June 30, 2016

Via Electronic Submittal (eFile)

Kimberly D. Bose, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 – 1st Street, N.E.
Washington, D.C. 20426-0001

Subject: **Yuba River Development Project**
FERC Project No. 2246-042 CA
Reply to SWRCB's, CDFW's and NMFS' May 6, 2016 Letters

Dear Secretary Bose:

This letter replies to technical comments and recommendations made by the California State Water Resources Control Board (State Water Board, or SWB), the California Department of Fish and Wildlife (CDFW), and the United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) in May 6, 2016 letters regarding the Yuba County Water Agency's (YCWA) Technical Memorandum 7-11/7-11a, *Fish Behavior and Hydraulics near Narrows 2 Powerhouse, and Study 7-11a, Radio Telemetry of Spring- and Fall-run Chinook Salmon Downstream of Narrows 2 Powerhouse* (Tech Memo). The Tech Memo was filed with the Federal Energy Regulatory Commission (FERC) by YCWA on March 31, 2016 in support of YCWA's relicensing of its Yuba River Development Project, FERC Project Number 2246.

If YCWA has not specifically addressed a comment in the State Water Board's, CDFW's or NMFS' letters in this reply, one should not infer that YCWA agrees or disagrees with that comment. YCWA reserves its right to address any comments if and when appropriate.

REPLY TO STATE WATER BOARD'S MAY 6, 2016 LETTER

SWB-1: "*YCWA displays DIDSON camera operational periods for each event but does not include how many hours and which hours were reviewed for each event. State Water Board staff recommends YCWA include this information or explain how the reviewed hours are allocated.*" (Attachment A, Page 1 of SWB's Letter)

Reply: The quantity of DIDSON™ footage collected and reviewed in 2012 was addressed in three places in the Tech Memo. These were:

> All four infrequent operational events[1] that occurred at Narrows 2 Powerhouse in 2012 were monitored. A total of 290 hours of Dual-Frequency Identification Sonar (DIDSON™) footage was collected, of which 95 hours (33%) were reviewed. (Tech Memo, page ES-2)
>
> Approximately 95 hours of DIDSON™ camera footage out of a total of 290 hours taken during the study were manually reviewed to develop a set of representative, reoccurring categorical behaviors (Table 3.5-1 and Figure 3.5-3). (Tech Memo, page 16)
>
> DIDSON™ camera monitoring occurred five times between August 14, 2012 and November 14, 2012 composing 290 hours of DIDSON™ footage, of which 95 hours were reviewed. (Tech Memo, page 97)

YCWA acknowledges that these statements are incomplete and provides the following clarification. A review of the tracking logs and DIDSON™ files results in the following revision of numbers for the DIDSON™ data and analysis. In total, YCWA collected 290 hours and 59 minutes of DIDSON™ data (footage) during the five monitoring events in 2012 (Table 1). As stated in the Tech Memo, 95 hours (33%) of these data were reviewed to develop a set of representative, reoccurring categorical fish behaviors. The list of behaviors compiled from this review was then used to evaluate and enumerate the behaviors as they were observed in the remaining 195 hours and 59 minutes of footage.

Table 1. A summary of 2012 DIDSON™ monitoring events and the associated footage reviewed for each operational event.

Operational Event	Operational Change	Date/Time of Event	Monitoring Type	Total Hours Recorded	Total Hours Reviewed	Data Review		Elapsed Time (Hours)
						Begin	End	
1	No Change	NA	DIDSON™	17:09	17:09	16:10 (8/14)	9:19 (8/15)	17:09
2	Two Changes: Powerhouse to Full Bypass to Powerhouse	(8/22) 10:16 - 12:00	DIDSON™	55:09	55:09	10:00 (8/21)	17:08 (8/23)	55:09
3	Powerhouse to Full Bypass	(8/31) 10:08	DIDSON™	68:18	68:18	9:00 (8/31)	9:31 (9/3)	72:31[1]
4	Two Changes: Partial Bypass to Full Bypass to Powerhouse	(10/29) 8:07	DIDSON™	97:06	97:06	13:54 (10/25)	15:00 (10/29)	97:06
5	Powerhouse to Full Bypass	(11/14) 15:00 - 16:00	DIDSON™	53:17	53:17	11:42 (11/12)	17:00 (11/14)	53:18
			Total	**290:59**	**290:59**	**--**		**295:12[1]**

[1] A gap exists in the data: 4 hours and 14 minutes was not recorded by the DIDSON™ between 10:26 AM and 2:40 PM on August 31, 2012.

[1] For the purpose of the Tech Memo, an "*operational event*" was a change in flow of more than 400 cfs. Such events included shutdowns, significant flow changes and start-ups. An operational event may be "planned" (i.e., scheduled with some advanced planning), "*forced*," or "*unplanne*d" (i.e., results from an emergency, such as equipment failure).

Table 4.4-3 (Tech Memo, page 97) clarifies the apparent discrepancy between the number of DIDSON™ monitoring periods and the number of monitored operational changes. DIDSON™ monitoring occurred on August 14-15, 2012, but no operational event occurred during this period, resulting in four infrequent operational events (item 1) and five DIDSON™ camera monitoring periods.

SWB-2: "*State Water Board staff also requests that a larger proportion of the DIDSON monitoring data is analyzed to identify all behaviors of Chinook salmon around the Narrows 2 Powerhouse facility during powerhouse operations and operational transitions.*" (Attachment A, Page 1 of SWB's Letter)

Reply: As described in YCWA's reply to SWB-1, YCWA reviewed all of the DIDSON™ footage related to operational events. YCWA hopes that the table and explanations provided in YCWA's reply to SWB-1 clarifies the amount of DIDSON™ footage reviewed.

SWB-3: "*lf subsampling is necessary, State Water Board staff suggests YCWA review scientific literature to find an appropriate subsampling method for behavior data derived from imaging technologies.*" (Attachment A, Page 1 of SWB's Letter)

Reply: As described in YCWA's reply to SWB-1, YCWA reviewed all of the DIDSON™ footage related to operational events. Sub-sampling of the footage was not necessary.

SWB-4: "*While YCWA collected data during an operational change from the Narrows 2 Powerhouse generation to the full bypass in Event 2, the data from this one event does not provide information on Chinook salmon behavior during all transitions in Narrows 2 Powerhouse operations, specifically transitions that include partial bypass discharge.*" (Attachment A, Page 1 of SWB's Letter)

Reply: YCWA agrees with this comment regarding the DIDSON™ monitoring. For that reason, YCWA deployed an Adaptive Resolution Imagery Sonar (ARIS™) camera in 2013 with the intention of expanding the range of operational events monitored for the study and included visual observations when, and if, such transitions occurred during the study.

