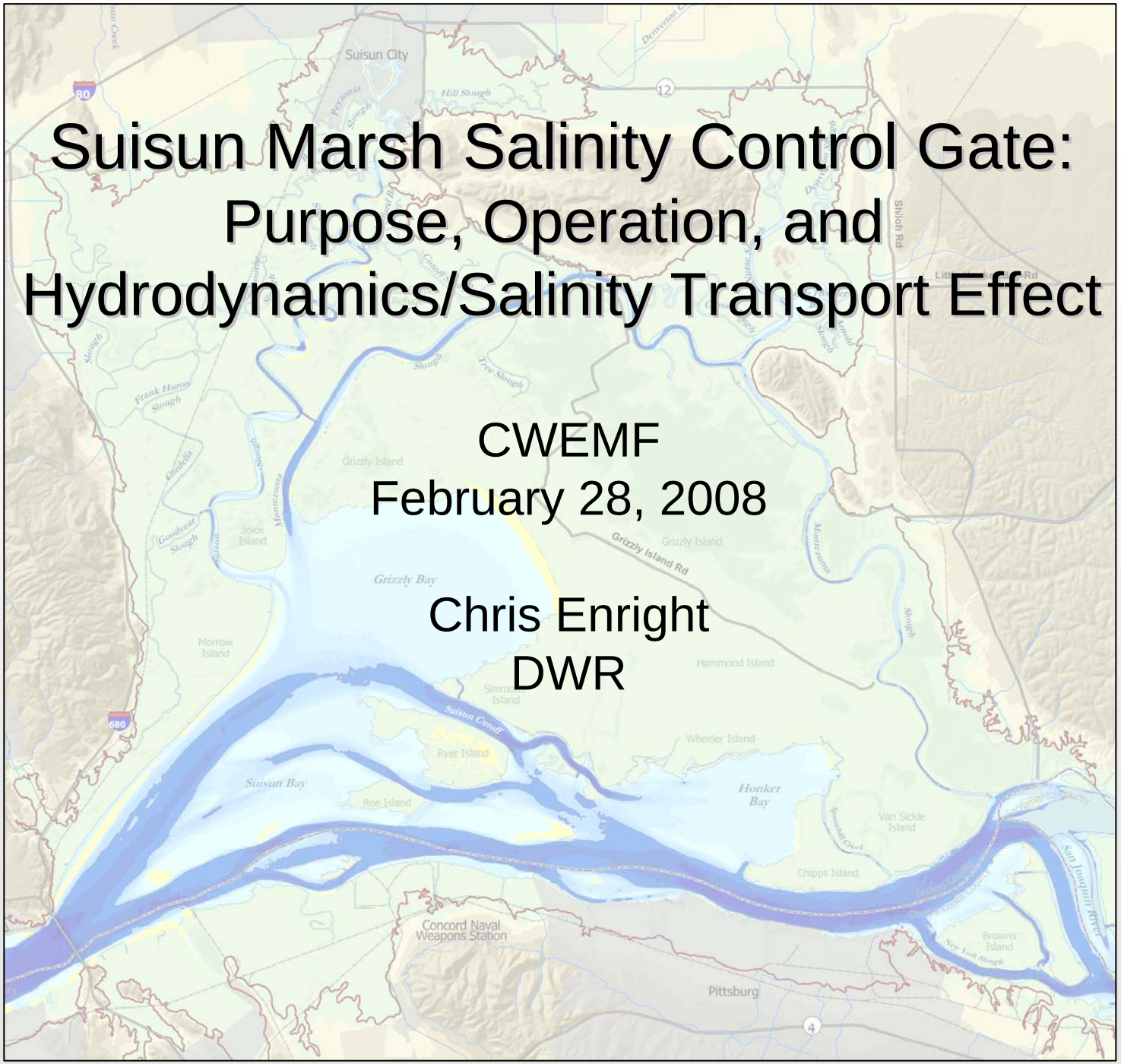
Suisun Marsh Salinity Control Gate: Purpose, Operation, and Hydrodynamics/Salinity Transport Effect

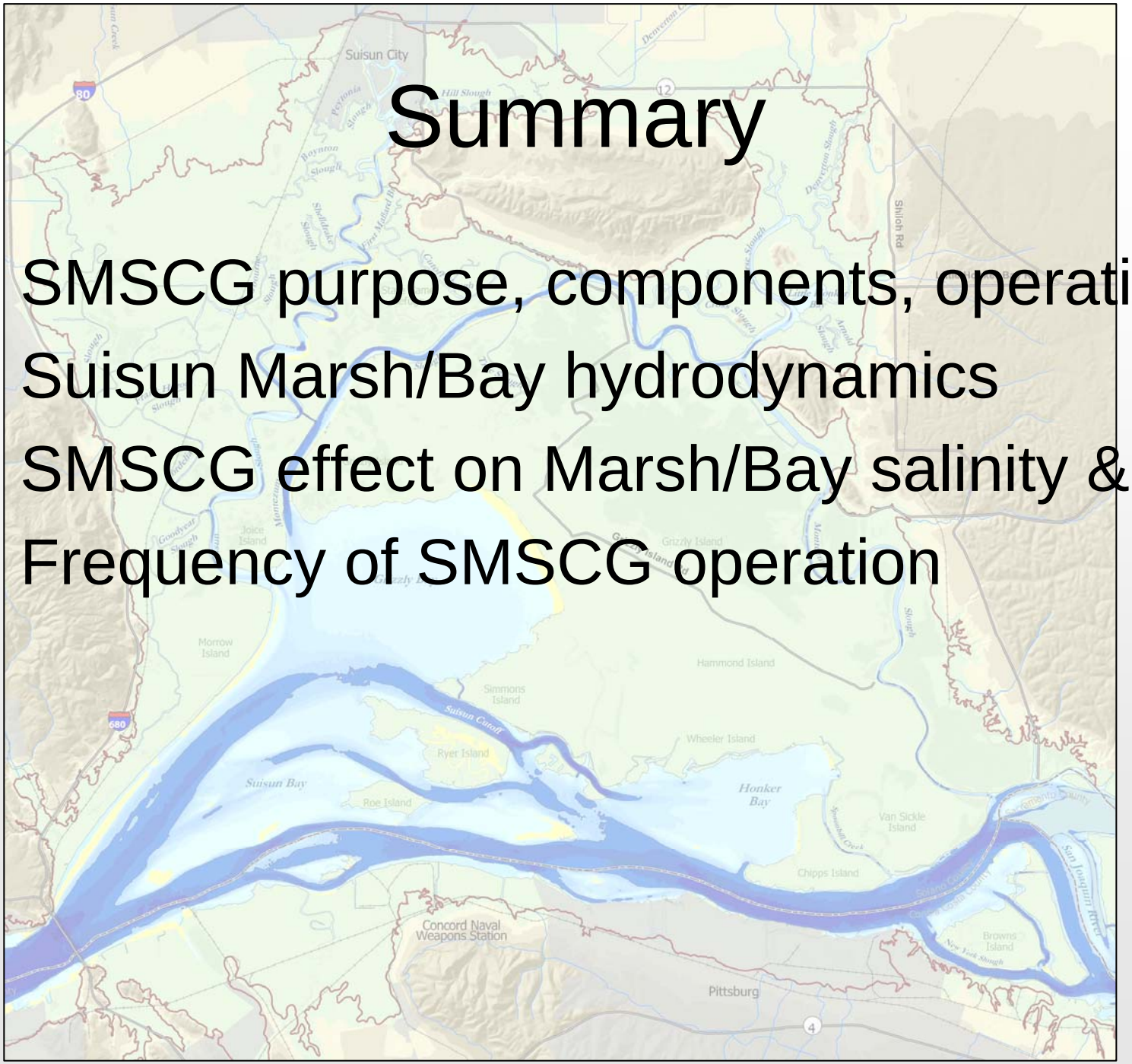
CWEMF
February 28, 2008

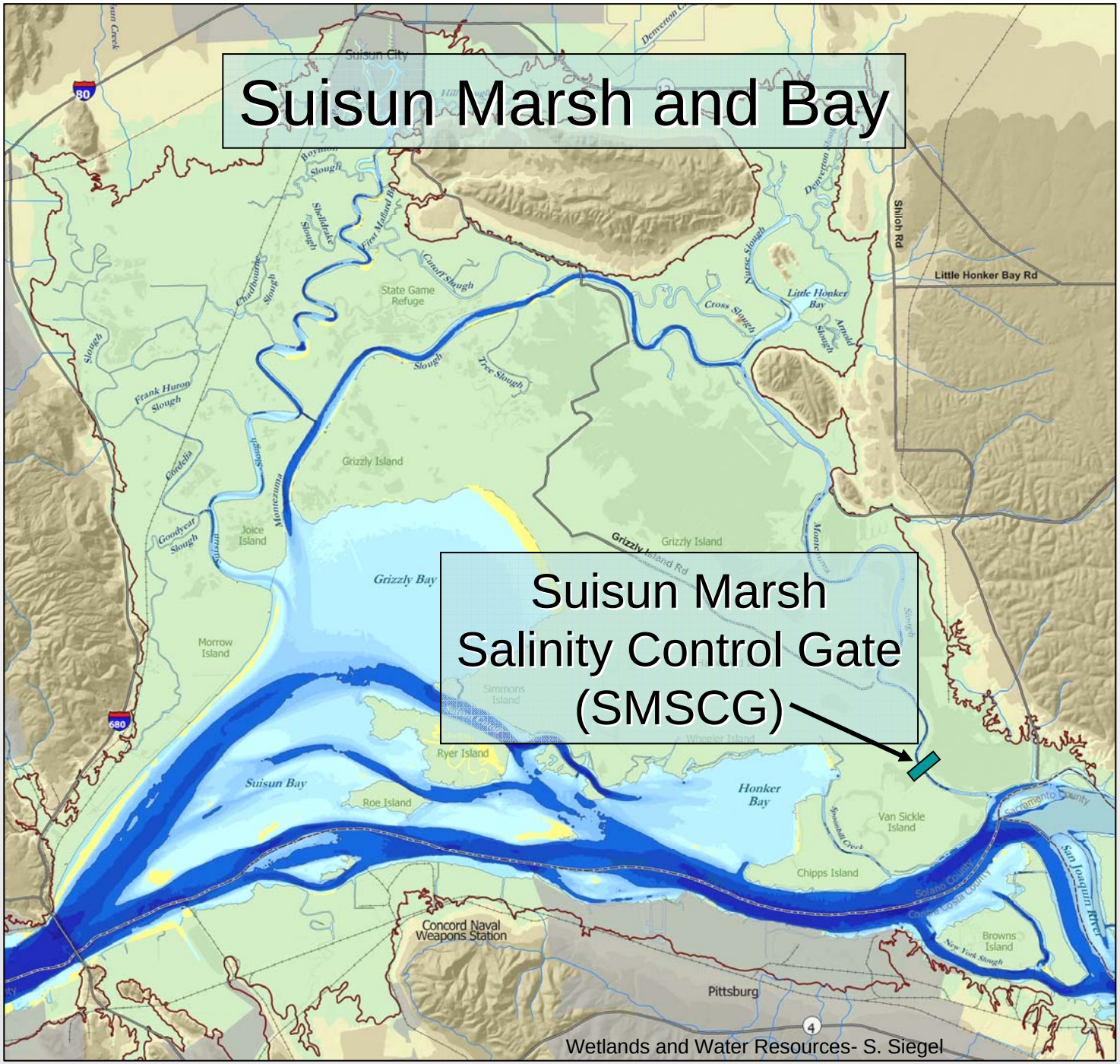
Chris Enright
DWR



Summary

- SMSCG purpose, components, operation
- Suisun Marsh/Bay hydrodynamics
- SMSCG effect on Marsh/Bay salinity & X2
- Frequency of SMSCG operation




Suisun Marsh and Bay
Suisun Marsh Salinity Control Gate (SMSCG)
Suisun City
State Game Refuge
Grizzly Island
Grizzly Bay
Suisun Bay
Honker Bay
Little Honker Bay
Little Honker Bay Rd
Shiloh Rd
Grizzly Island Rd
Joice Island
Morrow Island
Simmons Island
Ryer Island
Roe Island
Wheeler Island
Van Sickle Island
Chipps Island
Browns Island
Concord Naval Weapons Station
Pittsburg
Solano County
Contra Costa County
Sacramento County
San Joaquin River
New York Slough
Cordelia Slough
Montezuma Slough
Goodyear Slough
Frank Huron Slough
Tree Slough
Cross Slough
Nurse Slough
Arnold Slough
Denverton Slough
Chadbourne Slough
Sheldrake Slough
First Mallard Pt
Boynton Slough
Concord Slough
Spoonbill Creek
80
680
4

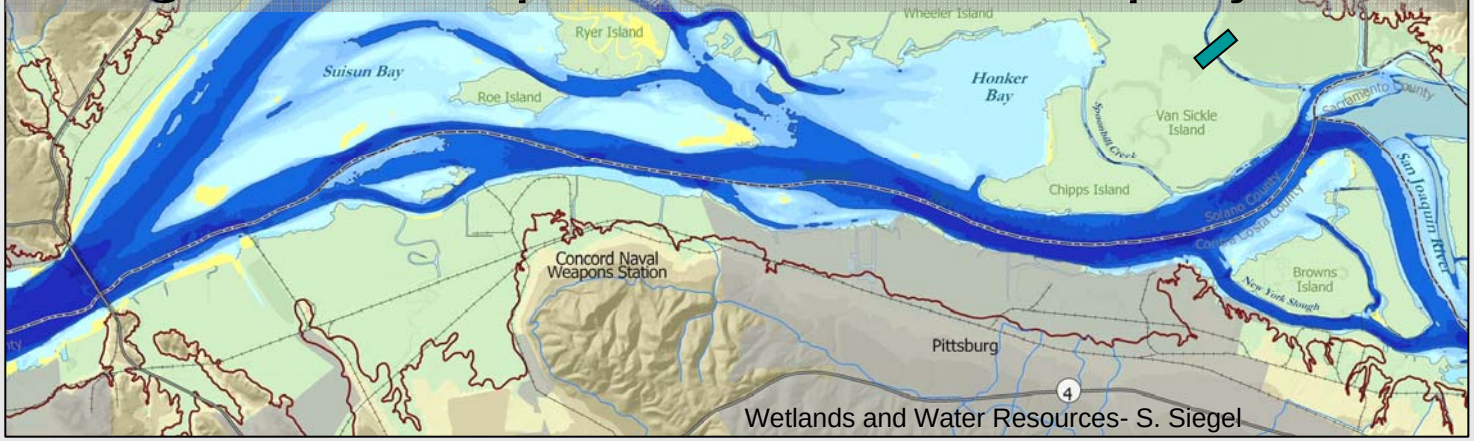
SMSCG Purpose

Guiding Conceptual Model:

- Reduced outflow increases salinity.
- Increased salinity reduces waterfowl food plant abundance and diversity.

