Appendix G

Giant Garter Snake Important Populations Maps

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2020 Tehama-Colusa Canal Authority Water Transfers Initial Study/ Environmental Assessment

Appendix G: Giant Garter Snake Important Population Maps

IMPORTANT GIANT GARTER SNAKE POPULATIONS

American Basin Recovery Unit

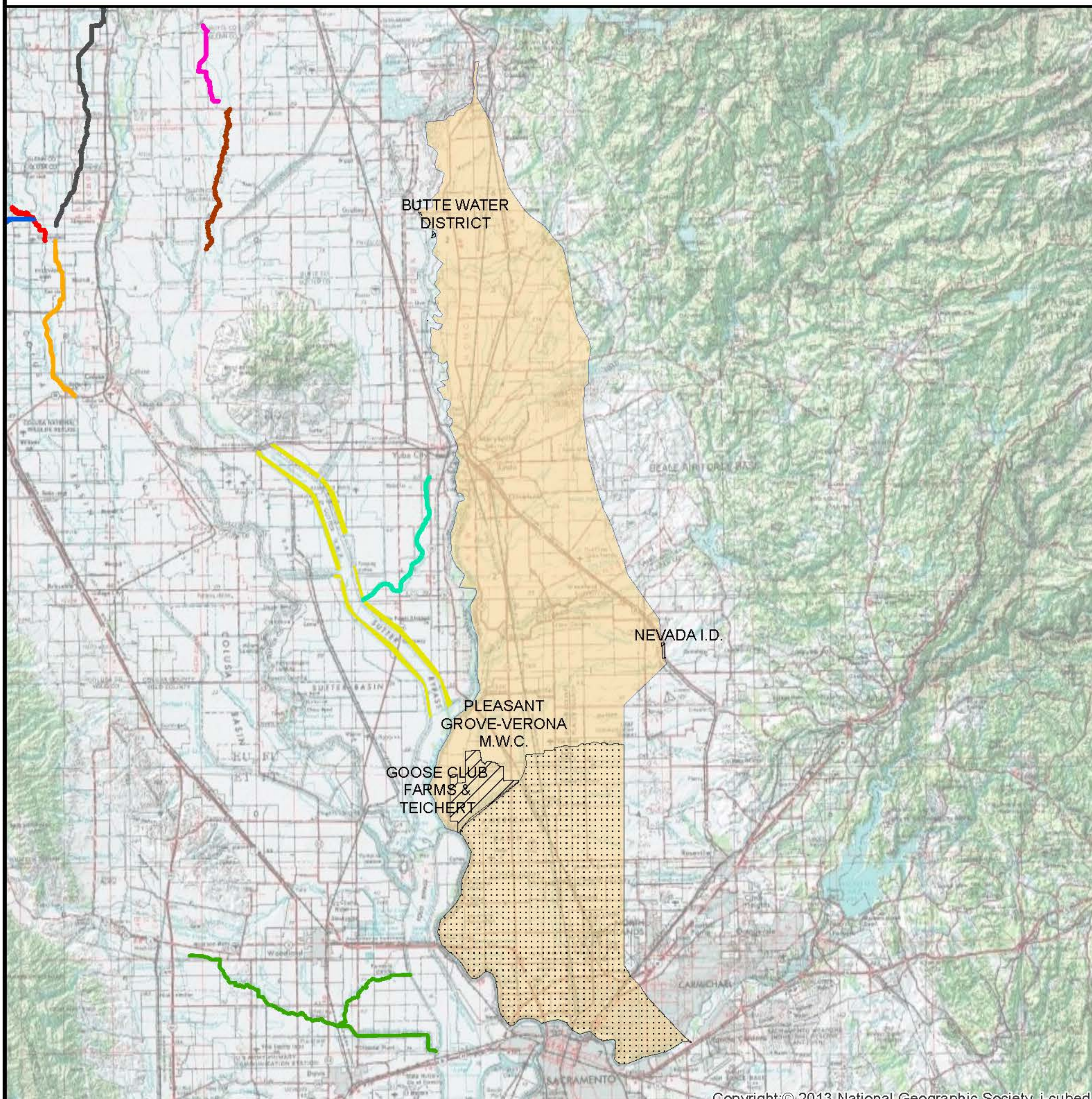
- Seller Areas in American Basin
- American Basin (376,104 acres)
- Butte Creek Selection
- Colusa Basin Drainage Canal Selection
- Colusa Drainage Canal
- Gilsizer Slough
- Hunters Creek Selection
- Logan Creek Selection
- Little Butte Creek
- Natomas Basin
- Sutter Bypass Toe Drain
- Willow Slough & Bypass

SELLER AREAS IN AMERICAN BASIN (acres)	
BUTTE WATER DISTRICT	55
GOOSE CLUB FARMS & TEICHERT	4
NEVADA IRRIGATION DISTRICT	132
PLEASANT-GROVE-VERONA MUTUAL WATER COMPANY	7429

Datum: NAD 1983

0 2.75 5.5 11 Miles

N



IMPORTANT GIANT GARTER SNAKE POPULATIONS

Butte Basin Recovery Unit

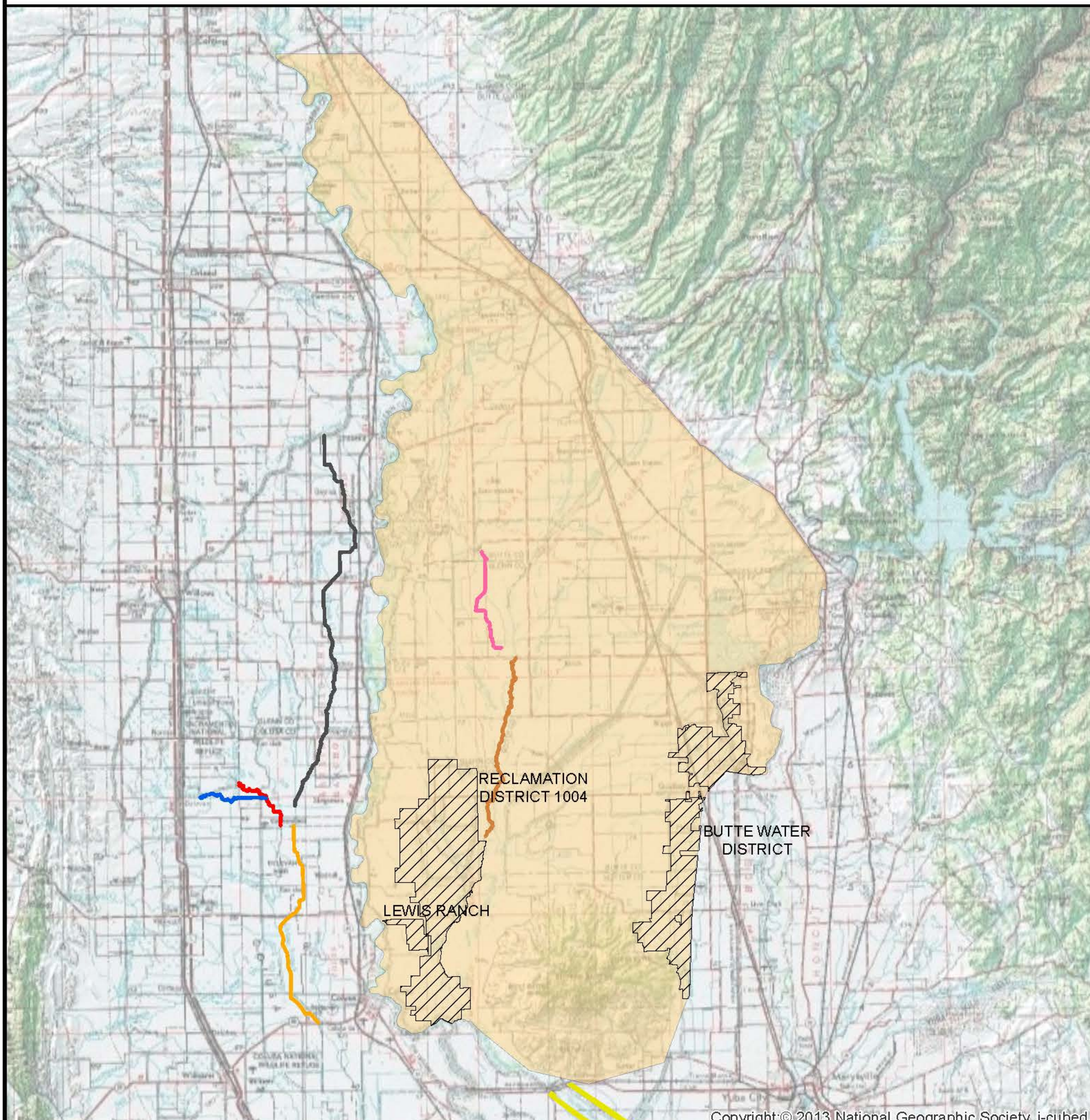
N

- Seller Areas in Butte Basin
- Butte Basin (479,117 acres)
- Butte Creek Selection
- Colusa Basin Drainage Canal Selection
- Colusa Drainage Canal
- Gilsizer Slough
- Hunters Creek Selection
- Little Butte Creek
- Logan Creek Selection
- Natomas Basin
- Willow Slough & Bypass
- Sutter Bypass Toe Drain

SELLER AREAS IN BUTTE BASIN (acres)	
BUTTE WATER DISTRICT	17656
LEWIS RANCH	1172
RECLAMATION DISTRICT 1004	23159

Datum: NAD 1983

0 2.25 4.5 9 Miles



IMPORTANT GIANT GARTER SNAKE POPULATIONS

N

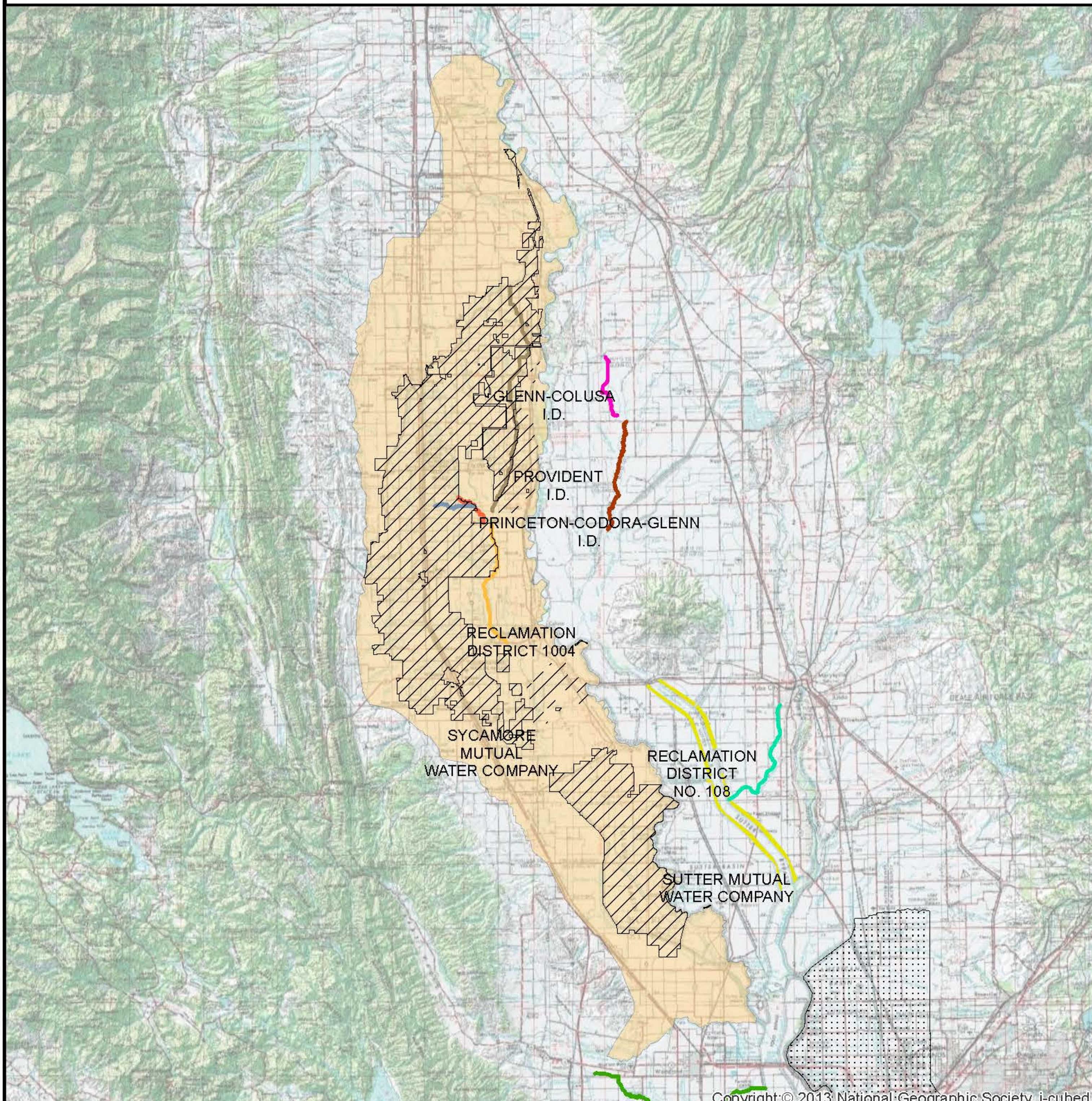
Colusa Basin Recovery Unit

- Seller Areas in Colusa Basin
- Colusa Basin (686,096 acres)
- Butte Creek Selection
- Colusa Basin Drainage Canal Selection
- Colusa Drainage Canal
- Gilsizer Slough
- Hunters Creek Selection
- Little Butte Creek
- Logan Creek Selection
- Natomas Basin
- Sutter Bypass Toe Drain
- Willow Slough & Bypass

SELLER AREAS IN COLUSA BASIN (acres)	
GLENN-COLUSA IRRIGATION DISTRICT	174886
PRINCETON-CORDORA-GLENN IRRIGATION DISTRCIT	12112
PROVIDENT IRRIGATION DISTRICT	17019
RECLAMATION DISTRICT 1004	54
RECLAMATION DISTRICT 108	58821
SUTTER MUTUAL WATER COMPANY	33
SYCAMORE MUTUAL WATER COMPANY	8431

Datum: NAD 1983

0 3.75 7.5 15 Miles



IMPORTANT GIANT GARTER SNAKE POPULATIONS

Delta Basin Recovery Unit

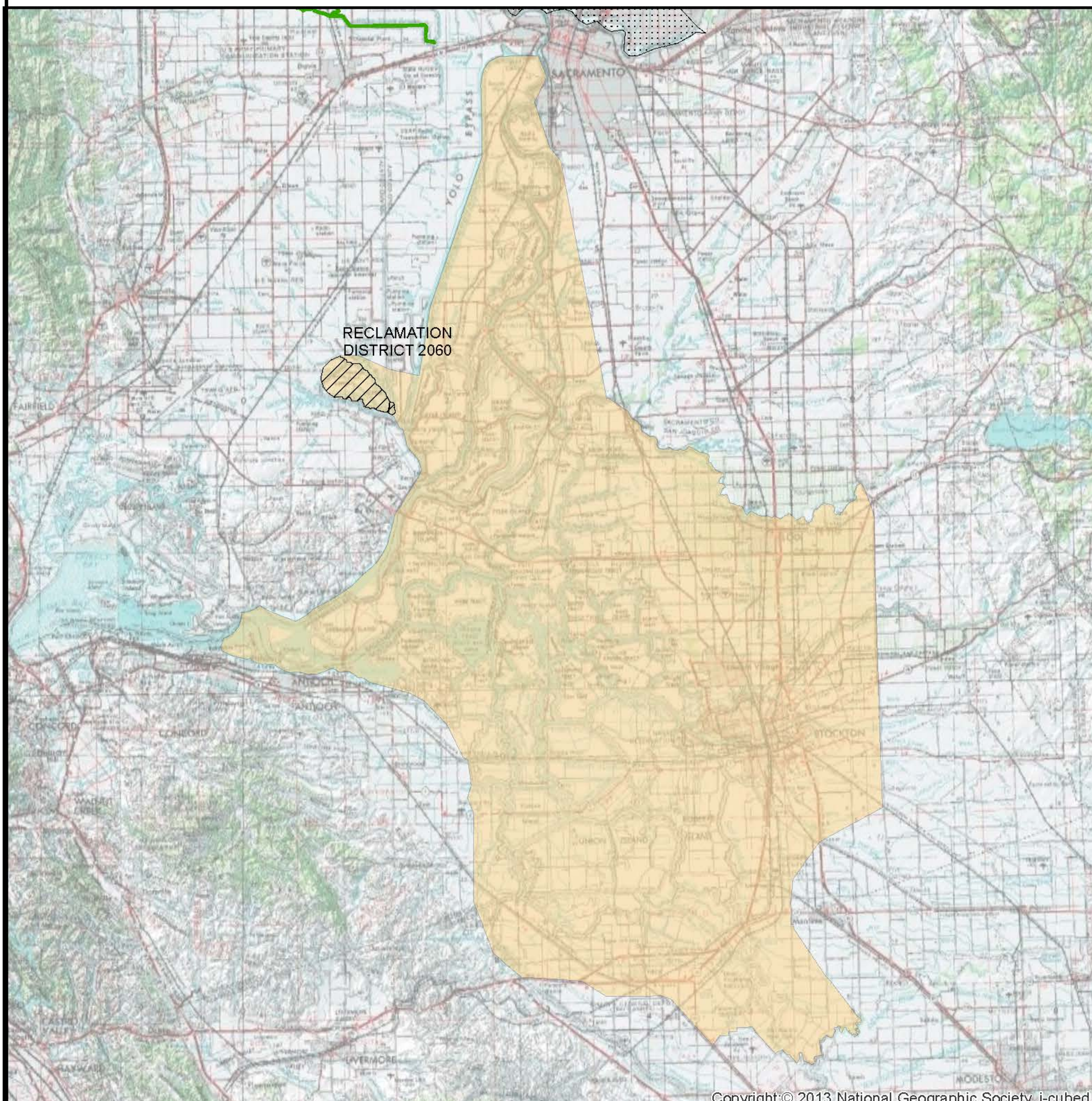
N

- Seller Areas in Delta Basin
- Delta Basin (786,268 acres)
- Butte Creek Selection
- Colusa Basin Drainage Canal Selection
- Colusa Drainage Canal
- Gilsizer Slough
- Hunters Creek Selection
- Little Butte Creek
- Logan Creek Selection
- Natomas Basin
- Willow Slough & Bypass
- Sutter Bypass Toe Drain

SELLER AREAS IN DELTA BASIN (acres)	
RECLAMATION DISTRICT 2060	5232

Datum: NAD 1983

0 2.75 5.5 11 Miles



IMPORTANT GIANT GARTER SNAKE POPULATIONS

Sutter Basin Recovery Unit

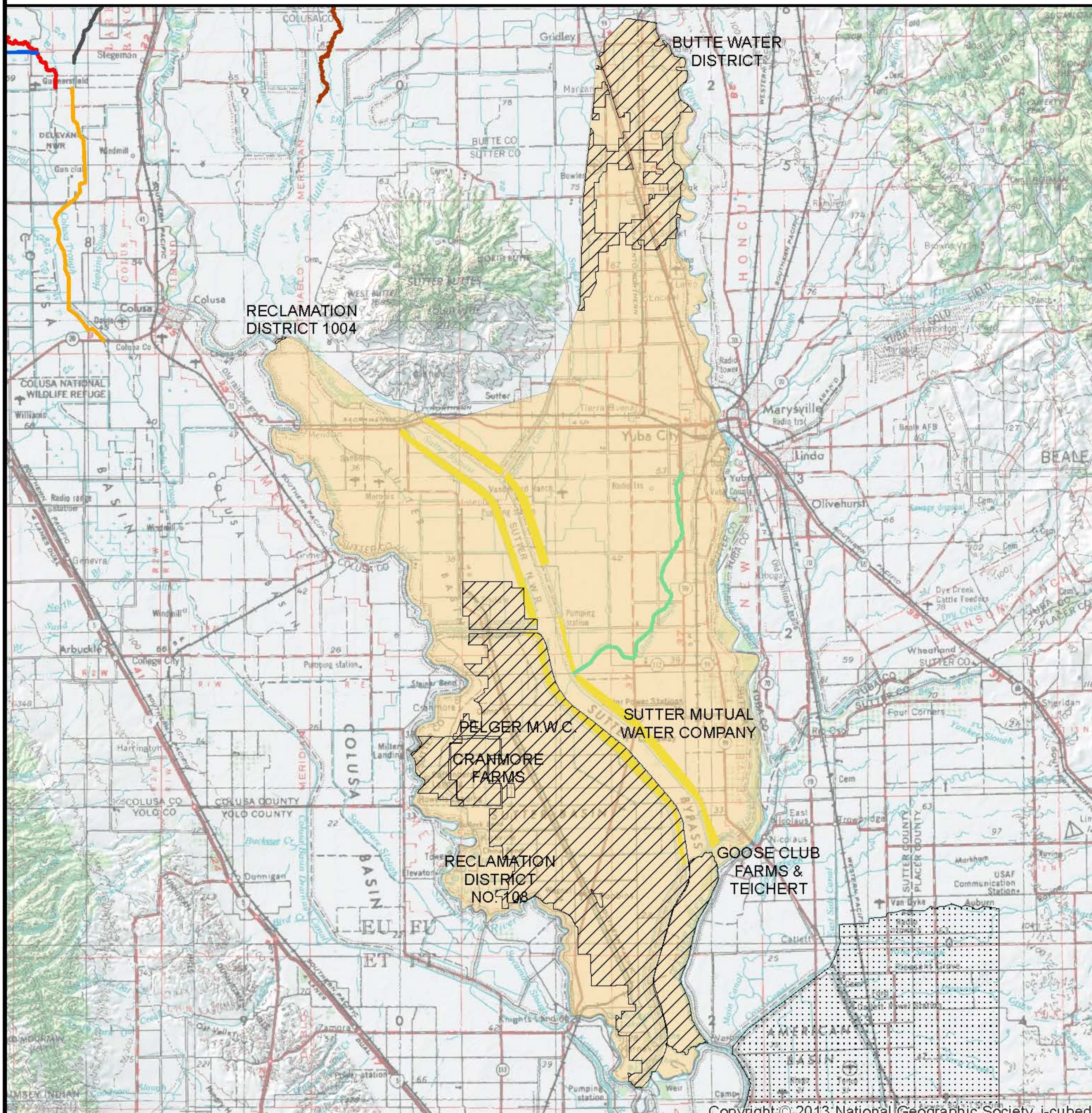
- Seller Areas in Sutter Basin
- Sutter Basin (239,927 acres)
- Butte Creek Selection
- Colusa Basin Drainage Canal Selection
- Colusa Drainage Canal
- Gilsizer Slough
- Hunters Creek Selection
- Little Butte Creek
- Logan Creek Selection
- Natomas Basin
- Willow Slough & Bypass
- Sutter Bypass Toe Drain

SELLER AREAS IN SUTTER BASIN (acres)	
BUTTE WATER DISTRICT	14508
CRANMORE FARMS	2219
GOOSE CLUB FARMS & TEICHERT	5724
PELGER MUTUAL WATER COMPANY	2970
RECLAMATION DISTRICT 1004	23
RECLAMATION DISTRICT 108	0.02
SUTTER MUTUAL WATER COMPANY	51085

N

Datum: NAD 1983

0 1.75 3.5 7 Miles



IMPORTANT GIANT GARTER SNAKE POPULATIONS

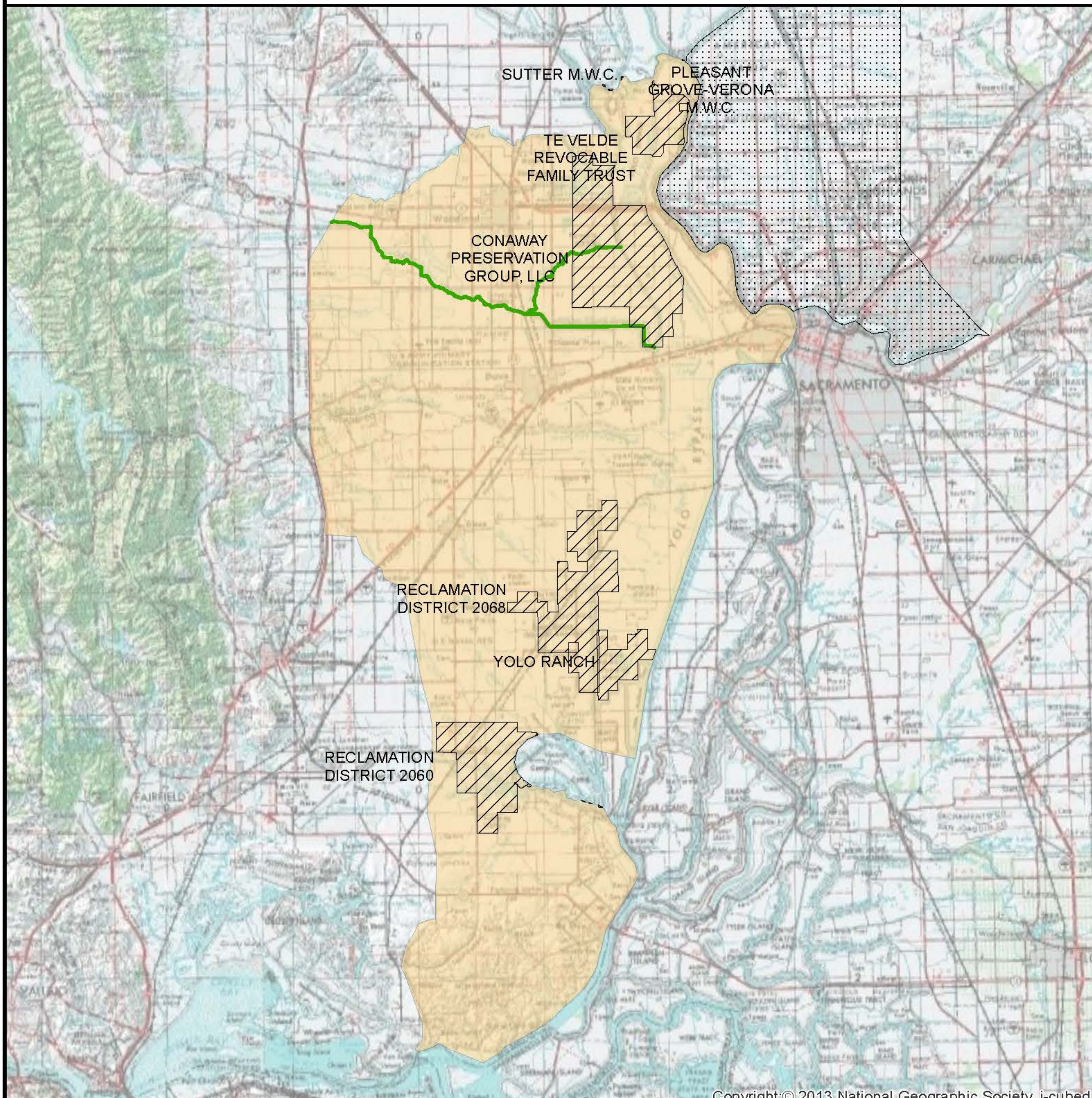
Yolo Basin Recovery Unit

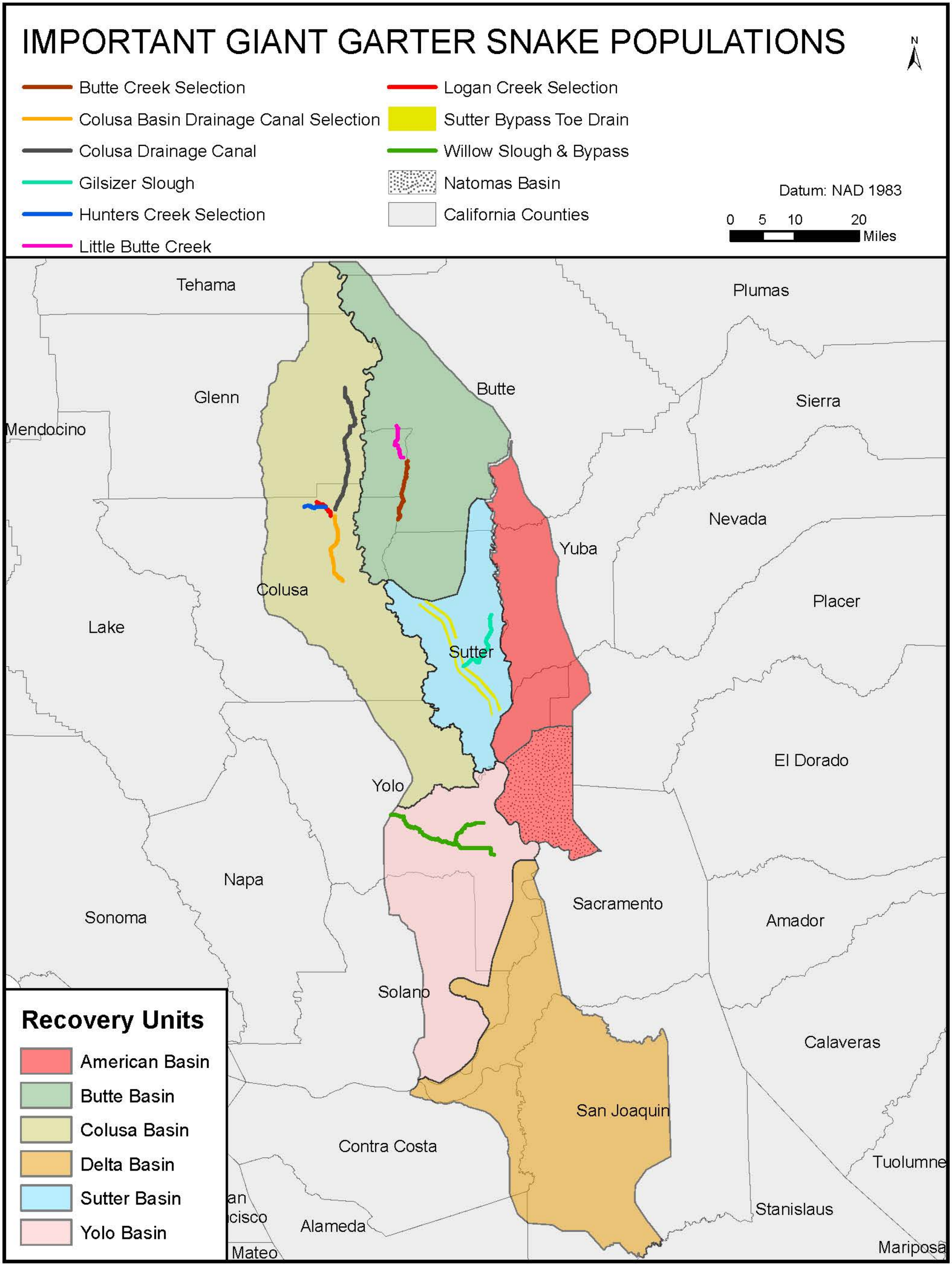
- Seller Areas in Yolo Basin
- Yolo Basin (410,915 acres)
- Butte Creek Selection
- Colusa Basin Drainage Canal Selection
- Colusa Drainage Canal
- Gilsizer Slough
- Hunters Creek Selection
- Little Butte Creek
- Logan Creek Selection
- Natomas Basin
- Sutter Bypass Toe Drain
- Willow Slough & Bypass

SELLER AREAS IN YOLO BASIN (acres)	
CONAWAY PRESERVATION GROUP, LLC	20463
PLEASANT-GROVE-VERONA MUTUAL WATER COMPANY	3
RECLAMATION DISTRICT 2060	9982
RECLAMATION DISTRICT 2068	13262
TE VELDE REVOCABLE FAMILY TRUST	4406
SUTTER MUTUAL WATER COMPANY	21
YOLO RANCH	3350

Datum: NAD 1983

0 2.25 4.5 9 Miles




IMPORTANT GIANT GARTER SNAKE POPULATIONS
N
Butte Creek Selection
Colusa Basin Drainage Canal Selection
Colusa Drainage Canal
Gilsizer Slough
Hunters Creek Selection
Little Butte Creek
Logan Creek Selection
Sutter Bypass Toe Drain
Willow Slough & Bypass
Natomas Basin
California Counties
Datum: NAD 1983
0 5 10 20
Miles
Tehama
Plumas
Glenn
Butte
Sierra
Mendocino
Nevada
Yuba
Colusa
Placer
Lake
Sutter
El Dorado
Yolo
Napa
Sacramento
Sonoma
Amador
Solano
Calaveras
San Joaquin
Contra Costa
Tuolumne
Stanislaus
Alameda
Mariposa
Mateo
Recovery Units
American Basin
Butte Basin
Colusa Basin
Delta Basin
Sutter Basin
Yolo Basin

Appendix H
Groundwater Modeling Results

Numerical groundwater modeling analysis

Numerical groundwater modeling analysis was performed using the Sacramento Valley Finite Element Groundwater Model (SACFEM2013) developed to simulate groundwater conditions in the Sacramento Valley. SACFEM2013 was selected as the numerical modeling tool for this analysis based on the state of the model and its capabilities to simulate groundwater conditions at a greater level of detail than other potential modeling tools within the Seller Service Area. Reclamation commissioned a peer review of the SACFEM2013 model in 2010 (WRIME 2011). Revisions were made to the model and the revised model was used for the impacts analysis described here.

SACFEM2013 uses the MicroFEM finite-element numerical modeling code. MicroFEM is capable of simulating multiple aquifer systems in both steady state and transient conditions. The model is capable of simulating groundwater conditions and groundwater/surface water interactions in the valley. SACFEM2013 was also used to estimate how groundwater pumping and recharge affects surface water.

SACFEM2013 covers the entire Sacramento Valley Groundwater Basin from just north of Red Bluff to the Cosumnes River in the south (see Figure H-1). The model was calibrated to historic conditions from Water Years (WY) 1970 through WY 2009. This SACFEM2013 model simulation, which includes highly variable hydrology (from very wet periods to very dry periods), was used as a basis for simulating groundwater substitution pumping. Proposed water transfers for 2020 were simulated in SACFEM2013 using September 1977 hydrologic conditions because this year represents the driest condition available during the SACFEM2013 simulation period (WY 1970 to WY 2003).

Groundwater drawdown impacts associated with the groundwater substitution pumping from 187 wells that are part of the Proposed Action have been modeled to estimate effects to groundwater resources. Table H-1 summarizes the pumping details including pumping capacity and the range of screened intervals of the modeled groundwater substitution pumping wells. The locations and depths of these wells are specified in the model based on data collected from the potential groundwater substitution sellers.

Figures H-1, H-2, H-3, and H-4 show the simulated drawdown due to the Proposed Action under September 1977 hydrologic conditions. During dry years, surface water resources are limited and users have historically increased groundwater pumping to address shortages. Proposed water transfers for 2020 were simulated in SACFEM2013 using September 1977 hydrologic conditions because this year represents the driest condition available during the SACFEM2013 simulation period (WY 1970 to WY 2003). Simulating transfers during this period illustrates the potential to compound impacts from dry-year pumping as compared to the No Action Alternative.

- Figure H-1 shows the simulated drawdown at the water table based on results from the top layer of the SACFEM2013 model. This layer has a depth of up to 35 feet bgs.

- Figure H-2 shows simulated drawdown at approximately 200 to 300 feet bgs.
- Figure H-3 presents the simulated drawdown at approximately 300 to 400 feet bgs.
- Figure H-4 presents the simulated drawdown at approximately 700 to 900 feet bgs.
- Figure H-5 overlays the Indian Trust Assets (ITAs) within the Sacramento Valley Groundwater Basin over the simulated drawdown at the water table.

Drawdown at the water table (Figure H-5) represents the estimated decline in the groundwater surface within the shallow, unconfined portion of the aquifer (i.e., the height of water within a shallow groundwater well). The drawdown in the deeper portions of the aquifer (Figures H-2 through H-4) represents a change in hydraulic head (i.e., water pressure) in a well that is screened in this deeper portion of the aquifer.

Table H-1. Water Transfers through Groundwater Substitution under the Proposed Action

Groundwater Basin	Potential Seller	Number of Wells	Pumping Rate (gpm)	Range of Screened Interval (feet)
Redding Area	Anderson-Cottonwood Irrigation District	2	1,000 - 5,500	150 - 455
Sacramento Valley	Canal Farms	3	3,500 - 5,000	65 - 660
	Eastside Mutual Water Company	1	4,720	150 - 240
	Giusti Farms	2	3,200	150 - 400
	Glenn-Colusa Irrigation District	17	800 – 4,300	25 –945
	Maxwell Irrigation District	2	3,800	150 - 240
	Natomas Central Mutual Water Company	14	1,000 - 2,500	10 - 952
	Pelger Mutual Water Company	4	1,500 - 5,000	101 - 485
	Pelger Road 1700 LLC	4	3,000 - 3,500	200 - 820
	Pleasant Grove-Verona Mutual Water Company	35	1,500 - 5,000	99 - 260
	Princeton-Codora-Glenn Irrigation District	13	1,000 - 3,000	120 - 380
	Provident Irrigation District	16	2,000 – 4,500	100 - 420
	Reclamation District 108	5	1,700 - 5,900	250 - 680
	Reclamation District 1004	28	1,000 - 5,800	56 - 430
	River Garden Farms	8	1,700 - 3,000	170 - 686
	Sutter Mutual Water Company	20	2,500 – 5,000	160 - 400
	Sycamore Mutual Water Company	5	3,200 - 6,500	160 - 906
	T&P Farms	2	3,500 - 4,000	256 - 862
	Te Velde Revocable Family Trust	5	2,200 - 4,700	115 - 455
	Windswept Land & Livestock	3	2,000 – 3,200	120 - 580

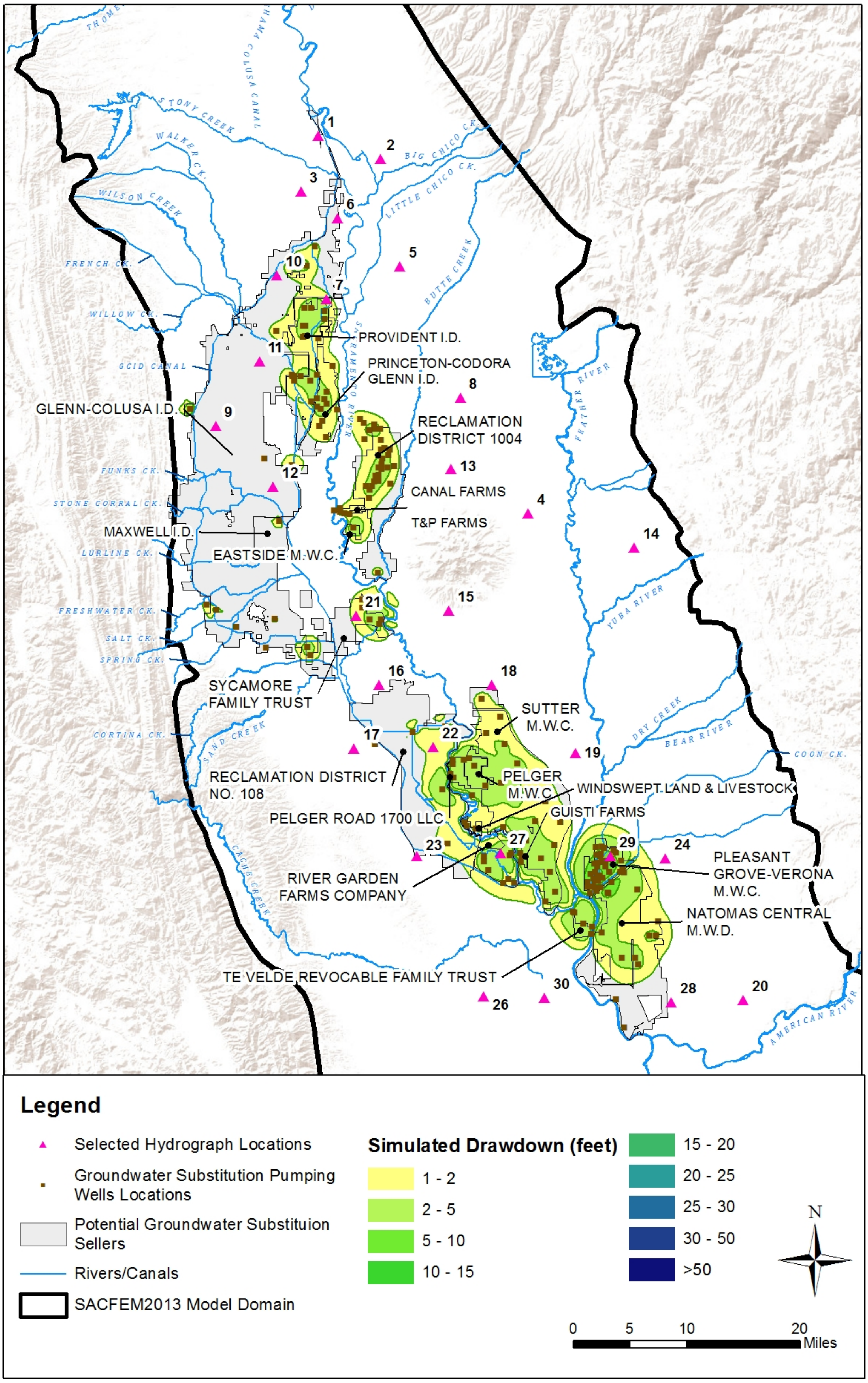


Figure H-1. Simulated Change in Water Table Elevation (0 to approximately 35 feet bgs), Based on September 1977 Hydrologic Conditions

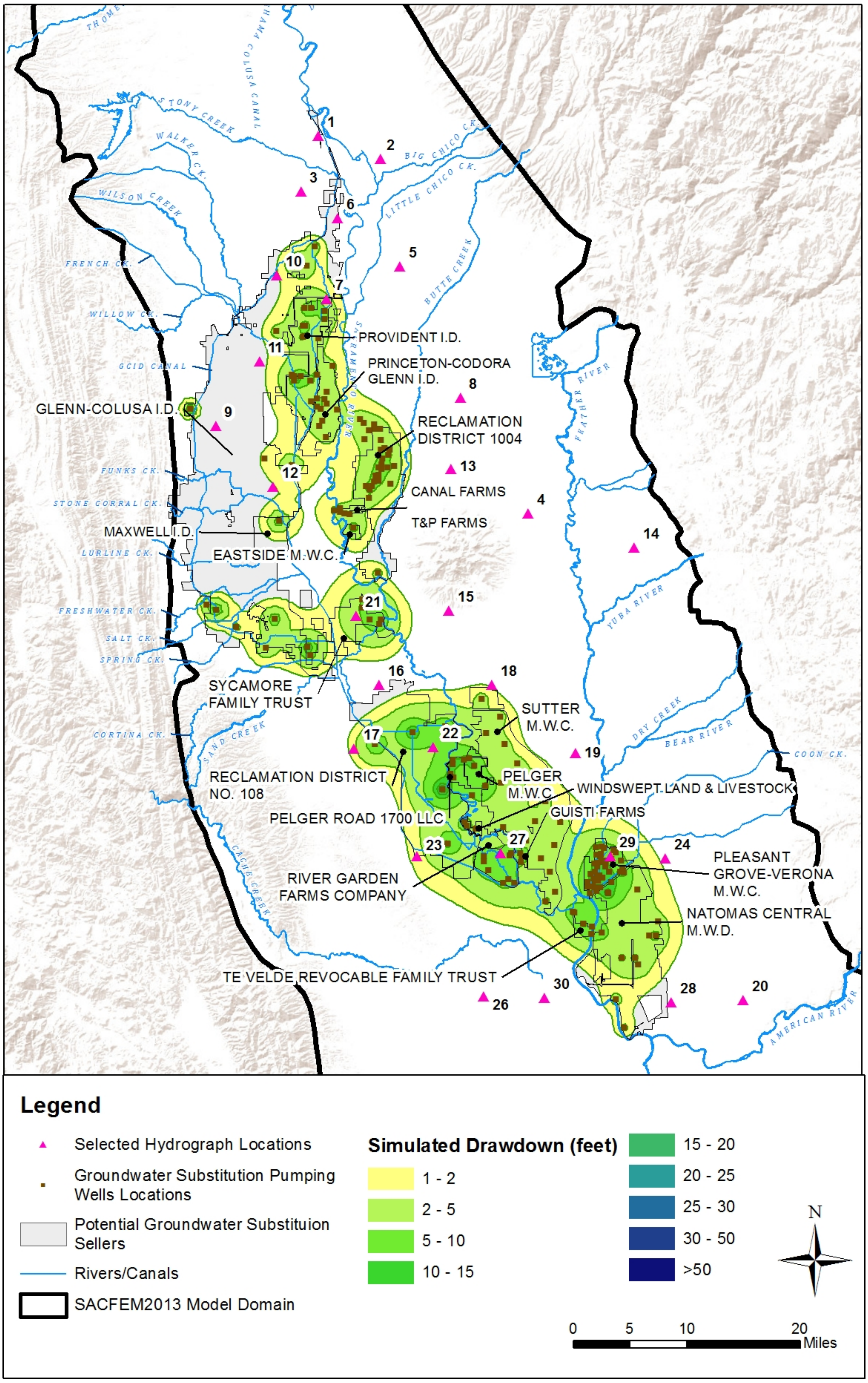


Figure H-2. Simulated Change in Groundwater Head (approximately 200 to 300 feet bgs), Based on September 1977 Hydrologic Conditions

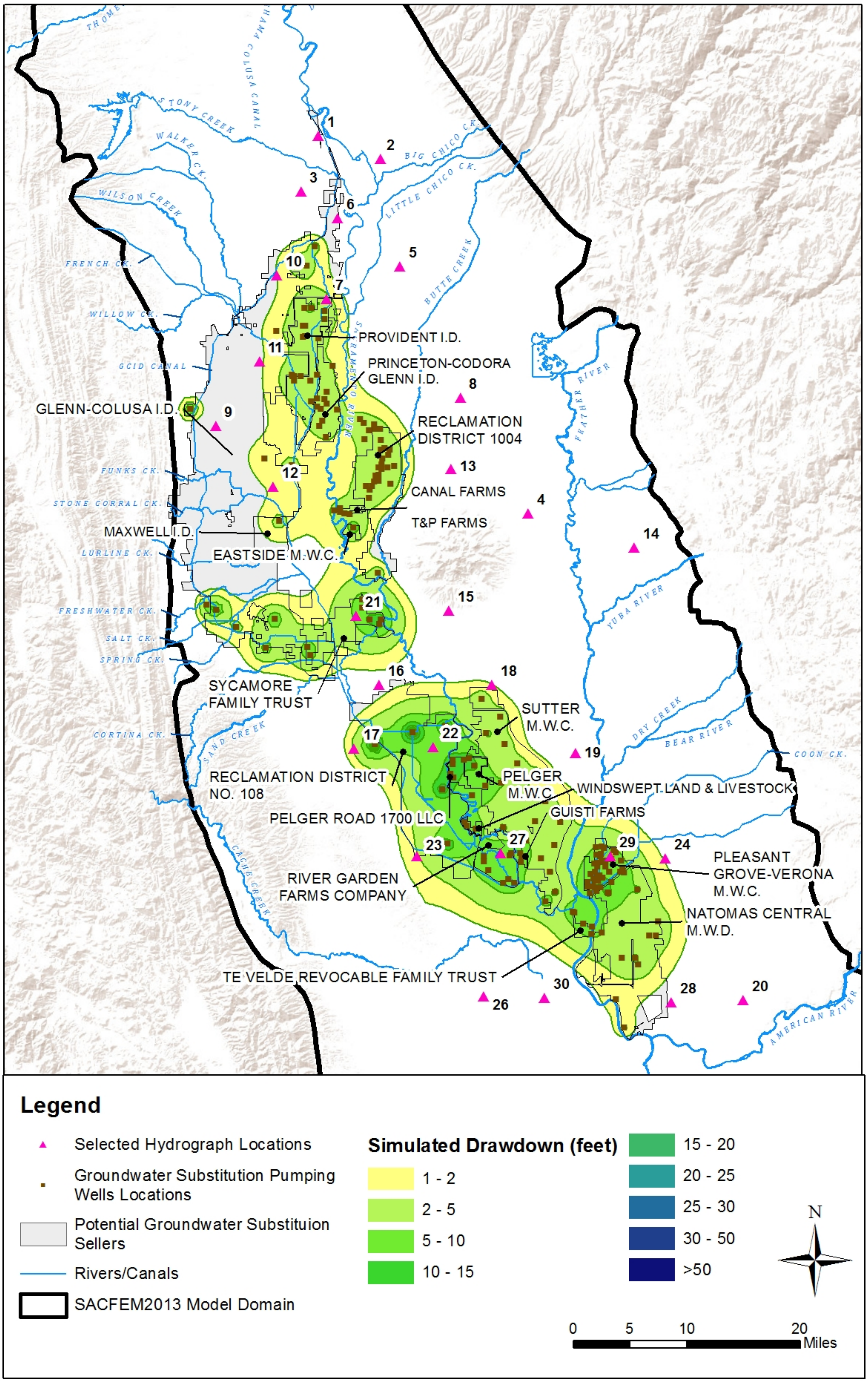


Figure H-3. Simulated Change in Groundwater Head (approximately 300 to 400 feet bgs), Based on September 1977 Hydrologic Conditions

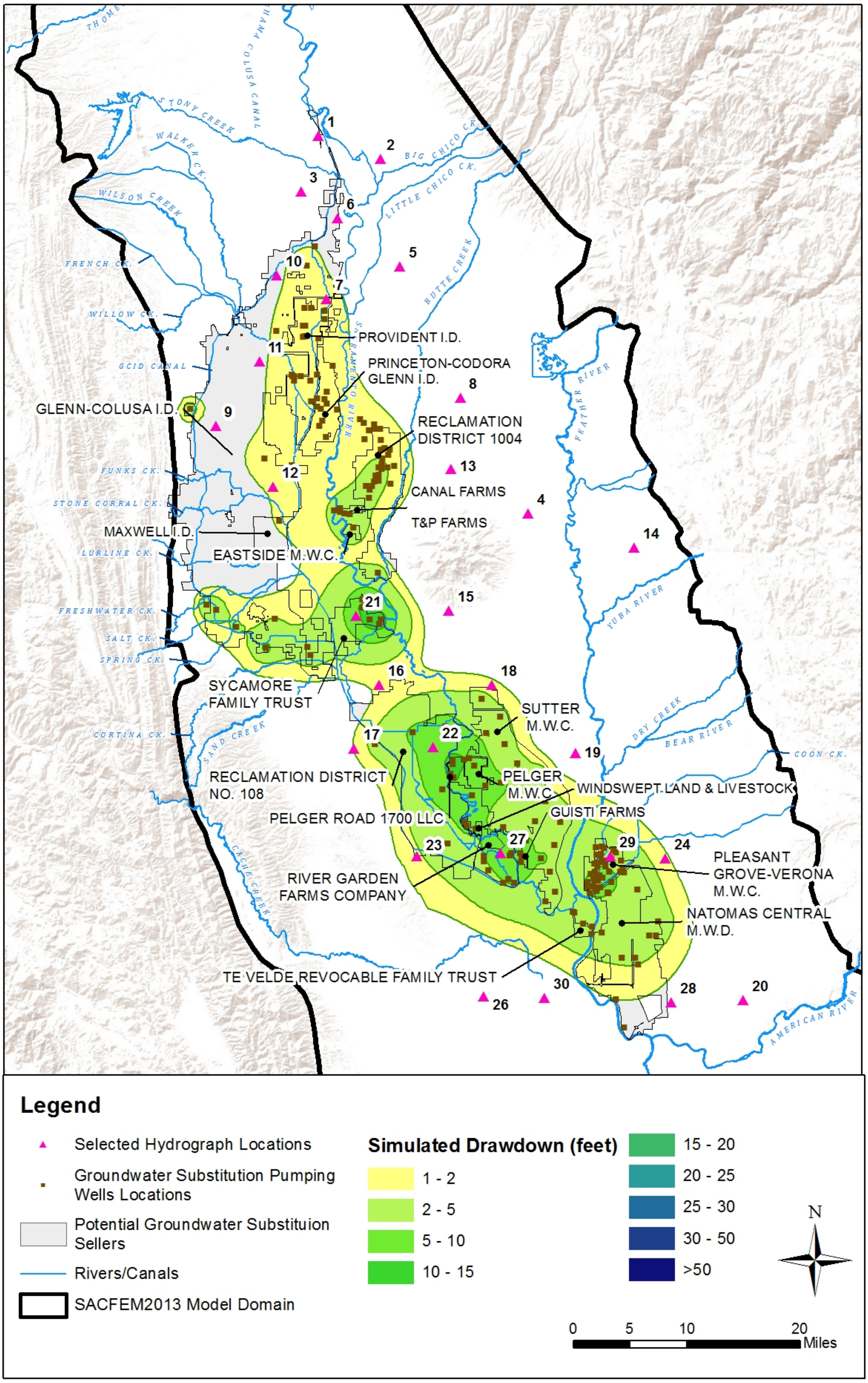


Figure H-4. Simulated Change in Groundwater Head (approximately 700 to 900 feet bgs), Based on September 1977 Hydrologic Conditions

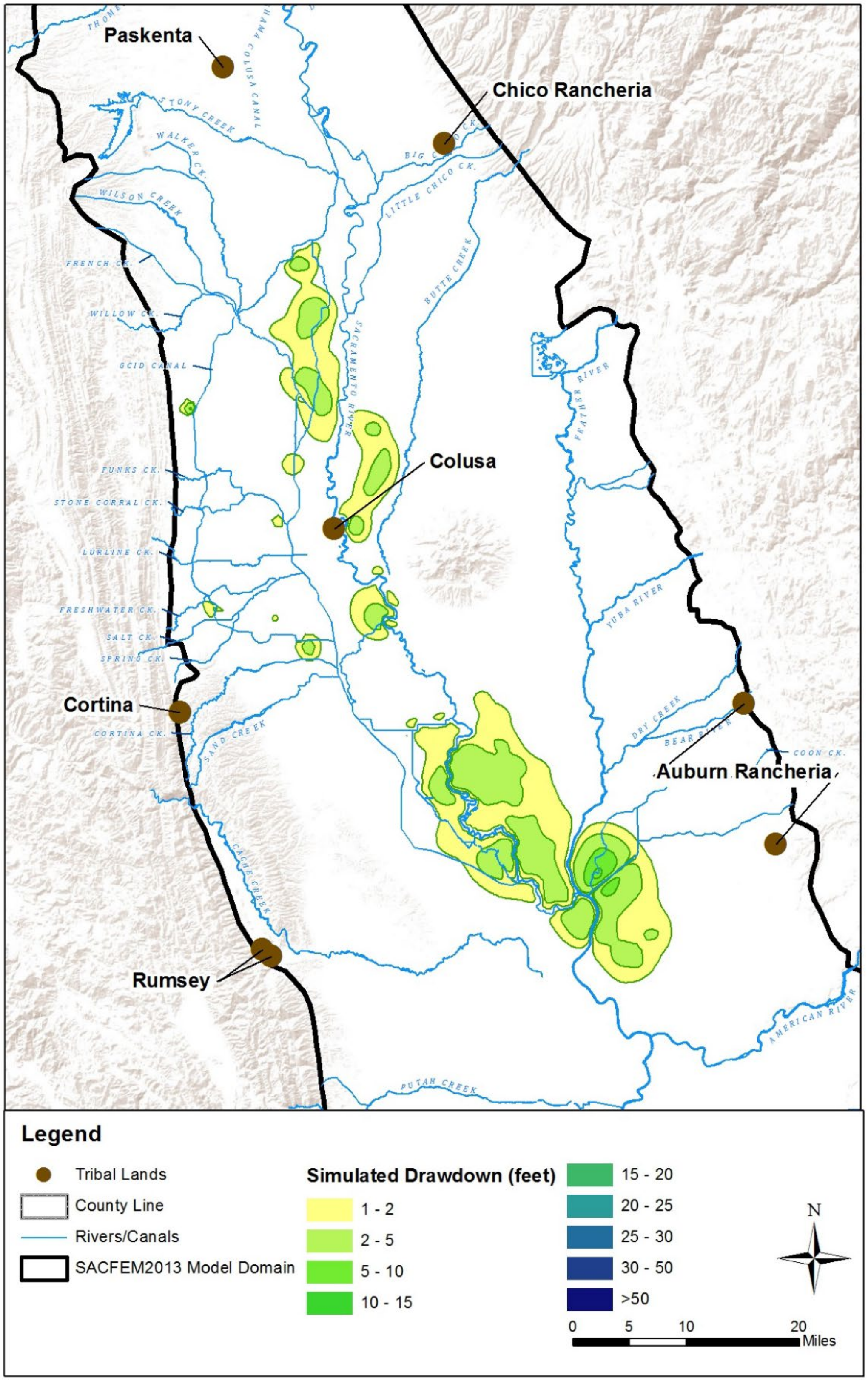
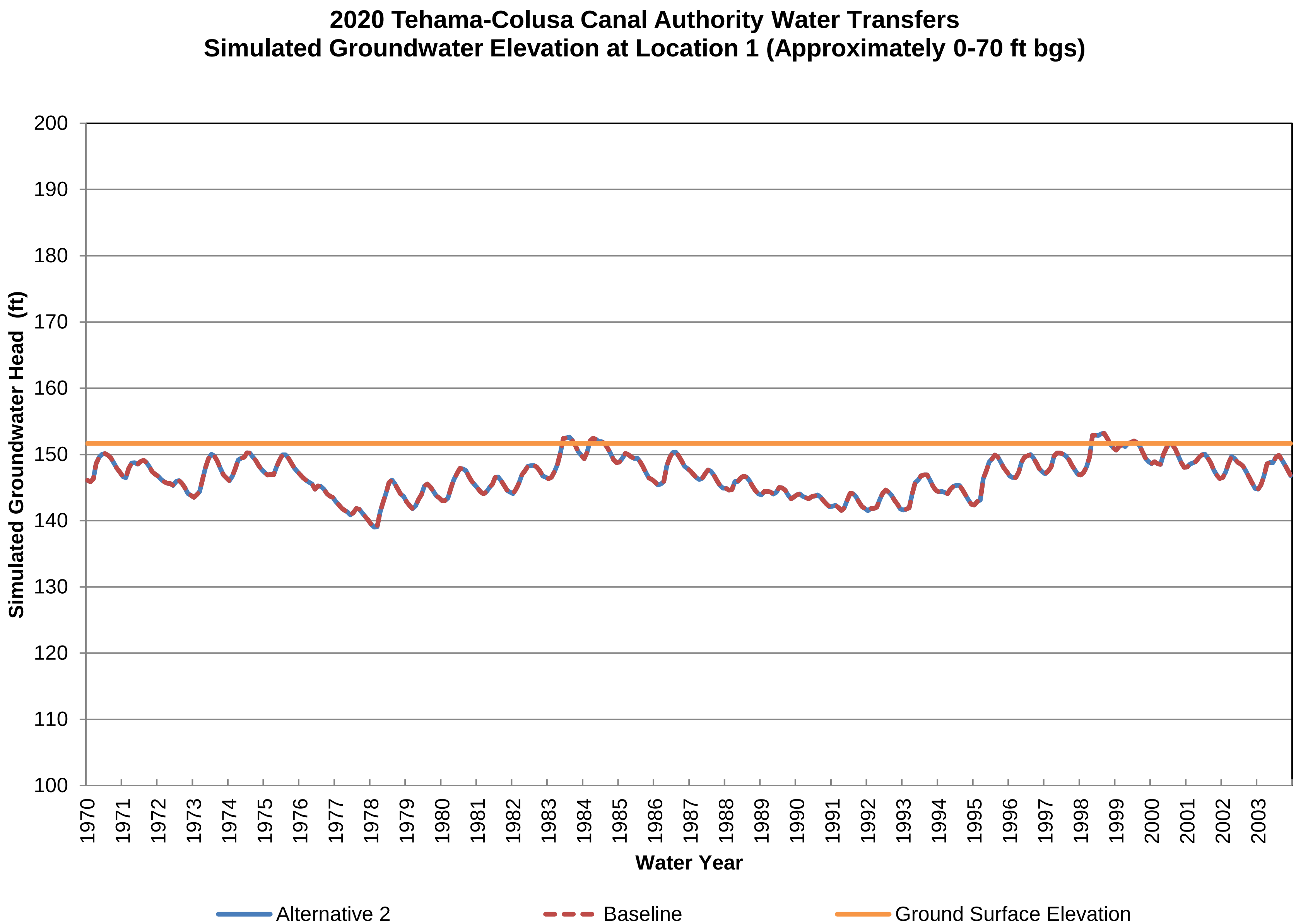
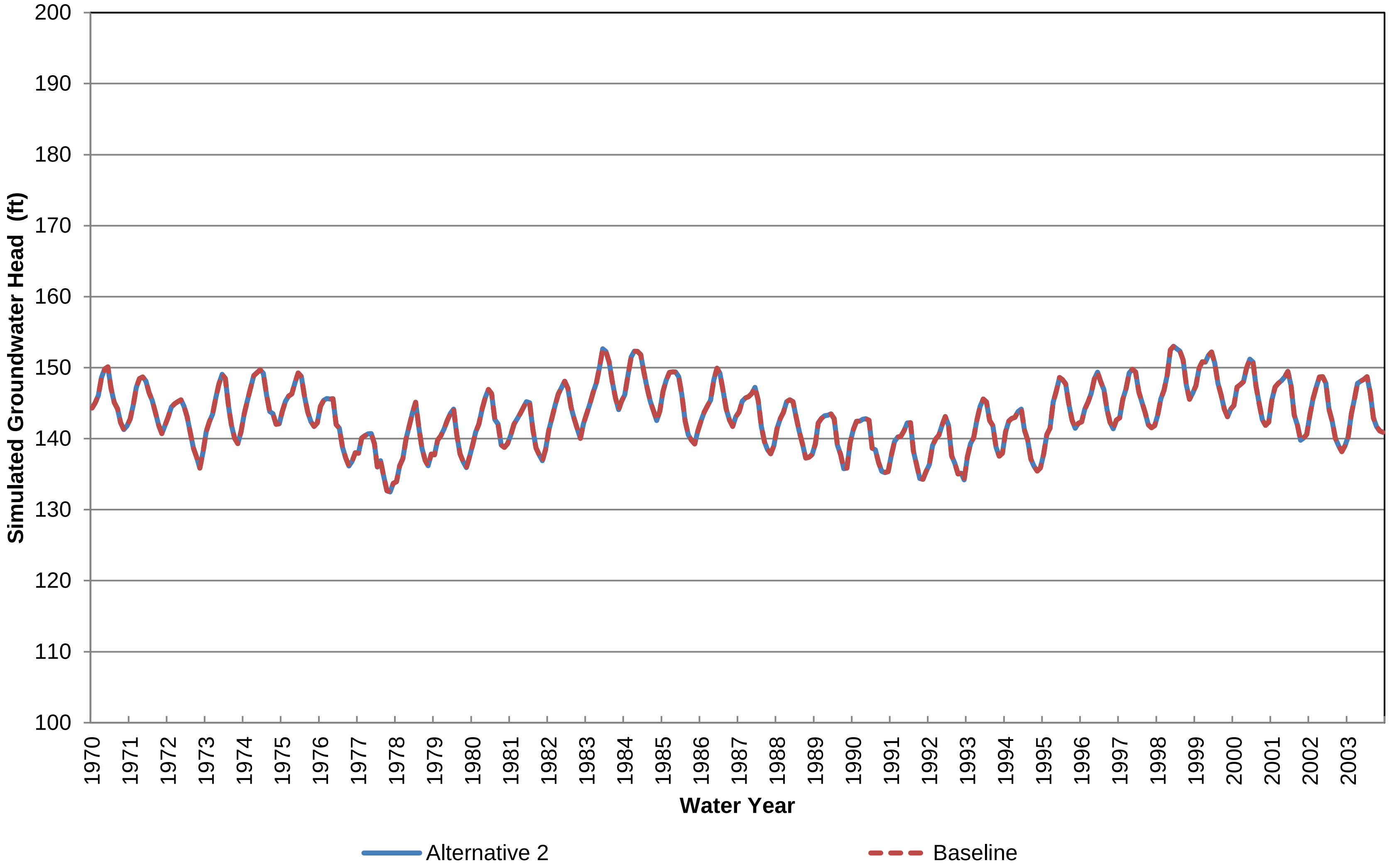


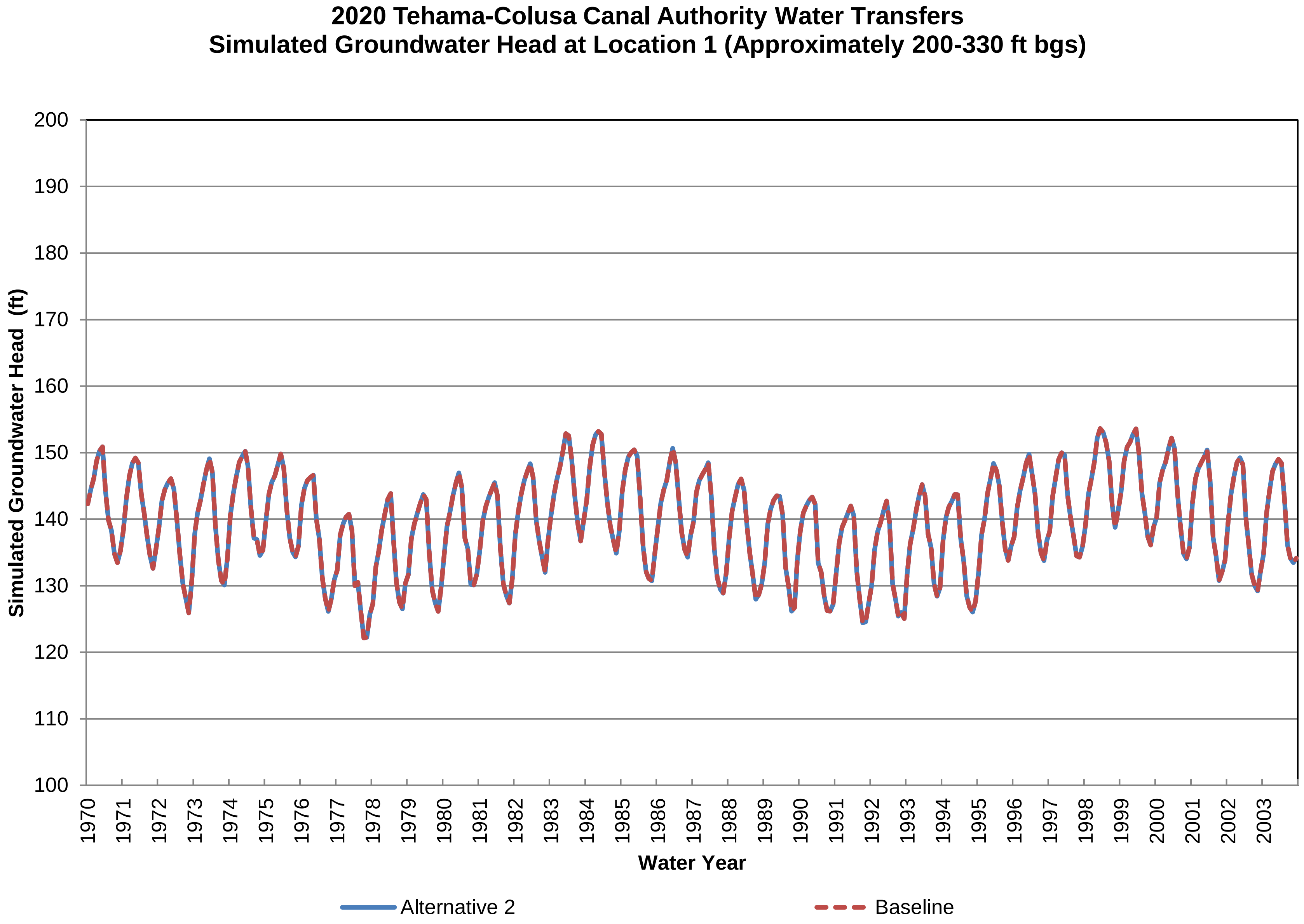
Figure H-5. Groundwater Effects to ITAs in the Sacramento Valley Groundwater Basin

Groundwater head hydrographs for Locations 1 to 34

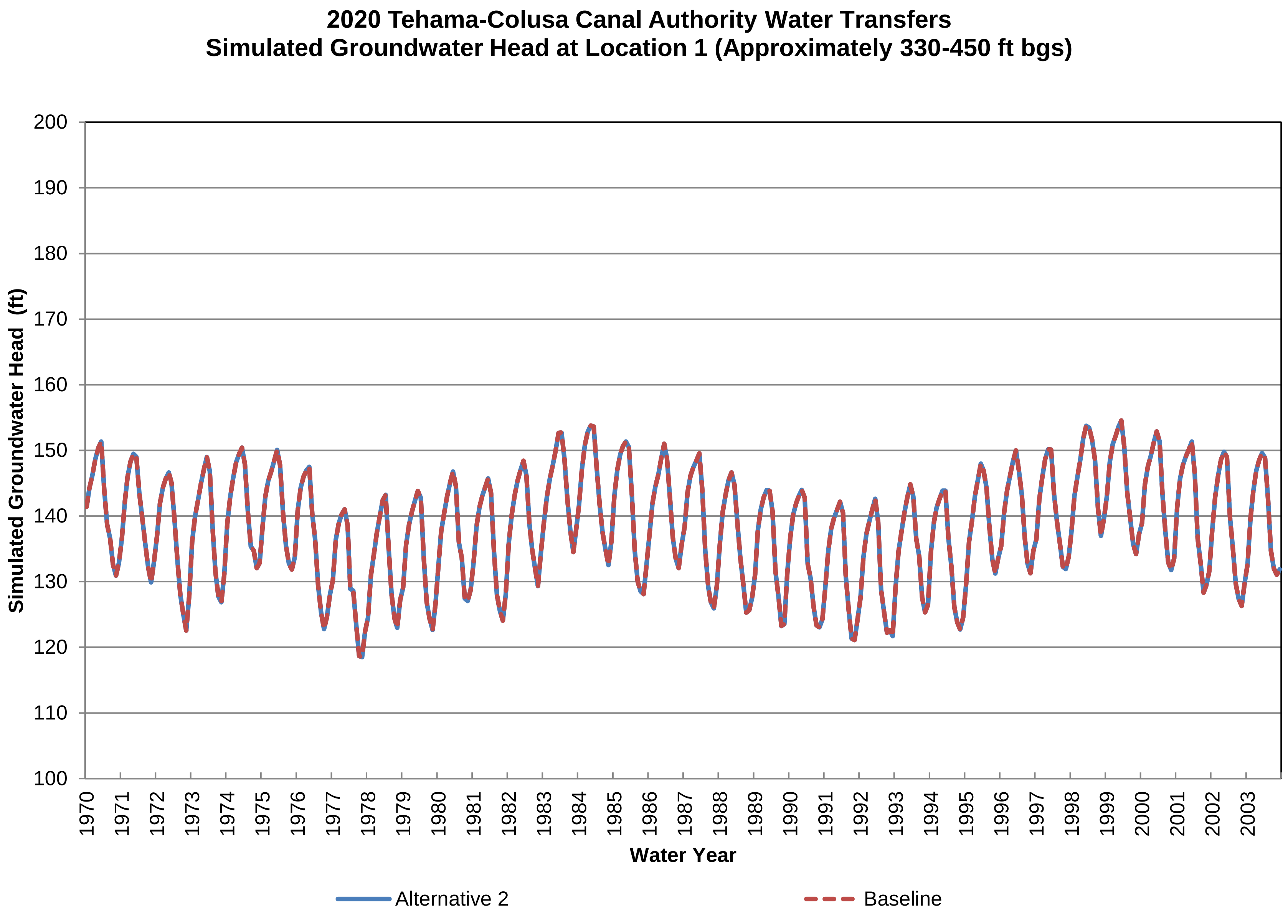

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 1 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 1 (Approximately 70-200 ft bgs)



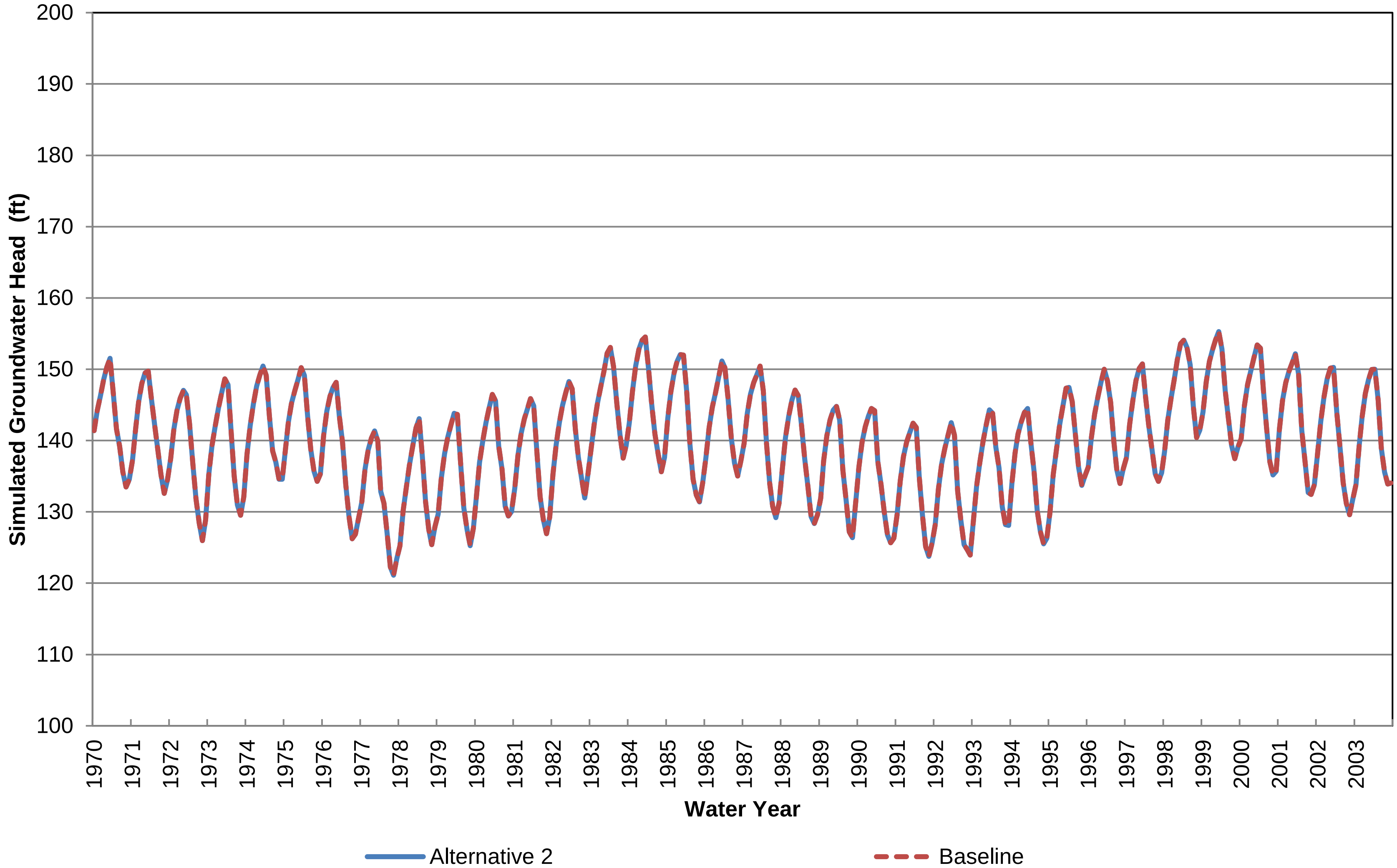


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 1 (Approximately 200-330 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

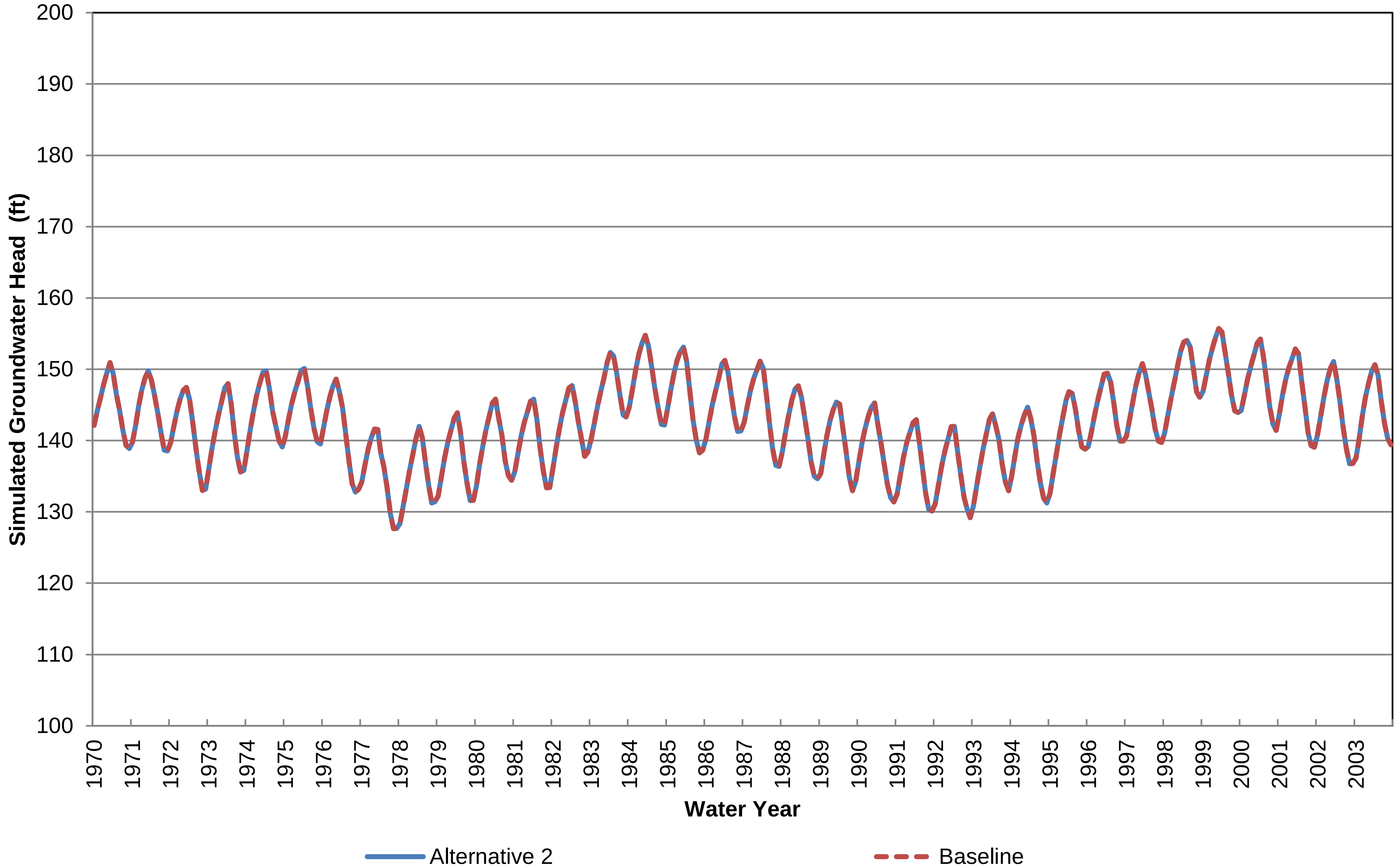


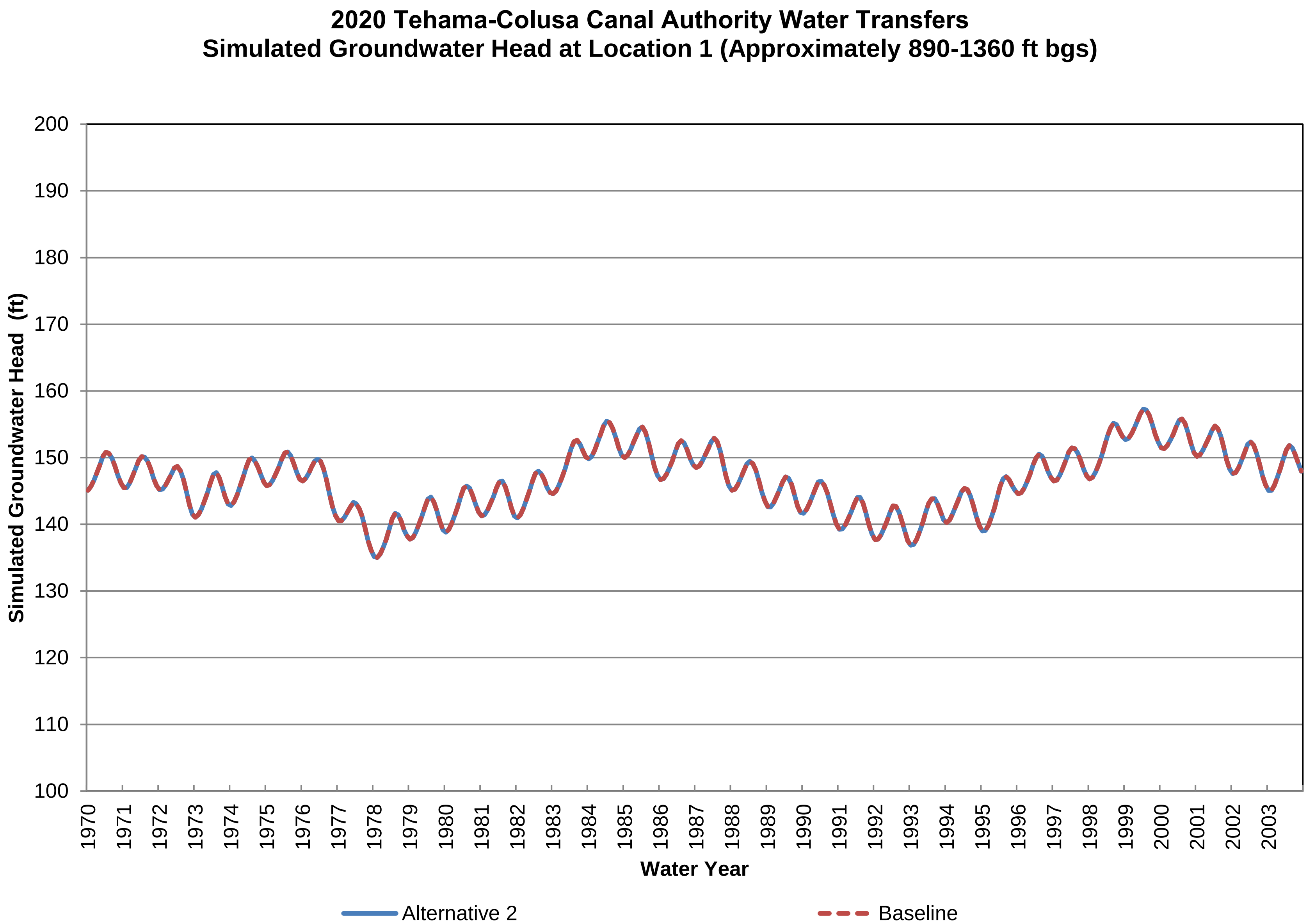
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 1 (Approximately 330-450 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 1 (Approximately 450-640 ft bgs)

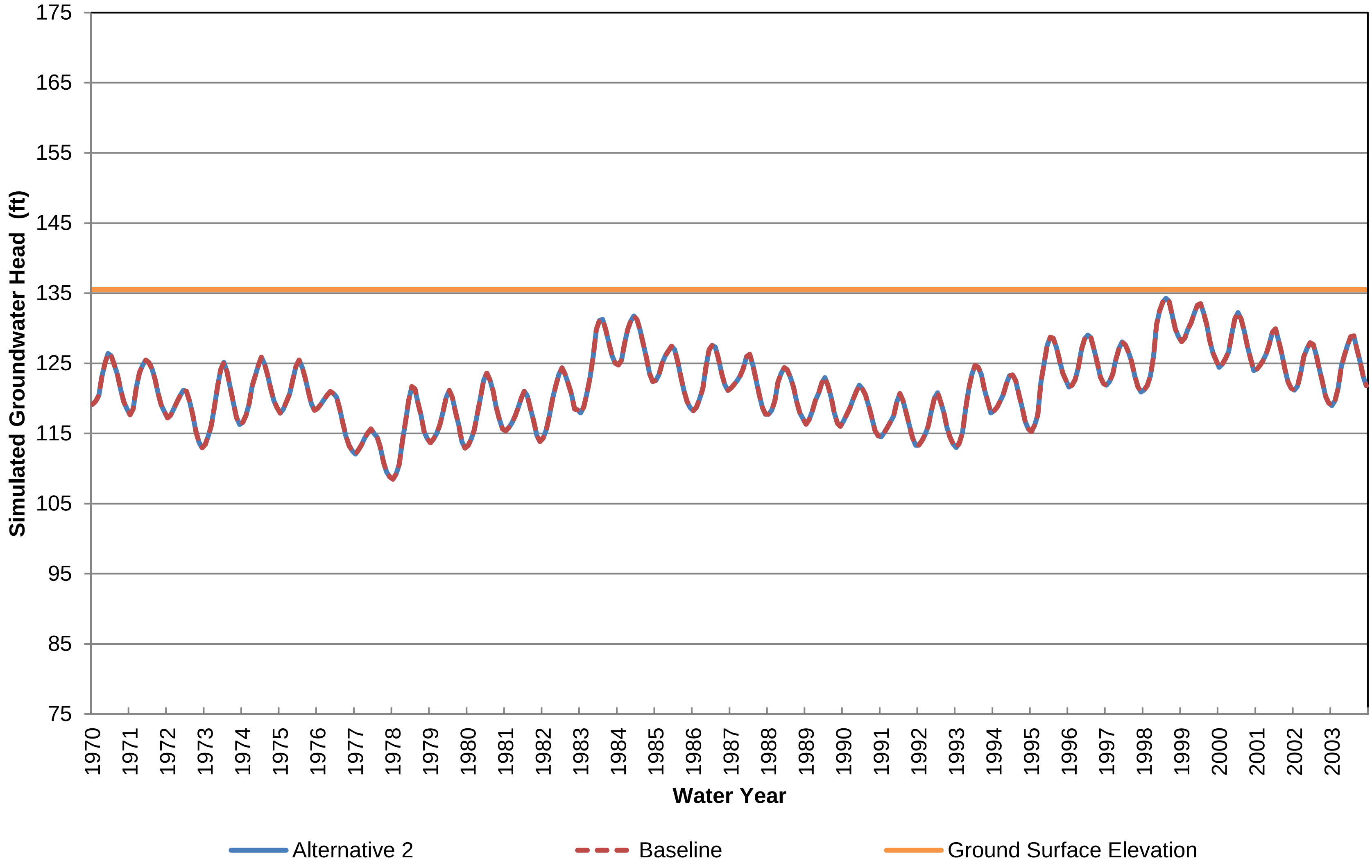


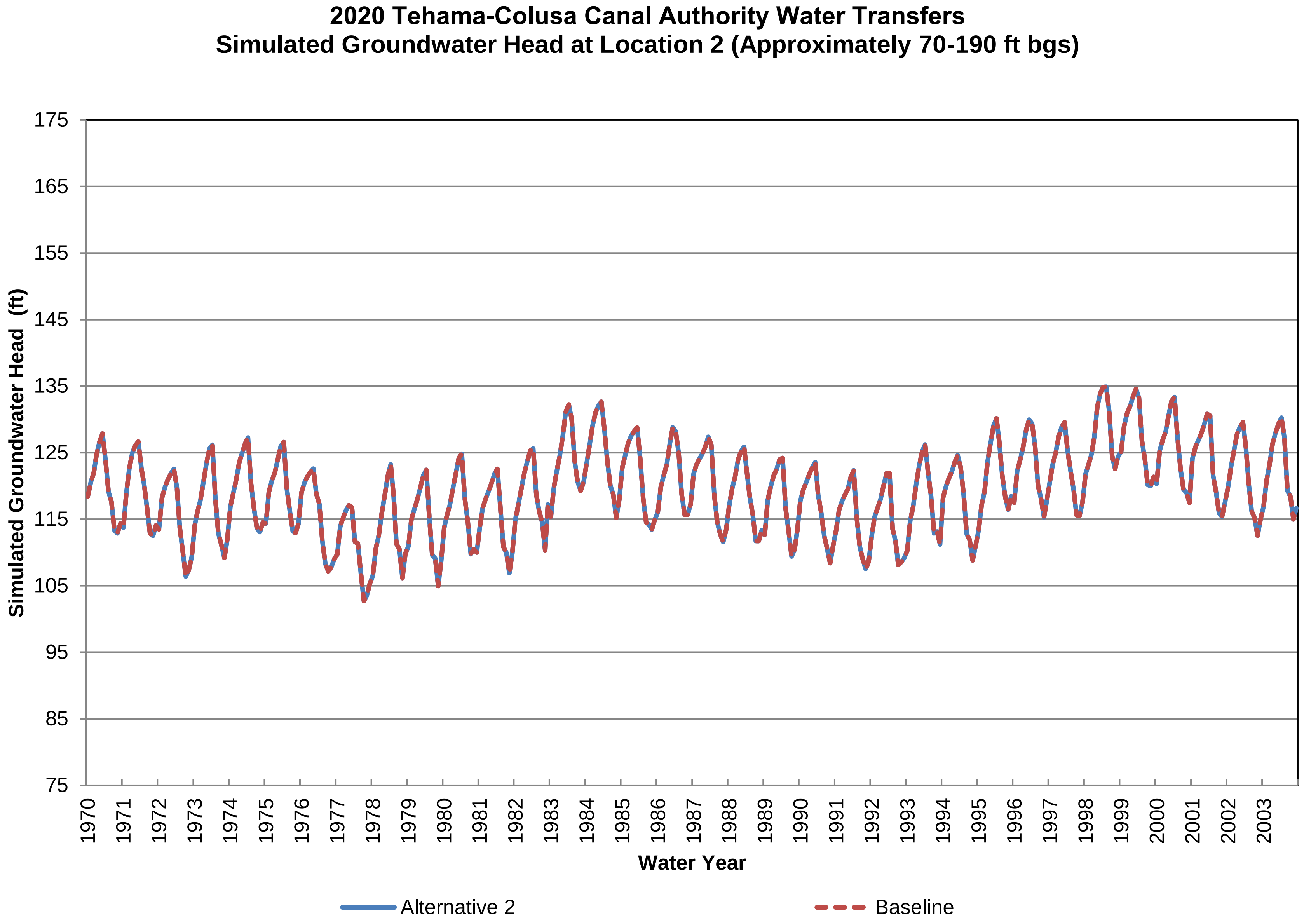
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 1 (Approximately 640-890 ft bgs)



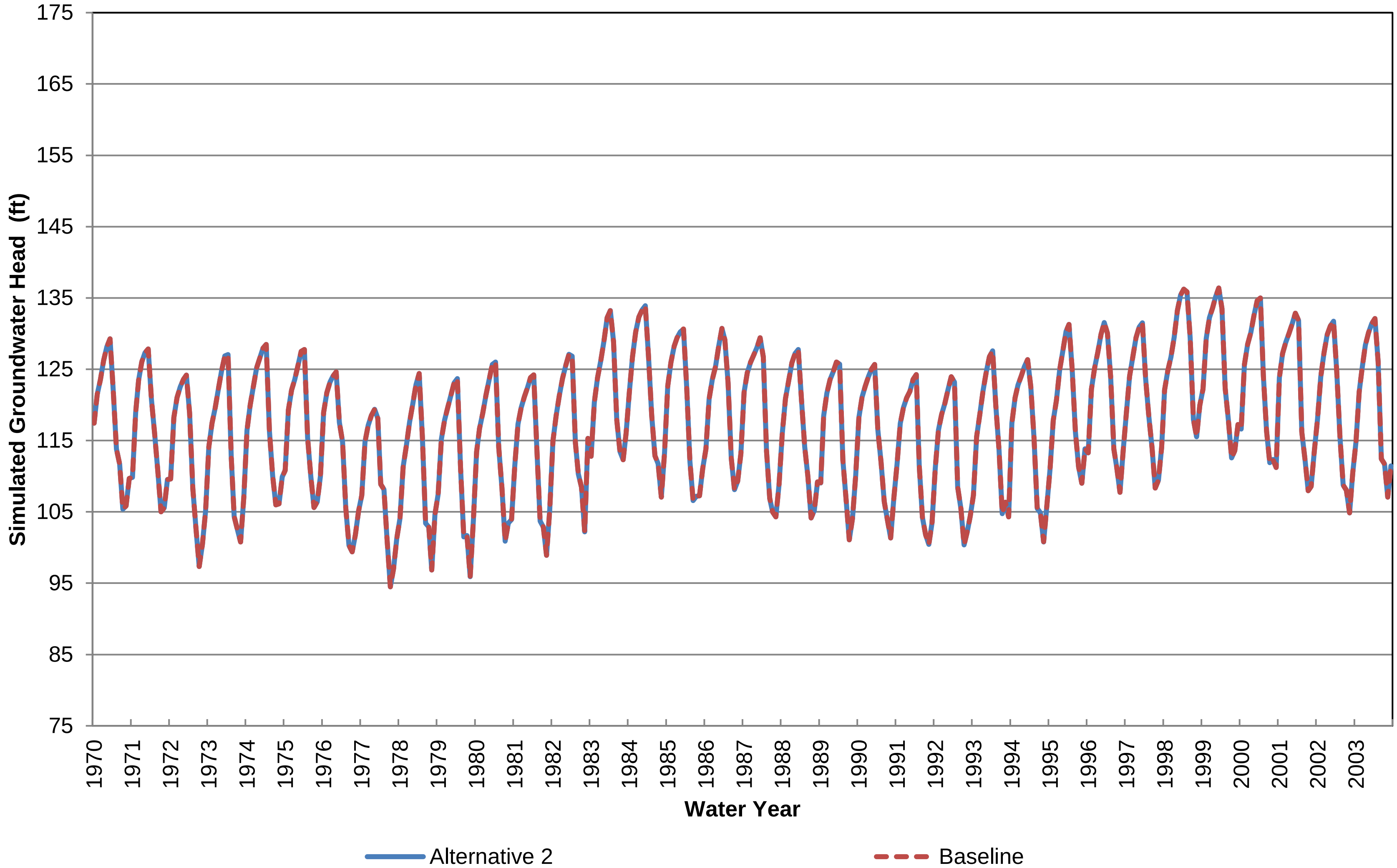

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 1 (Approximately 890-1360 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 2 (Approximately 0-70 ft bgs)

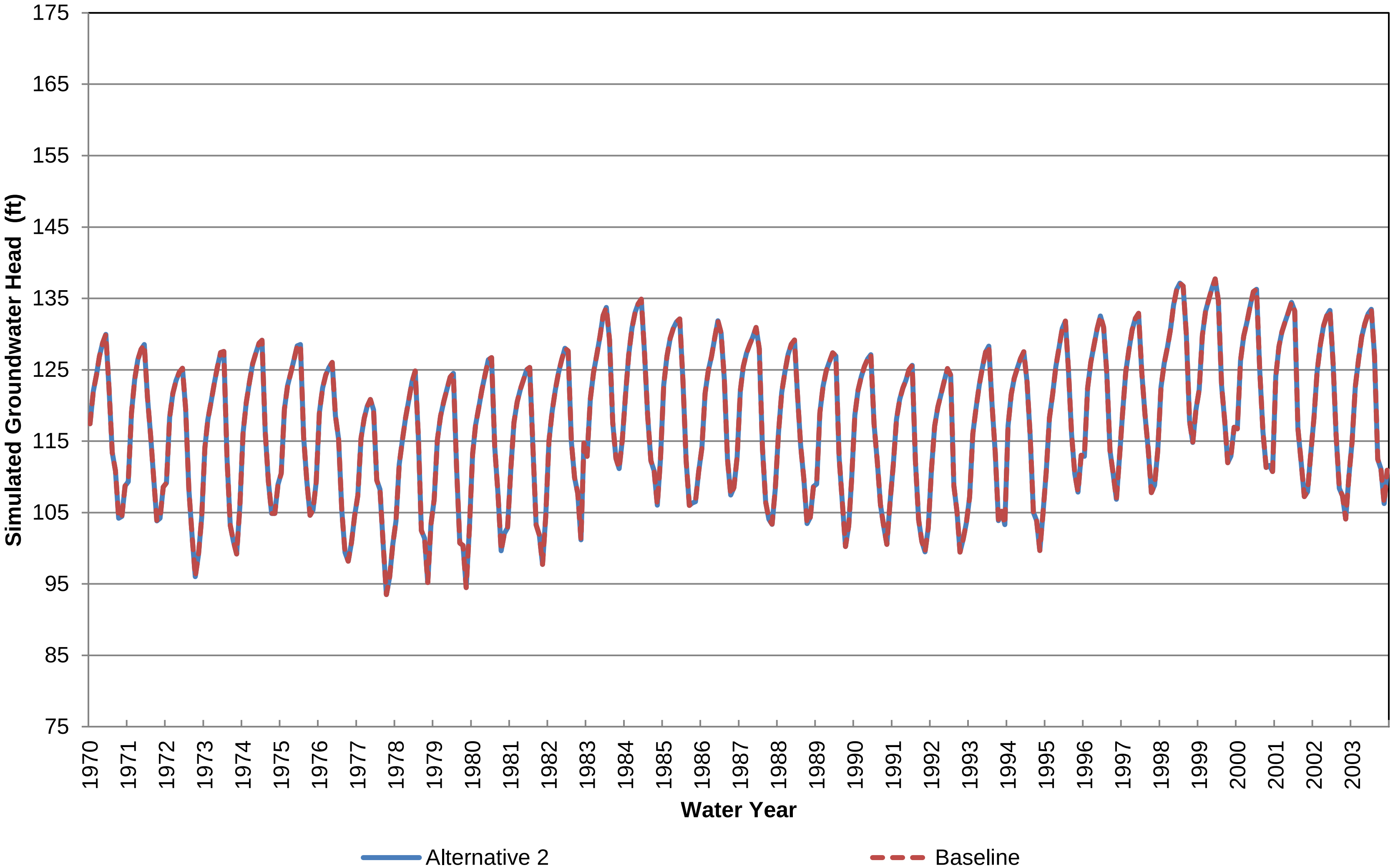


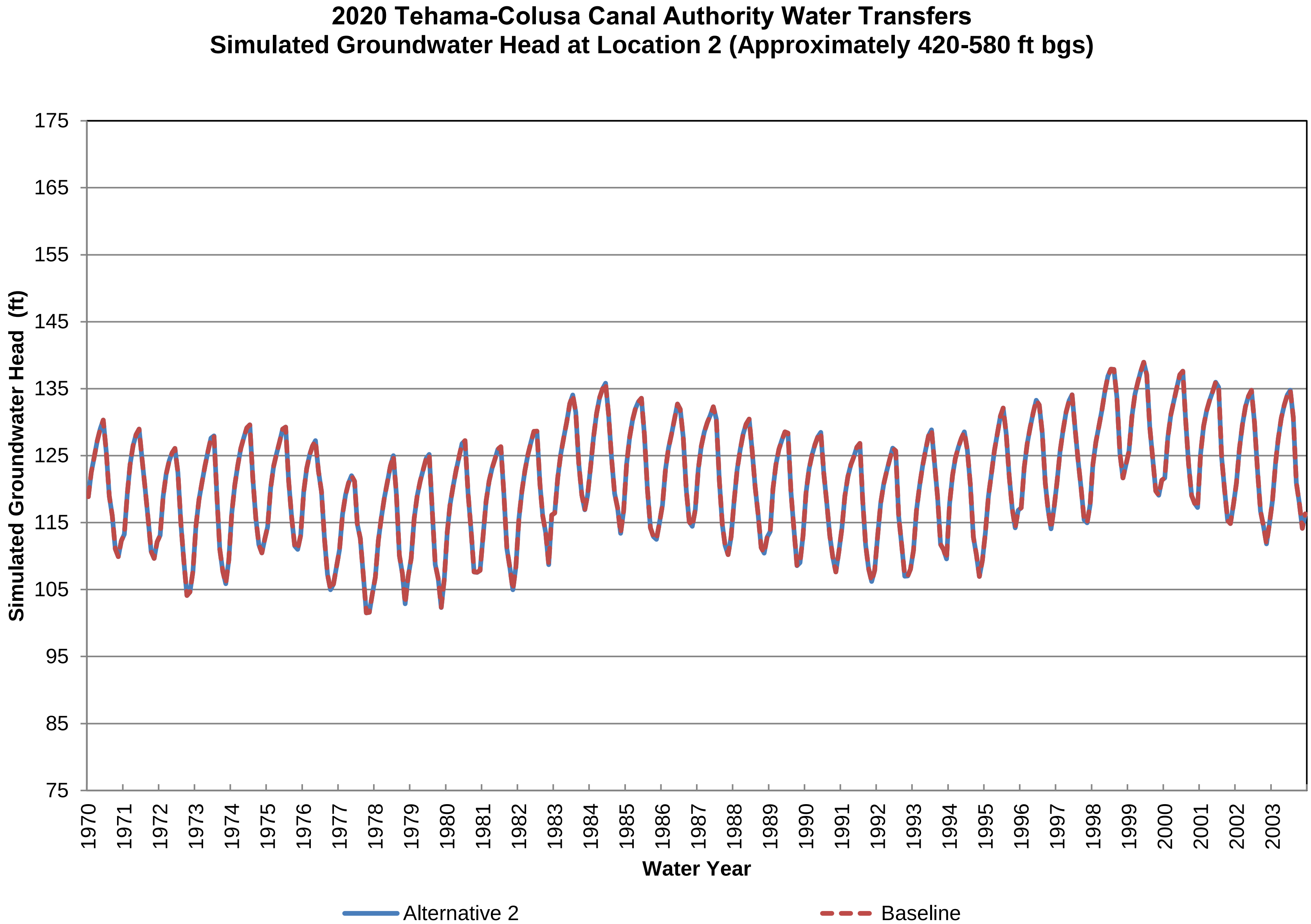

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 2 (Approximately 70-190 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 2 (Approximately 190-300 ft bgs)

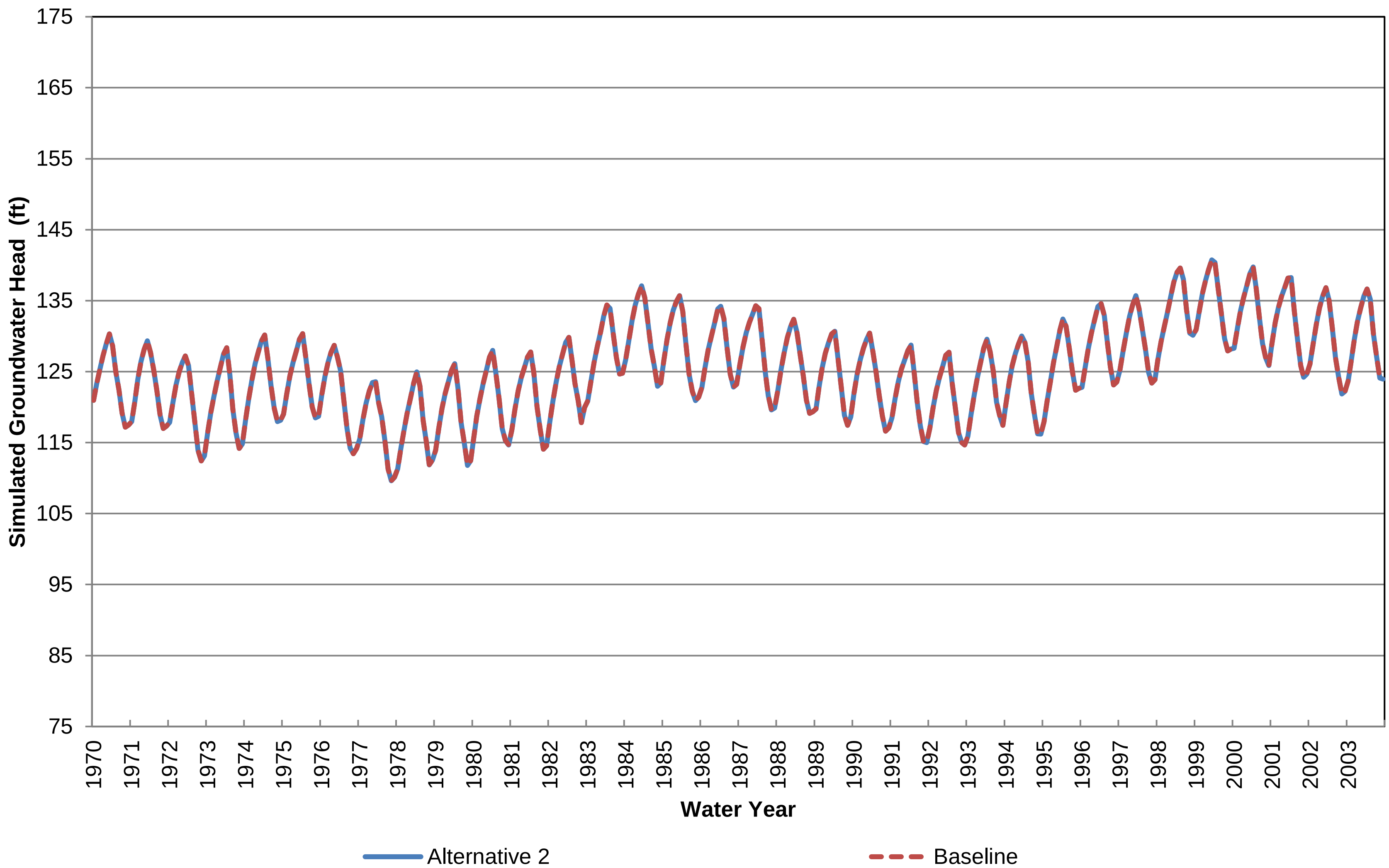


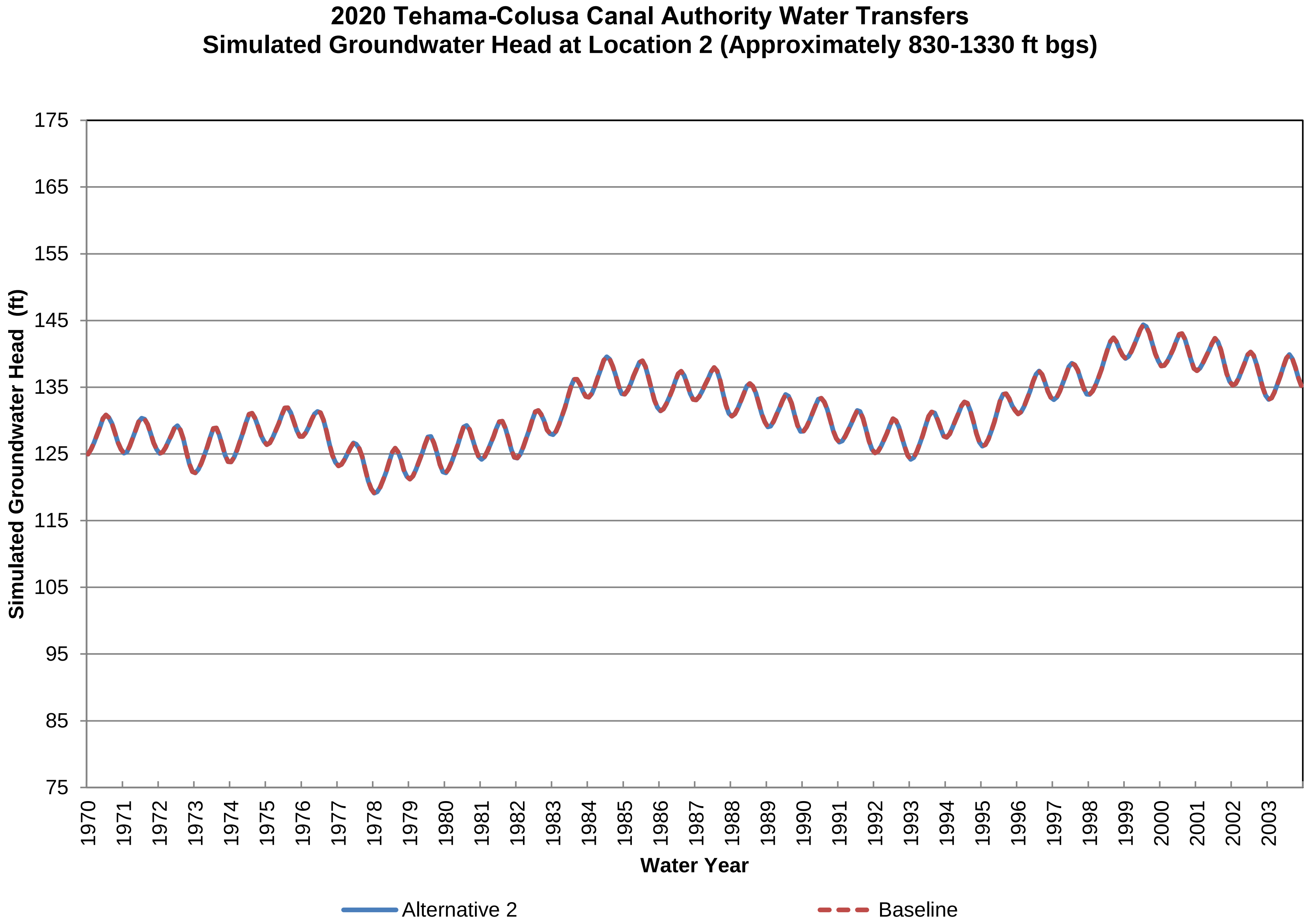
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 2 (Approximately 300-420 ft bgs)

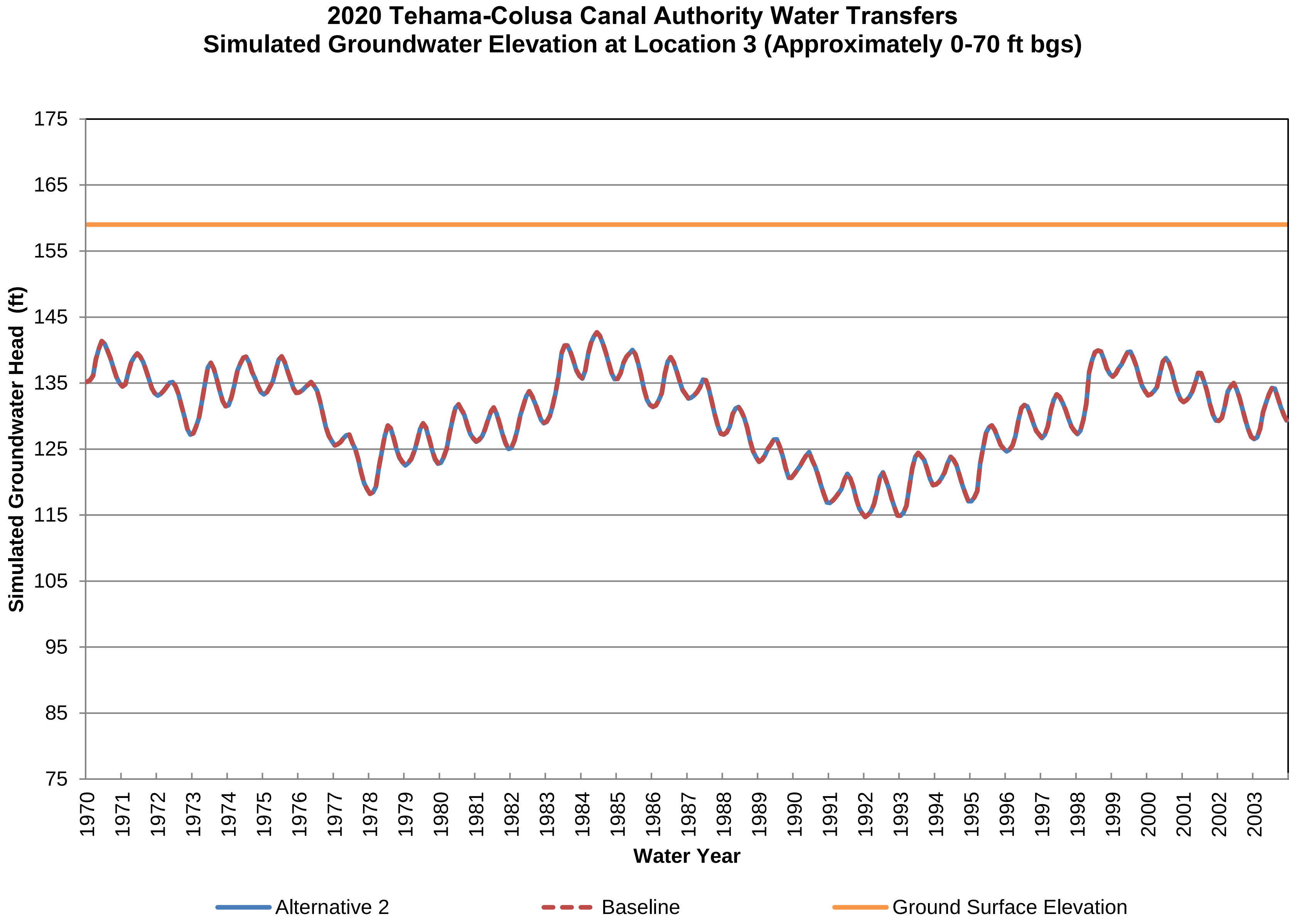



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 2 (Approximately 420-580 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

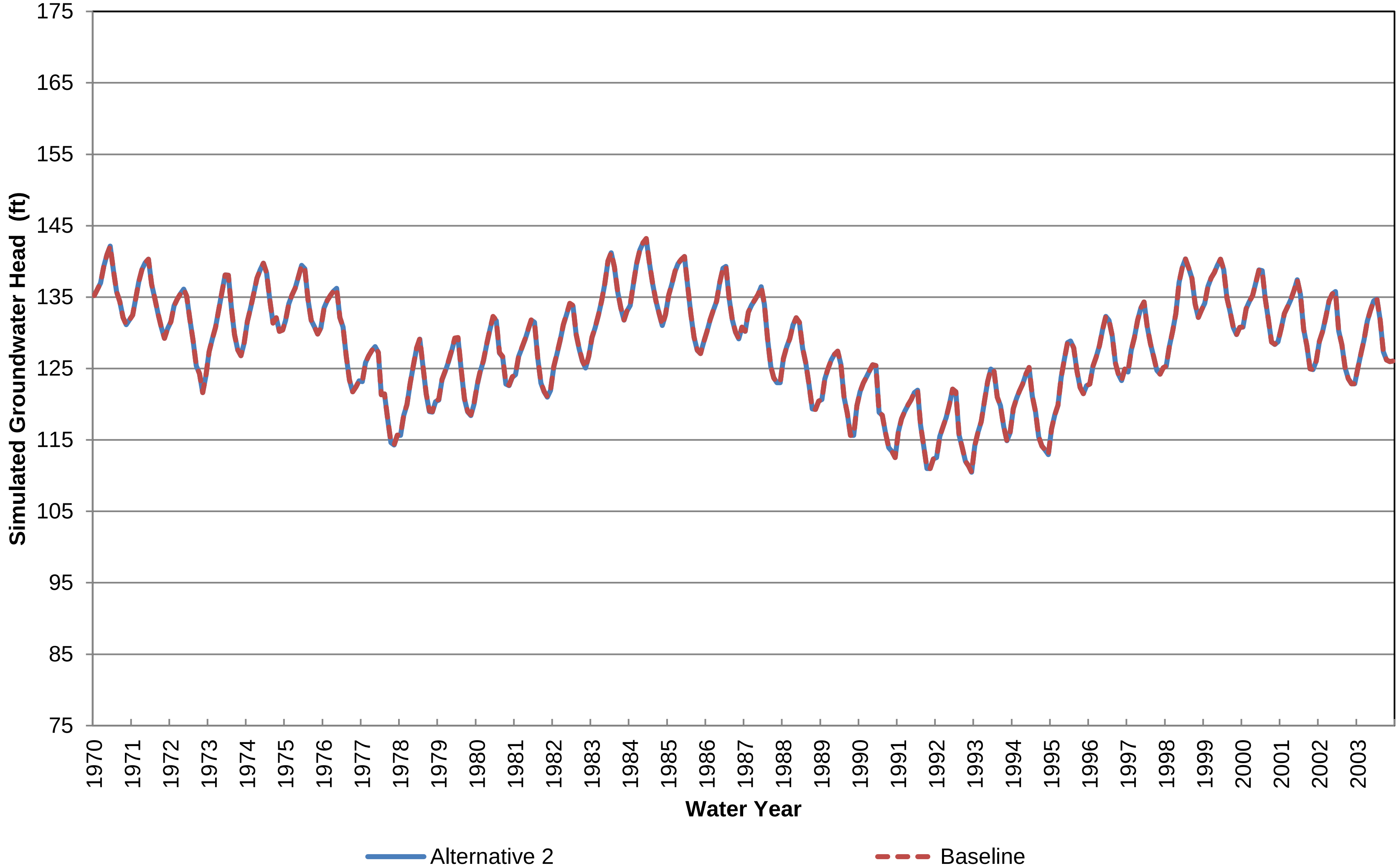
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 2 (Approximately 580-830 ft bgs)



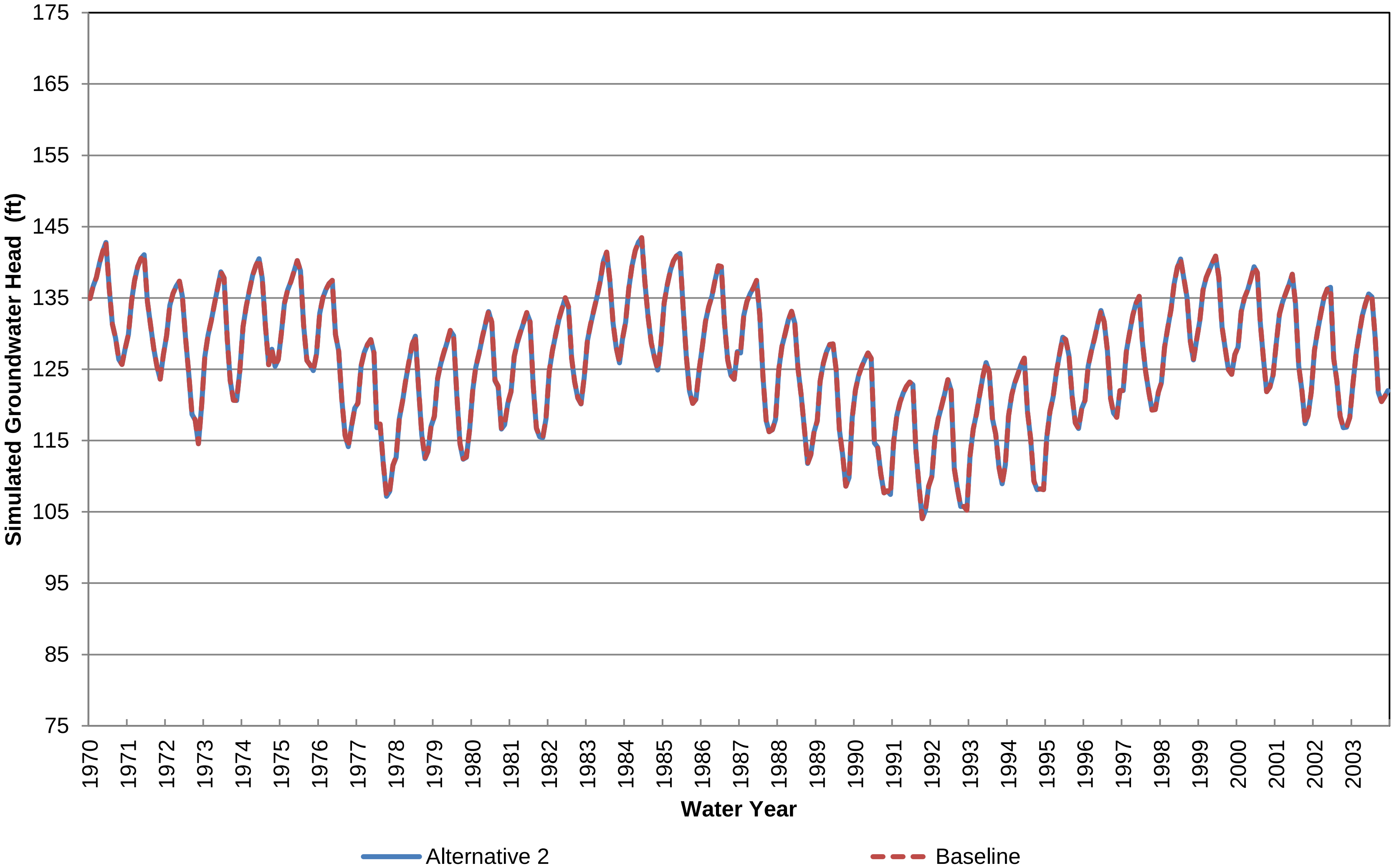

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 2 (Approximately 830-1330 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

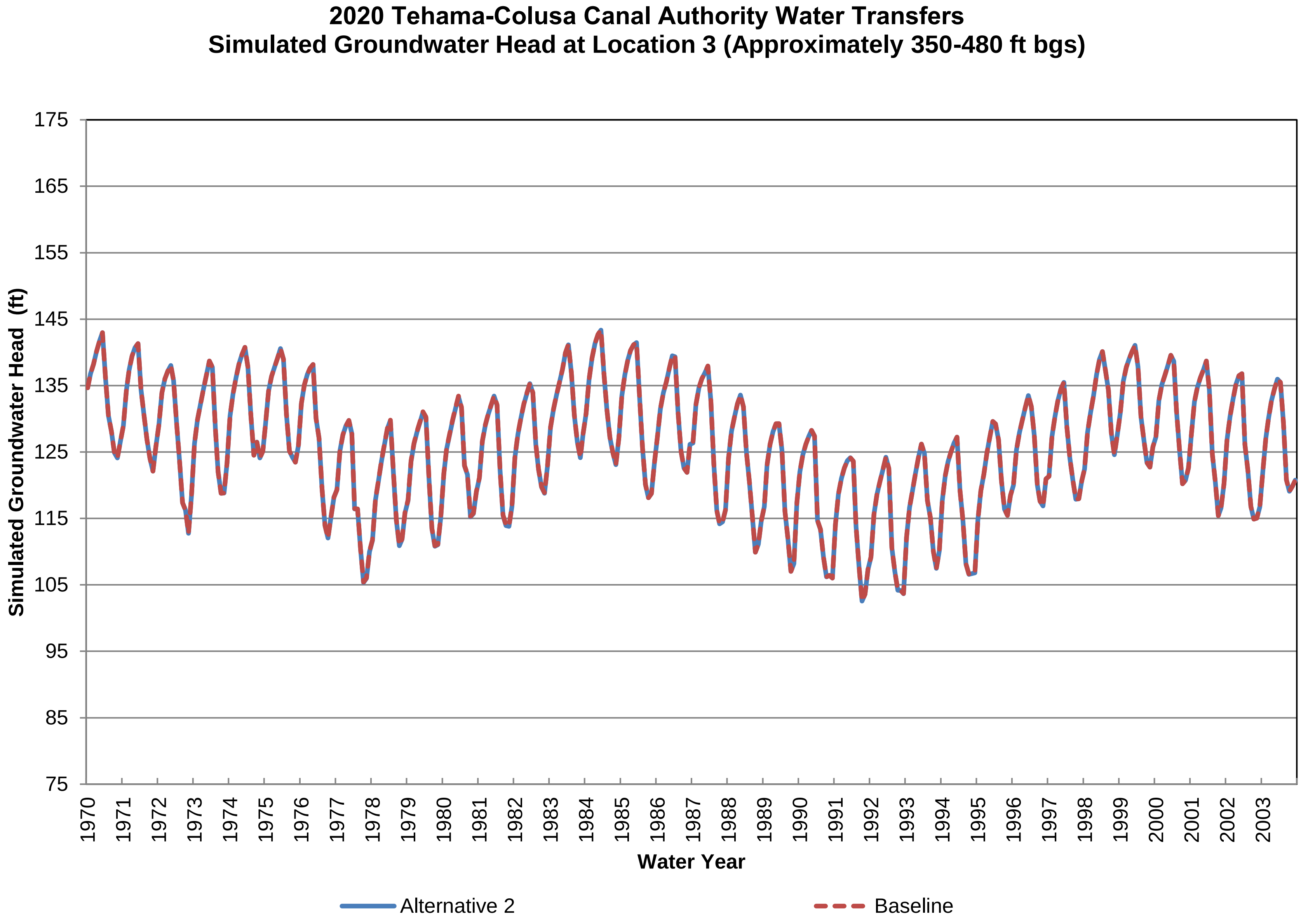

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 3 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 3 (Approximately 70-210 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 3 (Approximately 210-350 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 3 (Approximately 350-480 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
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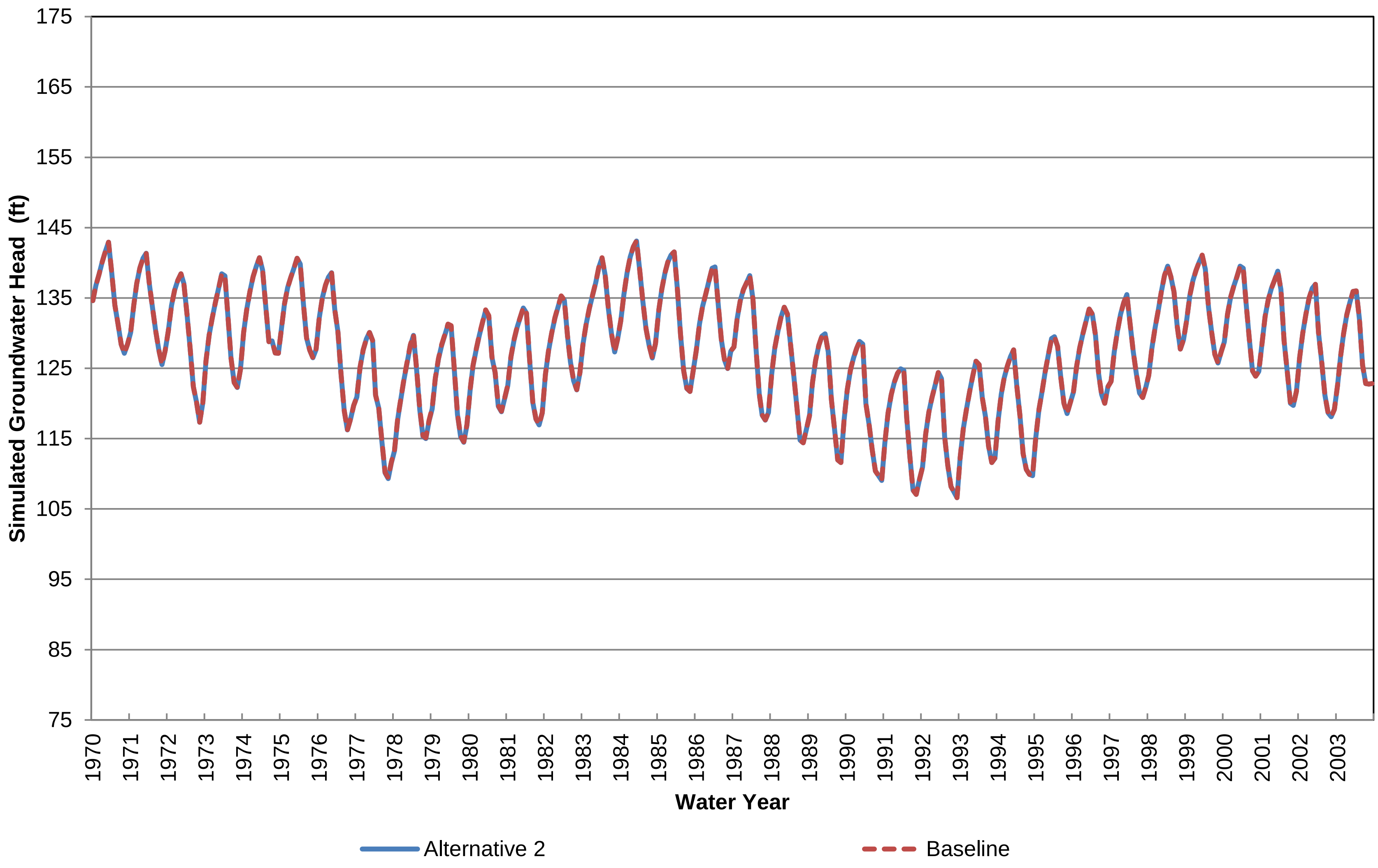
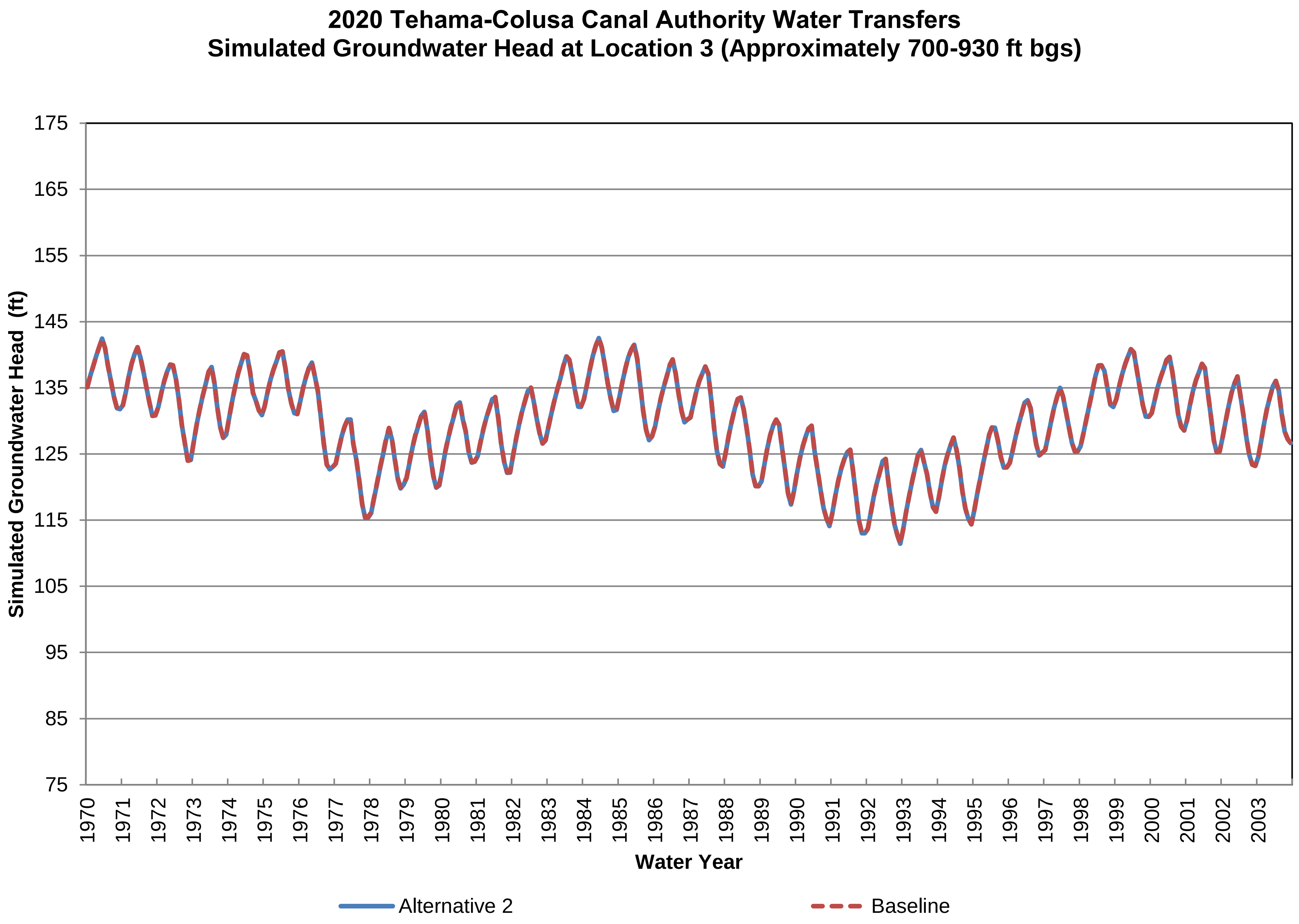
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 3 (Approximately 480-700 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 3 (Approximately 700-930 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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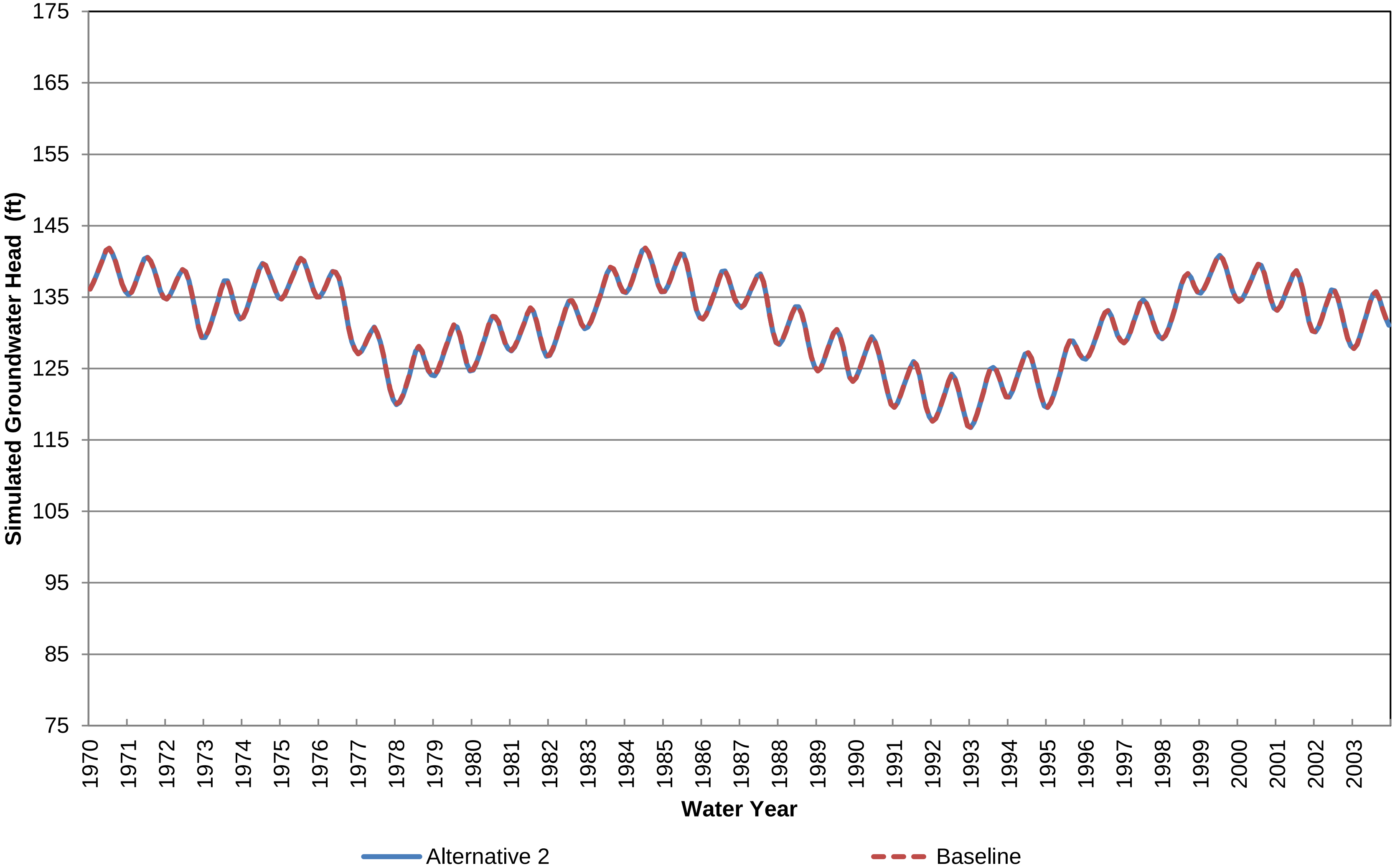
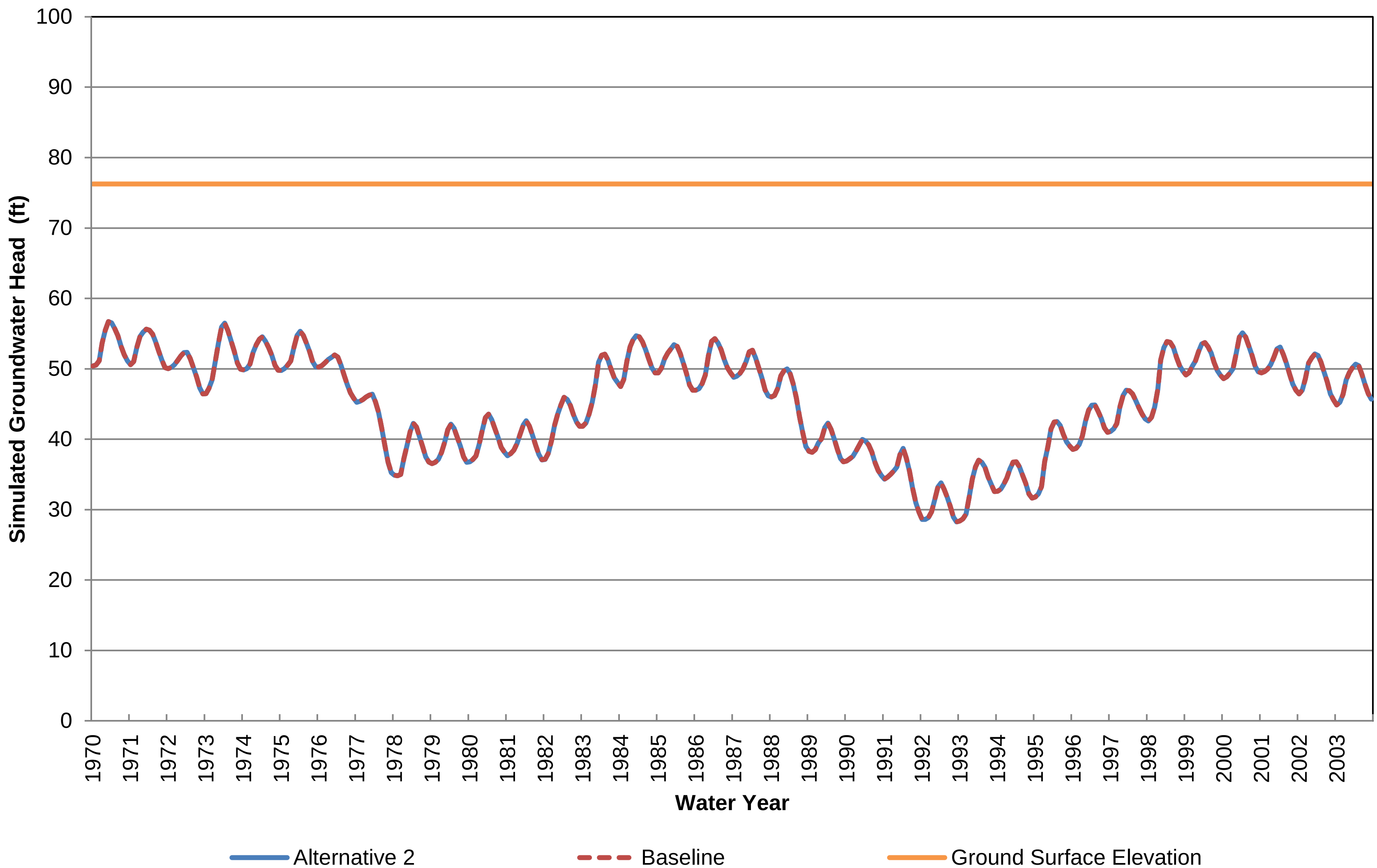
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

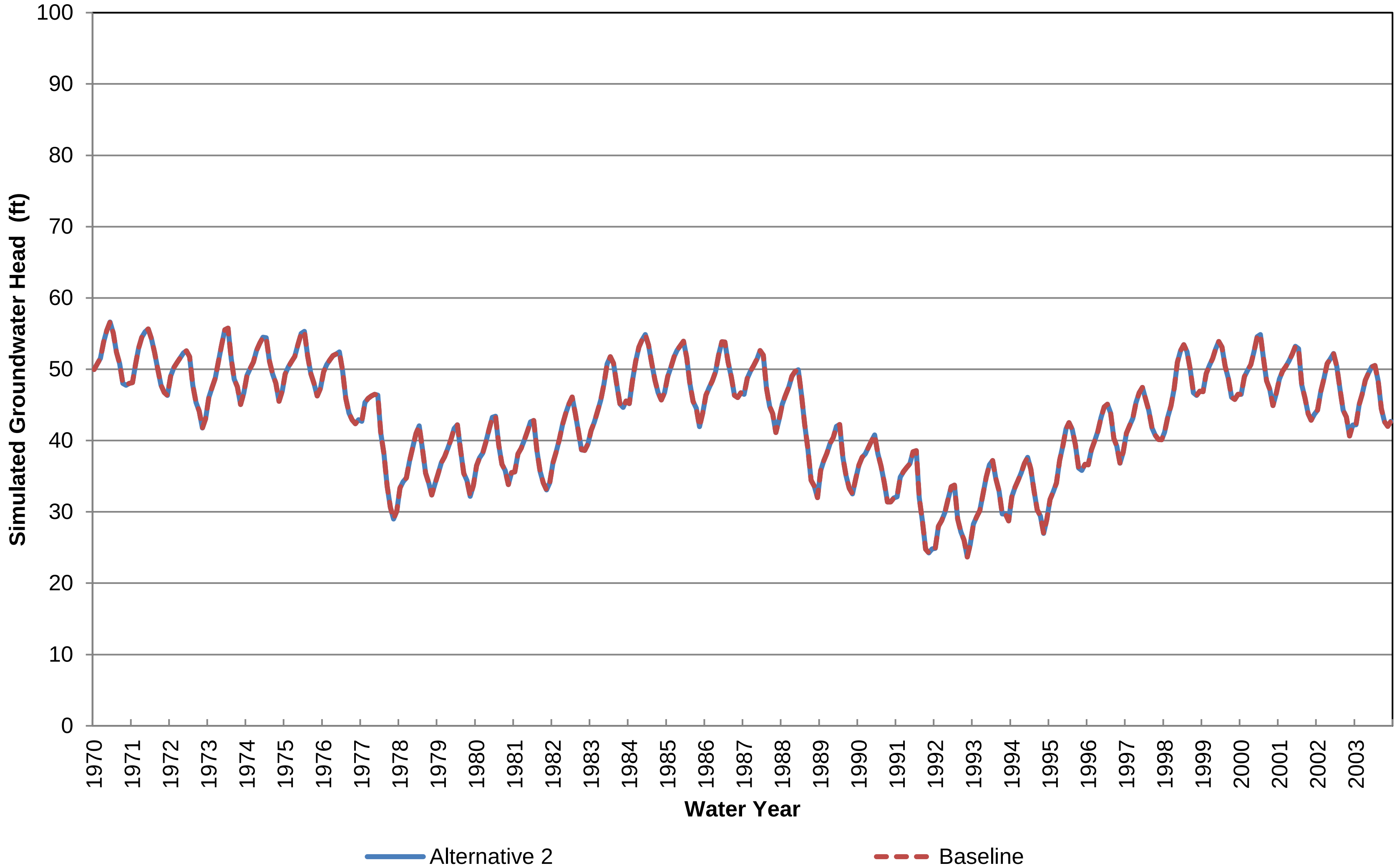
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 3 (Approximately 930-1290 ft bgs)

