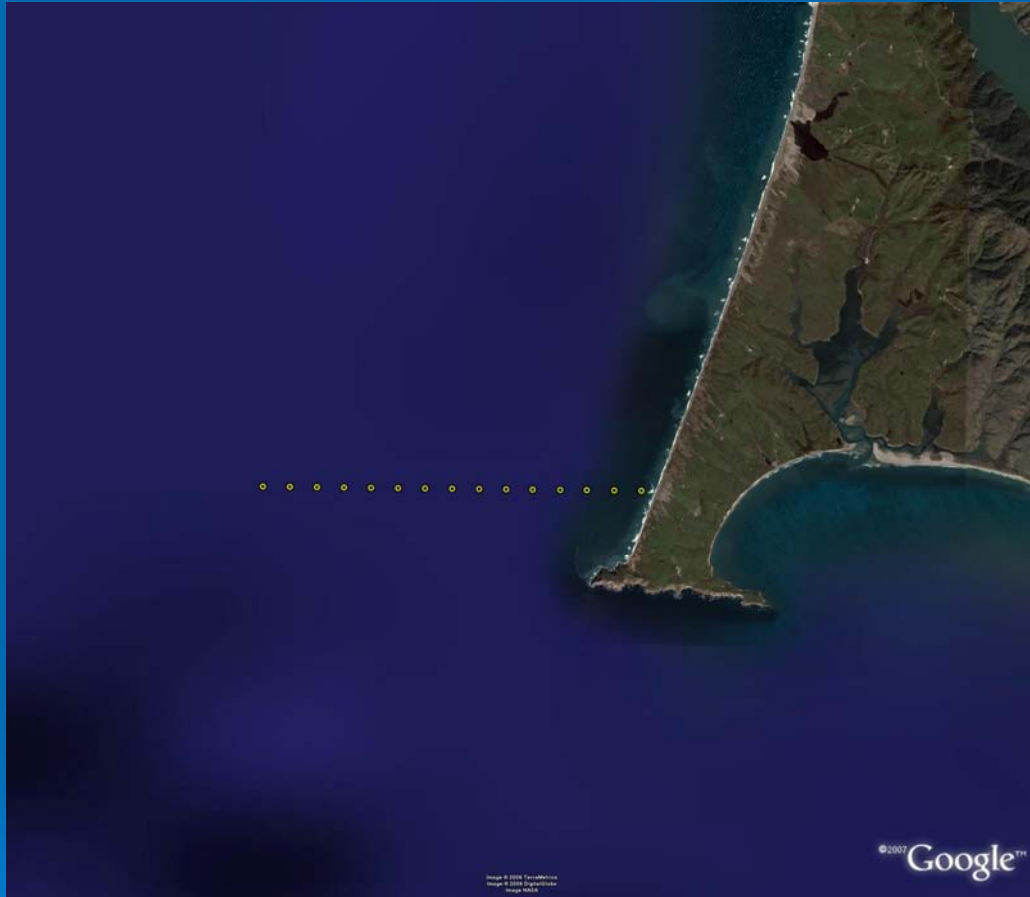


POST array at Pt. Reyes, CA



Prepared by:

