

APPENDIX E6

YUBA COUNTY WATER AGENCY'S OPERATIONS AND WATER TEMPERATURE MODELS, HYDROLOGY AND WATER TEMPERATURE DATA, TECHNICAL MEMORANDA, PROJECT VIDEO AND MAPS

Appendix E6 includes YCWA's Water Balance/Operations Model and Water Temperature Models, hydrology information, technical memoranda, YCWA's helicopter Project video and maps.¹ Specifically, the material in Appendix 6 includes:

- Existing Without-Project and With-Project hydrology (Disc #50). HEC-DSS files with hydrology from the simulated No Action Alternative (Operations Model Base Case Scenario), YCWA's Proposed Project Alternative, YCWA's Future Proposed Project Alternative and the Without-Project Alternative for the period of record from WY 1970 through WY 2010, for locations throughout the Project Area, including flows at multiple locations on the Middle Yuba River, North Yuba River, Yuba River, and Oregon Creek. Also included are historically-measured flow data from USGS gages within and nearby the Project Area for the available period of record at each gage.

The disc includes the following Operations Model data for the Without-Project, No Action, YCWA Proposed Project and YCWA Future Proposed Project alternatives:

- New Bullards Bar and Englebright reservoir storage and water-surface elevations
- In-basin diversions through the Camptonville Diversion Tunnel, Lohman Ridge Diversion Tunnel, New Colgate Penstock, and Narrows 2 Penstock
- Agricultural water supply diversions from Yuba River near Daguerre Point Diversion Dam
- Hydroelectric generation for the New Colgate, Narrows 2, and New Bullards Bar Minimum Flow powerhouses

The disc also includes unimpaired flow information at several key locations.

- Revised Existing Without-Project and With-Project water temperature data (Disc #51). DSS files with modeled water temperature data for the No Action Alternative, YCWA's Proposed Project Alternative, YCWA's Future Proposed Project Alternative and the Without-Project Alternative for the period from WY 1970 through WY 2010. The disc

¹ Due to the number of CDs and DVDs in Appendix E6, a compilation of Appendix E6 CDs and DVDs is provided in a separate binder named Exhibit E, Appendix E6, *Yuba Couth Water Agency's Operations and Water Temperature Models, Hydrology and Water Temperature Data, Technical Memoranda, and Project Video and Maps.*

also includes a DSS file with historically-measured water temperature data for locations throughout the Project Area. The period of record for historically-measured data varies by station, but most empirical data are from 2008 through 2013. Reservoir water temperature data are provided in MicrosoftTM Excel format for New Bullards Bar and Englebright reservoirs for the period of record from 1989 to 2013. Raw meteorological data are provided in DSS for the four stations within the Project.

- YCWA's revised Operations Model and hydrologic model input and output files (Disc #52). The disc includes the latest version of the Operations Model, version 1.20, setup to run the No Action Alternative, YCWA's Proposed Project Alternative, YCWA's Future Proposed Project Alternative and the Without-Project Alternative for the period of record from WY 1970 through 2010. The disc also includes the USACE HEC-DSS MicrosoftTM Excel Add-in, which is required to be installed on the user's computer to run the Operations Model. Output from the Operations Model is also included as part of the hydrologic data sets described above (Disc #50).
- YCWA's revised Water Temperature Models and model input and output files (Disc #53). YCWA's Water Temperature Models are included for four alternatives: 1) the No Action Alternative; 2) YCWA's Proposed Project Alternative; 3) YCWA's Future Proposed Project Alternative; and 4) the Without-Project Alternative. A temperature model GUI (graphical user interface) combines the three models needed to run each alternative: 1) the Upper Temp Model, which simulates water temperatures resulting from Project facilities upstream of Englebright Reservoir; 2) the Englebright Temp Model, which simulates water temperatures within Englebright Reservoir; and 3) the Lower Temp Model, which simulates Yuba River water temperatures downstream of Englebright Dam. Each model is capable of simulating the full period of record from WY 1970 through 2010. Output from the models are also included within the water temperature data set described above (Disc #51).
- A technical memorandum for each of the 48 FERC-approved relicensing studies, for which an interim or final technical memorandum has been developed (Discs #1 through #47).
- A helicopter video of the Project, including *read.me* instructions for viewing the video. The video extends from the confluence of the Yuba River with the Feather River upstream to and including the most upstream Project facilities and features (Discs #48 and #48A).
- Detailed 1:24,000 scale maps of the Project extending from the confluence of the Yuba River with the Feather River upstream to and including the most upstream Project facilities and features. Each map shows: elevation contours; county borders; rivers and streams including river miles in tenths of a mile; dams, diversions and other non-Project facilities; cities and towns; roads; stream flow and reservoir storage gages; railroads and transmission lines; and other major landmarks. Each map also shows land ownership (e.g., federal by land management agency, State of California, YCWA and others). (Disc #49).

