

WATER TRANSFER WORKING GROUP PROJECT DESCRIPTION

APPLICATION NO./COURT CLAIM NO.		
CS4-1858&59(A)@2 Court Claim Nos. 01858 and 01859		
APPLICANT NAME	CONTACT NAME	TELEPHONE NO.
Shaw Vineyards		
WATER RIGHT HOLDER'S NAME (if different)		EMAIL
The Barker Ranch, Ltd.		

DATE OF APPLICATION	PRIORITY DATE
	October 23, 1889

WATER SOURCE:	CROP:
Yakima River	Wetlands creation/restoration & wildlife habitat
INSTANTANEOUS QUANTITY:	ANNUAL QUANTITY:
59.25 cfs	21,866 acre-feet
PERIOD OF USE:	
January 1 – December 31 under water right change No. CS4-1858&59(A)	
PLACE OF USE:	PURPOSE OF USE:
S. 13, T. 10N, R. 27E, lying southwest of the Horn Rapids Canal; Sections 23, 24, 25, T. 10N, R. 27E, lying north and east of the Yakima River; S. 19, T. 10N, R. 28E, lying southwest of the Horn Rapids Canal EXCEPT that portion lying east of Grosscup Rd; W1/2 NW1/4, S. 29, T. 10N, R. 28 E, lying west of the Horn Rapids Canal EXCEPT short plats 628, 693, 694, and 746; S. 30, T. 10N, R. 28E, lying north of the Yakima River EXCEPT that portion lying east of Grosscup Rd. and north of Weidle Rd.; Section 31, T. 10N, R. 28E, lying north of the Yakima River.	Irrigation of 1,893 acres to support the continued creation and maintenance of wetlands and wildlife habitat, annually from January 1 through December 31.
IRRIGATION METHOD:	
Water is diverted from the Yakima River into a 3.06 mile buried pipe, thence to two main lateral turnouts where water is directed to various distribution ditches and secondary laterals. From these turnouts and laterals, various and numerous wetland and wildlife habitat zones are flood and sprinkler irrigated.	

CONSUMPTIVE USE CALCULATION:
See attachment

NARRATIVE DESCRIPTION OF PROJECT:
<p>This right has been the subject of two previous changes. In 2000, the purpose and period of use were changed to irrigation and wetlands creation and maintenance, January 1 to December 31. In 2011, OCR funding a project to convert 3 miles of open ditch to buried pie. The water savings, 10.5 cfs and 6,435.5 acre-feet, was placed in the Trust Water Rights Program (TWRP), and the remainder 59.25 cfs and 21866 acre-feet, was retained by Barker Ranch.</p> <p>This change proposes to temporarily transfer a portion of the Barker Ranch water right to Shaw Vineyards (7.04 cfs, 2,200 acre-feet per year for irrigation of 1,000 acres) and Easterday Farms (5.76 cfs, 1,800 acre-feet per year for irrigation of 2,400 acres) through 2032. The portion of the water right conveyed to Easterday Farms will be designated for instream flow purposes in the intervening reach. The proposed point of diversion for Shaw Vineyards is from the Yakima River within the S1/2 of S. 3, SE1/4 of S. 9, NE1/4 of S. 10, and NW1/4 of S. 11, all within T. 10N, R. 27E, Benton County, WA. The Easterday Farms points of withdrawal are wells</p>

adjacent to the Columbia River within the E1/2 of S. 20, T. 7N, R. 31E, Benton County, WA.

The water is made available for transfer through operational changes at the Barker Ranch. Historically, Barker Ranch was flood irrigated cattle pasture. Beginning 1995-96, Barker Ranch developed a wetland reserve plan to restore wetlands on the property. Over time, the property and water use has become more intensely managed, including efficiency improvements in water conveyance, reduced water application to wetland vegetation, and a reduction in irrigated acreage. Water that has gone unused over the past eight years has been temporarily placed in the TWRP as a donation. This is in addition to the water placed in the TWRP in 2011.

WTWG Project form

Benton County Water Conservancy Board

Technical Memorandum

DATE: July 30, 2013
TO: Barker Ranch Water Right Change/Transfer ROE Analysis
FROM: Darryll Olsen, Ph.D., Chairman, BCWCB
SUBJECT: Barker Ranch Water Right ACQ Analysis for CS4-1858&1859CTCL(A)

Background and Change/Transfer Objective:

The Barker Ranch water right (CS4-1858&1859CTCL(A)) functional use has experienced substantial change since the period of its original development relative to its current application. In effect, the Ranch site has moved from a cattle pasture with inefficient water use, to an inefficient, flooded wetlands area (wildlife habitat), to a more intensively managed Maintenance Wetlands Regime. Consumptive water use has changed.

The current Maintenance Wetlands Regime, with transitional post 2011-2012 operations, includes direct improvements to water conveyance and operational spill, managed and reduced water applications to wetlands plants and vegetation with reduced consumptive water use rates, and some reduction in total irrigation lands stemming indirectly from the overall water management changes.

Consequently, with active Maintenance Wetlands Regime changes in play, Barker Ranch seeks to provide a water right change/transfer lease for its increasing consumptive water use reductions—along with additional reductions in operational spill—and to use the lease funds to further improve on-site water use efficiencies. Through this action, both consumptive and non-consumptive water uses will be better optimized.

