

EXPLANATION

Symbols for historical map	Features	Symbols for present-day map
	Shoreline	
	Indefinite shoreline	Not applicable
	Mean lower low-water line	Seaward edge of intertidal wetland
	Boundaries for agricultural plots	Not shown
	Dikes or levees	
	Subaerial wetland (salt-water or fresh-water marsh)	
Not shown	Intertidal wetland	
	Forested upland	Not shown

STILLAGUAMISH RIVER AND PORT SUSAN

Setting
The Stillaguamish River drains the lower western slopes of the Cascade Mountains and bordering lowland. The river empties to Puget Sound through three distributaries: Hat Slough and South Pass, which discharge into Port Susan, and West Pass, which discharges farther north, beyond the map area, into Skagit Bay. The broad, flat-lying delta plain of this river has been diked and drained for agricultural use. Bayward of the dikes is a 3.6-sq-km (1.4 sq mi) marsh, beyond which is an extensive intertidal mudflat of 20 sq km (7.7 sq mi).

Shoreline and Wetland Changes
By the time of the 1886 mapping, several kilometers of dikes had been constructed and much of the original wetland had been developed for agricultural use. The first diking occurred in the early 1870's (Droker, written communication, 1978). Additional dikes have been built since 1886, especially in the vicinity of the West Pass distributaries, to create more land for agriculture. Much of the eastern delta plain has been converted from forest to agricultural land.

The Stillaguamish River delta has prograded significantly since the 1886 mapping, especially along the southern part of the delta near Hat Slough, where several small and three larger inter-distributary islands have formed. The progradation represents a fairly rapid sediment accumulation that probably is due mainly to a shift in the sediment load of distributary channels of the Stillaguamish River. The relative sizes of the former channels indicate that in 1886 most of the streamflow was carried by the distributaries West Pass

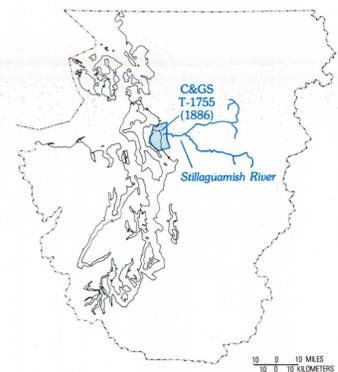
(discharging north of the map area) and South Pass; Hat Slough was a minor distributary. In contrast, the present main flow of the Stillaguamish River—and, therefore, the greatest sediment load—is through Hat Slough, which has widened as the South and West Pass distributaries have narrowed. Any increase in the Stillaguamish River's sediment loads above natural rates, such as may have resulted from farming, land-clearing, logging, or dredging upstream, may also have contributed to the progradation.

Compilation of Map
The 1886 topographic survey (T-1755) was the source material for map compilation. Geodetic control stations, roads, dikes, and cultural features provided the control for data transfer over most of the map area. To the west, however, along Livingston Bay and Lona Beach, topographic features were also used as control.

Adjustments in stream placement were required near the divergence of Hat Slough and the Stillaguamish River. A narrow meandering reach of the Stillaguamish River on the older map was shifted 10 mm (.4 in) to the southwest to align it with present-day topographic depressions that are believed to be vestiges of the former channel. Surviving cultural features were used as control in placing most of the historical shoreline along Hat Slough. The course of the slough just west of the divergence, however, was drawn by the early topographers as a dashed line, probably indicating indefinite shorelines at the time of mapping. In the absence of nearby cultural features for substantial control, the indefinite shoreline symbol (dash dotted line) was retained and the former channel was arbitrarily positioned for the best possible fit at the divergence.

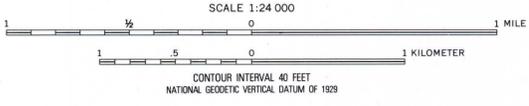
Summary of Environmental Changes and Some Planning Considerations

Progradation (seaward advance of shoreline)	Substantial. About 2.5 sq km of land appears to have been gained by progradation since the early mapping, and additional farmland has been created seaward of the early dikes.
Recession (landward retreat of shoreline)	None apparent.
Channel migration	Substantial. In 1886 most of the streamflow was through South Pass and West Pass; at present, the main flow is through Hat Slough.
Channel straightening	Since 1886, the channel of Hat Slough has straightened and widened, apparently by natural processes.
Diking or substantial filling of subaerial delta land near salt-water shoreline	Dikes have been placed along entire delta shoreline. The former wetland of Lona Beach spit has been enclosed by dikes.
Diking or substantial filling near stream banks	Dikes or levees confine the distributary channels on both sides of the river extending 2.7 km upstream from Hat Slough.
Other artificial landfill on subaerial delta land	Landfill probably supports buildings in town of Stanwood and the near surroundings.
Landfill on intertidal delta land	None apparent.
Loss of subaerial wetland	None. About 0.6 sq km of subaerial wetland has been added by progradation since 1886. At present, the subaerial wetland is 3.6 sq km (table 2). Most development of wetland predated oldest map source. The original wetland may have been as extensive as 10 sq km (table 2).
Loss of intertidal wetland	Historical data not available for comparison.
Some planning considerations	Diking and bank stabilization projects have reduced habitat diversity and availability to fish and wildlife. Diking has reduced incidence of flooding and salt-water incursion and enhanced productivity of agricultural land.



SOURCE MAPS FOR COMPILATION OF HISTORICAL SHORELINE AND LOCATION OF RIVER-MOUTH DELTA

Base from U.S. Geological Survey, Juniper Beach and Stanwood, 1956. Photorevisions as of 1968 and 1973.



HISTORICAL CHANGES OF SHORELINE AND WETLAND AT STILLAGUAMISH RIVER AND PORT SUSAN, WASHINGTON

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