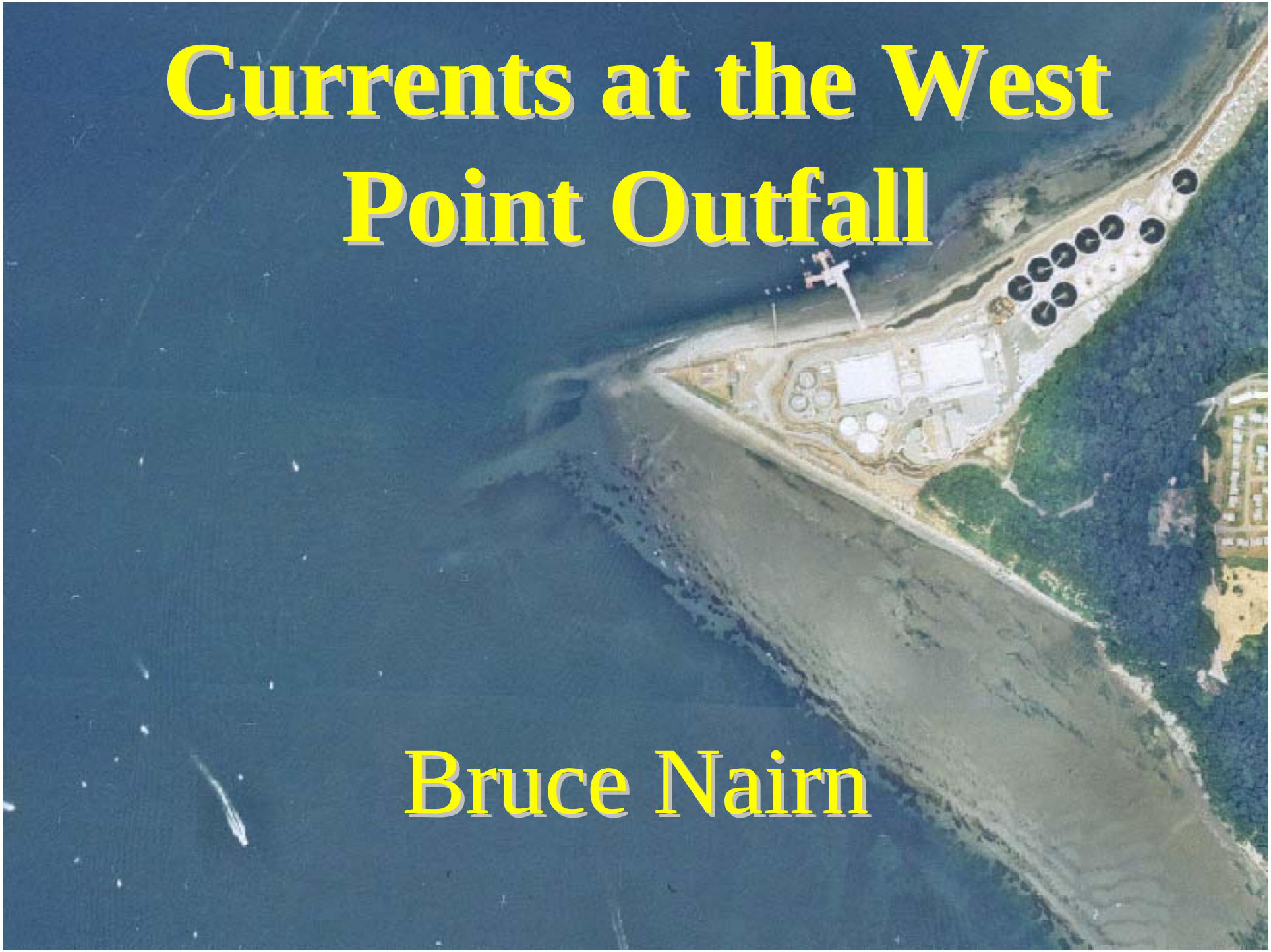
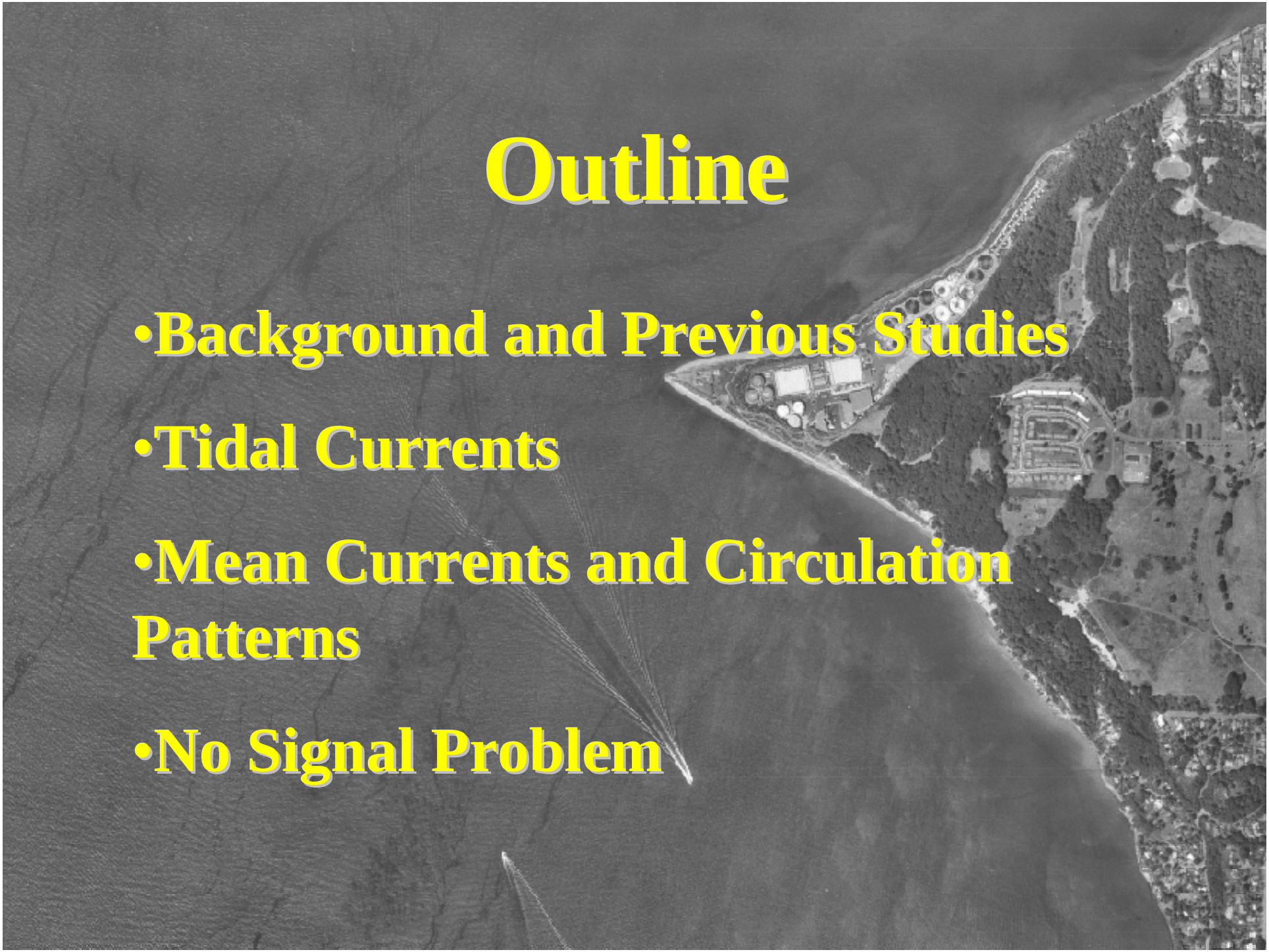
Currents at the West Point Outfall



