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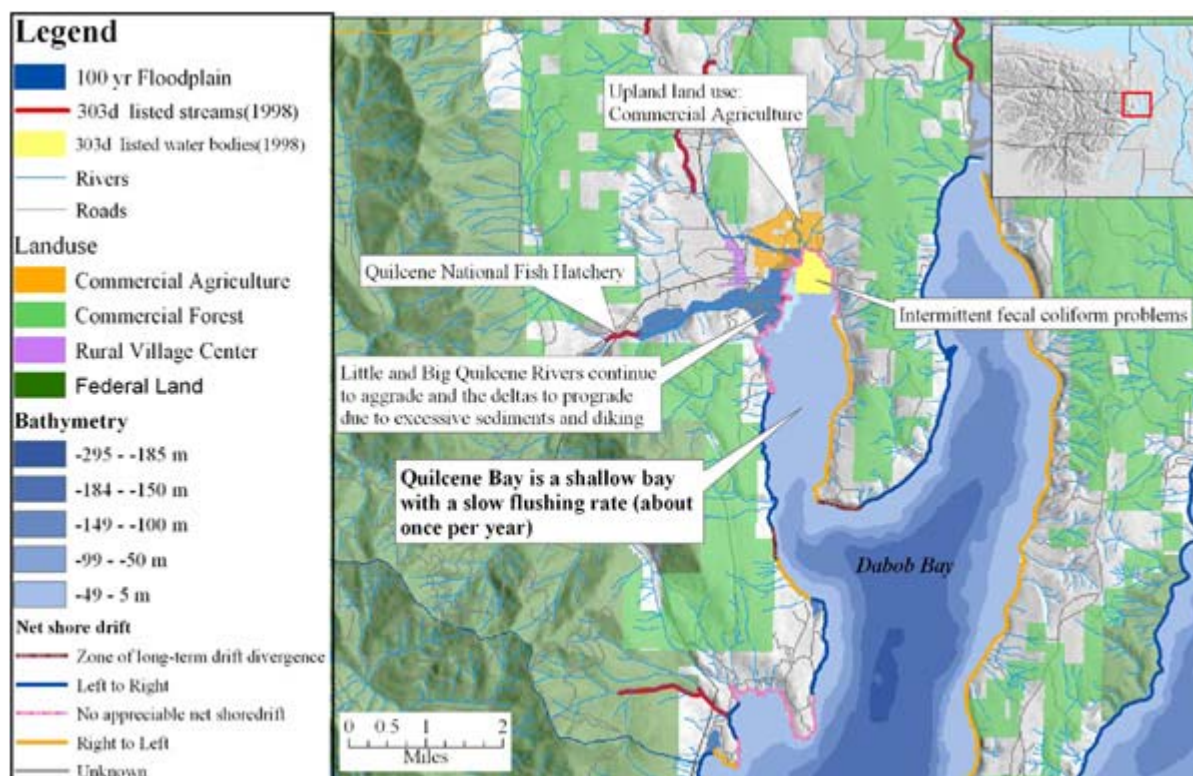
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## Management issues: marine example

### Quilcene Bay, Jefferson County

The map and narrative below are examples of how existing reports and data can be used to identify ecosystem-wide alterations and sources of impairments. The example focuses on Quilcene Bay, the eastern arm of Dabob Bay in Hood Canal.



### Management issues and identified sources of impairments

#### Alterations to physical properties:

Below the town of Quilcene located around river mile 0.8, the Big Quilcene River channel is diked, altering estuarine habitat. Development at the mouth of the Quilcene River has also led to channelization, dredging, and other types of armoring beside dikes. Sixty percent of the riparian zone below river mile 3.0 of the Little Quilcene River is developed with agriculture, roads and dikes, rural residences and forestry. Dikes, roads, and ditches impact the tidal delta.