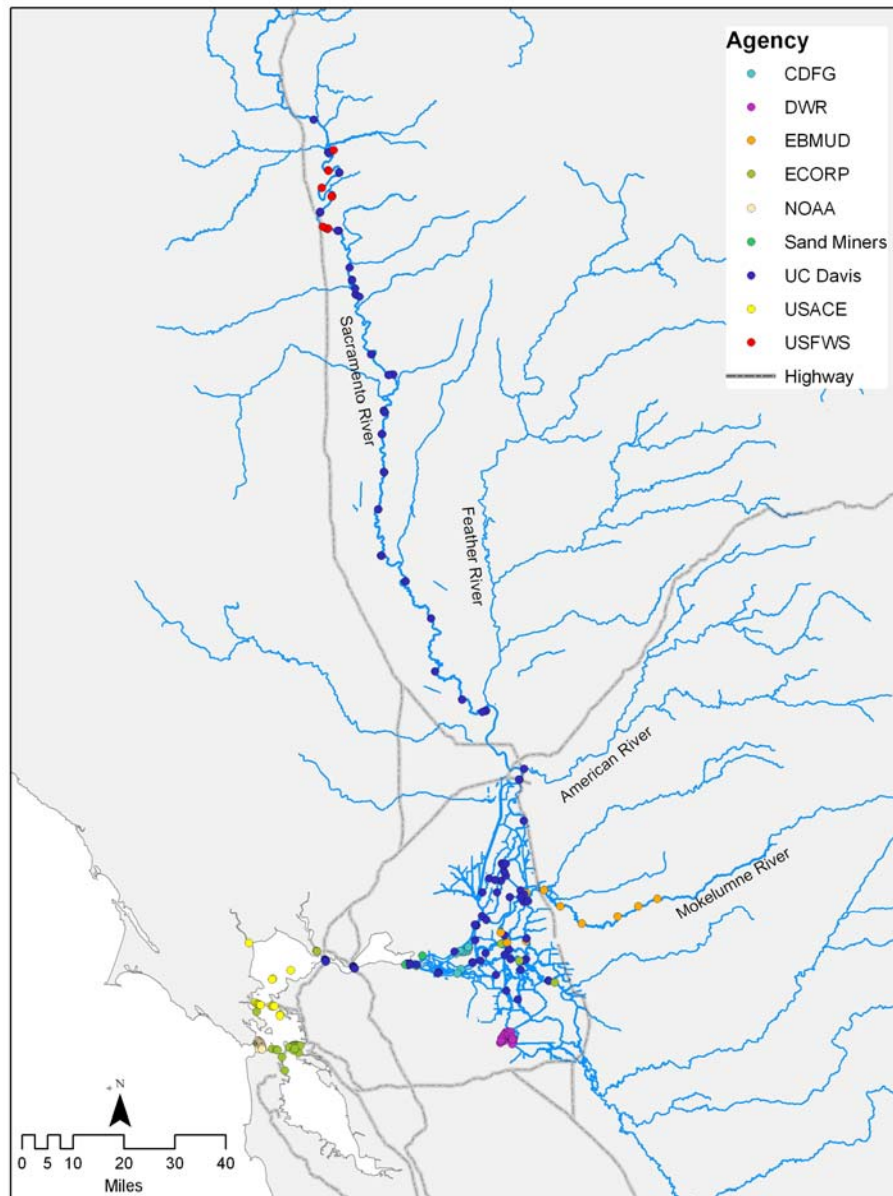
Bruce MacFarlane
Arnold Ammann

NOAA Fisheries
Southwest Fisheries Science Center
Santa Cruz Lab
Fisheries Ecology Division

Ocean Receiver Locations



Receiver Locations



Descriptive Salmon Statistics

[releases Dec - Jan]

Late-fall Chinook Salmon



	2007	2008	2009
FL (mm)	165 (141-198)	169 (144-204)	152 (139-175)
Wt (g)	46.5 (26-82)	52.6 (31-102)	39.0 (27-66)
N	200	304	300
Tag wt (%)	3.5 [V7-2L]	3.2 [V7-2L]	4.1 [V7-2L]

Steelhead



	2007	2008	2009
FL (mm)	217 (158-264)	224 (198-262)	228 (192-278)
Wt (g)	112 (43-220)	117 (86-185)	139 (86-261)
N	200	300	300
Tag wt (%)	3.7 [V9-1L]	4.2 [V9-2L]	1.3 V7-4L]

Other CFTC Tagging

[releases Dec - Apr]

Agency	Species	2006/7	2007/8	2008/9
ACOE	Chinook salmon	50	50	500
	Steelhead	49	50	500
USFWS	Chinook salmon	144	421	635

2009/10

NOAA/UCD	200
ACOE	500/500 (?)
FWS	300 (?)

