Item 2
Russian River
Biological Opinion,
Fish Habitat Flow & Water Rights Projects,
and Pathogen TMDL

A Workshop of the
North Coast Regional Water Quality Control Board
August 22, 2013
Workshop Outline

I. Introduction – Matt St. John

II. Russian River Biological Opinion – Dr. William Hearn, NMFS

III. Fish Habitat Flow Project and SCWA Water Quality Monitoring Data – Pam Jeane and Jeff Church, SCWA

IV. Pathogen TMDL Status and Monitoring – Rebecca Fitzgerald

V. Public Comment and Board Discussion
Purpose of Workshop

To present information & promote discussion on:

– Water management in Russian River balancing competing needs for water supply, recreation, and fisheries

– Implementation of the Russian River Biological Opinion

– TMDLs to address water quality impairments in Russian River
Nexus between Clean Water Act & Endangered Species Act

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## Russian River

<table>
<thead>
<tr>
<th>Water Quality Impairments</th>
<th>Threatened or Endangered Fish</th>
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<td>• Temperature</td>
<td>• coho salmon</td>
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<tr>
<td>• Pathogens</td>
<td>• Chinook salmon</td>
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- Total Maximum Daily Load
- Biological Opinion
Russian River TMDLs

• Sediment and Temperature – not scheduled
  – Sediment TMDL Implementation Policy - 2004
  – Policy and Action Plan to Implement the Water Quality Objective for Temperature – in development

• Pathogens – in development
## Agency Jurisdictions and Responsibilities

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### Total Maximum Daily Load

![Water Boards Logo]

### Biological Opinion

![NOAA Logo]
Changing River Flows to benefit steelhead and salmon in the Russian River

National Marine Fisheries Service
August 22, 2013
U.S. Department of Commerce
National Oceanic Atmospheric Administration
National Marine Fisheries Service

- Administration of Federal Endangered Species Act for Marine and Anadromous Species
- Administration of Marine Mammal Protection Act
- Administration of Magnuson-Stevens Act
Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps, Sonoma County Water Agency, Mendocino County Russian River Flood Control and Water Management District in the Russian River watershed

Purpose: take authorization

Public Policy Facil. Committee

- Flow ramp down rates at Coyote Valley Dam
- Channel maintenance in Russian River and greater Santa Rosa tributaries
- Impacts of flow management in 14 mi of Dry Creek
- Impacts of water releases on mainstem Russian
- Impacts of flood maintenance on estuary
- Mgmt of Warm Springs Dam Fish Hatchery
Flow related findings:

- D1610 normal yr flows: too high in upper Russian River,
- In Dry Creek, summer flows too high, prolonged winter flood releases can impact salmon and steelhead,
- D1610 normal yr flows impact natural lagoon forming process and salmonid rearing habitat.
Why lower summer flows between CVD and Cloverdale?

- Flow-habitat relations evaluated at 13 sites between Ukiah and Cloverdale (2001)

Table 1. Number of study sites at which flow releases from CVD is rated as having the largest amount of suitable steelhead rearing habitat (n=13).

<table>
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<th>Flow (cfs)</th>
<th>Steelhead fry</th>
<th>Steelhead juv.*</th>
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<tr>
<td>125</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>190</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>275</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*3 Study sites had similar quantities of habitat at all flows, thus not included here.

- High releases can deplete Lake Mendocino coldwater pool
WHY REDUCE FLOWS FOR THE ESTUARY?

- Central CA coast: estuaries commonly form lagoons—Mattole, Navarro, Gualala, Scott Creek, San Gregorio

- Lagoons formed by barrier beach and low summer flows.

- Lagoons highly productive, important summer rearing habitat for steelhead.

- Lagoons: deeper, less saline, increased streambed area.

- A disproportionately large number of adult steelhead returning from the ocean are reared in freshwater lagoons, *e.g.*, Scott Creek 85% of adults returning were lagoon reared (Bond et al. 2008).
• Review of coastal CA estuaries: steelhead densities higher in closed lagoons than open tidal estuaries.

• Russian River historically closed and formed a lagoon prior to Potter Valley and Lake Pillsbury
  • Holway (1913)
  • Ft Ross settlement records (1830s)
  • U.S. Coast & Geodetic Survey, 1875

• Mgmt prior to BiOp: lagoon formation precluded by artificially high inflows and jetty
  • Barrier beach forms naturally from waves
  • High inflows increase water levels behind barrier beach
  • Flooding is threatened
  • SCWA mechanically breaches beach at narrowest point

• Mgmt prior to BiOp: estuary managed as open, tidal system.
Mgmt prior to BiOp: when managed as open and tidal, steelhead densities in estuary appear very low
  • But good growth rates and high food production

NMFS (2008) BiOp: manage estuary as lagoon during summer
  • Modify breach: outlet angled to north, shallower, wider;
  • Reduce erosive high inflows;
  • Evaluate modifying or removing jetty that affects outflow channel and beach formation.

