

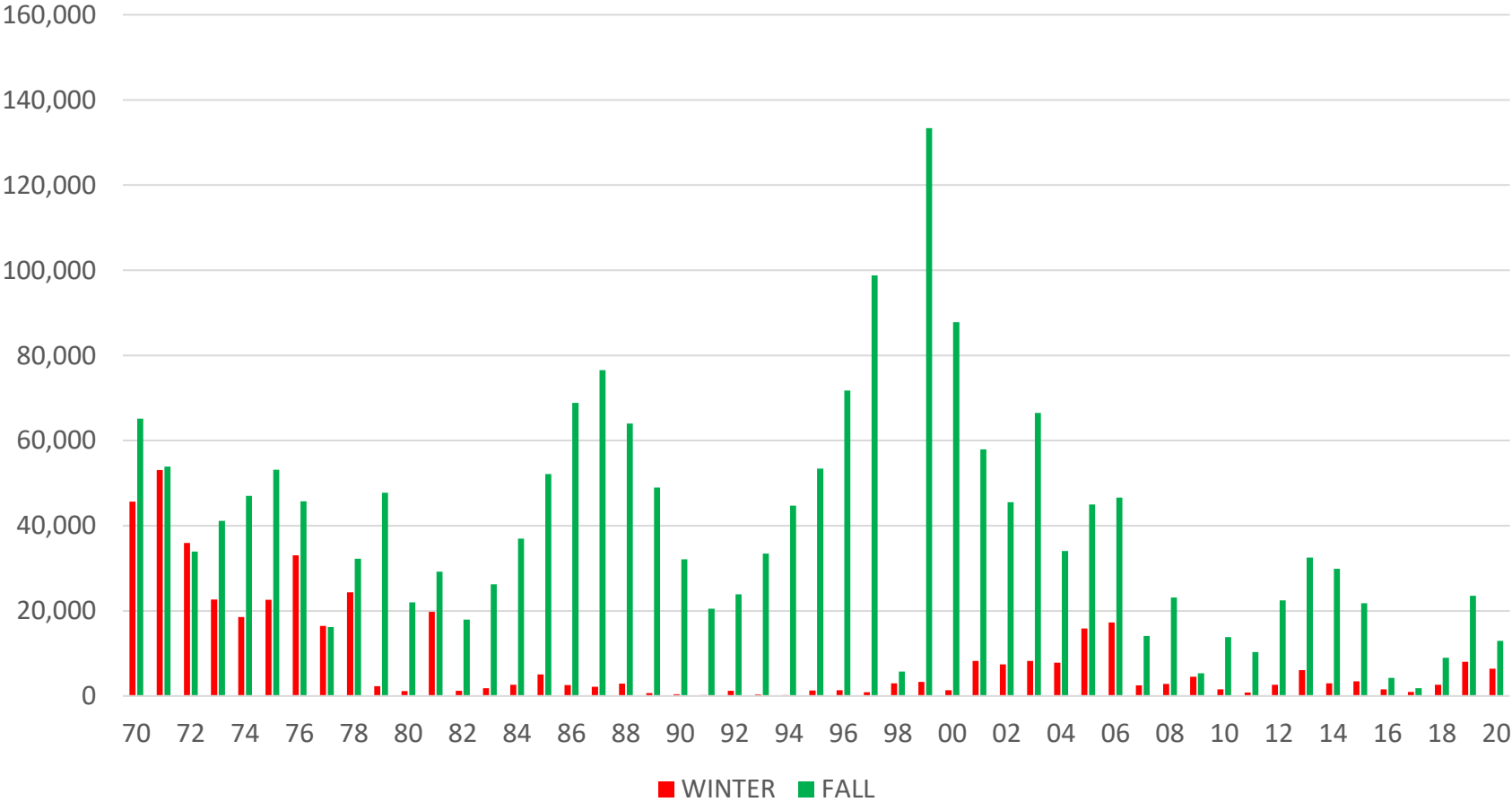
2021 SACRAMENTO RIVER TEMPERATURE MANAGEMENT WORKSHOP

Salmon Conditions and Status