Analysis:

Tables 1-5 describe the current water management operations and the expected results since the pipeline/conveyance improvements and initiation of the post-2011/12 Maintenance Wetlands Regime. As summarized below:

- Table 1 displays the measured 2008-2012 Barker Ranch water diversion data. With the water conveyance reduction pipeline in place and taking into account the Trust Water Program change that created the (B) portion of the water right, the 2011-12 (average) water diversion was 16,912 acre-ft.; and with an independent Barker Ranch Trust allocation (under (A) portion of water right) water in 2011-2012, a total amount of 21,865.9 acre-ft.

3030 W. Clearwater, Suite 205-A, Kennewick, WA, 99336
509-783-1623, FAX 509-735-3140, DOlsenEcon@AOL.com

- The two-year, peak year average trust allocation (A-portion) amounts to about 4,953.8 acre-ft.; the amount of water not diverted for out-of-stream (Ranch) use during 2011-12 operations. Per Ranch data, 2013 water usage appears to mirror 2012 operations.
- Table 1a and associated chart reveals the dramatic shift in the original CFO operations (cattle pasture) versus the ongoing shift to a Maintenance Wetlands Regime, based on the actual 2012 water diversion data. Under the cattle pasture model, large volumes of water were applied during the summer irrigation season, as compared to the non-use season. The bulk of the water diversion has shifted away from the period of high consumptive (ET) use (March-September).
- By the 2011-12 period, the Ranch is being managed for wetlands habitat, and the majority of water application is during the non-summer period; about 68.5% as compared to 31.5% during the summer period (the high evapotranspiration-ET period). In effect, the majority of water usage (has been) is being moved out of the ET period.
- Table 2 is informational in nature and depicts the actual 2012 water use (with Trust Program allocation), and the consumptive and non-consumptive uses authorized under the 2011 modification order (per the cited CFO). If allocated under the cattle pasture model (by acre-ft.), the consumptive usage would be about 12,189.9 acre-ft., and the non-consumptive use about 9,741.6 acre-ft.
- The preceding information and the nature of the 2012 use data make clear, that the actual consumptive use of the 2012 operations are no longer directly applicable to the allowed usage under the 2011 modification order (and cited CFO allocations). Much of the water use is outside of the primary consumptive (ET) use period.
- Table 3 displays the water right provisions (assumptions) about consumptive and non-consumptive water use—that would be applicable during a high consumptive use period. These percentage allocation numbers reference the modification order and CFO. They reflect the pre-modification order period, and the post-modification order period (2011-current year). The post-modification order period reflects the formal Trust Water Program donation, where conveyance losses were reduced (non-consumptive use).
- Table 3a displays the change in consumptive versus non-consumptive water use, but also takes into account the seasonal variation in operational spill during the summer period—the period of high consumptive (ET) use. The result is to shift the total consumptive use during the irrigation period from 62% to about 78%, with the remainder allocated to some conveyance loss and operational spill.
- Table 4 focuses on the estimated consumptive water use during the summer period, as the Ranch moves from the non-maintenance wetlands to the Maintenance Wetland Regime. While the technical estimates do vary, depending

on wetlands/swamp/open water conditions, consumptive use (ET) estimates for heavily flooded, dense vegetation wetlands suggest they use as high as 120% of consumptive use (ET) compared to irrigated agriculture, including agricultural lands in pasture and alfalfa production.¹

- In Table 4, the average alfalfa-pasture use ET for 2011-12 is provided, along with an efficiency factor for application. This value is then escalated to 120% to depict unmanaged, high vegetation wetlands ET use. The resulting estimate is about 76 inches/acre, or about 6.3 acre-ft. per acre. This is about 90.5% of the modification order/CFO at 7.0 acre-ft./acre.
- Table 5 depicts the changes to: 1) consumptive use during the summer period including proportional operational spill factors (Table 2a); 2) the estimated consumptive use relative to full irrigation use (Table 4); and a reduction in some irrigated acres for the Ranch, per the indirect effects of the Maintenance Wetland Regime changes.
- In Table 5, ~~107.8~~ acres are non-irrigated (reduction) with allowances made to not double count the acreage impacts within the other Maintenance Wetland Regime changes.
- Comprehensively, the Maintenance Wetland Regime includes changes to:
 - Distribution system operations and significantly greater check gate control (along with the pipeline installation).
 - Summer water allocations to the wetlands area.
 - Total irrigated acres.
 - Targeted vegetation types in the wetlands (for example, moving to Tall Wheat areas); and thinning Russian Olive trees.
 - Reducing operational spill needs indirectly affecting consumption use.
- In total per the above operational changes, Table 5 estimates indicate that a 4,953.8 reduction in diversion corresponds to a reduction in consumptive water use of about ~~3,991.5~~ acre-ft., with the Maintenance Wetlands Regime (including some irrigated acres reduction). Also, this reduction in water use relates to an additional reduction in real-time diversion associated with corresponding reduction in operational spill.

