

Attachment A1
Water Operation Detailed Results

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Attachment A1

Water Operation Detailed Results

This attachment contains detailed plots of New Melones and recirculation operations for each time-step modeled for the recent analysis that URS conducted. It also contains tables with summary statistics for each alternative plan evaluated. Section A1.1 contains this information for the existing level of development (LOD) and Section A1.2 contains information for the future LOD. Information for flow and electrical conductivity (EC) is displayed graphically in 10-year increments, and summary information on recirculation flow is provided prior to each alternative plan.

Four basic types of information exist:

1. Plots of existing conditions and future conditions with no-action operations (the No-Project Alternative and the No-Action Alternative, respectively)
2. Tables containing summary statistics for recirculation for each alternative plan
3. Plots of recirculation operation to satisfy the Vernalis flow objective for each alternative plan
4. Plots of recirculation operation to satisfy the Vernalis water quality objective for each alternative plan

Figures containing graphical output (monthly, bimonthly for April and May) for existing and future conditions (No-Project Alternative and the No-Action Alternative, respectively) have the following parameters:

- New Melones release for Vernalis water quality
- New Melones release for Vernalis flow requirement
- San Joaquin River (SJR) water quality at Vernalis
- SJR water quality at Maze
- SJR water quality standard at Vernalis

Tables containing summary statistics on quantity of recirculation for each alternative plan are also included in this attachment. These tables contain monthly recirculation statistics, bimonthly statistics for April and May, average recirculation by SJR 60-20-20 year type index (year type), frequency of recirculation by year type, and average recirculation during occurrence by year type.

Figures containing graphical output of SJR water quality, recirculation used to satisfy water quality standards, SJR flow, and recirculation used to satisfy flow standards are also included in this attachment. For plots of SJR water quality and recirculation used to satisfy water quality standards, the following parameters are included:

- New Melones release for Vernalis water quality
- Recirculation for Vernalis water quality
- Recirculation for Vernalis flow
- SJR water quality at Vernalis (EC)
- SJR water quality at Vernalis (EC) without project
- SJR water quality standard at Vernalis
- Delta-Mendota Canal water quality (EC)

For plots of SJR flow and recirculation used to satisfy flow standard, the following parameters are included:

- New Melones release for Vernalis flow objective
- Recirculation for Vernalis flow
- Recirculation for Vernalis water quality
- SJR flow at Vernalis
- SJR flow at Vernalis without project
- SJR flow standard at Vernalis

A1.1 Existing Level of Development

Figure A1-1 contains graphical output (monthly, and bimonthly for April and May) for existing (i.e., No-Project Alternative) conditions.

Summary statistics for each alternative plan modeled using the existing LOD can be found in the following tables:

- Table A1-1 Alternative A1 Existing LOD
- Table A1-2 Alternative A2 Existing LOD
- Table A1-3 Alternative B1 Existing LOD
- Table A1-4 Alternative B2 Existing LOD
- Table A1-5 Alternative C Existing LOD
- Table A1-6 Alternative D Existing LOD

Information regarding alternative plans modeled using the existing LOD is contained in the following figures:

- Figure A1-2 Alternative A1 Existing LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-3 Alternative A1 Existing LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-4 Alternative A2 Existing LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-5 Alternative A2 Existing LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-6 Alternative B1 Existing LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-7 Alternative B1 Existing LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-8 Alternative B2 Existing LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-9 Alternative B2 Existing LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-10 Alternative C Existing LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-11 Alternative C Existing LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-12 Alternative D Existing LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard

- Figure A1-13 Alternative D Existing LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard

A1.2 Future Level of Development

Figure A1-14 contains graphical output (monthly, and bimonthly for April and May) for future (i.e., No-Action Alternative) conditions.

Summary statistics for each alternative plan modeled using the future LOD can be found in the following tables:

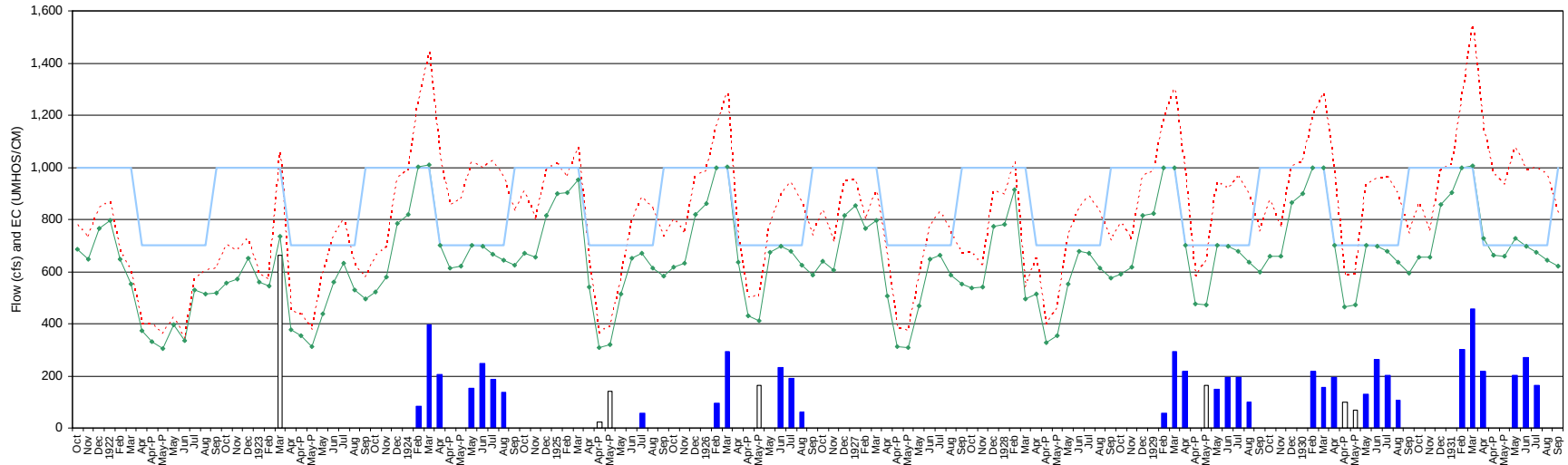
- Table A1-7 Alternative A1 Future LOD
- Table A1-8 Alternative A2 Future LOD
- Table A1-9 Alternative B1 Future LOD
- Table A1-10 Alternative B2 Future LOD
- Table A1-11 Alternative C Future LOD
- Table A1-12 Alternative D Future LOD

Information regarding alternative plans modeled using the future LOD is contained in the following figures:

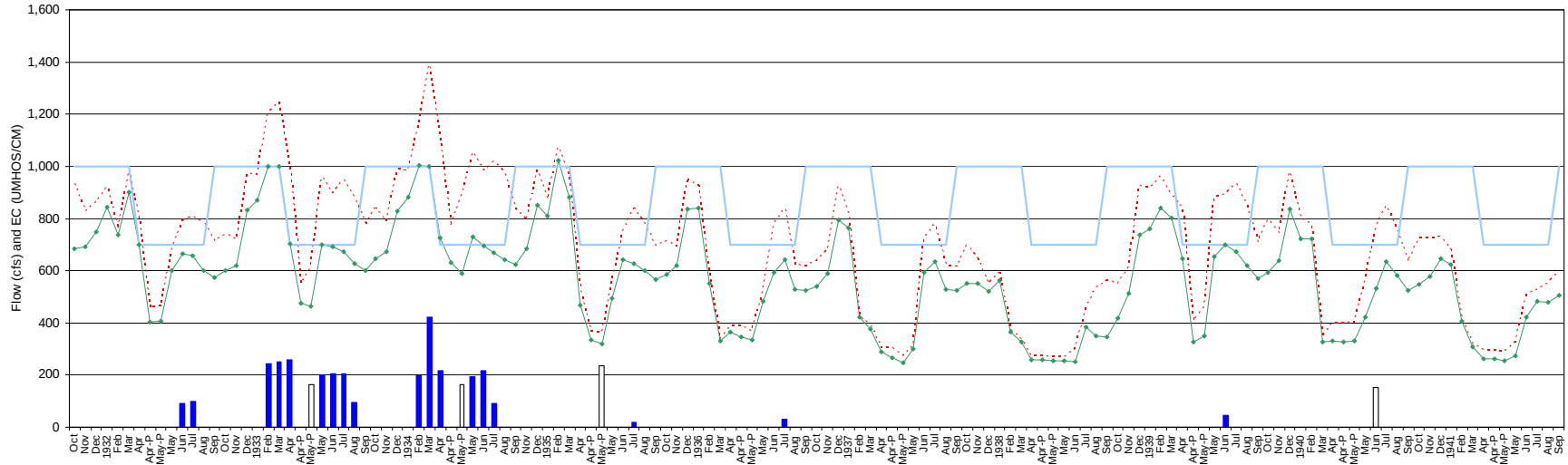
- Figure A1-15 Alternative A1 Future LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-16 Alternative A1 Future LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-17 Alternative A2 Future LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-18 Alternative A2 Future LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-19 Alternative B1 Future LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-20 Alternative B1 Future LOD

- San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-21 Alternative B2 Future LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-22 Alternative B2 Future LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-23 Alternative C Future LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-24 Alternative C Future LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard
- Figure A1-25 Alternative D Future LOD
 - San Joaquin River Quality and recirculation used to satisfy water quality standard
- Figure A1-26 Alternative D Future LOD
 - San Joaquin River flow and recirculation used to satisfy flow standard

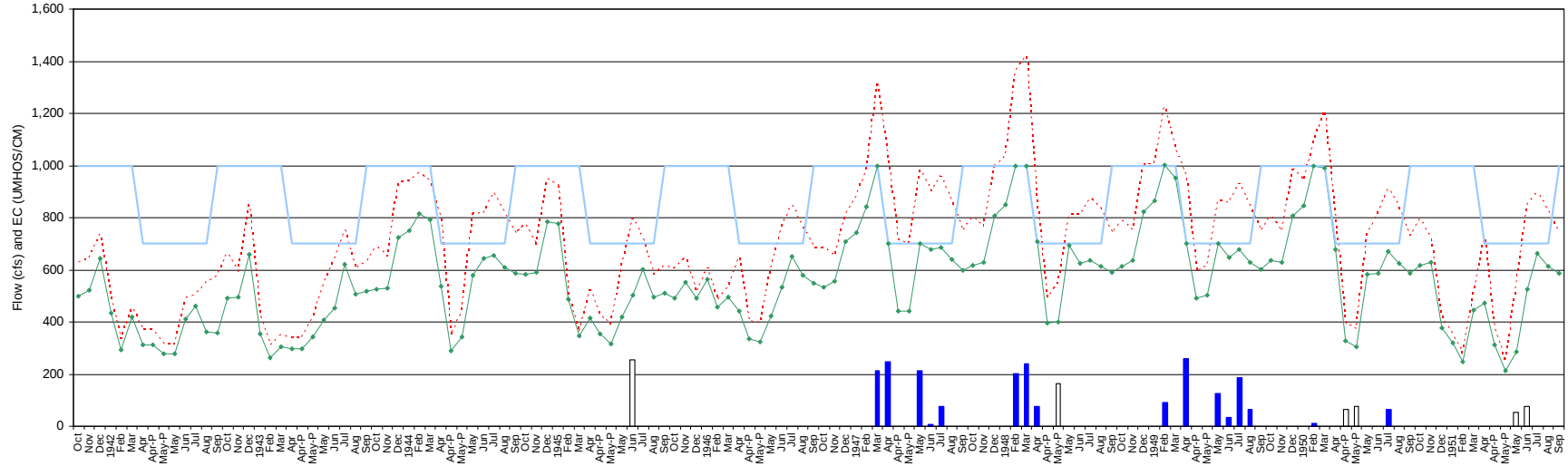
San Joaquin River Quality and New Melones Release for Water Quality and Flow
Water Years: 1922-1931



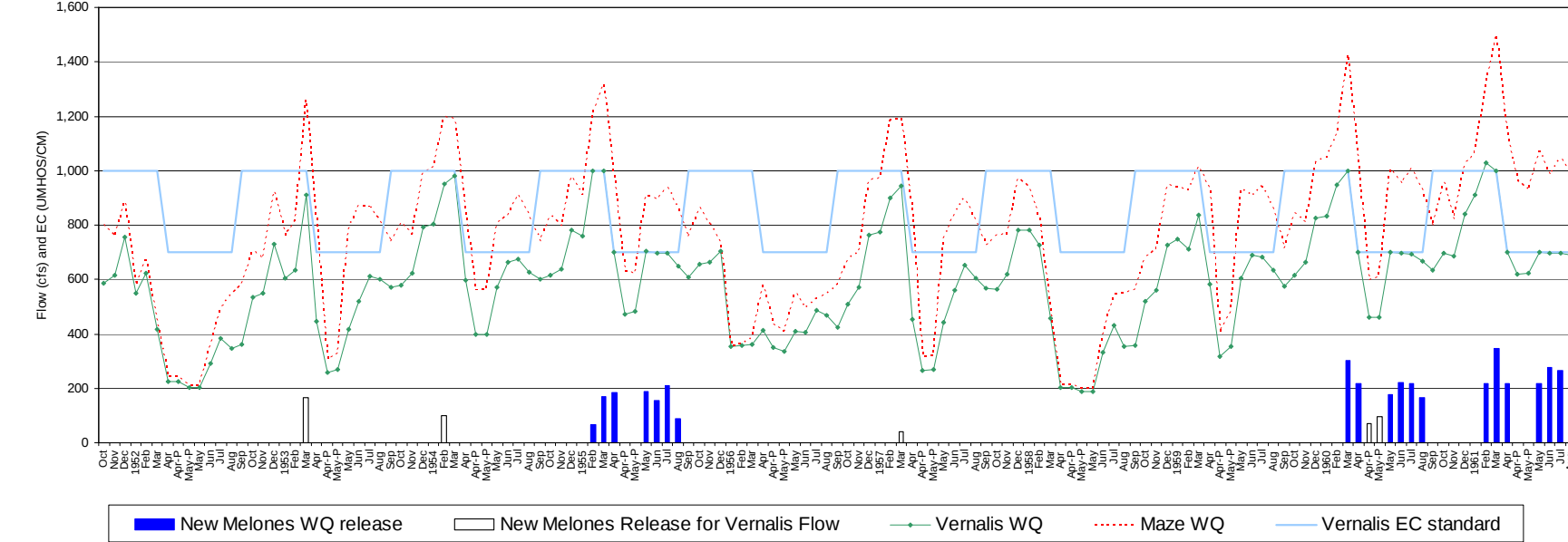
Water Years: 1932-1941



Water Years: 1942-1951



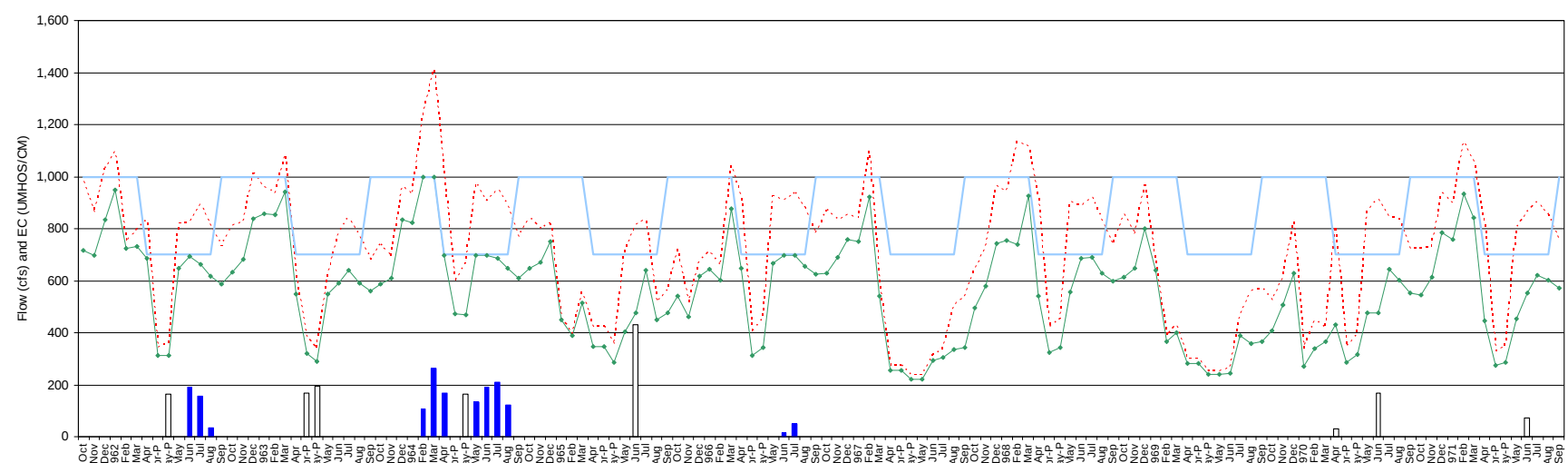
Water Years: 1952-1961



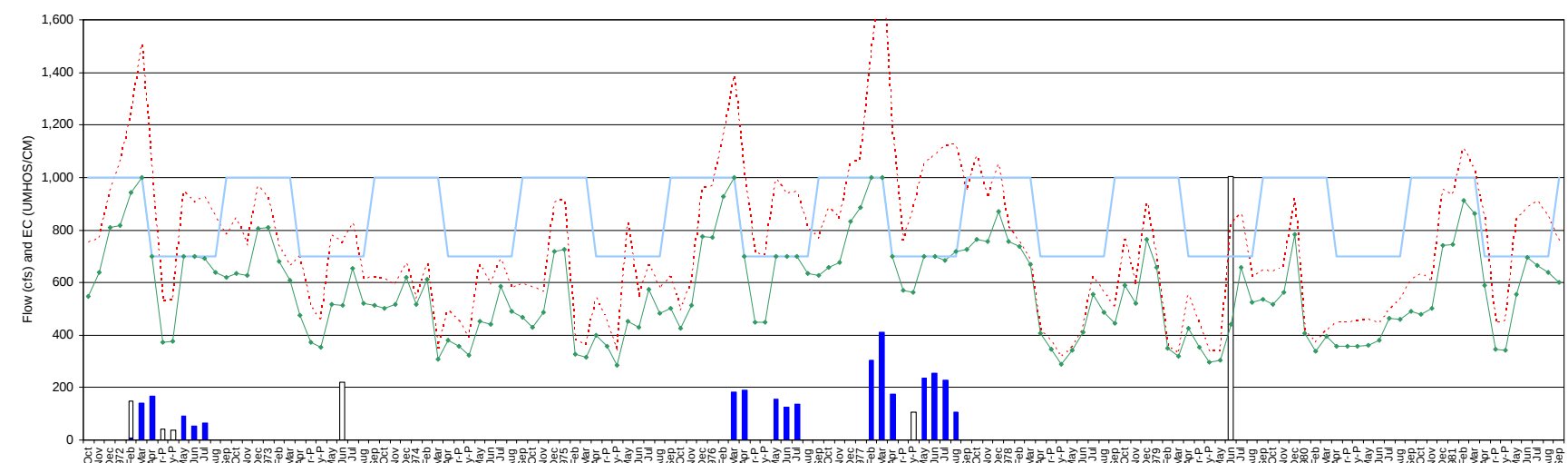
Key:
EC = electrical conductivity
WQ = water quality

Figure A1-1. CalSim No-Project Alternative

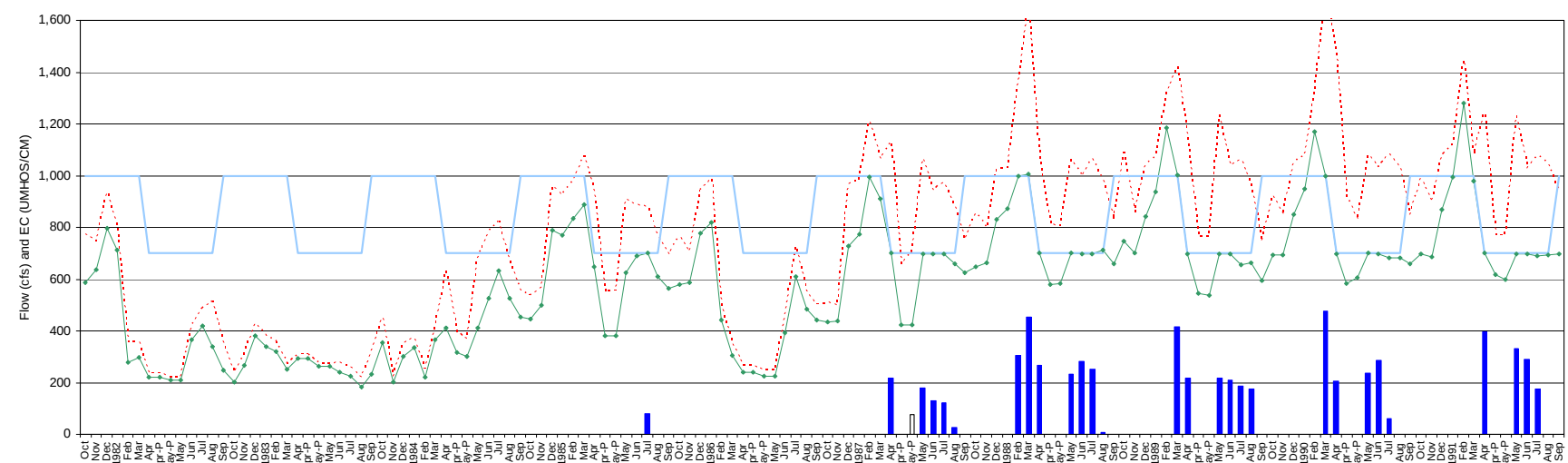
San Joaquin River Quality and New Melones Release for Water Quality and Flow
Water Years: 1962-1971



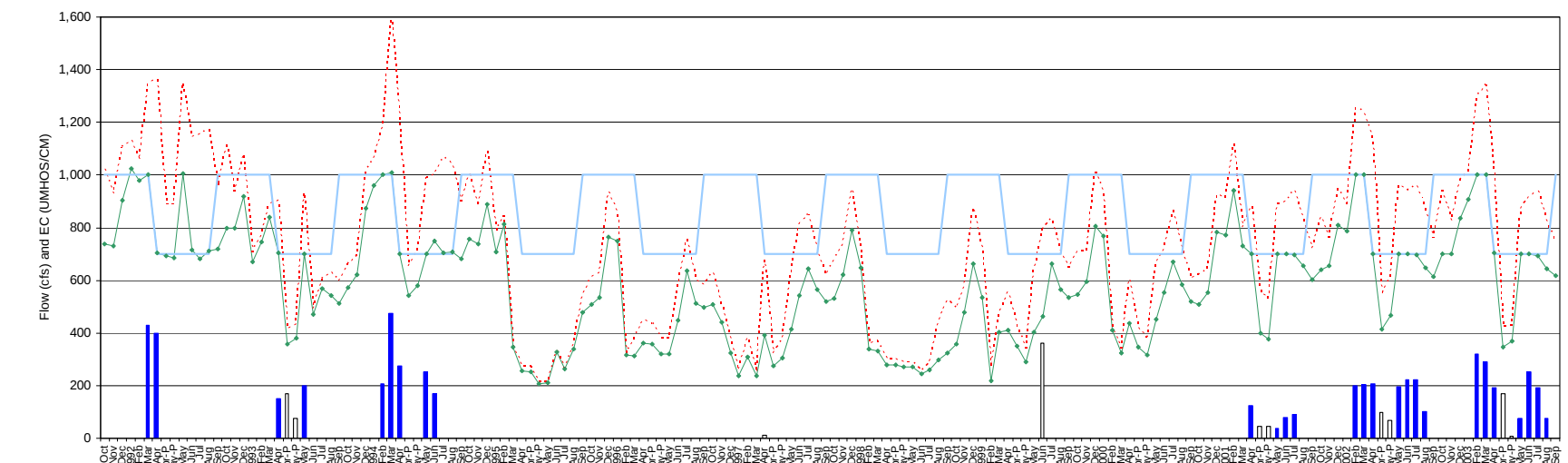
Water Years: 1972-1981



Water Years: 1982-1991



Water Years: 1992-2003



New Melones WQ release New Melones Release for Vernalis Flow Vernalis WQ Maze WQ Vernalis EC standard

Key:
EC = electrical conductivity
WQ = water quality

Figure A1-1. CalSim No-Project Alternative (continued)

Table A1-1. Alternative A1 Existing LOD
Recirculation used supplemental to New Melones release using Jones PP excess capacity
1000 acre feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	2	6	0	0	0	0	3	0	0	0	11
BN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D	0	0	0	0	2	5	1	0	0	0	1	0	0	0	9
C	0	0	0	0	2	0	0	0	0	1	1	0	0	0	5
All	0	0	0	0	1	2	0	0	0	0	1	0	0	0	5

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3
AN (16)	0	0	0	0	2	4	0	0	0	0	1	0	0	0	4
BN (13)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
D (13)	0	0	0	0	3	3	2	0	0	0	1	0	0	0	7
C (16)	0	0	0	0	2	2	2	0	0	1	2	0	1	0	6
All (82)	0	0	0	0	9	11	4	0	0	1	5	0	1	0	22

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	9	9	0	0	0	0	19	0	0	0	12
AN	0	0	0	0	16	26	0	0	0	0	46	0	0	0	45
BN	0	0	0	0	9	5	0	0	0	0	0	0	0	0	7
D	0	0	0	0	10	20	8	0	0	0	11	0	0	0	16
C	0	0	0	0	16	1	2	0	0	20	7	0	2	0	12
All	0	0	0	0	12	16	5	0	0	20	18	0	2	0	19

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
BN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	2	0	0	0	0	1	1	0	0	0	4
All	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN (16)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
BN (13)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D (13)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
C (16)	0	0	0	0	2	2	1	0	0	1	2	0	1	0	6
All (82)	0	0	0	0	5	3	1	0	0	1	2	0	1	0	10

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	1	6	0	0	0	0	3	0	0	0	11
BN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D	0	0	0	0	2	5	1	0	0	0	1	0	0	0	9
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
All	0	0	0	0	1	2	0	0	0	0	1	0	0	0	4

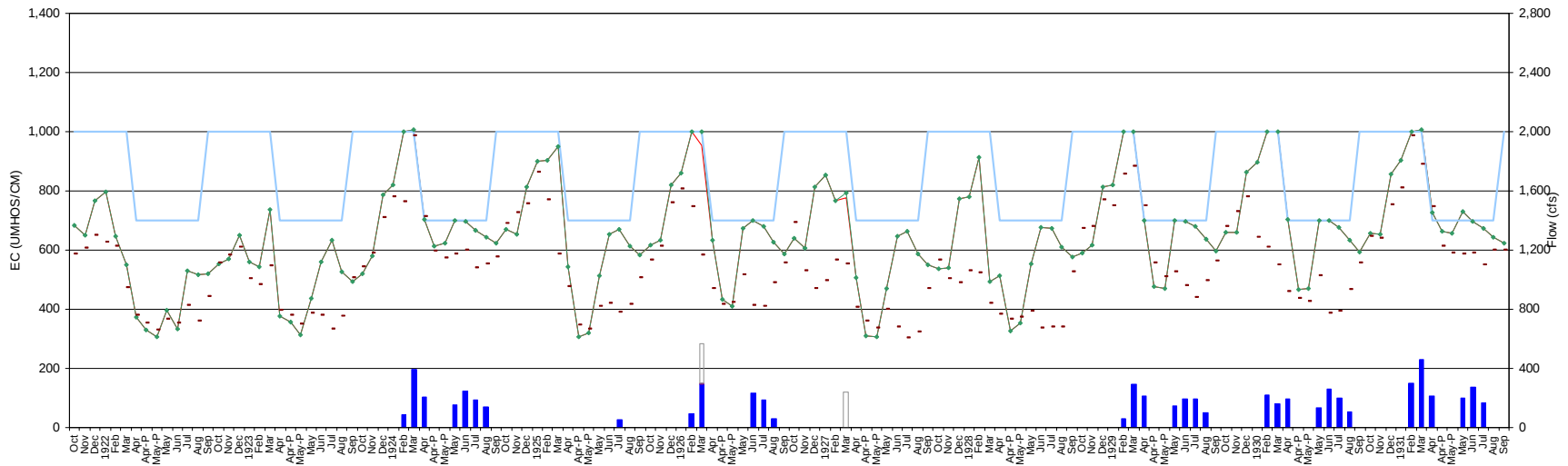
Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3
AN (16)	0	0	0	0	2	4	0	0	0	0	1	0	0	0	4
BN (13)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
D (13)	0	0	0	0	3	3	2	0	0	0	1	0	0	0	7
C (16)	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2
All (82)	0	0	0	0	7	9	3	0	0	0	4	0	0	0	18

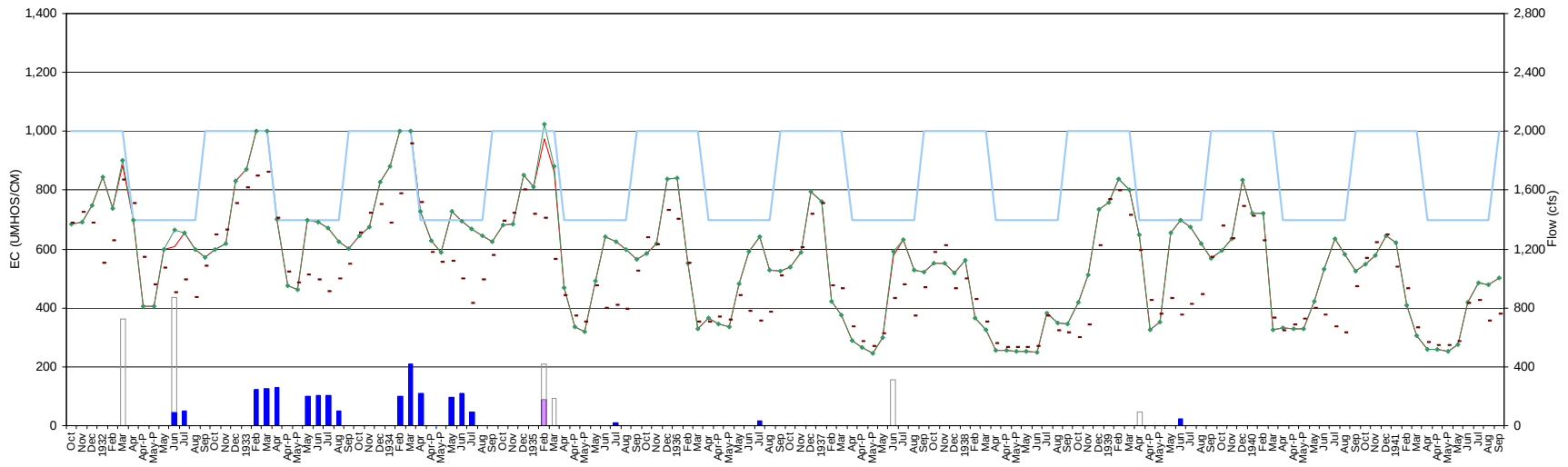
Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

San Joaquin River Quality and recirculation used to satisfy water quality standard

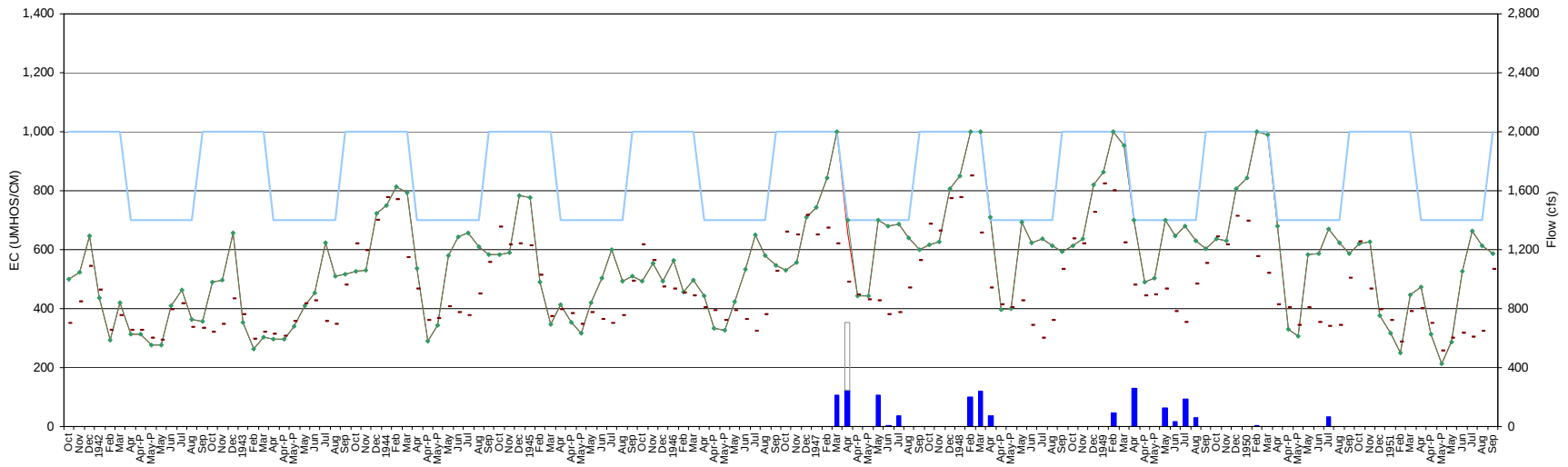
Water Year: 1922-1931



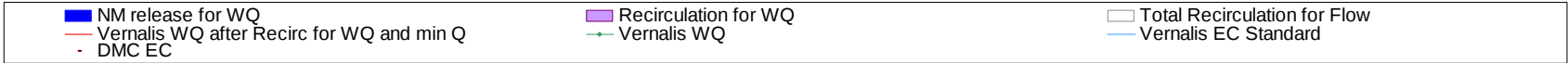
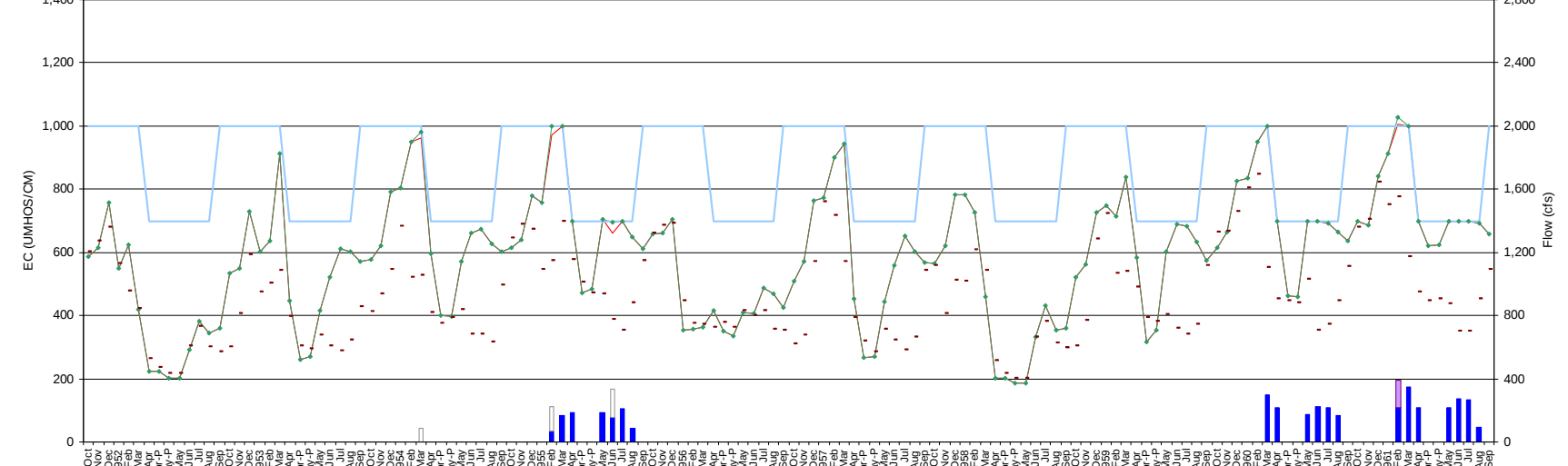
Water Year: 1932-1941



Water Year: 1942-1951



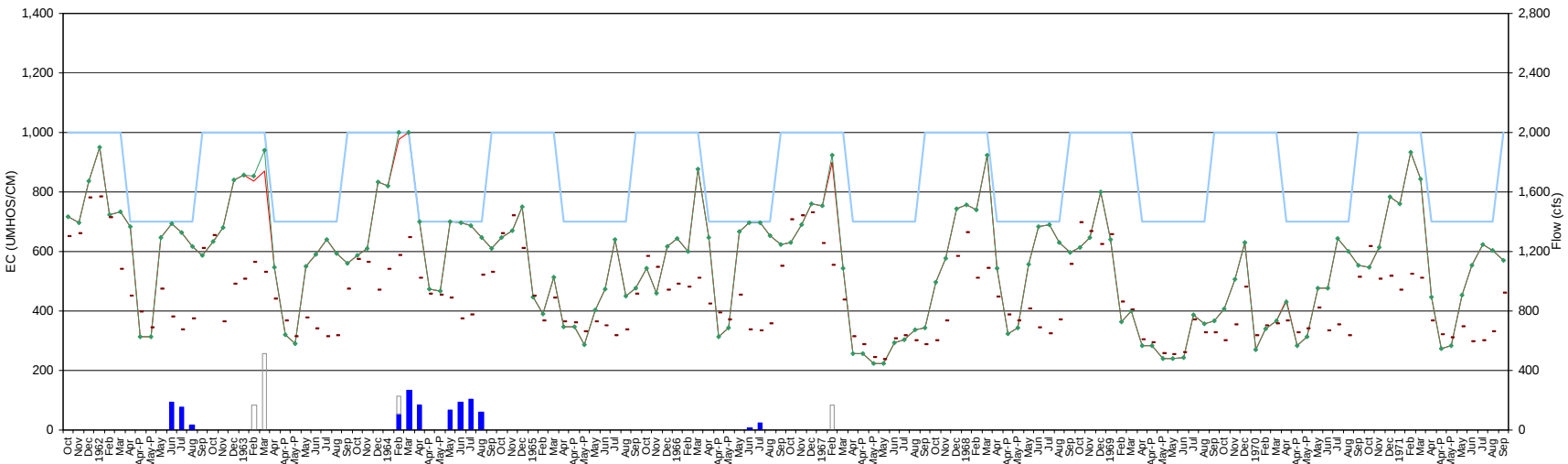
Water Year: 1952-1961



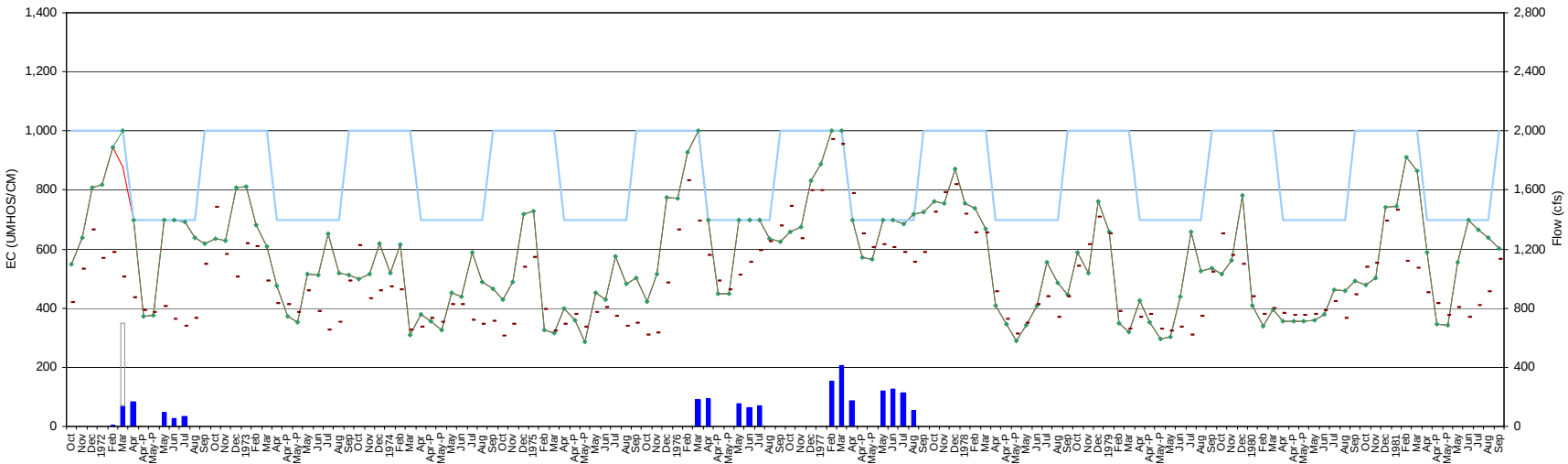
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-2. Alternative A1 Existing LOD

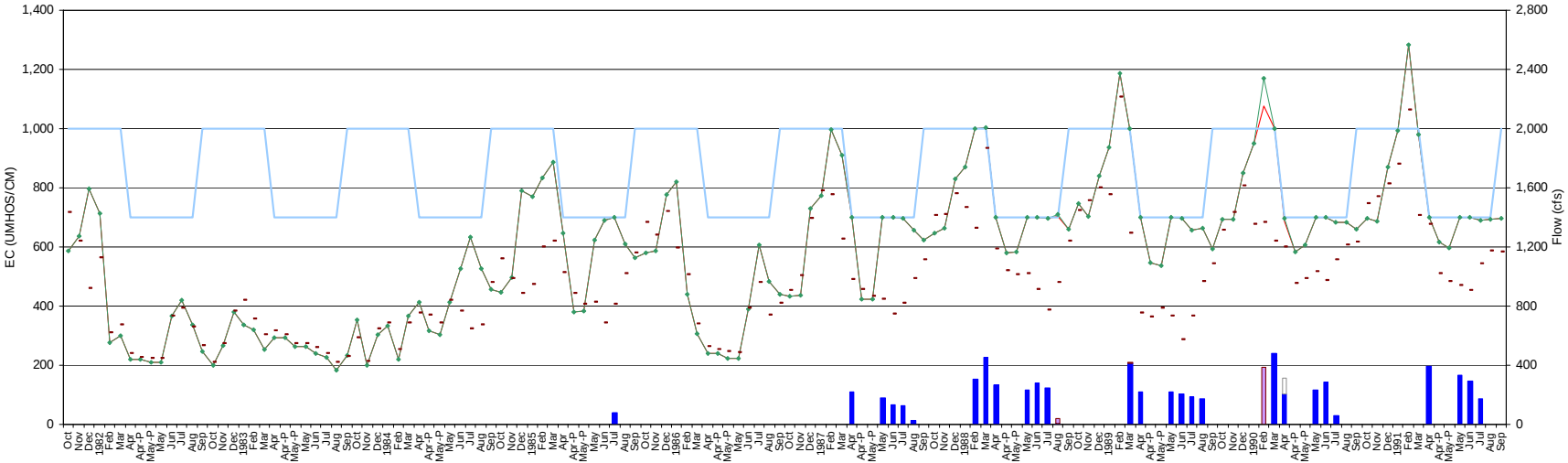
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



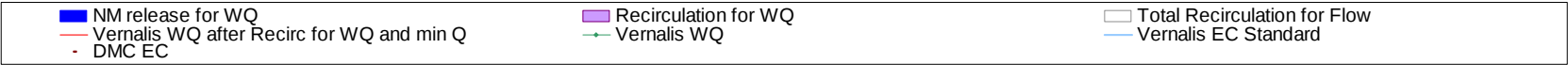
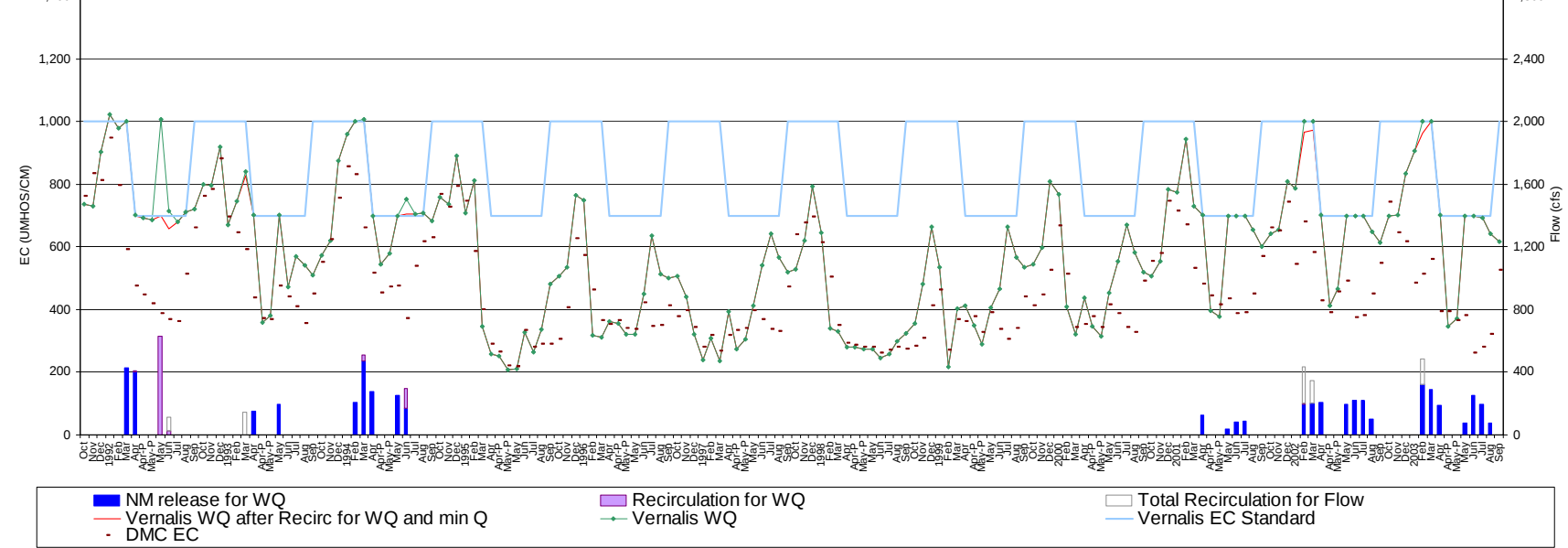
Water Year: 1972-1981



Water Year: 1982-1991



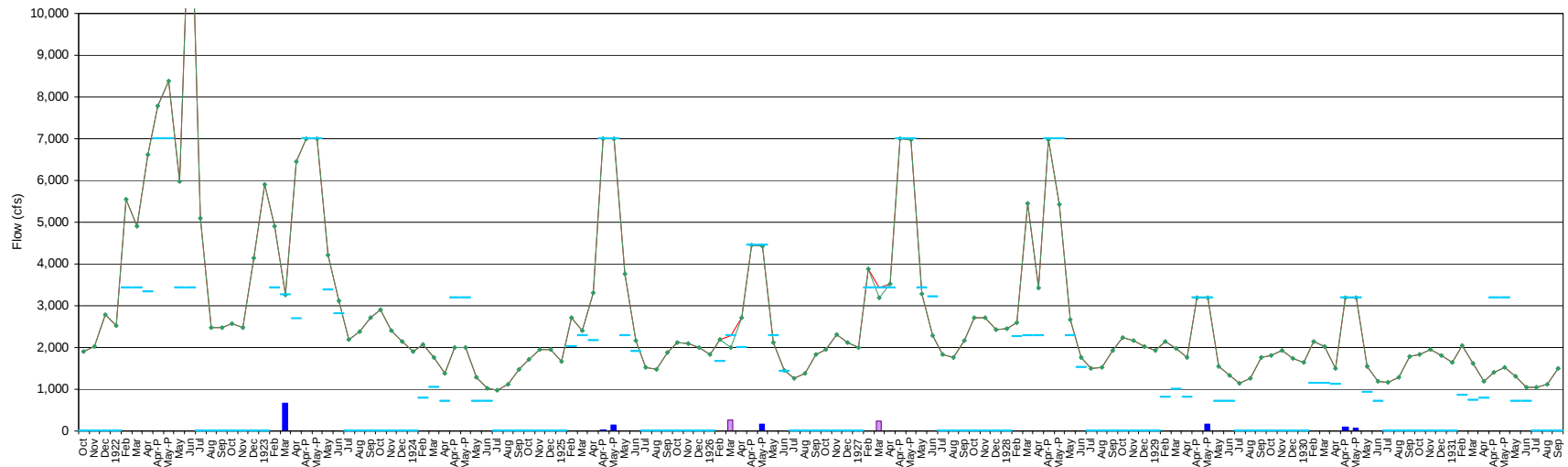
Water Year: 1992-2003



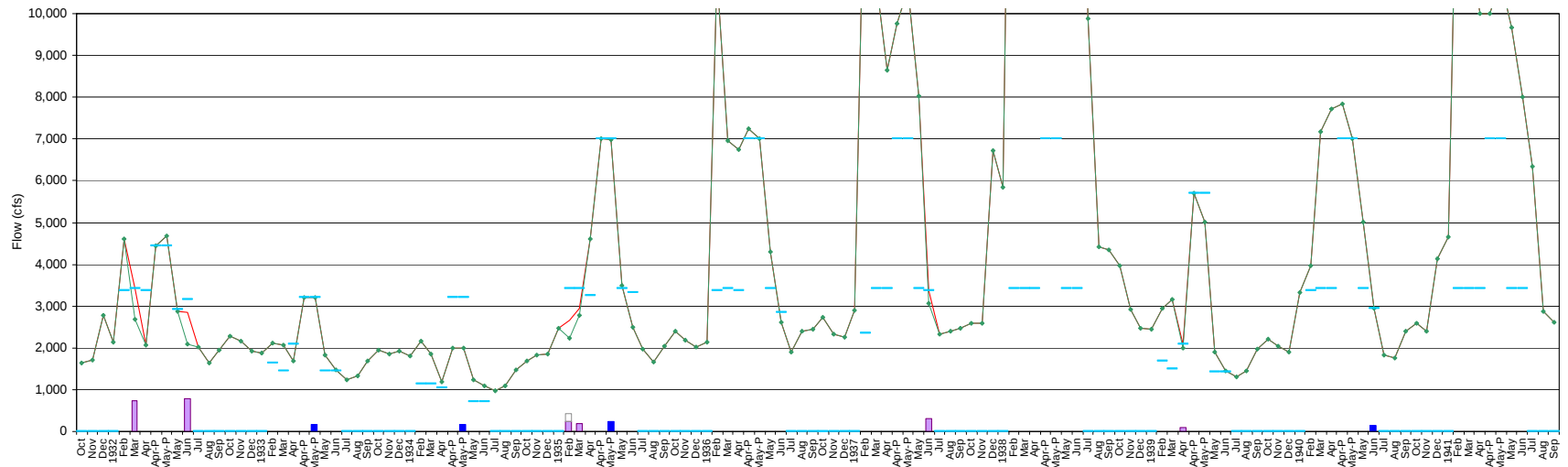
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-2. Alternative A1 Existing LOD (continued)

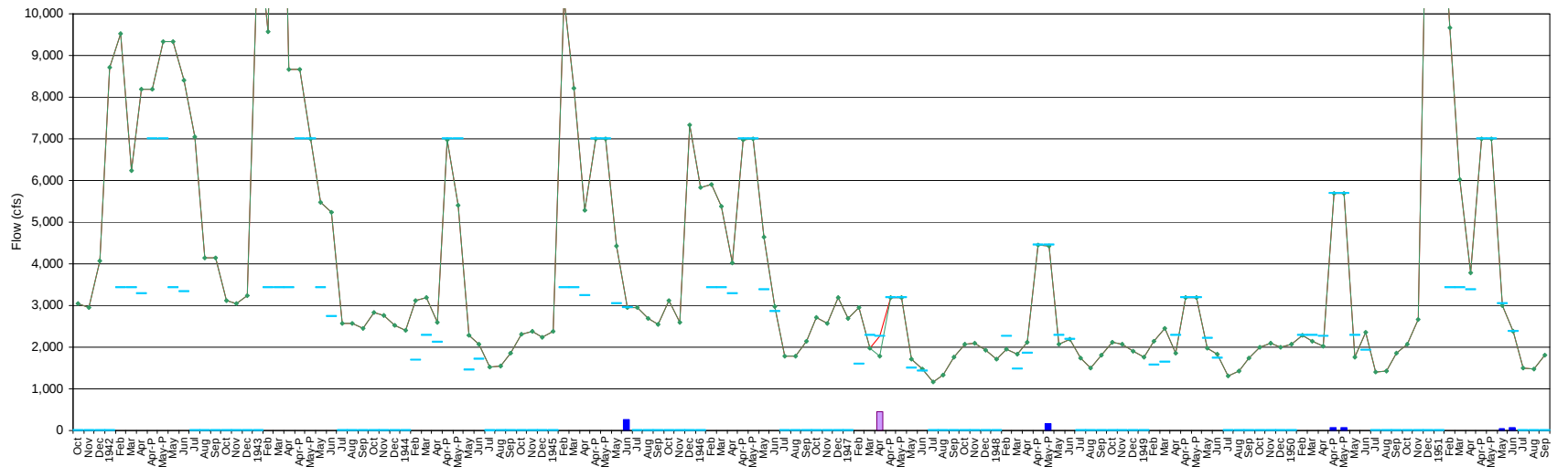
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



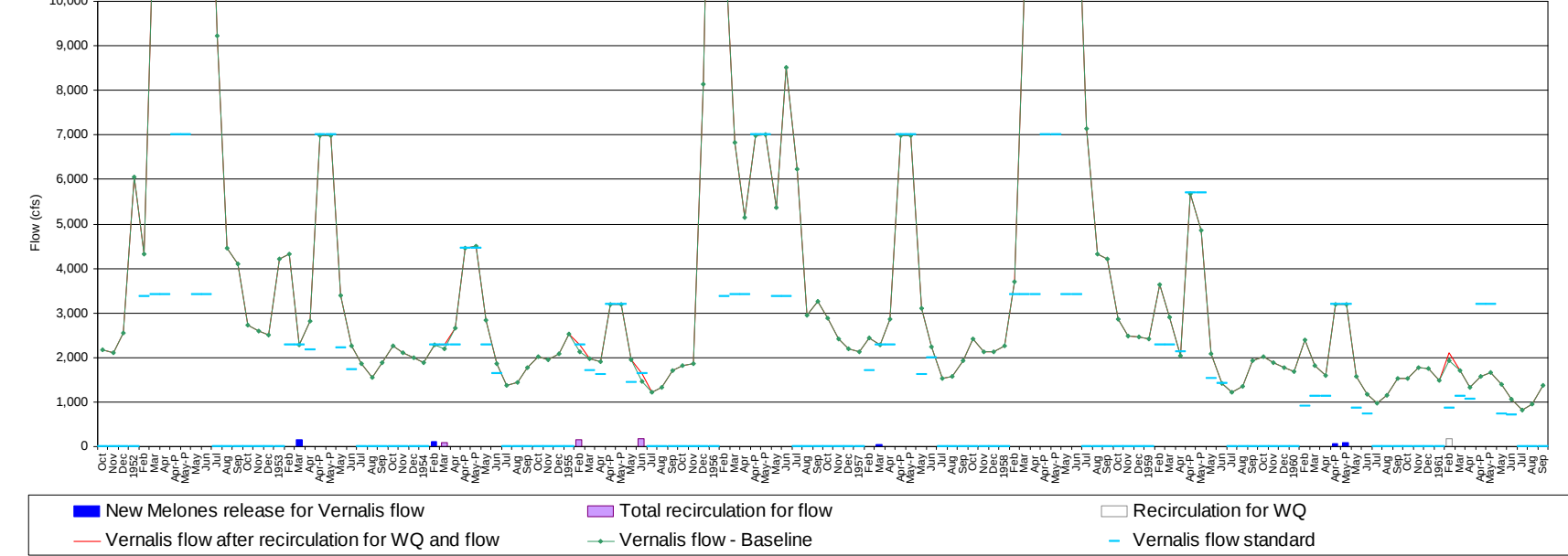
Water Year: 1932-1941



Water Year: 1942-1951



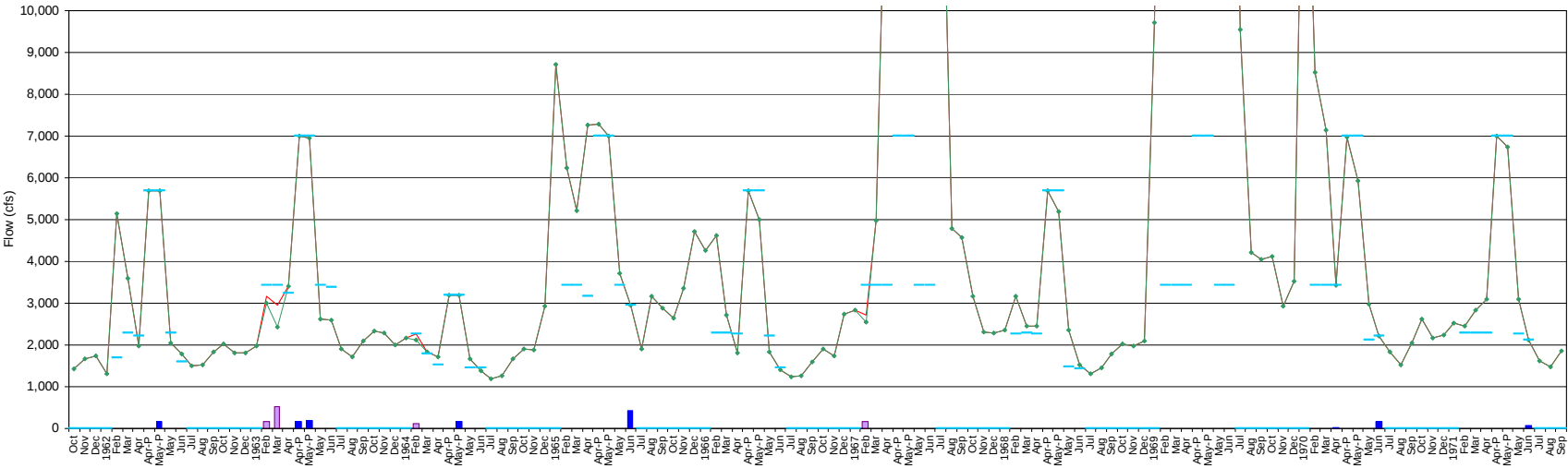
Water Year: 1952-1961



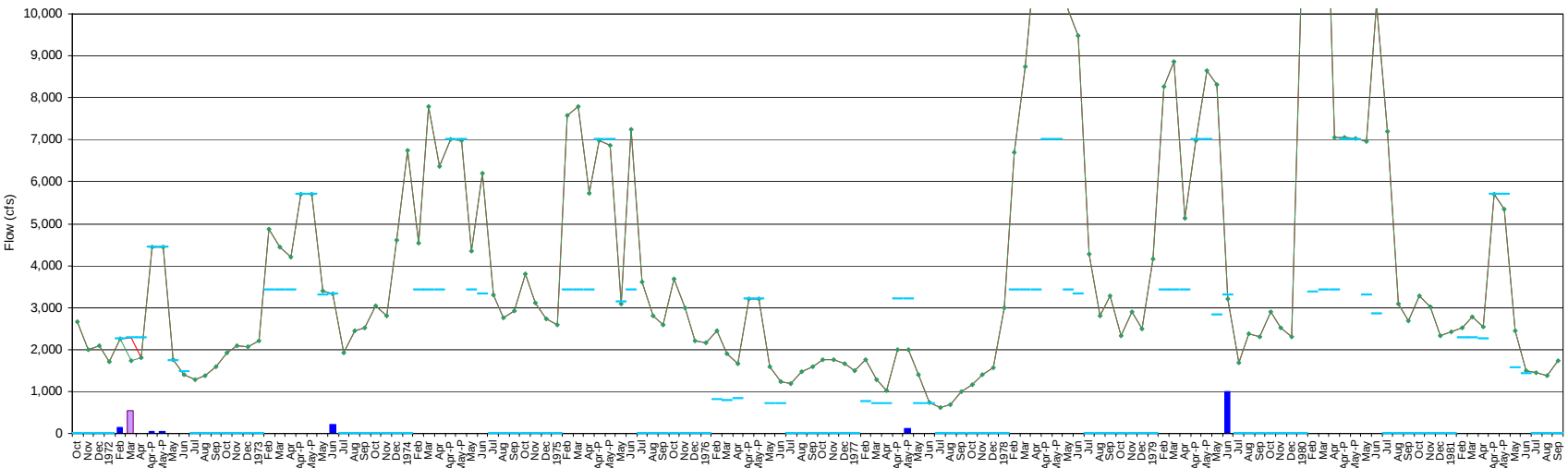
Key:
WQ = water quality

Figure A1-3. Alternative A1 Existing LOD

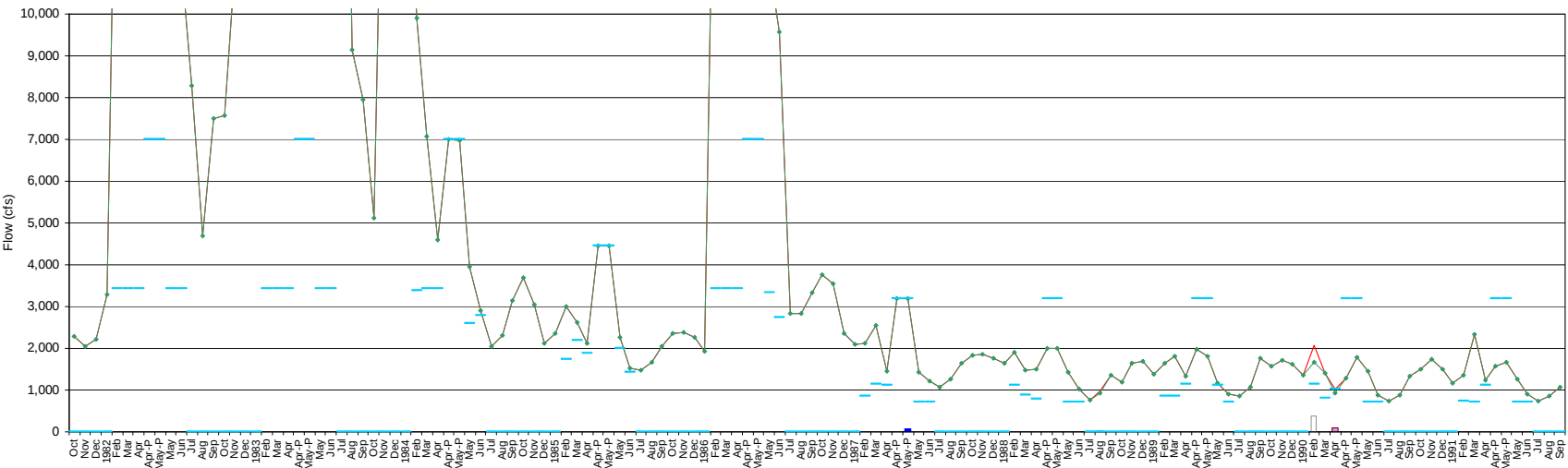
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



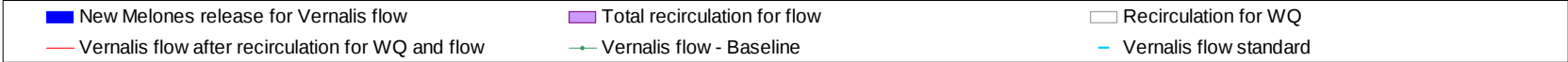
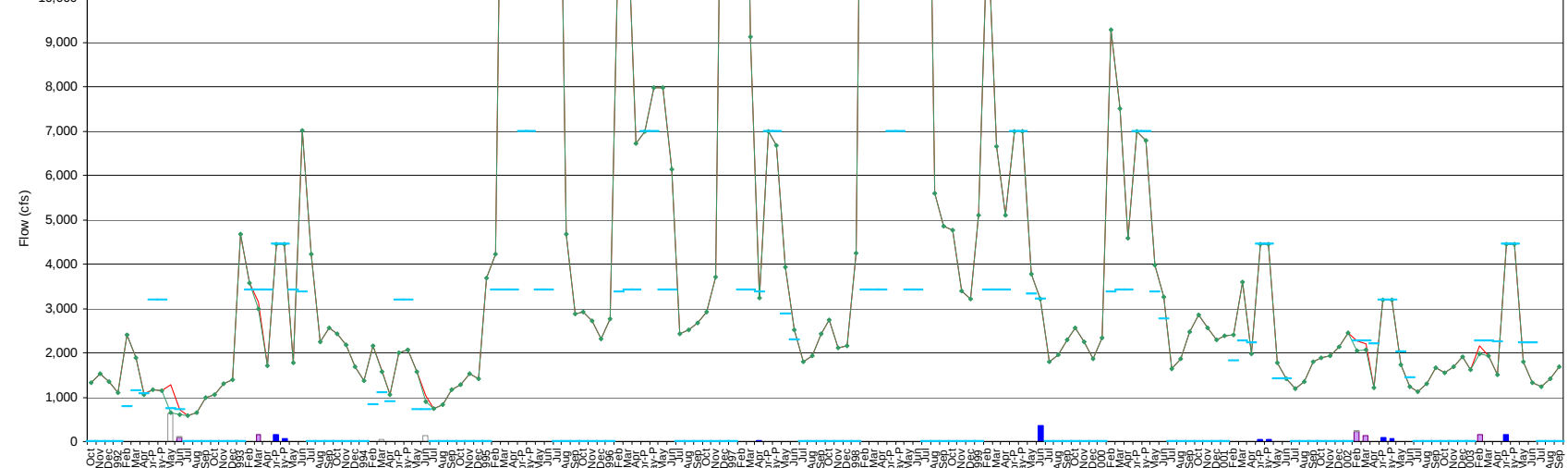
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-3. Alternative A1 Existing LOD (continued)

Table A1-2. Alternative A2 Existing LOD

Recirculation used prior to New Melones release using Jones PP excess capacity
1000 acre feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	2	6	0	0	0	0	3	0	0	0	11
BN	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
D	0	0	0	0	5	7	2	0	0	0	2	0	0	0	15
C	0	0	0	0	5	7	5	0	0	1	4	0	0	0	22
All	0	0	0	0	2	4	1	0	0	0	2	0	0	0	10

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	1	0	0	0	1	1	0	0	0	0	1	0	0	0	4
AN (16)	0	0	0	0	2	4	0	0	0	0	1	0	0	0	4
BN (13)	0	0	0	0	3	2	0	0	0	0	0	0	0	0	4
D (13)	0	0	0	0	4	3	2	0	0	0	3	2	0	0	8
C (16)	0	0	0	0	3	3	5	0	0	1	10	2	1	0	12
All (82)	1	0	0	0	13	13	7	0	0	1	15	4	1	0	32

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	13	0	0	0	9	9	0	0	0	0	19	0	0	0	13
AN	0	0	0	0	16	25	0	0	0	0	46	0	0	0	45
BN	0	0	0	0	5	4	0	0	0	0	0	0	0	0	6
D	0	0	0	0	16	30	11	0	0	0	7	2	0	0	25
C	0	0	0	0	26	37	15	0	0	20	7	2	2	0	30
All	13	0	0	0	15	25	14	0	0	20	10	2	2	0	25

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
AN	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
BN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D	0	0	0	0	5	5	1	0	0	0	2	0	0	0	13
C	0	0	0	0	5	7	5	0	0	1	4	0	0	0	22
All	0	0	0	0	2	2	1	0	0	0	1	0	0	0	7

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
AN (16)	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2
BN (13)	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
D (13)	0	0	0	0	4	3	1	0	0	0	3	2	0	0	7
C (16)	0	0	0	0	3	3	4	0	0	1	10	2	1	0	12
All (82)	1	0	0	0	10	6	5	0	0	1	14	4	1	0	24

