

GRAYS HARBOR ESTUARY MANAGEMENT UNIT

GRAYS HARBOR ESTUARY

Description:

The Grays Harbor Estuary is a bar-built estuary that was formed by the combined processes of sedimentation and erosion caused by both the Chehalis River and the Pacific Ocean. Historically, during low flows in the Chehalis River, sediment accumulated forming a bar across a portion (or potentially all) of the estuary mouth; this sediment is thought to have primarily originated from the Columbia River plume. As river flows increased, the sediment bars likely impeded direct mixing with near shore ocean waters until the force of the downstream flow began to erode the sediment bar. This dynamic process likely resulted in a constantly shifting channel in the lower Chehalis River.

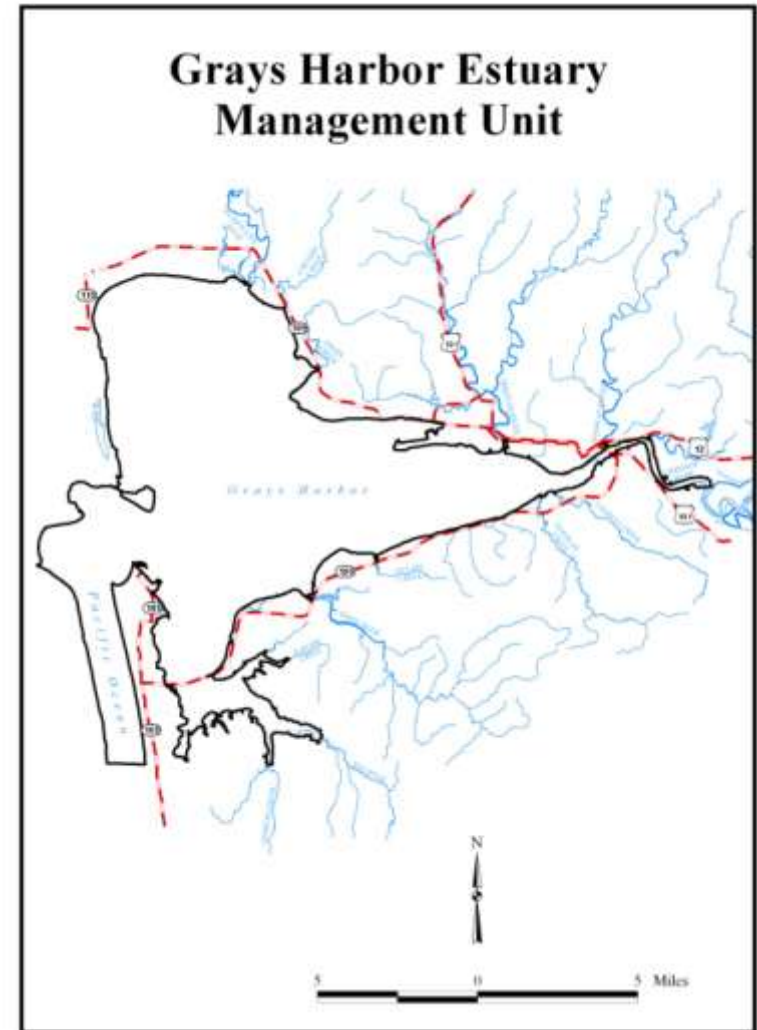
Land use in the immediate riparian areas was historically dominated by surge plain ecosystems. Vegetation in the intertidal region was dominated by dense eel grass beds. The primary factor that determined riparian land cover was the vertical distance above the average high tide line. Plant communities nearest the average high tide line were comprised salt tolerant species, and the presence of salt tolerant species decreased with increasing vertical distance from the high tide line. Currently 70% of the historically available estuary habitat is considered intact. The majority of land that has been converted from the historical cover is now dominated by urban development.

The estuary is considered to be in fair condition. Historically the estuary was considered the primary bottleneck for salmon survival in the basin, but recent advances in water quality treatment are thought to have improved this condition. A study is currently underway to assess juvenile use of the estuary (Grays Harbor Juvenile Assessment).

Major Tributaries: None

Land Uses: Urban development, rural residences, transportation infrastructure

Anadromous Fish Stocks: Spring Chinook, fall Chinook*, summer Chinook*, coho*, chum, and winter steelhead*, and bull trout* (* denotes priority stock)



Grays Harbor Estuary Tier 1 Concerns

Grays Harbor Estuary Tier 1		
WATER QUALITY		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> ➔ Water quality has been thought to be the primary factor limiting salmon productivity in the Grays Harbor estuary ➔ Water quality was thought to be impaired by acidic discharges from pulp mills and thought to contribute to increased incidence of infestation by a parasitic fluke ➔ Pulp mill effluent treatment was increased in the 1990s, and water quality is thought to have subsequently increased. Limited empirical evidence of water quality improvement. ➔ Water quality is may be compromised by the accumulation of dioxin-like chemicals in the sediments (and biota through bioaccumulation). ➔ Other chemical contaminants of concern include polycyclic aromatic hydrocarbon (PAHs), likely stemming from wood preservation and petroleum disposal, and butyltin derivatives from shipping and boat manufacturing. ➔ Chemical pollutants (e.g., pesticides) have been identified that stem from pest control in the timber, agricultural and oyster industry. These toxins have an impact on fish survival and productivity in laboratory experiments; limited empirical demonstration of this relationship. 	<ul style="list-style-type: none"> ➔ Degraded water quality has primarily stemmed from discharge of complex effluents from wastewater treatment facilities and pulp and paper mills ➔ Chemical usage for pest control and wood preservation usage 	<ul style="list-style-type: none"> ➔ Data Gap Assessment ➔ Enhance water quality: (1) Sediment dredging and/or capping; (2) phytoremediation; (3) pier removal ➔ Evaluate current water quality conditions and the impact of effluent treatment technologies ➔ In situ biomonitoring ➔ Minimize chemical usage in estuary and upland habitat ➔ Reduced effluent discharge

