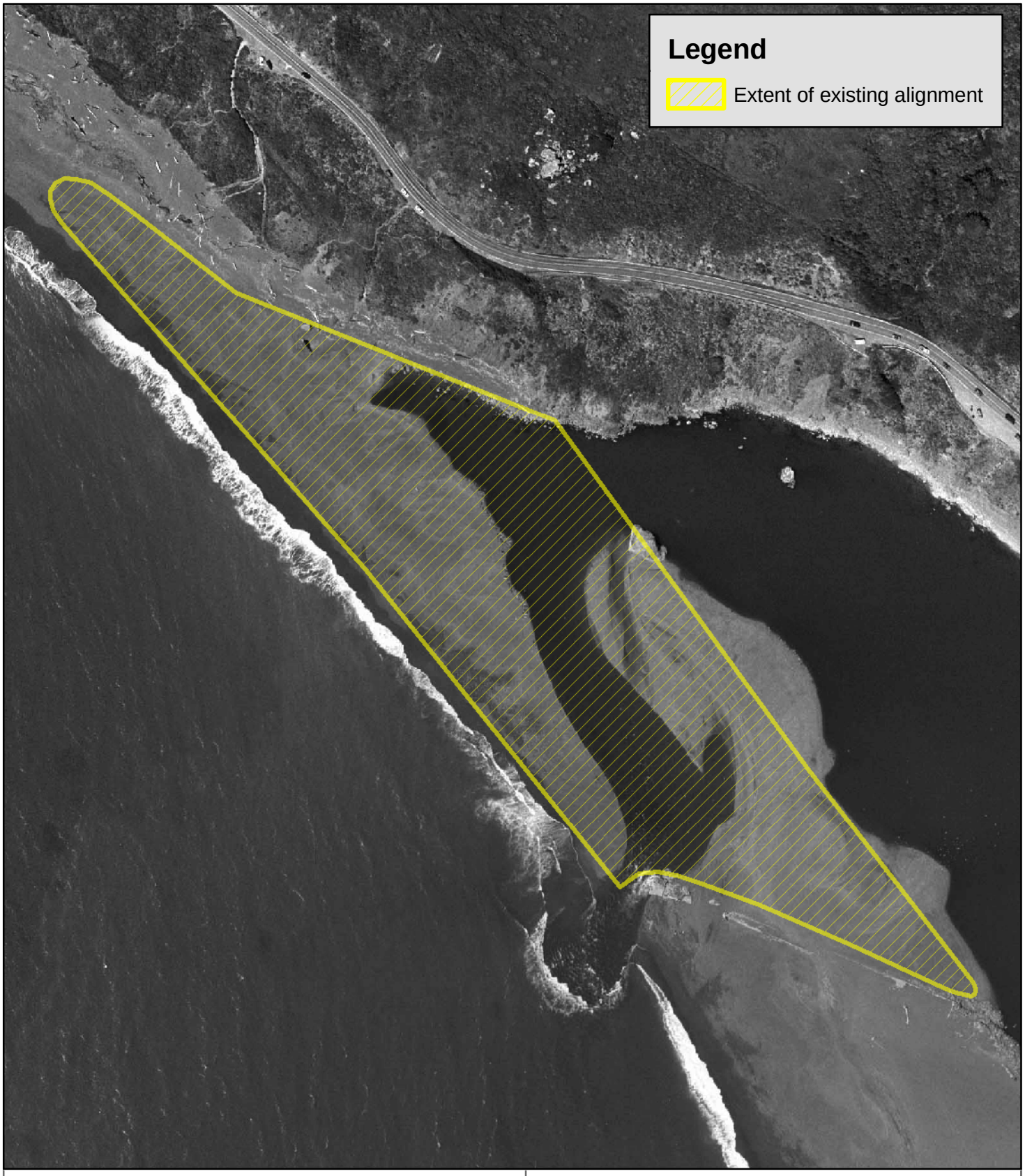


Source: Sonoma County Orthophotography (April-May, 2000)

