Smelt/Turbidity Experiment
OCAP Review
11/8/2011

(1) Results from 2010 experiment
(2) Results from 2011 experiment
(3) Plan for 2012

Three Step Plan

(1) Do smelt use turbidity as migratory trigger?

(2a) What do turbidity fields look like (data)?
AND
(2b) Can we manipulate them?
(data + modeling)

(3) Collect suspended solids data (SSC) to Compute fluxes and to develop sed. trans. model

Step 1

Should I Stay or Should I Go?
Tides, Turbidity, and Triggers for Delta Smelt Migration

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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

Sampling in 2010

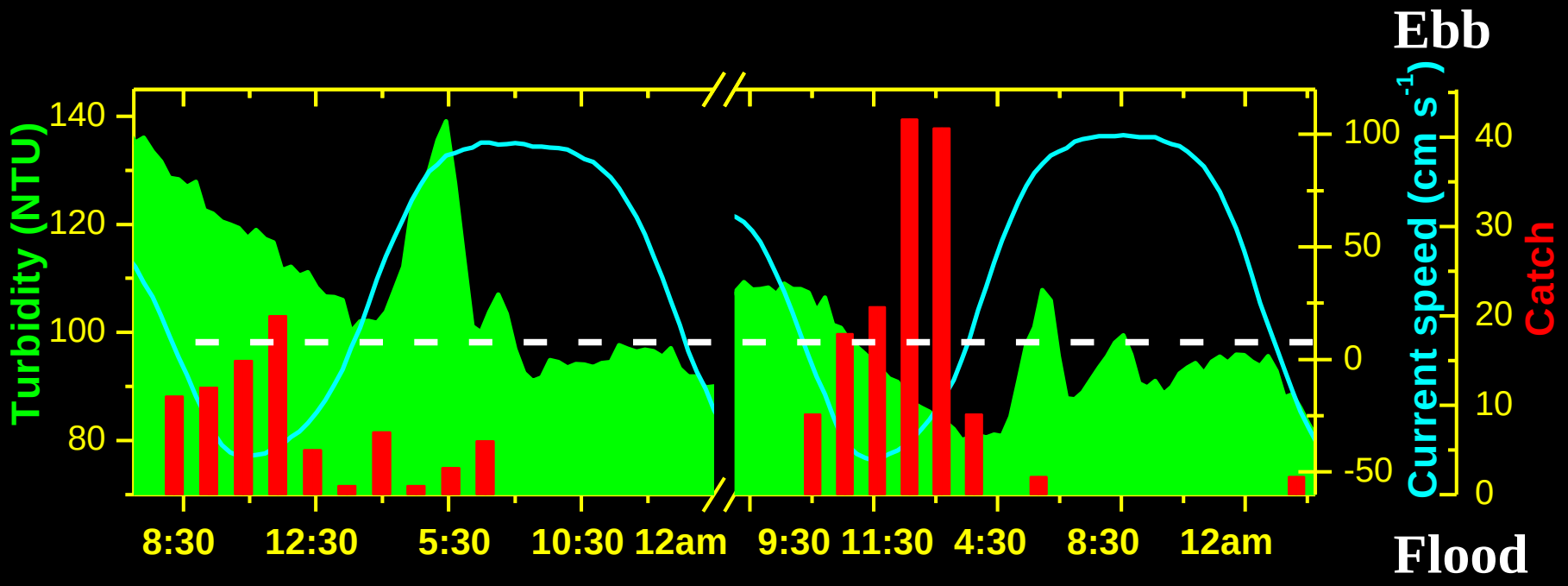
17

18

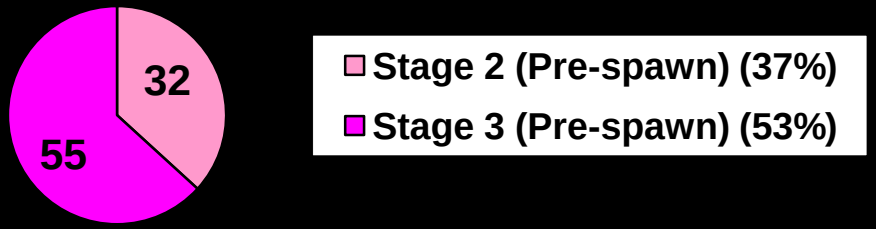
15

16

So, What Did We Catch?



