Stella Conjunctive Management Tool

Platte Annual Basin-Wide Meeting Grand Island, NE
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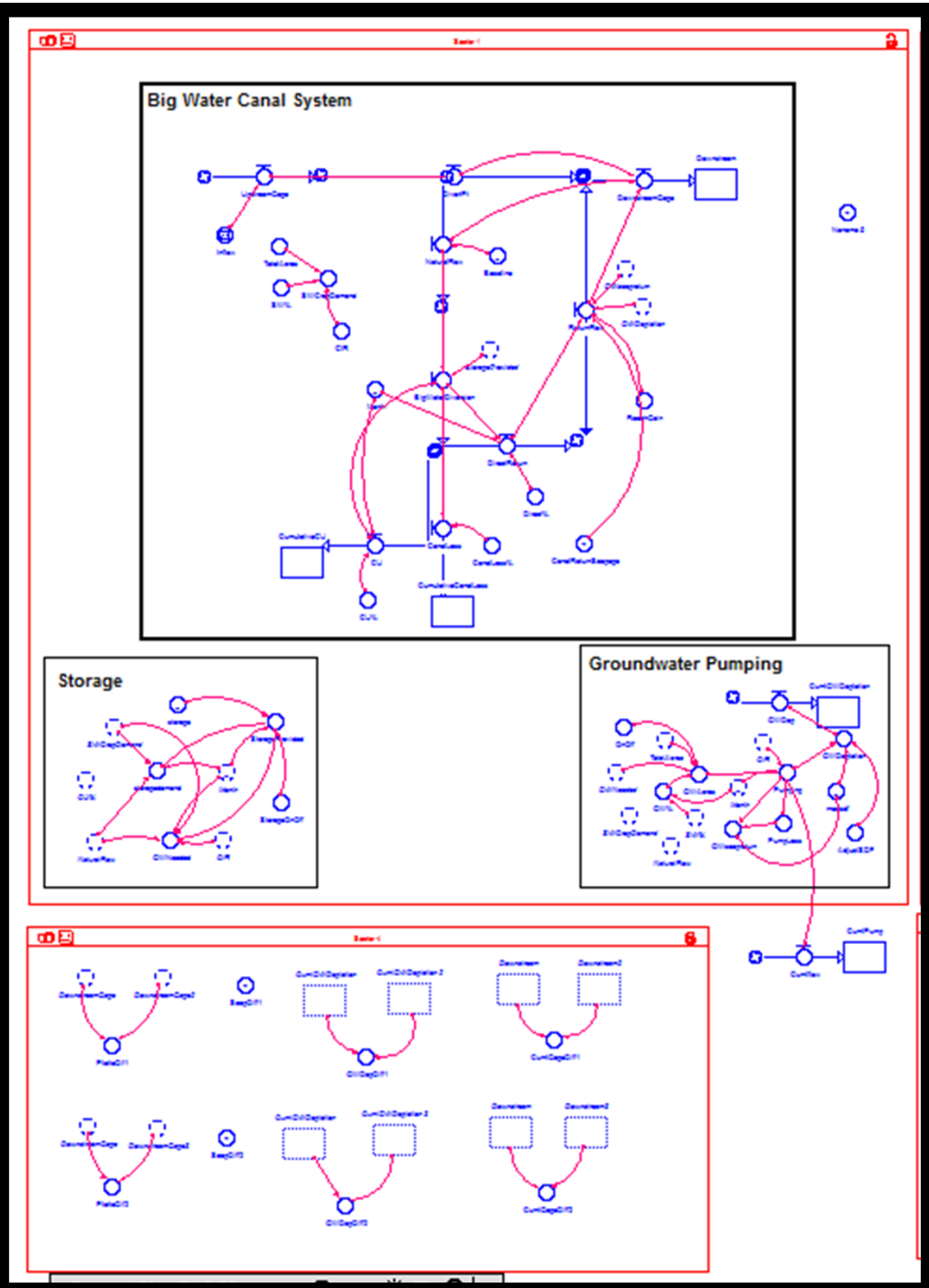
Nebraska Department of Natural Resources

Overview

- What does the modeling tool do?
- Model Assumptions/Setup
- Scenario Descriptions
- Scenario Results


Big Water Canal System
Storage
Groundwater Pumping

Model Purpose: What does the model do?

- Explore surface-groundwater interactions to illustrate differences between water management options
- Explores timing, not spatial aspect of surface-groundwater interactions
  - Previous COHYST work focused on spatial aspect
  - COHYST 2010 will do both temporal & spatial

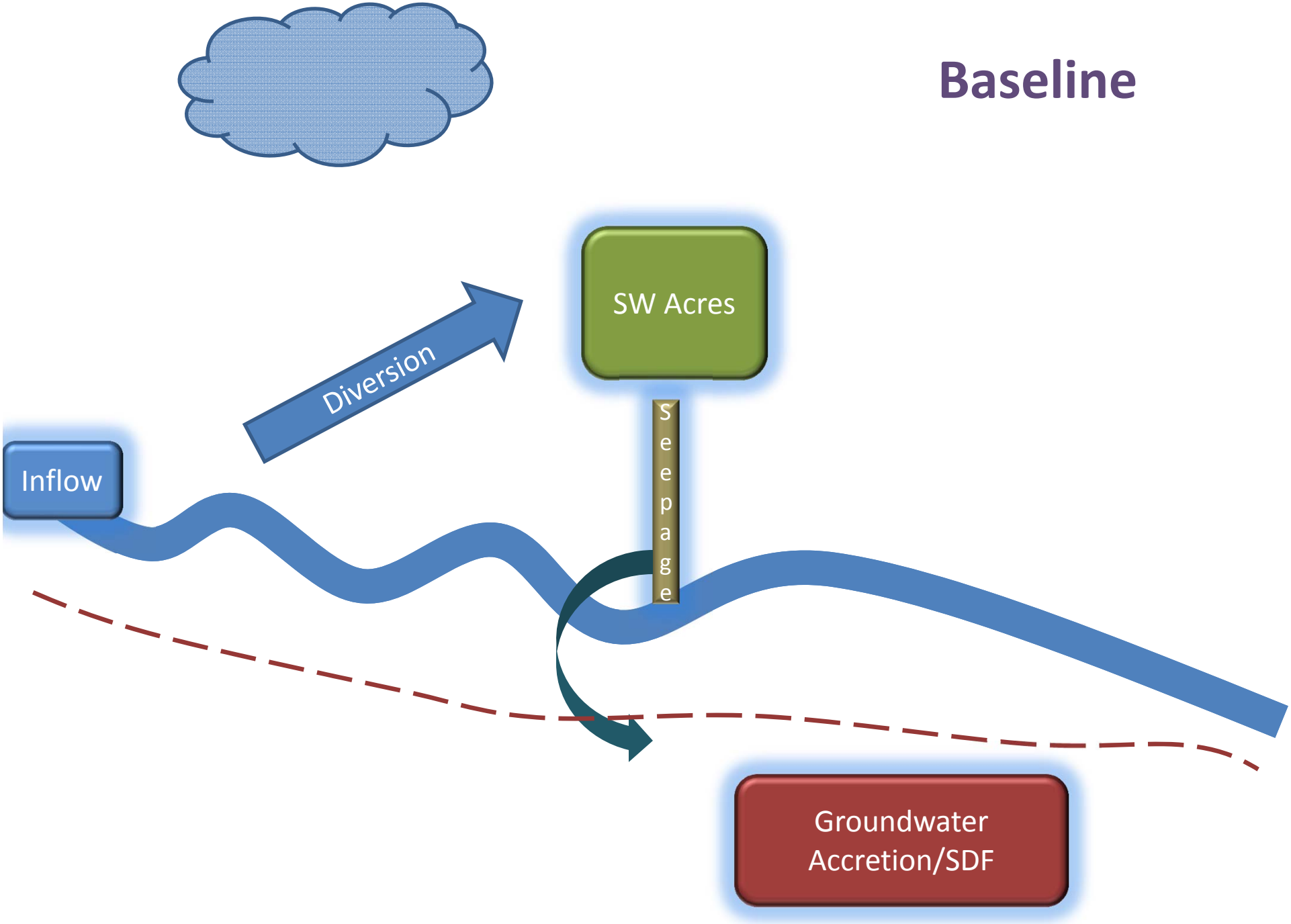
Model Assumptions

- Single Canal System
- Stream Depletion Factor (SDF)
- Recharge/Consumptive Use Rates
- SW Diversions & GW Pumping