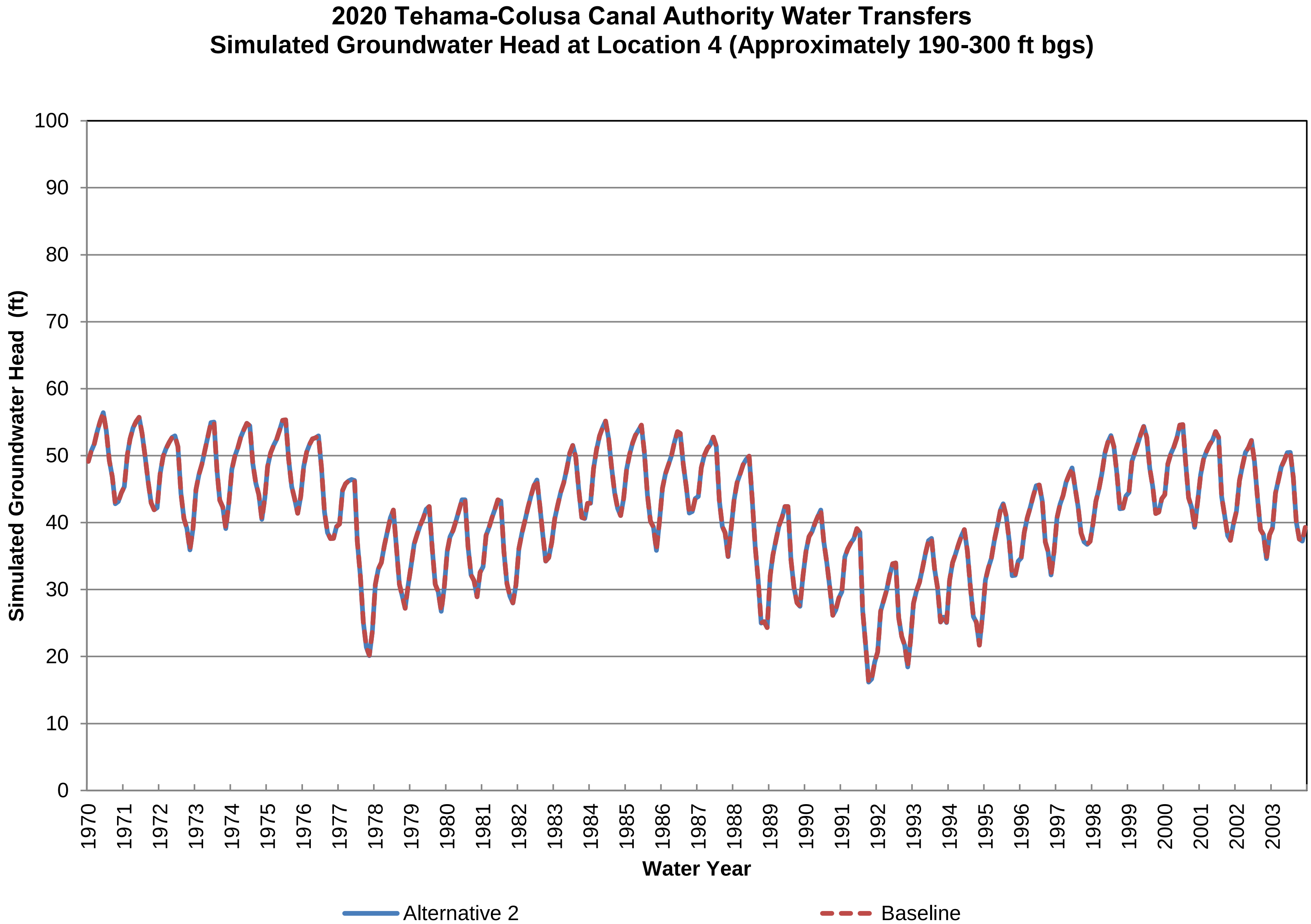


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 4 (Approximately 0-70 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 4 (Approximately 70-190 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 4 (Approximately 190-300 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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1998
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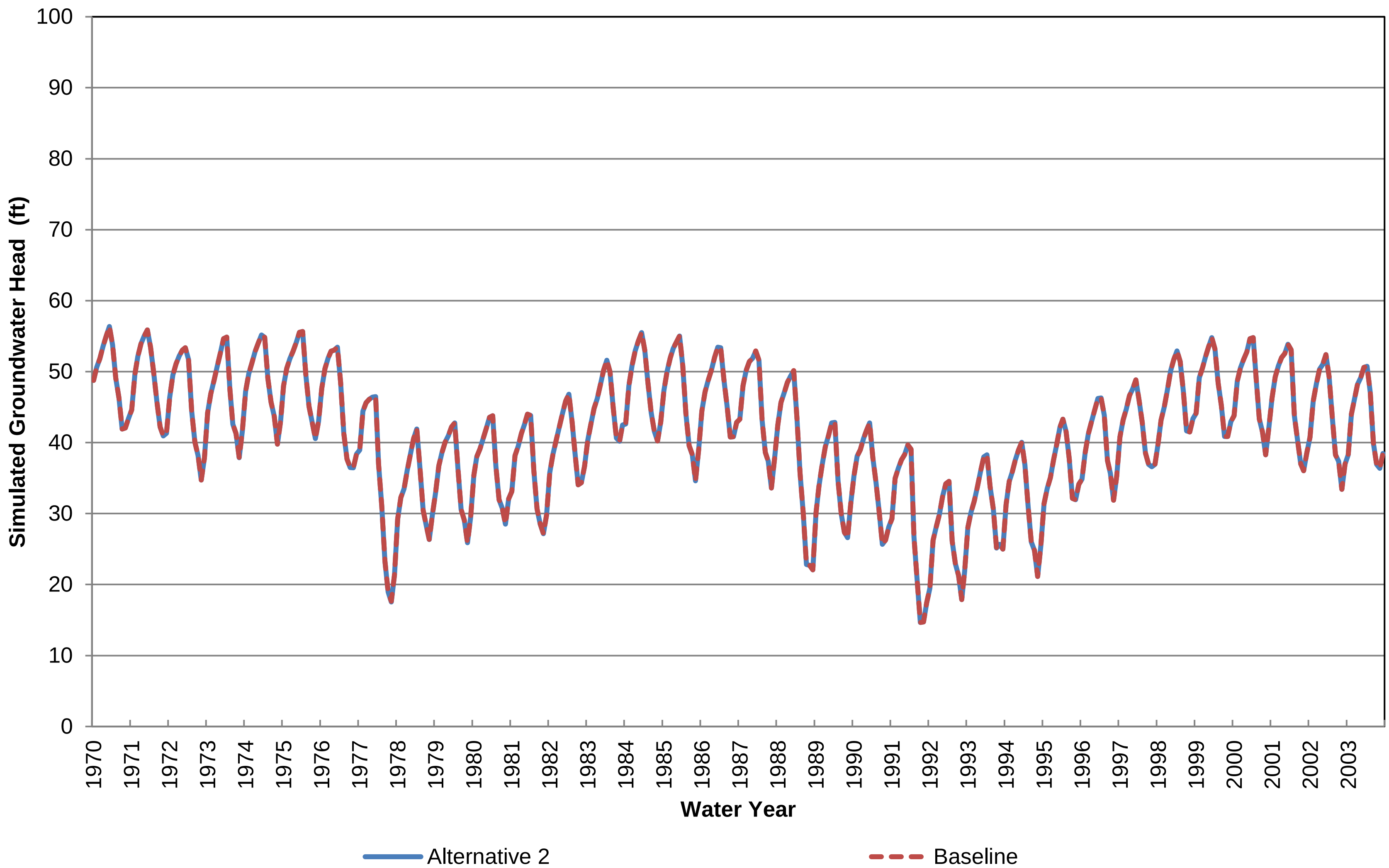
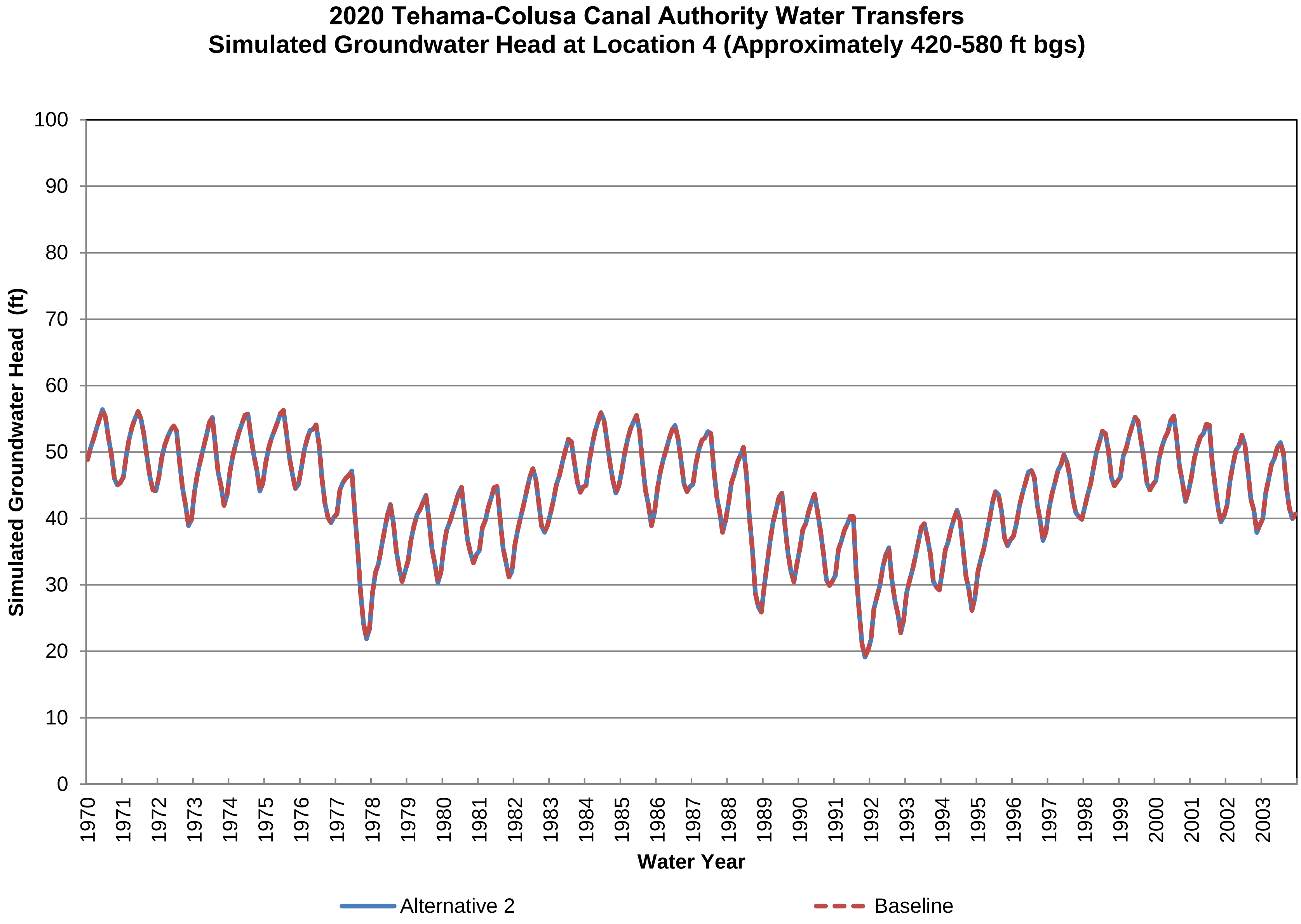
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 4 (Approximately 300-420 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 4 (Approximately 420-580 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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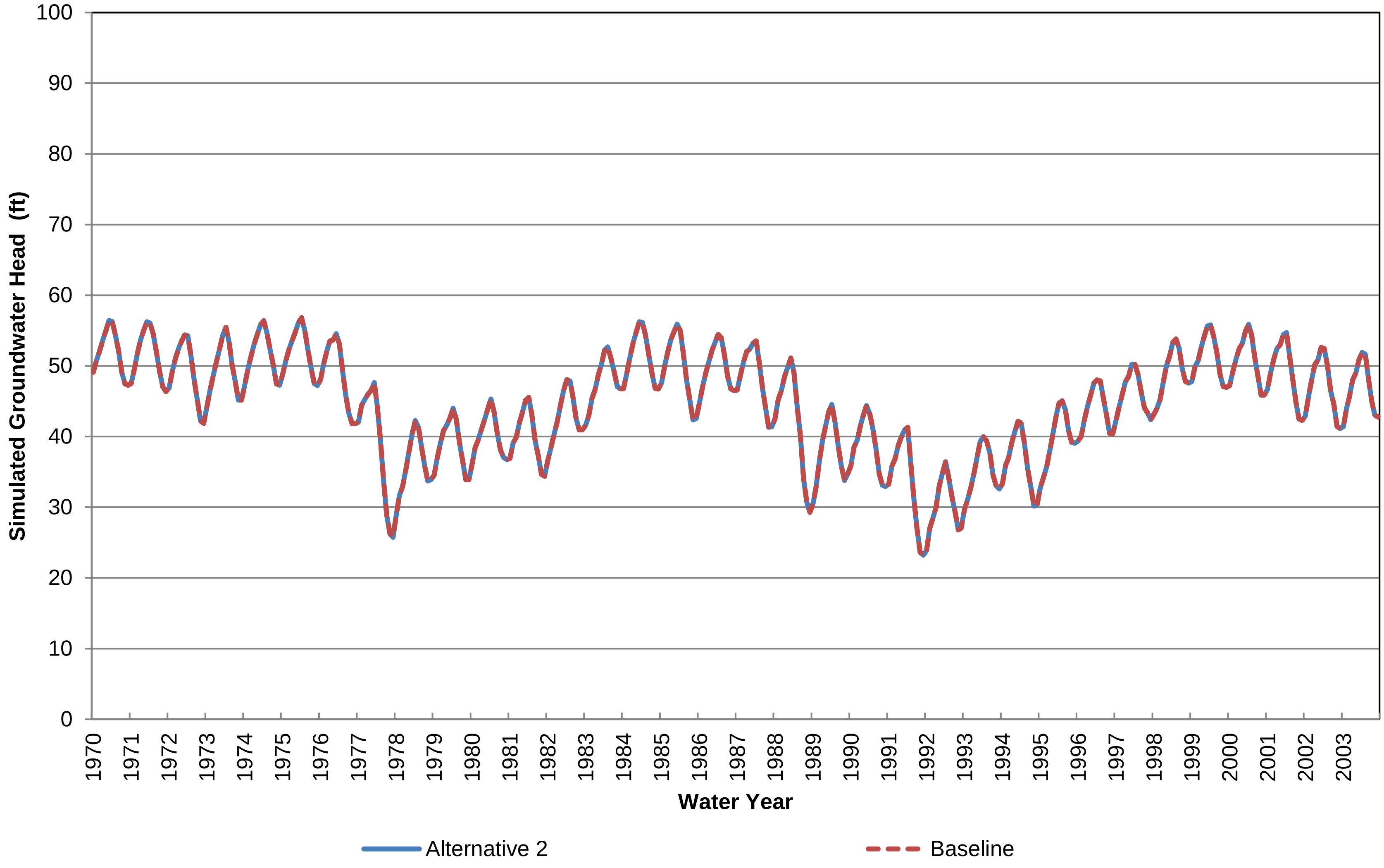
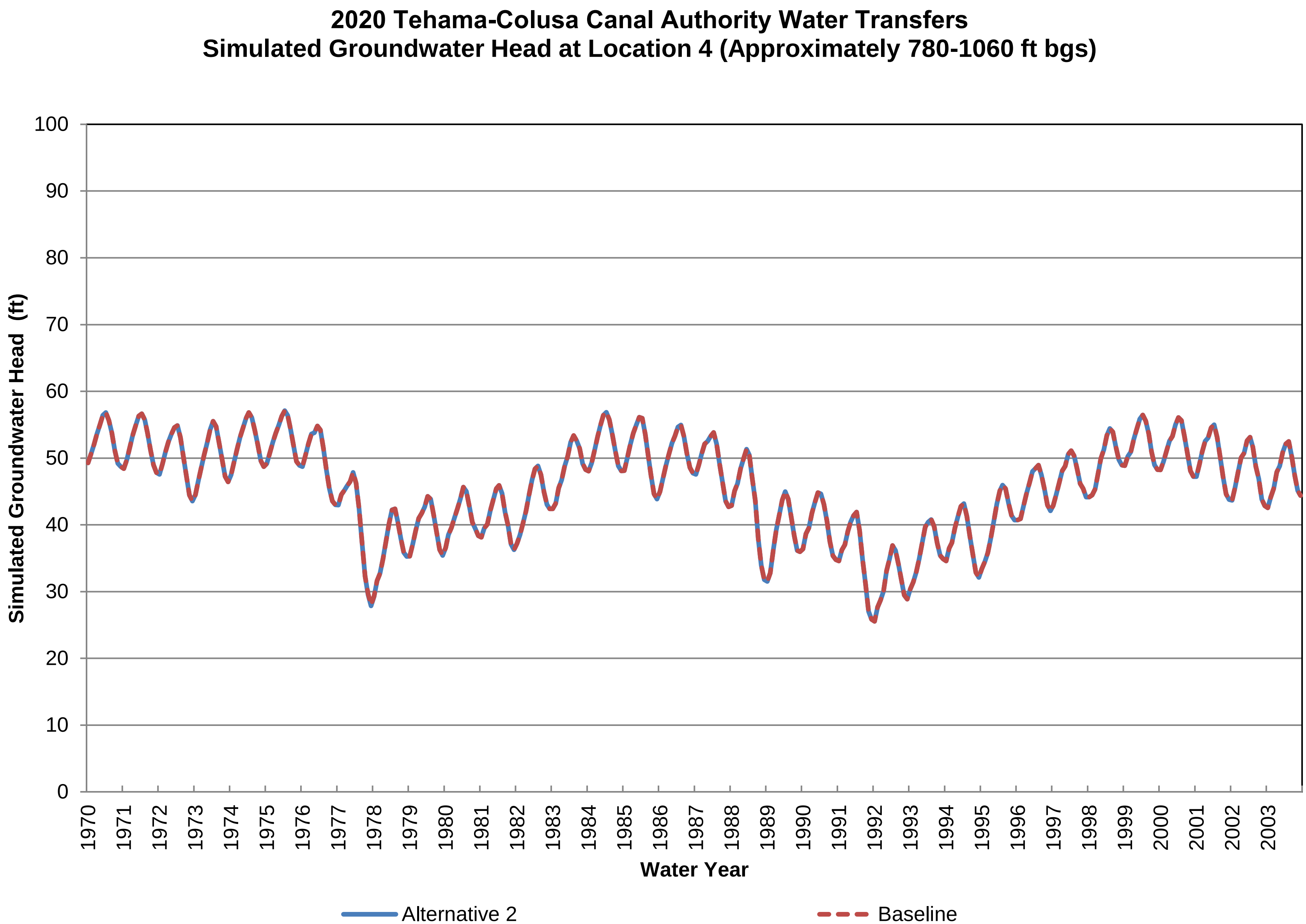
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 4 (Approximately 580-780 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 4 (Approximately 780-1060 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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1983
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1989
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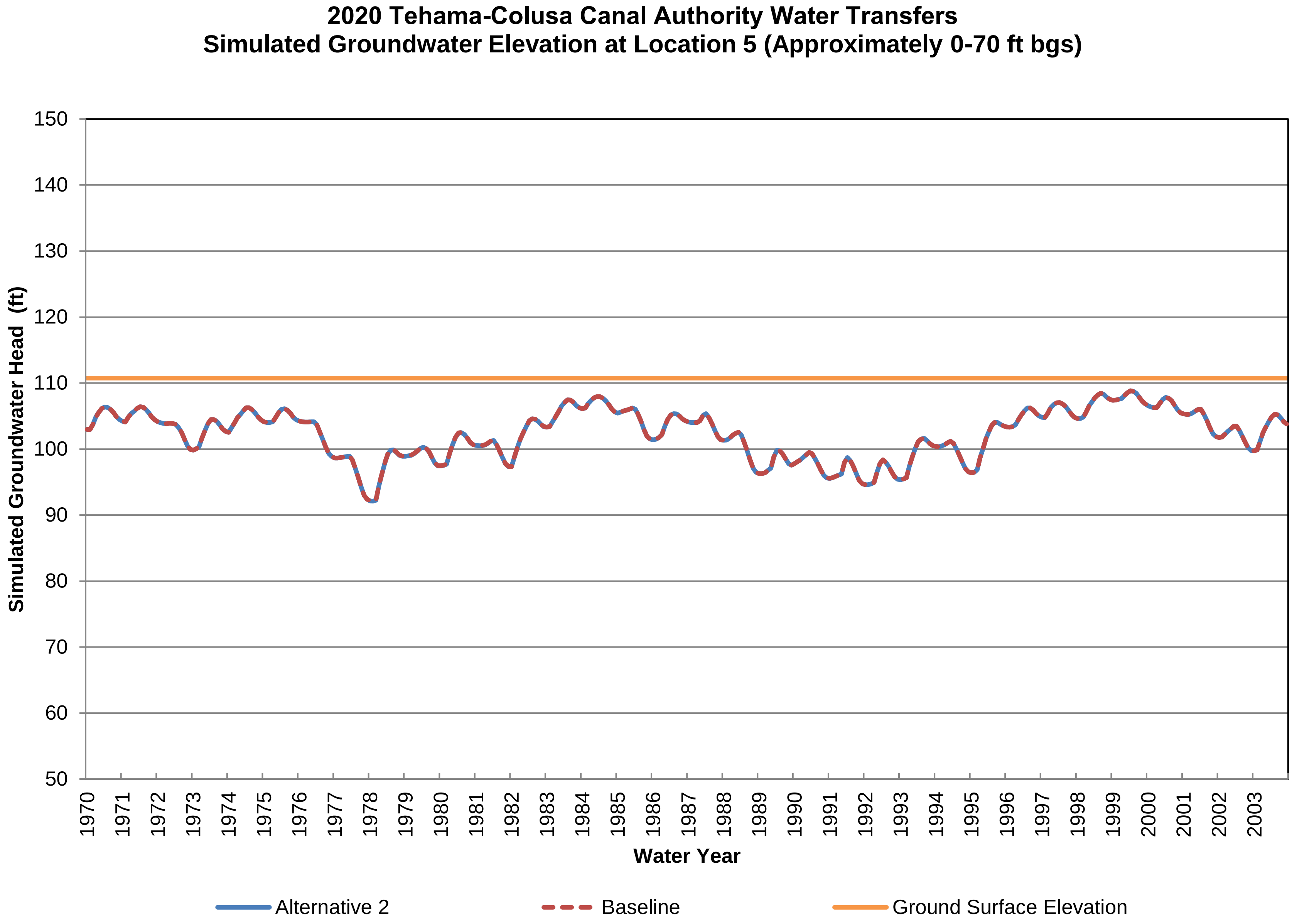
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 5 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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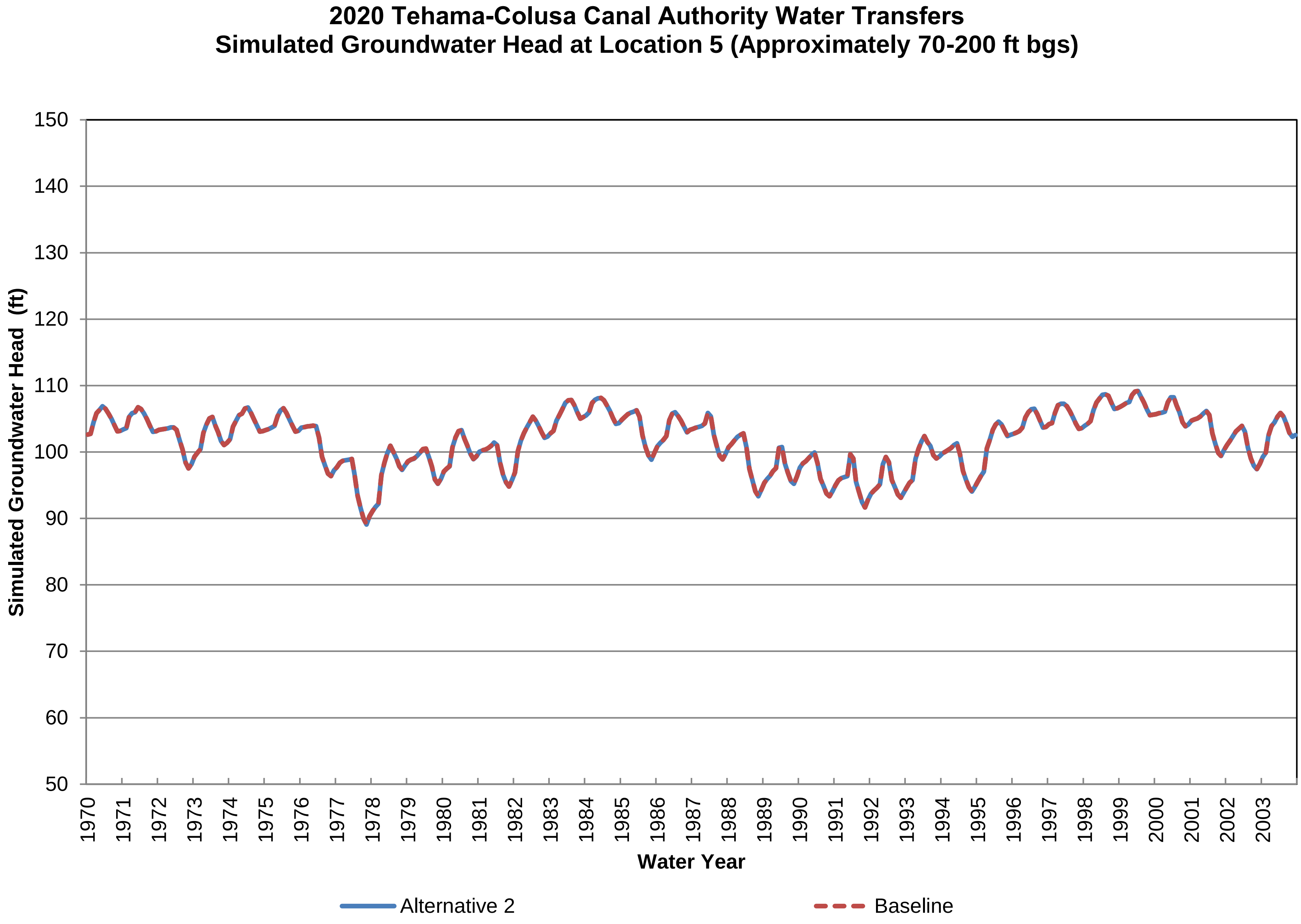
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 5 (Approximately 70-200 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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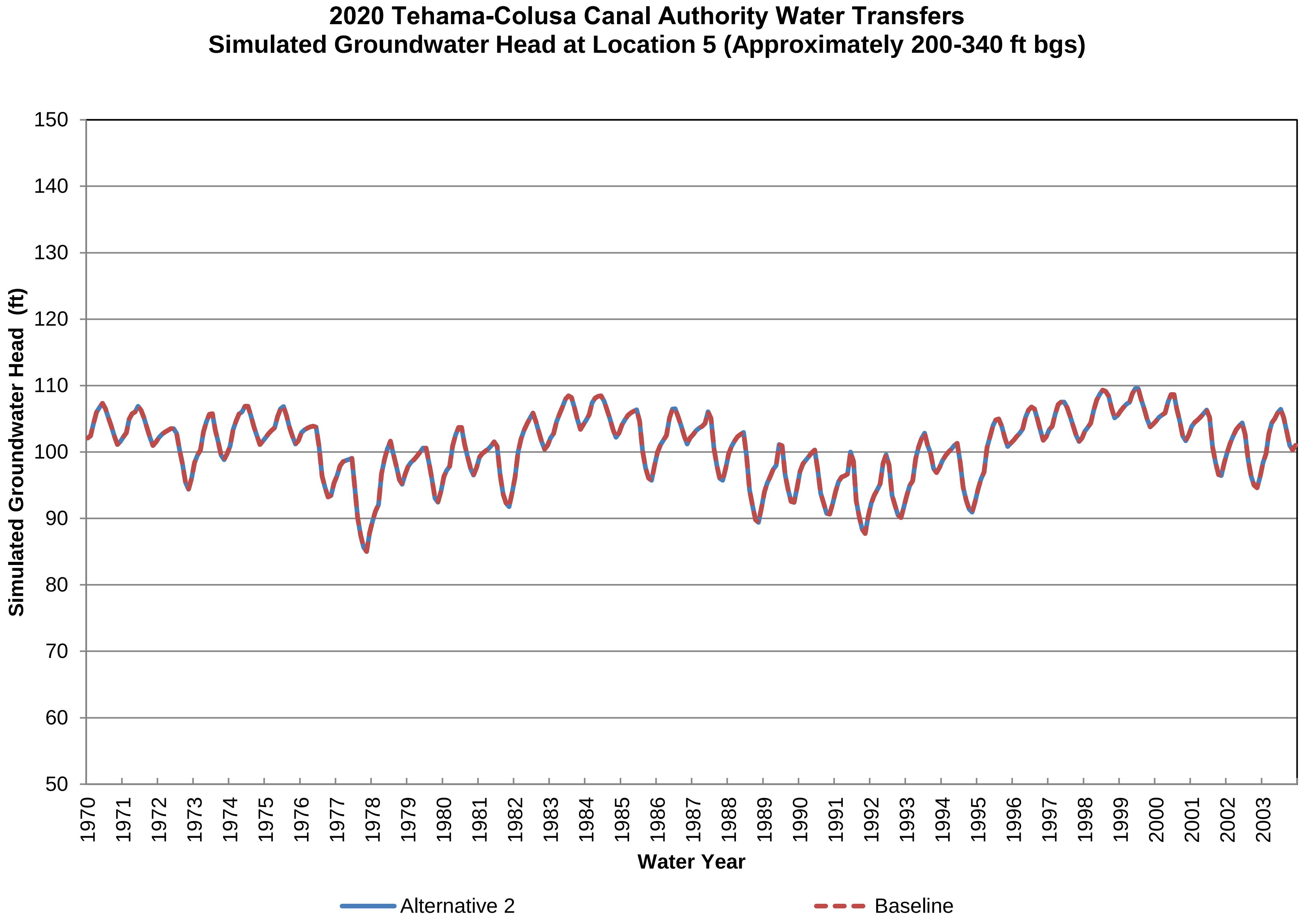
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 5 (Approximately 200-340 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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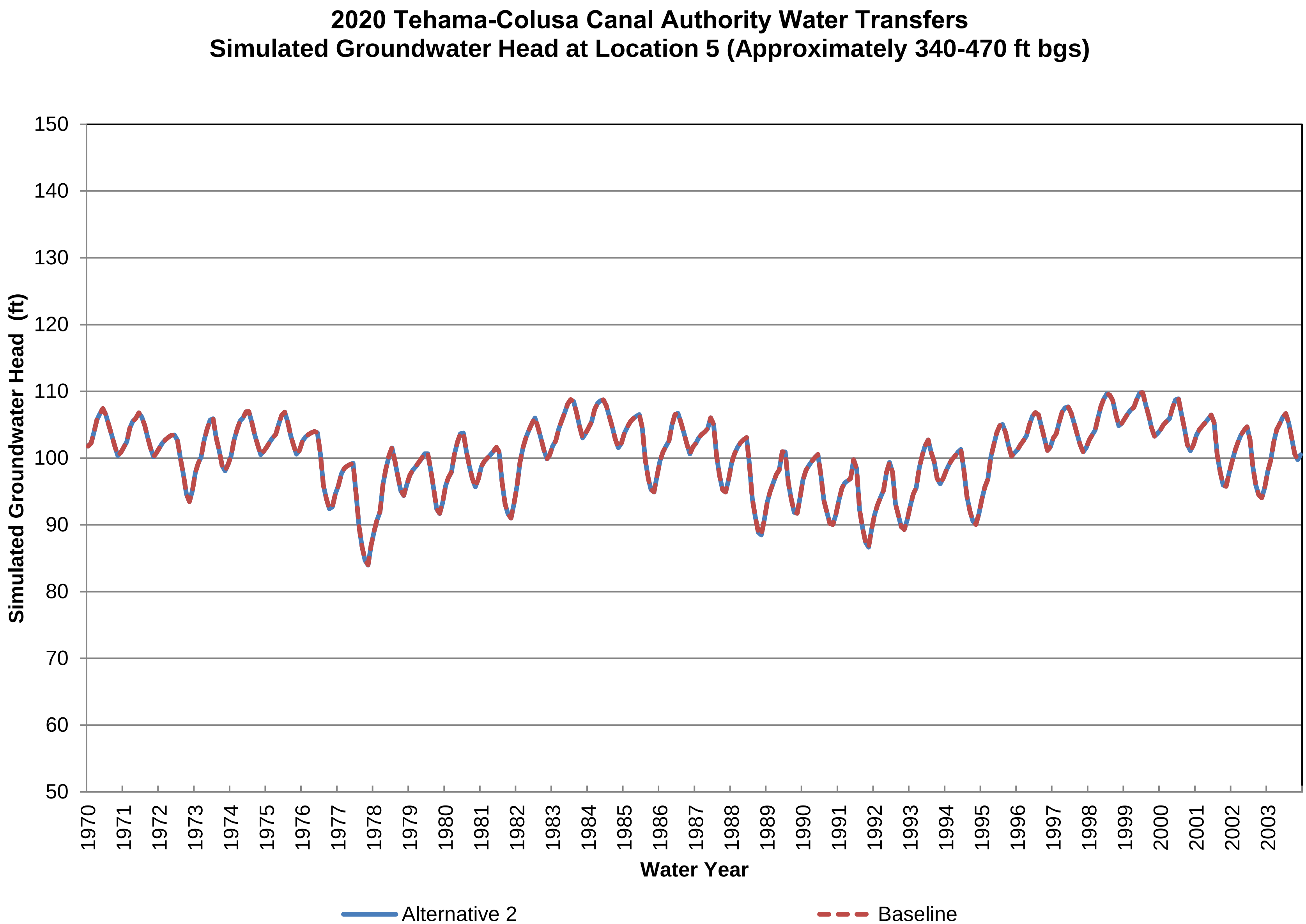
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 5 (Approximately 340-470 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
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1970
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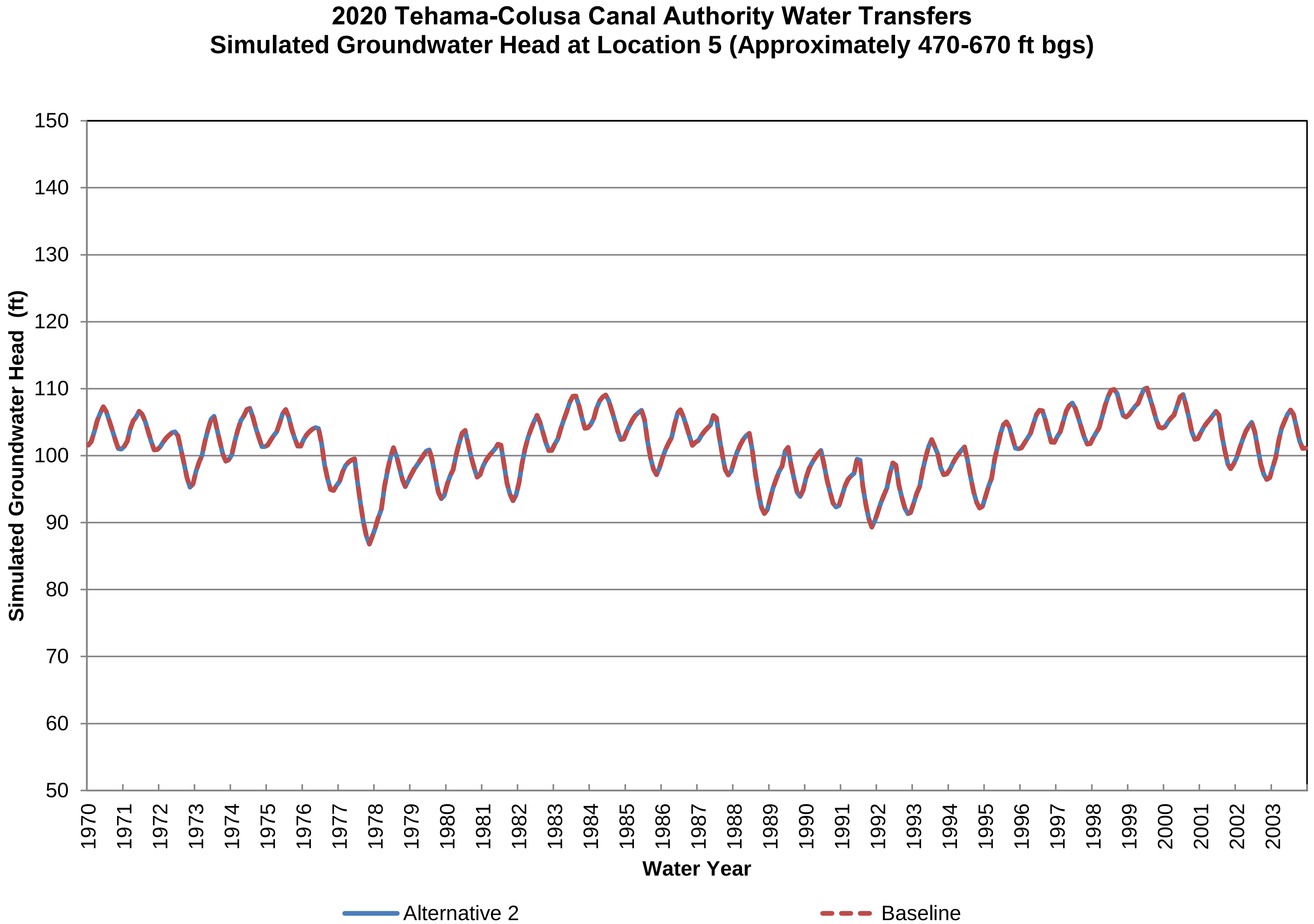
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 5 (Approximately 470-670 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
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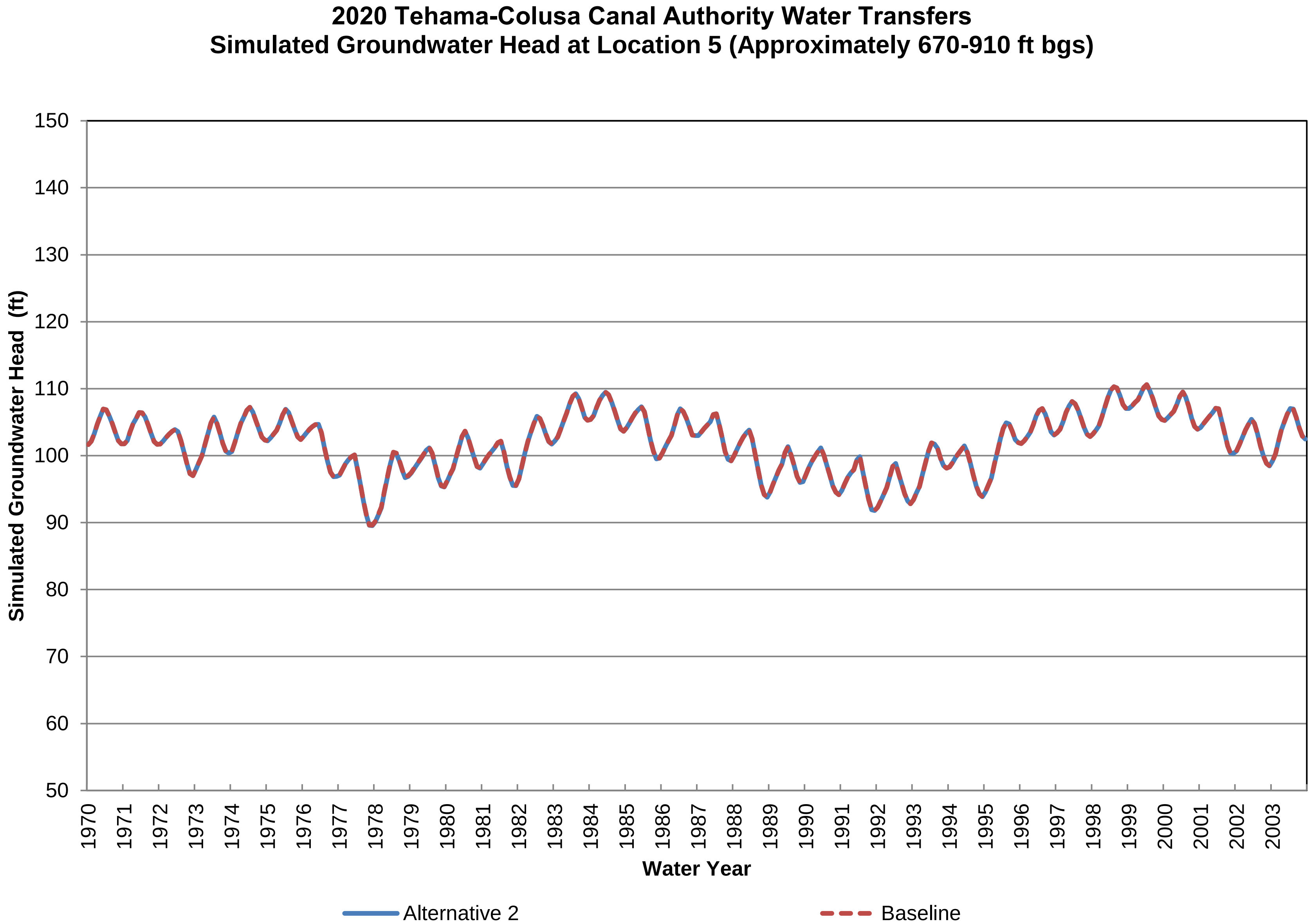
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 5 (Approximately 670-910 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
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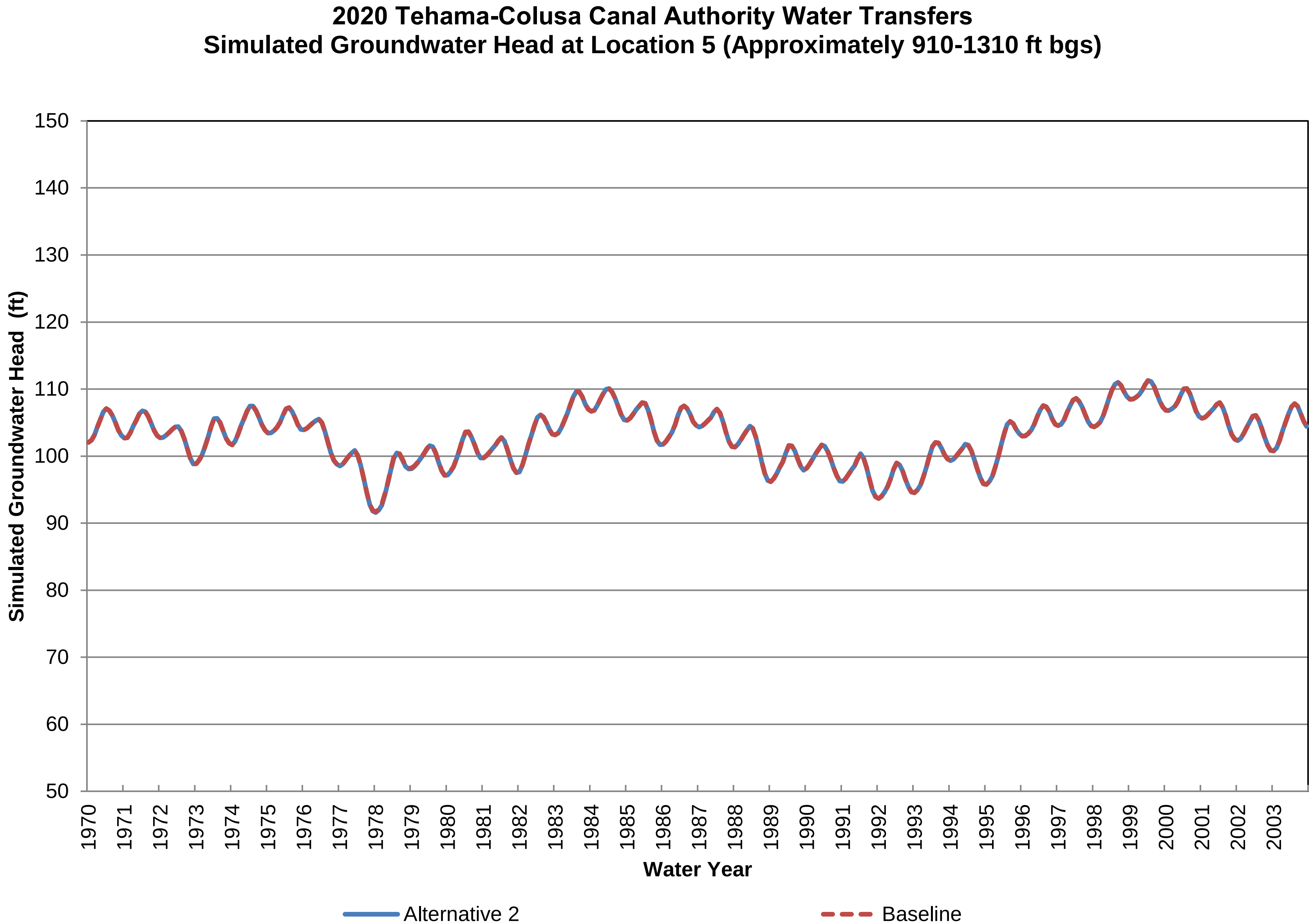
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 5 (Approximately 910-1310 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
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1970
1971
1972
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1974
1975
1976
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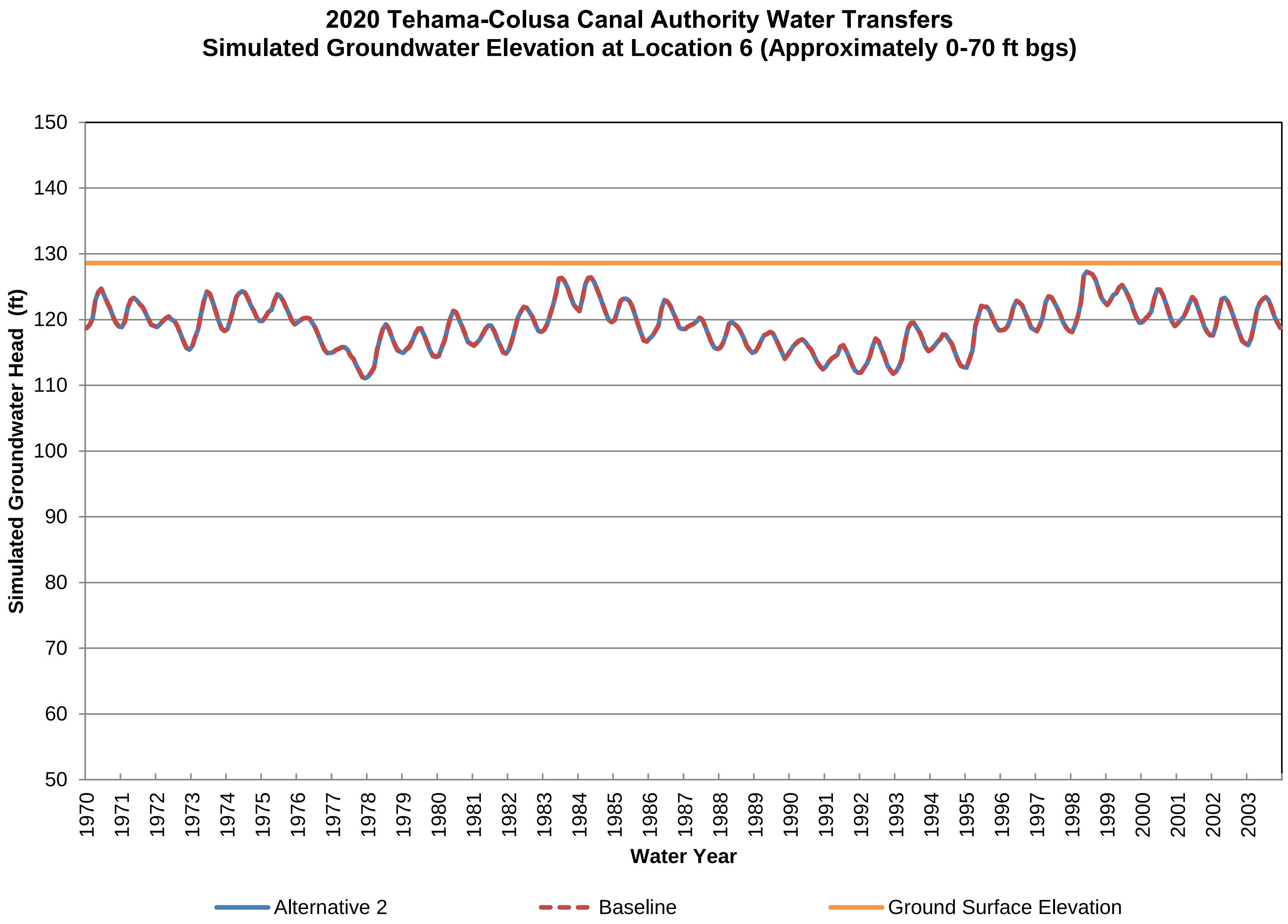
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 6 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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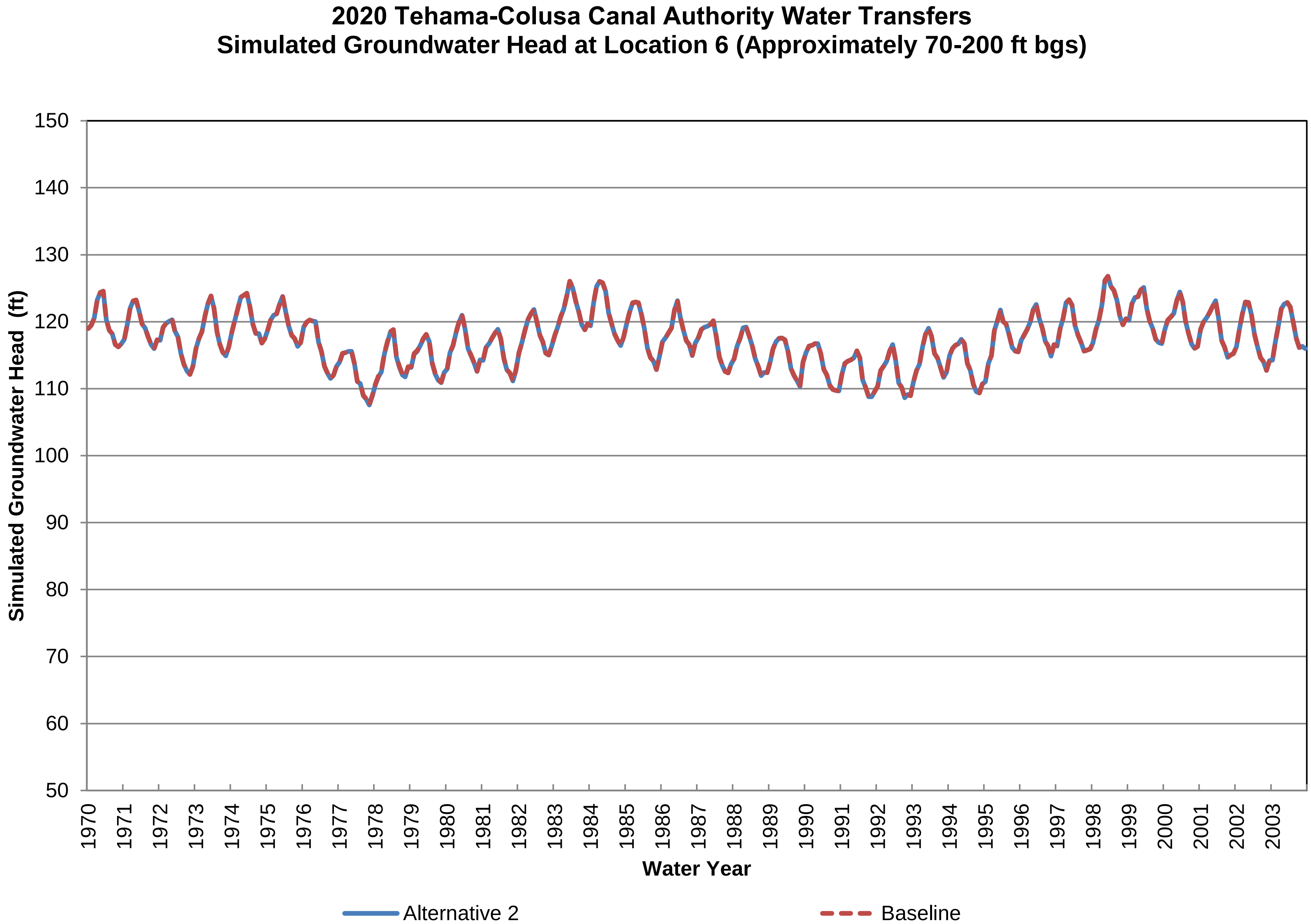
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 6 (Approximately 70-200 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
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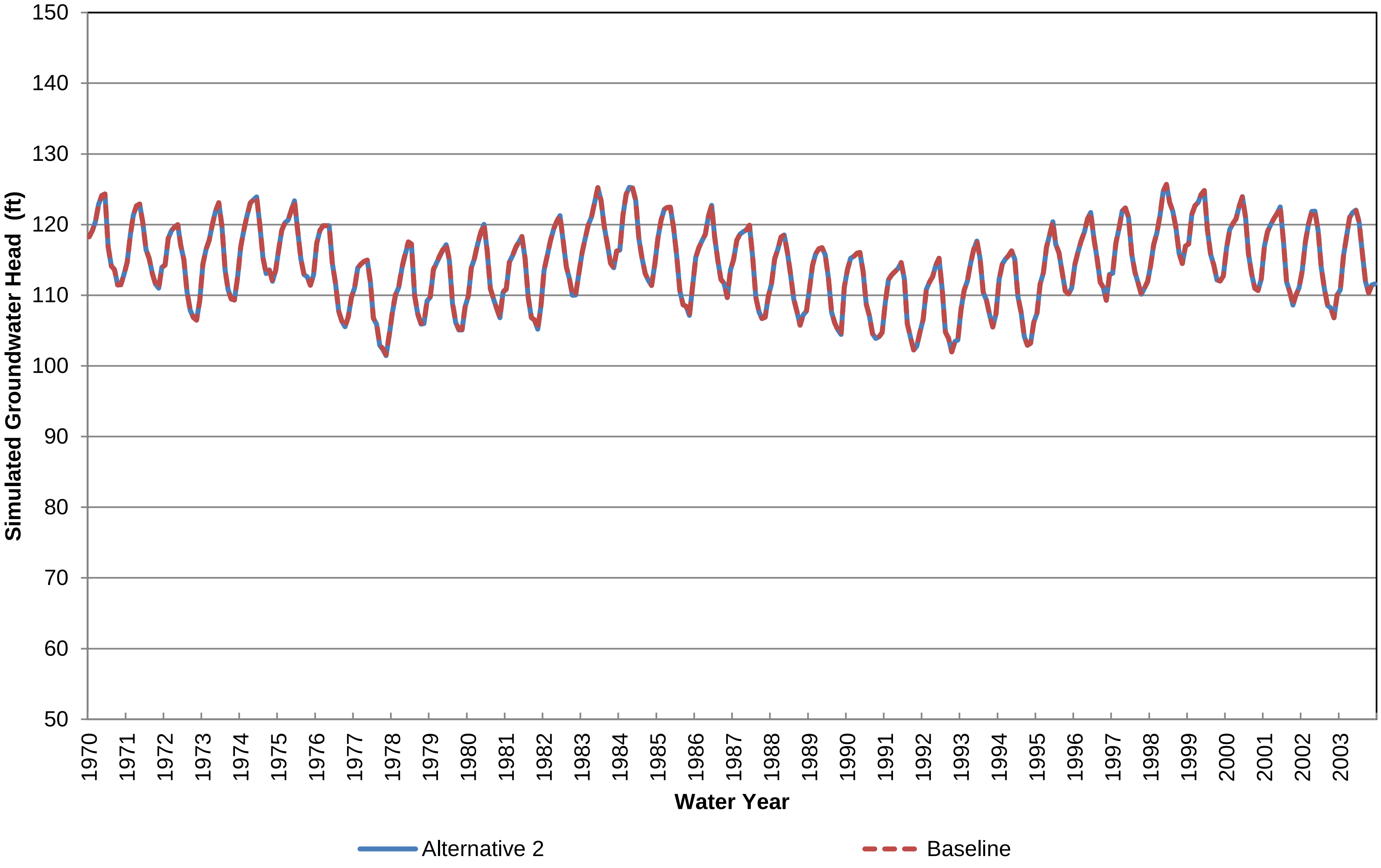
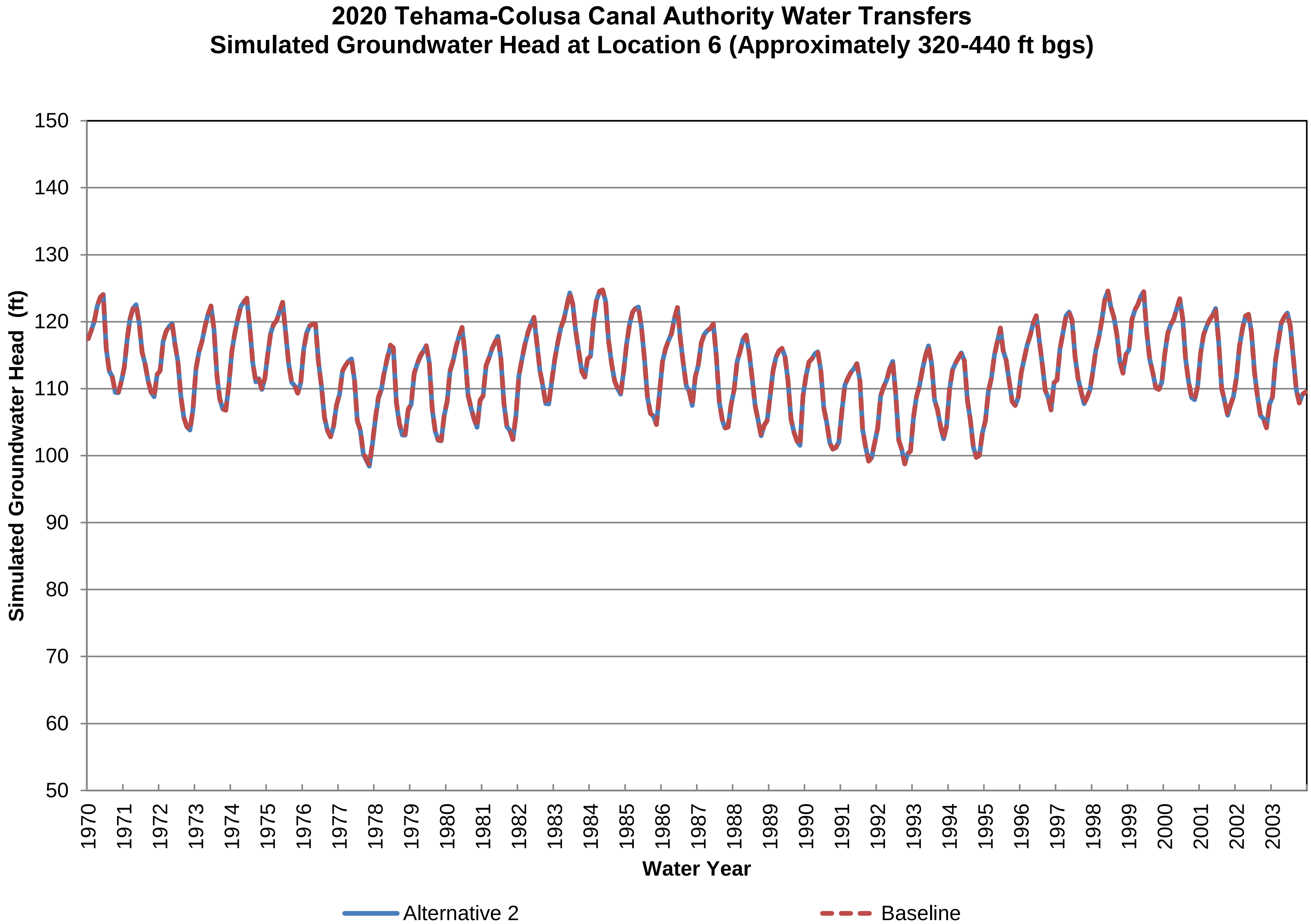
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 6 (Approximately 200-320 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 6 (Approximately 320-440 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
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1979
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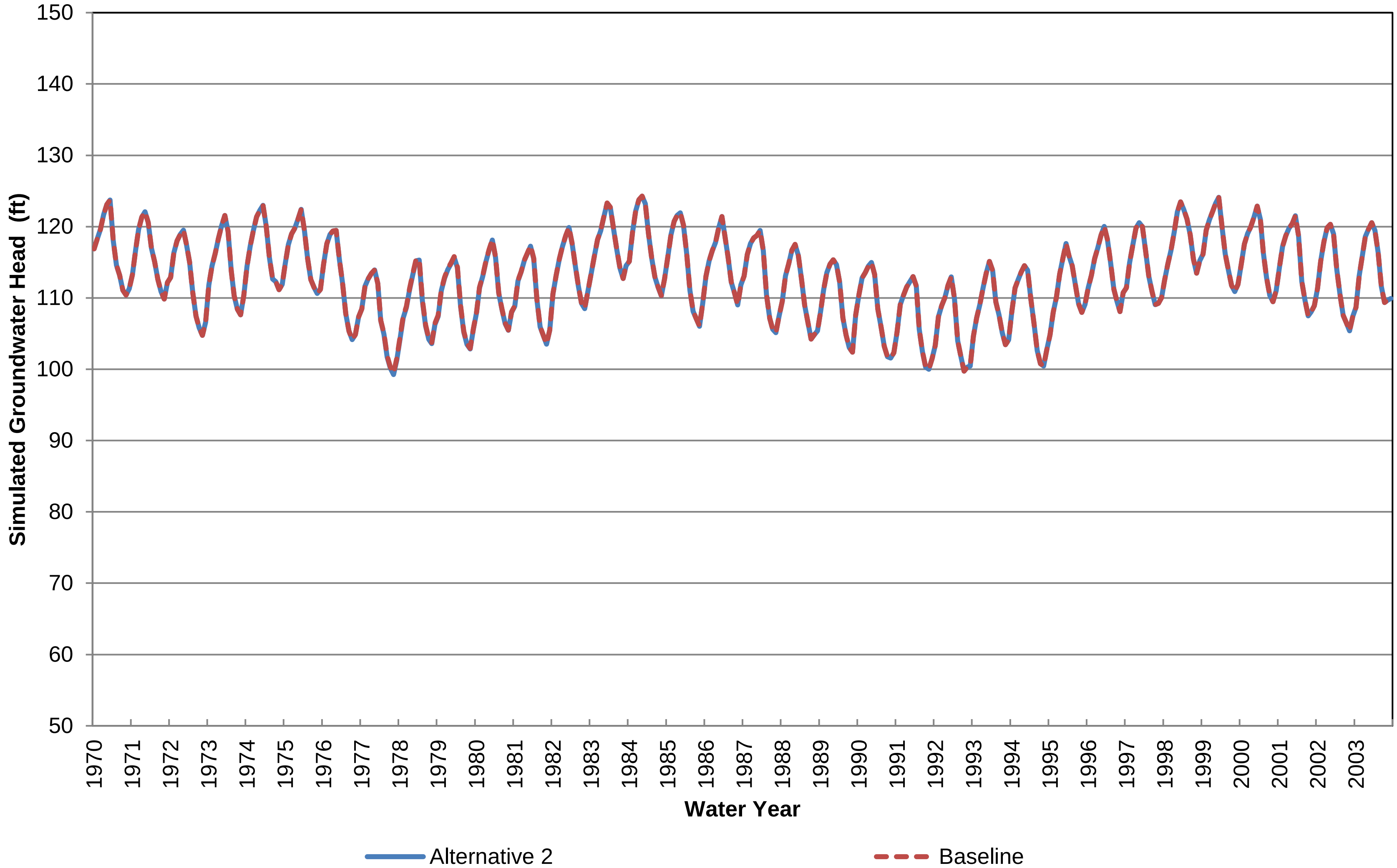
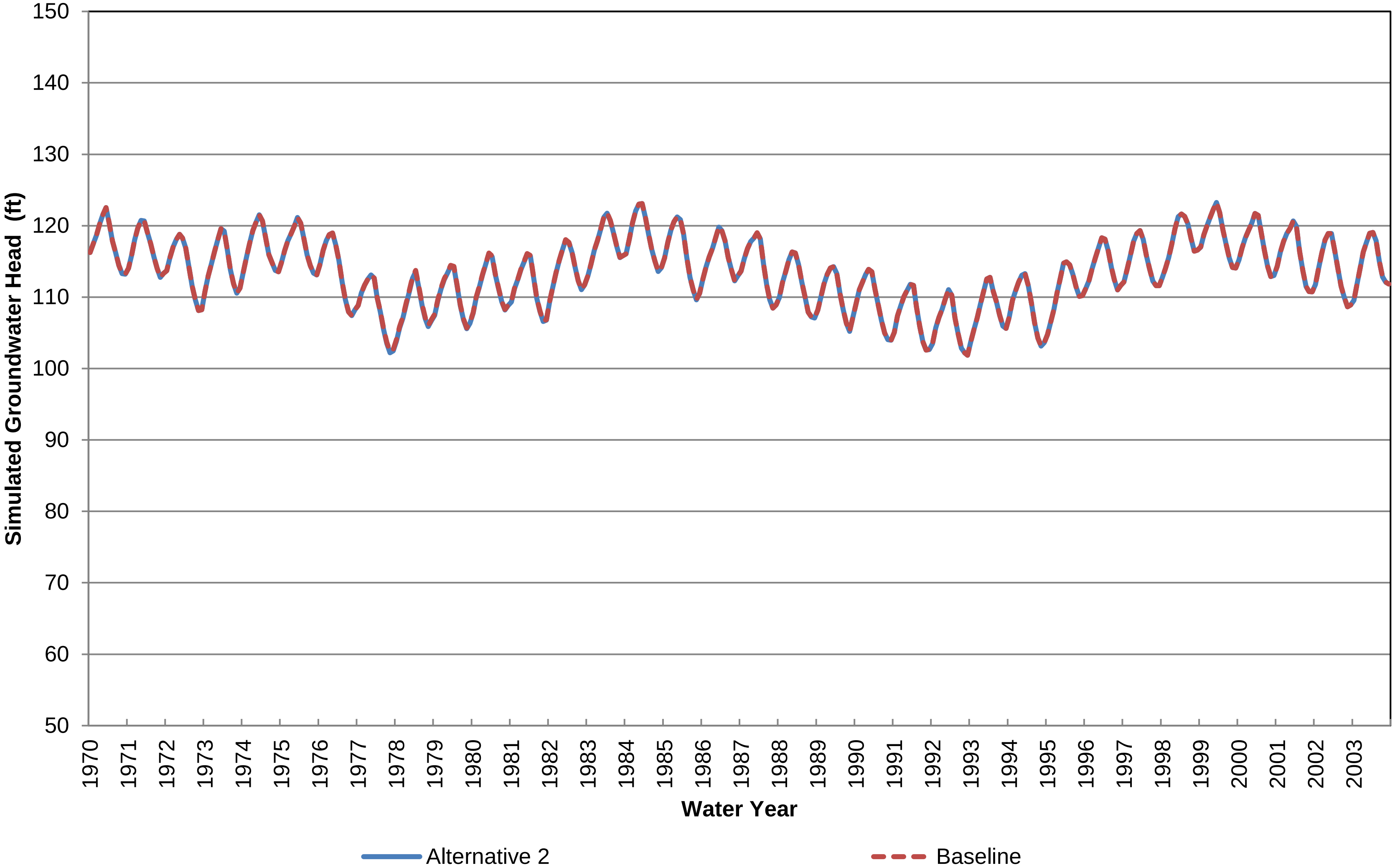
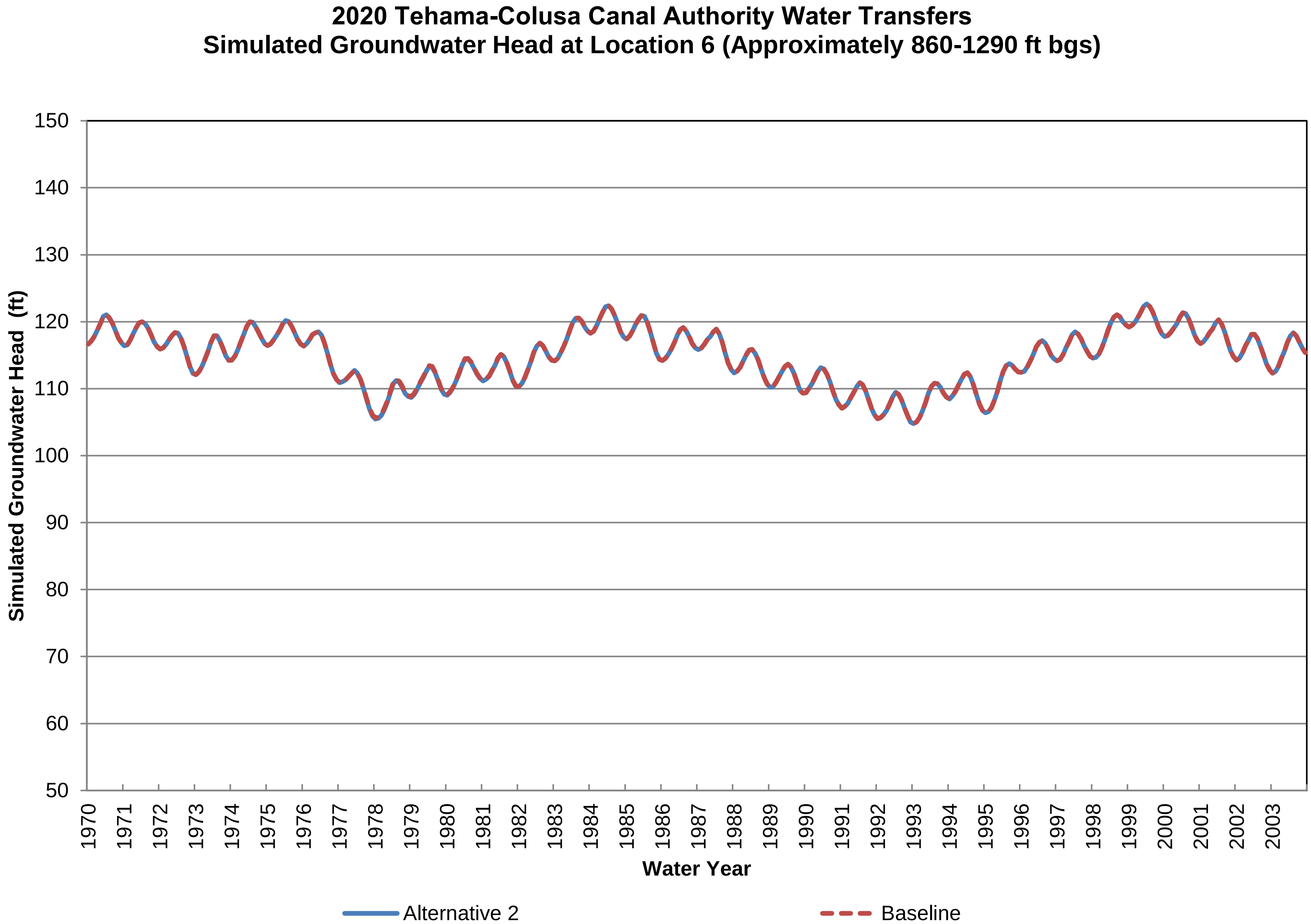
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 6 (Approximately 440-630 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 6 (Approximately 630-860 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 6 (Approximately 860-1290 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
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1979
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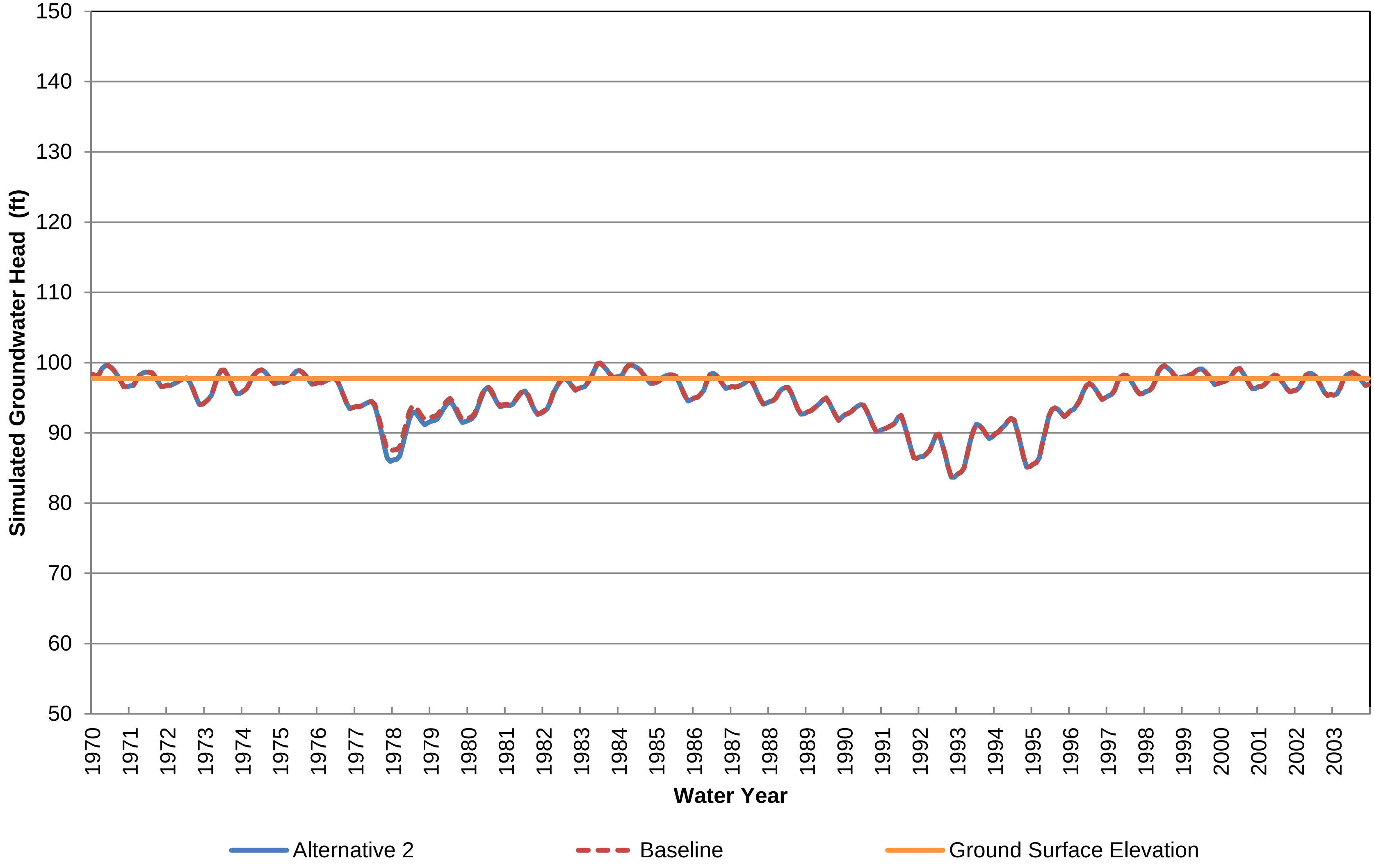
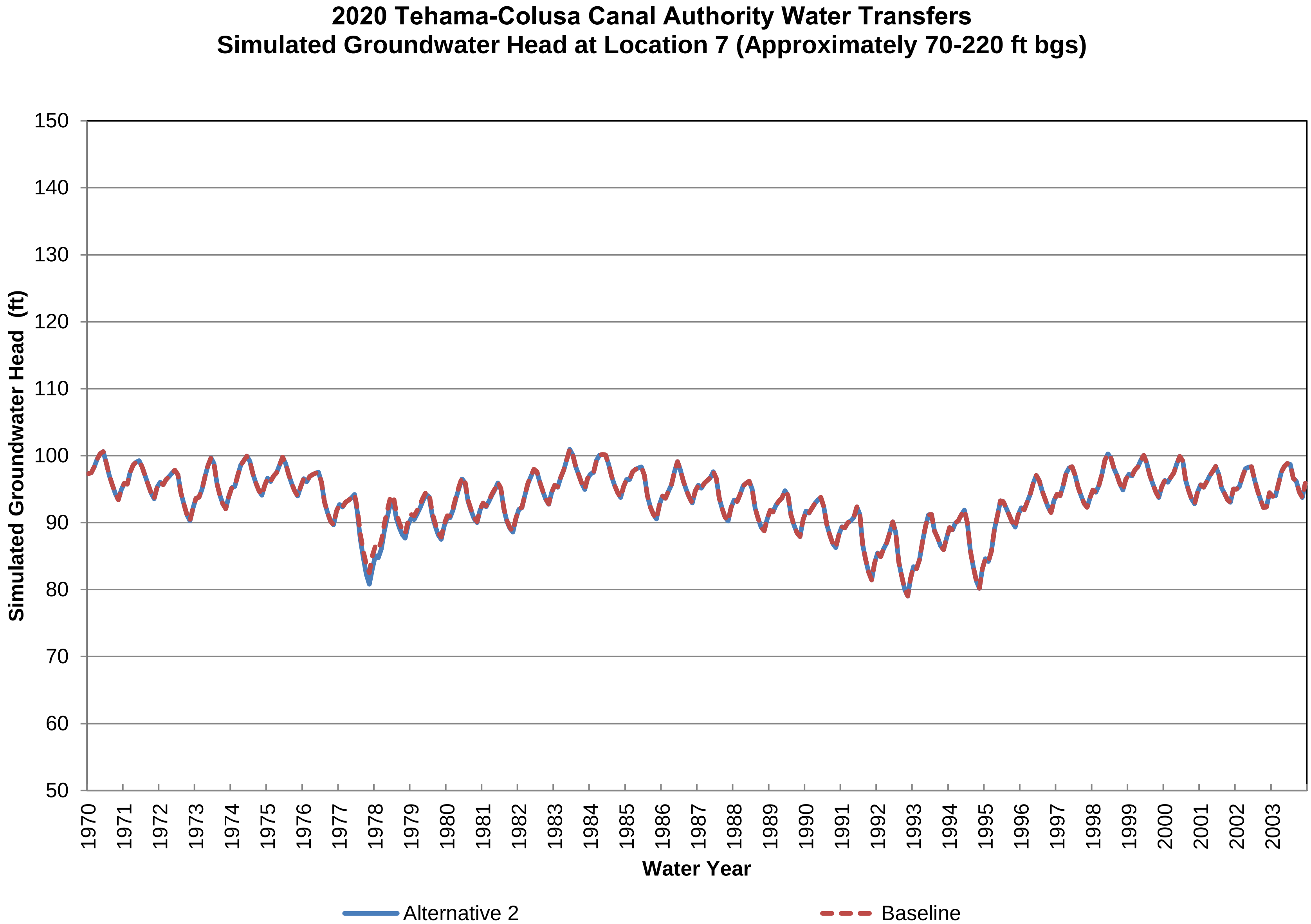
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 7 (Approximately 0-70 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 7 (Approximately 70-220 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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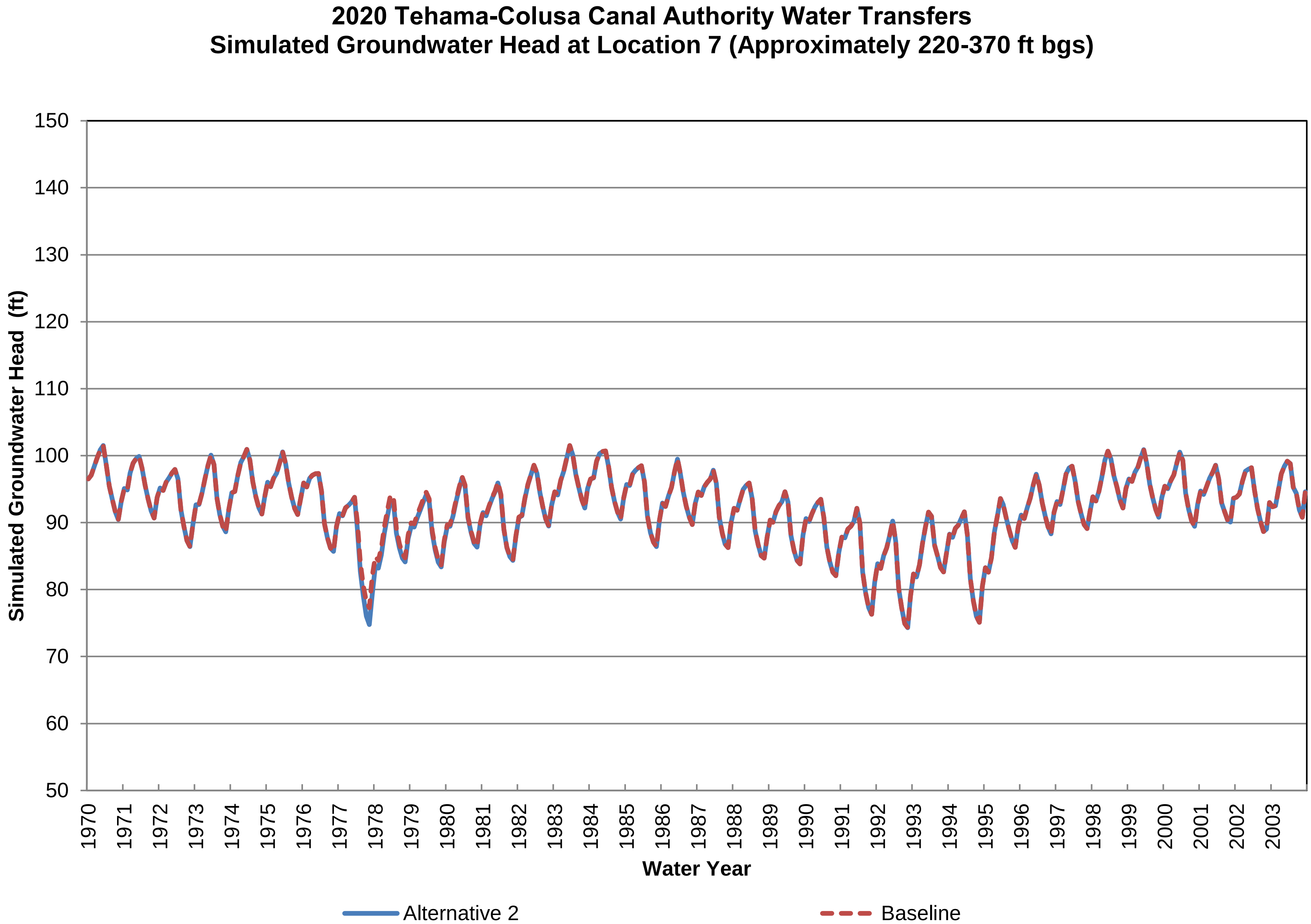
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 7 (Approximately 220-370 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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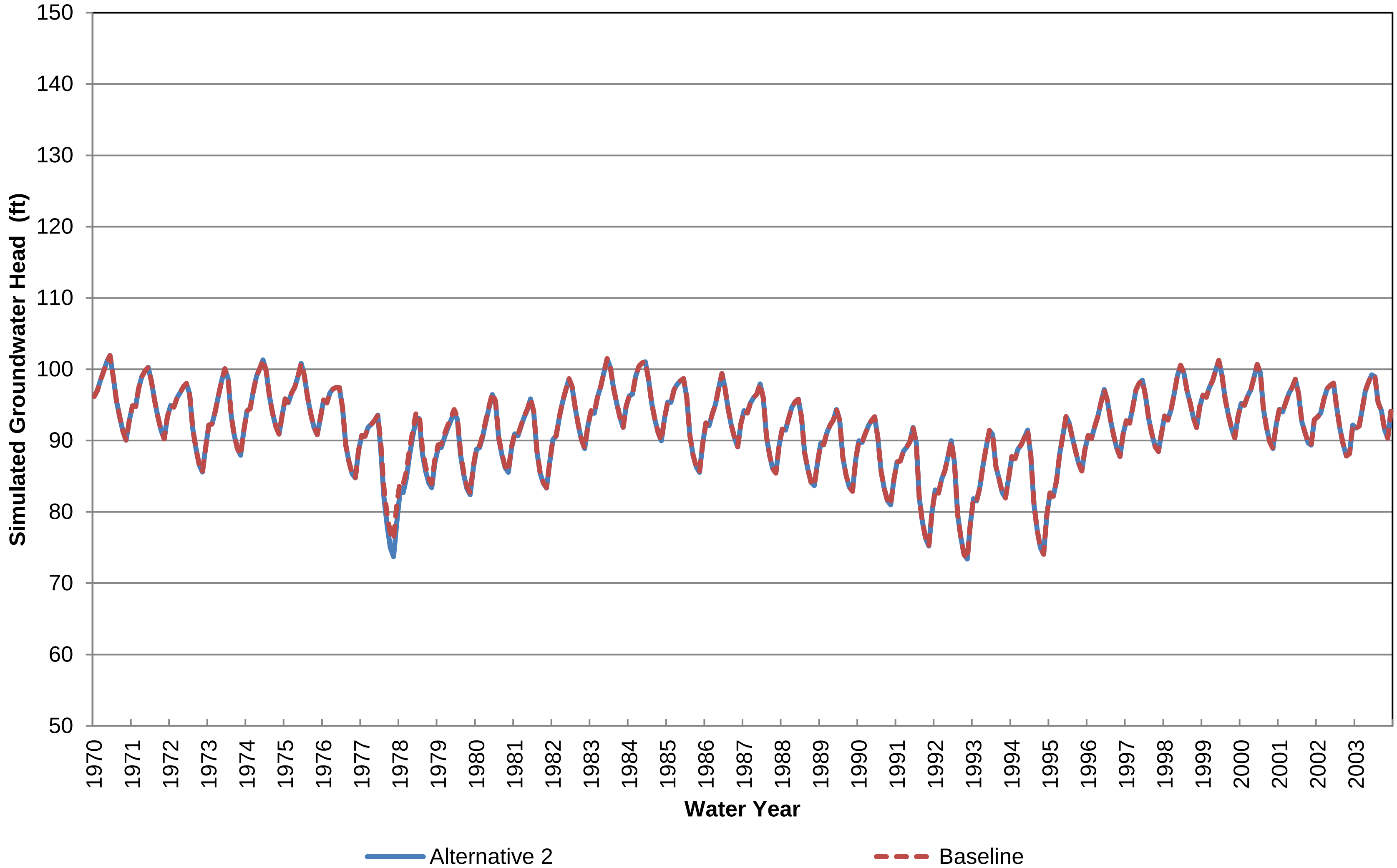
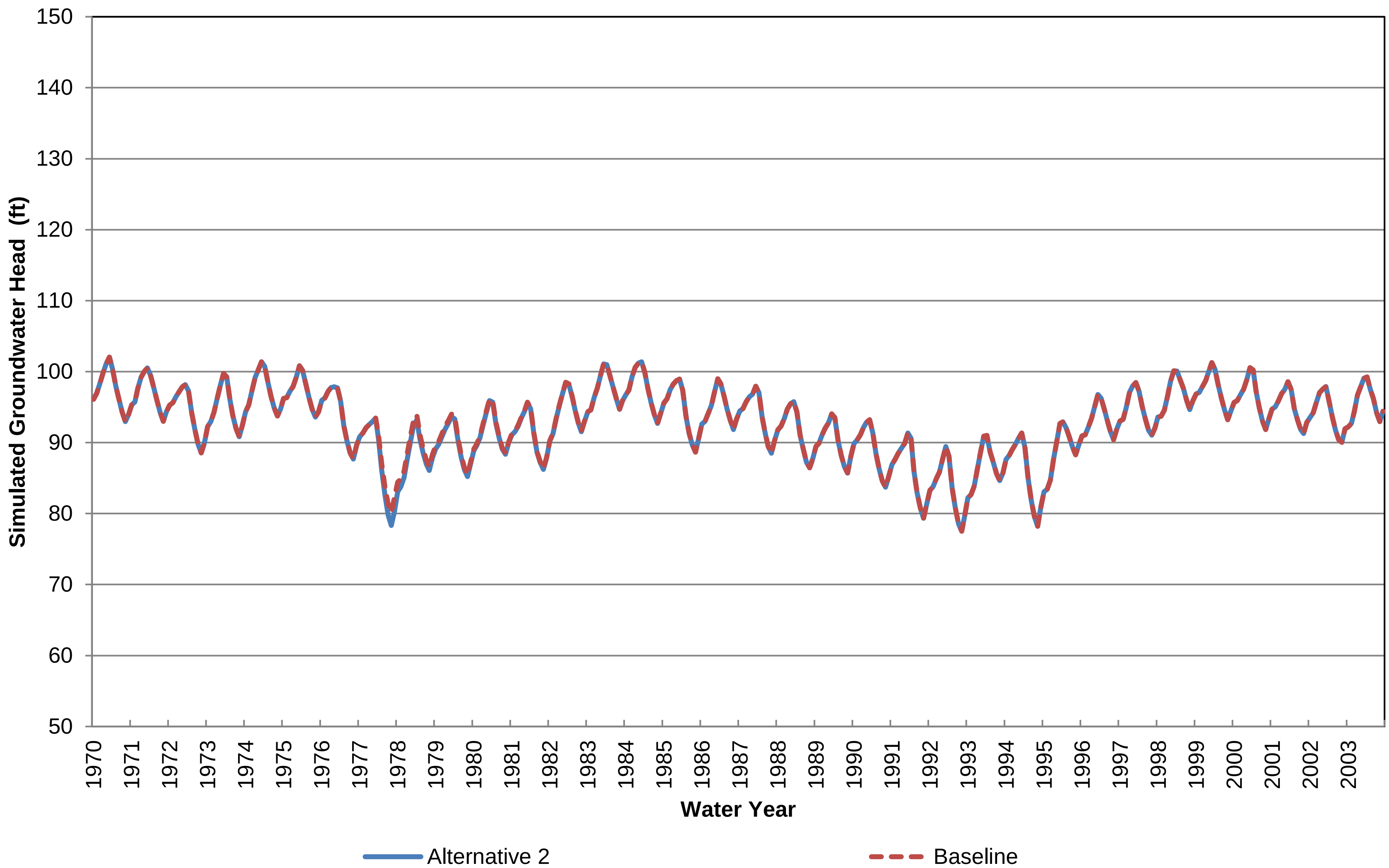
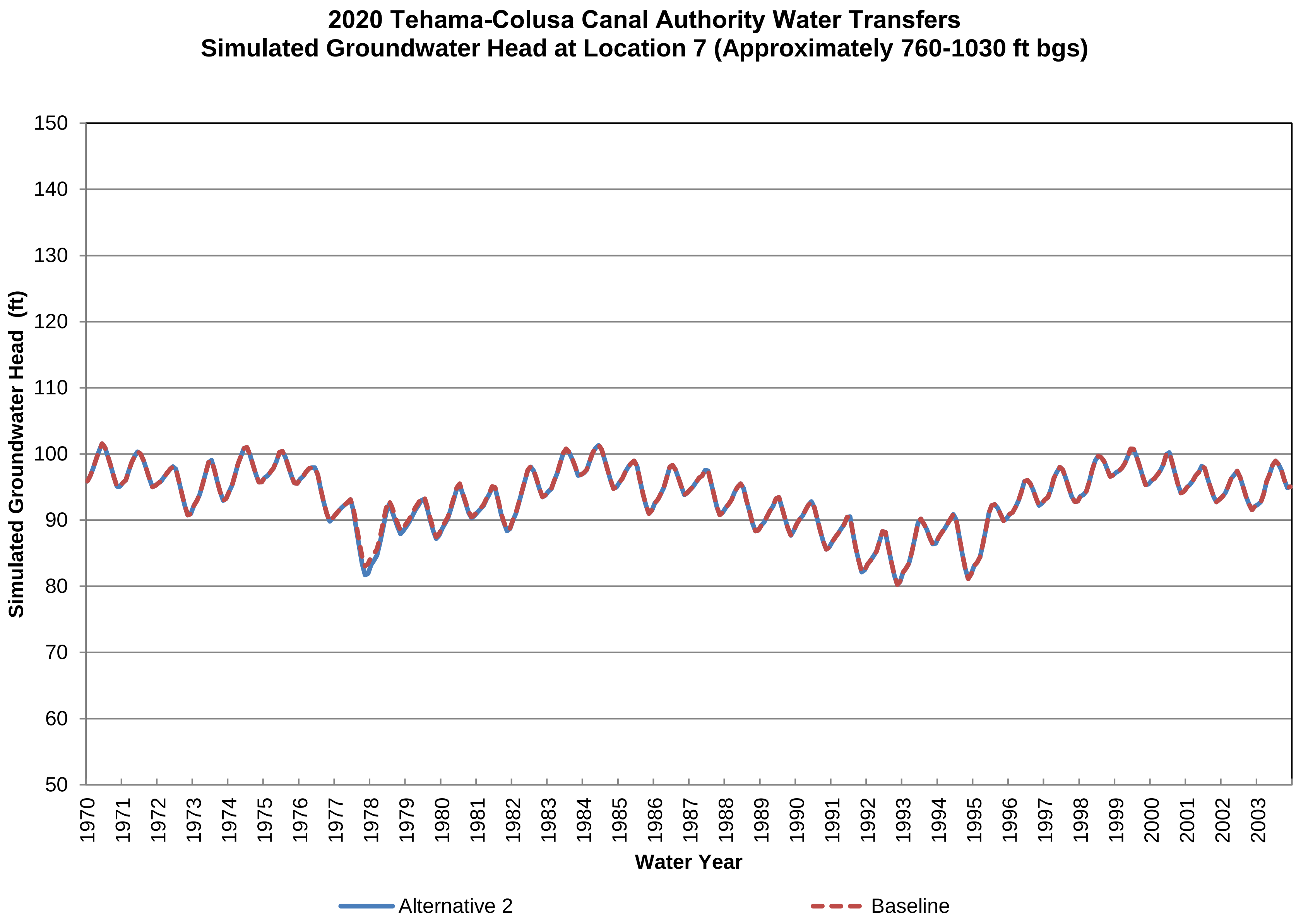
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 7 (Approximately 370-520 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 7 (Approximately 520-760 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 7 (Approximately 760-1030 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
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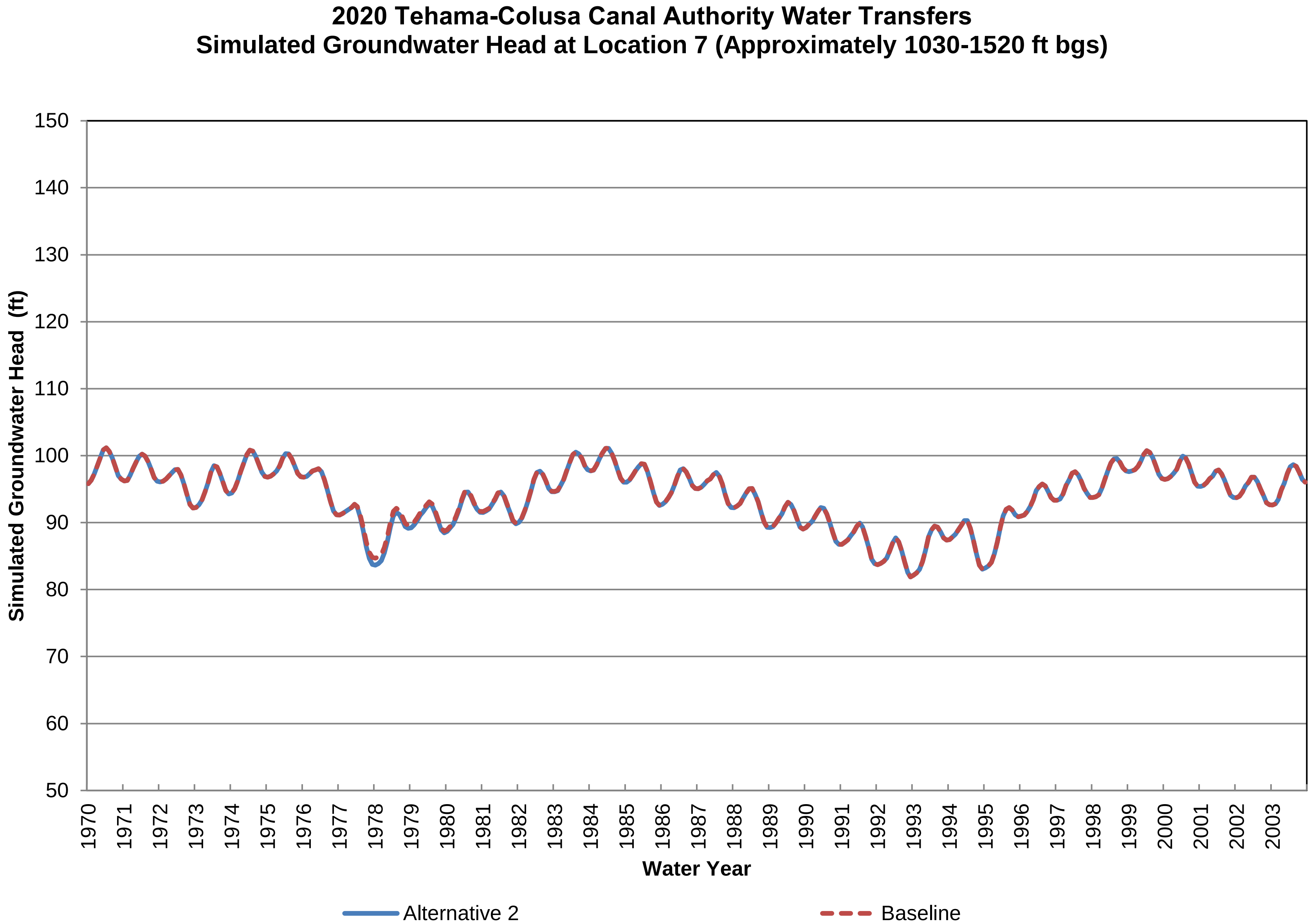
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 7 (Approximately 1030-1520 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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1997
1998
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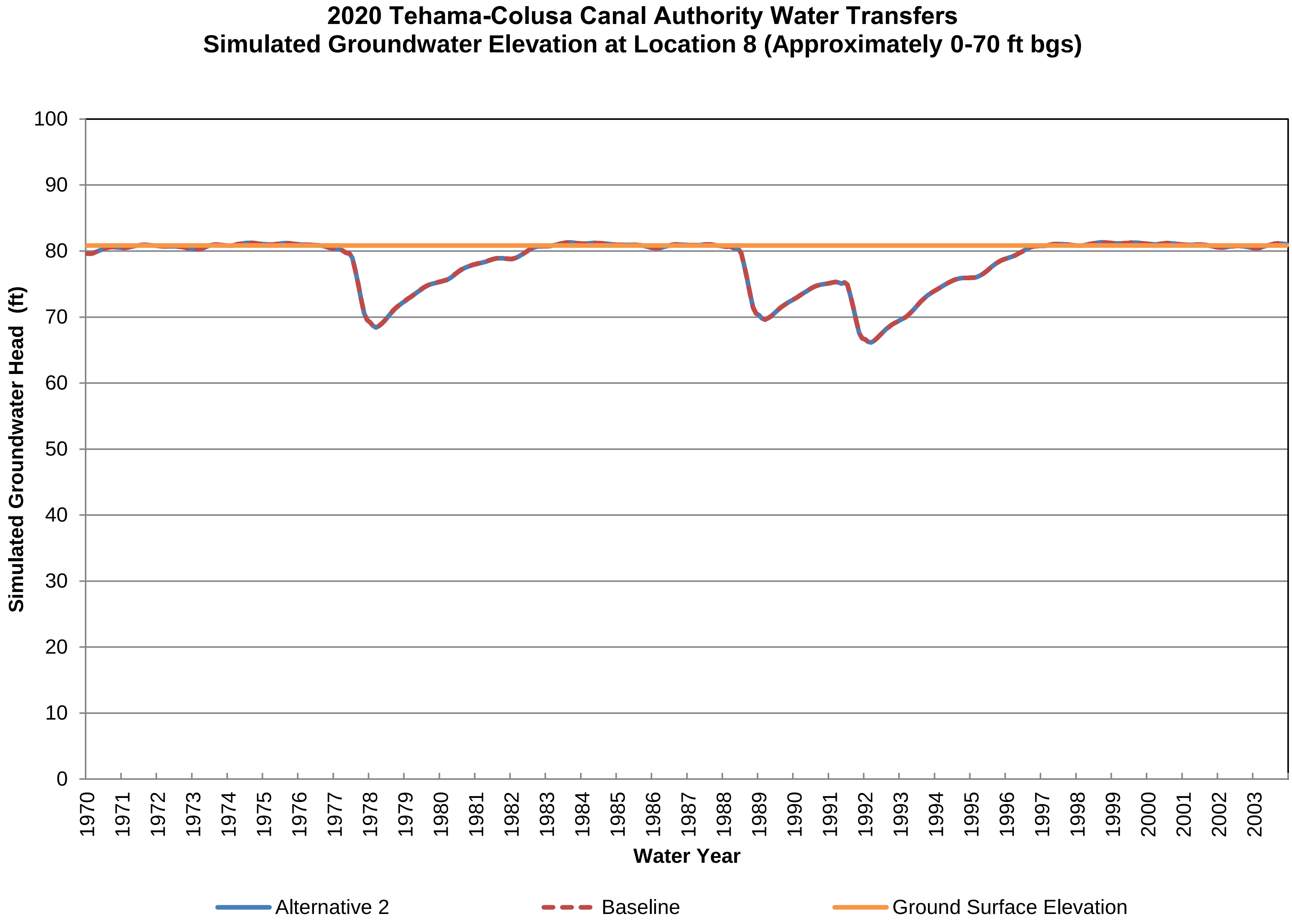
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 8 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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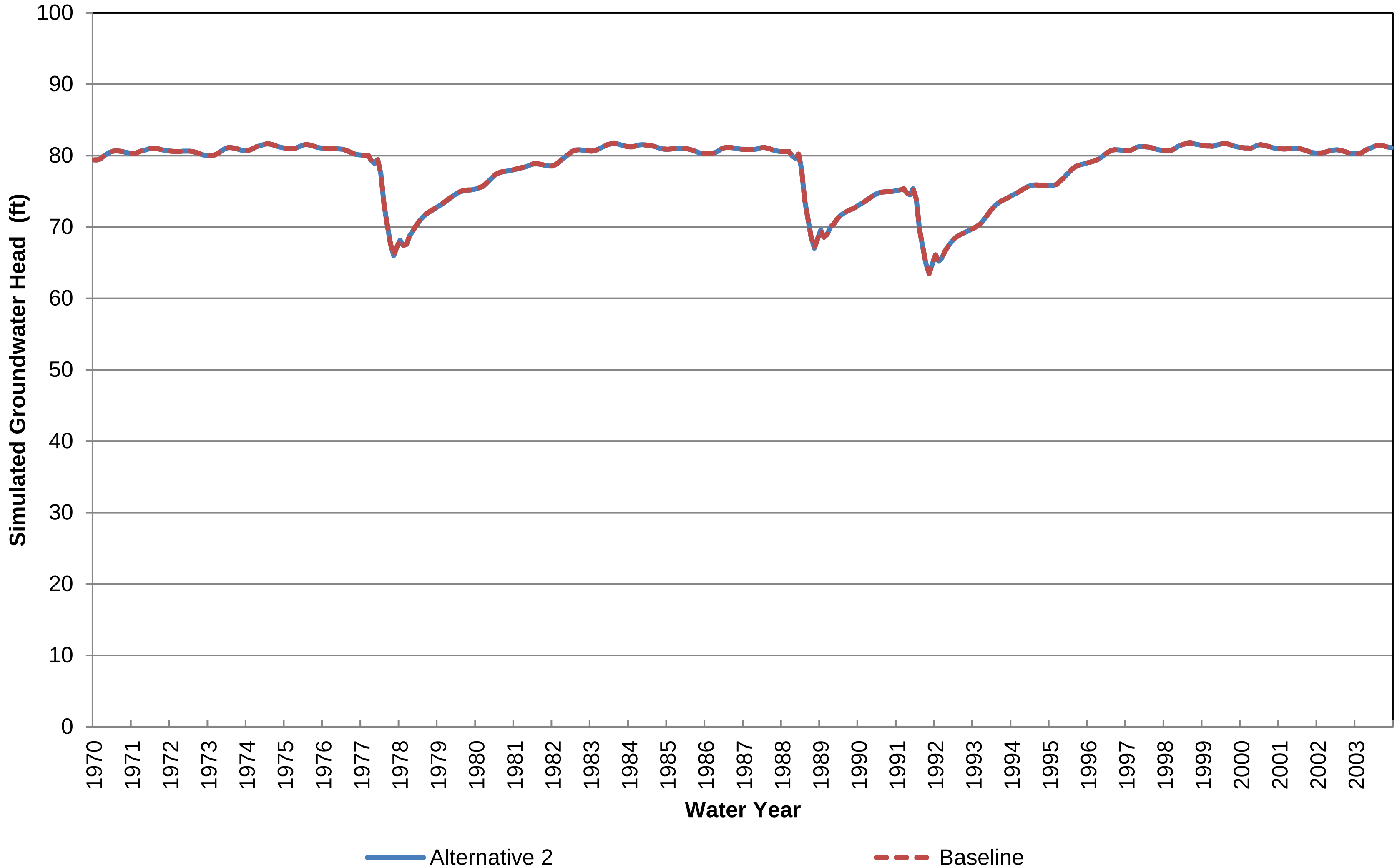
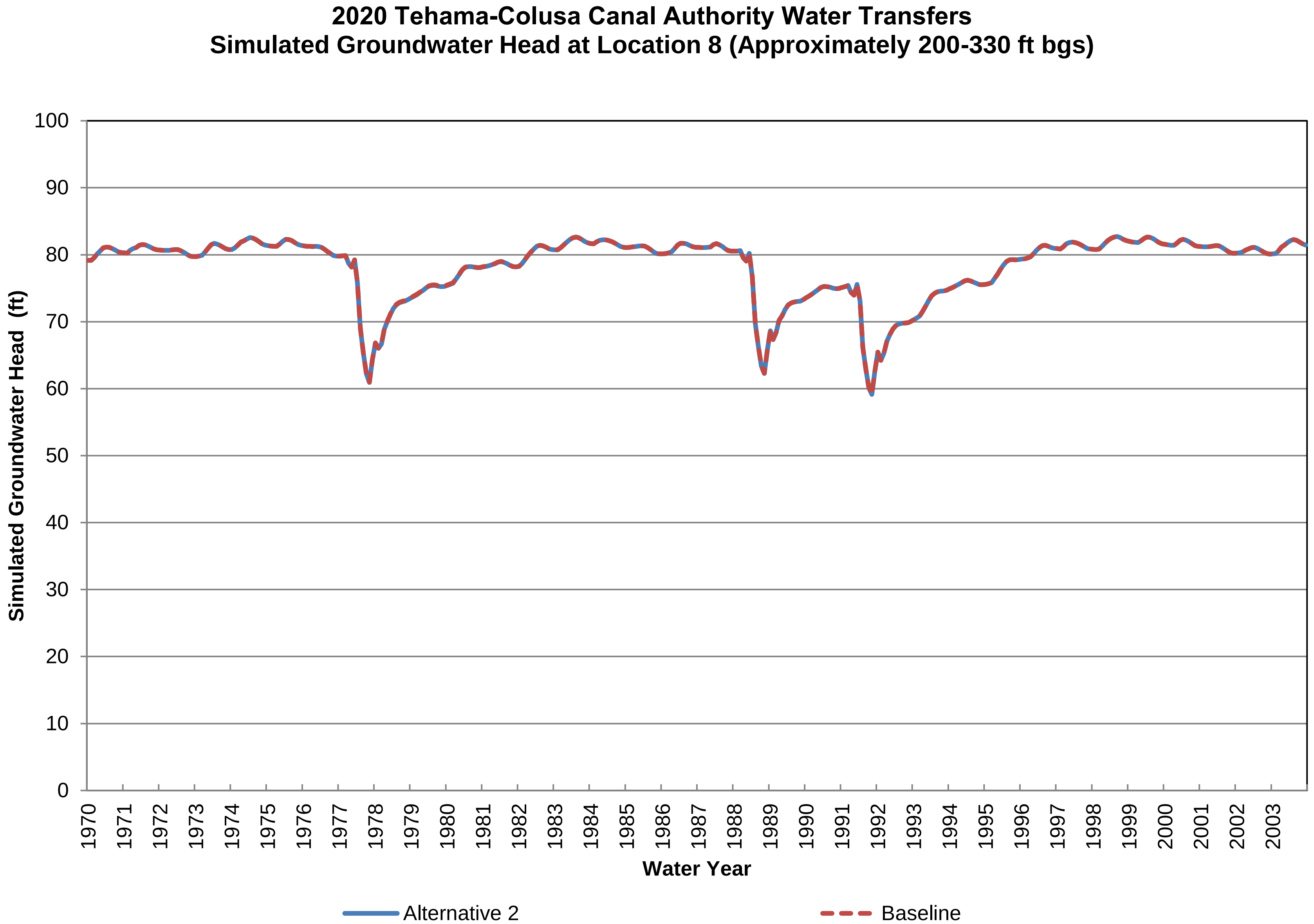
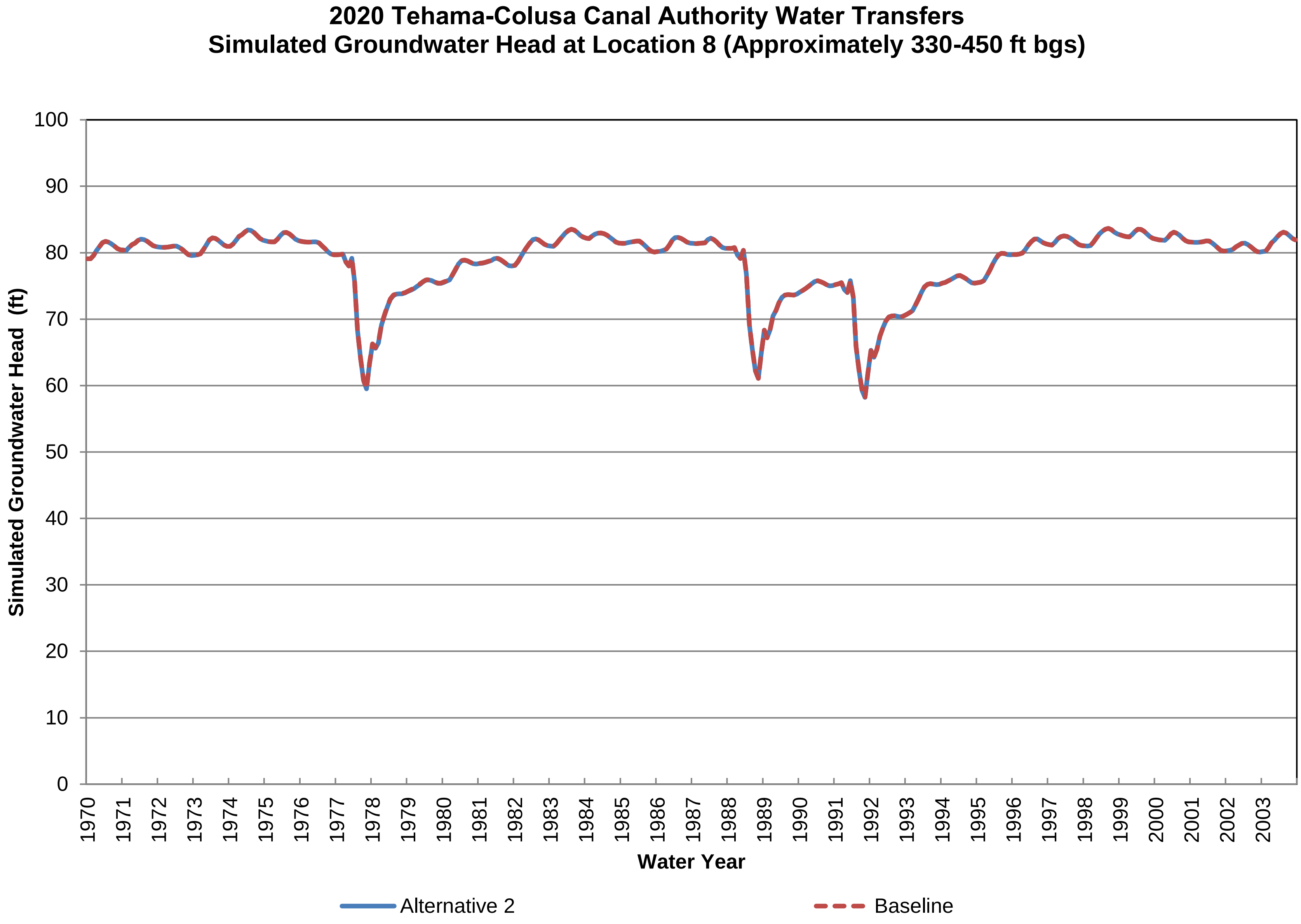
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 8 (Approximately 70-200 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 8 (Approximately 200-330 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 8 (Approximately 330-450 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
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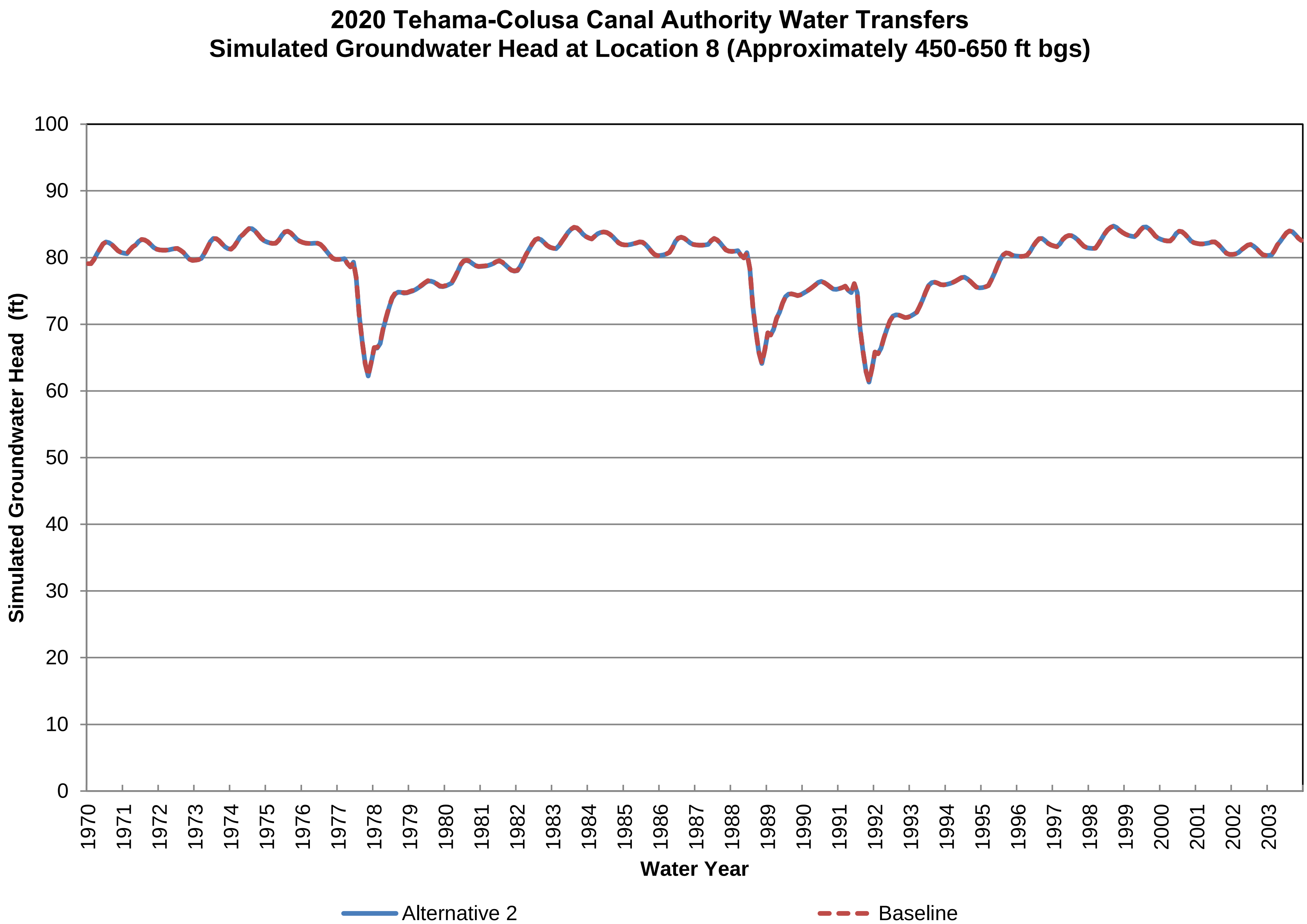
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 8 (Approximately 450-650 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
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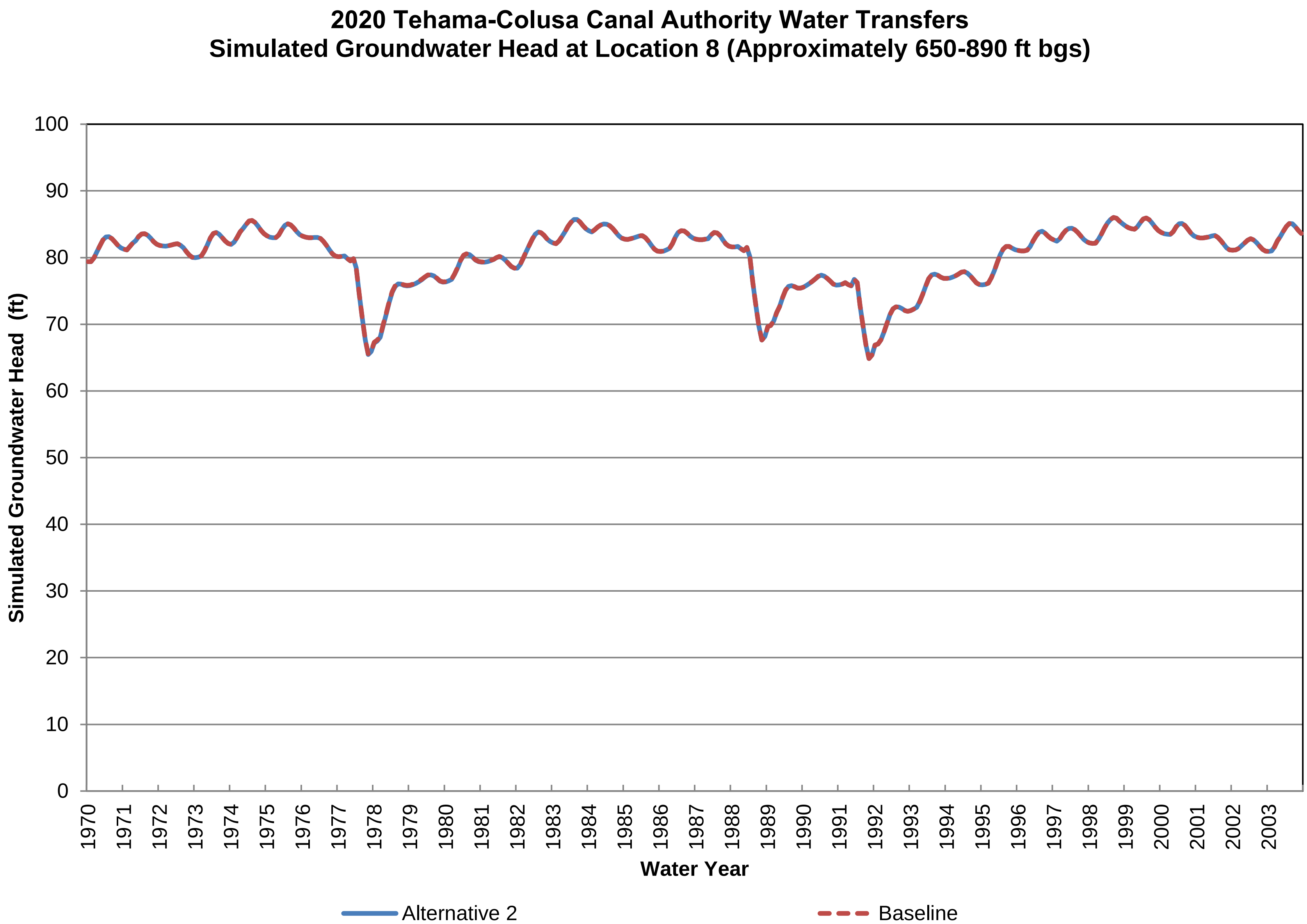
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 8 (Approximately 650-890 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
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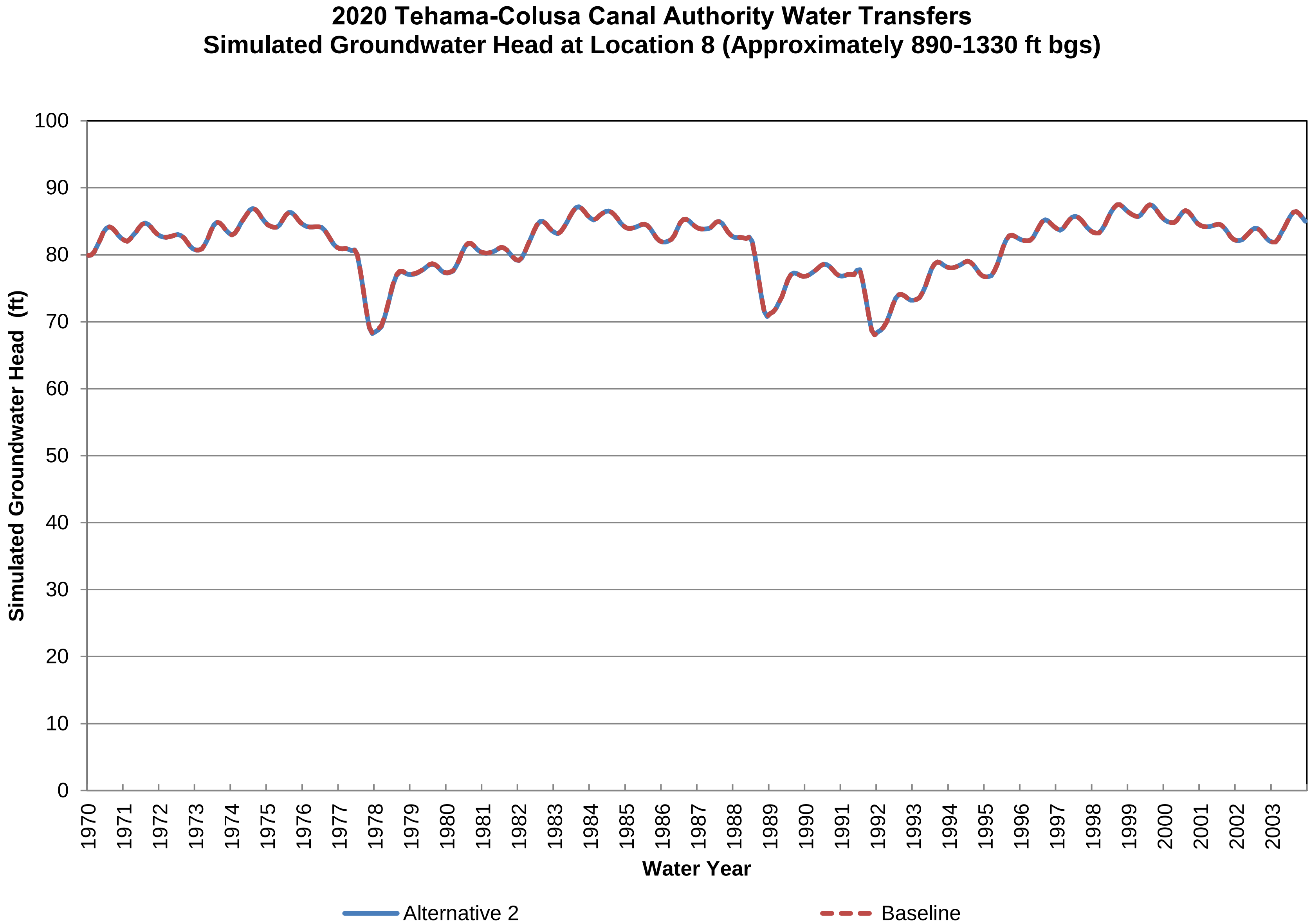
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 8 (Approximately 890-1330 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
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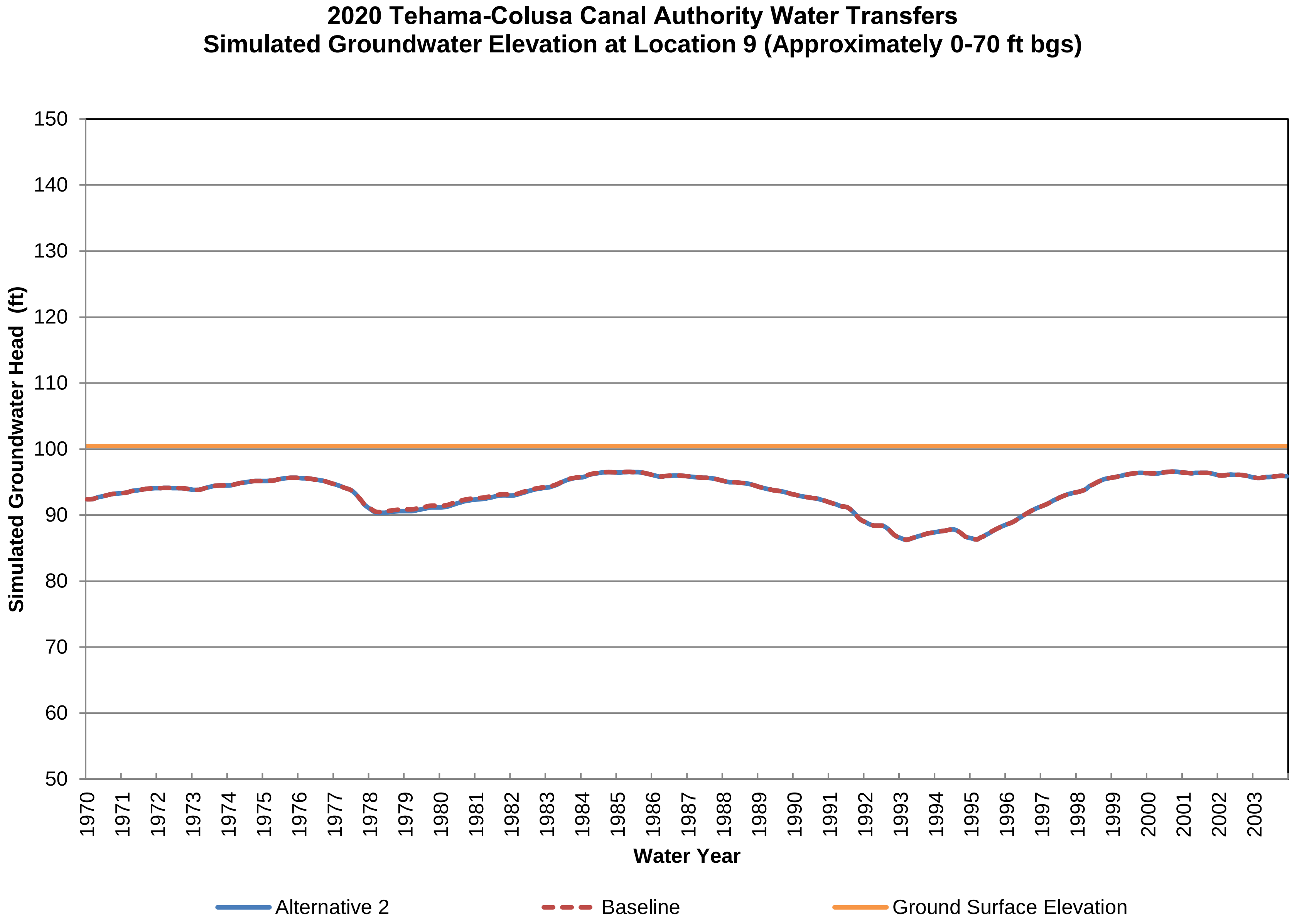
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 9 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1986
1987
1988
1989
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1992
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1994
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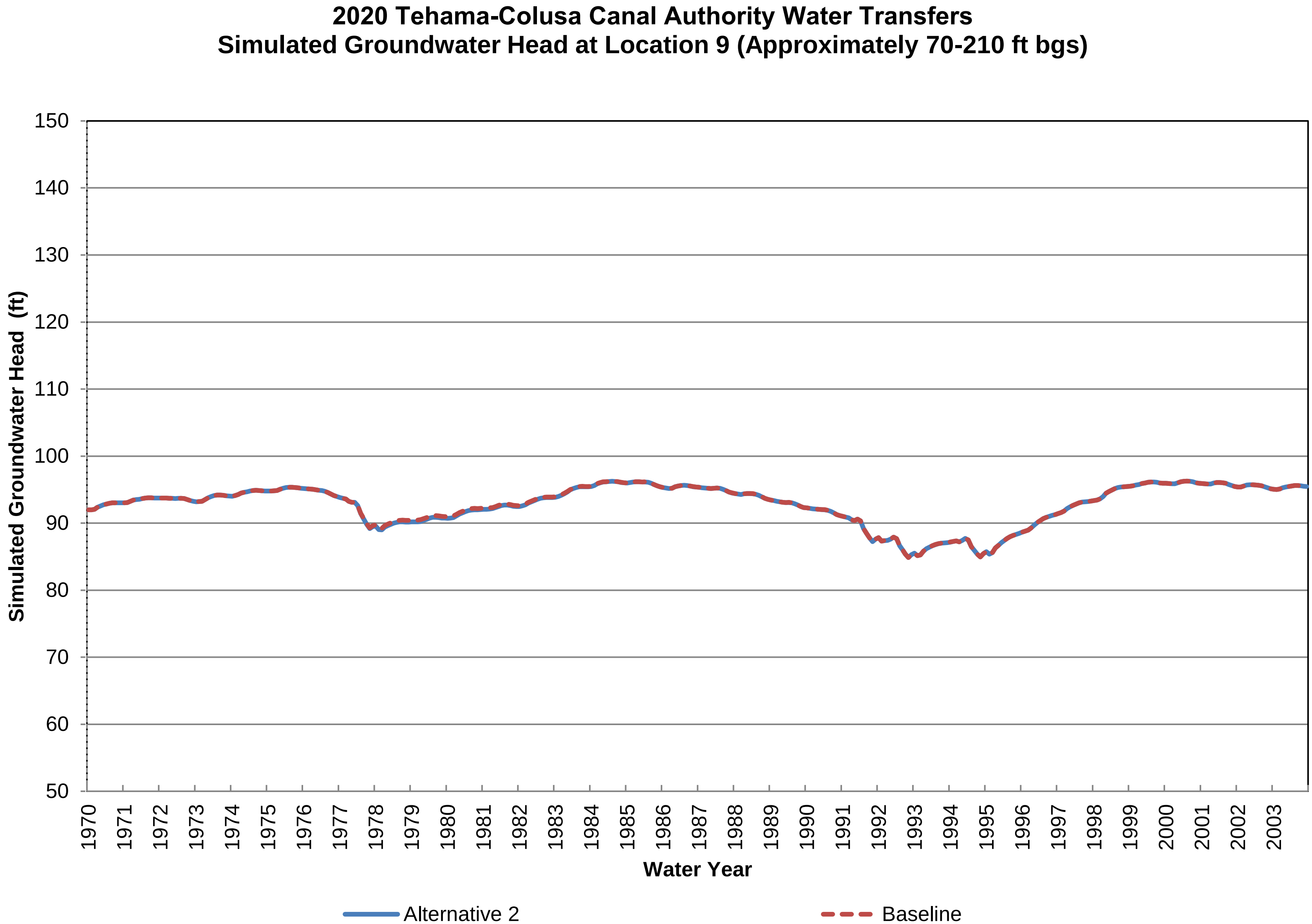
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 9 (Approximately 70-210 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
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1986
1987
1988
1989
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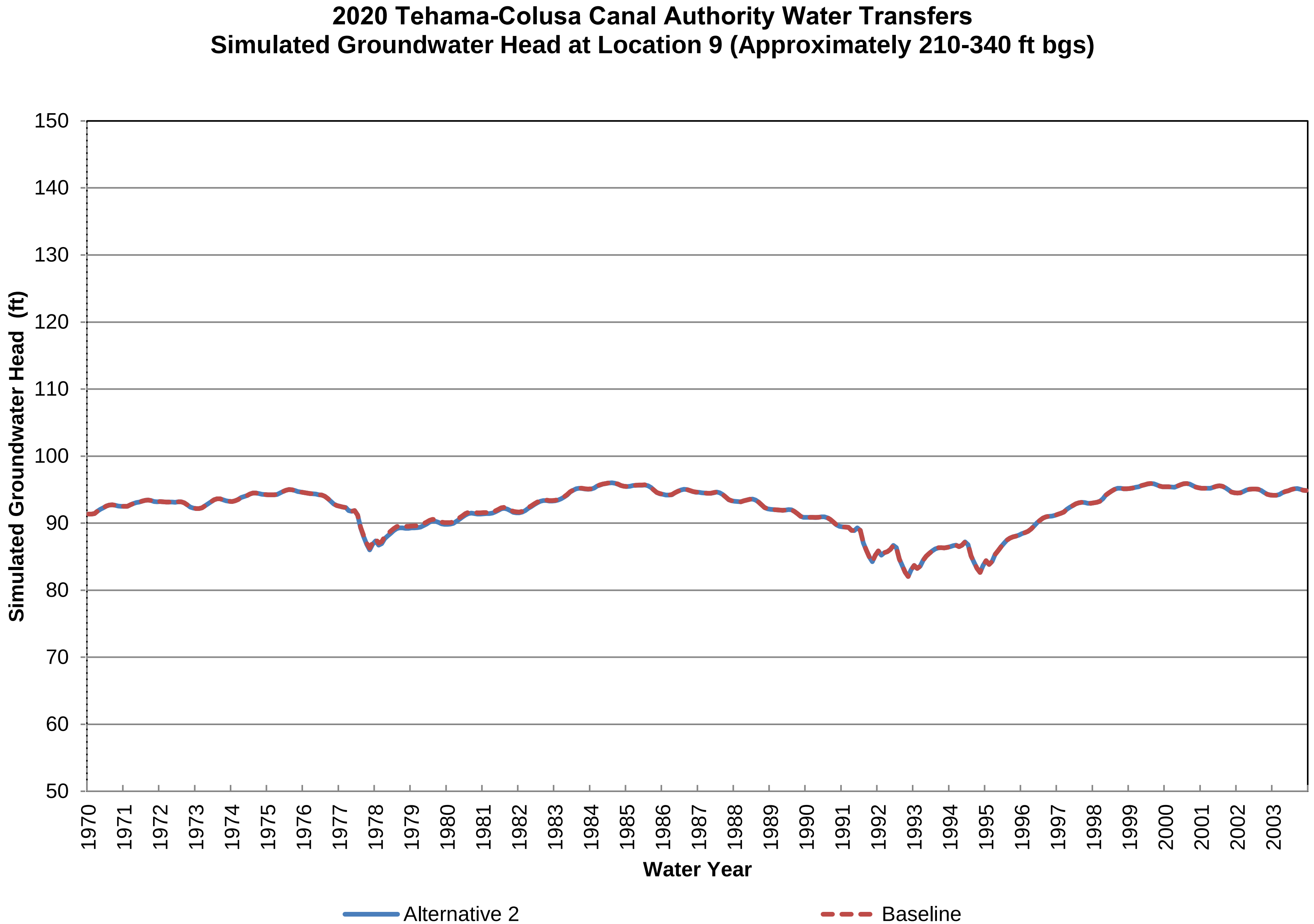
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 9 (Approximately 210-340 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
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1986
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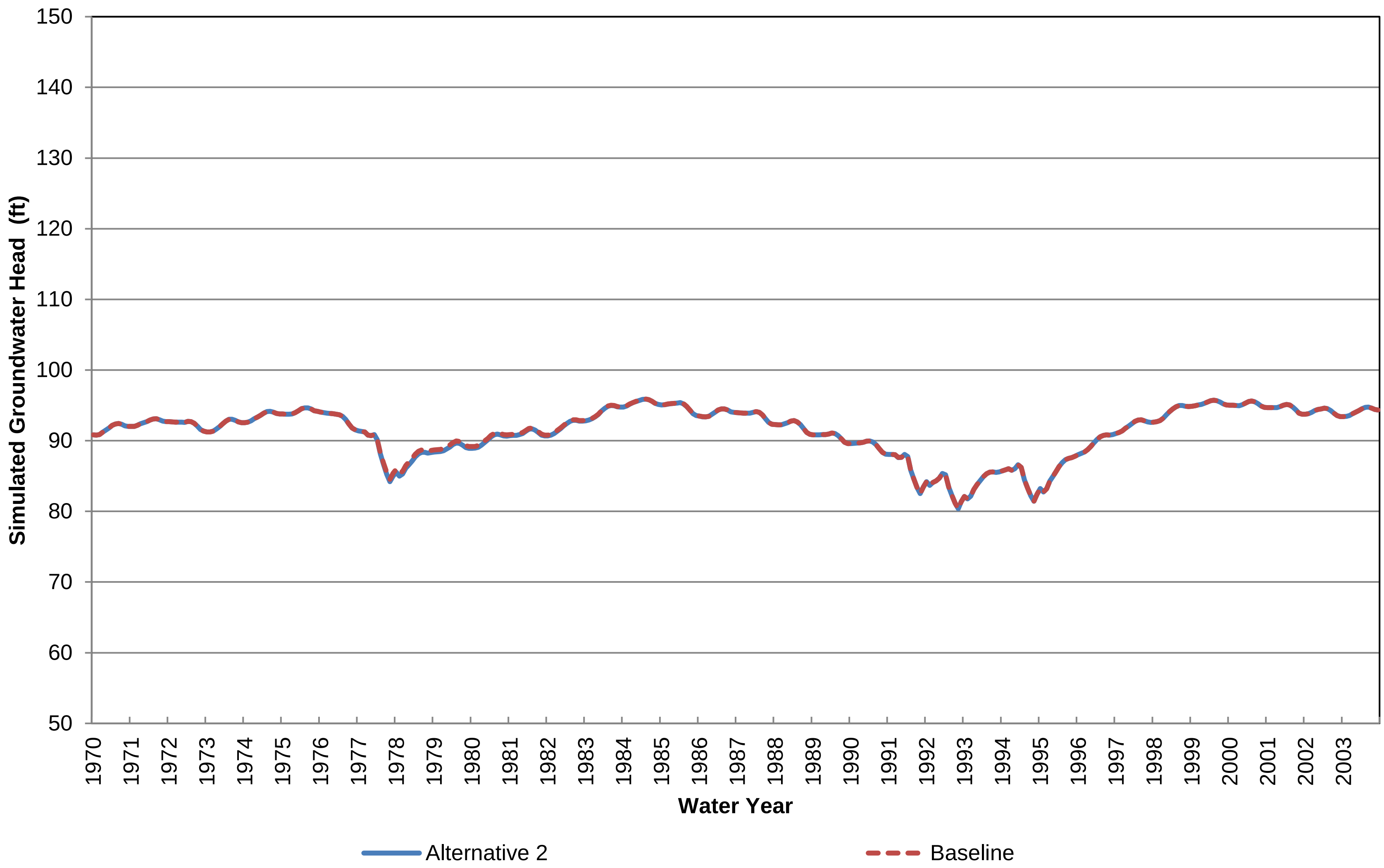
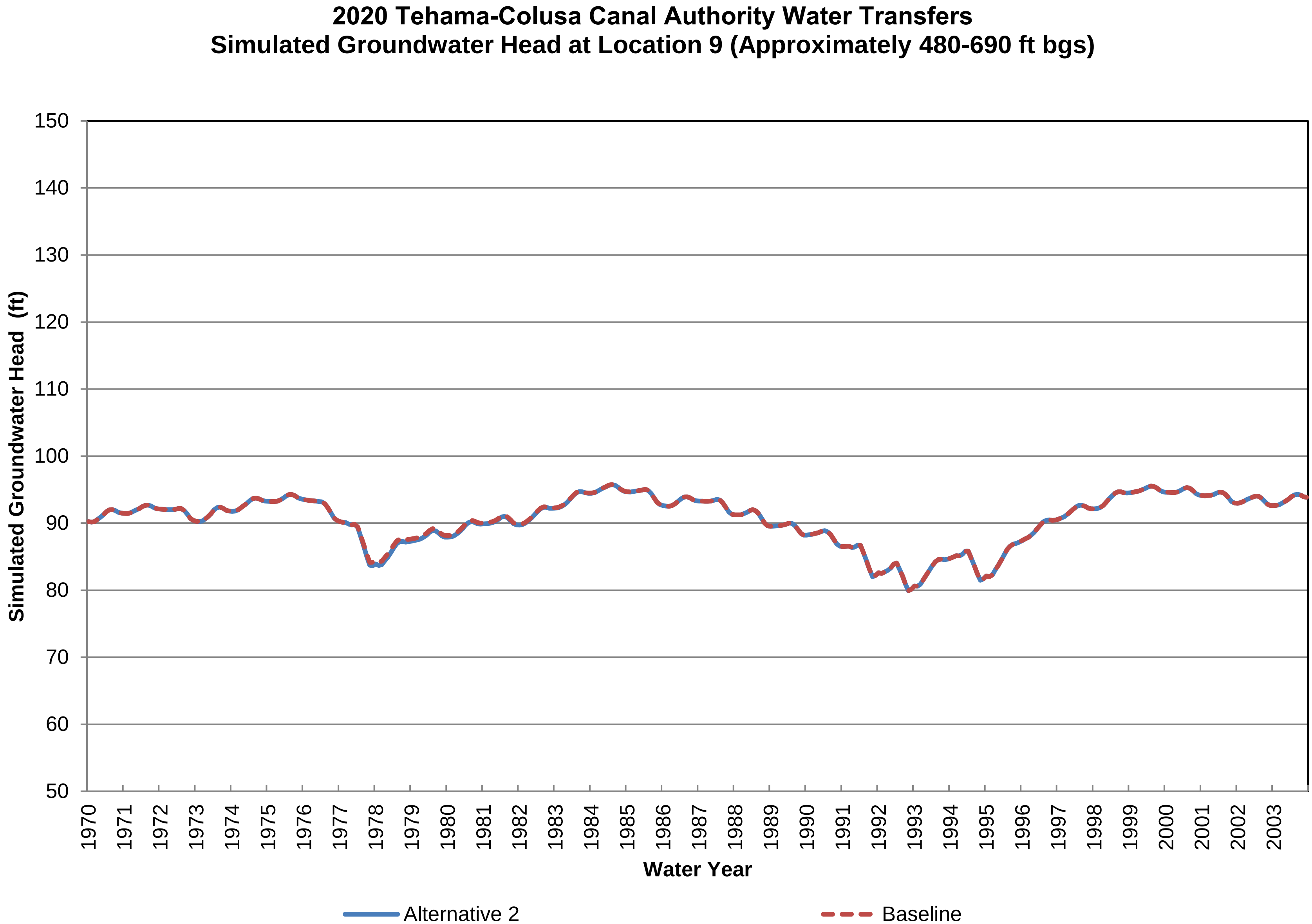
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 9 (Approximately 340-480 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 9 (Approximately 480-690 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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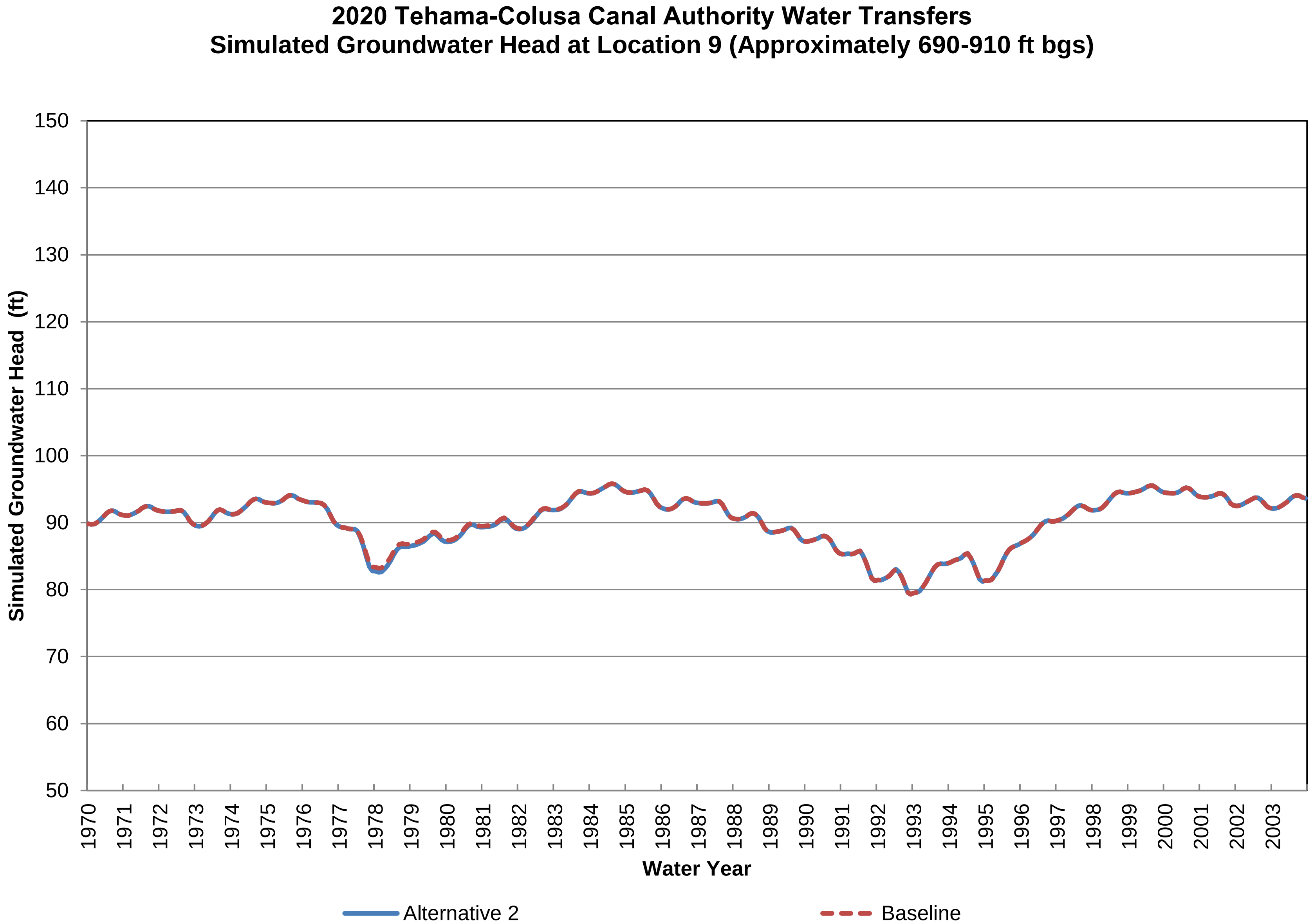
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 9 (Approximately 690-910 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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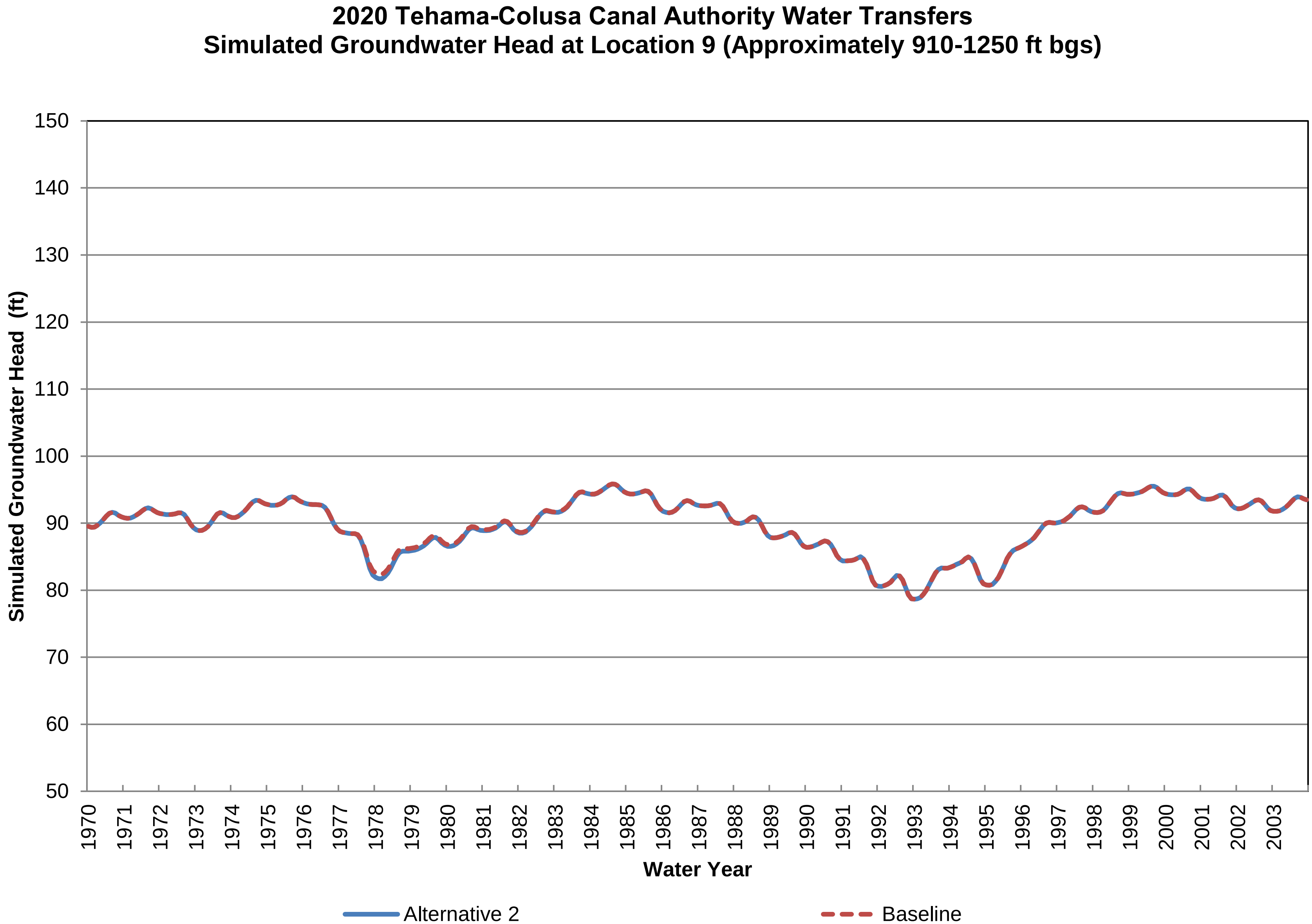
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 9 (Approximately 910-1250 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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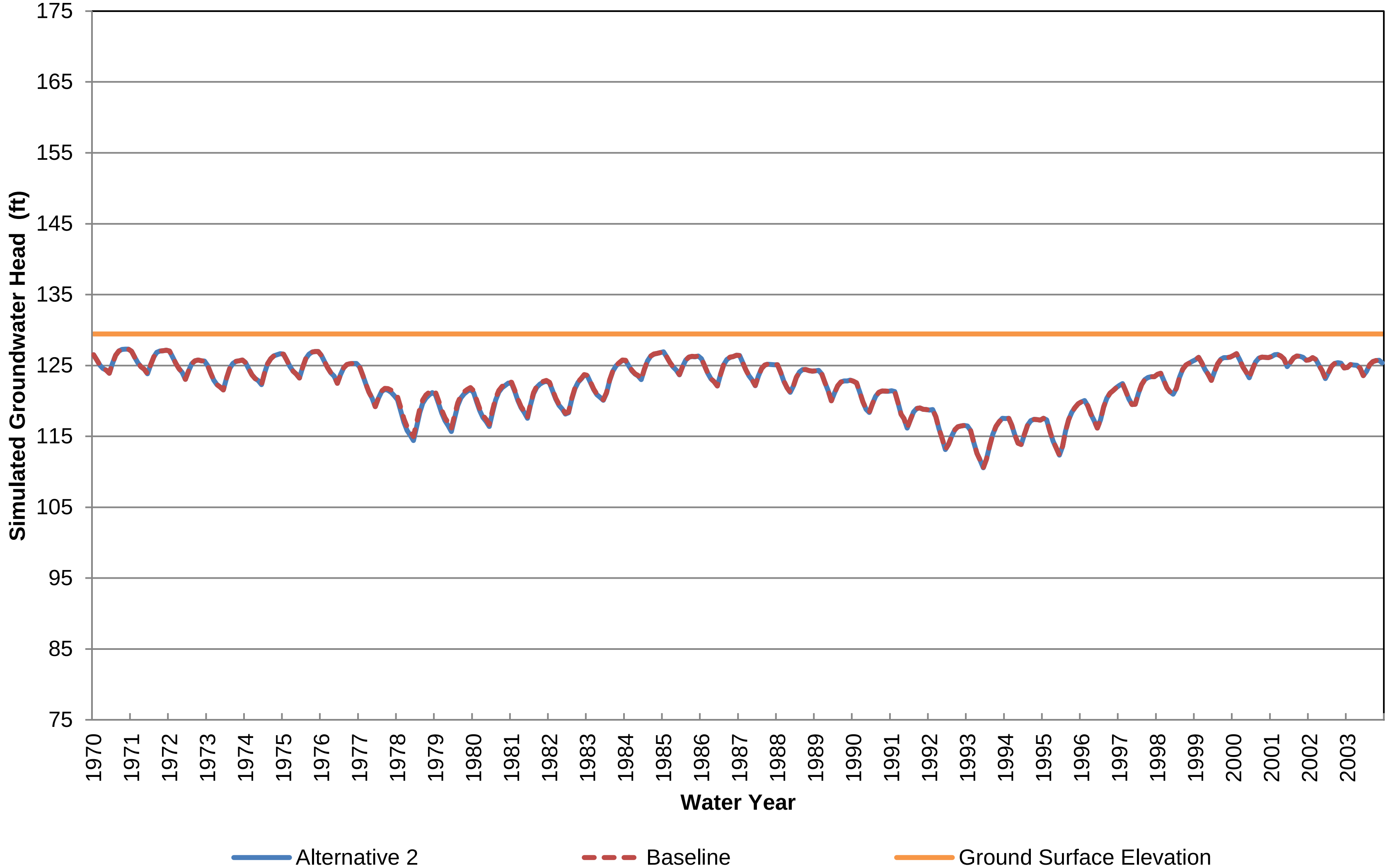
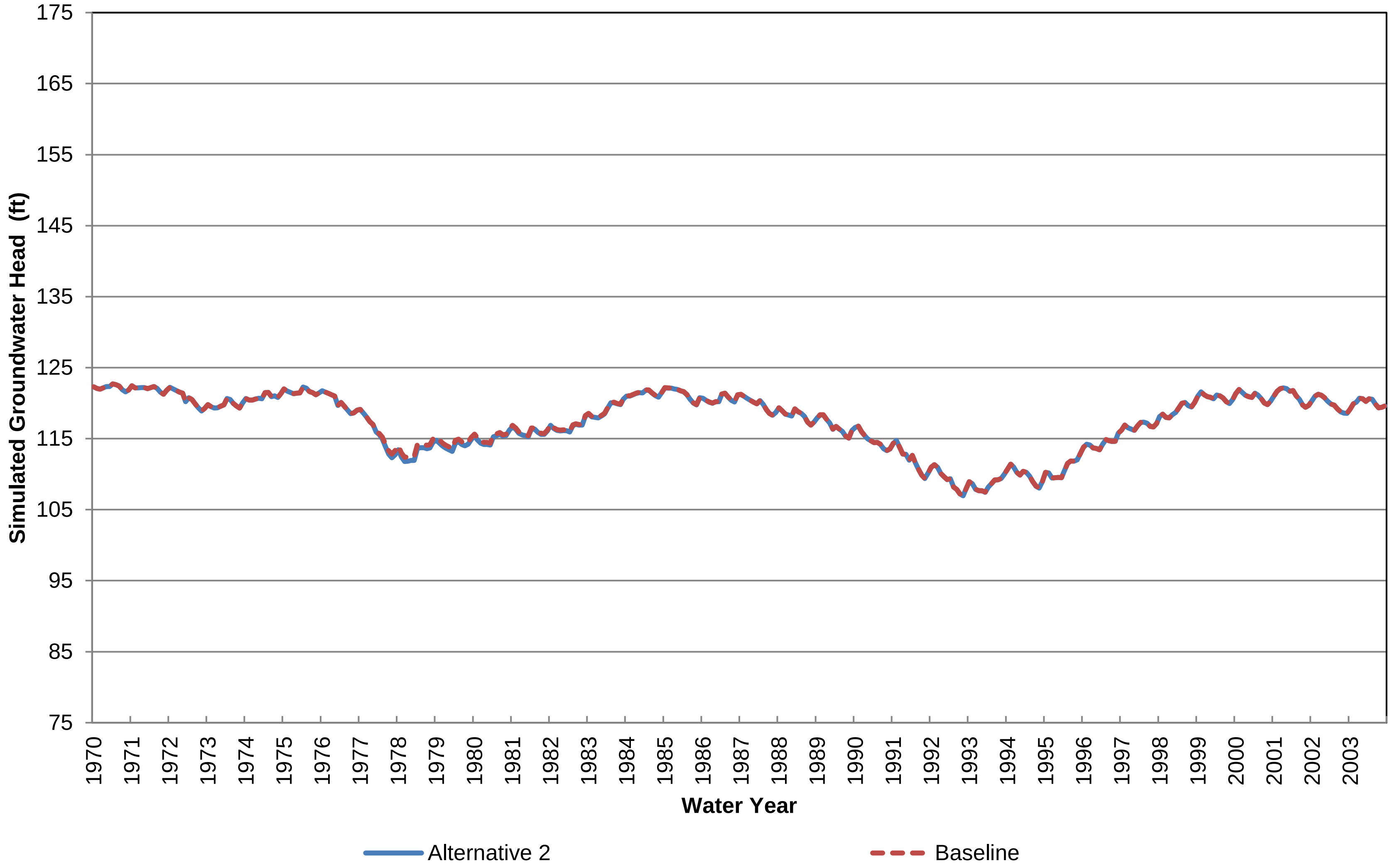
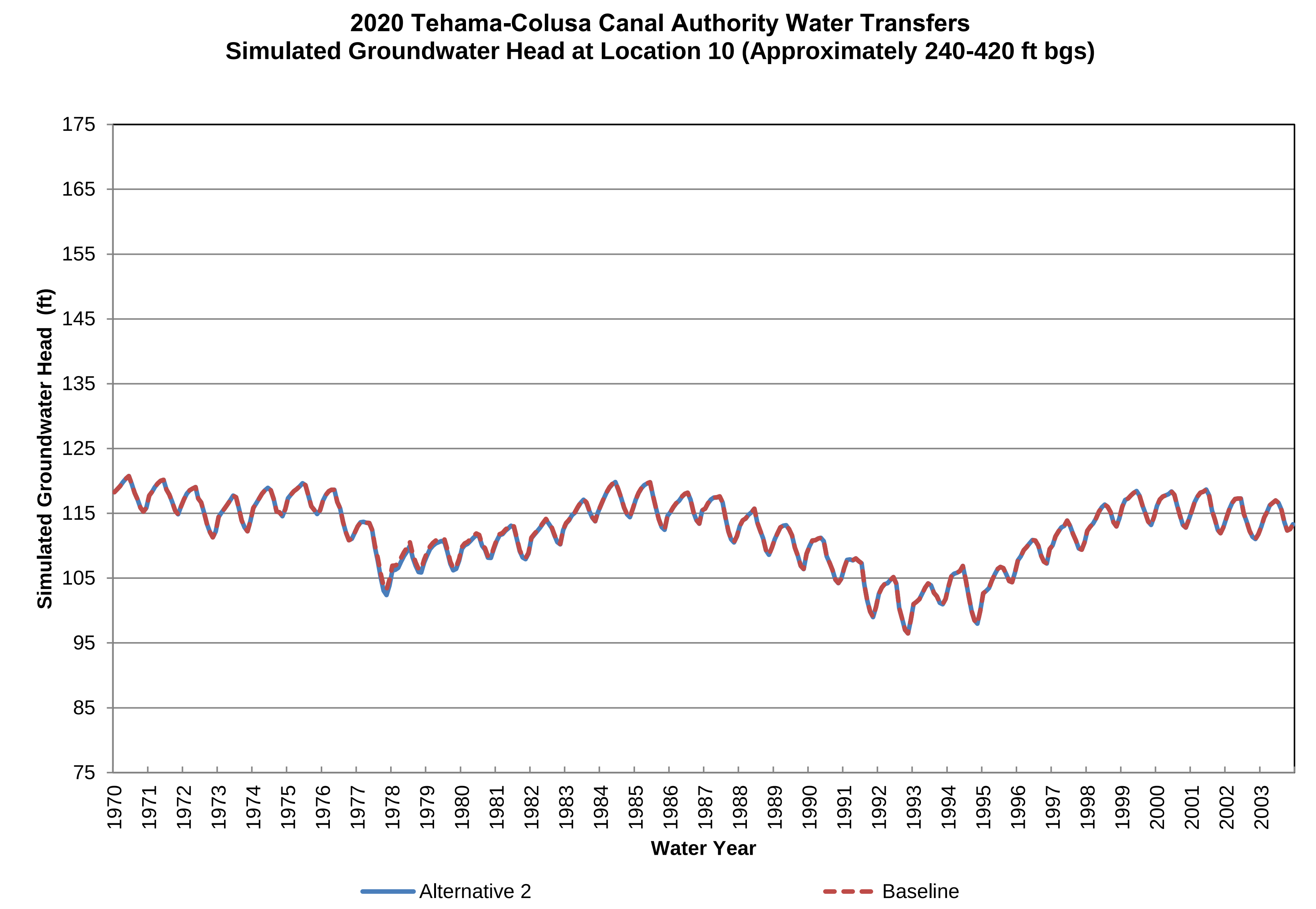
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 10 (Approximately 0-70 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 10 (Approximately 70-240 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 10 (Approximately 240-420 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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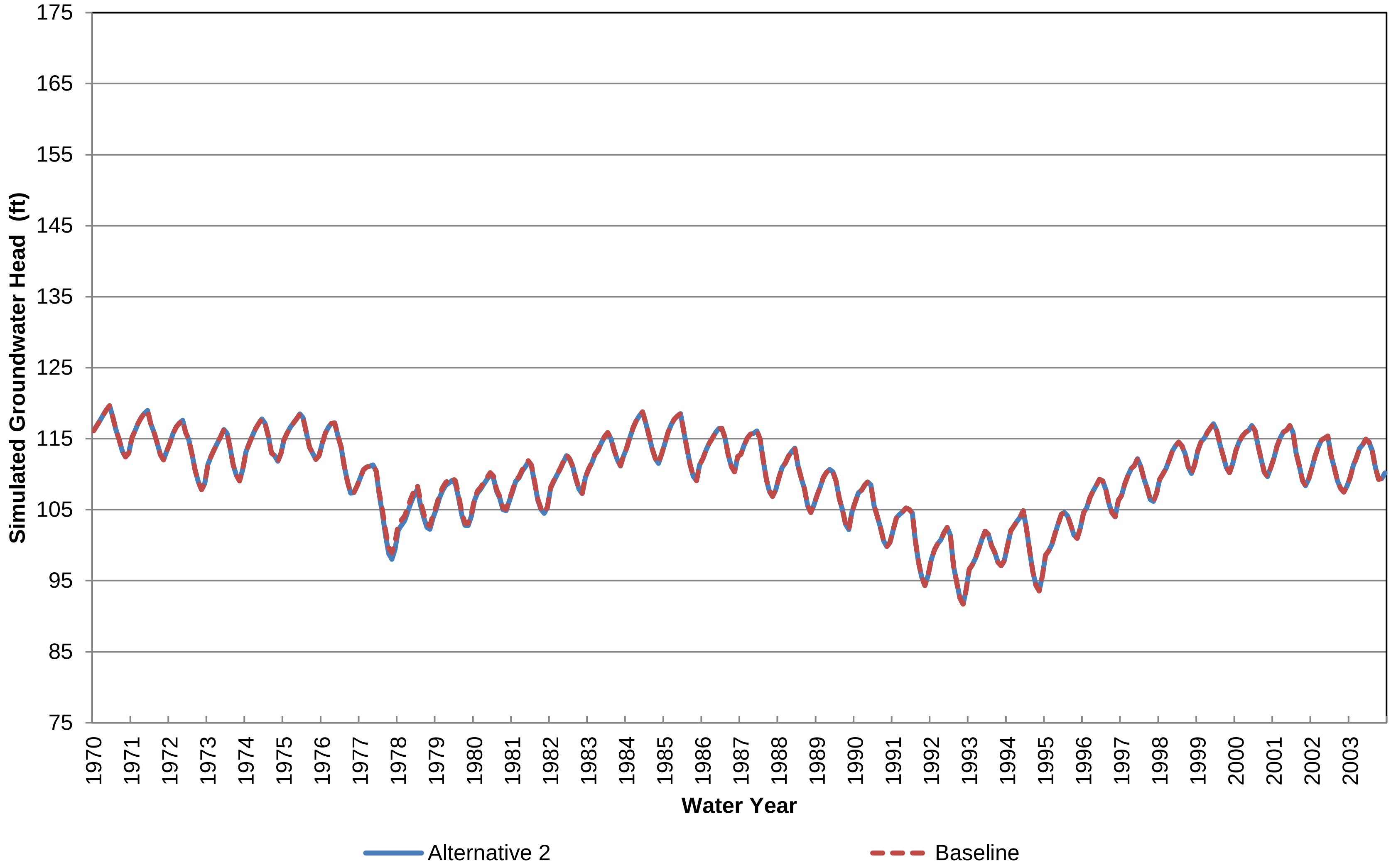
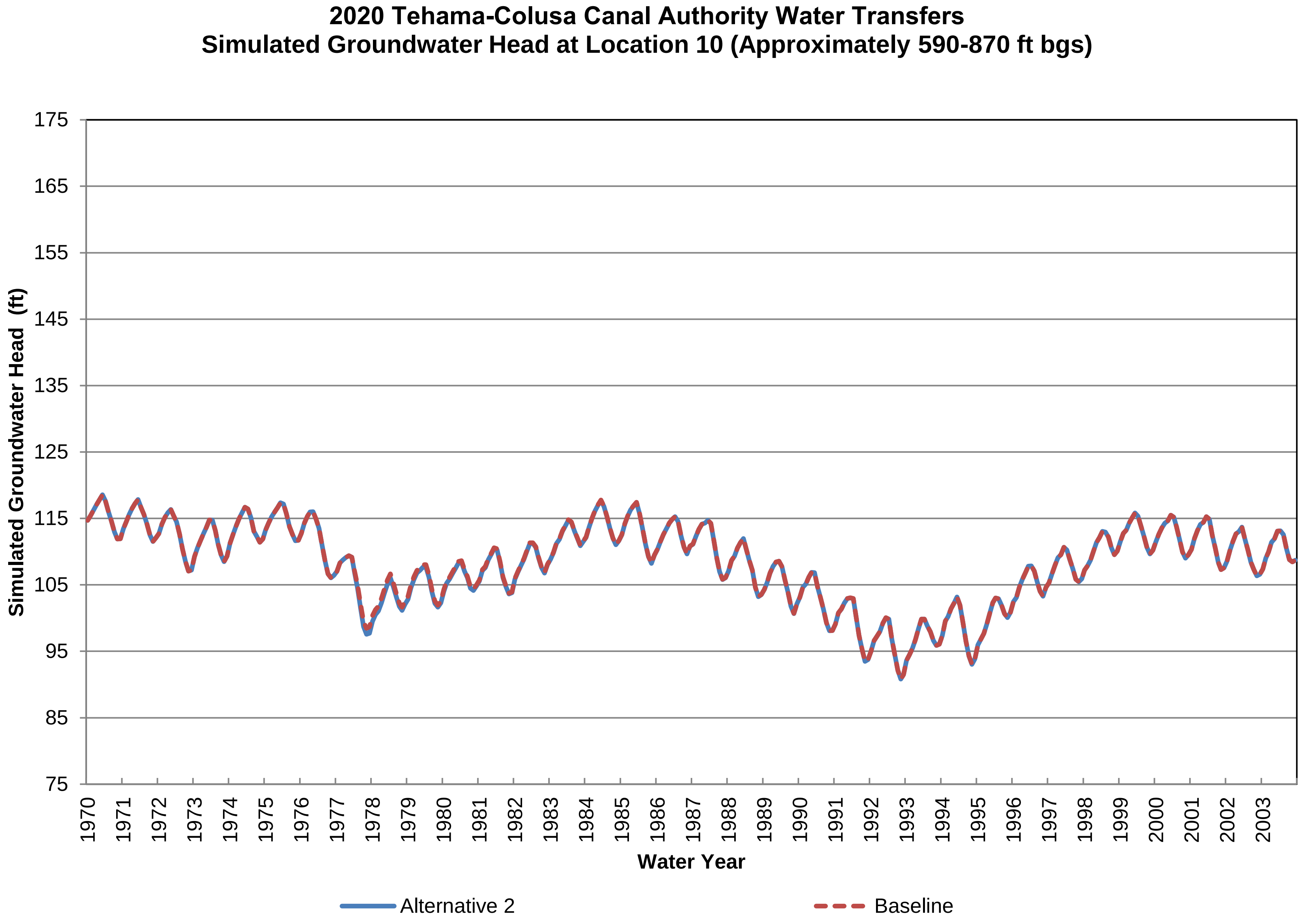
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 10 (Approximately 420-590 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 10 (Approximately 590-870 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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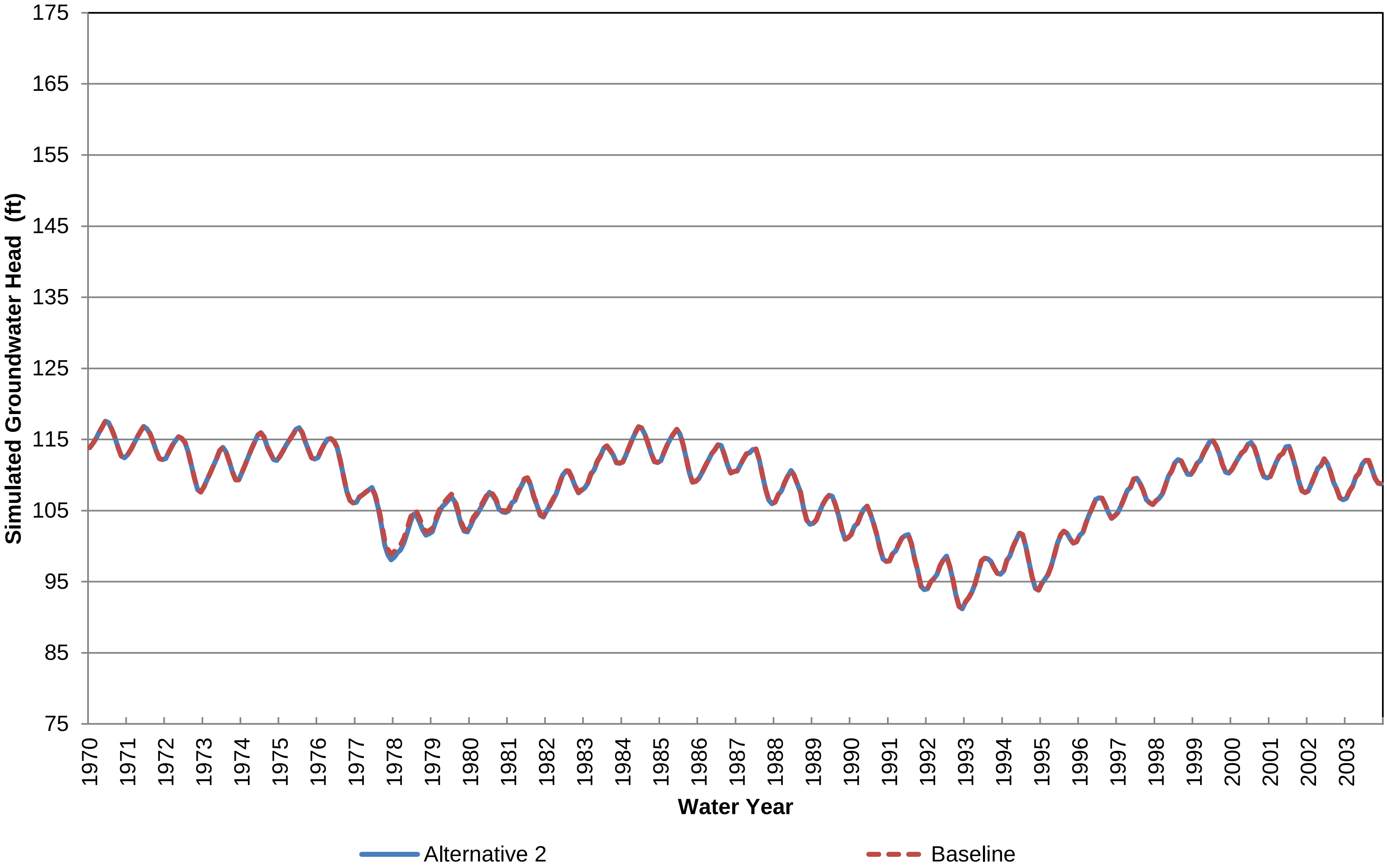
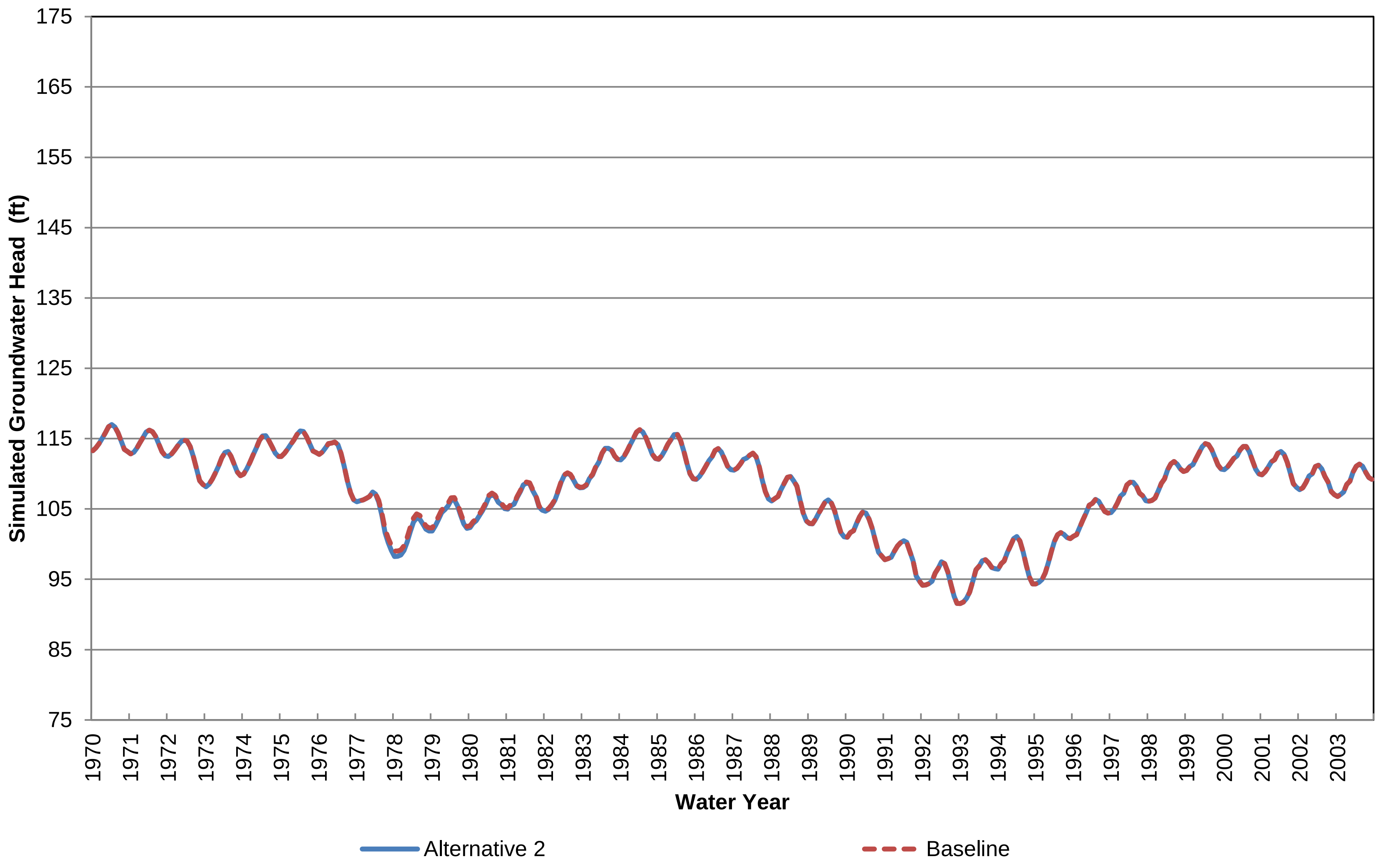
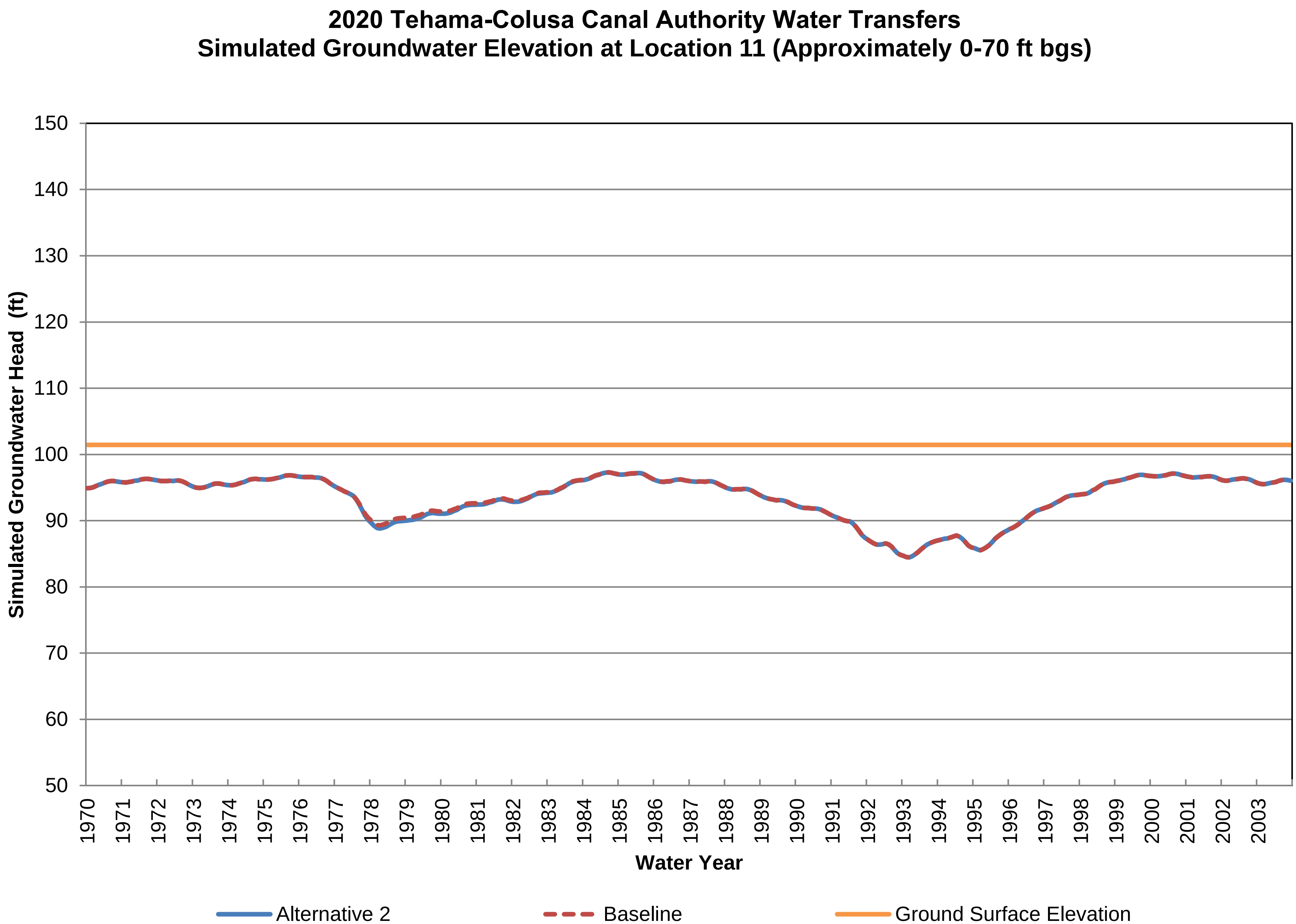
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 10 (Approximately 870-1160 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 10 (Approximately 1160-1590 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 11 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
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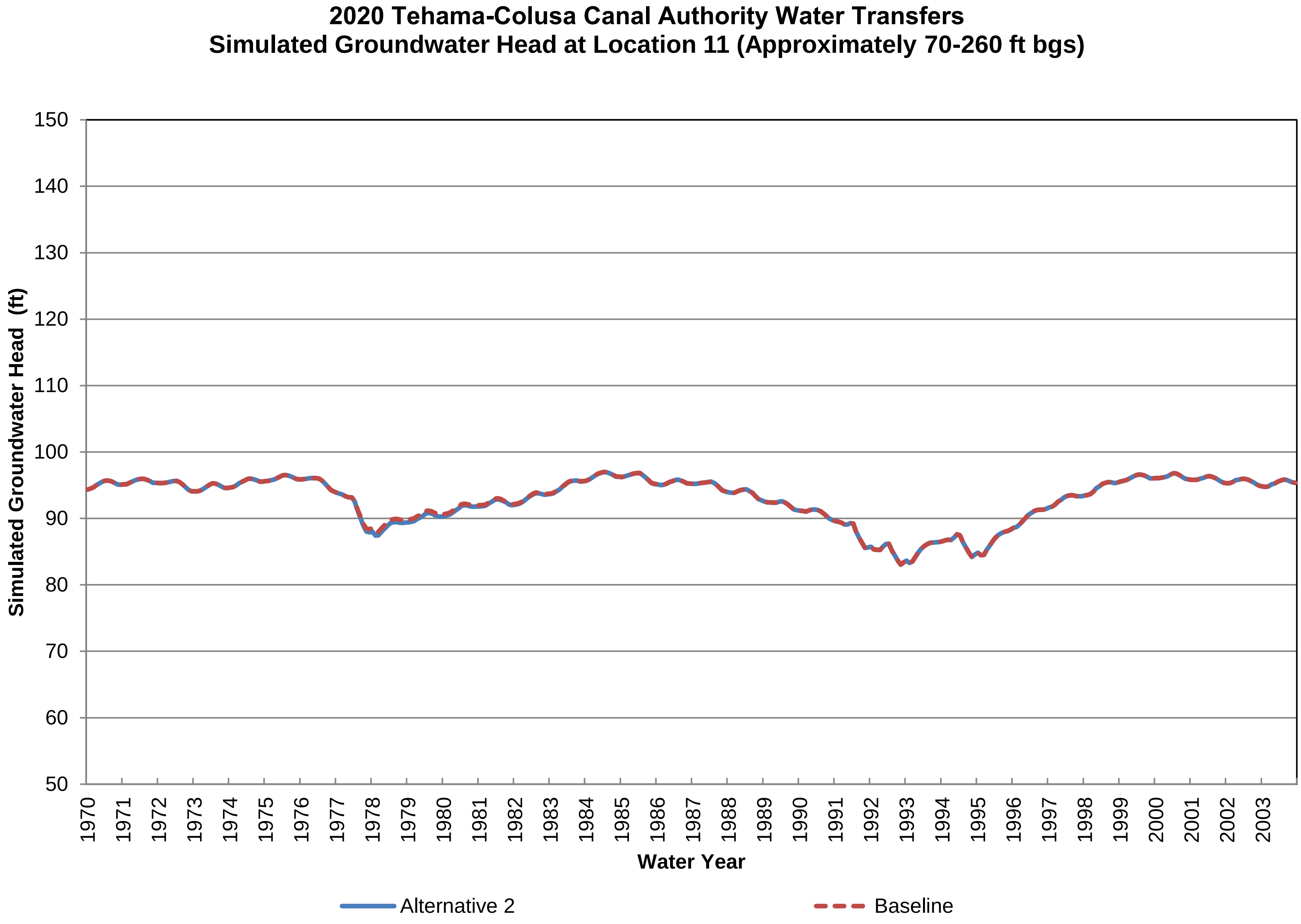
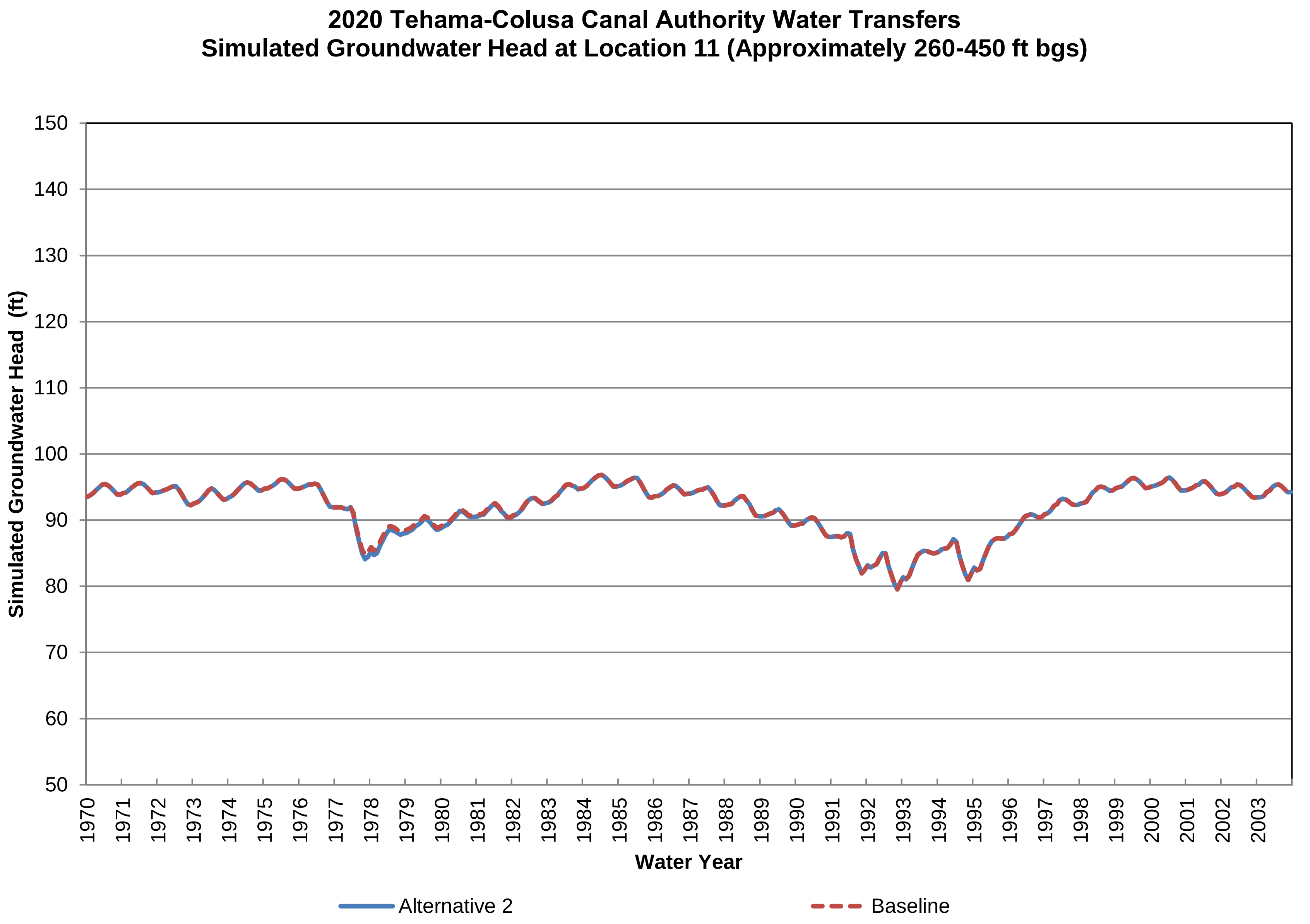
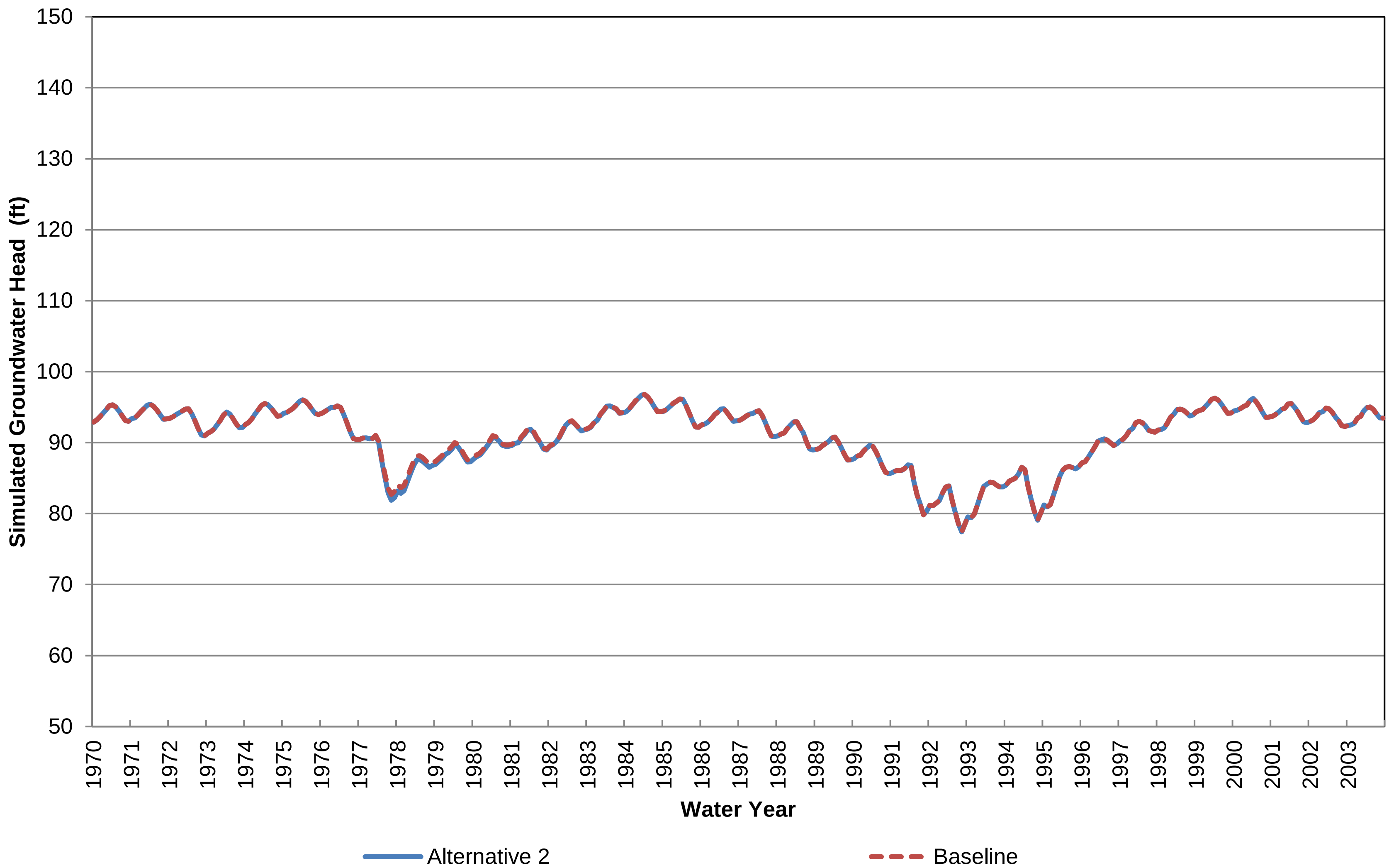
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 11 (Approximately 70-260 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

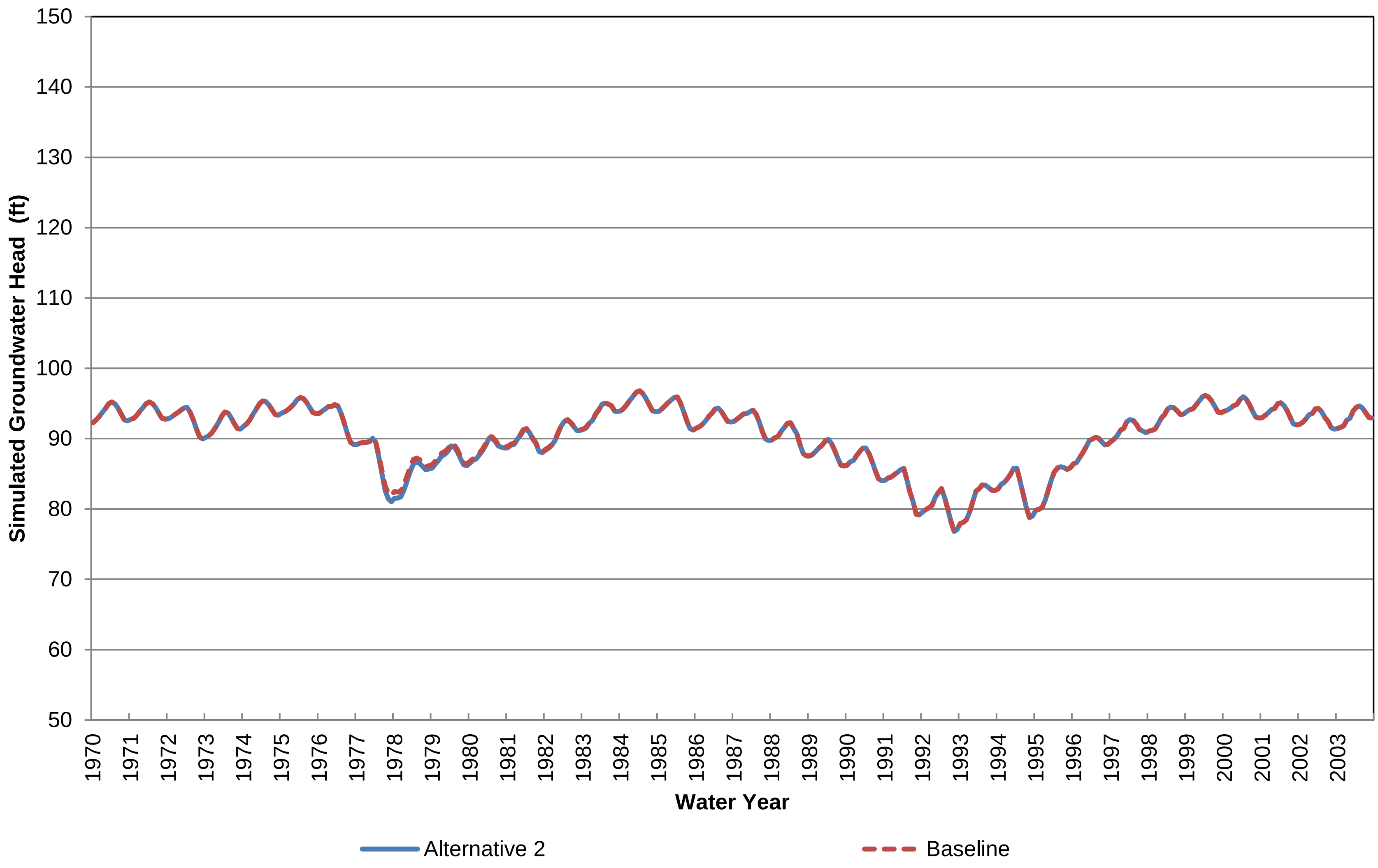


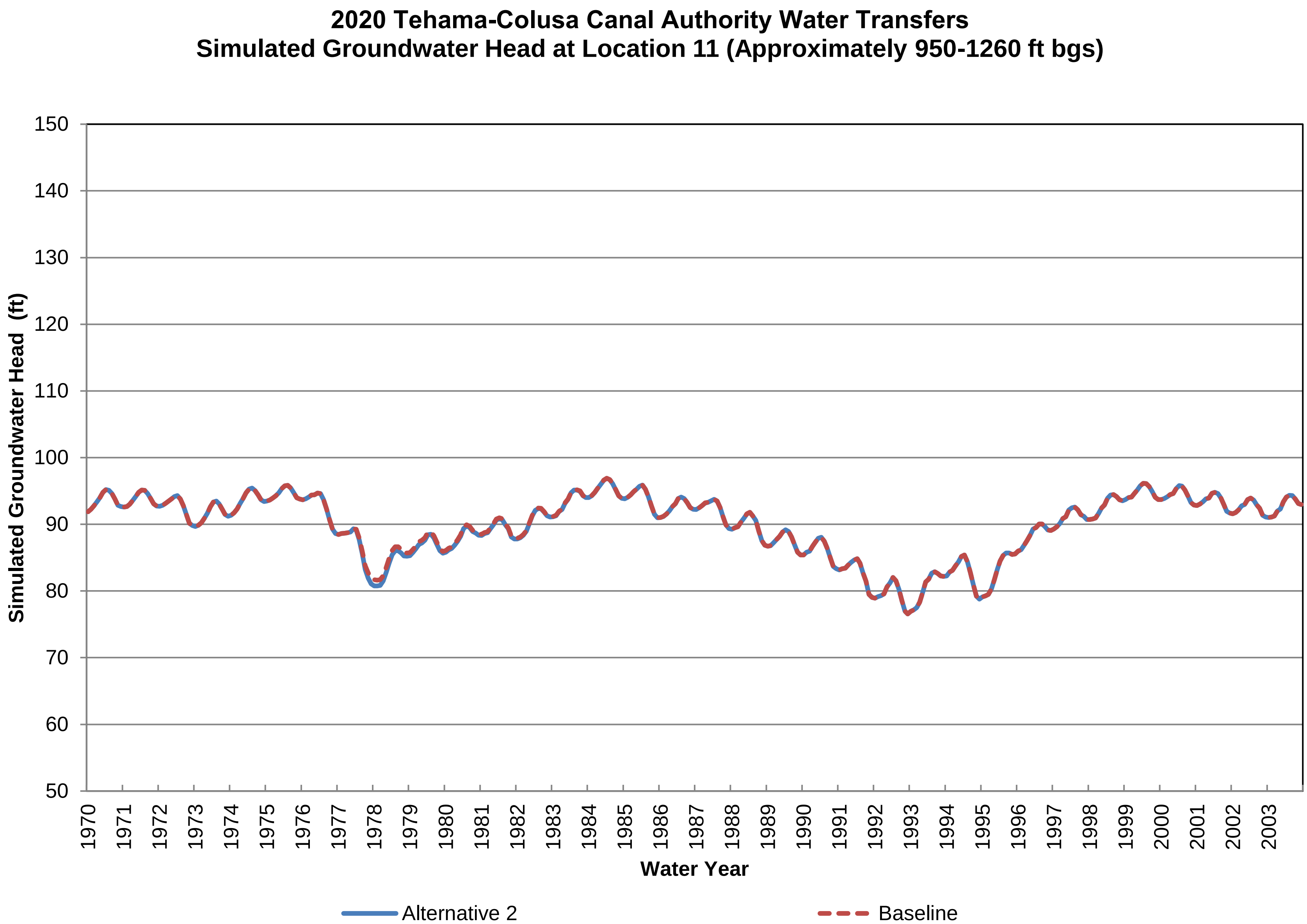
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 11 (Approximately 260-450 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 11 (Approximately 450-640 ft bgs)

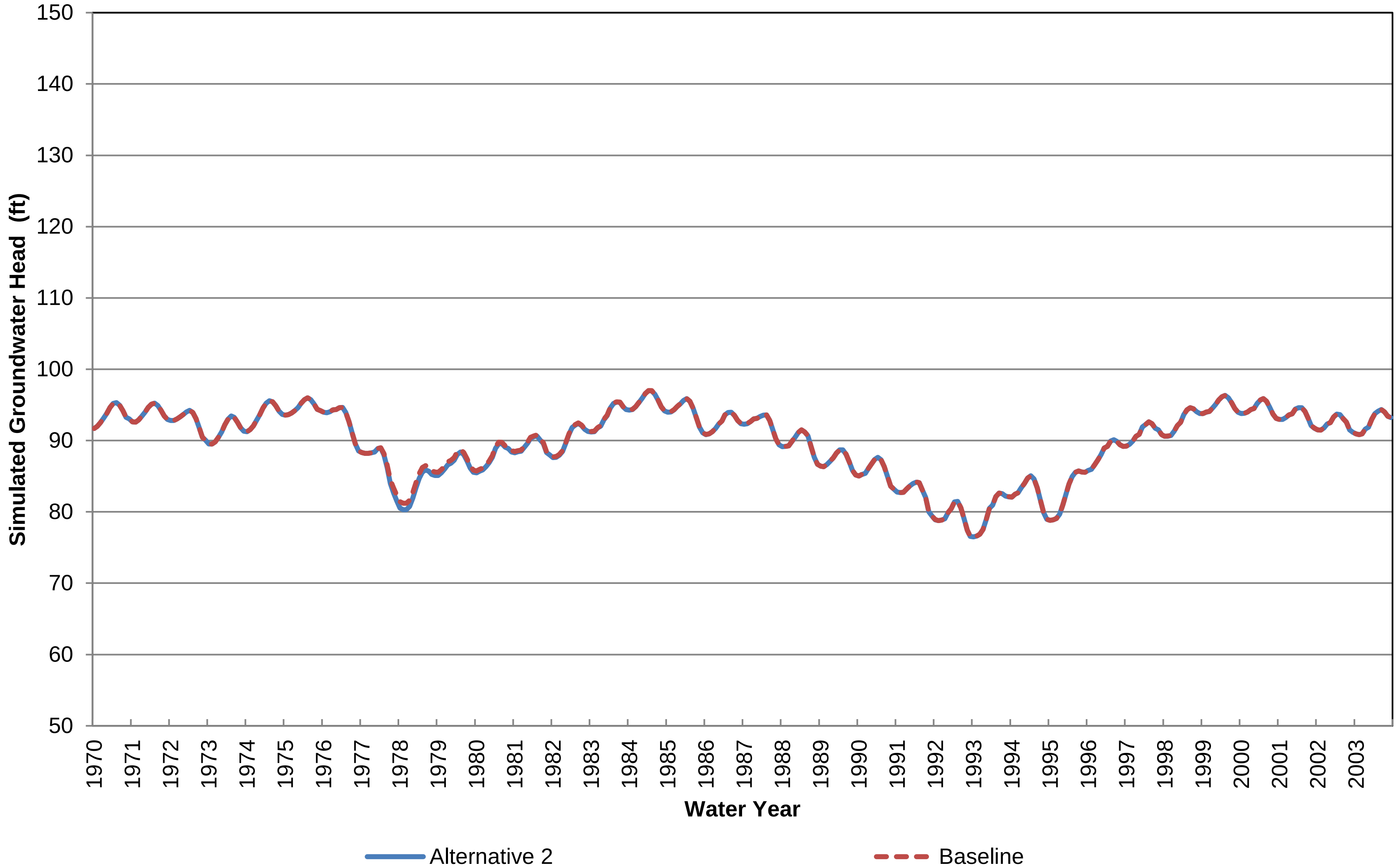


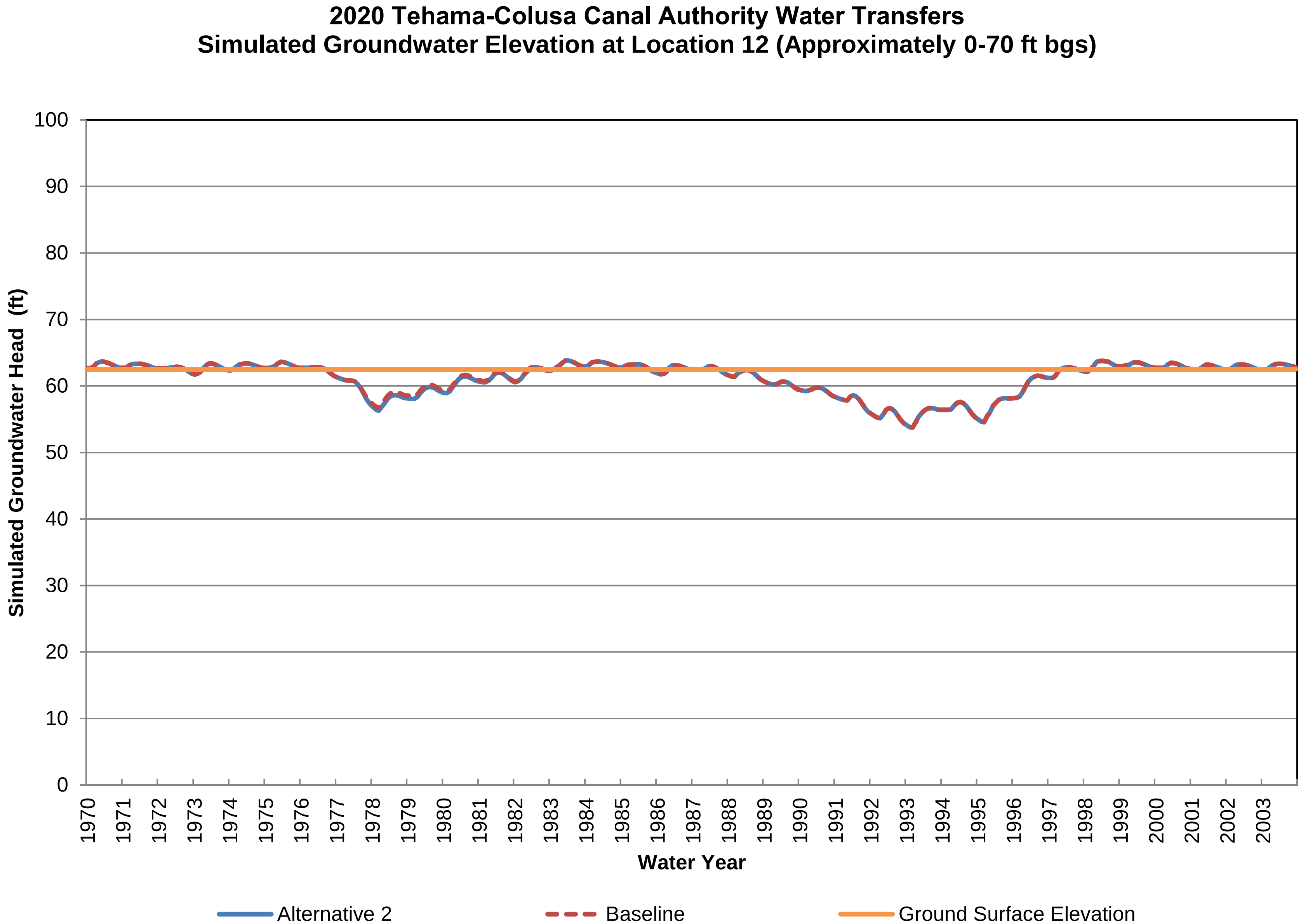
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 11 (Approximately 640-950 ft bgs)



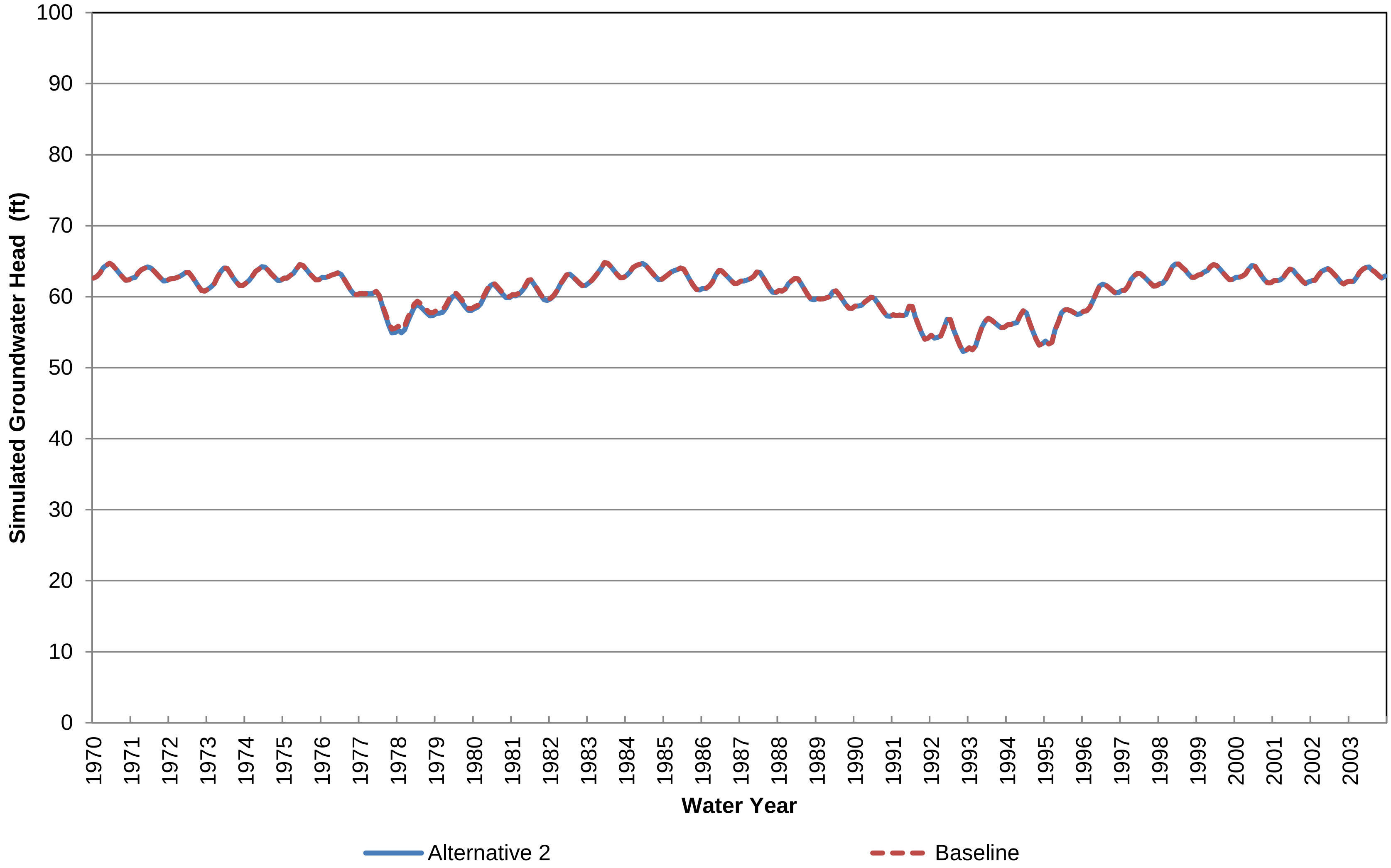

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 11 (Approximately 950-1260 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

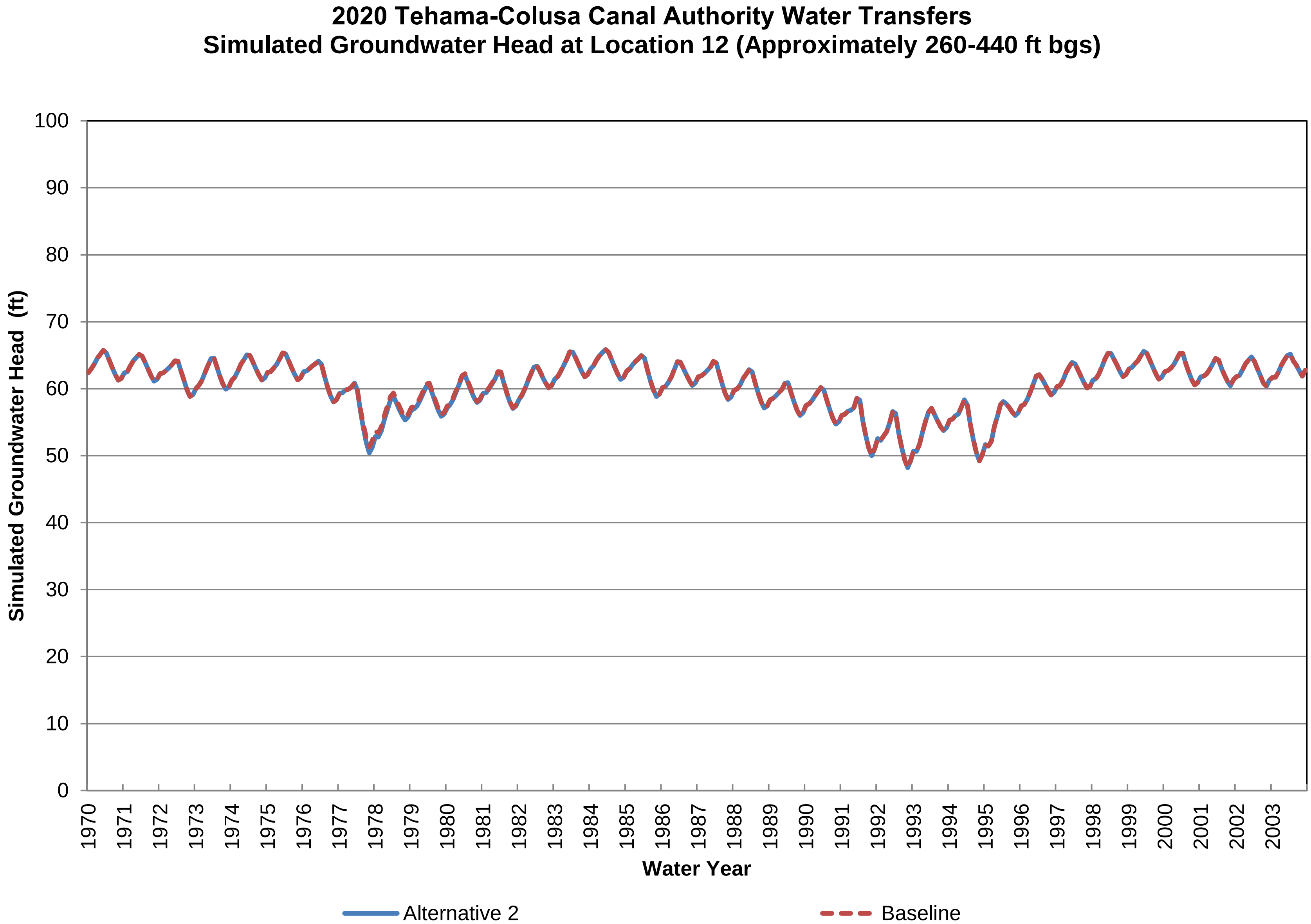
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 11 (Approximately 1260-1740 ft bgs)



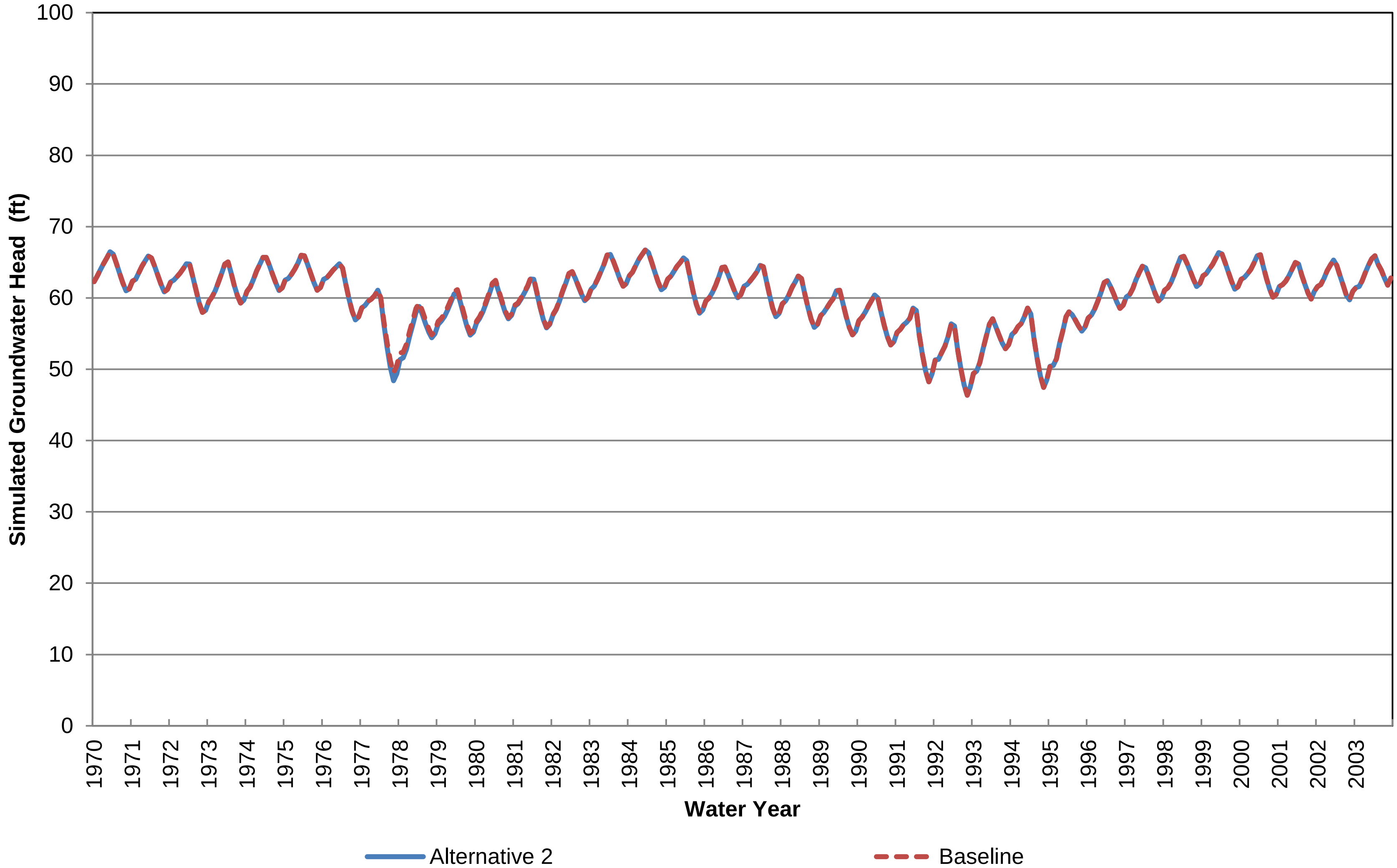

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 12 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 12 (Approximately 70-260 ft bgs)

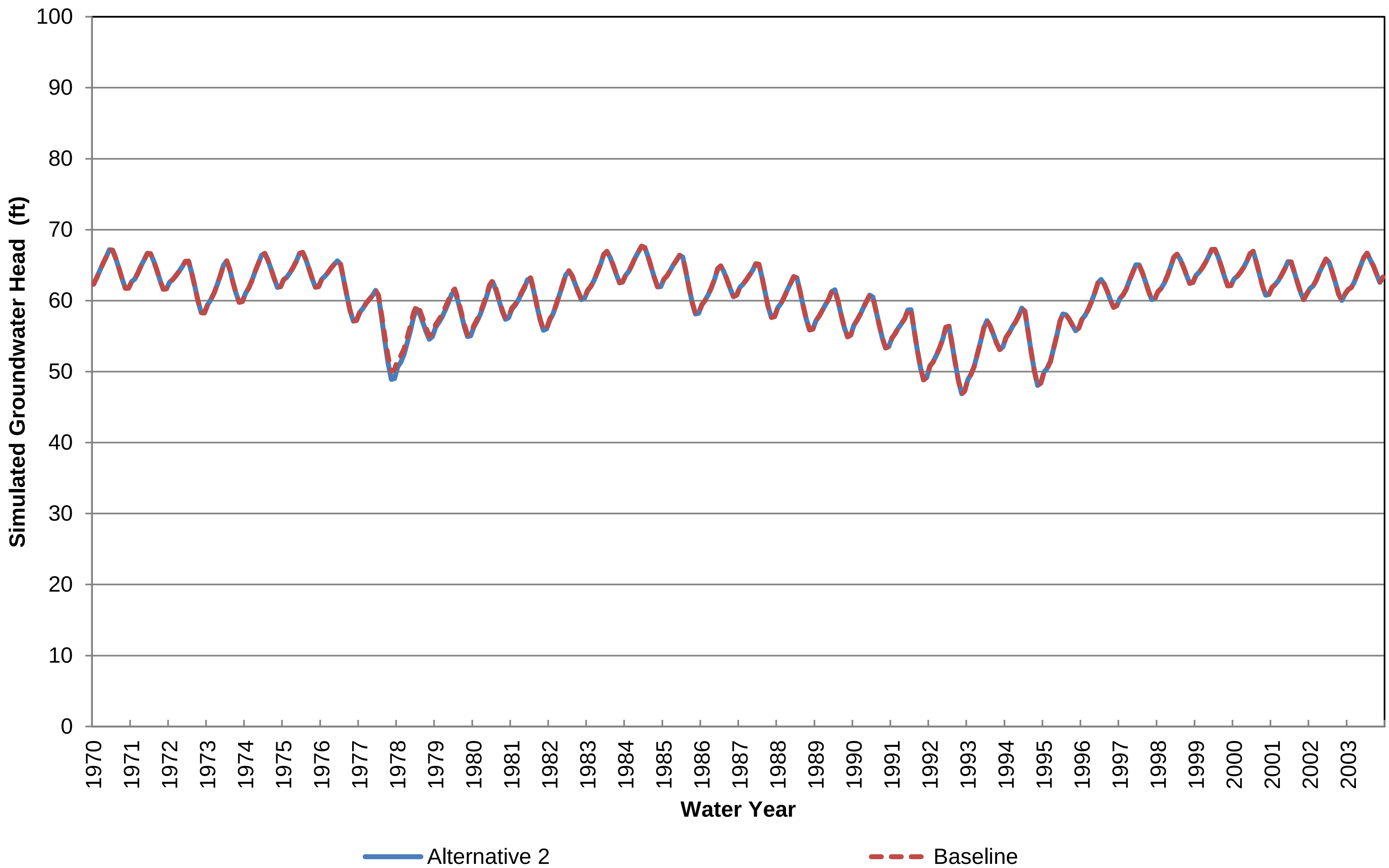


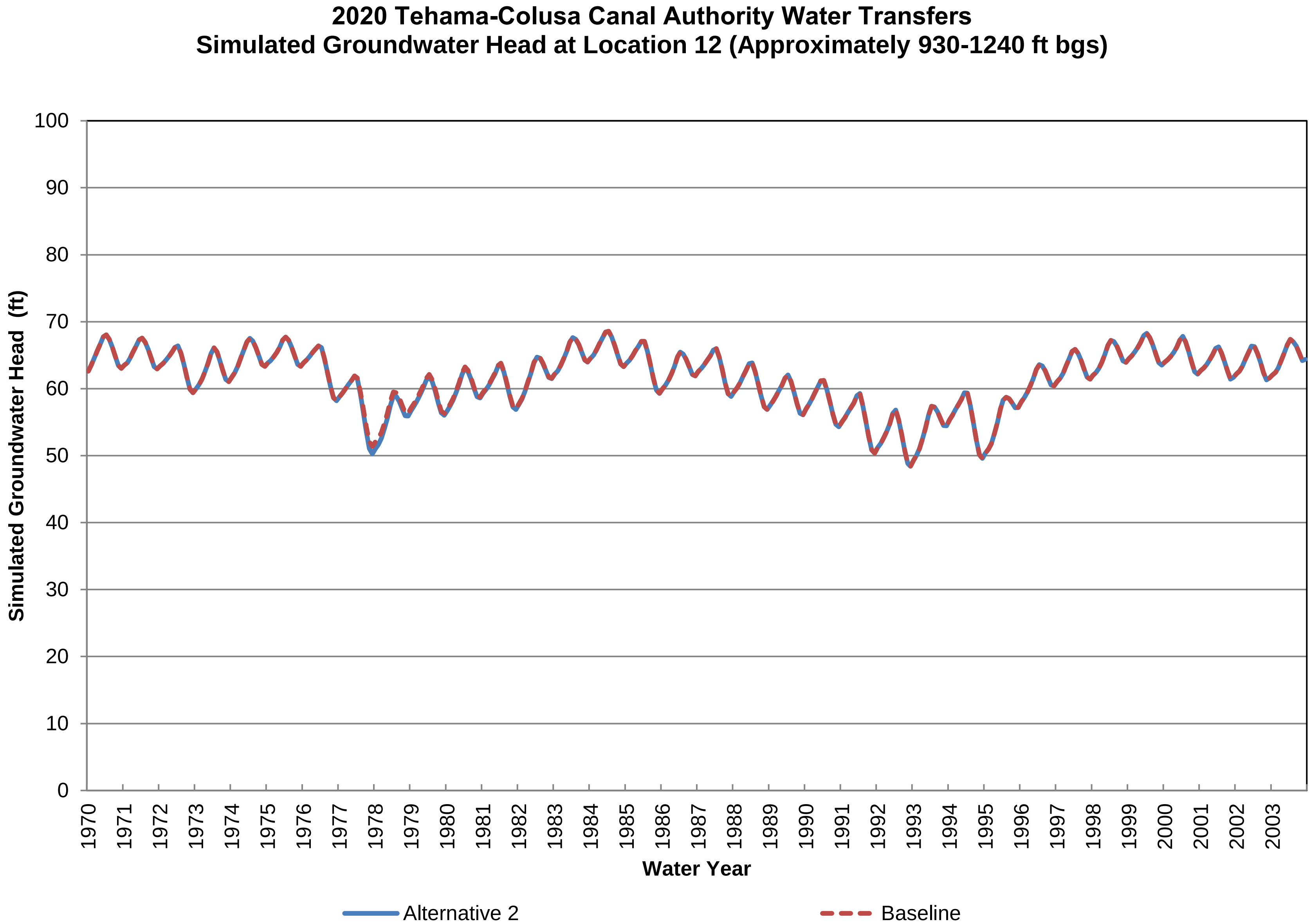

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 12 (Approximately 260-440 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 12 (Approximately 440-630 ft bgs)

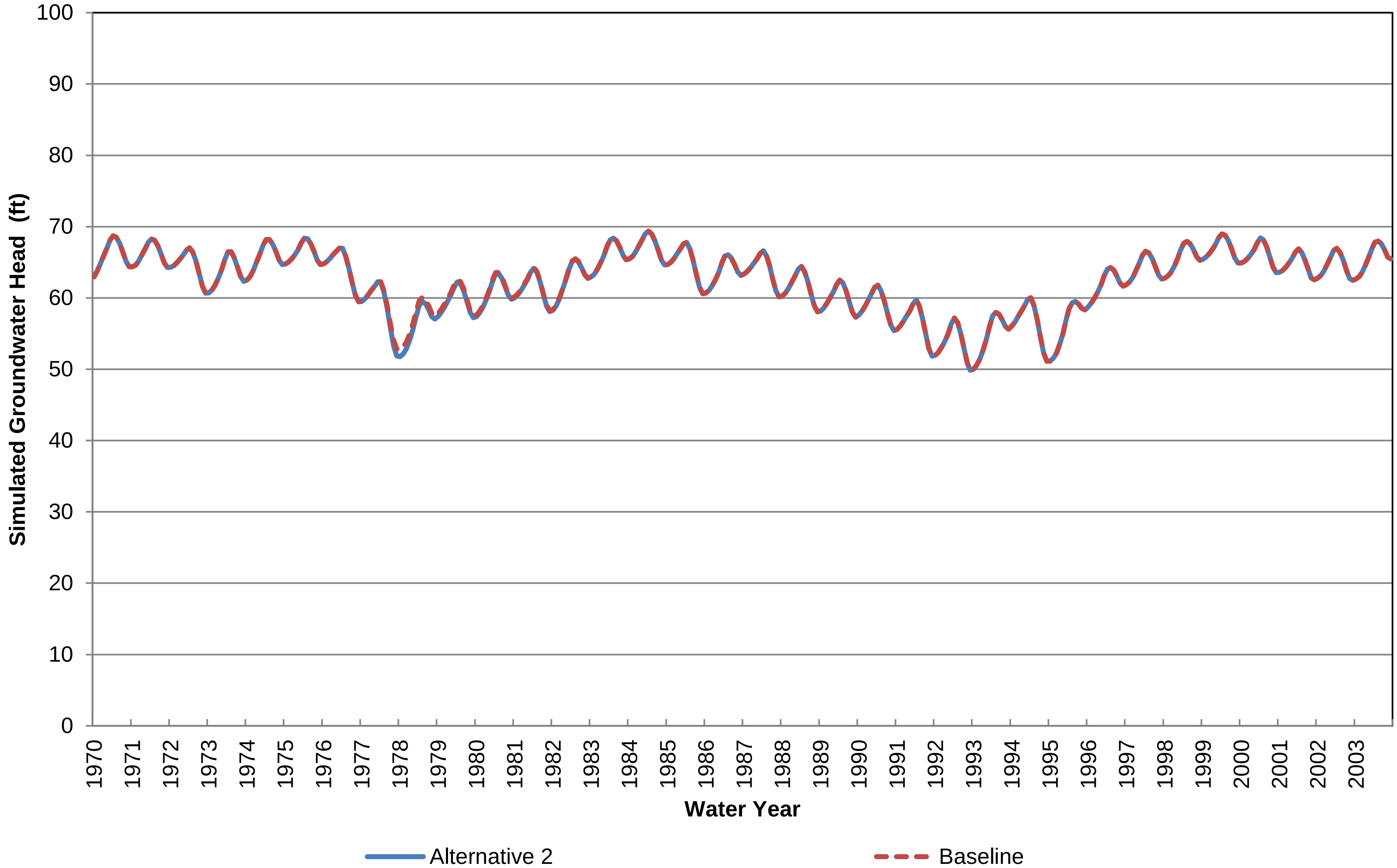


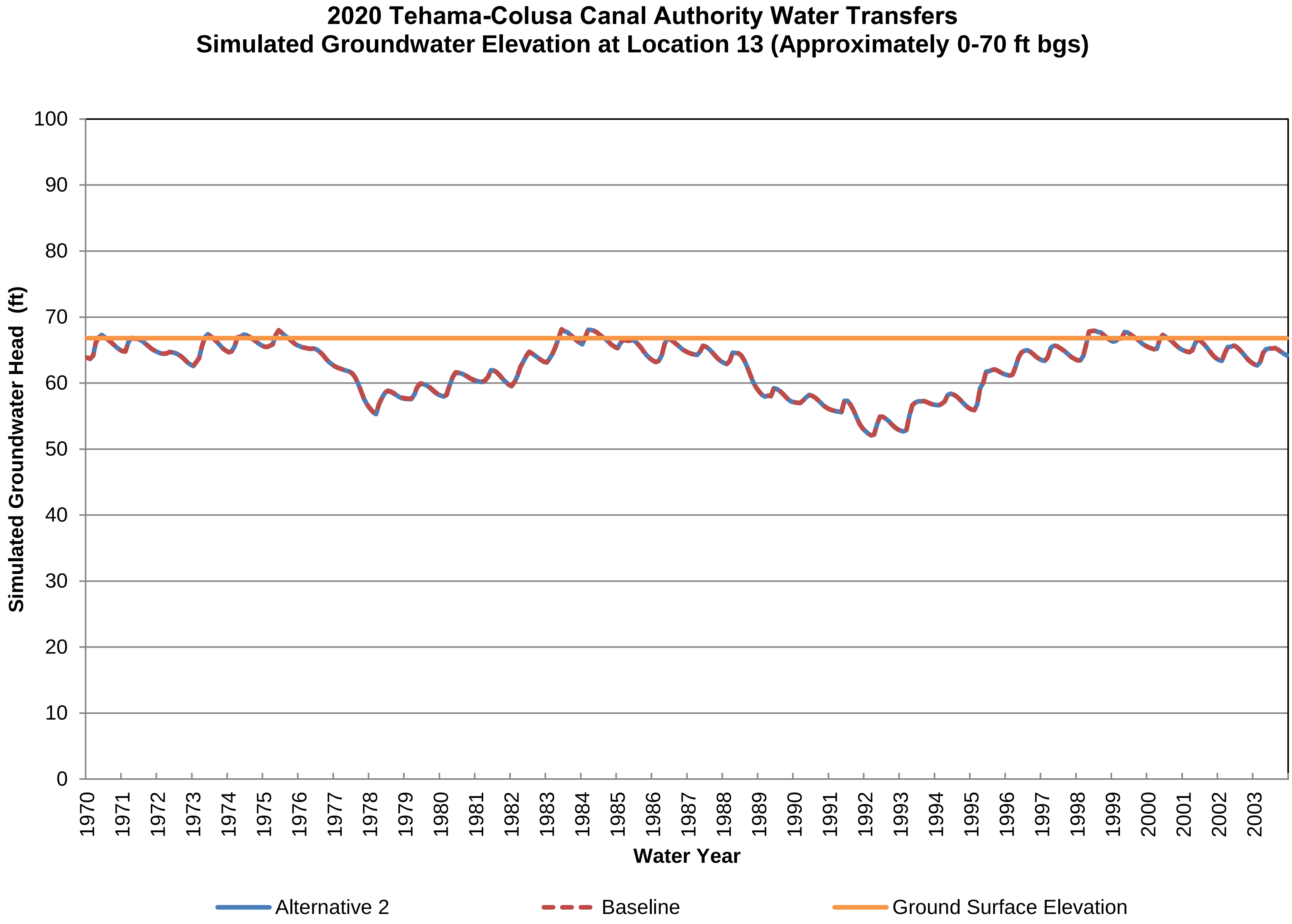
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 12 (Approximately 630-930 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 12 (Approximately 930-1240 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 12 (Approximately 1240-1700 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 13 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
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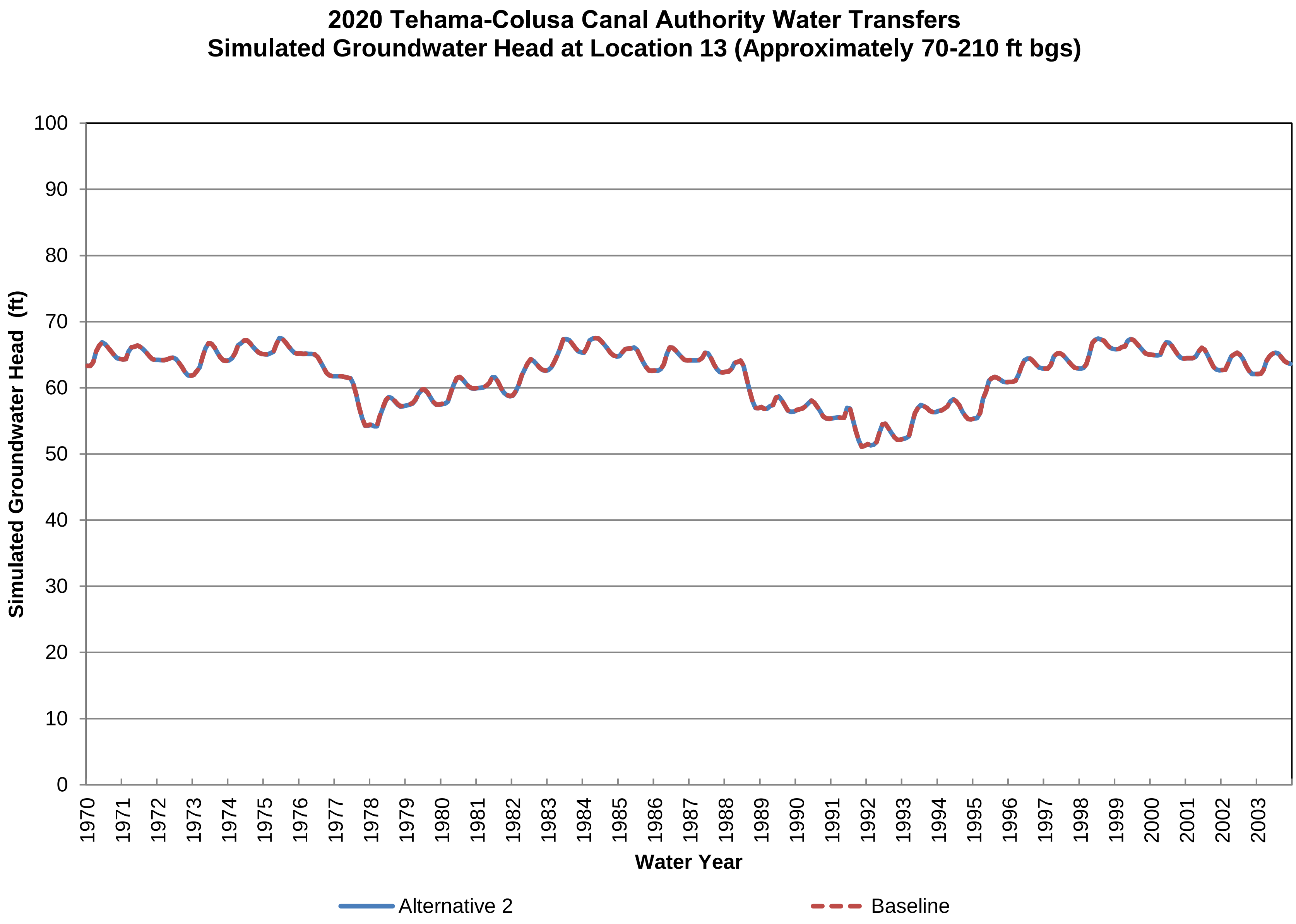
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 13 (Approximately 70-210 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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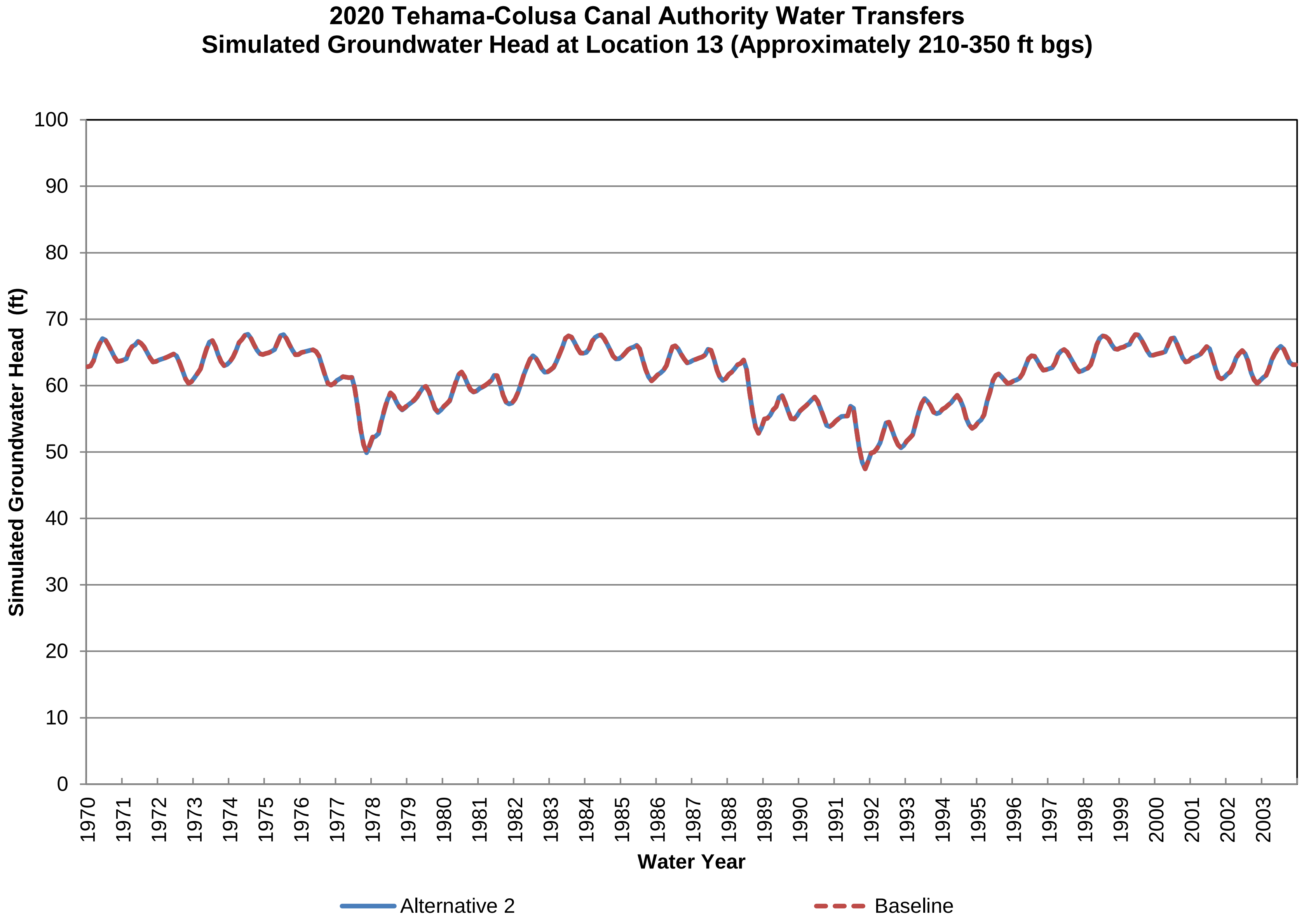
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 13 (Approximately 210-350 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
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0
1970
1971
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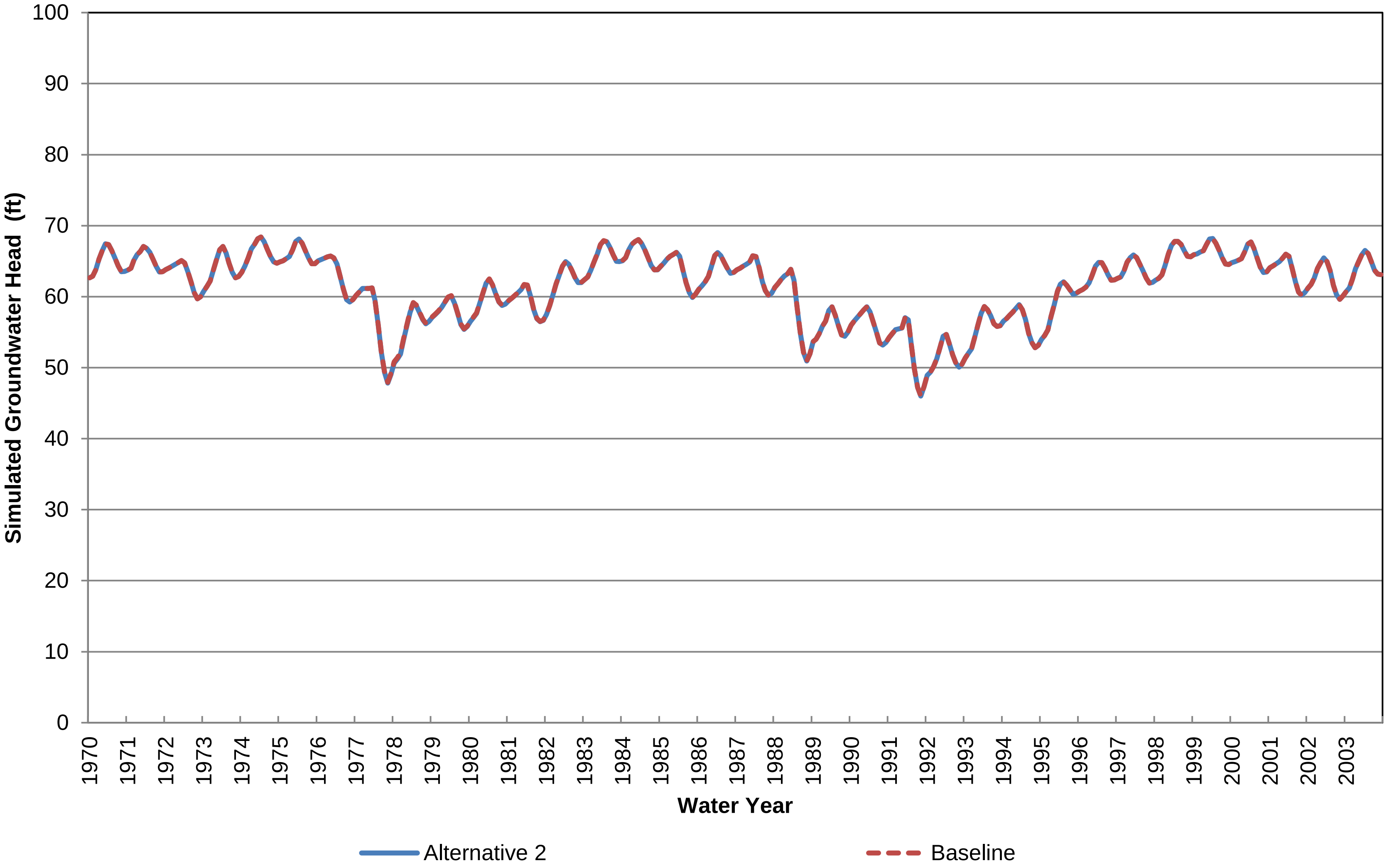
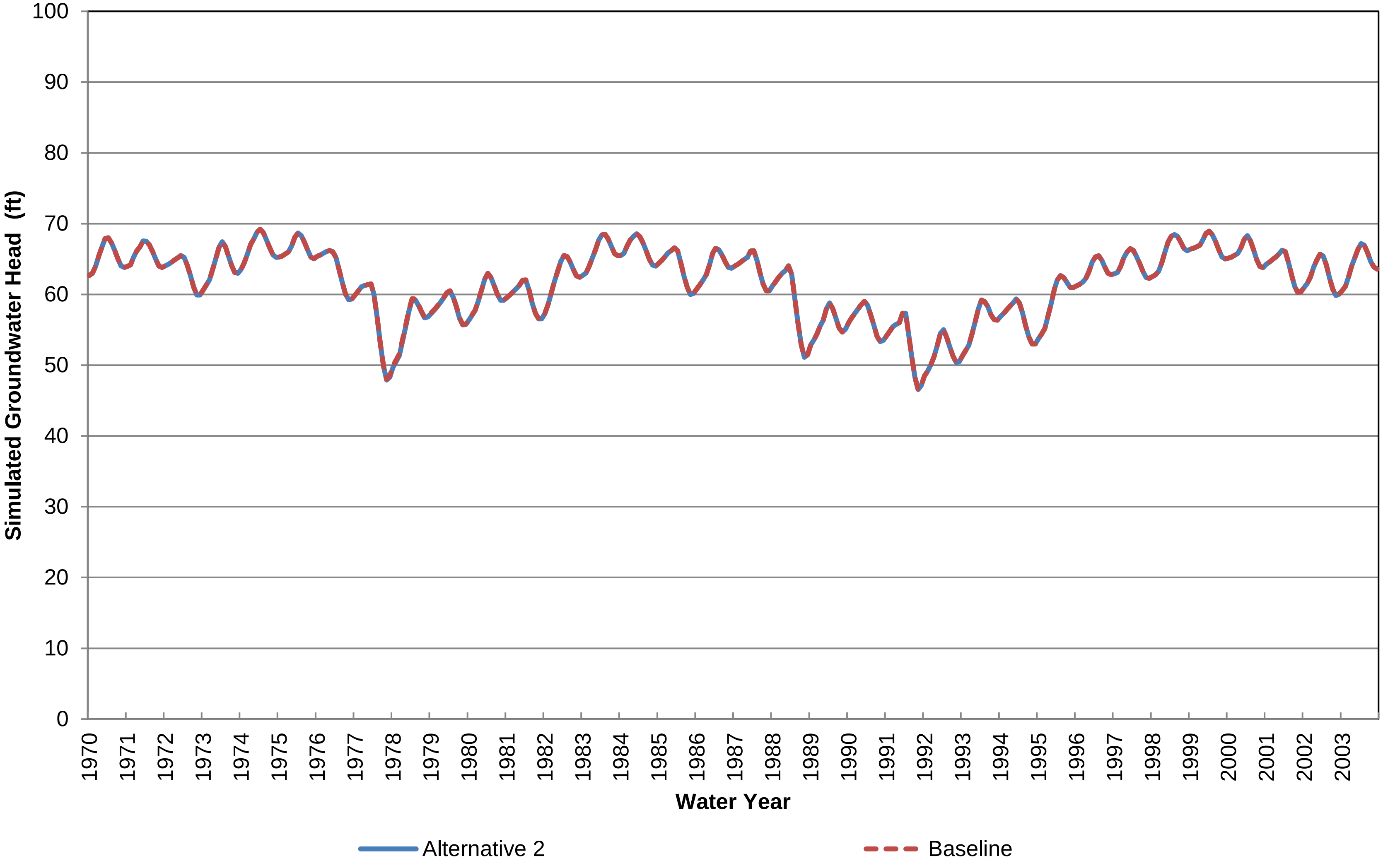
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

