

Sound Water Stewards Training 2020  
Whidbey Island and Camano Island  
Marine Biology, Intertidal Life, Intertidal Monitoring  
(Follows PowerPoint)  
By David Brubaker

**Morning Session**

**The Intertidal Zone:**

Tidal Patterns Create Several Zones

Upland, Supra Tidal, Intertidal, and Subtidal

Due to influences of land and sea, the intertidal zone contains a rich assemblage of biodiversity and is highly productive

Rocky Shore Zonation:

Splash zone, High tide zone, mid-tide zone, low tide zone, and subtidal zone

Each zone is characterized by different animal and plants

Factors Affecting Rocky Intertidal Zonation Patterns

1. Intertidal zones

Immersion in seawater

Emersion in air

2. Bio-bands of intertidal algae and animals

Diversity determined in part by presence of Keystone predator

Upper end of species range determined by abiotic tolerances to:

Temperature and desiccation

Lower end of species range determined by biotic interactions:

Predation and competition

Interaction between 5 species:

|            |                       |
|------------|-----------------------|
| Chthamalus | Little brown barnacle |
| Balanus    | Acorn barnacle        |
| Mytilus    | Blue mussel           |
| Nucella    | Welk                  |
| Pisaster   | Sea star              |

Relationship between community diversity and keystone species

Removal of a keystone species leads to increase in species richness

### **Identification of Intertidal Plants and Animals:**

Classification and species names

PORIFERA

Sponges

Halichondria sp.

Bread-crumb sponge

## CNIDARIA:

### Anemones

*Anthopleura elegantissima*      aggregating anemone

## Worms:

Polyclads (flatworms/(PLATHELMINTHES))

Nemertean (ribbon worms/(NEMERTINA))

Polychaeta (segmented worms/(ANNELIDA))

Sea nymph, blood worm, feather duster

## MOLLUSCA

### Chitons (polyplacoderma)

*Mopalia* sp.      mossy chiton

*Tonicella lineata*      lined chiton

### Limpets (gastropoda)

*Lottia digitalis*      finger limpet

*Lottia pelta*      shield limpet

*Tectura persona*      masked limpet

*Tectura scutum* plate limpet

Snails (gastropoda)

*Littorina scutulata* checkered periwinkle

*Littorina sitkana* sitka periwinkle

*Nucella ostrina* striped dog-winkle

*Euspira lewisii* Lewis's moon snail

Nudibranchs (gastropoda)

*Triopha catalinae* clown nudibranch

*Hermisenda crassicornis* opalescent nudibranch

*Onchidoris bilamellata* barnacle eating nudibranch

Clams and Mussels (bivalvia)

*Mytilus trossulus* pacific blue mussel

*Clinocardium nutallii* heart cockle

*Saxidomus gigantea*

butter clam

*Protothaca staminea*

pacific littleneck

## ARTHROPODA

### Arachnids:

*Neomolgus littoralis*

red velvet mite

### Crustaceans:

#### Isopods

*Gnoringosphaeroma oregonense* pill bug isopod

*Idotea wosnesenckii*

rockweed isopod

#### Amphipods

*Traskorchestia traskinana*

beach hopper

#### Barnacles

*Balanus glandula*

acorn barnacle

#### Shrimp

*Heptacarpus* sp.

Broken-back shrimp

Neotrypaea californiensis      ghost shrimp

## Crabs

Hemigrapsus nudus      purple shore crab

Carsinus maenes      European green crab (invasive)

Metacarcinus magister      dungeness crab  
(was Cancer magister)

Cancer productus      red rock crab

Scrya acutifrons      sharp-nose crab

Oregonia gracilis      graceful decorator crab

Pagurus sp      hermit crab

## ECHINODERMATA

### Sea Stars

*Pisaster ochraceus* ochre, purple star

*Evasterias trosceii* mottled sea star

*Crossaster pappus* rose star

*Pycnopodia helianthoides* sunflower star

*Amphipholis* sp. Brittle Star (serpent star)

### Sea Urchins

*Strongylocentrotus droebachiensis* green sea urchin

*Mesocentrotus franciscanis* red sea urchin

*Strongylocentrotus purpuratus* purple sea urchin

Sea Cucumber

*Cucumaria miniata*

orange sea cucumber

Sand Dollar

*Dendraster excentricus*

sand dollar

PLANT KINGDOM

Green Alga

*Ulva* sp

sea lettuce

Brown Alga

*Fucus* sp.

rock weed

*Saccharina latissima*

sugar kelp

*Nereocystis luetkeana*

Bull kelp

*Sargassum* sp.

Wireweed

Red Alga

Porphyra sp.

Laver

Mastocarpus sp.

Turkish washcloth (blade form)

Mastocarpus papillatus

tar spot (encrusting form)

Hildenbrandia sp

rusty rock

Marine Plants (roots, stems, leaves)

Zostera marina

eelgrass

Zostera japonica

japanese eel grass

Phyllospadix sp.

Surfgrass

Spartina sp

invasive cord grass

## Afternoon Session

### Introduction to Intertidal Monitoring

SWS Citizen Science Legacy project. Uses the protocol developed by SWS science members and marine scientists at UW Friday Harbor Marine Labs. Published and used since 2003.