0 120 240 480 Feet

figure 1

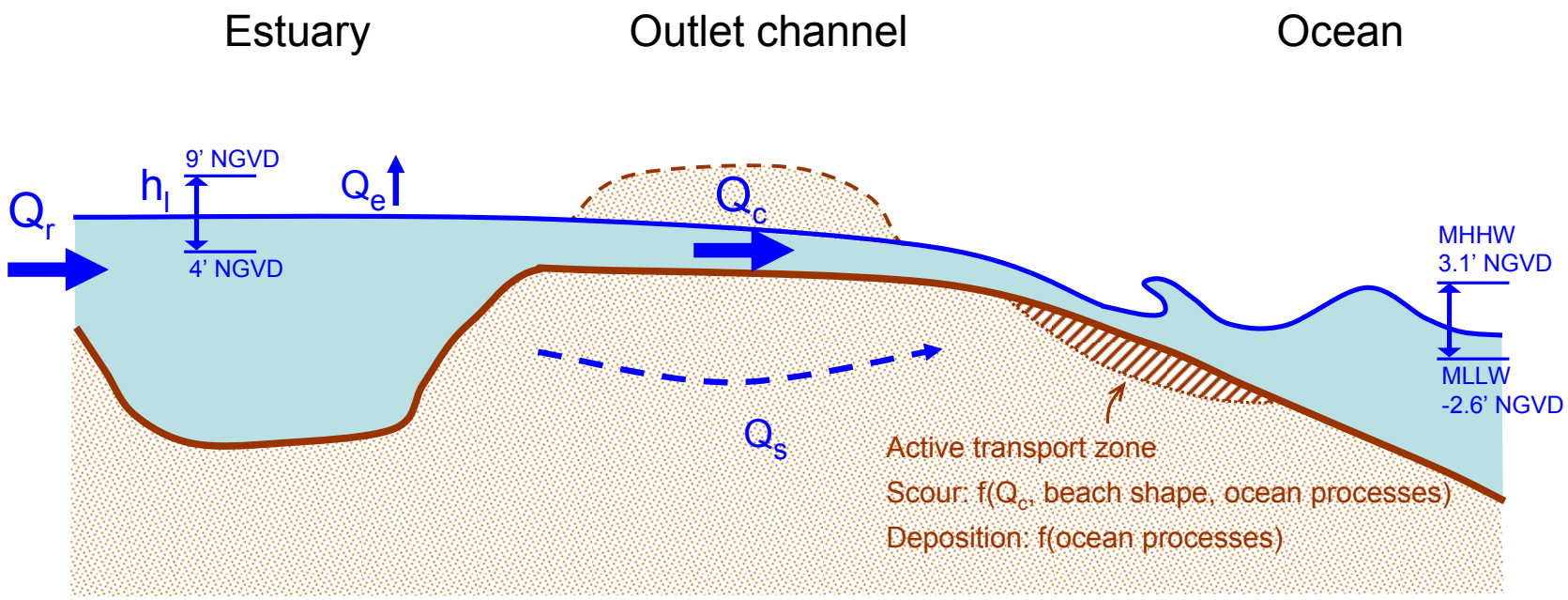
Russian River Estuary Outlet Channel Management Plan

Russian River Estuary Site Location

PWA Ref# - 1958.02

PWA

G:\1958.01_Russian_River\Projects



Parameters

h_l=lagoon water level

Q_r=river discharge

Q_c=outlet channel discharge

Q_s=seepage discharge

Q_e=evaporation from lagoon

Processes

- $Q_r = Q_c + Q_e + Q_s$ (averaged over days)
- No sediment transport within outlet channel
- Active sediment transport outside outlet channel