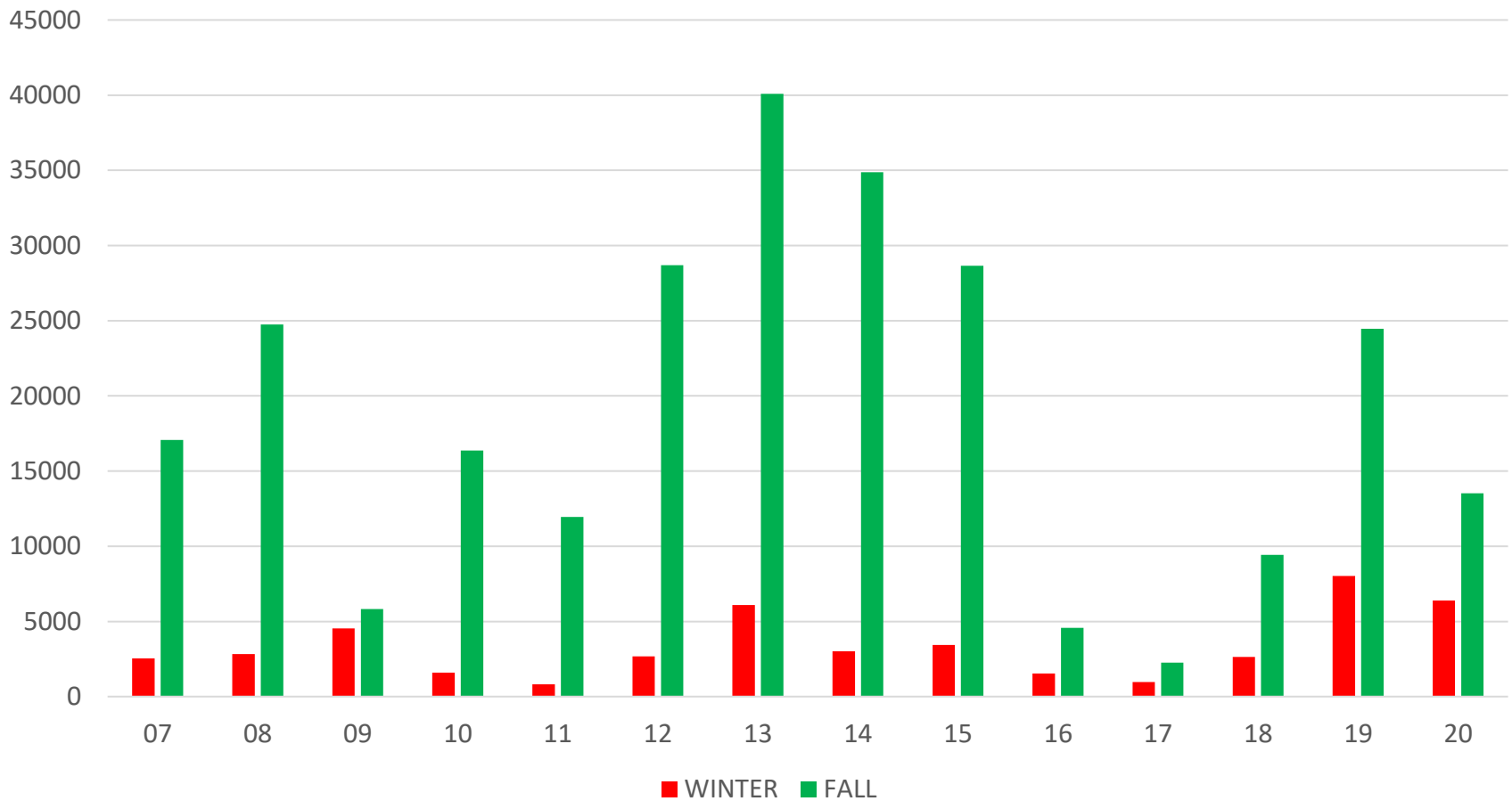
Upper Sac River Historical Salmon Counts for Winter and Fall run Chinook