Female Reproductive Stages



Results from 2011 Experiment

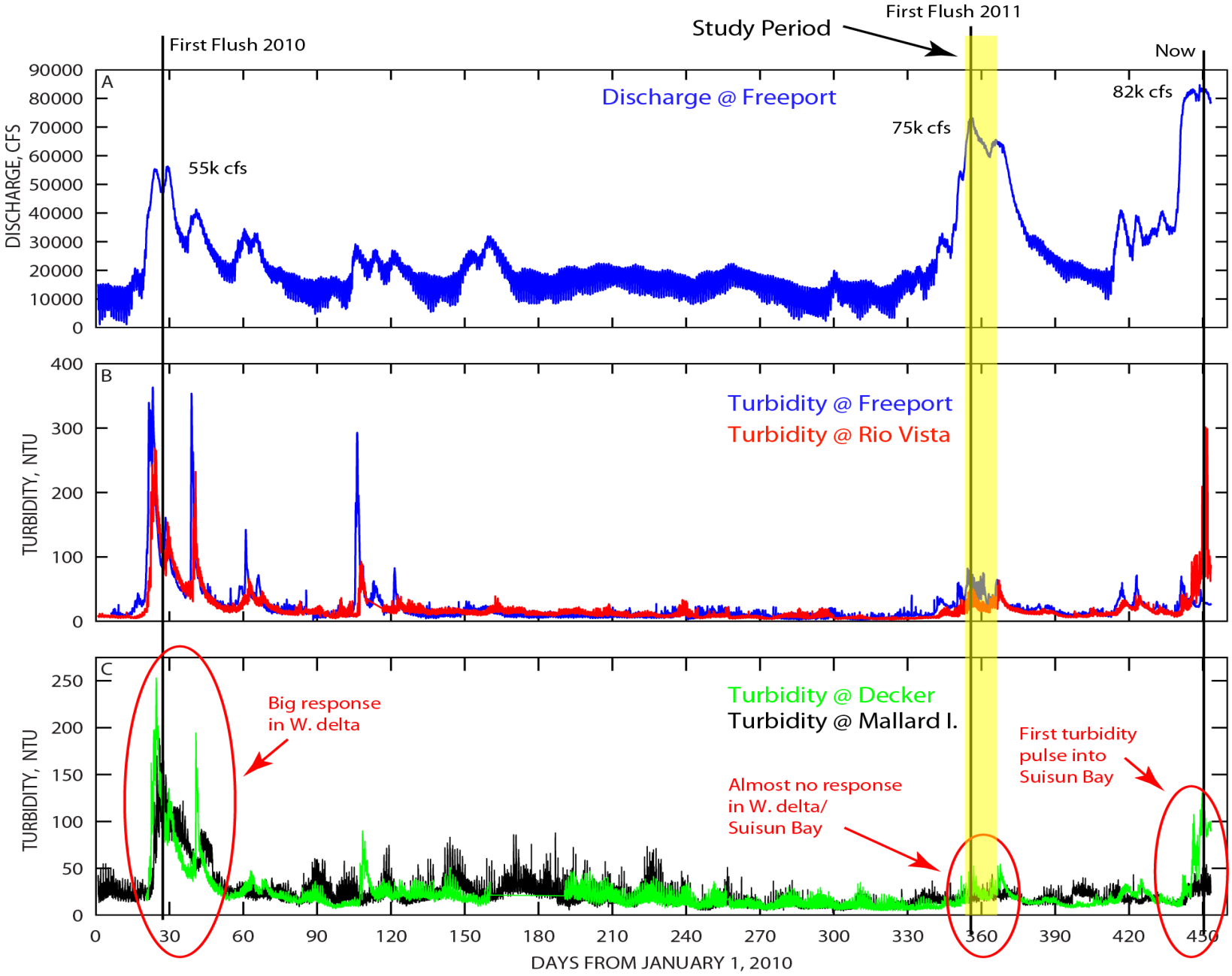
(1) First Flush (December) was wimpy

(2) Turbidity from Suisun Bay went a long way up Sac River. Adult delta smelt likely resident in Sac. R. near Decker? Lots of sandy beach!

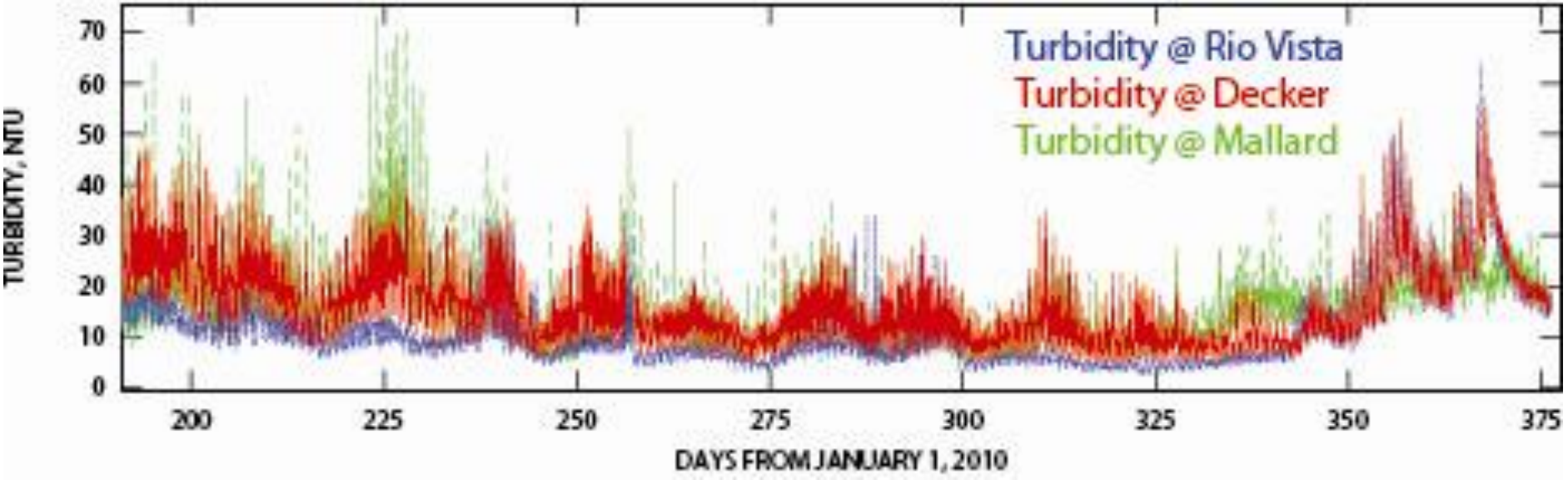
(3) What we found ?
Surfing with the tidal currents behavior