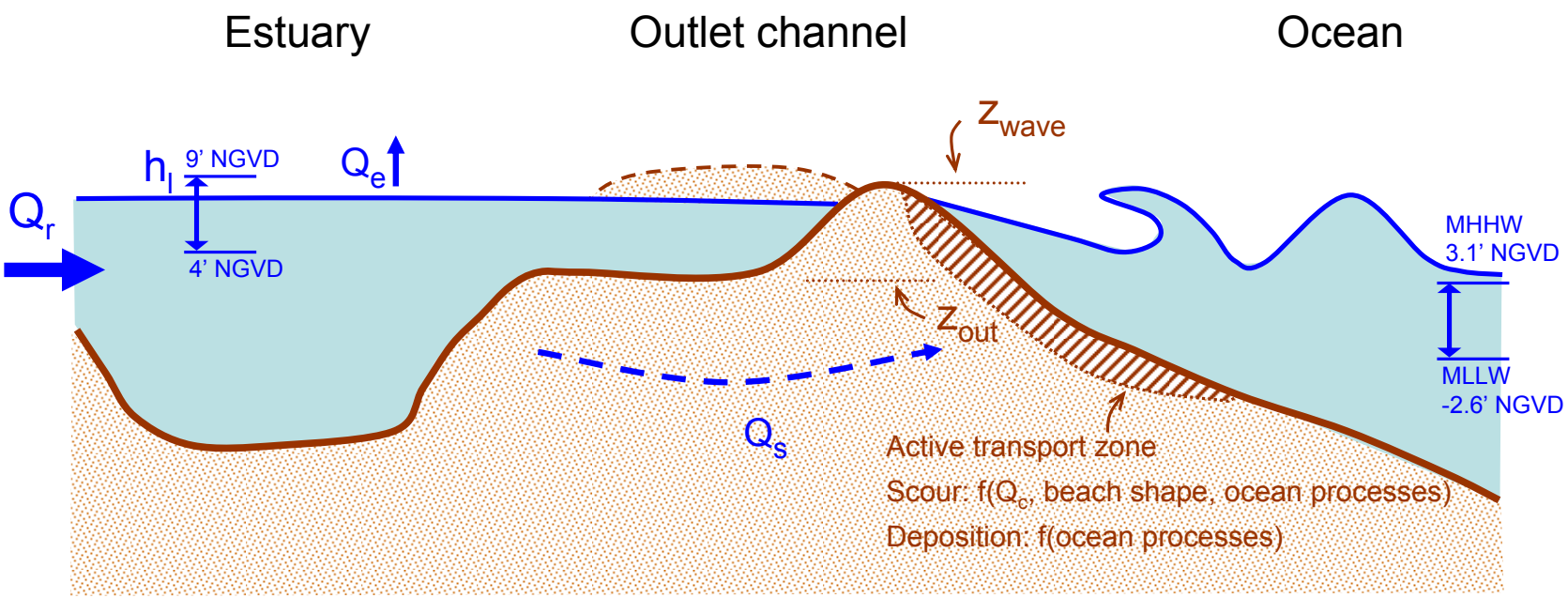
figure **2**

Russian River Estuary Outlet Channel Management Plan

Conceptual model – Target conditions

PWA Ref# 1958.01

PWA



Parameters

z_{out}=target channel bed elevation

z_{wave}=wave runup elevation; f(wave conditions, ocean water level, channel location)

Processes

- $z_{wave} \geq z_{out}$
- wave-induced sediment transport closes outlet channel
- $Q_c \rightarrow 0$
- h_l increasing

