Barbara Byrne - NOAA Federal

From: Barbara Byrne - NOAA Federal
Sent: Monday, June 17, 2019 2:41 PM
To: Kristin Begun - NOAA Affiliate; Stephen Maurano - NOAA Federal
Subject: Fwd: Stanislaus Temps

Kristin -- Stephen is going to try to help us with defining temp-related take exceedance on the Stan. I walked him through our ideas to date after the ROC meeting; here are some ideas from him forwarded below. As you may recall, Stephen came to us via EPA and has delved into much of the SJ-basin issues associated with the Bay Delta plan update so he's very up on the latest in temp compliance, though not in this specific context.

I'll set up a call for 3 to see if we can land on somthing reasonable and not too complicated....

---------- Forwarded message ---------
From: **Stephen Maurano - NOAA Federal** <stephen.maurano@noaa.gov>
Date: Mon, Jun 17, 2019 at 2:32 PM
Subject: Stanislaus Temps
To: Barbara Byrne - NOAA Federal <barbara.byrne@noaa.gov>

just food for thought. Ignore the percent of unimpaired flow distinctions, but here's how they represented their results. These are key tables/figures from https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/water_quality_control_planning/2016_sed/docs/ch_19_fish.pdf

Table 19-1. Primary Stanislaus, Tuolumne, and Merced River fall-run Chinook salmon and steelhead (composite) temperature evaluation considerations. For the primary evaluation locations, the anadromous portion of the river was split into quarters, with ¼ River being closer to the confluence and ¾ River being closer to the dam that limits anadromous migrations.

Evaluation Time Period	Primary Life Stage (fall-run Chinook and steelhead composite)	Temperature Evaluation Thresholds (°C)	Temperature Evaluation Thresholds (°F)	Primary Evaluation Locations
September 1 to October 31	Adult Migration	18 (7DADM)	64.4 (7DADM)	Confluence ¼ River ½ River
October 1 to March 31	Spawning, Egg Incubation, and Fry Emergence	13 (7DADM)	55.4 (7DADM)	½ River ¾ River Dam
March 1 to May 31	Core Juvenile Rearing	16 (7DADM)	60.8 (7DADM)	Confluence ¼ River ½ River ¾ River Dam
April 1 to June 30	Smoltification	14 (7DADM)	57.2 (7DADM)	Confluence ¼ River ½ River
June 1 to August 31	Summer Rearing	18 (7DADM)	64.4 (7DADM)	½ River ¾ River Dam

Table 19-3. The percentage of time on the Stanislaus River that USEPA salmon and steelhead temperature criteria (7DADM unit of measurement) are met each month under modeled baseline (base) conditions during 1970 to 2003, and the magnitude of expected percent change under modeled unimpaired flows of 20%, 30%, 40%, 50% and 60% at different river mile (RM) locations. Positive numbers under the unimpaired flows represent the magnitude of increases compared to baseline in the percentage of time that criteria are expected to be met, and negative numbers under the unimpaired flows represent the magnitude of reductions compared to baseline in the percentage of time that criteria are expected to be met. Expected changes in the amount of time that USEPA temperature criteria are met which are greater than positive 10% or less than negative 10% are highlighted green or red respectively (if applicable), and represent significant changes to salmon and steelhead temperature habitat if indicated at locations which are utilized by that life stage.