Time schedule

25 Feb 2008	Requested to submit proposal to Post
25 Mar	Proposal to POST
16 Apr	Notification of funding
28 May	Notification GFNMS permit approved (1 Jul 08 – 31 May 13)
19 & 20 May	Floation collars & VR3s received
9 July	15 Acoustic moorings deployed
7 April 2009	1 st data upload
29 April	2 nd data upload/grapple attempt
ASAP	next retrieval attempt
Oct – Nov	next scheduled data upload



Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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Imagery Date: Apr 29, 2003

lat 38.035703° lon -123.036566° elev -54 m

Eye alt 19.02 km

Total Detections [July '08 - Apr '09]



Chimney Rock

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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Detections by Species

Species	Unique tag IDs
Chinook salmon	38
steelhead	12
green sturgeon	12
sevengill shark	2
white shark	23
unknown	3

Chinook salmon IDs

[July '08 - Apr '09]



Chimney Rock

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Imagery Date: Apr 29, 2003

lat 38.035703° lon -123.036566° elev -54 m

Eye alt 19.02 km

Steelhead IDs

[July '08 - Apr '09]



Chimney Rock

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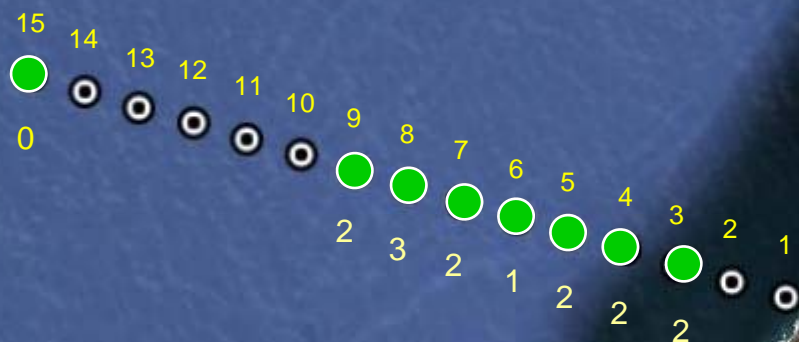
Imagery Date: Apr 29, 2003

lat 38.035703° lon -123.036566° elev -54 m

Eye alt 19.02 km

Green sturgeon IDs

[July '08 - Apr '09]



Chimney Rock

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Imagery Date: Apr 29, 2003

lat 38.035703° lon -123.036566° elev -54 m

Eye alt 19.02 km

White shark IDs

[July '08 - Apr '09]



