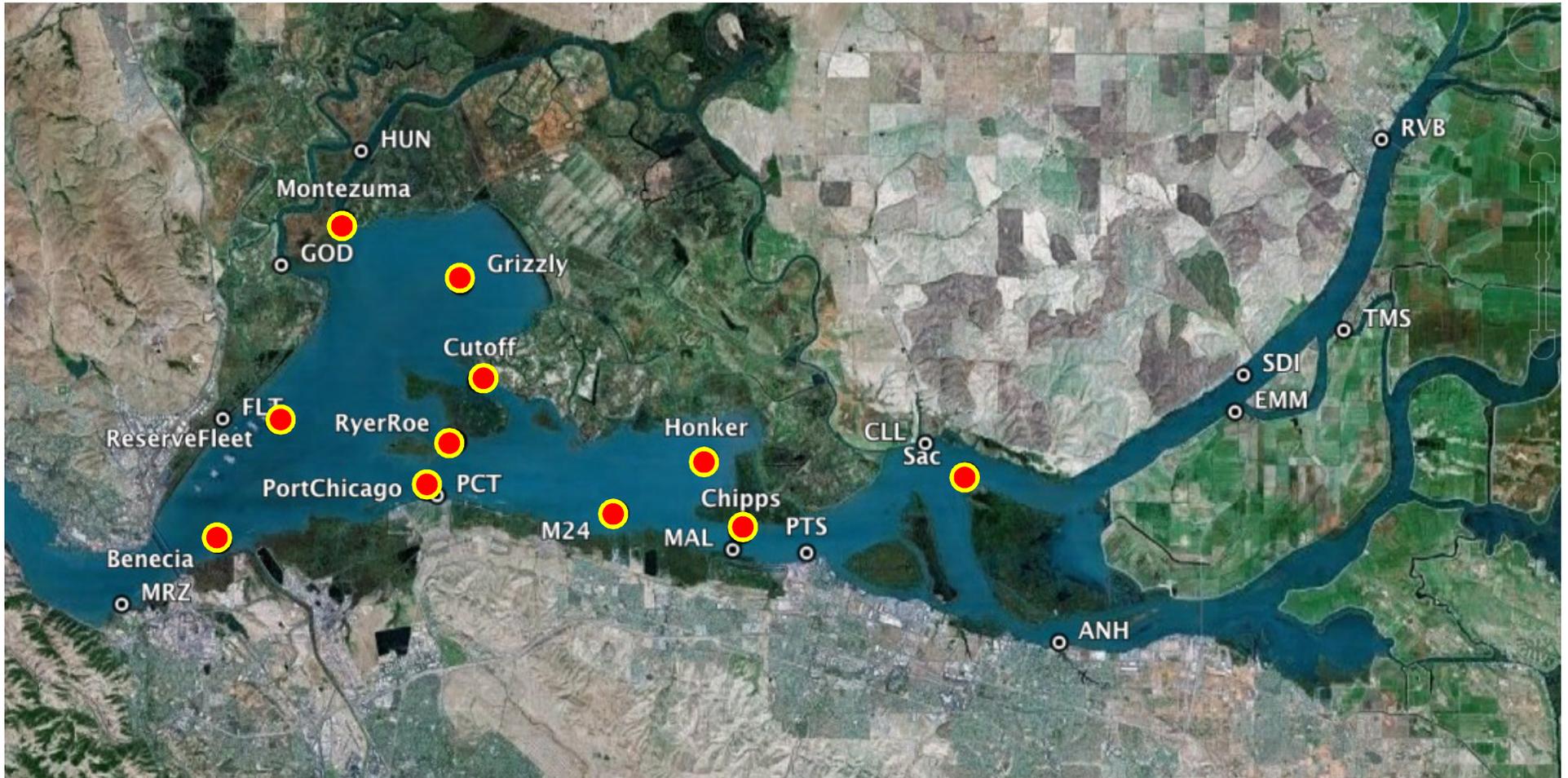


FLaSH Hydrodynamics and Salinity Field Variability

Stanford (Stephen Monismith) and
Cal (Mark Stacey)

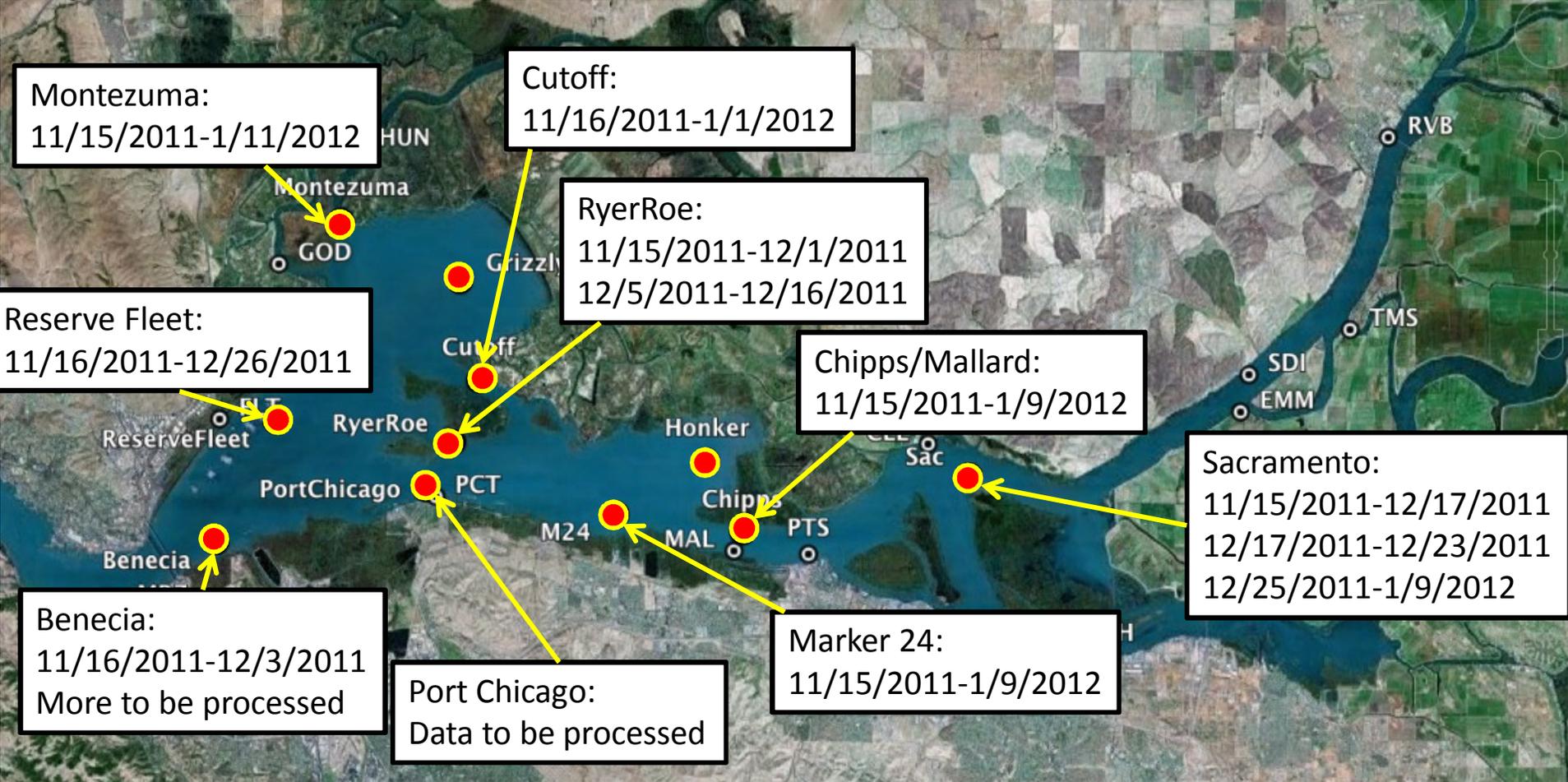
DRAFT: Results and associated discussion are preliminary and subject to change