Mainstem counts by year 1970-2020 and run



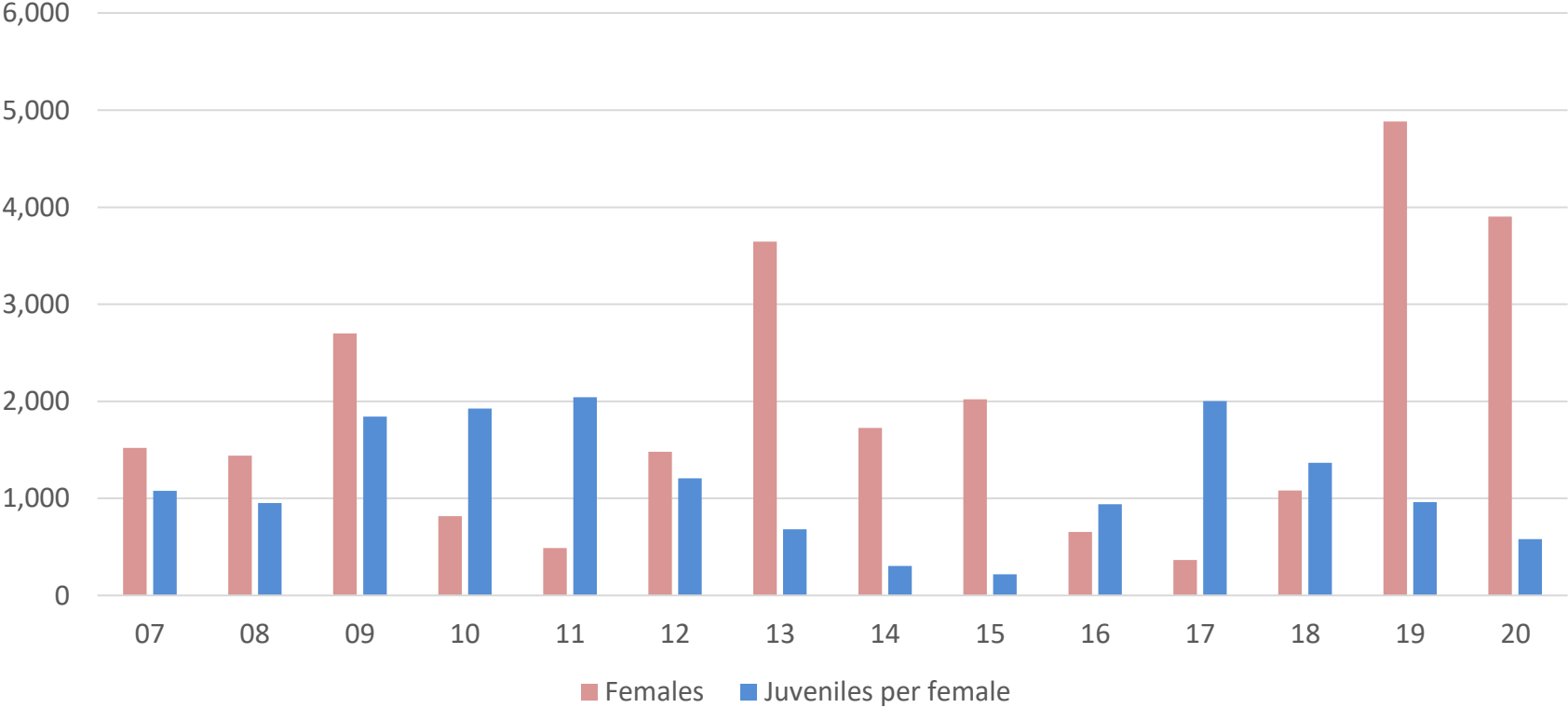