- YCWA’s revised Habitat Time Series Charting Program (i.e., includes Operations Model Base Case Scenario and YCWA’s proposed Project) for all of the study reaches upstream of Englebright Reservoir (Disc #54)
- YCWA’s revised Habitat Time Series Charting Program (i.e., includes Operations Model Base Case Scenario and YCWA’s proposed Project) for the Yuba River downstream of Englebright Dam (Disc #55)
- Additional analysis, results and cross sectional tool in support of Technical Memorandum 6-1, *Riparian Habitat Upstream of Englebright Reservoir* (Disc # 56B)
- Additional analysis, results and cross sectional tool in support of Technical Memorandum 6-2, *Riparian Habitat Downstream of Englebright Reservoir* (Disc # 57)

Table E6-1 lists the contents of this appendix, including file type and total file size.

Table E6-1. Contents of Appendix E6.

Name	File Type(s) on Disc	Total File Size (MB)	Disc #	As Referenced in Exhibit E
TECHNICAL MEMORANDA				
Technical Memorandum 1-1, Channel Morphology Above Englebright	2 Adobe pdf files	52 MB on CD	1	YCWA 2013a
Technical Memorandum 1-1, Attachment 1-1F Bedload Transport Files	2 Microsoft Word files, and 47 Microsoft Excel files	118 MB on CD	1A	YCWA 2013a
Technical Memorandum 1-2, Channel Morphology Below Englebright	4 Adobe pdf files	124 MB on CD	2	YCWA 2013b
Technical Memorandum 1-2, Attachment 1-2N Part 1 of 7	Executable folders with data (Disc 1 of 7)	2.63 GB on DVD	2A	YCWA 2013b
Technical Memorandum 1-2, Attachment 1-2N Part 2 of 7	Executable folders with data (Disc 2 of 7)	4.38 GB on DVD	2B	
Technical Memorandum 1-2, Attachment 1-2N Part 3 of 7	Executable folders with data (Disc 3 of 7)	2.73 GB on DVD	2C	
Technical Memorandum 1-2, Attachment 1-2N Part 4 of 7	Executable folders with data (Disc 4 of 7)	3.88 GB on DVD	2D	
Technical Memorandum 1-2, Attachment 1-2N Part 5 of 7	Executable folders with data (Disc 5 of 7)	1.85 GB on DVD	2E	
Technical Memorandum 1-2, Attachment 1-2N Part 6 of 7	Executable folders with data (Disc 6 of 7)	3.95 GB on DVD	2F	
Technical Memorandum 1-2, Attachment 1-2N Part 7 of 7	Executable folders with data (Disc 7 of 7)	3.95 GB on DVD	2G	
Technical Memorandum 2-1, Hydrologic Alteration	1 Adobe pdf file	16 MB on CD	3	YCWA 2013c
Technical Memorandum 2-1, Attachment 2-1A Data files of Hydrologic Alteration Analyses	27 Microsoft Excel files and 1 DSS file	293 MB on CD	3A	YCWA 2013c
Technical Memorandum 2-2, Water Balance/Operations Model	1 Adobe pdf file	8 MB on CD	4	YCWA 2012a
Technical Memorandum 2-2, Attachment 2-2E Water Balance/ Operations Model	4 DSS files and 3 Microsoft Excel files	26.6 MB on CD	4A	YCWA 2012a
Technical Memorandum 2-2, Attachment 2-2F Hydrologic Data Set	7 DSS files, 14 Microsoft Excel files and 2 Adobe pdf files	310 MB on DVD	4B	YCWA 2012a
Technical Memorandum 2-3, Water Quality	1 Adobe pdf file and 5 Microsoft Excel files	4 MB on CD	5	YCWA 2013d
Technical Memorandum 2-4, Bioaccumulation	1 Adobe pdf file	3 MB on CD	6	YCWA 2012b
Technical Memorandum 2-5, Water Temperature Monitoring	2 Adobe pdf files	61 MB on CD	7	YCWA 2013e
Technical Memorandum 2-5, Attachment 2-5D Stream Temperature DSS	2 DSS files	19 MB on CD	7A	YCWA 2013e

