**Attachment A - Maps**



Figure 1. Site maps of the project area. Map A puts the study area in its regional context. The area in the red box is expanded in Map B, which shows the relative position of features and places discussed in the proposal project narrative. Shellfish harvesting and consumption is prohibited in the area of Penn Cove covered by the red lines (WA State Department of Health, 2009). Map A after Collins and Sheikh, 2005. Map B after Khangaonkar, 2010.



Figure 2. Map of Penn Cove displaying proposed locations for monitoring submarine groundwater discharge flux and quality (yellow lines, red, green and yellow circles) and collecting sediment samples. Base map from Google Earth modified by Eric Grossman and Peter Swarzenski.



Figure 3. Map of Penn Cove displaying locations for water quality sampling and monitoring. Sampling in Penn Cove along the cruise tracks and at the numbered stations indicated would take place four times a year for two years (in November, February, May, and August). Vertical profiles of water quality parameters including nitrate, salinity, temperature, pH, dissolved oxygen, and chlorophyll *a* would be collected at the red stations by lowering a YSI multiparameter sonde and a SUNA nitrate sensor. Vertical profiling will take place twice at station 2 to compare water quality (and inputs and exports) during rising and falling tide. Lateral measurements of the same parameters would be conducted just below the surface along the blue cruise tracks by towing the instruments behind the boat. Grab samples would be collected at the surface and at mid-depth at the red stations and subjected to analyses of turbidity, nitrate-nitrite, orthophosphate, ammonia. Suspended sediments collected in these grab samples would be characterized, as would the bacterial community. Plankton tows will be conducted at the surface at the red stations. The anchored multiparameter sonde would be in place and collecting data on salinity, temperature, pH, and dissolved oxygen throughout the 2 year field study period. Stormwater samples would be collected at the outfalls marked on the map during significant runoff events. Those samples would be analyzed for fecal coliform bacteria, nitrate-nitrite, orthophosphate, ammonia, temperature, pH, dissolved oxygen, turbidity, and conductivity. Flow rates from these outfalls will be estimated to calculate loading of contaminants. Base map from Google Earth modified by Robert Turner.