

Exponent[®]

City of Antioch Testimony to SWRCB WaterFix Part 2 Proceedings

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Antioch-502

Summary of Testimony

- Opinion 1: Prior to about 1917, water within the Delta and at Antioch's intake location was historically fresh.
- Opinion 2: The Boundary 2 scenario is closest to "natural" flow conditions.
- Opinion 3: Fall X2 is an important component to establishing flow criteria that will not impair beneficial uses of water in the western Delta.
- Opinion 4: At a minimum, flow criteria protective of beneficial uses and public trust values at Antioch should include requiring D-1641 municipal and industrial water quality objectives be maintained at Antioch, as the 1968 Agreement is not protective of such beneficial uses at Antioch.

Opinion 1: Prior to about 1917, water within the Delta and at Antioch's intake location was historically fresh.

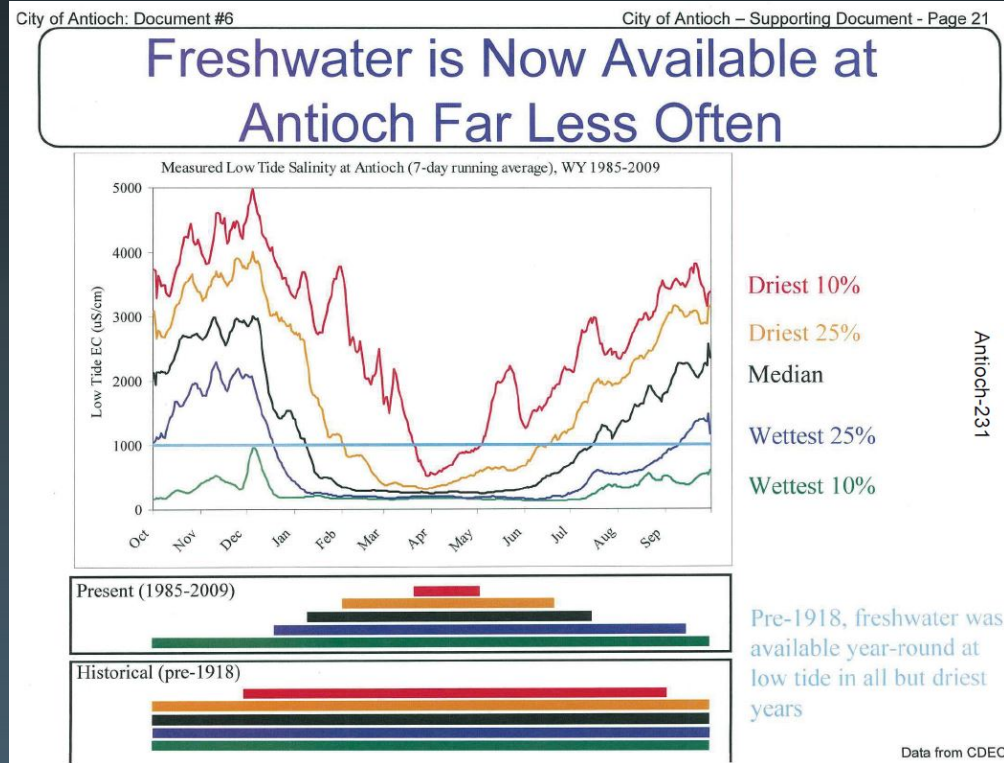
- *"From early days, Antioch has obtained all or most of its domestic and municipal water supply from the San Joaquin River immediately offshore from the City... However, conditions were fairly satisfactory in this respect until 1917, when the increased degree and duration of saline invasion began to result in the water becoming too brackish for domestic use during considerable periods in the summer and fall" (DPW 1931, p. 60)*

Opinion 1: Prior to about 1917, water within the Delta and at Antioch's intake location was historically fresh.

- Salinity intrusion began to increase markedly in about 1918, when *"the urge of war had encouraged heavy plantings of rice and other crops in the Sacramento Valley, result[ing] in the penetration of salt water into the Delta for a longer time and to a greater distance upstream than ever known before"* (Means 1928, p. 57)
- The historical record clearly demonstrates that "natural conditions" at Antioch were predominantly fresh, and that water was available for diversion year-round, at least during low tide, in all but the driest years.