Moorings



- Current profiler and top-bottom CTDs

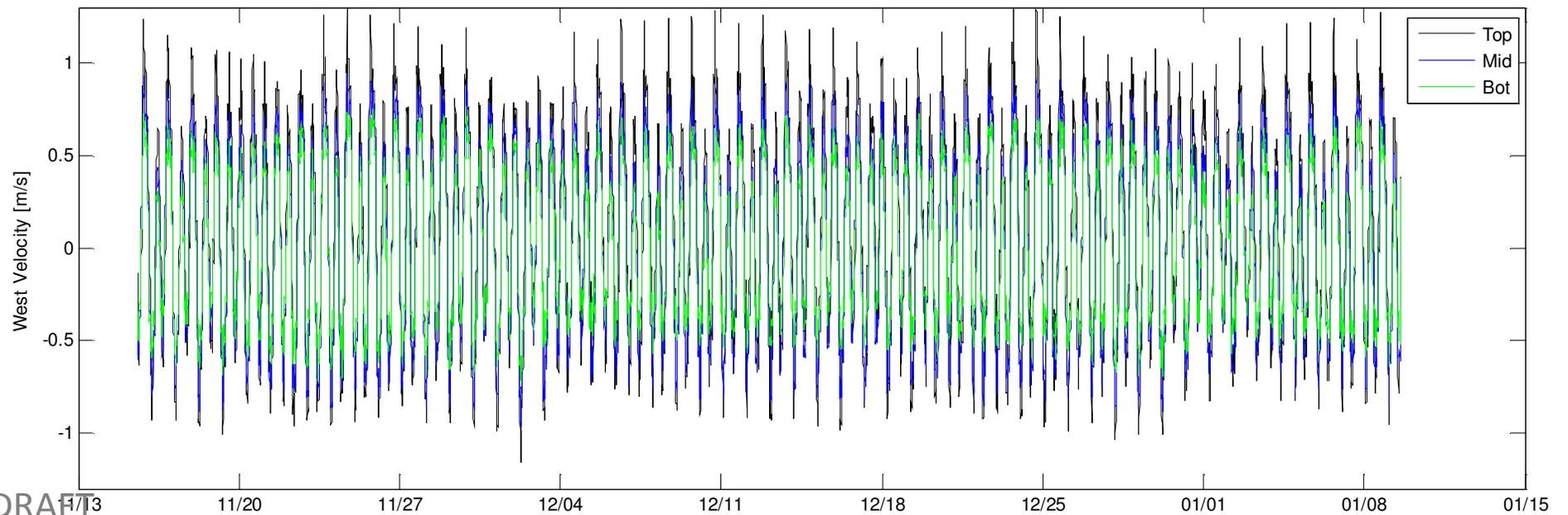
Hydrodynamics Coverage



- Current profiler and top-bottom CTDs

Sample velocity data

- Chipps Island: used for analyzing turbidity
 - Complete coverage, profiles saved approximately every second
 - Averaged into 5-minute ensembles to define tidal variability

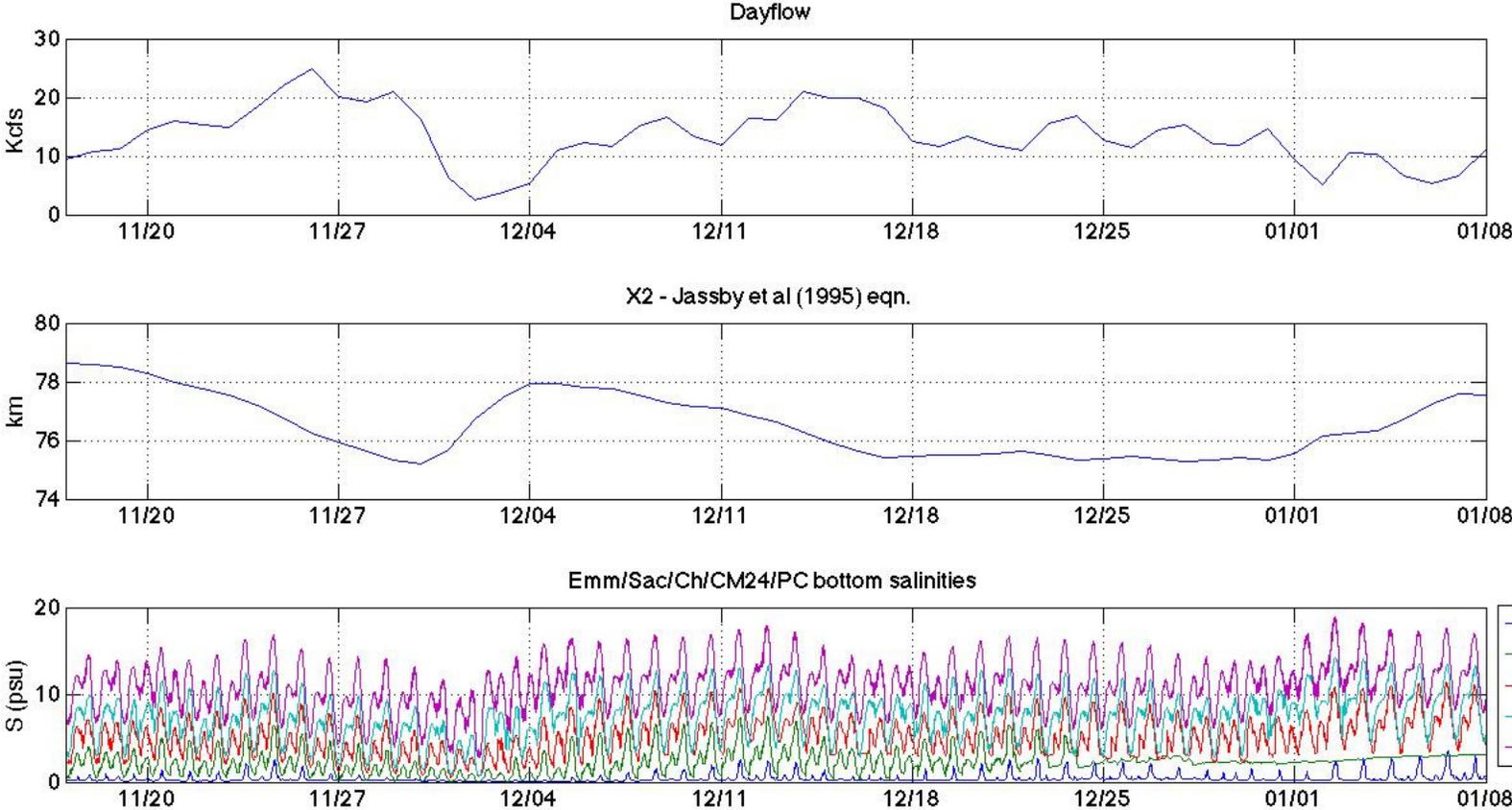


Salinity Station Summary

Stanford/Cal	CDEC
Sac	RVB
Chipps	Emm/SDI/TMS
CM24	CLL
Port Chicago	PTS
RyerRoe	MAL
Suisun Cut	PCT
Honker	HUN
Grizzly (1)	GOD
Montezuma	FLT
Reserve Fleet	MRZ
Benecia	

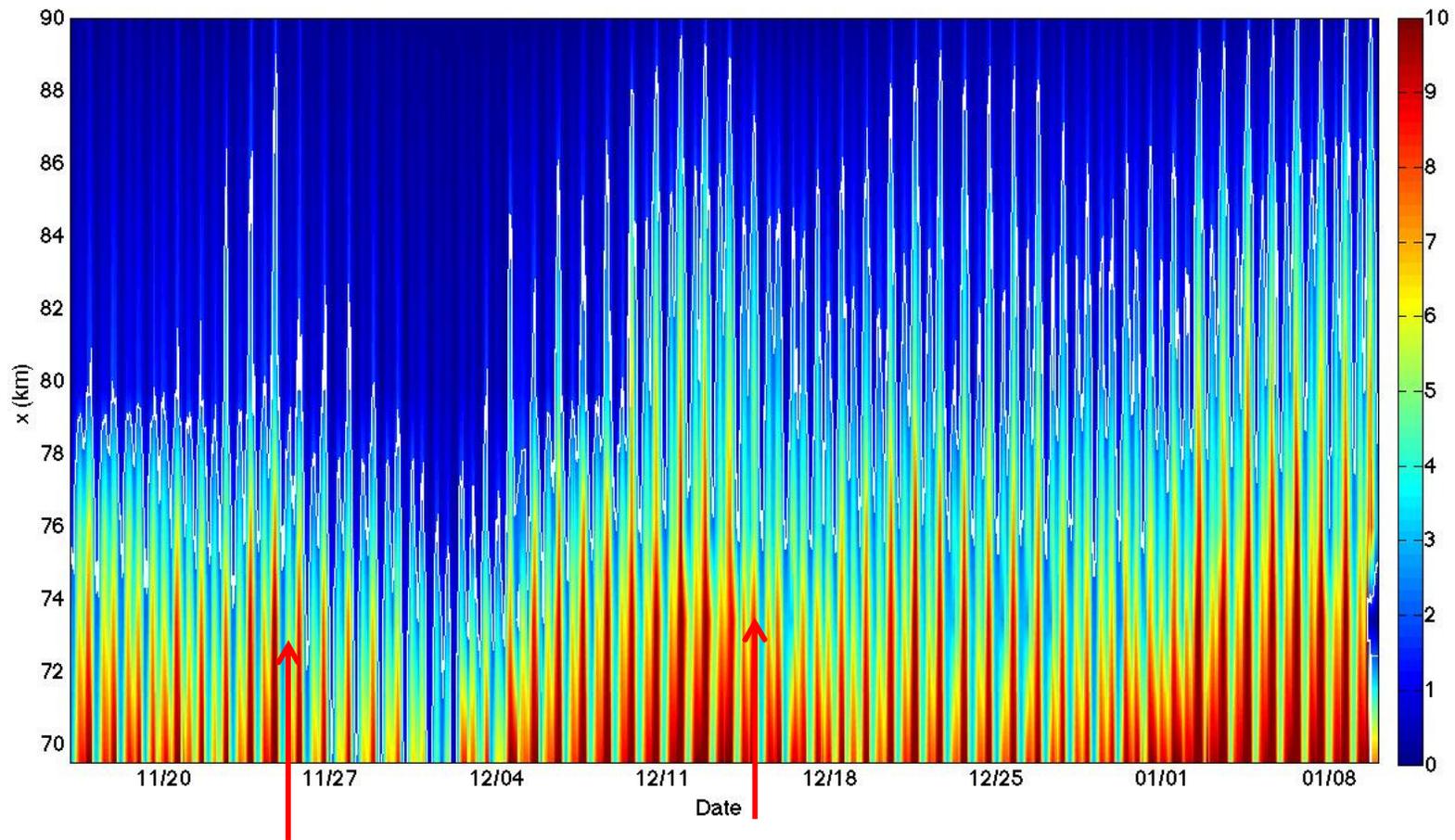
- Notes:
 - Top-bottom CTDs at all Stanford/Cal sites
 - Surface at Ryer Roe may have calibration error
 - Sacramento: lost surface, bottom bad after 12/25
 - Benecia: bottom salinity intermittently bad
 - Honker Bay: Salinity bad