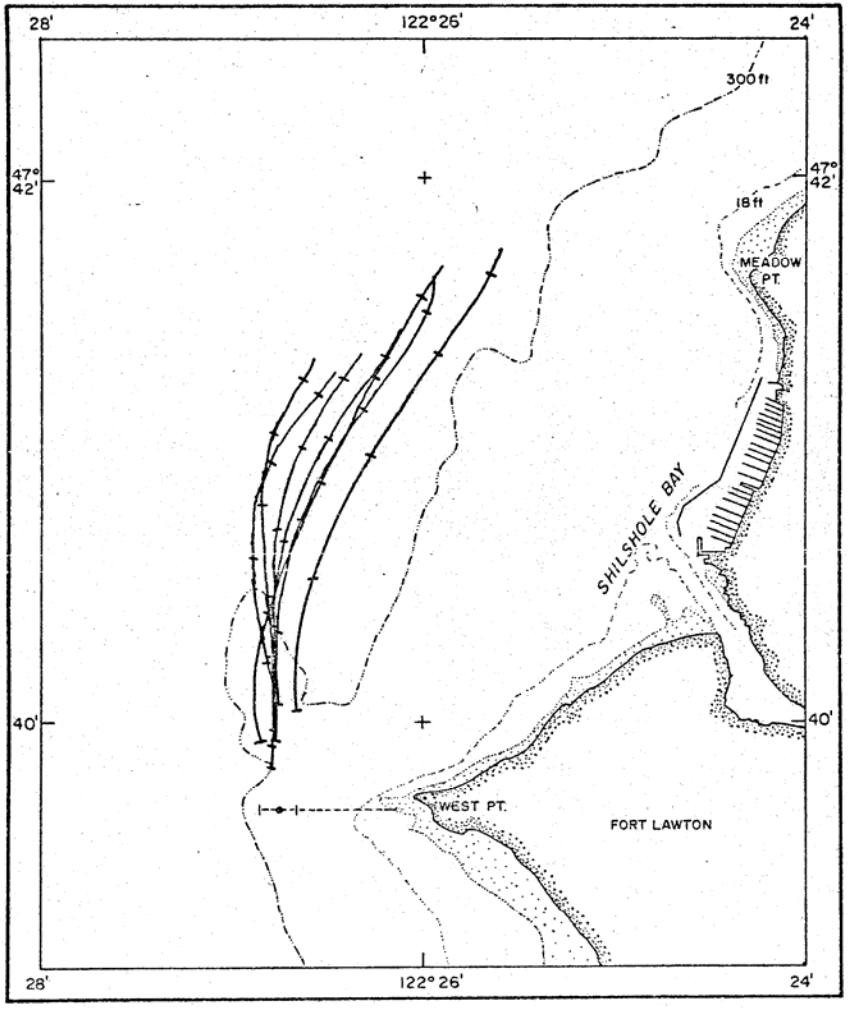
Bruce Nairn



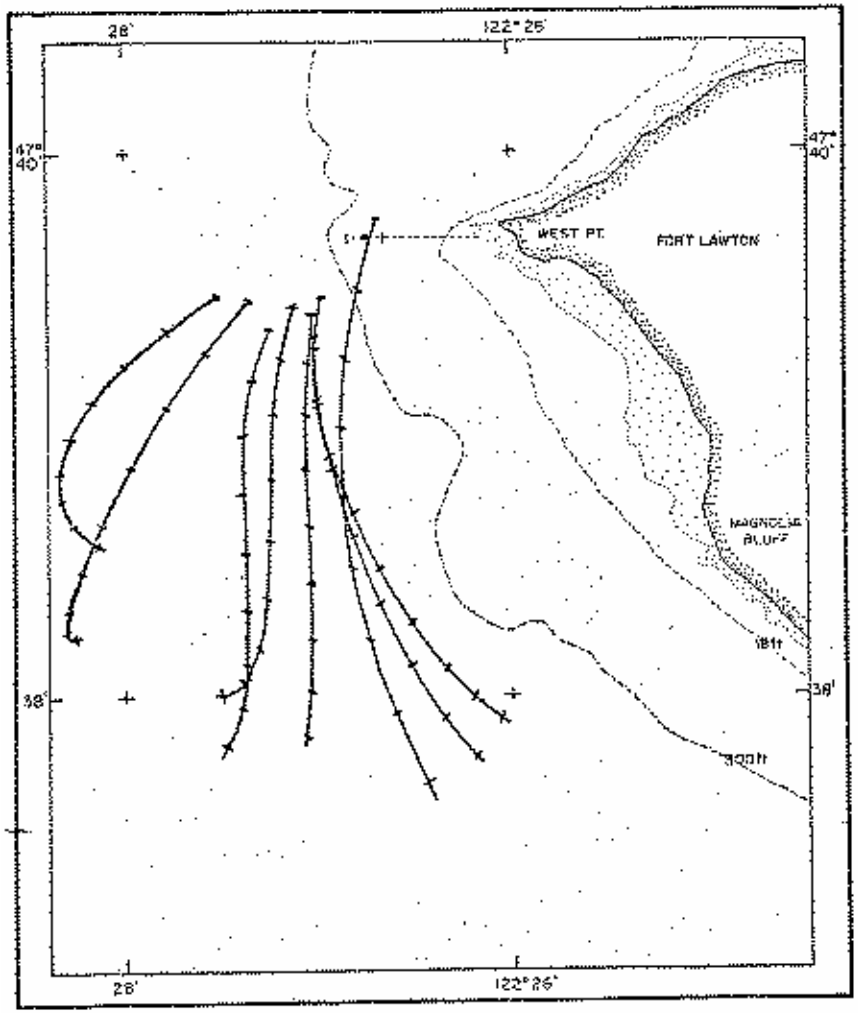
Outline

- Background and Previous Studies
- Tidal Currents
- Mean Currents and Circulation Patterns
- No Signal Problem

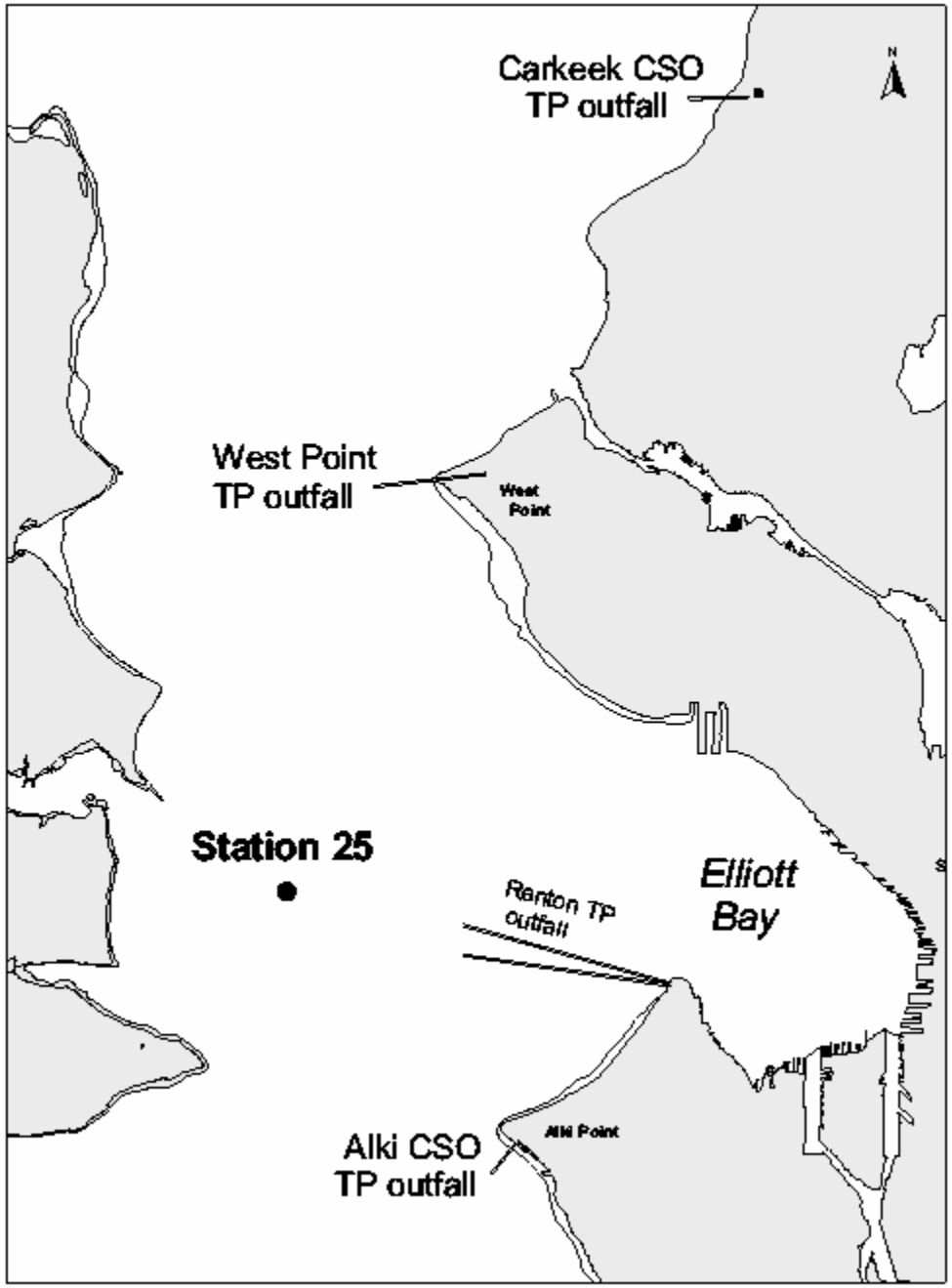
Previous Current Measurements at West Point

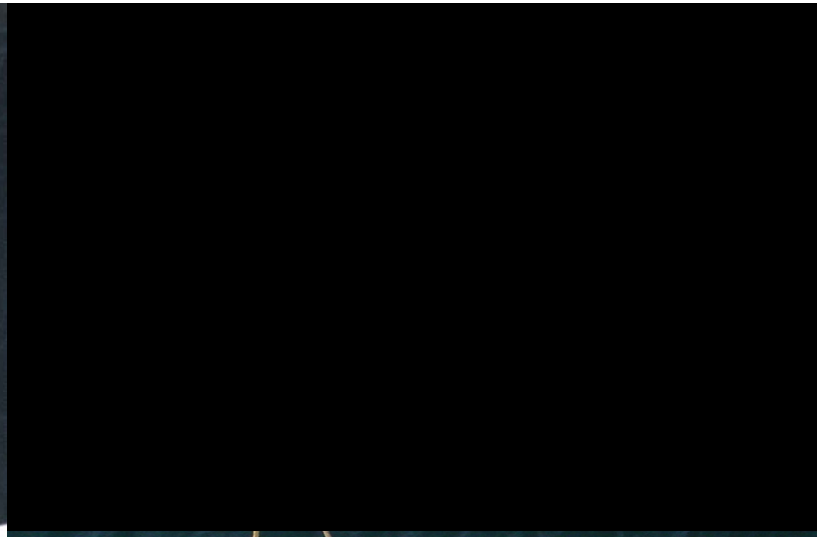


Ebb Tide

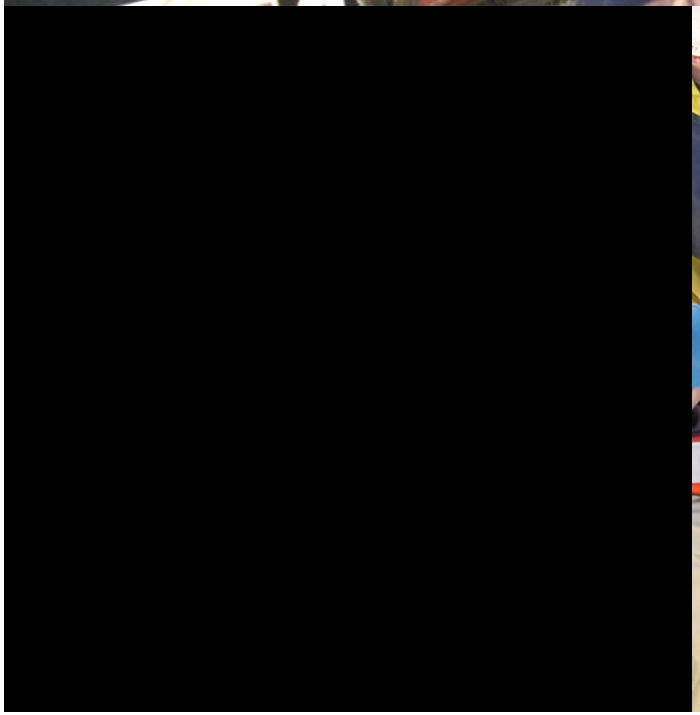


Flood Tide


Carkeek CSO
TP outfall
N
West Point
TP outfall
West
Point
Station 25
Elliott
Bay
Renton TP
outfall
Alki Point
Alki CSO
TP outfall