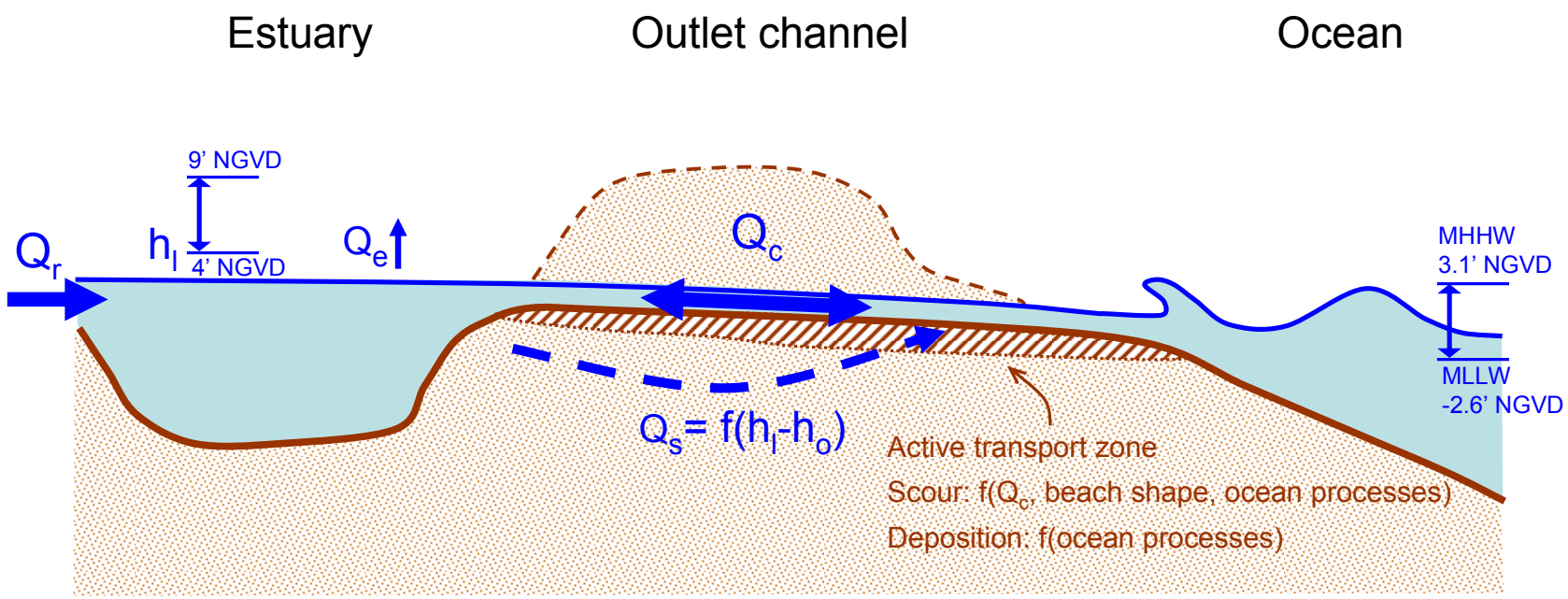
figure ***3***

Russian River Estuary Outlet Channel Management Plan

Conceptual model – Closure

PWA Ref# 1958.01

PWA



Parameters

u_c= f(channel slope, length, and width; Q_r; ocean water level)
(can be managed to greater or lesser degree)

