

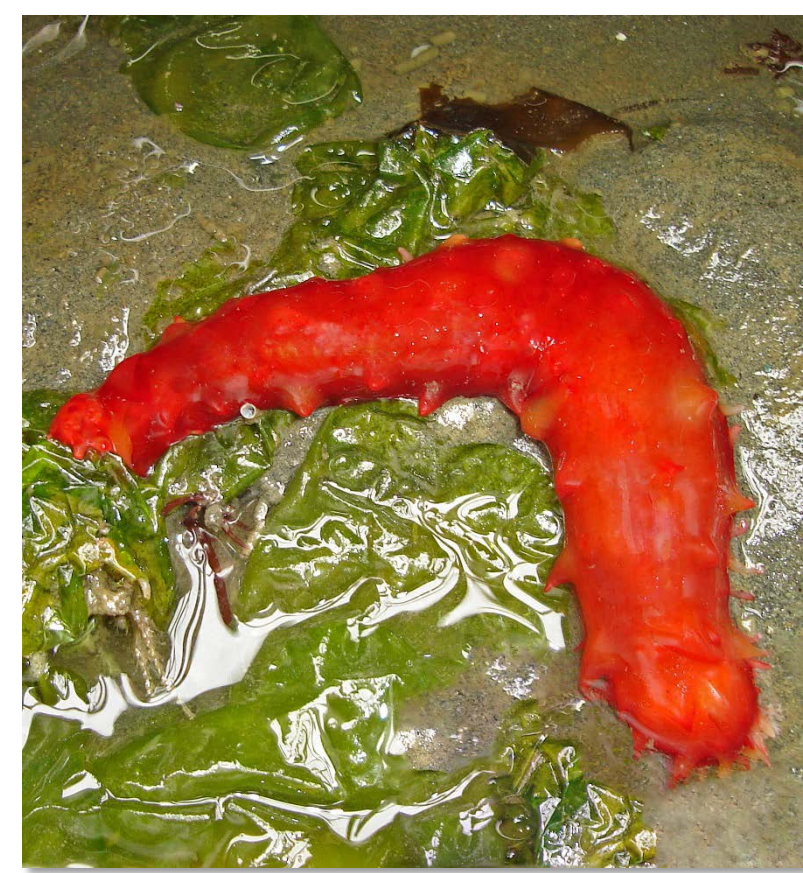
Why Study the Benthos?

Benthic organisms are key players in marine food webs, consuming detritus, cycling nutrients, and transferring energy to higher trophic levels. They are also important sentinels of estuary health because their limited capacity for movement makes them vulnerable to environmental disturbance.



Ecology's Marine Sediment Monitoring Program assesses Puget Sound sediment quality by determining:

- ❖ **Benthic Community Indices**
Taxa richness, evenness, abundance, diversity, and biomass.
- ❖ **Dominant Taxa**
The most abundant and frequently-occurring species.
- ❖ **Indicator Taxa**
Prevalence of stress-sensitive and stress-tolerant species in relation to chemistry and toxicity levels in the sediment.