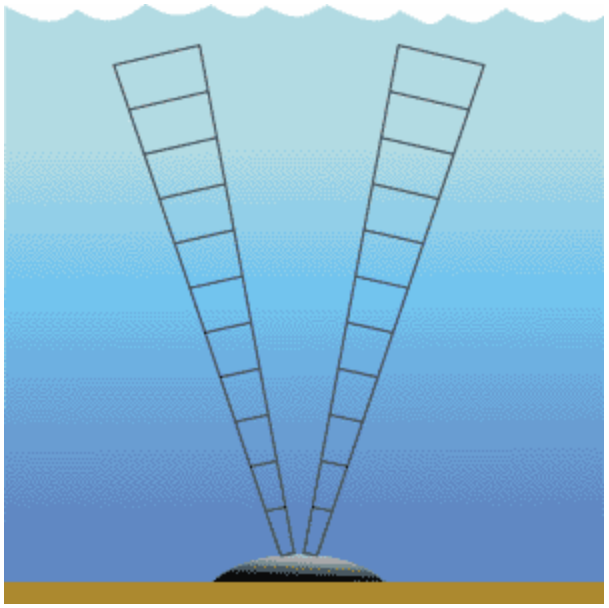


EVANS-HAMILTON
206 526-5622

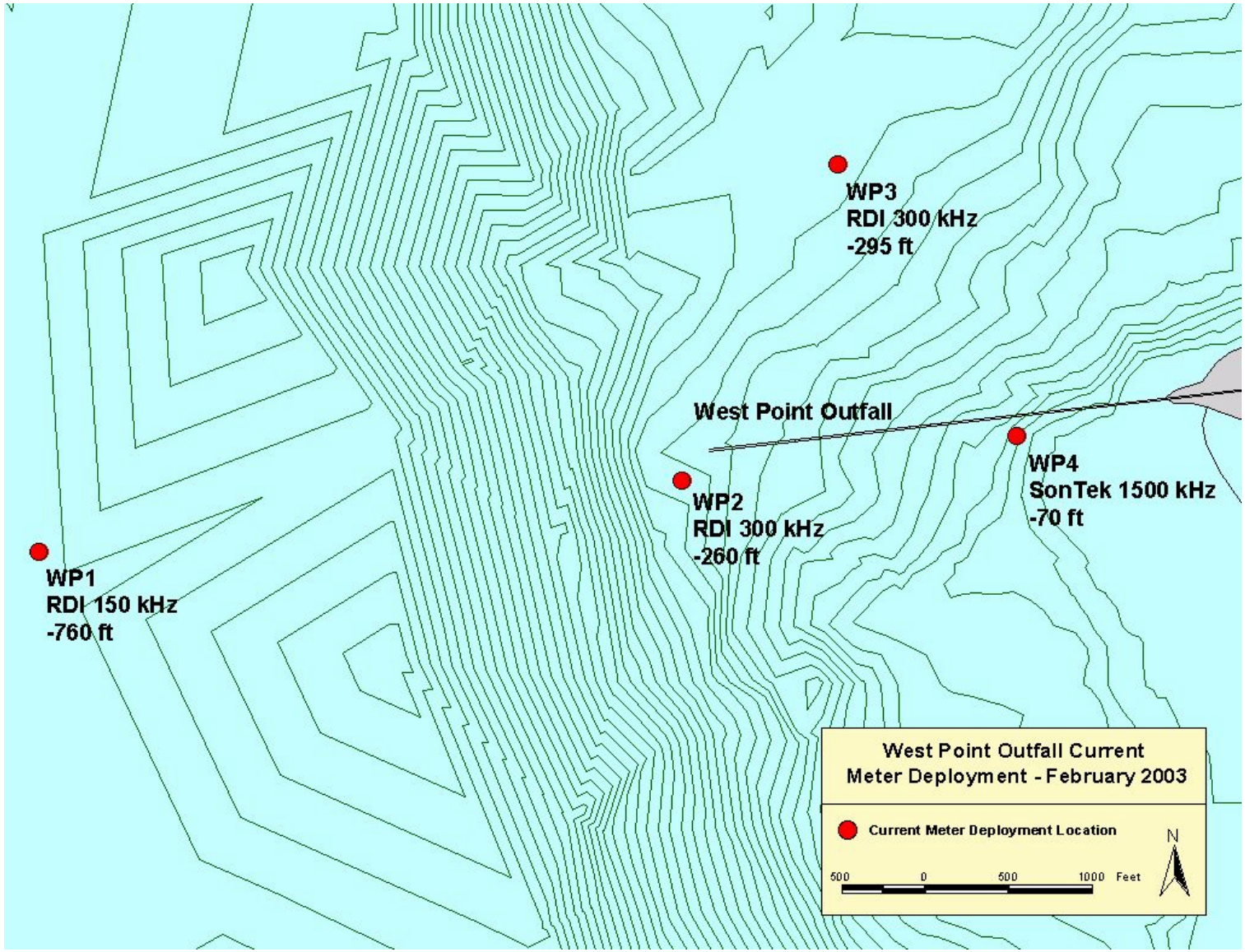


Current Meters

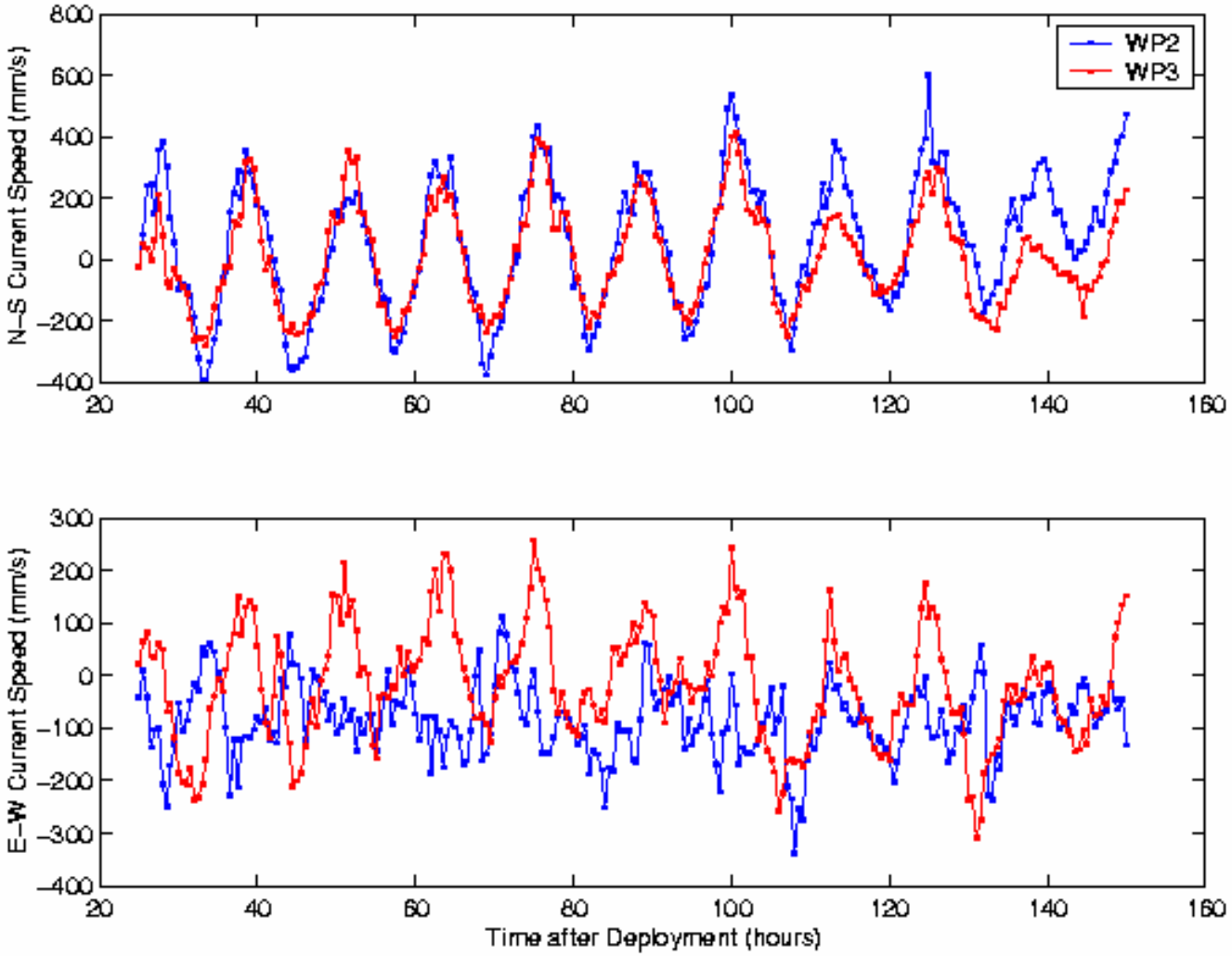
- Deployed Feb 4 - March 19, 2003
- 4 ADCP meters:
  - 1 150kHz RDI
  - 2 300 kHz RDI
  - 1 1500kHz SonTek



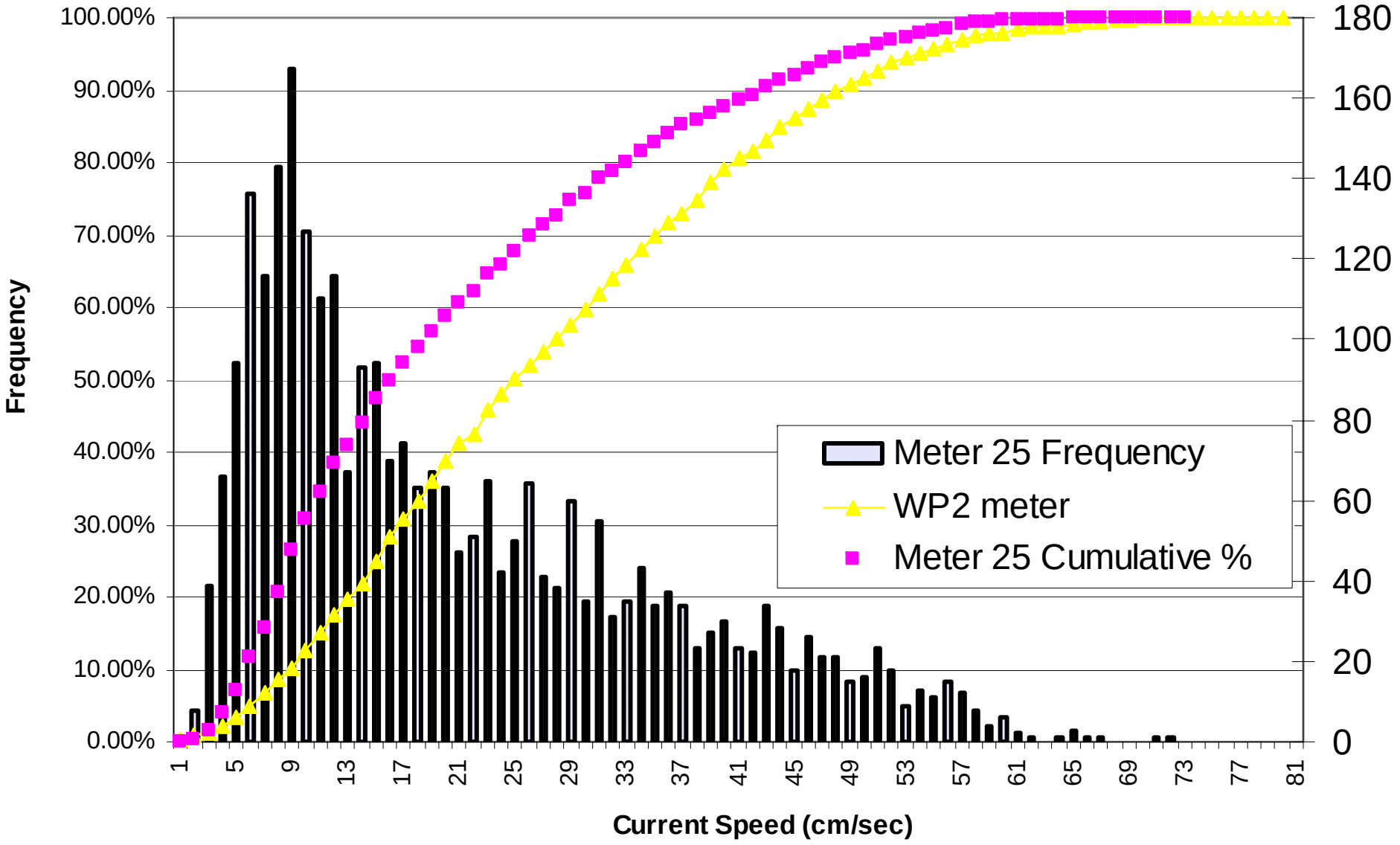
Meter Locations



Typical Tidal Current



Meter 25 and New WP Data



Tidal Current Summary

- Current Speeds are higher than observed at Meter 25
- 10% = 9cm/s vs. 6 cm/s
- 90% = 49 cm/s vs. 41 cm/s
- Will provide a slight increase to Initial Dilution predictions for NDPES permit

