abundant from 20-60 feet) (Mediaster).

Stichopus – a few – one seen at 95 feet.

Metridium – orange – scattered – on scattered rock – one seen at 61 feet, suspect one seen at about 80-85 feet.

1 Pipe fish collected but got away (looked just like the type we had in Florida).

Flat fish – seen occasionally to a depth of 110 feet – saw one fish swim deeper.

Pagurus – abundant.

2 February 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-22

County: Locality: just west of Skiff Point in Murden Cove, on Cambridge Island, Puget Sound.

Lat.: 47°39'05.5" N. Long.: 122°30'00" W.

Diver: R.C. Phillips Accompanied by: Glenn Dick

Equipment Used: SCUBA Air Consumption: a. ~ b. ~

Maximum Depth: 30 feet Duration: 20 minutes Visibility: ca. 10 feet

Water Transparency: murky Water Temperature: a. Surface - 7°C. b. Bottom - 7°C. - taken at 30 feet.

Air Temperature: ca. 48° F. Bottom Type: rocky Dominant Plant Cover: Plocamium and Odonthalia Ramaltiticks

Moon Phase: 1st quarter - day after Tide:

Current Speed: Weak current predicted - observed weak on ebb tide.

Water Salinity: a. Surface - ~ b. Bottom - Water pH: a. Surface - ~ Bottom -

Time in Water: 1225-1245 Weather Conditions: Cloudy, rain, wind 10 mph from south

Depth where Grass: a. Begins - b. Ends -

No grass observed - rocky bottom.

Found large cobbles on bottom to a depth of 21 feet - solid occurrence at this depth - found large muddy sand patches with large rocky areas alternating. More rock than muddy bottom.

Much red algae on rocks - some Nereocystis found - no leaves. Some Rhodymenia pertusa.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal Data for Area

Mean Tide Range - 7.7 feet

Nominal Tide Range - 11.4 feet

Mean Tide level - 6.6 feet

Tidal Data for Day

HHT - 1036 - 11.7 feet

LHT - ~

HLT - 0336 - 5.7 feet

LLT - 1802 - 0.5 ft

at time of visit the water level was 10.5 ft above MLLW at 1235

Many Cucumaria at 15 feet.

1 Aurelia seen floating.

Many Henricia strewn over bottom.

1 [redacted]

Pycnopodia seen.

a couple of species of Pisaster seen; possibly also Dermasterias.

Large anemone seen.

1 orange Metridium seen.

Several Stichopus seen.

[redacted] animals below MLLW. [redacted]

2 March 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-23

County: King Locality: Immediately north of Alki Pt., Puget Sound.

Lat.: 47° 34' 07" N. Long.: 122° 25' 00" W.

Diver: R.C. Phillips Accompanied by: Glenn Dick

Equipment Used: SCUBA Air Consumption: a.
b.

Maximum Depth: 75 feet Duration: 1 hr. 45 min. Visibility: Ca. 25-30 feet.

Water Transparency: clear Water Temperature: a. Surface -
b. Bottom - 20 feet - 7.5°C.

Air Temperature: 7.5° C. Bottom Type: gray muddy sand Dominant Plant Cover: Zostera marina

Moon Phase: Day of FQ Tide: neap tide - ebb tide

Current Speed: almost none observed.

Water Salinity: a. Surface - X
b. Bottom - Water pH: a. Surface - X
Bottom -

Time in Water: 1030-1215 Weather Conditions: partly cloudy - 23 mph - NE wind water rough.

Depth where Grass: a. Begins - 7 feet
b. Ends - 25 feet

Zostera: 1. growth starts in 7 feet - few plants here average only 2-3 mm. wide; only to 7-8 in. long. (from MLLW to 1 foot above MLLW in depth).

2. 10-20 plants dense - leaves - 6-10 mm. wide and to 18 inches long. Much leaf kill seen - but younger leaves are green - overall shorter than normal in summer. Plants most abundant in this depth.

3. 20-25 feet - leaves mostly 8-10 mm. wide - to 18 in. long.

Many young plants on regions where terminal plants are in upper size ranges and side branch plants are in smallest

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal Data for Day

HHT - 0912 - 11 feet

LHT - 2341 - 9.6 feet

HLT - 0326 - 5.4 feet

LLT - 1632 - 0.4 feet

Tidal Data for area

Mean tide range - 7.6 feet

Diurnal tide range - 11.3 ft

Mean tide level - 6.6 feet

At time of visit - the water level was 9.3 feet above MLLW at 1110. at 1215 the water level

D-23

Animals — weak at 60 feet — Metridium white most abundant — but also orange forms on wreck. Metridium on solid objects from 30 feet on down. Some small forms seen (about ½ inch high).

Seapens — begin in lower part of Zostera growth — in a definite belt — from 30 feet to about 45 feet deep — dense — about one animal per 2 feet. Large forms. Have eggs.

Starfish — young Pycnopodia and Solaster (latter most abundant). 1 new form seen — arms all filled in — no indentations — quite puffy.

2-3 rock cod around rock.

Hermit crabs in shells.

Nudibranchs common on sandy bottom from 10 feet to 60 feet.

Stichopus — abundant from 30-60 feet.

12 March 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-24

County: King Locality: Dungeness Head, near Sequim Bay, Puget Sound

Lat.: 47°35'08" N. Long.: 122°23'01" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: SCUBA Air Consumption: a.
b.

Maximum Depth: 25 feet Duration: 1 hour. Visibility: ca. 16 feet

Water Transparency: clear Water Temperature: a. Surface -
b. Bottom -

Air Temperature: Bottom Type: gray muddy sand Dominant Plant Cover: Zostera marina

Moon Phase: full moon two days after. Tide: slack low to incoming

Current Speed: 2½ knots at full flood (estimated).

Water Salinity: a. Surface -
b. Bottom -

Water pH: a. Surface -
Bottom -

Time in Water: 1330 - 1430 Weather Conditions: clear, no wind, sunny

Depth where Grass: a. Begins - 1 foot
b. Ends - 15 feet

Zostera

1. at slack low tide - there are many patches of Zostera in 1 foot deep. at 1330.

2 feet above MLLW. — Leaves 7-8 inches long - no more than 3 mm. wide. - heavy bill on them.

2. Wide separation of growth from this inshore location to the dense luxuriant growth offshore in deeper water.

3. Grass begins to pick up in 7-8 feet deep - dense in 8-15 feet deep (at 1430).

Right at LLLW level and deeper. — Leaves to 30 inches long - to 10 mm. wide.

Plants about 11-15/ft.². Good new health... growth — at 15 ft deep grass beginning to thin out (etc)

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for day

HHT - 0615 - 11.1 feet
LHT - 1822 - 9.8 feet.
HLT - 1229 - 2.8 feet
LLT - None today

Tidal Data for Area -

mean tide range - 7.6 feet
Diurnal tide range - 11.3 feet
mean tide level - 6.6 feet.

at time of visit water level was 3.0 feet above MLLW at 1330. at 1430 level was 4.6 feet above MLLW.

D-24

less dense. Plants much more luxuriant at this station at this time than a little south near Alki Point.

Sea pens inshore and offshore from Zostera. Polynices shell and egg case in Zostera beds. Large flatfish - very abundant - ca. 18 inches long to 2 feet long. Many starfish species seen. 2 species of sea anemone seen - one intertidal and a delicate white one deeper. Hermit crabs abundant. Several crab species common. Cryptochiton common - large - up to 15 inches long. One nudibranch common.

Visited there on 30 April 1963 - large and small Metridium crowded closely on pilings of offshore tower. 2-5 ft. Octopus. Zostera extends offshore well beyond tower -

Zostera begins inshore at 4.5 feet below MLLW. In dense band - beyond this it is in very sparse patchy quantity on out beyond the tower at depth of 20 feet below MLLW. We didn't go deeper. Plants getting very sparse at this depth. Leaves 8-10 mm. wide - to 32 inches long. Evidences on this date of growth rejuvenation: new groups of roots formed on nodes nearest leaf clusters signifying that new nodes are being proliferated. Water temp - 7.0°C.

16 March 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-25

County: Locality: North edge of Sand bar, Miller Bay, off Port Madison, Puget Sound Washington

Lat.: 47°44'09" N. Long.: 122°32'09" W.

Diver: Ronald C. Phillips Accompanied by: G. Dick

Equipment Used: SCUBA Air Consumption: a. RCP-2300 lbs./in².
b.

Maximum Depth: 8 feet Duration: 1 hour Visibility: 6 feet at most

Water Transparency: very murky Water Temperature: a. Surface - 6.75°C. in 5 feet
b. Bottom -

Air Temperature: 42°F. Bottom Type: fine muddy sand to soft muddy sand. Dominant Plant Cover: Zostera

Moon Phase: 2 days before LQ Tide: ebb - prog.

Current Speed: estimated 2-2½ knots in a tide rip where we anchored - some Zostera in this current most where current not as strong - from 1½-2f

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1145-1245 Weather Conditions: wind - ca. 15 mph., cloudy

Depth where Grass: a. Begins - 5 feet
b. Ends - 8 feet.

Water turbid over muddy bottom from swift current. Evident that Zostera and bacteria on mud hold substrate down.

1. Zostera starts at 5 feet - leaves to 8 mm. wide - mostly 5-8 mm. wide - to 2 feet long. Plants dense - farther from shore depth is still 5 feet and Zostera growth is a dense continuous bed.

5 feet at 1145

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for day

HHT - 0748 - 9.

LHT - 2203 - 9.2

HLT - 0221 - 5.5

LLT - 1503 - 1.5 f

Tidal data for area

mean tide range - 7.7 f

D mined tide range 11.

mean tide level - 6.6 f

at time of visit, water level was 5.3 8 feet above MLLW at 1145

61

D-25

This zone of growth between MLLW and LLLW (unless this zonation is modified by local conditions.

XX

Many plants in this zone with flowers. Water 6.75°C. - old - probably has not been very warm here, due to a very fast tidal sweep and mixing over flats. Plants long with well formed terete stalks. Some ~~flowers~~ stalks up to 3.5 cm. long.

2. Farther from shore bottom dips to 8 feet - plants larger - leaves 8-10 mm. wide but shorter - only to 18 inches long. Finer bottom. More sand. Growth neither dense nor abundant. No flowers.

Only Ulva and Porphyra - very small plants on rocks - inshore from zostera.

8 feet deep at 1200. Zone right at LLLW line.

Interesting - flowers at this early date. Had a mild winter - much sunshine since January 1963. Hypothesis - flowers inshore with long leaves - more light due to very turbid water. No flower offshore - leaves wider but shorter - less light in 3 feet of water. Also, up to this time we have had just a few minus tides ~~this~~ but these have been at night (2.3 up to -1.2, a few more up to -0.2-0.3

Interesting to see flowers in zone between MLLW and LLLW.

Interpretation - flowers inshore due to greater light there and relative freedom from any damaging effects of air exposure. Anthers in process of meiosis - most mature ones have pollen grains

3. Over 8 feet deep - no plants

2 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-26

County: Kitsap

Locality: Agate Passage - west side, just north of bridge, off Puget Sound.

Lat.: 47° 42' 09" N.

Long.: 122° 33' 08" W.

Diver: R.C. Phillips

Accompanied by: G. Dick

Equipment Used: ~~scuba~~ surface observation

Air Consumption: a. X
b. X

Maximum Depth: 17 feet

Duration: Observation only

Visibility: Can see bottom in 20 feet

Water Transparency: Clear

Water Temperature: a. Surface - X
b. Bottom - X

Air Temperature: 54°F.

Bottom Type: Sand and rock

Dominant Plant Cover: Laminaria, other algae, a little Zostera.

Moon Phase: FQ - one day after

Tide: ~~[illegible]~~ - ebb tide.

Current Speed: observed - very fast - (predicted maximum ebb at ~~[illegible]~~ 1435 - at 3.6 knots).