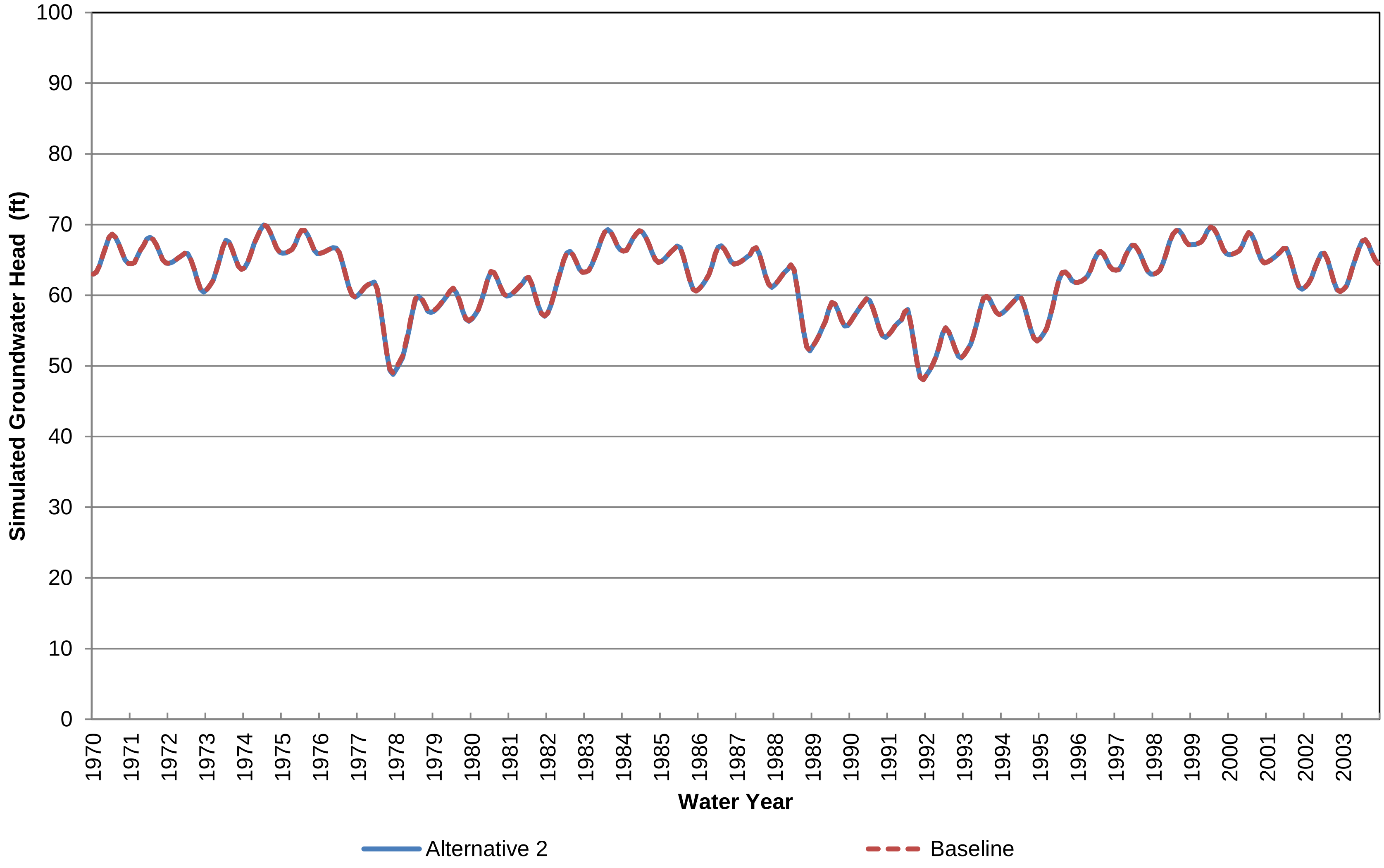
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 13 (Approximately 350-490 ft bgs)



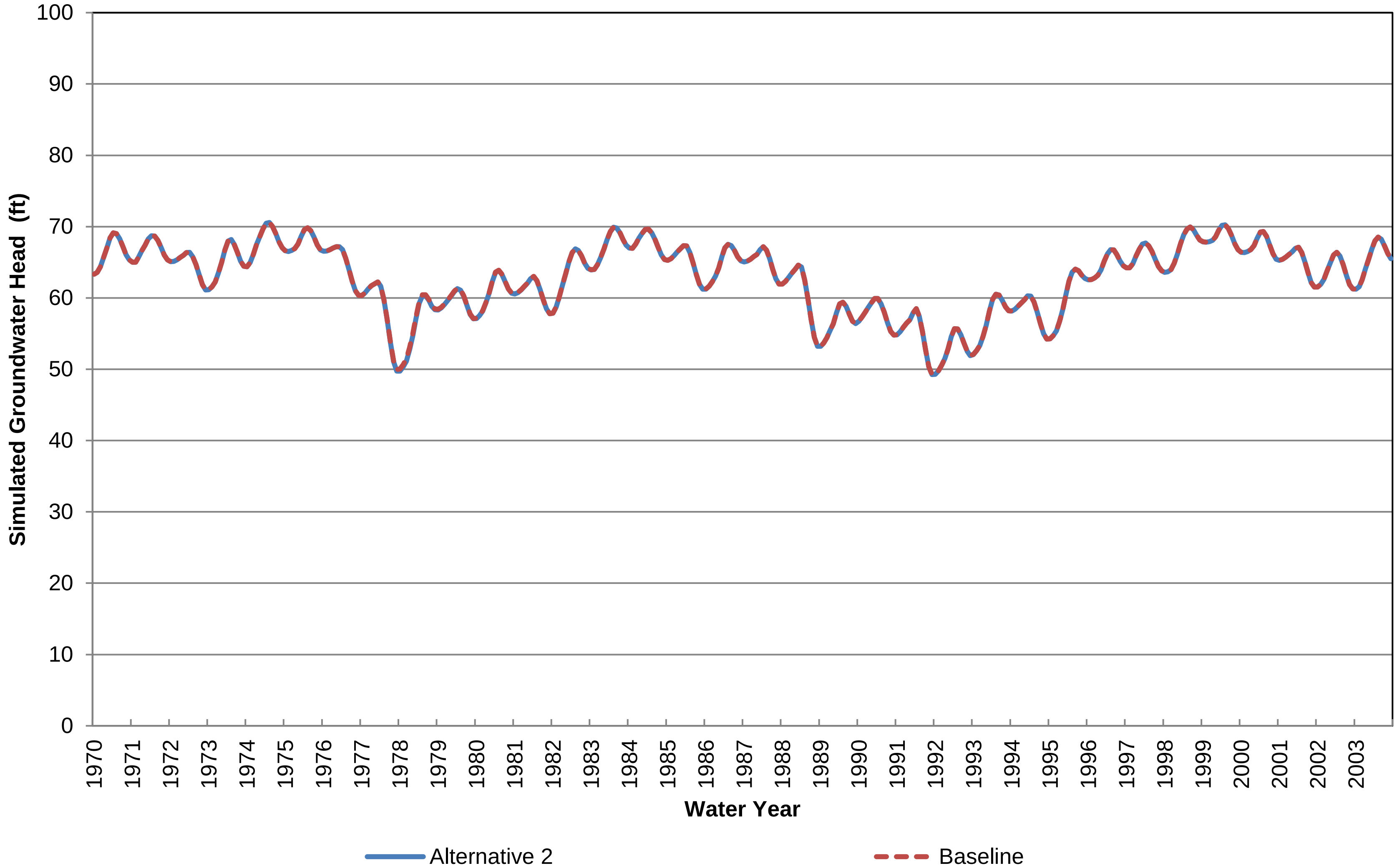
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 13 (Approximately 490-700 ft bgs)



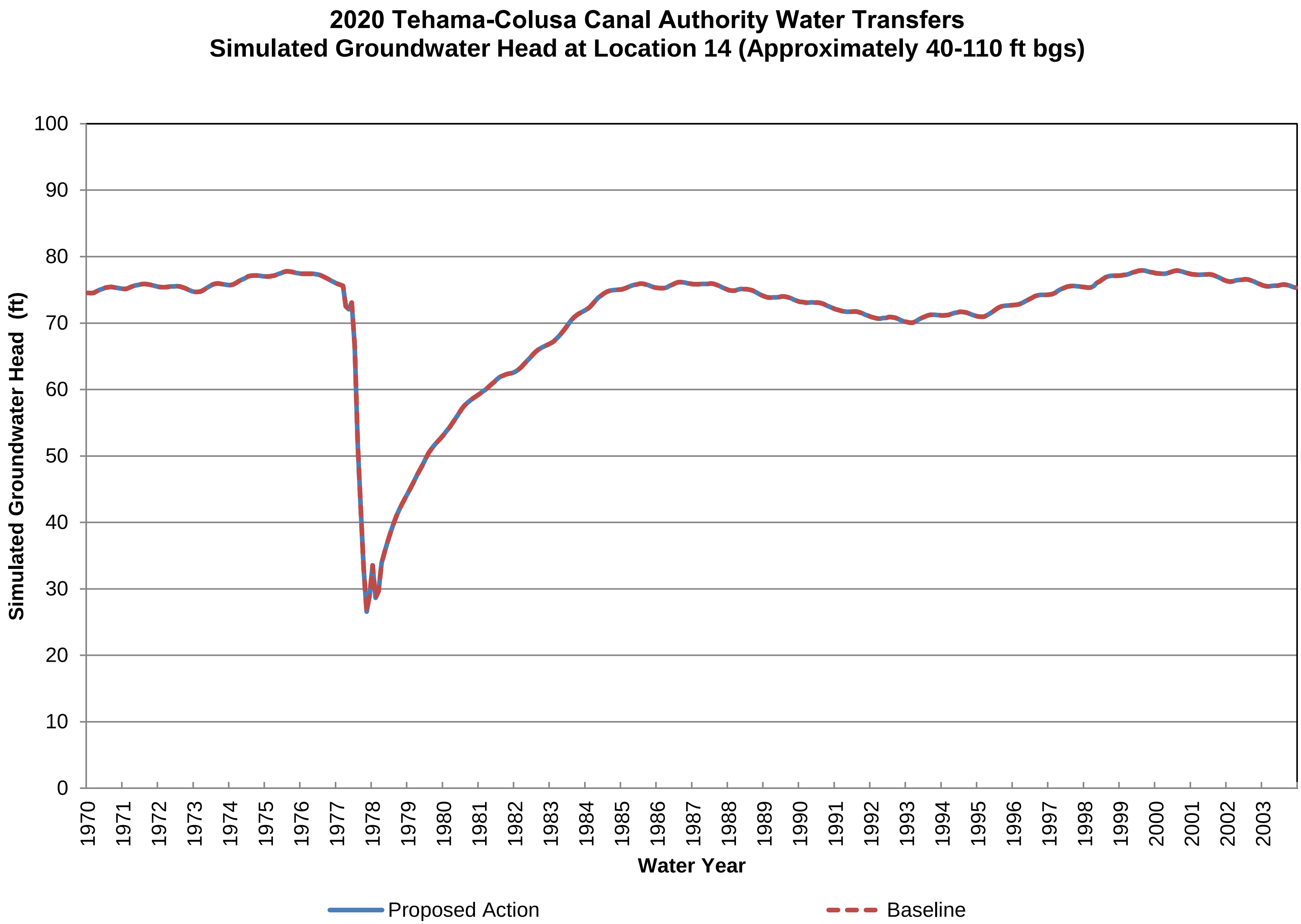
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 13 (Approximately 700-930 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 13 (Approximately 930-1280 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 14 (Approximately 0-40 ft bgs)


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 14 (Approximately 40-110 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
1972
1973
1974
1975
1976
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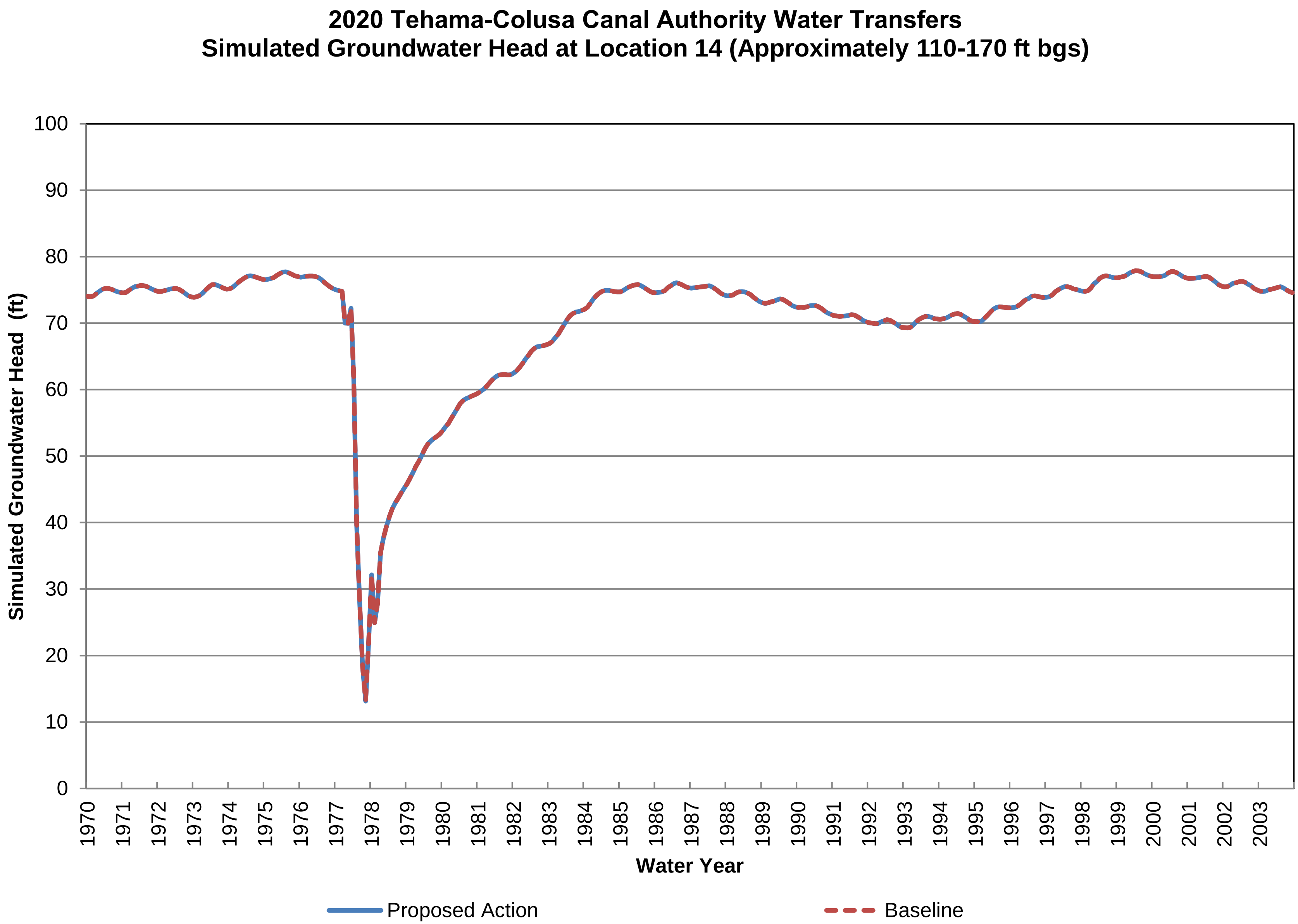
2001
2002
2003
Water Year
Proposed Action
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 14 (Approximately 110-170 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1970
1971
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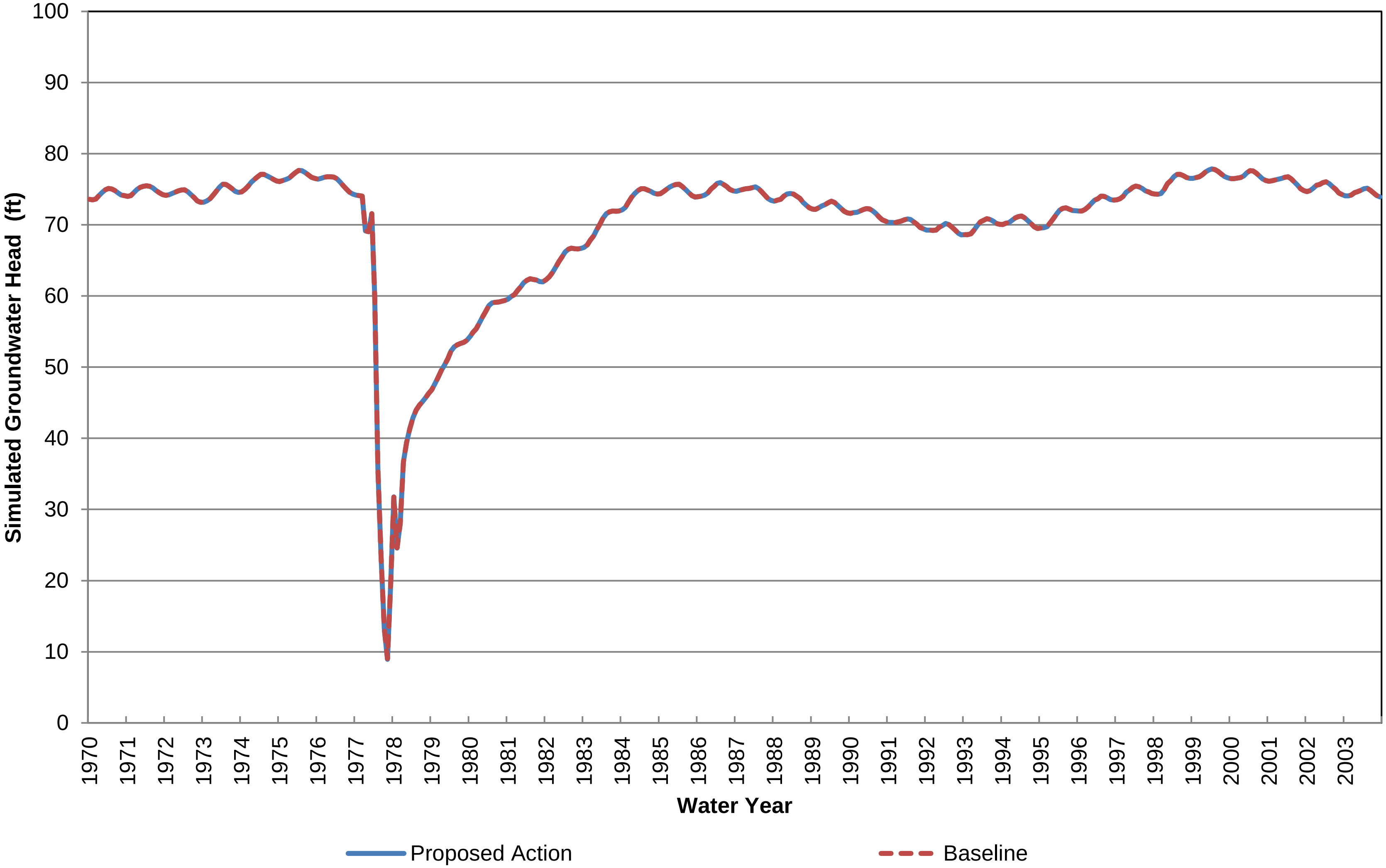
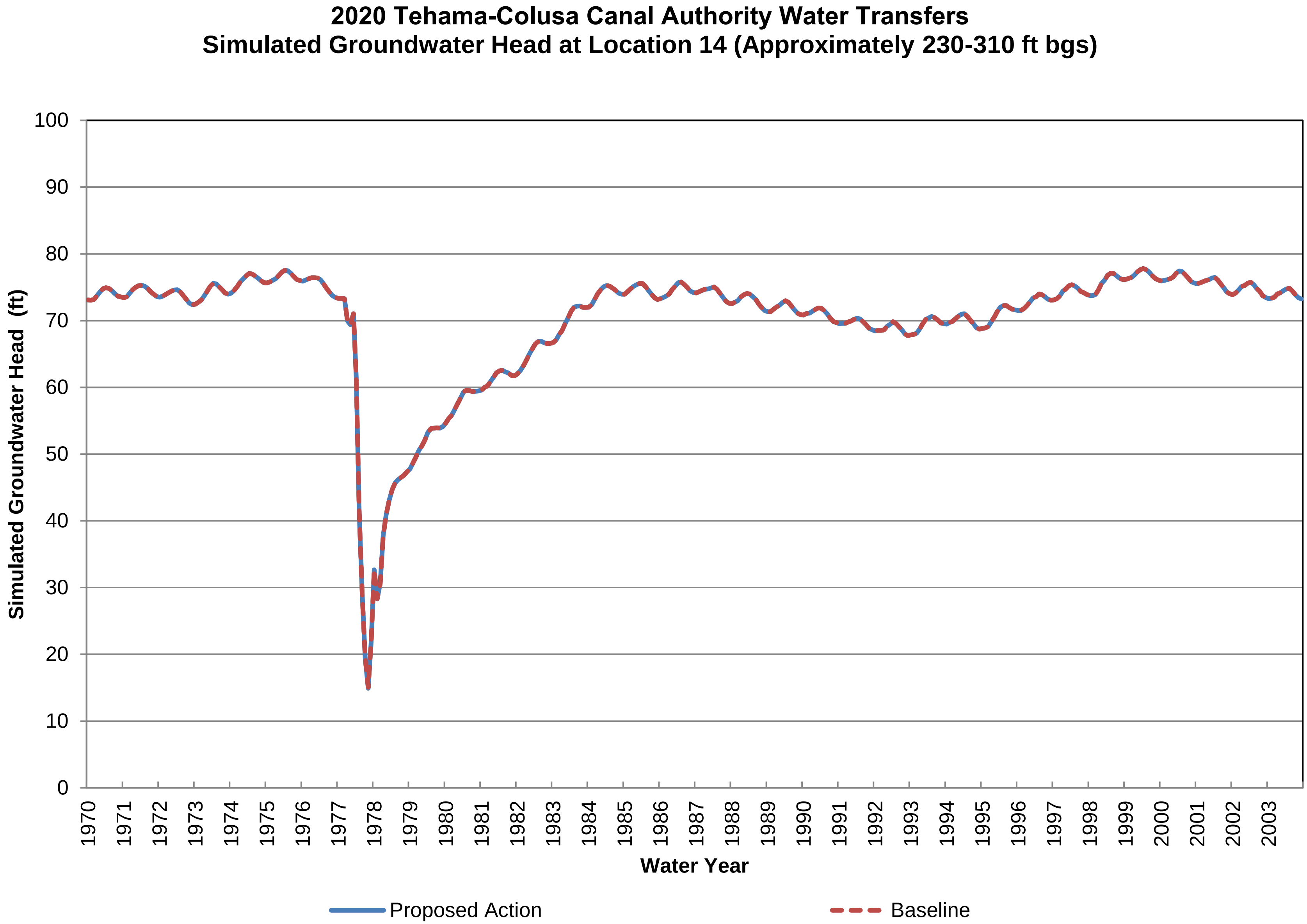
1999
2000
2001
2002
2003
Water Year
Proposed Action
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 14 (Approximately 170-230 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 14 (Approximately 230-310 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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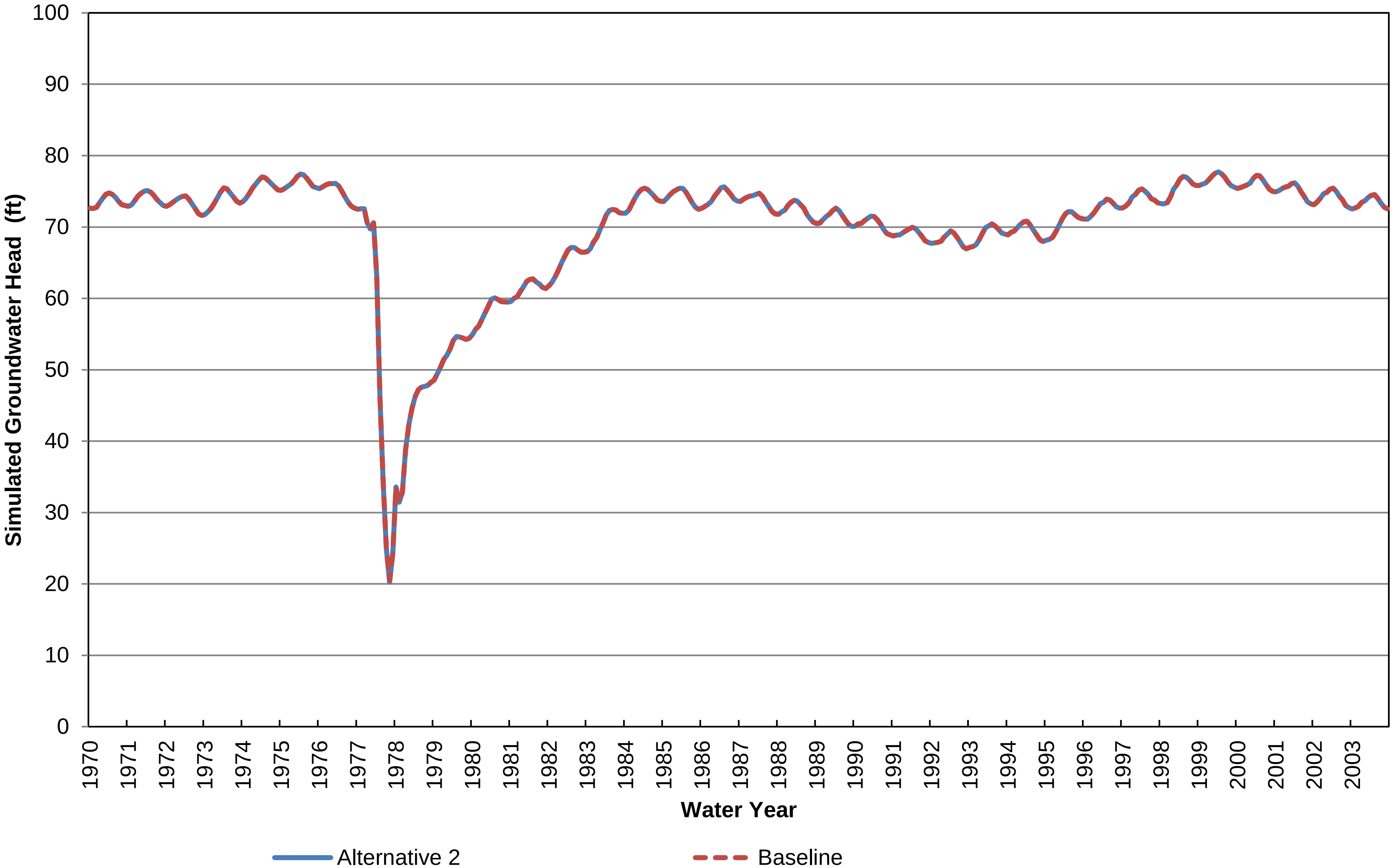
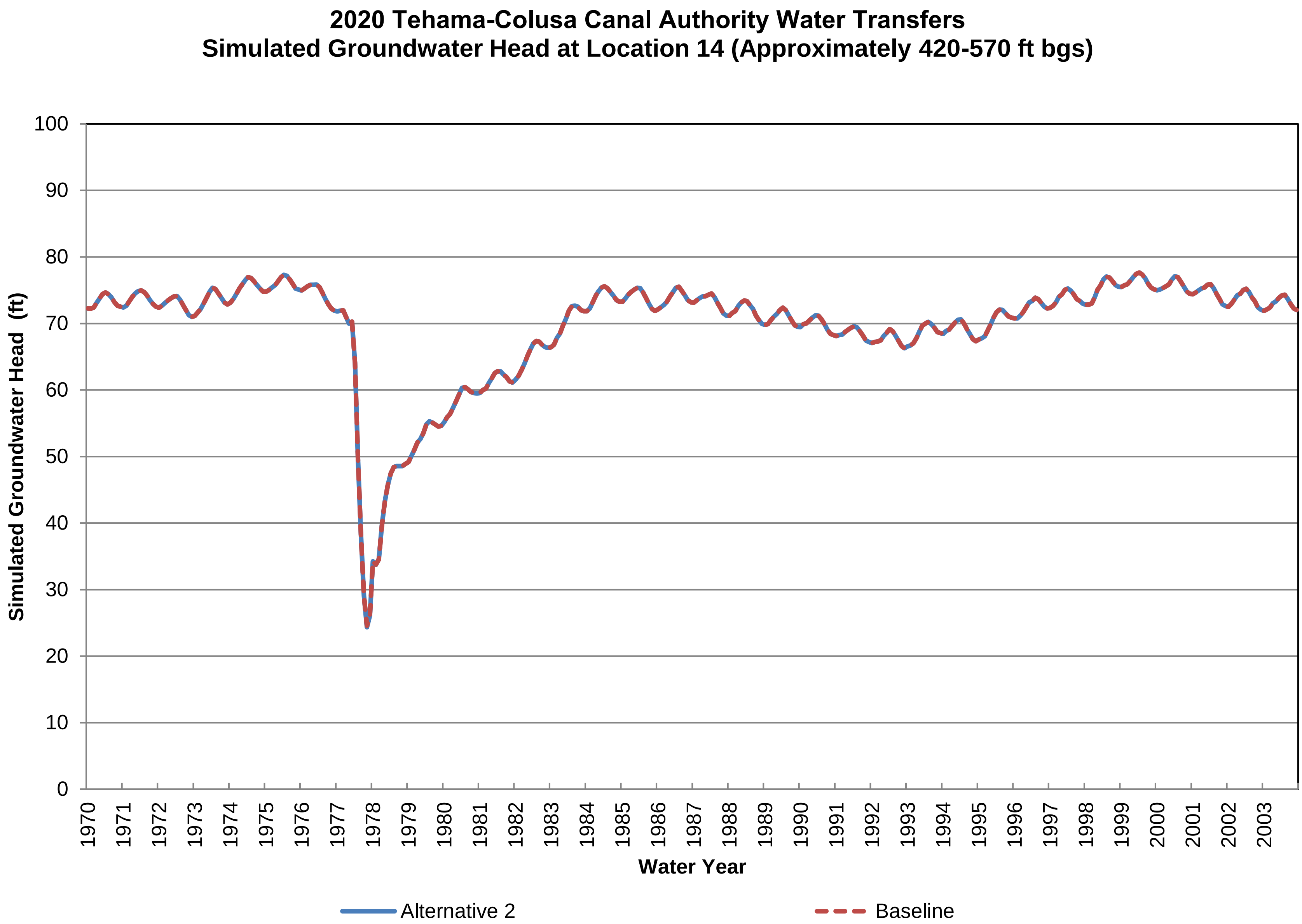
2002
2003
Water Year
Proposed Action
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 14 (Approximately 310-420 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 14 (Approximately 420-570 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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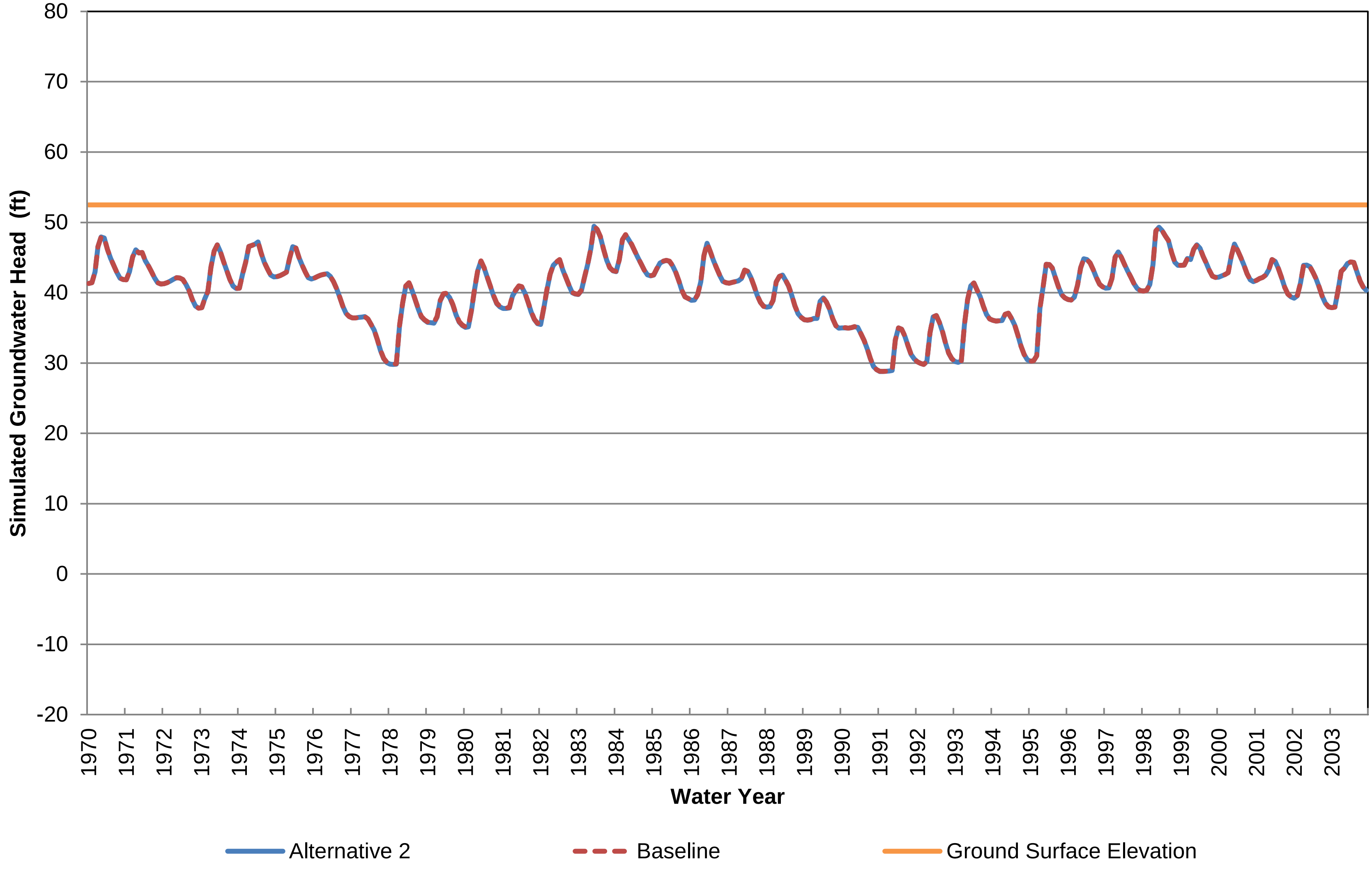
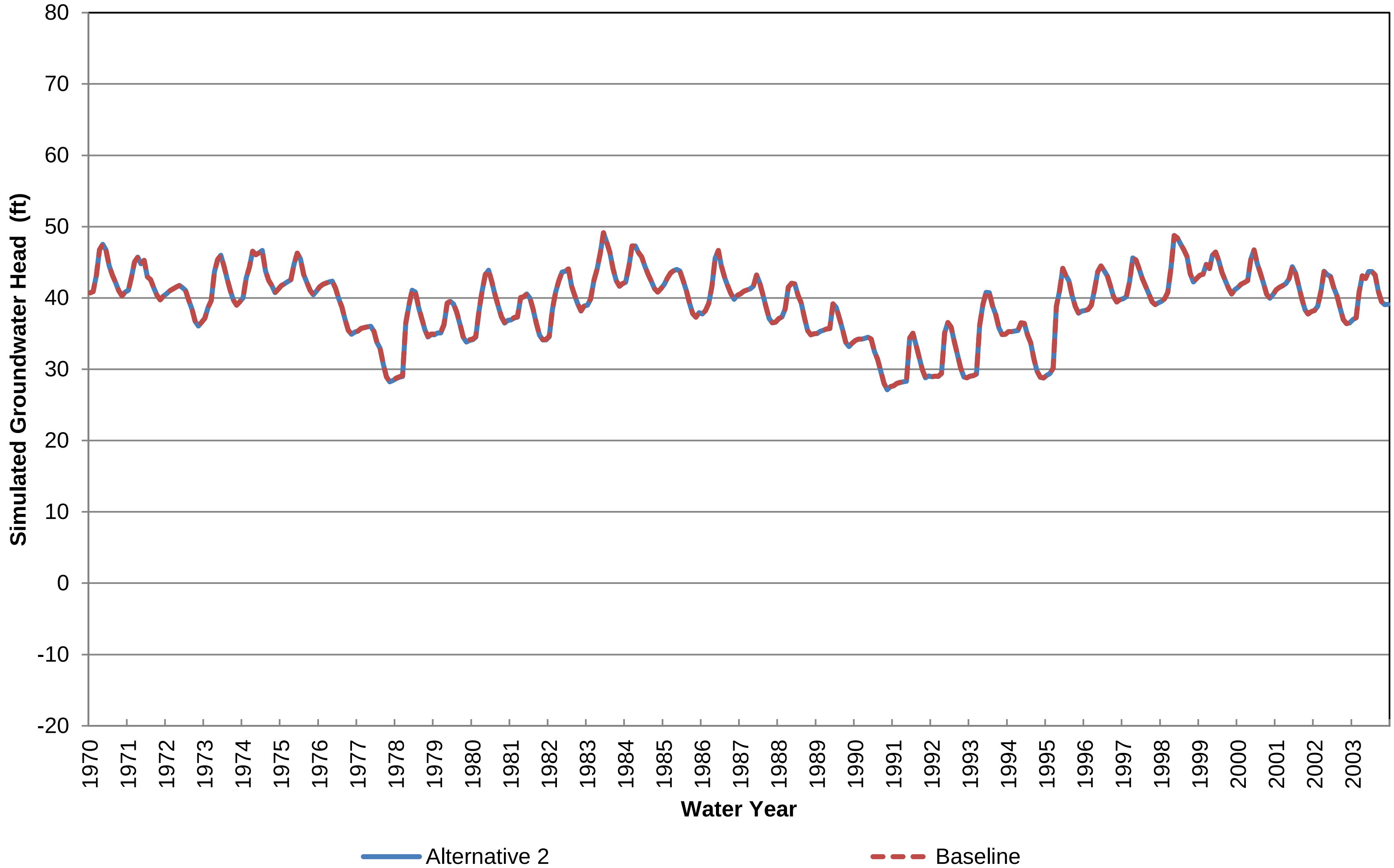
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

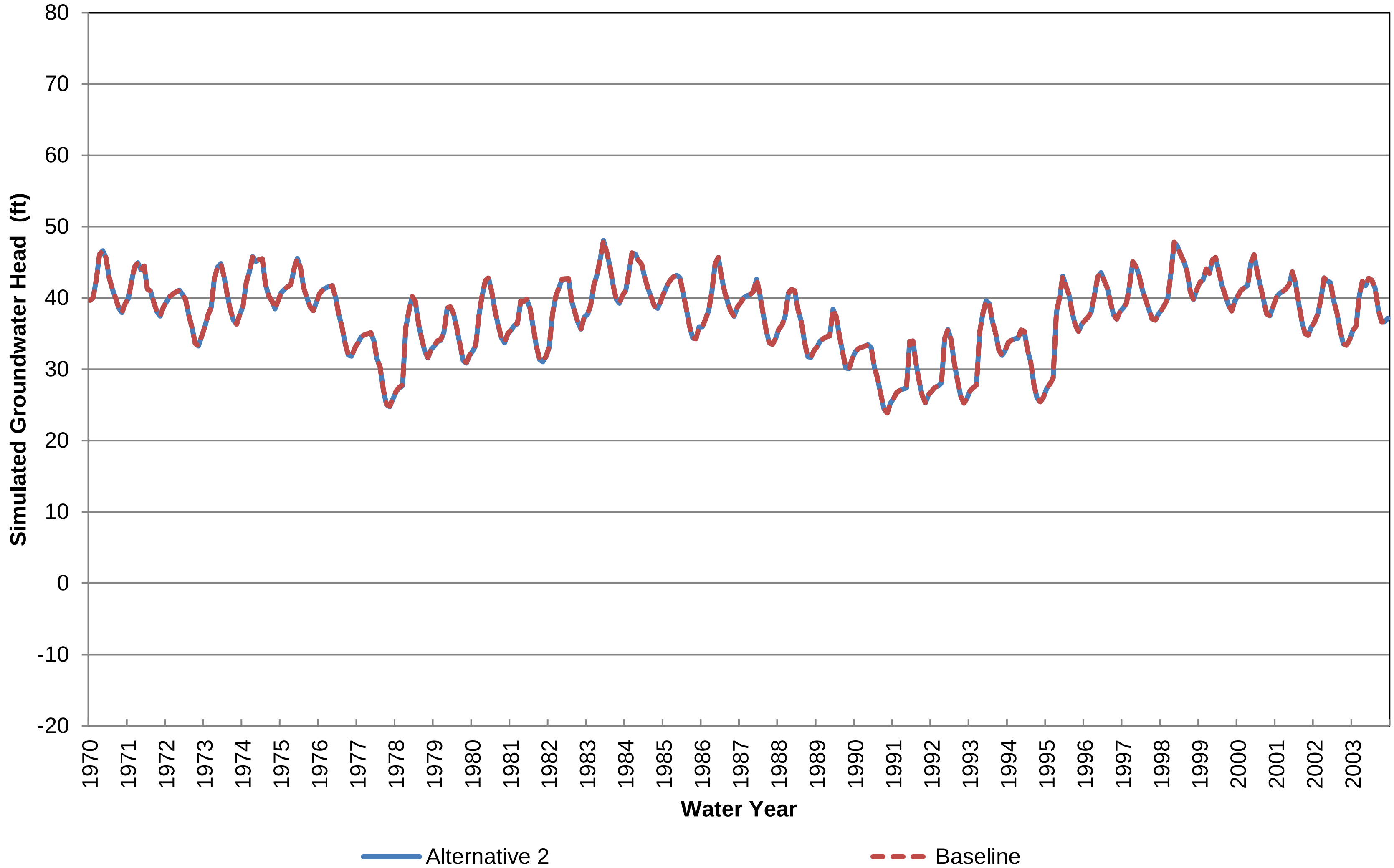
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 15 (Approximately 0-30 ft bgs)



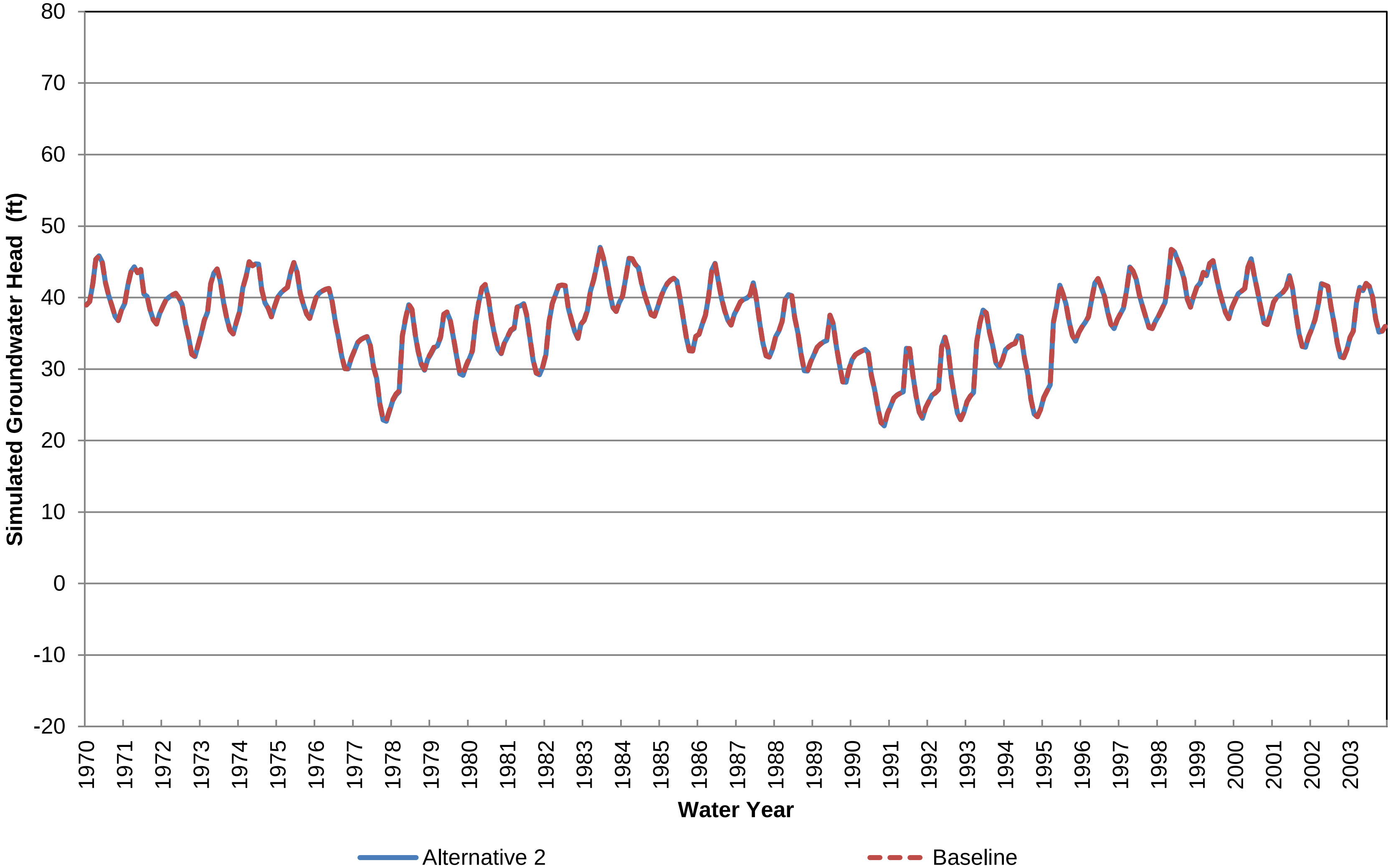
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 15 (Approximately 30-70 ft bgs)

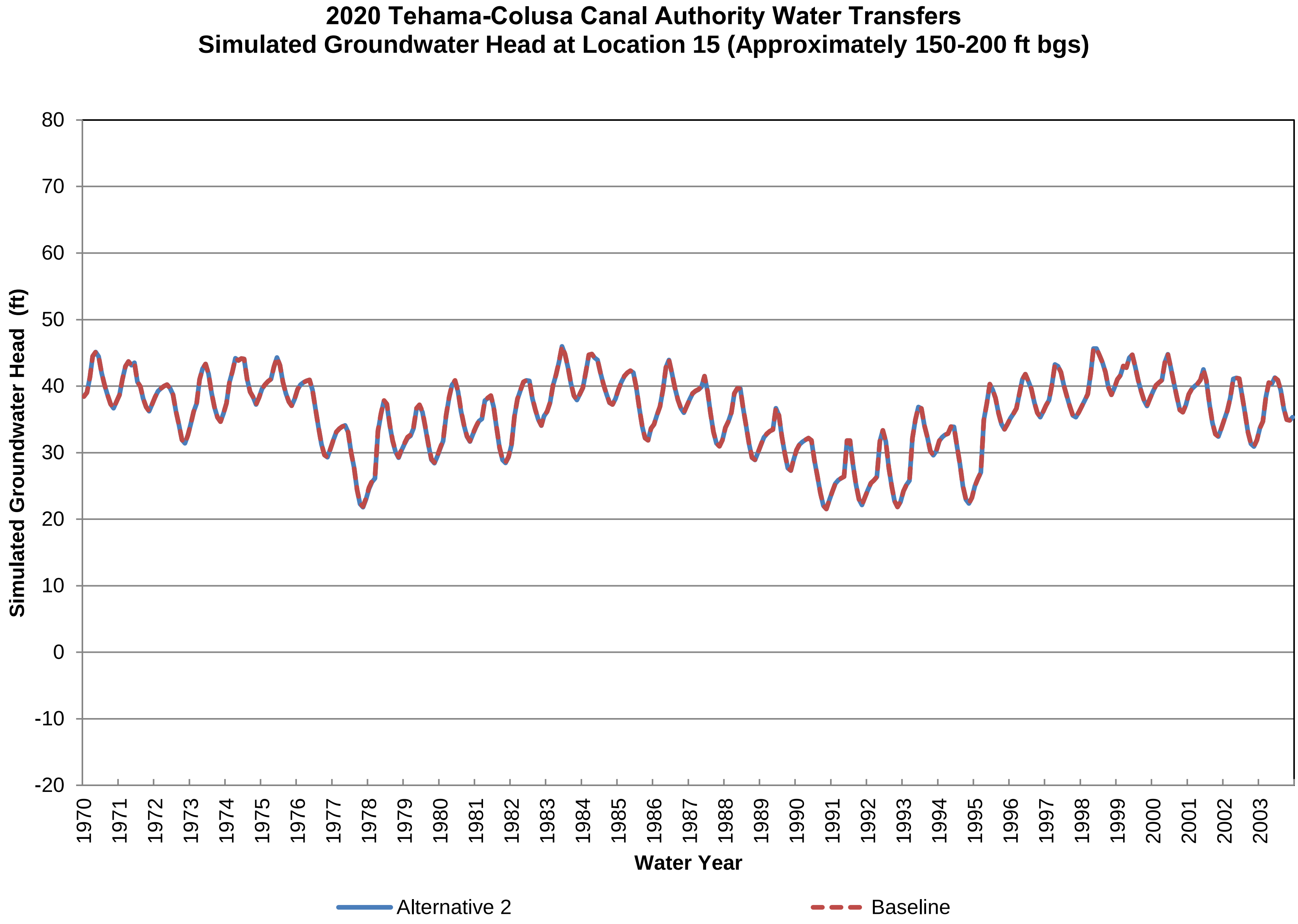


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 15 (Approximately 70-110 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 15 (Approximately 110-150 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 15 (Approximately 150-200 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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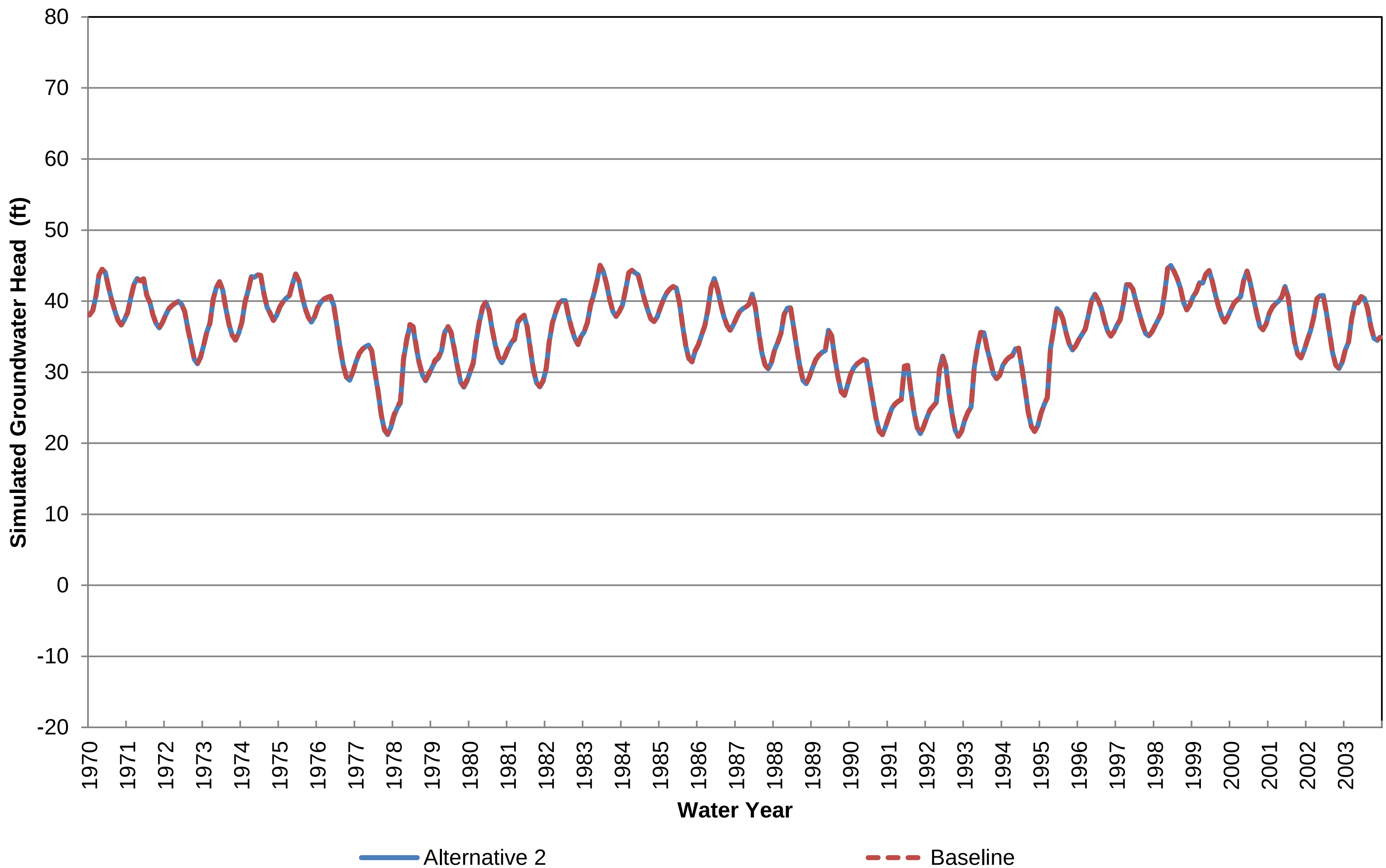
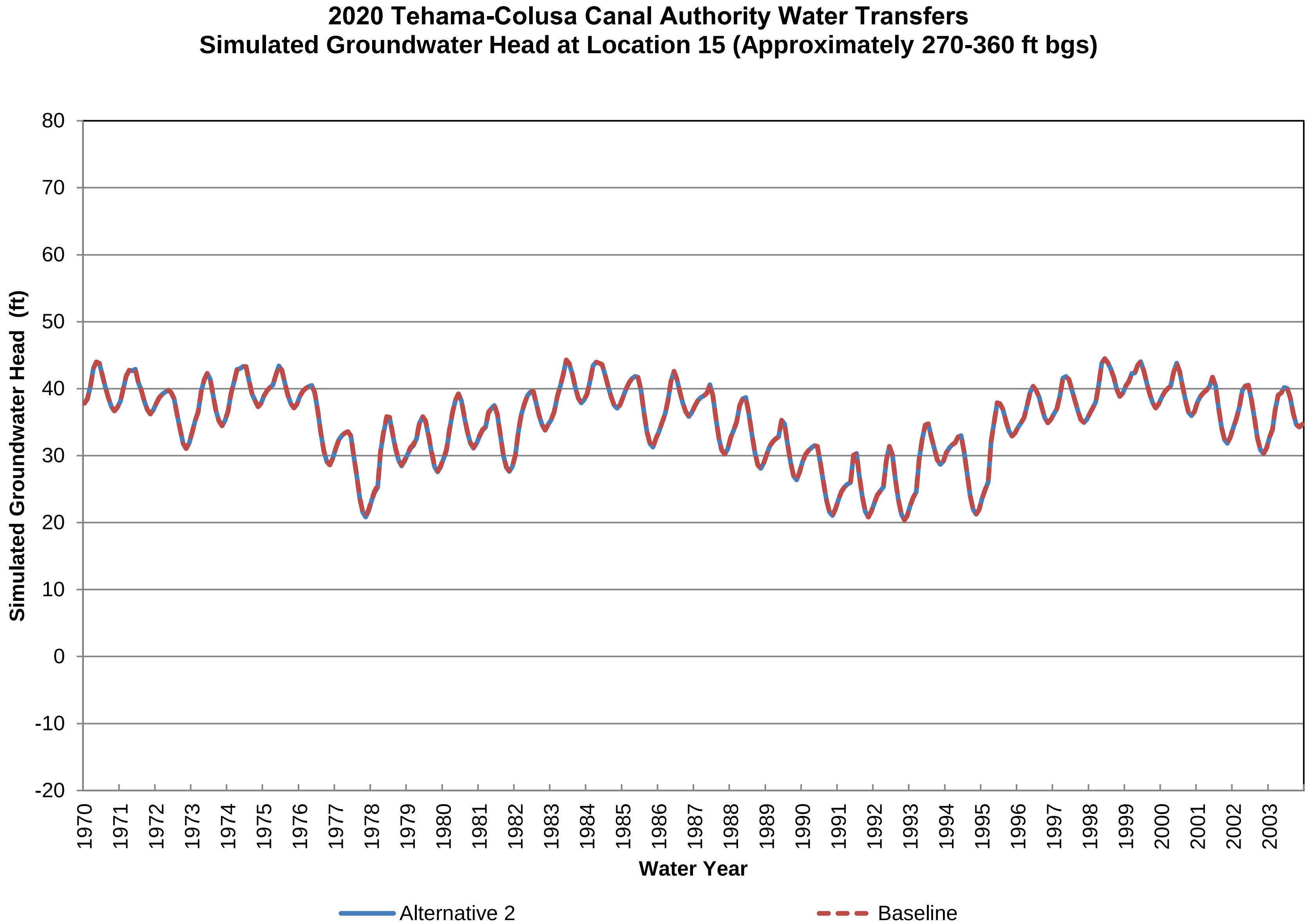
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 15 (Approximately 200-270 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 15 (Approximately 270-360 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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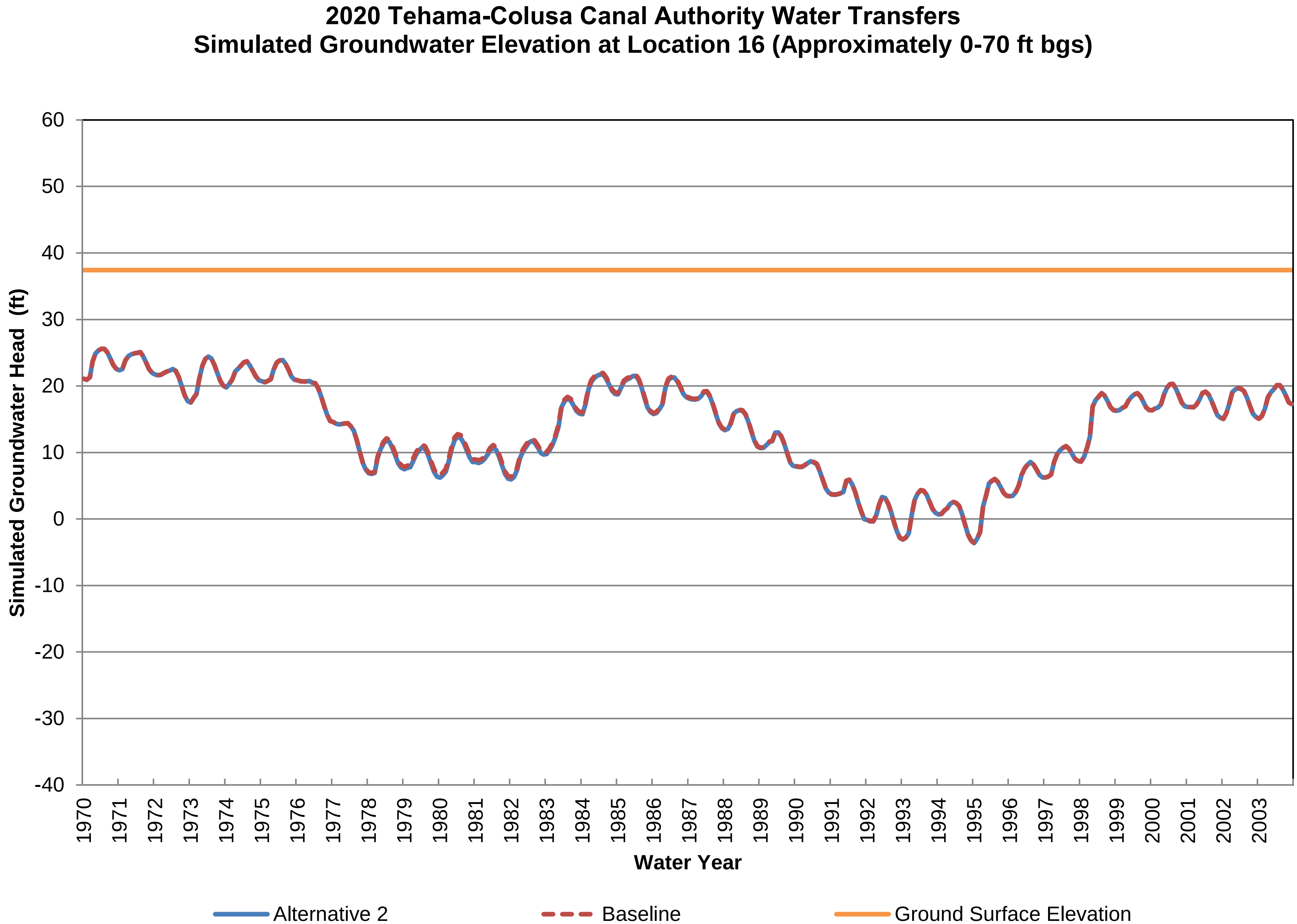
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 16 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
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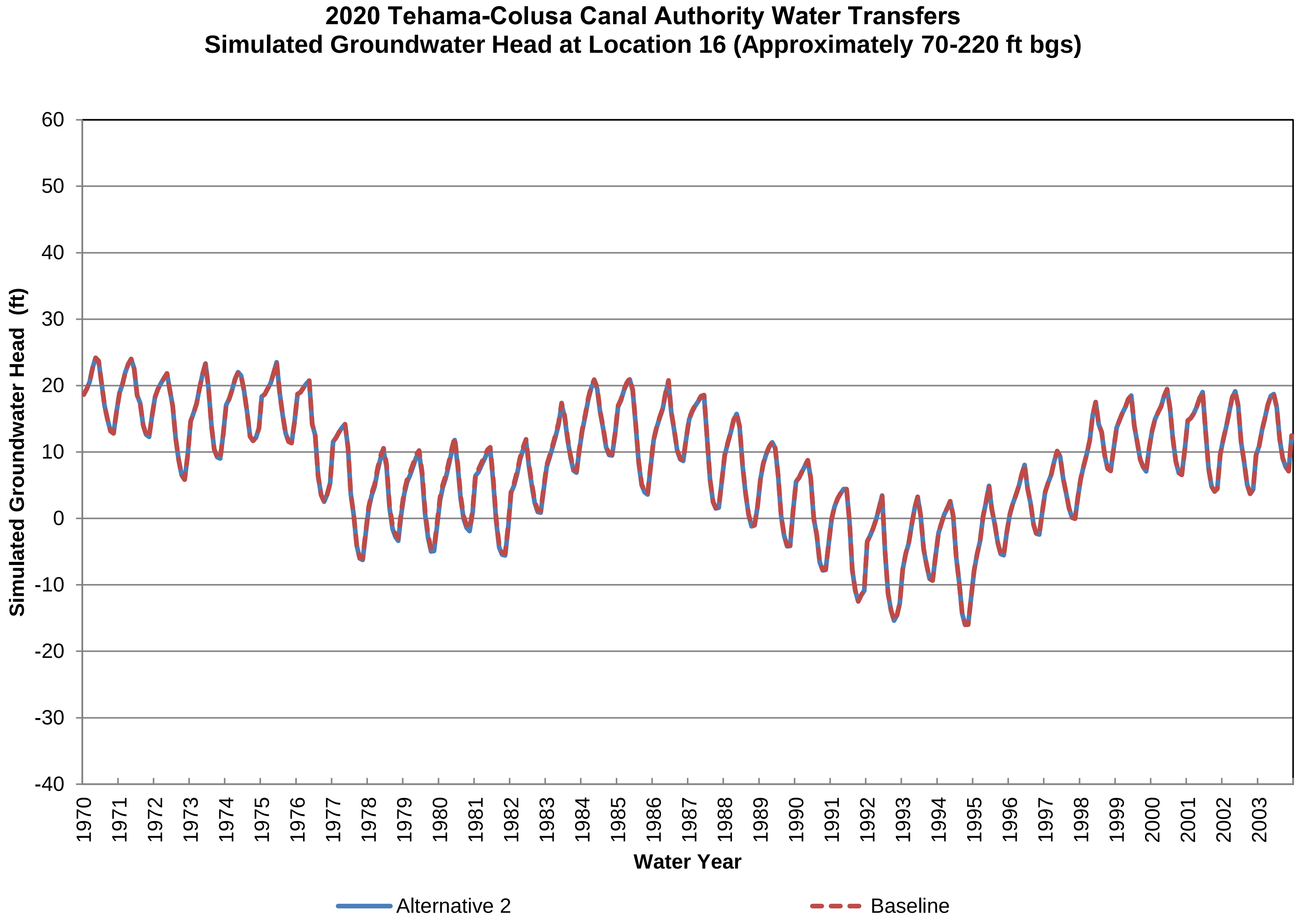
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 16 (Approximately 70-220 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
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1998
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2000
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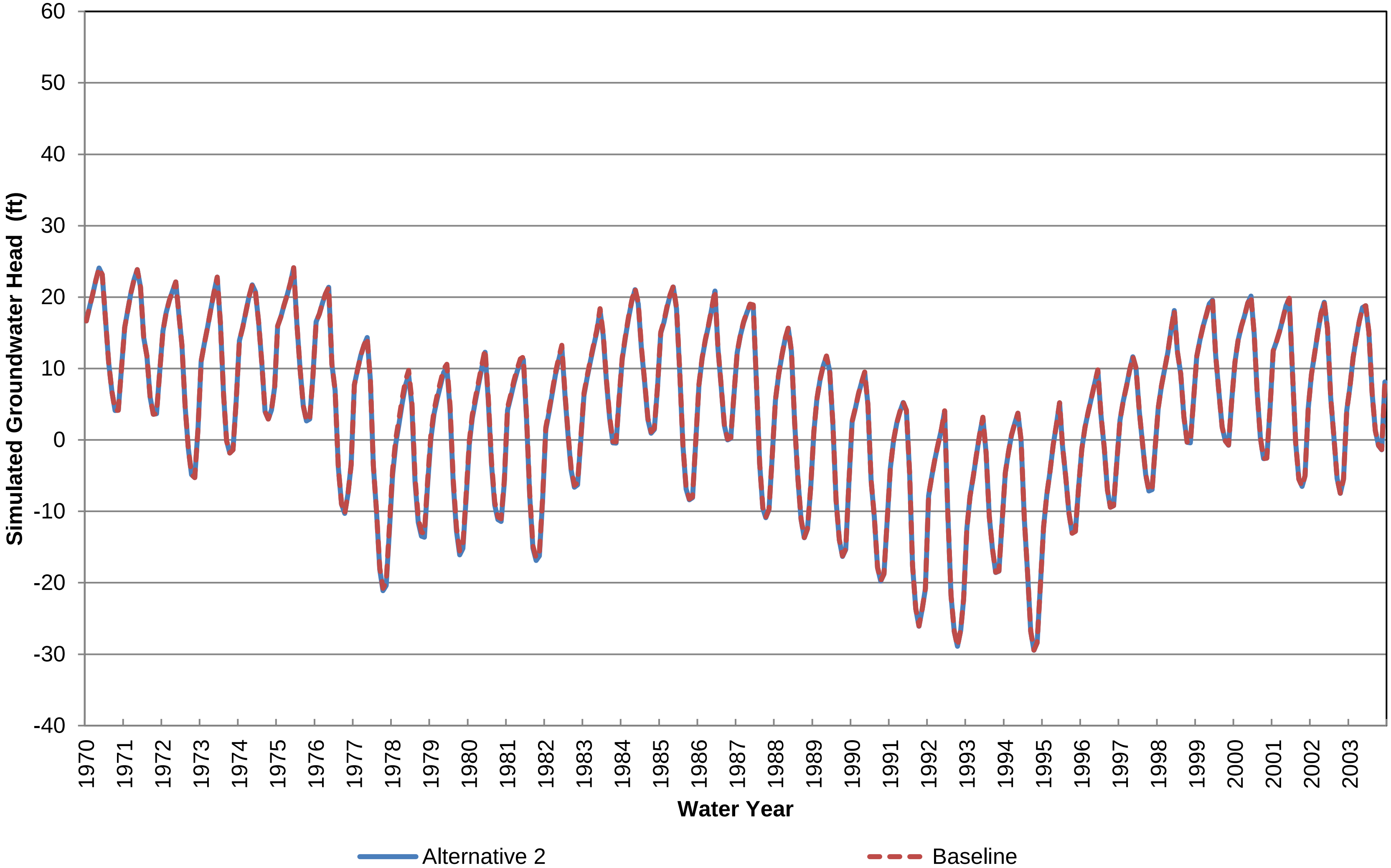
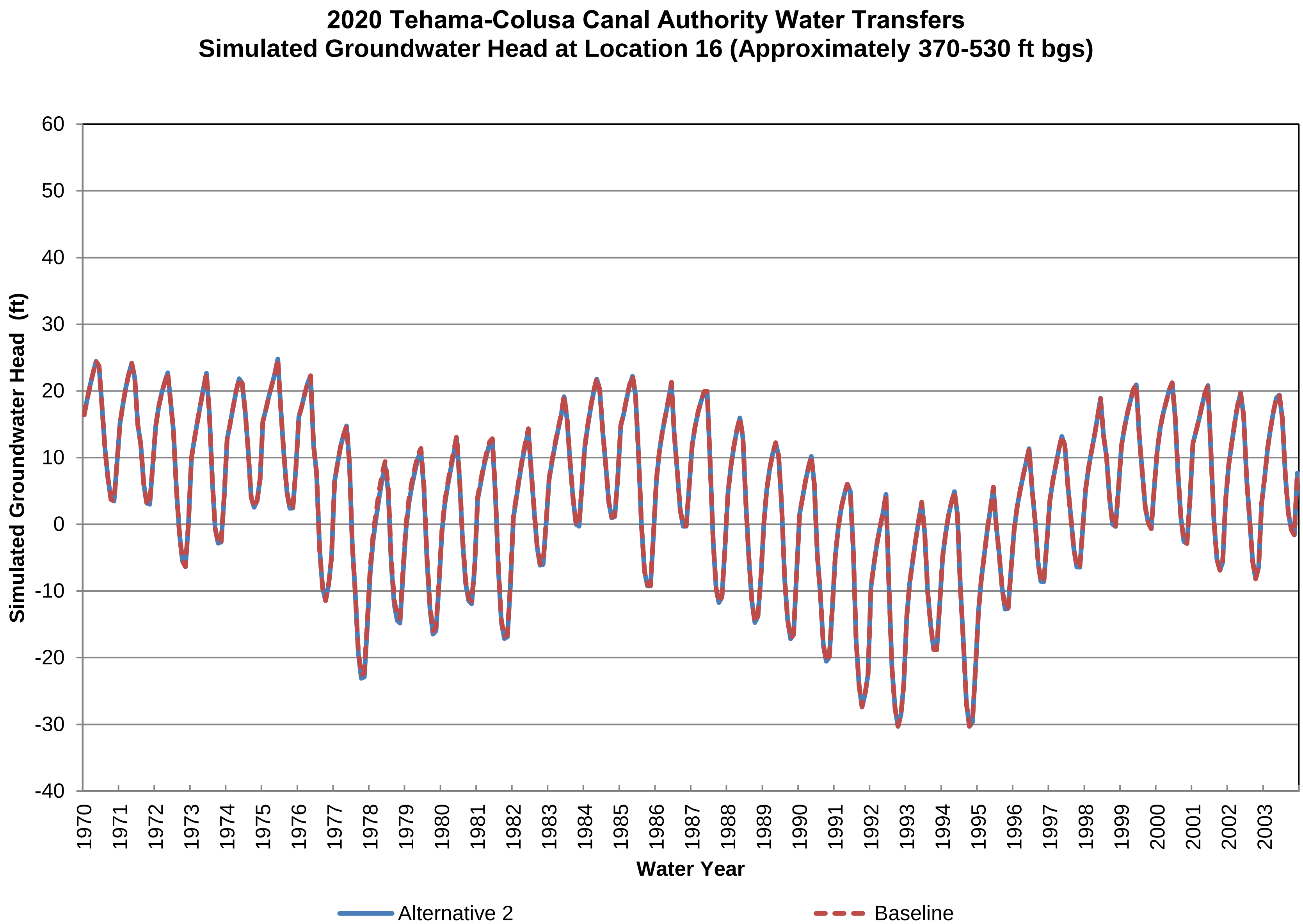
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 16 (Approximately 220-370 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 16 (Approximately 370-530 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
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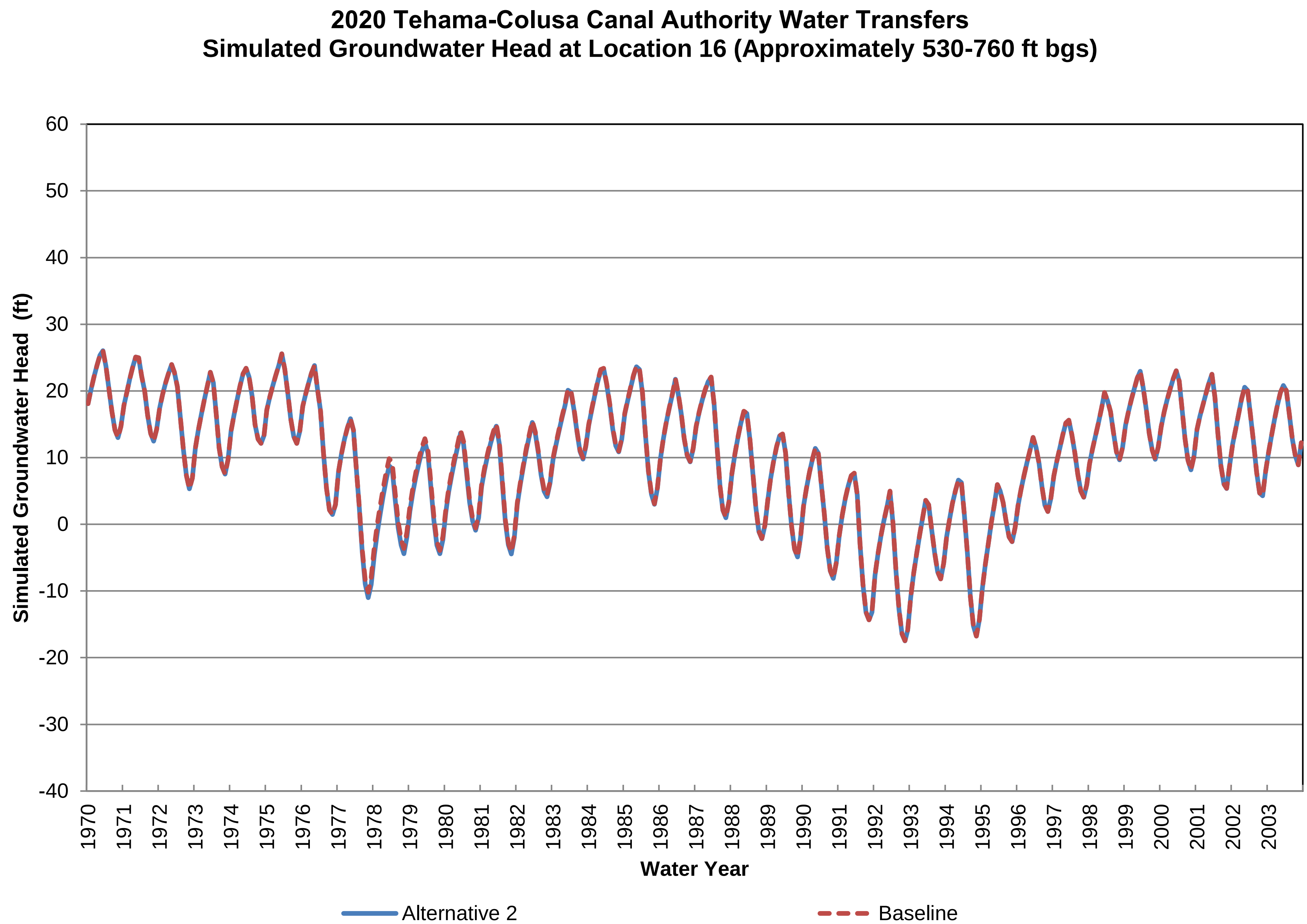
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 16 (Approximately 530-760 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
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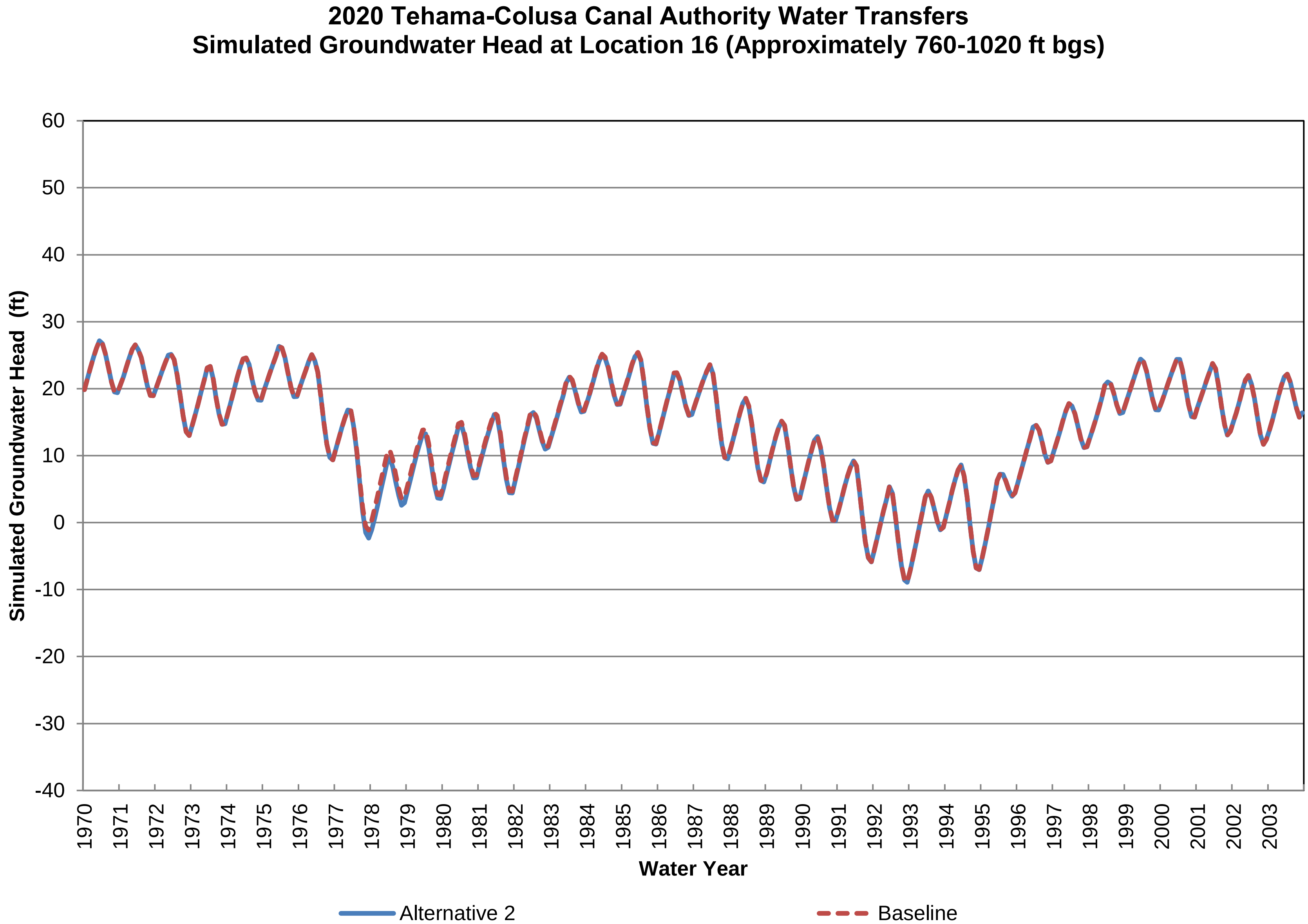
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 16 (Approximately 760-1020 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
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1998
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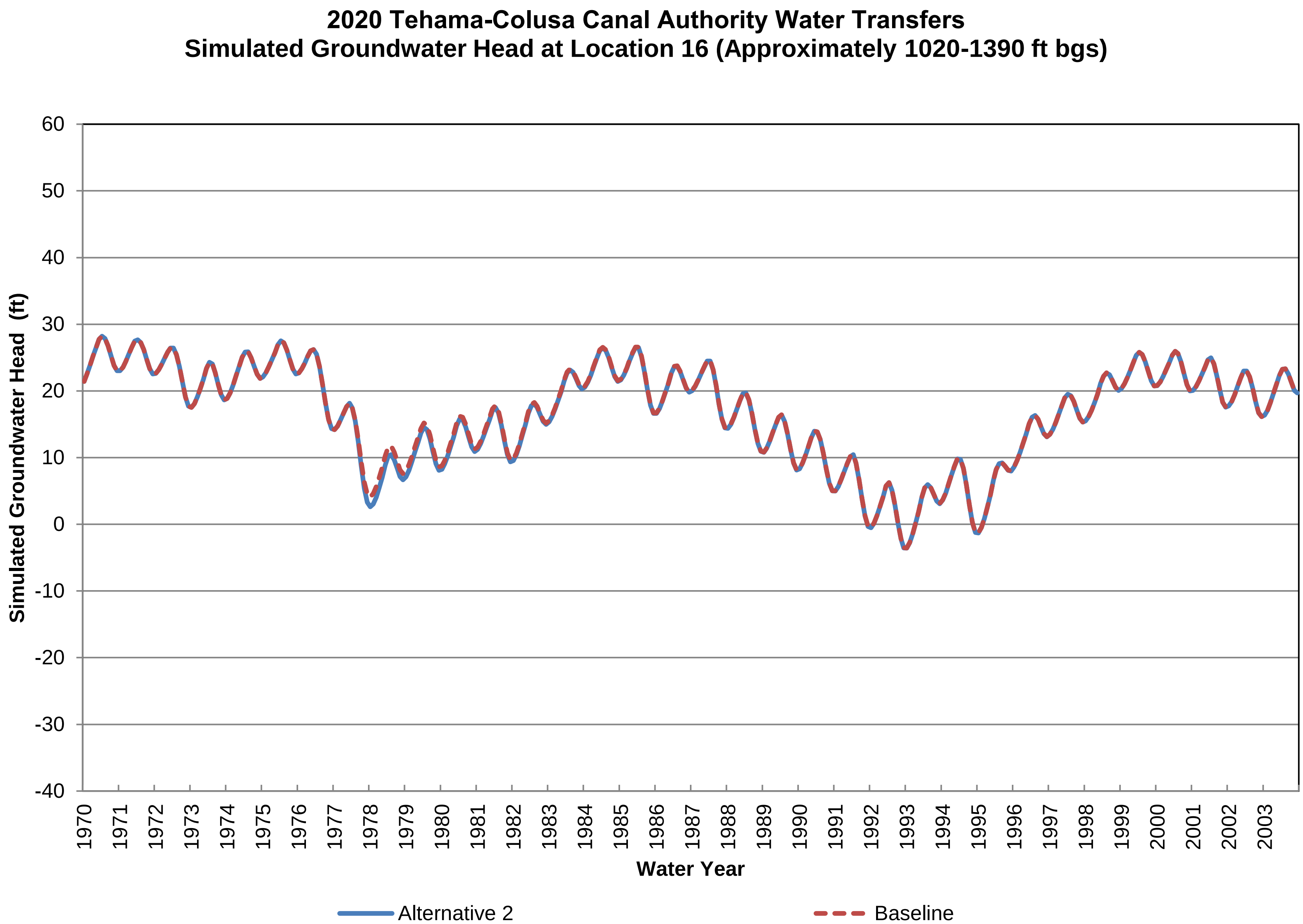
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 16 (Approximately 1020-1390 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
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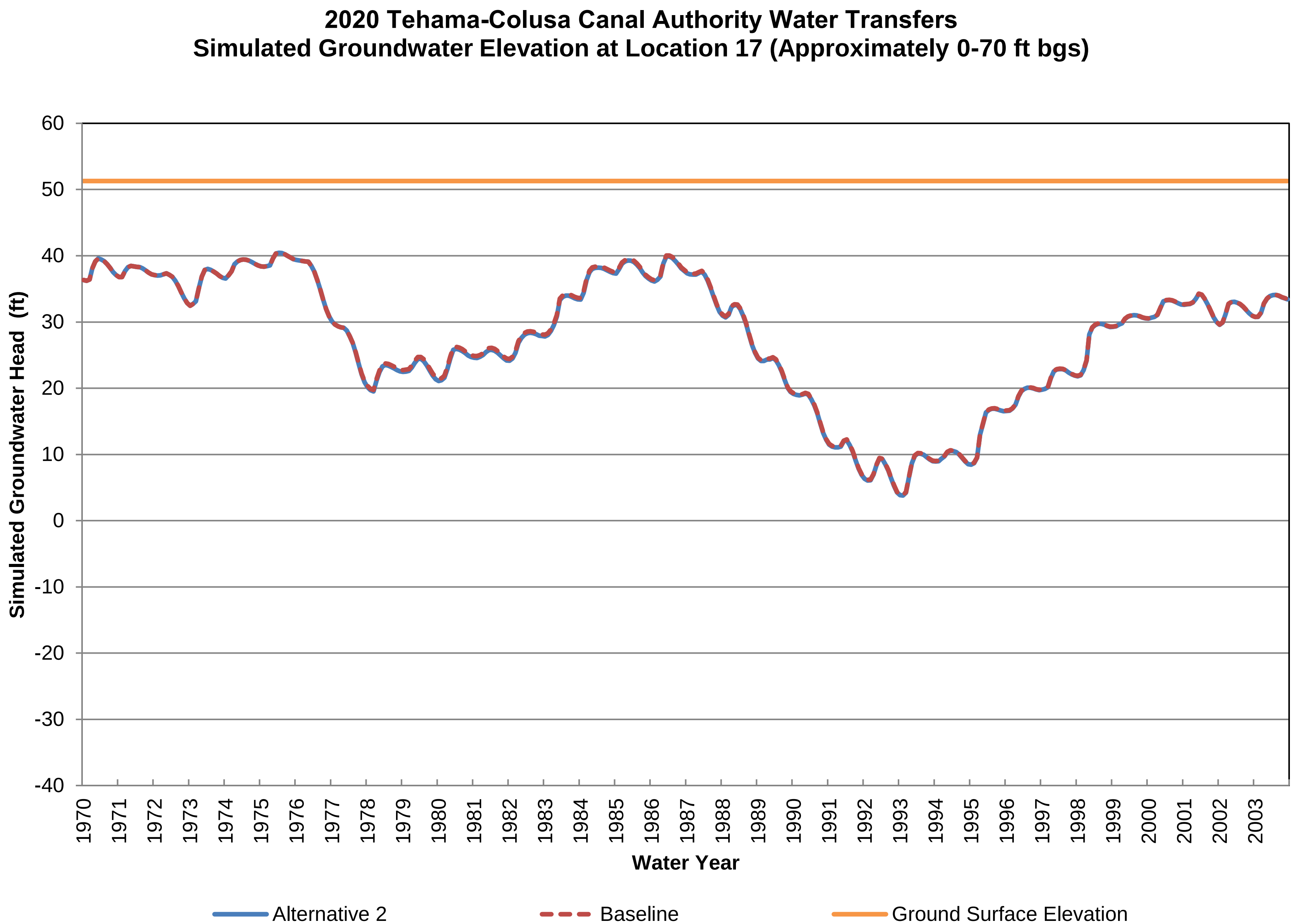
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 17 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1986
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1988
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1992
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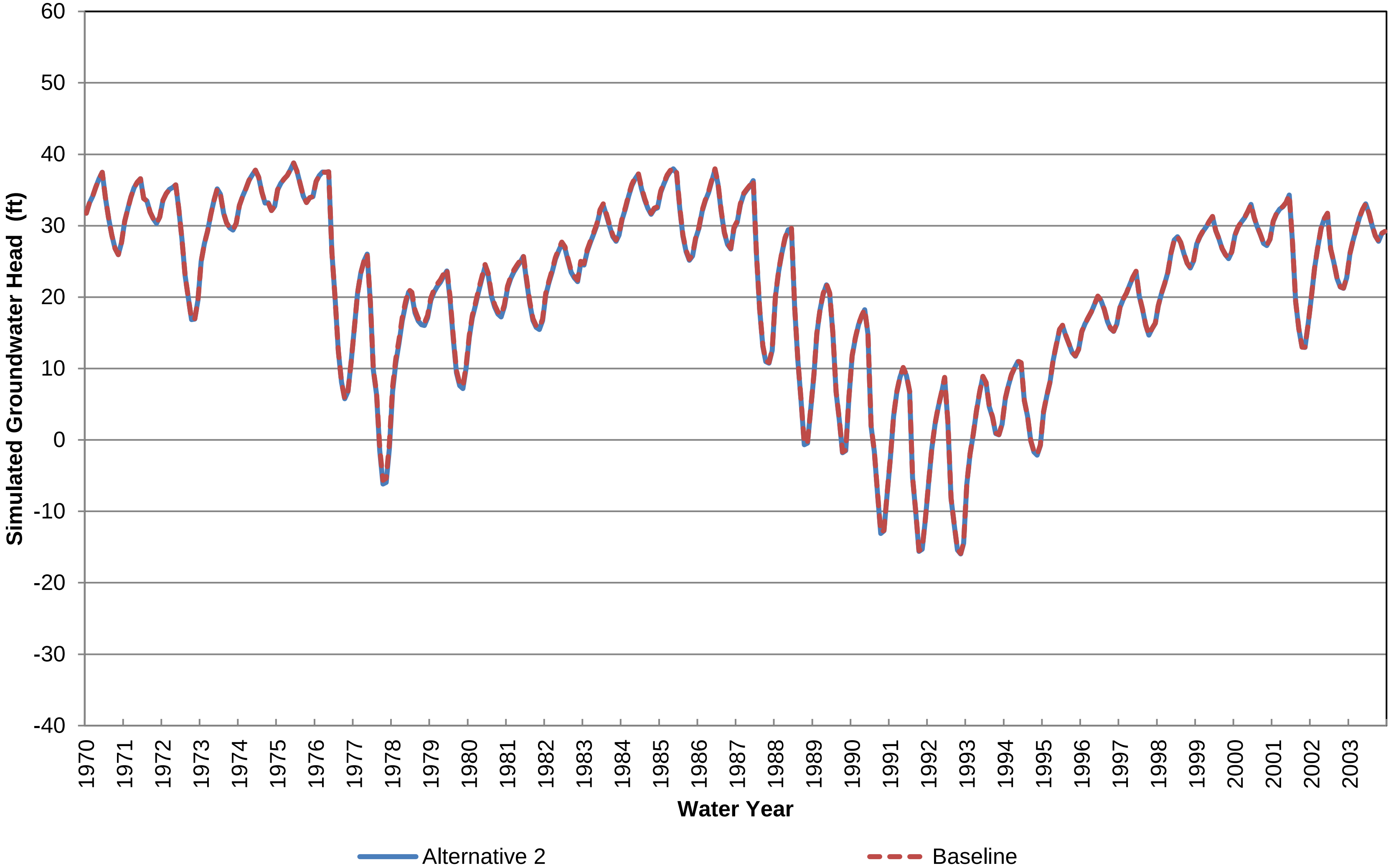
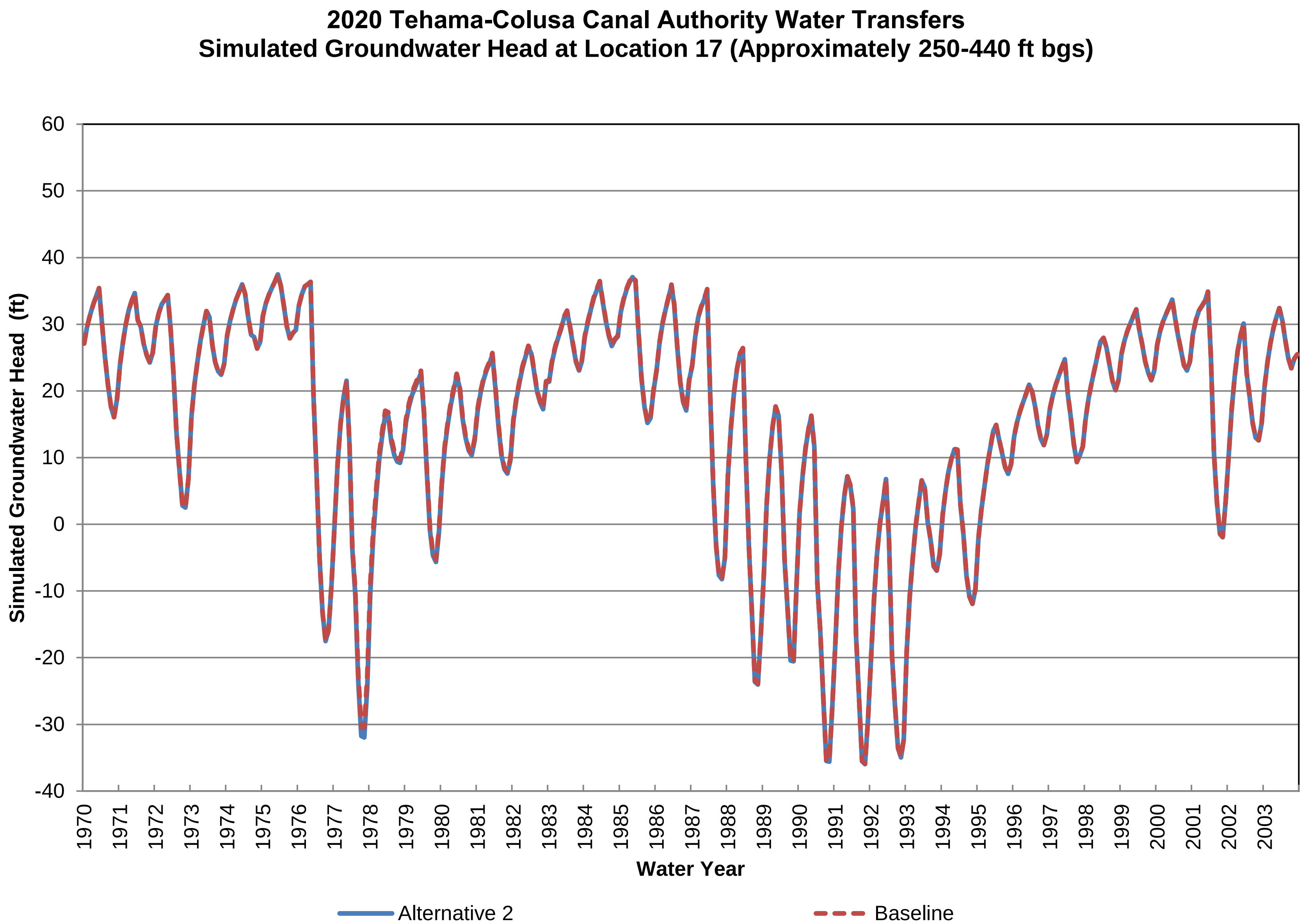
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 17 (Approximately 70-250 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 17 (Approximately 250-440 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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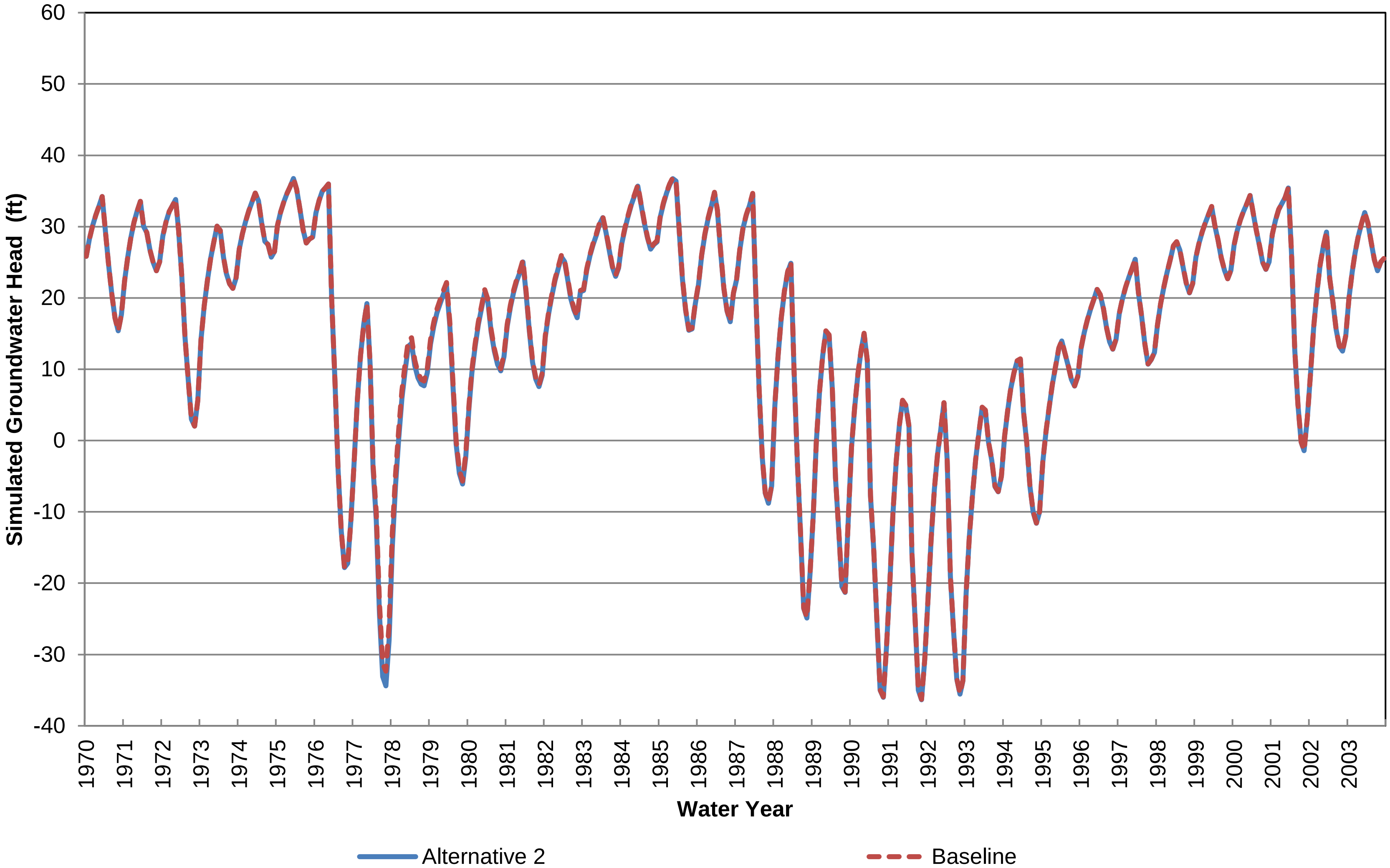
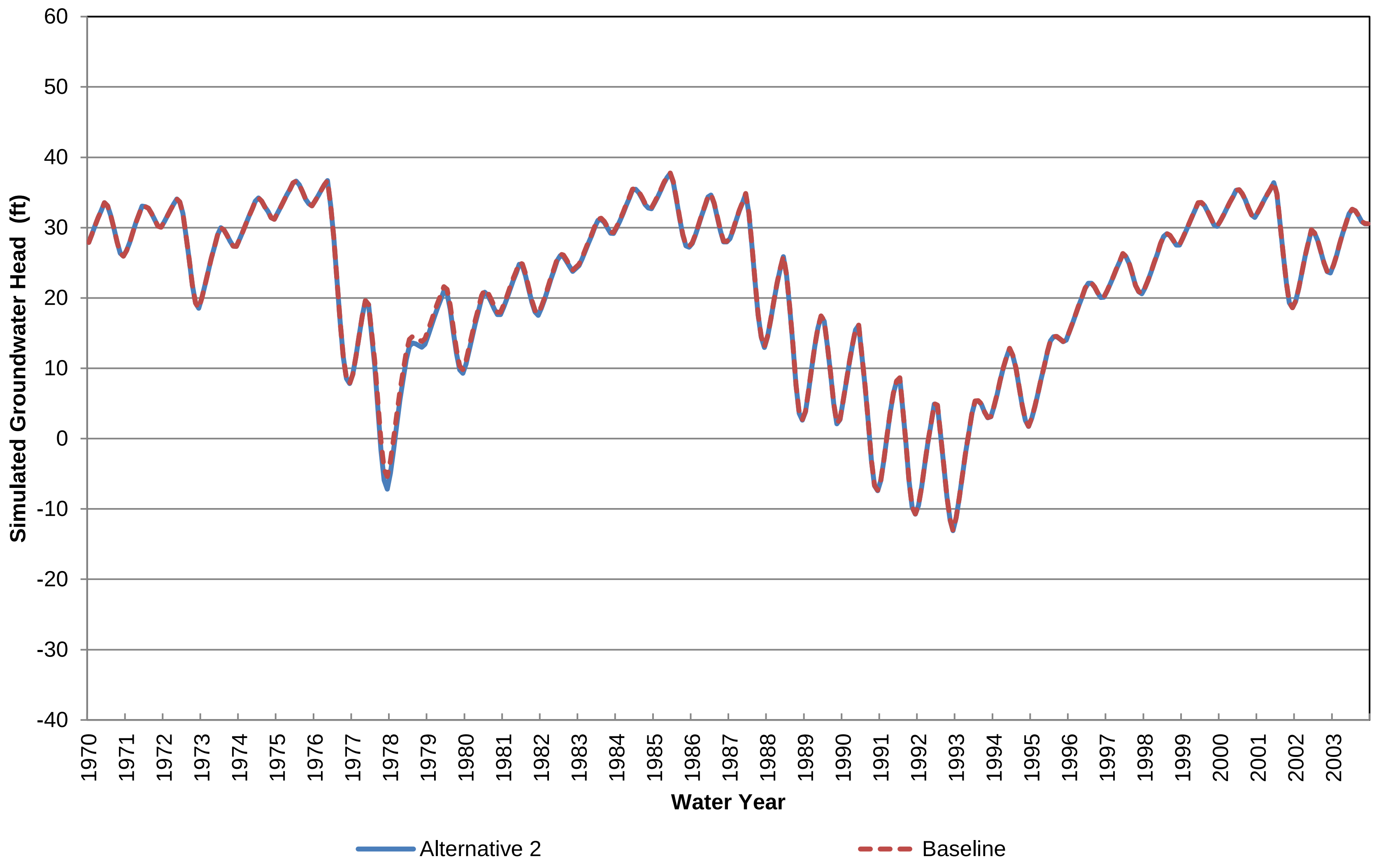
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

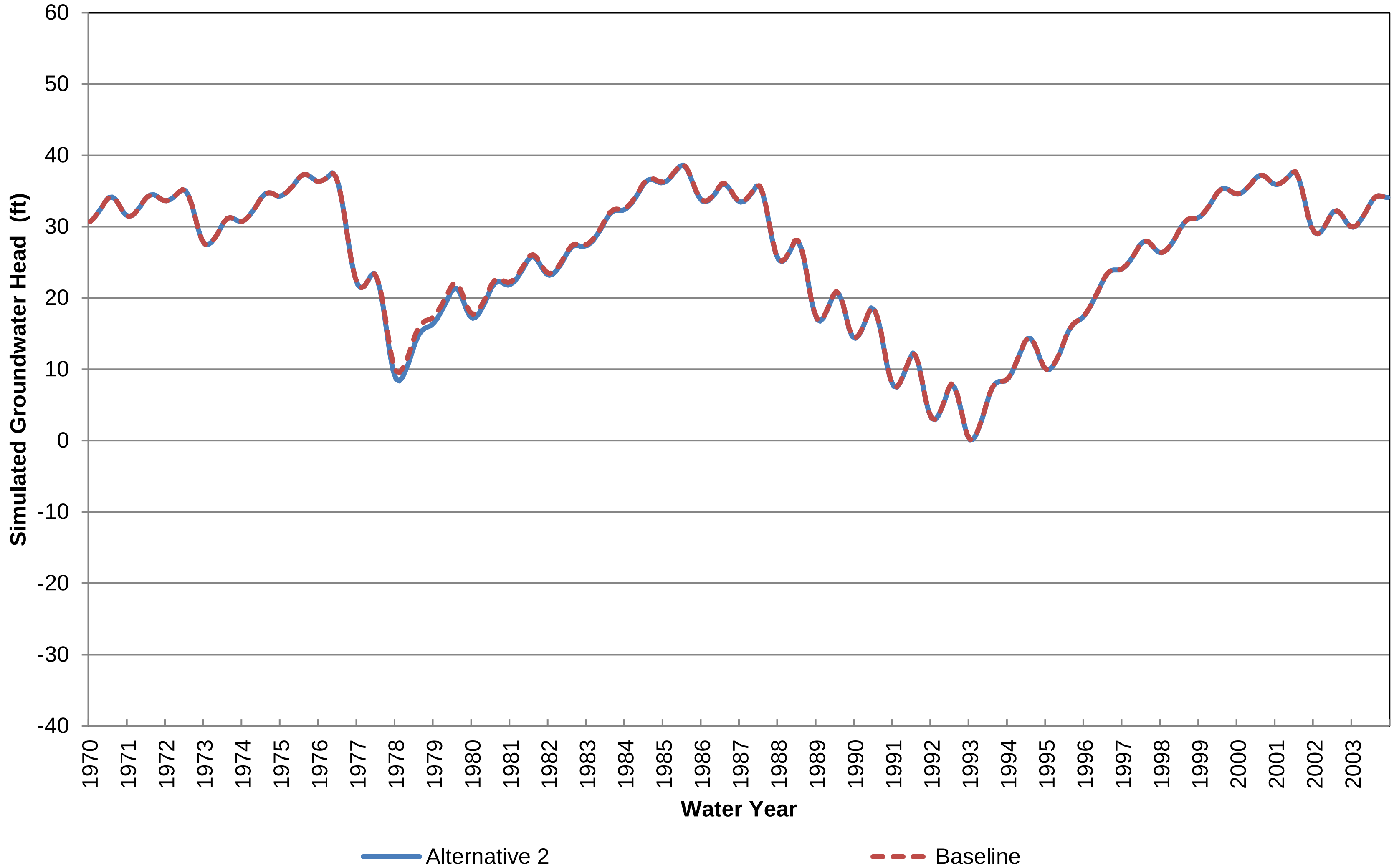
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 17 (Approximately 440-620 ft bgs)

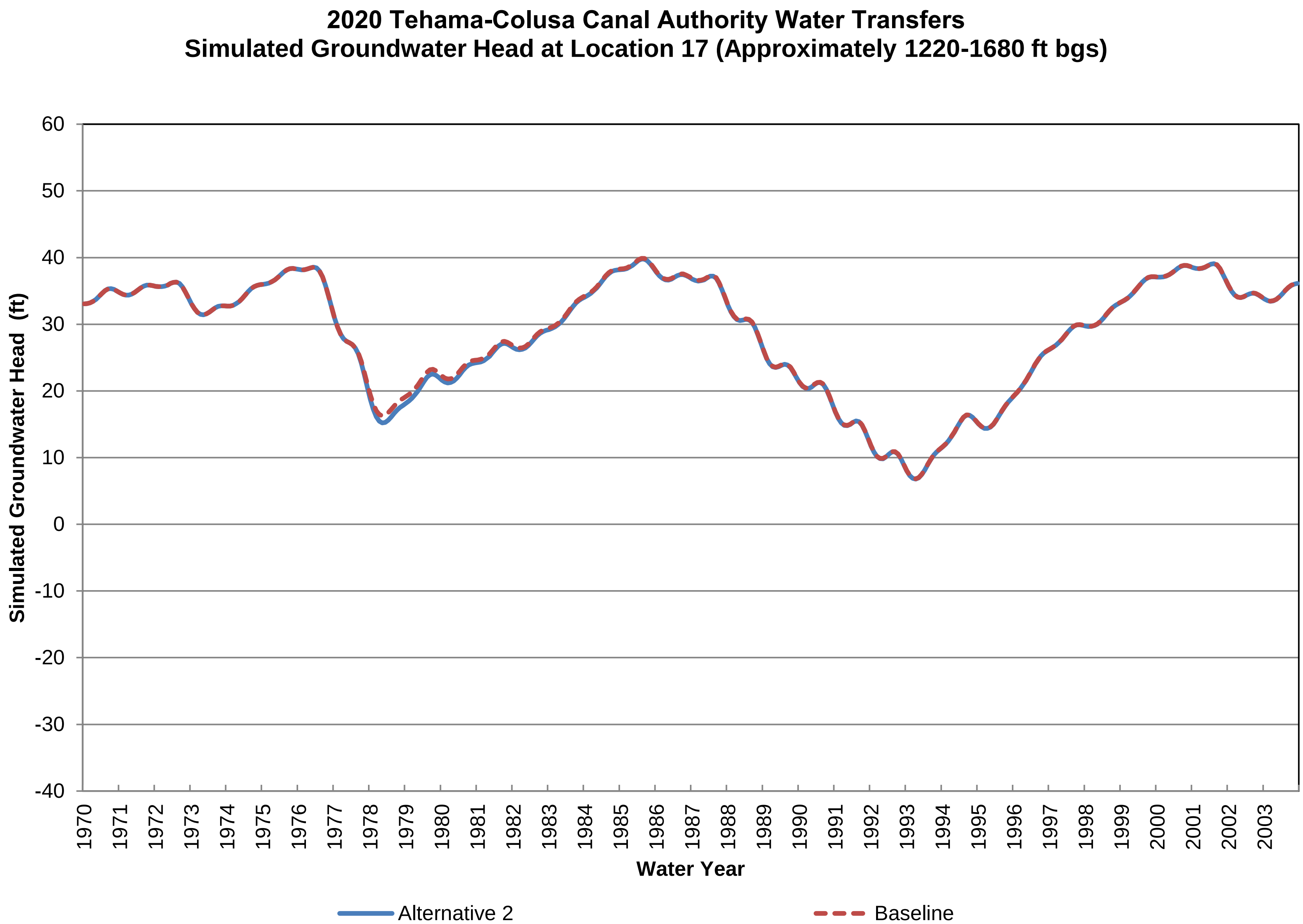


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 17 (Approximately 620-920 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 17 (Approximately 920-1220 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 17 (Approximately 1220-1680 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
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1977
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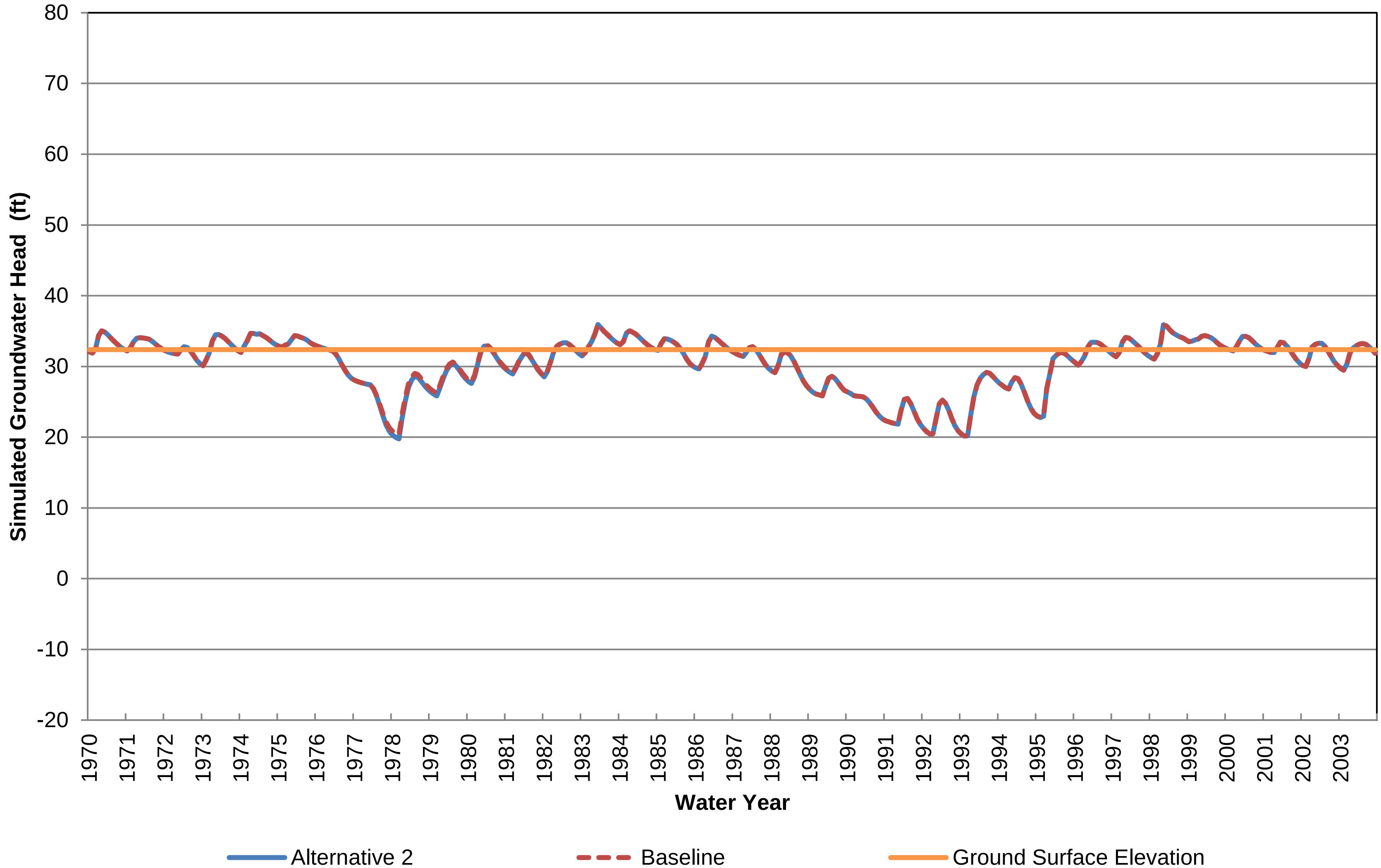
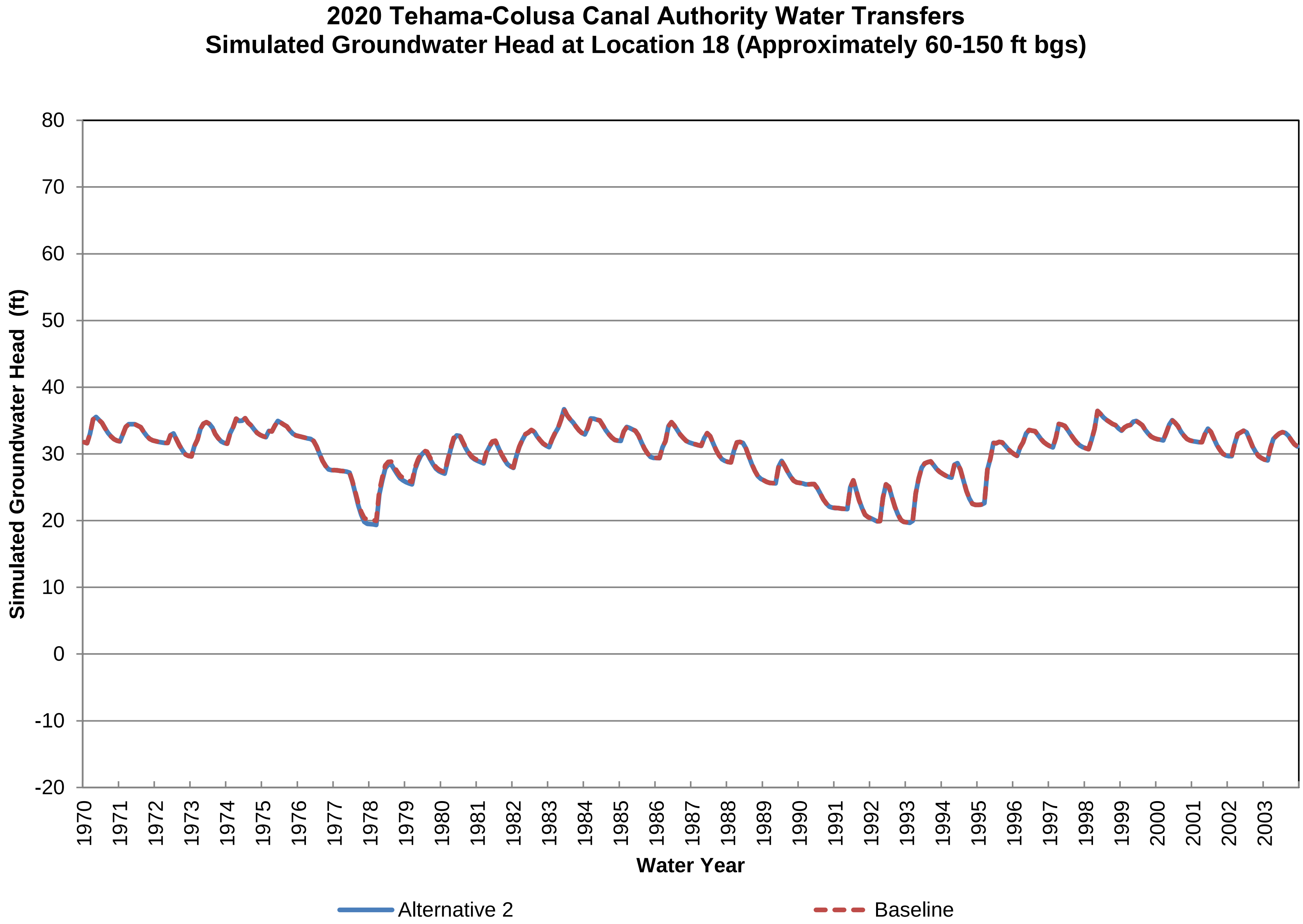
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 18 (Approximately 0-60 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 18 (Approximately 60-150 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
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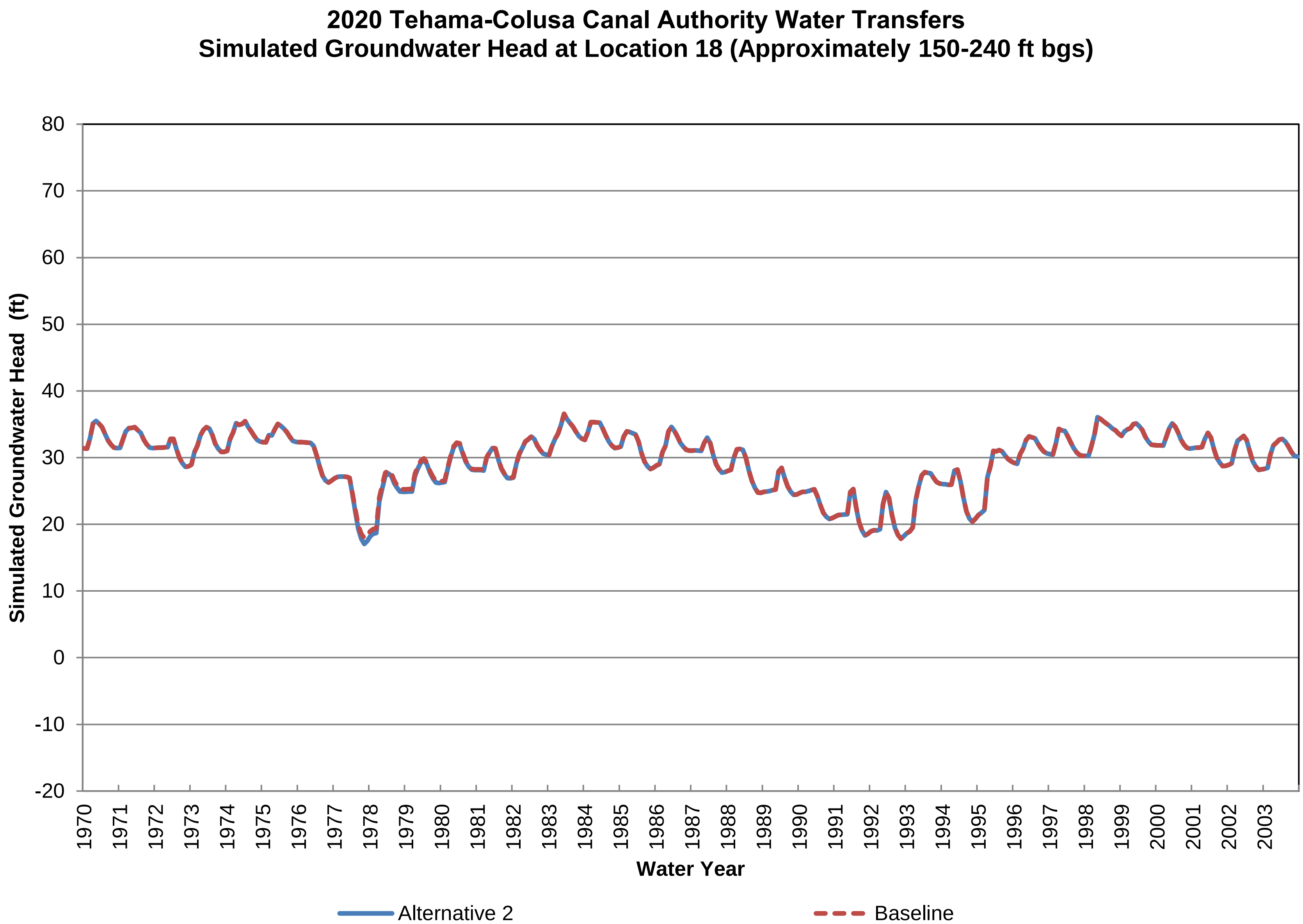
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 18 (Approximately 150-240 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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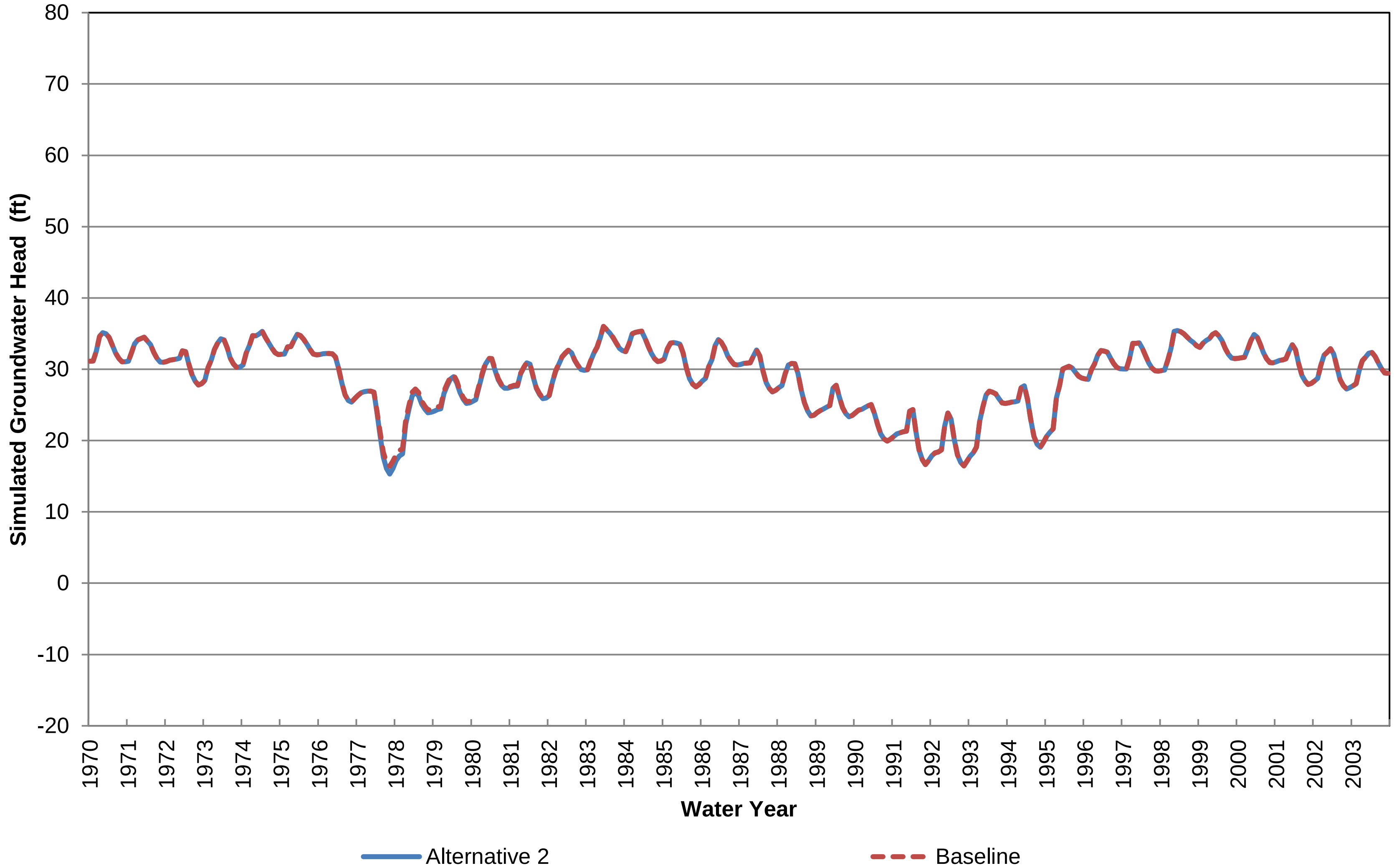
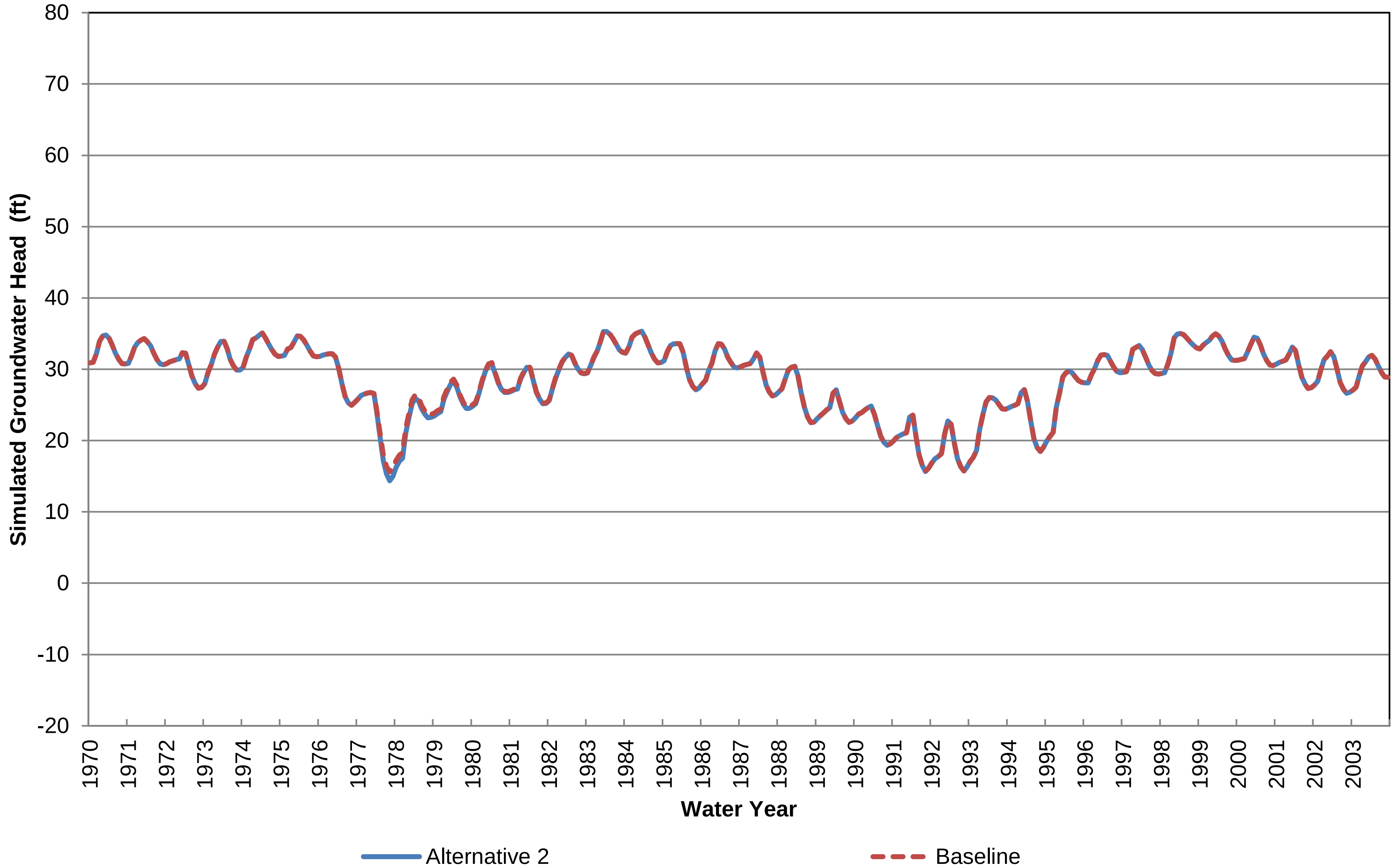
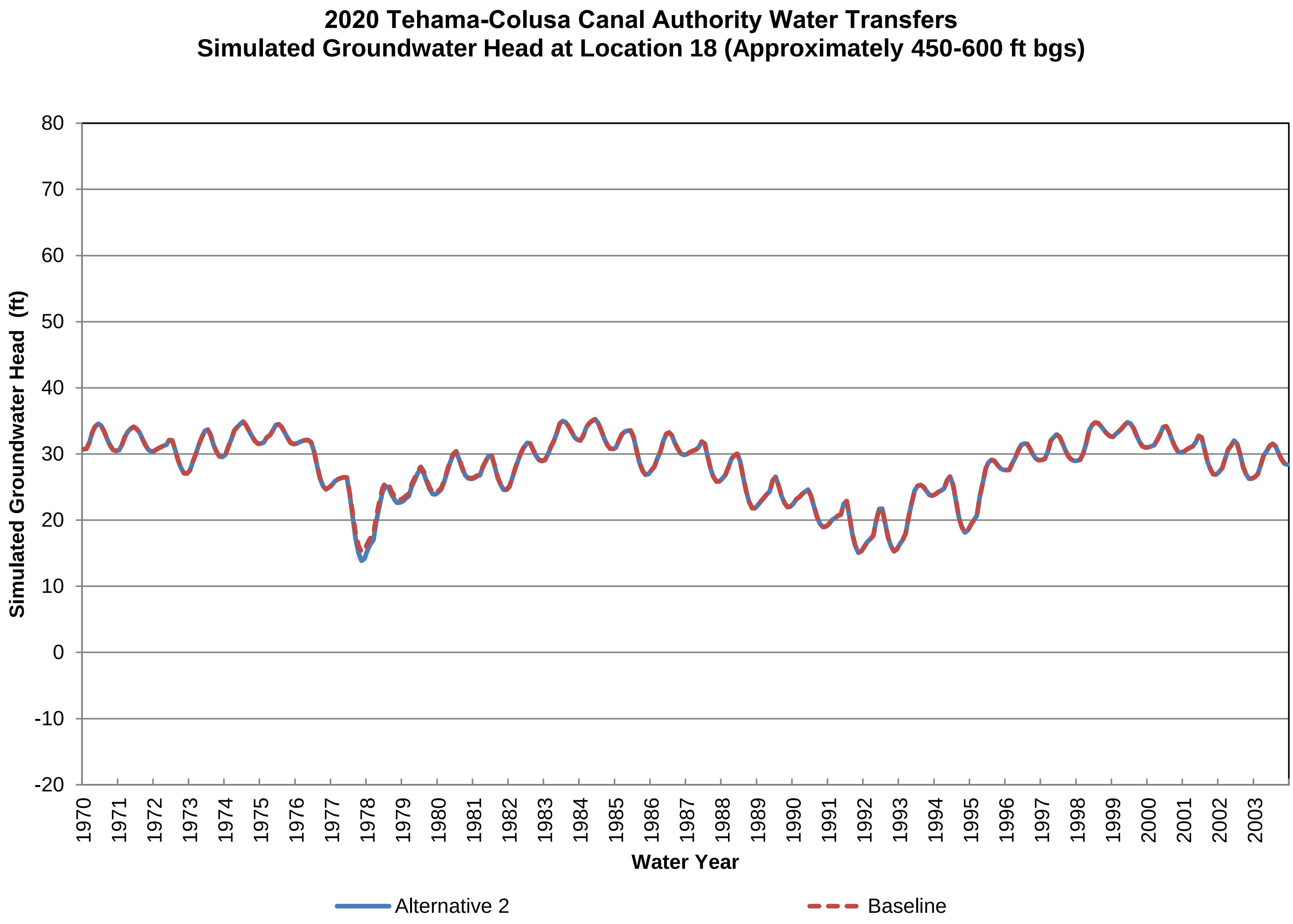
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 18 (Approximately 240-330 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 18 (Approximately 330-450 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 18 (Approximately 450-600 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
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1989
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1993
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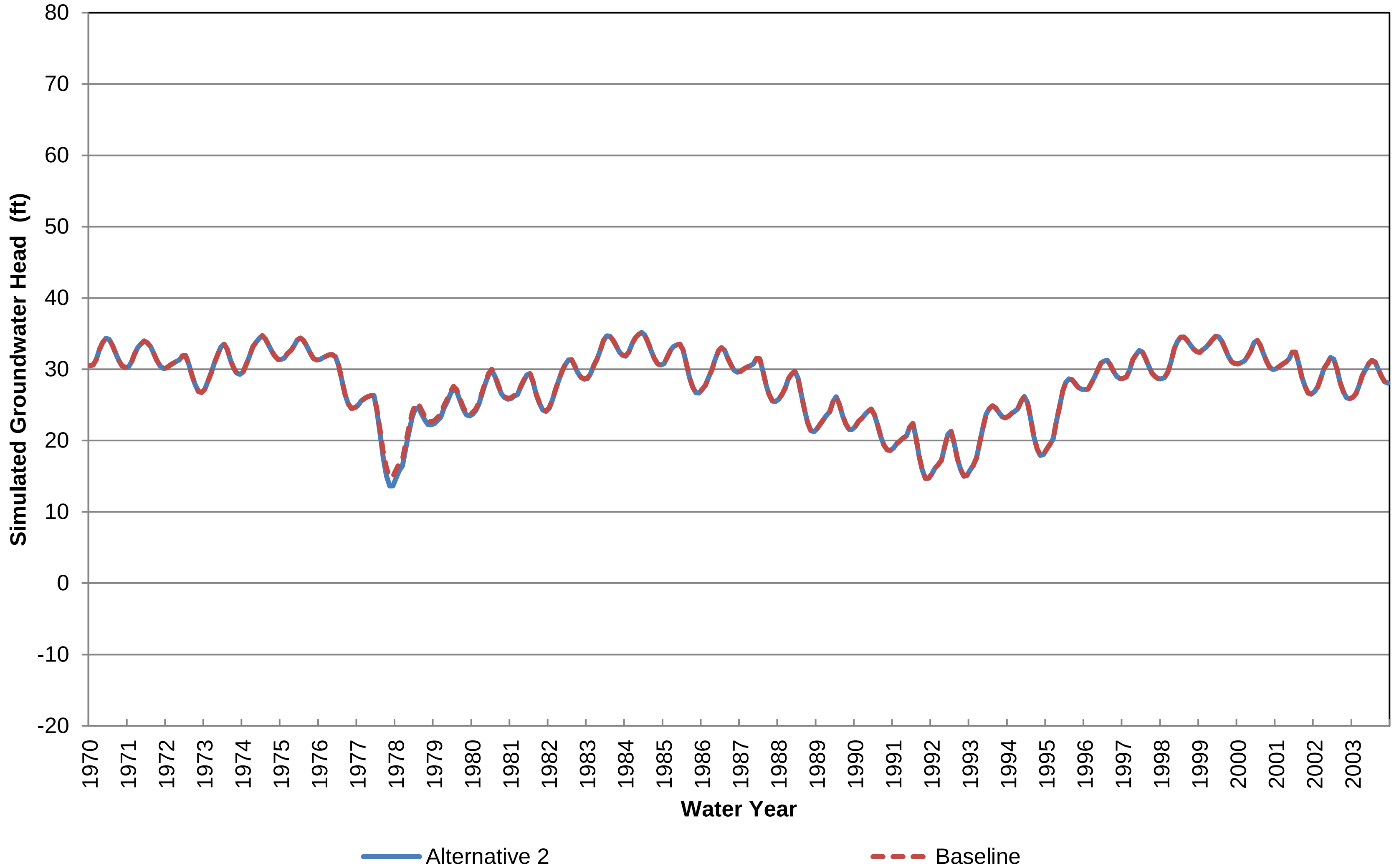
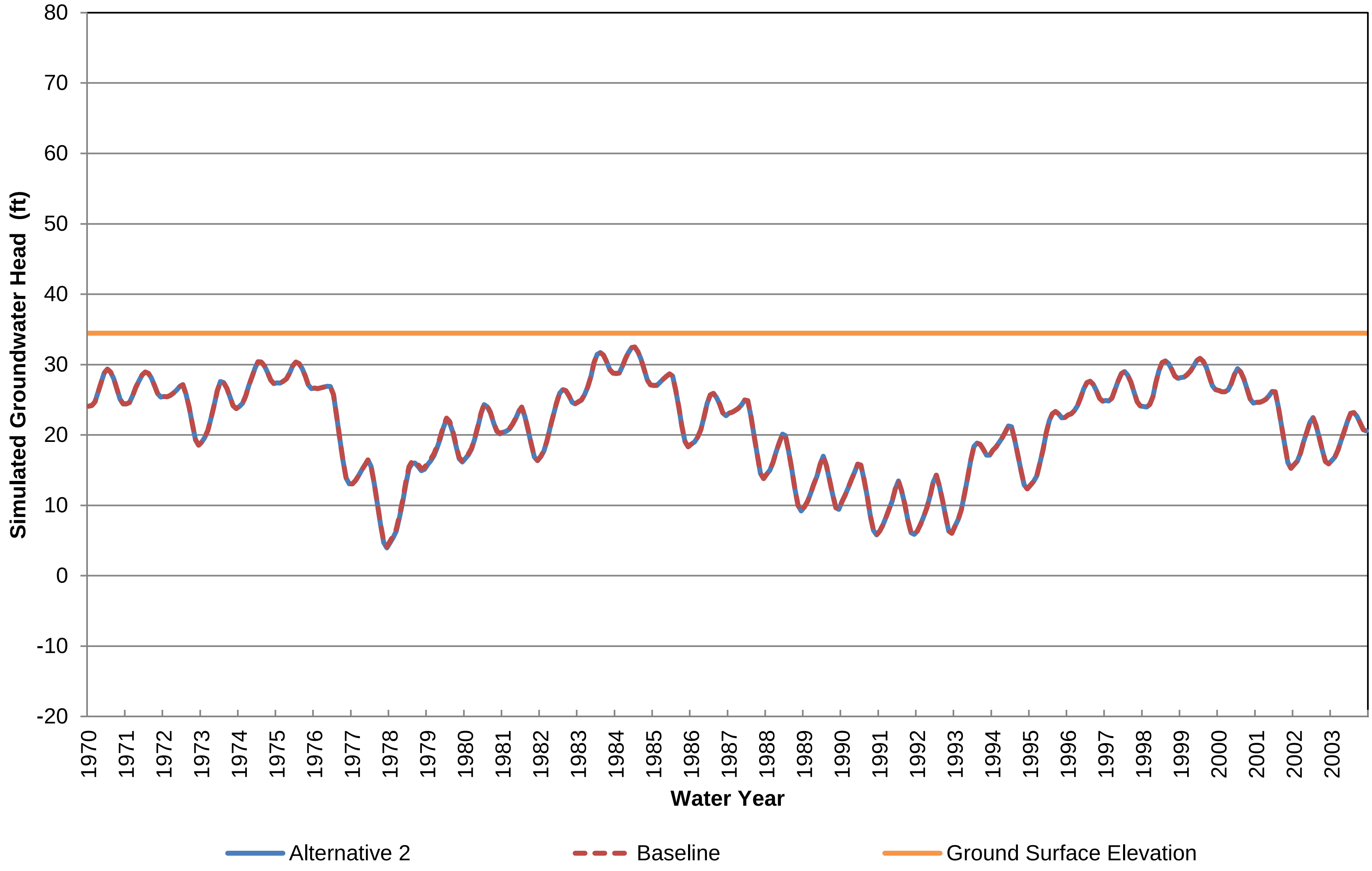
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

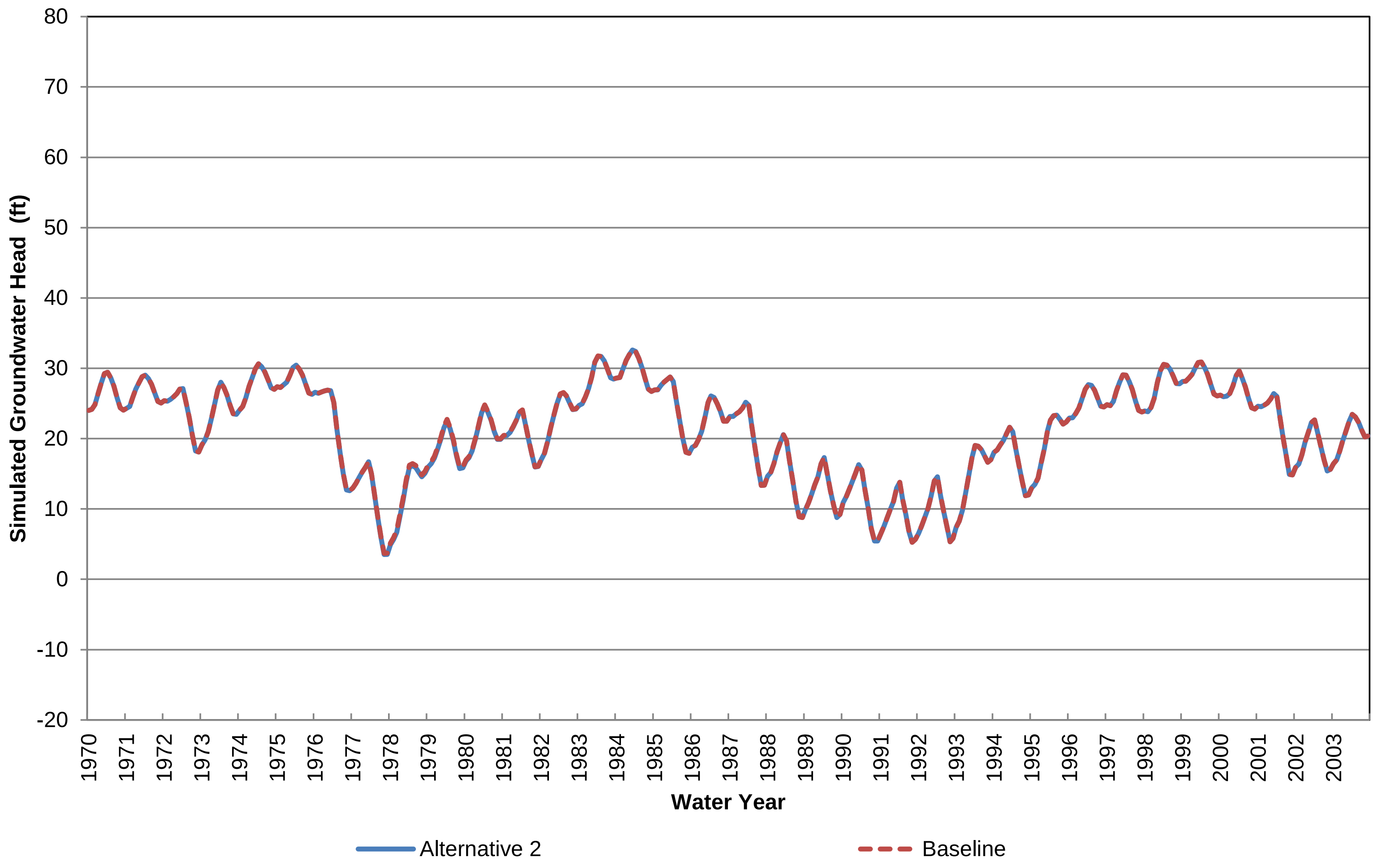
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 18 (Approximately 600-820 ft bgs)

