ATTACHMENT F. KAYAK POINT REGIONAL PARK PRE-RESTORATION MONITORING REPORT

WSU Snohomish County Extension Beach Watchers
Report to the Snohomish Marine Resources Committee
June 2010

Kayak Point Pre-Restoration Monitoring

Background:
The Snohomish County Marine Resources Committee is fully engaged in determining restoration options for Kayak Point County Park, a process that has spanned three years at this point. In that time, WSU Beach Watchers and other community members have been trained and engaged in collecting high quality data at the beach to assess conditions. In order to determine how the beach may change with any restoration effort, WSU Snohomish County Extension Beach Watchers were contracted to complete pre-restoration monitoring, including:

- Collection of baseline data from 7.1.09 – 6.30.10
- Training and coordination of volunteers in monitoring efforts
- Data Management and Initial Assessment Report

Major partners included:
People For Puget Sound Staff: technical review, field support
Edmonds Community College LEAF School: Volunteers for sampling

Methods / Protocols Development:
As indicated in the September 2008 report to the Snohomish County Marine Resources Committee, method development occurred with qualified scientists and citizen science specialists familiar with Kayak Point County Park. Monitoring methodology was adapted from the March's Point Pre-Restoration Monitoring effort funded by the Skagit County Marine Resources Committee (2007). One monitoring addition that has occurred includes invertebrate and alga diversity and abundance surveys at given tide heights in each zone. This data has not yet been evaluated as the data is intended for WSU Beach Watcher use at this time.

Monitoring Goals**:** To create an elevation, intertidal vegetation and sediment baseline in the Kayak Point County Park prior to restoration so that change over time can be determined by repeat monitoring.
To record transect locations so they can be returned to in future years.

Data Results:
2009 data results are Attachment 1 (Substrate and Vegetation Charts) and Attachment 2 (Real Elevation Profiles). Attachment 3 is the raw data in an Excel Spreadsheet. A preliminary assessment of the shoreline zones follows.

Beach Characteristics:
Vegetation Coverage: Vegetation coverage on the beach was extremely limited. Bands of eelgrass, previously not recorded, were found in 2009 with lower tides. Green seaweeds, in particular Ulva sp. seemed to dominate the mid to low intertidal areas. Very little backshore vegetation was encountered. All herbaceous coverage was documents in the Transport and Deposition Zones were lawn.

Substrate: Overall, the beach seems to be low on large substrate types. Gravel and sand predominate throughout the entire beach. This has an impact on the invertebrates documented.

Elevation: Elevation was recorded both in the built environment of the park (lawn and asphalt) as well as the beach face. All beaches were downward sloping with no large changes in elevation recorded. Increases in elevation in backshore areas reflect log accumulations and can be correlated with substrate type data. Some transects bisected occasional clam digger holes in the mid to lower intertidal zones.

Zones:
There are no significant changes in zones from 2008 data.

Deposition Zone: The Deposition Zone seems to be dominated by gravel substrate in the higher intertidal with increasing amounts of sand descending the beach. Strikingly, there was no sediment larger than gravel in this zone. Transect D4 (just north of the public dock) was not surveyed in 2009. Driftwood was found in a 4-6 meter band along the entire zone. Green seaweeds predominated the intertidal vegetation community.

Transport Zone: The driftwood band began at the roadway on Transects T1 and T2, indicating the artificially constrained size of the backshore. Substrate diversity seemed to increase in the southern portion of this lower intertidal zone. Eelgrass was encountered at about .5 meters above sea level in T2 – more me be further lower the beach but sampling ended close to the subtidal zone.

Erosion Zone: The Erosion Zone is located at the base of the southern bluffs. Native herbaceous vegetation was found only in this zone. Clay was found in the upper intertidal / backshore where bluff failures had occurred in the recent past. Intertidal vegetation was less tin this zone than others. In 2008, sediment had been incorrectly identified as silt –2009 data confirms that the mid to low intertidal of the Erosion zone are almost entirely sand. Elevation mounds at the toe of the bluffs were due to piles of sediment that had yet to be distributed by long shore transport.

Volunteer Coordination:
12 WSU Beach Watchers and 5 non-Beach Watchers were trained on June 16, 2010 in monitoring methodology. The training agenda and volunteer instructions are Attachments 4 and 5.

In total, 20 individuals will have participated in the contract period individuals participated in monitoring on six different monitoring dates during low tides in July and August. Approximately 150 volunteer hours went into the monitoring effort.

Two team leaders were recruited from the 2009 season and will be are currently taking a leadership role in staffing the monitoring days and being technical resources.

Volunteers Who Will or Have Participated in Kayak Point Survey in contract period:
WSU Beach Watchers

Fran Van Roekel	Tom Murphy	Judi Schwarz	Lin Folsom (Skagit)	Jim O'Neill
Craig Wollam	Fred Giorgi	Mary Harmann	Pat Smith	Becci Oxner
Lucinda Diann	Leslie Raphael	Lynn McCort	Bob Overstreet	April Bosley

Non-WSU Beach Watchers

18 LEAF School Students	Sandy Evans	Charlene Schwartz	Tom Carter

Recommendation for Future Monitoring:
Data Analysis: The data are rich and are being under-utilized. WSU Snohomish County Extension has made an initial inquiry to Washington Sea Grant to assist in finding graduate students or faculty member who could better evaluate the data sets. This is a high priority to pursue.

Monitoring Frequency: The schedule of monitoring should be evaluated since restoration is likely not to occur until three years, at a minimum. Extension staff will consult with project technical advisors to determine what level of monitoring should be maintained to sustain a robust data set and allow for other work to take place with the limited funding available.

Data Management: Currently, all data is being held annual Excel Workbooks. A database could be developed to maintain multiple year data sets and generate appropriate reports with great ease.

Conclusion:

This project has been an extremely positive, efficient partnership between the Snohomish County Marine Resources Committee, WSU Beach Watchers, Edmonds Community College LEAF School and People for Puget Sound. A solid baseline of existing conditions has been collected for two years, with a third season underway. A core team of WSU Beach Watchers has gained proficiency in the monitoring methodology and team leadership has developed. In the end, land managers and researchers will be able to determine the impacts of nearshore restoration efforts at Kayak Point County Park. It is appropriate to review the status of the monitoring effort at this time and focus on data management and assessment improvements.

Kayak Point Monitoring Instructions
June 2008

Monitoring Goals: To create an elevation, intertidal vegetation and sediment baseline in the Kayak Point County Park prior to restoration so that change over time can be determined by repeat monitoring. To record transect locations so they can be returned to in future years.

Team Equipment:
Stadia Rod, Transit Tripod and Transit Box
Quadrat
Two clipboards
Pencils and Pencil sharpeners
Surveyor Data Forms
Substrate / Vegetation Data Forms
Pebble County Surveys
Clear ruler
Site Maps and Narrative Descriptions
50 m tape measure
Compass
Bucket
Digital Camera, Photo Record Forms and Marker

Team Members
Up to two Surveyors
Stadia Rod Operator
Up to two vegetation / sediment monitors
One Photographer

Two Teams Can Work on Each Day!

Personal Gear: Recommended
Weather Appropriate Clothing (Hats, raingear, sunglasses)
Water and Refreshments for 4 hours.
Camping Stool or Knee Pads
Sunscreen
Field Guides and Binoculars (optional)

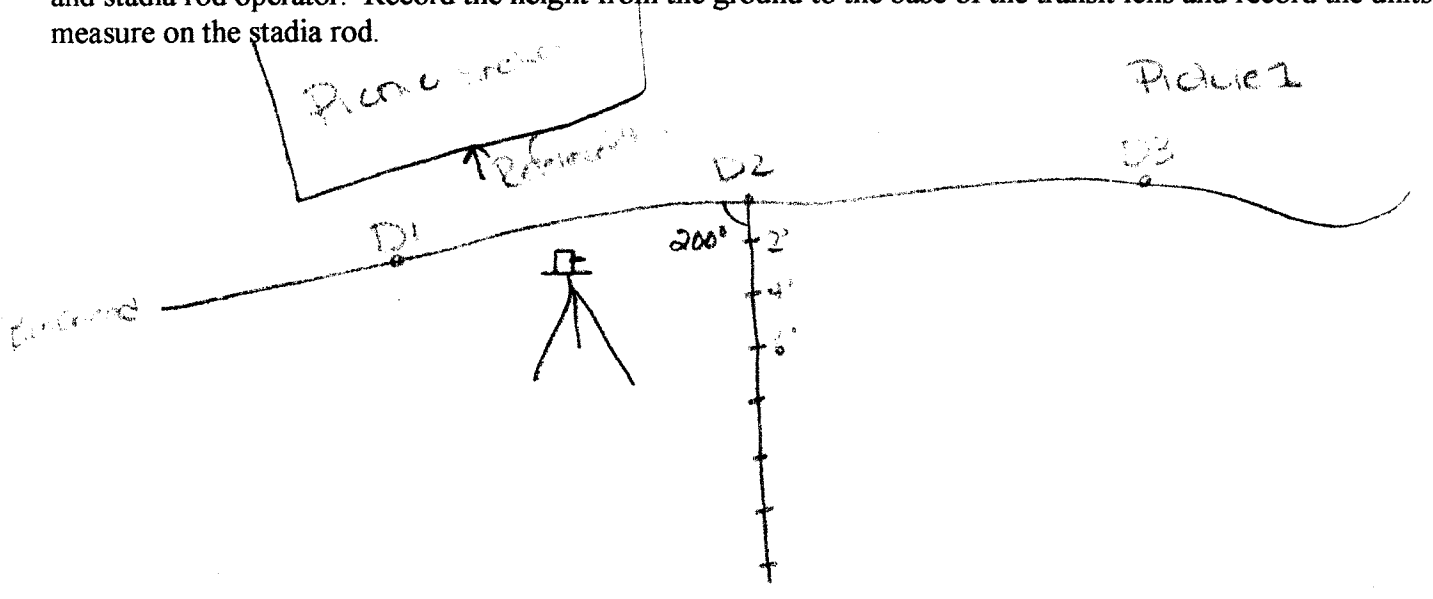
ELEVATION SURVEYS:

Finding the Transect Start Point.

Review the maps and site descriptions and identify your assigned transects and the relevant benchmarks on the map. Locate the start part for the first transect. All transects run from the backshore or landscaped park grounds, perpendicular to the beach, towards the water.

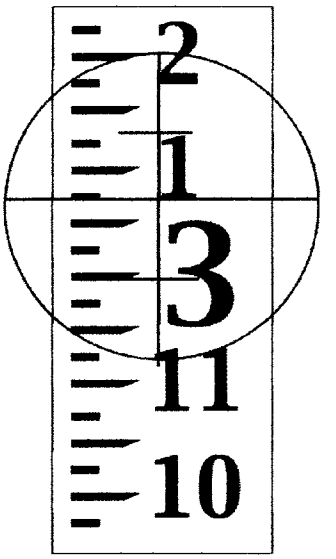
Setting Up the Transit:

Look for a transit location where it can be easily visible by as many transects as possible, situated *above* the entire transect terrain (see Picture 1). As beaches typically slope down towards the waters edge, this area will be towards the backshore area. Set the tripod legs up, making sure the foot pads have been pushed into the ground so the tripod is stable and secure. Raise the legs so the tripod is set up at a height comfortable for the shortest Surveyor. Level the tripod, adjusting one leveler at a time. Agree on hand signals between surveyor and stadia rod operator. Record the height from the ground to the base of the transit lens and record the units of measure on the stadia rod.



Taking an Elevation Reading:

Surveyor: Use the Optical Peep Sight (view finder) on the top of the transit to find the stadia rod in the distance – it will be blurry! The number recorded is found by lining up the rod with the middle cross hair in the view finder (see Picture 2). Use the focus dials to bring the scope into focus.



This reading would be 3ft 5 8in

The surveyor communicates to the stadia rod operator if the rod needs to be held more upright. The elevation reading is then recorded on the Surveyor's Sheet, along with the transect number and location on tape measure.

Important note for Surveyors! Leaning on the transit can drive it deeper into the ground without you noticing!

Stadia Rod Operator: He or she places the rod at 2 meter intervals along the transect, obvious changes in elevation or reference point locations. The rod should be held at the level of the ground and not allowed to sink into the substrate. Place the rod at the two meter intervals where ever they fall (on a log or rock is fine). When you decide to measure at an elevation change, communicate the distance on the transect to the Surveyor. The rod needs to be held straight up and down: a small hand-held level is pressed against the side of the rod to assist with this. Once the Surveyor gives the sign, move to the next elevation reading.

Documenting Reference Points

Reference Points allow us to return to the same transects again and again. The first measurements should be elevation reading, compass bearings and distance to the benchmarks indicated by staff. Be sure to place the stadia rod exactly at the reference point noted in the narrative descriptions. Measure the distance between the reference points and the transect start point as well as documenting compass bearing TO the start point FROM the transit.

Recording Transect Elevations:

1. Once the reference points are noted, lay out the tape measure using the compass bearing for each transect noted in the narrative description. Record this under "Compass Bearing for Transect" at top of Surveyors Sheet. "0 meters" on the tape measure should begin at the backshore end of your transect. Record the Site Name, Date and Transect No. on the Form. Complete the checklist at the top of the "Surveyor's Sheet".

2. The Stadia Rod Operator walks only on the **right side** of the tape measure (when looking towards the water). Start measuring elevation at the 0' mark (the start point) on the transect. Record the distance on the Surveyor Form under "Station #". Record the elevation under "Rod Ht.". Proceed down the beach taking measurements every two meters or if when there is an abrupt change in elevation.

3. End the transect no sooner than 20 meters after the low-tide platform is entered. A change from gravel and cobble to very fine sediments and a less sloped beach are indicative of reaching the low-tide platform. If possible, survey into eelgrass beds. If substrate becomes too muddy to walking, end the survey and note reason on the Surveyor's Sheet. There are ghost shrimp beds at Kayak Point which can liquefy muddy or sandy substrate.

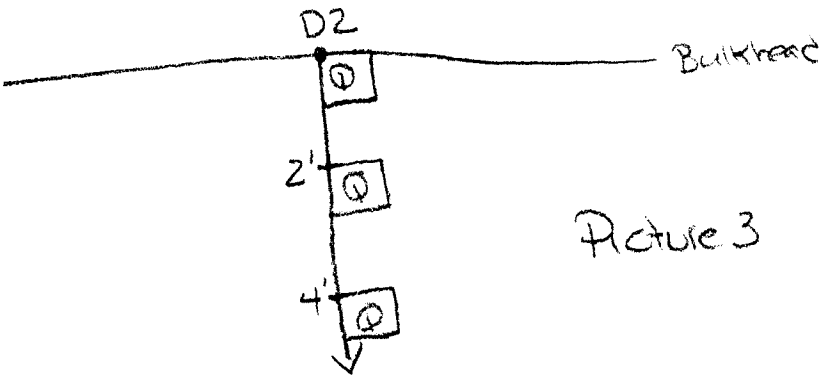
4. At the end of the transect (which can be underwater), complete the vegetation / substrate forms and pebble counts (if not done by other team members).

5. Retrieve all the equipment, check equipment list and move to next transect. If possible, leave transit where it is if all of the next transect can be viewed from the original location.

VEGETATION / SUBSTRATE SURVEY: *This is best done with a team of two people: one person to record the data and the other to do the actual assessment. It is a good idea to swap the roles once in a while as squatting on the beach for a long time can be very tiring.*

1. Recorder fills out the header information on the data form.

2. The Assessor places the quadrat every two meters along the transect, placing the top corner of the quadrat on the left side of the tape measure (See Picture 3 for a graphic depiction of where to place the quadrat). Be sure to walk on the **right side of the transect** (looking towards the water). Start at 0'. Record the distance on the form under "Transect Interval" for each quadrat.



Picture 3

3. At every place where the quadrat cords intersect and along the top edge of the quadrat, push down. This will give you 25 data points for substrate and 25 data points for vegetation at every station. Complete all the vegetation assessments first and then proceed to the substrate assessments. Note what sediment size and vegetation / seaweed your finger touches. In the box on the form that correlates physically with the quadrat box, record the vegetation / substrate type (using abbreviations provided in the 'Abbreviation Key'. Use the ruler to measure substrate at the median length of the rock.

SAMPLE Station: _12 meters___

vegetation

unv	unv	unv	brn	unv
unv	unv	unv	brn	brn
grn	unv	unv	unv	brn
Grn	grn	unv	unv	unv
grn	grn	grn	unv	unv

substrate

Bou	bou	mud	mud	mud
Bou	bou	gra	gra	Gra
Mud	mud	gra	gra	Gra
Mud	mud	mud	mud	gra
Mud	mud	mud	mud	mud

4. Move to the next station and repeat.

PEBBLE COUNT SURVEYS

Identify a high intertidal zone and a lower intertidal zone to the left of your transect. Each zone should be at least 100 square feet (10x by 10x – see Picture 3). You want to select an area that looks representative of the dominant conditions you see.

Walking in a spiral starting at the mid point of the zone, blindly reach down and measure whatever sediment you first touch (silt counts! Boulders count!). Record each millimeter measurement on the pebble count form. Record 100 pebble county measurements in each zone, being sure to record the transect and the zone (high intertidal or low intertidal) in the header. There are 100 boxes on the Pebble Count form, so fill them in and you are done!

PHOTO DOCUMENTATION

Photo documentation of transects, reference points and volunteers in action is very important! Staff will bring camera for all pictures to be taken on.

1. The first photo always taken each day is of the completed PHOTOGRAPHER'S RECORD. This box should be completed with pen or marker with site name, date, photographer name and camera type.

2. At each transect, take at least two pictures: One from the start point locating waterward and one from the water edge of the transect looking towards the start point. Record each shot on the Photo Description form. Use as many lines as needed to provide the location description. The location description should include a compass bearings TO a reference point and a narrative descriptive of where you are standing. Record the transect number and frame number. If you are taking volunteer action shots, record what ever information you can in the location description, but still record transect number and frame number.

3. Turn off the camera between uses and stow in the camera bag to protect it from sand / wind / rain.

Kayak Point Monitoring Instructions
June 2009

Monitoring Goals: To create an elevation, intertidal vegetation and sediment baseline in the Kayak Point County Park prior to restoration so that change over time can be determined by repeat monitoring. To record transect locations so they can be returned to in future years.

Team Equipment:
Stadia Rod, Transit Tripod and Transit Box
Several Quadrats
Two clipboards
Pencils and Pencil sharpeners
Surveyor Data Forms
Substrate / Vegetation Data Forms
Pebble County Surveys
Clear ruler
Site Maps and Narrative Descriptions
50 m tape measure and 100 ft. tape measure
Compass
Bucket
Digital Camera, Photo Record Forms and Quadrat Photo Labels
Hand lens
Species Lists

Team Members
Up to two Surveyors
Stadia Rod Operator
Up to two vegetation / sediment monitors
One Photographer
Up to three organism surveyors including one expert
Multiple Teams Will Work on Each Day!

Personal Gear: Recommended
Weather Appropriate Clothing (Hats, raingear, sunglasses)
Water and Refreshments for 4 hours.
Camping Stool or Knee Pads
Sunscreen
Field Guides and Binoculars (optional)

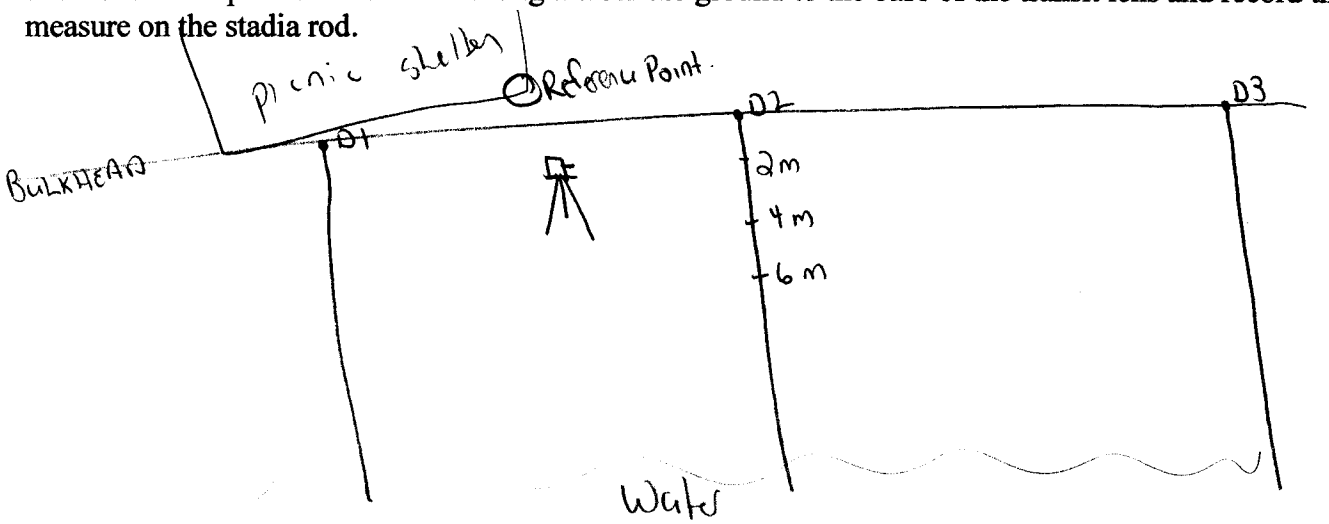
ELEVATION SURVEYS:

Finding the Transect Start Point.

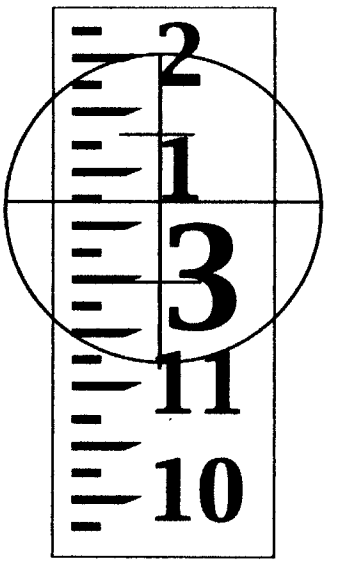
Review the maps and site descriptions and identify your assigned transects and the relevant benchmarks on the map. Locate the start part for the first transect. All transects run from the backshore or landscaped park grounds, perpendicular to the beach, towards the water.

Setting Up the Transit:

Look for a transit location where it can be easily visible by as many transects as possible, situated *above* the entire transect terrain (see Picture 1). As beaches typically slope down towards the waters edge, this area will be towards the backshore area. Set the tripod legs up, making sure the foot pads have been pushed into the ground so the tripod is stable and secure. Raise the legs so the tripod is set up at a height comfortable for the shortest Surveyor. Level the tripod, adjusting one leveler at a time. Agree on hand signals between surveyor and stadia rod operator. Record the height from the ground to the base of the transit lens and record the units of measure on the stadia rod.



Taking an Elevation Reading:
Surveyor: Use the Optical Peep Sight (view finder) on the top of the transit to find the stadia rod in the distance – it will be blurry! The number recorded is found by lining up the rod with the middle cross hair in the view finder (see Picture 2). Use the focus dials to bring the scope into focus.



This reading would be 3ft 5/8in

The surveyor communicates to the stadia rod operator if the rod needs to be held more upright. The elevation reading is then recorded on the Surveyor's Sheet, along with the transect number and location on tape measure.

Important note for Surveyors! Leaning on the transit can drive it deeper into the ground without you noticing!

Stadia Rod Operator: He or she places the rod at 2 meter intervals along the transect, obvious changes in elevation or reference point locations. The rod should be held at the level of the ground and not allowed to sink into the substrate. Place the rod at the two meter intervals where ever they fall (on a log or rock is fine). When you decide to measure at an elevation change, communicate the distance on the transect to the Surveyor. The rod needs to be held straight up and down: a small hand-held level is pressed against the side of the rod to assist with this. Once the Surveyor gives the sign, move to the next elevation reading.

Documenting Reference Points
Reference Points allow us to return to the same transects again and again. The first measurements should be elevation reading, compass bearings and distance to the benchmarks indicated by staff. Be sure to place the stadia rod exactly at the reference point noted in the narrative descriptions. Measure the distance between the reference points and the transect start point as well as documenting compass bearing TO the start point FROM the transit.

Recording Transect Elevations:
1. Once the reference points are noted, lay out the tape measure using the compass bearing for each transect noted in the narrative description. Record this under "Compass Bearing for Transect" at top of Surveyors Sheet. "0 meters" on the tape measure should begin at the backshore end of your transect. Record the Site Name, Date and Transect No. on the Form. Complete the checklist at the top of the "Surveyor's Sheet".

2. The Stadia Rod Operator walks only on the **right side** of the tape measure (when looking towards the water). Start measuring elevation at the 0' mark (the start point) on the transect. Record the distance on the Surveyor Form under "Station #". Record the elevation under "Rod Ht.". Proceed down the beach taking measurements every two meters or if when there is an abrupt change in elevation.

3. End the transect no sooner than 20 meters after the low-tide platform is entered. A change from gravel and cobble to very fine sediments and a less sloped beach are indicative of reaching the low-tide platform. If possible, survey into eelgrass beds. If substrate becomes too muddy to walking, end the survey and note reason on the Surveyor's Sheet. There are ghost shrimp beds at Kayak Point which can liquefy muddy or sandy substrate.

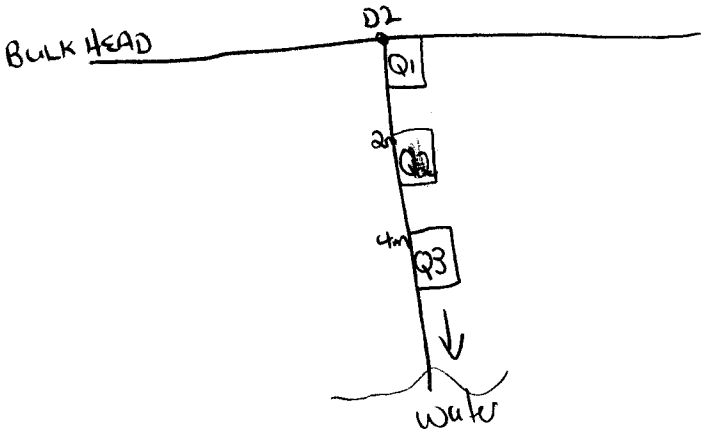
4. At the end of the transect (which can be underwater), complete the vegetation / substrate forms and pebble counts (if not done by other team members).

5. Retrieve all the equipment, check equipment list and move to next transect. If possible, leave transit where it is if all of the next transect can be viewed from the original location.