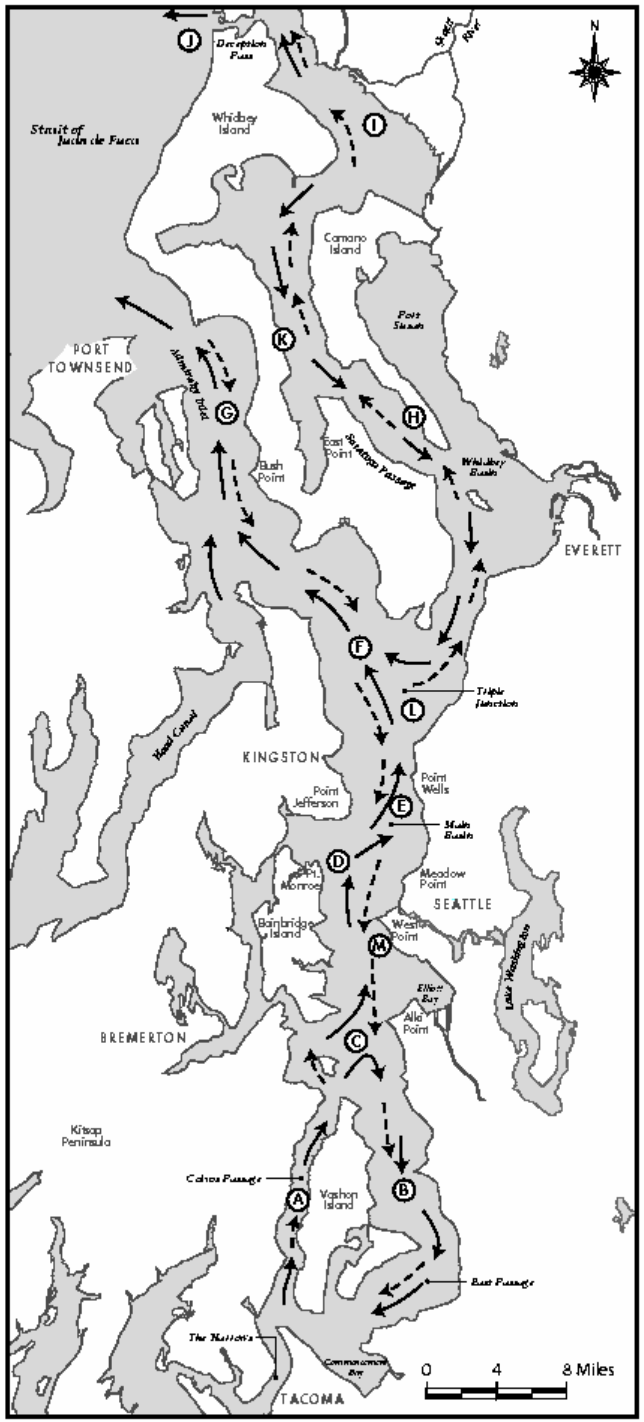


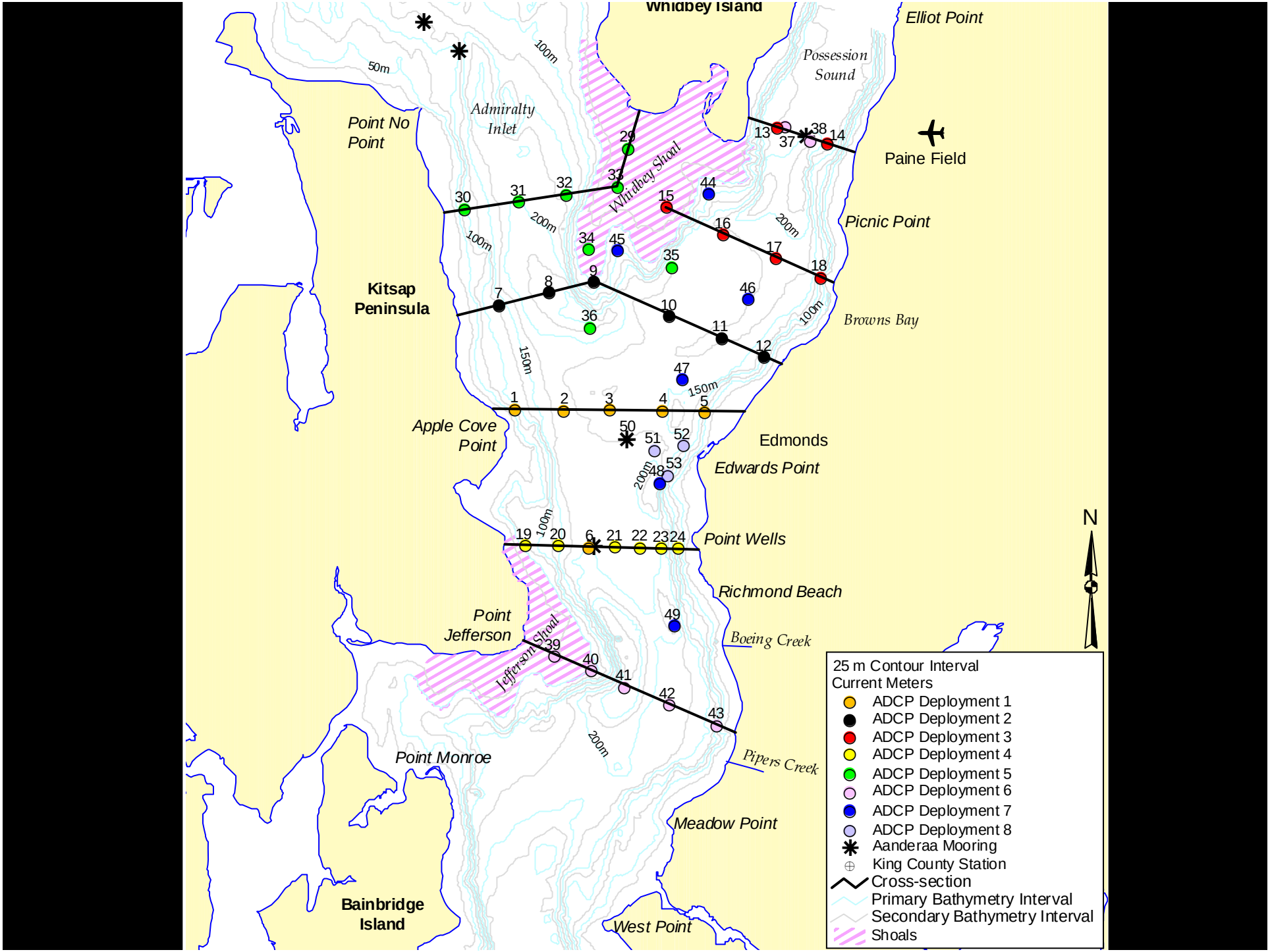
Figure 2

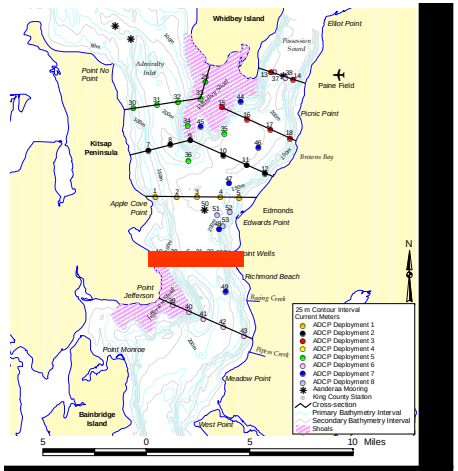
Inflow and Outflow in Puget Sound

Inflow

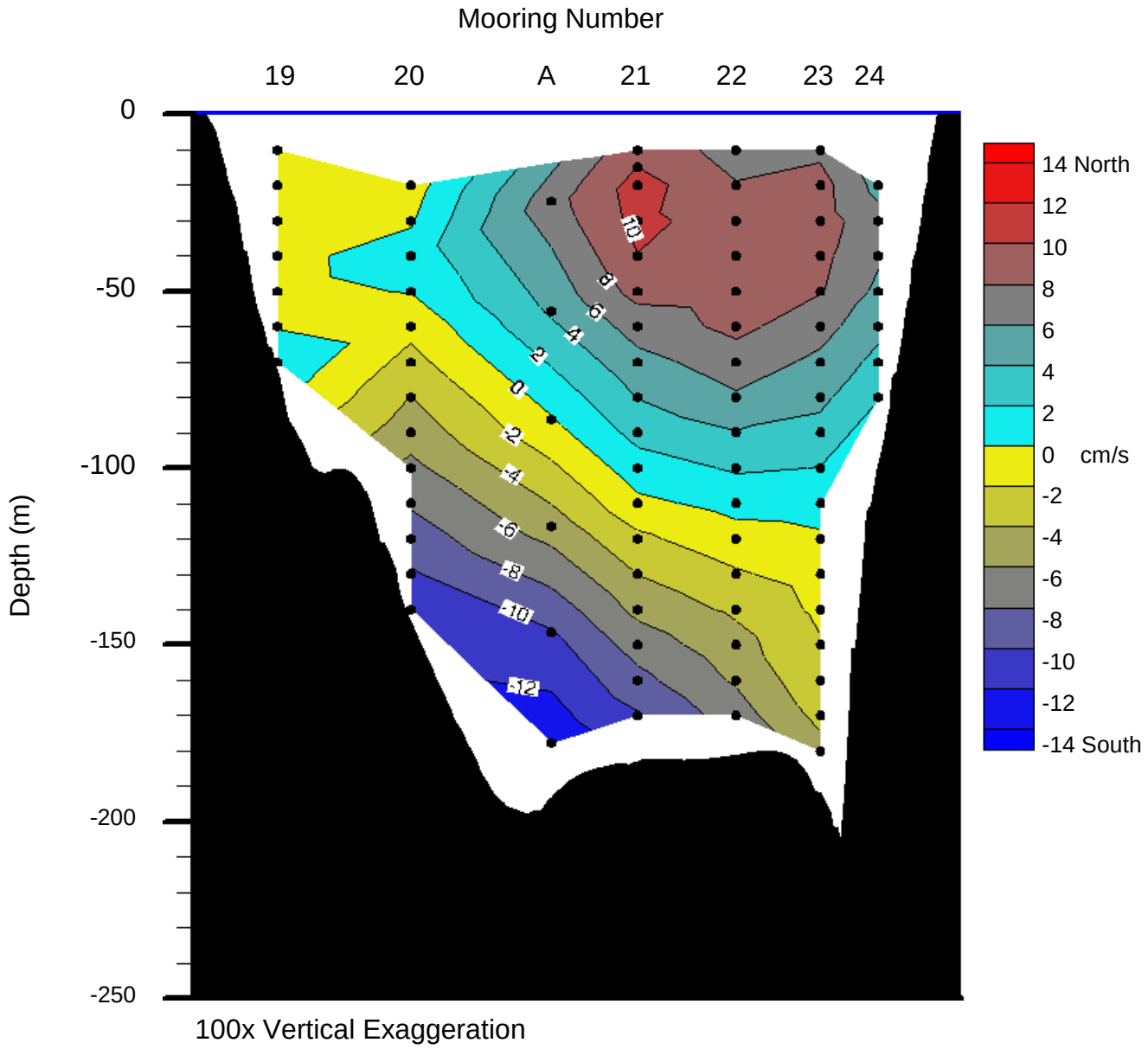
Outflow

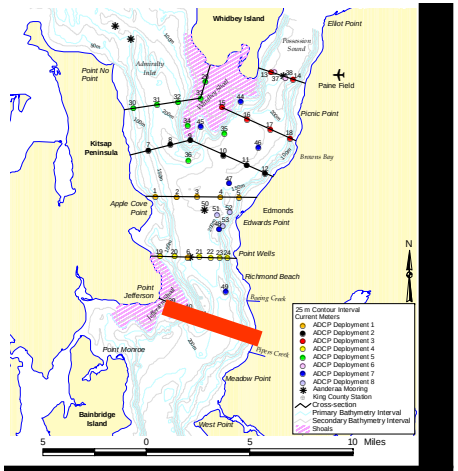
Creation and Production of this Illustration was a combined effort of the Wastewater Treatment Division and the WLRGIS & Visual Communications Unit


Whidbey Island
Elliot Point
Possession Sound
Admiralty Inlet
Point No Point
Paine Field
Whidbey Shoal
Picnic Point
Kitsap Peninsula
Browns Bay
Apple Cove Point
Edmonds
Edwards Point
Point Wells
Richmond Beach
Point Jefferson
Jefferson Shoal
Boeing Creek
Point Monroe
Pipers Creek
Meadow Point
Bainbridge Island
West Point
50m
100m
150m
200m
N
25 m Contour Interval
Current Meters
ADCP Deployment 1
ADCP Deployment 2
ADCP Deployment 3
ADCP Deployment 4
ADCP Deployment 5
ADCP Deployment 6
ADCP Deployment 7
ADCP Deployment 8
Aanderaa Mooring
King County Station
Cross-section
Primary Bathymetry Interval
Secondary Bathymetry Interval
Shoals



