Mill and Deer Creek Central Valley Spring-Run Chinook Salmon (SRCS) Briefing

Current Escapement Estimates

- Mill Creek – **8** fish through April 21, expanding this based on recent monitoring, we project an escapement estimate of **~60** fish.
- Deer Creek – **92** fish through April 24, expanding this based on recent monitoring, we project an escapement estimate of **~140** fish.

Abundance Trends and Extinction Risk

- Fourth consecutive year of critically low returns to Mill and Deer Creek (Figure 1 and Figure 2).
- Both Mill and Deer Creek SRCS populations have seen returns below 500 since 2015, which is a trigger for a high risk of extinction (Lindley et al. 2007).

Juvenile Life History

- SRCS juvenile emigration on Deer and Mill occurs October through June, with peak emigration February through March.
- This delayed emigration life history results in predicted high abundances in the lower Sacramento River April through June.

Reasons for Decline

- Very poor juvenile survival in freshwater.
    - NOAA SWFSC Mill Creek smolt acoustic studies confirm this poor survival (Figure 3).
- Juvenile SRCS emigrating from Mill and Deer Creek experience rapidly changing water conditions due to Sacramento River diversions and Shasta Reservoir operations
    - Up to 50% of the river is diverted between Hamilton City (RM 169) and Wilkins Slough (RM 117)
- NOAA SWFSC data (Michel 2016 CVPIA SIT) shows substantial improvement in in-river smolt survival as flow increases up to 13,000 cfs (Figure 4)
    - 35% at 5,000 cfs
    - 55% at 8,000 cfs
    - 65% at 13,000 cfs

Immediate Management Actions:

- Pursue voluntary cooperation with local water users on Mill and Deer Creek to provide flows that support downstream juvenile survival and upstream adult passage.
    - On Mill Creek June 30
    - On Deer Creek through June 15
- Increase Keswick releases so that a minimum of 8,000 cfs is maintained at Wilkins Slough through May 30.
- Develop Emergency Mill/Deer Creek Spring-run Action Plan
- Implement Sacramento River Keswick Spring Pulse Flow Study
- Complete fish passage improvement projects in Resources Agency Salmon Resiliency Plan
- Develop an emergency Captive Broodstock Program
- Accelerate development and implementation of the following habitat improvement projects:
    - Tisdale Weir fish passage and floodplain project
    - Fremont Weir fish passage and floodplain project
    - Inventory and reconnect side-channels, historic oxbows, and floodplain habitats within the Sacramento River project levees between river mile 219 and 80
    - Non-physical juvenile salmonid barrier at GCID oxbow

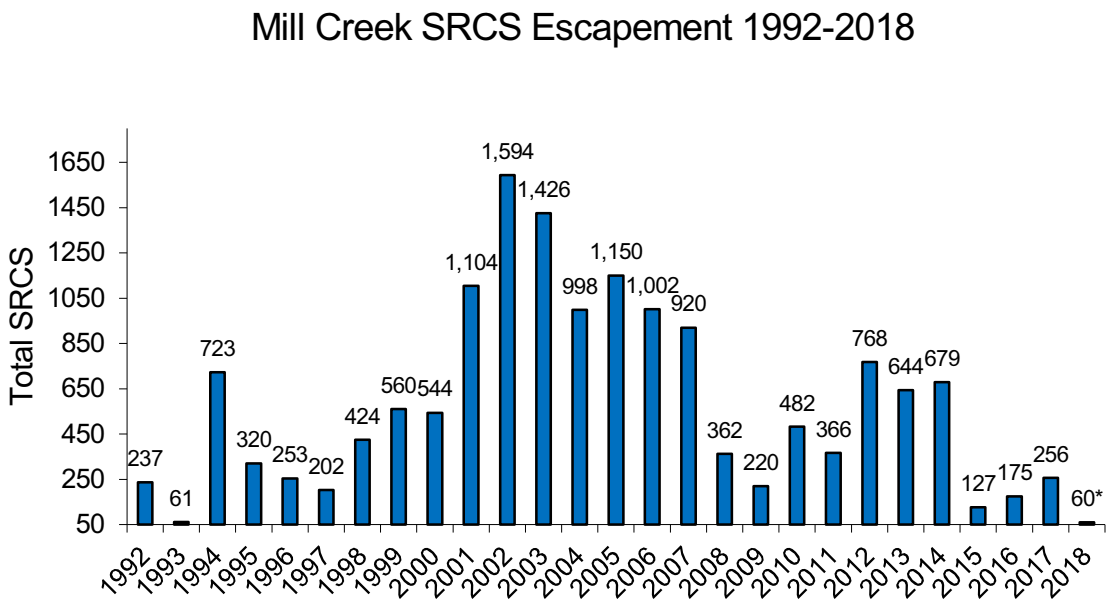

Figure 1. Mill Creek spring Chinook population estimates 1992 through 2018. * An estimated 60 SRCS will return to Mill Creek in 2018 based on monitoring to date.