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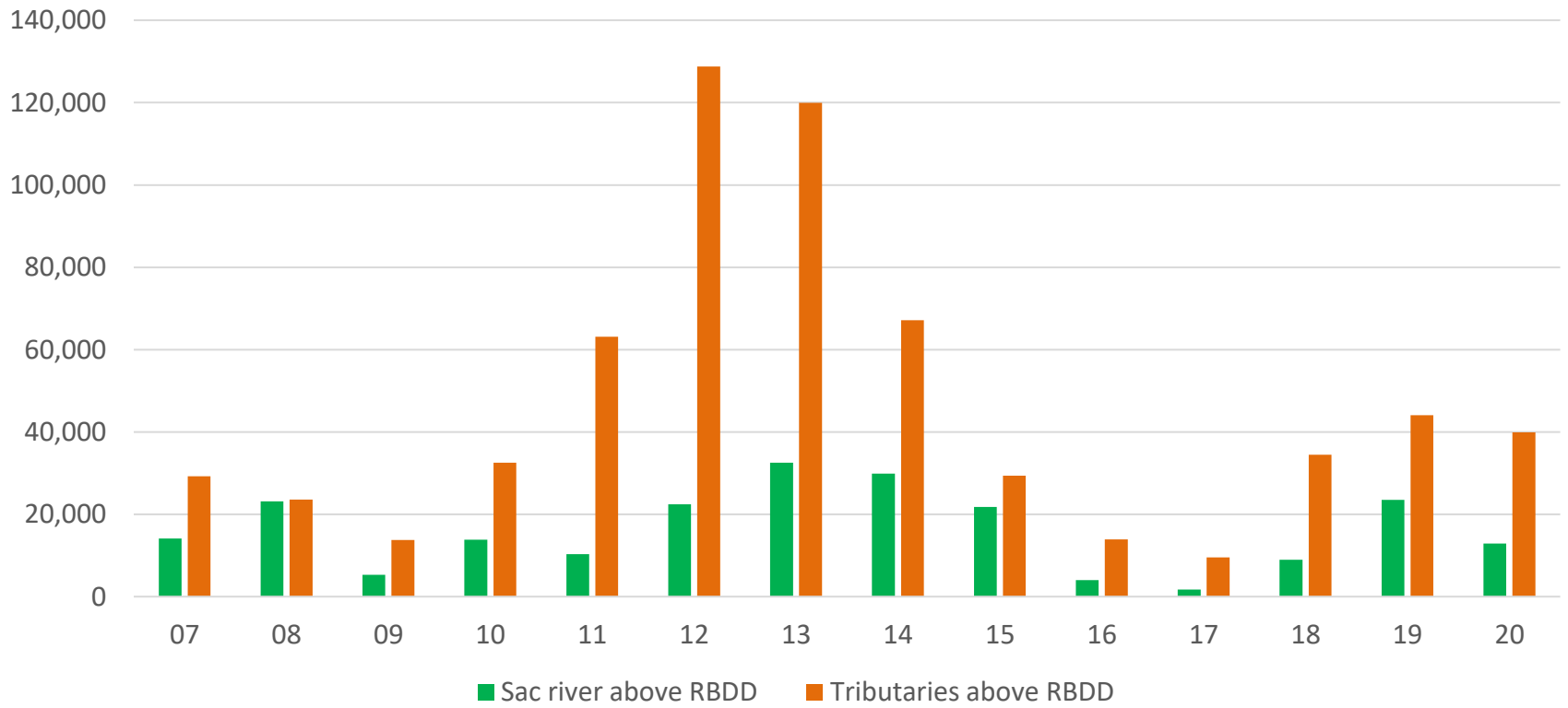
Winter-Run Chinook Status