VEGETATION / SUBSTRATE SURVEY: *This is best done with a team of two people: one person to record the data and the other to do the actual assessment. It is a good idea to swap the roles once in a while as squatting on the beach for a long time can be very tiring.*

1. Recorder fills out the header information on the data form.

2. The Assessor places the quadrat every two meters along the transect, placing the top corner of the quadrat on the left side of the tape measure (See Picture 3 for a graphic depiction of where to place the quadrat). Be sure to walk on the **right side of the transect** (looking towards the water). Start at 0'. Record the distance on the form under "Transect Interval" for each quadrat.



3. At every place where the quadrat cords intersect and along the top edge of the quadrat, push down. This will give you 25 data points for substrate and 25 data points for vegetation at every station. Complete all the vegetation assessments first and then proceed to the substrate assessments. Note what sediment size and vegetation / seaweed your finger touches. In the box on the form that correlates physically with the quadrat box, record the vegetation / substrate type (using abbreviations provided in the 'Abbreviation Key'. Use the ruler to measure substrate at the median length of the rock.

SAMPLE Station: _12 meters___

vegetation

unv	unv	unv	brn	unv
unv	unv	unv	brn	brn
grn	unv	unv	unv	brn
Grn	grn	unv	unv	unv
grn	grn	grn	unv	unv

substrate

Bou	bou	mud	mud	mud
Bou	bou	gra	gra	Gra
Mud	mud	gra	gra	Gra
Mud	mud	mud	mud	gra
Mud	mud	mud	mud	mud

4. Move to the next station and repeat.

INTERTIDAL ORGANISM QUADRATS

1. In the first year, place a marker at the +1, 0 and -1 tide height on the middle transect of each zone, as the tide recedes. This will be determined by the time the tide is supposed to be at that height regardless of conditions. In subsequent years, the markers will be placed at the same place along the transect as the first year. Record the location (distance from start point) along the transect on the Organism Quadrat Form.

2. Set up a perpendicular organism transect at each tide height, extending 100 feet on the left hand side of the transect (when looking towards the water. Have the 0' measure on the south or west side of the sediment transect. Use the compass bearing on the Organism Quadrat Form for that zone, to be provided.

3. The Organism Surveyors will put out all nine quadrats as the tide allows, walking along the land side of the organism transects. Each quadrat tide height will have a quadrat placed at 5', 50' and 100', placing the top left corner at the tape measure.

4. Prior to evaluating the quadrat contents, remove debris, shells, and unattached seaweeds.

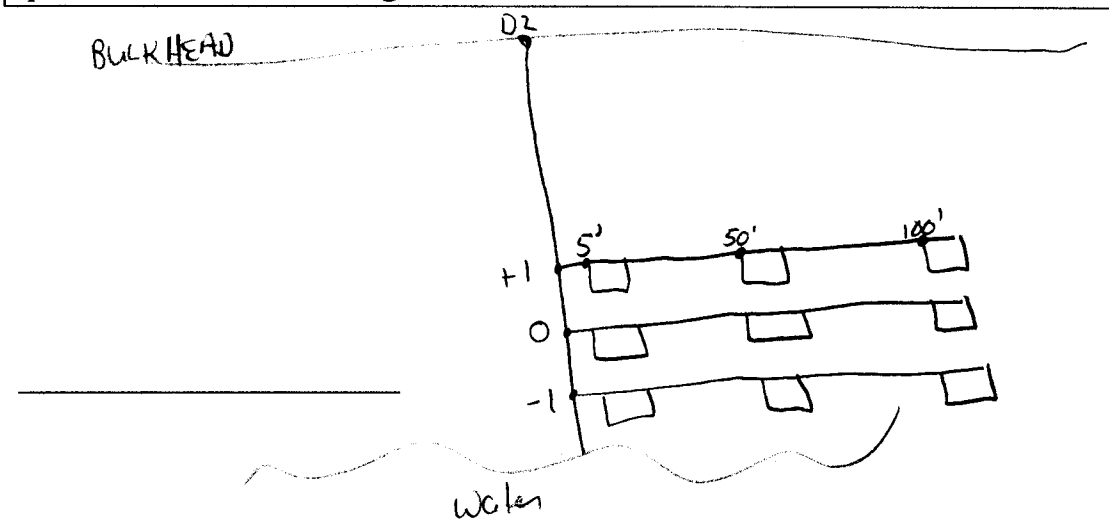
5. Photograph the quadrat with the appropriate quadrat identification card (DEP.O1.Q1) lying just outside and beside the quadrat. Record the photos on the Photo Record Form.

6. Record in the Quadrat Analysis Sections of the Field Data Sheet Side B all organisms to lowest taxonomic level possible. Refer to the EZ ID list (Form 5) of common seaweeds and invertebrates found at Beach Watcher sites, or to other identification guides for your area[1].

<u>For seaweeds and sea grasses:</u> Estimate the <u>percent</u> coverage of seaweeds & sea grasses. Estimating percent cover may be difficult if the plants or animals are sparsely scattered. Try to visualize how much area they would cover if they were packed close together. Other "helpers" for estimating percent cover, -use a card or piece of paper with a window cutout that is 25cm X 25cm (1% of the quarter meter quadrat). Have each team member estimate % cover, then record the average of the estimates.

<u>For invertebrates:</u> Record the number of each animal species when possible. For dense populations such as barnacles and mussels, or for colonial and aggregating animals such as sponges, bryozoans, compound ascidians and some species of anemones, record percent cover.

<u>Note:</u> On days when the lowest tide is –1.5 feet or higher, it is important to collect data at the – 1 foot transect level as soon as possible after the transect has been exposed, to give the team enough time to do a thorough job of identification. It may be necessary to temporarily stop the profile mapping, (make sure you flag the spot where you left off) and resume the profile just before low tide, then finish up with the 0 foot and +1 foot quadrats as the tide is coming in.



PEBBLE COUNT SURVEYS

Identify a high intertidal zone and a lower intertidal zone to the left of your transect. Each zone should be at least 100 square feet (10x by 10x – see Picture 3). You want to select an area that looks representative of the dominant conditions you see.

Walking in a spiral starting at the mid point of the zone, blindly reach down and measure whatever sediment you first touch (silt counts! Boulders count!). Record each millimeter measurement on the pebble count form. Record 100 pebble county measurements in each zone, being sure to record the transect and the zone (high intertidal or low intertidal) in the header. There are 100 boxes on the Pebble Count form, so fill them in and you are done!

PHOTO DOCUMENTATION

Photo documentation of transects, reference points and volunteers in action is very important! Staff will bring camera for all pictures to be taken on.

1. The first photo always taken each day is of the completed PHOTOGRAPHER'S RECORD. This box should be completed with pen or marker with site name, date, photographer name and camera type.

2. At each transect, take at least two pictures: One from the start point locating waterward and one from the water edge of the transect looking towards the start point. Record each shot on the Photo Description form. Use as many lines as needed to provide the location description. The location description should include a compass bearings TO a reference point and a narrative descriptive of where you are standing. Record the transect number and frame number. If you are taking volunteer action shots, record what ever information you can in the location description, but still record transect number and frame number.

3. At the organism transects, take a photo of each quadrat once the loose shells, seaweed, debris have been removed. Place the Quadrat Photo Label just outside the top left hand corner and take a picture looking down. Record the photos on the Photo Description Form. Take the Quadrat Photo Labels with you when you are done taking the photo.

4. Turn off the camera between uses and stow in the camera bag to protect it from sand / wind / rain.


Kayak Point
PEOPLE FOR PUGET SOUND
pugetsound.org
D1
D2
D3
7
D4
1
T1
6
T2
T3
5
E1
E2
E3
4
N
W
E
S
0
80
160
320
Feet
Approx. Reference Points
Legend
Profile monitoring stations

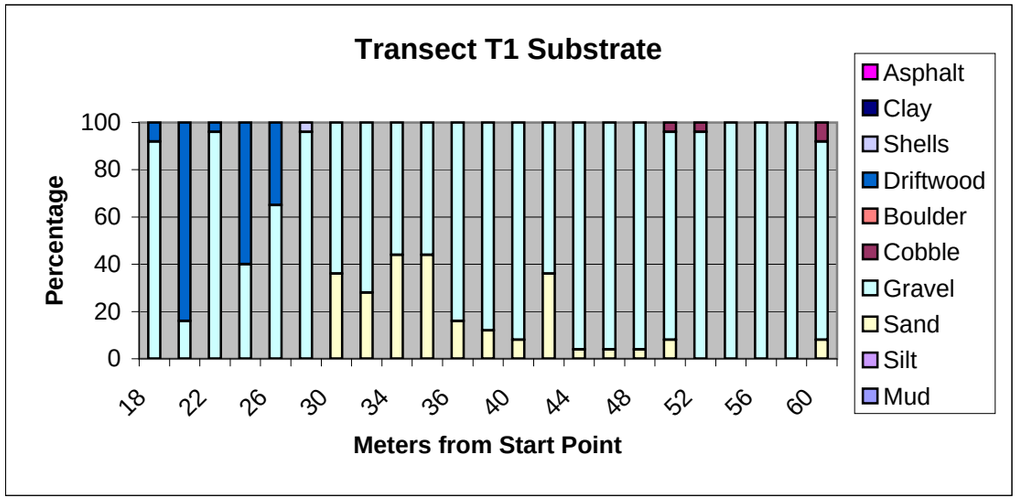

Kayak Point
PEOPLE FOR PUGET SOUND
pugetsound.org
D1
D2
D3
7
D4
1
T1
6
T2
T3
5
E1
E2
E3
4
N
W
E
S
0
80
160
320
Feet
Approx. Reference Points
Legend
Profile monitoring stations

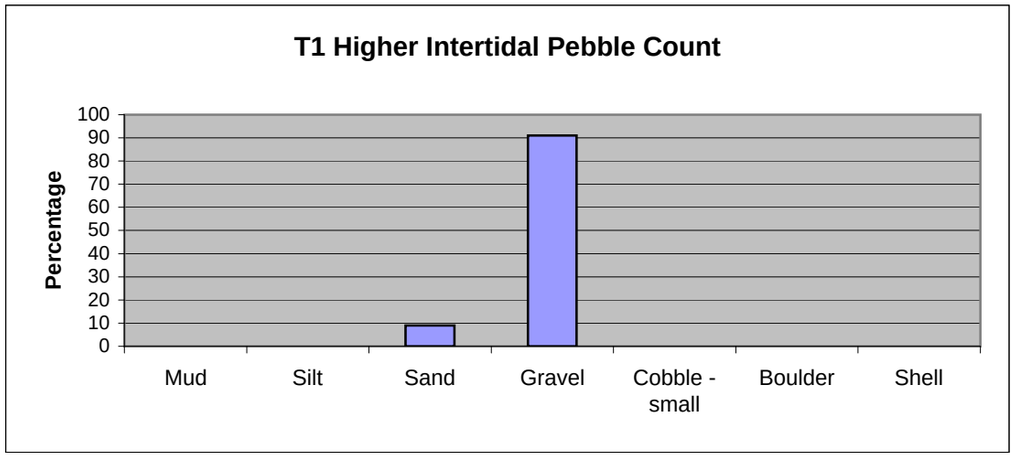
Kayak Pt beach profile monuments – South beach

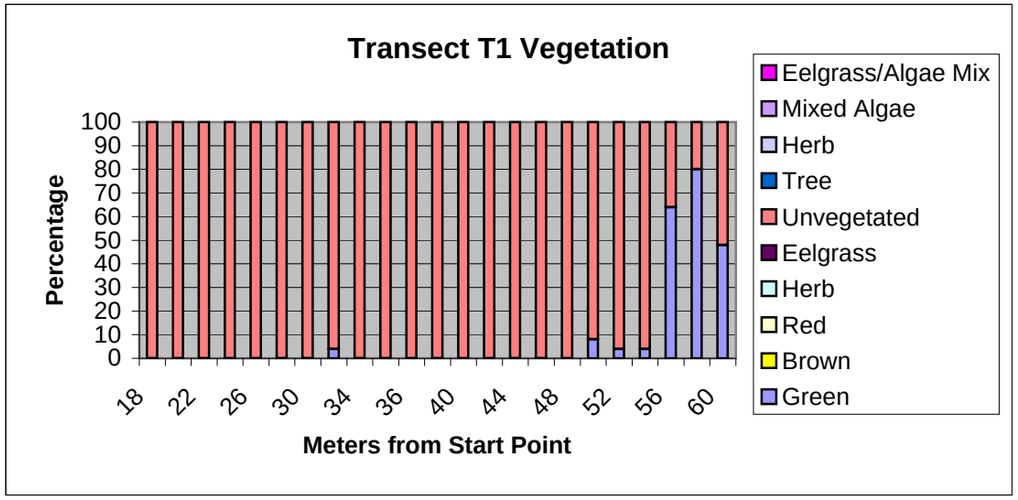
Kayak Pt beach profile monuments – Point (mon is in lawn, a few inches below surface)

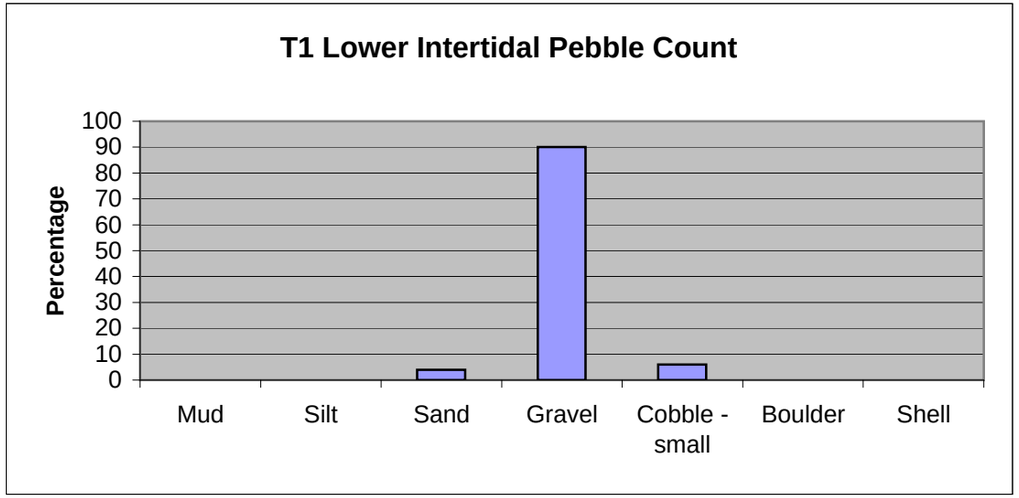
Kayak Pt beach profile monuments – West beach-south (corner of concrete pad)

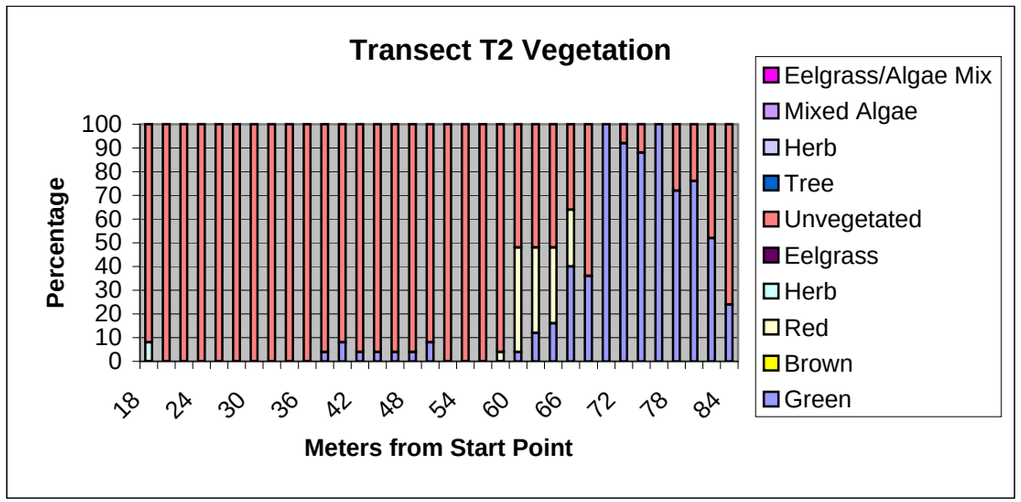
Kayak Pt beach profile monuments – West beach-north (paint on bulkhead, back sight mon also located 173 ft landward)

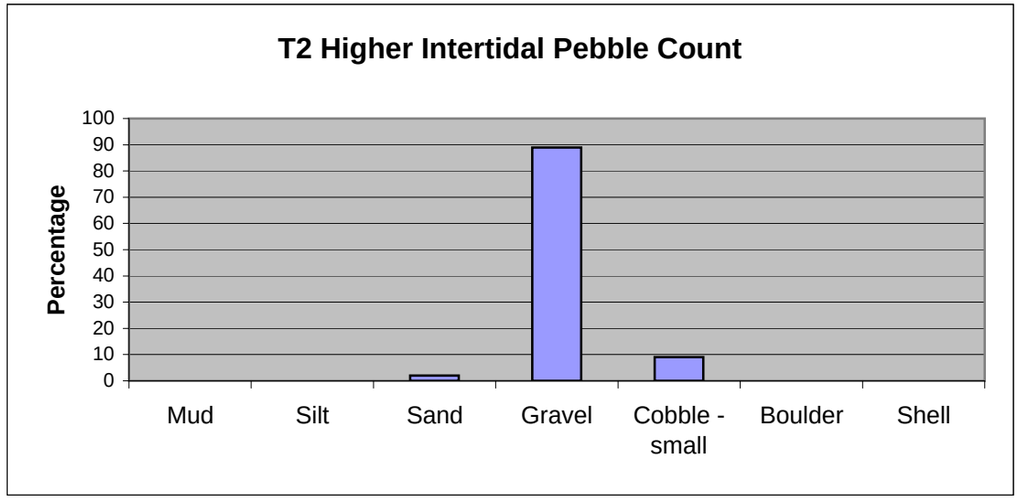

Transect T1 Substrate
Percentage
100
80
60
40
20
0
18
22
26
30
34
36
40
44
48
52
56
60
Meters from Start Point
Asphalt
Clay
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

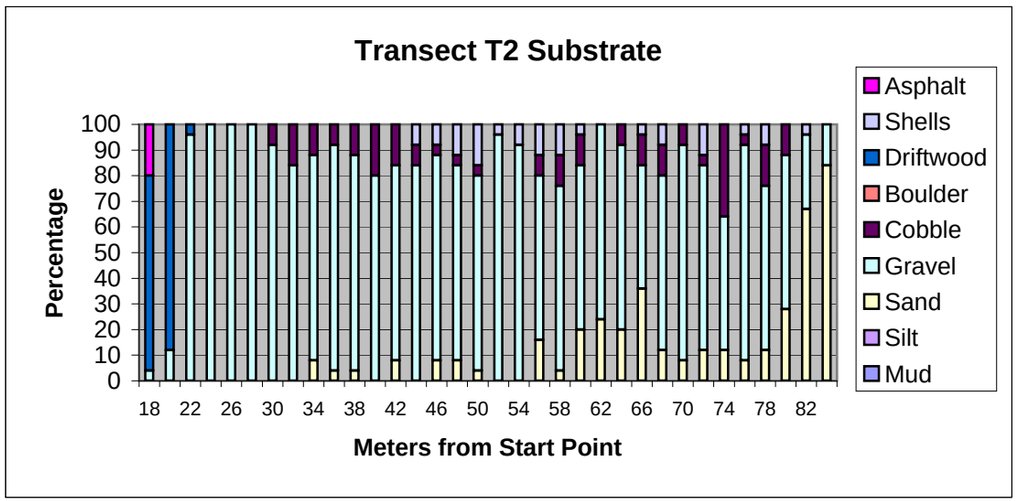

T1 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

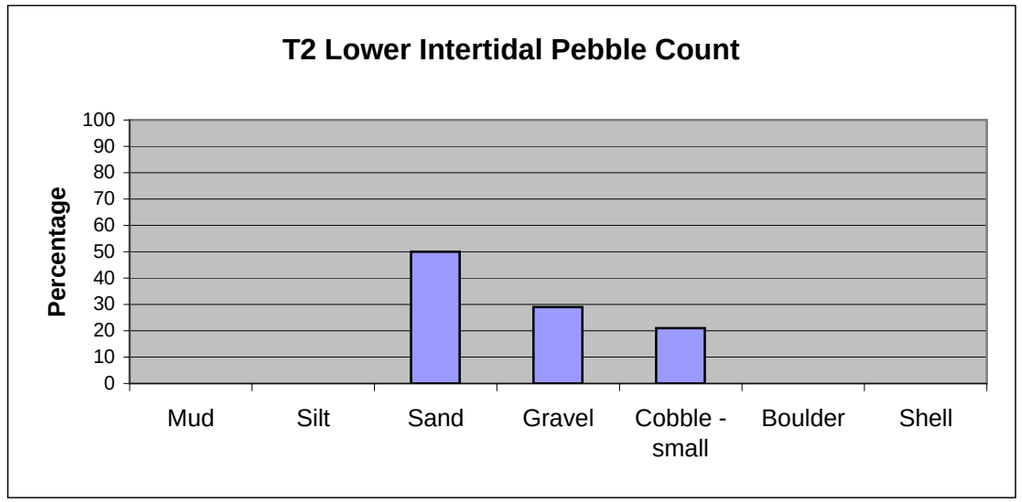

Transect T1 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
18
22
26
30
34
36
40
44
48
52
56
60
Meters from Start Point
Eelgrass/Algae Mix
Mixed Algae
Herb
Tree
Unvegetated
Eelgrass
Herb
Red
Brown
Green

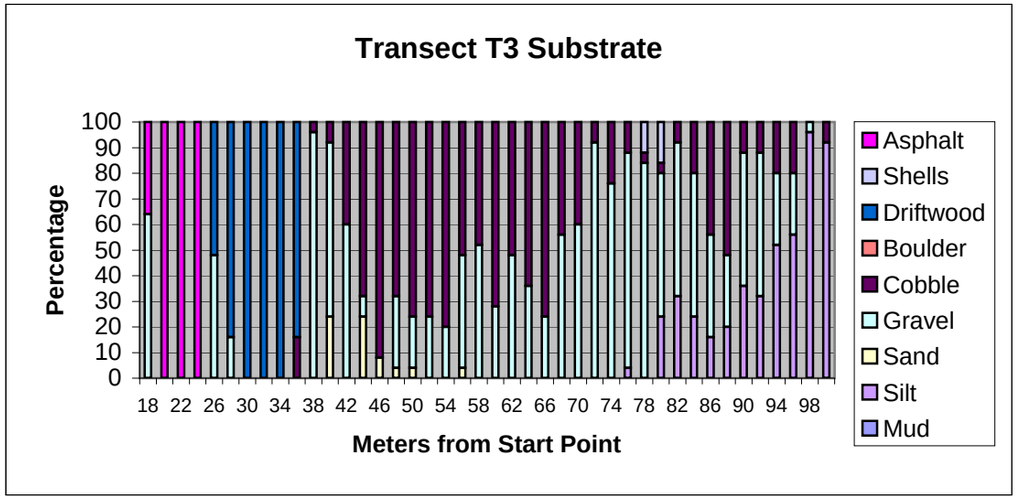

T1 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

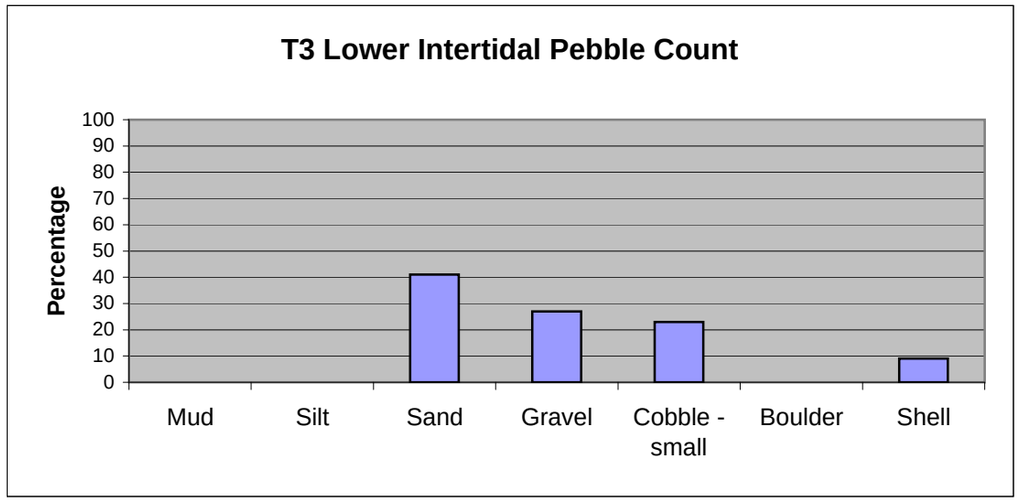

Transect T2 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
18
24
30
36
42
48
54
60
66
72
78
84
Meters from Start Point
Eelgrass/Algae Mix
Mixed Algae
Herb
Tree
Unvegetated
Eelgrass
Herb
Red
Brown
Green