First Flush was wimpy!
Lots of Water – almost no suspended solids

Wimpy First Flush – lots of water very little turbidity

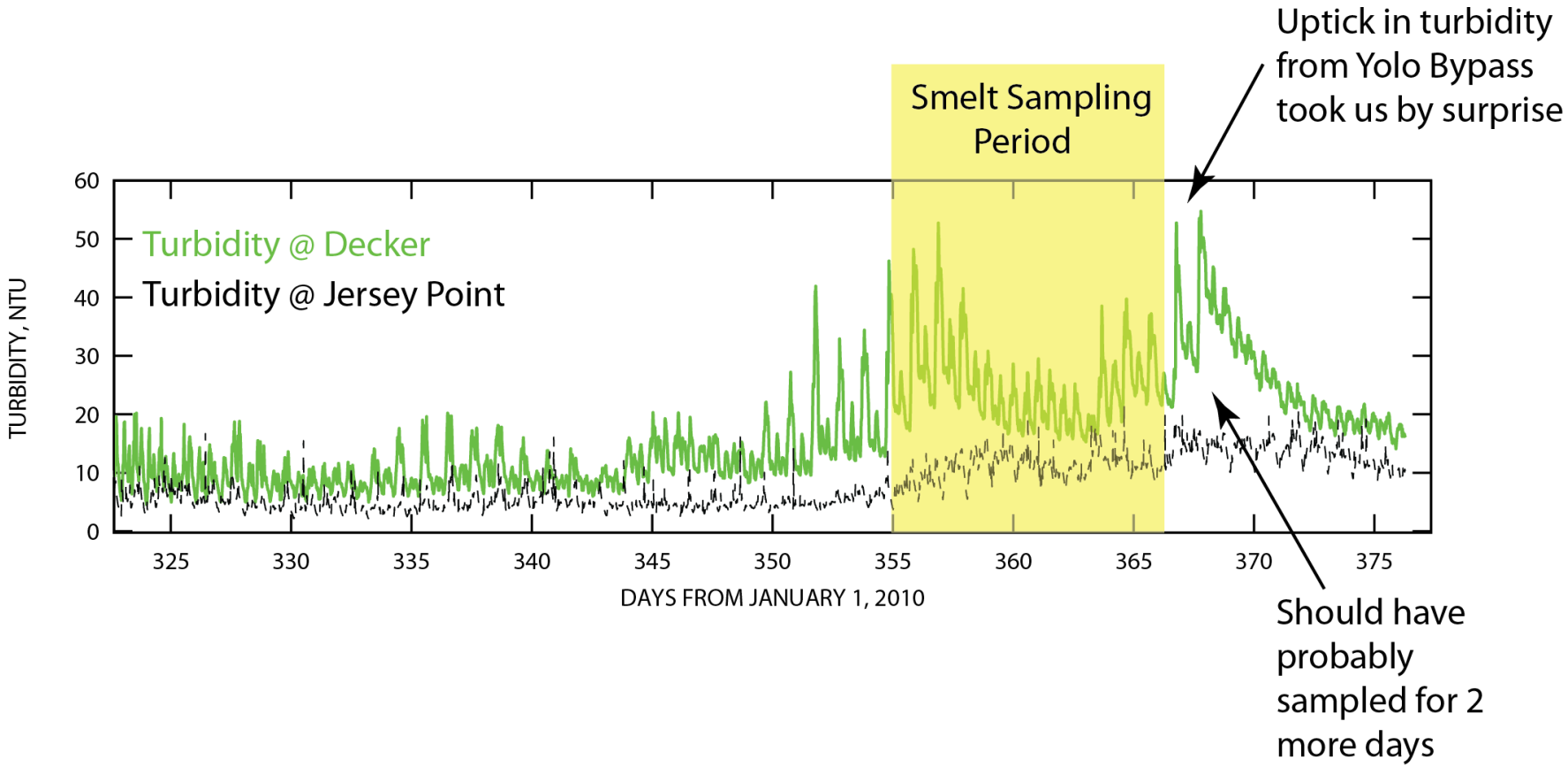


