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ENVIRONMENTAL DEFENSE

finding the ways that work

July 19, 2001

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Subject: Flow Allocations under the Trinity River Preferred Alternative

Under the criteria set forth in the current Record of Decision, the average increase in flow to the Trinity River is likely to be significantly less than is reported in the Final EIR/EIS. The Supplemental EIR/EIS should include alternatives that would provide a flow allocation method that would assure a frequency of flow volumes that is consistent with the analysis undertaken in the Final EIR/EIS.

The Trinity River ROD specifies that annual flow volumes be allocated to the Trinity River based on a hydrologic year-type, ranging from 369 thousand acre-feet (TAF) in critically dry years to 815 TAF in extremely wet years. How and when these year-types are determined makes a significant difference. The EIR/EIS assumes the actual year types are used to determine the allocation of flow to the river, and reports the probability of occurrence of each year-type and its associated flow allocation (Table 1, page C-5). In practice it is not possible, of course, to know for certain what the year-type classification is until the year is over. Therefore the ROD specifies that the April 1 forecast be used to determine year-type.

If the year-type is determined by historic forecast data, the flow allocations are likely to be less than projected, even if the median forecast is used. During the period 1953-1995, the April 1 median forecast predicted a drier than actual year-type six times, and a wetter than actual year type only once.[1] As a result of this difference, using the median forecast to allocate flow would result in an annual average of 13 TAF less flow than is reported in the Final EIR/EIS.

In fact, the Final EIR/EIS specifies that an adverse forecast (90% exceedence probability) be used to determine the year-type. Under this assumption, the year-type used to determine the flow allocation would be lower than the eventual actual year-type in 18 of

[1] All estimates are based on actual and forecast hydrology for the period 1953-1995. This period is the overlap between the hydrology considered as part of the Trinity River EIS/EIR and the period for which historic forecast data is available from DWR. The DWR forecast data used for this analysis has not been reviewed for accuracy. Variations in the methodology outlined in this memo would change the results slightly. An Excel spreadsheet with supporting analysis is available upon request.

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the 43 years, or 42% of the time. The average annual reduction in flow allocation would be approximately 49 TAF, or 17% of the expected increase above the baseline level of 340 TAF to 623 TAF.

These results are summarized below in Tables A-E and in Figure 1. Each table provides a different estimate of how often each year-type is projected to occur. Each table uses observed data from October through March of each year. Tables A-C use observed data for the April-September period as well, while Tables D-E use forecast data for these months. The runoff forecasts typically include only the main snowmelt months between April and July, and do not include any values for August and September, when hydrology is not normally determined by snowpack but by unpredictable thunderstorm activity. For these months, constants of 18 TAF (for the 50% forecast) and 7 TAF (for the 90% forecast) are used --- generally consistent with DWR's methodology in 2001.

The purpose of including Tables A and B in this analysis is only to show that the data underlying Tables C, D & E are consistent with the data used for the Final EIR/EIS. Tables C, D & E estimate expected flow allocations using the 1953-1995 hydrology based on actual flows (Table C), using a median forecast (Table D) and using an adverse forecast (Table E).

Table A is copied directly from the Final EIR/EIS. It seems likely that the probabilities are slightly incorrect, however. For example, the table suggests that there is a 28% probability of a dry year. The historic record indicates that there were in fact 25 dry years in the historic period (1912-1995 was used for the EIR/EIS), or 30% of the 84 years.

Table B is intended to be a corrected version of Table A, and its values are in fact very close to those found in Table A. The observed hydrologic values were found in the California Data Exchange Center (CDEC) database (variable TNL). The probabilities of occurrence for each year-type are ever so slightly different from those in Table A. The average annual flow allocation to the Trinity River would be 596 TAF, or 2 TAF more than is suggested by Table A.

Table C is created similarly to Table B, but includes only the hydrologic record from 1953 to 1995. This smaller set of years is used because DWR did not begin forecasting Trinity River basin inflow until 1953. Because these years are, on average, slightly wetter than those from 1912 to 1995, the average flow allocation to the River is slightly higher than the values projected in Tables A and B.

Table D uses an April 1 median forecast of Trinity River basin inflow to determine year-type. It uses observed flow values for October through March, the DWR 50% forecast for April through July, and a median value (18 TAF) for August though September.

Table E uses an April 1 adverse forecast for Trinity River basin inflow to determine year-type. It uses observed flow values for October through March, a 90% forecast for April

through July, and 90% exceedence value (7 TAF) for August though September. The Trinity River 90% forecast is simply 140 TAF less than the 50% forecast value.[2]

Figure 1 graphically illustrates the various probabilities of occurrence of each year type as projected in Tables C-E. Note that drier years are more likely if the forecast methodology is used, and especially if the 90% exceedence forecast methodology is used.

Table A: Values from Final EIR/EIS Table 1 (page C-3)
WY 1912-1995

Water-Year Class	Trinity River Allocation (TAF)	Annual Basin Water Runoff (TAF)	Probability of Occurrence
Extremely Wet	815	> 2000	12%
Wet	701	1350 to 2000	28%
Normal	647	1025 to 1350	20%
Dry	453	650 to 1025	28%
Critically Dry	369	< 650	12%
Average	594		

Table B: Observed Flows (CDEC variable: TNL)
WY 1912-1995

Water-Year Class	Trinity River Allocation (TAF)	Annual Basin Water Runoff (TAF)	Probability of Occurrence
Extremely Wet	815	> 2000	13%
Wet	701	1350 to 2000	27%
Normal	647	1025 to 1350	19%
Dry	453	650 to 1025	30%
Critically Dry	369	< 650	11%
Average	596		

[2] It is apparently common practice to assume that there is a constant numerical difference between the 50% and the 90% forecasts on a given river at a given time. 140 TAF is the preliminary estimate for use on the Trinity on April 1 (provided by Pierre Stephens of DWR).