Emerging Patterns in Puget Sound Benthos

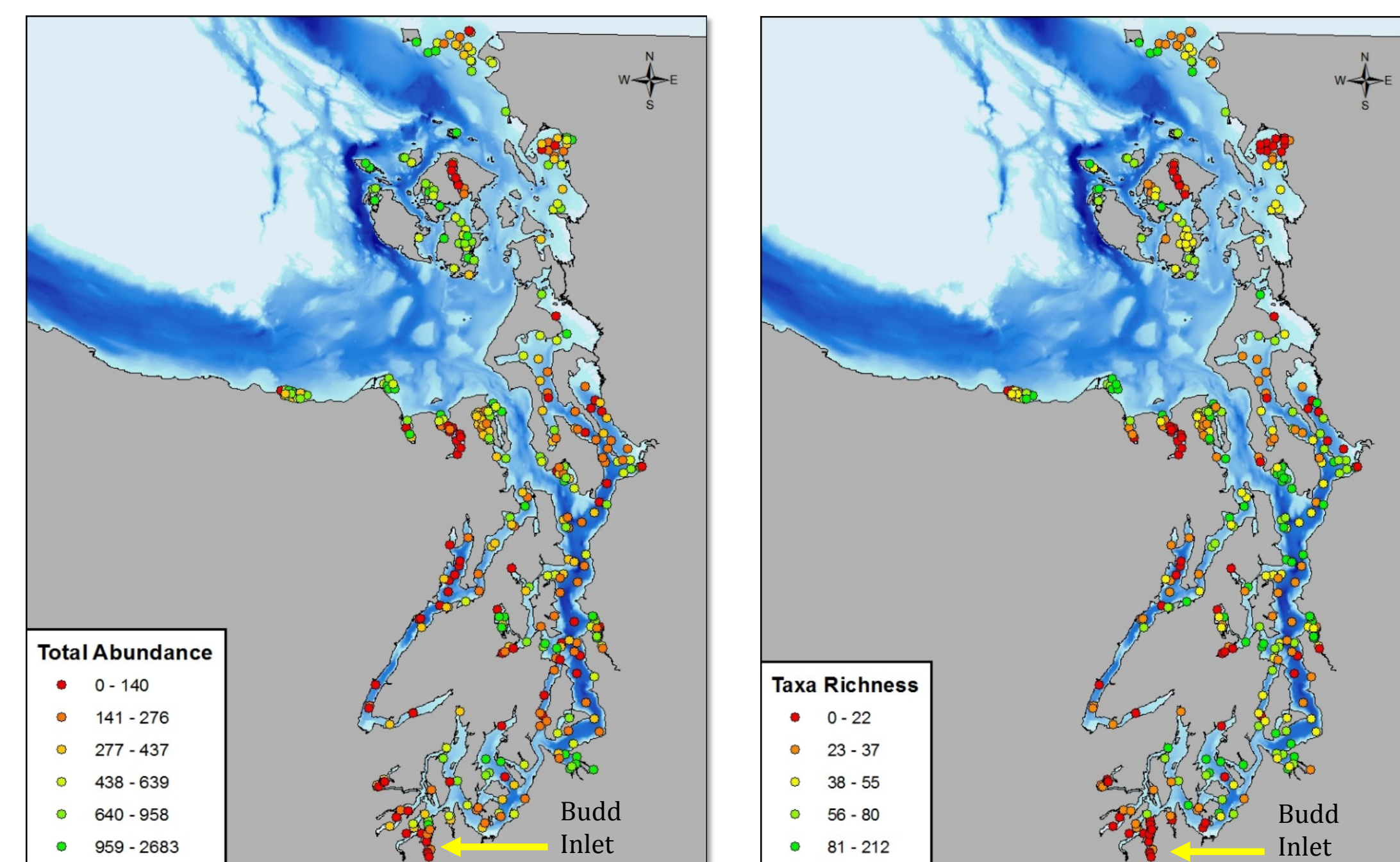


Figure 1. Total taxa abundance (left) and taxa richness (right) per 0.1 m² for the 2004 -2014 sediment survey

- ❖ **Lower Diversity in the South Sound:** Spatial pattern of low taxa abundance (number of individual organisms) and low taxa richness (number of taxa) in terminal inlets including parts of the South Sound and Hood Canal (Figure 1).
- ❖ **Why?** May be due to reduced flushing of water in terminal inlets, causing greater exposure to stressful conditions such as decreased dissolved oxygen levels, higher water temperatures, and contaminants.

