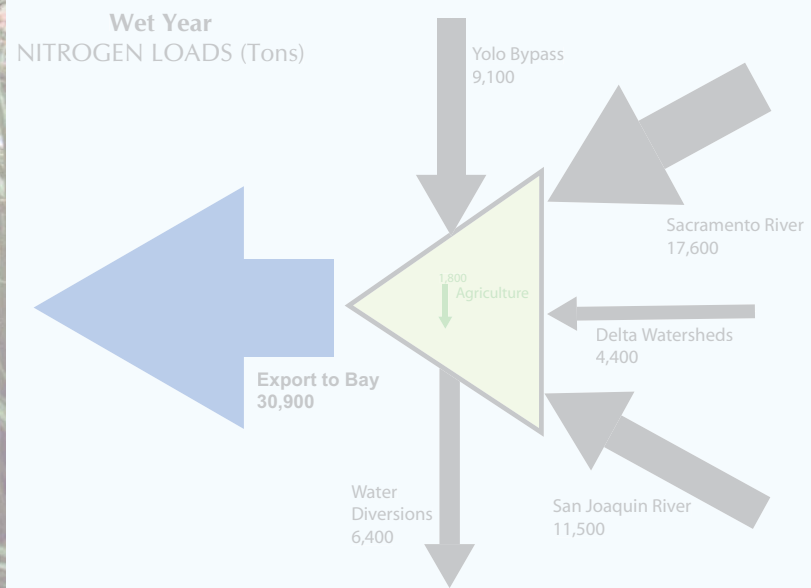


APPENDIX A

SUMMARY OF NUTRIENT DATA



Appendix A: Nutrient Data
Date range and number of samples

Station Name	First Sample Date	Last Sample Date	Ammonia - N	NO3 + NO2-N ¹	TKN	Total Nitrogen	Ortho-phosphate - P	Total Phosphorus
American River at 16th Street Bridge	10/10/1979	10/1/1981	6	7	7	7	7	7
American River at Discovery Park	10/12/1999	6/8/2004	119	101	0	108	94	102
American River at Fair Oaks	6/23/2003	6/23/2003	1	1	1	0	1	1
American River at Sacramento Water Plant	10/6/1997	8/4/1998	11	0	0	0	0	0
American River below Nimbus Dam	1/11/2001	6/9/2004	18	0	0	6	0	0
Antelope Cr nr mouth nr Red Bluff	3/7/2001	3/18/2002	4	8	0	0	0	8
Arcade Creek nr Del Paso Heights CA	2/6/1996	9/16/2004	70	70	63	0	70	71
Barker Slough	6/14/1995	3/12/1997	0	8	0	0	0	0
Battle Creek at Grover Road	10/22/2002	9/16/2003	25	25	0	25	25	25
Bear Creek near Rumsey	3/1/2001	5/24/2001	2	0	0	0	0	0
Bear River at Capetown	2/27/2001	5/22/2001	2	0	0	0	0	0
Bear River at Forty Mile Road	10/13/1999	9/16/2003	95	100	0	102	90	101
Bear River at Wheatland	6/23/1999	7/1/2003	50	49	50	0	50	50
Bear River near Mouth	3/27/2002	4/24/2002	2	0	0	0	0	0
Big Break near Oakley	10/26/1979	12/15/1995	235	252	252	0	181	182
Brentwood-effluent	8/1/2000	11/1/2004	47	0	0	0	0	6
Butte Slough nr Meridian	3/14/2001	3/11/2002	9	11	0	0	11	11
Cache Creek at Hwy 113	10/13/1999	9/15/2003	101	102	0	102	98	102
Cache Creek at Rumsey	10/25/1979	2/21/2001	47	61	61	0	46	61
Cache Creek near Lower Lake	11/5/2001	11/5/2001	1	0	0	0	0	0
Cache Creek NF nr Lower Lake	3/1/2001	5/24/2001	2	0	0	0	0	0
Calaveras River at Ashley Lane	10/12/1999	3/3/2000	5	5	0	5	5	5
Calaveras River at Hwy 26	4/29/2000	9/17/2003	83	83	0	87	78	86
Calhoun Cut at Hwy 113	9/29/1997	2/2/1998	3	8	15	0	6	8
City of Brentwood WWTP-Effluent 002	3/11/2002	6/11/2002	4	0	0	0	0	0
City of Brentwood WWTP-Effluent 003	9/23/2002	3/3/2003	7	0	0	0	0	6
City of Davis-Effluent	1/28/2002	12/3/2002	12	0	0	0	0	12
City of Manteca WWQCF-Effluent	1/1/2000	11/1/2004	66	0	0	0	0	8
City of Modesto WQCF-Effluent	1/1/2000	4/1/2004	39	0	0	0	0	16
City of Tracy WWTP-Effluent	1/1/2000	12/1/2004	58	0	0	0	0	0
City of Woodland WPCF-Effluent	1/31/2002	12/4/2002	12	0	0	0	0	12
Colusa Basin Drain	10/13/1999	9/15/2003	104	102	0	102	102	111
Concow C A Jordan Hill RD	4/23/2002	5/15/2002	2	0	0	0	0	0
Consumnes River at Michigan Bar Road	10/12/2001	8/5/2004	33	33	24	0	33	33
Contra Costa PP Number 01	5/21/1991	9/8/2004	54	41	33	0	13	33
Cosumnes River at Twin Cities Road	12/21/1999	6/25/2003	63	62	0	65	62	65
Cottonwood Cr SF nr Cottonwood	2/6/2001	5/7/2001	2	0	0	0	0	0
Cottonwood Creek at Cottonwood	10/22/2002	9/16/2003	22	23	0	25	25	25
Cottonwood Creek NF near Igo	2/6/2001	5/7/2001	3	0	0	0	0	0
Cow Creek at Dersch Road	10/22/2002	9/16/2003	24	23	0	25	25	25
Deer Cr at Hwy 99E nr Vina	3/7/2001	3/18/2002	4	0	0	0	0	8
Deer Creek at Leiniger Road	10/22/2002	9/16/2003	22	21	0	25	25	25
Delta Mendona Canal at Lindeman Road	6/22/1995	3/13/1997	0	8	0	0	0	0
Delta Mendota Canal	1/24/1990	9/2/1997	17	41	0	0	0	0
Delta Pumping Plant Headworks	6/22/1995	7/20/2005	66	72	66	0	66	66
Disappointment Slough at Bishop Cut	10/9/1979	12/10/2002	353	363	358	0	283	282
Discovery Bay-effluent	1/1/2001	11/1/2004	47	0	0	0	0	0
Diversion Pool US Dam	4/22/2002	4/22/2002	1	0	0	0	0	0
Diversion Pool US Power Plant	4/22/2002	4/22/2002	1	0	0	0	0	0
Dry Creek at Gallo Bridge below Hwy 132 at Modesto	8/7/2001	11/1/2001	3	0	0	0	0	3
Dry Creek WWTP (Roseville)-Effluent	7/1/2000	11/1/2004	65	0	0	0	0	12
Dry Creek WWTP (Roseville)-R1	7/1/2000	11/1/2004	65	0	0	0	0	0
Dry Creek WWTP (Roseville)-R2	7/1/2000	11/1/2004	53	0	0	0	0	0
Eel River above Outlet Creek near Dos Rios	3/1/2001	5/24/2001	2	0	0	0	0	0
Eel River at Scotia	2/28/2001	5/23/2001	2	0	0	0	0	0
Eel River MF at Dos Rios	3/1/2001	5/24/2001	2	0	0	0	0	0
Eel River SF nr Miranda	2/28/2001	5/23/2001	2	0	0	0	0	0
Elder Cr at Gerber	3/7/2001	6/5/2001	2	0	0	0	0	0
Fall River US Feather Falls	4/22/2002	5/16/2002	2	0	0	0	0	0
Feather River at Archer Ave	3/27/2002	4/24/2002	2	0	0	0	0	0
Feather River at Oroville	5/10/2001	4/24/2002	3	0	0	0	0	0
Feather River at Robinson Riffle	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River at Shanghai Bend	3/27/2002	4/24/2002	2	0	0	0	0	0
Feather River at Singh AB Riviera Rd.	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River at Yuba City	10/13/1999	9/16/2003	103	102	0	102	97	102
Feather River DS from Afterbay Outlet	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River DS from Diversion Dam	3/26/2002	3/26/2002	1	0	0	0	0	0
Feather River DS from Hatchery	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River DS from Hwy 162	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River DS from Project Boundary	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River DS from SCOR Outlet	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River near Mile Long Pond	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River near Nicolaus	10/17/1979	4/20/1998	31	38	38	0	31	38
Feather River near Verona	3/27/2002	4/24/2002	2	0	0	0	0	0
Feather River NF at Pulga	2/8/2001	5/10/2001	2	0	0	0	0	0
Feather River NF DS Poe PH	5/15/2002	5/15/2002	1	0	0	0	0	0
Feather River SF above Ponderosa RES	4/23/2002	5/16/2002	2	0	0	0	0	0
Feather River SF at Miners Ranch Canal Diversion Dam	2/8/2001	5/10/2001	2	0	0	0	0	0
Feather River US from Afterbay Outlet	3/26/2002	4/24/2002	2	0	0	0	0	0
Feather River US from Hatchery	3/26/2002	4/24/2002	2	0	0	0	0	0
Frank's Tract near Russo's Landing	10/11/1979	12/15/1995	259	271	270	0	192	192