Stanislaus River		Confluence (RM0)						1/4 River (RM13.3)						1/2 River (RM28.2)						3/4 River (RM43.7)						Below Goodwin (RM58.5)					
Life Stage	Month / USEPA Criteria (°F)	Base	Percent Unimpaired Flow					Base	Percent Unimpaired Flow					Base	Percent Unimpaired Flow					Base	Percent Unimpaired Flow					Base	Percent Unimpaired Flow				
			20%	30%	40%	50%	60%		20%	30%	40%	50%	60%		20%	30%	40%	50%	60%		20%	30%	40%	50%	60%		20%	30%	40%	50%	60%
AM	Sep (64.4)	10%	0%	0%	2%	0%	-2%	11%	0%	0%	8%	6%	4%	17%	2%	0%	14%	13%	11%	67%	3%	-1%	-1%	-1%	-6%	88%	12%	12%	12%	12%	12%
AM	Oct (64.4)	71%	7%	6%	12%	11%	11%	75%	8%	7%	12%	12%	10%	82%	9%	8%	11%	11%	10%	87%	11%	11%	12%	11%	11%	88%	12%	12%	12%	12%	12%
R	Oct (55.4)	3%	0%	-1%	-3%	-3%	-3%	3%	0%	0%	-2%	-2%	-3%	5%	0%	0%	1%	0%	-2%	17%	0%	0%	2%	-2%	-4%	55%	4%	1%	-2%	-5%	-9%
R	Nov (55.4)	27%	2%	2%	3%	1%	0%	27%	2%	1%	3%	1%	-1%	36%	2%	0%	2%	-1%	-4%	45%	6%	1%	3%	0%	-4%	64%	5%	1%	1%	2%	-4%
R	Dec (55.4)	99%	1%	1%	1%	1%	1%	99%	1%	1%	1%	1%	1%	97%	3%	3%	3%	3%	3%	95%	4%	4%	5%	5%	4%	90%	6%	6%	8%	7%	7%
R	Jan (55.4)	99%	0%	0%	0%	0%	0%	99%	0%	0%	0%	0%	0%	99%	0%	0%	0%	0%	0%	99%	0%	0%	0%	0%	0%	99%	0%	0%	0%	0%	0%
R	Feb (55.4)	85%	2%	3%	3%	4%	6%	85%	2%	3%	4%	5%	7%	93%	1%	0%	1%	2%	3%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%
R	Mar (55.4)	36%	7%	9.9%	9.6%	16%	21%	41%	4%	9%	9.96%	16%	21%	53%	0%	7%	12%	16%	22%	78%	-1%	4%	11%	14%	17%	100%	0%	0%	0%	0%	0%
CR	Mar (60.8)	91%	-1%	2%	5%	7%	8%	92%	-1%	4%	5%	7%	7%	97%	-1%	2%	2%	3%	3%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%
CR	Apr (60.8)	78%	-2%	1%	3%	9.9%	13%	81%	-1%	1%	8%	11%	13%	90%	0%	5%	7%	8%	8%	99%	1%	1%	1%	1%	1%	100%	0%	0%	0%	0%	0%
CR	May (60.8)	51%	-2%	4%	6%	14%	22%	61%	-1%	3%	7%	12%	18%	73%	1%	6%	9.7%	11%	13%	94%	2%	2%	3%	5%	6%	100%	0%	0%	0%	0%	0%
S	Apr (57.2)	39%	-2%	-1%	1%	5%	9.7%	45%	1%	2%	3%	8%	11%	64%	-1%	0%	2%	4%	9%	85%	1%	6%	8%	11%	12%	99%	1%	1%	1%	1%	1%
S	May (57.2)	5%	-2%	0%	2%	8%	17%	13%	-4%	-1%	2%	11%	22%	31%	-6%	0%	7%	16%	22%	67%	2%	3%	7%	10%	13%	97%	3%	3%	3%	3%	3%
S	Jun (57.2)	0%	0%	0%	1%	5%	7%	3%	0%	0%	1%	5%	6%	5%	0%	3%	4%	8%	13%	27%	-3%	-1%	2%	11%	17%	96%	2%	0%	1%	-1%	-2%
SR	Jun (64.4)	38%	-1%	1%	3%	12%	19%	47%	-4%	-2%	2%	11%	17%	56%	-2%	3%	7%	12%	15%	81%	3%	4%	5%	5%	7%	100%	0%	0%	0%	0%	0%
SR	Jul (64.4)	5%	0%	2%	2%	3%	4%	8%	-2%	2%	0%	1%	3%	12%	-1%	4%	4%	5%	7%	43%	3%	4%	9%	8%	8%	100%	0%	0%	0%	0%	0%
SR	Aug (64.4)	5%	2%	0%	-2%	-2%	-4%	6%	2%	-1%	-3%	-3%	-3%	8%	0%	-2%	-5%	-5%	-5%	47%	3%	-2%	1%	-1%	-7%	96%	4%	4%	4%	4%	4%

AM = Adult Migration
R = Reproduction (Spawning, Egg Incubation, and Fry Emergence)
CR = Core Rearing
S = Smoltification
SR = Summer Rearing

Table 19-15. Summary of Mean Annual Temperature Benefits Combined for the Stanislaus, Tuolumne, and Merced Rivers from Different February through June Unimpaired Flow (UF) Percentages for all Modeled Water Years.