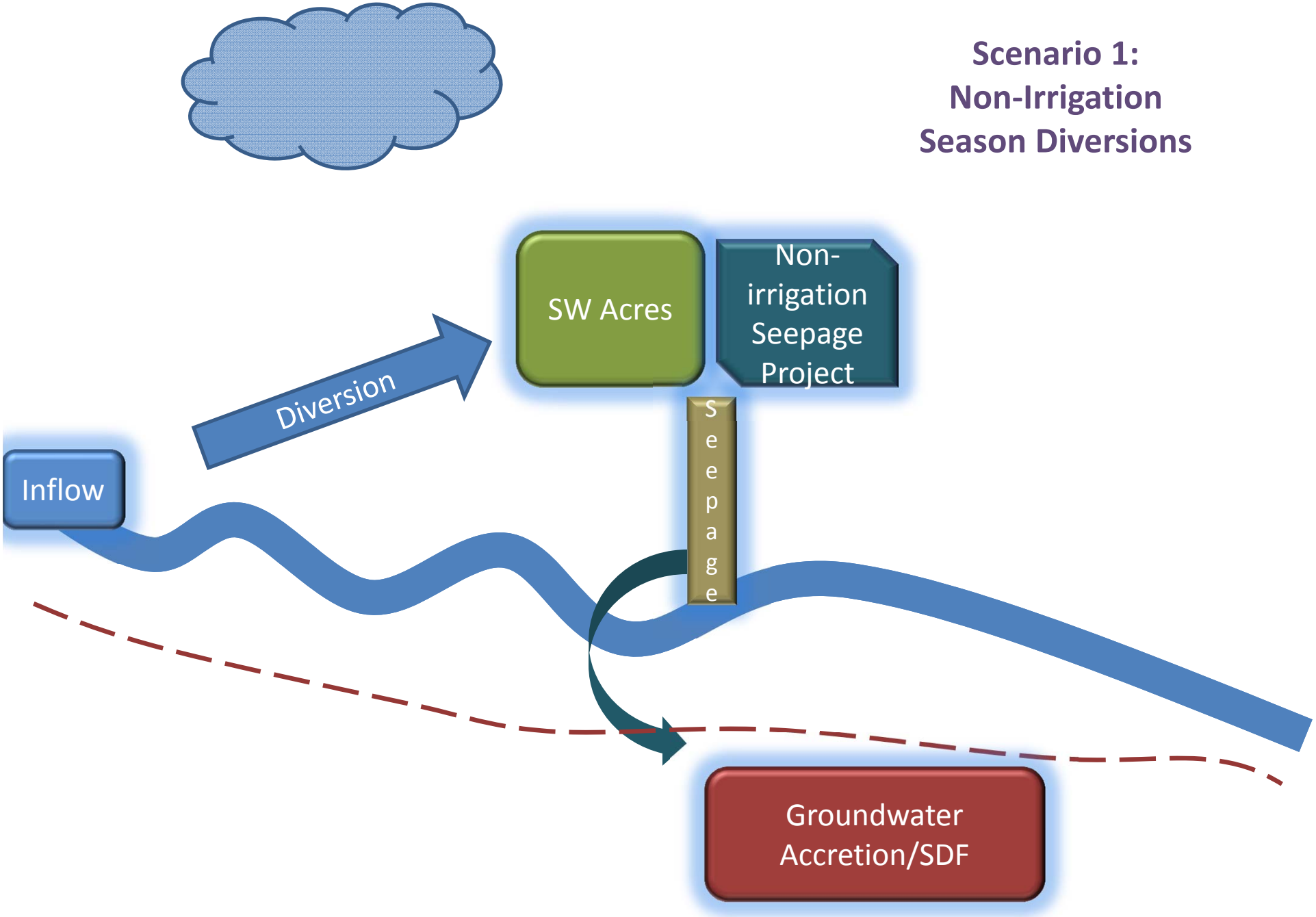
Scenarios

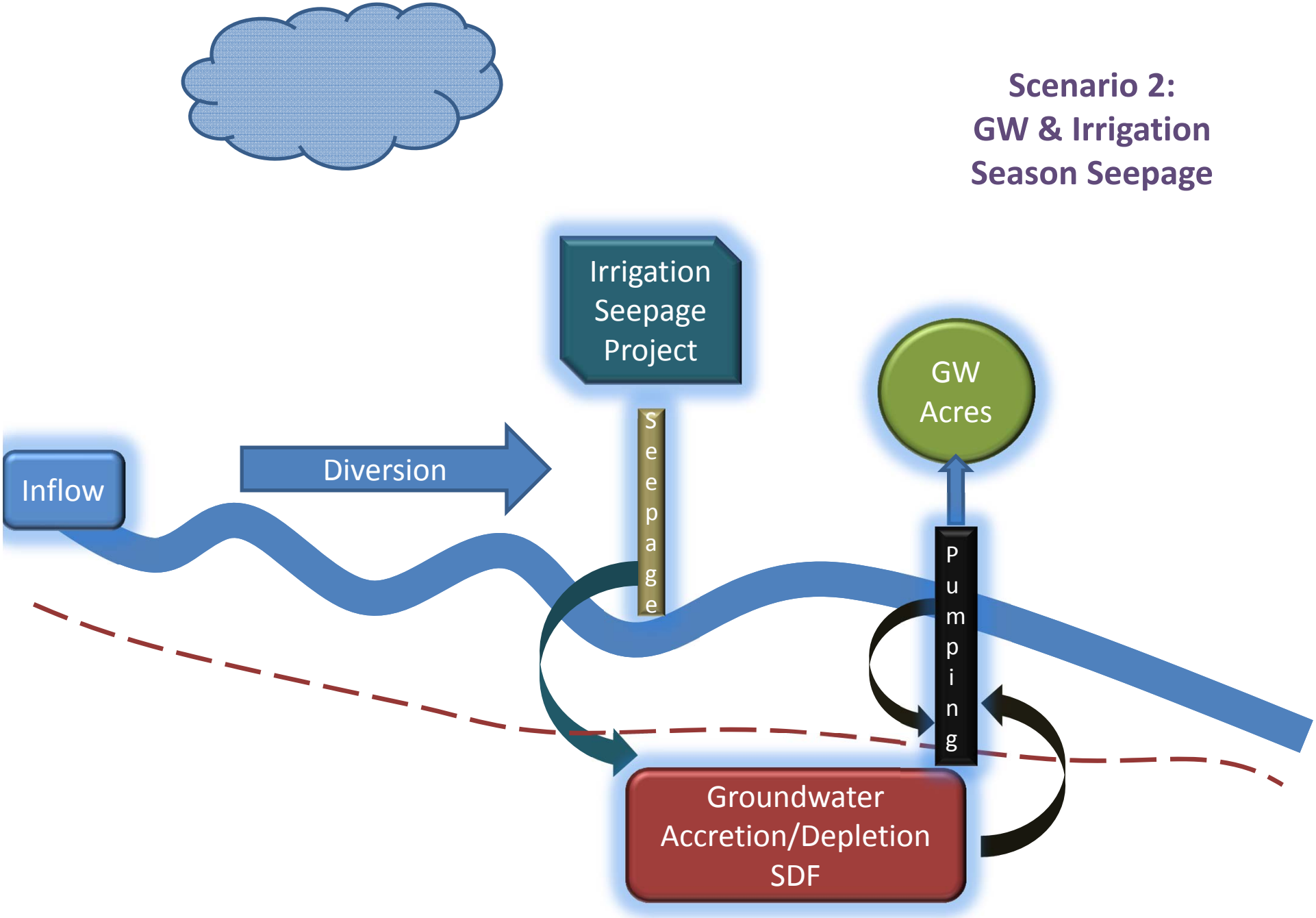
- Baseline + 4 Scenarios
- Baseline
  - SW use only
- Scenario 1
  - Same as baseline, except non-irrigation season diversions
- Scenario 2
  - SW & GW use
- Scenario 3
  - GW use only
- Scenario 4
  - GW use only during drought