Taxa Abundance by Phylum

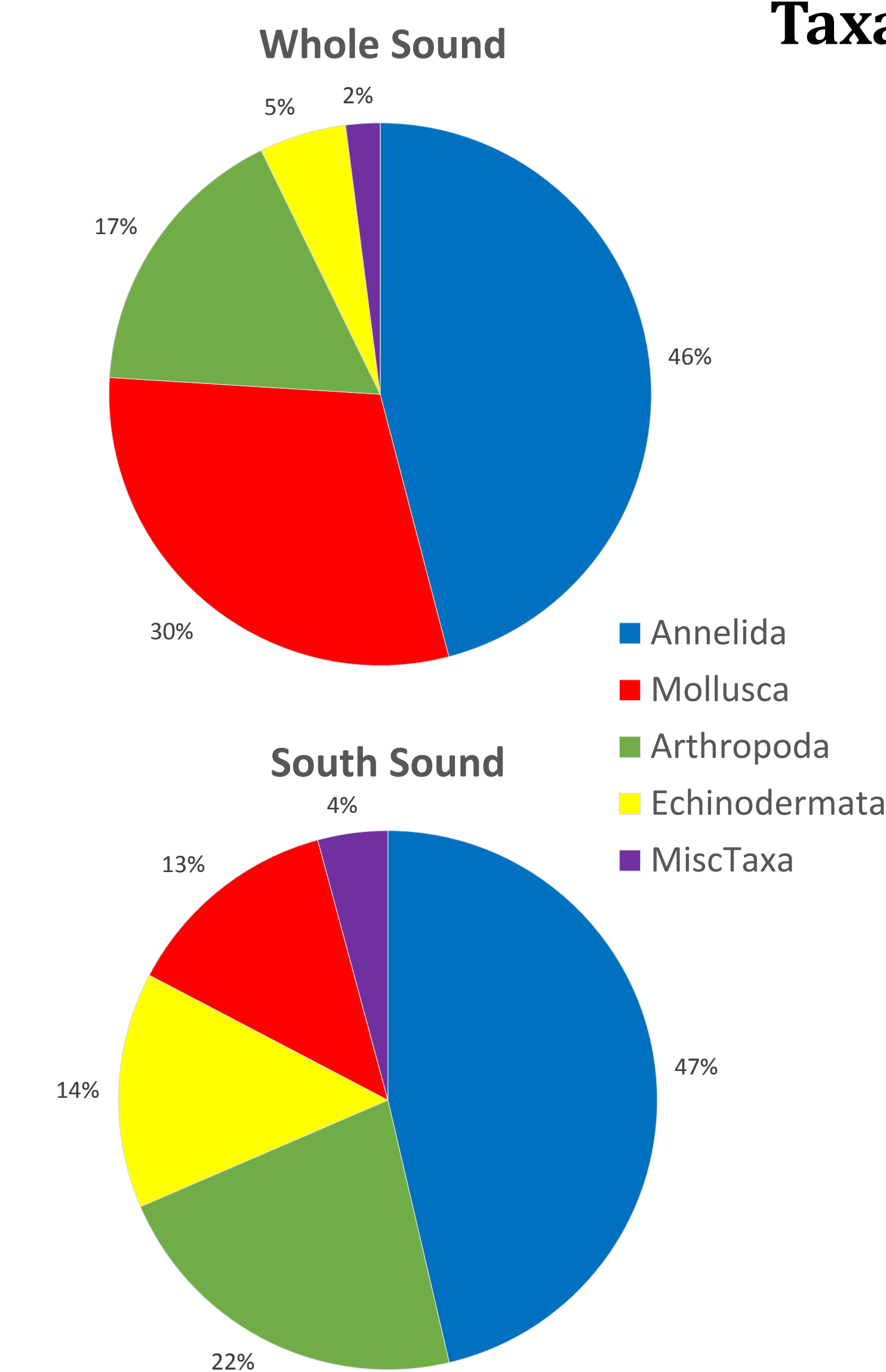


Figure 2. Taxa abundance by phylum for all of Puget Sound (top) and the South Sound (bottom). Abundances are for all projects, all years.

- ❖ Annelids (marine worms) account for almost half the total taxa abundance in Puget Sound (Figure 2).
- ❖ Echinoderms and arthropods make up a larger percentage of the total abundance in the South Sound than in Puget Sound as a whole (Figure 2).
- ❖ Although Annelida is the most abundant phylum, the echinoderm *Amphiodia* spp. and the arthropods *Euphilomedes carcharodonta* and *Eudorella pacifica* are the most abundant taxa in the South Sound (Figure 3).