Point Wells Section





Point Jefferson Section

Mooring Number

39 40 41 42 43

Depth (m)

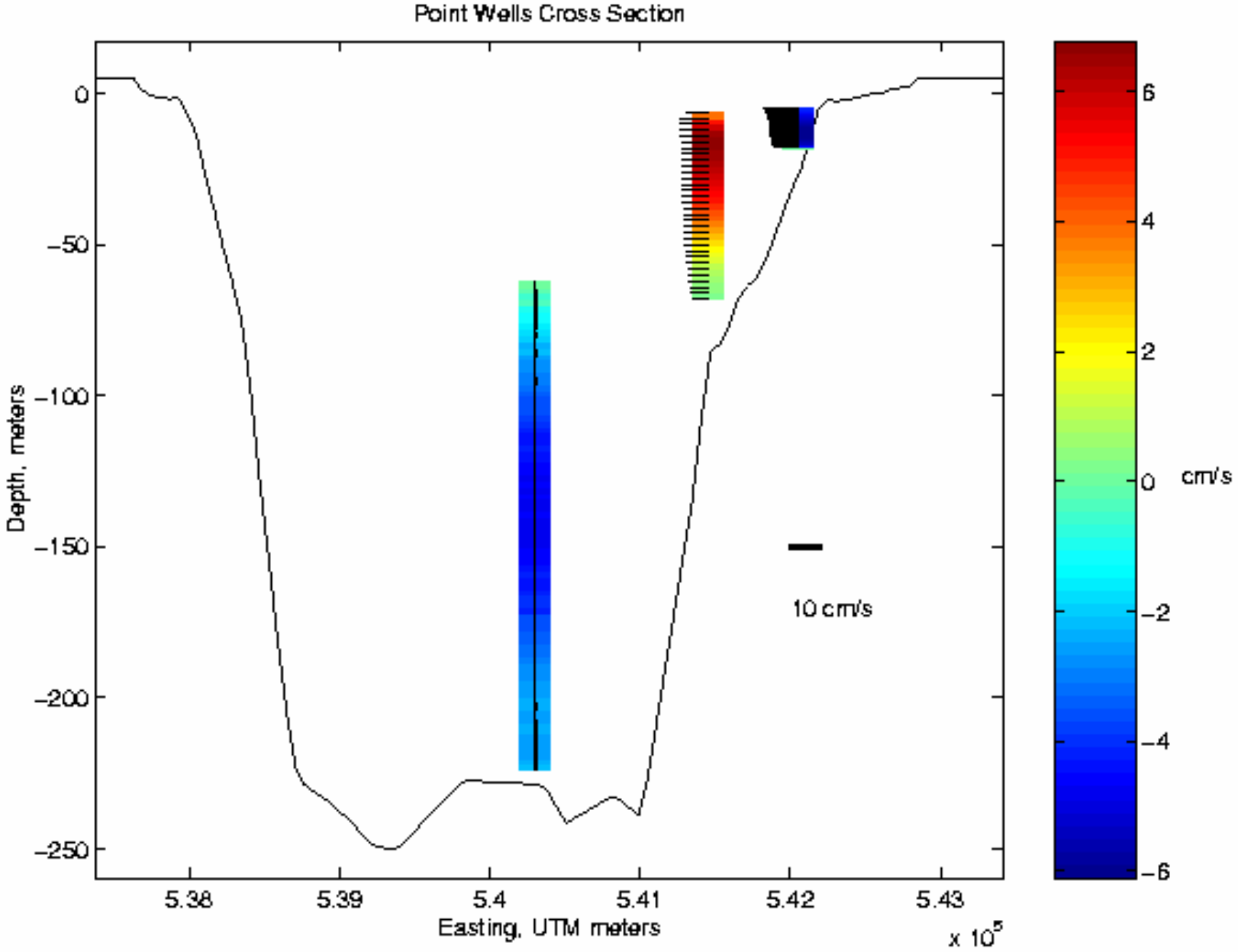
0 -50 -100 -150 -200 -250 -300

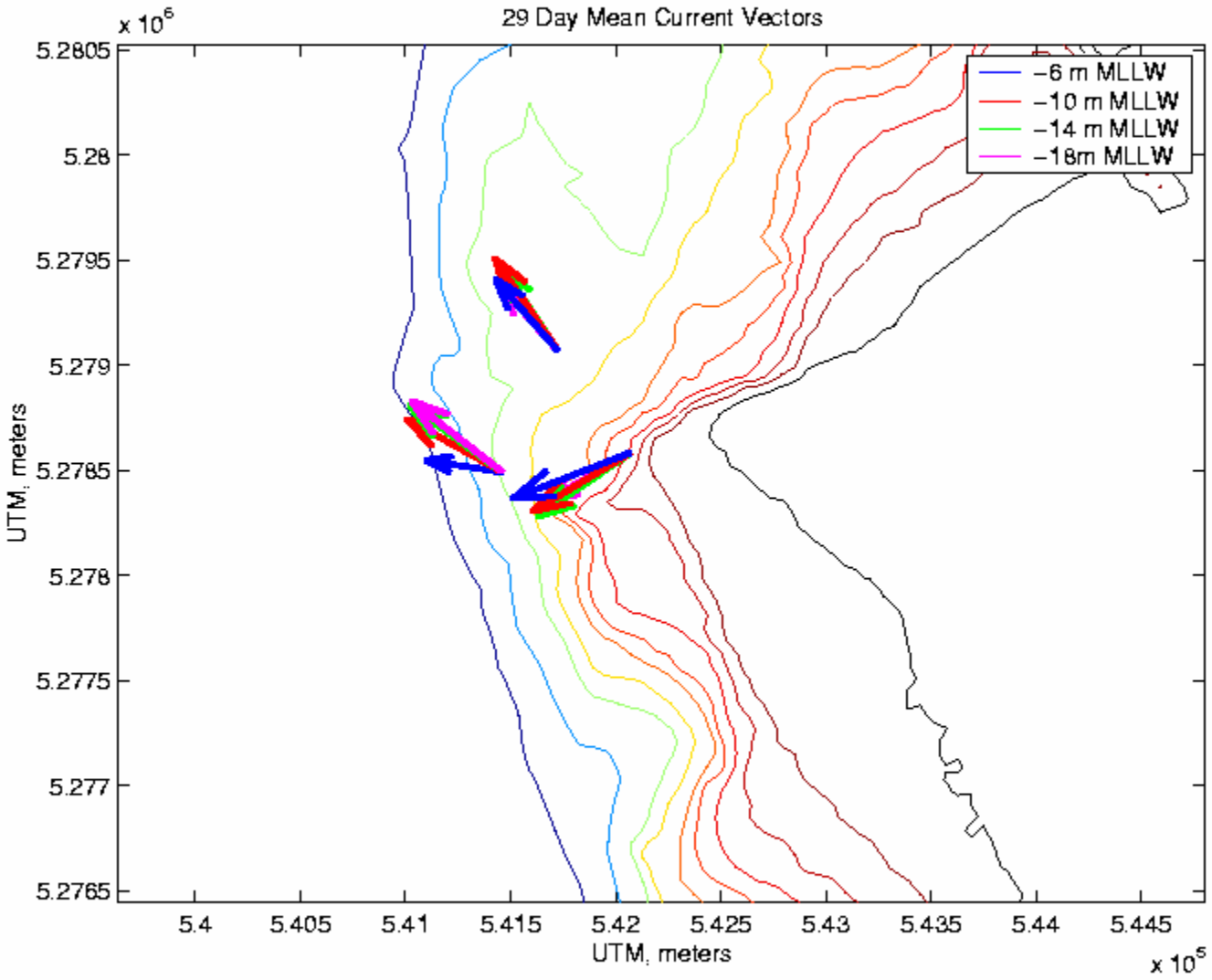
12 10 8 6 4 2 0 -2 -4

12 North
10
8
6
4
2
0 cm/s
-2
-4
-6
-8
-10

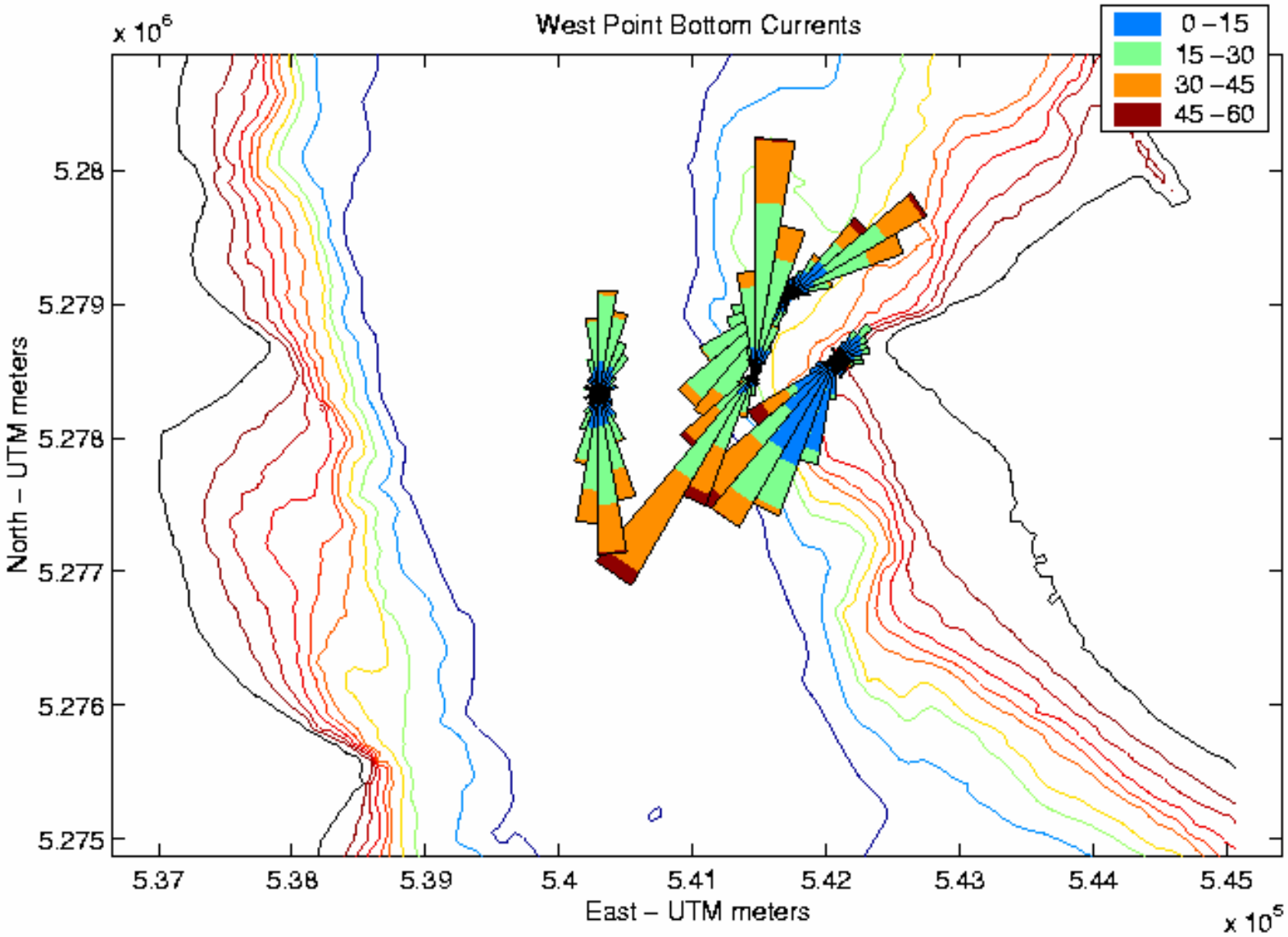
33x Vertical Exaggeration