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

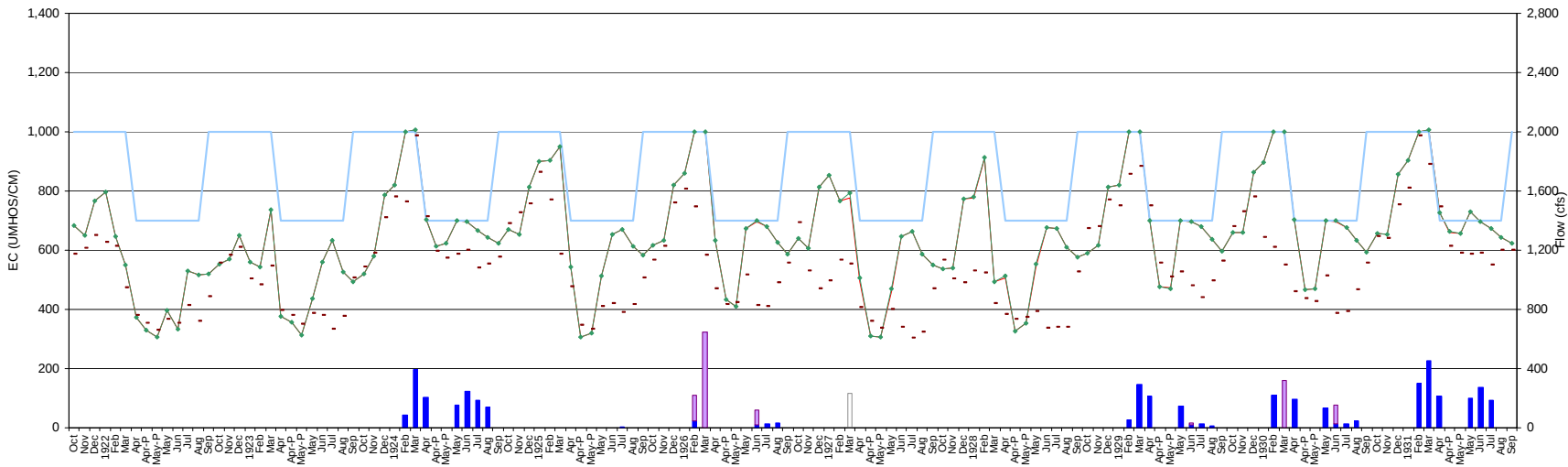
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	1	6	0	0	0	0	2	0	0	0	10
BN	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
D	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	0	0	0	0	0	2	0	0	0	0	1	0	0	0	3

Frequency of Occurrence

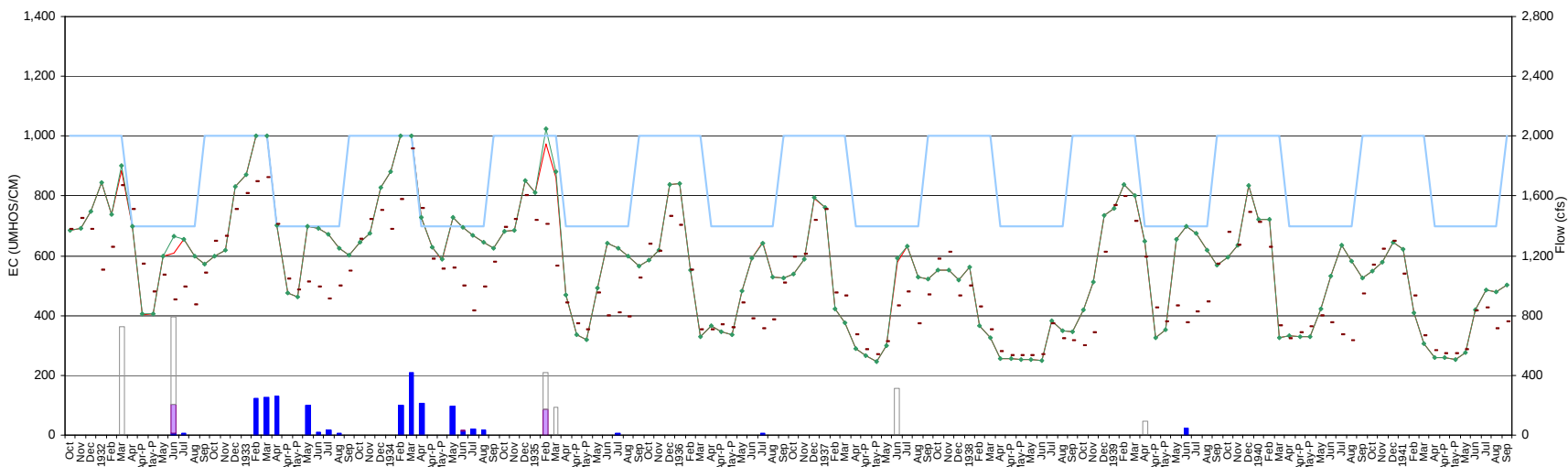
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3
AN (16)	0	0	0	0	2	4	0	0	0	0	1	0	0	0	4
BN (13)	0	0	0	0	1	2	0	0	0	0	0	0	0	0	2
D (13)	0	0	0	0	1	1	2	0	0	0	0	0	0	0	4
C (16)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
All (82)	0	0	0	0	5	8	3	0	0	0	2	0	0	0	14

Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

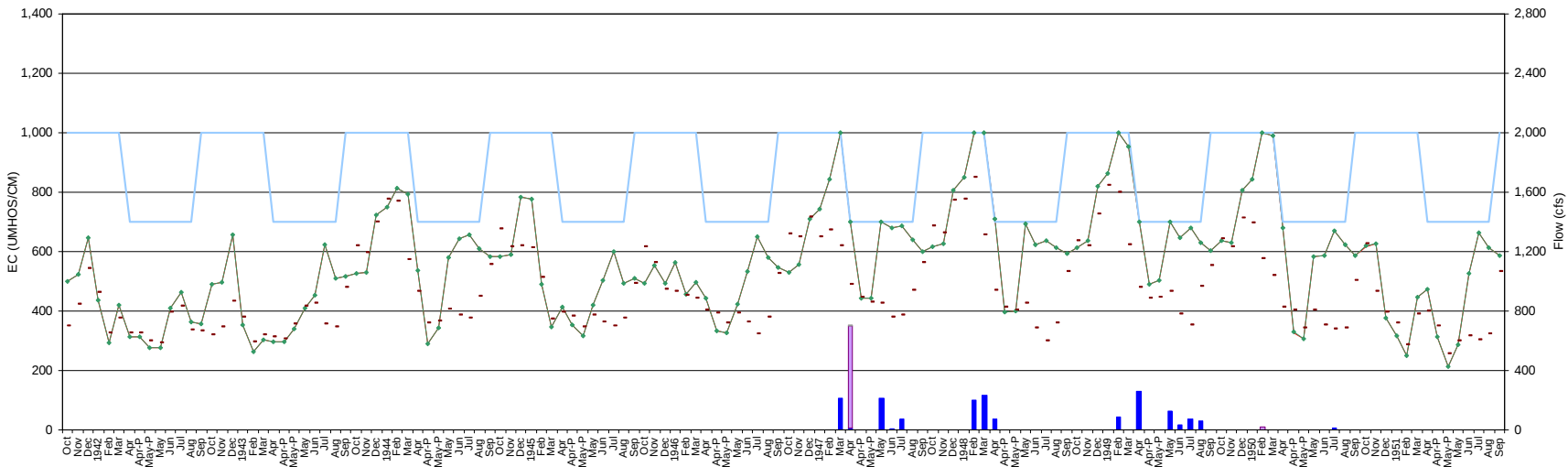
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1922-1931



Water Year: 1932-1941



Water Year: 1942-1951



Water Year: 1952-1961

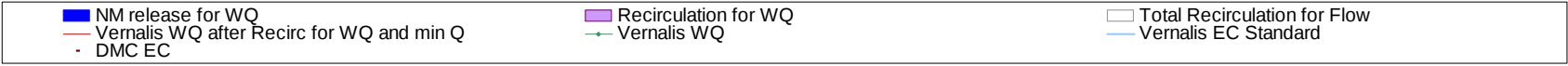
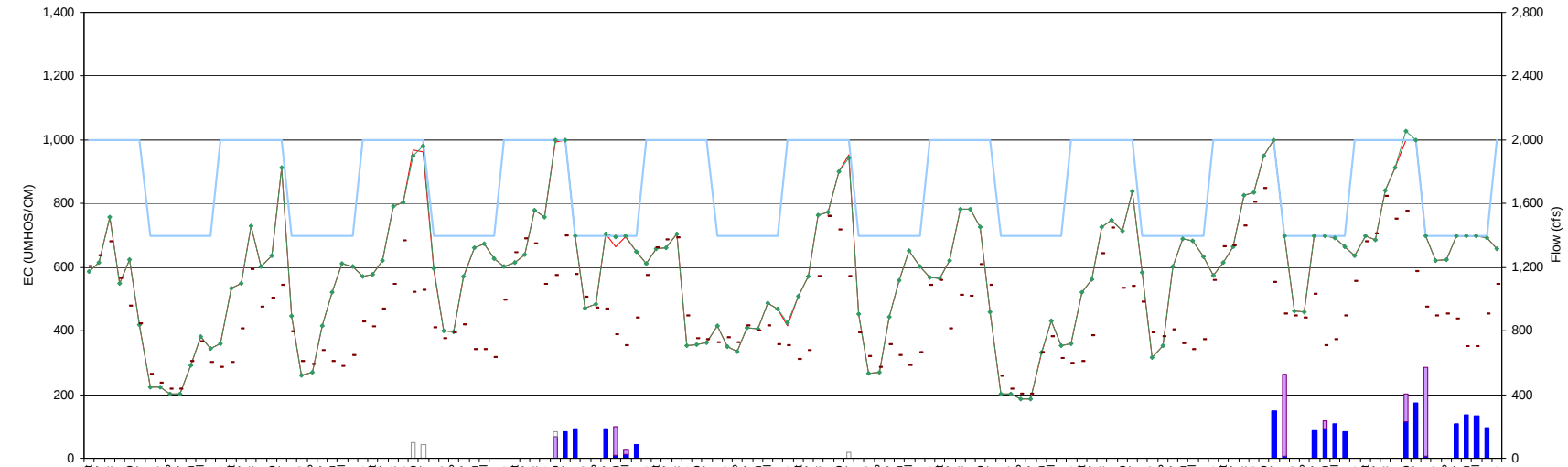
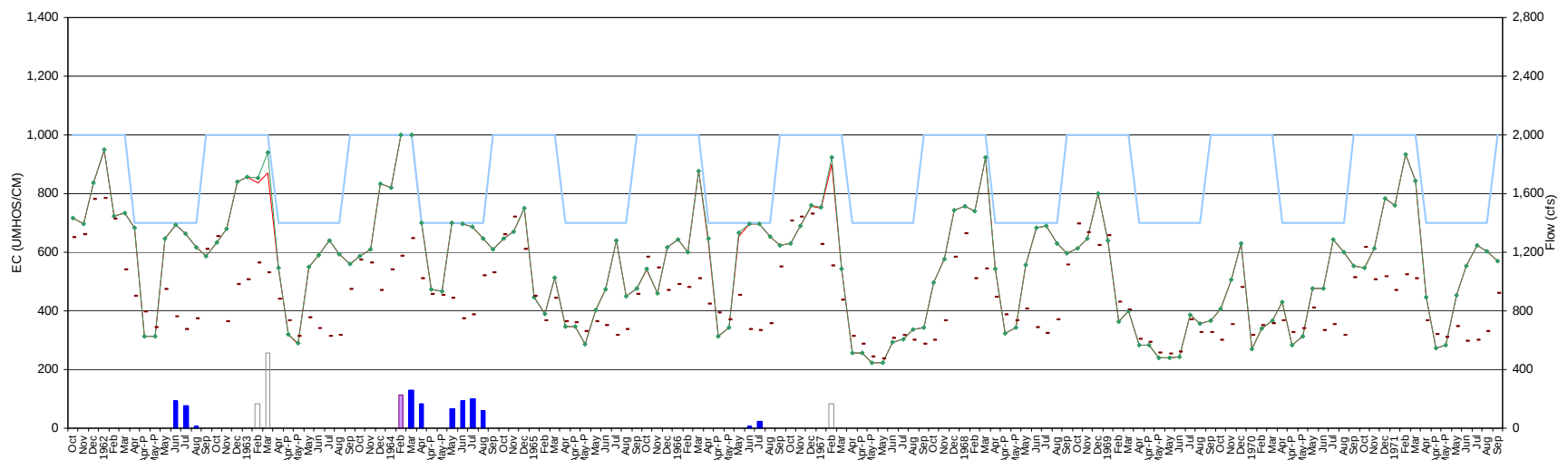
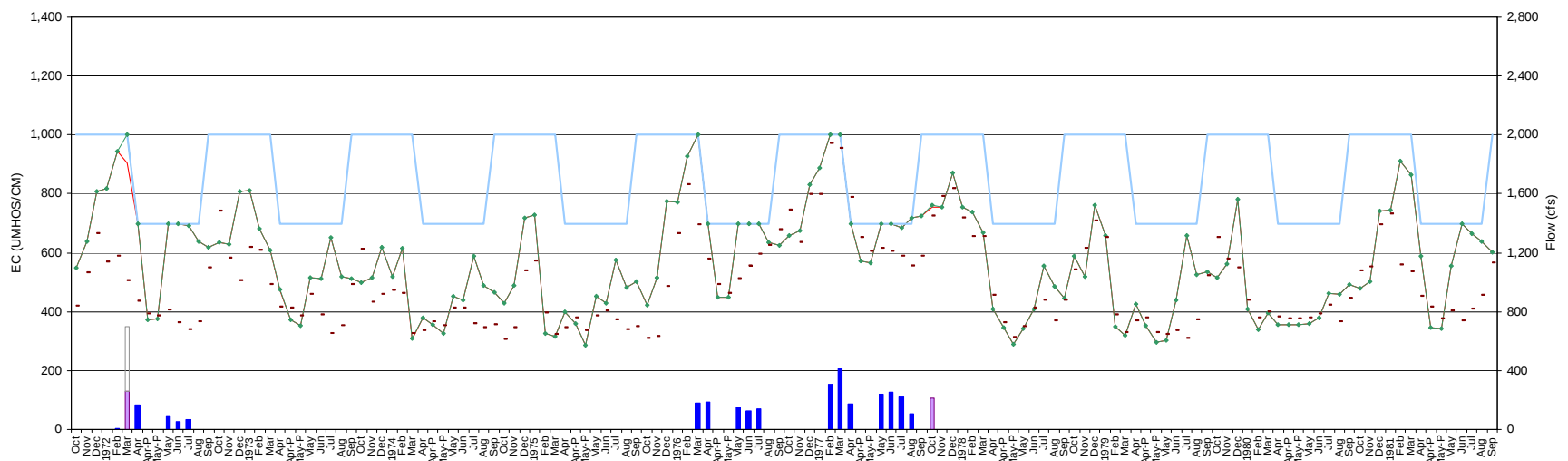


Figure A1-4. Alternative A2 Existing LOD

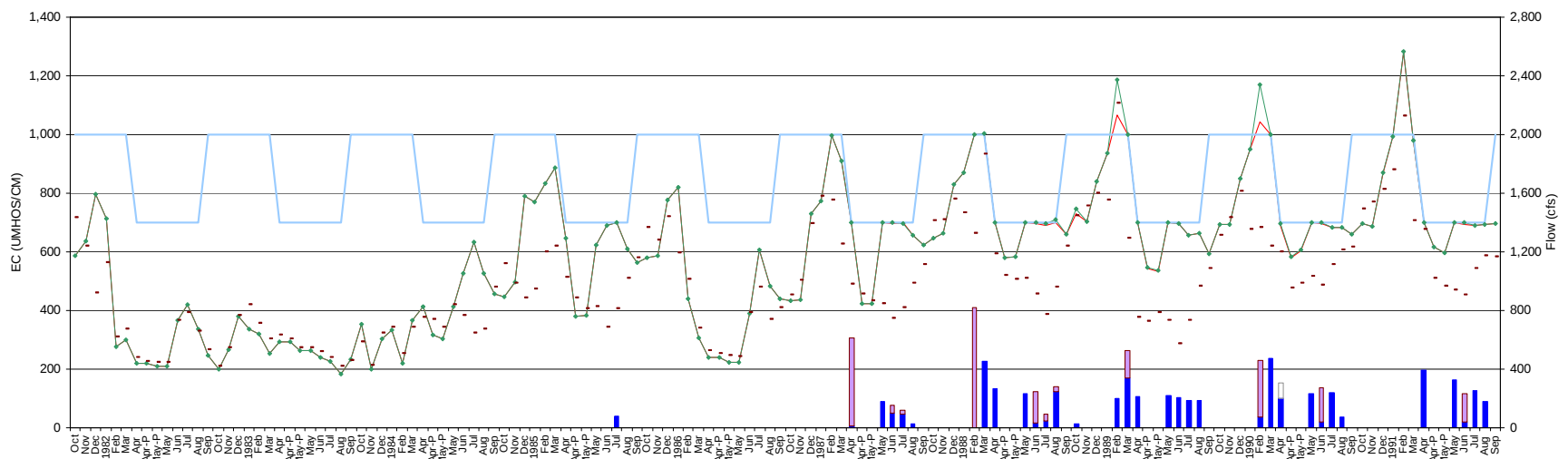
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



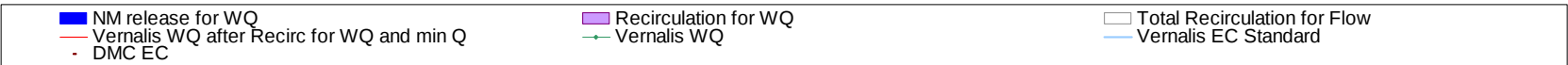
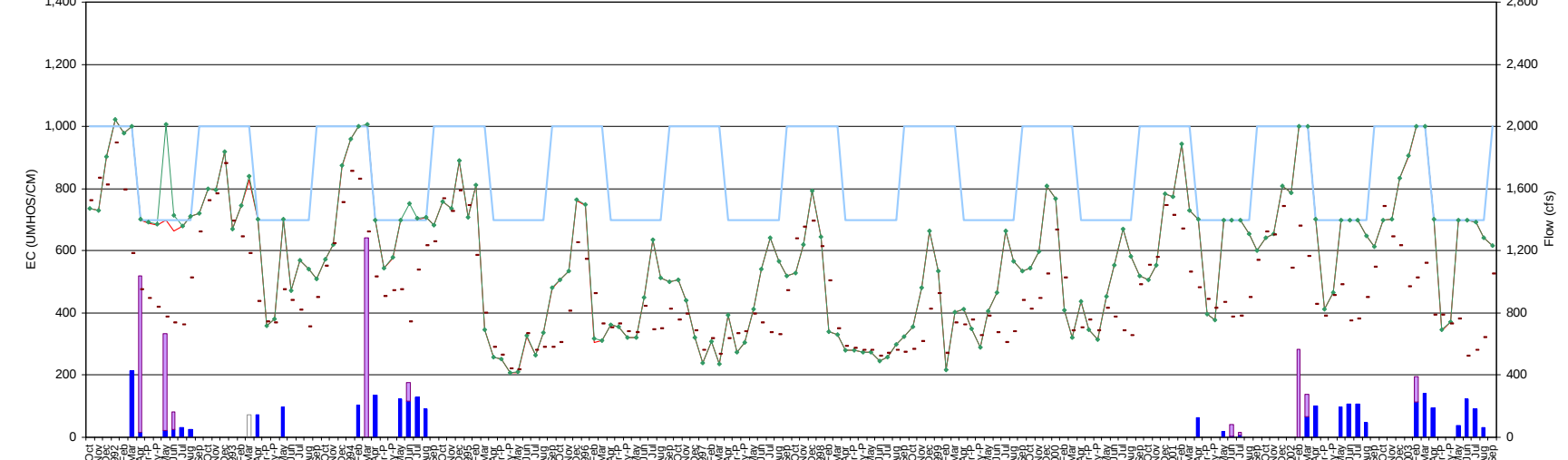
Water Year: 1972-1981



Water Year: 1982-1991



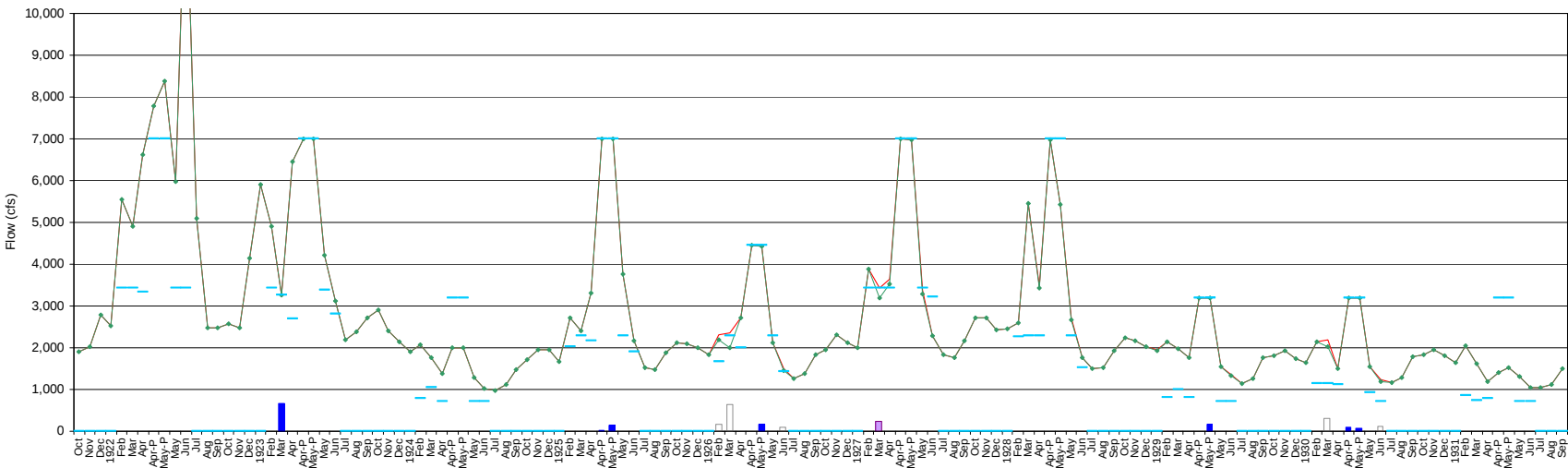
Water Year: 1992-2003



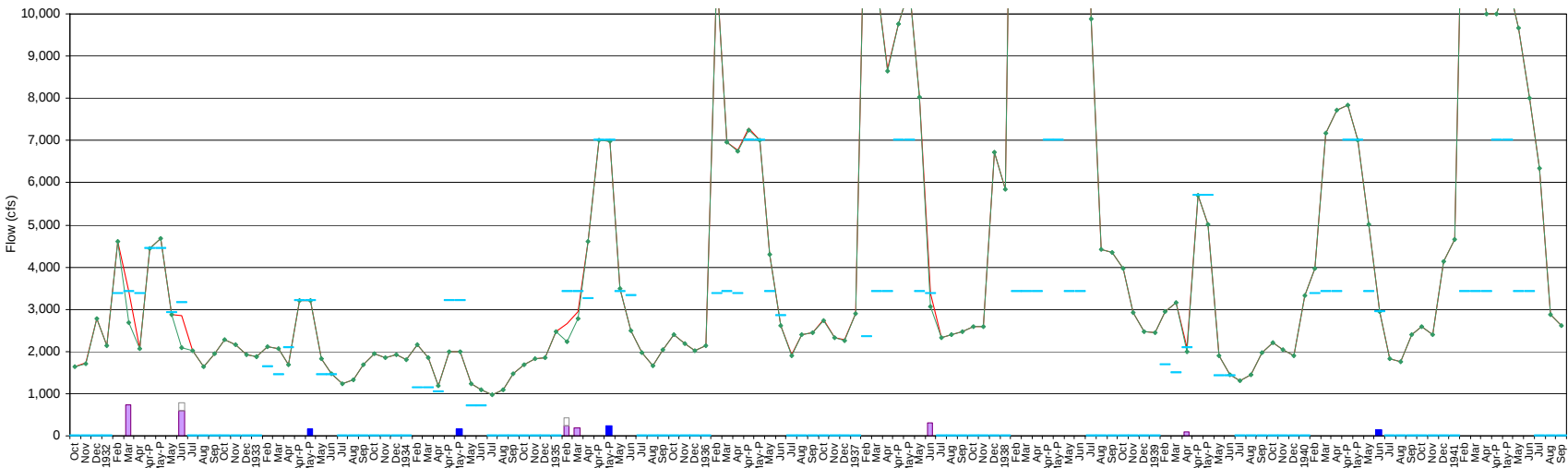
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-4. Alternative A2 Existing LOD (continued)

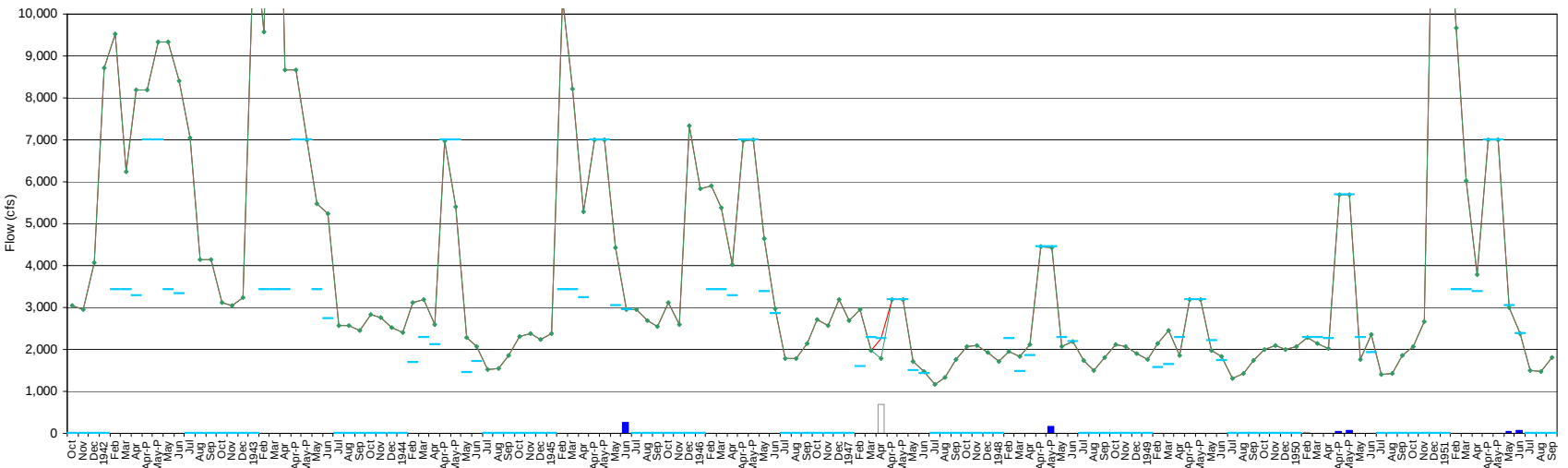
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



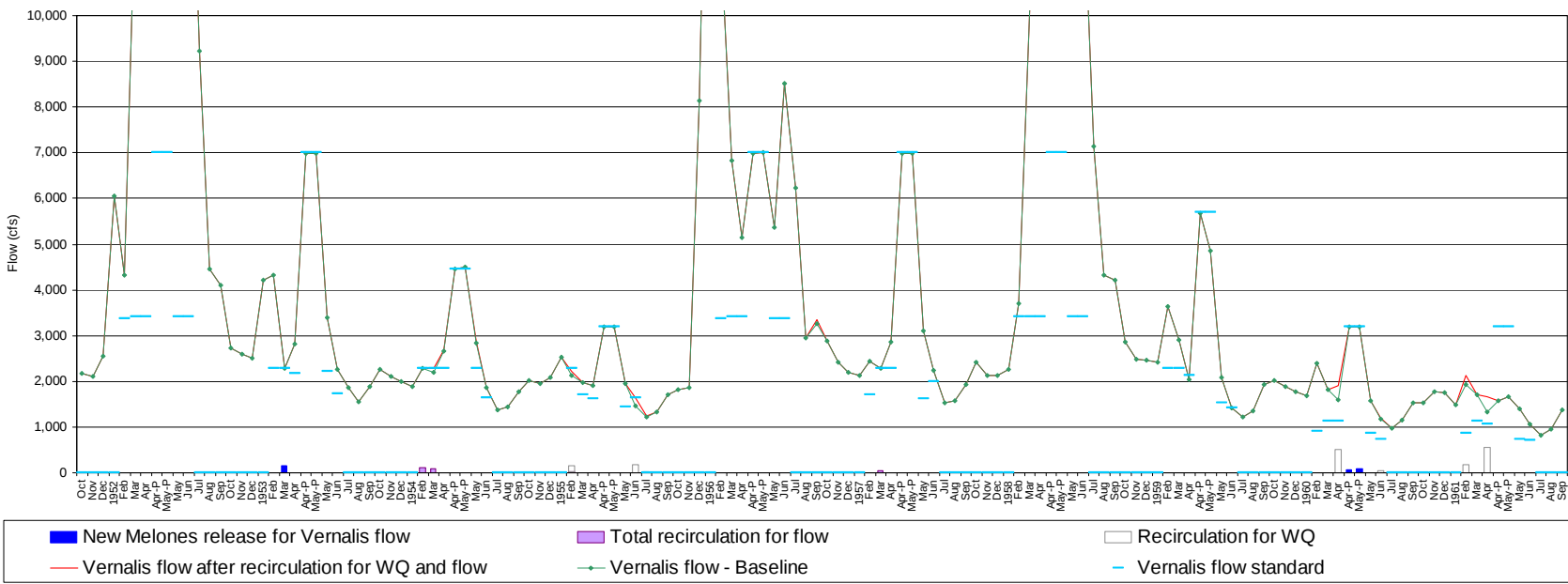
Water Year: 1932-1941



Water Year: 1942-1951



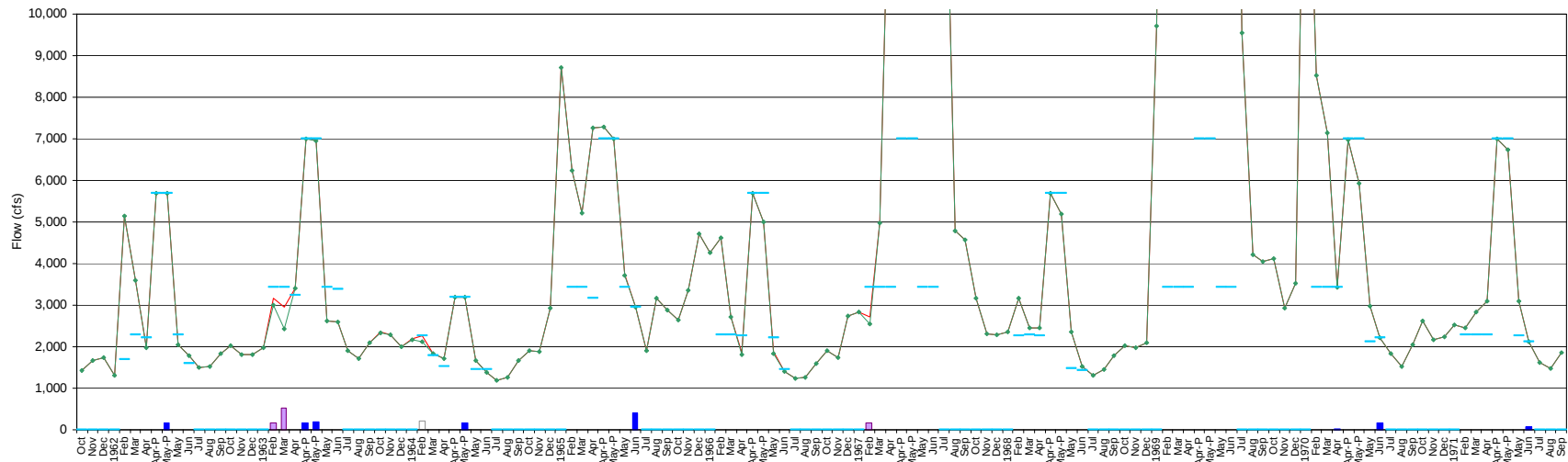
Water Year: 1952-1961



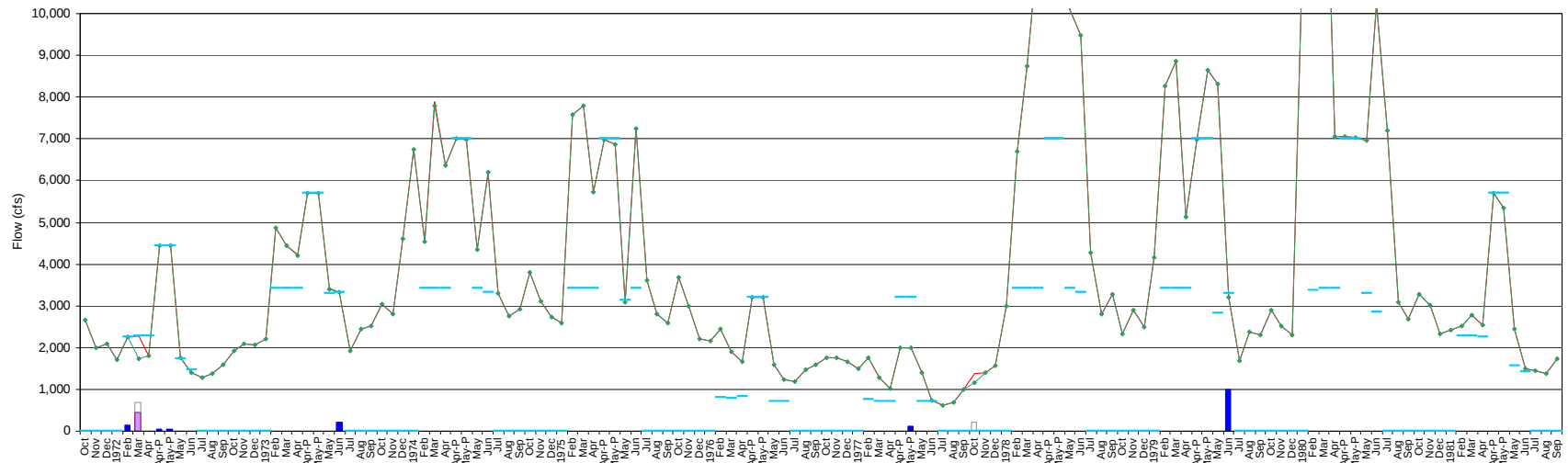
Key:
WQ = water quality

Figure A1-5. Alternative A2 Existing LOD

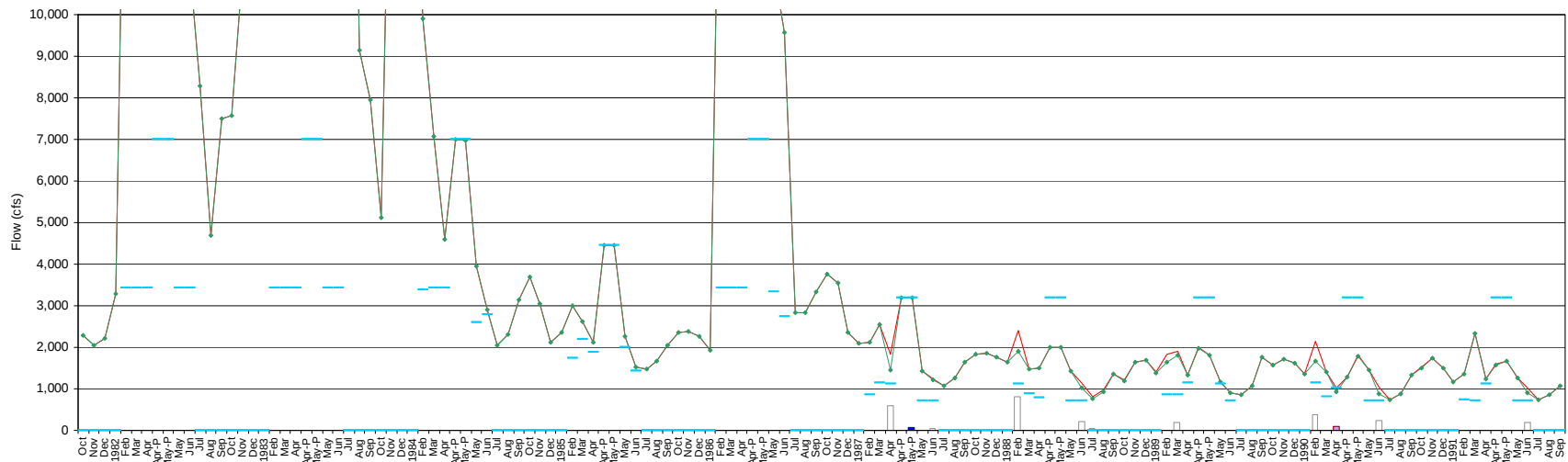
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



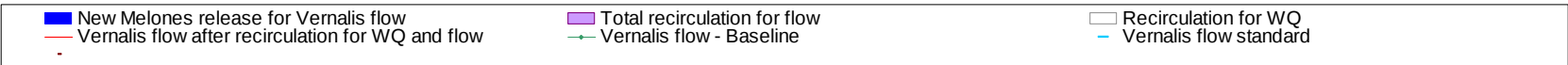
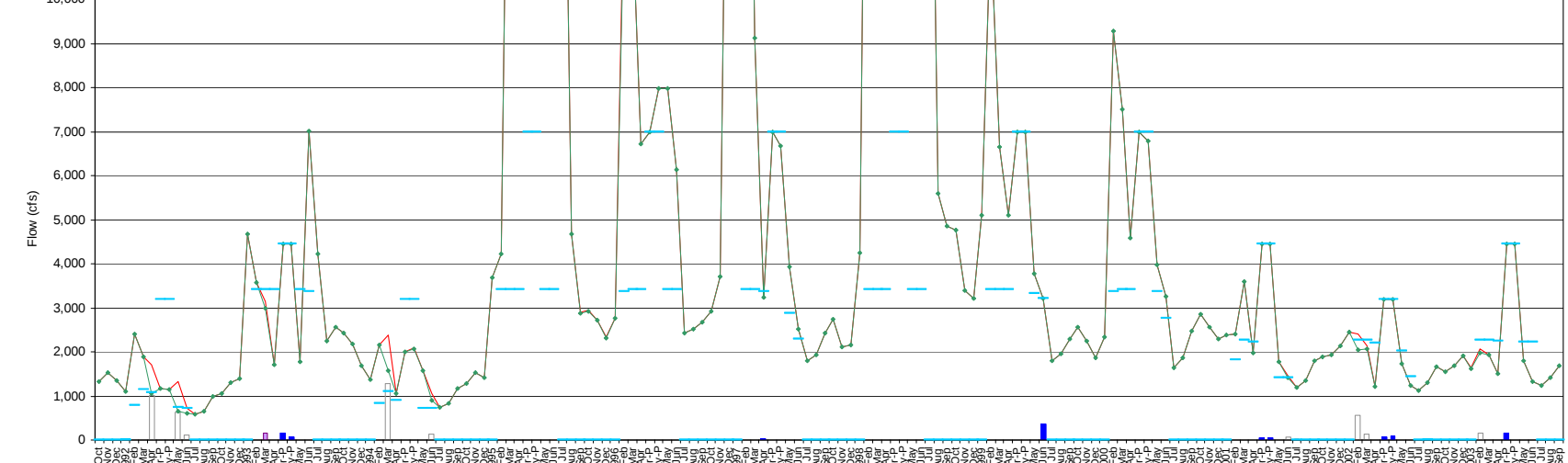
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-5. Alternative A2 Existing LOD (continued)

Table A1-3. Alternative B1 Existing LOD

Recirculation used supplemental to New Melones release using Jones PP and Banks excess capacity
1000 acre feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	2	10	0	0	0	0	12	0	0	0	24
BN	0	0	0	0	1	0	0	0	0	4	0	0	0	0	6
D	0	0	0	0	2	5	1	0	0	0	2	0	0	0	11
C	0	0	0	0	4	0	0	4	5	1	1	0	0	0	15
All	0	0	0	0	2	3	0	1	1	1	3	0	0	0	11

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3
AN (16)	0	0	0	0	2	4	0	0	0	2	6	0	0	0	6
BN (13)	0	0	0	0	1	1	0	0	0	5	0	0	0	0	7
D (13)	0	0	0	0	3	3	2	0	2	1	2	0	0	0	7
C (16)	0	0	0	0	2	2	2	7	7	1	2	0	1	0	11
All (82)	0	0	0	0	9	11	4	7	9	9	11	0	1	0	34

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	9	26	0	0	0	0	19	0	0	0	18
AN	0	0	0	0	16	38	0	0	0	3	32	0	0	0	64
BN	0	0	0	0	16	5	0	0	0	10	0	0	0	0	10
D	0	0	0	0	10	21	8	0	0	5	12	0	0	0	20
C	0	0	0	0	30	1	2	8	11	20	7	0	2	0	21
All	0	0	0	0	16	23	5	8	9	9	23	0	2	0	26

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
BN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	4	0	0	0	0	1	1	0	0	0	6
All	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN (16)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
BN (13)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D (13)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
C (16)	0	0	0	0	2	2	1	0	0	1	2	0	1	0	6
All (82)	0	0	0	0	5	3	1	0	0	1	2	0	1	0	10

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	1	10	0	0	0	0	12	0	0	0	23
BN	0	0	0	0	1	0	0	0	0	4	0	0	0	0	6
D	0	0	0	0	2	5	1	0	0	0	2	0	0	0	11
C	0	0	0	0	0	0	0	4	5	0	0	0	0	0	9
All	0	0	0	0	1	3	0	1	1	1	3	0	0	0	9

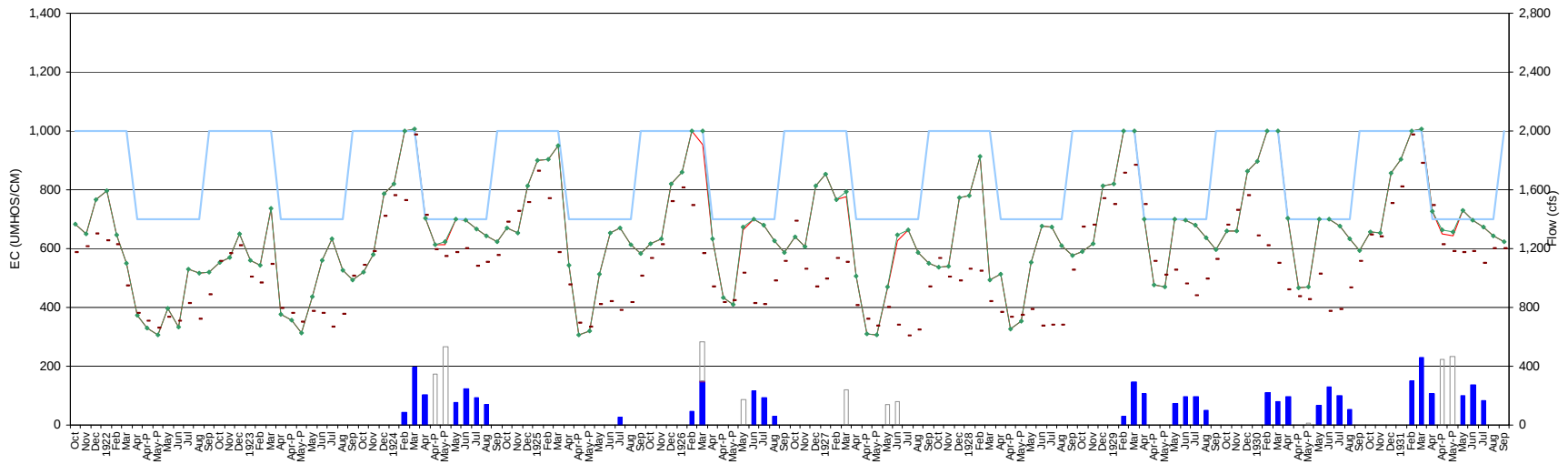
Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3
AN (16)	0	0	0	0	2	4	0	0	0	2	6	0	0	0	6
BN (13)	0	0	0	0	1	1	0	0	0	5	0	0	0	0	7
D (13)	0	0	0	0	3	3	2	0	2	1	2	0	0	0	7
C (16)	0	0	0	0	0	0	1	7	7	0	1	0	0	0	10
All (82)	0	0	0	0	7	9	3	7	9	8	10	0	0	0	33

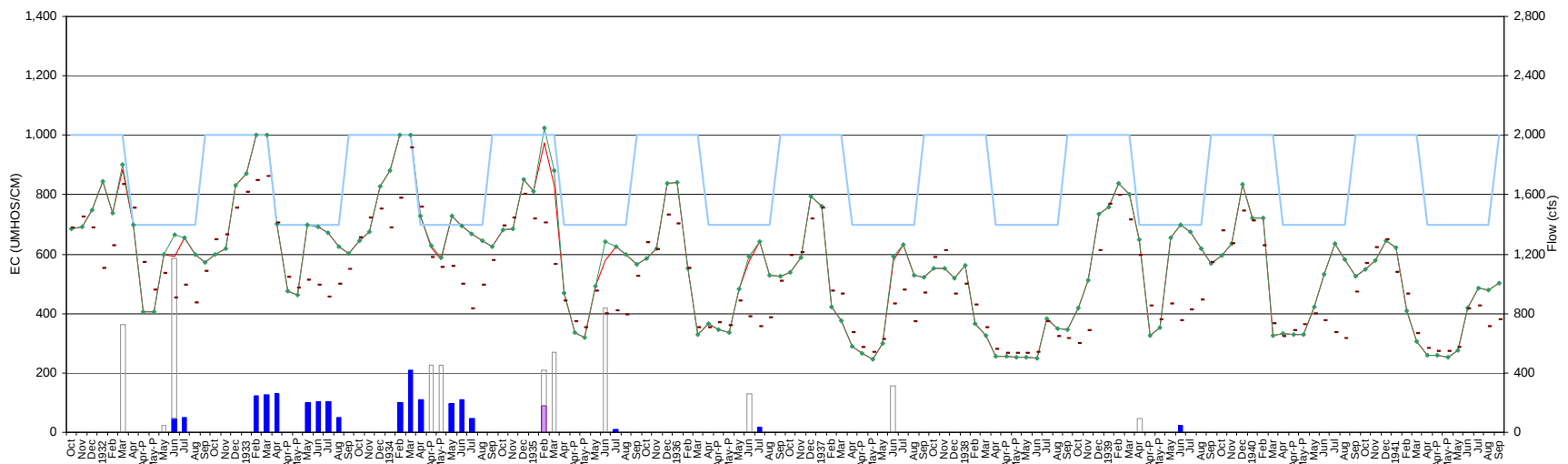
Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

San Joaquin River Quality and recirculation used to satisfy water quality standard

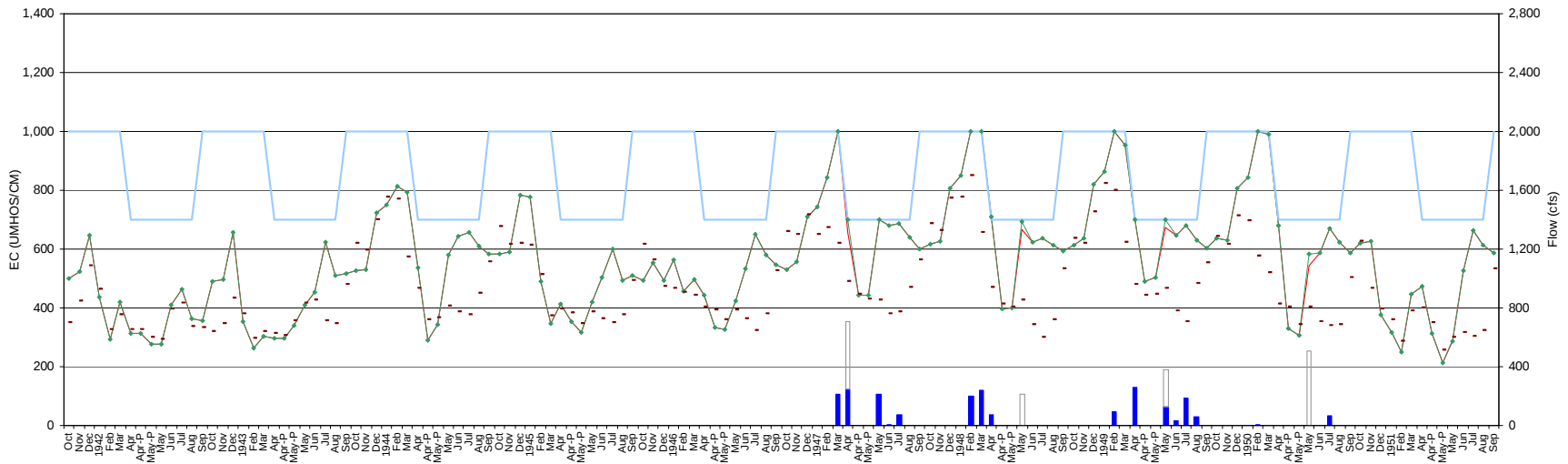
Water Year: 1922-1931



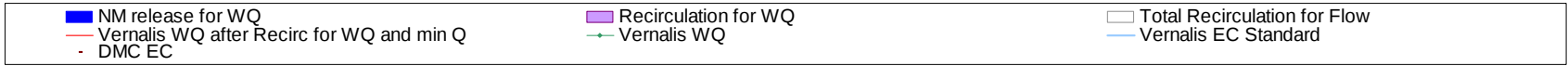
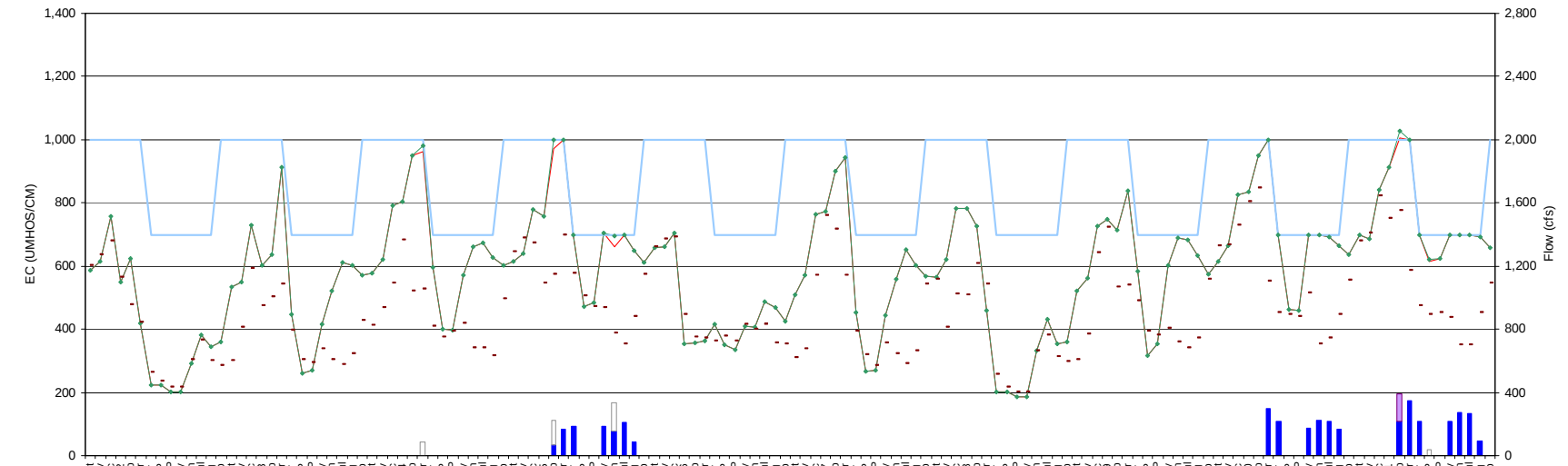
Water Year: 1932-1941



Water Year: 1942-1951



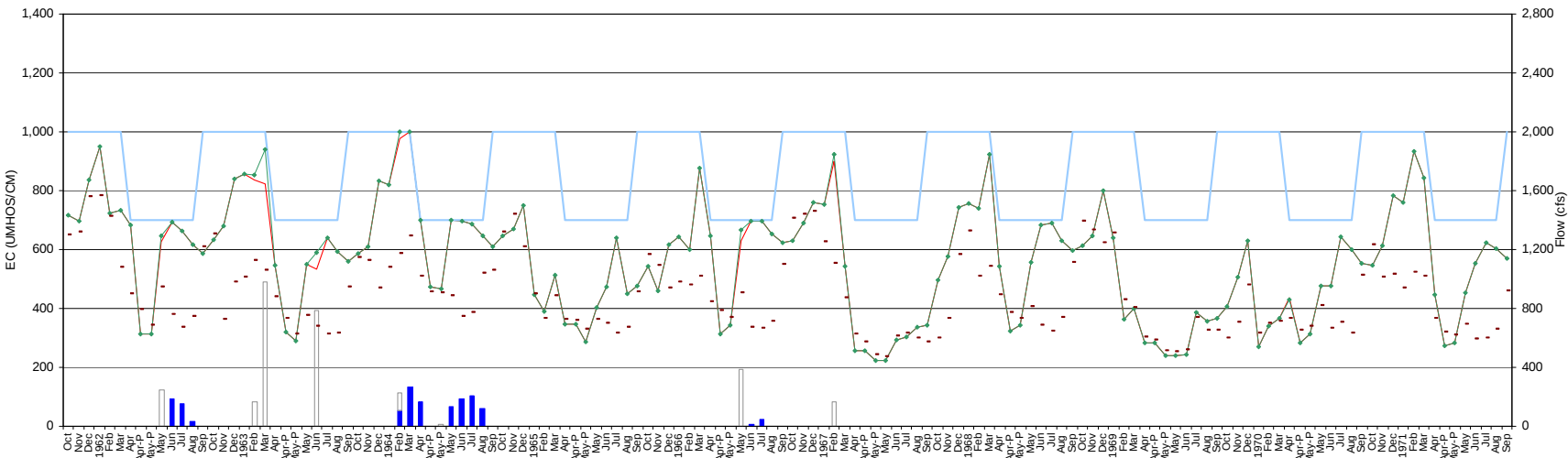
Water Year: 1952-1961



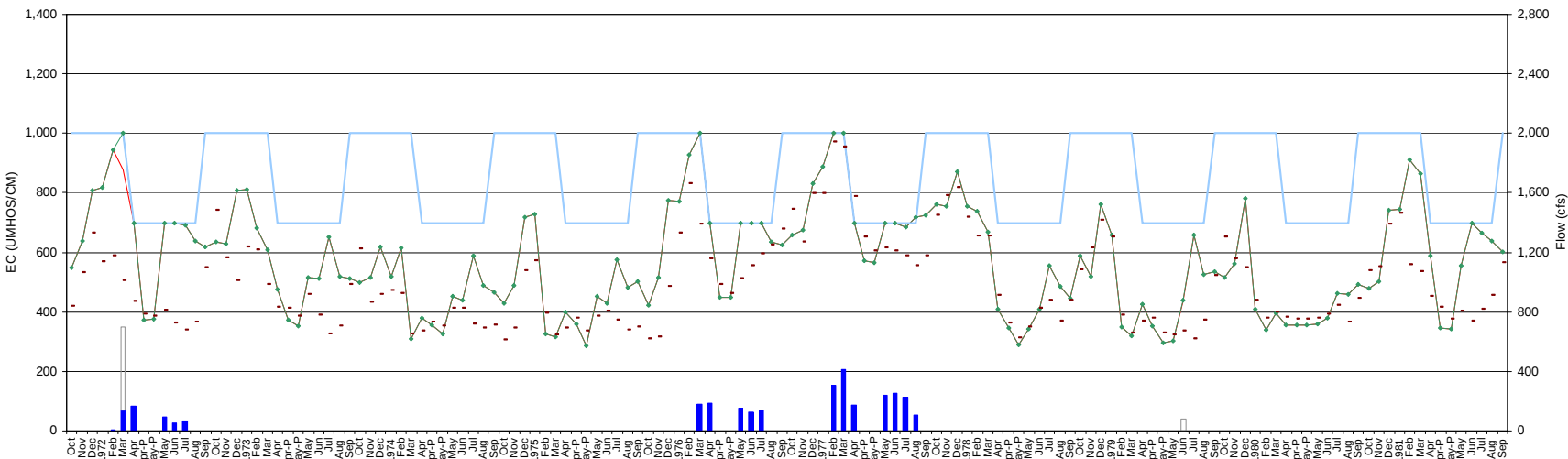
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-6. Alternative B1 Existing LOD

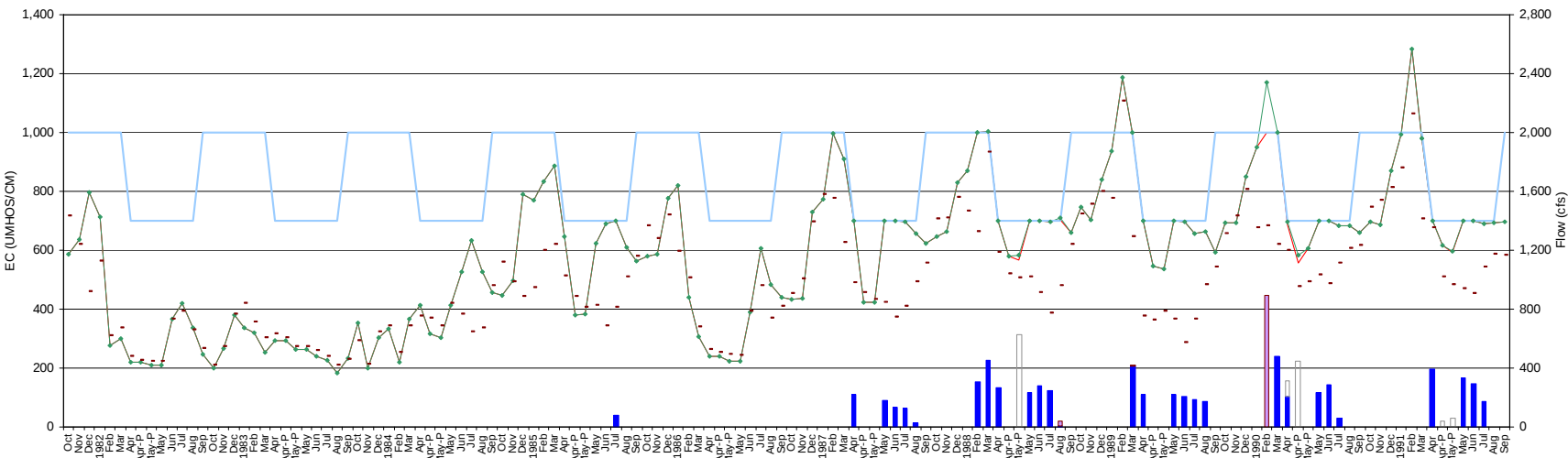
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



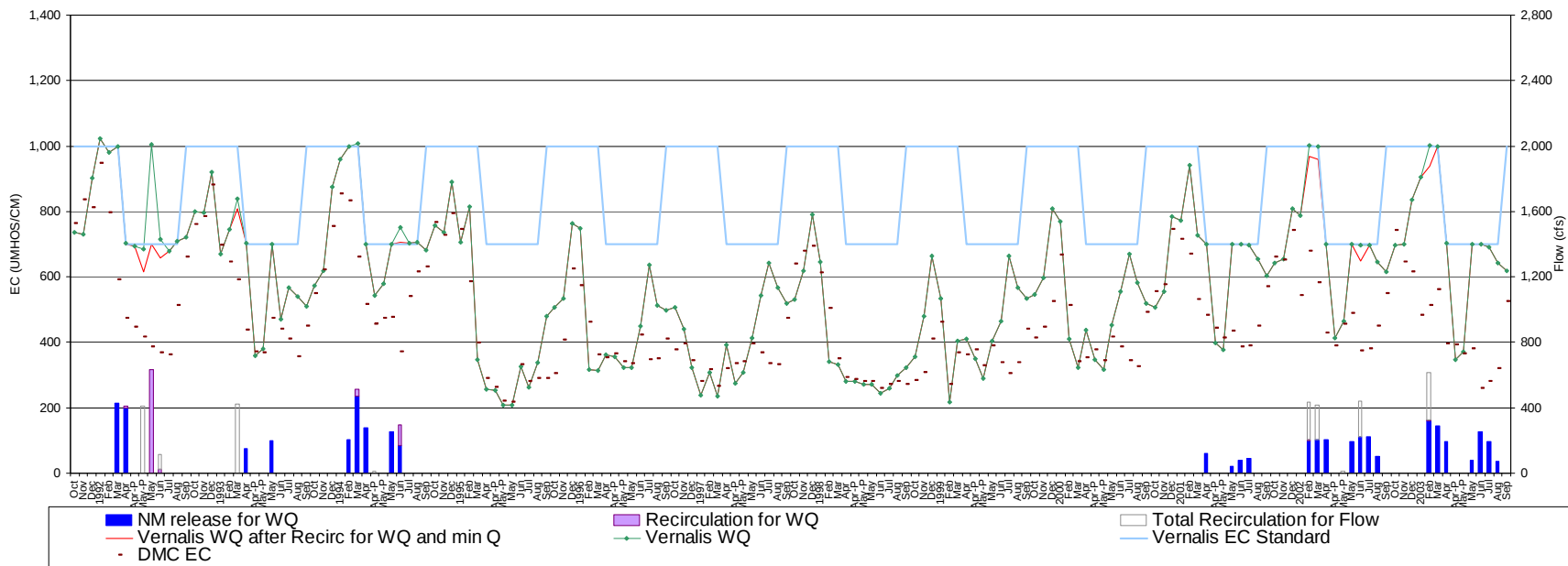
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003

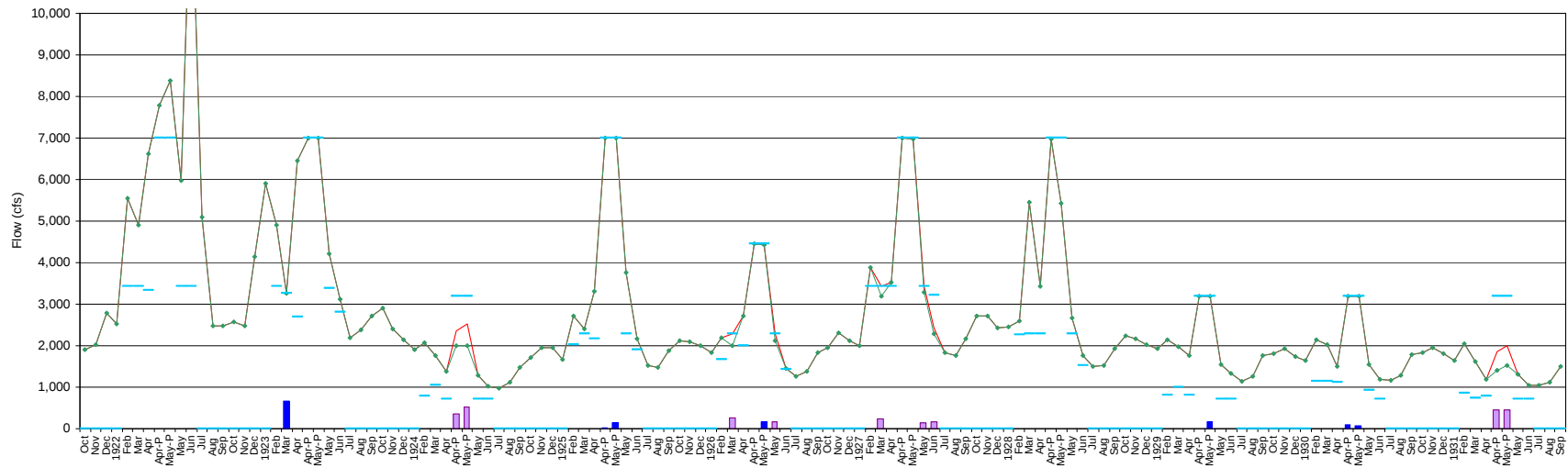


Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

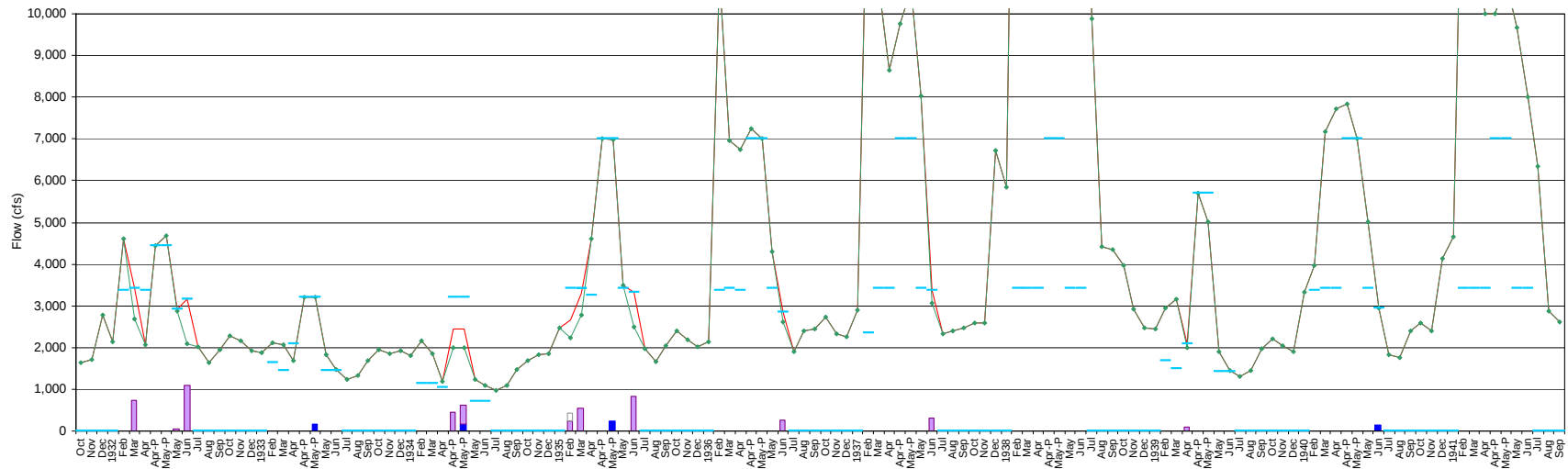
Figure A1-6. Alternative B1 Existing LOD (continued)

San Joaquin River flow and recirculation used to satisfy flow standard

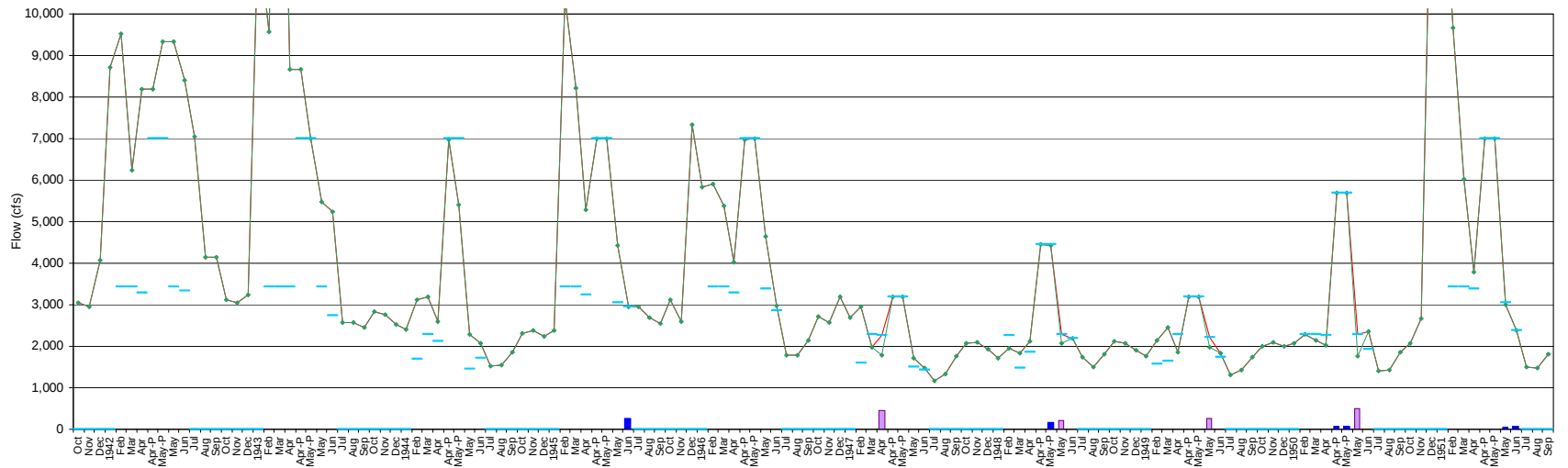
Water Year: 1922-1931



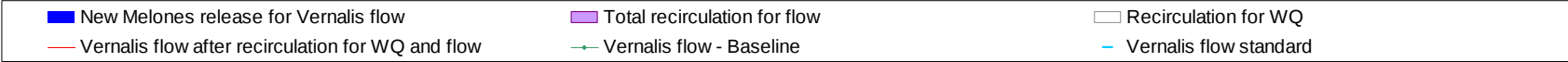
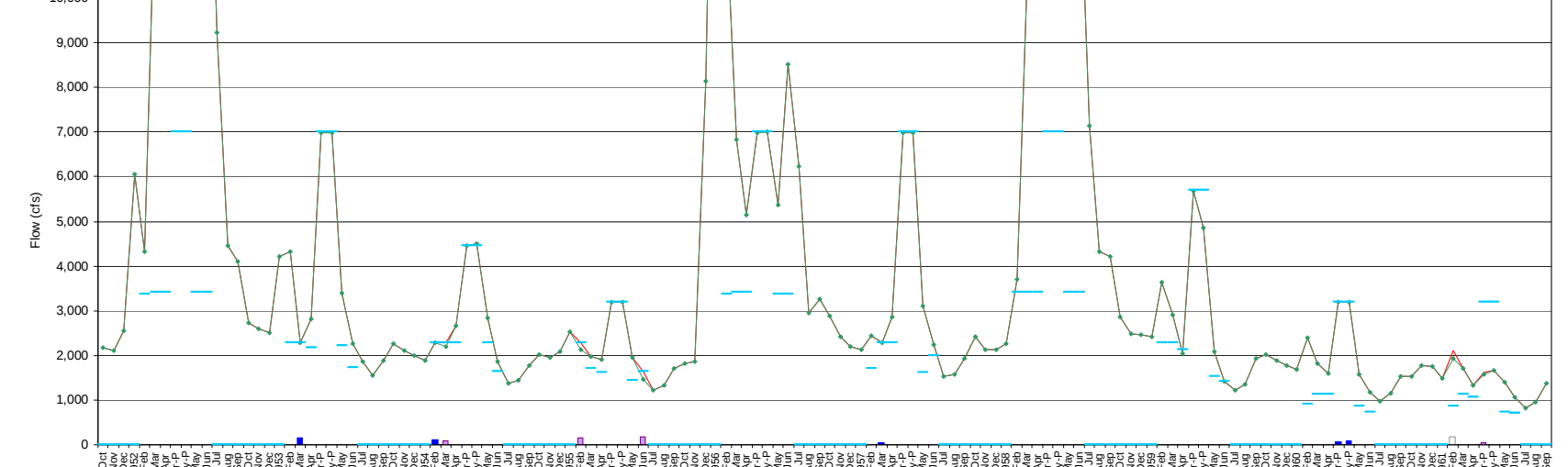
Water Year: 1932-1941