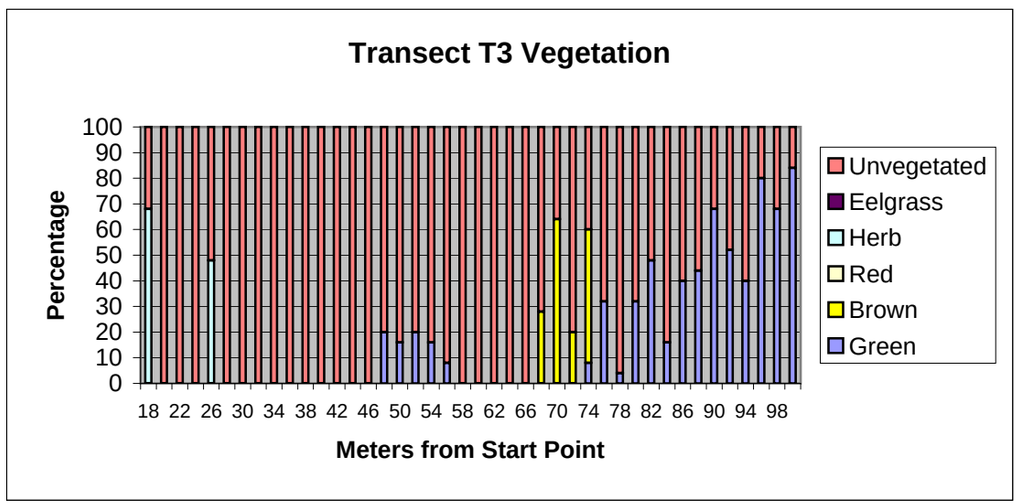

T2 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

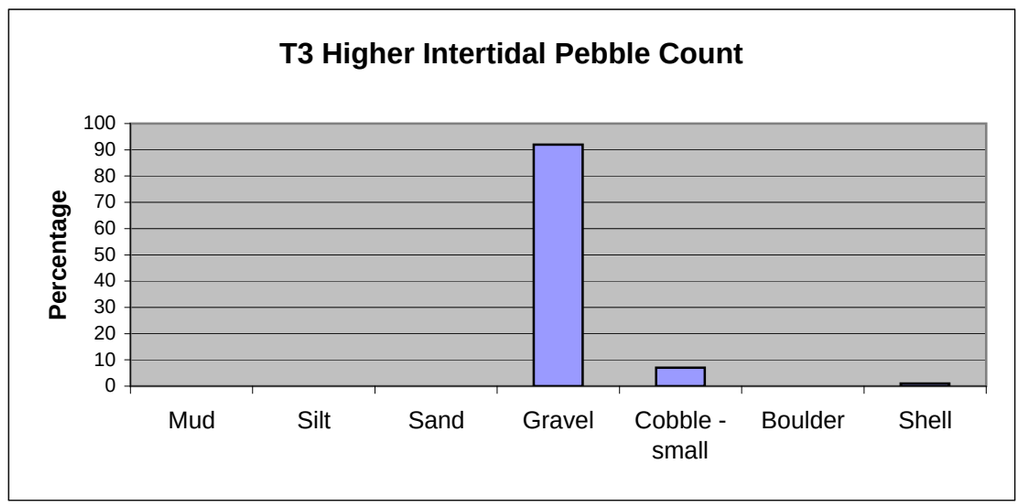

Transect T2 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
18
22
26
30
34
38
42
46
50
54
58
62
66
70
74
78
82
Meters from Start Point
Asphalt
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

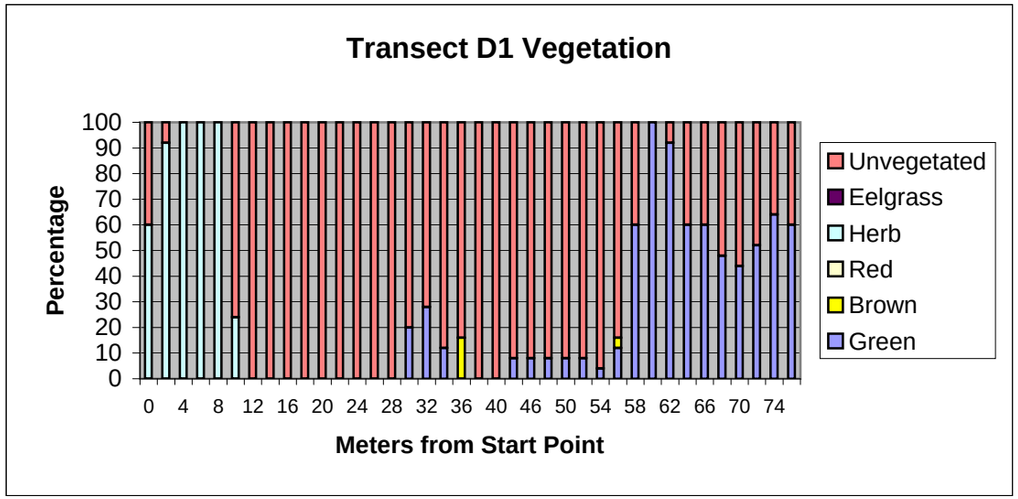

T2 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

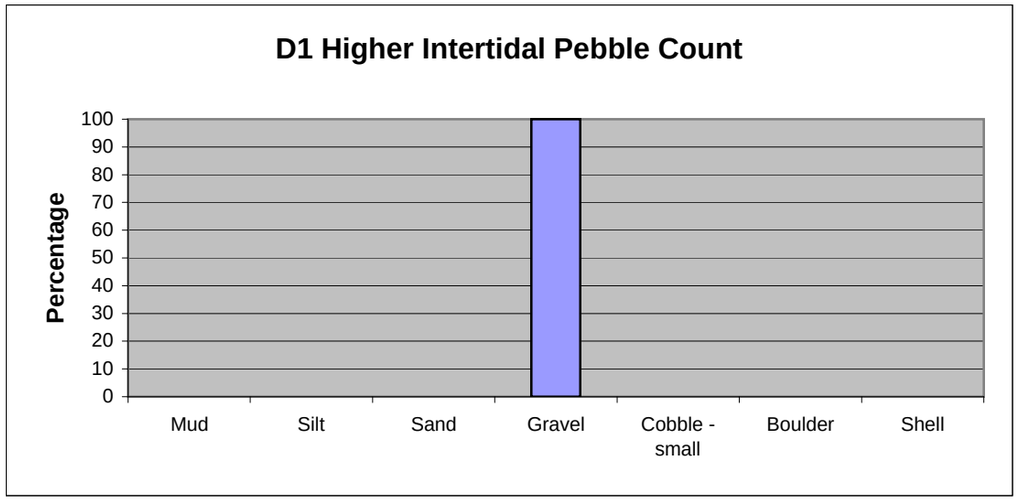

Transect T3 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
Meters from Start Point
Asphalt
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

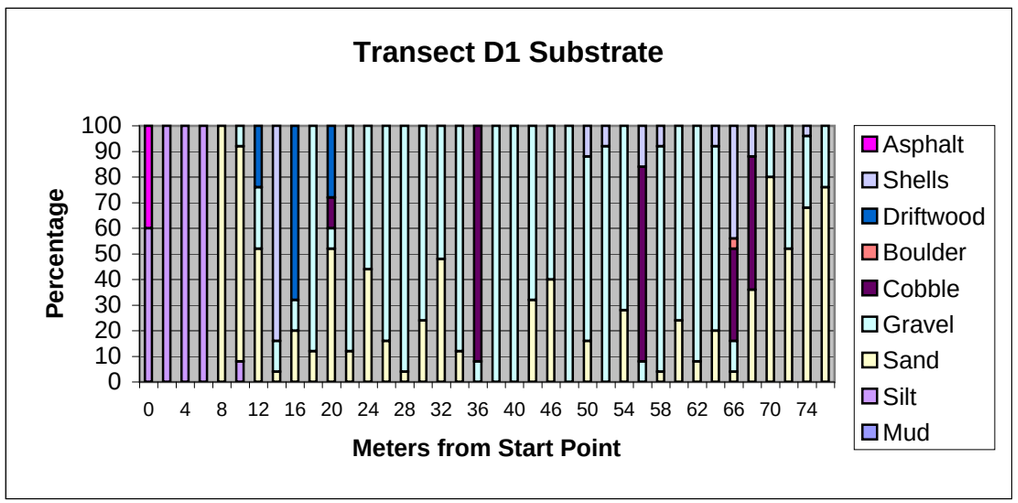

T3 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

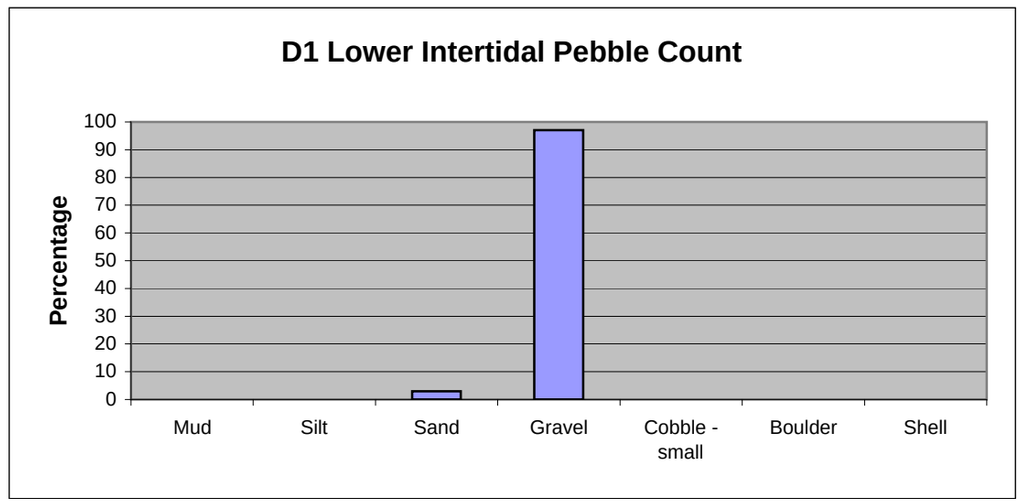

Transect T3 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
Meters from Start Point
Unvegetated
Eelgrass
Herb
Red
Brown
Green

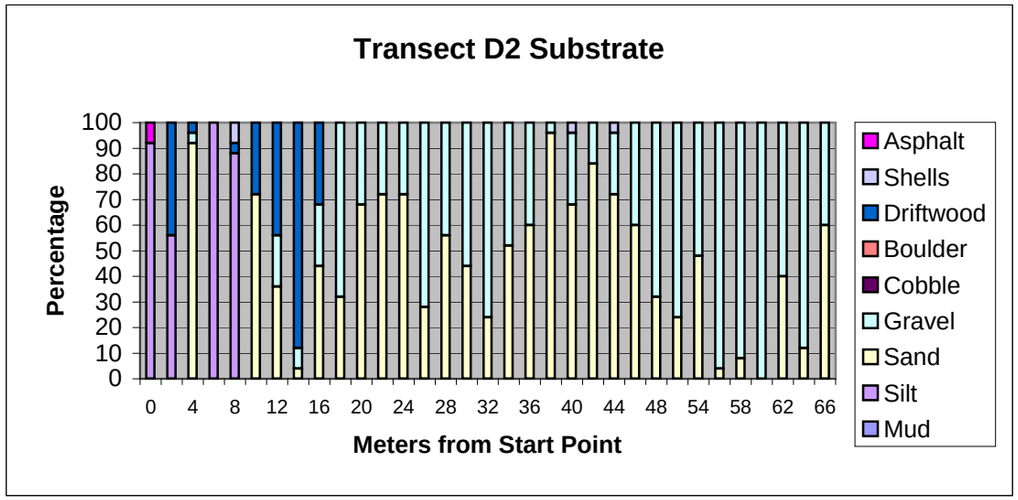

T3 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

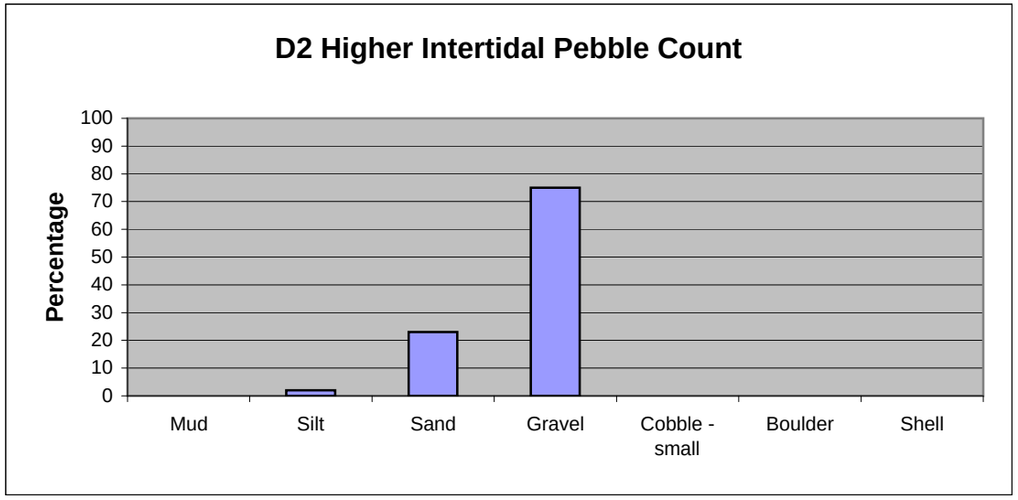

Transect D1 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 46 50 54 58 62 66 70 74
Meters from Start Point
Unvegetated
Eelgrass
Herb
Red
Brown
Green

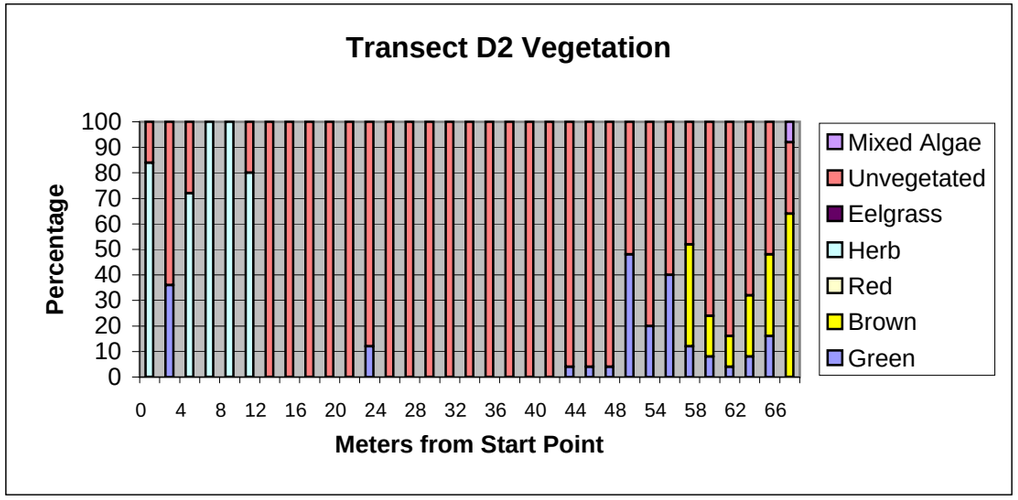

D1 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

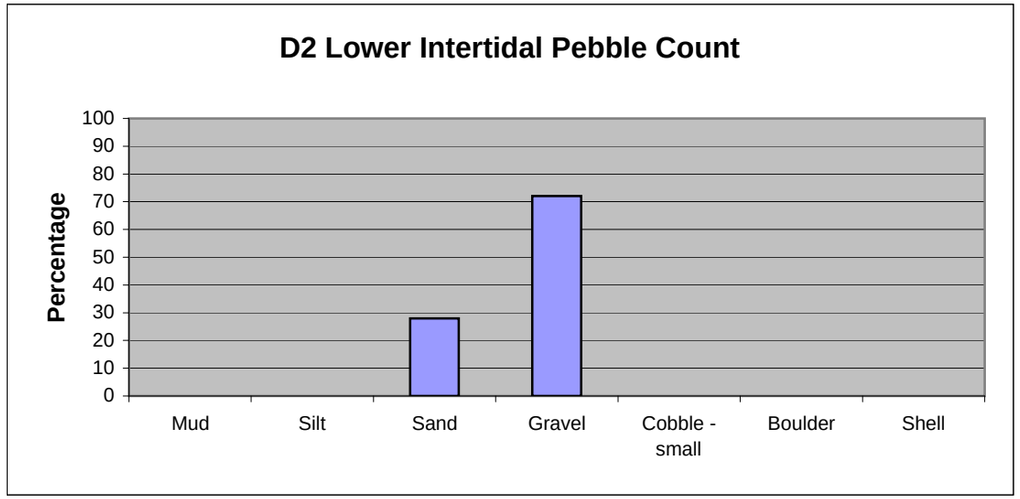

Transect D1 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 46 50 54 58 62 66 70 74
Meters from Start Point
Asphalt
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

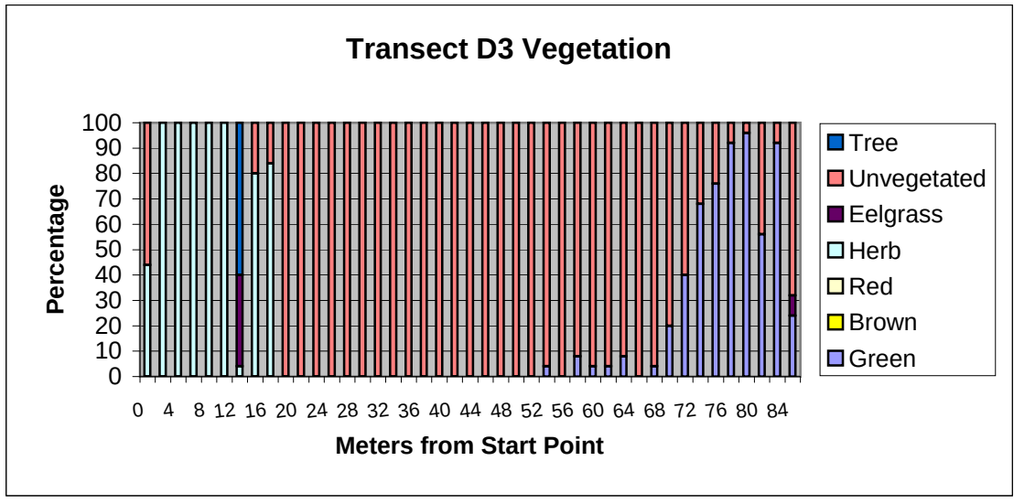

D1 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

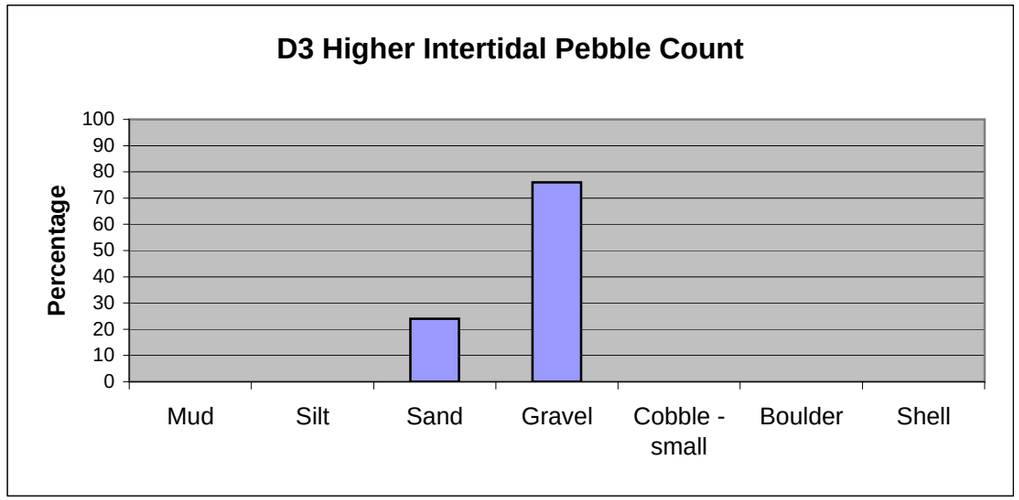

Transect D2 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 54 58 62 66
Meters from Start Point
Asphalt
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

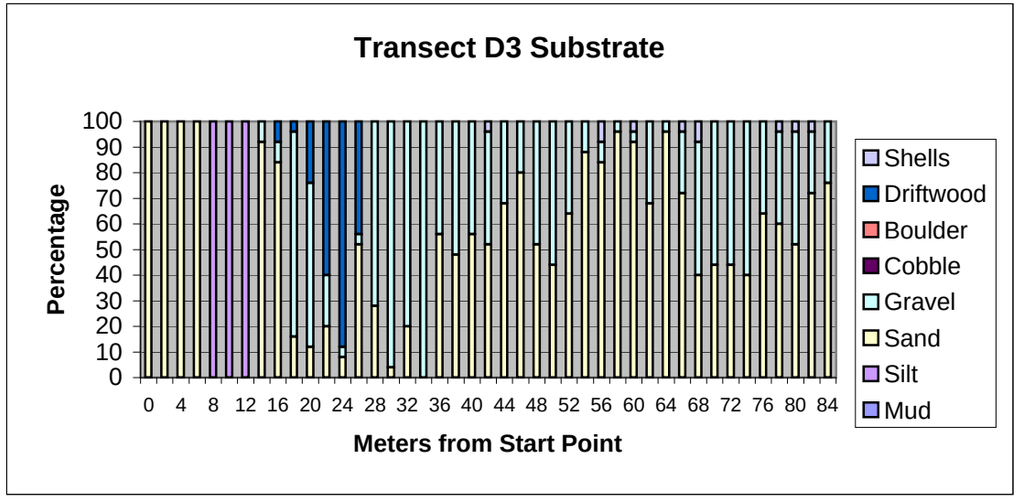

D2 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

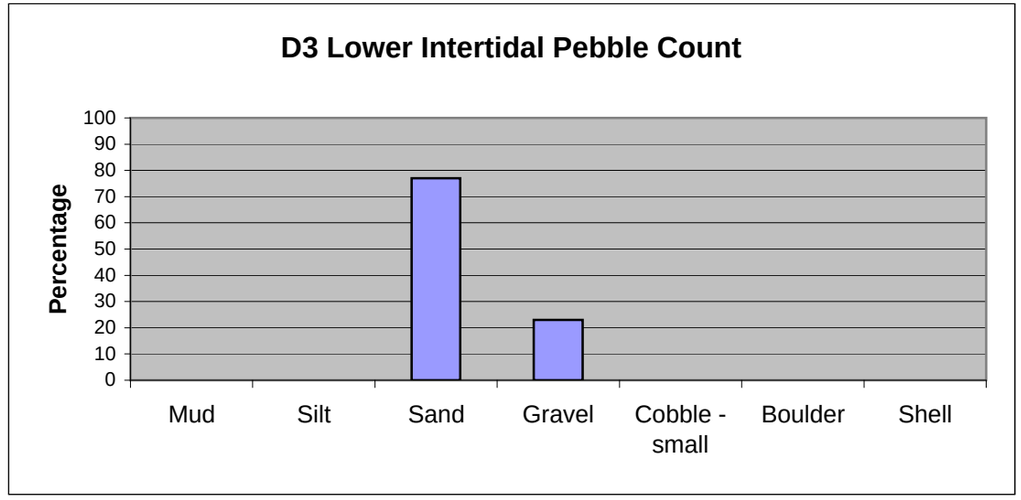

Transect D2 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 54 58 62 66
Meters from Start Point
Mixed Algae
Unvegetated
Eelgrass
Herb
Red
Brown
Green

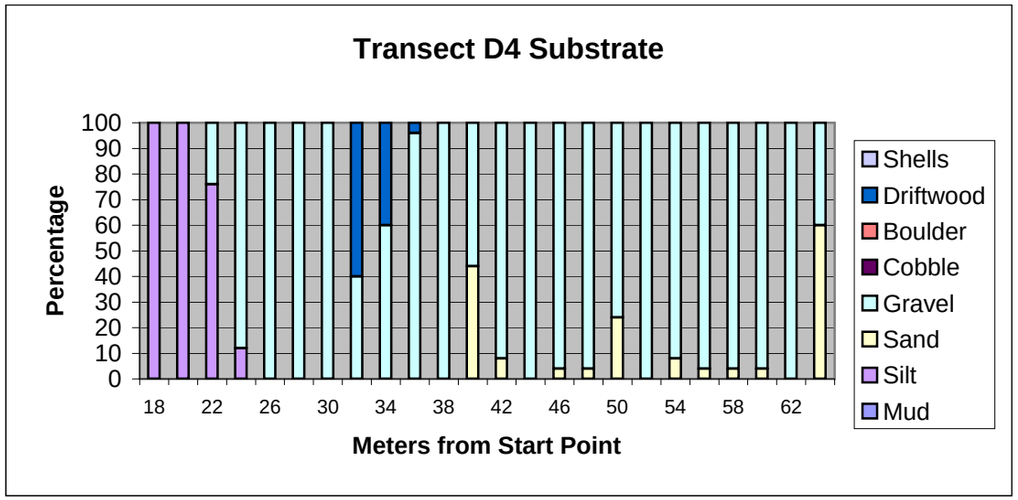

D2 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

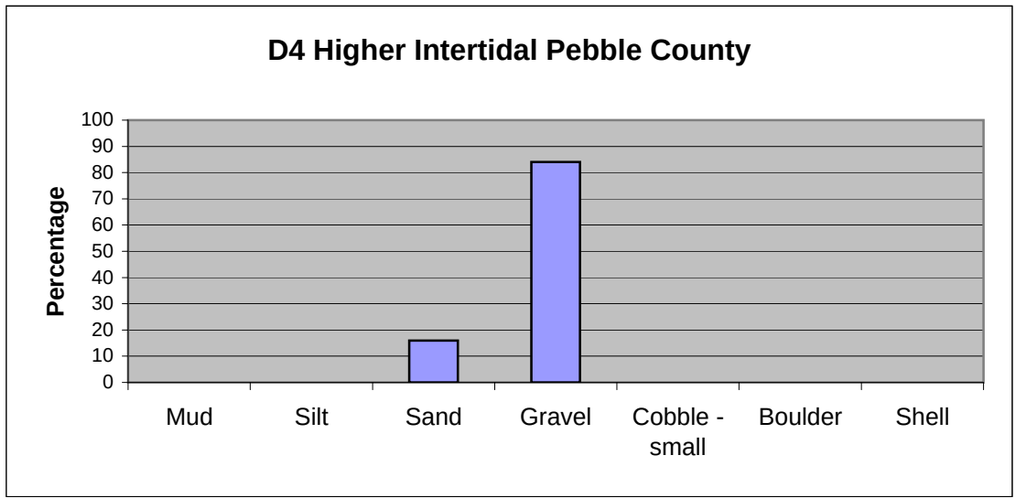

Transect D3 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84
Meters from Start Point
Tree
Unvegetated
Eelgrass
Herb
Red
Brown
Green