Salinity Analysis Methods

- Prior analyses used historical information to determine availability of water at low tide
- Historical information was adjusted for mix of water year types
 - 1906-2016: 14% of water years were critical
 - 1976-1991: 31% of water years were critical



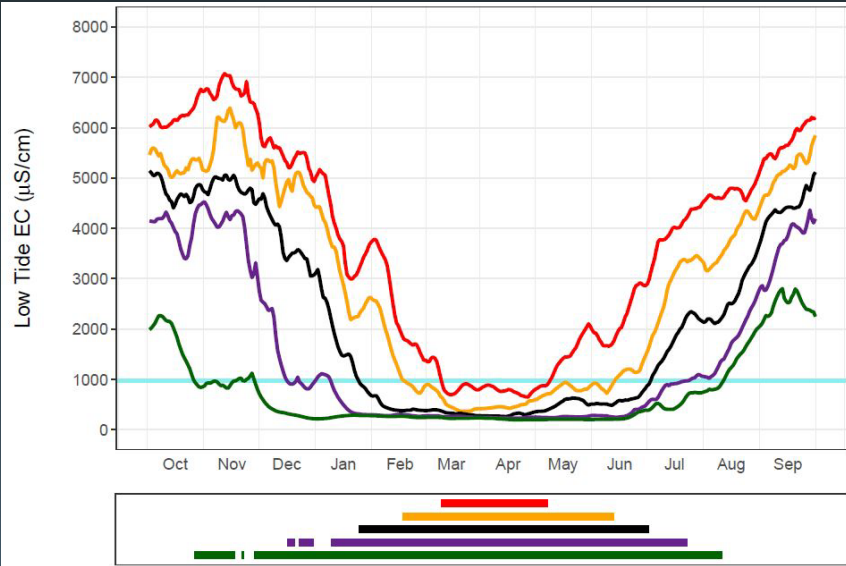
Opinion 2. The Boundary 2 scenario is closest to “natural” flow conditions.

Analysis Methods

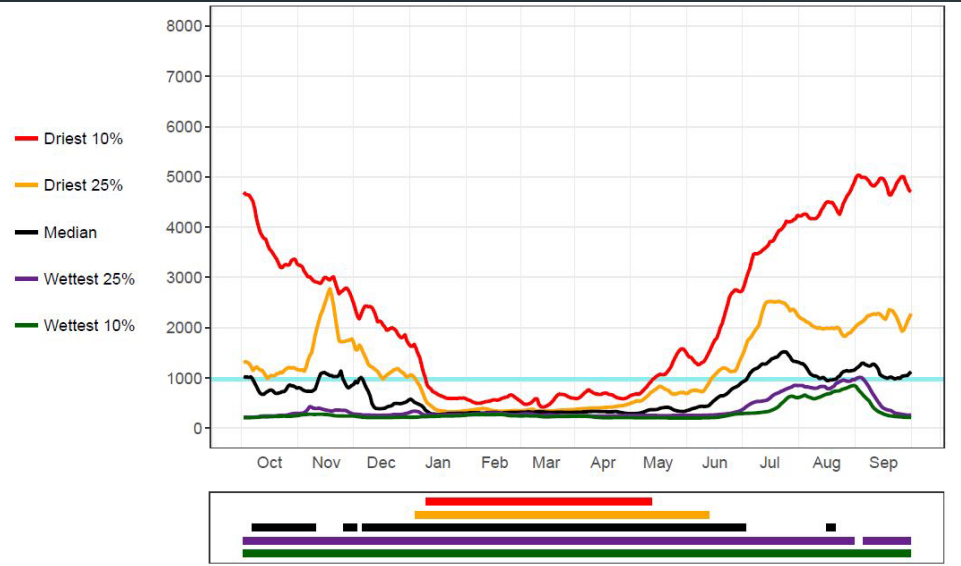
- Compared availability of useable water (< 250 mg/L chloride) at Antioch’s intake for historical and WaterFix conditions:
 - 1) Low tide (7-day running average)
 - 2) Peak daily salinity – 2 hours after higher high tide (HHT+2 hr) – as defined in Amendment 1 to 1968 Agreement (DWR-304)
- Calculated exceedance probabilities (10% driest, 25% driest, median, 25% wettest, 10% wettest) from DSM2 model results for 1976-1991