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1415 -

Weather Conditions: clear, no wind

Depth where Grass: a. Begins -
b. Ends -

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Observed a very sparse but recurring amount of Zostera at 15-17 feet.

Significant - Zostera in this extreme current.

Tidal data for area - that for Port Madison.

Tidal data for day -

HHT - 0036 - 10.7 feet
LHT - 1053 - 8.7 feet
HLT - 0620 - 6.6 feet
LLT - 1815 - 0.6 feet

At time of visit the water was 4.7 feet above MLLW.

2 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-27

County: Kitsap Locality: Liberty Bay, north side at Poulsbo

Lat.: 47°43'08" N. Long.: 122°38'05" W.

Diver: R. C. Phillips Accompanied by: G. Dick

Equipment Used: ~~SCUBA~~ Surface observation Air Consumption: a. X b. X

Maximum Depth: 6 feet Duration: —— Visibility: 2 feet at most.

Water Transparency: muddy-visibility 2 feet. Water Temperature: a. Surface - b. Bottom -

Air Temperature: 54°F. Bottom Type: mud Dominant Plant Cover: Nothing

Moon Phase: FQ; 1 day after Tide: ebb

Current Speed: Little, if any.

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom - X

Time in Water: 1445 Weather Conditions: clear, no wind

Depth where Grass: a. Begins - b. Ends -

No plants on bottom

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

2 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-28

County: Kitsap Locality: North shore of inlet going to Liberty Bay - opposite Keyport -

Lat.: 47°42'06" N. Long.: 122°36'04" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: SCUBA Air Consumption: a. X b. Y

Maximum Depth: 25 feet Duration: ½ hour Visibility: 8 feet

Water Transparency: murky Water Temperature: a. Surface - X b. Bottom - 9°C.

Air Temperature: 54°F. Bottom Type: muddy sand Dominant Plant Cover: Zostera.

Moon Phase: FQ - day after Tide: ebb.

Current Speed: little if any

Water Salinity: a. Surface - X b. Bottom - 28.2‰ Water pH: a. Surface - X Bottom - X

Time in Water: 1535-1605 Weather Conditions: clear - no wind

Depth where Grass: a. Begins - b. Ends - Observations made at 1535.

Zostera starts in 5 feet deep - relatively dense - leaves 2 mm. wide - to 5 inches long.

At 7 feet - leaves are 4-5 mm. wide and to 10 inches long.

At 10 feet - leaves are 5-8 mm. wide and to 12 inches long.

Zostera ends sharply at 10 feet deep. Plants at 7-10 feet never more than 12 plants / ft.².

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for area -

Mean tidal range - 8.1

Diurnal tide range - 11.

Mean water level - 6.9

Tidal data for day -

HHT - 0046 - 11.2 feet

LHT - 1103 - 9.2 fee

HLT - 0627 - 6.7 fee

LLT - 1822 - 0.7 fe

at time of visit at 1535 - water leve was 3.2 feet above MLLW.

D-28

Tiny sea pens start at 10 feet. Zone of large sea pens at 12 feet. Stichopus abundant at 20 feet. 2 pink starfish at 10 feet - many of these. Sunflower stars here. Mollusca abundant on zostera.

20 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-29

County: Kitsap Locality: In Port Orchard, just south of Bremerville - west side - north side of point of land.

Lat.: 47°38'04" N. Long.: 122° 35' 07" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 20 feet Duration: 15 minutes Visibility: can see bottom from 17 feet at surface.

Water Transparency: clear Water Temperature: a. Surface - b. Bottom - X

Air Temperature: 54°F. Bottom Type: sandy mud - rock inshore Dominant Plant Cover: bits of Agarum shells

Moon Phase: FQ-day after Tide: ebb.

Current Speed: none - weak current predicted.

Water Salinity: a. Surface - b. Bottom - Water pH: a. Surface - Bottom - X

Time in Water: 1630-1645 Weather Conditions: clear, no wind.

Depth where Grass: a. Begins - b. Ends - No grass

An abundance of starfish: Pycnopodia and - a large orange one.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

18 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-30

County: Kitsap Locality: Clam Bay, just south of Middle Pt., Puget Sound.

Lat.: 47°34'04" N. Long.: 122° 32'09" W.

Diver: R.C. Phillips Accompanied by: G. Duck

Equipment Used: SCUBA Air Consumption: a. X b. X

Maximum Depth: 30 feet Duration: 15 minutes Visibility: ca. 15 feet

Water Transparency: relatively clear Water Temperature: a. Surface - b. Bottom - 8.0°C. Taken at depth of 12 fe

Air Temperature: 50°F. Bottom Type: Rock with a thin veneer of mud. Dominant Plant Cover: Zostera marina

Moon Phase: Day after LQ Tide: Ebb

Current Speed: None observed. Predicted weak.

Water Salinity: a. Surface - X b. Bottom - 29.8‰ Water pH: a. Surface - X Bottom - X

Time in Water: 1245-1300 Weather Conditions: 20 mph SE wind, cloudy.

Depth where Grass: a. Begins - 9 feet b. Ends - 25 feet.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day

HHT - 0055 - 10.
LHT - 1103 - 8.0
HLT - 0702 - 6.3
LLT - 1821 - 0.9

Tidal data for area

Mean tide range - 7.8
Diurnal tide range - 11.5
Mean water level - 6.7 f

Inshore is rock - Sargassum, Fucus, on these. Rock over all substrates - at 9 feet the rock is covered by a thin veneer of mud.

1. Zostera starts at 9 feet - leaves ca. 5-6 mm. wide, up to 18 inches long. (in zone between MLLW and LLLW).

2. At 10 feet Zostera is dense - much substantial growth - leaves 8-10 mm. wide - up to 30 inches long. Leaves quickly approaching a summer aspect.

3. Best growth - most luxuriant - at

At 1300 the water level was 6.8 feet above MLLW

12-20 ff

D-30

4. From 20-25 feet roots thins out - stops at 25 feet.

5. Leaves heavily stipplytized.

6. Growth beginning - new roots seen at upper nodes which signifies new nodes being formed (probably also new leaf growth).

Observation from boat.

18 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

Checked two spots - south side - west side.

State: Washington

Diving No.: D-31

County: Kitsap Locality: Yukon Harbor, at Colby, Puget Sound

Lat.: 47°31'06" N. Long.: 122°32'08" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: None - observed Air Consumption: a. X b.

Maximum Depth: 5 - 16 feet Duration: X Visibility: to 16 feet.

Water Transparency: clear. Water Temperature: a. Surface - X b. Bottom -

Air Temperature: 50°F. Bottom Type: muddy sand Dominant Plant Cover: None.

Moon Phase: day after LQ Tide: ebb

Current Speed: Predicted weak. None observed.

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom -

Time in Water: X Weather Conditions: 20 mph - cloudy

Depth where Grass: a. Begins - No grass. b. Ends -

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

18 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-32

County: Kitsap Locality: Fern Cove, Colvos Passage, Puget Sound.

Lat.: 47° 28' 08" N. Long.: 122° 29' 03" W.

Diver: R.C. Phillips Accompanied by: G. Dick.

Equipment Used: SCUBA Air Consumption: a. X b.

Maximum Depth: 25 feet Duration: 25 minutes Visibility: 17 feet

Water Transparency: clear Water Temperature: a. Surface - X b. Bottom -

Air Temperature: 50° F. Bottom Type: rock - ~~patchy~~ muddy sand Dominant Plant Cover: kelp.

Moon Phase: day after LQ Tide: ebb

Current Speed: none observed. Predicted weak.

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1335-1400 Weather Conditions: 15 mph. SW wind; cloudy

Depth where Grass: a. Begins - No zostera. b. Ends -

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Solid Ulva at 3 feet on rock.
Much Fucus on rock
Solid Laminaria at 6 feet - much on down to 25 feet - but thins out below about 15 feet. (much L. saccharina).
At 10 feet - some Iridaea. 2 species of Desmarestia very common from 6 feet to 25 feet (filamentosa form more abundant of the two).
Rhodoptilum occasional
Rhodomenia pertusa common

Cotaria common at 25 feet.

Cystoseiria abundant - well distributed thru out range.

Nereocystis - plants from 6 inches to 6 feet seen - vast numbers seen developing (not seen in March).

Sargassum in 8 feet.

A real algal habitat - got into a muddy sand bottom at 20 feet - no grass. On this patch there was more muddy sand than at at Clam Cove, but no zostera on it.

Area possibly isolated from vegetative growth by rock - but at Deception Reef - there were isolated patches of zostera - had to be established by floating plants or by seed. Why could this not happen at Clam Cove?

20 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: 0-33

County: Kitsap Locality: Cove just north of Port Orchard, Puget Sound. Just off Washington Veterans Hospital.

Lat.: 47° 32' 09" N. Long.: 122° 35' 06" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: [redacted] Snorkeling Air Consumption: a. X b.

Maximum Depth: 21 feet. Duration: 50 minutes Visibility: Can see bottom from 21 feet

Water Transparency: Clear Water Temperature: a. Surface - 8.0°C. b. Bottom -X

Air Temperature: ca. 42°F. Bottom Type: muddy and soft. Dominant Plant Cover: Zostera

Moon Phase: Exactly midway between LQ and NM. Tide: flood.

Current Speed: slight current noted - weak.

Water Salinity: a. Surface - 28.7‰ b. Bottom -X Water pH: a. Surface - Bottom - X

Time in Water: 1040 - 1130 Weather Conditions: cloudy, 12 mph SW wind - clear inland

Depth where Grass: a. Begins - 7 feet b. Ends - 16 feet.

Observations were made at 1040 - 2 feet growth (16 foot depth) observation made at 1130.

1. Grass starts at 7 feet - extremely sparse and desperate at 7-9 feet. Leaves 4-5 mm. wide, only 8-11 inches long. (Roughly between MLLW and LLLW) Below LLLW
2. at 10-16 feet - the leaves were 8-10 mm. wide and up to 24 inches long.
3. From 12-15 feet deep the growth was fairly continuous but not dense (possibly 8-11/(ft.)²).
4. From 12-15 feet - only in this depth - a few flowering plants seen - not abundant but well scattered; not highly developed, only one or two [illegible]

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for day

HHT - 0221 - 11.8 feet

LHT - 1356 - 9.2 feet

HLT - 0839 - 4.0 feet

LLT - 2021 - 1.2 feet

Tidal Data for area

Mean Tide Range - 8.0 feet

Diurnal tide range - 11.7 ft.

Mean tide level - 6.8 ft.

at 1040 the water level was 5.5 above MLLW at 1130 -

D-33

5. Grass dense at 15-16 feet. Grass ends sharply at 16 feet (11 feet below MLLW).

6. Sea pens begin as soon as grass ends - a narrow zone of intermixing.

7. Starfish abundant on flat.

8. A broad shallow flat - 3 blocks offshore - as grass ends, the bottom drops off quickly and the sea pens begin.

9. Many - heavy population of snails on leaves.

10. Limpets just beginning on leaves.

11. Much particulate matter in water - sewage.

12. Most abundant and luxuriant growth from 12-15 feet deep.

Snails all over leaves - numerous.

20 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-34

County: Kitsap Locality: SW end of Sinclair Inlet, near Bond, Puget Sound.

Lat.: 41°31'07" N. Long.: 122°41'00" W.

Diver: R.C. Phillips Accompanied by: G. Duck

No dive - just an observation.

Equipment Used: —— Air Consumption: a. b. X

Maximum Depth: 12 feet Duration: X Visibility: murky

Water Transparency: turbid Water Temperature: a. Surface - 8.0°C. b. Bottom - X

Air Temperature: X Bottom Type: muddy Dominant Plant Cover: None

Moon Phase: between CQ and NM Tide: flood

Current Speed: Weak

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom - X

Time in Water: 1200 Weather Conditions:

Depth where Grass: a. Begins - No grass b. Ends -

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

20 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-35

County: Kitsap Locality: Dyes Inlet, near Bremerton

Lat.: 47°36'04" N. Long.: 122°40'06" W.