Anticipated outcome: reduced salinity, greater depths, wider channel for invertebrates, and greater steelhead & coho survival

Plan received academic peer review.
Summer Flow Scenarios:

- **Pre-reservoirs**: USGS Geyserville gage 1910-1913:
  - (Pre-1920s) Aug-October flows generally 0-25 cfs

- **D1610 Normal**: Hacienda min Q=125 cfs,
  - (1986-present) managed about 200 cfs

- **D1610 Dry**: Hacienda min Q= 85 cfs,
  - managed about 80-110 cfs

- **D1610 Critical**: Hacienda min Q=35 cfs,
  - managed about 50-75 cfs

- **NMFS BiOp**: Hacienda min Q= 70 cfs (instantaneous),
  - managed about 75-105 cfs

*At Healdsburg: D1610 dry=75 cfs; NMFS recommends 100 cfs
Difficulties keeping a closed estuary 2009-2013

• Lack of permits for alternative outlet channel
  – 2009 NEPA issue related to pinnipeds
  – Permits for additional volume for north angled outlet channel

• High inflow to estuary
  – Natural high trib inflow in some years -2010 & 2011
  – Healdsburg min Q too high during TUC

• Jenner Jetty likely interferes with outlet channel and barrier beach formation
Russian River Estuary longitudinal profile: Temperature (°C) (2009)

Dissolved Oxygen (mg/l)
Extensive Monitoring of Estuary Biota
Water Quality and Physical Conditions

- SCWA implementing fisheries, water quality, macroinvertebrate, and pinniped monitoring in estuary
- SCWA monitoring juvenile downstream migration patterns.
- Monitoring enables Adaptive Management of Estuary water levels,
  - Fine tune inflows, outlet channel mgmt, and potential modification of jetty.
Summary:

- **Russian River summer flows artificially high due to reservoirs**
- **Cloverdale to Lake Mendocino:**
  - Water temperatures suitable for steelhead
  - High current velocities limit amount of steelhead summer rearing habitat
  - High releases deplete L. Mendocino coldwater pool
- **Estuary**
  - Breaching practices and high summer inflow adversely affect lagoon formation
  - Managing estuary as lagoon would reduce salinity & increase depths and width: improve salmonid survival
Pam Jeane
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Who We Are

• Special district providing wholesale water supply, flood control, and sanitation services

• Local sponsor in operation of Russian River Project, including water supply releases from Lake Mendocino and Lake Sonoma, in cooperation with the Army Corps of Engineers

• Operations subject to compliance with federal and state laws, including Endangered Species Acts
Need for Section 7 Consultation

• To provide “incidental take” coverage for the Corps and Water Agency’s current operations and maintenance activities
  – Avoiding jeopardizing listed salmon and their critical habitats
  – Providing for continued flood control and water supply services for residents of Sonoma and Marin counties
Biological Opinion Implementation

• Fish Flow EIR, Estuary Management Project, and Temporary Urgency Change (TUC) Petitions required to avoid jeopardizing listed salmon and their critical habitats

• Extensive water quality monitoring in coordination with NMFS, CDFW, NCRWQCB, Sonoma County DPH
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Russian River Water Quality Monitoring

Jeff Church
Senior Environmental Specialist
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www.sonomacountywater.org
Goals and Objectives

Monitor water quality in support of Biological Opinion (BO) required changes in operations:

– Reduced summer flows and summer lagoon at Russian River estuary

Collect baseline data and analyze changes to operations for potential effects on availability of suitable aquatic habitat for salmonids.
Need for Additional Monitoring

TUC requires additional monitoring:

– Water samples collected to analyze potential effects on contact recreation and public health

– Monitoring Plan developed in coordination with NMFS, SWRCB, NCRWQCB, CDFW, and Sonoma County DPH

– Locations selected to complement and support NCRWQCB Pathogen TMDL effort
Current Monitoring Effort

• Long-term continuous monitoring at 15 stations:
  – Temperature, dissolved oxygen, pH, specific conductance, and salinity in estuary

• Water samples collected weekly at 11 stations:
  – Nutrients, algae and bacteria
General Observations

• High temperatures (>20°C) observed under range of flows (≤500 cfs) and river mouth conditions:
  – Including above and below D1610 minimums
  – Typically downstream of Cloverdale

• Exceedances of nutrient, algal, turbidity and bacteria criteria (EPA and CDPH):
  – Under range of flows and river mouth conditions
  – Primarily in upper river and lower river

• DO/pH generally stable and supportive of beneficial uses
Future Steps

• Continue monitoring in coordination with regulatory agencies to support BO and TUC requirements

• Share data with NCRWQCB and other agencies

• Utilize data for CEQA analysis in the Fish Flow EIR (Draft EIR - early 2014)
Russian River Water Quality Monitoring

Jeff Church
Senior Environmental Specialist
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Water Board’s Pathogen TMDL

Presentation Outline

1. Overview of the Russian River Pathogen TMDL
   – Definitions & scope
   – Schedule

2. Monitoring Efforts
   – History of work to date
   – Initial results
Russian River Pathogen TMDL

Total Maximum Daily Load

– Determines the maximum amount of a pollutant that a water body can receive and still be safe and healthy
– Identifies sources
– Provides a clean-up/implementation strategy