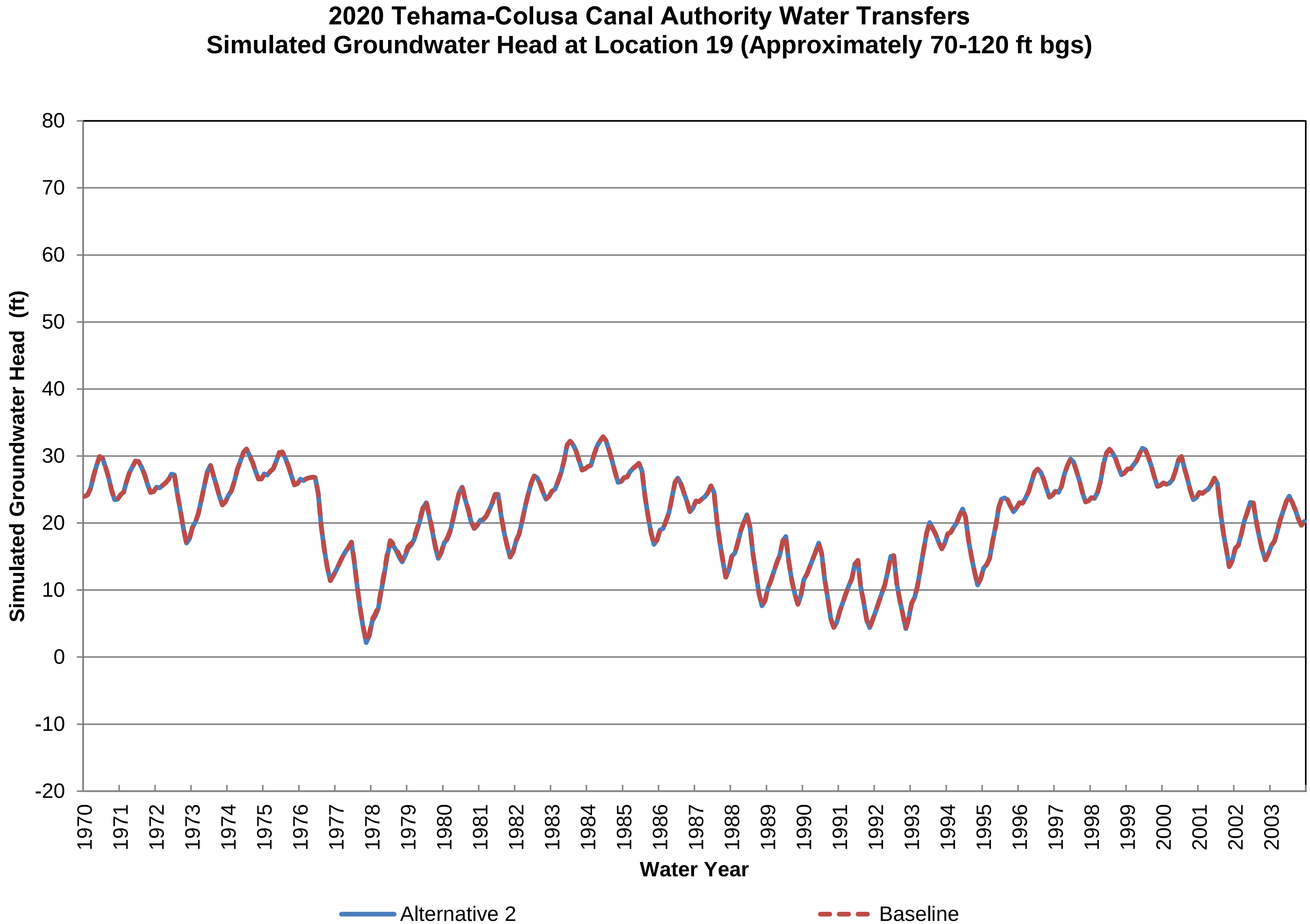


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 19 (Approximately 0-30 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 19 (Approximately 30-70 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 19 (Approximately 70-120 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
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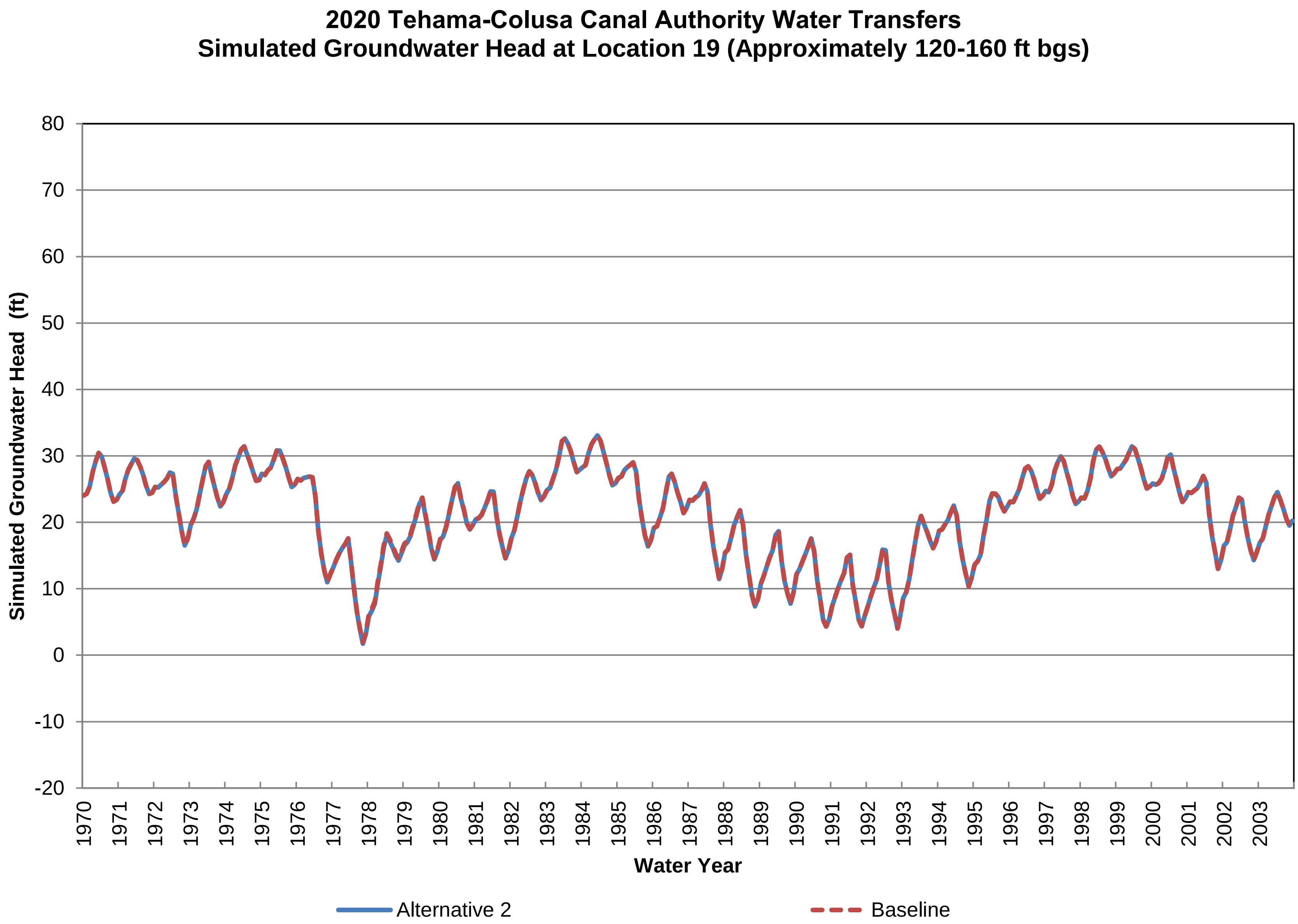
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 19 (Approximately 120-160 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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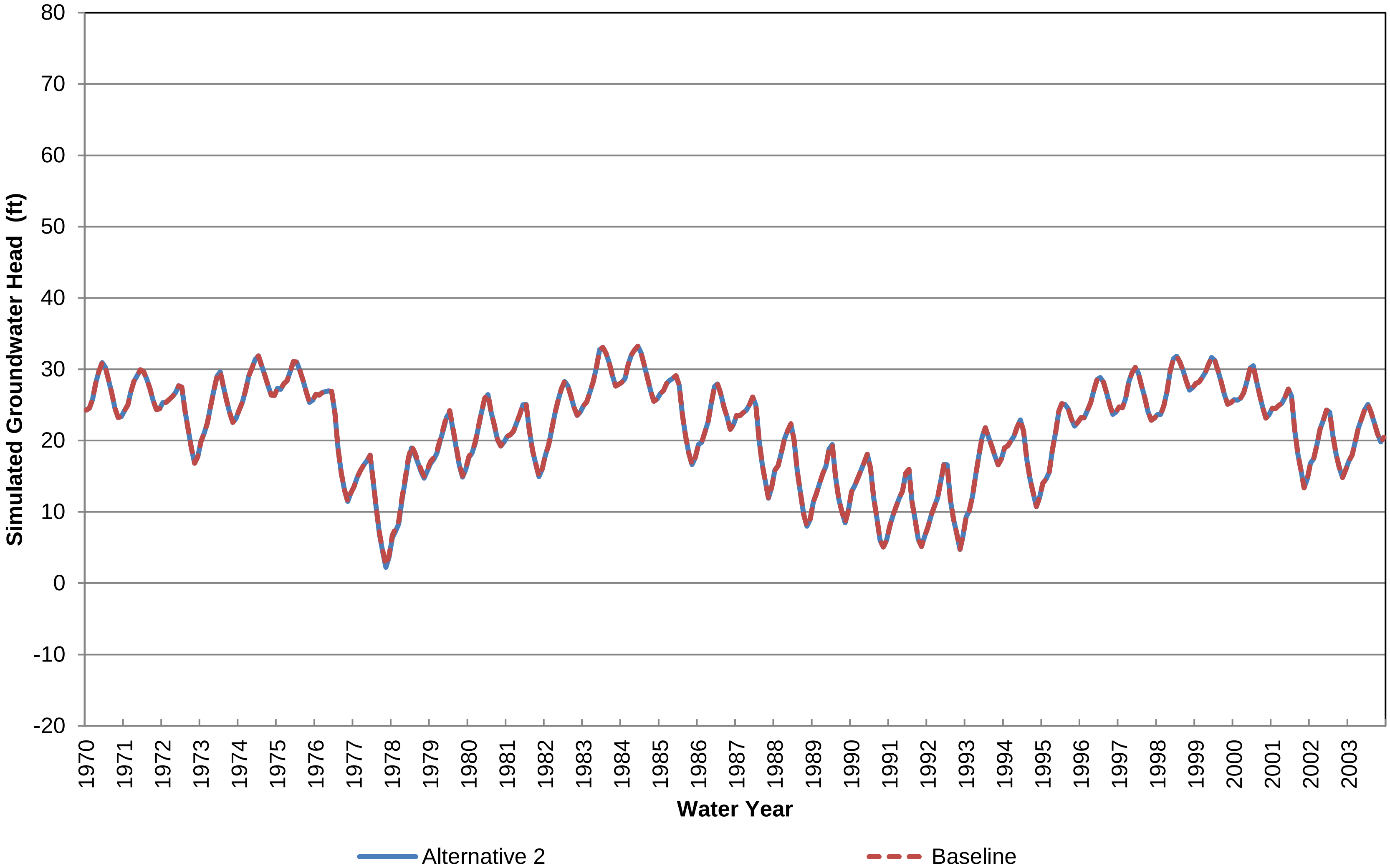
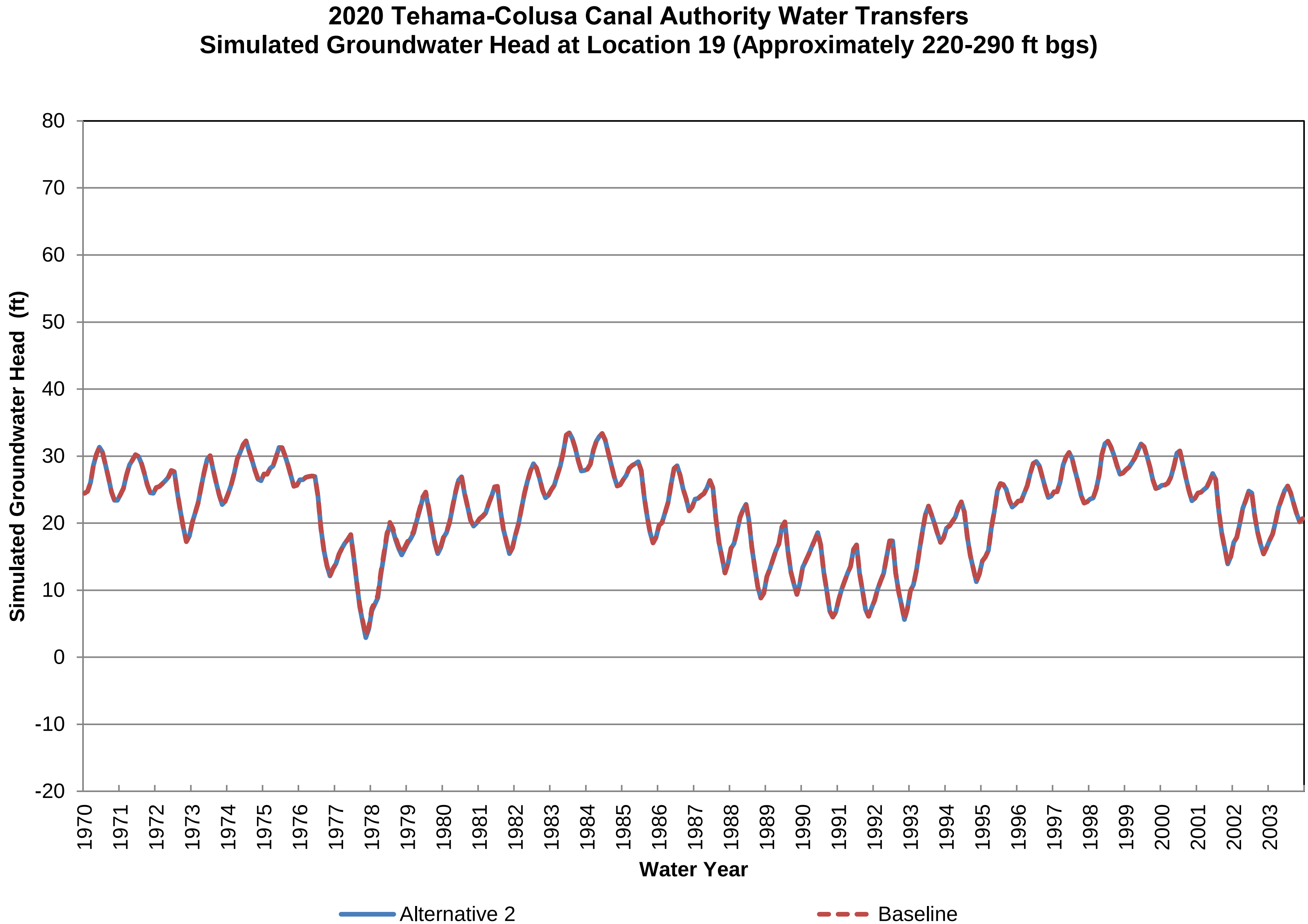
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 19 (Approximately 160-220 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 19 (Approximately 220-290 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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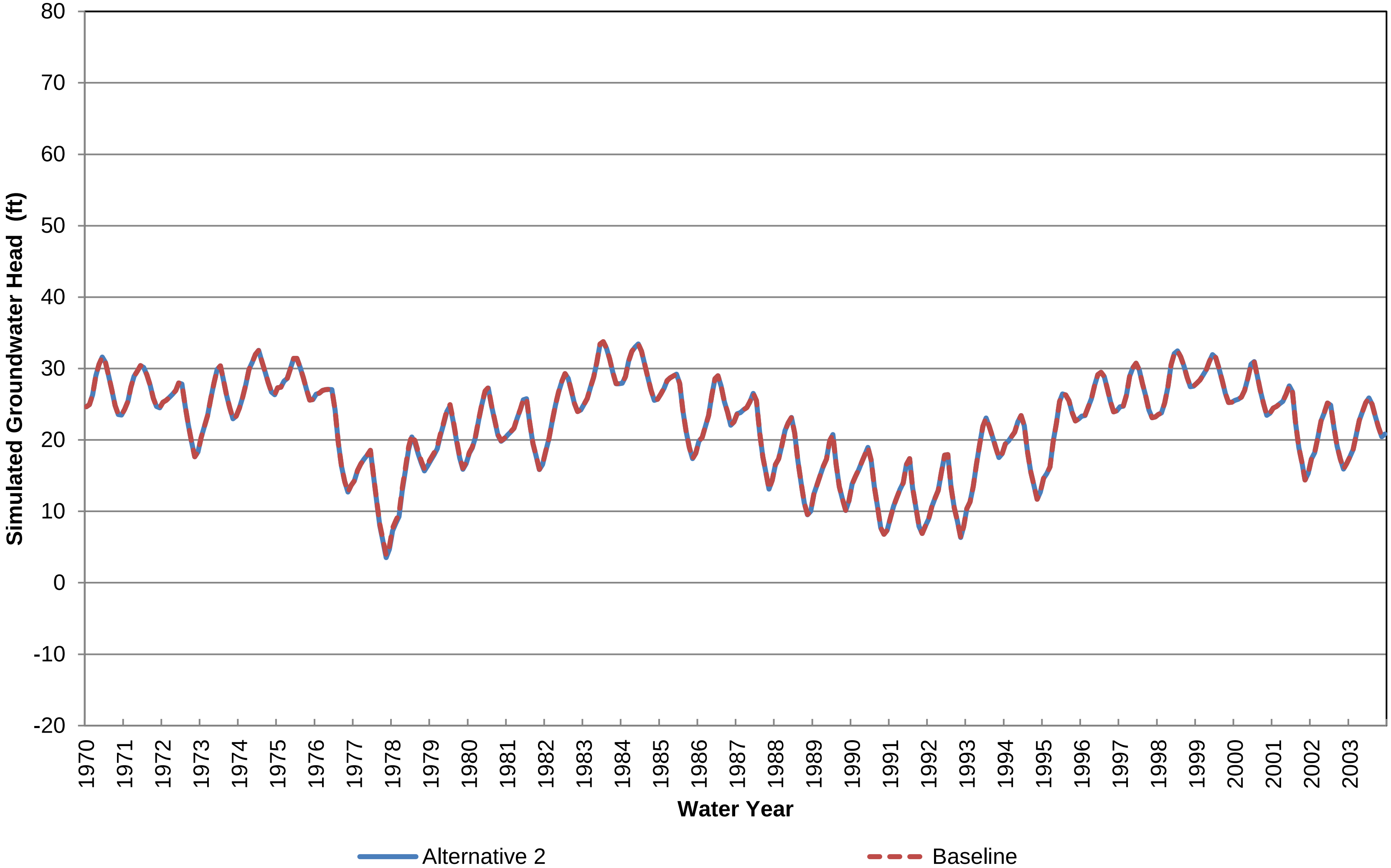
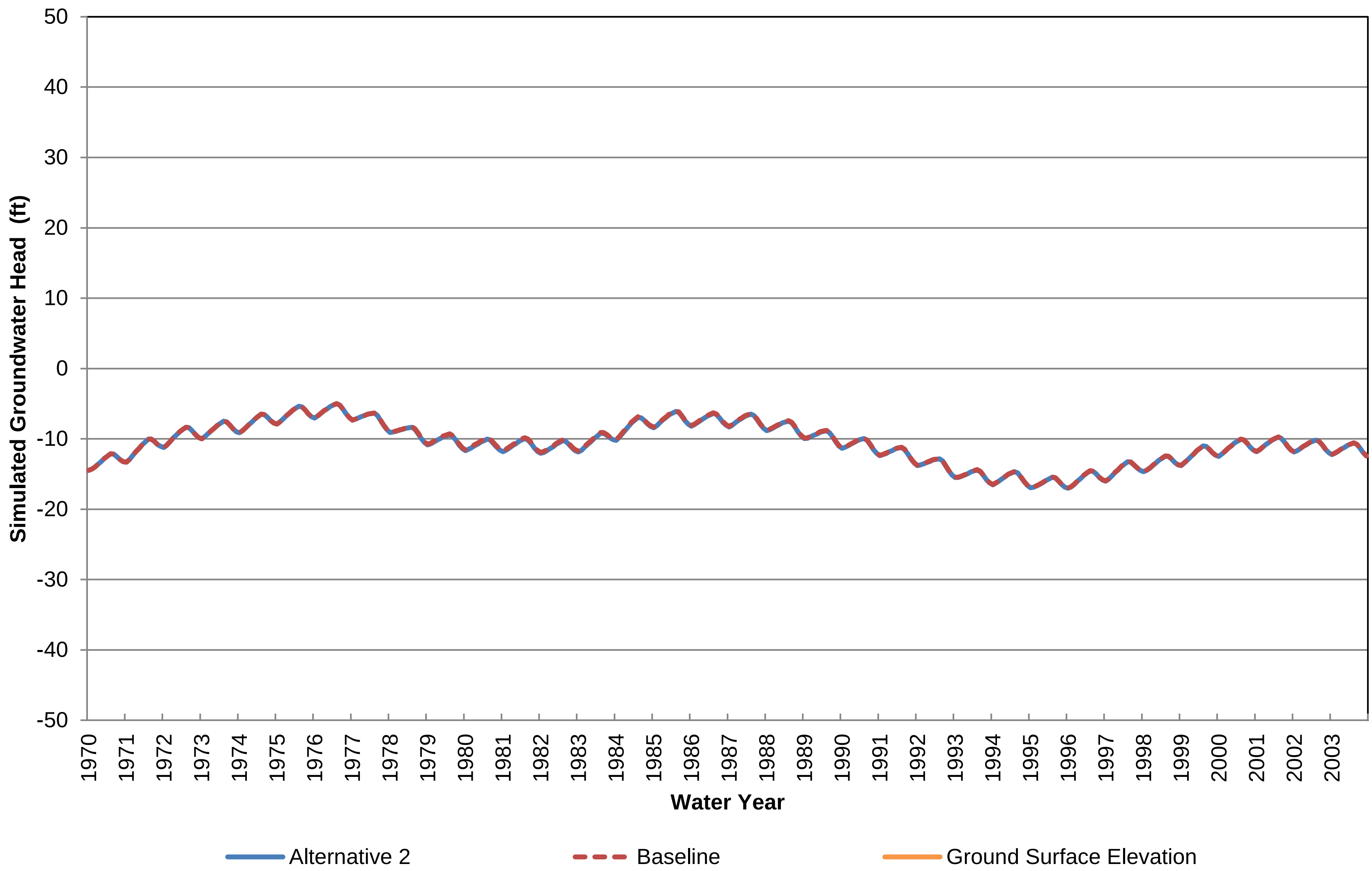
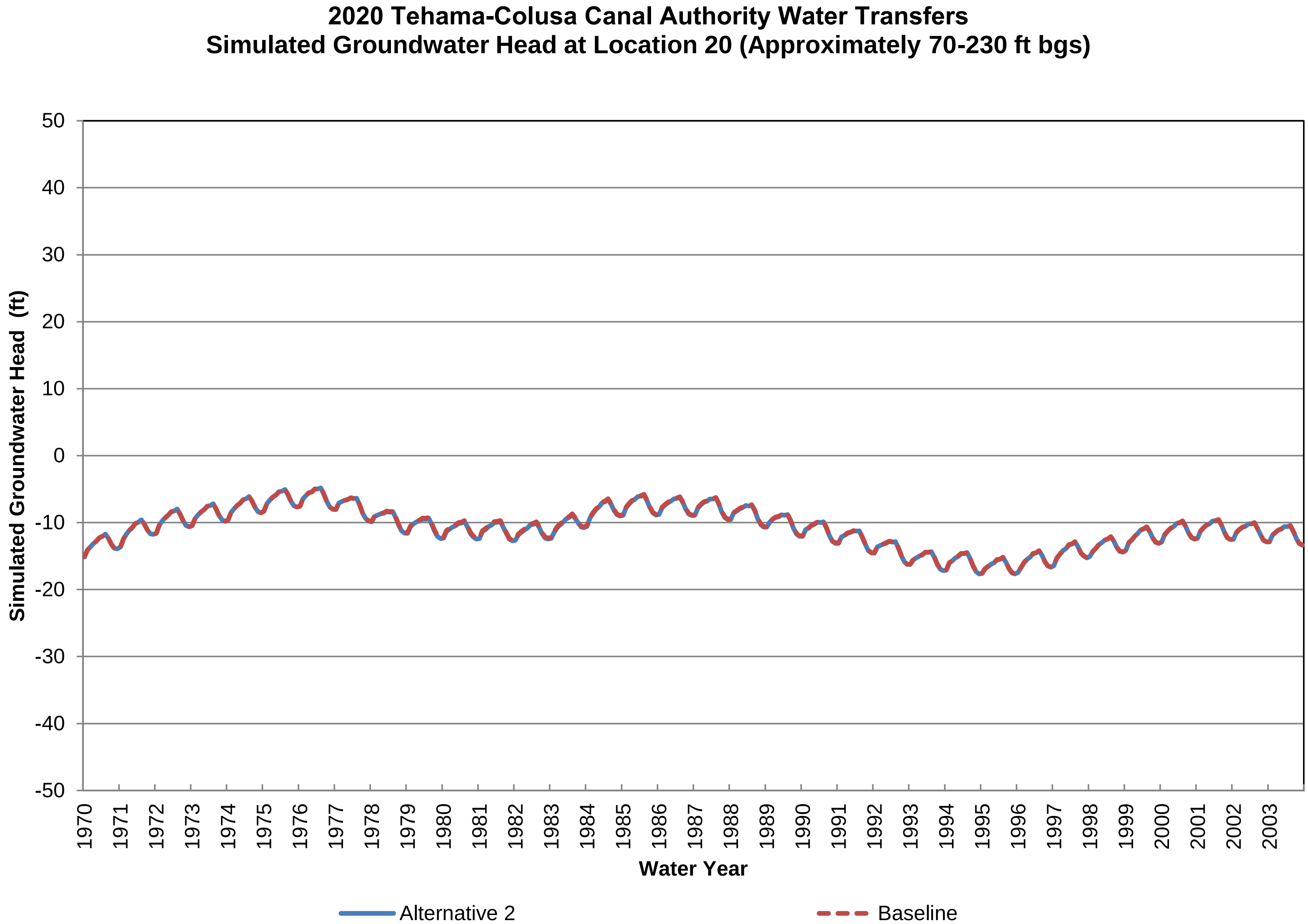
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 19 (Approximately 290-400 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 20 (Approximately 0-70 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 20 (Approximately 70-230 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
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1979
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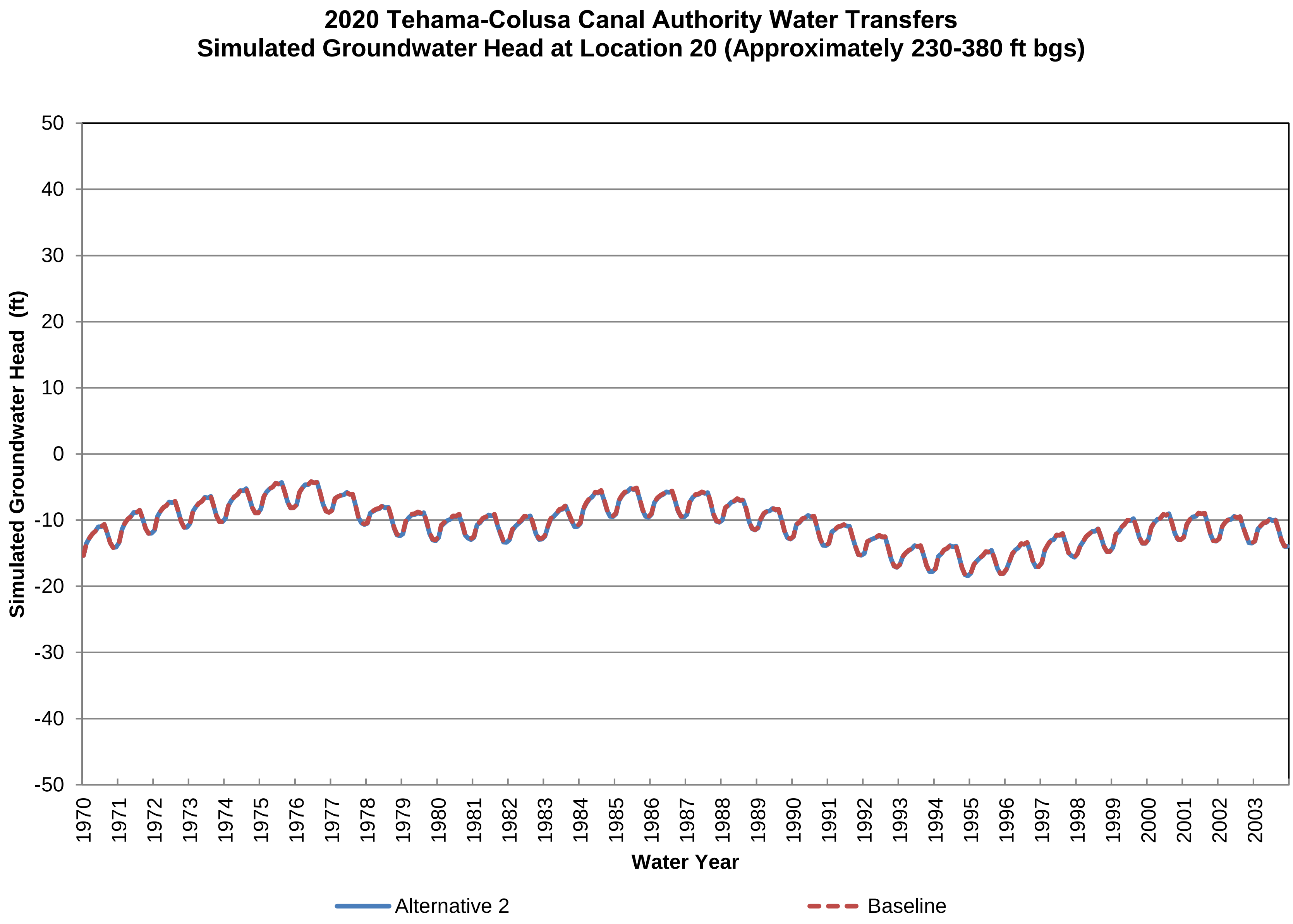
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 20 (Approximately 230-380 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
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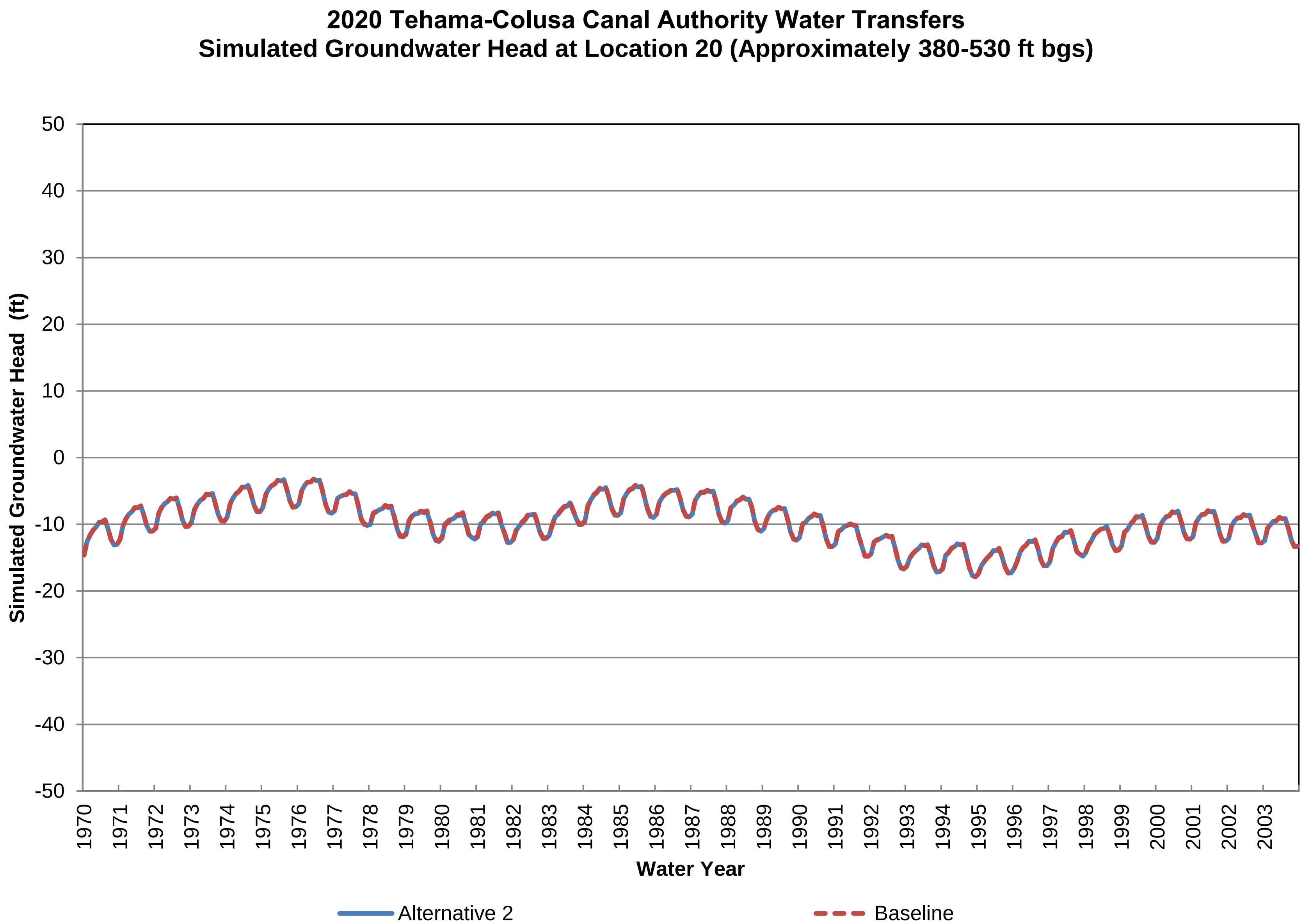
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 20 (Approximately 380-530 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
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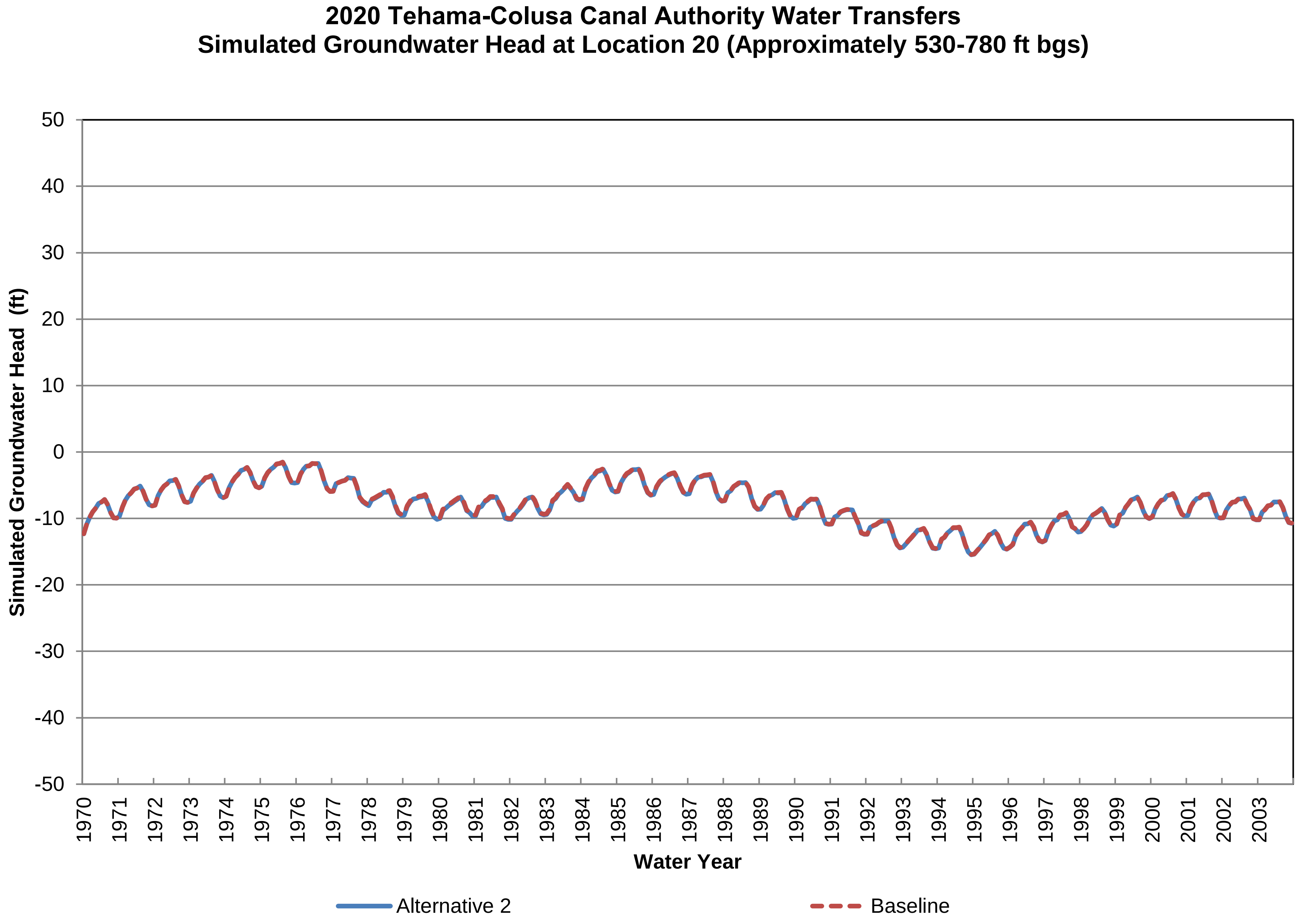
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 20 (Approximately 530-780 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
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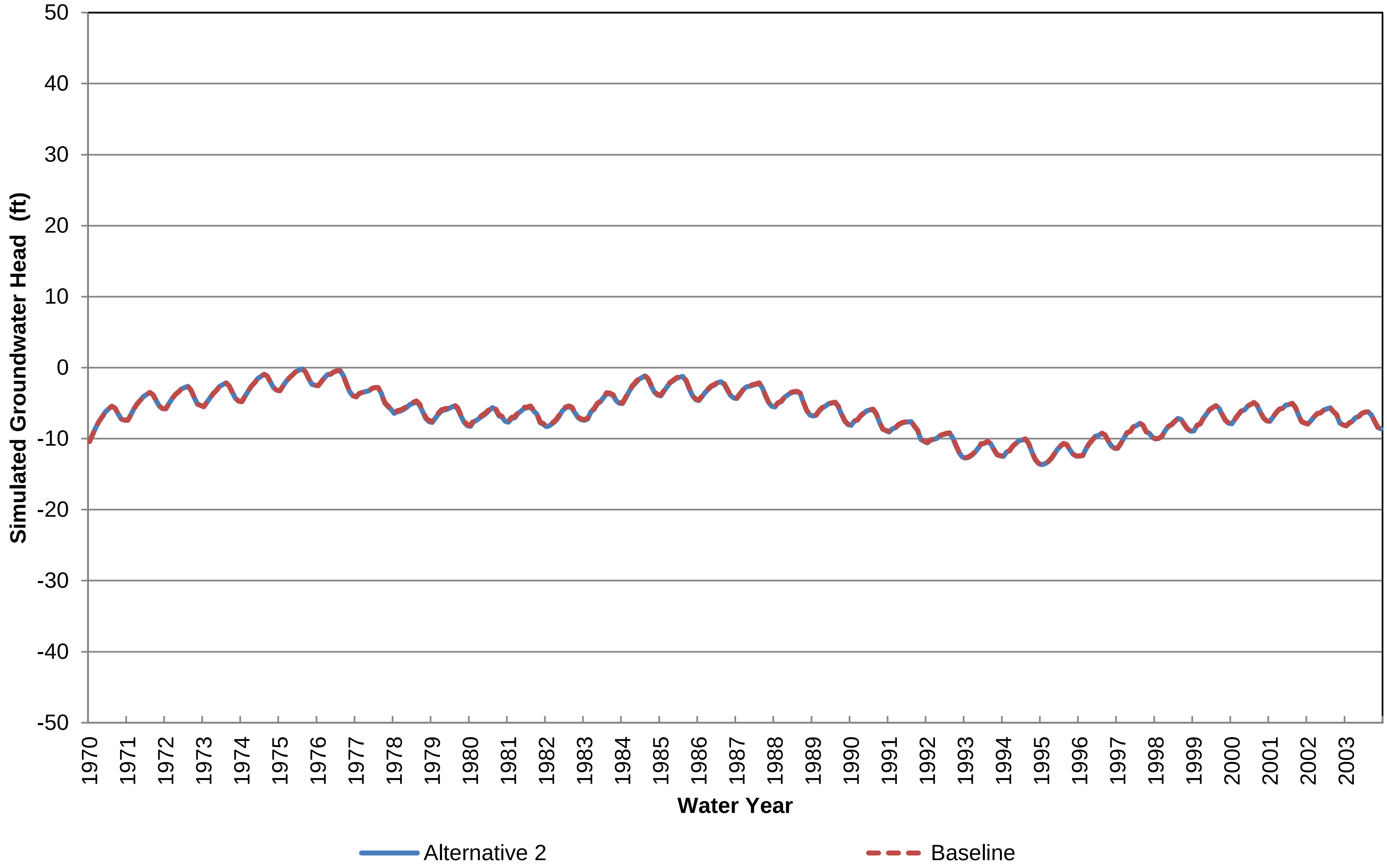
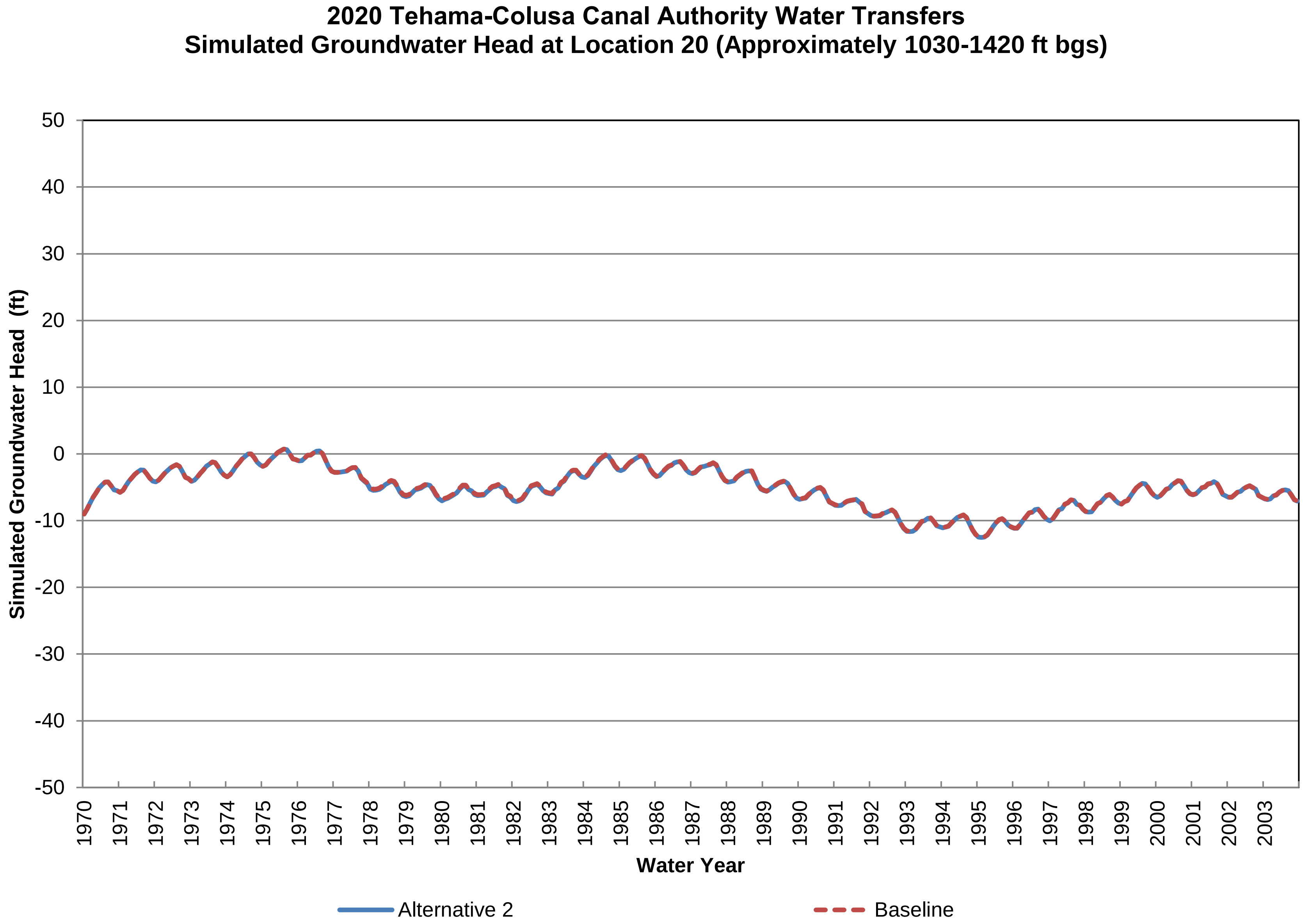
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 20 (Approximately 780-1030 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 20 (Approximately 1030-1420 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
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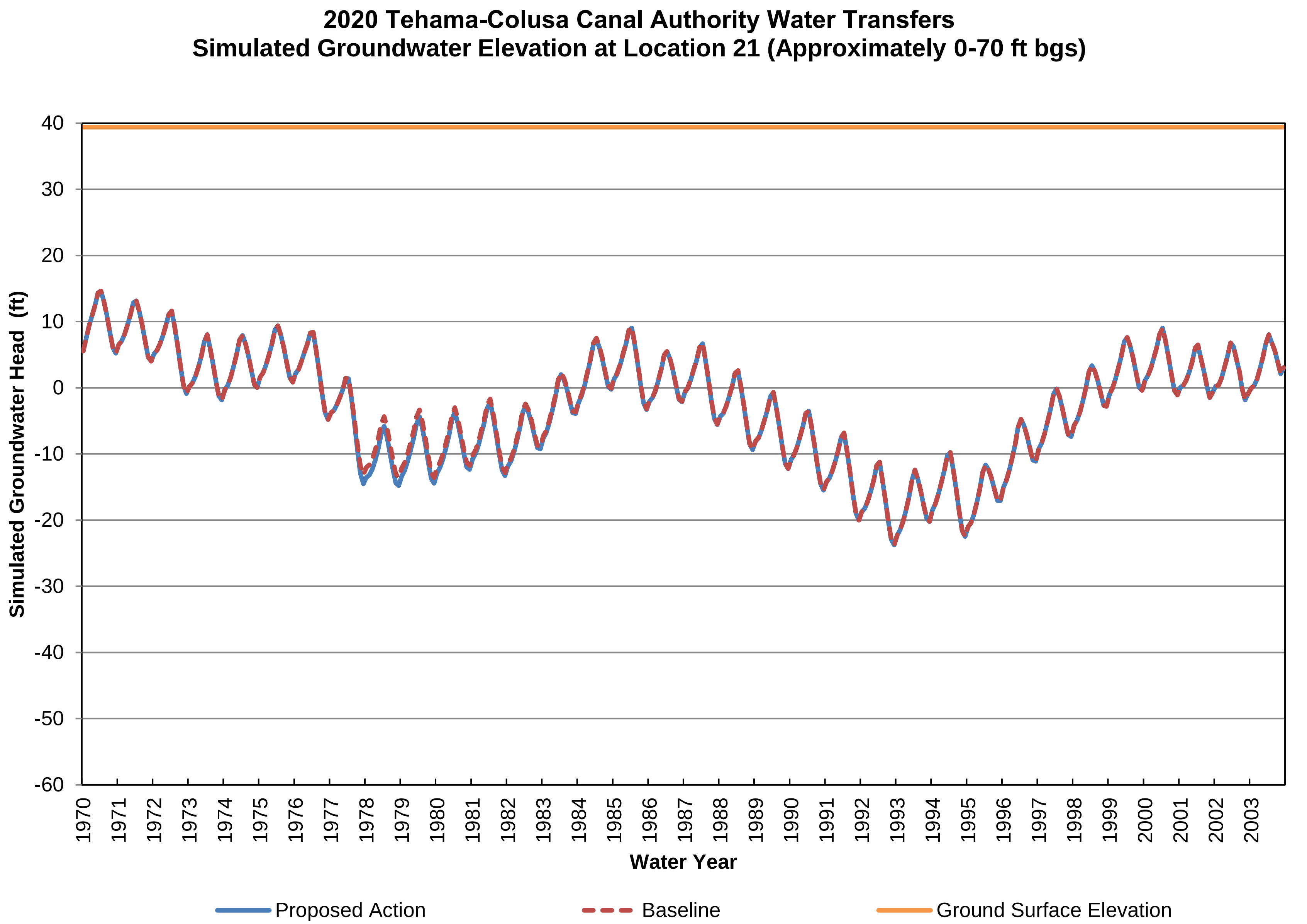
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 21 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1970
1971
1972
1973
1974
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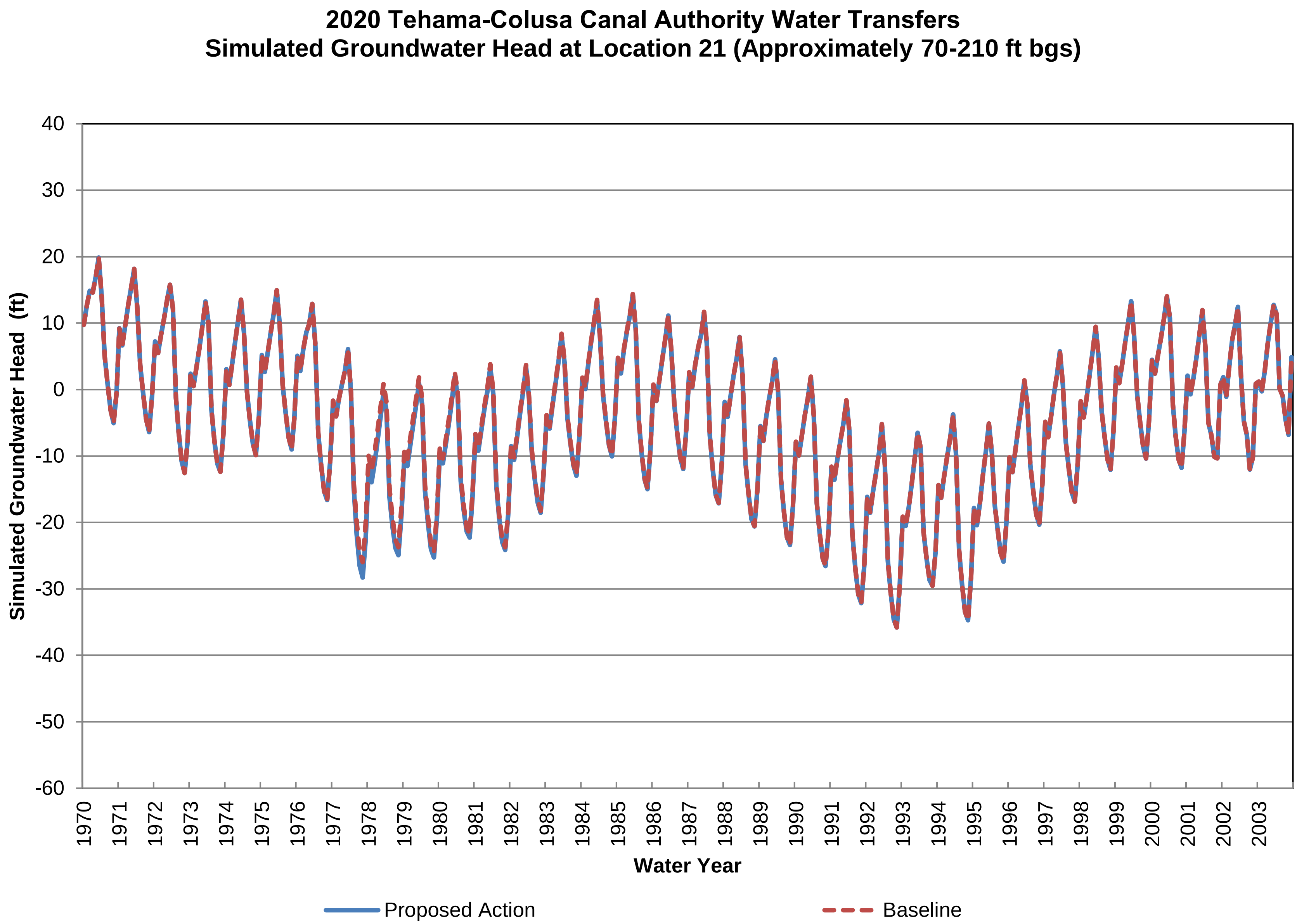
2003
Water Year
Proposed Action
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 21 (Approximately 70-210 ft bgs)
Simulated Groundwater Head (ft)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1970
1971
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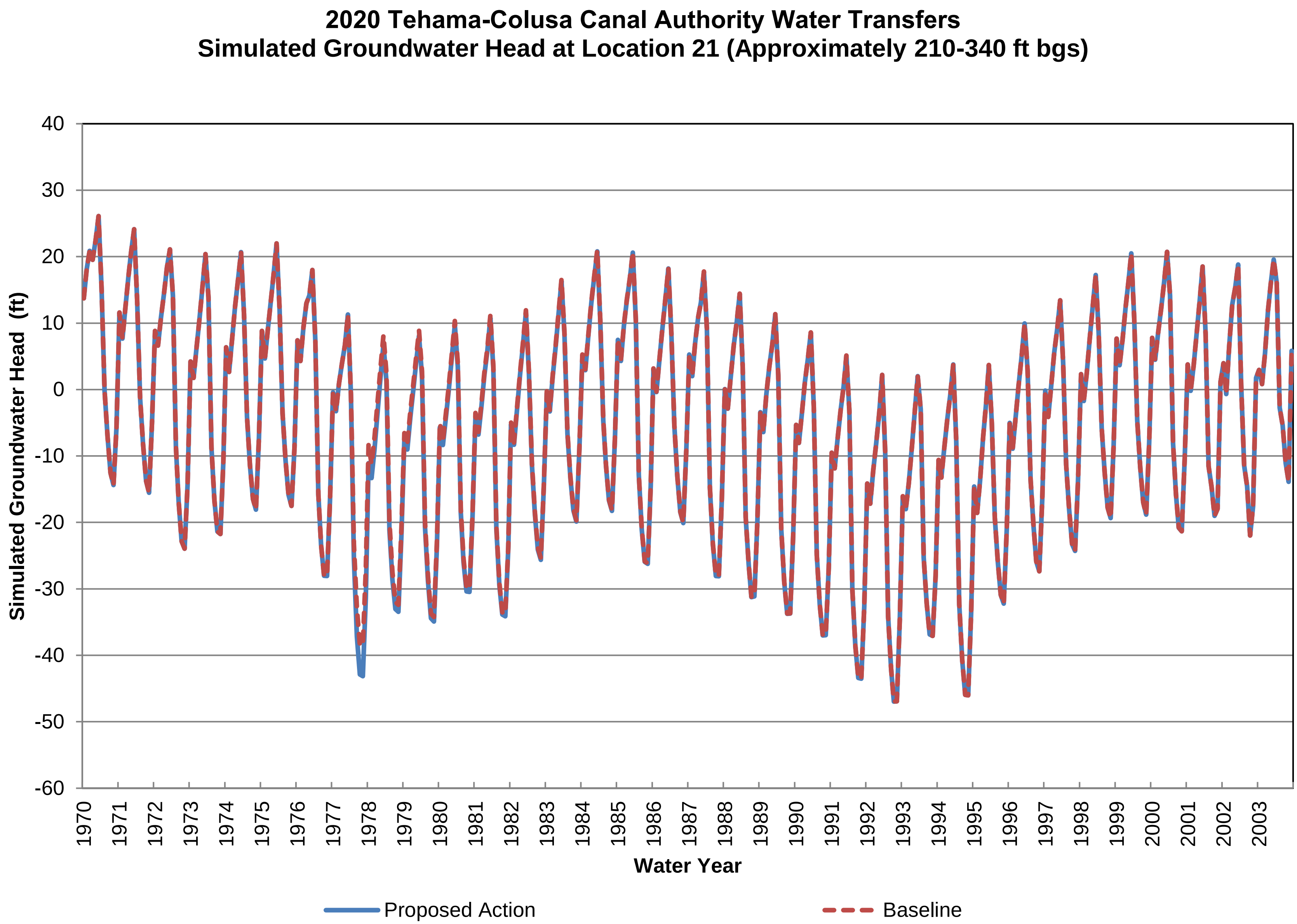
2001
2002
2003
Water Year
Proposed Action
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 21 (Approximately 210-340 ft bgs)
Simulated Groundwater Head (ft)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1970
1971
1972
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1974
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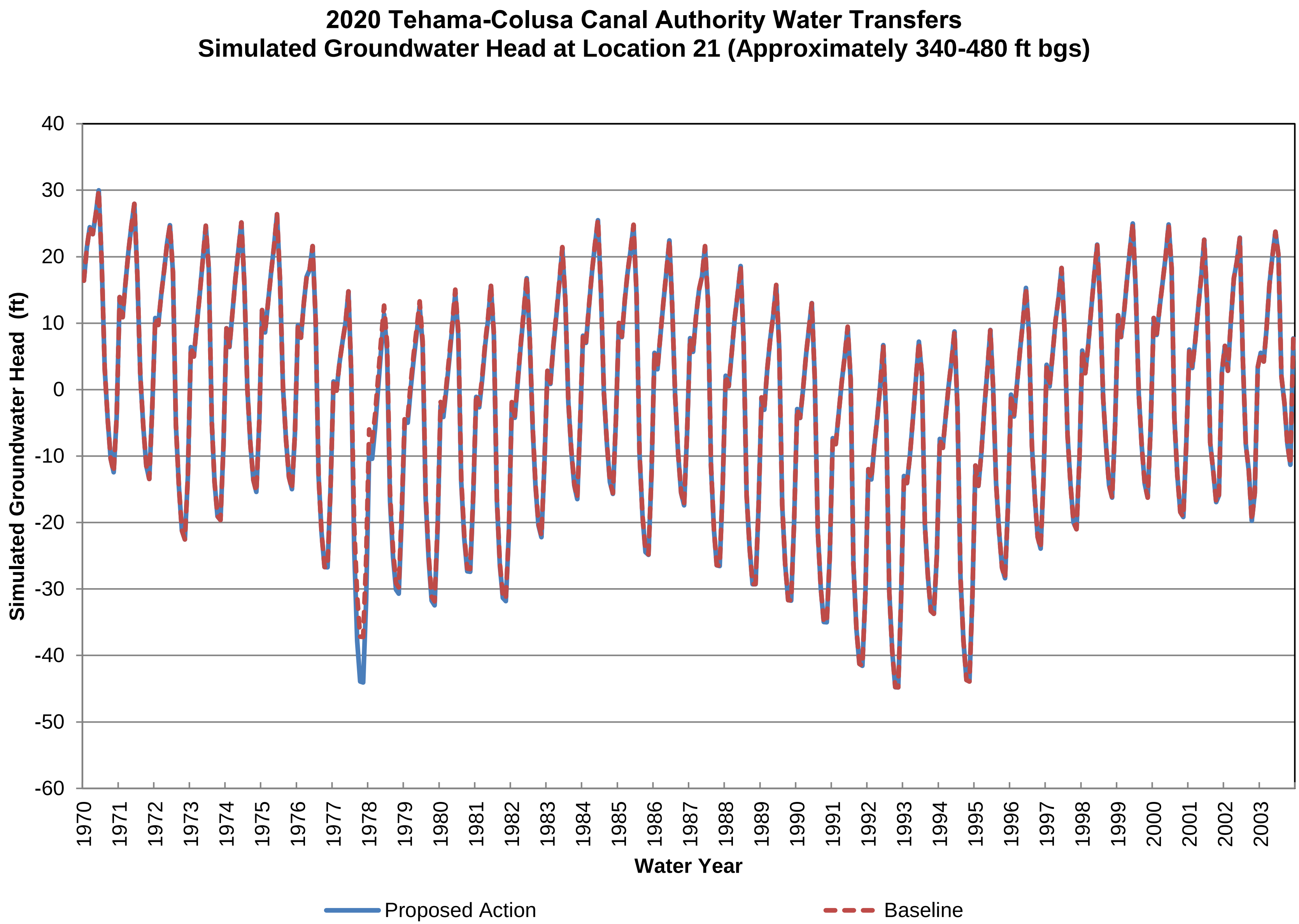
1998
1999
2000
2001
2002
2003
Water Year
Proposed Action
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 21 (Approximately 340-480 ft bgs)
Simulated Groundwater Head (ft)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1970
1971
1972
1973
1974
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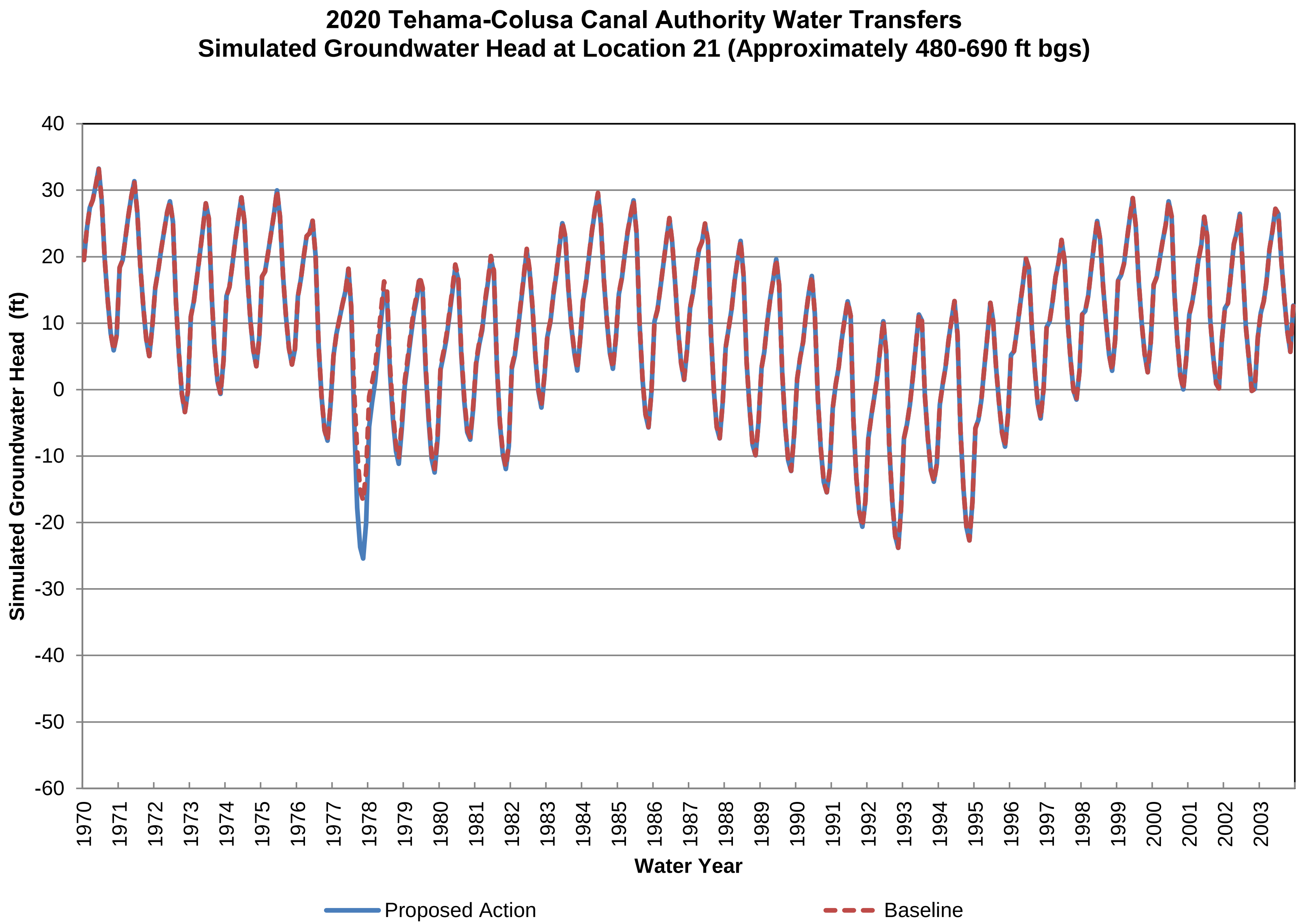
2001
2002
2003
Water Year
Proposed Action
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 21 (Approximately 480-690 ft bgs)
Simulated Groundwater Head (ft)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1970
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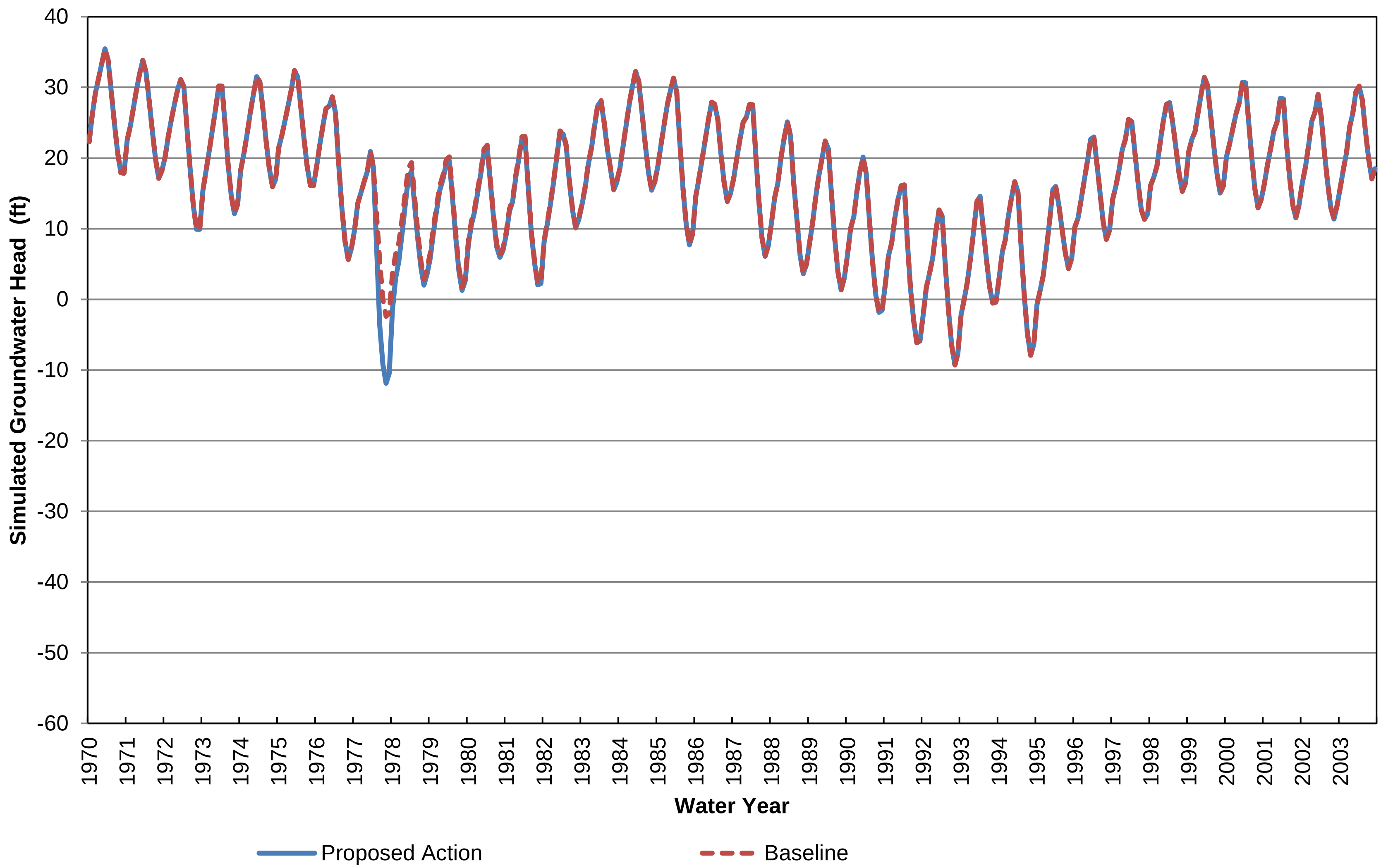
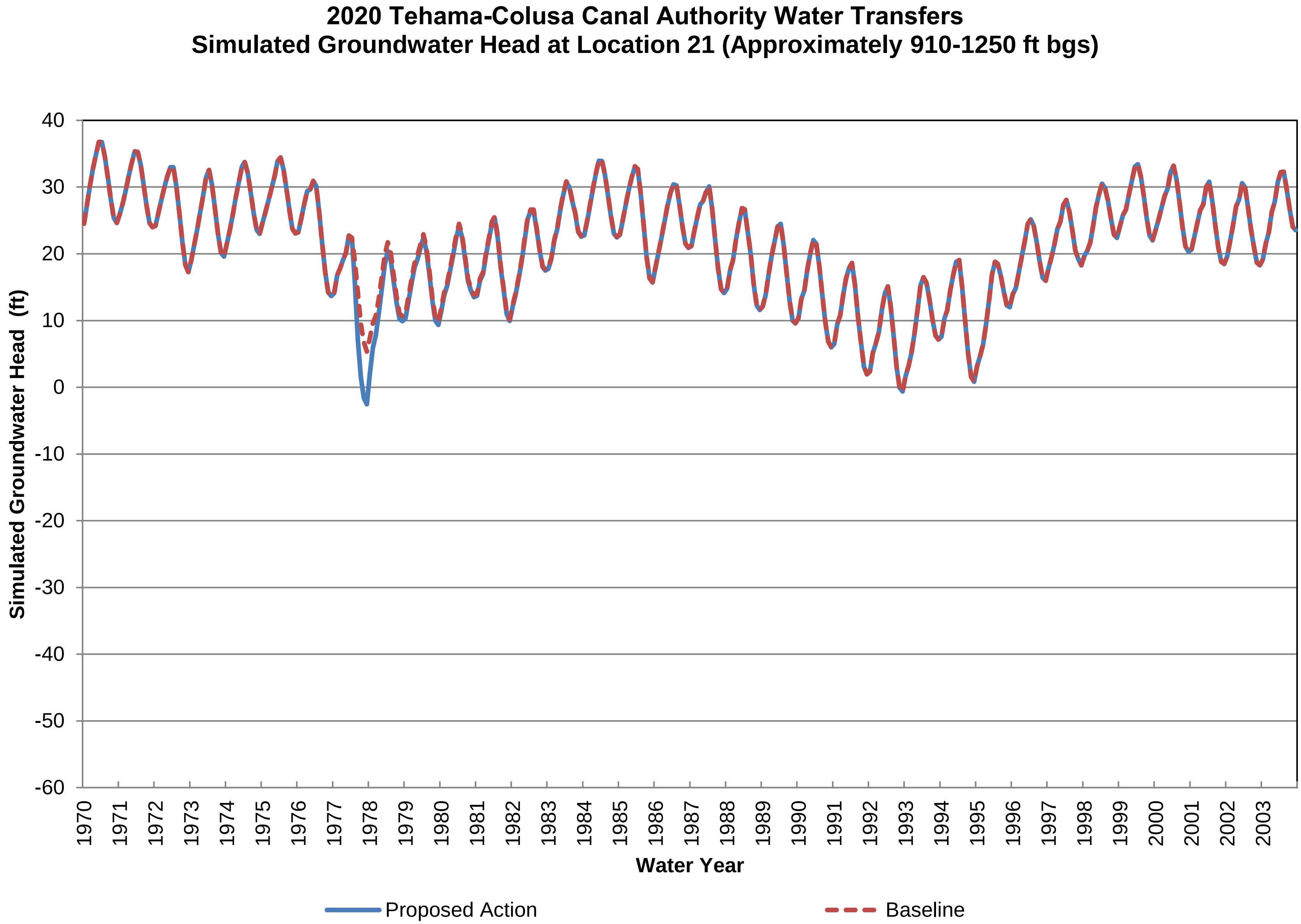
2001
2002
2003
Water Year
Proposed Action
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 21 (Approximately 690-910 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 21 (Approximately 910-1250 ft bgs)
Simulated Groundwater Head (ft)
40
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-10
-20
-30
-40
-50
-60
1970
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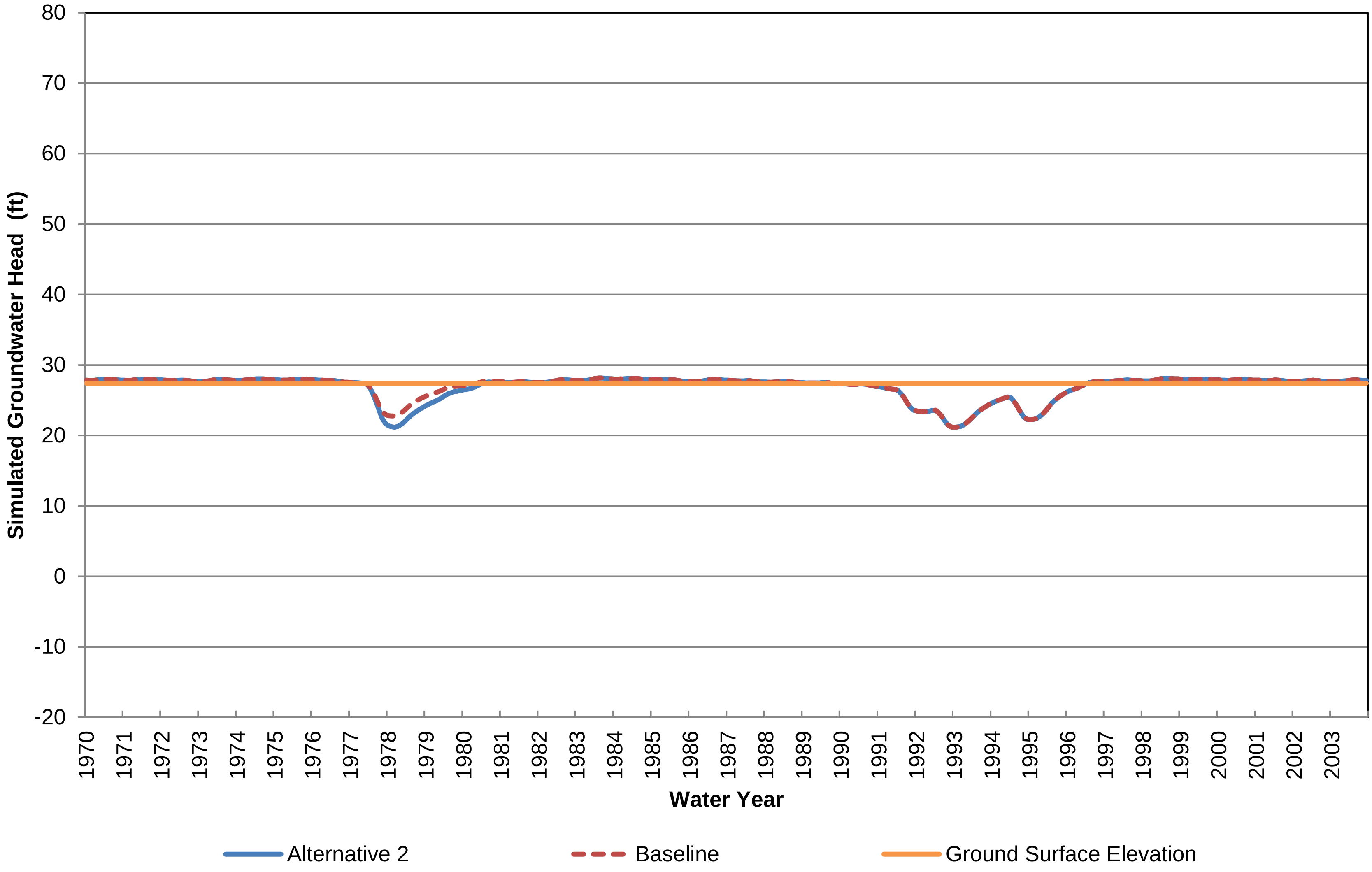
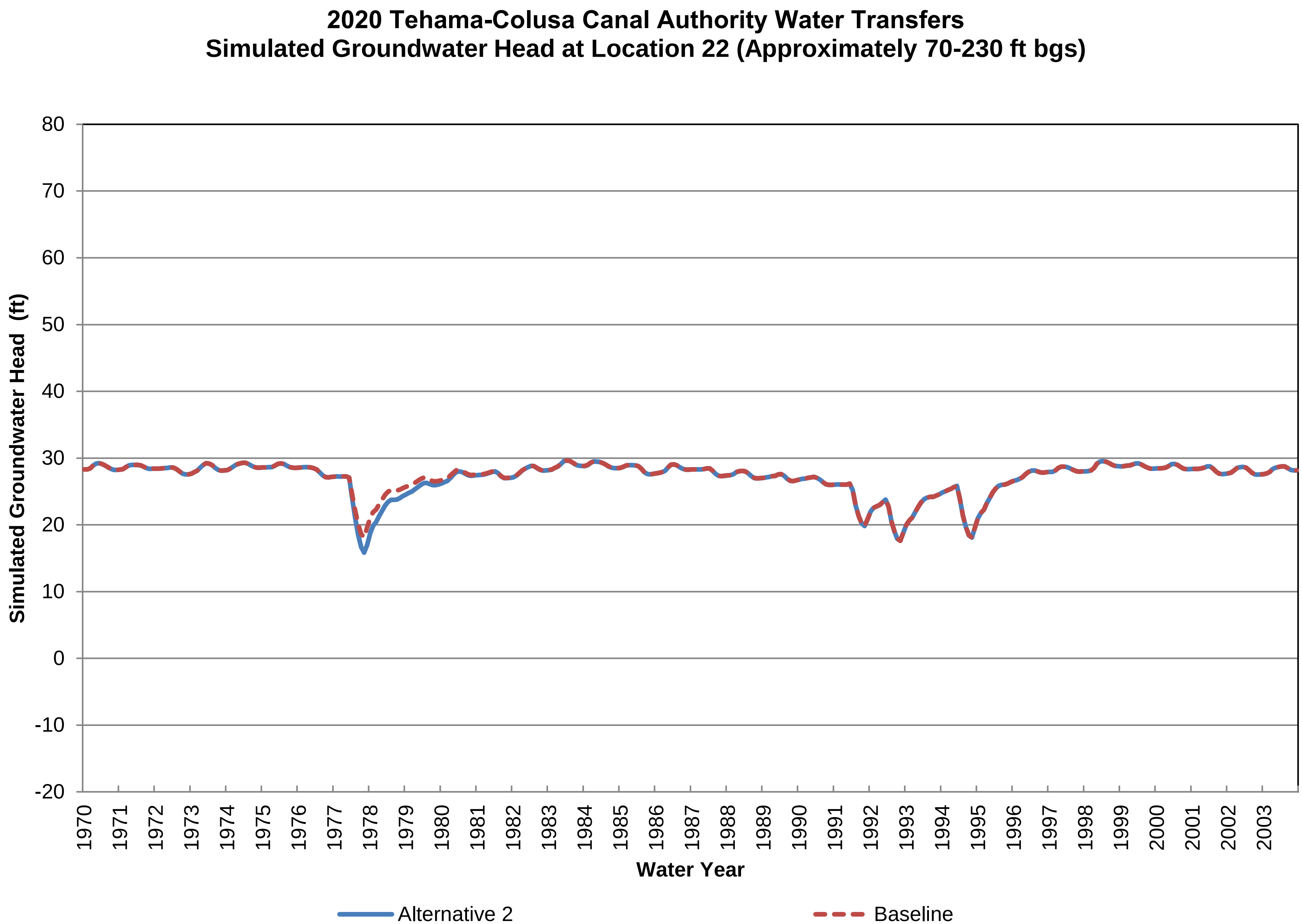
2002
2003
Water Year
Proposed Action
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 22 (Approximately 0-70 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 22 (Approximately 70-230 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
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40
30
20
10
0
-10
-20
1970
1971
1972
1973
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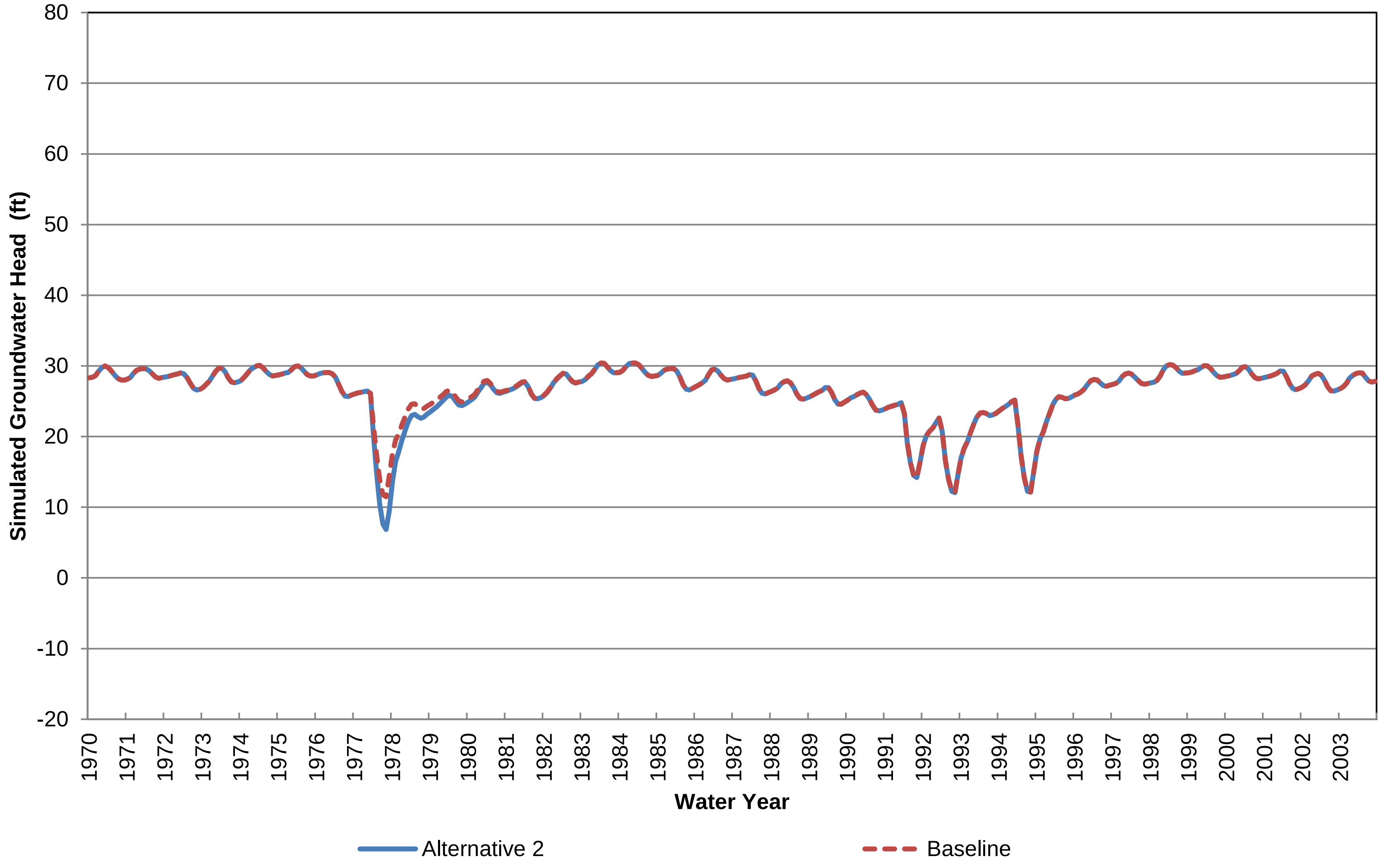
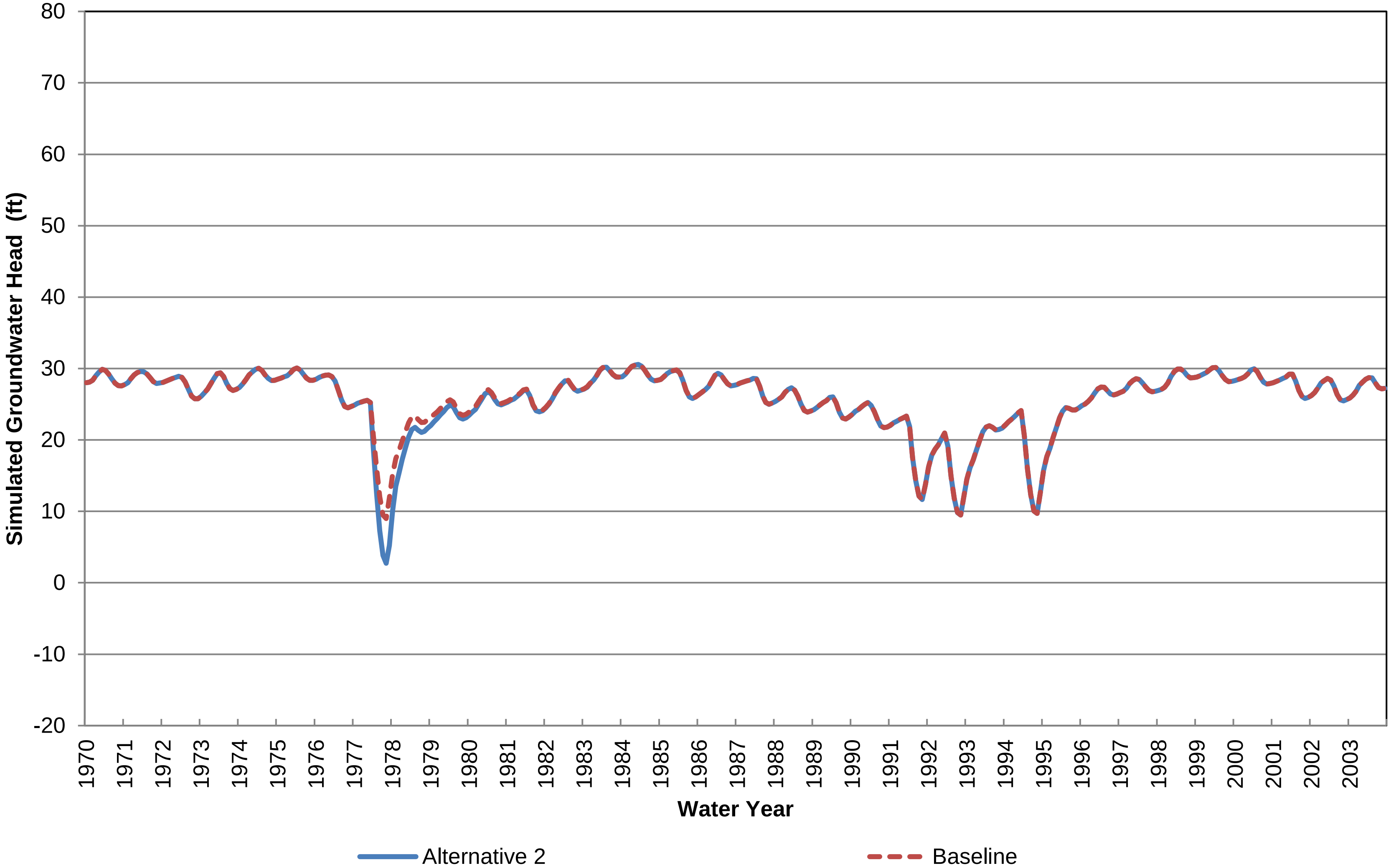
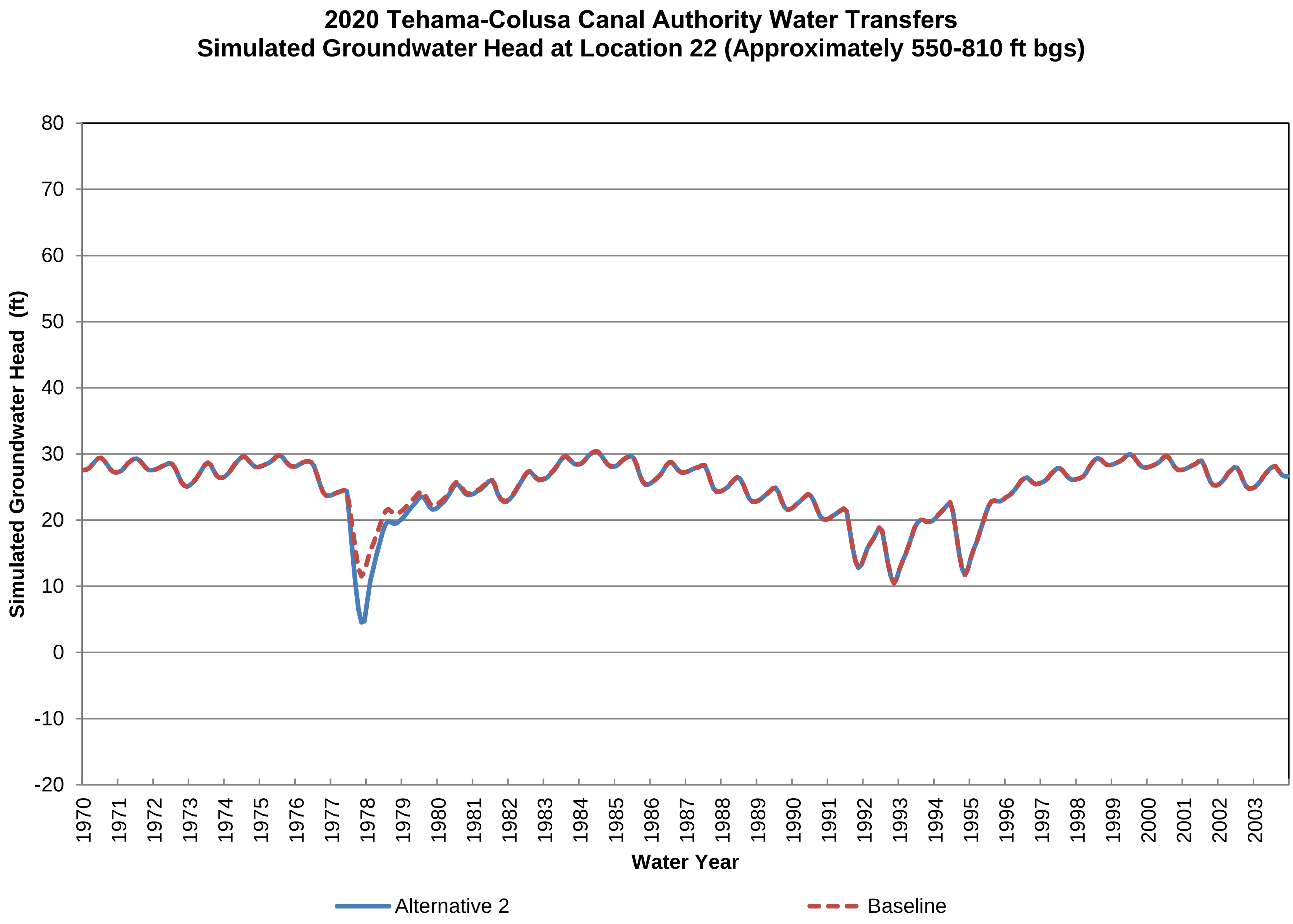
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 22 (Approximately 230-390 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 22 (Approximately 390-550 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 22 (Approximately 550-810 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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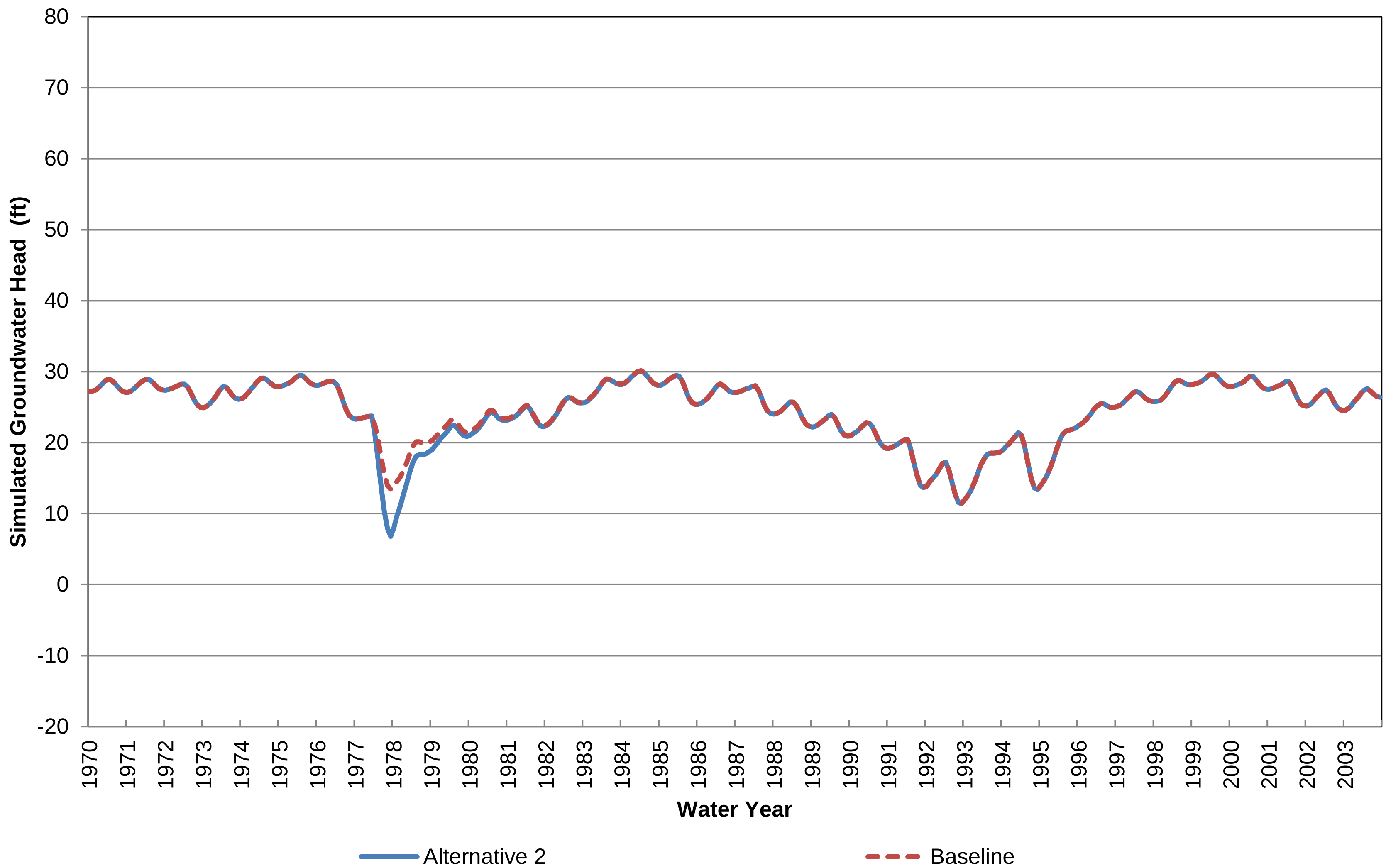
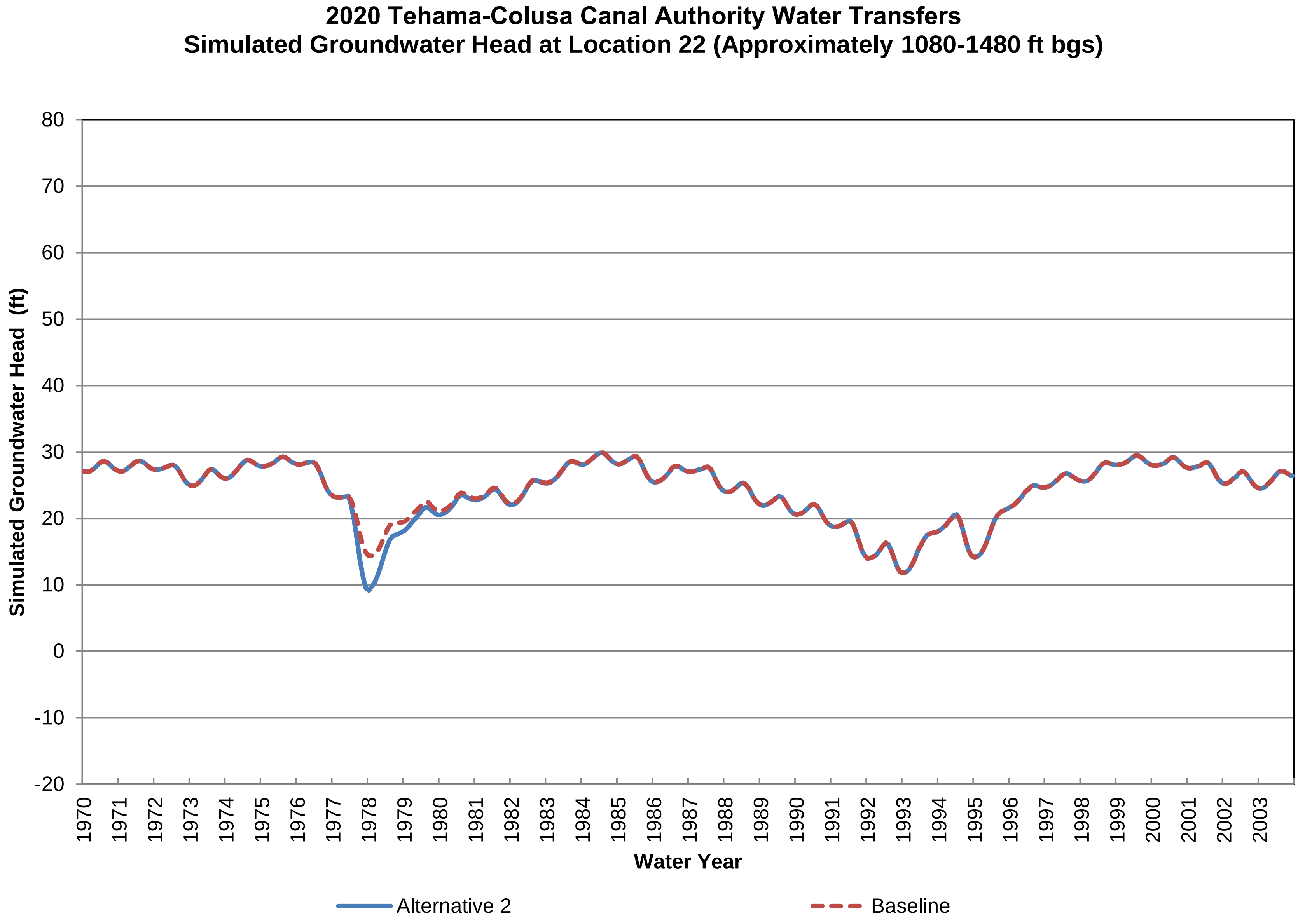
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 22 (Approximately 810-1080 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 22 (Approximately 1080-1480 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
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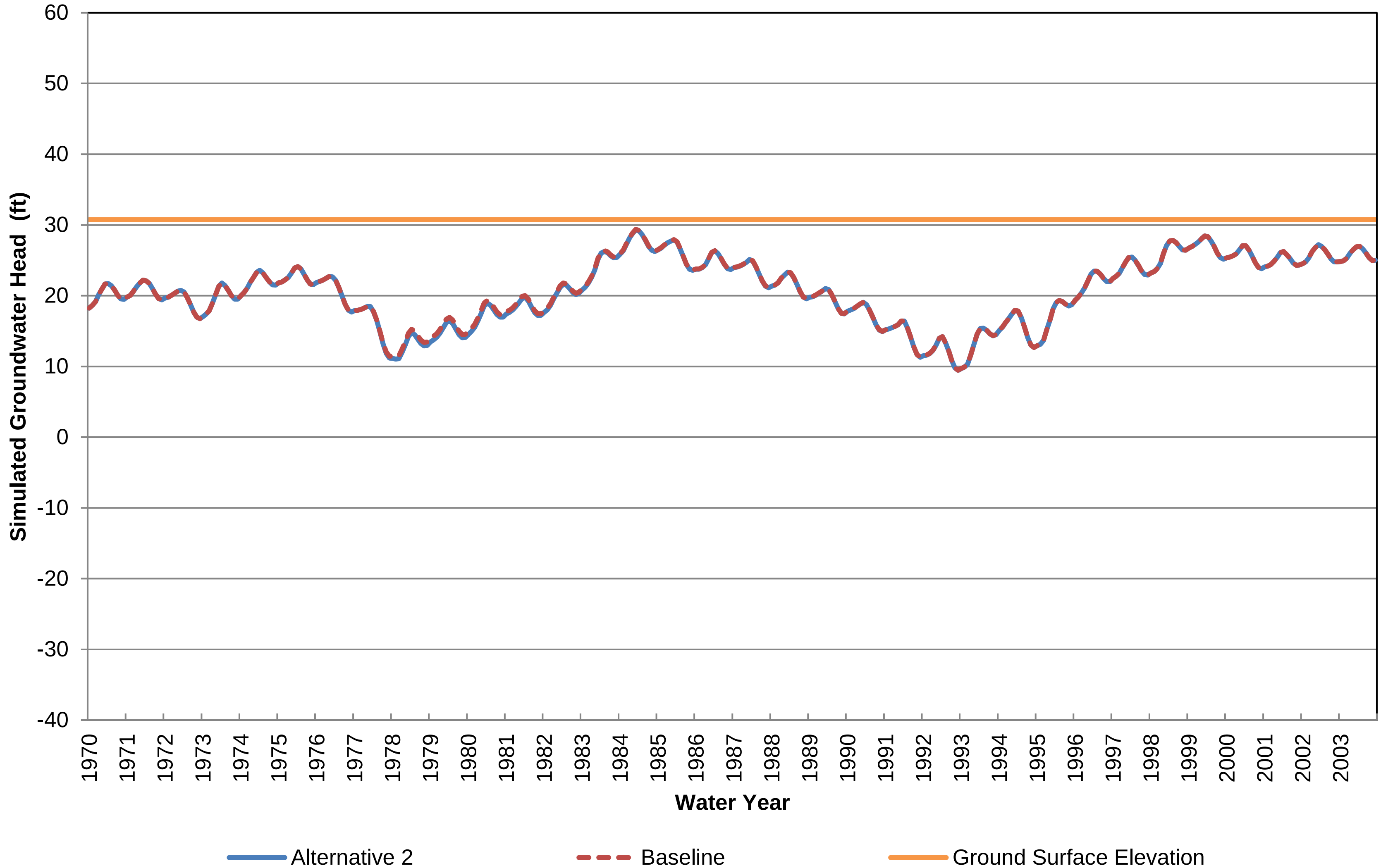
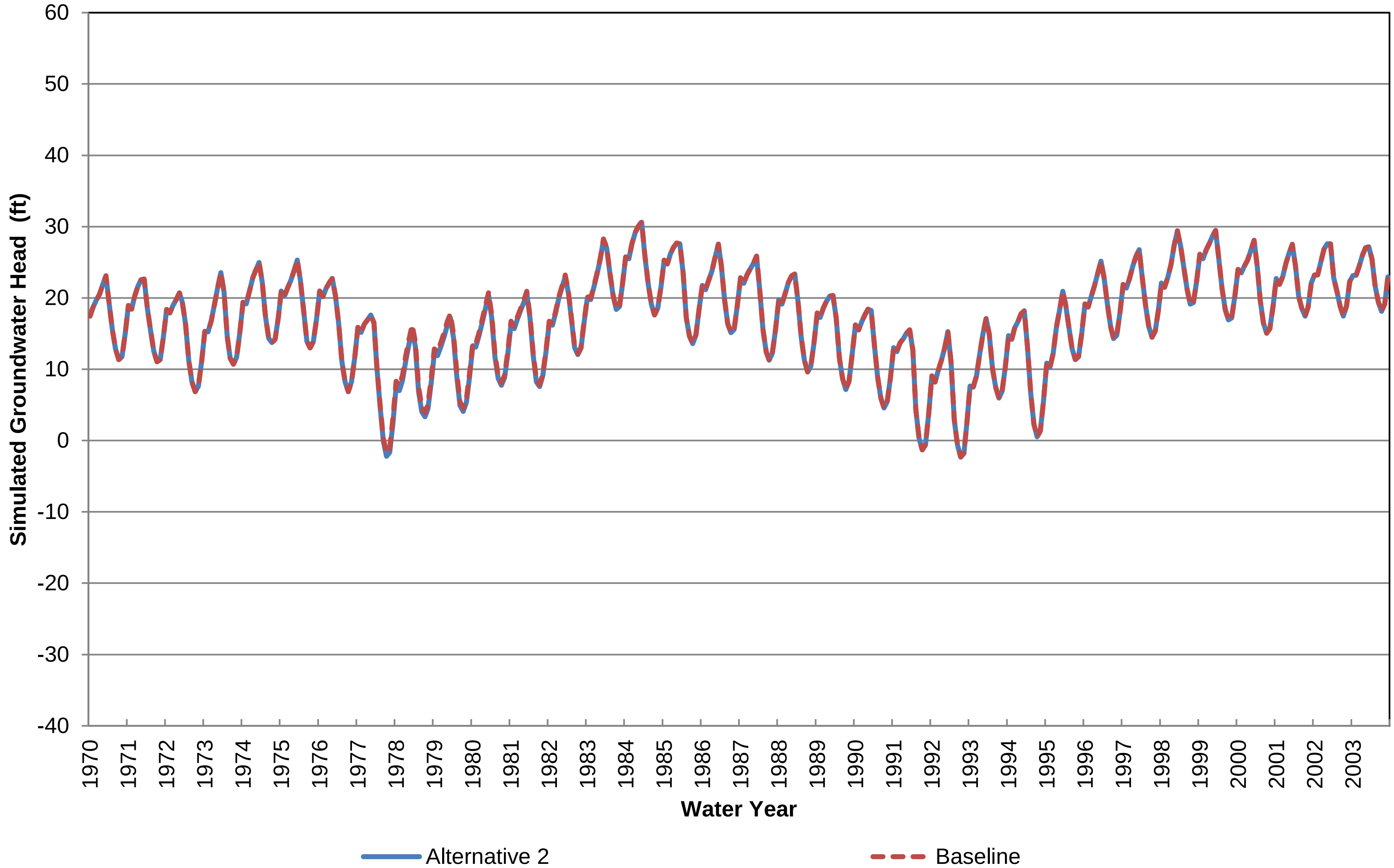
2001
2002
2003
Water Year
Alternative 2
Baseline

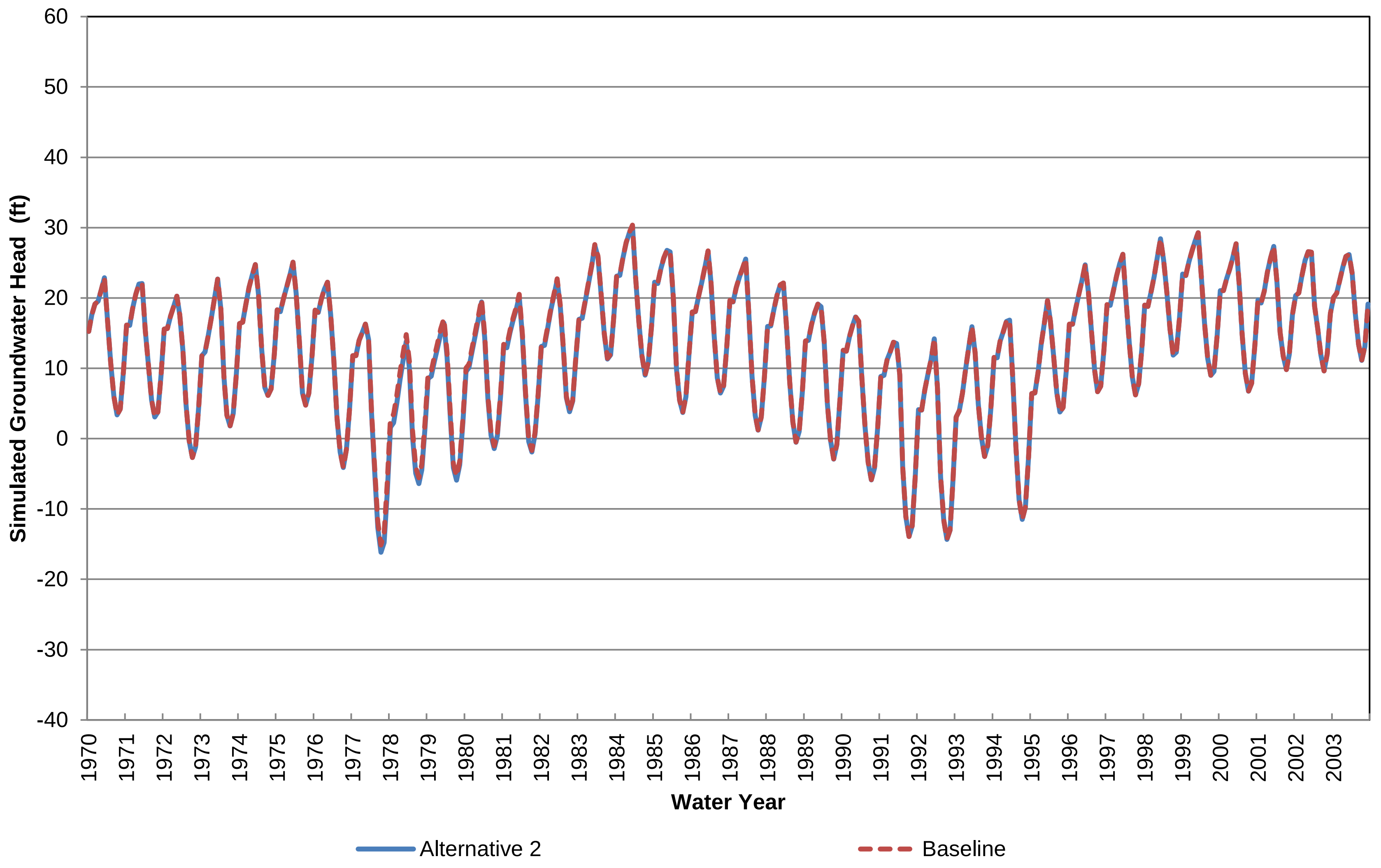
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 23 (Approximately 0-70 ft bgs)

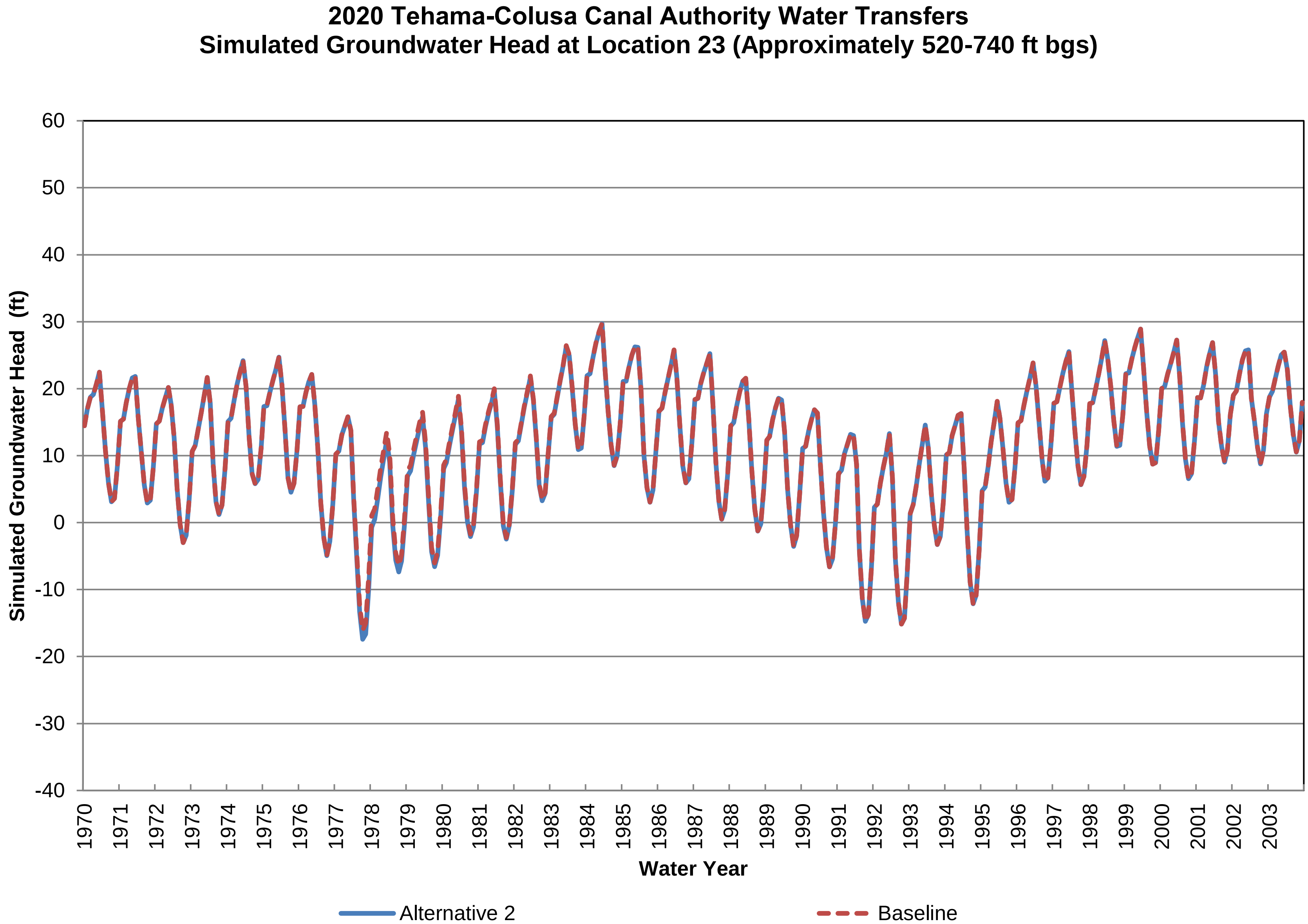


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 23 (Approximately 70-290 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 23 (Approximately 290-520 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 23 (Approximately 520-740 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
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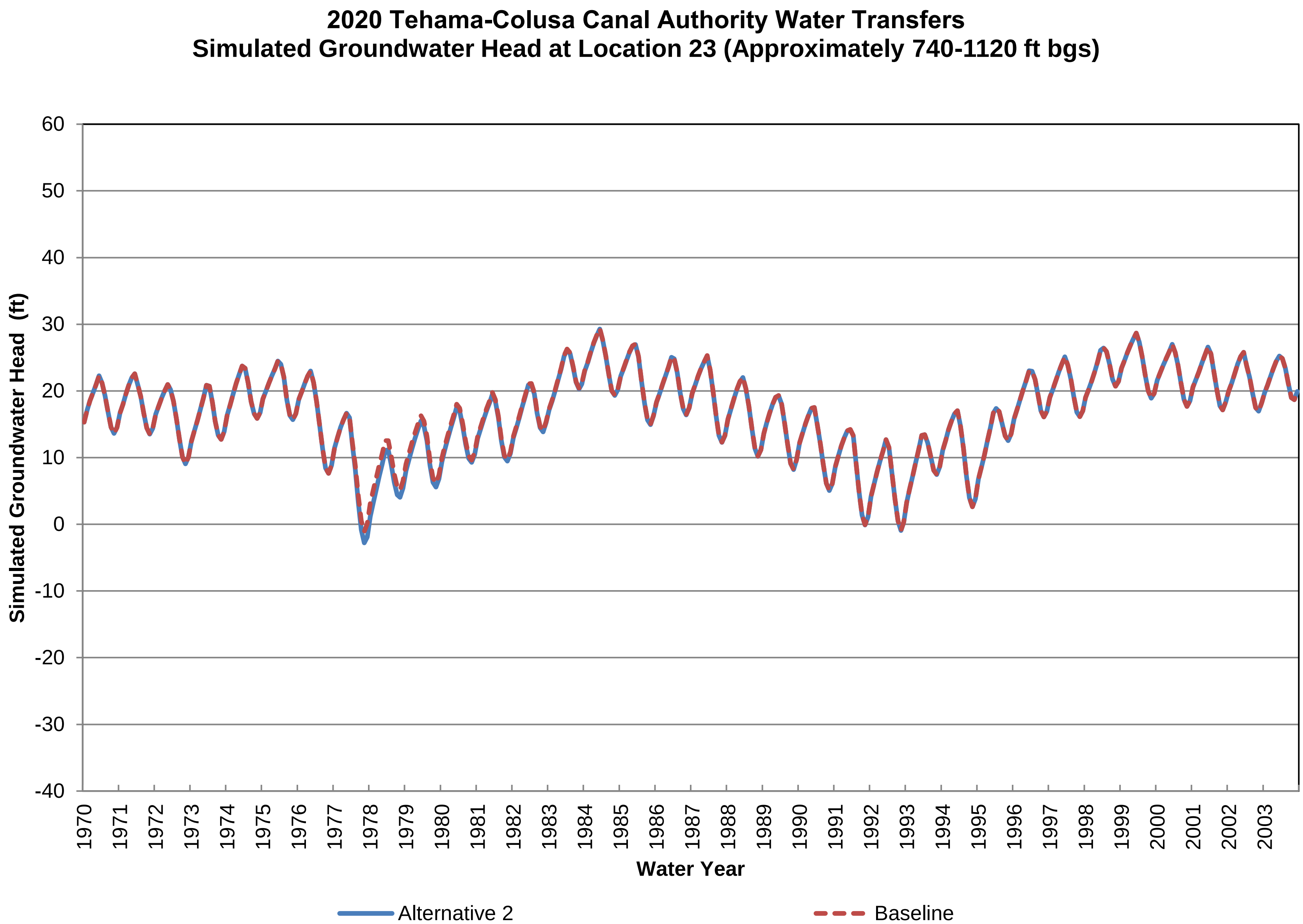
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 23 (Approximately 740-1120 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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1981
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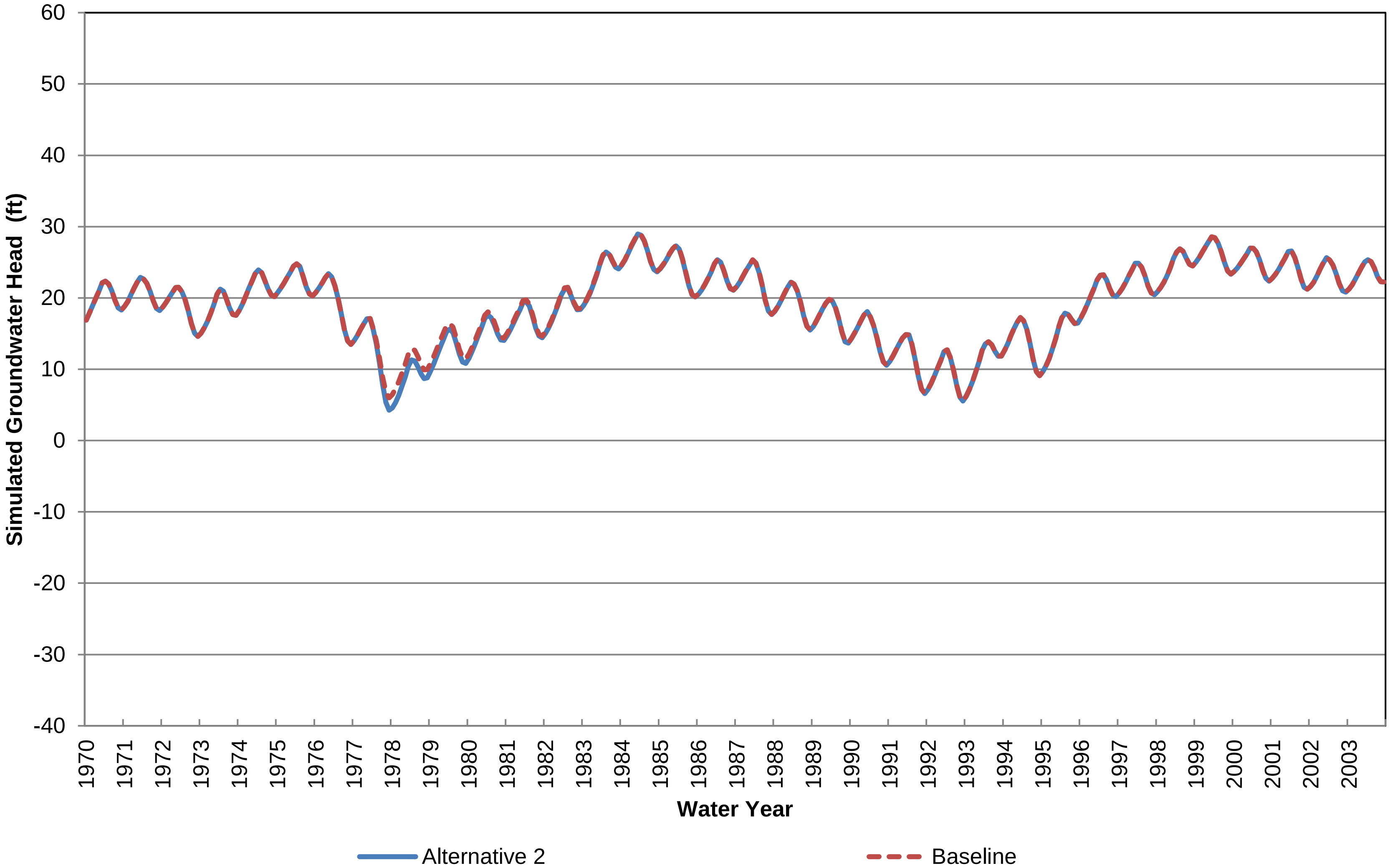
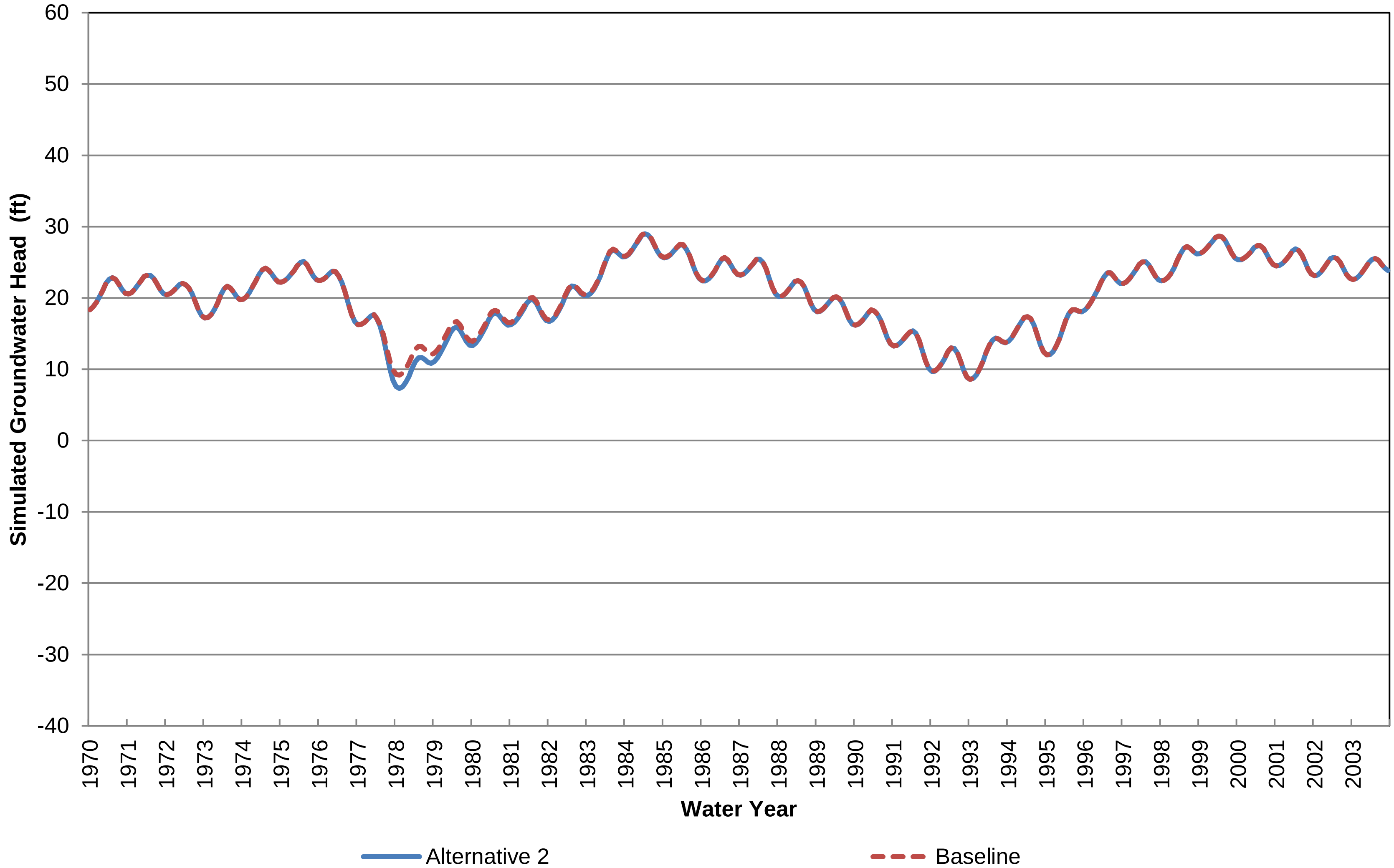
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

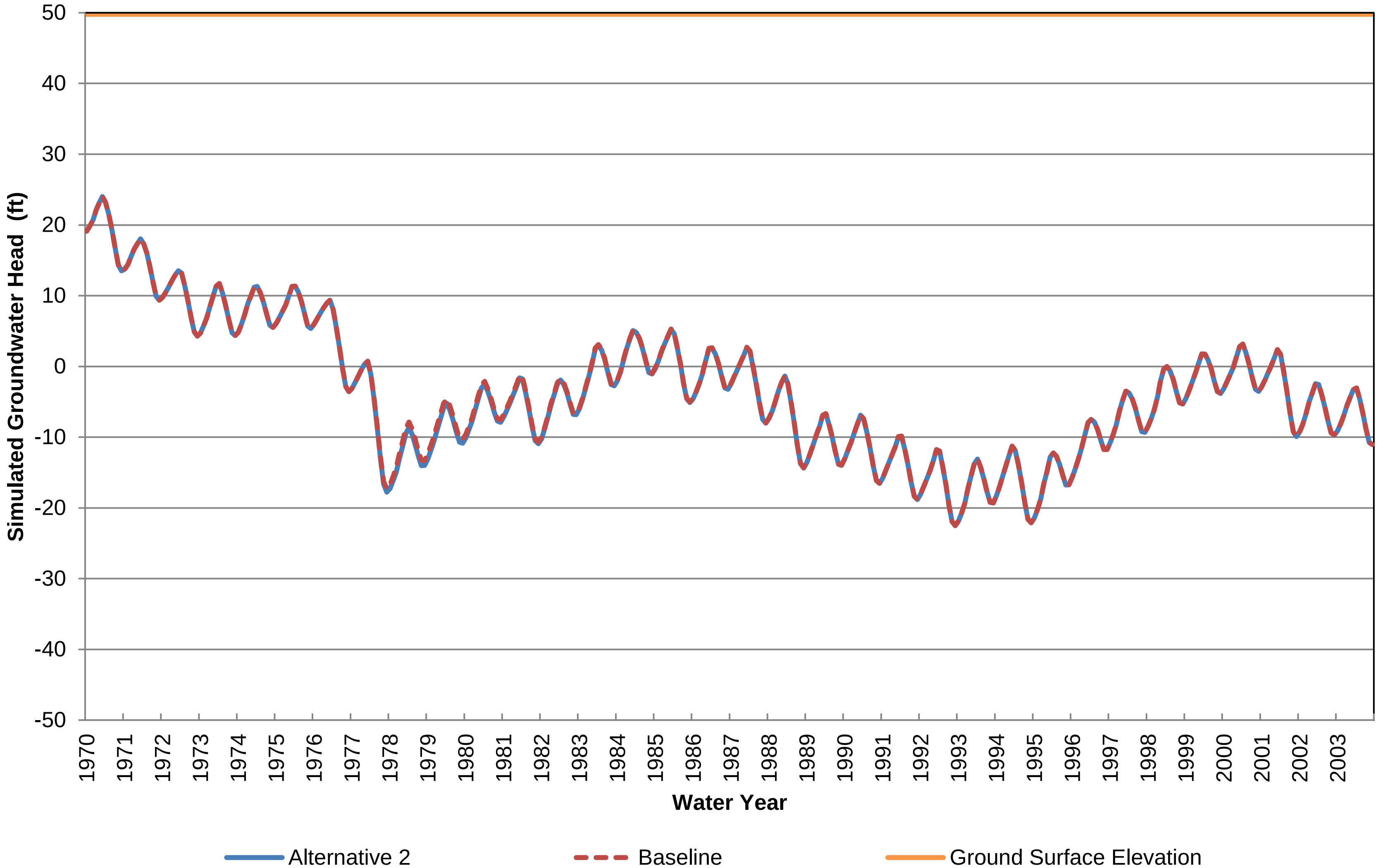
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 23 (Approximately 1120-1500 ft bgs)

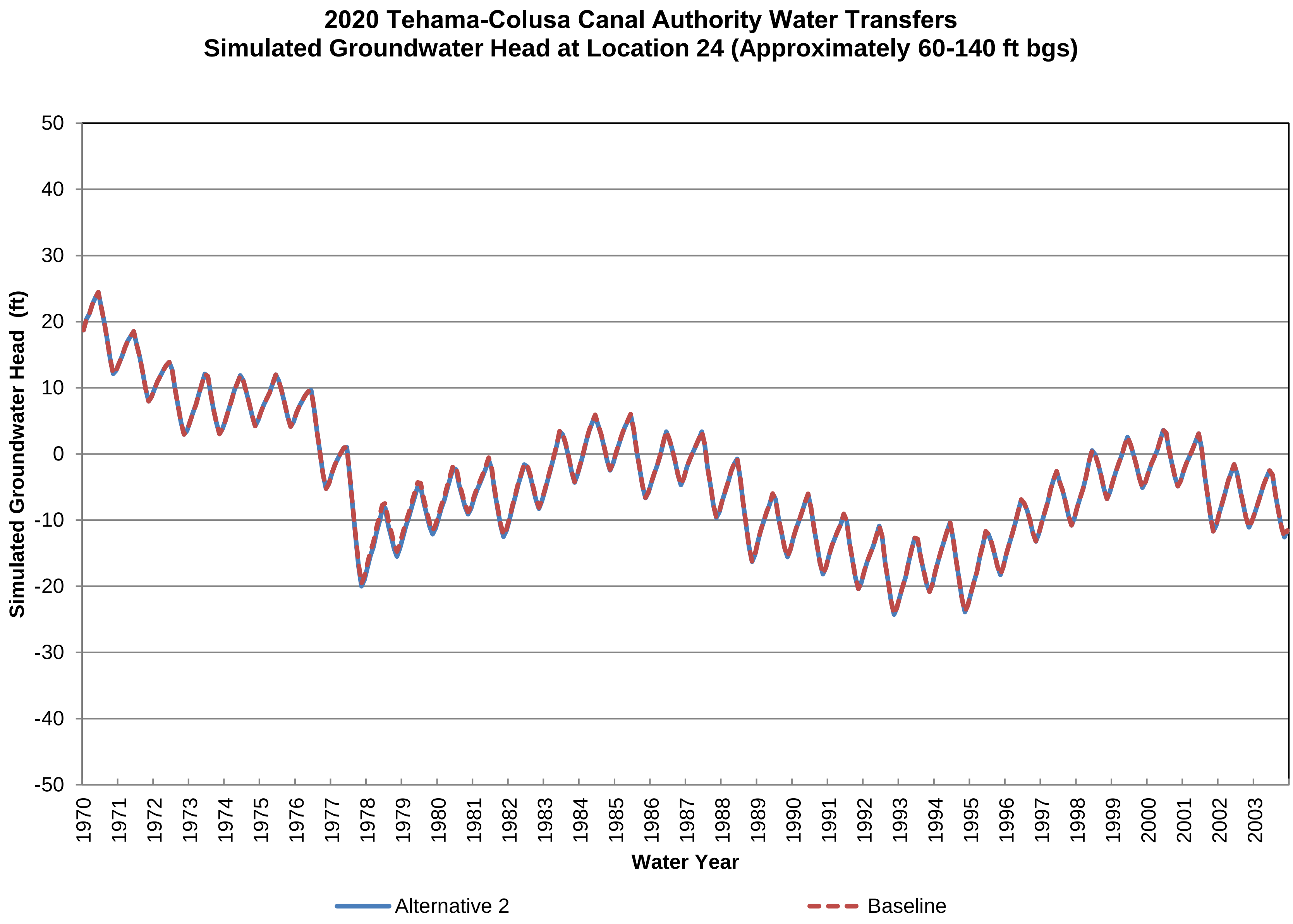


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 23 (Approximately 1500-2050 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 24 (Approximately 0-60 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 24 (Approximately 60-140 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
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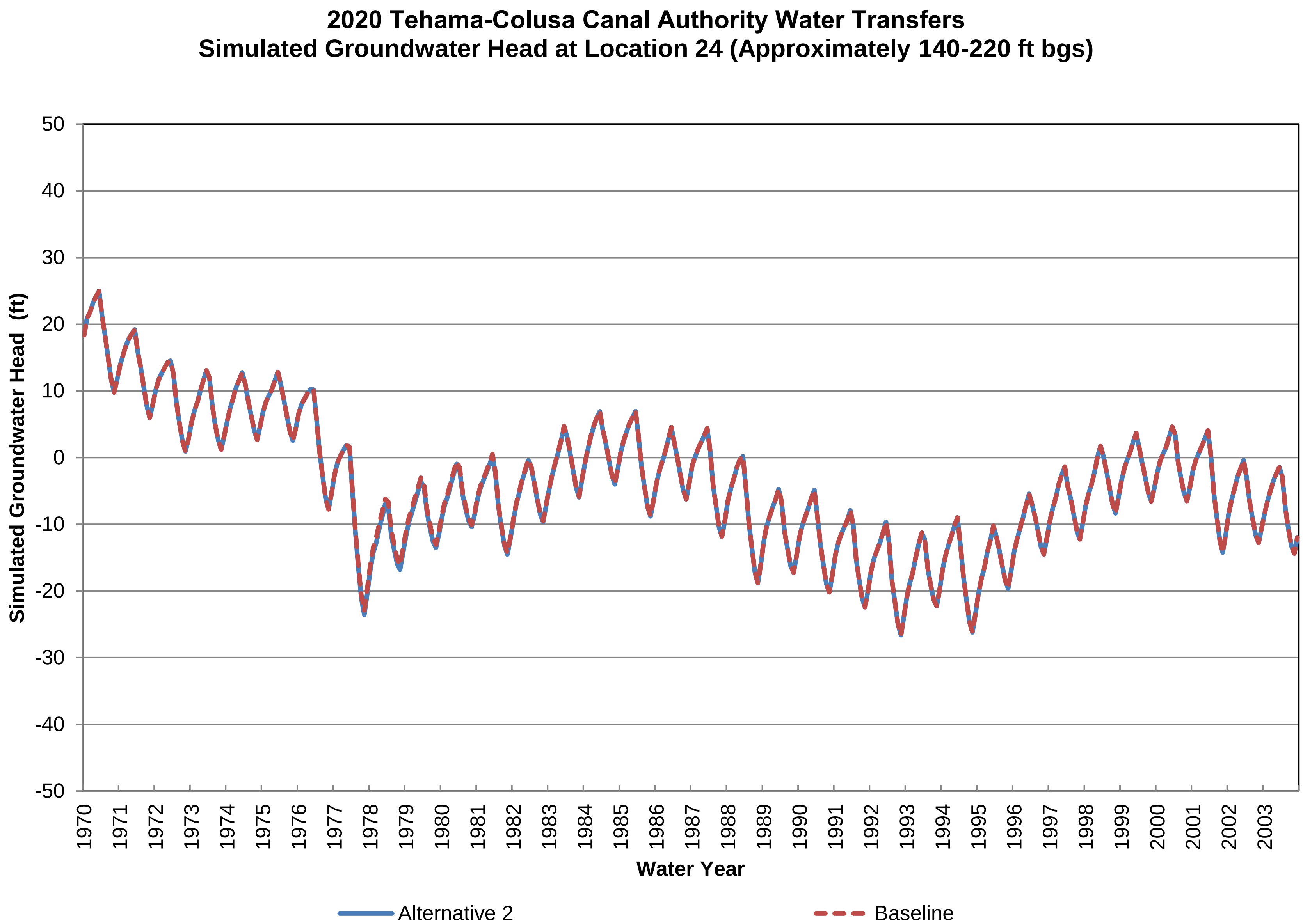
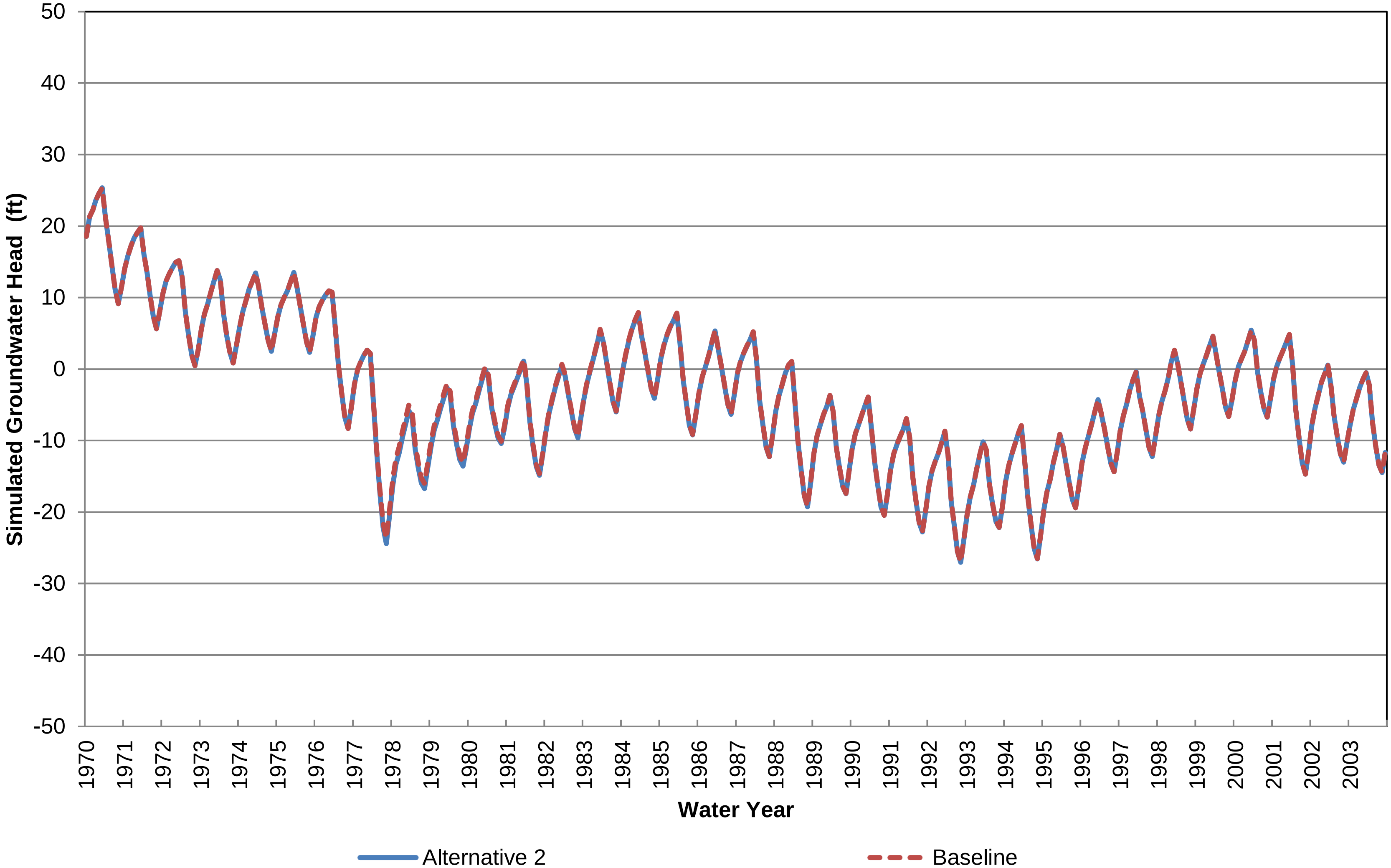
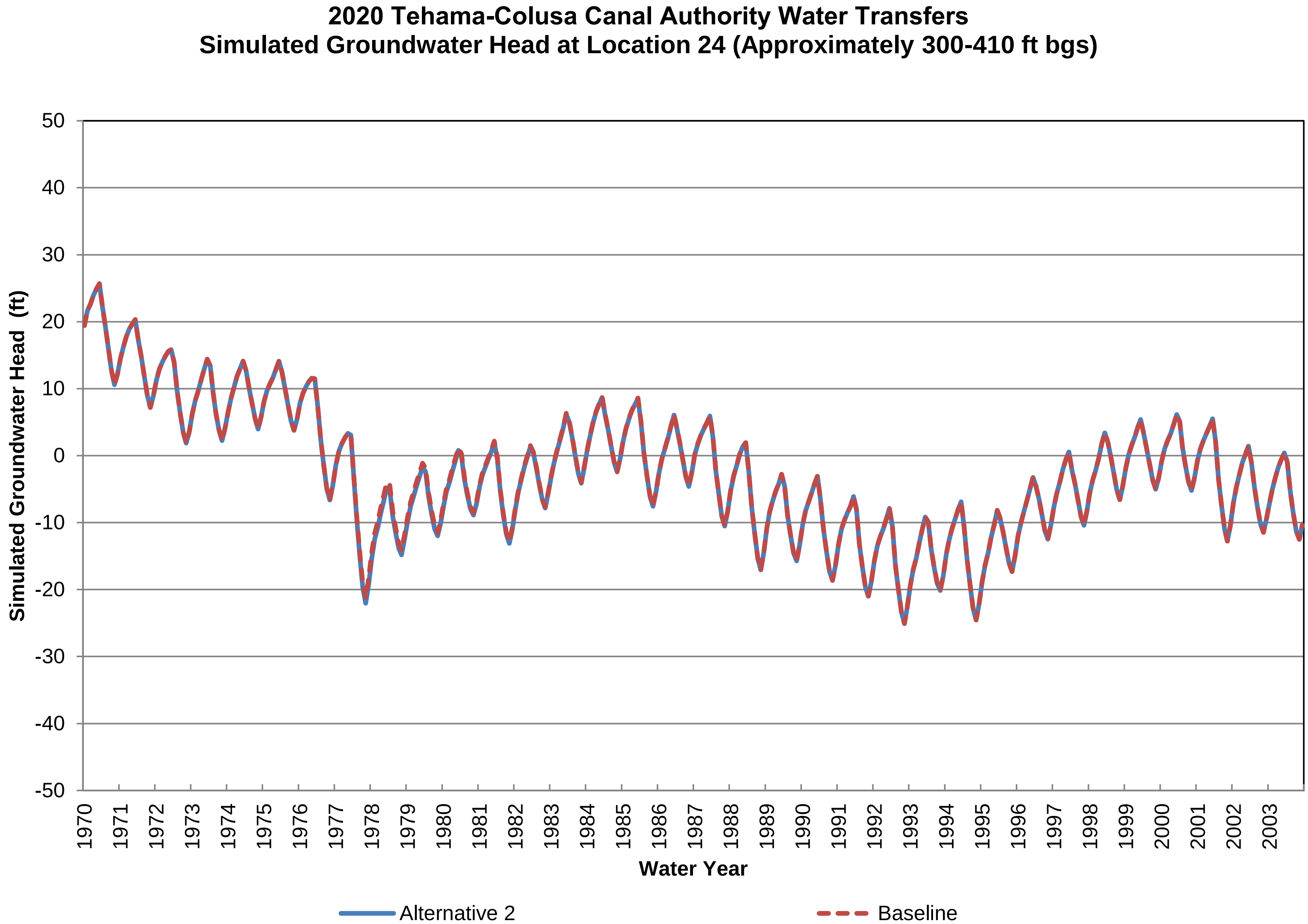
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 24 (Approximately 140-220 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 24 (Approximately 220-300 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 24 (Approximately 300-410 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
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1994
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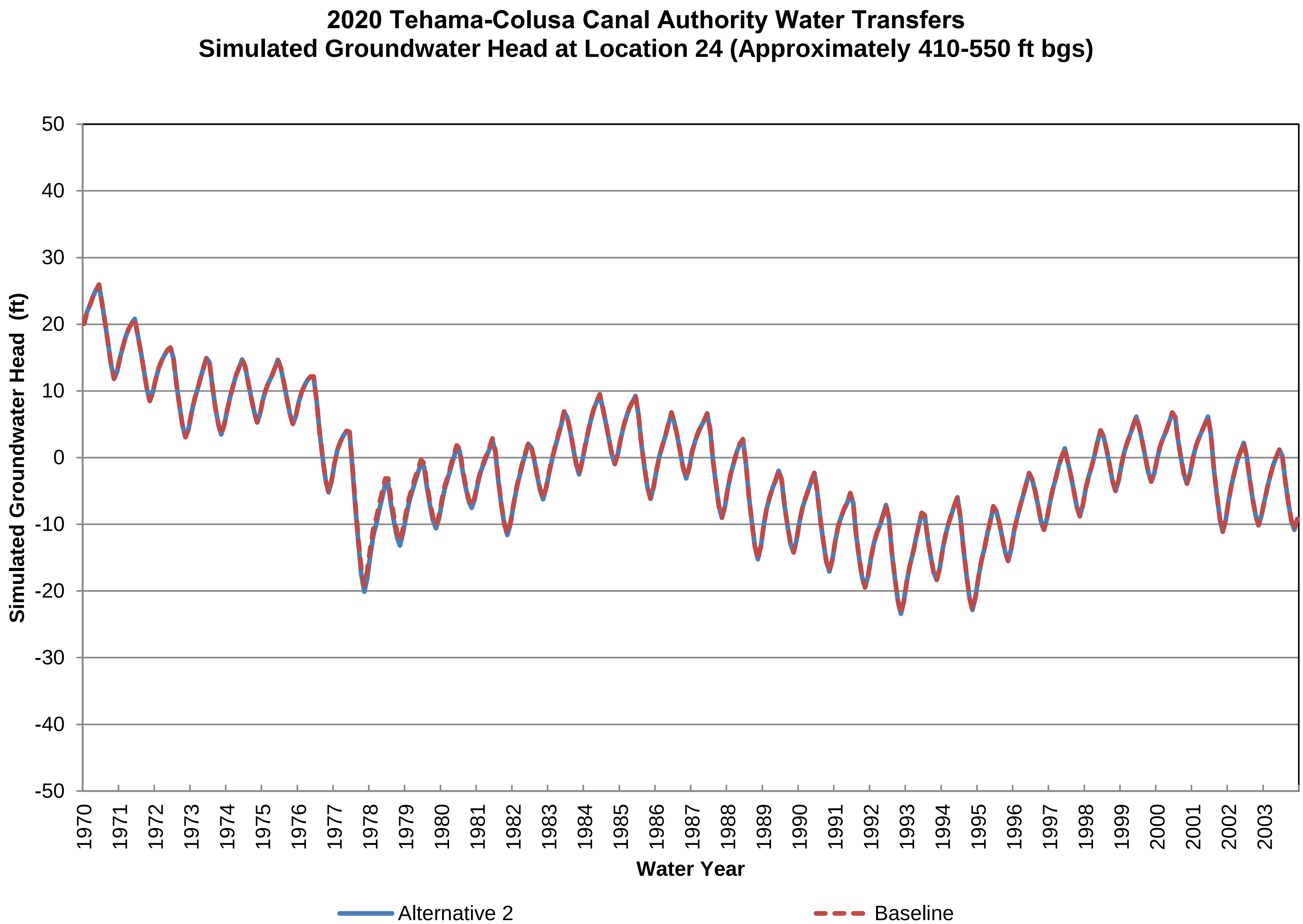
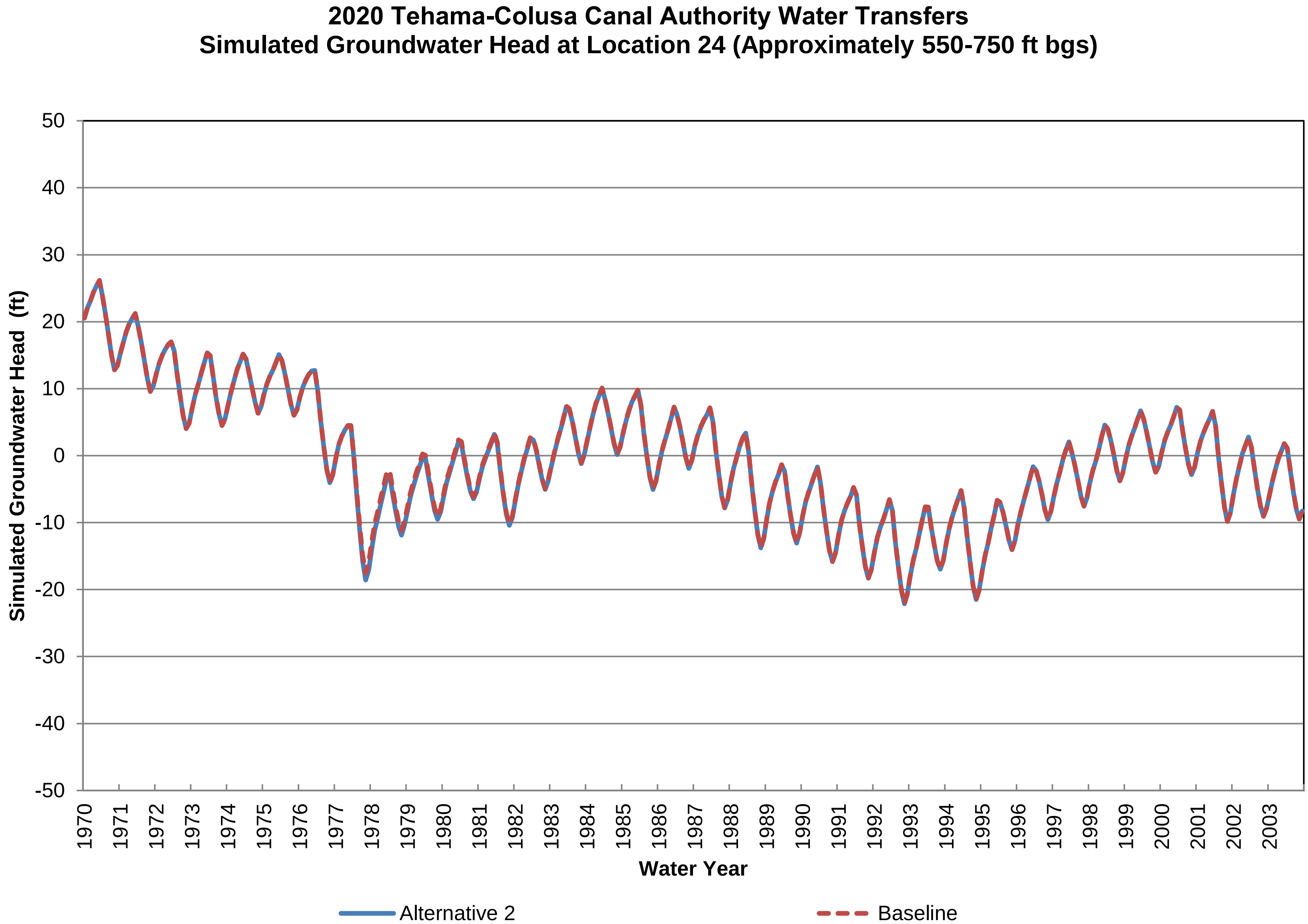
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

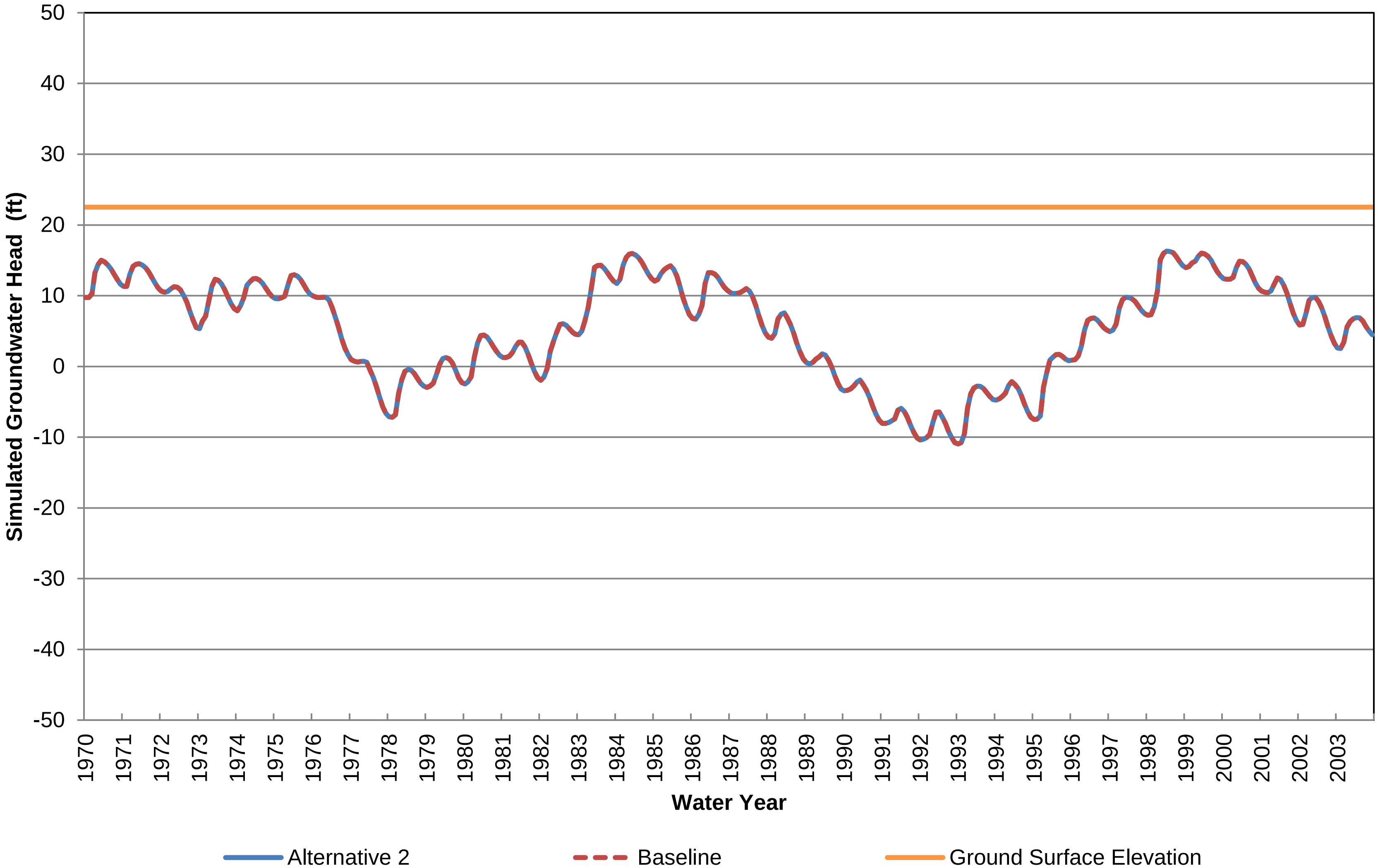


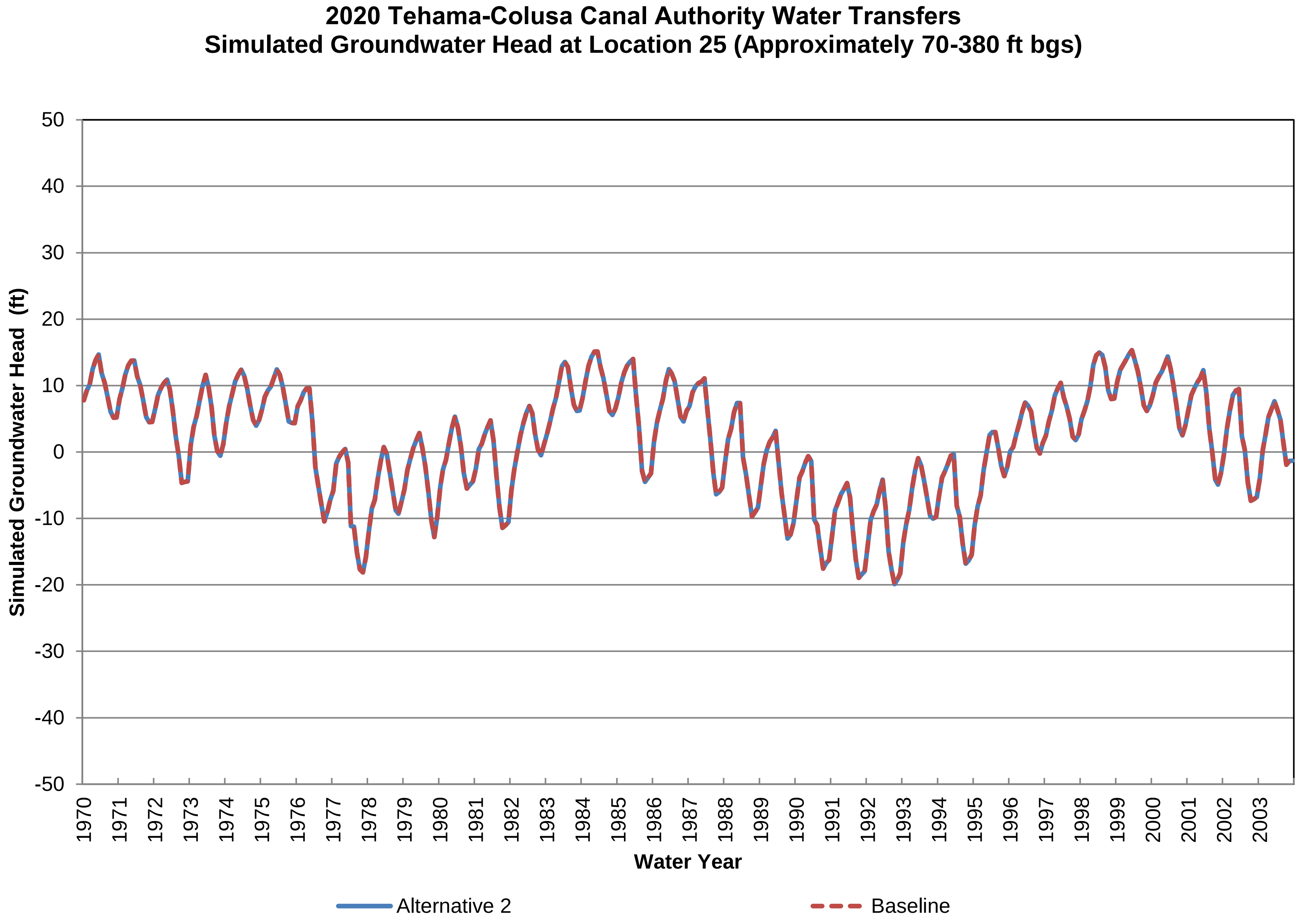
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 24 (Approximately 410-550 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 24 (Approximately 550-750 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 25 (Approximately 0-70 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 25 (Approximately 70-380 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
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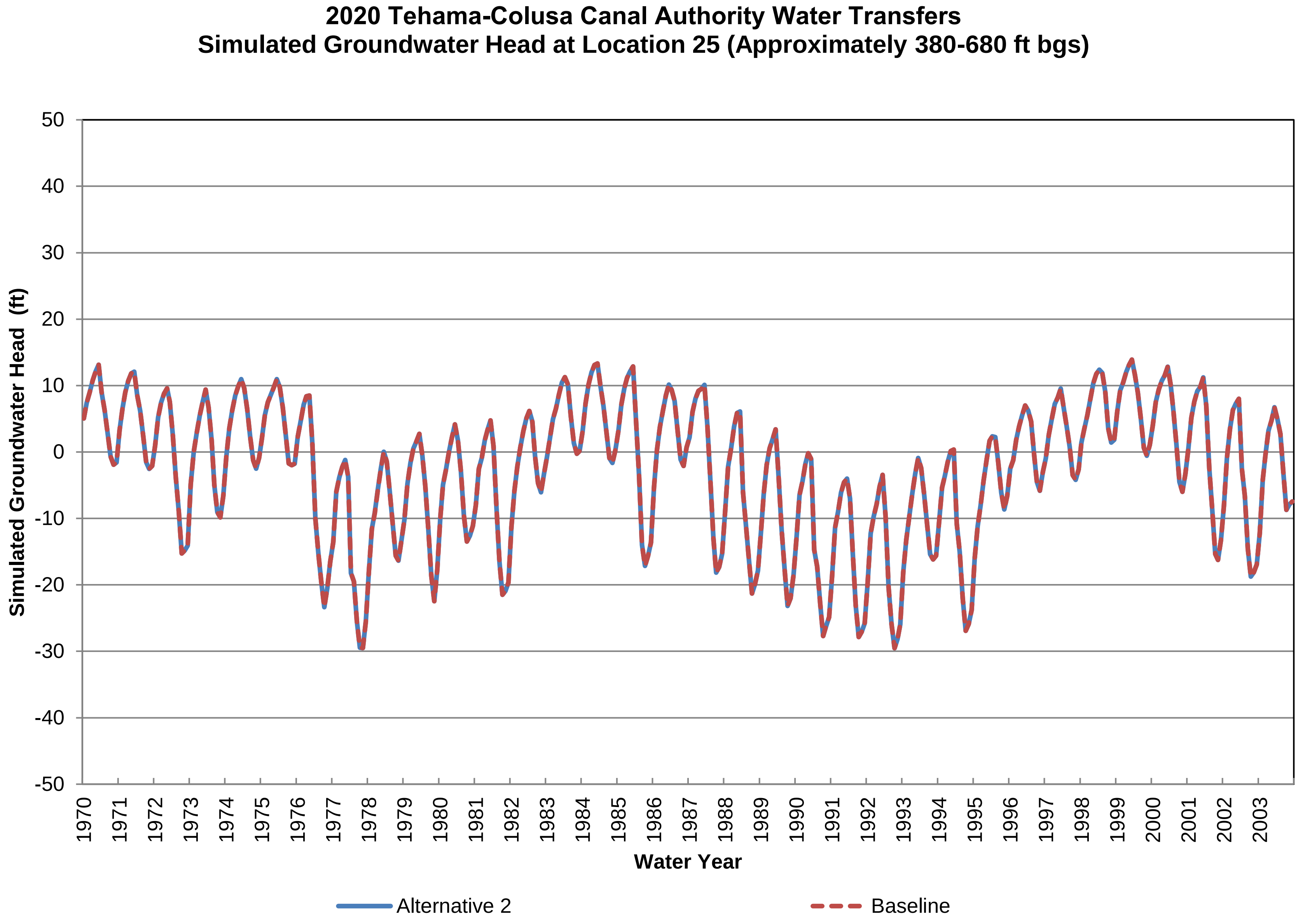
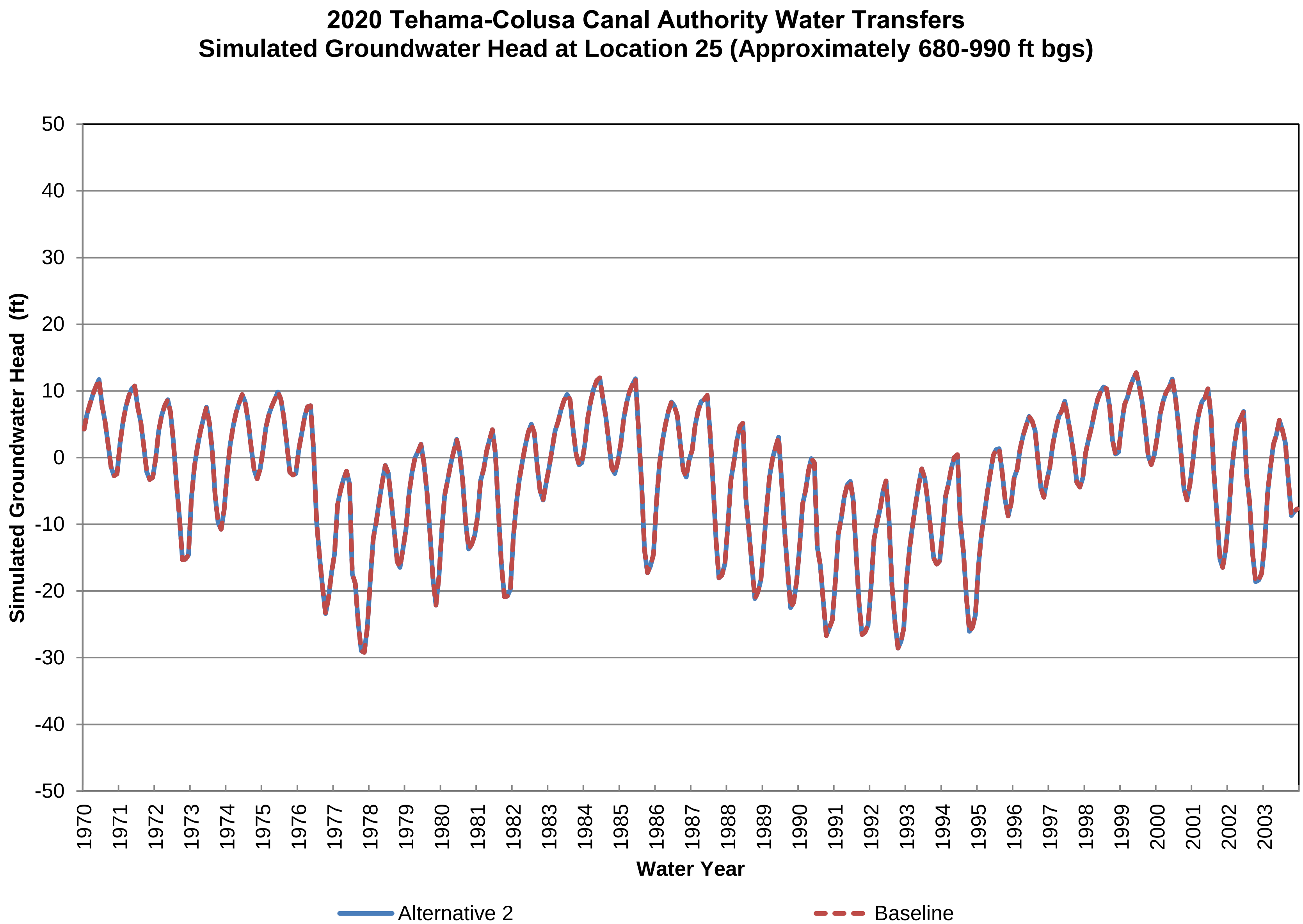
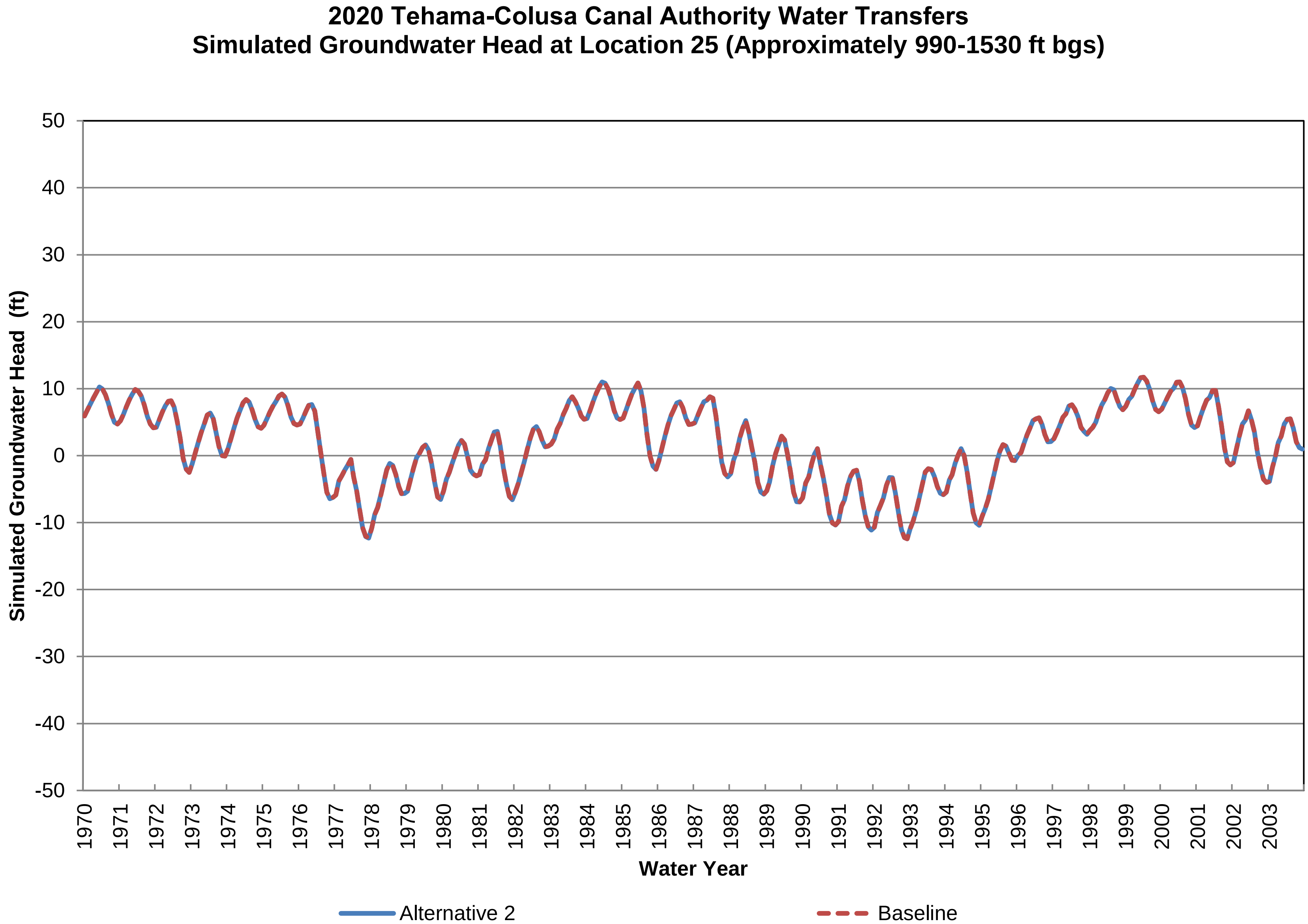
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



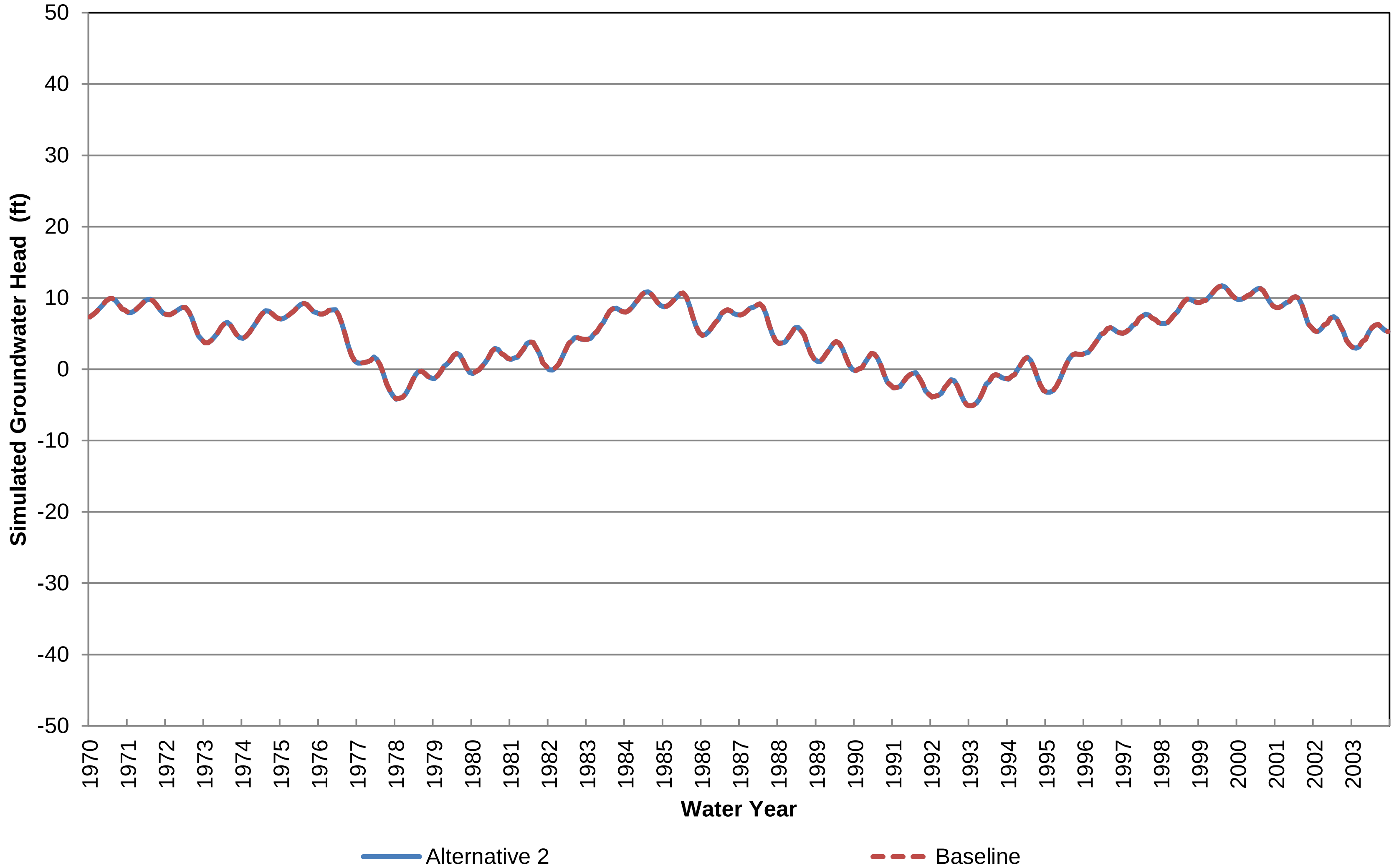
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 25 (Approximately 380-680 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 25 (Approximately 680-990 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

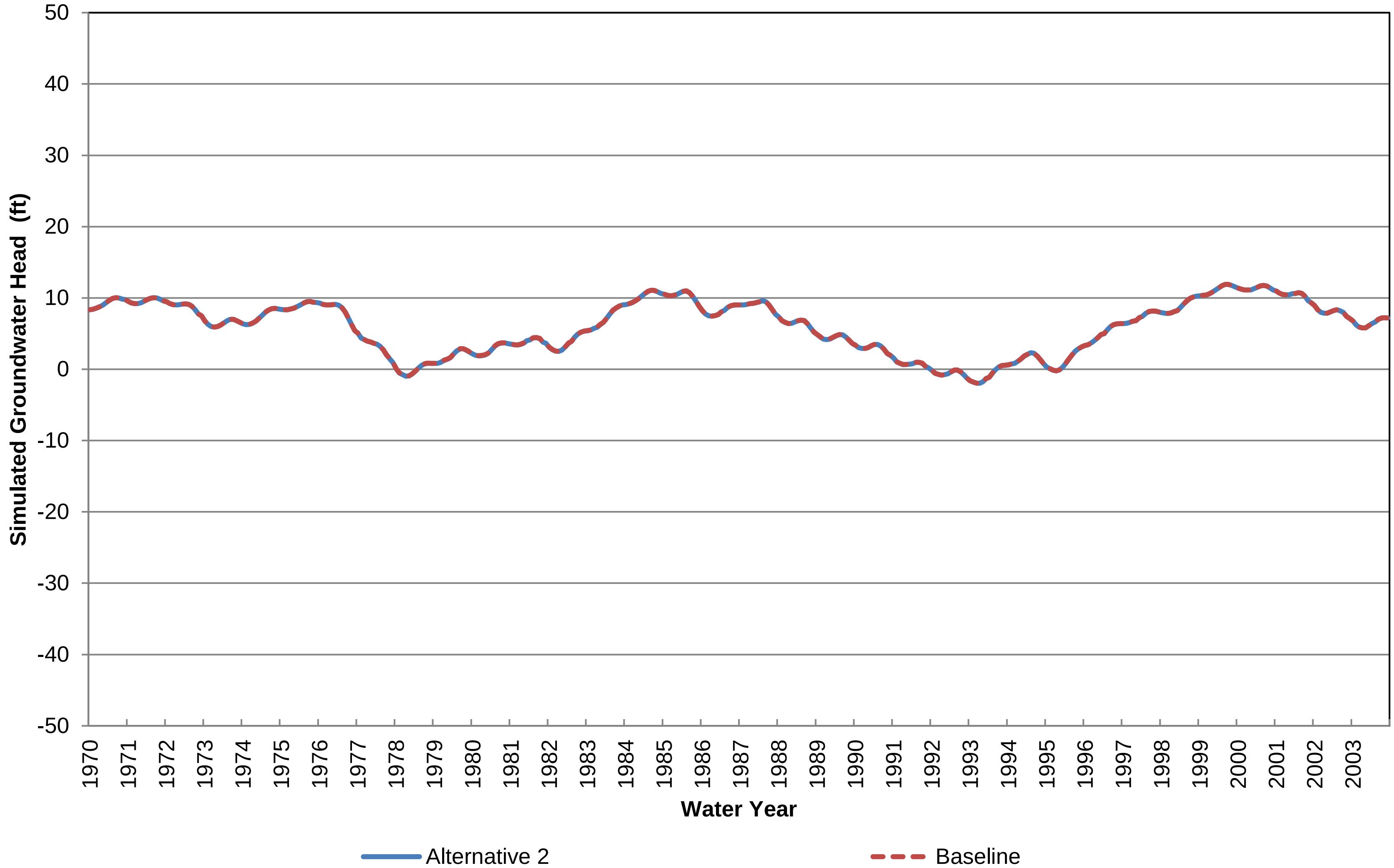


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 25 (Approximately 990-1530 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

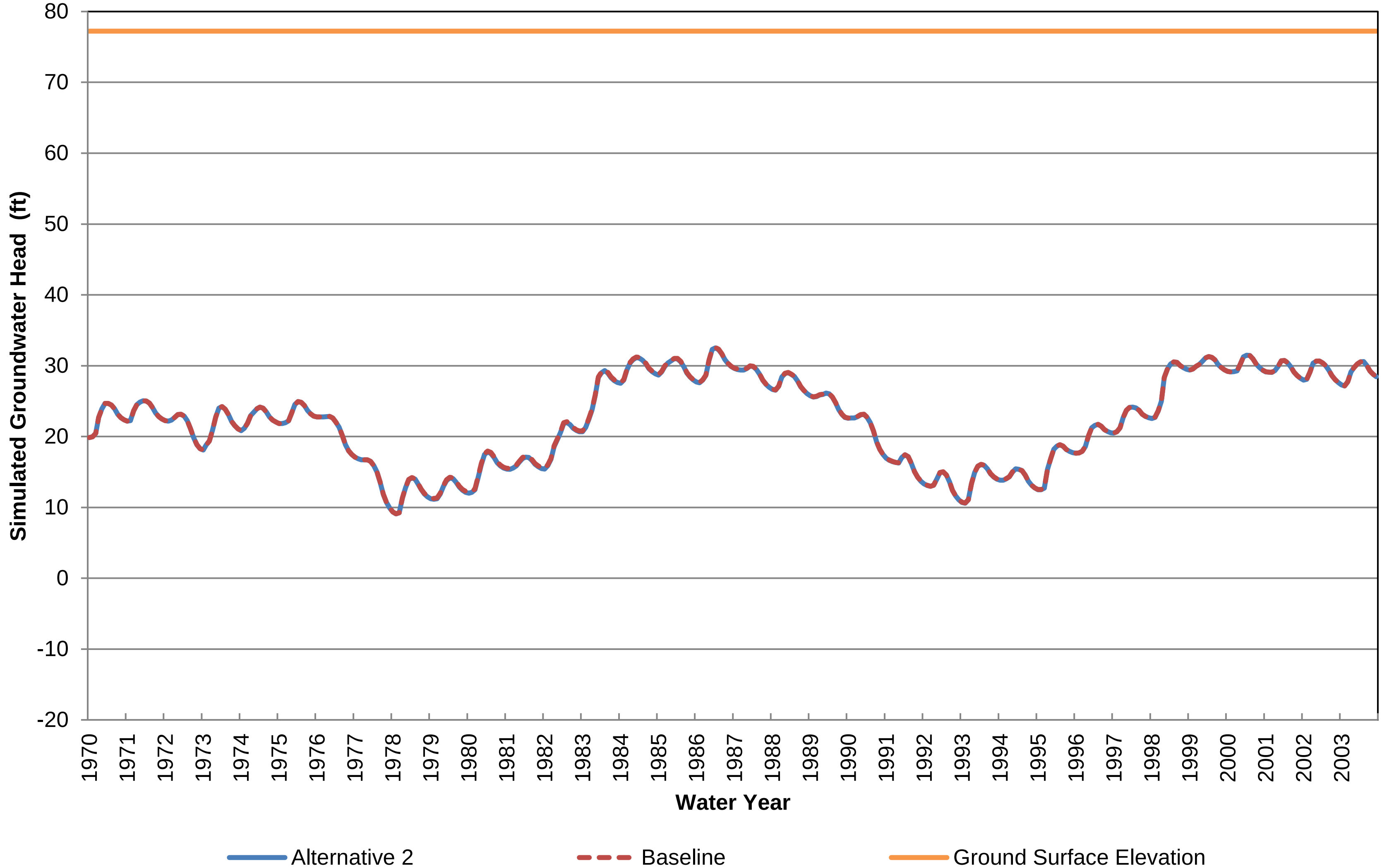
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 25 (Approximately 1530-2040 ft bgs)

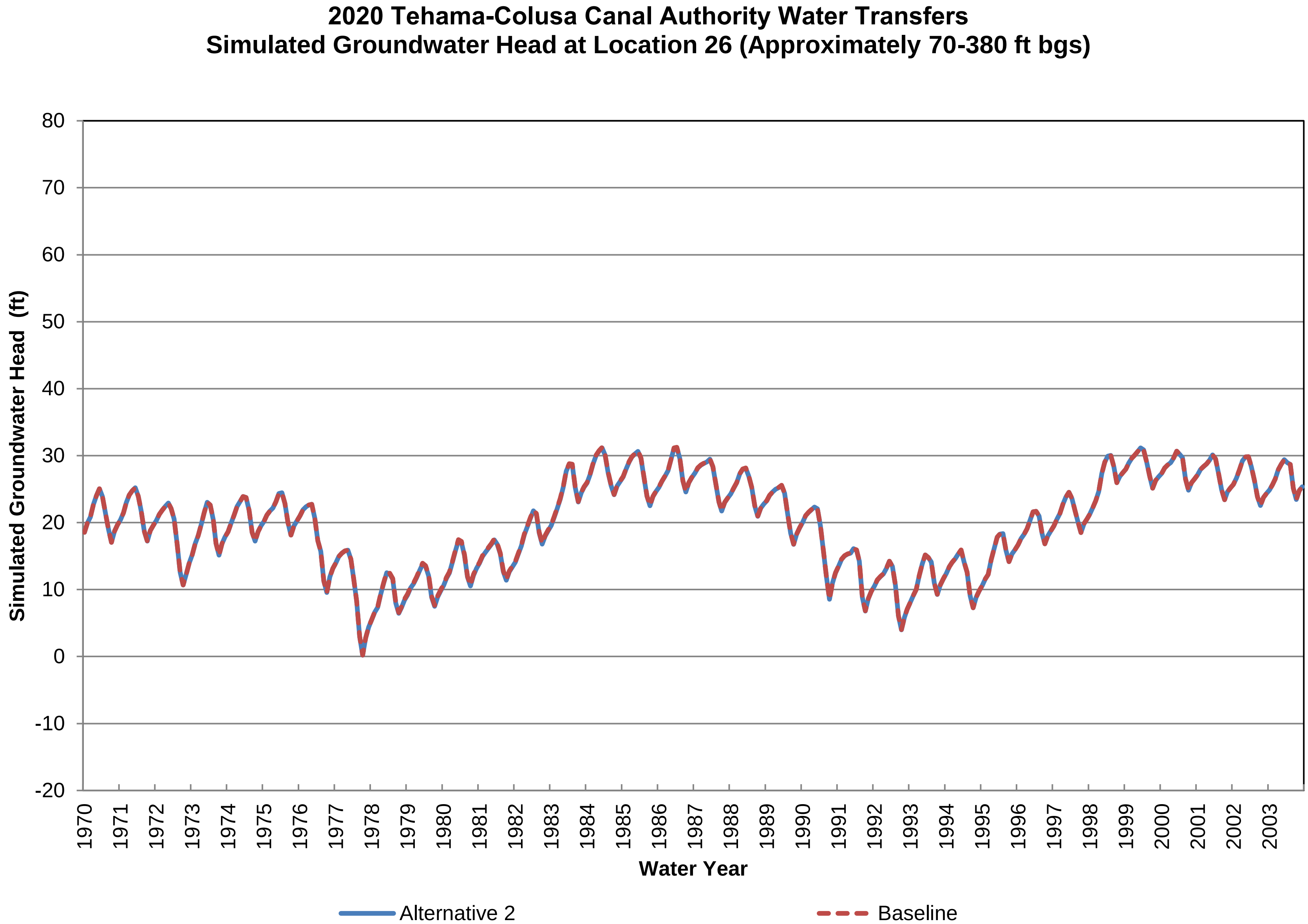


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 25 (Approximately 2040-2800 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 26 (Approximately 0-70 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 26 (Approximately 70-380 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
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1992
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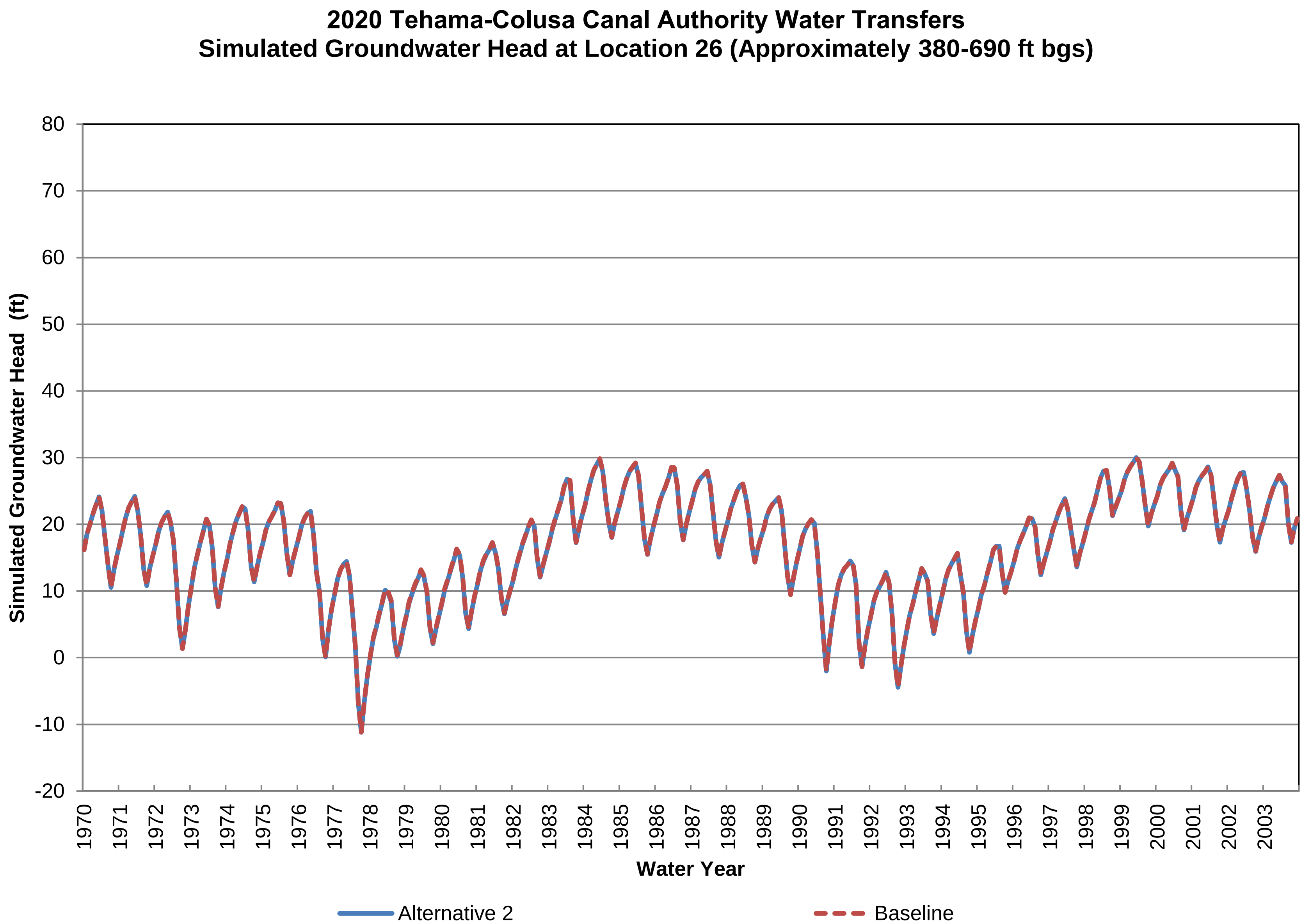
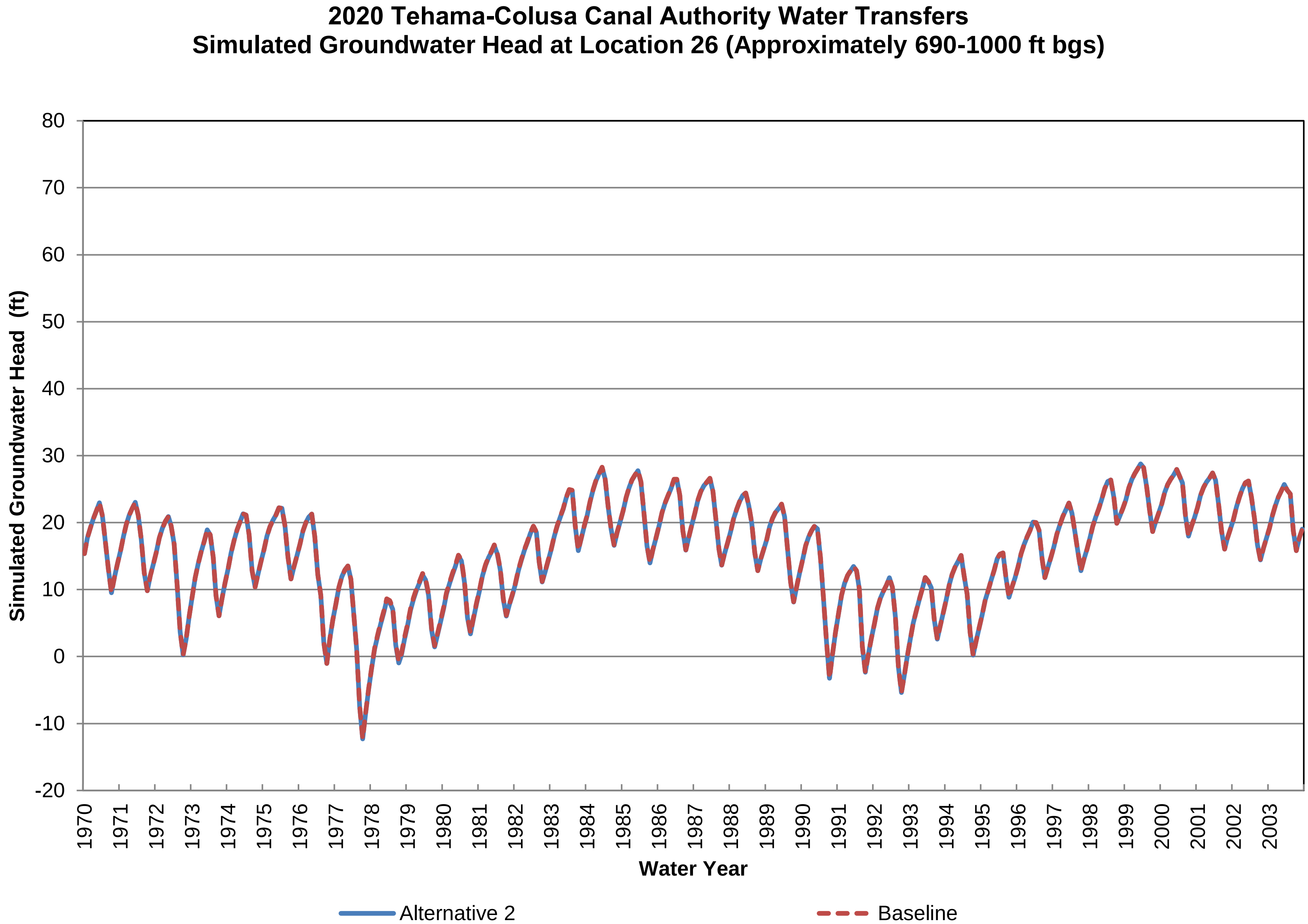
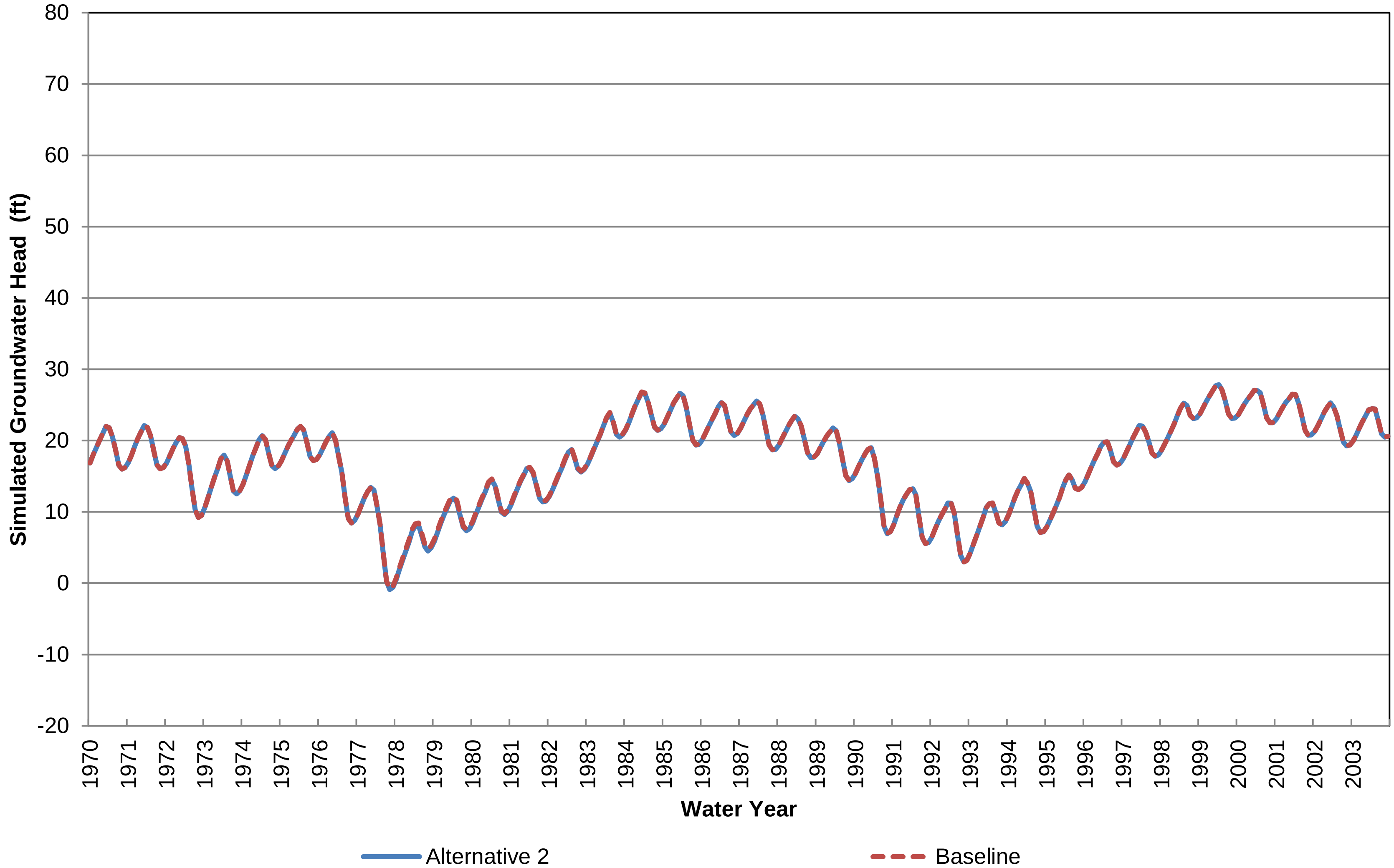
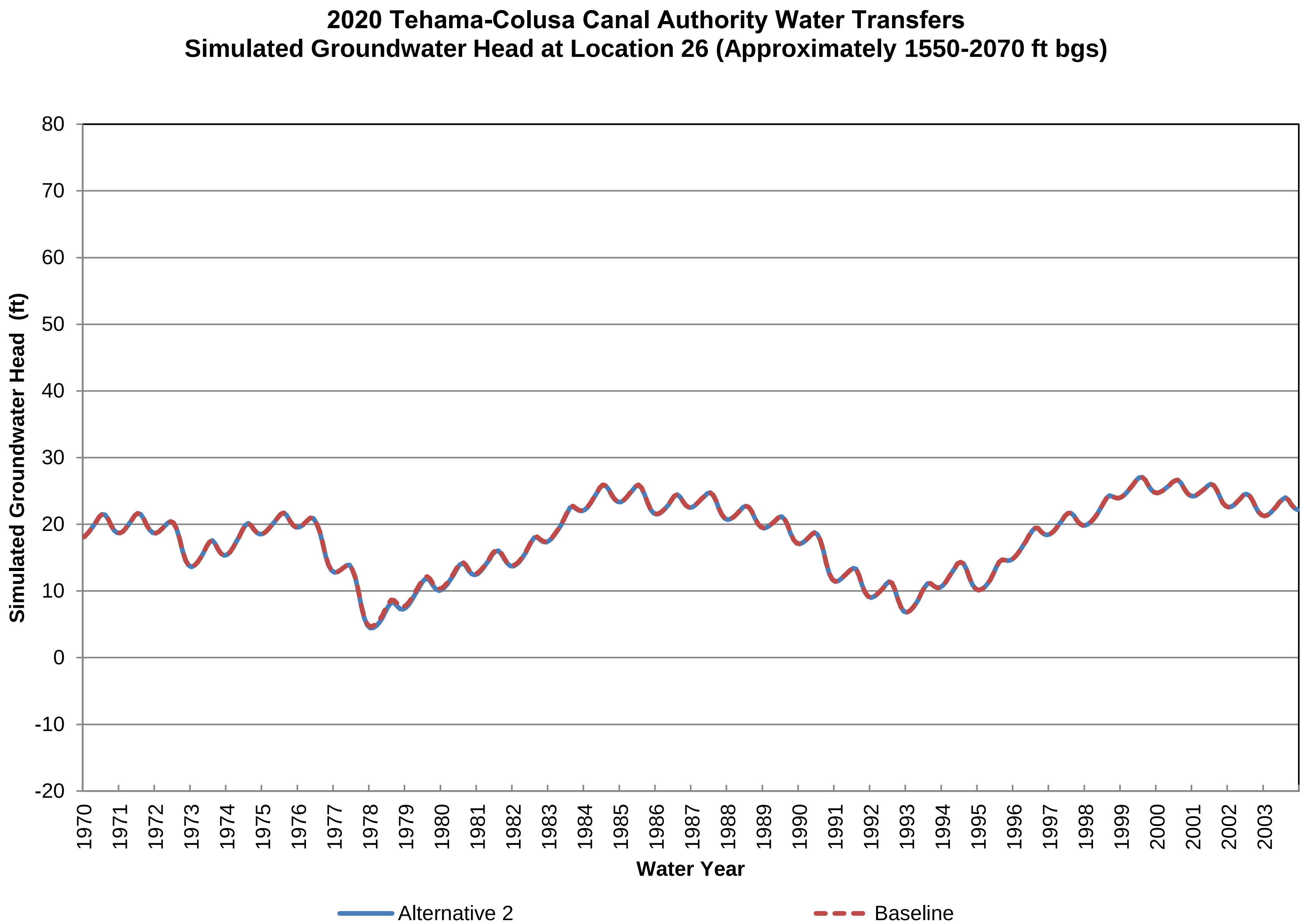
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 26 (Approximately 380-690 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 26 (Approximately 690-1000 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 26 (Approximately 1000-1550 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 26 (Approximately 1550-2070 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
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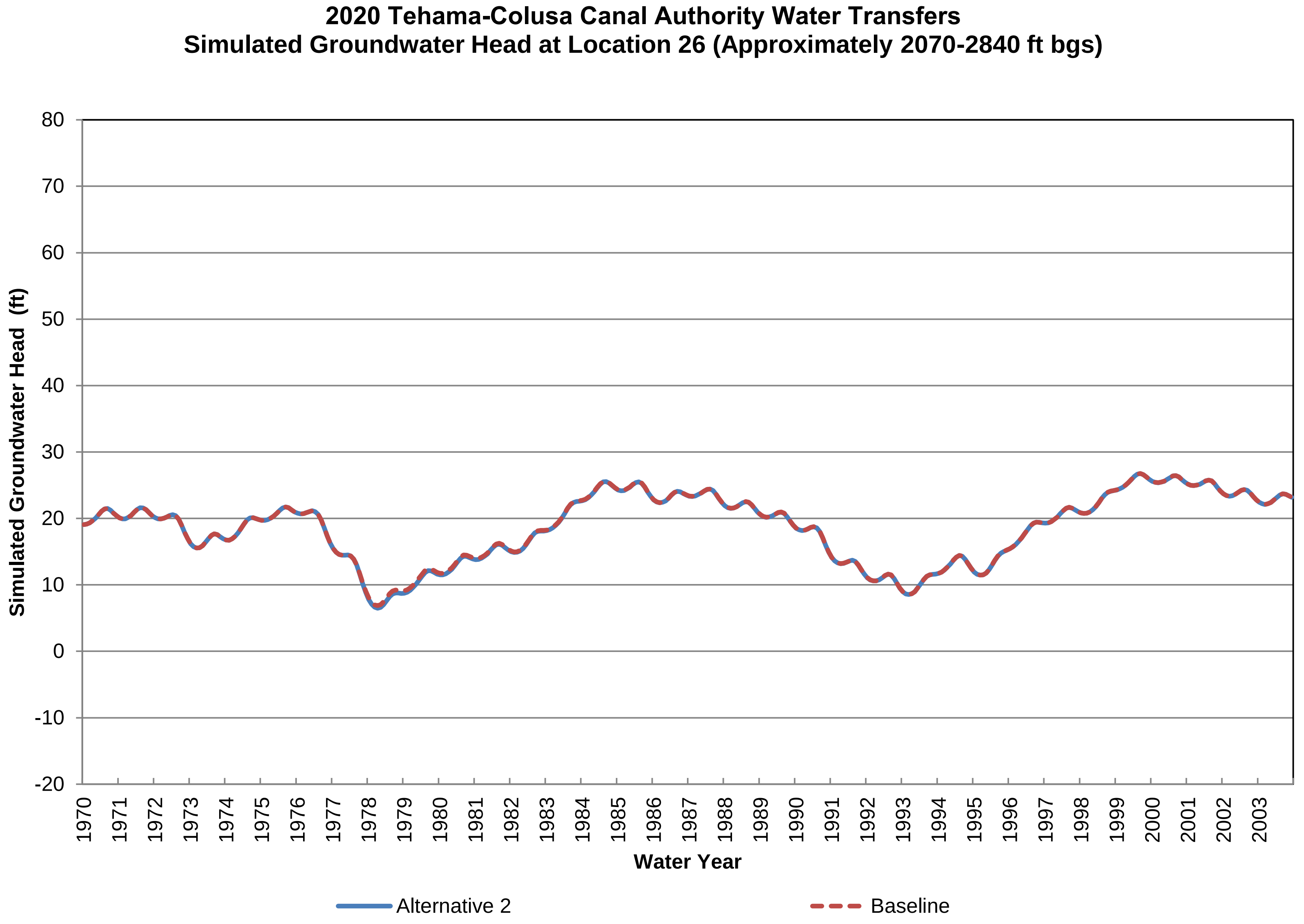
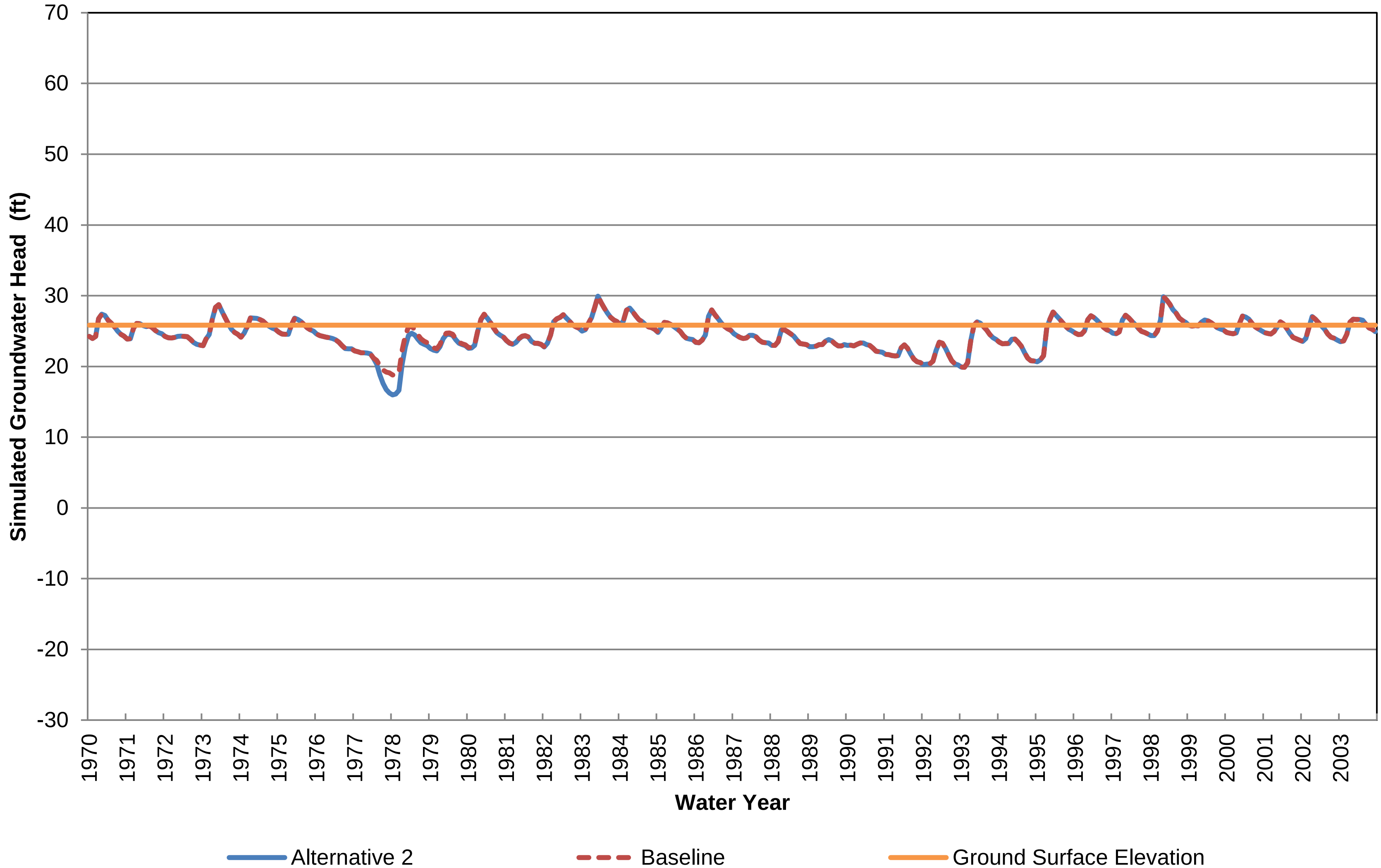
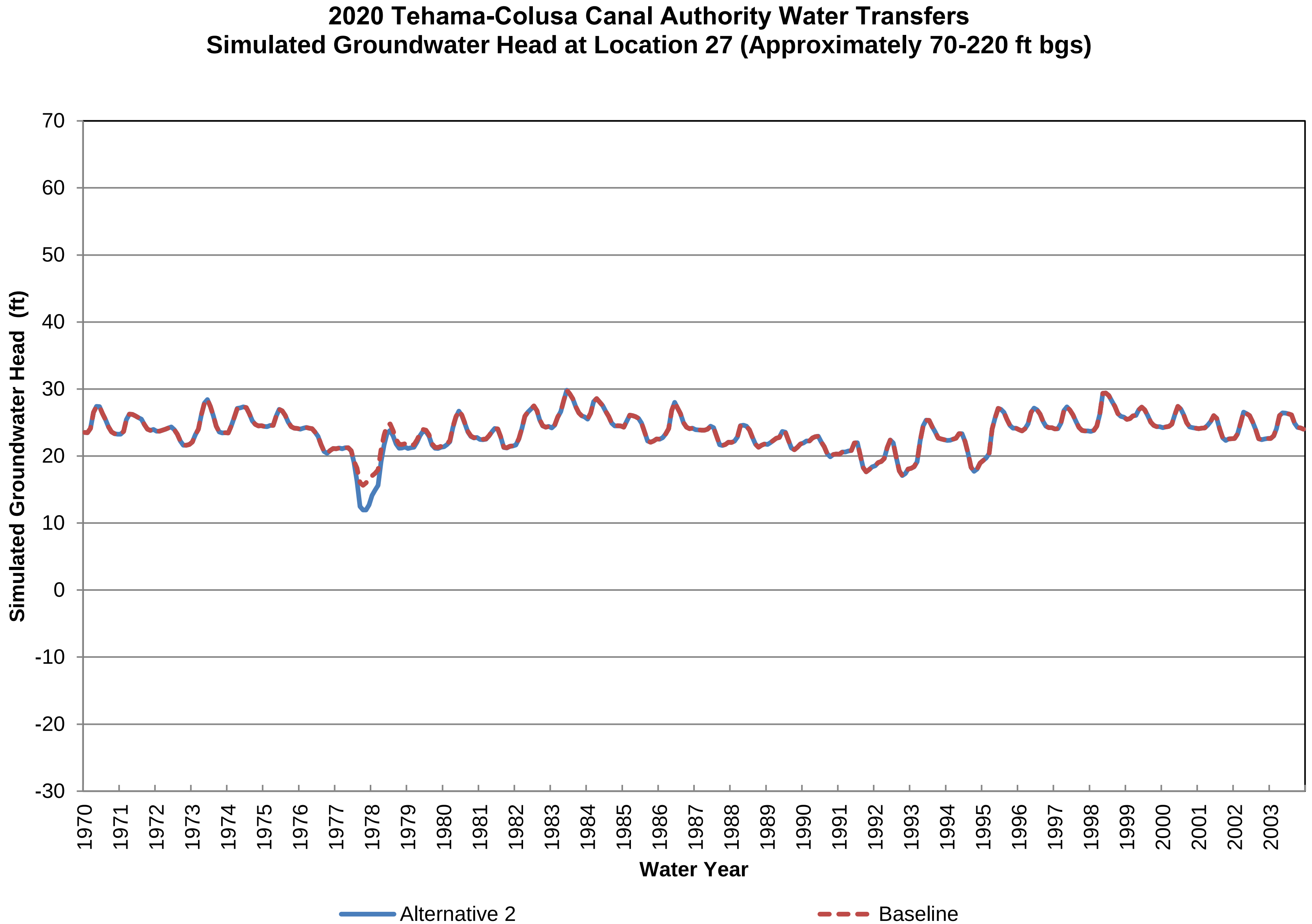
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

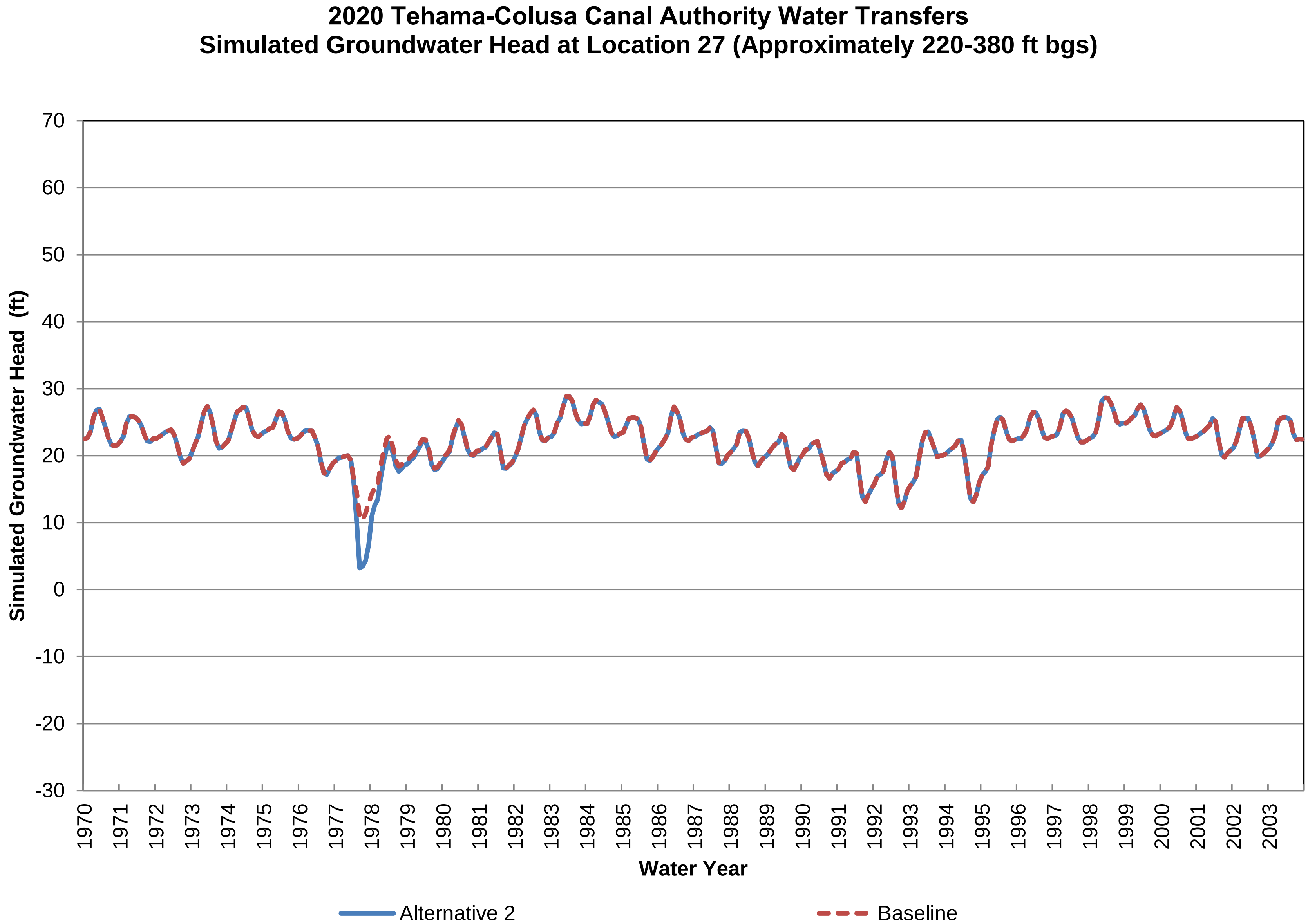


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 26 (Approximately 2070-2840 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 27 (Approximately 0-70 ft bgs)

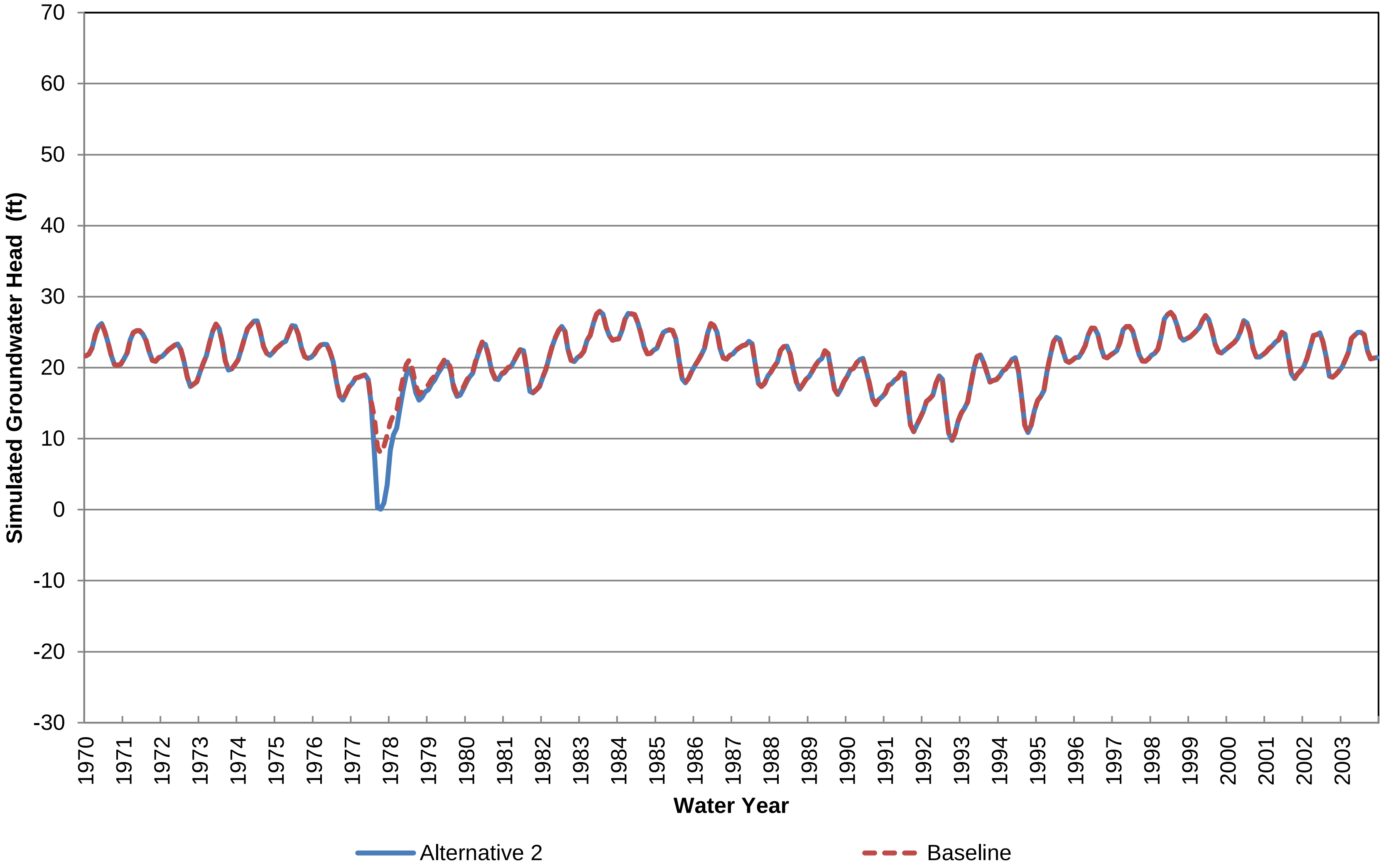



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 27 (Approximately 70-220 ft bgs)
Simulated Groundwater Head (ft)
70
60
50
40
30
20
10
0
-10
-20
-30
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

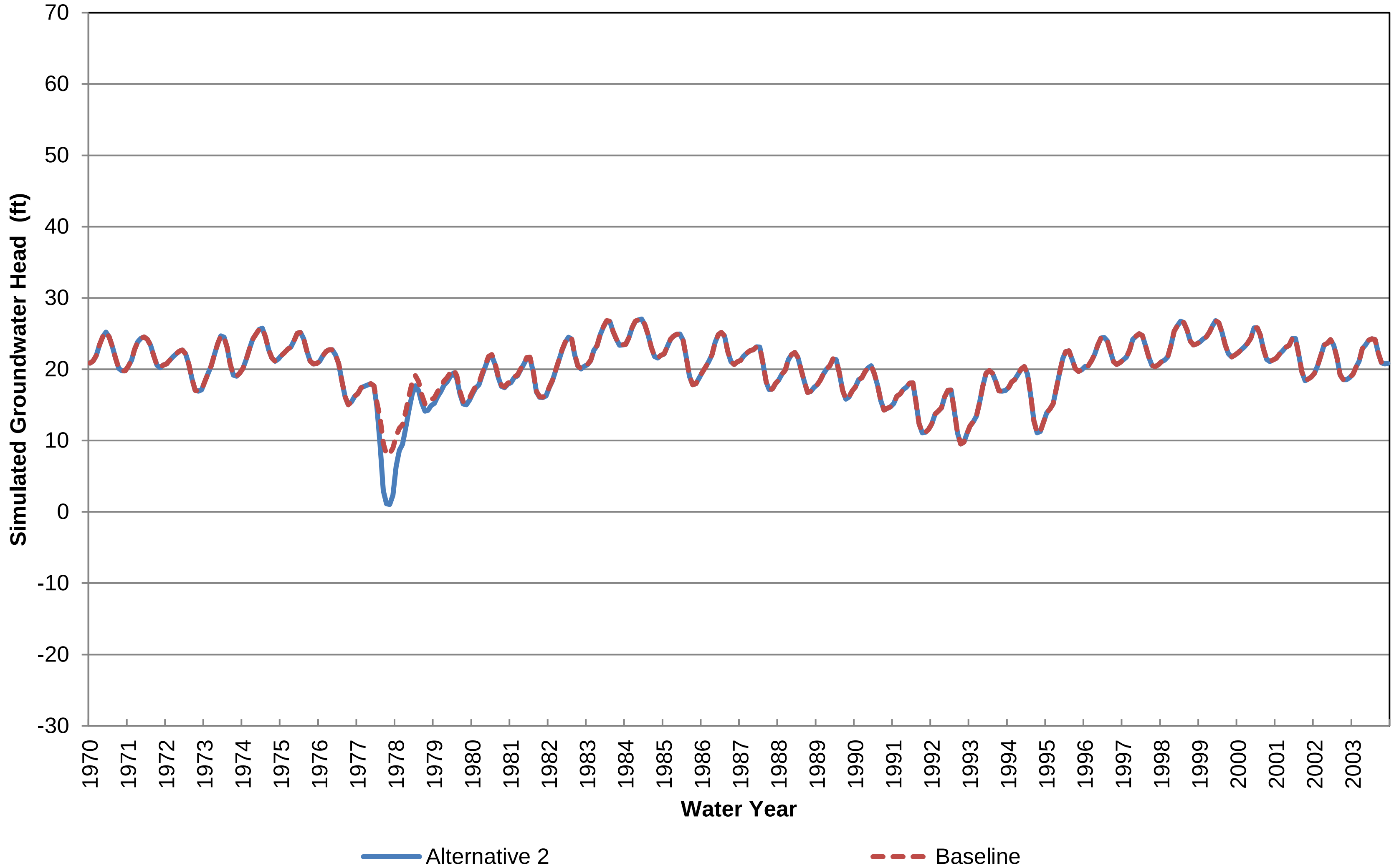


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 27 (Approximately 220-380 ft bgs)
Simulated Groundwater Head (ft)
70
60
50
40
30
20
10
0
-10
-20
-30
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

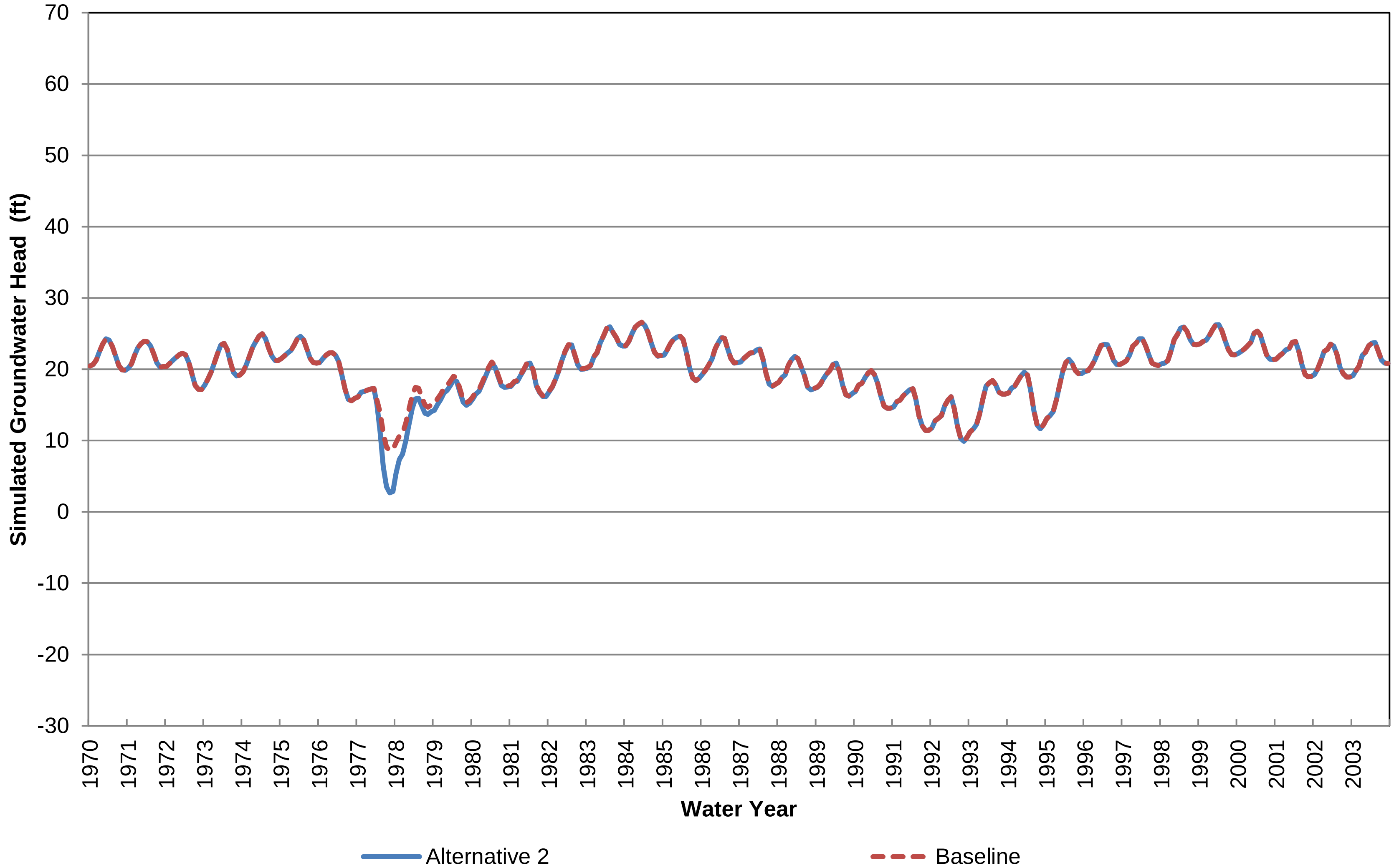
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 27 (Approximately 380-530 ft bgs)