Low Tide Salinity Comparison

Boundary 1



Boundary 2



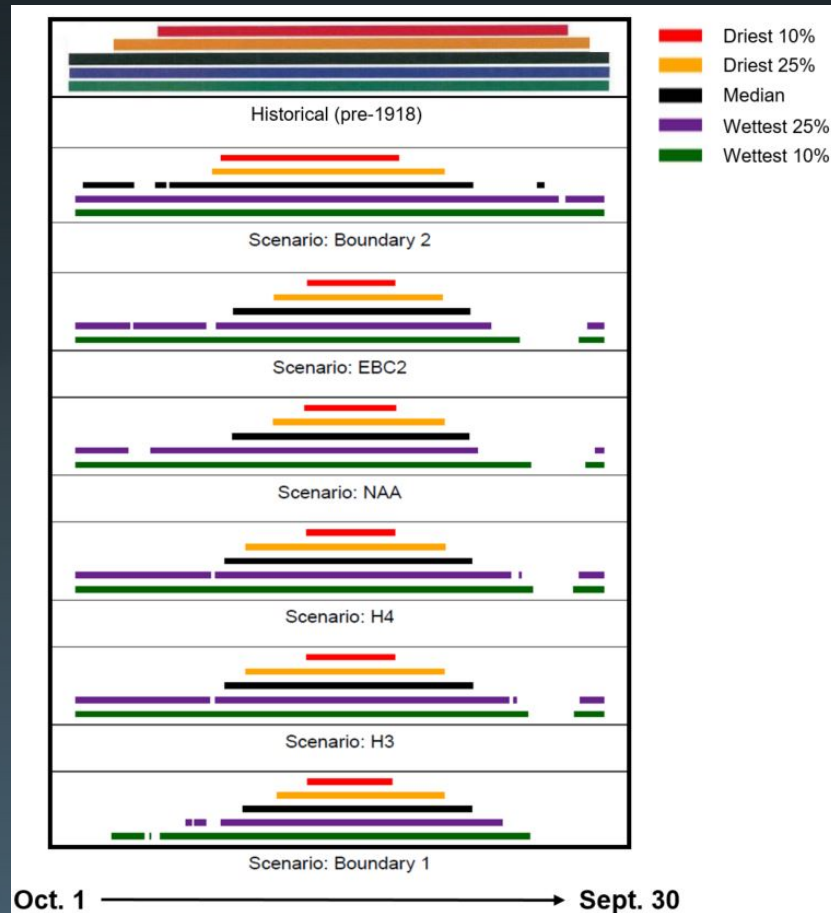
Availability of water at Antioch's Intake at low tide

Number of days per year chloride is below 250 mg/L at Antioch during low-tide for different hydrologic conditions and different exceedance levels (calculated from DSM2 model results for 1976-1991)

Table 1.

	EBC2 (days)	NAA (days)	B1 (days)	H3 (days)	H4 (days)	B2 (days)	Historical [pre-1918] Condition ^a
Driest 10 %	61	64	59	62	62	124	275
Driest 25 %	117	119	116	138	139	161	320
Median	164	164	159	172	171	260	365
Wettest 25 %	291	270	209	317	319	361	365
Wettest 10 %	325	328	281	334	338	365	365

^a Historical information indicates that during the driest 25 percent of historical (pre-1918) water years, chloride remained below 250 mg/L year-round (see Figure 1). Exceedance estimates for historical conditions (pre-1918) were adjusted for the 1976-1991 period because critical years occurred 31 percent of the time in 1976-1991 but less frequently in the historical record (e.g., only 14 percent of the time from 1906 to 2016).

