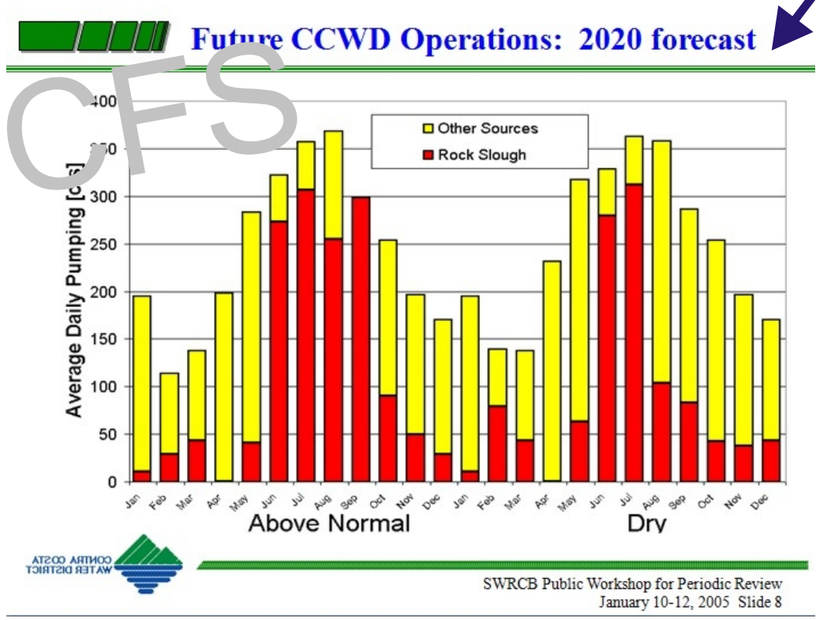
COMPARING UNITS OF MEASURE FOR DELTA WATER USE AND FLOW: June 2010: DSC

DSC: When reviewing water use and flow reports, and request for "near term" actions which will result in diverting more water from the Sacramento River annually, please note that the descriptions regarding the total amount of water to be diverted can be stated in "cubic feet per second" (CFS), Thousands of Acre Feet (TAF), Millions of Acre Feet (MAF) Gallons per second (GPS), minute, day, month or year, and other variations. ***Bottom line: how many gallons of water flows through the Sacramento River per year on average and how many gallons can be diverted without further destroying the natural environment?*** Determining the bottom line is nearly impossible when different agencies use different methods to report use and flow. Example: compare the CCWD 2020 forecast of water flow in CFS vs. CCWD use as reported by DWR for CCWD of 126 TAF (map, next page).



(thousands of acre-feet)

Hydrologic Region	1990 average	1990 drought	2000 average	2000 drought	2010 average	2010 drought	2020 average	2020 drought
North Coast								
Applied water demand	168	177	186	195	[illegible]	214	[illegible]	[illegible]
Net water demand	168	177	186	195	[illegible]	214	[illegible]	[illegible]
Depletion	110	112	[illegible]	[illegible]	[illegible]	132	[illegible]	[illegible]
San Francisco Bay								
Applied water demand	[illegible]	1,287	[illegible]	1,390	1,365	1,486	[illegible]	[illegible]
Net water demand	[illegible]	1,287	[illegible]	1,390	1,365	1,486	[illegible]	1,530
Depletion	[illegible]	1,175	[illegible]	1,271	1,247	[illegible]	1,287	1,403
Central Coast								
Applied water demand	[illegible]	[illegible]	315	321	365	373	420	429
Net water demand	[illegible]	[illegible]	253	268	304	311	349	357
Depletion	[illegible]	[illegible]	235	239	272	278	315	321
South Coast								
Applied water demand	3,851	3,997	4,446	4,617	5,180	5,381	6,008	6,244
Net water demand	3,511	3,641	4,010	4,161	4,623	4,799	5,309	5,514
Depletion	3,341	3,463	3,536	3,677	3,993	4,158	4,596	4,785
Sacramento River								
Applied water demand	744	807	911	989	1,076	1,167	1,231	1,335
Net water demand	744	807	911	989	1,076	1,167	1,231	1,335
Depletion	236	257	293	318	349	378	400	434
San Joaquin River								
Applied water demand	495	507	663	684	839	867	1,029	1,063
Net water demand	353	366	468	490	587	616	717	752
Depletion	192	194	258	265	332	340	410	420
Tulare Lake								
Applied water demand	523	523	716	716	892	892	1,116	1,116
Net water demand	214	214	292	292	364	364	454	454
Depletion	214	214	292	292	364	364	454	454
North Lahontan								
Applied water demand	37	38	43	44	46	48	51	52
Net water demand	37	38	43	44	46	48	51	52
Depletion	14	15	17	18	19	20	21	21
South Lahontan								
Applied water demand	187	193	292	302	409	423	550	565
Net water demand	123	125	191	198	269	277	360	372
Depletion	123	125	191	198	269	277	360	372
Colorado River								
Applied water demand	301	301	399	399	512	512	621	621
Net water demand	204	204	272	272	349	349	424	424
Depletion	204	204	272	272	349	349	424	424
TOTAL								
Applied water demand	7,800	8,100	9,300	9,700	10,900	11,400	12,700	13,200
Net water demand	6,800	7,100	7,900	8,300	9,200	9,600	10,500	11,000
Depletion	5,700	6,000	6,400	6,700	7,300	7,700	8,400	8,800