Appendix A: Nutrient Data
Date range and number of samples

Station Name	First Sample Date	Last Sample Date	Ammonia - N	NO3 + NO2-N ¹	TKN	Total Nitrogen	Ortho-phosphate - P	Total Phosphorus
Glen Creek US GLEN PD	4/22/2002	4/22/2002	2	0	0	0	0	0
Grizzly Bay at Dolphin near Suisun Slough	10/11/1979	12/11/2002	346	355	351	0	274	272
Harding Drain at Carpenter Rd nr Patterson	4/22/1992	10/30/2001	51	51	50	0	51	51
Hat Creek nr Cassel	2/20/2001	5/30/2001	2	0	0	0	0	0
Honcut Creek at Pacific Ranch NR Pale	3/27/2002	4/24/2002	2	0	0	0	0	0
Honker Bay near Wheeler Point	10/11/1979	12/18/1995	268	274	270	0	193	193
Hospital Creek below confluence of Ingram	6/14/2001	11/2/2001	4	0	0	0	0	4
Klamath River at Klamath Glen	2/27/2001	2/27/2001	1	0	0	0	0	0
Klamath River at Orleans Bridge	2/26/2001	5/21/2001	2	0	0	0	0	0
Klamath River bl Iron Gate Dam	2/20/2001	5/29/2001	2	0	0	0	0	0
Klamath River nr Seiad Valley	2/20/2001	5/29/2001	2	0	0	0	0	0
Lake Oroville A Dam	5/2/2002	5/2/2002	1	0	0	0	0	0
Lake Oroville M F	4/29/2002	4/29/2002	2	0	0	0	0	0
Lake Oroville Main Body	4/30/2002	4/30/2002	1	0	0	0	0	0
Lake Oroville N F	4/23/2002	4/23/2002	1	0	0	0	0	0
Lake Oroville S F	4/25/2002	4/25/2002	1	0	0	0	0	0
Little Potato Slough @ Terminus	1/10/1985	12/14/1995	189	189	189	0	132	132
Lodi-effluent	5/1/2000	10/1/2004	54	0	0	0	0	0
Lone Tree Creek at Austin Road near Manteca	6/15/2001	11/2/2001	4	0	0	0	0	4
Los Banos Creek at Hwy 140	10/12/1999	9/17/2003	102	102	0	102	102	102
Mad R nr Arcata	2/27/2001	2/27/2001	1	0	0	0	0	0
Main Drainage at El Camino	4/28/2000	9/15/2003	88	89	0	89	89	89
Mallard Island	1/22/1990	9/8/2004	46	21	21	0	21	21
Mattole River at Petrolia	2/27/2001	5/22/2001	2	0	0	0	0	0
McCloud River above Shasta Lake	2/20/2001	5/29/2001	2	0	0	0	0	0
Merced River at River Road	6/13/1985	8/3/2004	318	321	211	102	321	321
Merced-effluent	1/1/2003	12/1/2004	0	0	23	0	0	0
Middle River at Union Pt.	10/5/1982	12/13/1995	221	224	224	0	164	163
Mill Creek near mouth nr Los Molinos	3/7/2001	3/18/2002	4	0	0	0	0	7
Mokelumne River at New Hope Road	10/12/1999	9/17/2003	101	101	0	102	98	102
Mokelumne River at Woodbridge	10/16/1979	9/15/1994	71	72	76	19	55	78
Mud Slough at Kesterson	10/26/1999	9/17/2003	101	101	0	101	100	101
Mud Slough near Gustine	6/12/2001	10/31/2001	5	0	0	0	0	5
Natomas EMDC at El Ca	11/13/1997	9/13/2004	84	65	65	0	65	65
Navarro River near Navarro	2/28/2001	5/23/2001	2	0	0	0	0	0
North Afterbay	4/24/2002	4/24/2002	1	0	0	0	0	0
North Bay Aqueduct Barker Slough Pumping Plant	12/17/1997	9/15/2004	61	59	61	0	48	61
North Forebay	4/29/2002	4/29/2002	1	0	0	0	0	0
Noyo River nr Fort Bragg	2/28/2001	5/23/2001	2	0	0	0	0	0
Old River at Oak Island	9/4/1991	12/11/1995	66	66	66	0	54	54
Old River at Rancho Del Rio	10/10/1979	12/10/2002	361	363	357	0	276	276
Old River at Tracy Road Br.	10/10/1979	8/16/1991	206	213	209	0	148	146
Old River Near Byron	10/7/1997	8/4/1998	6	0	0	0	0	0
Orestimba Creek at River Road	10/12/1999	9/17/2003	104	100	0	100	100	105
Outlet Creek nr Longvale	3/1/2001	5/24/2001	2	0	0	0	0	0
Pit River at Hwy 299	2/20/2001	5/30/2001	2	0	0	0	0	0
Pit River NF at Alturas	2/20/2001	2/20/2002	3	0	0	0	6	6
Pit River nr Canby	2/20/2001	5/30/2001	2	0	0	0	0	0
Pit River nr Montgomery Creek	2/20/2001	5/30/2001	2	0	0	0	0	0
Pit River SF at Alturas	5/30/2001	5/30/2001	1	0	0	0	0	0
Pleasant Grove WWTP (Roseville)-Effluent	6/1/2004	11/1/2004	6	0	0	0	0	0
Putah Creek near Winters	10/25/1979	7/9/1980	1	4	4	0	4	4
Redwood Creek at Orick	2/27/2001	2/27/2001	1	0	0	0	0	0
Sacramento Regional WWTP Outfall	11/1/2000	10/27/2004	420	50	48	0	0	52
Sacramento River above Bend Bridge	5/28/1980	5/14/1998	26	27	26	0	27	26
Sacramento River above Colusa Basin Drain, near Knights	2/7/2001	5/9/2001	2	0	0	0	0	0
Sacramento River above Point Sacramento	10/11/1979	12/12/2002	351	358	352	0	275	275
Sacramento River above Shasta	2/20/2001	5/29/2001	2	0	0	0	0	0
Sacramento River at Balls Ferry	3/6/2001	6/4/2001	4	0	0	0	0	0
Sacramento River at Bend Bridge	3/6/2001	3/18/2002	4	8	0	0	8	8
Sacramento River at Bend Ferry Road	10/22/2002	9/16/2003	23	25	0	25	25	25
Sacramento River at Butte City	11/19/2001	9/16/2003	23	32	0	25	32	32
Sacramento River at Chipps Island	10/12/1979	12/18/1995	267	274	270	0	193	194
Sacramento River at Colusa	2/28/1996	5/13/2002	37	49	33	0	49	49
Sacramento River at Court Road	10/22/2002	9/16/2003	22	25	0	25	25	25
Sacramento River at Emmaton	10/11/1979	12/19/1995	270	276	271	0	192	193
Sacramento River at Freeport	10/17/1979	9/27/2004	345	316	237	129	295	348
Sacramento River at Hamilton City	3/7/2001	3/19/2002	4	8	0	0	0	7
Sacramento River at Hood-Greene's Landing	10/9/1979	7/5/2005	441	424	420	0	337	338
Sacramento River at Keswick	10/23/1979	3/18/2002	93	104	96	14	79	108
Sacramento River at Knights Landing	10/13/1999	9/15/2003	96	102	0	102	102	102
Sacramento River at Mallard Island	10/7/1997	8/5/1998	11	0	0	0	0	0
Sacramento River at Verona	2/22/1996	5/20/1998	28	28	28	0	28	28
Sacramento River at Veterans Bridge	1/11/2001	6/8/2004	18	0	21	6	0	0
Sacramento River at W. Sac Intake Structure	10/6/1997	8/4/1998	16	0	0	0	0	0
Sacramento River at Woodson Bridge	3/6/2001	9/16/2003	25	39	0	23	39	39
Sacramento River below Knights Landing	2/7/2001	5/9/2001	2	0	0	0	0	0
Sacramento River below Rio Vista Bridge	10/11/1979	12/19/1995	270	274	270	0	194	194
Sacramento River US of Feather River	3/27/2002	4/24/2002	2	0	0	0	0	0
Sacramento Slough	3/22/2000	5/16/2002	0	0	0	0	0	8
Sacramento Slough at Karnack	10/22/2002	9/15/2003	24	23	0	25	25	25