Basic salinity data



Summary of salinity variability

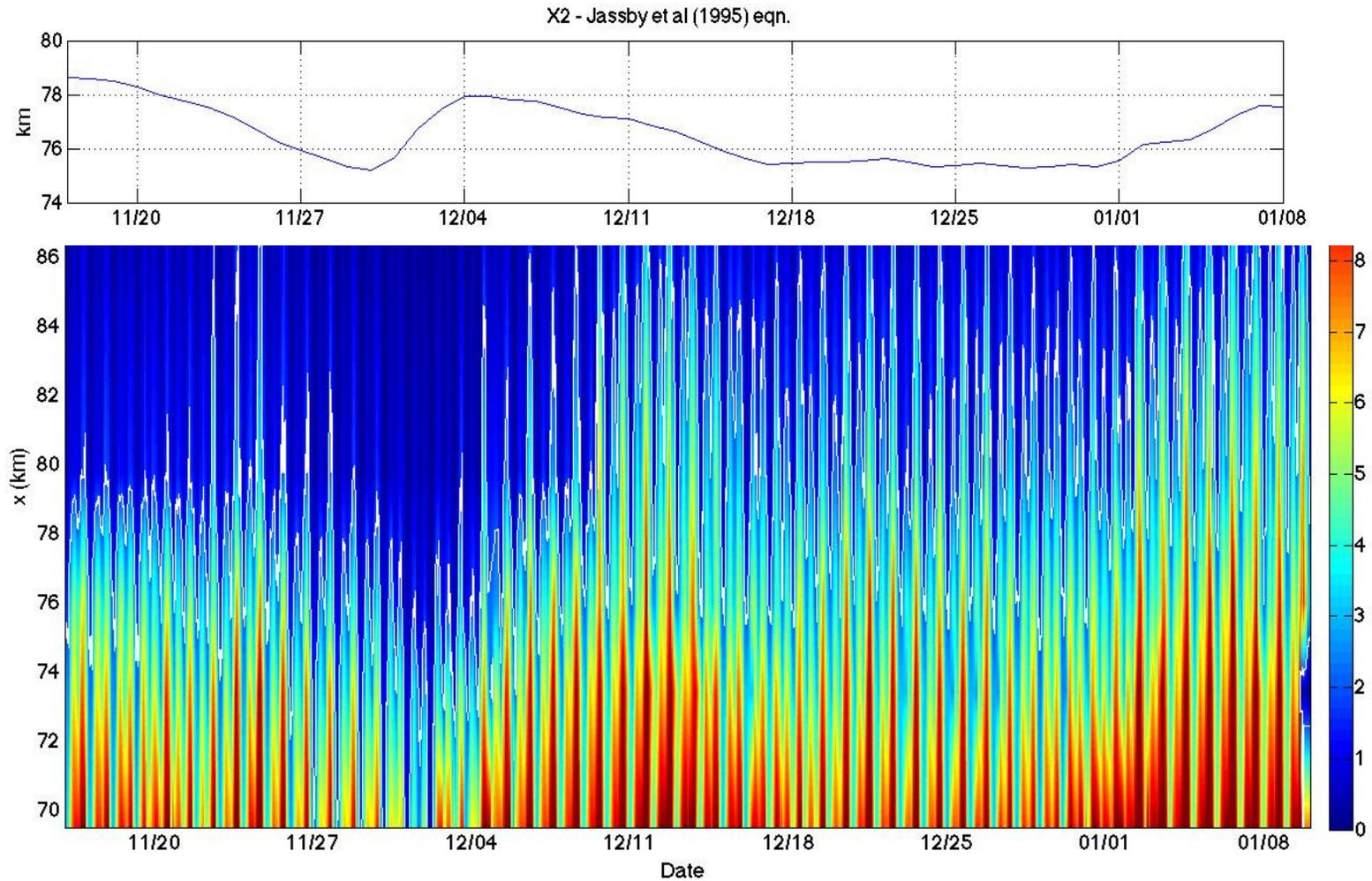
- White line = X2



First runoff
event

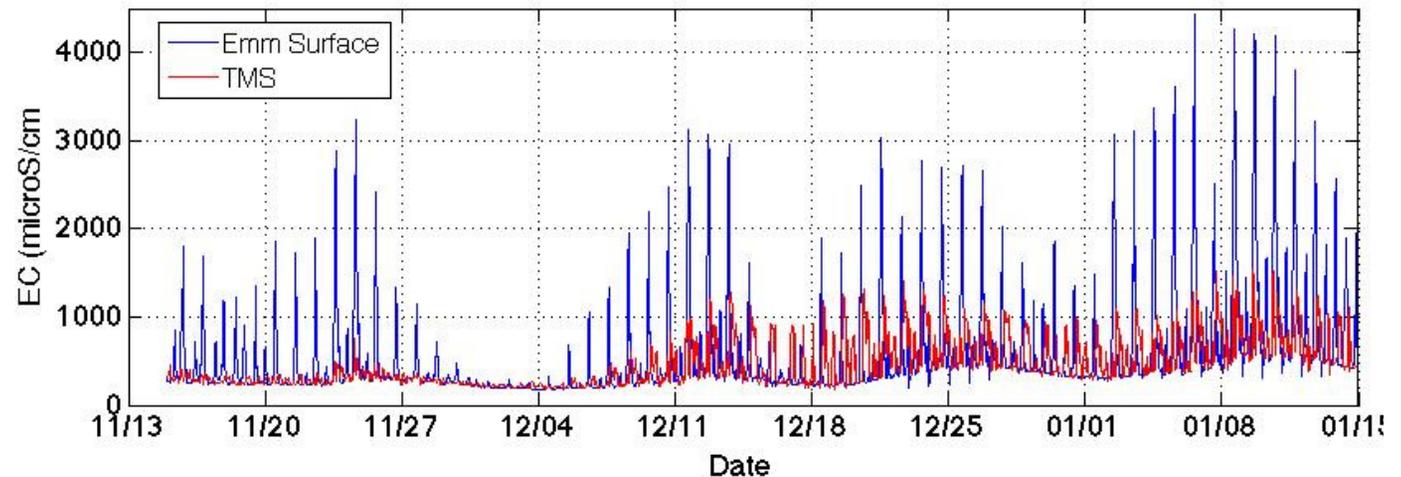
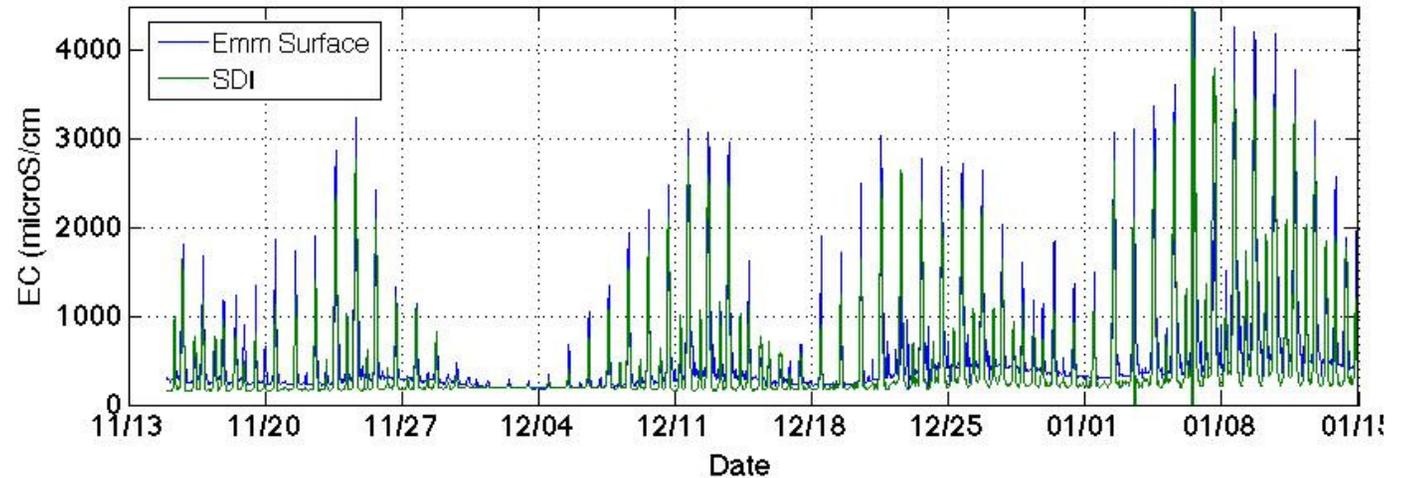
Second dayflow
peak on 12/14