Table E6-1. (continued)

Name	File Type(s) on Disc	Total File Size (MB)	Disc #	As Referenced in Exhibit E
TECHNICAL MEMORANDA (continued)				
Technical Memorandum 2-5, Attachment 2-5E Reservoir and Stream Temperature Raw Data	1 DSS file, 37 Microsoft Excel files	84 MB on CD	7B	YCWA 2013e
Technical Memorandum 2-6, Water Temperature Models	5 Adobe pdf files	28.5 MB on CD	8	YCWA 2013f
Technical Memorandum 2-6, Attachment 2-6B Water Temperature Models and Input Files	195 Associated Modeling files	764 MB on DVD	8A	YCWA 2013f
Technical Memorandum 3-1, Aquatic Macroinvertebrates Above Englebright	4 Adobe pdf files and 2 Microsoft Excel files	36.2 MB on CD	9	YCWA 2013g
Technical Memorandum 3-2, Aquatic Macroinvertebrates Below Englebright	3 Adobe pdf files, and 1 Microsoft Excel file	9.92 MB on CD	10	YCWA 2013h
Technical Memorandum 3-3, Special-Status Aquatic Mollusks	1 Adobe pdf file	1 MB on CD	11	YCWA 2012c
Technical Memorandum 3-4, Special-Status Amphibians – FYLF Surveys	2 Adobe pdf files	69 MB on CD	12	YCWA 2012d
Technical Memorandum 3-5, Special-Status Amphibians – FYLF Modeling	1 Adobe pdf file	60 MB on CD	13	YCWA 2013i
Technical Memorandum 3-5, Attachment 3-5E – River2D Model Files	344 Associated Modeling files	1.23 GB on DVD	13A	YCWA 2013i
Technical Memorandum 3-6, Special-Status Turtles – Western Pond Turtle	7 Adobe pdf files	136 MB on CD	14	YCWA 2012e
Technical Memorandum 3-7, Reservoir Fish Populations	2 Adobe pdf files, and 2 Microsoft Excel files	13.2 MB on CD	15	YCWA 2012f
Technical Memorandum 3-8, Stream Fish Populations Above Englebright	3 Adobe pdf files, and 2 Microsoft Excel files	10 MB on CD	16	YCWA 2013j
Technical Memorandum 3-9, Non-ESA Fish Below Englebright	1 Adobe pdf file	18 MB on CD	17	YCWA 2013k
Technical Memorandum 3-9, Attachment 3-9A RMT VAKI Access Data Base Files	1 Microsoft Access database file	22 MB on CD	17A	YCWA 2013k
Technical Memorandum 3-9, Attachment 3-9B CDFG Angler Survey Data Base Files	1 Microsoft Access database file	3 MB on CD	17B	YCWA 2013k
Technical Memorandum 3-9, Attachment 3-9D Copies of References Cited	74 Adobe pdf files	300 MB on CD	17C	YCWA 2013k
Technical Memorandum 3-10, Instream Flow Above Englebright	2 Adobe pdf files	53 MB on CD	18	YCWA 2013l
Technical Memorandum 3-10, Attachment 3-10F Habitat Time Series Charting Program	5 program files	20 MB on CD	18A	YCWA 2013l
Technical Memorandum 3-11, Entrainment	1 Adobe pdf file	3 MB on CD	19	YCWA 2013m
Technical Memorandum 3-12, New Colgate Powerhouse Ramping	1 Adobe pdf file	28 MB on CD	20	YCWA 2012g
Technical Memorandum 3-13, Focused 2013 Foothill Yellow-legged Frog Surveys	1 Adobe pdf file	5 MB on CD	21	YCWA 2013n
Technical Memorandum 3-14, Focused 2013 Western Pond Turtle Surveys	1 Adobe pdf file	6 MB on CD	22	YCWA 2013o
Technical Memorandum 4-1, Special-Status Wildlife – CWHR	3 Adobe pdf files	46 MB on CD	23	YCWA 2012h
Technical Memorandum 4-2, Special-Status Wildlife – Bats	1 Adobe pdf file	1 MB on CD	24	YCWA 2012i

Table E6-1. (continued)