u_{crit} is f(grain size)

Processes

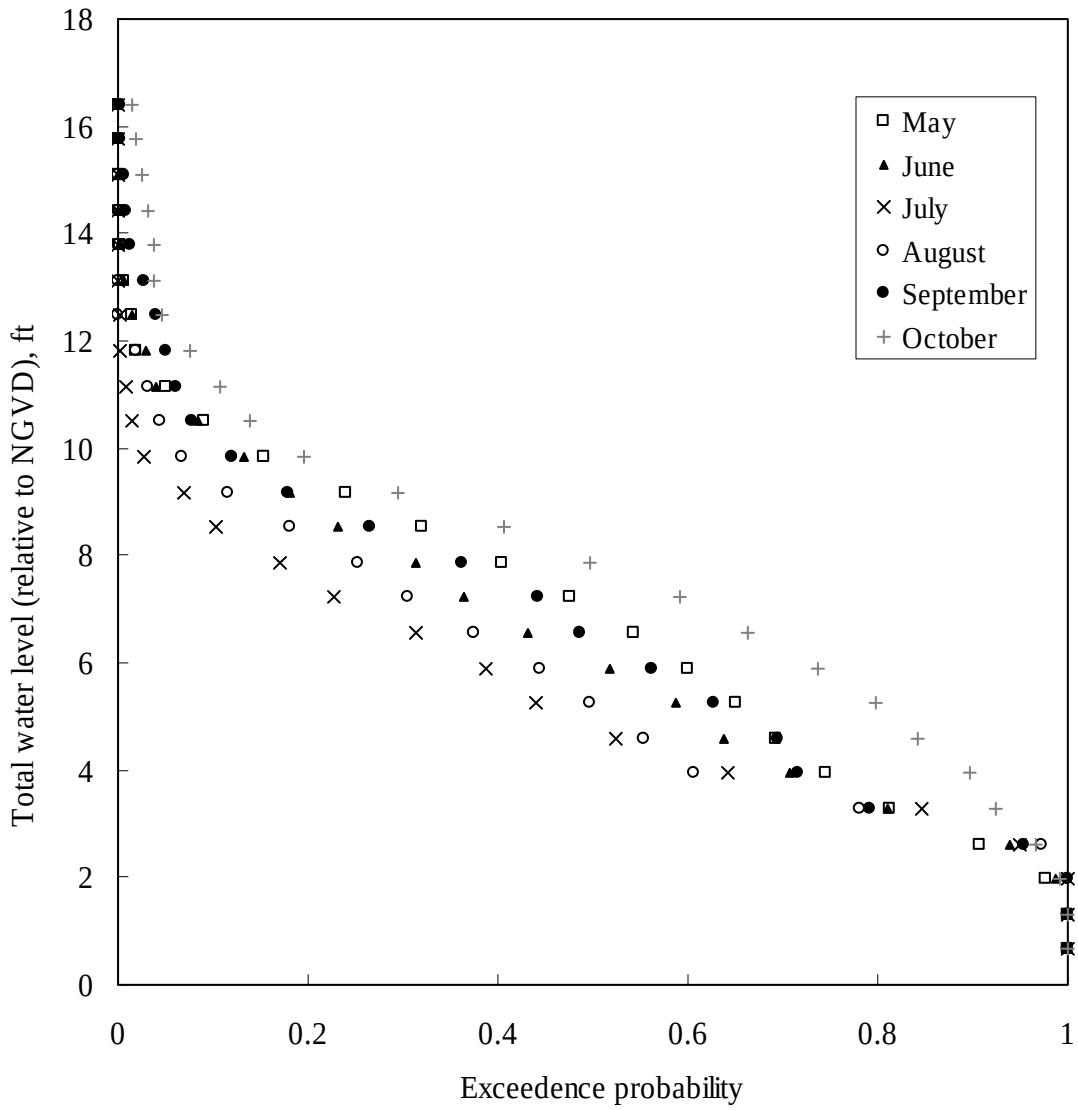
- $u_c > u_{crit}$; high velocities scour channel
- Q_s increases; high seepage creates groundwater piping and erosion
- sediment transport within outlet channel