SWB-5: "*State Water Board staff believes that YCWA should increase the quantity of data analyzed to capture all behaviors of Chinook salmon around the Narrows 2 Powerhouse facility during operations and operational transitions. If subsampling is necessary, State Water Board staff suggests YCWA review scientific literature to find an appropriate subsampling method for behavior data derived from imaging technologies.*" (Attachment A, Page 1 of SWB's Letter)

Reply: YCWA met its commitments to monitor and review DIDSON™ and ARIS™ footage as outlined in an e-mail (Attachment 1) to FERC and Relicensing Participants on July 17, 2013. The e-mail stated:

> **DIDSON™ [ARIS™] CAMERA DATA COLLECTION**
> FERC review and comments on the 2012 interim report suggested the following activity occur for DIDSON [ARIS™] monitoring.

"We recommend YWCA apply the methodologies described in Study Plan 7.11 during the 2013 field season, with the following modifications:

1) *YCWA should conduct DIDSON [ARIS™] monitoring during planned outages of the Narrows 2 powerhouse between July 15 and December 15, 2013.*
2) *YCWA should deploy a DIDSON [ARIS™] camera and begin monitoring at least 4 hours prior to an operational change from a generation status to non-generation status.*
3) *At the latest, YCWA should deploy a DIDSON [ARIS™] camera and begin monitoring the morning of the day prior to an operational change from a non-generation status to a generation status and may discontinue monitoring 4 hours after the Narrows 2 powerhouse returns to a generation status.*
4) *If a prolonged outage of Narrows 2 powerhouse were to occur during the 2013 field season as it did in 2012, YCWA should consult with the NMFS on a periodic DIDSON deployment schedule to capture seasonal fish use and behavior in the vicinity of the Narrows 2 draft tubes during the project's outage."*

Based on the direction of FERC, YCWA will use the DIDSON [ARIS™] to monitor below the Narrows 2 Powerhouse during specific operational scenarios from July 15 through December 15, 2013 with a single DIDSON [ARIS™]. These operational scenarios include:

1. During the planned outage (as stated above, current[ly] scheduled to occur from August 26 through September 4, 2013)
2. Operational change from generation status to non-generation status (i.e., taking Narrows 2 Powerhouse from online to offline)
3. Operational change from non-generation status to generation status (i.e., taking the Narrows 2 Powerhouse from offline to online)
4. During prolonged outage of Narrows 2 Powerhouse (not including the planned outage described in Scenario #1)
5. Change in flow magnitude of 400 cfs during bypass or generation (this scenario was included in the FERC-approved Study 7.11, and includes any combination of changes in the combined releases from the Narrows 2 Powerhouse, Full Bypass and Partial Bypass)

The e-mail continues with YCWA's commitment of effort:

For the planned outage (Scenario #1), YCWA will begin DIDSON [ARIS™] monitoring 24 hours prior to the outage and continue until 24 hours after the outage period. All collected data during the planned outage will be analyzed.

> For scenarios #2, #3 and #5, YCWA will begin DIDSON [ARIS™] monitoring at least 4 hours prior to the scheduled change, and will continue DIDSON monitoring for at least 4 hours after the change has occurred.
>
> For Scenario #4, YCWA will begin DIDSON [ARIS™] monitoring no later than 2 days after outage begins (note that the change from online to offline and offline to online during the outage will be covered under Scenarios # 2 and #3). YCWA will deploy the DIDSON [ARIS™] and operate it continuously during the prolonged outage. The DIDSON [ARIS™] data will only be analyzed for every 2-day monitoring block (two on/two off). Collecting data continuously will safeguard again[st] loss, as more days will be analyzed if any of the required monitoring days are missed due to unforeseen circumstances.

The e-mail was written prior to YCWA acquiring the capability to employ the ARIS™ camera, which was substituted for the DIDSON™ camera in 2013. While not specifically mentioned in the e-mail, YCWA intended to review all of the data collected during the 8-hour periods monitored for scenarios #2, #3, and #5. Footage was recorded outside the prescribed periods, because the ARIS™ was left to run between operational events, but this additional footage was not reviewed as it was considered outside the scope of the study (i.e., did not record fish activities during operational events). The objective of the ARIS™ monitoring was to:

> …describe behavioral activities by anadromous fish at all project operational conditions and during transition periods, including how Narrows 2 Powerhouse operational changes influence species interaction with the Narrows 1 [2] Powerhouse.

As directed by FERC, this was to be evaluated from the 4 hours prior to, during, and 4 hours after operational events, and not the potentially large number of hours between operational events.

YCWA conducted a review of the data tracking logs and ARIS™ files, which resulted in the revision of the total hours recorded and the number of hours reviewed for 2013. A total of 1,584 hours and 21 minutes of footage was recorded, including 1,057 hours and 30 minutes recorded during periods between operational events. The difference results in a total of 526 hours and 51 minutes of data recorded during the operational events prescribed in the July 17, 2013 e-mail to FERC and Relicensing Participants. Ten of the events were from scenarios #2, #3, or #5 listed above, requiring approximately 8 hours of monitoring each. There was one event for scenario #1, none for scenario #4, and one event that was monitored but did not fit any of the above scenarios (Event 6). All of the ARIS™ footage recorded in the 8-hour-long windows prescribed by FERC for scenarios #2, #3, and #5 was reviewed. The total footage reviewed included 201 hours and 11 minutes of data. (Table 2.)

Table 2. A detailed account of each monitoring event and the hours of ARIS™ data collected and reviewed at Narrows 2 powerhouse in 2013.

Event	Date (2013)	Operational Event	Time of Event	Monitoring Type	Total Hours Recorded	Total Hours Reviewed	Review		Elapsed Time
							Begin Time	End Time	
1	7/31	Testing of Narrows 1 Unit	12:07-19:11	ARIS™	15:04	15:04	8:07	23:11	15:04
	8/1		9:00-18:00	ARIS™	17:00	17:00	5:00	22:00	17:00
	8/8		17:42	ARIS™	8:00	8:00	13:42	21:42	8:00
2	8/25	Increase flow at Narrows 2 Powerhouse	12:20	ARIS™	8:00	8:00	8:20	16:20	8:00
3	8/31	Flow reduction and start of Partial Bypass operation	11:19	ARIS™	8:00	8:00	7:19	15:19	8:00
4	9/8 - 10/1	Unit outage at Narrows 2 Powerhouse	7:29 (9/8) - 12:03 (10/1)	ARIS™	429:00	103:20	--[1]	--[1]	N/A
5	10/1	Testing of Narrows 2 Unit	12:03	ARIS™	8:00	8:00	8:03	16:03	8:00
6	10/7	Partial Bypass to Full Bypass	14:01	ARIS™	0:00	0:00	--	--	N/A
7	10/11	Full Bypass to Narrows 2 Powerhouse	11:10	ARIS™	1:47	1:47	10:30	14:02	3:32[2]
8	10/13	Emergency event at Narrows 2 Powerhouse; Narrows 2 Powerhouse to Full Bypass	14:00	ARIS™	0:00	0:00	--	--	N/A
9	10/14 - 10/15	Full Bypass to Narrows 2 Powerhouse	14:06	ARIS™	8:00	8:00	10:06	18:06	8:00
10	11/22	Narrows 2 Powerhouse to Full Bypass	6:03-6:10	ARIS™	8:00	8:00	2:03	10:10	8:07
11	11/22	Full Bypass to Narrows 2 Powerhouse	16:08	ARIS™	8:00	8:00	12:08	20:00	7:52
12	11/29	Emergency event at Narrows 2 Powerhouse; brief switch to Full Bypass	4:50-4:57	ARIS™	8:00	8:00	0:50	8:57	8:07
				Total	**526:51**	**201:11**	--		--

[1] The large amount of data recorded during the outage was subsampled as described in the Tech Memo. This produced many beginning and ending time stamps for the review and could not be presented in this format. A table of the subsampling periods is presented in Attachment 2 to this letter.