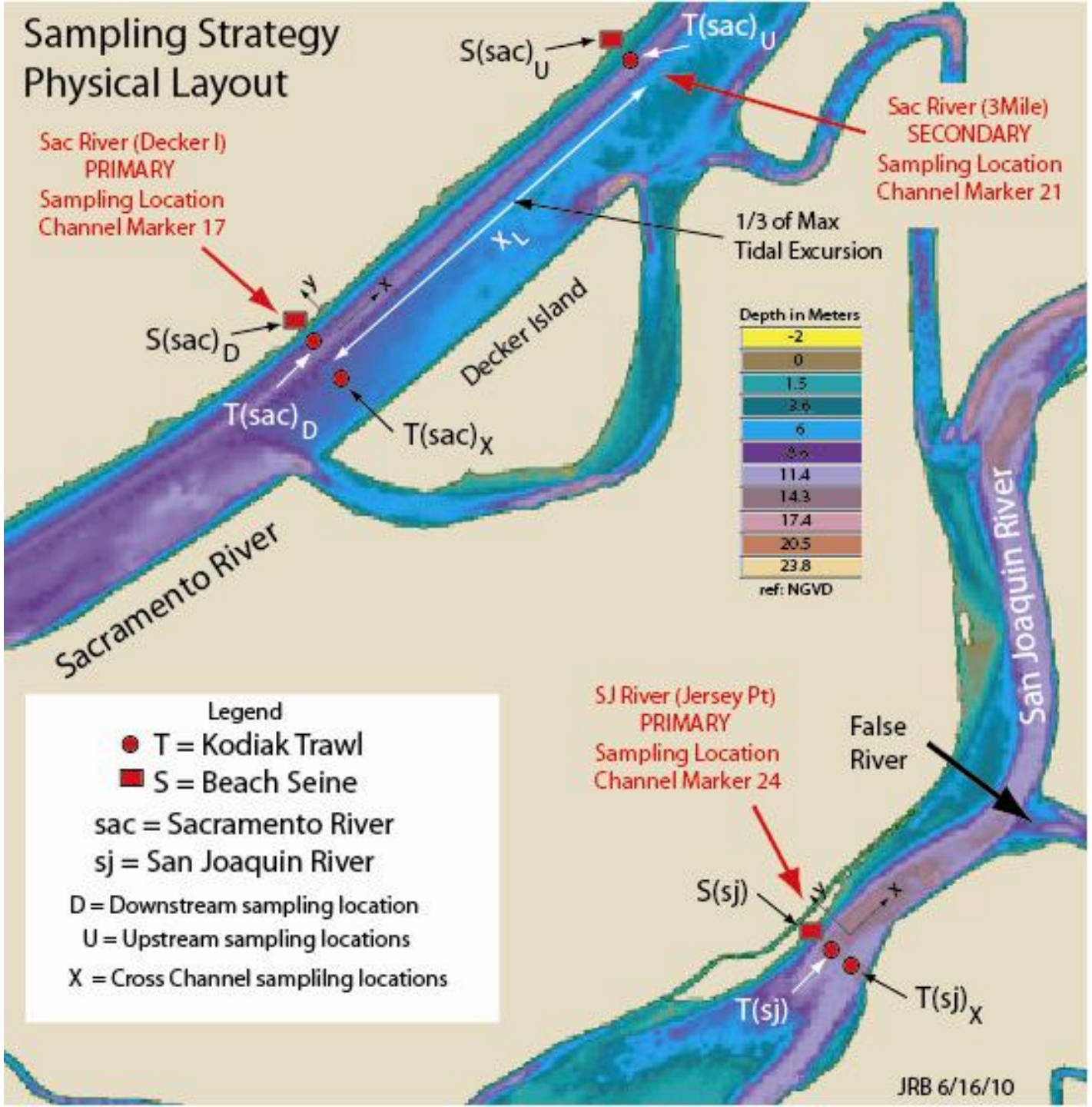
Large Turbidity Gradient along lower Sacramento River
Decker almost always turbid
Turb > 12.5 NTU