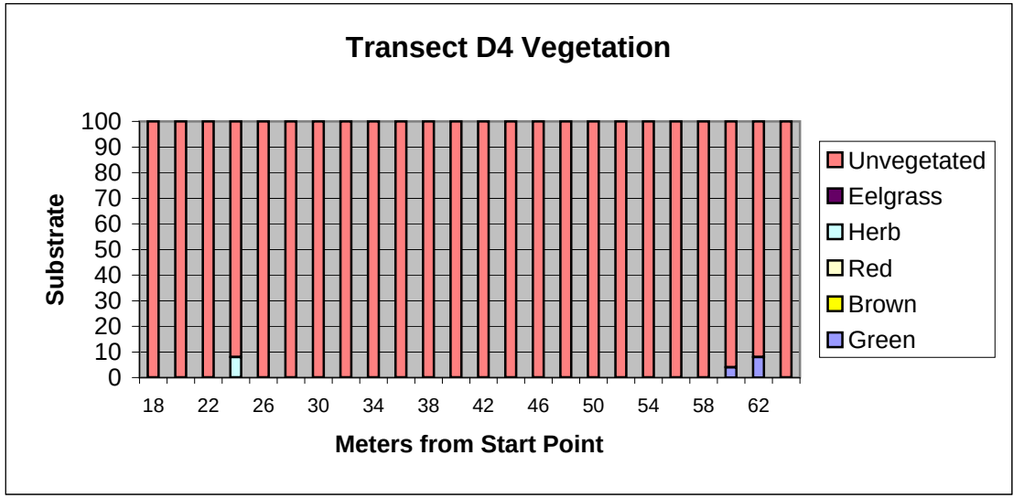

D3 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

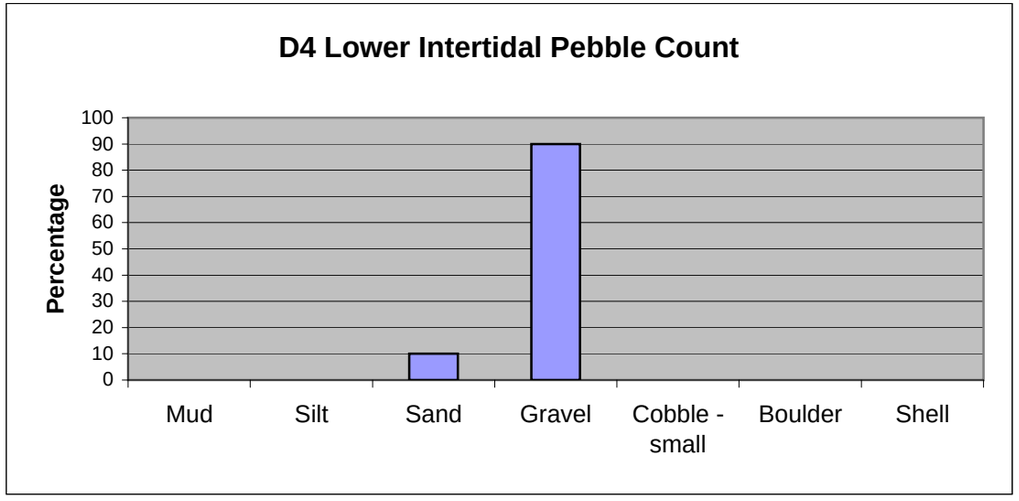

Transect D3 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84
Meters from Start Point
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

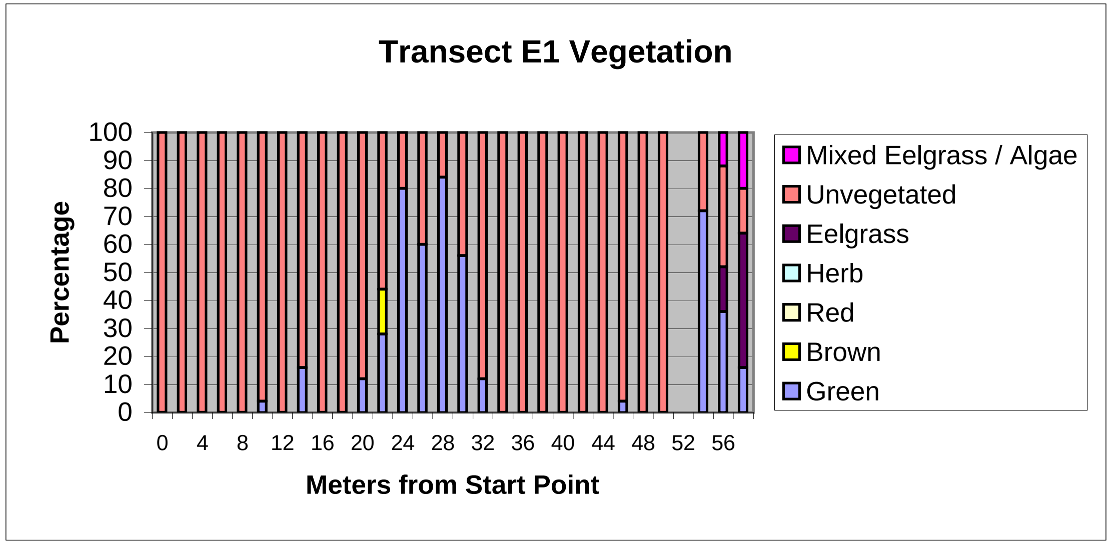

D3 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

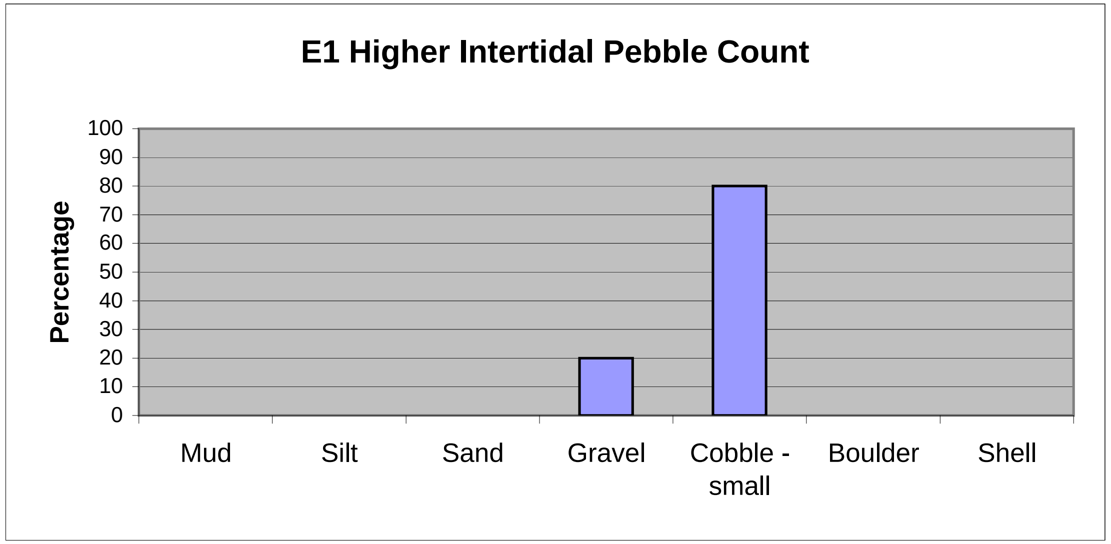

Transect D4 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
18
22
26
30
34
38
42
46
50
54
58
62
Meters from Start Point
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

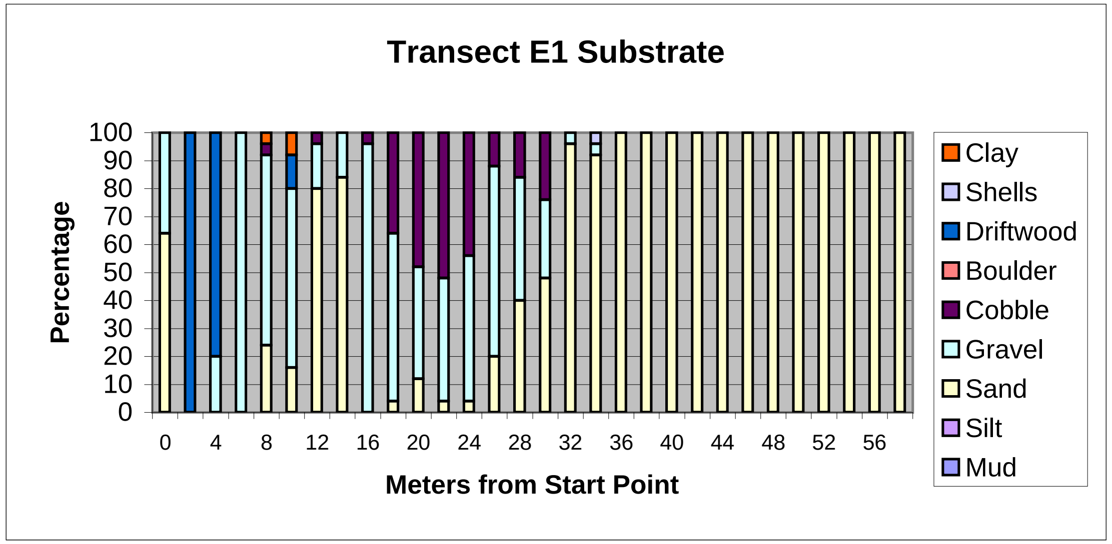

D4 Higher Intertidal Pebble County
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

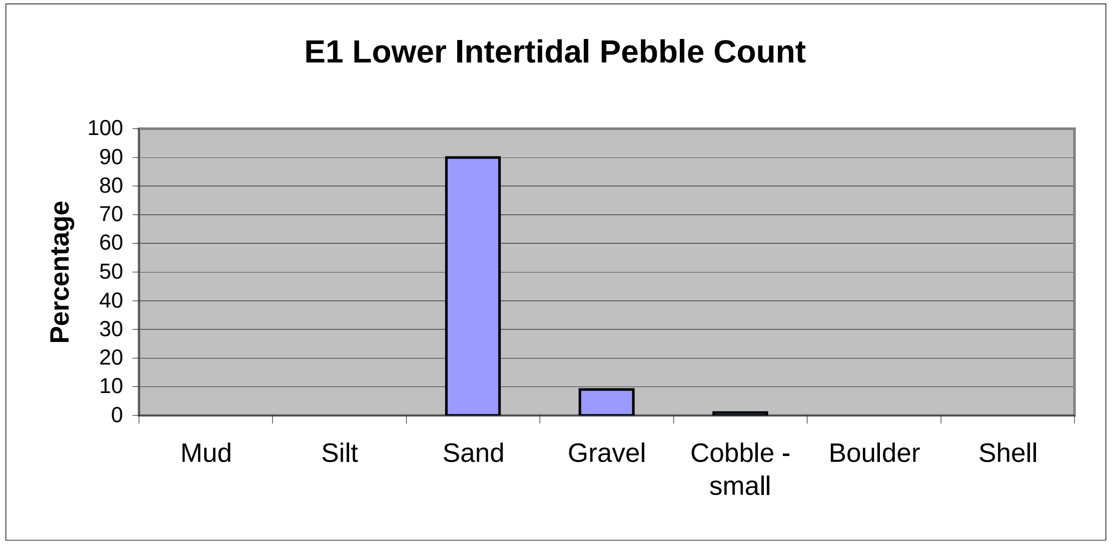

Transect D4 Vegetation
Substrate
100
90
80
70
60
50
40
30
20
10
0
18
22
26
30
34
38
42
46
50
54
58
62
Meters from Start Point
Unvegetated
Eelgrass
Herb
Red
Brown
Green

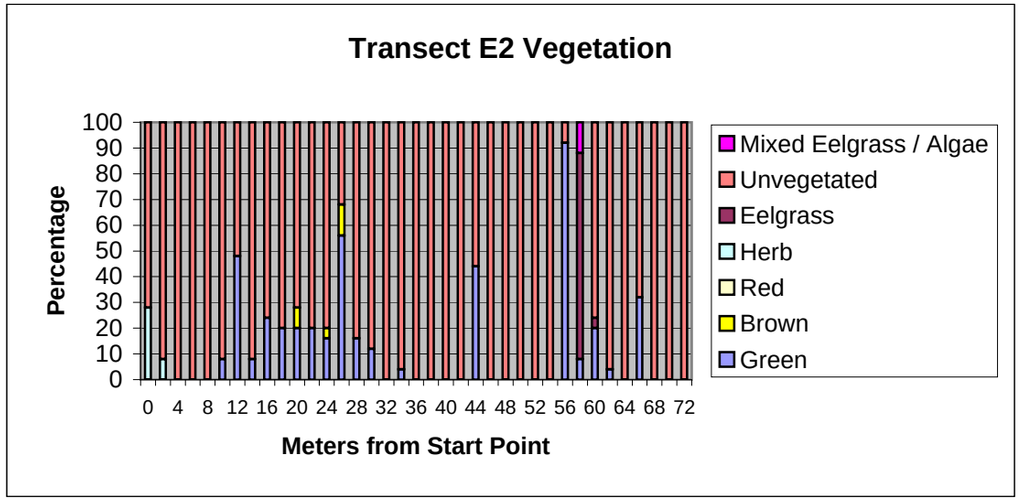

D4 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

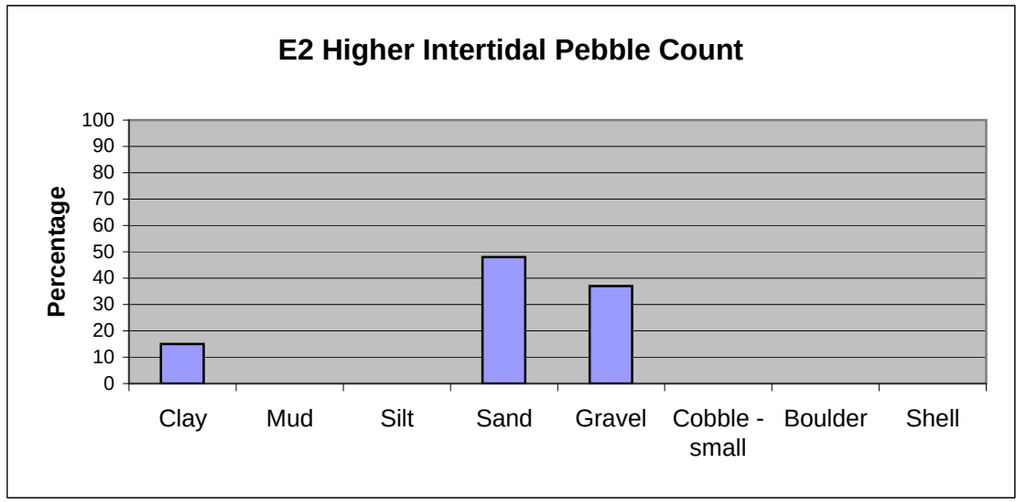

Transect E1 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56
Meters from Start Point
Mixed Eelgrass / Algae
Unvegetated
Eelgrass
Herb
Red
Brown
Green

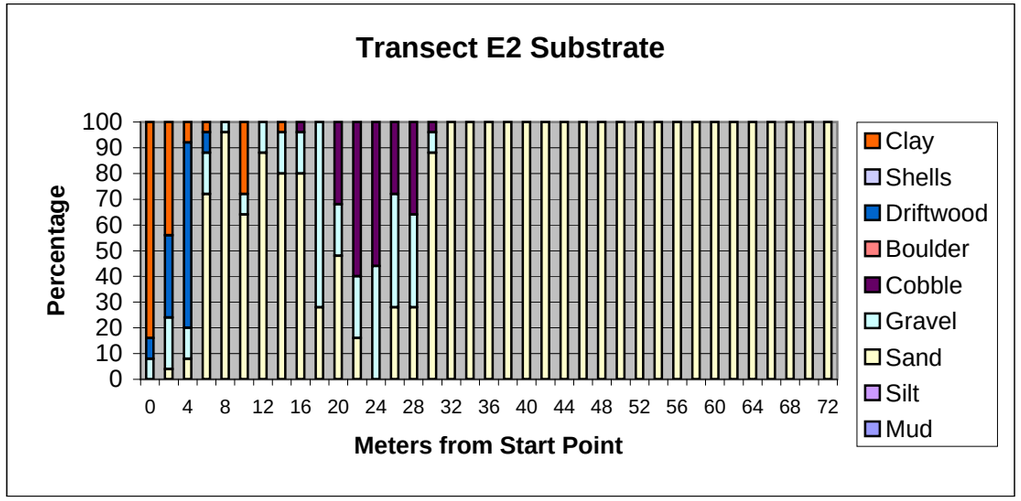

E1 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

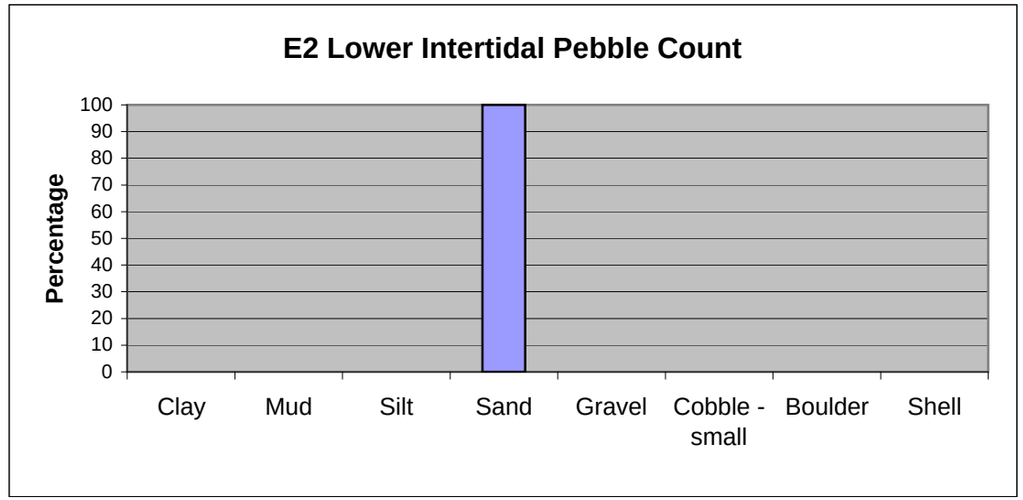

Transect E1 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56
Meters from Start Point
Clay
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud

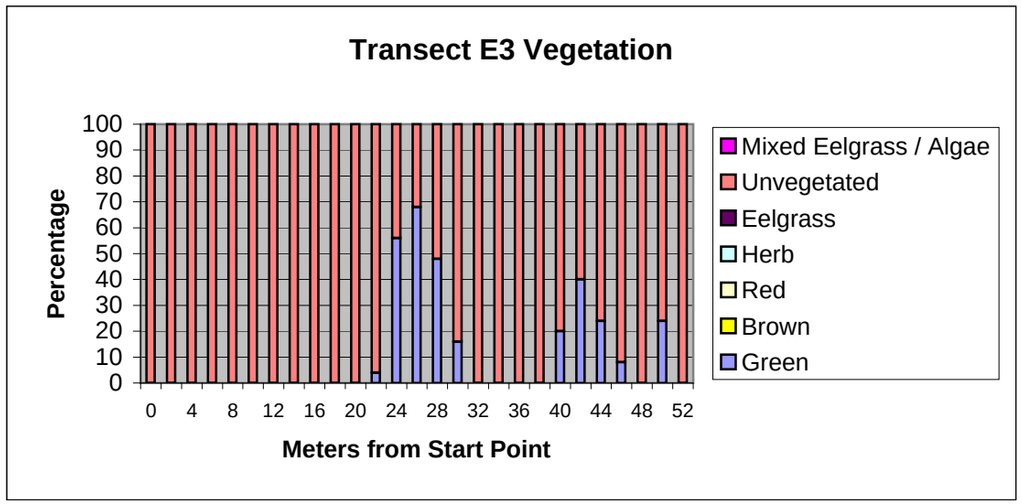

E1 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

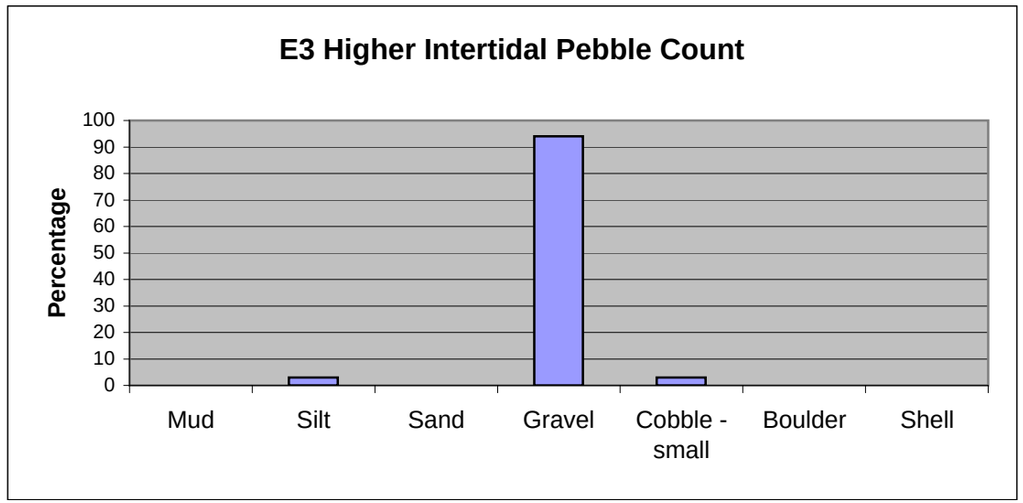

Transect E2 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72
Meters from Start Point
Mixed Eelgrass / Algae
Unvegetated
Eelgrass
Herb
Red
Brown
Green

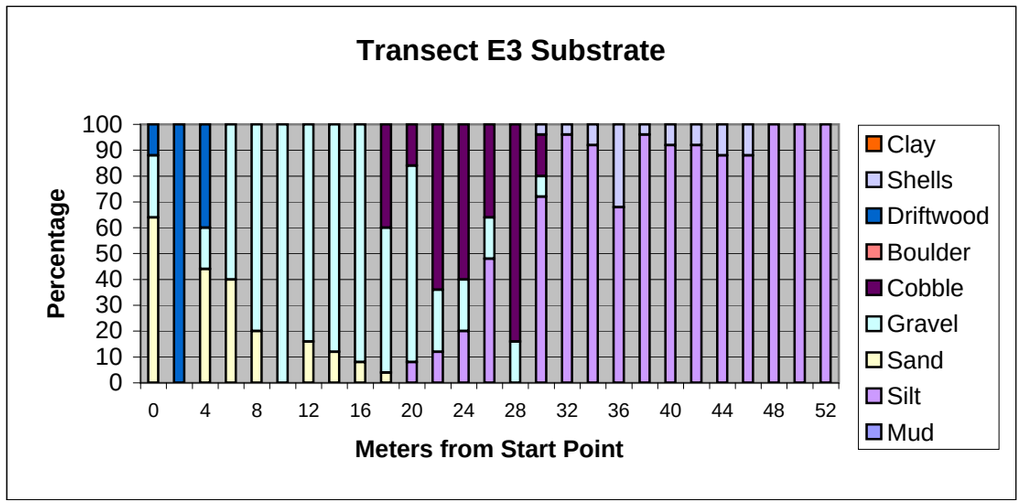

E2 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

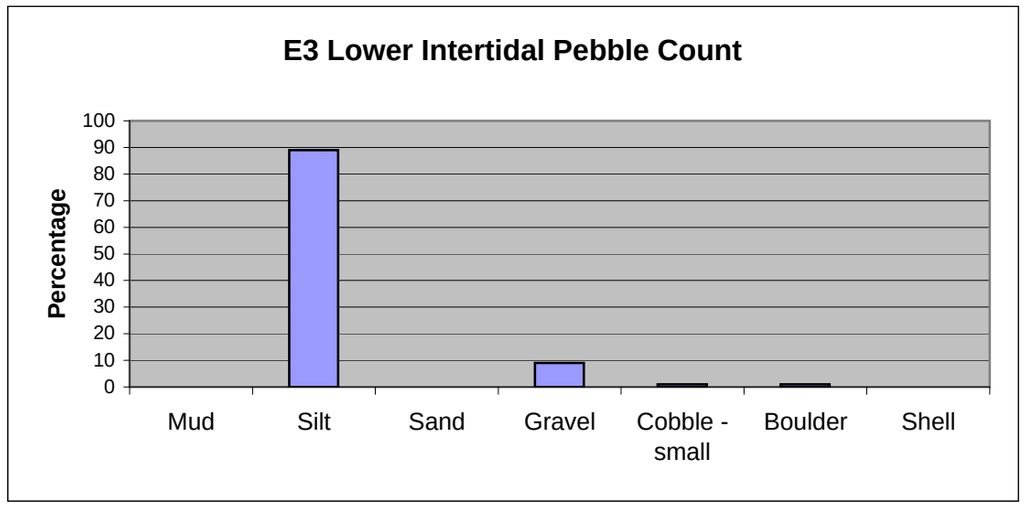

Transect E2 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72
Meters from Start Point
Clay
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud


E2 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell


Transect E3 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52
Meters from Start Point
Mixed Eelgrass / Algae
Unvegetated
Eelgrass
Herb
Red
Brown
Green


E3 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell


Transect E3 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52
Meters from Start Point
Clay
Shells
Driftwood
Boulder
Cobble
Gravel
Sand
Silt
Mud


E3 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Mud
Silt
Sand
Gravel
Cobble - small
Boulder
Shell

Transect Data

Site:______________ Date:___________ Transect:_________

Transect Interval: ____

vegetation

substrate

Transect Interval: ____

vegetation

substrate

Transect Interval: ____

vegetation

substrate

Transect Interval: ____

vegetation

substrate

Transect Interval: ____

vegetation

substrate

Transect Interval: ____

vegetation

substrate

Transect Interval: ____

vegetation

substrate

Transect Interval: ____

vegetation

substrate

Pebble Count: Higher Intertidal

Site:_____ Date:_____Transect: _____

Pebble Count: Lower Intertidal

Site:_____ Date:_____Transect: _____

Surveyor's Sheet:

Site:___________________ Date:_________ Transect: ______

Compass Bearing of Transect: ________

Check List:

1. Tripod feet stable and secure ___
2. Tripod leveled and secured ___
3. Lens cap stowed ___
4. Reference bench marks and transect start located ___
5. Hand signals agreed upon (straighten rod, turn numbers to me, section up, section down, move on) ___
6. Transect tape out ___
7. Stadia rod measurement units recorded below ___
8. Height of transit recorded (from bottom of lens to ground)

Reference Point ____, Rod Ht. ____m, Dista. ____m, Compass ___

Reference Point ____, Rod Ht. ____m, Dista. ____m, Compass ___

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Height of transit: ______

Rod Units:
__Cm
__M
__Ft / in

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Station # ________m Rod Ht.________

Abbreviation Key

Vegetation:

Green Algae – grn
Brown Algae – brn
Red Algae – red
Kelp – kel
Eelgrass – eel
Mixed Algae – mix (more than three kinds of seaweed)
Mixed Algae and Eelgrass – emx
(more than three kinds of seaweed / eelgrass)
Unvegetated – unv (bare ground)
Herbaceous Plants – her (non-woody stem)
Tree – tre (more than 20 feet tall, single woody stem)
Shrub – shr (less than 20 feet tall, multi-woody stem)

Substrate:

Mud – mud sticks together and rolls into 'snakes'
Silt – sil gritty, but can't see individual grains
Sand – san <1mm, >.125mm (visible grains)
Gravel – gra 1 to 64 mm (about the size of your pinky)
Cobble – cob 64.1 to 256 mm (about the size of your head
Boulder – bou 256mm (bigger than your head)
Bedrock – bed solid bedrock connected to subsurface bedrock
Hardpan – pan compacted fines that stick together like solid rock
Shell – she shell fragments (not living)
Wood – woo driftwood to small woody debris bits.
Bulkhead – bul
Asphalt / Roadway - asp

Abbreviation Key

Vegetation:

Green Algae – grn
Brown Algae – brn
Red Algae – red
Kelp – kel
Eelgrass – eel
Mixed Algae – mix (more than three kinds of seaweed)
Mixed Algae and Eelgrass – emx
(more than three kinds of seaweed / eelgrass)
Unvegetated – unv (bare ground)
Herbaceous Plants – her (non-woody stem)
Tree – tre (more than 20 feet tall, single woody stem)
Shrub – shr (less than 20 feet tall, multi-woody stem)

Substrate:

Mud – mud sticks together and rolls into 'snakes'
Silt – sil gritty, but can't see individual grains
Sand – san <1mm, >.125mm (visible grains)
Gravel – gra 1 to 64 mm (about the size of your pinky)
Cobble – cob 64.1 to 256 mm (about the size of your head
Boulder – bou 256mm (bigger than your head)
Bedrock – bed solid bedrock connected to subsurface bedrock
Hardpan – pan compacted fines that stick together like solid rock
Shell – she shell fragments (not living)
Wood – woo driftwood to small woody debris bits.
Bulkhead – bul
Asphalt / Roadway - asp

PHOTOGRAPHER'S RECORD

Site Name:________________________________

Date:________________________________

Photographer Name:________________________________

Camera Type:________________________________

Photo Description

Transect	Location Description	Frame No.
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____

Transect	Location Description	Frame No.
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____
______	________________________________	_____

Pre-Restoration Beach Monitoring Training
June 20, 9:30 AM – 2:00 PM

Warm Beach Community Church
9620 188th St. NW, Stanwood and
Kayak Point County Park

9:30 AM Welcome

9:40 AM Snohomish Marine Resource Committee Plan for Kayak Point County Park
Presenter: Stef Frenzl, Snohomish Marine Resources Committee Lead Staff and WSU Beach Watcher (Class of 2006)

10:10 AM Monitoring Methods Overview and Hands-On Practice
- Kayak Point Survey Design
- Elevation Surveying
- Substrate / Vegetation Surveys
- Photo Point Documentation

Presenters: Chrys Bertolotto, WSU Beach Watchers / Snohomish County and Keeley O'Connell, People For Puget Sound

11:20 AM BREAK

11:30 AM Seaweed / Invasive Species Overview and Beach Safety Tips
Presenter: Chrys Bertolotto

12:00 PM TRAVEL to Kayak Point County Park / Lunch Break (Free parking!)