Baseline

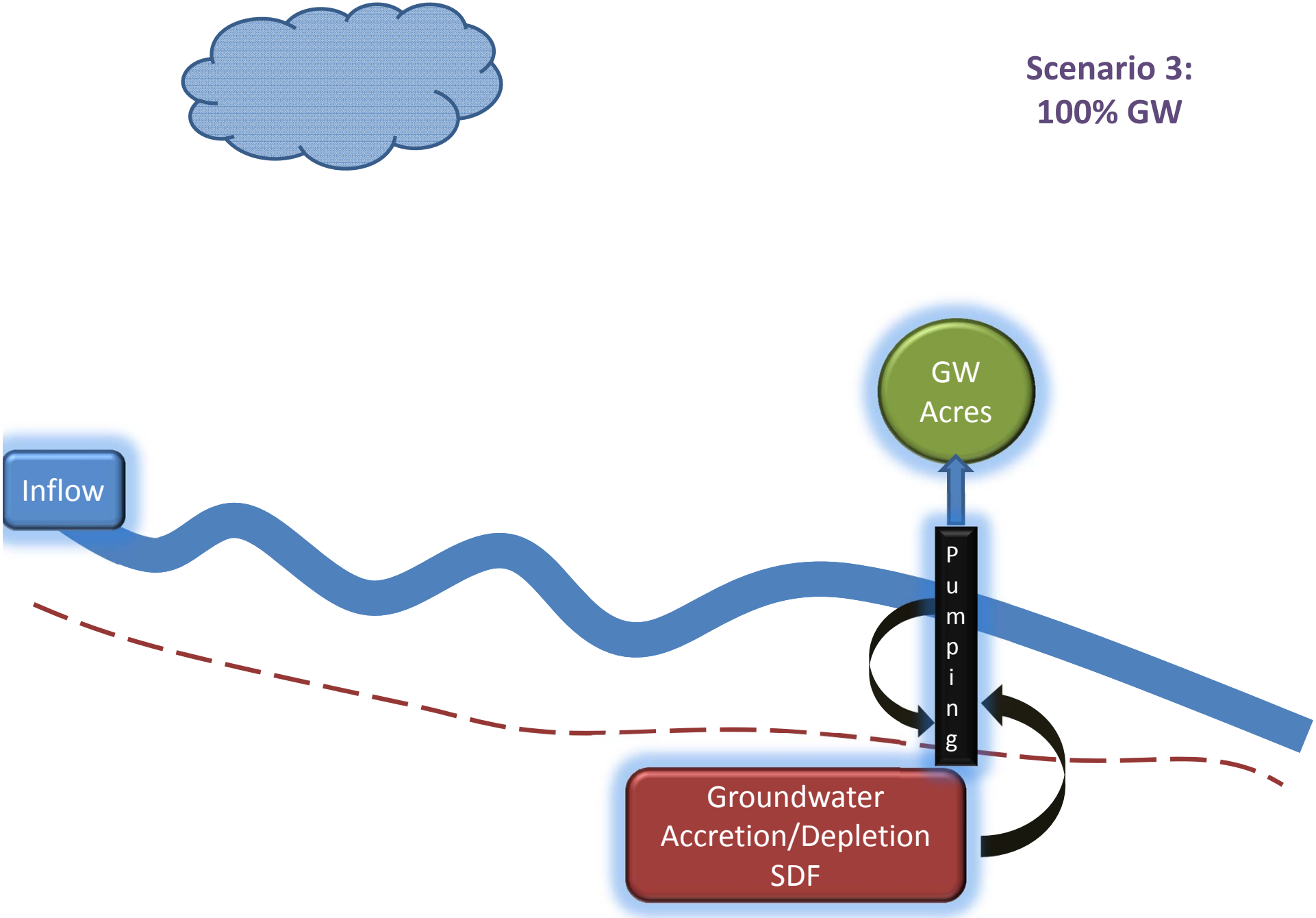

SW Acres
Diversion
Inflow
Seepage
Groundwater Accretion/SDF

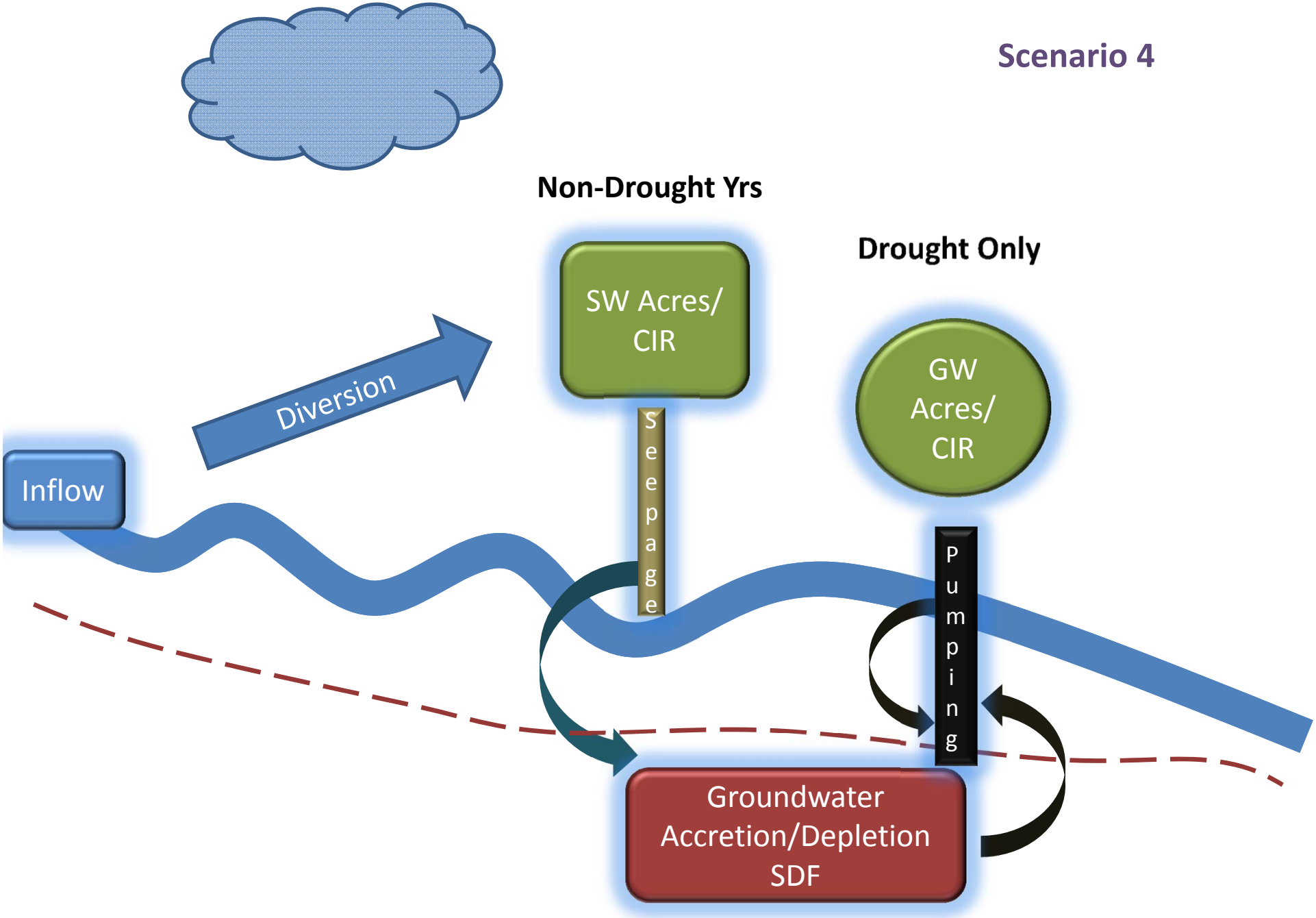
Scenario 1: Non-Irrigation Season Diversions

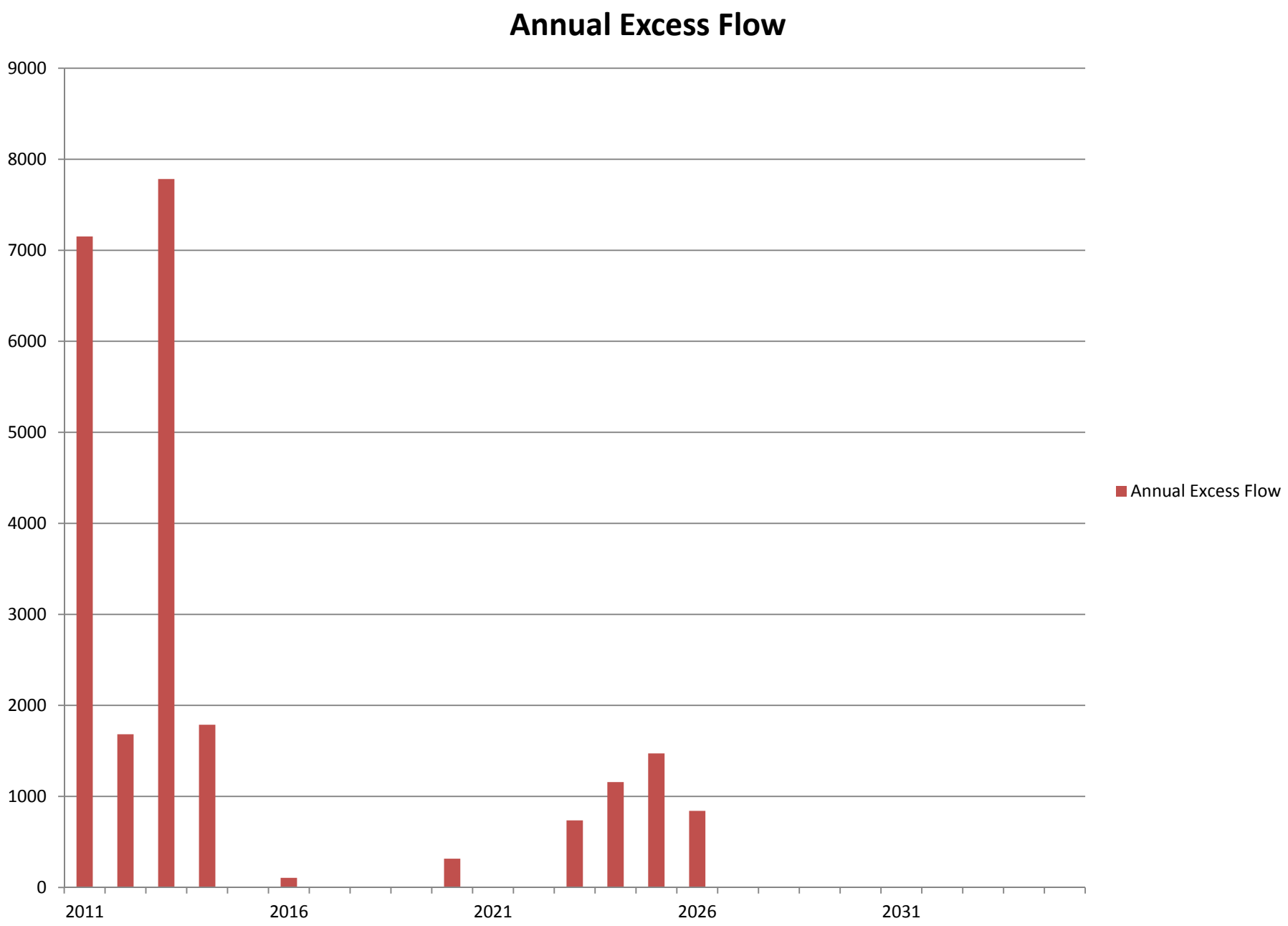


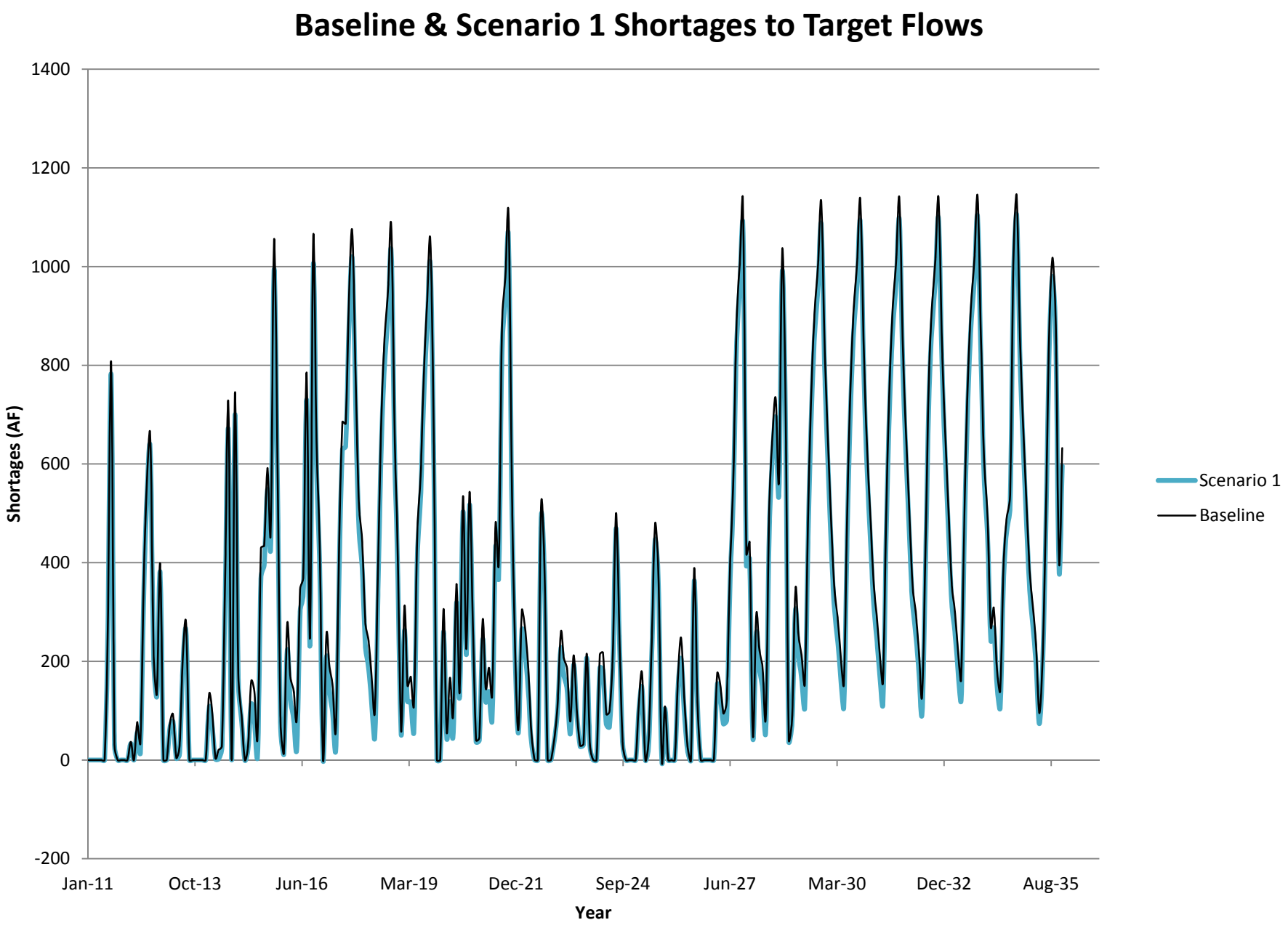

Scenario 2:
GW & Irrigation
Season Seepage
Irrigation
Seepage
Project
GW
Acres
Inflow
Diversion
Seepage
Pumping
Groundwater
Accretion/Depletion
SDF

