



Sonoma
Water

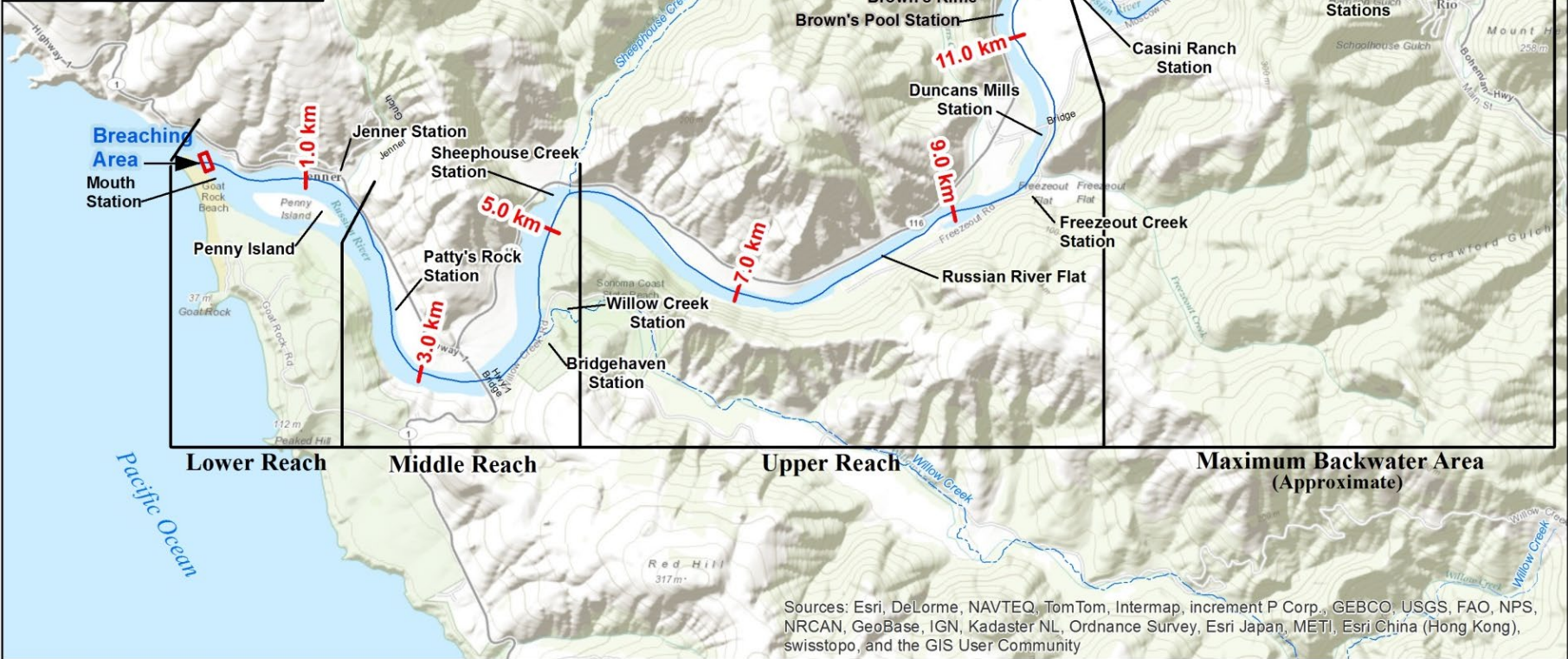
Russian River Estuary Management Project 2018 Review and 2019 Update

AUGUST 28, 2019

Jessica Martini-Lamb
Environmental Resources Manager

    sonomawater.ca.gov





Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Flood Risk Management



Beach Management Activities



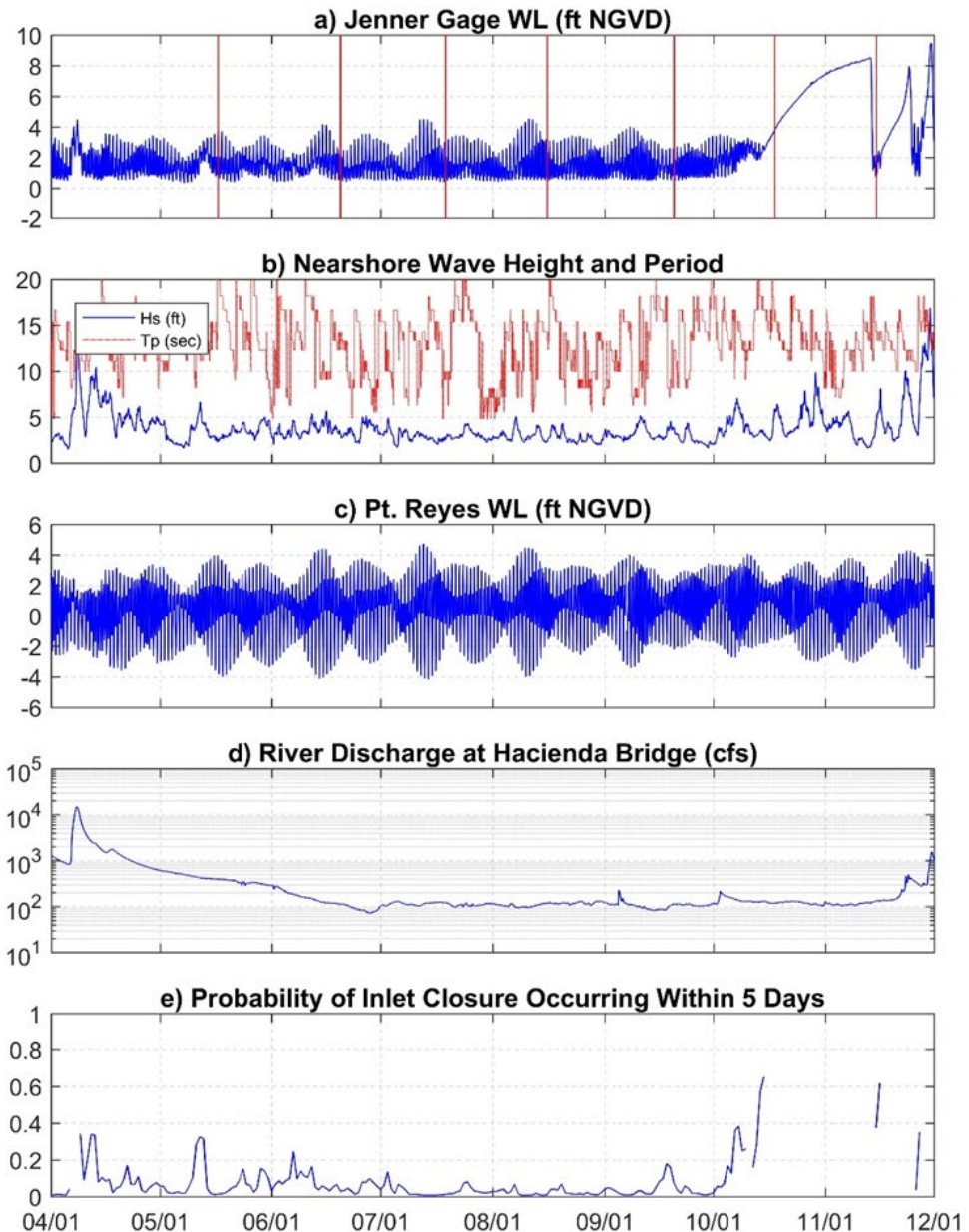
Artificial breach



Outlet channel

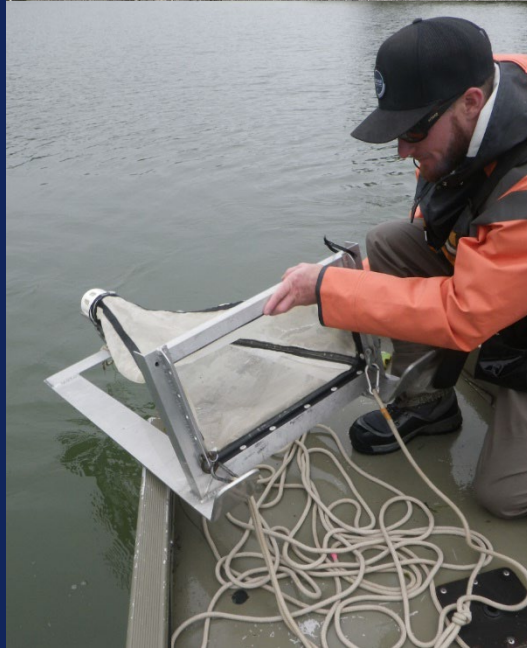
2018 Management

- Lagoon Management Period (May 15 – October 15) – 0 closures
- Remainder of 2018 – 6 fall closures
 - 1 beach management event in December
- Inlet located at jetty groin through mgmt. season
- Swell wave events occurred in summer
- High flood water events occurred during December events



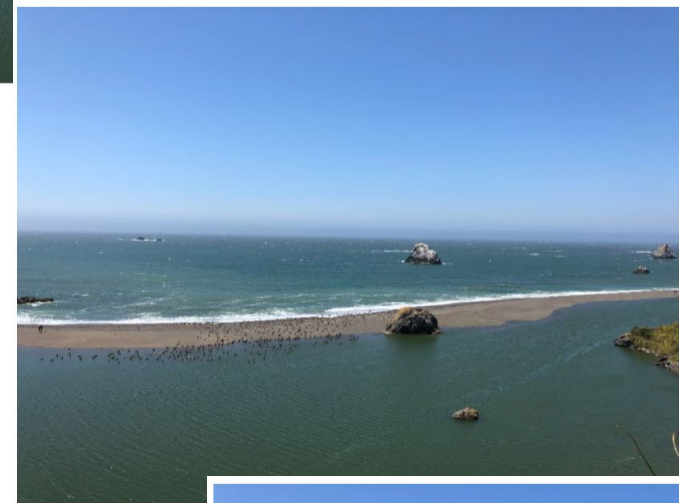
Estuary Monitoring

- Fisheries
 - downstream migrant trapping, seining, PIT-tag antennas
- Invertebrates and prey availability
- Pinnipeds
- Water quality
- Beach topography



2019 Estuary Activities

- Adaptive Management Plan Update
- Continue to monitor biological and water quality conditions
- 1 closure during Lagoon Management Period to date – ended in self or citizen breach





Sonoma
Water

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Russian River Estuary Adaptive Beach Management Plan Summary of Updates from 2018

Jenner Community Center
August 28th, 2019

Summary of Plan Updates

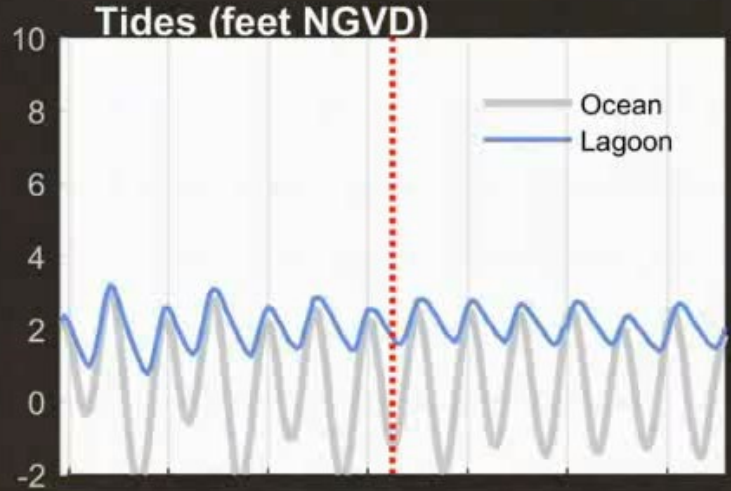
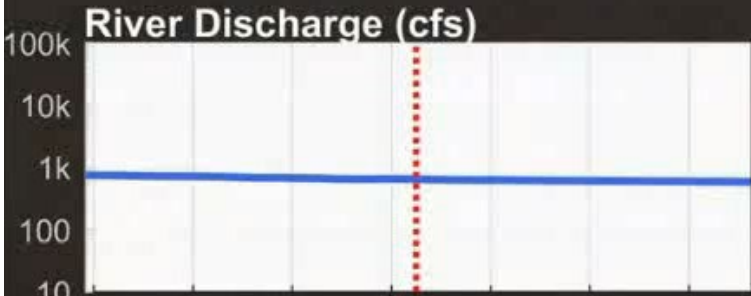
1. **Apply insights** from monitoring and scientific studies to revise conceptual model
2. **Use predictive tools** to anticipate outcomes of different actions
3. **Add graphics** to inform beach management actions
4. **Clarify the decision process** for beach management actions

1. Apply insights from monitoring and scientific studies



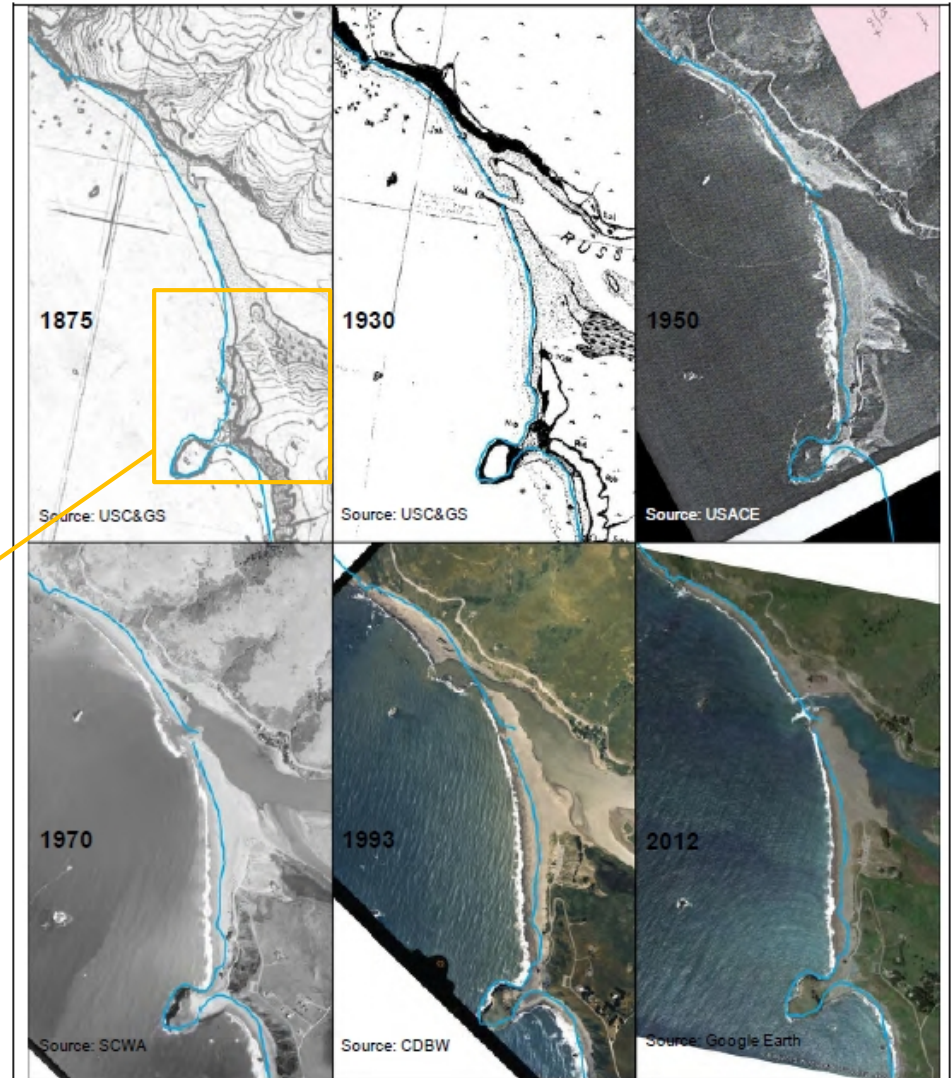
March 6, 2015 06:11:22

Photos courtesy of Bodega Marine Lab
video created by ESA with funding from SCWA



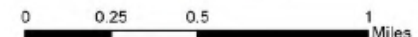
1. Apply insights from monitoring and scientific studies

- Historic maps indicate that Goat Rock was only connected to the shore by a tombolo (low-lying sand spit) prior to jetty construction.
- Shoreline **accretion** of 1.5 ft/yr on GRSB since 1930.
- Shoreline **erosion** of 0.8 ft/yr at neighboring beach to the south since 1930.