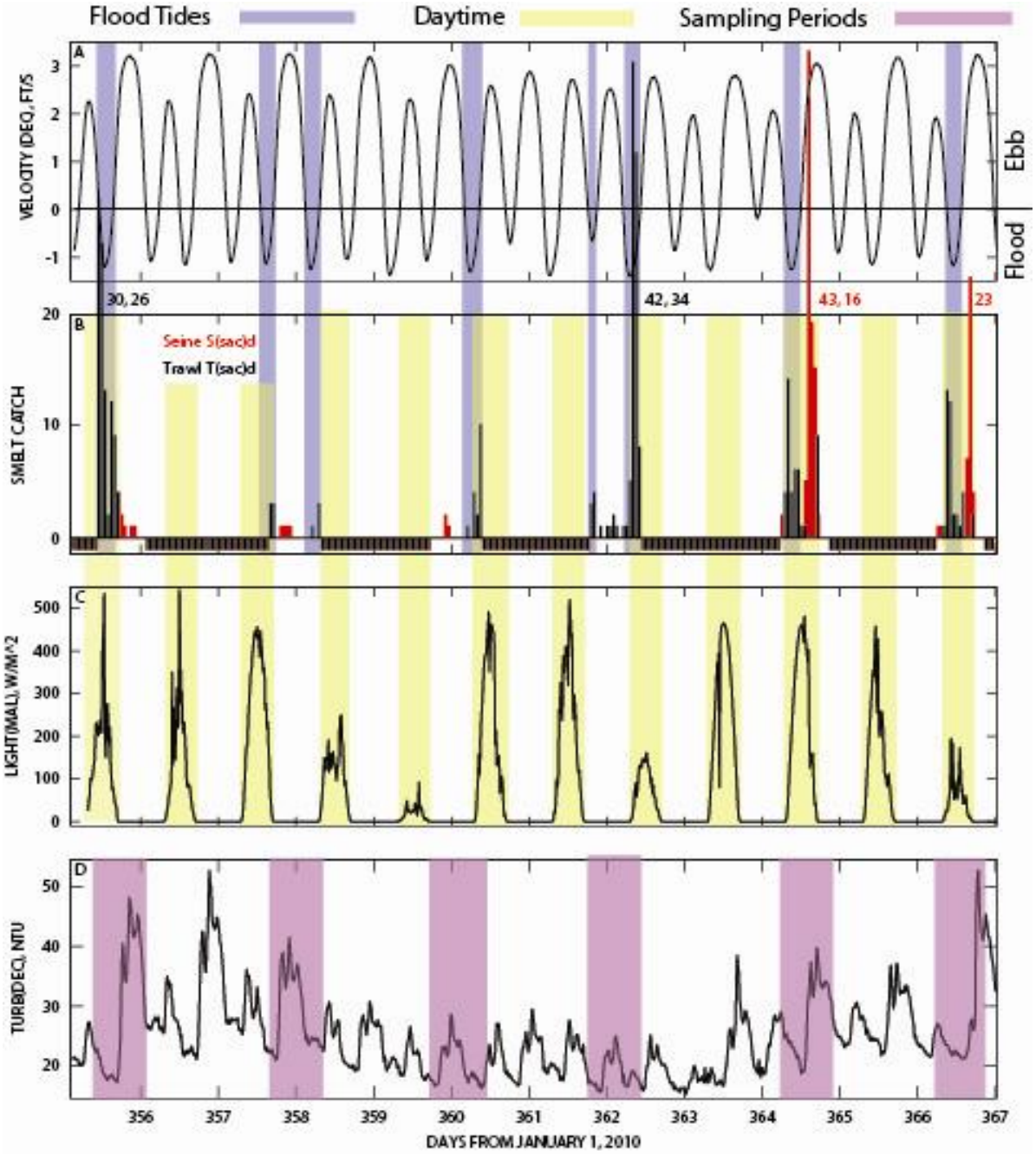


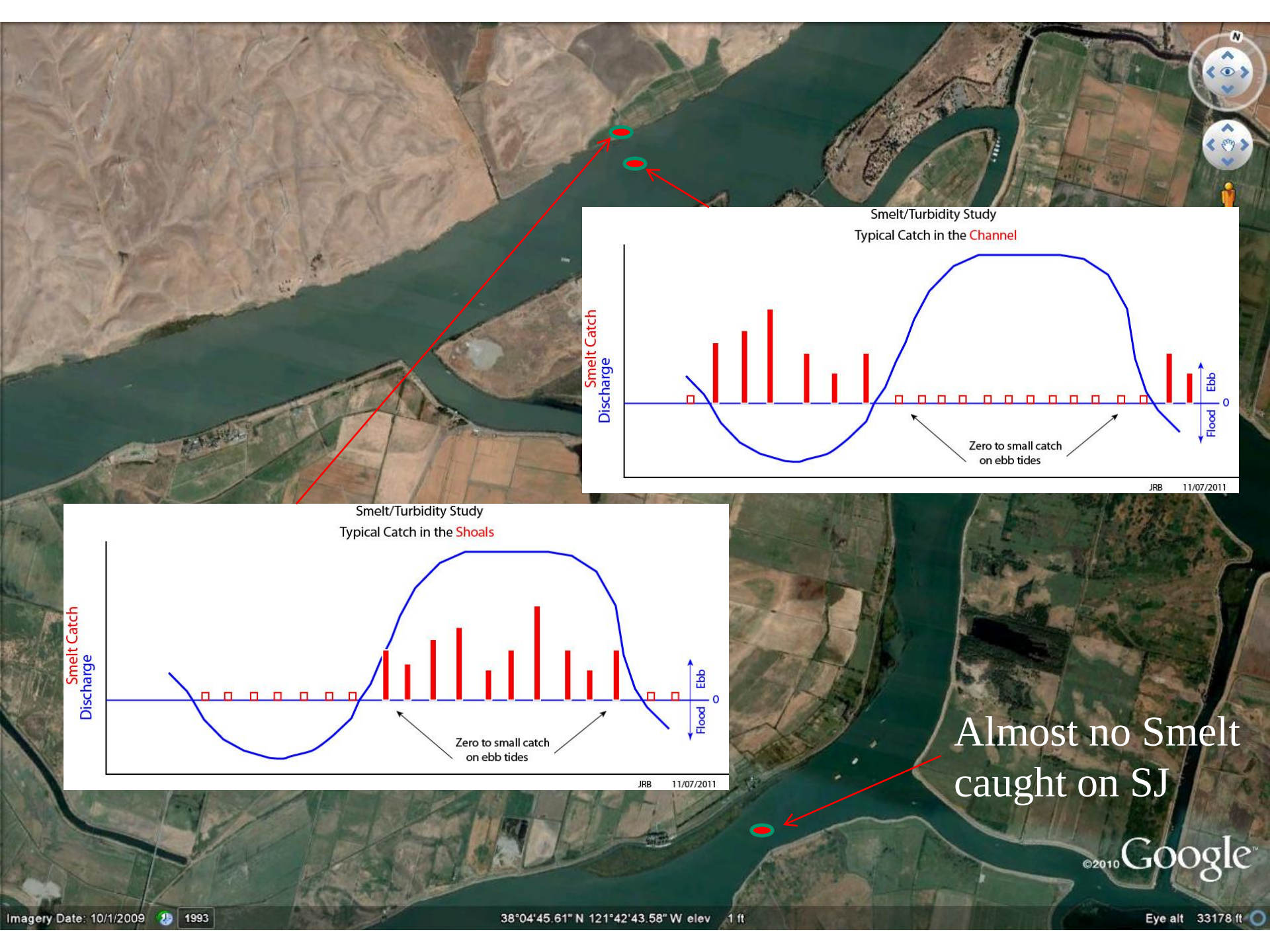
Is it possible Lower Sac. Is summer/fall
adult smelt habitat?