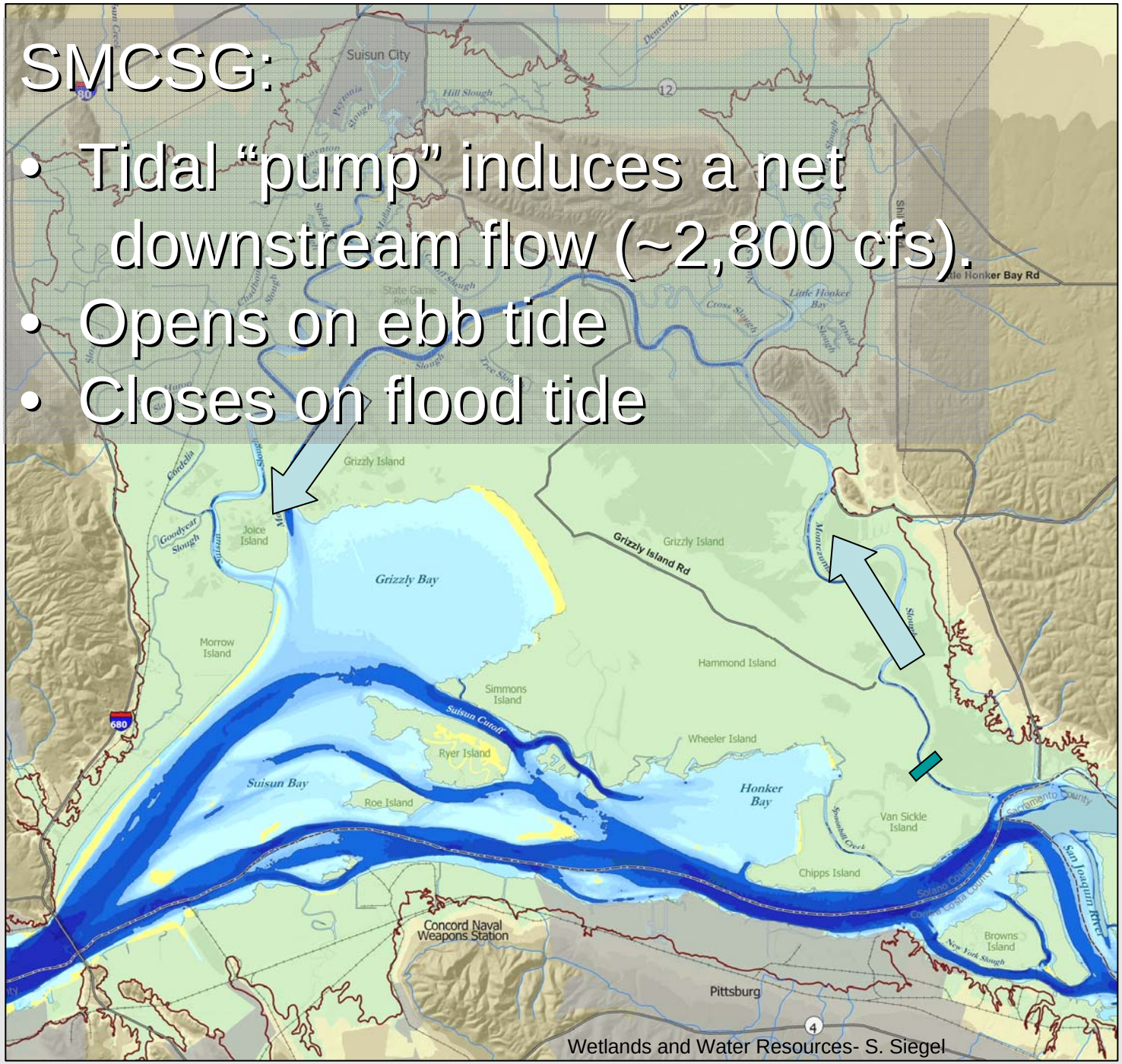
SMSCG Purpose:

- Reduce salinity in Suisun Marsh to help mitigate the impacts of the water projects

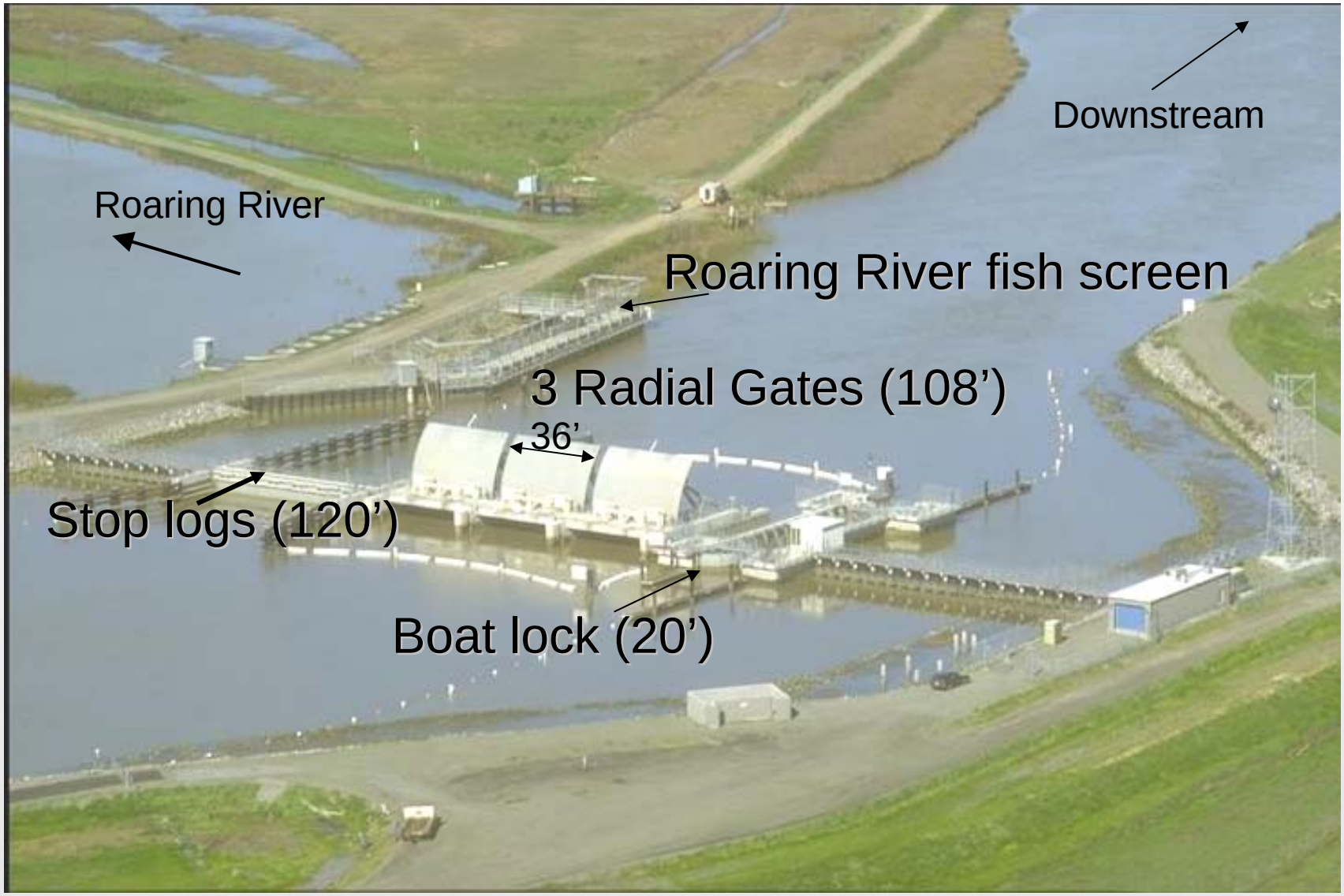


SMCSG:

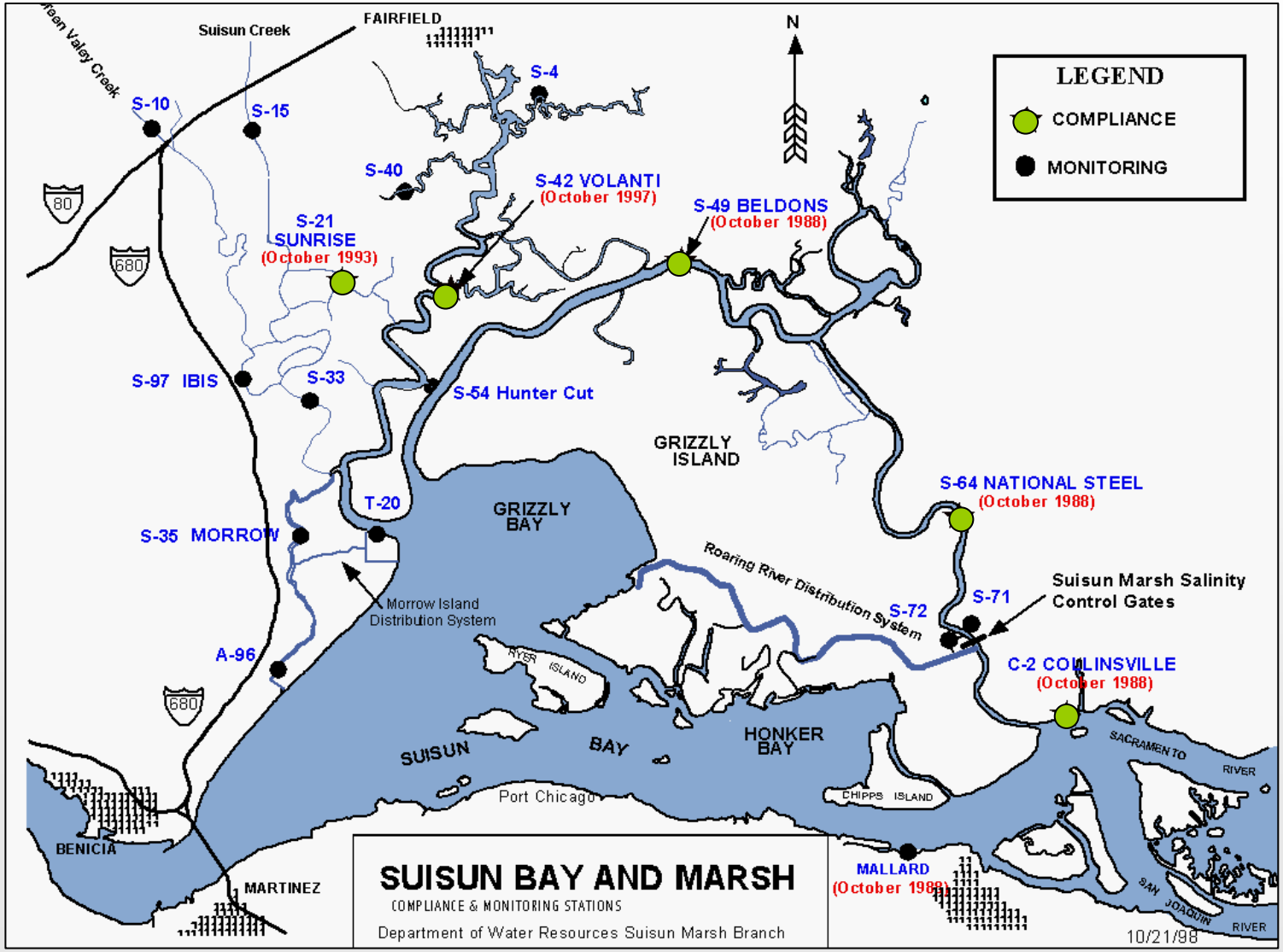
- Tidal “pump” induces a net downstream flow (~2,800 cfs).
- Opens on ebb tide
- Closes on flood tide