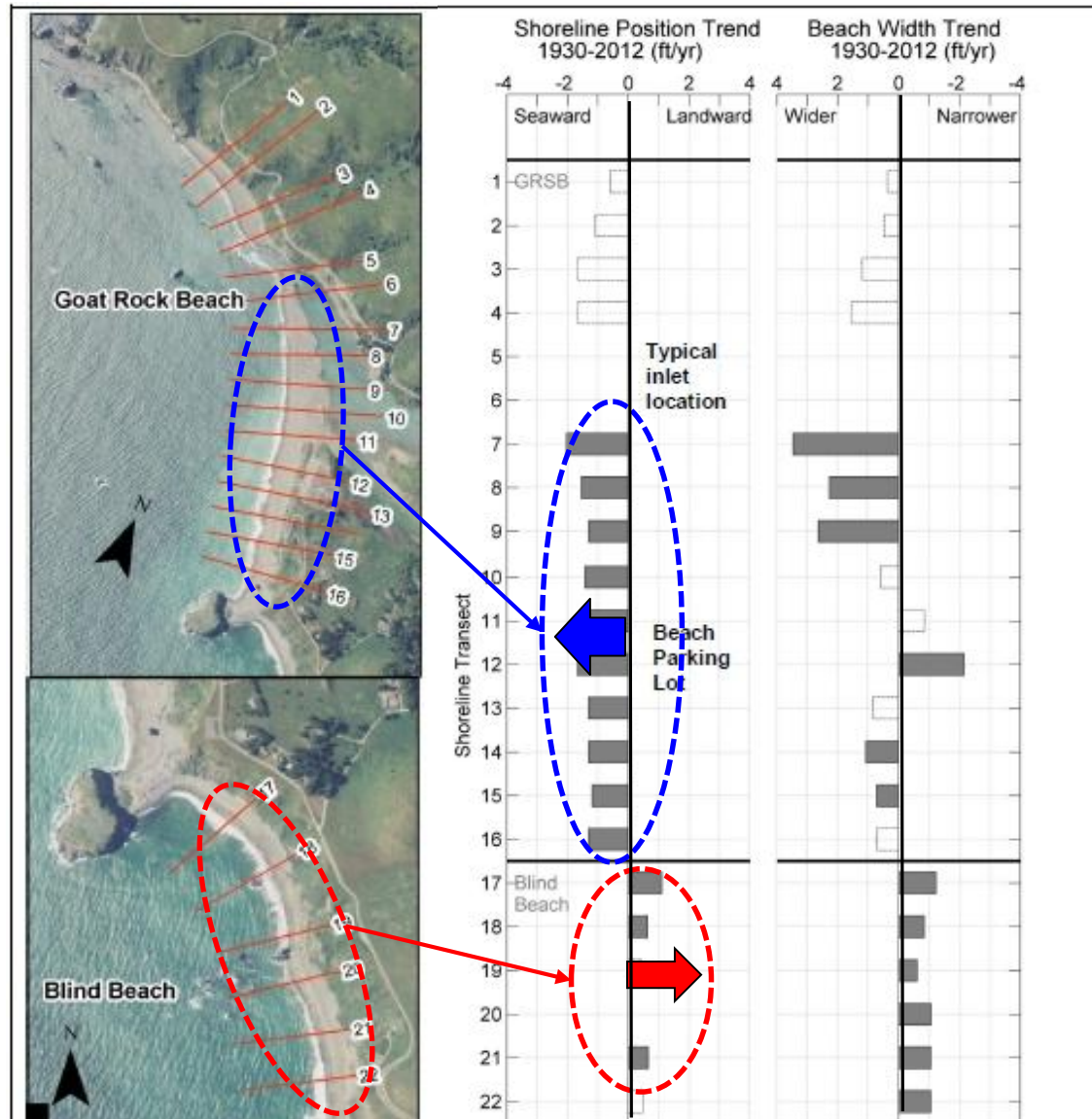


Legend

— 1930 shoreline



1. Apply insights from monitoring and scientific studies



dot:10.7289/V5/TM-SWFSC-569



NOAA Technical Memorandum NMFS
 This TM series is used for documentation and timely communication of preliminary results, interim reports, or special purpose information. The TMs have not received complete formal review, editorial control, or detailed editing.

JANUARY 2017

SPATIAL STRUCTURE OF WATER-QUALITY IMPACTS AND FORAGING OPPORTUNITIES FOR STEELHEAD IN THE RUSSIAN RIVER ESTUARY: AN ENERGETICS PERSPECTIVE

David Boughton¹, Joshua Fuller², Gregg Horton³, Eric Larson⁴, William Matsubu⁵, and Charles Simenstad⁵

¹ NOAA Fisheries, SW Fisheries Science Center, Fisheries Ecology Division, 110 McAllister Way, Santa Cruz, CA 95060

² NOAA Fisheries West Coast Region, California Coastal Office, U.S. Department of Commerce, 777 Sonoma Ave., Rm. 325, Santa Rosa, CA 95404

³ Sonoma County Water Agency, 404 Aviation Blvd., Santa Rosa, California 95403

⁴ California Department of Fish and Wildlife, Region 3, 7329 Silverado Trail, Yountville, CA 94558

⁵ School of Aquatic and Fishery Sciences, 324A Fishery Sciences, 1122 N.E. Boat Street, Box 355020, University of Washington, Seattle, WA 98195-5020 USA

NOAA-TM-NMFS-SWFSC-569

U.S. DEPARTMENT OF COMMERCE
 National Oceanic and Atmospheric Administration
 National Marine Fisheries Service
 Southwest Fisheries Science Center

Table 1. Temperature (° C) rating scheme for freshwater- and marine-acclimated residents.

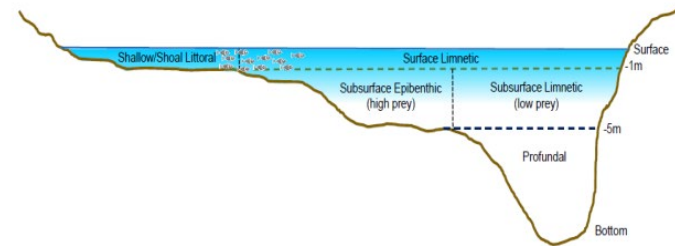
Fastest growth	Positive growth	No or Negative growth	Unsuitable
14° - 18° C	< 14° or 18° - 21° C	21° - 25° C	> 25° C

Table 3. Dissolved oxygen (mg/L) rating scheme for freshwater- and marine-acclimated residents.

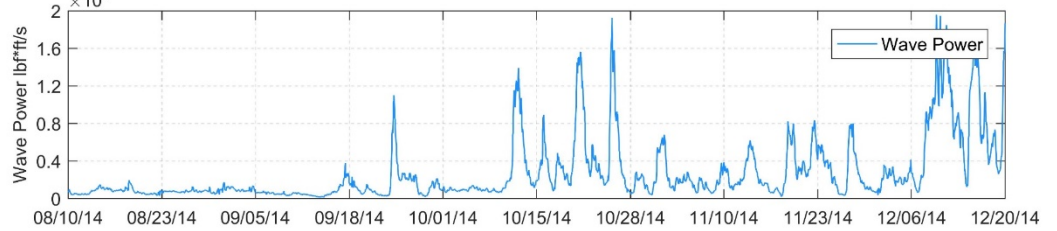
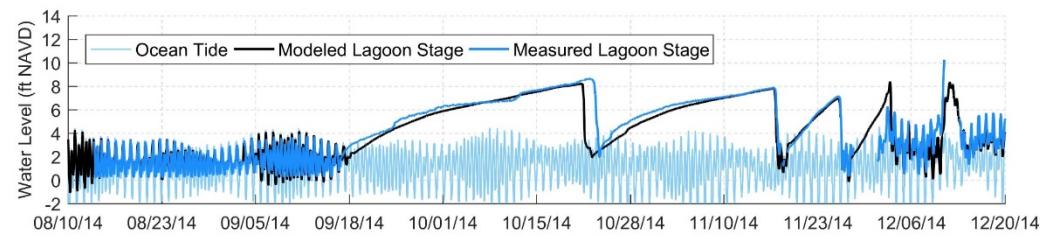
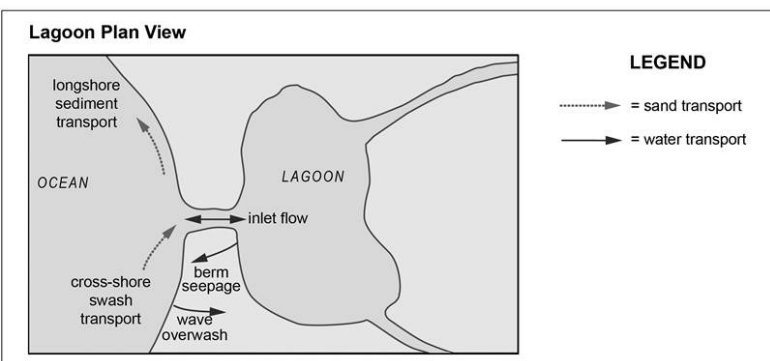
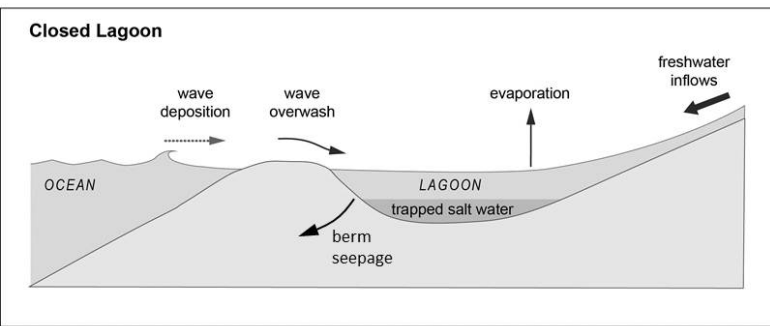
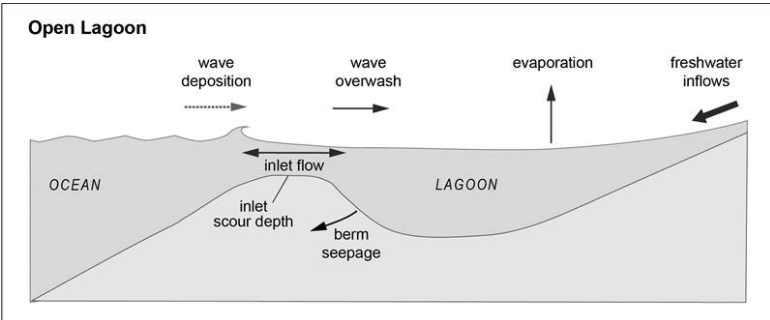
Minimal or no impairment	Moderate impairment	Severe impairment	Unsuitable
> 6 mg/L	4 – 6 mg/L	3 – 4 mg/L	< 3 mg/L

Table 2. Salinity (‰) rating scheme for freshwater- and marine-acclimated residents.

Hypotonic	Isotonic	Hypertonic	Marine
< 10 ‰	10 - 15 ‰	15 - 28 ‰	> 28 ‰

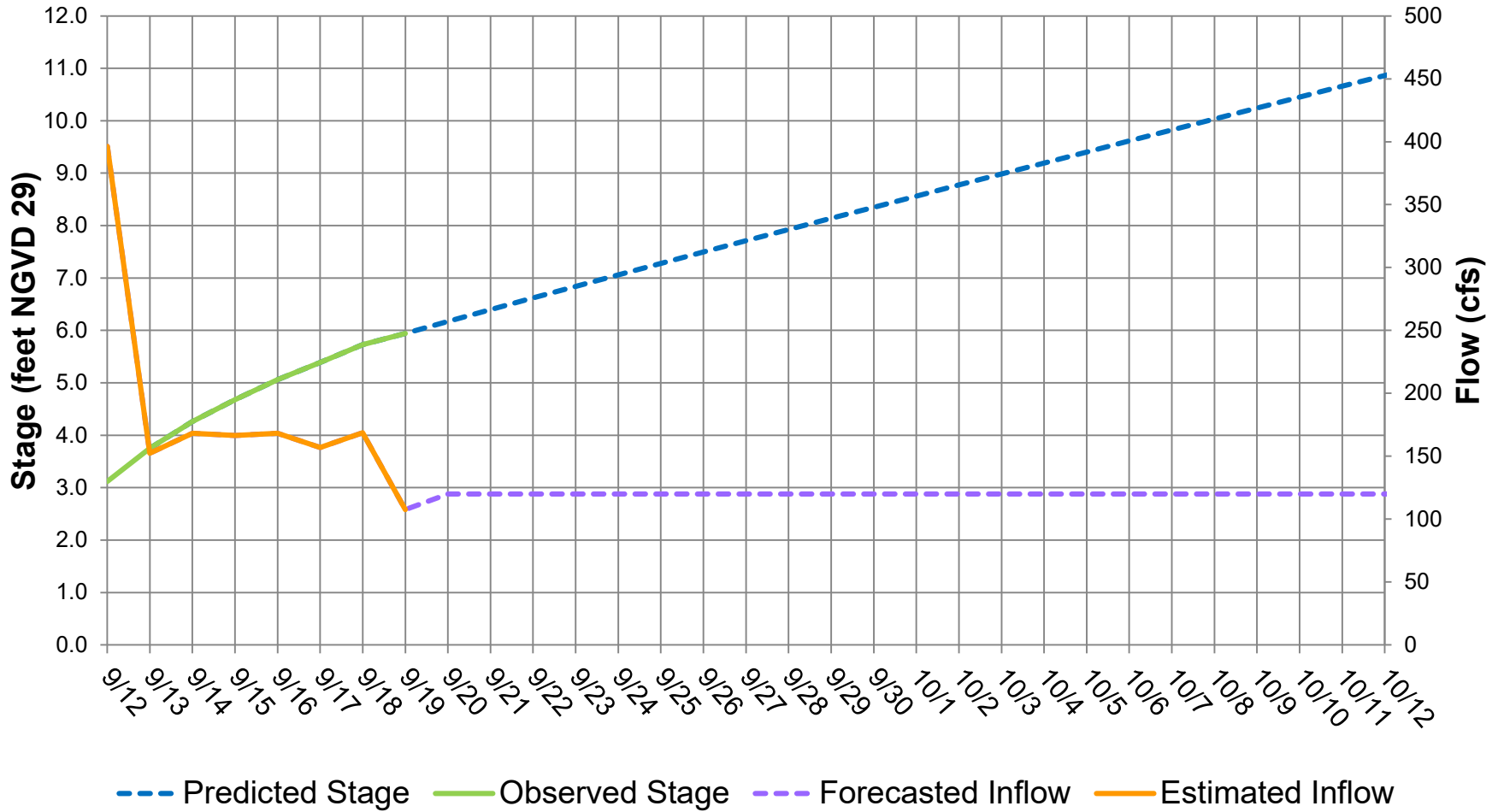


Lagoon Water Balance

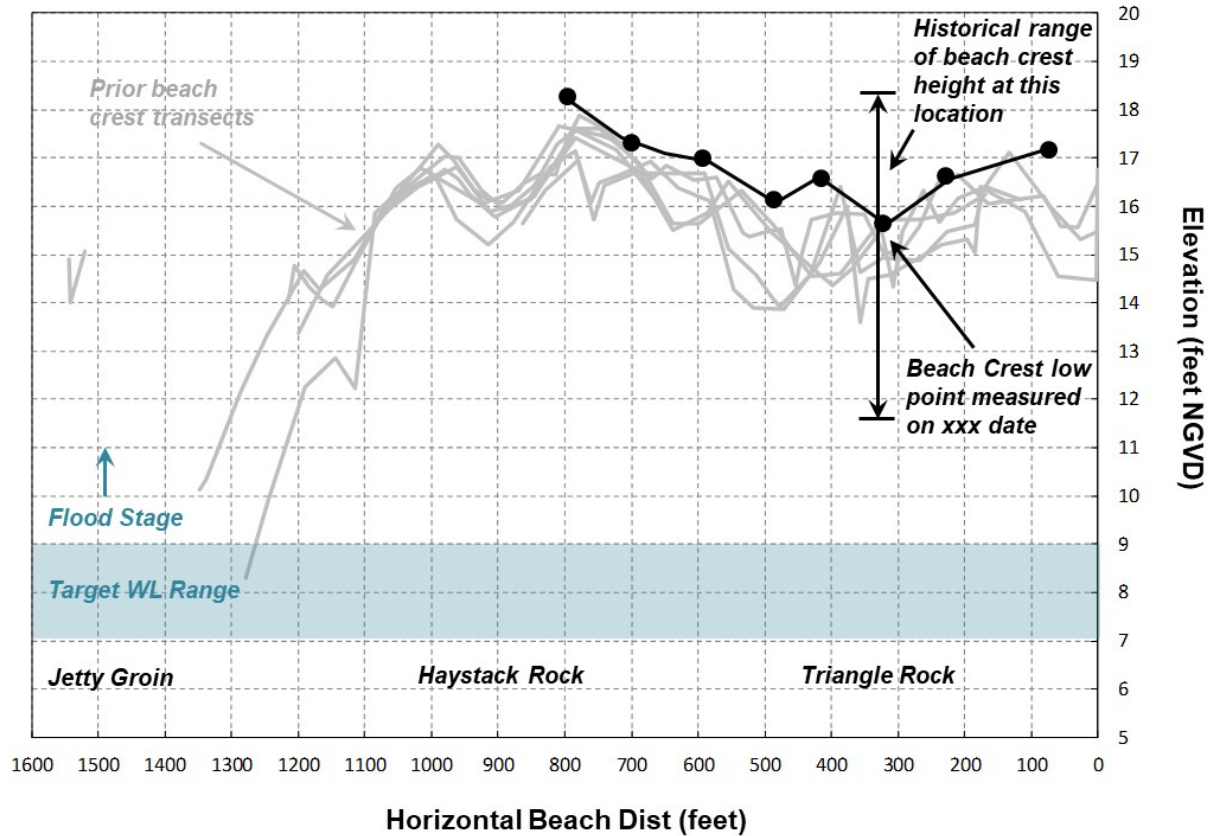
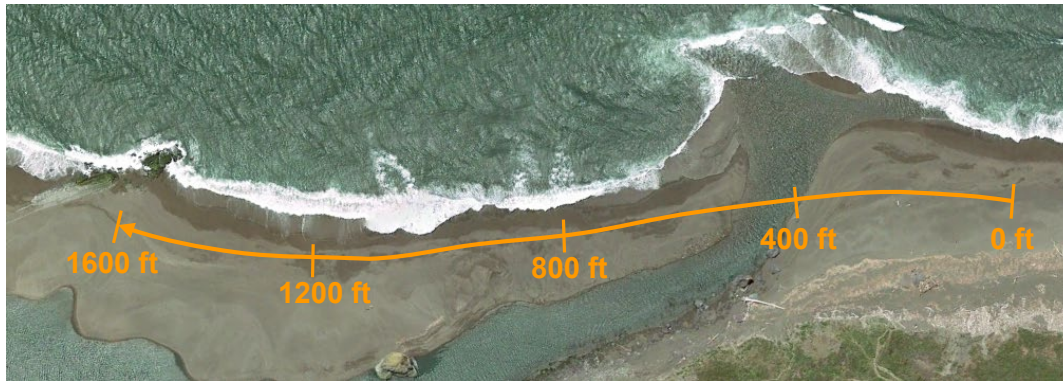