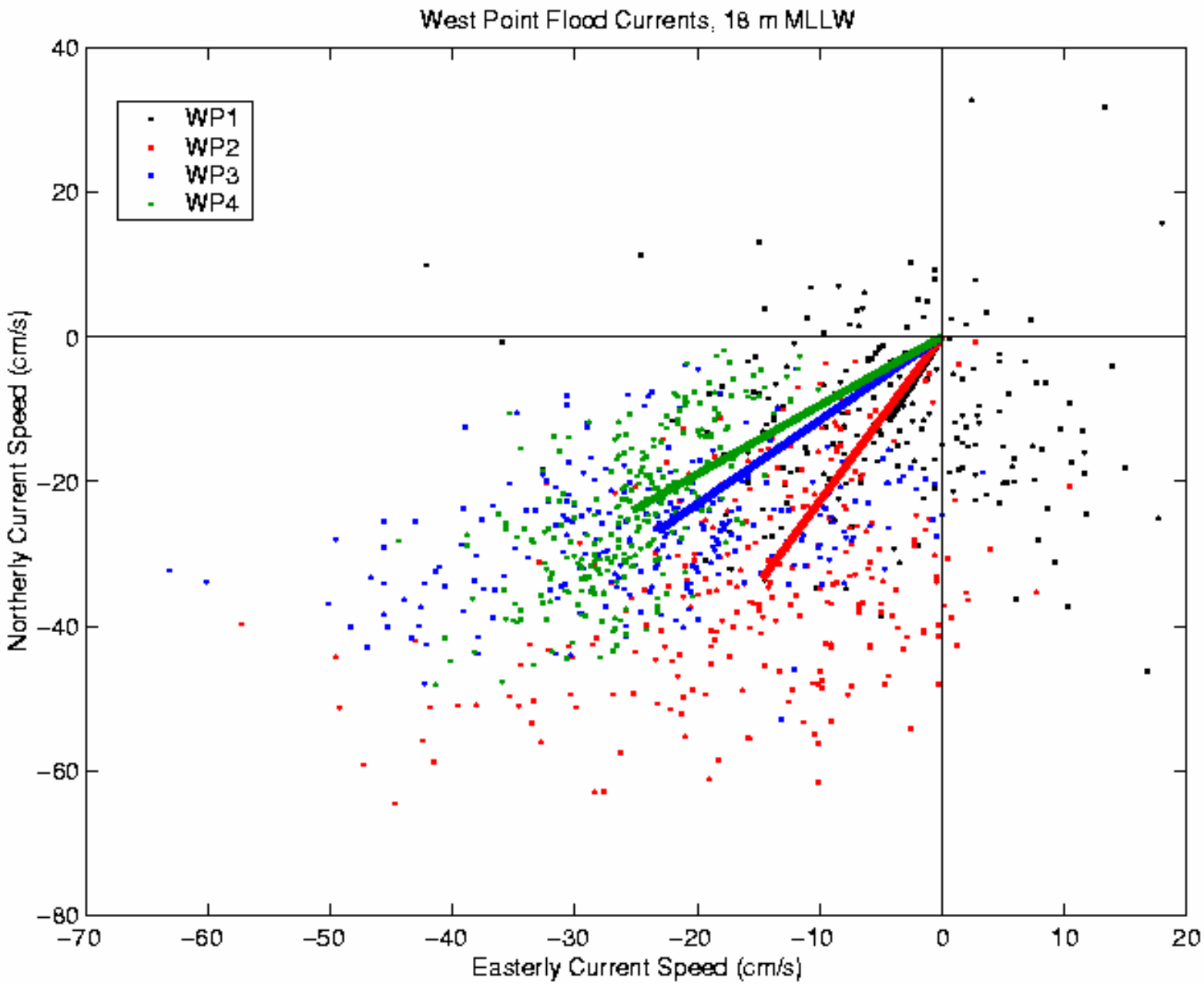
Point Wells Cross Section

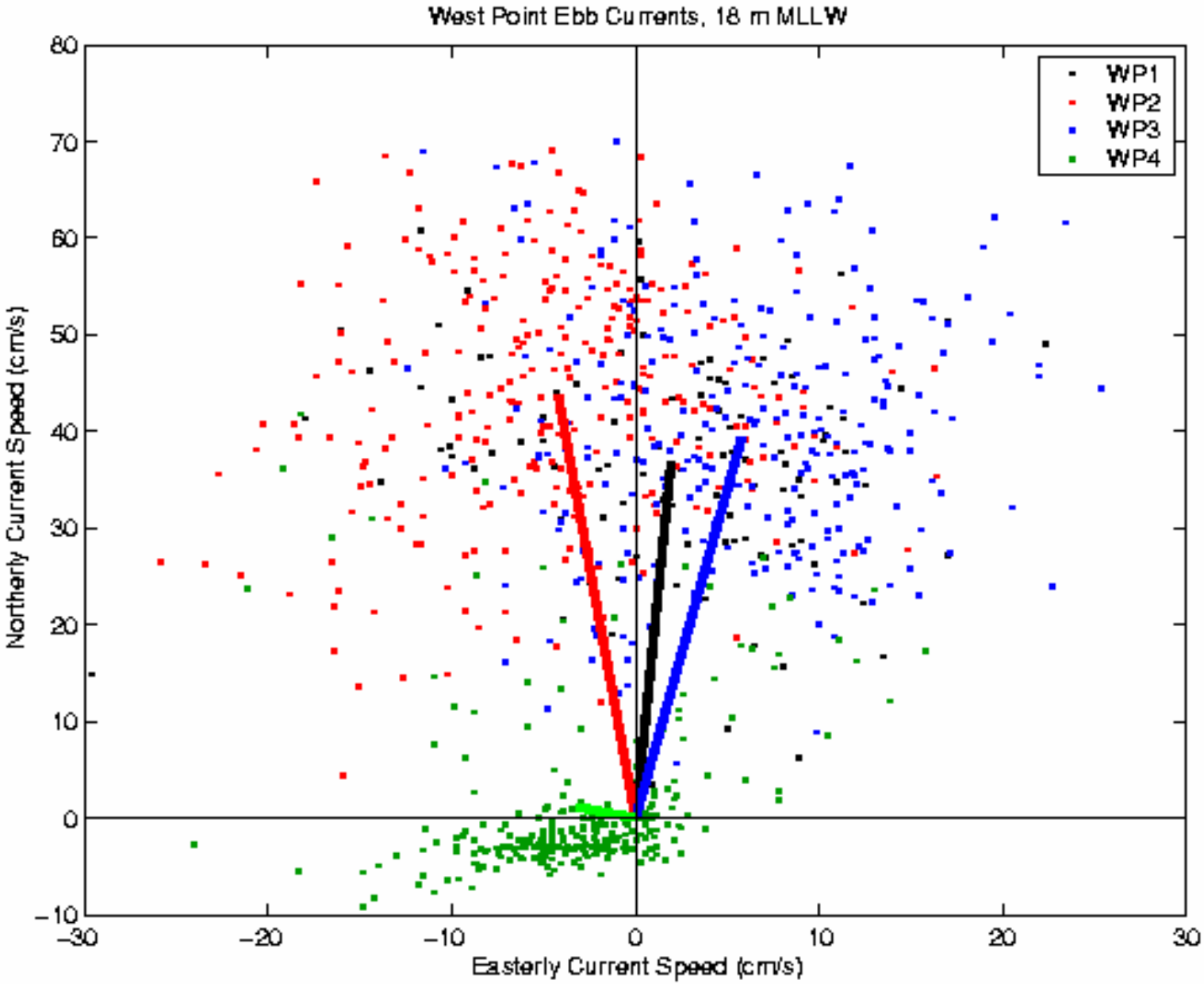



29 Day Mean Current Vectors
x 10^6
5.2805
5.28
5.2795
5.279
5.2785
5.278
5.2775
5.277
5.2765
UTM, meters
5.4
5.405
5.41
5.415
5.42
5.425
5.43
5.435
5.44
5.445
x 10^5
UTM, meters
−6 m MLLW
−10 m MLLW
−14 m MLLW
−18m MLLW