SMSCG Components

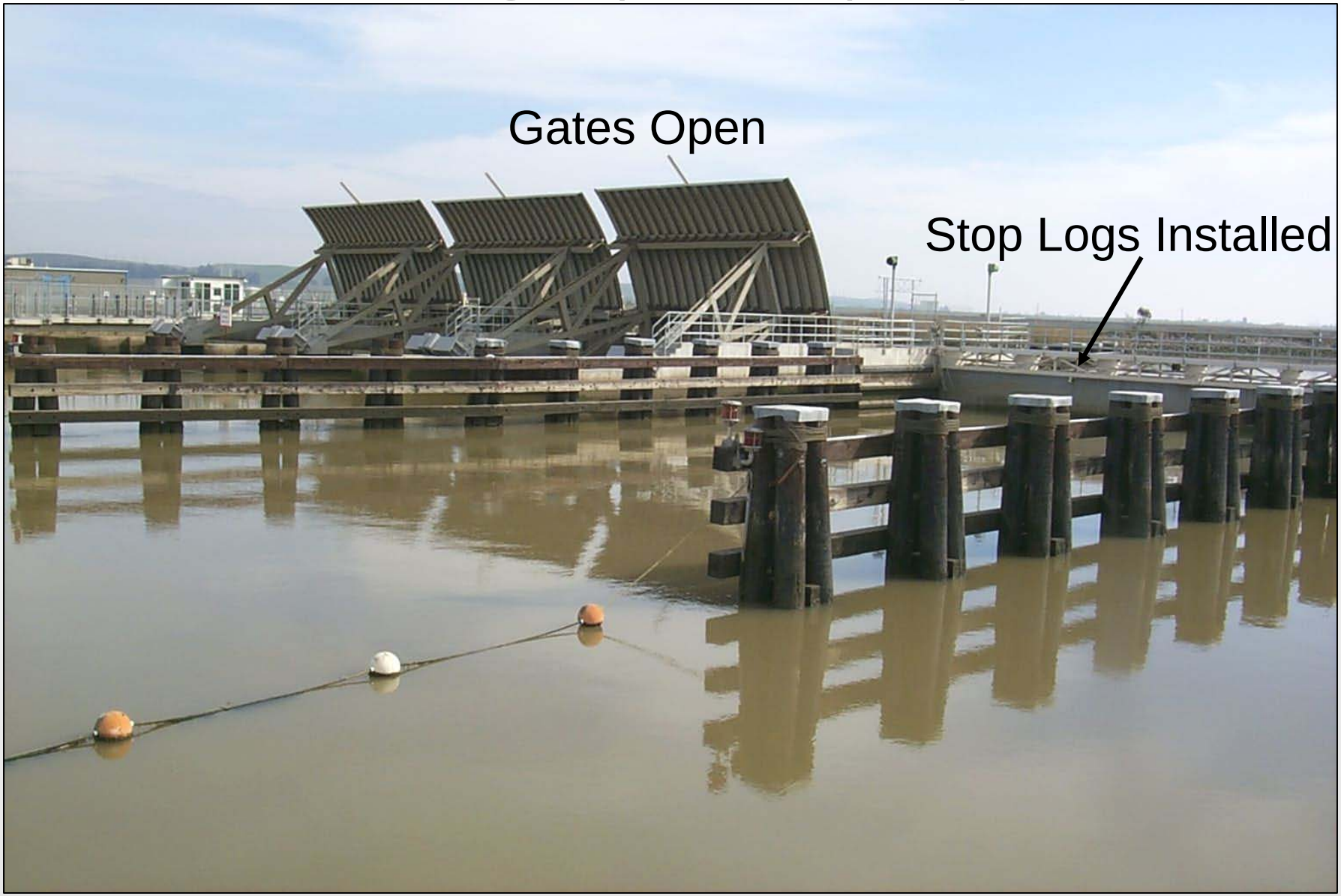


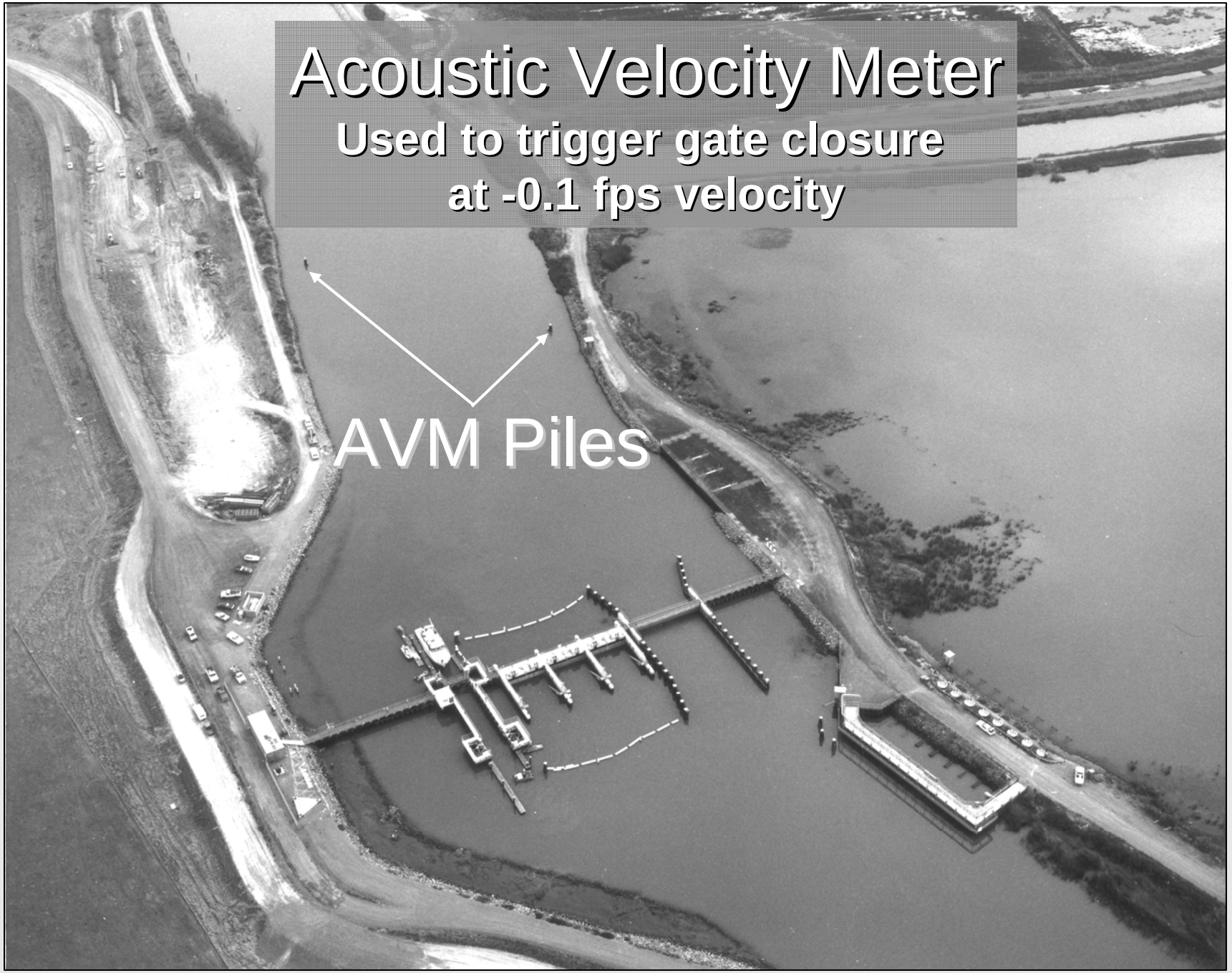
Salinity Standard Compliance Locations
Both regulatory and contractual



Looking Upstream (southeast)

Looking ~Upstream (east)



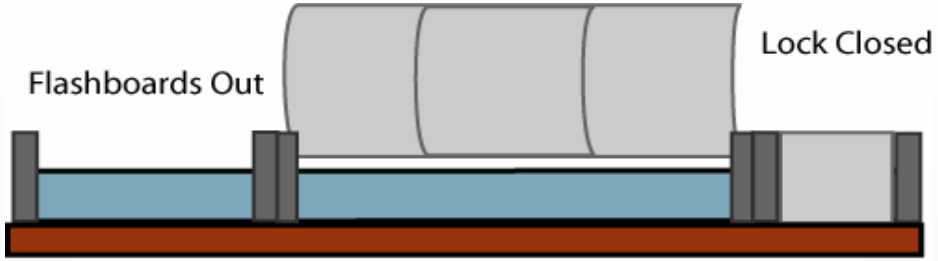

Acoustic Velocity Meter
Used to trigger gate closure
at -0.1 fps velocity
AVM Piles

SMSCG Boat Lock (looking downstream - flood tide)

SMSCG Boat Lock (looking upstream - flood tide)

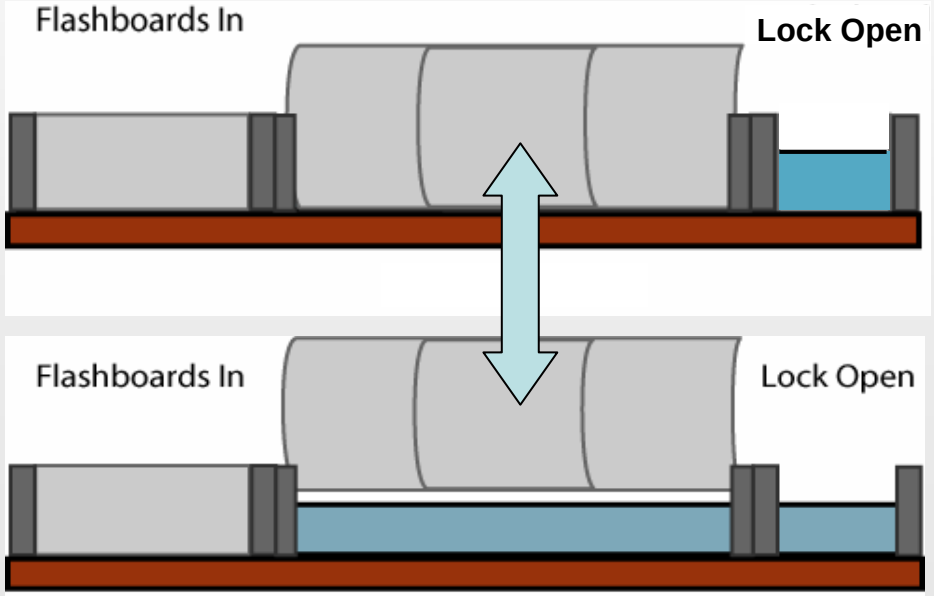
Suisun Marsh Salinity Control Gate Configurations

June ⟹ September



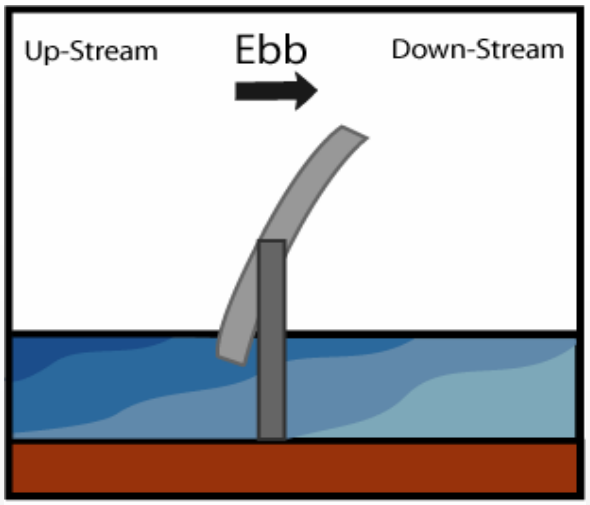
SMSCG Not Operating

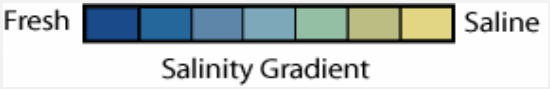
October ⟹ May
(when needed to meet standards)



SMSCG Operating

SMSCG Side View

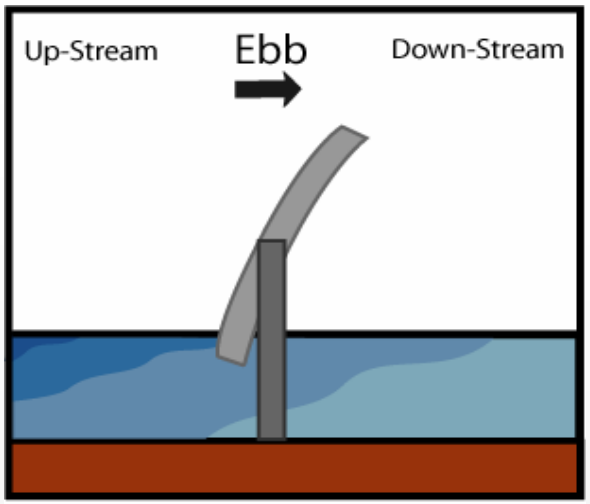


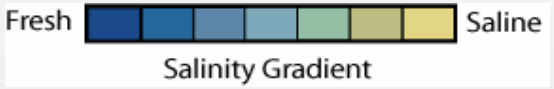


In operation:

- Closes on flood tide when current > -0.1 fps
- Open on ebb tide when upstream water level is 0.3 ft > downstream water level

SMSCG Side View





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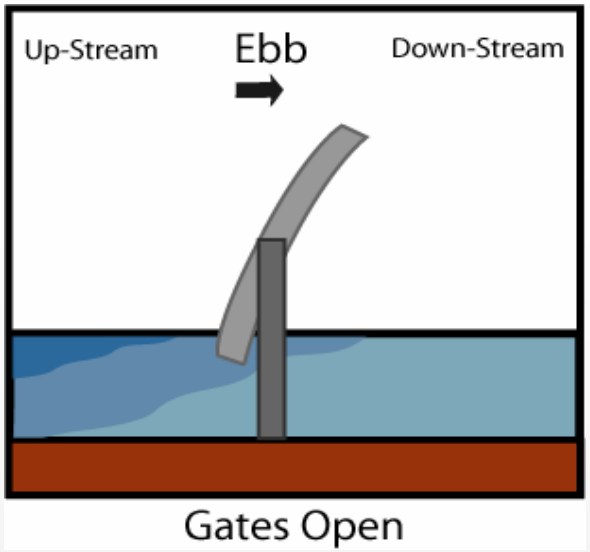

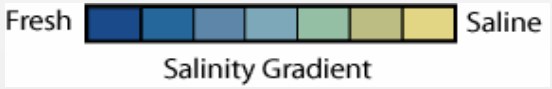

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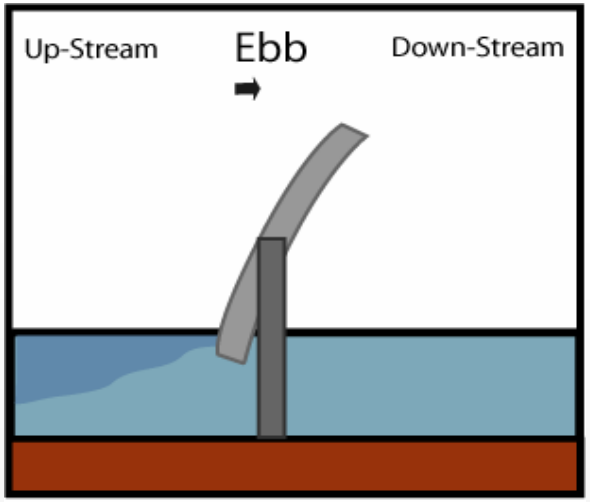

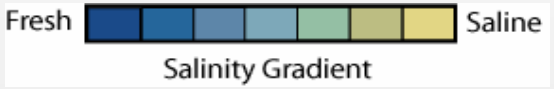

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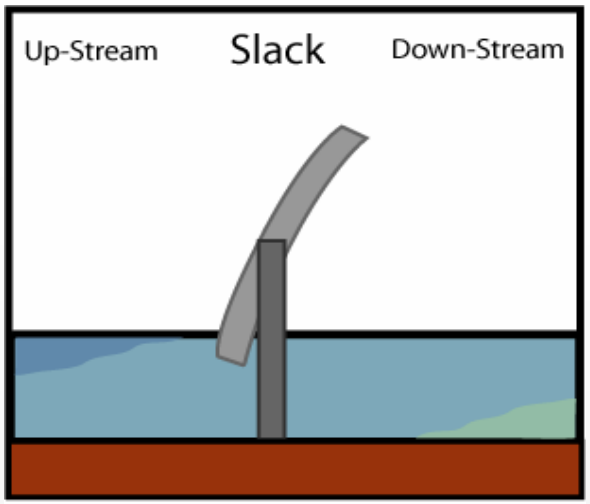

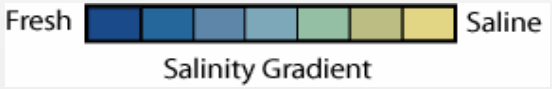

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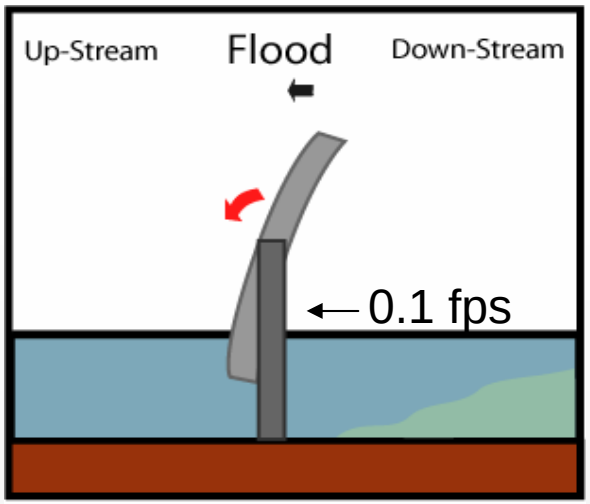