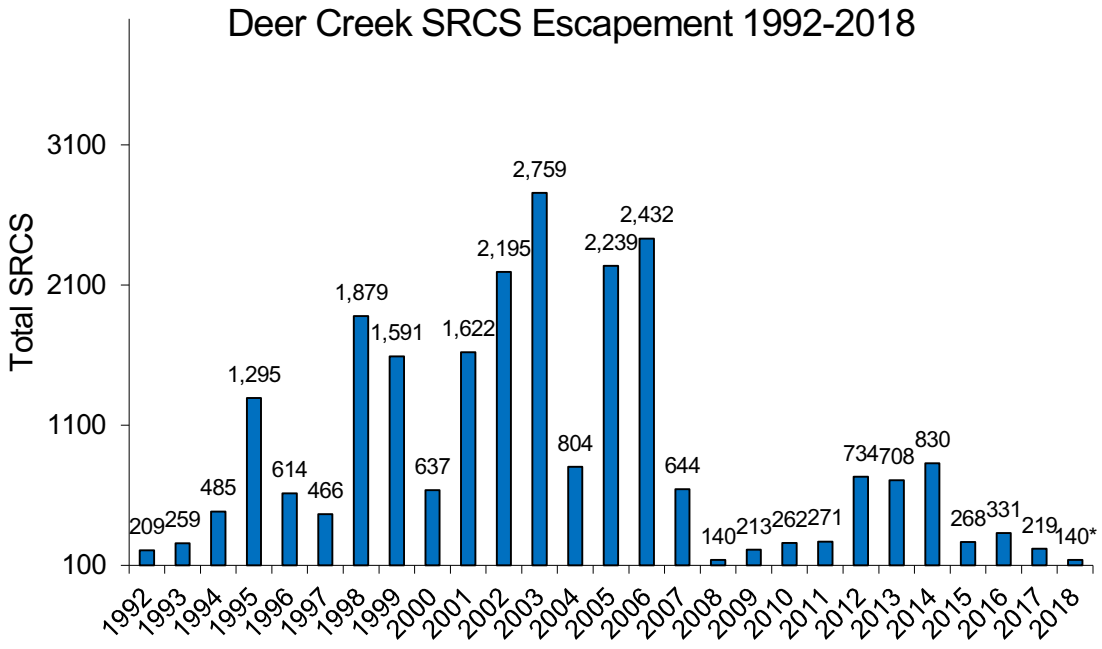

Figure 2. Deer Creek spring Chinook population estimates 1992 through 2018. * An estimated 140 SRCS will return to Deer Creek in 2018 based on monitoring to date.