Diver: R.C. Phillips Accompanied by: R. Dick

Equipment Used: SCUBA Air Consumption: a. X
b.

Maximum Depth: 30 feet Duration: ½ hour Visibility: 8 feet.

Water Transparency: murky-large sewage particles in water. Water Temperature: a. Surface - 8.5°C.
b. Bottom - X

Air Temperature: X Bottom Type: soft muddy sand Dominant Plant Cover: zostera.

Moon Phase: between LQ and NM. Tide: flood-almost slack low (at

Current Speed: None observed

Water Salinity: a. Surface - 28.0‰
b. Bottom - X

Water pH: a. Surface - X
Bottom -

Time in Water: 1315-1345 Weather Conditions:

Depth where Grass: a. Begins - 7 feet
b. Ends - 14 feet.

above MLLW

1. Grass starts at 7 feet - sparse at 7 feet.
2. Grass ends at 14 feet - sparse at 14 feet.
3. Most abundant and luxuriant growth from 10-12 feet deep.
4. Leaves 3-4 mm wide; to 12 inches long.
5. No significant distinction in leaf size over the depth range.
6. Plants dense from 10-12 feet deep.
7. Young flowering plants abundant from 10-12 feet deep (smallest flowering

Essentially all the grass in this area occurs shallower than LLLW.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for day

HHT - 0244 - 12.4 feet

LHT - 1419 - 9.8 feet

HLT - 0923 - 4.0 feet

LLT - 2105 - 1.2 feet

Tidal data for area

Mean tide range - 8.6 feet.

Nominal tide level - 12.3 feet

Mean tide level - 7.1 feet

At 1330 the water level was 9.4 ft.

D-35

8. Flowering plants - most luxuriant growth between MLLW and LLLW.

9. Little, if any, much lower than LLLW.

Many sand dollars in sand shoreward of zostera.

Cucumaria abundant deeper than zostera.

Ulva extensive shoreward of zostera.

Animal life abundant in bed - crabs, tunicates, worms, snails, other forms. Possibly clams.

Snails all over leaves - laying eggs.

25 april 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-36

County: King Locality: North side of Beals Pt., Vashon Island. Puget Sound.

Lat.: 47°28'02" N. Long.: 122°26'01" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 4 feet Duration: 15 minutes Visibility: cannot see bottom in 2

Water Transparency: turbid Water Temperature: a. Surface -
b. Bottom - 9.5°C.

Air Temperature: 14.2°C. Bottom Type: muddy sand Dominant Plant Cover: not much

Moon Phase: 2 days after N M Tide: flood

Current Speed: None.

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1245 - 1300

Weather Conditions: clear - 20 mph north end

Depth where Grass: a. Begins - 2 ft.
b. Ends - 4 feet.

Grass rare.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day

HHT - 0504 - 12.1 feet
LHT - 1847 - 12.1 feet
HLT - ——
LLT - 1202 - —2.0

Tidal data for area

Mean tidal range - 8.0 ft
Diurnal tidal range - 11.7 ft
Mean tidal level - 6.8 ft

At 1250 water level 1.4 feet MLLW

near MLLW. On 2 feet plants sparse. only 3 seen. leaves 4-5 inches long - to 1.5 mm. wide, at most 2 mm. wide.

Between MLLW and LLLW. a little growth at 4 feet - on a coarse sandy mud - more sand than mud. leaves to 18 in. long - in 5-8 mm. wide class.

New roots being formed - new succulent, internodes

25 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-37

County: King Locality: North of Hall Pt. - offshore Manzanita - south tip of Vashon Island Puget Sound

Lat.: 47°21'03" N. Long.: 122°29'03" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: SCUBA Air Consumption: a. X b.

Maximum Depth: 15 feet. Duration: 20 minutes Visibility: murky

Water Transparency: see about 8 feet. Water Temperature: a. Surface - 9.6°C. b. Bottom - X

Air Temperature: X Bottom Type: sand mostly. Dominant Plant Cover: zostera

Moon Phase: 2 days after NM. Tide: flood

Current Speed: None.

Water Salinity: a. Surface - b. Bottom - 29.5‰ in 7 feet. Water pH: a. Surface - Bottom - X

Time in Water: 1405-1425 Weather Conditions: clear - 20 mph - north wind

Depth where Grass: a. Begins - 1 foot. b. Ends - 7 feet

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day

HHT - 0508 - 12.3 ft

LHT - 1851 - 12.3 ft

HLT - ———

LLT - 1206 - -2.0

Tidal data for area

Mean tidal range - 8.2 ft

Diurnal tidal range - 11.9 ft

Mean tide level - 6.9 ft

at MLLW

1. Zostera starts in one foot. Leaves 7 inches long. only 2 mm. wide at most. Some at 18 inches deep to 4 mm. wide. On sand bottom. Sparse at first - single plants - gradually increase.

Between MLLW and LLLW.

2. At 2 feet get a continuous growth. Not dense but continuous. Leaves up to 5 mm. wide - to 12 in. long.

3. At 4 ft. leaves increase in length to 30 inches.

Below ———

4. At 5 feet deep the leaves at 8-10 mm.

at 1410 the water level was 1 feet above MLLW

D-37

Below 7 feet deep Agarshella is solid.

This is a broad shallow flat – not deep – but it drops off fast below Zostera into deep water.

Orange tube worms.
Some hydroids on Agarshella.
Many clams.
Sea pens start at 15 feet.

25 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-38

County: King Locality: Just north of Pt. Sandford - west side of Vashon Island, Puget Sound.

Lat.: 47°24'03" N. Long.: 122°31'03" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 17 feet Duration: 15 minutes Visibility: See bottom from 15 feet

Water Transparency: clear Water Temperature: a. Surface - X b. Bottom - 9.5°C. - at 17 feet

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover:

Moon Phase: 2 days after NM. Tide: flood

Current Speed: a very slight flow

Water Salinity: a. Surface - X b. Bottom - 29.5‰ in 17 feet Water pH: a. Surface - X Bottom - X

Time in Water: 1530-1545 Weather Conditions: clear, 20 mph. North wind

Depth where Grass: a. Begins - 7 feet b. Ends - 17 feet

Between [redacted] MLLW and LLLW.

LLLW

1. Zostera starts in 7 ft. on firm muddy sand. Leaves 3-4 mm-wide, to 15 in. long.
2. at 10 ft. leaves 8 mm. wide, to 24 inches long.
3. Plants stop at 17 feet.

Plants abundant but not dense.

Many anemones on leaves.

Marine Soil Texture: (weight in grams)

22.6 mm. -	
16.0 mm. -	
11.2 mm. -	
8.00 mm. -	
5.66 mm. -	
4.00 mm. -	
2.83 mm. -	
2.00 mm. -	
1.41 mm. -	
1.00 mm. -	
0.707 mm. -	
0.500 mm. -	
0.354 mm. -	
0.250 mm. -	
0.177 mm. -	
0.125 mm. -	
0.088 mm. -	
0.063 mm. -	
0.044 mm. -	

Tidal Data for Day

HHT - 0504 - 11.8 fe

LHT - 1847 - 11.8 fe

HLT - ——

LLT - 1156 - -2.0

Tidal data for area

mean tide range - 8.0 ft

D mixed tide range - 11.

mean tide level - 6.8 ft

at time of visit - 1540 - the wat level was 6.3 feet above MLLW

25 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-39

County: Kitsap Locality: at Grsgonia - on Peninsula - Colvos Passage - Puget Sound.

Lat.: 47°27'07" N. Long.: 122°31'09" W.

Diver: R.C. Phillips Accompanied by: G. Dick.

Equipment Used: SCUBA Air Consumption: a. X b.

Maximum Depth: 90 feet Duration: 20 minutes Visibility: ca. 15 feet in shallow wat a. 5 feet at 90 feet.

Water Transparency: clear. Water Temperature: a. Surface - X b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: 2 days after NM Tide: flood.

Current Speed: none observed.

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom -

Time in Water: 1615-1635 Weather Conditions: clear - 20 mph North wind

Depth where Grass: a. Begins - 10 feet b. Ends - 30 feet.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Ulva inshore on rocks. Some Porphyra.

1. Zostera begins at 10 feet deep. Leaves only 2-3 mm. wide.

2. From 10-11 feet deep - plants abundant. Leaves 5-8 mm. wide - to 10 in. long.

3. at 12 feet - leaves 8-10 mm. wide - to 30 inches long. abundant.

4. Plants end abruptly at 20 feet (a few stragglers at 30 feet).

many Stichopus beyond Zostera.

at 40 feet a garden of Ulva, Rhodymenia pertusa etc

Tidal data for day

HHT - 0502 - 12 fe

LHT - 1845 - 12 feet.

HLT - +

LLT - 1200 - -2.

Tidal data for area

Mean tide range - 7.9 ft

Minimal tide level - 11.6 f

Mean tide level - 6.7 ft.

at time of visit - 1615 - water le was 7.8 feet above M L

D-39

at 60 feet Rhodymenia ca. 3 inches tall.
at 75 feet - plants ca. 1 inch tall.
Plants end at 85 feet.

A very steep grade.

25 April 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-40

County: Pierce Locality: Big Harbor, on Olympic Peninsula, near Tacoma. Puget Sound

Lat.: 47°20'03" N. Long.: 122°35'00" W.

Diver: No diver. Accompanied by: X

Equipment Used: None Air Consumption: a. b. X

Maximum Depth: 17 feet Duration: X Visibility: clear.

Water Transparency: see bottom in 17 feet. Water Temperature: a. Surface - b. Bottom -

Air Temperature: X Bottom Type: X Dominant Plant Cover: None.

Moon Phase: 2 days after NM. Tide: flood.

Current Speed: None

Water Salinity: a. Surface - b. Bottom - X Water pH: a. Surface - Bottom -

Time in Water: 1500 Weather Conditions: clear - 20 mph North wind

Depth where Grass: a. Begins - b. Ends -

No grass.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

4 May 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

County: Snohomish Locality: Eulalip Bay, east shore. next to big dock. Diving No.: D-41

Lat.: 48°03'07" N. Long.: 122°16'07" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: SCUBA Air Consumption: a. b. X

Maximum Depth: 15 feet Duration: 15 minutes Visibility: 6-8 feet in water to 10 feet de Visibility zero at 15 ft. deep

Water Transparency: Murky Water Temperature: a. Surface - b. Bottom - X

Air Temperature: X Bottom Type: muddy Dominant Plant Cover: zostera

Moon Phase: Equally midway between FQ and FM. Tide: [redacted] ebb

Current Speed: gentle.

Water Salinity: a. Surface - b. Bottom - X Water pH: a. Surface - Bottom - X

Time in Water: 1330-1345 Weather Conditions: cloudy, 15 mph. South wind.

Depth where Grass: a. Begins - 6 ft. b. Ends - 10 feet.

2.0 feet above MLLW. — 1 Plant seen at 6 feet deep on soft mud. Leaves 3-4 mm. wide; to 6 inches long.

Between MLLW and LLLW. — At 9 feet a few plants seen - leaves to 8 mm. wide; to 30 inches long. Some plants flowering but sparse. Visibility here only 6-8 feet.

At 10 feet another clump of plants [redacted] a clump about 4 feet square in area. Maybe 20 plants in all. Same size as in 9 feet.

Small area - very few plants - not robust growth.

Water extremely murky - on a very gentle etc

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for area

Mean Tidal Range - 7.6 feet

Diurnal Tide Range - 11.2 ft.

Mean Tide Level - 6.6 ft.