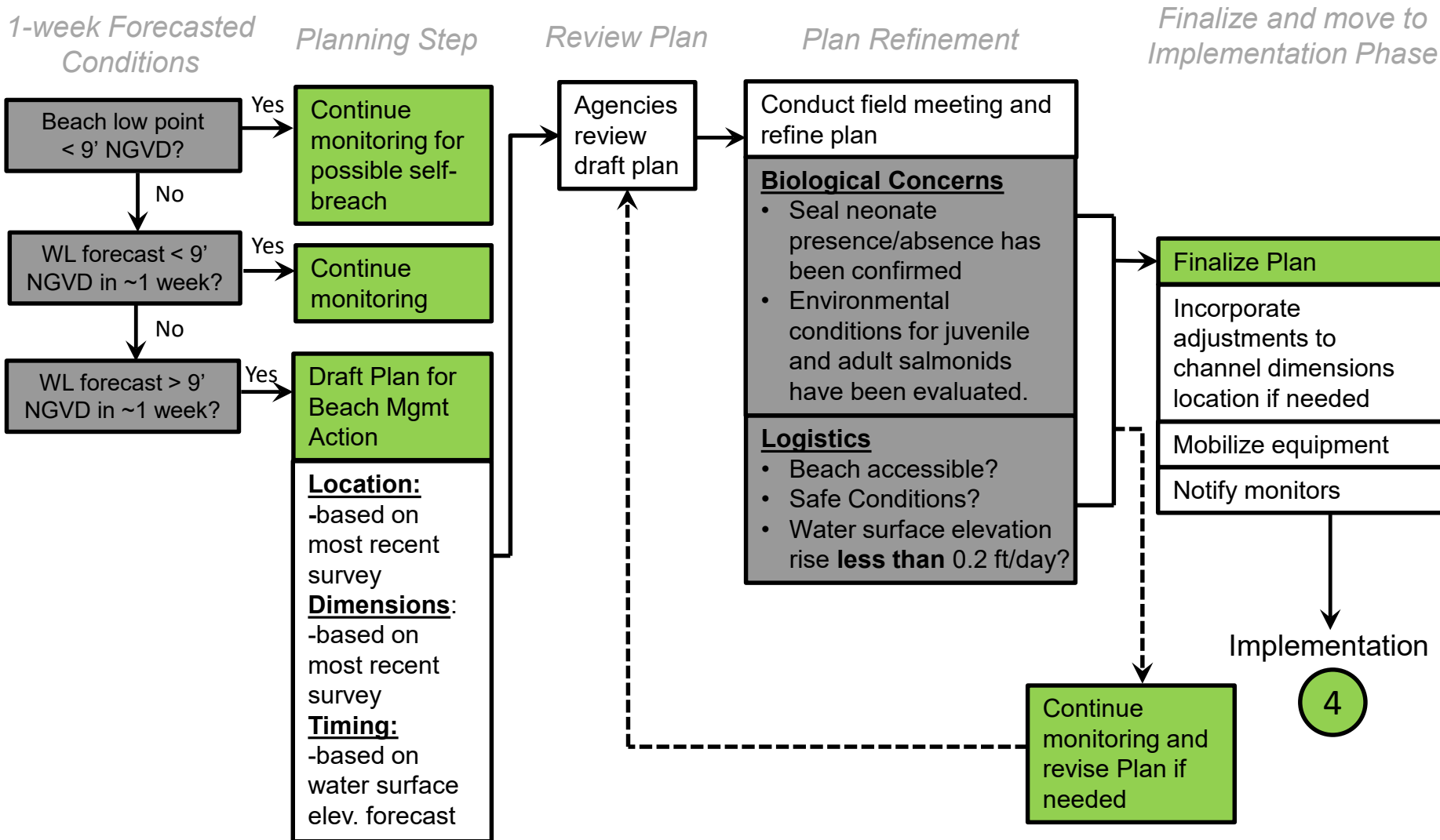
2. Use predictive tools to anticipate outcomes



3. Add graphics to inform beach management actions



4. Clarify the decision process



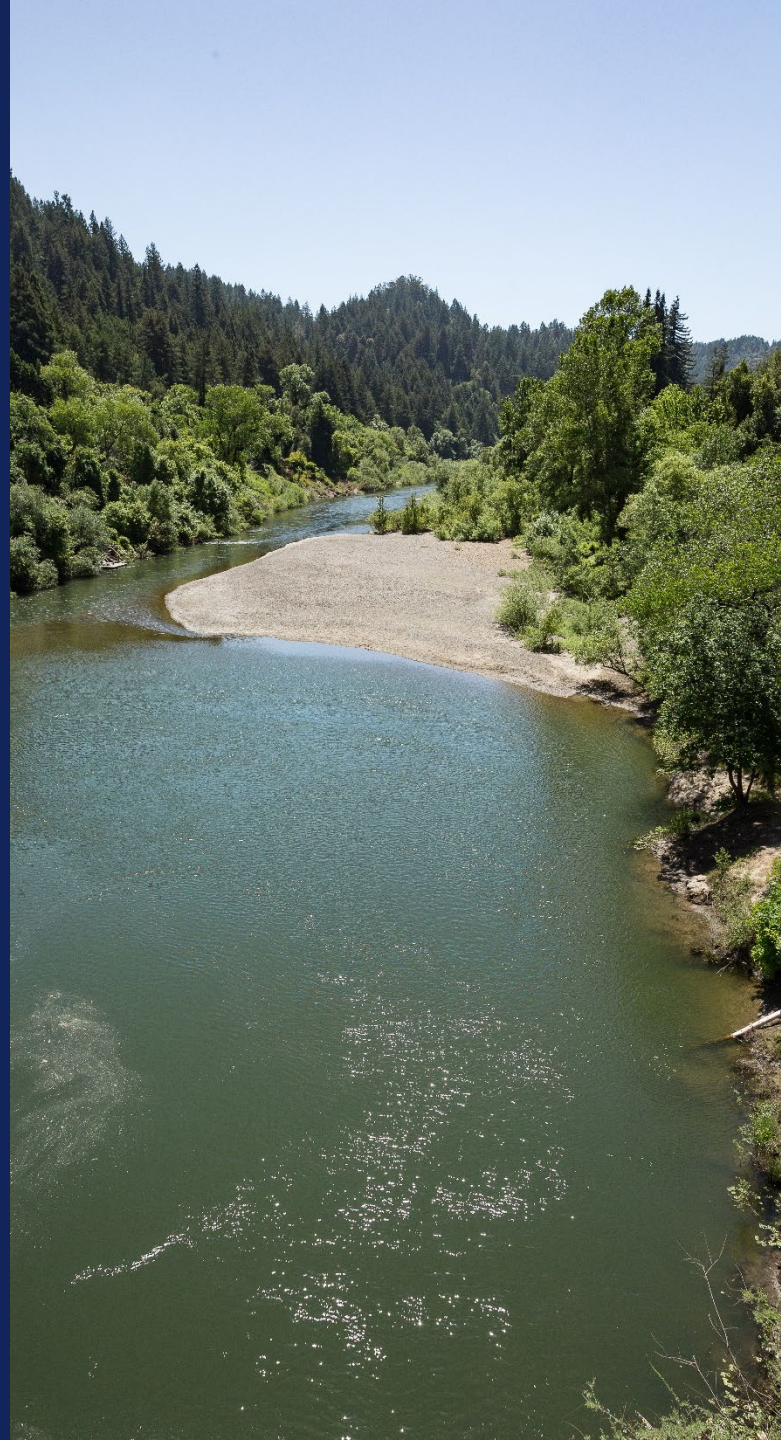


Sonoma Water

Clean. Reliable. Essential. Every Day.

Russian River Estuary Fish Monitoring

by Dave Cook



Estuary Fish Monitoring

- Inventory Fish in Estuary
- Determine Distribution & Abundance
 - Common species
 - Threatened/Endangered salmonids
 - Chinook salmon, coho salmon, steelhead





Distinct Population Segment



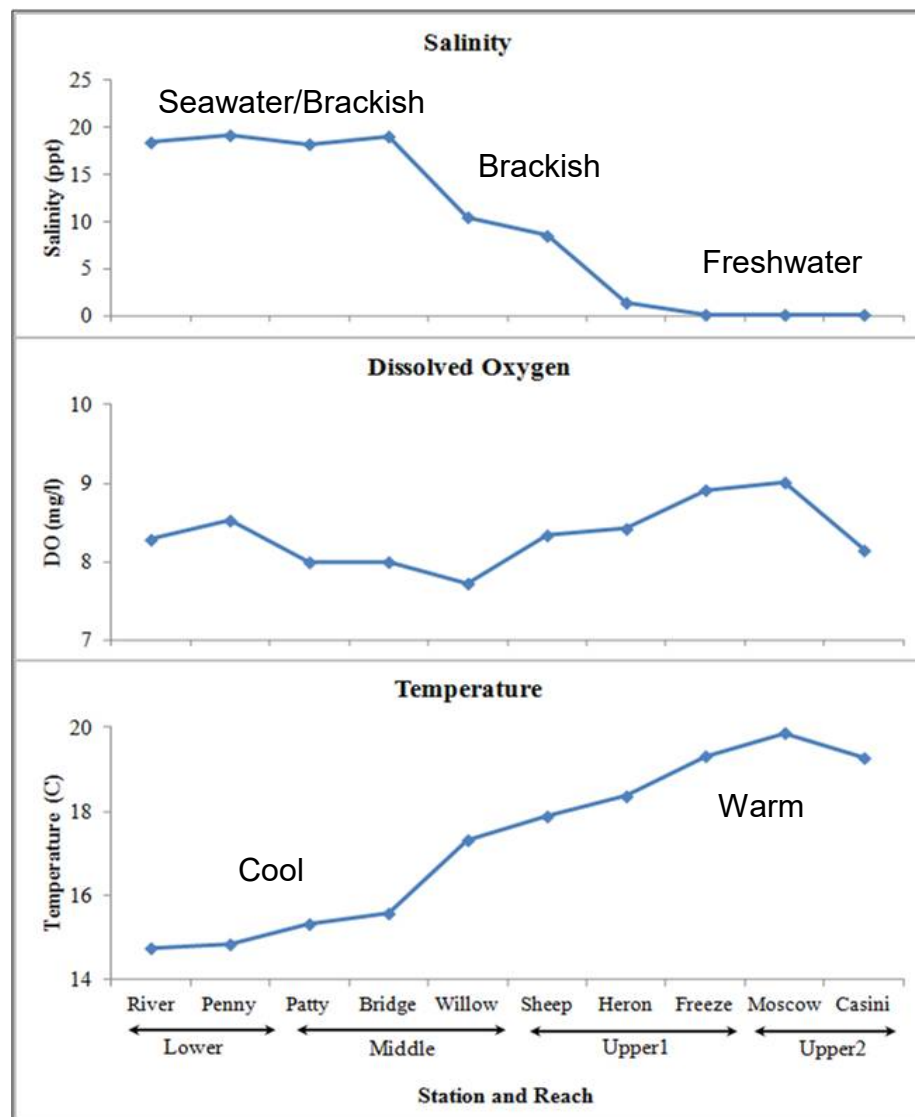
Tidal vs Lagoon

- Open river mouth
 - Tidal, cold seawater, daily exchange
- Outlet channel
 - Lagoon, increase volume of fresh or brackish water



Water Conditions

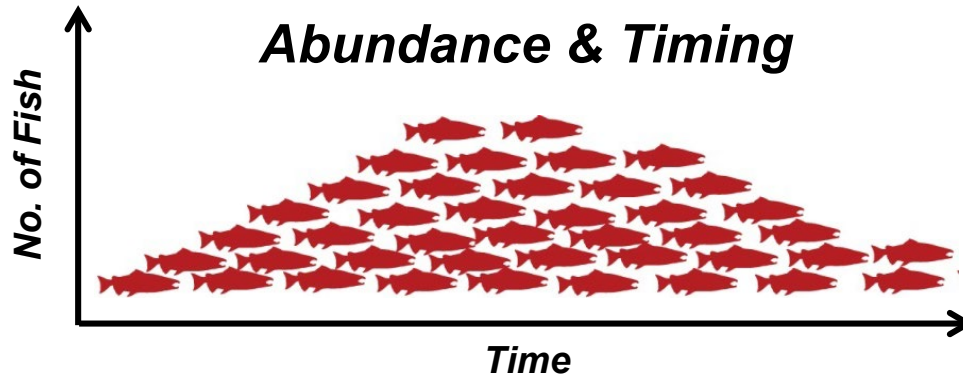
- Longitudinal salinity gradient
- Stratified water column
- Tidal vs Lagoon