Appendix A: Nutrient Data
Date range and number of samples

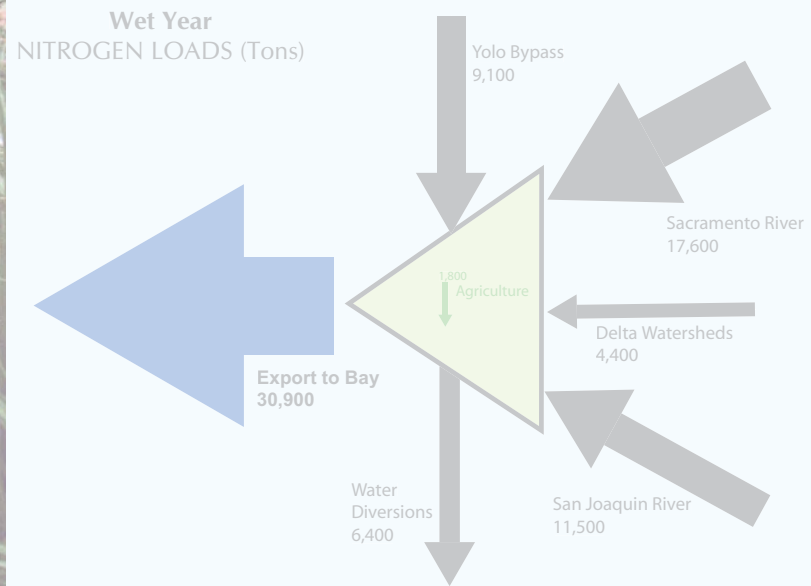
Station Name	First Sample Date	Last Sample Date	Ammonia - N	NO3 + NO2-N ¹	TKN	Total Nitrogen	Ortho-phosphate - P	Total Phosphorus
Salmon River at Somes Bar	2/26/2001	5/21/2001	2	0	0	0	0	0
Salt Slough at Hwy 165	10/12/1999	9/17/2003	102	102	0	102	102	102
San Joaquin River at Antioch Ship Channel	10/12/1979	12/18/1995	265	274	270	0	192	193
San Joaquin River at Buckley Cove	10/10/1979	12/10/2002	352	357	353	0	276	275
San Joaquin River at Crows Landing	7/11/2000	11/16/2001	49	47	28	8	47	47
San Joaquin River at Hwy 120	10/9/1979	9/17/2003	354	369	276	90	291	290
San Joaquin River at Hwy 132	10/12/1999	9/17/2003	102	102	0	102	102	102
San Joaquin River at Hwy 165	10/12/1999	9/17/2003	101	102	0	102	102	102
San Joaquin River at Hwy 4	11/4/1997	3/31/2000	23	12	0	12	12	12
San Joaquin River at Jersey Point	10/12/1979	12/15/1995	254	267	266	0	188	188
San Joaquin River at Laird Park	7/12/2000	11/15/2001	18	18	0	8	18	18
San Joaquin River at Maze Rd Bridge	7/16/1985	9/6/1994	52	52	52	0	52	52
San Joaquin River at Mendota	1/8/1980	9/6/1984	4	6	6	0	7	6
San Joaquin River at Newman	9/7/1984	3/31/1993	57	57	56	0	58	57
San Joaquin River at Patterson	7/17/1985	9/17/2003	164	165	75	90	165	165
San Joaquin River at Potato Point	10/11/1979	12/10/2002	352	359	355	0	276	277
San Joaquin River at Stevinson	6/24/1985	1/26/2001	60	60	60	0	60	60
San Joaquin River at Twitchell Island	10/11/1979	12/15/1995	264	275	272	0	194	193
San Joaquin River at Vernalis	10/9/1979	7/19/2005	958	879	790	90	773	793
San Joaquin River Ship Channel @ Light 18	6/12/2001	8/28/2001	11	11	11	0	0	11
San Joaquin River Ship Channel @ Light 24	6/12/2001	8/28/2001	22	22	22	0	0	32
San Joaquin River Ship Channel @ Light 36	6/12/2001	8/28/2001	22	22	22	0	0	33
San Joaquin River Ship Channel @ Light 41	6/12/2001	8/28/2001	22	22	22	0	0	33
San Joaquin River Ship Channel @ Light 45	6/12/2001	8/28/2001	22	22	22	0	0	32
San Joaquin River upstream of Merced	7/26/2000	11/15/2001	17	17	0	7	17	17
San Luis Drain at Terminus1	3/20/2000	9/17/2003	91	92	0	92	81	92
San Pablo Bay near Mare Island	10/12/1979	12/12/1979	0	4	0	0	3	3
San Pablo Bay near Pinole Point	2/14/1980	12/13/2002	318	320	319	0	252	250
Scott River at mouth	2/20/2001	5/29/2001	2	0	0	0	0	0
Shasta River ab Yreka Cr	3/21/2001	2/25/2002	2	10	0	0	10	10
Shasta River nr Yreka	3/20/2001	2/26/2002	17	25	17	0	25	25
Sherman Lake near Antioch	10/26/1979	12/18/1995	257	263	260	0	187	188
Smith River at Hiouchi	2/27/2001	5/22/2001	2	0	0	0	0	0
South Afterbay	4/24/2002	4/24/2002	1	0	0	0	0	0
South Forebay	4/22/2002	4/29/2002	2	0	0	0	0	0
South Fork Mokelumne below Sycamore Slough	10/10/1979	9/27/1983	63	67	63	0	45	45
Spanish Grant Combined Drain Near Patterson	7/11/2001	10/30/2001	4	0	0	0	0	3
Stanislaus River at Caswell Park	3/20/2000	9/17/2003	0	0	0	0	0	92
Stanislaus River at Caswell Park1	3/20/2000	9/17/2003	92	92	0	92	92	0
Stanislaus River at Ripon	7/15/1985	9/29/1994	77	77	77	0	77	77
Stanislaus River at Road J6	10/12/1999	3/3/2000	10	10	0	10	10	10
Stockton-effluent	1/1/2002	12/1/2002	0	0	0	0	0	12
Stony Creek at Orland	10/22/2002	9/16/2003	22	18	0	25	25	25
Stony Creek below Black Butte Dam nr Orland	3/5/2001	3/18/2002	4	0	0	0	0	8
Sucker Run near Forbestown	4/23/2002	5/16/2002	2	0	0	0	0	0
Suisun Bay at Bulls Head nr. Martinez	10/12/1979	12/12/2002	350	356	351	0	276	276
Suisun Bay off Middle Point nr. Nichols	10/12/1979	12/12/2002	344	355	351	0	276	278
Suisun Slough 300' south of Volanti Slough	10/10/1979	10/16/1984	72	74	69	0	56	56
Susan River at Lassen St Bridge	2/20/2001	2/21/2002	4	0	0	0	0	0
Sutter Bypass ab RD 1500 Pumping Plant	3/14/2001	11/13/2001	7	8	0	0	8	8
Sycamore Slough near Mouth	10/10/1979	9/27/1983	60	62	63	0	45	45
Tracy-effluent	1/1/2002	12/1/2002	0	0	0	0	0	12
Trinity River at Hoopa	2/26/2001	5/21/2001	2	0	0	0	0	0
Trinity River at Lewiston	2/26/2001	5/21/2001	2	0	0	0	0	0
Trinity River at Weitchpec (mouth)	2/26/2001	5/21/2001	2	0	0	0	0	0
Trinity River SF at Sandy Bar nr Willow Creek	2/26/2001	5/21/2001	2	0	0	0	0	0
Tuolumne River at Modesto	7/15/1985	3/21/1995	83	83	83	0	83	83
Tuolumne River at Shiloh	10/12/1999	9/17/2003	101	102	0	102	102	102
Turlock Irrigation District Lateral 5 near Patterson	6/13/2001	10/30/2001	5	0	0	0	0	4
Turlock-effluent	4/1/2000	11/1/2004	85	0	0	0	0	6
Turning Basin San Joaquin Ship Channel	6/12/2001	8/28/2001	22	22	22	0	0	31
Vacaville-Effluent	1/9/2000	12/7/2004	59	0	48	64	0	44
Van Duzen River near Bridgeville	2/28/2001	5/23/2001	2	0	0	0	0	0
West Canal at Clifton Court Intake	10/10/1979	12/11/1995	267	274	270	0	195	193
West Squaw Creek ab Shasta Lake	5/29/2001	5/29/2001	1	0	0	0	0	0
Westport Drain near Modesto	6/14/2001	11/1/2001	5	0	0	0	0	5
Willow Cr at Co Rd A-27 nr Litchfield	2/20/2001	2/21/2002	4	0	0	0	0	0
Woodland-effluent	1/1/2000	11/1/2004	55	0	0	0	0	0
Yuba R A Mouth	3/27/2002	4/24/2002	2	0	0	0	0	0
Yuba River at Marysville	10/29/1979	6/24/2002	44	48	46	0	39	47
Yuba River at Simpson Lane	10/13/1999	9/16/2003	96	94	0	102	82	102
Yuba-effluent	1/1/2002	12/1/2004	10	0	0	0	0	12

Notes:

1. May contain data reported as NO3-N

APPENDIX B

SUMMARY OF FLOW DATA



Summary of Flow Information in the Central Valley

This section summarizes flow information, divided into wet and dry seasons and from wet (above normal, wet) and dry years (below normal, dry, critical). This information will form the basis for evaluating the transport of key constituents as part of the development of conceptual models for major drinking water constituents of concern.

