CALFED Bay-Delta Program Storage and Conveyance Refinement Process:

A Status Report on System Modeling Using DWRSIM

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Department of Water Resources, Sacramento

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CALFED Storage and Conveyance Refinement Process: A Status Report on DWRSIM Model Studies

This brief report presents status of DWRSIM model studies activities since last quarterly report of September 24, 1997. Today's presentation will cover three aspects of DWRSIM studies.

a) Overview of DWRSIM completed model studies

b) DWRSIM Sensitivity studies and Key Assumptions

c) Discussion

A list of completed DWRSIM studies and Key Model Assumptions are presented in Table 1. Details of study assumptions, inputs and results are also available on the DWR's Hydrology and Operations Section home page at the URL;

http://wwwhydro.water.ca.gov/calfed.html

Study results in terms of project deliveries are presented in Tables 3 and water supply benefits of storage and conveyance facilities are compared in Table 3a.

A number of DWRSIM sensitivity studies have been completed and a list of these studies with Key Study Assumptions, is given in Table 2. Study results showing variations in project deliveries are given in Tables 4a and 4b.

Key results from selected studies are also presented in several graphs and charts.

TABLE 1
CALFED DWRSIM STUDIES AND KEY ASSUMPTIONS

1. D-1485 Base Study: Study 2020d09b-calfed-527

D-1485 Bay-Delta Standards
2020 level hydrology
SWP variable demand
Stanislaus Operation (USBR Interim Operation Plan)

2. Benchmark: Study 2020d09b-calfed-514

1995 WQCP Bay-Delta Standards
Selected Upstream AFRP in-stream flows

3. Benchmark Reoperation: Study 2020d09b-calfed-515a

Benchmark plus
- maximum wheeling of CVP water through SWP facilities

4. Benchmark Reoperation: Study 2020d09b-calfed-515

Benchmark plus
- maximum wheeling of CVP water through SWP facilities
- unmet CVP demands on SWP system

5. No Action: Study 2020d09b-calfed-516a

Benchmark plus
AFRP Delta Actions
a. April-May export restrictions
   - 1:3 below normal, dry & critical years
   - 1:4 above normal years
   - 1:5 wet years
b. More X2 days at Chipps Island in May-June
c. Delta Cross Channel closed November through June.

6. No Action: Study 2020d09b-calfed-516

Benchmark plus
AFRP in-stream flows below Goodwin Dam
AFRP Delta Actions
a. April-May export restrictions
   - 1:3 below normal, dry & critical years

- 1:4 above normal years
- 1:5 wet years

b. More X2 days at Chipps Island in May-June

c. Delta Cross Channel closed November through June.

7. No Action with Reoperation: Study 2020d09b-calfed-517

No Action plus
- maximum wheeling of CVP water through SWP facilities
- unmet CVP demand on SWP system

8. No Action with Reoperation and ERPP (ALT 1A): Study 2020d09b-calfed-518

No Action with Reoperation (Study 516) plus
- ERPP flow targets

New Facility Scenarios

Note: New Criteria

Isolated facility criteria
- included in E/I ratio and SJR April-May pulse ratio
- no constraint on IF diversions to total Delta export ratio (i.e., 100%)

Minimum through Delta exports
1000 cfs Oct-Mar and July-Sept
0 cfs Apr-June

9. New Facility -SDI (ALT 2A): Study 2020d09b-calfed-528

ALT 1A plus
- South Delta Improvements (SDI)

10. New Facility - IF (ALT 3A): Study 2020d09b-calfed-529

ALT 2A plus
- 5,000 cfs Isolated Facility (IF)
- Delta Cross Channel gates closed from September through June and open July through August.

11. New Facilities - SDSS (ALT 2D): Study 2020d09b-calfed-530

ALT 2A plus
- 2.0 MAF South of Delta Surface Storage (SDSS)
- 3500 cfs Inlet and Outlet capacities.

12. New Facilities - NDGS, NDSS, NDES, SDGS & SDSS (ALT 1C): Study 2020d09b-calfed-531

ALT 2A plus
- 0.25 MAF North of Delta Groundwater Storage (NDGS)
- 2.0 MAF North of Delta Surface Storage (NDSS)
- 1.0 MAF North of Delta Environmental Storage (NDES)
  - diversion and discharge capacities of 5,000 cfs
  - no new diversion in any given water year until a 60,000 cfs mean daily flow event occurred at Chico Landing
- 0.50 MAF South of Delta Groundwater Storage (SDGS)
- 1.0 MAF South of Delta Surface Storage (SDSS) with 3500 cfs inlet and outlet capacities.

13. New Facilities - NDGS, NDSS, NDES, SDGS, SDSS & SJBSS (ALT 2B): Study 2020d09b-calfed-532

ALT 2A plus
- All of the ALT 1C facilities with
  - 2.0 MAF South of Delta Surface Storage (SDSS)
  - 0.24 MAF San Joaquin Basin Surface Storage (SJBSS)

14. New Facilities - IF and IDS (ALT 3B): Study 2020d09b-calfed-533

ALT 2B plus
- 5,000 cfs Isolated Facility (IF)
- 0.2 MAF In Delta Storage (IDS)

15. New Facilities - IF and IDS (ALT 3E): Study 2020d09b-calfed-534

ALT 2B plus
- 15,000 cfs Isolated Facility (IF)
- 0.2 MAF In Delta Storage (IDS)

16. New facilities-NDSS and NDES: Study 2020d09b-calfed-543

ALT 2A Plus
- 2.0 MAF North of Delta Surface Storage (NDSS)
- 1.0 MAF North of Delta Environmental Storage (NDES)
  - diversion and discharge capacities of 5,000 cfs
  - no new diversion in any given water year until a 60,000 cfs mean daily flow event occurred at Chico Landing

TABLE 2
CALFED DWRSIM SENSITIVITY STUDIES AND KEY ASSUMPTIONS

1. New Facility - IF: Study 2020d09b-calfed-529b

ALT 3A with 5,000 cfs Isolated Facility (IF) modified for;
- Delta Cross Channel gates closed from November through June and open July through October.

2. New Facility - IF: Study 2020d09b-calfed-529c

ALT 3A with 5,000 cfs Isolated Facility(IF) modified for;
- IF not included in Delta Inflow/Export Ratio
- Delta Cross Channel gates closed from September through June and open July through August.

3. New Facility - IF: Study 2020d09b-calfed-529d

ALT 3A with 5,000 cfs Isolated Facility(IF) modified for;
- Minimum through Delta exports
  - 3000 cfs Oct-Mar and July-Sept
  - 0 cfs Apr-June

4. New Facility - IF: Study 2020d09b-calfed-529e

ALT 3A with 5,000 cfs Isolated Facility(IF) modified for;
- IF not included in Delta Inflow/Export Ratio
- Minimum through Delta exports
  - 3000 cfs Oct-Mar and July-Sept
  - 0 cfs Apr-June

5. New Facilities - NDGS, NDSS, NDES, SDGS, SDSS & SJBSS: Study 2020d09b-calfed-532a

ALT 2B modified for;
- New diversions to NDSS or NDES in any given water year are not dependent on any mean daily flow event occurring at Chico Landing.

6. New Facilities - IF and IDS: Study 2020d09b-calfed-534a

ALT 3E 15,000 cfs Isolated Facility (IF) for modified for;
- Minimum through Delta exports to be zero in all months of the year.

7. New facilities - NDSS, NDES: Study 2020d09b-calfed-543a

ALT 2A with 2.0 MAF North of Delta Surface Storage (NDSS) and 1.0 MAF North of Delta Environmental Storage (NDES) modified for;

- New diversions to NDSS or NDES in any given water year are not dependent on any mean daily flow event occurring at Chico Landing.

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Table 3
PRELIMINARY DWRSIM STUDY RESULTS
WATER SUPPLY BENEFITS OF CALFED STORAGE & CONVEYANCE FACILITIES

Study Information			Storage/Conveyance	SWP Deliveries		CVP Deliveries		Total SWP & CVP Deliveries	
ID	Alt	Ver	Components	critical	73-yr	critical	73-yr	critical	73-yr
527	D-1485	9.06	D-1485	2360	3341	2631	2790	4991	6131
514	B.M.	9.06	WQCP1995+Upstream AFRP Actions	2117	3257	1917	2543	4034	5800
515	-	9.06	B.M.+Max Wheeling+Surrogate	2117	3316	1929	2549	4046	5865
515a	-	9.06	B.M.+Max Wheeling	2146	3307	1910	2547	4056	5854
516	No Act	9.06	B.M.+Delta Actions	2124	3280	1889	2484	4013	5764
516a	-	9.06	B.M.+Delta Actions without AFRP Goodwin	2088	3270	1884	2481	3972	5751
517	-	9.06	B.M.+Delta Actions+Max Wheeling +Surrogate	2103	3347	1916	2500	4019	5847
518	1A	9.06	Study 517+ERPP	2103	3347	1902	2494	4005	5841
528	2A	9.06	Study 518+SDI	2136	3348	1944	2538	4080	5886
529	3A	9.06	Stusy 518+SDI+5,000cfs IF	2085	3365	1843	2497	3928	5862
530	2D	9.06	Study 518+SDI+SDSS	2557	3702	1894	2467	4451	6169
531	1C	9.06	Study 518+SDI+NDSS+NDES+SDSS+NDGS+SDGS	2699	3804	1840	2542	4539	6346
532	2B	9.06	Study 518+SDI+NDSS+NDES+SDSS+NDGS+SDGS+SBJSS	2793	3864	1825	2525	4618	6389
533	3B	9.06	Study 532+5,000 cfs IF+IDS	2764	3898	1769	2398	4533	6296
534	3E	9.06	Study 532+15,000 cfs IF+IDS	2685	3835	1684	2395	4369	6230
543	-	9.06	Study 518+SDI+NDSS+NDES	2282	3481	1960	2516	4242	5997

All Units in TAF/yr
Interruptable Deliveries are not included in SWP.

