

Biological Studies

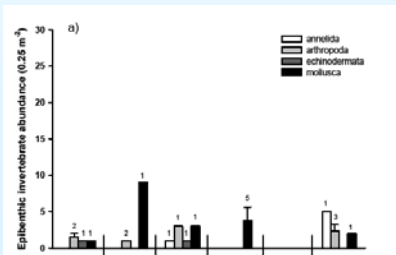
Biological monitoring within the Puget Sound Fast Ferry Study area began in 2005 and is ongoing. This work is building on monitoring conducted by WSF from 1999-2002 and previous studies. Monitoring includes sampling of benthic infauna, epibenthic macroinvertebrates, and macrophytes including underwater video surveys of bull kelp and eelgrass. There are five monitoring sites within the study area and one reference site at Crystal Springs. Current studies also include proposed beach nourishment sites on Point White and Point Glover as well as adjacent reference sites.



Biological monitoring sites, sampled in 2005 and 2006

Macroinvertebrates

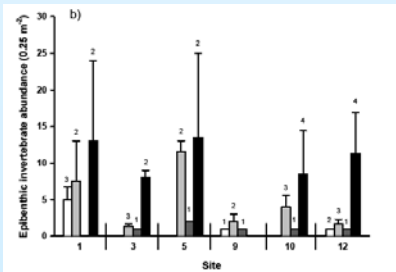
Abundance of benthic infauna and epibenthic macroinvertebrates in Rich Passage is generally low. Species diversity varies considerably from site to site and year to year, ranging from high to very low. Invertebrate assemblage consists mainly of mussels, barnacles, snails, and limpets in the upper tidal zone and crabs, anemones, shrimp, tube worms, sea stars, clams, and cockles in lower and shallow subtidal zones.



Little neck clam (*Protothaca staminea*)



Red rock crab (*Cancer productus*)



Kelp crab (*Pugettia* spp.)

Infauna abundance at sample sites in a) 2005 and b) 2006 with number of cores shown above each error bar



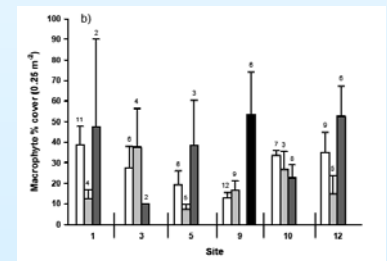
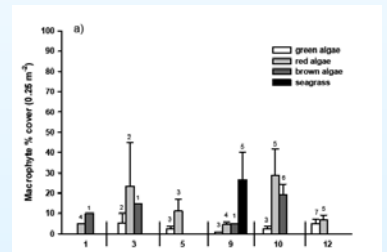
Anemones (*Metridium senile*)

Taxon	Site (January 2005)						Site (September 2006)					
	1	3	5	9	10	12	1	3	5	9	10	12
Annelida												
Serpulidae, Serpulidae (Tube worm)		X				X X					X	X
Arthropoda												
Mediterranean (Anemone)	X			X			X			X	X X	
Crustacea												
Cancer magister (Dungeness crab)	X											
Cancer productus (Red rock crab)									X		X X	X X
Chthamalis spp., Balanus spp. (Barnacles)	X X X	X	X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Hyas lyratus (Lyme crab)	X											
Oregonia gracilis (Decorator crab)		X										
Pagurus spp. (Hermit crabs)							X X	X X		X X	X X	X X
Pinnacidae (Shrimps)							X X	X X	X X	X X	X X	X X
Pugettia spp. (Kelp crabs)							X X	X X	X X	X X	X X	X X
Echinodermata												
Pisaster ochraceus (Cohre sea star)	X	X					X X X	X X X	X X X	X X X	X X X	X X X
Mollusca										X		
Glycymeris nutalli (Cockle)										X		
Littorididae, Pectinidae (Scallops)		X										
Littorididae (Limpets)	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Mopalia spp. (Chitons)	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Mya arenaria (Soft-shell clam)									X			
Mytilus spp. (Horse mussels)												X
Nucifraga (Nucifraga)				X								
Octopus spp. (Octopi)												X
Tresus spp. (Horse clams)	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Trochidae (Snails)	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X

Epibenthic macroinvertebrate presence within intertidal and subtidal quadrats, January 2005 and September 2006

Macrophytes

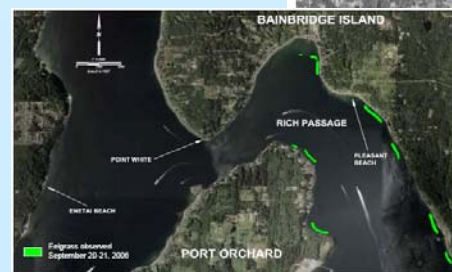
Macrophyte assemblage consists of green macroalgal species in the upper tidal zone and a mix of green, red, and sparse brown algae at lower tidal elevations. In recent surveys no bull kelp beds have been identified, although individual kelp is sometimes observed. Eelgrass beds occur in the eastern portion of Rich Passage along Bainbridge Island and Port Orchard shorelines and have not changed significantly since 2000.



Macrophyte percent cover at sample sites in a) 2005 and b) 2006 with number of quadrats shown above each error bar



Picture showing presence of red macroalgae in lower intertidal zone on Point White



Distribution of eelgrass, September 2006

Distribution of eelgrass, 2000