Grays Harbor Estuary Tier 1		
TOTAL ESTUARY HABITAT LOSS		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> ➔ Total estuary habitat is thought to have been reduced by approximately 30% (or 14,579 acres) over historical levels 	<ul style="list-style-type: none"> ➔ Loss of habitat has been primarily from diking and filling to promote urban development shipping and railroad access. 	<ul style="list-style-type: none"> ➔ Grays Harbor Juvenile Assessment ➔ Reclaim developed estuary habitat

Grays Harbor Estuary Tier 2 Concerns

Grays Harbor Estuary Tier 2			EXOTIC SPECIES		
Symptom		Cause		General Actions	
<p>➔ Spartina is considered the primary exotic species of concern. Infestations have been increasing since 1991, but control efforts have reduced the rate of growth. Spartina is thought to negatively impact salmon productivity by increasing sediment retention and outcompeting native eelgrass.</p>		<p>➔ Accidental exotic species transport from Willapa Bay</p>		<p>➔ Control invasive species. See Section 5.</p> <p>➔ Minimize the spread of non-native Spartina</p>	

Grays Harbor Estuary Tier 2			SEDIMENT		
Symptom		Cause		General Actions	
<p>➔ High rates of sediment deposition in the estuary. Increased turbidity from dredging is also thought to have significantly reduced eelgrass beds and benthic fauna abundance/diversity, although quantitative data is relatively limited.</p> <p>➔ Although anthropogenic sources of sediment have increased, natural sources of sediment have decreased. Reduced rates of natural sedimentation have resulted in increased coastal erosion, particularly near Half-moon Bay. To compensate, dredging has increased in the outer harbor.</p> <p>➔ Increased rates of sedimentation potentially impact the osmoregulatory function in salmon, particularly coho.</p>		<p>➔ High rates of sediment disturbance in the upper watershed</p> <p>➔ Increased dredging and reductions in natural sediment deposition</p> <p>➔ Increased sediment retention by dams on the Columbia River</p> <p>➔ Estuary sedimentation/turbidity is enhanced by dredging of the navigation channel</p>		<p>➔ Reduce sediment re-suspension via dredging</p>	

Grays Harbor Estuary Tier 2			TRIBUTARY CONNECTIVITY		
Symptom		Cause		General Actions	
<p>➔ Connectivity to stream habitat throughout the estuary is generally reduced and is rated poor to fair. Loss of connectivity is particularly pronounced in the South Bay watersheds (particularly John's and Elk River subbasins). Many stream crossings are impassible at all life stages. Many migration barriers are present down-stream of most reaches preventing all upstream migration and promoting sediment retention; particularly of concern for primary tributaries directly discharging into mainstem or estuary habitat.</p>		<p>➔ Highest road densities</p>		<p>➔ Enhance estuary connectivity by removing migration barriers</p> <p>➔ Evaluate current estuary habitat usage and distributions of life-history patterns among salmonid stocks</p>	

Grays Harbor Estuary Tier 2

SURGE PLAIN

➔ Connectivity to the tidally influenced surge plain habitat is relatively poor in the South Bay, lower Wishkah/Hoquiam watershed. Chehalis mainstem has good connectivity to surge plain habitat except near Montesano (stream diking) and the Satsop Development Park.

➔ High road density and lateral diking

➔ Enhance access to off-channel habitat

Grays Harbor Estuary Tier 3 Concerns

Grays Harbor Estuary Tier 3		OCEAN CONNECTIVITY
Symptom	Cause	General Actions
➔ Increased ocean connectivity as a result of dredging and damming of the Columbia	➔ Dredging and reduced sediment transport from the Columbia River plume	

Grays Harbor Estuary Tier 3		LARGE WOODY DEBRIS
Symptom	Cause	General Actions
➔ LWD concentrations are thought to be highly reduced over historic levels. Reduced levels are thought to reduce smolt survival	➔ Reduced downstream transport from headwater streams ➔ Removal for navigation purposes	➔ Increased LWD in mud flats

Grays Harbor Estuary Tier 3		CHANNEL STABILITY
Symptom	Cause	General Actions
➔ Channel stability has been significantly altered throughout the estuary. The stream channel is more confined than in pre-development conditions.	➔ Primarily as a result of dredging in the navigation channel	
➔ Loss of eelgrass is thought to be a major factor limiting rearing habitat for juvenile salmonids.	➔ Eel grass has also been directly removed for oyster culture	➔ Enhance eel grass bed density