Table C: Observed Flows (CDEC variable: TNL)
WY 1953-WY 1995

Water-Year Class	Trinity River Allocation (TAF)	Annual Basin Water Runoff (TAF)	Probability of Occurrence
Extremely Wet	815	> 2000	16%
Wet	701	1350 to 2000	33%
Normal	647	1025 to 1350	19%
Dry	453	650 to 1025	26%
Critically Dry	369	< 650	7%
Average	623		

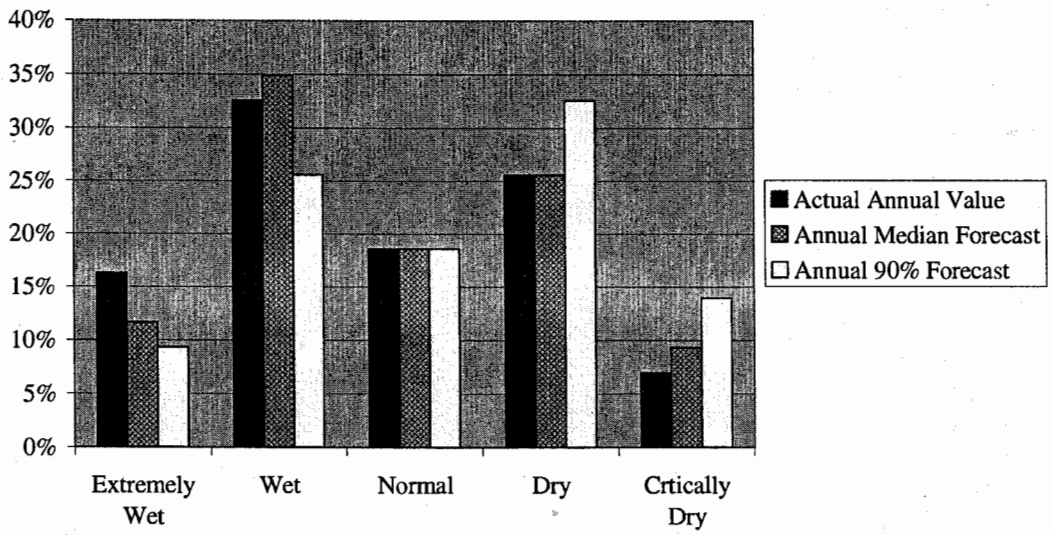
Table D: Observed Flows Oct-Mar, Median Forecast Apr-July, Average Values Aug-Sep
WY 1953-WY 1995

Water-Year Class	Trinity River Allocation (TAF)	Annual Basin Water Runoff (TAF)	Probability of Occurrence
Extremely Wet	815	> 2000	12%
Wet	701	1350 to 2000	35%
Normal	647	1025 to 1350	19%
Dry	453	650 to 1025	26%
Critically Dry	369	< 650	9%
Average	610		

Table E: Observed Flows Oct-Mar, Adverse Forecast Apr-July, Adverse Values Aug-Sep
WY 1953-WY 1995

Water-Year Class	Trinity River Allocation (TAF)	Annual Basin Water Runoff (TAF)	Probability of Occurrence
Extremely Wet	815	> 2000	9%
Wet	701	1350 to 2000	26%
Normal	647	1025 to 1350	19%
Dry	453	650 to 1025	33%
Critically Dry	369	< 650	14%
Average	574		

Figure 1
Probability of Trinity River Year Type
Using Alternative Methodologies
(based on 1953-1995 hydrology)



For the period 1953-1995, were it possible to have perfect foresight and use the observed values for the Trinity River, the average Trinity River Flow allocation would be 623,000 AF (Table C). This is analogous to the estimates used in the Final EIR/EIS, though the hydrologic period is shorter. If the median forecast is used, the average Trinity River flow allocation would be 610 TAF (Table D), or 13 TAF than if the observed values could be used. If the adverse forecast is used, the average Trinity River flow allocation would be 574 TAF (Table E), 36 TAF less than if the median forecast is used and 49 TAF less than if the observed values could be used. Under this hydrology, use of the 90% forecast would dictate that a use of a drier year type than actual would be used to determine the allocation of flow to the Trinity River in 18 out of 43 years, or 42% of the time. This loss of 49 TAF is approximately 17% of the projected annual increase, under the preferred alternative, in flow allocation from 340 TAF to 623 TAF.

Environmental Defense believes that the annual dedication of flow allocated to the Trinity River should be consistent with the probabilities of occurrence reported in the Final EIR/EIS. We do understand that it is necessary to use some form of forecast methodology to implement the preferred alternative. Fortunately, the supplemental EIR/EIS presents an opportunity to develop a forecast methodology that would provide expected flow allocations to the Trinity River that are consistent with those reported in the Final EIR/EIS and evaluated as the basis for that alternative. Of course, all impacts to power and water users, as well as all benefits to the Trinity River and its fisheries, should

be evaluated in accordance with the best estimate of what is actually expected to occur under the implementation of any particular alternative.

Thank you for your consideration of this suggestion. Of course, I am available to answer any questions.

Sincerely,

Spreck Rosekrans
Senior Analyst

Cc: Trinity River Listserver
Pierre Stephens, DWR

ATTACHMENT #4

ENVIRONMENTAL DEFENSE

Trinity River Plan Flow Allocations

(measured at Lewiston)