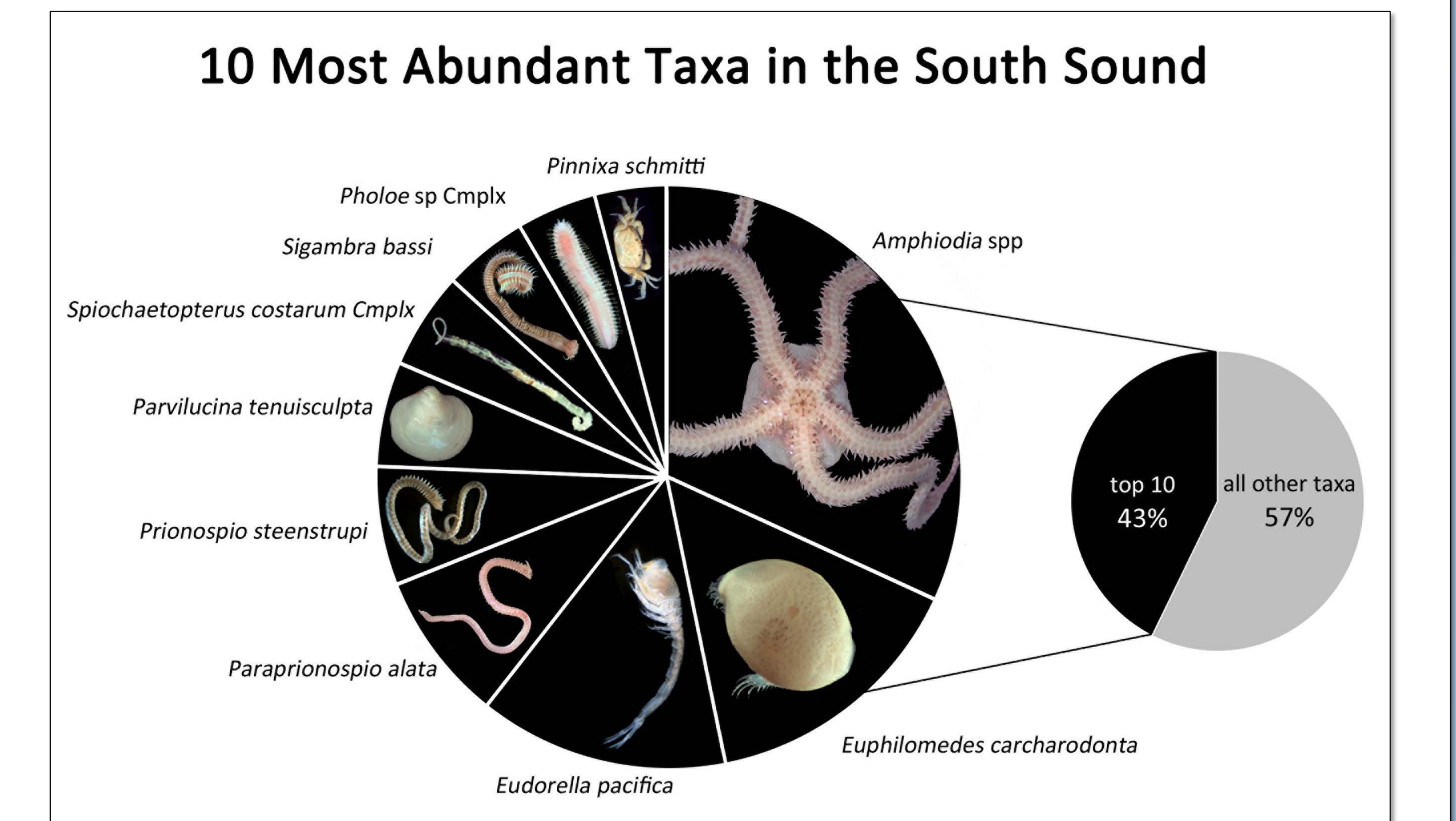


Figure 3. Ten most abundant taxa in the South Sound (over all projects, all years).