[2] The 1 hour and 47 minutes recorded during event #7 occurred over a period of 3 hours and 32 minutes as a result of the same technical failure that resulted in less than the full 8 hours of footage for the event.

The large amount of footage collected during the annual outage (scenario #1) included an extended period of release from the Full Bypass or the Partial Bypass. In this case, the ARIS™ footage was sub-sampled, as described in detail in the Tech Memo, resulting in 103 hours and 20 minutes of reviewed footage. The sub-sampled periods are presented in Attachment 2 to this letter.

SWB-6: "*YCWA sub-sampled these* [2013 underwater video monitoring] *data without providing a justification. State Water Board staff recommends that YCWA review data a minimum of 4 hours prior, during, and 4 hours after each operational change (for a total of 12 hours), if data are available. YCWA should increase the quantity of data analyzed to capture all behaviors of Chinook salmon around the Narrows 2 Powerhouse facility during operations and operational transitions. If subsampling is necessary, State Water Board staff suggests YCWA review scientific literature to find an appropriate subsampling method for behavior data derived from imaging technologies.*" (Attachment A, Page 2 of SWB's Letter)

Reply: The footage referred to by the State Water Board was collected voluntarily by YCWA beyond what was described in YCWA's July 17, 2013 e-mail to FERC and Relicensing Participants, or as required by the FERC-approved study. YCWA agreed to attempt the data collection after consultation with NMFS during a site visit on August 28, 2013. YCWA had no commitment to review any of the footage, and views it of little value given the limited range of visibility.

SWB-7: "*In conclusion, the fragmented hydrophone array (missing H1, H2, H6, H8, and H10) created a significant gap in YCWA's ability to track Chinook salmon and accurately calculate percent of maximum fish presence*." (Attachment B, Page 1 of SWB's Letter)

Reply: The analysis presented in Figures 4.6-10 through 4.6-16 of the Tech Memo (Tech Memo, pages 171 – 177) show estimates of the percent maximum fish presence for each fish under the operational conditions in which each fish was tracked. YCWA recognizes that these are not perfect illustrations of fish behavior downstream of Narrows 2 Powerhouse, but considers them to be the most reliable information available.

As described in Section 6.2 of the Tech Memo:

> On June 17, 2015 during the installation of the remote monitoring equipment, YCWA noticed that several of the hydrophones were not operating correctly. Hydrophones H2, H6, H8, and H10 were indicating varying levels of impaired functionality. Immediate steps were taken to request an outage in order for the hydrophones to be replaced and work was scheduled for July 2, 2015. This work was canceled by the California Independent Systems Operator due to high temperatures and the anticipation of high demand on California's power grid. The work was re-scheduled for August 3, 11, 21, 31, September 3, and October 7, each time being canceled due to the California ISO or mechanical problems with the Narrows 1 Powerhouse, requiring flow be maintained at Narrows 2 Facilities. The four hydrophones were finally replaced on October 15, 2015.

As shown in the Tech Memo (Figure 3.8-5, page 54), the hydrophones were mounted in a semi-permanent fashion to either bedrock or boulder substrate on the bottom of the river. Replacing the hydrophones and cables required commercial divers. Safe diving practices require that divers work in flow velocities no more than 2 feet per second. YCWA and the divers determined that this meant that the divers would work with no more than 150 cfs releasing from the Full Bypass, excluding any work in the Bypass Pool, or under complete non-operation of any Narrows 2 Facility. As described above, these conditions were not achieved until mid-October 2015.

The tailrace downstream of Narrows 2 Powerhouse was covered by a high concentration of hydrophones. The original intent of this was to overcome challenging tracking conditions (i.e., aeration) during powerhouse operations. However, as it turned out during the study, it also allowed for significant overlap in the areas covered by each hydrophone when the powerhouse was not operating, as was the case in fall 2015. So, while hydrophones H2, H6, H8, and H10

were not fully functional, hydrophones H3, H4, H5, H7, H9, H11, H12, H13, H14, H15, and H16 were all performing perfectly. Near the powerhouse, H3, H4, H5, and H7 collected data that were used to calculate two-dimensional (2D) positions throughout the upper end of the site. 2D positions were not resolved in a small area between hydrophones H8 and H10. However, analysis can be conducted to determine the frequency with which fish were in this area through a process of elimination, although this would be a very costly process and the results would be of questionable value. That is, knowing when fish were in this specific part of the study area would add little to the knowledge that was gained from the study.

The Bypass Pool and hydrophone H1 are another matter. HTI informed YCWA and Relicensing Participants that the single hydrophone (H1) in the Bypass Pool would not generate 2D positions when the hydrophone locations were originally proposed because 2D positions require a minimum of three hydrophones. Additionally, this location is subject to extremely forceful and turbulent hydraulics under Full Bypass operations, so while YCWA agreed to place a single hydrophone there, it was recognized that the hydrophone might not stay in place and would provide no 2D information.

SWB-8: "*Given the limited number of salmon in the Yuba River by the end of September 2015, YCWA contends that six Chinook salmon satisfy the sample size criteria defined in Section 3.8.1.1. State Water Board staff does not believe the target sample size was meant to be based on that year's Yuba River Chinook salmon run size. State Water Board staff's understanding is that the agreed upon target sample size was 85 Chinook salmon.*" (Attachment B, Page 1 of SWB's Letter)

Reply: YCWA has not taken a position on the sample size criteria, either that it was satisfied or not satisfied in the Tech Memo. The information and statistics on catch on page 155 of the Tech Memo were not intended to be definitive statements to the satisfaction of any study elements, but rather to frame the low catch in the context of what had been a very low return up to that point in the study year.

SWB-9: "*However, State Water Board staff also recognizes that YCWA used the incorrect fishing gear for a majority of sampling hours conducted in June and July 2015. YCWA was using Blue Fox #4 size (~2.5-inch lure) until the late July, when YCWA switched its fishing gear to a preferred salmon K15 Kwikfish (~5=inch lure).*" (Attachment B, Page 2 of SWB's Letter)

Reply: YCWA did not report, specifically, on the times when each type of fishing gear was employed. In fact, YCWA used a variety of sizes of spinning lures and plugs (e.g., Kwikfish and others) in the first 4 weeks of sampling (i.e., June and July efforts). The fact that the use of spinning gear was suspended in the midst of the July 20 – 31 sampling event does not imply that the other types of tackle were not being used. They were.