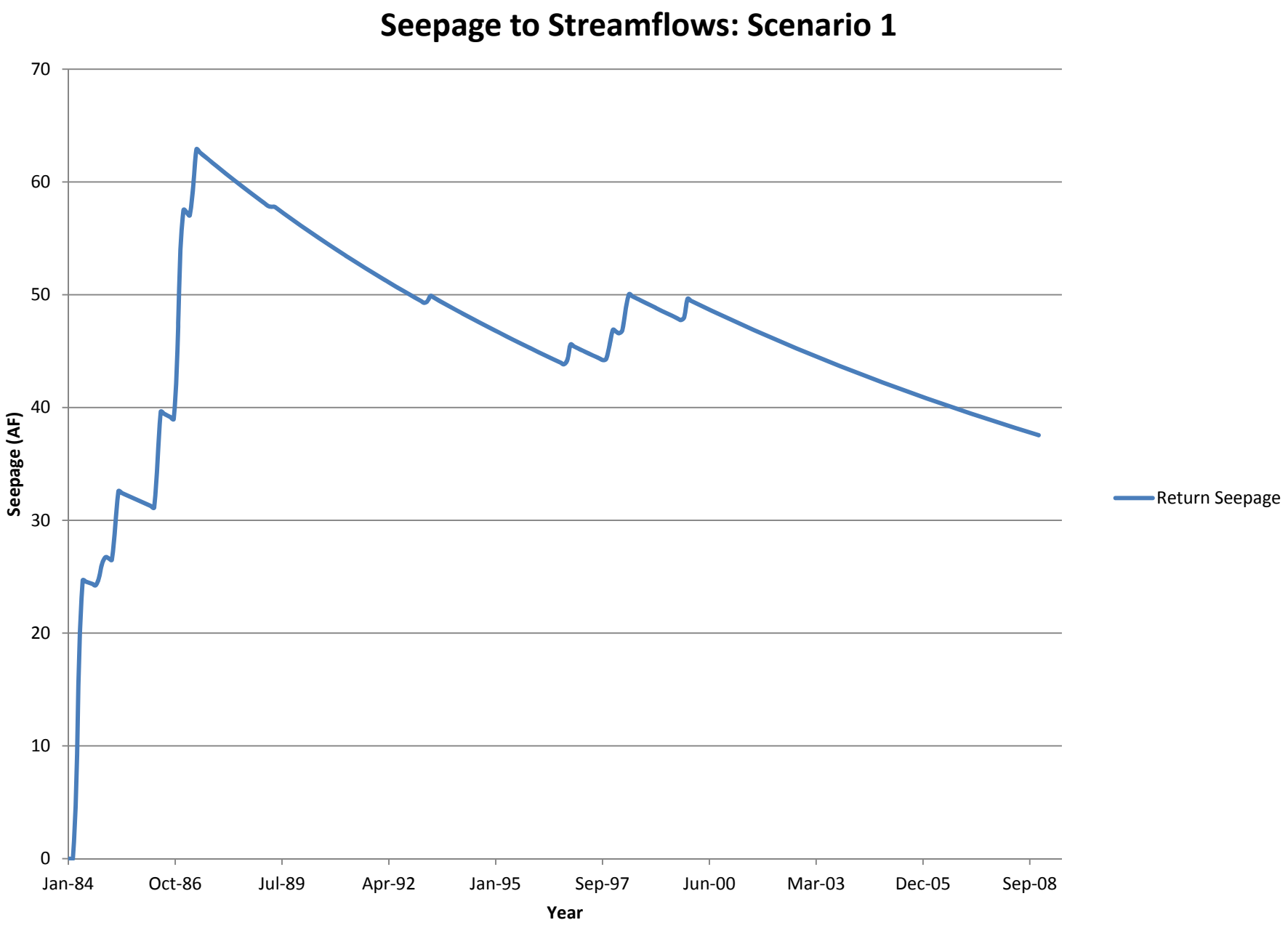
Scenario 3:
100% GW

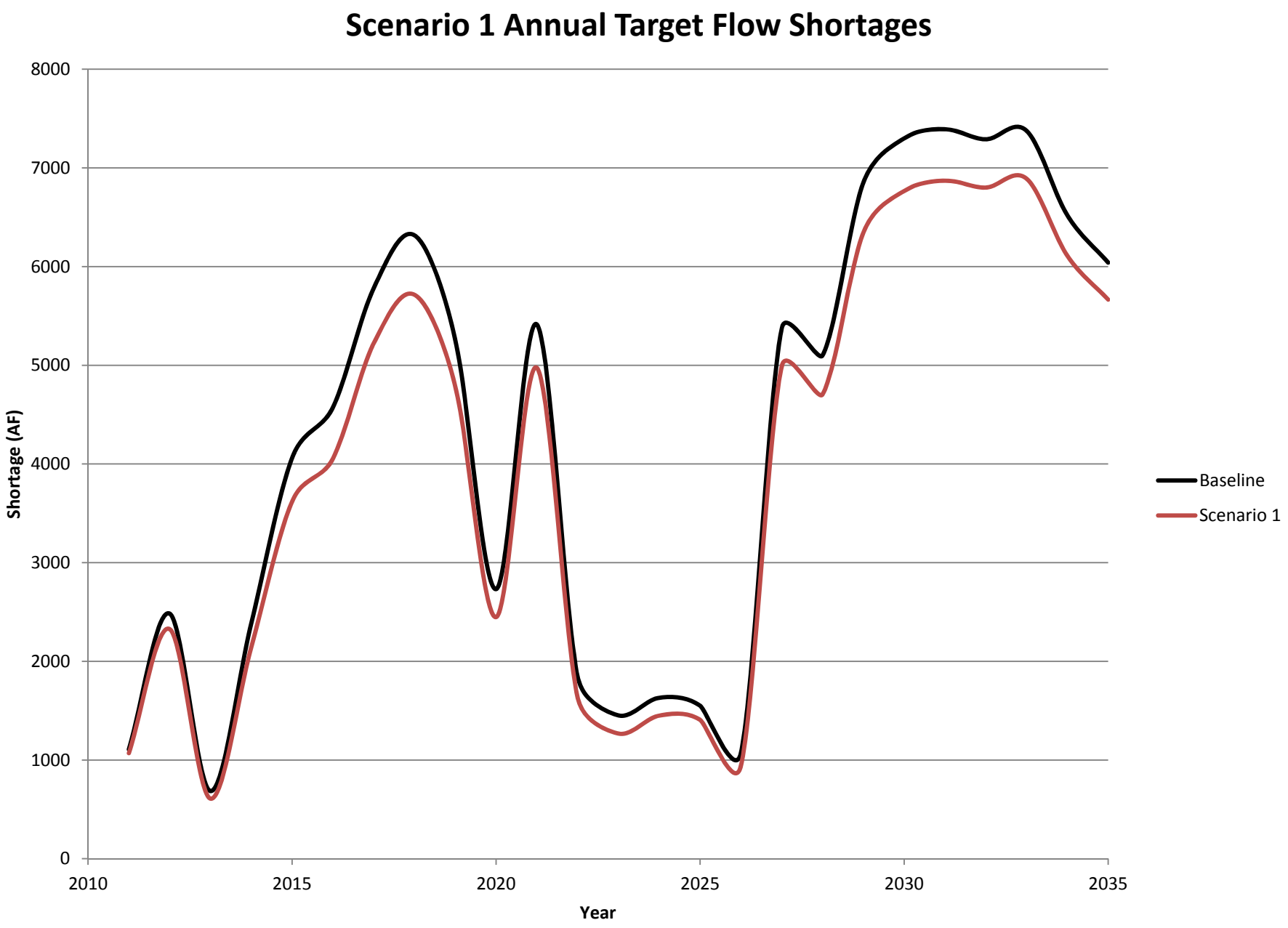


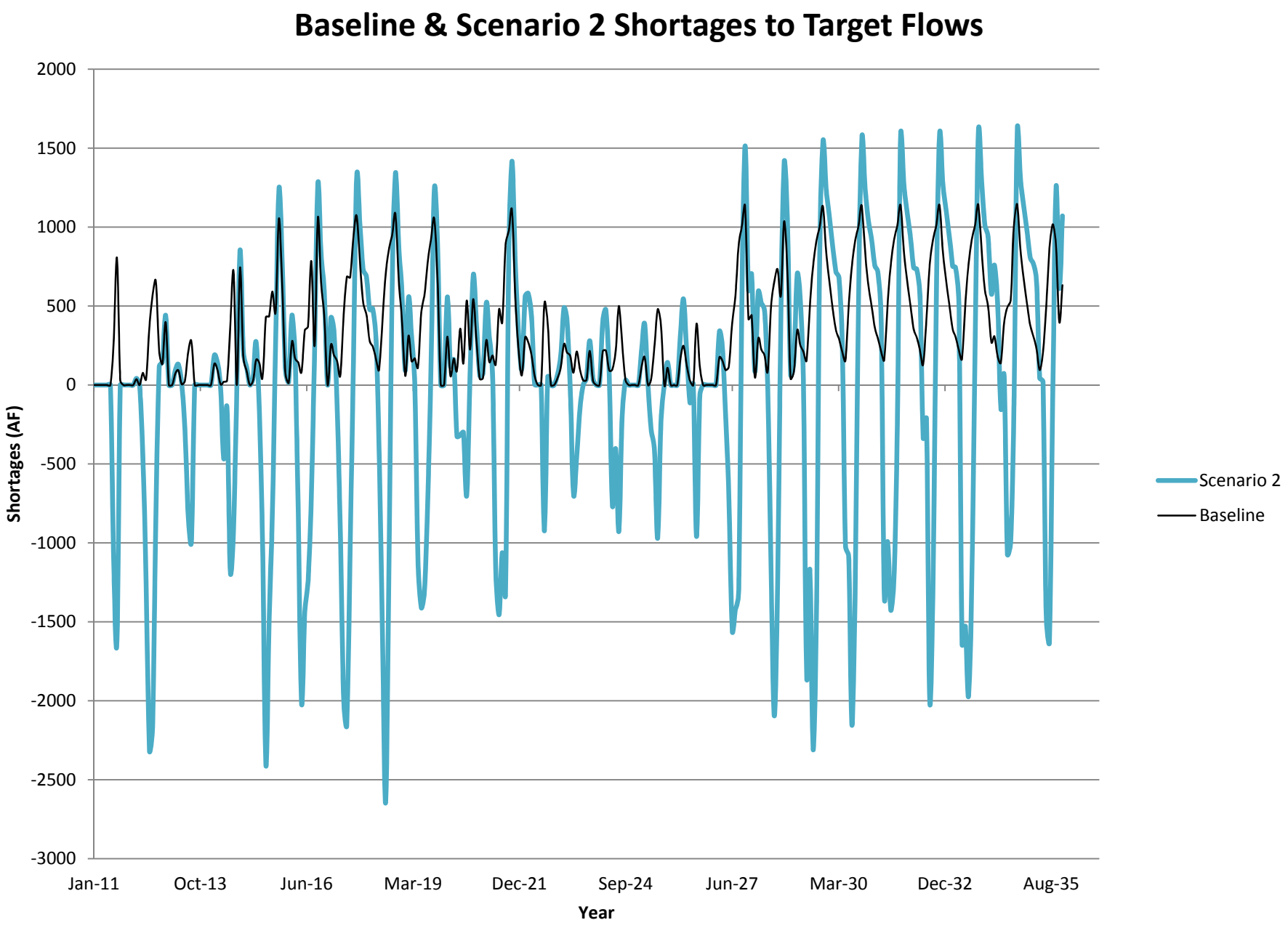

Scenario 4
Non-Drought Yrs
Drought Only
SW Acres/ CIR
GW Acres/ CIR
Diversion
Inflow
Seepage
Pumping
Groundwater Accretion/Depletion SDF