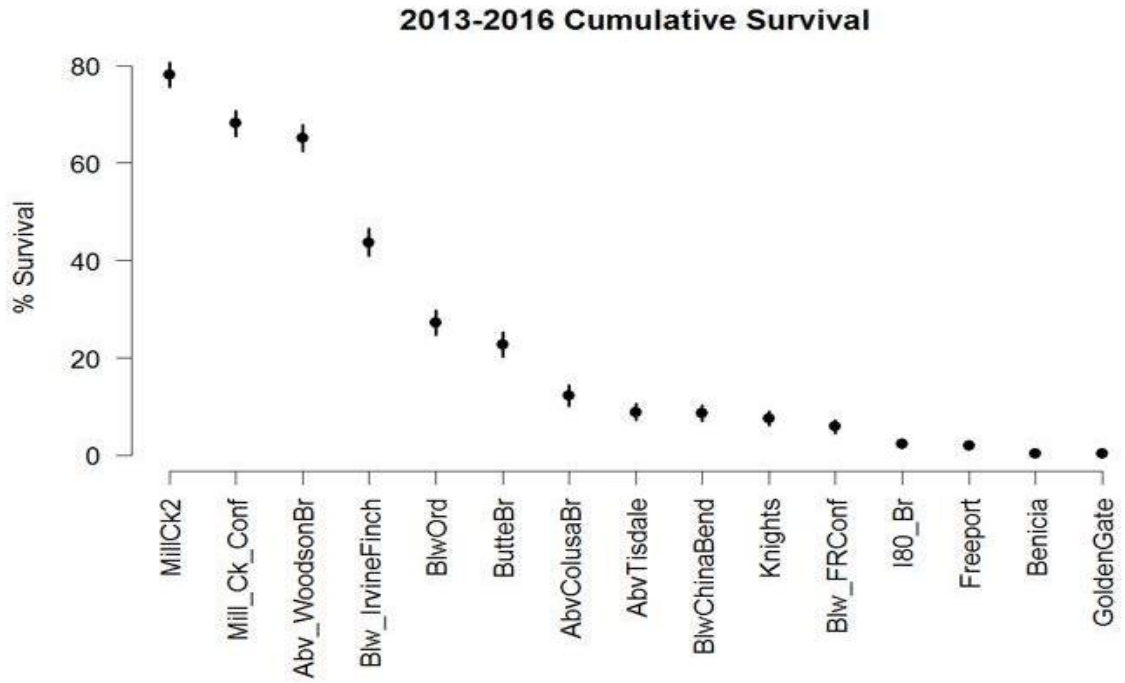

Figure 3. Cumulative survival for Mill Creek SRCS smolts implanted with acoustic transmitters, released into lower Mill Creek, and tracked using a receiver array extending from lower Mill Creek to the Golden Gate 2013-2016 (Notch, 2017).

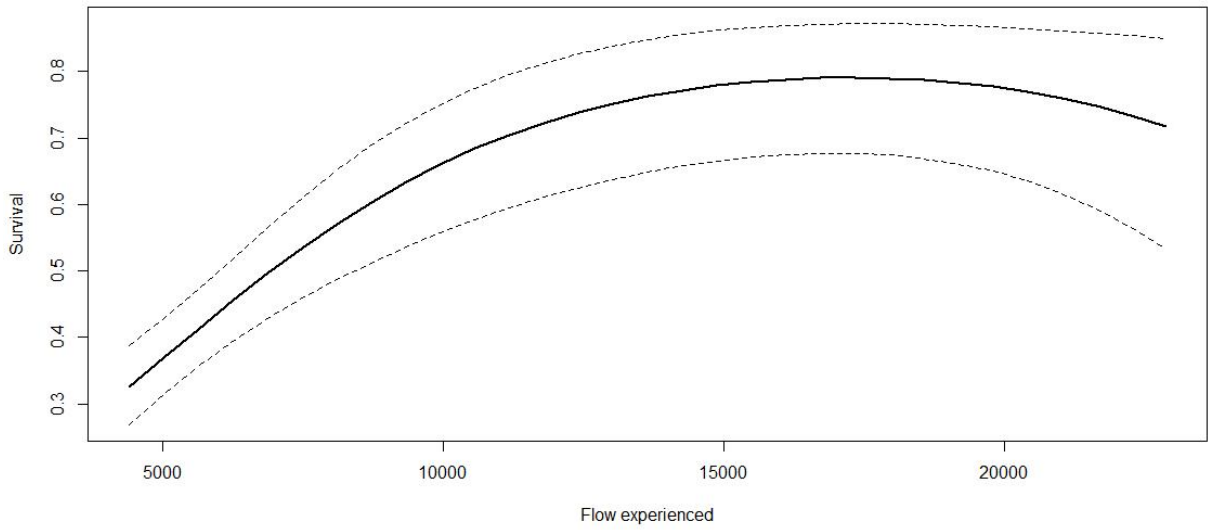

Figure 4. The simulated relationship between flow and survival of acoustic-tagged late-fall-run Chinook smolts in the main stem Sacramento River at Bend Bridge. Flow is plotted with cubic feet per second (CFS) as the unit of measurement. The dotted lines represent 95% confidence intervals (Michel 2016).

References

Lindley, S. T., R. S. Schick, E. Mora, P. B. Adams, J. J. Anderson, S. Greene, C. Hanson, B. P. May, D. McEwan, R. B. MacFarlane, C. Swanson, and J. G. Williams. 2007. Framework for Assessing Viability of Threatened and Endangered Chinook Salmon and Steelhead in the Sacramento-San Joaquin Basin. San Francisco Estuary and Watershed Science 5(1):26.

Michel, Cyril. 2016. Preliminary late-fall-run Chinook salmon smolt outmigration analysis for the Central Valley Science and Integration Team December, 2016 meeting. UCSC/NMFS-SWFCS Santa Cruz Lab.

Notch, Jeremy. 2017. Outmigration Survival of Wild Juvenile Chinook Salmon Smolts from Mill Creek 2013-2016. UCSC-NMFS Fisheries Ecology Division, Santa Cruz, CA.