12:45 PM Field Practice: Hands on with Equipment

1:55 PM Sign Up for Monitoring Days!

2:00 PM Go Elsewhere!

WSU BEACH WATCHERS SNOHOMISH COUNTY

PEOPLE FOR PUGET SOUND pugetsound.org

SNOHOMISH COUNTY MARINE RESOURCES COMMITTEE

Pre-Restoration Beach Monitoring Training
June 16, 9:30 – 3:30 PM

9:30 AM Welcome and Overview

9:45 AM Monitoring Methods Overview and Hands-On Practice
Kayak Point Survey Design
Elevation Surveying
Substrate / Vegetation Surveys
Presenter: Chrys Bertolotto, WSU Snohomish County Extension Beach Watchers

10:30 AM BREAK (Check out the sediment type samples and try out the equipment!)

10:45 AM Plan for Kayak Point County Park
Presenter: Keeley O'Connell, People For Puget Sound 11:30 AM Biota

11:30 AM Monitoring / Safety / Pebble Counts
Presenter: Chrys Bertolotto

12:15 PM TRAVEL to Kayak Point County Park / Lunch Break (Free parking!)

1:30 PM Field Practice: Hands on with Equipment
Station Leaders: Fred Giorgi, Craig Wollam and Chrys Bertolotto

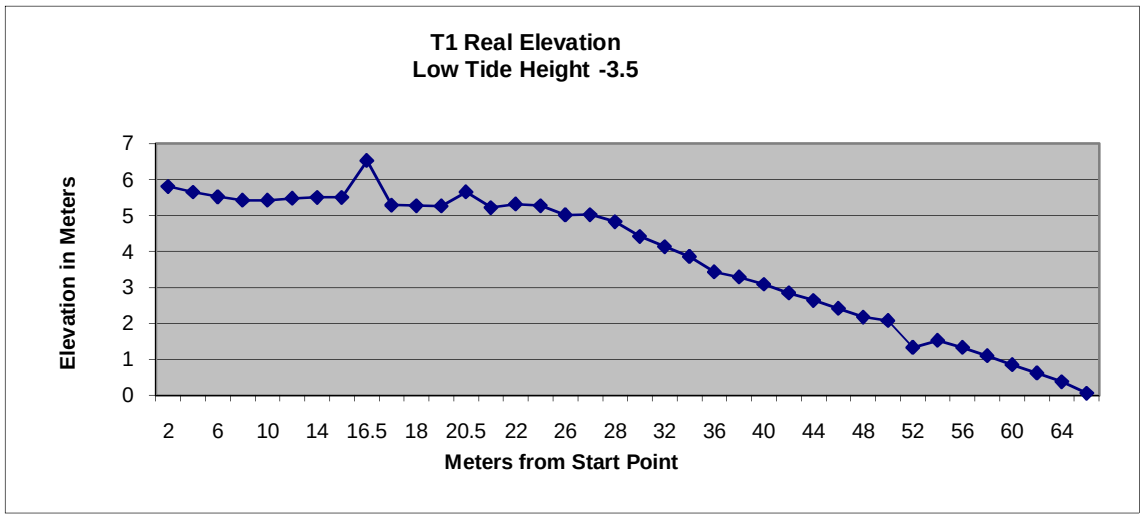
3:15 PM Sign Up for Monitoring Days!

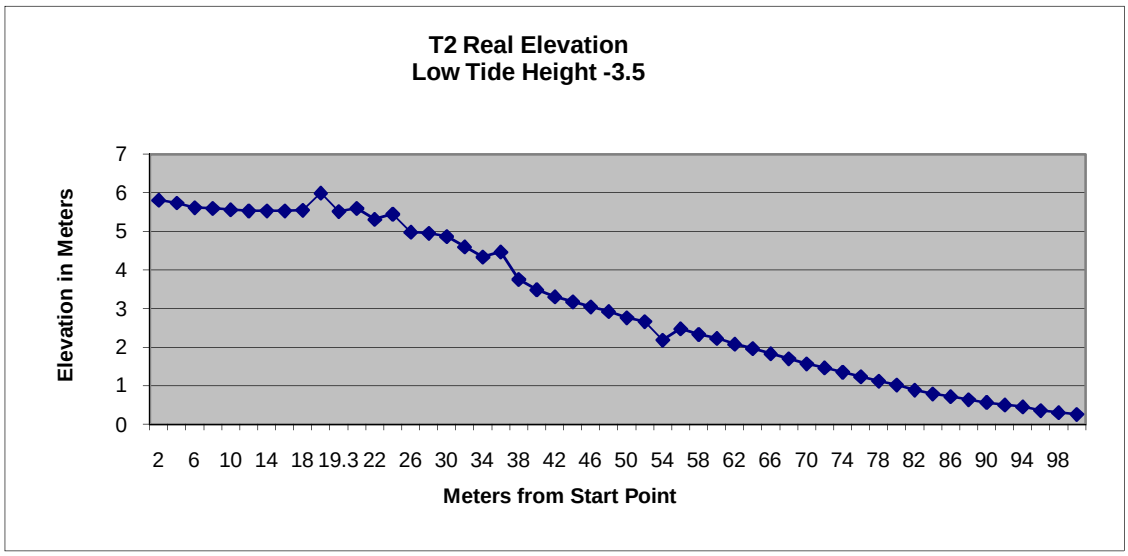
3:30 PM Evaluation / Go Elsewhere!

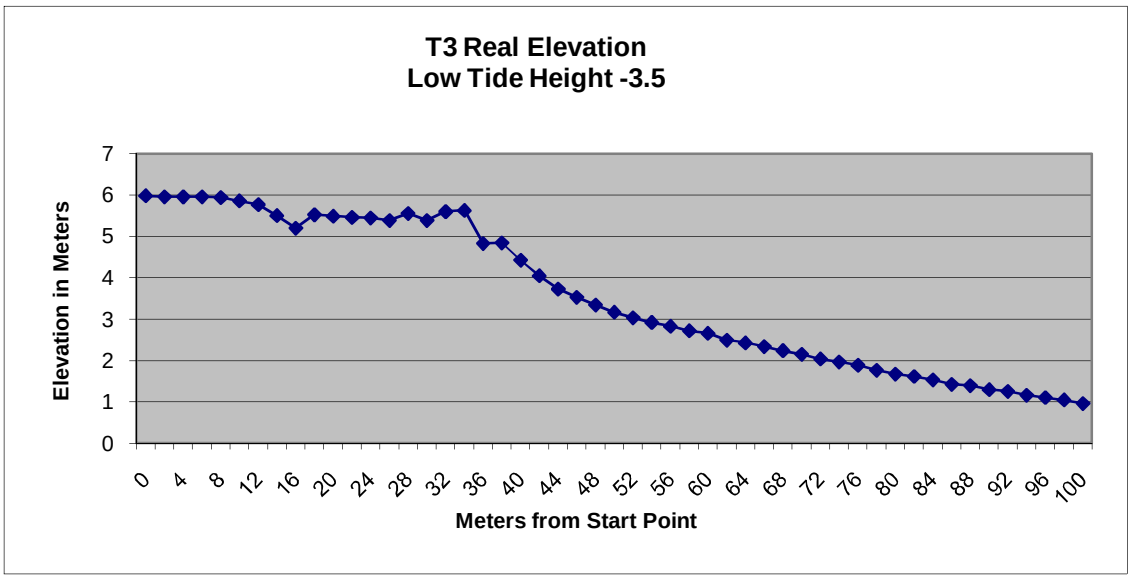
Directions
North County Fire Hall (Warm Beach), 19727 Marine Drive, Stanwood

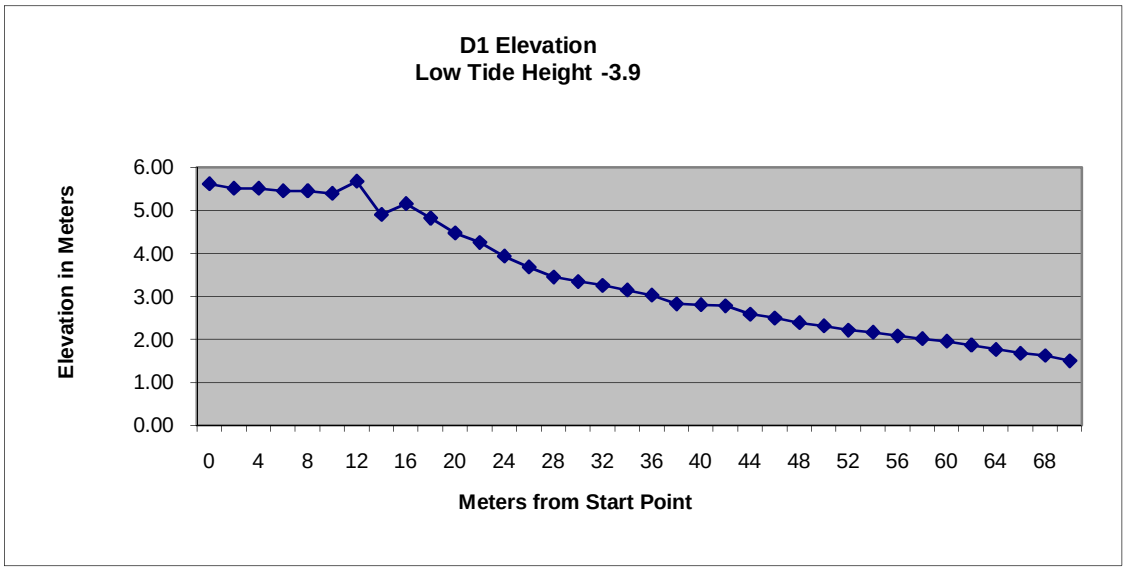
From the South:
Take I-5 to Exit 199. Turn left at the off ramp to the Tulalip Reservation / Marine Drive. Drive past signs for the Tulalip Shores, Spee-bi-dah, Sunnyshores, McKees Beach communities and Kayak Point County Park. Continue north. Marine Drive will turn right on 180th St. NW. Then, take left to get back on Marine Drive / 92nd Ave NW. The fire hall will be on your right hand side.

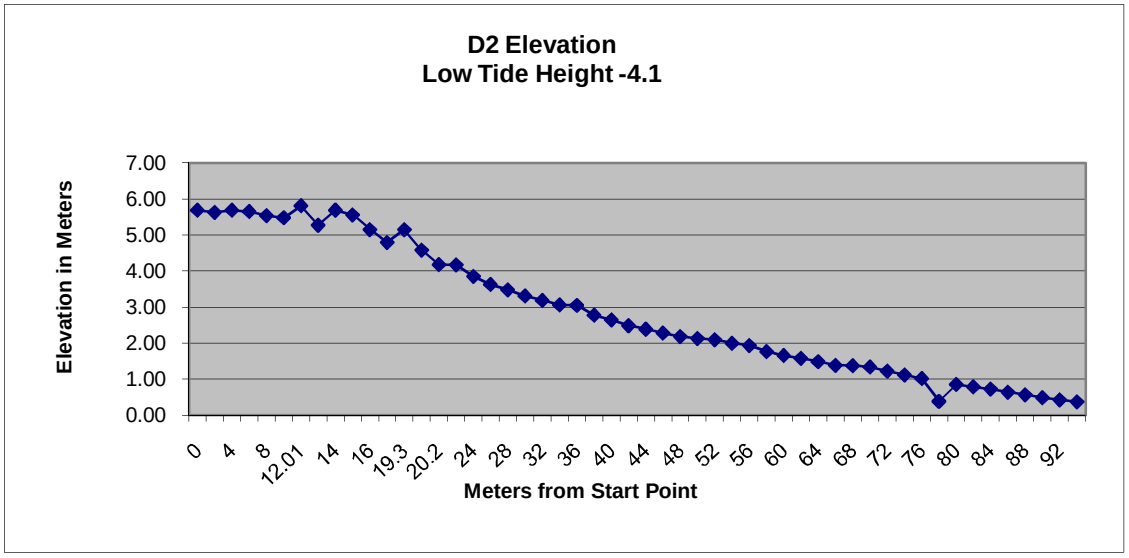
From North:
Take Exit 212 into Stanwood.
Turn left onto 88th Ave NW (to the Park and Ride) just after Pioneer Highway and train tracks.
This will turn into Marine Drive / 84th Ave NW.
The fire hall will be on your left after passing 201st St. NW.

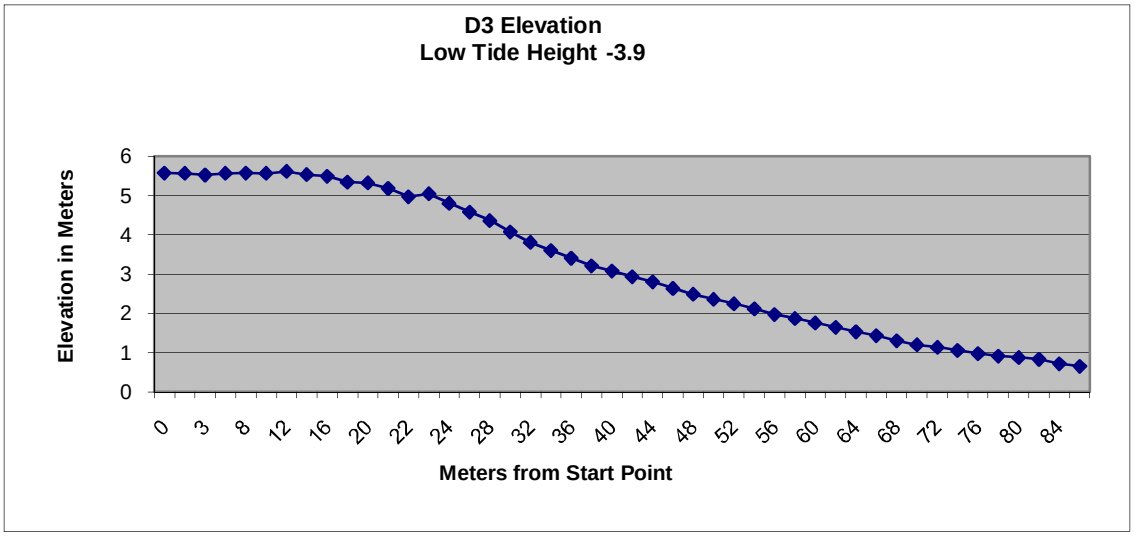

T1 Real Elevation
Low Tide Height -3.5
Elevation in Meters
0
1
2
3
4
5
6
7
2 6 10 14 16.5 18 20.5 22 26 28 32 36 40 44 48 52 56 60 64
Meters from Start Point

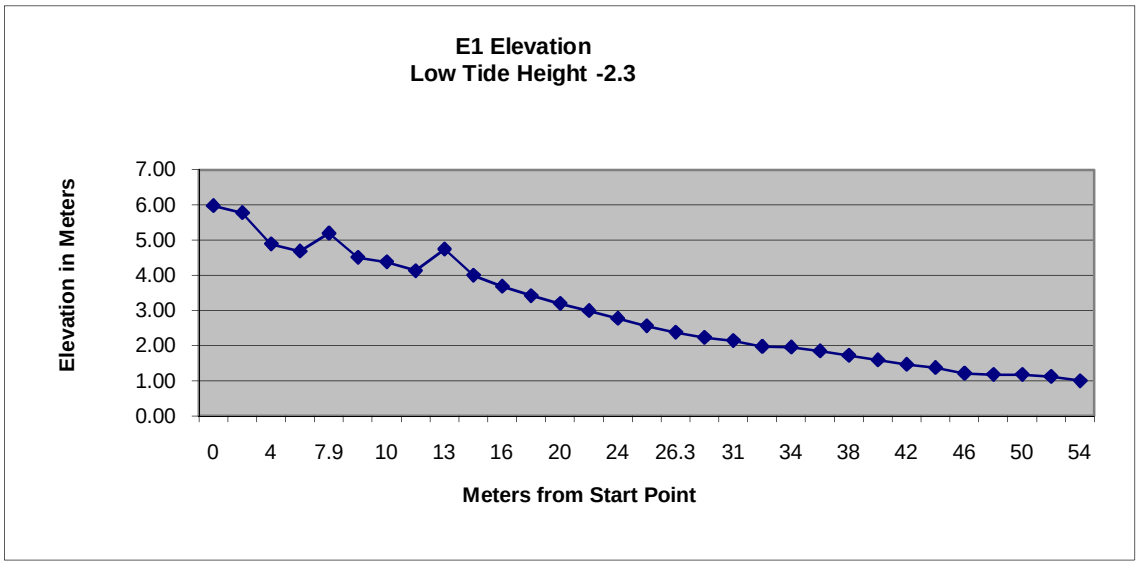

T2 Real Elevation
Low Tide Height -3.5
Elevation in Meters
0
1
2
3
4
5
6
7
2 6 10 14 18 19.3 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
Meters from Start Point

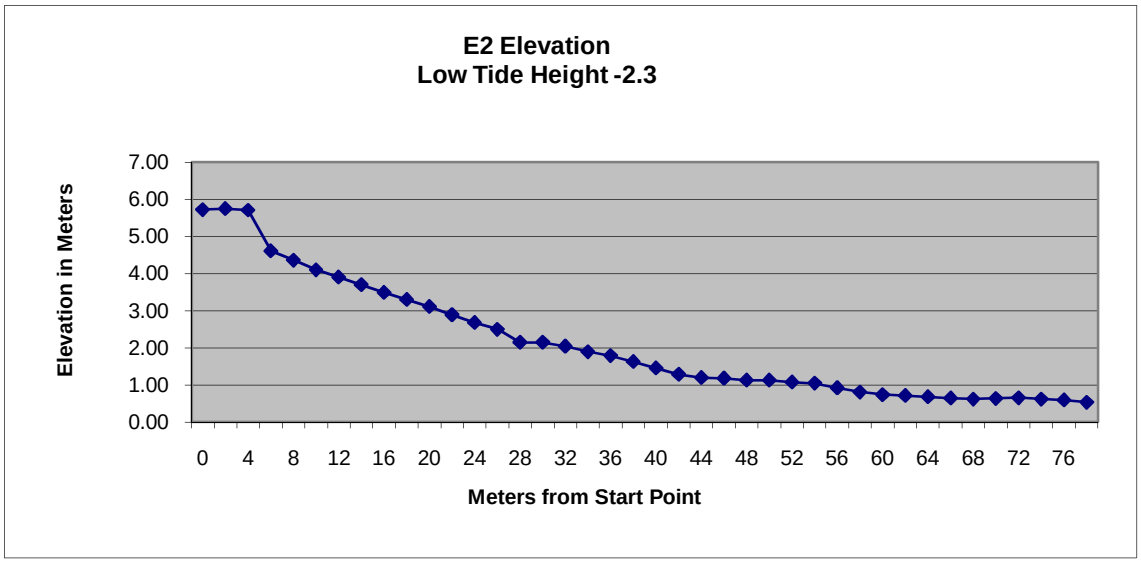

T3 Real Elevation
Low Tide Height -3.5
Elevation in Meters
0
1
2
3
4
5
6
7
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Meters from Start Point

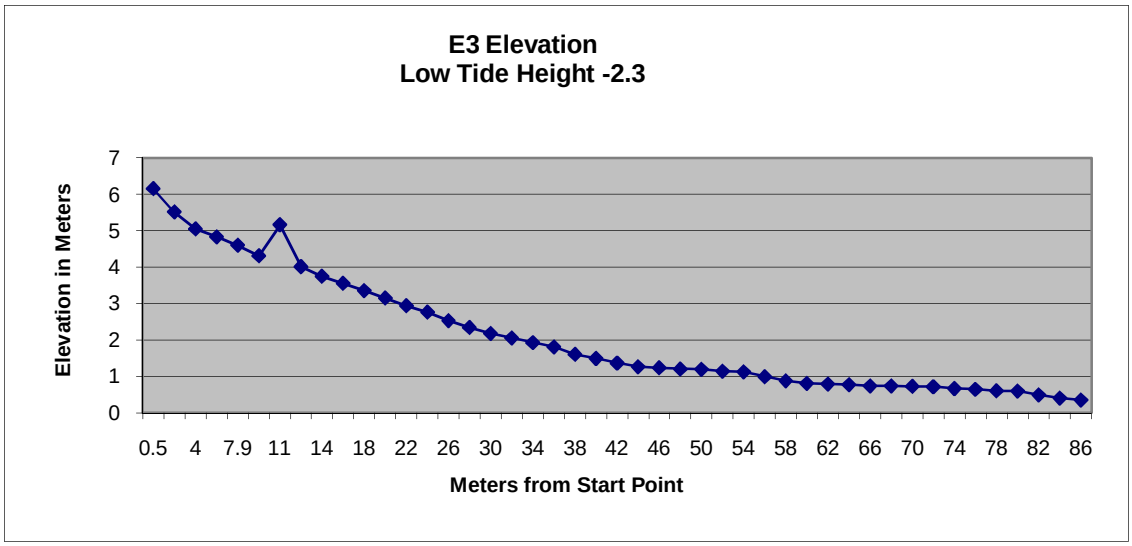

D1 Elevation
Low Tide Height -3.9
Elevation in Meters
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68
Meters from Start Point

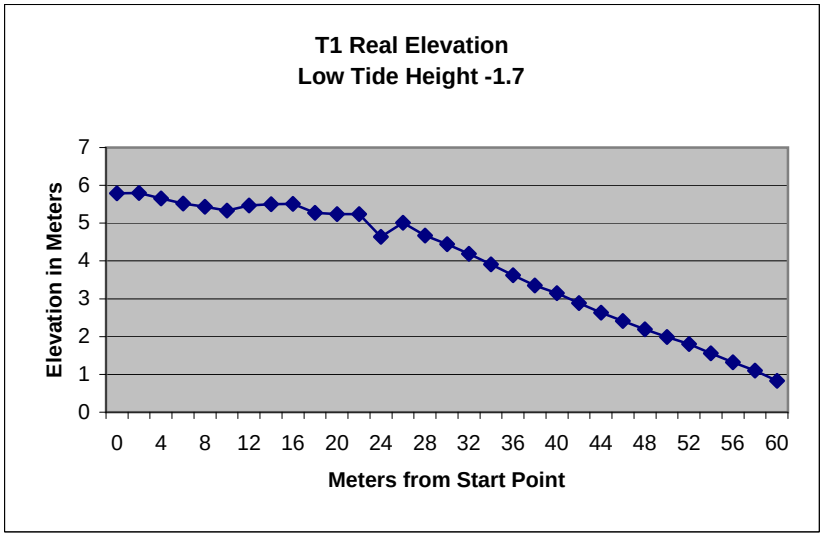

D2 Elevation
Low Tide Height -4.1
Elevation in Meters
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 8 12.01 14 16 19.3 20.2 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92
Meters from Start Point

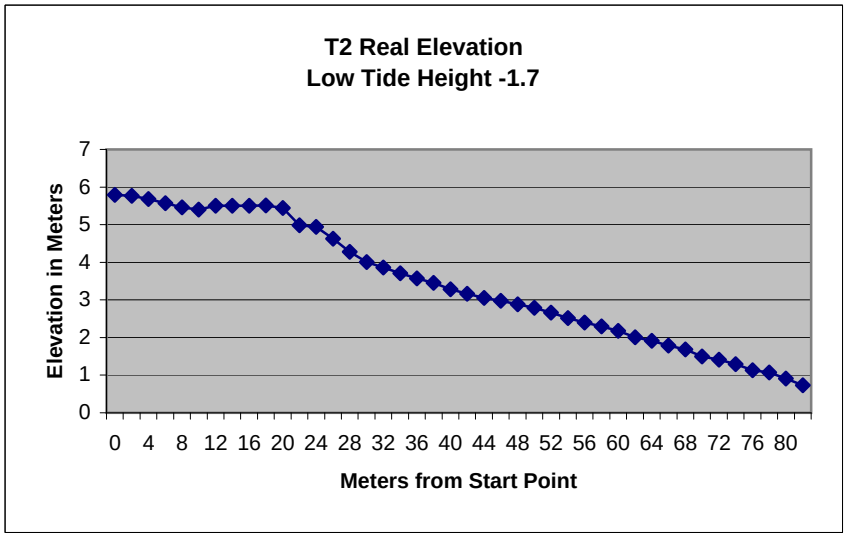

D3 Elevation
Low Tide Height -3.9
Elevation in Meters
6
5
4
3
2
1
0
0 3 8 12 16 20 22 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84
Meters from Start Point