Description of Region

The Central Valley consists of two main drainage basins that combine and culminate to form the Sacramento-San Joaquin River Delta. The Sacramento and San Joaquin Rivers do not contribute equal volumes of water. The Sacramento River delivers approximately 6 times the volume of water in drier than normal years and 3.3 times the volume in wetter than normal years as the San Joaquin River. For this reason, the flow information has been divided into two hydrologically distinct areas consisting of the Sacramento River Watershed and the San Joaquin River Watershed.

Seasonal flows – all year summary

With the geographical influences on the water load, there are also seasonal influences based on month. California's Mediterranean climate is the result of wet cool winters and dry hot summers. It is not unusual for minimal rain to fall in the central valley between May and September. As such, we need to divide our analysis of flow between the wet and dry seasons.

These trends are consistent throughout the central valley with highest flows in the San Joaquin watershed between March and May, and between February and March in the Sacramento River watershed.

Temporal flows – WY index summary

Additionally, a normal water year is expressed as the 30-year average rainfall from October 1st to September 30th of the following year. It is extraordinarily rare that exactly that much rainfall would be produced in any given year, is it far more likely that the water year would fall above or below this average. To summarize the water year, categories based on the distance from average rainfall can help describe the condition of the flow over years and longer time scales. The category that each Water Year falls into is based upon the Water Year Index (also known as the Runoff Index). The index is specific for the San Joaquin and Sacramento River watersheds and is defined in Table 1 and Table 2. The variables are defined as X being the current year's April-July unimpaired runoff, Y is the current October-March unimpaired runoff, and Z is the previous year's index.

Table 1 Sacramento River Valley Water Year Index

Sacramento River Valley	
Water Year/Runoff Index: $0.4*X + 0.3*Y + 0.3*Z$	Unimpaired runoff: The sum of Sacramento River flow above Bend Bridge near Red Bluff, Feather River inflow to Oroville, Yuba River flow at Smartville, and American River inflow to Folsom

Table 2 San Joaquin River Valley Water Year Index

San Joaquin River Watershed	
Water Year/Runoff Index: $0.6*X + 0.2*Y + 0.2*Z$	Unimpaired runoff: The sum of inflows to New Melones Reservoir (from the Stanislaus River), Don Pedro Reservoir (from the Tuolumne River), New Exchequer Reservoir (from the Merced River), and Millerton Lake (from the San Joaquin River)

Below is a listing of these categories:

Classification	Water Year/Runoff Index (maf)
Wet Year	equal or grater than 9.2
Above Normal Year	greater than 7.8 and less than 9.2
Below Normal Year	equal or less than 7.8 and greater than 6.5
Dry Year	equal or less than 6.5 and grater than 5.1
Critical Year	equal or less than 5.4

(Source: Suisun Marsh Monitoring Program Annual Data Summary: Water Year 1998.)

Figure 1 describes the water year trends in the Sacramento and San Joaquin River watersheds respectively.

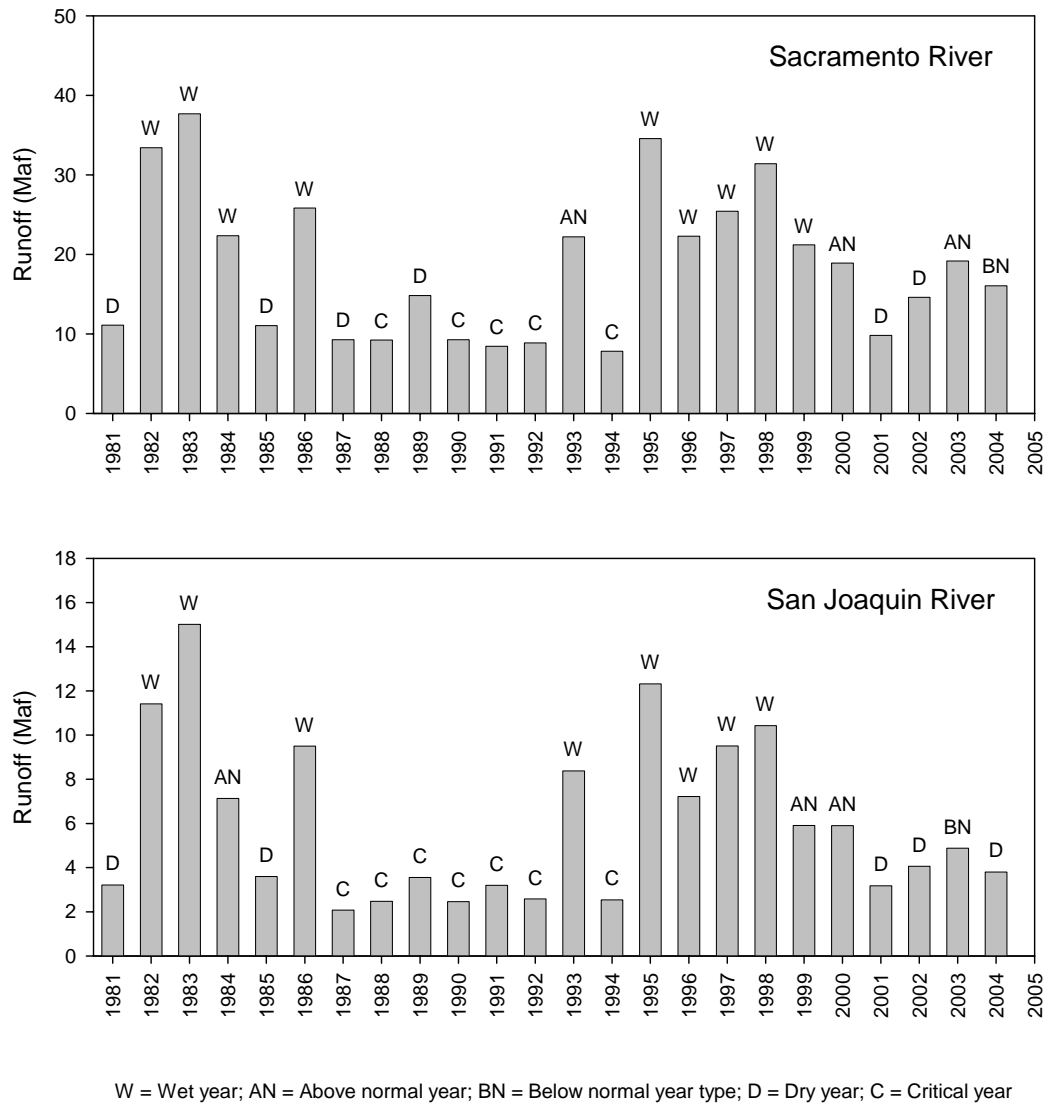


Figure 1. Water Year Indexes for the Sacramento and San Joaquin River watersheds

Sacramento Watershed

The Sacramento River watershed covers nearly 68,500 km² of land from Shasta County to the northern section of the San Francisco Bay delta. Flow for this region is generated primarily from snowmelt in the northern Sierra Nevada and Klamath Mountain ranges. Because a portion of the flows is diverted for agricultural use, the flow rates the furthest downstream are not always the largest.

Dry years

There have been twelve drier than normal years since 1981 (Figure 1). Most occurred during the drought from 1987 to 1992. Of these 12 dry years, five have been critical dry years based on previous year’s rainfall and water storage amounts.

Wet years

There have been twelve wetter than normal years since 1981 (Figure 1). Of these, nine were determined to be defined by the water year index as “wet” years; only three were merely above normal for flows.

San Joaquin Watershed

The San Joaquin River watershed covers nearly 44,000 km² of land from Kings County to the southern section of the San Francisco Bay delta. Flow for this region is generated primarily from snowmelt in the middle and southern Sierra Nevada mountain ranges. Because a portion of flows is diverted for agricultural use, the flow rates the furthest downstream are not always the largest.

