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**From:** J. Stuart - NOAA Federal <j.stuart@noaa.gov>  
**Sent:** Friday, June 14, 2019 1:06 PM  
**To:** Brian Ellrott - NOAA Federal  
**Subject:** Re: Most recent estimates of salmon mortality/survival through the Delta

I don't recall explicitly citing Wim's paper, I do know we used it in the 2009 opinion, and I think maybe even water fix. It also came up in court. Stuff begins to blur together unfortunately. Did cite to Russ' 2016 paper - I am assuming this is the SF Estuary and watershed paper.

On Thu, Jun 13, 2019 at 12:21 PM Brian Ellrott - NOAA Federal <[brian.ellrott@noaa.gov](mailto:brian.ellrott@noaa.gov)> wrote:

Jeff,

Do you cover/mention the following from Perry et al. 2016 in the Delta effects section?

Kimmerer (2008) estimated that at 10% pre-salvage survival (i.e., 90% combined loss from initial entrainment from both pre-screen loss and imperfect fish guidance efficiency at louvers or screens), the proportion of winter-run Chinook Salmon released in the Sacramento River that die in the fish facilities ("proportional loss") could be as high as 30% at combined exports of 300 m<sup>3</sup>s<sup>-1</sup>.

On Thu, Mar 14, 2019 at 11:08 AM J. Stuart - NOAA Federal <[j.stuart@noaa.gov](mailto:j.stuart@noaa.gov)> wrote:

Hi Brian,

I'd look to Perry et al 2016 paper (see attached). Overall survival through the Delta for LFR CS releases near Sac (2006-2010) had survivals ranging from 0.17 to 0.54. Survival was highest in the Sacramento and Sutter/Steamboat Slough routes, lowest through the interior Delta routes (Georgiana Slough and DCC). Caveats- large LFR hatchery fish, typically released in Dec - Feb time frame. May not represent other "size" migrants or seasons.

For the SJ river side, the 6-year study (had 2011-2014 studies) the survival rate for steelhead ranged from 0.15 (2013 - drought year) to 0.54 (2011 very wet year in the SJR basin) from Durham Ferry release to Chipps Island.. Chinook salmon (FR CS hatchery fish) had very low survival, typically < 5% for through Delta survival from Durham Ferry to Chipps Island. Perry et al (2016) states that SJR survival for CS from 2003 to 2012 ranged from 0 to 0.11 and has been <5% for 15 of 22 releases.

Hope this helps.

Jeff

On Thu, Mar 14, 2019 at 10:05 AM Brian Ellrott - NOAA Federal <[brian.ellrott@noaa.gov](mailto:brian.ellrott@noaa.gov)> wrote:

Jeff,

Can you point me to recent literature I could use to complete the paragraph below? It doesn't have to be specific to winter-run.

*Operating the CVP/SWP and the resultant conditions that are created reduce survival of juvenile salmonids outmigrating through the Delta. Prior to the protections established by the 2009 biological opinion, mortality of winter-run juveniles entering the interior of the Delta (through DCC or Georgiana Slough), was estimated to be approximately 66%, with a range of 35-90% mortality(NMFS 2009<sup>[BE1]</sup>). More recently, juvenile salmon mortality through the Delta has been estimated at...X%*

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**Brian Ellrott**

Central Valley Salmonid Recovery Coordinator  
NOAA Fisheries West Coast Region  
U.S. Department of Commerce  
Mobile: 916-955-7628  
Office: 916-930-3612  
[brian.ellrott@noaa.gov](mailto:brian.ellrott@noaa.gov)

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**Jeffrey S. Stuart, M.S.**

Fishery Biologist

NOAA Fisheries West Coast Region  
U.S. Department of Commerce  
California Central Valley Office  
650 Capitol Mall, Suite 5-100  
Sacramento, CA 95814-4706

Office: 916-930-3607  
[J.Stuart@noaa.gov](mailto:J.Stuart@noaa.gov)



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**Brian Ellrott**

Central Valley Salmonid Recovery Coordinator  
NOAA Fisheries West Coast Region  
U.S. Department of Commerce  
Mobile: 916-955-7628  
Office: 916-930-3612  
[brian.ellrott@noaa.gov](mailto:brian.ellrott@noaa.gov)

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**Jeffrey S. Stuart, M.S.**  
*Fishery Biologist*

*NOAA Fisheries West Coast Region  
U.S. Department of Commerce  
California Central Valley Office  
650 Capitol Mall, Suite 5-100  
Sacramento, CA 95814-4706*

Office: 916-930-3607  
[J.Stuart@noaa.gov](mailto:J.Stuart@noaa.gov)



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