figure ***4***
Russian River Estuary Outlet Channel Management Plan

Conceptual model – Breaching

PWA Ref# 1958.01

PWA



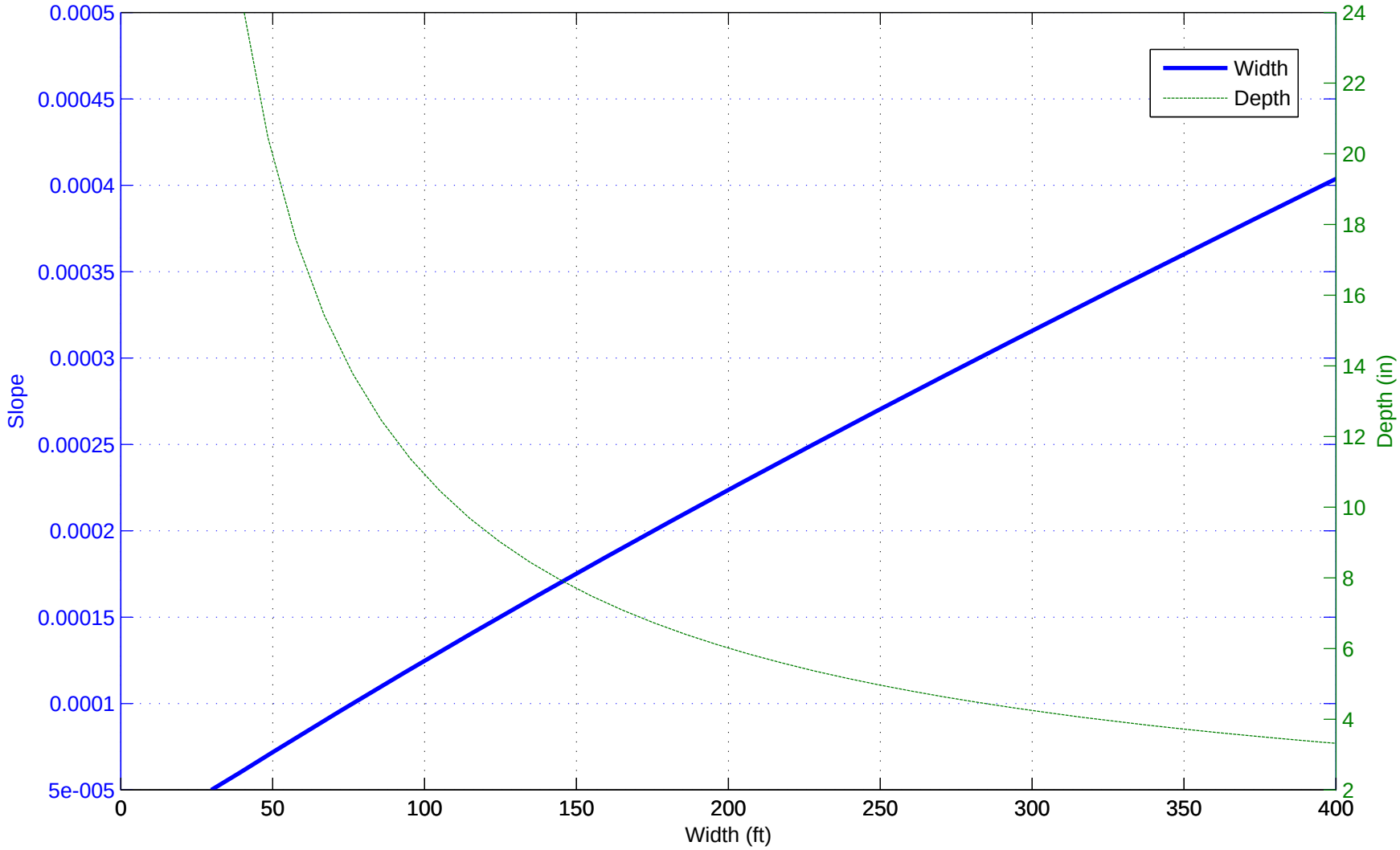
Source: D. Behrens (unpublished). Wave data from CDIP Point Reyes buoy.
Note: Total water level calculated as sum of daily higher high tide and wave runup elevation. Wave runup calculated from Stockdon et al (2006) using estimated de-shoaled deepwater equivalent wave heights.