Tidal data for day

HHT - 0226 - 11.1 feet

LHT - 1452 - 8.5 feet

HLT - 2025 - 3.6 feet

LLT - 0849 - 2.9 feet

At 1340 water level was 8.0 [redacted] feet above MLLW.

4 May 63

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

County: Snohomish Locality: South side of Kayak Pt. - Port Susan Sound. Diving No.: D-42

Lat.: 48°08'01" N. Long.: 122°22'00" W.

Diver: R.C. Phillips Accompanied by: G. Dick.

Equipment Used: SCUBA Air Consumption: a. X b.

Maximum Depth: 25 feet Duration: 30 minutes Visibility: ca. 15-18 feet.

Water Transparency: clear Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: coarse sand - some mud in zostera growth Dominant Plant Cover: zostera

Moon Phase: exactly midway between Fq and FM. Tide: [redacted] ebb

Current Speed: gentle observed

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1430-1500. Weather Conditions: cloudy - 15 mph. So. wind.

Depth where Grass: a. Begins - 10 feet. b. Ends - 14 feet.

Important — dirty water layer 3-4 feet thick at surface. Below this water was extremely clear. Prevailed on out as far from shore as we went.

Between MLLW and LLLW.

1. 10 feet leaves 8-10 mm. wide; to 30 inches long. Growth begins sharply. Zone about 20 feet wide. Not a dense luxuriant growth. (Possibly near LLLW).

2. One patch of plants on 10 feet - leaves 4-5 mm. wide; to 12-15 inches long. On same depth as above but spatially separated from above. Do not same growth as above (possibly between MLLW and LLLW).

Below LLLW

3. At 12-14 feet - dense plants in a zone about 50 yards wide. Plants not overly dense but are terminal. (OC) at 1445 water level was 8.5ft

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal Data for Area

Mean Tide Range - 7.6 feet

[redacted] Tide Range - 11.2 ft.

Mean Tide Level - 6.6 feet

Tidal Data for Day

HHT - 0226 - 11.1 ft

LHT - 1452 - 8.5 ft

HLT - 2025 - 3.6 ft

LLT - 0849 - 2.9 ft

D-42 on a particularly soft muddy bottom. They root very deeply in the substrate — up to 9-10 inches deep.

Interesting problem here 3 size ranges of plants - each spatially separated from each other, yet essentially ~~in~~ in equal depth as the other.

4. Zostera ends at 14 feet - no plants beyond or offshore from this. No animals except that worm holes are abundant. Except for this the bottom is a desert.

5. One species of starfish seen on muddy bottom - only 2 animals seen.

6. Occasional flatfish seen.

Plant growth not continuous - but dense in patches. Extremely luxuriant in one depth zone. Is this bottom or what?
It would appear that the longer the leaves the less dense the plants are.

Interesting area - 3 size classes of plants. One extremely large class - seen only in San Juan Islands - first time seen in Puget Sound.

Dense luxuriant leaves - are they dense too? Real genetic factor

2. Possible nutrient interaction with pulp mill effluent from nearby Everett?

3. Or light screen from overlying dirty water screen so that plants are stimulated to grow tall (a vegetative stimulation?).

Study this area to see if reproductive periodicity works in with any vegetative periodicity.

9 May 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-43

County: Island Locality: Between Columbia Beach and Clinton, Whidbey Island, Puget Sound

Lat.: 47°57'07" N. Long.: 122°21'02" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 20 feet Duration: 10 minutes Visibility: ca. 15 ft.

Water Transparency: clear. Water Temperature: a. Surface - X b. Bottom - 11.5°C. - 10 ft.

Air Temperature: 15°C. Bottom Type: muddy sand - soft Dominant Plant Cover: None.

Moon Phase: F M, day after Tide: flood

Current Speed: gentle.

Water Salinity: a. Surface - X b. Bottom -

Water pH: a. Surface - X Bottom -

Time in Water: 1210-1220 Weather Conditions: clear - 15 mph - NW wind

Depth where Grass: a. Begins - X b. Ends -

No grass

Broad shallow flat to 200 yds. offshore - to there only 5 ft. deep - then bottom plunges off fast to the depths.

A five feet thick muddy layer of water on top of clear water on bottom. Water may be too murky for grasses (or too fresh?). If on low tide this murky or fresh water layer is 5 ft. thick and water is 5 feet deep, grasses may not be able to grow.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

From intertidal out to at least where the bottom plunges off. The bottom is riddled by small holes - found also at Eglelip - density about 11-20/ft.². Found many small butter clams in holes, but also found ghost shrimps in them (Urogeba pugettensis). Found also a blindgob

Sea pen band at 20 feet deep

We brought back a shrimp and kept it in a jar of water for 24 hours in a small jar where the water warmed up to room temperature. When we added formaldehyde to preserve it, the animal was still living (book states that animal will die if it does not touch the sides of its burrow).

9 May 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-44

County: Island Locality: Southside of Sandy Point, Whidbey Island, Puget Sound

Lat.: 48°01'09" N. Long.: 122°22'03" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: SCUBA Air Consumption: a. X b.

Maximum Depth: 25 feet Duration: 10 minutes Visibility: to 15 feet

Water Transparency: clear Water Temperature: a. Surface - ~~8.3°C.~~ b. Bottom - 12.0°C.

Air Temperature: see D-43 Bottom Type: muddy sand Dominant Plant Cover: little Zostera

Moon Phase: FM-day after Tide: flood

Current Speed: gentle

Water Salinity ‰ a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1310-1320 Weather Conditions: clear - 15 mph NW wind

Depth where Grass: a. Begins - 7 feet b. Ends - ~~9~~ 9 feet

Many ghost shrimp holes as at D-43.

Another 5 feet thick murky water layer - under this water is as clear as a whistle.

Below LLLW - One small patch of grass seen in 7-9 feet. We looked widely but could find no more. Leaves 10-12 mm. wide and to 4 feet long. Some plants flowering.

Patch appeared to come from one plant. Growth strung out along an elongated axis.

hydroids common on leaves.

Clams common.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for area

mean tidal range - 7.6 feet

diurnal tidal range 11.2 feet

mean tide level - 6.6 feet

Tidal data for day

HHT - 1824 - 10.7 feet

LHT - 0424 - 10.1 feet

HLT - 2344 - 5.8 feet

LLT - 1119 - -0.6 feet

1315 - at time first water level was 1.3

9 May 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-45

County: Island Locality: Southside of East Point, Whidbey Island, Puget Sound

Lat.: 48°05'07" N. Long.: 122°29'03" W.

Diver: R. C. Phillips Accompanied by: L. Duck

Equipment Used: SNORKEL Air Consumption: a. b. X

Maximum Depth: 10 feet Duration: 20 minutes Visibility: see bottom from surface in

Water Transparency: clear Water Temperature: a. Surface - see D-43. b. Bottom -

Air Temperature: see D-43 Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: FM-1 day after Tide: flood

Current Speed: very strong - at least 2½ knots - probably gets stronger

Water Salinity: a. Surface - b. Bottom - X Water pH: a. Surface - Bottom - X

Time in Water: 1400-1420 Weather Conditions: clear - 15 mph NW wind

Depth where Grass: a. Begins - 4 feet b. Ends - 10 feet

Holes of ghost shrimp abundant from intertidal on out. A few clams here.

Between MLLW and LLLW — 1. Grass starts in 4 feet - leaves 10 mm. wide, ca. 3 feet long.

close to LLLW — 2. Large plot about 20 feet across - runs parallel to beach - leaves 10-12 mm. wide, ca. 3-4 feet long. 5-6 feet deep. Plants abundantly flowering - dense in plot.

Modifying influences: strong current, lee of island - shelter by tall trees on shore. 3. 2 other bands running parallel to shore - 7-9 feet deep. Also flowering.

4. Scattered plants in 10 feet. No deeper

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal Data for Area

Mean tide range - 7.6 feet

Diurnal tide range - 11.2 fe

Mean tide level - 6.6 feet

Tidal Data for Day

HHT - 1824 - 10.7 feet

LHT - 0424 - 10.1 feet

HLT - 2344 - 5.8 feet

LLT - 1119 - -0.6 f

1410 - At time of visit, water level wa

3.4 [illegible] MLLW

9 May 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-46

County: Island Locality: Elger Bay, Camano Island, Puget Sound.

Lat.: 48°06'07" N. Long.: 122°27'09" W.

Diver: No dive made. Accompanied by: ⊘

Equipment Used: ——— Air Consumption: a. X
b.

Maximum Depth: ⊘12 feet Duration: 5 minutes Visibility: see bottom from surface in 1

Water Transparency: clear Water Temperature: a. Surface - 11.0°C.
b. Bottom - X

Air Temperature: X Bottom Type: muddy sand. Dominant Plant Cover: Zostera

Moon Phase: FM- day after Tide: flood

Current Speed: gentle

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: ⊘ 1445 Weather Conditions: clear - 15 mph NW wind

Depth where Grass: a. Begins - 4 feet
b. Ends - ⊘12 feet

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal Data for Area
See D-45

Tidal Data for Day
See D-45

At 1445 water was 5.2 feet above MLLW

above MLLW. 1. 4 feet - Zostera in small, highly scattered patches. Leaves 4-5 mm. wide; to 12 inches long. Some plants flowering - flowers small. Leaf kill evident.

Between MLLW and LLLW. — 2. 5-6 feet - leaves 5-8 mm. wide; to 18 inches long. Plants in scattered patches.

approximately below LLLW. — 3. 7-12 feet - leaves 10 mm. wide; to 30 inches long. Most dense in 7-8 feet. Scattered patches very scattered over 8 foot belt

9 May 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-47

County: Island Locality: Just north of Camano Head, Camano Island, Puget Sound.

Lat.: 48°04'00" N. Long.: 122°21'09" W.

Diver: No dive made Accompanied by:

Equipment Used: — Air Consumption: a. X b.

Maximum Depth: see to 15 ft. Duration: 1520 Visibility: clear

Water Transparency: clear Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: sandy mud Dominant Plant Cover: No grass

Moon Phase: FM, day after Tide: flood

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: Weather Conditions: clear, 15 mph NW wind

Depth where Grass: a. Begins - X b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

9 May 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D- 48

County: Island Locality: East side of Sidney Island, Puget Sound.

Lat.: 48°01'02" N. Long.: 122°19'02" W.

Diver: R.C. Phillips Accompanied by: G. Dick.

Equipment Used: No dive Air Consumption: a. b. X

Maximum Depth: can only see 11 feet. Duration: 5 minutes Visibility:

Water Transparency: Water Temperature: a. Surface - b. Bottom - see D-43

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: FM-day after Tide: flood

Current Speed: gentle

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom - X

Time in Water: 1540 Weather Conditions: clear, 15 mph NW wind

Depth where Grass: a. Begins - 9 feet b. Ends - only can see 11 feet

near LLLW. 1. Grass starts in 9 feet - Leaves 10 mm. wide, to 3 feet long.

2. I don't know how deep it goes - it was still present at 11 feet - could only see 11 feet deep.

Nowhere abundant - not dense but common. A fair amount over a wide area.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal Data for area

Mean tide range - See

Diurnal tide range - D-44

Mean tide level - or D-45

Tidal Data for day

HHT -

LHT - See D-4

HLT - or D-45

LLT -

at 1540 ft. level ... 7.1 ft.

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-49

County: Pierce

Locality: On east side of island, across from Lyleman on Fox Island.

Lat.: 47°16'00" N.

Long.: 122°38'04" W.

Diver: R.C. Phillips

Accompanied by: G. Dick

Equipment Used: Snorkel

Air Consumption: a.
b. X

Maximum Depth: 18 feet

Duration: 10 minutes

Visibility: see bottom in 18 feet from surface

Water Transparency: clear

Water Temperature: a. Surface - X
b. Bottom - X

Air Temperature: X

Bottom Type: sandy mud

Dominant Plant Cover: lots of Neoagardhiella, No grass. Sargassum, and Laminaria saccharina.