Summary of salinity variability



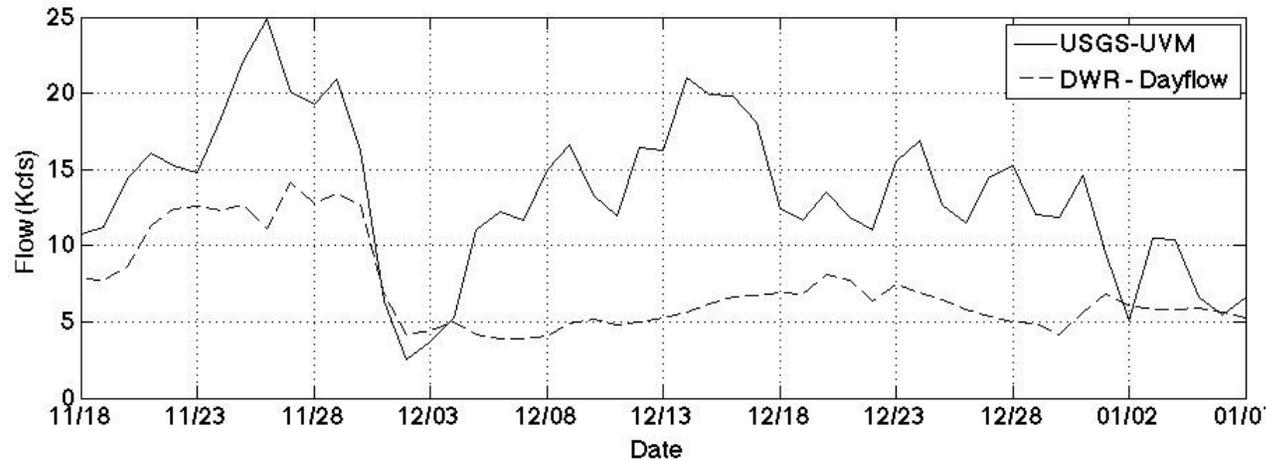
Upstream salinity stations for X2?

- There are 3 CDEC stations upstream of CLL, all relatively close to one another:
 - Decker Island and Emmaton are in some agreement
 - Entrance to Three Mile Slough is quite distinct

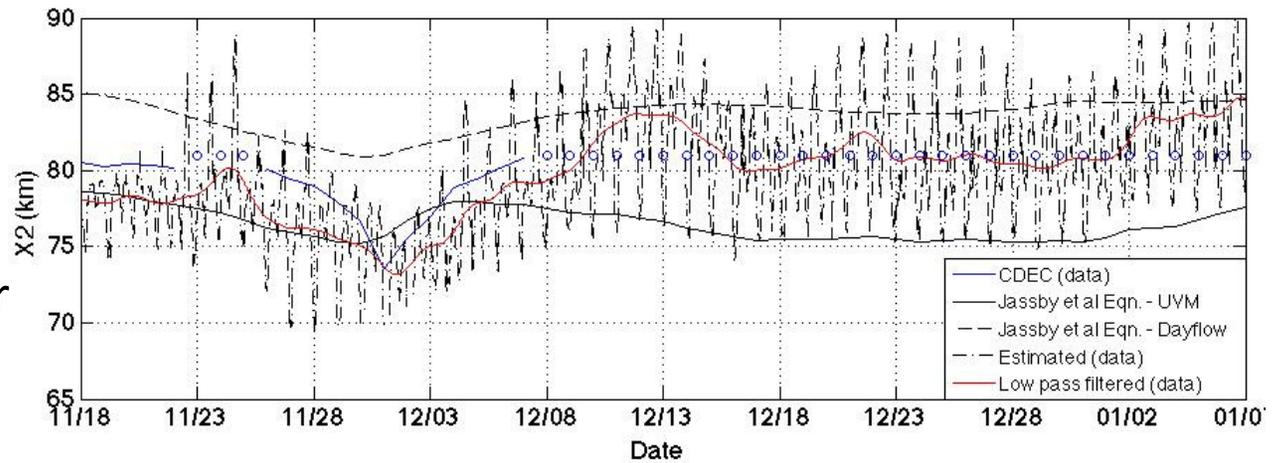


Calculations of X2

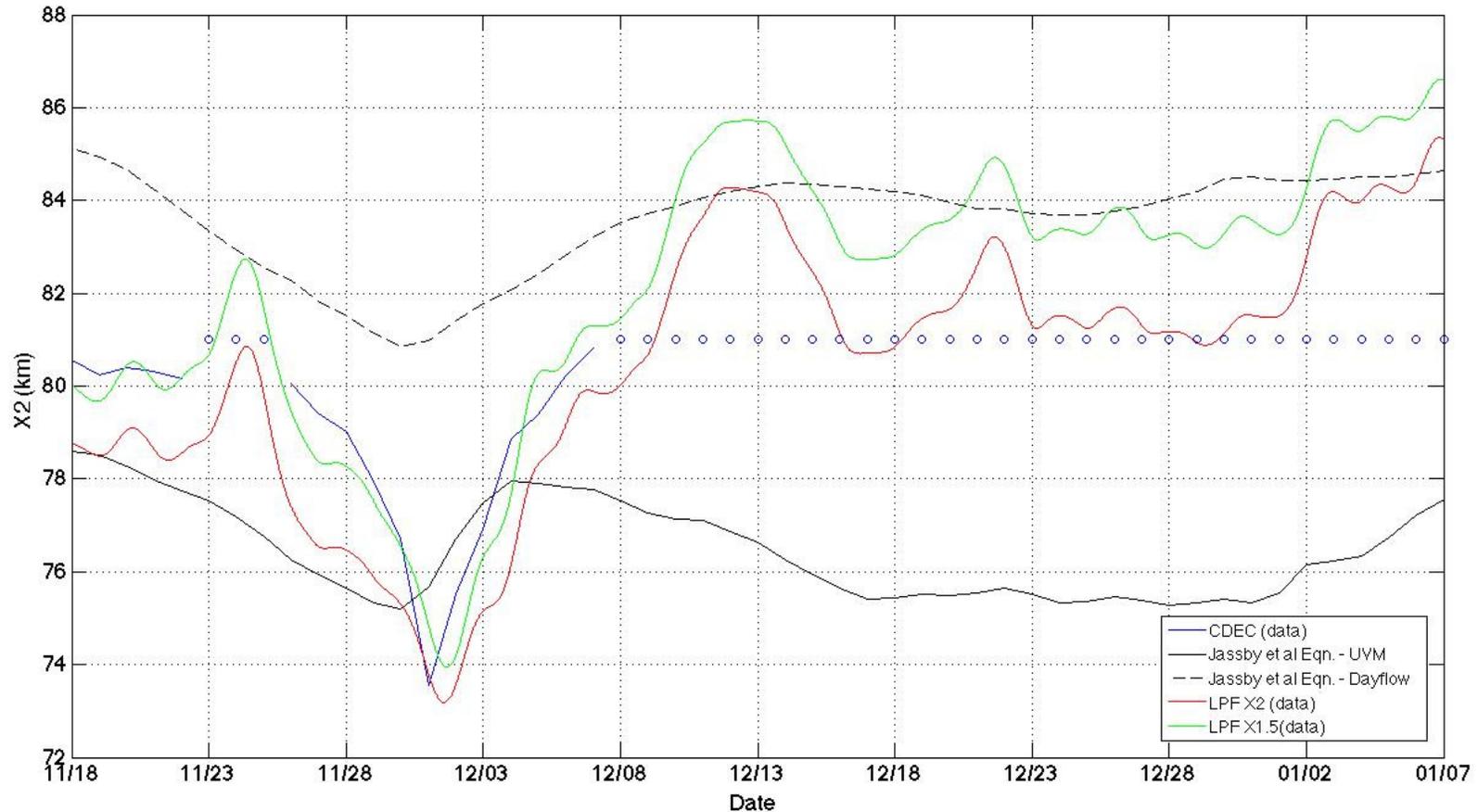
- Huge discrepancy between DAYFLOW and UVM estimates of freshwater flow
 - Leads to two very different predictions of X2



- Data (our observations or CDEC surface estimate) is intermediate, and transitions from the lower (UVM-based) to the higher (DAYFLOW_based) predictions