http://portal2.water.ca.gov/swpao/docs/bulletin/98/bulletin132-98.pdf

Chapter 8 — Water Supply and Allocation

TAF - BY MONTH

Figure 8-6
Water Pumped at Banks Pumping Plant in 19[illegible], by Month

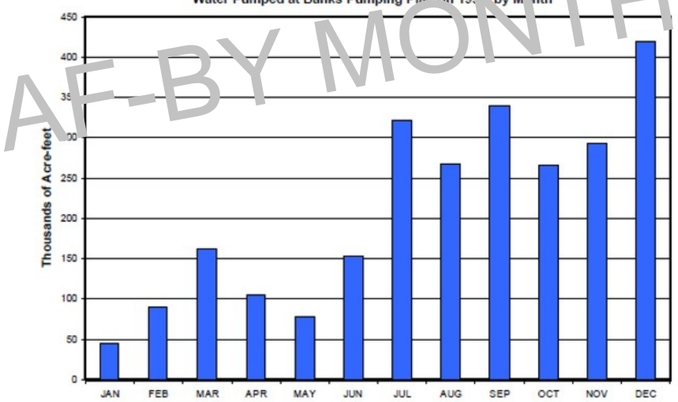
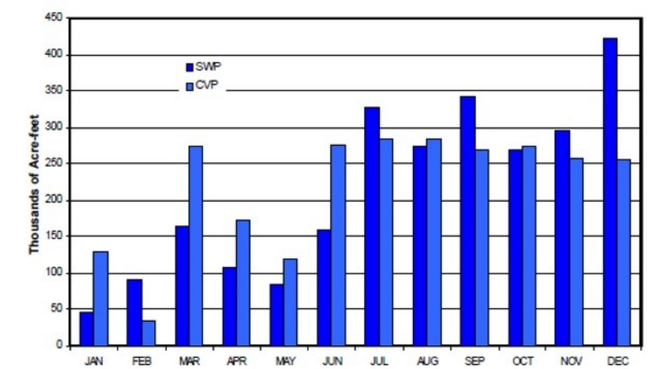


Figure 8-7
Water Diverted from the Sacramento-San Joaquin Delta by the State Water Project and Central Valley Project in 1997, by Month



89

TAF-BY YEAR

TAF & CFS

Sacramento-San Joaquin Delta region)

Table 1[illegible]-x Flood parameters for principal streams Sacramento-San Joaquin Delta region

Stream	Location	Mean annual runoff (taf)	Peak stage of record (ft)	Peak discharge of record (cfs)
Sacramento R	at Freeport	17,270	129.6[1]	117,000
San Joaquin R	near Vernalis	3,308	34.9[1]	79,000
Cosumnes R	at Michigan Bar	362	18.5	93,000
Mokelumne R	at Woodbridge	403[2]	29.6	27,000
Yolo Bypass	near Woodland	2,340[3]	34.9	374,000
Putah Cr	near Winters	349[2]	30.5	81,000