Fish Monitoring Objectives

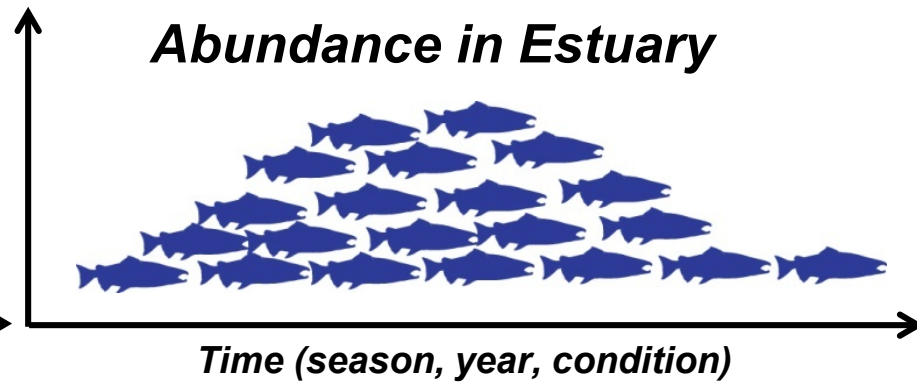
1.) FISH ENTERING THE ESTUARY

Abundance & Timing



2.) FISH RESIDING IN ESTUARY

Abundance in Estuary



Size / Age

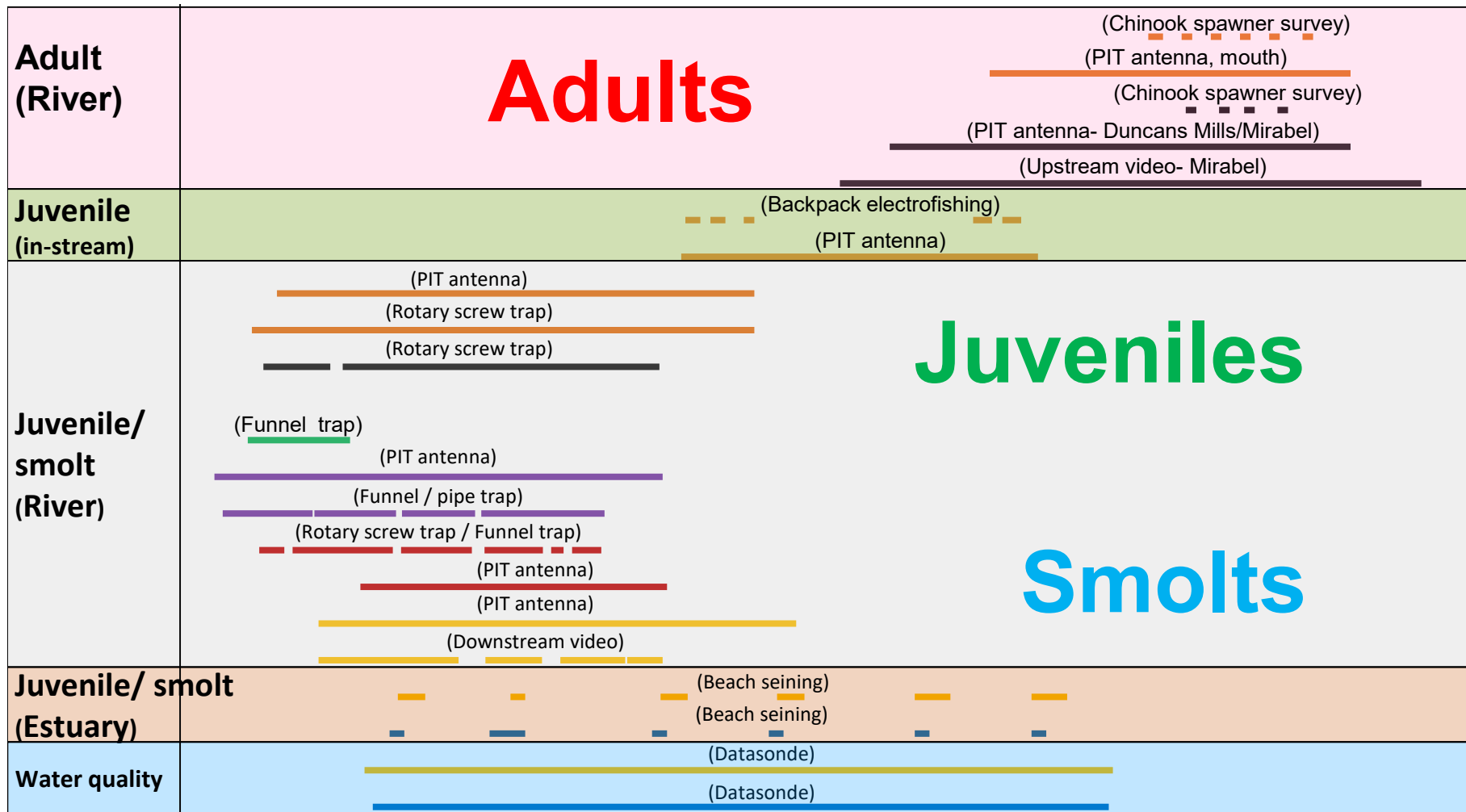


Residence Time & Growth





Monitoring Timing and Life Stage



1-Apr 1-May 1-Jun 1-Jul 1-Aug 1-Sep 1-Oct 1-Nov 1-Dec 1-Jan

— Lower estuary — Upper estuary — Austin Creek — Dutch Bill Creek — Mark West Creek — Mainstem — Dry Creek

Monitoring Locations

- Downstream Migrant Trap
- PIT Antenna
- Seining Station

Austin Creek



Mainstem (Mirabel)



PIT Antennas



Mark West Creek



Dutch Bill Creek



Estuary

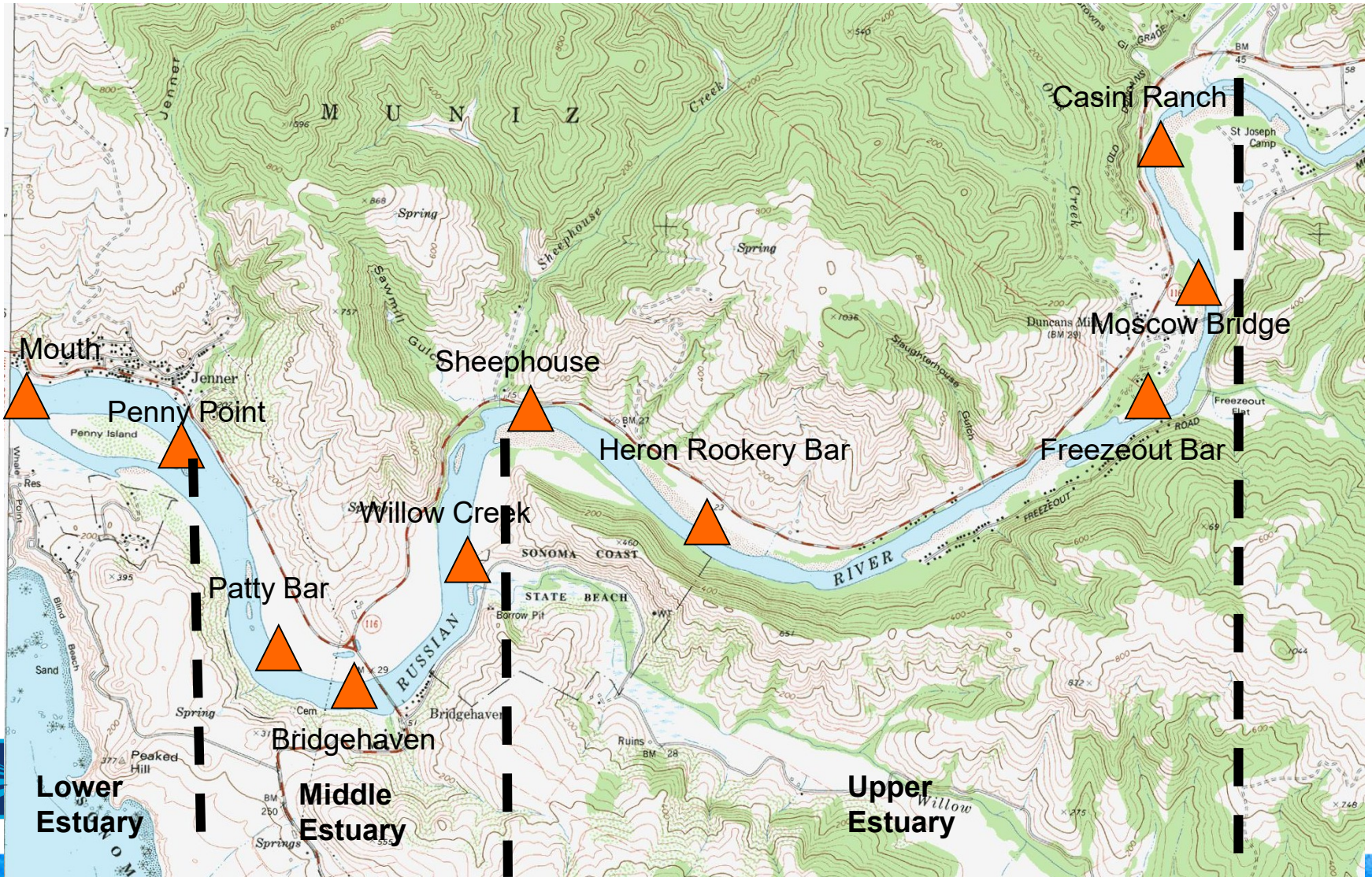


Estuary Fish Monitoring Methods

- Study Area
 - River mouth to Duncans Mills (6 miles)
- Studies began in 2003
- Survey Period: May-Oct
- Fish sampling
 - Beach seine
 - PIT tag steelhead



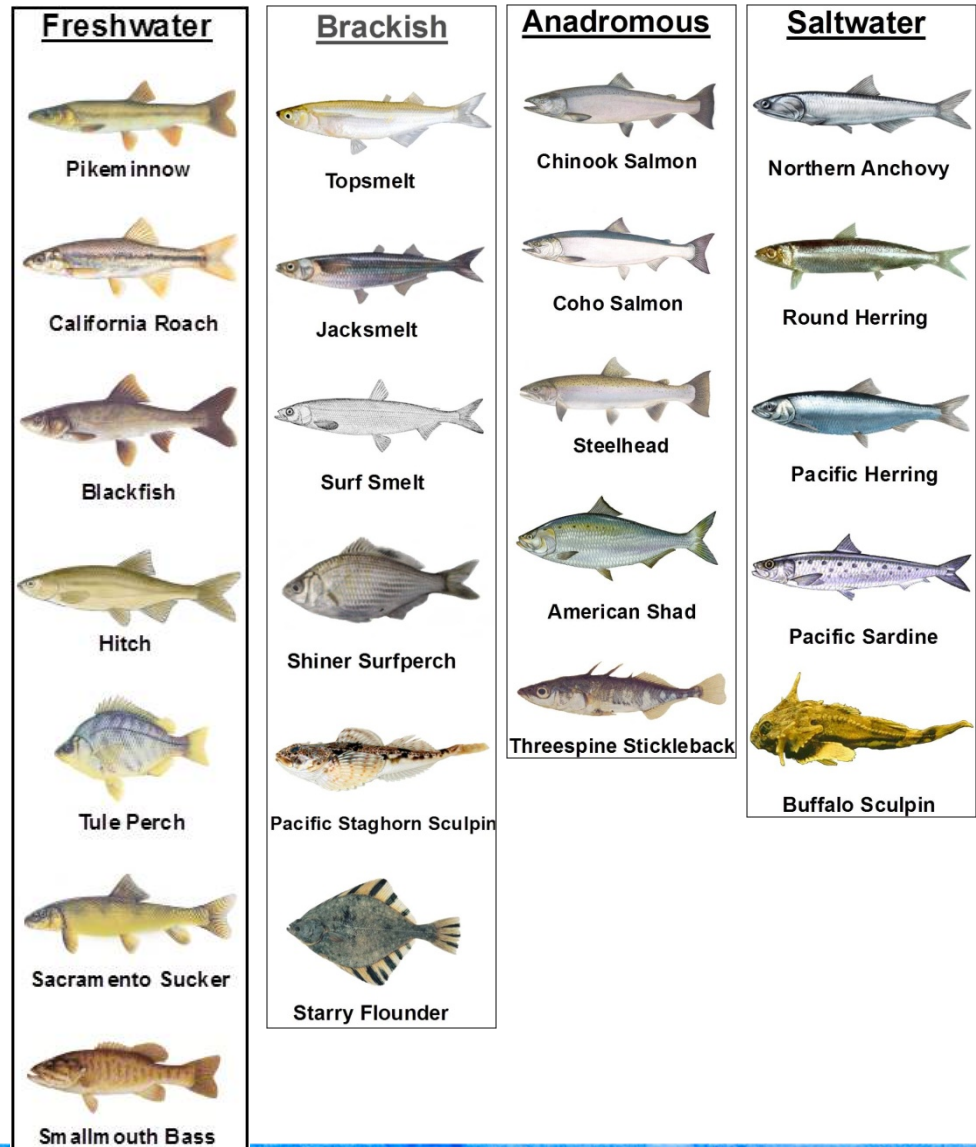
Estuary Reaches & Seine Stations





Fish Monitoring Results

- Capture 5,000-46,000 fish per year
- Identified 53 fish species
 - Freshwater
 - Estuarine
 - Marine
 - Anadromous
 - Generalist



New Species

- 2017
 - California halibut
- 2018
 - Giant kelpfish
 - Red eared sunfish



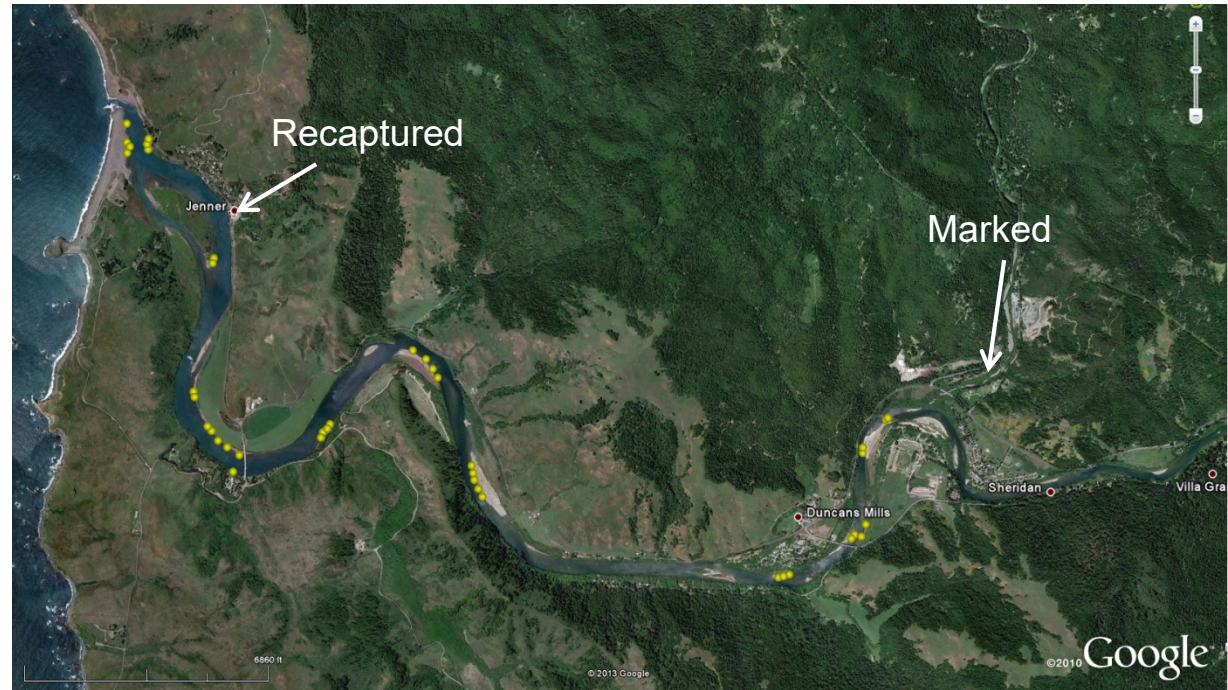
Steelhead: Mark & Recapture

- Steelhead PIT-tagged in Estuary
- 1,091 steelhead since 2008
- 65 recaptures

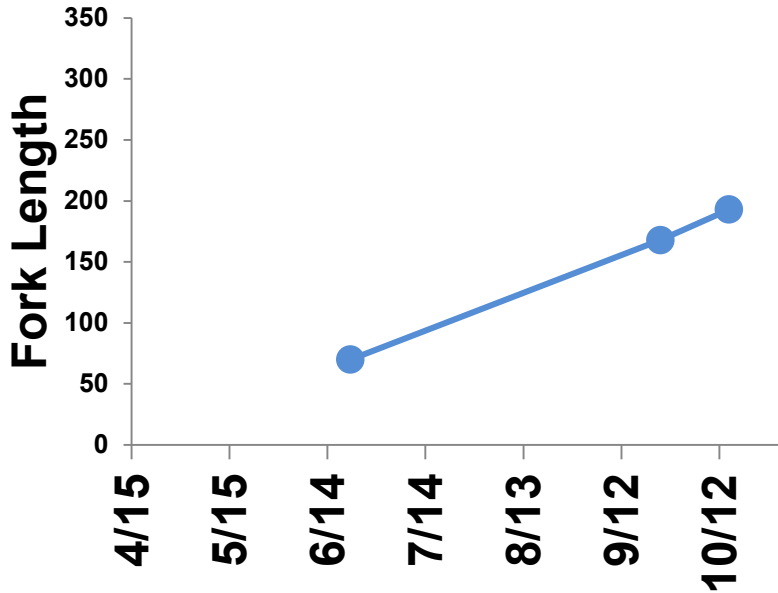


Movement: PIT Tag #C40B

- Steelhead
 - Young of the year
 - PIT tagged
- Marked
 - Austin Creek
 - June 21
- Recaptured
 - Lower Estuary
 - August 15
- Traveled 7 miles from a freshwater creek to a heavily marine influenced site