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D—009126

Table 3a
PRELIMINARY DWRSIM STUDY RESULTS
WATER SUPPLY BENEFITS COMPARISON OF CALFED STORAGE & CONVEYANCE FACILITIES

Study Information			Storage/Conveyance	SWP & CVP Deliveries		Surrogate Deliveries		SWP Interruptible [1]	
ID	Alt	Ver	Components	critical	73-yr	critical	73-yr	critical	73-yr
527	D-1485	9.06	D-1485	957	331	0	0	-30	-44
515	-	9.06	B.M.+Max Wheeling+Surrogate	12	65	234	350	-6	-14
515a	-	9.06	B.M.+Max Wheeling	22	54	0	0	-11	-14
516	No Act	9.06	B.M.+Delta Actions	-21	-36	0	0	4	-27
516a	-	9.06	B.M.+Delta Actions without AFRP Goodwin	-62	-49	0	0	-11	-31
517	-	9.06	B.M.+Delta Actions+Max Wheeling +Surrogate	-15	47	203	353	6	-50
518	1A	9.06	Study 517+ERPP	-29	41	232	353	21	-49
528	2A	9.06	Study 518+SDI	46	86	237	354	57	112
529	3A	9.06	Stusy 518+SDI+5,000cfs IF	-106	62	232	356	68	107
530	2D	9.06	Study 518+SDI+SDSS	417	369	283	396	-31	-52
531	1C	9.06	Study 518+SDI+NDSS+NDES+SDSS+NDGS+SDGS	505	546	298	403	-31	-78
532	2B	9.06	Study 518+SDI+NDSS+NDES+SDSS+NDGS+SDGS+SBJSS	584	589	312	409	-31	-64
533	3B	9.06	Study 532+5,000 cfs IF+IDS	499	496	306	418	-31	-44
534	3E	9.06	Study 532+15,000 cfs IF+IDS	335	430	297	407	-31	-52
543	-	9.06	Study 518+SDI+NDSS+NDES	208	197	252	370	27	99

[1] Benefits measured against Study 514 benchmark
All Units in TAF/yr

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D-009127
D-009127

Table 4A
PRELIMINARY DWRSIM SENSITIVITY STUDIES RESULTS
WATER SUPPLY BENEFITS OF CALFED STORAGE & CONVEYANCE FACILITIES

Study Information			Storage/Conveyance	SWP & CVP Deliveries		Surrogate Delivery		SWP [1] Interruptible	
ID	Ver	Date	Components	critical	73-yr	critical	73-yr	critical	73-yr
529b	9.06	10/30/97	Study 529 + Cross Channel Gate open July to October	-418	-26	220	351	69	106
529c	9.06	10/30/97	Study 529 + IF not part of Export Ratio	45	140	242	364	96	164
529d	9.06	10/30/97	Study 529 + min 3,000 cfs thru Delta July to March	9	94	234	359	70	108
529e	9.06	10/30/97	Study 529 + IF not in Export Ratio + min 3,000 cfs thru Delta	158	171	245	366	91	166
532a	9.06	10/30/97	Study 532 + NDSS 0 trigger value	792	700	340	423	-32	-66
534a	9.06	10/30/97	Study 534 + min 0 cfs thru Delta	83	320	308	406	-29	-51
543a	9.06	10/30/97	Study 543 + NDSS 0 trigger value	462	495	285	397	16	72

[1] Benefits measured against Study 514 benchmark
All units in TAF/yr

D-009128

D-009128

Table 4B
PRELIMINARY DWRSIM SENSITIVITY STUDIES RESULTS
WATER SUPPLY BENEFITS OF CALFED STORAGE & CONVEYANCE FACILITIES

Study Information			Storage/Conveyance	SWP & CVP Deliveries		Surrogate Delivery		SWP Interruptible	
ID	Ver	Date	Components	critical	73-yr	critical	73-yr	critical	73-yr
529b[1]	9.06	10/30/97	Study 529 + Cross Channel Gate open July to October	-312	-90	-12	-6	0	-2
529c[1]	9.06	10/30/97	Study 529 + IF not part of Export Ratio	151	76	10	7	27	56
529d[1]	9.06	10/30/97	Study 529 + min 3,000 cfs thru Delta July to March	115	30	2	2	1	0
529e[1]	9.06	10/30/97	Study 529 + IF not in Export Ratio + min 3,000 cfs thru Delta	264	107	13	9	22	58
532a[2]	9.06	10/30/97	Study 532 + NDSS 0 trigger value	209	114	28	14	0	-2
534a[3]	9.06	10/30/97	Study 534 + min 0 cfs thru Delta	-251	-109	10	-1	2	2
543a[4]	9.06	10/30/97	Study 543 + NDSS 0 trigger value	255	300	32	26	-12	-28

[1] Benefits measured against Study 529
[2] Benefits measured against Study 532
[3] Benefits measured against Study 534
[4] Benefits measured against Study 543
All units in TAF/yr