4,1001

¹ Orang, M.N., R. L. Snyder, and S. Sarreshteh. 2009. "Historical Estimates of Agricultural and Wetlands Water Use in the San Joaquin-Sacramento River Delta." CA Water Plan Update, CADWR, Vol.4, Crop Water Use. This particular study appears to parallel the Ranch conditions more closely than other studies.

Analysis Tables

TABLE 1.
Barker Ranch Review of CS4-1858&1859CTCL(A), Water Right Use
2008-2012 Operations With and Without Consumptive Use Modifications (Cattle Pasture vs Wetlands/Habitat)

2012 Operations (with 4,000 acre-ft. trust allocation) with Baseline Consumptive Use Application:

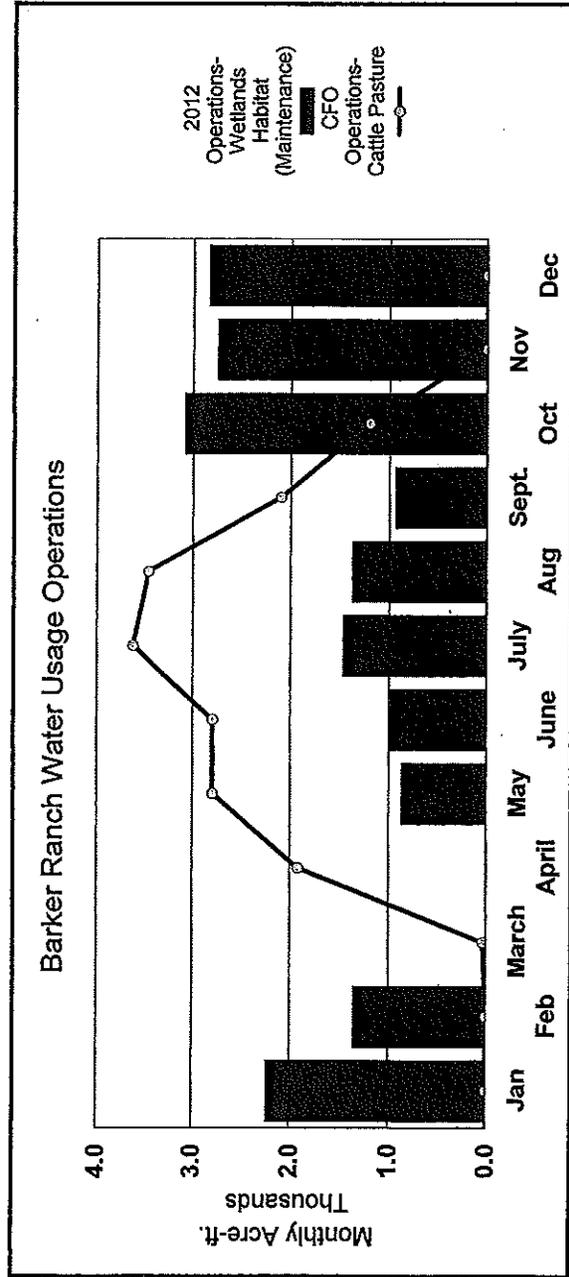
Total Monthly Acre-ft.	Jan	Feb	March	April	May	June	July	Aug	Sept.	Oct	Nov	Dec	Total	Total with Barker Ranch Trust Water*
2008	1770.3	1003.7	1007.4	1238.5	1512.6	1263.9	1820.9	1820.1	1835.7	3215.8	3207.3	1574.5	21,270.7	25,270.7
2009	2009.7	0	0	1988.7	0	0	0	0	0	0	2624.2	2081.5	8,704.1	21,271.1
2010	3658.8	345.1	833.1	1323	2231.4	1186.3	1752.4	1130.6	291.6	2644	2094.6	2372.3	19,843.0	19,843.0
Pipe Project Trust (A)*	1983.5	698.2	138.9	280.8	744.4	1135.7	1017.5	1415.1	645	2784.5	2568.4	2482.7	15,882.7	21,865.7
2011	2,241.8	1,357.0	0.0	0.0	879.3	983.8	1,487.6	1,376.3	941.0	3,085.9	2,756.6	2,846.2	17,931.5	21,865.9
2012														

Two-Year, Peak year Ave. 2008-2012	20,556.9
Two-Year, Peak year Ave. 2011-2012	16,912.1
2011-2012 Peak Usage Minus 2011-2012 Average:	3,644.8

* NOTE: Separate Barker Ranch Trust Program water from CS4-1858&1859CTCL(B) authorized in 2011.
 Source: Barker Ranch gaging/measuring station (2008-2012) and Trust Water Program data.