Moon Phase: 4 days before F.Q.

Tide: ebb, almost dark low.

Current Speed:

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1300

Weather Conditions: clear, 20 mph south wind

Depth where Grass: a. Begins -
b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal Data for day

HHT - 2118 - 13.4 ft.

LHT - 0615 - 10.8 ft.

HLT - 0225 - 7.0 ft.

LLT - 1357 - -1.4 ft.

Tidal Data for Area

Mean tidal range - 9.3 ft.

Diurnal tidal range - 13.0 ft.

Mean tide level - 7.4 feet

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-50

County: Pierce Locality: Cove near Arletta, west end of Hale Passage.

Lat.: 47°17'01" N. Long.: 122°40'08" W.

Diver: R.C. Phillips Accompanied by: Stick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 10 feet Duration: 10 minutes Visibility: see bottom in 10 feet

Water Transparency: slightly murky Water Temperature: a. Surface - 16.0°C. b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera.

Moon Phase: 4 days before F.Q. Tide:

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom - X

Time in Water: 1340-1350 Weather Conditions: clear, 20 mph south wind

Depth where Grass: a. Begins - b. Ends -

Zostera marina seen in 10 feet - a few plants flowering - not quite ready for pollination but almost. Dominant large flowers. Leaves 10 mm. wide - to 32 inches long.

Ctenophores abundant.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal Data for Day

HHT - 2118 - 13.4 ft.
LHT - 0615 - 10.8 ft.
HLT - 0225 - 7.0 ft.
LLT - 1357 - -1.4 ft.

Tidal Data for Area

Mean tidal level - 7.4 ft.
Diurnal tide range - 13.0 ft.
Mean tide range - 9.5 ft.

At time of visit water level was 1.4 ft below MLLW

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-51

County: Pierce Locality: just south of Raft Island, near Henderson Bay.

Lat.: 47°19'04" N. Long.: 122°40'03" W.

Diver: R.C. Phillips Accompanied by: D. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 20 feet Duration: 5 minutes Visibility: 3-4 feet.

Water Transparency: Very turbid Water Temperature: a. Surface - X
b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Ulva, Desmarestia, Enteromorpha

Moon Phase: 4 days before FQ Tide: just barely ebb.

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1420-1425

Weather Conditions: clear, 20 mph south wind

Depth where Grass: a. Begins -
b. Ends -

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal Data for Day

HHT - 2118 - 13.7 feet

LHT - 0615 - 11.1 feet

HLT - 0226 - 7.1 feet

LLT - 1358 - -1.3 feet

Pycnopodia helianthoides - occasional.

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-52

County: Pierce Locality: Cove inside South Head - across from McNeil Island.

Lat.: 47°14'08" N. Long.: 122°43'04" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 5 feet Duration: 10 minutes Visibility: 2 feet

Water Transparency: very turbid Water Temperature: a. Surface - 16.6°C.
b. Bottom - X

Air Temperature: X Bottom Type: muddy. Dominant Plant Cover: Zostera

Moon Phase: 4 days before FQ Tide: just beginning to flood

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1450-1500

Weather Conditions: clear, 20 mph wind - south

Depth where Grass: a. Begins -
b. Ends -

Observations on grass in 3-5 feet.
Some Zostera between MLLW and LLLW - little flowering.
Most abundant below LLLW - densest flowering here.
Leaves 5-8 mm. wide - to 2 feet long.
Stigmas exerted for pollination.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal Data for Day

HHT - 2122 - 14.0 feet
LHT - 0619 - 11.4 feet
HLT - 0228 - 7.2 feet
LLT - 1400 - -1.2 feet

Tidal Data for Area

mean tide range - 9.7 feet
diurnal tide range - 13.6 feet
mean tide level - 7.8 feet

At 1500 water level was 0.6 feet

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-53

County: Pierce Locality: Just north of Still Harbor, McNeil Island.

Lat.: 47°13'07" N. Long.: 122°40'04" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 15 feet Duration: 10 minutes Visibility: clear - see bottom in 15 feet

Water Transparency: clear Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: X Bottom Type: muddy sand. Dominant Plant Cover: Ulva

Moon Phase: 4 days before FQ Tide: flood

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom -

Water pH: a. Surface - X
Bottom -

Time in Water: 1510-1520 Weather Conditions: clear, 20 mph wind - south

Depth where Grass: a. Begins -
b. Ends -

No grass.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-54

County: Pierce Locality: Oro Bay, near Vega, Anderson Island

Lat.: 47°08'08" N. Long.: 122° 42'02" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 10 feet Duration: 10 minutes Visibility: see bottom in 10 feet

Water Transparency: slightly turbid Water Temperature: a. Surface - 12.2°C. b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: great mass of Ulva.

Moon Phase: 4 days before FQ Tide: flood

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - X

Water pH: a. Surface - X Bottom - X

Time in Water: 1540 - 1550

Weather Conditions: clear, 20mph wind - south

Depth where Grass: a. Begins - b. Ends -

No grass.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-55

County: Pierce Locality: Marginally Protected

Lat.: 47°06'09" N. Long.: 122° 41'04" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 7 feet Duration: ~~10~~ minutes Visibility: see bottom in 7 feet

Water Transparency: turbid Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: None

Moon Phase: 4 days before FQ Tide: flood

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1620-1630

Weather Conditions: clear - 20 mph wind - south

Depth where Grass: a. Begins -
b. Ends -

No grass

Sea pens on bottom in 7 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-56

County: Pierce Locality: Taylor Bay - across from Hartstene Island

Lat.: 47°11'02" N. Long.: 122°46'05" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 17 feet Duration: 15 minutes Visibility: clear - see bottom in 17 feet

Water Transparency: clear Water Temperature: a. Surface - X
b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: None

Moon Phase: 4 days before FQ Tide: flood

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1640-1655 Weather Conditions: clear, 20 mph wind south

Depth where Grass: a. Begins -
b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-57

County: Pierce Locality: South of Dougall Pt., Hartstene Island.

Lat.: 47°16'04" N. Long.: 122°52'01" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 20 feet Duration: 10 minutes Visibility: see bottom in 20 feet.

Water Transparency: clear Water Temperature: a. Surface - X b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera abundant

Moon Phase: 4 days before FQ Tide: flood

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - X

Water pH: a. Surface - X Bottom - X

Time in Water: 1735-1745

Weather Conditions: clear 25 mph south wind

Depth where Grass: a. Begins - b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

11 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-58

County: Pierce Locality: Vaughn Bay, near Vaughn.

Lat.: 47°20'02" N. Long.: 122°47'00" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 14 feet Duration: 10 minutes Visibility: 14 feet - to bottom

Water Transparency: clear Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Enteromorpha

Moon Phase: 4 days before FQ Tide: flood

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom - X

Time in Water: 1800-1810 Weather Conditions: clear - 25 mph - south wind

Depth where Grass: a. Begins - b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-59

County: Mason Locality: Gerald Cove, Harstene Island.

Lat.: 47° 17'01" N. Long.: 122°53'00" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 12 feet Duration: 6 minutes Visibility: 12 feet - see bottom

Water Transparency: clear Water Temperature: a. Surface - X
b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Ulva

Moon Phase: 3 days before FQ Tide: slack high tide.

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 0700 - 0706

Weather Conditions: cloudy - 10 mph south wind

Depth where Grass: a. Begins -
b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-60

County: Mason Locality: Cove inside Graham Pt, Pickering Passage

Lat.: 47°14'08" N. Long.: 122°56'03" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 12 feet Duration: 15 minutes Visibility: see bottom in 12 feet

Water Transparency: clear Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: ± 52°F. Bottom Type: muddy sand Dominant Plant Cover: Ulva

Moon Phase: 3 days before FQ Tide: ebb.

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface X
Bottom X

Time in Water: 0720-0735

Weather Conditions: cloudy, 10 mph south wind

Depth where Grass: a. Begins -
b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-61

County: Mason Locality: off Lilly Pt., Hammersley Inlet

Lat.: 47°12'01" N. Long.: 122°59'01" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 14 feet Duration: 5 minutes Visibility: saw bottom in 14 feet

Water Transparency: clear Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: 52°F. Bottom Type: muddy sand Dominant Plant Cover: Ulva

Moon Phase: 3 days before FQ Tide: ebb

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom -

Water pH: a. Surface - X
Bottom -

Time in Water: 0745-0750 Weather Conditions: cloudy, 10 mph south wind

Depth where Grass: a. Begins -
b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: 0-62

County: Mason Locality: Inside Potlatch Pt., Squaxin Island.

Lat.: 47°11'07" N. Long.: 122° 54'09" W.

Diver: R.C. Phillips Accompanied by: D. Dick

Equipment Used: Snorkel Air Consumption: a. b. X

Maximum Depth: 10 feet Duration: 10 minutes Visibility: see bottom in 10 feet.

Water Transparency: murky Water Temperature: a. Surface - b. Bottom - X

Air Temperature: 52°F. Bottom Type: muddy sand Dominant Plant Cover: Ulva

Moon Phase: 3 days before FQ Tide: ebb

Current Speed: X

Water Salinity: a. Surface - X b. Bottom -

Water pH: a. Surface - X Bottom -

Time in Water: 0805-0815 Weather Conditions: cloudy, 12 mph south wind

Depth where Grass: a. Begins - b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-63

County: Mason Locality: Totten Inlet

Lat.: 47°08'01" N. Long.: 123°00'02" W.

Diver: R.C. Phillips Accompanied by: G. Duck

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 9 feet Duration: 15 minutes Visibility: see bottom in 9 feet

Water Transparency: murky Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: 53°F. Bottom Type: muddy sand - lot of rock Dominant Plant Cover: None

Moon Phase: 3 days before FQ Tide: ebb

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 0840 - 0855 Weather Conditions: cloudy, 15 mph south wind

Depth where Grass: a. Begins -
b. Ends -

No grass

Some oysters seen

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-64

County: Thurston Locality: Eld Inlet

Lat.: 47°05'08" N. Long.: 122°56'09" W.

Diver: R. C. Phillips Accompanied by: G. Duck

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 8 feet. Duration: 5 minutes Visibility: 8 feet - see bottom

Water Transparency: murky Water Temperature: a. Surface - X
b. Bottom - X

Air Temperature: 53° F. Bottom Type: muddy sand Dominant Plant Cover: None

Moon Phase: 3 days before FQ Tide: ebb

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 0915-0920

Weather Conditions: cloudy, 15 mph - south wind

Depth where Grass: a. Begins -
b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-65

County: Thurston Locality: Near Quilt Harbor, Budd Inlet

Lat.: 47°07'00" N. Long.: 122°53'06" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 9 feet Duration: 10 minutes Visibility: see bottom in 9 feet

Water Transparency: murky Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Ulva

Moon Phase: 3 days before FQ Tide: eff

Current Speed: X

Water Salinity: a. Surface - X b. Bottom -

Water pH: a. Surface - X Bottom -

Time in Water: 0940-0950

Weather Conditions: cloudy, 16 mph. - south wind

Depth where Grass: a. Begins - b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

12 June 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-66

County: Mason Locality: East side of Squaxin Island.

Lat.: 47°11'00" N. Long.: 122°53'09" W.

Diver: R.C. Phillips Accompanied by: G. Dick

Equipment Used: Snorkel Air Consumption: a. X
b.

Maximum Depth: 12 feet Duration: 10 minutes Visibility: see bottom in 12 feet

Water Transparency: clear Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Ulva

Moon Phase: 3 days before FQ Tide: ebb

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom -

Water pH: a. Surface - X
Bottom -

Time in Water: 1000-1010 Weather Conditions: cloudy, 16 mph south wind

Depth where Grass: a. Begins -
b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

16 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-67

County: Island Locality: just north of Saxon Pt., Admiralty Bay, west side of Whidbey Island

Lat.: 48°04'09" N. Long.: 122°36'07" W.