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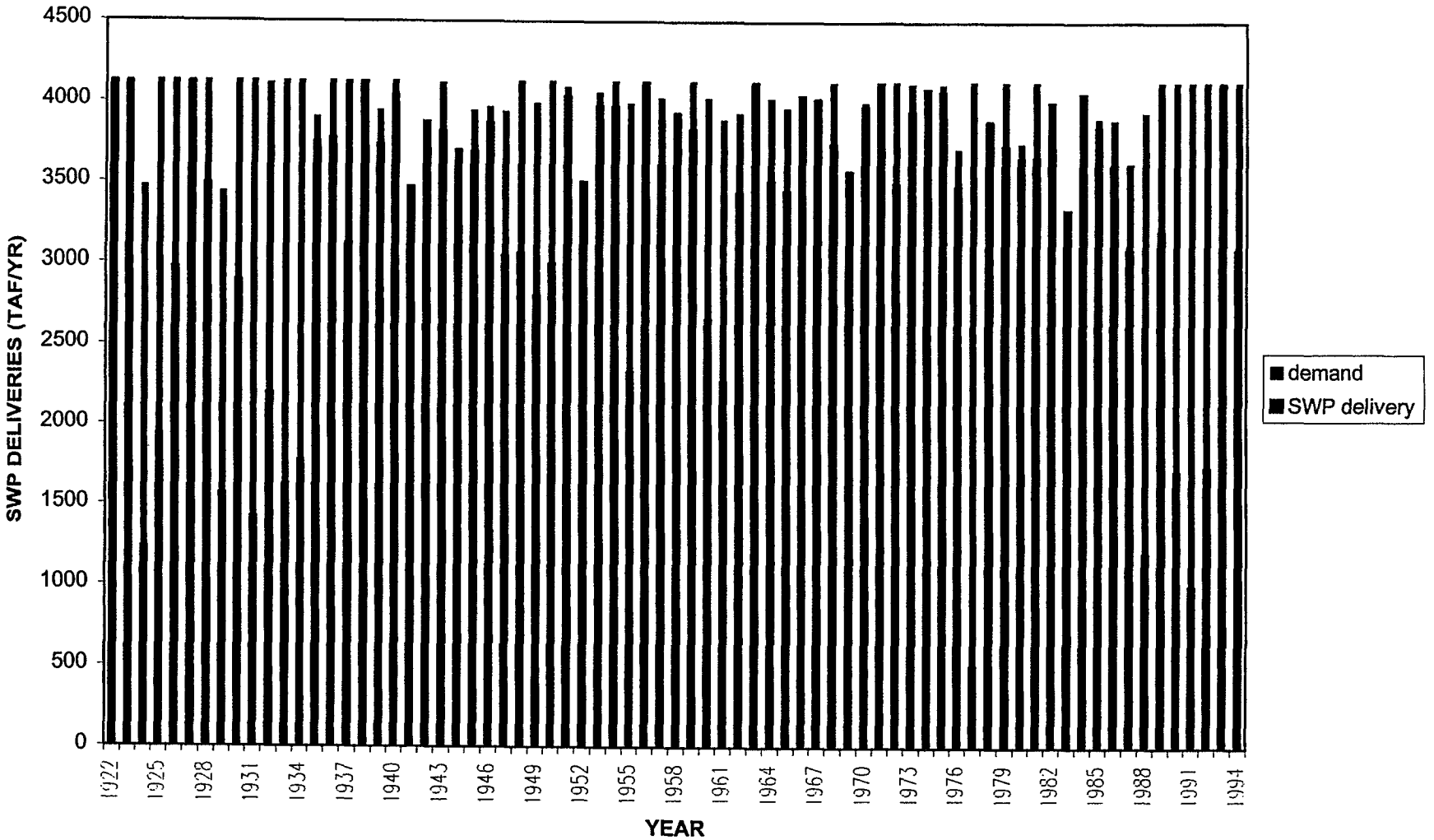
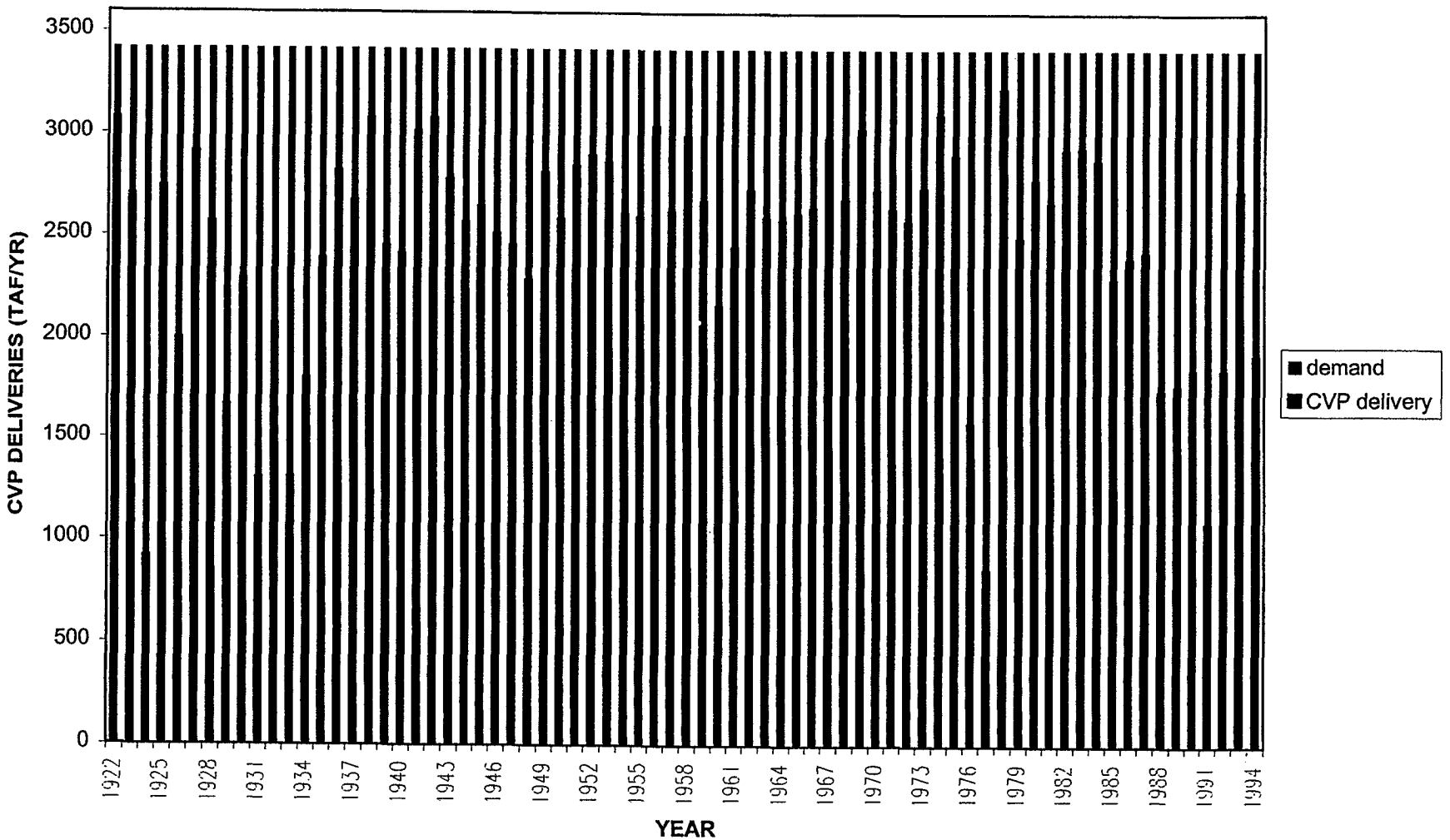
D-009129

SWP DEMAND AND DELIVERY
(No Action Scenario 2020d09b-calfed-516)



CVP DEMAND AND DELIVERY
(No Action Scenario 2020d09b-calfed-516)



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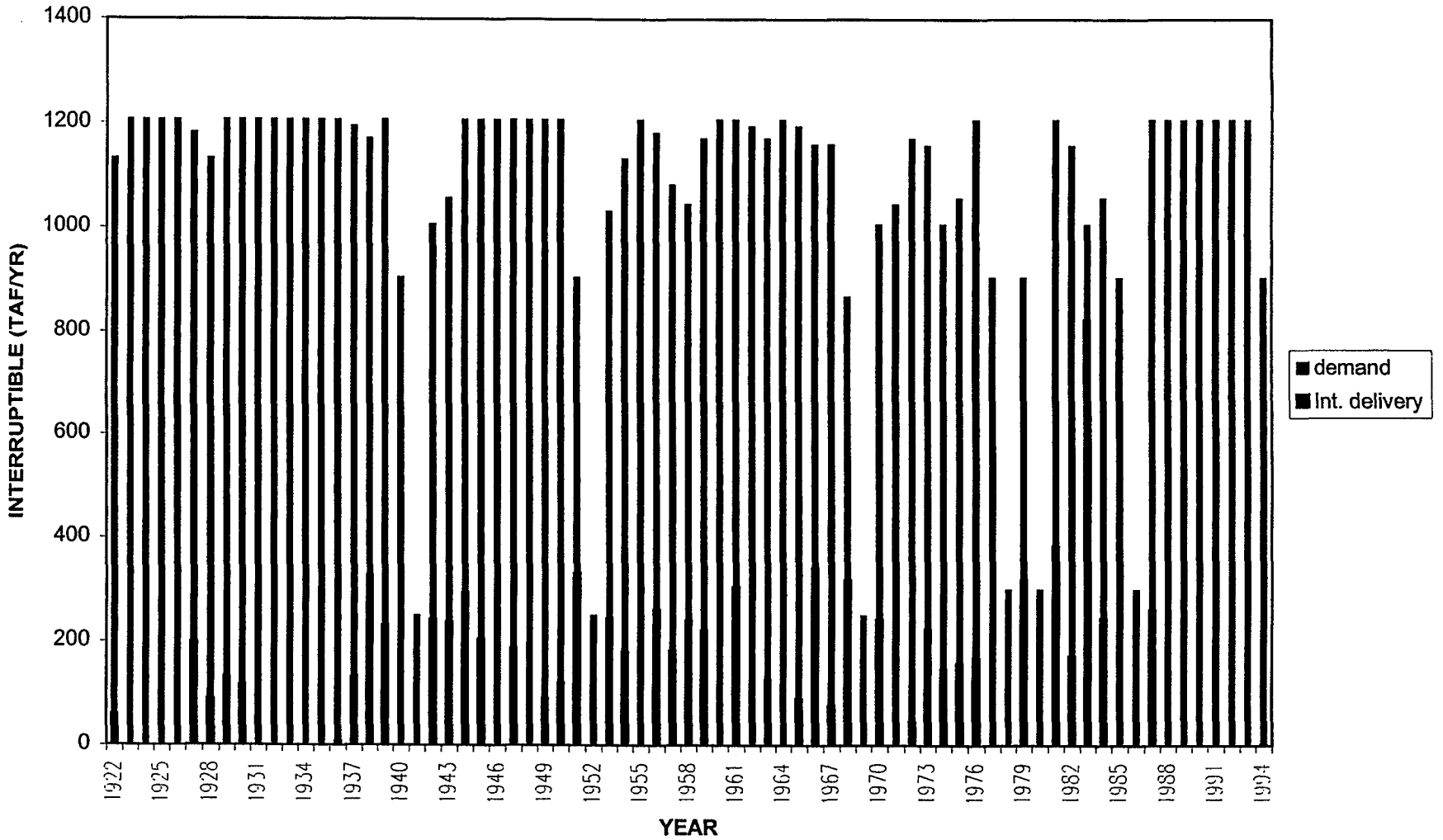
SWP INTERRUPTIBLE DEMAND AND DELIVERY
(No Action Scenario 2020d09b-calfed-516)