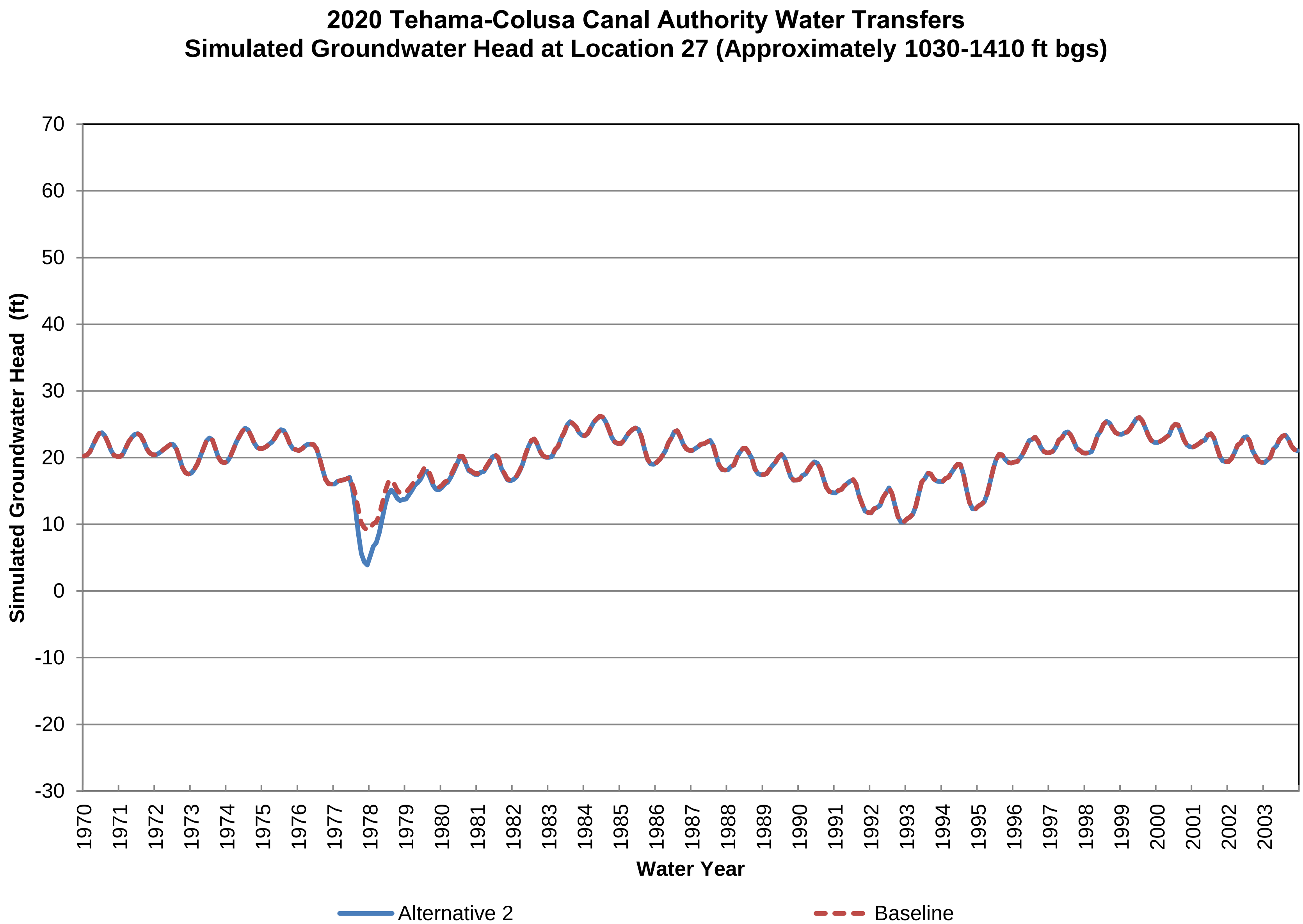


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 27 (Approximately 530-770 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 27 (Approximately 770-1030 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 27 (Approximately 1030-1410 ft bgs)
Simulated Groundwater Head (ft)
70
60
50
40
30
20
10
0
-10
-20
-30
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1992
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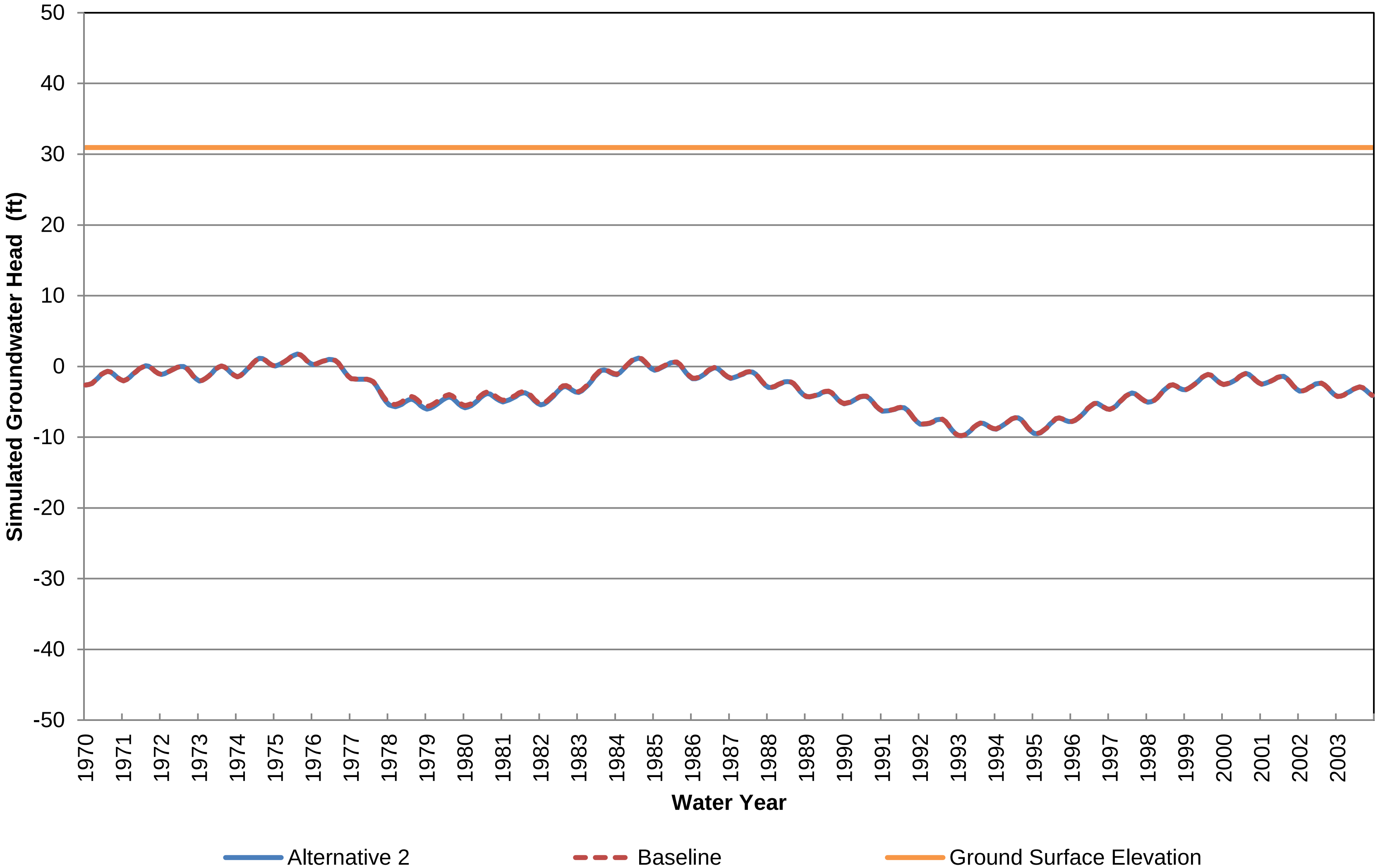
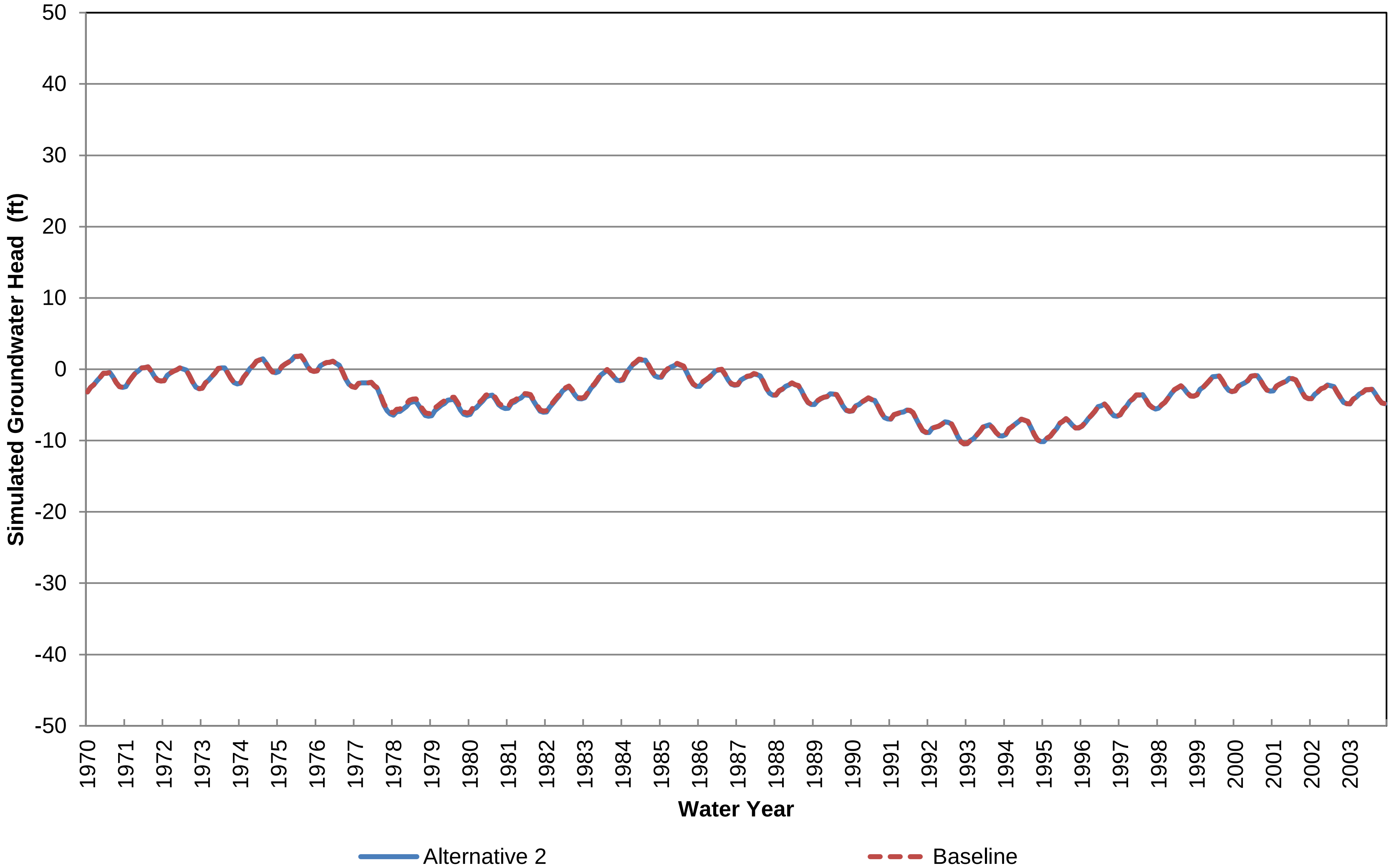
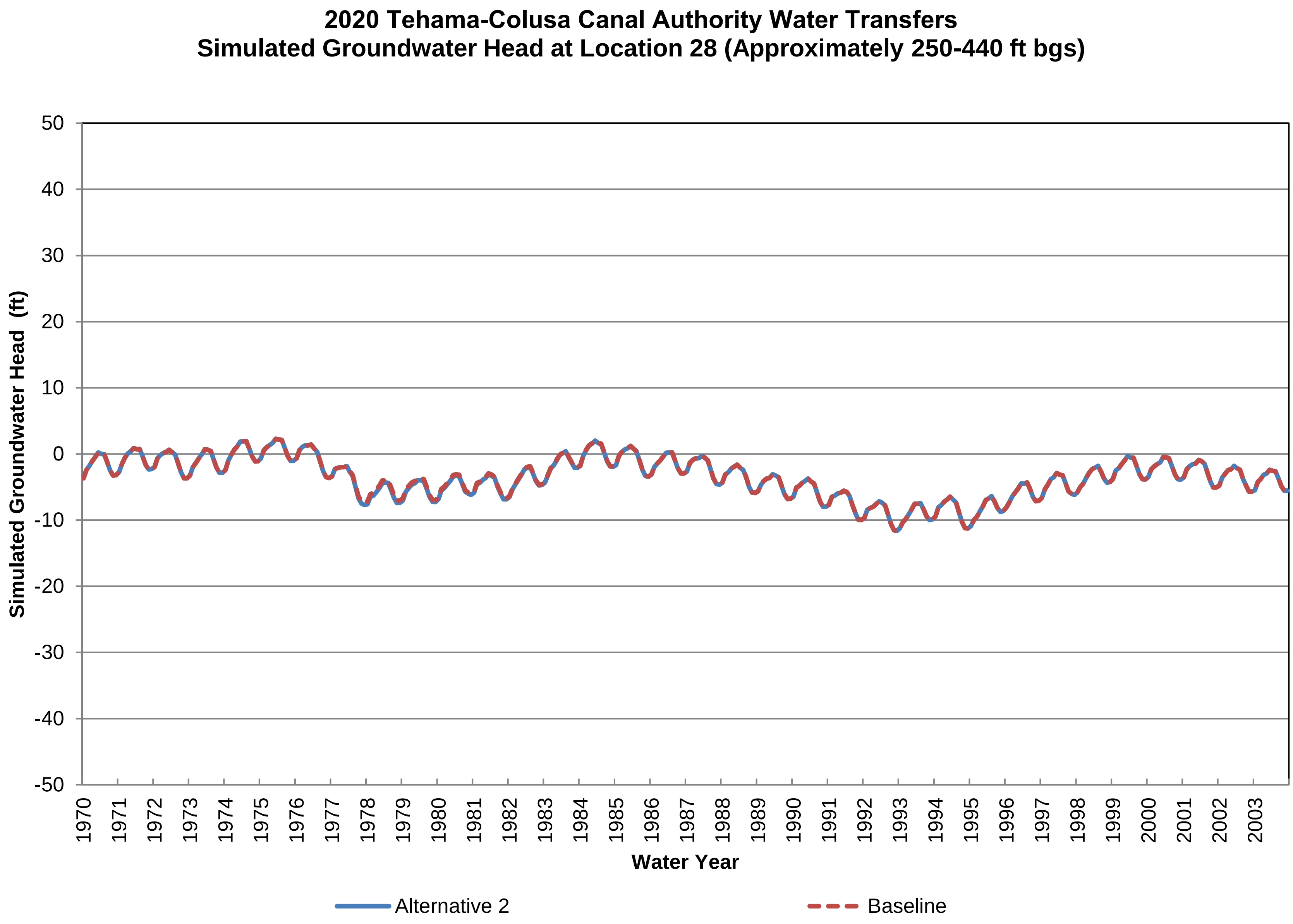
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 28 (Approximately 0-70 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 28 (Approximately 70-250 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 28 (Approximately 250-440 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
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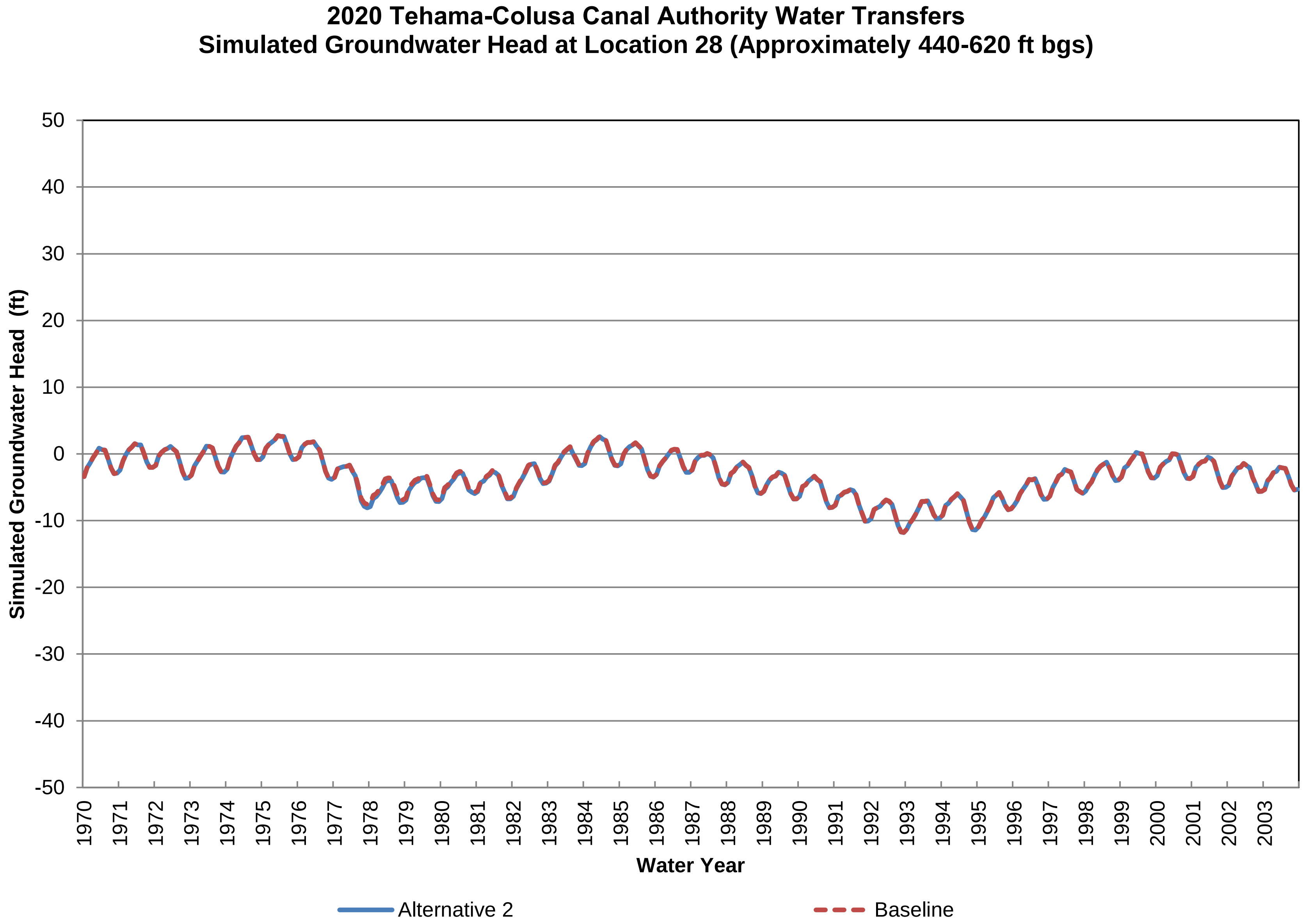
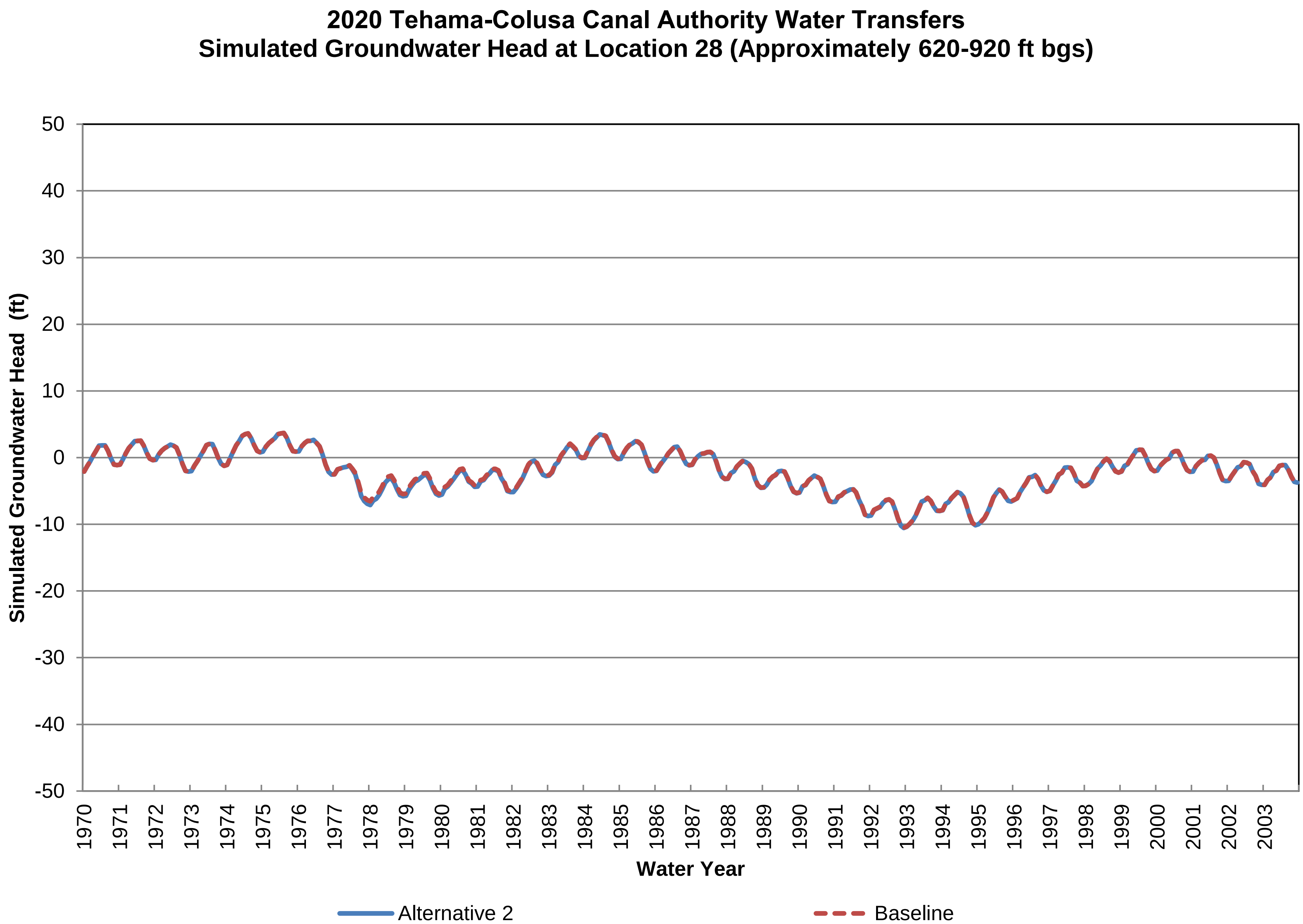
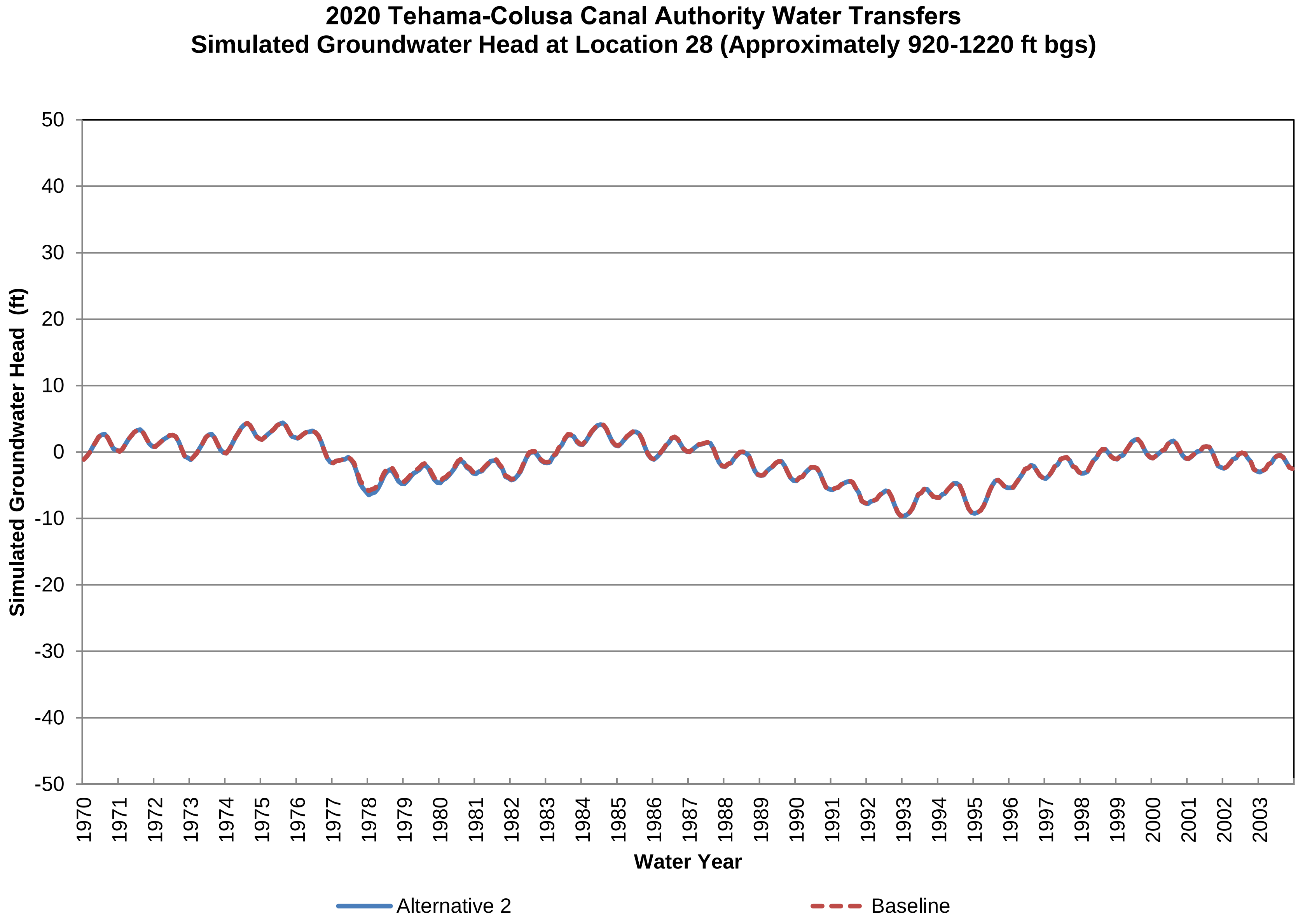
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

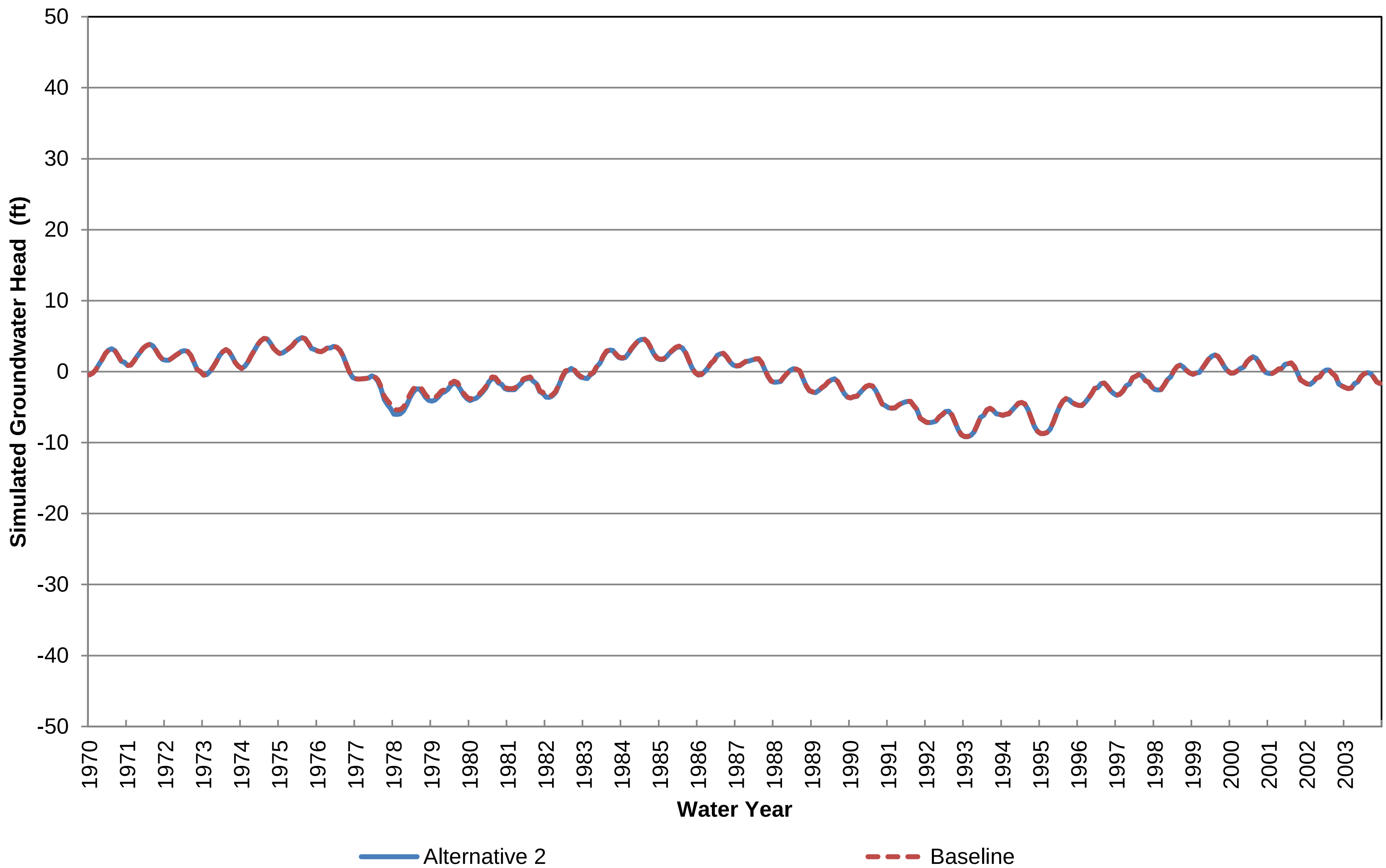

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 28 (Approximately 440-620 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

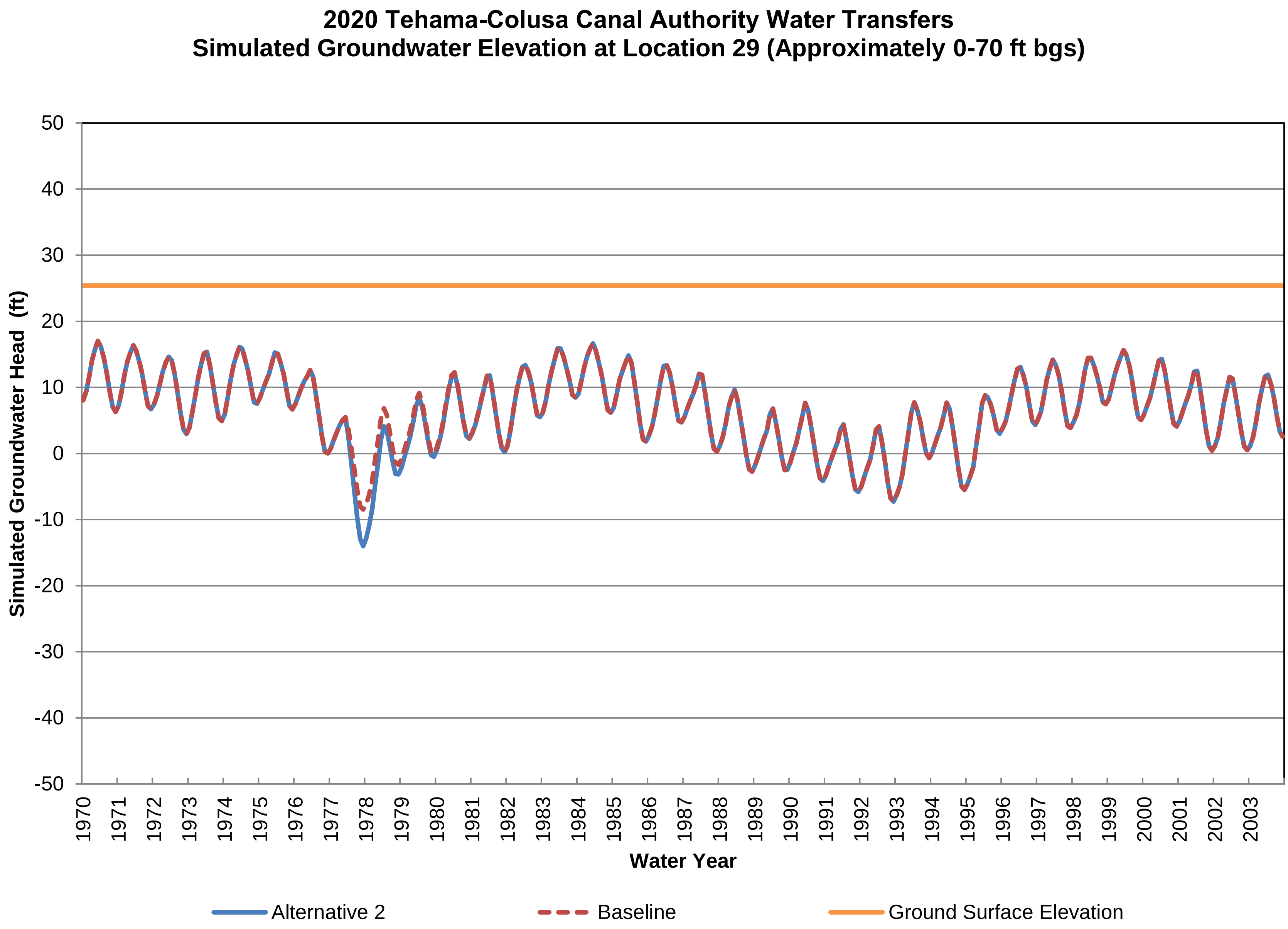

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 28 (Approximately 620-920 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 28 (Approximately 920-1220 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 28 (Approximately 1220-1680 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 29 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
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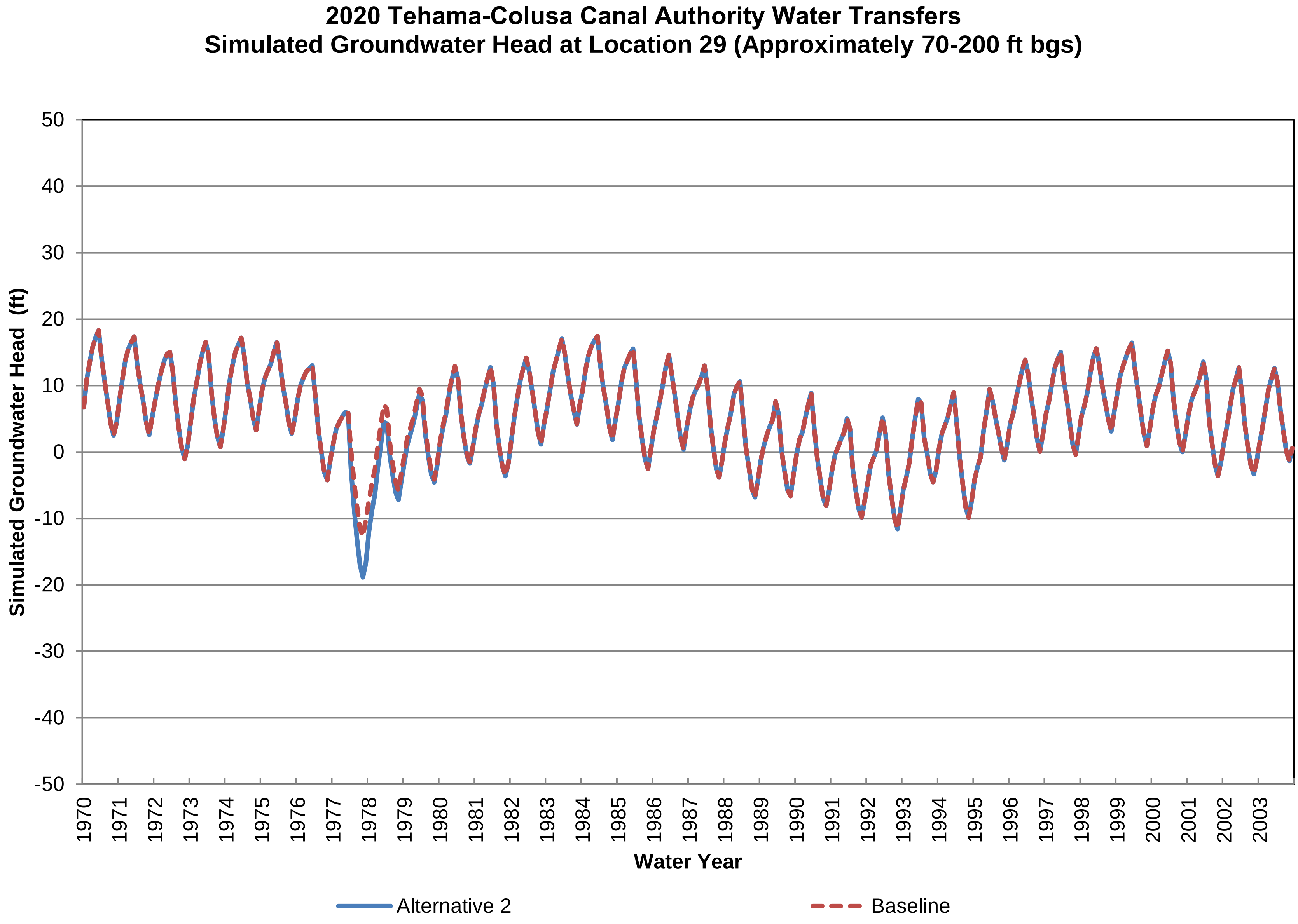
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 29 (Approximately 70-200 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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1995
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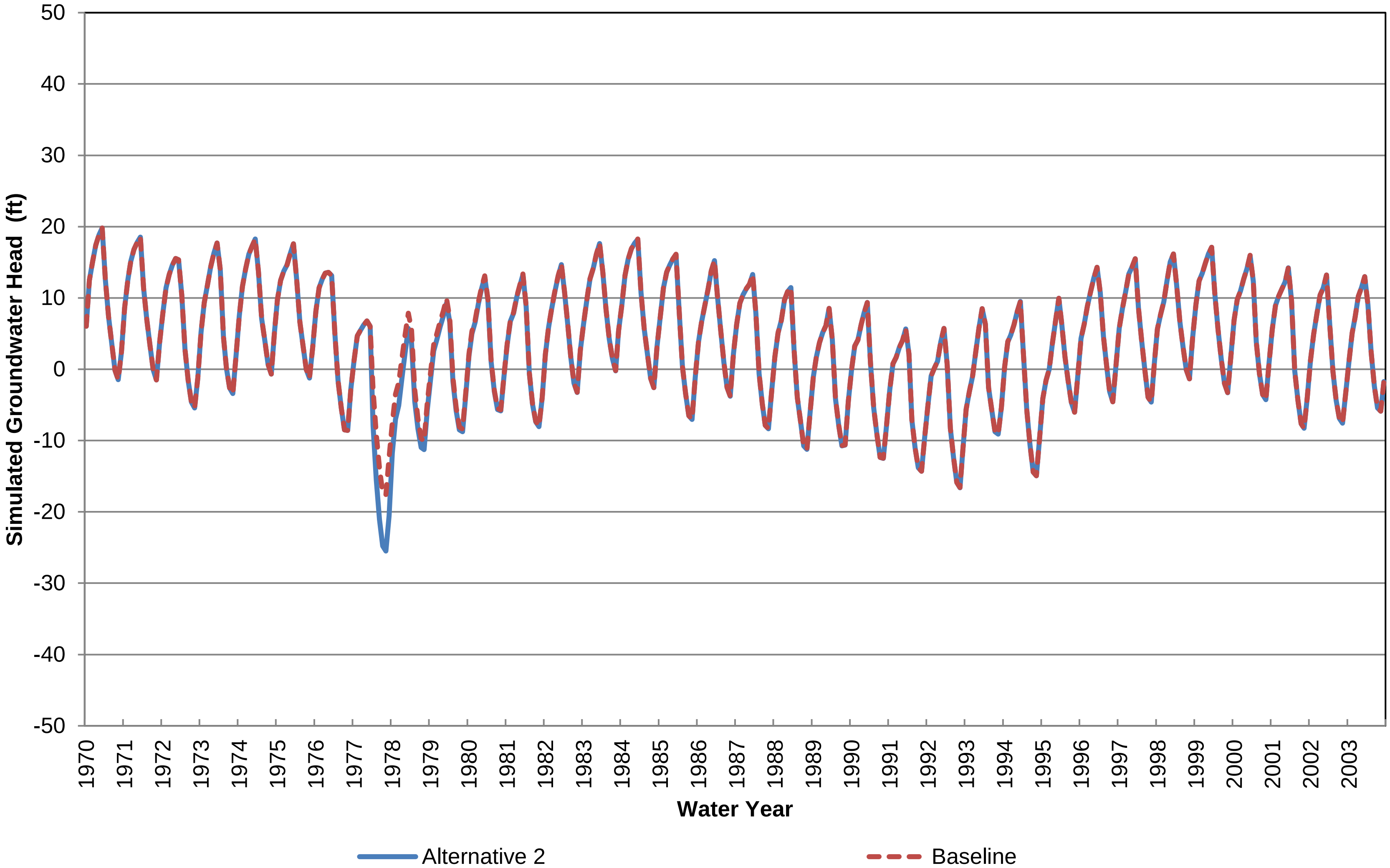
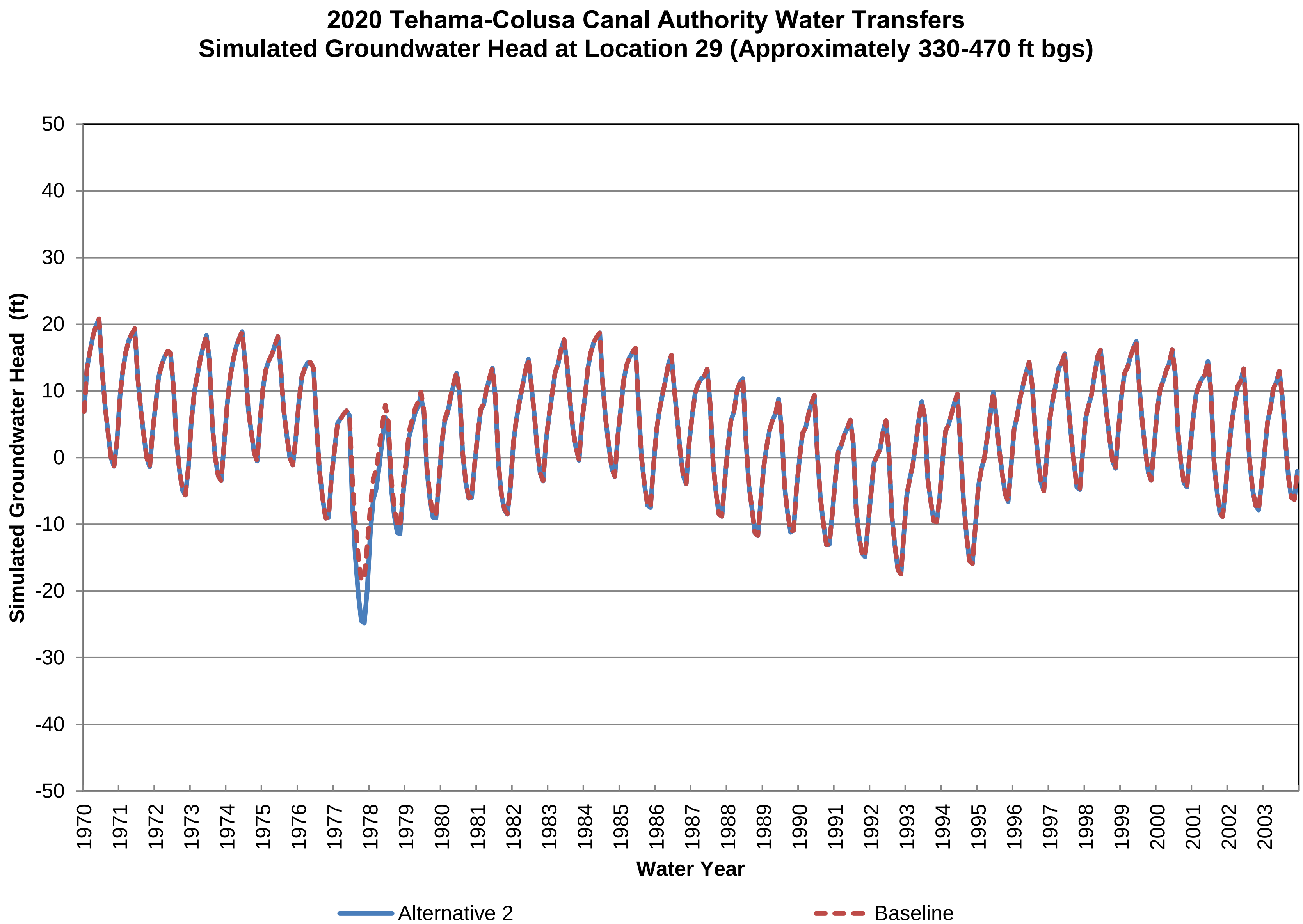
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 29 (Approximately 200-330 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 29 (Approximately 330-470 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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1983
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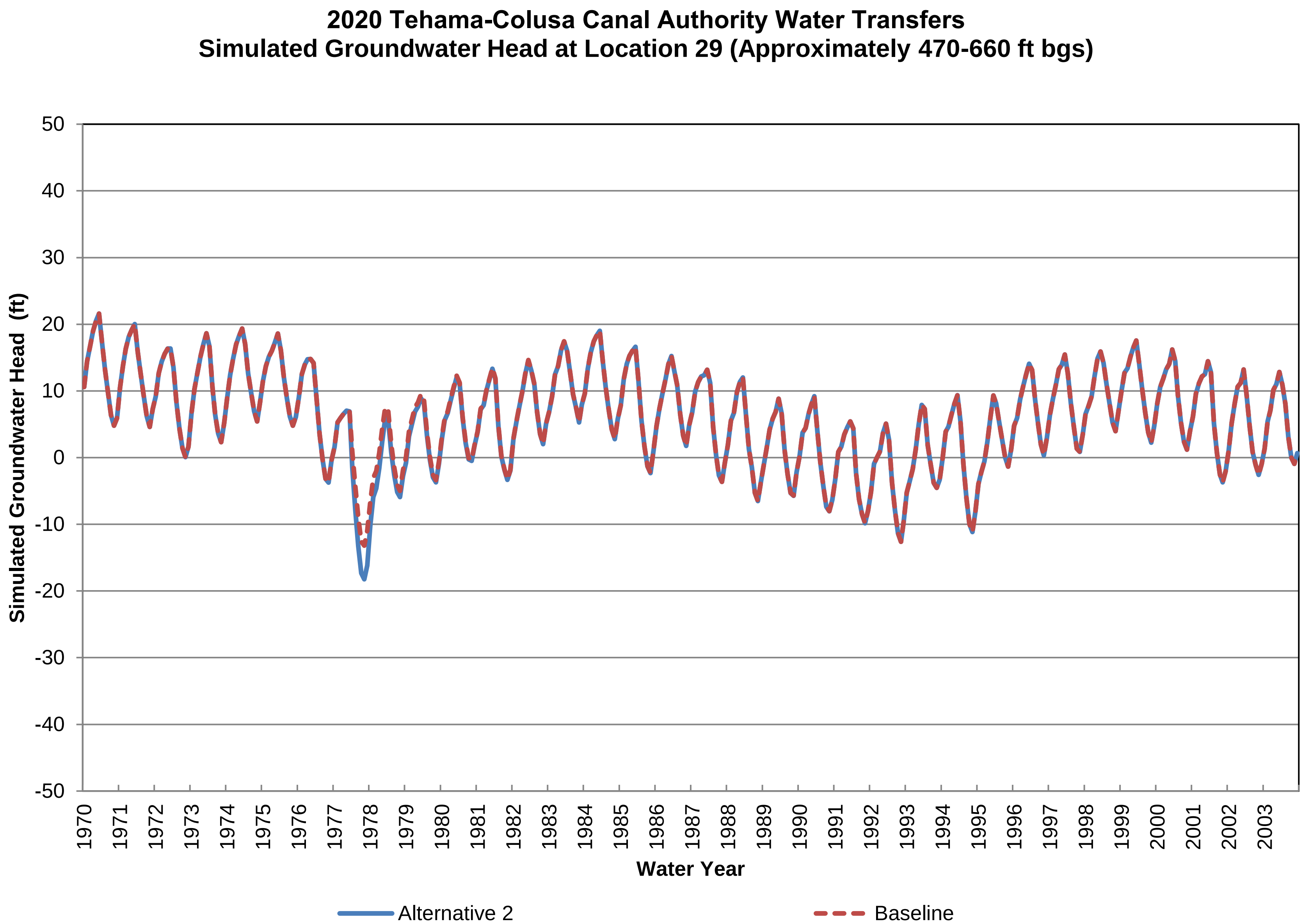
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 29 (Approximately 470-660 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
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1989
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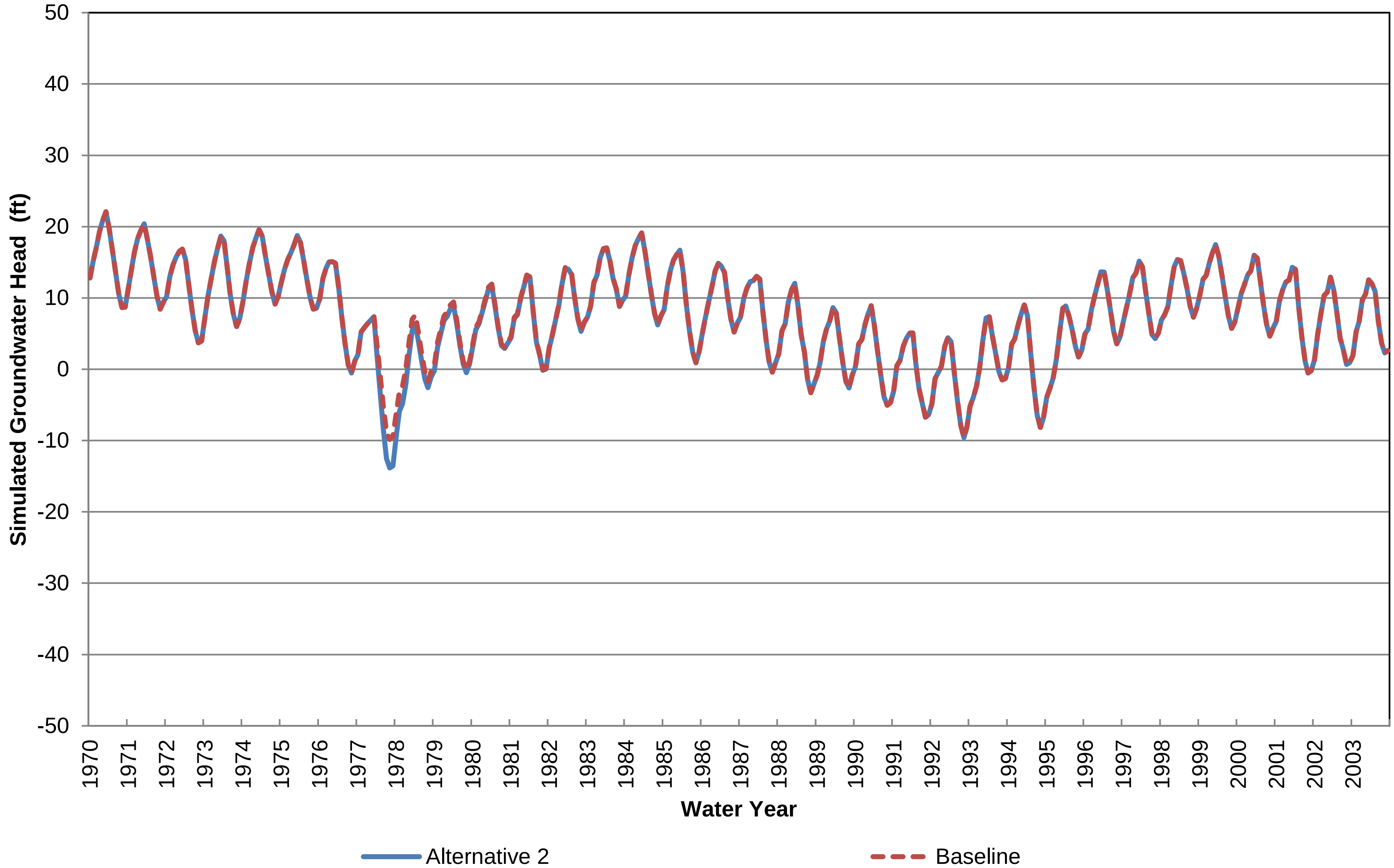
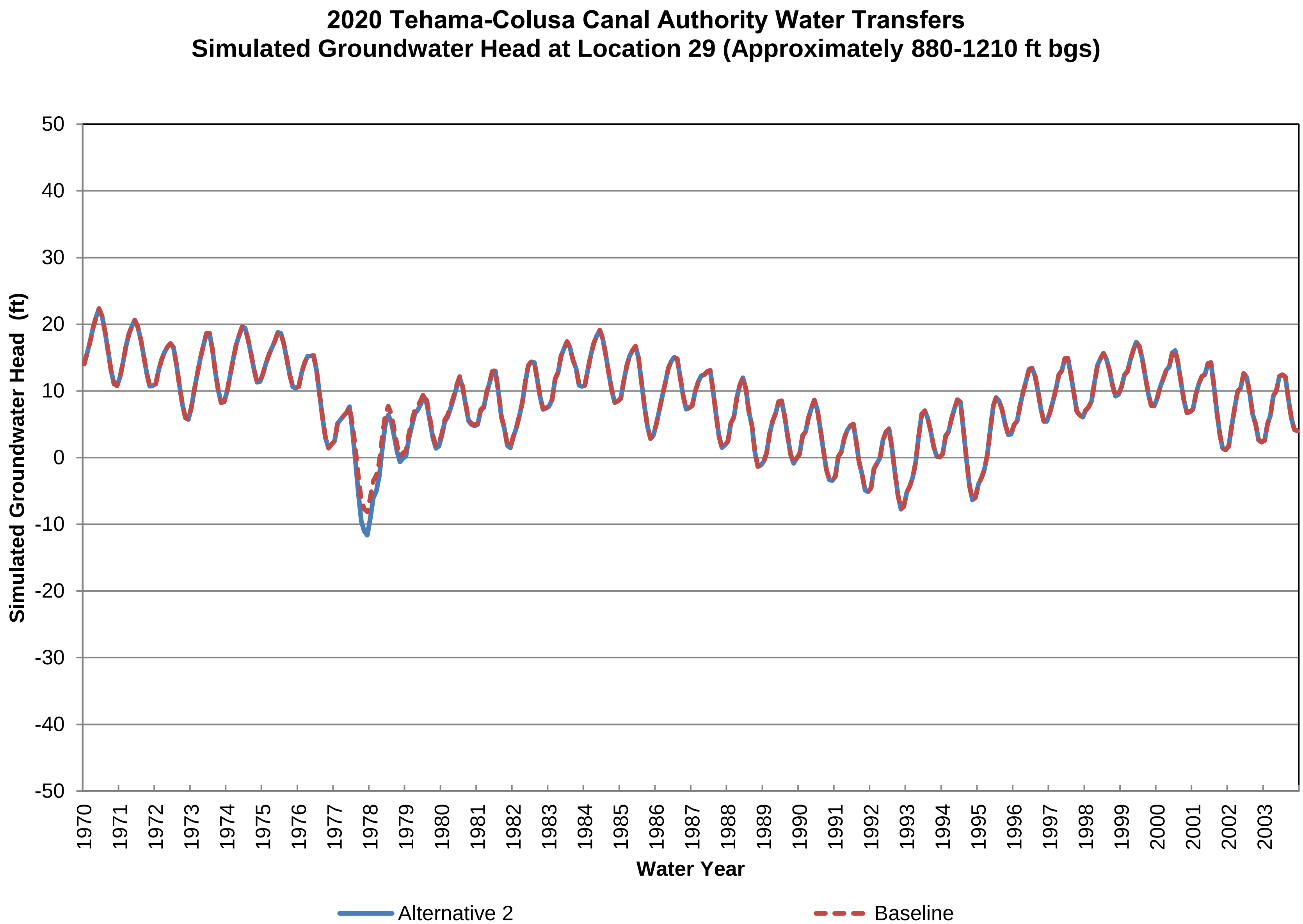
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 29 (Approximately 660-880 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 29 (Approximately 880-1210 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
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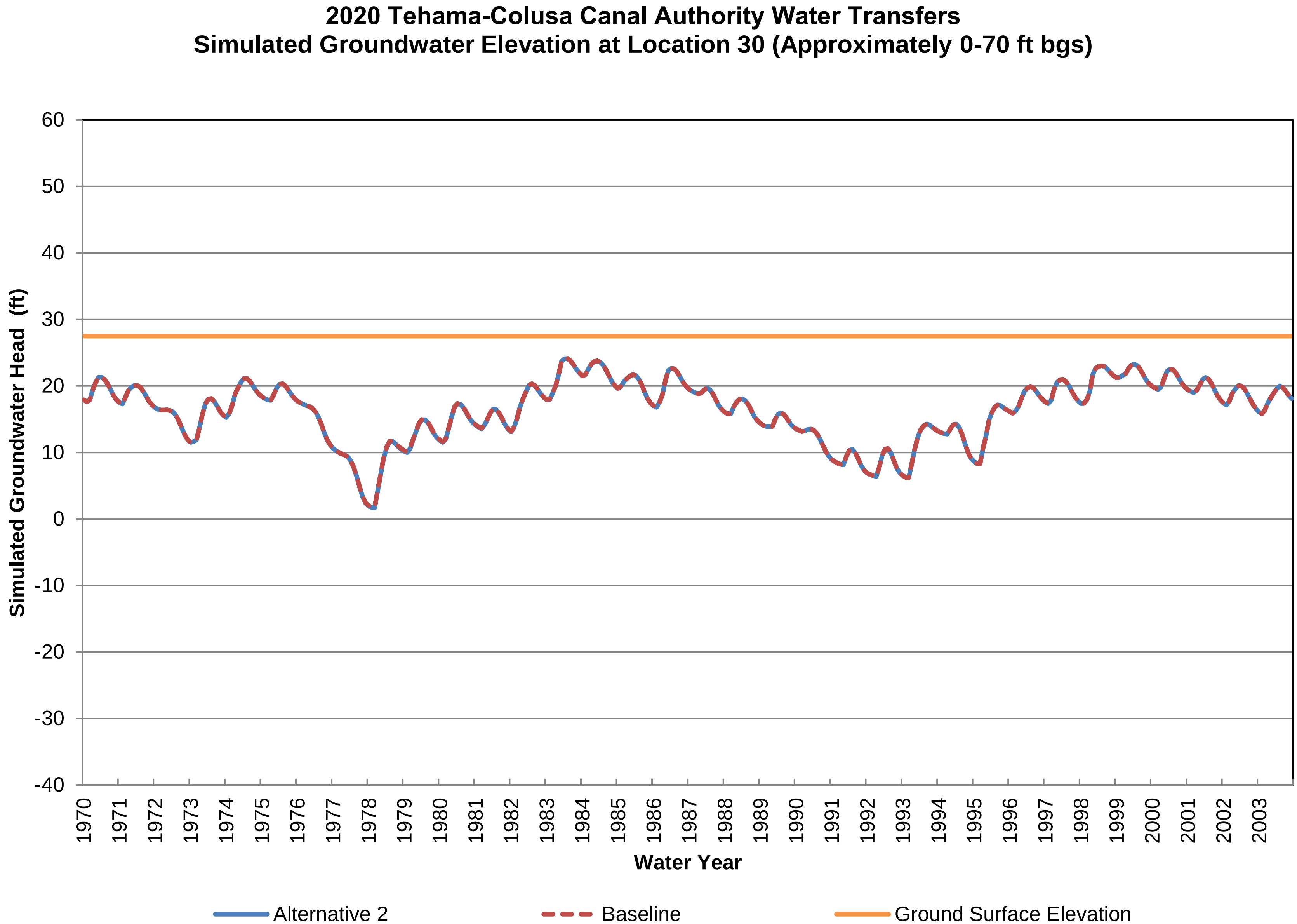
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 30 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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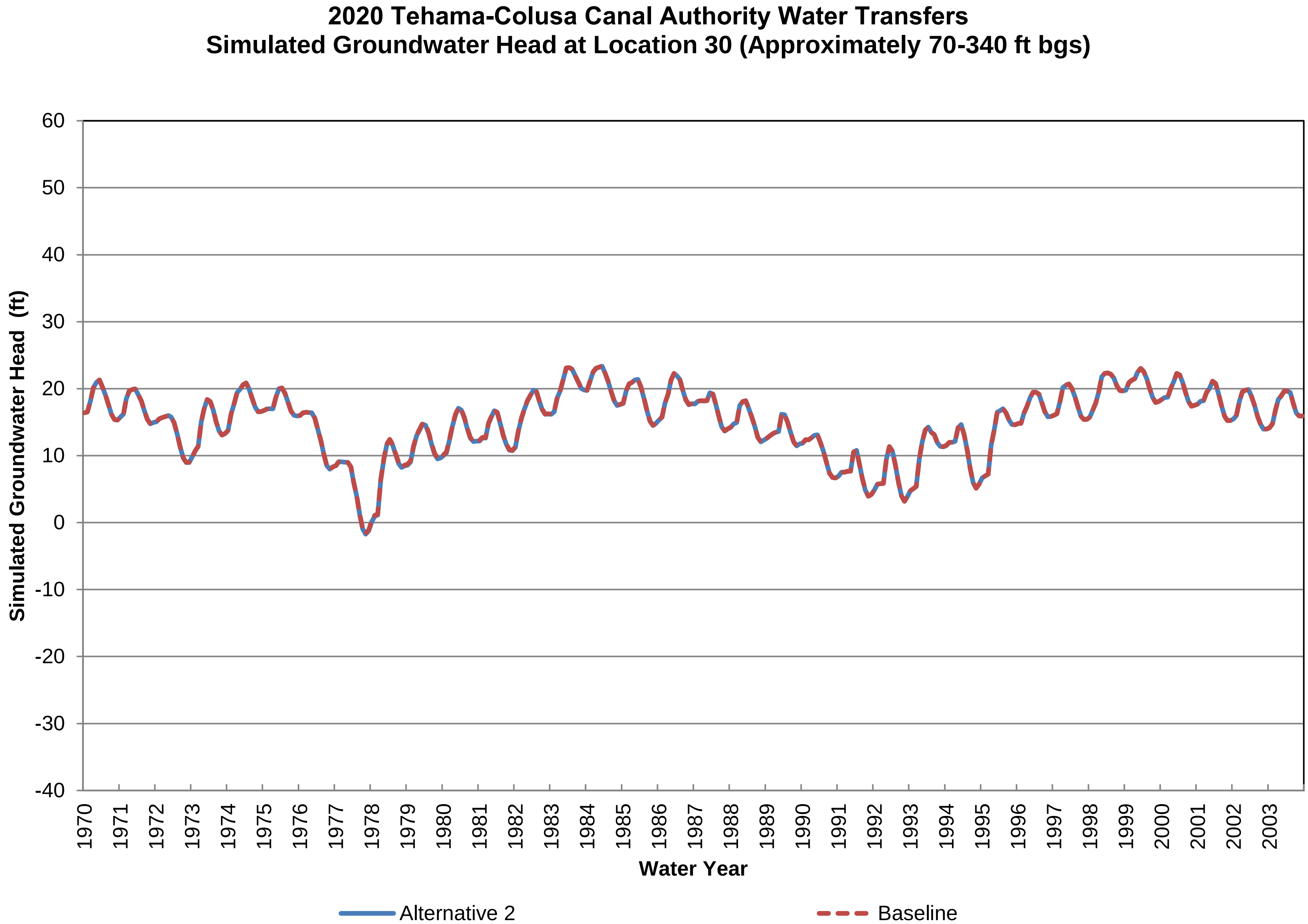
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 30 (Approximately 70-340 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1986
1987
1988
1989
1990
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1992
1993
1994
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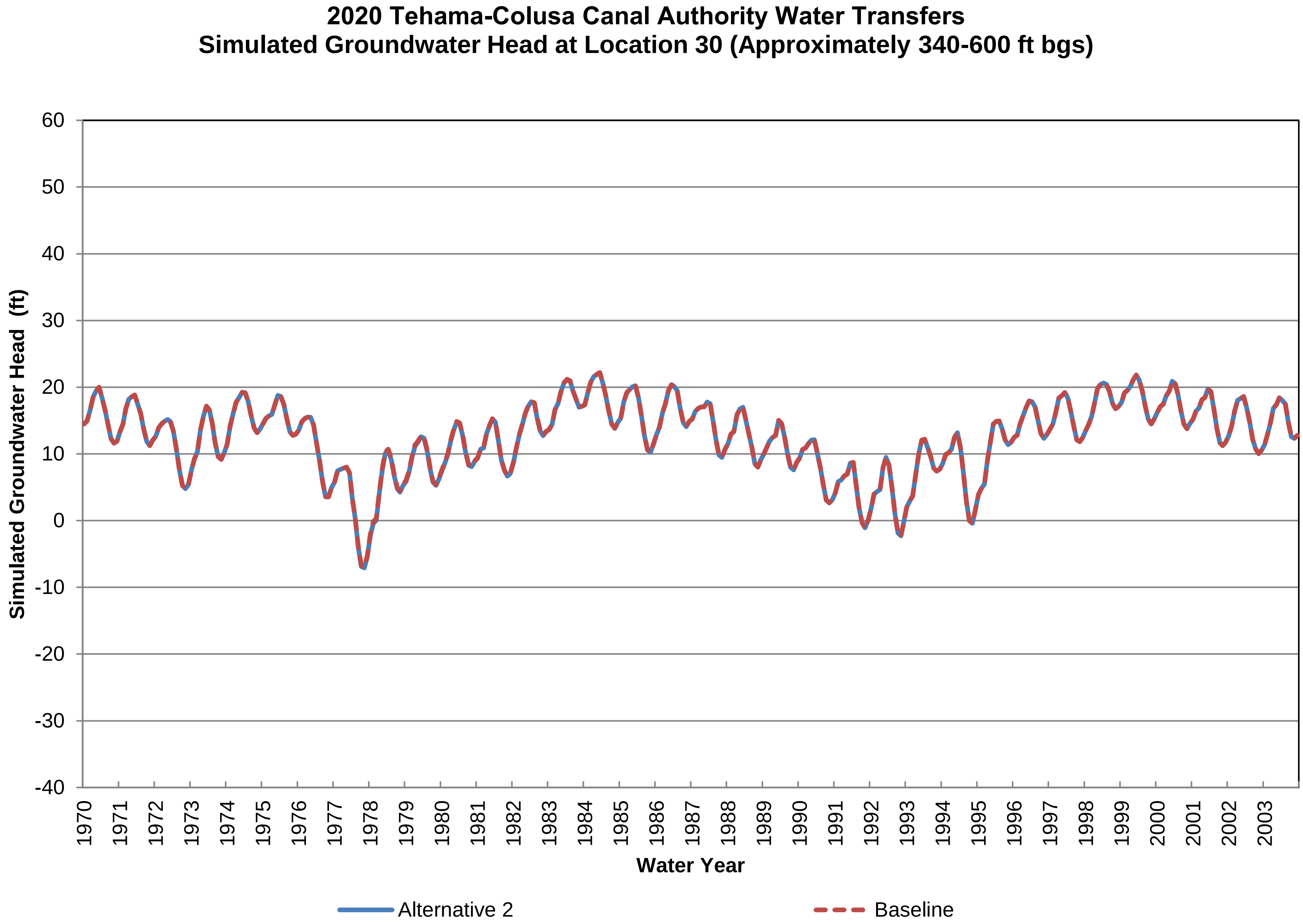
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 30 (Approximately 340-600 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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1989
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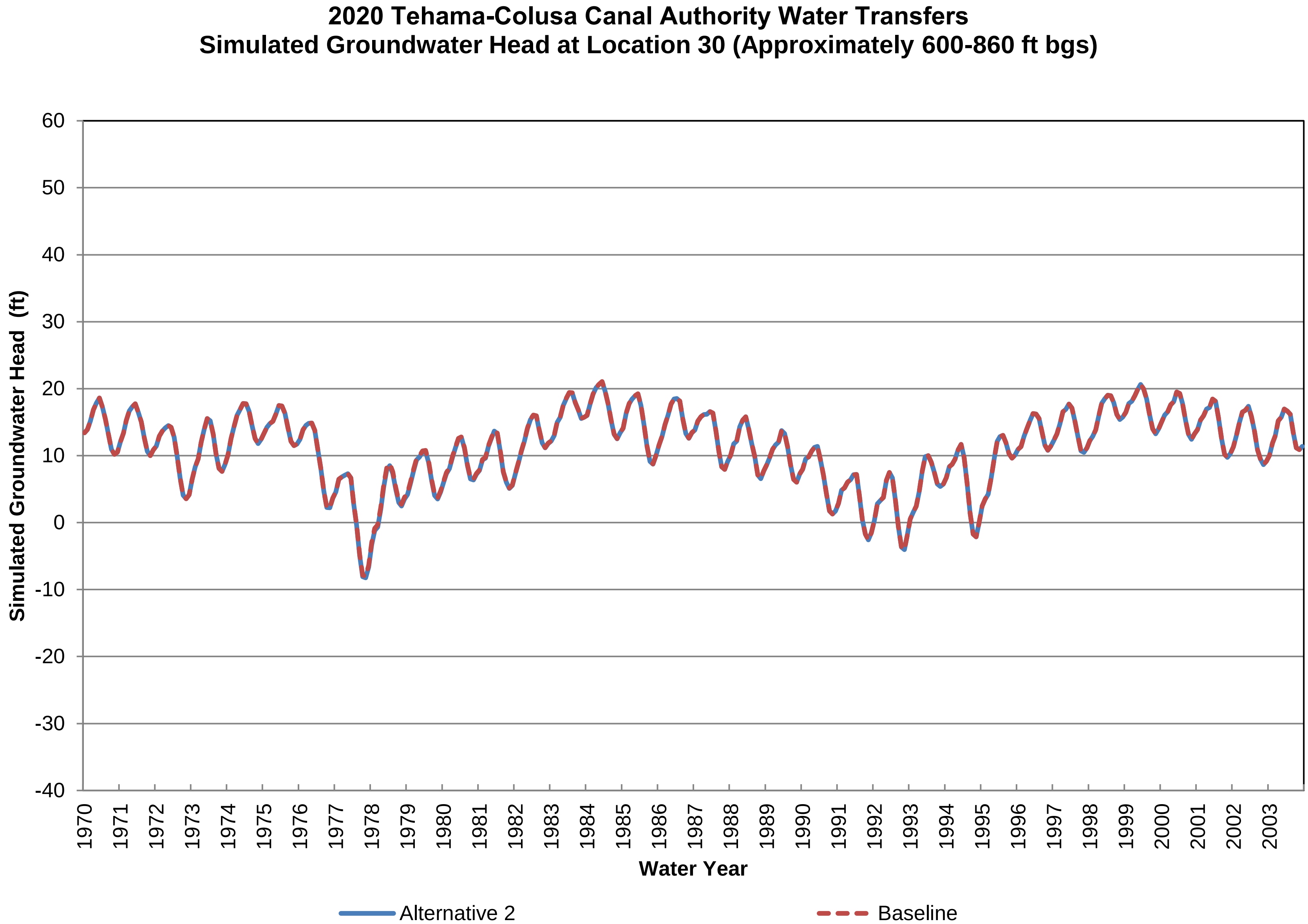
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 30 (Approximately 600-860 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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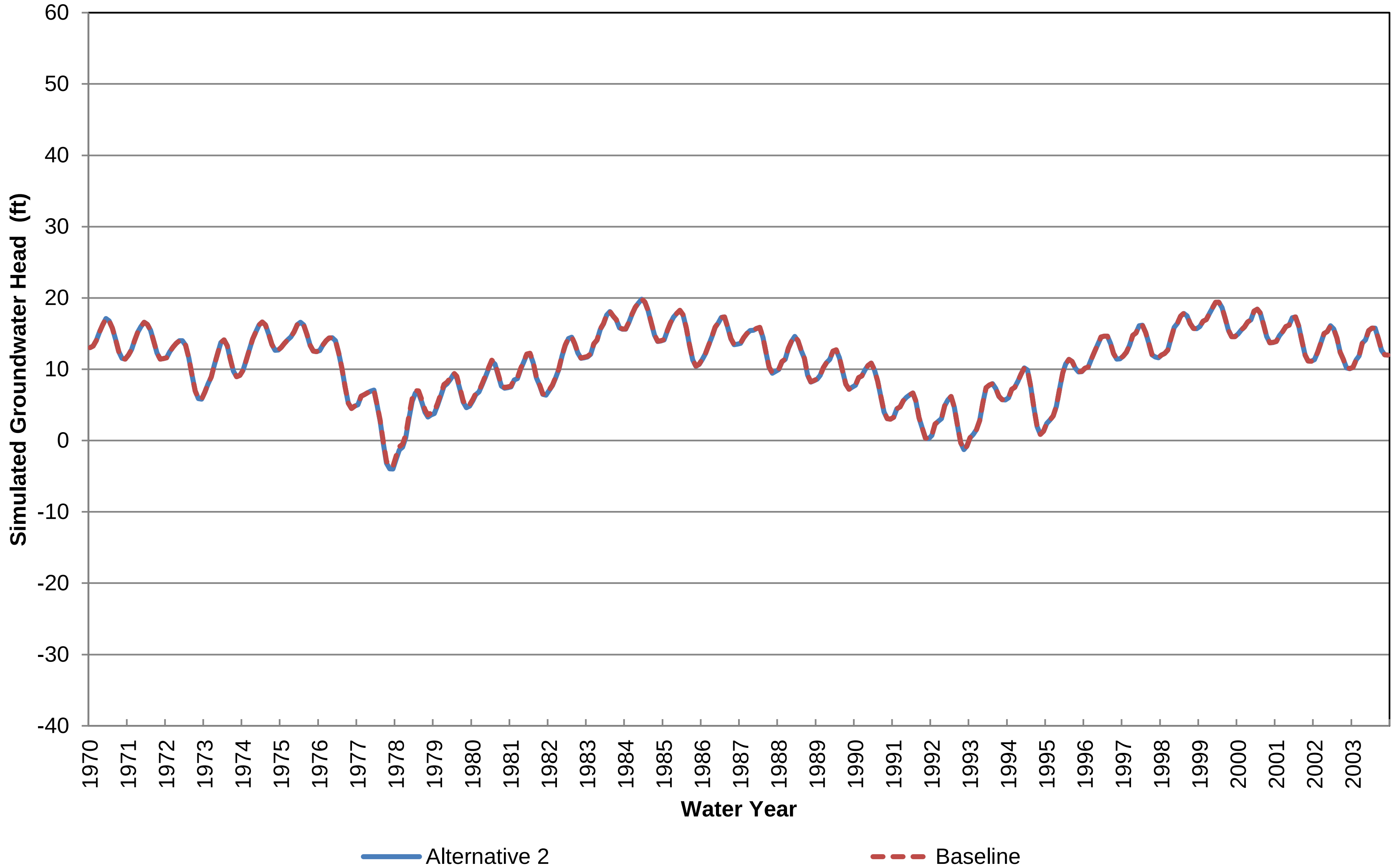
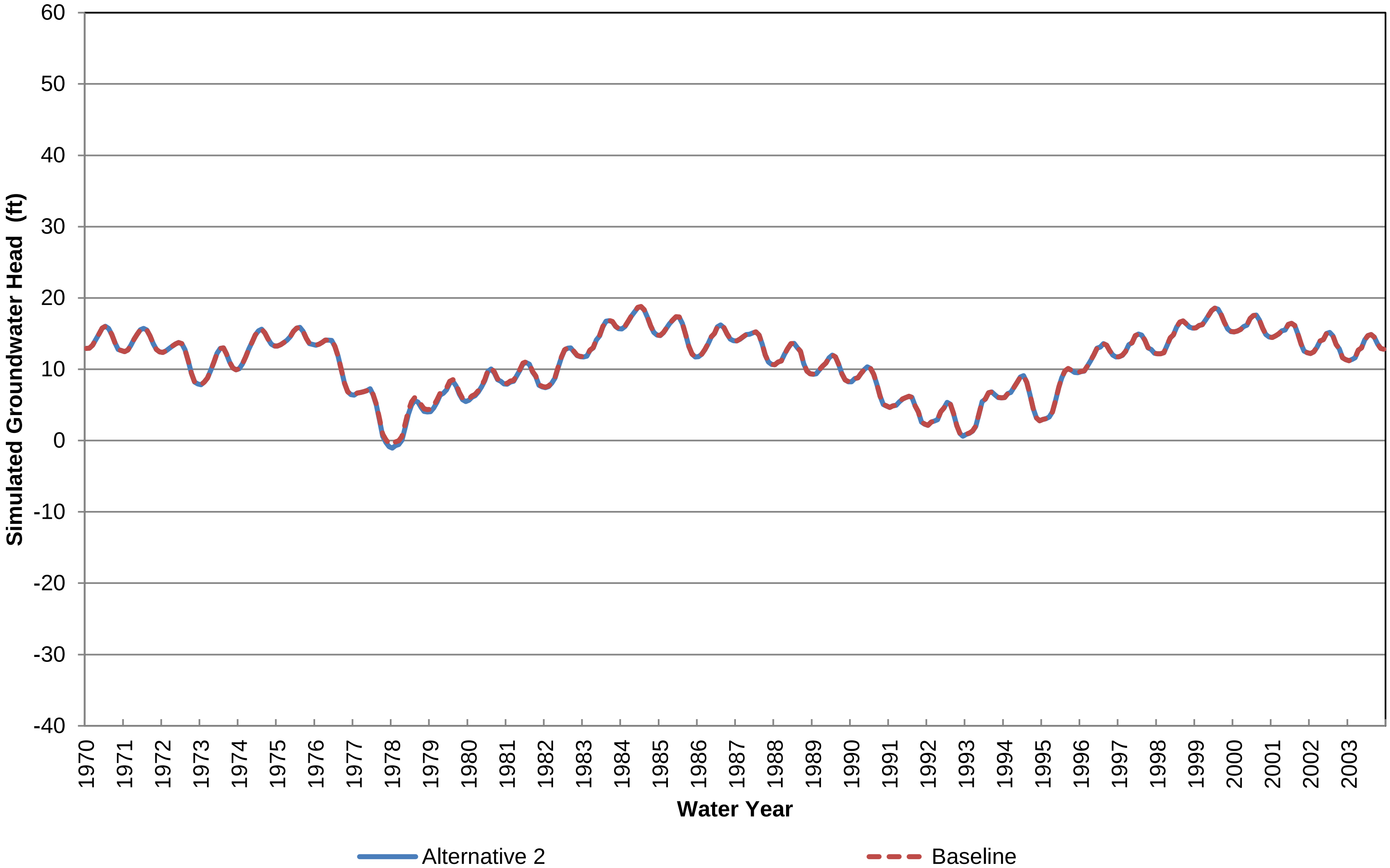
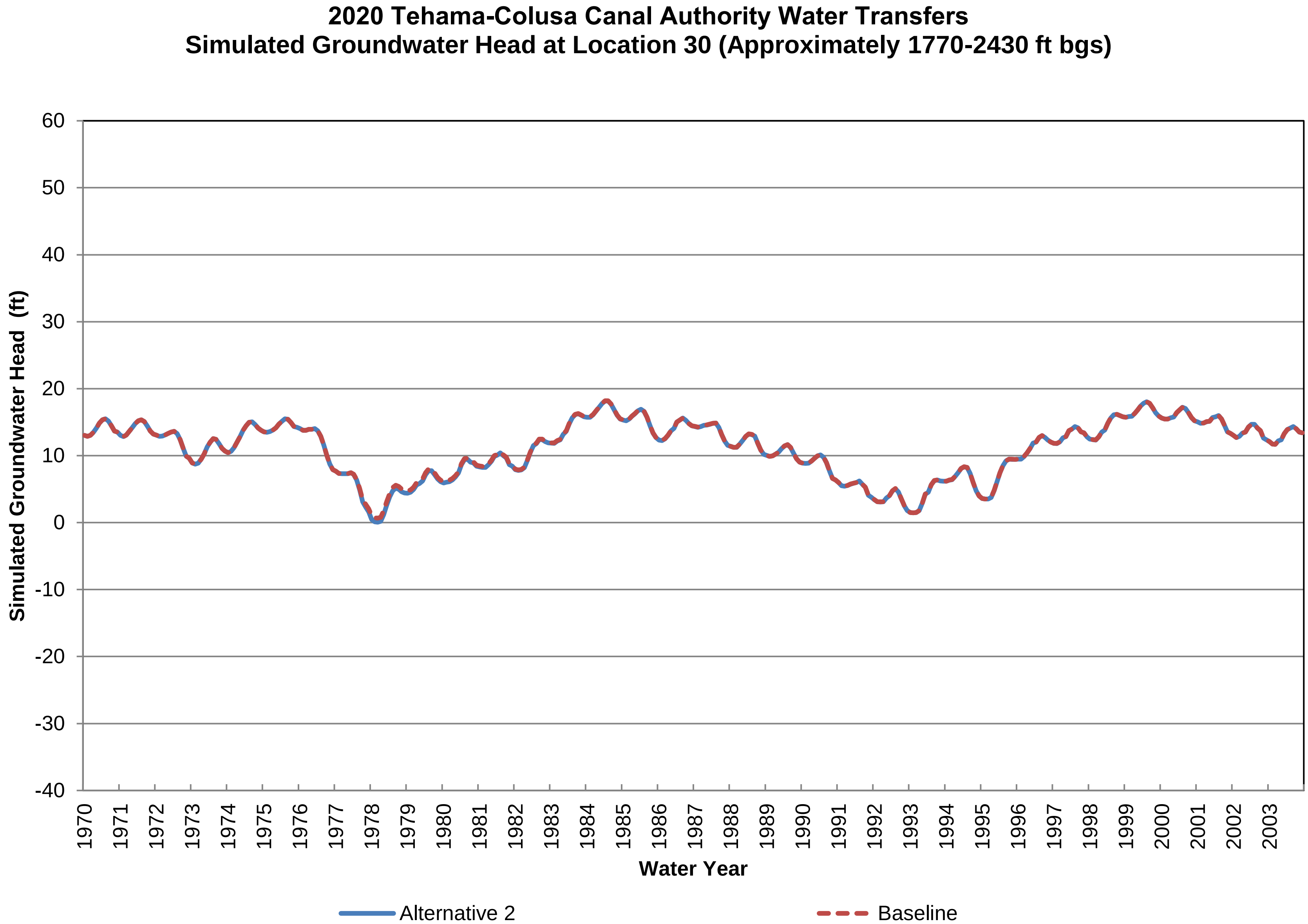
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 30 (Approximately 860-1330 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 30 (Approximately 1330-1770 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 30 (Approximately 1770-2430 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
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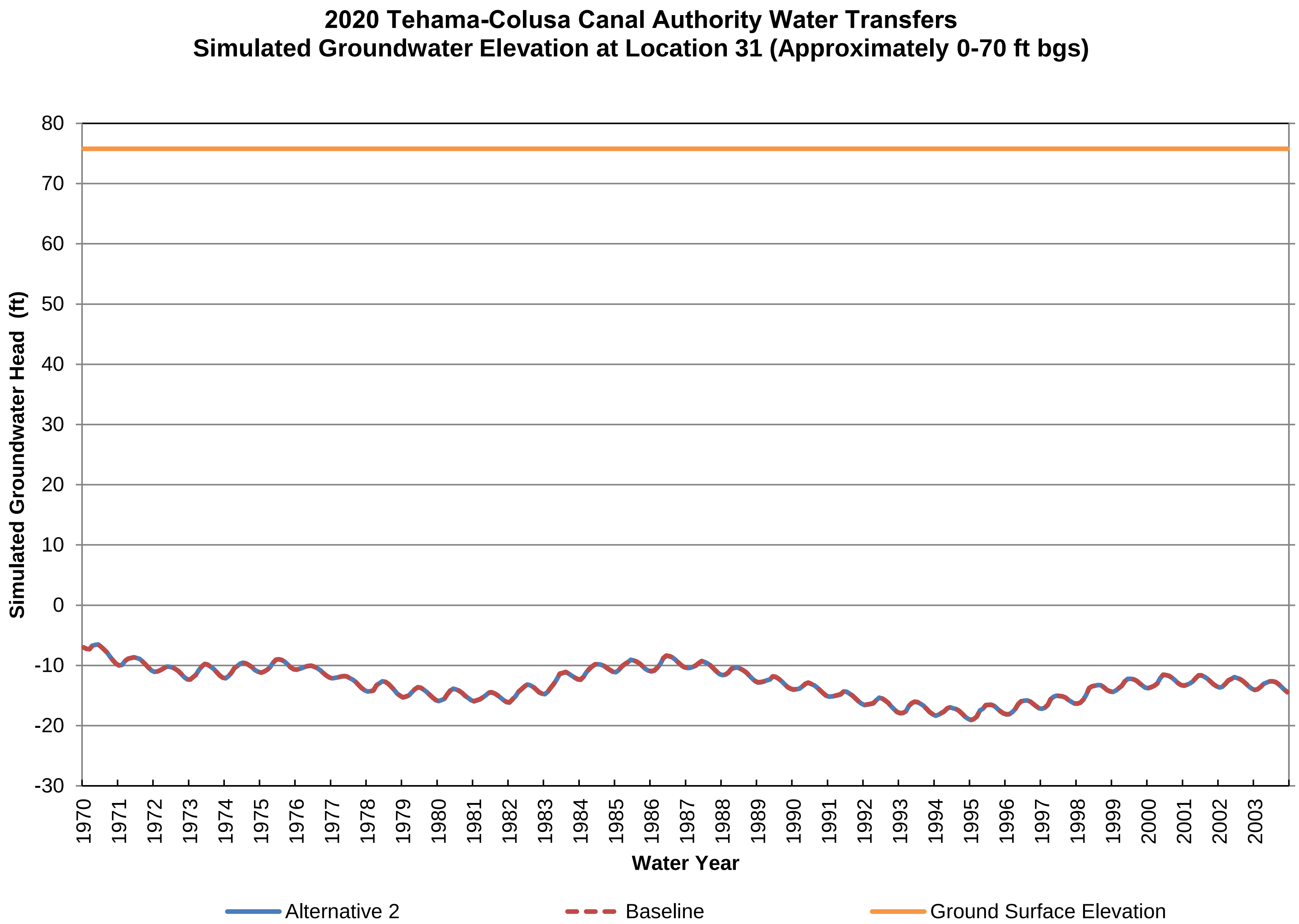
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 31 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
-30
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
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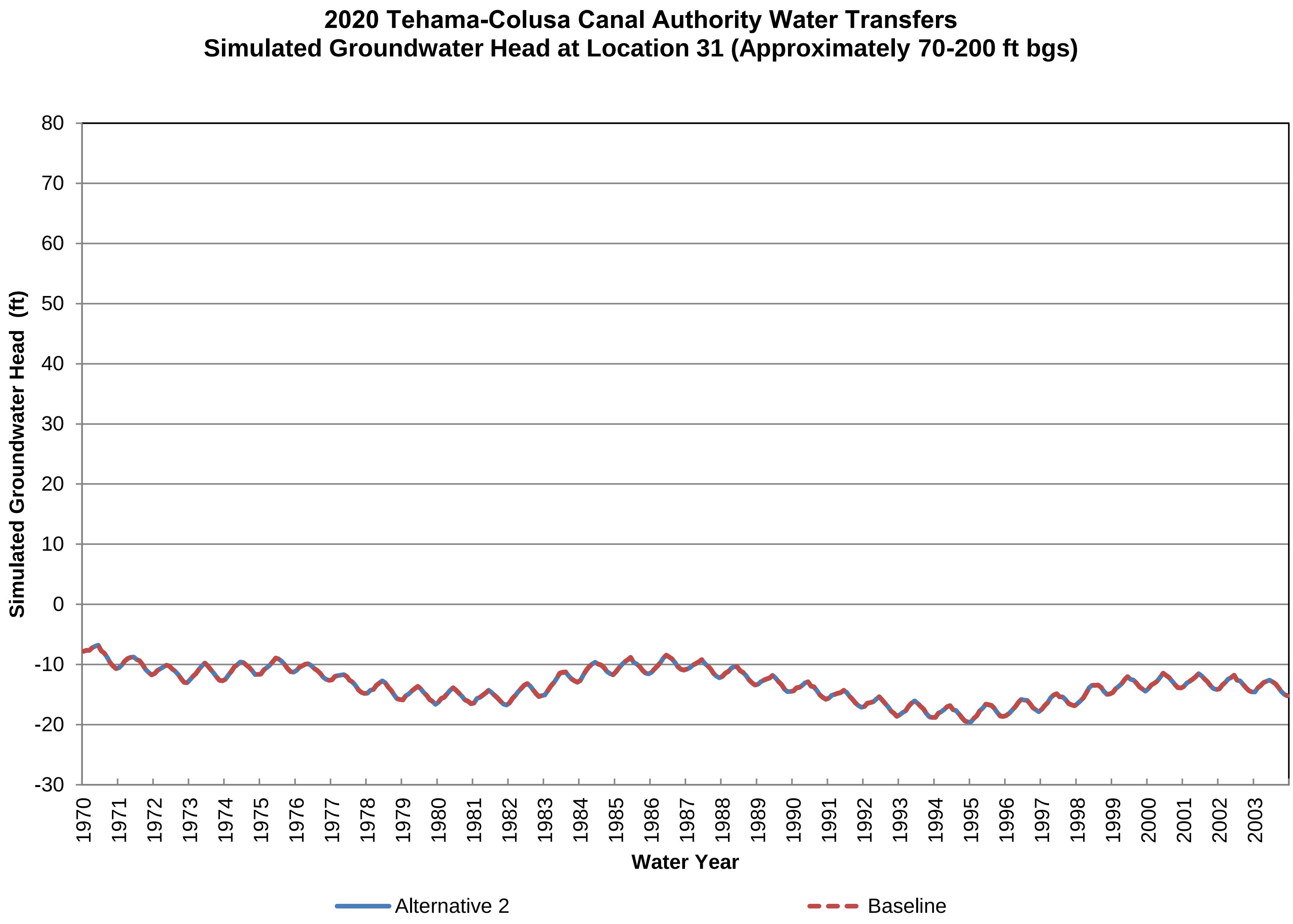
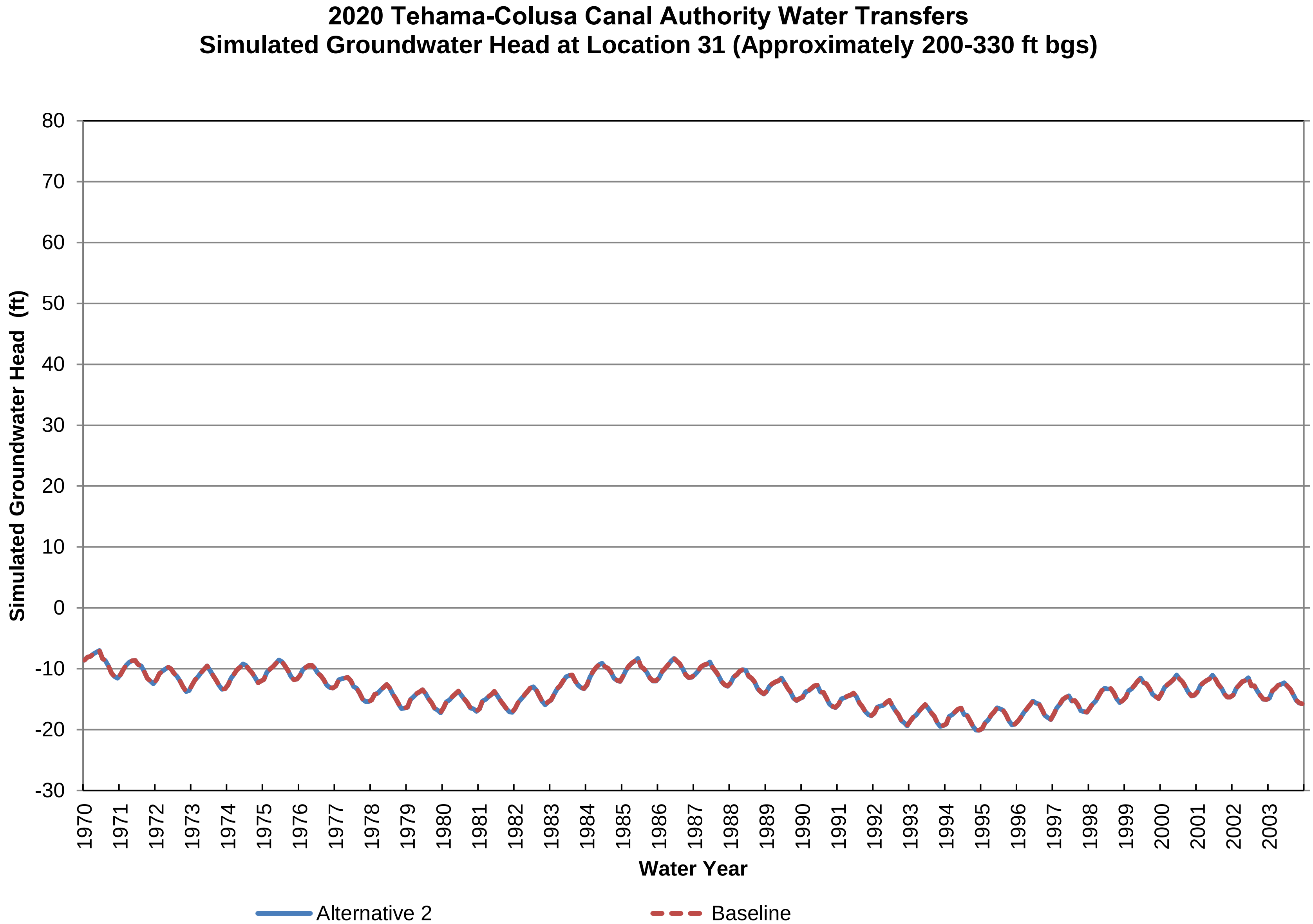
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 31 (Approximately 70-200 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
-30
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 31 (Approximately 200-330 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
-30
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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1983
1984
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1989
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1991
1992
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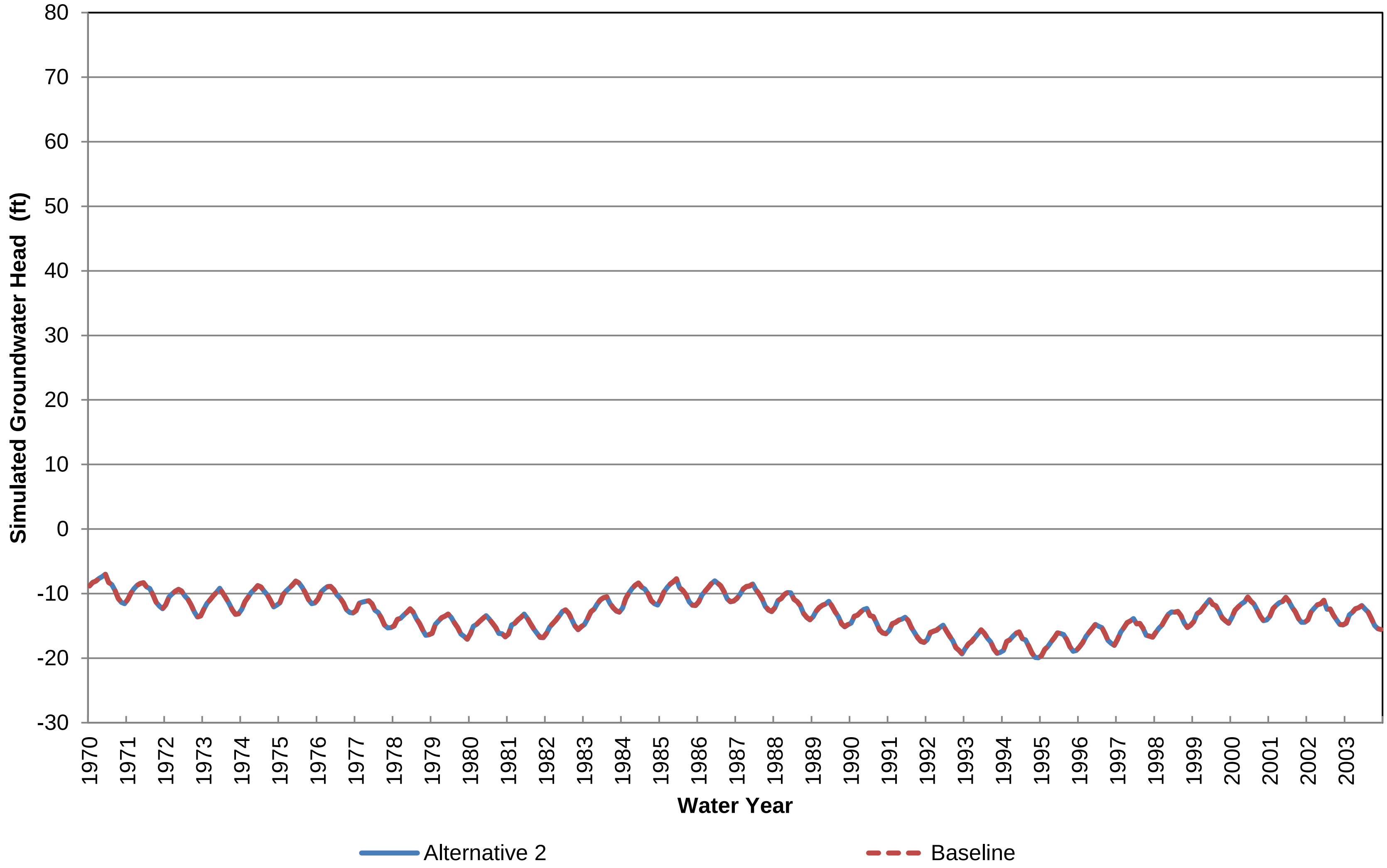
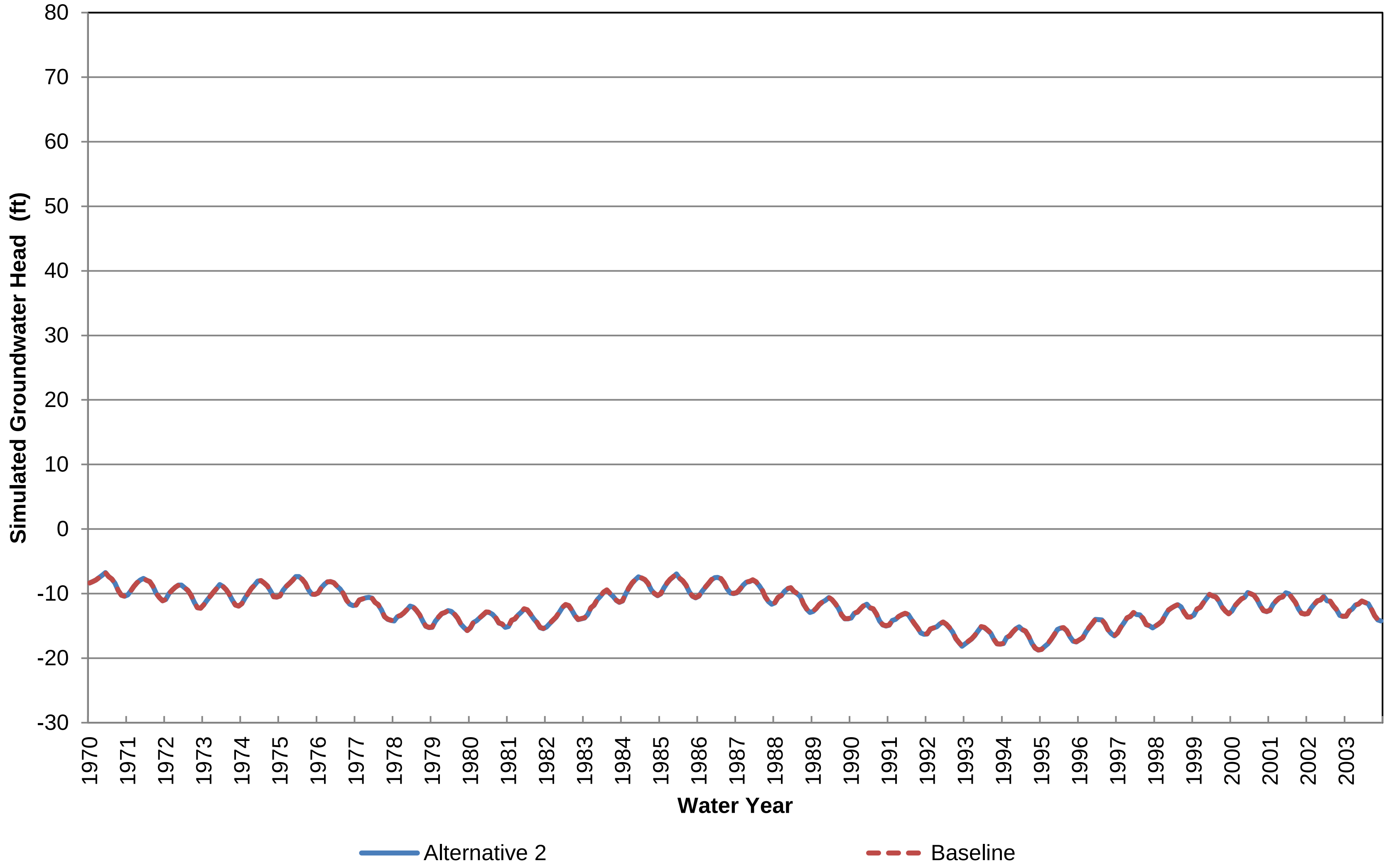
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

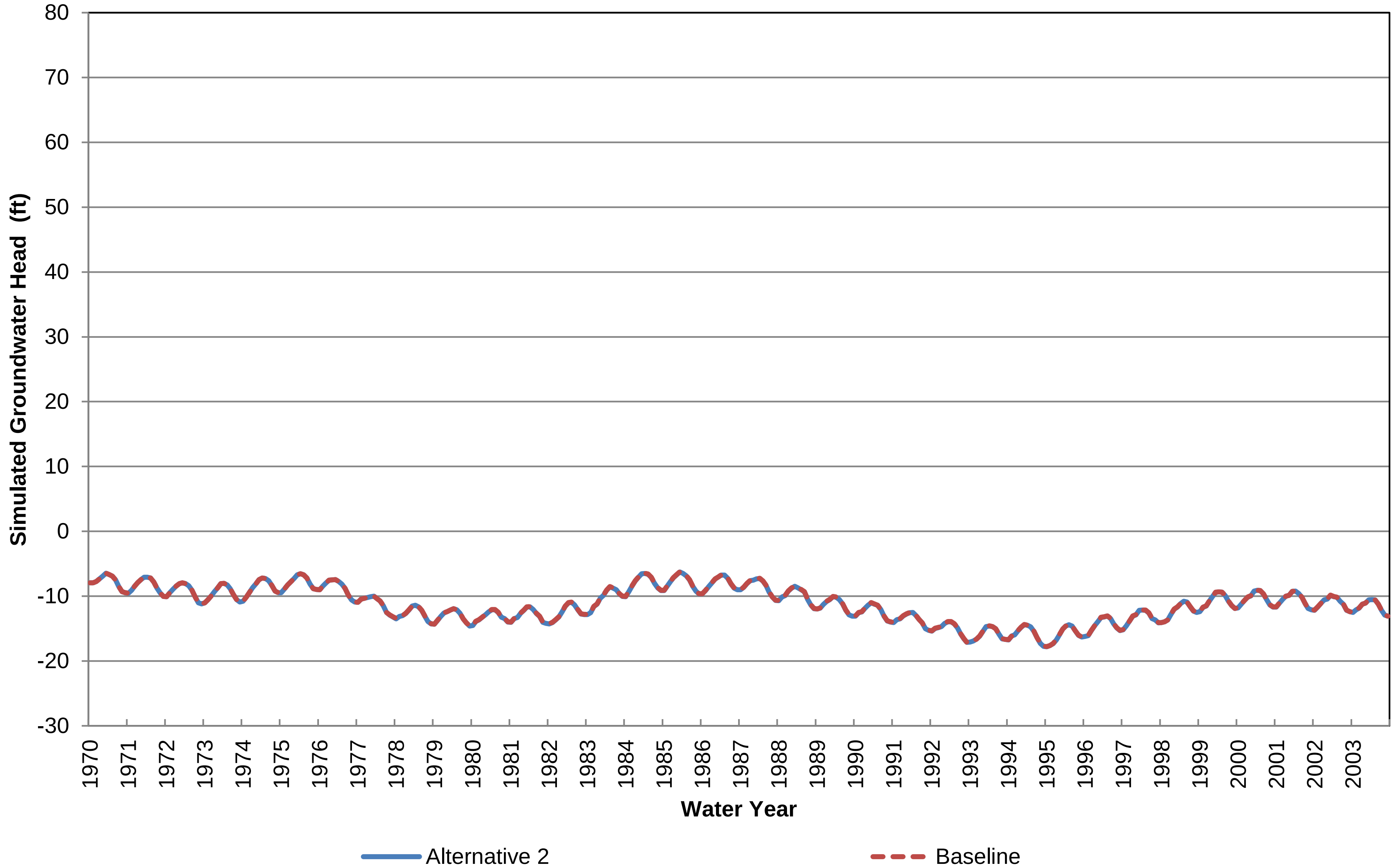
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 31 (Approximately 330-460 ft bgs)



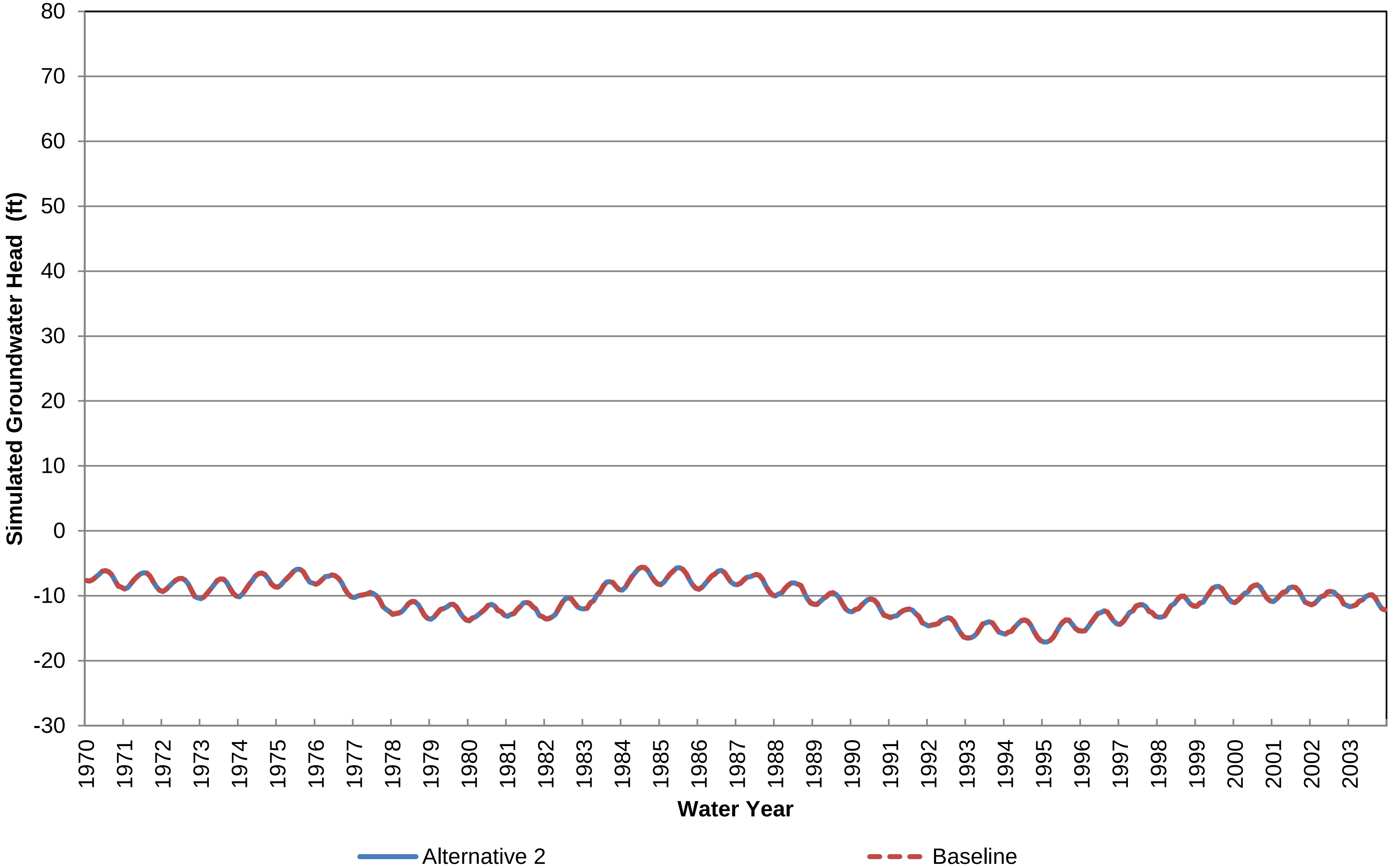
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 31 (Approximately 460-650 ft bgs)



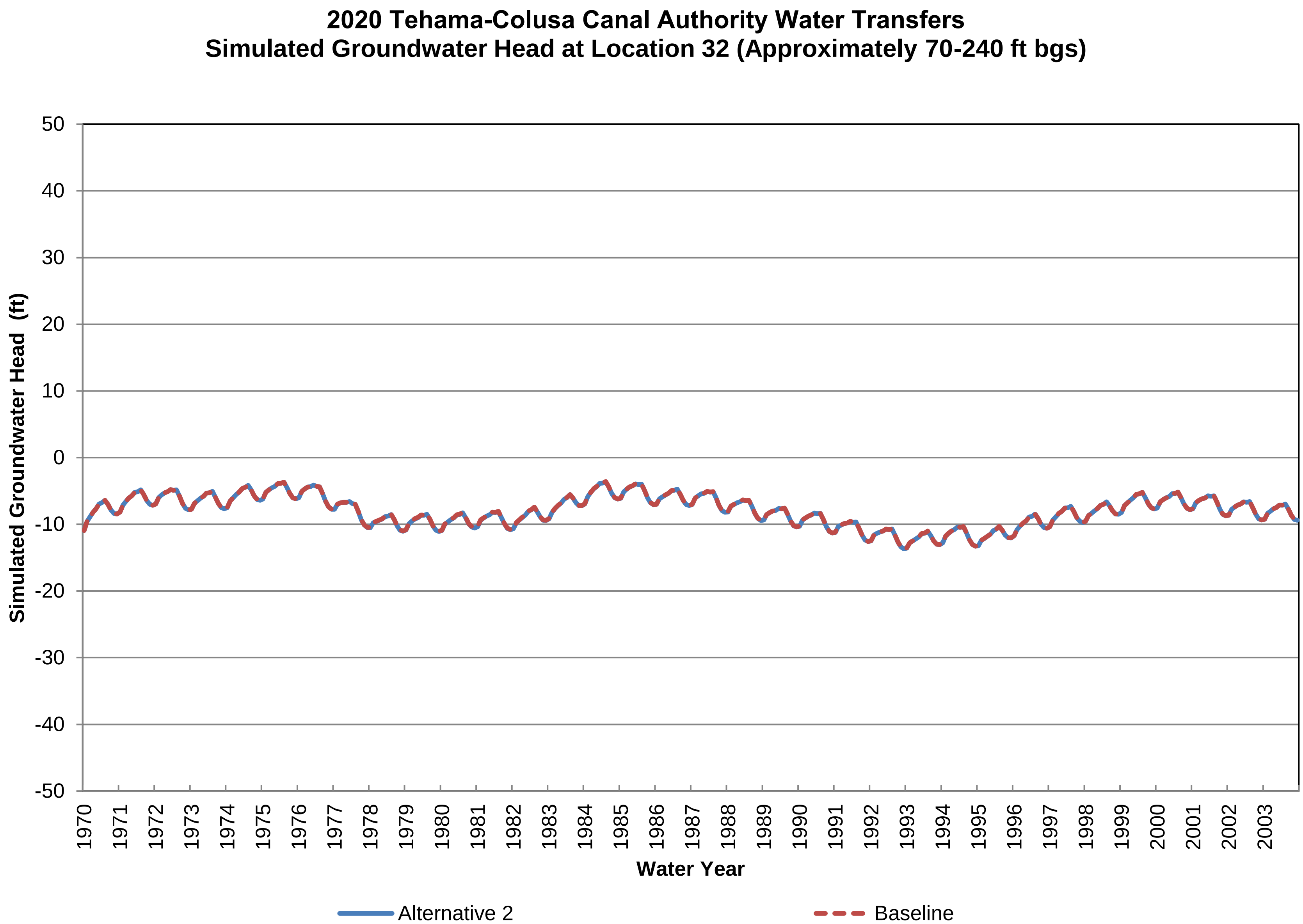
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 31 (Approximately 650-870 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 31 (Approximately 870-1190 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 32 (Approximately 0-70 ft bgs)


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 32 (Approximately 70-240 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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1983
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1998
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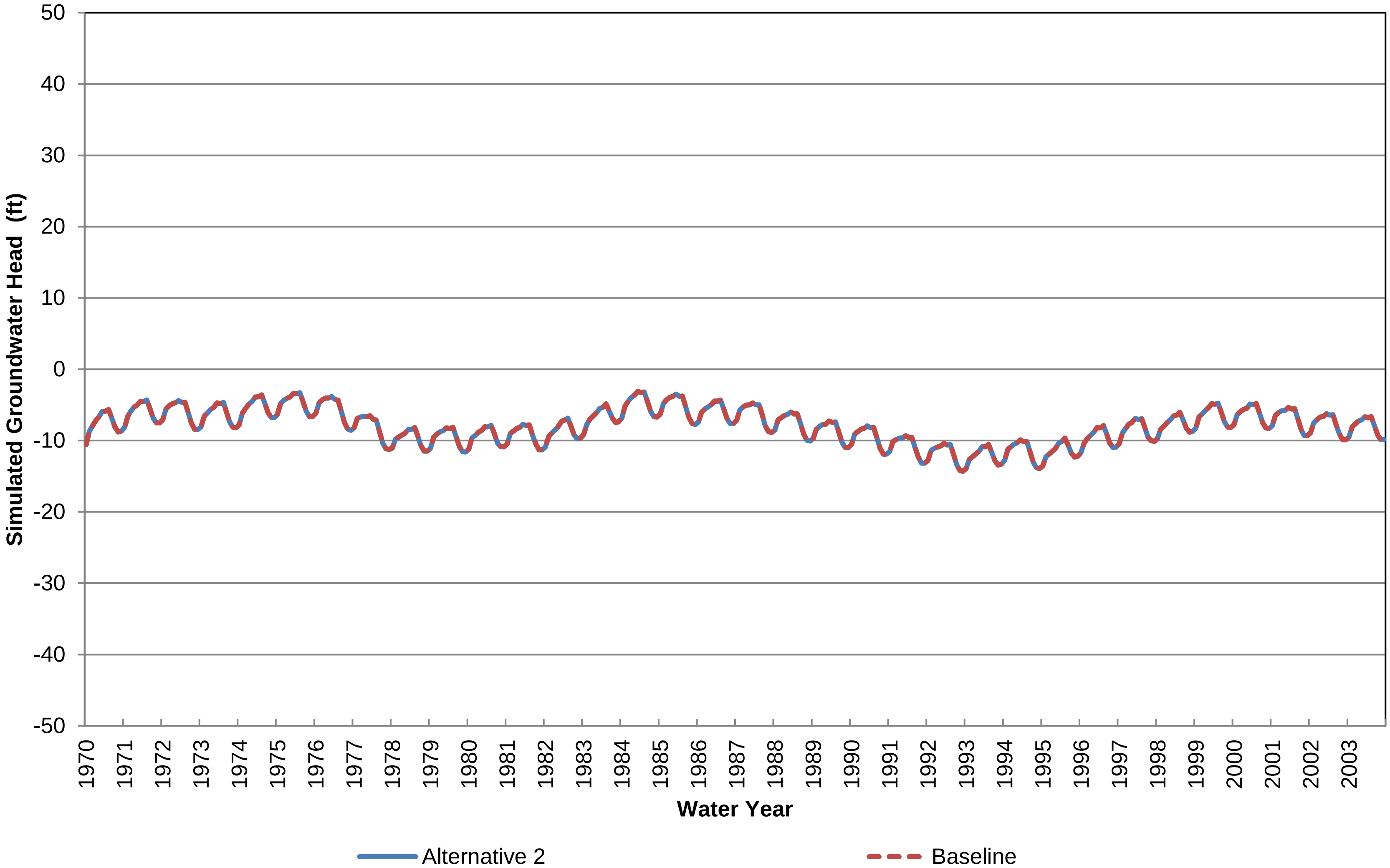
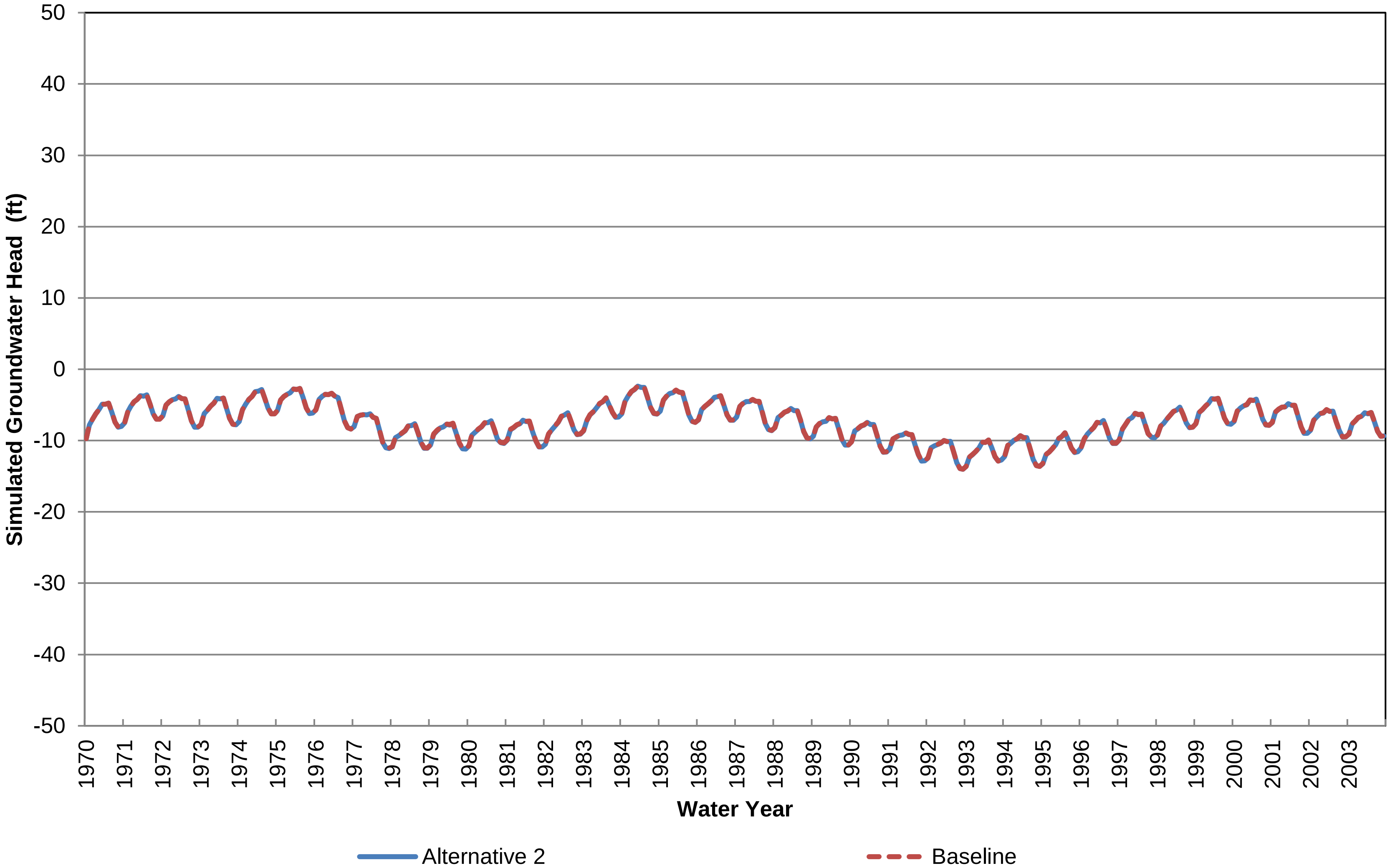
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

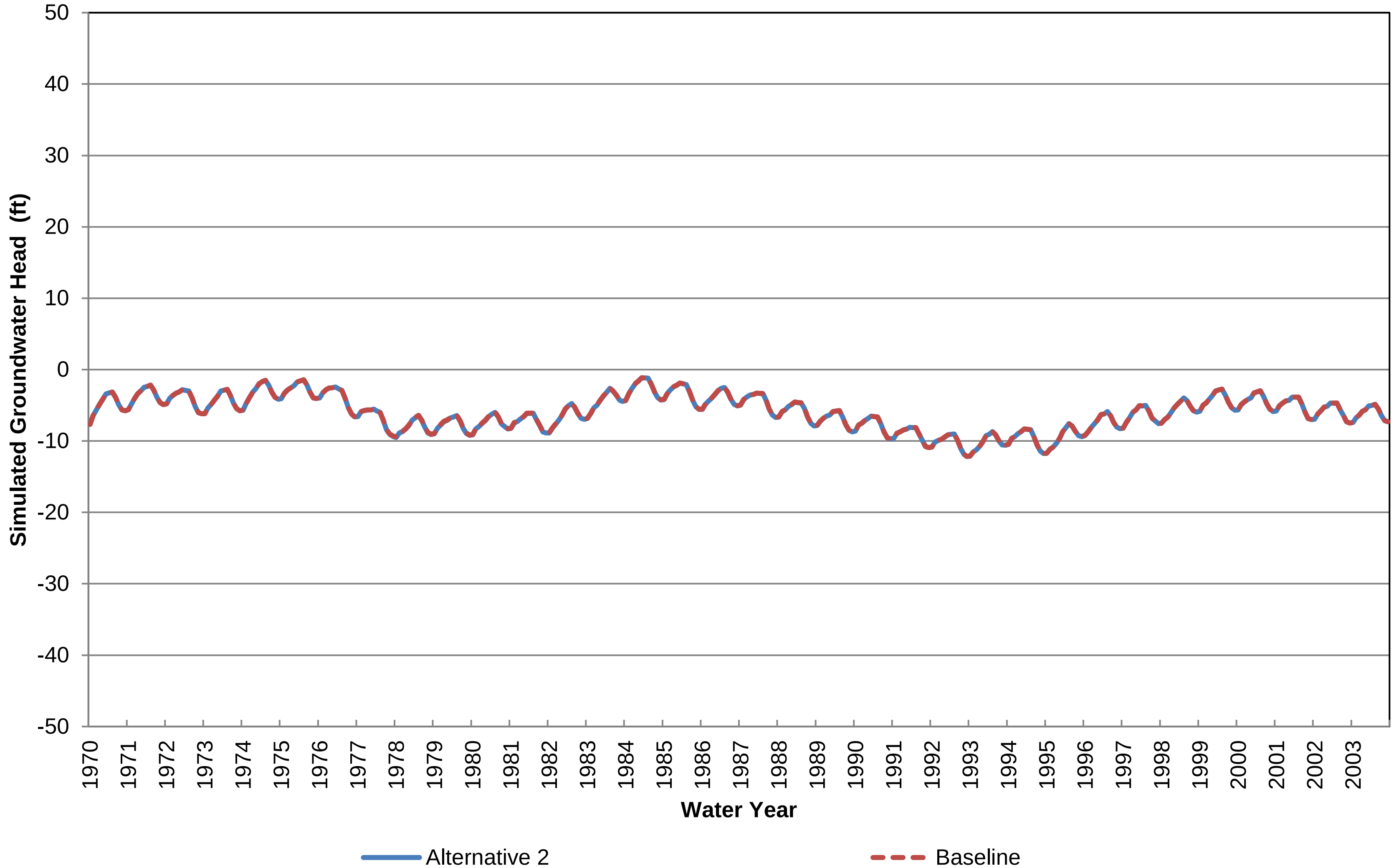
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 32 (Approximately 240-410 ft bgs)

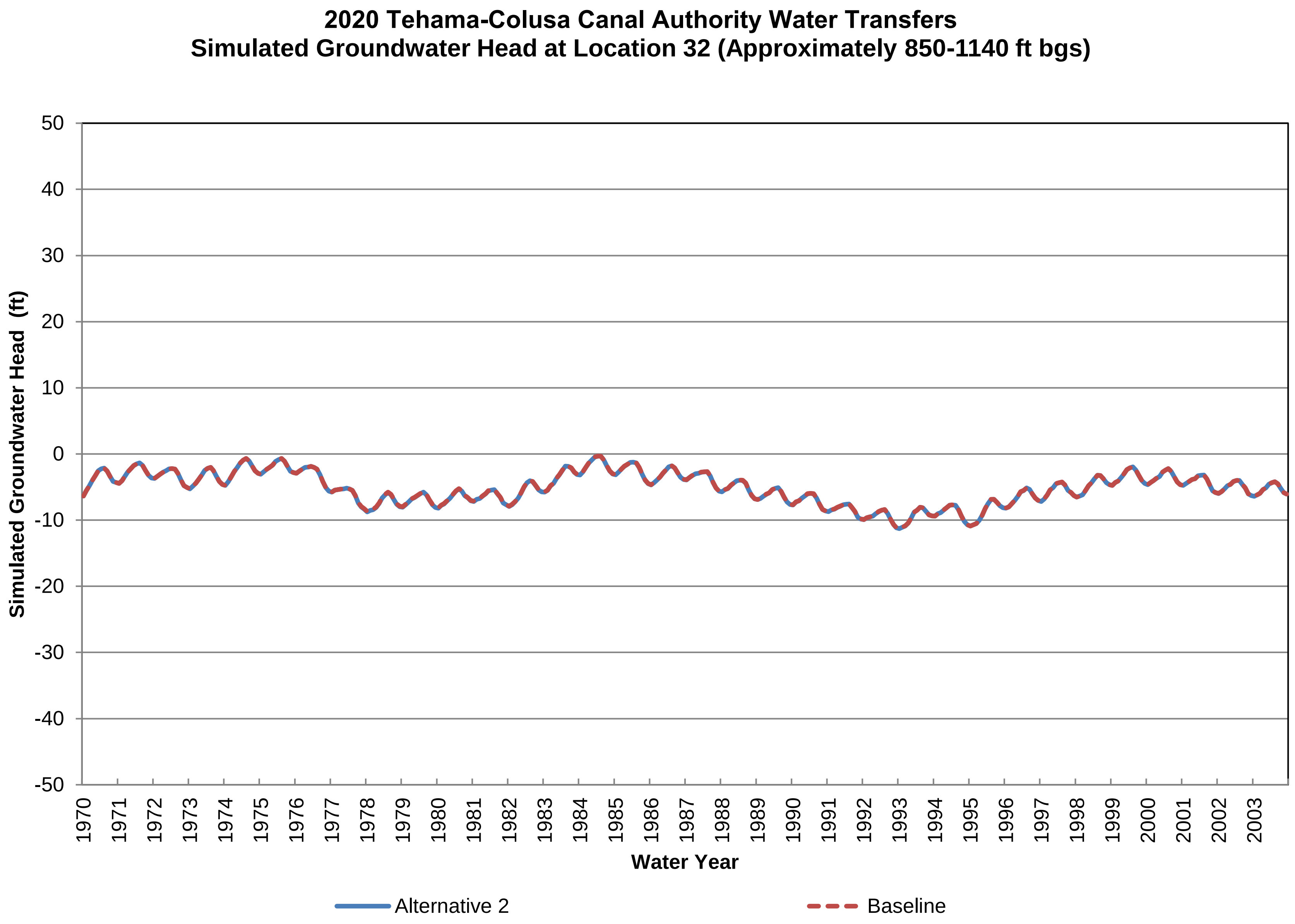


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 32 (Approximately 410-580 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 32 (Approximately 580-850 ft bgs)





2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 32 (Approximately 850-1140 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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1983
1984
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1990
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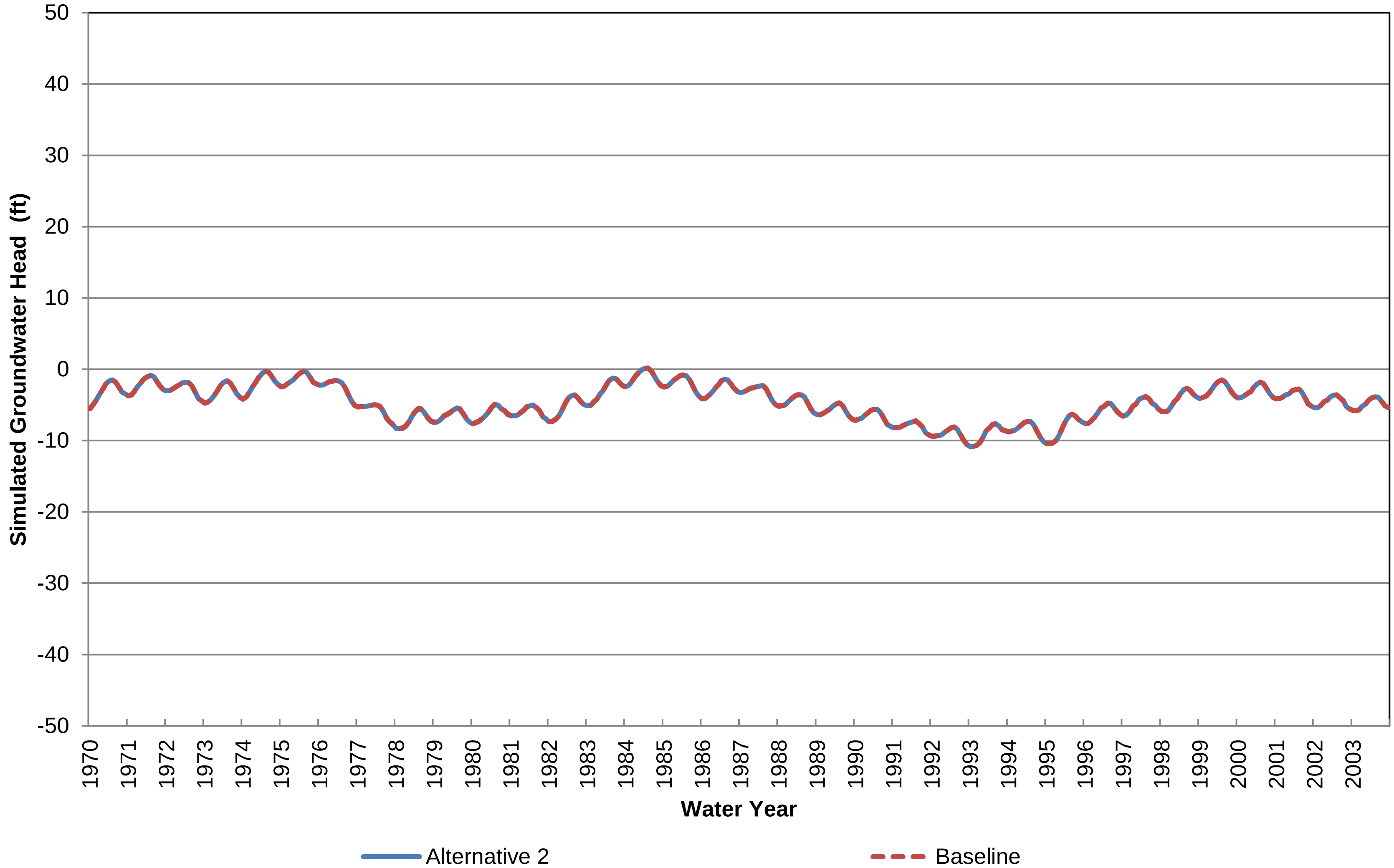
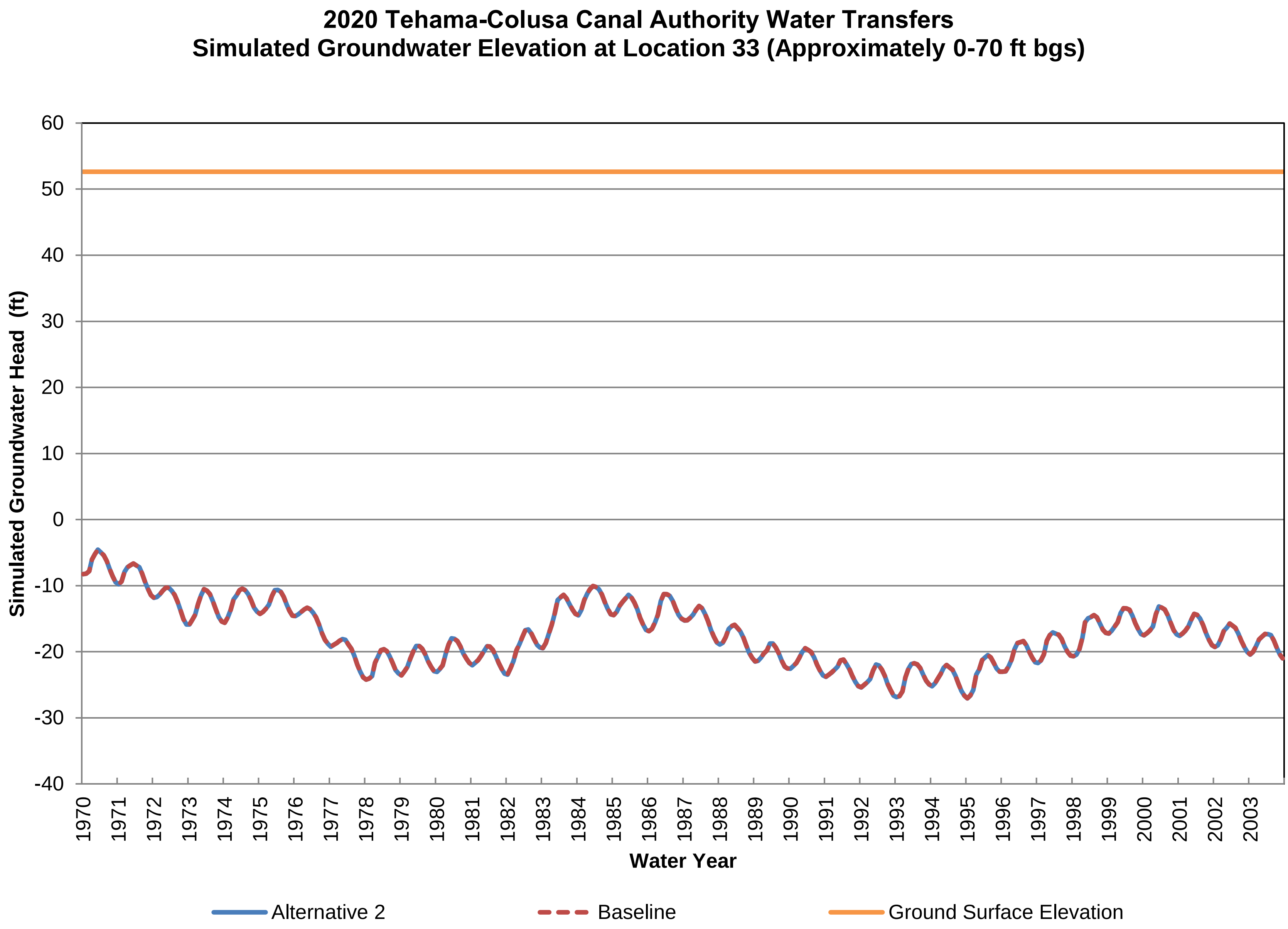
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 32 (Approximately 1140-1560 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 33 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
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1991
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1994
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1996
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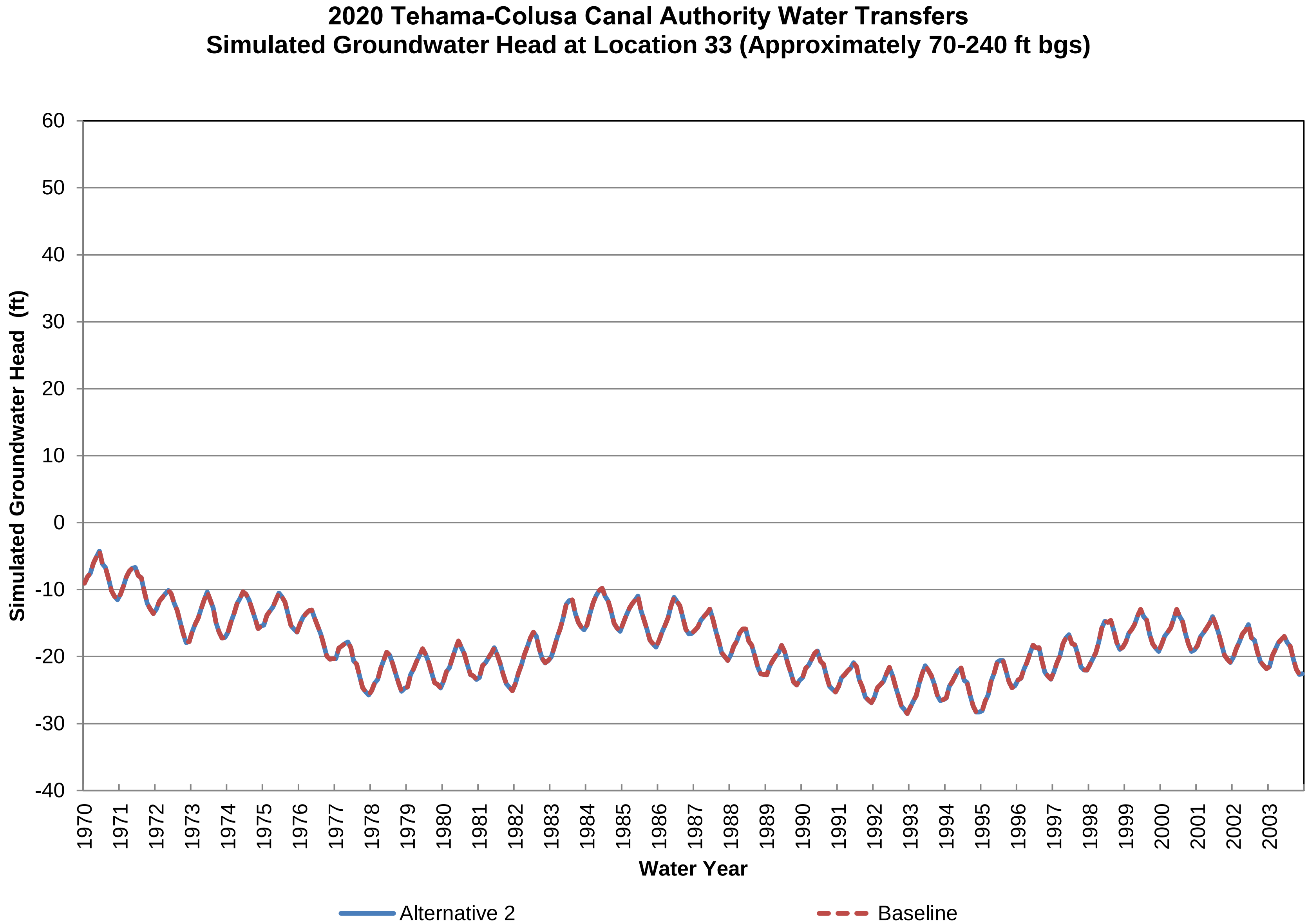
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 33 (Approximately 70-240 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
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1978
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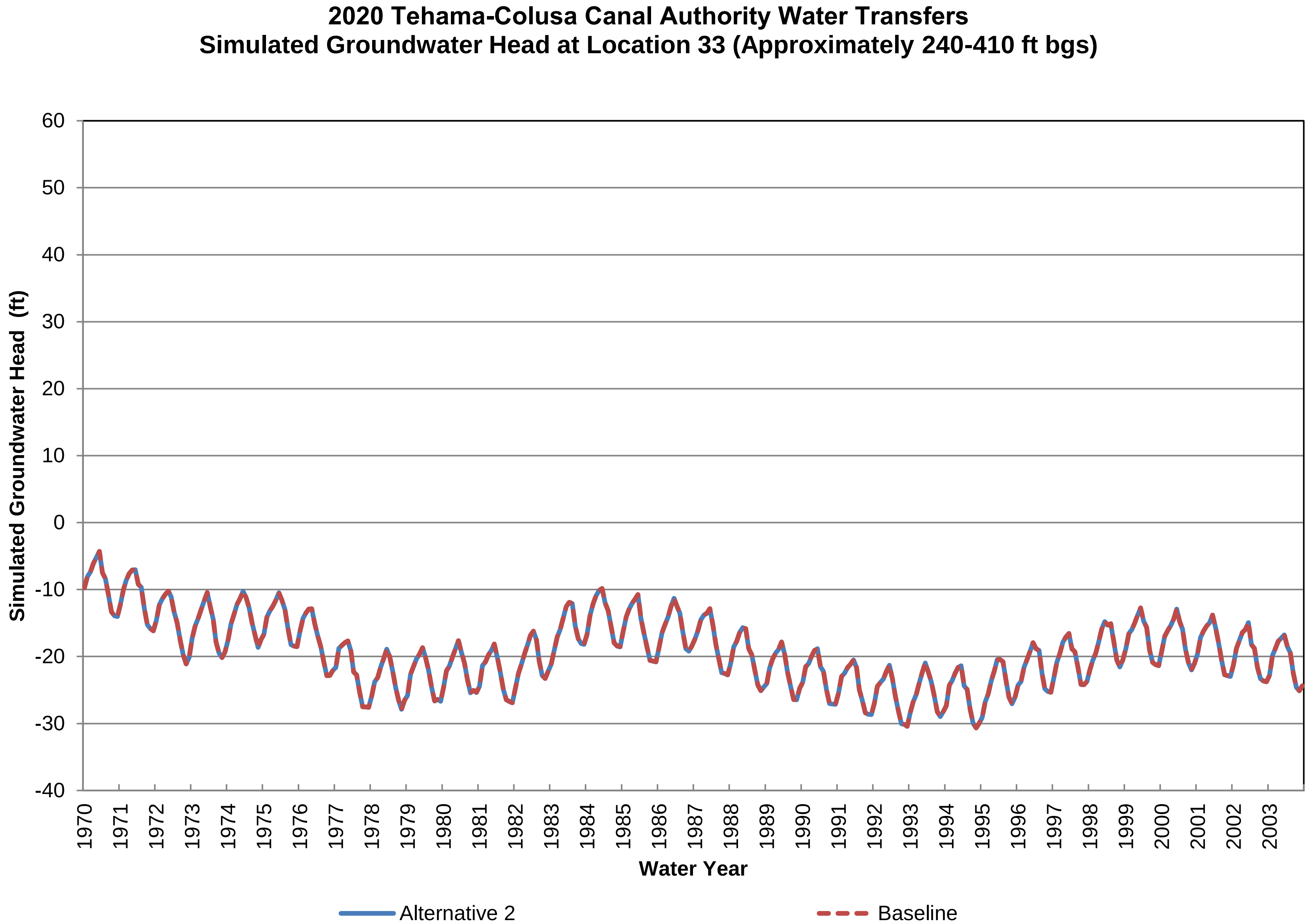
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 33 (Approximately 240-410 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
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1978
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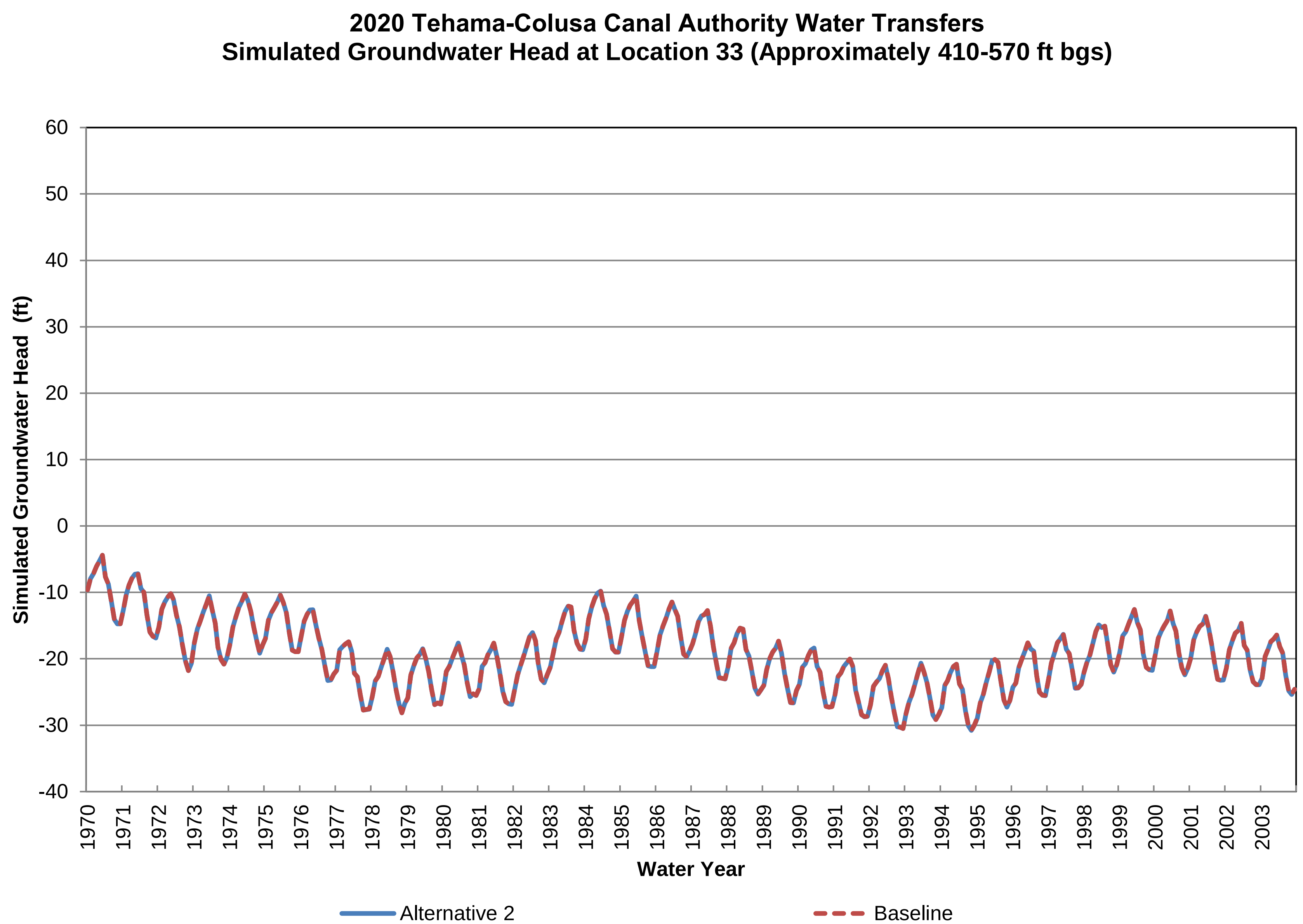
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 33 (Approximately 410-570 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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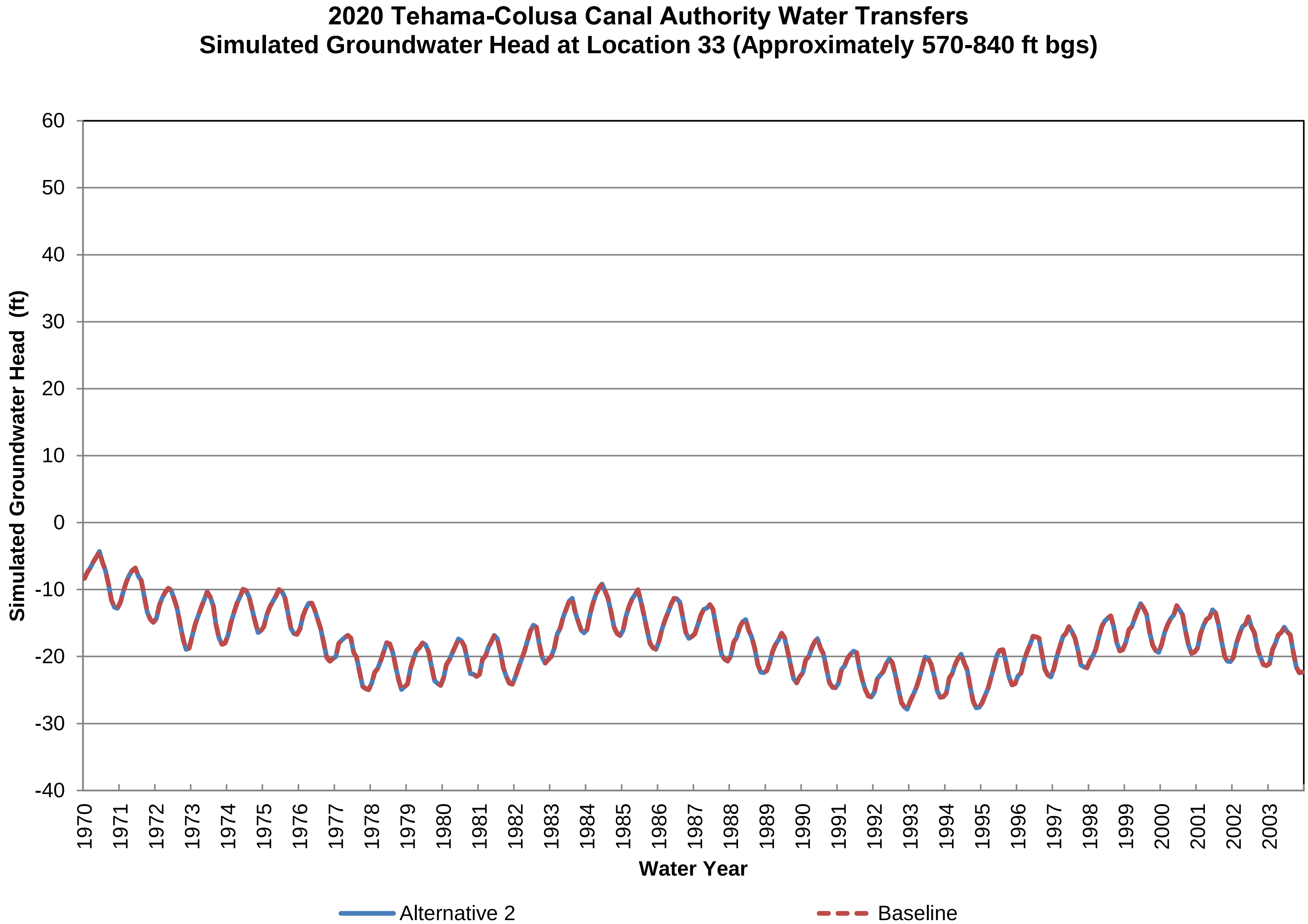
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 33 (Approximately 570-840 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
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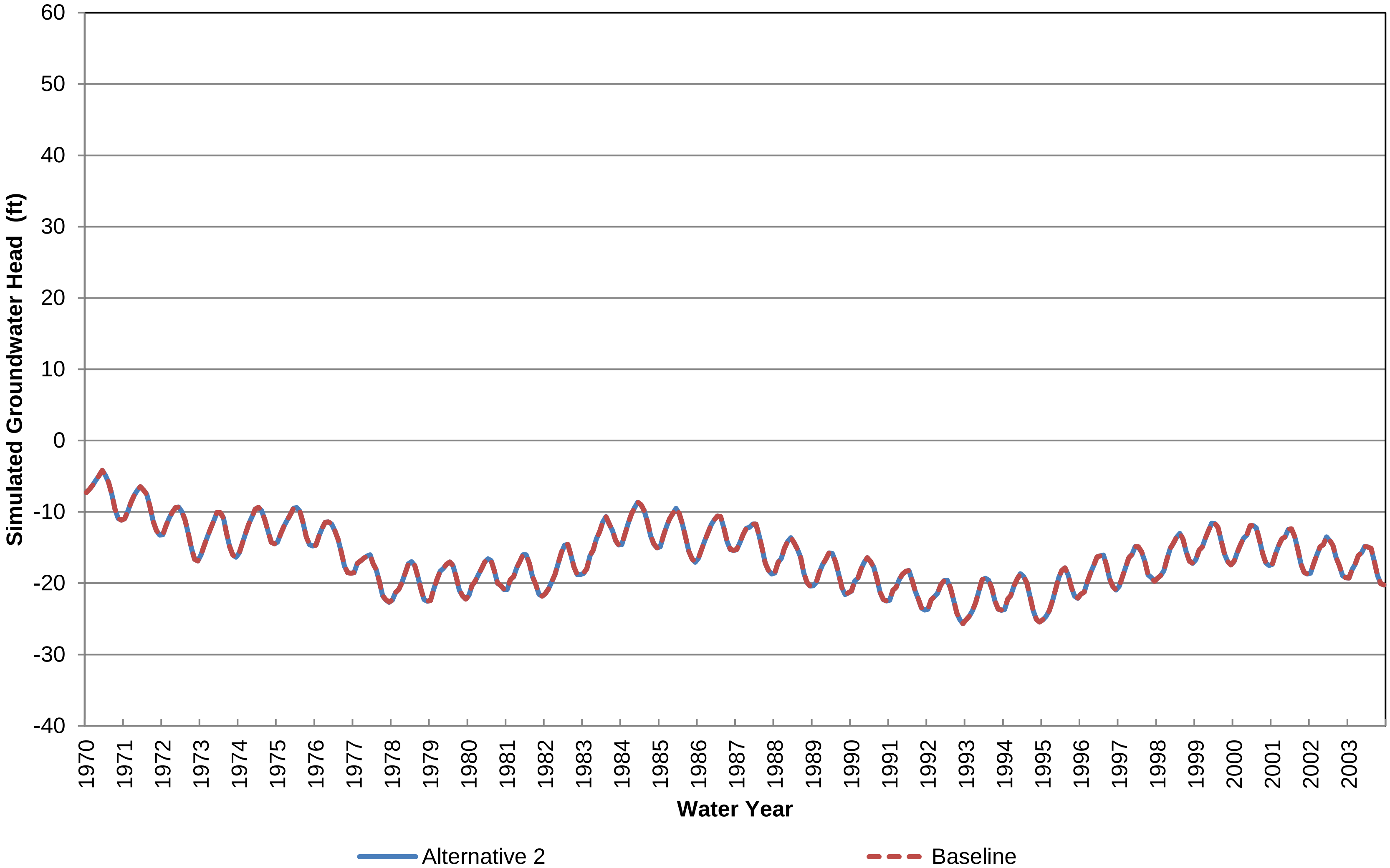
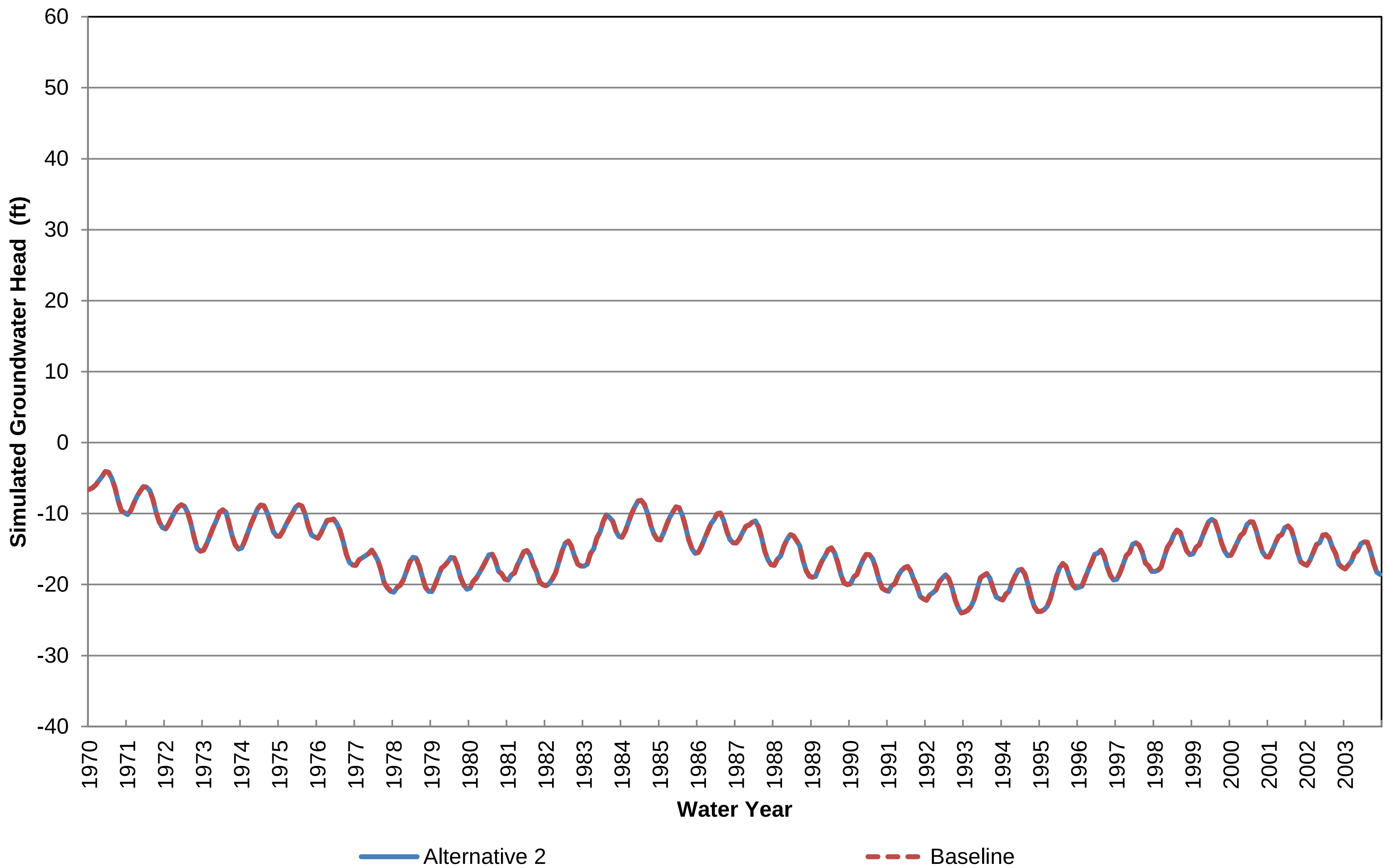
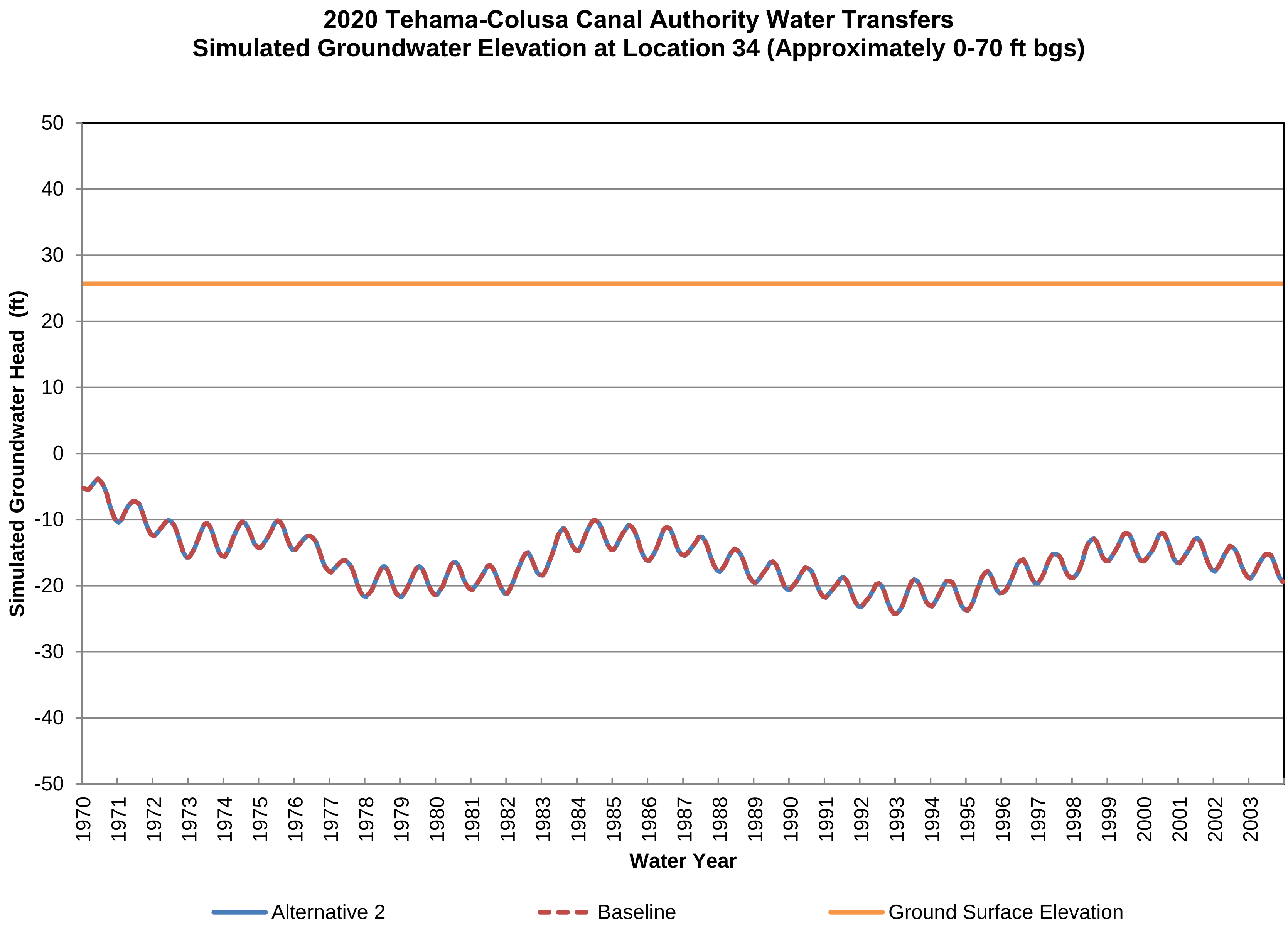
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

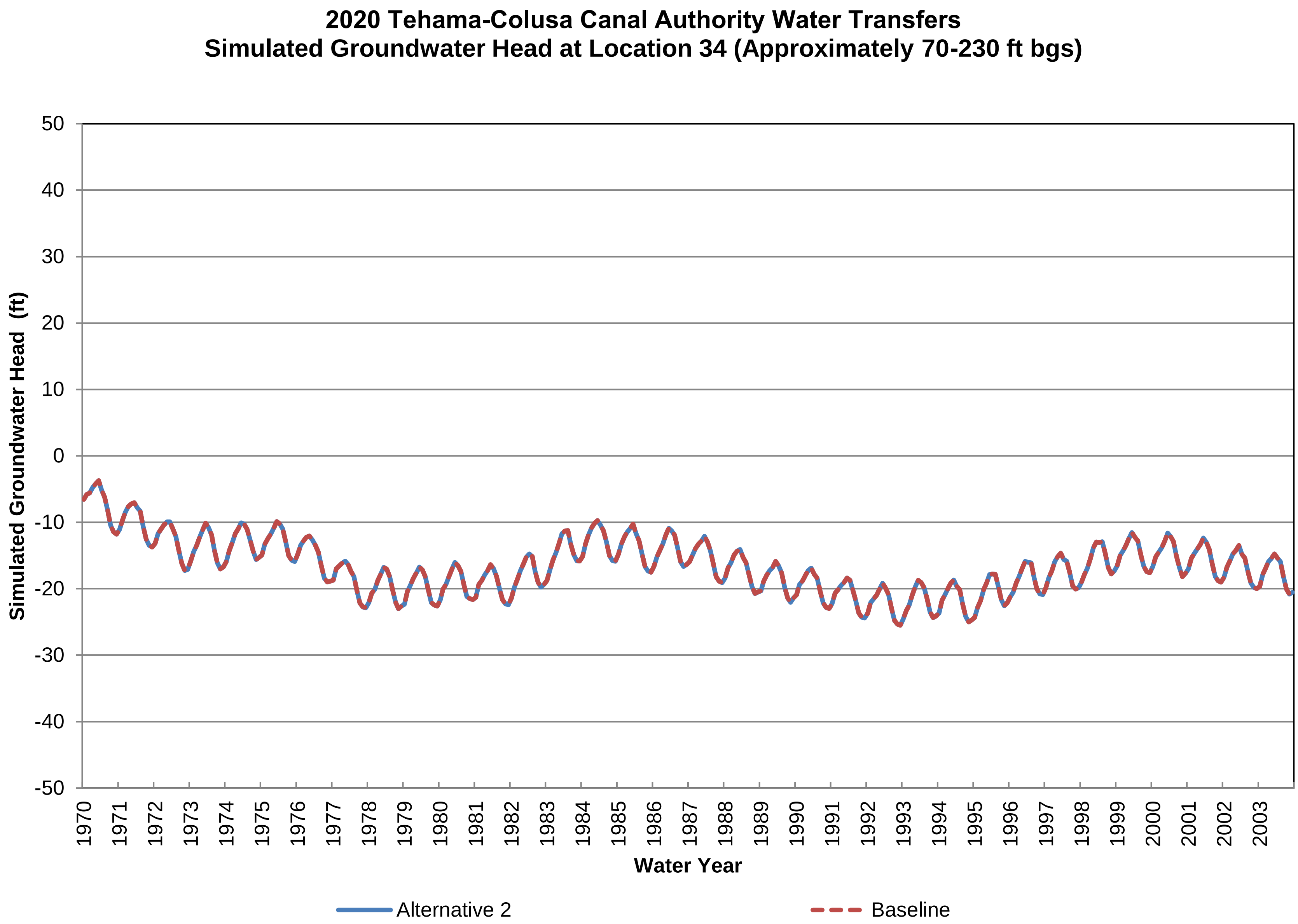
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 33 (Approximately 840-1120 ft bgs)



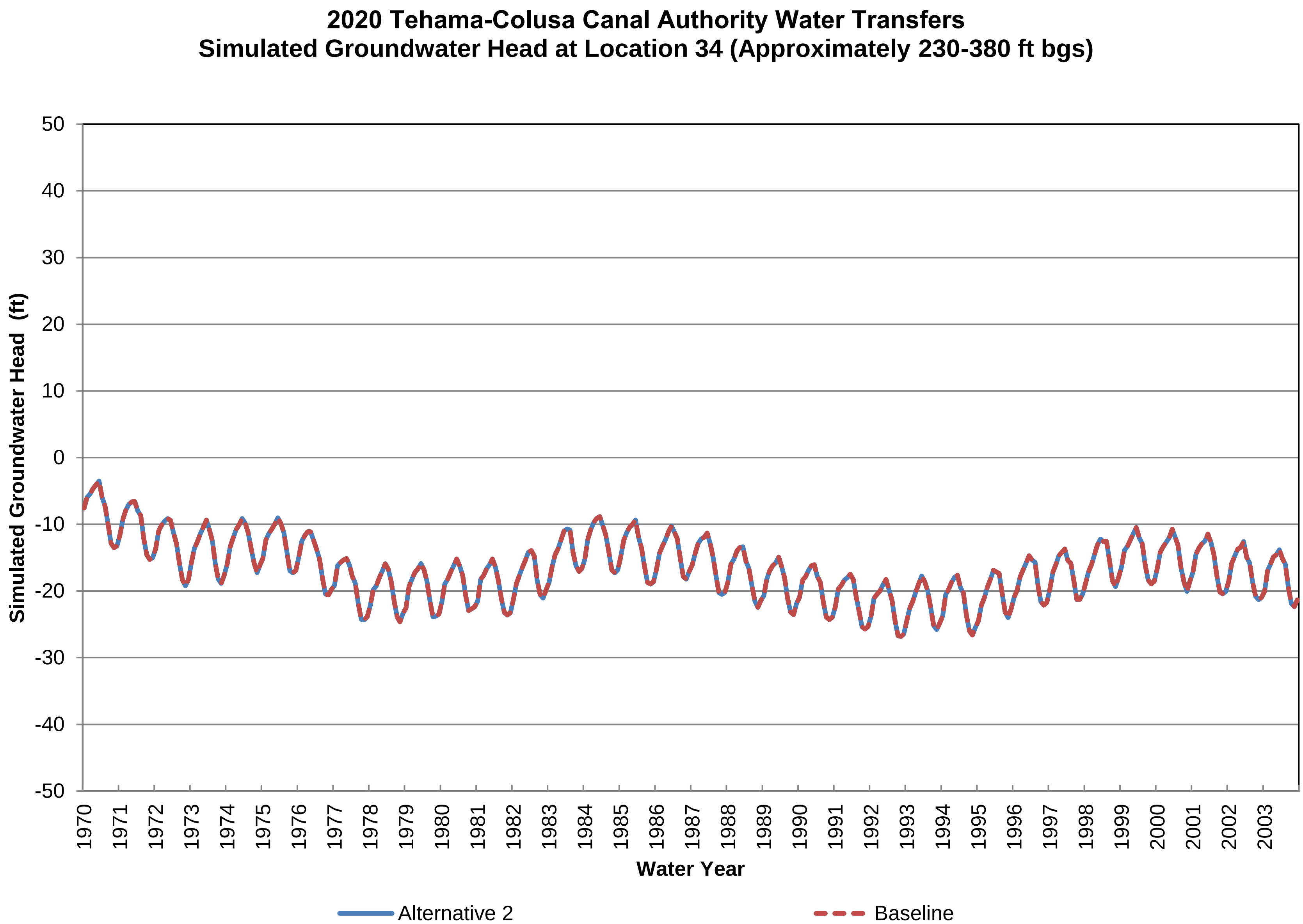
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 33 (Approximately 1120-1540 ft bgs)




2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Elevation at Location 34 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline
Ground Surface Elevation

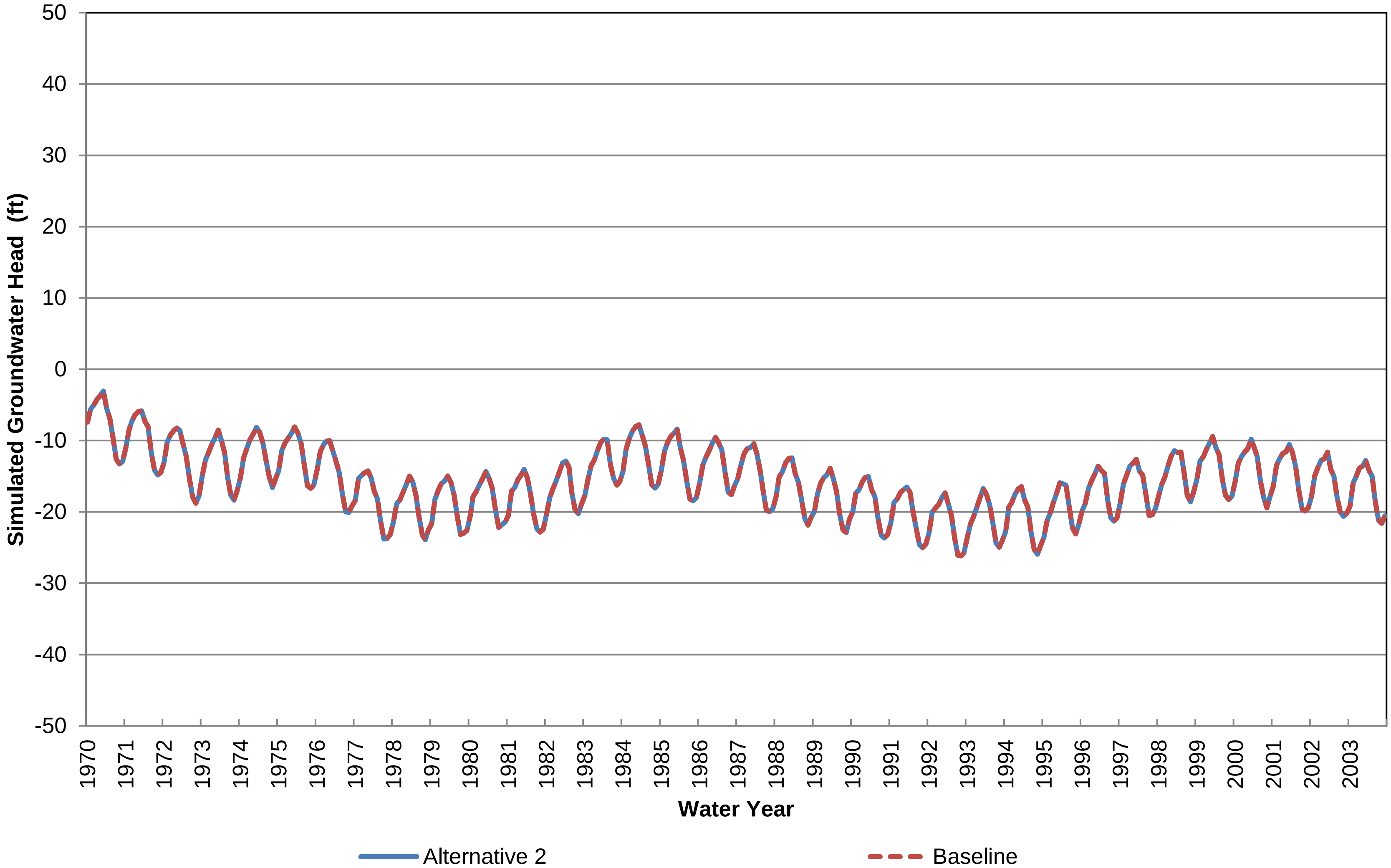


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 34 (Approximately 70-230 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

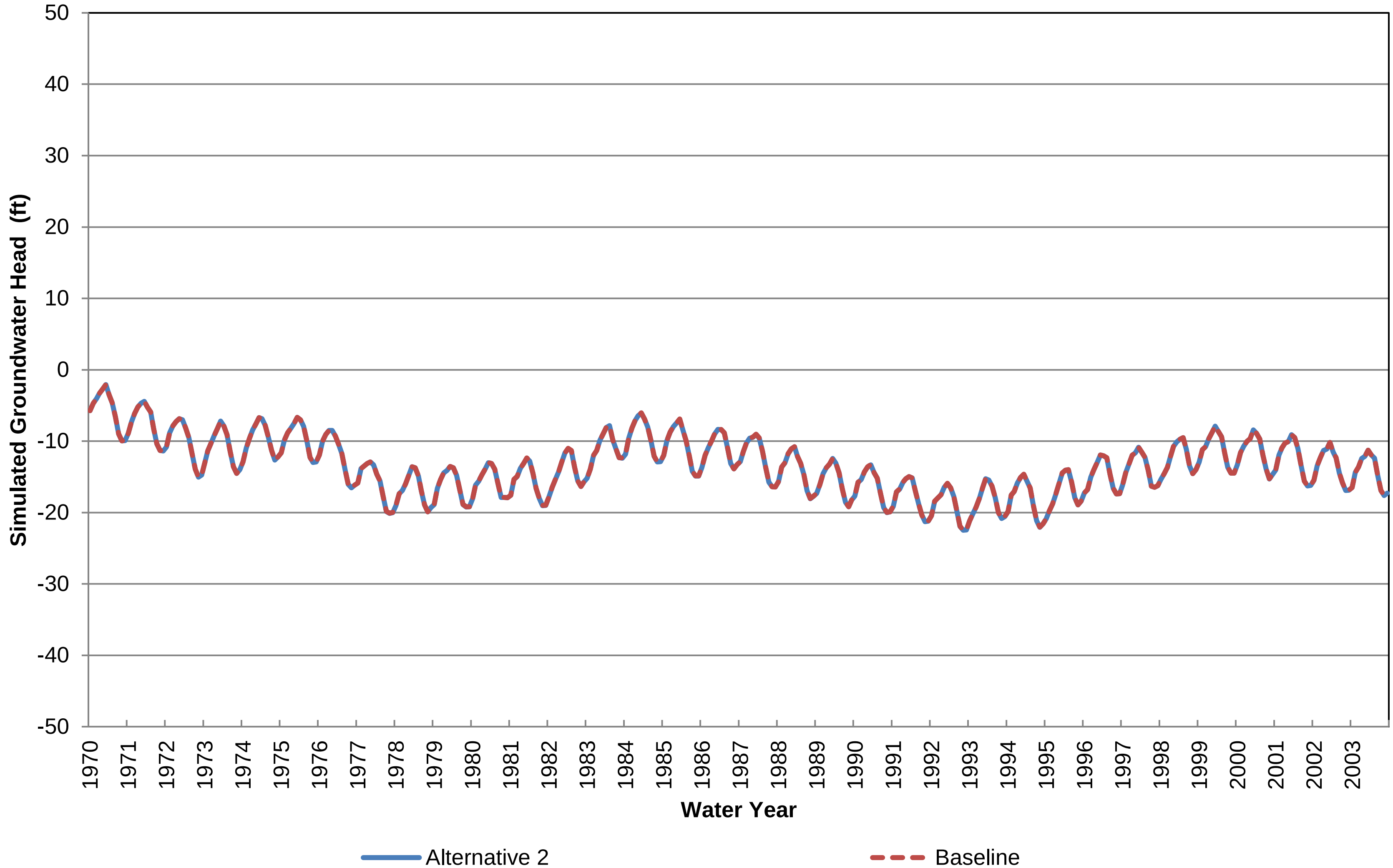


2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 34 (Approximately 230-380 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Water Year
Alternative 2
Baseline

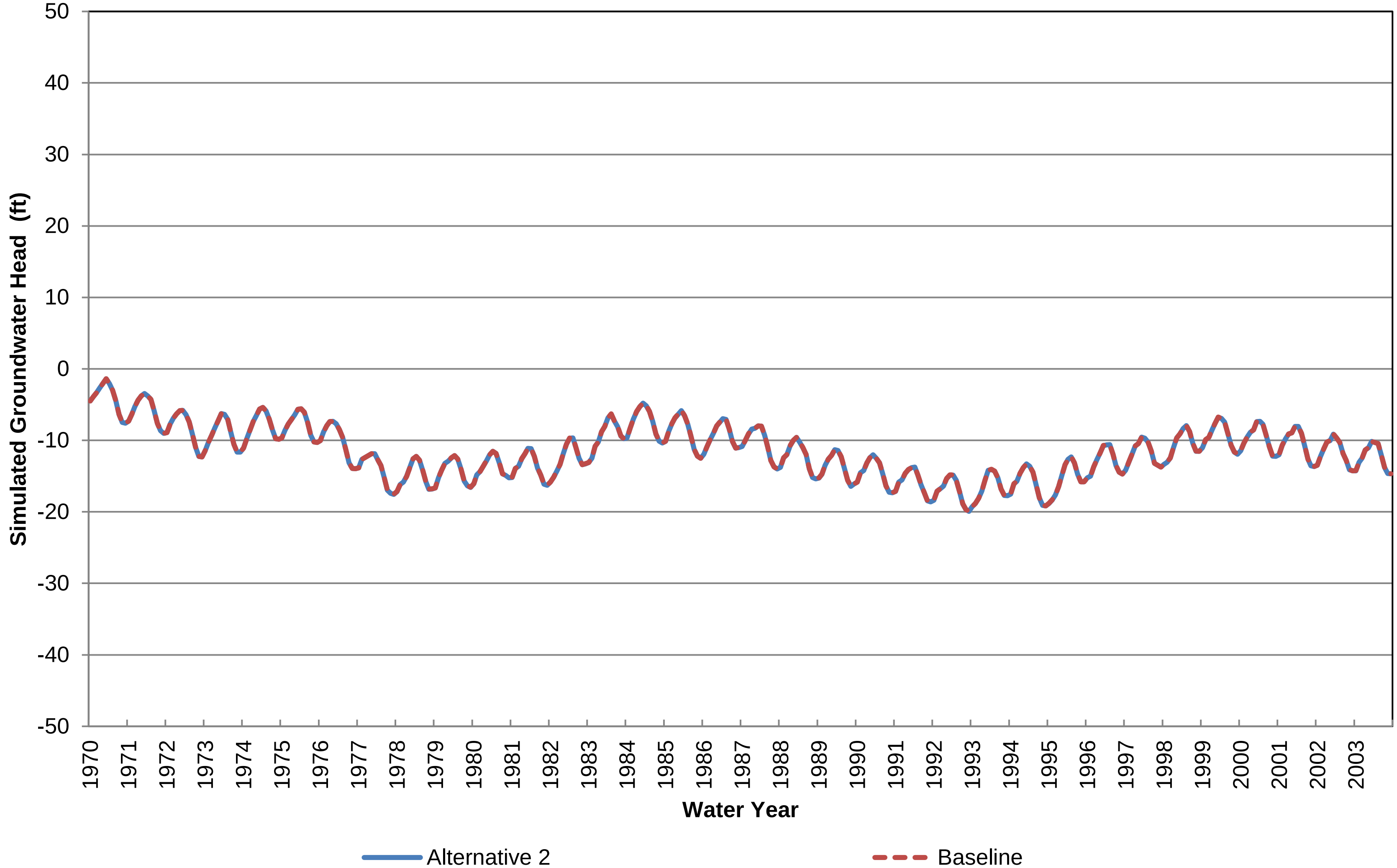
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 34 (Approximately 380-540 ft bgs)



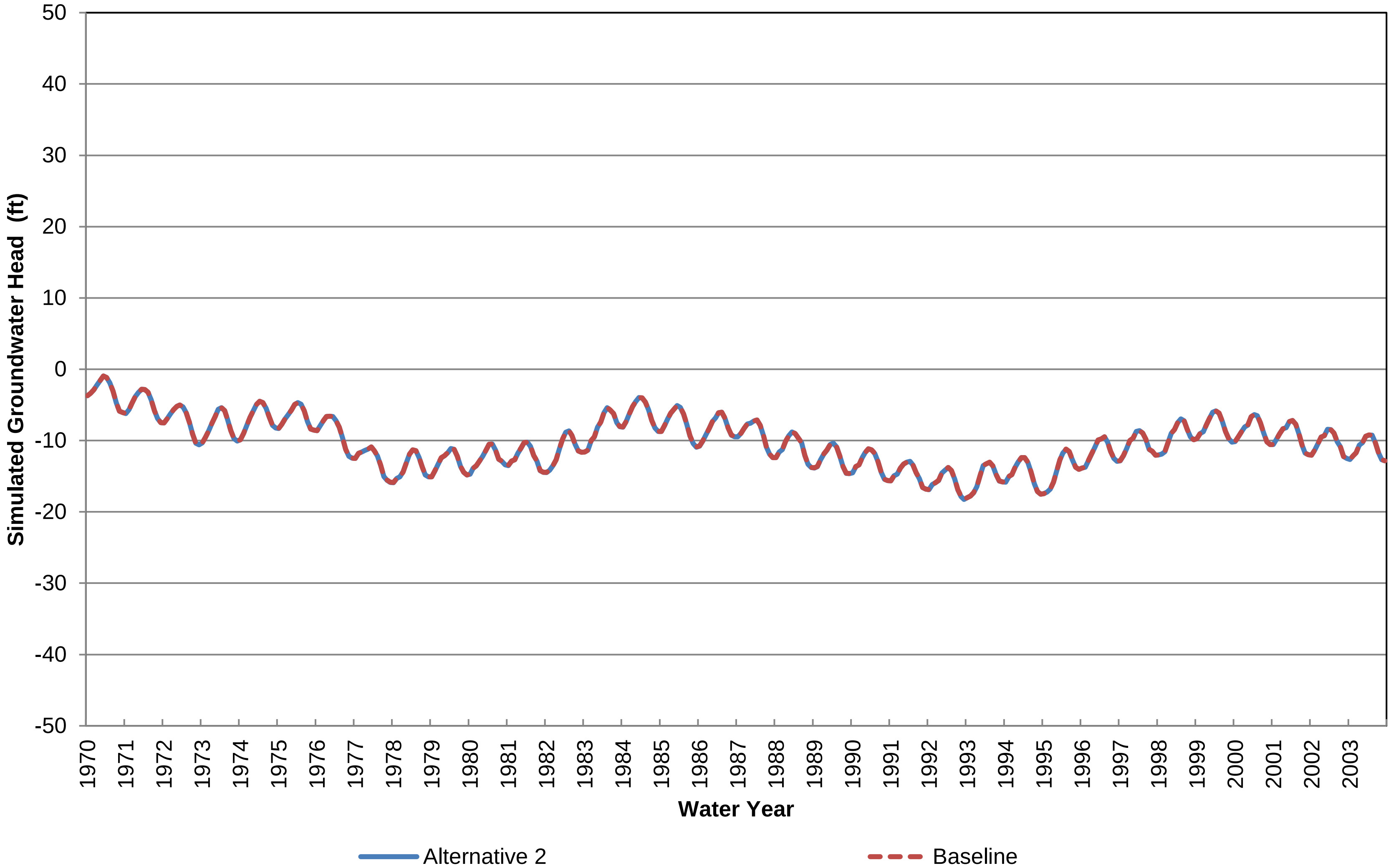
2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 34 (Approximately 540-780 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 34 (Approximately 780-1040 ft bgs)



2020 Tehama-Colusa Canal Authority Water Transfers
Simulated Groundwater Head at Location 34 (Approximately 1040-1430 ft bgs)



Appendix I

2015 Water Transfers Data Reports

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Anderson-Cottonwood Irrigation District

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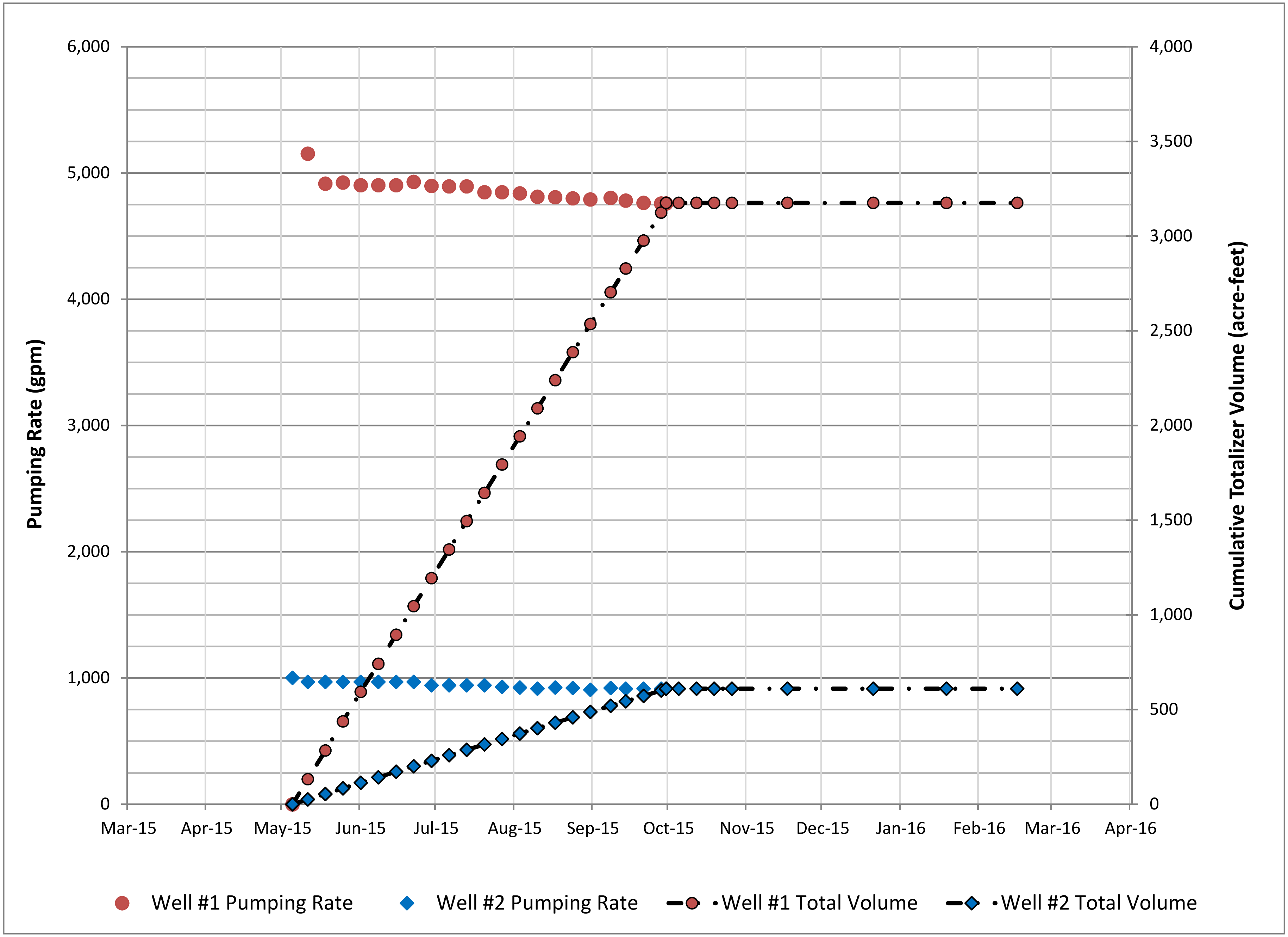
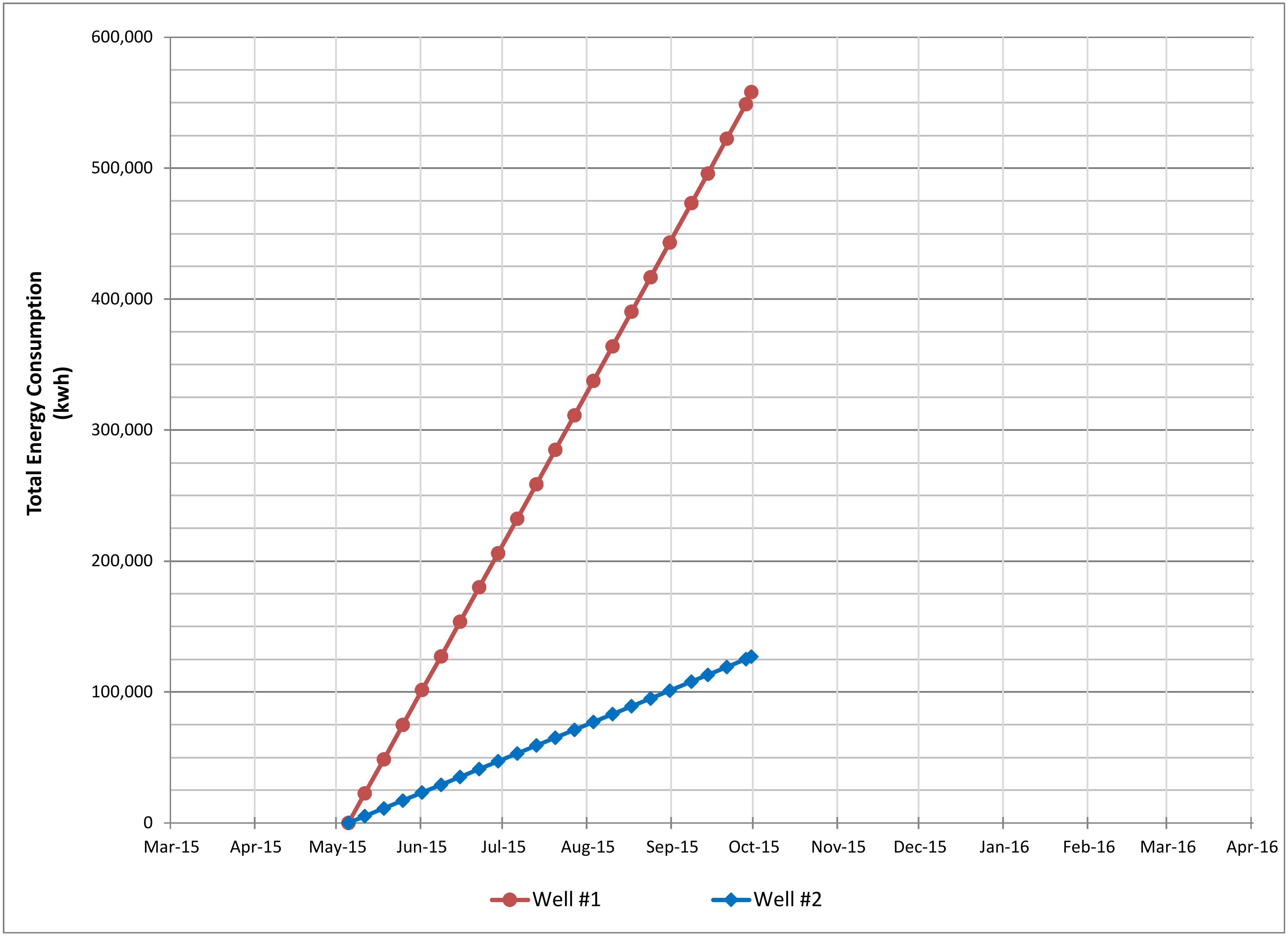
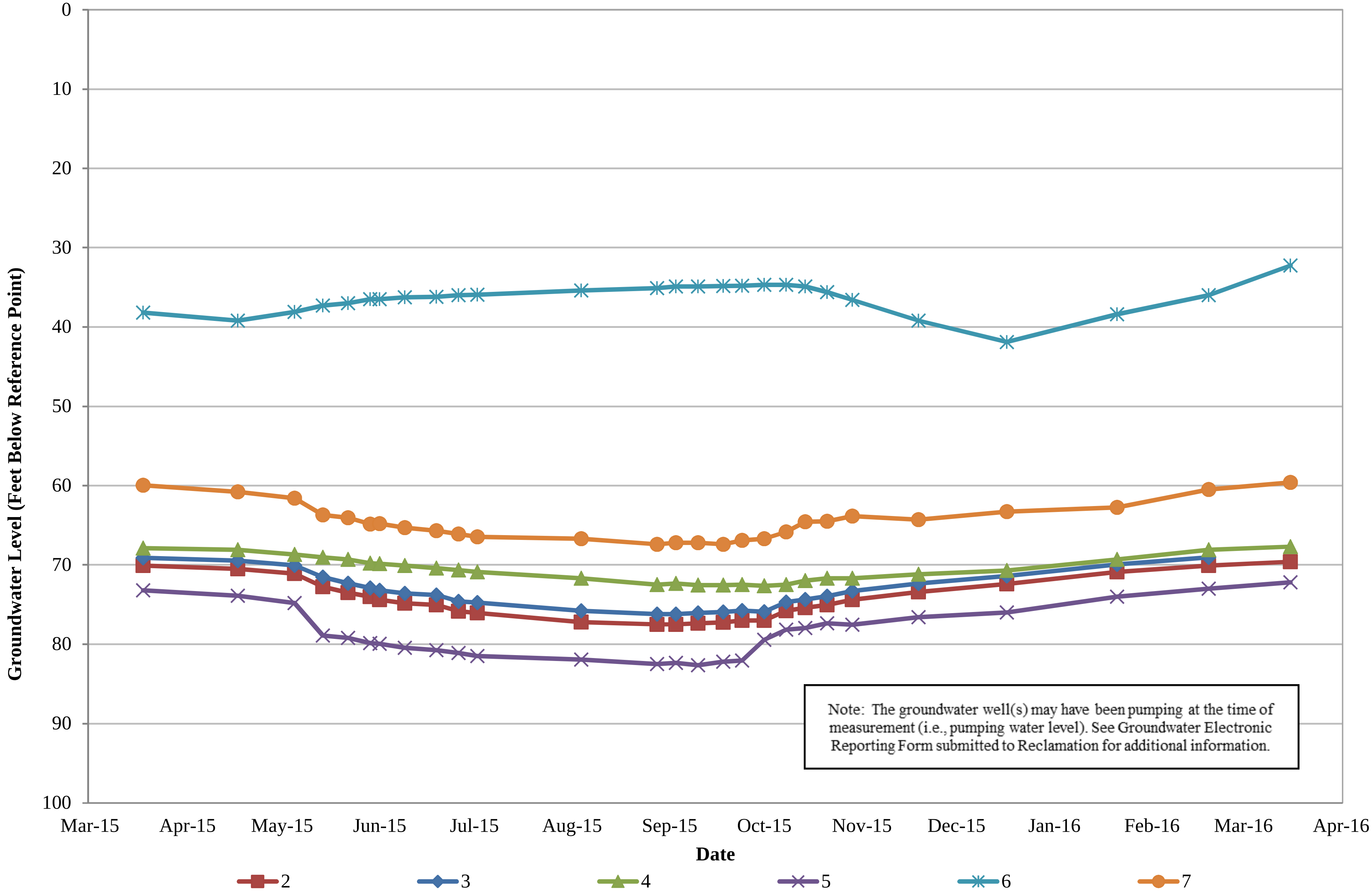