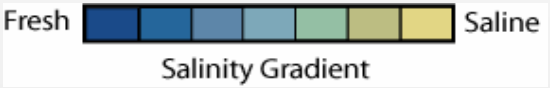

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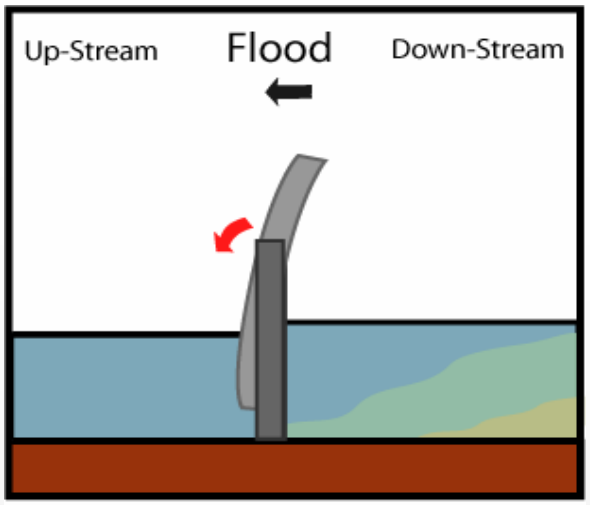

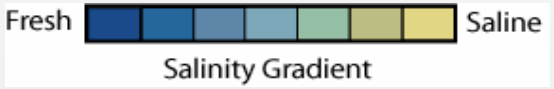

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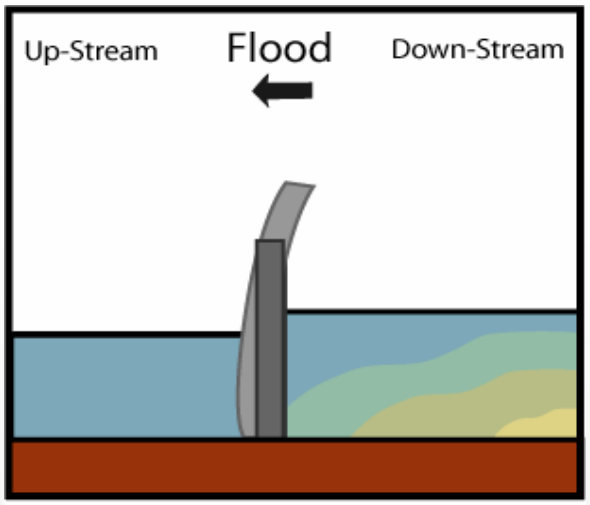
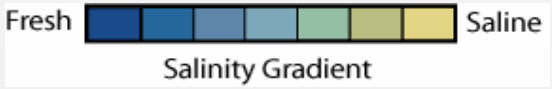
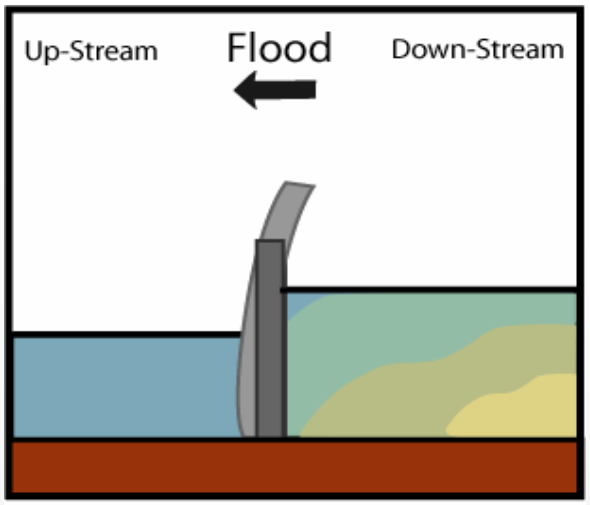


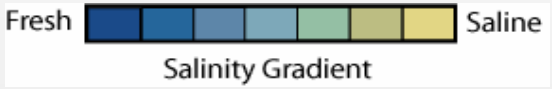
Gates Closed



Salinity Gradient

SMSCG Side View





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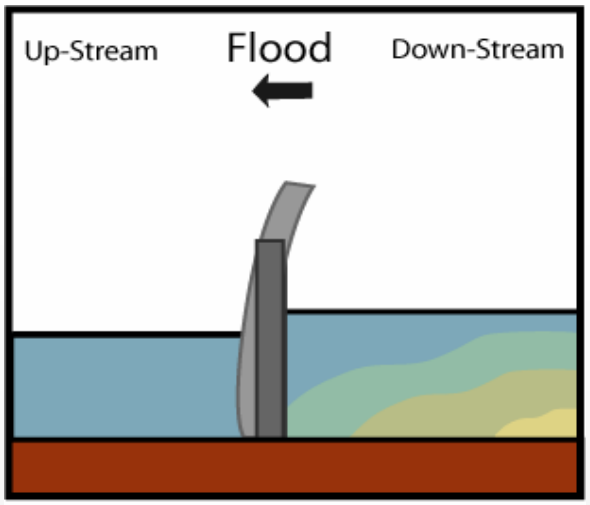

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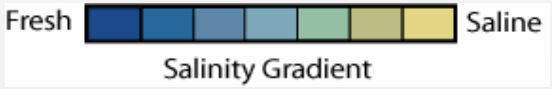
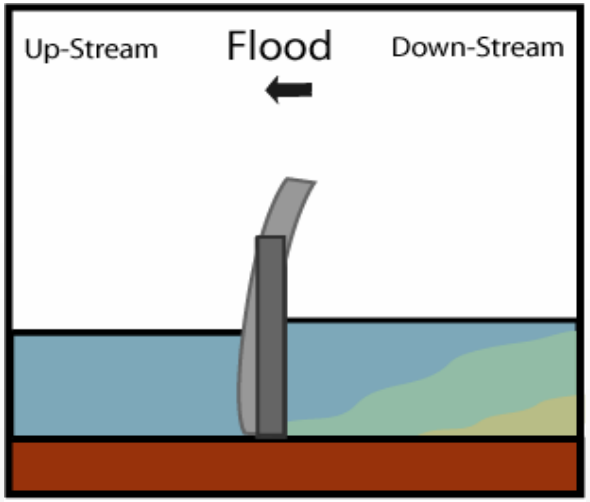


Salinity Gradient

SMSCG Side View



Gates Closed

Salinity Gradient

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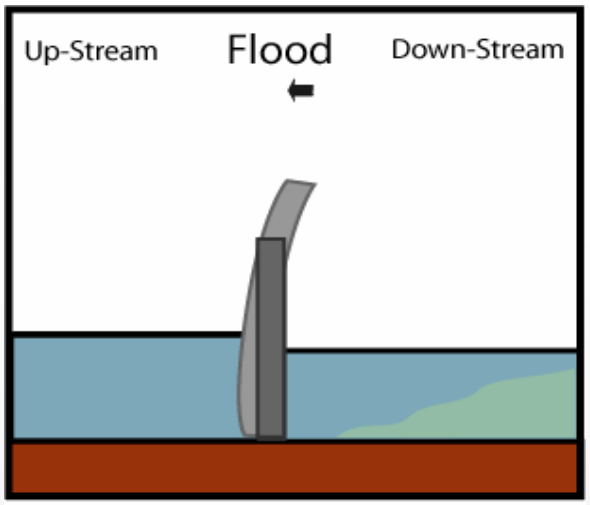

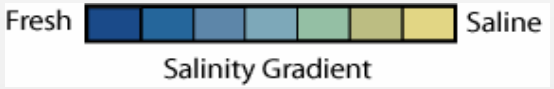

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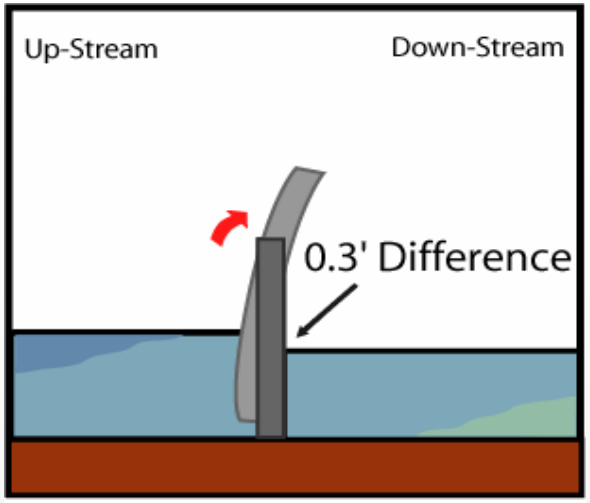

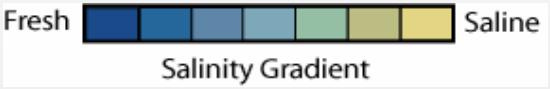

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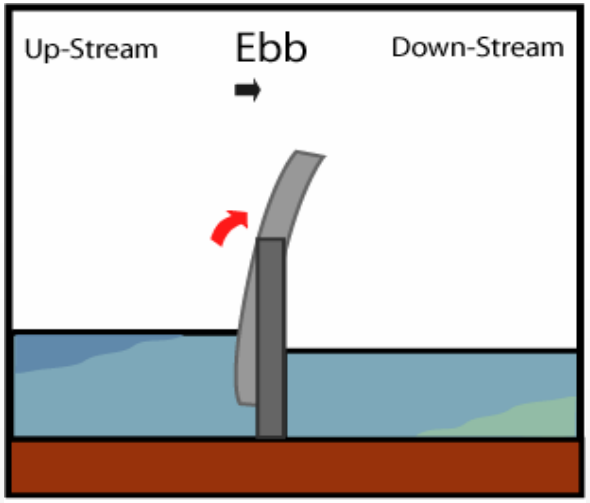

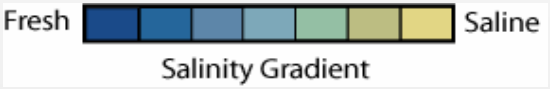

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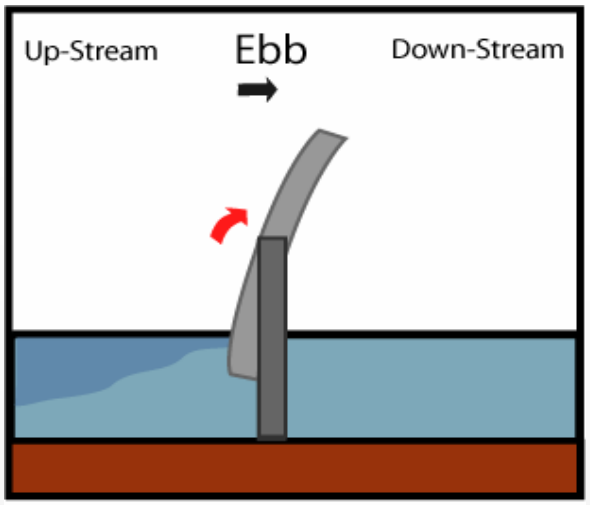

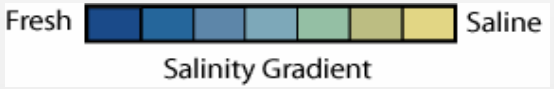

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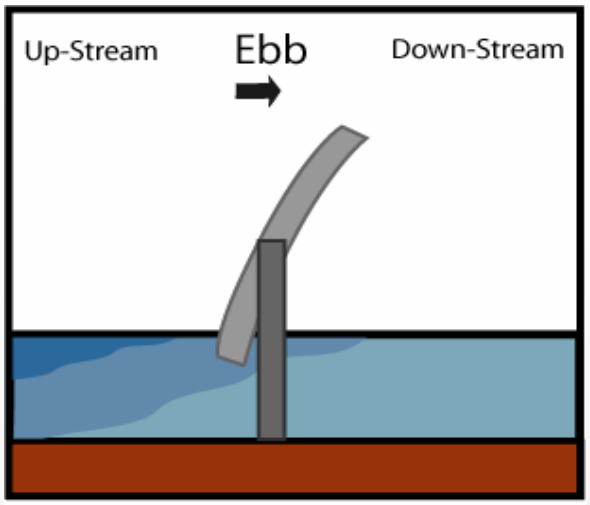

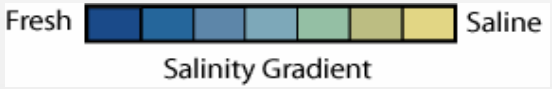

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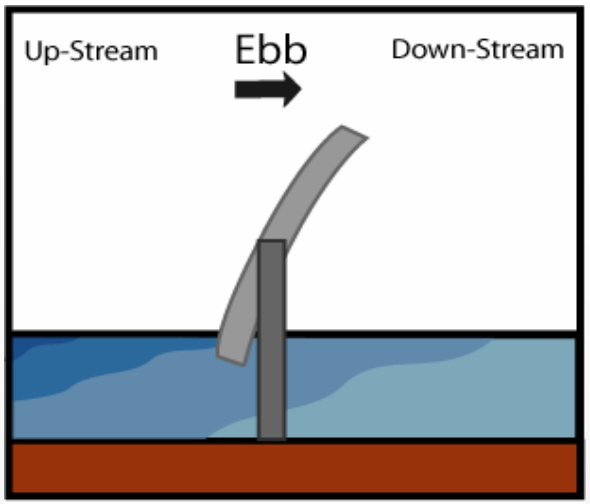