figure **5**
Russian River Outlet Channel Management Plan

Total Water Level Exceedance, May-Oct

PWA Ref# 1958.01

PWA



Source: Stability curve for local bed shear stress of 0.5 Pa, flowrate of 70 cfs, and Manning's roughness of 0.02.

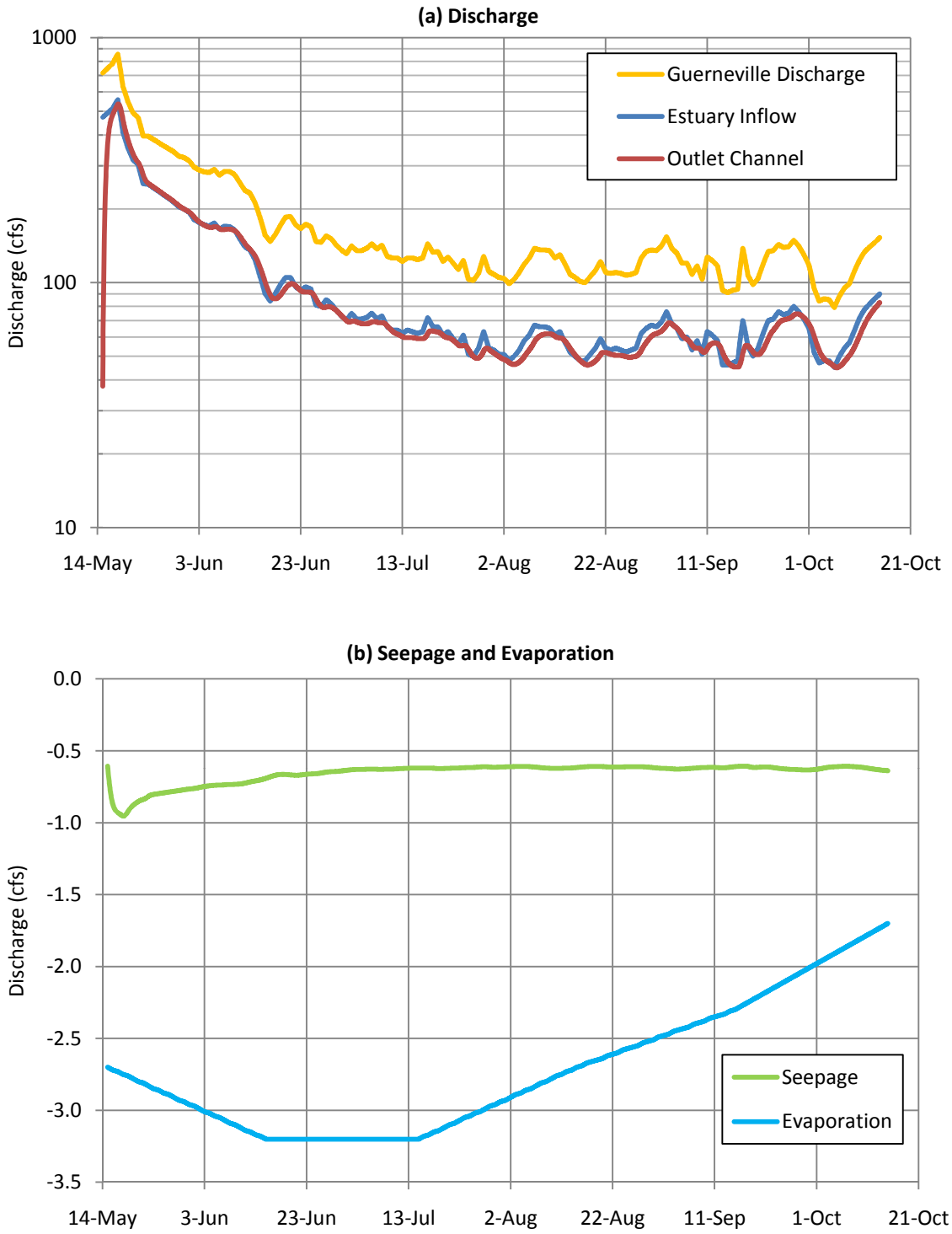
Figure 6
Russian River Estuary Outlet Channel Management Plan

Slope vs. Width Stability Plot

PWA Ref# 1958.01

PWA

j:\1958.01RREAMPOutletChannel\Task 4 Prelim geometry\matlab\solve_geometry.m



Source: 2010 anticipated discharge at Guerneville and into lagoon calculated by scaling observed 2000 discharge at USGS gage #11467000 (Russian River near Guerneville, CA). Evaporation rates calculated from monthly climatological rates for CIMIS evapotranspiration zone 1 (California coast).