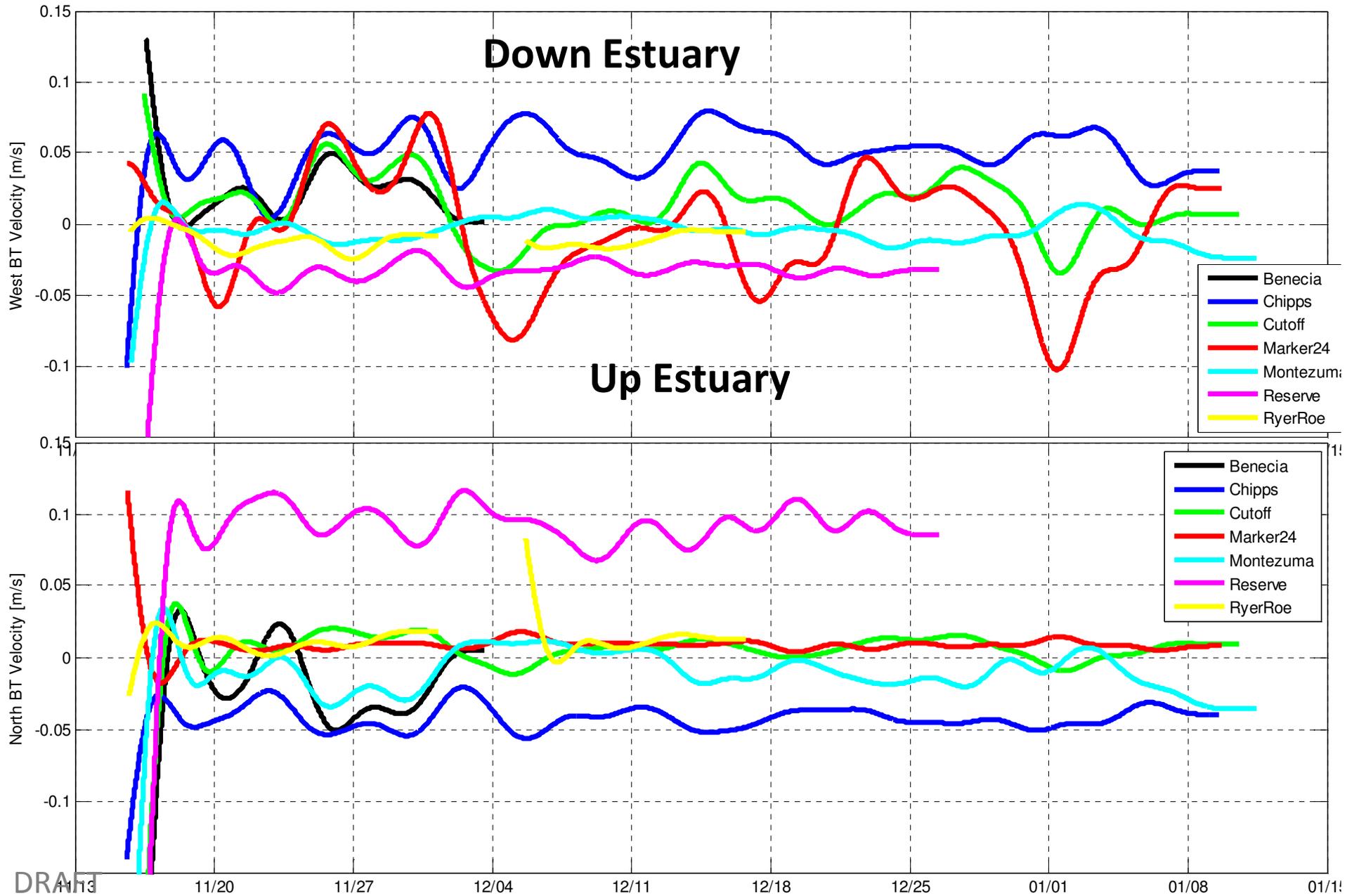
X2: Tidally averaged



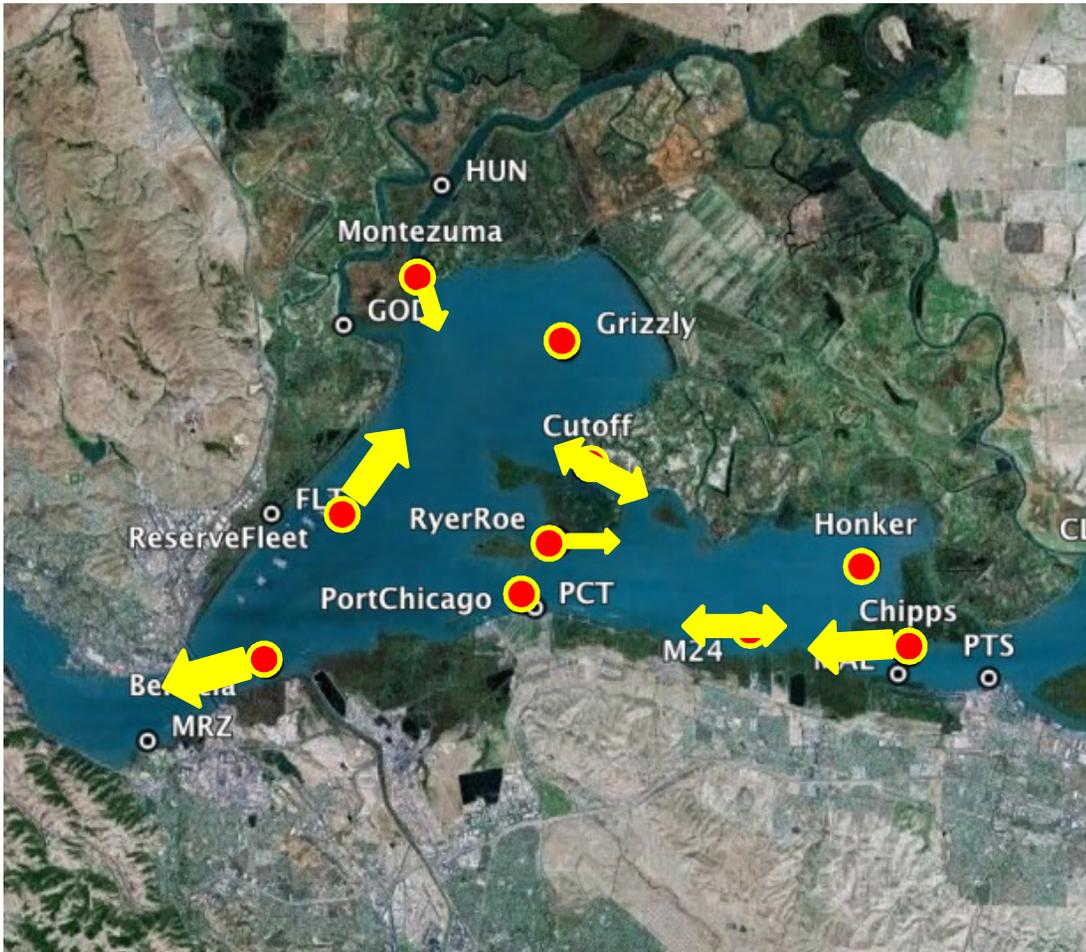
- Tidally-filtered X2 timeseries shows transition of data between the two predictions
- Note: CDEC surface estimate agrees better with X1.5 than X2