Diver: R. C. Phillips Accompanied by: G. Gee

Equipment Used: Snorkel Air Consumption: a. ____ b.

Maximum Depth: 18 feet Duration: ½ hour. Visibility: see bottom in 20 feet.

Water Transparency: clear. Water Temperature: a. Surface - 12.0°C. b. Bottom - same at bottom

Air Temperature: 22°C. Bottom Type: muddy sand Dominant Plant Cover: Narcoseptis, algae

Moon Phase: 2 days after LQ Tide: slack high tide

Current Speed: - at end of dive was at least a 2 knot current - ebb.

Water Salinity: a. Surface - 29.4‰ b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1315-1345 Weather Conditions: clear, 15 mph NW wind

Depth where Grass: a. Begins - 12 feet b. Ends - 18 feet.

Small patches of Zostera in 18 feet deep - at nearshore edge of Narcoseptis growth. Patches small and scattered. Leaves 8-10 mm. wide, to 4 feet long. Abundantly flowering - flowering stalks to 5 feet long. Spathes extremely large - stigmas exerted.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for day

HHT - 2339 - 8.6 feet

LHT - 1350 - 6.6 feet

HLT - 1727 - 5.1 feet

LLT - 0648 - -0.2 feet

Tidal data for area

Mean tidal range - 5.6 feet

Diurnal tide range - 8.8 feet

Mean tide level - 5.3 feet

at time of visit - 1330 - water level was 6.6 feet

at or below LLLW.

No growths of any kind - just these developing seedlings. Evidence of colonization of a new area by seeds.

Seedstill

Inshore of this depth are scattered plants of Zostera - probably arose from seed - just single plants or one terminal plant with two branches. Plants small - leaves 3-4 mm. wide, to 11 inches long. Very short rhizomes are crooked

16 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-68

County: Island Locality: just south of Rush Pt., west side of Whidbey Island.

Lat.: 48°02'00" N. Long.: 122°36'03" W.

Diver: Ronald C. Phillips Accompanied by: J. Lee

Equipment Used: Snorkel Air Consumption: a. b. X

Maximum Depth: 25 feet Duration: 20 minutes Visibility: see bottom in 25 feet

Water Transparency: clear Water Temperature: a. Surface - 12.0°C. b. Bottom - same

Air Temperature: 22°C. Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: 2 days after LQ Tide: ebb

Current Speed: little observed

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1525-1545 Weather Conditions: clear, 15 mph NW wind

Depth where Grass: a. Begins - 9 feet b. Ends - 25 feet

Closest water in Puget Sound I have encountered.

Best grass bed I have seen in all of Puget Sound.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal Data for Data

HHT - 2345 - 9.2 feet

LHT - 1356 - 7.1 feet

HLT - 1749 - 5.2 feet

LLT - 0640 - -0.1 ft

Tidal Data for Area

Mean tide range - 6.0 feet

Diurnal tide range - 9.4 feet

mean tide level - 5.6 feet

at time of visit water level was 5.8 ft below MLLW (+15.4')

1. Start is 9 feet - leaves 5-8 mm. wide, up to 18 inches long. No flowers seen. Patchy but large patches.

all in zone below LLLW (according to my calculations).

2. 10-25 feet - plants continuous in a swath - abundantly flowering. Stalks 6-7 feet long. More flowers than vegetative plants (or so it seems). Most terminal blants

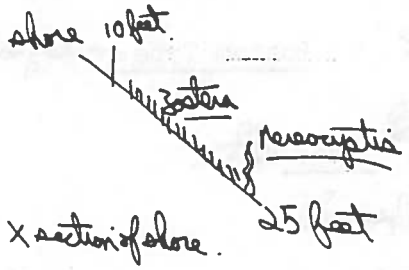
D-68

Say on bottom – leaves form a wall like a forest. Plants extremely dense – possibly 30-40 / ft.²

A continuous band of plants from 10 yards to about 50 yards offshore. Leaves very wide and long. ~~Stigmas~~ spotted on flowers.

Anthers on all leaves – large and dense.

Halodule and Syringodium abundant.



1. Seems to be a peak in flowering abundance !!
2. Many flowering spathes with anthers spent and already disintegrated off – anthers disintegrate off spathes when they are spent.
3. Many spathes with developing seeds – anthers off and ovaries greatly enlarged – plants well below LLLW – 15-25 feet deep.

16 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-69

County: Island Locality: off Austin, Mutiny Bay, west side of Whidbey Island.

Lat.: 47°59'06" N. Long.: 122°32'05" W.

Diver: No dive. Accompanied by: ———

Equipment Used: observation Air Consumption: a. b. X

Maximum Depth: ~~surface~~ 15 feet Duration: 15 minutes Visibility: see bottom from surface in 15 fee

Water Transparency: somewhat murky Water Temperature: a. Surface - b. Bottom - X

Air Temperature: 22°C. Bottom Type: muddy sand Dominant Plant Cover: Zosters

Moon Phase: 2 days after LQ Tide: ebb

Current Speed: none

Water Salinity: a. Surface - b. Bottom - X Water pH: a. Surface - Bottom - X

Time in Water: 1500-1515 Weather Conditions: clear, 15 mph. NW wind.

Depth where Grass: a. Begins - 9 feet b. Ends - 15 feet (may have been deeper

1. In 9-11 feet - plants with leaves 5-8 mm. wide, to 3 ft. long. Many flowers. In large patches, continuous growth in some spots.

2. In 15 feet grass continuous - leaves 8-10 mm. wide, to 5½ ft long. Not many flowering stalks seen.

A massive amount of Zosters in Mutiny Bay.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for bay and Tidal data for area see D-68

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-70

County: Island Locality: Penn Cove, east side of Whidbey Island, Washington

Lat.: 48°14'03" N. Long.: 122°41'09" W.

Diver: No dive Accompanied by: —

Equipment Used: Observation Air Consumption: a. X b.

Maximum Depth: 6 feet Duration: — Visibility: 6 feet

Water Transparency: very murky Water Temperature: a. Surface - b. Bottom -

Air Temperature: Bottom Type: muddy sand - soft Dominant Plant Cover: Zostera

Moon Phase: slightly midway between LQ and NM Tide: flood

Current Speed: little observed

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom -

Time in Water: 1125 Weather Conditions: partly cloudy - 15 mph west wind.

Depth where Grass: a. Begins - 18 inches b. Ends - observations ended in 6 feet

1. Zostera started in 18 inches - leaves 5-8 mm. wide, to 8 inches long. In small patches. No flowers seen.

2. Dense plants in large patches in 5-6 feet loop. Leaves 8-10 mm. wide, to 4 feet long - abundantly flowering.

Cyanea very abundant - almost a bloom.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for Day

HHT - 0032 - 11.5 feet
LHT - 1514 - 10.2 feet
HLT - 1959 - 6.6 feet
LLT - 0753 - 1.2

Tidal data for area

Mean tidal range - 7.8 feet
Diurnal tidal range - 11.5 feet
mean tide level - 6.7 feet

at time of visit water level was 3.9 feet above MLL

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-71

County: Island Locality: North Bluff, east side of Whidbey Island, Washington

Lat.: 48°07'08" N. Long.: 122°33'07" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. b. X

Maximum Depth: to 8 feet Duration: X Visibility: to 3 feet.

Water Transparency: very murky Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: between 1Q and NM Tide: flood

Current Speed: X

Water Salinity ‰ a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1200 Weather Conditions: partly cloudy, 15 mph W wind

Depth where Grass: a. Begins - X b. Ends -

Zostera in 8 feet deep. Leaves 8-10 mm. wide, to 4 feet long. No flowers seen. Grass dredged up.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

For tidal data see D-70.

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-72

County: Island Locality: South side of Dugualla Pt., Holmes Harbor, east side of Whidbey Island, Washington

Lat.: 48°04'05" N. Long.: 122°32'07" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. X b.

Maximum Depth: 0 feet Duration: X Visibility: 6-7 feet

Water Transparency: very turbid Water Temperature: a. Surface - 16.2°C. b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: None

Moon Phase: between LQ and NM Tide: flood

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - X Water pH: a. Surface - X Bottom -

Time in Water: 1230 Weather Conditions: partly cloudy - 15 mph W. wind

Depth where Grass: a. Begins - X b. Ends - X

No grass by dredging.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-73

County: Island Locality: Just north of Lowell Pt., west side of Camano Island, Washington

Lat.: 48°07'08" N. Long.: 122°30'03" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. X b.

Maximum Depth: 15 feet Duration: X Visibility: see bottom from 7 feet

Water Transparency: murky Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: rocky Dominant Plant Cover: Ulva and Enteromorpha

Moon Phase: midway between 1Q and NM Tide: flood

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1320 Weather Conditions: Partly cloudy, 15 mph W wind

Depth where Grass: a. Begins - No grass b. Ends -

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-74

County: Island Locality: Smuck Pt., North west tip of Camano Island, Washington

Lat.: 48°15'00" N. Long.: 122°31'08" W.

Diver: Nodine Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. X b.

Maximum Depth: 12 feet Duration: X Visibility: ~~ 7 feet.

Water Transparency: very murky Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: rocky Dominant Plant Cover: None.

Moon Phase: midway between LQ and NM. Tide: flood.

Current Speed: X

Water Salinity: a. Surface - X b. Bottom -

Water pH: a. Surface - X Bottom - X

Time in Water: 1400

Weather Conditions: partly cloudy - 15 mph W wind.

Depth where Grass: a. Begins - b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-75

County: Locality: just east of Polnell Pt., east side of Whidbey Island, Washington

Lat.: 48°16'08" N. Long.: 122°33'01" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. X b.

Maximum Depth: 17 feet Duration: X Visibility: Only see 7 feet down

Water Transparency: very murky Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: rocky to 15 feet muddy sand on out Dominant Plant Cover: None

Moon Phase: midway between LQ and NM Tide: flood

Current Speed: over 2 knots - very strong

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1425 Weather Conditions: partly cloudy - 15 mph W wind

Depth where Grass: a. Begins - b. Ends -

No grass

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-76

County: Snohomish-Skagit Locality: Skagit Bay mud flats, just north of West Pass, north of Stanwood.

Lat.: 48°17'05" N. Long.: 122°23'09" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. X b.

Maximum Depth: 6 feet Duration: X Visibility: Only see 3 feet down

Water Transparency: very murky Water Temperature: a. Surface - 17.2°C. b. Bottom - X

Air Temperature: X Bottom Type: gray sandy clay Dominant Plant Cover: Juncus and a sedge - and a green alga

Moon Phase: midway between LQ and NM. Tide: flood

Current Speed: X

Water Salinity: a. Surface - 5.7‰ b. Bottom - X Water pH: a. Surface - X Bottom - X

Time in Water: 1455-1500 Weather Conditions: Partly cloudy, 15 mph W wind

Depth where Grass: a. Begins - No Zostera b. Ends -

6 feet deep over flat over a wide area. Juncus and a sedge from land down into water and submerged even flowers of plants submerged.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-77

County: Skagit Locality: SE tip of Ika Island, off North fork of Skagit River, Washington

Lat.: 48°21'06" N. Long.: 122°29'08" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. X b.

Maximum Depth: 5 feet. Duration: X Visibility: only see 5 ft. down

Water Transparency: very murkey Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: gray sandy clay Dominant Plant Cover: Juncus

Moon Phase: midway between 1Q and FM Tide: flood

Current Speed: X

Water Salinity: a. Surface - 10.1‰ b. Bottom - X Water pH: a. Surface - X Bottom -

Time in Water: 1530 Weather Conditions: partly cloudy, 15 mph W wind

Depth where Grass: a. Begins - b. Ends - No Zostera

Juncus from shore on out to completely submerged over a wide area.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-78

County: Island Locality: in Smith Bay, Hidalgo Island - west shore.

Lat.: 122°34'05" N. Long.: 48°26'03" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. X b.