Growth: PIT Tag #C40B

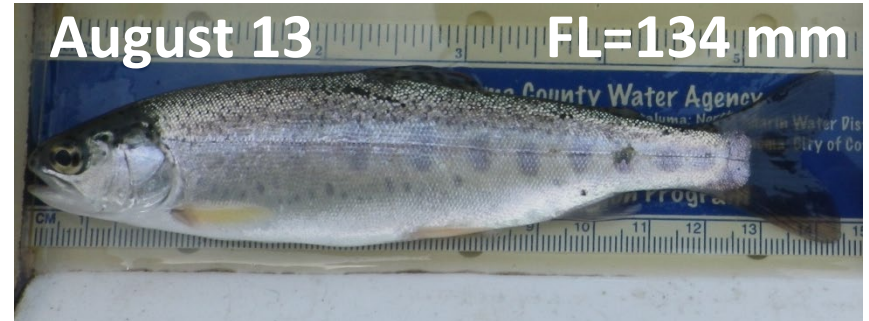


- Fork Length = 63-191 mm
- Growth = 1.06 mm/day



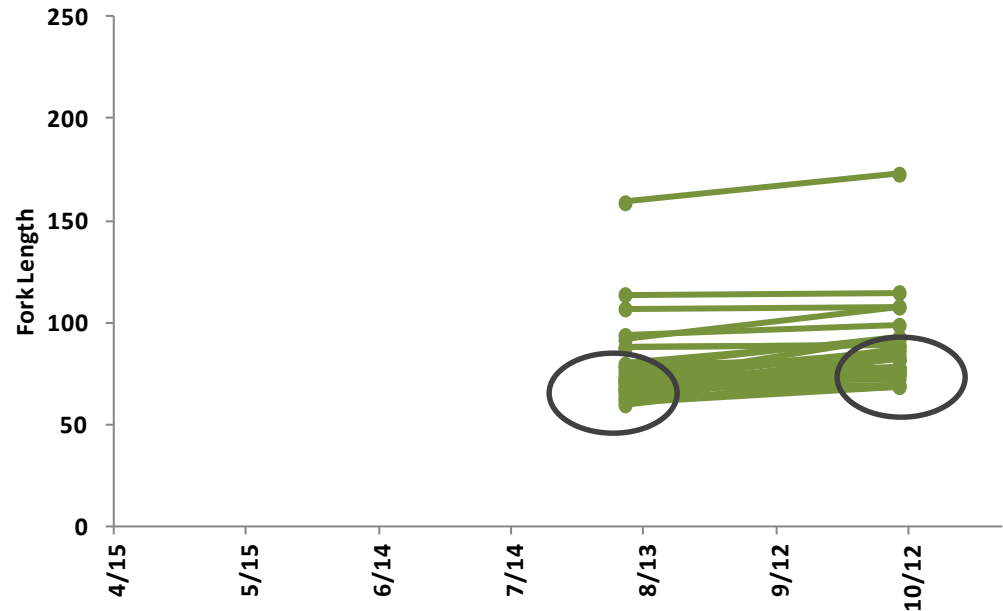
PIT# 8B4E

- Steelhead parr & smolt
- Lower Estuary (Jenner Gulch)
- FL=134-209 mm
- Days = 63
- Growth = 1.2 mm/d



Austin Creek Recaptures & Growth

- Steelhead parr
- Tagged and recaptured in Austin Creek
- Growth rates not as high as in Estuary
 - Growth 0.2 mm/day



Marked Aug 2

Recaptured Oct 10



Estuary Fish Summary

- High fish diversity
 - 53 species
 - Dynamic environment: Marine, estuarine, and freshwater habitats
- Steelhead
 - Juveniles rear in the Estuary
 - Growth rate
 - Greater in Estuary than in freshwater creeks





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Estuary Community Meeting

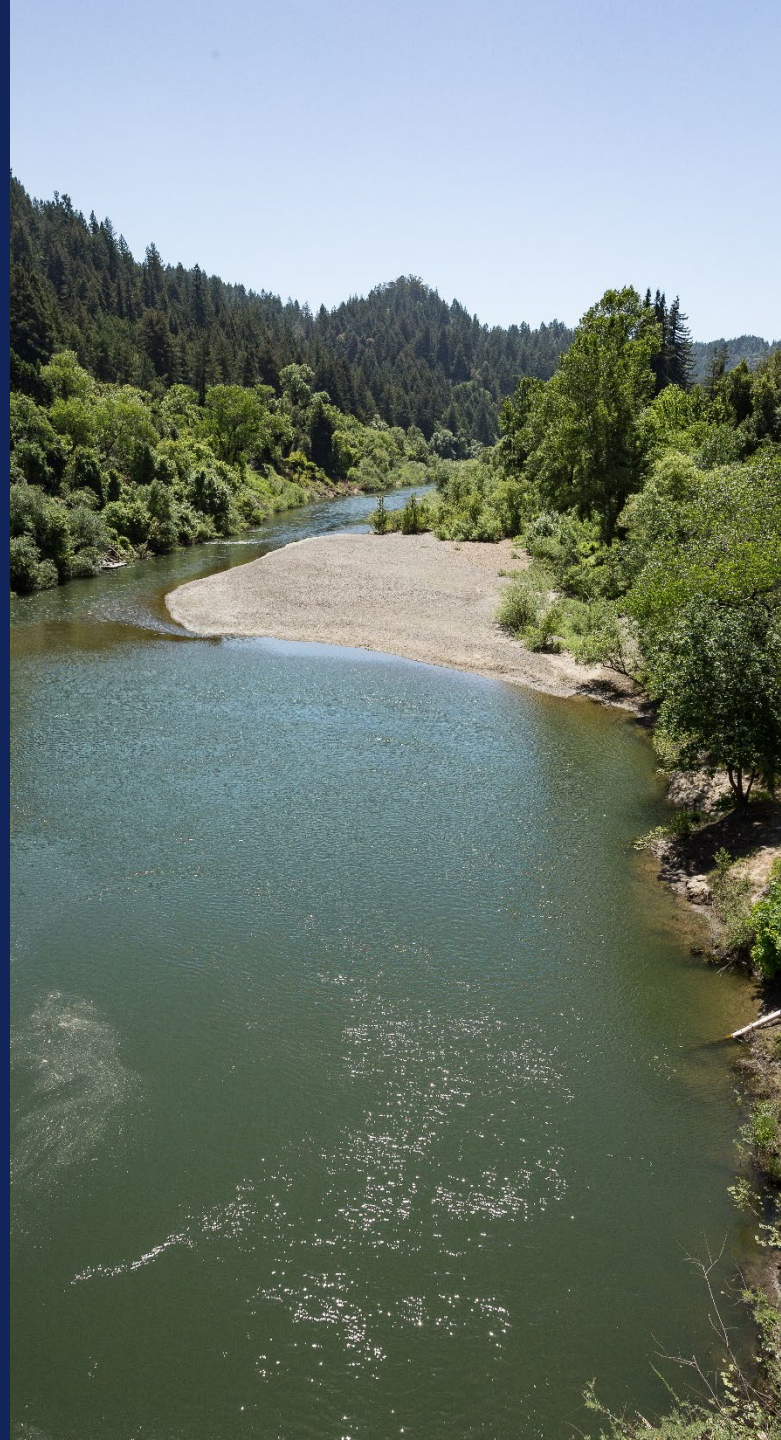
RUSSIAN RIVER ESTUARY WATER QUALITY
MONITORING 2009 THROUGH 2018

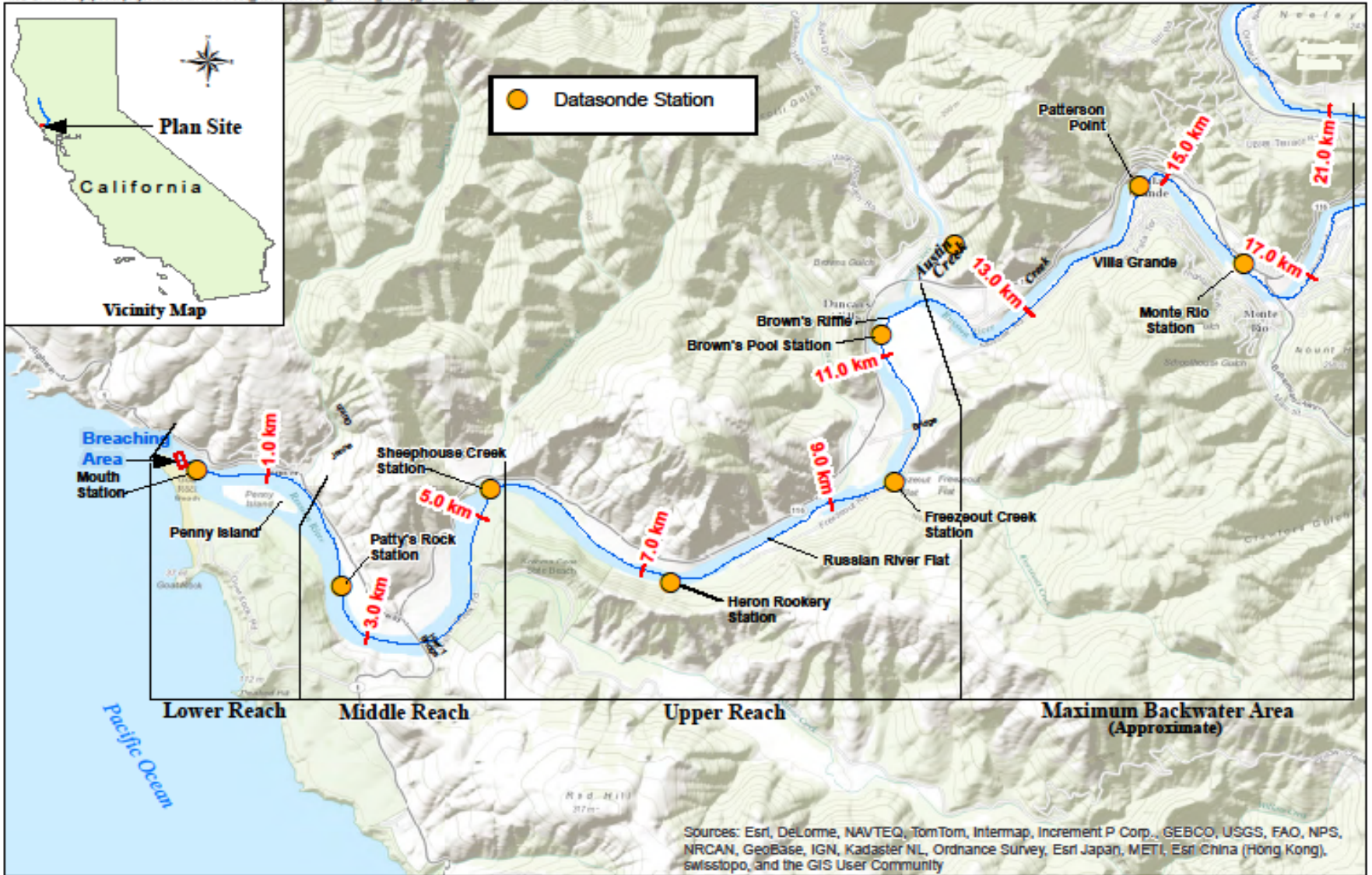
AUGUST 28, 2019

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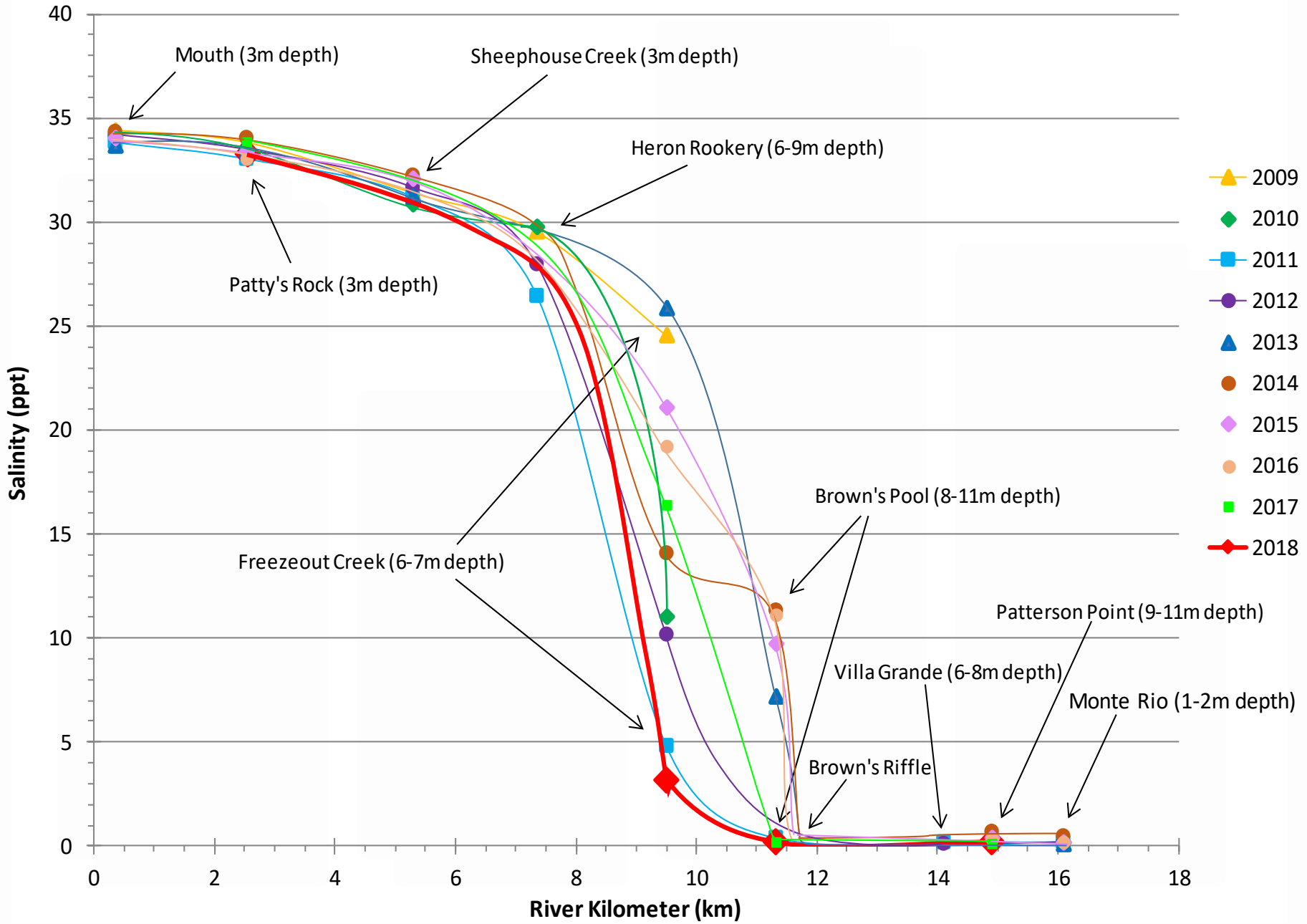


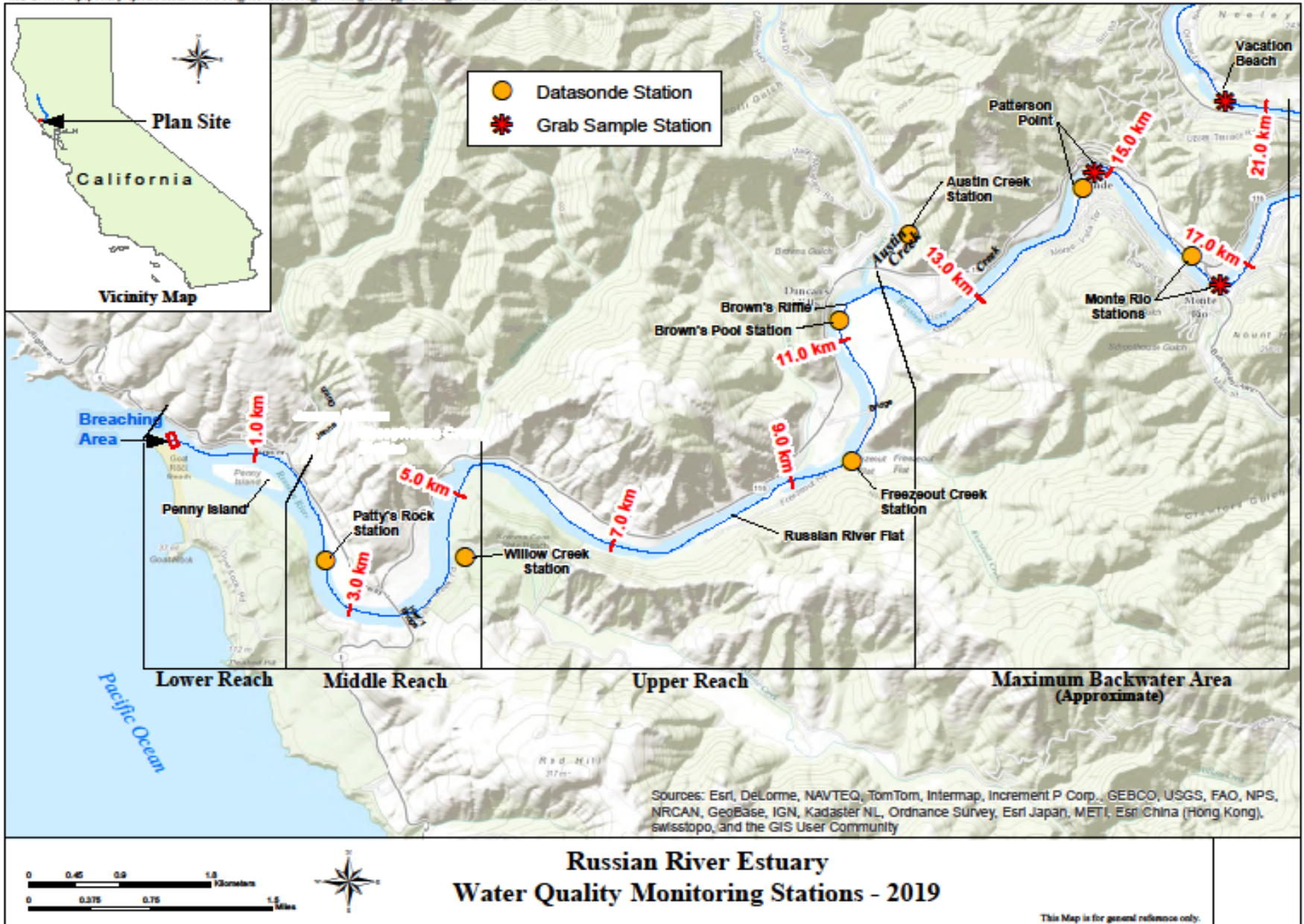


Russian River Estuary Water Quality Monitoring Stations 2009-2018

This Map is for general reference only.