Tidal and Depth Averaged Circulation

DRAFT

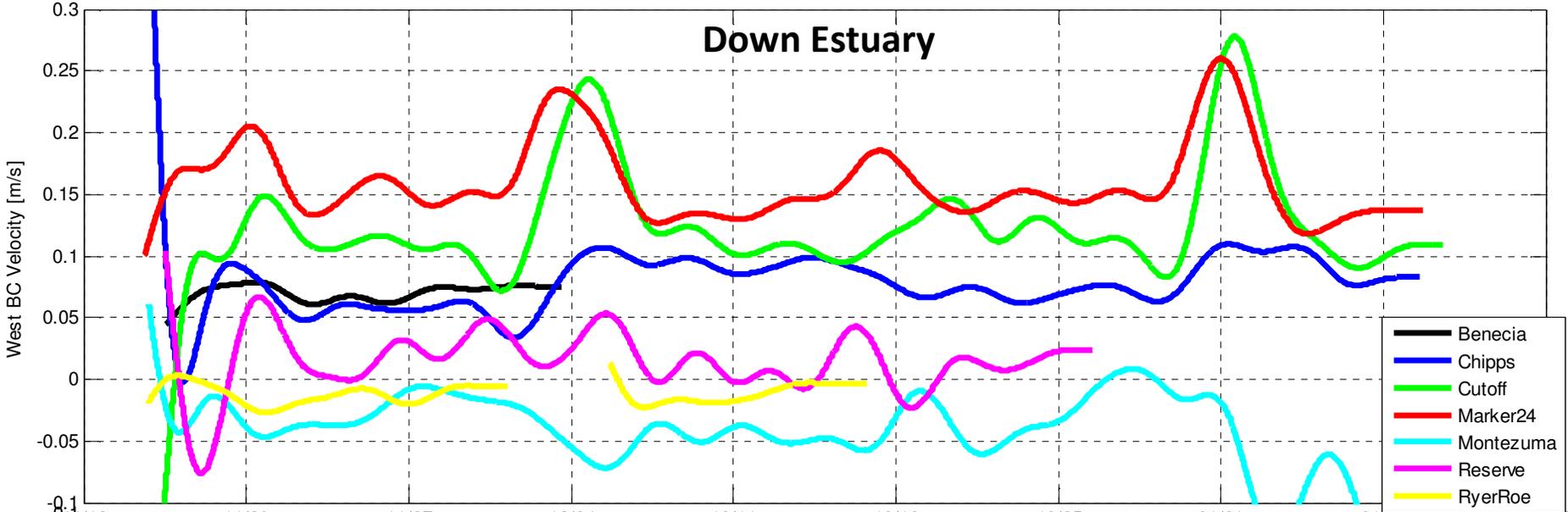


Depth-Averaged Circulation

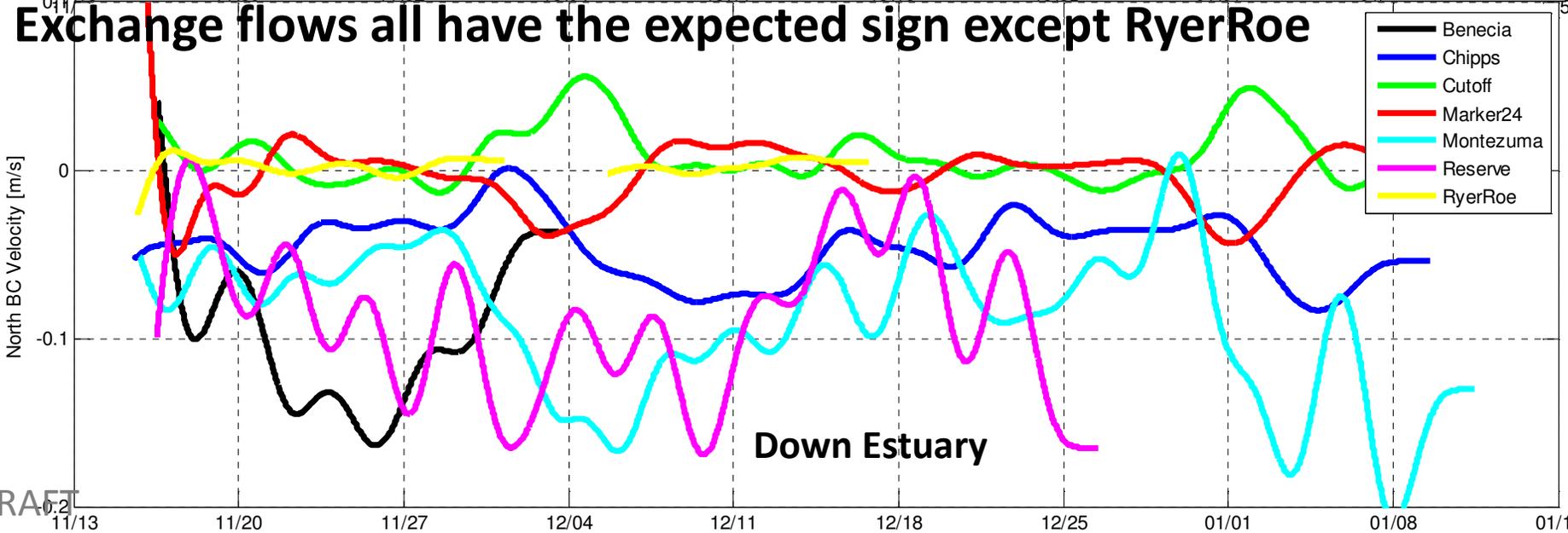


- Suisun Cutoff and Marker 24 behave similarly; switching sign following the first runoff event
- Reserve Fleet appears to be persistently up-estuary, but there may be lateral structure there
- Port Chicago still needs to be processed

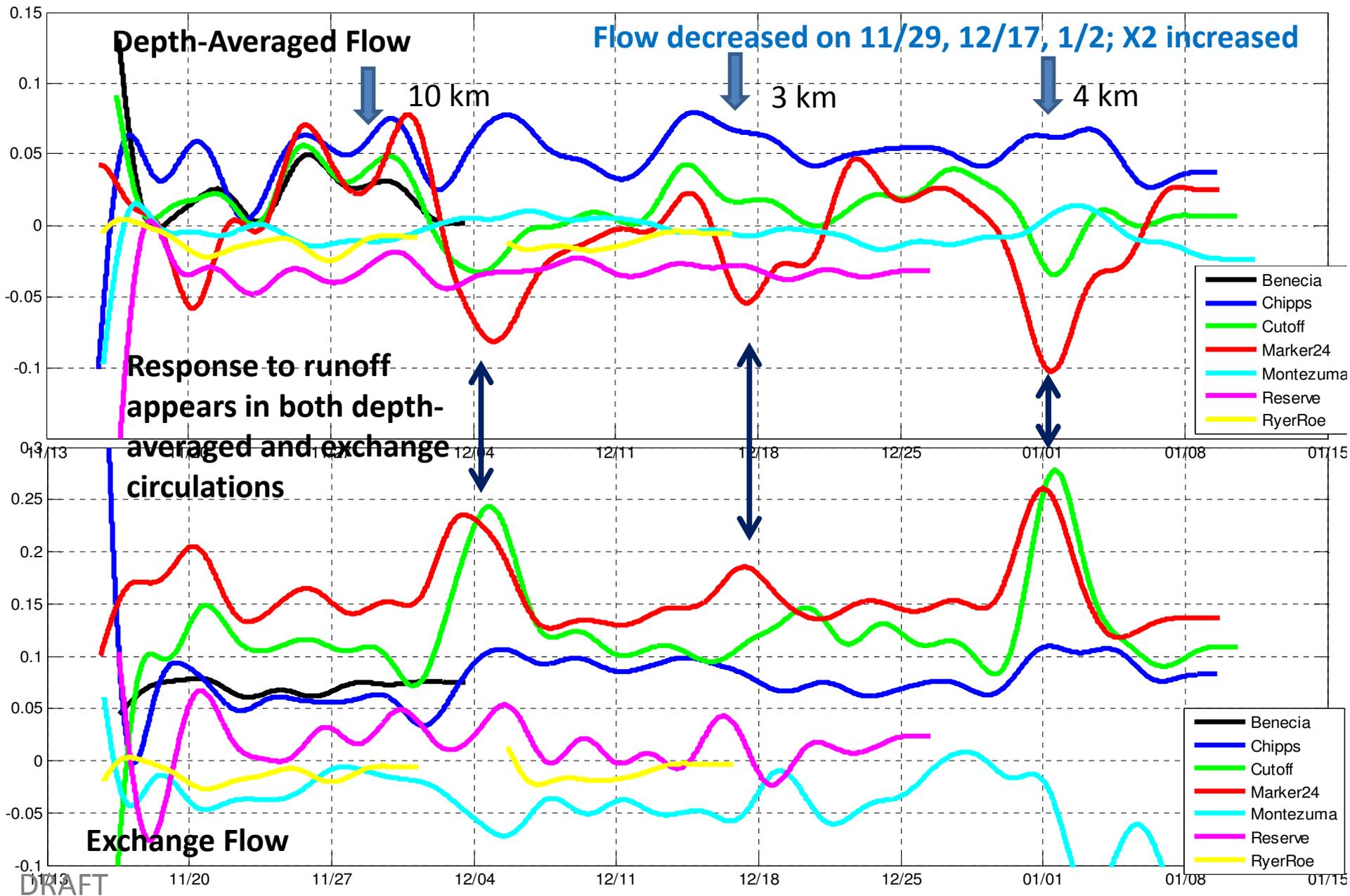
Exchange flow: Surface currents



Exchange flows all have the expected sign except RyerRoe



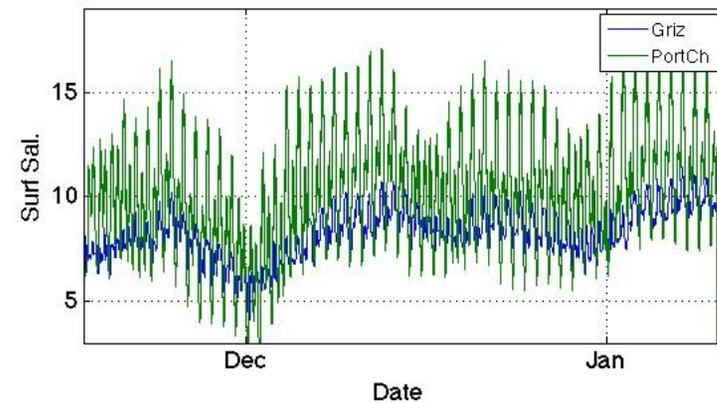
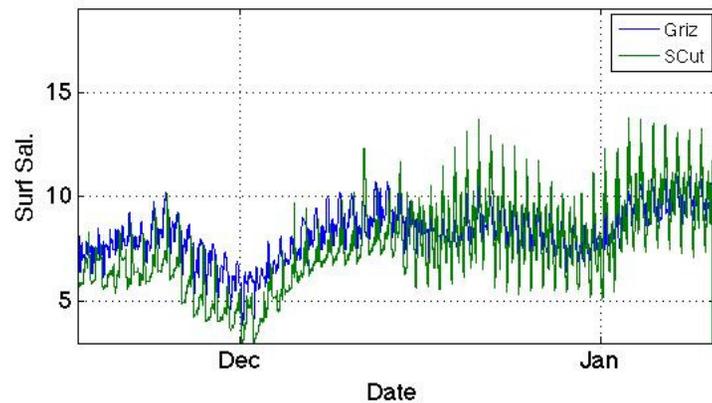
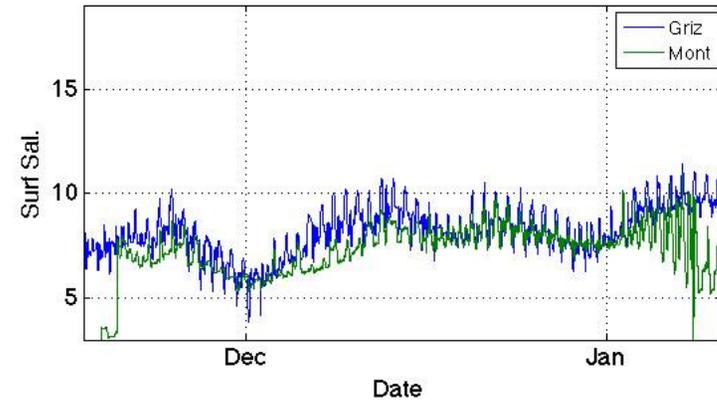
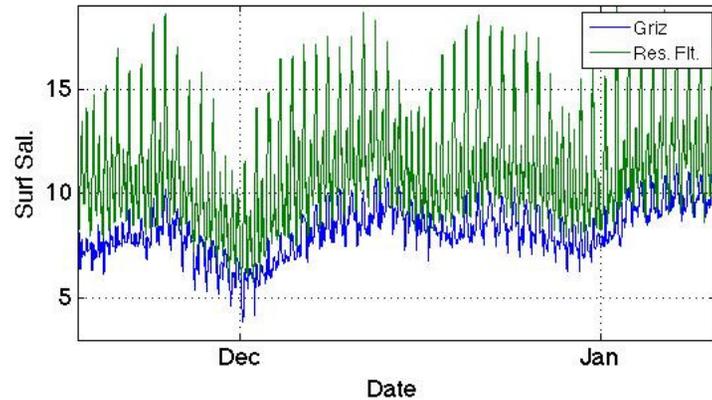
Response of Circulation to Runoff DRAFT