Chimney Rock

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Imagery Date: Apr 29, 2003

lat 38.035703° lon -123.036566° elev -54 m

Eye alt 19.02 km



**Movement
rate:**

**Chinook
salmon**



**Movement
rate:**

Steelhead



**Movement
rate:**

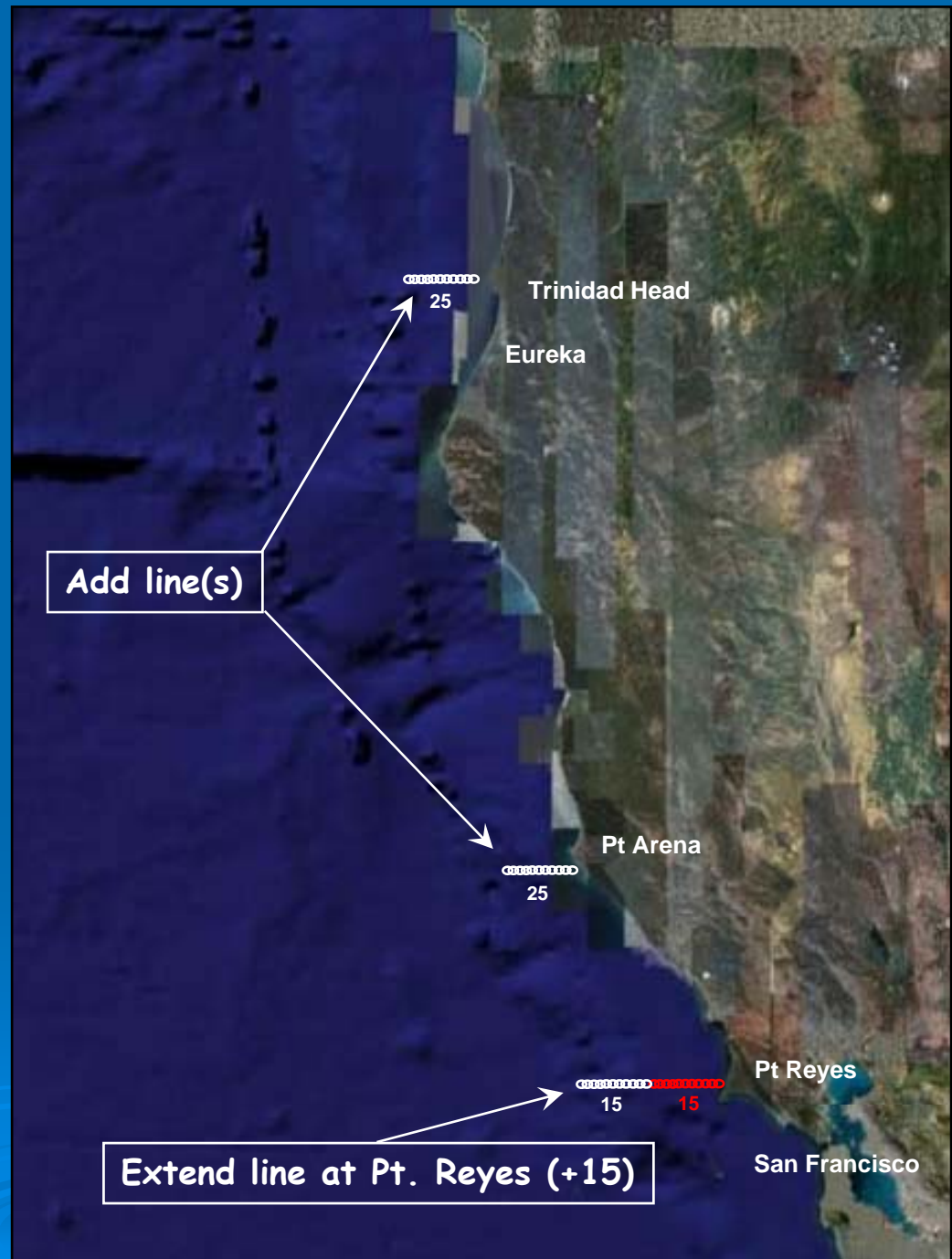
**Green
sturgeon**

Implications for conservation & management

- Proof of concept: line at Point Reyes detected a range of fish species
- Provides estimates of residence time (usage) & migration rate in the productive Gulf of the Farallones
- Provides inventory data to the Gulf of the Farallones National Marine Sanctuary
- **With extension & replenishment, may provide survival estimates for salmonids that would add information to PFMC determinations**

Future Considerations

- Extend line at Pt. Reyes
- Add 1 or 2 lines northward - migration rate & survival estimates (Chinook salmon & steelhead?)
- Provide tags
- Support continuation of river, delta & estuary arrays





Art by Ray Troll

Migration & Survival of Juvenile Salmonids in California's Central Valley & San Francisco Estuary



R.B. MacFarlane 
A.P. Klimley **UCDAVIS**
S.L. Lindley 
A.J. Ammann 
P.T. Sandstrom **UCDAVIS**
C.J. Michel 
E.D. Chapman **UCDAVIS**

CALFED BAY-DELTA
PROGRAM

Collaborators



University of California, Davis
 Dept. Wildlife, Fish & Cons. Biology
 &
 NOAA, NMFS, SWFSC
 Fisheries Ecology Division

Natural & Anthropogenic Influences,
 Battle Creek to Golden Gate



U.S. Army Corps of Engineers,
 San Francisco, CA

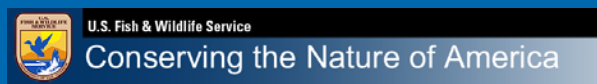


Bay Planning Coalition,
 San Francisco, CA

Dredging & Disposal,
 San Francisco Estuary



ECORP Consulting, Inc.,
 Rocklin, CA



U.S. Fish & Wildlife Service,
 Stockton, CA

Water Exports & Pumping,
 Delta



CA Dept. Water Resources,
 Sacramento, CA



East Bay Municipal Utility District,
 Lodi, CA

Ecosystem studies & hatchery,
 Mokelumne River



Hanson Environmental, Inc.,
 Walnut Creek, CA

Sand mining,
 Rivers confluence

Collaborators (cont'd)