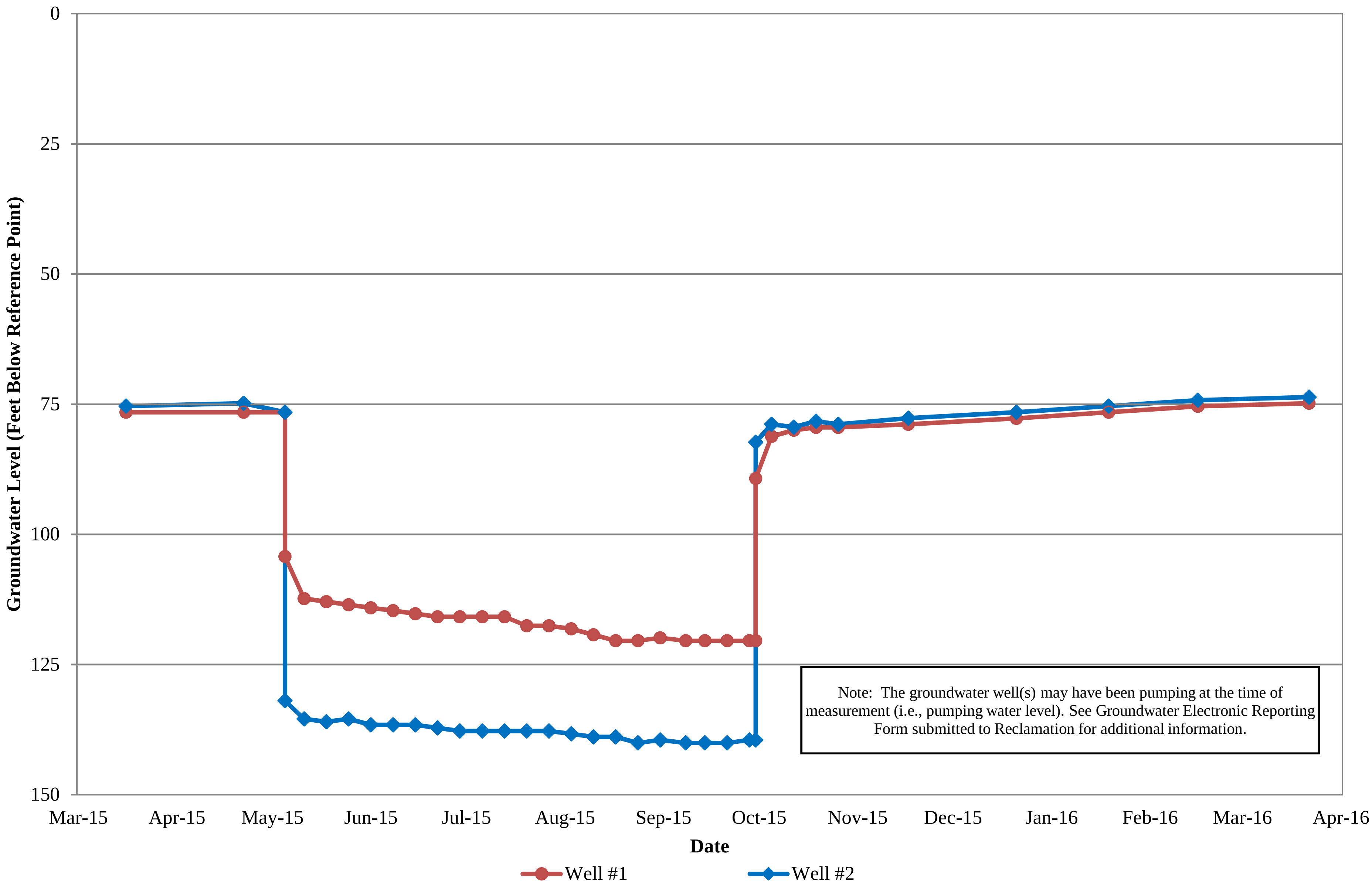
6,000
5,000
4,000
3,000
2,000
1,000
0
Pumping Rate (gpm)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Cumulative Totalizer Volume (acre-feet)
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Well #1 Pumping Rate
Well #2 Pumping Rate
Well #1 Total Volume
Well #2 Total Volume

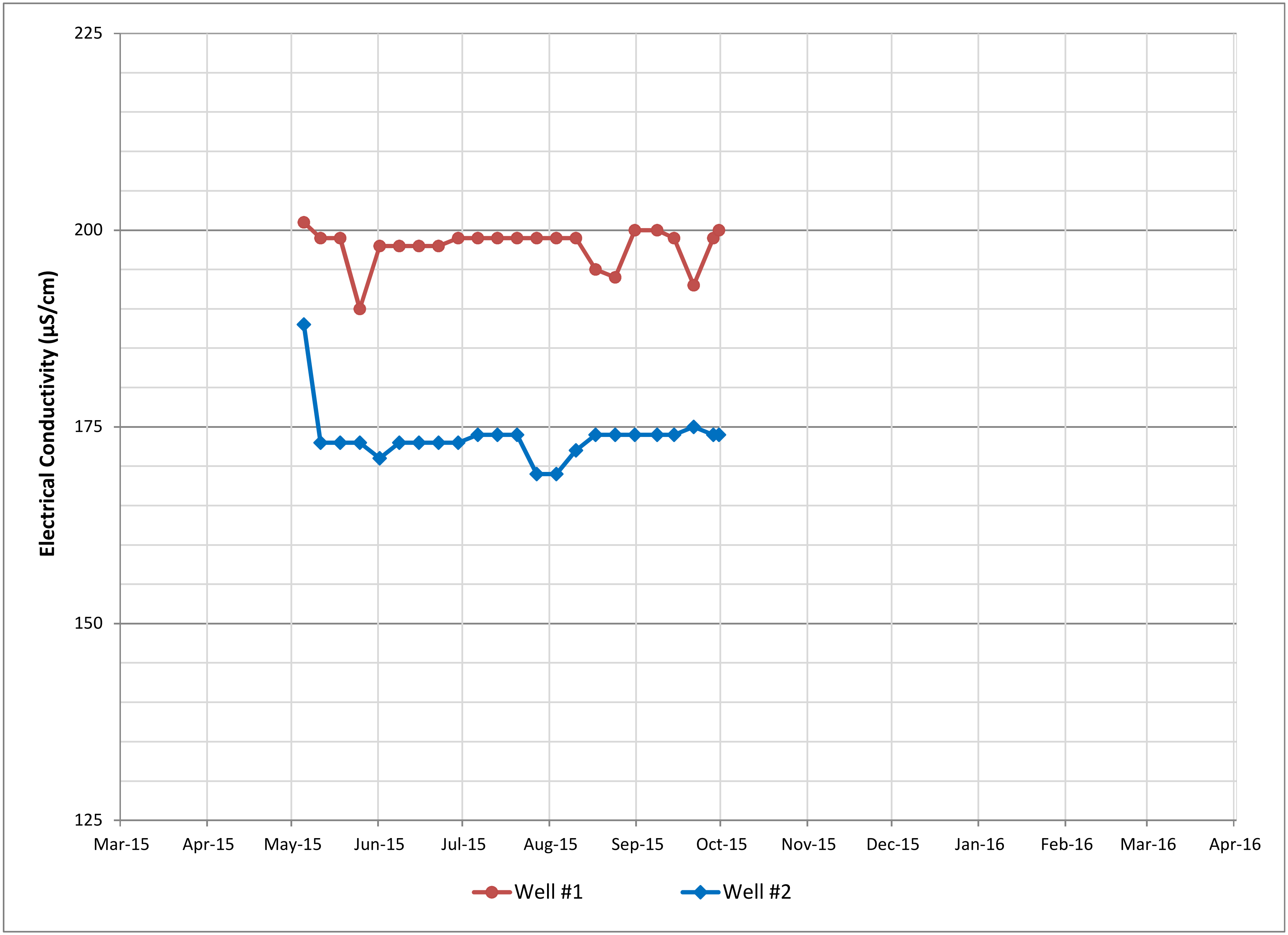

Total Energy Consumption
(kwh)
600,000
500,000
400,000
300,000
200,000
100,000
0
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Well #1
Well #2

Anderson-Cottonwood Irrigation District
Monitoring Well Groundwater Level Data



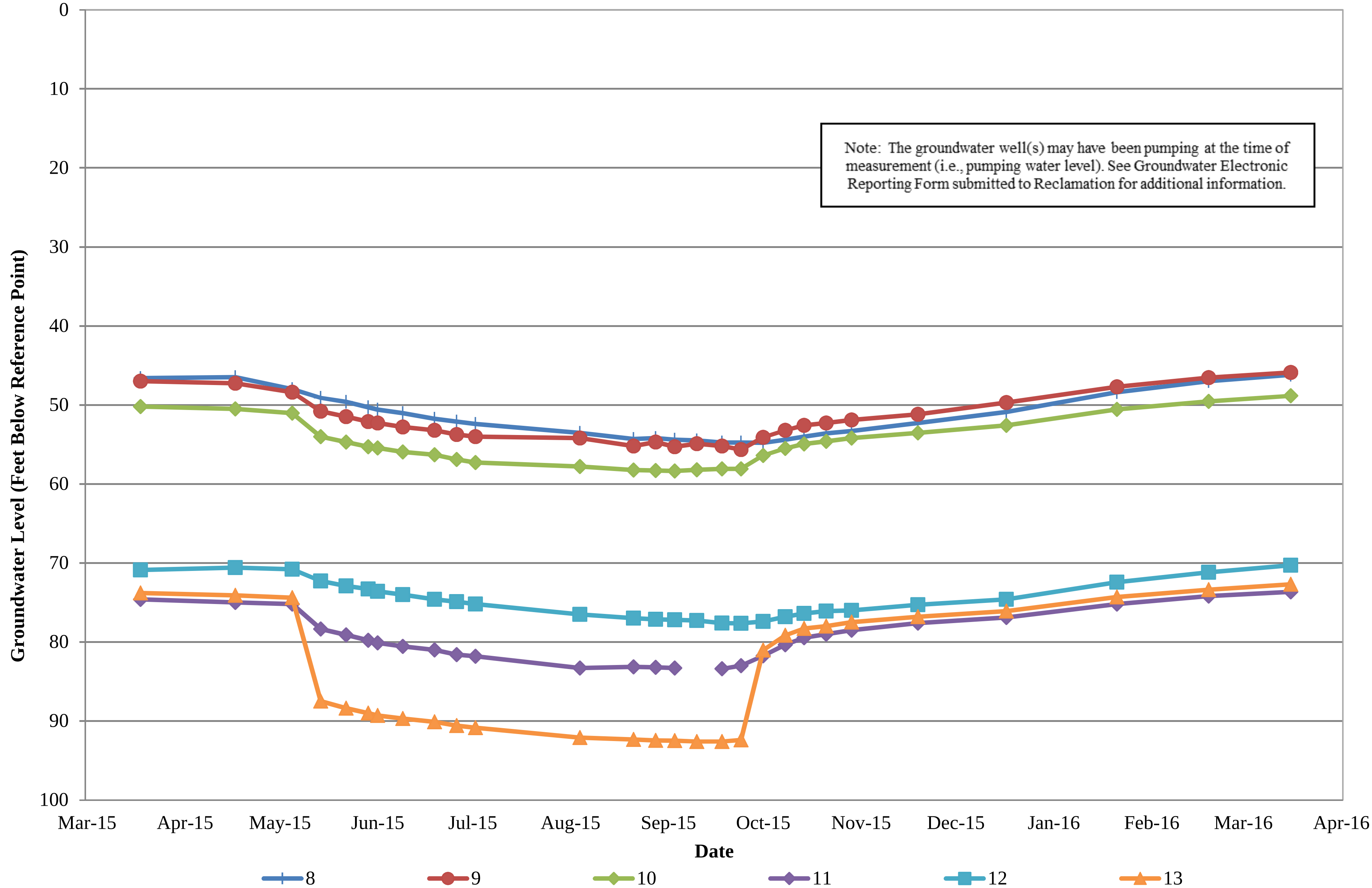
Anderson-Cottonwood Irrigation District
Production Well Groundwater Level Data

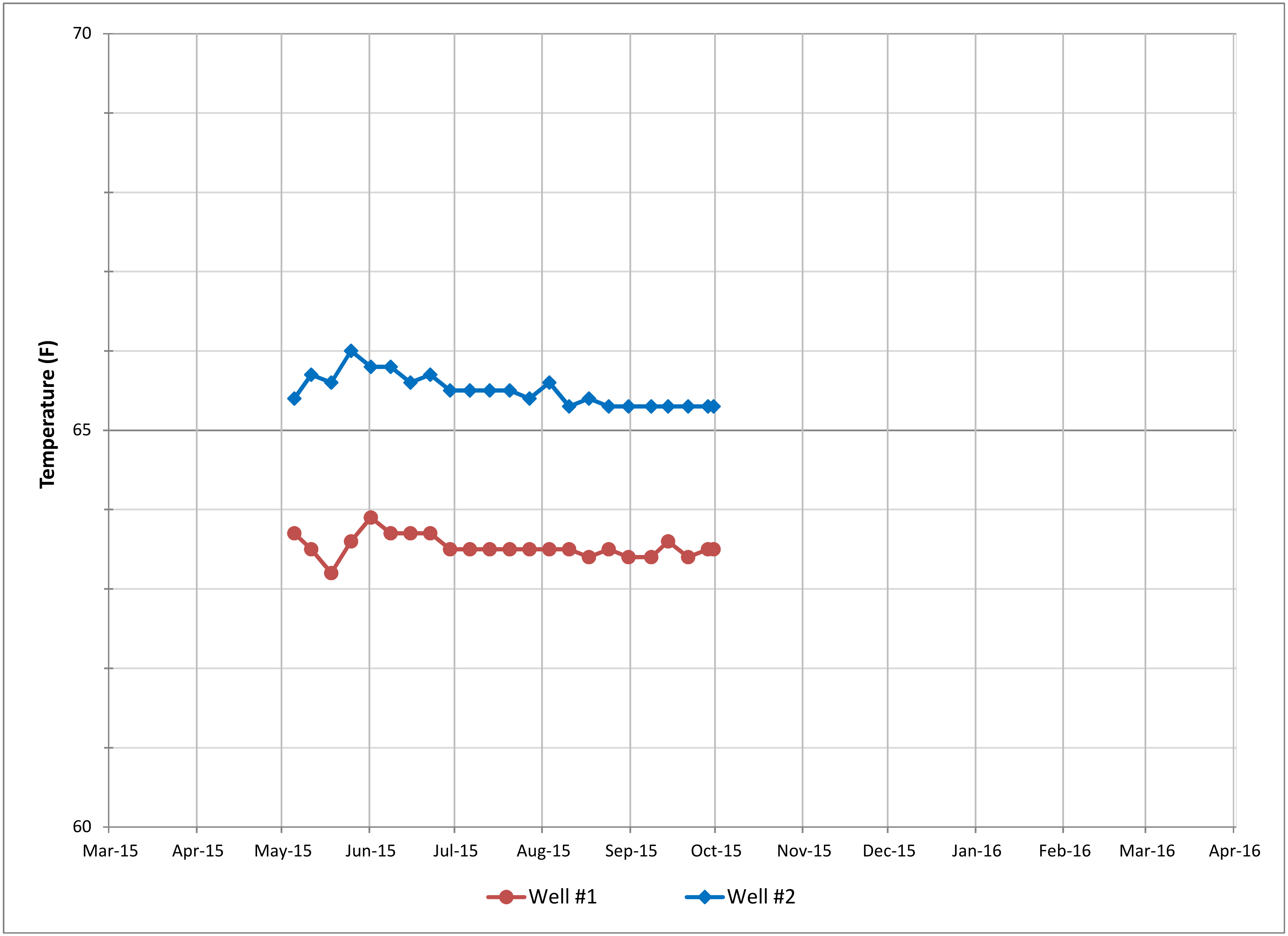




Electrical Conductivity (µS/cm)
225
200
175
150
125
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Well #1
Well #2

Anderson-Cottonwood Irrigation District
Monitoring Well Groundwater Level Data





70
65
60
Temperature (F)
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Well #1
Well #2

Canal Farms

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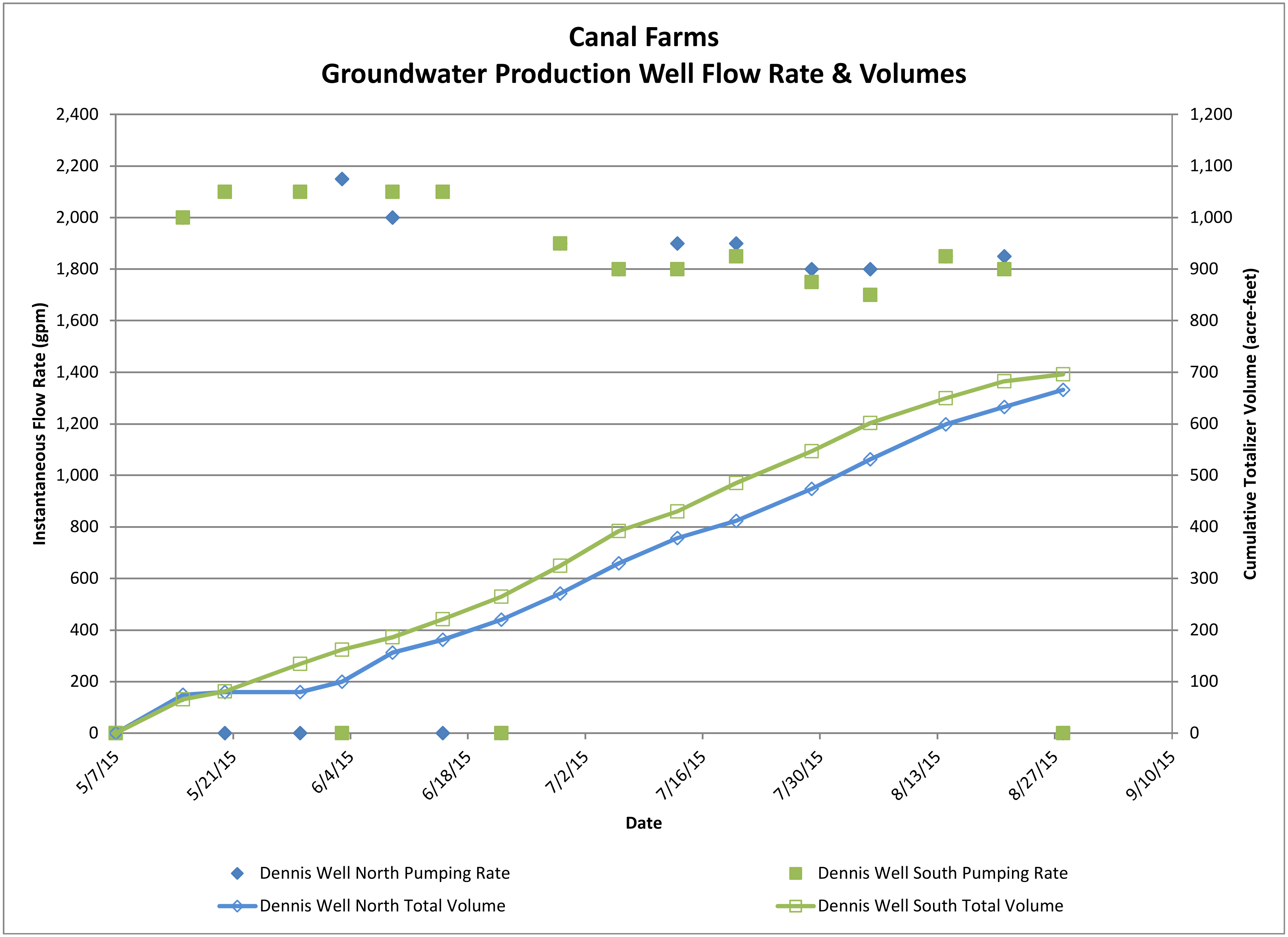
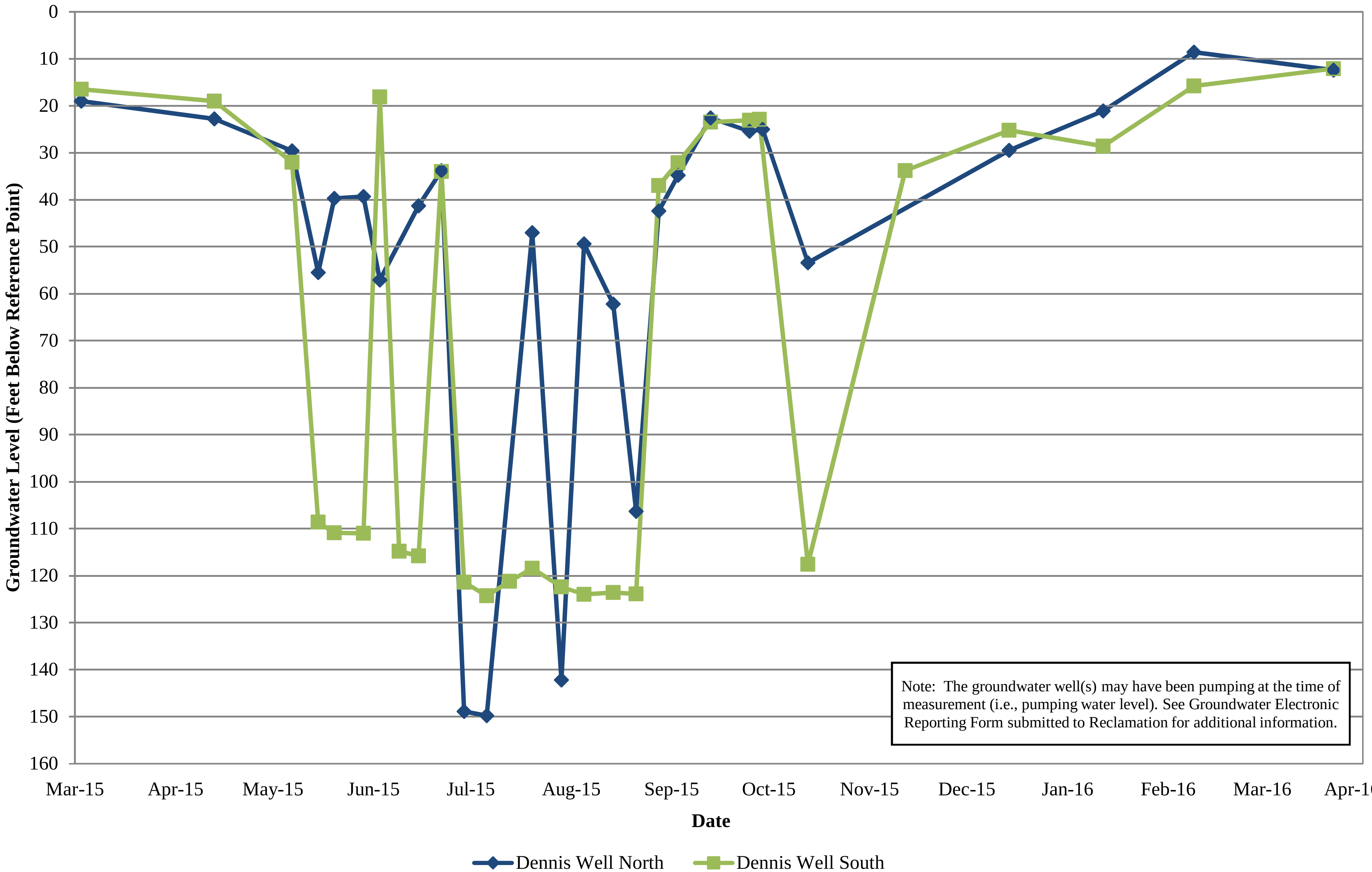
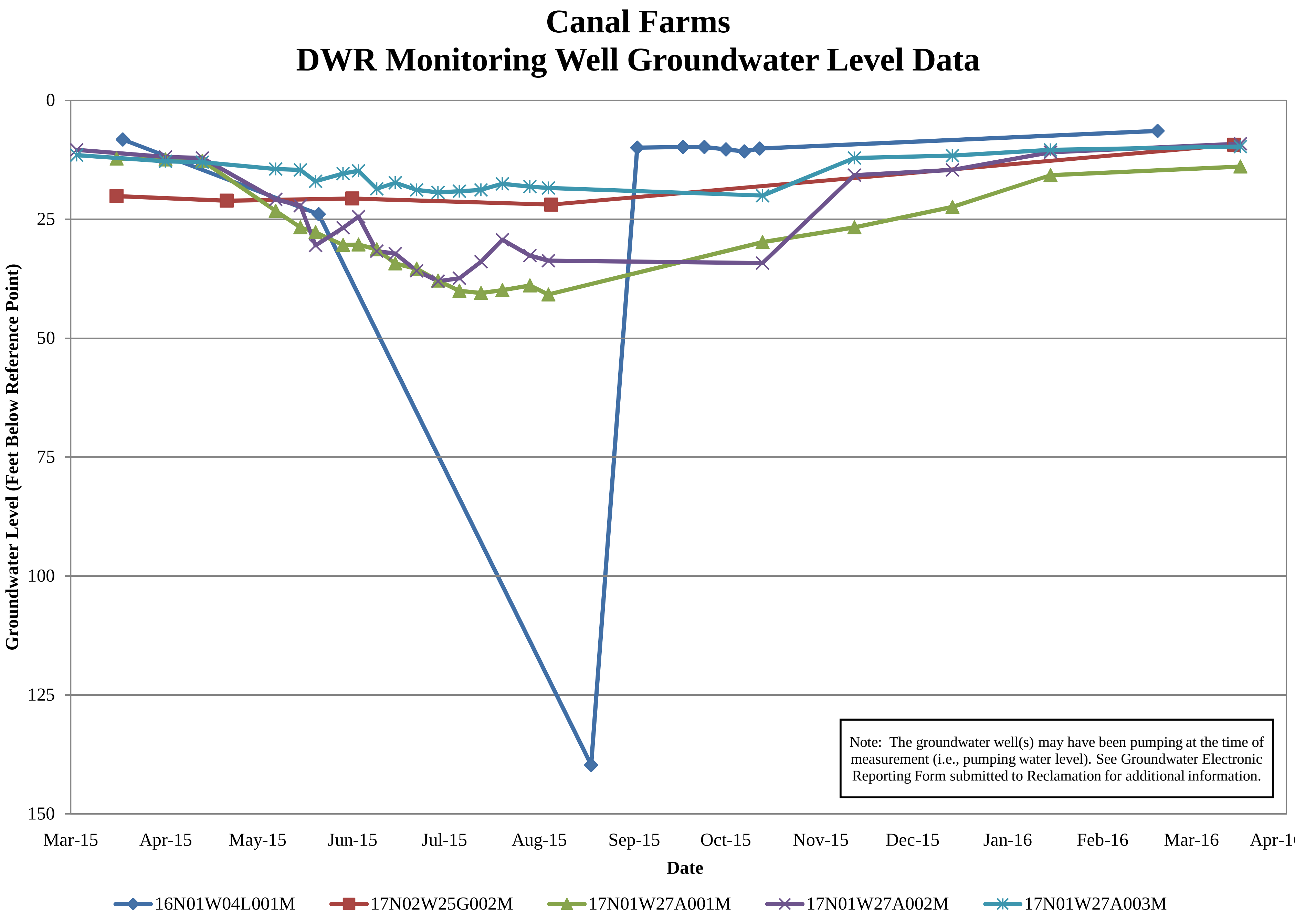


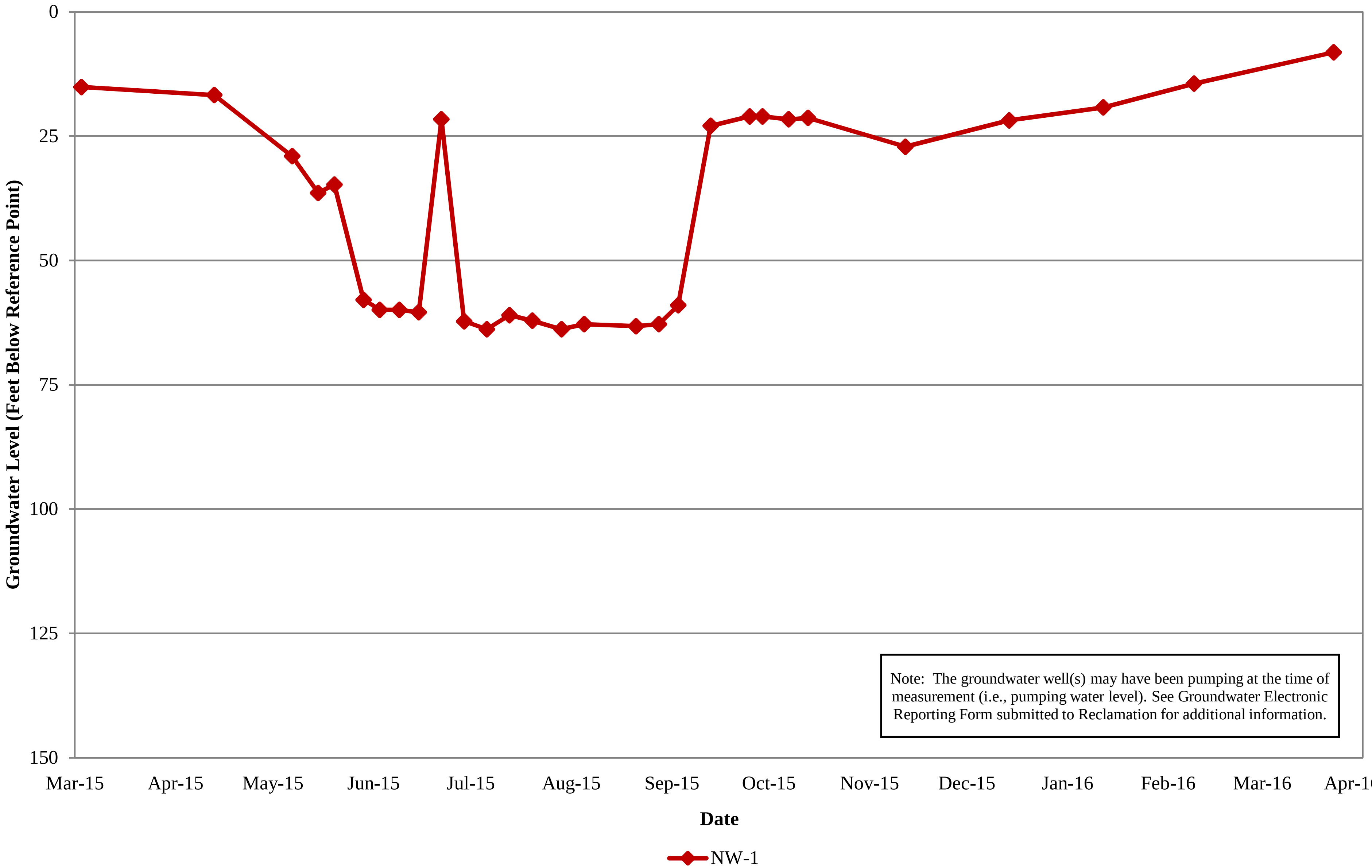
Canal Farms
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/7/15
5/21/15
6/4/15
6/18/15
7/2/15
7/16/15
7/30/15
8/13/15
8/27/15
9/10/15
Date
Dennis Well North Pumping Rate
Dennis Well South Pumping Rate
Dennis Well North Total Volume
Dennis Well South Total Volume

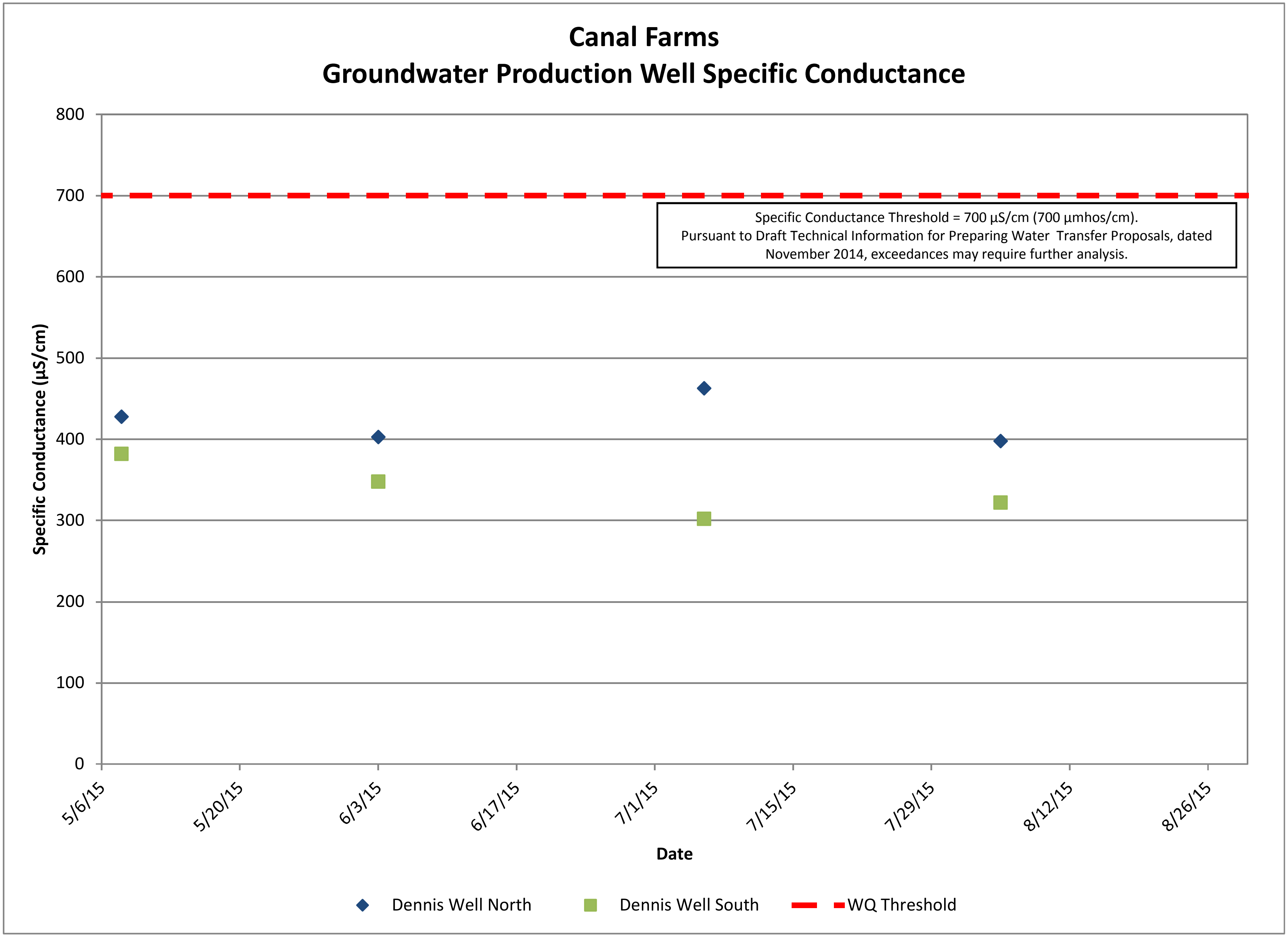
Canal Farms
Production Well Groundwater Level Data




Canal Farms
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet Below Reference Point)
0
25
50
75
100
125
150
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
16N01W04L001M
17N02W25G002M
17N01W27A001M
17N01W27A002M
17N01W27A003M

Canal Farms
Monitoring Well Groundwater Level Data




Canal Farms
Groundwater Production Well Specific Conductance
Specific Conductance (µS/cm)
800
700
600
500
400
300
200
100
0
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for Preparing Water Transfer Proposals, dated November 2014, exceedances may require further analysis.
5/6/15
5/20/15
6/3/15
6/17/15
7/1/15
7/15/15
7/29/15
8/12/15
8/26/15
Date
Dennis Well North
Dennis Well South
WQ Threshold

Conaway Preservation Group

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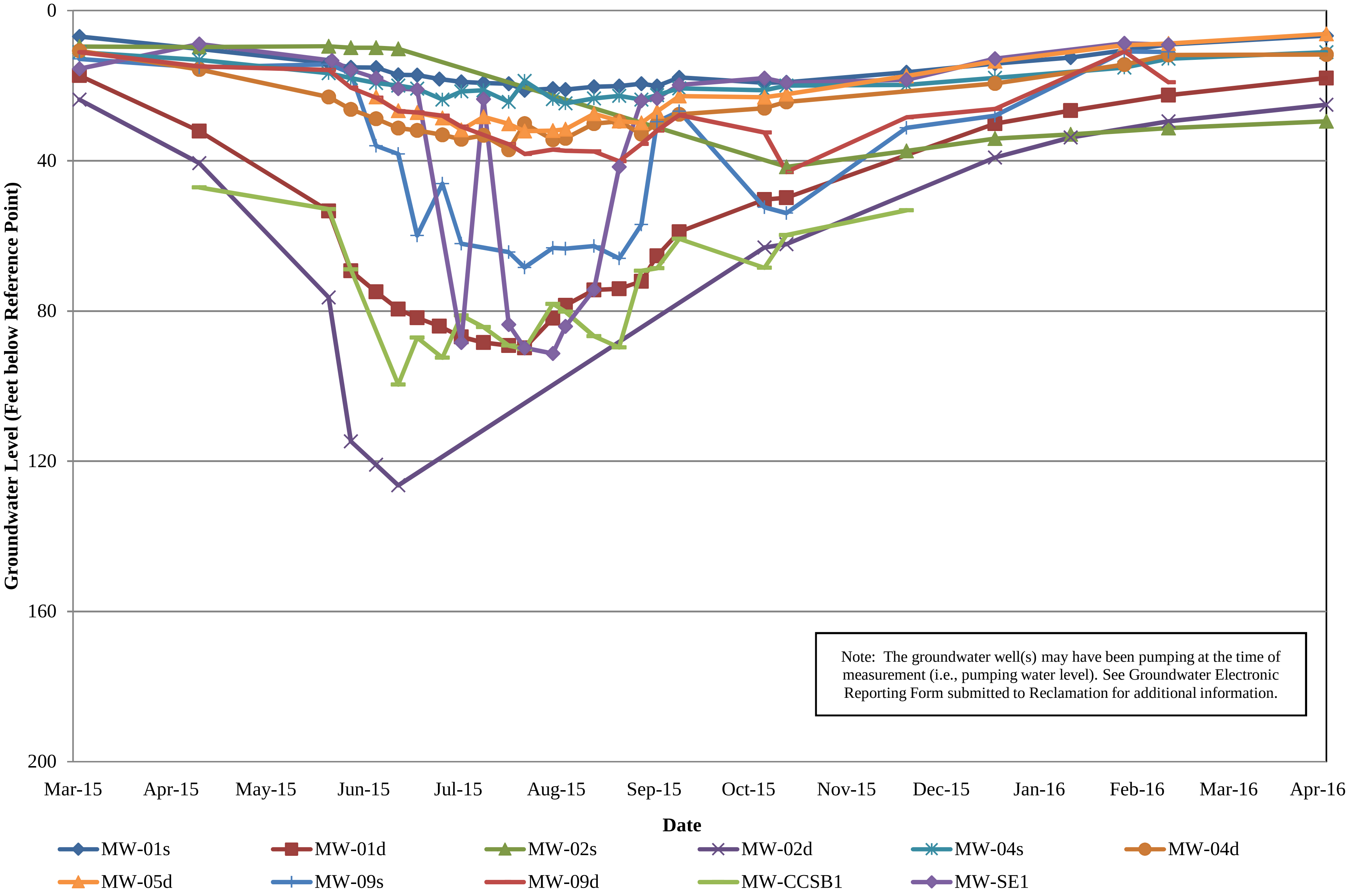
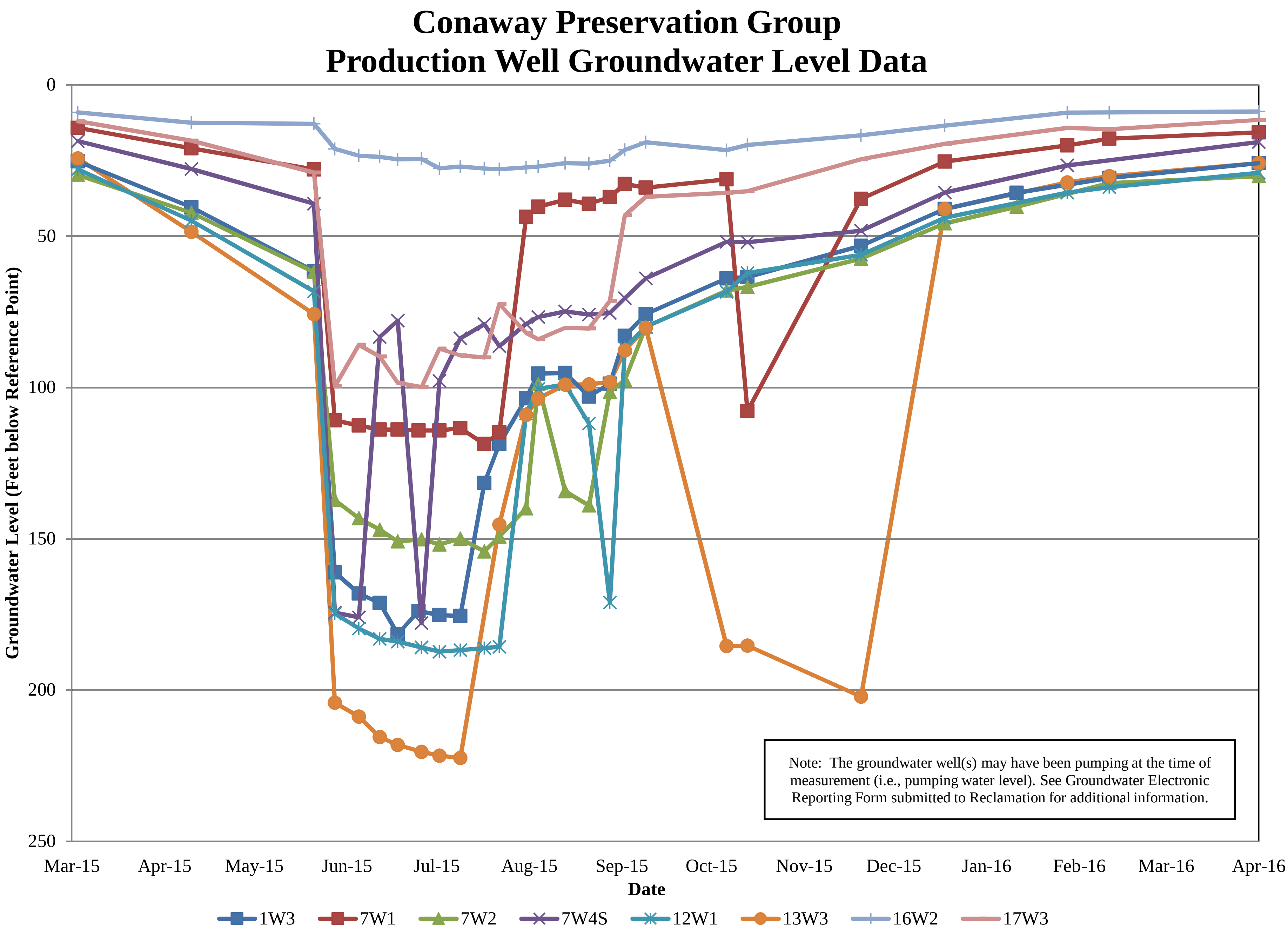
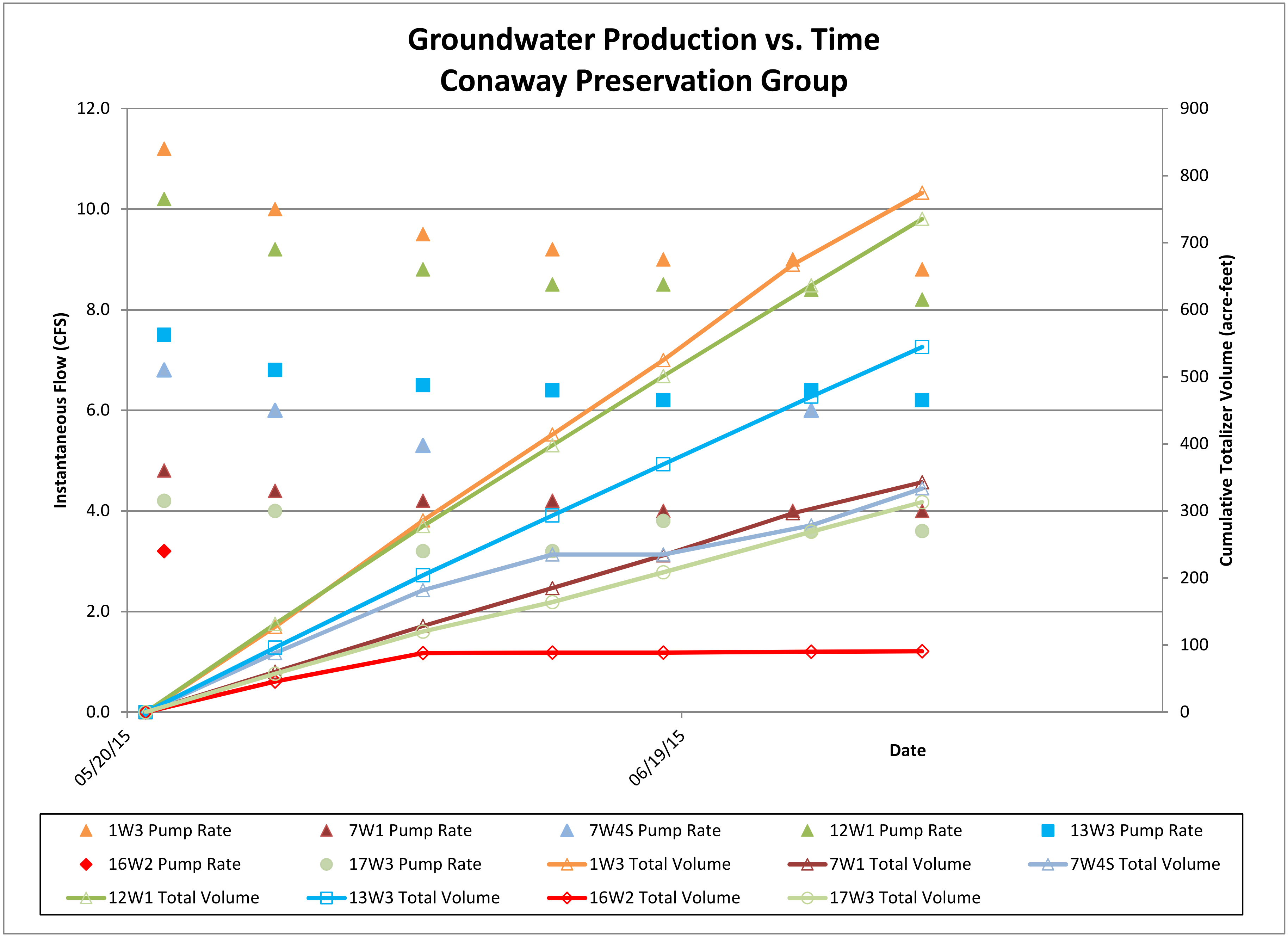
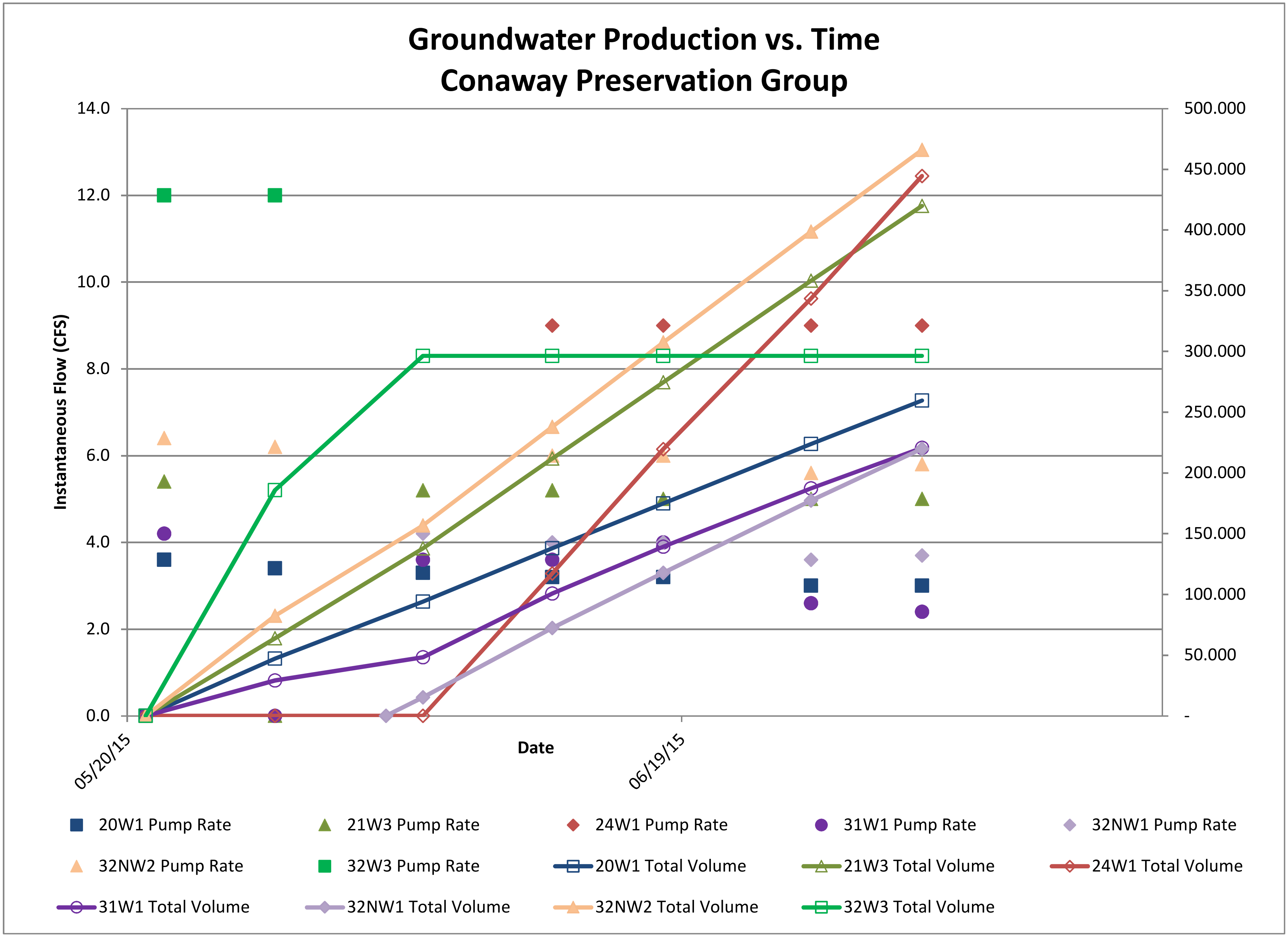
Conaway Preservation Group
Monitoring Well Groundwater Level Data

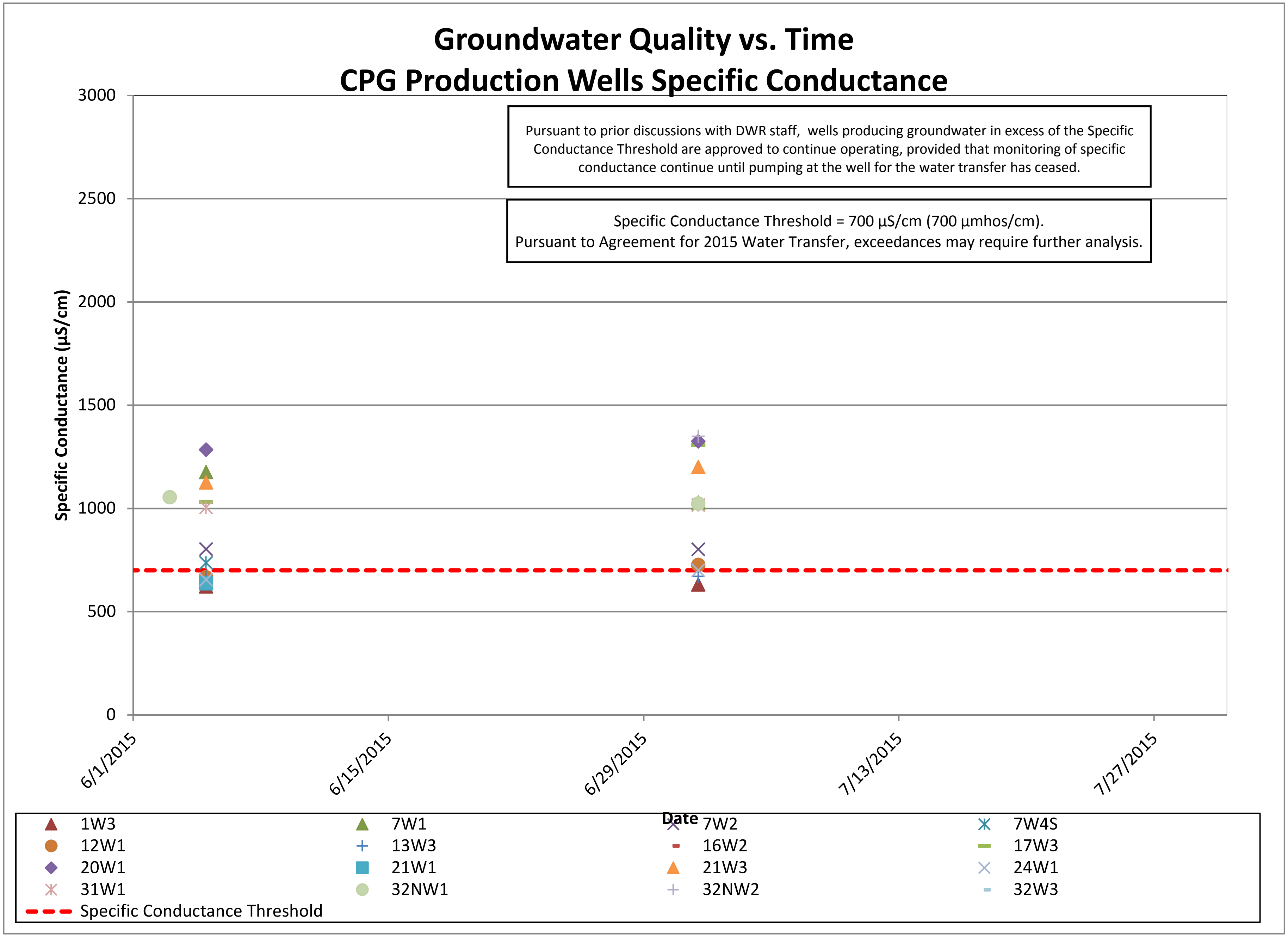


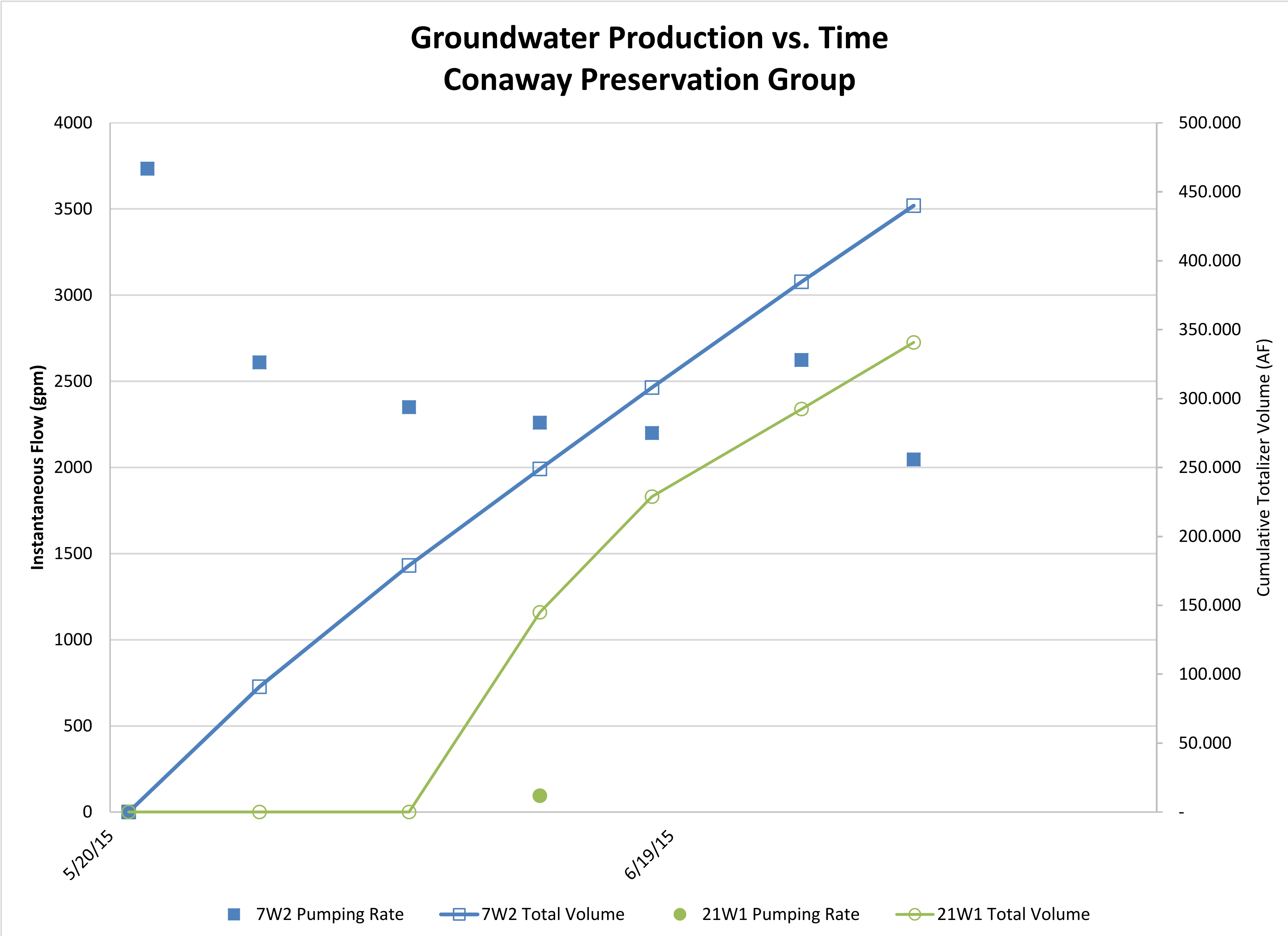

Conaway Preservation Group
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
1W3
7W1
7W2
7W4S
12W1
13W3
16W2
17W3
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.

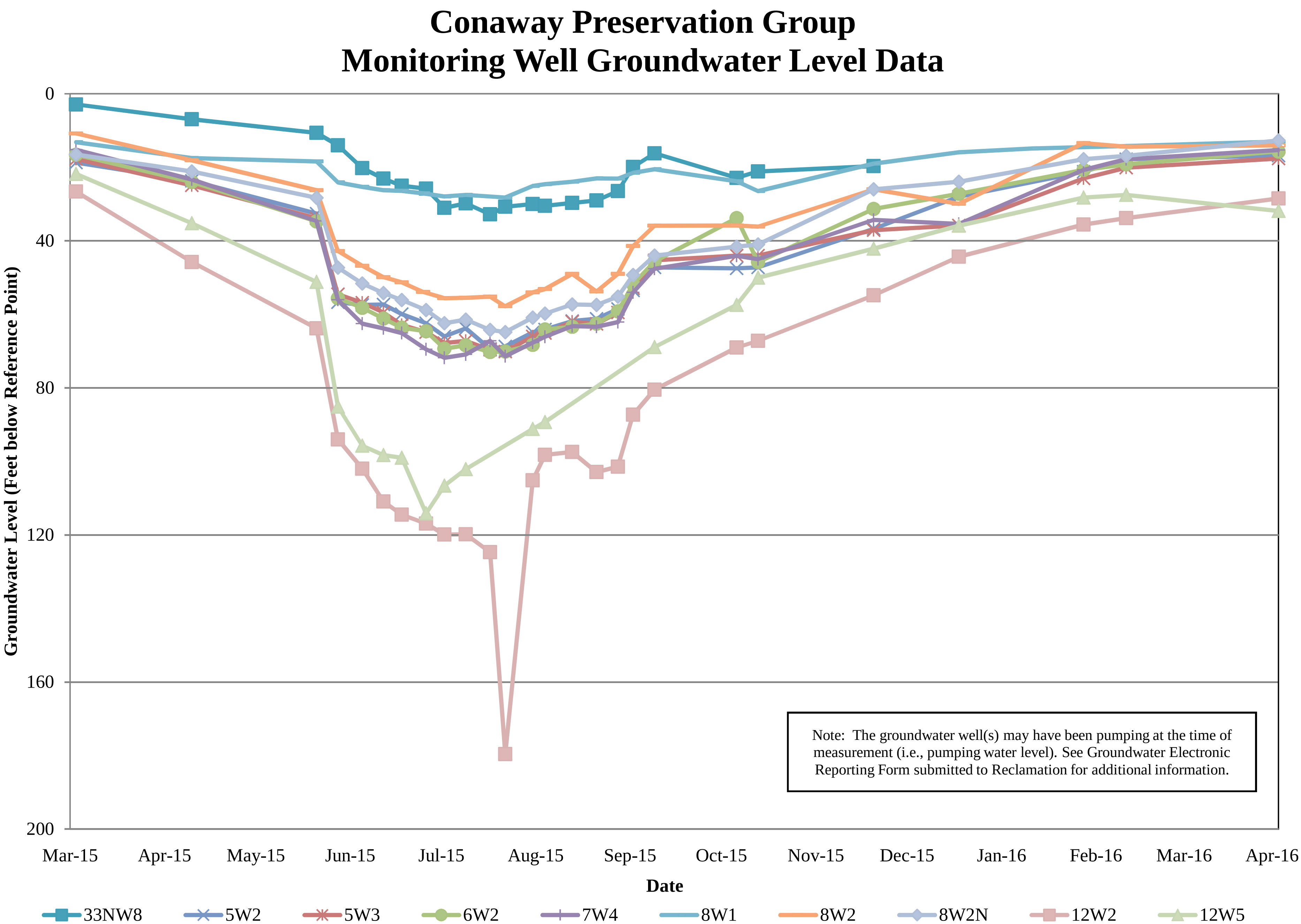


Groundwater Production vs. Time
Conaway Preservation Group
Instantaneous Flow (CFS)
Cumulative Totalizer Volume (acre-feet)
Date
0.0
2.0
4.0
6.0
8.0
10.0
12.0
0
100
200
300
400
500
600
700
800
900
05/20/15
06/19/15
1W3 Pump Rate
7W1 Pump Rate
7W4S Pump Rate
12W1 Pump Rate
13W3 Pump Rate
16W2 Pump Rate
17W3 Pump Rate
1W3 Total Volume
7W1 Total Volume
7W4S Total Volume
12W1 Total Volume
13W3 Total Volume
16W2 Total Volume
17W3 Total Volume


Groundwater Production vs. Time
Conaway Preservation Group
Instantaneous Flow (CFS)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
500.000
450.000
400.000
350.000
300.000
250.000
200.000
150.000
100.000
50.000
-
05/20/15
06/19/15
Date
20W1 Pump Rate
21W3 Pump Rate
24W1 Pump Rate
31W1 Pump Rate
32NW1 Pump Rate
32NW2 Pump Rate
32W3 Pump Rate
20W1 Total Volume
21W3 Total Volume
24W1 Total Volume
31W1 Total Volume
32NW1 Total Volume
32NW2 Total Volume
32W3 Total Volume

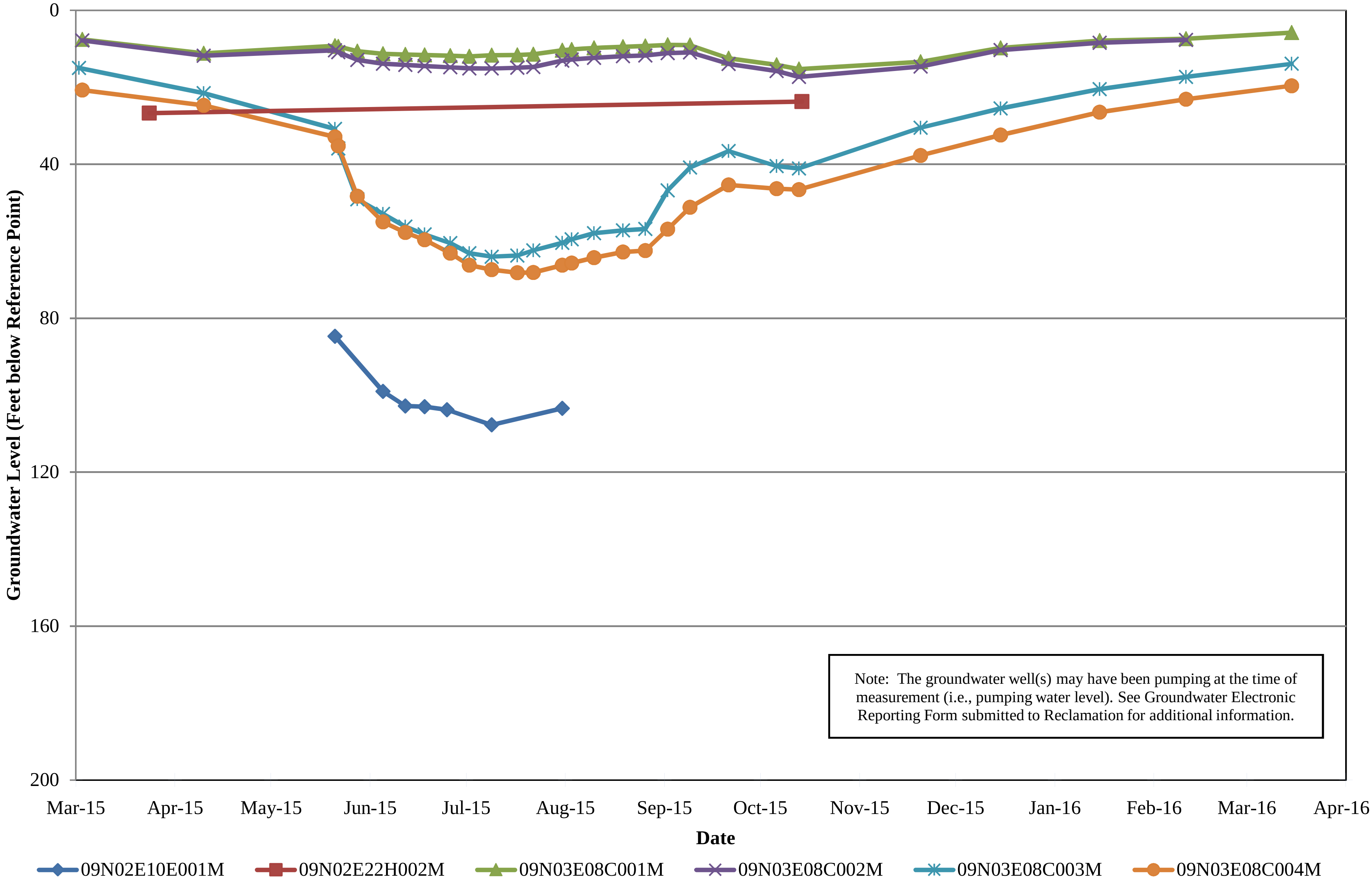

Groundwater Quality vs. Time
CPG Production Wells Specific Conductance
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Agreement for 2015 Water Transfer, exceedances may require further analysis.
Specific Conductance (µS/cm)
3000
2500
2000
1500
1000
500
0
6/1/2015
6/15/2015
6/29/2015
7/13/2015
7/27/2015
Date
1W3
7W1
7W2
7W4S
12W1
13W3
16W2
17W3
20W1
21W1
21W3
24W1
31W1
32NW1
32NW2
32W3
Specific Conductance Threshold

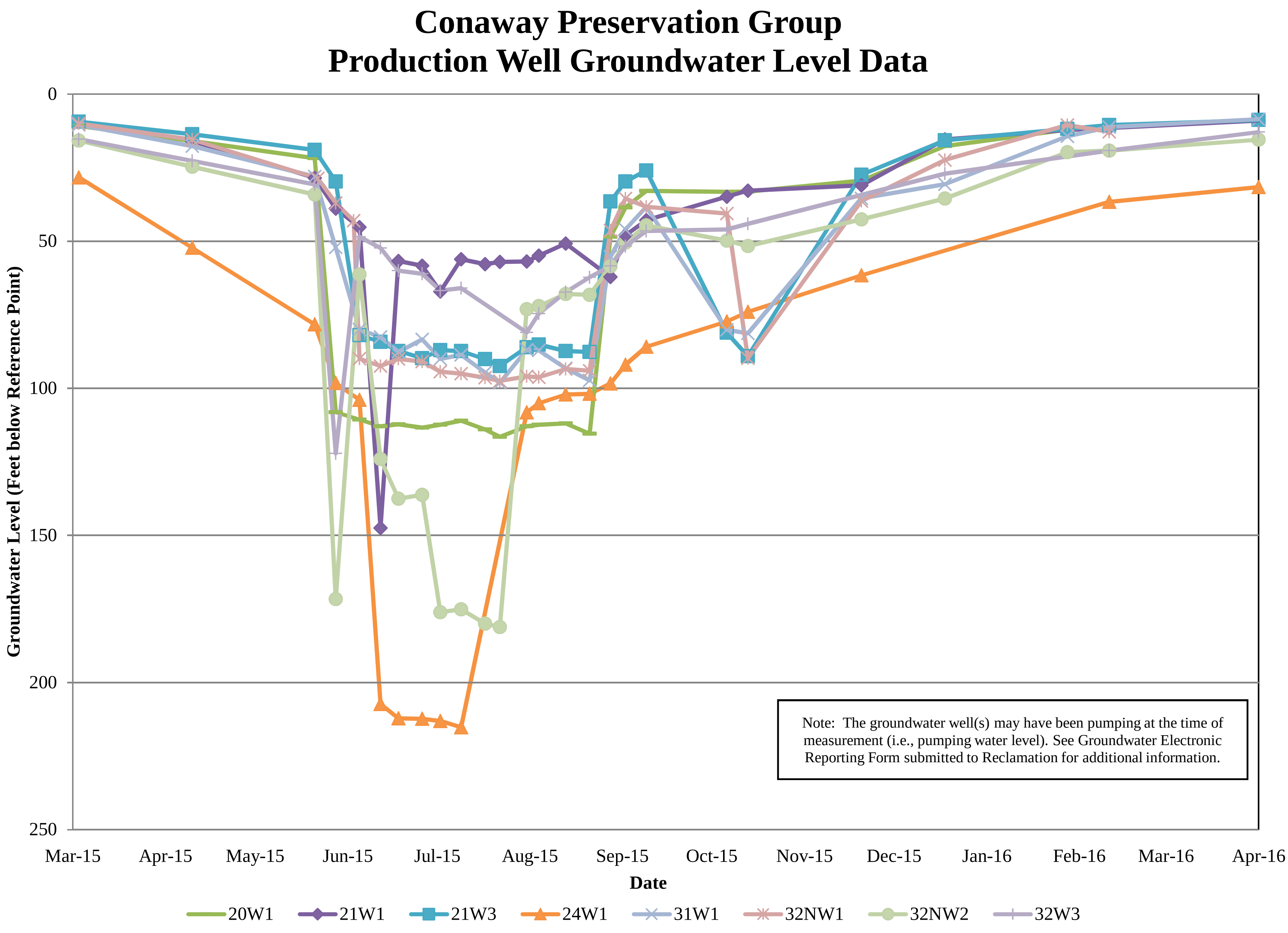

Groundwater Production vs. Time
Conaway Preservation Group
Instantaneous Flow (gpm)
Cumulative Totalizer Volume (AF)
4000
3500
3000
2500
2000
1500
1000
500
0
500.000
450.000
400.000
350.000
300.000
250.000
200.000
150.000
100.000
50.000
-
5/20/15
6/19/15
7W2 Pumping Rate
7W2 Total Volume
21W1 Pumping Rate
21W1 Total Volume



Conaway Preservation Group
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
40
80
120
160
200
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
33NW8
5W2
5W3
6W2
7W4
8W1
8W2
8W2N
12W2
12W5
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.

Conaway Preservation Group
DWR and YCFFWCD Monitoring Well Groundwater Level Data




Conaway Preservation Group
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
20W1
21W1
21W3
24W1
31W1
32NW1
32NW2
32W3

Eastside Mutual Water Company

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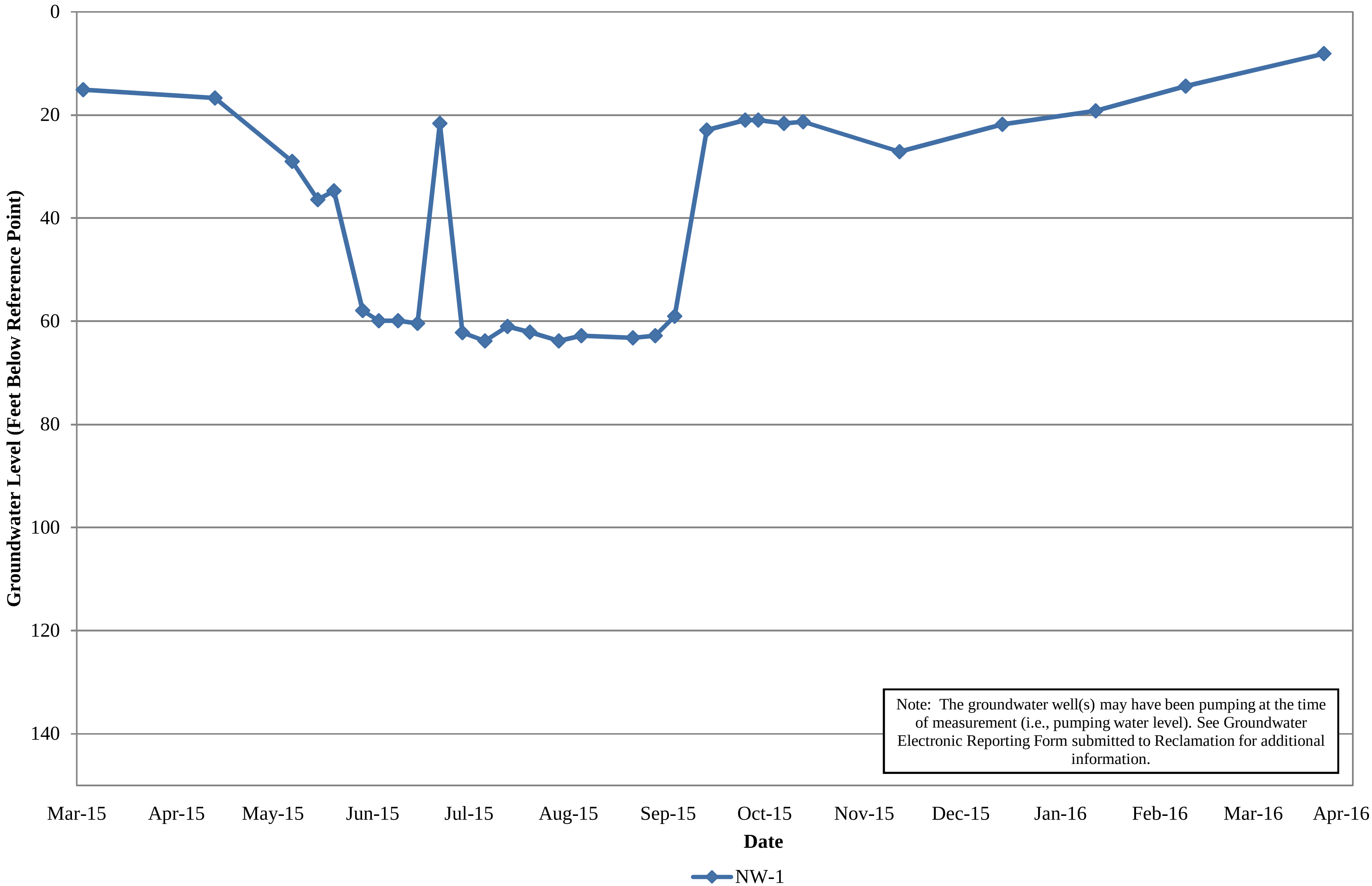
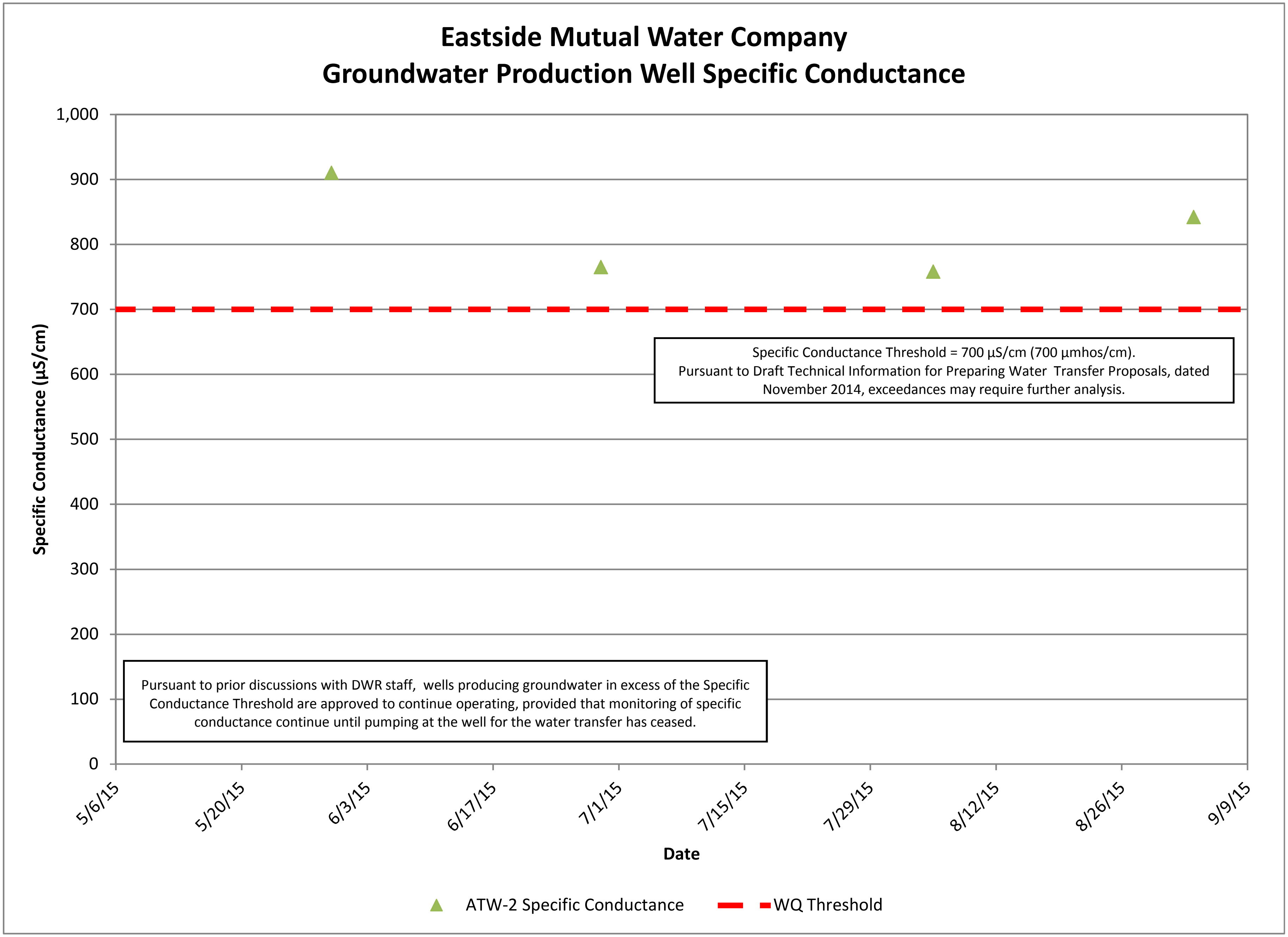
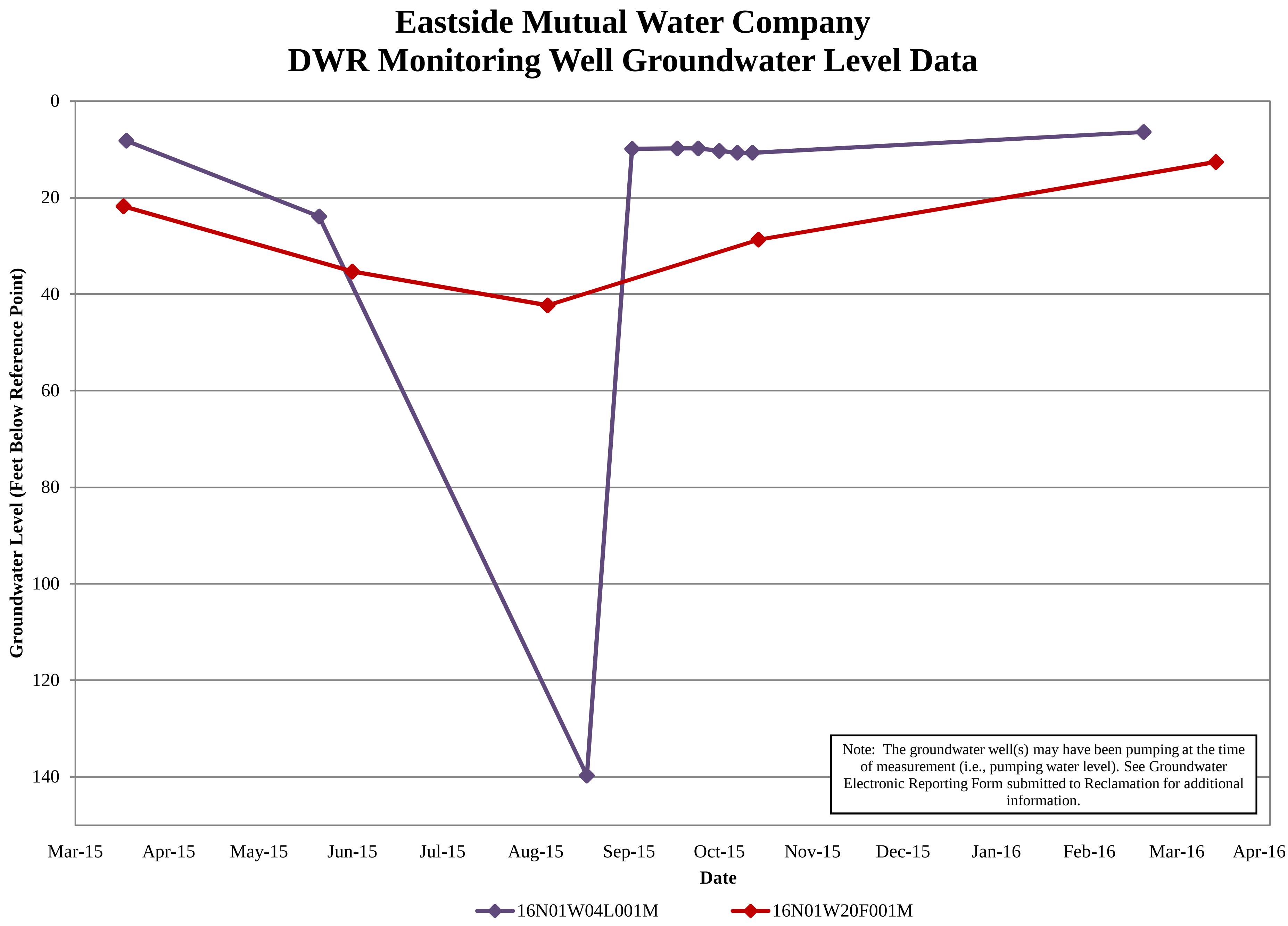
Eastside Mutual Water Company
Monitoring Well Groundwater Level Data



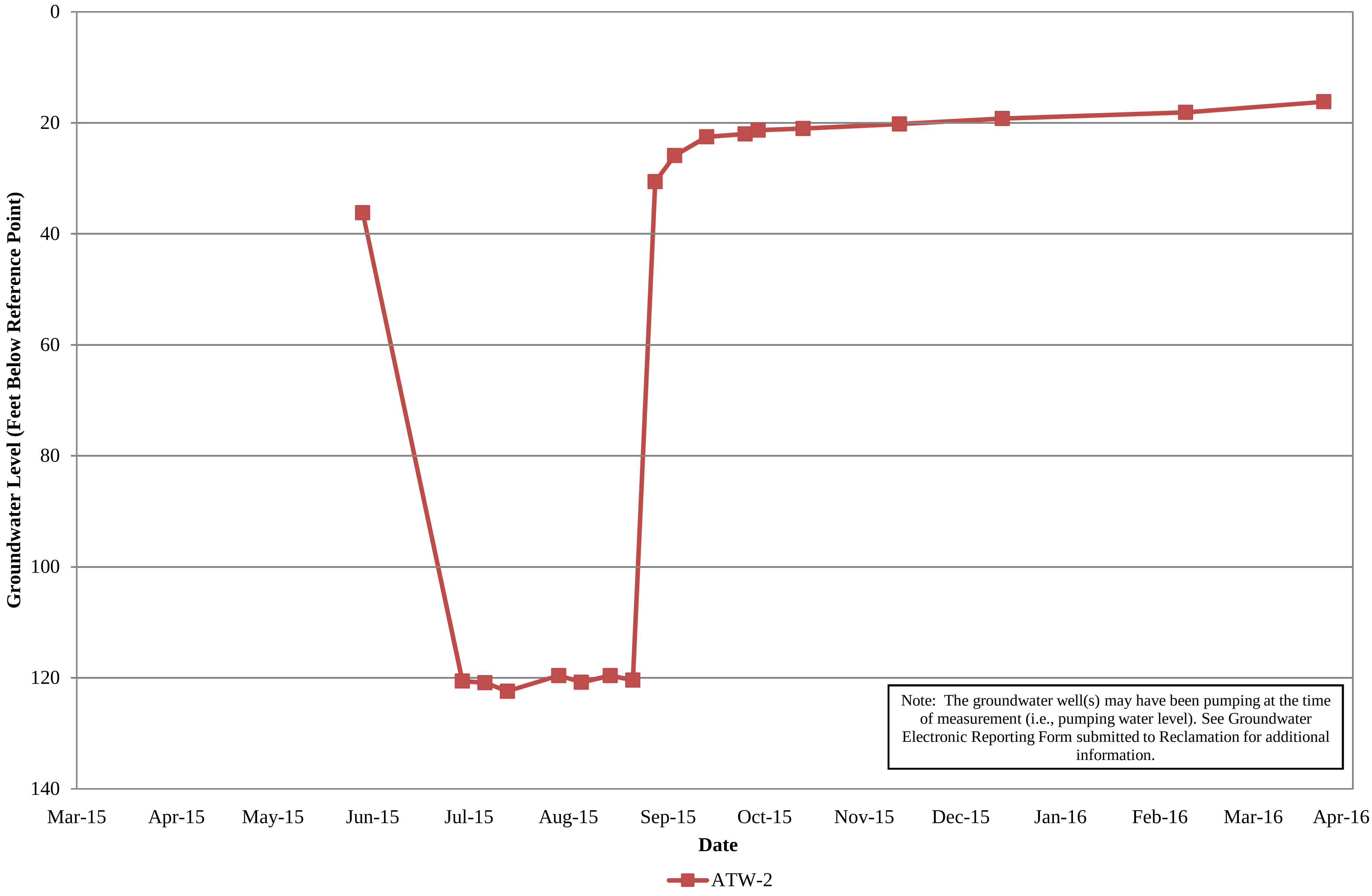


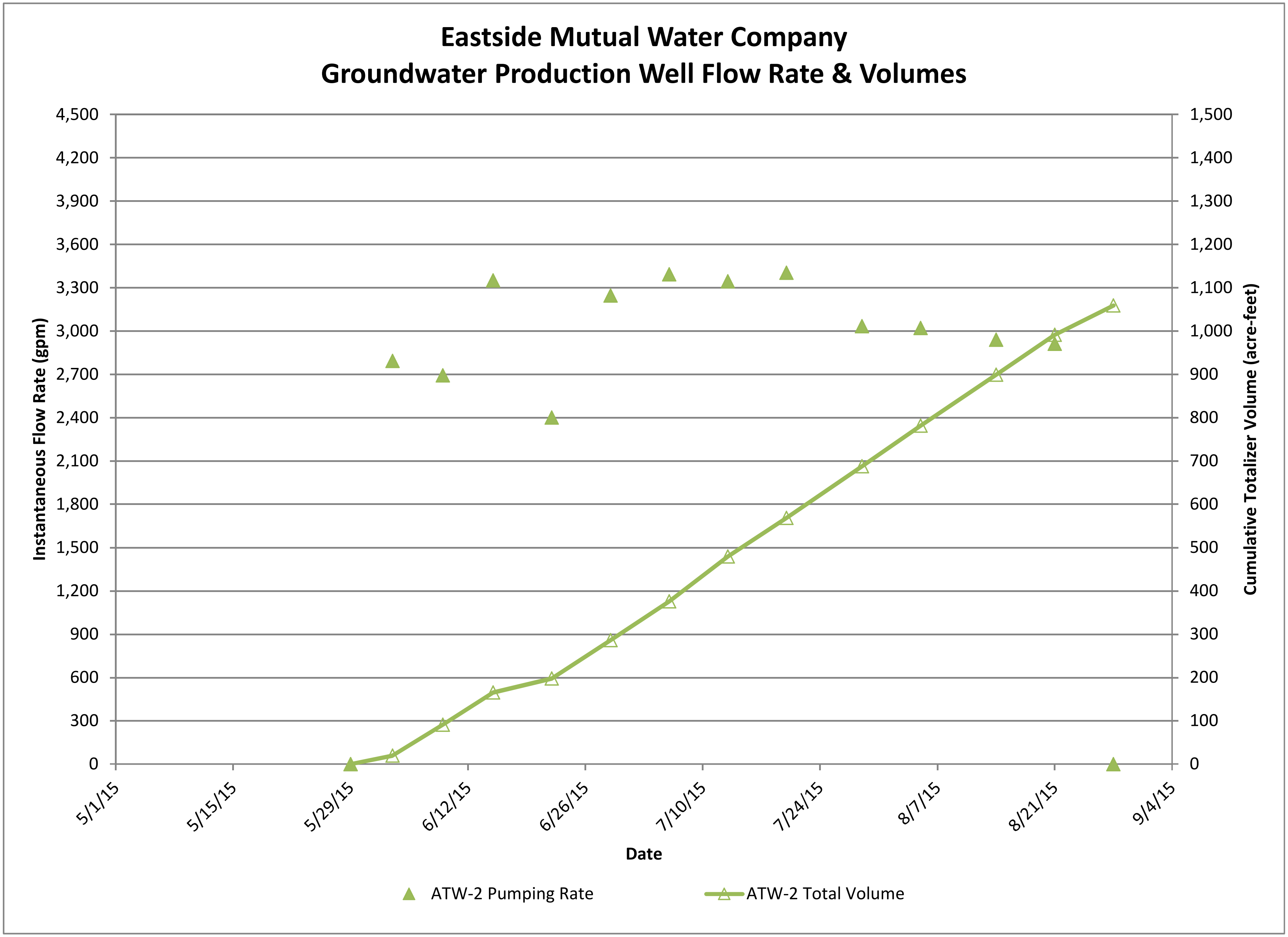
Eastside Mutual Water Company
Groundwater Production Well Specific Conductance
1,000
900
800
700
600
500
400
300
200
100
0
Specific Conductance (µS/cm)
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for Preparing Water Transfer Proposals, dated November 2014, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
5/6/15
5/20/15
6/3/15
6/17/15
7/1/15
7/15/15
7/29/15
8/12/15
8/26/15
9/9/15
Date
ATW-2 Specific Conductance
WQ Threshold



Eastside Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet Below Reference Point)
0
20
40
60
80
100
120
140
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
16N01W04L001M
16N01W20F001M
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.

Eastside Mutual Water Company
Production Well Groundwater Collection Data





Eastside Mutual Water Company
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
4,500
4,200
3,900
3,600
3,300
3,000
2,700
2,400
2,100
1,800
1,500
1,200
900
600
300
0
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
8/21/15
9/4/15
Date
ATW-2 Pumping Rate
ATW-2 Total Volume

Glenn-Colusa Irrigation District

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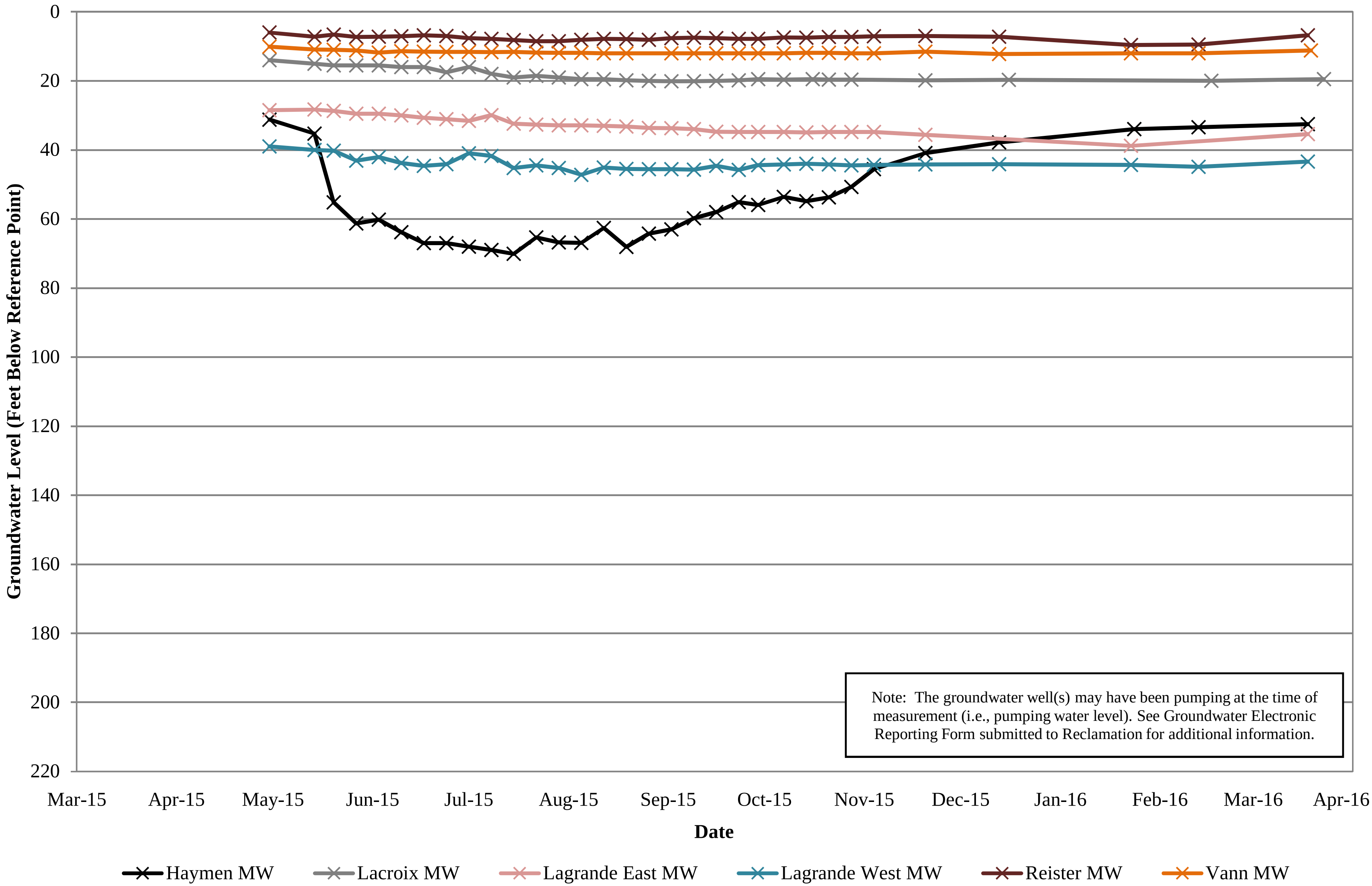
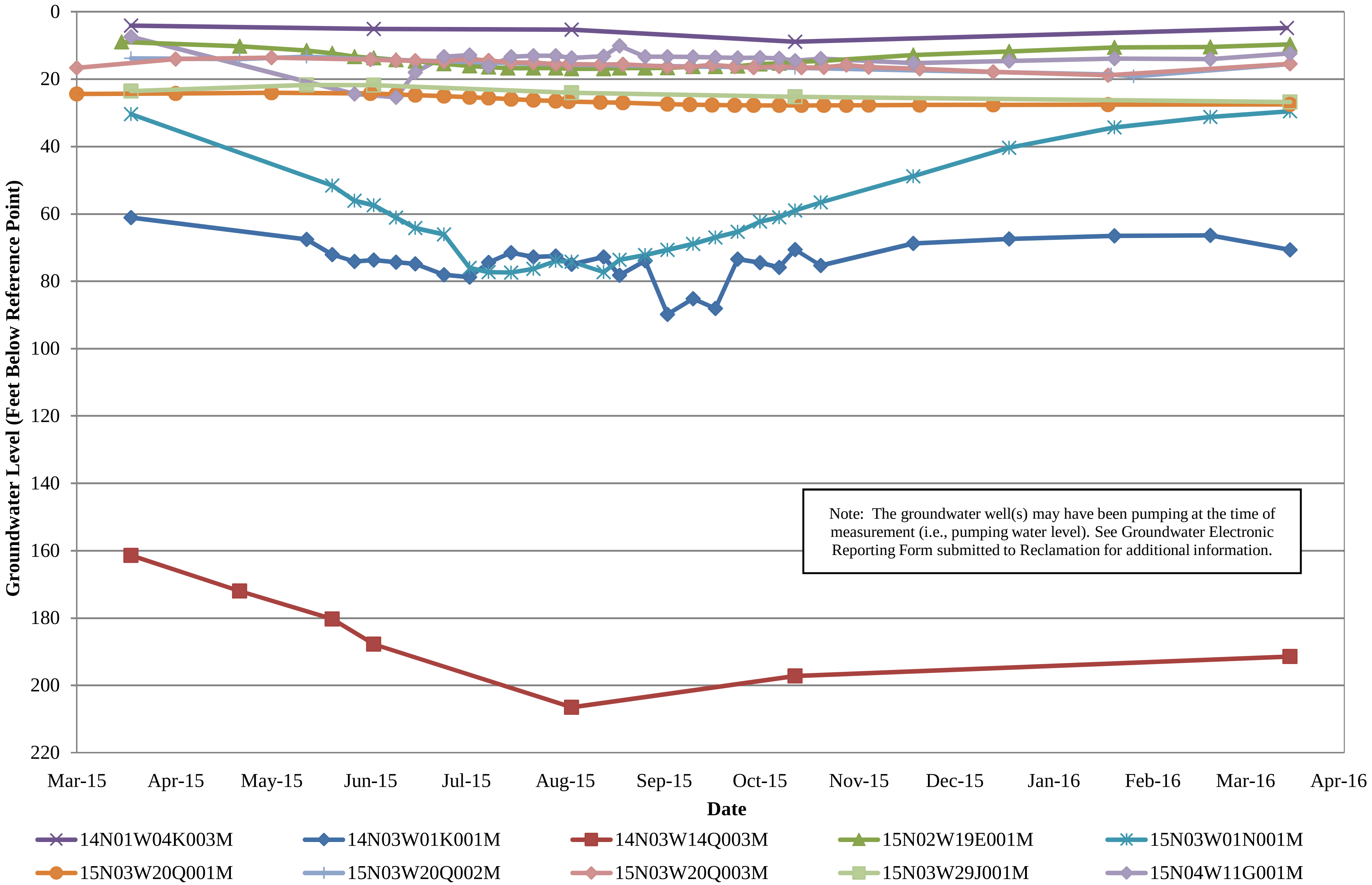
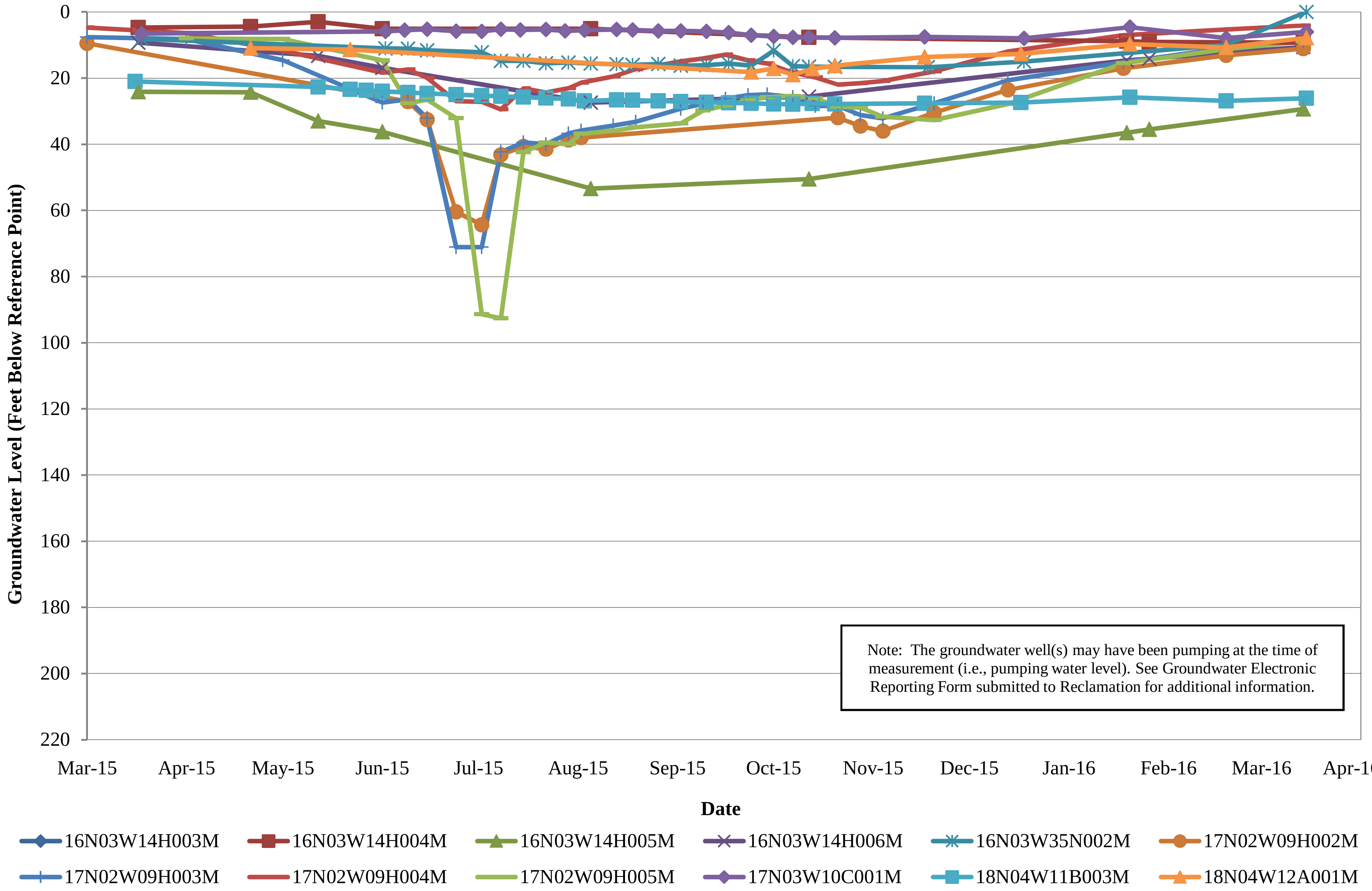
Glenn-Colusa Irrigation District
Monitoring Well Groundwater Level Data



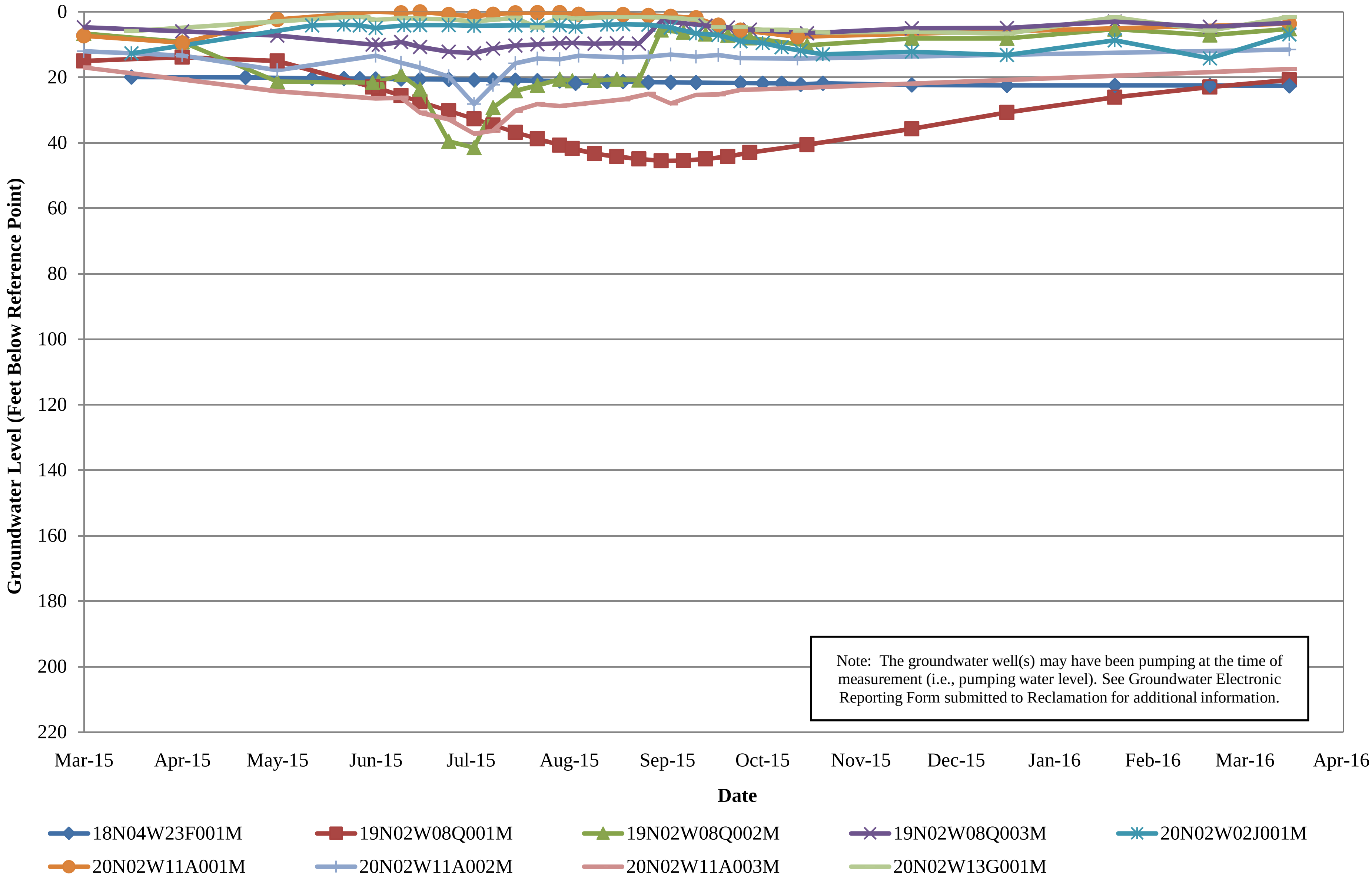
Glenn-Colusa Irrigation District
DWR Monitoring Well Groundwater Level Data



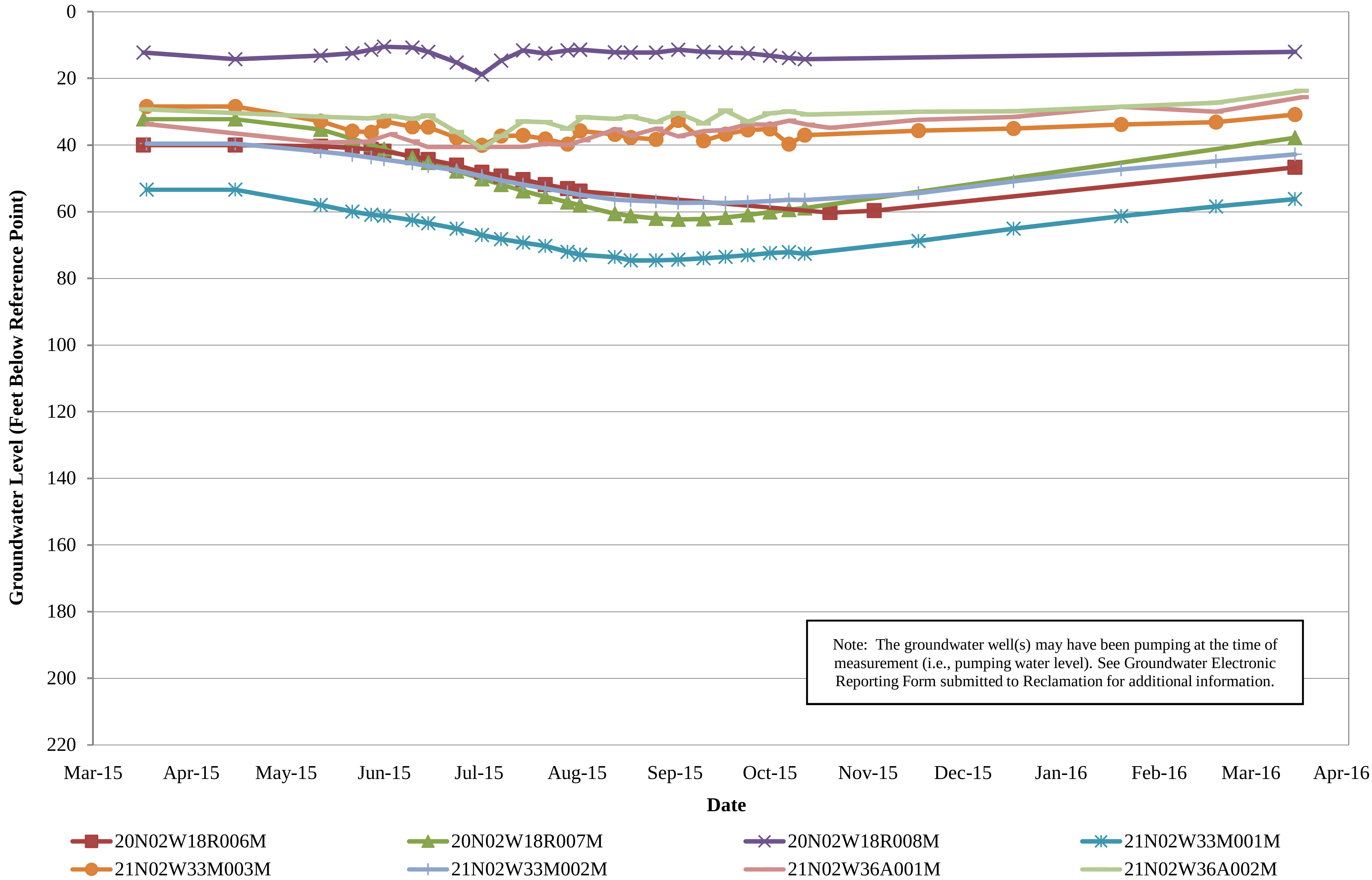
Glenn-Colusa Irrigation District
DWR Monitoring Well Groundwater Level Data

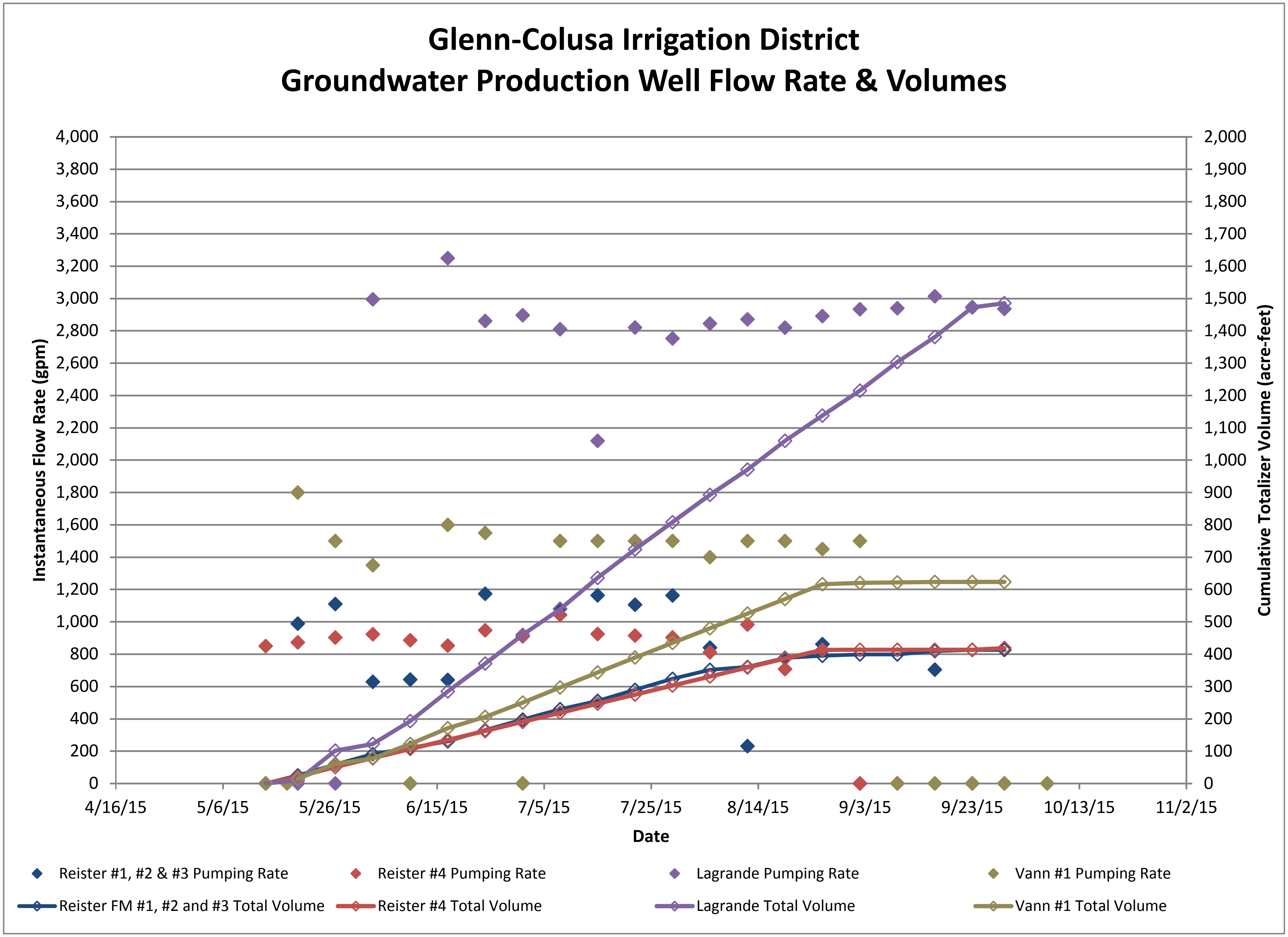


Glenn-Colusa Irrigation District
DWR Monitoring Well Groundwater Level Data

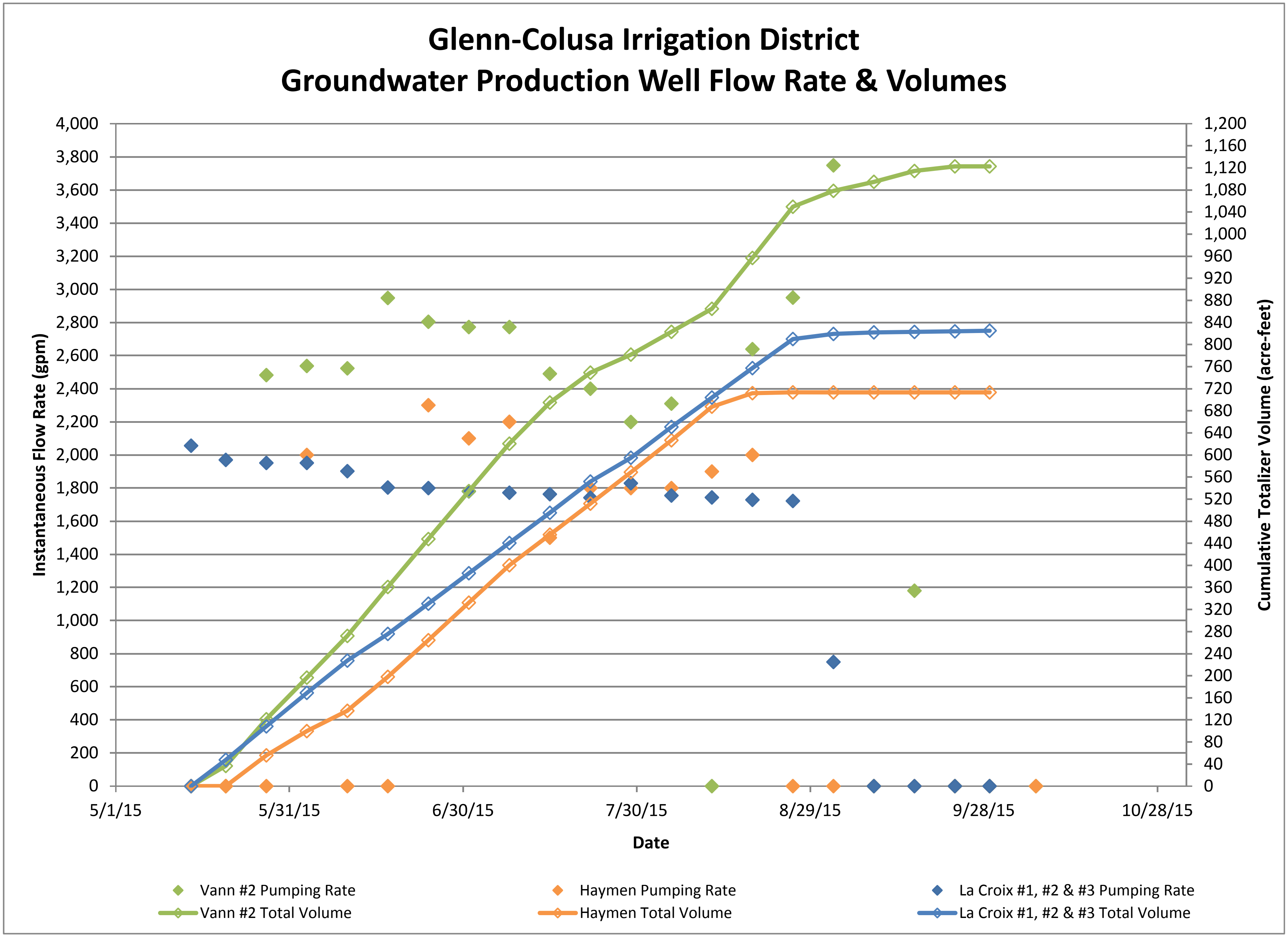


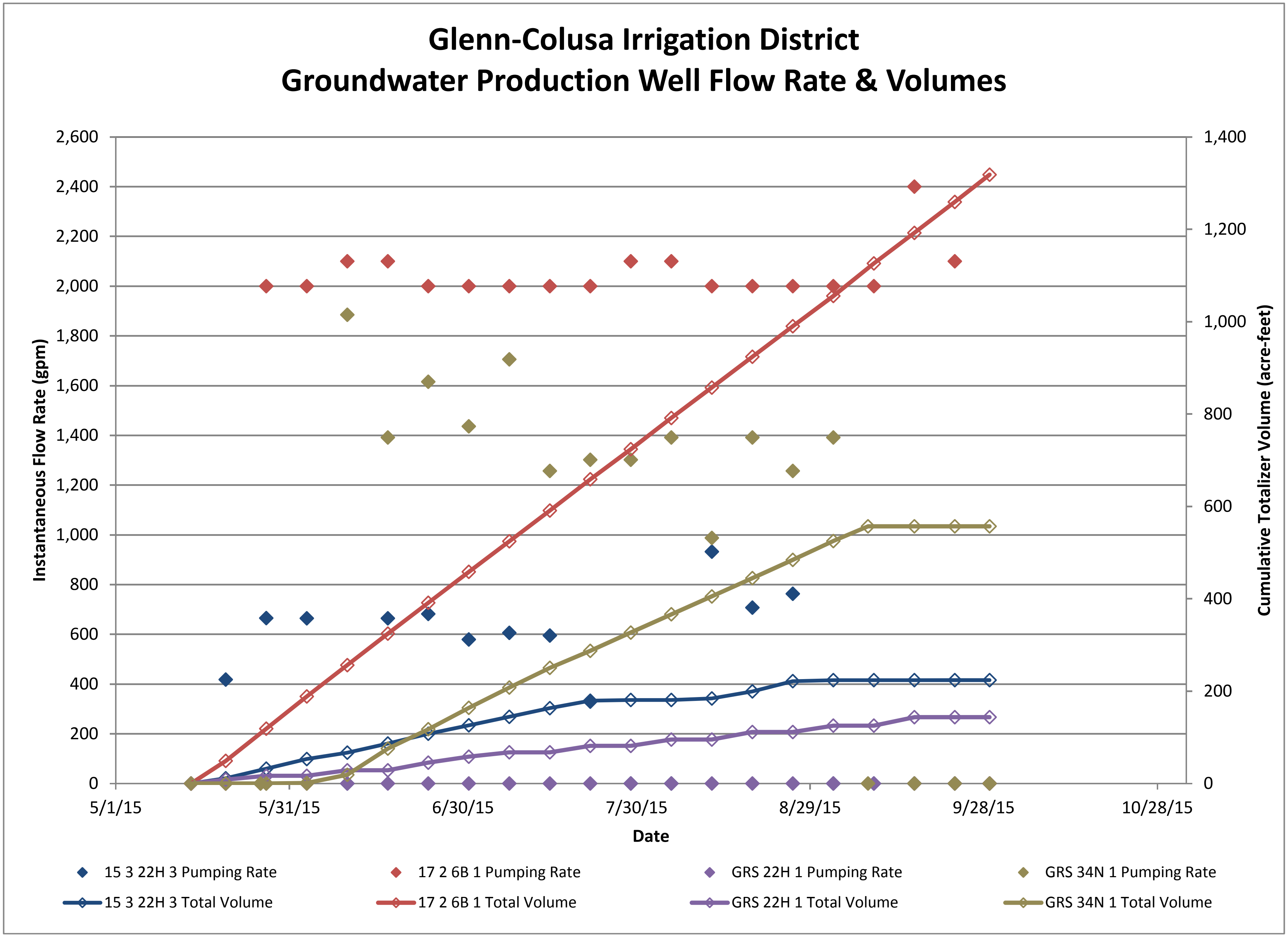
Glenn-Colusa Irrigation District
DWR Monitoring Well Groundwater Level Data



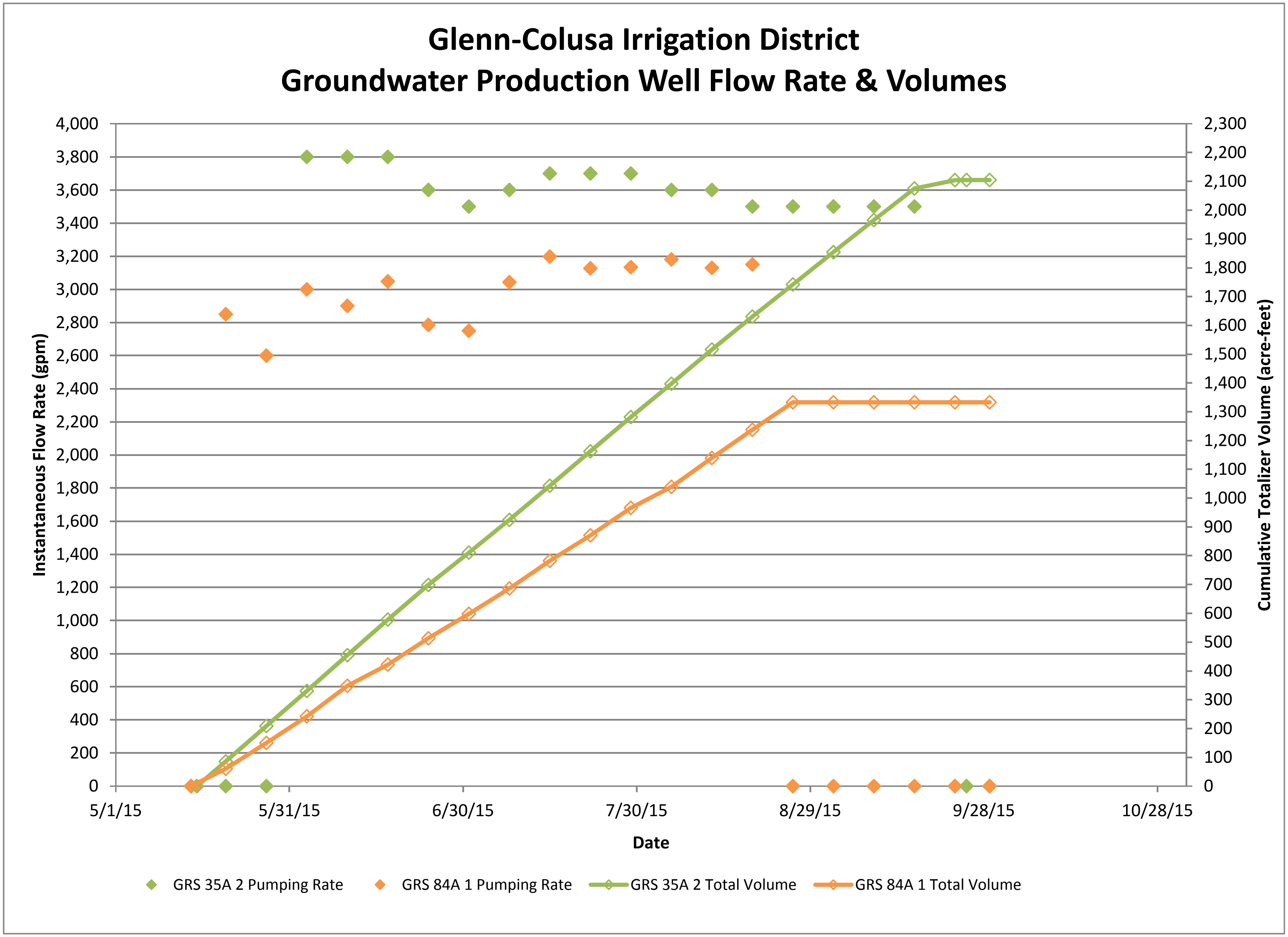


Glenn-Colusa Irrigation District
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
4,000
3,800
3,600
3,400
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
4/16/15
5/6/15
5/26/15
6/15/15
7/5/15
7/25/15
8/14/15
9/3/15
9/23/15
10/13/15
11/2/15
Date
Reister #1, #2 & #3 Pumping Rate
Reister #4 Pumping Rate
Lagrande Pumping Rate
Vann #1 Pumping Rate
Reister FM #1, #2 and #3 Total Volume
Reister #4 Total Volume
Lagrande Total Volume
Vann #1 Total Volume


Glenn-Colusa Irrigation District
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
Date
5/1/15
5/31/15
6/30/15
7/30/15
8/29/15
9/28/15
10/28/15
Vann #2 Pumping Rate
Vann #2 Total Volume
Haymen Pumping Rate
Haymen Total Volume
La Croix #1, #2 & #3 Pumping Rate
La Croix #1, #2 & #3 Total Volume

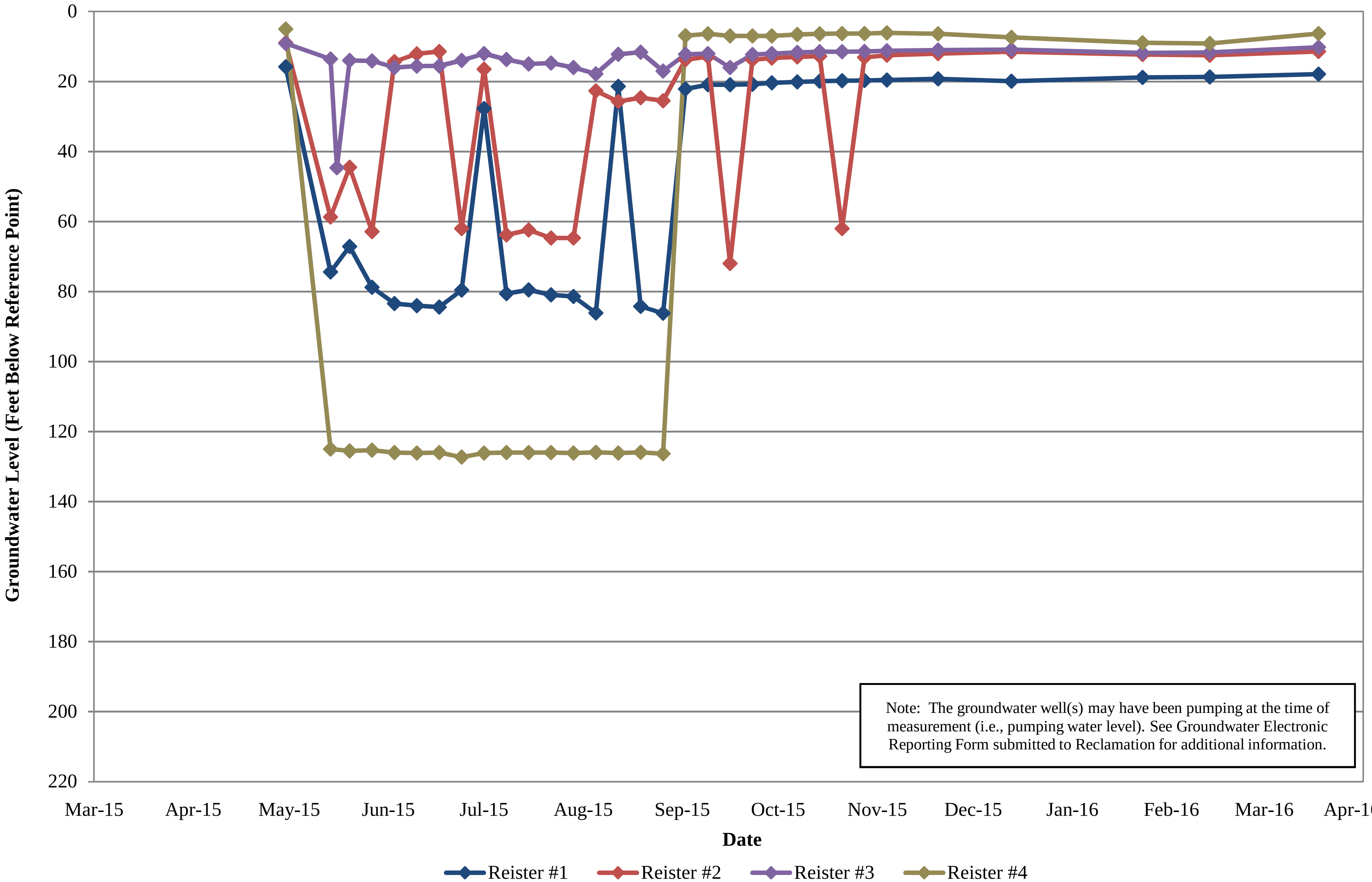


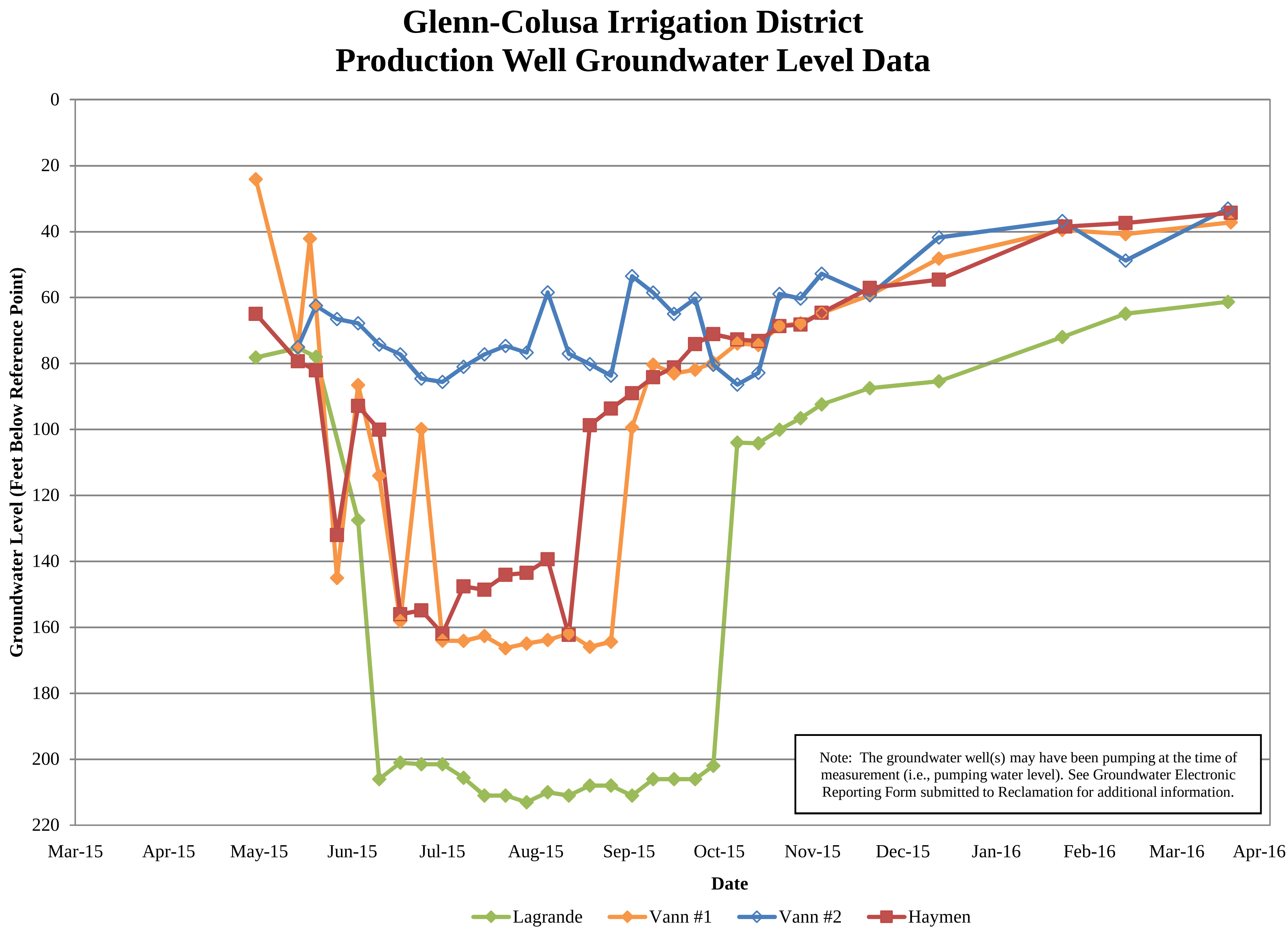
Glenn-Colusa Irrigation District
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
Date
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1,400
1,200
1,000
800
600
400
200
0
5/1/15
5/31/15
6/30/15
7/30/15
8/29/15
9/28/15
10/28/15
15 3 22H 3 Pumping Rate
17 2 6B 1 Pumping Rate
GRS 22H 1 Pumping Rate
GRS 34N 1 Pumping Rate
15 3 22H 3 Total Volume
17 2 6B 1 Total Volume
GRS 22H 1 Total Volume
GRS 34N 1 Total Volume



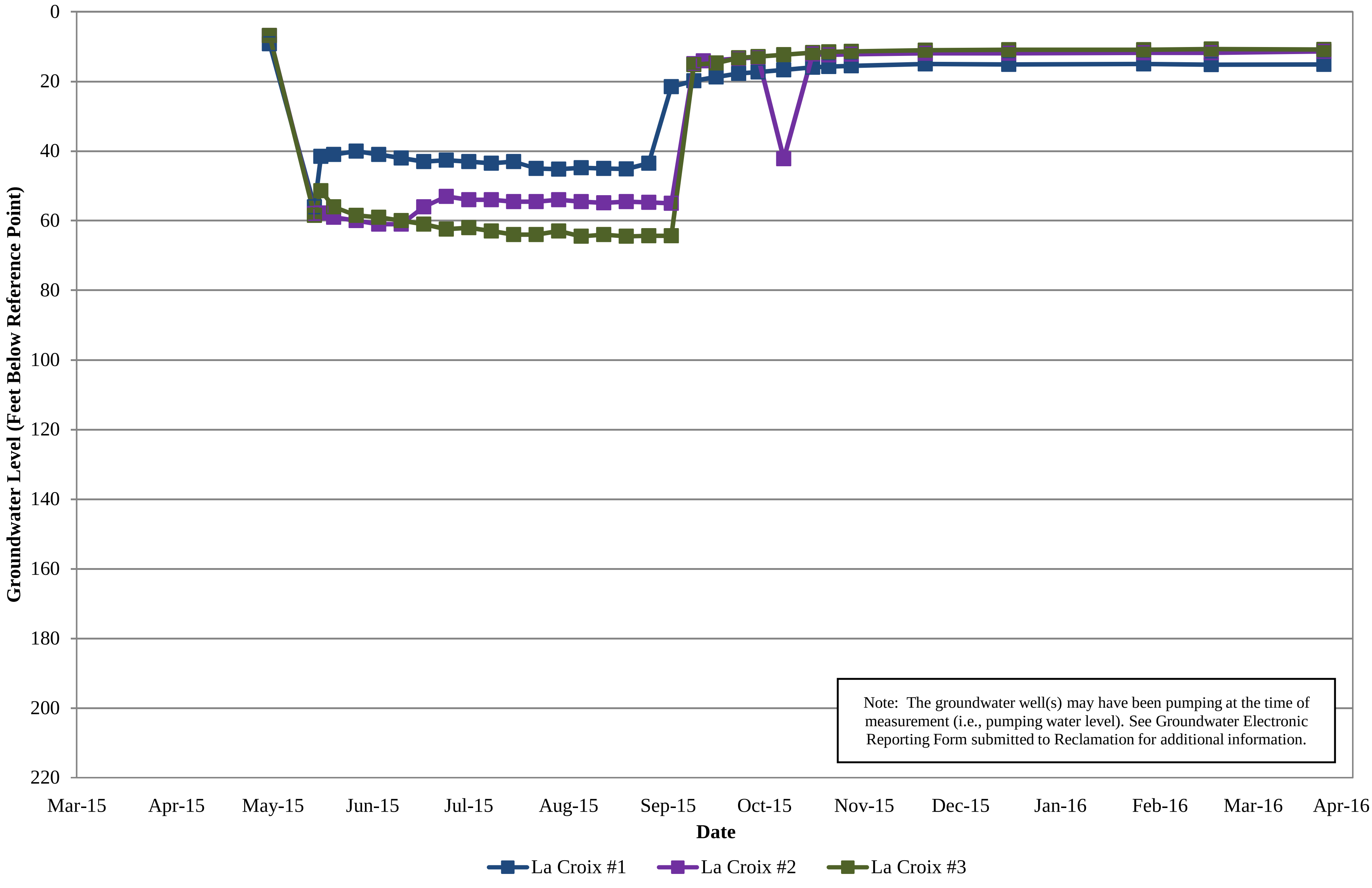
Glenn-Colusa Irrigation District
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
4,000
3,800
3,600
3,400
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/1/15
5/31/15
6/30/15
7/30/15
8/29/15
9/28/15
10/28/15
Date
GRS 35A 2 Pumping Rate
GRS 84A 1 Pumping Rate
GRS 35A 2 Total Volume
GRS 84A 1 Total Volume

Glenn-Colusa Irrigation District
Production Well Groundwater Level Data

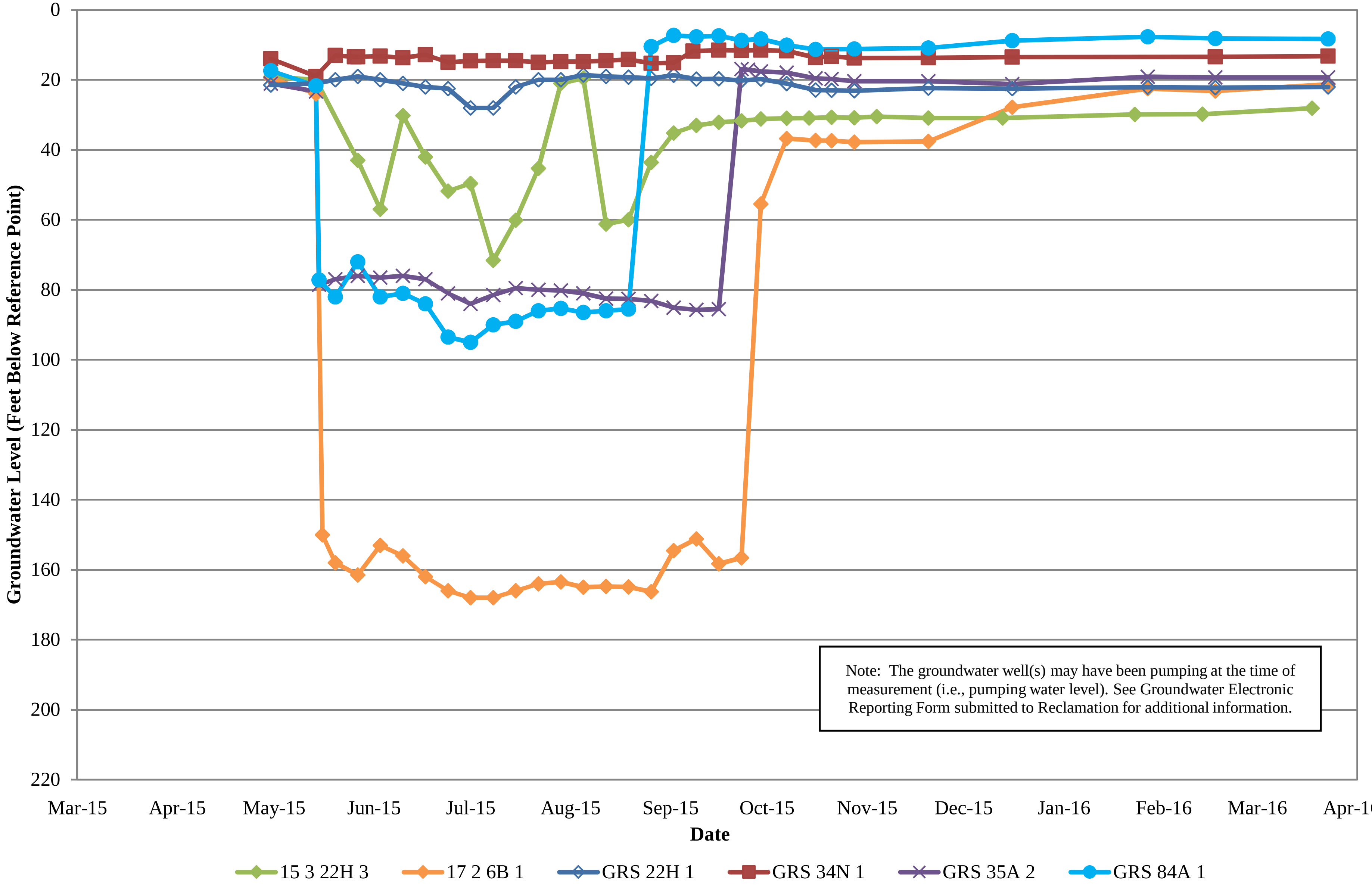


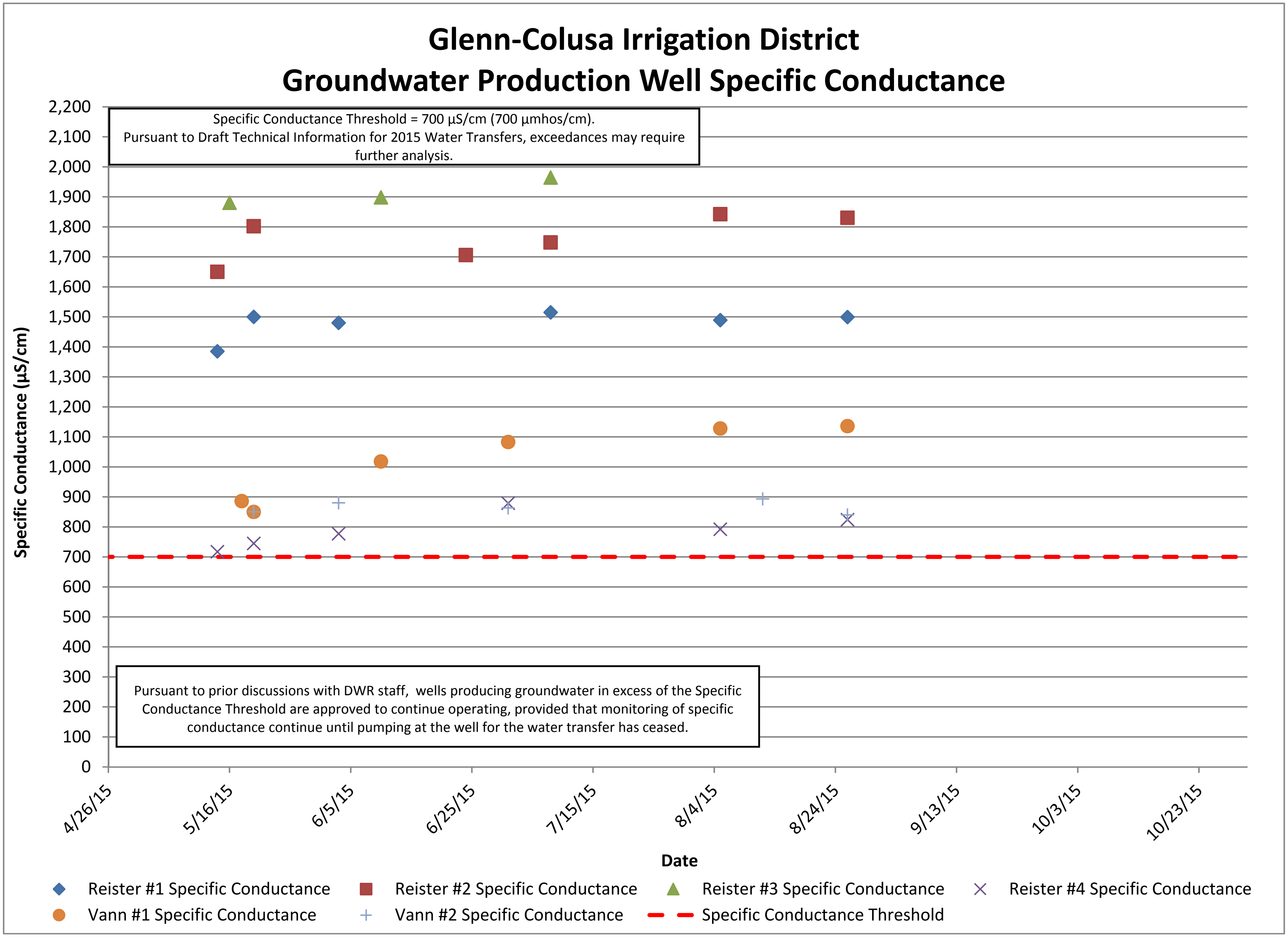

Glenn-Colusa Irrigation District
Production Well Groundwater Level Data
Groundwater Level (Feet Below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
220
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Lagrande
Vann #1
Vann #2
Haymen

Glenn-Colusa Irrigation District
Production Well Groundwater Level Data

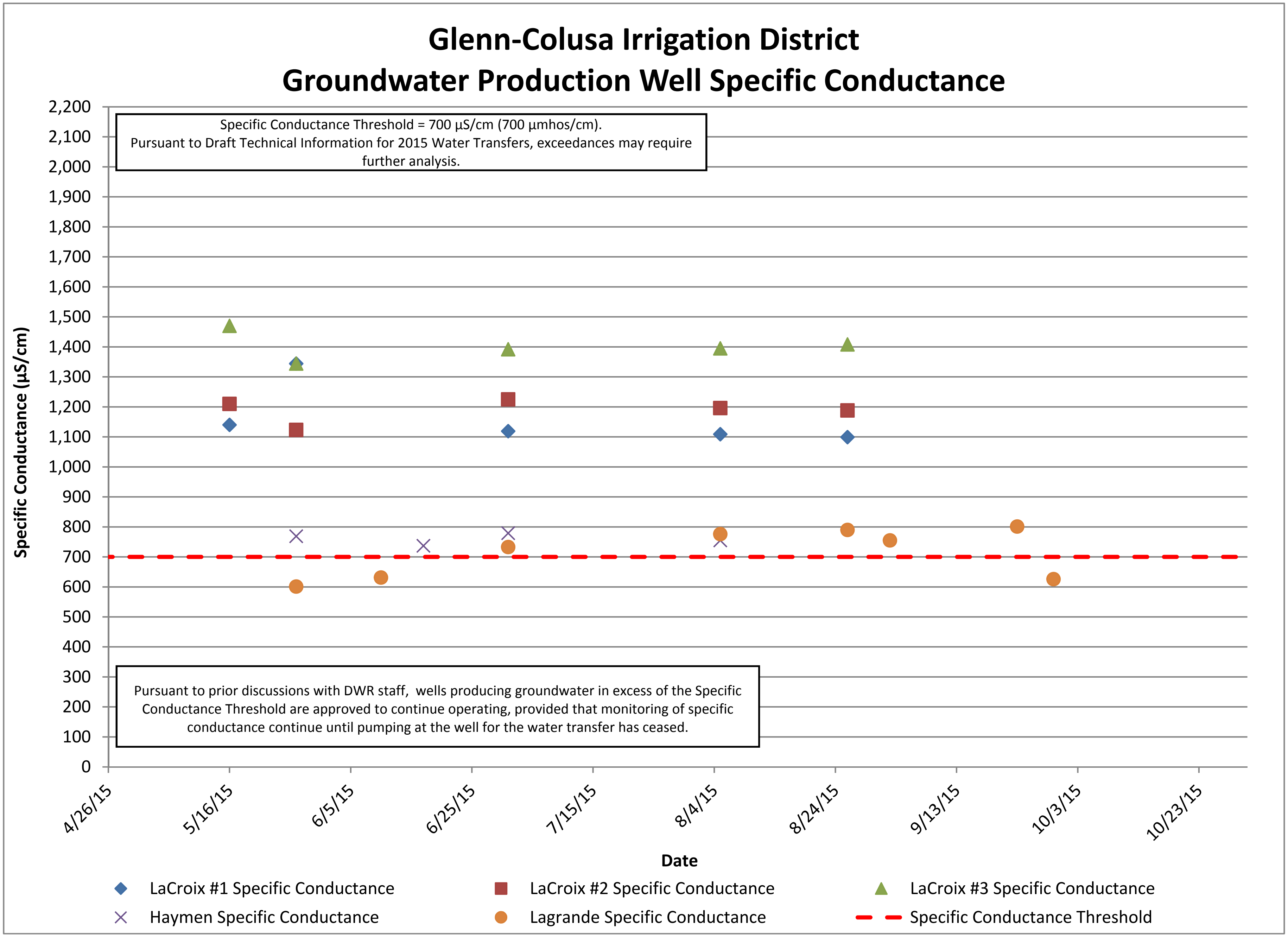


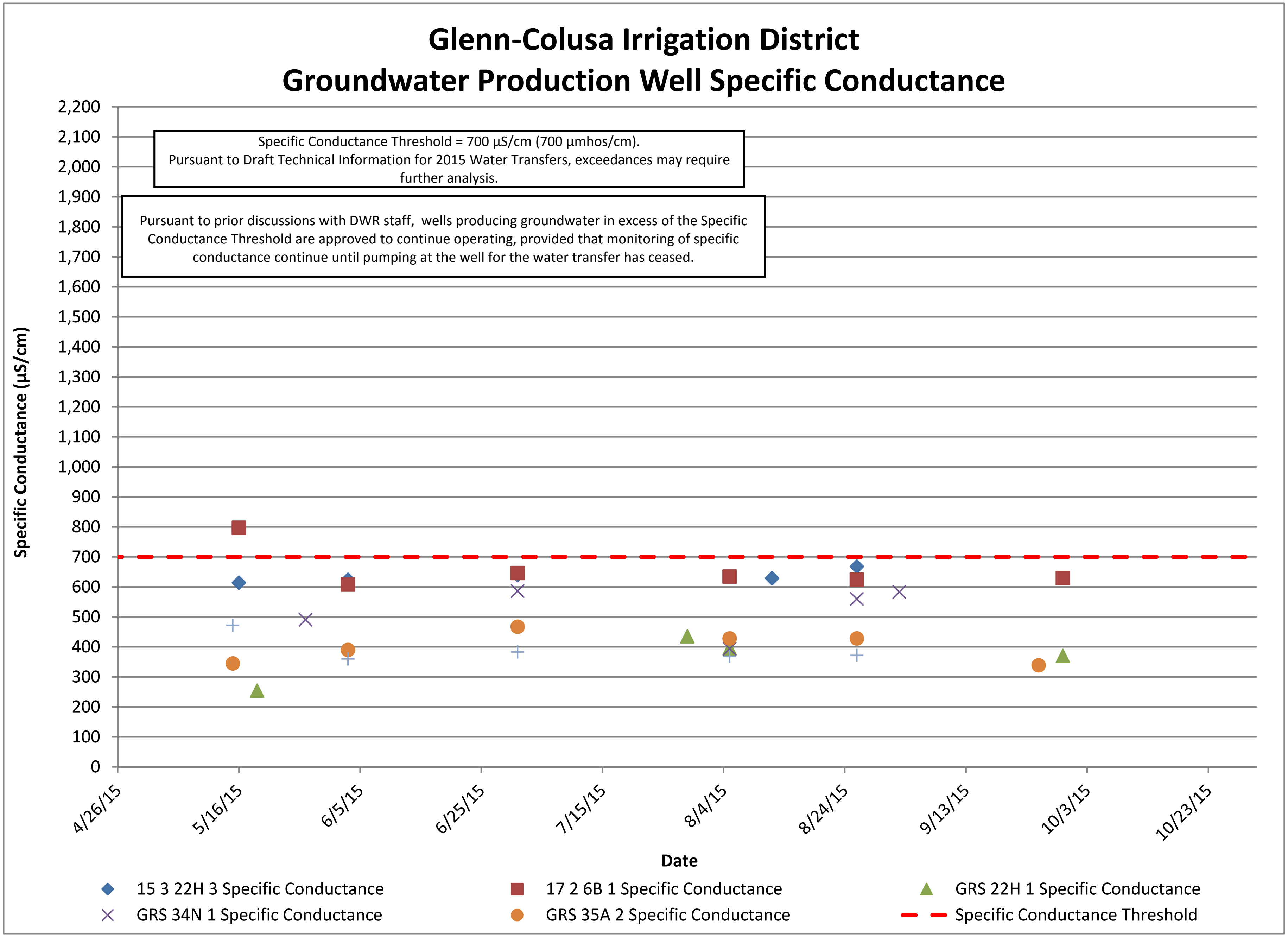
Glenn-Colusa Irrigation District
Production Well Groundwater Level Data





Glenn-Colusa Irrigation District
Groundwater Production Well Specific Conductance
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2015 Water Transfers, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
Specific Conductance (µS/cm)
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
4/26/15
5/16/15
6/5/15
6/25/15
7/15/15
8/4/15
8/24/15
9/13/15
10/3/15
10/23/15
Date
Reister #1 Specific Conductance
Reister #2 Specific Conductance
Reister #3 Specific Conductance
Reister #4 Specific Conductance
Vann #1 Specific Conductance
Vann #2 Specific Conductance
Specific Conductance Threshold


Glenn-Colusa Irrigation District
Groundwater Production Well Specific Conductance
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2015 Water Transfers, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
Specific Conductance (µS/cm)
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
4/26/15
5/16/15
6/5/15
6/25/15
7/15/15
8/4/15
8/24/15
9/13/15
10/3/15
10/23/15
Date
LaCroix #1 Specific Conductance
LaCroix #2 Specific Conductance
LaCroix #3 Specific Conductance
Haymen Specific Conductance
Lagrande Specific Conductance
Specific Conductance Threshold


Glenn-Colusa Irrigation District
Groundwater Production Well Specific Conductance
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2015 Water Transfers, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
Specific Conductance (µS/cm)
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
4/26/15
5/16/15
6/5/15
6/25/15
7/15/15
8/4/15
8/24/15
9/13/15
10/3/15
10/23/15
Date
15 3 22H 3 Specific Conductance
17 2 6B 1 Specific Conductance
GRS 22H 1 Specific Conductance
GRS 34N 1 Specific Conductance
GRS 35A 2 Specific Conductance
Specific Conductance Threshold

Garden Highway Mutual Water Company

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Figure 2
Garden Highway Mutual Water Company
Groundwater Production Well Flow Rates & Volumes

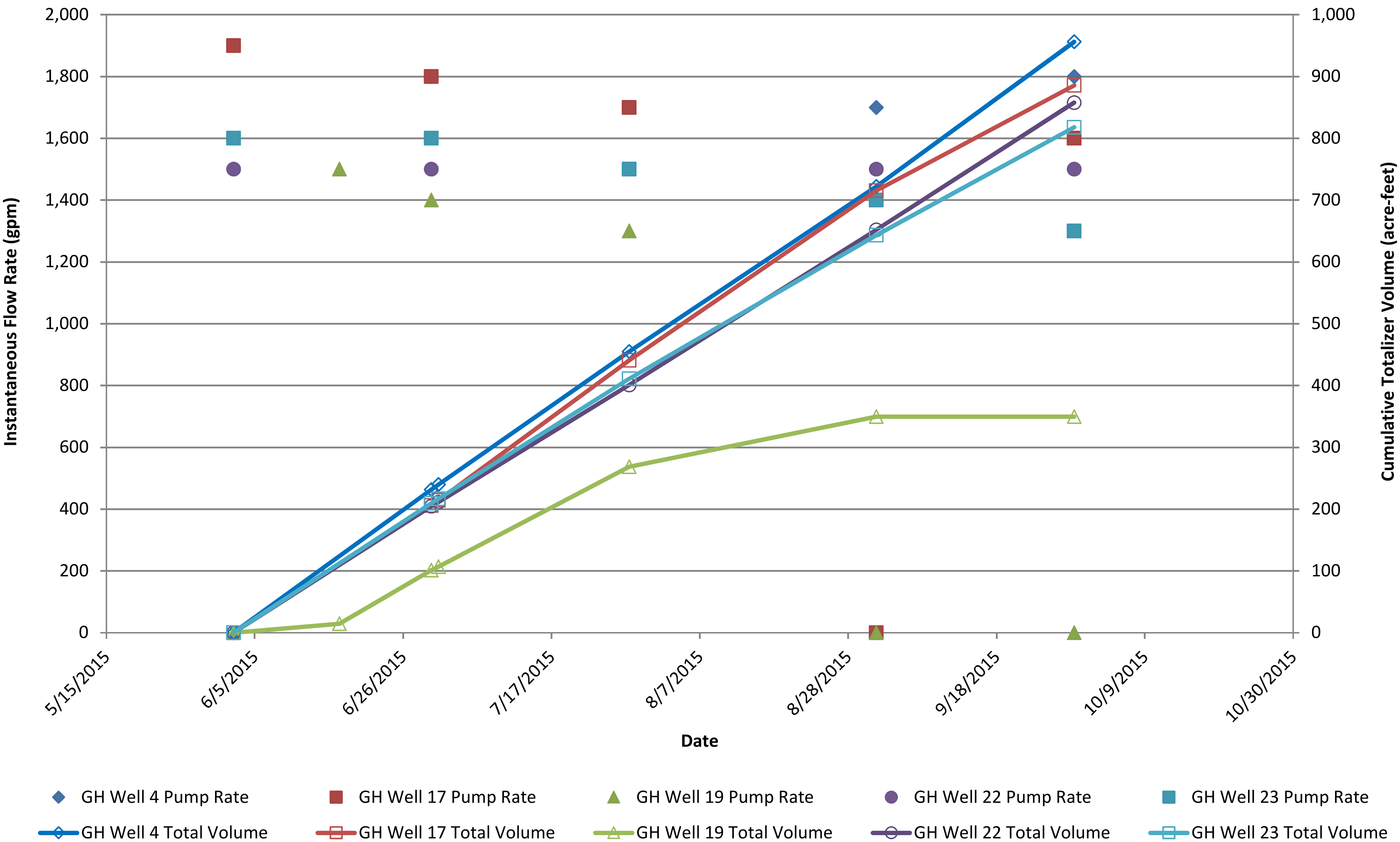
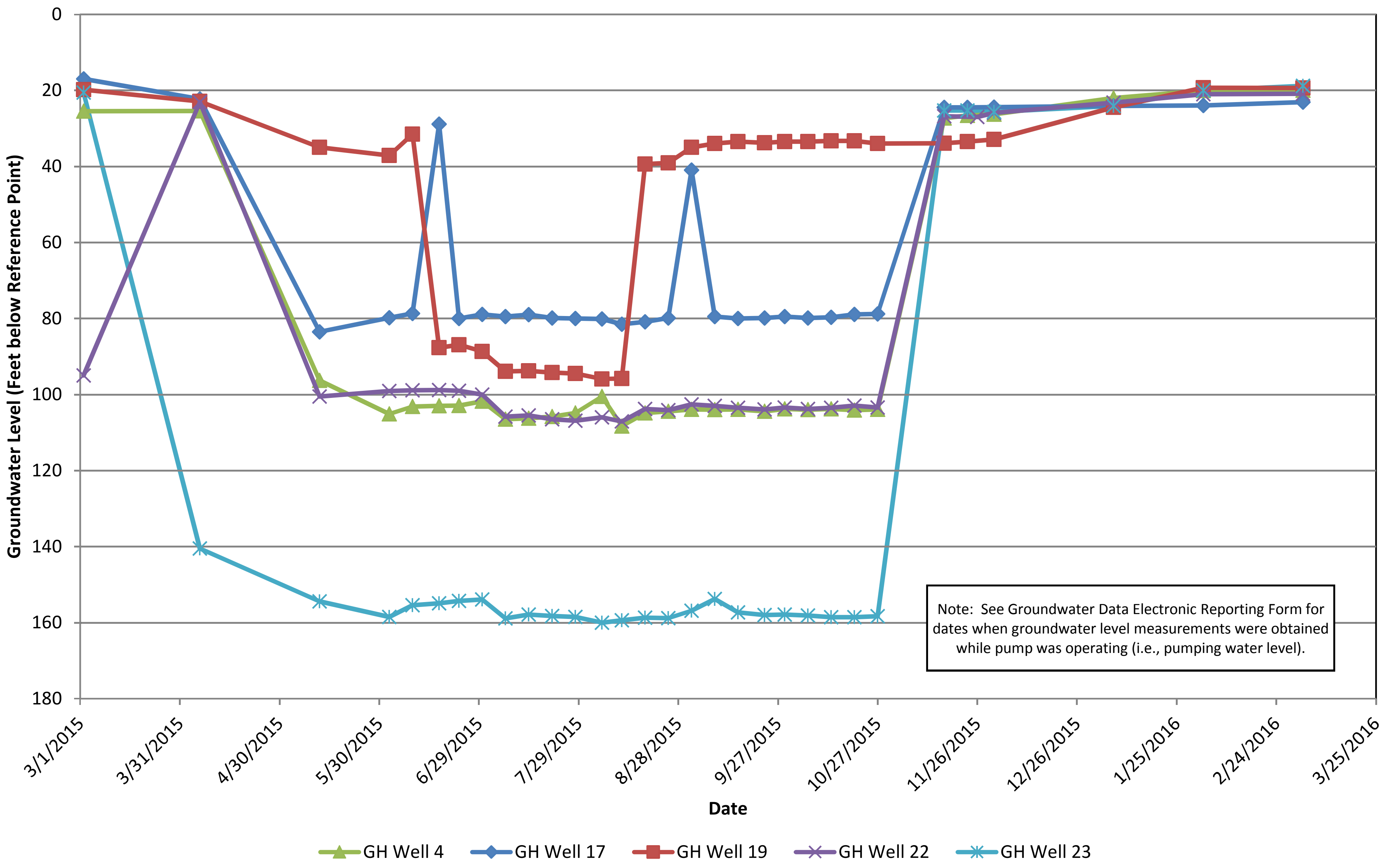


Figure 3A
Garden Highway Mutual Water Company
Production Well Groundwater Level Data



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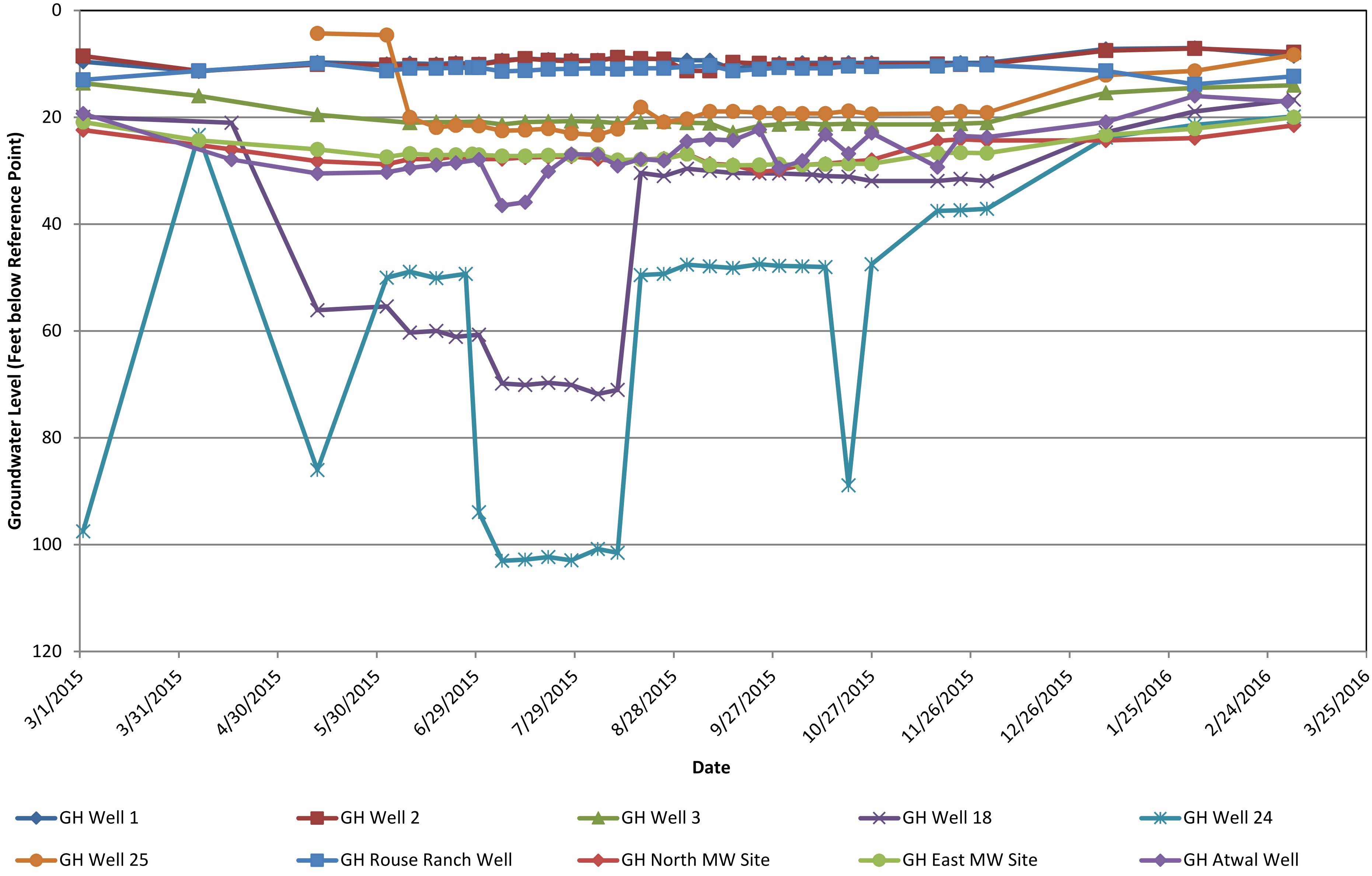
Tab: Pumping Water Levels

Figure 3B
Garden Highway Mutual Water Company
Monitoring Well Groundwater Level Data



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Tab: Monitoring Well Water Levels 1

Figure 3C
Garden Highway Mutual Water Company
Monitoring Well Groundwater Level Data

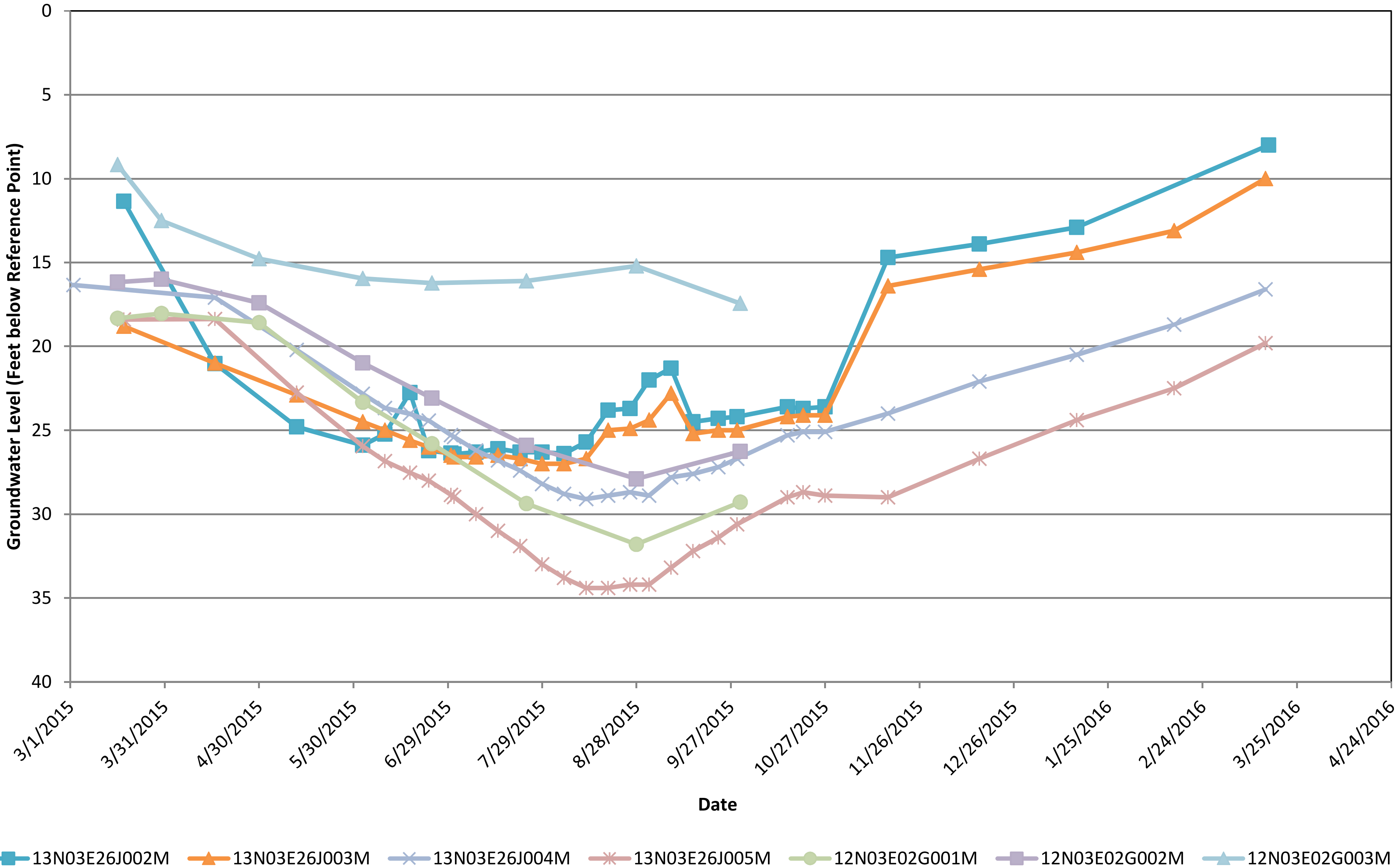
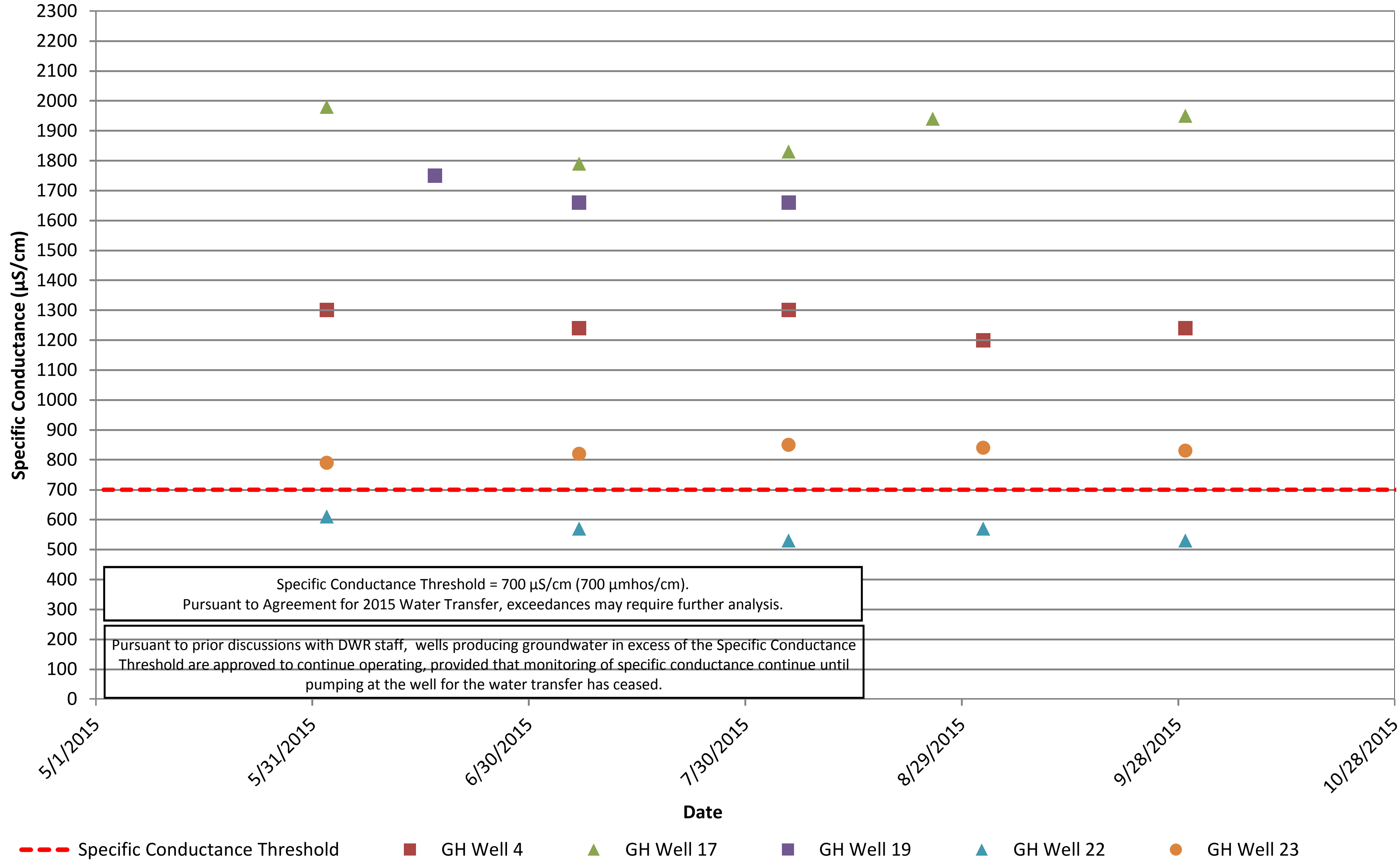


Figure 7
Garden Highway Mutual Water Company
Groundwater Production Well Specific Conductance



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Tab: Water Quality Data

Natomas Central Mutual Water Company

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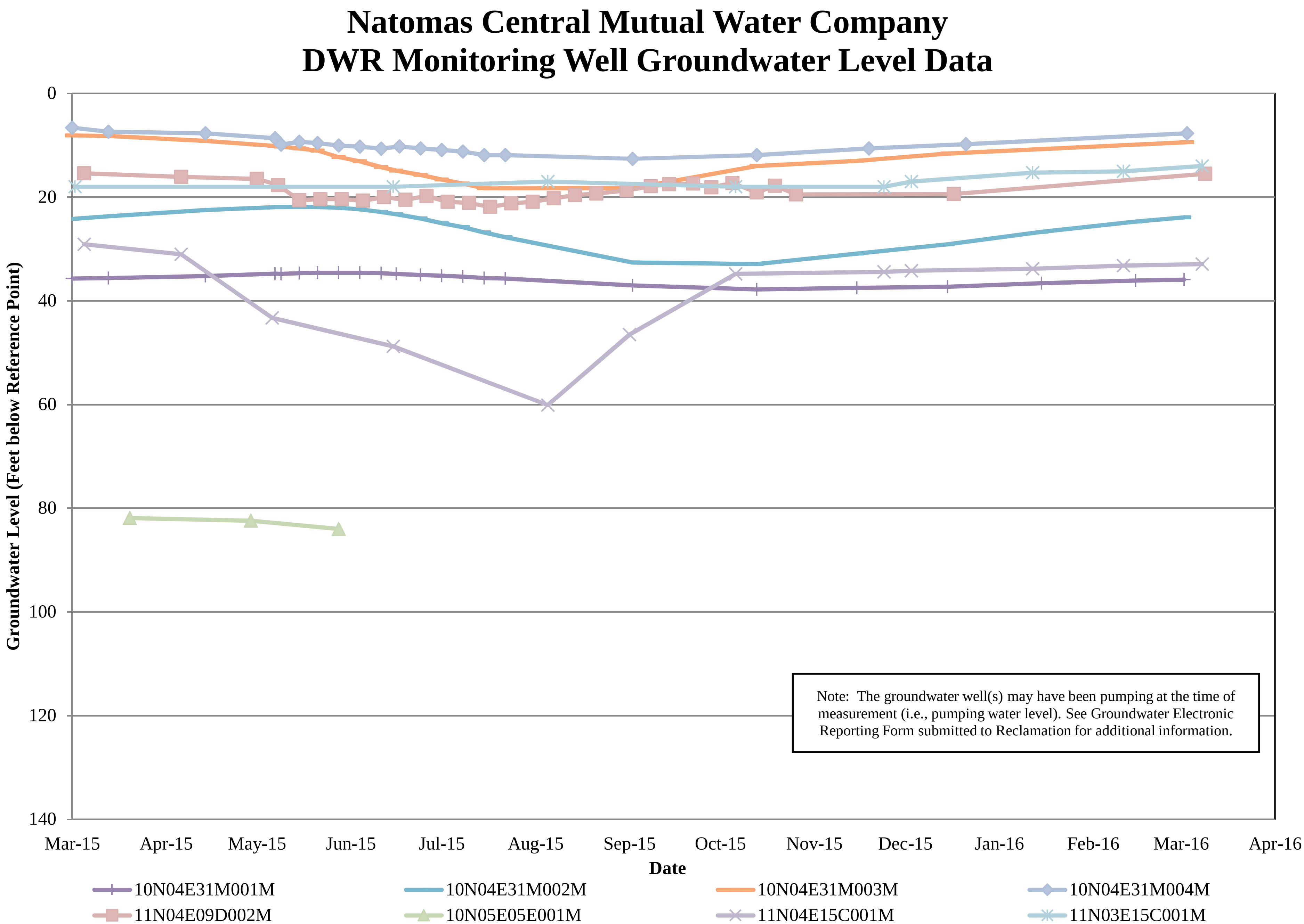
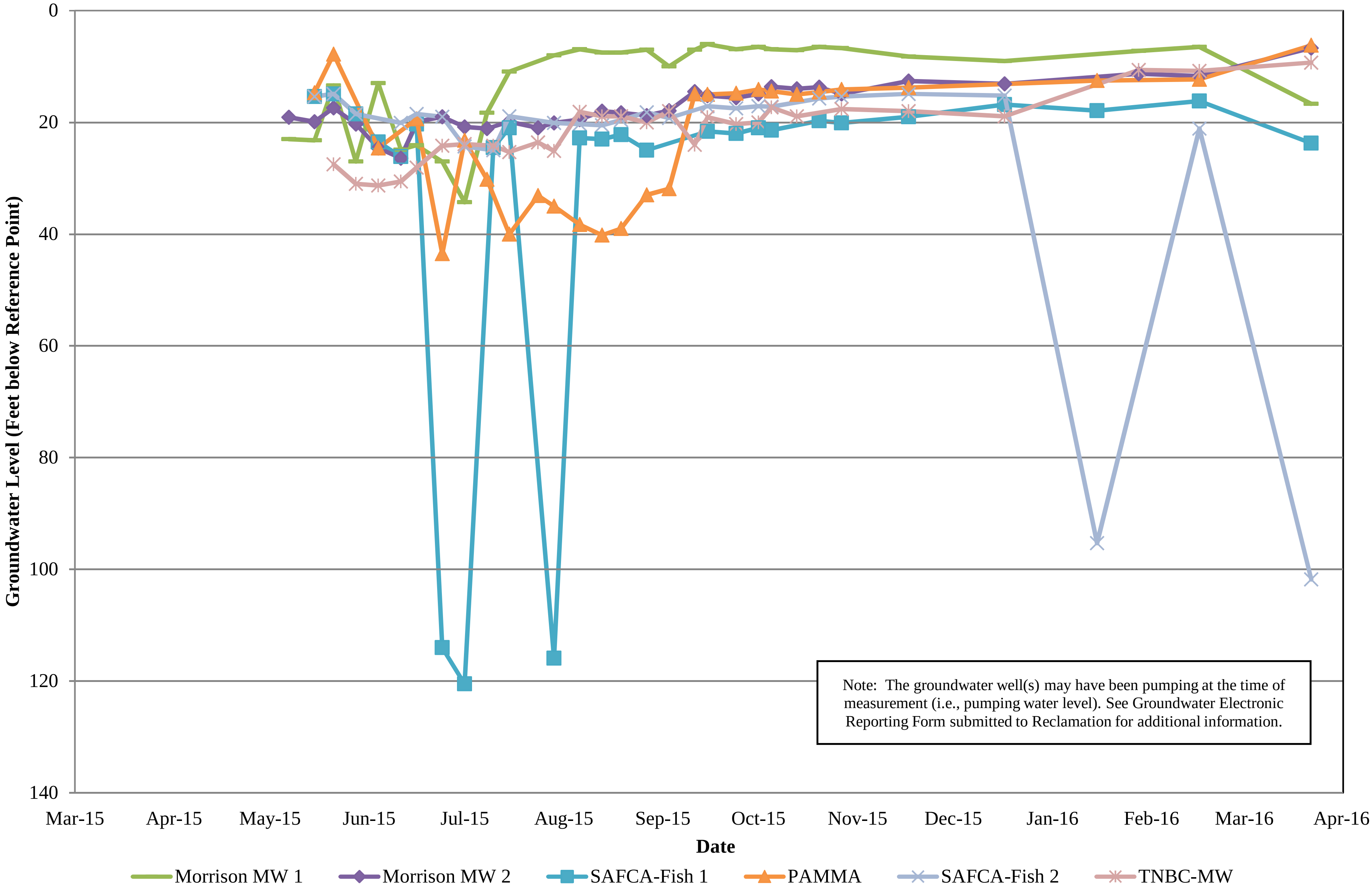
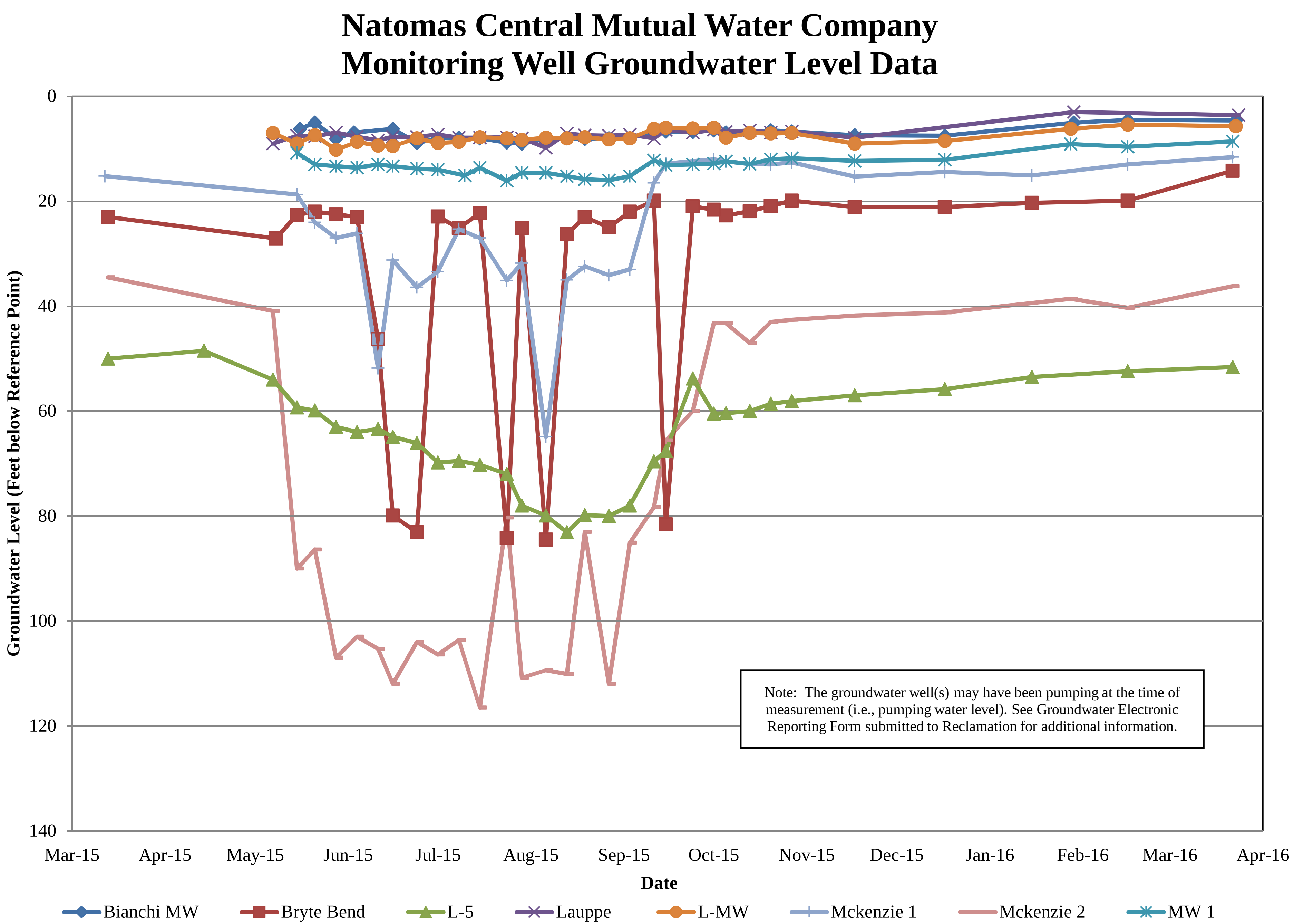

Natomas Central Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
10N04E31M001M
10N04E31M002M
10N04E31M003M
10N04E31M004M
11N04E09D002M
10N05E05E001M
11N04E15C001M
11N03E15C001M
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.