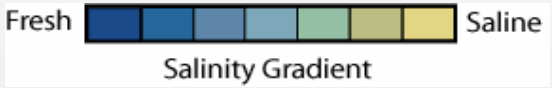

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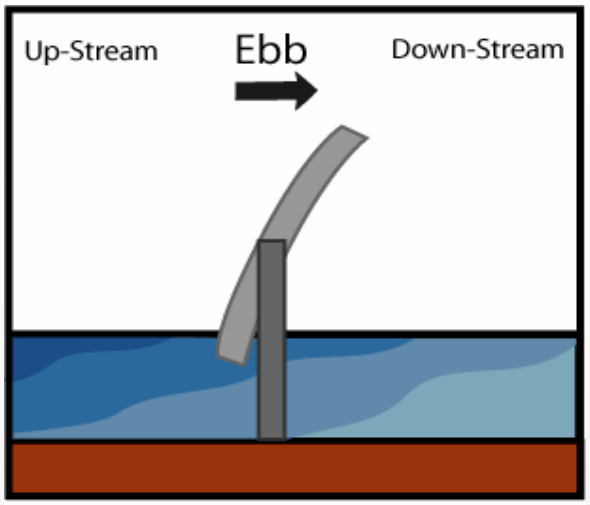
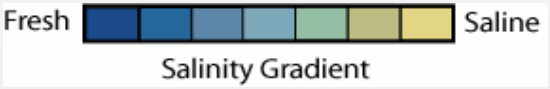
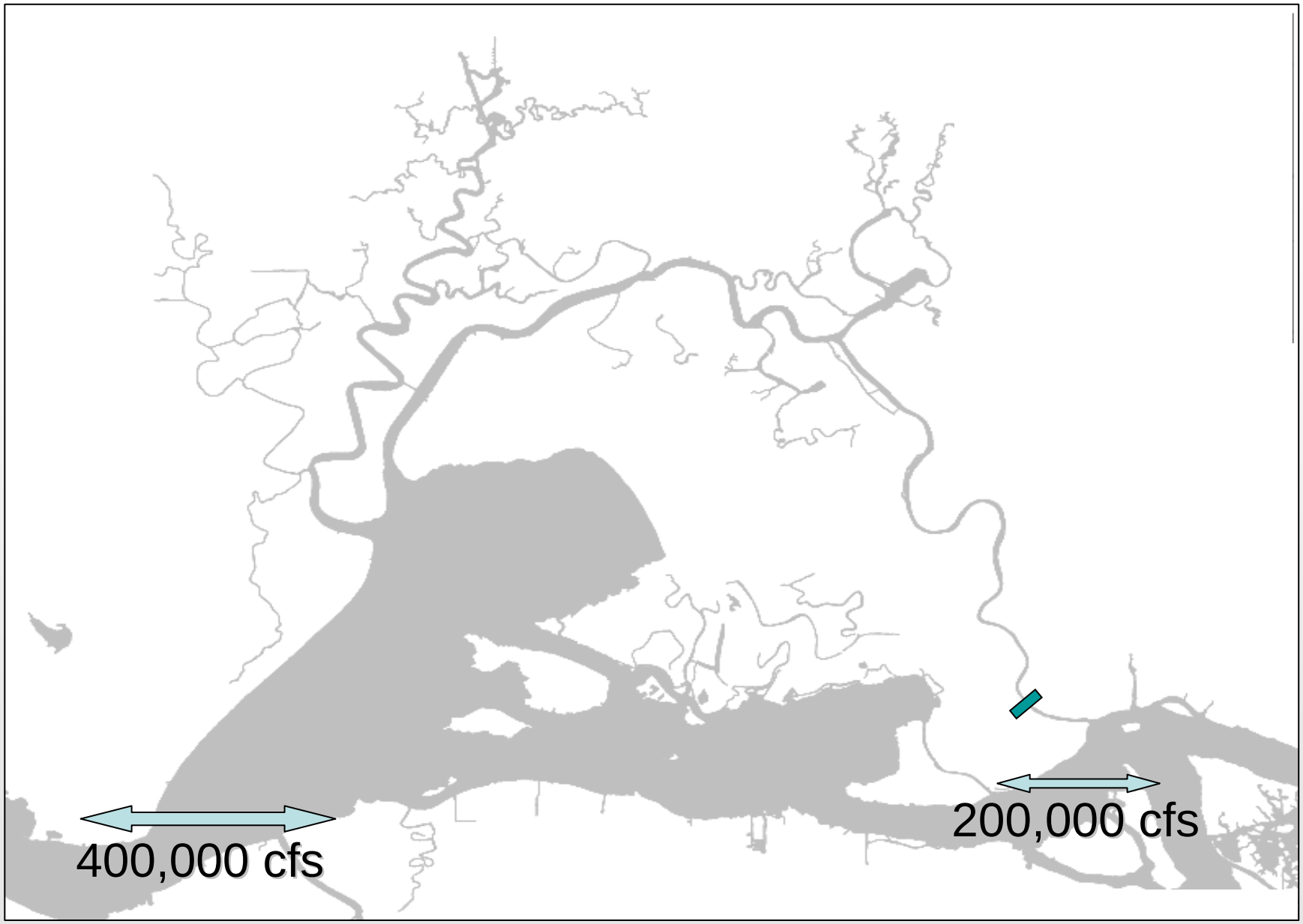
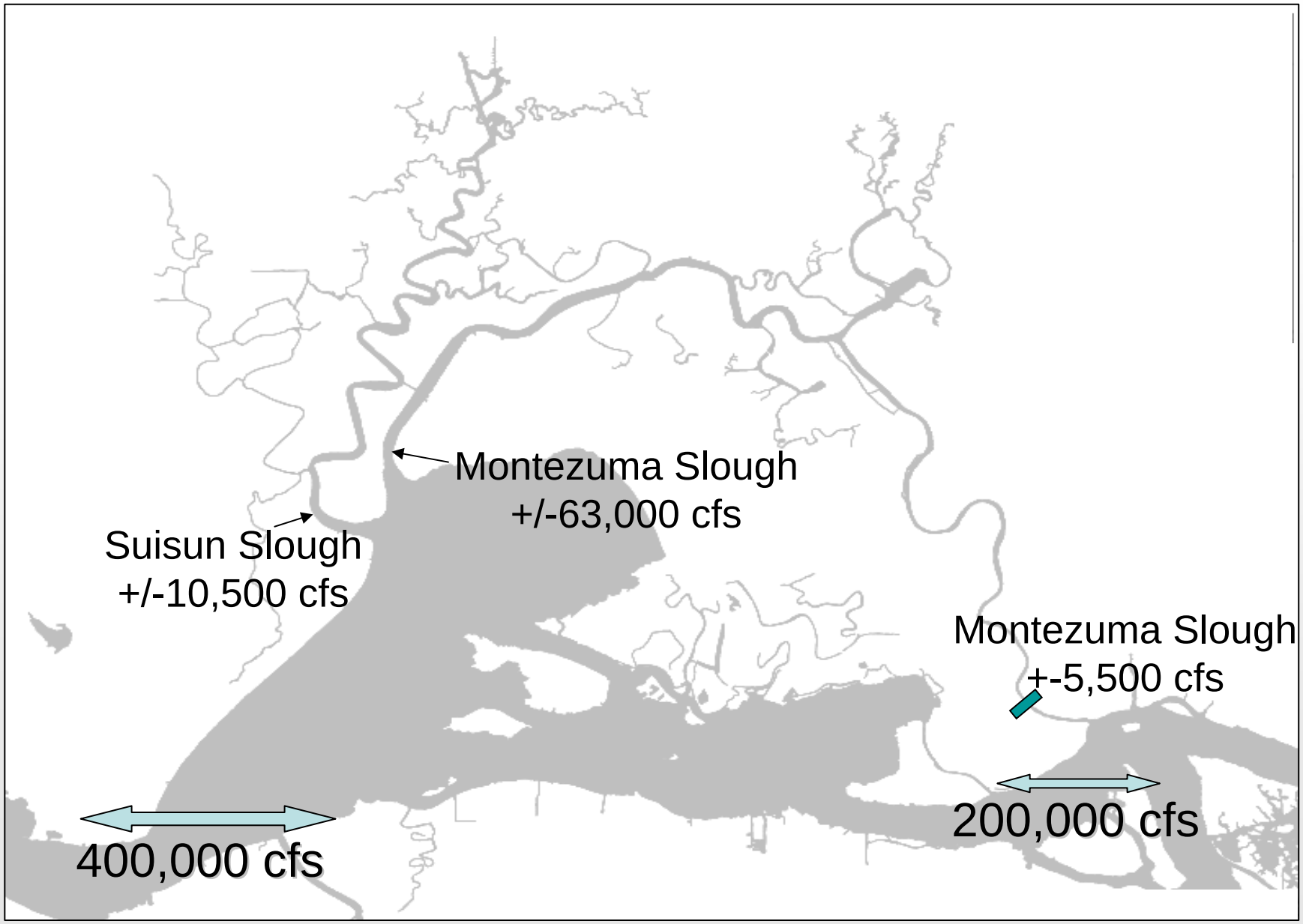