Table 1a.
Barker Ranch Water Release Regimes, Initial CFO Operations vs 2012 Operations

2012 Operations (Actual):	Jan	Feb	March	April	May	June	July	Aug	Sept.	Oct	Nov	Dec	Total
Acre-ft. Use	2,241.8	1,357.0	0.0	0.0	875.3	983.8	1,487.6	1,376.3	941.0	3,085.9	2,756.6	2,846.2	17,931.5
"Cow Pasture Model" Per CFO Typical Water Use Distribution	0	0	35.9	1918.6705	2797.314	2797.314	3622.163	3480.7795	2087.9855	1201.4105	0	0	17,931.5



2012 Operations (Actual):

Total Water Volume During March-September:	Acre-ft.	Percent
	5,644.0	31.5%
Total Water Volume During October-February:	Acre-ft.	Percent
	12,287.5	68.5%

TABLE 2

**Barker Ranch Review of CS4-1858&1859CTCL(A), Water Right Use
2012 Operations With and Without Consumptive Use Modifications (Cattle Pasture vs Wetlands/Habitat)**

2012 Operations (with 4,000 acre-ft. trust allocation) with Baseline Consumptive Use Application:

	Jan	Feb	March	April	May	June	July	Aug	Sept.	Oct	Nov	Dec	Total	Total with Trust Water
2012 Operations (Actual): Acre-ft.	2,241.8	1,357.0	0.0	0.0	875.3	983.8	1,467.6	1,376.3	941.0	3,085.9	2,756.6	2,846.2	17,931.5	21,931.5

2012 Operations Per 2012 Modification Order and CFO Water Allocations:

Consump. (55.5%)	1,246.4	754.5	0.0	0.0	486.7	547.0	816.0	765.2	523.2	1,715.8	1,532.7	1,582.5	9,969.9	12,189.9
Non-Consump. (44.5%)	995.4	602.5	0.0	0.0	388.6	436.8	651.6	611.1	417.8	1,370.1	1,223.9	1,263.7	7,961.6	9,741.6
Total Monthly Acre-ft.	2,241.8	1,357.0	0.0	0.0	875.3	983.8	1,467.6	1,376.3	941.0	3,085.9	2,756.6	2,846.2	17,931.5	21,931.5

2012 Operations (with 4,000 acre-ft. trust allocation) with Modified Consumptive Use Per Application Per AgWeatherNet-Consumptive Use (ET) Months:

Water Use in Direct ET Months:	0	0	0	0	875.3	983.8	1,467.6	1,376.3	941.0	3,085.9	0	0	8,730
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Source: OCR-Ecology 2011 Modification Order (CFO) and Barker Ranch water diversion data for 2012.

TABLE 3.

Barker Ranch Review of CS4-1858&1859CTCL(A), Water Right Use Allocation Regime Over Time

CFO Baseline Allocation of Water Use (1992, 1999, and 2011 Ecology Modification Order):

Total Acres Served: 1923 Irrigated Acres

	Irrigation cfs Primarily Consumptive	Conveyance cfs Non-Cons. Use	Operational Spill cfs Non-Cons. Use	Stock Water Consumptive Use	Acre-ft. Estimated Consumptive Use	Acre-ft. Estimated Non-Cons. Use	Total Use
Baseline Water Allocation							
Allocation cfs Per CFO and BCWCB Action (1999)	39.5	17.3	14.3	0.05	---	---	69.75
% cfs Allocation:	55.5%	24.3%	20.1%	0.1%	---	---	100%
Acre-ft. Use:	13,461	6,877	5,689	34	13,461	14,841	28,302
% Acre-ft Allocation:	55.5%	24.3%	20.1%	0.1%	47.6%	44.5%	100%
Total Acre-ft./Acre:					7.00	7.72	
Allocation 2011 Mod. Order							
Allocation cfs Per Modification Order (2011)	39.5	6.8	12.9	0.00	---	---	59.25
% cfs Allocation:	66.7%	11.5%	21.8%	0.0%	---	---	100%
Acre-ft. Use:	13,461	2,510	4,761	0	13,461	8,405	21,866
% Allocation:	66.7%	11.5%	21.8%	0.1%	61.6%	38.4%	100%
Acre-ft./Acre:					7.00	4.37	

TABLE 3a

Barker Ranch Review of CS4-1858&1859CTCL(A), Water Right Use

Allocation Regime Over Time with Change to Summer Spill Percentage Based on 2012 Operations

CFO Baseline Allocation of Water Use (1992, 1999, and 2011 Ecology Modification Order):

Total Acres Served: 1923 Irrigated Acres

	Irrigation cfs Primarily Consumptive	Conveyance cfs Non-Cons. Use	Operational Spill cfs Non-Cons. Use	Stock Water Consumptive Use	Acre-ft. Estimated Consumptive Use	Acre-ft. Estimated Non-Cons. Use	Total Use
Baseline Water Allocation							
Allocation cfs Per CFO and BCWCB Action (1999)	39.5	17.3	14.3	0.05	---	---	69.75
% cfs Allocation:	55.5%	24.3%	20.1%	0.1%	---	---	100%
Acre-ft. Use:	13,461	6,877	5,689	34	13,461	14,841	28,302
% Acre-ft Allocation:	55.5%	24.3%	20.1%	0.1%	47.6%	44.5%	100%
Total Acre-ft./Acre:					7.00	7.72	
Allocation 2011 Mod. Order							
Allocation cfs Per Modification Order (2011)	39.5	6.8	12.9	0.00	---	---	59.25
% cfs Allocation:	66.7%	11.5%	21.8%	0.0%	---	---	100%
Acre-ft. Use:	13,461	2,510	4,761	0	13,461	8,405	21,866
% Allocation:	66.7%	11.5%	21.8%	0.1%	61.6%	44.5%	100%
Acre-ft./Acre:					7.00	4.37	
With Operational Spill Reduction: Summer Period Operations*							
Allocation cfs Per Modification Order (2011)	39.5	6.8	4.1	0.00	---	---	50.36
% cfs Allocation:	78.4%	13.5%	8.1%	0.0%	---	---	100%
Acre-ft. Use:	13,461	2,317	1,365	0	13,461	3,702	17,163
% Allocation:	78.4%	13.5%	8.1%	0.1%	78.4%	21.6%	100%
Acre-ft./Acre:					7.00	1.93	

* Based on proportional water use/operation spill during the summer period, relative to the non-summer period.