Further, YCWA suspended use of the #4 Blue Fox spinners to limit the catch for steelhead, not to increase the catch of salmon. On July 20, 2015, Leslie Alber of CDFW's Fisheries Branch sent an e-mail to Joel Passovoy of HDR requesting additional information regarding how YCWA would limit steelhead by-catch. Mr. Passovoy responded stating:

> We have been using #4 Blue Fox spinners and K15 Kwikfish. Both with 1/0 single barbless hooks. We experimented with the spinners fairly early on, but have not used them for the last six days of fishing. The large gear would appear to be minimizing by-catch, as we generally only hook about 20% (estimated) of the fish that hit the lures. We have not measured any of the fish captured, but they are generally in the range of 14-16 inches.

CDFW re-authorized the 4(d) permit with an increase in the take of adult steelhead from 10 to 20 fish and the following conditions:

- Use of #4 Blue Fox spinning lures will be discontinued and only K15 Kwickfish with 1/0 single barbless hooks will be used to minimize the impacts on by-catch.
- A Department representative can be present at any point during angling activities. The Department representative will be allowed to photograph fish at the time of capture to document the condition of the captured fish.
- Sampling will not be allowed within the area that gravel augmentation work is being conducted until gravel augmentation is complete.

YCWA made every effort to capture any salmon that might have been in the vicinity of the Narrows Pool. YCWA hired the same local guide that was employed by the Yuba Accord River Management Team (RMT) for the fish tagging in 2009-2011. The guide has 18 years of experience guiding salmon fishing in the Yuba River and had previously been contracted by the Pacific States Marine Fisheries Service, the Department of Water Resources, U.S. Fish and Wildlife Service, and CDFW to capture salmon for telemetry tagging. Daily tackle selection and strategy were determined by the guide.

The VAKI data supports the more logical notion that catch in June and July was limited by the low numbers of Chinook salmon in the Yuba River at that point in the year. Table 4.6-3 of the Tech Memo presents RMT data for fish ascending the ladders at Daguerre Point Dam from 2009 through February 2016. A total of 55 fish passed the ladders between March 1 and July 31, a point 12.5 miles downstream of the study site. It is much more reasonable to assume that low numbers of fish in the river explain why YCWA did not capture any fish in June and July.

SWB-10: "*A primary objective in the tagging procedure is to minimize stress of tagged fish to ensure the fish are returned to the river with limited additional energy expenditure. Minimal handling reduces sampling effects and allows for the collection of the most accurate data from each fish. However, Figure 4.6-1 shows multiple photographs of what appears to be unnecessary chinook salmon handling practices (e.g., holding fish out of the water). State Water Board staff encourages YCWA to avoid such practices in the future as they may bias data.)*." (Attachment B, Page 2 of SWB's Letter)

Reply: YCWA acknowledges that it was unnecessary to lift the fish out of the water for the photos. However, it was only for 1 to 2 seconds immediately before the fish was released. The

practice was self-corrected by field staff, as illustrated in two of the six photographs in Figure 4.6-1, on page 154 of the Tech Memo.

REPLY TO CDFW'S MAY 6, 2016 LETTER

CDFW-1: "*The Department requests that YCWA redo the analysis to include a larger proportion of the DIDSON™ monitoring data to capture more salmonid behavior information. If subsampling is necessary, the Department suggests YCWA review scientific literature to find an appropriate subsampling method for behavioral data derived from imaging technologies.*" (Page 3 of CDFW's Letter)

Reply: As described in YCWA's reply to SWB-1, YCWA reviewed all of the DIDSON™ footage.

CDFW-2: "*For the revised analysis, the Department requests YCWA clearly present (e.g., in the form of a table) the number of hours of data reviewed during each monitoring period and the corresponding operational event(s) and subsequent behavior observed.*" (Page 3 of CDFW's Letter)

Reply: As described in YCWA's reply to SWB-1, YCWA reviewed all of the DIDSON™ footage.

CDFW-3: "*The Department requests that YCWA clarify whether 484 or 184 of the total 2,129 hours of footage were reviewed.*" (Page 4 of CDFW's Letter)

Reply: As described in YCWA's reply to SWB-5, the ARIS™ data were re-examined and the total number of hours recorded (1,584 hours and 21 minutes), the total number recorded during monitoring periods (526 hours and 51 minutes), and the total number of hours reviewed for analysis (201 hours and 11 minutes) have been revised, and are more clearly shown in Table 2.

CDFW-4: "*The Department requests YCWA provide a justification with respect to the minimal amount of data included in the analysis. The Department also requests that YCWA redo the analysis to include a larger proportion of the ARIS™ monitoring data to capture more salmonid behavior information. If subsampling is necessary, the Department suggests that YCWA review scientific literature to find an appropriate subsampling method for behavioral data derived from imaging technologies.*" (Page 4 of CDFW's Letter)

Reply: As described in YCWA's reply to SWB-5, YCWA conducted monitoring and footage review as described in its e-mail to FERC and Relicensing Participants on July 17, 2013 and consistent with the FERC-approved study with the ARIS™ camera used in place of the DIDSON™ camera. The large amount of footage collected during the annual outage was sub-sampled to a more practical level resulting in approximately 24 percent of the outage being reviewed.

CDFW-5: "*The Department requests YCWA explain why these data are "not related to the focus of Study 7.11" if the data were excluded before or after subsampling, and to which operational events the excluded data corresponds.*" (Page 4 of CDFW's Letter)

Reply: As described in YCWA's reply to SWB-5, the ARIS™ data collected outside the operational event monitoring periods, and not required by the study, as described in the July 17, 2013 e-mail to FERC were archived and not included in any of the analysis, which was only applied to the data collected during the annual outage and operational events. The excluded data did not correspond to any operational events.

CDFW-6: "*For the revised analysis, the Department requests YCWA clearly present (e.g., in the form of a table) the number of hours of data reviewed during each monitoring period and the corresponding operational event(s) and subsequent behavior observed.*" (Page 4 of CDFW's Letter)

Reply: Refer to YCWA's replies to SWB-5 and CDFW-4.

CDFW-7: "*The Department requests YCWA revise the GoPro® camera monitoring data analysis to include all useable (i.e., visually interpretable) footage.*" (Page 5 of CDFW's Letter)

Reply: Refer to YCWA's reply to SWB-5 and SWB-6. Data were collected voluntarily by YCWA and outside the scope of the study: there was no commitment made by YCWA or a requirement in the study to review the full data set. As this was an experimental technique, it was not applied at all of the monitoring events and represents an incomplete data set.

CDFW-8: "*The Department believes that Project operations of the Narrows 2 facilities attract Chinook salmon to the Narrows 2 Powerhouse area and lead to the milling behavior they exhibit in the area*." (Page 5 of CDFW's Letter)

Reply: CDFW has not provided any evidence to support its opinion. It is just as likely that fish were holding here because the area falls within their well-known habitat preference for deep pools for holding.