Protocol is used as is or in part by many other regional groups: NW Straits, Snohomish Beach Watchers, DNR Aquatic Reserves (Cherry Pt & Fidalgo Bay), Harbor Wild Watch, and Sea Grant.

New expanded goal (slide) (a 3-part goal):

The goal of intertidal monitoring is: 1) To collect trend data at specific beach sites in Island County documenting changes, if any, to beach slope, substrate, and biodiversity following the Sound Water Stewards (SWS) monitoring Guidelines and Procedures, 2) to provide the SWS volunteers the opportunity to continue learning about near shore ecology and practicing citizen science skills, and 3) to educate our larger community about our beaches and encourage caring and stewardship.

How many beaches do we monitor? 12 on Camano and 10+ on Whidbey once each year at the summer low tide season from May through August.

Data held in data base with SWS—efforts now to develop regional data base to upload any Intertidal monitoring data for anyone to use.

Basics of the monitoring protocol (guidelines and procedures) (same location each year)

**Profile and Quadrat Layout  
Camano Island State Park #1 (2007)**

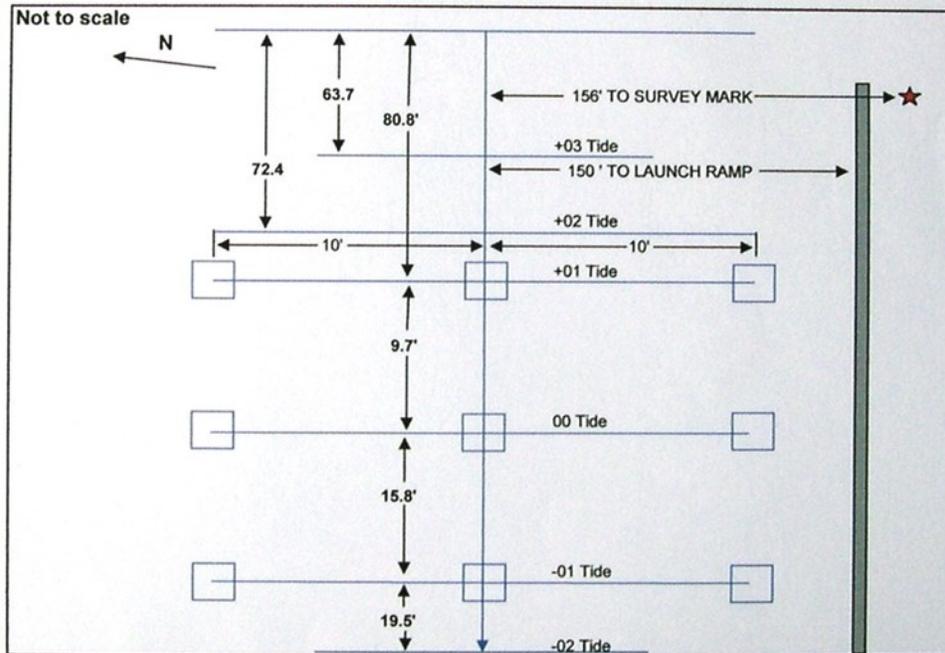
**Latitude:** N 48°07.473  
**Longitude:** W 122°29.698  
**WA DNR classification:** Estuarine-Mixed Coarse-Open  
**Tide chart reference station:** Greenbank, Whidbey Island  
**Team coordinator:** J. Custer / D. Hoekstra

**Eelgrass:** Yes  
**Bulkhead history:** None  
**Vegetation:** Shoreplants / Natual  
**Backshore topography:** No Bank

**Directions to beach:** Enter Camano Island State Park and proceed to launch ramp area.

**Directions to start of profile line:** Proceed 156' northerly of Survey Mark or 150' northerly of top of north edge of launch ramp. You will find a 6" diameter concrete pile flush with the ground. It will have a center of 1" diameter steel. Start profile line 25' west (227° M) of concrete pile. Profile line runs 227° M to center of large white building on Whidbey Island.

**Vertical ht. reference:** The top of the 1" diameter steel is the vertical reference for this line. The top of the 1" diameter steel is 14.55 ft above MLLW.



WSU Beach Watchers Baseline Monitoring Program



**Profile line** from permanent starting point/ permanent reference point to water's edge via compass reading and sighting to fixed geological point or structure on distant shore (records slope, substrate type, presence/absence of organisms in 20 swath along line)

**Quadrats** set out in 3 transects in low tide zone (+1 ft, 0, -1ft low tide level) and equal distant apart.

(estimate % cover or numbers of attached animals and plants): surface area for attachment a premium. More quantitative measure

**Bivalve Dig:** in area of quadrat transects

**Cumulative Species List**

**Publication:**

Jason Toft J, Leska Fore, Todd Hass, Barbara Bennett, Linda Brubaker, and David Brubaker, 2017. A Framework to Analyze Citizen Science Data for Volunteers, Managers, and Scientists. Citizen Science: Theory and Practice, X(X), pp. 1-11, DOI, <https://doi.org/10.5334/cst> p. 100.