Sources: OCR-Ecology 2011 modification order (CFO).

Table 4.
Estimated ET Use for Wetlands vs Modification Order (CFO) Irrigation Use Designation

Inches Per Acre Use:

	Estimated ET Alfalfa-Pasture	ET with 90% Efficiency Factor	Estimated ET Full Production Wet Lands*	Consumptive Use Modification Order	Modification Order vs Wetlands	% Nonconsumptive ET Use (Return Flows)
2011 ET Data	53.9	59.9	71.9	84.0	12.1	14.4%
2012 Et Data	60.1	66.8	80.1	84.0	3.9	4.6%
Average	57.0	63.3	76.0	84.0	8.0	9.5%
Percent Cons. Use For Modification Order						90.5%

Source: WSU AgWeatherNet 2011-2012 data

* Estimate at 120% of Crop Lands with Alfalfa-Pasture per California Water Plan Update 2009..

Table 5.
Estimated Consumptive Use Available for Change/Transfer

Revised Post 2012-2013 Operations with Water Use Reductions at Barker Ranch--Maintenance Wetlands Program:

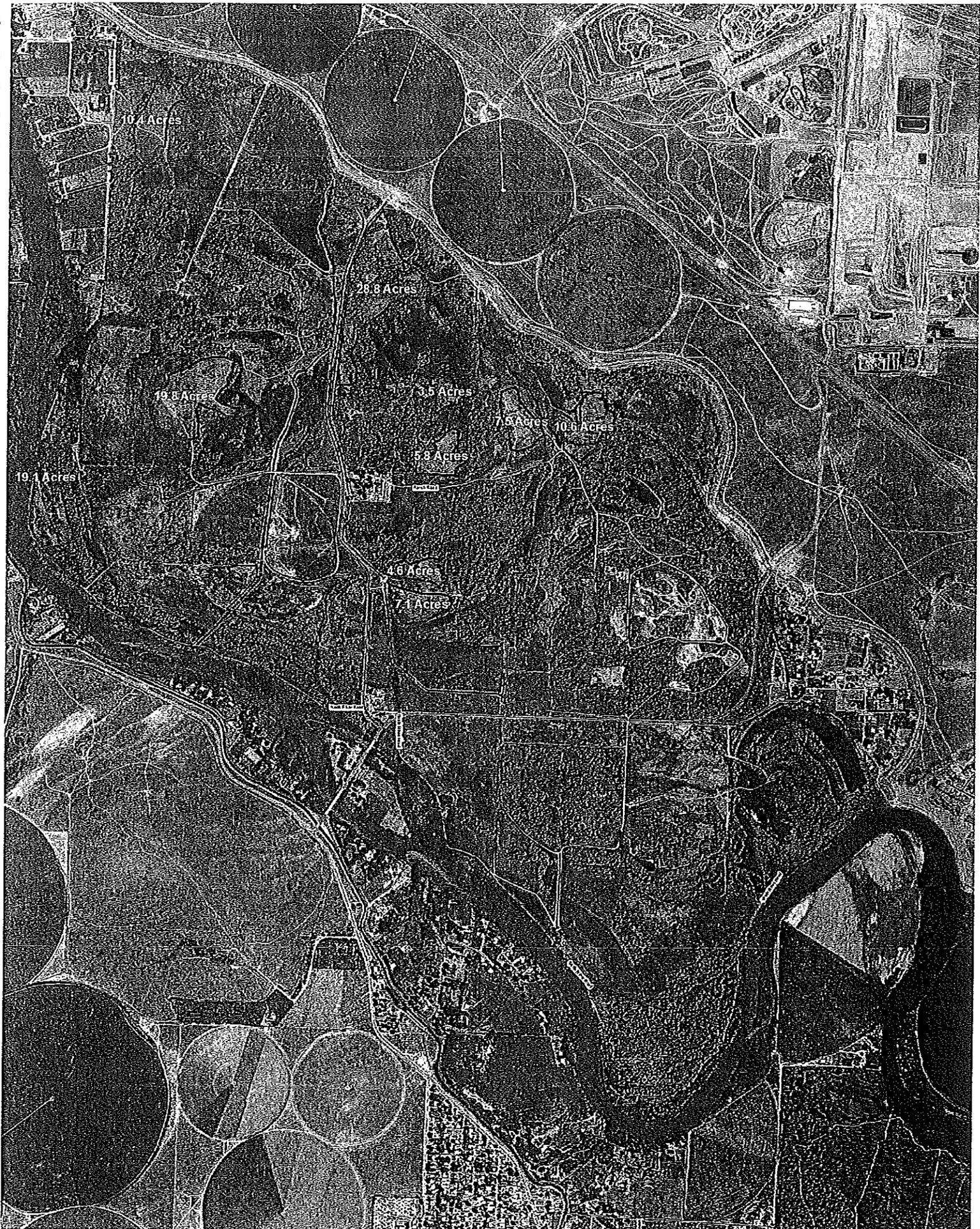
Total Acre-ft. Reduction at Barker Ranch*	Consumptive (Table 2a.)	Consumptive Acre-ft.	Consumptive Irrigation Minus Return Flows (Table 3)	Total Consumptive Acre-ft.**
4,675.6	78.4%	3,665.7	90.5%	3,317.4
Total Acre-ft. reduction with irrigation reduction of 108 acre				684.0
				4,001.4

