Next four talks are related

Background and Context

2-Gates project

(1) Triggers for delta smelt migration
(2) Turbidity monitoring in the delta
(3) Linking Turbidity to Suspended Sediment
(4) Tidally correcting fisheries data
2-Gates Project asked the question:

Q?: Can we manage delta smelt distributions (and reduce smelt salvage at the pumps) by controlling the turbidity field?
Q1: Do increases in turbidity associated with the first flush trigger smelt migration?

Talk 1 - Triggers for delta smelt migration
Q2: Can we use turbidity as a surrogate for managing delta smelt?

Talk 2 - Turbidity Monitoring in the Delta
Q3: Can we manage turbidity?

Talk 2 - Turbidity Monitoring in the Delta

Talk 3 - Modeling (Linking turbidity to suspended solids concentrations)
Q4: How do we interpret fisheries data in the context of a strongly tidally forced system like the Delta?

Talk 4 - Accounting for the tides in fisheries data
Should I Stay or Should I Go?
Tides, Turbidity, and Triggers for Delta Smelt Migration

Jon Burau, USGS
Bill Bennett, UCD
Julio Adib-Sami, CDFG

Special thanks to the captains and biologists of the Department of Fish and Game and USGS.
Sampling track at channel-shoal interface opposite Decker Island in lower Sacramento River

Hydrodynamic instruments were mounted on navigation buoy #17
So, What Did We Catch?

Female Reproductive Stages

- Stage 2 (Pre-spawn) (37%)
- Stage 3 (Pre-spawn) (53%)
Beach seine data revealed most smelt caught on ebb tides

Flood/Ebb Assymetry in Smelt Catch

Smelt Caught in deep/fast water on flood tides

Smelt Caught in shallow/slow water on ebb tides

Most of velocity shear near channel edge

(J. Netto USFWS, Pers. Comm.)
Conceptual model of “surfing with the tide”
Delta Smelt

Chinook Salmon

Mississippi Silverside

Threadfin Shad

Current speed (cm s$^{-1}$)

Turbidity (NTU)

Fish catch

8:30  12:30  5:30  10:30  12am  9:30  11:30  4:30  8:30  12am
Next Steps:

Proposed sampling for First flush this winter
Sampling Strategy

Physical Layout

Legend

- T = Kodiak Trawl
- S = Beach Seine

sac = Sacramento River
sj = San Joaquin River

D = Downstream sampling location
U = Upstream sampling locations
X = Cross Channel sampling locations

Sac River (3Mile) SECONDARY Sampling Location Channel Marker 21

Sac River (Decker I) PRIMARY Sampling Location Channel Marker 17

1/3 of Max Tidal Excursion

Depth in Meters

- 0
- 1.5
- 3
- 6
- 9
- 11.4
- 14.4
- 17.4
- 20.5
- 23.8

ref: NGVD
Sacramento River Sampling on Odd Days
2 Trawls, 2 Seines operating simultaneously for 12 hours

Primary Seine
\[ S(sac)_D \]
\[ \Delta t = 1 \text{ hr} \]

Primary Trawl
\[ T(sac)_D \]
\[ \Delta t = 1 \text{ hr} \]

Secondary Seine
\[ S(sac)_U \]
\[ \Delta t = 2 \text{ hr} \]

Secondary Trawl
\[ T(sac)_X \]
\[ \Delta t = 2 \text{ hr} \]

Trawl Alternates between \[ T(sac)_X \] and \[ T(sac)_U \]

Notes:
If either primary Trawl or Seine are unable to sample, Secondary units will serve as backup.
San Joaquin River Sampling on Even Days

1 Trawl, 1 Seines operating simultaneously for 12 hours

Seine

$S(sj)$

$\Delta t = 2 \, \text{hr}$

Trawl

$T(sj)$

$\Delta t = 2 \, \text{hr}$

Sampling synchronized with $S(sj)$

$T(sj)_X$

$\Delta t = 2 \, \text{hr}$
Low Outflow: Passive Transport of Delta Smelt

Particle trajectory reversibility
High Outflow: Passive Transport of Delta Smelt

RMA 2D Model:
John De George
Questions?