Life Stage	Month	USEPA Criteria (°F)	Maximum Compliance Possible (Mile-Days)	Total Compliance under Baseline (Mile-Days)	% of Maximum Compliance Achieved					
					Baseline	20% UF	30% UF	40% UF	50% UF	60% UF
AM	Sep	64.4	4,926	1,222	25%	26%	25%	30%	29%	28%
AM	Oct	64.4	5,090	3,268	64%	70%	69%	72%	72%	71%
R	Oct	55.4	5,090	343	7%	7%	6%	7%	5%	5%
R	Nov	55.4	4,926	1,430	29%	31%	29%	30%	28%	26%
R	Dec	55.4	5,090	4,677	92%	95%	95%	95%	94%	94%
R	Jan	55.4	5,090	4,972	98%	98%	98%	98%	98%	98%
R	Feb	55.4	4,762	3,806	80%	80%	81%	83%	84%	85%
R	Mar	55.4	5,090	2,574	51%	52%	55%	57%	62%	66%
CR	Mar	60.8	5,090	4,382	86%	87%	90%	93%	95%	96%
CR	Apr	60.8	4,926	3,388	69%	71%	78%	83%	87%	91%
CR	May	60.8	5,090	2,730	54%	60%	68%	73%	78%	82%
S	Apr	57.2	4,926	2,353	48%	49%	53%	56%	61%	66%
S	May	57.2	5,090	1,612	32%	34%	38%	42%	49%	54%
S	Jun	57.2	4,926	851	17%	19%	21%	23%	26%	28%
SR	Jun	64.4	4,926	2,275	46%	53%	59%	63%	68%	71%
SR	Jul	64.4	5,090	1,387	27%	28%	27%	30%	30%	29%
SR	Aug	64.4	5,090	1,007	20%	21%	19%	19%	19%	18%

AM = Adult Migration
R = Reproduction (Spawning, Egg Incubation, and Fry Emergence)
CR = Core Rearing
S = Smoltification
SR = Summer Rearing

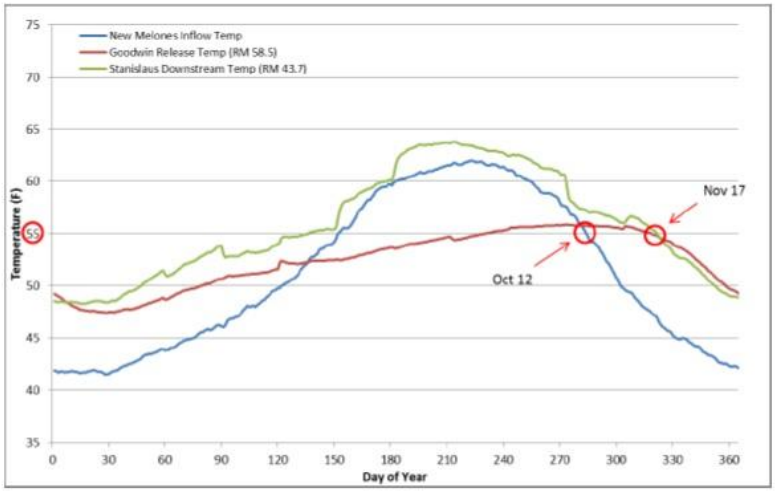

Figure 19-8. Stanislaus River average daily temperature under baseline conditions from 1960 to 2010 at three different locations. There is an approximately 1-month delay from when fall-run Chinook salmon should be able to access optimal spawning temperatures (less than 55.4 °F) to when they can under current conditions.

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