Maximum Annual Observed Salinity by Russian River Estuary Monitoring Station



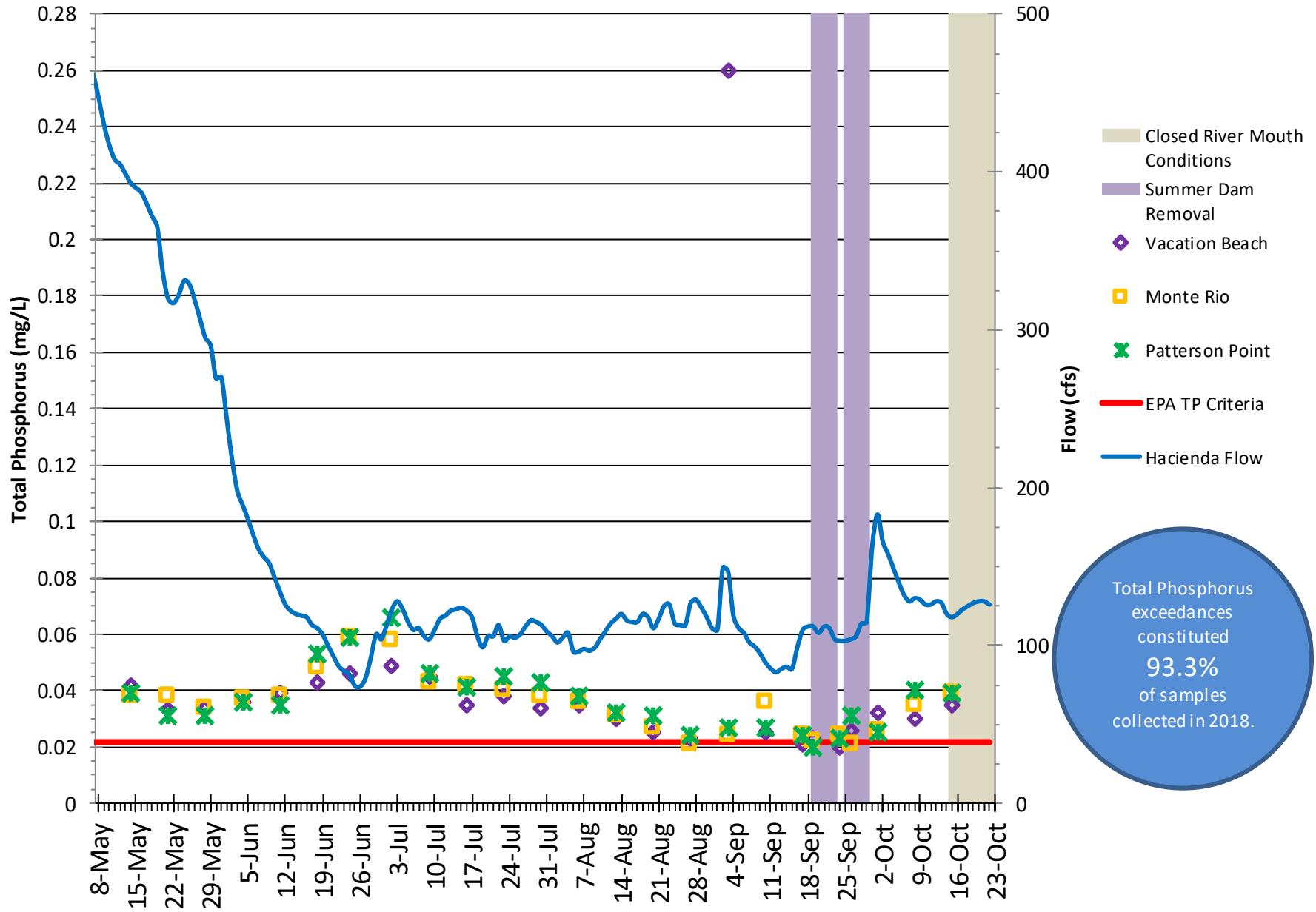


Nutrient and *Chlorophyll a* Percent Exceedances

Estuary Monitoring Season	Total Phosphorus Percent Exceedance	Total Nitrogen Percent Exceedance	Total Chlorophyll a Percent Exceedance
2009	100	N/A	N/A
2010	84.6	15.4	18.0
2011	92.3	30.8	23.7
2012	61.5	6.9	11.5
2013	99.0	15.3	44.9
2014	100	14.4	23.1
2015	86.5	1.9	26.0
2016	83.9	8.1	39.1
2017	97.3	9.3	54.7
2018	93.3	5.3	36.6

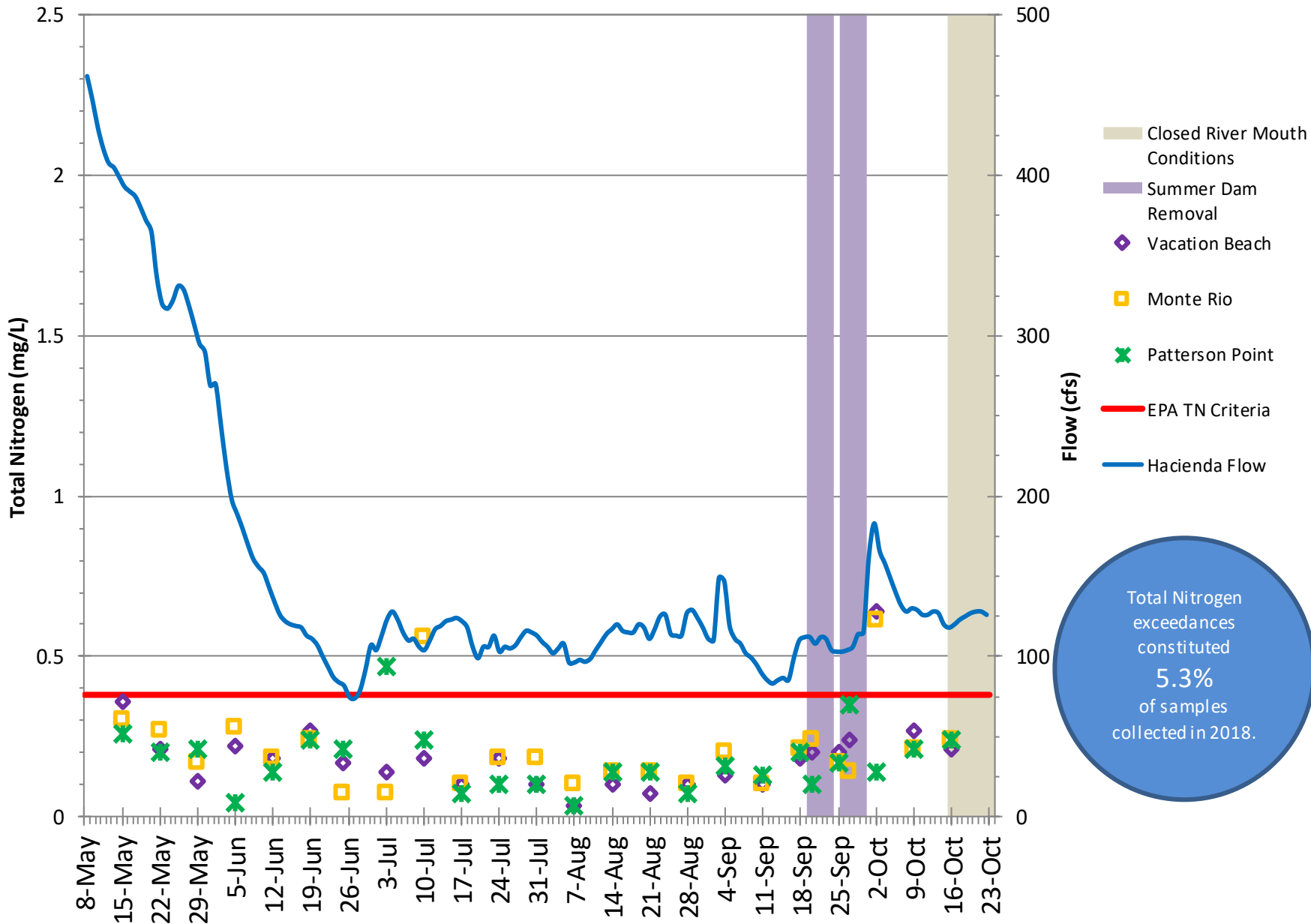


Total Phosphorus - Lower Russian River and Estuary - 2018



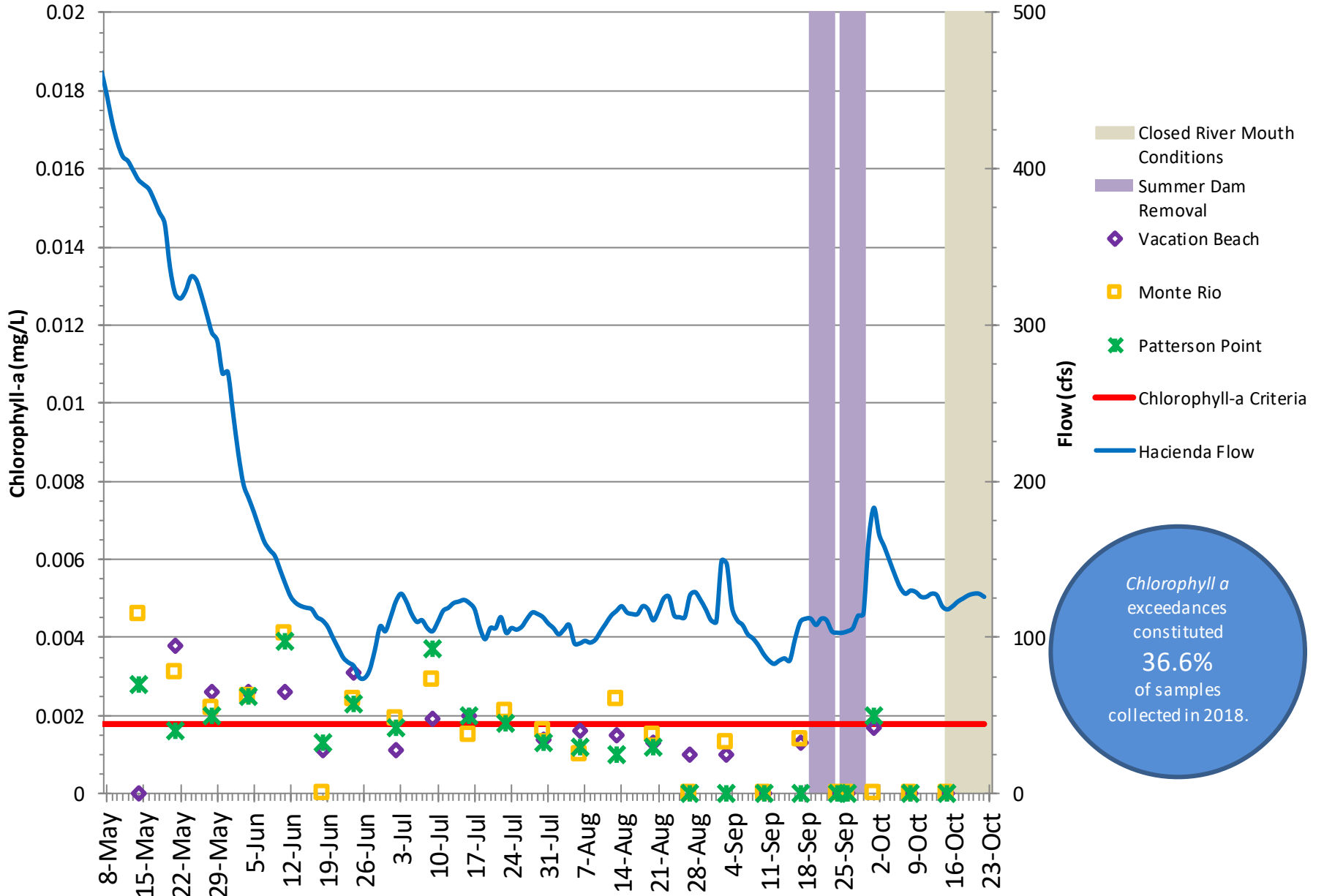
Total Phosphorus exceedances constituted 93.3% of samples collected in 2018.

Total Nitrogen - Lower Russian River and Estuary - 2018



Total Nitrogen exceedances constituted 5.3% of samples collected in 2018.

Chlorophyll a - Lower Russian River and Estuary - 2018



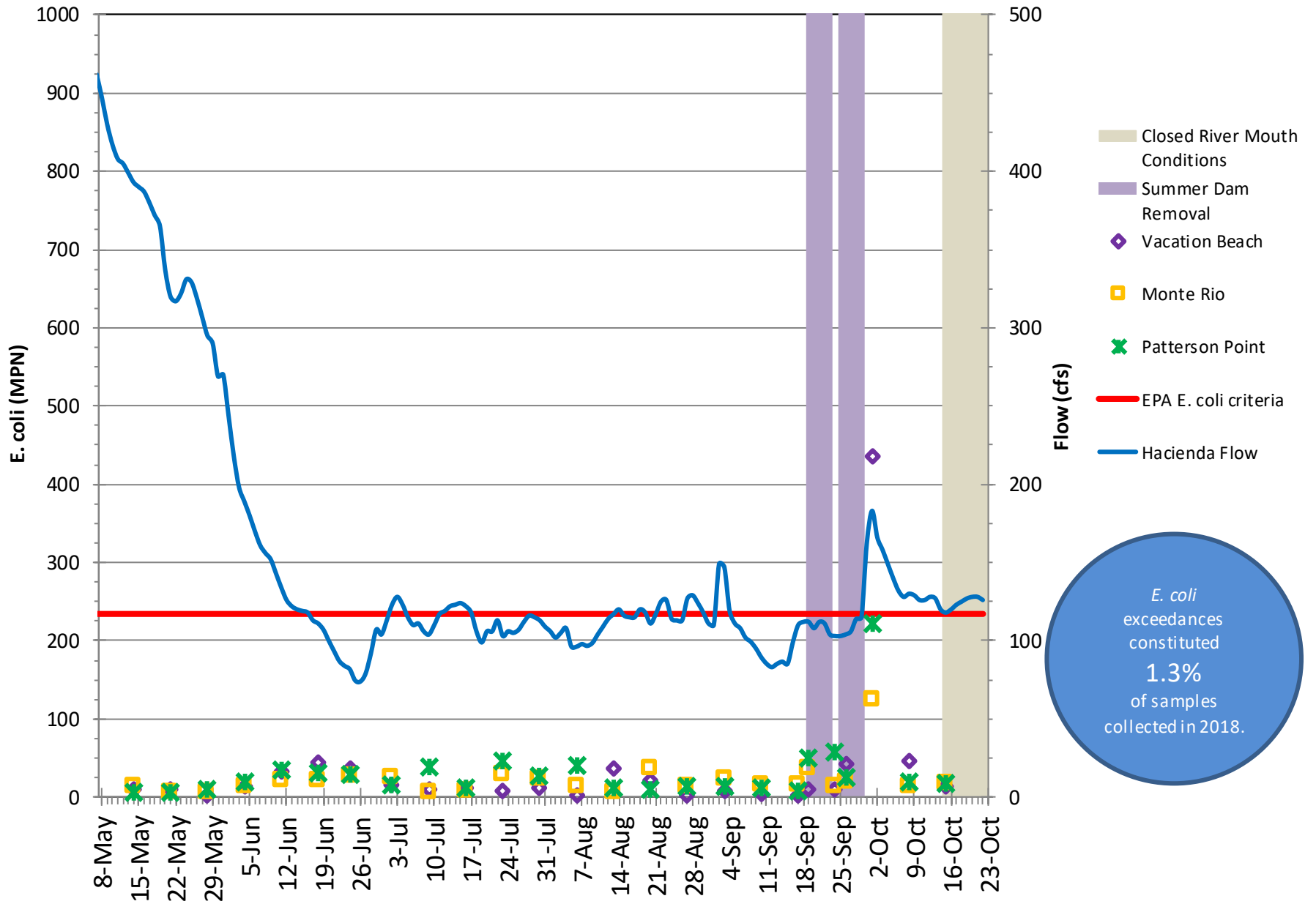
Escherichia coli (*E. coli*)