Maximum Depth: 14-16 feet Duration: X Visibility: only see 5 feet down

Water Transparency: very murky Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: mixed rocky and muddy sand Dominant Plant Cover: tremendous s Laminaria - 10-12 feet Nereocystis, large ones

Moon Phase: midway between LQ and NM. Tide: [redacted] ebb

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1610 Weather Conditions: partly cloudy - 15 mph W wind

Depth where Grass: a. Begins - X b. Ends -

Few seedlings of Zostera at 14-16 feet. Leaves 3-5 mm. wide, to 11 inches long

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day

HHT - 0054 - 11.0 feet
LHT - 1536 - 9.7 feet
HLT - 2045 - 6.6 feet
LLT - 0839 - -1.2 feet

Tidal data for area

Mean tidal range - 7.3 feet
Diurnal tidal range - 11.2 feet
Mean tide level - 6.4 feet

at time of first water level was 9.8 feet above MLLW

17 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-79

County: Island Locality: Just south of Pt. Hoypus, north east tip of Whidbey Island, Washington

Lat.: 48° 24' 05" N. Long.: 122° 35' 09" W.

Diver: No diving Accompanied by: X

Equipment Used: Observation and dredging Air Consumption: a. b. X

Maximum Depth: 10-12 feet Duration: X Visibility: only see 5 feet down

Water Transparency: very murky Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: midway between LQ and NM Tide: ebb

Current Speed: none observed

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1620 Weather Conditions: Partly cloudy, 15 mph W wind.

Depth where Grass: a. Begins - b. Ends -

Zostera common - leaves 5-8 mm. wide, up to 18 inches long. No flowers seen.

Plants between MLLW and LLLW.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

For tidal data see D-78

at time of visit water level was 9.8 feet above MLLW

18 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-80

County: Jefferson Locality: Between Pt. Wilson and Pt. Hudson, near Port Townsend, Washing

Lat.: 48°07'08" N. Long.: 122°45'05" W.

Diver: R.C. Phillips Accompanied by: Jerome Lee

Equipment Used: Snorkel Air Consumption: a. X b.

Maximum Depth: 20 feet Duration: 45 minutes Visibility: 14 feet

Water Transparency: murky Water Temperature: a. Surface - 12°C. b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: NM - 2 days before Tide: flood

Current Speed: a little current

Water Salinity: a. Surface - 30.8 ‰ b. Bottom - X Water pH: a. Surface - X Bottom - X

Time in Water: 1005 - 1050 Weather Conditions: foggy, almost no wind

Depth where Grass: a. Begins - 1 foot b. Ends - as deep as we went was 20 feet.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for Day

HHT - 0011 - 8.5 feet

LHT - 1545 - 8.0 feet

HLT - 1936 - 6.3 fee

LLT - 0748 - -1.9

Tidal Data for area

Mean tide range - 5.3 fee

Diurnal tide range - 8.6

Mean tide level - 5.2 feet

1. Solid Zostera from almost low tide line to 20 feet deep - stretches a long way offshore. This is a broad shallow flat. Leaves inshore up to 5 feet long, 10-12 mm. wide, abundantly flowering.

2. Over 8 feet deep leaves were up to 6 feet long no flowers seen. Plants in vegetative interval. Flowering probably all over.

Plants on flat exceedingly dense - could not see bottom through the [illegible] long leaves

At time of visit - 1045 - water [illegible] at about MLLW

D-80

I never did get to the offshore limit of growth. It could not have been very much further out.

Grass with much diatom growth on it – appears very dirty.

Cyprea abundant.

Gorgonians almost in bloom proportions.

18 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington

Diving No.: D-81

County: Jefferson Locality: Mystery bay, north side, Kilisut Harbor, Marrowstone Island, Washington

Lat.: 48°03'05" N. Long.: 122°41'05" W.

Diver: No dive. Accompanied by: X

Equipment Used: observation Air Consumption: a. X b.

Maximum Depth: 3 ft. Duration: X Visibility: 3 feet.

Water Transparency: very turbid Water Temperature: a. Surface - X b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: N M - two days before Tide: flood

Current Speed: X

Water Salinity ‰ a. Surface - X b. Bottom - X

Water pH: a. Surface - X Bottom - X

Time in Water: 1155

Weather Conditions: foggy - no wind

Depth where Grass: a. Begins - 2 feet b. Ends - ?

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Added data for log

Dense zostera in 2 to 3 feet - extends deeper. Leaves in 2 to 3 feet - 5-8 mm. wide - ca. 2 feet long. No flowers seen.

Dense zostera all over north end of Kilisut Harbor.

18 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-82

County: Jefferson Locality: north side of Kala Pt., Quimper Peninsula, south of Port Townsend

Lat.: 48° 03'07" N. Long.: 122°46'03" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation Air Consumption: a. X
b.

Maximum Depth: 9 feet Duration: X Visibility: 9 feet

Water Transparency: very murky Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: zostera

Moon Phase: NM - two days before. Tide: flood.

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom -

Water pH: a. Surface - X
Bottom -

Time in Water: 1220 Weather Conditions: foggy - no wind.

Depth where Grass: a. Begins - 6 feet
b. Ends - ?

Zostera not dense - growth is patchy - not too abundant. Leaves 2½ feet long ca. 5-8 mm. wide.

Plants from 6-7 feet in zone between MLLW and LLLW.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.60 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal Data - see D-80

at time of visit water level was 4.0 feet above MLLW.

18 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-83

County: Jefferson Locality: Upper end of Oak Bay, west side; south of Indian Island.

Lat.: 48°00'07" N. Long.: 122°43'03" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation Air Consumption: a. X
b. X

Maximum Depth: 12 feet Duration: X Visibility: 12 feet.

Water Transparency: [illegible] Foggy Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: NM-2 days before Tide: flood

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1240 Weather Conditions: foggy - no wind

Depth where Grass: a. Begins - 2 feet
b. Ends - 12 feet - later

1. Grass in 2 feet with leaves 5-8 mm. wide - to 2 feet long. Plants scattered - growth patchy. Prevailed to 5 feet deep.

2. Over 5 feet deep - leaves 8-10 mm. wide - to 4-5 feet long. Growth also patchy - occasionally dense. Prevailed to 12 feet deep.

At 12 feet deep - the bottom drops off quickly.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for Day

HHT - 0030 - 9.2 feet
LHT - 1604 - 8.7 feet
HLT - 2009 - 6.3 feet
LLT - 0821 - -1.[illegible]

Tidal data for Area

Mean tide range - 6.0 feet
Diurnal tide range - 9.4 feet
Mean tide level - 5.6 feet

At 1240 water was 8.5 feet above MLLW.

18 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-84

County: Jefferson Locality: north side of Olele Pt., Quimper Peninsula

Lat.: 47°58'03" N. Long.: 122°41'03" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation Air Consumption: a. X
b.

Maximum Depth: 12-13 feet Duration: X Visibility: 12-13 feet

Water Transparency: Clear Water Temperature: a. Surface - 13°C.
b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: NM-2 days before Tide: flood

Current Speed: X

Water Salinity: a. Surface - 30.4‰
b. Bottom - X

Water pH: a. Surface - X
Bottom -

Time in Water: 255 Weather Conditions: foggy - no wind

Depth where Grass: a. Begins - 2 feet
b. Ends - ?

Growths inshore - dense continuous.

In 12-13 feet - leaves 8-10 mm. wide, to 3-4 feet long. Sparse.

Nereocystis common in 14 feet.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

18 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-85

County: Jefferson Locality: North of Nodule Pt., Marrowstone Island, Admiralty Inlet

Lat.: 48°02'02" N. Long.: 122°40'05" W.

Diver: Nodvin Accompanied by: X

Equipment Used: Observation Air Consumption: a. X
b. X

Maximum Depth: 17 feet Duration: X Visibility: 17 feet

Water Transparency: clear Water Temperature: a. Surface - 12°C.
b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: 2 days before NM. Tide: flood

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1320 Weather Conditions: sunny—no wind

Depth where Grass: a. Begins - 3 feet
b. Ends - can only see 17 feet

Zostera growth from 3-15 feet was dense and unbroken-continuous.

Leaves 8-12 mm. wide—to 6 feet long. Plants in vegetative interval.

A massive amount of plants.

Could not see bottom thru leaves.

At 17 feet—plants were sparse and scattered. Growth diminishing.

Quite a distance from shore—on a broad shallow flat.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

23 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-86

County: Kitsap Locality: Skunk Bay, between Foulweather Bluff and Norwegian Pt., Puget S

Lat.: 47° 55'06" N. Long.: 122°35'05" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation Air Consumption: a. X
b.

Maximum Depth: 15 feet Duration: X Visibility: 15 feet

Water Transparency: clear Water Temperature: a. Surface - 11.0°C.
b. Bottom -

Air Temperature: 15.2°C. Bottom Type: mudly sand Dominant Plant Cover: Zostera

Moon Phase: 3 days after NM Tide: ebb

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom -

Water pH: a. Surface - X
Bottom -

Time in Water: 0930 Weather Conditions: Partly cloudy, 20 mph NE wind

Depth where Grass: a. Begins - 5 feet
b. Ends - ? (see 15 feet).

1. Grass starts in 5 feet. On 5-7 feet leaves 3-5 mm. wide, to 15 inches long.

2. at 7-11 feet leaves 5-8 mm. wide, to 2 feet long. Growth dense in patches.

3. At 11 feet deeper - leaves 8-10 mm. wide, to 5 feet long. a few flowering stalks seen. Dense continuous growth.

Probably the peak of flowering is over.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for Day

HHT - 1920 - 10.95 feet

LHT - 0511 - 9.02 feet

HLT - 0018 - 5.24 feet

LLT - 1208 - -1.29 feet

Tidal data for area

Mean tidal range - 6.7 feet

Diurnal tidal range - 10.4 fe

Mean tide level - 6.1 feet

At time of visit the water level was 1.8 feet ... MLLW

23 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-87

County: Kitsap Locality: Across from Port Gamble, just south of Indian village - offshore of Hood Canal.

Lat.: 47°51'00" N. Long.: 122°34'01" W.

Diver: No diver Accompanied by: X

Equipment Used: Observation Air Consumption: a. X b.

Maximum Depth: 17 feet Duration: X Visibility: 17 feet.

Water Transparency: Clear Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: 3 days after NM Tide: eff

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 10:12 Weather Conditions: Partly cloudy, 20 mph NE wind

Depth where Grass: a. Begins - 6 feet b. Ends - ? (see 17 feet).

1. Grass starts at 6 feet. Leaves 5-8 mm. wide - to 18 inches to 2 feet long.
2. at 15 feet leaves 8-10 mm. wide, to 3 feet long. a few flowering stalks seen.

Growth continuous but not dense.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

For tidal data see D89.

At time of visit water level was 0.4 ft above MLLW.

23 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-88

County: Kitsap Locality: Salsbury Pt., Hood Canal ⇐ - right at Hood Canal Bridge

Lat.: 47°51'04" N. Long.: 122°36'03" W.

Diver: Nobody. Accompanied by: X

Equipment Used: Observation Air Consumption: a. X b.

Maximum Depth: 15 feet Duration: X Visibility: see 15 feet

Water Transparency: clear Water Temperature: a. Surface - X b. Bottom -

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: 3 days after NM Tide: ebb.

Current Speed: strong. Maximum ebb at 0909 - velocity predicted at 1.3 knots. At time of visit current was 1.17 k

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1030 Weather Conditions: Partly cloudy - 20 mph NE winds

Depth where Grass: a. Begins - 2 feet. b. Ends - ? (see 15 feet).

1. At 2 feet grass leaves - 4-5 mm. wide, to 12 inches long. Growth patchy.

2. 4 to 7 feet deep - leaves 5-8 mm. wide, to 2 feet long.