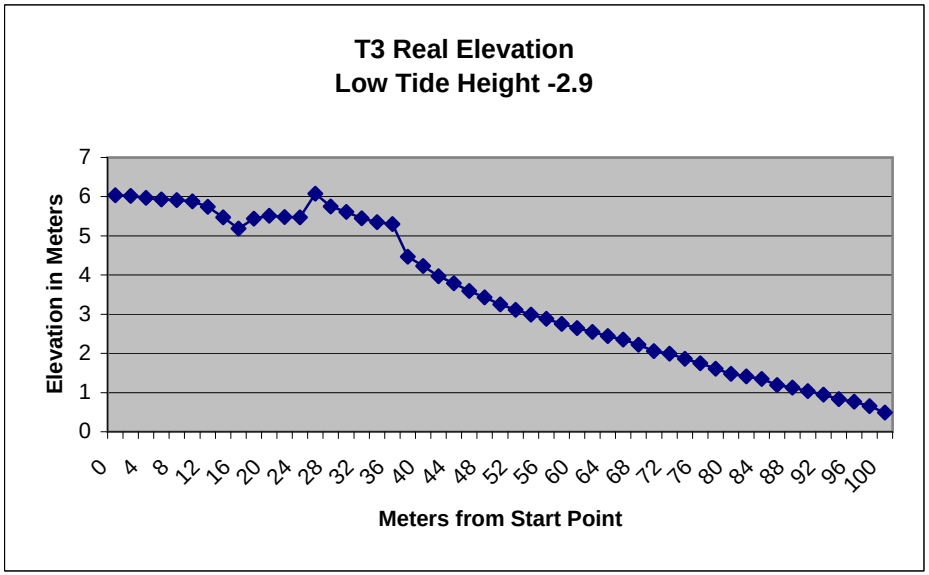

E1 Elevation
Low Tide Height -2.3
Elevation in Meters
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 7.9 10 13 16 20 24 26.3 31 34 38 42 46 50 54
Meters from Start Point

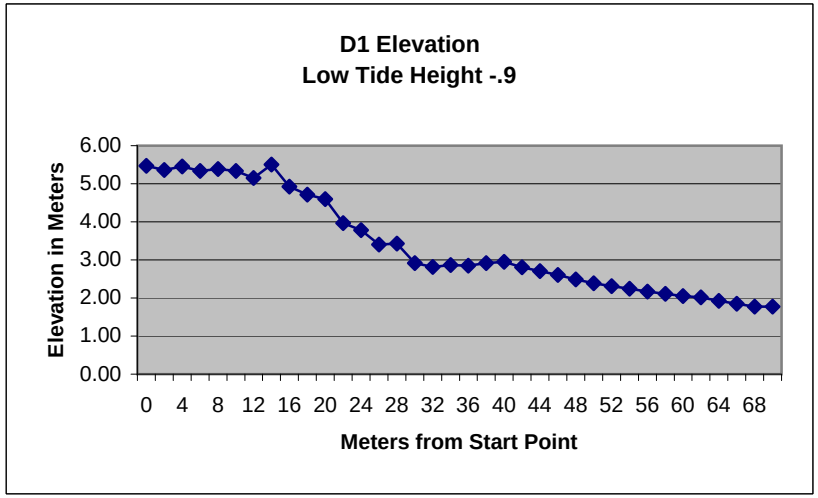

E2 Elevation
Low Tide Height -2.3
Elevation in Meters
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76
Meters from Start Point

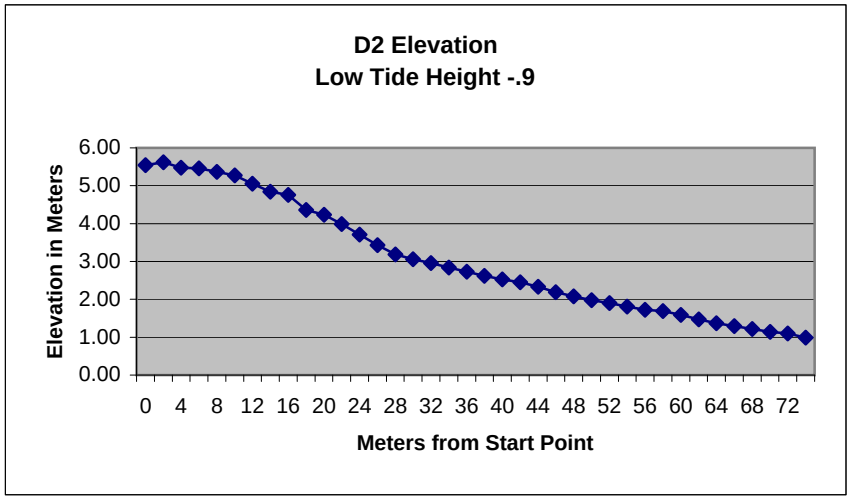

E3 Elevation
Low Tide Height -2.3
Elevation in Meters
7
6
5
4
3
2
1
0
0.5 4 7.9 11 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86
Meters from Start Point

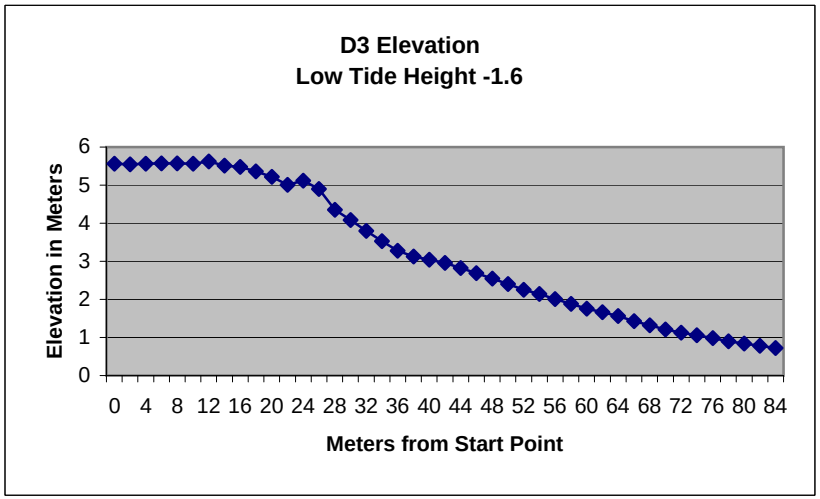

T1 Real Elevation
Low Tide Height -1.7
Elevation in Meters
0 1 2 3 4 5 6 7
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60
Meters from Start Point

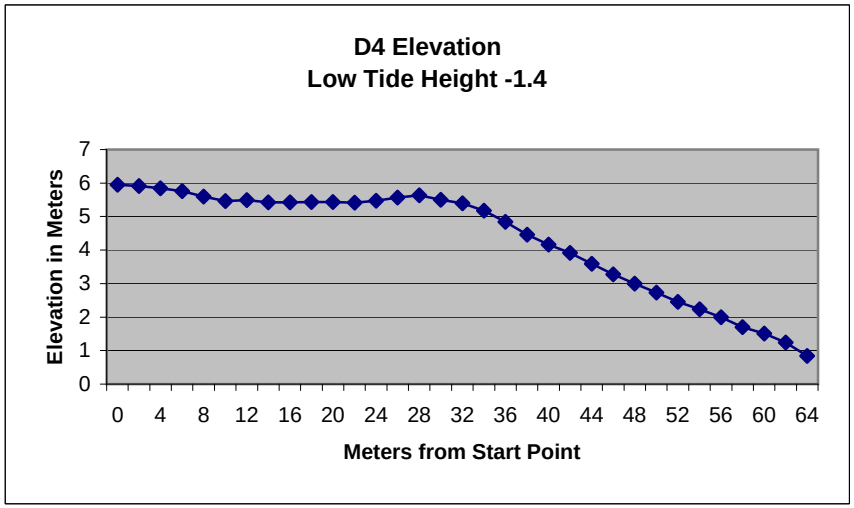

T2 Real Elevation
Low Tide Height -1.7
Elevation in Meters
0 1 2 3 4 5 6 7
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80
Meters from Start Point

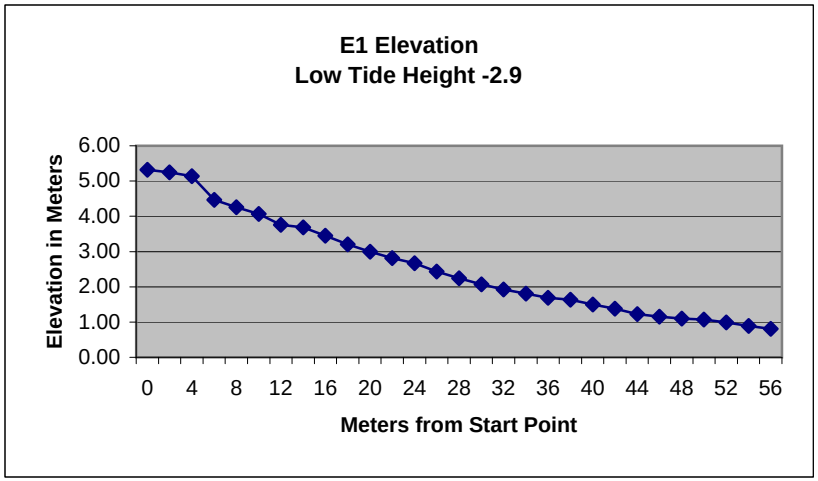

T3 Real Elevation
Low Tide Height -2.9
Elevation in Meters
0 1 2 3 4 5 6 7
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Meters from Start Point

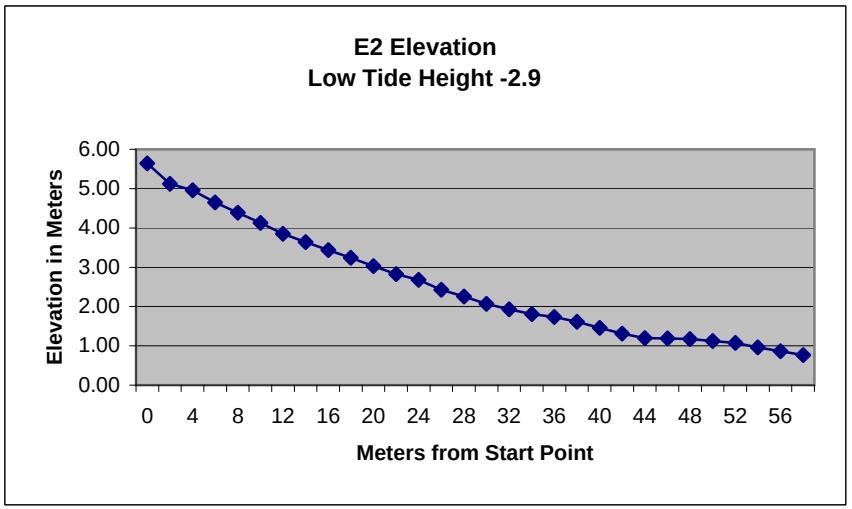

D1 Elevation
Low Tide Height -.9
Elevation in Meters
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68
Meters from Start Point

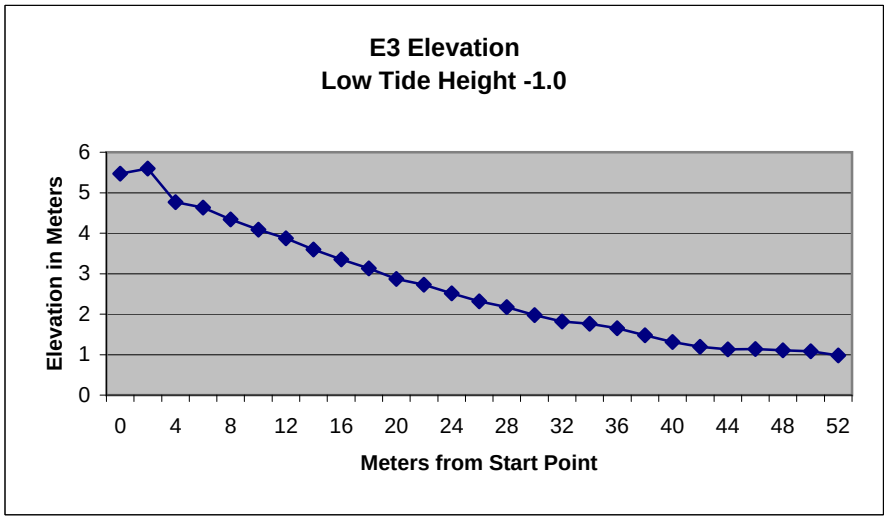

D2 Elevation
Low Tide Height -.9
Elevation in Meters
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72
Meters from Start Point

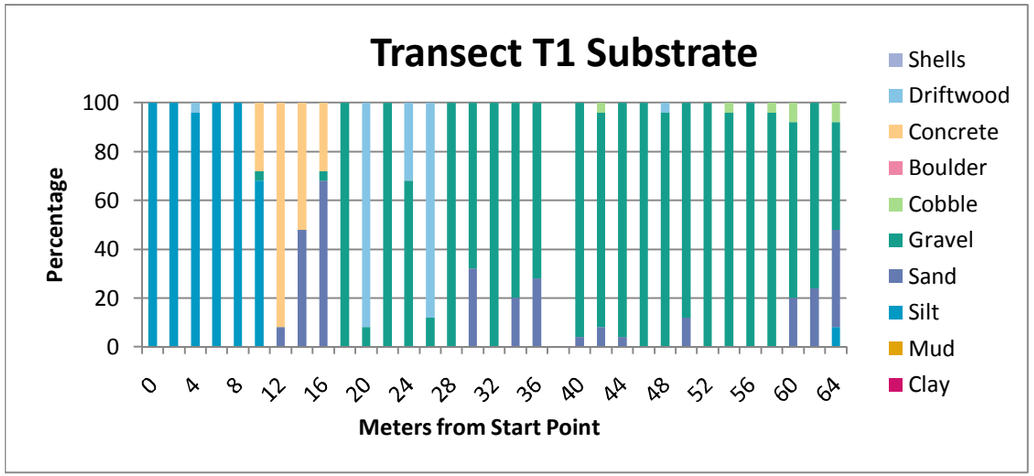

D3 Elevation
Low Tide Height -1.6
Elevation in Meters
6
5
4
3
2
1
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84
Meters from Start Point

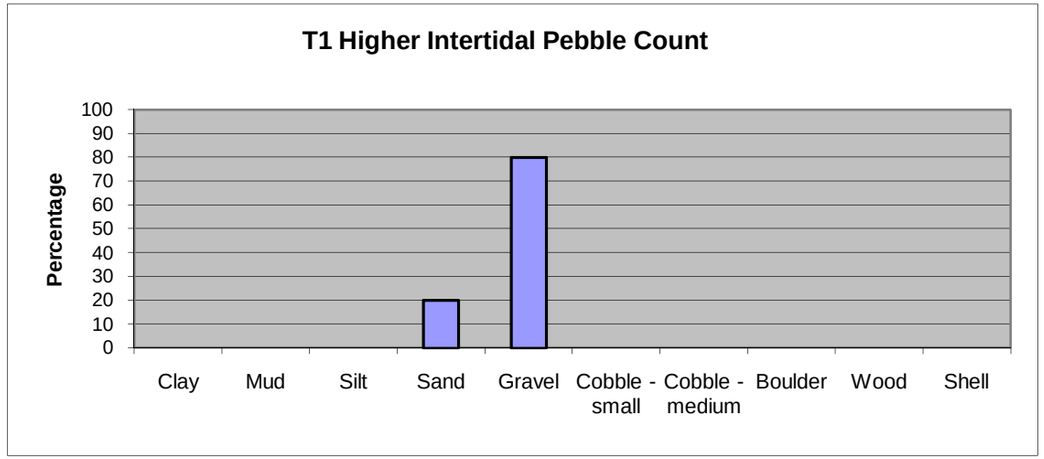

D4 Elevation
Low Tide Height -1.4
Elevation in Meters
7
6
5
4
3
2
1
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64
Meters from Start Point

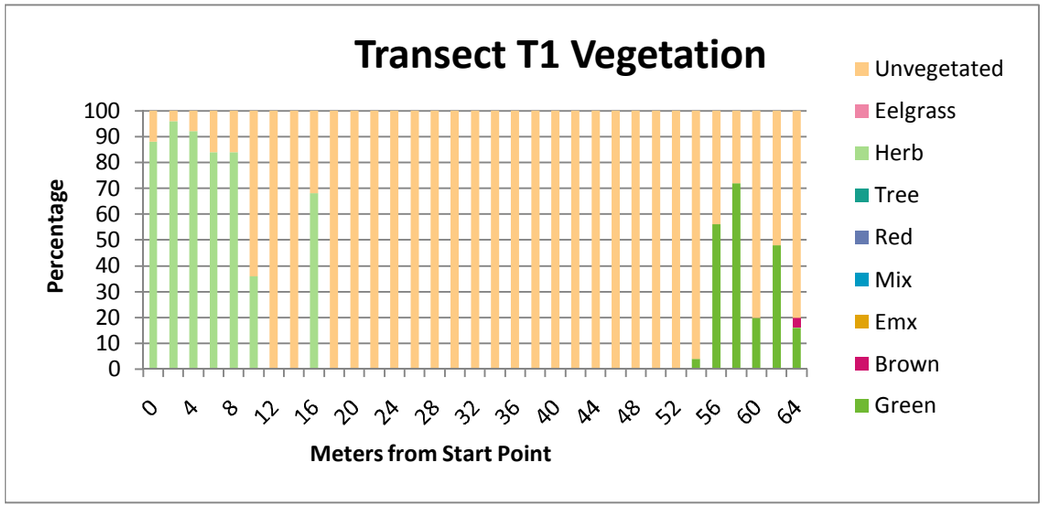

E1 Elevation
Low Tide Height -2.9
Elevation in Meters
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56
Meters from Start Point

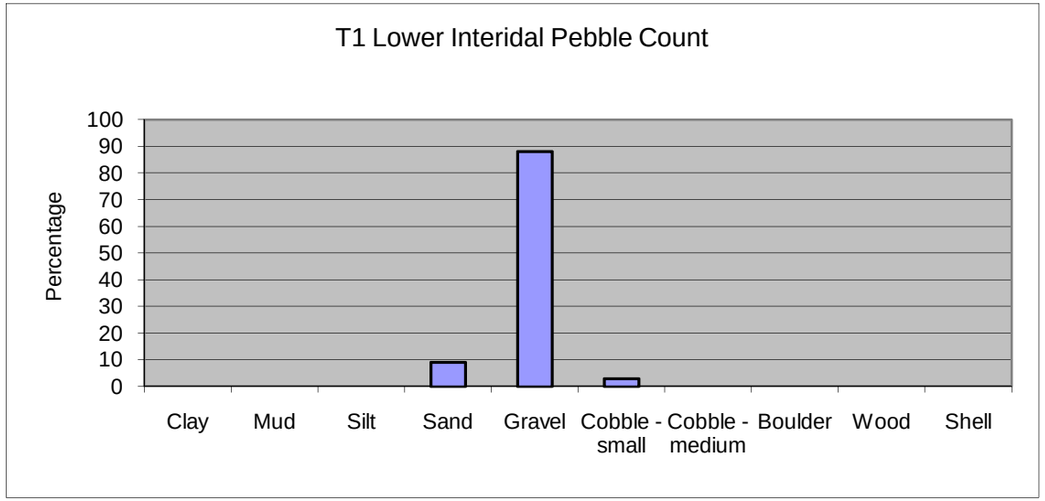

E2 Elevation
Low Tide Height -2.9
Elevation in Meters
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56
Meters from Start Point

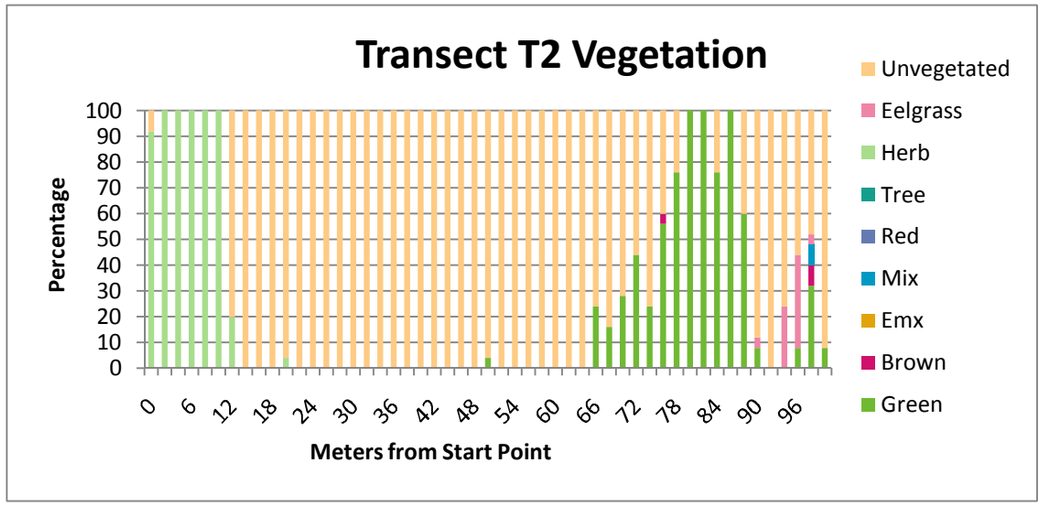

E3 Elevation
Low Tide Height -1.0
Elevation in Meters
6
5
4
3
2
1
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52
Meters from Start Point

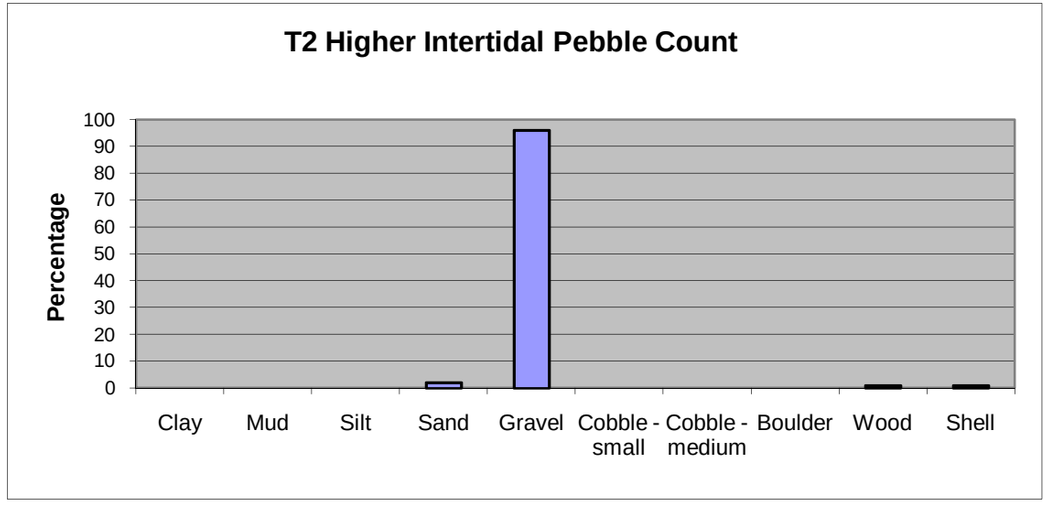

Transect T1 Substrate
Percentage
Meters from Start Point
Shells
Driftwood
Concrete
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay

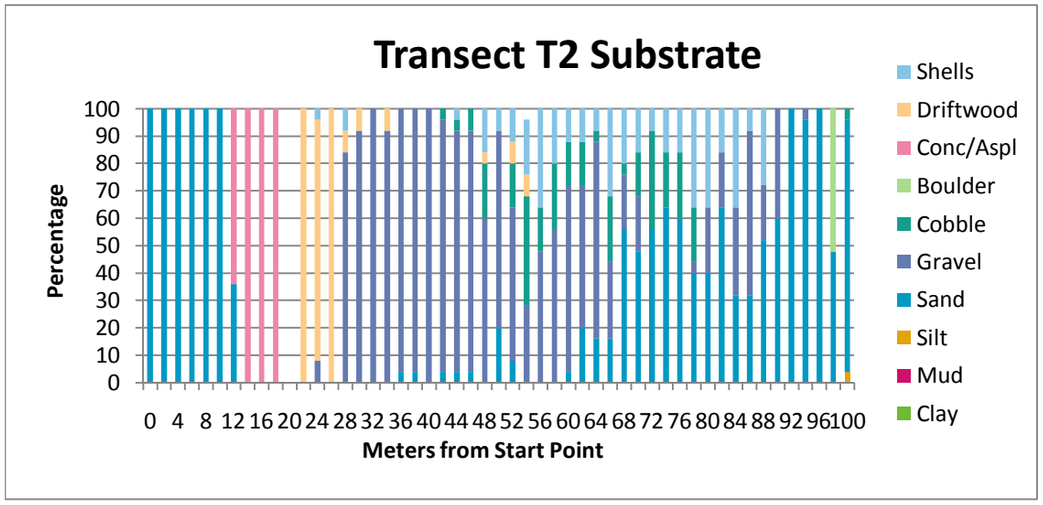

T1 Higher Intertidal Pebble Count
Percentage
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

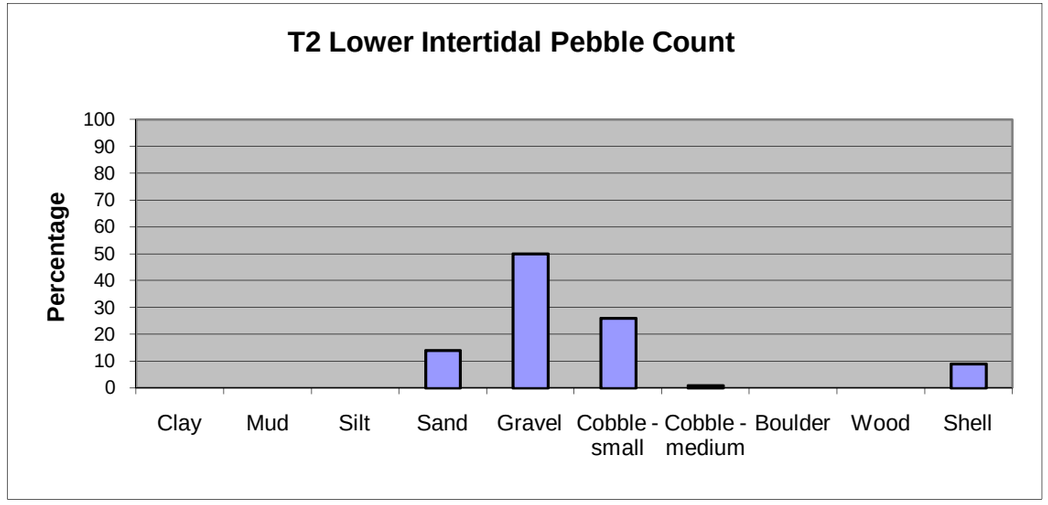

Transect T1 Vegetation
Percentage
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