Percent Exceedances

Estuary Monitoring Season	<i>Escherichia coli</i> (<i>E. coli</i>) Percentage Exceedance
2009	0
2010	N/A
2011	0
2012	0
2013	1.0
2014	6.3
2015	1.9
2016	2.2
2017	1.3
2018	1.3



E. coli - Lower Russian River and Estuary - 2018





**Sonoma
Water**

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Sonoma
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Russian River Estuary Invertebrate Monitoring

AUGUST 28, 2019

Jessica Martini-Lamb
Environmental Resources Manager

    sonomawater.ca.gov





Invertebrate Monitoring Locations



Transects at Each Site





Modified During Closed Conditions











SONOMA Sonoma County Water Agency
City of Petaluma; North Marin Water District;
Water District; City of Sonoma; City of Cotati



3DD, 0083
BC9FF23











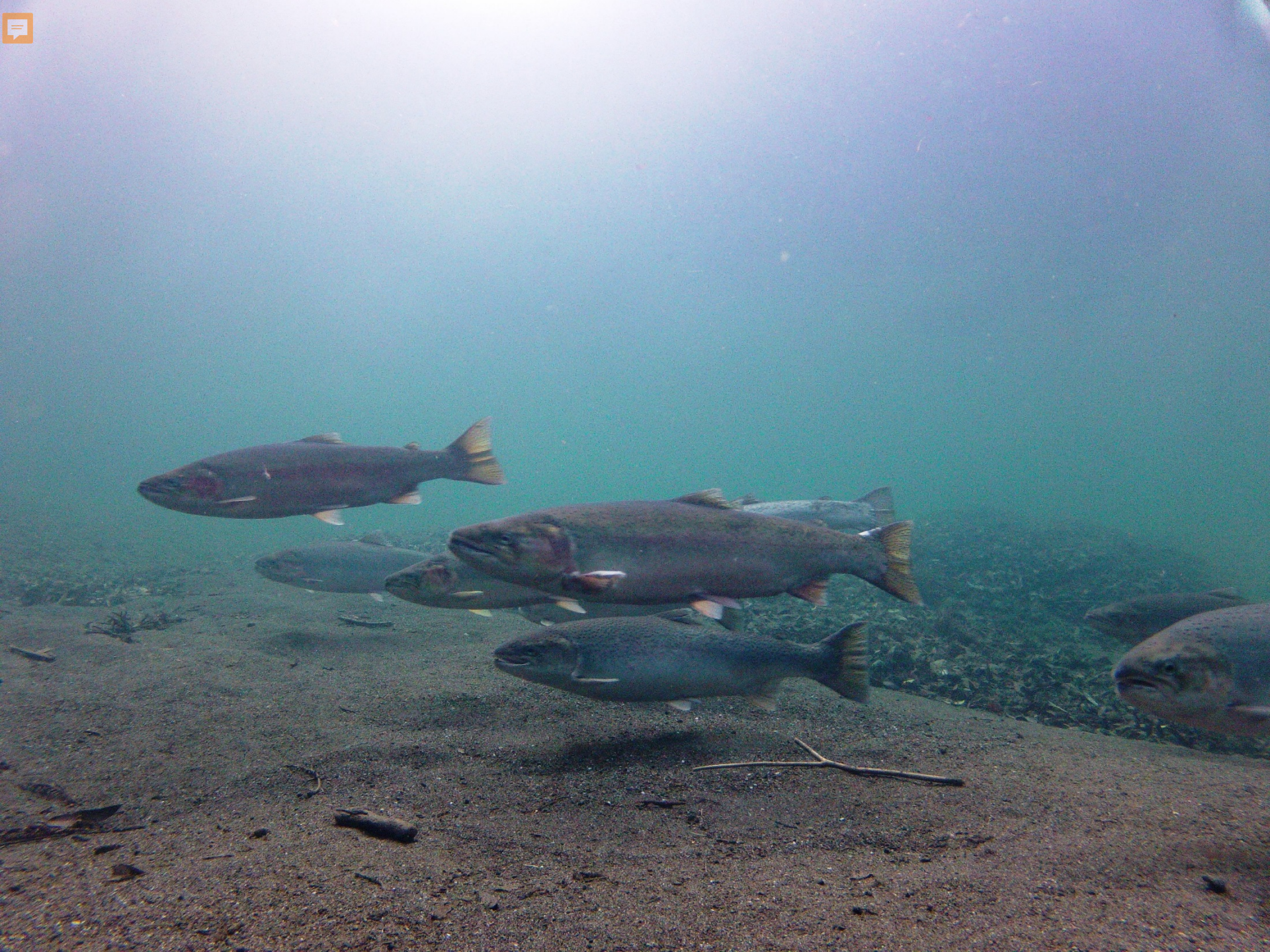




Location JENNER Date 10/19/2011
Species STHD Marks _____ Sex M F
Length 317 Weight 385.5
Comments: Scales
3D9.1C2D58FEA2
RECAP JG8







Rearing Habitat

- Prey available
- Water quality affects juvenile salmonid habitat quality
 - Water temperatures
 - Dissolved oxygen
 - Salinity





Sonoma
Water

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Sonoma Water

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Monitoring Pinnipeds at Jenner