Dry years

There have been thirteen drier than normal years since 1981 (Figure 1). Many of these occurred during a spate of 6 consecutive critical years from 1987 to 1992.

Wet years

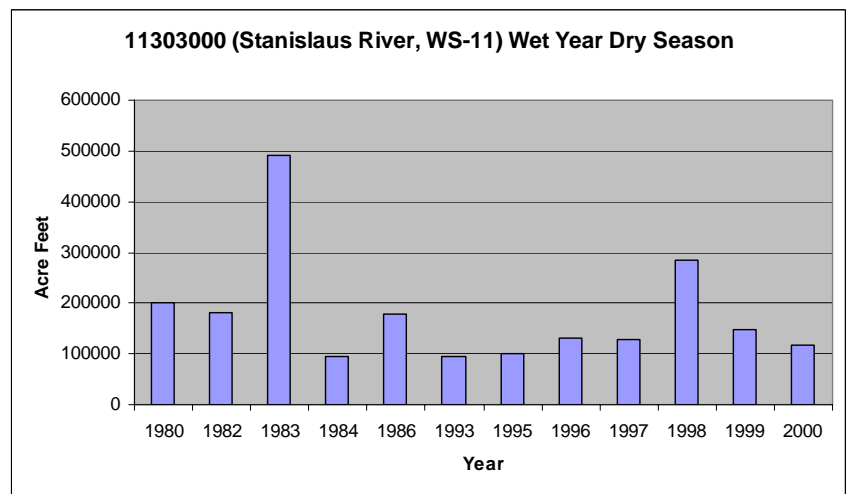
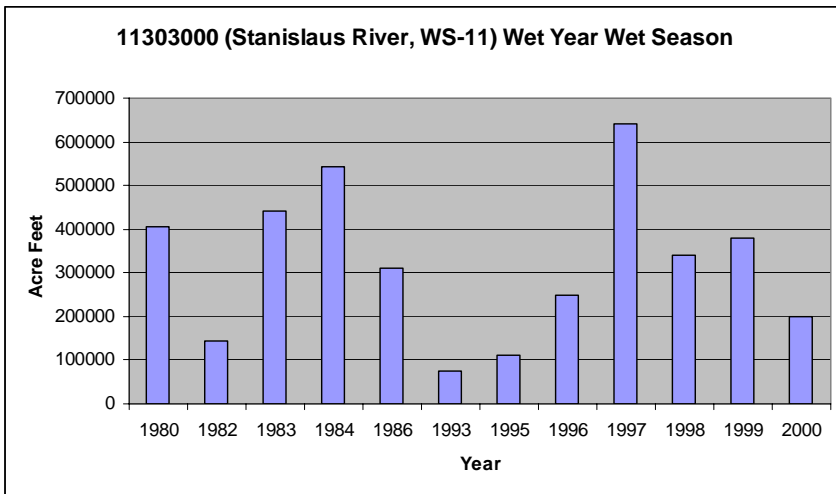
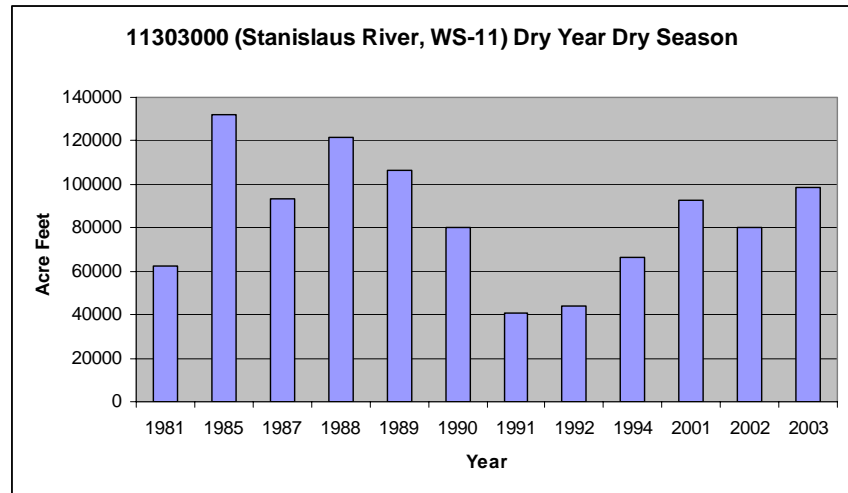
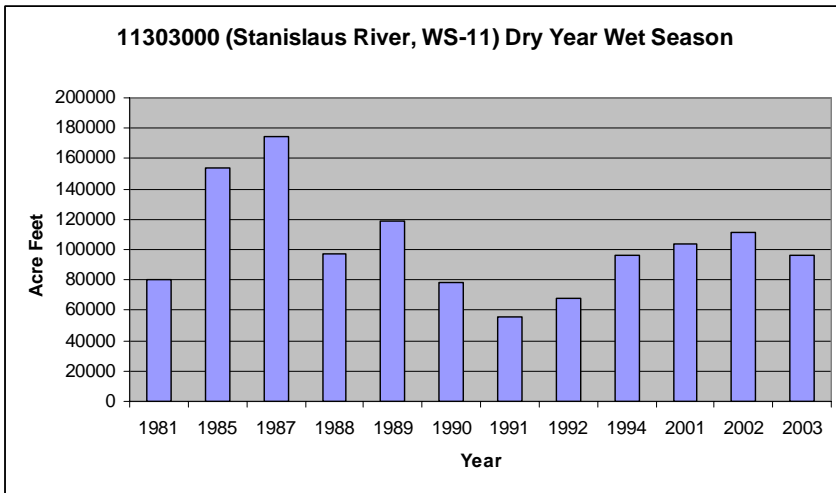
There have been 11 wetter than normal years since 1981 (Figure 1). Eight of these years were classified as “wet” years based on the Water Year Index.

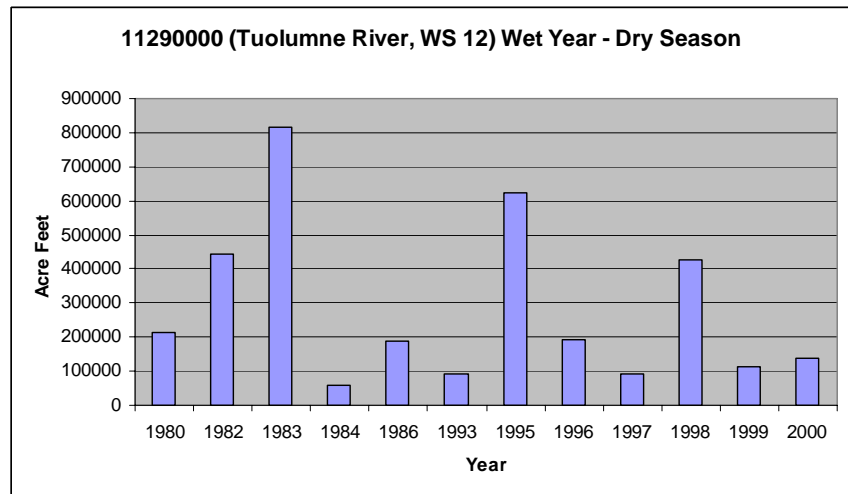
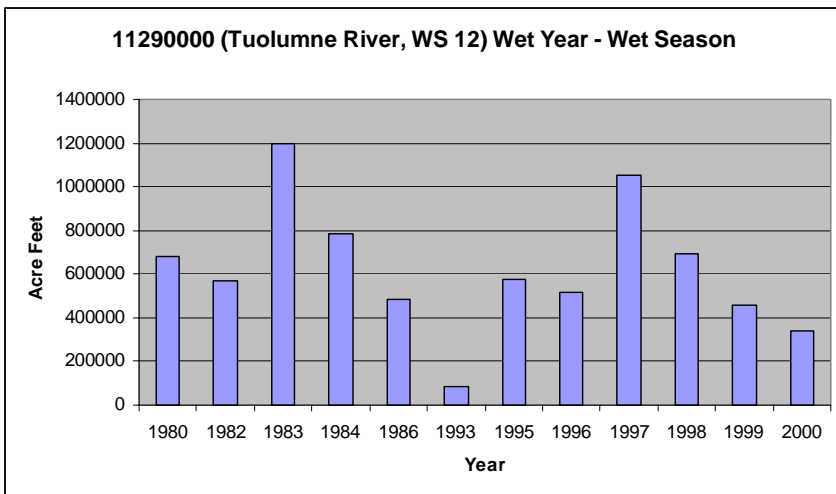
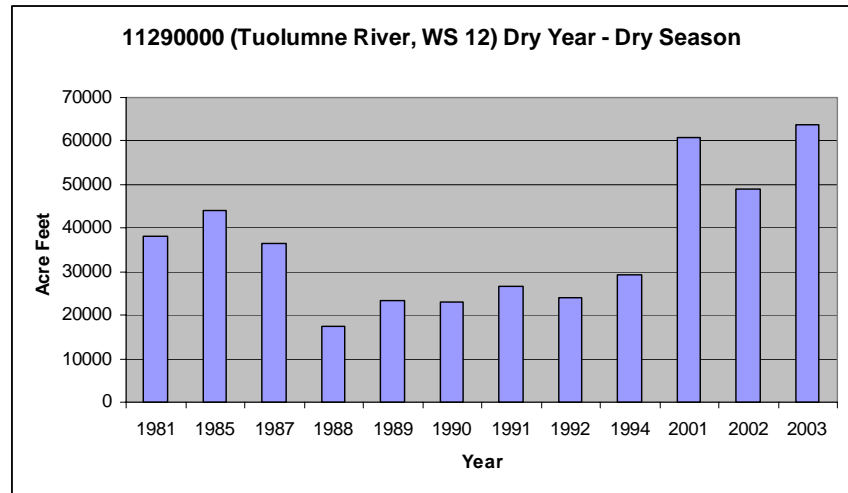
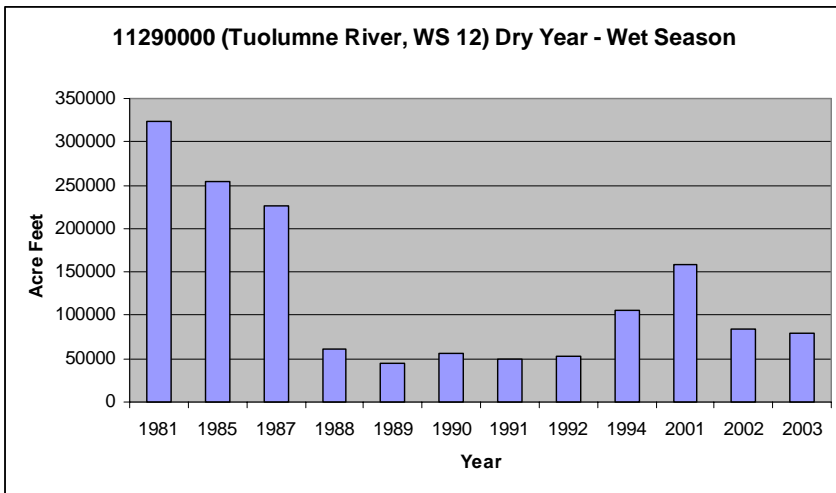
Wet and Dry Season Definition