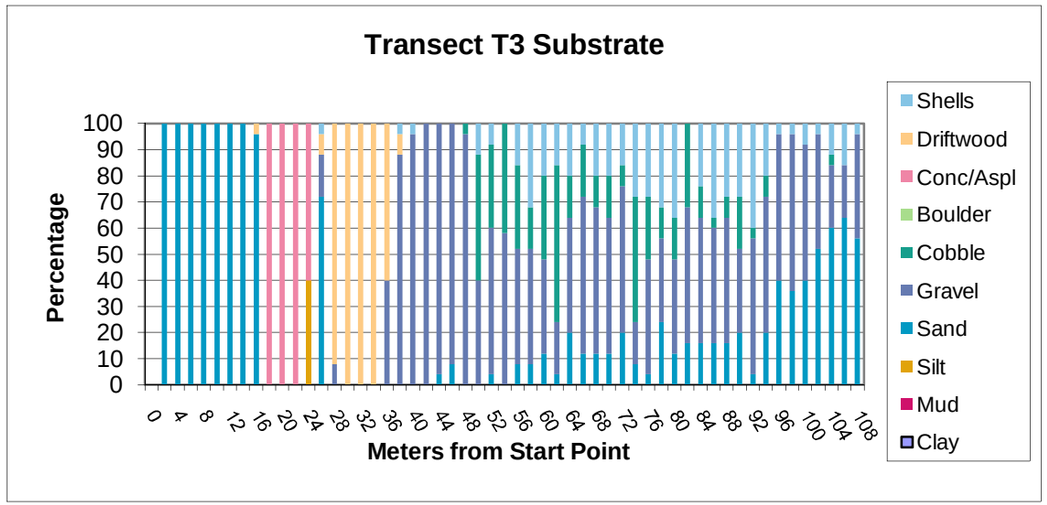

T1 Lower Interidal Pebble Count
Percentage
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

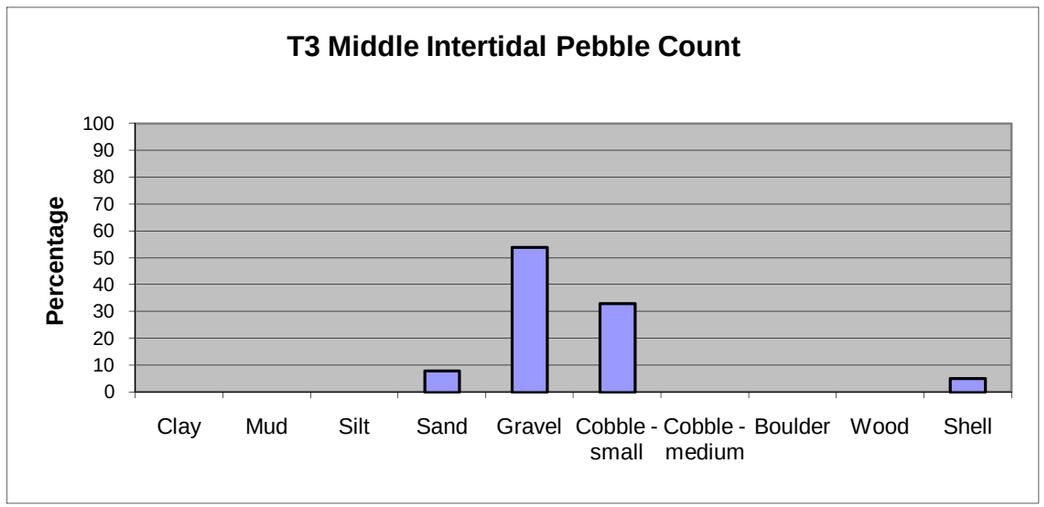

Transect T2 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 6 12 18 24 30 36 42 48 54 60 66 72 78 84 90 96
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

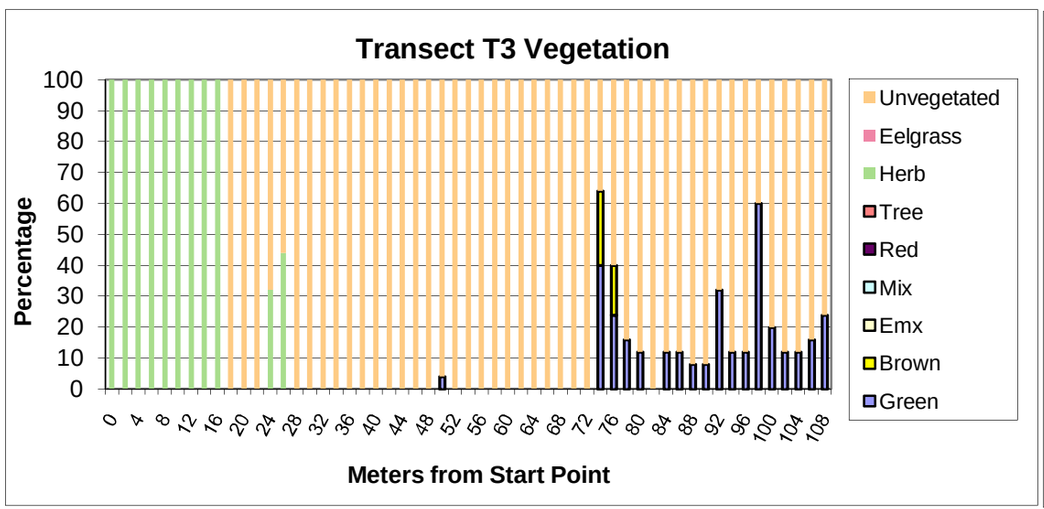

T2 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

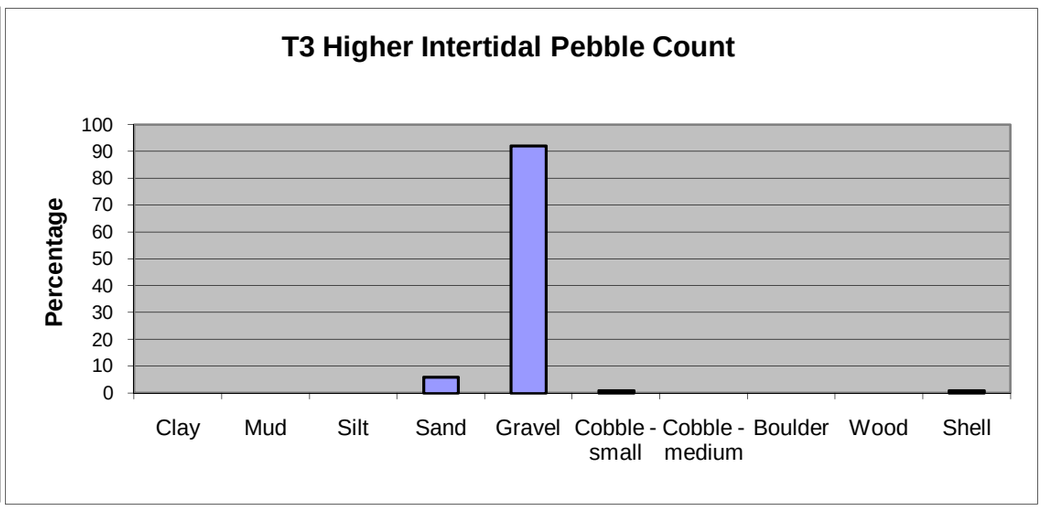

Transect T2 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Meters from Start Point
Shells
Driftwood
Conc/Aspl
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay

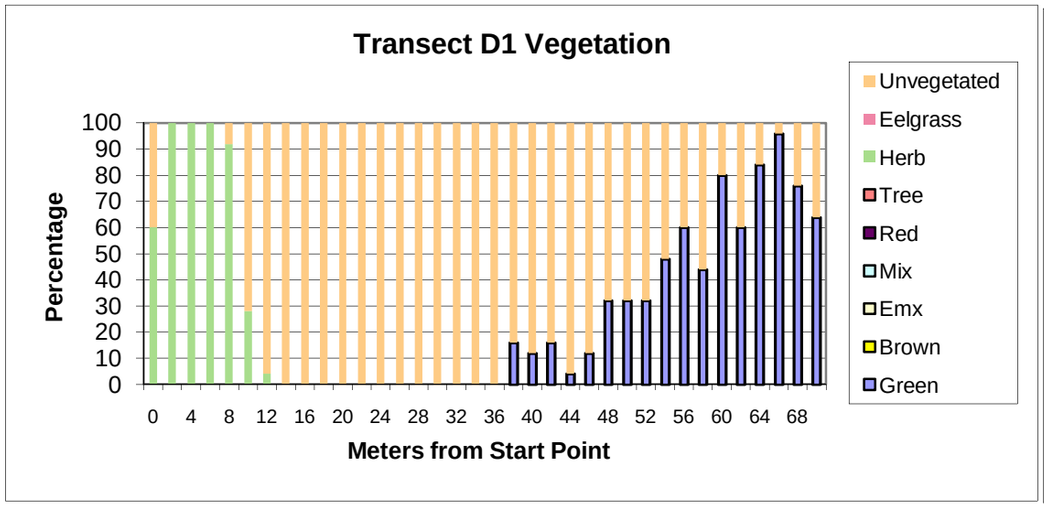

T2 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

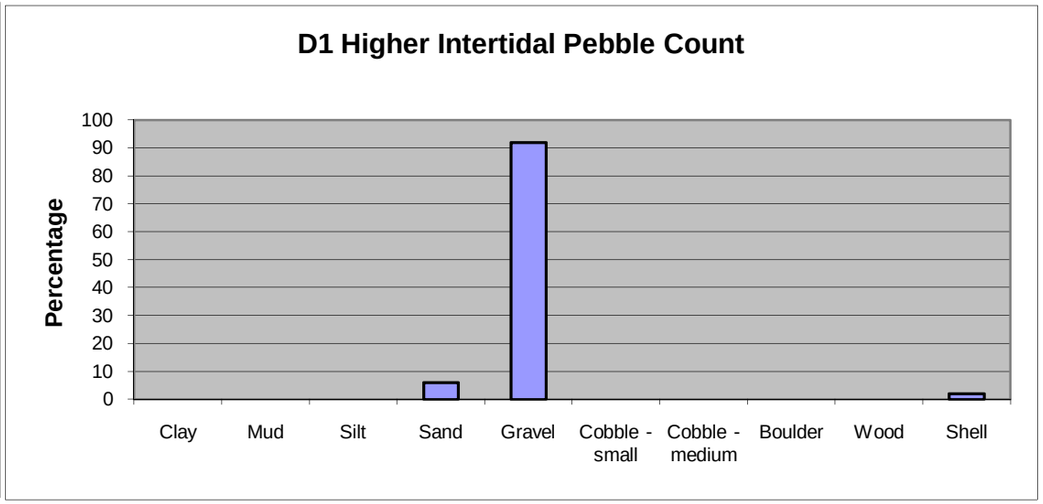

Transect T3 Substrate
Percentage
Meters from Start Point
Shells
Driftwood
Conc/Aspl
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay

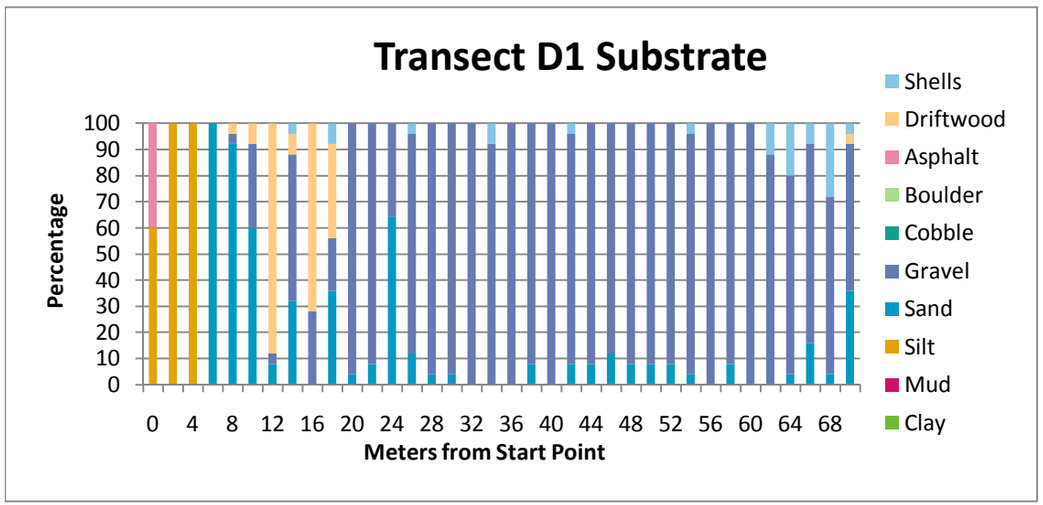

T3 Middle Intertidal Pebble Count
Percentage
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

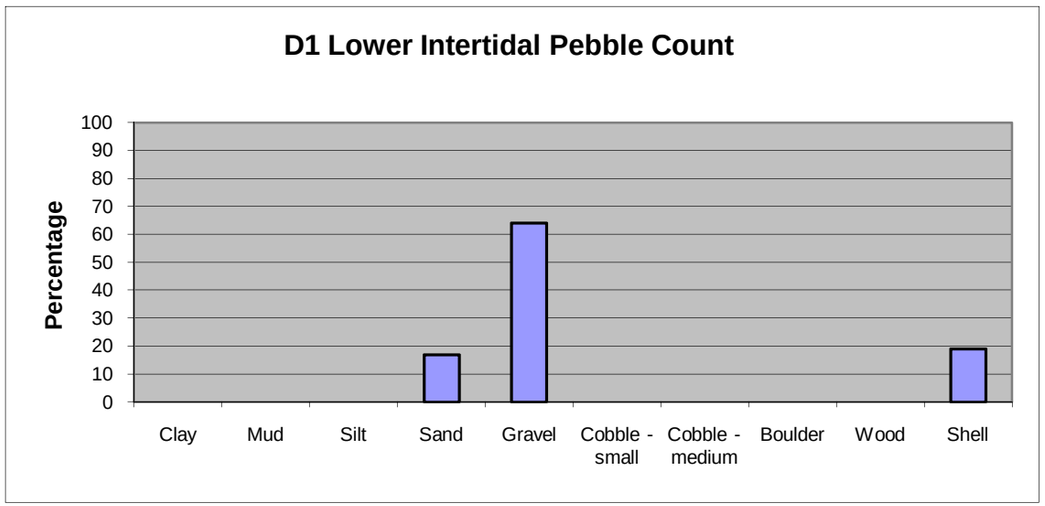

Transect T3 Vegetation
Percentage
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

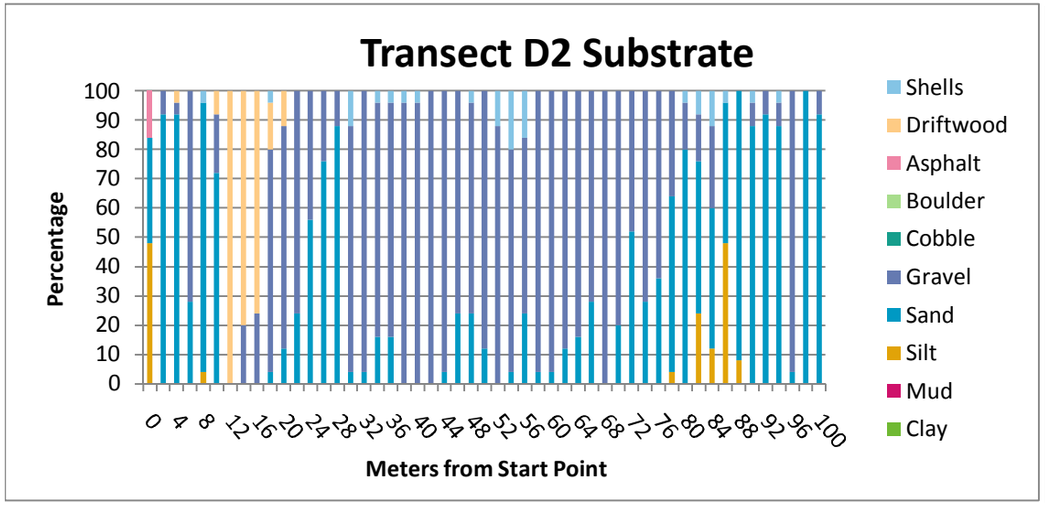

T3 Higher Intertidal Pebble Count
Percentage
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

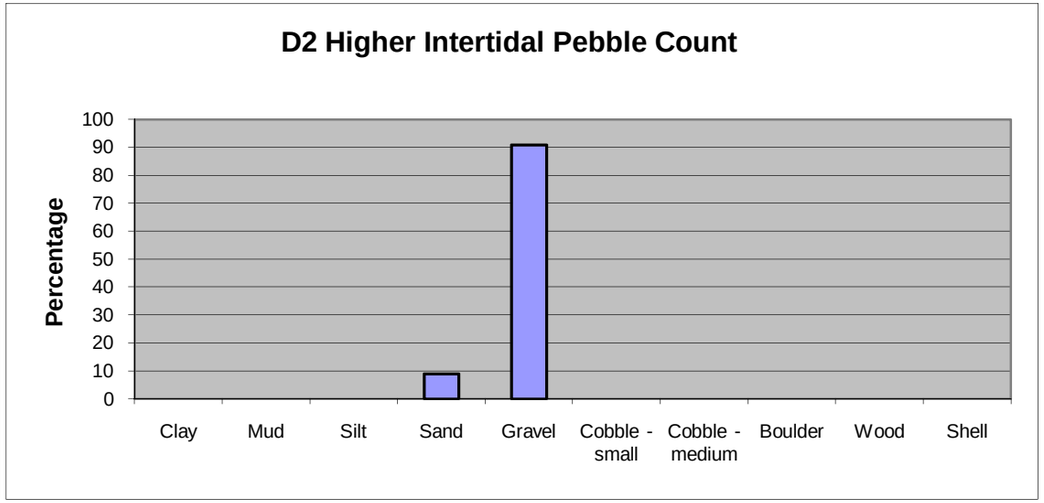

Transect D1 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

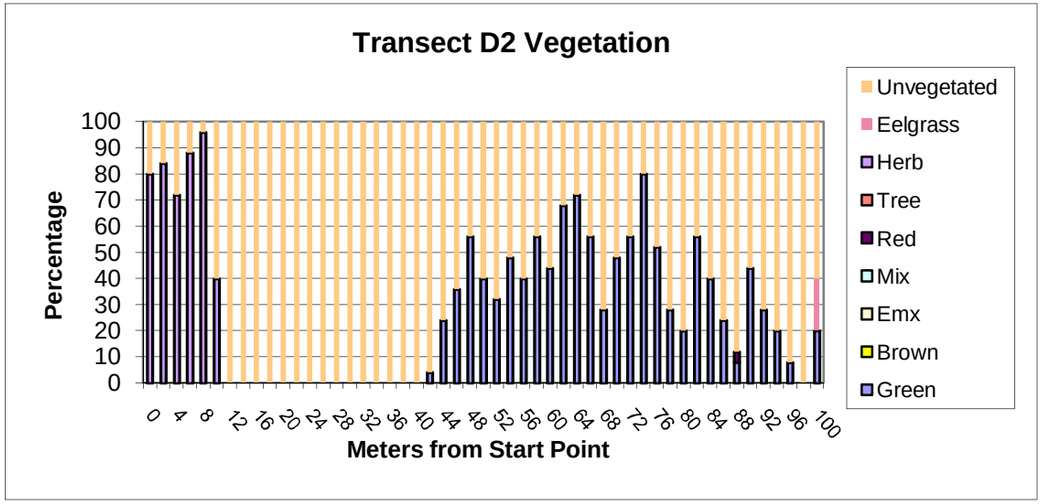

D1 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

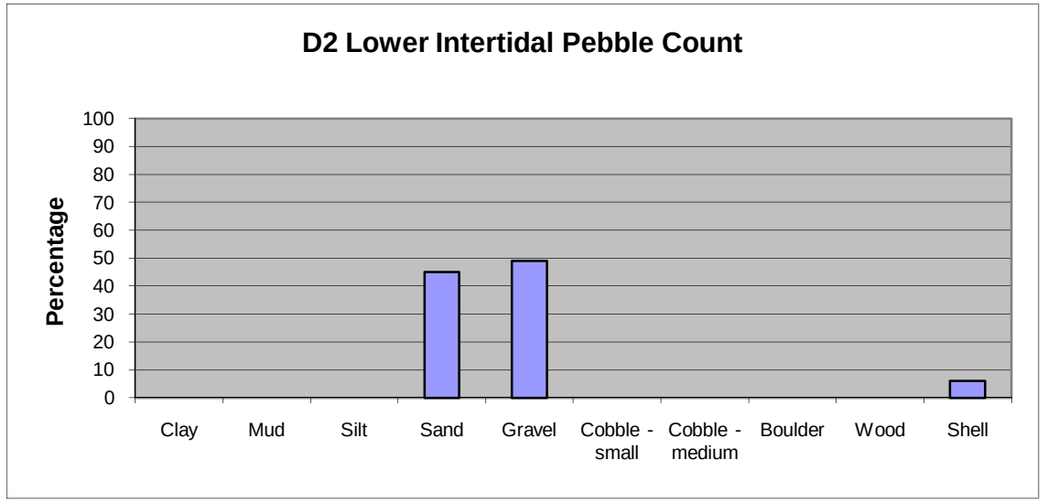

Transect D1 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68
Meters from Start Point
Shells
Driftwood
Asphalt
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay

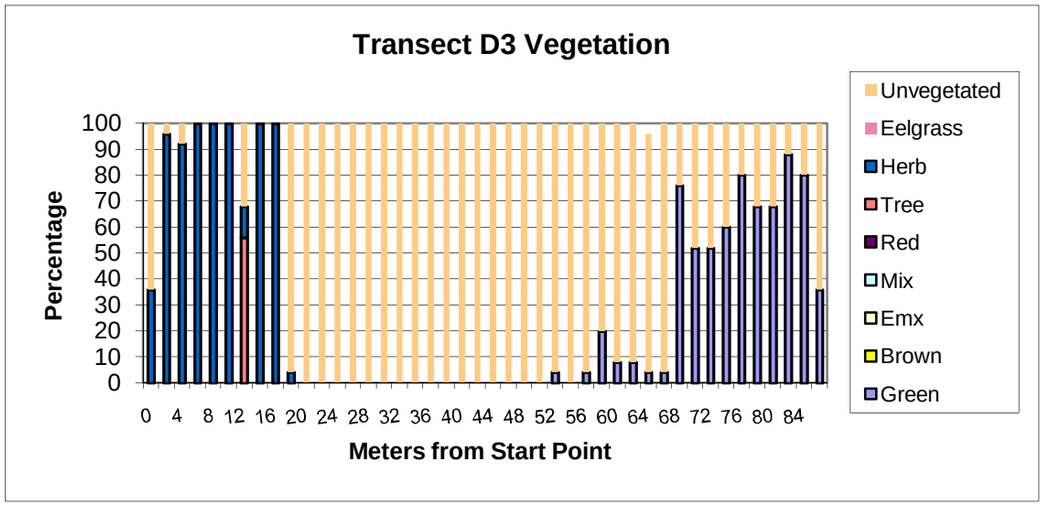

D1 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

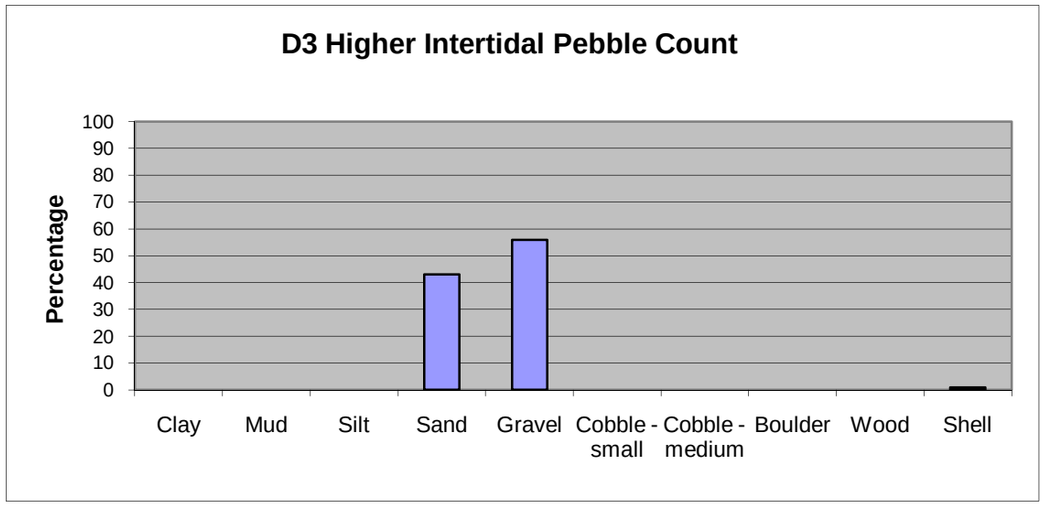

Transect D2 Substrate
Percentage
Meters from Start Point
Shells
Driftwood
Asphalt
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay

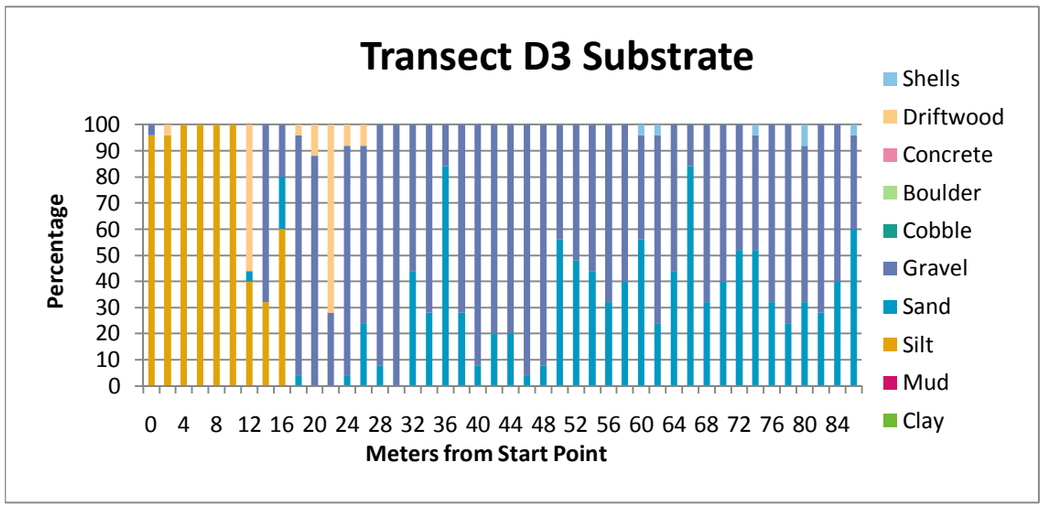

D2 Higher Intertidal Pebble Count
Percentage
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