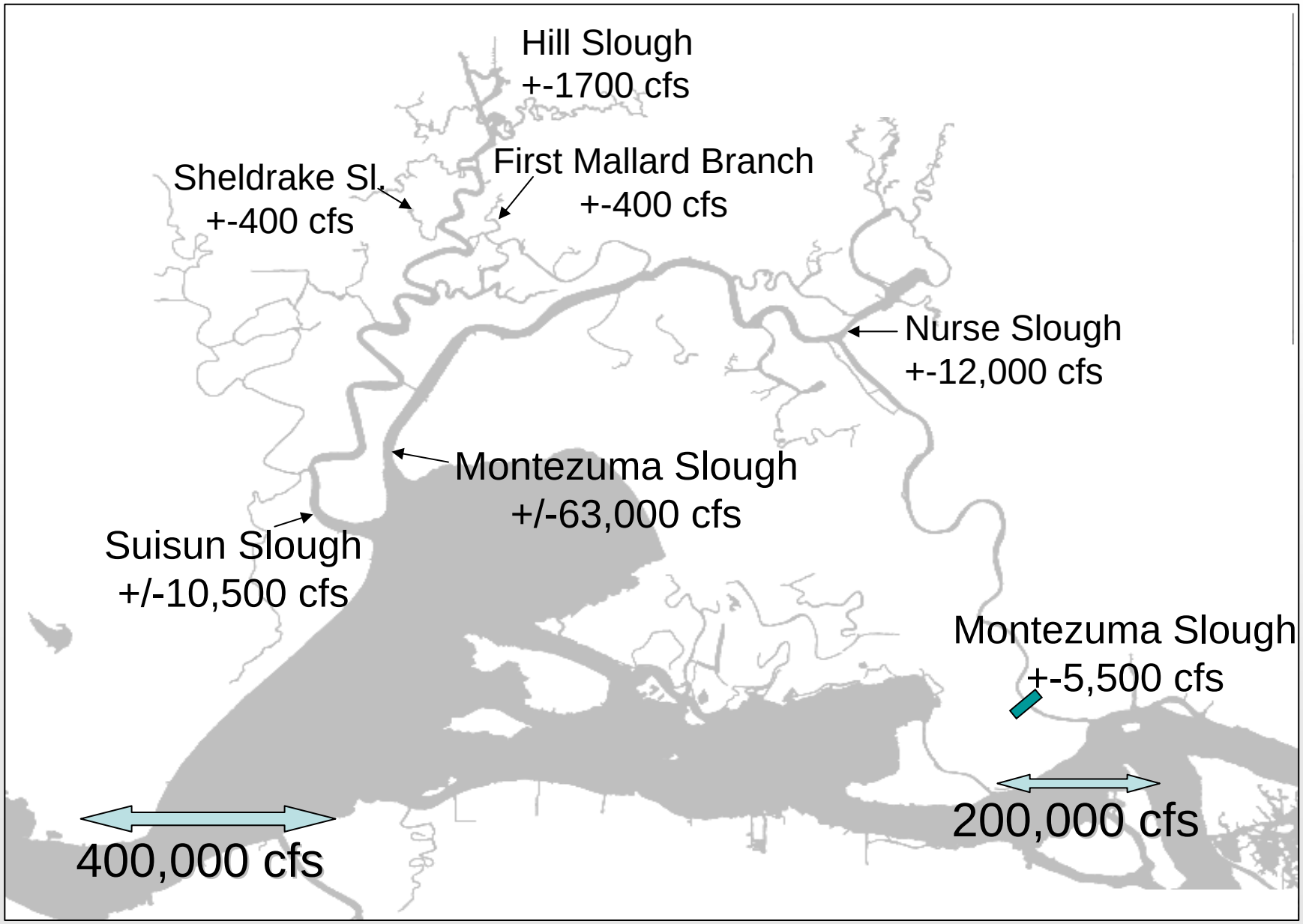
Tidal Time Scale Flows



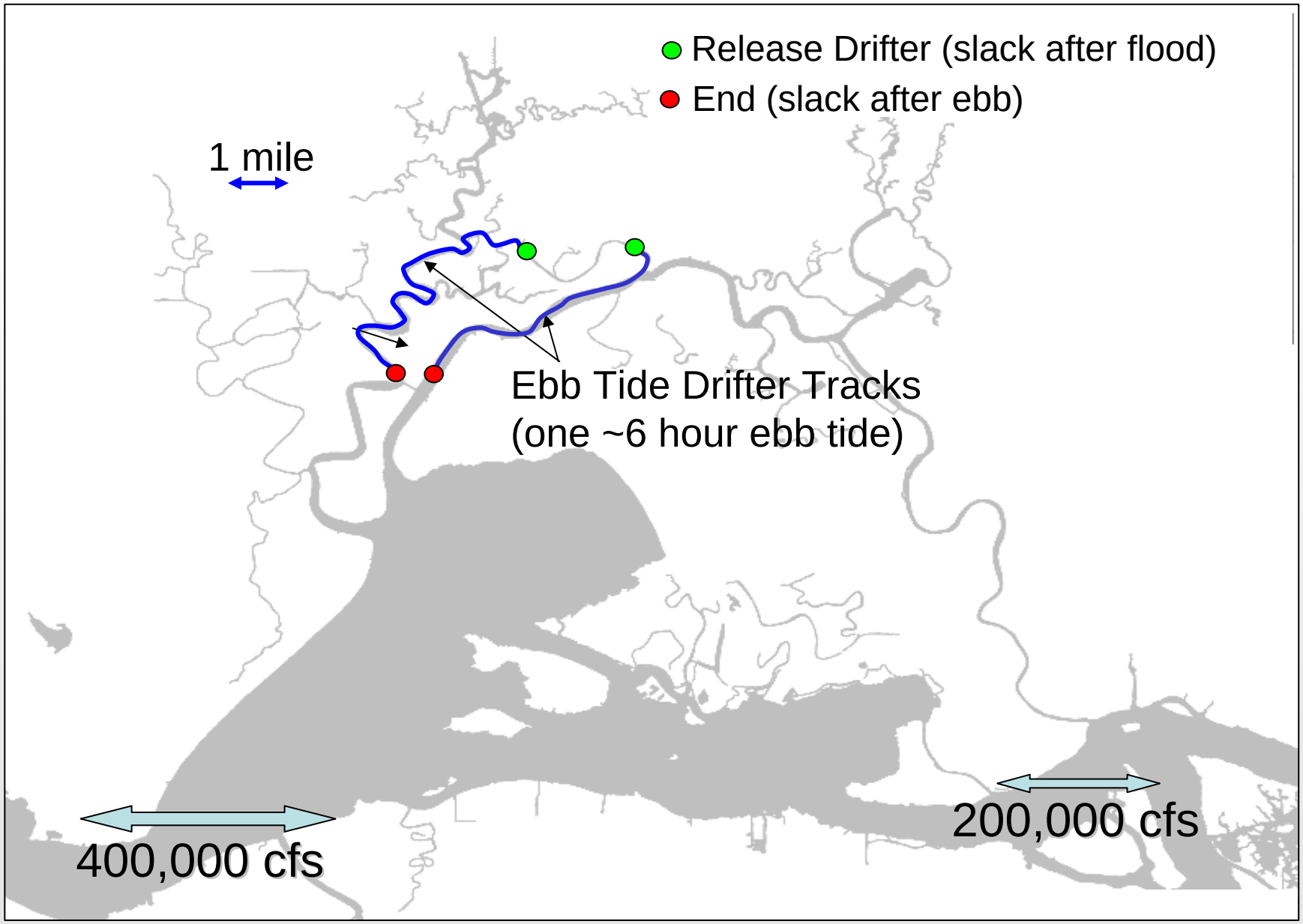
Tidal Time Scale Flows



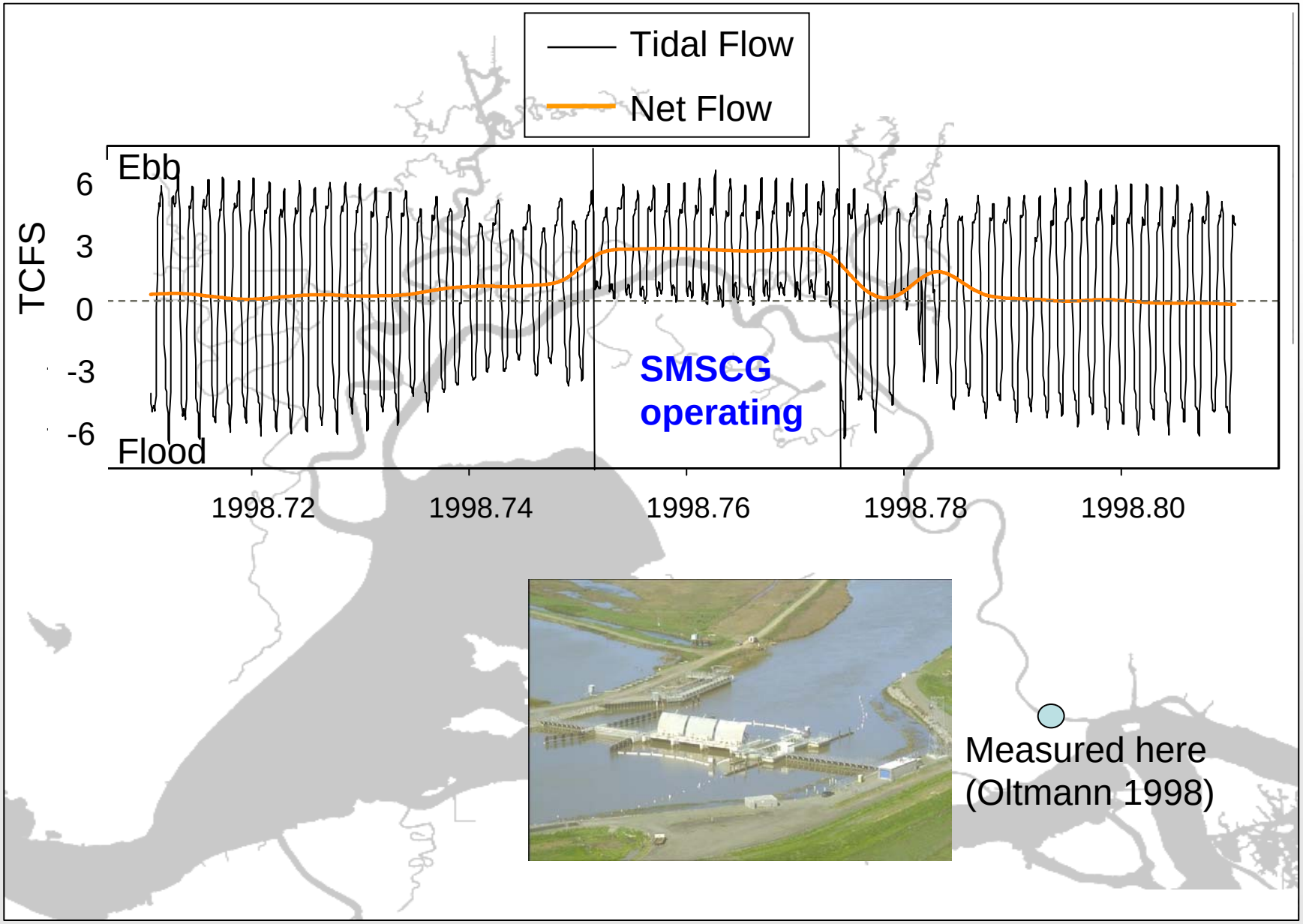
Tidal Time Scale Flows



Tidal Time Scale Excursion

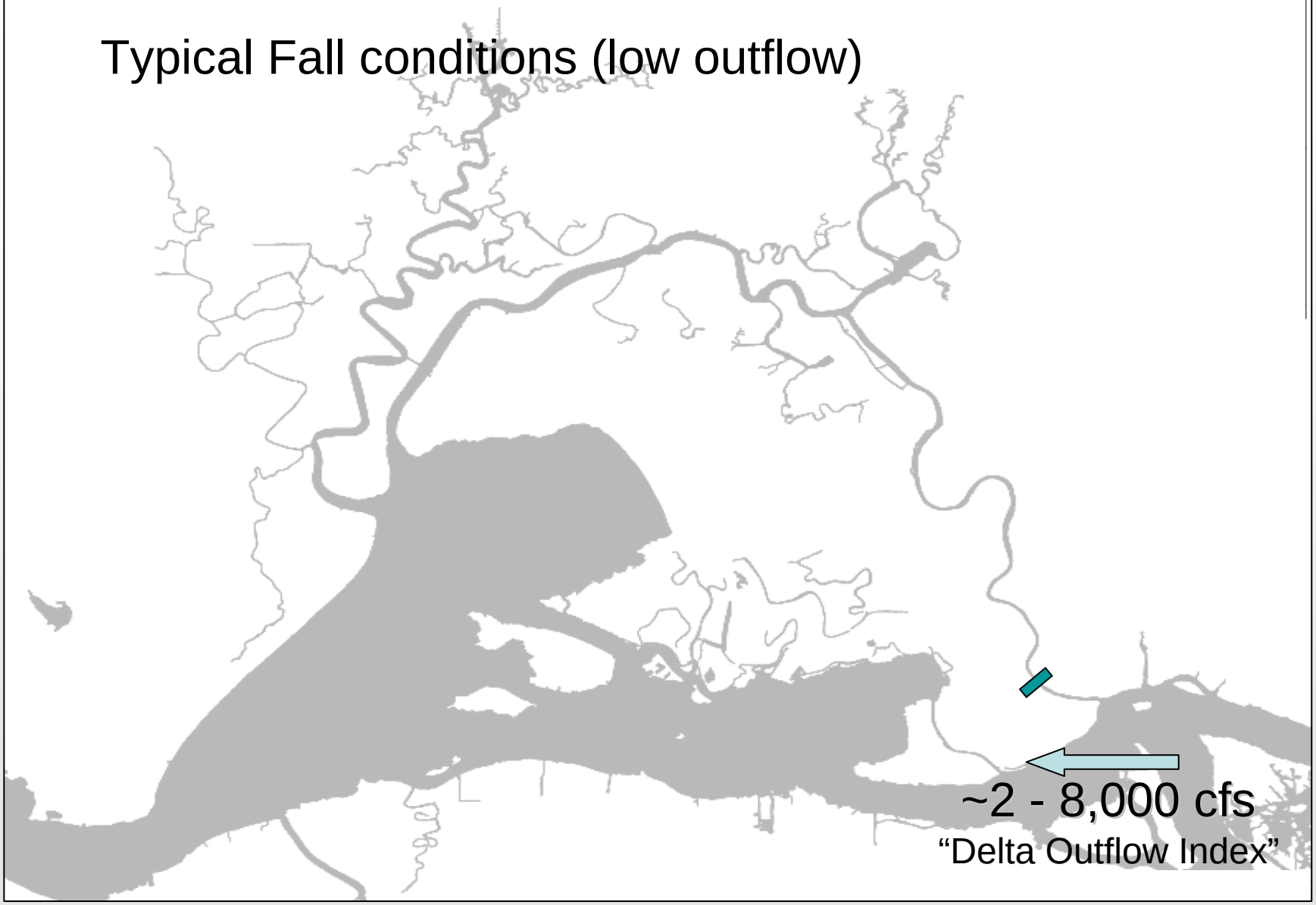


Tidal Time Scale Flows



Sub-tidal Time Scale (“Net”) Flows

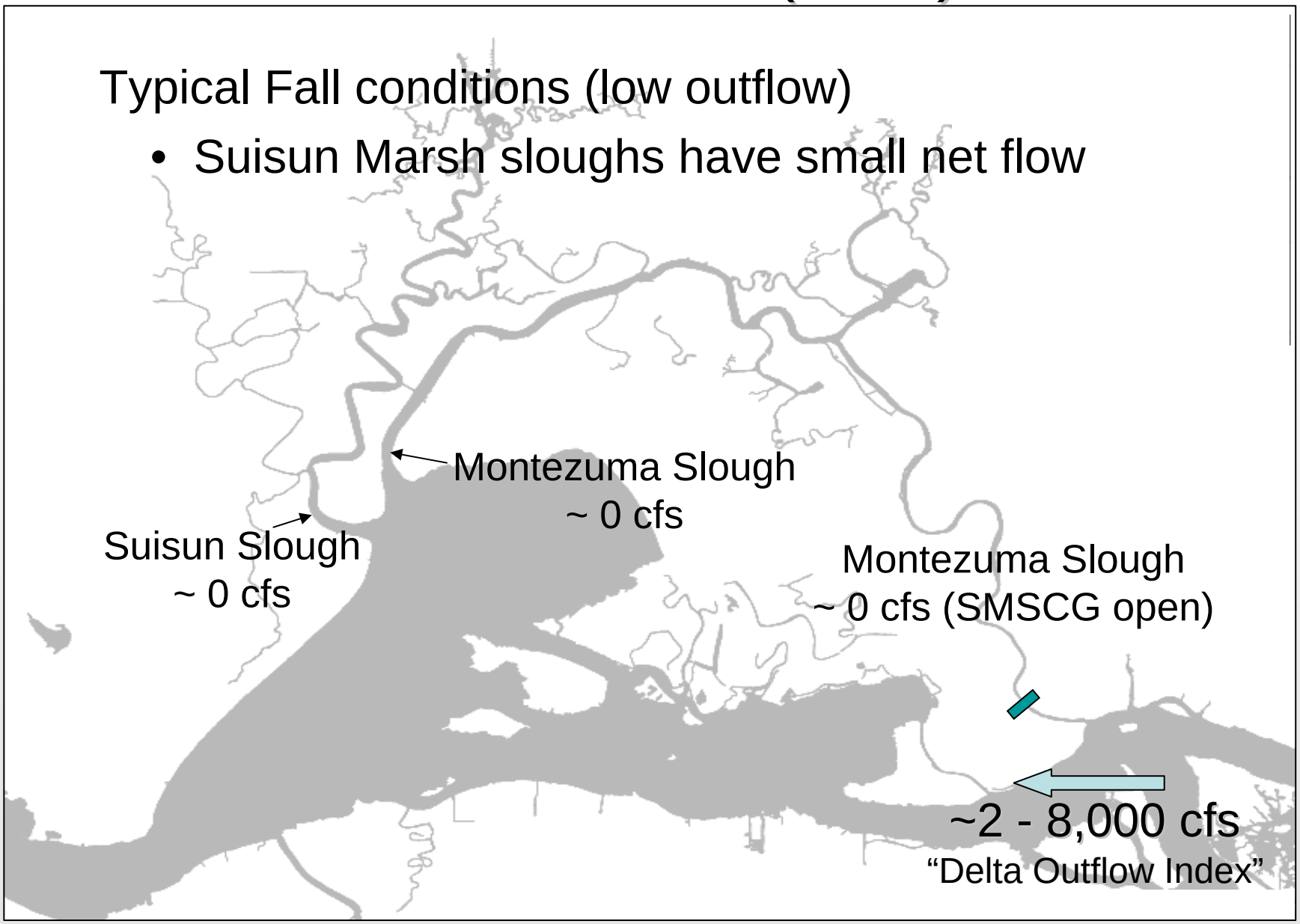
Typical Fall conditions (low outflow)



Sub-tidal Time Scale ("Net") Flows

Typical Fall conditions (low outflow)

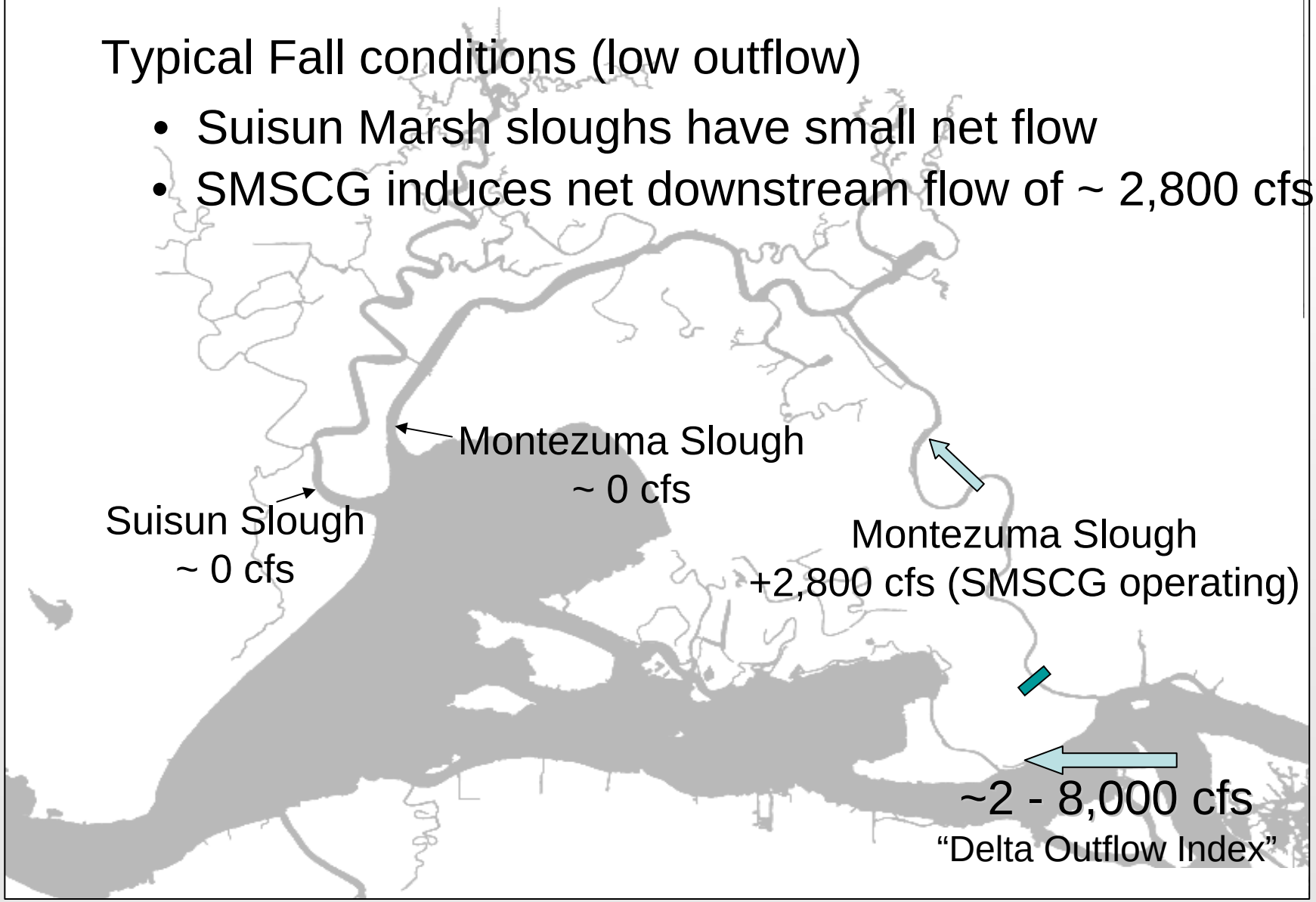
- Suisun Marsh sloughs have small net flow