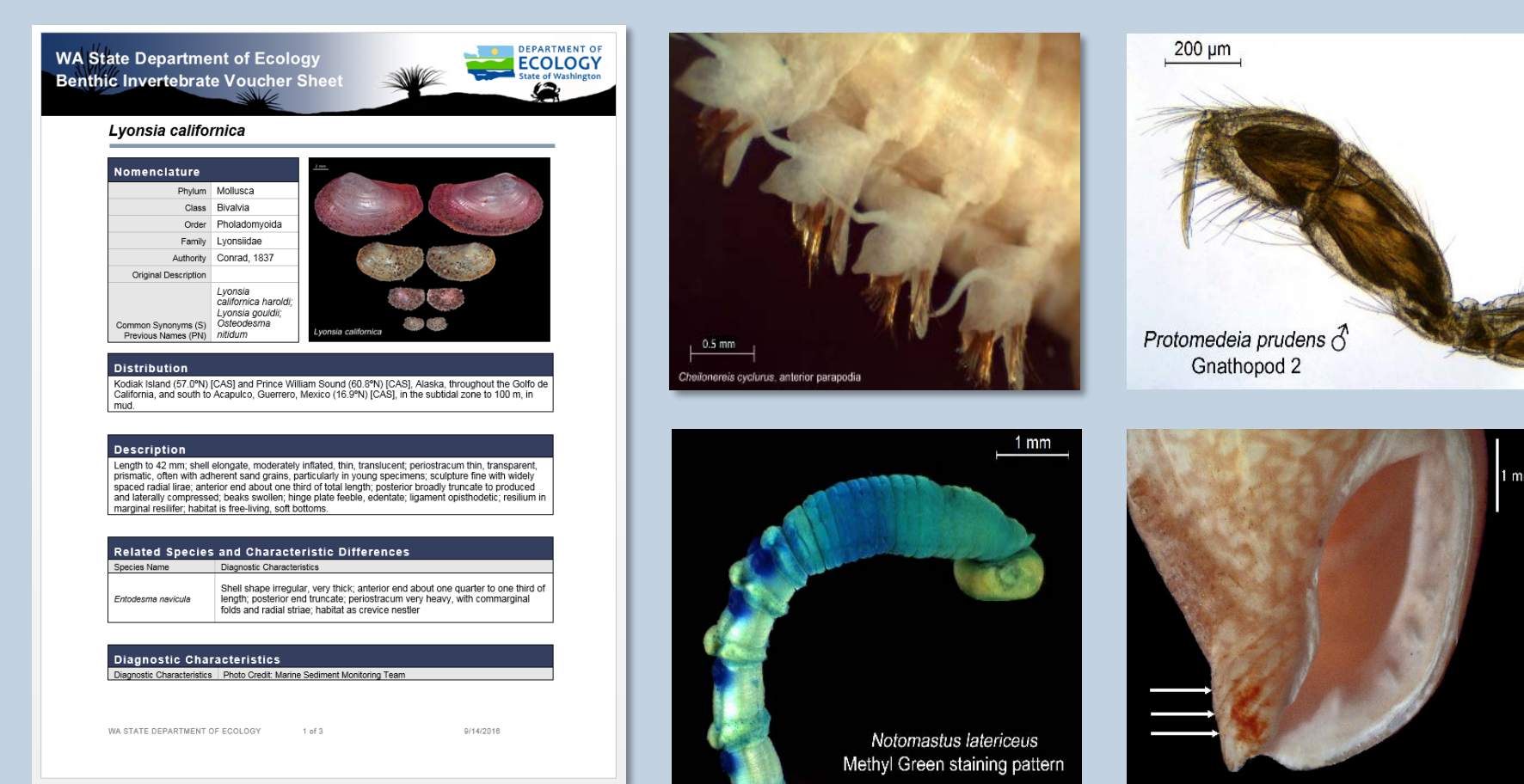
A Focus on Taxonomy

Accurate benthic community analyses relies on our ability to identify the invertebrates we collect consistently over time to the lowest phylogenetic level possible, usually to species. Our products for ensuring taxonomic consistency include:

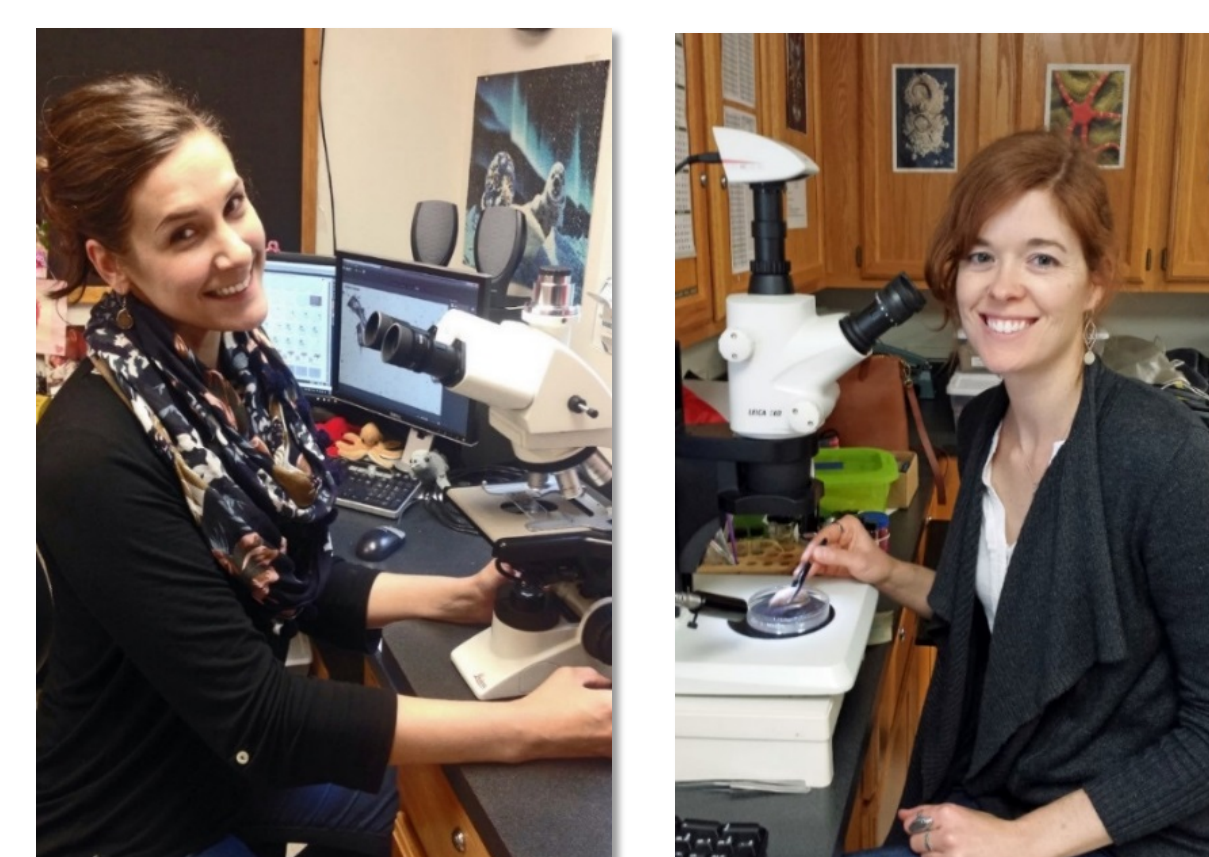
- ❖ **Voucher Specimens & Literature**
Our collection houses over 14,000 specimens of 2,037 invertebrate taxa verified by experts and over 3,500 literature references.



- ❖ **Voucher Sheets of Species Characteristics**
Photomicroscopy is used to show diagnostic characters for all species in Puget Sound.