San Joaquin remained relatively clear During smelt sampling

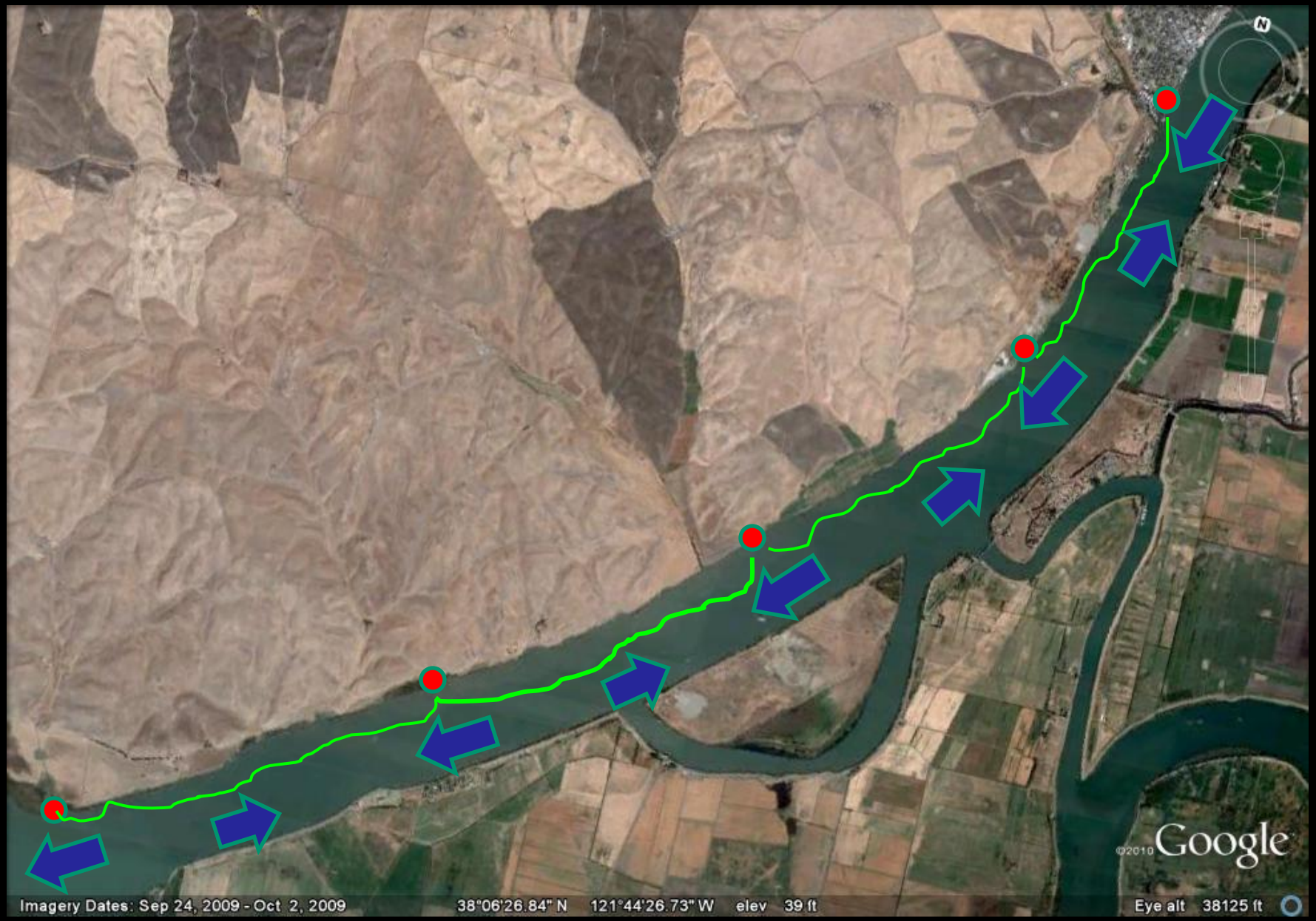



Sampling Strategy
Physical Layout
S(sac)U
T(sac)U
Sac River (3Mile)
SECONDARY
Sampling Location
Channel Marker 21
Sac River (Decker I)
PRIMARY
Sampling Location
Channel Marker 17
1/3 of Max
Tidal Excursion
XL
+Y
-X
S(sac)D
T(sac)D
T(sac)X
Decker Island
Depth in Meters
-2
0
1.5
3.6
6
8.9
11.4
14.3
17.4
20.5
23.8
ref: NGVD
Sacramento River
San Joaquin River
False
River
SJ River (Jersey Pt)
PRIMARY
Sampling Location
Channel Marker 24
S(sj)
T(sj)
T(sj)X
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 samplilng locations
JRB 6/16/10


Flood Tides
Daytime
Sampling Periods
A
VELOCITY (DEC), FT/S
Ebb
Flood
30, 26
42, 34
43, 16
23
B
Seine S(sac)d
Trawl T(sac)d
SMELT CATCH
C
LIGHT(MAL), W/M^2
D
TURB(DEC), NTU
356
357
358
359
360
361
362
363
364
365
366
367
DAYS FROM JANUARY 1, 2010


Smelt/Turbidity Study
Typical Catch in the Channel
Smelt Catch
Discharge
Ebb
0
Flood
Zero to small catch
on ebb tides
JRB
11/07/2011
Smelt/Turbidity Study
Typical Catch in the Shoals
Smelt Catch
Discharge
Ebb
0
Flood
Zero to small catch
on ebb tides
JRB
11/07/2011
Almost no Smelt
caught on SJ
©2010 Google
Imagery Date: 10/1/2009
1993
38°04'45.61" N 121°42'43.58" W elev 1 ft
Eye alt 33178 ft

Conceptual model of "surfing with the tide"



Summary?

(1) Smelt are in the upper water column during flood tides,

(2) Smelt are in the shallows during ebb tides, although this signal is a bit weaker (perhaps because of gear efficiency)

(3) Smelt appear to leave the shallows & upper part of water column during the night (much lower catch at night overall).