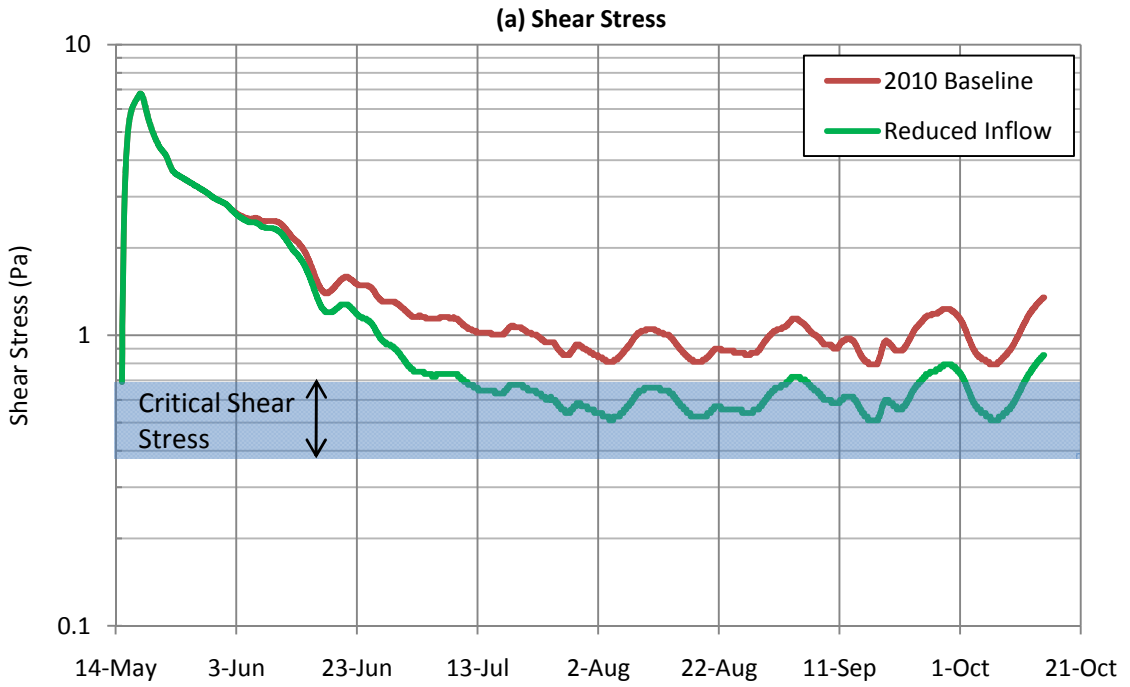
figure 7

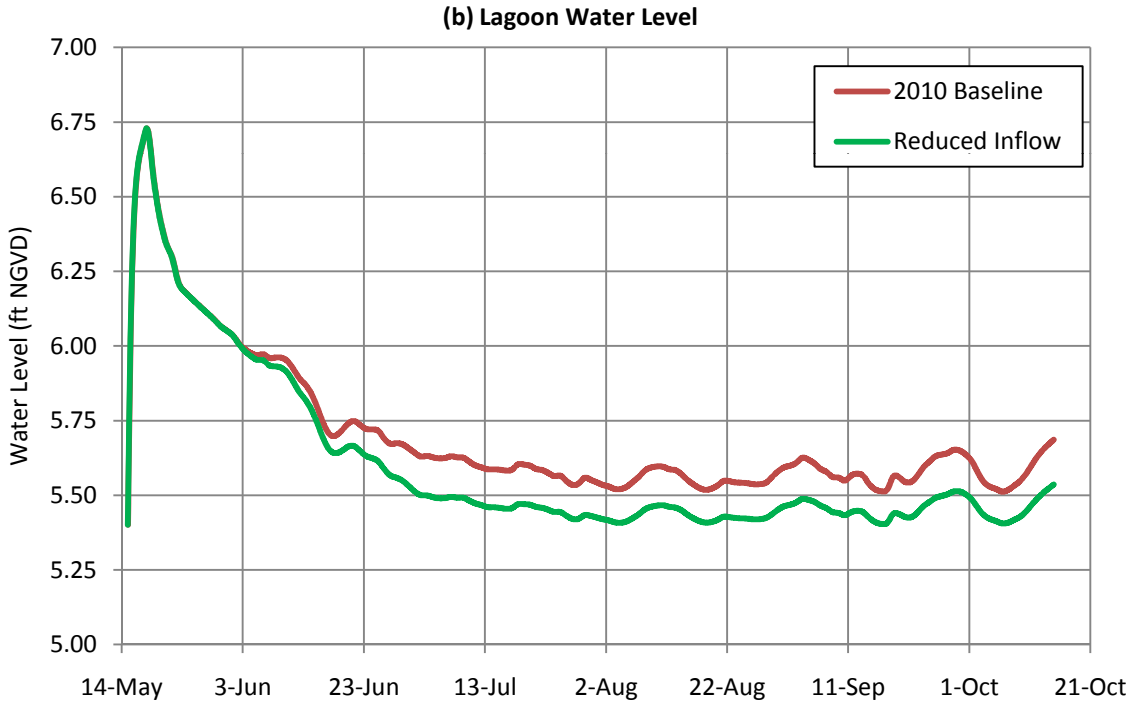
Russian River Estuary Outlet Channel Management Plan

Hydraulic Model Discharge - 2010 Anticipated Hydrology

PWA Ref#: 1958.01

PWA





Notes: Baseline channel geometry: width=100 ft, length=300 ft, bed=5 ft NGVD, n = 0.02.
Source: HEC-RAS hydraulic model results for outlet channel.

figure **8**

Russian River Estuary Outlet Channel Management Plan

Hydraulic Model Results - 2010 Anticipated Hydrology

PWA Ref#: 1958.01

PWA