Sub-tidal Time Scale ("Net") Flows

Typical Fall conditions (low outflow)

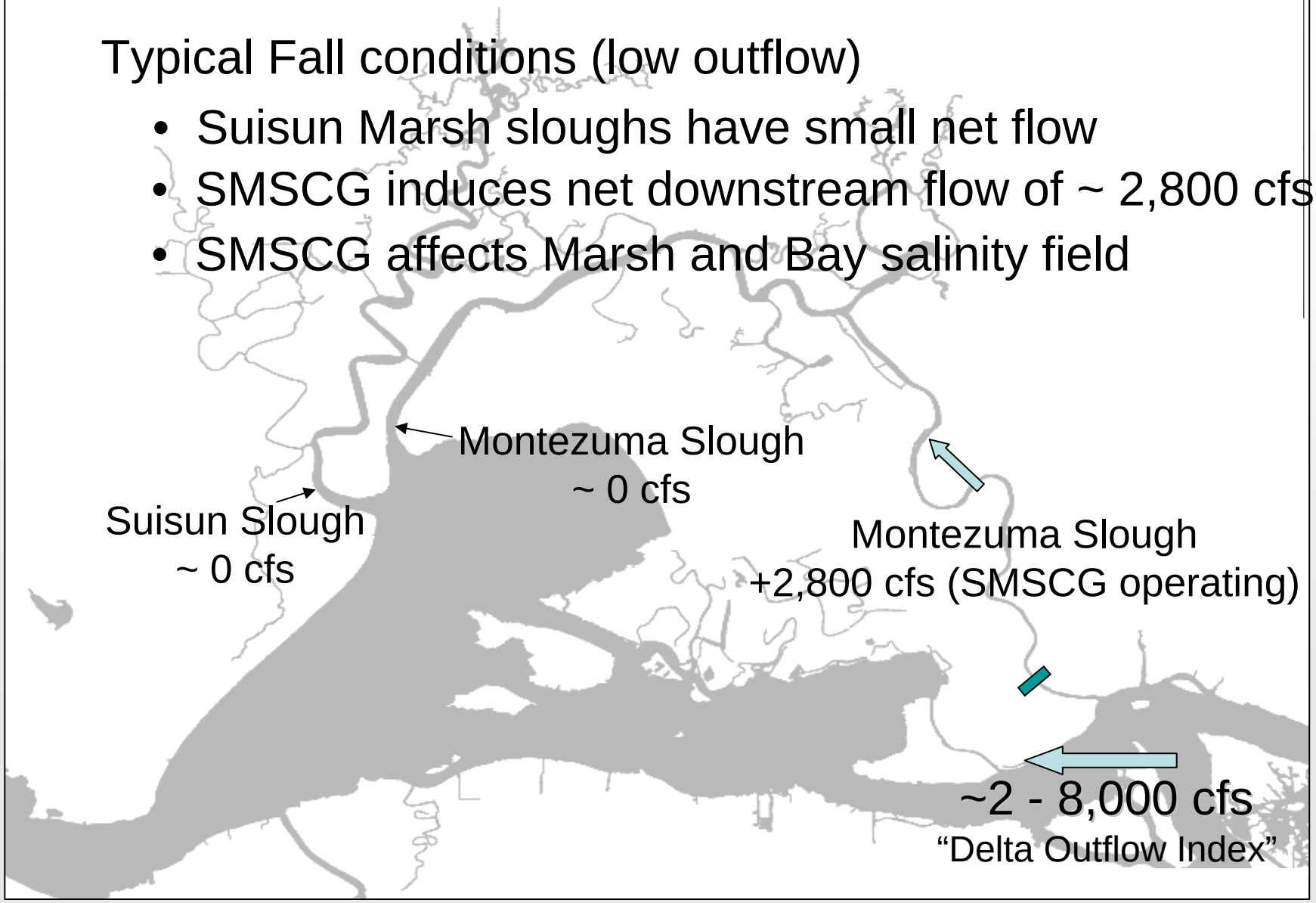
- Suisun Marsh sloughs have small net flow
- SMSCG induces net downstream flow of ~ 2,800 cfs



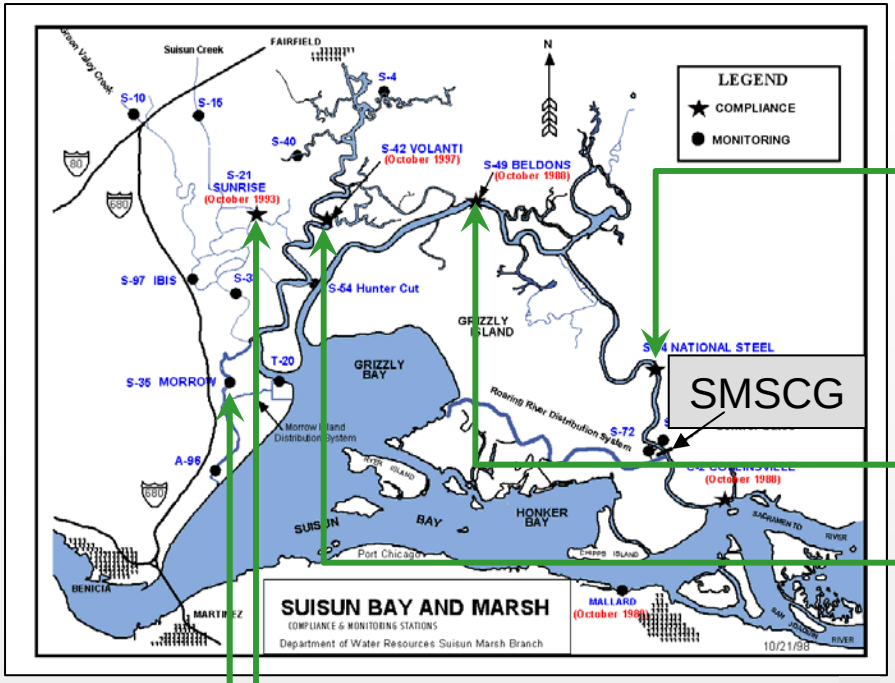
Sub-tidal Time Scale ("Net") Flows

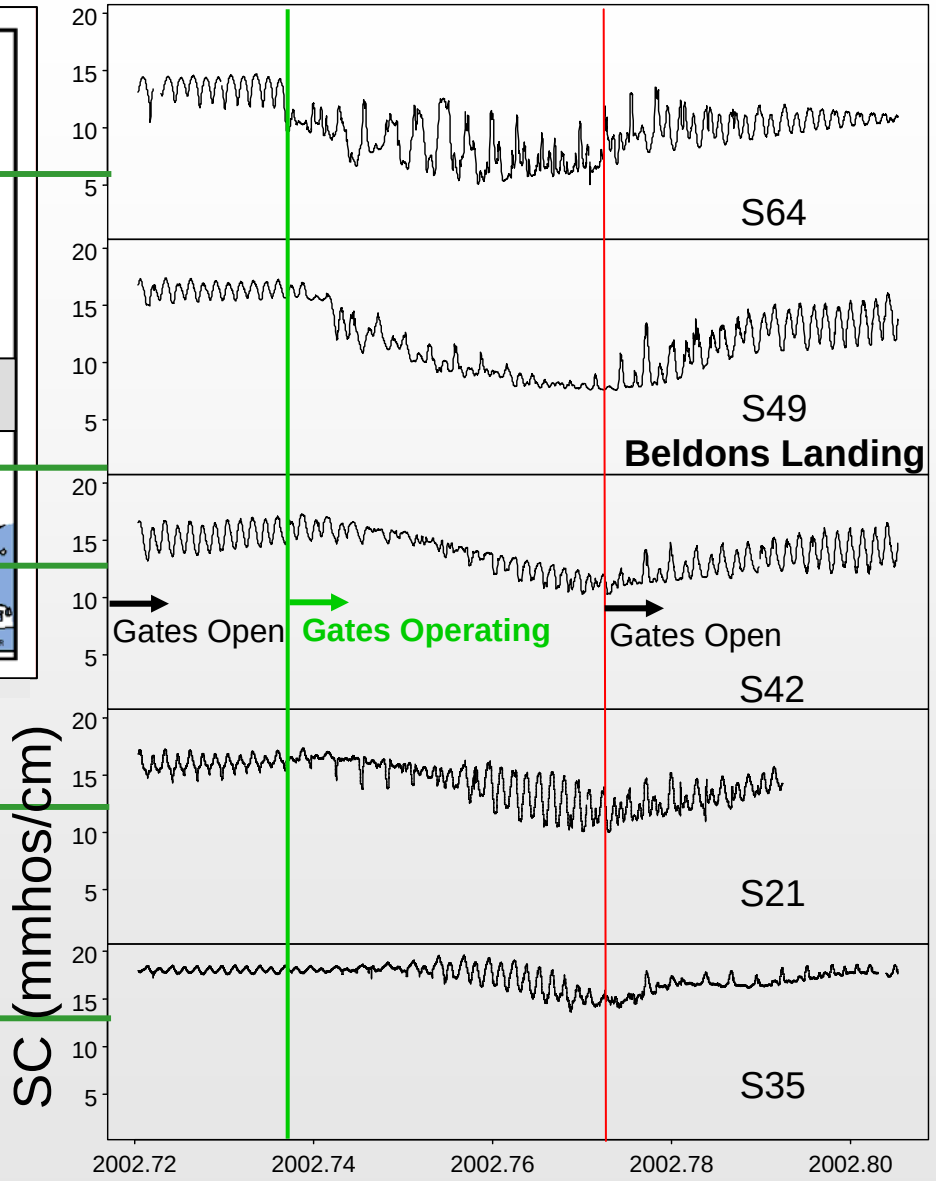
Typical Fall conditions (low outflow)

- Suisun Marsh sloughs have small net flow
- SMSCG induces net downstream flow of ~ 2,800 cfs
- SMSCG affects Marsh and Bay salinity field