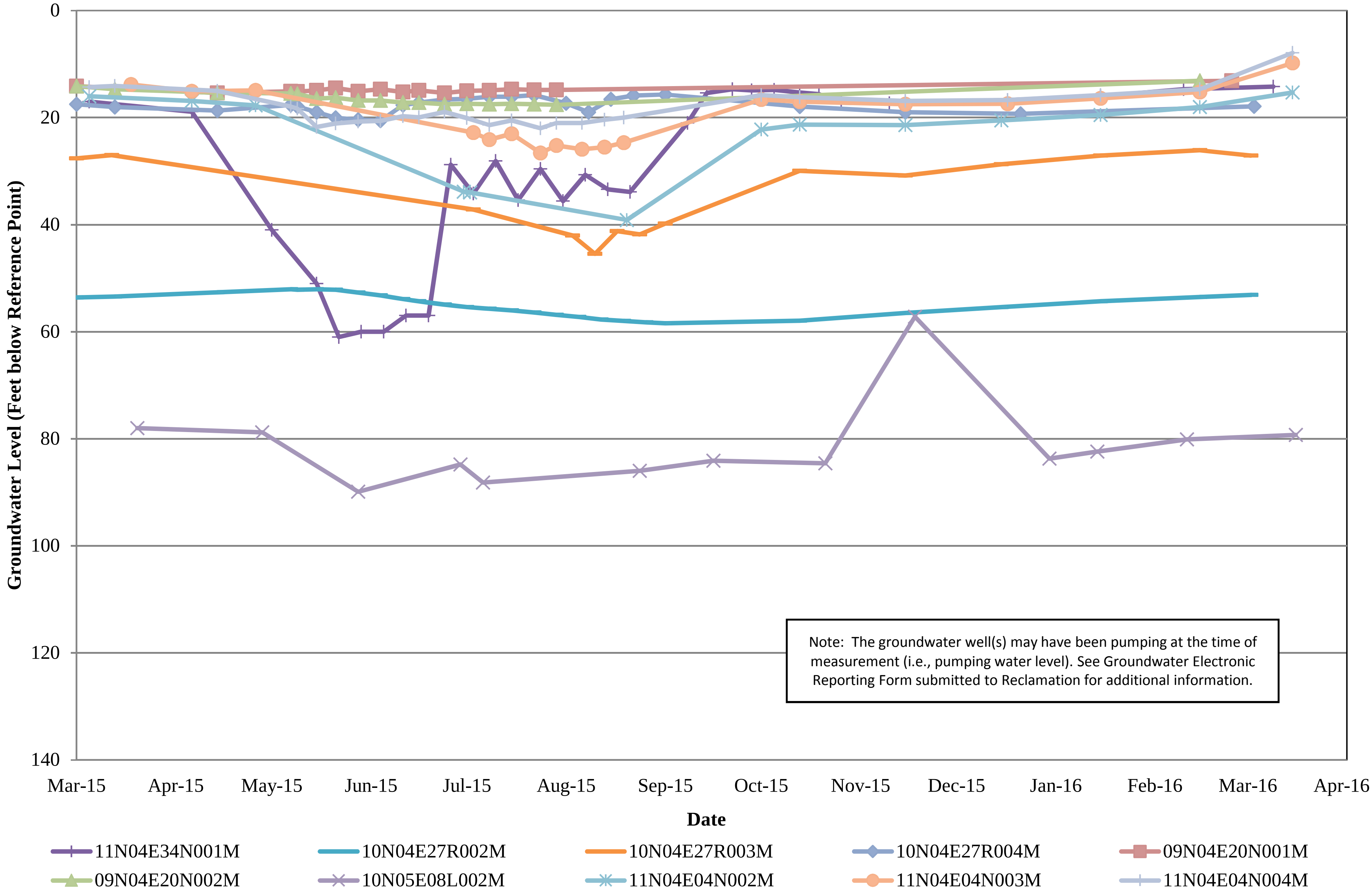
Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data

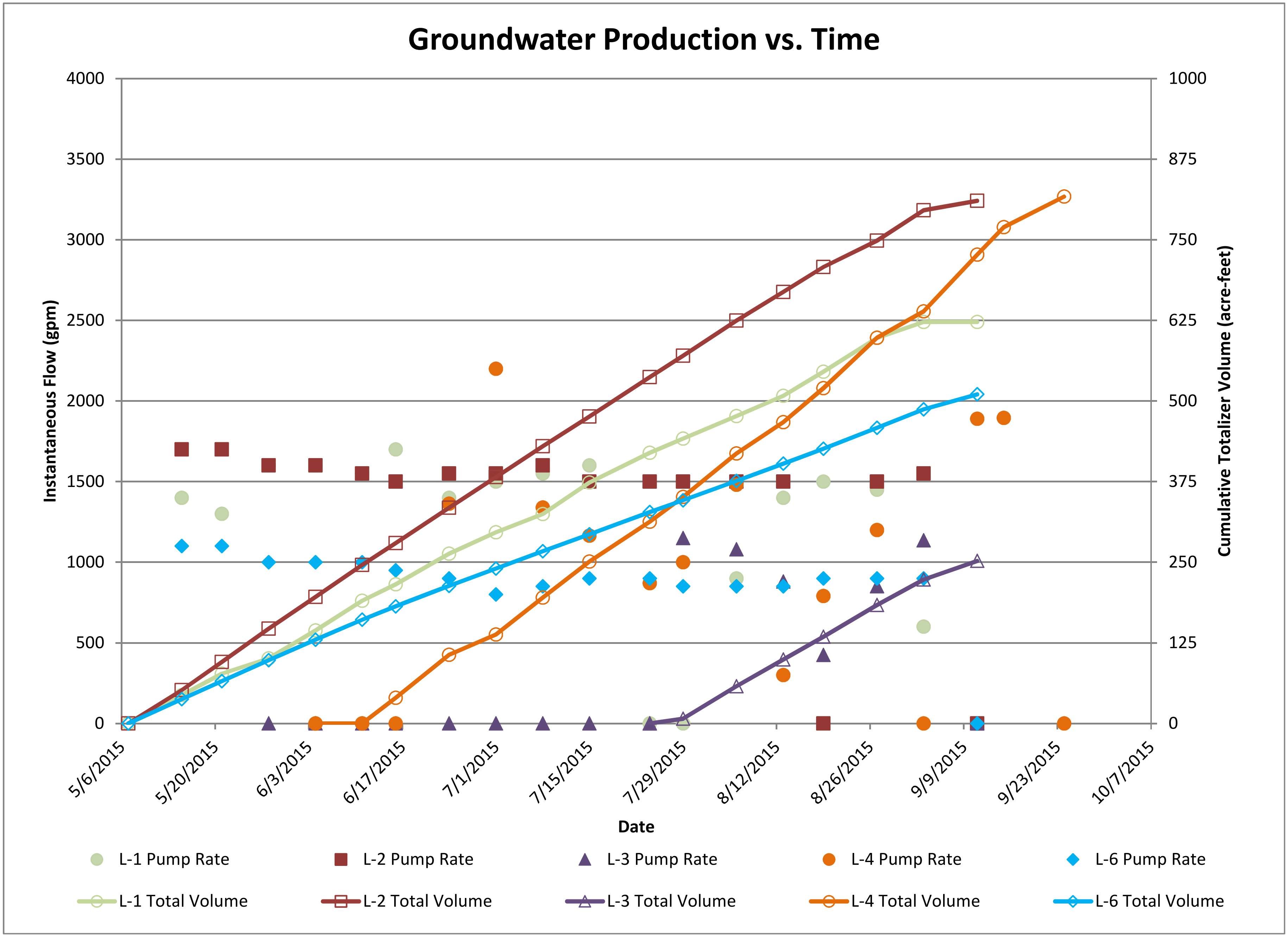




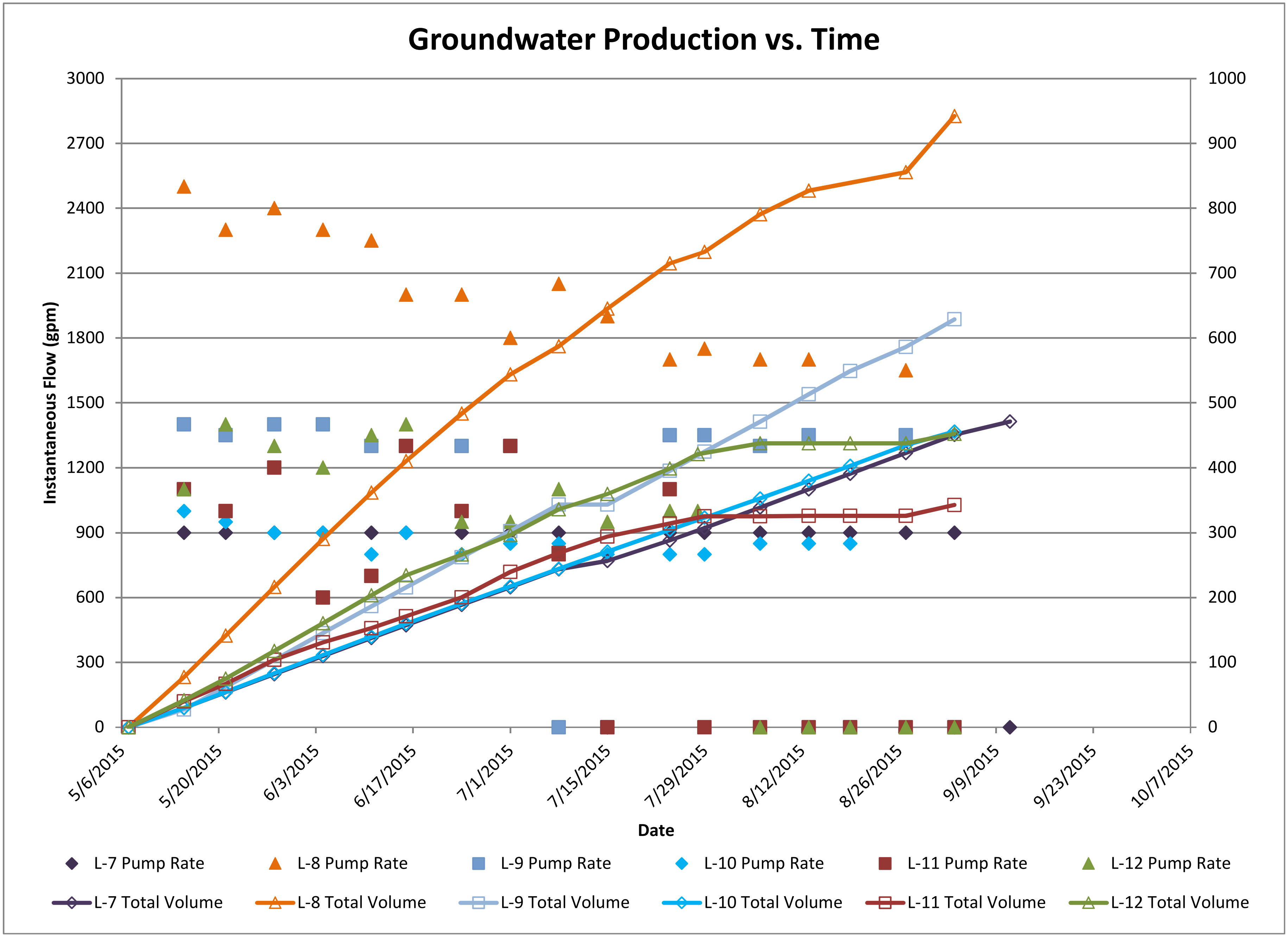
Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Bianchi MW
Bryte Bend
L-5
Lauppe
L-MW
Mckenzie 1
Mckenzie 2
MW 1
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.

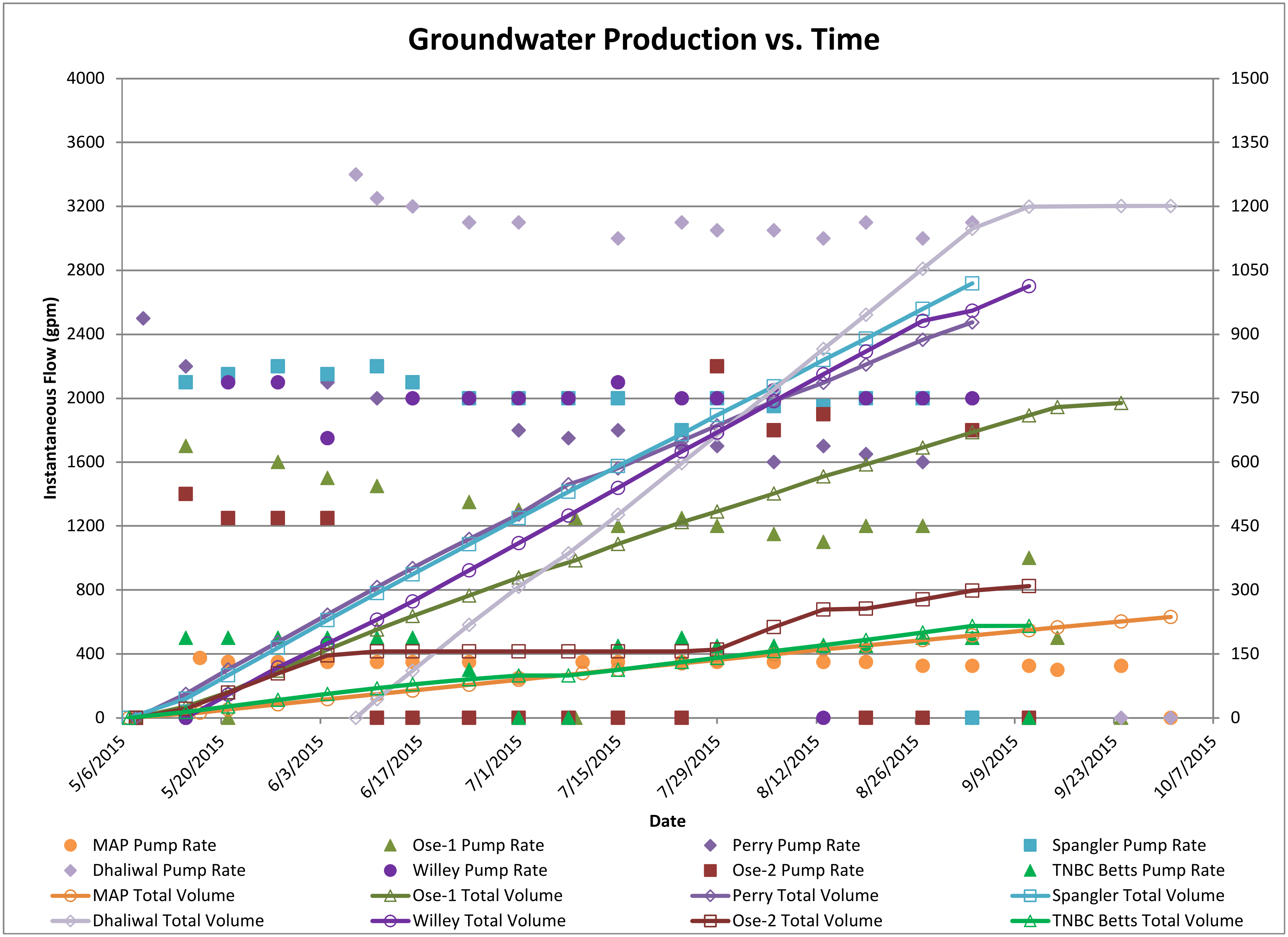
Natomas Central Mutual Water Company
DWR Monitoring Well Groundwater Level Data



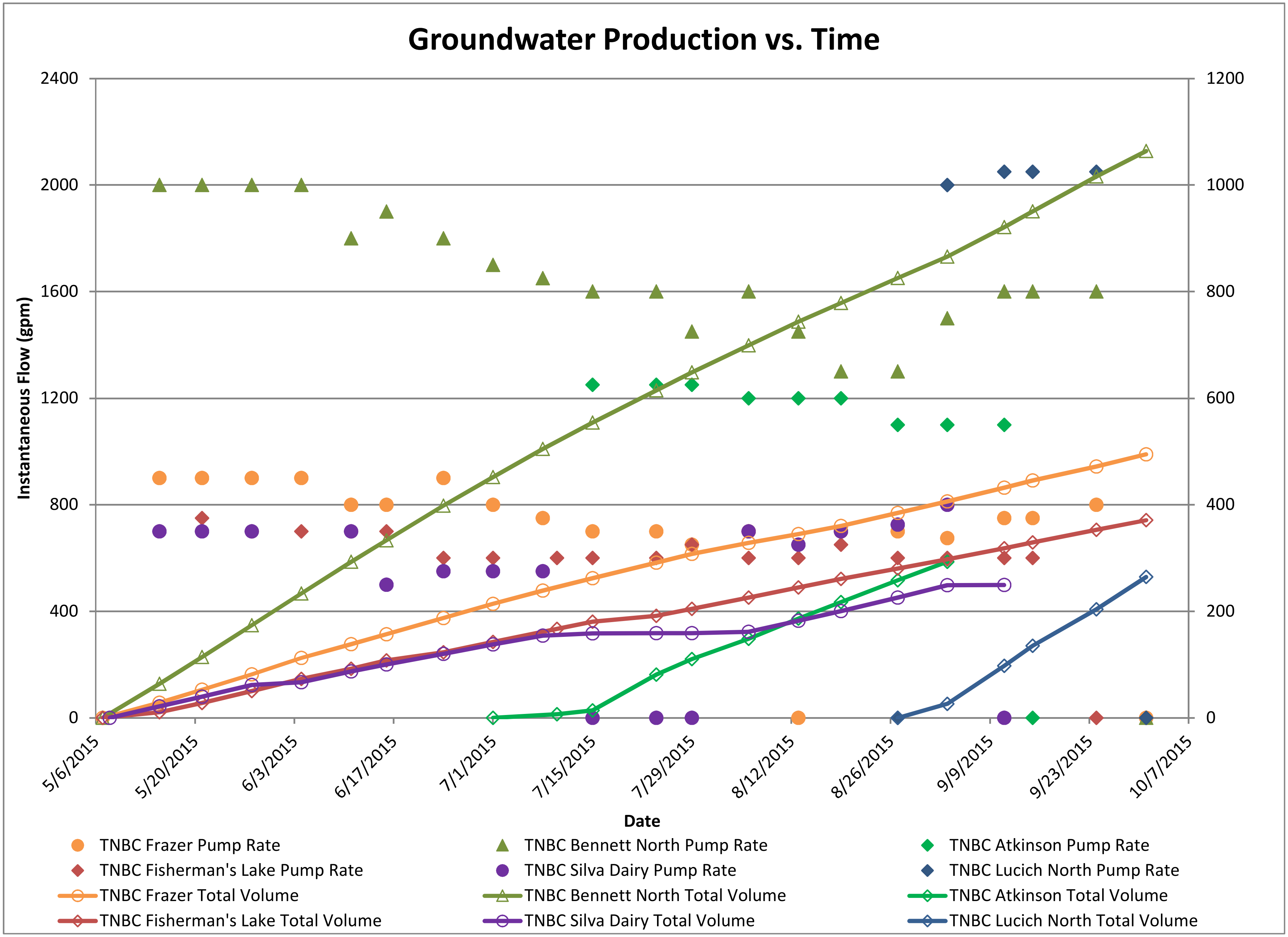


Groundwater Production vs. Time
Instantaneous Flow (gpm)
Cumulative Totalizer Volume (acre-feet)
4000
3500
3000
2500
2000
1500
1000
500
0
1000
875
750
625
500
375
250
125
0
5/6/2015
5/20/2015
6/3/2015
6/17/2015
7/1/2015
7/15/2015
7/29/2015
8/12/2015
8/26/2015
9/9/2015
9/23/2015
10/7/2015
Date
L-1 Pump Rate
L-2 Pump Rate
L-3 Pump Rate
L-4 Pump Rate
L-6 Pump Rate
L-1 Total Volume
L-2 Total Volume
L-3 Total Volume
L-4 Total Volume
L-6 Total Volume


Groundwater Production vs. Time
Instantaneous Flow (gpm)
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1000
900
800
700
600
500
400
300
200
100
0
5/6/2015
5/20/2015
6/3/2015
6/17/2015
7/1/2015
7/15/2015
7/29/2015
8/12/2015
8/26/2015
9/9/2015
9/23/2015
10/7/2015
Date
L-7 Pump Rate
L-8 Pump Rate
L-9 Pump Rate
L-10 Pump Rate
L-11 Pump Rate
L-12 Pump Rate
L-7 Total Volume
L-8 Total Volume
L-9 Total Volume
L-10 Total Volume
L-11 Total Volume
L-12 Total Volume

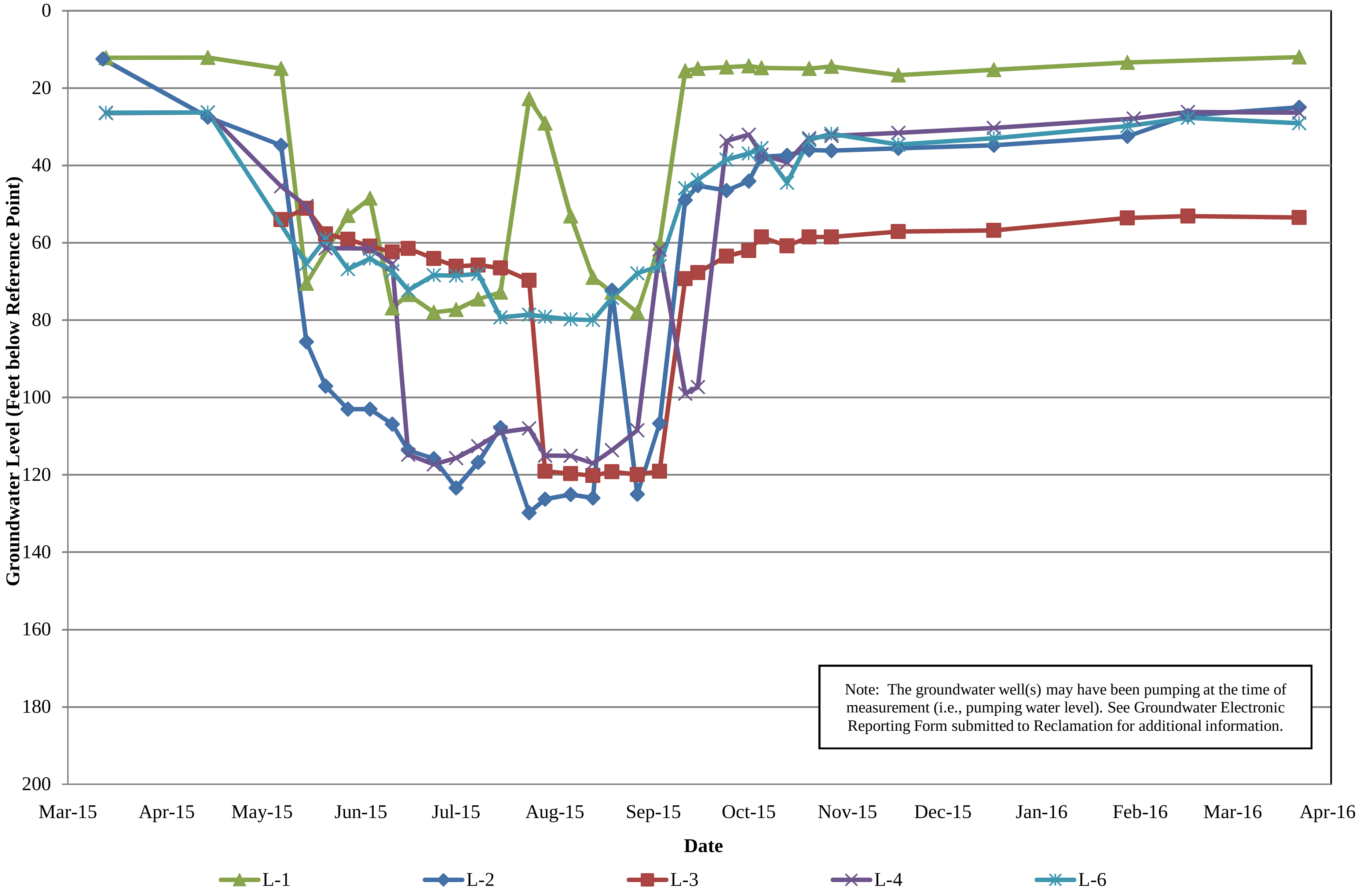


Groundwater Production vs. Time
Instantaneous Flow (gpm)
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0
1500
1350
1200
1050
900
750
600
450
300
150
0
5/6/2015
5/20/2015
6/3/2015
6/17/2015
7/1/2015
7/15/2015
7/29/2015
8/12/2015
8/26/2015
9/9/2015
9/23/2015
10/7/2015
Date
MAP Pump Rate
Ose-1 Pump Rate
Perry Pump Rate
Spangler Pump Rate
Dhaliwal Pump Rate
Willey Pump Rate
Ose-2 Pump Rate
TNBC Betts Pump Rate
MAP Total Volume
Ose-1 Total Volume
Perry Total Volume
Spangler Total Volume
Dhaliwal Total Volume
Willey Total Volume
Ose-2 Total Volume
TNBC Betts Total Volume

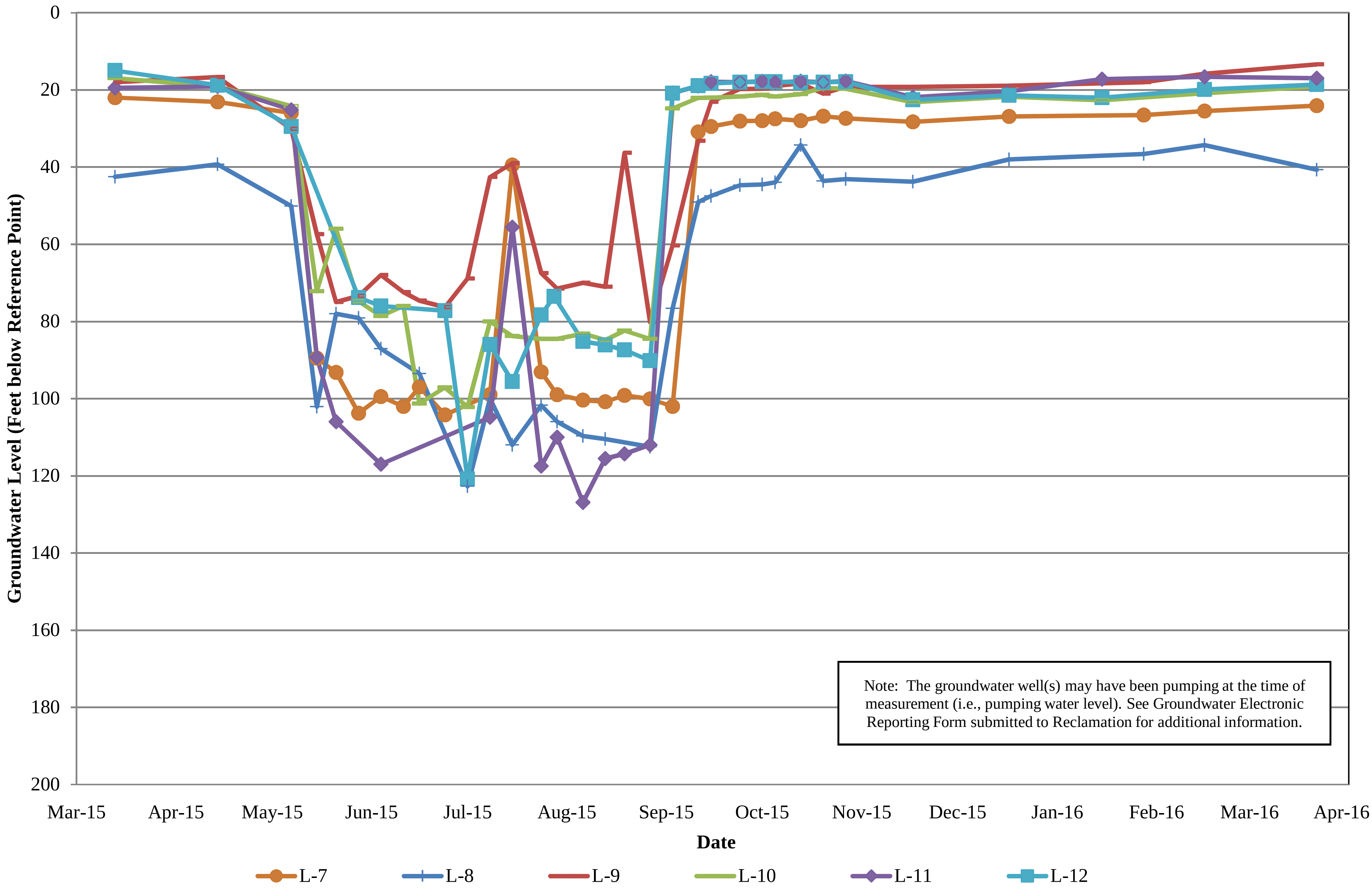


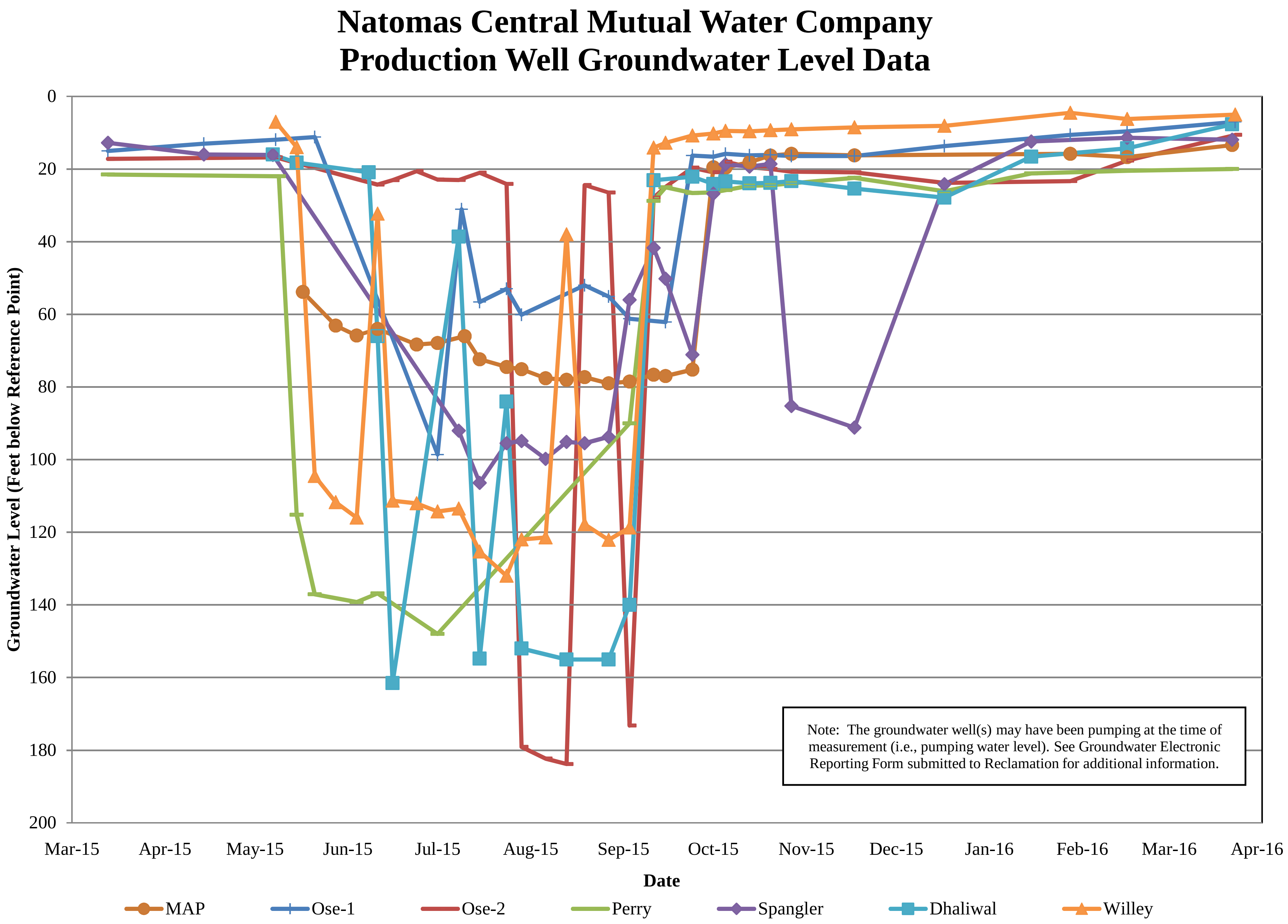
Groundwater Production vs. Time
Instantaneous Flow (gpm)
2400
2000
1600
1200
800
400
0
1200
1000
800
600
400
200
0
5/6/2015
5/20/2015
6/3/2015
6/17/2015
7/1/2015
7/15/2015
7/29/2015
8/12/2015
8/26/2015
9/9/2015
9/23/2015
10/7/2015
Date
TNBC Frazer Pump Rate
TNBC Bennett North Pump Rate
TNBC Atkinson Pump Rate
TNBC Fisherman's Lake Pump Rate
TNBC Silva Dairy Pump Rate
TNBC Lucich North Pump Rate
TNBC Frazer Total Volume
TNBC Bennett North Total Volume
TNBC Atkinson Total Volume
TNBC Fisherman's Lake Total Volume
TNBC Silva Dairy Total Volume
TNBC Lucich North Total Volume

Natomas Central Mutual Water Company
Production Well Groundwater Level Data

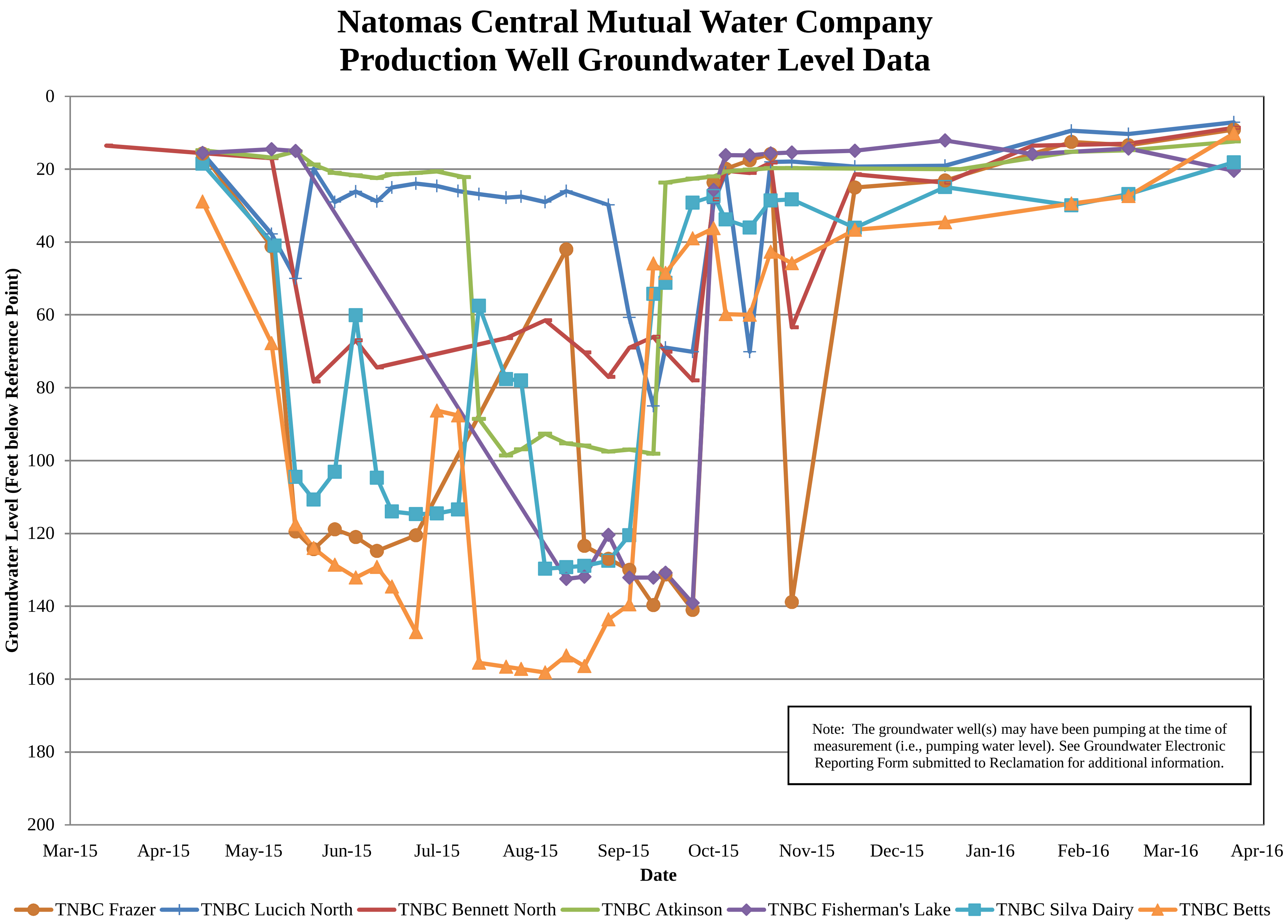


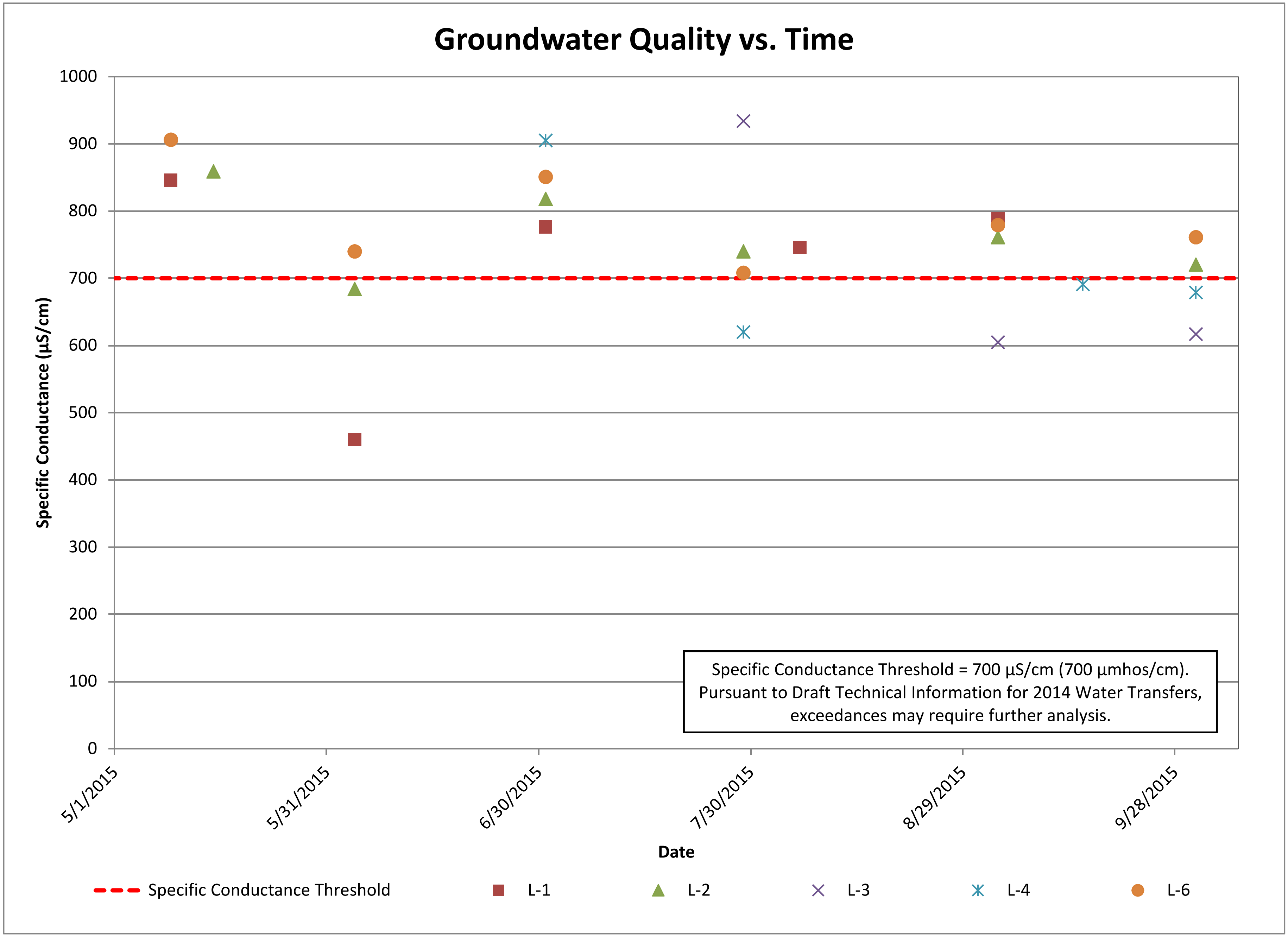
Natomas Central Mutual Water Company
Production Well Groundwater Level Data



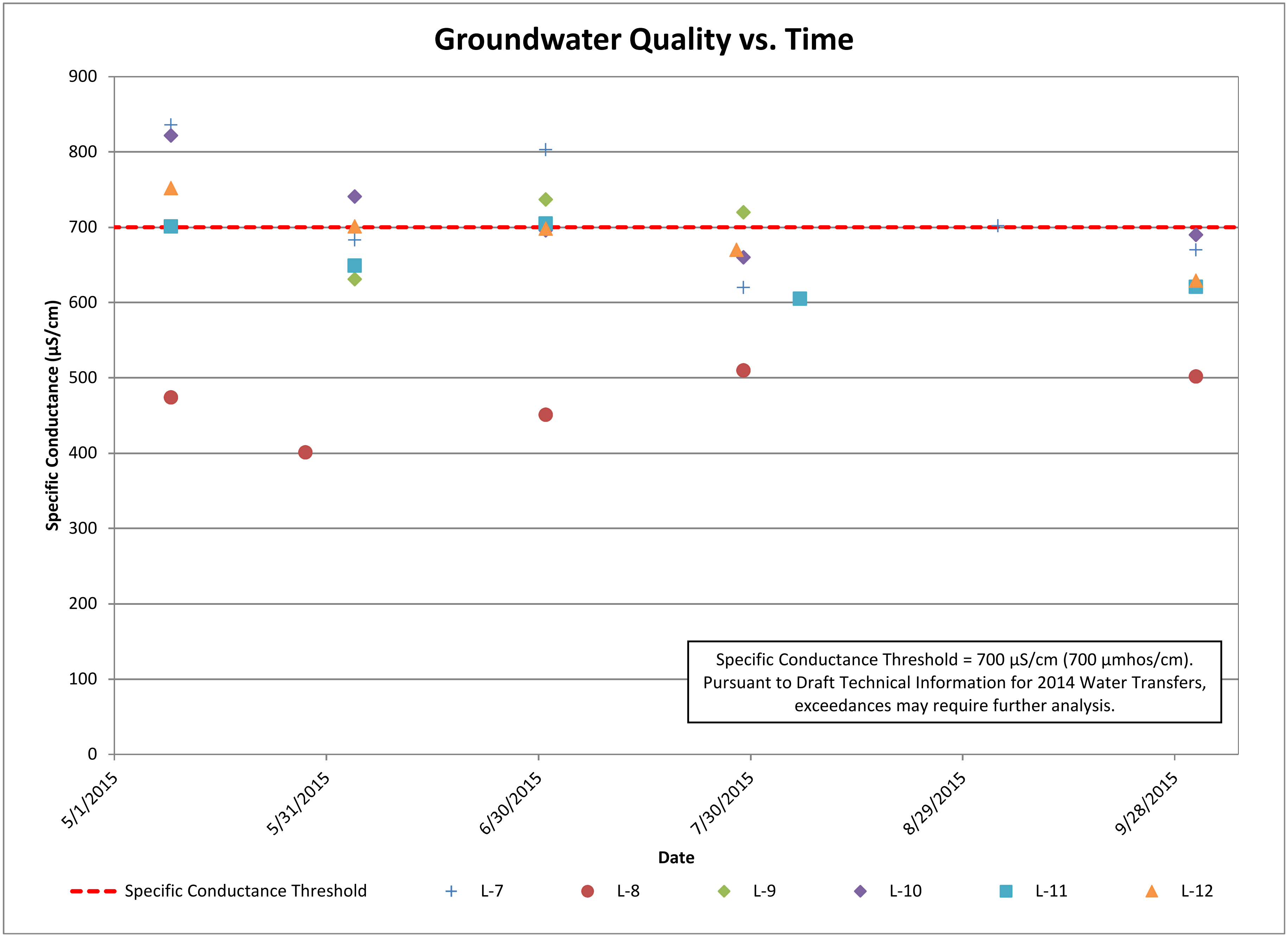


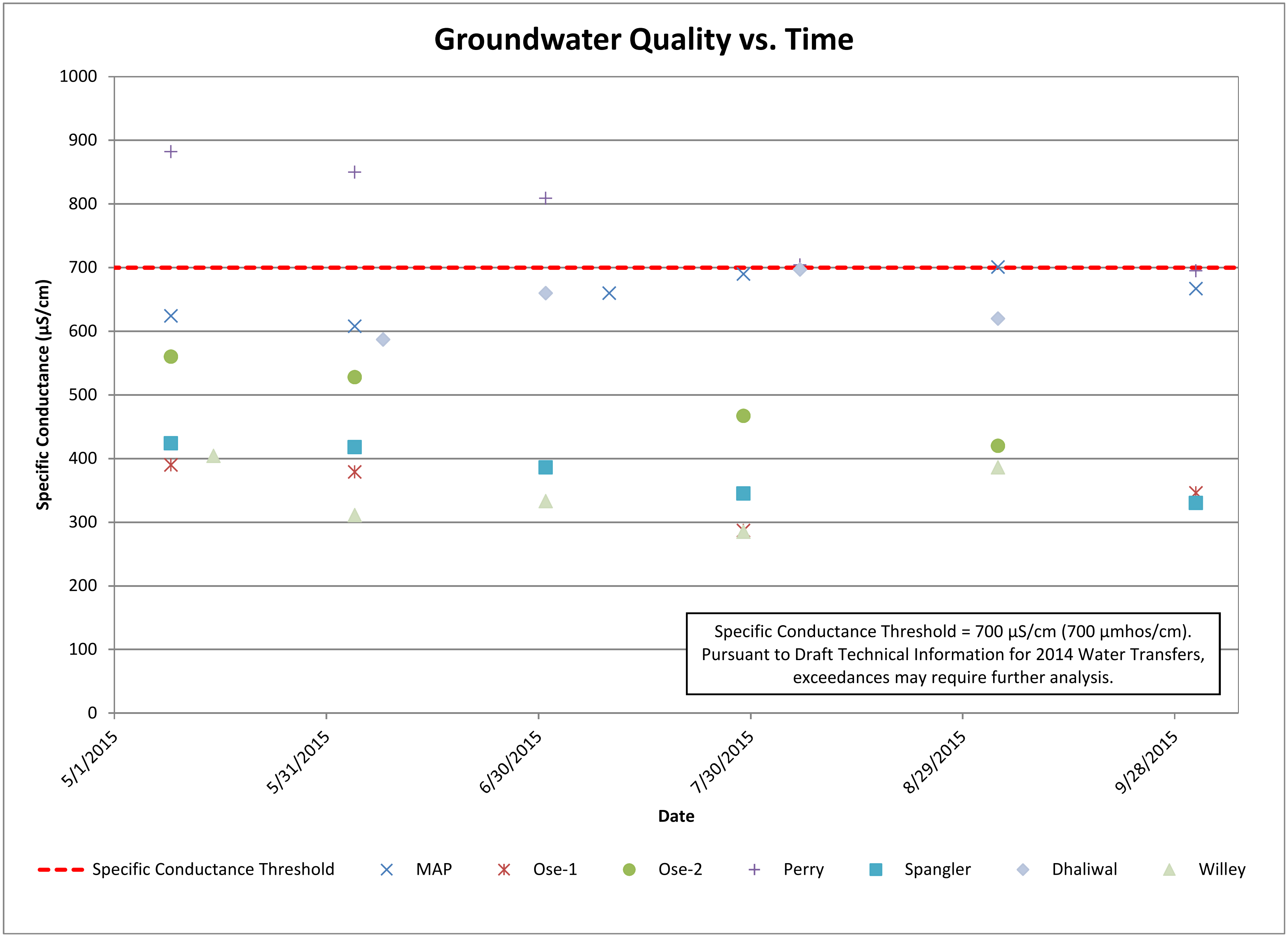
Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
MAP
Ose-1
Ose-2
Perry
Spangler
Dhaliwal
Willey
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.


Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
TNBC Frazer
TNBC Lucich North
TNBC Bennett North
TNBC Atkinson
TNBC Fisherman's Lake
TNBC Silva Dairy
TNBC Betts

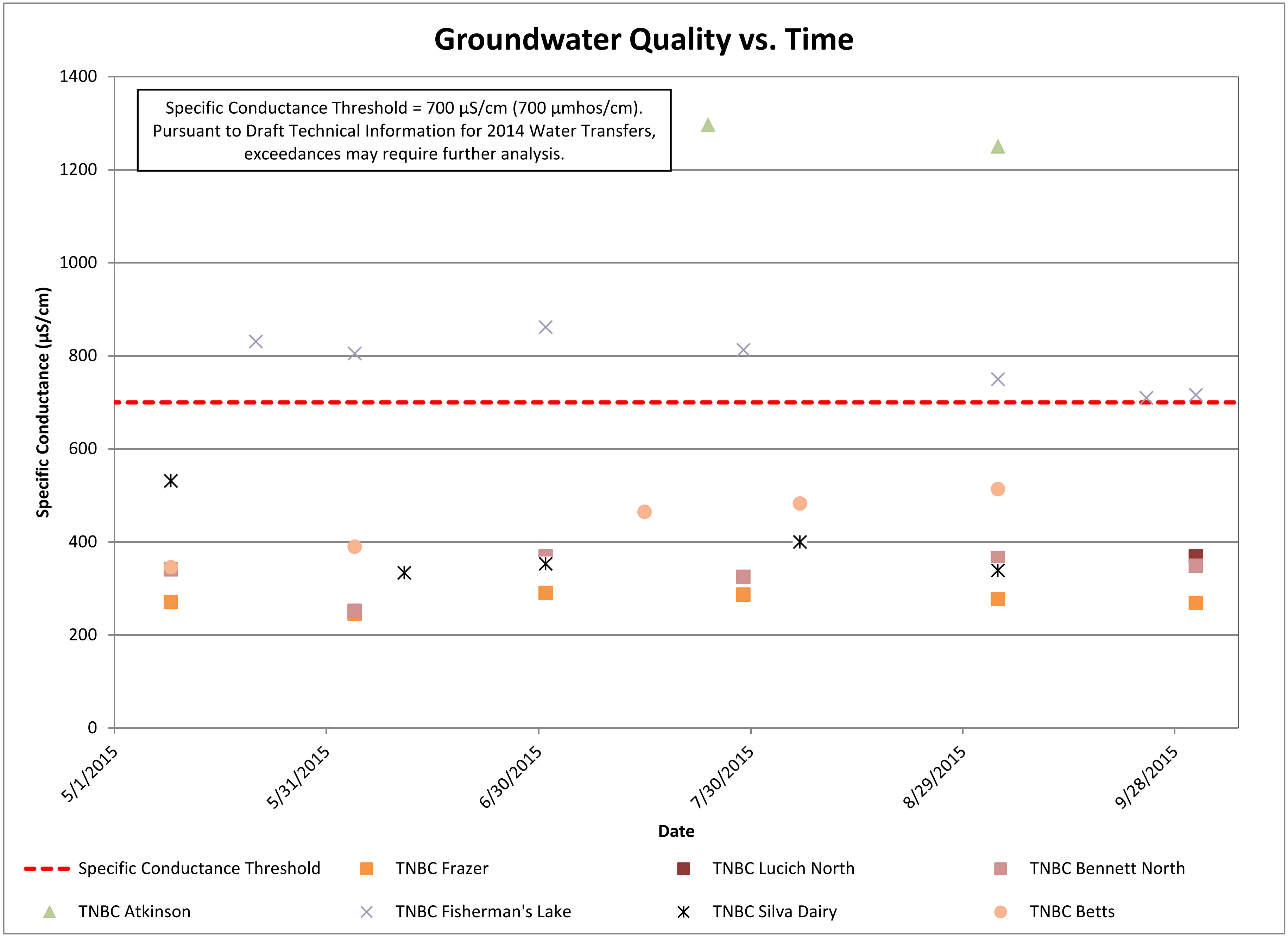


Groundwater Quality vs. Time
Specific Conductance (µS/cm)
1000
900
800
700
600
500
400
300
200
100
0
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
Date
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2014 Water Transfers,
exceedances may require further analysis.
Specific Conductance Threshold
L-1
L-2
L-3
L-4
L-6


Groundwater Quality vs. Time
Specific Conductance (µS/cm)
900
800
700
600
500
400
300
200
100
0
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
Date
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2014 Water Transfers,
exceedances may require further analysis.
Specific Conductance Threshold
L-7
L-8
L-9
L-10
L-11
L-12



Groundwater Quality vs. Time
Specific Conductance (µS/cm)
1000
900
800
700
600
500
400
300
200
100
0
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
Date
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm). Pursuant to Draft Technical Information for 2014 Water Transfers, exceedances may require further analysis.
Specific Conductance Threshold
MAP
Ose-1
Ose-2
Perry
Spangler
Dhaliwal
Willey


Groundwater Quality vs. Time
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2014 Water Transfers,
exceedances may require further analysis.
Specific Conductance (µS/cm)
1400
1200
1000
800
600
400
200
0
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
Date
Specific Conductance Threshold
TNBC Frazer
TNBC Lucich North
TNBC Bennett North
TNBC Atkinson
TNBC Fisherman's Lake
TNBC Silva Dairy
TNBC Betts

Pelger Mutual Water Company

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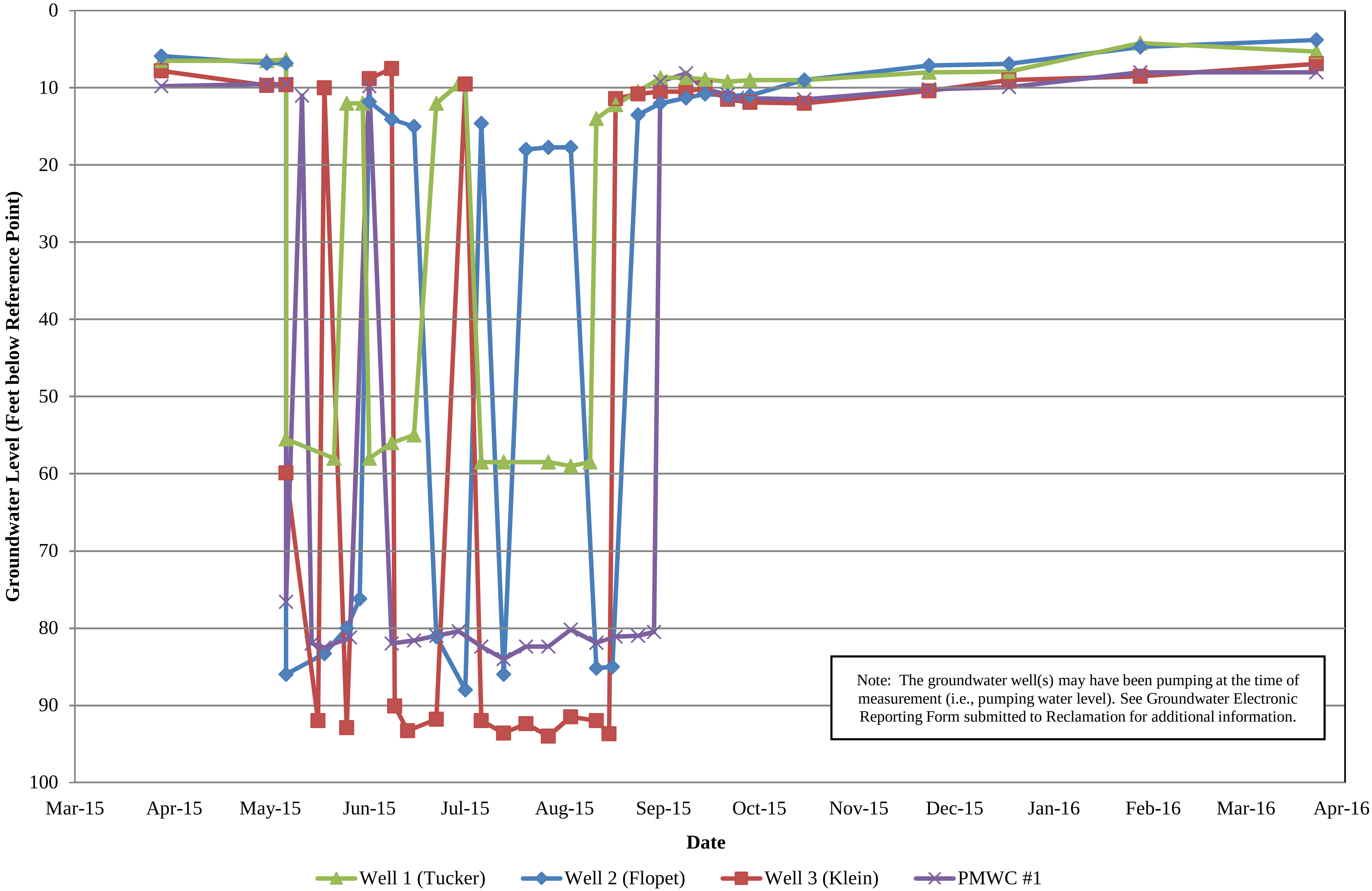
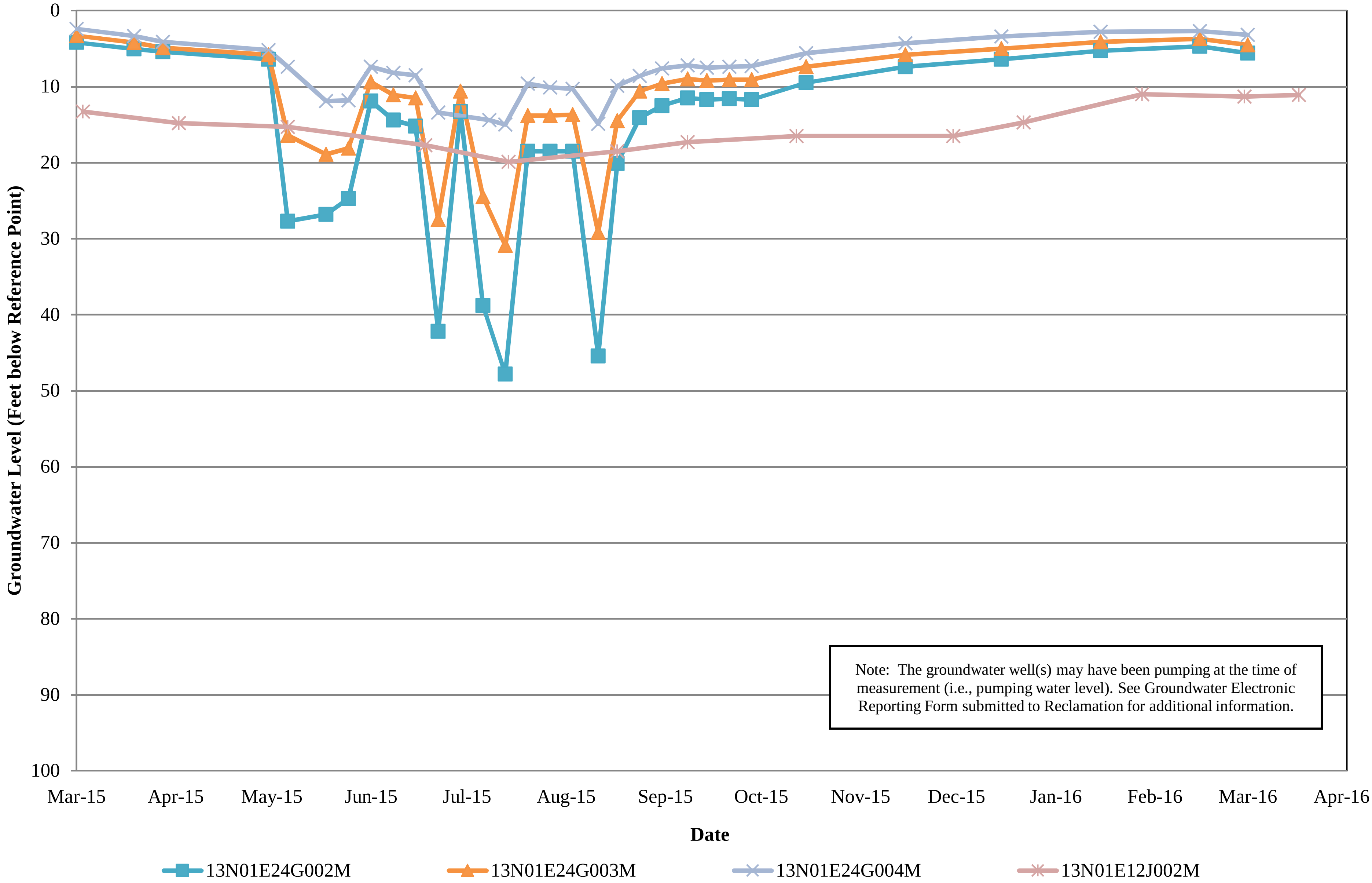
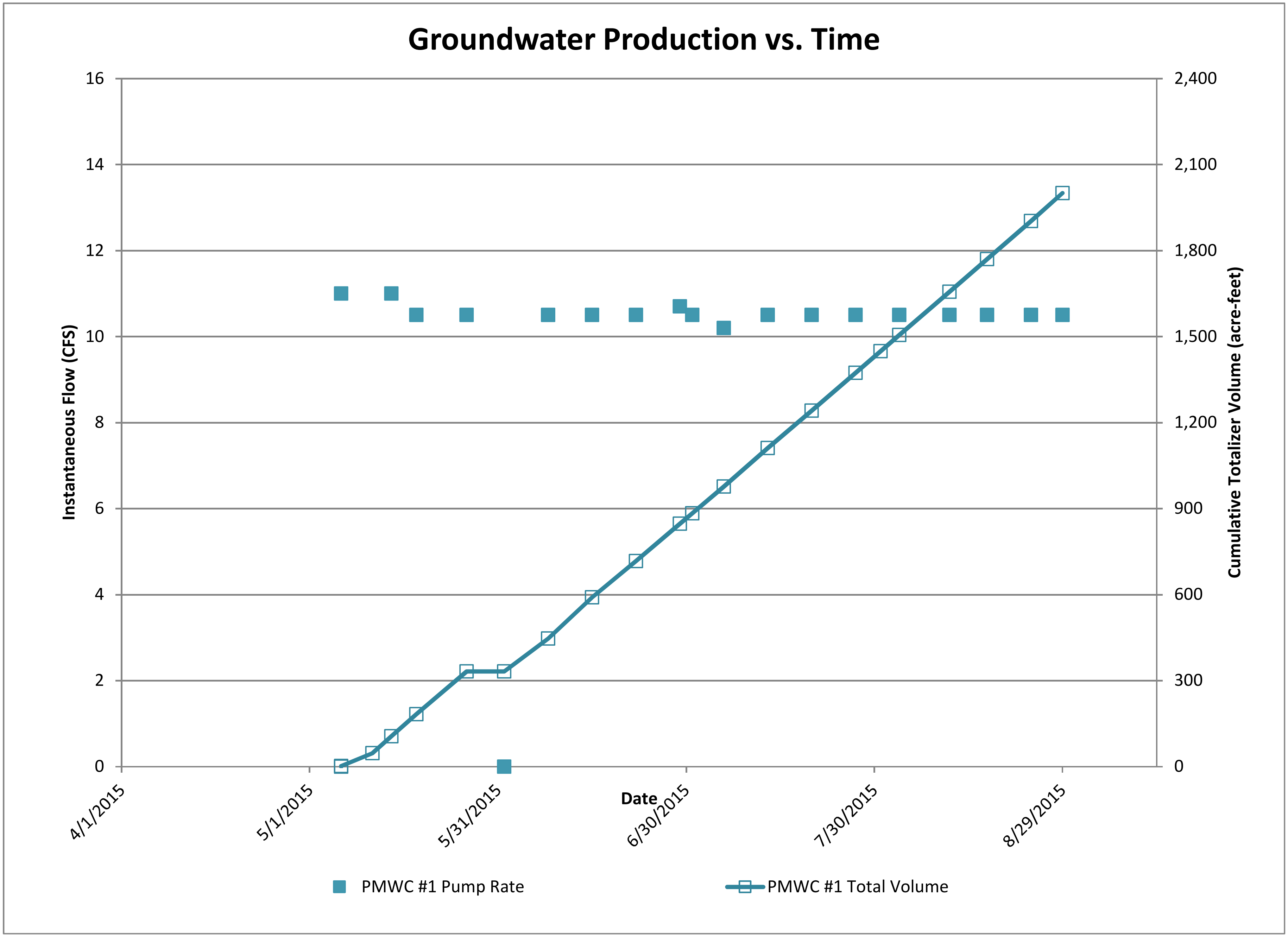
Pelger Mutual Water Company
Production Well Groundwater Level Data



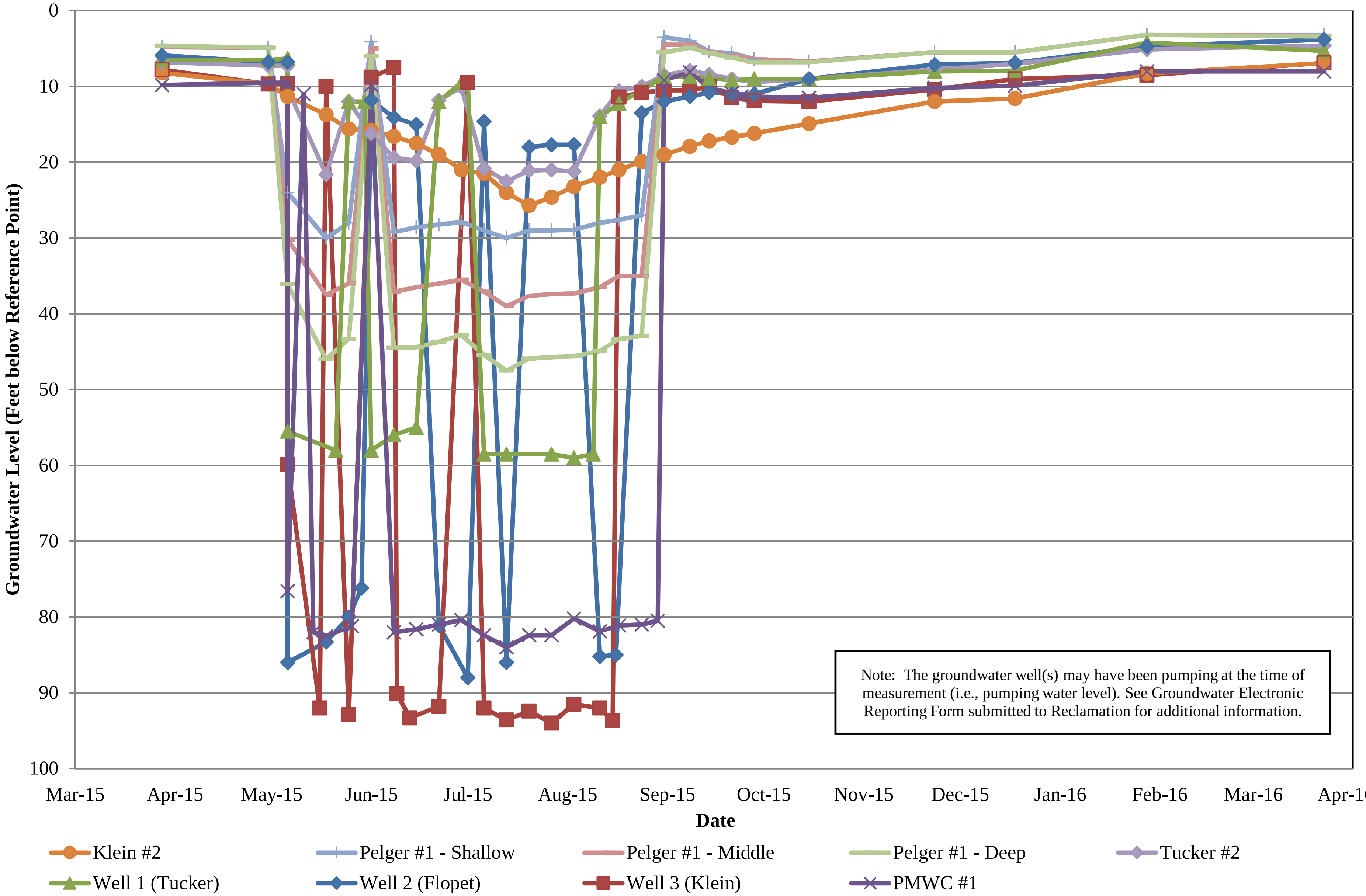
Pelger Mutual Water Company
DWR Monitoring Well Groundwater Level Data

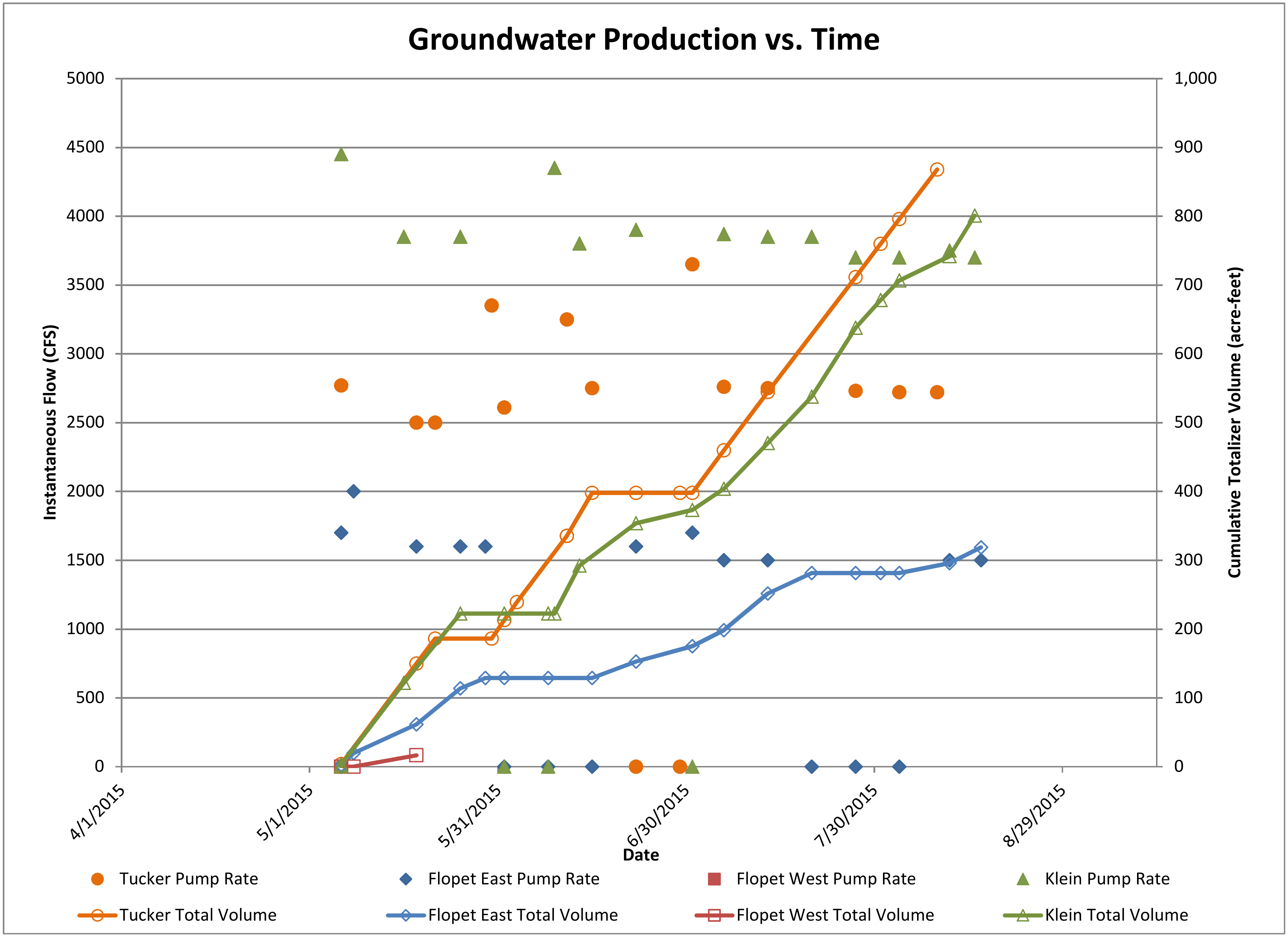


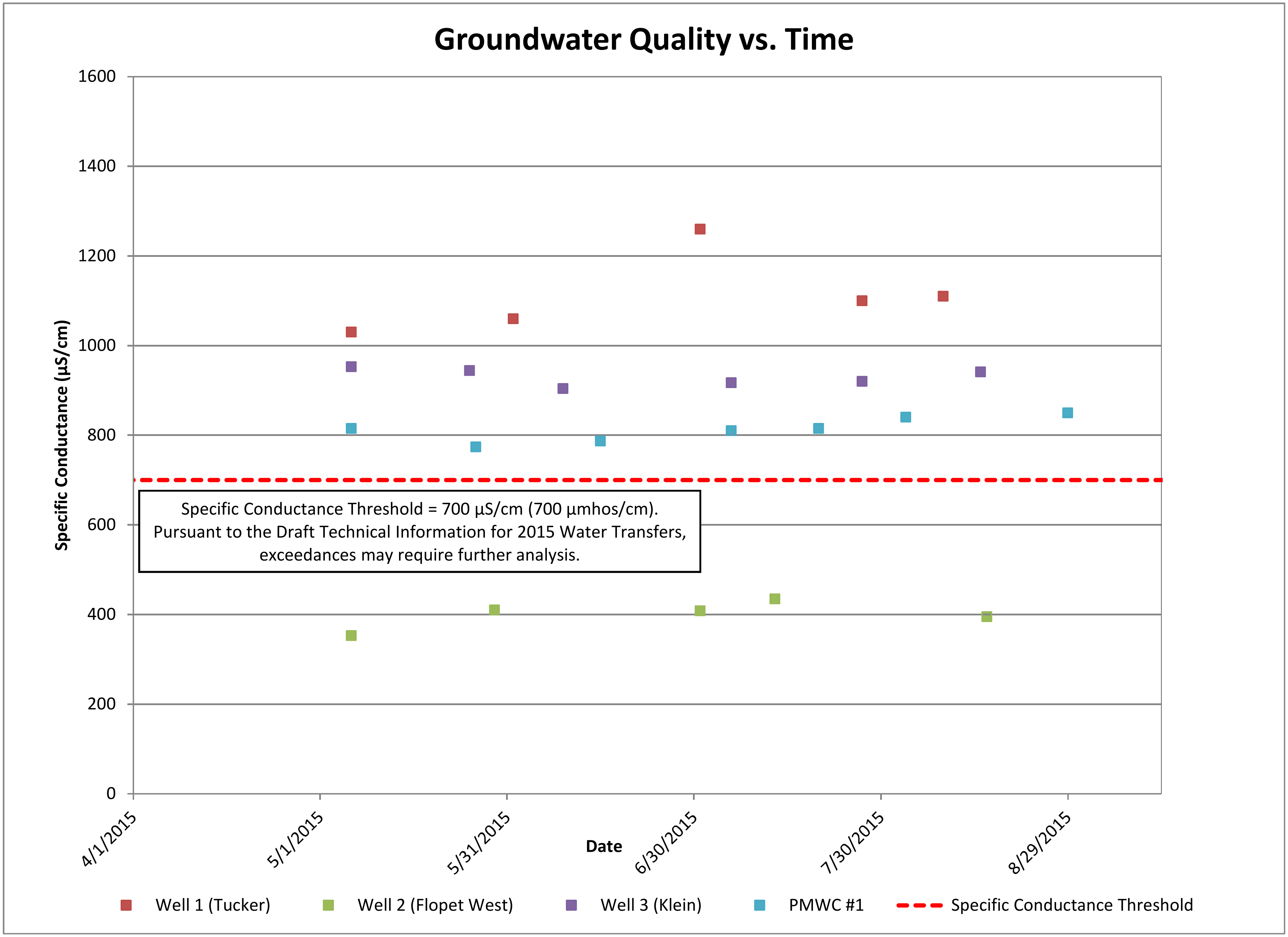


Groundwater Production vs. Time
Instantaneous Flow (CFS)
Cumulative Totalizer Volume (acre-feet)
Date
0
2
4
6
8
10
12
14
16
0
300
600
900
1,200
1,500
1,800
2,100
2,400
4/1/2015
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
PMWC #1 Pump Rate
PMWC #1 Total Volume

Pelger Mutual Water Company
Monitoring Well Groundwater Level Data




Groundwater Production vs. Time
Instantaneous Flow (CFS)
Cumulative Totalizer Volume (acre-feet)
Date
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1,000
900
800
700
600
500
400
300
200
100
0
4/1/2015
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
Tucker Pump Rate
Flopet East Pump Rate
Flopet West Pump Rate
Klein Pump Rate
Tucker Total Volume
Flopet East Total Volume
Flopet West Total Volume
Klein Total Volume



Groundwater Quality vs. Time
1600
1400
1200
1000
800
600
400
200
0
Specific Conductance (µS/cm)
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to the Draft Technical Information for 2015 Water Transfers,
exceedances may require further analysis.
4/1/2015
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
Date
Well 1 (Tucker)
Well 2 (Flopet West)
Well 3 (Klein)
PMWC #1
Specific Conductance Threshold

Pelger Road 1700, LLC

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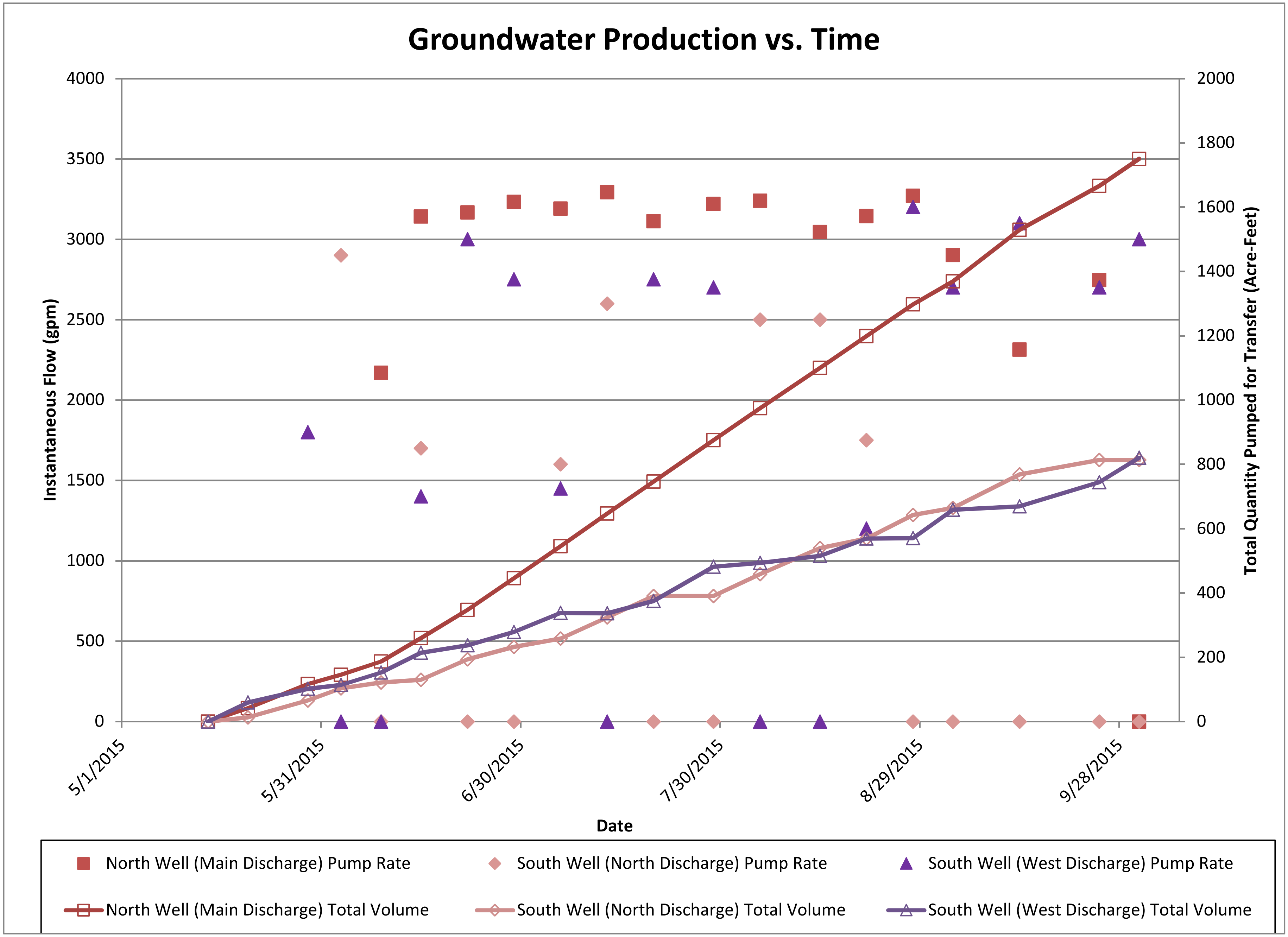
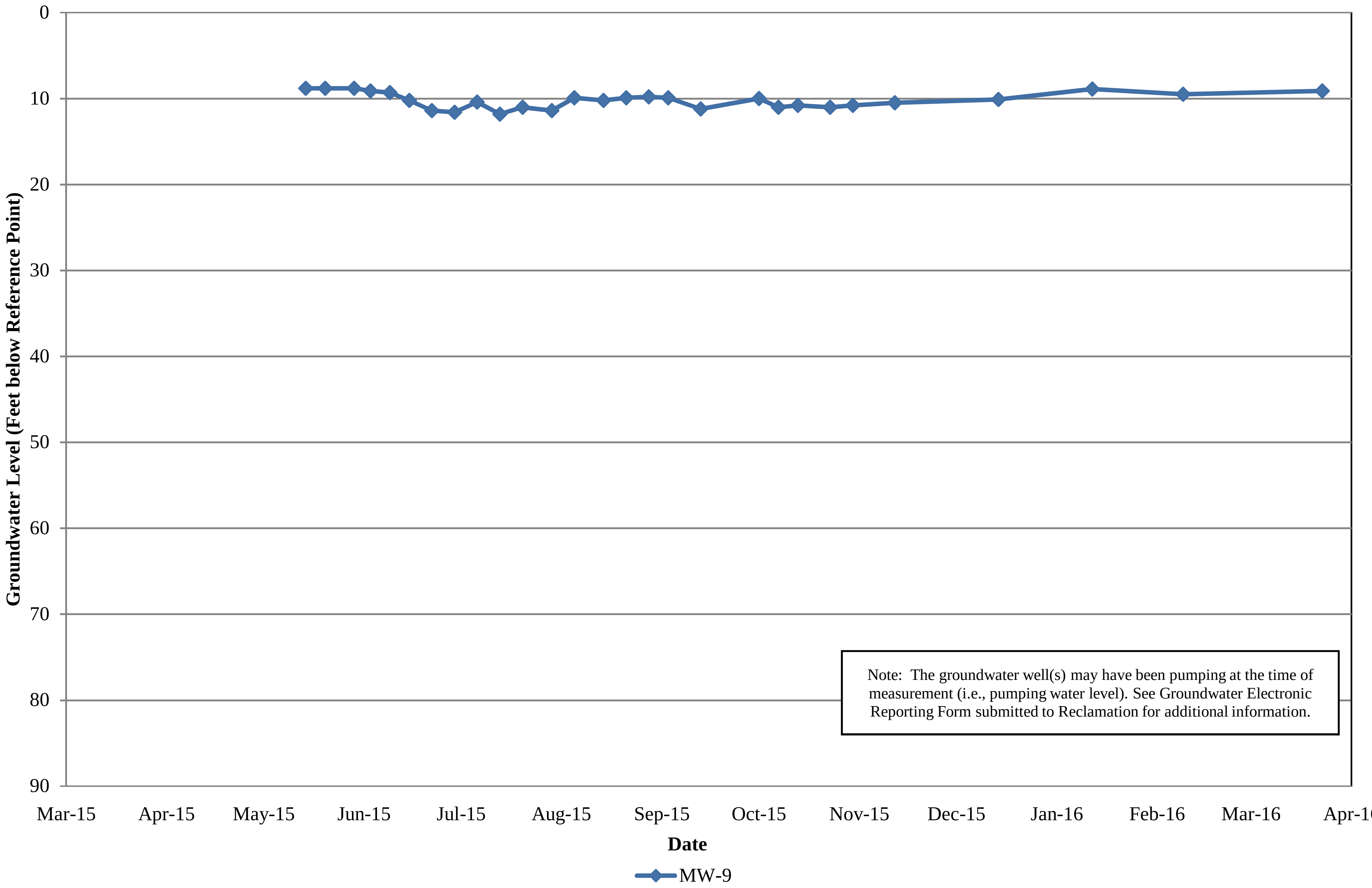
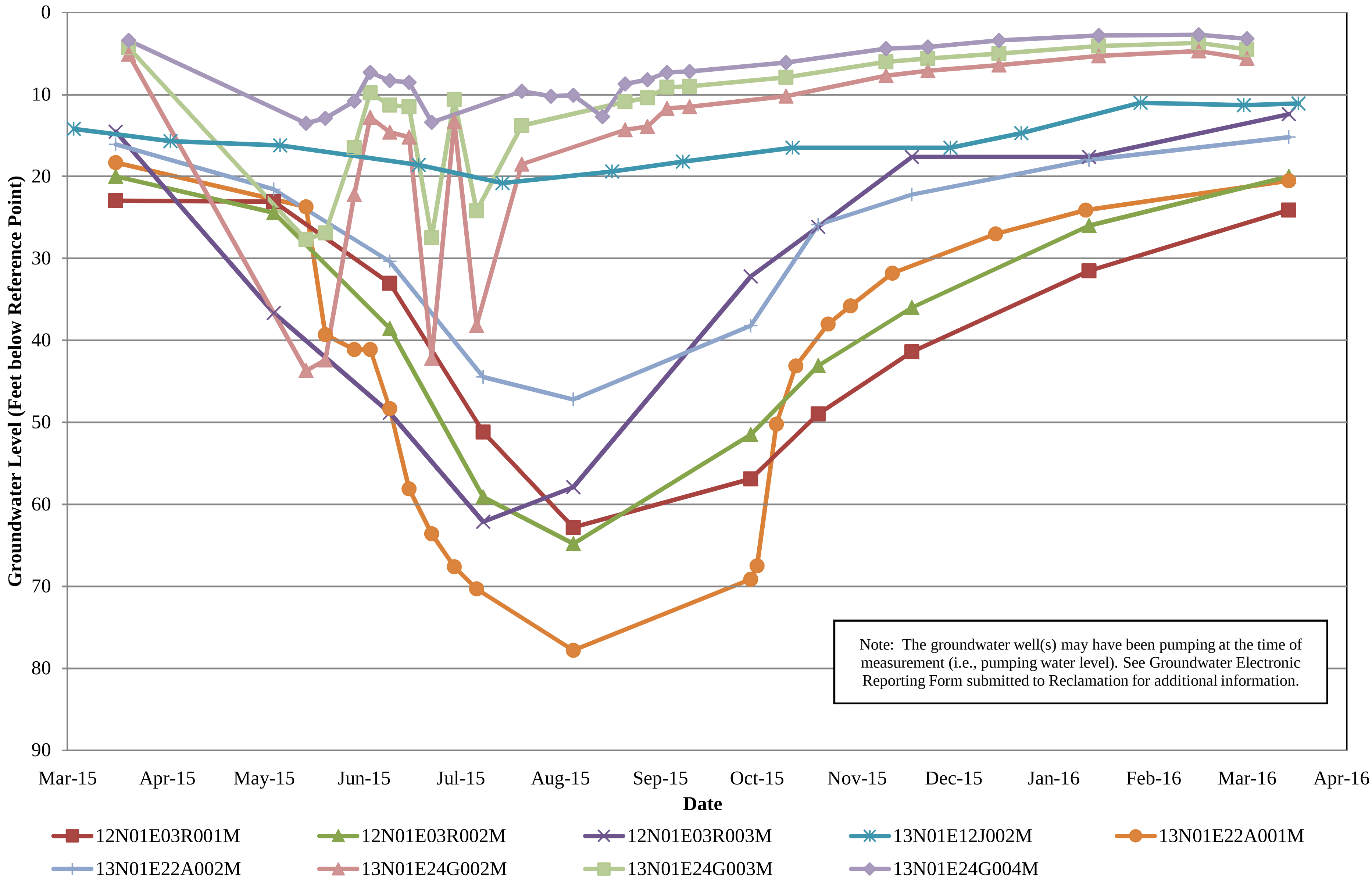
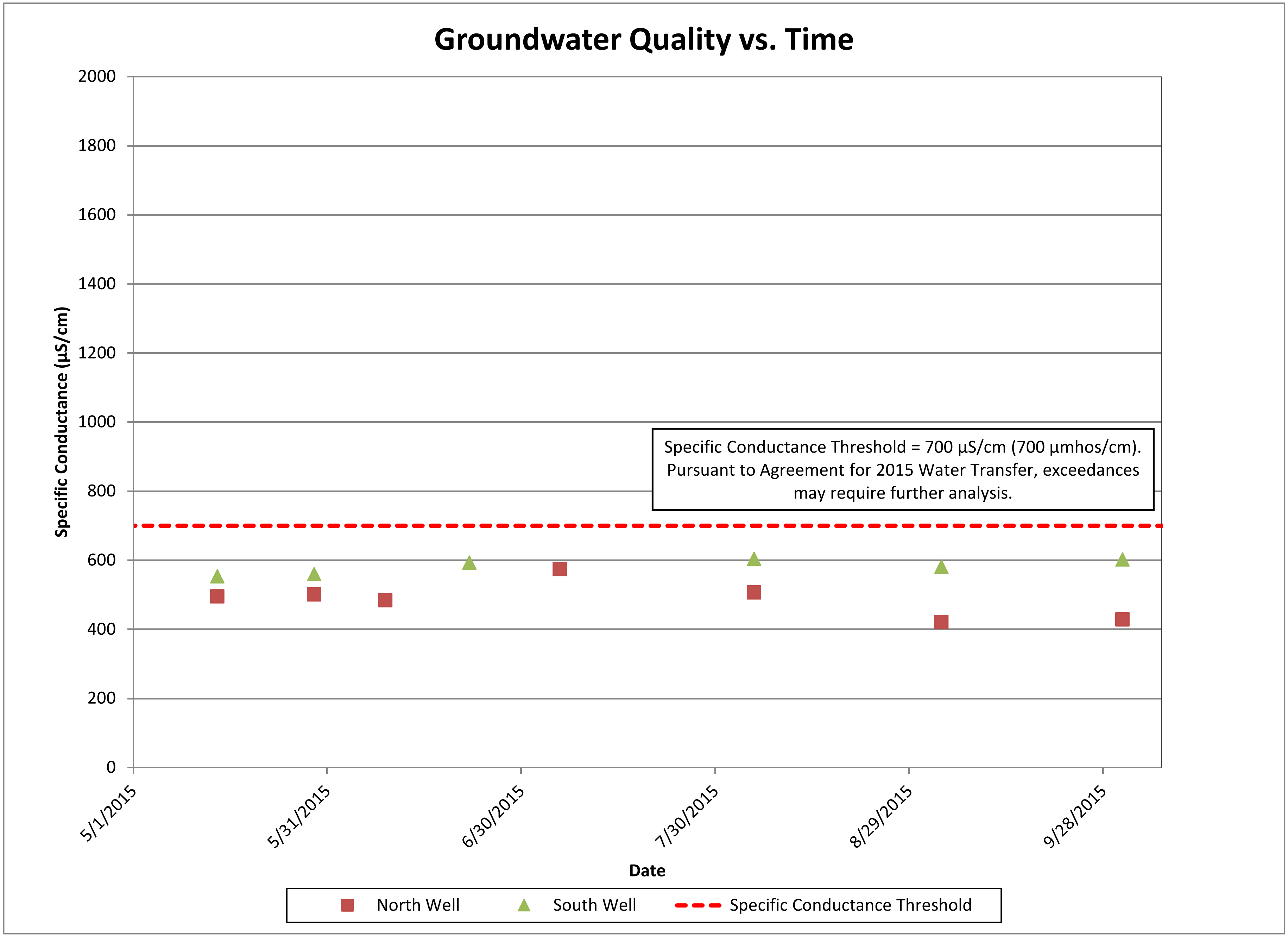

Groundwater Production vs. Time
Instantaneous Flow (gpm)
Total Quantity Pumped for Transfer (Acre-Feet)
Date
4000
3500
3000
2500
2000
1500
1000
500
0
2000
1800
1600
1400
1200
1000
800
600
400
200
0
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
North Well (Main Discharge) Pump Rate
South Well (North Discharge) Pump Rate
South Well (West Discharge) Pump Rate
North Well (Main Discharge) Total Volume
South Well (North Discharge) Total Volume
South Well (West Discharge) Total Volume

Pelger Road 1700, LLC
Monitoring Well Groundwater Level Data



Pelger Road 1700, LLC
DWR Monitoring Well Groundwater Level Data




Groundwater Quality vs. Time
Specific Conductance (µS/cm)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm). Pursuant to Agreement for 2015 Water Transfer, exceedances may require further analysis.
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
Date
North Well
South Well
Specific Conductance Threshold

Pleasant Grove-Verona Mutual Water Company

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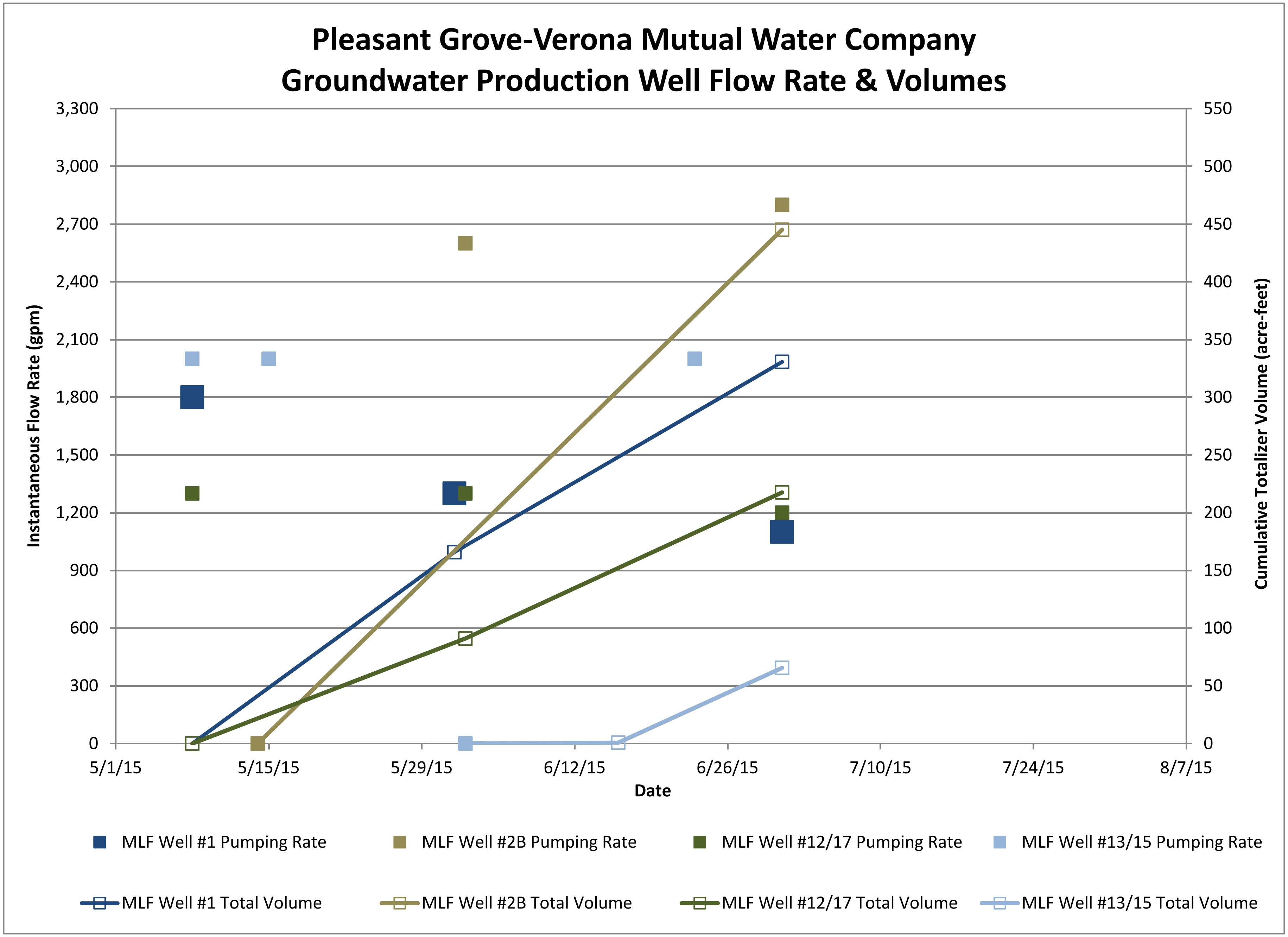
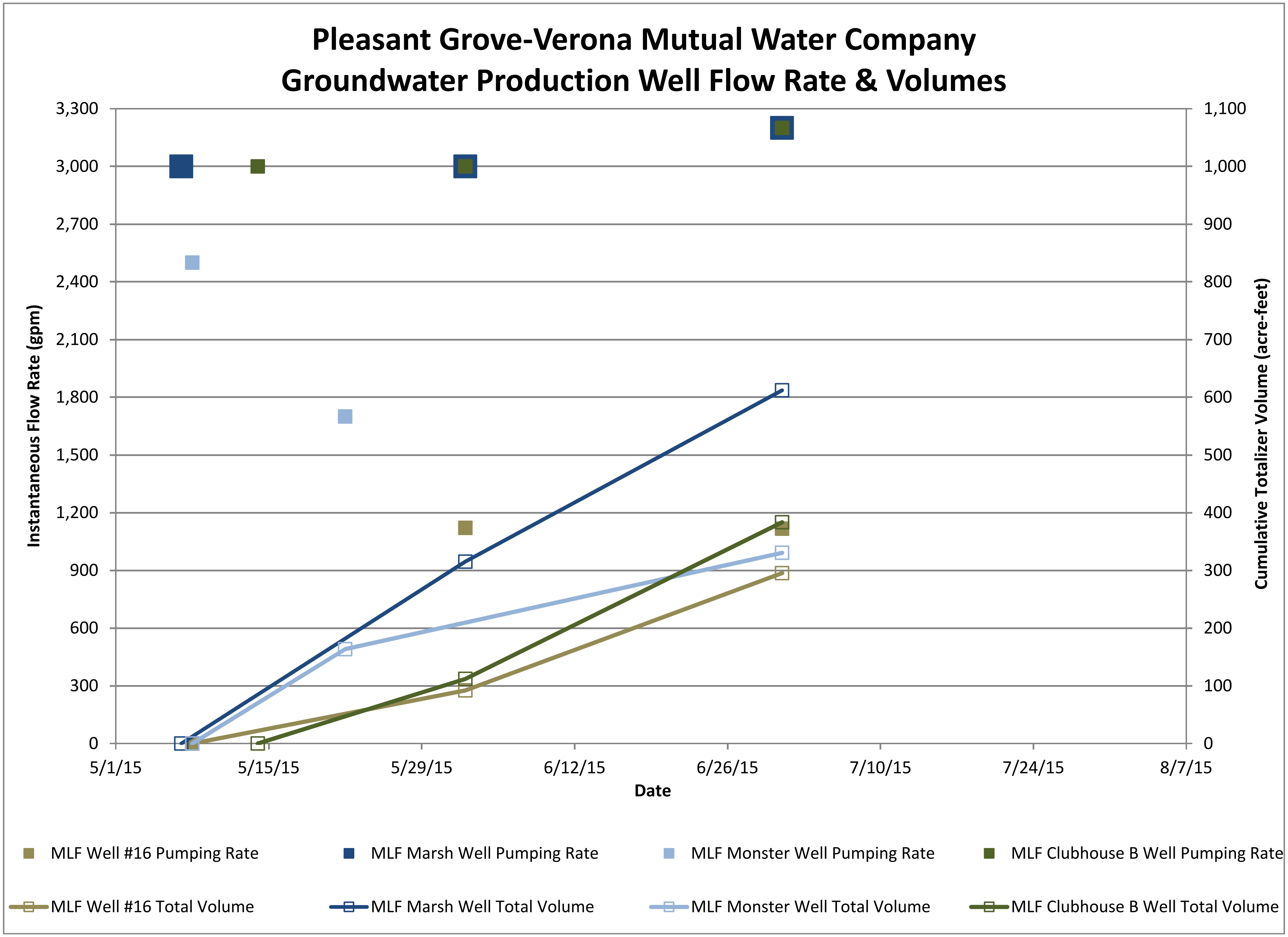
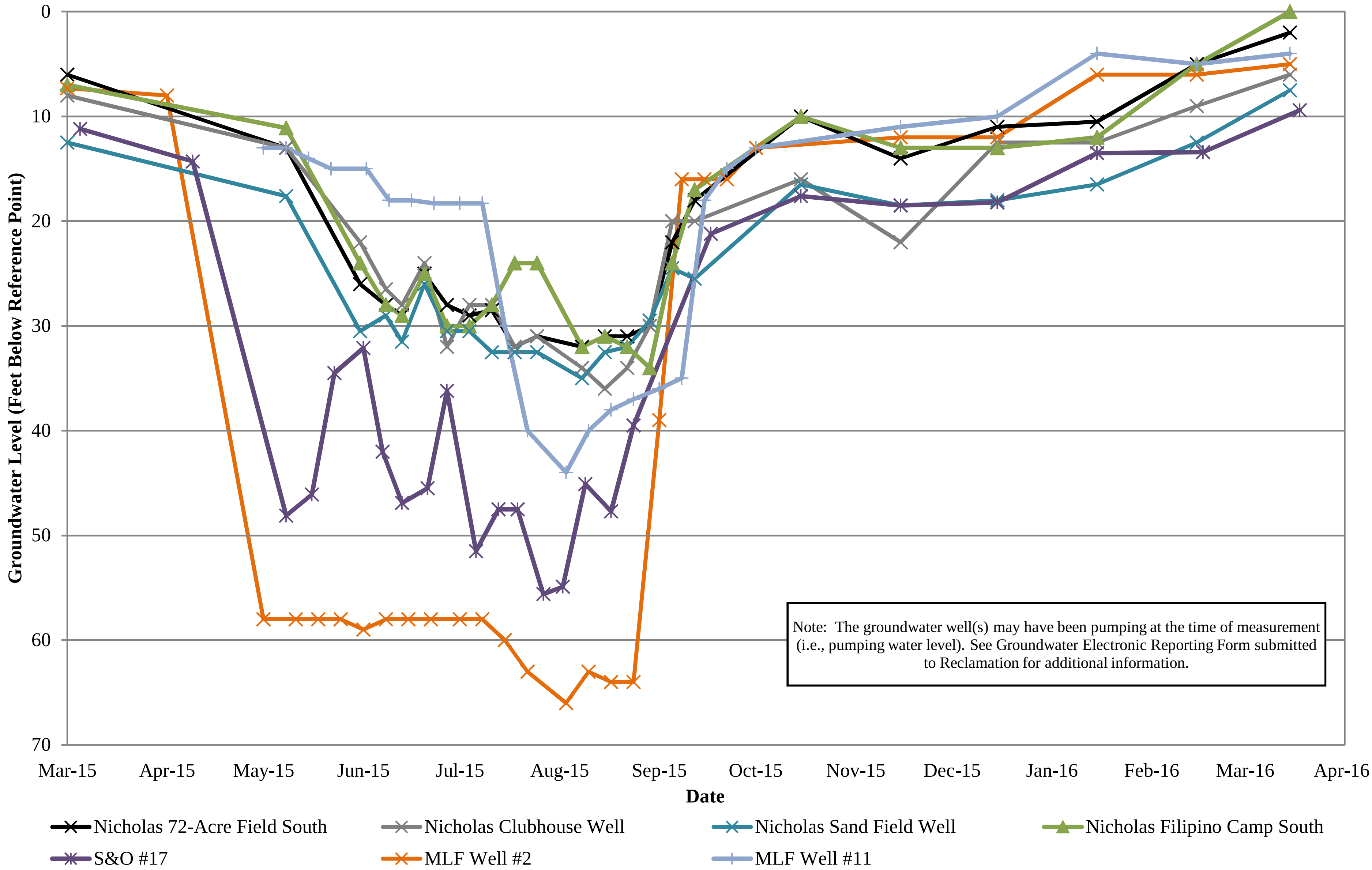
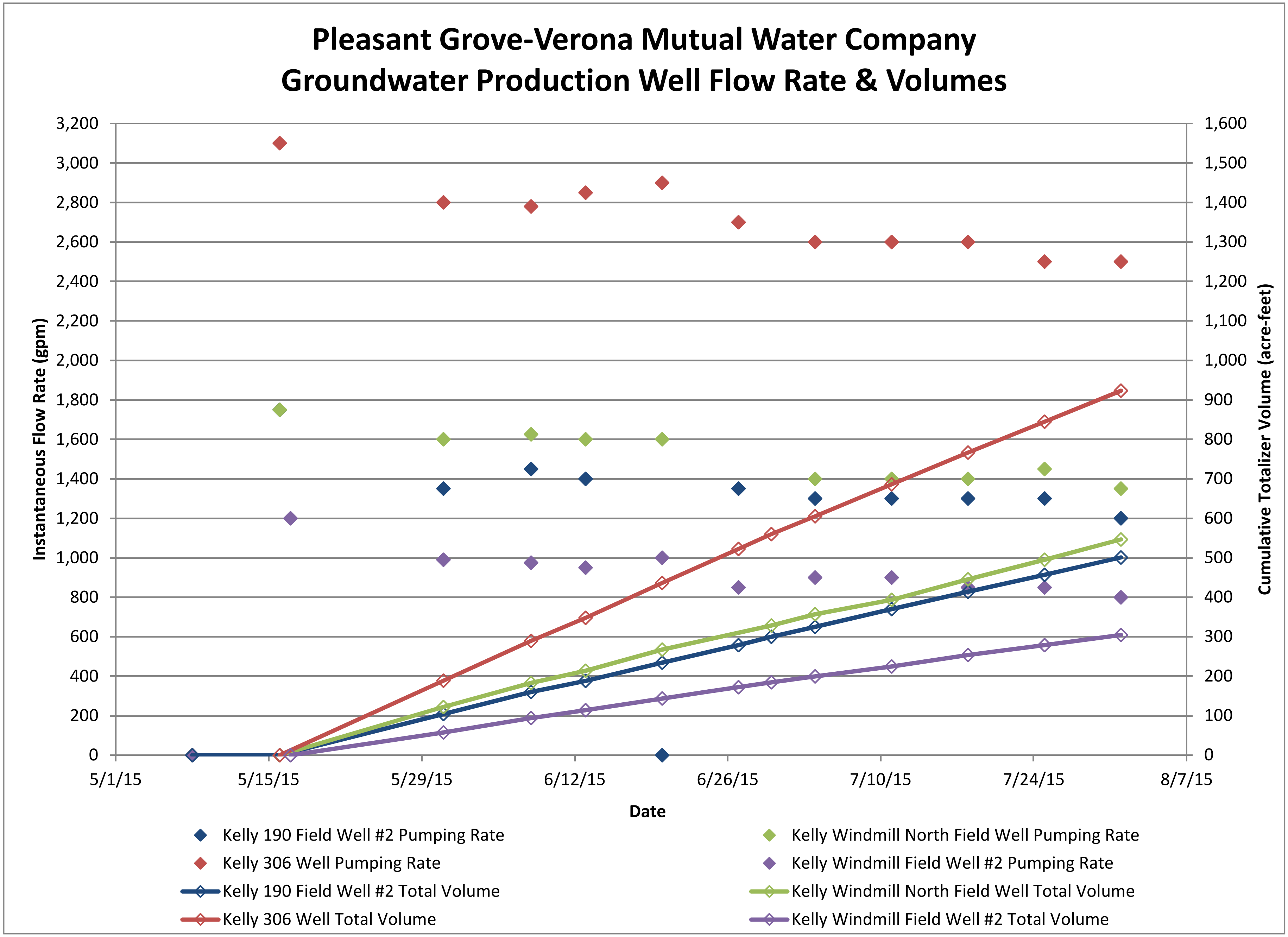

Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
Date
3,300
3,000
2,700
2,400
2,100
1,800
1,500
1,200
900
600
300
0
550
500
450
400
350
300
250
200
150
100
50
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
MLF Well #1 Pumping Rate
MLF Well #2B Pumping Rate
MLF Well #12/17 Pumping Rate
MLF Well #13/15 Pumping Rate
MLF Well #1 Total Volume
MLF Well #2B Total Volume
MLF Well #12/17 Total Volume
MLF Well #13/15 Total Volume

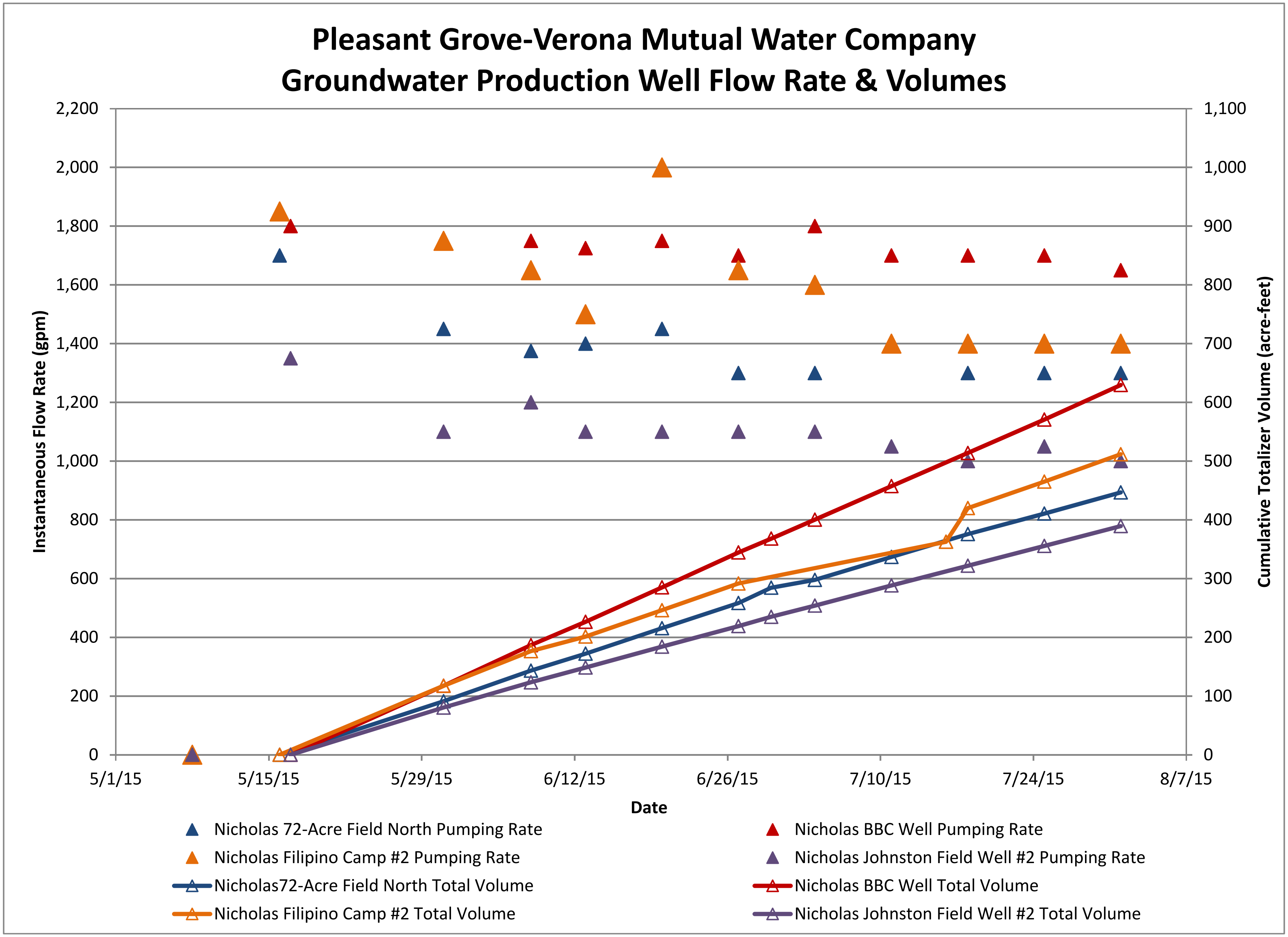

Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
3,300
3,000
2,700
2,400
2,100
1,800
1,500
1,200
900
600
300
0
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
MLF Well #16 Pumping Rate
MLF Marsh Well Pumping Rate
MLF Monster Well Pumping Rate
MLF Clubhouse B Well Pumping Rate
MLF Well #16 Total Volume
MLF Marsh Well Total Volume
MLF Monster Well Total Volume
MLF Clubhouse B Well Total Volume

Pleasant Grove-Verona Mutual Water Company
Monitoring Well Groundwater Level Data



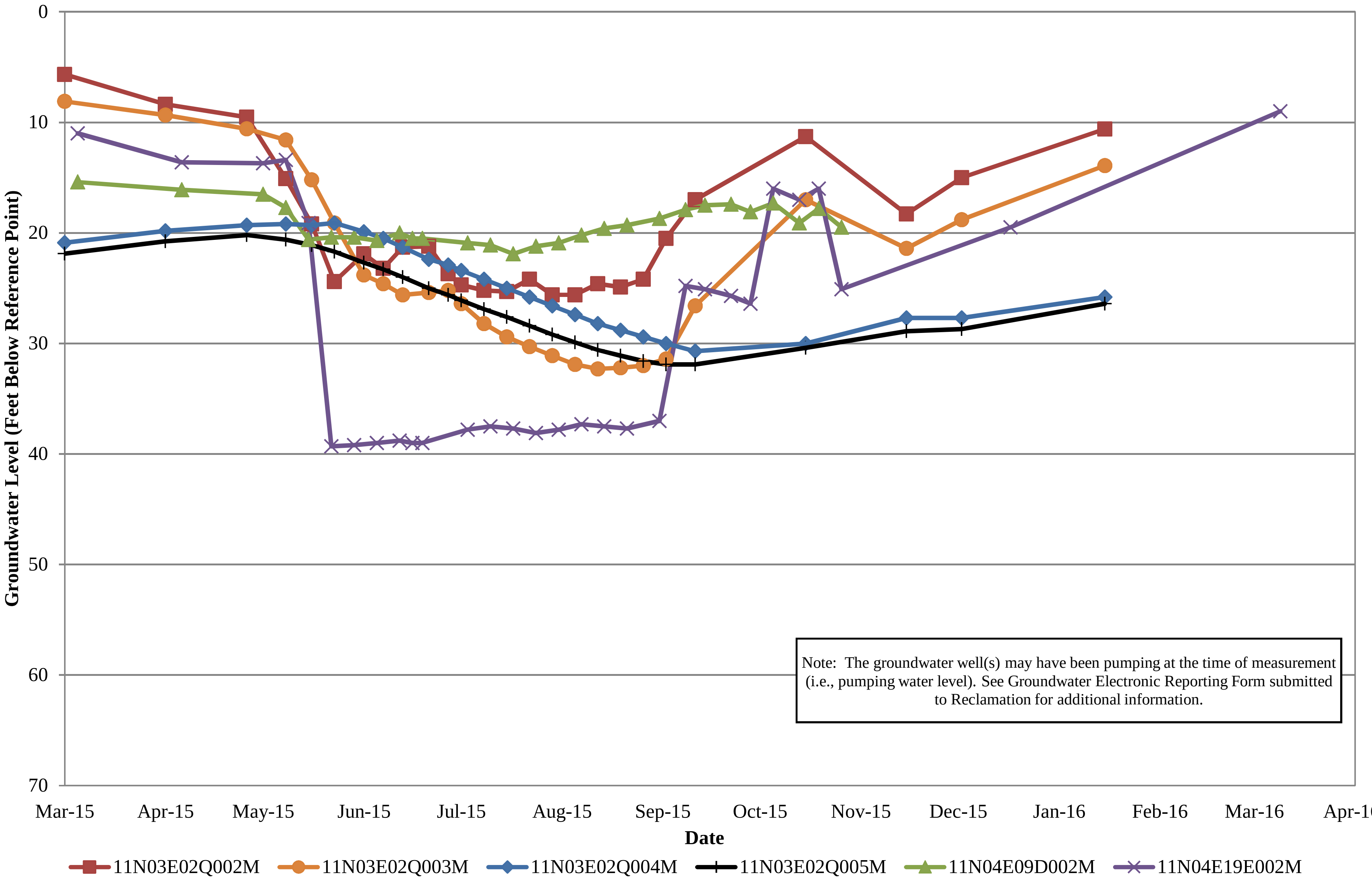


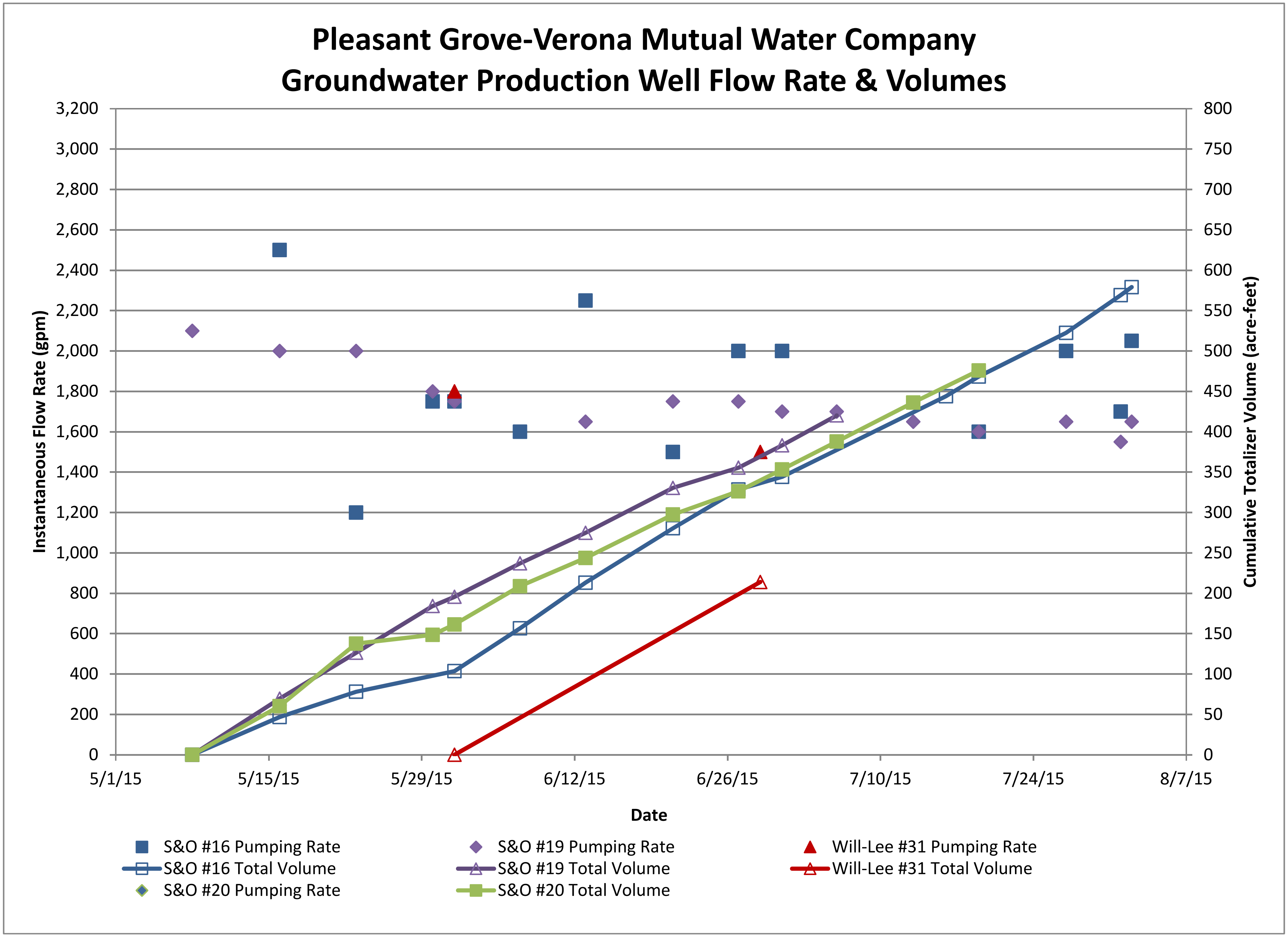
Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
Kelly 190 Field Well #2 Pumping Rate
Kelly 306 Well Pumping Rate
Kelly 190 Field Well #2 Total Volume
Kelly 306 Well Total Volume
Kelly Windmill North Field Well Pumping Rate
Kelly Windmill Field Well #2 Pumping Rate
Kelly Windmill North Field Well Total Volume
Kelly Windmill Field Well #2 Total Volume



Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
Date
Nicholas 72-Acre Field North Pumping Rate
Nicholas BBC Well Pumping Rate
Nicholas Filipino Camp #2 Pumping Rate
Nicholas Johnston Field Well #2 Pumping Rate
Nicholas72-Acre Field North Total Volume
Nicholas BBC Well Total Volume
Nicholas Filipino Camp #2 Total Volume
Nicholas Johnston Field Well #2 Total Volume

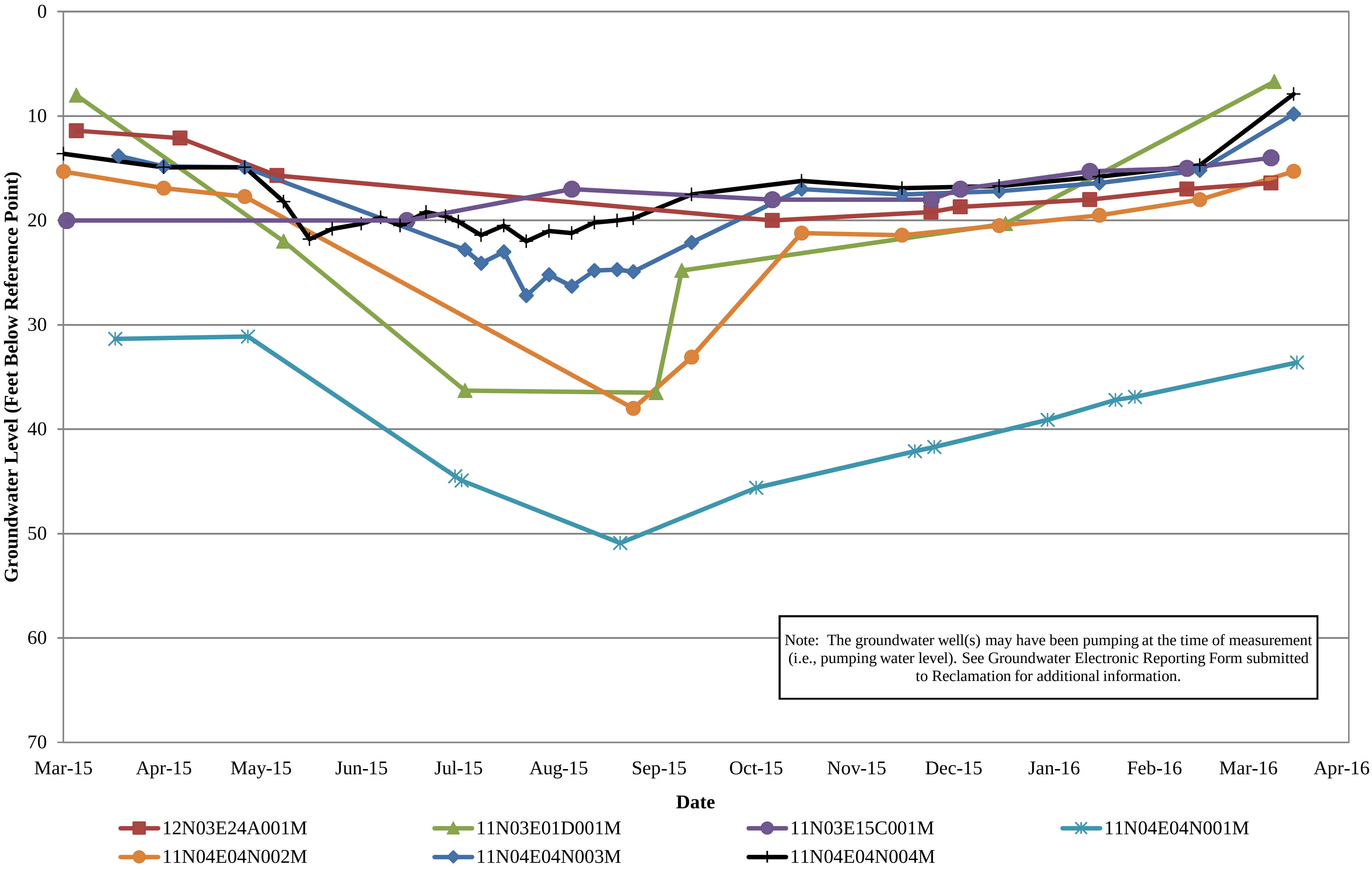
Pleasant Grove-Verona Mutual Water Company
DWR Monitoring Well Groundwater Level Data

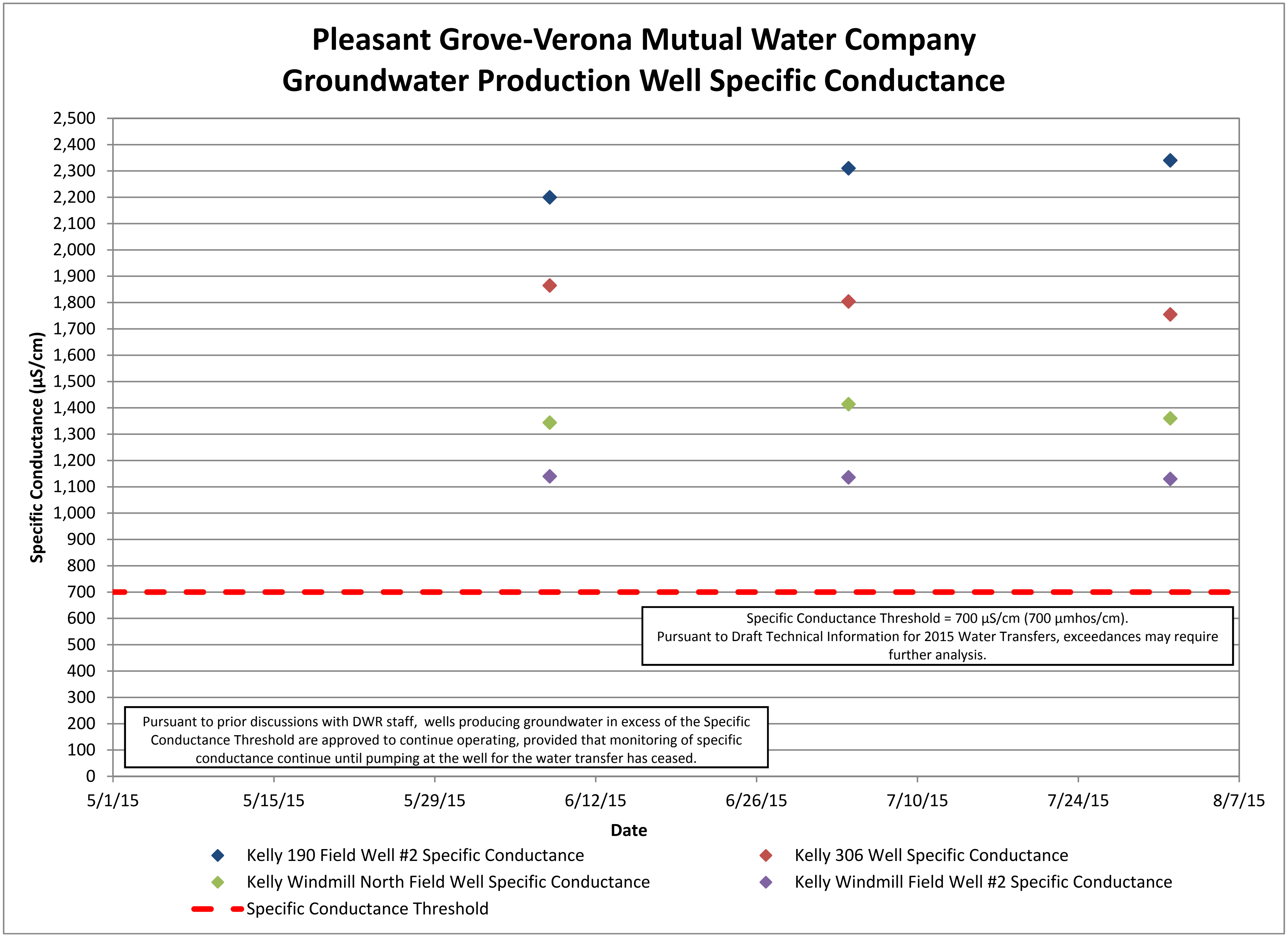




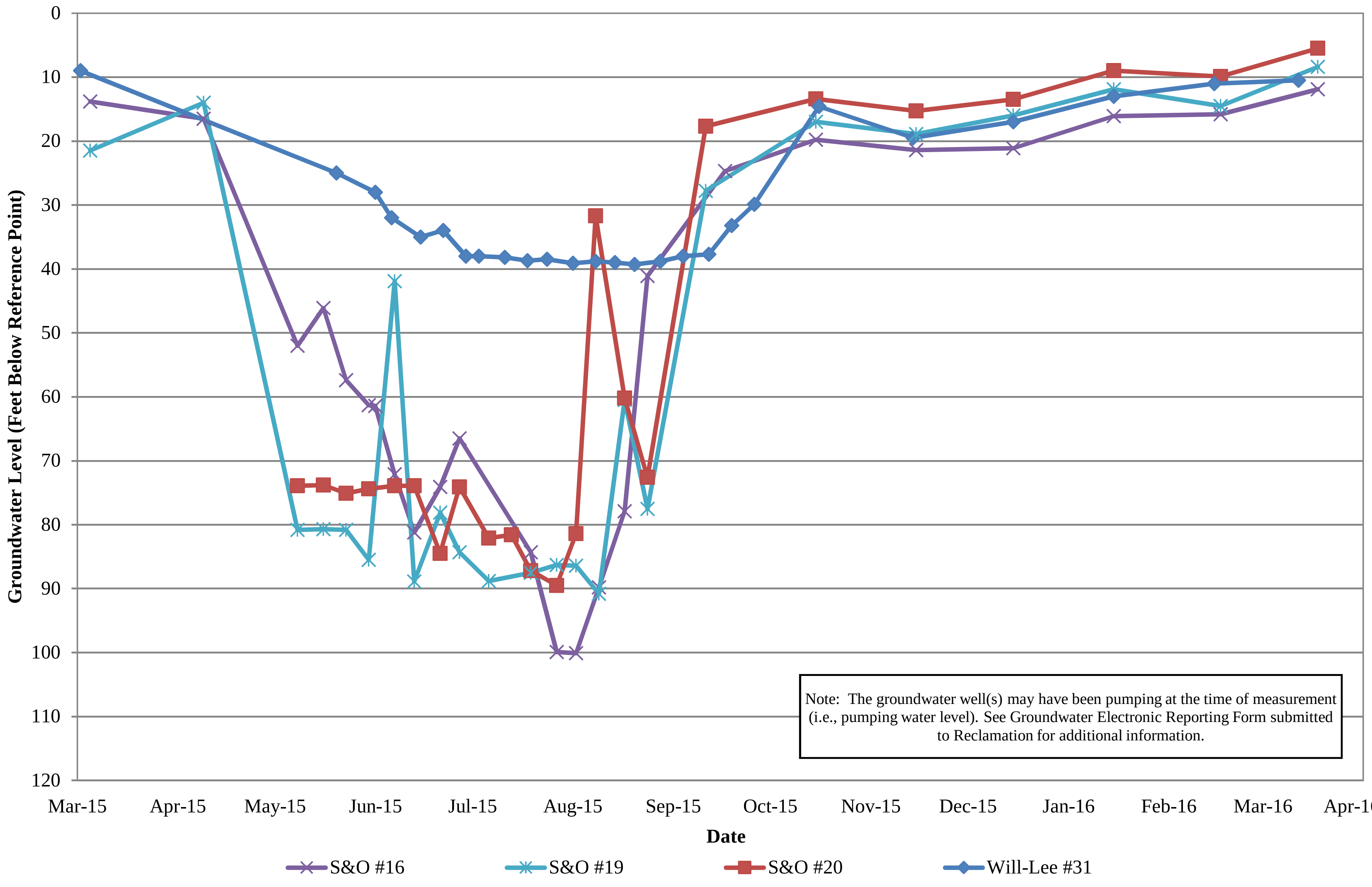
Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
S&O #16 Pumping Rate
S&O #16 Total Volume
S&O #20 Pumping Rate
S&O #19 Pumping Rate
S&O #19 Total Volume
S&O #20 Total Volume
Will-Lee #31 Pumping Rate
Will-Lee #31 Total Volume

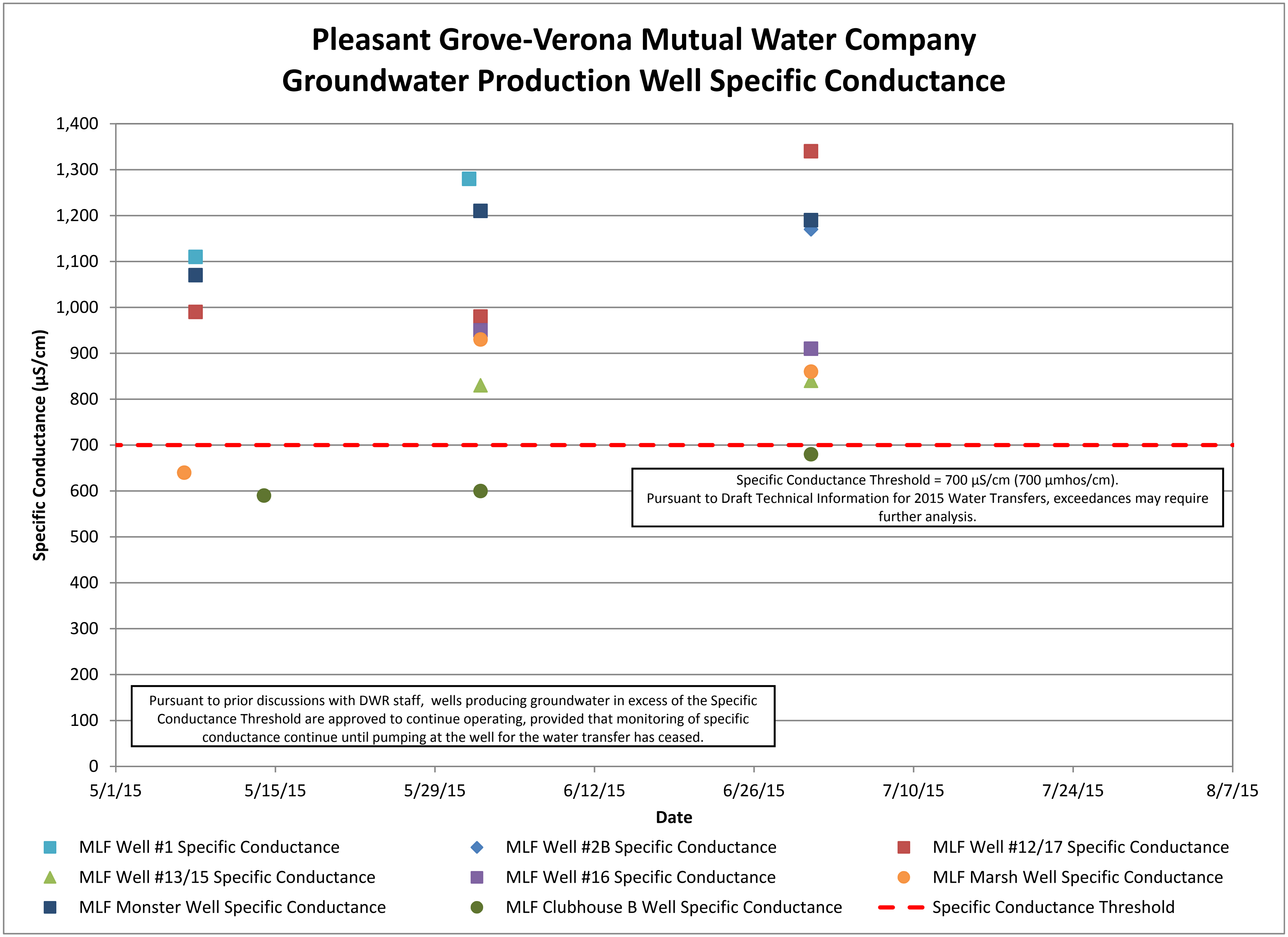
Pleasant Grove-Verona Mutual Water Company
DWR Monitoring Well Groundwater Level Data



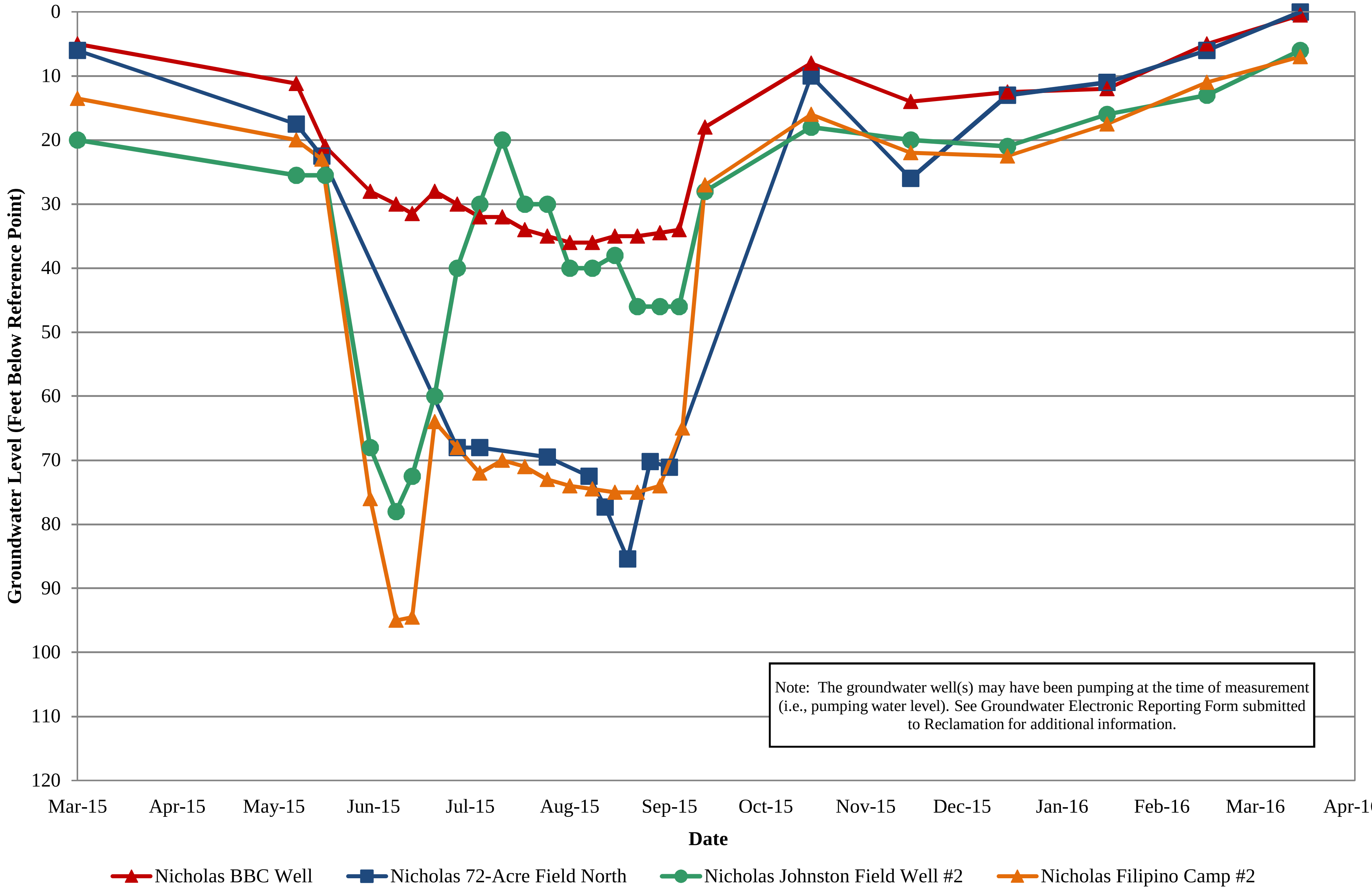

Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Specific Conductance
Specific Conductance (µS/cm)
2,500
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2015 Water Transfers, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
Kelly 190 Field Well #2 Specific Conductance
Kelly 306 Well Specific Conductance
Kelly Windmill North Field Well Specific Conductance
Kelly Windmill Field Well #2 Specific Conductance
Specific Conductance Threshold

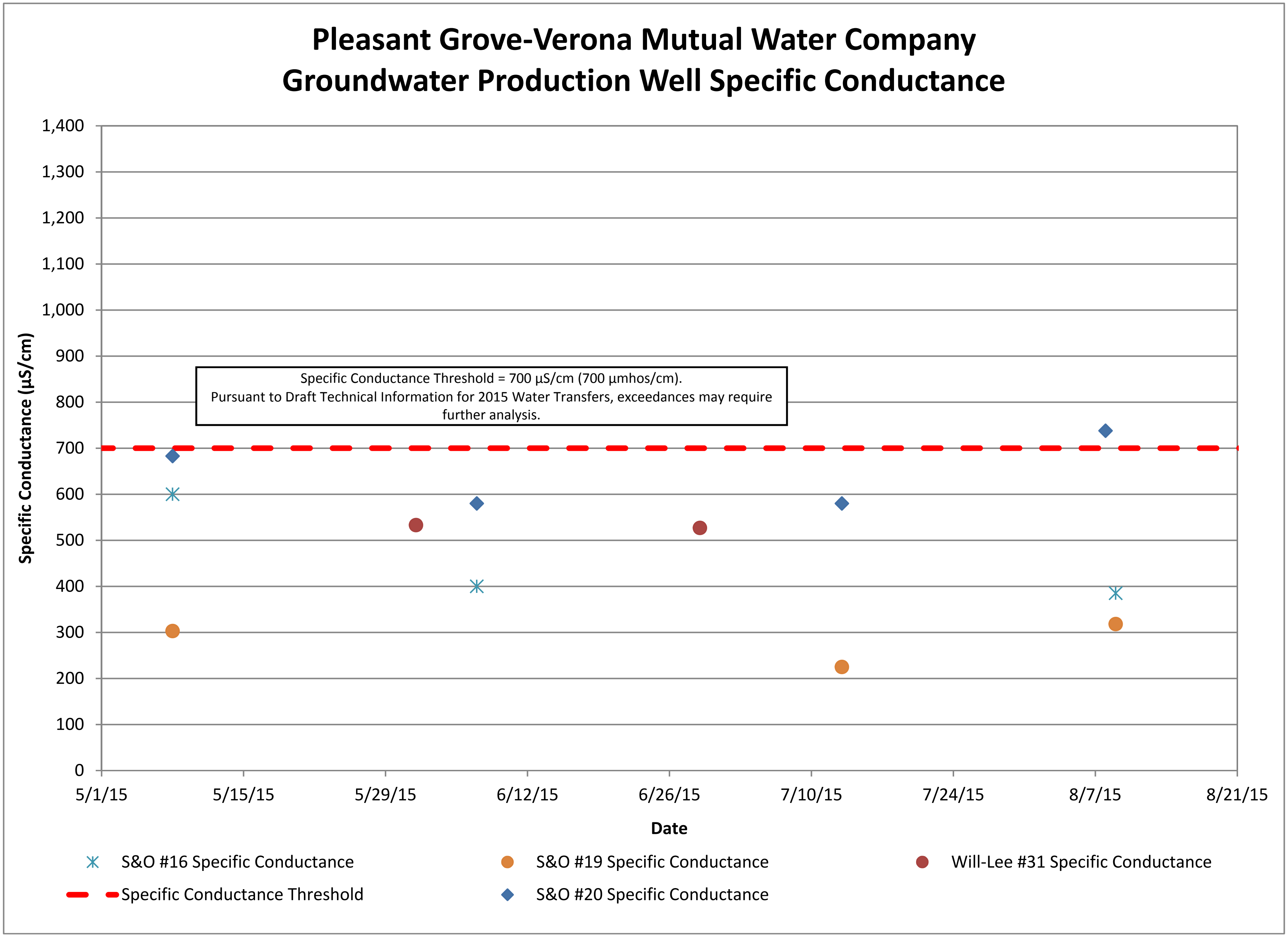
Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data




Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Specific Conductance
Specific Conductance (µS/cm)
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2015 Water Transfers, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
MLF Well #1 Specific Conductance
MLF Well #2B Specific Conductance
MLF Well #12/17 Specific Conductance
MLF Well #13/15 Specific Conductance
MLF Well #16 Specific Conductance
MLF Marsh Well Specific Conductance
MLF Monster Well Specific Conductance
MLF Clubhouse B Well Specific Conductance
Specific Conductance Threshold

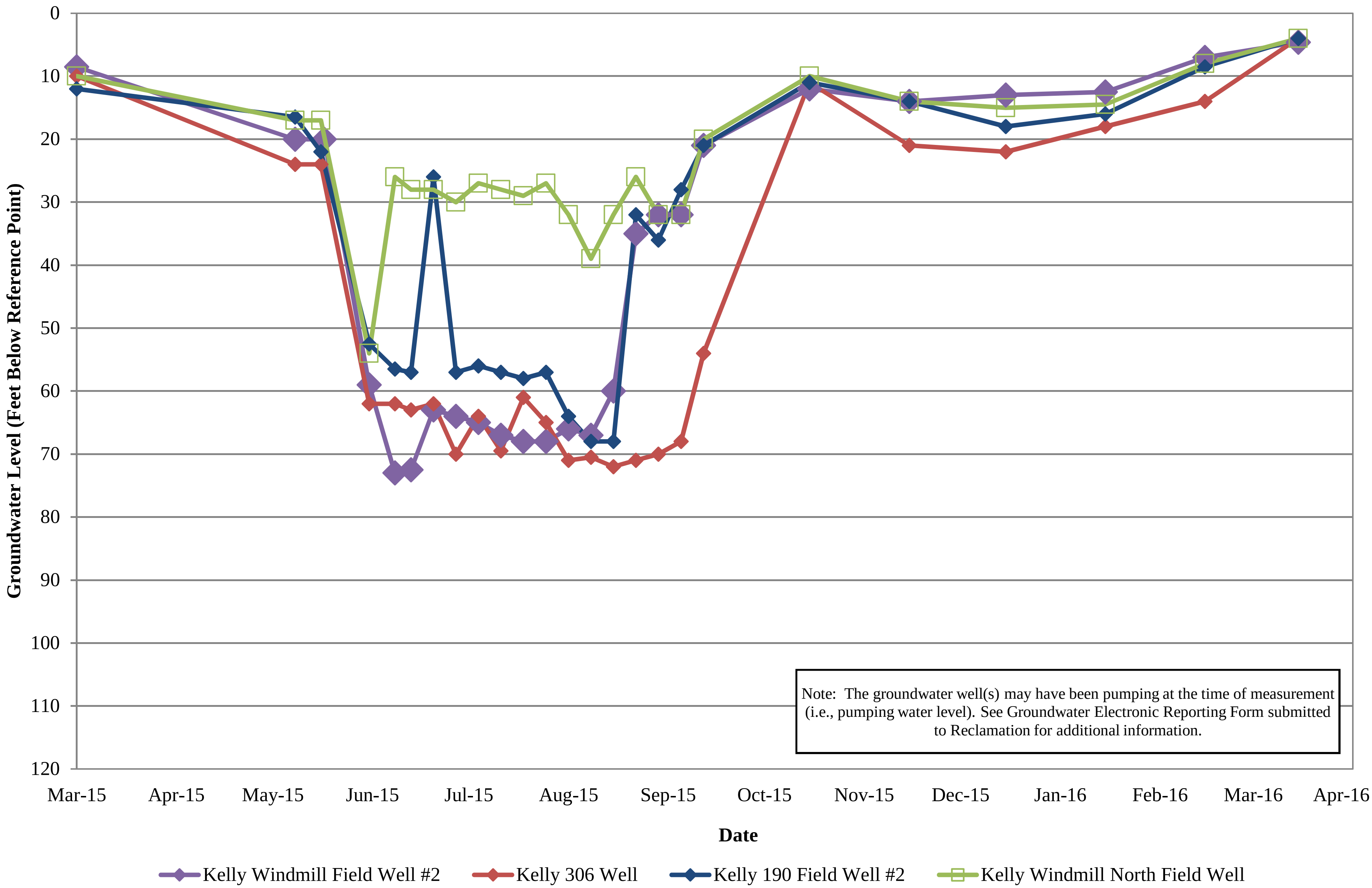
Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data



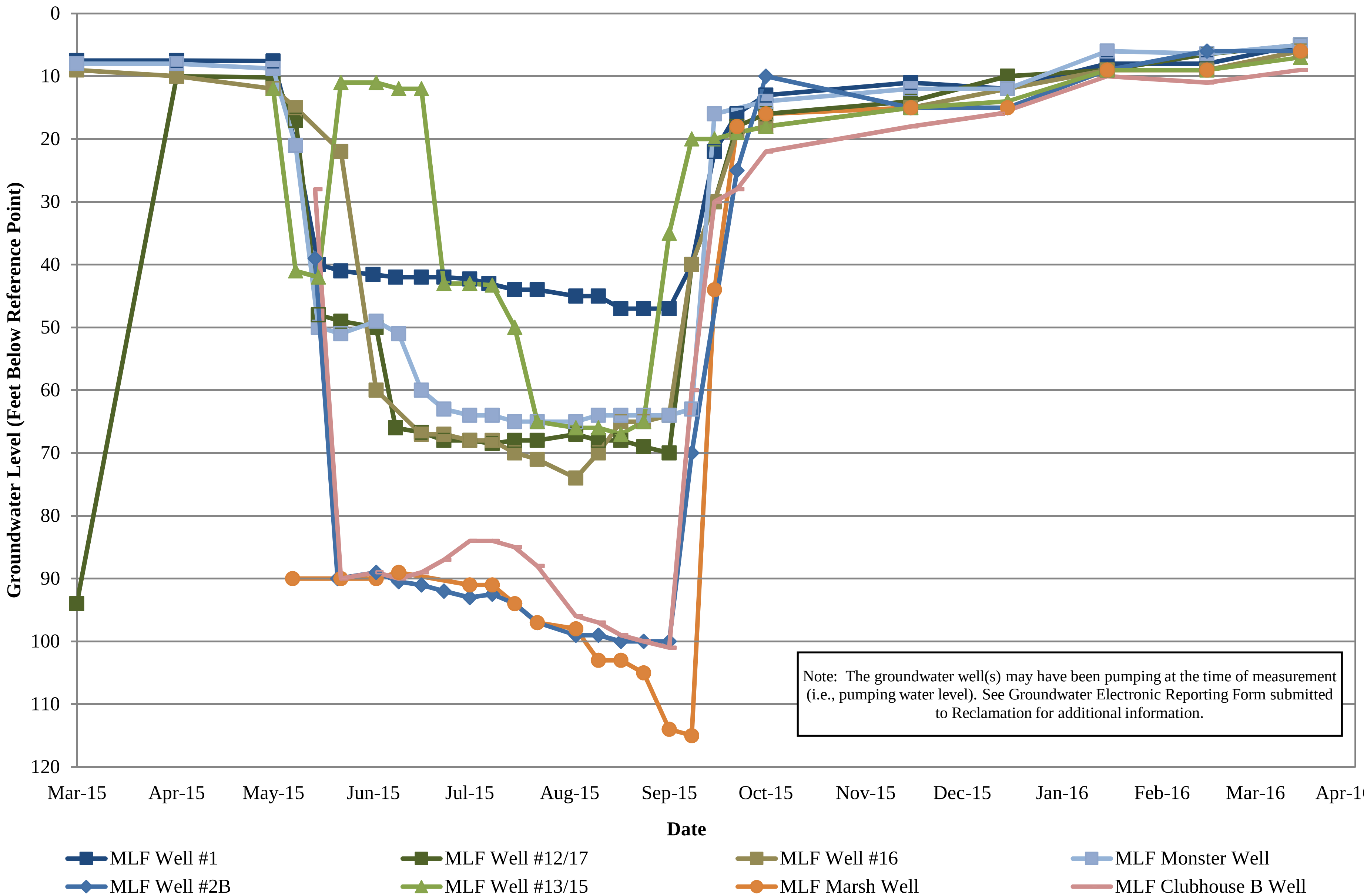


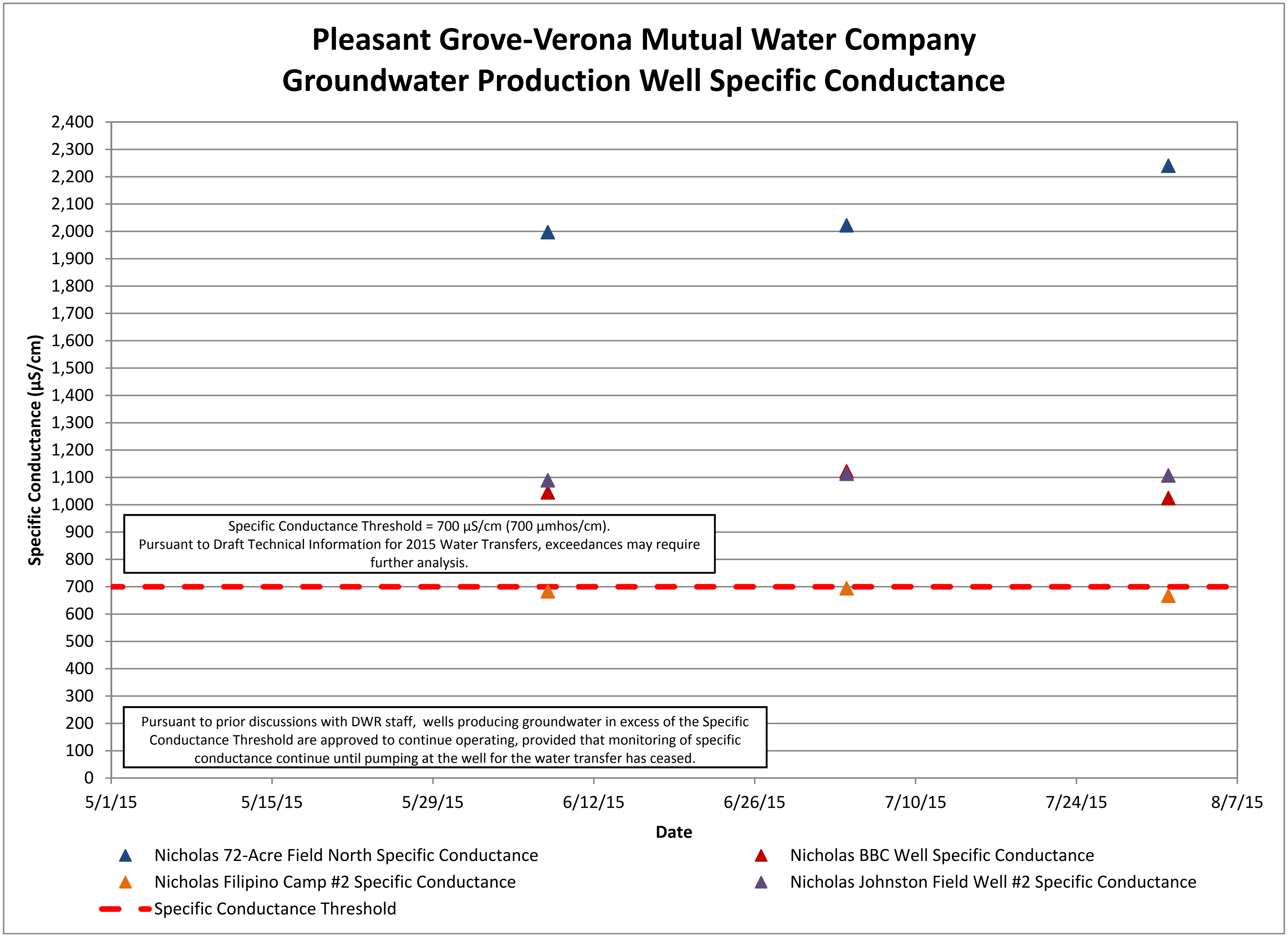
Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Specific Conductance
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2015 Water Transfers, exceedances may require further analysis.
Specific Conductance (µS/cm)
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
8/21/15
Date
S&O #16 Specific Conductance
S&O #19 Specific Conductance
Will-Lee #31 Specific Conductance
Specific Conductance Threshold
S&O #20 Specific Conductance

Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data



Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data




Pleasant Grove-Verona Mutual Water Company
Groundwater Production Well Specific Conductance
Specific Conductance (µS/cm)
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2015 Water Transfers, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
Nicholas 72-Acre Field North Specific Conductance
Nicholas BBC Well Specific Conductance
Nicholas Filipino Camp #2 Specific Conductance
Nicholas Johnston Field Well #2 Specific Conductance
Specific Conductance Threshold

Princeton-Codora-Glenn Irrigation District

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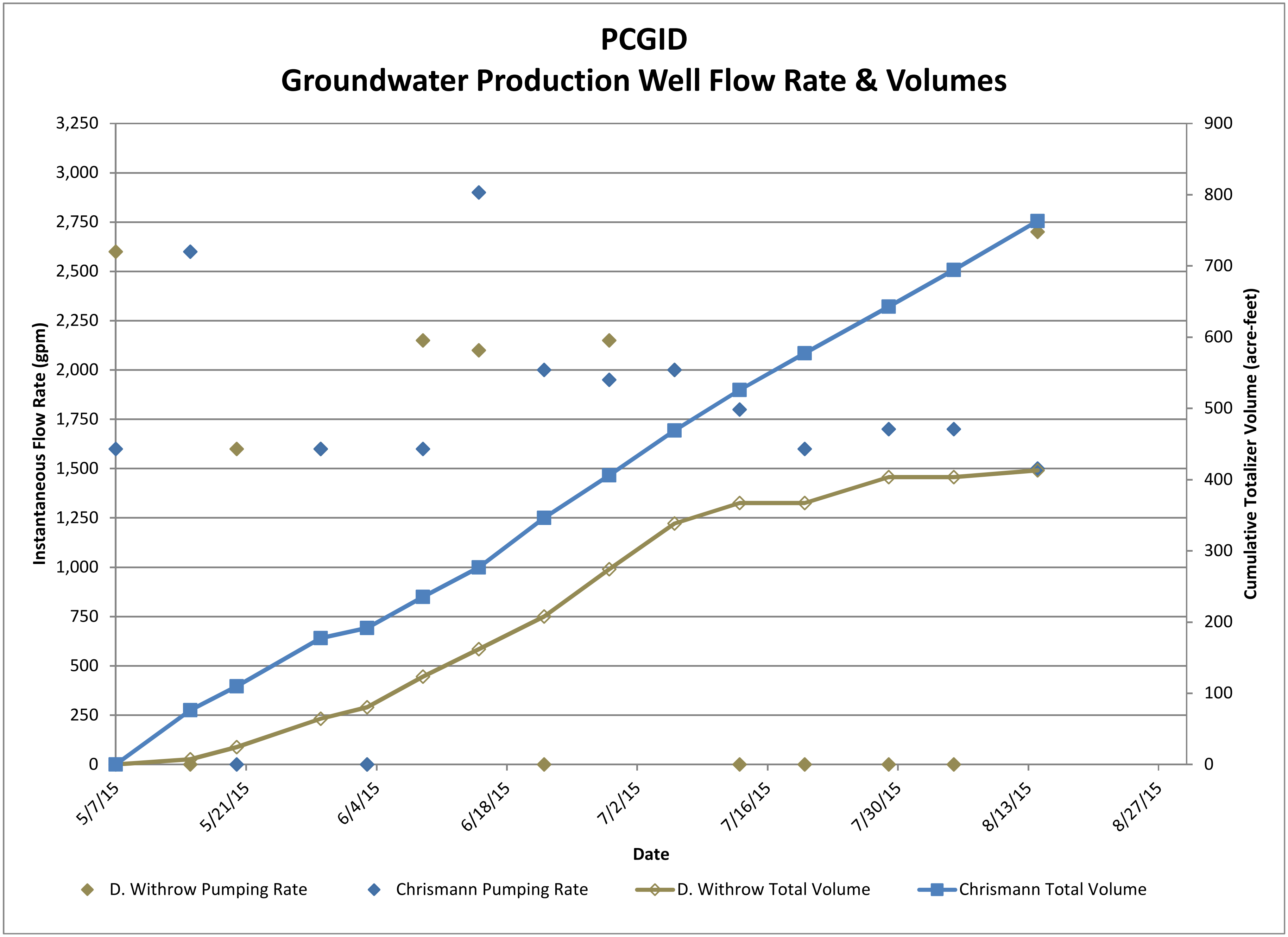
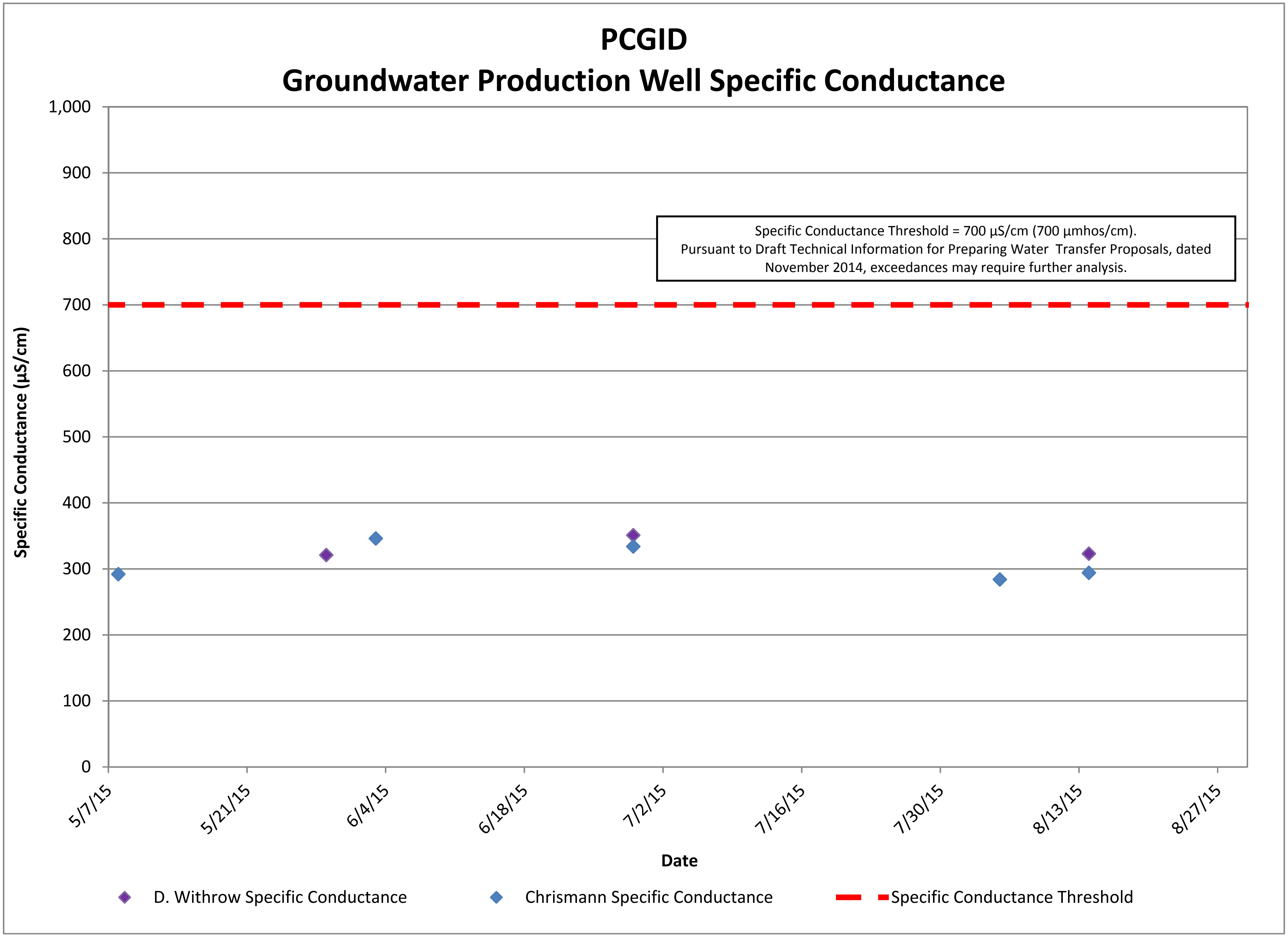
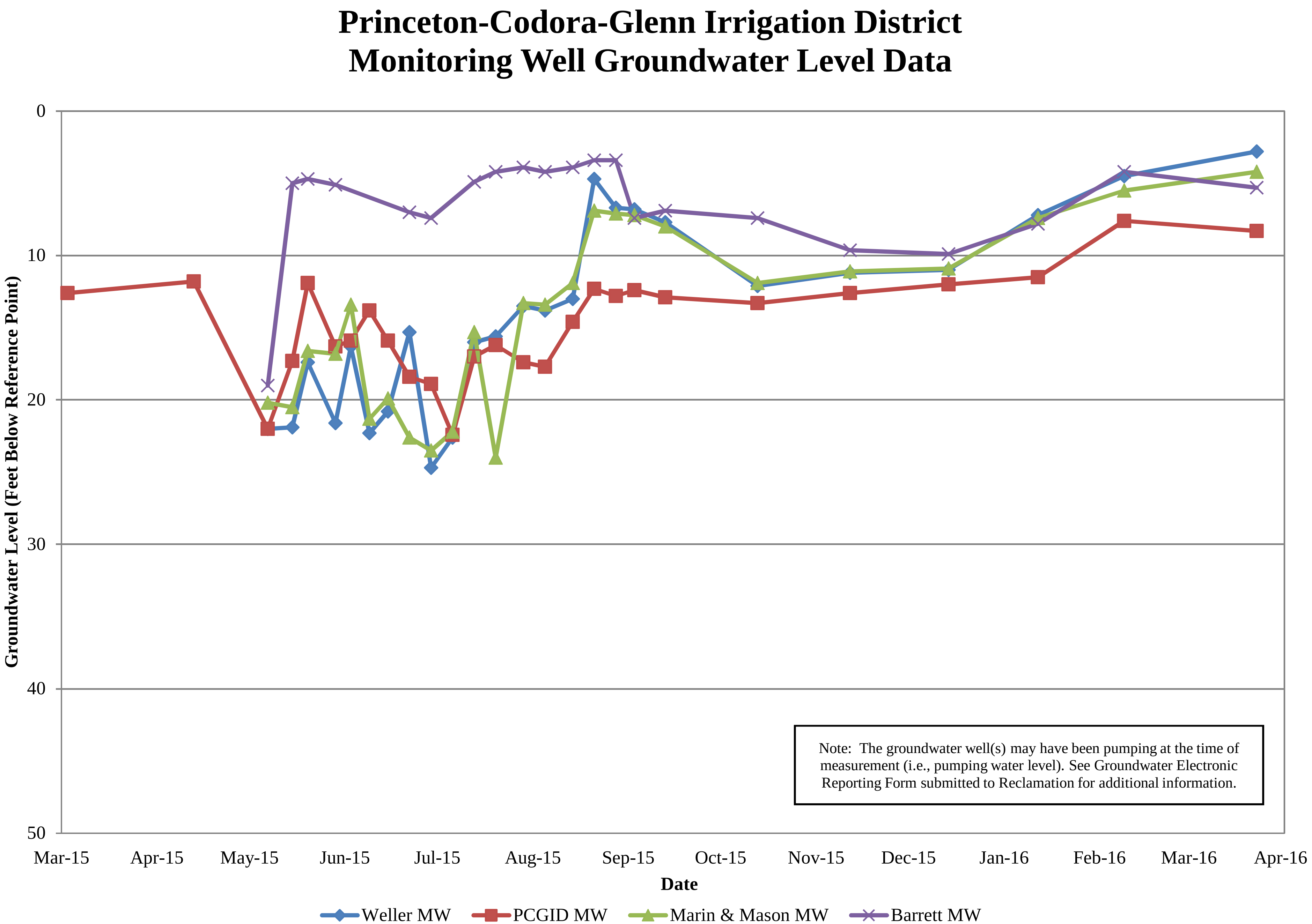
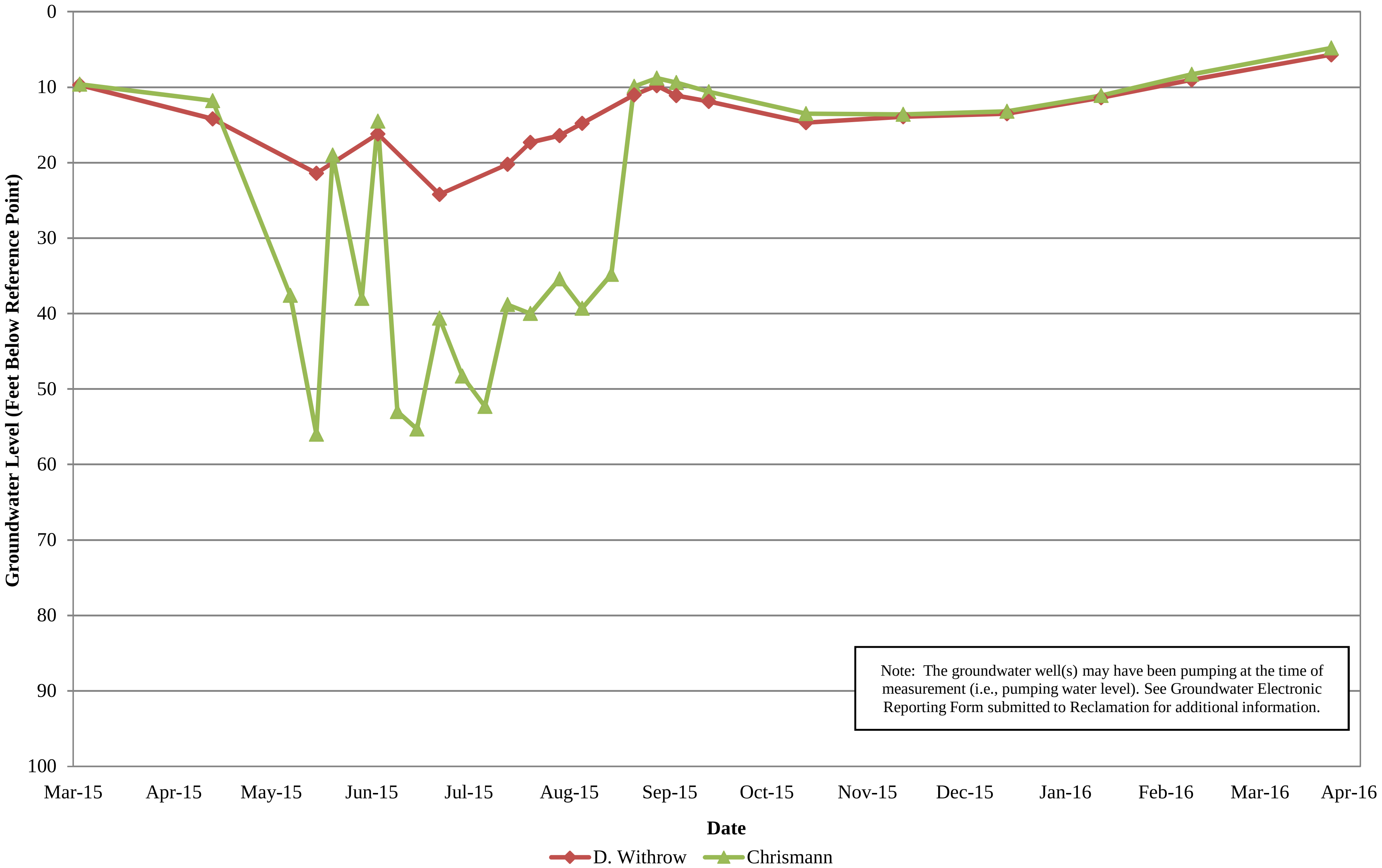


PCGID
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
3,250
3,000
2,750
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
900
800
700
600
500
400
300
200
100
0
5/7/15
5/21/15
6/4/15
6/18/15
7/2/15
7/16/15
7/30/15
8/13/15
8/27/15
Date
D. Withrow Pumping Rate
Chrismann Pumping Rate
D. Withrow Total Volume
Chrismann Total Volume

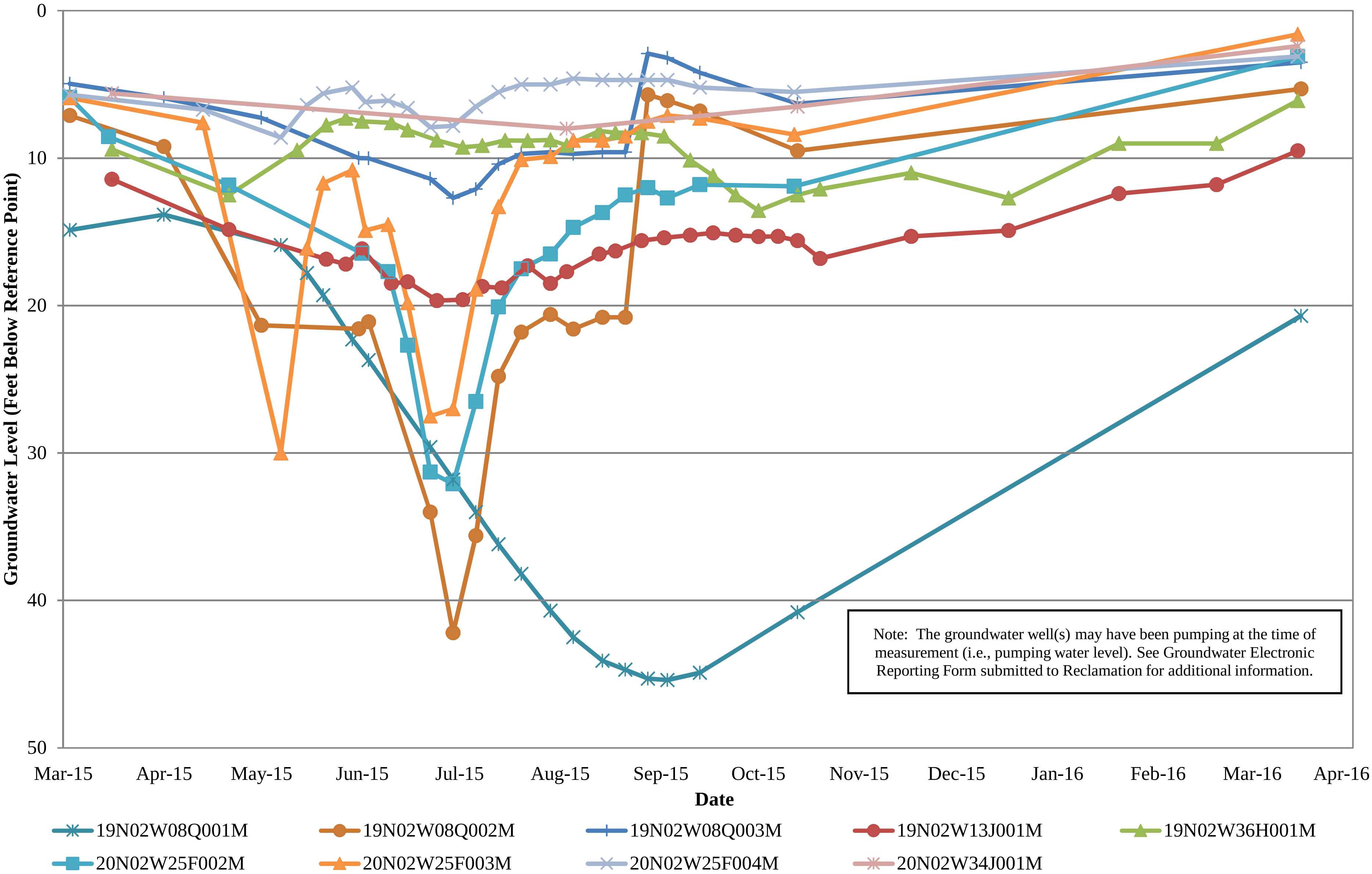

PCGID
Groundwater Production Well Specific Conductance
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for Preparing Water Transfer Proposals, dated November 2014, exceedances may require further analysis.
Specific Conductance (µS/cm)
1,000
900
800
700
600
500
400
300
200
100
0
5/7/15
5/21/15
6/4/15
6/18/15
7/2/15
7/16/15
7/30/15
8/13/15
8/27/15
Date
D. Withrow Specific Conductance
Chrismann Specific Conductance
Specific Conductance Threshold


Princeton-Codora-Glenn Irrigation District
Monitoring Well Groundwater Level Data
Groundwater Level (Feet Below Reference Point)
0
10
20
30
40
50
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Weller MW
PCGID MW
Marin & Mason MW
Barrett MW
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.

Princeton-Codora-Glenn Irrigation District
Production Well Groundwater Level Data



Princeton-Codora-Glenn Irrigation District
DWR Monitoring Well Groundwater Level Data



Provident Irrigation District

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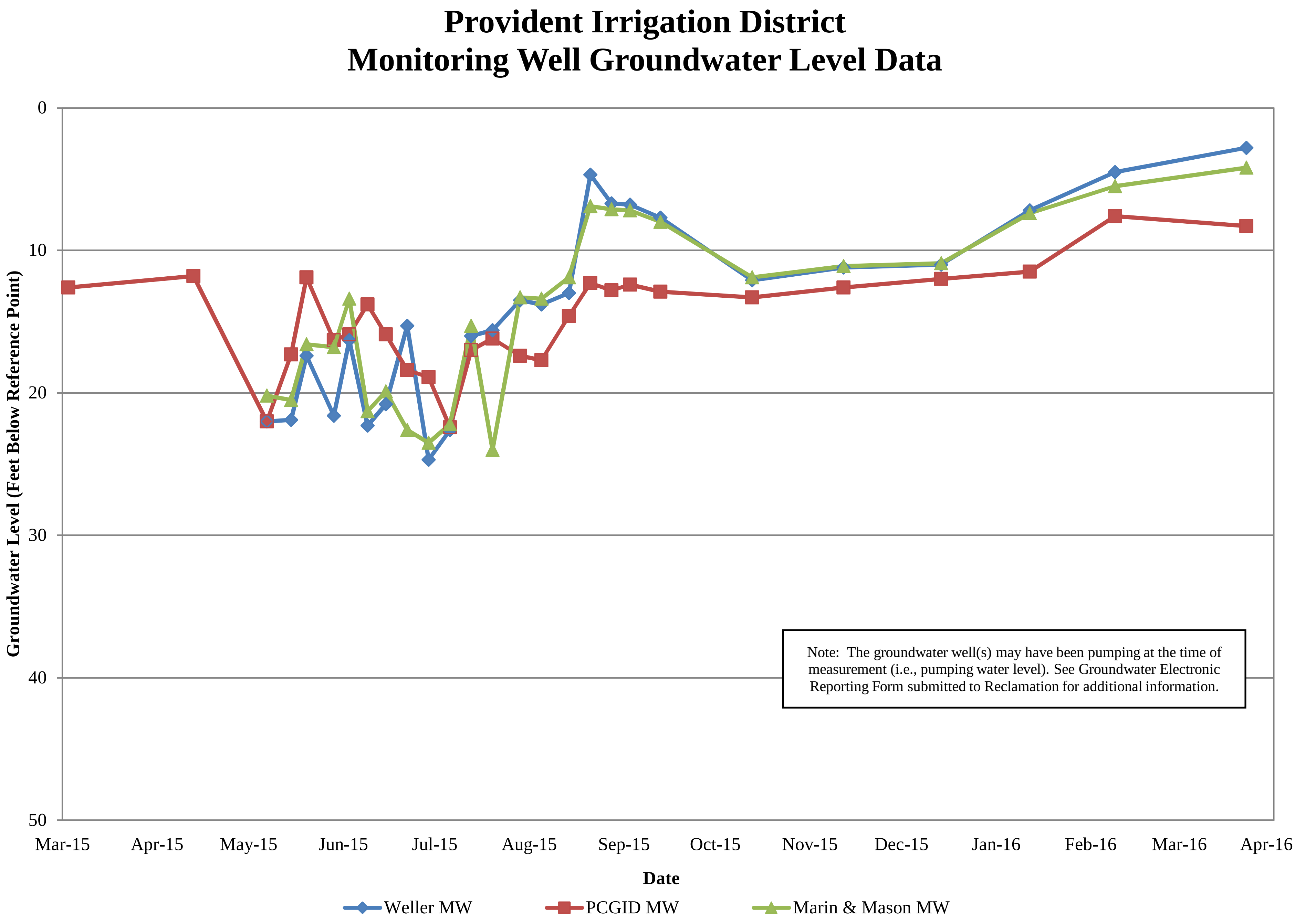
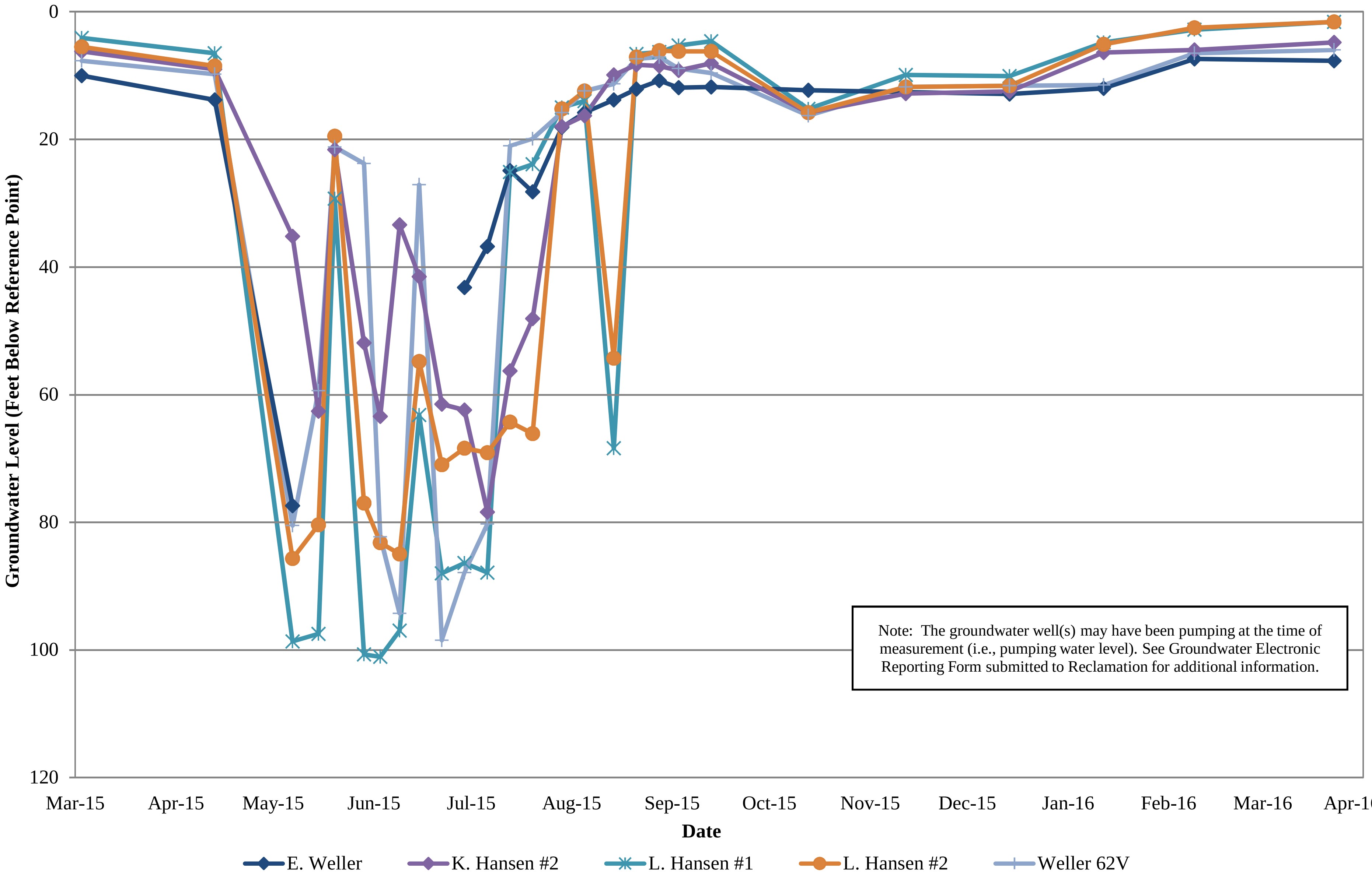
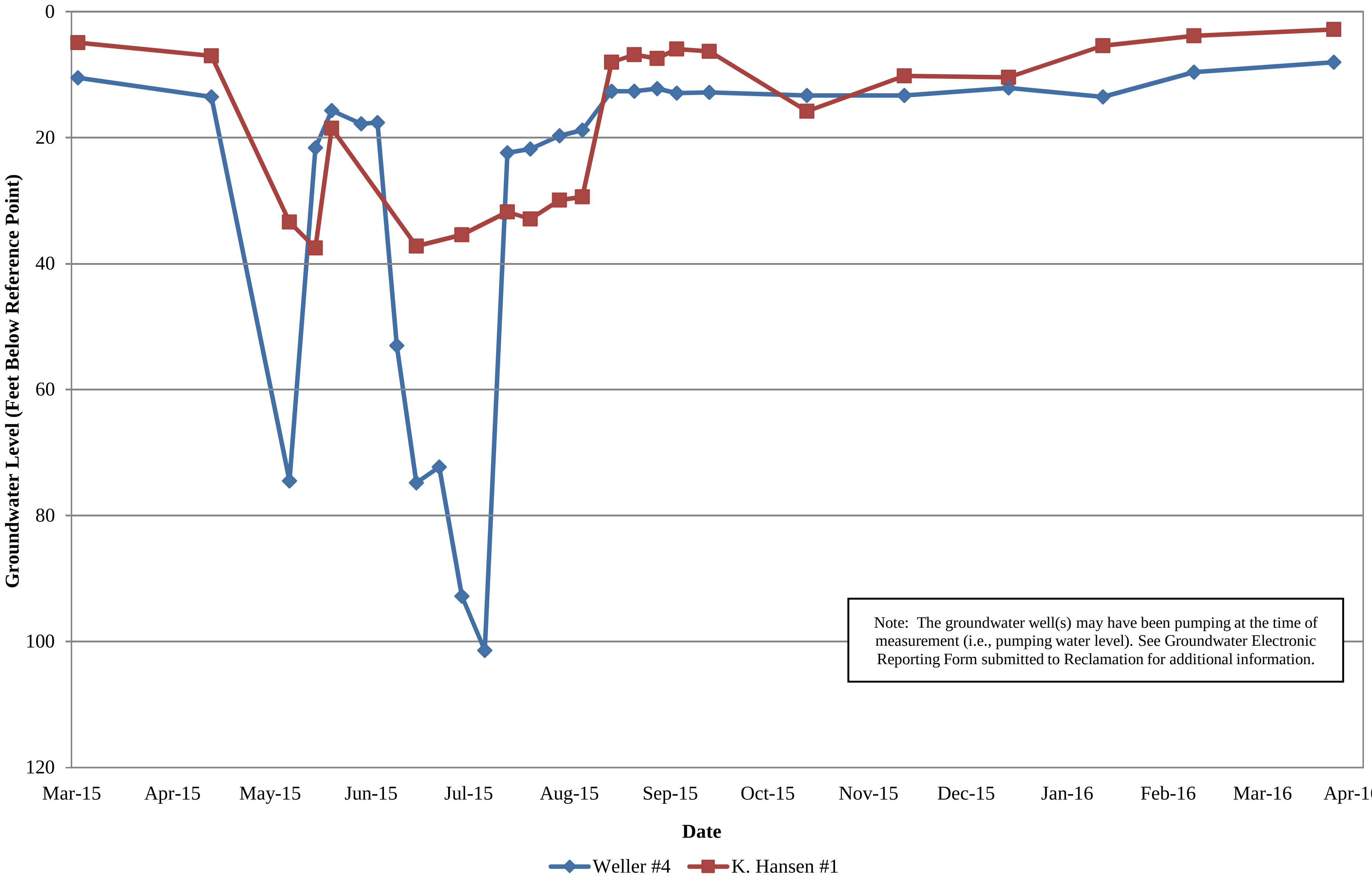


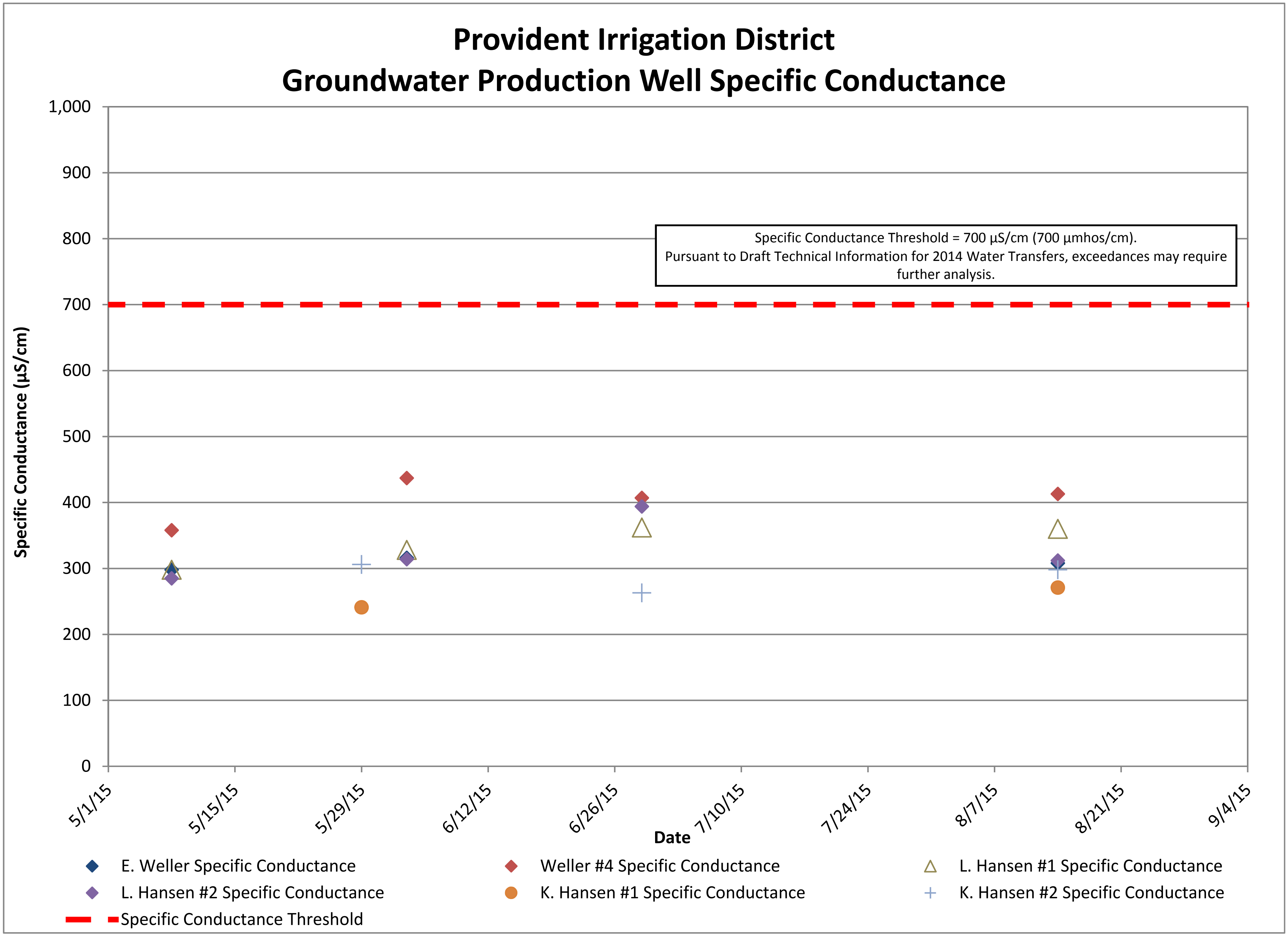
Provident Irrigation District
Monitoring Well Groundwater Level Data
Groundwater Level (Feet Below Reference Point)
0
10
20
30
40
50
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Weller MW
PCGID MW
Marin & Mason MW
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.