California Department of
Fish & Game

Ecological studies of steelhead &
resident rainbow trout in South Fork
of the Yuba River



H.T. Harvey & Associates

Impacts of levee repair in Delta
(contracted by DWR)



Environ Corporation

Fish behavior at artificial
reefs in San Francisco
Estuary



Study Area

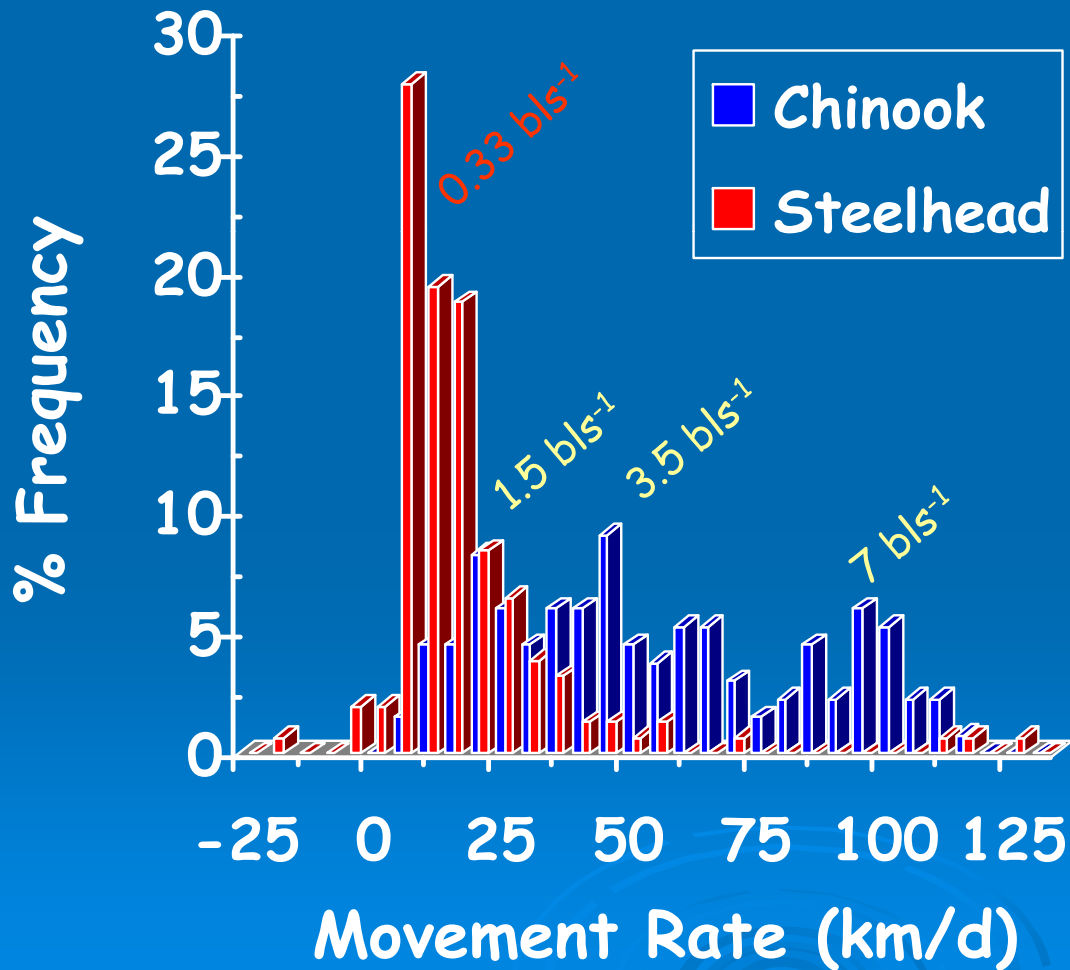


Image by Tom Pearson

Movement Rate 2007

Battle Creek - Golden Gate

[520 km]