Water Year: 1942-1951



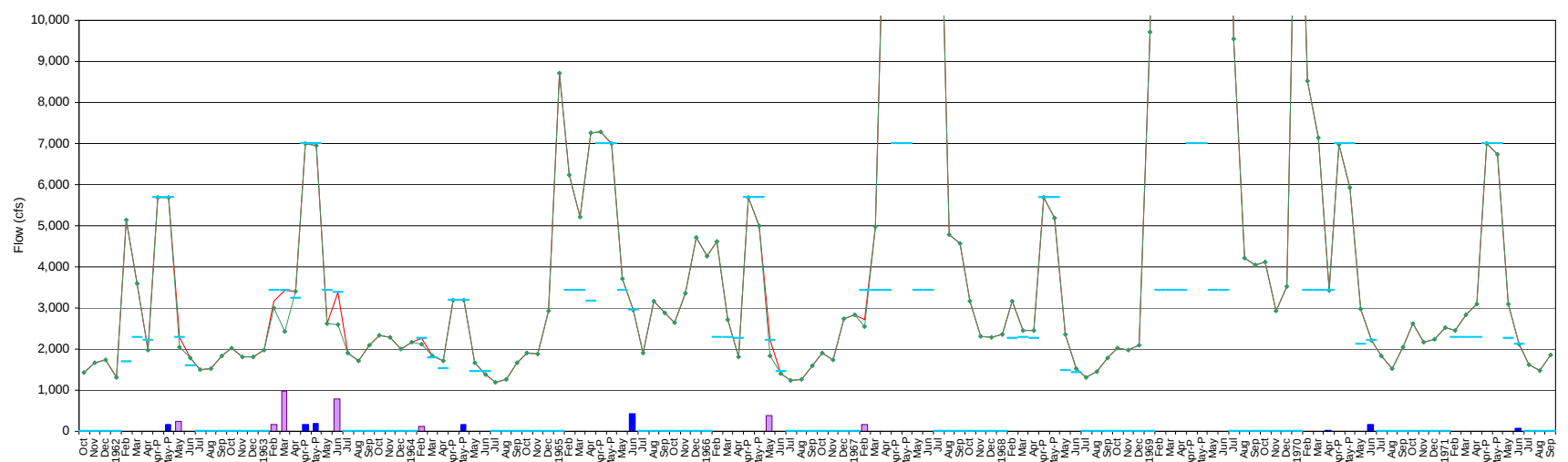
Water Year: 1952-1961



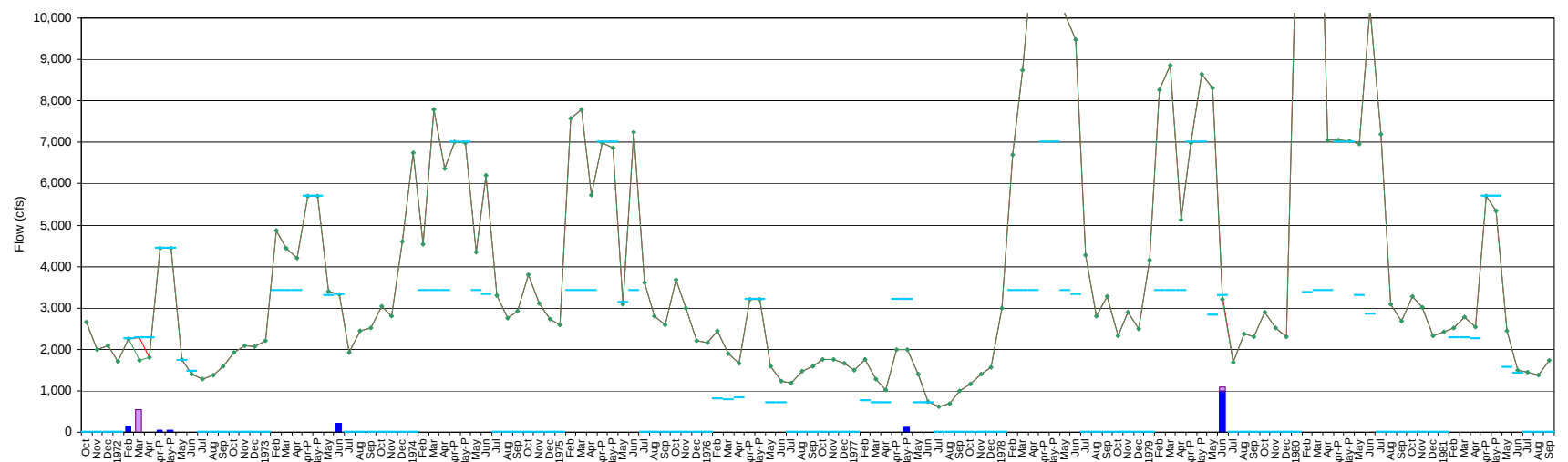
Key:
WQ = water quality

Figure A1-7. Alternative B1 Existing LOD

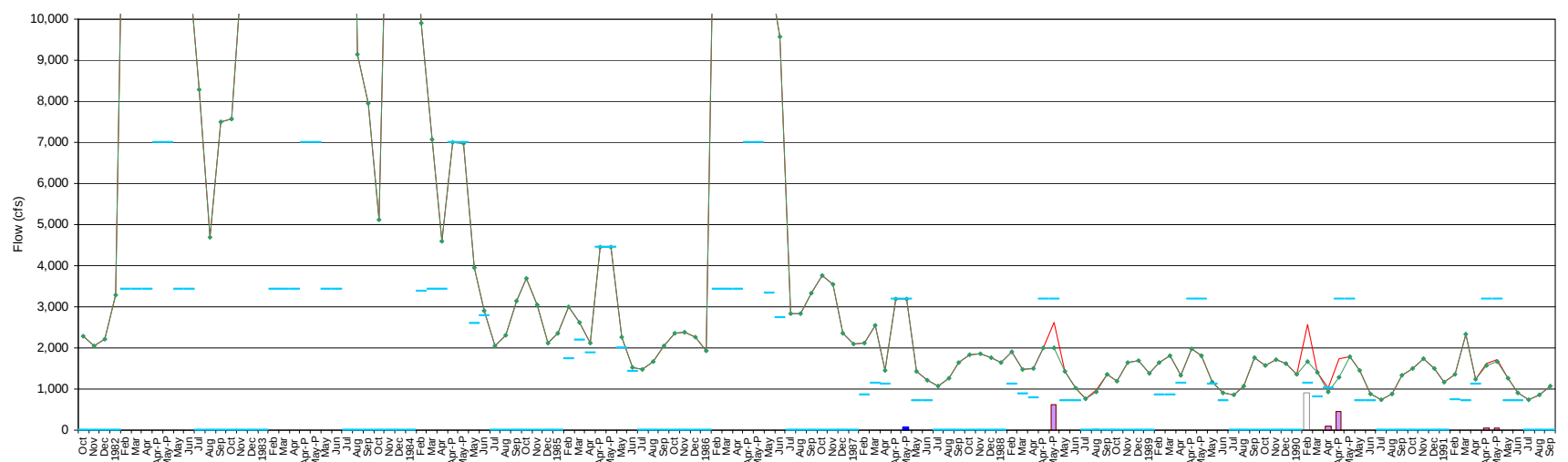
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



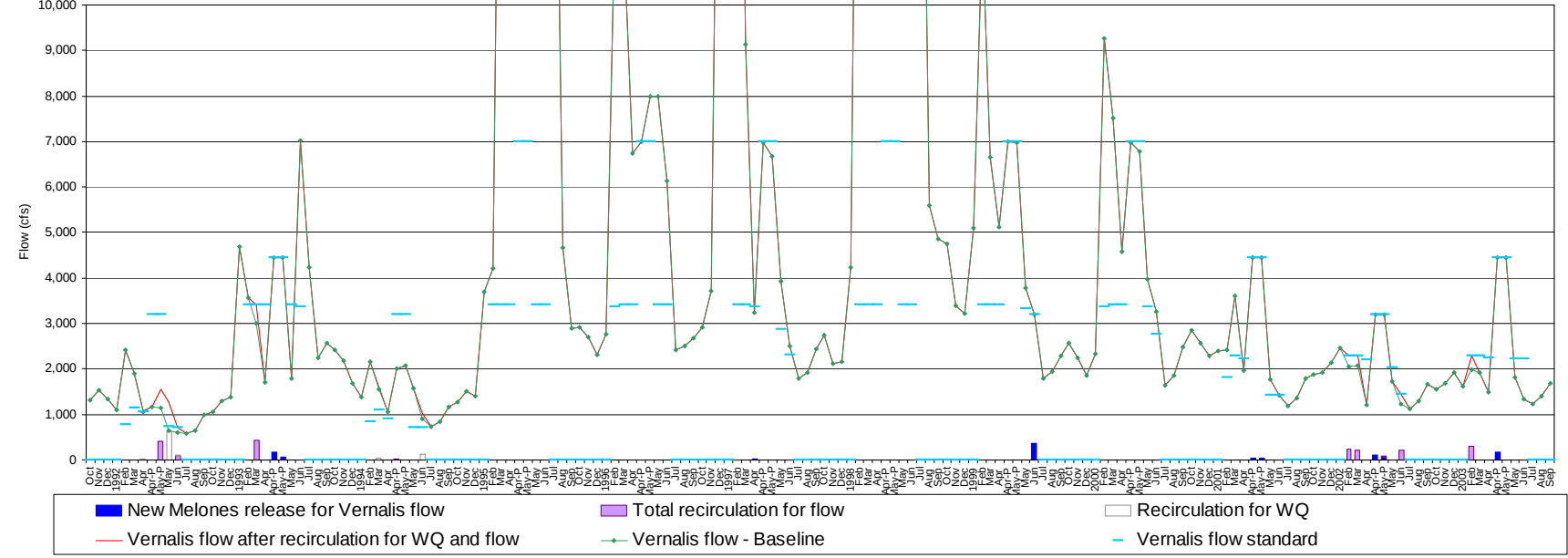
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-7. Alternative B1 Existing LOD (continued)

Table A1-4. Alternative B2 Existing LOD

Recirculation used prior to New Melones release using Jones PP and Banks excess capacity
1000 acre feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	1	0	0	0	0	1	0	0	0	0	2	0	0	0	4
AN	0	0	0	0	2	9	0	0	0	0	18	0	0	0	30
BN	0	0	0	0	3	1	0	0	0	4	0	0	0	0	8
D	0	0	0	0	6	8	2	0	1	0	3	0	0	0	20
C	0	0	0	0	7	7	5	4	6	1	5	0	0	0	34
All	0	0	0	0	3	5	1	1	1	1	5	0	0	0	18

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	1	0	0	0	1	1	0	0	0	0	2	0	0	0	5
AN (16)	0	0	0	0	2	4	0	0	0	2	10	0	0	0	10
BN (13)	0	0	0	0	3	2	0	0	1	5	0	0	0	0	9
D (13)	0	0	0	0	4	3	2	0	3	1	4	2	0	0	11
C (16)	0	0	0	0	3	3	5	7	7	1	11	2	1	0	15
All (82)	1	0	0	0	13	13	7	7	11	9	27	4	1	0	50

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	13	0	0	0	9	26	0	0	0	0	22	0	0	0	18
AN	0	0	0	0	16	38	0	0	0	1	29	0	0	0	48
BN	0	0	0	0	14	4	0	0	3	10	0	0	0	0	11
D	0	0	0	0	19	36	11	0	5	5	9	2	0	0	24
C	0	0	0	0	35	36	15	8	13	20	7	2	2	0	36
All	13	0	0	0	20	31	14	8	10	9	17	2	2	0	30

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
AN	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
BN	0	0	0	0	3	0	0	0	0	1	0	0	0	0	3
D	0	0	0	0	5	6	1	0	0	0	3	0	0	0	16
C	0	0	0	0	7	7	5	0	0	1	5	0	0	0	25
All	0	0	0	0	3	2	1	0	0	0	2	0	0	0	8

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
AN (16)	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2
BN (13)	0	0	0	0	2	0	0	0	0	1	0	0	0	0	3
D (13)	0	0	0	0	4	3	1	0	0	0	4	2	0	0	7
C (16)	0	0	0	0	3	3	4	0	0	1	11	2	1	0	12
All (82)	1	0	0	0	10	6	5	0	0	2	16	4	1	0	25

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

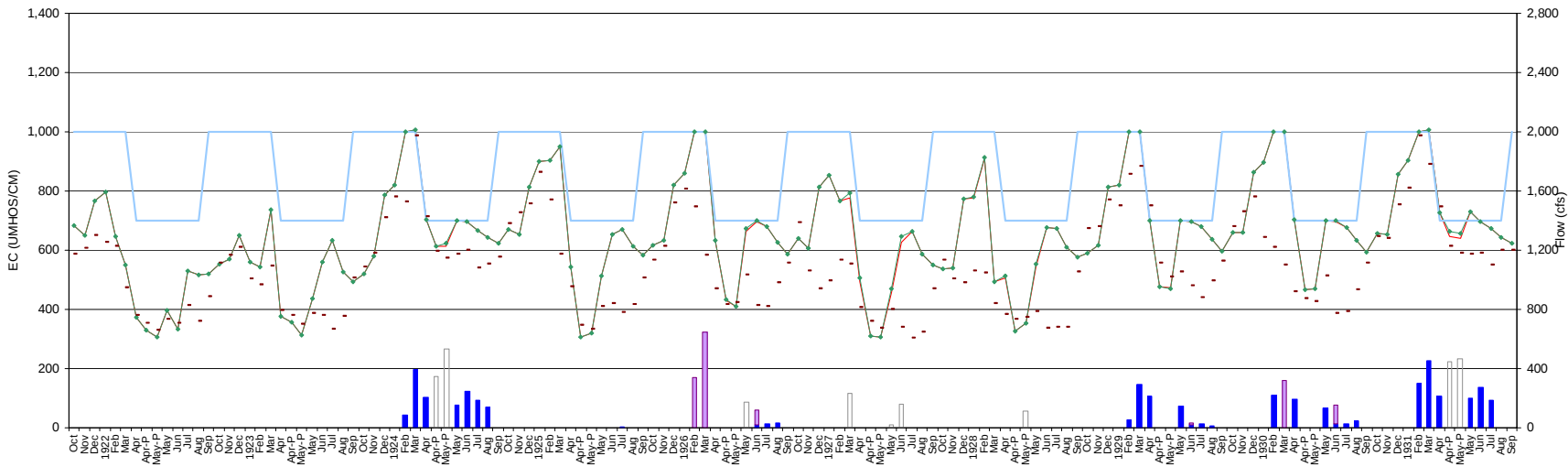
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	1	0	0	0	0	2	0	0	0	3
AN	0	0	0	0	1	9	0	0	0	0	18	0	0	0	29
BN	0	0	0	0	1	1	0	0	0	3	0	0	0	0	4
D	0	0	0	0	0	2	0	0	1	0	0	0	0	0	4
C	0	0	0	0	0	0	0	4	6	0	0	0	0	0	9
All	0	0	0	0	1	3	0	1	1	1	4	0	0	0	10

Frequency of Occurrence

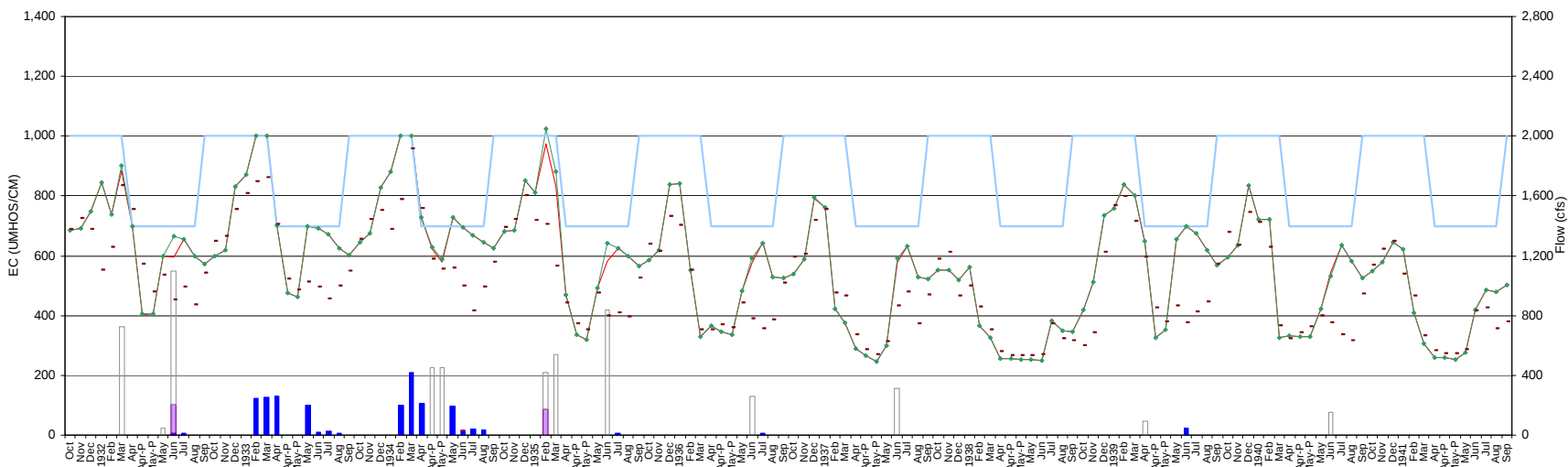
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	0	0	0	0	2	0	0	0	4
AN (16)	0	0	0	0	2	4	0	0	0	2	10	0	0	0	10
BN (13)	0	0	0	0	2	2	0	0	1	5	0	0	0	0	9
D (13)	0	0	0	0	1	1	2	0	3	1	0	0	0	0	8
C (16)	0	0	0	0	0	0	1	7	7	0	0	0	0	0	10
All (82)	0	0	0	0	6	8	3	7	11	8	12	0	0	0	41

Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

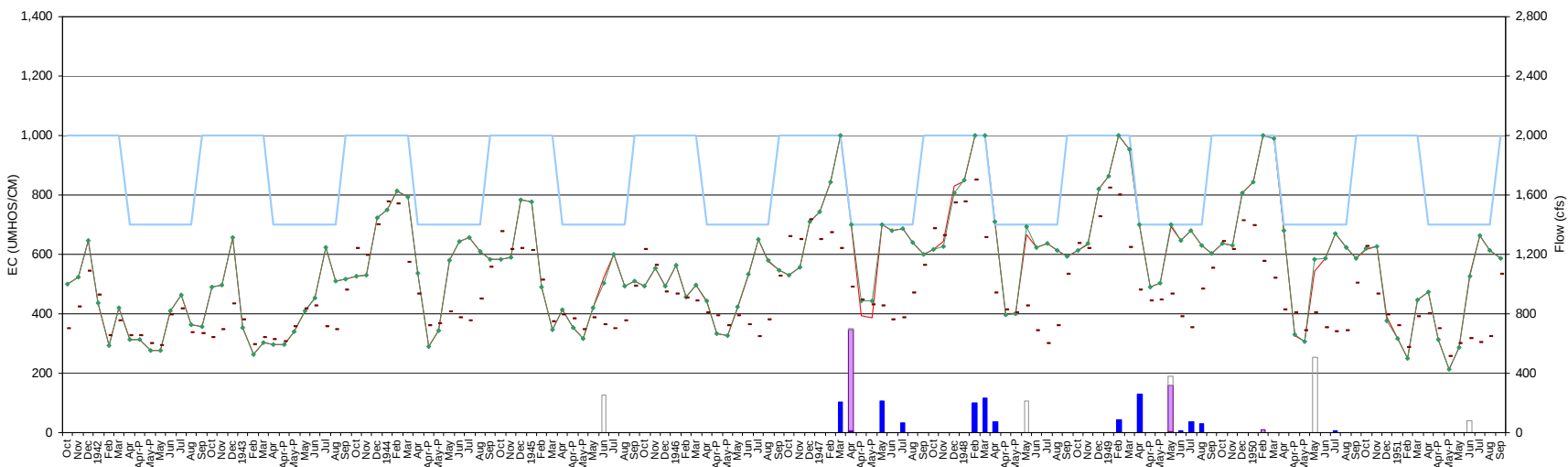
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1922-1931



Water Year: 1932-1941



Water Year: 1942-1951



Water Year: 1952-1961

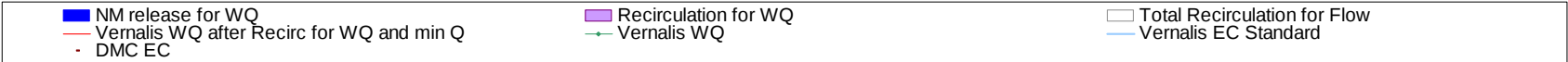
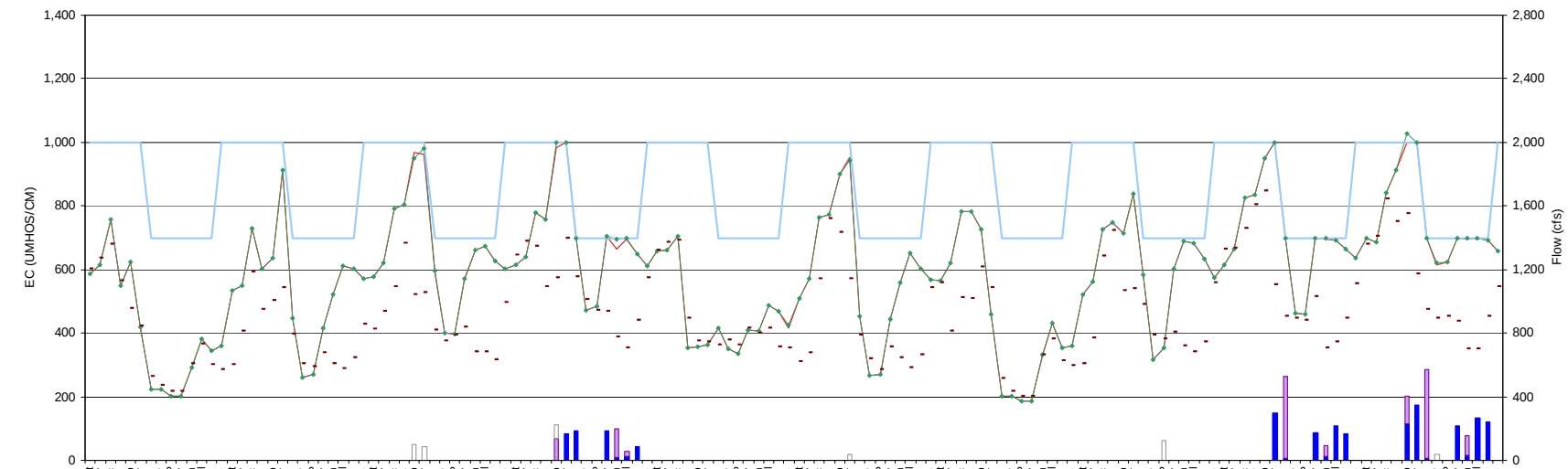
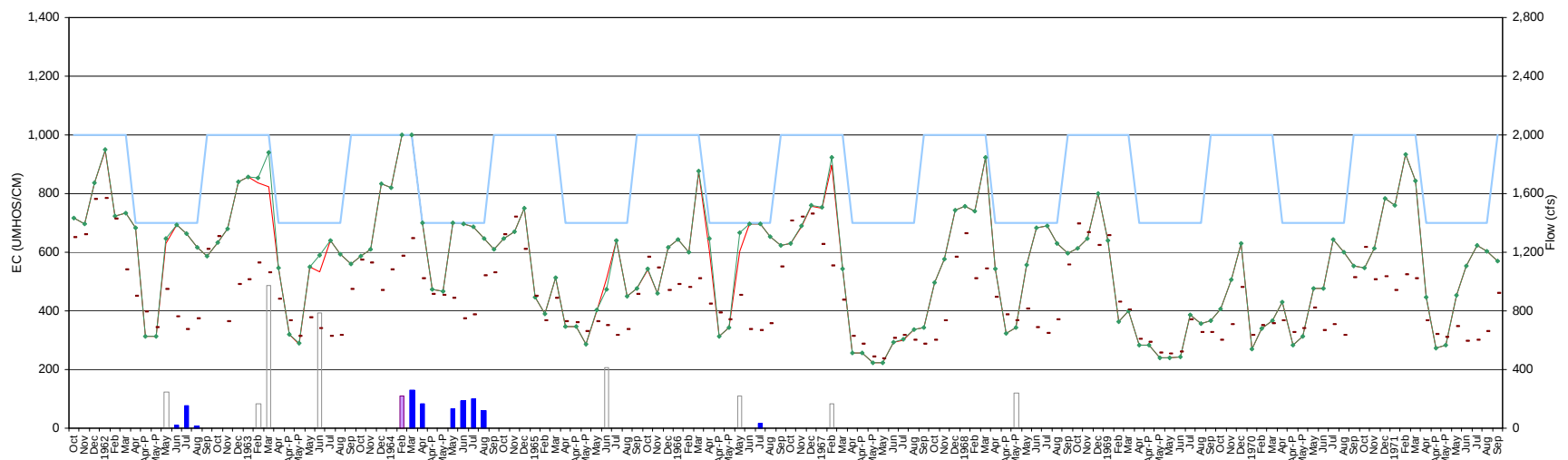
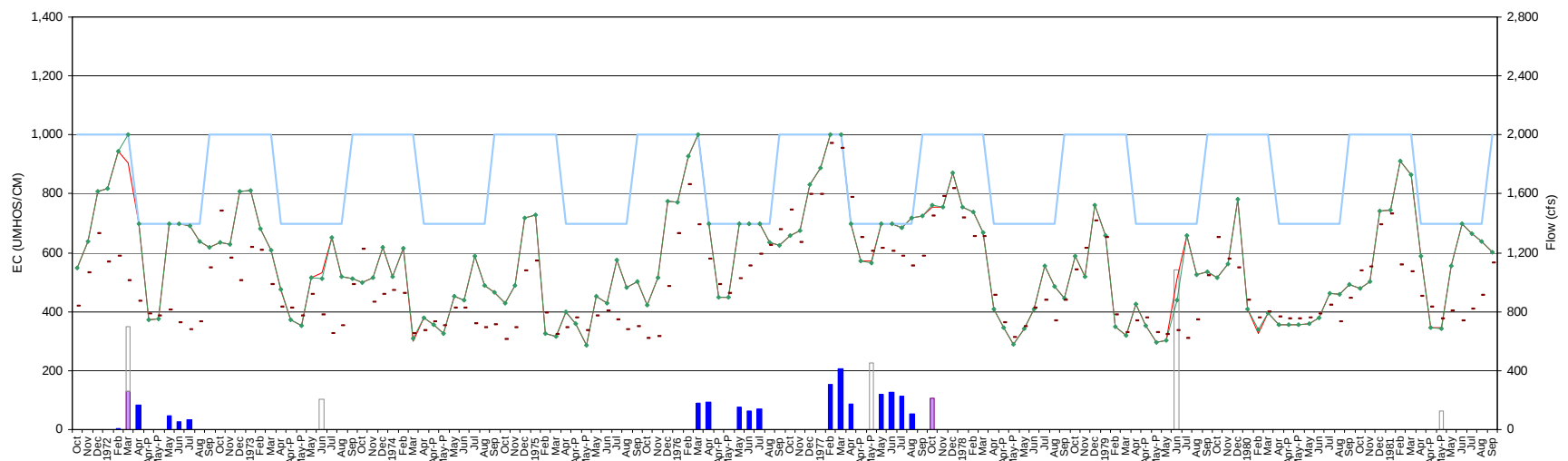


Figure A1-8. Alternative B2 Existing LOD

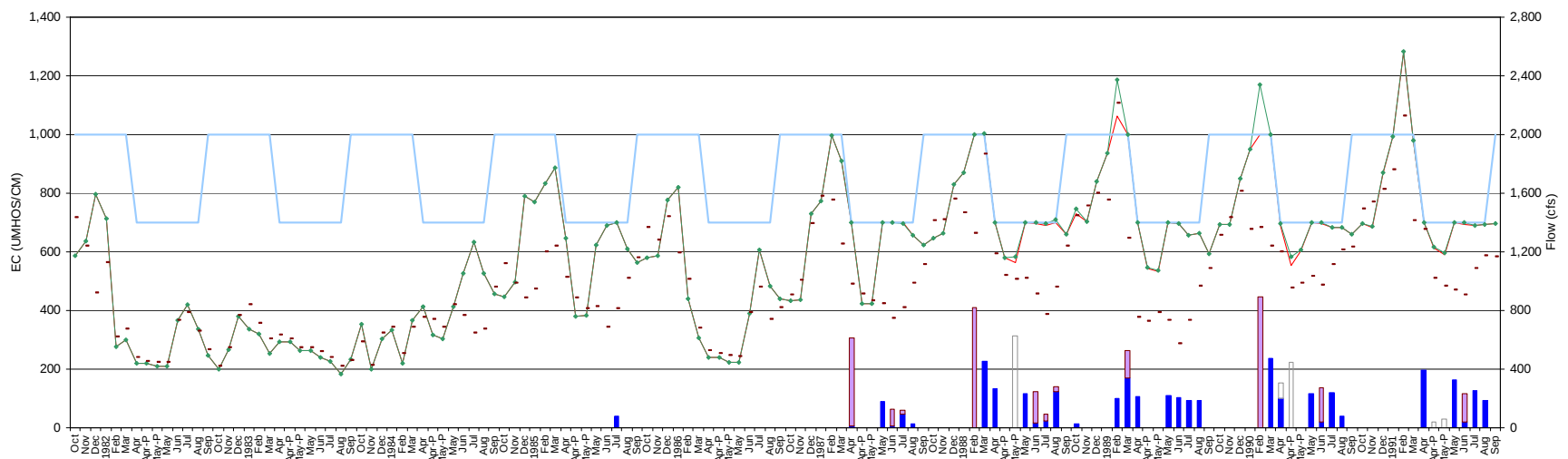
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



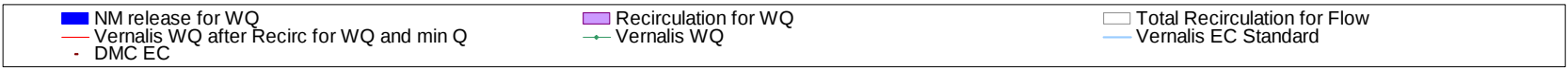
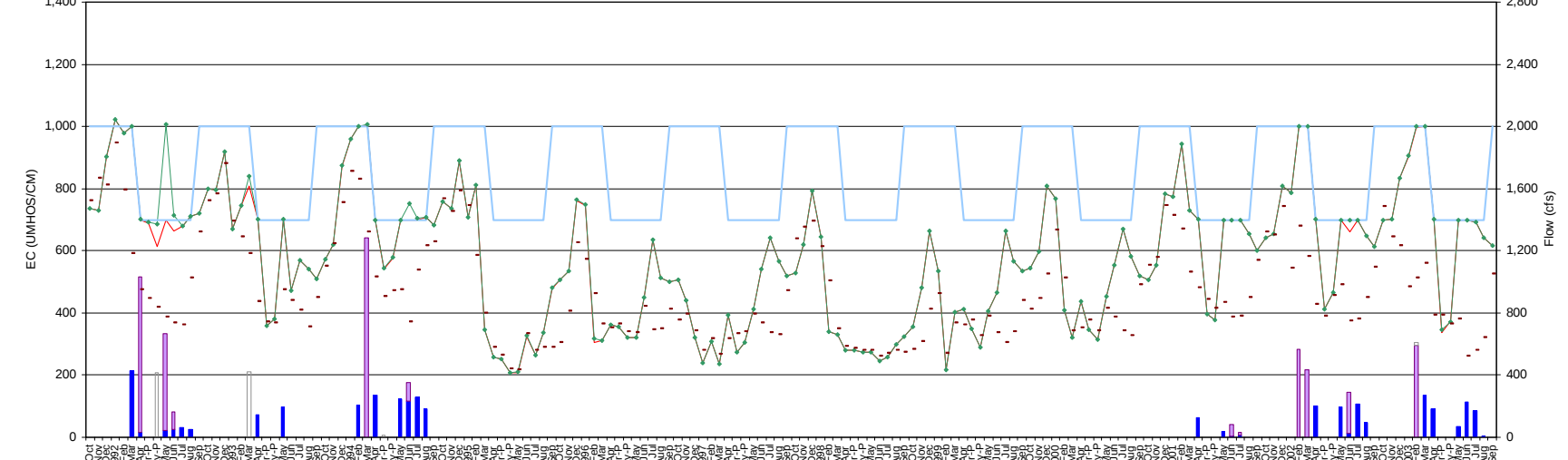
Water Year: 1972-1981



Water Year: 1982-1991



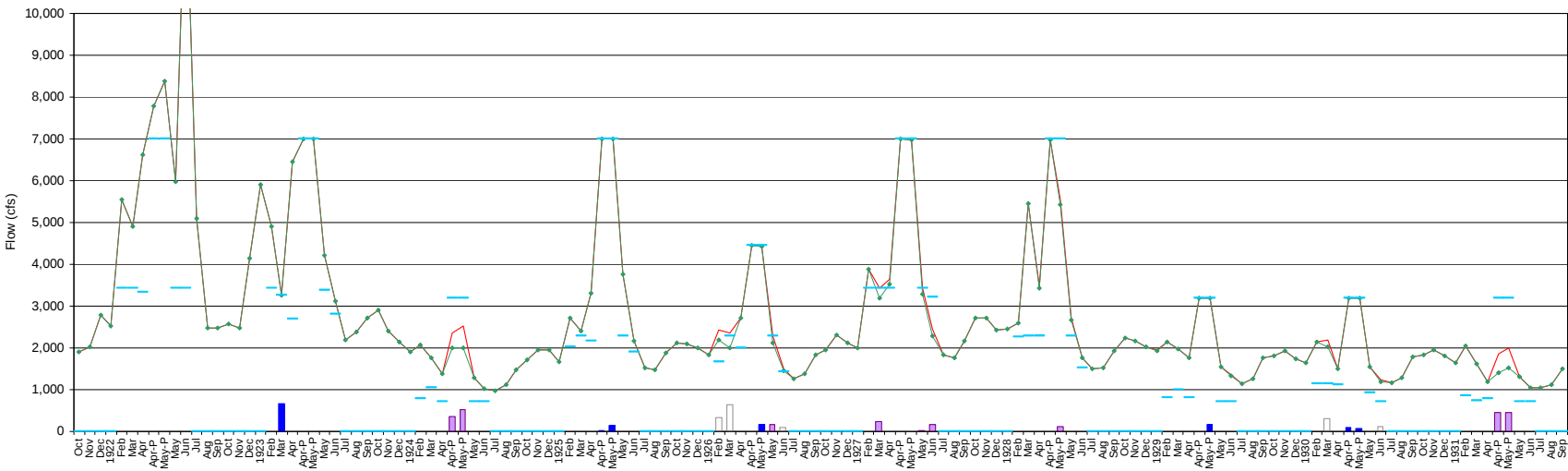
Water Year: 1992-2003



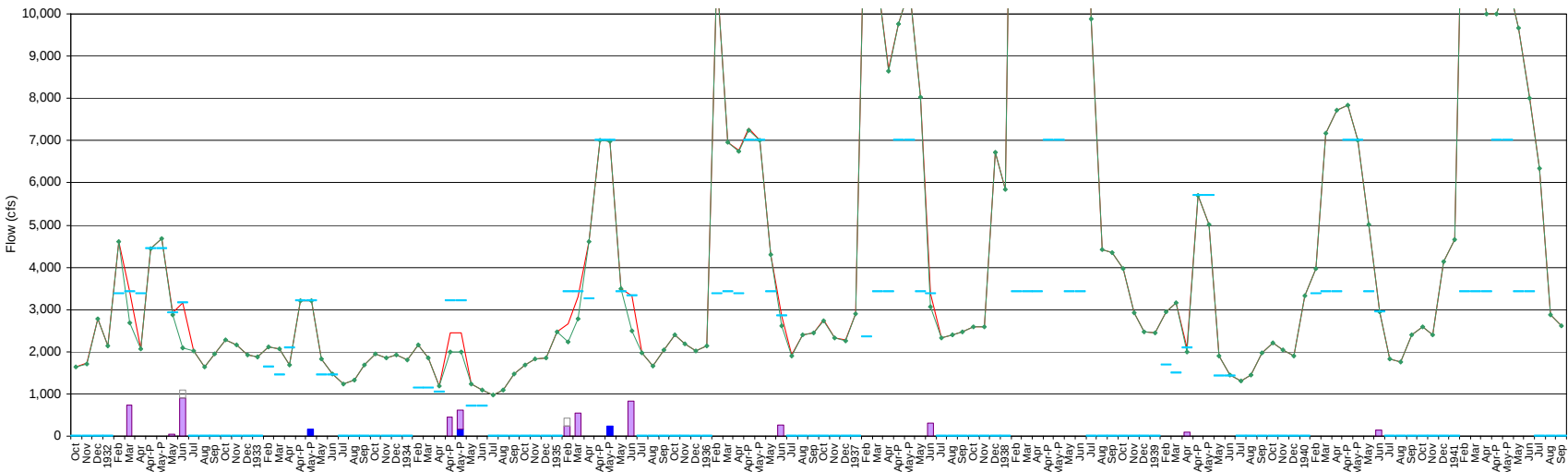
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-8. Alternative B2 Existing LOD (continued)

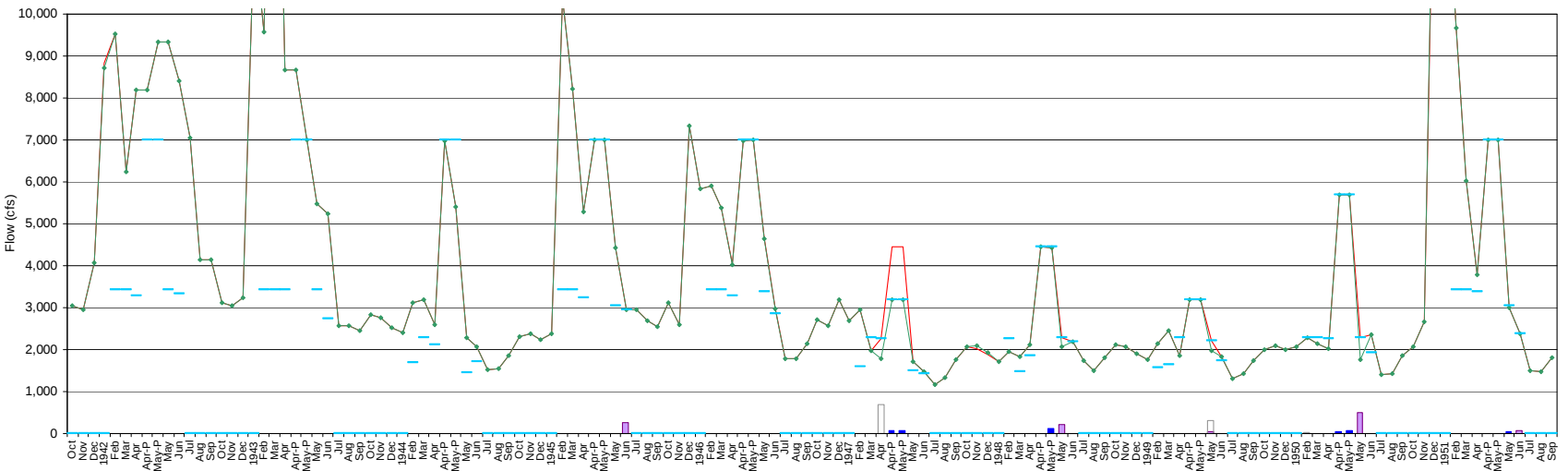
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



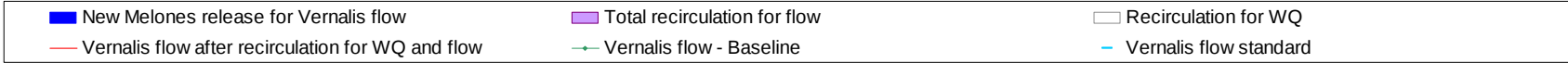
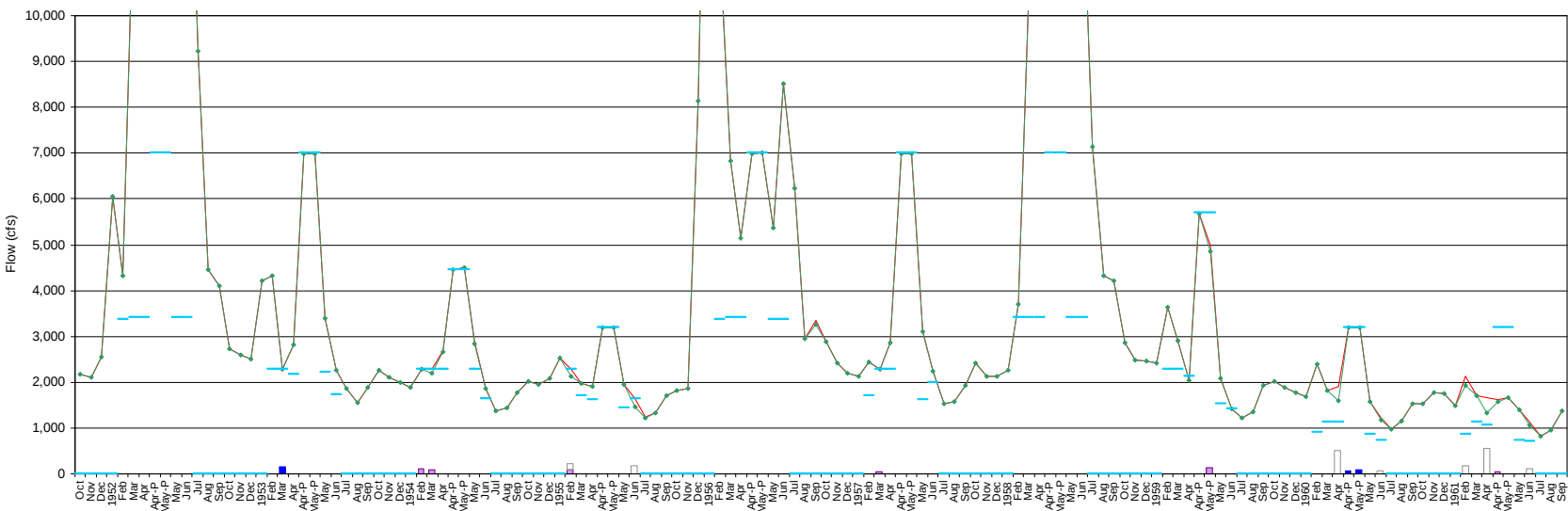
Water Year: 1932-1941



Water Year: 1942-1951



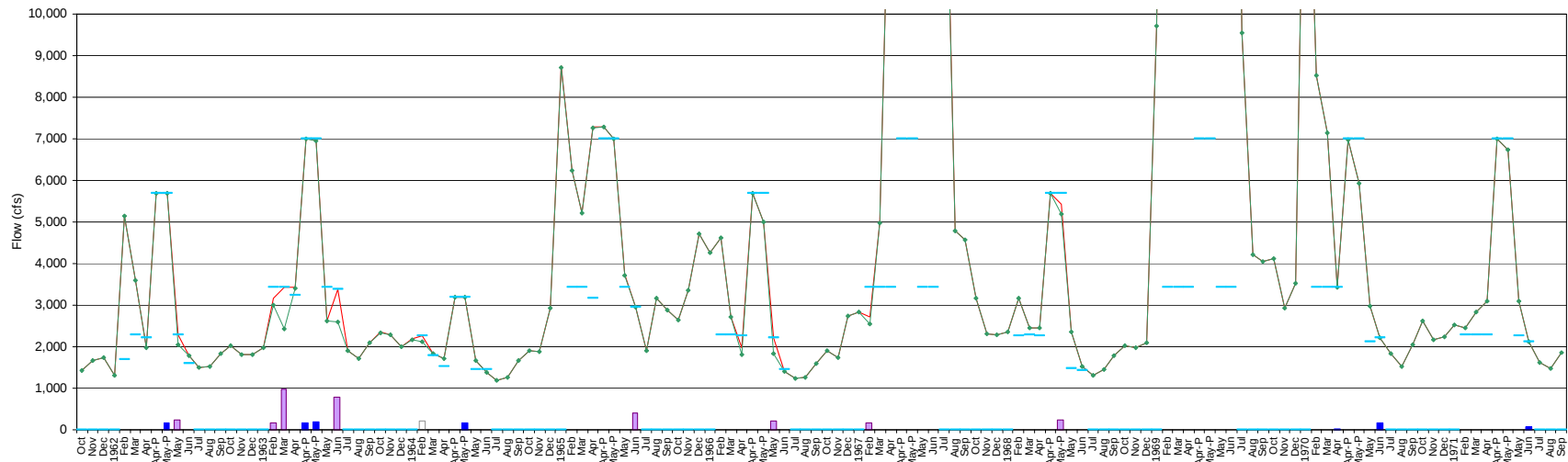
Water Year: 1952-1961



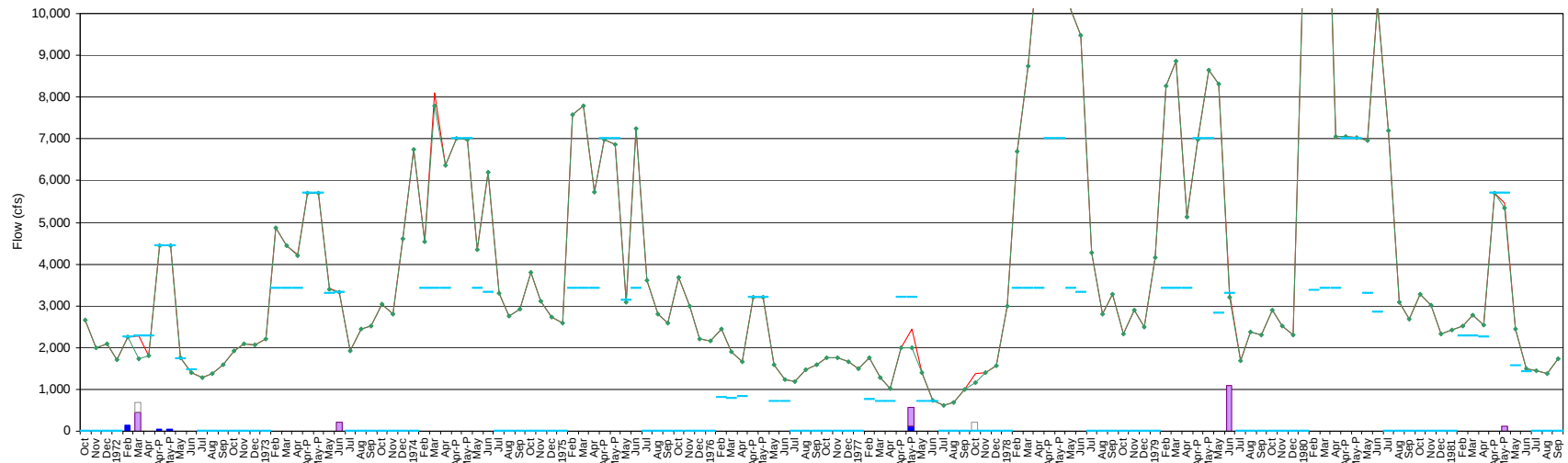
Key:
WQ = water quality

Figure A1-9. Alternative B2 Existing LOD

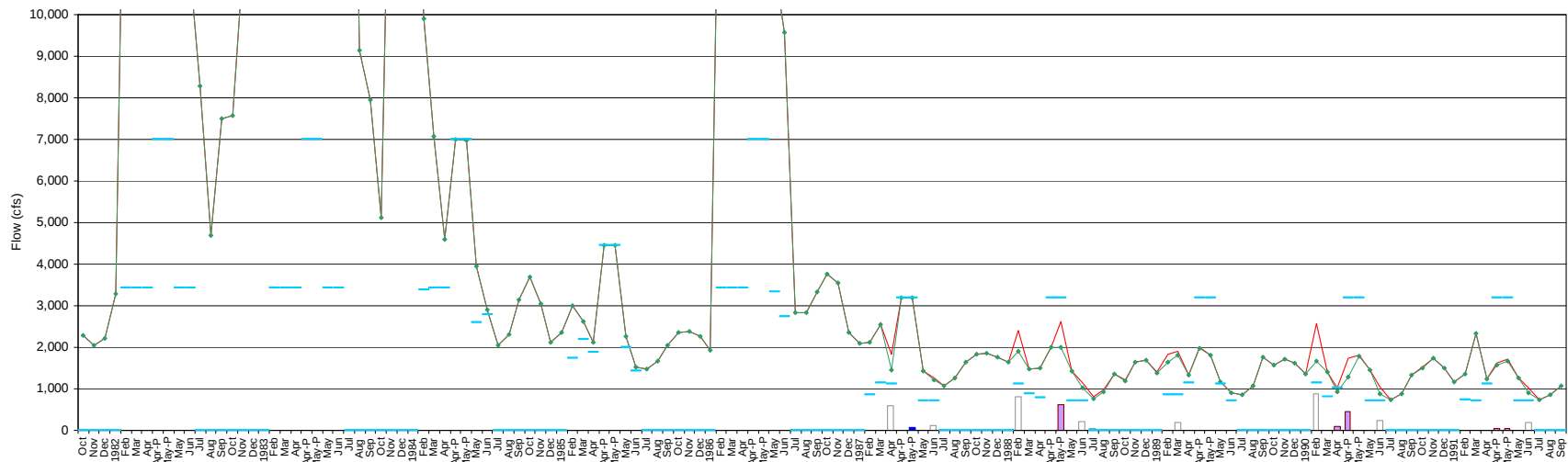
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



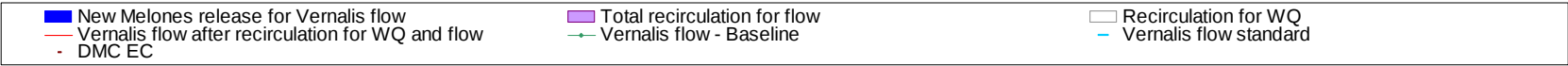
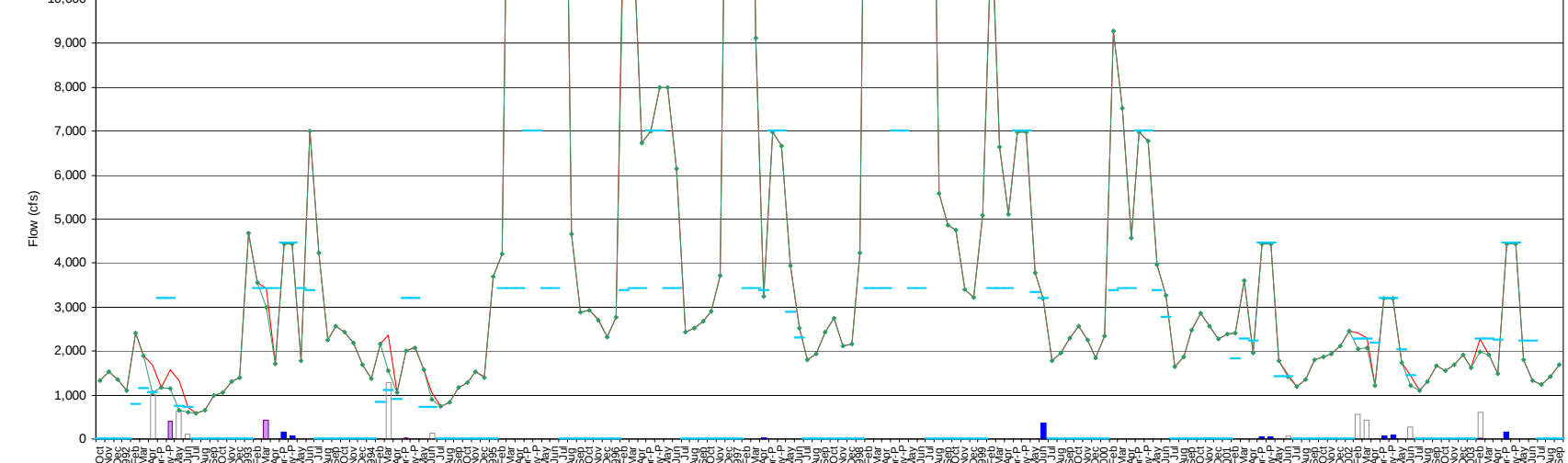
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
EC = electrical conductivity
WQ = water quality

Figure A1-9. Alternative B2 Existing LOD (continued)

Table A1-5. Alternative C Existing LOD

Recirculation used prior to New Melones release using Jones PP and Banks excess capacity
with CVP “impacts” to meet flow standard
1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow
Average by Year Type

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	1	0	0	0	2	1	2	0	0	1	2	0	0	0	8
AN	0	0	0	0	6	12	0	0	2	2	23	0	0	0	45
BN	0	0	0	0	4	4	4	0	4	5	5	0	0	0	26
D	0	0	0	0	6	10	6	0	5	1	3	0	0	0	32
C	0	0	0	0	7	7	5	12	11	1	5	0	0	0	48
All	0	0	0	0	5	6	3	2	4	2	7	0	0	0	30

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	1	0	0	0	1	1	2	0	1	2	2	0	0	0	7
AN (16)	0	0	0	0	2	5	1	0	2	2	12	0	0	0	14
BN (13)	0	0	0	0	4	5	5	0	3	6	3	0	0	0	11
D (13)	0	0	0	0	5	4	6	0	4	2	7	2	0	0	11
C (16)	0	0	0	0	3	3	5	10	11	1	11	2	1	0	15
All (82)	1	0	0	0	15	18	19	10	21	13	35	4	1	0	58

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	13	0	0	0	48	26	26	0	4	8	22	0	0	0	29
AN	0	0	0	0	44	40	2	0	18	13	30	0	0	0	51
BN	0	0	0	0	15	10	11	0	19	10	20	0	0	0	31
D	0	0	0	0	16	32	12	0	17	8	6	2	0	0	37
C	0	0	0	0	35	36	15	19	16	20	7	2	2	0	51
All	13	0	0	0	26	28	13	19	16	11	17	2	2	0	42

Recirculation for WQ
1000 AF

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
AN	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
BN	0	0	0	0	3	0	0	0	0	1	0	0	0	0	3
D	0	0	0	0	5	6	1	0	0	0	3	0	0	0	16
C	0	0	0	0	7	7	5	0	0	1	5	0	0	0	25
All	0	0	0	0	3	2	1	0	0	0	2	0	0	0	8

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
AN (16)	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2
BN (13)	0	0	0	0	2	0	0	0	0	1	0	0	0	0	3
D (13)	0	0	0	0	4	3	1	0	0	0	4	2	0	0	7
C (16)	0	0	0	0	3	3	4	0	0	1	11	2	1	0	12
All (82)	1	0	0	0	10	6	5	0	0	2	16	4	1	0	25

Total Recirculation for Flow
1000 AF

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	2	1	2	0	0	1	2	0	0	0	8
AN	0	0	0	0	5	12	0	0	2	2	22	0	0	0	44
BN	0	0	0	0	2	4	4	0	4	4	5	0	0	0	23
D	0	0	0	0	1	4	4	0	5	1	1	0	0	0	16
C	0	0	0	0	0	0	0	12	11	0	0	0	0	0	24
All	0	0	0	0	2	4	2	2	4	1	6	0	0	0	21

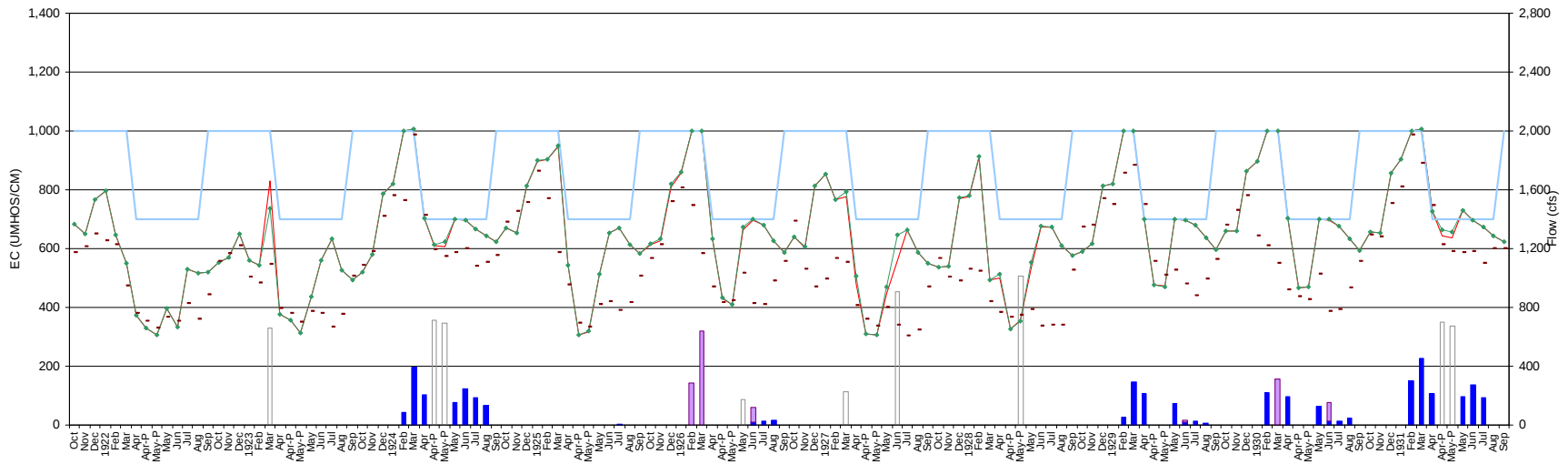
Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	2	0	1	2	2	0	0	0	6
AN (16)	0	0	0	0	2	5	1	0	2	2	12	0	0	0	14
BN (13)	0	0	0	0	3	5	5	0	3	6	3	0	0	0	11
D (13)	0	0	0	0	2	2	6	0	4	2	3	0	0	0	11
C (16)	0	0	0	0	0	0	1	10	11	0	0	0	0	0	11
All (82)	0	0	0	0	8	13	15	10	21	12	20	0	0	0	53

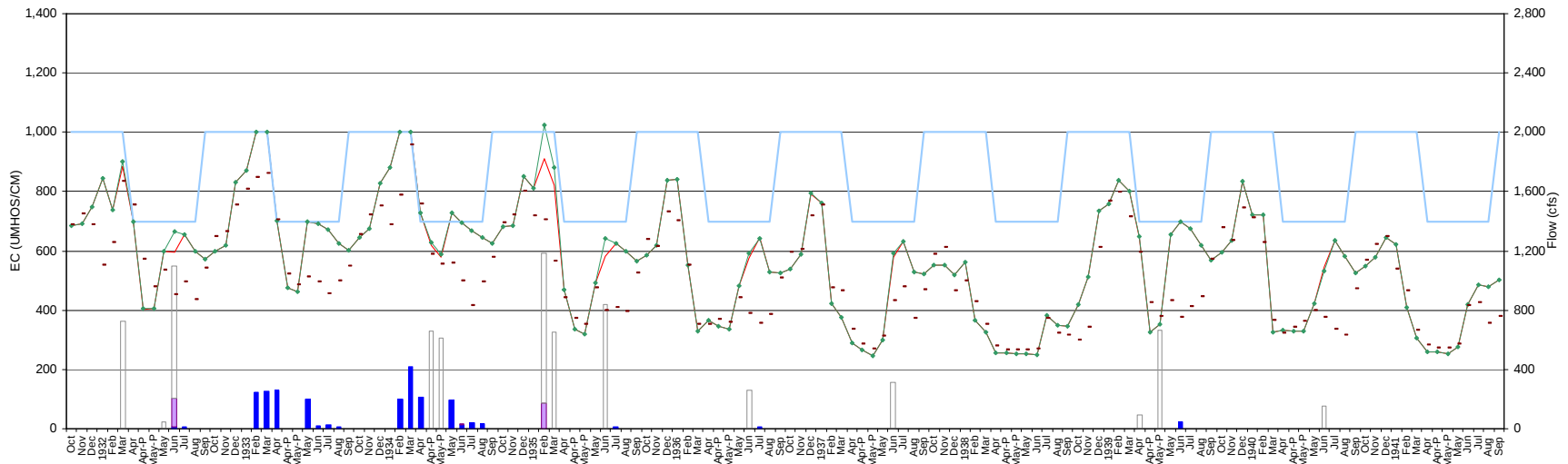
Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

San Joaquin River Quality and recirculation used to satisfy water quality standard

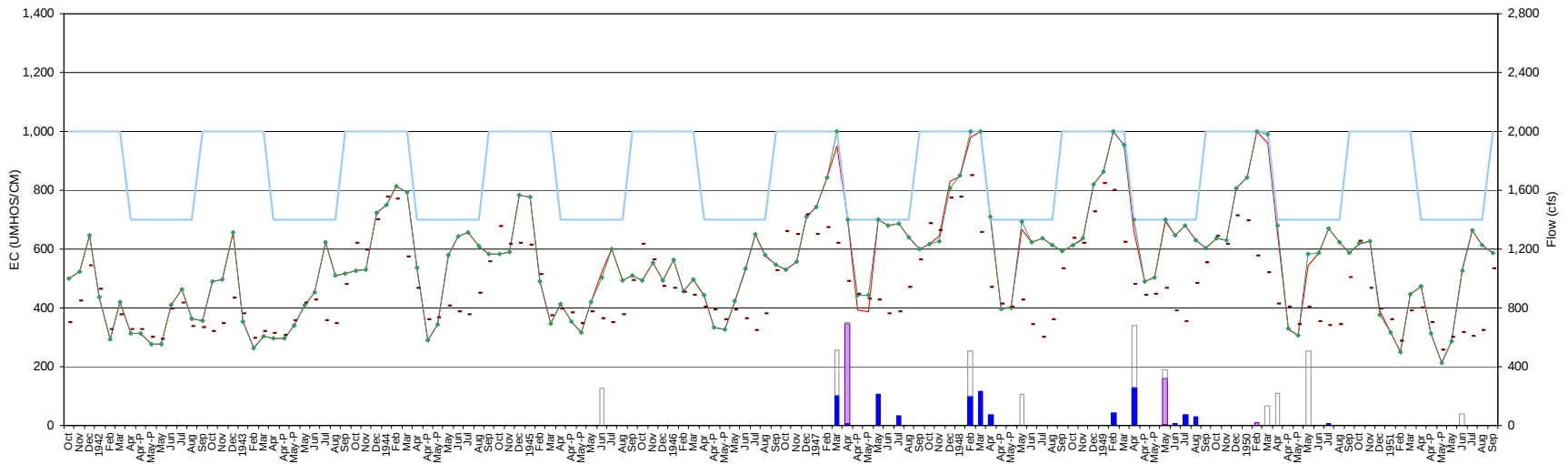
Water Year: 1922-1931



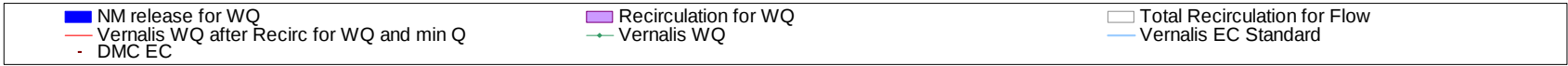
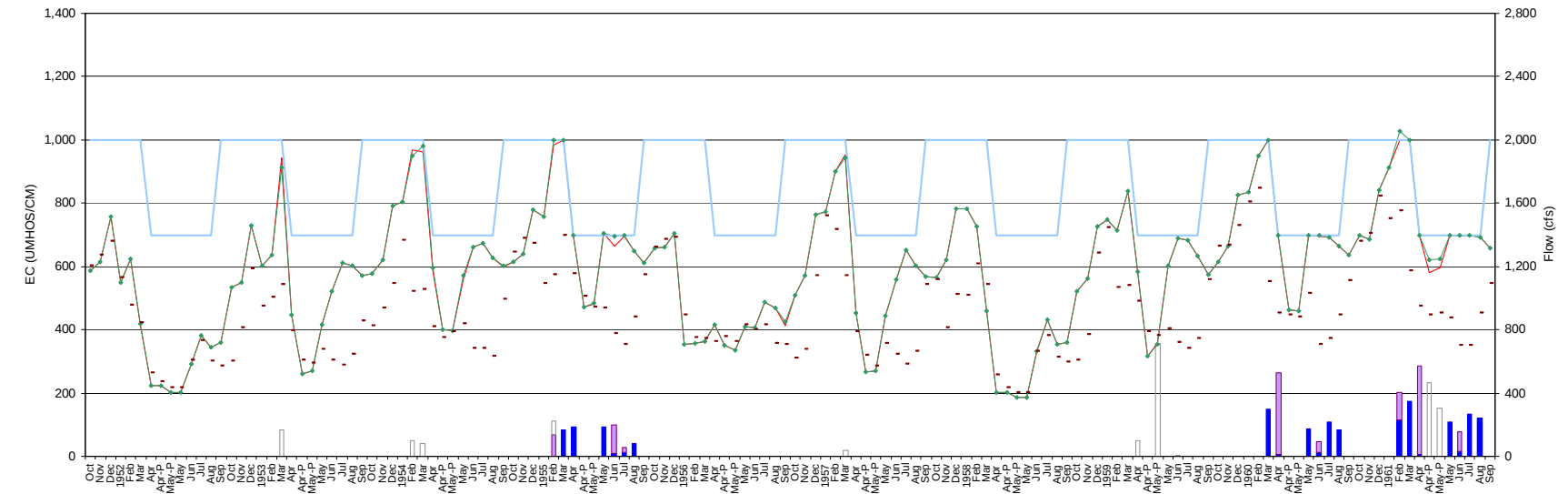
Water Year: 1932-1941