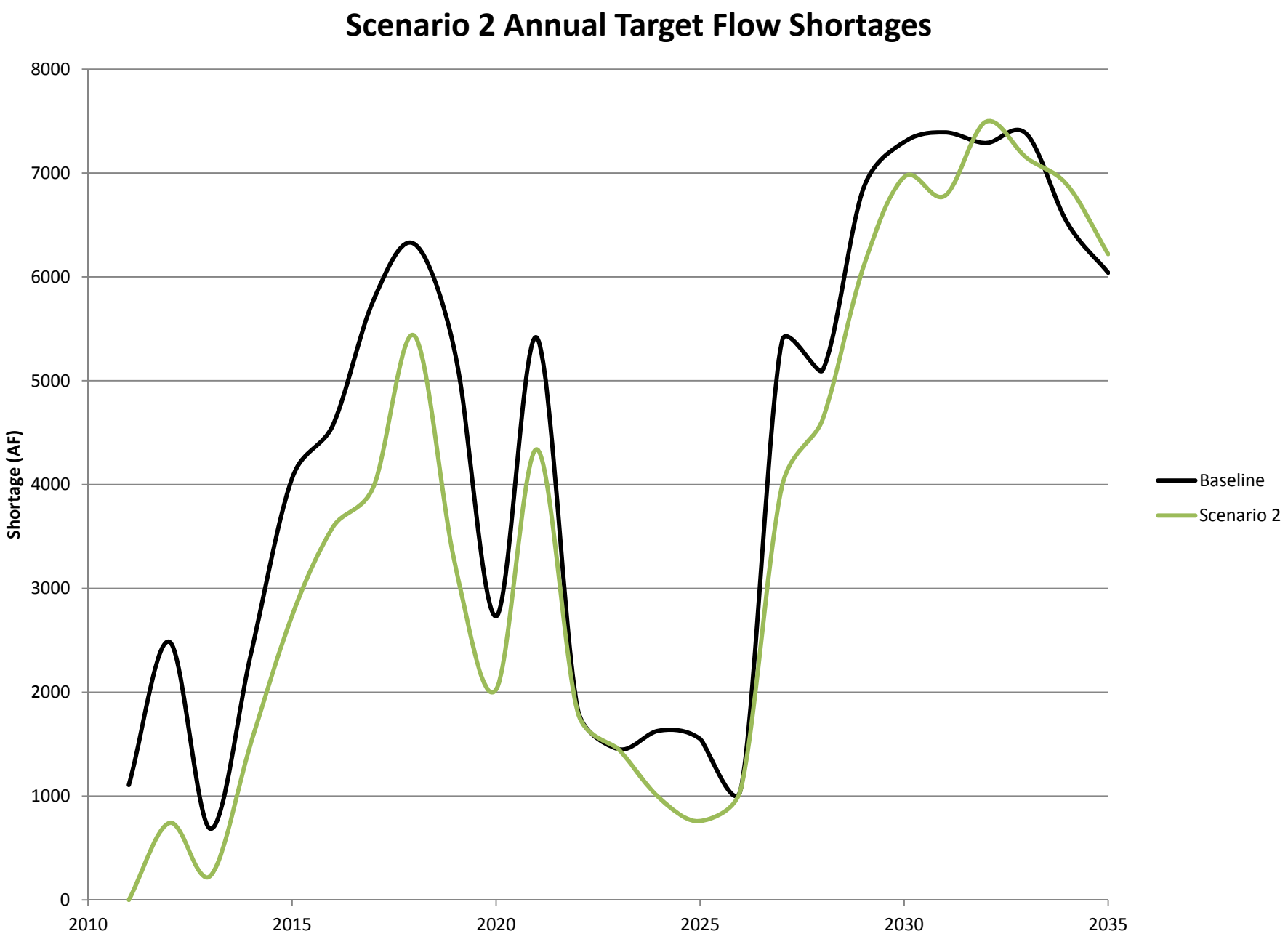

Annual Excess Flow
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2011
2016
2021
2026
2031
Annual Excess Flow

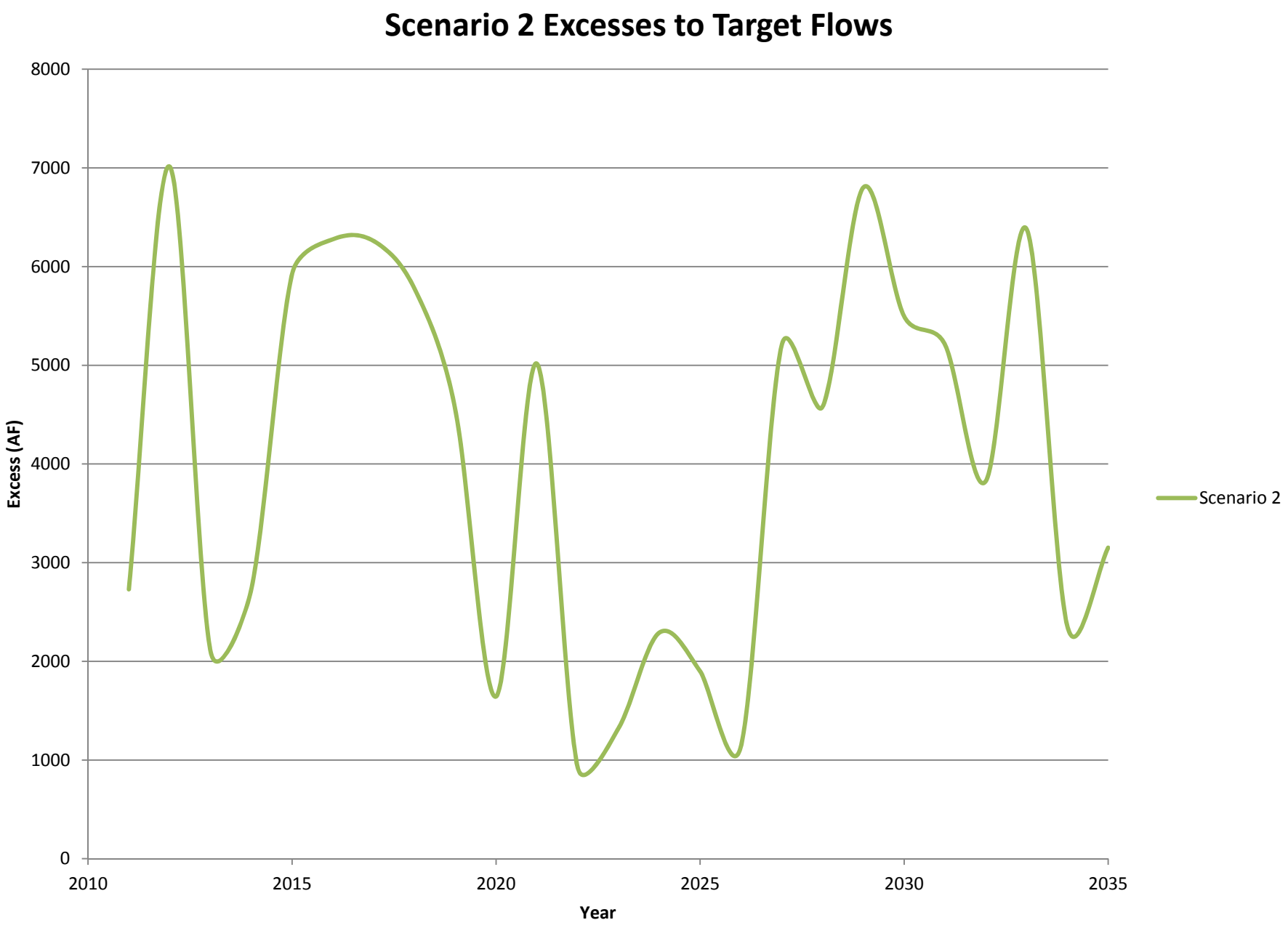

Baseline & Scenario 1 Shortages to Target Flows
1400
1200
1000
800
600
400
200
0
-200
Shortages (AF)
Jan-11
Oct-13
Jun-16
Mar-19
Dec-21
Sep-24
Jun-27
Mar-30
Dec-32
Aug-35
Year
Scenario 1
Baseline