CDFW-9: "*Department staff were present during the operational event on October 25, 2012, and observed the partial-bypass in operation for approximately four hours (approximately 0800 hours to 1200 hours). Water from the Partial Bypass discharges from the powerhouse as a highly pressurized sub-aerial spray that extends 60 to 70 ft vertically into the air and about 100 to 130 ft downstream (see Figure 1). The result of the discharge is a massive arched plume of water that cascades down onto the river channel and north bank on river*." (Page 5 of CDFW's Letter)

Reply: As CDFW and FERC are aware, YCWA is installing a hood on the Partial Bypass that has been designed to eliminate the spray of water onto the bank when the Partial Bypass is used. YCWA is taking this action to protect fish from stranding related to the spray from the Partial Bypass.

In addition, as required by the FERC-ordered *Narrows 2 Facilities Prioritized Operations and Monitoring Plan*, YCWA monitors fish stranding after each use of the Partial Bypass. To date, YCWA has not found any stranded fish in relation to use of the Partial Bypass.

CDFW-10: *"The Department requests that YCWA disclose this information to the Department, FERC, and other relicensing participants."* (Page 12 of CDFW's Letter)

Reply: YCWA has disclosed to CDFW and other agencies all incidences of stranding of which YCWA is aware.

In addition, as required by the FERC-ordered *Narrows 2 Facilities Prioritized Operations and Monitoring Plan*, YCWA monitors fish stranded or in isolation pools after specific changes in Project operations, and by January 15 of each year until a new license becomes effective, unless otherwise approved by FERC, YCWA will file with FERC a report summarizing the results of its monitoring in the previous calendar year. Also, YCWA advises agencies when stranded or isolated fish are observed, and as required by the FERC-approved *Streambed Monitoring Below Englebright Dam Plan*, YCWA has and will continue to take action to reduce the potential of fish stranding or isolation. For instance, YCWA has removed a pool where fish were observed to be isolated, has initiated action to remove the gravel bar that sometimes forms at very low-flow conditions and is known to isolate fish under those conditions, and plans to install a hood on the Partial Bypass (refer to YCWA's reply to CDFW-9) to reduce the potential for fish stranding.

CDFW-11: *"Page 155 of TM 7-11 and 7-11a states: 'The six fish that were tagged by YCWA represented 1.3 percent of the fish that traversed Daguerre Point Dam by the end of September 2015. Thus, if only 13 percent of fish traversing Daguerre Point Dam make it up to Narrows 2 Powerhouse, then the six fish represent 10 percent of the fish that would be expected to be present during sampling.' The Department disagrees with this statement. YCWA determined the target sample size of 85 salmon using a mean population estimate derived from eight years of data, from 2004 through 2011. It is not appropriate for YCWA to use one year of data (2015) to make assumptions regarding the number of fish that should have been available in the study area for capture and tagging. Additionally, the Department believes other factors that occurred during the study contributed to the lack of fish captured and tagged as well as the number of fish present in the study area as explained below.* (Page 14 of CDFW's Letter)

Reply: YCWA acknowledges that the paragraph is unclear. To clarify, at of the end of September 2015, 451 Chinook salmon had traversed Daguerre Point Dam. Past telemetry data showed that 13 percent of tagged fish located above the dam migrated up to the area near Narrows 2 Powerhouse. As these are the only data available to work with, it is reasonable to assume that the number of fish that reached Narrows 2 Powerhouse by the end of September 2015 was closer to 59 (i.e., 13% of 451) than 451. Therefore, the six fish captured represent between 10 and 1.3 percent of the fish that may have been present in the study area. The paragraph was intended to put the low numbers of fish caught into the context of a year of very low returns up to that point. The combined spring- and fall- Chinook salmon run for 2015-2016 Yuba River Chinook salmon was the second lowest since 2009-2010. Moreover, it was the third lowest return for March, second lowest for April and May, and lowest for June, July, August, September, and October for the past 7 years (Table 3) (i.e., 2009-2010 through 2015-2016).

Table 3. Monthly counts and cumulative totals for Chinook salmon counted by the RMT at Daguerre Point Dam from March 1, 2015 through February 22, 2016.

	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
2009-2010	1	10	101	462	190	582	1,368	1,086	286	126	59	45	4,316
2010-2011	15	9	219	2,420	395	180	672	2,012	223	136	30	22	6,333
2011-2012	9	0	0	24	50	836	1,713	3,900	797	171	196	25	7,721
2012-2013	3	2	239	501	127	269	1,261	2,975	1,077	117	62	22	6,655
2013-2014	14	8	383	1,225	1,055	964	1,311	4,407	1,723	204	32	54	11,380
2014-2015	5	46	95	408	205	1,173	896	3,144	2,371	686	64	42	9,135
2015-2016	4	2	11	17	21	18	378	902	2,047	1,376	188	16	4,980

Source: Table 4.6-3, on page 155 of the Tech Memo.

CDFW-13: *"YCWA did not initiate use of Kwikfish until the second half of the second sampling event even though they weren't catching any salmon with Blue Fox #4 lures and almost reached their steelhead bycatch limit. The first and second sampling events provided the best opportunity for YCWA to capture and tag spring-run Chinook salmon during the study, thus the Department believes YCWA's choice of lures may have caused YCWA to miss capturing and tagging some of the spring-run present in the study area."*(Page 15 of CDFW's Letter)

Reply: As described in YCWA's reply to SWB-9, Kwikfish were utilized from the beginning of the tagging effort. YCWA used all gear types and strategies available under the 4(d) permit and as advised by the local fishing guide from the outset of sampling.

CDFW-14: *"The Department believes that holding these salmon out of water for a photo opportunity was inappropriate and incompatible with the requirements of the ESA Section 4(d) authorization and the well-being of the fish. The Department believes the additional stress placed on the fish during handling may have affected the behavior of these fish after tagging*." (Page 15 of CDFW's Letter)

Reply: Refer to YCWA's reply to SWB-10. YCWA agrees that holding fish out of the water for the photos, however brief, was inappropriate and the practice was stopped prior to the end of sampling.

CDFW-15: *"Specifically, the Department believes noise, vibrations, and disturbance to streambed substrate created by the injection of gravel may have: 1) deterred fish from entering the study area and decreased the possibility of fish being captured and tagged and thus reduced the sample size for tracking; and 2) interfered with the hydrophones and reduced the efficacy of the telemetry system resulting in erroneous or unsuccessful monitoring of tagged fish*." (Page 16 of CDFW's Letter)

Reply: In e-mails dated July 31, 2015 and August 26, 2015, Doug Grothe of the USACE at Englebright Dam reported that gravel injections started on July 15 and ended on August 7, 2015. While it is possible that the activities deterred fish from entering the study area, the vast majority

of the tagging effort occurred downstream of the gravel injection site. The gravel injection site was determined to not be appropriate fishing habitat by the fishing guide and was never sampled. Similarly, interference with the hydrophone array is not a concern as the gravel injection activities had finished prior to the capture and tagging of any fish. Further, since USACE has performed gravel injection at this site in recent years, and agreed to continue the practice annually, all parties were aware that this would occur when the study plan was developed, and when FERC directed YCWA to perform the study in 2015.