Chinook

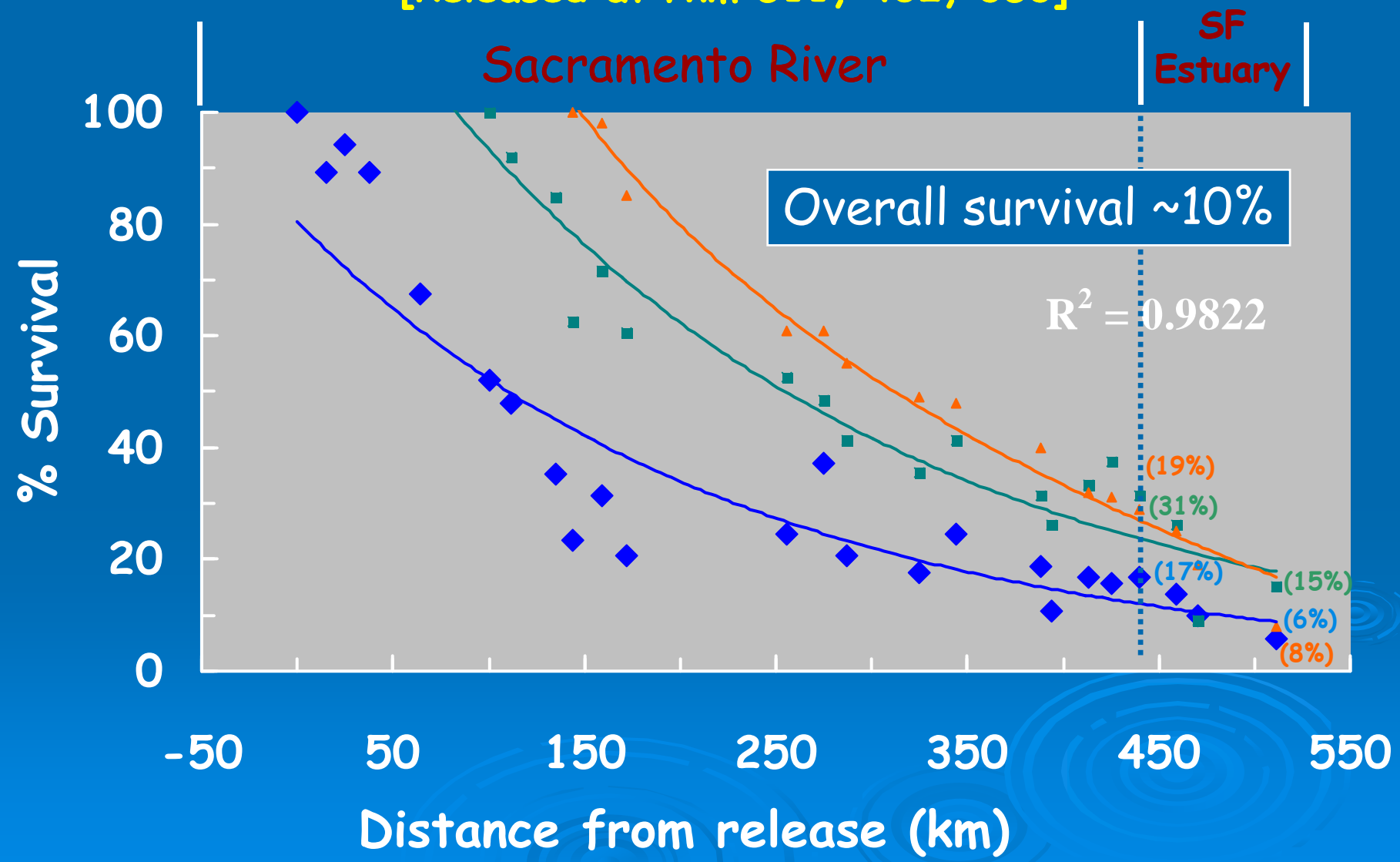
$\bar{x} = 50.7 \pm 2.6 \text{ km d}^{-1}$
 [3.7 bls⁻¹ (160 mm)]
 min: 1.3 km d⁻¹
 max: 111 km d⁻¹