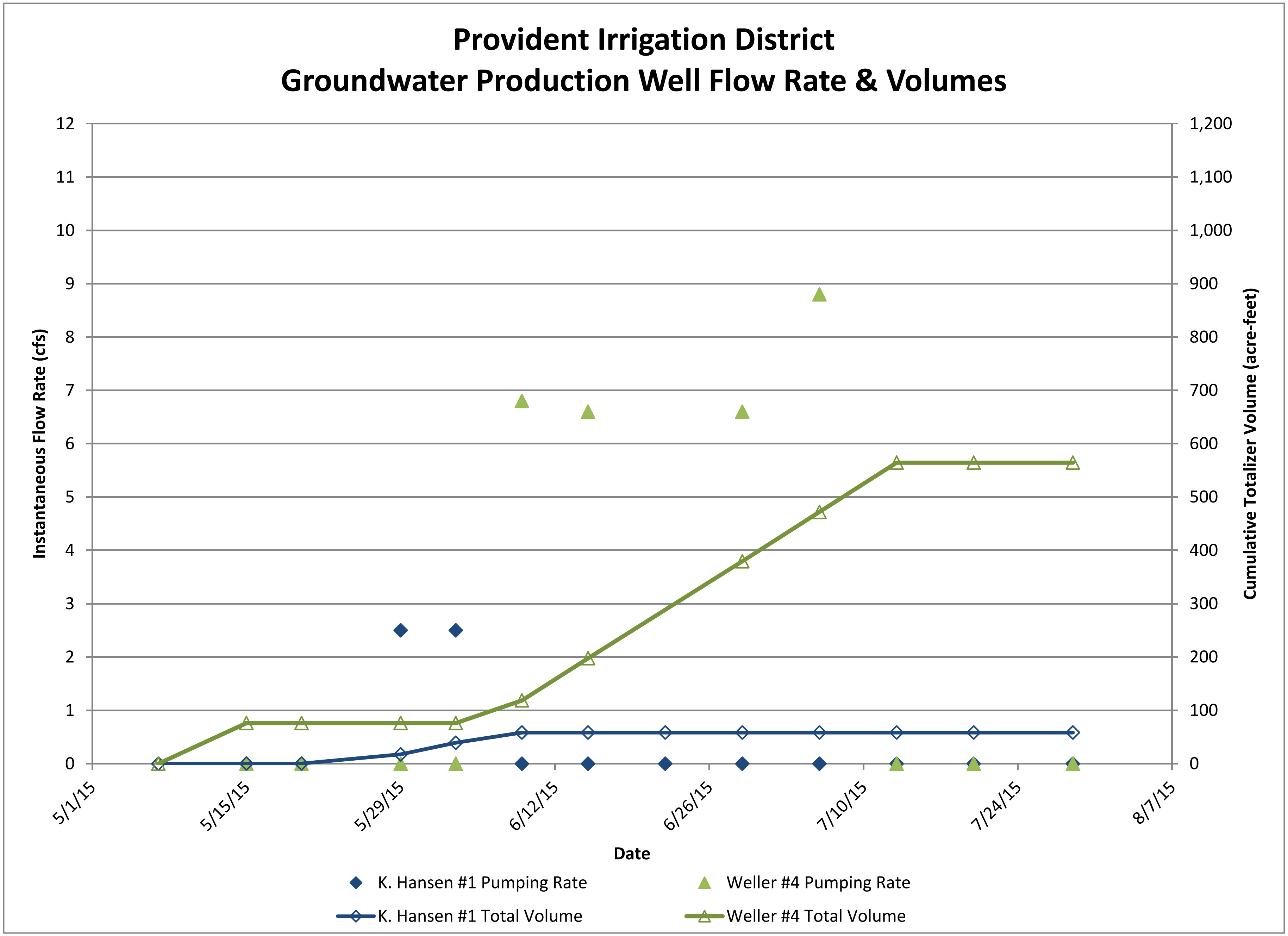
Provident Irrigation District
Production Well Groundwater Level Data

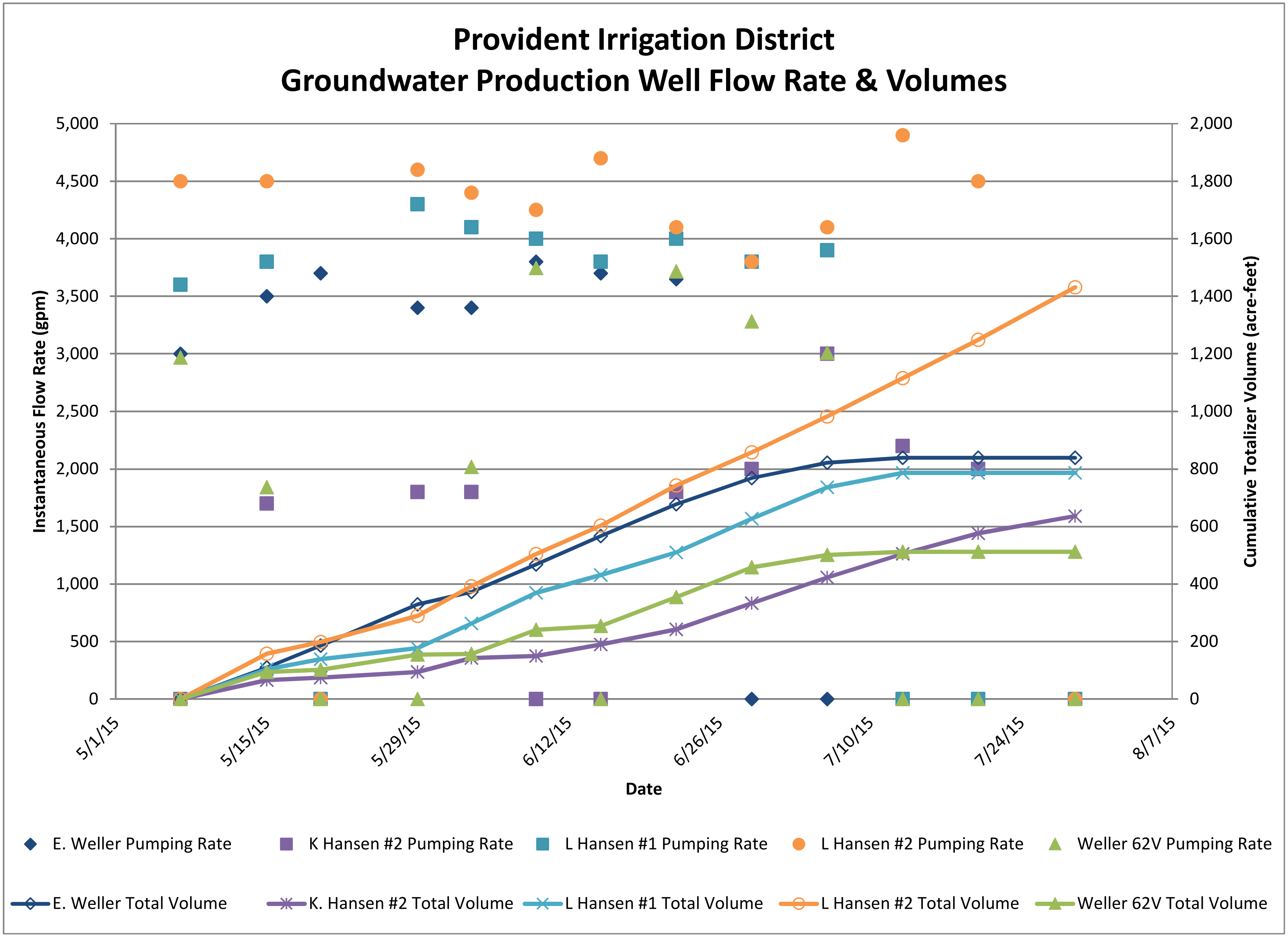


Provident Irrigation District
Production Well Groundwater Level Data

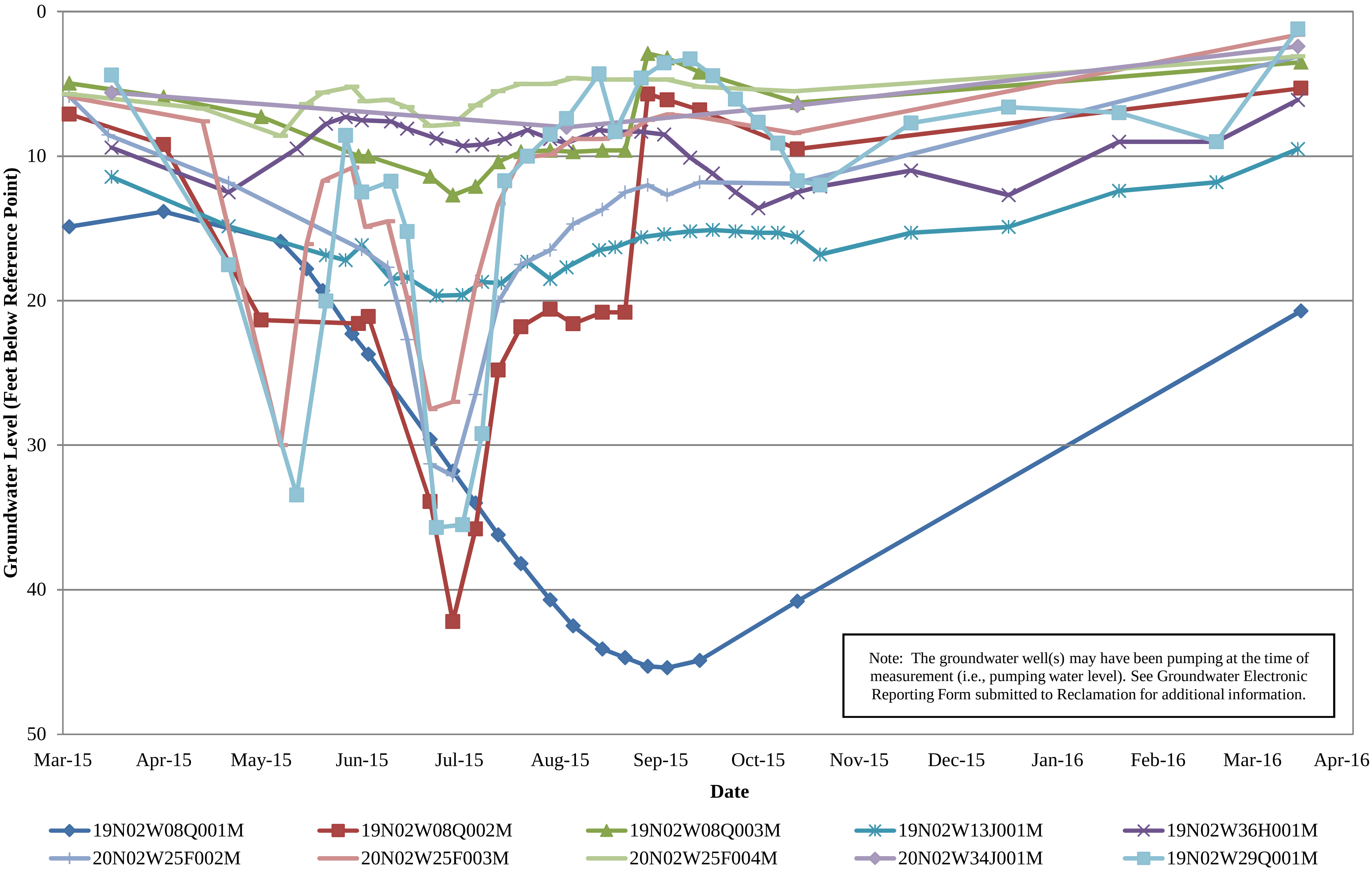



Provident Irrigation District
Groundwater Production Well Specific Conductance
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for 2014 Water Transfers, exceedances may require further analysis.
Specific Conductance (µS/cm)
1,000
900
800
700
600
500
400
300
200
100
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
8/21/15
9/4/15
Date
E. Weller Specific Conductance
Weller #4 Specific Conductance
L. Hansen #1 Specific Conductance
L. Hansen #2 Specific Conductance
K. Hansen #1 Specific Conductance
K. Hansen #2 Specific Conductance
Specific Conductance Threshold


Provident Irrigation District
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (cfs)
Cumulative Totalizer Volume (acre-feet)
0
1
2
3
4
5
6
7
8
9
10
11
12
0
100
200
300
400
500
600
700
800
900
1,000
1,100
1,200
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
K. Hansen #1 Pumping Rate
Weller #4 Pumping Rate
K. Hansen #1 Total Volume
Weller #4 Total Volume


Provident Irrigation District
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
Date
E. Weller Pumping Rate
K Hansen #2 Pumping Rate
L Hansen #1 Pumping Rate
L Hansen #2 Pumping Rate
Weller 62V Pumping Rate
E. Weller Total Volume
K. Hansen #2 Total Volume
L Hansen #1 Total Volume
L Hansen #2 Total Volume
Weller 62V Total Volume

Provident Irrigation District
DWR Monitoring Well Groundwater Level Data



Reclamation District No. 108

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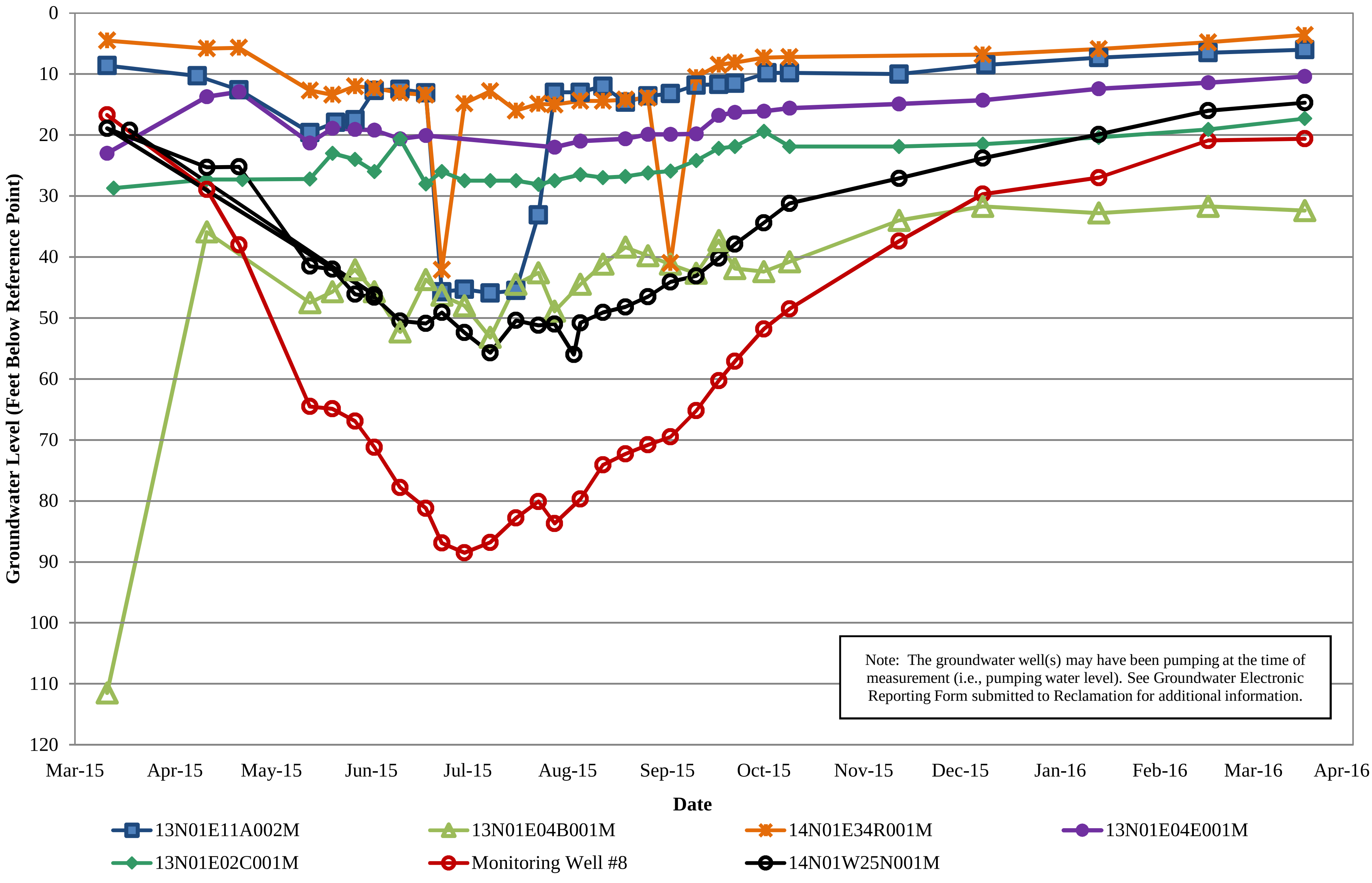
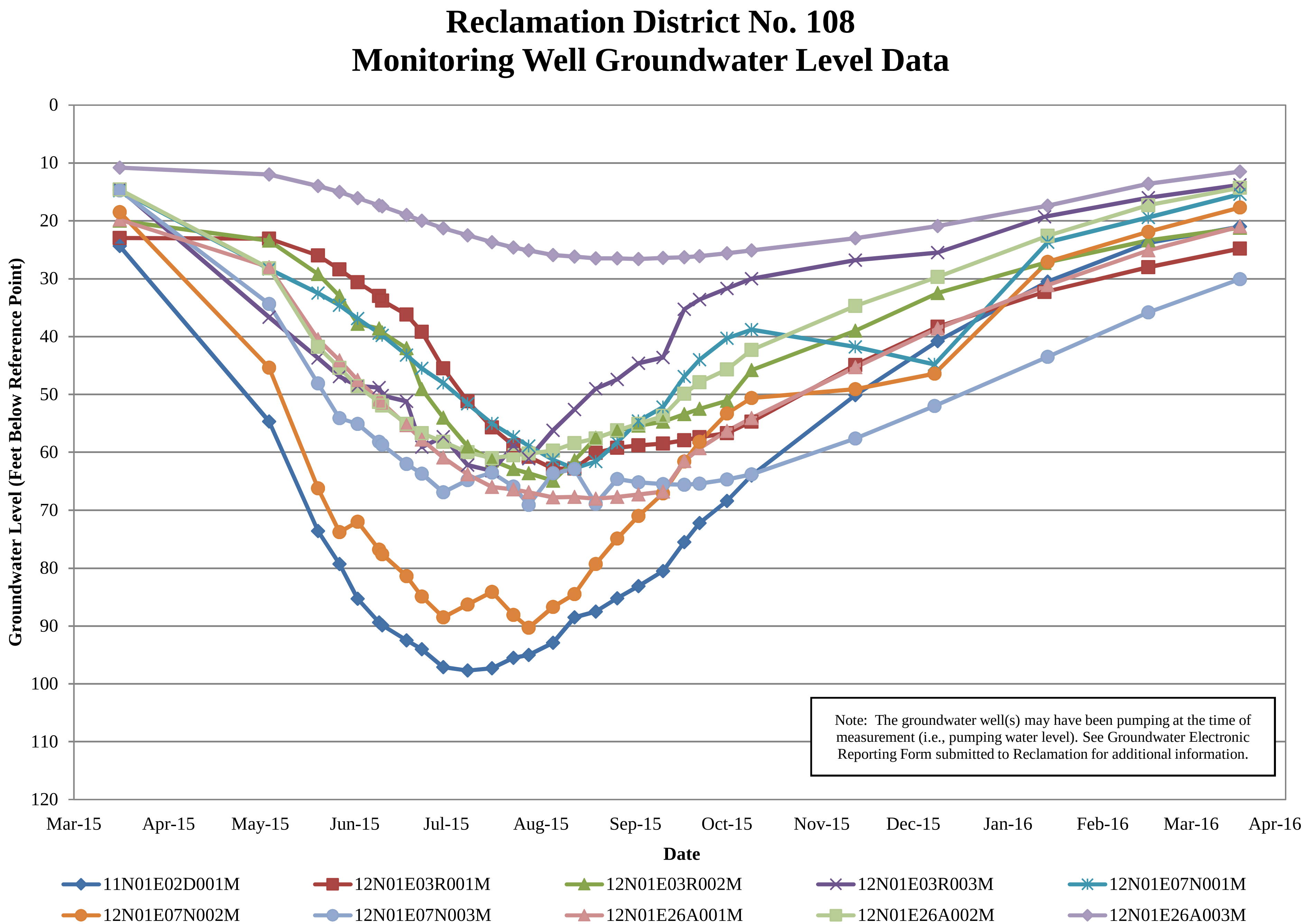
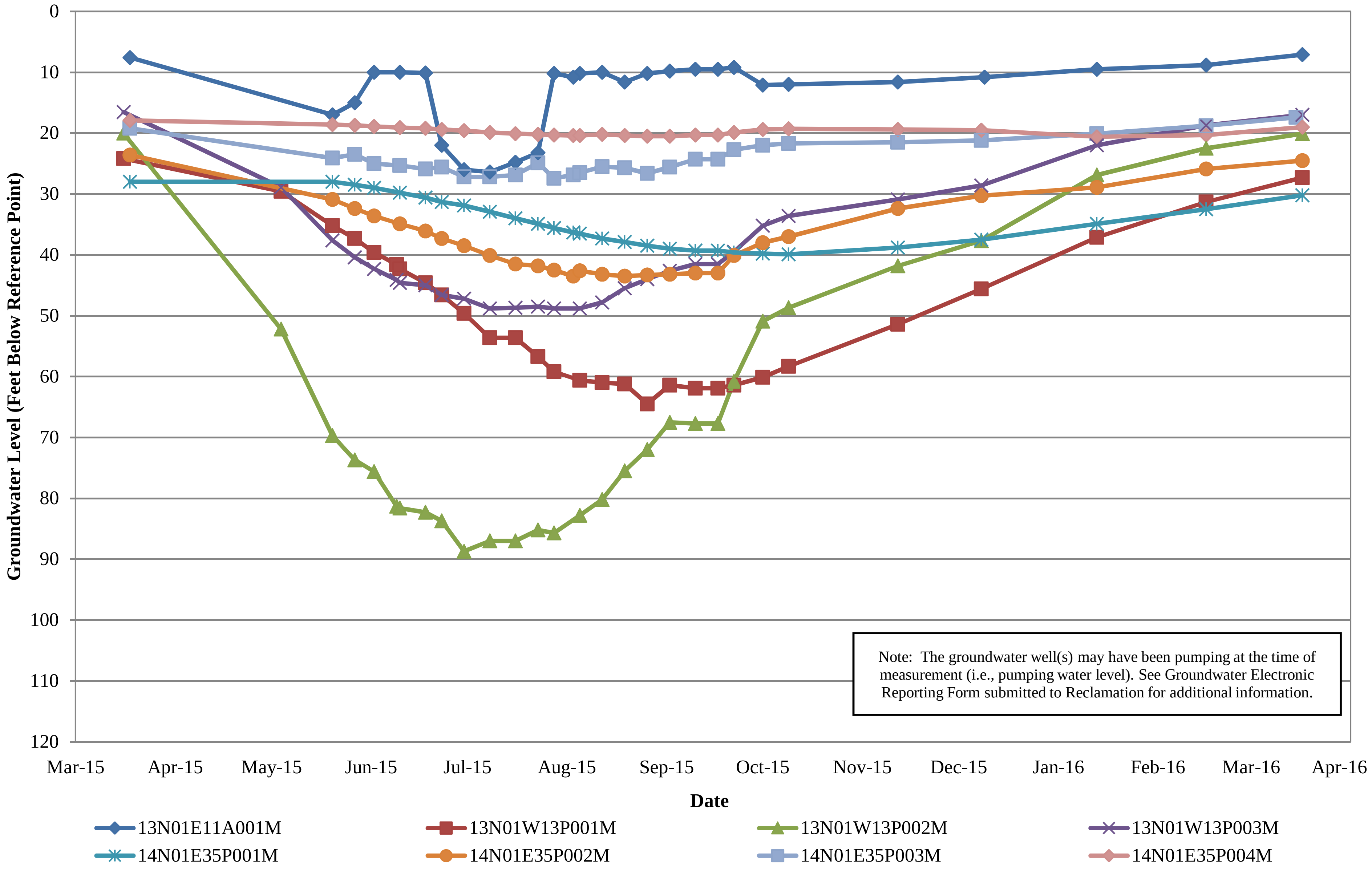
Reclamation District No. 108
Monitoring Well Groundwater Level Data

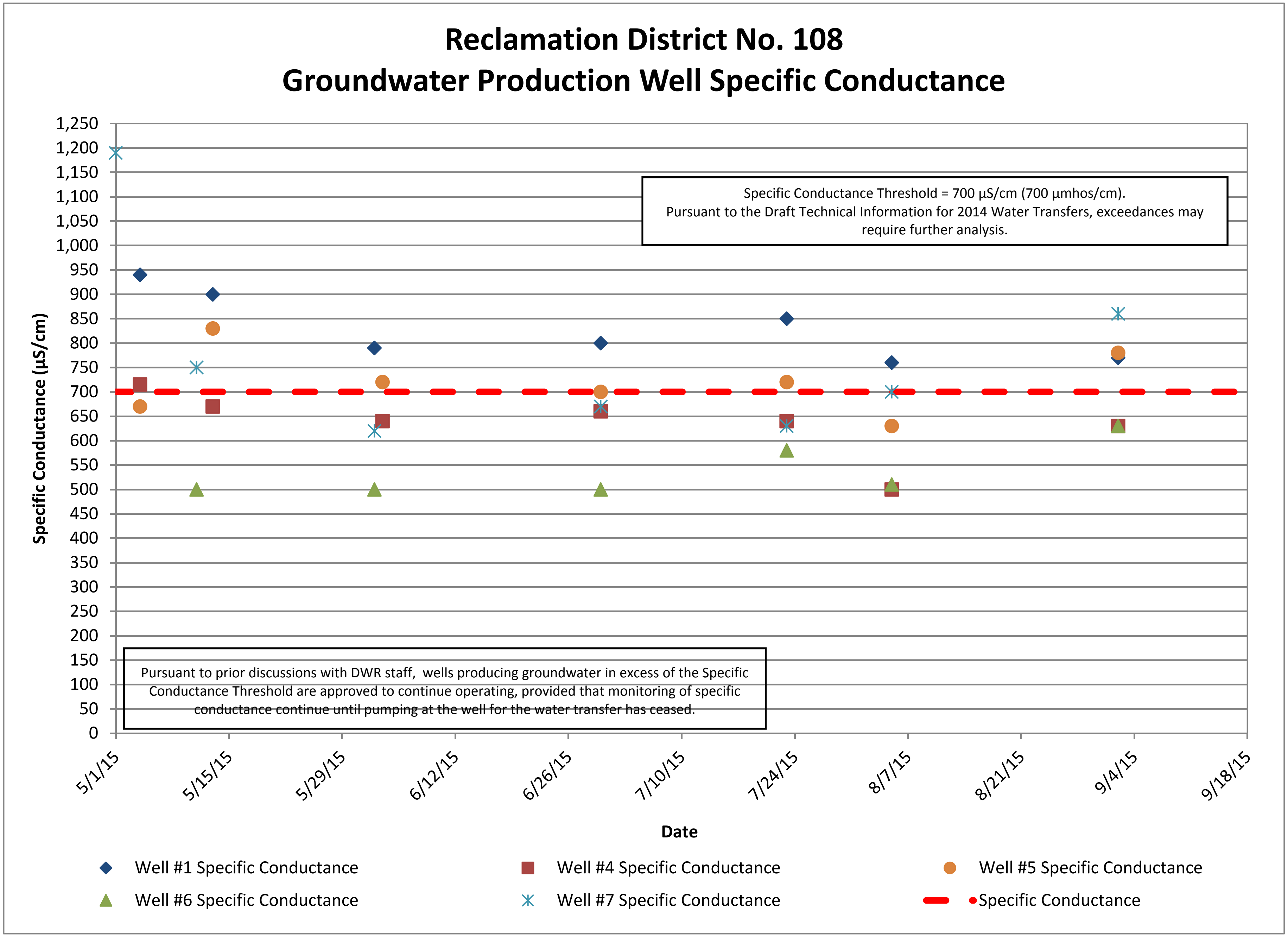




Reclamation District No. 108
Monitoring Well Groundwater Level Data
Groundwater Level (Feet Below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
110
120
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
11N01E02D001M
12N01E03R001M
12N01E03R002M
12N01E03R003M
12N01E07N001M
12N01E07N002M
12N01E07N003M
12N01E26A001M
12N01E26A002M
12N01E26A003M

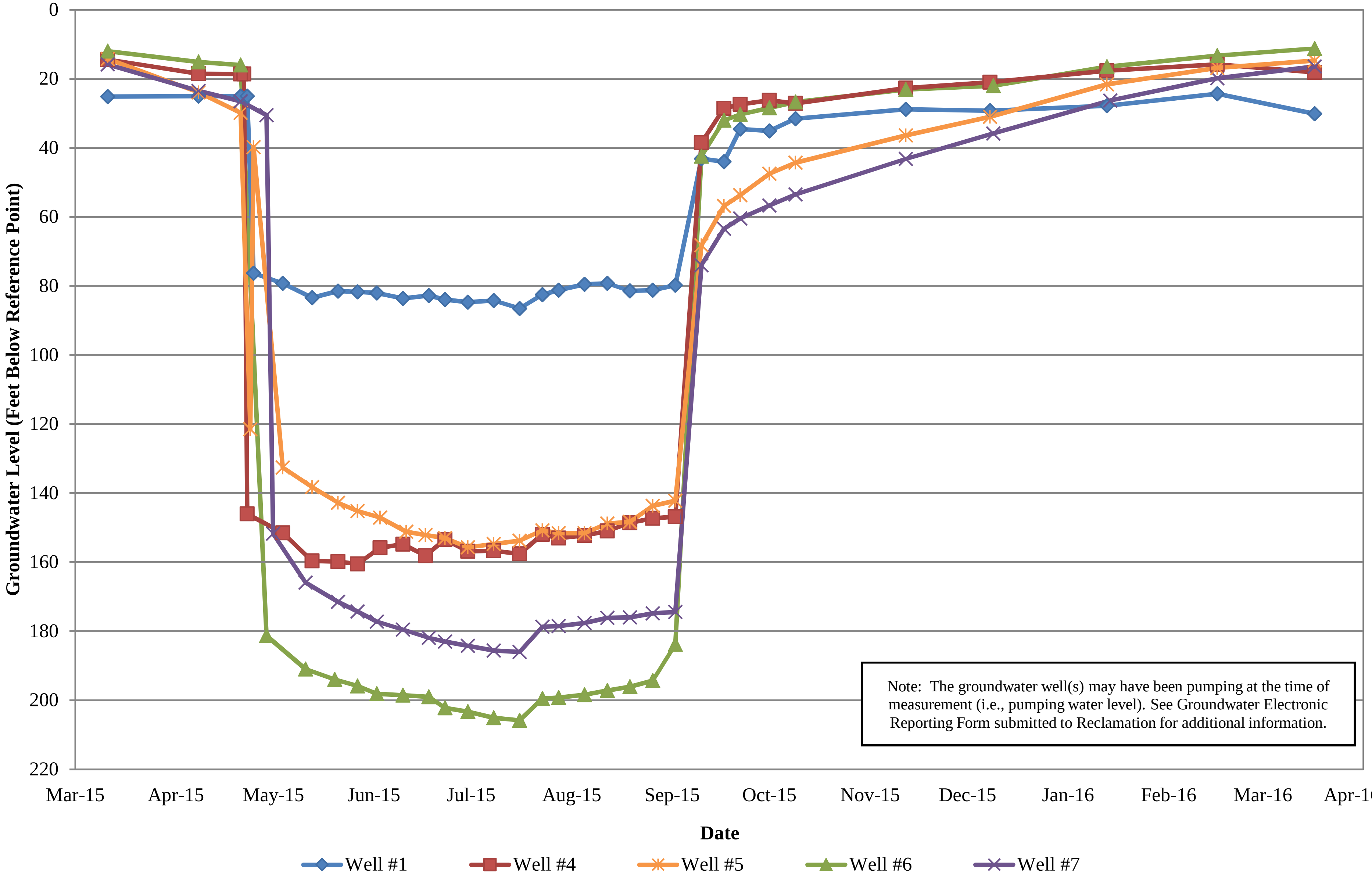
Reclamation District No. 108
Monitoring Well Groundwater Level Data

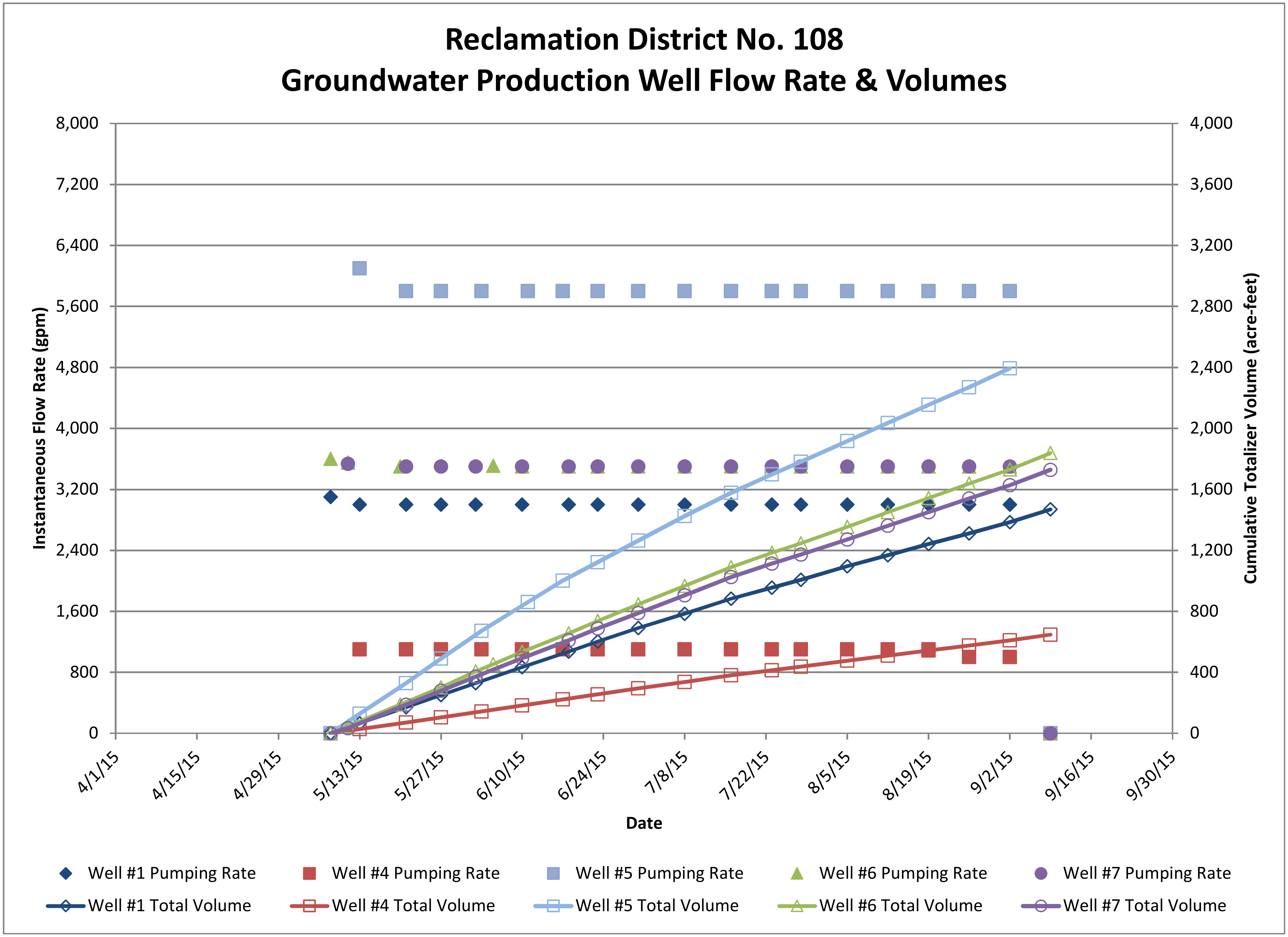




Reclamation District No. 108
Groundwater Production Well Specific Conductance
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to the Draft Technical Information for 2014 Water Transfers, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
Specific Conductance (µS/cm)
1,250
1,200
1,150
1,100
1,050
1,000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
5/1/15
5/15/15
5/29/15
6/12/15
6/26/15
7/10/15
7/24/15
8/7/15
8/21/15
9/4/15
9/18/15
Date
Well #1 Specific Conductance
Well #4 Specific Conductance
Well #5 Specific Conductance
Well #6 Specific Conductance
Well #7 Specific Conductance
Specific Conductance

Reclamation District No. 108
Production Well Groundwater Level Data





Reclamation District No. 108
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
Cumulative Totalizer Volume (acre-feet)
8,000
7,200
6,400
5,600
4,800
4,000
3,200
2,400
1,600
800
0
4,000
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
400
0
4/1/15
4/15/15
4/29/15
5/13/15
5/27/15
6/10/15
6/24/15
7/8/15
7/22/15
8/5/15
8/19/15
9/2/15
9/16/15
9/30/15
Date
Well #1 Pumping Rate
Well #4 Pumping Rate
Well #5 Pumping Rate
Well #6 Pumping Rate
Well #7 Pumping Rate
Well #1 Total Volume
Well #4 Total Volume
Well #5 Total Volume
Well #6 Total Volume
Well #7 Total Volume

River Garden Farms

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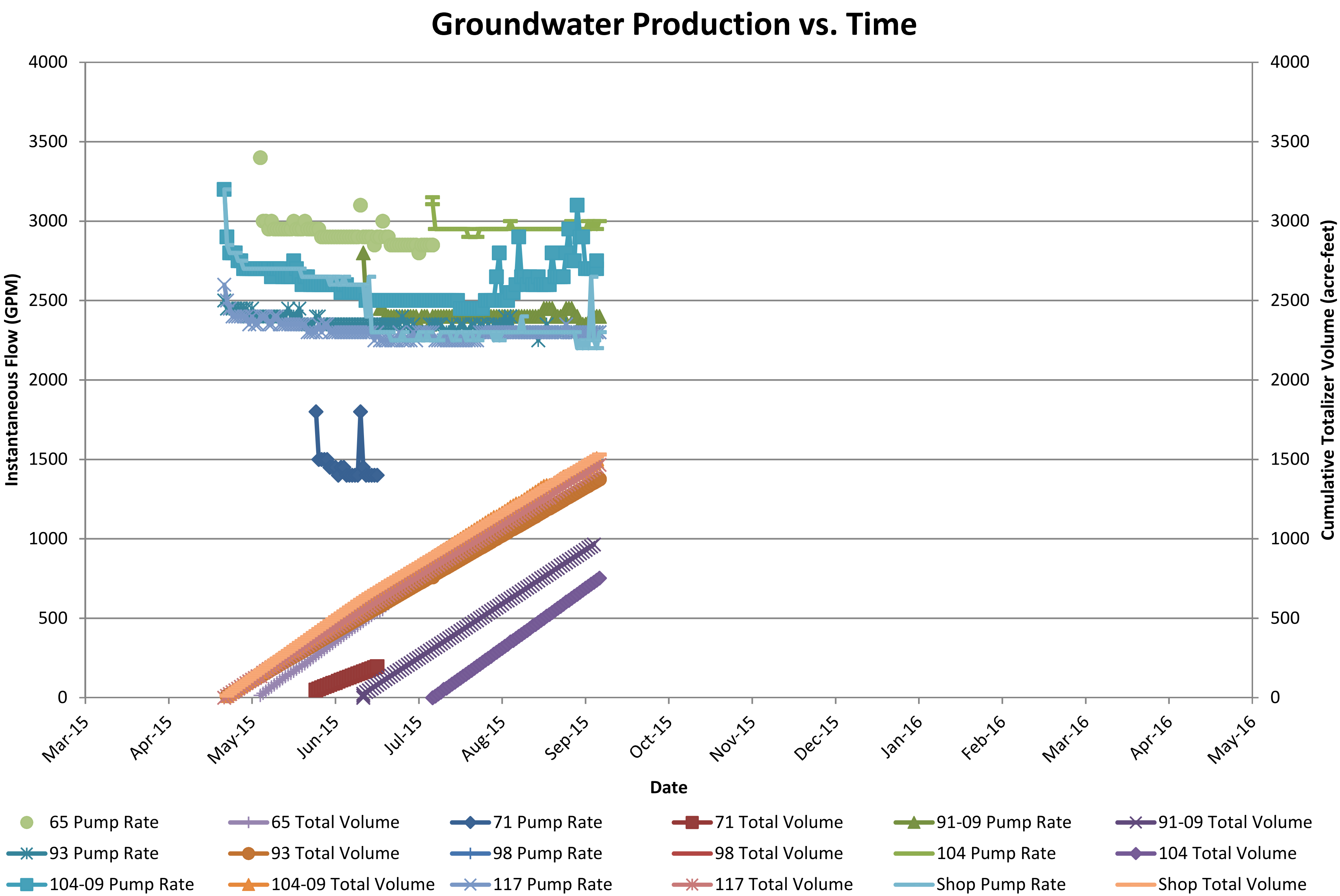
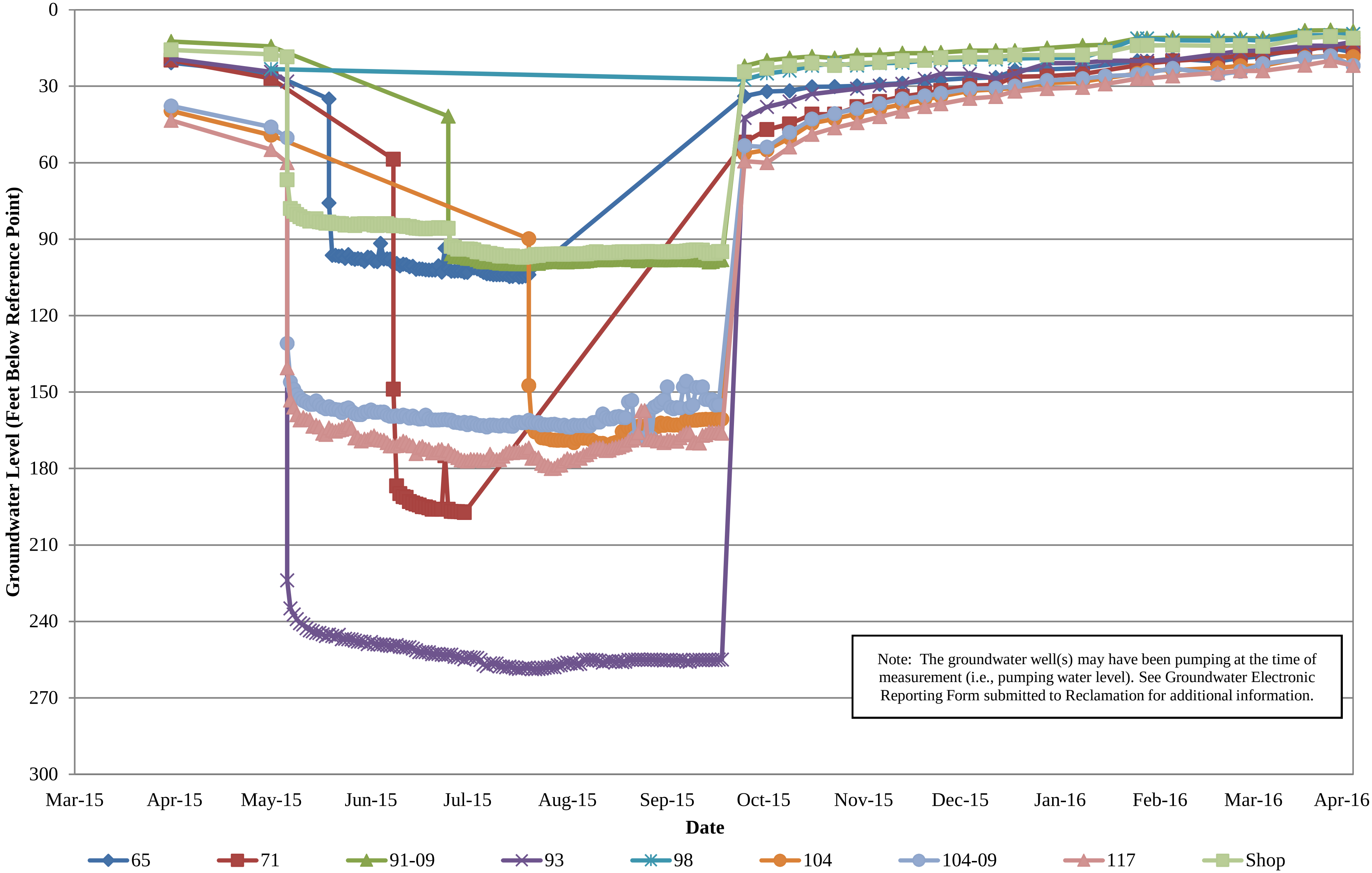
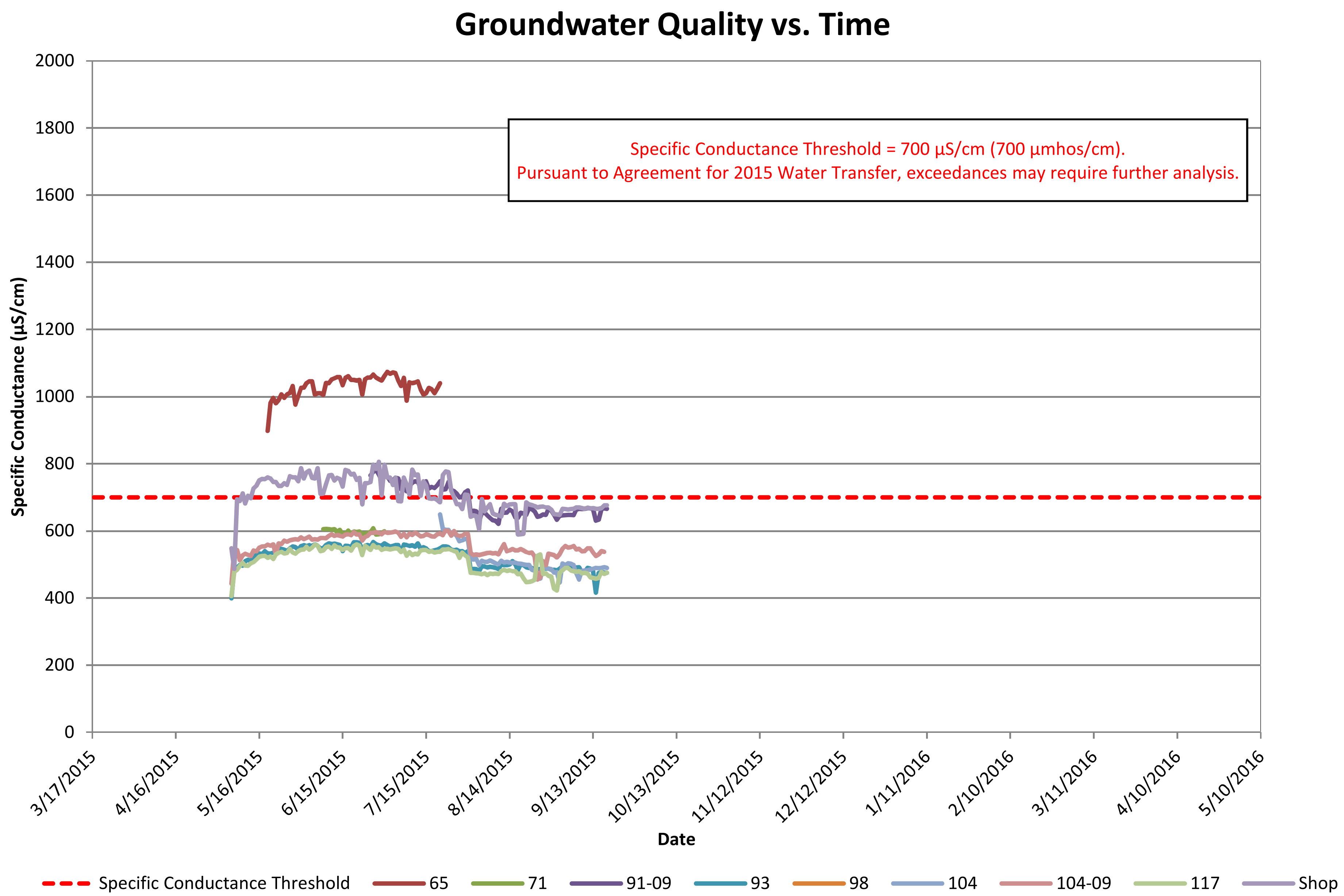


C:\Users\woodruffam\AppData\Local\Temp\Temp1_2015 WT Groundwater Data Electronic Reporting Forms 08.05.2016.zip\RGF Groundwater Data Electronic Reporting Form 08.05.2016.xlsx
Tab: Production Data

River Garden Farms
Production Well Groundwater Level Data





River Garden Farms

Final Report of 2015 Water Transfer Monitoring

July 2016

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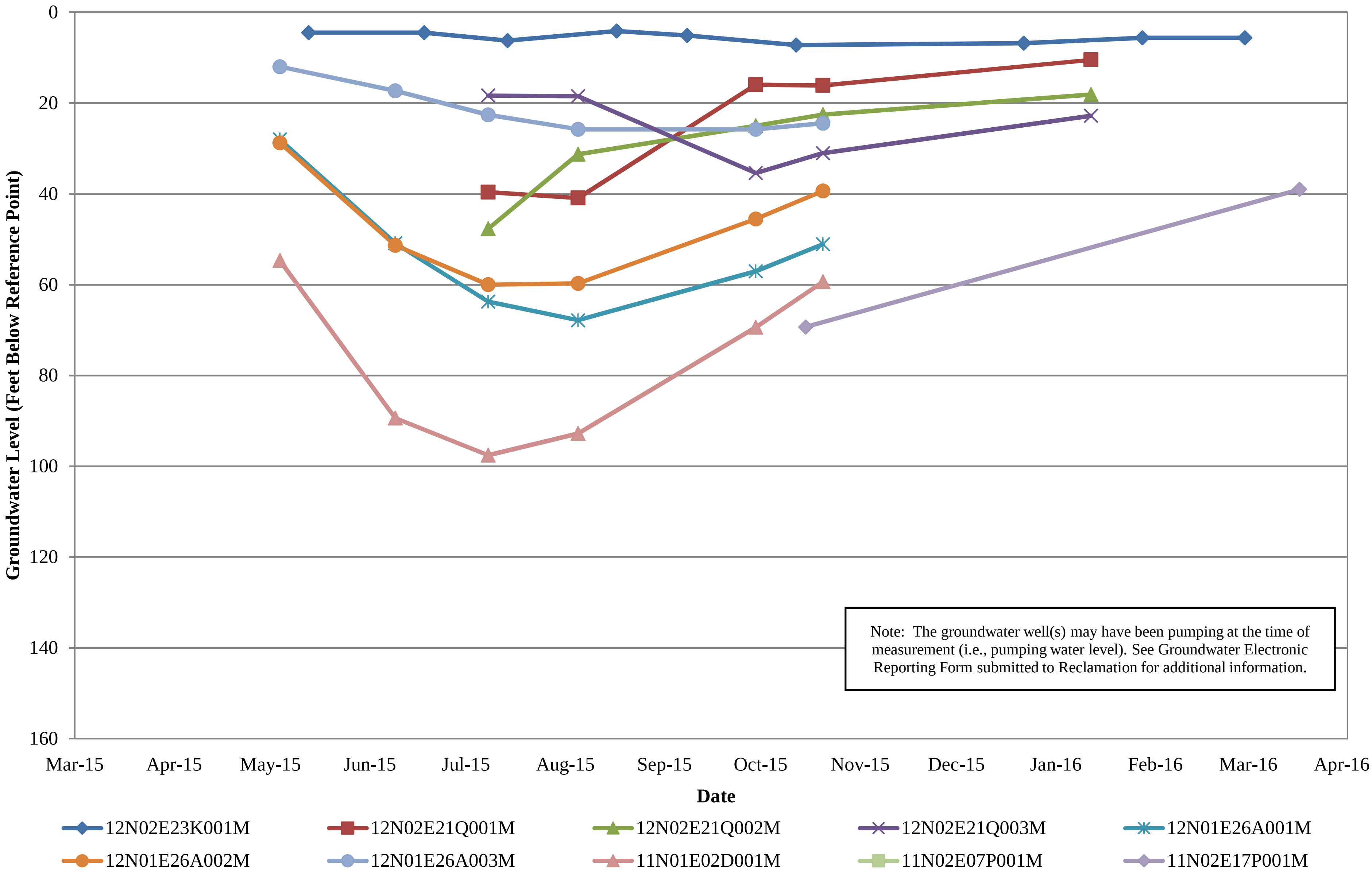
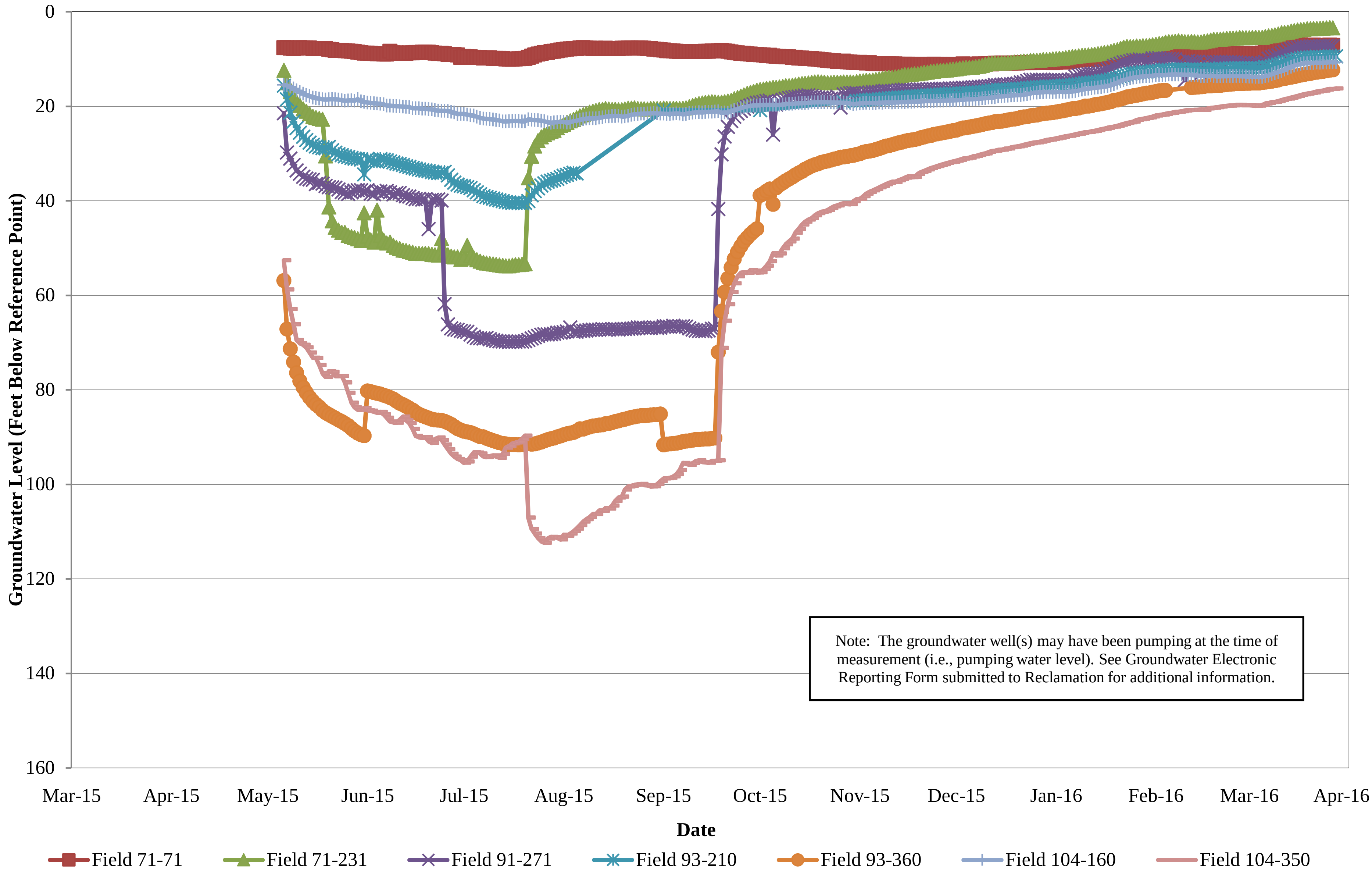
Tab: Water Quality Data

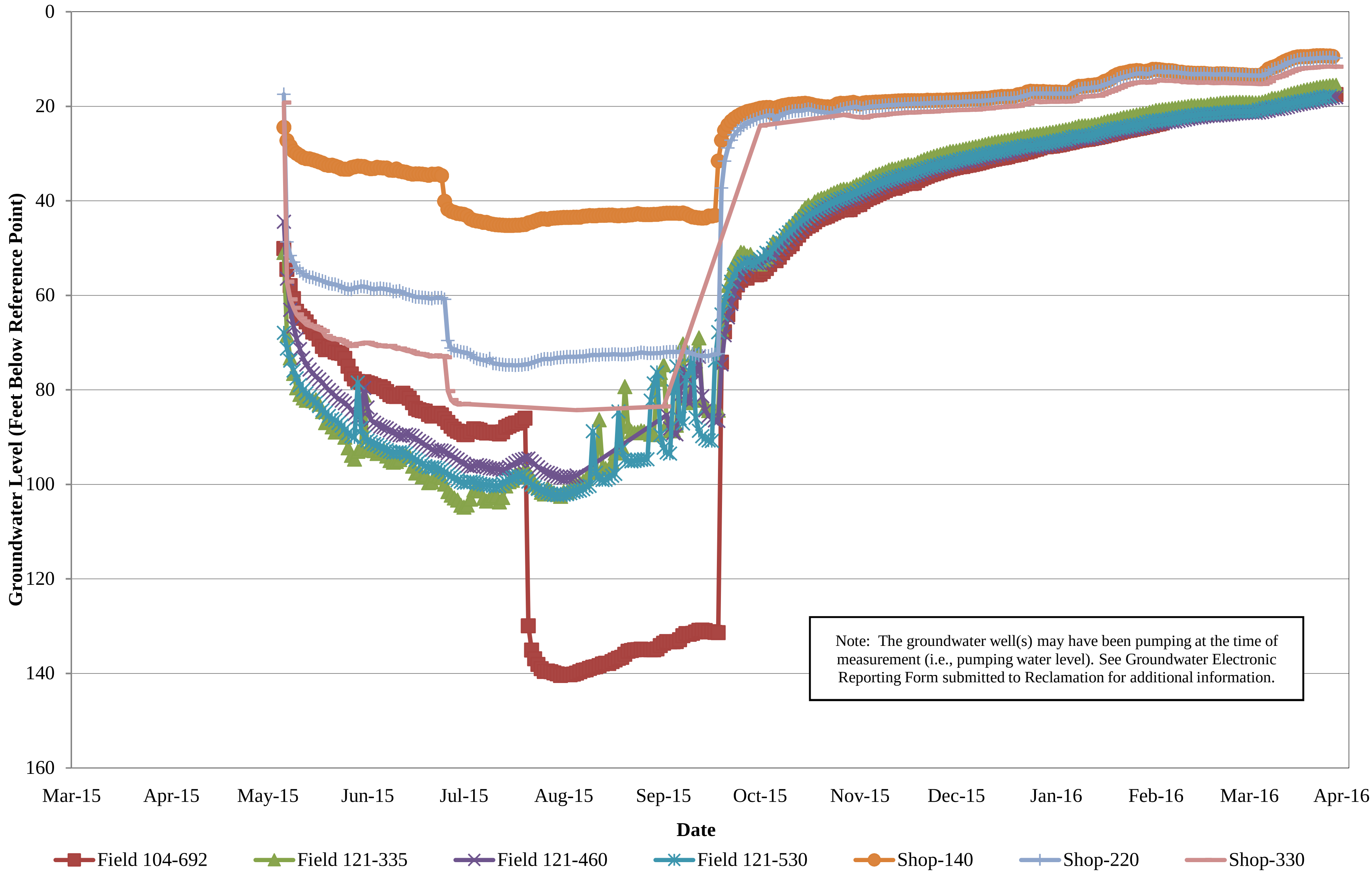
River Garden Farms
DWR Monitoring Well Groundwater Level Data



River Garden Farms
Monitoring Well Groundwater Level Data



River Garden Farms
Monitoring Well Groundwater Level Data



T&P Farms

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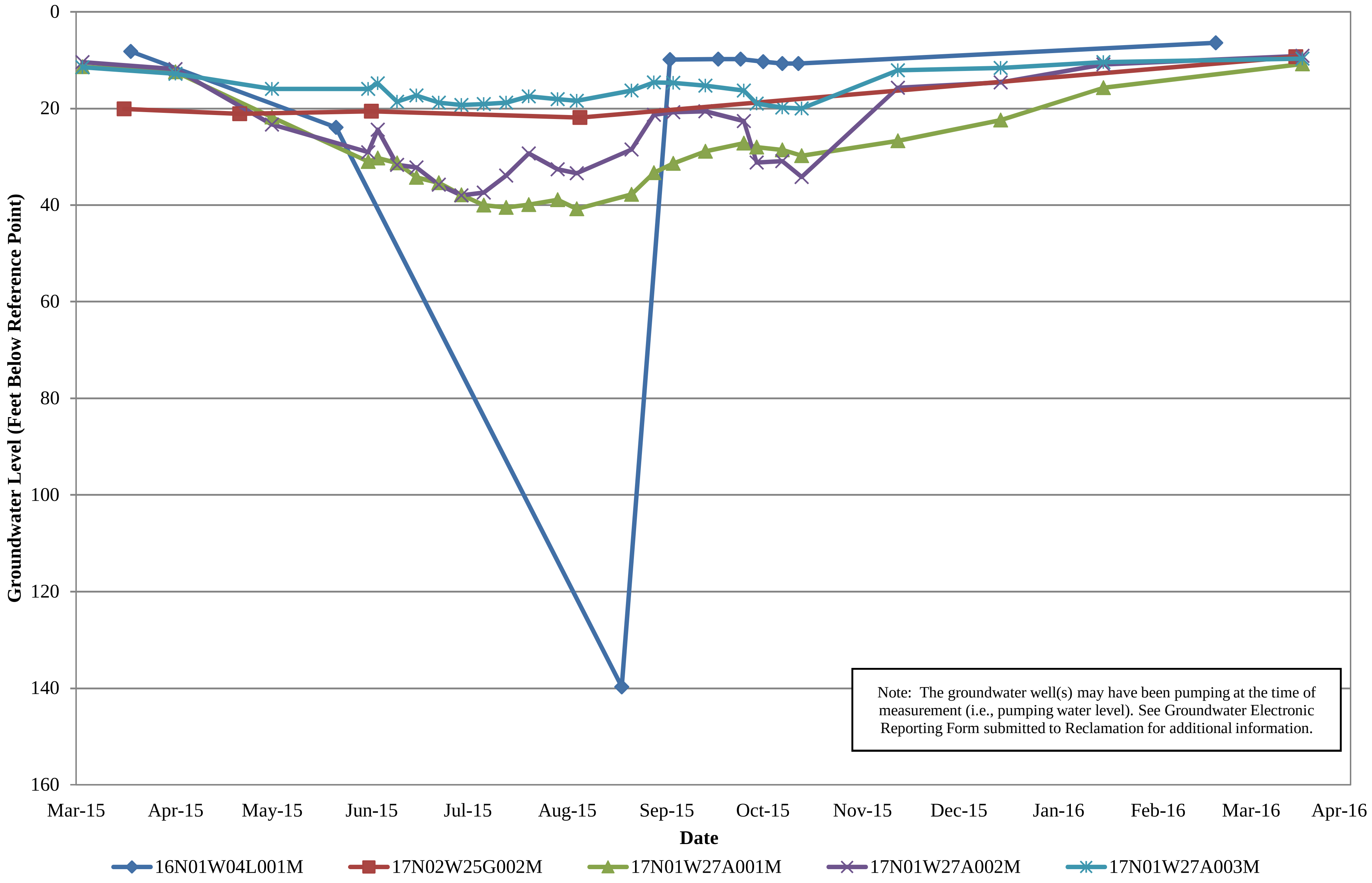
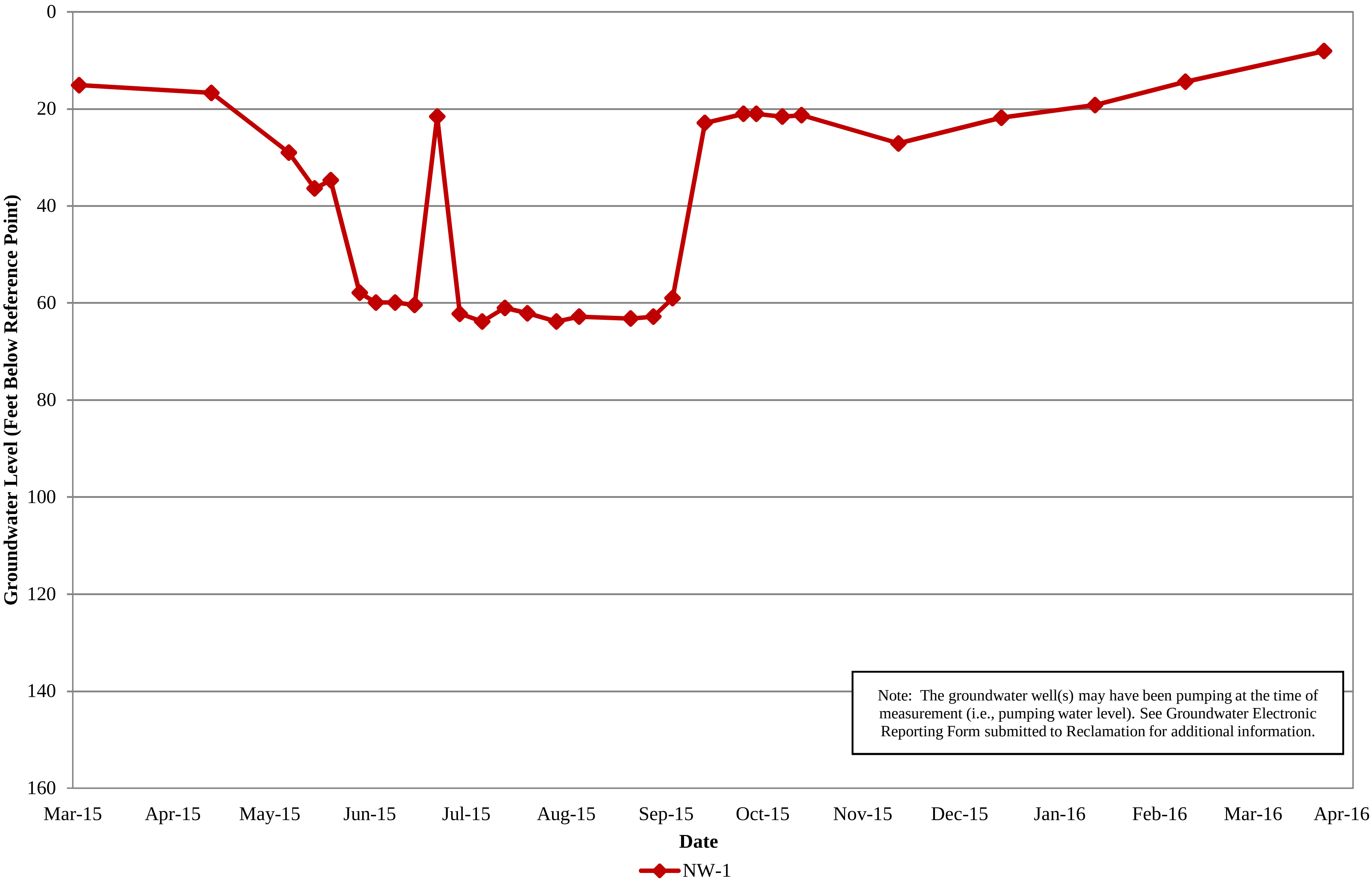
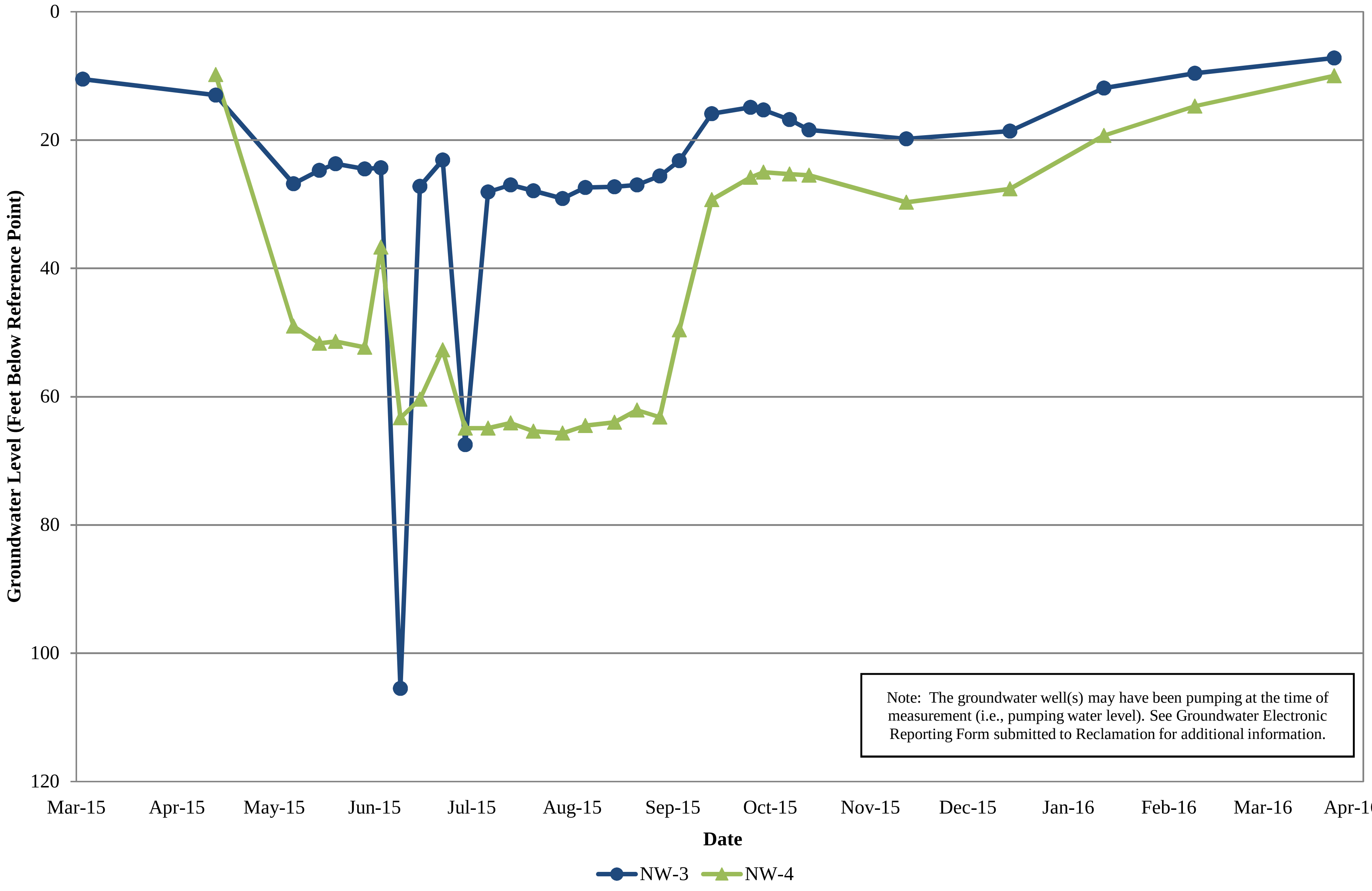
T&P Farms
DWR Monitoring Well Groundwater Level Data

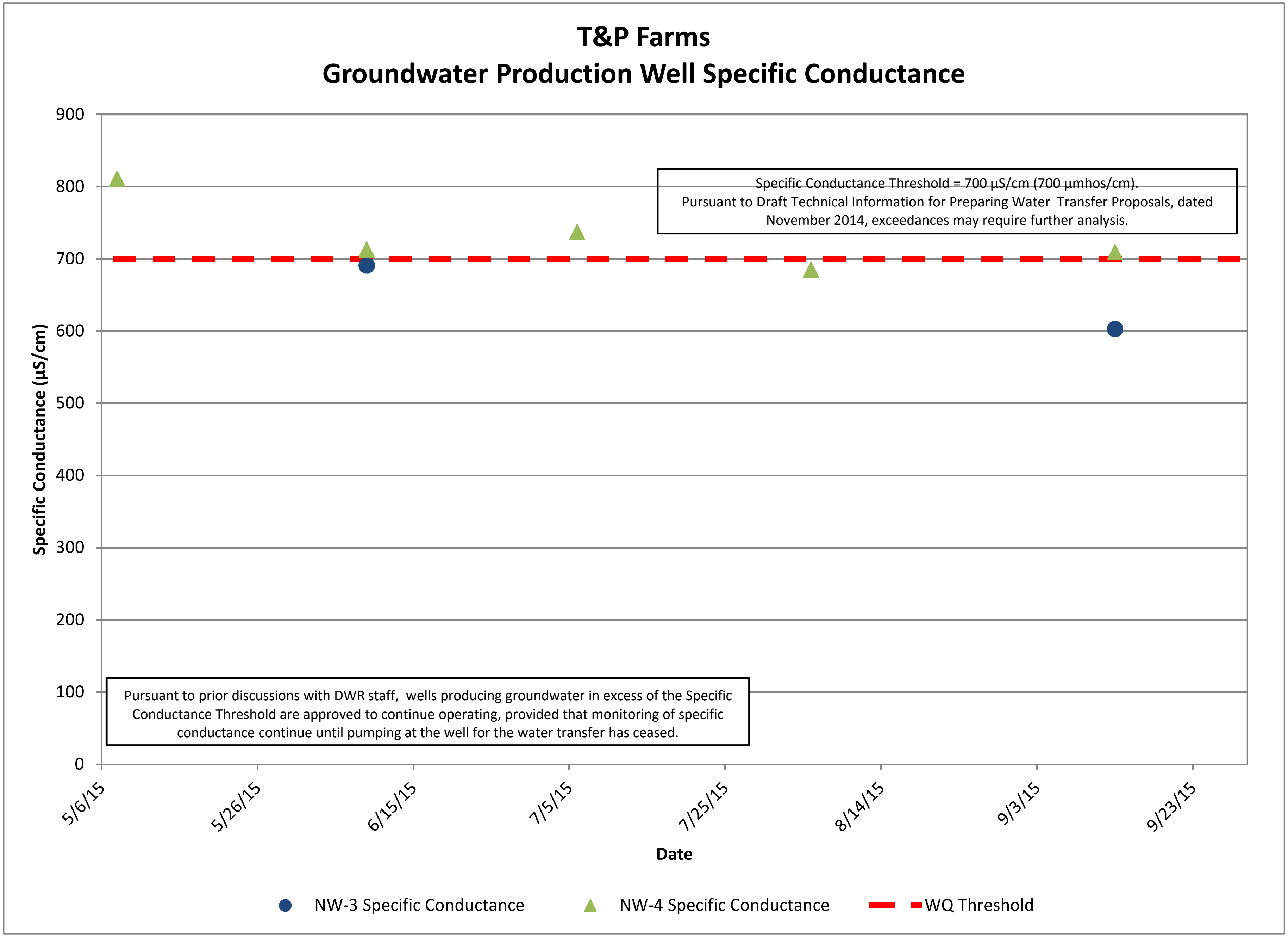


T&P Farms
Monitoring Well Groundwater Level Data

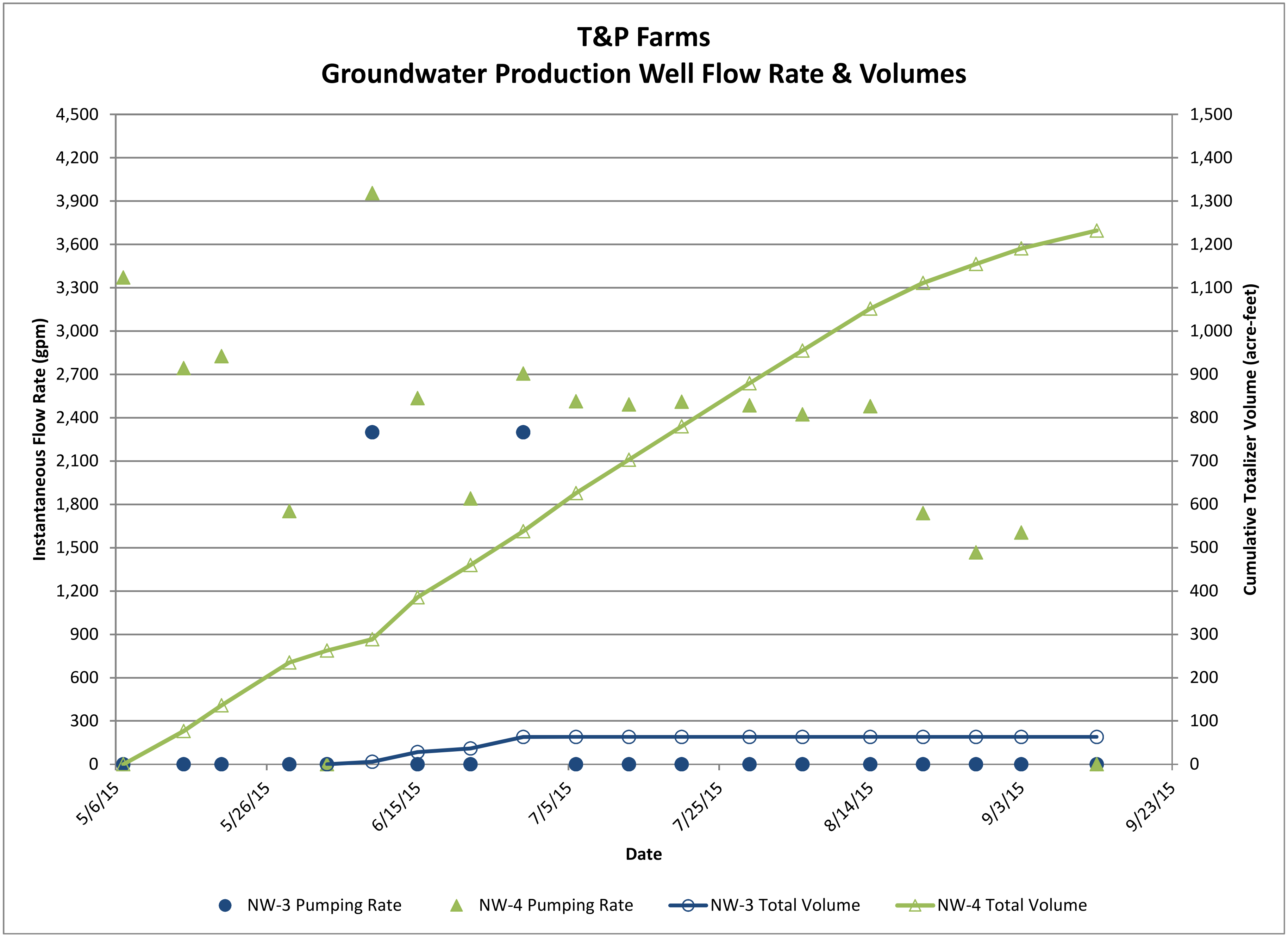


T&P Farms
Production Well Groundwater Level Data





T&P Farms
Groundwater Production Well Specific Conductance
Specific Conductance (µS/cm)
900
800
700
600
500
400
300
200
100
0
5/6/15
5/26/15
6/15/15
7/5/15
7/25/15
8/14/15
9/3/15
9/23/15
Date
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Draft Technical Information for Preparing Water Transfer Proposals, dated November 2014, exceedances may require further analysis.
Pursuant to prior discussions with DWR staff, wells producing groundwater in excess of the Specific Conductance Threshold are approved to continue operating, provided that monitoring of specific conductance continue until pumping at the well for the water transfer has ceased.
NW-3 Specific Conductance
NW-4 Specific Conductance
WQ Threshold


T&P Farms
Groundwater Production Well Flow Rate & Volumes
Instantaneous Flow Rate (gpm)
4,500
4,200
3,900
3,600
3,300
3,000
2,700
2,400
2,100
1,800
1,500
1,200
900
600
300
0
Cumulative Totalizer Volume (acre-feet)
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
5/6/15
5/26/15
6/15/15
7/5/15
7/25/15
8/14/15
9/3/15
9/23/15
Date
NW-3 Pumping Rate
NW-4 Pumping Rate
NW-3 Total Volume
NW-4 Total Volume

Te Velde Revocable Family Trust

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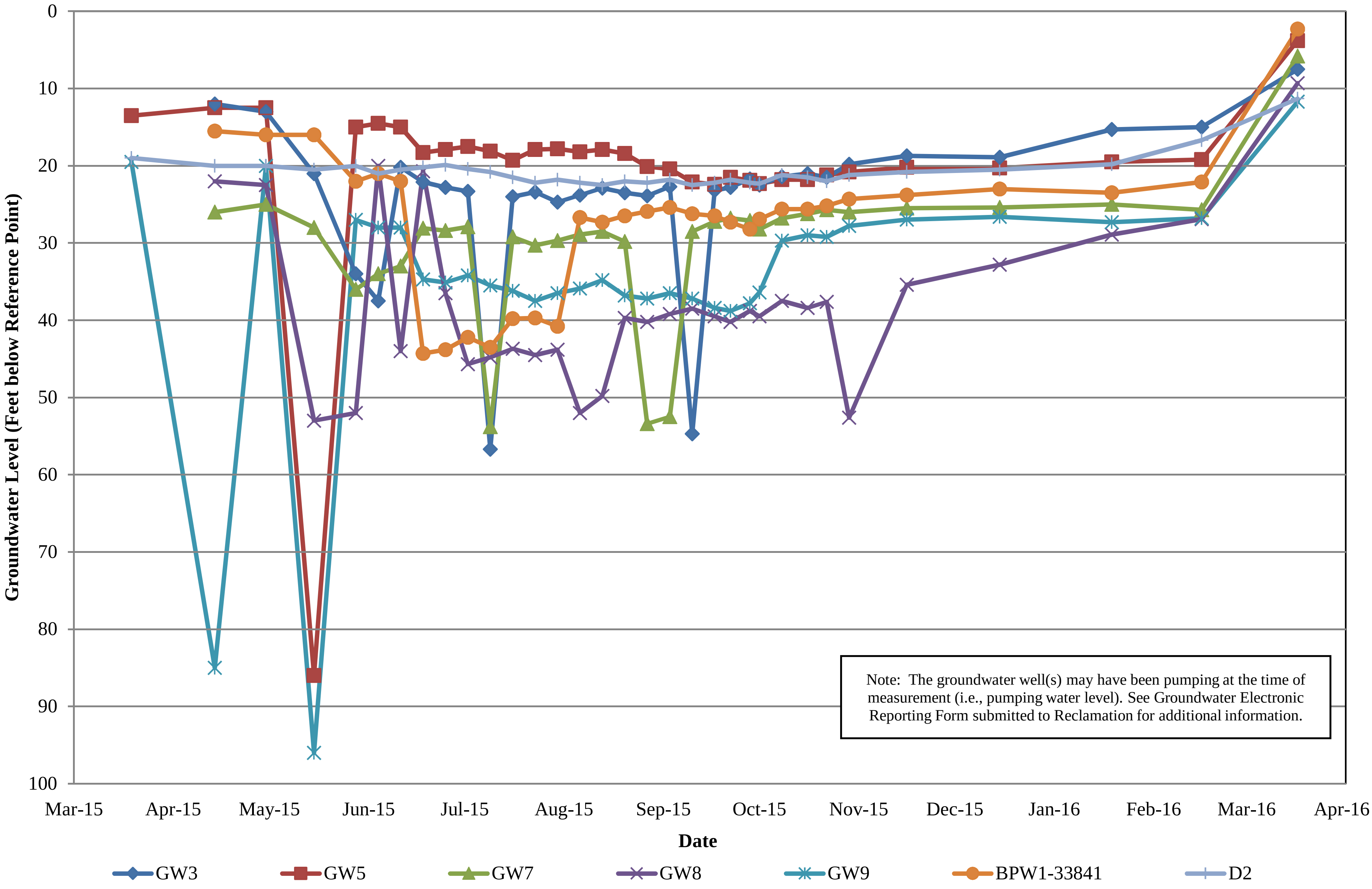
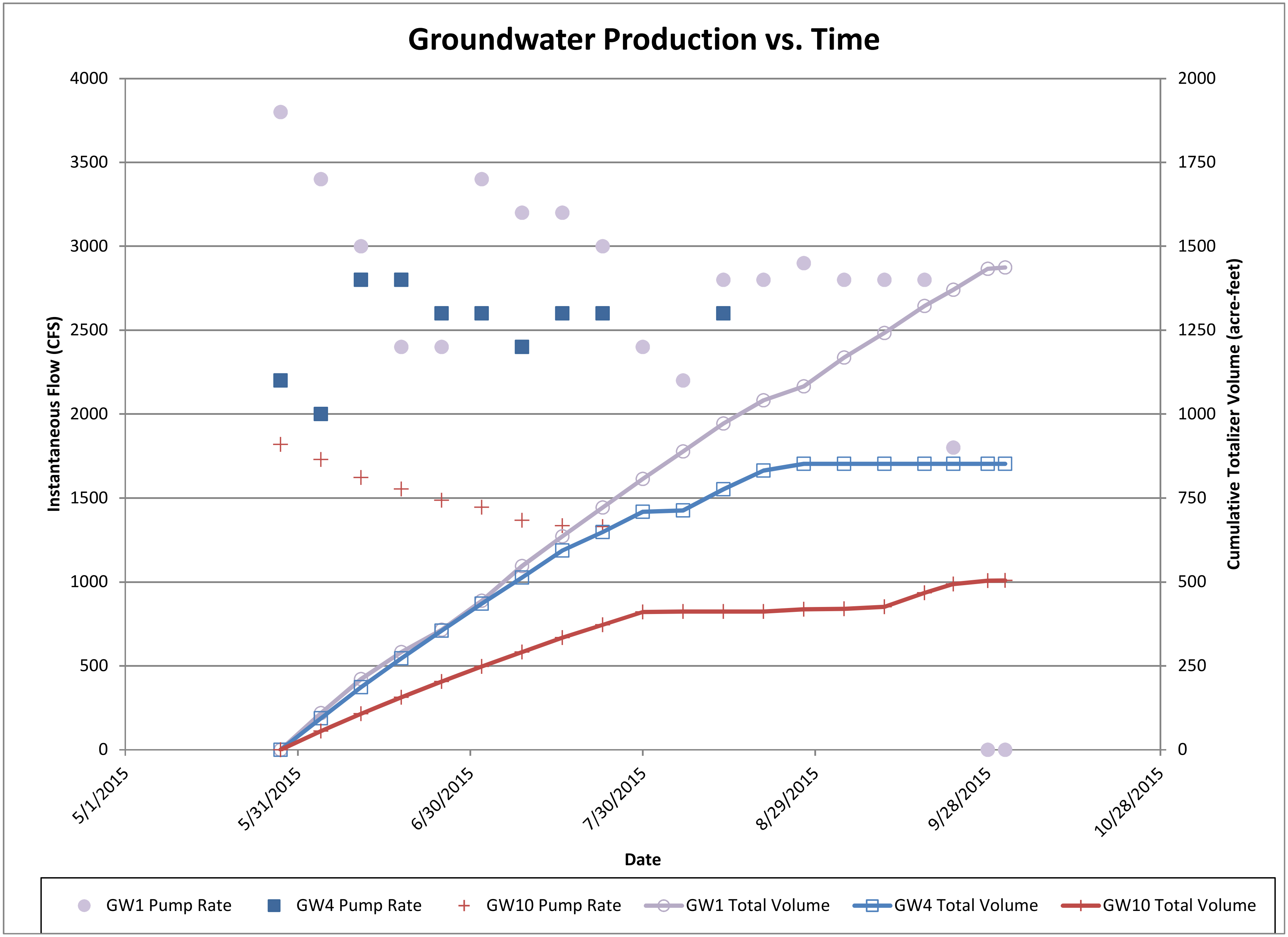
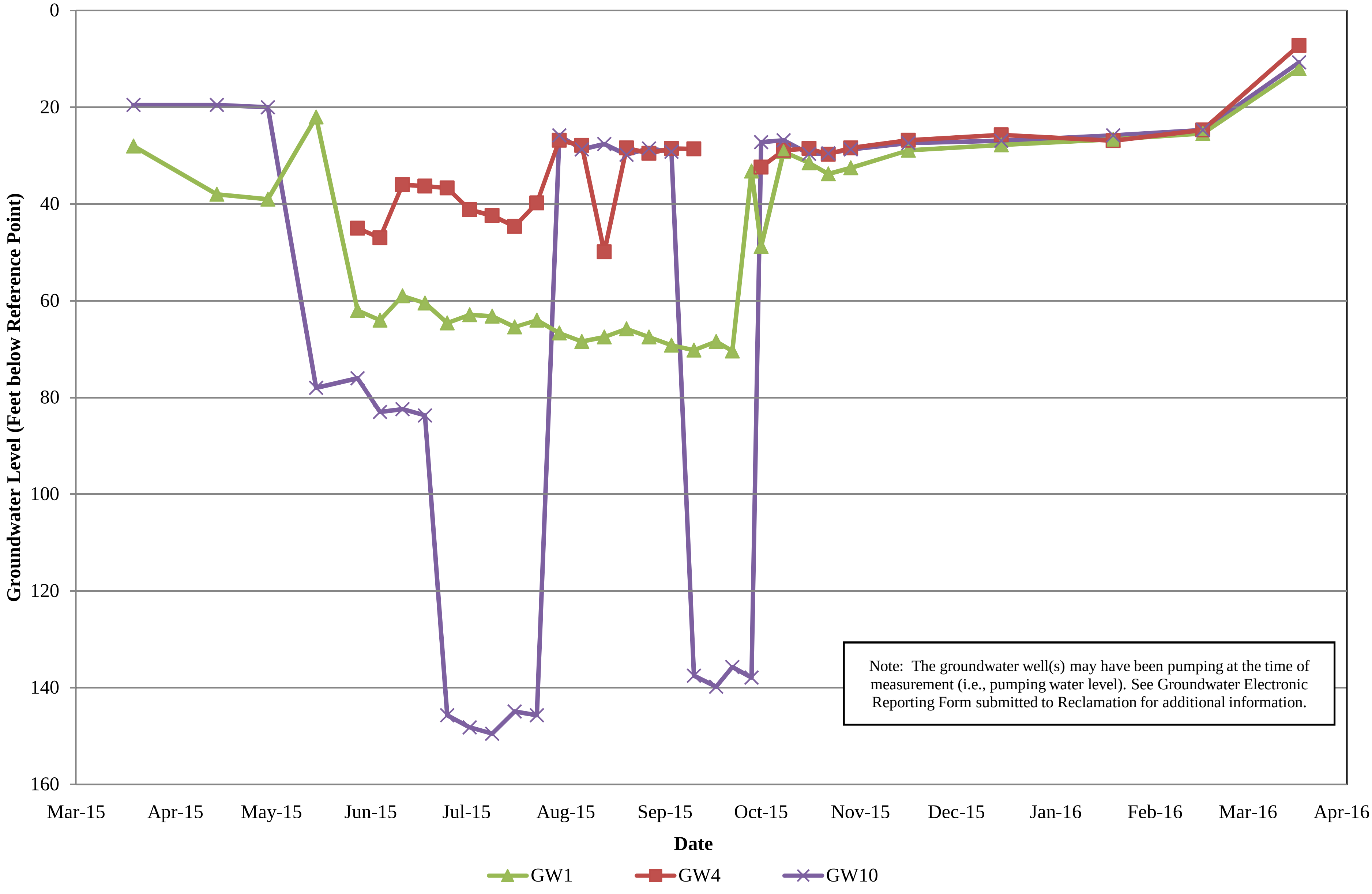
Te Velde Revocable Family Trust
Monitoring Well Groundwater Level Data



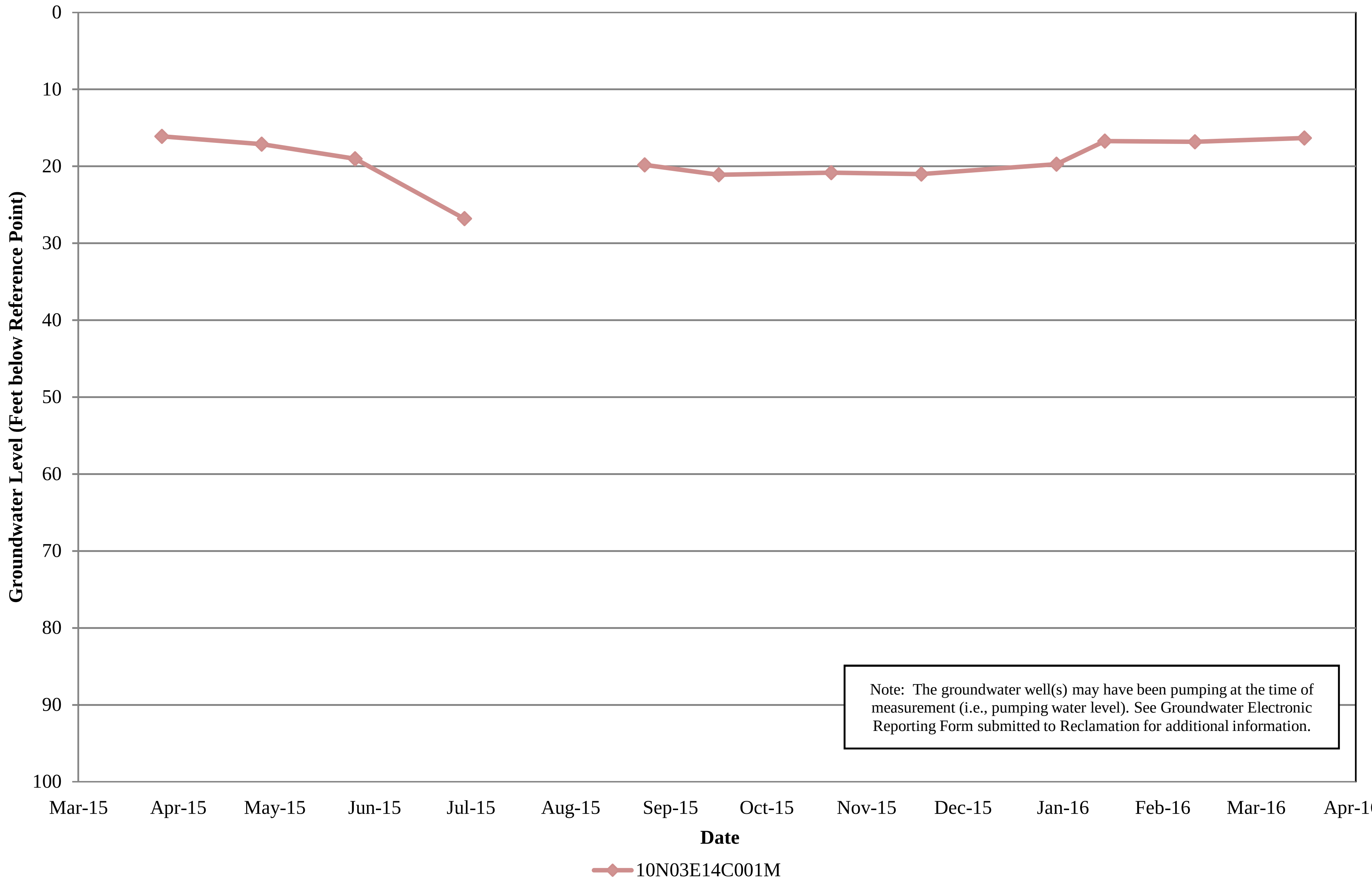


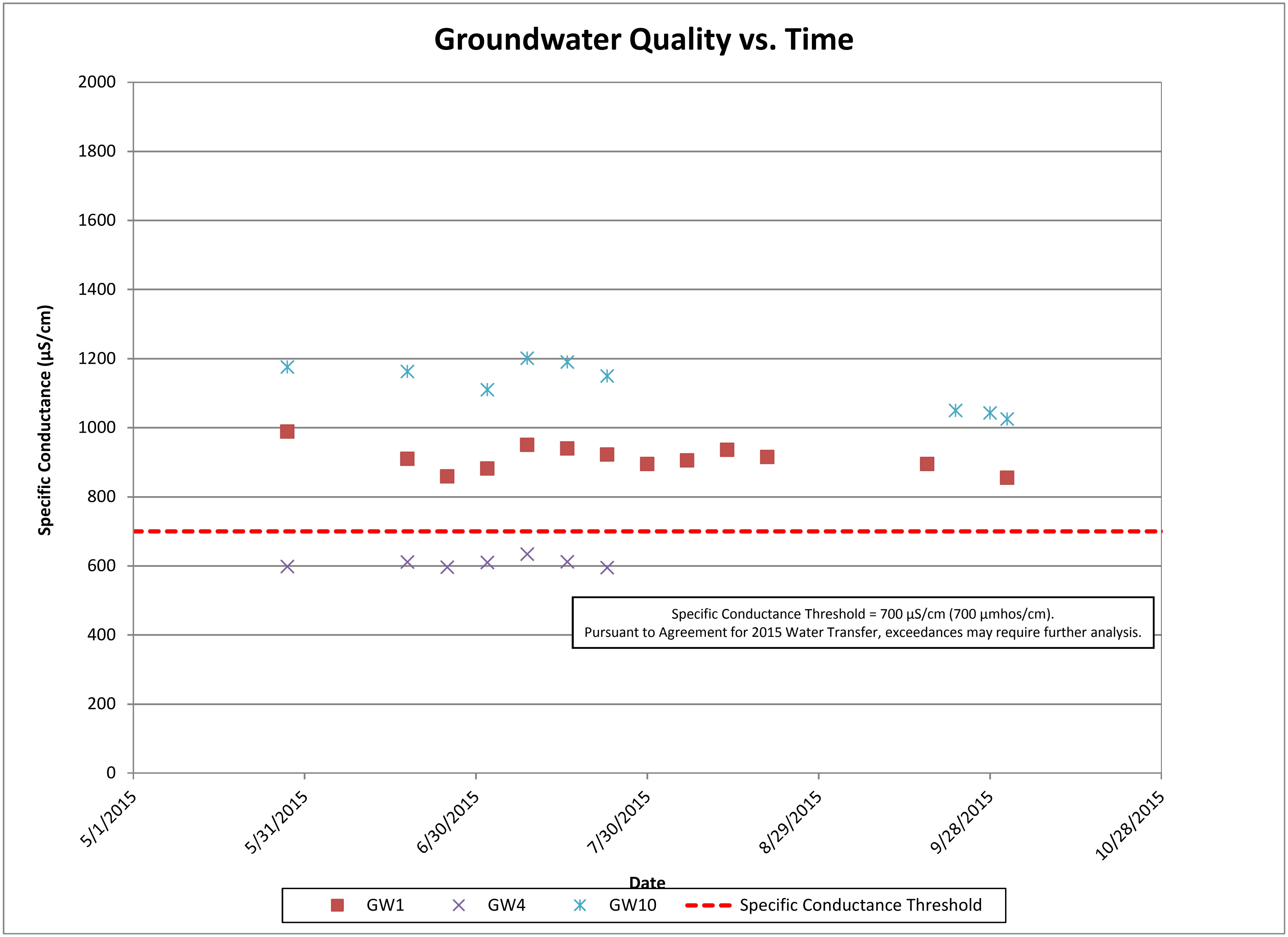
Groundwater Production vs. Time
Instantaneous Flow (CFS)
4000
3500
3000
2500
2000
1500
1000
500
0
Cumulative Totalizer Volume (acre-feet)
2000
1750
1500
1250
1000
750
500
250
0
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
10/28/2015
Date
GW1 Pump Rate
GW4 Pump Rate
GW10 Pump Rate
GW1 Total Volume
GW4 Total Volume
GW10 Total Volume

Te Velde Revocable Family Trust
Production Well Groundwater Level Data



Te Velde Revocable Family Trust
DWR Monitoring Well Groundwater Level Data




Groundwater Quality vs. Time
Specific Conductance (µS/cm)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Specific Conductance Threshold = 700 µS/cm (700 µmhos/cm).
Pursuant to Agreement for 2015 Water Transfer, exceedances may require further analysis.
5/1/2015
5/31/2015
6/30/2015
7/30/2015
8/29/2015
9/28/2015
10/28/2015
Date
GW1
GW4
GW10
Specific Conductance Threshold

Appendix J

Cumulative Projects

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Appendix J Cumulative Projects

This appendix provides an analysis of overall cumulative effects of Proposed Action taken together with other past, present, and reasonably foreseeable probable future projects (or actions) as required by NEPA implementing regulations (40 CFR, Section 1508.7) and CEQA Guidelines (14 CFR, Section 15130). The reasonably foreseeable probable future actions considered in this cumulative effects analysis are actions located within the Seller Service Area that have been identified as potentially having an effect on resources that also may be affected by the Proposed Project. This analysis follows applicable guidance provided by the CEQ in *Considering Cumulative Effects under the National Environmental Policy Act* (1997) and *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (*2005).

J.1 Cumulative Projects

The cumulative analysis considers other potential water transfers that could occur in the 2020 transfer season, including other CVP water transfers, non-CVP water transfers, and additional water transfers. No construction projects within the Seller Service Area were analyzed. Table J-1 lists potential sellers, including those in the Proposed Action, that have indicated interest or have provided water for transfer in the past, including:

- Potential transfers from sellers in the Sacramento River, American River, Yuba River, and north-westerly Delta areas. The majority of these potential sellers, which include the sellers in the Proposed Action, were evaluated in the Long-Term Water Transfers EIS/EIR and subsequent Long-Term Water Transfers RDEIR/SDEIS prepared by SLDMWA and Reclamation that analyzed potential CVP-related transfers from 2019 to 2024. Additional sellers in the Sacramento River area not evaluated in the EIS/EIR have indicated interest in selling water in 2020 and are also included in Table J-1.

- Potential transfers from sellers in the Feather River Region from entities holding settlement agreements with DWR that could make surface water available for CVP or SWP contractors. These transfers would be approved and facilitated by DWR.

The Lower Yuba River Accord (Yuba Accord) transfers were not included in the cumulative condition analysis in Chapter 3 because transfers would be made available in a different geographical area than the Proposed Action. The Yuba Accord provides for both stored water and groundwater substitution transfers ranging from 60,000 AF per year and up to an additional 140,000 AF for state and federal contractors in drier years. From 2007 through 2014, Yuba Accord transfers averaged approximately 129,000 AF. Transfers under the Yuba Accord historically account for a large portion of the DWR approved water transfers and represented 73 percent of the DWR approved transfers in 2015 (DWR 2015a). Groundwater substitution transfers for the Yuba Accord would occur in the North Yuba and South Yuba subbasins and would not affect groundwater levels near the Proposed Action.

J.1.1 Potential transfers analyzed in the cumulative analysis

The cumulative analysis considers other CVP and non-CVP water transfers that could occur in addition to Proposed Action. These water transfer methods could include cropland idling and groundwater substitution (the same as described for the Proposed Action). Transfer methods could also include additional methods such as conservation, where a seller takes a conservation action to reduce irrecoverable water losses, and stored reservoir water, which includes releases of water that would have remained in storage in non-CVP or SWP reservoirs.

Transfer water shown in Table J-1 could be sold to multiple agencies, including, TCCA, East Bay Municipal Utility District (MUD), SWP contractors receiving water from the North Bay Aqueduct, and south of Delta buyers, including SLDMWA and Metropolitan Water District of Southern California. Unlike transfers to TCCA and East Bay MUD that would be diverted off the Sacramento River, transfers to south of Delta buyers would be exported through the Delta via Banks or Jones Pumping Plants.

Table J-1. Potential Cumulative Sellers (Upper Limits)

Water Agency	Groundwater Substitution[1] (acre-feet)	Cropland Idling/ Crop Shifting[1] (acre-feet)	Stored Reservoir Release[1] (acre-feet)	Conservation[1] (acre-feet)	Maximum Potential Transfer (acre-feet per year)
Sacramento River Area					
Anderson-Cottonwood Irrigation District	5,225				5,225
Baber, Jack et al.		2,310			2,310
Canal Farms	1,000	635			1,635
Conaway Preservation Group	35,000	21,349			35,000
Cranmore Farms (Pelger Road 1700 LLC)	8,000	2,500			8,000
Eastside Mutual Water Company	2,230				2,230
Giusti Farms	1,000				1,000
Glenn-Colusa Irrigation District	25,000	66,000			91,000
Henle Family Limited Partnership	700				700
Maxwell Irrigation District	3,000	5,000			8,000
Natomas Central Mutual Water Company	30,000				30,000
Pelger Mutual Water Company	4,670	2,538			4,670
Pleasant Grove-Verona Mutual Water Company	18,000	9,000			18,000
Princeton-Cordora-Glenn Irrigation District	6,600	6,600			12,100
Provident Irrigation District	10,000	9,900			16,900
Reclamation District 108	15,000	20,000			35,000
Reclamation District 1004	7,175	12,500			19,675
River Garden Farms	10,000	10,000			16,000
Sutter Mutual Water Company	18,000	18,000			18,000
Sycamore Mutual Water Company	15,000	10,000			20,000

Water Agency	Groundwater Substitution[1] (acre-feet)	Cropland Idling/ Crop Shifting[1] (acre-feet)	Stored Reservoir Release[1] (acre-feet)	Conservation[1] (acre-feet)	Maximum Potential Transfer (acre-feet per year)
T&P Farms	1,200	890			1,200
Te Velde Revocable Family Trust	7,094	6,975			7,094
Windswept Land & Livestock	2,000				2,000
American River Area					
City of Sacramento	5,000				5,000
Placer County Water Agency			47,000		47,000
Sacramento County Water Agency	15,000				15,000
Sacramento Suburban Water District	30,000				30,000
Yuba River Area					
Browns Valley Irrigation District			5,000	3,100	8,100
Cordua Irrigation District	12,000				12,000
Feather River Area					
Butte Water District	5,500	11,500			17,000
Garden Highway Mutual Water Company	14,000				14,000
Gilsizer Slough Ranch	3,900				3,900
Goose Club Farms and Teichert Aggregates	10,000	10,000			10,000
South Sutter Water District			15,000		15,000
Tule Basin Farms	7,320				7,320
Biggs-West Gridley Water District[2]		32,190			32,190
Richvale Irrigation District[2]		22,345			22,345
Plumas Mutual Water Company[2]	5,000	1,750			4,550
South Feather Water and Power[2]			10,000		10,000
Sutter Extension Water District[2]	4,000	11,000			15,000
Western Canal Water District[2]		37,655			37,655
Total	**337,614**	**330,637**	**77,000**	**3,100**	**661,799**

[1] These totals cannot be added together. Agencies could make water available through groundwater substitution, cropland idling, or a combination of the two; however, they will not make the full quantity available through both methods. The last column reflects the total upper limit for each agency and will not equal the sum of all the individual transfer quantities for each agency.

[2] Entity holds Settlement Agreement with DWR.

Table J-1 lists the transfer method and associated maximum annual transfer quantity potentially available from each seller. The actual quantity of water transferred in a given year, as evidenced by past dry years, is less than the totals shown in Table J-1 and depends on a number of factors, including hydrologic conditions and available conveyance capacity. Cross Delta transfers to south-of-Delta buyers require pumping at the CVP and SWP south Delta export facilities and historically account for the majority of the transfers from sellers listed in Table J-1. Table J-2 lists the total quantities of cross Delta transfers from 2009 to 2015 that ranged from zero to 414,629 AF from 2009 through 2015, or approximately zero to 55 percent of the maximum total shown in Table J-1. In 2014, Sacramento Valley sellers transferred 35,446 AF to TCCA Member Units. In 2015, TCCA used 23,997 AF of transfer water from Settlement Contractors. TCCA did not engage in water transfers in 2016 – 2019, and cross-Delta water transfers were not implemented.

Table J-2. Historic Cross Delta Water Transfers (2009 – 2015)

Year	Total Acre-Feet
2009	274,551
2010	264,165
2011	0
2012	84,781
2013[1]	351,515
2014[1]	414,629
2015[1]	262,466

Source: DWR and SWRCB 2015

[1] Data for 2013, 2014 and 2015 are for quantities made available North of the Delta and include Streamflow Depletion losses (where applicable) but do not include carriage water losses across the Delta. Data for 2015 is preliminary as of May 2015 and may change as the year develops. Cross Delta water transfers using facilities operated by DWR in 2014 and 2015 were 305,699 AF and 104,348 AF respectively and Reclamation 73,930 AF and 157,018 AF respectively.

Transfers originating from the Sacramento Valley represent a small portion of the Sacramento Valley's overall water supply. In addition to the transfers described in Table J-1, TCCA may also engage in "Project Water" transfers under the Central Valley Project Improvement Act section 3405(a)(1)(m). Reclamation analyzed potential impacts of these transfers in an EA in 2016, the "Accelerated Water Transfer and Exchange Program for Sacramento Valley Central Valley Project Contractors – Contract Years 2016-2020." The EA identified no effect to biological resources and potentially small, beneficial effects to other resources. Because these transfers would not have adverse effects, they are not included in the cumulative conditions analysis in Chapter 3.

J.1.2 Voluntary Agreements

On December 12, 2018, the State Water Resources Control Board (Board) adopted Resolution 2018-0059, approving an update to the Bay-Delta Water Quality Control Plan (Bay-Delta Plan). The agreement included flow and non-flow measures to improve water quality in the Bay-Delta watershed to support viability of native fishes. On March 1, 2019, several parties, including the Sacramento River Settlement Contractors, entered into the "*Planning Agreement Proposing Project Description and Procedures for the Finalization of the Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan* (Planning Agreement).

The flow measures discussed in the Planning Agreement provide instream flows above existing conditions and in a manner that: (a) does not conflict with the requirements of the Sustainable Groundwater Management Act and (b) maintains reliability of water supply for other beneficial uses, including designated wildlife refuges. These flows above existing conditions will be generated through land fallowing, reservoir reoperation and/or demand reduction, and limited use of groundwater substitution. Table J-3 shows the flow contributions from the Sacramento River watershed.

Table J-3. Contribution of Flow to the Voluntary Agreement in the Sacramento River Watershed

Tributary	Season	Source	Application[2]	Flow Contributions (in TAF)				
				C	D	BN	AN	W
Sacramento	Spring or summer[1]	Land fallowing	Block		100	100	100	
Feather	Spring or summer [1]	Land fallowing	Block		50	50	50	
Yuba	Assume spring likely [1]	Reservoir storage	Block		50	50	50	
American	Spring	Groundwater substitution	Hybrid	10	10			
		Reservoir storage				10	10	
		Reservoir storage and/or groundwater substitution			10			
		Reservoir storage and/or groundwater substitution		20	20			

[1] Flow represents an instream target, Blocks can be scheduled within constraints, and Hybrid represents a combination.
[2] Subject to coordination with California Department of Fish and Wildlife (DFW) (Yuba) or fisheries agencies (Sacramento, Feather)
TAF – Thousand acre-feet

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Appendix K

Comments and Responses

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Appendix K
Comments and Responses

K.1 Introduction

This appendix contains responses to comments received on the Draft Initial Study/ Environmental Assessment (IS/EA). While responding to comments on an IS/ND is not specifically required by CEQA, CEQA Guidelines Section 15074(b) requires that the lead agency consider any comments received on the IS/ND prior to approving the project. This document provides evidence that TCCA considered all comments received on this IS/EA.

Each commenter, their associated agency/group, and assigned number identification is listed in Section K.2. Section K.3 includes the comments and responses to those comments. Appendix L includes the full comment letters.

K.2 List of Commenters

Table K-1 presents commenters and associated agencies or groups that submitted comments on the 2020 TCCA In-Basin Water Transfers IS/EA.

Table K-1. List of Commenters

Commenter	Agency/Group	Letter ID
Nicole Goi	Sacramento Municipal Utility District	1
Nancy Finch	Department of Water Resources	2

K.3 Detailed Comments and Responses

Individual responses to comments are presented in the following section.

Comment Letter 1, Nicole Goi, Sacramento Municipal Utility District

Comment 1-1

The Sacramento Municipal Utility District (SMUD) appreciates the opportunity to provide comments on the Mitigated Negative Declaration (MND) for the 2020 Tehama-Colusa Canal Authority In-Basin Water Transfers Project (Project SCH, 2019049121). SMUD is the primary energy provider for Sacramento County and a portion of the proposed Project area. SMUD's vision is to empower our customers with solutions and options that increase energy efficiency, protect the environment, reduce global warming, and lower the cost to serve our region. As a Responsible Agency, SMUD aims to ensure that the proposed Project limits the potential for significant environmental effects on SMUD facilities, employees, and customers.

We have no comments to offer at this time but would appreciate if the Tehama-Colusa Canal Authority would continue to keep SMUD facilities in mind as environmental review of this Project moves forward. Please reroute the Project analysis for SMUD's review if there are any changes to the scope of the Project.

Response
Copies of the Final IS/EA will be provided to each party that commented on the Draft IS/EA. Thank you for your comment.

Comment Letter 2, Nancy Finch, Department of Water Resources

Comment 2-1

The Department of Water Resources (DWR) has reviewed the MND for 2020 Tehama-Colusa Canal Authority (TCCA) In Basin Water Transfers. DWR has the following comments.

Proposed Project
The proposed project includes water transfers of up to 36,685 acre-feet (AF) of water from willing sellers on northern California waterways who have contracts with the United States (Sellers) to Member Units of the TCCA (Buyers). These water transfers would reduce potential effects of water supply shortages in 2020 through a combination of groundwater substitution transfers and cropland idling transfers.

Comments
As stated in the California Water Action Plan, 2018 Update, California promotes safe and effective water transfers. To that end, DWR requests the environmental analysis in the MND and the IS/EA address our concerns on the following: (1) data and information in Chapter 2; (2) groundwater model; (3) proposed monitoring and mitigation measures. To that end, we request the following specific comments be addressed.

Response

The comment summarized the Proposed Project and DWR's comments on the IS/EA.

Comment 2-2

2.3.6.3 Environmental Setting- Groundwater
The MND does not have an accurate environmental setting description for groundwater: it relies on data that has been supplemented and superseded. The

MND needs to provide a more accurate and comprehensive groundwater evaluation based on current and best available information.

The groundwater environmental setting section uses DWR's 2002 Sacramento River Basin-wide Water Management Plan and DWR's 2003 Bulletin 118 from to qualitatively describe the groundwater quality of Sacramento Valley as generally good but with some localized issues. For an accurate alternatives analysis, DWR requests the alternatives be analyzed based on current water quality data from the State Water Resources Control Board Groundwater Ambient Monitoring and Assessment (https://www.waterboards.ca.gov/water issues/programs/gama/online tools.html) and DWR's Water Data Library (http://wdf.water.ca.gov/waterdatalibrary/) which provide additional details on the localized issues.

According to the MND, groundwater levels in the northern Sacramento Valley Groundwater Basin have declined over the last 15 years mostly due to the persistent dry weather conditions since 2006. Those levels have also declined due to land use changes between 2004 and 2019, especially in areas without surface water on the west side of the Sacramento Valley in Colusa, Glenn, and Tehama Counties. Such Land use changes include: (1) dry farming/grazing acreage converted to orchards of permanent crops, and (2) annual/truck crop acreage converted to orchards of permanent crops.

Response

Section 2.3.6.3, Hydrology and Water Quality Environmental Setting has been updated.

Comment 2-3

Between 2004 and 2019, shallow wells (generally comprised of domestic wells) on the west side of the Sacramento Valley reflect record low groundwater levels. Shallow wells in this area appear to be the most sensitive to dry and drought year conditions and the increase in groundwater pumping from aquifer zone at greater depths. Although the multiple aquifer zones (shallow, intermediate, deep) located west of the Sacramento River are assumed to be separated by aquitards, it cannot be assumed that the aquitards provide full, laterally continuous barriers; therefore, pumping from deep wells may impact groundwater levels in wells completed in aquifer zones above the pumping zone. DWR recommends to include this information in the groundwater environmental setting analysis.

While groundwater levels in the northern Sacramento Valley Groundwater Basin may show an increase between spring 2018 and spring 2019, groundwater levels on the west side and other areas of the northern Sacramento Valley still show a cumulative decrease since 2004. The MND states that past groundwater trends are indicative of groundwater levels declining moderately during extended droughts and recovering to predrought levels after subsequent wet periods. There are no data to substantiate such a statement. DWR requests you provide the data to substantiate the conclusion that the Sacramento Valley Groundwater Basin has moderate levels of groundwater decline and recover groundwater and your modeling analysis of the date, if necessary.

Response

SACFEM2013 includes the best available representation of the Sacramento Valley hydrogeology. The model was calibrated to represent transient historical conditions in the valley, including cycles of wet and dry periods. The model does not explicitly simulate aquitard units in the Sacramento Valley because, as they commenter notes, not all aquitards in this area are laterally continuous enough to be represented as separate layers. However, the "vertical resistance" parameter in SACFEM2013 is assigned to represent the overall resistance to groundwater movement in the vertical direction within each model layer. This resistance is a function of the presence, or absence, of aquitard units within the area. The vertical resistance values were assigned through the calibration process such that the model adequately represented groundwater levels both horizontally and vertically across the Sacramento Valley.

Appendix D, Groundwater Existing Conditions has been revised to include additional figures that further describe groundwater level trends in the Sacramento Valley. The following figures have been added to Appendix D:

1. Spring 2004 to Spring 2015 change in groundwater elevation in shallow (less than 200 ft bgs) wells.

2. Spring 2004 to Spring 2015 change in groundwater elevation in intermediate (greater than 200 ft and less than 600 ft deep bgs) wells.

3. Spring 2004 to Spring 2015 change in groundwater elevation in deep (greater than 600 ft bgs) wells.

Section 2.3.6.3, Hydrology and Water Quality has been revised to include a discussion of groundwater level decline during dry periods (2004 to 2015) and the recovery of groundwater levels during subsequent wet periods (2017 and 2018).

Comment 2-4

According to the MND, Yolo, Colusa, Glenn, and Sutter Counties have experienced subsidence generally related to groundwater pumping and subsequent consolidation of loose aquifer sediments. DWR recommends that the MND specify if the land subsidence is temporary (elastic) or permanent (inelastic). If the MND does not specify the land subsidence is temporary, DWR requests the MND includes supporting information as to why the land subsidence is not temporary.

Response

Appendix D, Groundwater Existing Conditions has been revised to include figures showing the change in ground surface elevation at three extensometer locations within the Sacramento Valley. The following figures have been added to Appendix D:

1. Zamora Extensometer (11N01E24Q008M) Ground Surface Displacement Plot

2. Conaway Ranch Extensometer (09N03E08C004M) Ground Surface Displacement Plot

3. Sutter Extensometer (11N04E04N005M) Ground Surface Displacement Plot

Section 2.3.6.3, Hydrology and Water Quality has been revised to include a discussion of inelastic (i.e., permanent) and elastic (i.e., temporary) land subsidence trends in the Sacramento Valley.

Comment 2-5

Groundwater Model
The MND used SACFEM2013, a numerical groundwater model calibrated to historical conditions from water years 1970 through 2009 to estimate groundwater level impacts of the Proposed Action. SACFEM2013 does not represent the existing groundwater and land use conditions because the period of analysis only considers historical hydrology of water years 1970 through 2003, which does not include the recent historic drought and crop conversions. DWR recommends extending the calibration and simulation period through 2019 to provide the most recent hydrology and agricultural water use conditions.

Response

The SACFEM2013 was calibrated for conditions from WY 1970 through WY 2000, including wet periods such as the winter of WY 1983 and dry periods (WY 1976 – WY 1977; WY 1988 – WY 1992). For simulation of the proposed action SACFEM2013 was run under the same hydrologic conditions. However, for the analysis, the level of demand was fixed at a 2010 level of development. Therefore, population, land use, and agricultural demands used in the model is representative of demands that existed in 2010 and held constant. Simulation of the fixed level of demand under historical hydrologic conditions (e.g., precipitation, reservoir inflows, unregulated flows) allows for an assessment of the changes in groundwater conditions solely due to transfer pumping.

Regarding the comment on the model capturing groundwater conditions after 2003, the IS/EA is intended to assess environmental conditions resulting from implementation of transfer activities under the Proposed Action for a one-year period. A key consideration is whether there is a 1-year period that is representative of a reasonable worst-case condition for Sacramento Valley hydrology within the period of analysis. WY 1977 represents the driest hydrologic condition within the period of analysis. DWR calculated the Sacramento Valley WY index to be 3.11, the lowest on record. Figures H-1 through H-4 in Appendix H show the simulated change in groundwater level resulting from the Proposed Action under hydrologic conditions similar to 1977 as a conservative estimate of impacts during a dry period. WY 1977 represents a period that is drier than the recent dry hydrologic conditions (2007 through 2016). The minimum WY index for this period is 4.00 (WY 2015). DWR calculated runoff in the Sacramento valley to be 5.12 million acre-feet (MAF) during WY 1977 (DWR 2020). In comparison, the calculated runoff in WY 2014 and WY 2015 was 7.46 and 9.23 MAF, respectively (DWR 2020). Therefore, the analysis includes a period similar to recent dry hydrologic conditions.

Comment 2-6

Groundwater Monitoring Program and Mitigation Plan: Mitigation Measure GW-1
Mitigation measure GW-1 needs to include land surface elevation survey to monitor land subsidence. At this time, mitigation measure GW-1 provides a monitoring program that relies solely on groundwater levels triggers from different Groundwater Management Plans (GMP) as a proxy to monitor the occurrence of land subsidence. Since evidence suggests the GMPs for the Northern Sacramento Valley have very little to no quantitative criteria, reliance solely on those GMPs as the basis for this mitigation measure is inadequate. DWR recommends land surface elevation surveys be conducted prior to, during, and after the groundwater substitution transfer is needed in order to directly monitor land subsidence in the vicinity of Seller's region.

Response

Mitigation Measure GW-1 requires halting of transfer related pumping if groundwater levels reach historic low groundwater level or quantitative BMOs. The groundwater level trigger defaults to the historic low groundwater level in areas without quantitative BMOs. Halting of transfer if groundwater level trigger is reached would avoid permanent land subsidence from occurring.

Comment 2-7

Due to highly technical nature of groundwater substitution transfers, DWR offers its assistance in the review of the completeness and quality of the transfer proposal on a case-by-case basis, including but not limited to: (1) the groundwater level monitoring well network, (2) groundwater level triggers, and (3) mitigation plans, to ensure less than significant impacts from the Proposed Action and protect California natural resources. DWR requests copies of any subsequent environmental documentation related to the Project, including, but not limited to any CEQA and NEPA documents and all legal notices prepared by your district and other partners.

Response
Copies of the Final IS/EA will be provided to each party that commented on the Draft IS/EA. Thank you for your comment.

References

Department of Water Resources (DWR). 2020. Chronological Reconstructed Sacramento and San Joaquin Valley Water Year Hydrologic Classification Indices. Accessed on: 03 17 2020 Available at: http://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST

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Appendix L

Comment Letters

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SMUD®

1

Sent Via E-Mail

March 3, 2020

Jeff Sutton
Tehama-Colusa Canal Authority
P.O. Box 1025
Willows, CA 95922
jsutton@tccanal.com

Subject: **2020 Tehama-Colusa Canal Authority In-Basin Water Transfers / MND / 202002901**

Dear Mr. Sutton:

The Sacramento Municipal Utility District (SMUD) appreciates the opportunity to provide comments on the Mitigated Negative Declaration (MND) for the 2020 Tehama-Colusa Canal Authority In-Basin Water Transfers Project (Project, SCH 2019049121). SMUD is the primary energy provider for Sacramento County and a portion of the proposed Project area. SMUD's vision is to empower our customers with solutions and options that increase energy efficiency, protect the environment, reduce global warming, and lower the cost to serve our region. As a Responsible Agency, SMUD aims to ensure that the proposed Project limits the potential for significant environmental effects on SMUD facilities, employees, and customers.

We have no comments to offer at this time but would appreciate if the Tehama-Colusa Canal Authority would continue to keep SMUD facilities in mind as environmental review of the Project moves forward. Please reroute the Project analysis for SMUD's review if there are any changes to the scope of the Project. 1-1

If you have any questions regarding this letter, please contact SMUD's Environmental Management Specialist, Rob Ferrera, at rob.ferrera@smud.org or 916.732.6676.

Sincerely,

Nicole Goi

Nicole Goi
Regional & Local Government Affairs
Sacramento Municipal Utility District
6201 S Street, Mail Stop B404
Sacramento, CA 95817
nicole.goi@smud.org

Cc: Rob Ferrera

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

2

VIA EMAIL

March 4, 2020

Governor's Office of Planning & Research

MAR 05 2020

STATE CLEARINGHOUSE

Mr. Jeff Sutton
Tehama-Colusa Canal Authority
Post Office Box 1025
Willows, California 95988
jsutton@tccanal.com

SCH# 2020029001 2020 Tehama-Colusa Canal Authority in Basin Water Transfers Mitigated Negative Declaration and Initial Study, and Environmental Assessment (MND)

Dear Mr. Sutton:

The Department of Water Resources (DWR) has reviewed the MND for 2020 Tehama-Colusa Canal Authority (TCCA) In Basin Water Transfers. DWR has the following comments.

Proposed Project
The proposed project includes water transfers of up to 36,685 acre-feet (AF) of water from willing sellers on northern California waterways who have contracts with the United States (Sellers) to Member Units of the TCCA (Buyers). These water transfers would reduce potential effects of water supply shortages in 2020 through a combination of groundwater substitution transfers and cropland idling transfers. 2-1

Comments
As stated in the California Water Action Plan, 2018 Update, California promotes safe and effective water transfers. To that end, DWR requests the environmental analysis in the MND and the IS/EA address our concerns on the following: (1) data and information in Chapter 2; (2) groundwater model; and (3) proposed monitoring and mitigation measures. To that end, we request the following specific comments be addressed.
Alternatives Analysis

2.3.6.3 Environmental Setting – Groundwater
The MND does not have an accurate environmental setting description for groundwater: it relies on data that has been supplemented or superseded. The MND needs to provide a more accurate and comprehensive groundwater evaluation based on current and best available information.

The groundwater environmental setting section uses DWR's 2002 Sacramento River Basin-wide Water Management Plan and DWR's 2003 Bulletin 118 from to qualitatively describe the groundwater quality of Sacramento Valley as generally good but with some localized issues. For an accurate alternatives analysis, DWR requests the alternatives be analyzed based on current water quality data from the State Water Resources Control Board Groundwater Ambient Monitoring and Assessment (https://www.waterboards.ca.gov/water_issues/programs/gama/online_tools.html) and 2-2

DWR's Water Data Library (http://wdl.water.ca.gov/waterdatalibrary/) which provide additional details on the localized issues.

According to the MND, groundwater levels in the northern Sacramento Valley Groundwater Basin have declined over the last 15 years mostly due to the persistent dry weather conditions since 2006. Those levels have also declined due to land use changes between 2004 and 2019, especially in areas without surface water on the west side of the Sacramento Valley in Colusa, Glenn, and Tehama Counties. Such Land use changes include: (1) dry farming/grazing acreage converted to orchards of permanent crops, and (2)annual/truck crop acreage converted to orchards of permanent crops.

2-2 Cont.

Between 2004 and 2019, shallow wells (generally comprised of domestic wells) on the west side of the Sacramento Valley reflect record low groundwater levels. Shallow wells in this area appear to be the most sensitive to dry and drought year conditions and the increase in groundwater pumping from aquifer zone at greater depths. Although the multiple aquifer zones (shallow, intermediate, deep) located west of the Sacramento River are assumed to be separated by aquitards, it cannot be assumed that the aquitards provide full, laterally continuous barriers; therefore, pumping from deep wells may impact groundwater levels in wells completed in aquifer zones above the pumping zone. DWR recommends to include this information in the groundwater environmental settings analysis.

While groundwater levels in the northern Sacramento Valley Groundwater Basin may show an increase between spring 2018 and spring 2019, groundwater levels on the west side and other areas of the northern Sacramento Valley still show a cumulative decrease since 2004. The MND states that past groundwater trends are indicative of groundwater levels declining moderately during extended droughts and recovering to predrought levels after subsequent wet periods. There are no data to substantiate such a statement. DWR requests you provide the data to substantiate the conclusion that the Sacramento Valley Groundwater Basin has moderate levels of groundwater decline and recover groundwater and your modelling analysis of the date, if necessary.

2-3

According to the MND, Yolo, Colusa, Glenn, and Sutter Counties have experienced subsidence generally related to groundwater pumping and subsequent consolidation of loose aquifer sediments. DWR recommends that the MND specify if the land subsidence is temporary (elastic) or permanent (inelastic). If the MND does not specify the land subsidence is temporary, DWR requests the MND includes supporting information as to why the land subsidence is not temporary.

2-4

Groundwater Model

The MND used SACFEM2013, a numerical groundwater model calibrated to historical conditions from water years 1970 through 2009 to estimate groundwater level impacts of the Proposed Action. SACFEM2013 does not represent the existing groundwater and land use conditions because the period of analysis only considers historical hydrology of water years 1970 through 2003, which does not include the recent historic drought and crop conversions. DWR recommends extending the calibration and simulation period through 2019 to provide the most recent hydrology and agricultural water use conditions.

2-5

Groundwater Monitoring Program and Mitigation Plan: Mitigation Measure GW-1
Mitigation measure GW-1 needs to include land surface elevation survey to monitor land subsidence. At this time, mitigation measure GW-1 provides a monitoring program that relies solely on groundwater level triggers from different Groundwater Management Plans (GMP) as a proxy to monitor the occurrence of land subsidence. Since evidence suggests the GMPs for the Northern Sacramento Valley have very little to no quantitative criteria, reliance solely on those GMPs as the basis for this mitigation measure is inadequate. DWR recommends land surface elevation surveys be conducted prior to, during, and after the groundwater substitution transfer is needed in order to directly monitor land subsidence in the vicinity of Seller's region. 2-6

Due to highly technical nature of groundwater substitution transfers, DWR offers its assistance in the review of the completeness and quality of the transfer proposal on a case-by-case basis, including but not limited to: (1) the groundwater level monitoring well network, (2) groundwater level triggers, and (3) mitigation plans, to ensure less than significant impacts from the Proposed Action and protect California natural resources. DWR requests copies of any subsequent environmental documentation related to the Project, including, but not limited to any CEQA and NEPA documents and all legal notices prepared by your district and other partners. Please send future correspondence and questions to: 2-7

Anna Fock, Supervising Engineer
Department of Water Resources
State Water Project Analysis Office
1416 Ninth Street, Room 1620
Sacramento, California 94236-0001
(916) 653-0190

If you have any questions or need additional information, please contact me by phone at (916) 653-6840, fax (916) 653-0952, or email Nancy.Finch@water.ca.gov.

Sincerely,

Casey Pancaro c/o Nancy Finch
Casey Pancaro
Staff Attorney

Nancy Finch
Senior Attorney

Appendix M

Mitigation Monitoring and Reporting Program

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Appendix M
Mitigation Monitoring and Reporting Program

M.1 Introduction

Section 21081.6 of the Public Resources Code (PRC) and California Environmental Quality Act (CEQA) Guidelines section 15097 require the Lead Agency for each project that is subject to CEQA to monitor performance of the mitigation measures included in any environmental document to ensure that implementation does, in fact, take place. The PRC requires the Lead Agency to adopt a monitoring and reporting program for assessing and ensuring the implementation of required mitigation measures.

In accordance with PRC Section 21081.6, Tehama-Colusa Canal Authority (TCCA) has developed this Mitigation Monitoring and Reporting Program (MMRP) for the project. Mitigation measures have been incorporated into the proposed project to reduce impacts to less than significant levels. The MMRP summarizes the monitoring and reporting plans for the mitigation measures identified in the IS/MND. The purpose of the MMRP is to ensure activities associated with transferring water comply with all applicable environmental requirements.

M.2 Mitigation and Monitoring

Table M-1 lists the mitigation measures identified in the IS/MND, the responsible parties, method of verification, and time frame for verification.

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
AQ-1	Selling agency would reduce pumping at diesel wells to reduce emissions to below the thresholds. If an agency is making water available for transfer through cropland idling and groundwater substitution actions in the same year, the reduction in vehicle emissions can partially offset groundwater substitution pumping at a rate of 4.25 AF of water produced by idling to one acre-foot of groundwater pumped (Byron & Buck 2009). Agencies may also decide to replace old diesel wells with cleaner (i.e., higher emission tier) diesel pumps or electric wells to reduce emission below the thresholds. Any selling agency with potentially significant emissions, as determined by this IS/EA, will be required to submit information, prior to making water available for transfer through groundwater substitution actions, that documents the wells that would be pumped to stay below the thresholds. The selling agency must also maintain recordkeeping logs that document the specific engine to be used for making water available for transfer through groundwater substitution actions, the power rating (hp), and applicable emission factors. Emission calculations for daily emissions will be completed for comparison to the significance thresholds determined for each selling agency. In the annual report, the selling agencies will be required to submit documentation specifying that the wells	Participating sellers	Reclamation	Daily recordkeeping logs specifying the engines operated by each selling agency with potentially significant emissions and calculated criteria pollutant emissions.	Monthly during transfer.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	would only be pumped in accordance with the transfer proposals.						
VEG and WILD-1	Mitigation Measure VEG and WILD-1 includes measures to avoid potentially significant impacts to terrestrial species associated with cropland idling transfers and reduce any potential impacts to less than significant: As part of the review and approval process for proposed water transfers, Reclamation will have access to the land to verify how the water for transfer is being made available and to verify that actions to protect the giant garter snake are being implemented.	Participating sellers	Reclamation	Transfer package with maps of fields to be idled.	Ongoing during transfer season.		
VEG and WILD-1	Movement corridors for aquatic species (including pond turtle and giant garter snake) include major irrigation and drainage canals. The water seller will keep adequate water in major irrigation and drainage canals. Canal water depths should be similar to years when transfers do not occur or, where information on existing water depths is limited, at least two feet of water will be considered sufficient.	Participating sellers	Reclamation	Transfer application package with field spot-checks.	Ongoing during transfer season.		
VEG and WILD-1	Maintaining water in smaller drains and conveyance infrastructure supports key habitat attributes such as emergent vegetation for giant garter snake escape cover and foraging habitat. If cropland idling/shifting occurs, Reclamation will work with sellers to document that adequate water remains in drains and canals. Documentation may include flow records, photo documentation, or other means of documentation subject to approval by Reclamation and USFWS.	Participating sellers	Reclamation	Transfer application package with field spot-checks.	Ongoing during transfer season.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
VEG and WILD-1	Fields abutting or immediately adjacent to areas with known important giant garter snake populations (Appendix G) will not be permitted to participate in cropland idling/shifting transfers. Important giant garter snake populations are defined for purposes of this mitigation measure as populations previously identified by biologists from USFWS, USGS, and possibly contract biologists. These populations of giant garter snakes were identified early on in previous consultations and are in, or connected to, areas that are considered public or protected. Most of these areas have specific management plans for giant garter snakes either for mitigation or as wildlife refuges. One factor influencing the importance of these areas is that they can provide a refuge for snakes independent of rice production. Fields abutting or immediately adjacent to the following areas are considered important giant garter snake habitat: • Little Butte Creek between Llano Seco and Upper Butte Basin Wildlife Area • Butte Creek between Upper Butte Basin and Gray Lodge Wildlife areas • Colusa Basin drainage canal between Delevan and Colusa National Wildlife Refuges • Gilsizer Slough	Participating sellers	Reclamation	Transfer application package, maps of fields to be idled, and field spot-checks of land idled.	Prior to and during water transfers.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	• Colusa Drainage Canal • Land side of the Toe Drain along the Sutter Bypass • Willow Slough and Willow Slough Bypass in Yolo County • Hunters and Logan Creeks between Sacramento and Delevan National Wildlife Refuges • Lands in the Natomas Basin						
VEG and WILD-1	At the end of the water transfer year, Reclamation will prepare an annual monitoring report that contains the following: • Maps of rice production and all cropland idling actions within the seller district that occurred within the range of potential transfer methods analyzed. • Results of current scientific research, summary of monitoring pertinent to water transfer actions, and new giant garter snake detections. • Discussion of conservation measure effectiveness. • Cumulative history of crop idling and crop shifting specifically to make water available for transfers within the sellers area. The report will be submitted to the USFWS and CDFW no later than	Reclamation	Reclamation	Review of monitoring report and annual meeting with USFWS	After water transfers.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	January 31, of the year following the year in which the transfer occurred.						
VEG and WILD-1	Reclamation will establish annual meetings with the Service to discuss the contents and findings of the annual report. These meetings will be scheduled following the distribution of the monitoring report and prior to the last day of February.	Reclamation	Reclamation	Distribution of monitoring report to USFWS and occurrence of annual meeting.	Meeting occurs prior to the next transfer season		
VEG and WILD-1	If, upon Reclamation's review of monitoring reports or other scientific literature, it appears that the Project is having unanticipated effects on the giant garter snake, Reclamation will contact the Service to discuss the information available and effectiveness of Project conservation measures.	Reclamation	Reclamation	Review of monitoring report by Reclamation and occurrence of annual meeting with USFWS.	Meeting occurs prior to the next transfer season.		
VEG and WILD-1	Reclamation will monitor the effectiveness of the conservation measures by funding giant garter snake distribution and occupancy research. The research, conducted by USGS, includes annual sampling of giant garter snake within the action area and focuses on their distribution and occupancy dynamics. The research is designed to evaluate the effectiveness of the conservation measures to maintain giant garter snake occupancy at sites making water available for transfer in accordance with this IS/EA.	Reclamation	Reclamation	Reclamation funding of giant garter snake research.	Ongoing.		
GW-1	The objective of Mitigation Measure GW-1 is to avoid potentially significant adverse environmental effects from groundwater level declines such as (1) impacts to other legal users of water; (2) land subsidence; (3) adverse effects to groundwater-dependent vegetation and or (4) migration of reduced quality	Participating sellers	Reclamation	Transfer application package.	Prior to water transfers.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	groundwater. The mitigation measure also requires prompt corrective action so that impacts discussed previously will be reduced to less than significant in the event unanticipated effects occur. The measure accomplishes this by monitoring groundwater levels and land subsidence in the period during which groundwater is being pumped in lieu of diverting the surface water. Additionally, the mitigation plan identifies necessary preventative action measures if monitoring shows that identified trigger points are reached during transfer-related pumping. Reclamation will verify that sellers implement the monitoring program and mitigation plan to avoid potentially significant adverse effects of transfer-related groundwater extraction. In addition, each entity making surface water available for transfer through groundwater substitution actions must confirm that the proposed groundwater pumping will be compatible with state and local regulations and GMPs. As GSPs are developed by GSAs, potential sellers must confirm that the proposed pumping and the following Monitoring Program and Mitigation Plan, verified by Reclamation, is compatible with applicable GSPs.						
GW-1	<u>Well Review Process</u> Potential sellers must submit well data for Reclamation review as part of the transfer approval process. The DRAFT Technical Information for Preparing Water Transfers Proposals (Water Transfer White Paper) (Reclamation and	Participating sellers	Reclamation	Transfer application package.	Prior to water transfers.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	DWR 2019) can be consulted to understand the information that is necessary for Reclamation at approve a transfer.						
GW-1	<u>Monitoring Program</u> Potential sellers must complete and implement a monitoring program subject to Reclamation's approval that shall include, at a minimum, the following components:	Participating sellers	Reclamation	Transfer application package and monitoring reports.	Prior to, during, and after water transfers.		
GW-1	*Monitoring Well Network* The monitoring program shall incorporate a sufficient number of monitoring wells, as determined by Reclamation, to accurately characterize groundwater levels from the appropriate aquifers and their response in the area before, during, and after transfer-related substitution pumping takes place. Depending on local conditions, additional groundwater level monitoring may be required near ecological resource areas. It should be noted that monitoring well networks have been established for some of the participating pumping wells (those wells being used in-lieu of diverting surface water that is being made available for transfer) that have also participated in water transfers in previous years. For wells that have not participated in water transfers previously, the sellers would identify, in the transfer proposal, suitable monitoring wells as defined below for review and approval by Reclamation. If	Participating sellers	Reclamation	Transfer application package and monitoring data.	Plan submitted prior to water transfers; monitoring information submitted during and after transfer.		

	a suitable monitoring well(s) is not identified for a participating pumping well, the well will not be allowed to participate in a water transfer until a suitable monitoring well(s) is identified. The monitoring well network would include the participating pumping well and a suitable groundwater level monitoring well(s) in the vicinity of the participating pumping well(s). Suitable monitoring well(s) would: (1) be within a two-mile radius of the seller's groundwater substitution pumping well; (2) be located within the same Bulletin 118 subbasin as the groundwater substitution pumping well; and (3) have a screen depth(s) in the same aquifer level (shallow, intermediate, or deep) as the groundwater substitution pumping well. Wells with short historic records could be considered, but short records (that do not extend to 2014 or earlier) could limit the transfer because the historic low would not reflect the persistent dry conditions from 2011 to 2015. In this situation, the lowest groundwater level for the short period of record would be used, but because the groundwater level would likely be higher than the historic low during the prior drought period, the groundwater level triggers (described below) would be more restrictive (i.e., the lowest recorded groundwater level could be reached more quickly during transfer-related groundwater substitution pumping than occurred in the short period of record when groundwater levels were higher). Monitoring requirements at the participating groundwater substitution pumping well and suitable monitoring well(s) would detect impacts to third parties and land subsidence. Monitoring						

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	and mitigation for impacts to groundwater dependent deep-rooted vegetation and migration of reduced quality groundwater are discussed below under "Other Monitoring".						
GW-1	*Groundwater Level Monitoring* Sellers will collect measurements of groundwater levels in both the participating wells (those wells being used in lieu of diverting surface water that is being made available for transfer) and monitoring wells. Groundwater level measurements will be used to identify potential concerns for both third party impacts and inelastic (irreversible) subsidence based on the identified trigger points. Groundwater level monitoring will include measurements before, during, and after transfer-related substitution pumping. The seller will measure groundwater levels as follows: • Prior to transfer: Groundwater levels will be measured in both the participating pumping well(s) and the monitoring well(s) monthly from March in the year of the proposed transfer-related substitution pumping until the start of the transfer pumping. Monitoring will also be conducted on the day that the transfer pumping begins, prior to the pump being turned on.	Participating sellers	Reclamation	Transfer application package with field spot-checks and monitoring data.	Prior to, during, and after water transfers.	.	

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	• During transfer-related substitution pumping: Groundwater levels will be measured in both the participating pumping well(s) and the monitoring well(s) weekly throughout the pumping period. Post-transfer pumping: Groundwater levels will be measured in both the participating well(s) and the monitoring well(s) weekly for one month after the end of transfer-related pumping, after which groundwater levels will be measured monthly through March of the year following the end of the pumping.						
GW-1	*Groundwater Level Triggers* The primary criteria used to identify potentially significant impacts to groundwater levels are the basin management objectives (BMOs) set by GMPs. In the Sacramento Valley, Shasta, Tehama, Glenn, Butte, Colusa, Sutter, Yuba, Nevada, Placer, Sacramento and Yolo counties have established GMPs to provide guidance in managing the resource. In areas where quantitative BMO groundwater level triggers exist, sellers will manage groundwater levels to these triggers and initiate the mitigation plan (discussed below) if groundwater levels reach the trigger. In areas where quantitative BMOs do not exist, sellers will manage groundwater levels to maintain them above the identified historic low groundwater level (trigger) and will initiate the mitigation plan	Participating sellers	Reclamation	Regular inspection, monitoring data, and report if triggers are exceeded, if necessary.	Plan submitted prior to water transfers; monitoring information submitted during and after transfer.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	(discussed below) if groundwater levels reach the trigger. Most of the quantitative BMOs within the Seller Service Area are tied to historic low groundwater levels. Therefore, the use of historic low groundwater levels in areas without quantitative BMOs is consistent with the approach for areas with quantitative BMOs. As part of a seller's transfer proposal subject to Reclamation's review and approval, the seller will need to identify the monitoring wells and the specific groundwater level trigger for each well (established through the local BMO or the historic low groundwater level for that well). Groundwater level declines due to pumping occur initially at the pumping well and then propagate outward from that location. The magnitude of groundwater level decline caused by pumping also decreases with increasing distance from the pumping well. Therefore, groundwater level declines caused by transfer-related substitution pumping would be measured first at the pumping well and subsequently at the monitoring well. The decline would be greatest at the participating well and lower at the monitoring well. Therefore, it is likely that groundwater levels in the participating well would decline to the historic low level sooner than at the monitoring well(s). The monitoring well(s) would provide information surrounding the participating well to avoid potential cumulative impacts.						

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
GW-1	*Groundwater Quality* For municipal sellers, the comprehensive water quality testing requirements of Title 22 are considered sufficient for the water transfer monitoring program. Agricultural sellers shall measure specific conductance in samples from each participating production well. Samples shall be collected when the seller first initiates pumping, monthly during the transfer pumping period, and at the termination of transfer-related pumping.	Municipal sellers	Reclamation	Inspections during transfer period and monitoring data.	Prior to, during, and after water transfers		
GW-1	*Groundwater Pumping Measurements* All groundwater wells pumping to replace surface water made available for transfer shall be configured with a permanent instantaneous and totalizing flow meter capable of accurately measuring well discharge rates and volumes. Flow meters will be installed and calibrated in accordance with manufacturer's recommendations and the relevant documentation will be submitted by the seller to Reclamation. Flow meter readings will be recorded just prior to initiation of transfer-related substitution pumping and no less than monthly throughout the duration of the pumping period, as close as practical to the last day of the month. Readings will also be recorded just after cessation of pumping.	Participating sellers	Reclamation	Inspections during transfer period and monitoring data.	Prior to, during, and after water transfers.		
GW-1	*Shallow Groundwater Level Monitoring for Deep Rooted Vegetation* To avoid significant effects to vegetation and allow sellers to modify actions before significant effects occur, sellers will monitor groundwater level data to verify that significant adverse effects to	Participating sellers	Reclamation	Inspection, monitoring data, and report if deep rooted vegetation are impacted (only required in areas	Plan submitted prior to water transfers; monitoring information submitted		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	deep-rooted vegetation are avoided. This monitoring is only required in areas with deep-rooted vegetation (i.e., oak trees and riparian trees that would have tap roots greater than 10 feet deep) within a one-half mile radius of the participating well and areas where groundwater levels are between 10 to 25 feet below ground surface prior to starting transfer-related pumping. This monitoring is not required in areas with no deep-rooted vegetation (i.e., oak trees and riparian trees that would not have tap roots greater than 10 feet deep) within one-half mile of the participating wells or in areas where vegetation is located along waterways or irrigated fields that will continue to have water during the period of transfer. In their transfer proposal to Reclamation, the seller would be required to identify if monitoring for deep-rooted vegetation is a requirement. Existing resources such as DWR's groundwater dependent ecosystem maps (https://gis.water.ca.gov/app/NCDatasetViewer/) or any existing biological survey data in the area, and aerial imagery (e.g. Google Maps) could be used to identify deep rooted vegetation near the participating pumping well. If deep-rooted vegetation is identified near the participating well, a groundwater level monitoring well with the following requirements would need to be identified and monitored: (1) monitoring well is within a one-half mile radius of the deep-rooted vegetation; and (2) monitoring well would measure shallow groundwater level changes (within the interval between 10 to 25 feet			with deep-rooted vegetation).	during and after transfer.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	below ground surface). The participating pumping well can function as the monitoring well if the previously mentioned requirements are met. If monitoring data at the monitoring well indicate that groundwater levels have dropped below root zones of deep-rooted vegetation (i.e., more than 10 feet, where groundwater was 10 to 25 feet below ground surface prior to starting the surface-water transfer), the seller must implement actions set forth in the mitigation plan. However, if historic data show that groundwater levels in the area have typically fluctuated by more than this amount annually during the proposed transfer period, then the transfer may be allowed to proceed. Prior to transfer pumping, the seller must submit to Reclamation historic data showing groundwater fluctuations in the area of the deep-rooted vegetation. If no monitoring wells with the requirements discussed in the previous paragraph exist, monitoring would be based on visual observations by a qualified plant ecologist/certified arborist of the health of these areas of deep-rooted vegetation until it is feasible to obtain or install shallow groundwater monitoring. Monitoring of these areas would include a pre-pumping vegetation assessment within a half-mile radius of the pumping well followed by an assessment near the end of the pumping season but prior to fall/autumn leaf-drop. The assessment of post-pumping impacts on deep-rooted vegetation will be conducted by a qualified plant ecologist/arborist and will take into account the existing health						

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	conditions of the vegetation prior to pumping, species present, size-class of trees, and rainfall data from the previous water years. If the qualified plant ecologist/certified arborist determines, based on site-specific circumstances, that groundwater pumping has caused significant adverse impacts to deep-rooted vegetation (that is, any loss of the deep-rooted vegetation), the seller must implement restoration actions set forth in the mitigation plan. Findings from the pre-pumping and post pumping assessment will be reported to Reclamation.						
GW-1	*Coordination Plan* The monitoring program will include a plan to coordinate the collection and organization of monitoring data. This plan will describe how input from third-party well owners will be incorporated into the monitoring program and will include a plan for communication with Reclamation as well as other decision makers and third parties. Additionally, Reclamation, Member Units of the TCCA, and potential seller(s) will coordinate closely with potentially affected third parties to collect and monitor groundwater data. If a third party expects that it may be affected by a proposed transfer, that party should contact Reclamation and the seller with its concern. The burden of collecting groundwater data will not be the responsibility of the third party. If warranted, additional groundwater level monitoring to address the third-party's concern may be incorporated into the monitoring and mitigation plans required by Mitigation Measure GW-1.	Participating sellers	Reclamation	Transfer application package with Coordination Plan.	Prior to water transfers.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
GW-1	*Evaluation and Reporting* The monitoring program will describe the method of reporting monitoring data. At a minimum, sellers will provide data summary tables to Reclamation, both during and after transfer-related substitution pumping. Post-transfer reporting will continue through March of the year following the transfer. Sellers will provide a final summary report to Reclamation evaluating the effects of the water transfer. The final report will identify transfer-related effects on groundwater and surface water (both during and after pumping), and the extent of effects, if any, on local groundwater users. It shall include groundwater-level contour maps for the area in which the transfer-related pumping is located, showing pre-transfer groundwater levels, groundwater levels at the end of the transfer period, and recovered groundwater levels in March of the year following the transfer. Groundwater level contour maps for different aquifer depths should also be included where data are available. The summary report shall also identify the extent of transfer-related effects, if any, to ecological resources such as fish, wildlife, and vegetation resources.	Participating sellers	Reclamation	Transfer application package and monitoring data and report.	Plan submitted prior to water transfers; monitoring information submitted during and after transfer.		
GW-1	*Mitigation Plan* Potential sellers must complete and implement a mitigation plan to avoid potentially significant groundwater impacts and ensure prompt corrective action in the event unanticipated effects occur. This plan must document the planned actions if there are unanticipated impacts to groundwater resources or groundwater-dependent	Participating sellers	Reclamation	Mitigation plan, monitoring data for mitigation activities, and regular inspections of mitigation activities.	Submit Mitigation Plan to Reclamation prior to water transfers.		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	vegetation. This plan must be submitted to Reclamation as part of the transfer approval process.						
GW-1	*Groundwater Resource Mitigation* If groundwater level triggers are reached at the participating pumping well(s) or the suitable monitoring well (s) (either BMO triggers or historic low groundwater levels), transfer-related pumping would stop from the participating pumping well that reached the trigger. Transfer-related pumping would be stopped when the trigger is first reached at either the participating pumping well(s) or the suitable monitoring well(s). Transfer-related pumping could not continue from this well (in the same year or a future year) until groundwater levels recovered to above the groundwater level trigger. Implementation of the mitigation plan thus avoids any potentially significant groundwater impacts. Other corrective actions could include: • Lowering of pumping bowls in non-transferring wells affected by substitution pumping. • Reimbursement to non-transferring third parties for significant increases in their groundwater pumping costs due to the groundwater substitution pumping action, as compared with their costs absent the transfer.	Participating sellers	Reclamation	Mitigation plan, monitoring data for mitigation activities, and regular inspections of mitigation activities.	Prior to, during and after water transfers		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	• Reimbursement to non-transferring third parties for modifications to infrastructure that may be affected. • Other appropriate actions based on local conditions.						
GW-1	*Deep-Rooted Vegetation Mitigation* If shallow groundwater level monitoring suggests that groundwater levels have dropped below root zones of deep-rooted vegetation (i.e., more than 10 feet, where groundwater was 10 to 25 feet below ground surface prior to starting the transfer-related pumping), the seller must stop transfer-related pumping at the participating pumping well and cannot resume pumping until groundwater levels have recovered to levels above the root zones. However, if historic data at the location indicate shallow groundwater levels typically declined during the transfer period and remained below the root zone then the transfer may be allowed to proceed. In areas where visual monitoring is conducted to monitor health of deep-rooted vegetation, the seller must stop transfer-related pumping at the participating well if the qualified plant ecologist/arborist, determines a loss or substantial risk of loss of vegetation. If adverse impacts to deep-rooted vegetation occur, the seller will perform restoration activities by replanting similar vegetation at a 1:1 ratio at the location loss occurs (for every 1 inch diameter at breast height (dbh) lost, 1 inch in dbh will be planted. For example if 12-inch dbh of oak is lost then the seller would have to plant a twelve 15-gallon oak	Participating sellers	Reclamation	Mitigation plan, monitoring data for mitigation activities, and regular inspections of mitigation activities.	Prior to, during and after water transfers		

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	saplings at around 1-inch dbh each. Therefore, the seller would plant more trees than lost. The seller will plant, irrigate, maintain, and monitor restoration of vegetation for three years to replace the loss(es). All plantings will be fitted with exclusion cages or other suitable protection from herbivores. Plantings will be irrigated for three years or until the survival criterion is met. If 75% of the plants survive at the end of the three -year monitoring period, the revegetation will be considered successful. If the survival criterion is not met at the end of the monitoring period, planting and monitoring will be repeated after mortality causes have been identified and corrected. Annual monitoring reports, prepared by a qualified plant ecologist/arborist, will document the status of the plantings and recommendations for remediation as necessary. The monitoring reports will be provided to the seller and Reclamation by August 31 following each year of monitoring (generally July 1 through June 30) to allow time for additional planting activities, if necessary. Transfer-related pumping could not continue at the subject well while vegetation restoration activities consistent with the requirements above are ongoing (i.e. three years or until the survival criterion is met). Transfer-related pumping at the subject well could not resume after restoration unless the seller provides evidence that resuming pumping will not affect deep-rooted vegetation (such as data from the installation of a new shallow groundwater level monitoring well within						

Table M-1 Mitigation Measures

Measure Number	Mitigation Measure	Responsible Party	Monitoring Party	Method of Verification	Timing of Verification	Verification of Completion Initials	Dates
	a one-half mile radius of the deep-rooted vegetation that indicates stable shallow groundwater levels at less than ten feet).						

Appendix N

Revisions to the Initial Study/

Environmental Assessment

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Appendix N
Revisions to the Initial Study/ Environmental Assessment

Changes to the text of the IS/EA in response to public comments are shown below. Only substantial text changes are included, with deletions of text signified by strikeouts and additions of text signified with italics. None of these changes constitute new significant information or result in any new significant impacts of the proposed project.

Chapter 1, Introduction

Page 1-3

The second sentence in Section 1.2 on page 1-3 is revised as follows:

> As of ~~January27~~*March 20*, 2020, the seasonal average rainfall to date has been ~~66~~*64* percent of the historic seasonal average (DWR 2020).

Chapter 2, Alternatives

Page 2-1

The first two sentences on page 2-1 is revised as follows:

> For the No Action Alternative, the TCCA, on behalf of the Member Units, during contract year 2020, would not buy water from willing sellers ~~that required~~ *who require* Reclamation approval in order to transfer water ~~to the Member Units~~. Agricultural ~~and urban~~ water users could experience shortages in contract year 2020.

Page 2-12

The fourth paragraph on page 2-12 is revised as follows:

> *Groundwater Quality.* Groundwater in the Redding Area Groundwater Basin area of analysis is typically of good quality, as evidenced by its low total dissolved solids (TDS) concentrations, ~~which range from 70 to 360~~*with a maximum concentration of 278* milligrams per liter (mg/L) (~~DWR 2003~~*SWRCB 2020*). Areas of high salinity (poor water quality), are generally found on the western basin margins, where the groundwater is in contact with marine sedimentary rock. Elevated levels of iron, manganese, nitrate, and ~~high~~ TDS have been detected in some areas (~~DWR 2003~~*SWRCB 2020*). Localized high concentrations of boron have been detected in the ~~southern~~*northern* portion of the basin (~~DWR Northern District 2002~~*SWRCB 2020*).

Pages 2-12 and 2-13

Text in the last incomplete paragraph on page 2-12, which continues to page 2-13 is revised as follows:

> Groundwater levels in the northern Sacramento Valley Groundwater Basin have declined over the last 15 years (spring 2004 to spring 2019) ~~mostly due to~~*coinciding with* the persistent dry weather conditions since 2006 (see Change in Groundwater Elevation Map-Spring 2004 to Spring 2019 in Appendix D, pp. D-2 through D-4). *Land use changes (e.g., dry farming/grazing and annual/truck crop acreage converted to permanent crops) between 2004 and 2019 (DWR 2020a), especially in areas without surface water on the west side of the Sacramento Valley in Colusa, Glenn, and Tehama Counties, and the groundwater pumping associated with this change, have also contributed to the decline in northern Sacramento Valley Groundwater Basin levels.*

Page 2-13

The last complete paragraph on page 2-13 is revised as follows:

> In summary, groundwater levels in the Sacramento Valley Groundwater Basin are showing ~~continued~~recovery with some wells showing an increase in groundwater levels in comparison to Spring 2015 levels but not to pre-drought levels. Past groundwater trends are indicative of groundwater levels declining moderately during extended droughts and recovering to pre-drought levels after subsequent wet periods. *Change in groundwater elevation (see Figures D-13 through D-15 in Appendix D) for Spring 2004 to Spring 2015 for shallow, intermediate, and deep wells indicate groundwater levels decreased during 2004 through 2015, which includes several years of dry hydrologic conditions with six years classified as Dry or Critical (DWR 2020b). In the subsequent wetter years of 2017 and 2018, groundwater levels recovered, with DWR noting up to 19.5 feet, 36.3 feet, and 18.0 feet groundwater in shallow, intermediate, and deep wells, respectively (see Appendix D, Figure D-7 through D-9). While groundwater levels may decline during certain periods, groundwater elevations in the Sacramento Valley may begin recovering in subsequent wetter periods.* Appendix D includes groundwater well monitoring data to further characterize groundwater levels in the Sacramento Valley Groundwater Basin near the potential selling entities.

Page 2-14

The first paragraph on Page 2-14 is revised as follows:

> *Land Subsidence.* Historically, greater than one foot of land subsidence has occurred in the eastern portion of Yolo County and the southern portion of Colusa County, owing to groundwater extraction and geology. *Ground surface elevation at the Zamora gage has declined steadily over the past two decades (see Figure D-16 in Appendix D).* Due to groundwater withdrawal over several decades, between 0.3 to 1.1 feet of land subsidence has been recorded east of the town of

Zamora between 2008 and 2019 (DWR ~~2020a~~*2020c*). ~~In Yolo County within Conaway Ranch~~ *At the Conaway Ranch gage in Yolo County, ground surface elevation decreased sharply in 2013 and 2014, a dry period. There was little to no recovery of ground surface elevation in the following years (see Figure D-17 in Appendix D).* DWR measured land subsidence at approximately 0.2 of a foot from 2012 to 2013 and an additional 0.6 of a foot from 2013 to 2014 (DWR ~~2020b~~*2020d*). *Ground surface elevation trends at these two locations suggest inelastic (i.e., permanent) land subsidence*. In comparison, slightly less than 0.1 of a foot of subsidence occurred over the previous 22 years (1991-2012). Since 2014, ground surface elevations have rebounded to pre-2012 levels at this station, however there is some decline at a slower rate with approximately 0.1 of a foot of subsidence recorded since 2015 (DWR ~~2020b~~*2020d*). The area between Zamora, Knights Landing, and Woodland has been most affected (Yolo County 2012). In Colusa County, approximately 2.14 feet of subsidence was measured in the Arbuckle area between 2008 and 2017 (DWR 2019c). In Glenn and Sutter counties, ground surface displacement was measured between 0.4 to 0.6 of a foot from 2008 through 2017 and 0.2 to 0.4 of a foot from 2008 through 2019 (DWR ~~2020c~~*2020e*). *At the Sutter extensometer, land surface elevation decreased between 2008 and 2016, a period of dry conditions (see Figure D-18 in Appendix D). The ground surface elevation at this location increased following the low elevation in 2015, during generally wetter hydrologic conditions. The trends at the Sutter extensometer suggest that at least a portion of the observed subsidence is elastic (i.e., temporary) and a portion may be inelastic (i.e., permanent), however a definite conclusion is difficult to make.* Subsidence in these regions are generally related to groundwater pumping and subsequent consolidation of loose aquifer sediments.

Chapter 3, Environmental Impacts

Page 3-12

The following text in Section V. Cultural Resources on page 3-20 is revised as follows:

~~There~~This transfer would ~~be no~~*occur within existing facilities and there would be no* ground disturbing activities, *changes in* land ~~alteration~~*use*, or construction proposed that could disturb ~~historical or archeological resources~~*historic properties* associated with the Proposed Action. ~~Thus, there would be no disturbance impacts to existing or potential burial sites, cemeteries, or human remains interred outside~~ *This is the type* of ~~formal cemeteries~~ ~~A Reclamation archaeologist was consulted in 2015 to ensure the Proposed Action would have no adverse impact on any historic properties. The Proposed Action evaluated in this IS/EA is similar to the Proposed Action evaluated in 2015 (Reclamation 2015). It was determined~~ *undertaking* that ~~water transfers~~ does not have the potential to cause effects ~~on~~*to* historic properties, ~~if~~ *should such properties be* present, ~~and Reclamation had no further obligation under~~ *pursuant to the Title 54 U.S.C. § 306108, commonly known as Section 106 (Section 106) of the* National Historic Preservation Act ~~Section 106, pursuant to~~ *regulations codified at* 36 CFR ~~Part~~§

> 800.3(a)(1). ~~This determination still applies to the action.~~ *Reclamation has no further obligations under Section 106, pursuant to 36 CFR § 800.3(a)(1).*

Page 3-28

The first sentence in the first paragraph on page 3-28 is revised as follows:

> The proposed Anderson-Cottonwood ID transfer would ~~withdraw~~*result in the substitution of* up to 4,800 AF per year of groundwater from production wells (see Table H-1 in Appendix H for details on number of wells and pumping capacity) *for surface water.*

Page 3-36

The following text in the last paragraph on page 3-36 is revised as follows:

> If adverse impacts to deep-rooted vegetation occur, the seller will perform restoration activities by replanting similar vegetation at a 1:1 ratio *at the location loss occurs* (for every 1 inch diameter at breast height (dbh) lost, 1 inch in dbh will be planted. For example if 12-inch dbh of oak is lost then the seller would have to plant a ~~12~~*twelve 15*-gallon oak sapling*s* at around 1-inch dbh *each*.

Appendix D, Groundwater Existing Conditions

Pages D-1 and D-2

The following text is added between bullet number 4 and 5 on pages D-1 and D-2:

5. *Spring 2004 to Spring 2015 change in groundwater elevation in shallow (<200 feet bgs), intermediate (200-600 feet bgs), and deep (>600 feet bgs) wells. These figures were retrieved from DWR's Open Data Portal (https://data.ca.gov/dataset/northern-sacramento-valley-groundwater-elevation-change-maps)*

6. *Zamora Extensometer 11N01E24Q008M Ground Surface Displacement Plot. This figure was retrieved from DWR's Water Data Library (http://wdl.water.ca.gov/waterdatalibrary/docs/Hydstra/docs/11N01E24Q008M/POR/GROUND_SURFACE_DISPLACEMENT_POINT_PLOT.PNG)*

7. *Conaway Ranch Extensometer 09N03E08C004M Ground Surface Displacement Plot. This figure was retrieved from DWR's Water Data Library (http://wdl.water.ca.gov/waterdatalibrary/docs/Hydstra/docs/09N03E08C004M/POR/GROUND_SURFACE_DISPLACEMENT_POINT_PLOT.PNG)*

8. *Sutter Extensometer 11N04E04N005M Ground Surface Displacement Plot. This figure was retrieved from DWR's Water Data Library (http://wdl.water.ca.gov/waterdatalibrary/docs/Hydstra/docs/11N04E04N005M/POR/GROUND_SURFACE_DISPLACEMENT_POINT_PLOT.PNG)*

Page D-14

The following figures are added after Figure D-12 on page D-14:

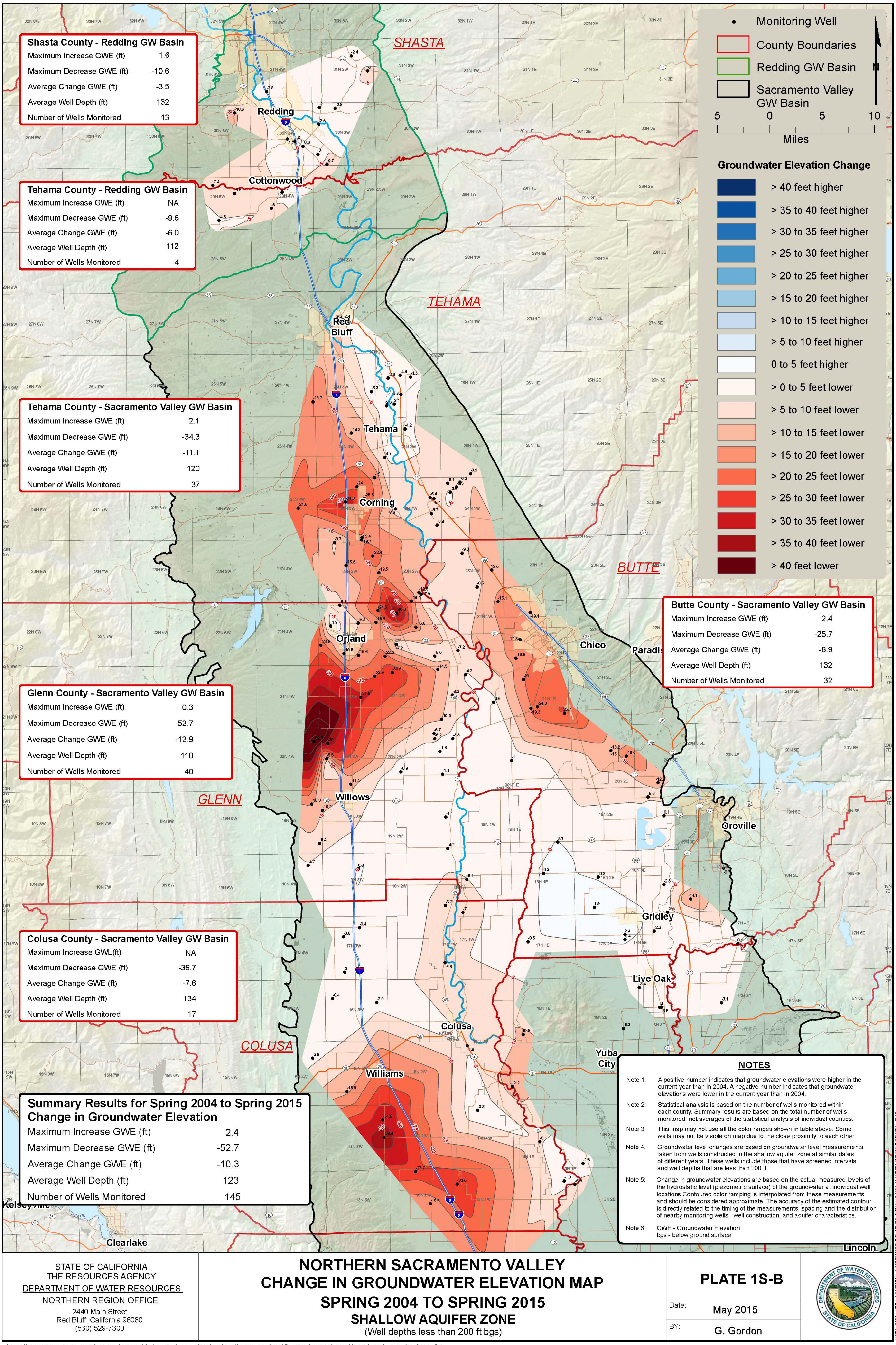
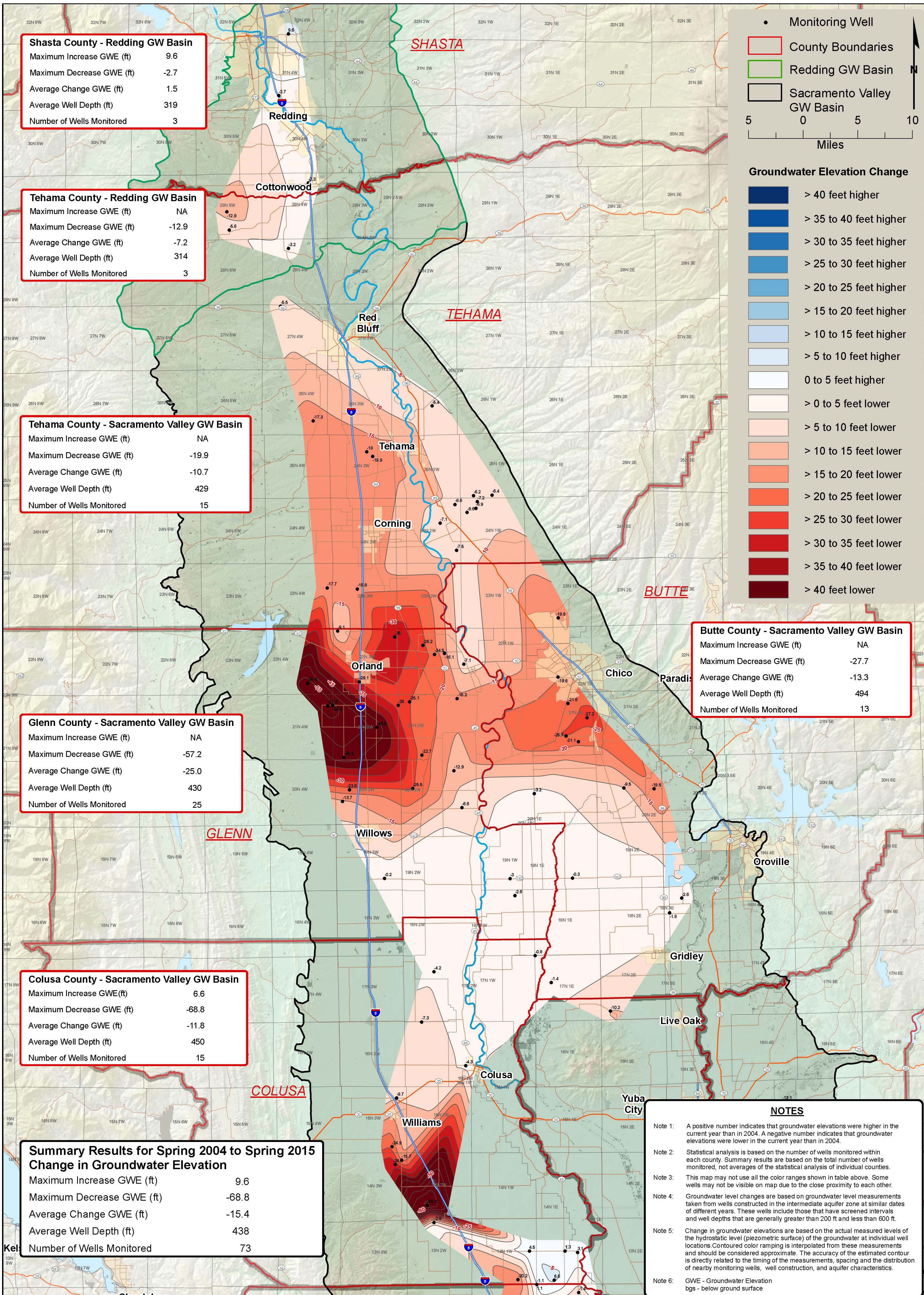


Figure D-13. Spring 2004 to Spring 2015 Change in Groundwater Elevation in Shallow Wells (<600 ft bgs)



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
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NORTHERN SACRAMENTO VALLEY
CHANGE IN GROUNDWATER ELEVATION MAP
SPRING2004 TO SPRING 2015
INTERMEDIATE AQUIFER ZONE
(Well depths generally greater than 200 ft and less than 600 ft deep bgs)

PLATE 1I-B
Date: May 2015
BY: G. Gordon

http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/GroundwaterLevel/gw_level_monitoring.cfm

Figure D-14. Spring 2004 to Spring 2015 Change in Groundwater Elevation in Intermediate Wells (200-600 ft bgs)

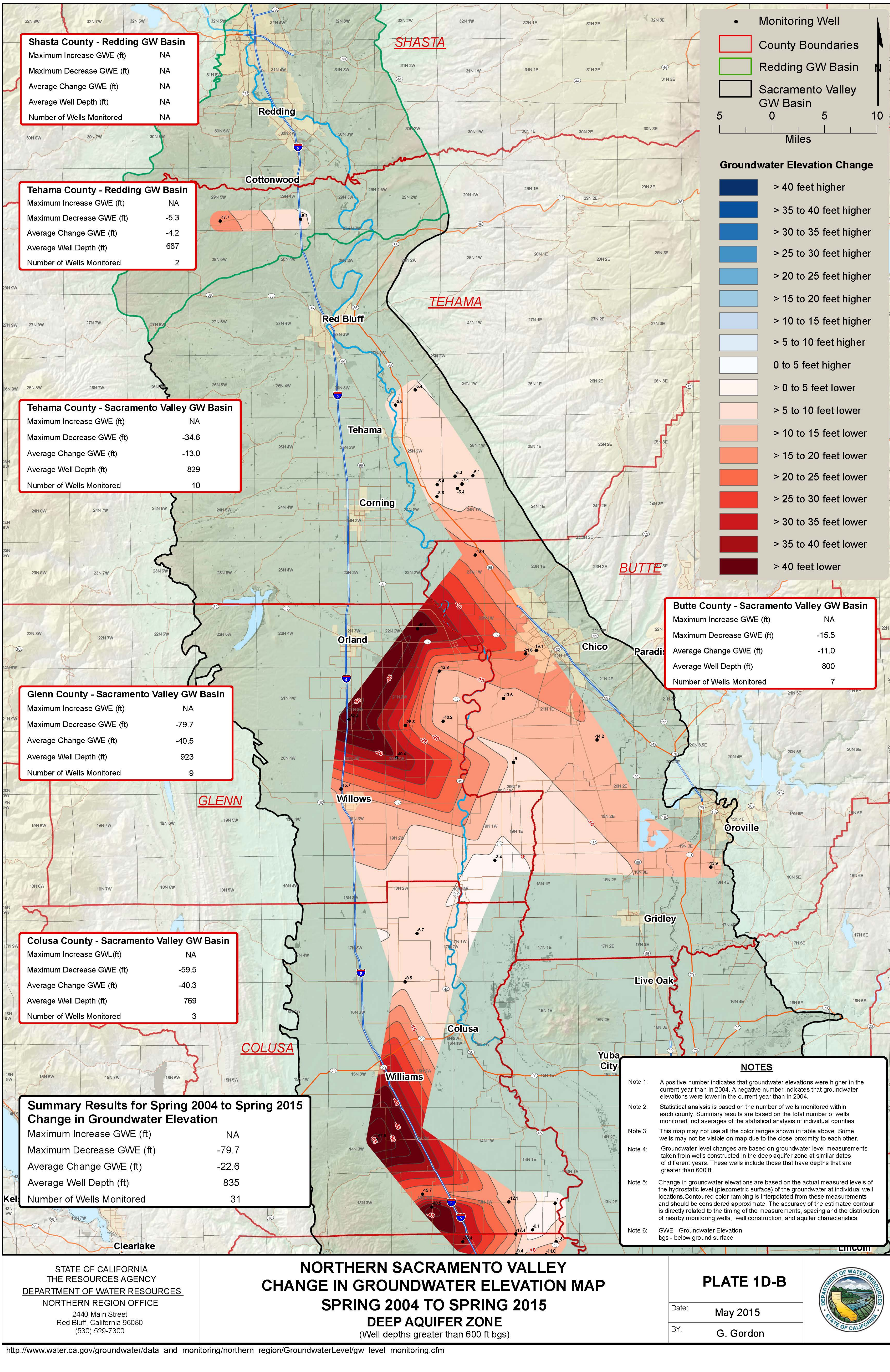

Figure D-15. Spring 2004 to Spring 2015 Change in Groundwater Elevation in Deep Wells (>600 ft bgs)

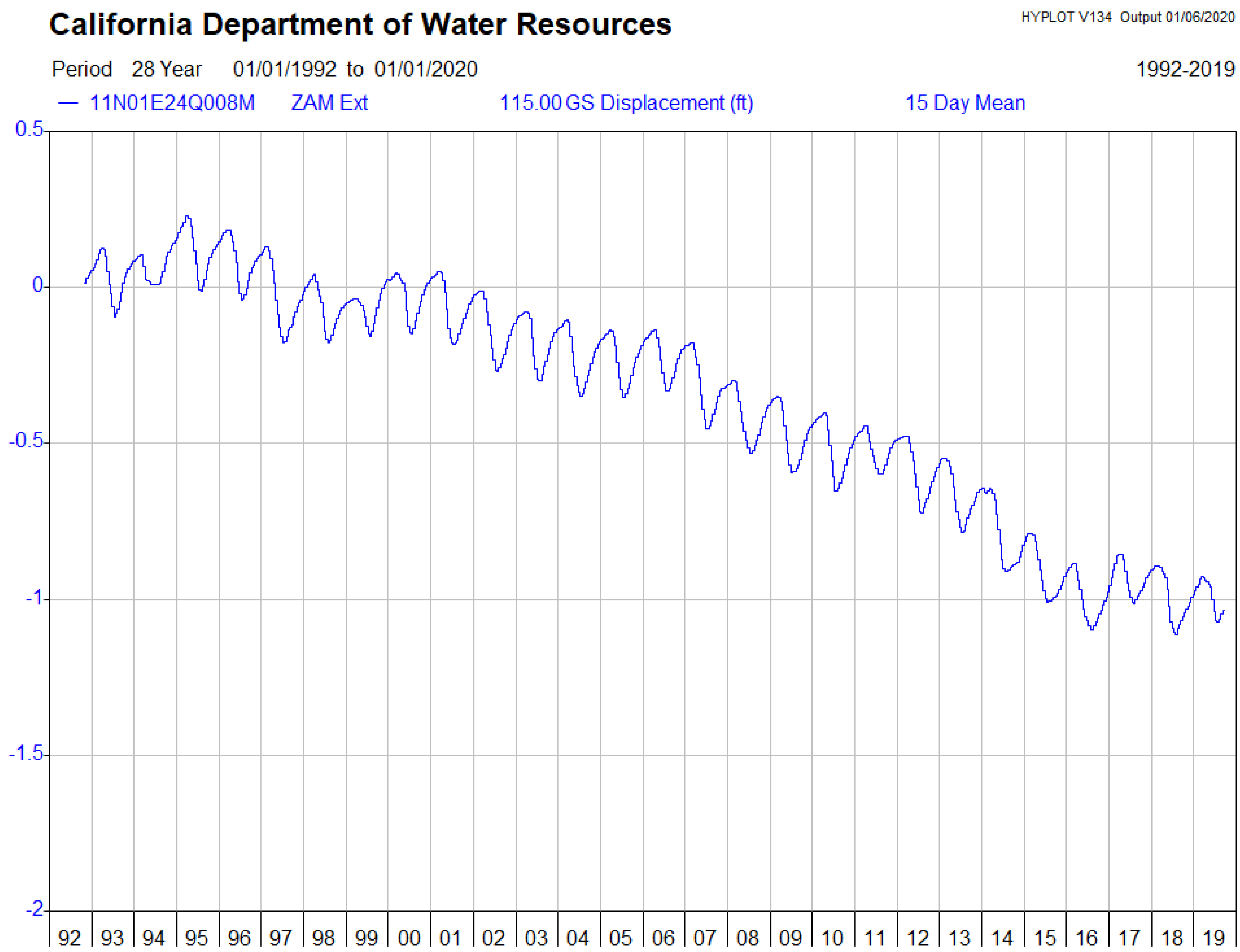

Figure D-16. Zamora Extensometer (11N01E24Q008M) Ground Surface Displacement Plot

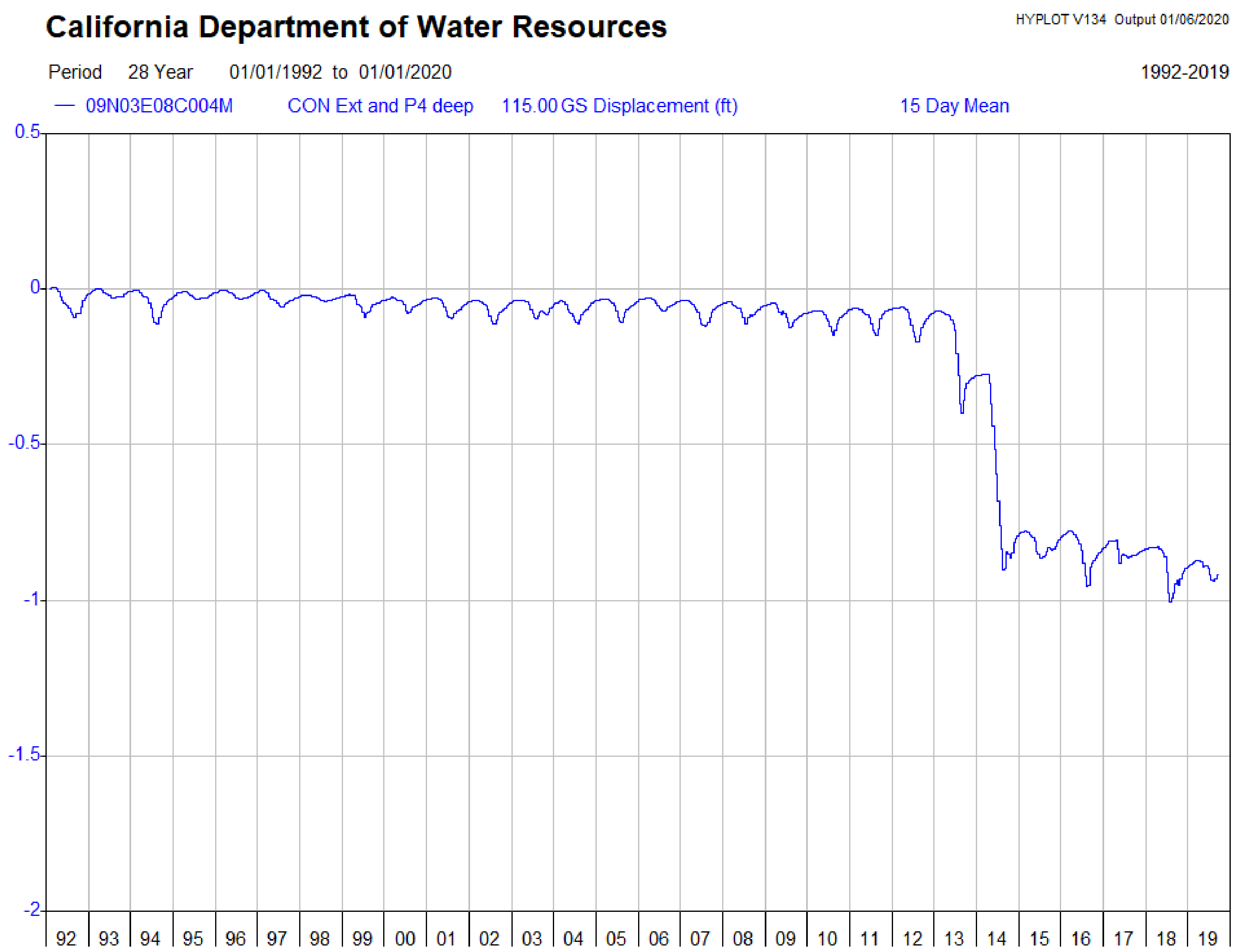

Figure D-17. Conaway Ranch Extensometer (09N03E08C004M) Ground Surface Displacement Plot

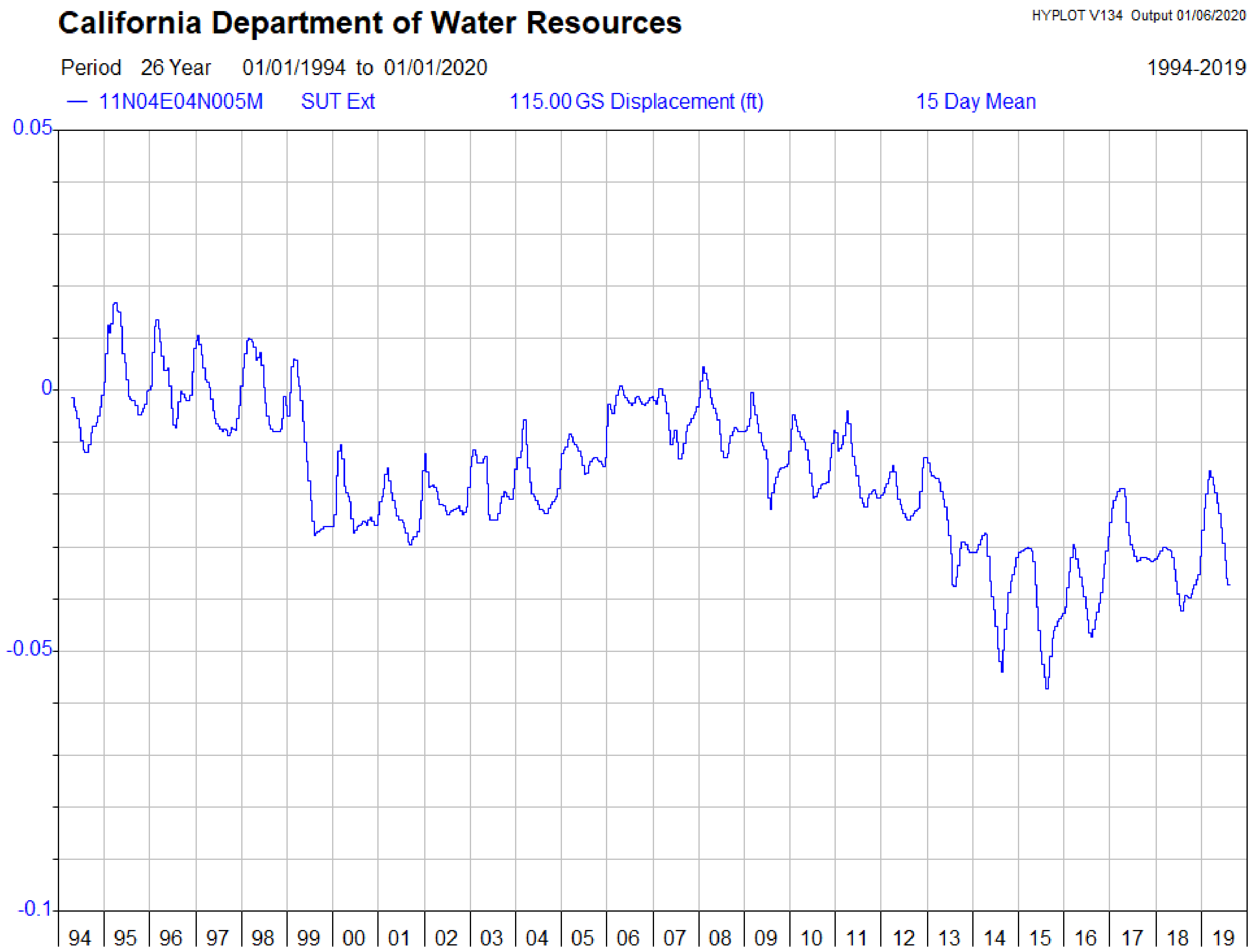

Figure D-18. Sutter Extensometer (11N04E04N005M) Ground Surface Displacement Plot

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