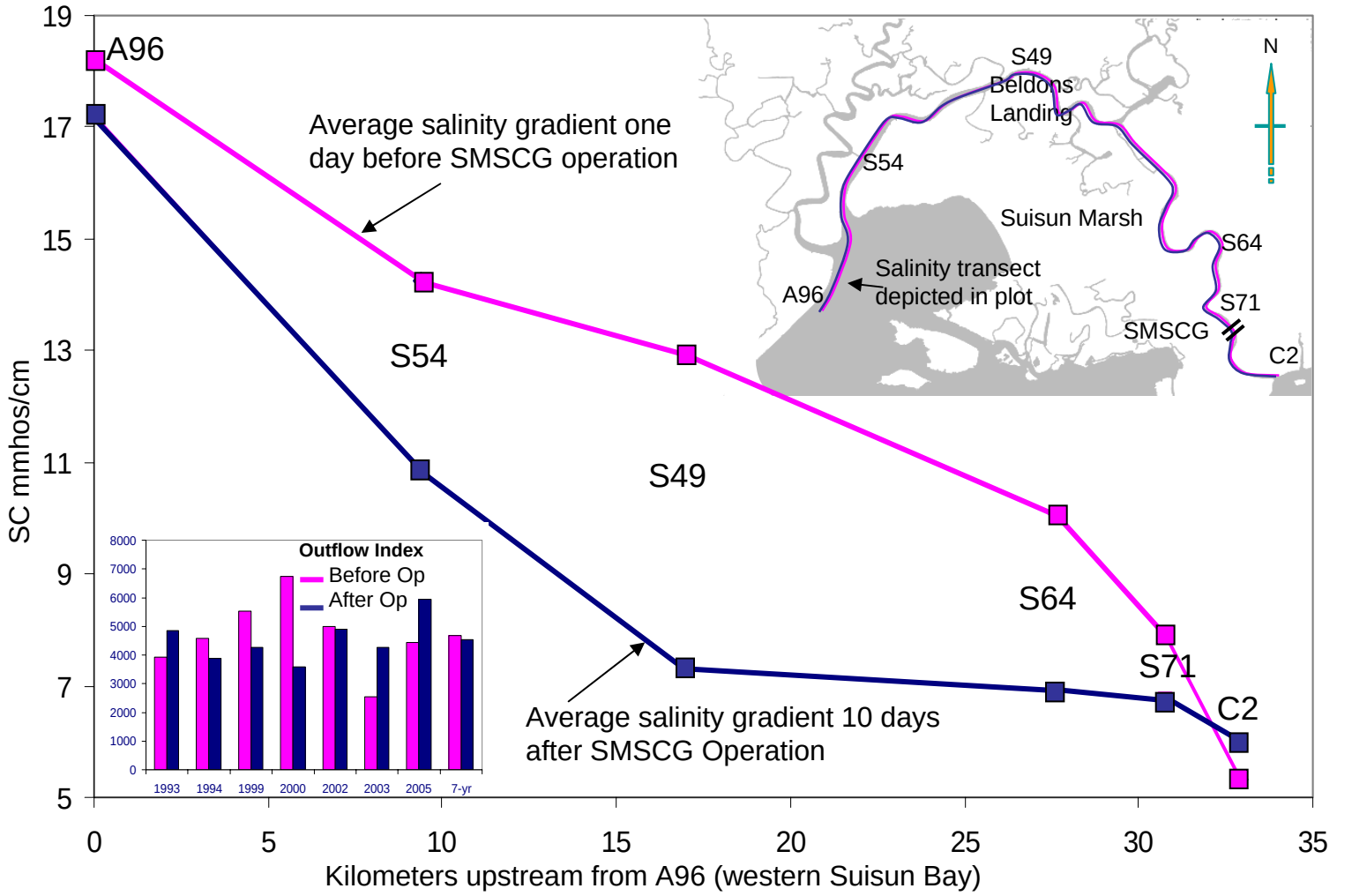


Salinity Response to SMSCG Operation

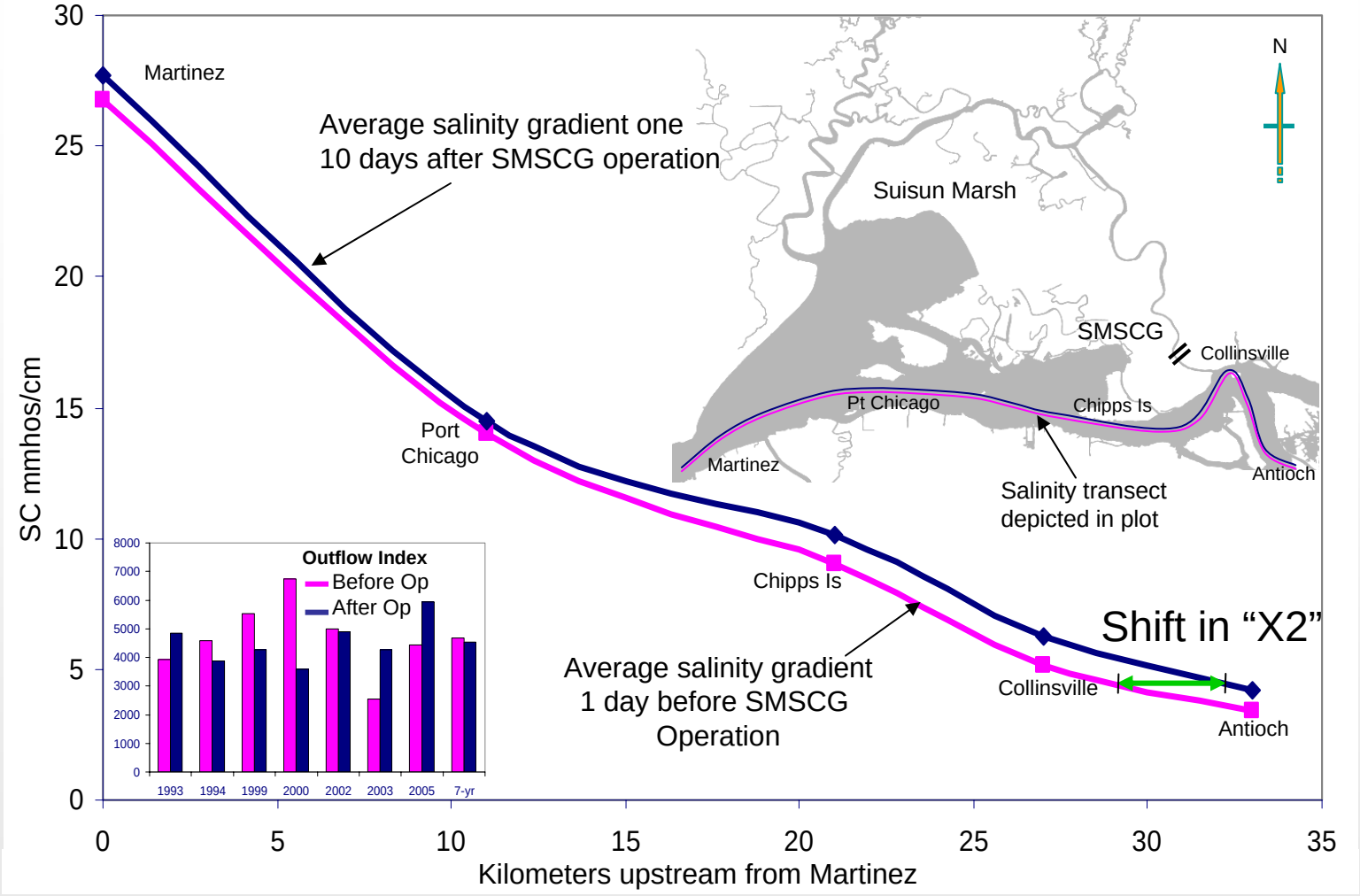




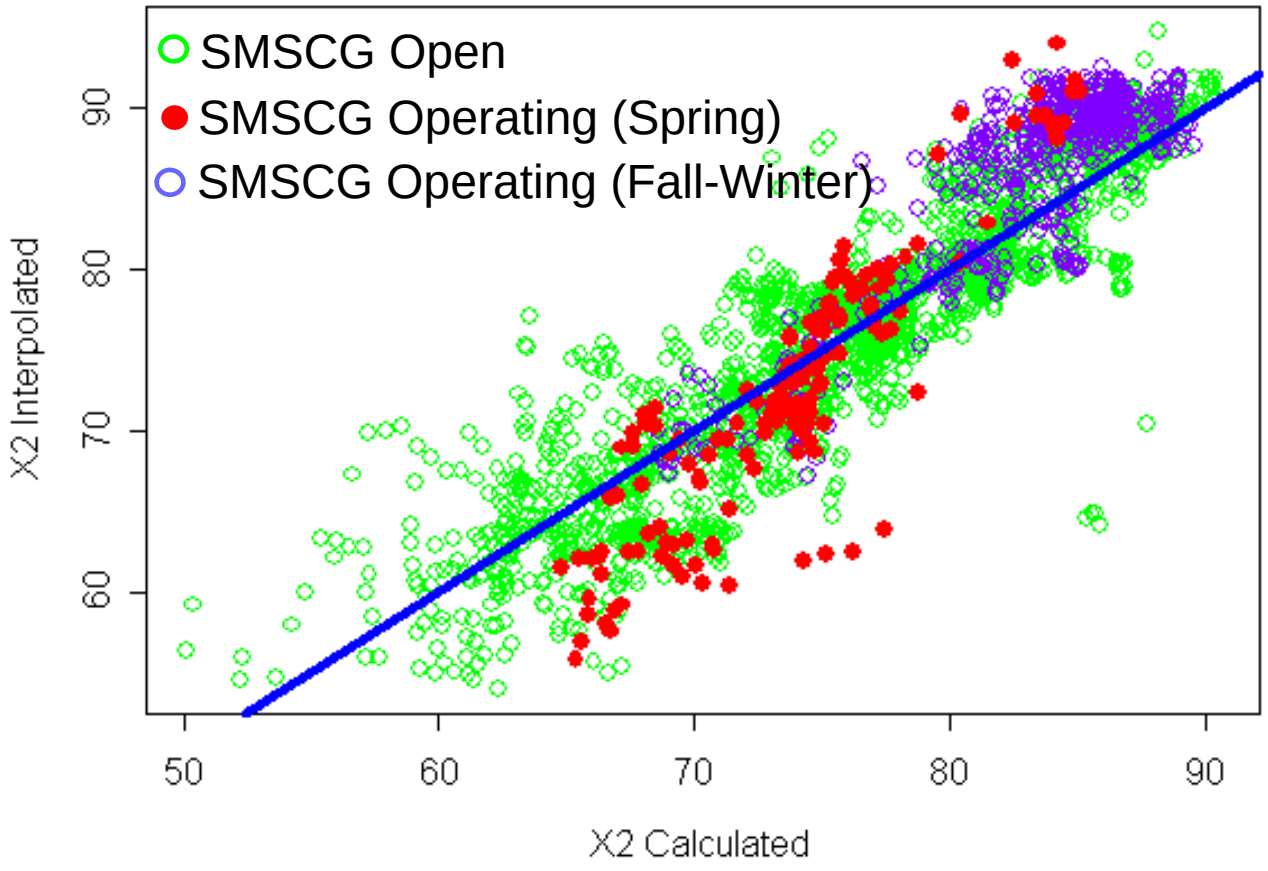
SMSCG effect on Montezuma Slough



SMSCG effect on Suisun Bay

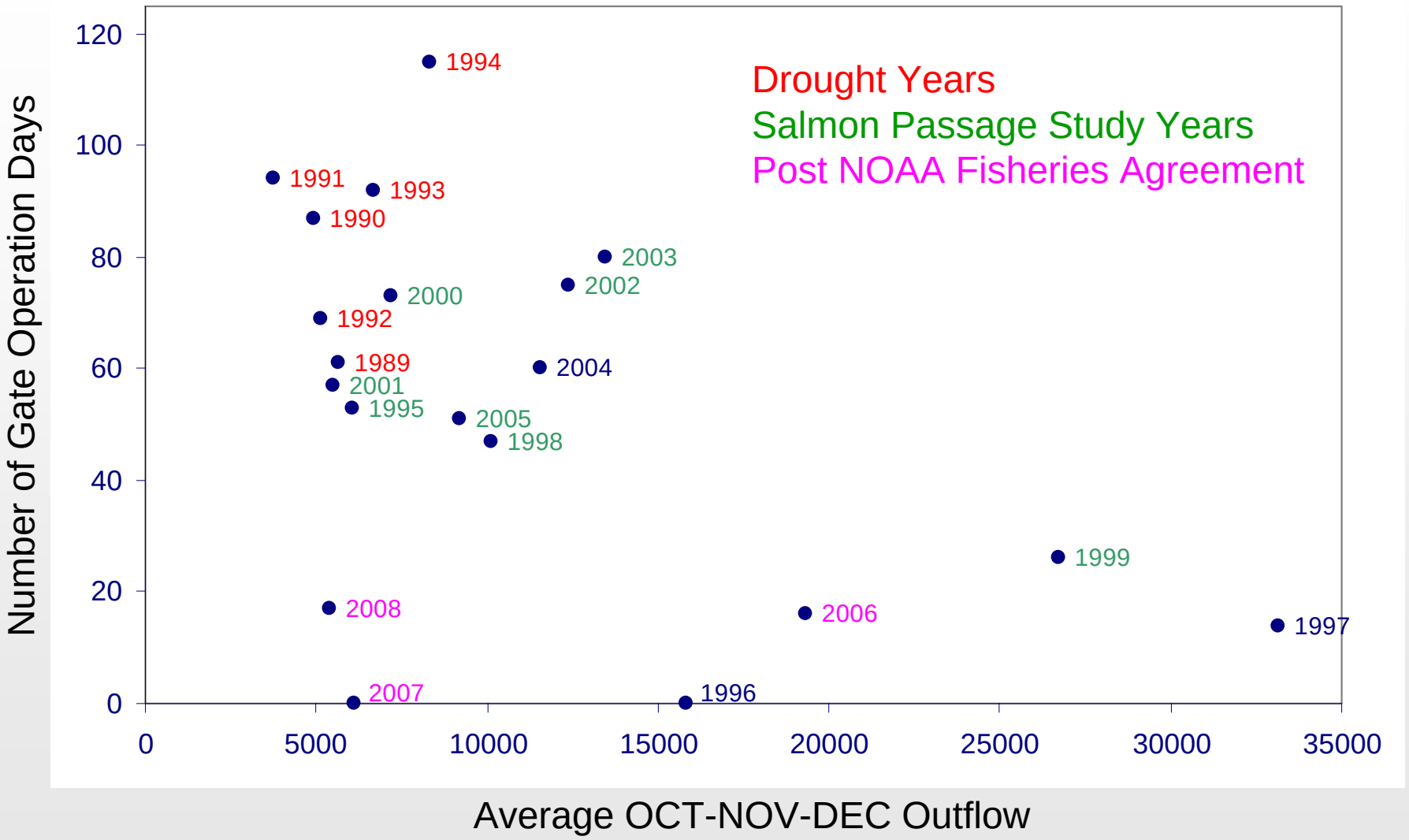


Interpolated and Calculated X2: Effect of Suisun Marsh Gates

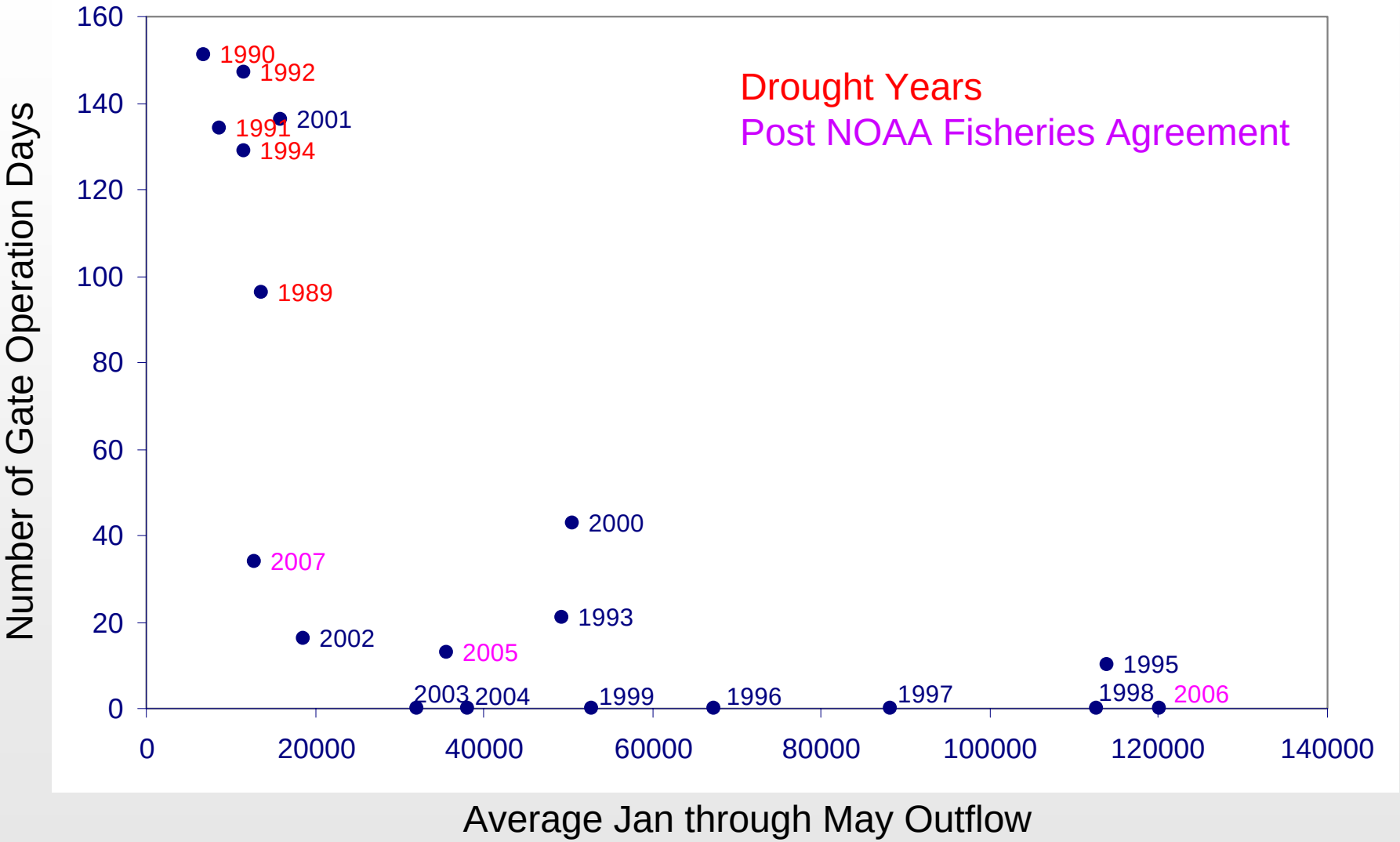


Courtesy Wim Kimmerer

SMSCG Operation Frequency Versus Outflow



SMSCG Operation Frequency Versus Outflow



Thank You

- Paul Massera
- Jim Sung
- Kate Le
- Brad Tom