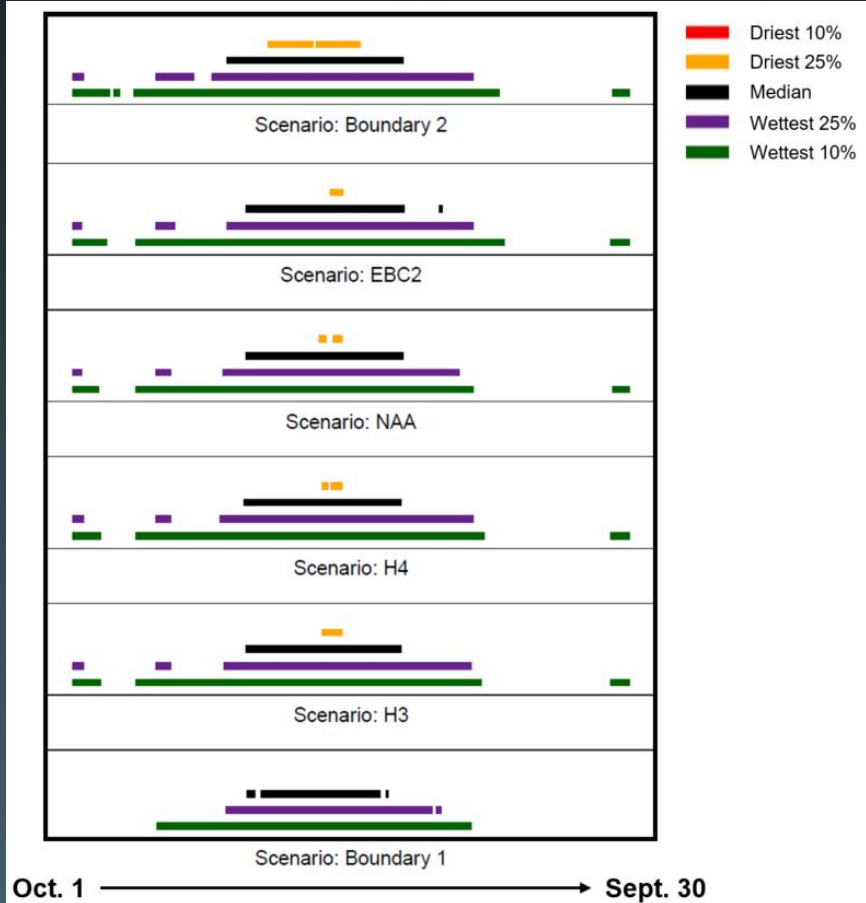


Oct. 1 → Sept. 30

Availability of “useable water” at Antioch’s Intake (HHT+2hr)

Table 2. Number of days per year chloride is below 250 mg/L at Antioch 2 hours after higher-high tide for different hydrologic conditions for different exceedance levels (calculated from DSM2 model results for 1976-1991)

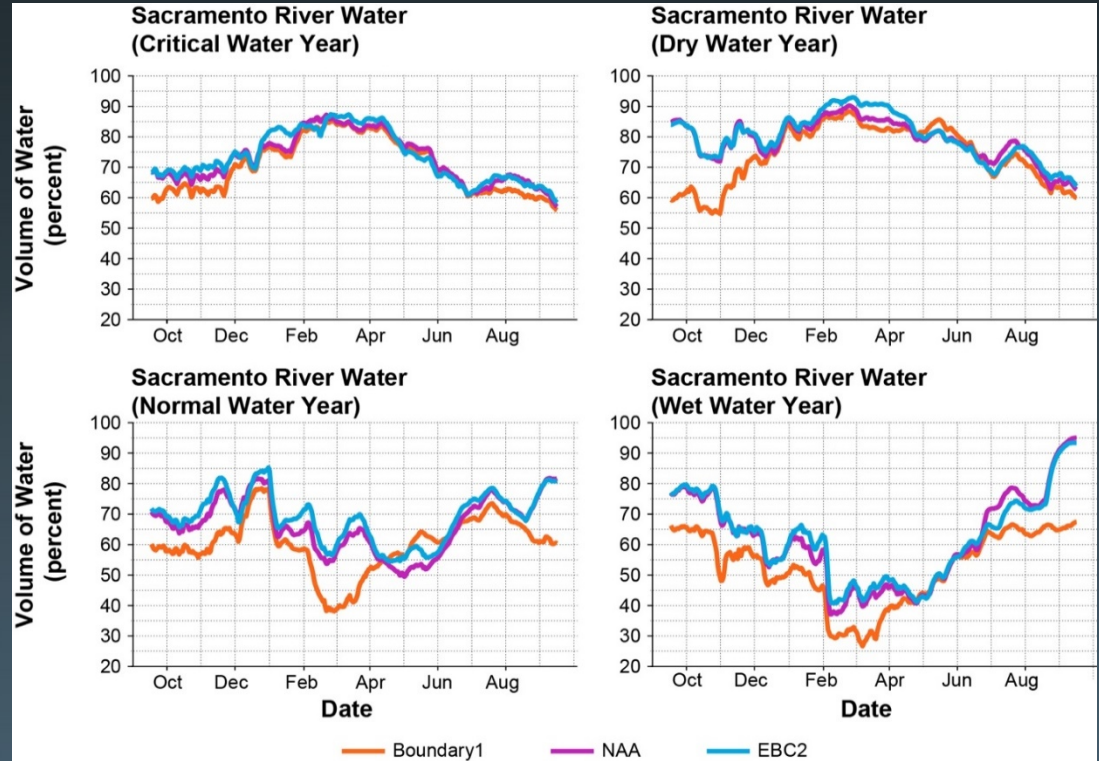
	EBC2 (days)	NAA (days)	B1 (days)	H3 (days)	H4 (days)	B2 (days)
Driest 10 %	0	0	0	0	0	0
Driest 25 %	10	13	0	14	13	60
Median	108	104	87	103	104	116
Wettest 25 %	183	174	140	182	186	206
Wettest 10 %	278	252	207	259	261	282