* Includes adjustment for reduction of 108 acres from irrigation after 2013, based on prorated savings from 4,953.8 acre-ft. (from Table This reflects 4,953.8 acre-ft./1923 acres = 2.58 acre-ft. per acre; or net savings reduction of 278 acre-ft.

** Represents an effective consumptive efficiency rate of about 71%, with pipeline/conveyance loss improvements, reduce operational and post 2011-2012 Maintenance Wetlands Program.

NOTE: Water use ET reductions are based on several operational changes:

- 1) Changes to distribution system operation with new distribution gates (and pipeline modifications).
- 2) Changing the allocation to the Wetlands to a maintenance system, from a high water-ET use regime.
- 3) Reducing some incidental watered areas within the wetlands.
- 4) Integrating lower ET use plants within the wetlands (tall wheat grass and other).
- 5) Continued modification of the distribution system to reduce operational spills and related consumption use--system efficiency improves will continue reducing real-time water withdrawals, providing more instream flow.
- 6) Reduced open-water locations in summer period per miquito district requests.
- 7) Thinning program for Russian Olive trees.



Wetlands vs Ag. ET Charts

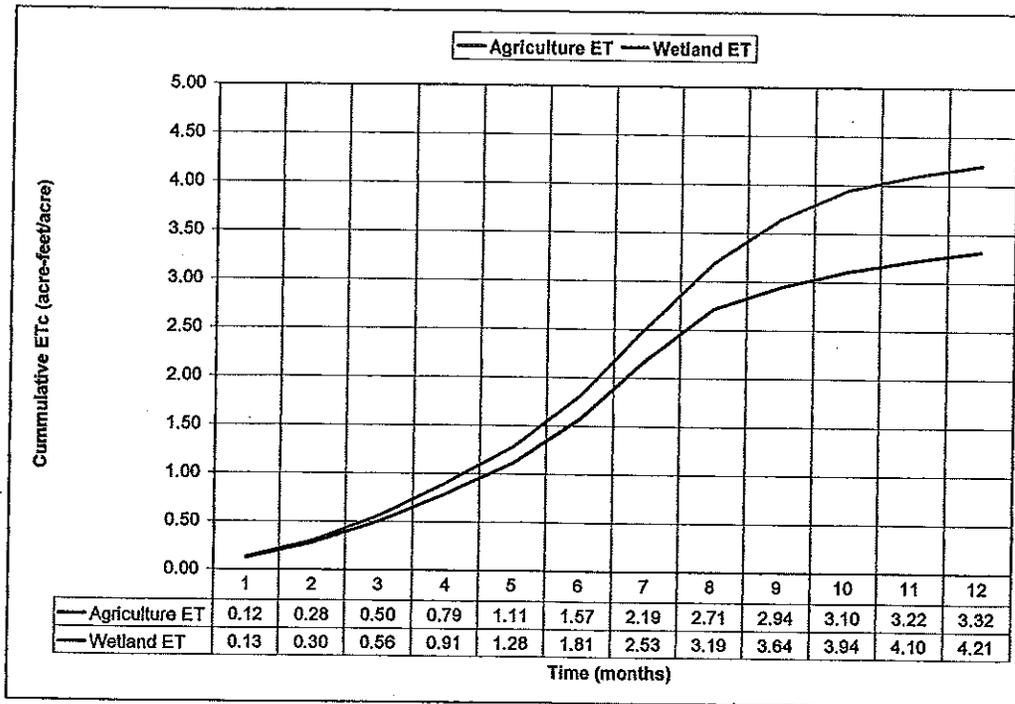


Figure 7- A plot of cumulative ET_c versus time for agriculture and wetland surfaces in the Delta Uplands during 1998.