Name	File Type(s) on Disc	Total File Size (MB)	Disc #	As Referenced in Exhibit E
TECHNICAL MEMORANDA (continued)				
Technical Memorandum 4-2, Attachment 4-2B Raw Acoustic Data	Raw Bat Acoustic Data (Disc 1 of 2)	4.38 GB on DVD	24A	YCWA 2012i
Technical Memorandum 4-2, Attachment 4-2B Raw Acoustic Data	Raw Bat Acoustic Data (Disc 2 of 2)	2.55 GB on DVD	24B	YCWA 2012i
Technical Memorandum 5-1, Special-Status Plants	2 Adobe pdf files	53 MB on CD	25	YCWA 2012j
Technical Memorandum 6-1, Riparian Habitat Above Englebright	2 adobe pdf files	58 MB on CD	26	YCWA 2014a
Technical Memorandum 6-2, Riparian Habitat Below Englebright	4 Adobe pdf files	126 MB on CD	27	YCWA 2013p
Technical Memorandum 6-3, Wetlands	1 Adobe pdf file	304 kB on CD	28	YCWA 2012k
Technical Memorandum 7-1, ESA-Listed Plants	1 Adobe pdf file	4 MB on CD	29	YCWA 2012l
Technical Memorandum 7-2, Narrows 2 PH Intake Extension	1 Adobe pdf file	2 MB on CD	30	YCWA 2013q
Technical Memorandum 7-3, ESA-Listed Amphibians - CRLF	8 Adobe pdf files	100 MB on CD	31	YCWA 2012m
Technical Memorandum 7-4, ESA-Listed Wildlife – Valley Elderberry Longhorn Beetle	1 Adobe pdf file	5 MB on CD	32	YCWA 2012n
Technical Memorandum 7-5, CESA-Listed Plants	2 Adobe pdf files	6 MB on CD	33	YCWA 2012o
Technical Memorandum 7-6, CESA and Fully Protected Wildlife - CWHR	1 Adobe pdf file	8 MB on CD	34	YCWA 2012p
Technical Memorandum 7-7, CESA-Listed Wildlife – Bald Eagle	1 Adobe pdf file	16 MB on CD	35	YCWA 2012q
Technical Memorandum 7-8, ESA CESA-Listed Salmonids Below Englebright Dam	1 Adobe pdf file	20 MB on CD	36	YCWA 2013r
Technical Memorandum 7-9, Green Sturgeon Below Englebright	1 Adobe pdf file	3 MB on CD	37	YCWA 2013s
Technical Memorandum 7-10, Instream Flow Downstream of Englebright Dam	1 Adobe pdf file	41 MB on CD	38	YCWA 2013t
Technical Memorandum 7-10, Attachment 7-10A SRH2D Hydrodynamic Model Part 1 of 7	Executable folders with data (Disc 1 of 7)	2.63 GB on DVD	38A	YCWA 2013t
Technical Memorandum 7-10, Attachment 7-10A SRH2D Hydrodynamic Model Part 2 of 7	Executable folders with data (Disc 2 of 7)	4.38 GB on DVD	38B	
Technical Memorandum 7-10, Attachment 7-10A SRH2D Hydrodynamic Model Part 3 of 7	Executable folders with data (Disc 3 of 7)	2.73 GB on DVD	38C	
Technical Memorandum 7-10, Attachment 7-10A SRH2D Hydrodynamic Model Part 4 of 7	Executable folders with data (Disc 4 of 7)	3.88 GB on DVD	38D	
Technical Memorandum 7-10, Attachment 7-10A SRH2D Hydrodynamic Model Part 5 of 7	Executable folders with data (Disc 5 of 7)	1.85 GB on DVD	38E	
Technical Memorandum 7-10, Attachment 7-10A SRH2D Hydrodynamic Model Part 6 of 7	Executable folders with data (Disc 6 of 7)	4.38 GB on DVD	38F	
Technical Memorandum 7-10, Attachment 7-10A SRH2D Hydrodynamic Model Part 7 of 7	Executable folders with data (Disc 7 of 7)	4.38 GB on DVD	38G	
Technical Memorandum 7-10, Attachment 7-10G Multi Flow Habitat Duration and habitat Time Series Charting Program	Executable folder with data	41 MB on CD	38H	

Table E6-1. (continued)