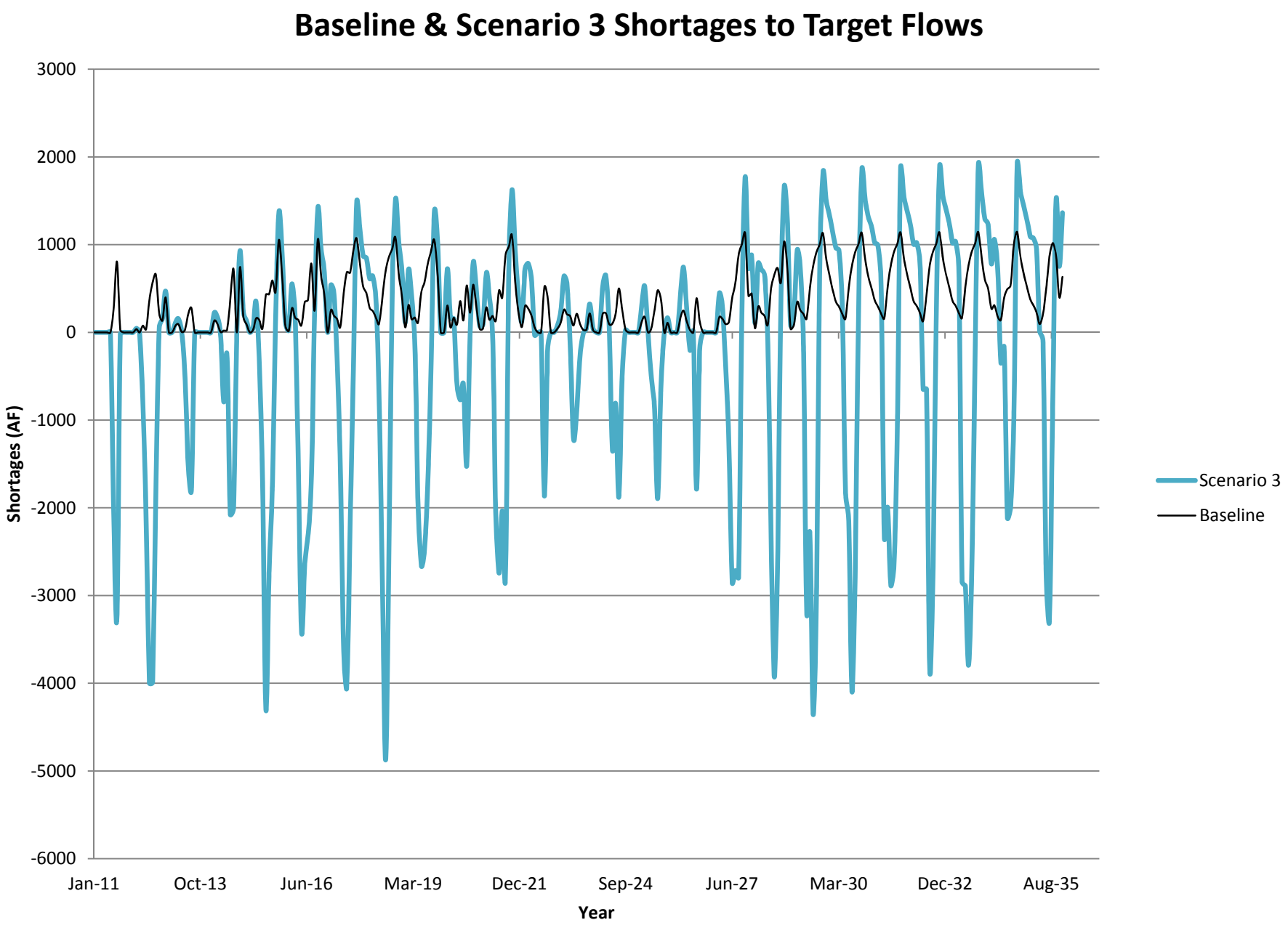

Seepage to Streamflows: Scenario 1
70
60
50
40
30
20
10
0
Seepage (AF)
Jan-84
Oct-86
Jul-89
Apr-92
Jan-95
Sep-97
Jun-00
Mar-03
Dec-05
Sep-08
Year
Return Seepage

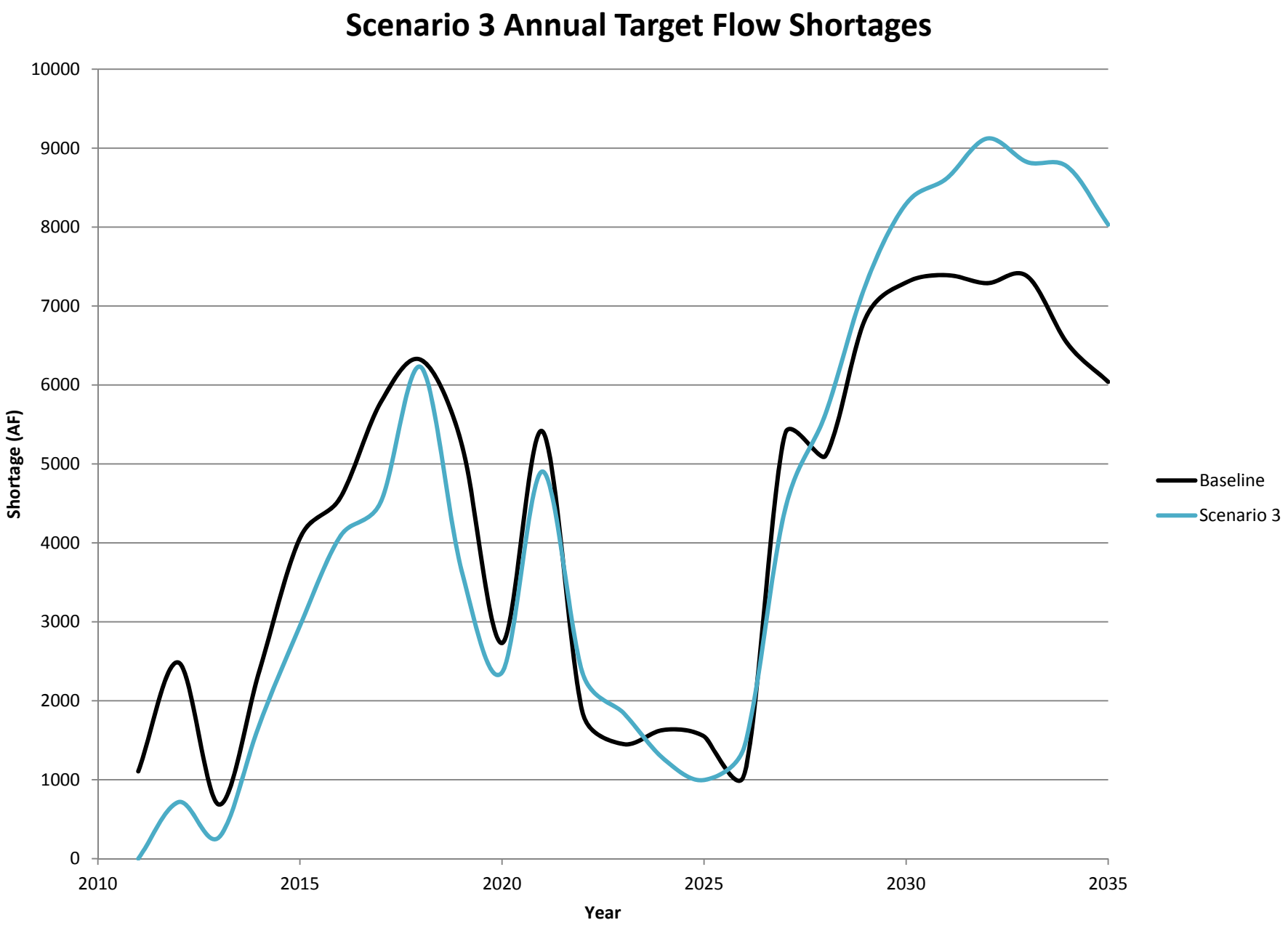

Scenario 1 Annual Target Flow Shortages
8000
7000
6000
5000
4000
3000
2000
1000
0
Shortage (AF)
2010
2015
2020
2025
2030
2035
Year
Baseline
Scenario 1

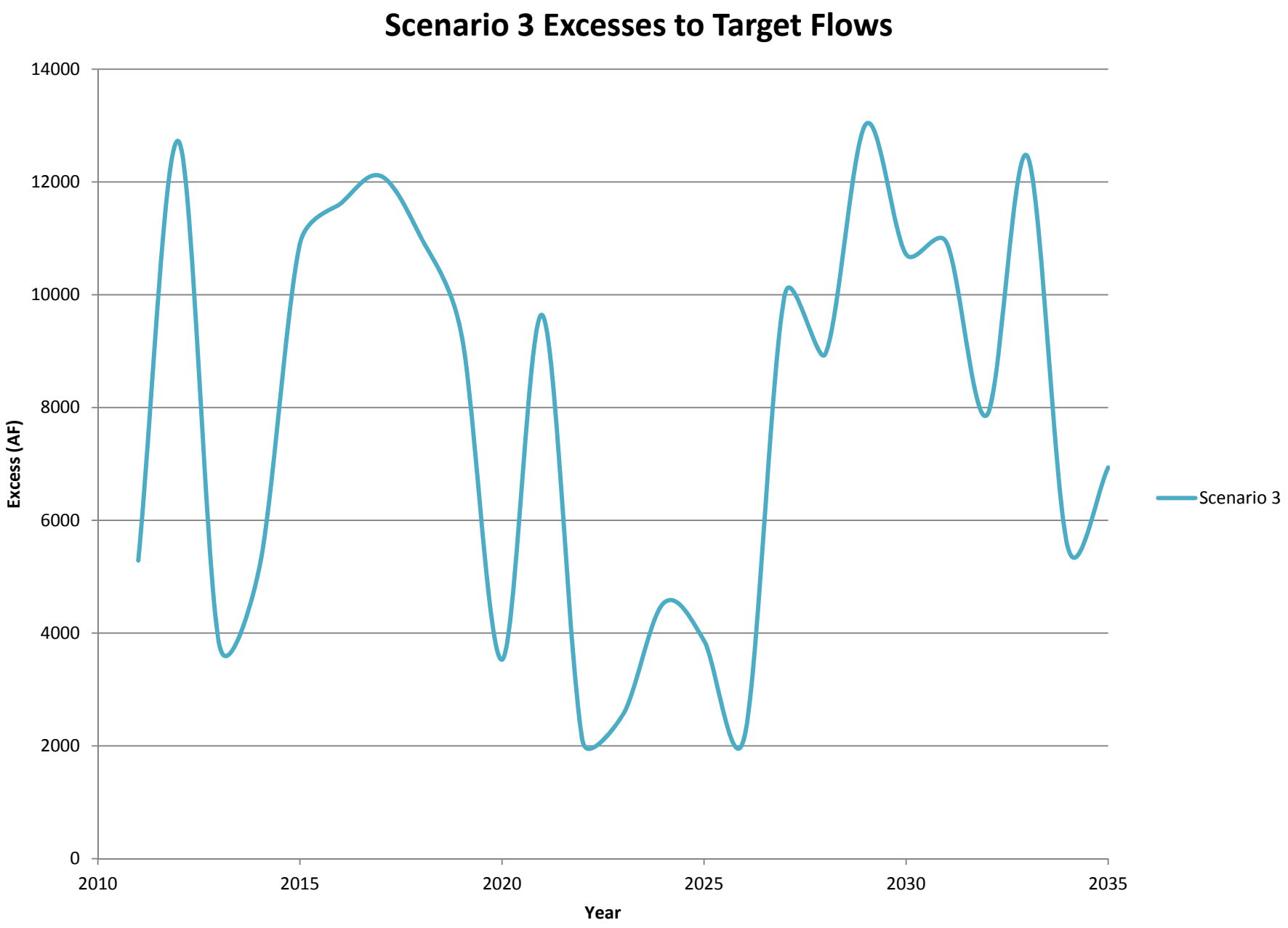

Baseline & Scenario 2 Shortages to Target Flows
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
Shortages (AF)
Jan-11
Oct-13
Jun-16
Mar-19
Dec-21
Sep-24
Jun-27
Mar-30
Dec-32
Aug-35
Year
Scenario 2
Baseline