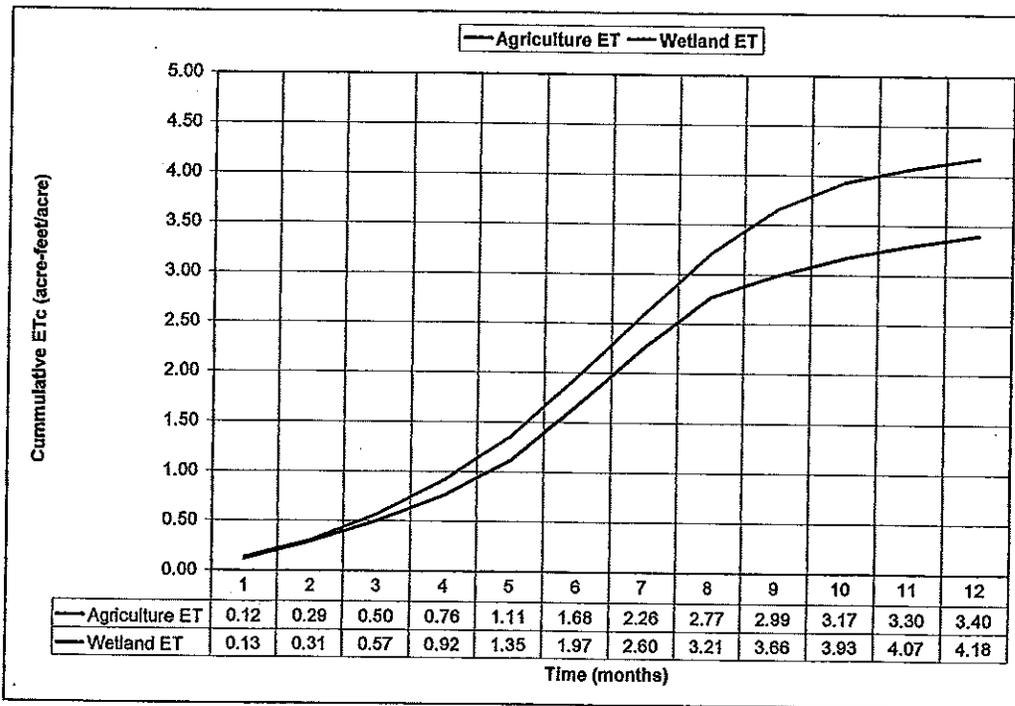


Figure 8- A plot of cumulative ET_c versus time for agriculture and wetland surfaces in the Delta Uplands during 2000.

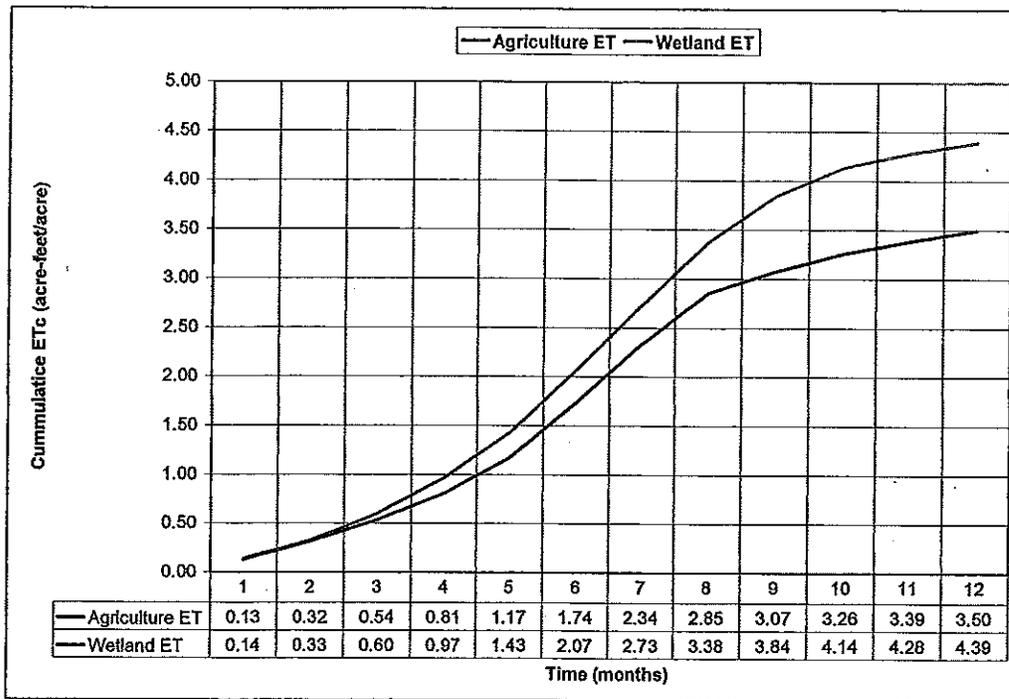


Figure 5- A plot of cumulative ET_c versus time for agriculture and wetland surfaces in the Delta Lowlands during 2000.