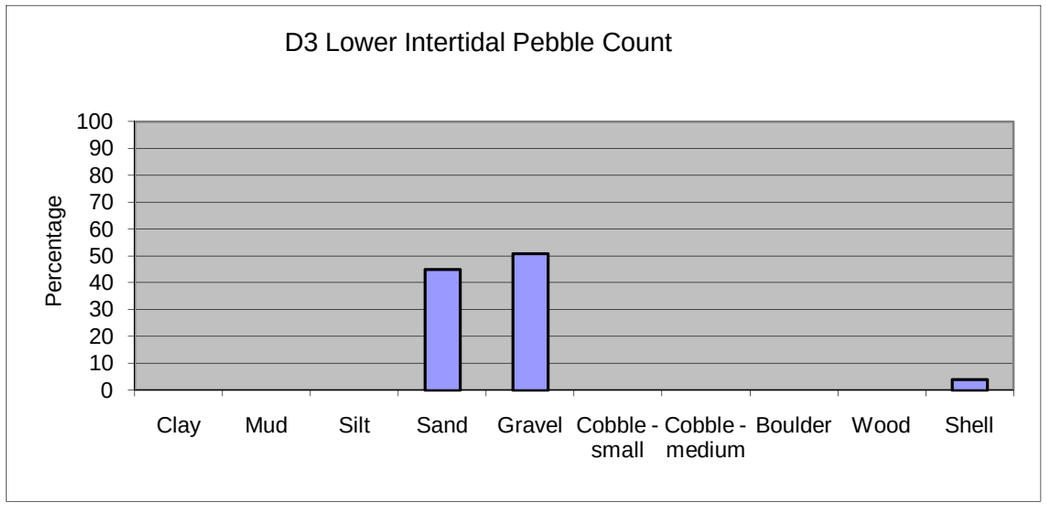

Transect D2 Vegetation
Percentage
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

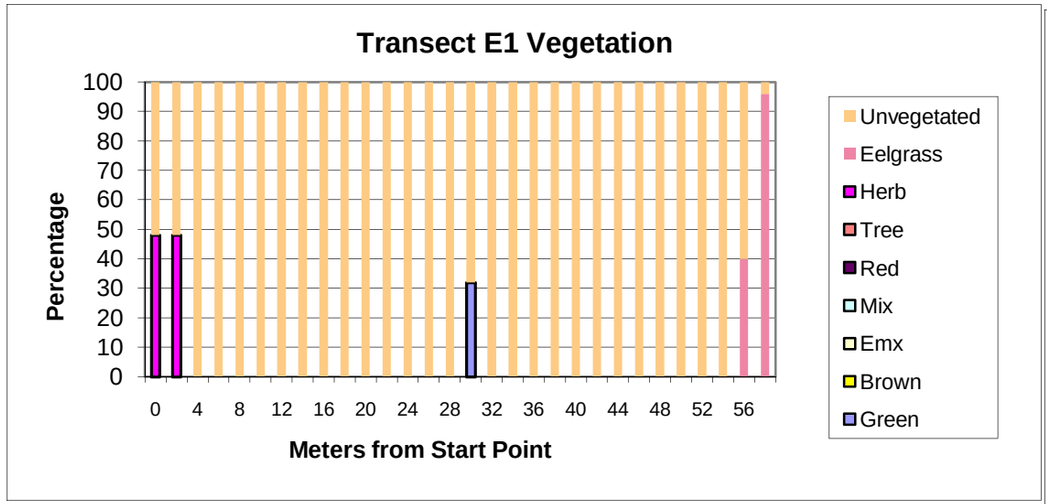

D2 Lower Intertidal Pebble Count
Percentage
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

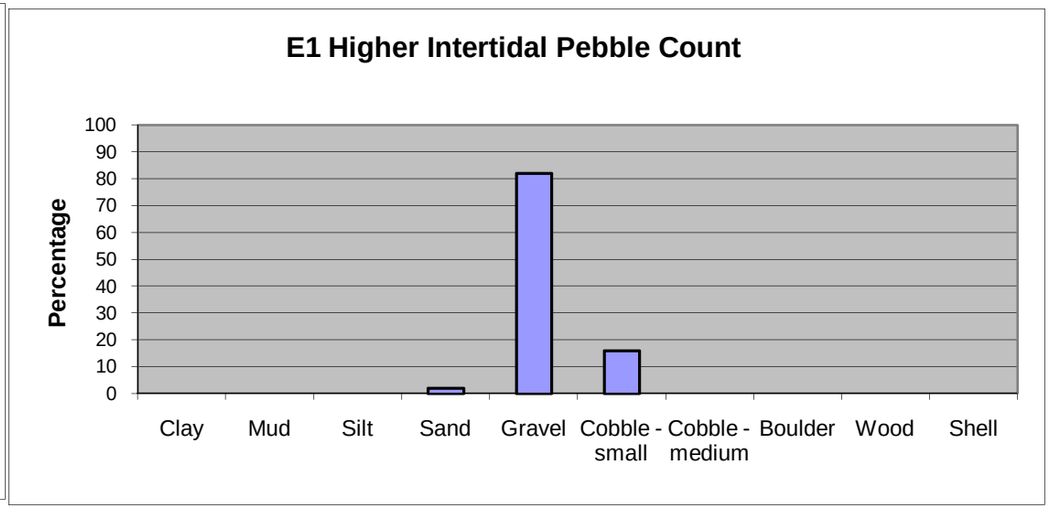

Transect D3 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

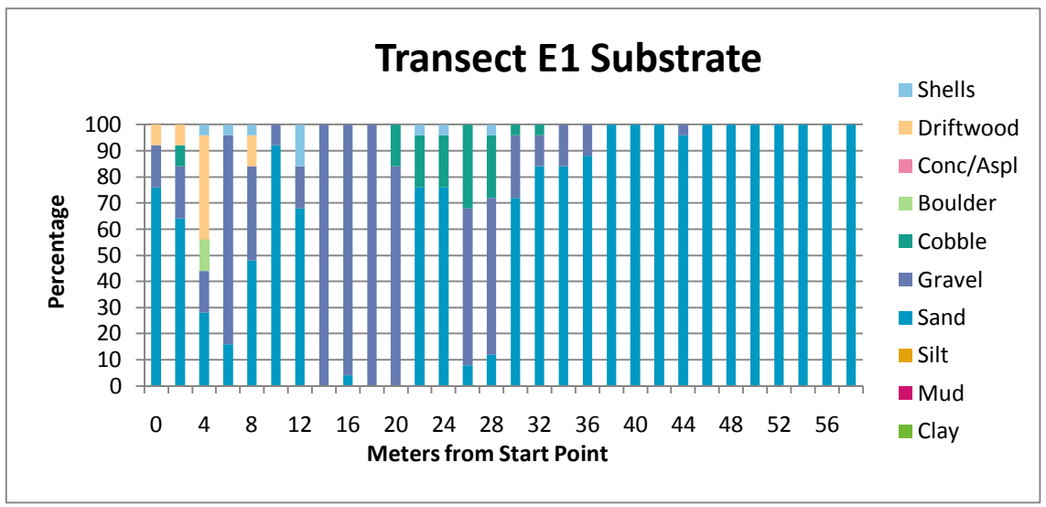

D3 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

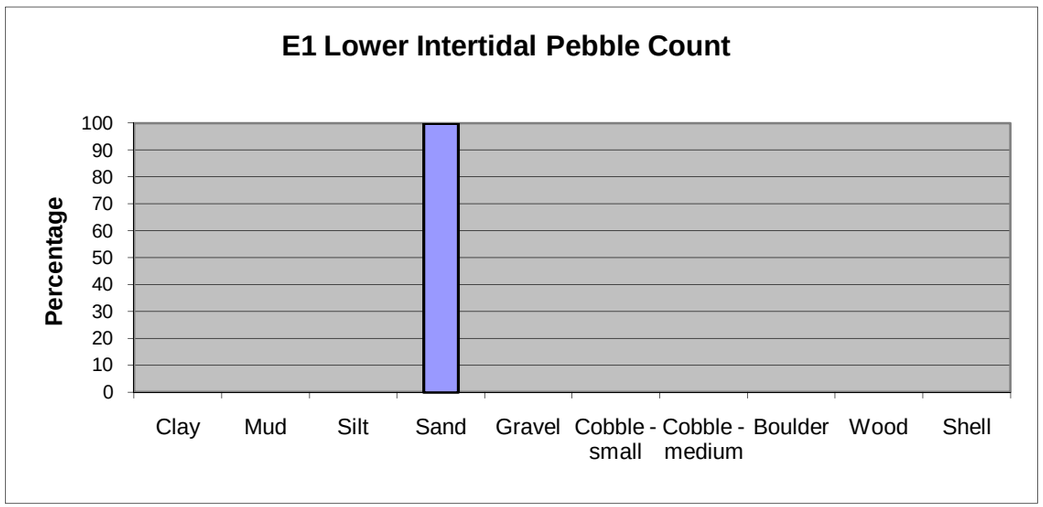

Transect D3 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84
Meters from Start Point
Shells
Driftwood
Concrete
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay

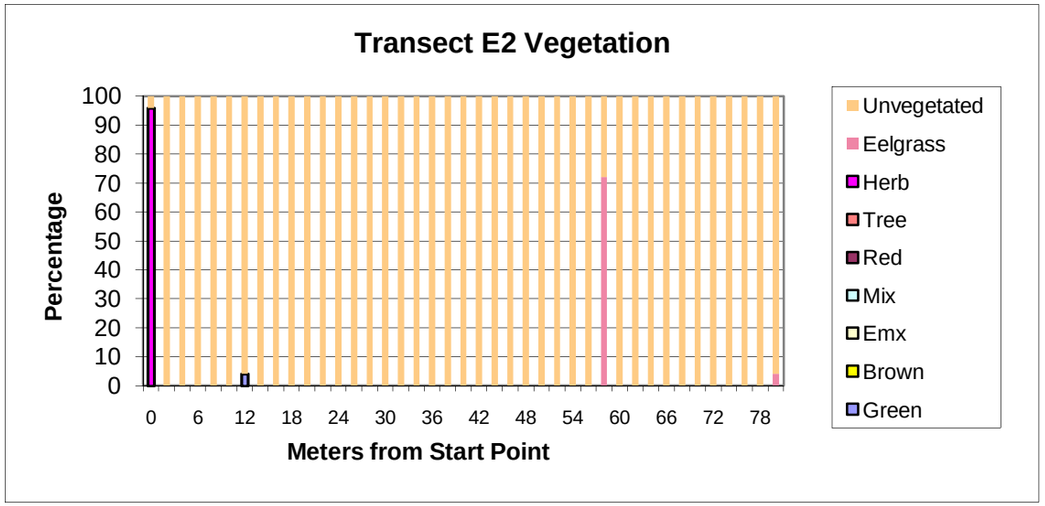

D3 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

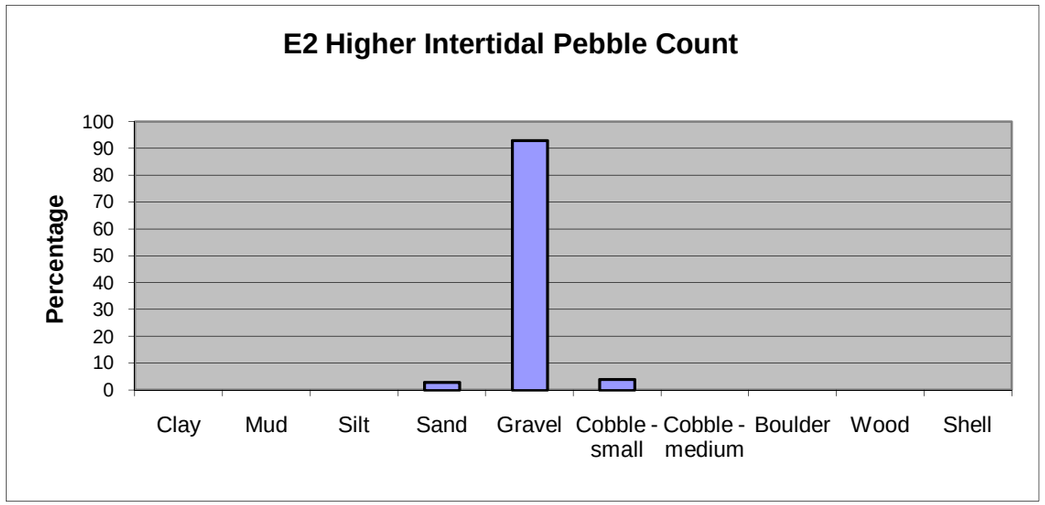

Transect E1 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

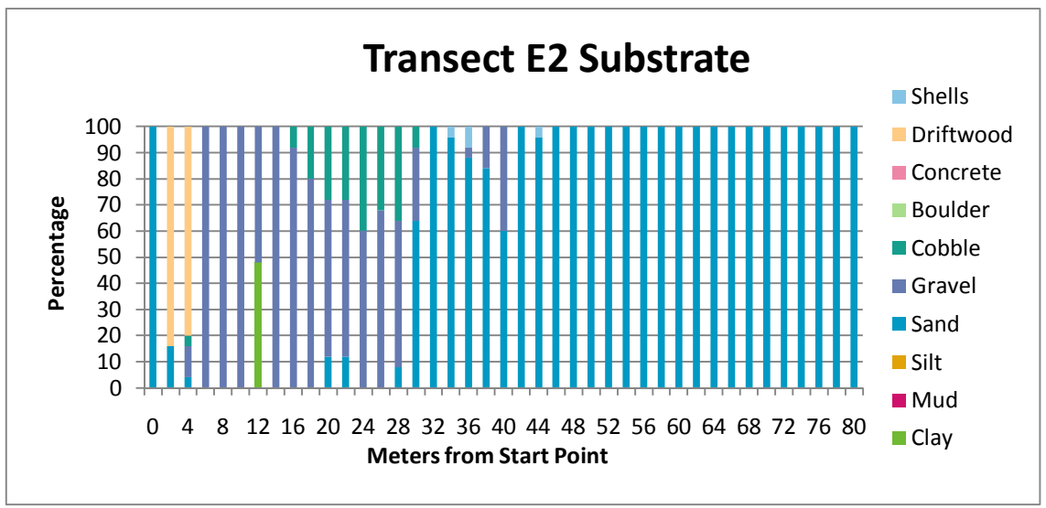

E1 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

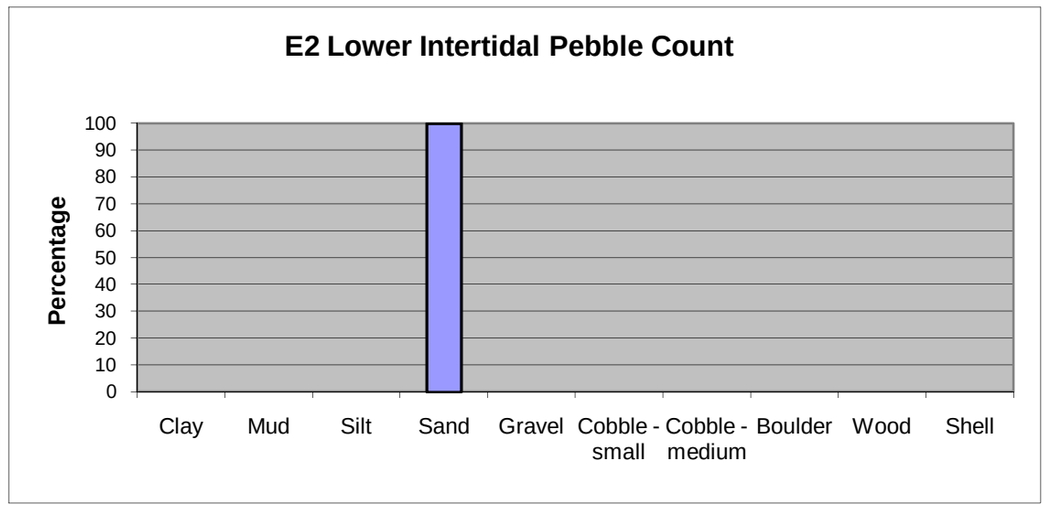

Transect E1 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56
Meters from Start Point
Shells
Driftwood
Conc/Aspl
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay

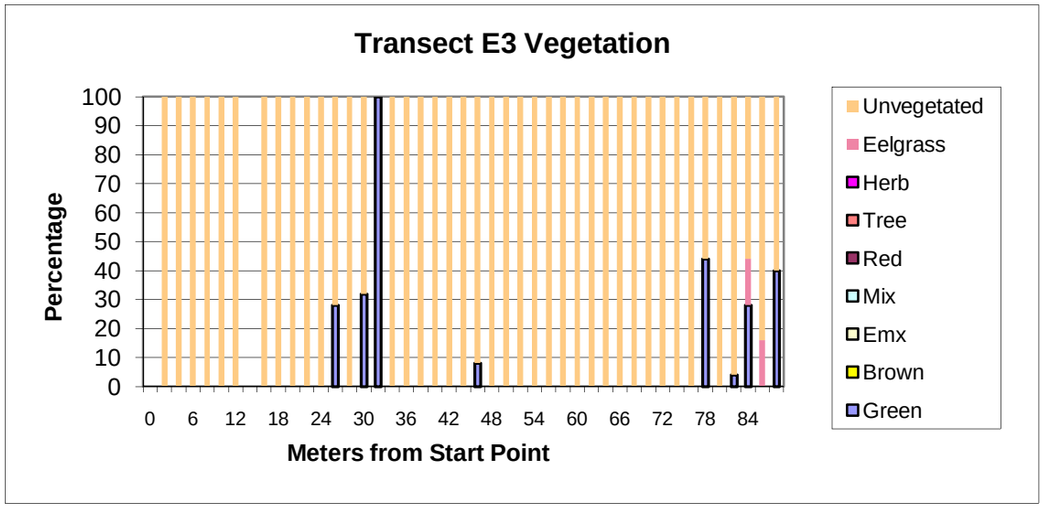

E1 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

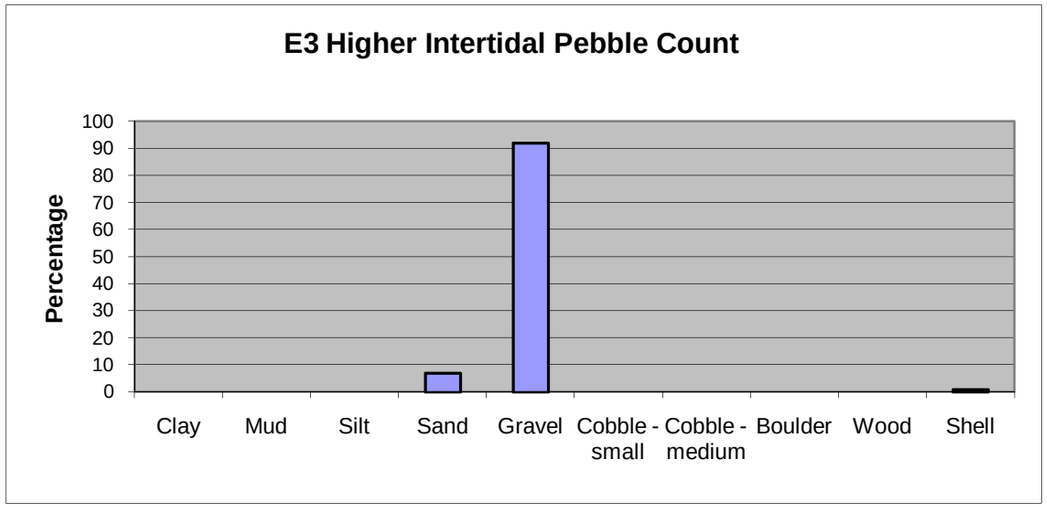

Transect E2 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 6 12 18 24 30 36 42 48 54 60 66 72 78
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green

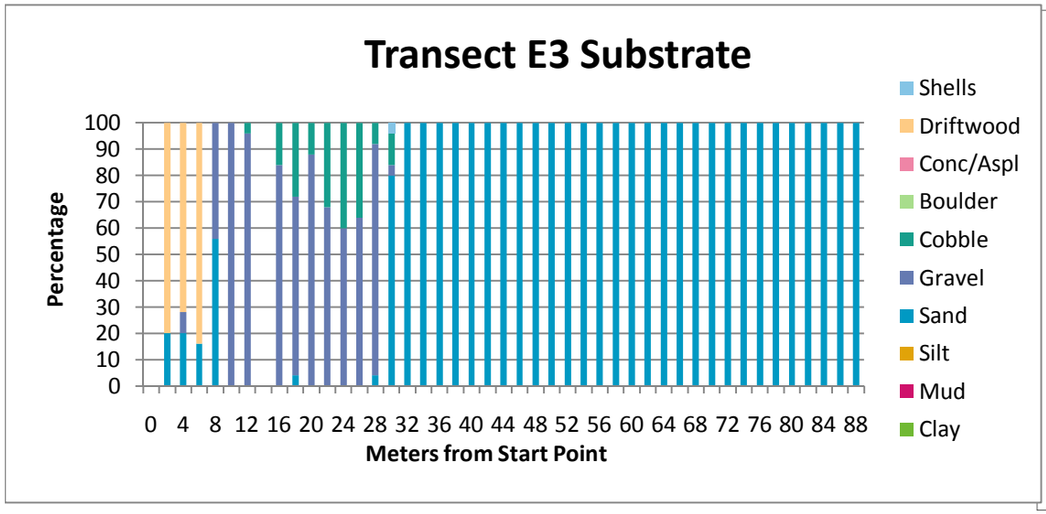

E2 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

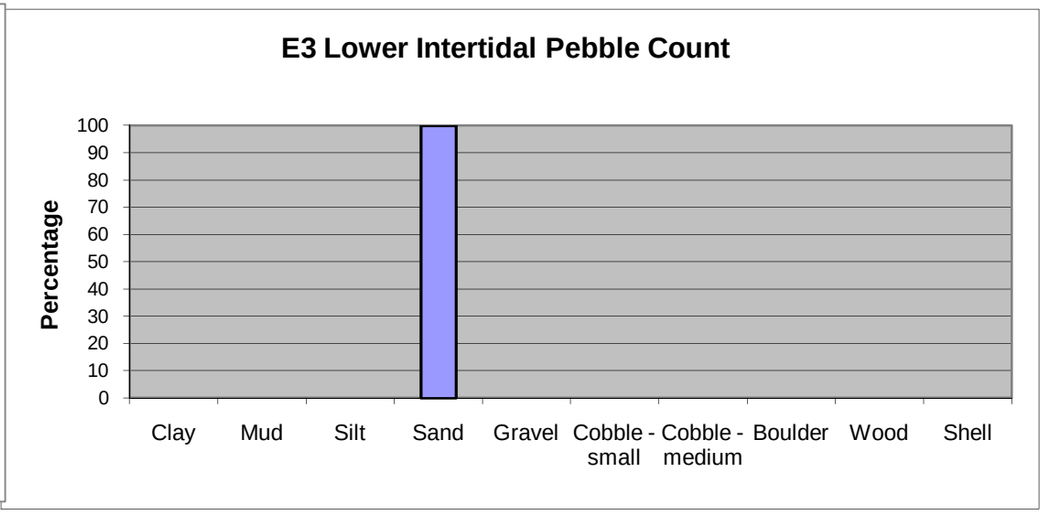

Transect E2 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80
Meters from Start Point
Shells
Driftwood
Concrete
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay


E2 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell


Transect E3 Vegetation
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 6 12 18 24 30 36 42 48 54 60 66 72 78 84
Meters from Start Point
Unvegetated
Eelgrass
Herb
Tree
Red
Mix
Emx
Brown
Green


E3 Higher Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell


Transect E3 Substrate
Percentage
100
90
80
70
60
50
40
30
20
10
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88
Meters from Start Point
Shells
Driftwood
Conc/Aspl
Boulder
Cobble
Gravel
Sand
Silt
Mud
Clay


E3 Lower Intertidal Pebble Count
Percentage
100
90
80
70
60
50
40
30
20
10
0
Clay
Mud
Silt
Sand
Gravel
Cobble - small
Cobble - medium
Boulder
Wood
Shell

Pre-Restoration Monitoring

Training **06/16/10** 9:30 AM - 3:30 PM Wednesday	**Kayak** **06/24/10** 9:00 AM - 2:00 PM Thursday	**Kayak** **06/25/10** 9:00 AM - 2:00 PM Friday	**Kayak** **07/12/10** 9:30 AM - 2:30 PM Monday	**Kayak** **07/14/10** 11:00 AM - 4:00 PM Wednesday	**Kayak** **08/10/10** 9:30 AM - 2:30 PM Tuesday	**Kayak (Back-up Date)** **08/11/10** 10:30 AM -3:30 PM Wednesday
April	April	Apil	Bob	Ben L.	Craig	Bob O.
Aubrery	Ben	Ben	Craig	Craig	Erin	Craig
Bea	Bob O.	Bob O.	Fred	Fred	Fred	Fred
Ben L.	Craig	Craig	Leslie	Leslie	Jim O.	Lynn M.
Craig	Jim O.	Leslie	Lucinda	Lucinda	Lynn M.	Mary H.
Dave C.	Leslie	Lucinda	Lynn M.	Lynn M.	Margy O.	Sandy E.
Erin G.	Lucinda	Lynn M.	Mary H.	Mary H.	Mary H.	
Fred G.	Lynn M.	Mary H.	Paul (PPS)	Paul (PPS)	Sandy E.	
Jim O.	Mary H.	Paul (PPS)	Susan R.	Erin		
Leslie R.	Tom C.	Sandy E.		Susan R.		
Lucinda		Wally D.		April		
Lynn M.						
Margy O.						
Mary H.						
Michael M.						
Sandy E.						
Stefan D.						
Steve J.						
Susan R.						
Tom Carter						

Training attendees will sign up on 6/16 for scheduled monitoring dates.
Two additional days of monitoring at Mukilteo Lighthouse Park have been eliminated from this schedule.