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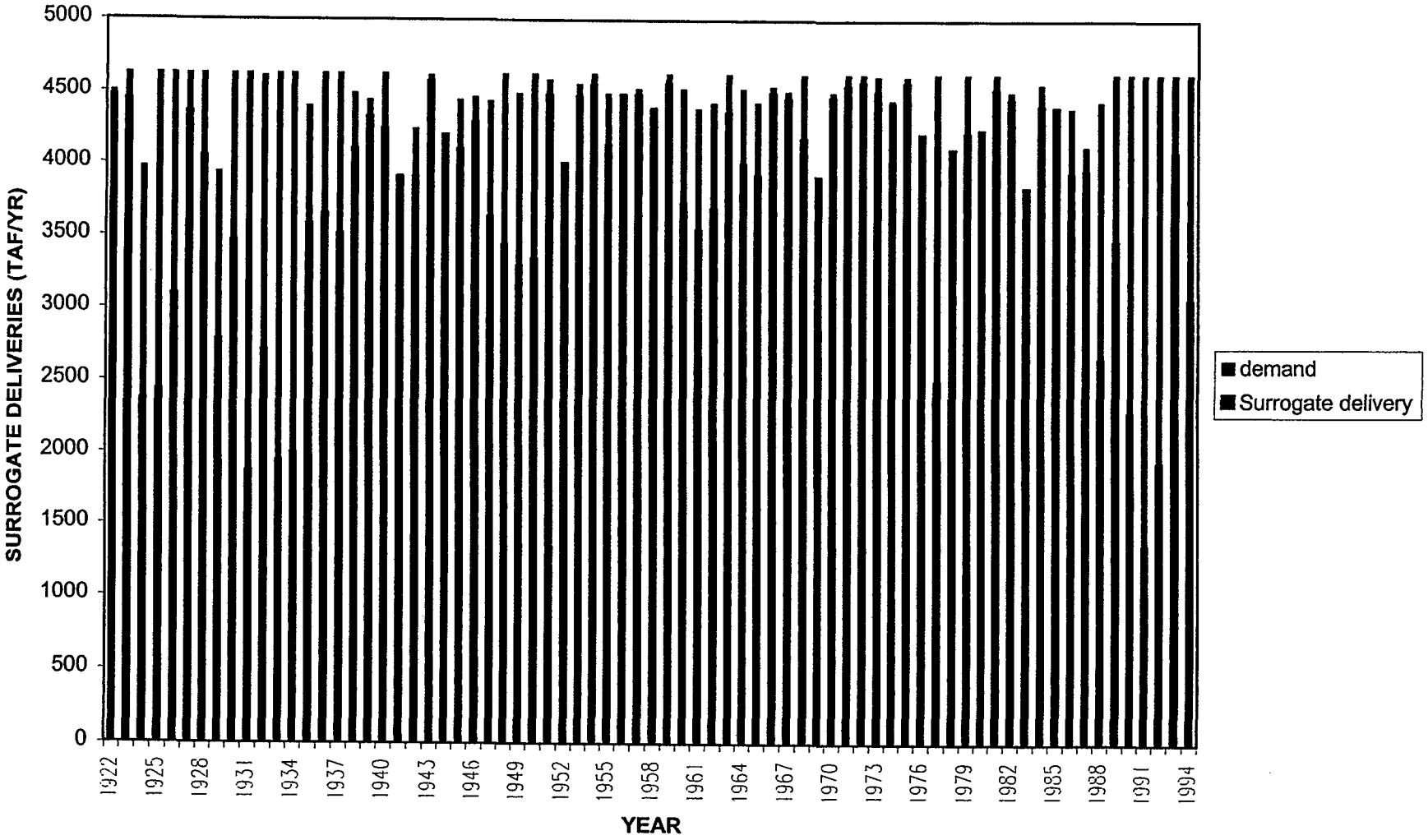
SURROGATE DEMAND AND DELIVERY
(2020d09b-calfed-531 SDI+NDSS+NDGS+SDSS+SDGS)



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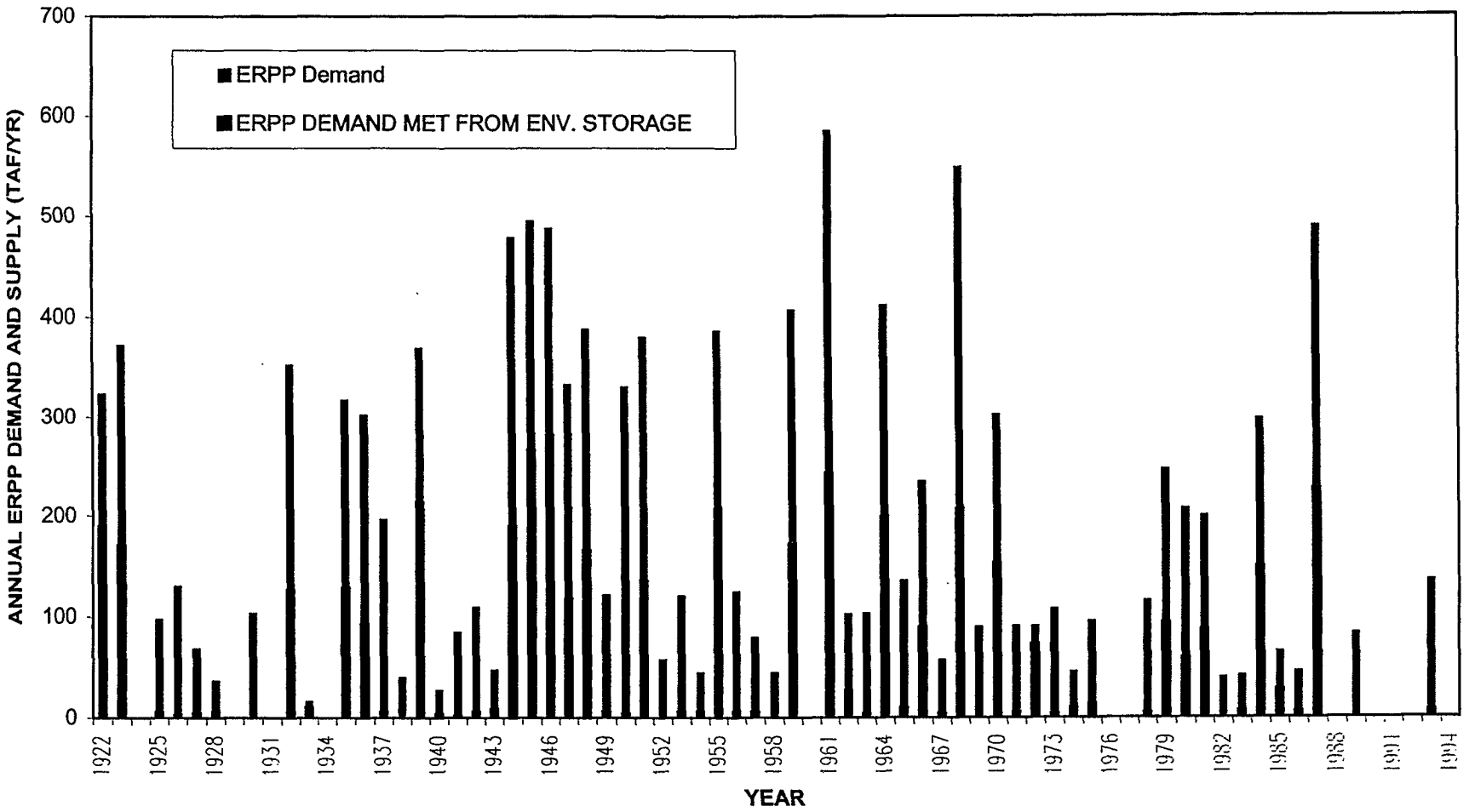
ERPP DEMAND AND DEMAND MET FROM ENVIRONMENTAL STORAGE
NEW FACILITIES ALT 2E
(2020d09b-calfed-532)



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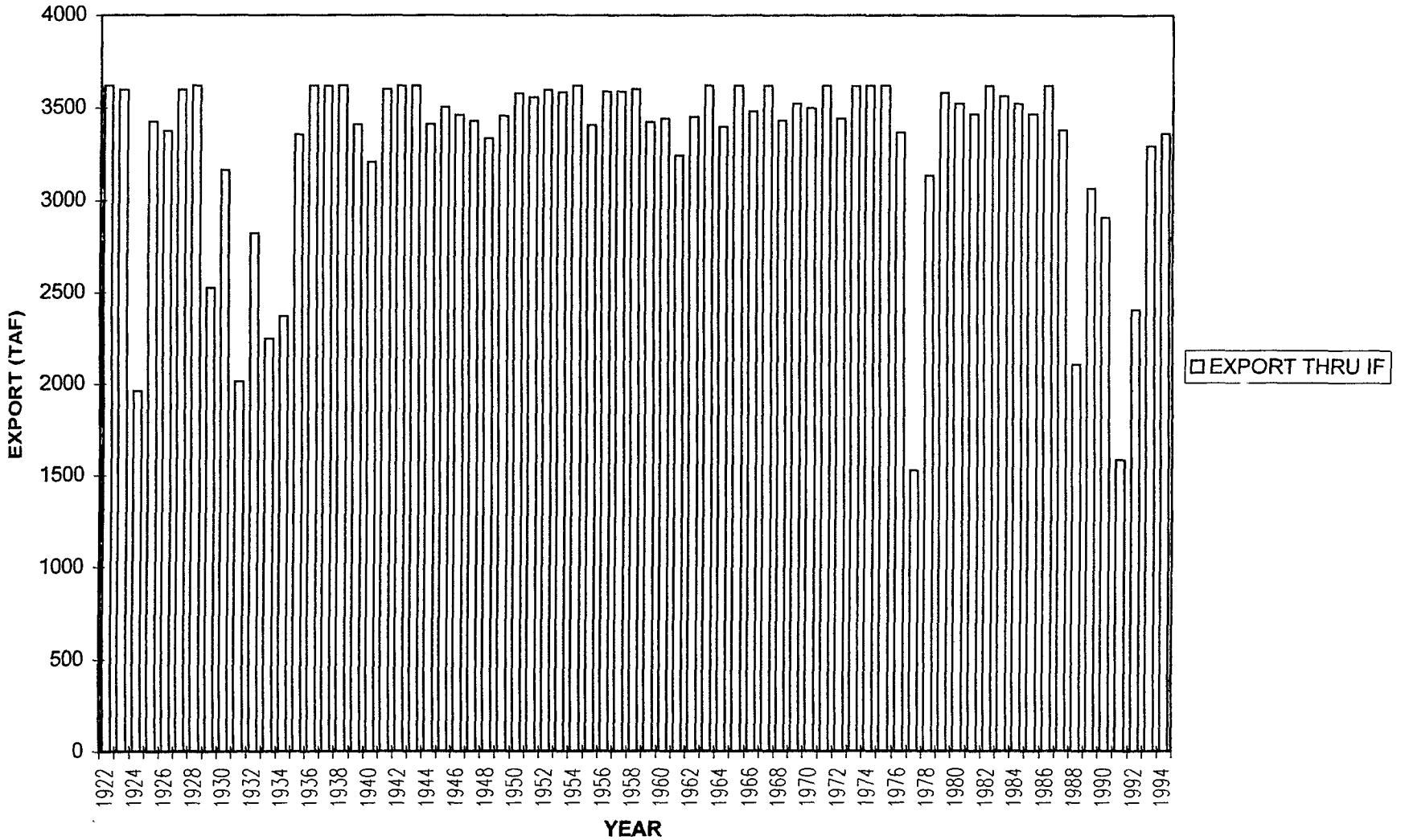
EXPORTS THROUGH ISOLATED FACILITY
CALFED 5,000 CFS IF (ALT 3A)
STUDY 2020d09b-calfed-529