Opinion 3: Fall X2 is an important component to establishing flow criteria that will not impair beneficial uses of water in the western Delta.

- Boundary 1 scenario shows largest changes in composition, increases in salinity
- Boundary 1 is not operated to Fall X2

Antioch 202-Errata, Figure 6:
 Source fractions of Sacramento River water at Antioch's intake as modeled by DSM2, averaged by water year type



Opinion 3: Fall X2 is an important component to establishing flow criteria that will not impair beneficial uses of water in the western Delta.

- D-1641 compliance:
- Boundary 1 complies least frequently
- Boundary 2 is in compliance

Table 3. Number of days in each water year that the 250 mg/L chloride threshold for municipal and industrial beneficial uses is not met at PP#1 based on DWR model results.

Water Year	Year Type	Total Days	EBC2	NAA	B1	H3	H4	B2
1976	Critical	366	26	0	0	0	0	0
1977	Critical	365	0	23	0	0	0	0
1978	Normal	365	6	78	85	55	73	0
1979	Normal	365	0	7	57	0	0	0
1980	Normal	366	45	23	18	0	0	0
1981	Dry	365	0	0	0	0	0	0
1982	Wet	365	2	2	8	0	0	0
1983	Wet	365	21	0	0	0	0	0
1984	Wet	366	0	0	0	0	0	0
1985	Dry	365	0	0	8	0	0	0
1986	Wet	365	15	21	0	0	0	0
1987	Dry	365	0	0	38	0	0	0
1988	Critical	366	0	0	0	0	0	0
1989	Dry	365	55	80	88	53	51	0
1990	Critical	365	23	18	0	0	0	0
1991	Critical	365	17	91	95	52	33	0
		sum	210	343	397	160	157	0

Opinion 4. At a minimum, flow criteria protective of beneficial uses and public trust values at Antioch should include requiring D-1641 municipal and industrial water quality objectives be maintained at Antioch, as the 1968 Agreement is not protective of such beneficial uses at Antioch.

- The 1968 Agreement (Antioch-101) provides at p. 2 that “in the future the average number of days per year that usable river water will be available to the City will be caused to decrease, and such decrease will be due in part to the operation of the State Water Resources Development System.”
- The Agreement applies only to chlorides and only to municipal and industrial use by the City
- The Agreement contains no standards or mitigation specifically protective of public trust or recreational uses.

Opinion 4. At a minimum, flow criteria protective of beneficial uses and public trust values at Antioch should include requiring D-1641 municipal and industrial water quality objectives be maintained at Antioch, as the 1968 Agreement is not protective of such beneficial uses at Antioch.

- The City requests either
 - DWR enter into a new agreement (or modify the existing agreement) to mitigate the City for the impacts of the WaterFix project
 - Or
 - The State Water Board should require that DWR (a) operate to D-1641 at Antioch and (b) operate to meet Fall X2 requirements