Although there is a standard definition for the water year in California, there is no standard definition for the wet and dry season. For the purpose of this effort, the wet season has been defined as the period from October 1 to April 30 (7 months) and the dry season has been defined as May 1 to September 30.

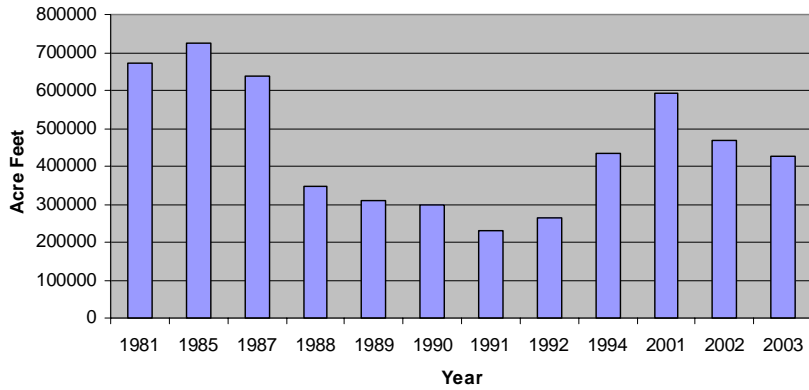
Flow summary data

Using daily discharge data from USGS gauging stations in the central valley, and the division into wet and dry years and wet and dry seasons described above, flows are summarized for key stations. Fifteen stations corresponding to the subwatersheds defined in Chapter 4 of the main report have been classified in this manner. There are four categories of flow for each station: wet year wet season, wet year dry season, dry year wet season, and dry year dry season. These data will be used as the basis for calculating constituent load in each of these four categories.

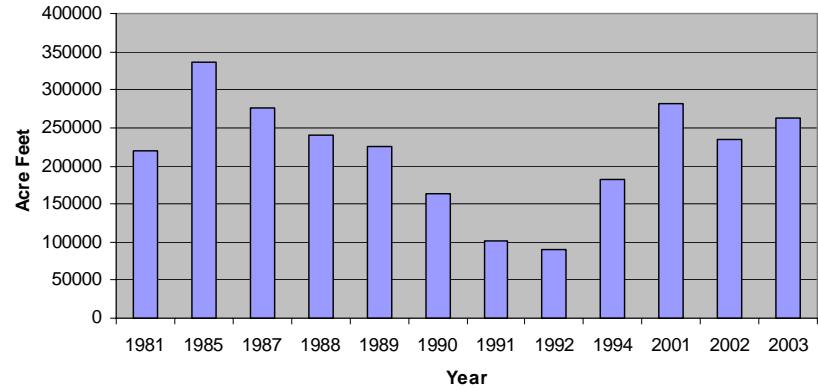




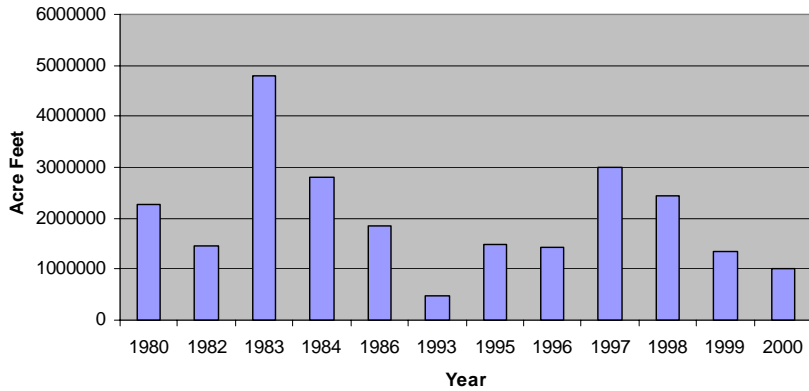
11303500 (San Joaquin River, WS 10) Dry Year - Wet Season



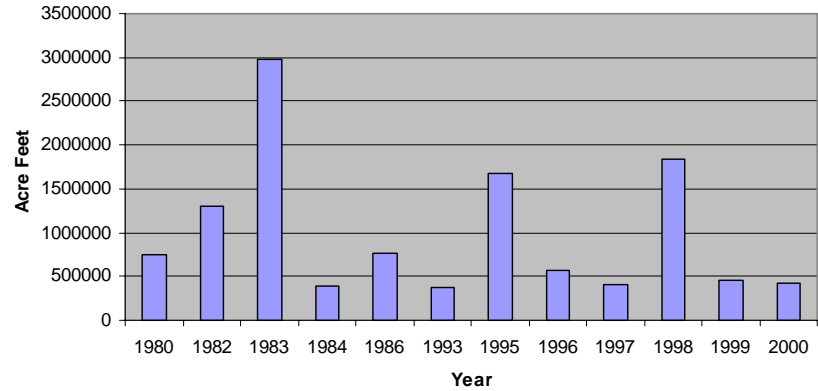
11303500 (San Joaquin River, WS 10) Dry Year - Dry Season