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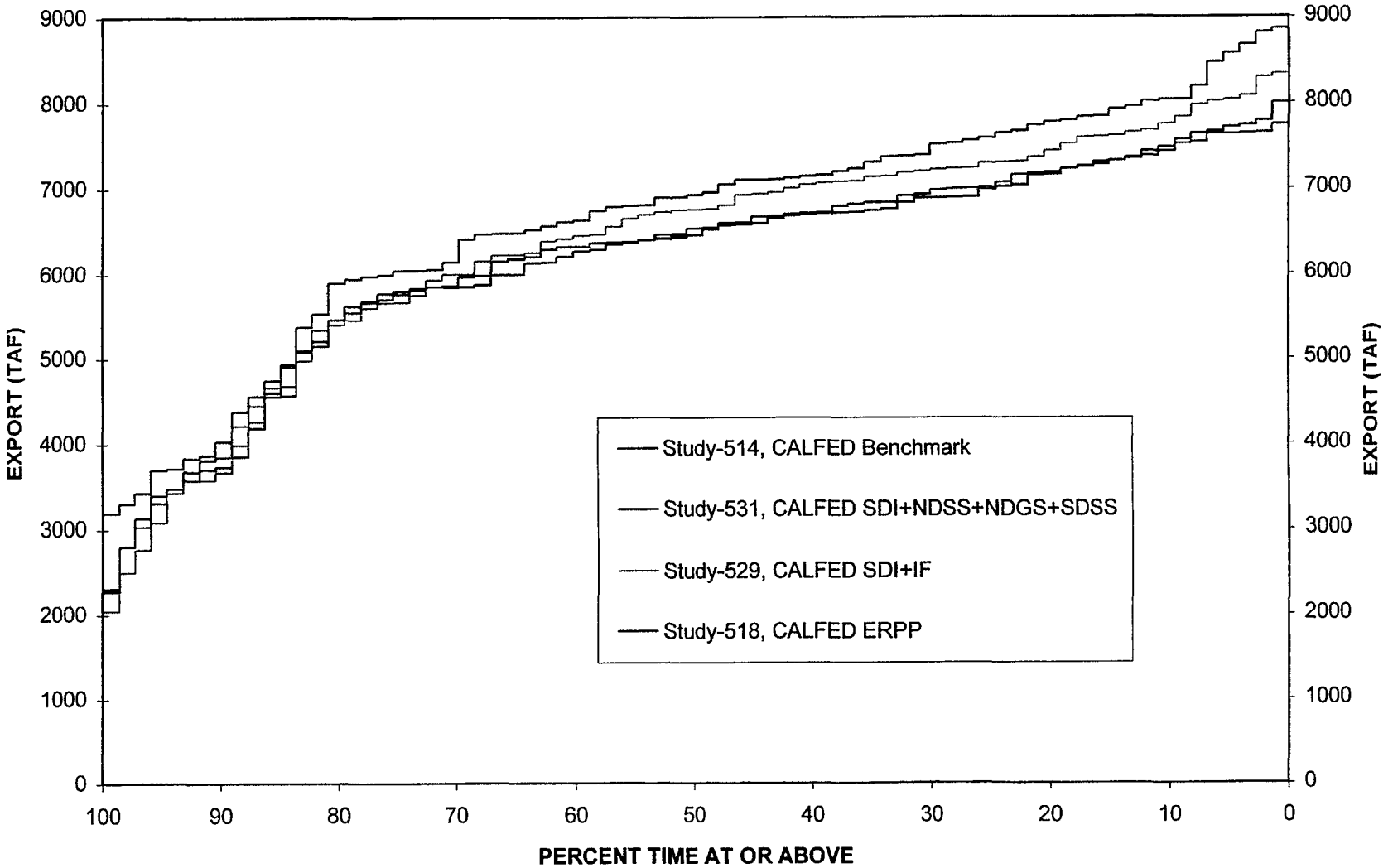
FREQUENCY OF ANNUAL BANKS AND TRACY EXPORT