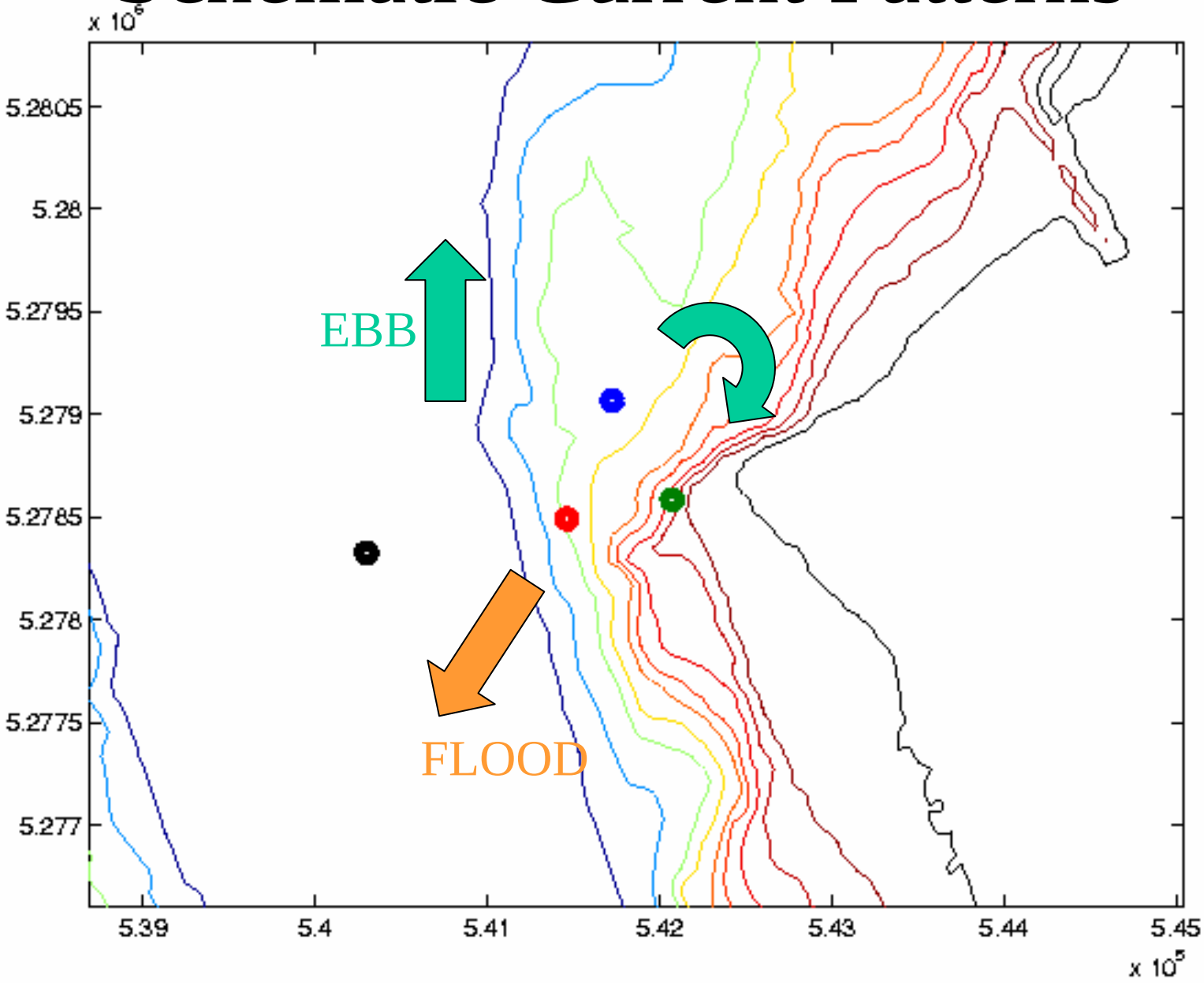
West Point Bottom Currents



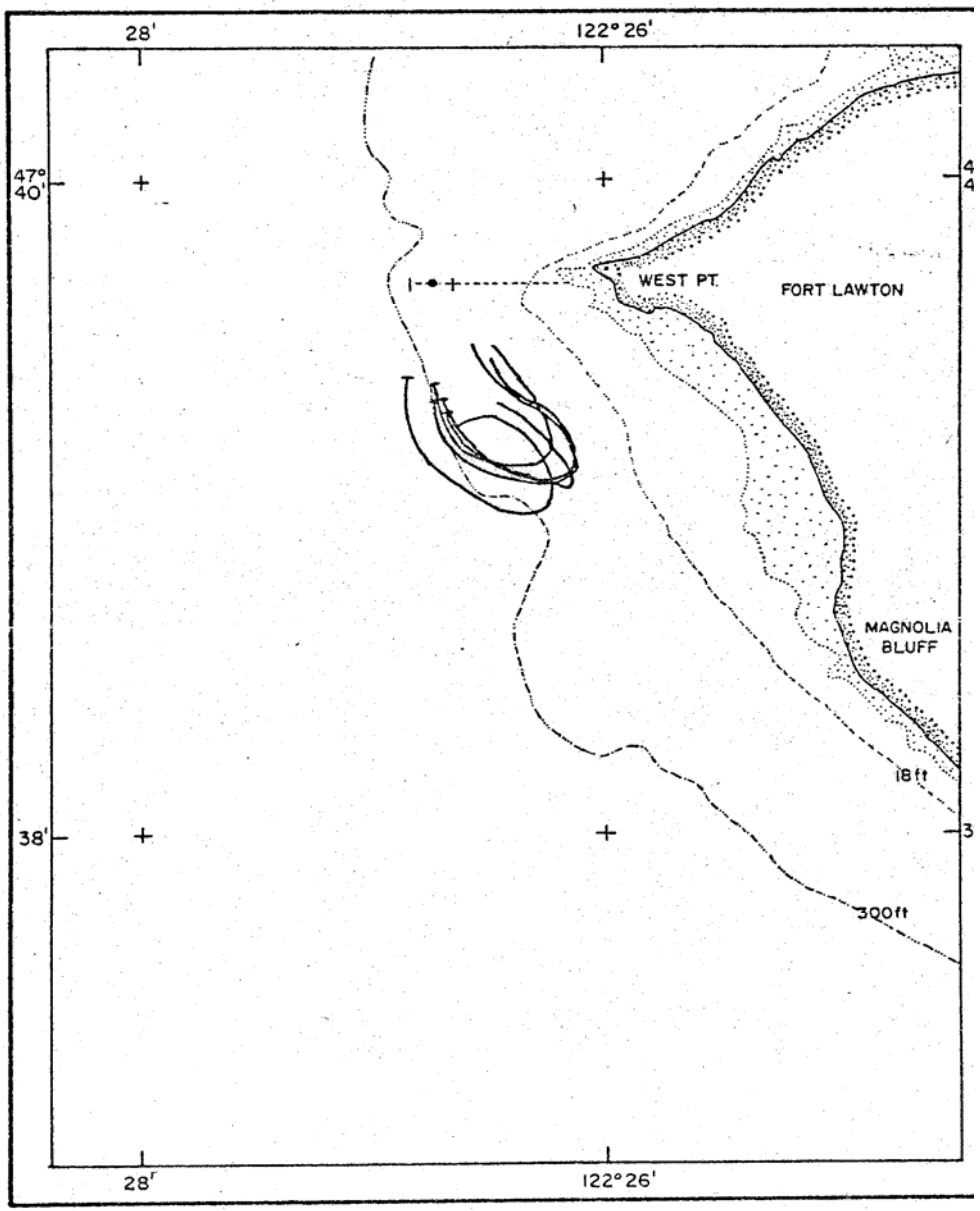

West Point Flood Currents, 18 m MLLW
WP1
WP2
WP3
WP4
Northerly Current Speed (cm/s)
Easterly Current Speed (cm/s)
40
20
0
−20
−40
−60
−80
−70
−60
−50
−40
−30
−20
−10
0
10
20


West Point Ebb Currents, 18 m MLLW
WP1
WP2
WP3
WP4
Northerly Current Speed (cm/s)
Easterly Current Speed (cm/s)
80
70
60
50
40
30
20
10
0
−10
−30
−20
−10
0
10
20
30

