

You are a wastewater planner for Puget Sound and must rate the relative severity of impacts from disposing of sewage effluent in different basins. Sewage is usually discharged below the halocline so that it mixes well with ambient water before reaching the surface, where it can contaminate beaches. However, the sewage discharge may aggravate low-oxygen conditions in the subsurface layer.

- Using the diagrams on 320–321 of S&A, use the table below to fill in the essential characteristics of the four types of positive estuaries.

Estuary Characteristics	Estuary Type			
	Salt wedge	Fjord	Well mixed	Partially mixed
Relative river input High/Moderate/Low	High	High	Low	Moderate
Relative tidal mixing High/Moderate/Low	Low	Low	High	Moderate
Haline stratification Strong/Moderate/Weak	Strong	Strong	Weak	Moderate
Slope of isohalines	Sharp angle = “wedge”	Horizontal	Near-vertical	Gradual angle
Special morphology	Near large river mouth	Long, U-shape, narrow, deep, sill	Shallow, maybe narrow	Open, wide, deep

The impact of deep-discharged sewage effluent depends on **flushing**, the rate at which water is replaced by net subsurface intrusion of ocean water & its entrainment into the net surface outflow to the ocean.

- Using the map on the back of this page and the diagrams on 320–321 of S&A, use the table below to fill in the locations and essential characteristics of the 4 types of positive estuaries in Puget Sound.

Location	Name of Location	Type of estuary	Flushing Fast/Medium/Slow	Explanation
A	Hood Canal	Fjord	Slow	Sill & shape reduce inflow of deep water
B	Admiralty Inlet	Well mixed	Fast	Little river input & strong mixing over series of sills
C	Whidbey Basin	Salt wedge	Slow	Heavy river input, weak tidal currents because of 180° turn
D	Main Basin	Partially mixed	Moderate	Moderate river input, wide & open to tidal exchange
E	South Sound	Complex inlets & passages	Slow	Narrows silled outlet discharges to MB, not ocean