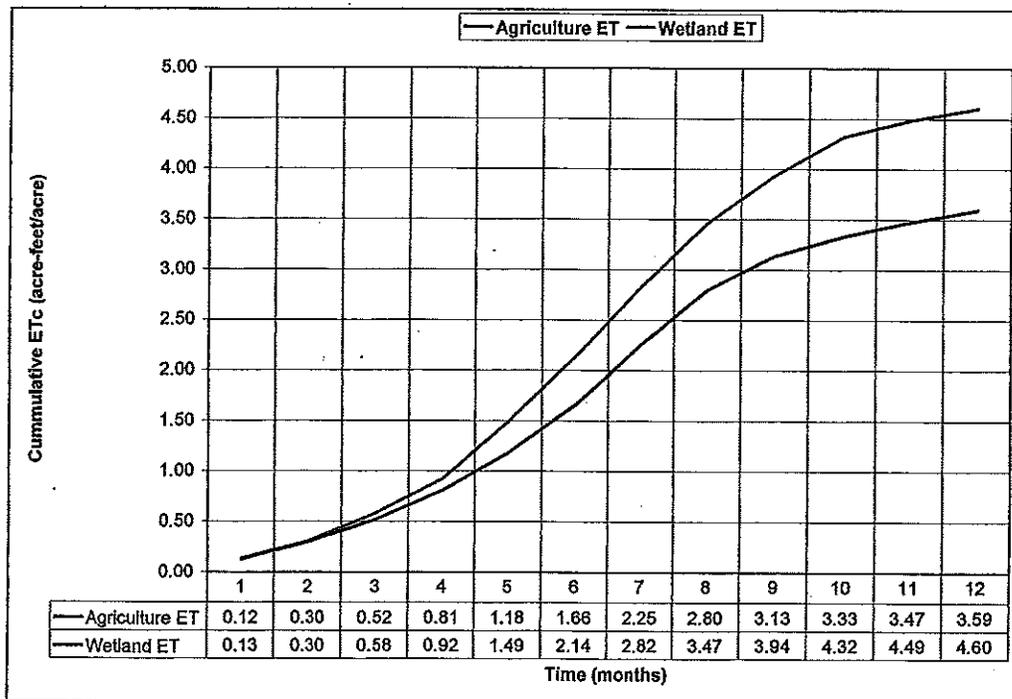


Figure 6- A plot of cumulative ET_c versus time for agriculture and wetland surfaces in the Delta Lowlands during 2001.

Barker Ranch Yearly Water Use - 2012

"Typical Year" Water Use Calculations According to Hydrologist Richard Bain

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct.	Nov.	Dec.
Days	31	26	14	10	25	25	25	31	30	31	30	31
Avg CFS	52.3	26	29.3	33.8	40.3	46.4	49.4	50.0	51.1	52.3	52.3	52.3
Acre Feet	3215.8	1340.8	813.6	670.4	1998.4	2300.9	2449.6	3074.4	3040.7	3215.8	3112.1	3215.8
Cum. Acre Feet	3215.8	4556.7	5370.3	6040.7	8039.1	10349.0	12789.6	15864.0	18904.7	22120.6	25232.7	28448.5

2002

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct.	Nov.	Dec.
Days	31	25	14	7	27	30	31	31	30	31	30	31
Avg CFS	45.7	28.6	28.6	23.1	22.3	17.7	18.7	26.3	33.2	51.5	52.1	52.5
Acre Feet	2810.0	1418.2	794.2	320.7	1194.3	1053.2	1149.8	1617.1	1975.6	3166.7	3100.2	3228.1
Cum. Acre Feet	2810.0	4228.2	5022.4	5343.2	6537.4	7590.7	8740.5	10357.6	12333.2	15499.9	18600.1	21828.2

2003

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct.	Nov.	Dec.
Days	26	0	0	30	31	30	31	31	30	31	30	31
Avg CFS	49.4	0	0	14.6	19.1	18.0	22.4	34.3	44.0	51.4	51.1	49.4
Acre Feet	2547.6	0.0	0.0	868.8	1174.4	1071.1	1377.3	2109.1	2618.2	3160.5	3040.7	3037.5
Cum. Acre Feet	2547.6	2547.6	2547.6	3416.4	4590.8	5661.9	7039.2	9148.3	11766.5	14927.0	17967.7	21005.3

2004

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct.	Nov.	Dec.
Days	1	0	0	29	31	30	31	31	30	31	30	31
Avg CFS	51.5	0	0	19.9	18.1	20.8	26.7	36.1	45.4	44.7	49.6	49.0
Acre Feet	102.2	0.0	0.0	1144.7	1112.9	1237.7	1641.7	2219.7	2701.5	2748.5	2951.4	3012.9
Cum. Acre Feet	102.2	102.2	102.2	1246.8	2359.8	3597.5	5239.2	7459.0	10160.5	12909.0	15860.5	18873.4

2005

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct.	Nov.	Dec.
Days	27	24	0	1	29	30	27	31	21	31	30	16
Avg CFS	43.2	32.5	0.0	8.6	14.1	19.7	21.9	25.2	20.7	27.5	26.2	21.6
Acre Feet	2313.6	1547.1	0.0	17.1	811.1	1172.2	1172.8	1549.5	862.2	1690.9	1559.0	685.5
Cum. Acre Feet	2313.6	3860.7	3860.7	3877.7	4688.8	5861.0	7033.9	8583.4	9445.6	11136.6	12695.6	13381.1

2006

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct.	Nov.	Dec.
Days	30	18	0	24	31	30	31	31	16	31	29	26
Avg CFS	24.3	24.3	0.0	15.4	18.3	21.0	22.0	29.4	28.4	41.7	41.3	39.2
Acre Feet	1446.0	867.6	0.0	733.1	1125.2	1249.6	1352.7	1807.8	901.3	2564.1	2375.6	2021.6
Cum. Acre Feet	1446.0	2313.6	2313.6	3046.7	4171.9	5421.5	6774.2	8582.0	9483.3	12047.4	14423.0	16444.6

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