Name	File Type(s) on Disc	Total File Size (MB)	Disc #	As Referenced in Exhibit E
TECHNICAL MEMORANDA (continued)				
Technical Memorandum 7-10, Attachment 7-10H SRH2D Hydrodynamic Model Part 7 of 7	GIS Polygon Shape files	26 MB on CD	38I	
Technical Memorandum 7-11 & 7-11a Fish Behavior and Hydraulics Near Narrows 2 Powerhouse and Radio Telemetry Study of Spring – and Fall-run Chinook Salmon Downstream of Narrows 2 Powerhouse	1 Adobe pdf file	7 MB on CD	39	YCWA 2012r
Technical Memorandum 7-12, Proj. Effects on Fish Facilities Assoc. with Daguerre Point Dam	1 Adobe pdf file	1 MB on CD	40	YCWA 2013u
Technical Memorandum 7-13, Shutdown of Narrows 2 Powerhouse Partial Bypass	1 Adobe pdf file, 1 Microsoft Excel file and 1 DSS file	20 MB on CD	41	YCWA 2014b
Technical Memorandum 8-1, Recreational Use and Visitor Surveys	3 Adobe pdf files and 2 Microsoft Excel files	21 MB on CD	42	YCWA 2013v
Technical Memorandum 8-1 Attachment 8-1H Completed Visitor Surveys	892 Adobe pdf files	695 MB on CD	42A	YCWA 2013v
Technical Memorandum 8-2, Recreation Flow	This is a placeholder. YCWA plans to file this tech memo on CD by June 30, 2015.		43	--
Technical Memorandum 9-1, Primary Project Roads and Trails	1 Adobe pdf file	40 MB on CD	44	YCWA 2013w
Technical Memorandum 10-1, Visual Quality	1 Adobe pdf file	11 MB on CD	45	YCWA 2012s
Technical Memorandum 12-1, Historic Properties	1 Adobe pdf file	24 MB on CD	46	YCWA 2013x
Technical Memorandum 13-1, Native American Traditional Cultural Properties	1 Adobe pdf file	6 MB on CD	47	YCWA 2013y
HELICOPTER VIDEO				
Yuba River Development Project- Helicopter Video	1 digital versatile disc (DVD) (Disc 1 of 2) Media files	7.5 GB on DVD	48	YCWA 2009
Yuba River Development Project- Helicopter Video	1 compact disc (CD) (Disc 2 of 2) 14 jpeg files, 2 Adobe pdf files and 1 Microsoft Word file	65 MB on CD	48A	YCWA 2009
1:24,000 QUADRANGLES				
Yuba River Development Project 1:24k Quadrangle Maps	1 compact disc (CD)	12 MB on CD	49	YCWA 2013z
DATA AND MODELS				
Existing Without-Project and With-Project Hydrology	6 DSS files	38 MB on CD	50	YCWA 2013aa
Existing Without-Project and With-Project Water Temperature Data	6 DSS files; 3 Microsoft Excel files	77 MB on CD	51	YCWA 2013bb
Yuba River Development Project Operations Model	6 DSS files; 3 Microsoft Excel file; 1 HEC DSS Application	60 MB on CD	52	YCWA 2013cc
Yuba River Development Project Water Temperature Models	248 associated files (executable and programs)	687 MB on CD	53	YCWA 2013dd
Yuba River Development Project Habitat Time Series Charting Program (3-10F)	5 program files	20 MB on CD	54	YCWA 2013ee
Yuba River Development Project Habitat Time Series Charting Program (7-10G)	Executable folder with data	41 MB on CD	55	YCWA 2013ff
Addendum to Technical Memorandum 6-1 Riparian Habitat Above Englebright – Additional Analysis	6 Microsoft Excel files; 1 Microsoft Word file	66 MB on CD	56	YCWA 2014c
Addendum to Technical Memorandum 6-1 Attachment 6-1B Cross Section tool	1 zipped folder w/executable files	149 MB on CD	56A	YCWA 2014c

Table E6-1. (continued)

Name	File Type(s) on Disc	Total File Size (MB)	Disc #	As Referenced in Exhibit E
DATA AND MODELS (continued)				
Addendum to Technical Memorandum 6-2 Riparian Habitat Downstream of Englebright Dam – Additional Analysis	1 Adobe pdf file; 7 Microsoft Excel files	27 MB on CD	57	YCWA 2014d
Addendum to Technical Memorandum 7- 10 Instream Flow Downstream of Englebright Dam – Depth and Velocity Summary Tables for In-Channel and for Floodplain	1 Adobe pdf file	121 kB on CD	58	YCWA 2014e

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Appendix E6

Attachments

Due to the size and/or format of the material in this appendix, YCWA has filed with FERC these materials on compact disc (CD) and digital versatile disc (DVD) as part of this Application for New License.

Copies of the material in this appendix on CD and DVD may be obtained upon request by contacting:

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