Drought-Related Emergency Regulation Requiring Enhanced Water Conservation and Additional Water User Information for the Protection of Specific Fisheries in Tributaries to the Russian River
- California State Water Resources Control Board -
Russian River Priority Tributary Watersheds
Important Reaches Within RR Priority Tributary Watersheds
The Russian River is Critical Habitat for Three Salmonid Species

1) Coho Salmon

2) Steelhead Trout

3) Chinook Salmon
Salmonid Life Cycle

- Egg
- Spawner
- Alevin
- Fry
- Smolt
- Adult
Russian River Coho and Steelhead are Dependent on the Tributaries for the First Full-Year of Their Three Year Lifespan
Coho Salmon Evolutionary Significant Unit Populations in California

- Southern Oregon/Northern CA Coast ESU (Threatened)
- Central California Coast ESU (Endangered)

Map showing the distribution of Coho Salmon ESUs in California.
Connected Stream Channel vs. Isolated Pools

Porter Creek, RR Watershed Sonoma County

Green Valley Creek, RR Watershed, Sonoma County
Coho Salmon Smolt
Fish Rescues are the Last Resort in the Efforts to Save Coho and Steelhead

Pena Creek Fish Rescue, May 2015

Coho Salmon Smolts Returned to the Mainstem of the RR
Russian River Coho Salmon Captive Broodstock Program

• Extinction of coho salmon in the Russian River basin was imminent without immediate intervention

• In 2001, state and federal agencies, along with non-profit groups, collaborated to begin a captive broodstock program.
Broodstock Collection History

- Dutch Bill Creek
- Green Valley Creek
- Felta Creek
- Captive

#Fish

- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
Decline of Coho in the Russian River Watershed

- Brown, et al. 1994
- Jong, 2006

<table>
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<tr>
<th>Year</th>
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References:
- Brown, et al. 1994
- Jong, 2006
Significant CDFW Fishery Restoration Grant Funds have been invested in the four Priority Watersheds. Nearly $10 Million has been spent within the four Priority Watersheds in the last 10 Years.
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Historical Stocking and wet/dry
Historical Stocking and wet/dry
Trickle of water maintains surface connection between pools
Juvenile Rearing

• Juvenile coho salmon rear in pools through the summer
  − They require low water temperatures and dissolved oxygen in those pools in order to survive
• Research indicates that even small amounts of surface flow can maintain sufficient water quality in pool habitats
  − However, once surface water connection between pools is lost due to lack of flow, water quality conditions deteriorate rapidly
• Flow conditions described here are minimum subsistence flow conditions and are not suitable management standards outside of this drought emergency
  − Summer rearing flows for growth and maintenance of populations over time are substantially greater
Survival in Disconnected Pools

• This figure shows results from an empirically derived model of coho salmon survival developed by the Russian River Coho Salmon Captive Broodstock monitoring program.
  • Once pools become disconnected, the probability of juvenile survival decreases.
  • The longer the fish are forced to reside in disconnected pools, the more likely they are to perish.

Modeled relationship between juvenile coho salmon survival and persistence in hydraulically disconnected pool habitats (Obedzinski 2015).
Dissolved Oxygen

- The correlation between low dissolved oxygen levels with poor juvenile survival suggests asphyxiation may be a causative factor in their mortality.
- A trickle of surface flow over riffles and into pools will help keep dissolved oxygen levels up in rearing pools.

Observed relationship between dissolved oxygen in milligrams per liter (mg/l) and monthly juvenile coho salmon survival between 2011 and 2013 (CBP 2014).
Juvenile coho salmon require cool water to survive
  - Temperatures within the yellow field are potentially stressful

It is not clear how hydraulic connectivity will effect temperatures
  - But, increases in groundwater inputs to surface streams will likely have a cooling influence in pool habitats
How Emergency Regulations will Help

• Issuing the Conservation Order is likely to improve flow conditions in the four priority stream reaches by:
  – Allowing more groundwater seepage to contribute to stream flow, and;
  – Retain existing surface flow in streams

• In the next two slides, we compare recent stream flow measurements with water use estimates in Green Valley Creek
  • Water use estimates were developed in 2014 by O’Connor Environmental as part of an integrated hydrologic modeling exercise using 2012 data
Stream Flow Conditions

- Flow just below the priority reach in Green Valley Creek persisted through the summer months in 2010, 2011, and perhaps in 2012.
  - The stream appeared to go dry in 2013, and 2014.
- Keep in mind the following:
  - Drought conditions have reduced summer stream flows across all four priority streams by 90% or more from 2010 levels (Russian River Coho Partnership).
- Can we keep the stream from drying up?
Water Demand

• Non-commercial water use constitutes an estimated 42% of overall annual groundwater demand in Green Valley Creek.