Water Year: 1942-1951



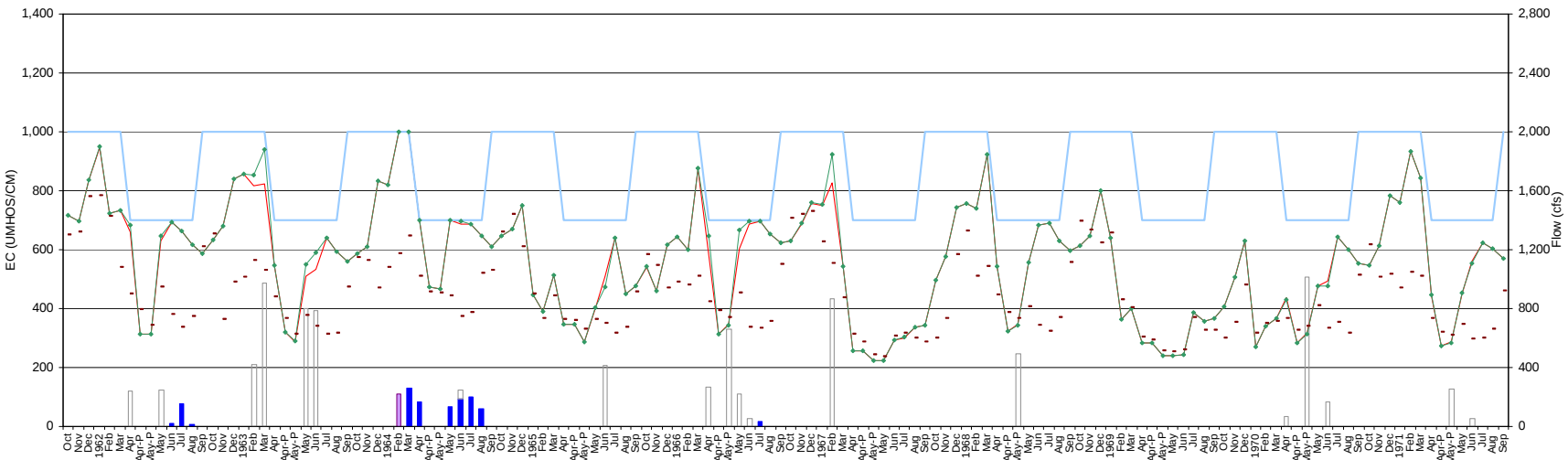
Water Year: 1952-1961



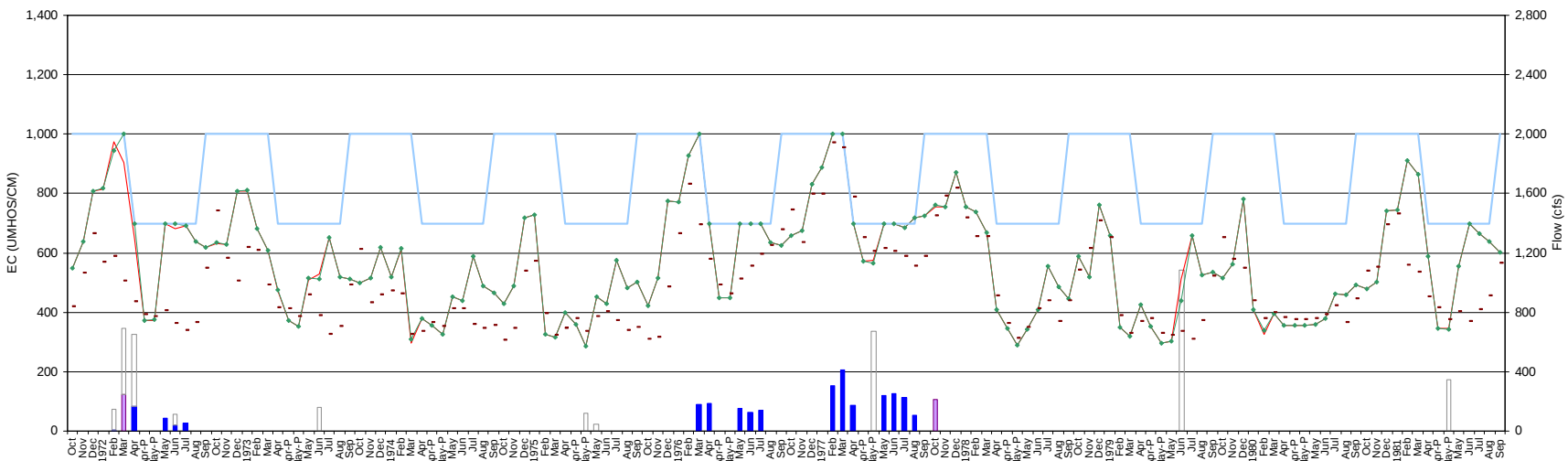
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-10. Alternative C Existing LOD

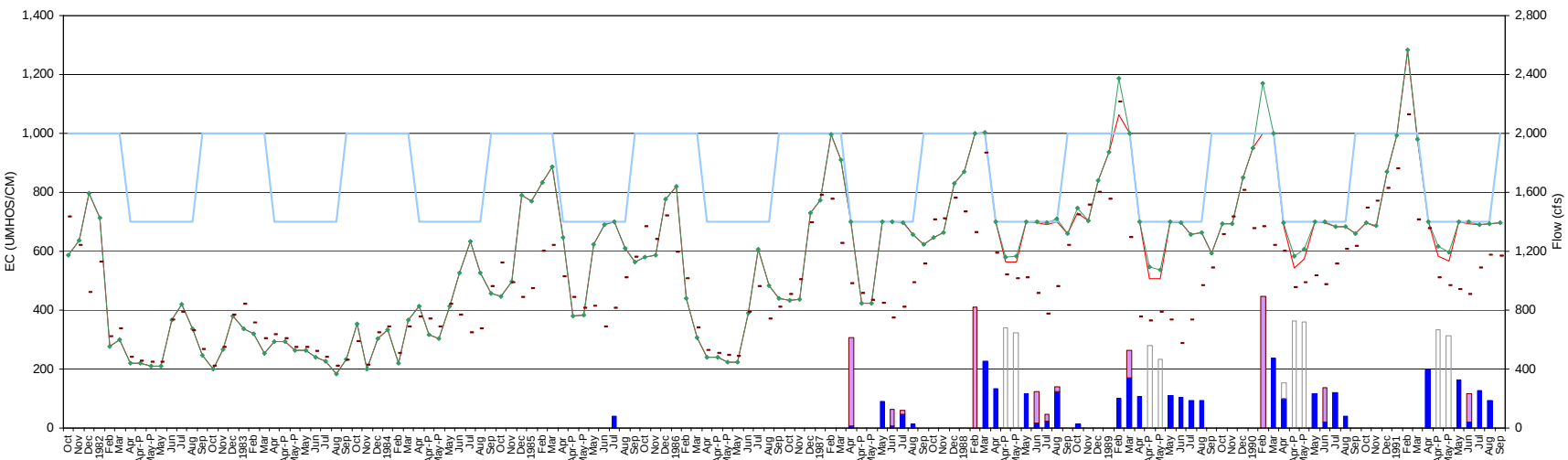
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003

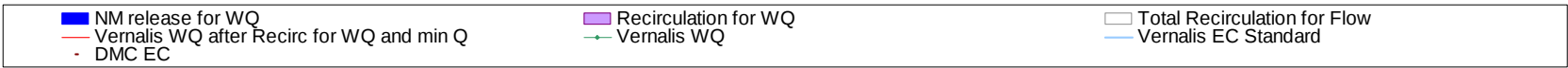
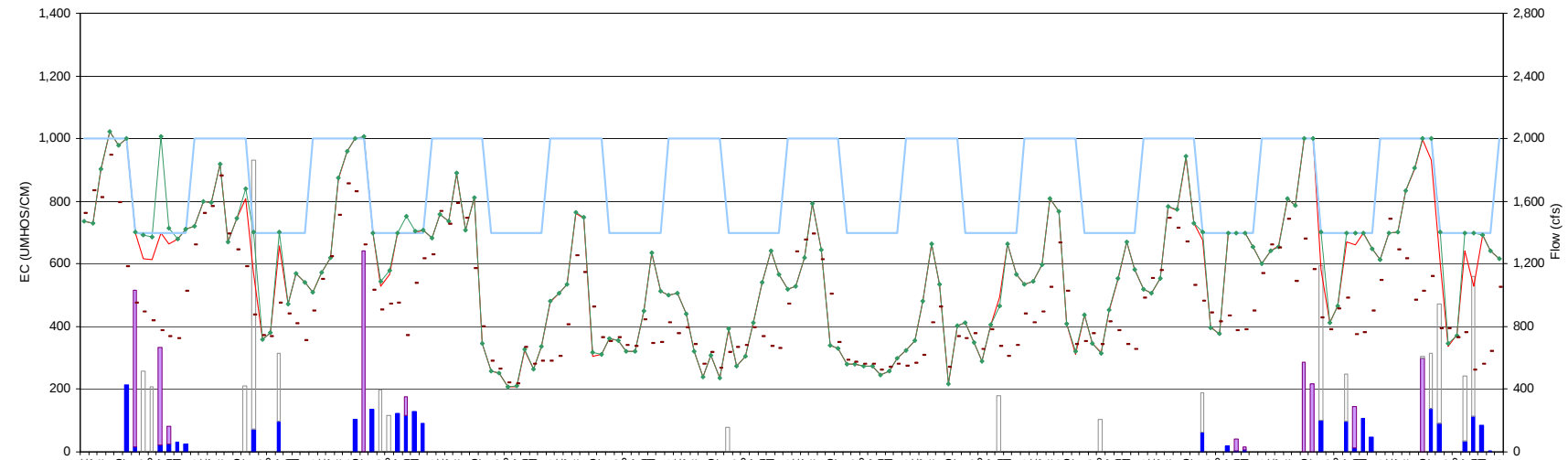
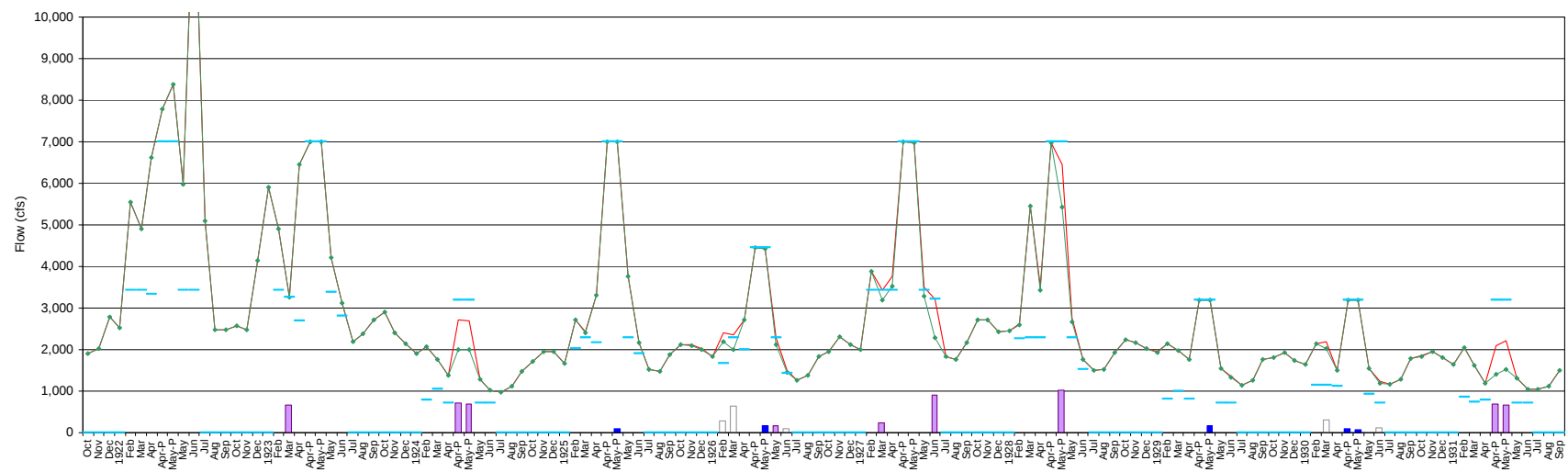
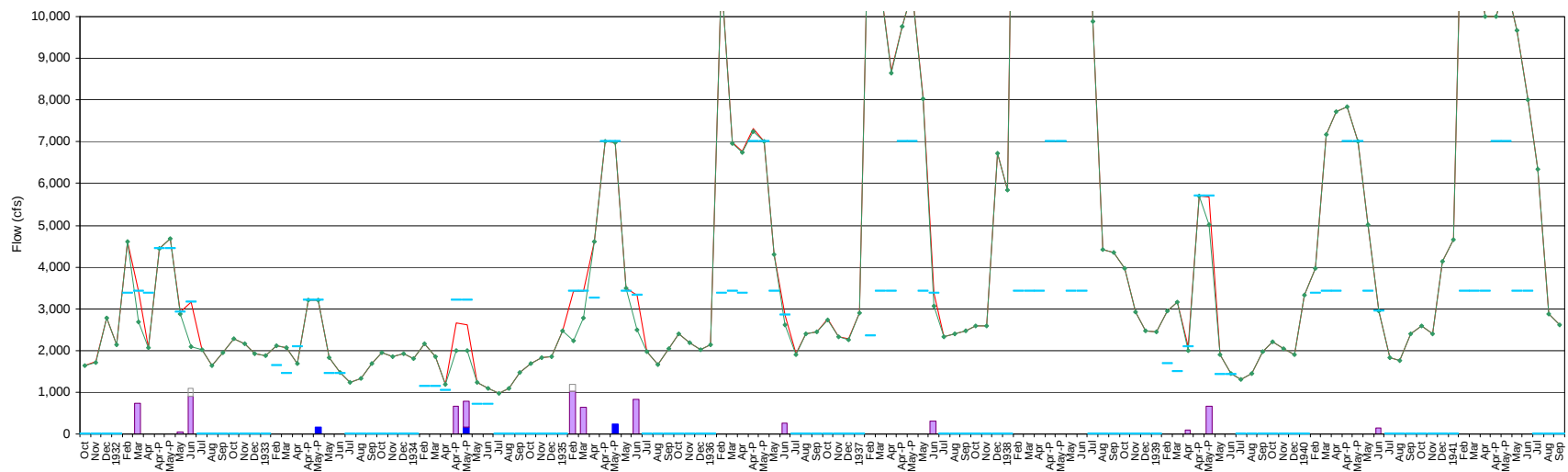


Figure A1-10. Alternative C Existing LOD (continued)

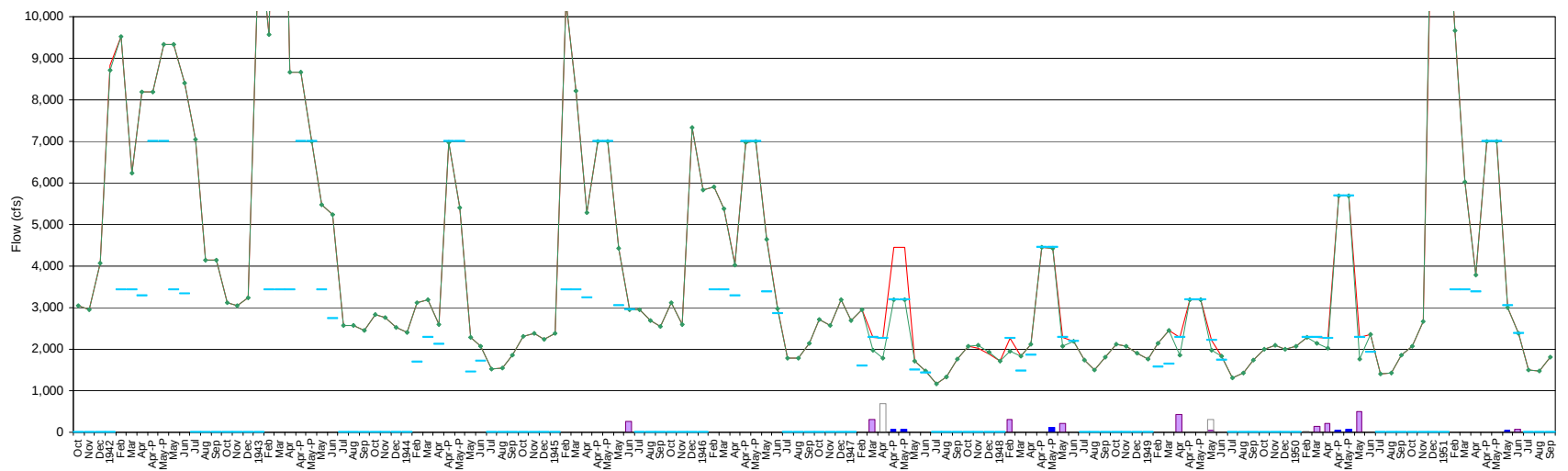
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



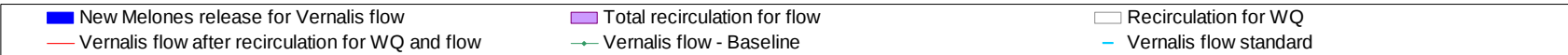
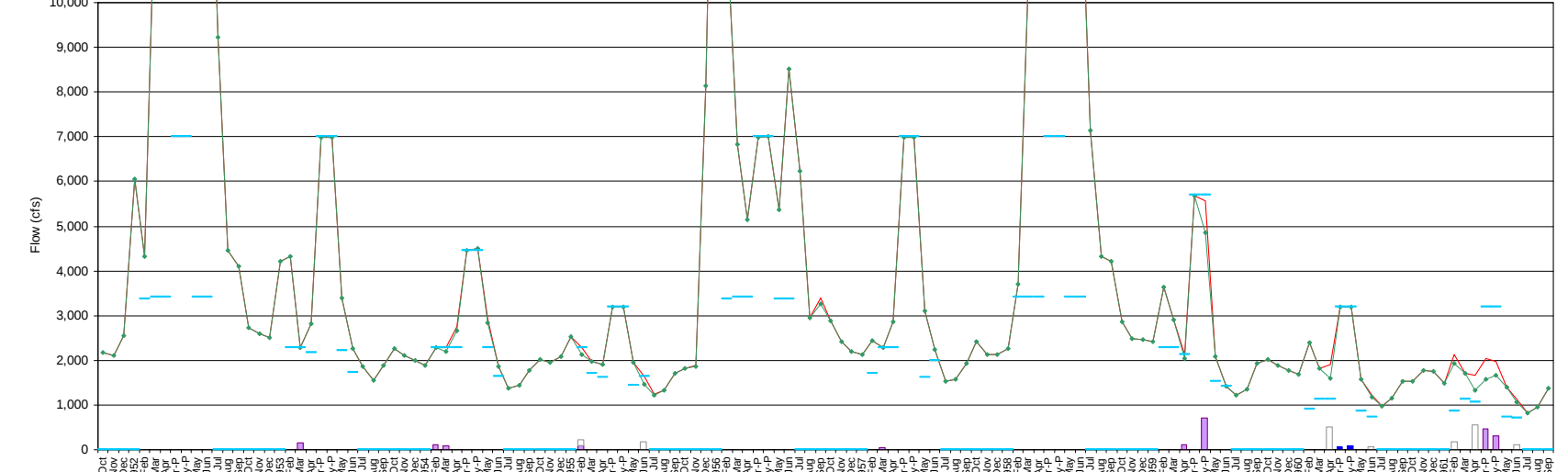
Water Year: 1932-1941



Water Year: 1942-1951



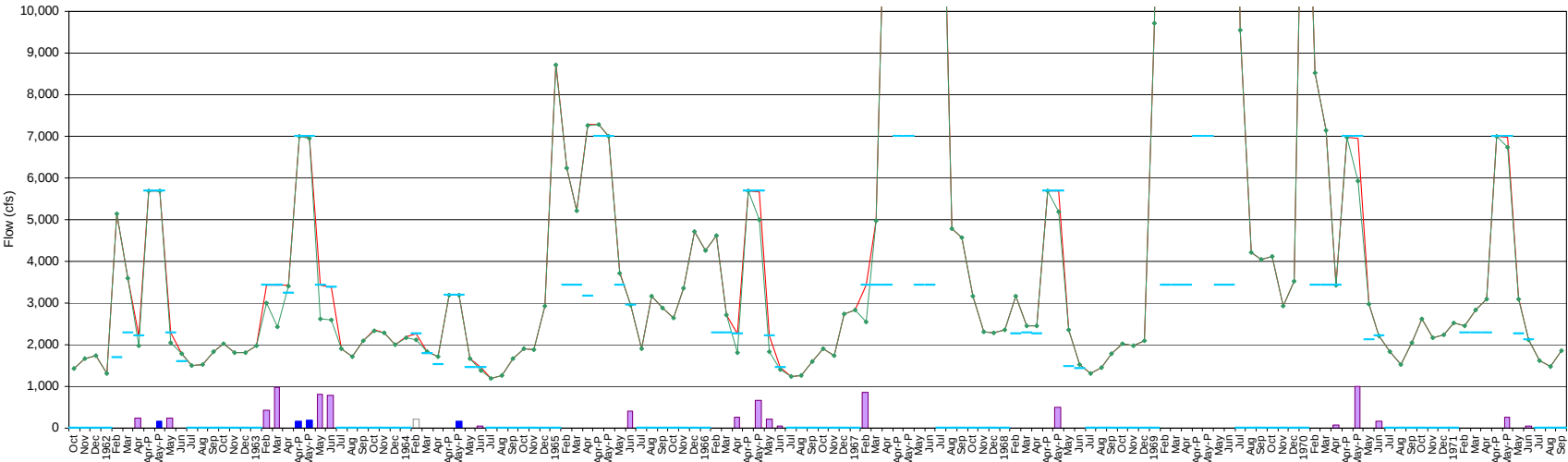
Water Year: 1952-1961



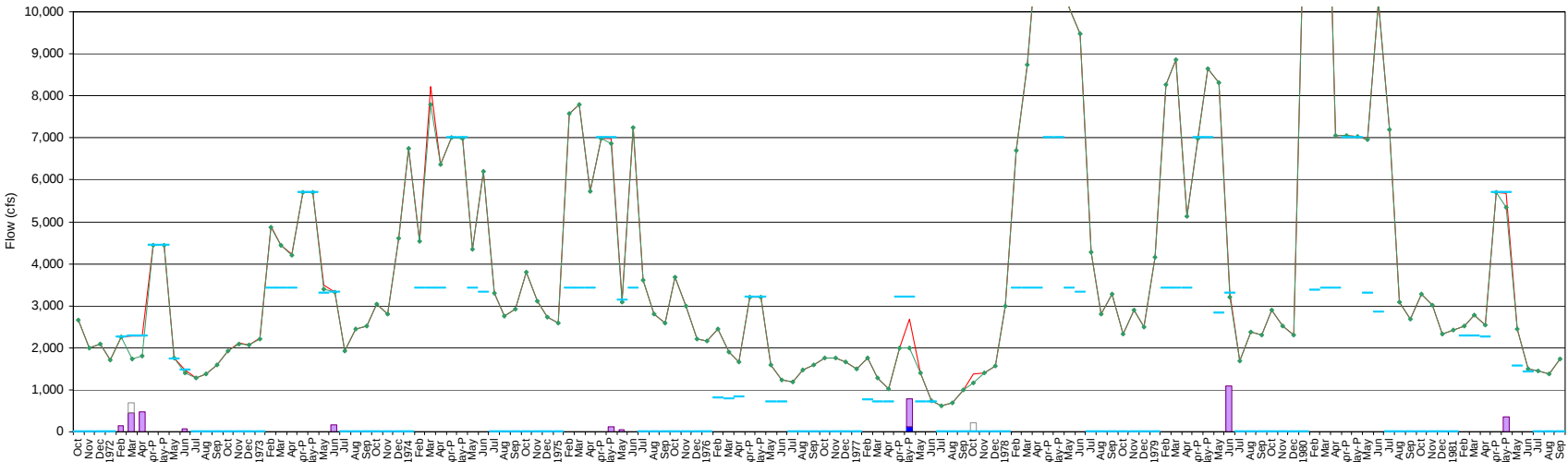
Key:
WQ = water quality

Figure A1-11. Alternative C Existing LOD

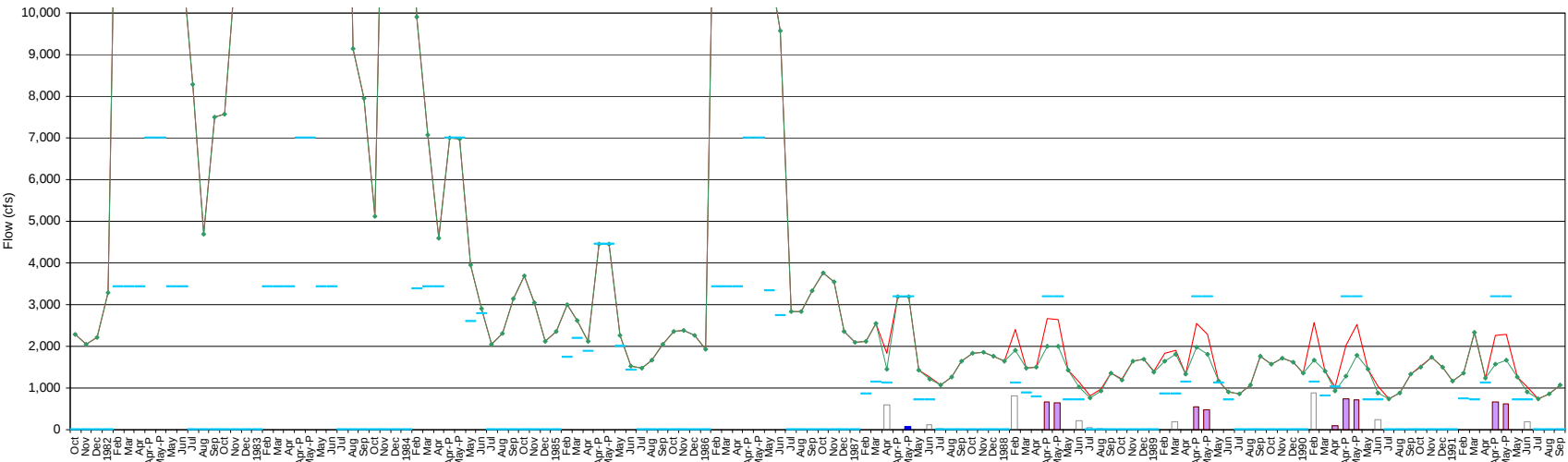
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



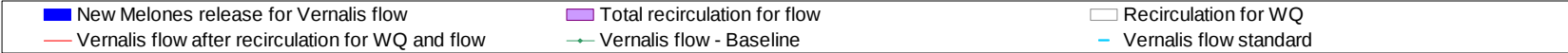
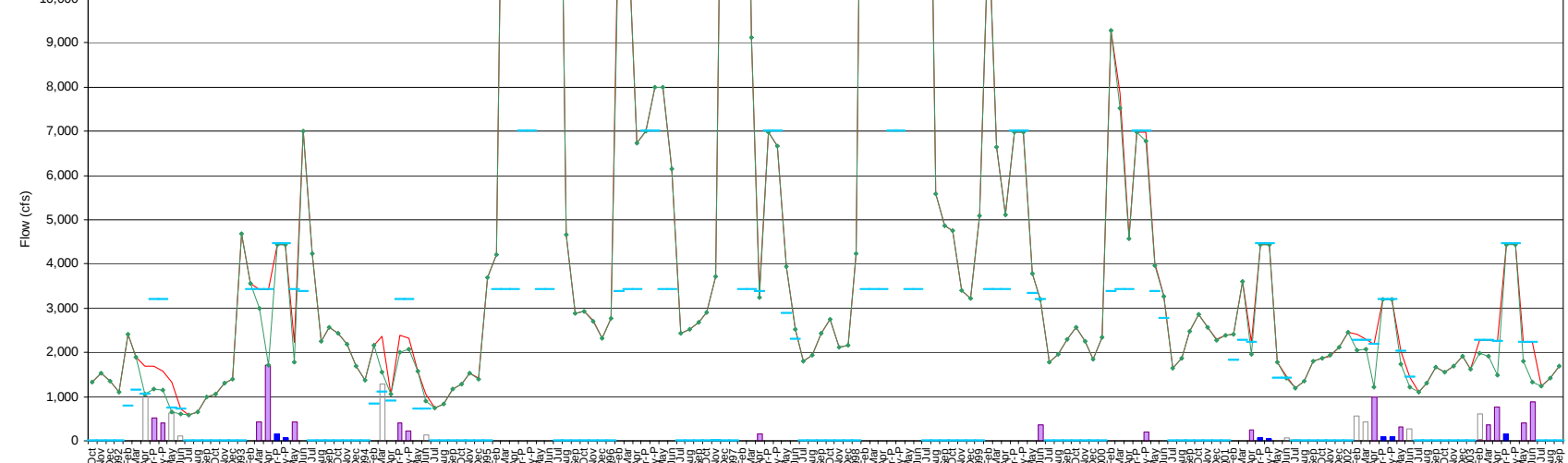
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-11. Alternative C Existing LOD (continued)

Table A1-6. Alternative D Existing LOD

Recirculation used prior to New Melones release using Jones PP and Banks excess capacity
with CVP “impacts” to meet flow and Quality standard

1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	2	0	0	0	2	1	2	0	0	1	1	0	0	0	9
AN	0	0	0	0	6	12	0	0	2	2	23	0	0	0	45
BN	0	0	0	0	4	8	5	0	4	5	5	0	0	0	31
D	0	0	0	0	6	16	7	0	5	5	4	1	0	0	44
C	0	0	0	0	15	25	6	12	11	6	5	0	0	0	83
All	1	0	0	0	6	11	4	2	4	3	7	0	0	0	40

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	3	0	0	0	1	1	2	0	1	2	2	0	0	0	8
AN (16)	0	0	0	0	2	5	1	0	2	2	12	0	0	0	14
BN (13)	0	0	0	0	4	6	6	0	3	6	3	0	0	0	11
D (13)	0	0	0	0	5	6	6	0	4	7	8	4	0	0	12
C (16)	1	0	0	0	6	8	7	10	11	6	12	3	1	0	16
All (82)	4	0	0	0	18	26	22	10	21	23	37	7	1	0	61

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	13	0	0	0	48	26	28	0	4	8	17	0	0	0	28
AN	0	0	0	0	44	40	2	0	18	13	30	0	0	0	51
BN	0	0	0	0	15	17	11	0	19	10	21	0	0	0	37
D	0	0	0	0	16	35	14	0	17	10	6	3	0	0	48
C	6	0	0	0	41	51	14	19	16	17	7	3	5	0	83
All	11	0	0	0	29	36	14	19	16	12	16	3	5	0	53

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	2	0	0	0	0	0	0	0	0	1	0	0	0	0	3
AN	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
BN	0	0	0	0	3	5	3	0	0	1	1	0	0	0	13
D	0	0	0	0	5	14	4	0	0	5	4	1	0	0	32
C	0	0	0	0	15	25	6	0	0	6	5	0	0	0	59
All	1	0	0	0	4	8	2	0	0	2	2	0	0	0	20

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	3	0	0	0	0	0	1	0	0	1	0	0	0	0	3
AN (16)	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2
BN (13)	0	0	0	0	2	2	3	0	0	2	1	0	0	0	4
D (13)	0	0	0	0	5	6	4	0	0	6	7	4	0	0	9
C (16)	1	0	0	0	6	8	6	0	0	6	12	3	1	0	14
All (82)	4	0	0	0	14	16	14	0	0	15	21	7	1	0	32

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

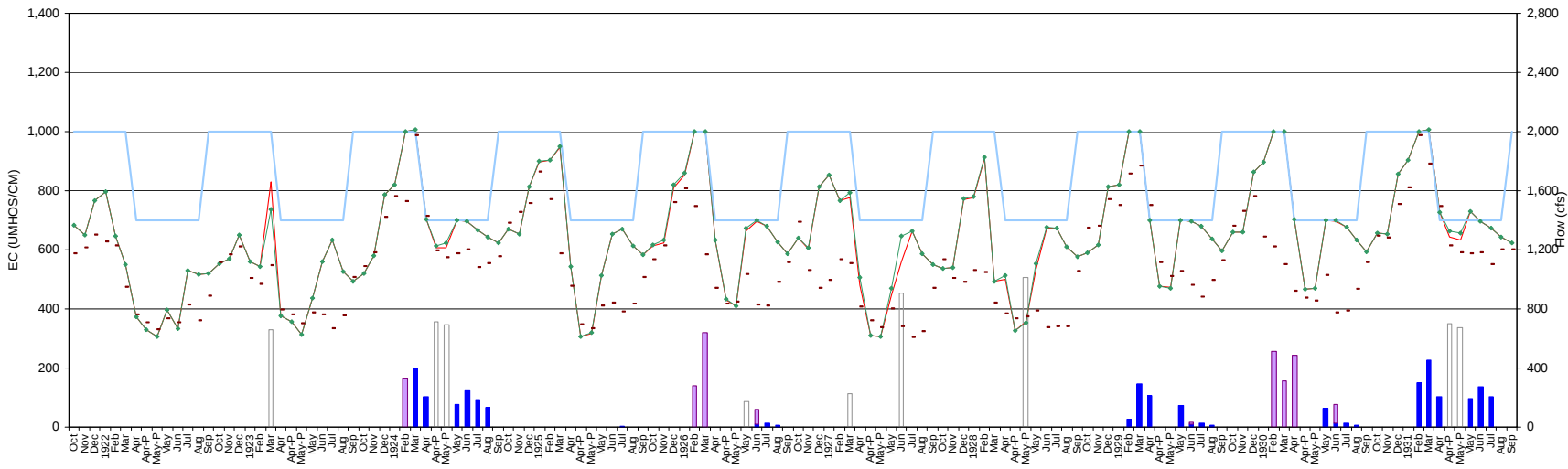
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	2	1	2	0	0	0	1	0	0	0	7
AN	0	0	0	0	5	12	0	0	2	2	22	0	0	0	43
BN	0	0	0	0	2	2	2	0	4	3	4	0	0	0	18
D	0	0	0	0	1	2	3	0	5	0	0	0	0	0	12
C	0	0	0	0	0	0	0	12	11	0	0	0	0	0	24
All	0	0	0	0	2	3	1	2	4	1	5	0	0	0	20

Frequency of Occurrence

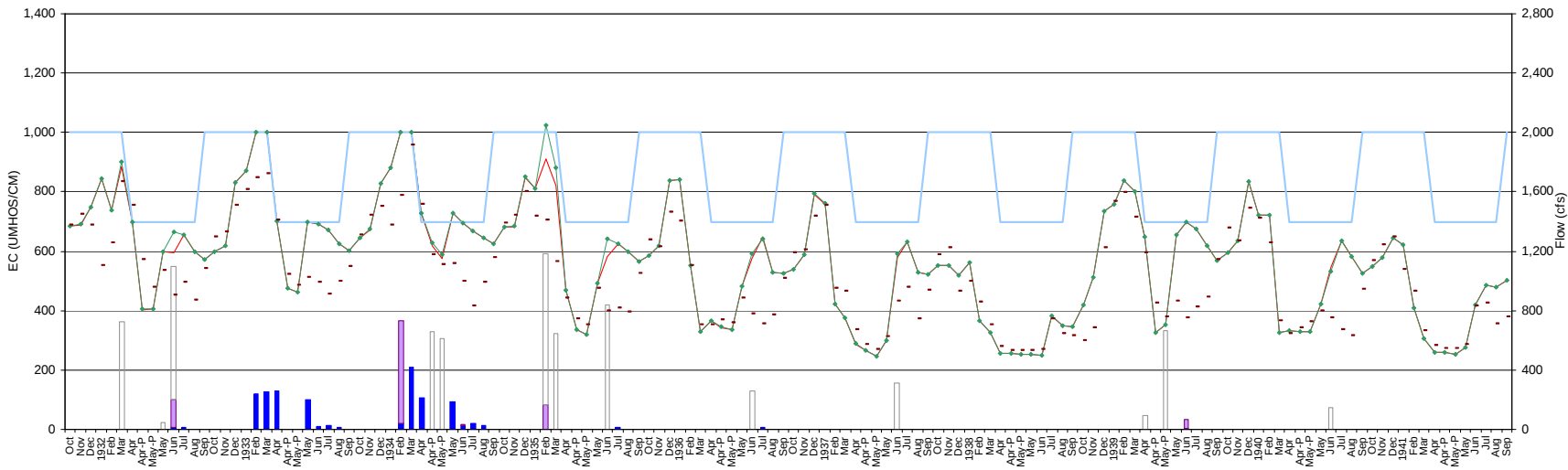
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	2	0	1	1	2	0	0	0	6
AN (16)	0	0	0	0	2	5	1	0	2	2	12	0	0	0	14
BN (13)	0	0	0	0	3	5	4	0	3	6	3	0	0	0	11
D (13)	0	0	0	0	3	2	6	0	4	1	2	0	0	0	11
C (16)	0	0	0	0	0	0	1	10	11	0	0	0	0	0	11
All (82)	0	0	0	0	9	13	14	10	21	10	19	0	0	0	53

Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

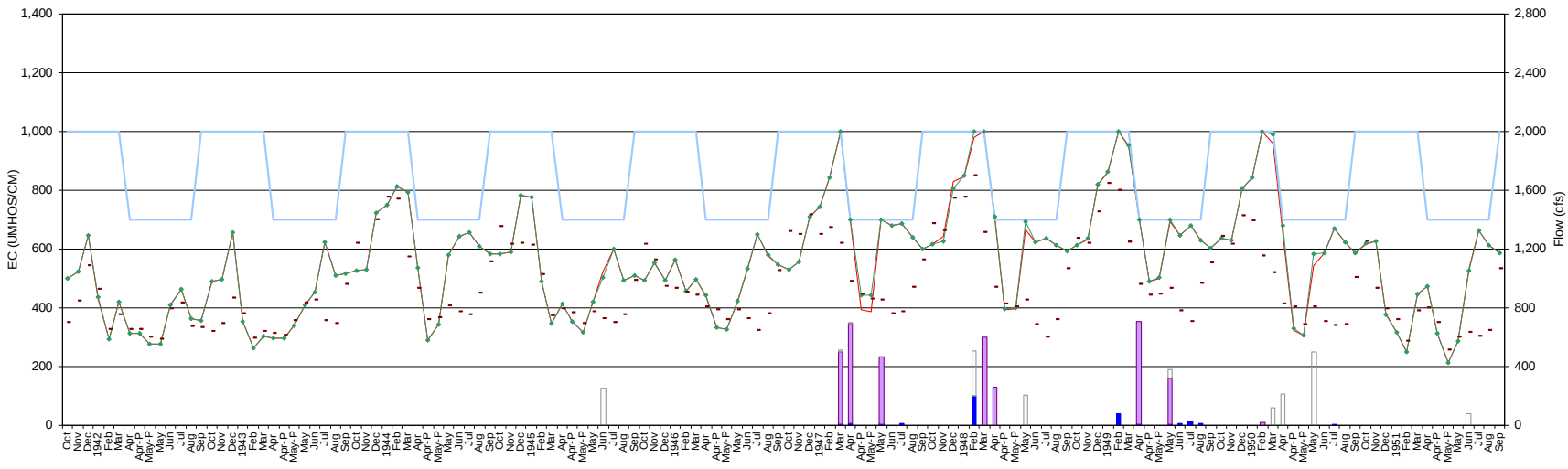
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1922-1931



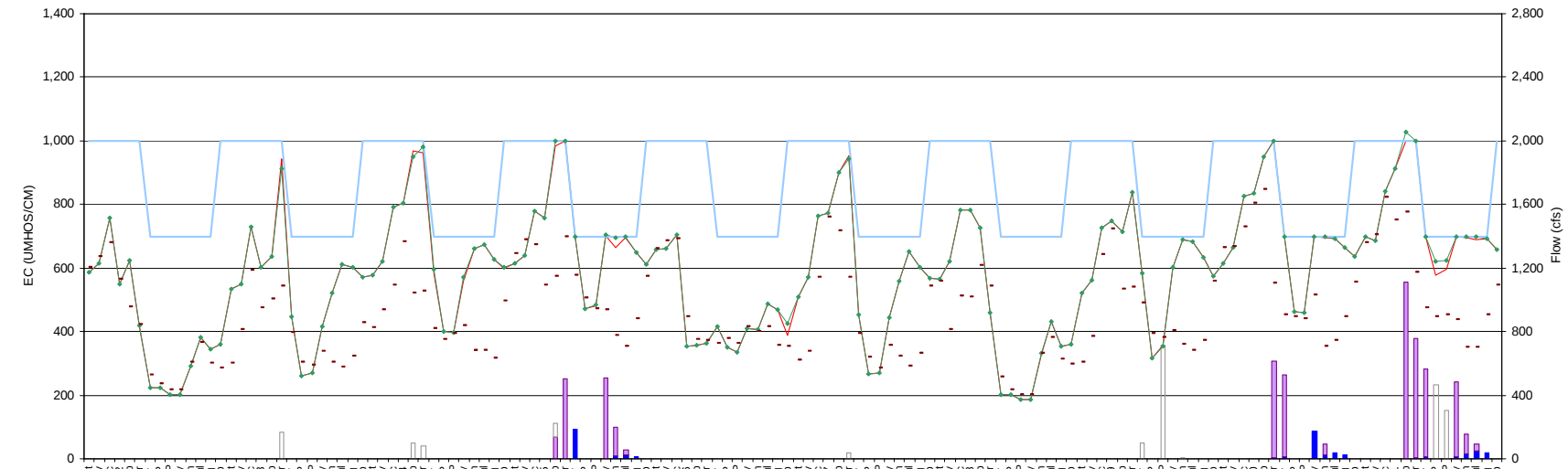
Water Year: 1932-1941



Water Year: 1942-1951



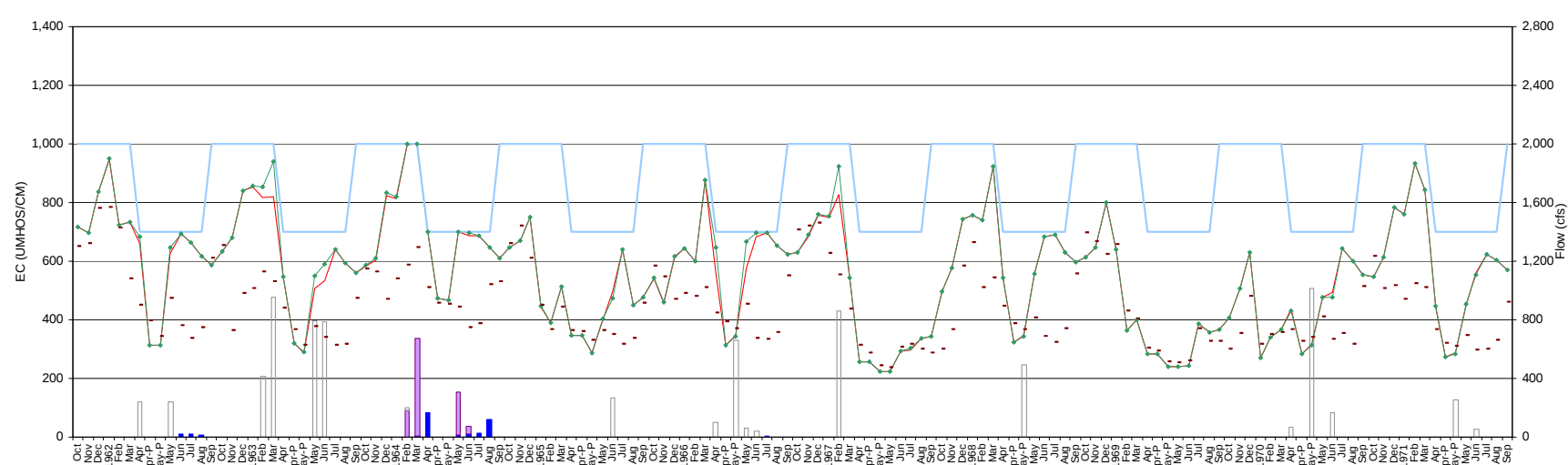
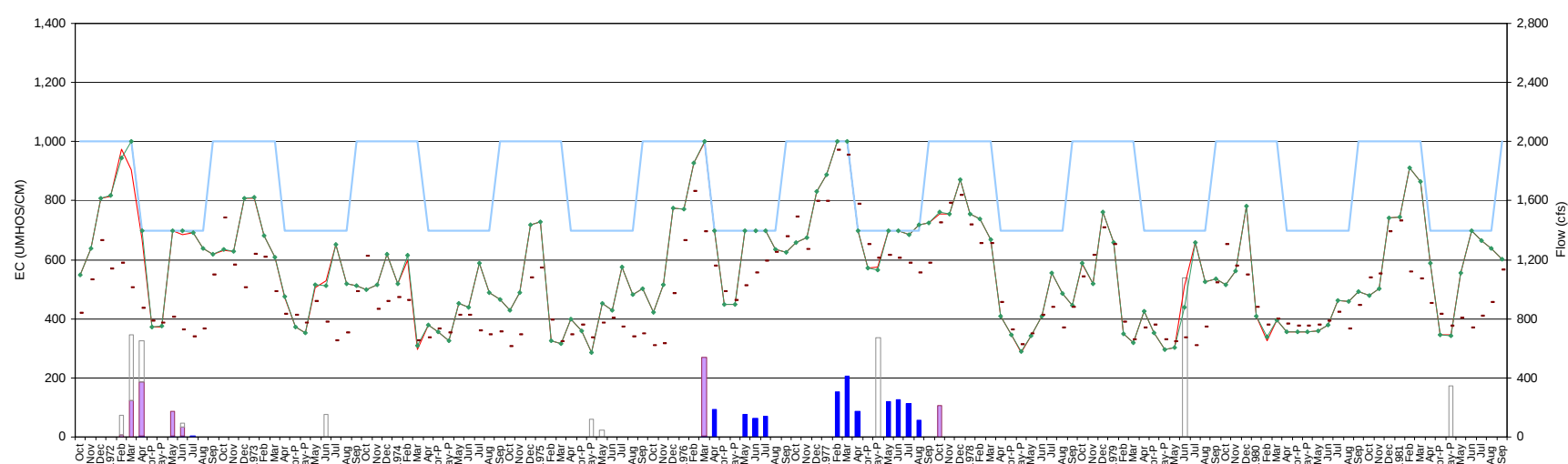
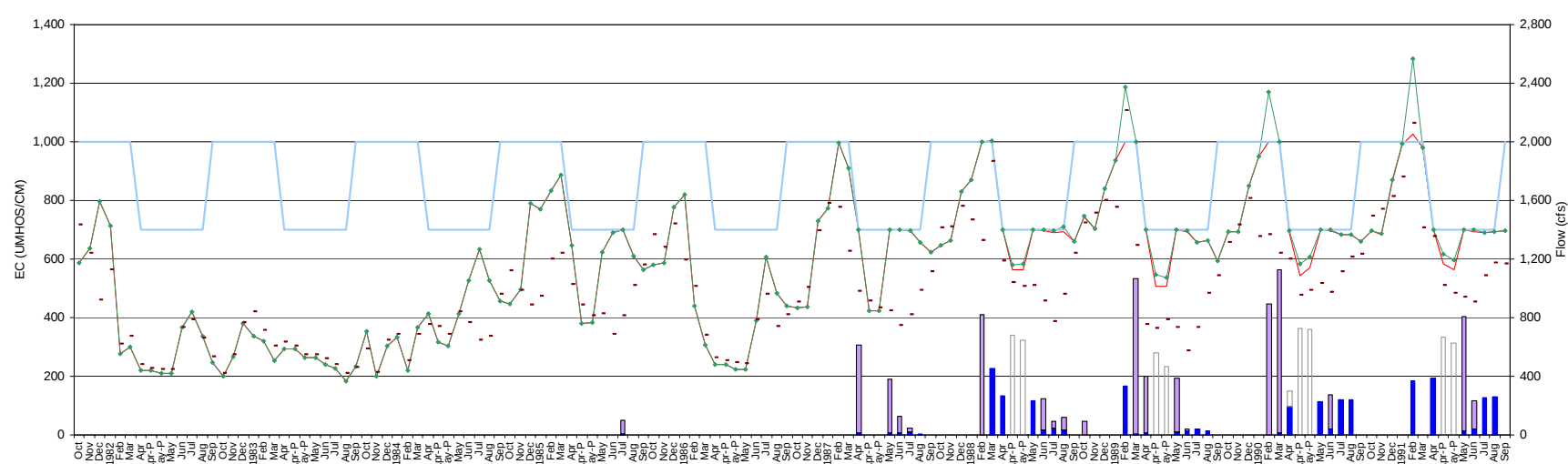
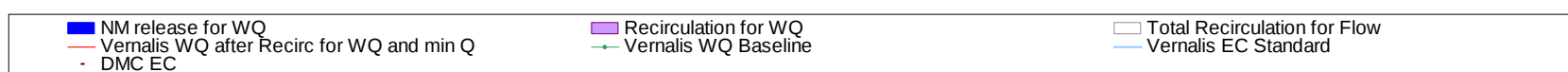
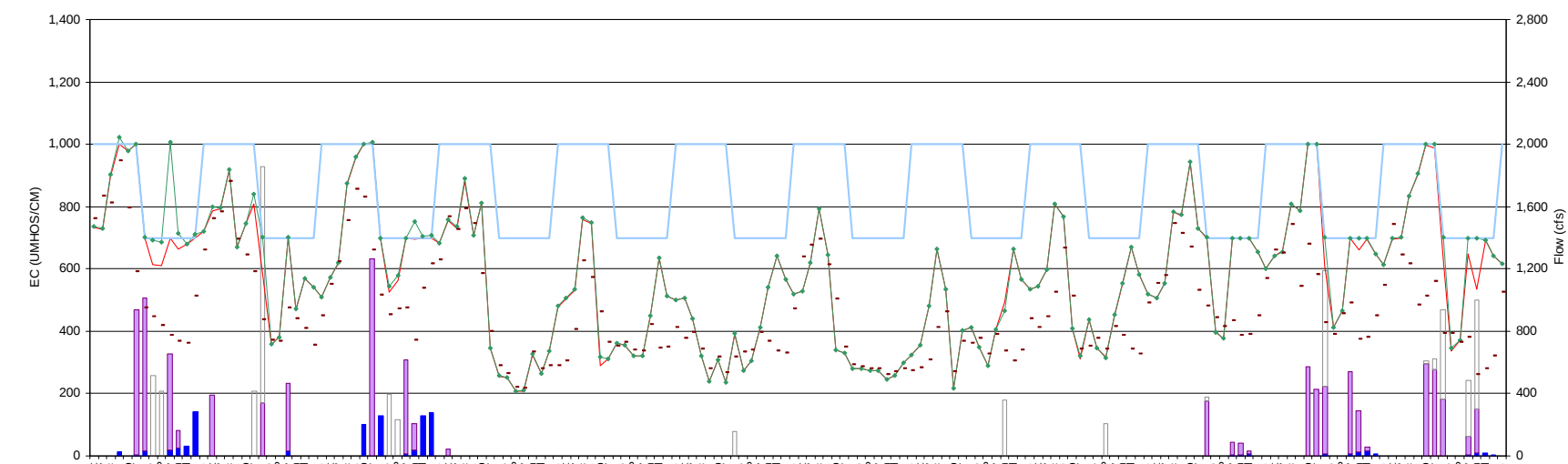
Water Year: 1952-1961



Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-12. Alternative D Existing LOD

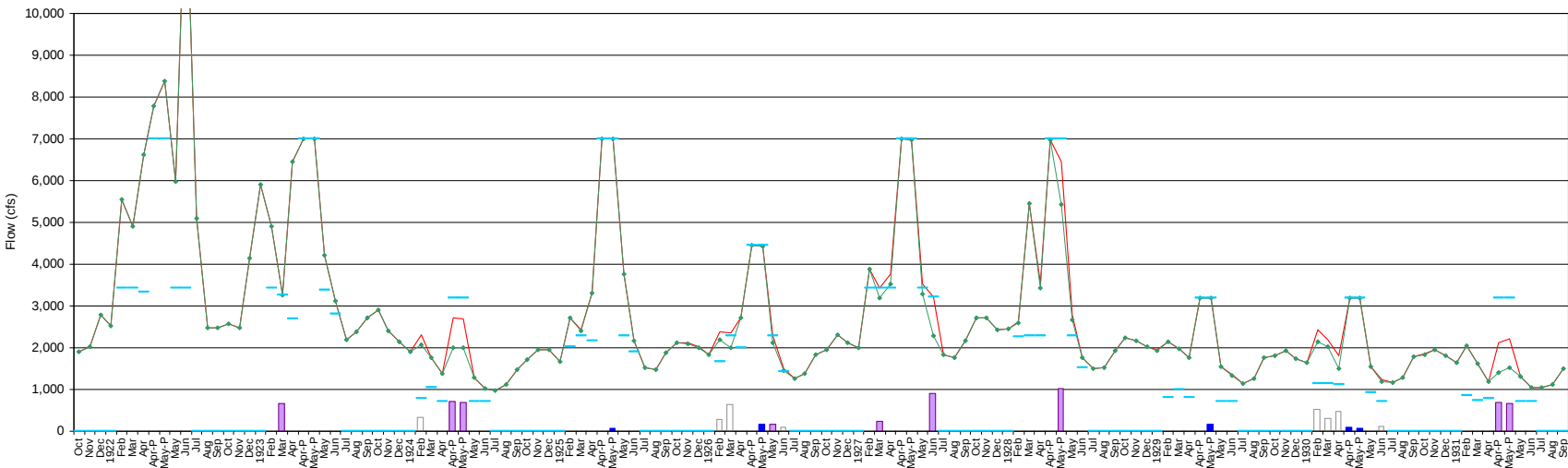
San Joaquin River Quality and recirculation used to satisfy water quality standard

Water Year: 1962-1971**Water Year: 1972-1981****Water Year: 1982-1991****Water Year: 1991-2003**

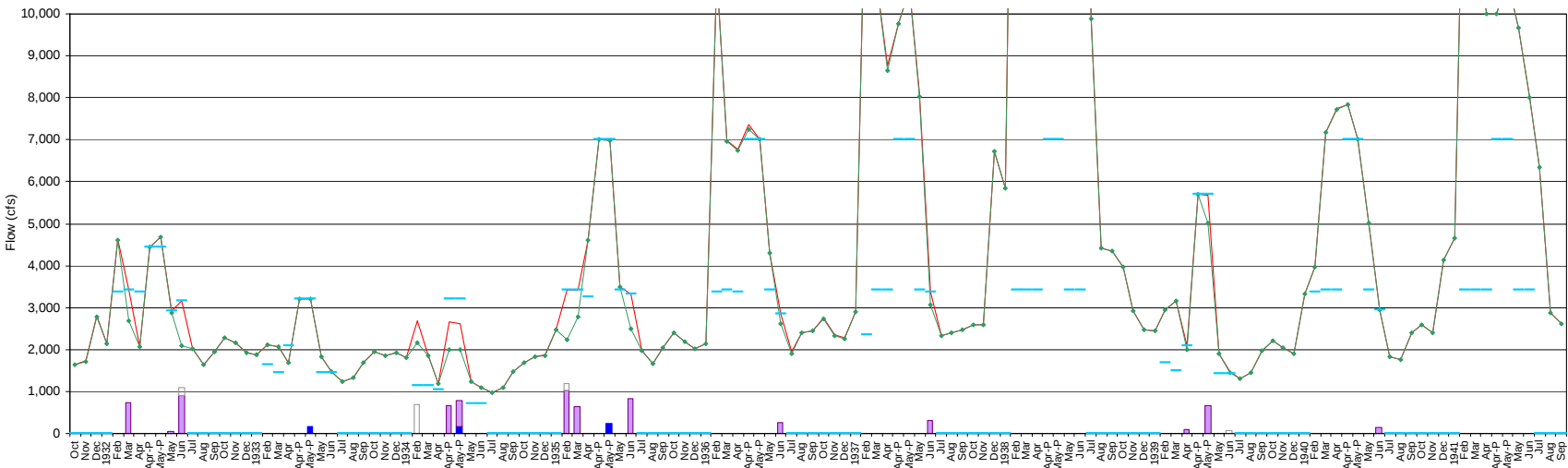
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-12. Alternative D Existing LOD (continued)

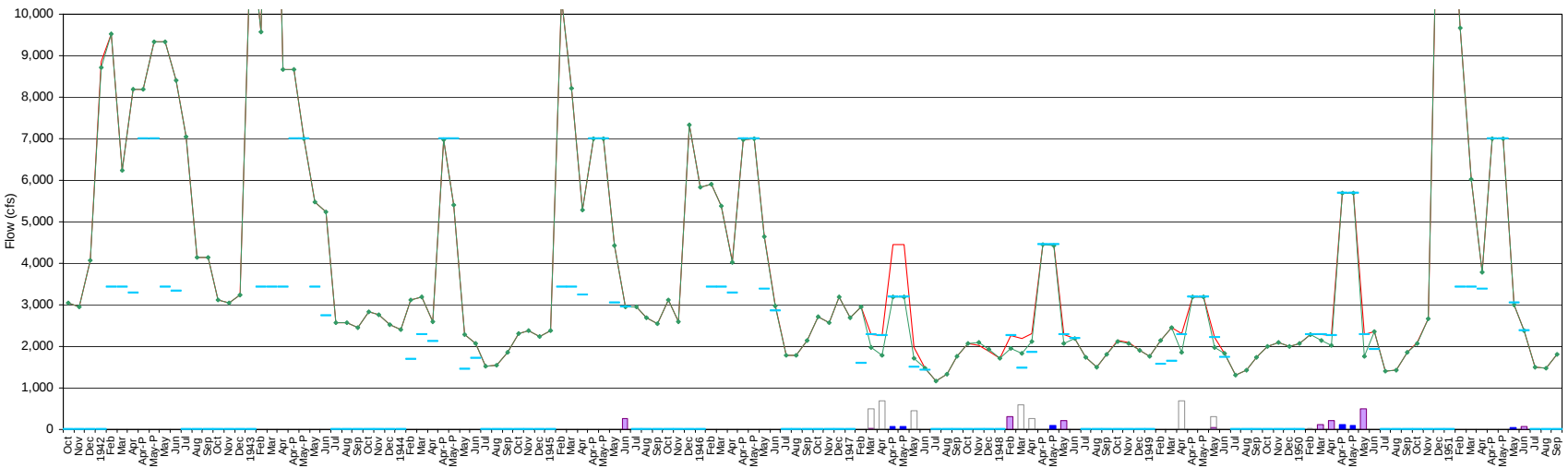
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



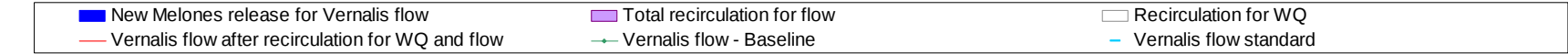
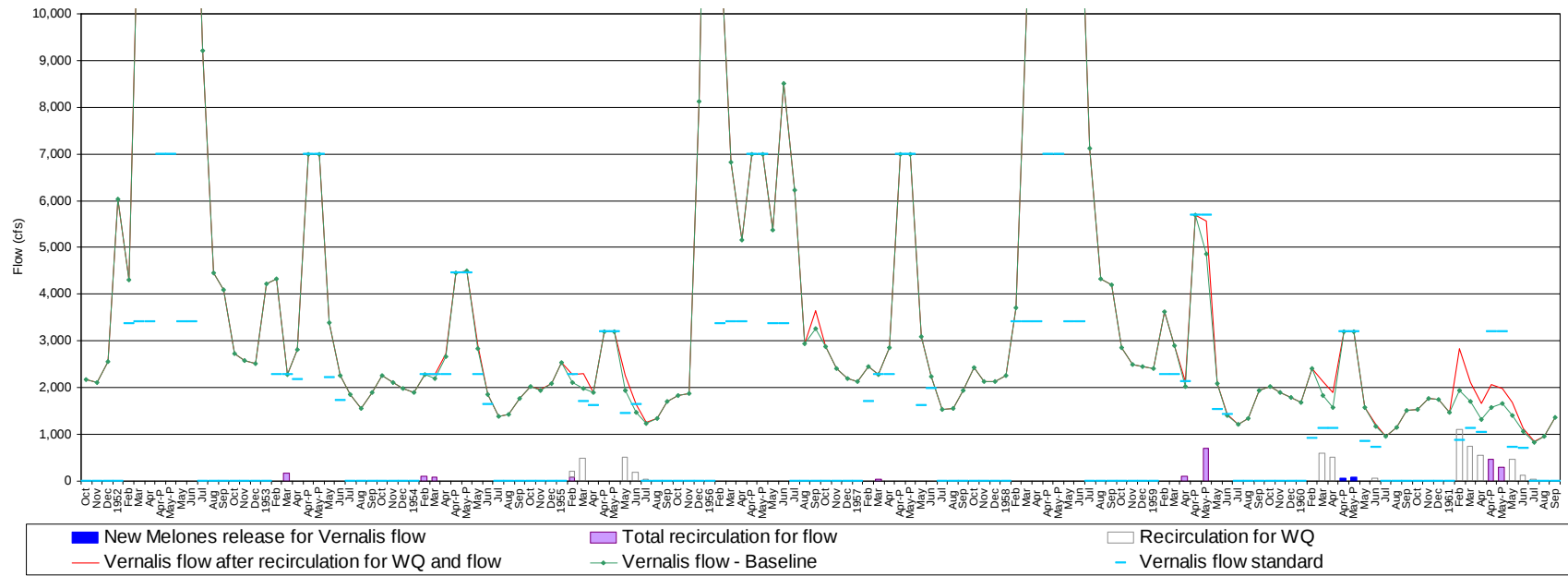
Water Year: 1932-1941



Water Year: 1942-1951



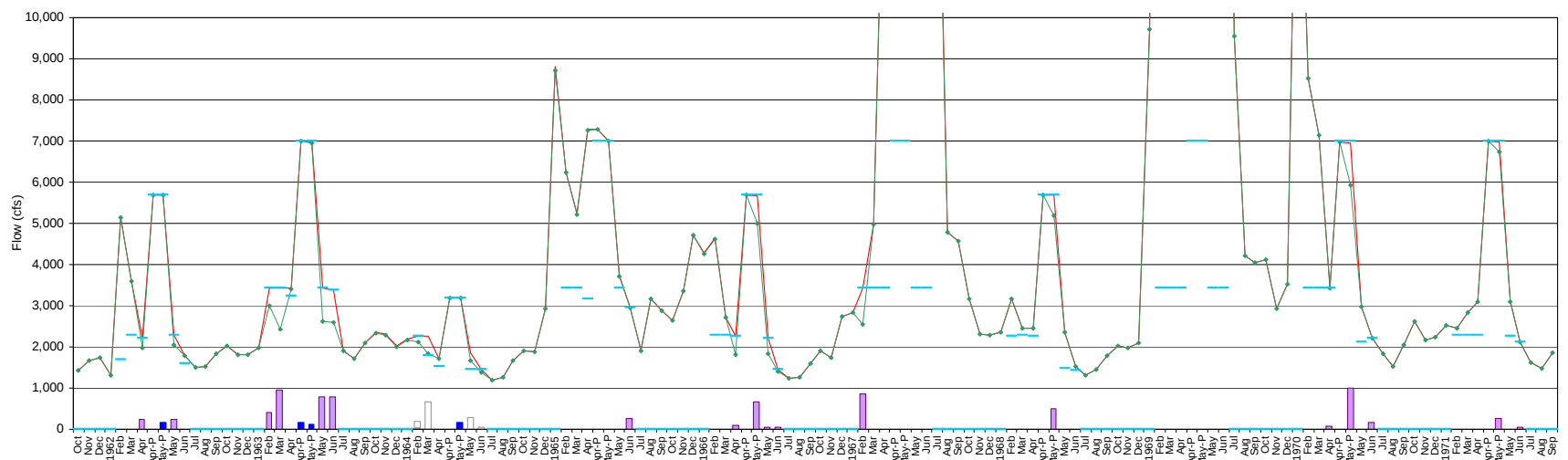
Water Year: 1952-1961



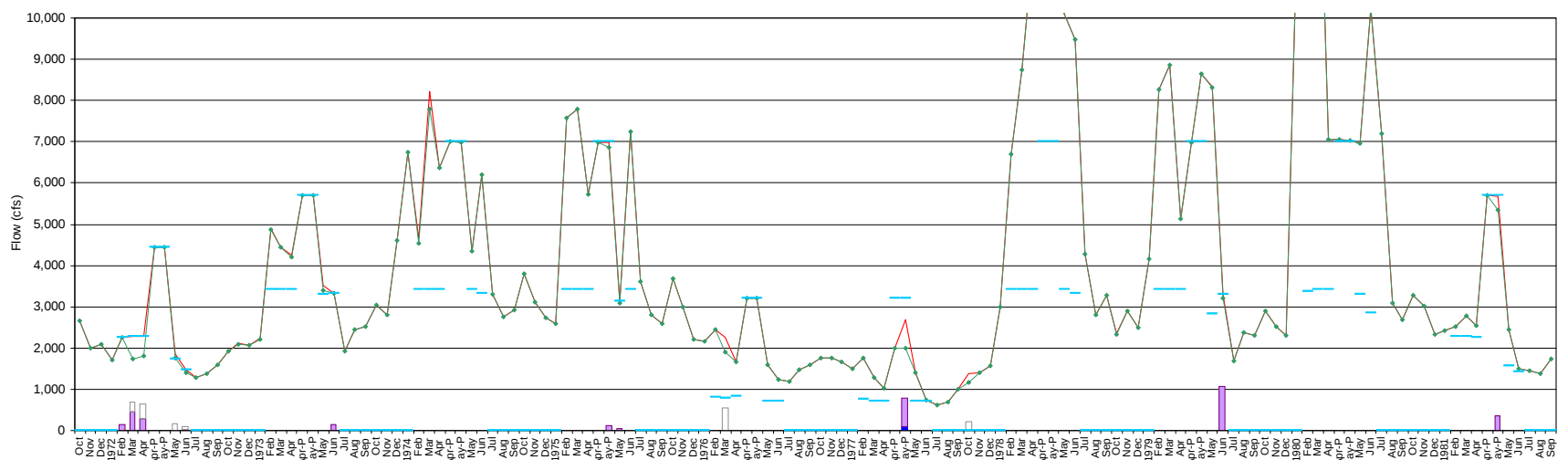
Key:
WQ = water quality

Figure A1-13. Alternative D Existing LOD

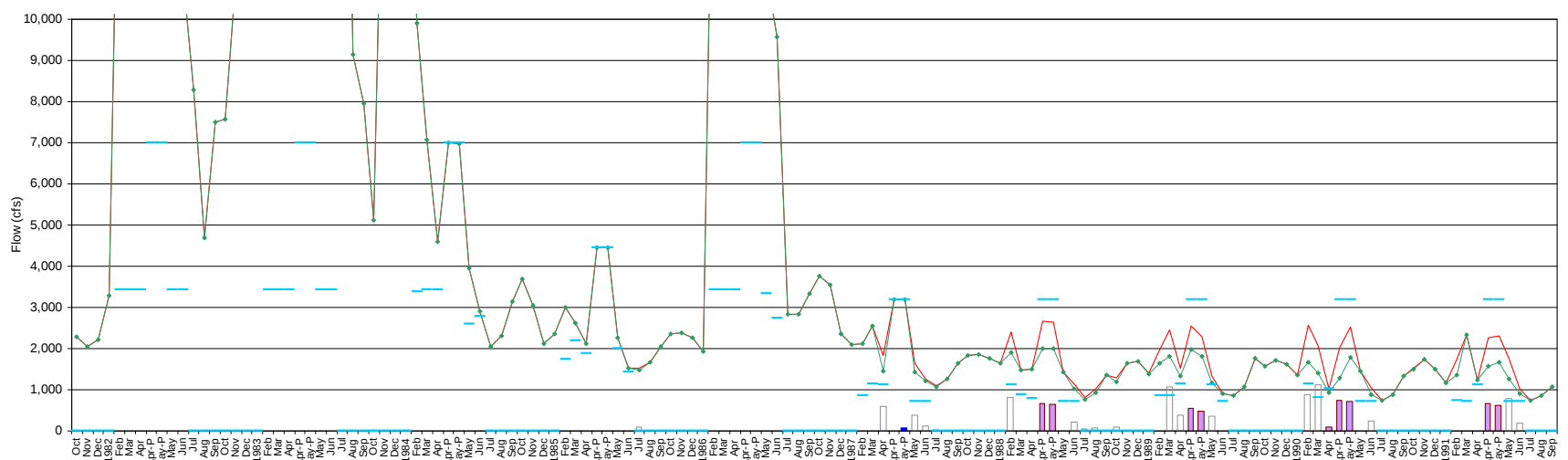
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