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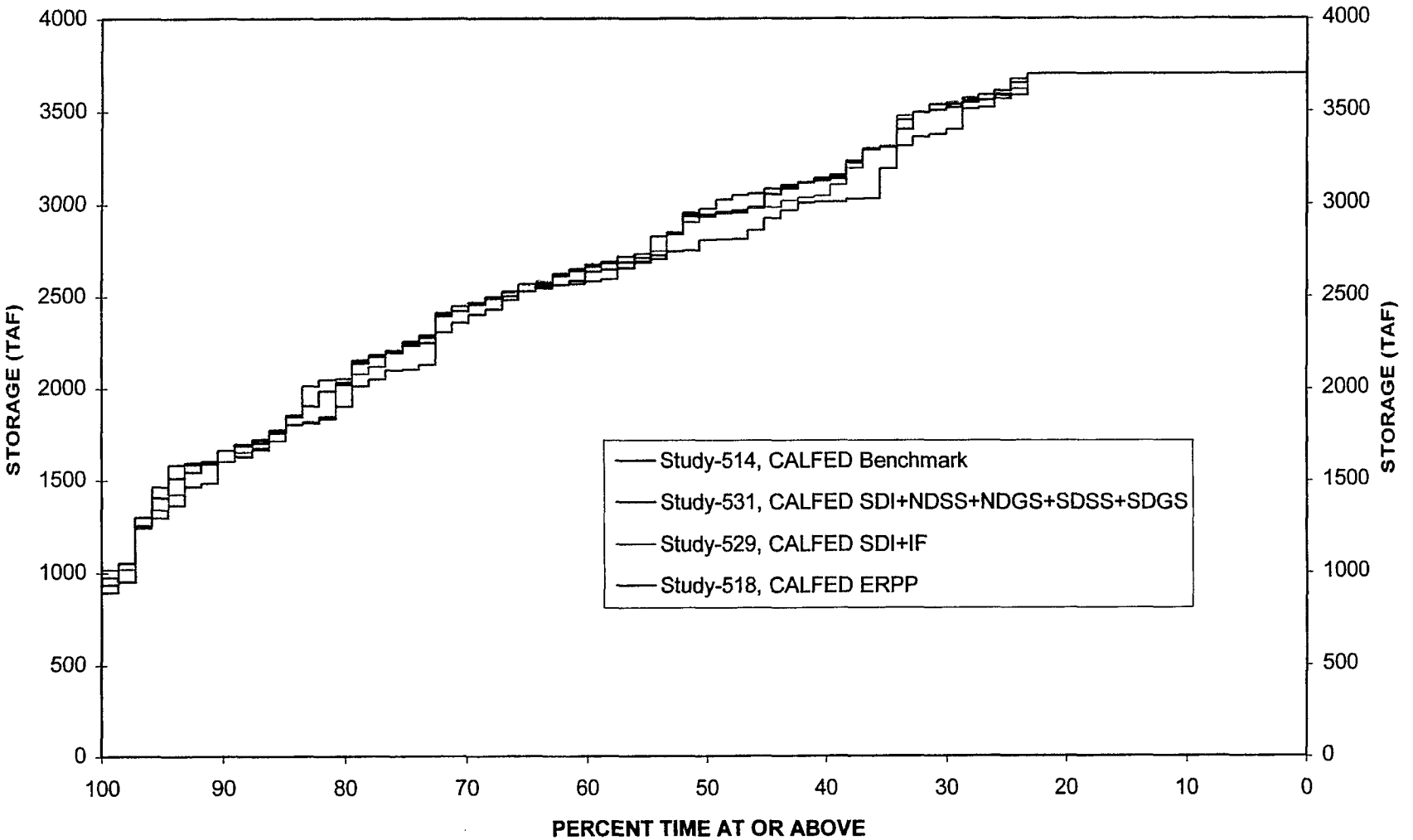
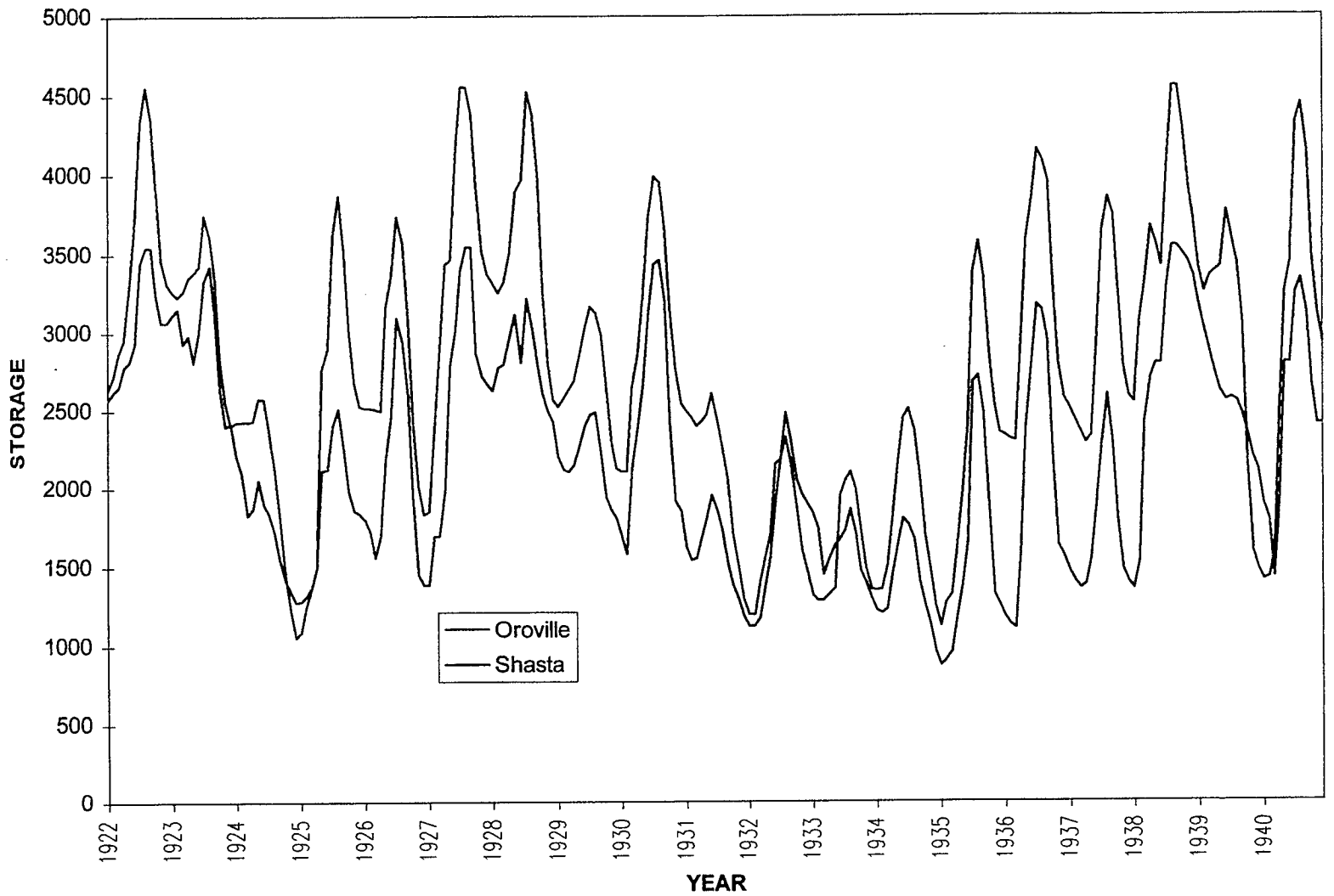
FREQUENCY OF END OF SEPTEMBER SHASTA STORAGE