1 Different date than peak discharge
2 Most recent but less than period of record
3 Water Years 1946-1977

Many Delta levees are of doubtful structural integrity due to early origin and [illegible]

http://www.water.ca.gov/frankstract/docs/(7)Addendum%20-%20Flooded%20Island%20Pre-feasibility%20Report.pdf

MAF

	[.....Sacramento Valley.....]					[.....San Joaquin Valley.....]				
	[...Runoff (maf).....]				[.WY Index.]	[...Runoff (maf). ..]				[..WY Index.]
	Oct-Mar	Apr-Jul	WYsum	Index	Yr-type	Oct-Mar	Apr-Jul	WYsum	Index	Yr-type
199[illegible]	[illegible]	4.01	8.44	4.21	C	0.56	2.57	3.20	1.96	C
1992	5.41	2.93	8.87	4.06	C	0.86	1.66	2.58	1.56	C
1993	12.44	8.98	22.21	8.54	AN	2.49	5.65	8.38	4.20	W
1994	4.55	2.73	7.81	5.02	C	0.66	1.80	2.54	2.05	C
1995	19.83	13.60	34.55	12.89	W	3.67	8.01	12.32	5.95	W
1996	13.05	8.37	22.29	10.26	W	2.57	4.51	7.22	4.12	W
1997	20.22	4.39	25.42	10.82	W	5.75	3.59	9.51	4.13	W
1998	17.65	12.54	31.40	13.31	W	2.82	7.11	10.43	5.65	W
1999	12.97	7.26	21.19	9.80	W	1.90	3.85	5.91	3.59	AN
2000	12.06	5.96	18.90	8.94	AN	1.98	3.78	5.90	3.38	AN
2001	5.64	3.46	9.81	5.76	D	0.92	2.23	3.18	2.20	D
2002	9.32	4.57	14.60	6.35	D	1.27	2.75	4.06	2.34	D
2003	10.71	7.74	19.31	8.21	AN	1.25	3.49	4.87	2.81	BN

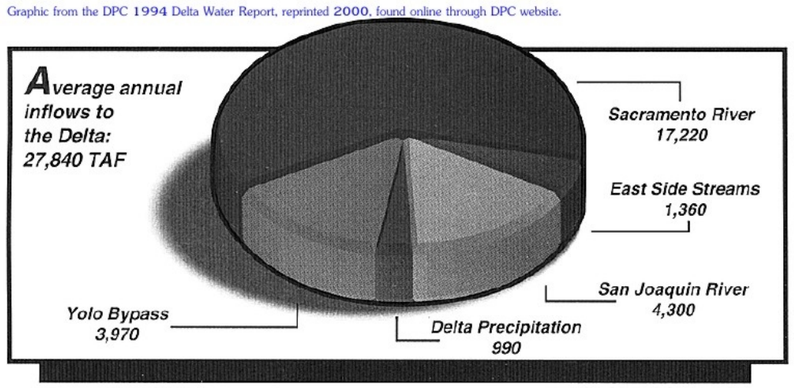
Information compiled by N. Suard for submission to DSC June 2010

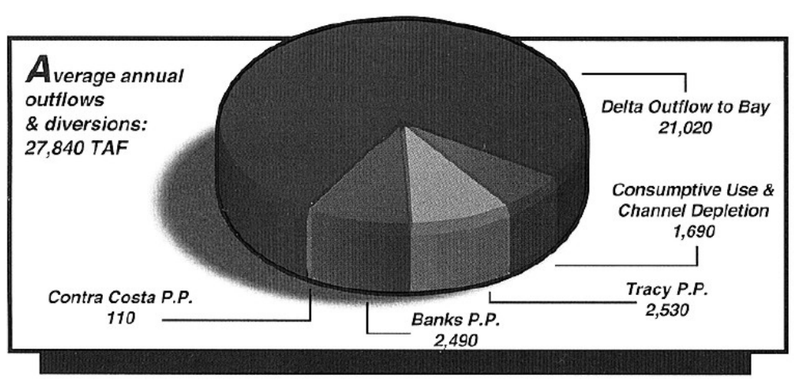
Delta water diversions per map to the right, from CA Water Plan Update 2005:

Banks Pumping Plant (SWP)	3,666 TAF
CVP	2,482 TAF
CCWD	126 TAF
North Bay Aqueduct	47 TAF
Yolo Bypass	2,956 TAF
Precipitation est	954 TAF
Consumptive Use est	1,690 TAF
Totals per DWR data:	11,921 TAF

Query: What will be the total diversions if all proposed "near term" projects are approved by the DSC to create the "central canal" in effect? Combine the increase in diversions for (a)Yolo Bypass project; (b)Freeport pump; (c)McCormack/Williamson "flood protection: and water diversion; (d)Mokelumnke dredging and enlarging; (e)SJ gates or tunnel plans; (f)CCWD upgrade plan & water storage expansion; (f) NBA move & expand plans; (G) DCC reoperaton; (h) Suisun Marsh restoration plans using Delta water.

Graphic from the DPC 1994 Delta Water Report, reprinted 2000, found online through DPC website.



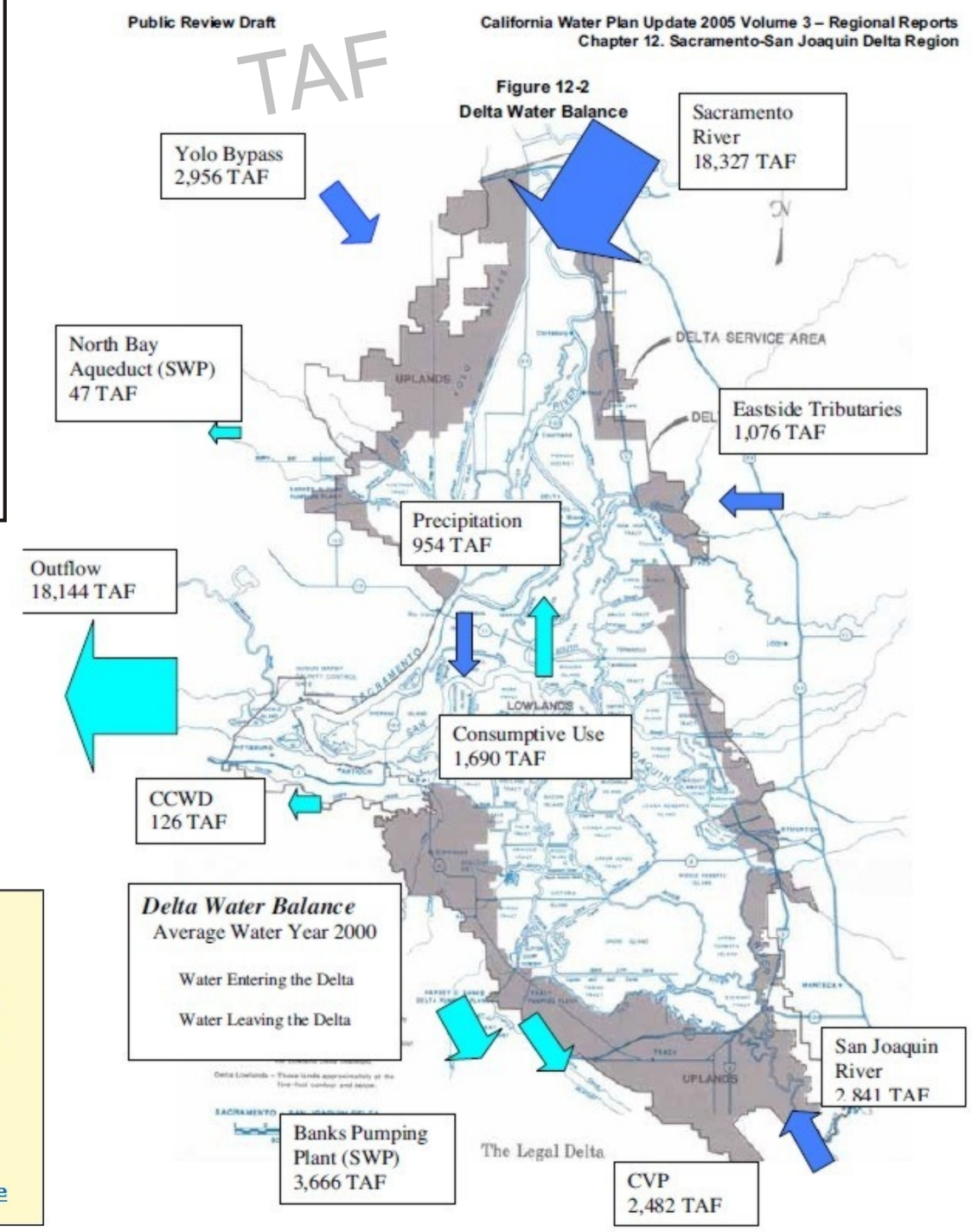


All values in thousand acre-feet (TAF).