Summary of salt field variability

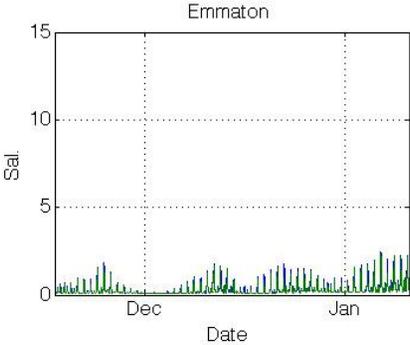
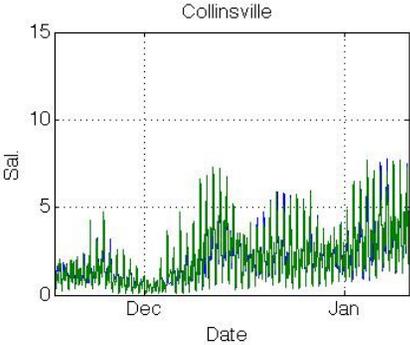
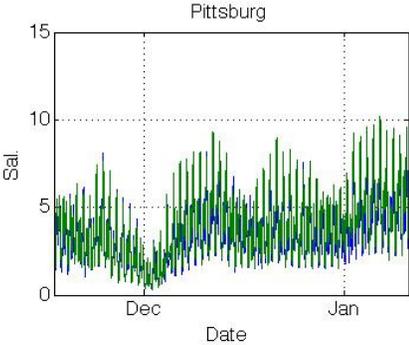
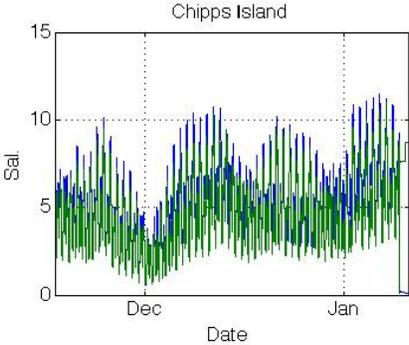
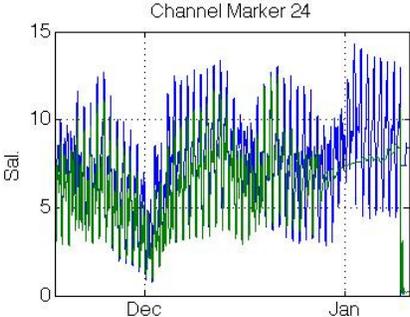
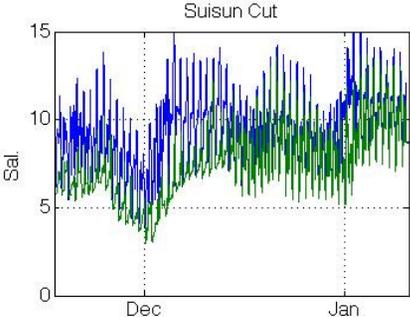
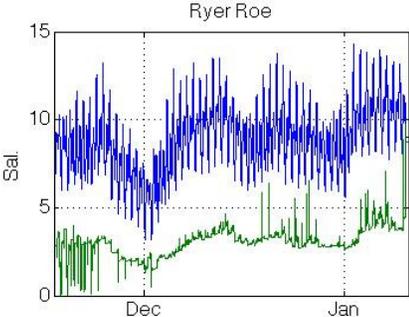
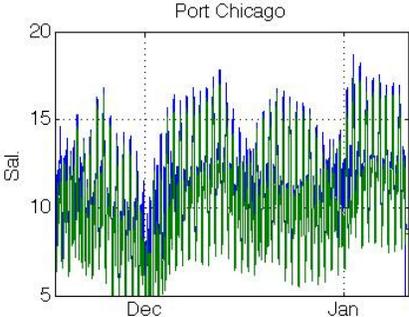
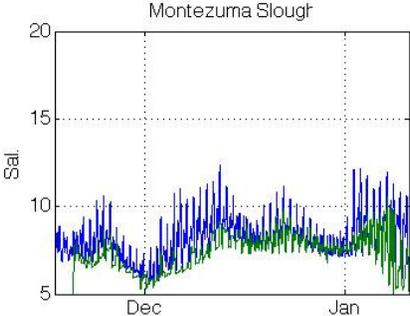
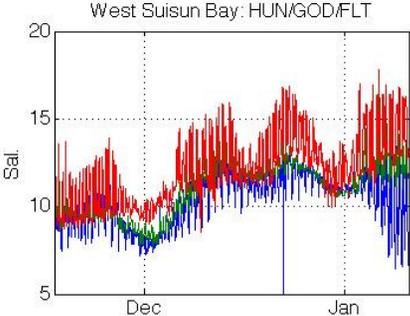
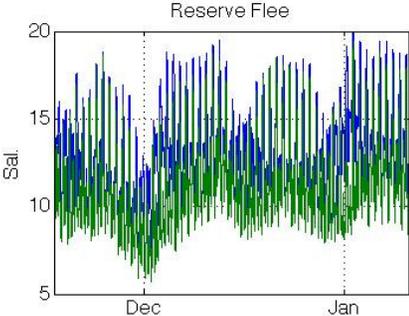
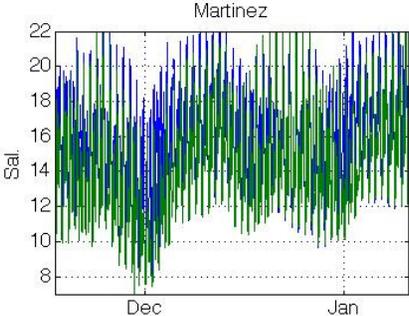
- X2 prediction sensitive to flow used in calculations (DAYFLOW v. UVM)
 - Observed X2 consistent between moorings and CDEC (technically X1.5)
 - Observed X2 response to changes in runoff is lagged vs. the prediction
 - Strength of X2 response to changes in runoff much stronger than predicted
- Response of salt field following runoff event driven by both strengthened estuarine exchange and shifts in the depth-averaged circulation

Grizzly Bay Salinity and Nearby Stations

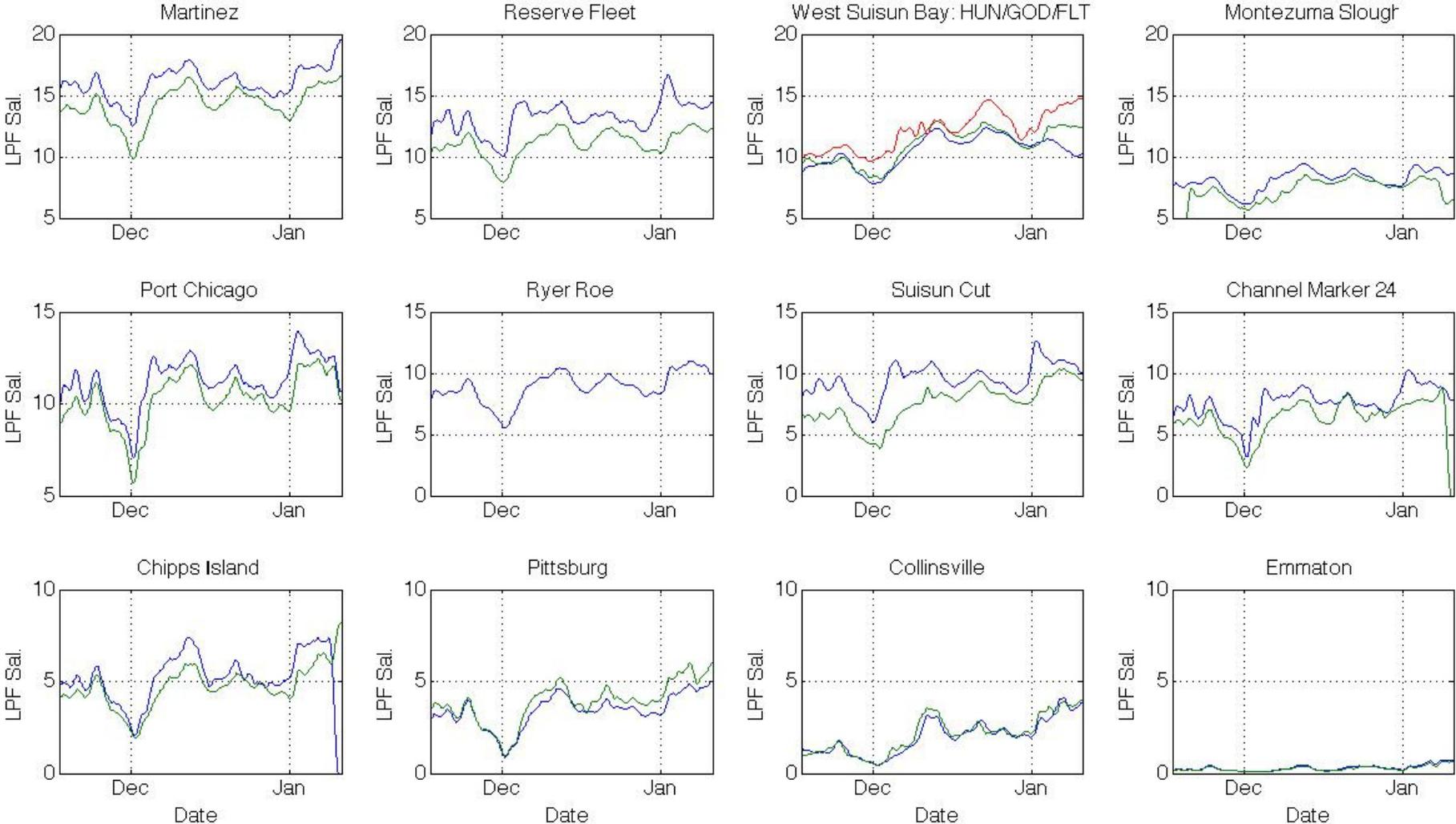


- Grizzly Bay is consistently fresher than Reserve Fleet
 - Very similar variability to Montezuma Slough
 - Exception in mid-December during the recovery of the salt field when Grizzly is more saline than either Montezuma or Suisun Cutoff