• Demand for water is greatest in the summer months.

• Reduction in such water use this summer is therefore likely to “free up” water for the creek.
  – Only a small amount is needed to maintain a trickle.
What is success?

Trickle of water maintains surface connection between pools.
2013 Coho Survival

2013 Juvenile Wild Coho Expanded Minimum Count by Tributary

Expanded minimum count of wild juvenile coho in the Russian River Watershed for the period of July-September, 2013 = 12,590 fish

For streams where every pool was snorkeled, this total is the number of fish observed minus the number of spring-released hatchery fish. For streams where every second pool was surveyed, this total was derived by expanding the number of fish observed by the actual number of pools (multiplying by 2) then subtracting the number of spring-released hatchery fish. This conservative estimate makes the assumption that all hatchery fish were still present at the time of survey.

*Counts are from NOAA electrofishing surveys
2014 Coho Survival

2014 Juvenile Wild Coho Expanded Minimum Count by Tributary

Expanded minimum count of wild juvenile coho in the Russian River Watershed for the period of May-September, 2014 = 426 fish. For Dutch Bill and Green Valley, this total is the number of coho observed prior to spring plantings. In Willow and Pena, where every second pool was surveyed, this total was derived by expanding the number of wild fish observed by the actual number of pools (multiplying by 2). Willow was snorkeled prior to spring plantings. Pena was not planted in the spring and was snorkeled in the summer.
2015 Monitoring
Voluntary Drought Initiative Outreach in 2014

• June 5 – CDFW and NMFS met with Sonoma County Farm Bureau regarding Voluntary Drought Initiative Program

• June 6 – NMFS met with Mendocino County Farm Bureau regarding Voluntary Drought Initiative Program

• September 2 – CDFW sends out letters notifying Green Valley Creek landowners of the 2014 Voluntary Drought Initiative Program

• October 27 – CDFW sends out letters notifying Mill Creek and Dutch Bill Creek landowners of the 2014 Voluntary Drought Initiative Program
Voluntary Drought Initiative Outreach in 2015

April 9 – CDFW sends out letters notifying landowners of 2015 Voluntary Drought Initiative Program

April 21 - Joint letter sent to landowners in urging participation in the Voluntary Drought Initiative

April 23 - Op Ed article in Santa Rosa Press Democrat by CDFW Director Charlton H. Bonham and State Board Executive Director Thomas Howard

April 29 - Meeting with the Farm Bureau and Resource Conservation Districts

May 5 - Letters sent notifying landowners of Voluntary Drought Initiative public meetings

May 11 - Press release publicizing Voluntary Drought Initiative public meetings

May 14 - Meeting held in Occidental for Green Valley and Dutch Bill Creeks

May 20 - CDFW presents at Vineyard Irrigation Efficiency & Water Quality Management Workshop

May 21 - Meeting held in Windsor for Mark West and Mill Creeks

June 5 - CDFW presents at Sonoma County Winegrowers’ Grower Seminar
Programs Available

NMFS and CDFW have made it a priority to continue work with landowners on projects that will enhance flow and conserve water

• Voluntary Drought Initiative Program
• Small Irrigation Registration
• Emergency Tank Registration
• Flow for Fish Rebate Program
CDFW and NMFS contacts for Voluntary Drought Agreements

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Conclusion

• To date voluntary measures have not resulted in enough water conservation in the four priority reaches

• The Enhanced Water Conservation Order is an important step toward the goal of maintaining a surface connection between pools this summer, and keeping these coho and steelhead alive.
Information Order

• We cannot say with certainty whether conservation actions will be sufficient to protect coho salmon in part because we lack information on water demand and the effect it has on stream flows

• The information order can provide this important data and therefore support better, more reliable, management decisions