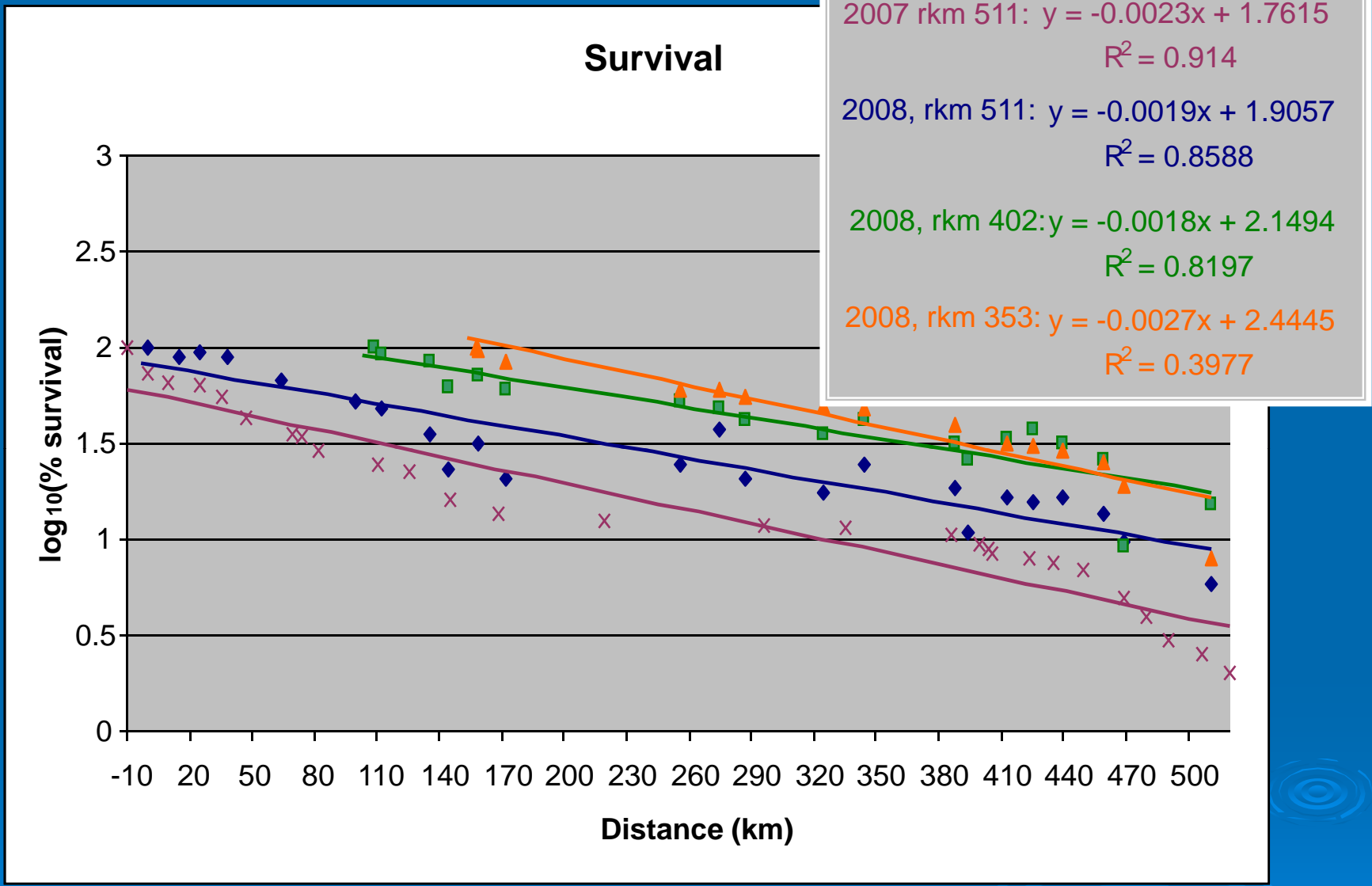
Steelhead

$\bar{x} = 14.0 \pm 1.5 \text{ km d}^{-1}$
 [0.8 bls⁻¹ (200 mm)]
 min: -20.8 km d⁻¹
 max: 123 km d⁻¹

Late-fall Chinook Survival 2008

[Released at rkm 511, 402, 353]





No difference in slopes among release sites in 2008
 Difference between 2007 & 2008 at upper site $P < 0.05$

Late-fall Chinook 2008