3. 7-15 feet deep - leaves 8-10 mm. wide, to 4 feet long. Dense continuous growth.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

For tidal data see D-89.

At time of visit the water level was 0 ft above MLLW. (water exactly at MLLW).

23 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-89

County: Jefferson Locality: just south of South Pt., Hood Canal

Lat.: 47°49'05" N. Long.: 122°42'00" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation Air Consumption: a. X b.

Maximum Depth: 10 feet Duration: X Visibility: to 10 feet

Water Transparency: clear Water Temperature: a. Surface - b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zosters

Moon Phase: 3 days after NM Tide:

Current Speed: X

Water Salinity: a. Surface - b. Bottom - X Water pH: a. Surface - Bottom - X

Time in Water: 1455 Weather Conditions: Partly cloudy, 20 mph NE wind.

Depth where Grass: a. Begins - exposed b. Ends - ? (see to 10 feet).

above MLLW. - Intertidal grass 3-5 mm. wide; to 11 inches long. Growth patchy. Just barely exposed.

At 10 feet - leaves 3-4 feet long; 8-10 mm. wide. Growth dense in patches.

Below LLLW

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day

HHT - 1919 - 10.83 feet

LHT - 0508 - 8.92 ft

HLT - 0017 - 5.19 feet

LLT - 1207 - -1.27

Tidal Data for Area

Mean tidal range - 6.7 feet

Diurnal tidal range - 10.3 ft

Mean tide level - 6.2 feet

at time of visit water level was

23 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-90

County: Kitsap Locality: Near (NE) Lone Rock, south of Hazel Pt., Hood Canal.

Lat.: 47°40'01" N. Long.: 122°45'03" W.

Diver: No dive Accompanied by: X

Equipment Used: Observation Air Consumption: a. X b.

Maximum Depth: 11 feet Duration: X Visibility: 11 feet

Water Transparency: slightly murky Water Temperature: a. Surface - 13.5°C. b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover:

Moon Phase: 3 days after NM Tide:

Current Speed: X

Water Salinity: a. Surface - X b. Bottom - Water pH: a. Surface - X Bottom -

Time in Water: 1125 Weather Conditions: Partly cloudy, 20 mph NE winds

Depth where Grass: a. Begins - 2 feet. b. Ends - ? (11 feet seen).

1. Zostera starts in 2 feet - to 8 feet: leaves 5-8 mm. wide - to 18 inches long. Growth continuous but not dense.

2. At 9-11 feet - leaves 8-10 mm. wide - to 2 feet long. Growth patchy and not dense.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

For tidal data see D-9

at time of visit water l was 0.8 feet belo MLLW.

23 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-91

County: Jefferson Locality: just north of Lokutaka Pt, Toandos Peninsula, Hood Can

Lat.: 47°41'08" N. Long.: 122°49'08" W.

Diver: Not a dive Accompanied by: X

Equipment Used: Observation Air Consumption: a. X
b.

Maximum Depth: 15 feet Duration: X Visibility: ~~very~~ 15 feet

Water Transparency: very clear Water Temperature: a. Surface - X
b. Bottom -

Air Temperature: X Bottom Type: rock and muddy sand Dominant Plant Cover: Sargassum

Moon Phase: 3 days after NM Tide: dead low (-1.3 feet).

Current Speed: X

Water Salinity: a. Surface - X
b. Bottom -

Water pH: a. Surface - X
Bottom -

Time in Water: 1255 Weather Conditions: Partly cloudy - 20 mph NE winds

Depth where Grass: a. Begins - 3 feet
b. Ends - 10 feet

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

For tidal data see D-92

Water level 1.3 feet below MLLW at 1255.

1. Zostera starts in 3 feet.

2. Zostera ends in 10 feet.

Growth not dense. It is patchy. No flowering stalks seen.

Bottom rock and muddy sand. From shore to 15 feet feet - Sargassum was extremely abundant. Plants 10-14 feet long (extend from bottom to surface). Sargassum dense - they shade out the light on the bottom.

23 July 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-92

County: Jefferson Locality: Duckabush, Hood Canal

Lat.: 47°39'00" N. Long.: 122°55'06" W.

Diver: Notnie Accompanied by: X

Equipment Used: Observation Air Consumption: a. X b. X

Maximum Depth: 12 feet Duration: X Visibility: 12 feet

Water Transparency: clear Water Temperature: a. Surface - 15.5°C. b. Bottom - X

Air Temperature: X Bottom Type: muddy sand Dominant Plant Cover: Zostera

Moon Phase: 3 days after NM Tide: low tide

Current Speed: X

Water Salinity: a. Surface - 28.8‰ b. Bottom - — Water pH: a. Surface - X Bottom - X

Time in Water: 1200 Weather Conditions: partly cloudy - 20mph NE winds

Depth where Grass: a. Begins - intertidal b. Ends - ? (only saw 12 feet).

1. Grass starts on shore at ~~[illegible]~~ a little above MLLW.

Some of this (the greater part) is ~~[illegible]~~ above MLLW.

Exposed grass to 3 feet deep - leaves 3-5 mm. wide, ~~to~~ 11 inches long. Growth dense, continuous. Bottom muddy - some sand. No flowers. A germinating seedling found in this zone. Seed still attached.

Approximately at MLLW line.

2. At 3 feet deep, leaves 5-8 mm. wide, to 30 inches long. Growth dense, continuous. Flowering stalks dense and abundant, flowers gone - seeds now developing on spathes.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Tidal data for day

HHT - 1933 - 12.2 feet

LHT - 0524 - 10.1 feet

HLT - 0037 - 5.8 feet

LLT - 1227 - -1.3 feet

Tidal data for area

Mean tide range - 7.8 feet

Diurnal tide range - 11.6 feet

Mean tide level - 6.8 feet

At time of visit water level was 1.2 [illegible]

8 August 1963

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-93

County: Island Locality: Partridge Pt., west side of Whidbey Island, West Beach.

Lat.: 48°14'095" N. Long.: 122° 46' 00" W.

Diver: R.C. Phillips Accompanied by: J. Gee

Equipment Used: SCUBA Air Consumption: a. X
b. X

Maximum Depth: 25 feet Duration: 1 hour 15 min. Visibility: Ca. 15 feet.

Water Transparency: somewhat murky Water Temperature: a. Surface -
b. Bottom -

Air Temperature: X Bottom Type: rocky-coarse sand Dominant Plant Cover: Phyllospadix scouleri + algae.

Moon Phase: 3 days after FM Tide: outgoing

Current Speed: none.

Water Salinity: a. Surface - X
b. Bottom - X

Water pH: a. Surface - X
Bottom - X

Time in Water: 1000-1115

Weather Conditions: clear - 10 mph NW wind

Depth where Grass: a. Begins - 2 feet
b. Ends - 20 feet.

Marine Soil Texture: (weight in grams)

22.6 mm. -
16.0 mm. -
11.2 mm. -
8.00 mm. -
5.66 mm. -
4.00 mm. -
2.83 mm. -
2.00 mm. -
1.41 mm. -
1.00 mm. -
0.707 mm. -
0.500 mm. -
0.354 mm. -
0.250 mm. -
0.177 mm. -
0.125 mm. -
0.088 mm. -
0.063 mm. -
0.044 mm. -

Tidal data for day

HHW - 1901 - 7.5 feet
LHW - 0504 - 6.05 f
HLW - X
LLW - [redacted] - 0.4
1135

Tidal Data for Area -

Mean tide range - 4.5 fee
Diurnal tide range - 7.
Mean tide level - 4.7 f

Phyllospadix scouleri extremely abundant, dense, and robust. Plants most dense in water 4-16 feet. Plants peter out at 20 feet. No → flowers seen. ? inflorescences seen - just seeds - no real flowers [redacted] left.

Growth - from MLLW to 20 feet below (roughly).

One small group of dwarf plants at 2 feet deep.

at time of visit - 1045 - water level

Put on Map

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

D-94

State: Washington Diving No.:

County: Island Locality: Still Beach - just above West Beach. Whidbey Isl

Lat.: N. Long.: W.

Diver: R.C. Phillips Accompanied by:

Equipment Used: SCUBA Air Consumption: a.
b.

Maximum Depth: 15 feet Duration: Visibility:

Water Transparency: Water Temperature: a. Surface -
b. Bottom -

Air Temperature: Bottom Type: Dominant Plant Cover:

Moon Phase: Tide:

Current Speed:

Water Salinity ‰ a. Surface - Water pH: a. Surface -
b. Bottom - Bottom -

Time in Water: Weather Conditions:

Depth where Grass: a. Begins - 10 feet
b. Ends - 15 feet

Depth at - 2 feet.

Zostera marina occasional. Ik

flowering stem.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

Put on Map

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-75

County: Island Locality: Camet Bay extreme north end of Whidbey Island.

Lat.: N. Long.: W.

Diver: R. C. Phillips Accompanied by:

Equipment Used: Air Consumption: a.
b.

Maximum Depth: Duration: Visibility:

Water Transparency: Water Temperature: a. Surface -
b. Bottom -

Air Temperature: Bottom Type: Dominant Plant Cover:

Moon Phase: Tide:

Current Speed:

Water Salinity ‰ a. Surface -
b. Bottom -

Water pH: a. Surface -
Bottom -

Time in Water: Weather Conditions:

Depth where Grass: a. Begins - MLLW
b. Ends - ?

Zostera Marina - out of water

Tide - 2 feet.

Last dense patch of Z. marina.

Leaves up to 15-20 in. long.
4-5 mm. wide.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-77

County: Locality: Kitsap Memorial State Park, Hood Canal

Lat.: N. Long.: W.

Diver: Observation Accompanied by:

Equipment Used: Air Consumption: a.
b.

Maximum Depth: to 4 ft. Duration: Visibility:

Water Transparency: Water Temperature: a. Surface -
b. Bottom -

Air Temperature: Bottom Type: Dominant Plant Cover:

Moon Phase: Tide: -3.5 ft.

Current Speed:

Water Salinity: a. Surface - Water pH: a. Surface -
b. Bottom - Bottom -

Time in Water: Weather Conditions:

Depth where Grass: a. Begins - ½ ft deep. Marine Soil Texture: (weight in grams)
b. Ends - ? - Observed it to 4 ft. deep

Zostera marina patchy. Leaves 3 mm. wide; to 3-3½ ft. long. Stigmas out, ebracted. Flowering plants sparse.

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-

DIVING LOG SHEET

DEPARTMENT OF BOTANY

SEATTLE PACIFIC COLLEGE

State: Washington Diving No.: D-73

County: Locality: SW corner of Bowlsweather Bluff, at mouth of Hood Canal.

Lat.: N. Long.: W.

Diver: Accompanied by:

Equipment Used: Observation Air Consumption: a.
b.

Maximum Depth: Duration: Visibility:

Water Transparency: Water Temperature: a. Surface -
b. Bottom -

Air Temperature: Bottom Type: Dominant Plant Cover:

Zostera

Moon Phase: Tide: -0.5 ft

Current Speed:

Water Salinity: a. Surface -
b. Bottom -

Water pH: a. Surface -
Bottom -

Time in Water: Weather Conditions:

Depth where Grass: a. Begins - MLLW
b. Ends - over 5 ft. deep

Zostera marina - dense in large flat,
leaves 4-5 mm. wide in shallow
water, to 2 ft. long

Flowering plants absent -
stamens & pistils only.

Marine Soil Texture: (weight in grams)

22.6 mm.	-
16.0 mm.	-
11.2 mm.	-
8.00 mm.	-
5.66 mm.	-
4.00 mm.	-
2.83 mm.	-
2.00 mm.	-
1.41 mm.	-
1.00 mm.	-
0.707 mm.	-
0.500 mm.	-
0.354 mm.	-
0.250 mm.	-
0.177 mm.	-
0.125 mm.	-
0.088 mm.	-
0.063 mm.	-
0.044 mm.	-