Winter-run Females (in-river) and the juveniles produced per female by year



Fall-run Chinook status

Fall run in mainstem (green) vs tributary counts (orange) in Sacramento River Watershed above Red Bluff by year

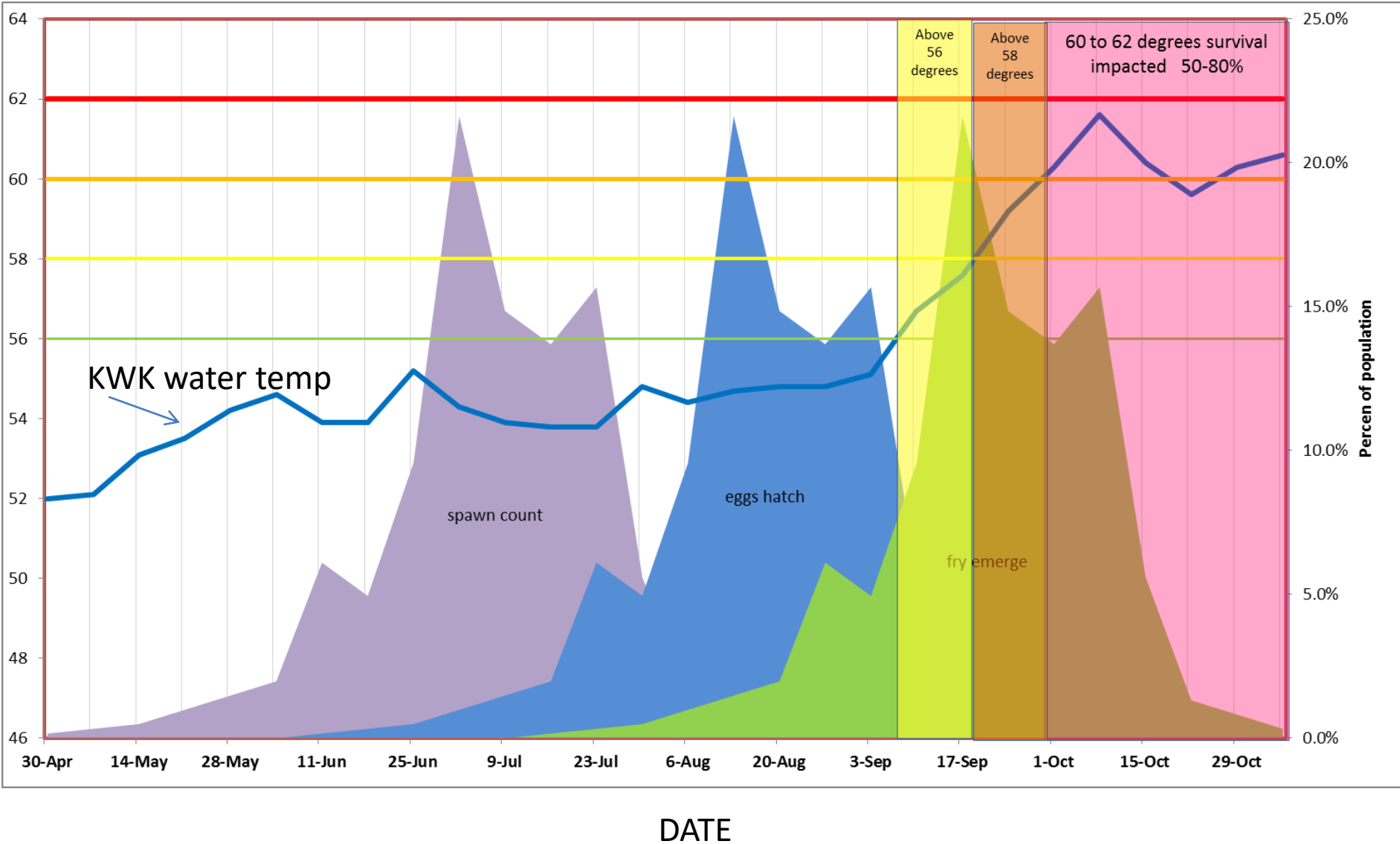


Sacramento River

Temperature Management

- Temperature management is critical throughout egg/fry incubation, water temperatures over 56 degrees can reduce in-redd survival incrementally up to 62 degrees above which conditions are lethal to all survival.
- In most years the upper river below Keswick Dam is held below 56 degrees by management of cold-water releases from Shasta Reservoir.
- In years where Shasta Reservoir levels are low (drought years) high water temperatures during both winter-and fall run redd incubation periods (Jun-Nov) can result in high egg mortality.
- This happened most recently in 2014 and again in 2015 when only an estimated 5% of in-river winter-run juveniles emigrated past Red Bluff (20-year average is approximately 25%) and similar poor survival impacts to fall-run were estimated

Potential Impacts to 2014 Winter-Run Life Stages due to Water Temperatures in the Upper Sacramento River



Impacts of Dry Hydrology on Salmon Populations in the Upper Sacramento River Watershed

- Low Shasta Reservoir levels from poor run-off and snow melt lead to reduced cold-water availability for salmon redds during both winter and fall-run incubation periods.
- Tributary fall-run spawners are delayed or blocked from entering tributaries by low flows and warm water at mouths leaving these fish to spawn in the poor mainstem environment.
- Sept-Feb: Flows are reduced (often to a minimum of 3,250 cfs) to conserve water. This leads to redd dewatering and juvenile stranding.
- Low flows prevent both winter and fall-run juveniles from accessing shoreline vegetative cover important to rearing habitat needs, reducing resting shelter and increasing predator contacts.
- Low flows are typically very clear during drought periods (no rain run off to muddy the water). Clear water attracts abundant aquatic and avian predators (fish, otters, cormorants and mergansers) to easily contact and consume rearing and migrating juveniles in the watershed.