Formulas Used in the Calculator

1 CFS = 7.4805 gps
1 CFS = 448.83 gpm
1 CFS = 646,316.883 gpd
1 CFS = 235,905,662 gpa
1 CFS = 50 MI *
1 CFS = 40 MI *
1 CFS = 38.4 MI *
1 CFS = 723.97 AFA
1 CFS = 31,536,000 CFA

***** ***See*** **the Miner's Inch page**



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Estimated Use of Water in the United States in 1990
Conversion Factors

Multiply	By	To Obtain
	Area	
acre	43,560	square foot
	4,047	square meter
	0.001562	square mile
	Flow	
gallon per day (gal/d)	3.785	liter per day
million gallons per day (Mgal/d)	1.121	thousand acre-feet per year
	0.001547	thousand cubic feet per second
	0.6944	thousand gallons per minute
	0.003785	million cubic meters per day
	1.3815	million cubic meters per year
thousand acre-feet per year	0.8921	million gallons per day
	0.001380	thousand cubic feet per second
	0.6195	housand gallons per minute
	0.003377	million cubic meters per day

Some water relations in inch-pounds units are listed below:

(Approximations)

1 gallon	=	8.34 pounds
1 million gallons	=	3.07 acre-feet
1 cubic foot	=	62.4 pounds
	=	7.48 gallons
1 acre-foot (acre-ft)	=	325,851 gallons
	=	43,560 cubic feet
1 inch of rain	=	17.4 million gallons per sqare mile
	=	27,200 gallons per acre
	=	100 tons per acre

USGS Water-Use home page
The URL for this page is http://water.er.usgs.gov/public/watuse/wuconv.html
If you have questions or comments about this document contact Water-Use Web Team
Last modified: 4/10/96

DEPARTMENT OF WATER RESOURCES
CALIFORNIA WATER FACTS

Average annual precipitation	22.9 inches*
Average annual runoff	71 million ac-ft
Lowest annual runoff (1977)	15 million ac-ft
Highest annual runoff (1983)	135 million ac-ft
Population (2000)	34.1 million
2000 average irrigated crop acres	9.0 million acres
Sacramento-San Joaquin Delta 2000 total outflow	18.2 million ac-ft
Sacramento-San Joaquin Delta 2000 required outflow	7.2 million ac-ft
2000 average applied urban water use	8.7 million ac-ft
2000 average applied agricultural water use	33.7 million ac-ft
2000 average applied environmental water use** (includes 23. 1 million ac-ft wild and scenic river flows)	39.6 million ac-ft
Special Districts in California performing water supply/water management function (including county service areas)	over 2,800
Total capacity of 1,350 surface reservoirs	41 million ac-ft
Usable storage capacity of groundwater basins	estimates range between 143 and 450 million ac-ft

* The average annual rainfall is calculated on a 30 year average.

** Environmental water includes regulated wild and scenic river flows, instream river flows, Sacramento-San Joaquin Delta required outflow, managed wildlife refuge water, and the Environmental Water Account. Theoretically, the number would also include water for native vegetation; however, it is not quantified at this time.

CONVERSION FACTORS FOR WATER

1 cubic foot	7.48 gallons	62.4 pounds of water
1 cubic foot per second (cfs)	450 gallons per minute (gpm)	646,400 gallons per day
	1.98 ac-ft per day	
1 acre-foot	325,851 gallons	43,560 cubic feet
	Covers an acre of land one foot deep	1,233 cubic meters
1 million cubic meters	811 acre-feet	
1 cubic meter per second	35.32 cfs	
1 hectare	2.47 acres	
1 million gallons	3.07 acre-feet	
1 million gallons per day (mgd)	1,120 ac-ft per year	
10 cents per 1,000 gallons	$32.59 per ac-ft	