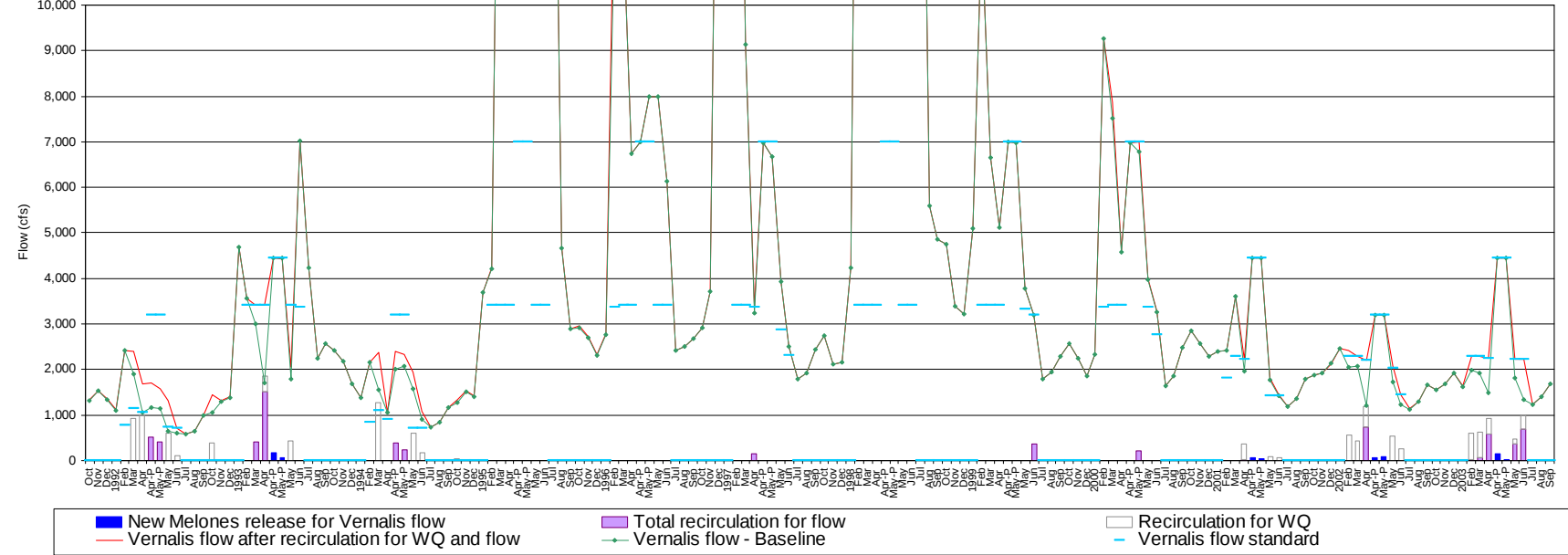
Water Year: 1972-1981



Water Year: 1982-1991



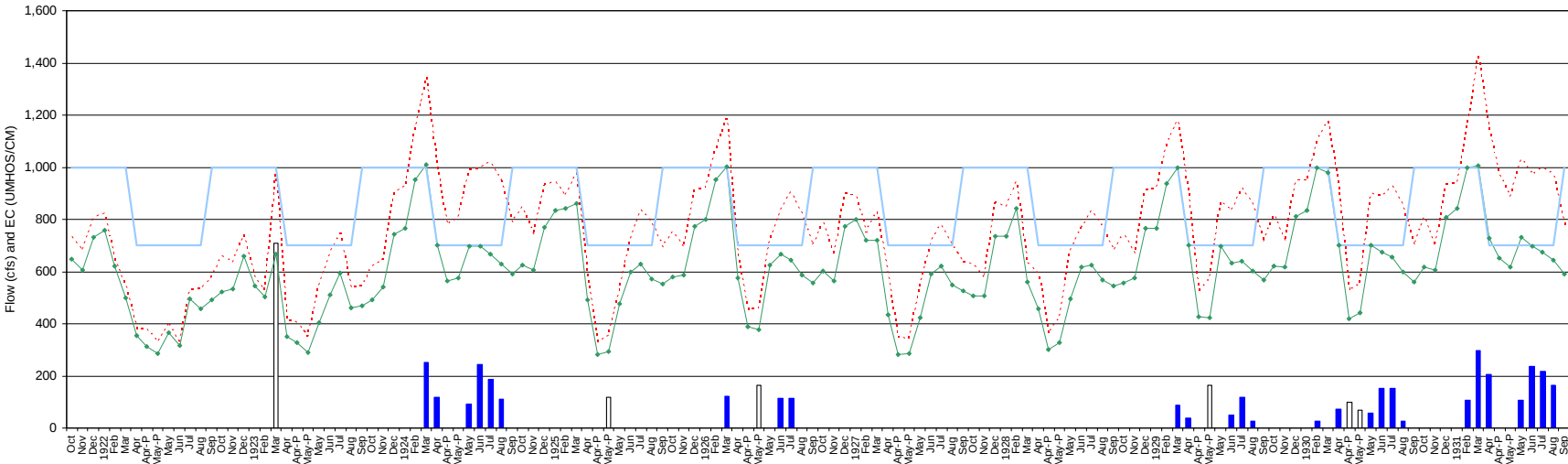
Water Year: 1992-2003



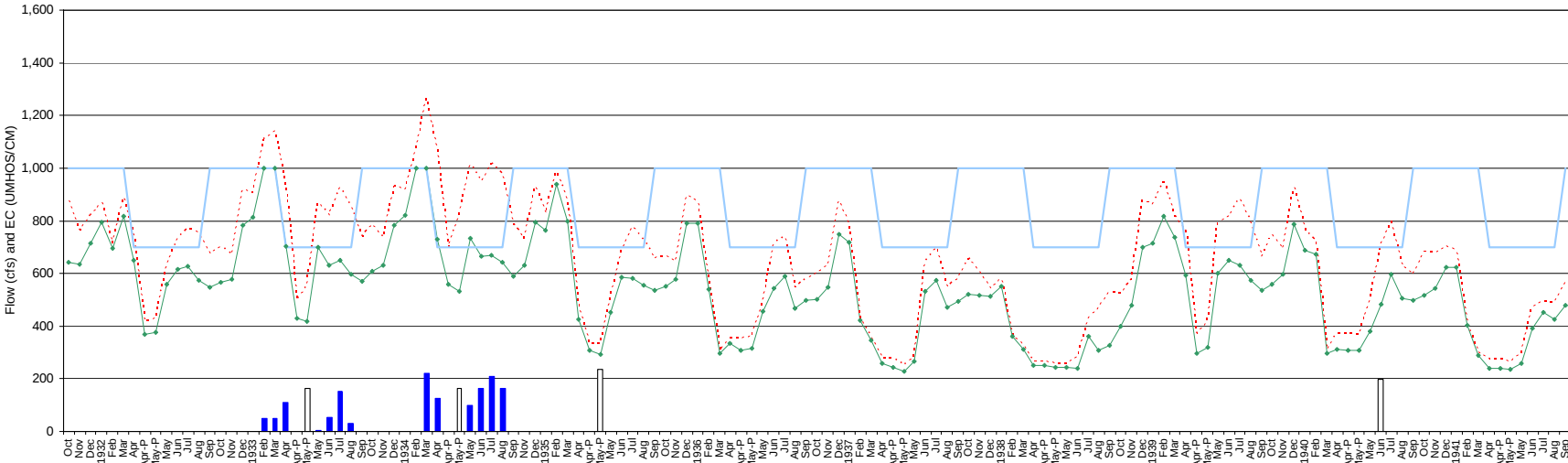
Key:
WQ = water quality

Figure A1-13. Alternative D Existing LOD (continued)

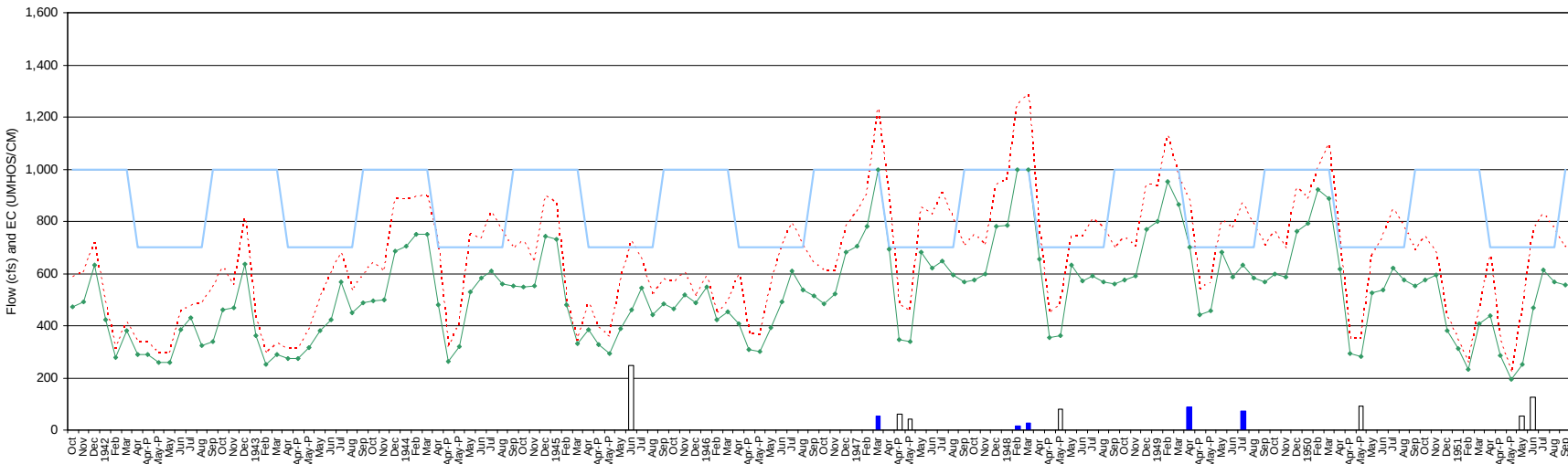
San Joaquin River Quality and New Melones Release for Water Quality and Flow
Water Year: 1922-1931



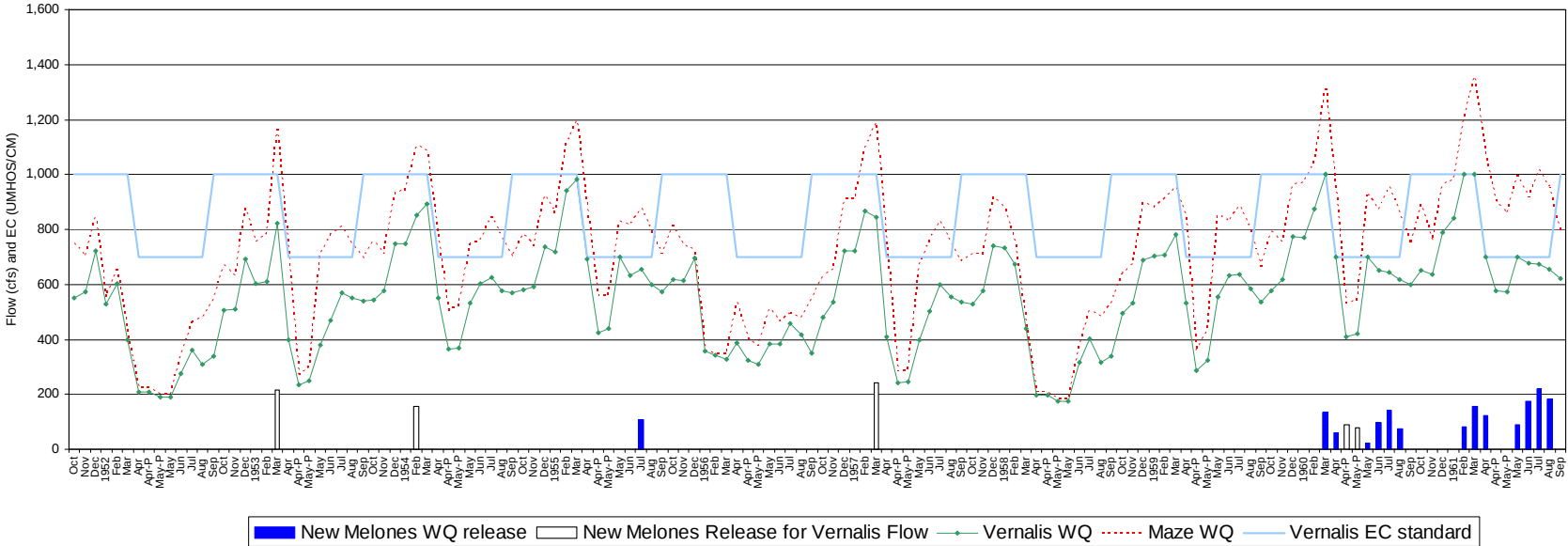
Water Year: 1932-1941



Water Year: 1942-1951



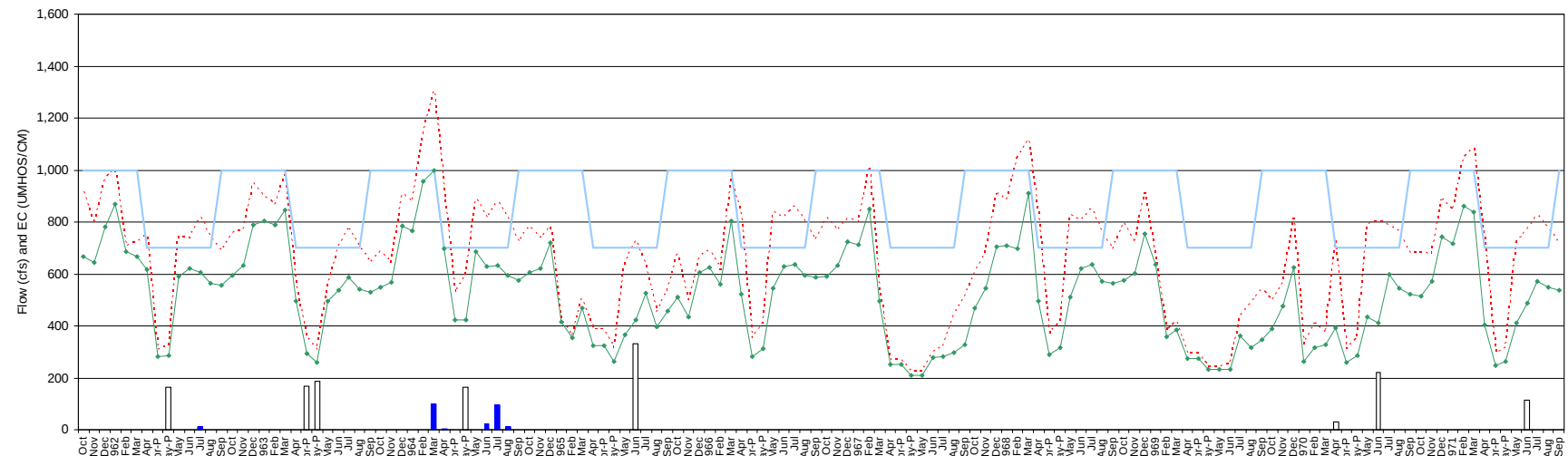
Water Year: 1952-1961



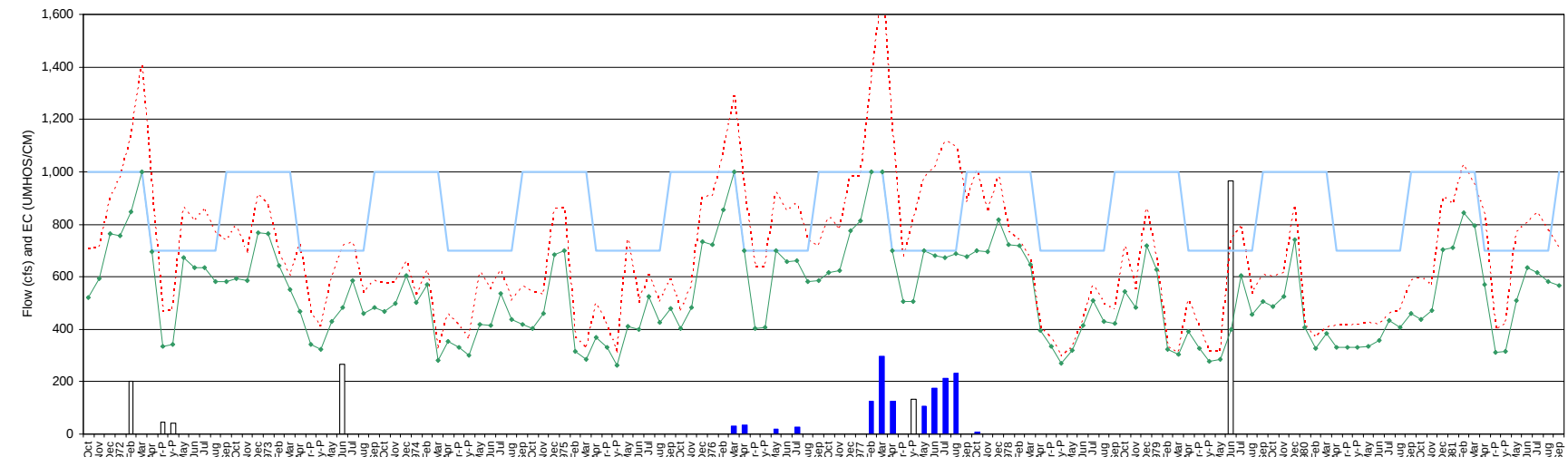
Key:
EC = electrical conductivity
WQ = water quality

Figure A1-14. CalSim No-Action Alternative

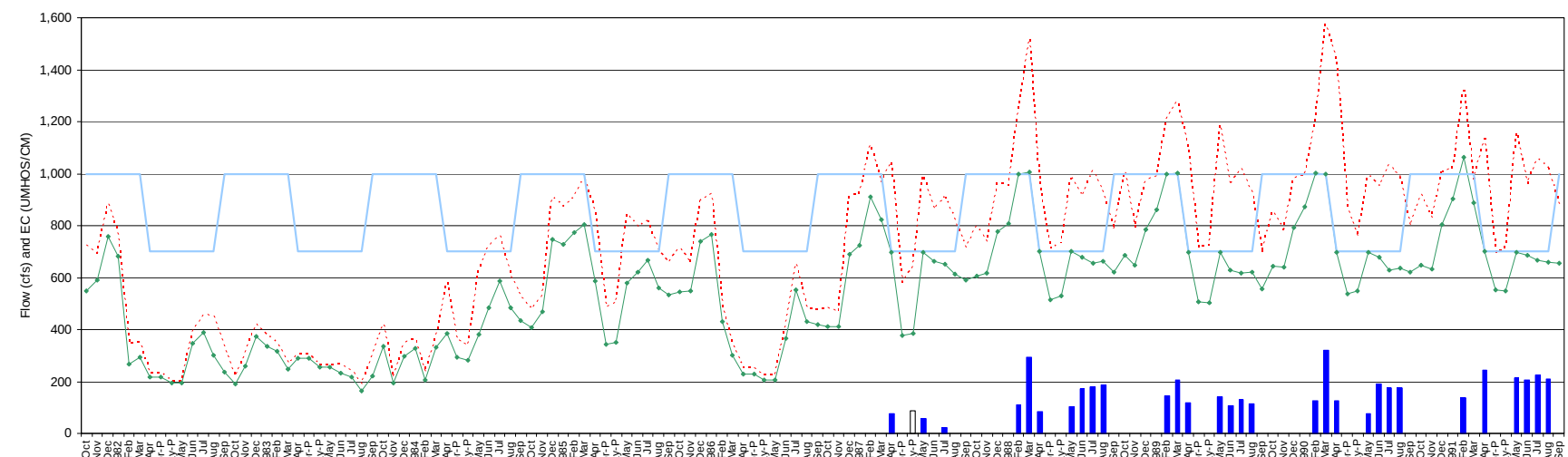
San Joaquin River Quality and New Melones Release for Water Quality and Flow
Water Year: 1962-1971



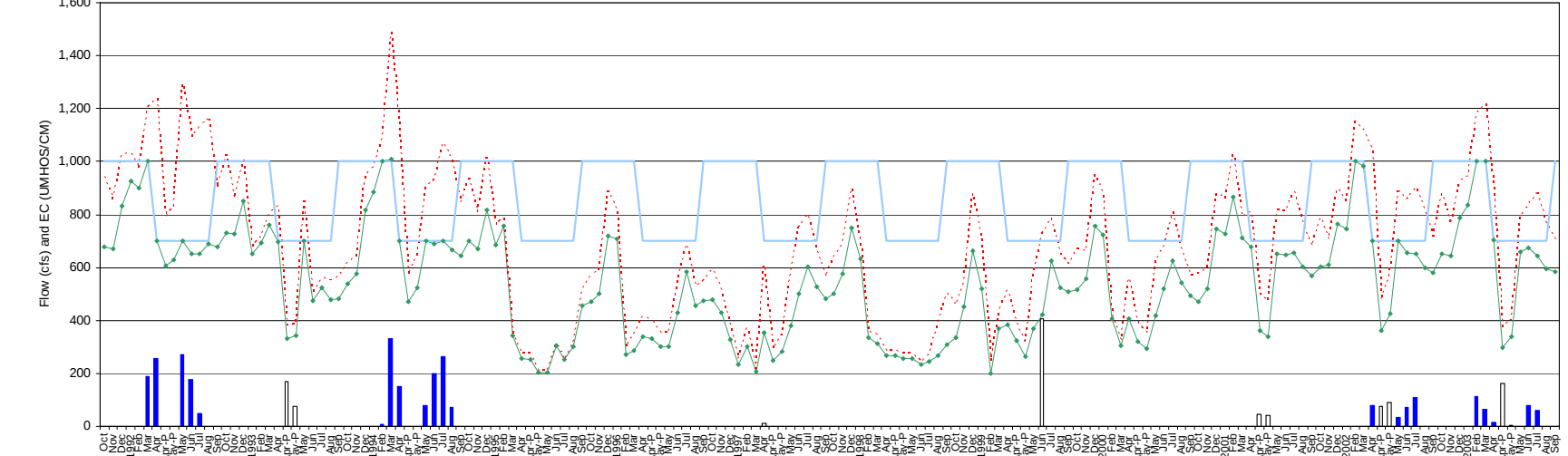
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



■ New Melones WQ release □ New Melones Release for Vernalis Flow — Vernalis WQ - - - Maze WQ — Vernalis EC standard

Key:
EC = electrical conductivity
WQ = water quality

Figure A1-14. CalSim No-Action Alternative (continued)

Table A1-7. Alternative A1 Future LOD

Recirculation used supplemental to New Melones release using Jones PP excess capacity
1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN	0	0	0	0	2	11	2	0	0	0	5	0	0	0	20
BN	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
D	0	0	0	0	4	6	3	0	0	1	2	0	0	0	14
C	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2
All	0	0	0	0	1	3	1	0	0	0	2	0	0	0	7

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN (16)	0	0	0	0	1	4	1	0	0	0	2	0	0	0	4
BN (13)	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
D (13)	0	0	0	0	3	3	3	0	0	1	4	0	0	0	10
C (16)	0	0	0	0	0	1	3	0	0	1	1	0	0	0	5
All (82)	0	0	0	0	6	9	7	0	0	2	8	0	0	0	23

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	17	0	0	0	17
AN	0	0	0	0	33	43	37	0	0	0	40	0	0	0	80
BN	0	0	0	0	15	9	0	0	0	0	0	0	0	0	13
D	0	0	0	0	15	27	11	0	0	7	5	0	0	0	19
C	0	0	0	0	0	2	4	0	0	2	10	0	0	0	5
All	0	0	0	0	18	29	12	0	0	4	16	0	0	0	26

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN (16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN (13)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D (13)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
C (16)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
All (82)	0	0	0	0	2	2	0	0	0	0	0	0	0	0	4

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN	0	0	0	0	2	11	2	0	0	0	5	0	0	0	20
BN	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
D	0	0	0	0	4	6	3	0	0	1	2	0	0	0	14
C	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1
All	0	0	0	0	1	3	1	0	0	0	2	0	0	0	7

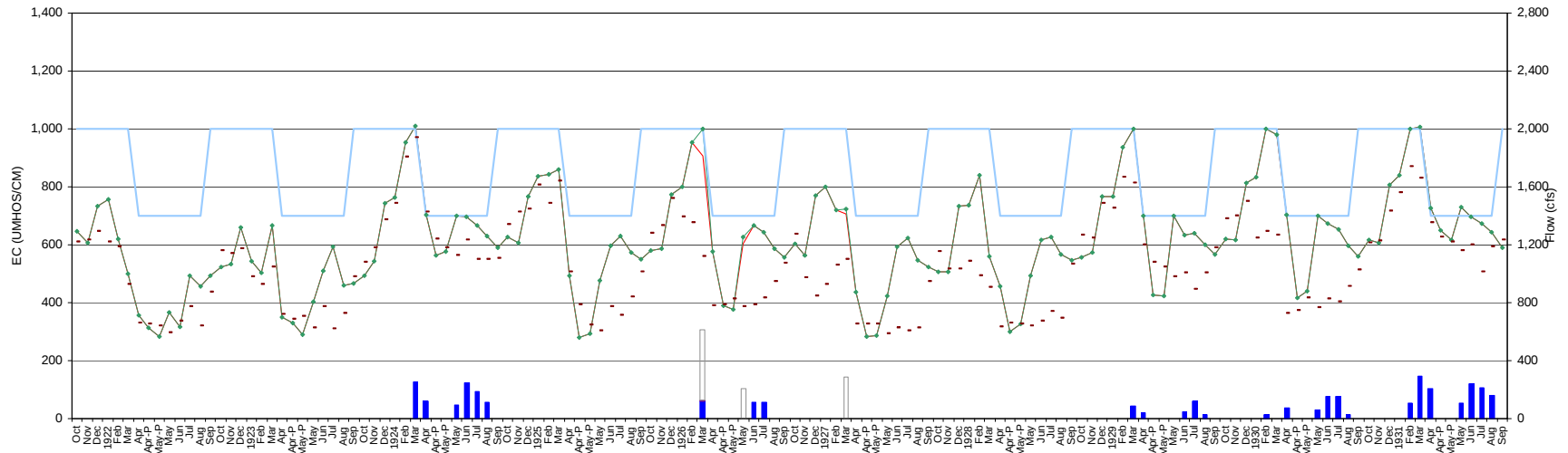
Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN (16)	0	0	0	0	1	4	1	0	0	0	2	0	0	0	4
BN (13)	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
D (13)	0	0	0	0	3	3	3	0	0	1	4	0	0	0	10
C (16)	0	0	0	0	0	0	3	0	0	1	1	0	0	0	4
All (82)	0	0	0	0	6	8	7	0	0	2	8	0	0	0	22

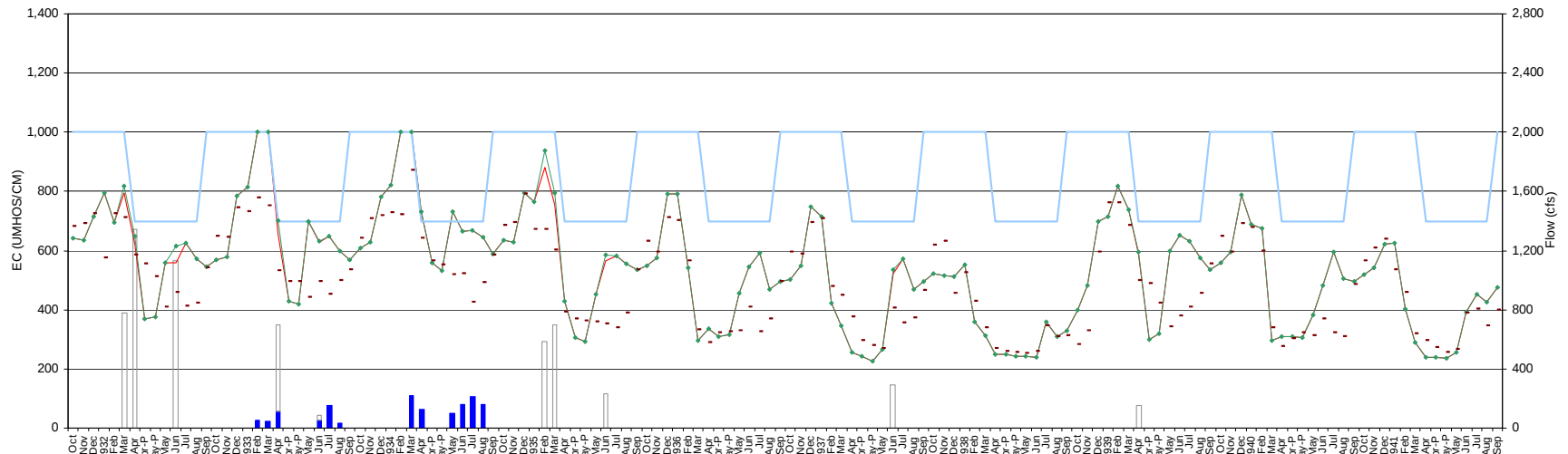
Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

San Joaquin River Quality and recirculation used to satisfy water quality standard

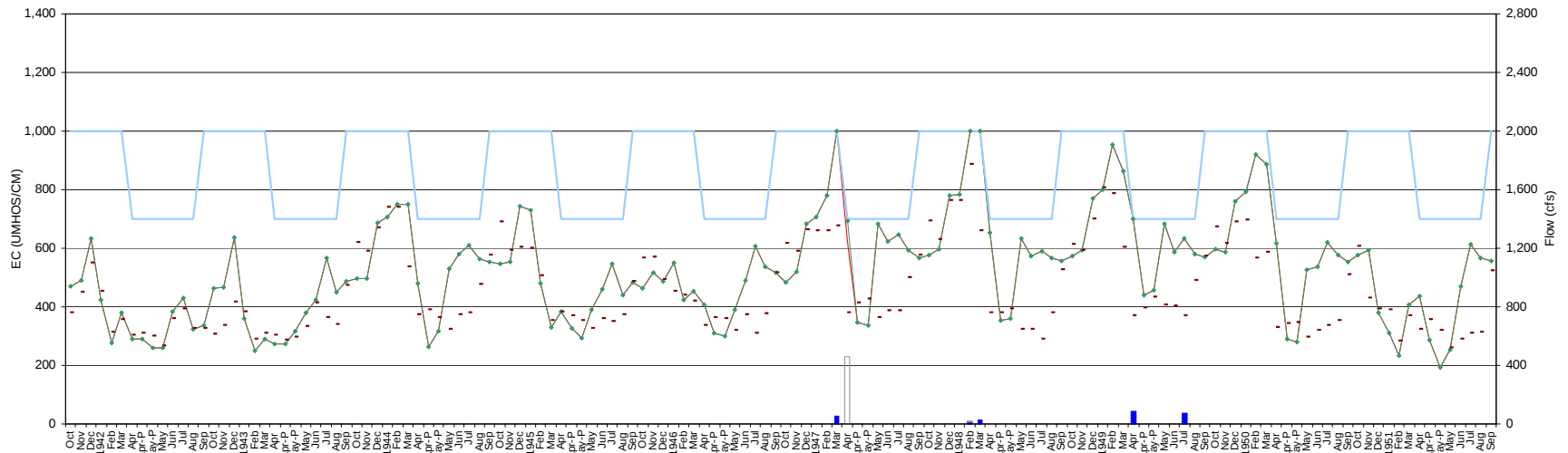
Water Year: 1922-1931



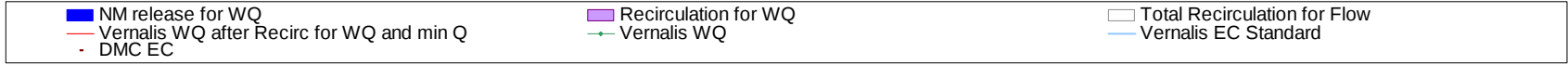
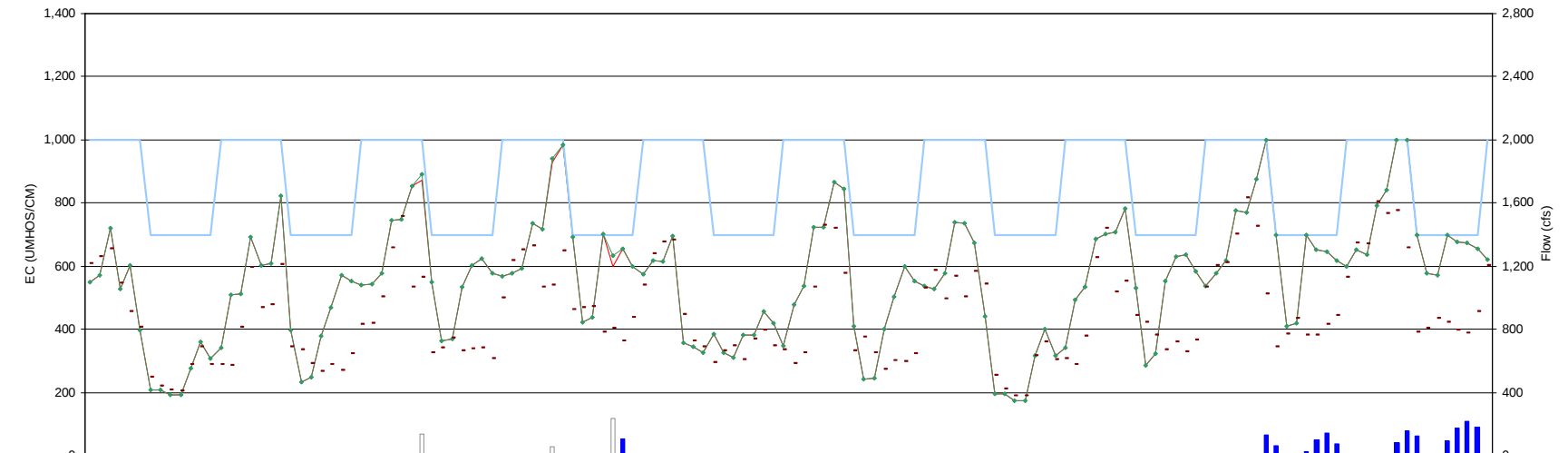
Water Year: 1932-1941



Water Year: 1942-1951



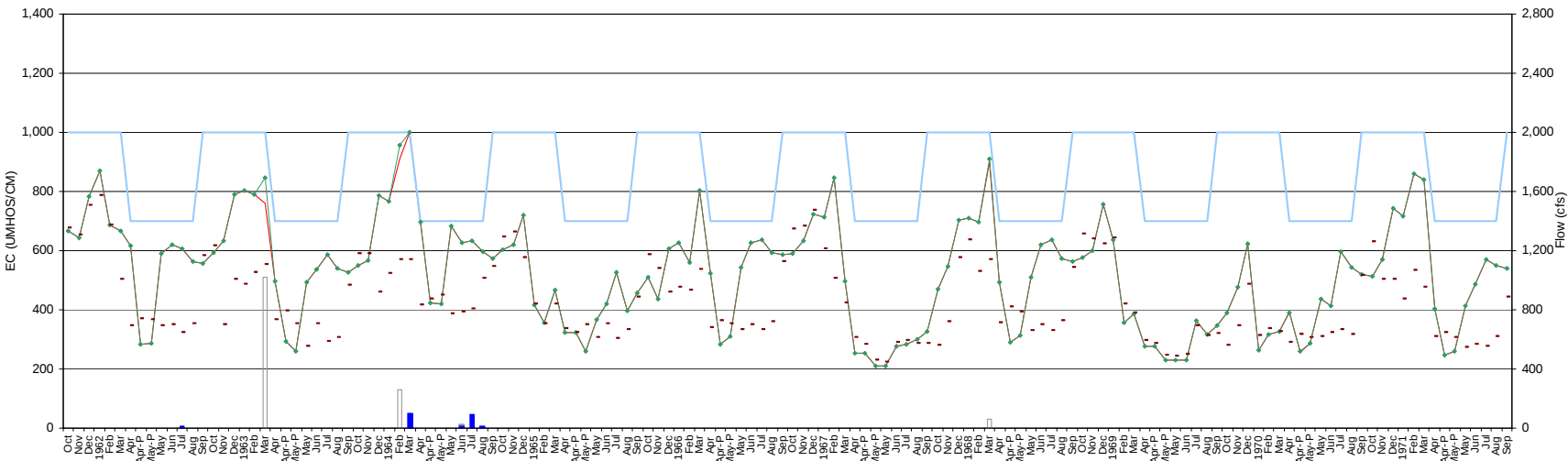
Water Year: 1952-1961



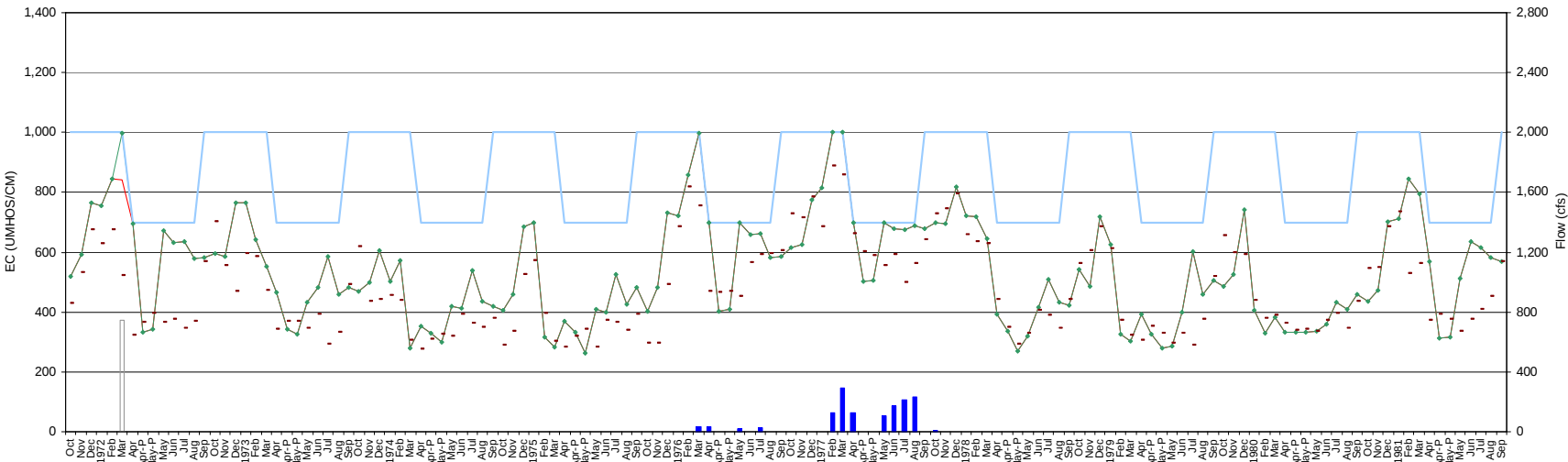
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-15. Alternative A1 Future LOD

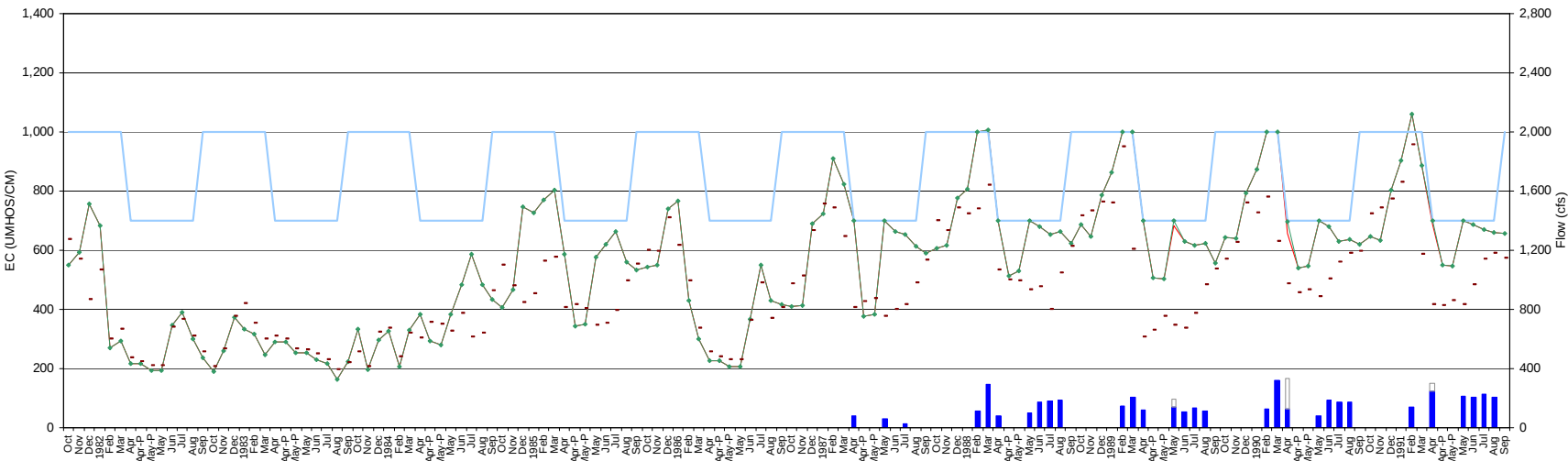
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



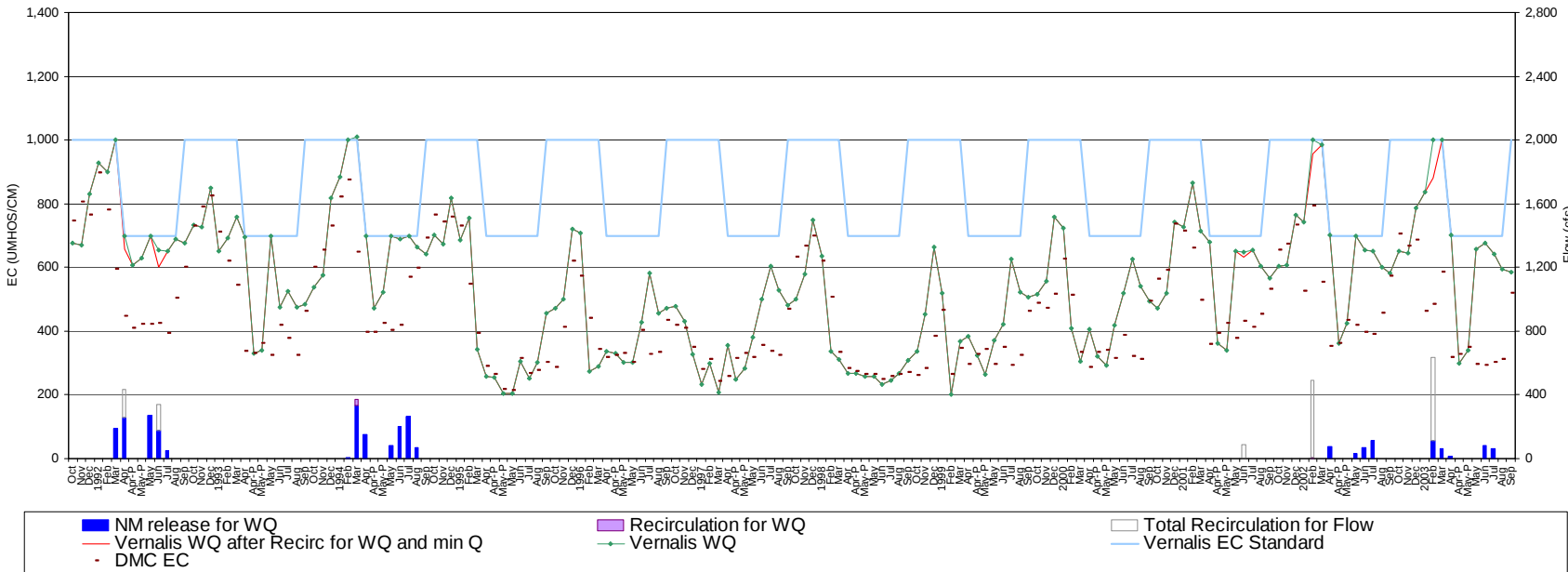
Water Year: 1972-1981



Water Year: 1982-1991



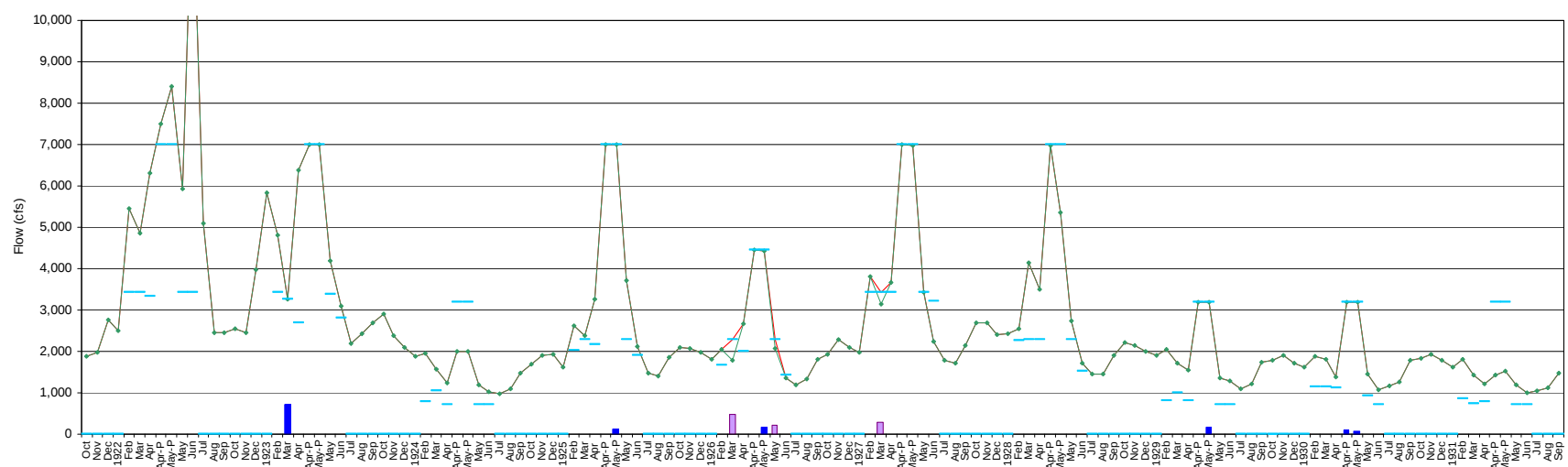
Water Year: 1992-2003



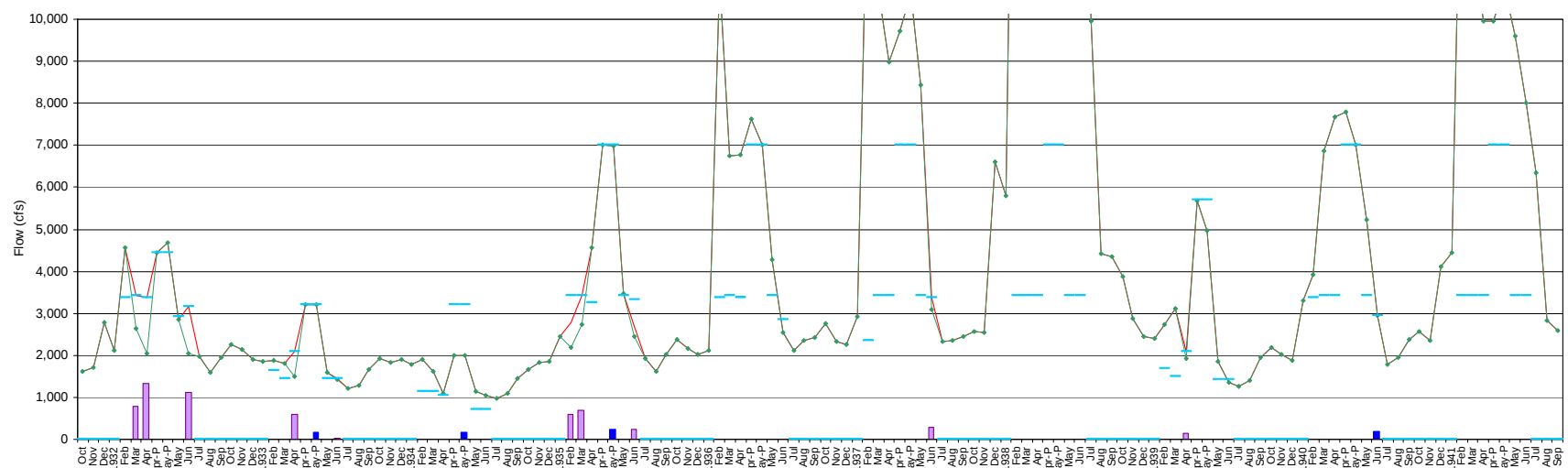
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-15. Alternative A1 Future LOD (continued)

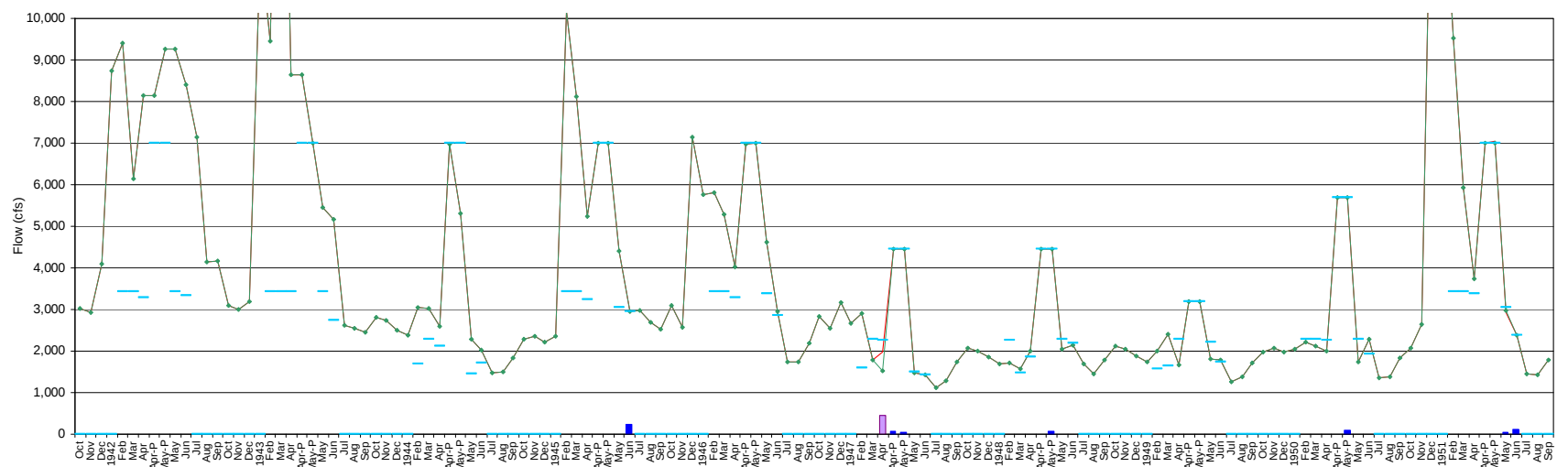
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



Water Year: 1932-1941



Water Year: 1942-1951



Water Year: 1952-1961

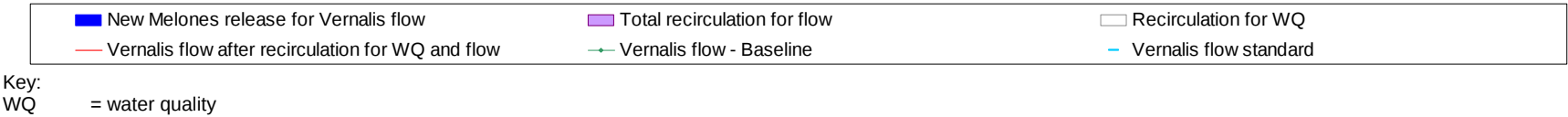
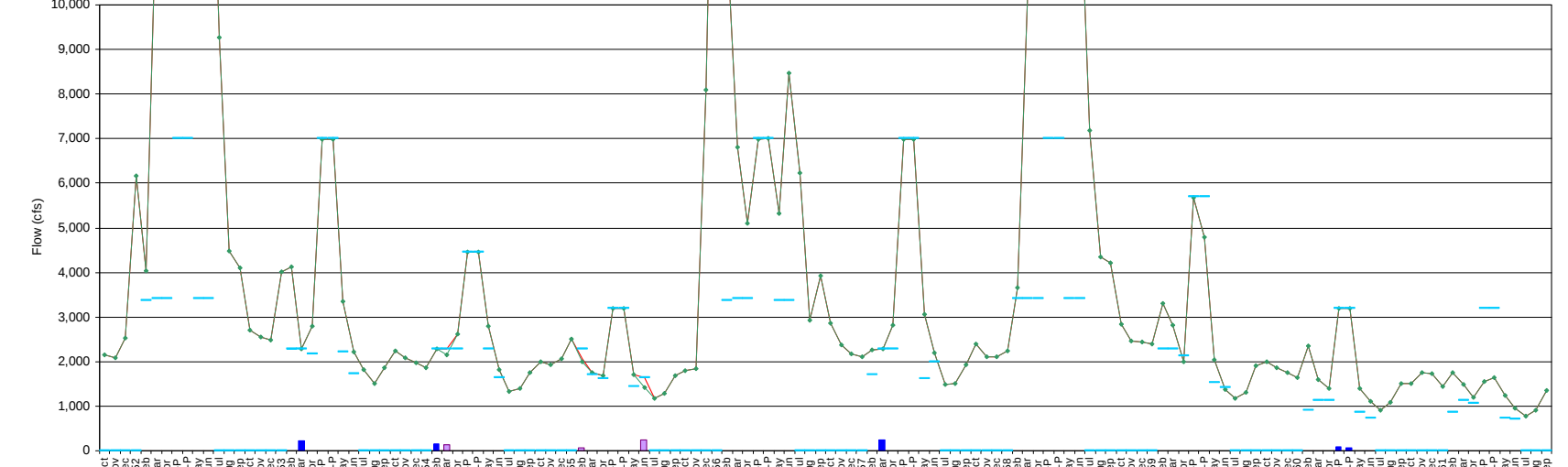
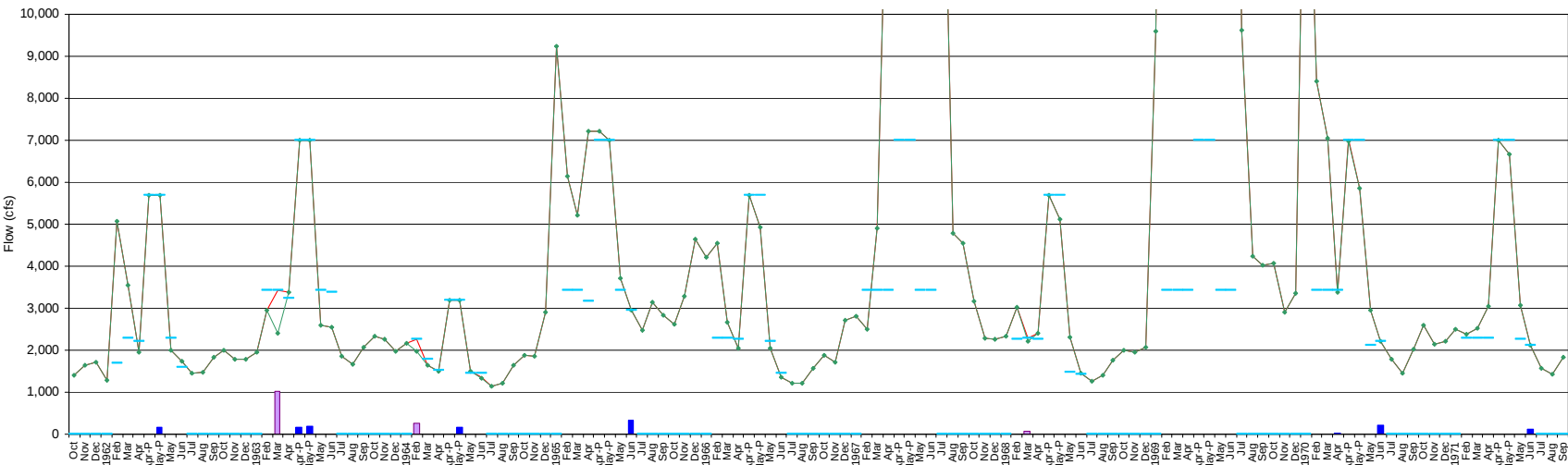
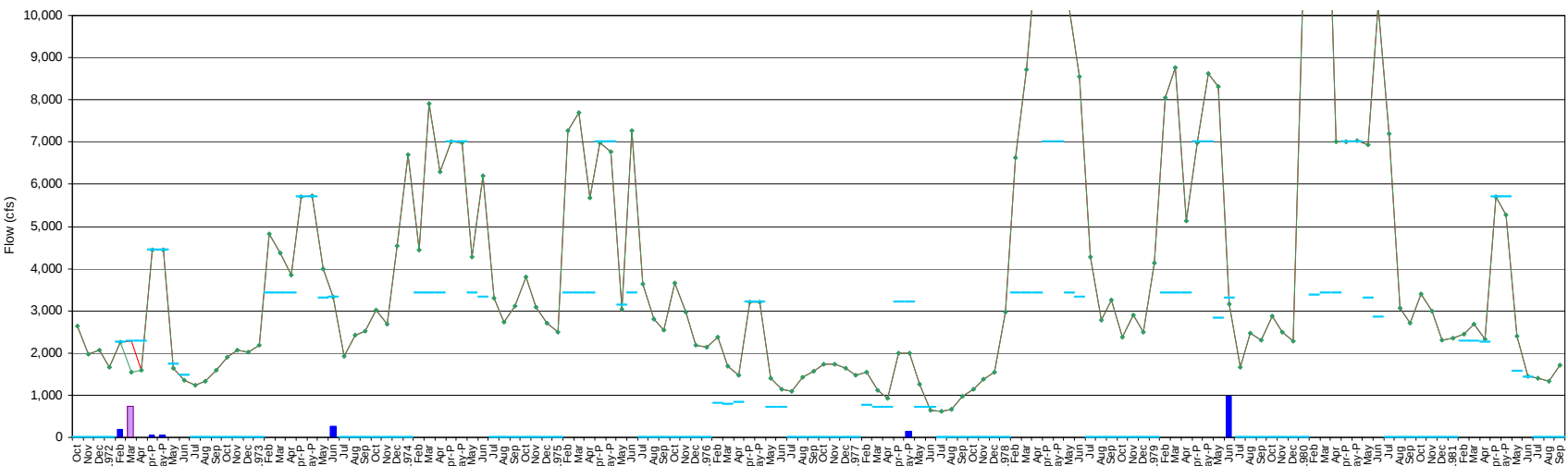


Figure A1-16. Alternative A1 Future LOD

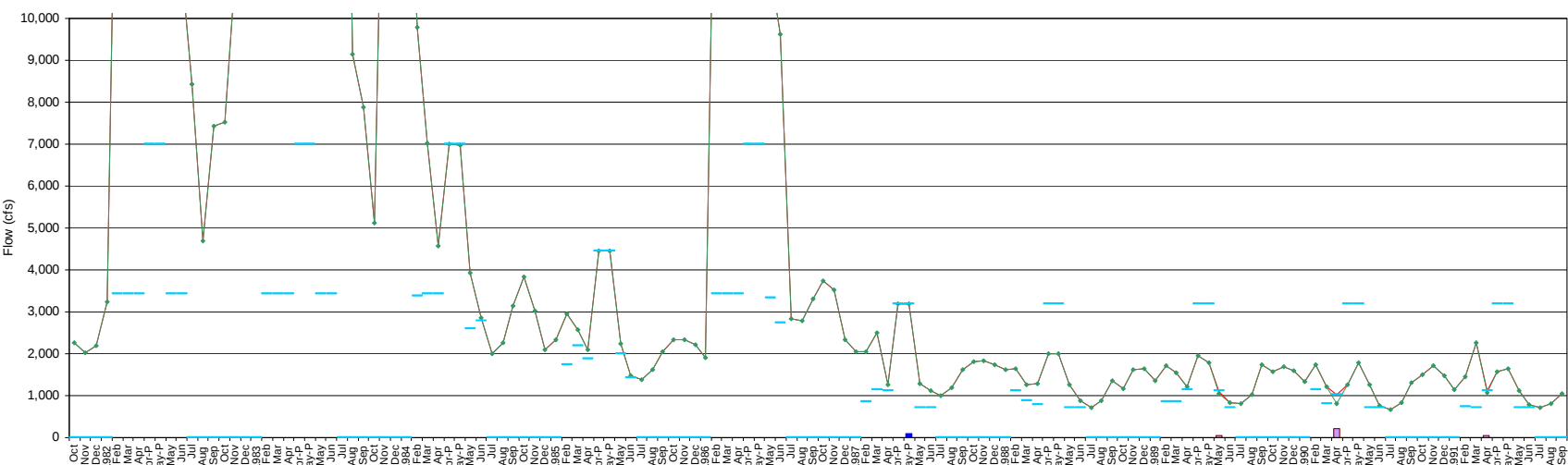
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



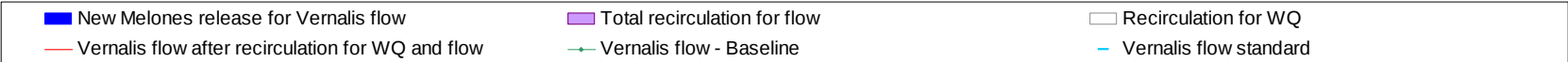
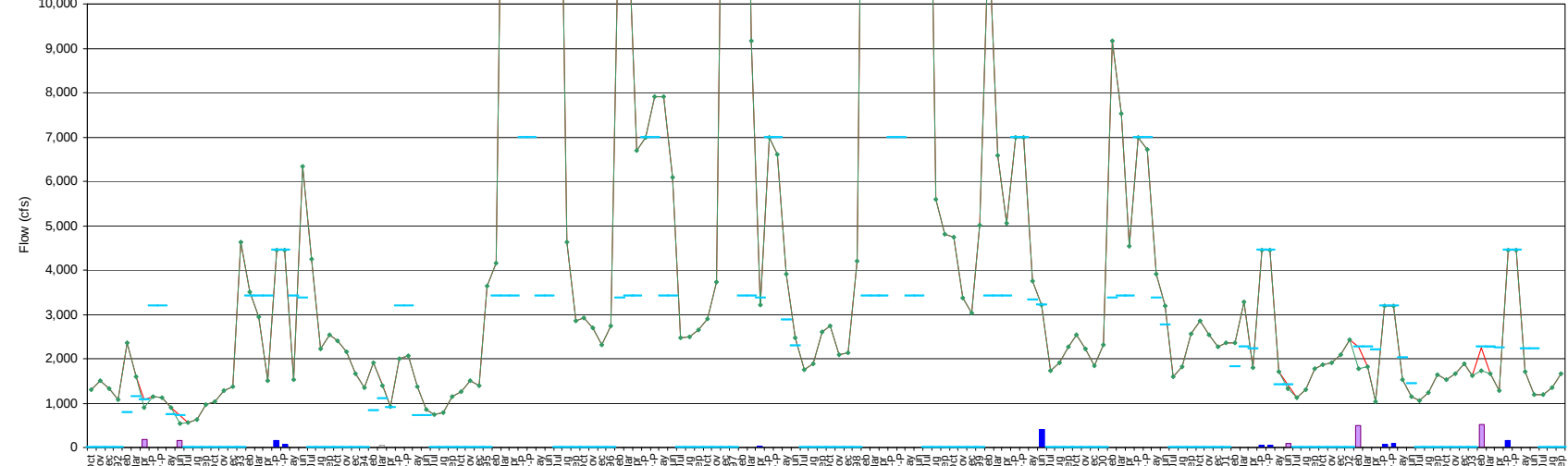
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-16. Alternative A1 Future LOD (continued)

Table A1-8. Alternative A2 Future LOD

Recirculation used supplemental to New Melones release using Jones PP excess capacity
1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN	0	0	0	0	2	11	2	0	0	0	5	0	0	0	20
BN	0	0	0	0	3	2	0	0	0	0	0	0	0	0	5
D	0	0	0	0	4	7	3	0	0	1	2	0	0	0	16
C	0	0	0	0	4	1	3	0	0	2	1	0	0	0	10
All	0	0	0	0	2	4	1	0	0	0	2	0	0	0	9

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN (16)	0	0	0	0	1	5	1	0	0	0	2	0	0	0	5
BN (13)	0	0	0	0	3	2	0	0	0	0	0	0	0	0	4
D (13)	0	0	0	0	4	3	3	0	0	1	4	0	0	0	10
C (16)	0	0	0	0	3	1	6	0	0	4	1	0	0	0	10
All (82)	0	0	0	0	11	11	10	0	0	5	8	0	0	0	30

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	17	0	0	0	17
AN	0	0	0	0	33	34	37	0	0	0	40	0	0	0	65
BN	0	0	0	0	13	12	0	0	0	0	0	0	0	0	15
D	0	0	0	0	14	29	11	0	0	7	5	0	0	0	21
C	0	0	0	0	20	8	9	0	0	7	10	0	0	0	16
All	0	0	0	0	17	26	12	0	0	7	16	0	0	0	25

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
C	0	0	0	0	4	1	3	0	0	2	1	0	0	0	10
All	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN (16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN (13)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D (13)	0	0	0	0	2	1	0	0	0	0	2	0	0	0	4
C (16)	0	0	0	0	3	1	6	0	0	4	1	0	0	0	10
All (82)	0	0	0	0	6	2	6	0	0	4	3	0	0	0	15

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

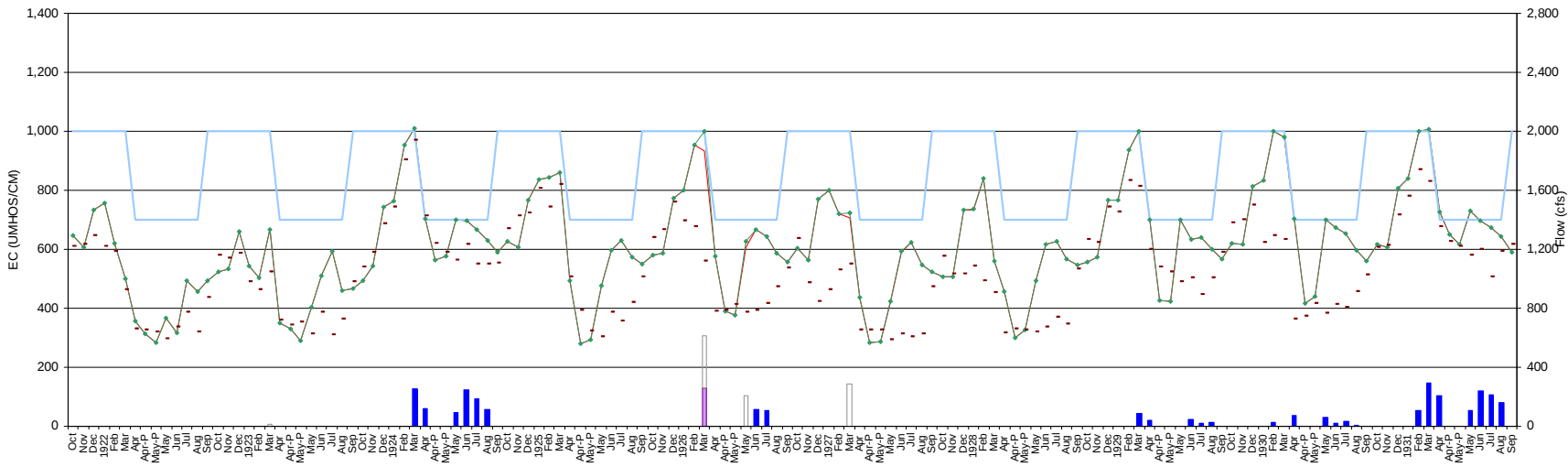
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN	0	0	0	0	2	11	2	0	0	0	5	0	0	0	20
BN	0	0	0	0	2	2	0	0	0	0	0	0	0	0	4
D	0	0	0	0	3	5	3	0	0	1	1	0	0	0	14
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	0	0	0	0	1	3	1	0	0	0	1	0	0	0	7