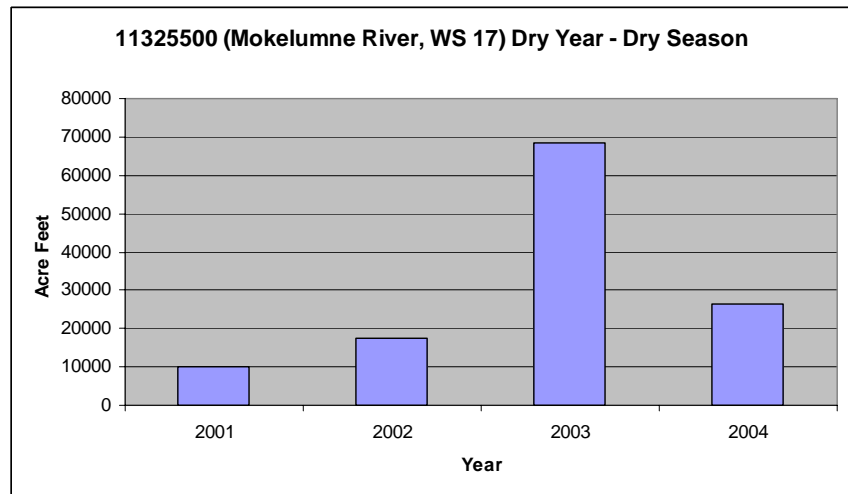
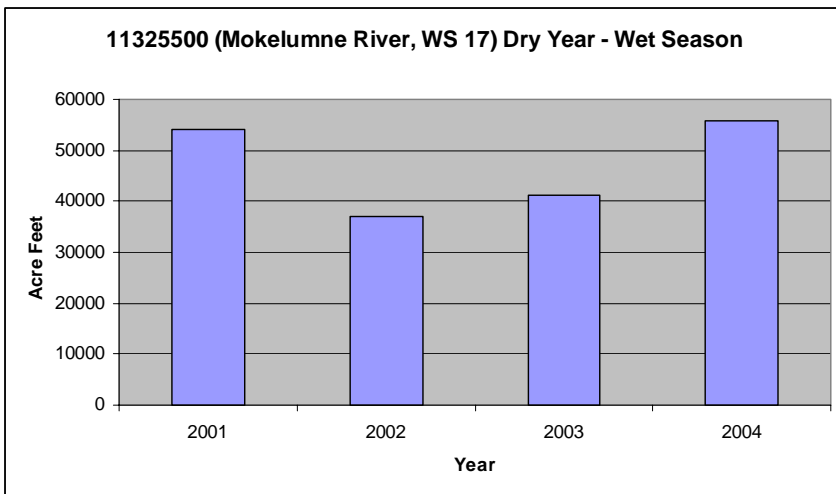
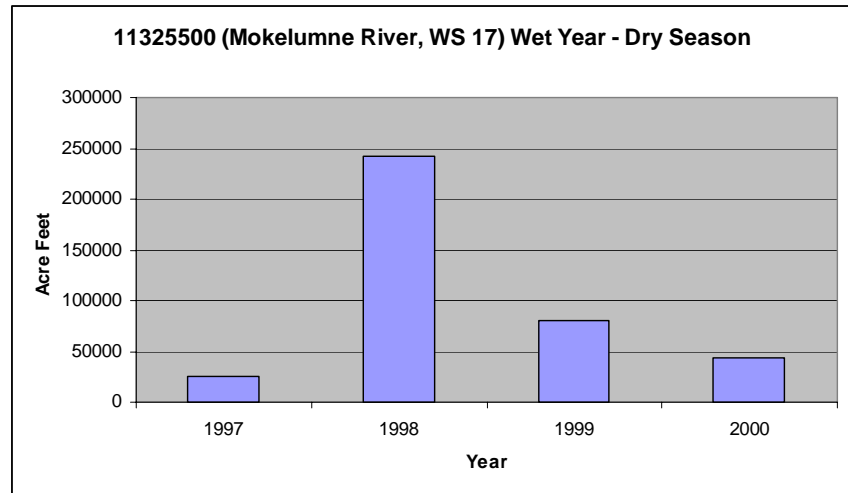
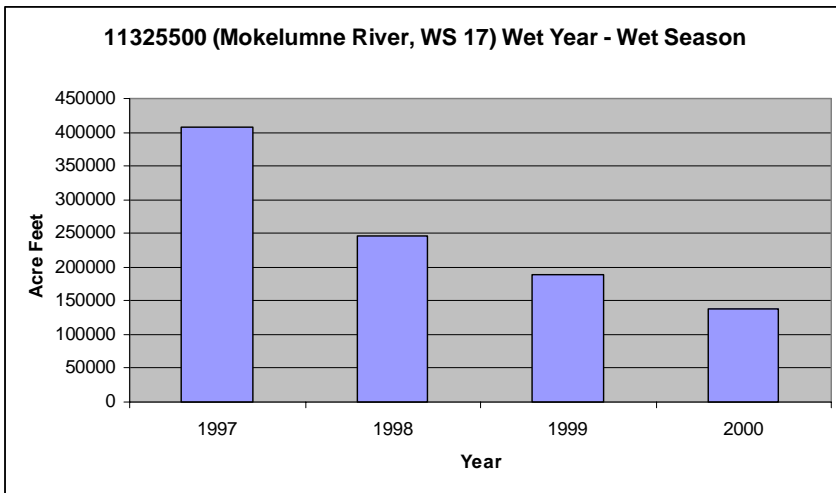


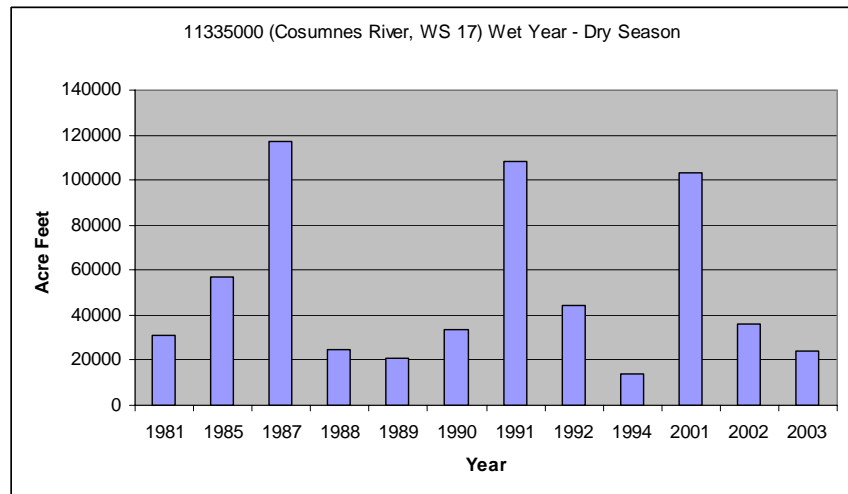
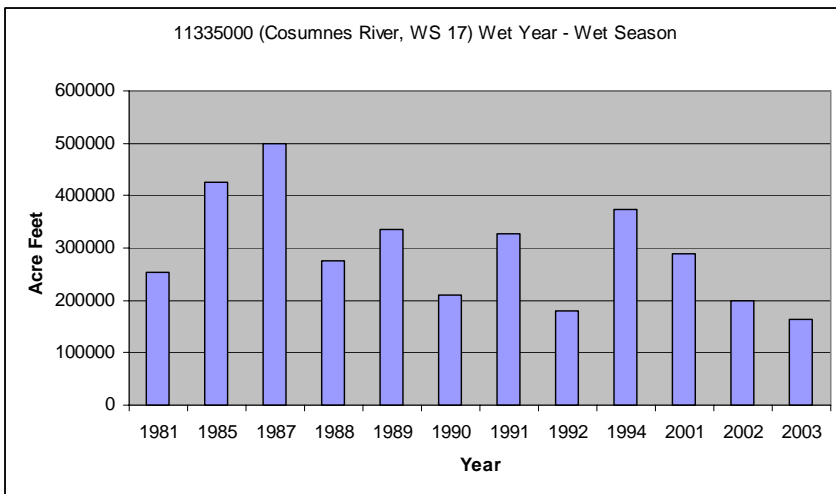
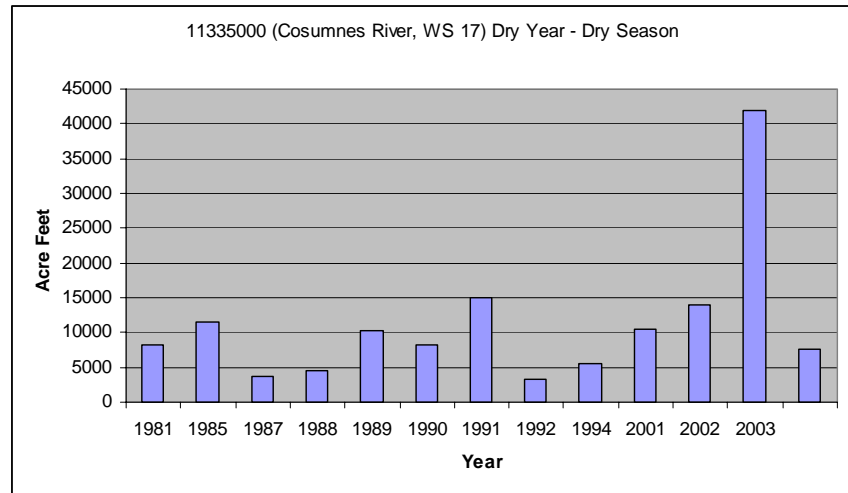
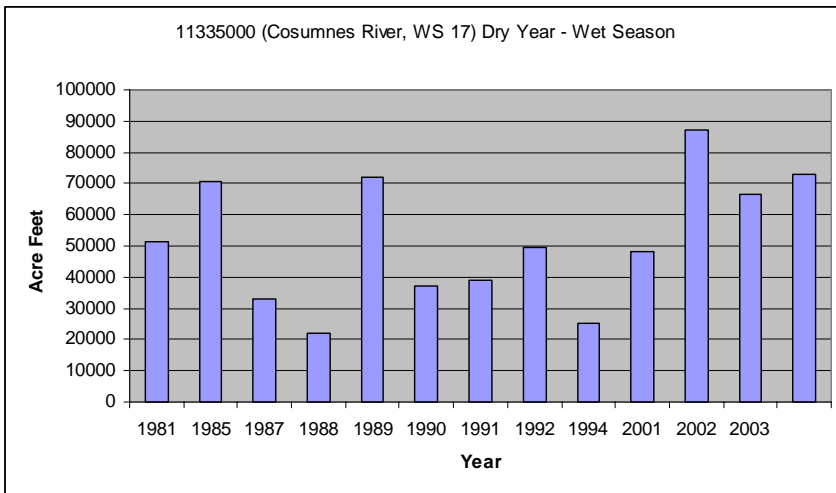
11303500 (San Joaquin River, WS 10) Wet Year - Wet Season