CDFW-16: "*Hydrophone H1, which was installed in the Full Bypass Pool, was destroyed in early August 2015 and was not replaced for the duration of the fish tracking period. Thus, no behavior data were collected for fish utilizing the Full Bypass Pool during the entire tracking period. As described on Page 179 of TM 7-11 and 7-11a, hydrophones H2, H6, H8, and H10 were not functioning from June 17, 2015, through October 15, 2015. Hydrophones H2, H6, H8, and H10 were located on the east side of the powerhouse, along the east side of the tailrace, and along the south bank of the river. With these hydrophones not functioning, this portion of the study area is not represented in the tracking data and thus not included in the behavior analysis.*" (Page 16 of CDFW's Letter)

Reply: Refer to YCWA's reply to SWB-7. YCWA acknowledges CDFW's comment regarding hydrophone H1, which was not replaced after it was destroyed by operation of the Full Bypass. CDFW's comment is accurate in pointing out the gap in complete coverage within the monitoring site created by hydrophones H2, H6, H8, and H10. However, CDFW overlooks the fact that the data collected still represents a much larger body of information regarding fish movement in the vicinity of Narrows 2 Powerhouse than both the DIDSON™ and ARIS™ data collection combined. Also, because of the total number of hydrophones placed in the study area, 2D fish positions were still calculated within much of the area where hydrophones H2, H6, H8 and H10 were located (see Tech Memo, Section 4.3.6 Analysis, pages 165 – 177)

CDFW-17: "*The Department requests that YCWA provide a summary of all salmonid stranding and mortality events that have been linked to the operation of the Narrows 2 facilities and/or have occurred within the vicinity of the Narrows 2 facilities for the last ten years (2005 through 2015) and include which facilities were operating during those events. This information will be useful for supplementing salmonid behavior data related to Project operations that were not successfully collected during the study.*" (Page 16 of CDFW's Letter)

Reply: As described in YCWA's reply to CDFW-10, YCWA has disclosed to CDFW and other agencies all incidences of fish stranding of which YCWA is aware.

REPLY TO NMFS' MAY 6, 2016 LETTER

NMFS-1: "*When properly set up, the ARIS camera was able to effectively capture images of fish in the vicinity of the Narrows 2 Powerhouse, but this equipment was not set-up up to properly record images for several of the operational changes:..*" (Enclosure A, Page 4 of NMFS' Letter)

Reply: NMFS does not present any supporting evidence for this statement. Technical difficulties arising from challenging environmental conditions do not necessitate the conclusion

that the equipment was improperly deployed. Even under the best conditions, the range of the ARIS™ was limited to 13 feet during Narrows 2 Powerhouse generation. Environmental conditions, software and firmware bugs, and sensitivities are difficult to predict or control. These sorts of down times are a normal part of monitoring and do not negate the value of the data that were collected.

NMFS-2: "*NMFS found this subsampled percentage too low…"* (Enclosure A, Pages 4 and 5 of NMFS' Letter)

Reply: Refer to YCWA's replies to SWB-1 and SWB-5. YCWA conducted monitoring and footage review as described in its e-mail to FERC on July 17, 2013, with the ARIS™ camera used in place of the DIDSON™ camera. The large amount of ARIS™ footage collected during the annual outage was sub-sampled down to a more practical level resulting in approximately 24 percent of the outage being reviewed.

NMFS-3: "*Our understanding is the initial fishing was conducted with blue fox lures (#4 size), and the California Department of Fish and Wildlife advised YCWA to discontinue use of this lure and use K15 Kwikfish with barbless hooks to successfully catch Chinook salmon. NMFS' understanding is salmon were only caught after the fishing lures used were changed to the Kwikfish type, which did not occur until the fifth sampling effort (where sampling number is based on Table 4.6-2 in Study Report 7.11a); this could explain why no fish were caught during the first four sampling attempts*." (Enclosure A, Page 5 of NMFS' Letter)

Reply: As described in YCWA's replies to SWB-9 and CDFW-13, Kwikfish were utilized from the beginning of the tagging effort. YCWA used all gear types and strategies available under the 4(d) permit and as advised by the local fishing guide from the outset of sampling.

NMFS-4: "*OEP staff should also consider that the U.S. Army Corps of Engineers conducted spawning gravel injections to areas directly below the Narrows 1 Powerhouse, beginning July 15, 2015. This caused interruption of the sampling for Chinook salmon until the Corps' work was completed*." (Enclosure A, Page 5 of NMFS' Letter)

Reply: As described in YCWA's reply to CDFW-15, YCWA's sampling schedule was not interrupted and the gravel injection site and YCWA's sampling areas only overlapped in the study plan. In fact, the gravel injection site was determined to not be appropriate fishing habitat by the fishing guide and was never sampled.

NMFS-5: "*Four inoperable hydrophones were not replaced until October 15, 2015 (one day before the end of fish tracking, which occurred from August 24 through October 16, 2015). Also, a hydrophone in the Narrows 2 Full Bypass pool became inoperable in early August, but was never replaced (Report, p. ES-4). This resulted in the recording of no fish tracking positions in the Narrows 2 Full Bypass pool over a monitoring period when it was in operation for extensive periods.*" (Enclosure A, Page 6 of NMFS' Letter)

Reply: Refer to YCWA's replies to SWB-7 and CDFW-16.

NMFS-6: *"OEP staff should consider that tracking did not occur as far downstream as the Narrows 1 Powerhouse."* (Enclosure A, Page 7 of NMFS' Letter)

Reply: YCWA filed a letter with FERC on February 10, 2014 to inform FERC that YCWA and the Relicensing Participants had reached collaborative agreement on a path forward for Study 7.11a, *Radio Telemetry Study of Spring- and Fall-run Chinook Salmon Migratory Behavior downstream of Narrows 2 Powerhouse*. The letter outlined six items that would be used to guide the completion of Phase 2 of the study. The first two items were as follows:

- YCWA will use the HTI system in Phase 2 of the Study.
- YCWA will deploy the HTI system in a pattern recommended by HTI staff (i.e., 16 hydrophones in the study area, six of which are in the area near Narrows 2 Powerhouse).

In its e-mail to YCWA, which was attached to the YCWA letter to FERC, NMFS agreed to these two points. Further, the hydrophone array was installed according to the positioning prescribed by HTI. The downstream extent of the array was limited by proximity to the Narrows 1 Powerhouse given that the powerhouse can operate without warning and would be a significant safety hazard during work in the river. Further, YCWA's study focused on the operations of its FERC facilities, not those of another licensee.

If you have any questions regarding this matter, please contact me.

Sincerely,

Curt Aikens

Curt Aikens
General Manager

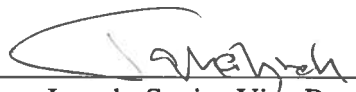
Attachments: 1. An Email Dated July 17, 2014 from YCWA to FERC and Relicensing Participants
2. A table showing the subsampling schedule for the ARIS™ data collected during the 2013 scheduled maintenance outage at Narrows 2 Powerhouse

cc: Alan Mitchnick – FERC, DC
Ken Hogan – FERC, DC
Relicensing Participants on YCWA's Yuba River Development Project's Relicensing E-Mail Contact List (via e-mail)

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary of the Federal Energy Regulatory Commission in this proceeding (Yuba River Development Project, FERC Project No. 2246-000).