Frequency of Occurrence

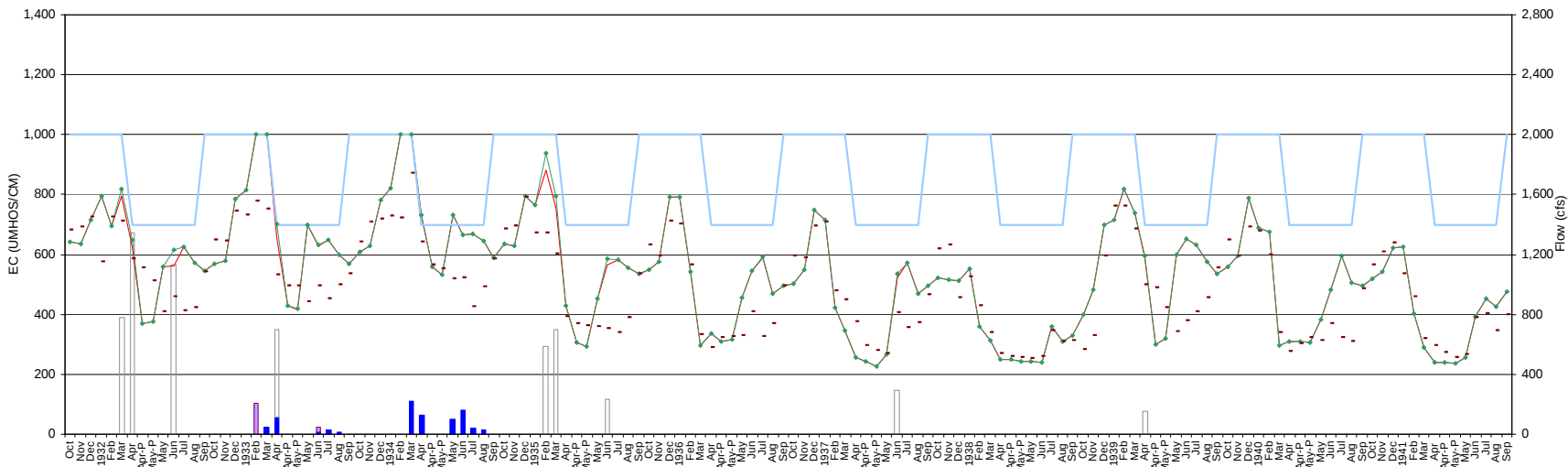
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
AN (16)	0	0	0	0	1	5	1	0	0	0	2	0	0	0	5
BN (13)	0	0	0	0	3	2	0	0	0	0	0	0	0	0	4
D (13)	0	0	0	0	3	3	3	0	0	1	2	0	0	0	10
C (16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All (82)	0	0	0	0	7	10	4	0	0	1	5	0	0	0	20

Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

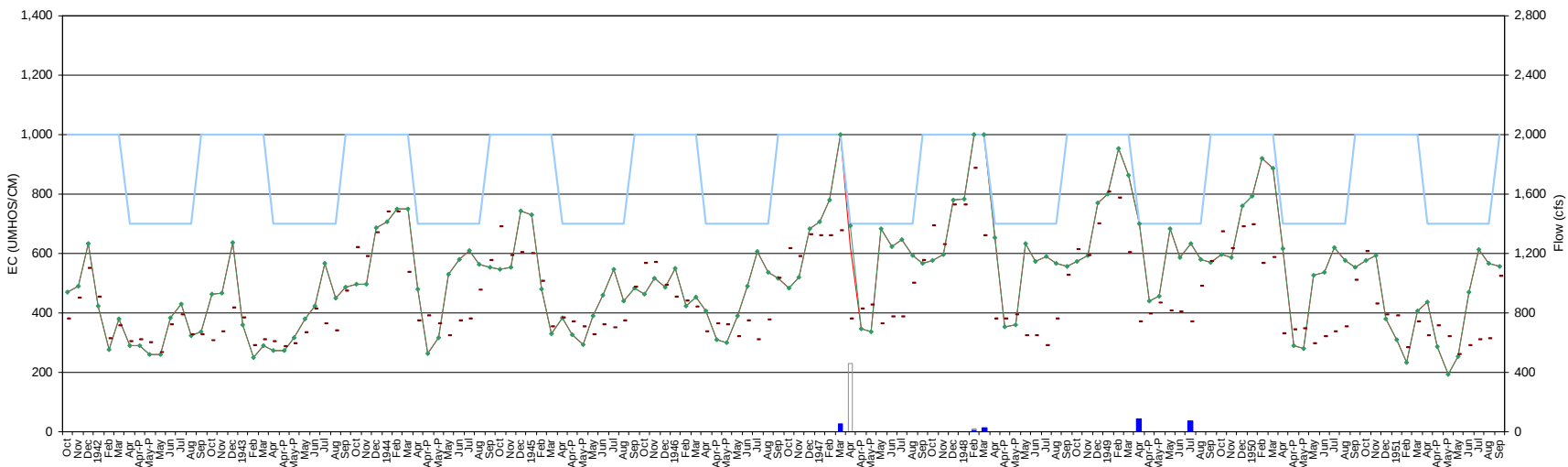
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1922-1931



Water Year: 1932-1941



Water Year: 1942-1951



Water Year: 1952-1961

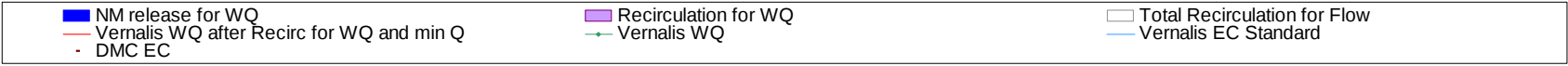
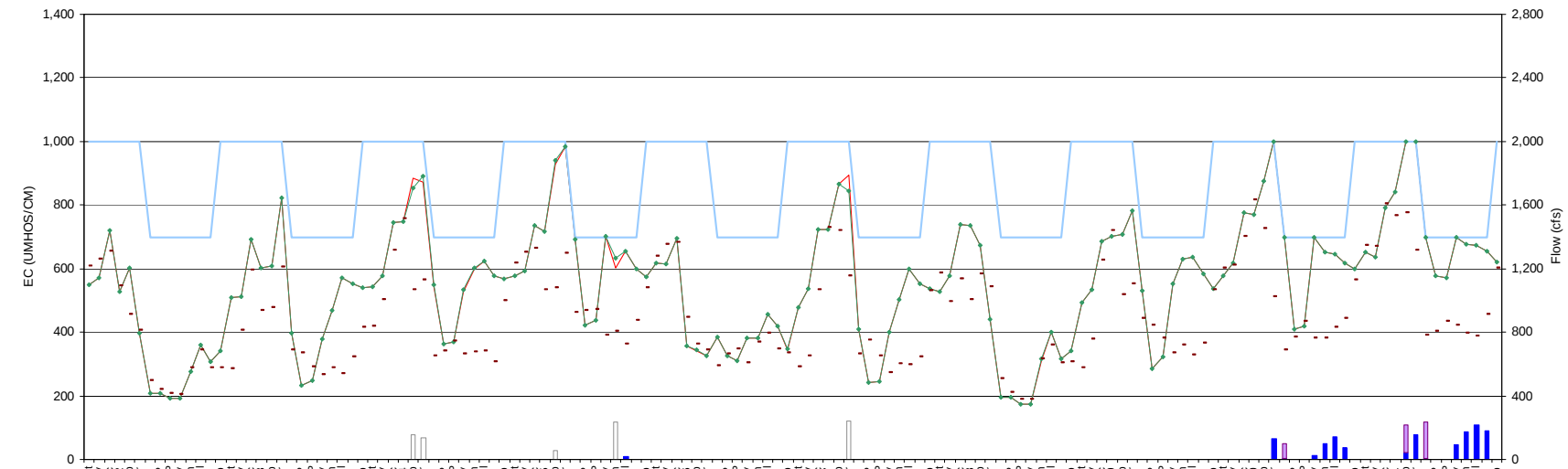
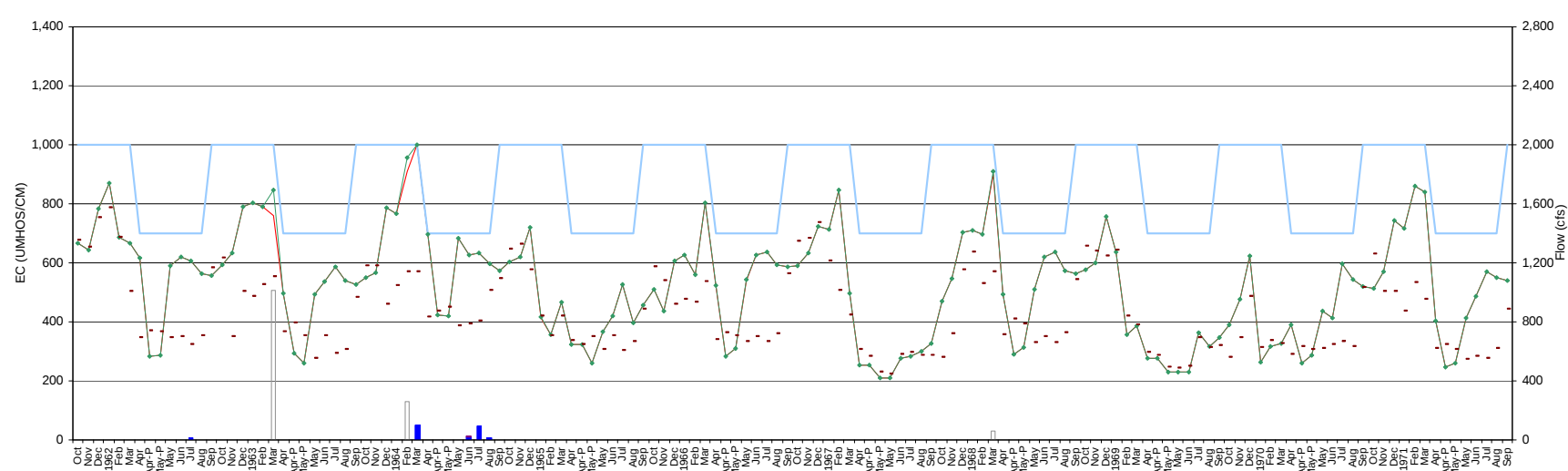
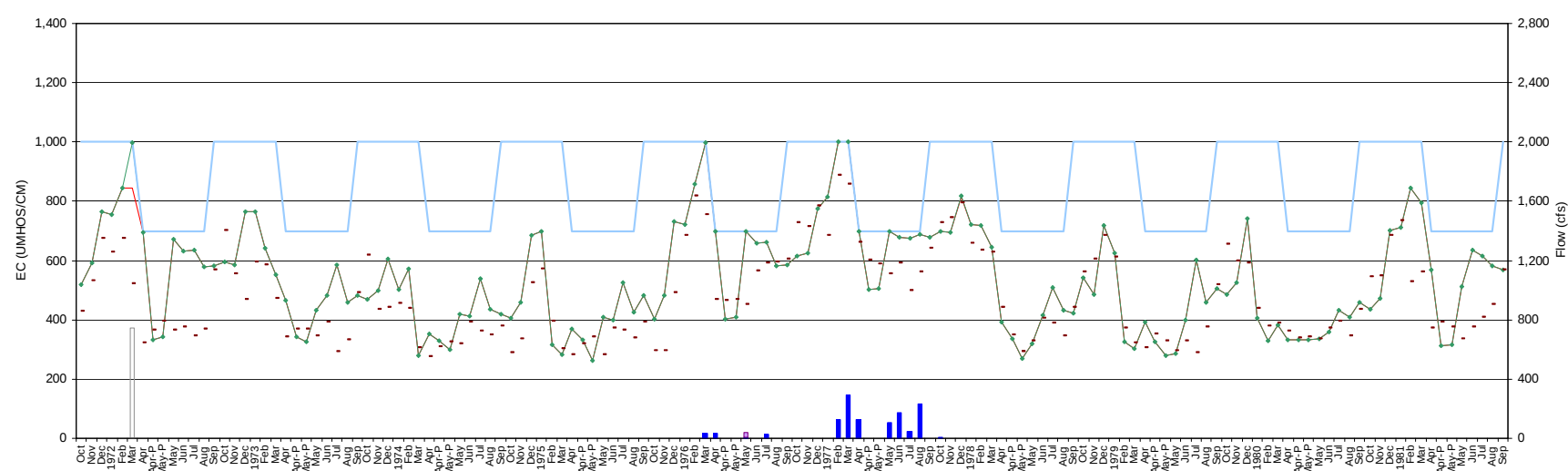
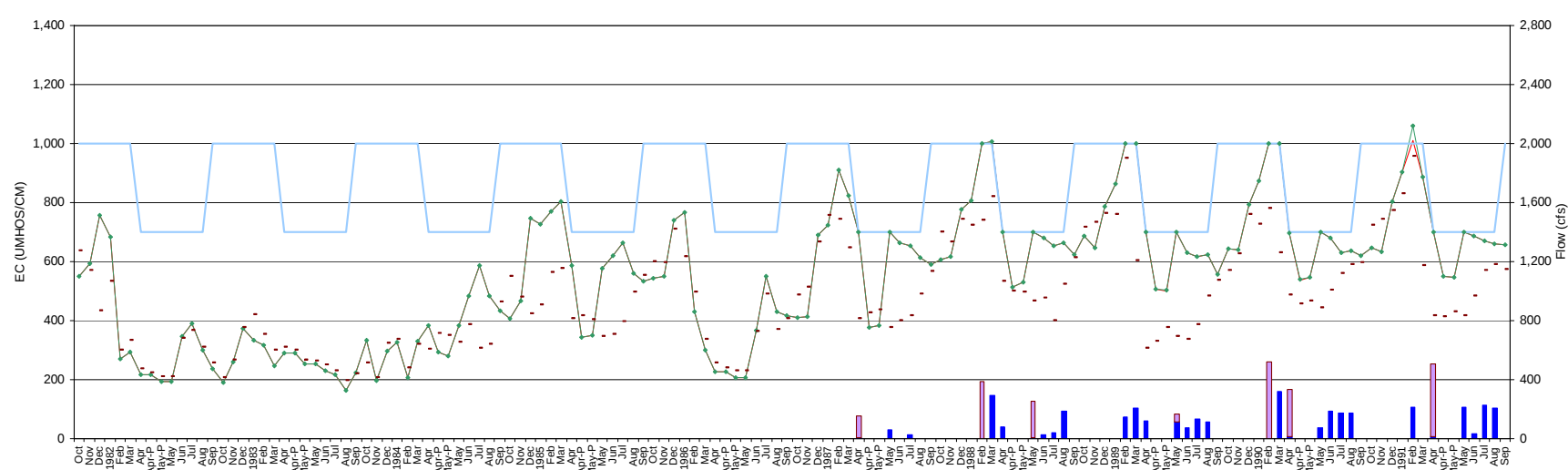
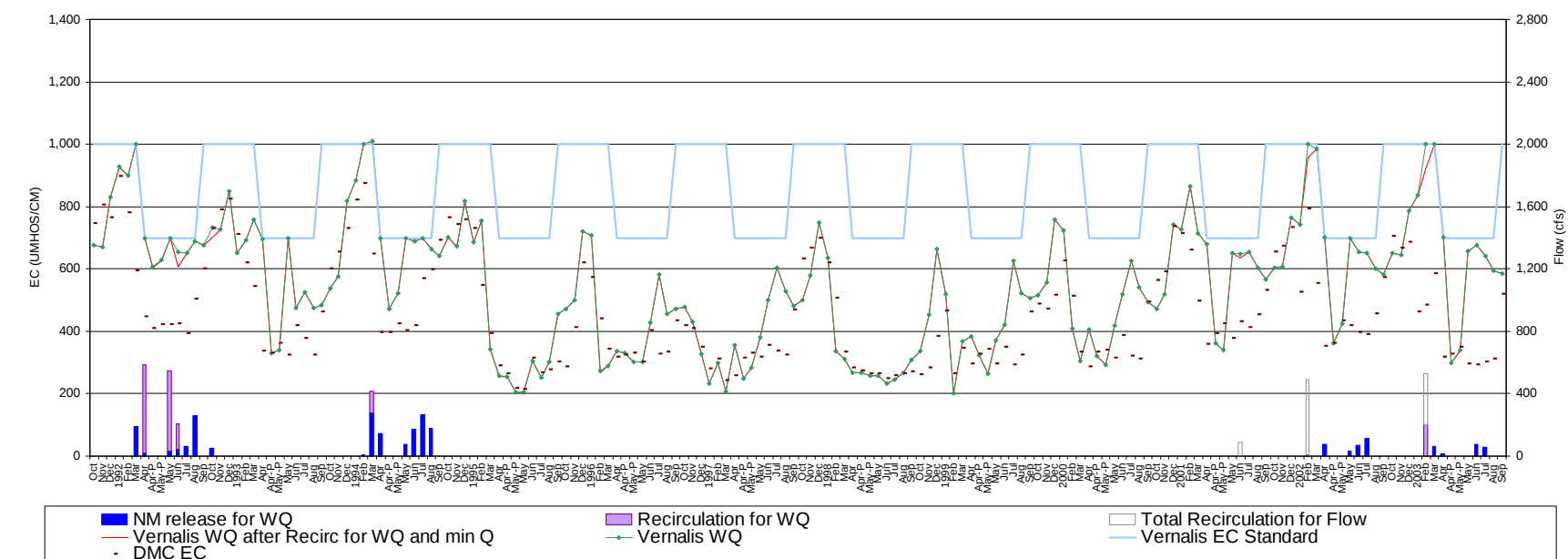


Figure A1-17. Alternative A2 Future LOD

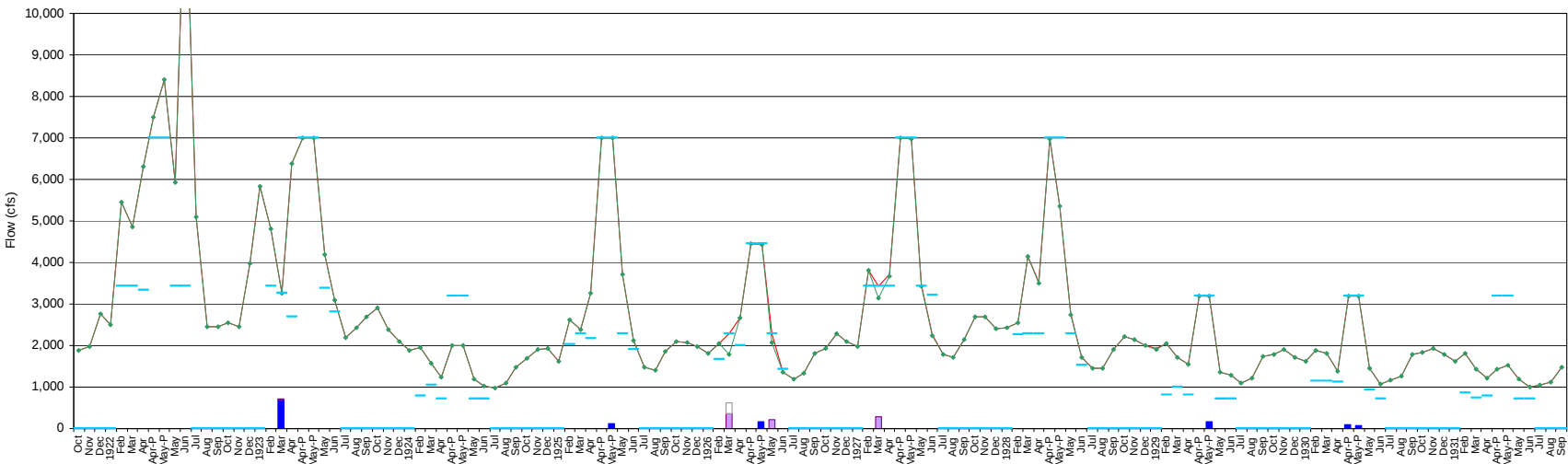
San Joaquin River Quality and recirculation used to satisfy water quality standard

Water Year: 1962-1971**Water Year: 1972-1981****Water Year: 1982-1991****Water Year: 1992-2003**

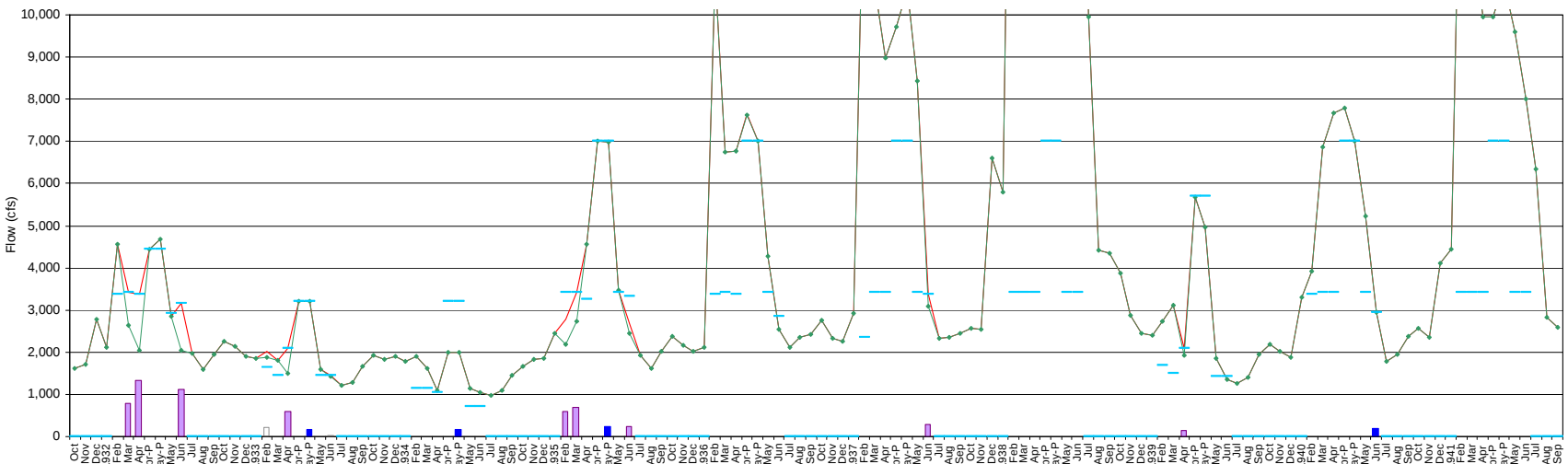
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-17. Alternative A2 Future LOD (continued)

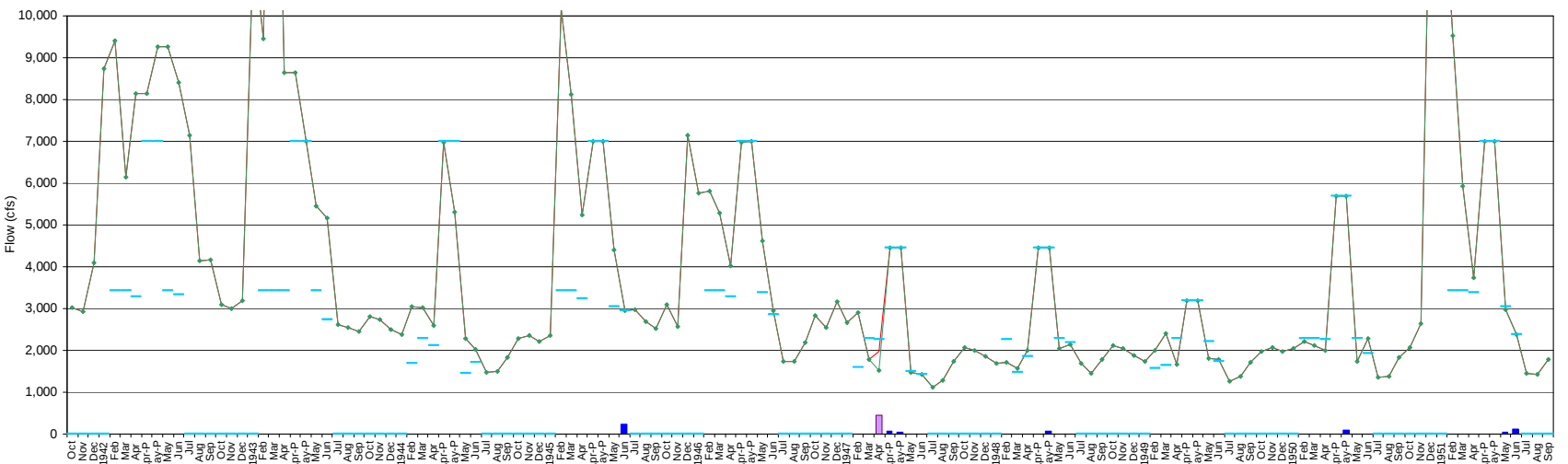
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



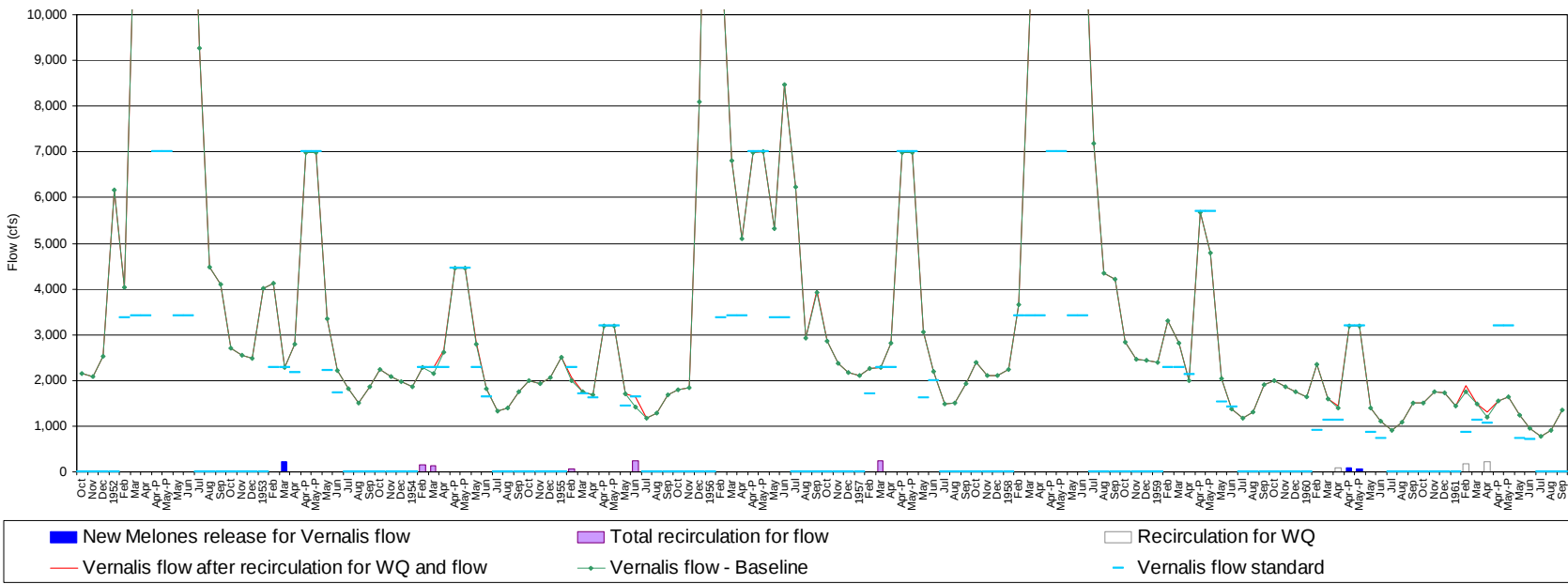
Water Year: 1932-*1941



Water Year: 1942-1951



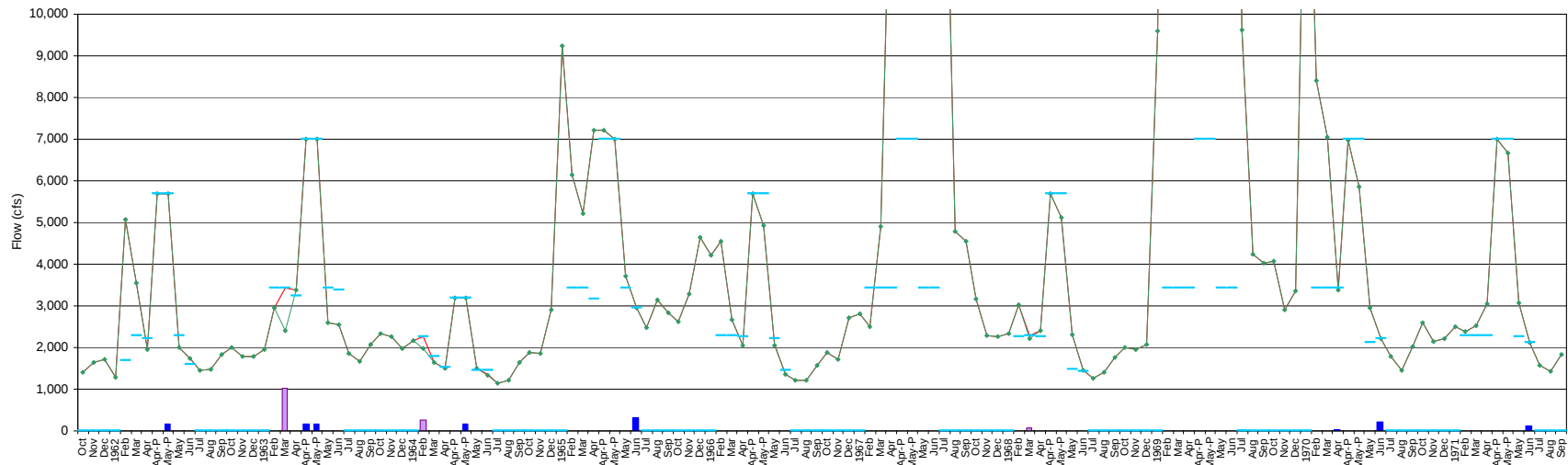
Water Year: 1952-1961



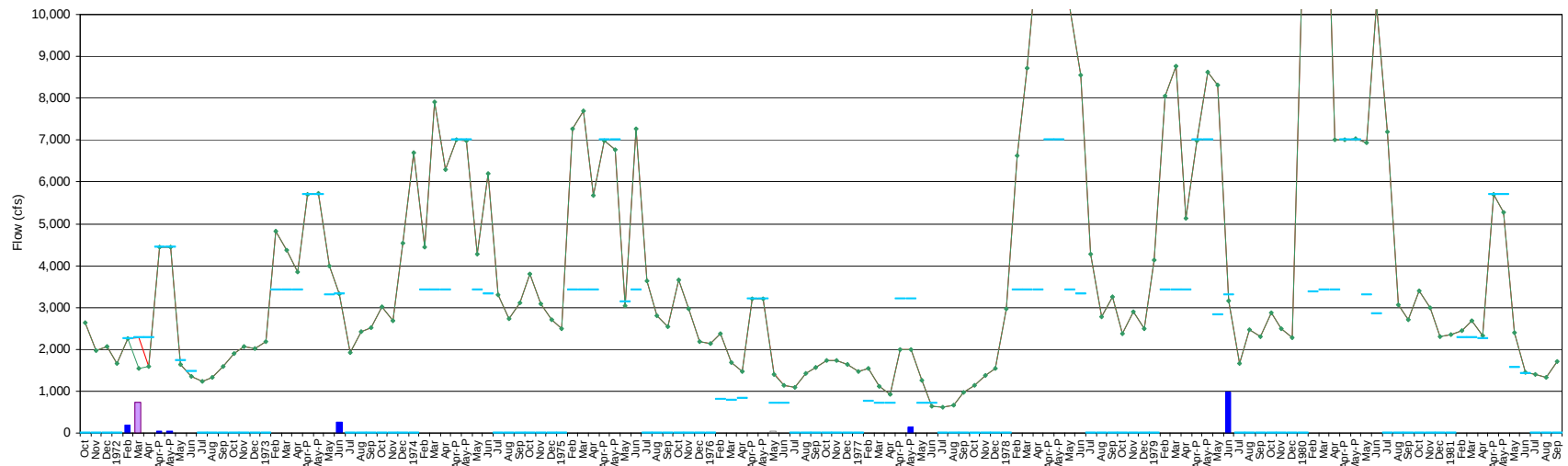
Key:
WQ = water quality

Figure A1-18. Alternative A2 Future LOD

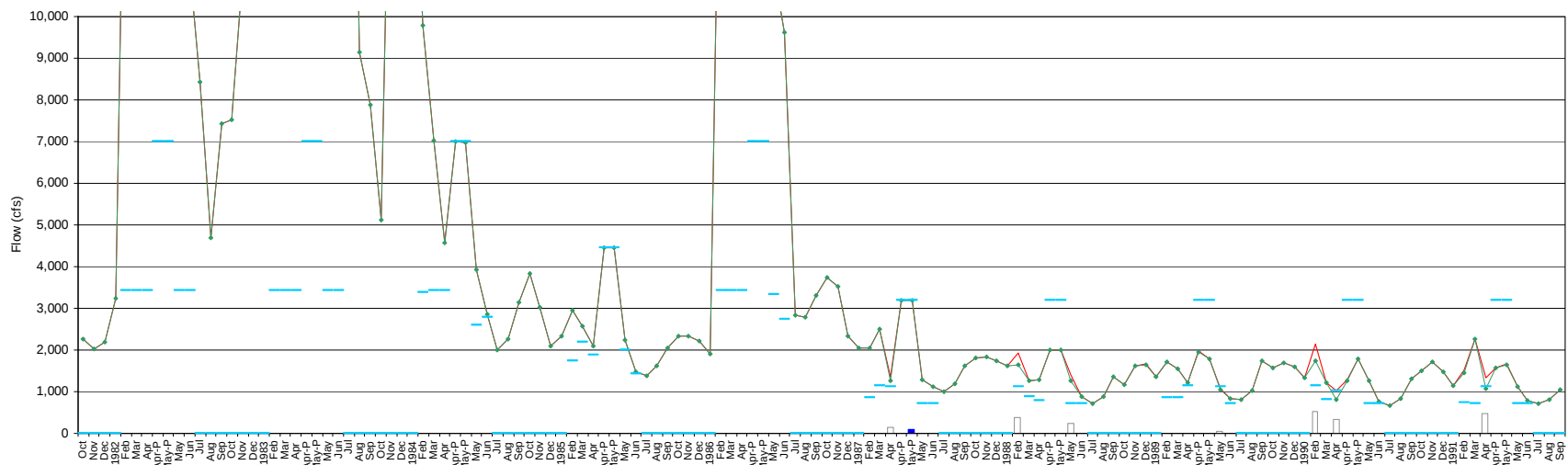
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



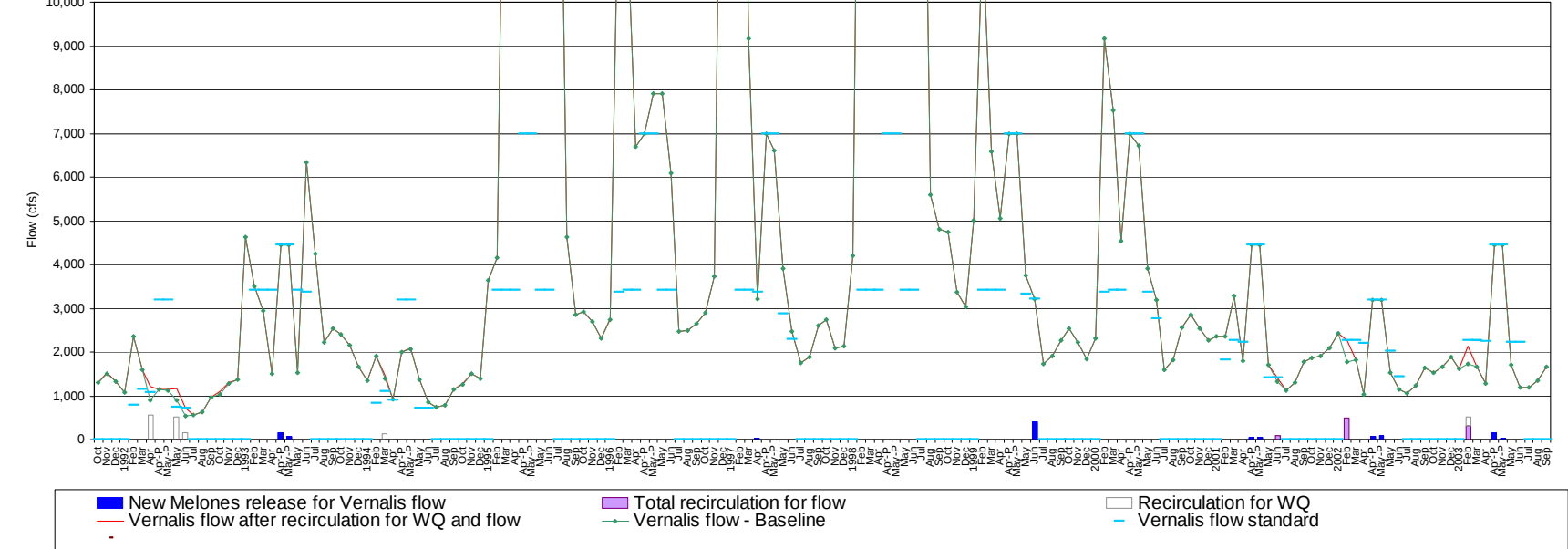
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-18. Alternative A2 Future LOD (continued)

Table A1-9. Alternative B1 Future LOD

Recirculation used supplemental to New Melones release using Jones PP and Banks excess capacity

1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	2	11	2	0	0	0	12	0	0	0	27
BN	0	0	0	0	5	1	0	0	0	3	2	0	0	0	11
D	0	0	0	0	4	8	3	0	0	1	3	0	0	0	19
C	0	0	0	0	0	0	1	2	3	0	1	0	0	0	6
All	0	0	0	0	2	4	1	0	1	1	3	0	0	0	12

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
AN (16)	0	0	0	0	1	4	1	0	0	1	6	0	0	0	6
BN (13)	0	0	0	0	2	1	0	0	0	4	2	0	0	0	6
D (13)	0	0	0	0	3	4	3	0	0	2	5	0	0	0	10
C (16)	0	0	0	0	0	1	3	4	6	1	1	0	0	0	9
All (82)	0	0	0	0	6	11	7	4	6	8	15	0	0	0	33

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	20	0	0	0	0	17	0	0	0	19
AN	0	0	0	0	33	43	37	0	0	3	31	0	0	0	72
BN	0	0	0	0	31	9	0	0	0	9	16	0	0	0	23
D	0	0	0	0	19	27	11	0	0	5	8	0	0	0	25
C	0	0	0	0	0	2	4	8	8	2	10	0	0	0	11
All	0	0	0	0	25	28	12	8	8	6	19	0	0	0	29

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN (16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN (13)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D (13)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
C (16)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
All (82)	0	0	0	0	2	2	0	0	0	0	0	0	0	0	4

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
AN	0	0	0	0	2	11	2	0	0	0	12	0	0	0	27
BN	0	0	0	0	5	1	0	0	0	3	2	0	0	0	11
D	0	0	0	0	4	8	3	0	0	1	3	0	0	0	19
C	0	0	0	0	0	0	1	2	3	0	1	0	0	0	6
All	0	0	0	0	2	4	1	0	1	1	3	0	0	0	12

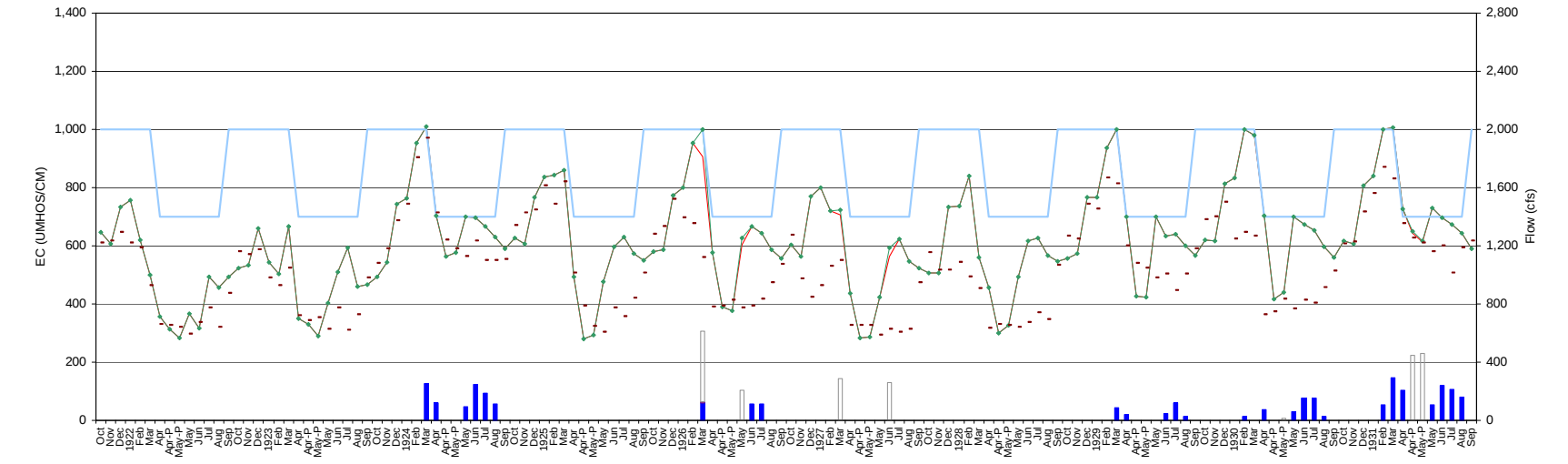
Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
AN (16)	0	0	0	0	1	4	1	0	0	1	6	0	0	0	6
BN (13)	0	0	0	0	2	1	0	0	0	4	2	0	0	0	6
D (13)	0	0	0	0	3	4	3	0	0	2	5	0	0	0	10
C (16)	0	0	0	0	0	0	3	4	6	1	1	0	0	0	8
All (82)	0	0	0	0	6	10	7	4	6	8	15	0	0	0	32

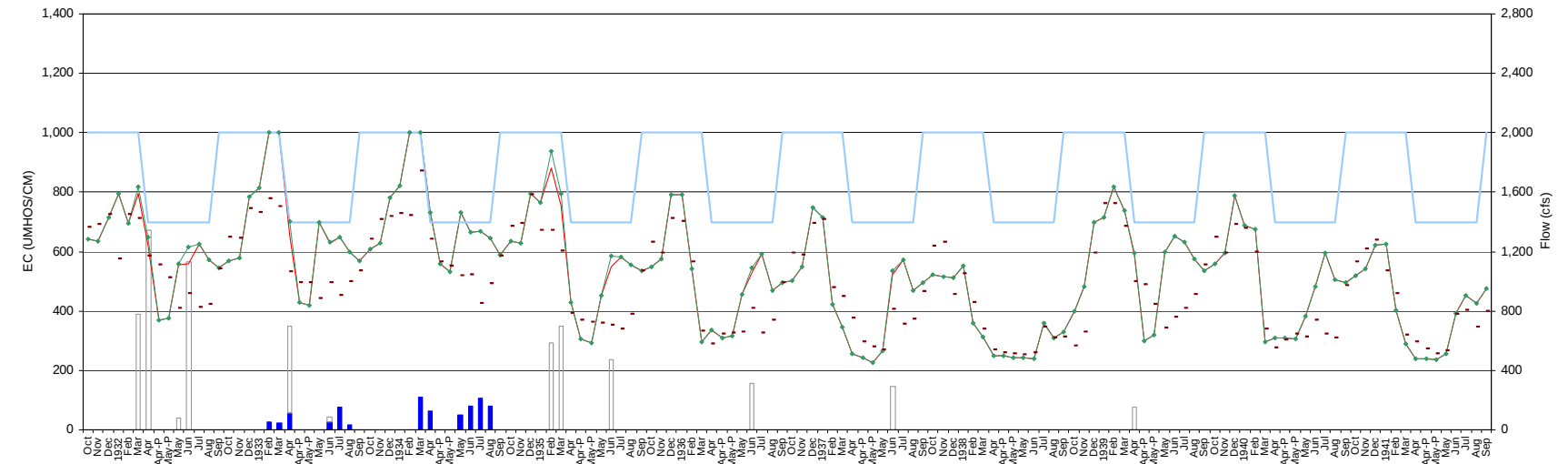
Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

San Joaquin River Quality and recirculation used to satisfy water quality standard

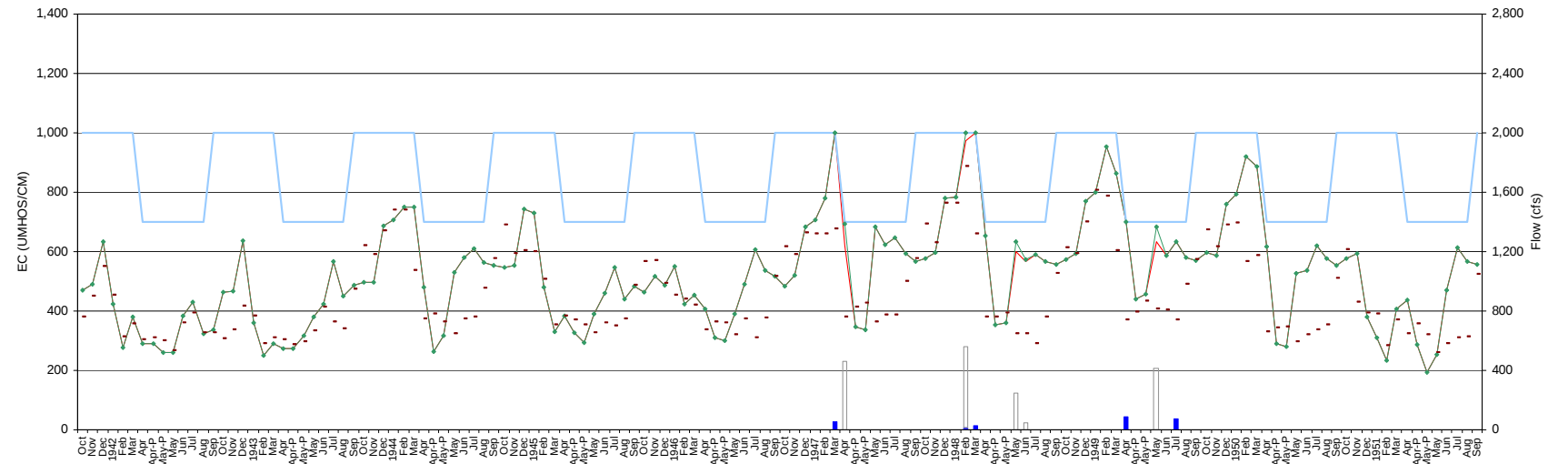
Water Year: 1922-1931



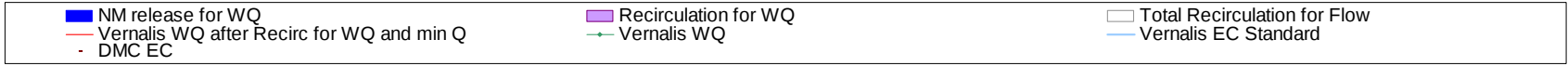
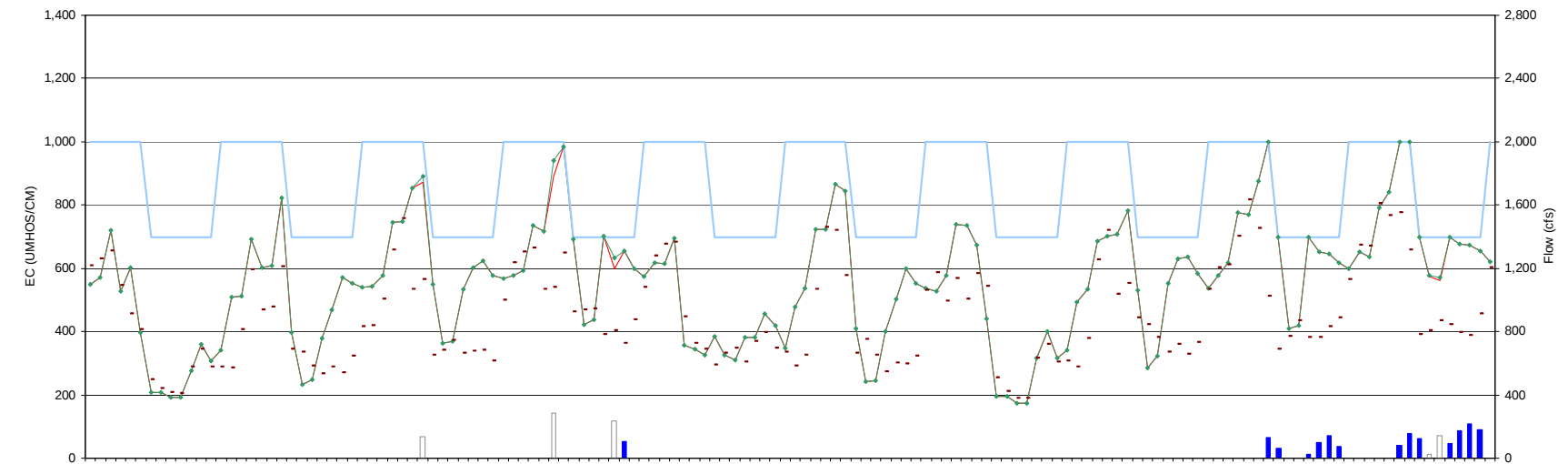
Water Year: 1932-1941



Water Year: 1942-1951



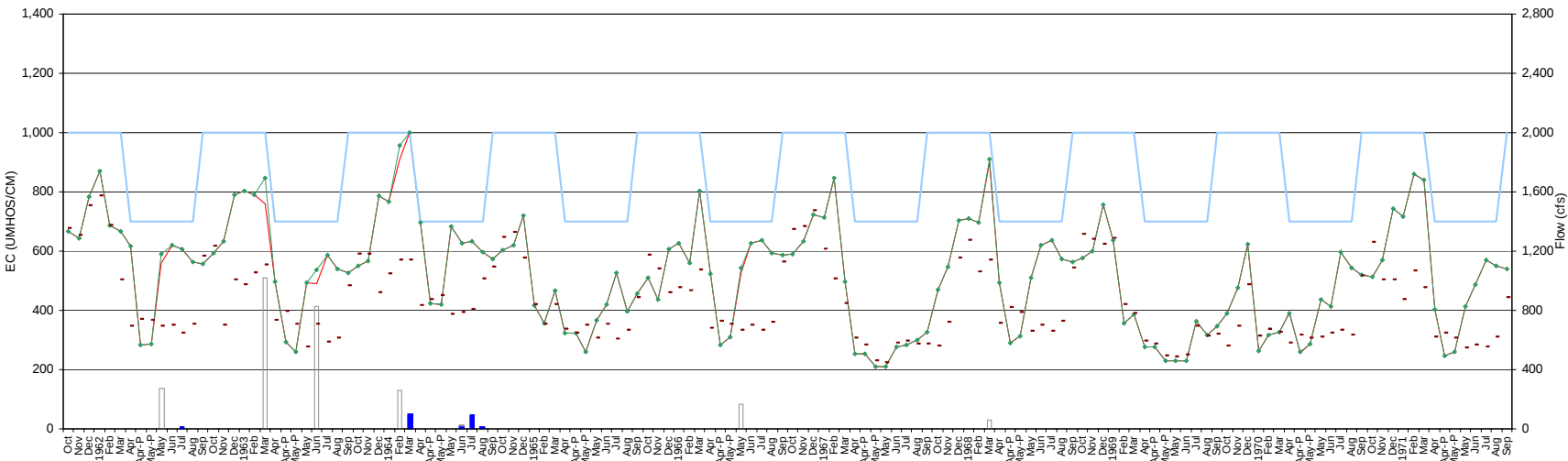
Water Year: 1952-1961



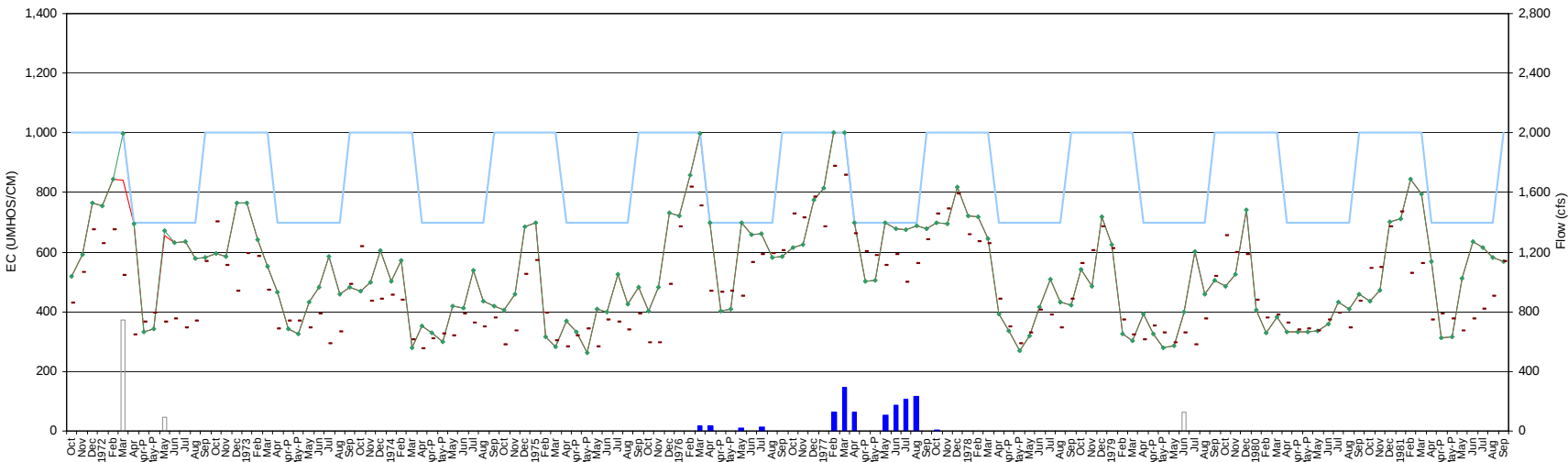
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-19. Alternative B1 Future LOD

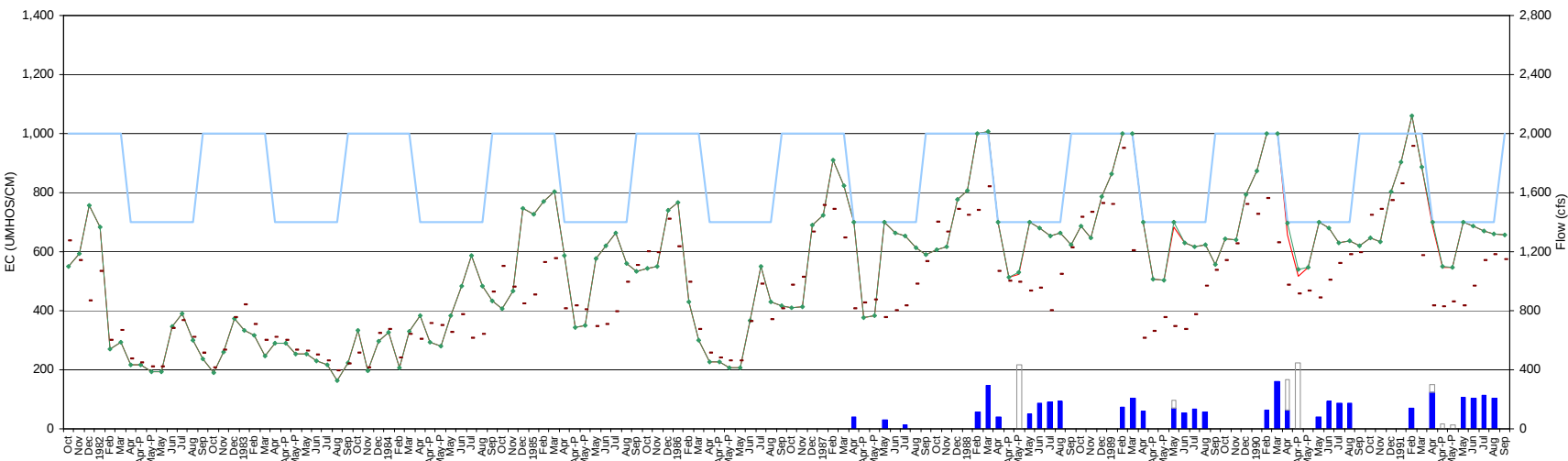
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



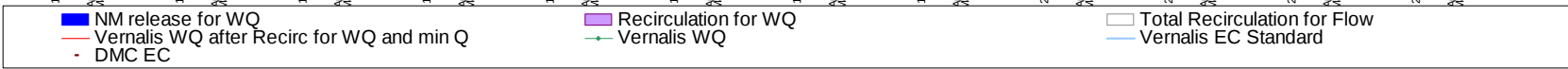
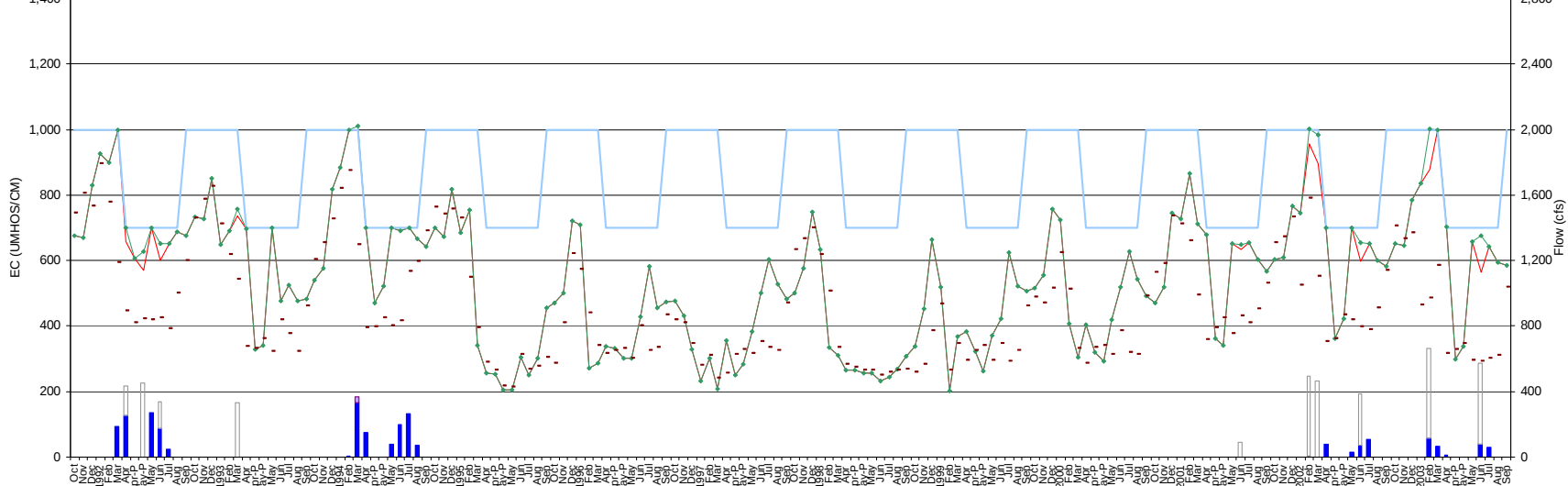
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003

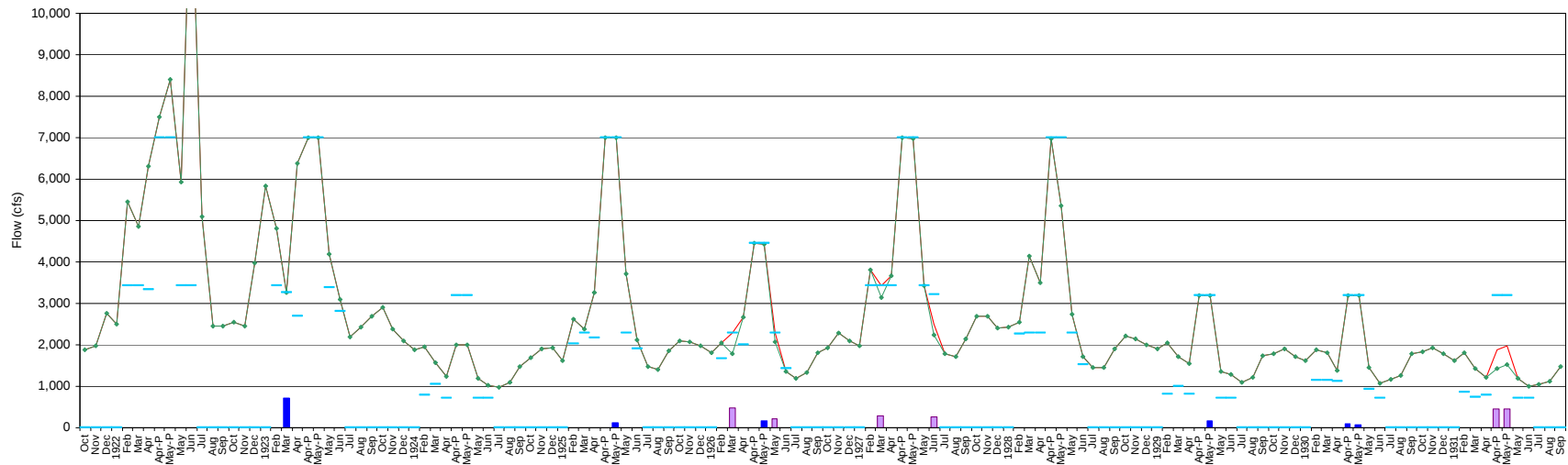


Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

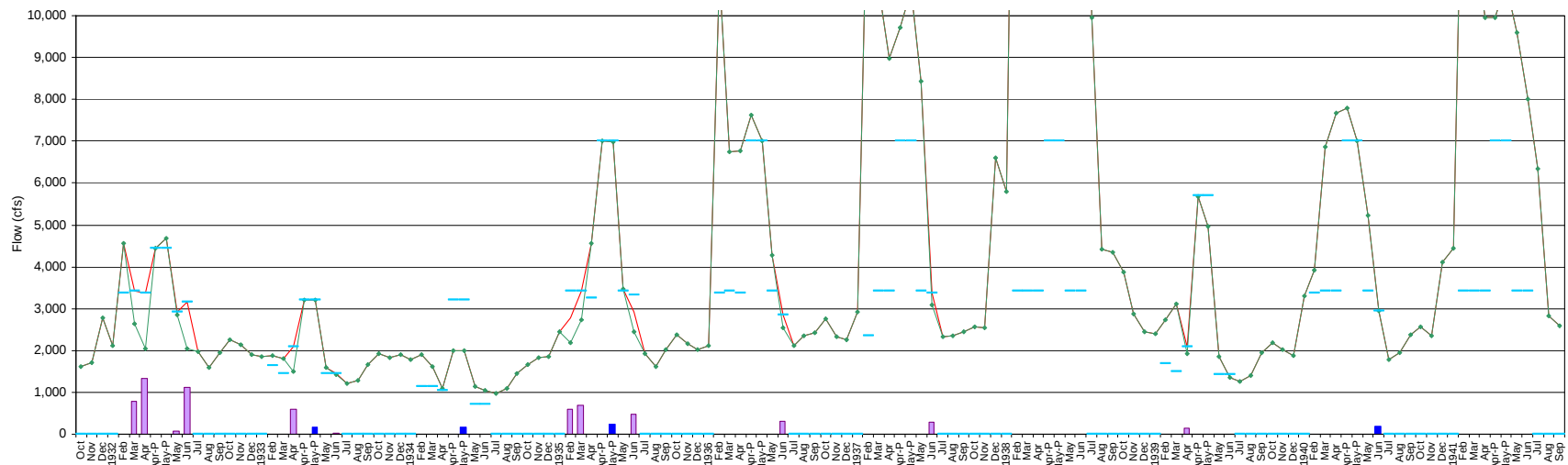
Figure A1-19. Alternative B1 Future LOD (continued)

San Joaquin River flow and recirculation used to satisfy flow standard

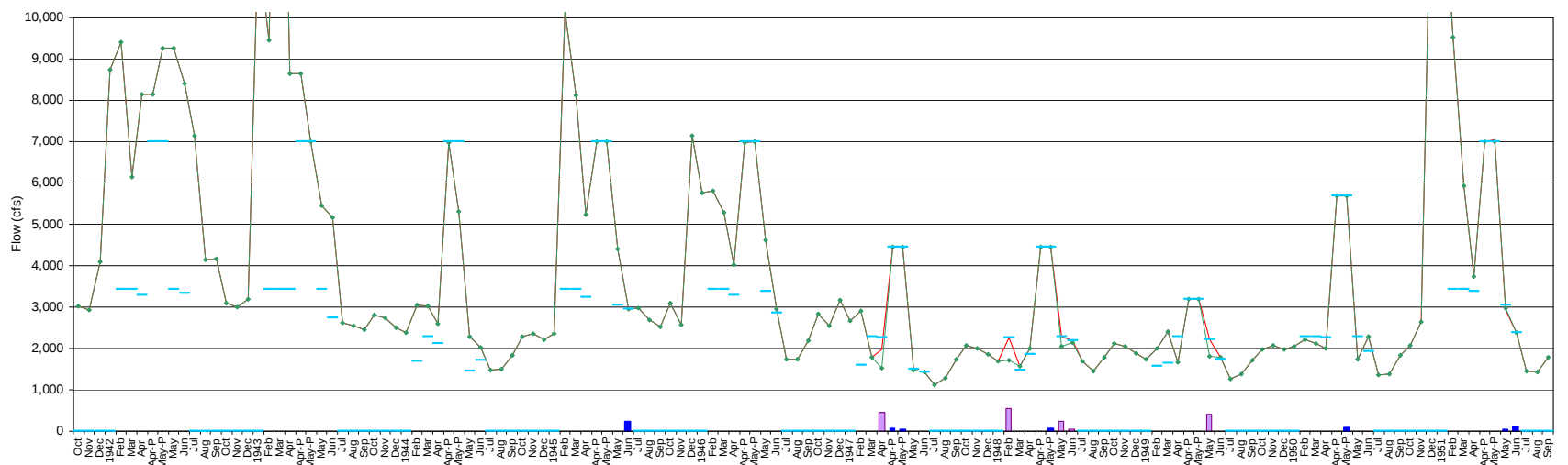
Water Year: 1922-1931



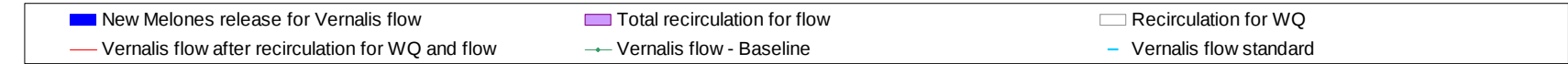
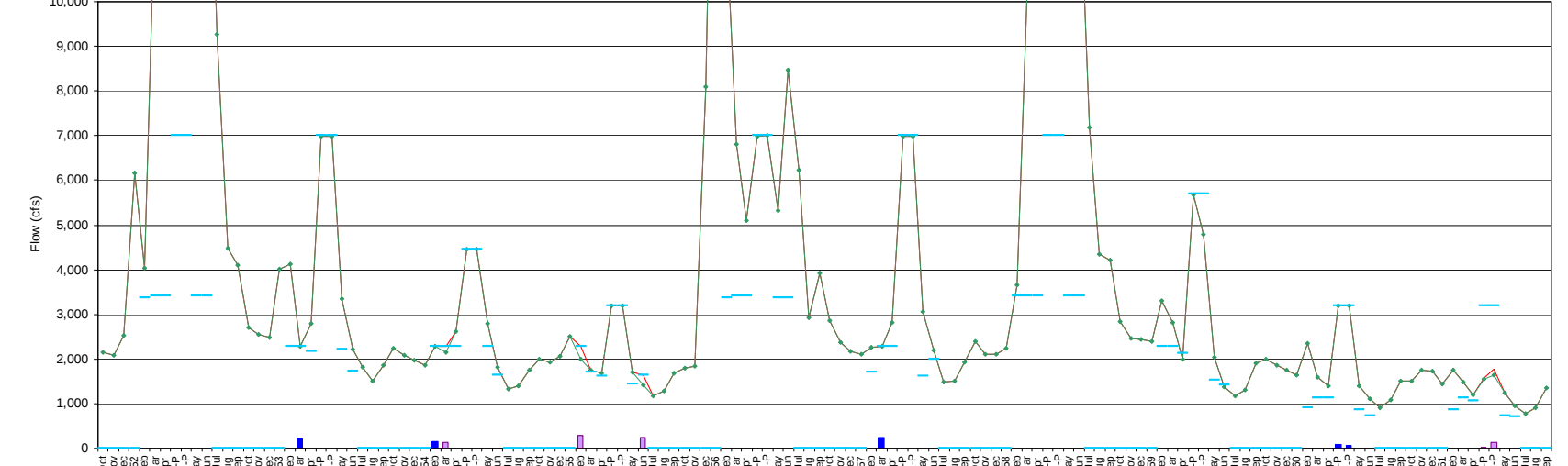
Water Year: 1932-1941