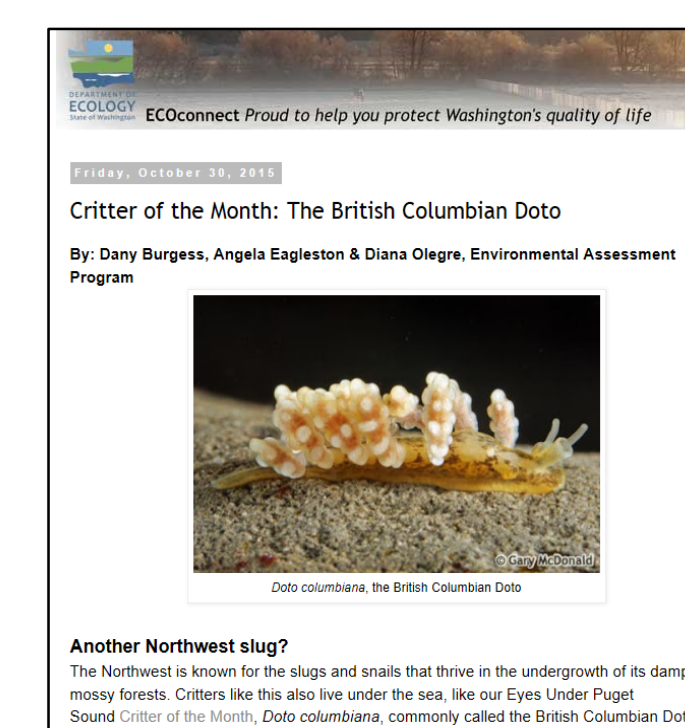
- ❖ **Taxonomic Workshop Notes**
Published notes detailing discoveries and resolutions that occur during hands-on collaborative sessions with regional taxonomists.



- ❖ **Flickr® Photos:** "Mugshot" images of specimens are posted to Flickr® photo albums and linked to species profiles on the Encyclopedia of Puget Sound website.



- ❖ **Critter of the Month blog**
Features a different species or group of marine invertebrates every month, providing insight into the anatomy and life history of the sediment-dwelling creatures we encounter.



Sample Collection and Processing



Field work is conducted aboard the R/V Skookum.

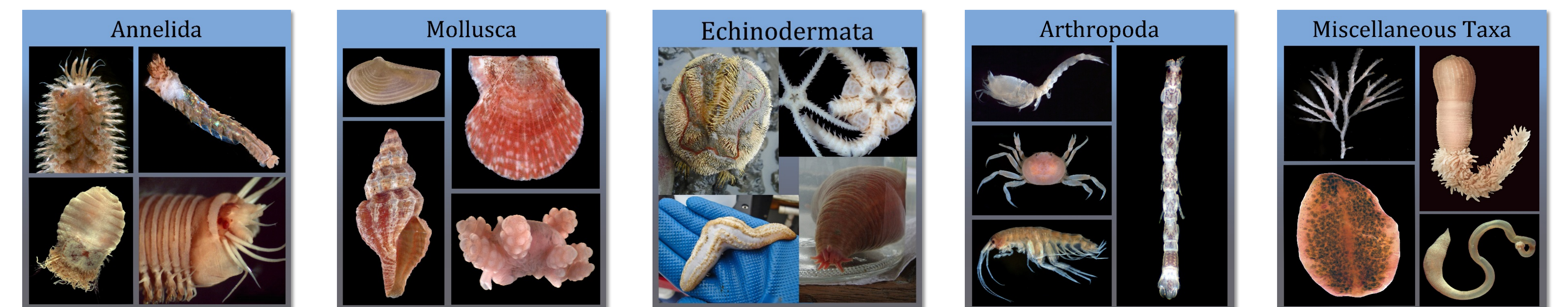


Sediment is collected using a double van Veen grab.



Samples are rinsed on a 1 mm screen and sorted at the lab.

- ❖ Benthos are sorted into 5 phyla groups, then counted and identified to the lowest practical taxonomic level.



New in 2016 - Biomass and Size Classification

Specimens will be wet-weighted, measured, and categorized into one of 4 size classes (after Macdonald et al., 2012), providing insight into:

- ❖ Changes in trophic and size structure over time
- ❖ Background environmental vs. localized anthropogenic changes in sediment conditions



Literature Cited

- ❖ Macdonald TA, Burd BJ, van Roodselaar A (2012) Facultative feeding and consistency of trophic structure in marine soft-bottom macrobenthic communities. Mar Ecol Prog Ser 445:129-140