August 28, 2019



Andrea Pecharich
Environmental Specialist
andrea.pecharich@scwa.ca.gov





Seals and sea lions

harbor seals



California sea lions



Northern elephant seals





10+ years of monitoring



34 community volunteers



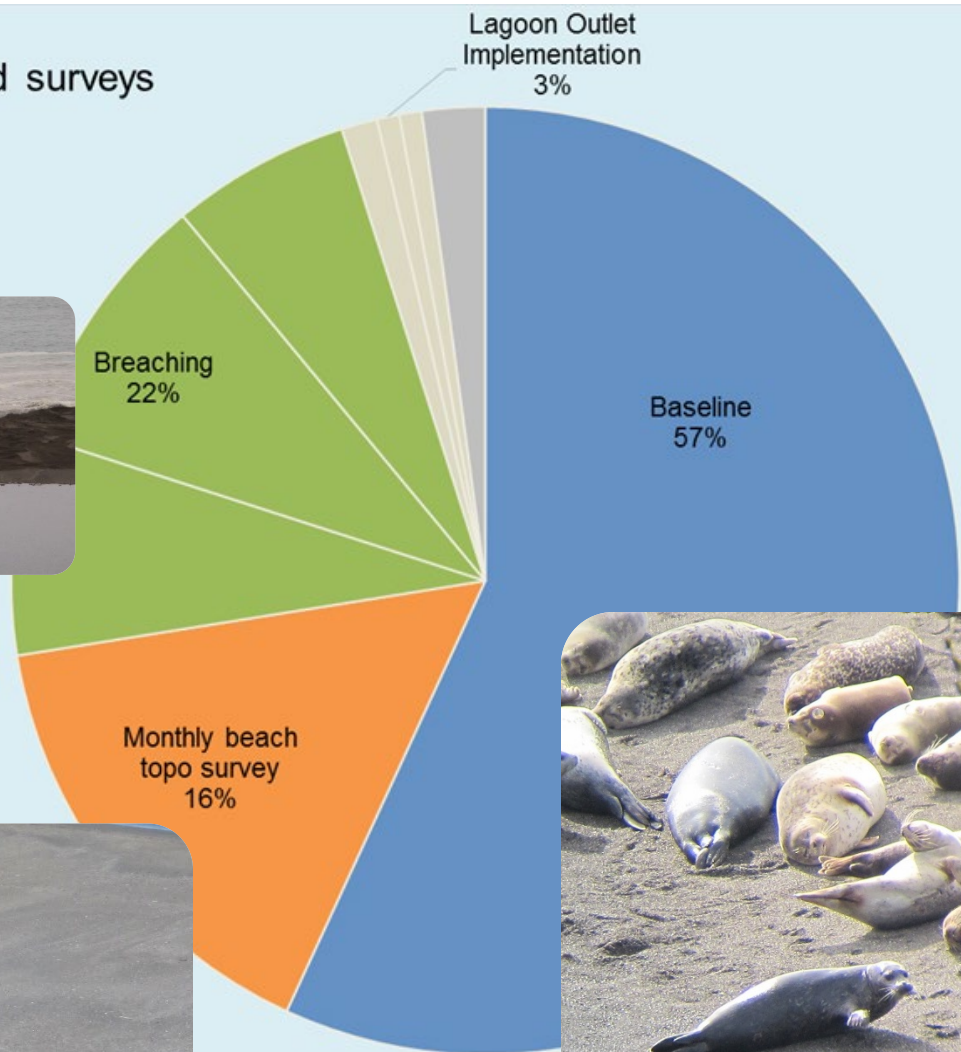
700 surveys



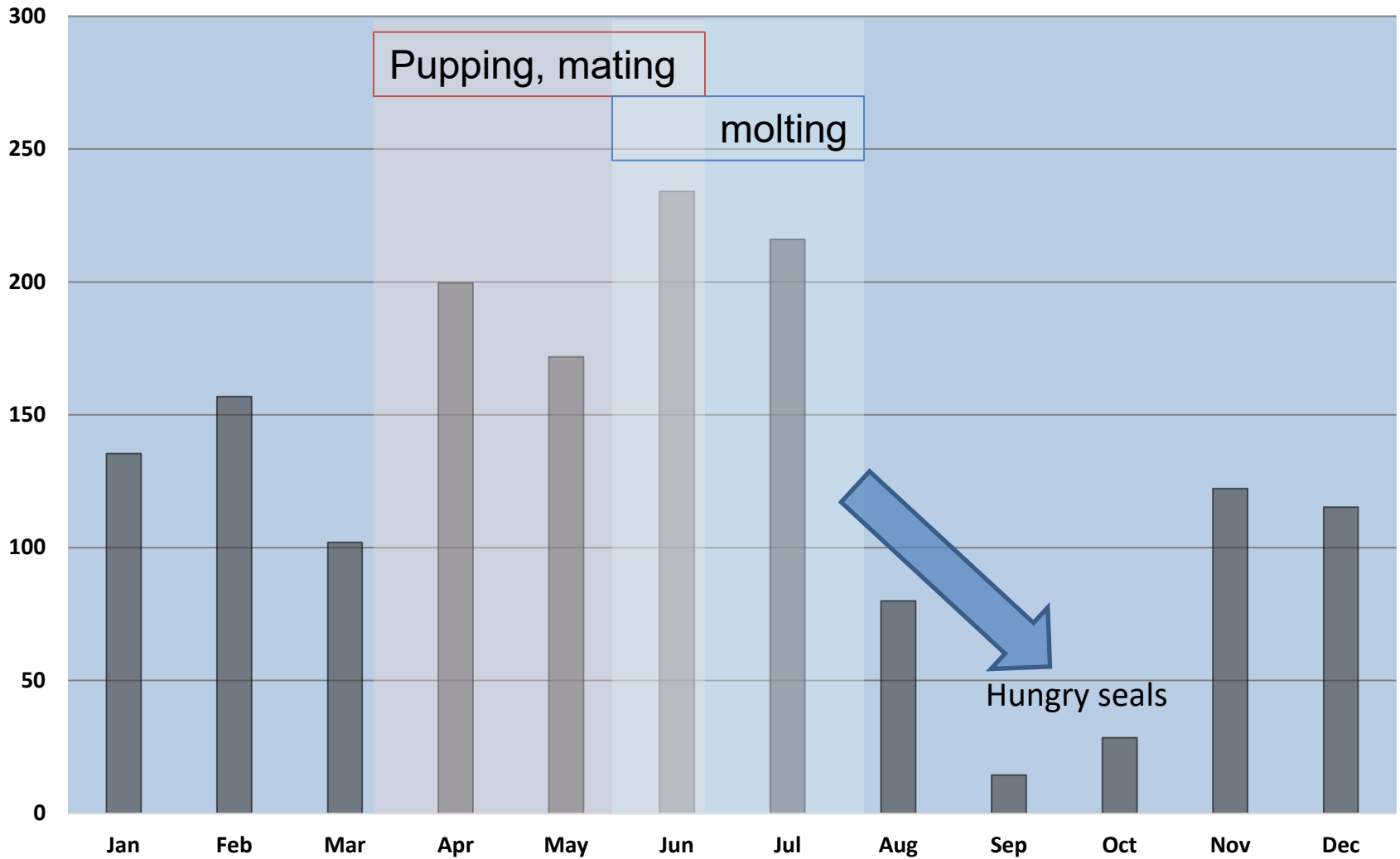
Over 1,000 volunteer hours



Types of pinniped surveys



Seasonal Patterns





Seasonal patterns

Pupping/mating



Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



Seasonal patterns

molting



Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec



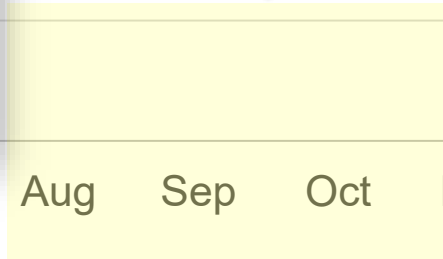
Senoma
Water



Seasonal patterns



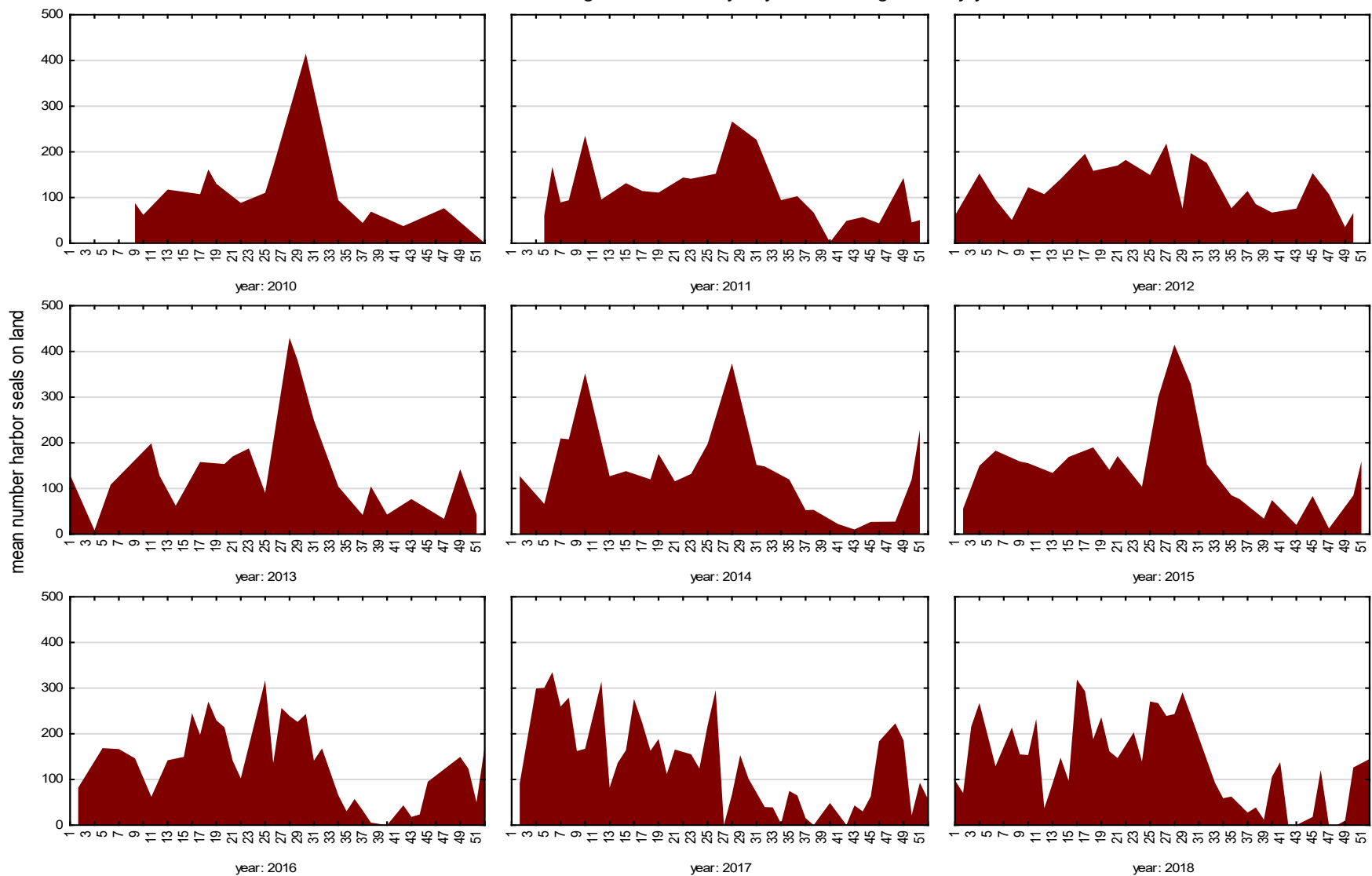
Hungry seals



Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

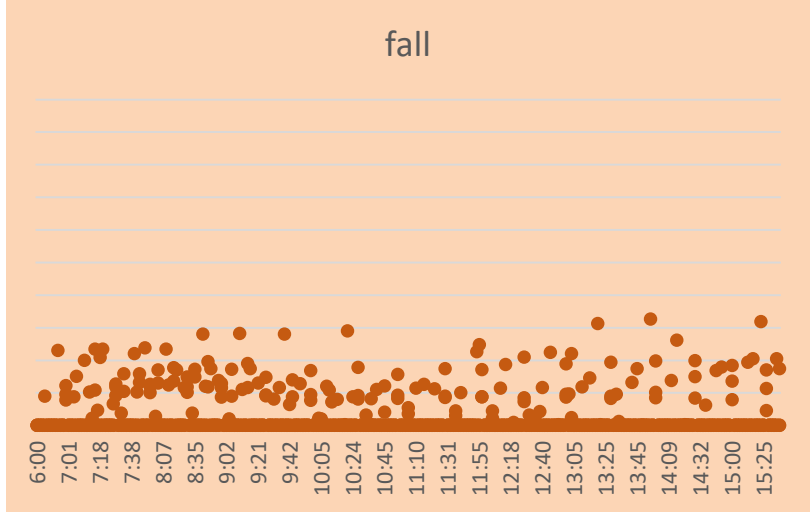
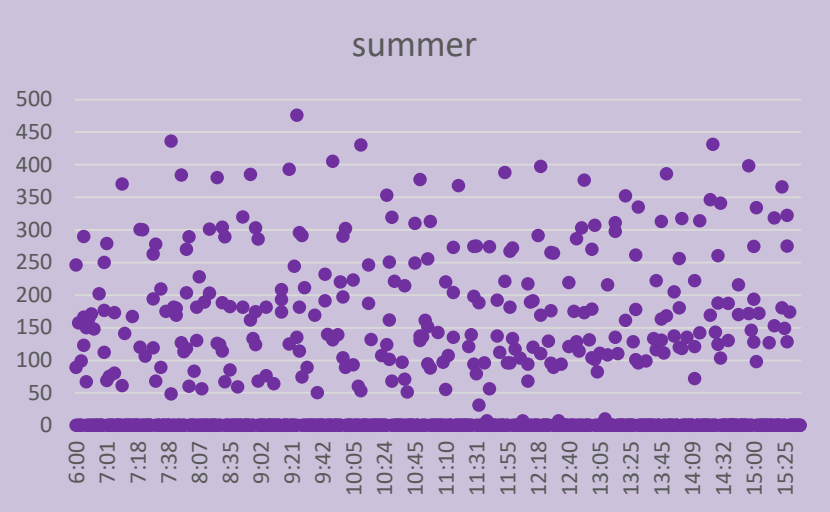
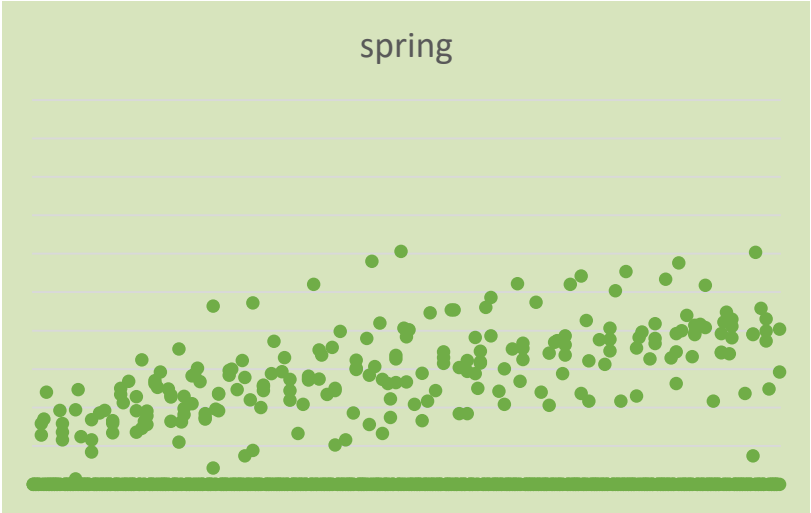
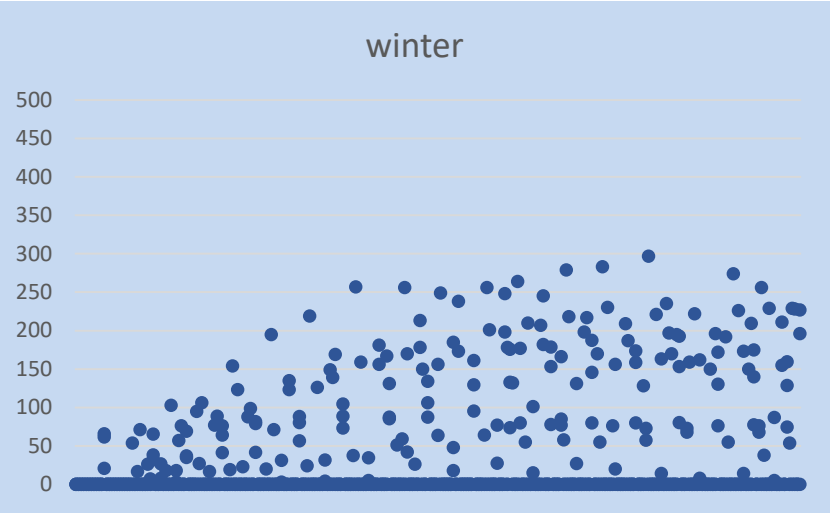


Mean count of harbor seals at Jenner during baseline surveys by week; categorized by year from 2010 to 2018

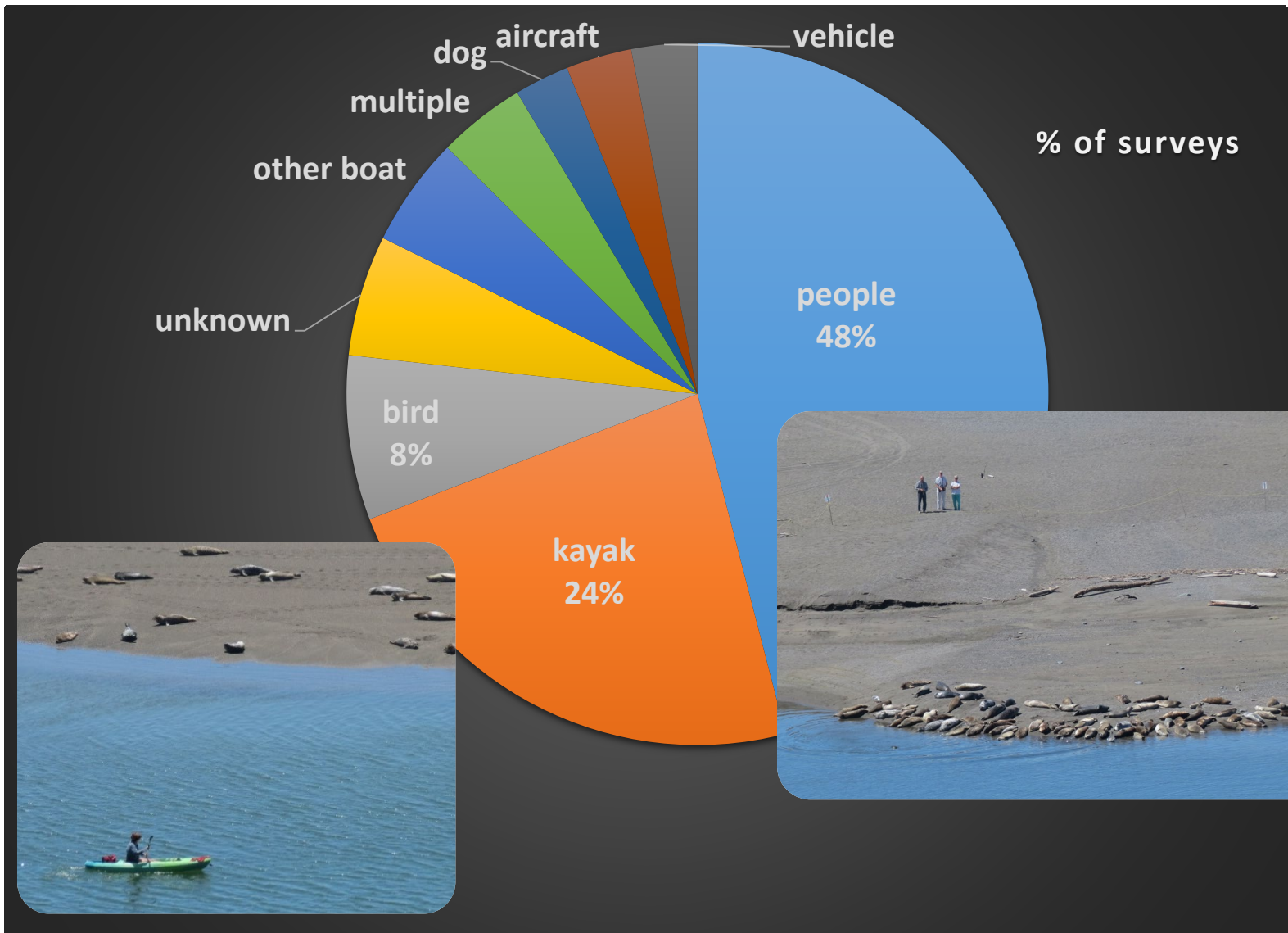


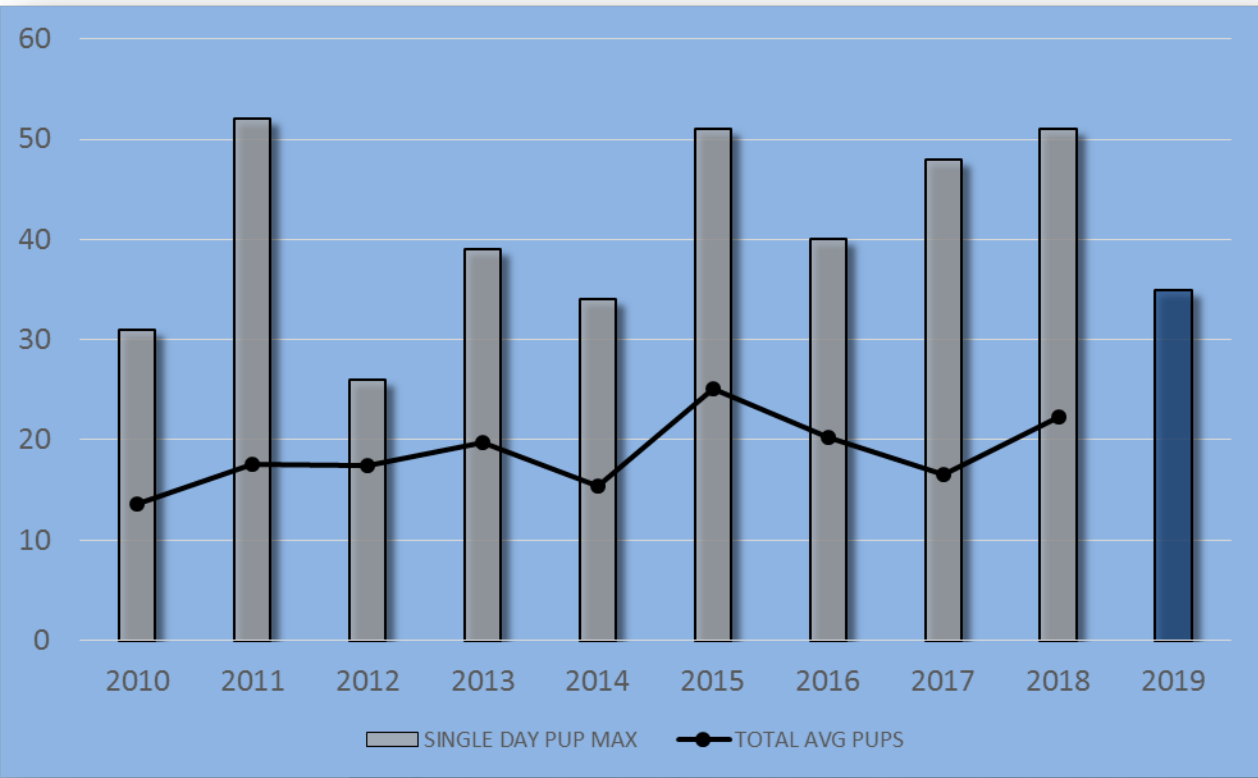


Daily patterns



Sources of disturbance: baseline surveys





Seal pups



Report injured pinnipeds



SONOMA COUNTY WATER AGENCY - PINNIPED INJURY/MORTALITY REPORT

Observer Name: Andrea Pecharich

Sonoma County Water Agency
404 Aviation Blvd., Santa Rosa, CA 95403
Contact: Andrea Pecharich, 707-547-1947

Location of Observation: Jenner Sonoma County, CA Russian River Estuary
City: _____
Location Description: Goat Rock State Beach
Lat: 38°27'05.61" N Long: 123°07'43.43" W actual estimated
Determined by: GPS map internet

Activity: baseline pinniped photo survey beach mgmt. fish WQ inverts other
River mouth: open closed transition perched precipitation: clear fog rain
Air temp (°F): 57 visibility: excellent fair poor Ocean state: 1
Wind speed (mph): 6 wind direction: se (Beaufort water)

Initial Observation
Date: 10/16/14
Common name: harbor seal genus: Phoca species: vitalina
First observed: beach/land floating swimming
Condition: alive fresh dead moderate decomposition advanced decomposition mummified/skeletal
 whole carcass partial carcass
Morphological data
Sex: male female unknown
Age class: adult sub-adult yearling pup unknown
Standard length: _____ cm actual estimate
(standard length = measured tip of nose to tip of tail with tape held body, not curvilinear length)

Photo/video taken:
 YES NO

Tag data: tags present at time of stranding? YES NO ID# _____ color _____ type _____ placement* _____
tags applied during initial observation? YES NO
* placement is either dorsal (head), left front, right front, left rear, right rear (flipper)

Nature of injury or mortality: Related to SCWA activity human caused (non SCWA) animal caused unknown
Note: in most cases unless you observe the injury or mortality event you will not be able to determine the cause
Description of incident including exact location and potential cause of injury/mortality:
apparent shark bite located on left side pelvic region - size of bite equivalent to V size of seal's rear flipper

Injured animals should NOT be approached. If an injured animal is observed contact Jessica Martini-Lamb immediately (707) 322-8177. Dead pinnipeds should be examined in order to determine species, age, gender, injuries and to look for any unique markings like brands or flipper tags. Explanation of Fields sheet contains more information to assist in identification. Please call Andrea Pecharich if a fresh dead pinniped is observed (707) 322-1059.

REPORTING:	COMPLETED:	DATE:
Report received by Andrea Pecharich or Jessica Martini-Lamb (SCWA)	<input checked="" type="checkbox"/>	<u>10/16/14</u>
Report sent to Southwest Regional Stranding Coordinator (Justin Vezibicke)	<input type="checkbox"/>	
Report sent to NMFS Office of Protected Resources (Benjamin Laws)	<input type="checkbox"/>	
Report sent to Cal Academy of Sciences (Sue Pemberton/Denise Greig)	<input type="checkbox"/>	
Message left on CAS stranding hotline (dead animals): 415-379-5381	<input type="checkbox"/>	<u>NA</u>
Marine Mammal Center notified (for animals in DISTRESS): 415-289-SEAL	<input type="checkbox"/>	



Sonoma Water

Clean. Reliable. Essential. Every day.

Andrea Pecharich
Environmental Specialist
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