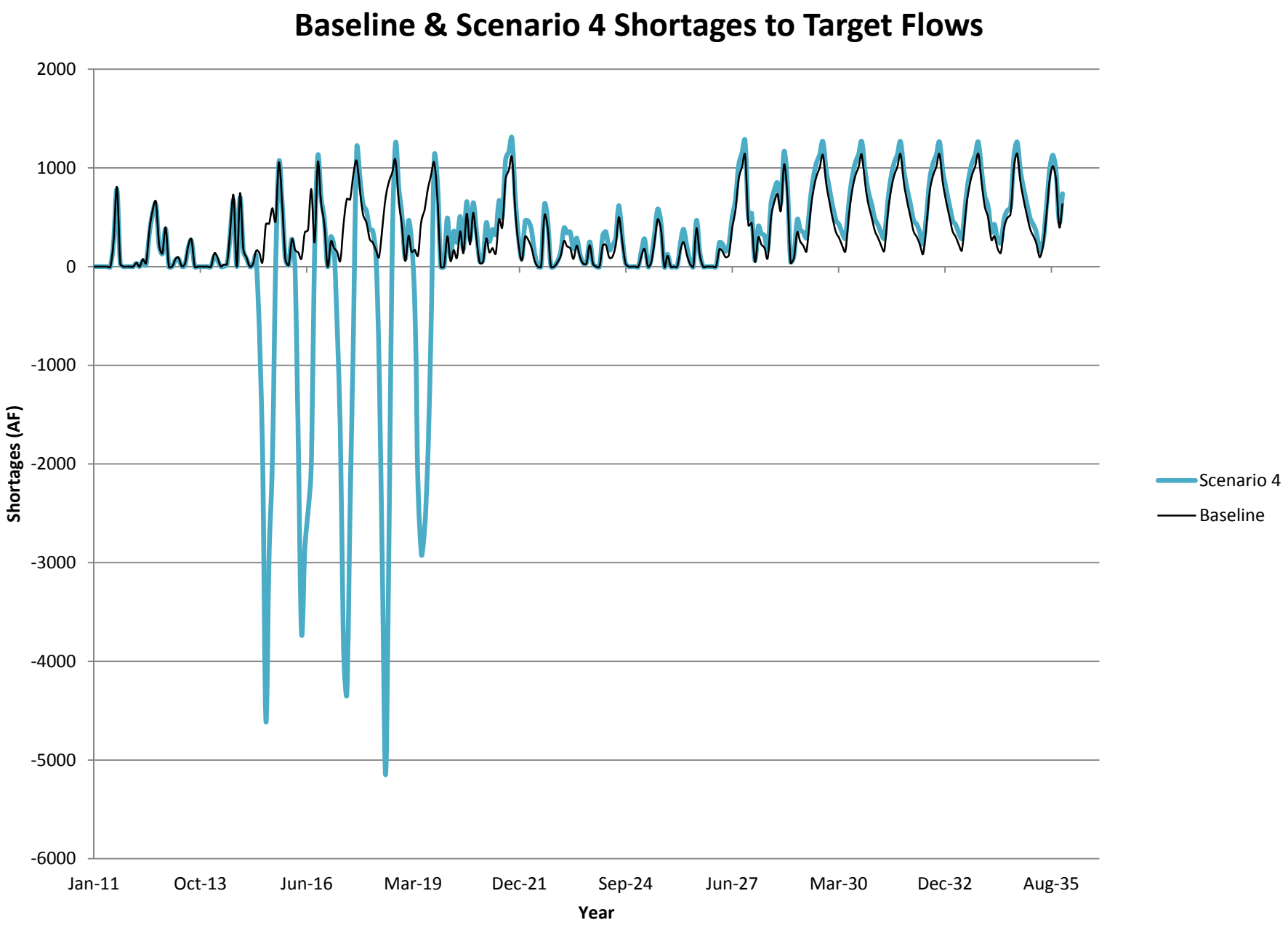

Scenario 2 Annual Target Flow Shortages
Shortage (AF)
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2015
2020
2025
2030
2035
Baseline
Scenario 2

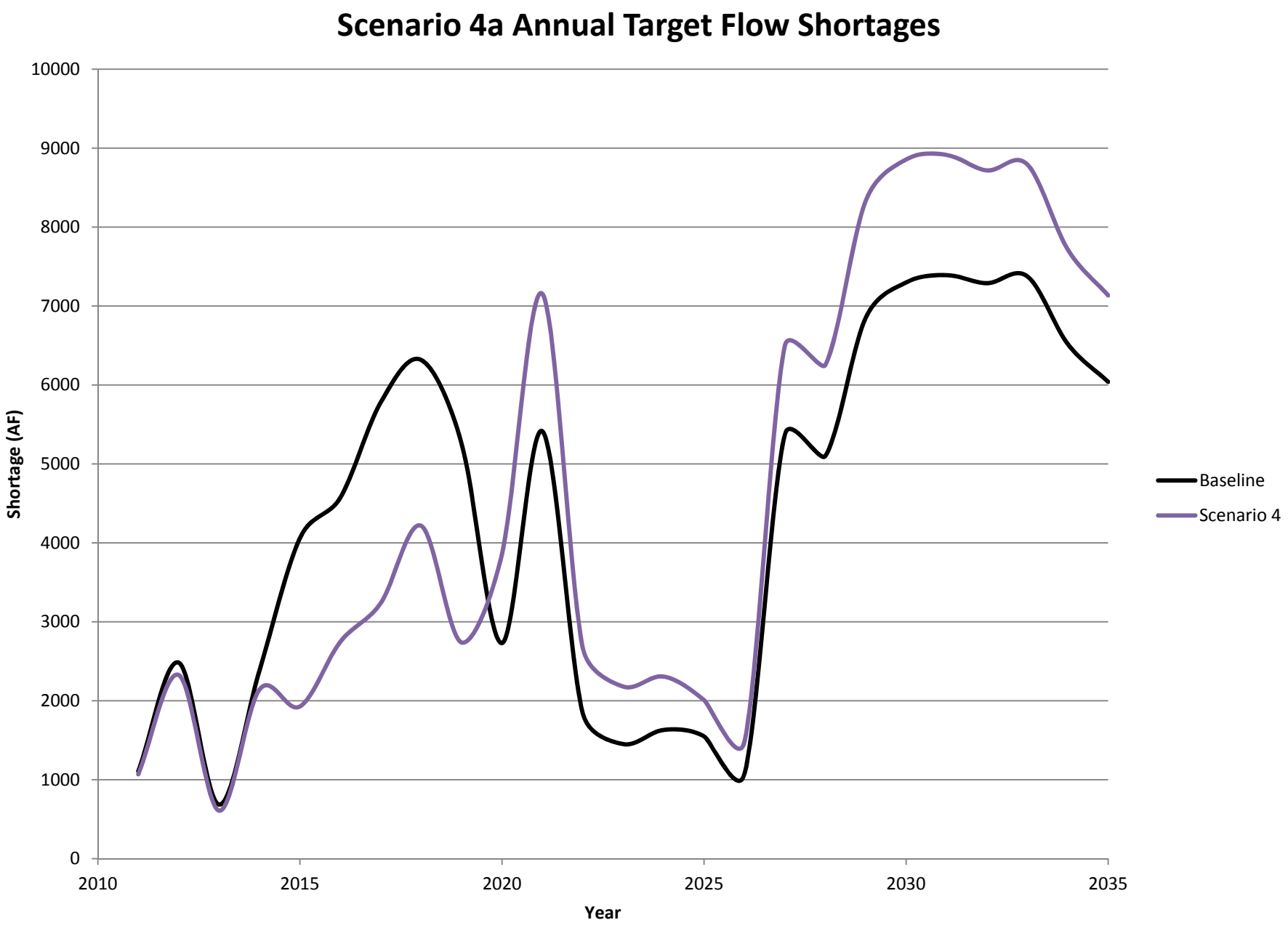

Scenario 2 Excesses to Target Flows
8000
7000
6000
5000
4000
3000
2000
1000
0
Excess (AF)
2010
2015
2020
2025
2030
2035
Year
Scenario 2

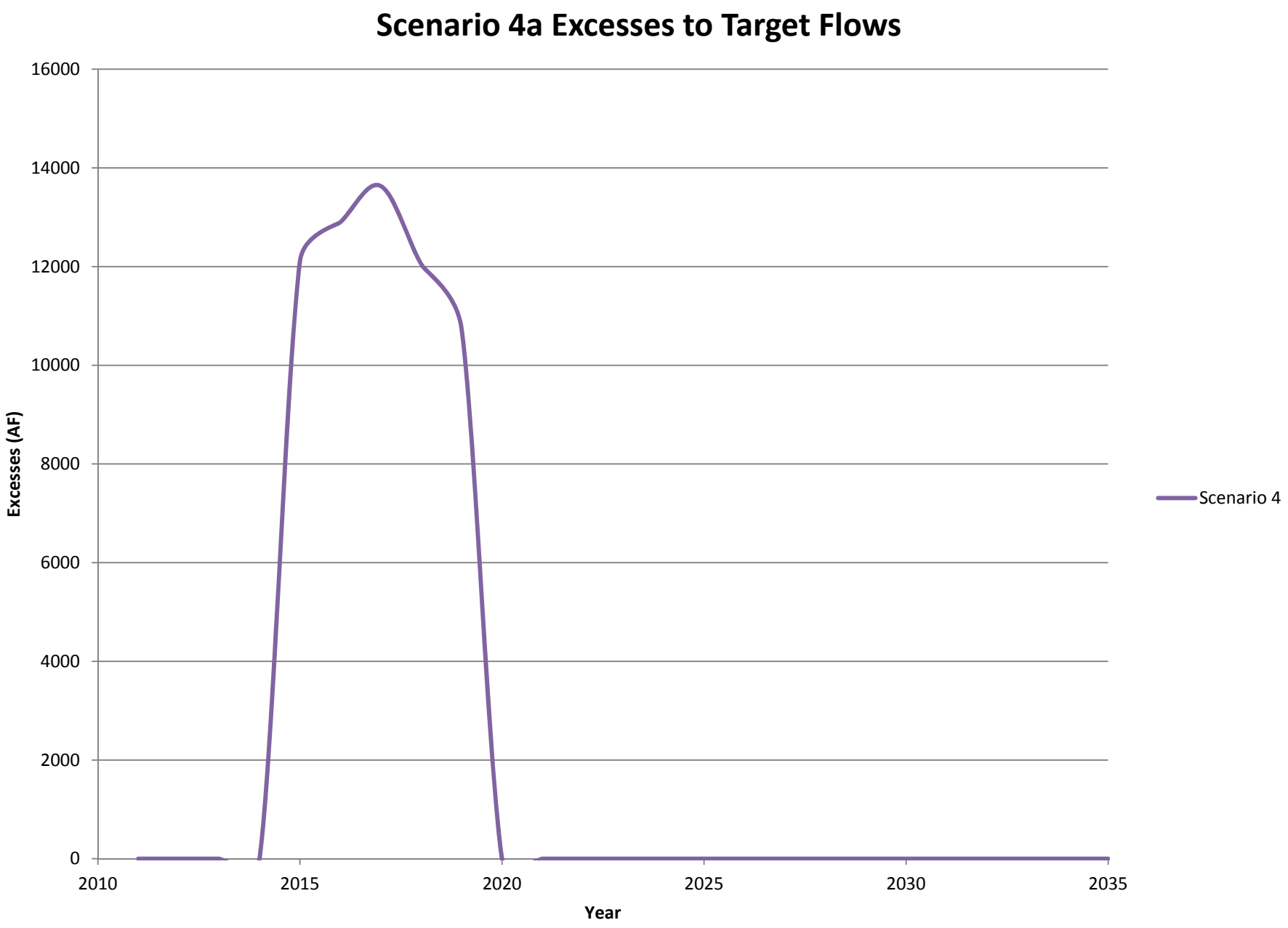

Baseline & Scenario 3 Shortages to Target Flows
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
Shortages (AF)
Jan-11
Oct-13
Jun-16
Mar-19
Dec-21
Sep-24
Jun-27
Mar-30
Dec-32
Aug-35
Year
Scenario 3
Baseline