Dated in Sacramento, CA this 30th day of June, 2016.



James Lynch, Senior Vice President
HDR, Inc.
2379 Gateway Oaks, Suite 200
Sacramento, CA 95833
(916) 679-8740

Yuba River Development Project
Reply to SWRCB's, CDFW's and NMFS' May 6, 2016 Letter

Attachment 1

July 17, 2013 Email

Pitts, Sheila

From: Pitts, Sheila
Sent: Friday, June 10, 2016 10:35 AM
To: Passovoy, Joel
Cc: Pitts, Sheila
Subject: FW: Yuba Relicensing: Confirmation of Upcoming Study 7.11 Work

---

From: Lynch, Jim
Sent: Wednesday, July 17, 2013 1:28 PM
To: 'richard.wantuck@noaa.gov'; John Wooster; Alison Willy; Ramon Martin; Lynch, MaryLisa@Wildlife (MaryLisa.Lynch@wildlife.ca.gov) (MaryLisa.Lynch@wildlife.ca.gov); Hoobler, Sean@Wildlife (Sean.Hoobler@wildlife.ca.gov); Parker Thaler; 'Kenneth Hogan'; 'Alan Mitchnick'
Cc: Geoff Rabone (grabone@ycwa.com); Curt Aikens (caikens@ycwa.com); Kopp, Gabriel; Mike Kline; Peter Wade
Subject: Yuba Relicensing: Confirmation of Upcoming Study 7.11 Work

- YUBA RIVER DEVELOPMENT PROJECT RELICENSING –

Study 7.11, Fish Behavior and Hydraulics Near Narrows 2 Powerhouse
Confirmation of Upcoming Activities

This email provides an update regarding remaining activities under the FERC-approved Study 7.11, *Fish Behavior and Hydraulics Near Narrows 2 Powerhouse*.

BACKGROUND

Expected Narrows 2 Powerhouse, Full Bypass and Partial Bypass Operations - Much of Study 7.11 implementation is linked to operations of the Narrows 2 Powerhouse. As background, 2013 is a dry water year. Through July 9, the release from Narrows 2 Powerhouse has been approximately 1,000 cfs, with no releases through the Partial Bypass and one day of Full Bypass operation on July 8. From July 9 to date, flow from Narrows 2 Powerhouse averaged near 1,800 cfs. Through July 8, PG&E's Narrows 1 Powerhouse consistently operated near 670 cfs and is now offline. YCWA expects at this time that flow through Narrows 2 Powerhouse will remain relatively steady to August 26 when YCWA plans to have a maintenance outage which will extend through September 4 (this is the tentative schedule for the outage, but the period may change). As the outage begins, YCWA will gradually transition flow from Narrows 2 Powerhouse to the Full Bypass. At the end of the outage (or when YCWA decides to bring Narrows 2 Powerhouse back online, if later than September 4), YCWA will gradually transition flow from the Full Bypass to the Narrows 2 Powerhouse. Of course, all of this is subject to change.

Coordination with Fish Stranding and Radio Telemetry Studies – As information, FERC has approved and YCWA will conduct in 2013 Study 7.13, *Fish Stranding Associated with Shutdown of Narrows 2 Powerhouse Partial Bypass*. Results of Study 7.13 will be included in the Study 7.11 technical memorandum, as directed by FERC. YCWA distributed to NMFS, USFWS and CDFW a draft Study 7.11a, *Radio Telemetry Study of Spring- and Fall-run Chinook Salmon Migratory Behavior Downstream of Narrows 2 Powerhouse.* Written comments are due to YCWA by July 31. YCWA will file the final study plan with FERC and implement the study as approved by FERC. At this time, we expect some work (testing of technologies) to occur in 2013, but the majority of the study to occur in 2014. An interim technical memorandum for Study 7.11 (including the Study 7.11a information to date) will be issued by March 2014 for the 2013 study period, and a final technical memorandum is expected to be issued in early 2015.

The remaining work for Study 7.11 is described below.

DIDSON CAMERA DATA COLLECTION

FERC review and comments on the 2012 interim report suggested the following activity occur for DIDSON monitoring.

> *"We recommend YWCA apply the methodologies described in Study Plan 7.11 during the 2013 field season, with the following modifications:*

1) YCWA should conduct DIDSON monitoring during planned outages of the Narrows 2 powerhouse between July 15 and December 15, 2013.

2) YCWA should deploy a DIDSON camera and begin monitoring at least 4 hours prior to an operational change from a generation status to non-generation status.

3) At the latest, YCWA should deploy a DIDSON camera and begin monitoring the morning of the day prior to an operational change from a non-generation status to a generation status and may discontinue monitoring 4 hours after the Narrows 2 powerhouse returns to a generation status.

4) If a prolonged outage of Narrows 2 powerhouse were to occur during the 2013 field season as it did in 2012, YCWA should consult with the NMFS on a periodic DIDSON deployment schedule to capture seasonal fish use and behavior in the vicinity of the Narrows 2 draft tubes during the project's outage."

Based on the direction of FERC, YCWA will use the DIDSON to monitor below the Narrows 2 Powerhouse during specific operational scenarios from July 15 through December 15, 2013 with a single DIDSON. These operational scenarios include:

1. During the planned outage (as stated above, current scheduled to occur from August 26 through September 4, 2013)
2. Operational change from generation status to non-generation status (i.e., taking Narrows 2 Powerhouse from online to offline)
3. Operational change from non-generation status to generation status (i.e., taking the Narrows 2 Powerhouse from offline to online)
4. During prolonged outage of Narrows 2 Powerhouse (not including the planned outage described in Scenario #1)
5. Change in flow magnitude of 400 cfs during bypass or generation (this scenario was included in the FERC-approved Study 7.11, and includes any combination of changes in the combined releases from the Narrows 2 Powerhouse, Full Bypass and Partial Bypass)

For the planned outage (Scenario #1), YCWA will begin DIDSON monitoring 24 hours prior to the outage and continue until 24 hours after the outage period. All collected data during the planned outage will be analyzed.

For scenarios #2, #3 and #5, YCWA will begin DIDSON monitoring at least 4 hours prior to the scheduled change, and will continue DIDSON monitoring for at least 4 hours after the change has occurred.

For Scenario #4, YCWA will begin DIDSON monitoring no later than 2 days after outage begins (note that the change from online to offline and offline to online during the outage will be covered under Scenarios # 2 and #3). YCWA will deploy the DIDSON and operate it continuously during the prolonged outage. The DIDSON data will only be analyzed for every 2-day monitoring block (two on/two off). Collecting data continuously will safeguard again loss, as more days will be analyzed if any of the required monitoring days are missed due to unforeseen circumstances.