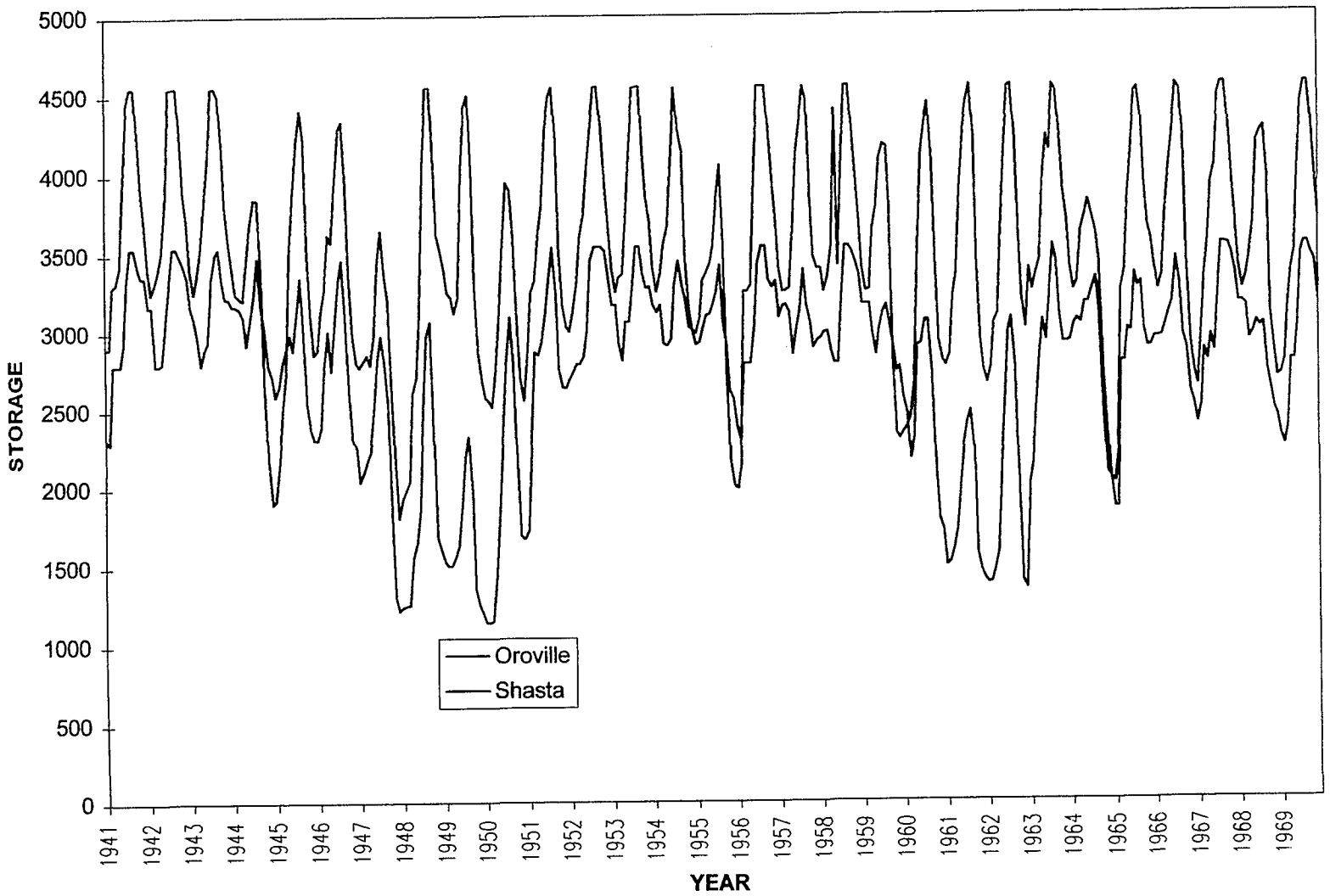


D—009137

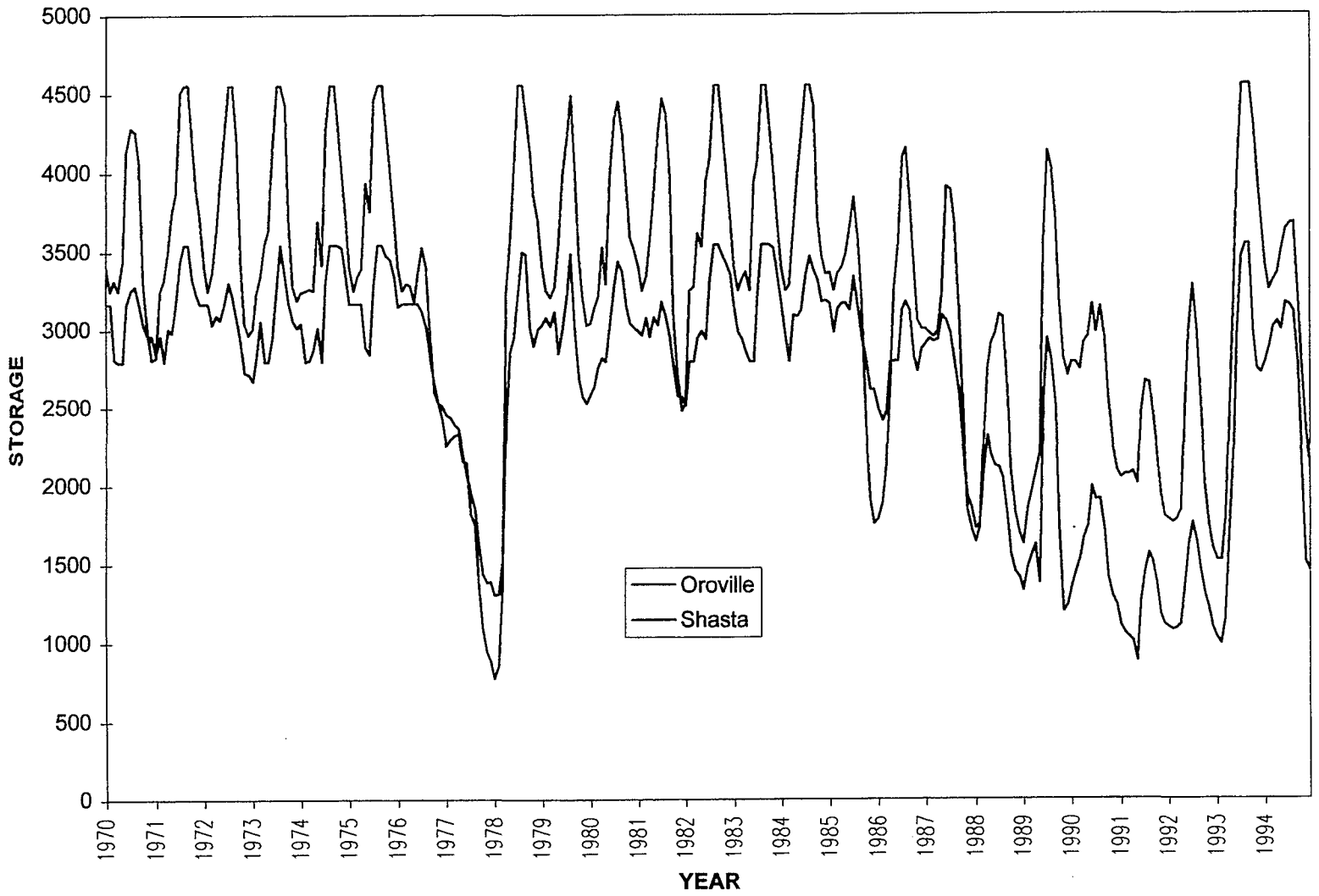
END OF MONTH STORAGE ALT 1C (2020d09b-calfed-531)



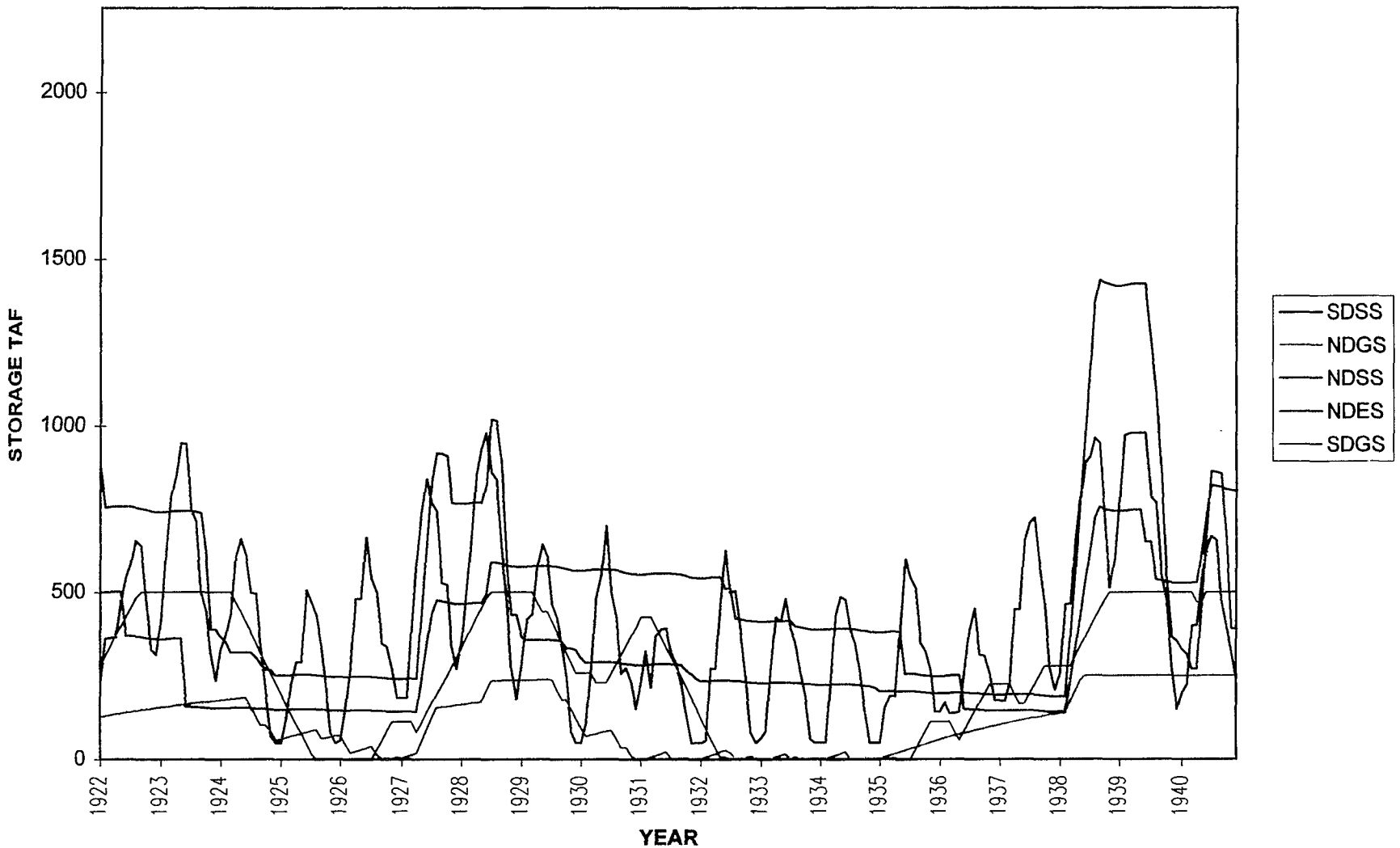
END OF MONTH STORAGE ALT 1C (2020d09b-calfed-531)



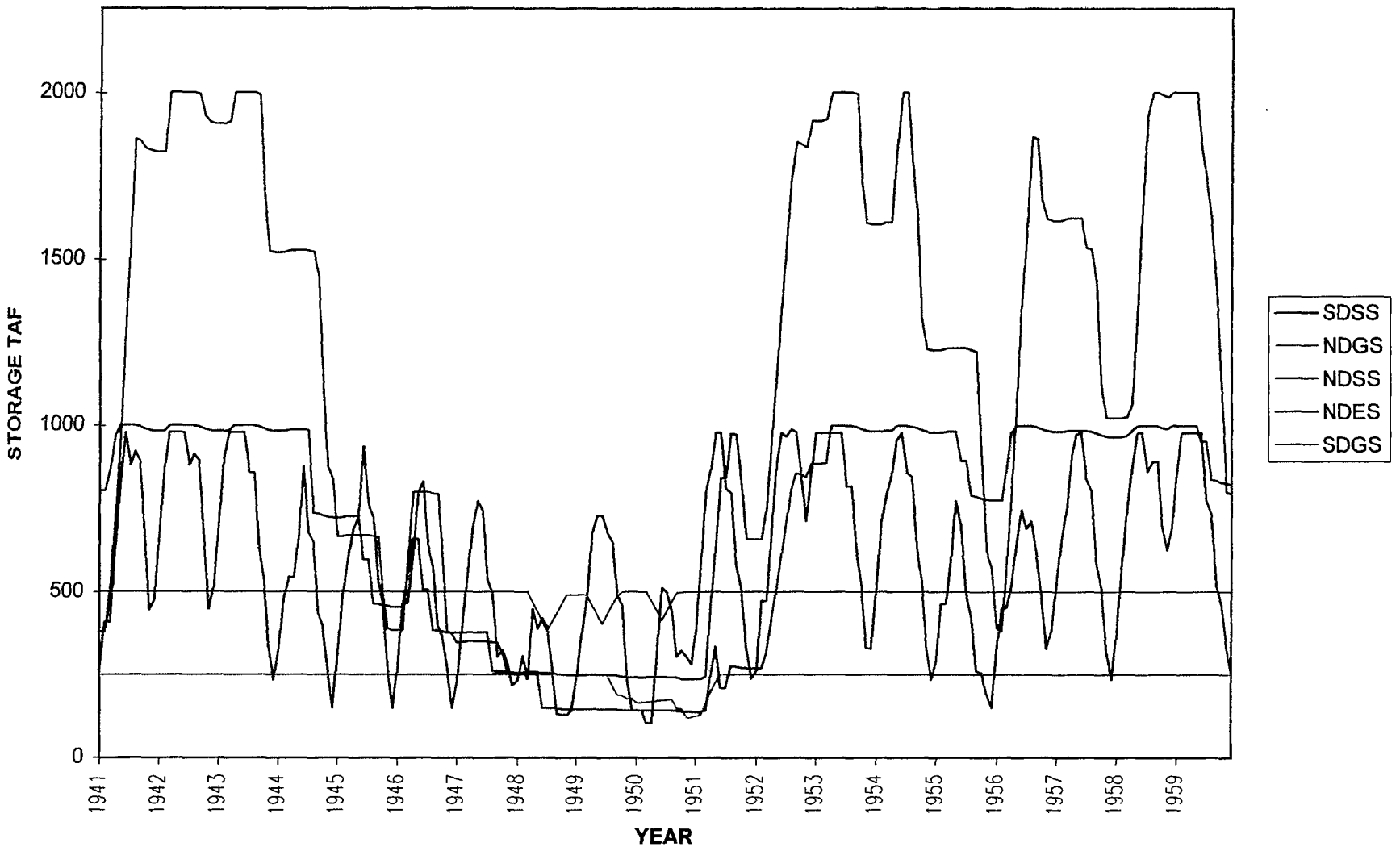
END OF MONTH STORAGE ALT 1C (2020d09b-calfed-531)