Fecal Indicator Bacteria

– *E. coli*, *Enterococcus* spp.
– Indicators of pathogens
Fecal Indicator Bacteria Impairments

- Un-named Tributary at Fitch Mountain
- Russian River at Healdsburg Memorial Beach
- Russian River from Guerneville to Monte Rio
- Green Valley Creek
- Laguna de Santa Rosa
- Santa Rosa Creek
# Russian River Pathogen TMDL Schedule

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeframe</th>
</tr>
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<tbody>
<tr>
<td>Technical TMDL Analysis Draft Complete</td>
<td>Winter 2014</td>
</tr>
<tr>
<td>CEQA Scoping Meeting</td>
<td>Spring 2014</td>
</tr>
<tr>
<td>Implementation Plan Draft Complete</td>
<td>Summer 2014</td>
</tr>
<tr>
<td>Peer Review and Basin Plan Amendment Complete</td>
<td>Fall 2014</td>
</tr>
<tr>
<td>Public Comment Period</td>
<td>Winter 2015</td>
</tr>
<tr>
<td>Regional Board Consideration/Hearing</td>
<td>Spring 2015</td>
</tr>
<tr>
<td>State Board Consideration/Hearing</td>
<td>Fall 2015</td>
</tr>
<tr>
<td>U.S. EPA Consideration</td>
<td>Spring 2016</td>
</tr>
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TMDL Monitoring Efforts

• UC Davis Pilot Study – 2007 to 2010
  – Provided monitoring design recommendations

• Pathogen TMDL Monitoring Effort – 2011 to 2013
  – Sampled to help answer the following questions:
    • Are objectives attained?
    • What is the variability of fecal indicator bacteria?
    • What are the most significant sources?
    • What are natural background levels?
    • Do high-use beach areas pose a higher risk?

• TMDL Septic Source Study – 2012 to 2013
  – Sampled to help answer:
    • Do rural watersheds with a higher density of parcels with septic systems contribute more fecal indicator bacteria than watersheds with a lower density of parcels with septic systems?
• Fecal indicator bacteria (FIB) levels are higher in tributaries than in the mainstem
• FIB levels are higher during wet periods than dry periods
• During wet periods, FIB levels are higher in urban sewer areas and in areas with septic systems than in less developed areas
Russian River Fecal Indicator Bacteria
Comparison of Dry vs Wet Weather Periods

Fecal Indicator Bacteria Concentration (MPN/100mL)

- E. coli
  - Dry Period
  - Wet Period

- Enterococcus
  - Dry Period
  - Wet Period

Use EPA (2012) Beach Action Value

Russian River Fecal Indicator Bacteria
Comparison of Dry vs Wet Weather Periods

Fecal Indicator Bacteria Concentration (MPN/100mL)

- E. coli
  - Dry Period
  - Wet Period

- Enterococcus
  - Dry Period
  - Wet Period

Use EPA (2012) Beach Action Value
Comparison of Dry vs Wet Weather Periods

**Russian River *Bacteroides* Bacteria**

**Median Values from Forested Land Use Category**

- **Total Bacteroides**
  - **Dry Period**
  - **Wet Period**

- **Human-specific Bacteroides**
  - **Dry Period**
  - **Wet Period**

- **Bovine-specific Bacteroides**
  - **Dry Period**
  - **Wet Period**

The box plots illustrate the concentration of *Bacteroides* Bacteria in different categories over dry and wet weather periods.
TMDL Monitoring Initial Results

• Human-source *Bacteroides* bacteria were detected in all locations and in all land use categories

• Human-source *Bacteroides* bacteria levels were higher in areas with septic systems than in urban sewered areas

• *E. coli* and *Bacteroides* bacteria levels were higher in rural watersheds with a high density of parcels with septic systems than in watersheds with a low density of parcels with septic systems
Septic Source Study Results
Comparison of Parcel Densities

E. coli Bacteria Concentration (MPN/100mL)
All Bacteroides Bacteria Concentration (16S rRNA genes/100mL)

EPA (2012) Beach Action Value
High Parcel Density: 0.76 to 3.99 parcels/acre
Low Parcel Density: 0.01 to 0.11 parcels/acre or 100 ac. to 10 ac. parcels
Russian River Nutrient Study

- **Purpose:** to help understand nutrient concentrations, algal growth, and algal species
- **Summer 2011**
- **Samples were collected along the mainstem Russian River from Healdsburg Memorial Beach to Monte Rio Beach**
- **Results**
  - Diel dissolved oxygen and pH data do not show a signal of biostimulatory response in most of the river during most of the summer
  - Algal biomass increases seen in late June
  - No microcystin toxin found
Contact Information

Webpage:
http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/russian_river

Mailing List:
http://www.waterboards.ca.gov/resources/email_subscriptions/reg1_subscribe.shtml

Phone:
(707) 576-2220

E-mail:
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Charles Reed, Russian River TMDL Project Manager creed@waterboards.ca.gov
Summary and Conclusions

- Pollutant source control is key
- Source control will take time
- Other factors may affect pathogen concentrations
- We will continue to work together