It is important to note that, with the exception of Scenario #1, none of the above scenarios are currently scheduled. Field teams will respond to an alert from operators, when events are identified. YCWA will inform agencies as well in a timely fashion to allow for attendance, but emphasizes that short notices may occur.

At this time, YCWA has had a custom mount (a mount is necessary to stabilize the camera and maximize the clarity of the image) built for the DIDSON to monitor in a fixed location from the shore nearest the Narrows 2 Powerhouse looking out across the powerhouse's outlet openings, and this is where YCWA plans to perform the DIDSON monitoring for each of the scenarios described above. However, YCWA believes NMFS suggested an alternative DIDSON monitoring location might be beneficial. YCWA will contact NMFS to discuss this.

ON-SHORE VISUAL COUNTS AND FISH OBSERVATIONS

FERC review and comments on the 2012 interim report suggested the following activity occur for visual counts and fish observations.

"We recommend that YCWA modify the study to include shore-based anadromous salmonid counts and fish behavioral observations in the vicinity of the Narrows 2 project facilities immediately before, during, and after each operational change that shifts flows between the Narrows 2 powerhouse, bypasses, and the Narrows 1 powerhouse.

"In addition YCWA project personnel should continue to collect incidental observations as provide for in section 5.3.3.3 of Study 7.11; however, instead of the "opportunistic" observations described in the study plan, the observations should be conducted at least twice on each day (upon arrival, and before departure) on days YCWA project personnel are present at the facility. YCWA project personnel should record each observation event on the Narrows 2 Fish Observation Record form and enumerate and mark on a map (similar to that in attachment 7.11B of the interim technical memorandum) each observation of adult salmonid(s) in the vicinity of the Narrows 2 powerhouse. This information should be used to augment the radio-telemetry data (discussed above) when analyzing potential project effects on fish behavior."

YCWA will conduct visual monitoring during all 2013 operational changes (scenario #2, #3 and #5) beginning July 15 through December 15, 2013. This start date will coincide with the DIDSON monitoring task and allow for data to be analyzed together.

Note that shoreline observations by YCWA operations staff will be conducted in 2014 to support the radio-telemetry data, as instructed by FERC.

PRESSURE AND REMAINING VELOCITY MEASUREMENT IN THE NARROWS 2 TUNNEL

Pressure calculations in the FERC-approved Study 7.11 were not completed in 2012. These measurements primarily include high-resolution stage measurements at specific locations near the downstream end of the Narrows 2 Powerhouse at different flows. The end of the concrete box-trapezoidal channel at the exit of the concrete channel into the Yuba River was not modeled for velocity due to its shape (note, the concrete channel appears to expand along its length from its start at the steel draft tube joint to the exit into the Yuba River). The draft tube discharges into the tailrace below the river water surface elevation, subjecting performance in the tailrace to variable backwater effects ranging from low flow conditions to times when the river is flowing full when Englebright Dam is spilling. Field measurements will help to determine if this calculation can be achieved. Direct velocity measurements at multiple flows (described in the next section) may provide insight into the velocity characteristics of this area and negate the need for modeled results. Nonetheless, effort will be made to attempt to model the results, as specified in the study plan. Water elevation loggers will be deployed below Narrows 2 Powerhouse in August 2013 and will monitor until December 15. Velocity measurements near the Narrows 2 Powerhouse Tunnel will be collected during velocity sampling described below. The event is currently scheduled for October 2013. YCWA will inform agencies as well in a timely fashion to allow for attendance, but emphasizes that short notices may occur.

VELOCITY SAMPLING BELOW NARROWS 2 POWERHOUSE

YCWA committed to develop a velocity sampling plan in collaboration with the NMFS, prior to conducting a series of velocity measurements below the Narrows 2 Powerhouse. In general, FERC stated that point and transect data would be collected at three flows: low Full Bypass flow (~300 cfs), low Narrows 2 Powerhouse flow (~400 cfs, which is about as low as YCWA operates the powerhouse), and moderate Narrows 2 Powerhouse flow (~600 to 800 cfs).

The sampling locations and frequency of point data needed to be collaboratively agreed upon between YCWA and NMFS. YCWA created an aerial image and proposed a sampling scheme overlay to NMFS. The planning template was modified and iteratively adjusted between YCWA and NMFS. The final product is attached to this email for reference. This is a modification of the original sampling scheme in the study plan but represents a greater effort and broader set of data collection. The modification to the original sampling plan was to reduce transect depth measurements in shallower habitats, as four depth bins (i.e. 20%, 40%, 60% and 80% of total depth) were not necessary in shallow habitat. The reduced number of transect measurements were offset by an increase in gridded point measurements. YCWA expects that velocity measurements will occur in October 2013, but may be rescheduled due to flow coordination requirements. YCWA will inform agencies two weeks prior to the event in a timely fashion to allow for attendance, but emphasizes that changes may occur due to flow schedule requirements.

Please email or call me if you have any questions about this upcoming work.

JAMES LYNCH | **HDR Engineering, Inc.**
Senior Vice President, Hydropower Services

2379 Gateway Oaks, Suite 200 | Sacramento, CA 95833
916.679.8700 | d: 916.679.8740 |c: 916.802.6247
james.lynch@hdrinc.com | hdrinc.com

Yuba River Development Project
Reply to SWRCB's, CDFW's and NMFS' May 6, 2016 Letter

Attachment 2

ARIS™ Data 2013 Outage Subsampling Schedule

ARIS™ Data - Hours reviewed for fish behavior analysis during the Narrows 2 Powerhouse maintenance outage in 2013

Time of Day	Hour	9/8/2013	9/9/2013	9/10/2013	9/11/2013	9/12/2013	9/13/2013	9/14/2013	9/15/2013	9/16/2013	9/17/2013	9/18/2013	9/19/2013	9/20/2013	9/21/2013	9/22/2013	9/23/2013	9/24/2013	9/25/2013	9/26/2013	9/27/2013	9/28/2013	9/29/2013	9/30/2013
night	0:00							•																
	1:00				•					•						•		•				•		
	2:00				•			•									•						•	
	3:00	•		•		•				•					•									
	4:00								•		•	•		•			•	•					•	•
	5:00					•	•						•		•				•		•	•		
dawn	6:00	•	•		•					•		•			•				•	•	•			•
	7:00			•		•	•	•	•		•		•	•		•	•	•				•	•	
day	8:00			•		•			•															
	9:00											•	•		•			•		•	•		•	
	10:00		•			•	•											•					•	•
	11:00	•			•					•	•		•	•	•	•								
	12:00										•					•						•		
	13:00							•	•								•							•
	14:00							•		•				•					•					
	15:00	•		•	•		•										•		•	•				
	16:00		•									•									•	•		
dusk	17:00			•	•	•	•					•	•		•			•	•		•	•		
	18:00	•	•					•	•	•	•			•		•	•			•			•	•
night	19:00										•	•									•			
	20:00		•										•											
	21:00								•											•				
	22:00	•	•																•	•				•
	23:00			•			•							•		•								

Page Left Blank