Water Year: 1942-1951



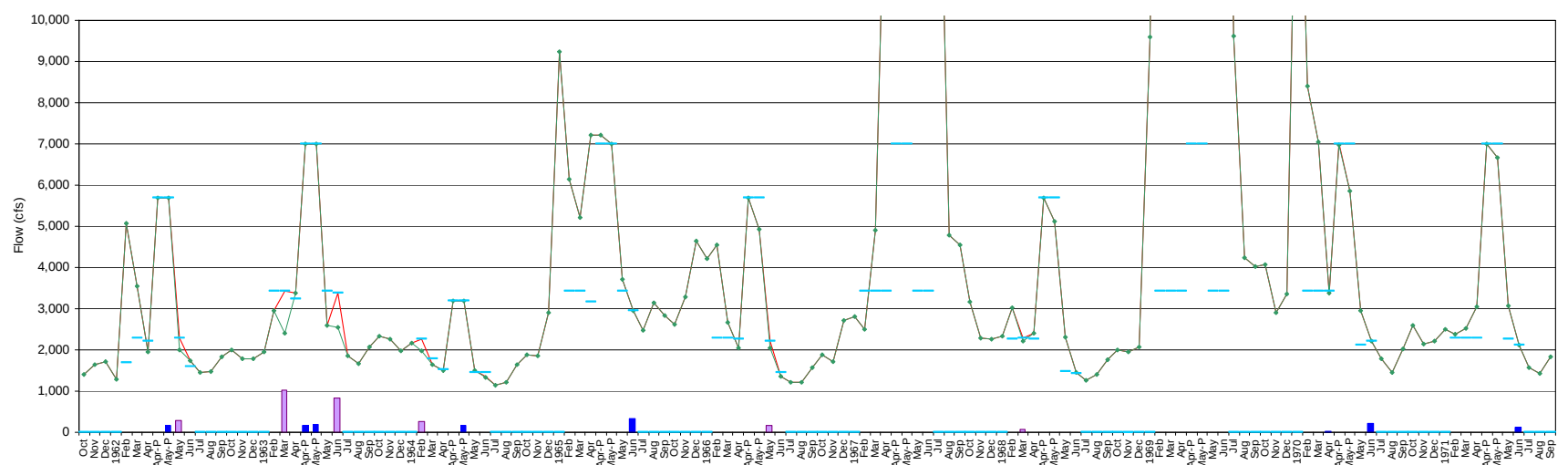
Water Year: 1952-1961



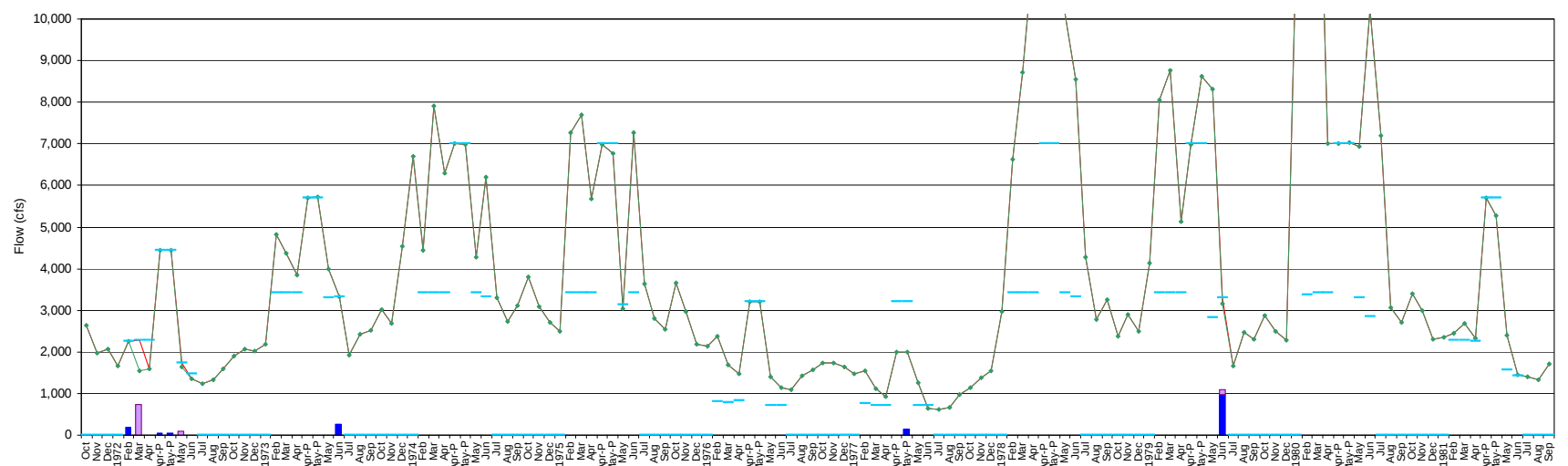
Key:
WQ = water quality

Figure A1-20. Alternative B1 Future LOD

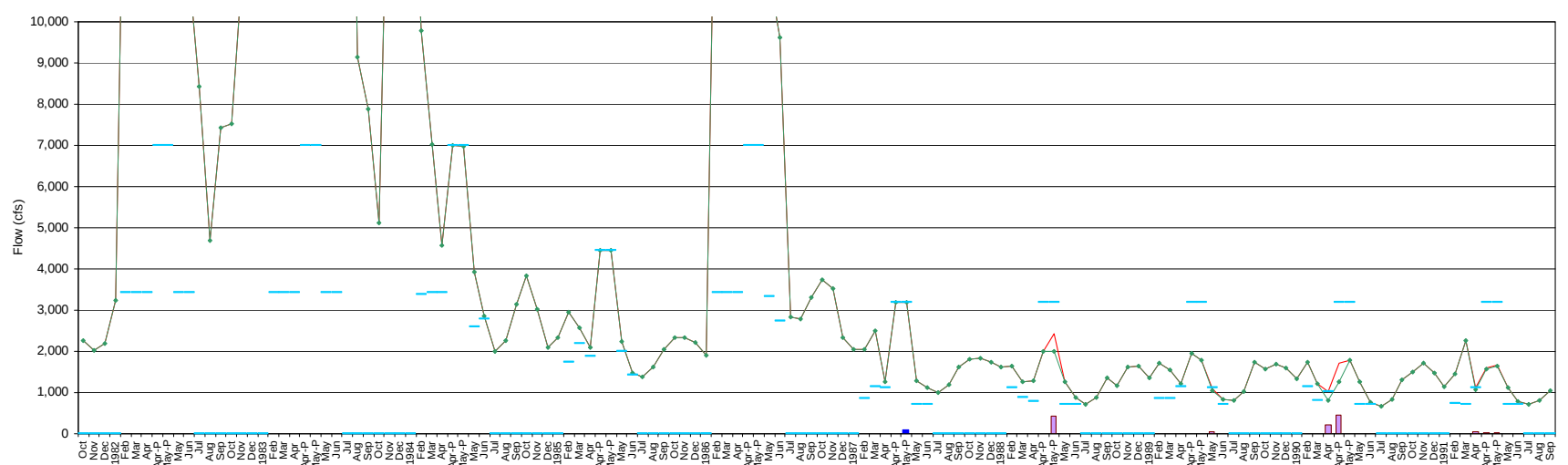
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



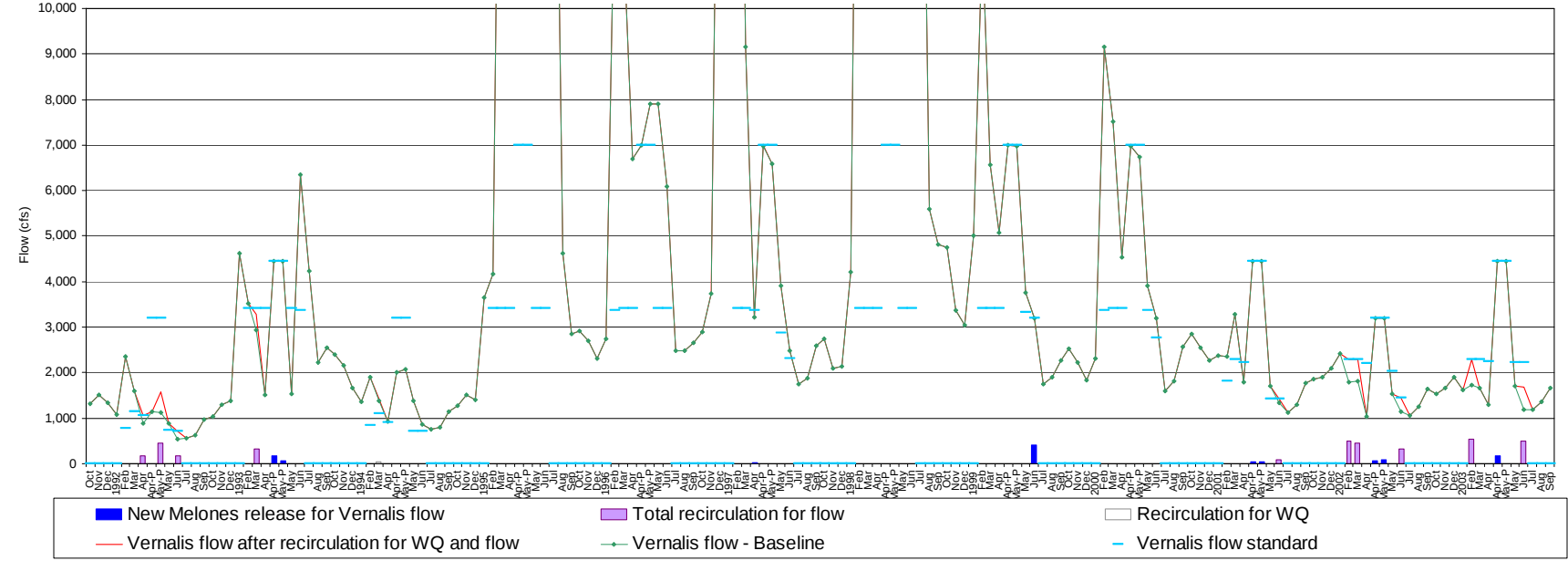
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-20. Alternative B1 Future LOD (continued)

Table A1-10. Alternative B2 Future LOD

Recirculation used prior to New Melones release using Jones PP and Banks excess capacity
1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	1	0	0	0	0	2	0	0	0	2
AN	0	0	0	0	2	11	2	0	0	0	18	0	0	0	33
BN	0	0	0	0	6	2	0	0	0	2	2	0	0	0	13
D	0	0	0	0	5	9	3	0	0	1	3	0	0	0	21
C	0	0	0	0	4	1	3	3	4	2	1	0	0	0	16
All	0	0	0	0	3	4	1	1	1	1	5	0	0	0	16

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	1	0	0	0	0	2	0	0	0	3
AN (16)	0	0	0	0	1	5	1	0	0	1	11	0	0	0	12
BN (13)	0	0	0	0	3	2	0	0	0	4	2	0	0	0	7
D (13)	0	0	0	0	4	4	3	0	0	2	5	0	0	0	10
C (16)	0	0	0	0	3	1	6	5	6	4	1	0	0	0	12
All (82)	0	0	0	0	11	13	10	5	6	11	21	0	0	0	44

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	20	0	0	0	0	18	0	0	0	19
AN	0	0	0	0	33	34	37	0	0	3	26	0	0	0	45
BN	0	0	0	0	26	12	0	0	0	8	16	0	0	0	23
D	0	0	0	0	17	29	11	0	0	5	8	0	0	0	27
C	0	0	0	0	20	8	9	9	10	7	10	0	0	0	22
All	0	0	0	0	22	26	12	9	10	6	20	0	0	0	29

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3
C	0	0	0	0	4	1	3	0	0	2	1	0	0	0	10
All	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN (16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN (13)	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
D (13)	0	0	0	0	2	1	0	0	0	0	3	0	0	0	4
C (16)	0	0	0	0	3	1	6	0	0	4	1	0	0	0	10
All (82)	0	0	0	0	6	2	6	0	0	4	5	0	0	0	15

Total Recirculation for Flow

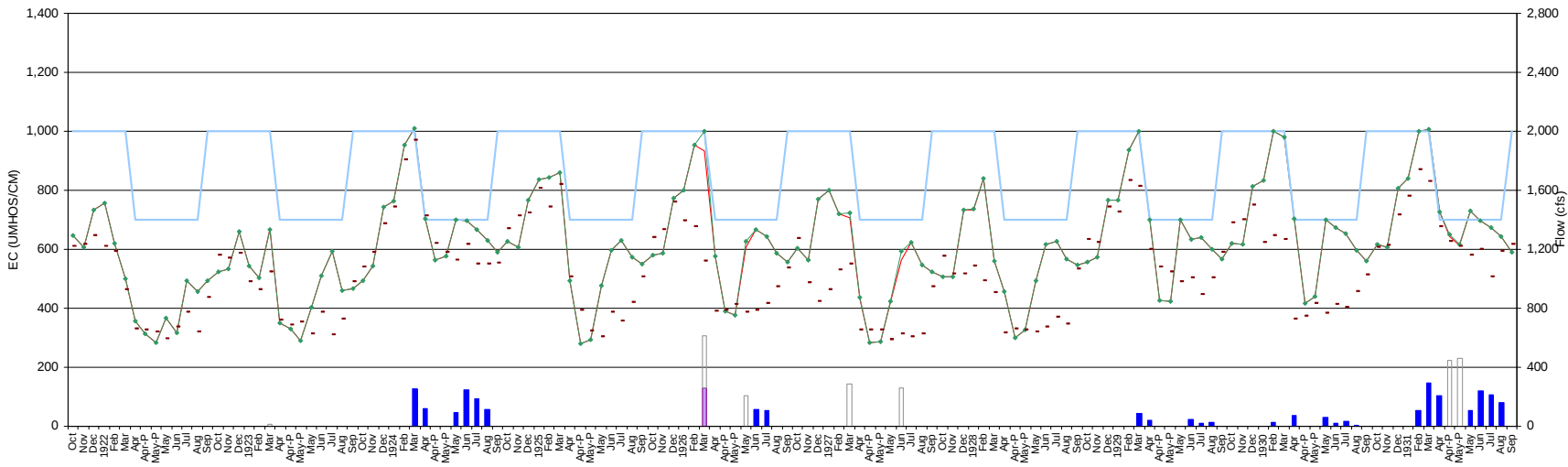
1000 AF

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	1	0	0	0	0	2	0	0	0	2
AN	0	0	0	0	2	11	2	0	0	0	18	0	0	0	33
BN	0	0	0	0	5	2	0	0	0	2	2	0	0	0	11
D	0	0	0	0	4	8	3	0	0	1	2	0	0	0	18
C	0	0	0	0	0	0	0	3	4	0	0	0	0	0	6
All	0	0	0	0	2	4	1	1	1	1	5	0	0	0	13

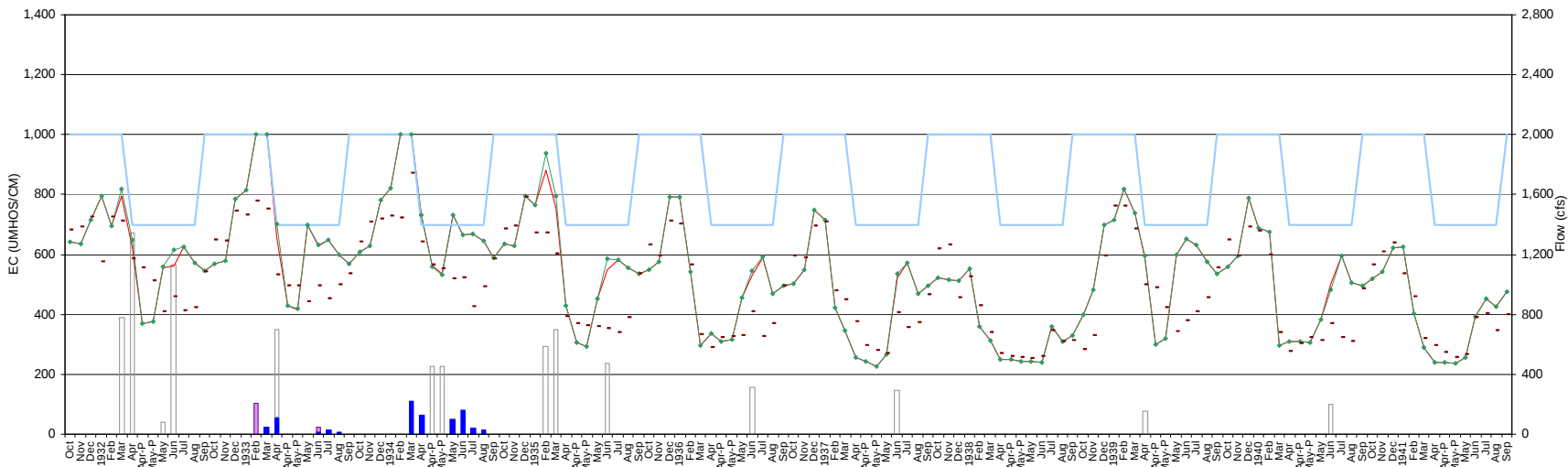
Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	1	0	0	0	0	2	0	0	0	3
AN (16)	0	0	0	0	1	5	1	0	0	1	11	0	0	0	12
BN (13)	0	0	0	0	3	2	0	0	0	4	2	0	0	0	7
D (13)	0	0	0	0	3	4	3	0	0	2	3	0	0	0	10
C (16)	0	0	0	0	0	0	0	5	6	0	0	0	0	0	7
All (82)	0	0	0	0	7	12	4	5	6	7	18	0	0	0	39

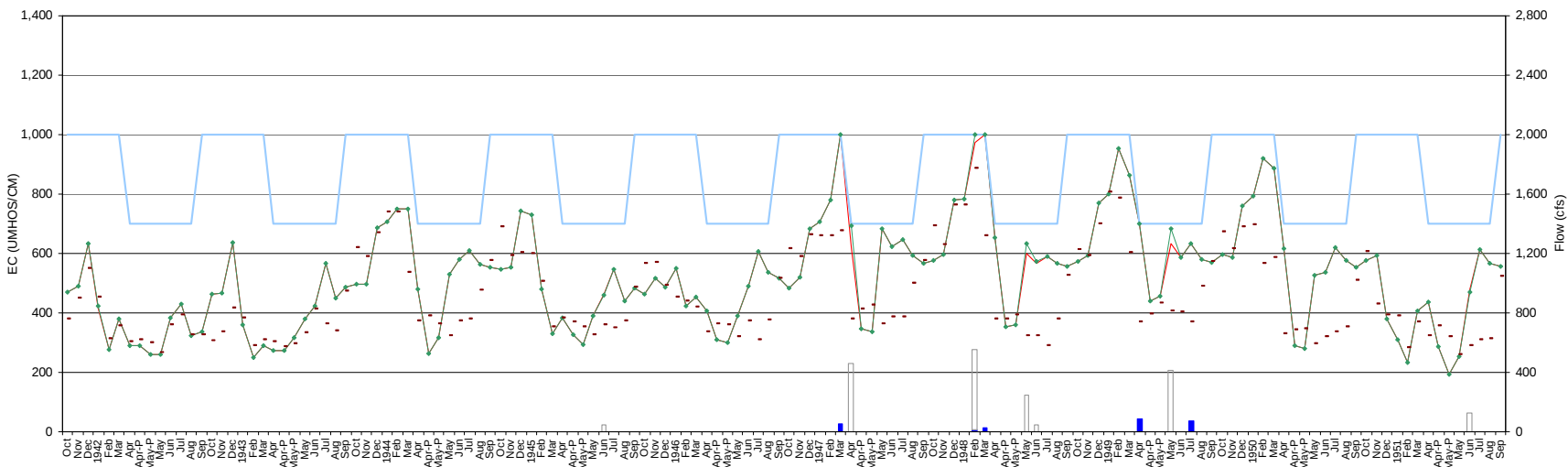
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1922-1931



Water Year: 1932-1941



Water Year: 1942-1951



Water Year: 1952-1961

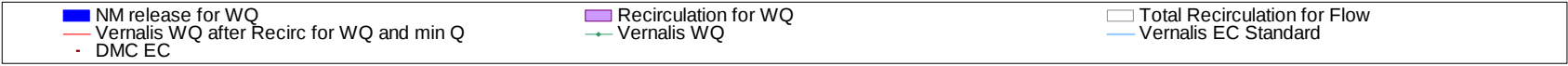
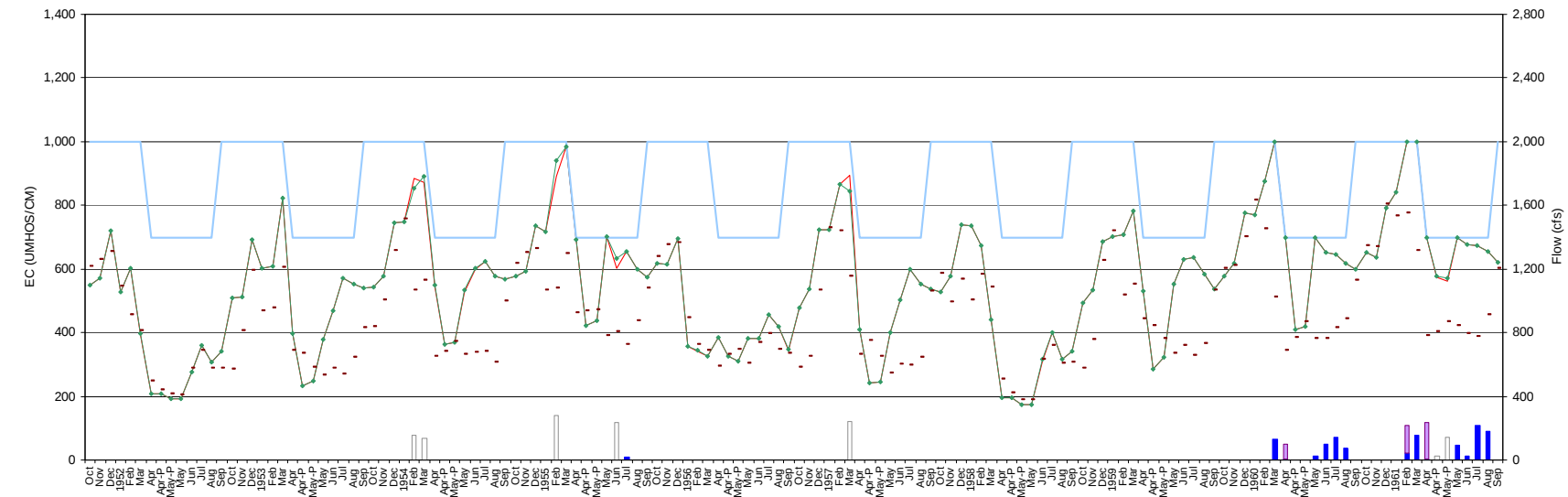
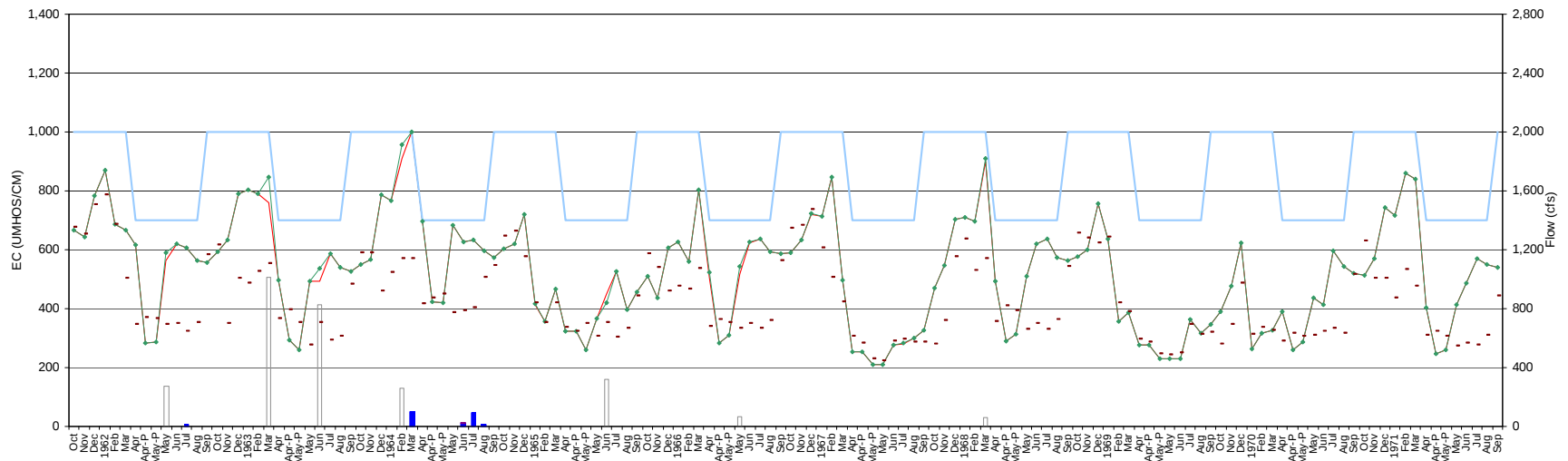


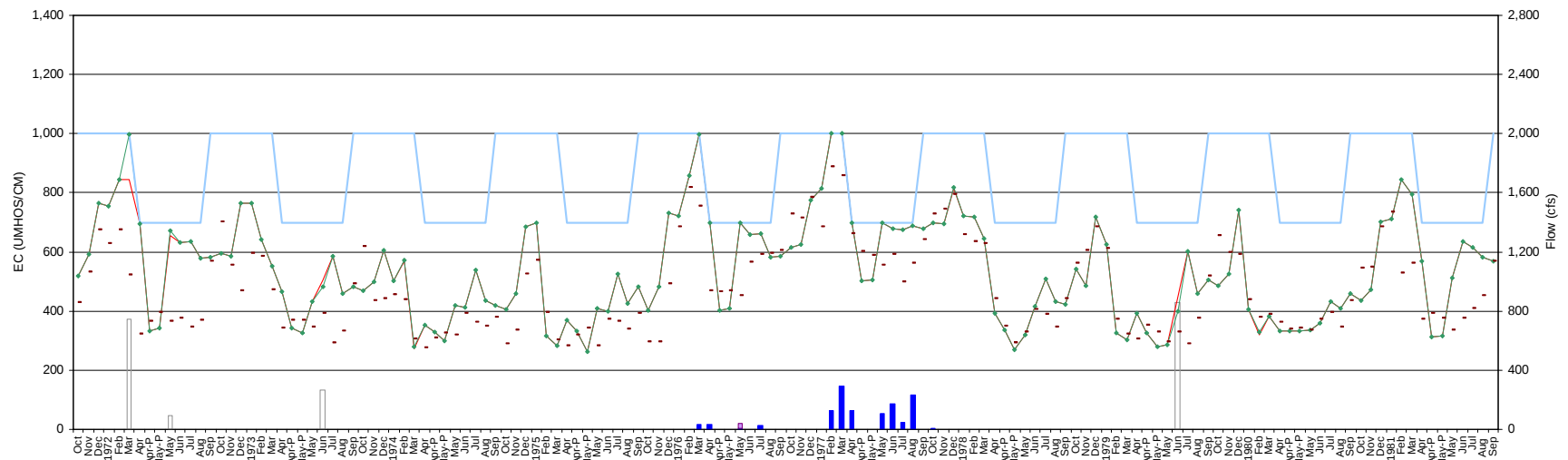
Figure A1-21. Alternative B2 Future LOD

San Joaquin River Quality and recirculation used to satisfy water quality standard

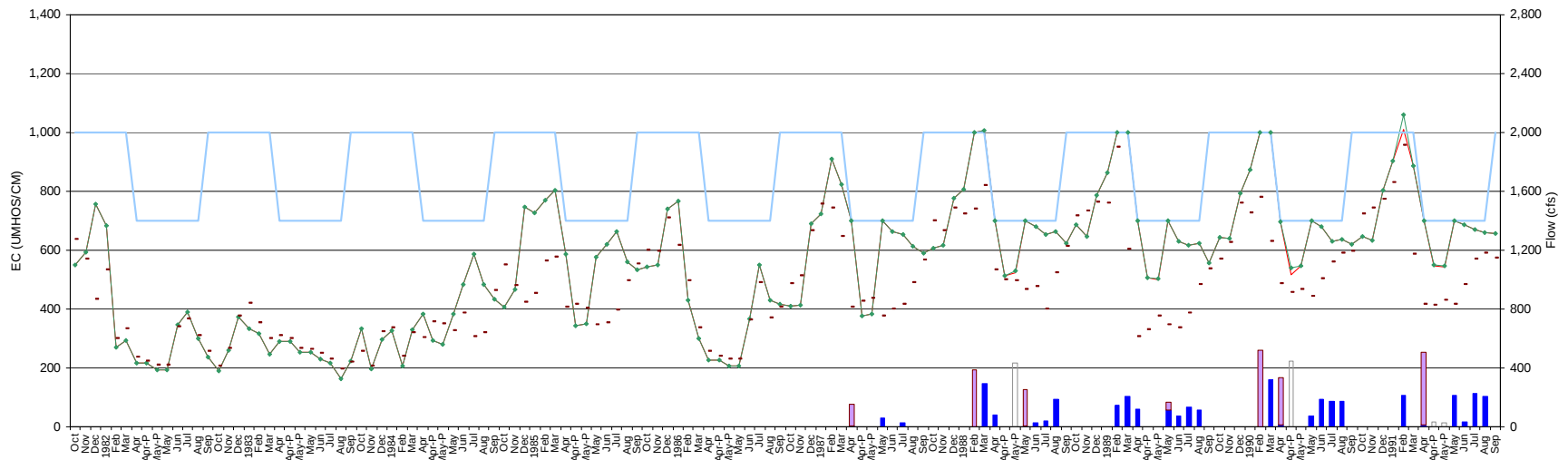
Water Year: 1962-1971



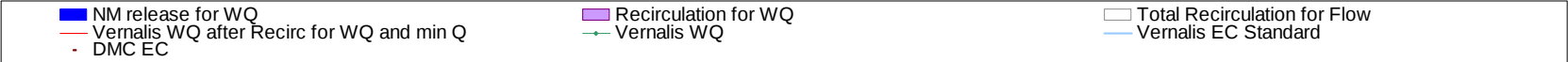
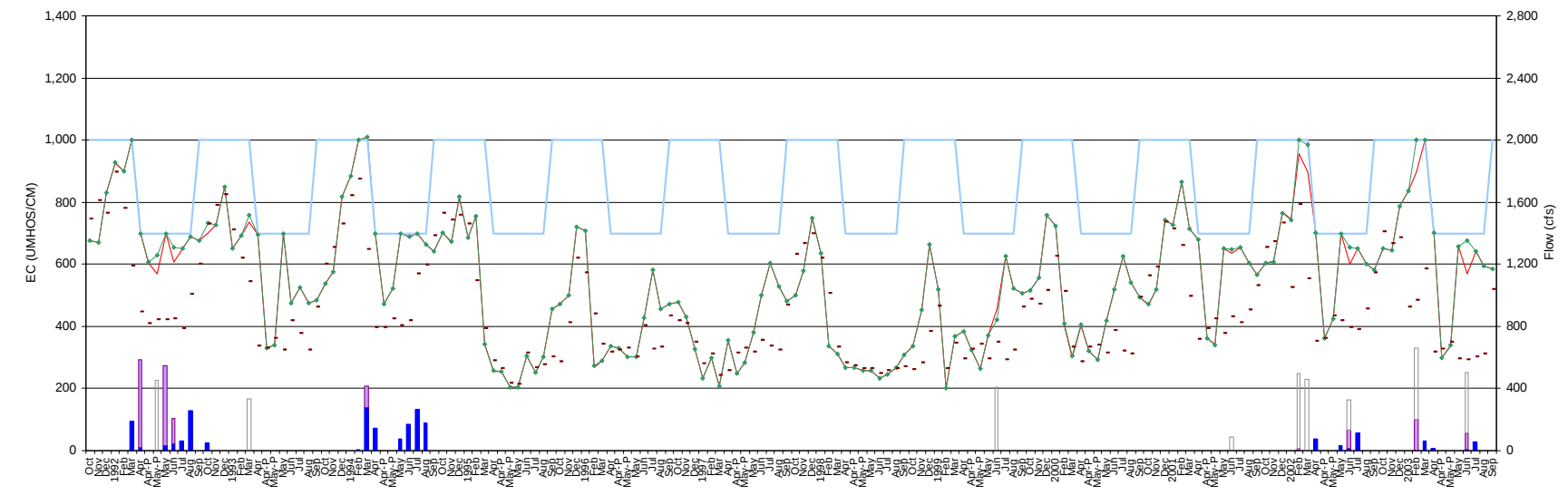
Water Year: 1972-1981



Water Year: 1982-1991



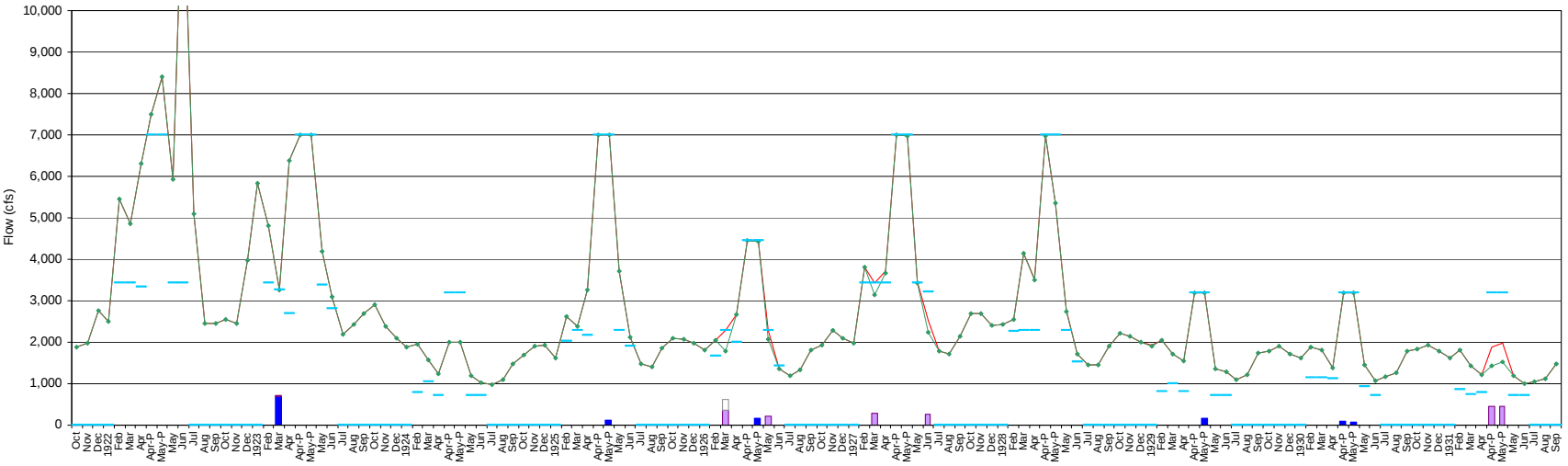
Water Year: 1992-2003



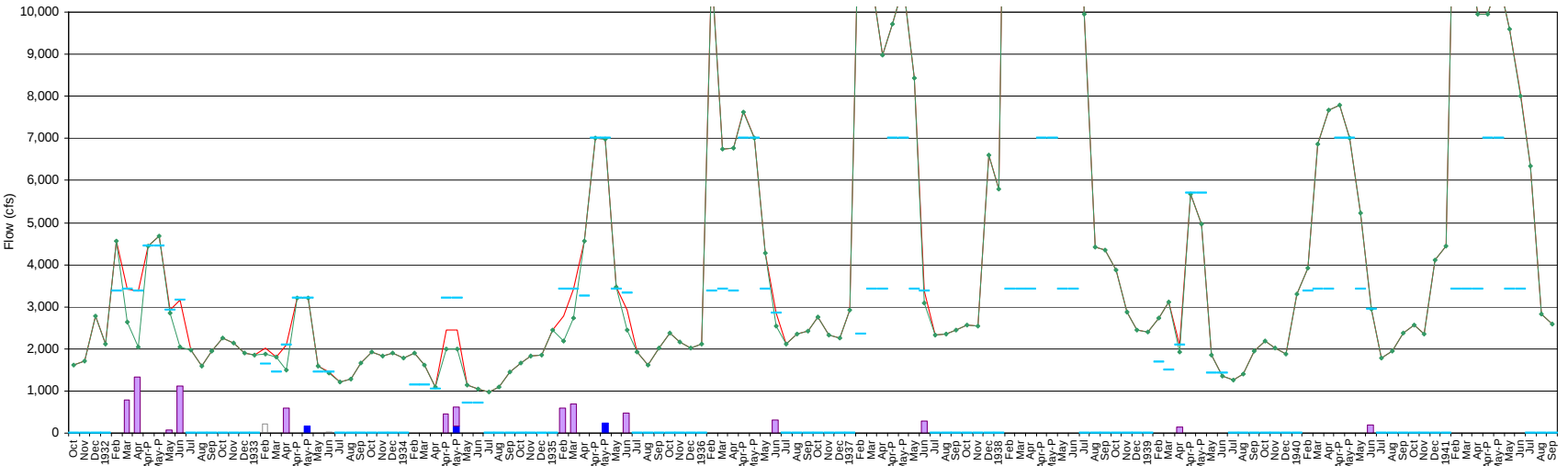
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-21. Alternative B2 Future LOD (continued)

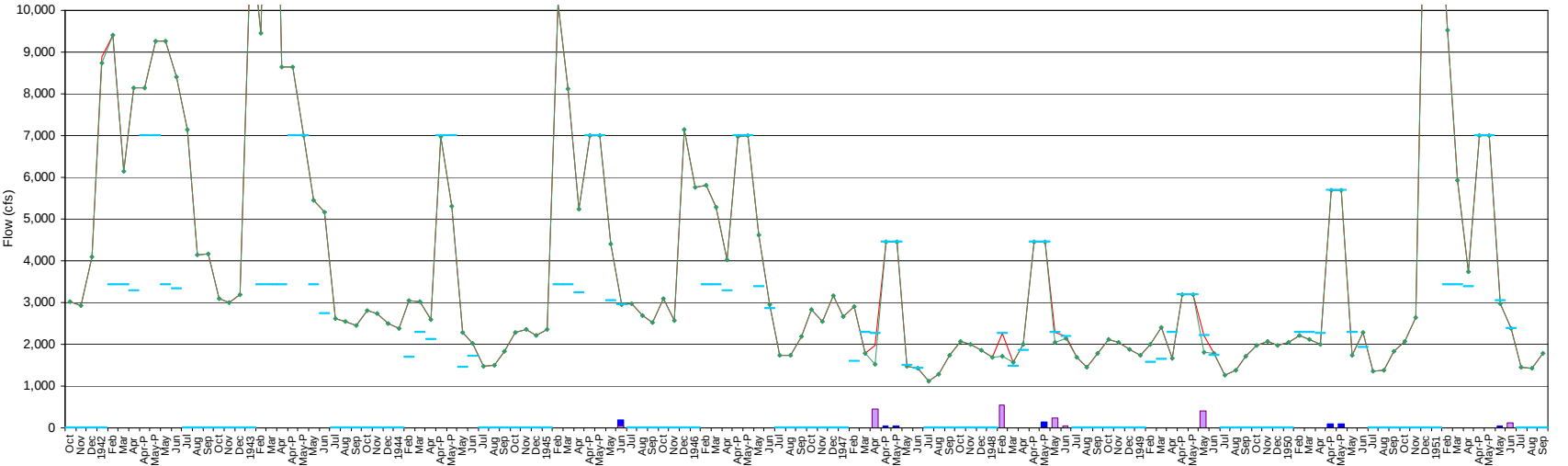
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



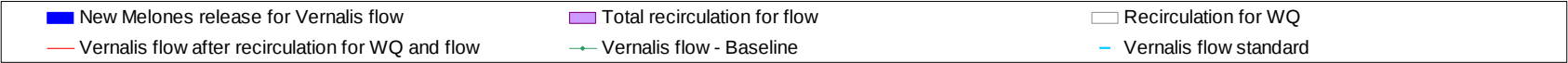
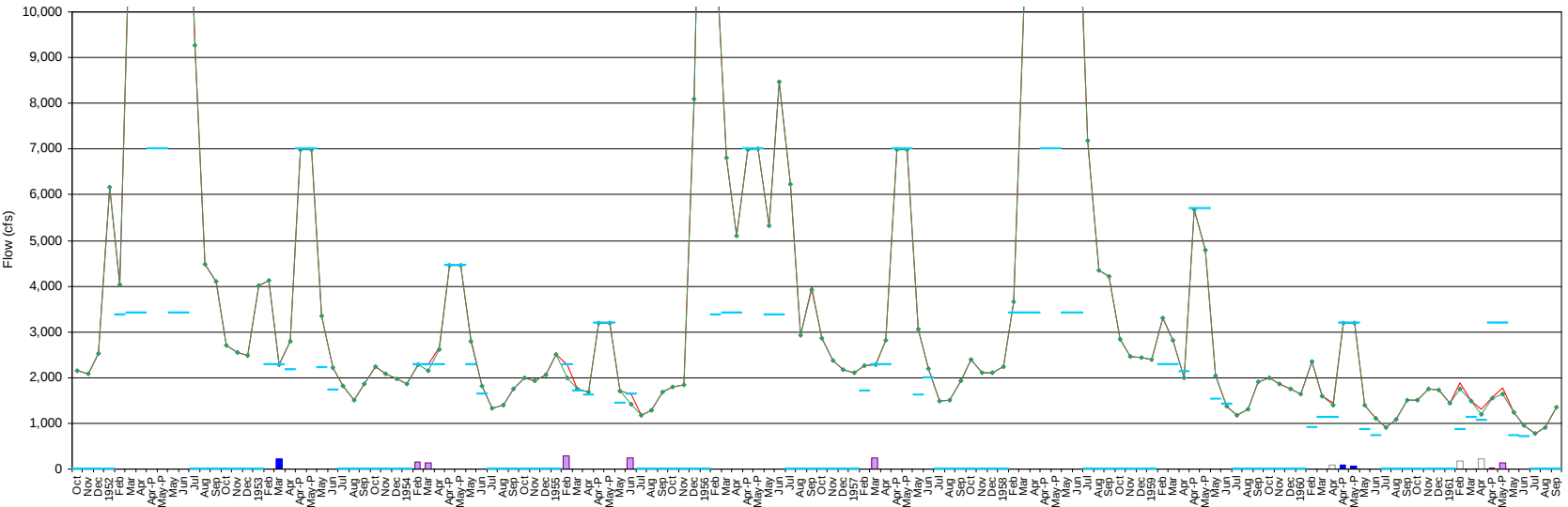
Water Year: 1932-1941



Water Year: 1942-1951



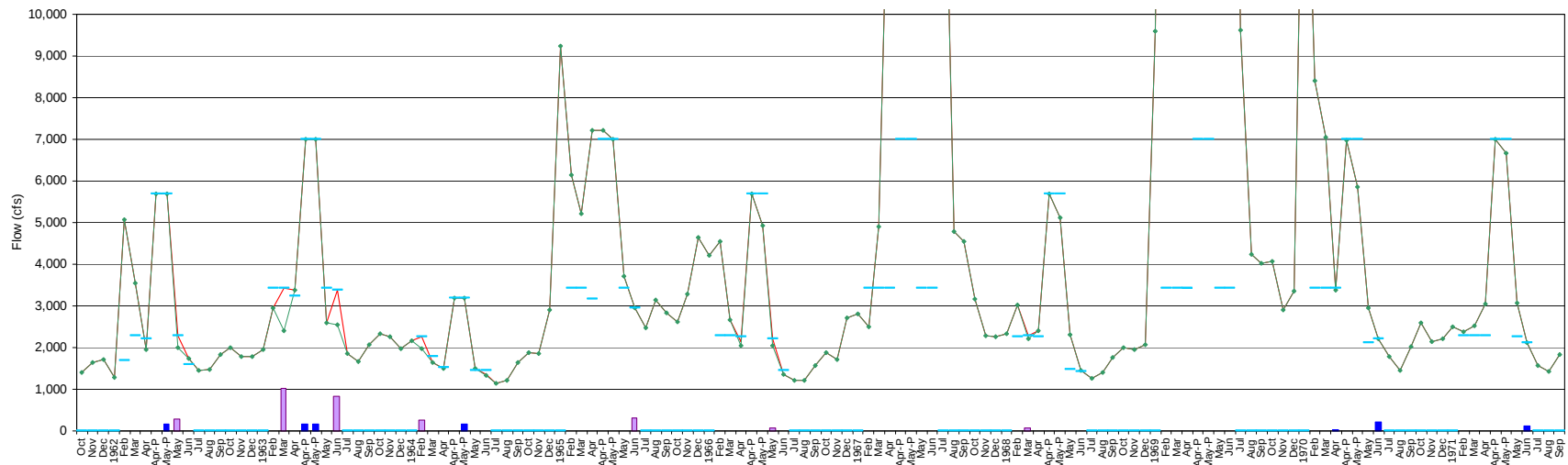
Water Year: 1952-1961



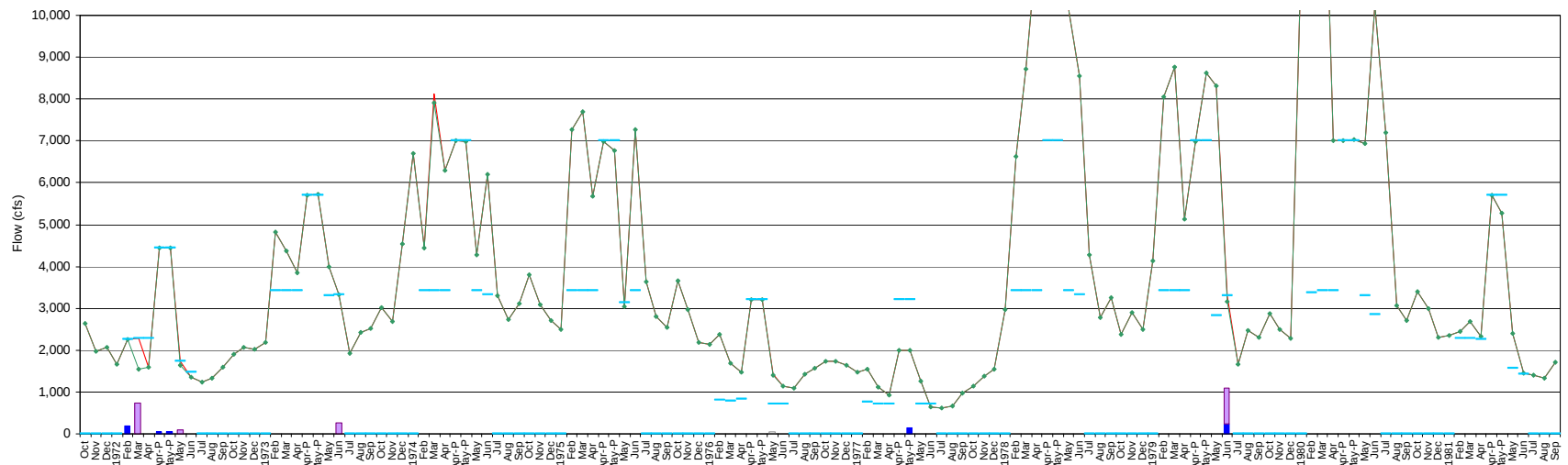
Key:
WQ = water quality

Figure A1-22. Alternative B2 Future LOD

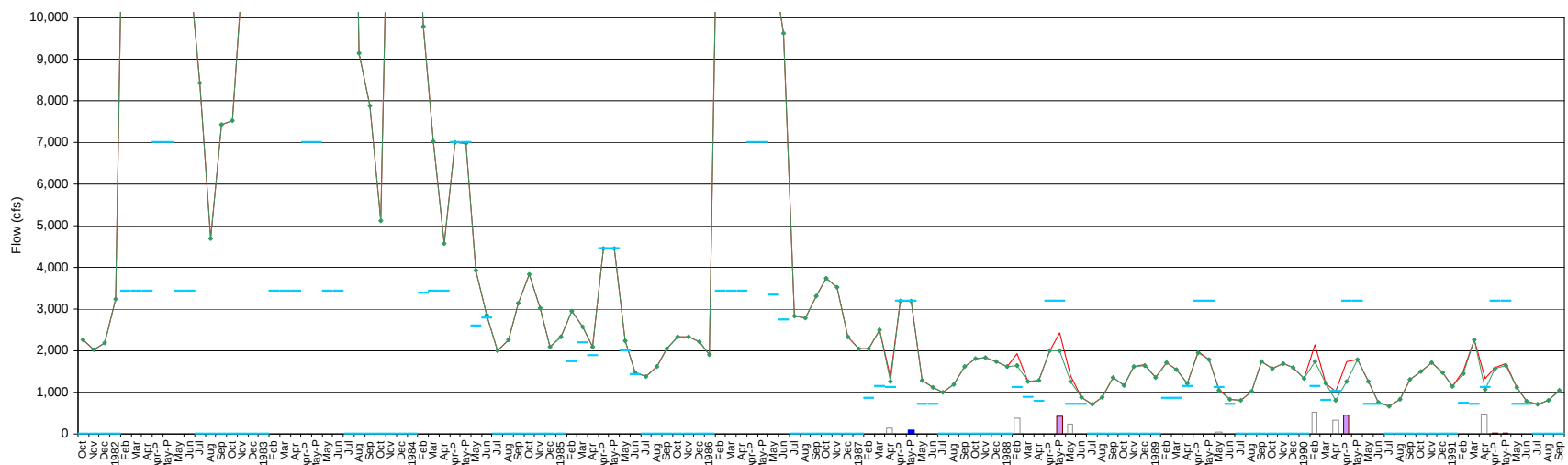
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



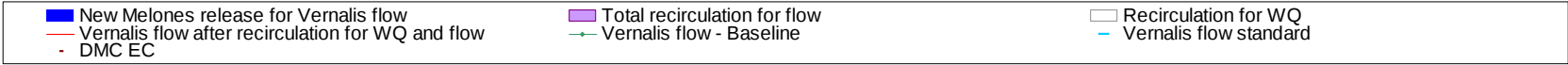
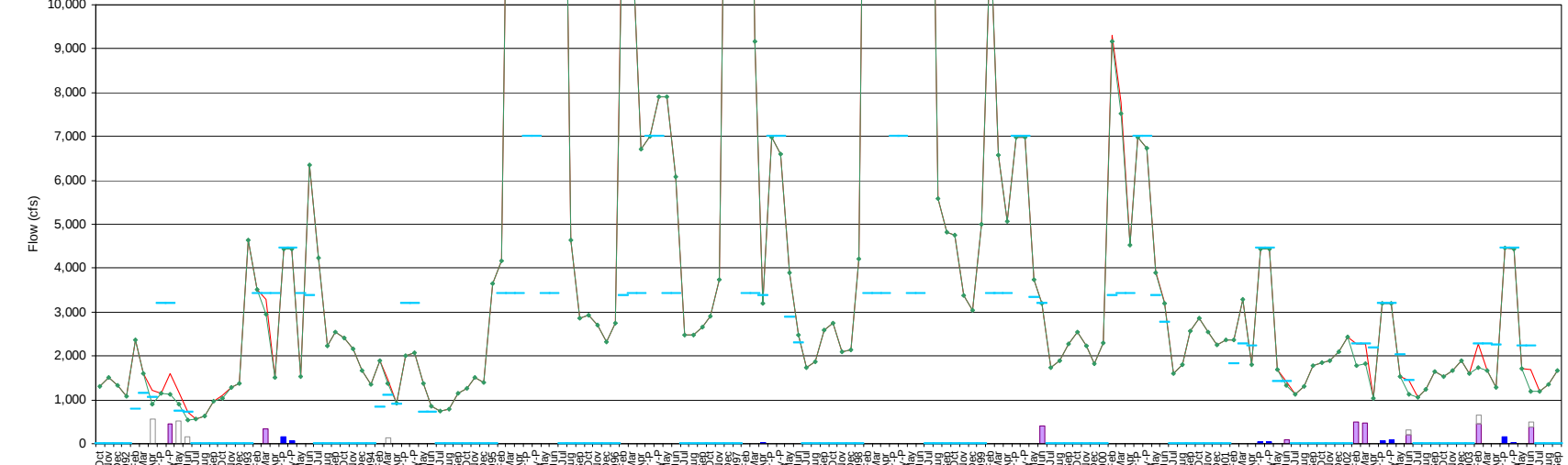
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
EC = electrical conductivity
WQ = water quality

Figure A1-22. Alternative B2 Future LOD (continued)

Table A1-11. Alternative C Future LOD

Recirculation used prior to New Melones release using Jones PP and Banks excess capacity
with CVP “impacts” to meet flow standard

1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow

Average by Year Type

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	2	1	2	0	0	1	2	0	0	0	8
AN	0	0	0	0	6	13	3	0	2	2	25	0	0	0	50
BN	0	0	0	0	6	7	5	0	4	5	6	0	0	0	32
D	0	0	0	0	6	12	8	0	0	2	5	0	0	0	33
C	0	0	0	0	4	1	3	11	9	2	1	0	0	0	30
All	0	0	0	0	4	6	4	2	3	2	7	0	0	0	28

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	2	0	0	2	2	0	0	0	6
AN (16)	0	0	0	0	2	5	2	0	1	2	12	0	0	0	13
BN (13)	0	0	0	0	4	5	5	0	2	6	4	0	0	0	11
D (13)	0	0	0	0	5	6	8	0	0	4	9	0	0	0	11
C (16)	0	0	0	0	3	1	6	9	9	4	2	0	0	0	13
All (82)	0	0	0	0	15	18	23	9	12	18	29	0	0	0	54

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	51	29	29	0	0	7	18	0	0	0	31
AN	0	0	0	0	47	43	20	0	30	14	33	0	0	0	62
BN	0	0	0	0	20	17	12	0	25	11	19	0	0	0	38
D	0	0	0	0	16	26	14	0	0	6	7	0	0	0	39
C	0	0	0	0	20	8	9	19	16	7	7	0	0	0	36
All	0	0	0	0	24	27	14	19	18	9	20	0	0	0	43

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
D	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3
C	0	0	0	0	4	1	3	0	0	2	1	0	0	0	10
All	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN (16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN (13)	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
D (13)	0	0	0	0	2	1	0	0	0	0	3	0	0	0	4
C (16)	0	0	0	0	3	1	6	0	0	4	1	0	0	0	10
All (82)	0	0	0	0	6	2	6	0	0	4	5	0	0	0	15

Total Recirculation for Flow

1000 AF

Year Type Averages by San Joaquin River Index

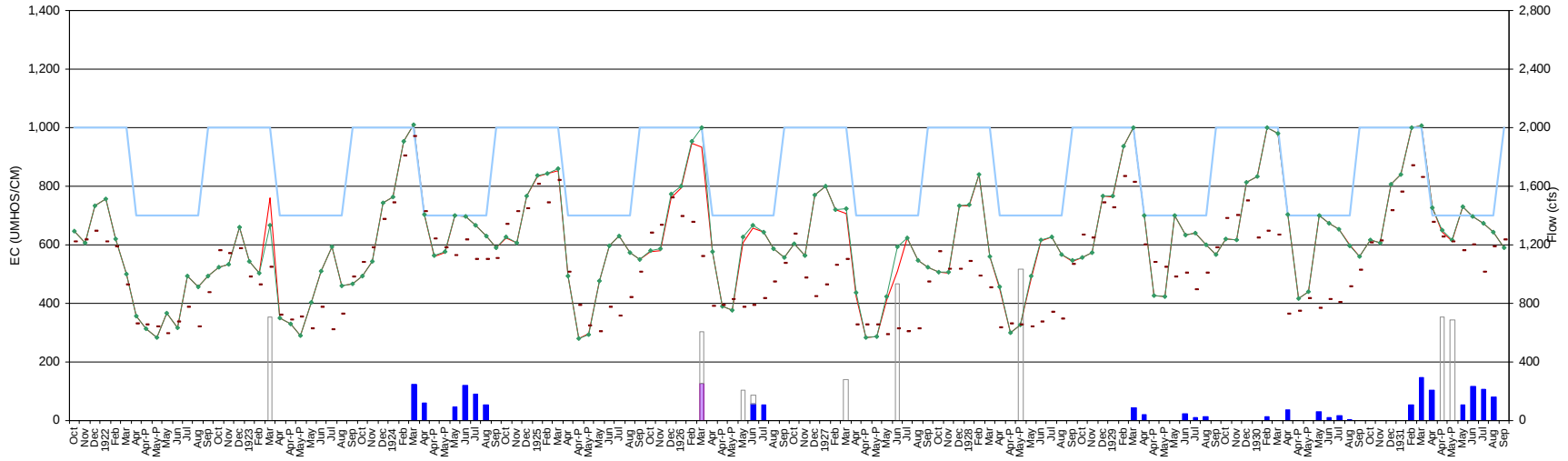
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	2	1	2	0	0	1	2	0	0	0	8
AN	0	0	0	0	6	13	3	0	2	2	25	0	0	0	50
BN	0	0	0	0	5	7	5	0	4	5	5	0	0	0	31
D	0	0	0	0	5	11	8	0	0	2	4	0	0	0	31
C	0	0	0	0	0	0	0	11	9	0	0	0	0	0	20
All	0	0	0	0	3	6	3	2	3	2	7	0	0	0	26

Frequency of Occurrence

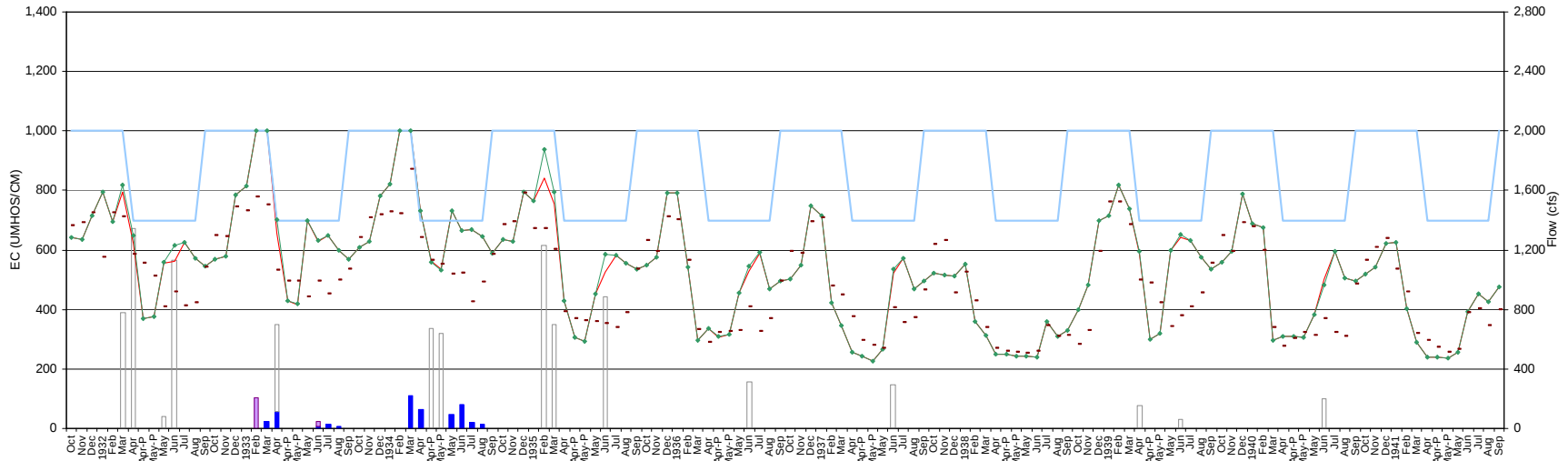
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	2	0	0	2	2	0	0	0	6
AN (16)	0	0	0	0	2	5	2	0	1	2	12	0	0	0	13
BN (13)	0	0	0	0	4	5	5	0	2	6	4	0	0	0	11
D (13)	0	0	0	0	4	6	8	0	0	4	8	0	0	0	11
C (16)	0	0	0	0	0	0	0	9	9	1	1	0	0	0	10
All (82)	0	0	0	0	11	17	17	9	12	15	27	0	0	0	51

Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

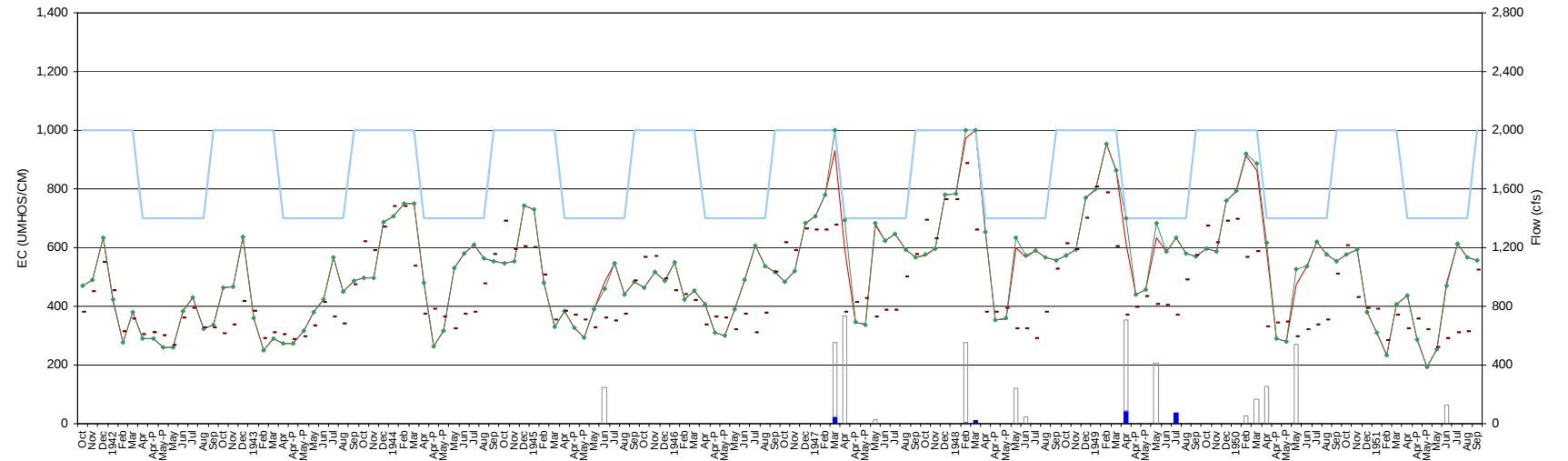
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1922-1931



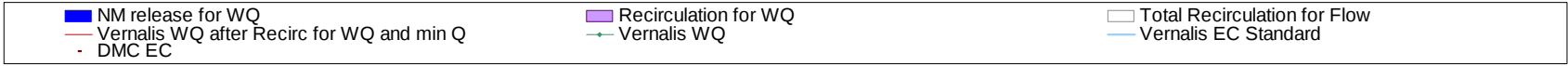
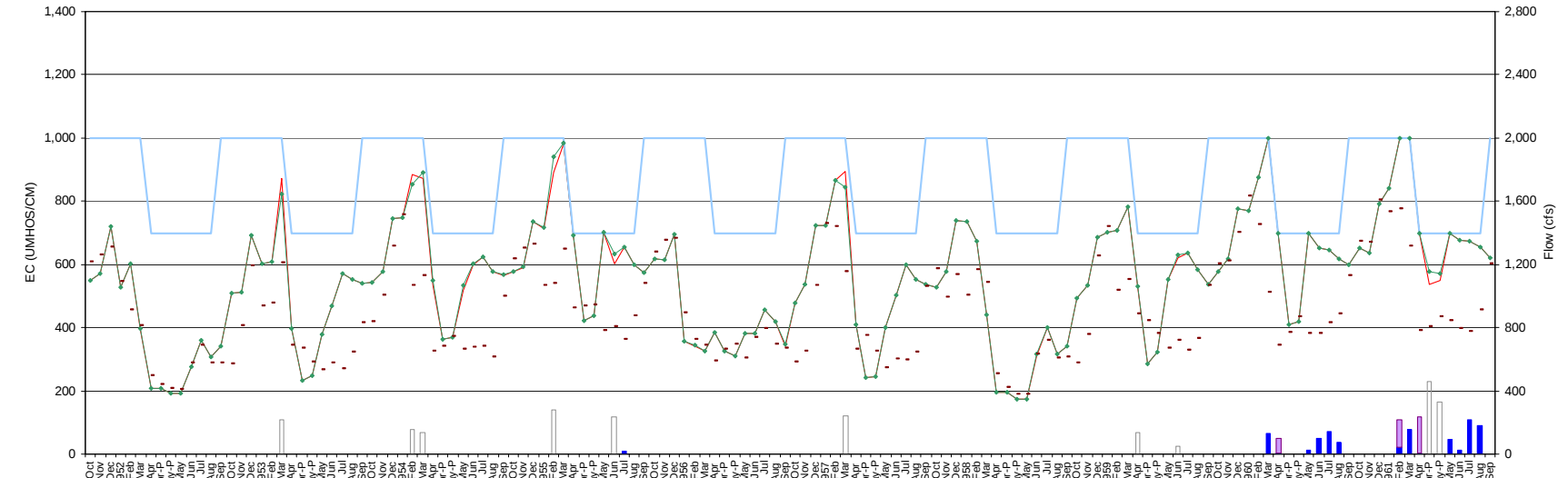
Water Year: 1932-1941



Water Year: 1942-1951



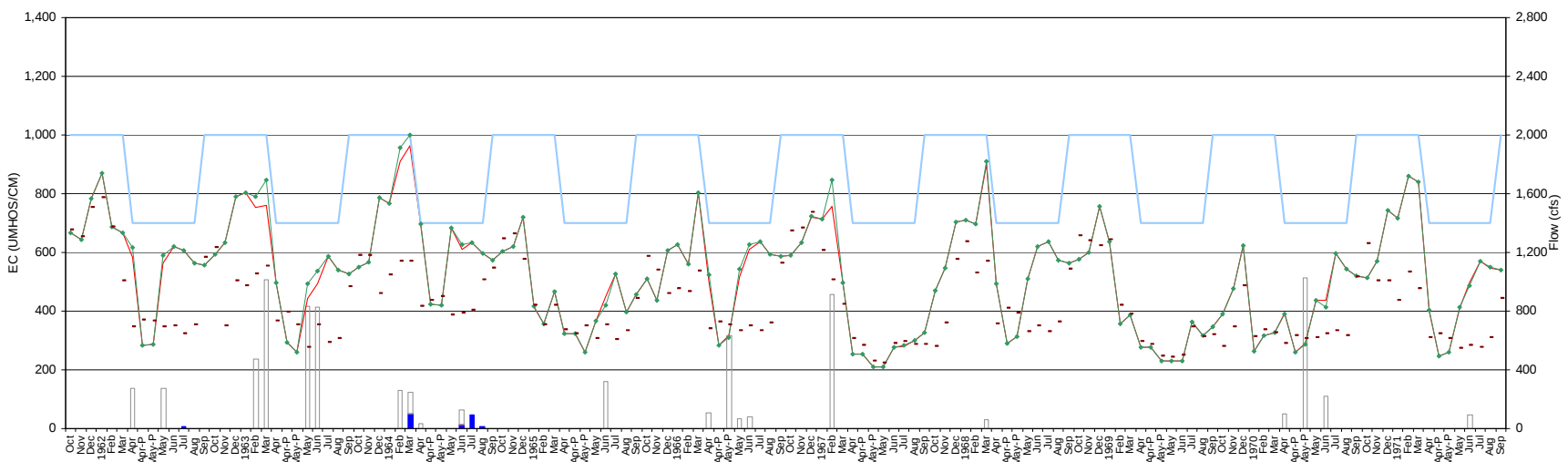
Water Year: 1952-1961



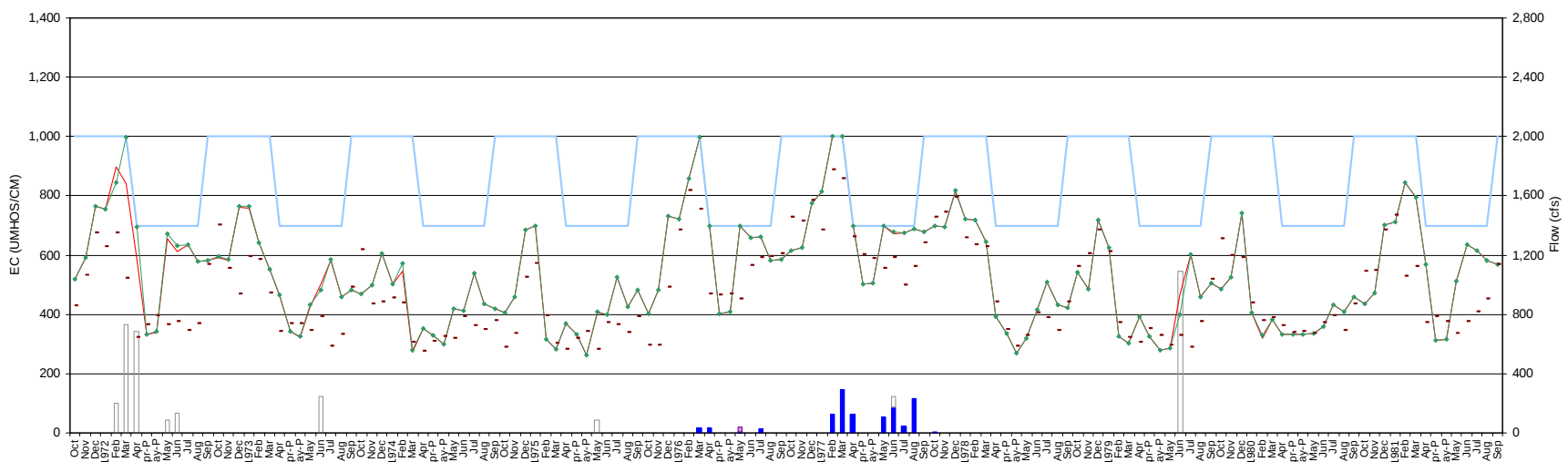
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-23. Alternative C Future LOD