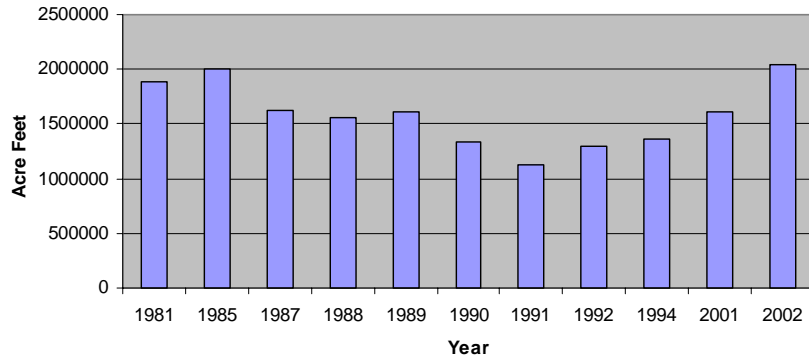
11303500 (San Joaquin River, WS 10) Wet Year - Dry Season



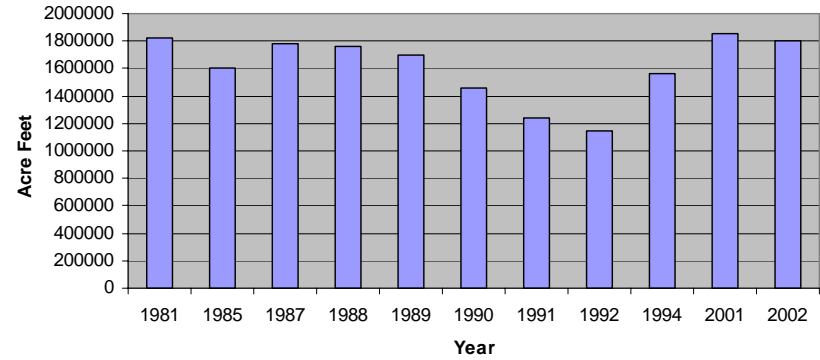




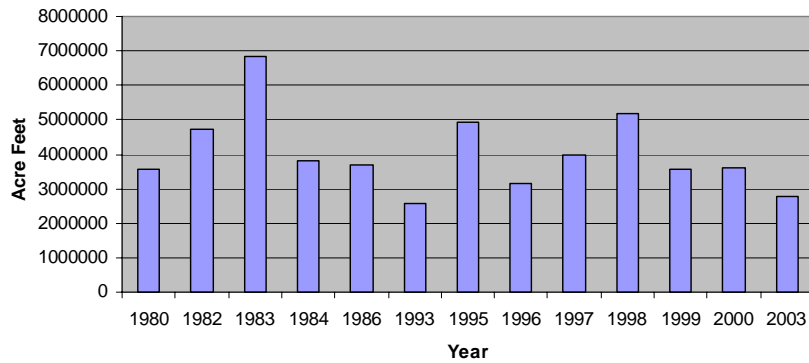
**11377100 (Sacramento River above Bend Bridge, WS 1) Dry
Year - Wet Season**



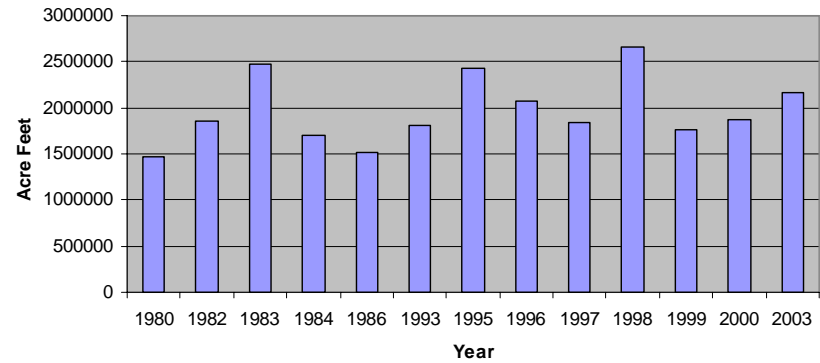
**11377100 (Sacramento River above Bend Bridge, WS 1) Dry
Year - Dry Season**



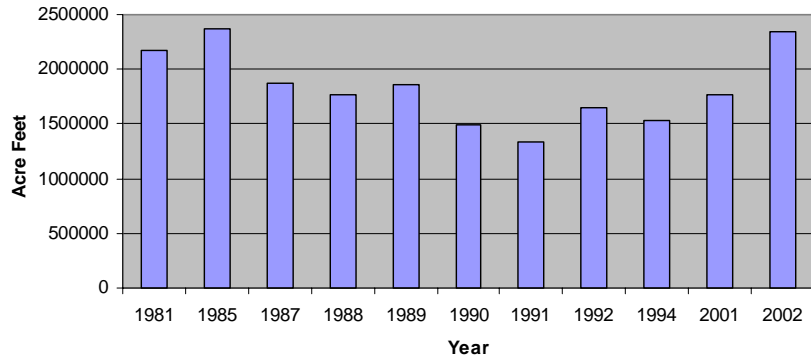
**11377100 (Sacramento River above Bend Bridge, WS 1) Wet
Year - Wet Season**



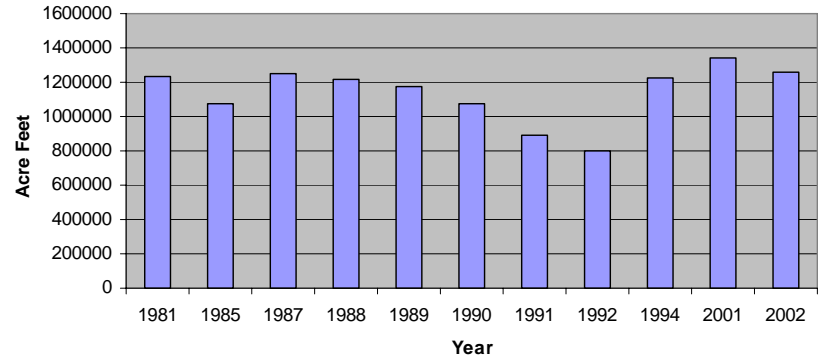
**11377100 (Sacramento River above Bend Bridge, WS 1) Wet
Year - Dry Season**



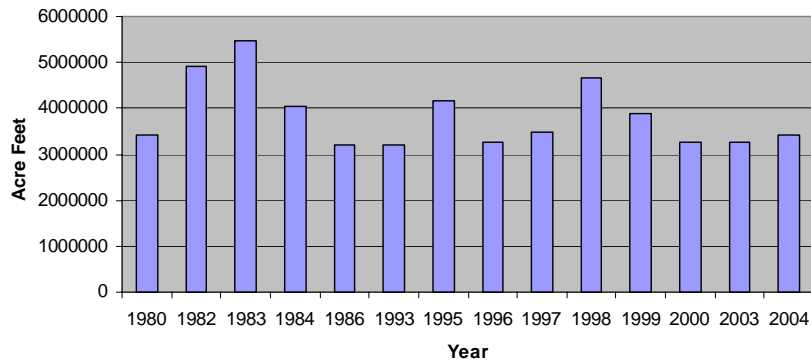
11389500 (Sacramento River at Colusa, WS 3) Dry Year - Wet Season



11389500 (Sacramento River at Colusa, WS 3) Dry Year - Dry Season



11389500 (Sacramento River at Colusa, WS 3) Wet Year - Wet Season



11389500 (Sacramento River at Colusa, WS 3) Wet Year - Dry Season