#### Water quality and sediment:

The marine water quality of Quilcene Bay is excellent but the northern portion has experienced intermittent fecal coliform problems. Upland sources have been identified as the source of the fecal coliform pollution. Other non-point pollution sources include the marina on the western shore of Quilcene Bay and erosion from forestry practices. Watershed planning has encouraged the repair of septic systems and fencing livestock away from tidally inundated pastures primarily around Donovan Creek which flows

into the Northern part of the bay.

Both the Little and Big Quilcene Rivers continue to aggrade and the deltas to prograde due to excessive sediments and diking. Due to the river aggradation and delta progradation, historically accessible river areas are no longer accessible by boat.

Quilcene Bay is a shallow (less than 50 meters deep) arm of Dabob Bay which links to Hood Canal. Quilcene Bay has a slow flushing rate of about once per year. Low oxygen problems are evident in the associated stratified Hood Canal but no available data suggests that oxygen levels are depleted in Quilcene Bay.

### **Major fish and shellfish habitat issues:**

The Quilcene National Fish Hatchery is located on the Big Quilcene River at river mile 2.8. Upstream passage by anadromous fish is restricted between September and December by an electric weir. A raised culvert and water intake structure permanently block access to Penny Creek which could potentially provide excellent refuge habitat.

Diking and filling of deltas has reduced the complex web of distributary channels and sloughs that support post-emergent chum salmon fry that are adapting to saline conditions and need food and cover from predators. The rearing habitat in the lower reach of the Little Quilcene is also poor due to low LWD, few pools and low channel complexity. Low flows, high sediment loads, and unstable channels account for poor salmon spawning habitat in the lower reaches of the Big and Little Quilcene Rivers.

Quilcene Bay is known for its shellfish and it is important to insure the maintenance of the good water quality to support healthy shellfish. As of 1999 shellfish growing areas in Quilcene Bay are approved except for the northern section which is unclassified. The northern part of the bay hosts continuous eelgrass beds, herring spawning sites, and surf smelt spawning sites along the beaches.

### **Riparian Issues:**

Areas of the lower rivers have been cleared for agriculture and left only pockets of riparian vegetation which are further segmented by road crossings. By 1883, diking of the lower Big Quilcene River had eliminated valuable salt marsh habitat and tidal channels which may have been re-gained along the margins of the prograded delta area although the progradation itself is not a desired quality. High salt marsh and the naturally occurring riparian zone between the Boat Haven marina and Indian George Creek estuary have been eliminated as the shoreline was developed. The re-establishment of the salt marsh is anticipated since restoration efforts, such as removing the fill and others mentioned above, have occurred.

## **Measures to protect ecosystem-wide processes**

- **Hydrology and floodplain issues:** Protect floodplains from development and enforce regulations.
- **Riparian issues:** Protect native vegetation.
- **Water quality issues** Control non-point sources to ensure continued good marine water quality. Protect riparian vegetation.

## **Restoration actions**

- **Hydrology and Floodplain issues:**

Support restoration activities necessary to restore estuary function, restore sinuosity, and re-connect the rivers with tidal channels involve dike removal at the mouth of the Little Quilcene and setting back or removing levees at the mouth of the Big Quilcene in the lower river and estuary.

- **Water quality issues:**

Assess, stabilize, and monitor sediment sources that are contributing to the progradation of the river deltas. Study and determine source of fecal coliform pollution.

- **Riparian issues:**

Acquire properties along the nearshore to restore salt marsh habitats. Study the appropriateness of buffers for developments on the nearshore.

- **Habitat issues:**

Add large woody debris to the Little Quilcene River, the Big Quilcene River and Donovan Creek river mouths. Consider more natural soft armoring techniques in lieu of bulkheads.

**Primary reports used:** [Limiting Factors Analysis, Correa, G. 2002](#); [TAG 2002, Ames, Graves, and Weller, 2000](#); [Parametrix, Inc.2000](#)

**Primary data layers:** 30 m DEM; Land use; Rivers; Roads; FEMA 100 year floodplain; Ecology 303(d) water quality list; Major Public Lands, Puget Sound Bathymetry, Net Shore Drift.

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