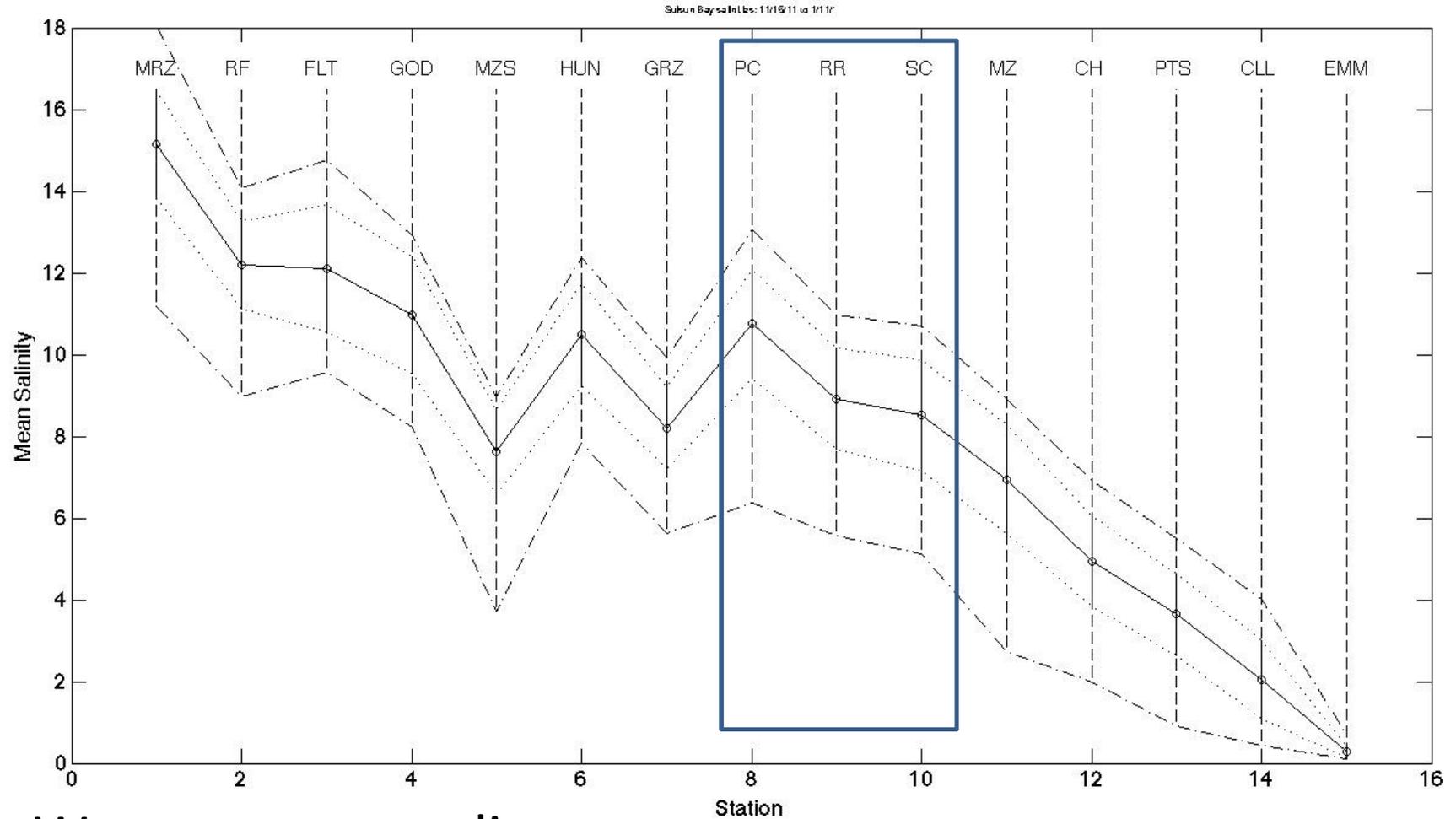
Spatial variations in salinity



Tidally-averaged salinity variations

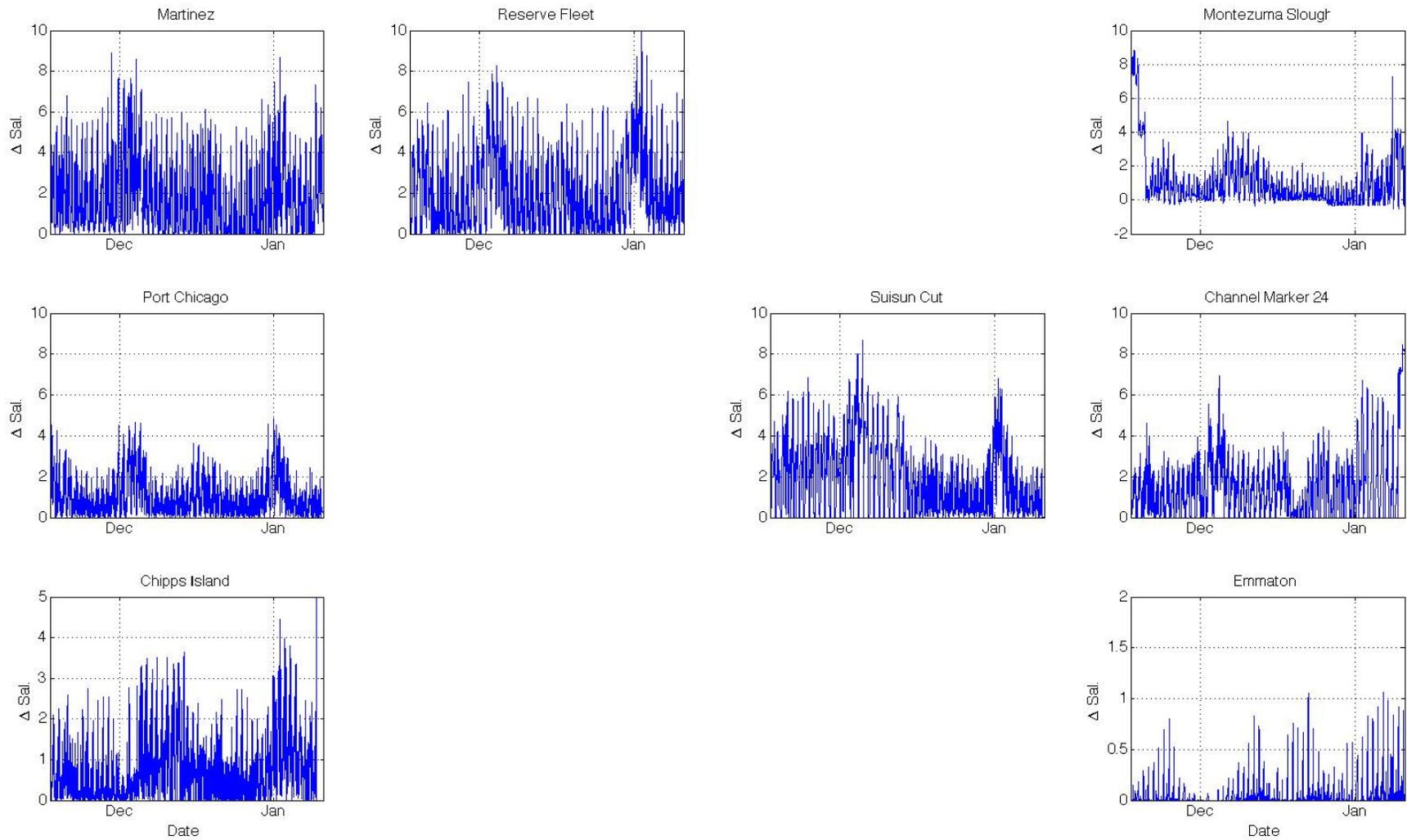


Overview of salinity field



- West-to-east gradient
 - South-to-North also evident: northern channels fresher
 - Influence of Montezuma Slough?

Spatial variation of stratification



Discussion of Spatial Variability

- North-to-South Gradient:
 - Shallow water habitats on north freshened
 - Created/preserved by Montezuma slough?
- Stratification stronger in northern channels
 - Both Reserve Fleet and Suisun Cutoff more stratified than Main channel

Next Steps

- Freshwater flow discrepancy must be evaluated
 - UVM vs DAYFLOW
- Define spatial structure and variability in the salinity field
 - Principal Components Analysis
- Decompose salt flux decompositions at stations
 - Effects of braided channels on salinity balance in estuaries