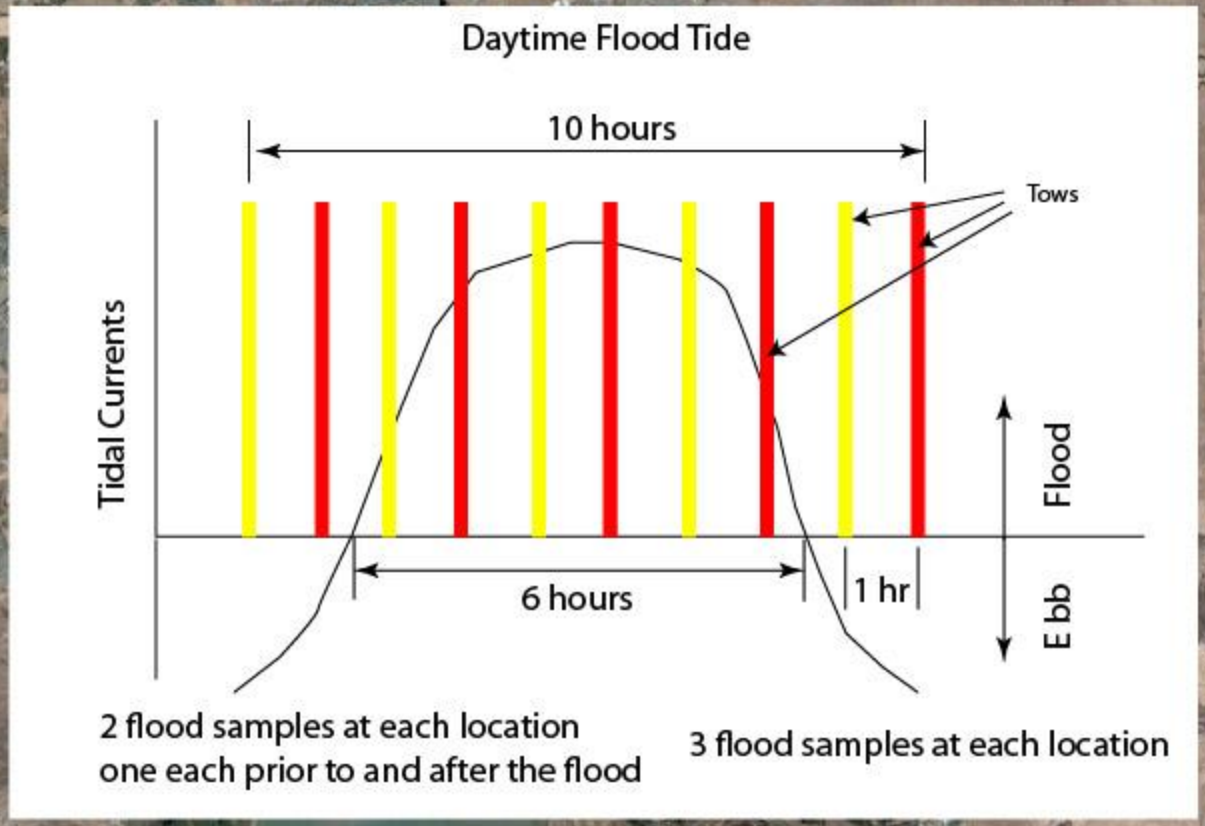
(4) Picked up more smelt in center channel as turbidity increased

Plans for Next Year

Got behavior last year

Next year will focus on trigger and distributional shift

Pre-flush sampling locations
and sampling timing/duration



CCH

Trawl - 2
Secondary

North Delta Migratoy Pathway

SAC(3)

SAC(2)

SAC(1)

Trawl - 1
Primary

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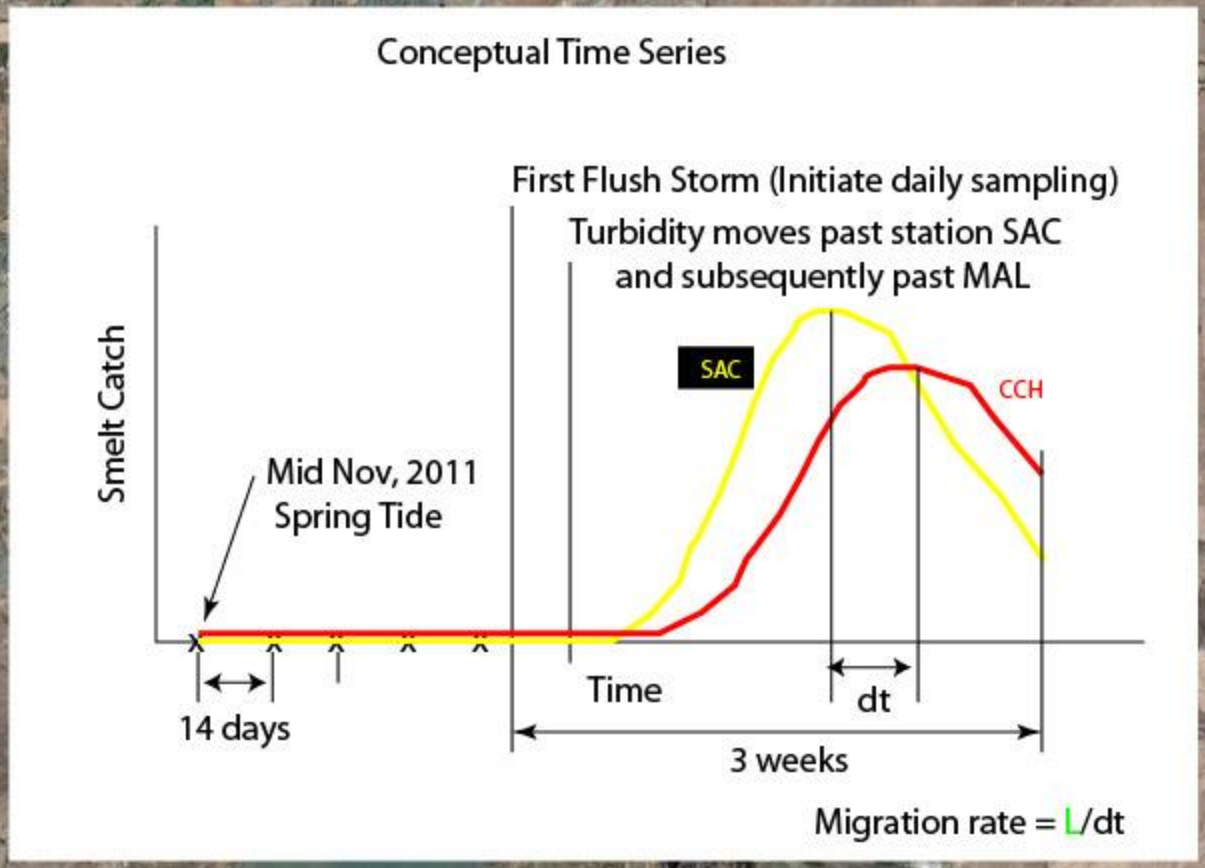
First-Flush sampling locations
and conceptual time series of catch data