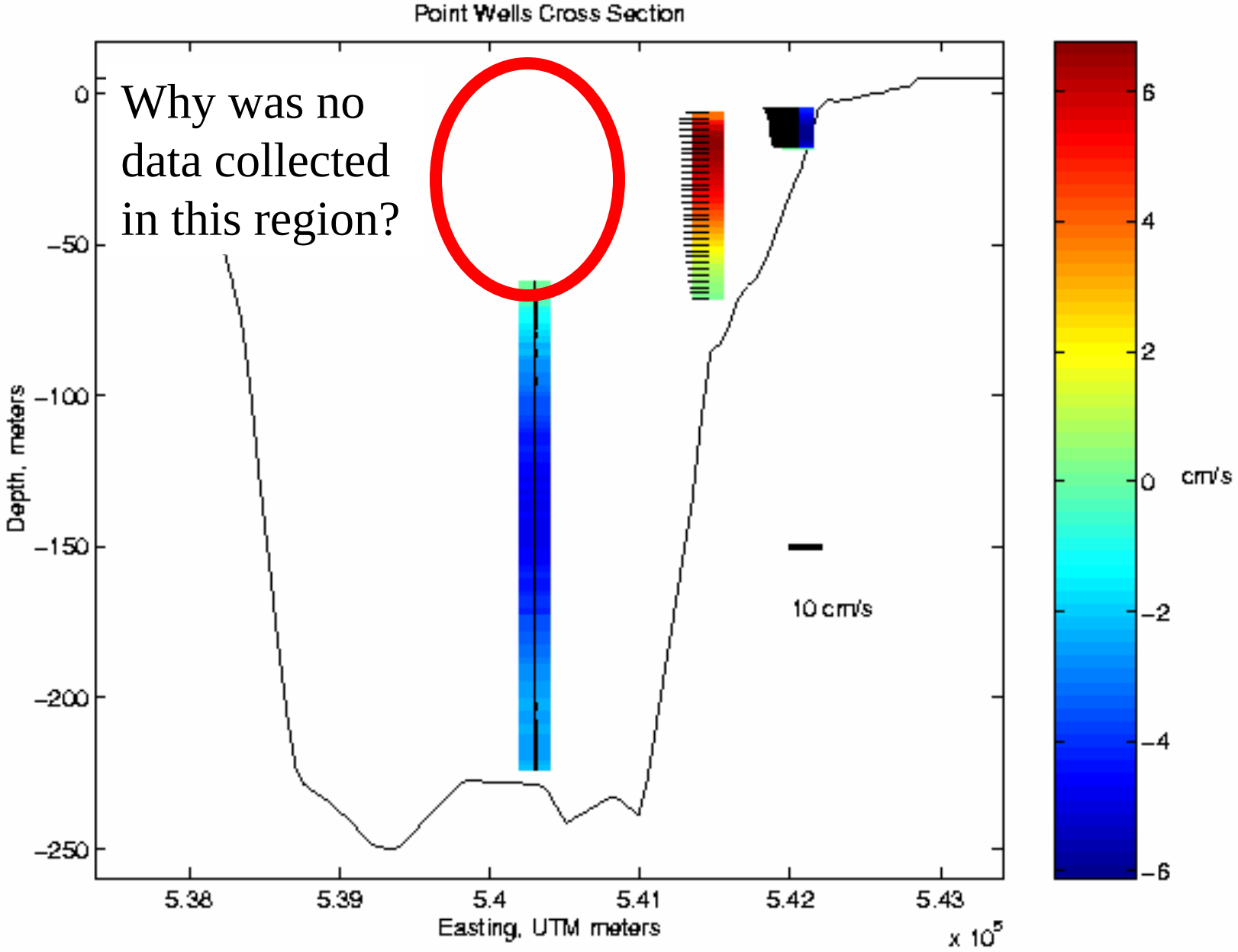
Schematic Current Patterns



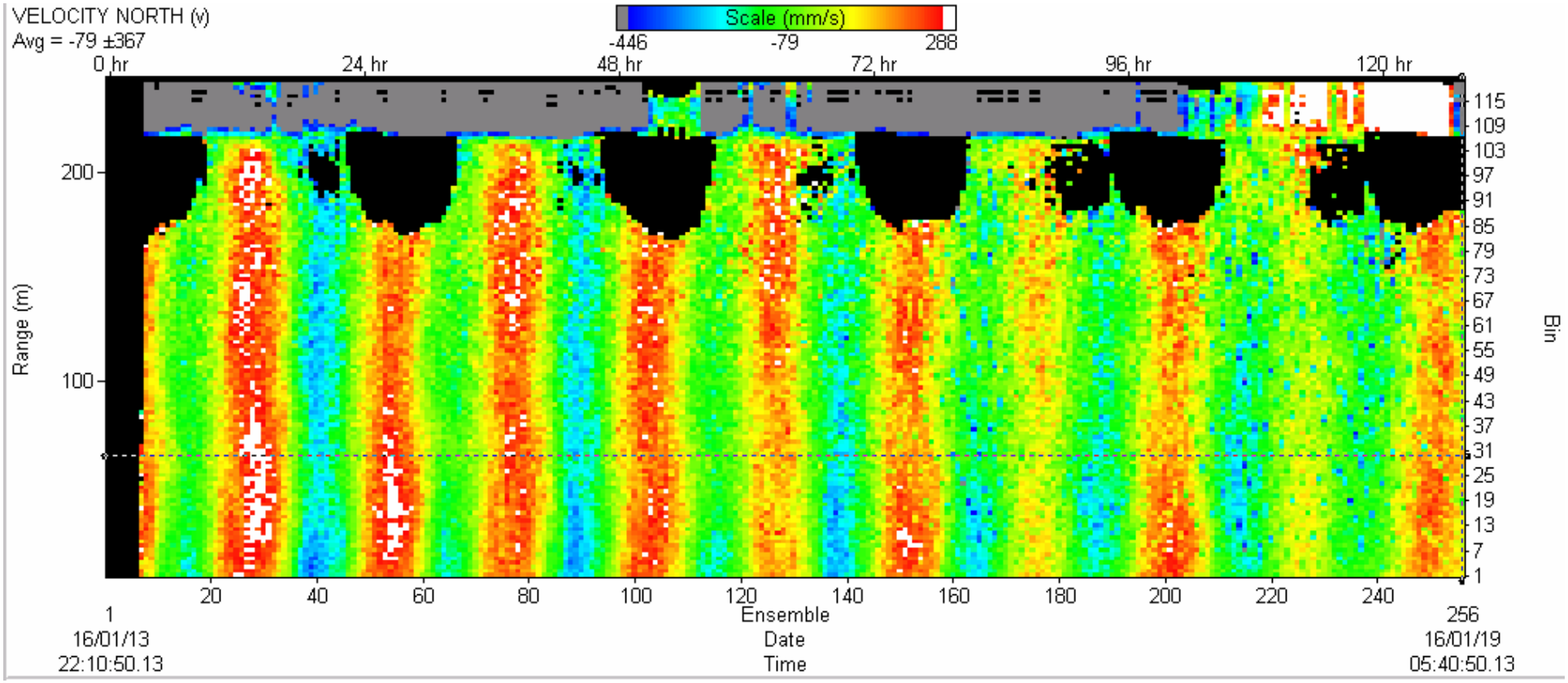
Eddy South of West Point



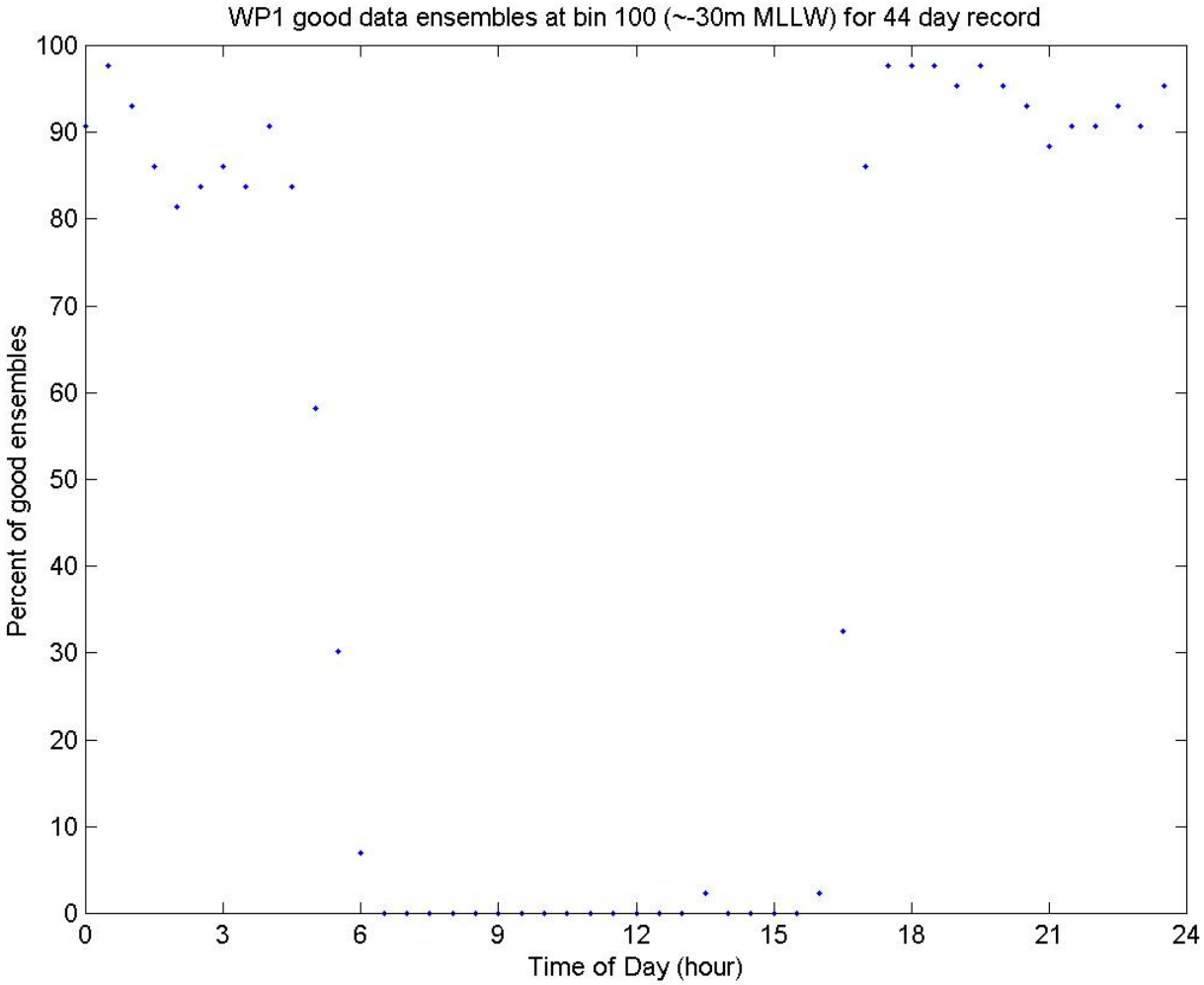
Point Wells Cross Section



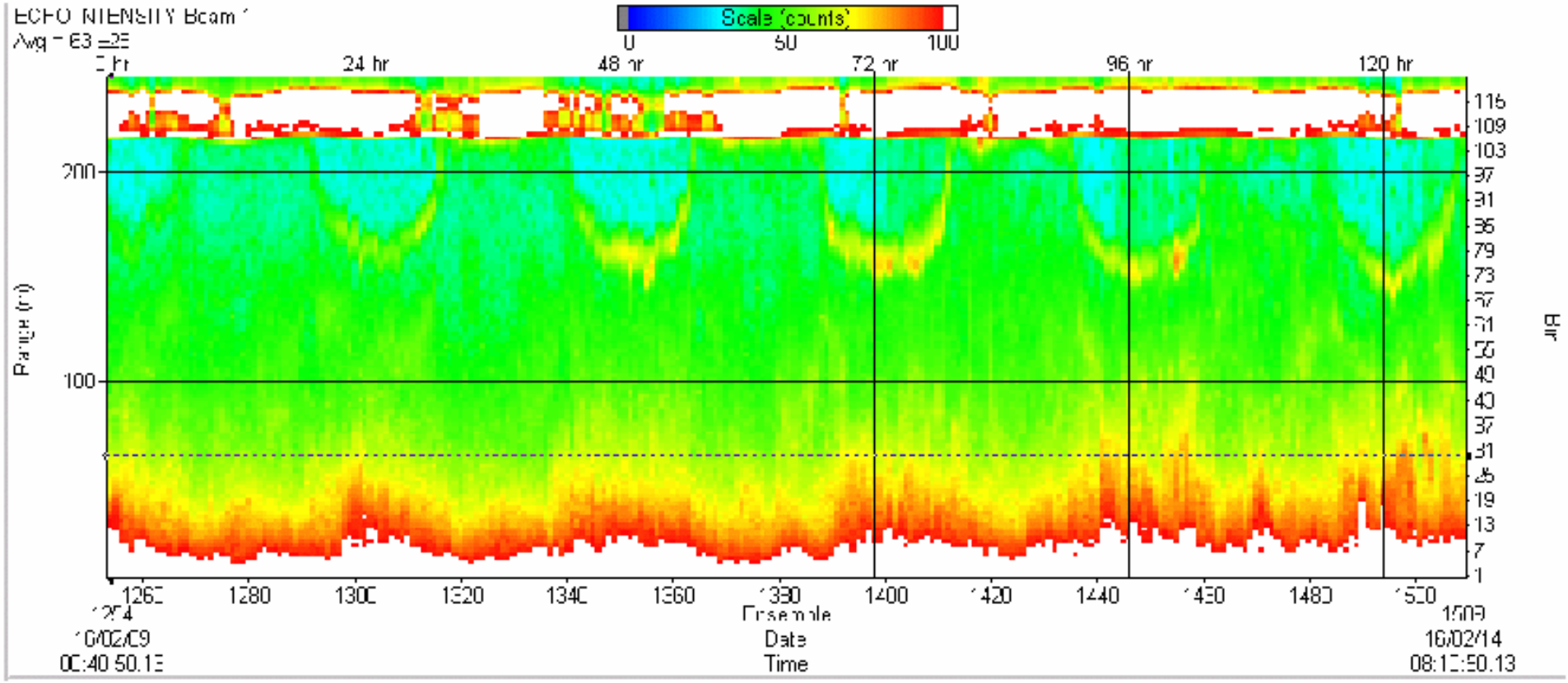
ADCP Time Series

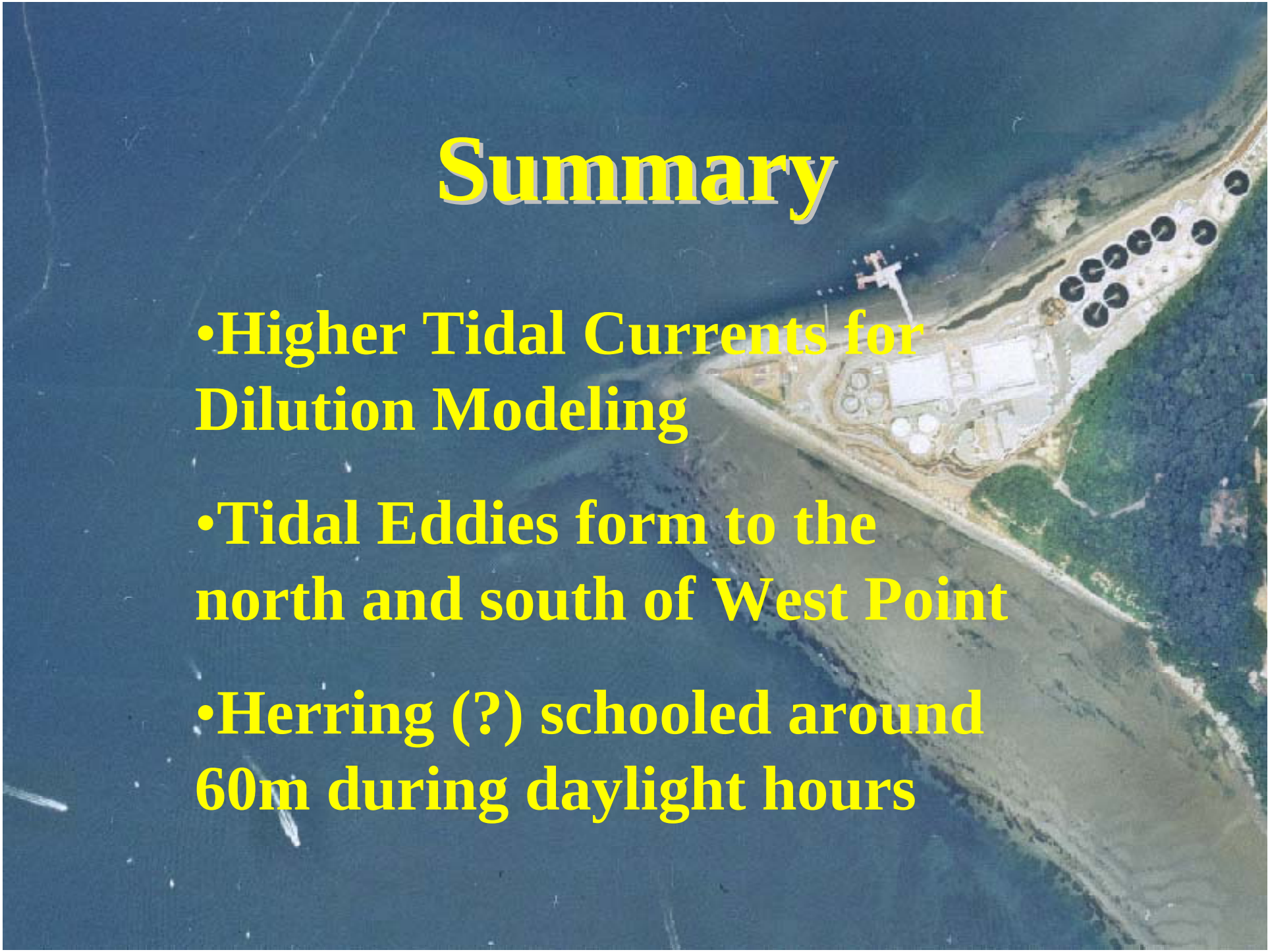


Average Daily Signal Variation



Signal Strength





Summary

- Higher Tidal Currents for Dilution Modeling
- Tidal Eddies form to the north and south of West Point
- Herring (?) schooled around 60m during daylight hours

Acknowledgments

KC Environmental Lab
Evans-Hamilton, Inc.