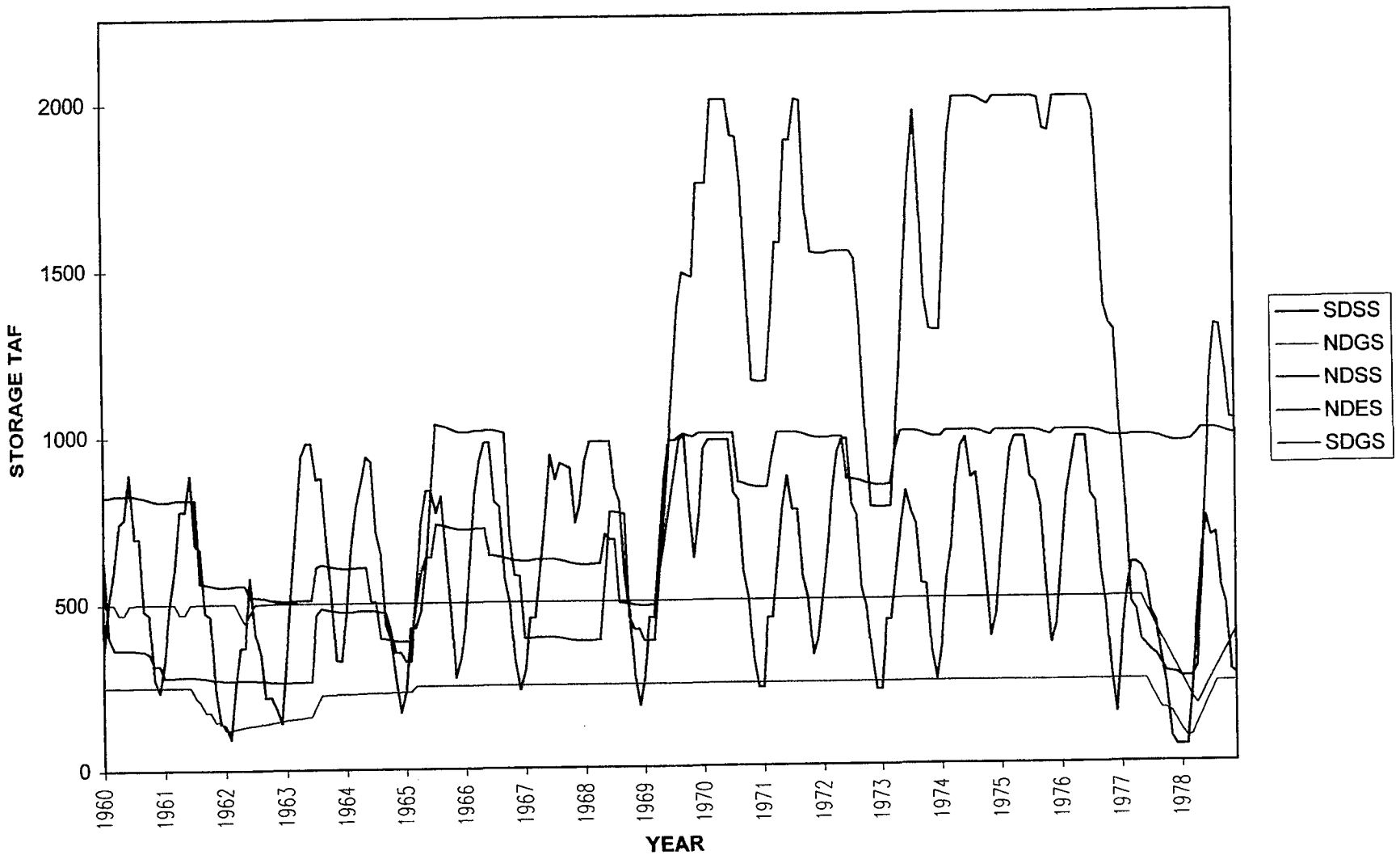
END OF MONTH STORAGE ALT 1C (2020d09b-calfed-531)



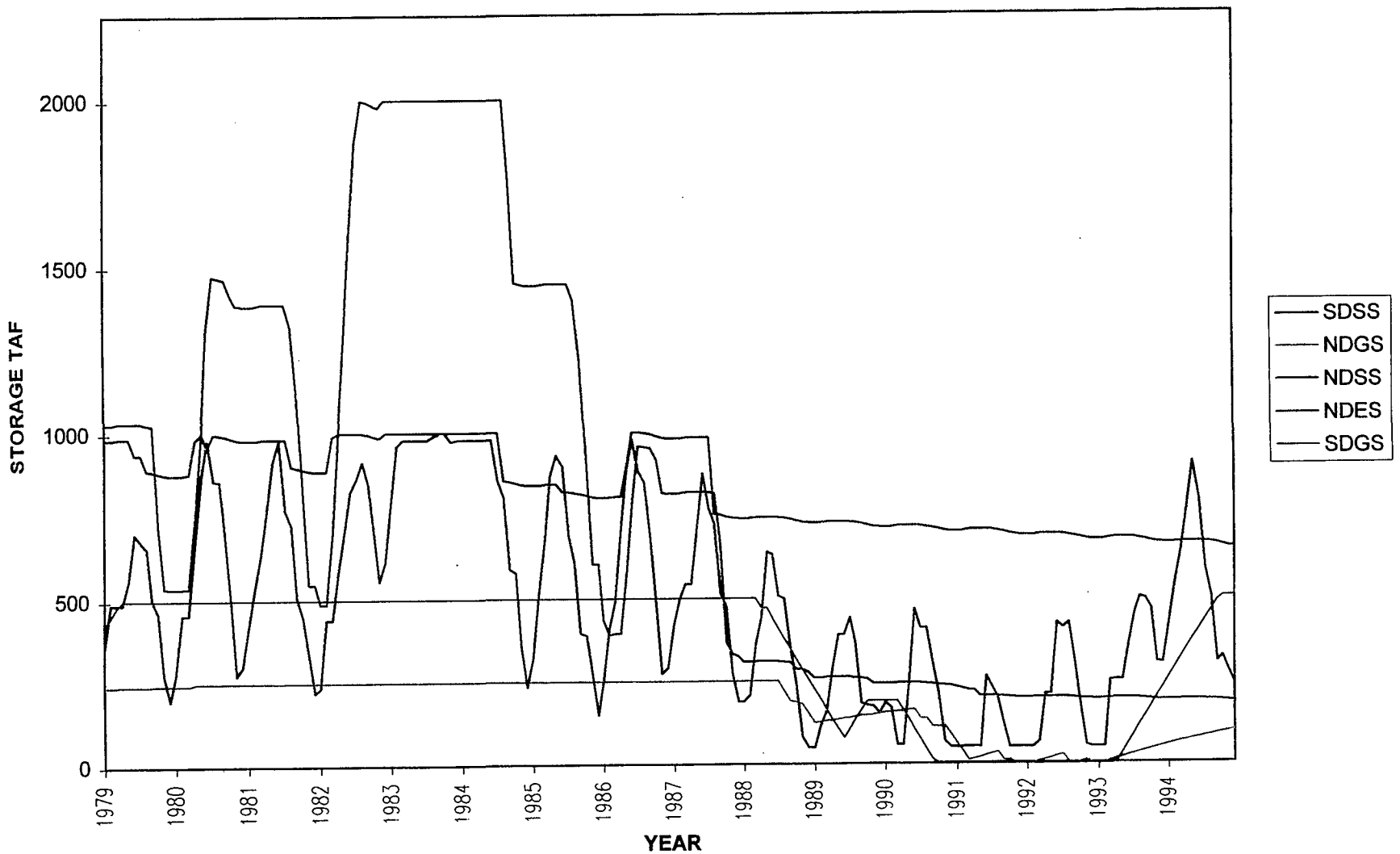
END OF MONTH STORAGE ALT 1C (2020d09b-calfed-531)



END OF MONTH STORAGE ALT 1C (2020d09b-calfed-531)



END OF MONTH STORAGE ALT 1C (2020d09b-calfed-531)



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