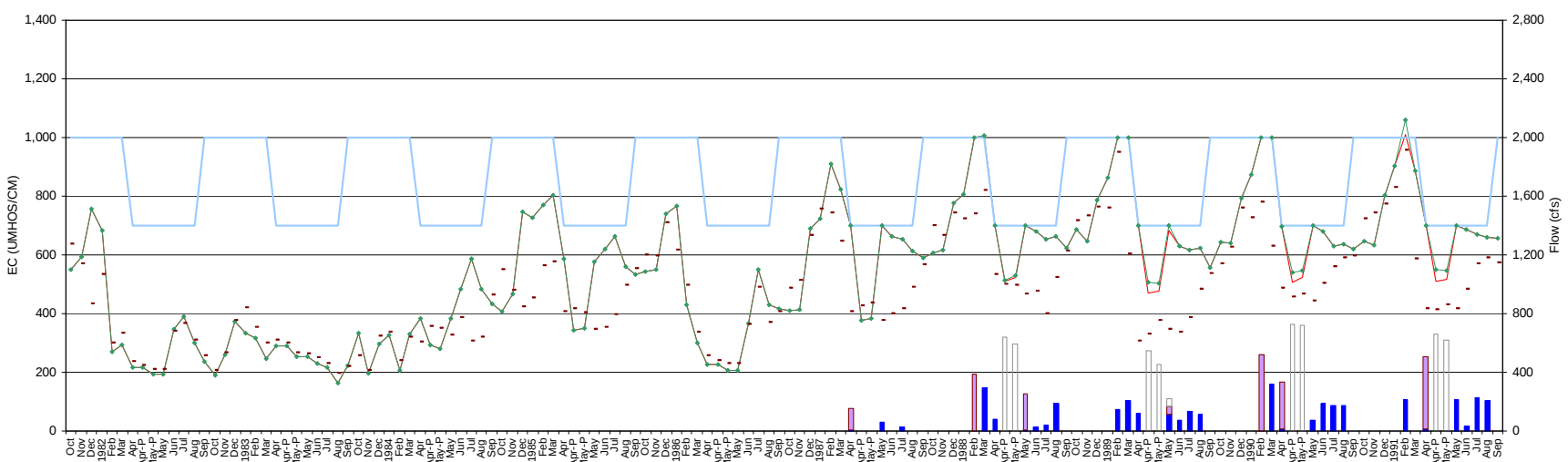
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



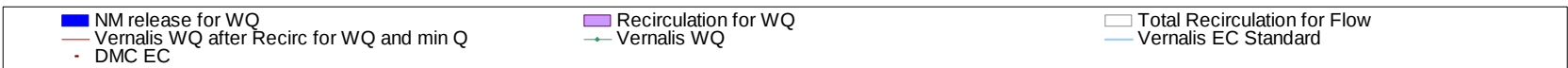
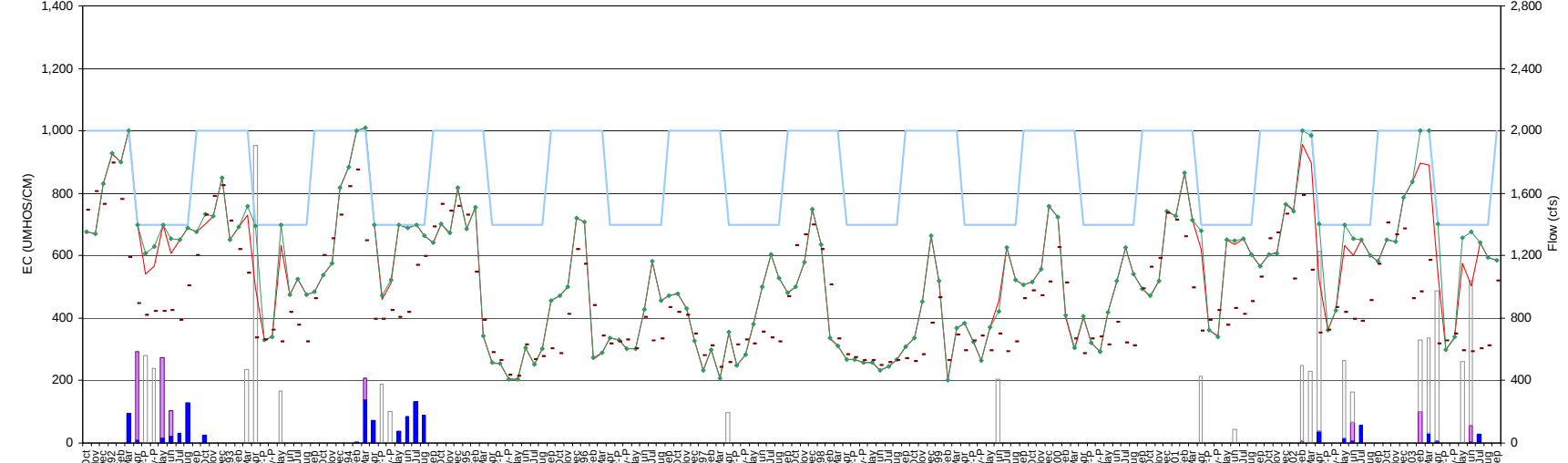
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003

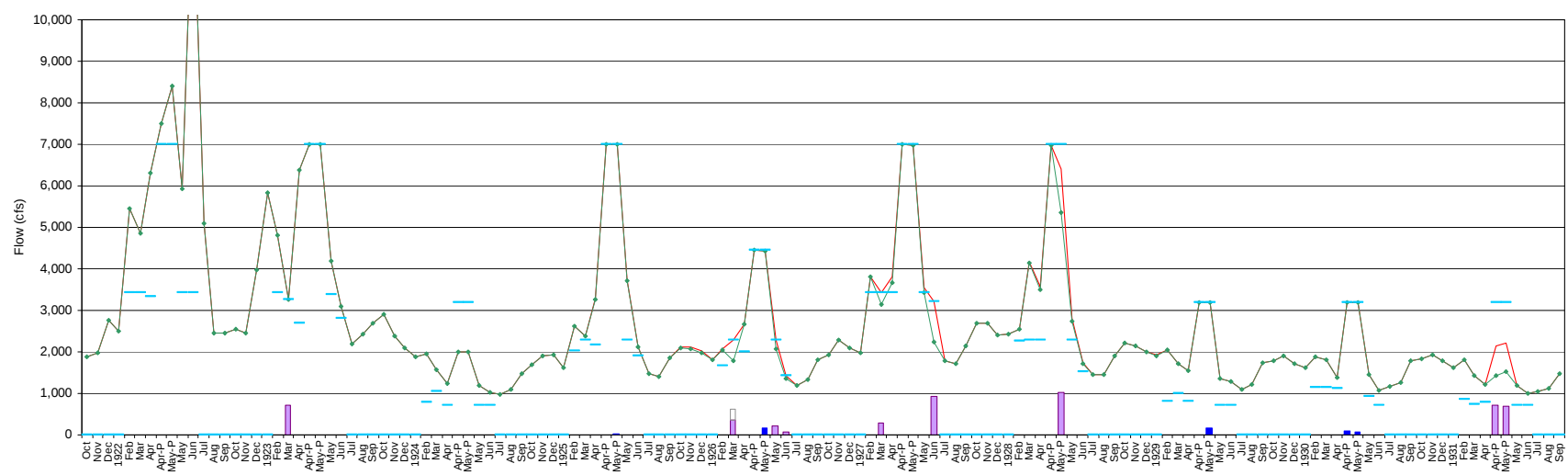


Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

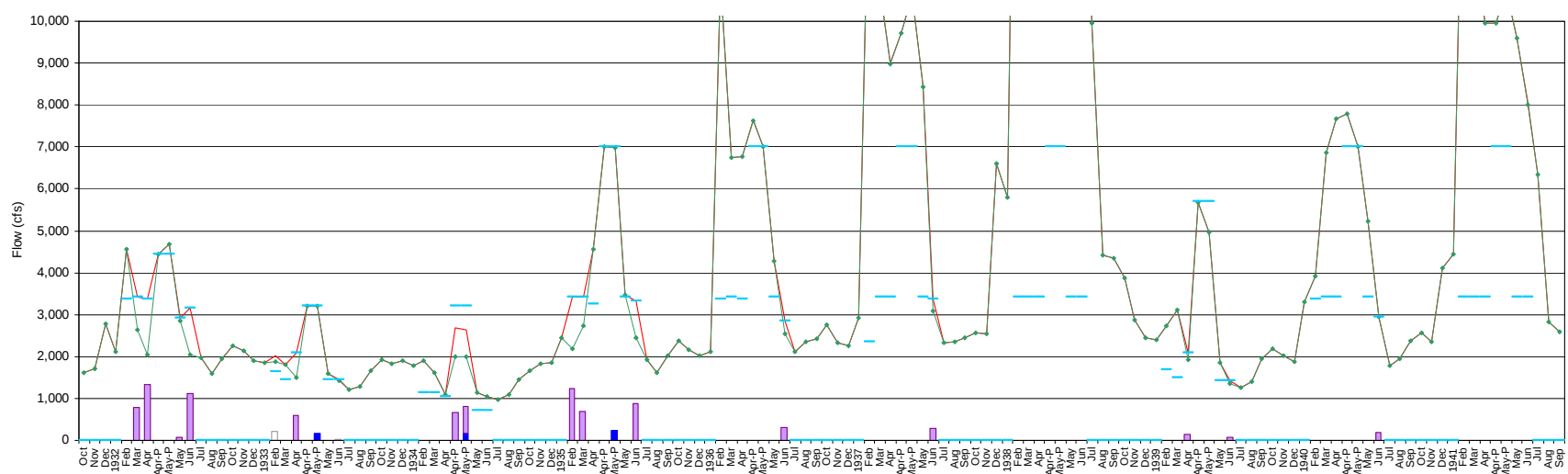
Figure A1-23. Alternative C Future LOD (continued)

San Joaquin River flow and recirculation used to satisfy flow standard

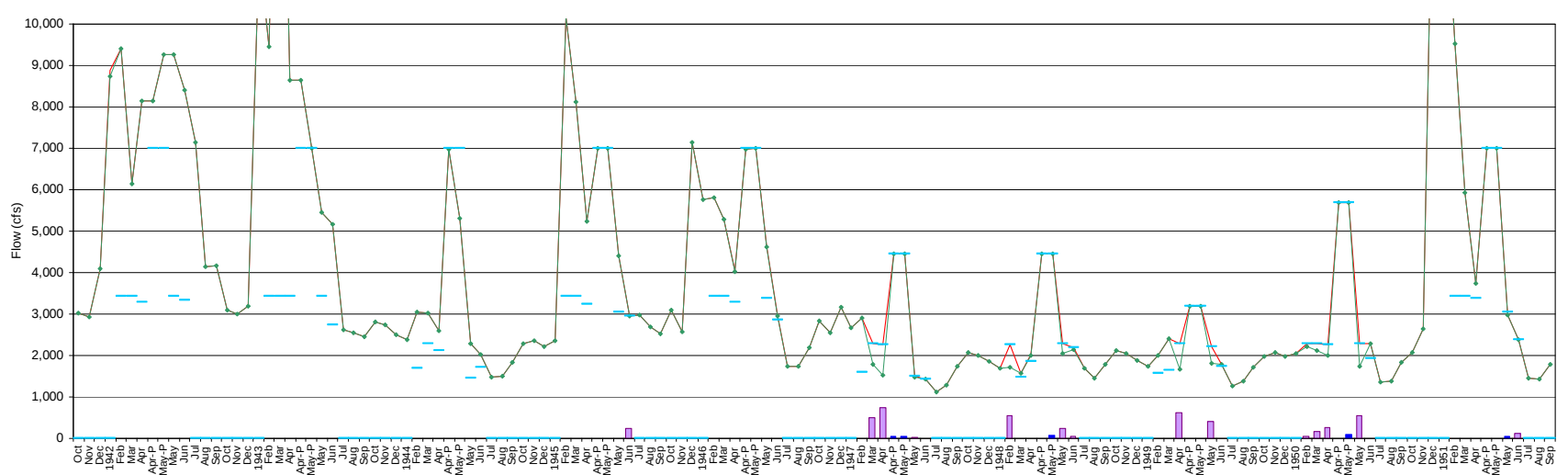
Water Year: 1922-1931



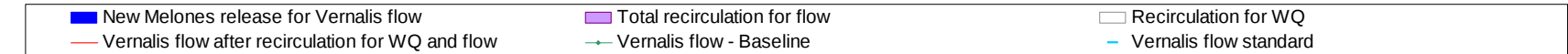
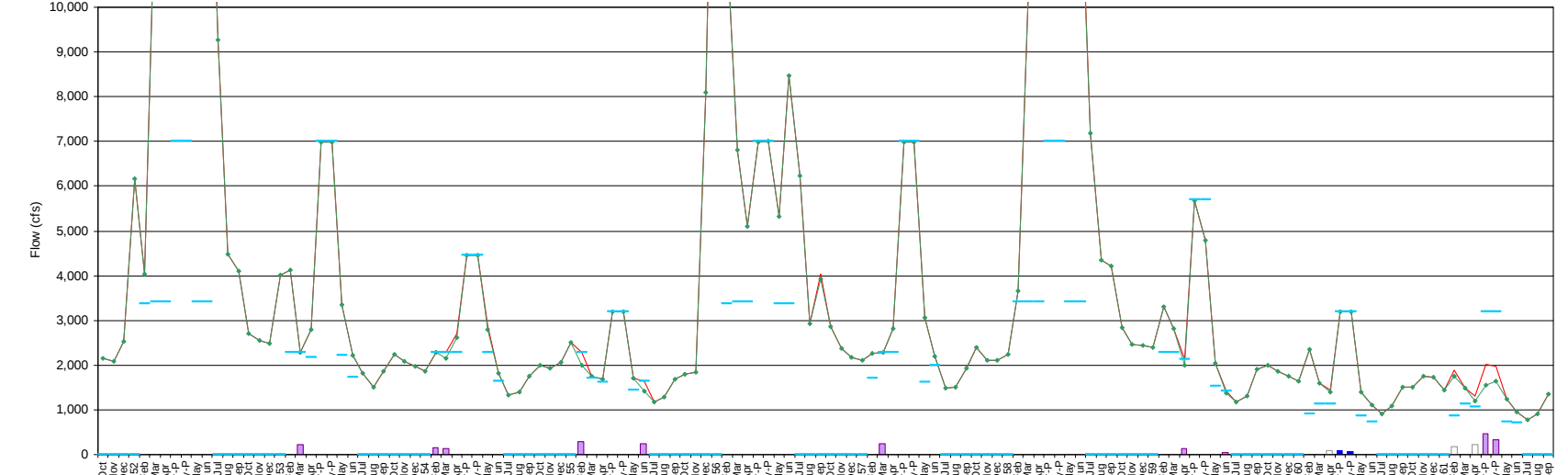
Water Year: 1932-1941



Water Year: 1942-1951



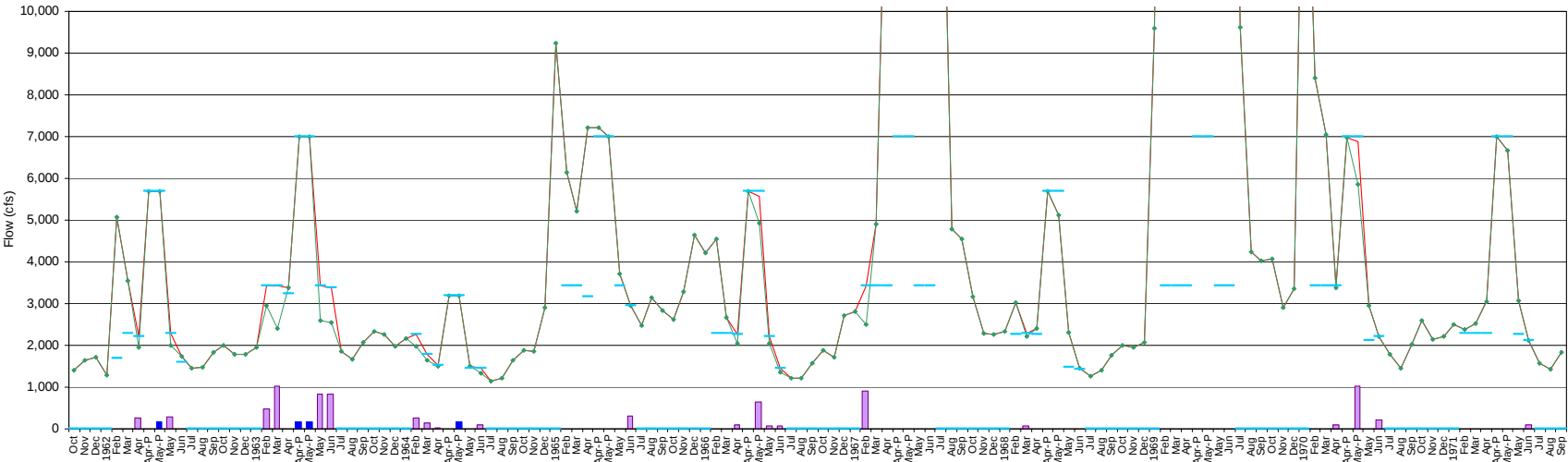
Water Year: 1952-1961



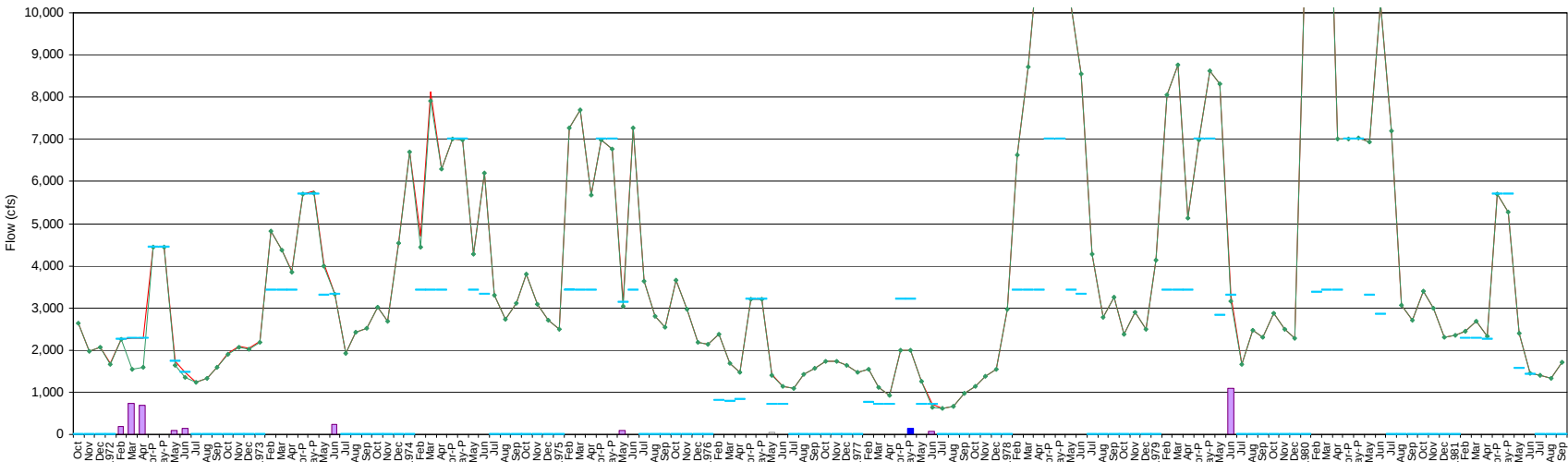
Key:
WQ = water quality

Figure A1-24. Alternative C Future LOD

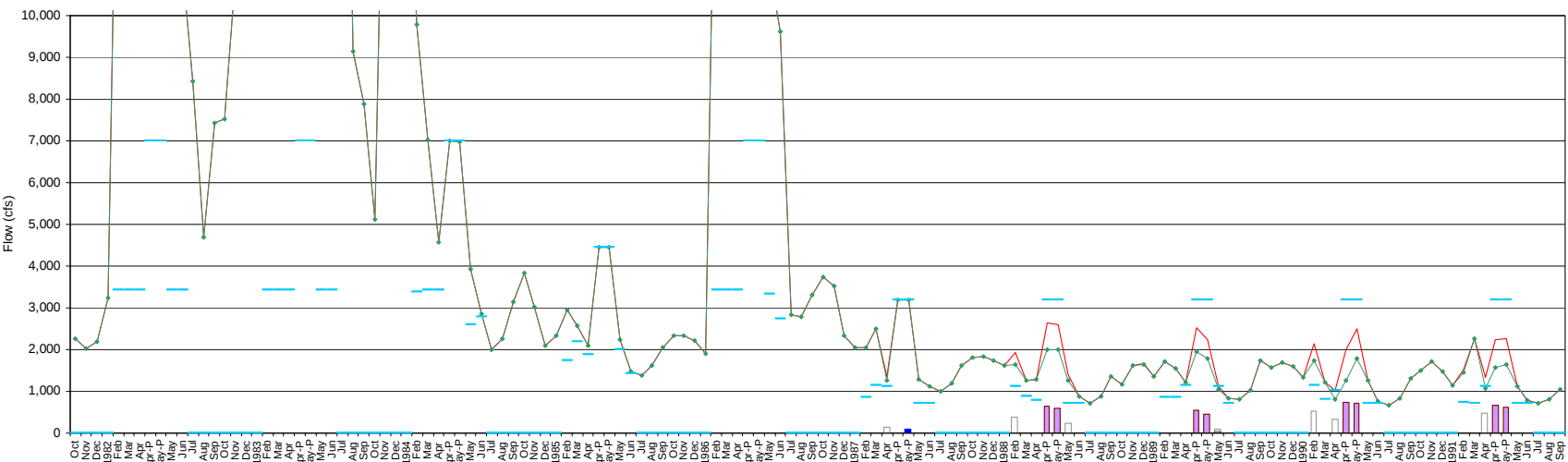
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1962-1971



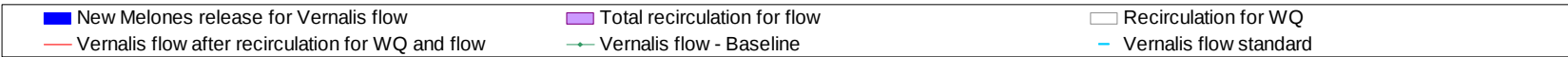
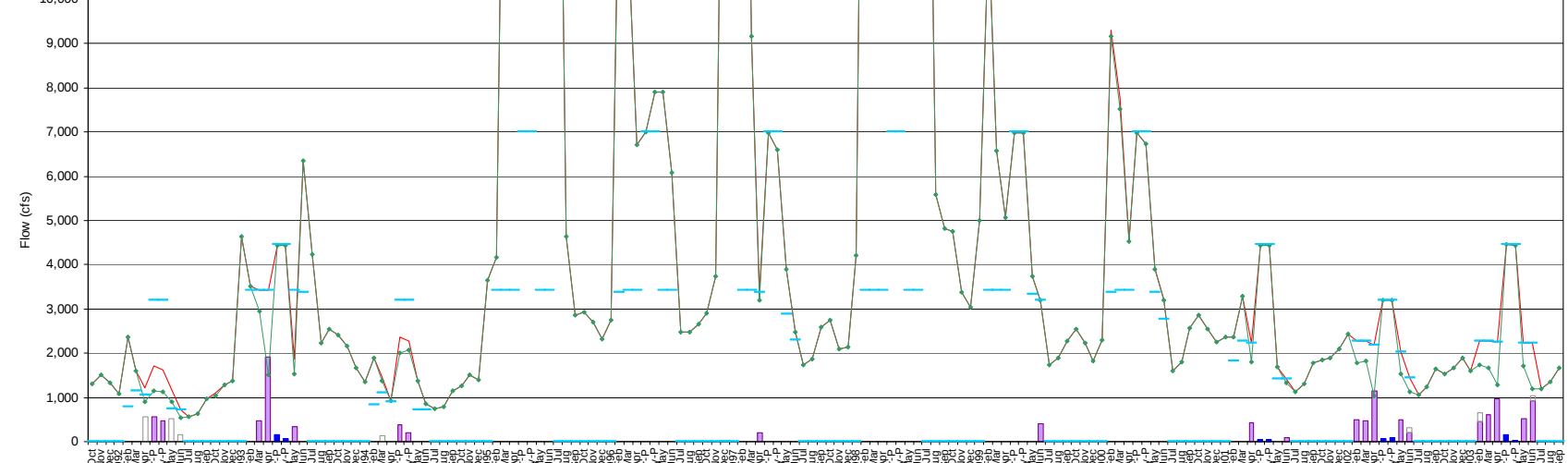
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-24. Alternative C Future LOD (continued)

Table A1-12. Alternative D Future LOD

Recirculation used prior to New Melones release using Jones PP and Banks excess capacity
with CVP “impacts” to meet flow and quality standard

1000 acre-feet

Recirculation for WQ plus Total Recirculation for Flow
Average by Year Type

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	2	1	2	0	0	1	1	0	0	0	8
AN	0	0	0	0	6	13	3	0	2	2	25	0	0	0	50
BN	0	0	0	0	6	7	5	0	4	5	6	0	0	0	32
D	0	0	0	0	6	13	8	0	0	2	5	0	0	0	35
C	0	0	0	0	5	13	4	11	9	4	1	0	0	0	46
All	0	0	0	0	5	9	4	2	3	2	7	0	0	0	32

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	2	0	0	0	1	1	2	0	0	2	2	0	0	0	7
AN (16)	0	0	0	0	2	5	2	0	1	2	12	0	0	0	13
BN (13)	0	0	0	0	4	6	5	0	2	6	4	0	0	0	11
D (13)	0	0	0	0	5	7	8	0	0	4	9	0	0	0	11
C (16)	0	0	0	0	5	7	10	9	9	11	2	0	0	0	14
All (82)	2	0	0	0	17	26	27	9	12	25	29	0	0	0	56

Average Flow During Occurrence

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	6	0	0	0	51	29	29	0	0	7	17	0	0	0	28
AN	0	0	0	0	47	43	20	0	30	14	33	0	0	0	62
BN	0	0	0	0	20	15	12	0	25	11	19	0	0	0	38
D	0	0	0	0	16	25	14	0	0	7	7	0	0	0	42
C	0	0	0	0	15	29	7	19	16	6	7	0	0	0	52
All	6	0	0	0	22	27	13	19	18	8	20	0	0	0	47

Recirculation for WQ

1000 AF

Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN	0	0	0	0	1	1	0	0	0	0	0	0	0	0	3
D	0	0	0	0	1	4	0	0	0	0	1	0	0	0	6
C	0	0	0	0	5	13	4	0	0	4	1	0	0	0	26
All	0	0	0	0	1	3	1	0	0	1	0	0	0	0	7

Frequency of Occurrence

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
AN (16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BN (13)	0	0	0	0	1	2	2	0	0	0	1	0	0	0	3
D (13)	0	0	0	0	2	4	1	0	0	1	4	0	0	0	5
C (16)	0	0	0	0	5	7	10	0	0	11	1	0	0	0	12
All (82)	2	0	0	0	8	13	13	0	0	12	6	0	0	0	22

Total Recirculation for Flow

1000 AF

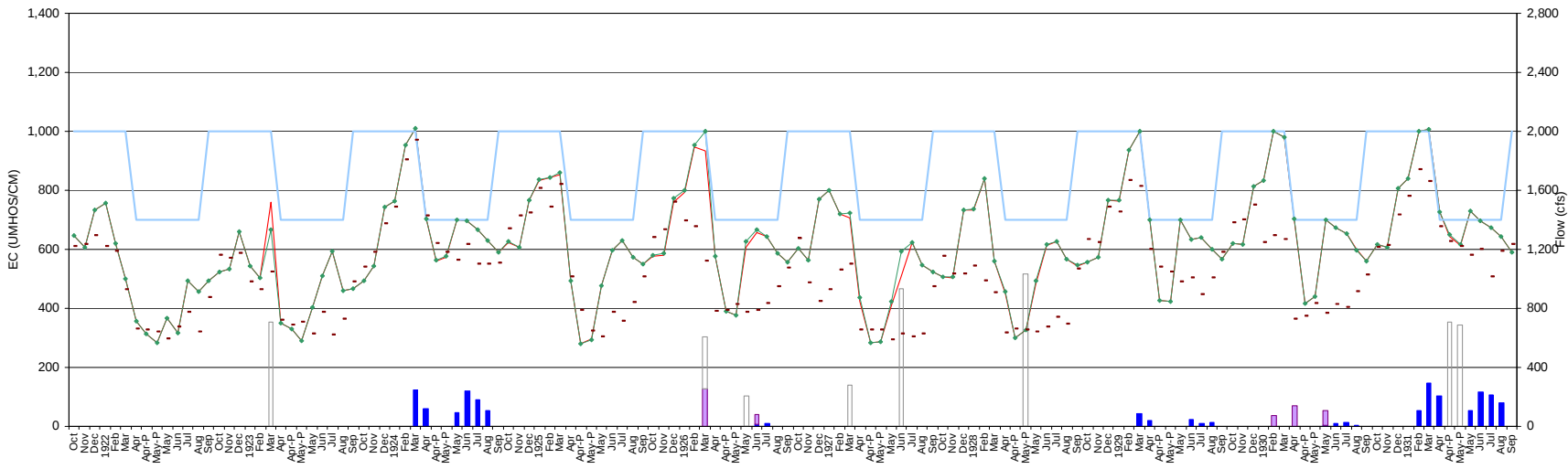
Year Type Averages by San Joaquin River Index															
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W	0	0	0	0	2	1	2	0	0	1	1	0	0	0	8
AN	0	0	0	0	6	13	3	0	2	2	25	0	0	0	50
BN	0	0	0	0	5	6	4	0	4	5	5	0	0	0	30
D	0	0	0	0	5	10	8	0	0	2	4	0	0	0	29
C	0	0	0	0	0	0	0	11	9	0	0	0	0	0	20
All	0	0	0	0	3	5	3	2	3	2	7	0	0	0	25

Frequency of Occurrence

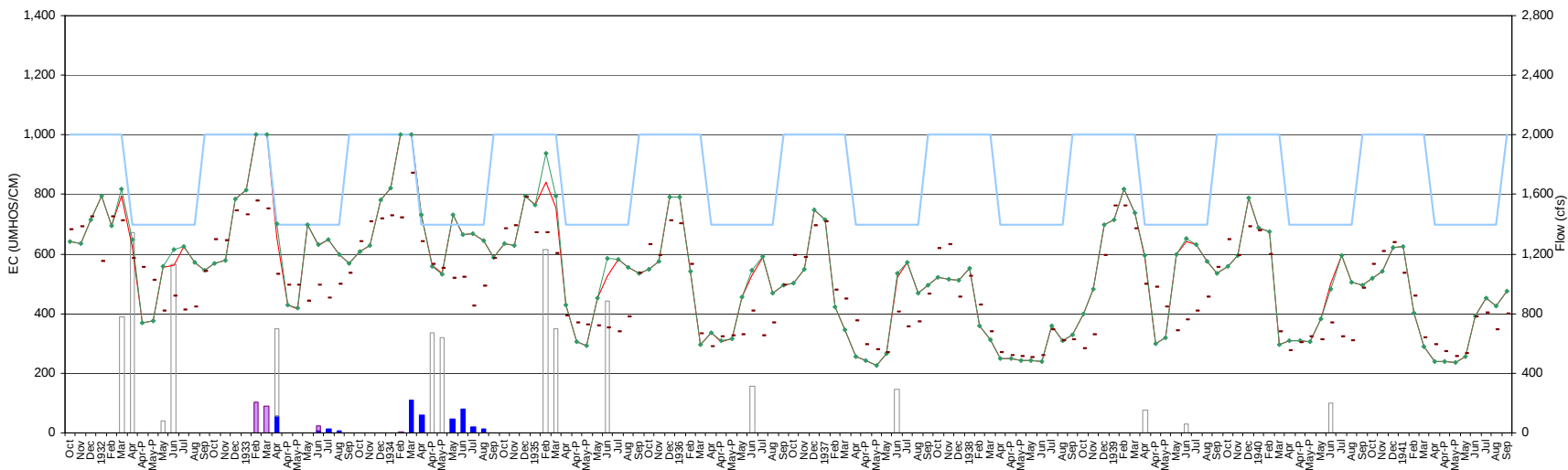
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Apr-P	May-P	May	Jun	Jul	Aug	Sep	Water Year
W (24)	0	0	0	0	1	1	2	0	0	2	2	0	0	0	6
AN (16)	0	0	0	0	2	5	2	0	1	2	12	0	0	0	13
BN (13)	0	0	0	0	4	5	5	0	2	6	4	0	0	0	11
D (13)	0	0	0	0	4	6	8	0	0	4	7	0	0	0	11
C (16)	0	0	0	0	0	0	1	9	9	0	1	0	0	0	10
All (82)	0	0	0	0	11	17	18	9	12	14	26	0	0	0	51

Key:
AF = acre-feet
AN = above normal
Apr-P and May-P = pulse periods
Apr and May = nonpulse periods
BN = below normal
C = critical
D = dry
W = wet

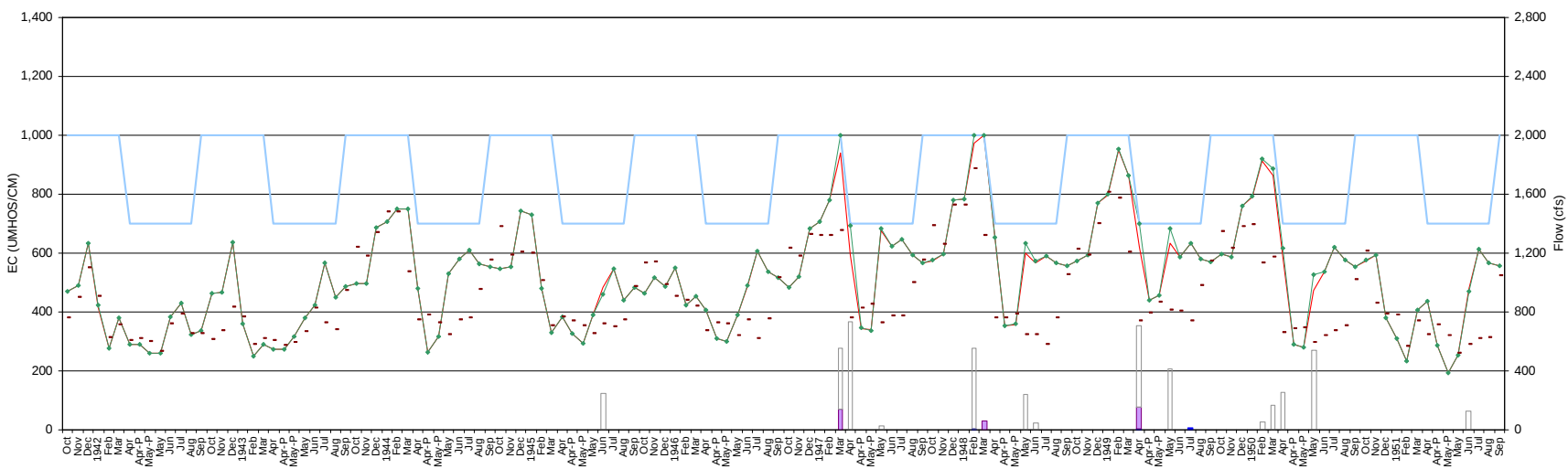
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1922-1931



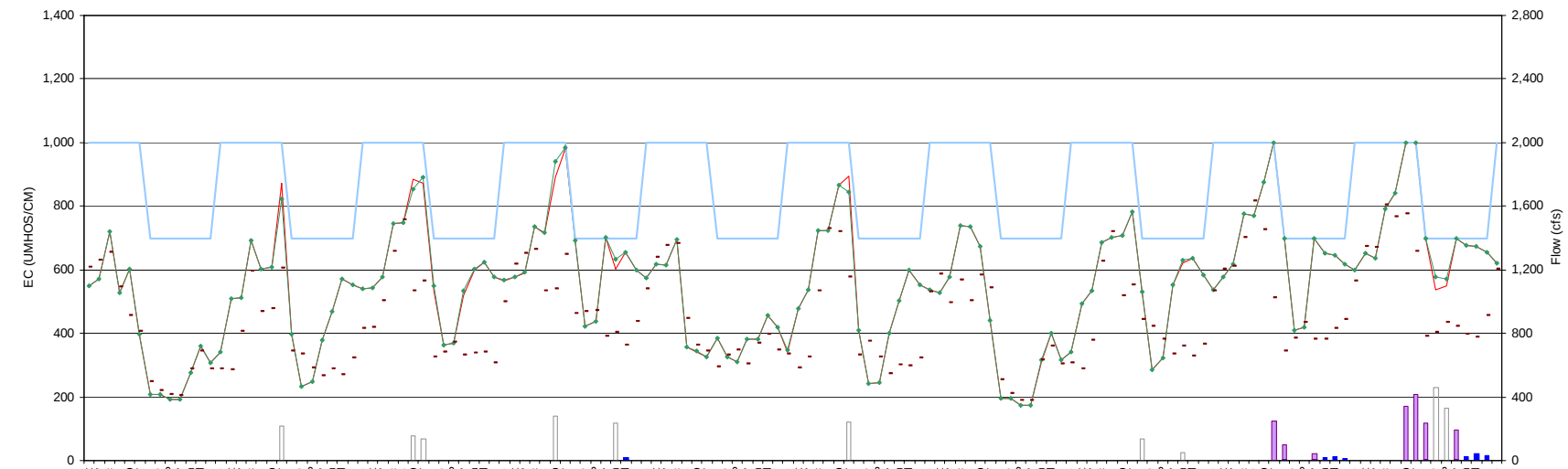
Water Year: 1932-1941



Water Year: 1942-1951



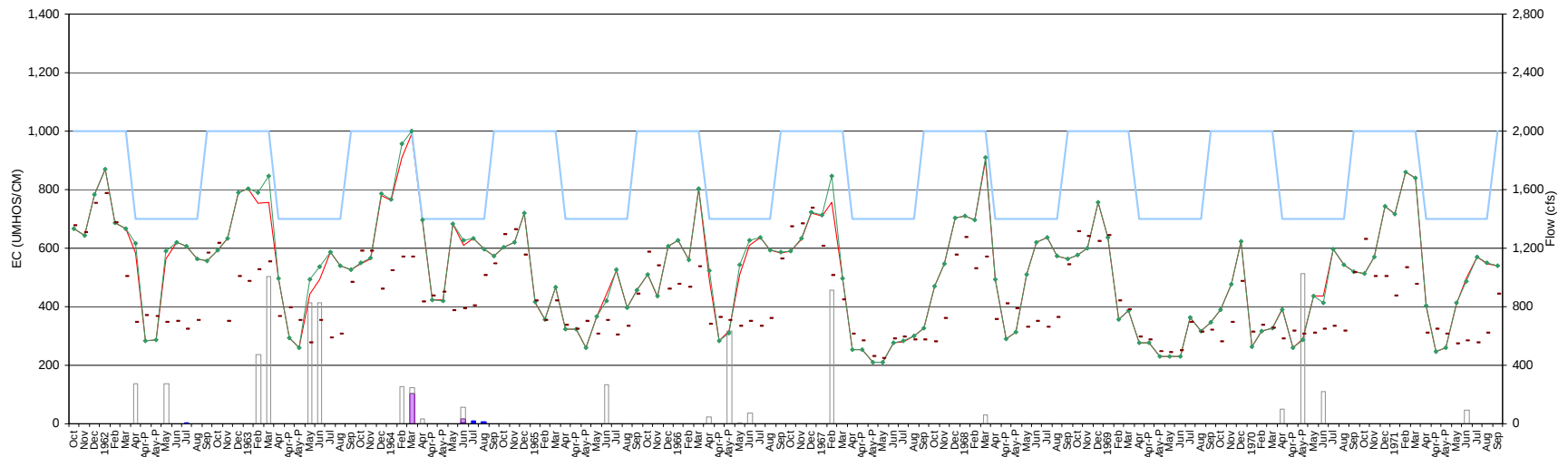
Water Year: 1952-1961



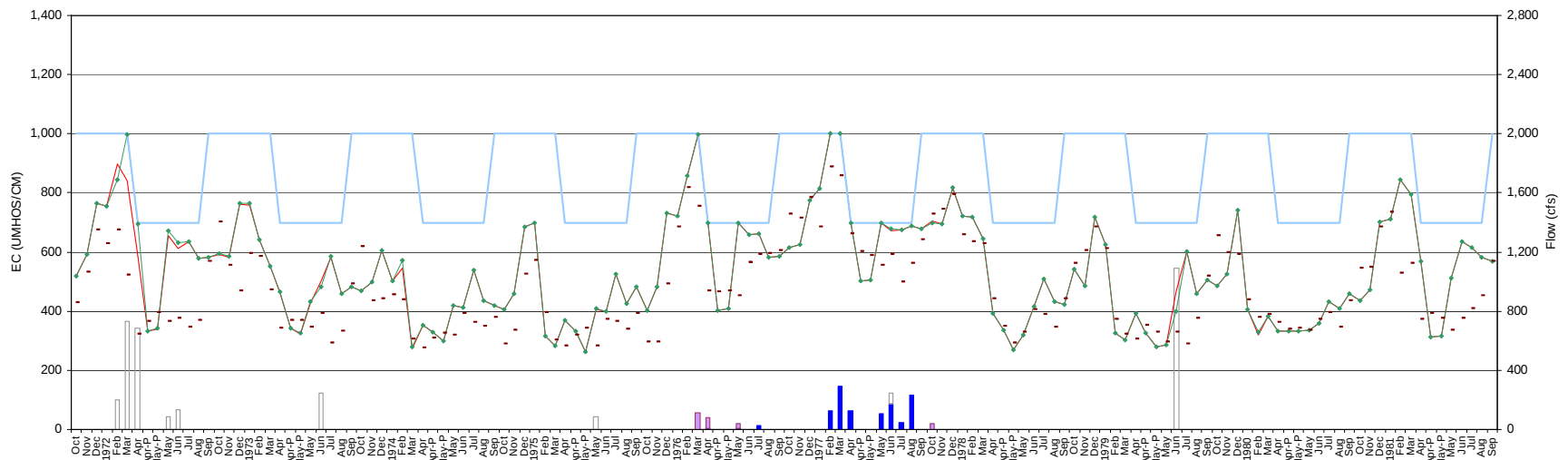
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-25. Alternative D Future LOD

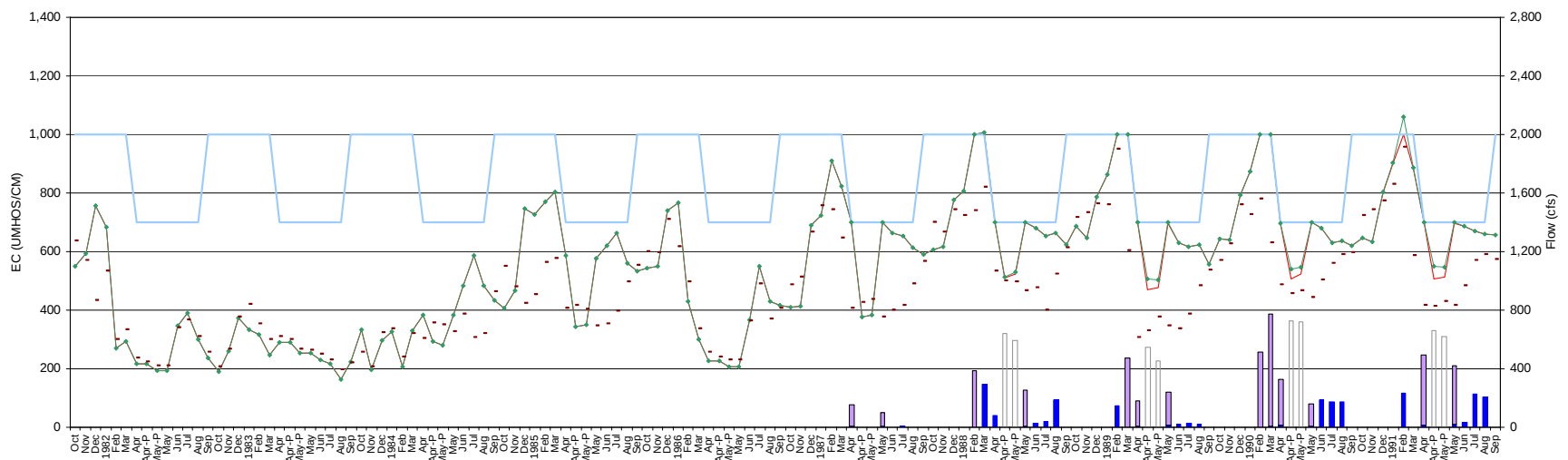
San Joaquin River Quality and recirculation used to satisfy water quality standard
Water Year: 1962-1971



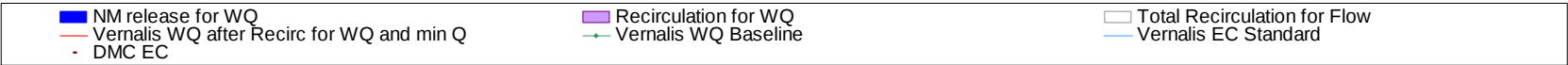
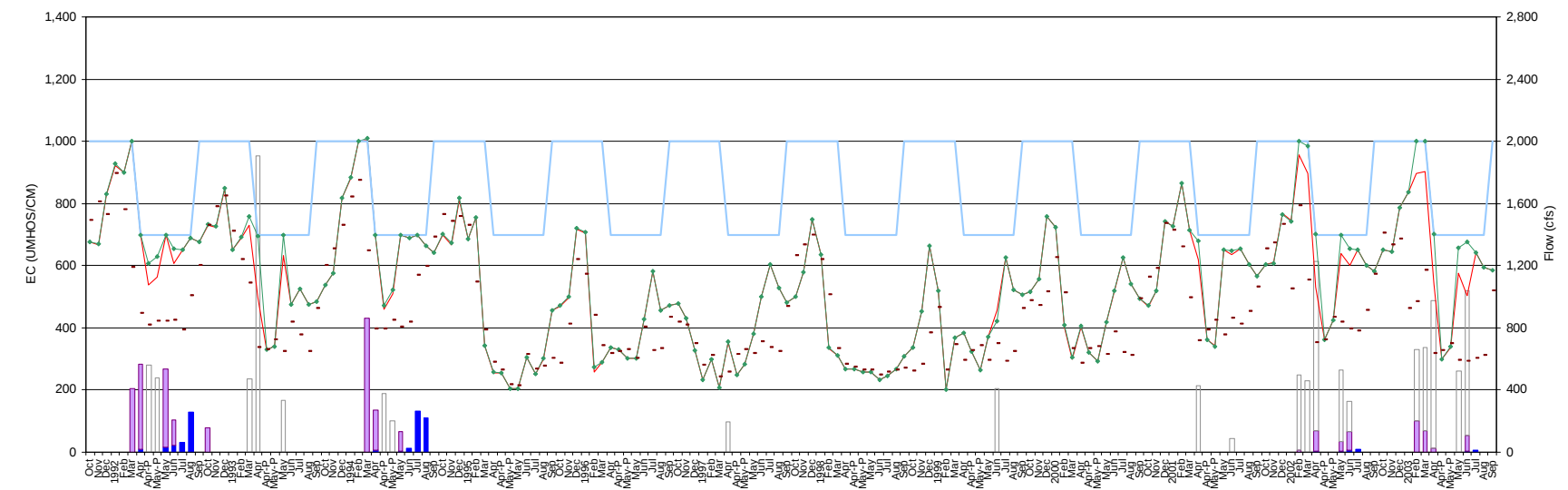
Water Year: 1972-1981



Water Year: 1982-1991



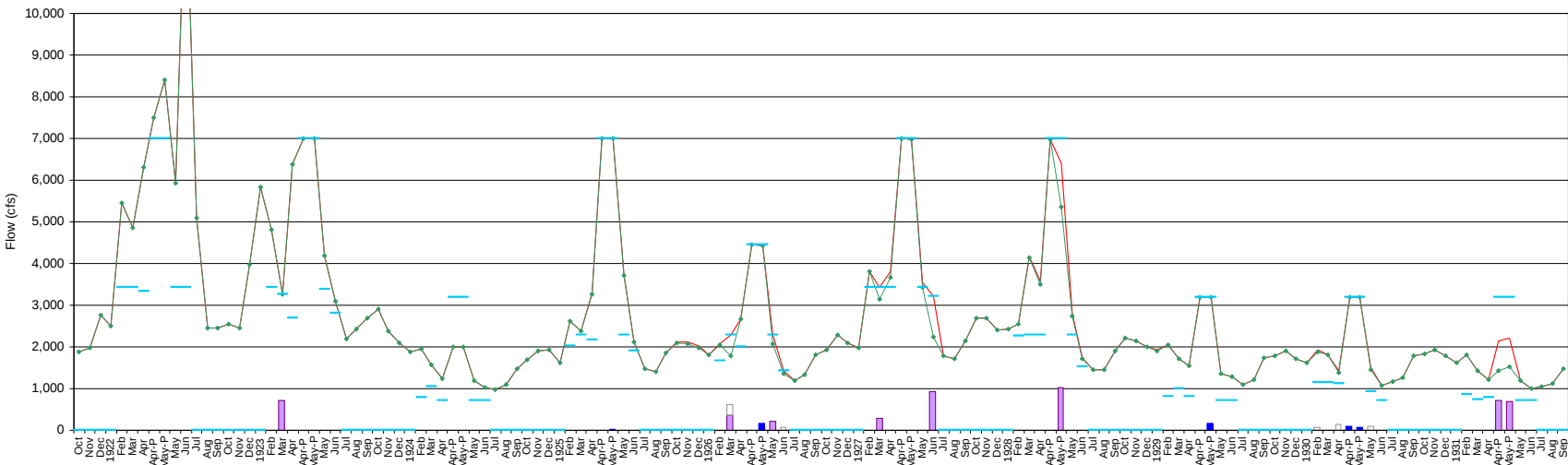
Water Year: 1992-2003



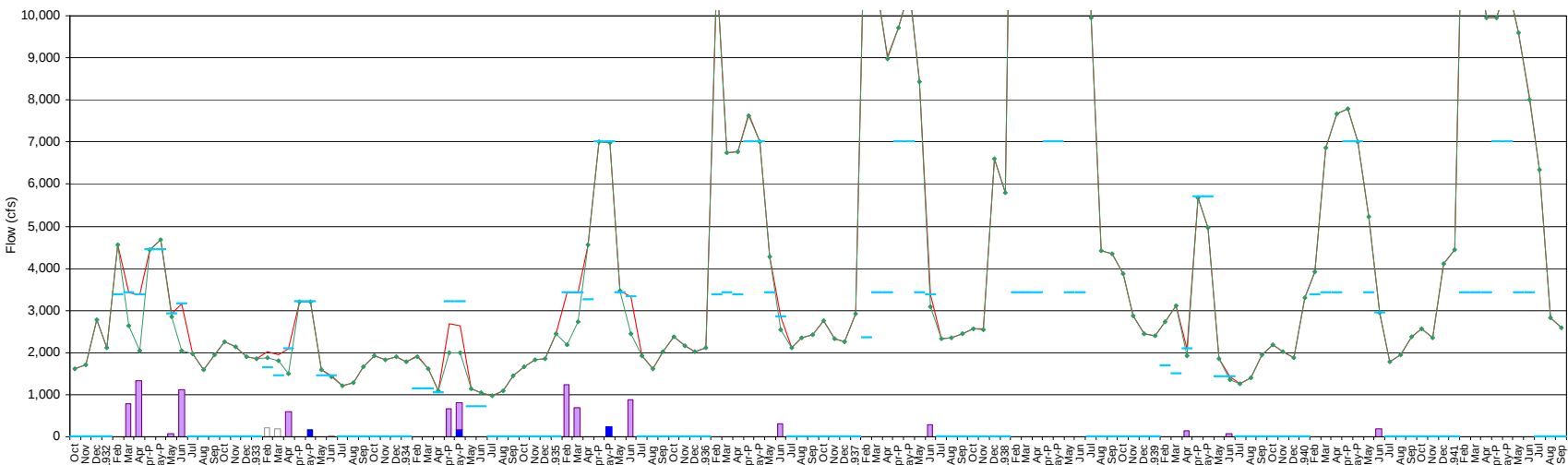
Key:
EC = electrical conductivity
NM = New Melones
Q = flow
WQ = water quality

Figure A1-25. Alternative D Future LOD (continued)

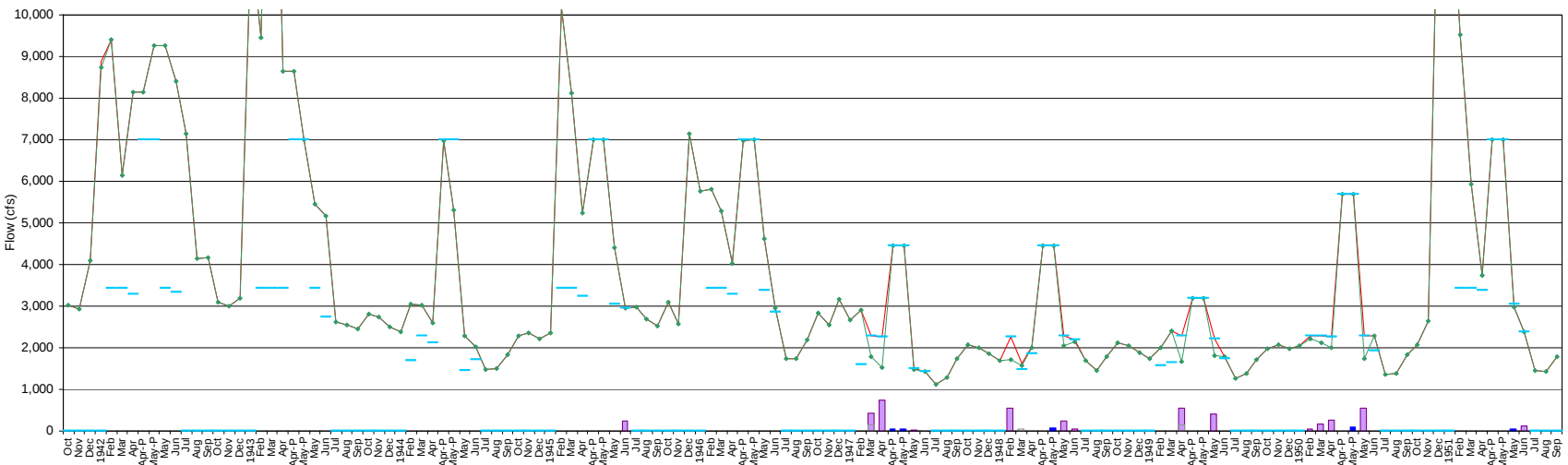
San Joaquin River flow and recirculation used to satisfy flow standard
Water Year: 1922-1931



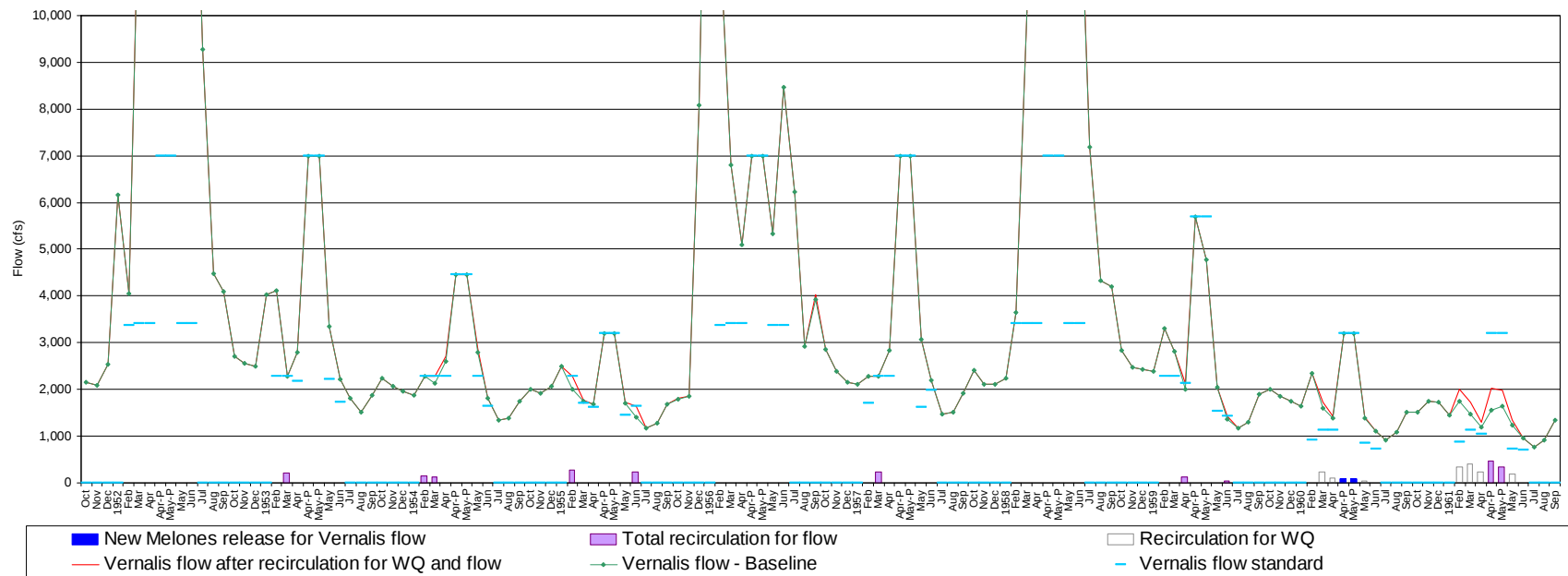
Water Year: 1932-1941



Water Year: 1942-1951



Water Year: 1952-1961

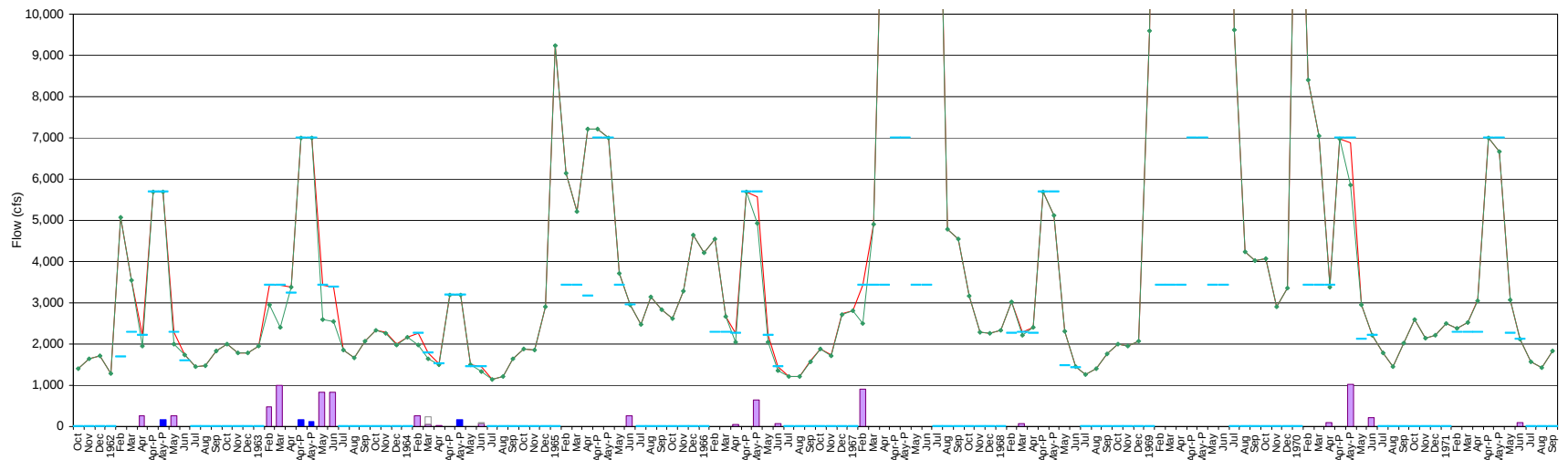


Key:
WQ = water quality

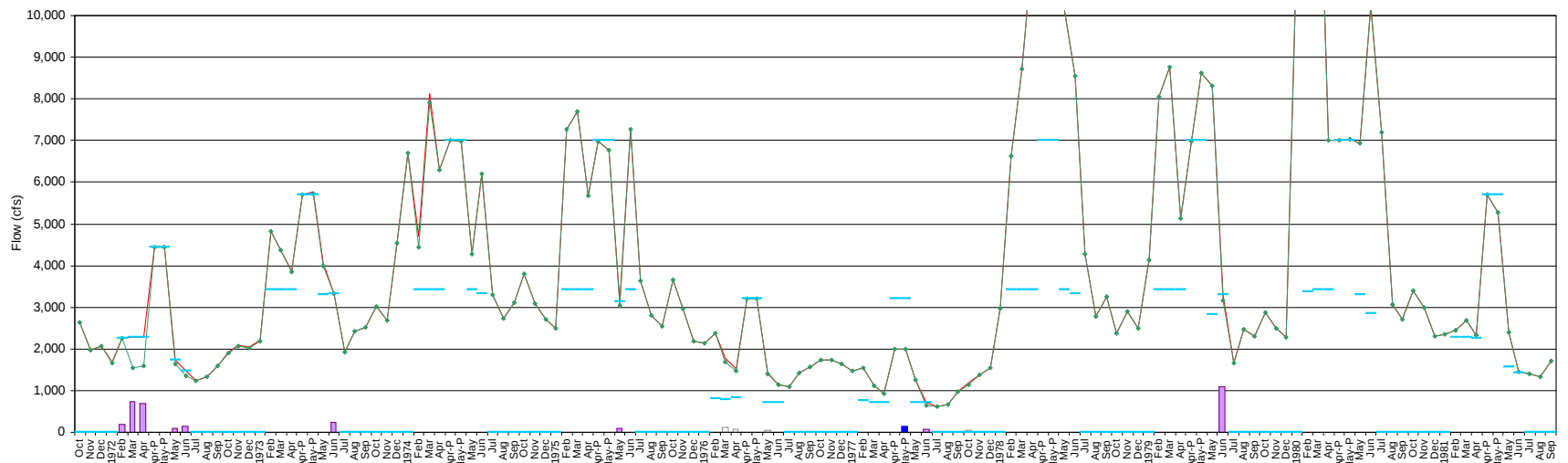
Figure A1-26. Alternative D Future LOD

San Joaquin River flow and recirculation used to satisfy flow standard

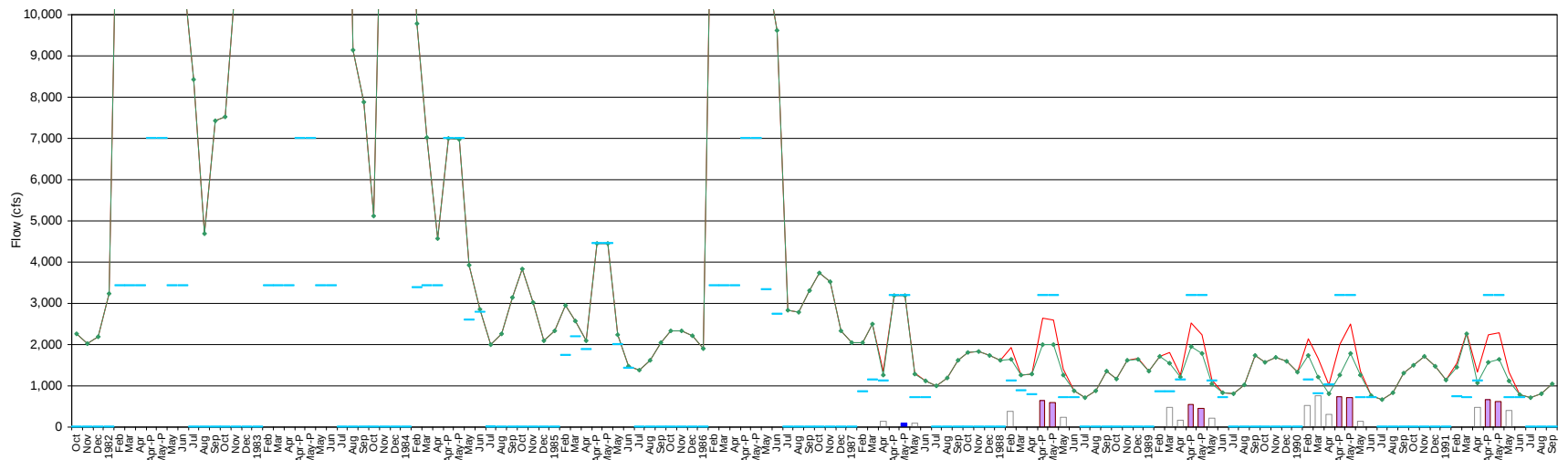
Water Year: 1962-1971



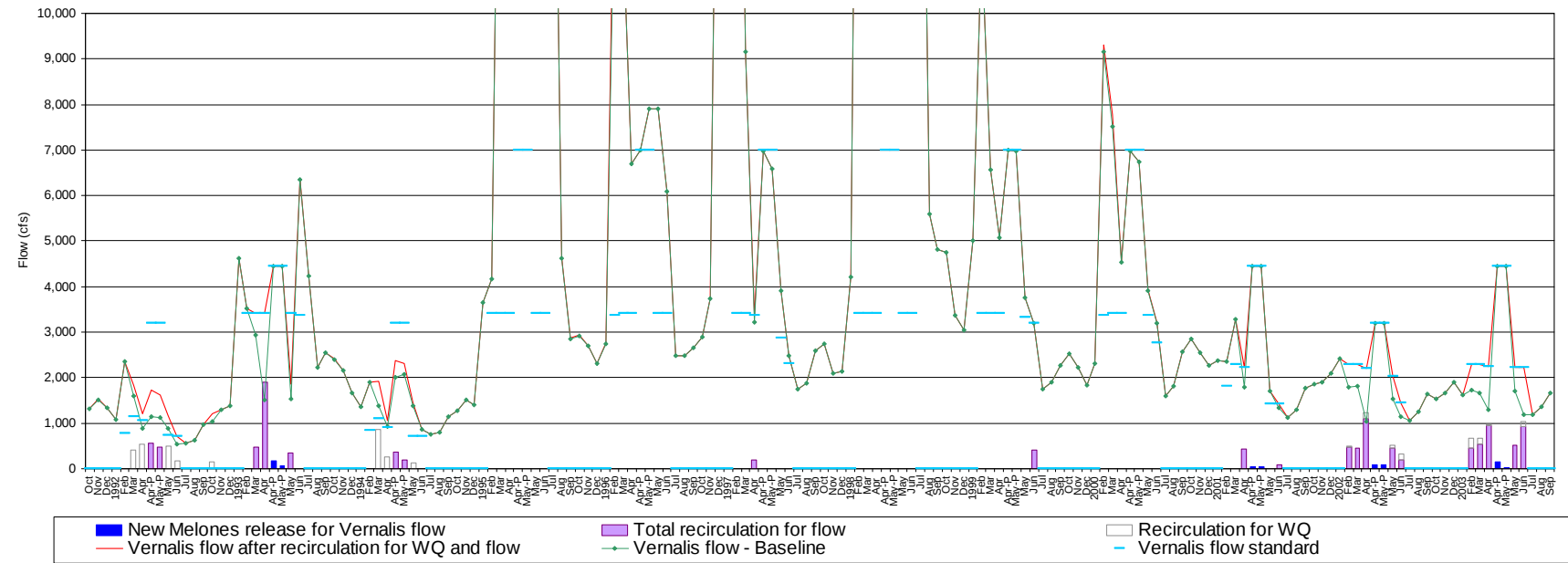
Water Year: 1972-1981



Water Year: 1982-1991



Water Year: 1992-2003



Key:
WQ = water quality

Figure A1-26. Alternative D Future LOD (continued)