CCH

L = Dista
betwe
sampling
stations

SAC

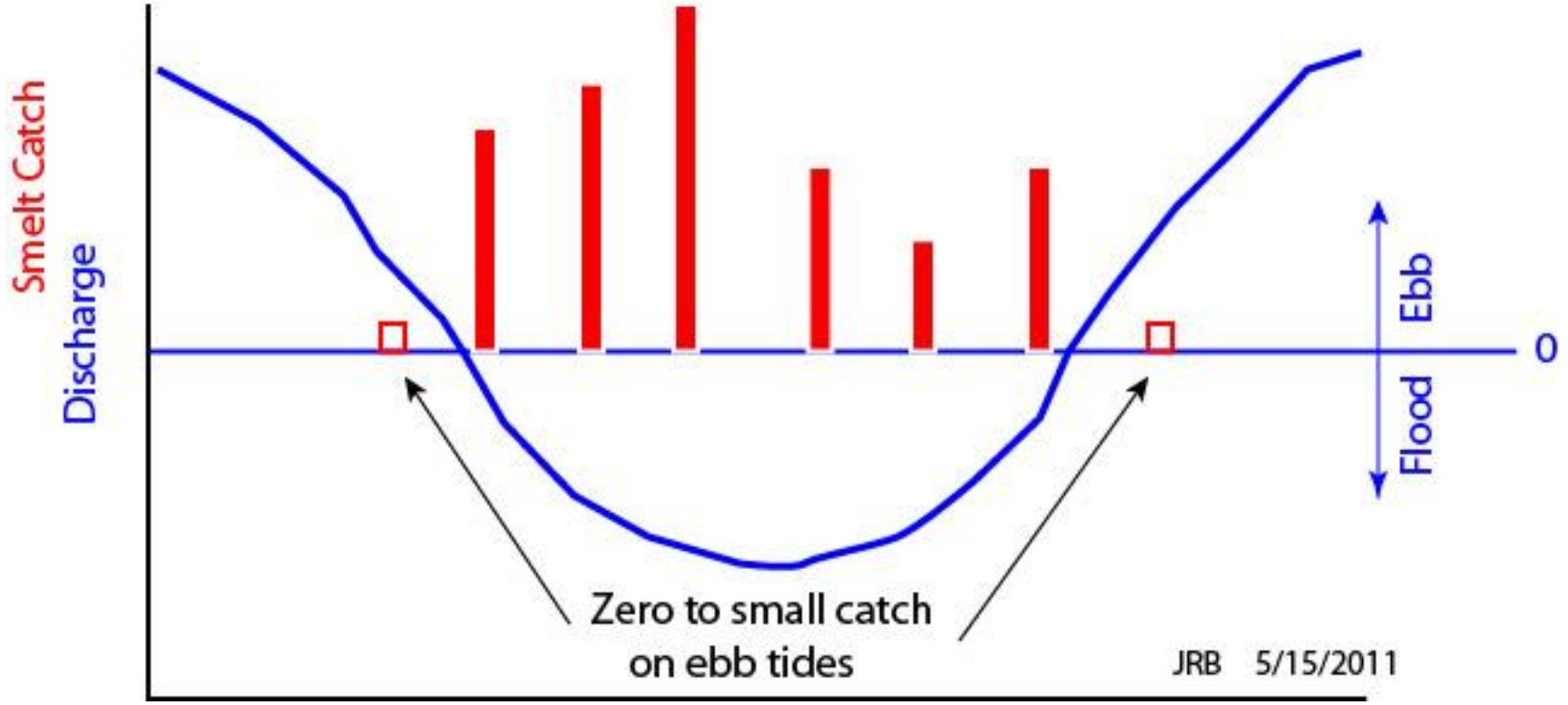
SAC location selected from Pre-Flush location
SAC(1), SAC(2), SAC(3).
The SAC location is selected as the location ju
upstream of the max spring tide
EC/Turbidity/smelt intrusion from Suisun Bay

Smelt/Turbidity Study

Sampling centered on flood tides

Hourly sampling

At least 1 ebb tide sample before and after flood tide



Where are we?

We took a year off in the field
to publish results