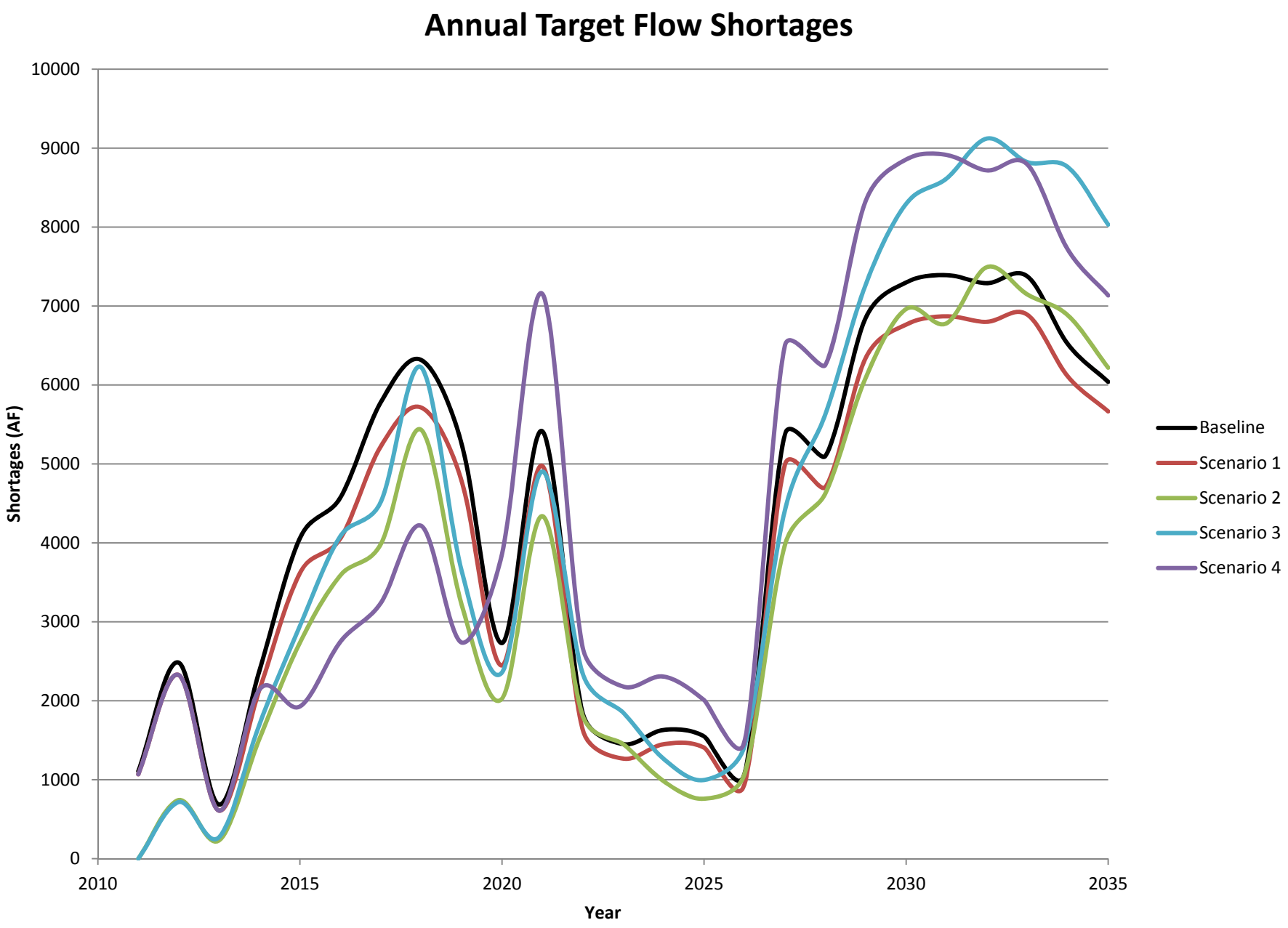

Scenario 3 Annual Target Flow Shortages
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Shortage (AF)
2010
2015
2020
2025
2030
2035
Year
Baseline
Scenario 3

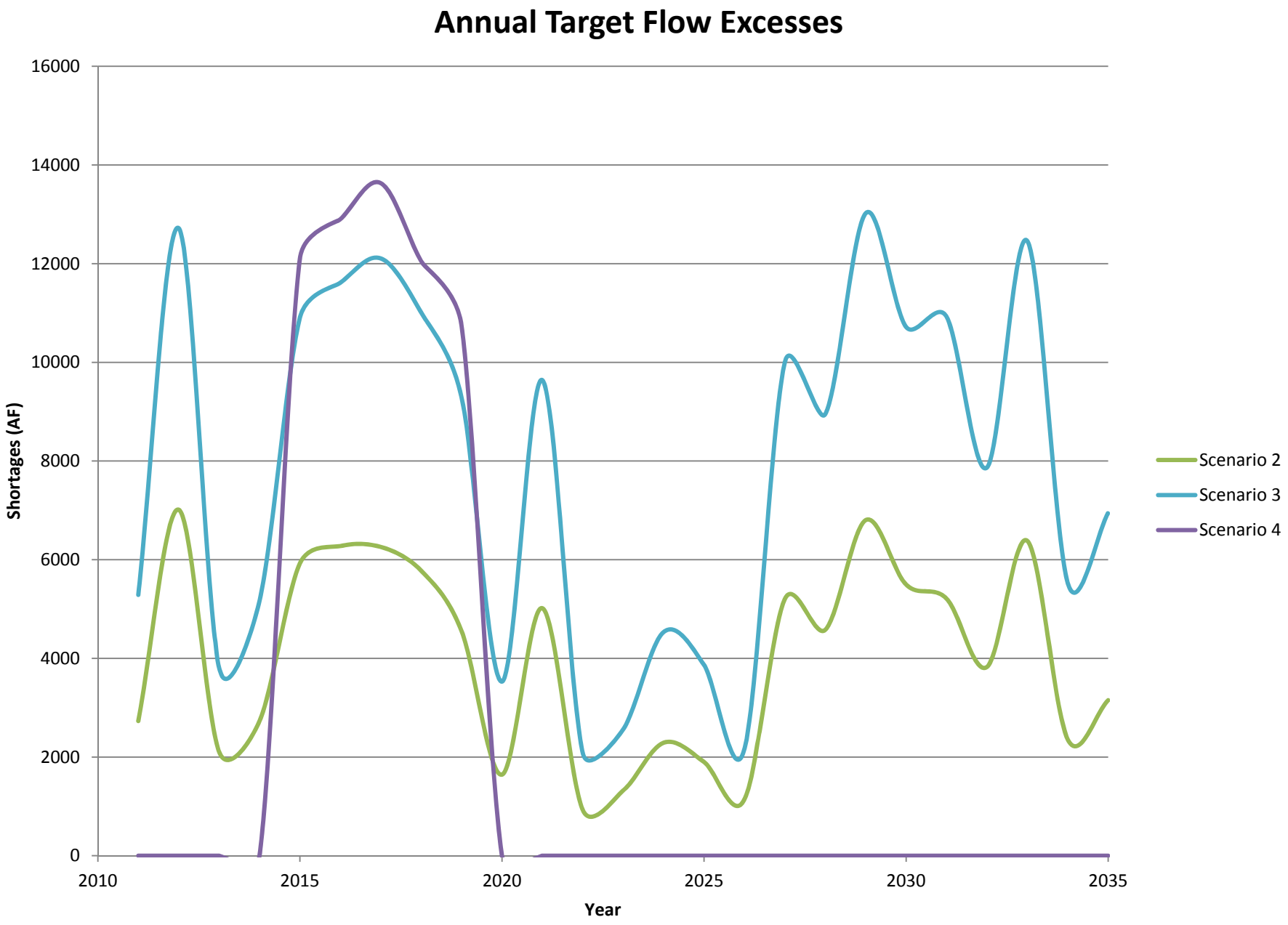

Scenario 3 Excesses to Target Flows
14000
12000
10000
8000
6000
4000
2000
0
Excess (AF)
2010
2015
2020
2025
2030
2035
Year
Scenario 3


Baseline & Scenario 4 Shortages to Target Flows
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
Shortages (AF)
Jan-11
Oct-13
Jun-16
Mar-19
Dec-21
Sep-24
Jun-27
Mar-30
Dec-32
Aug-35
Year
Scenario 4
Baseline


Scenario 4a Annual Target Flow Shortages
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Shortage (AF)
2010
2015
2020
2025
2030
2035
Year
Baseline
Scenario 4


Scenario 4a Excesses to Target Flows
16000
14000
12000
10000
8000
6000
4000
2000
0
Excesses (AF)
2010
2015
2020
2025
2030
2035
Year
Scenario 4


Annual Target Flow Shortages
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Shortages (AF)
2010
2015
2020
2025
2030
2035
Year
Baseline
Scenario 1
Scenario 2
Scenario 3
Scenario 4


Annual Target Flow Excesses
16000
14000
12000
10000
8000
6000
4000
2000
0
Shortages (AF)
2010
2015
2020
2025
2030
2035
Year
Scenario 2
Scenario 3
Scenario 4

Thank You!