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Technical Memorandum

To: GSA Managers

From: Davids Engineering and Woodard & Curran

Date: May 28, 2021

Subject: **Butte Subbasin DRAFT Projected Hydrographs Relative to Minimum Thresholds and Measurable Objectives**

Introduction and Purpose

As part of formulating and evaluating Butte Subbasin Groundwater Sustainability Plan Minimum Thresholds (MTs) and Measurable Objectives (MOs), the Butte Basin Groundwater Model (BBGM) integrated hydrologic model (model) was used to evaluate groundwater levels that could occur in the future. In each of the three proposed monitoring well networks (shallow, deep and interconnected surface waters), simulated groundwater level hydrographs were prepared for each monitoring well location and compared to draft MTs developed for each well. The purpose was to understand the historical and projected future conditions under the 2070 central climate change scenario with respect to MTs and MOs. The 2070 climate change projected future condition represents a future condition with climate change impacts but without projects and management actions for review of MTs and MOs.

This Technical Memorandum briefly describes the model scenario and describes the criteria used to establish draft MTs and MOs. It also provides some initial observations to guide interpretation of the hydrographs.

Model Scenarios

Model runs were made for the scenarios listed below. The model operates on a daily time step.

1) Historical (2000-2018)
2) Current Conditions (2019-2068)
3) Future Conditions without Climate Change (2019-2068)
4) Future Conditions with 2030 Climate Change (2019-2068)
5) Future Conditions with 2070 Climate Change (2019-2068)

Model Scenarios 2 through 5 use 1971-2018 and add 2004-2005 as a basis for the hydrology (i.e. precipitation, streamflow) inputs for a 50 year scenario run. The climate change scenarios adjust the historical hydrology to reflect changes in timing and magnitude of runoff due to climate change based on the climate change guidance provided by DWR.

Hydrographs for the future conditions with 2070 climate change and the historical measured groundwater levels were plotted on one chart for each of the monitoring well locations (i.e. the chart includes the 2000 through 2018 historical run and 2019 through 2068 projected future run). The charts

show simulated groundwater elevations on the left vertical axis and groundwater depths below ground surface (bgs) on the right vertical axis. Ground surface elevation is also plotted along with the elevation and depth bgs of the draft MT and MO. The charts are organized by monitoring network beginning with the shallow, followed by the deep and interconnected surface water networks and included as attachments to this TM.

Projected future water levels from the model run are a line plot of the monthly values averaged from the daily results. The projected future water levels have been adjusted on the graphs at wells where the historical measurements were offset from the model results. This is an accepted modeling practice and it is noted on the hydrographs when such an adjustment has been made.

Undesirable Results

Groundwater levels are recommended as the sustainability metric for the chronic decline of groundwater levels and as a proxy for storage and the depletion of interconnected surface water. The undesirable results statement proposed for these three sustainability indicators and related considerations in setting minimum thresholds (MTs) are provided below.

Level

The undesirable result for the chronic lowering of groundwater levels is a result that would cause significant and unreasonable reduction in the long-term viability of Beneficial Uses and Users over the planning and implementation horizon of this GSP.

Chronic decline of groundwater levels can impact beneficial uses and users in three primary ways:

1. Cause domestic wells to go dry
2. Impact the health of vegetation in Groundwater Dependent Ecosystems (GDEs), and
3. Impact the conjunctive use of groundwater for agricultural production.

To protect the beneficial use by domestic wells, groundwater levels need to remain higher than the bottom depth of domestic wells. After reviewing one set of hydrographs, the Butte Advisory Board (BAB) suggested an MT that would protect 93% of the domestic wells. This is described as an MT calculation method to determine the shallowest 7th percentile of domestic well depths. To protect the health of vegetation in GDEs, shallow monitoring wells will be installed in GDEs to allow the MTs outside of GDEs to be set without regard to the GDE criteria, so the MTs in this set of hydrographs do NOT consider the GDE criteria. Protecting the conjunctive use of groundwater for agricultural production requires MTs that allow the groundwater level to be lower during droughts, when groundwater pumping increases to augment reduced surface water availability. Depending on the depths of domestic wells, the need for lower levels during droughts could cause some domestic wells to go dry if the MTs are set based on the conjunctive use beneficial use. Conversely, setting MTs based solely on domestic well depths may impact the ability of agricultural beneficial users to pump groundwater during droughts. Local stakeholders must agree on a balance between these two beneficial uses.

In the shallow and deep monitoring networks, the MT was calculated based on the shallowest of the following criteria:

1) Shallowest 7th percentile of domestic well depths to protect at least 93% of the domestic wells in DWR's well completion database, and
2) 100% of historical range to protect conjunctive use of groundwater.

Undesirable Results (UR) Detection = 25% fall below the minimum threshold for 24 consecutive months (i.e. 11 of 41 wells in shallow aquifer representative monitoring network, 3 of 12 wells in deep aquifer representative monitoring wells))

Storage

The undesirable result for the reduction of groundwater in storage is a result that would cause significant and unreasonable reduction in the long-term viability of Beneficial Uses and Users over the planning and implementation horizon of this GSP.

The MT determined for levels is expected to be sufficiently protective of the groundwater storage sustainability criteria.

Depletion of Interconnected Surface Water

The undesirable result for depletions of interconnected surface water is a result that causes significant and unreasonable adverse effects on Beneficial Uses and Users of interconnected surface water within the Butte Subbasin over the planning and implementation horizon of this GSP.

Monitoring wells screened to monitor shallow water levels and at more than 2,000 but less than 7,280 feet from major streams are selected to monitor interconnected surface water. MTs for these wells are a set 10 feet below the minimum measured historic level.

UR Detection = 25% fall below the minimum threshold for 24 consecutive months (3 of 12 representative monitoring wells); this is the same rationale as for lowering of groundwater levels.

Minimum Thresholds

The MTs plotted on the charts are based on parameters and criteria that have been presented to the GSA Managers at recent meetings. The MTs elevations for each monitoring well are equal to the most shallow of:

- **Agricultural beneficial use criteria (conjunctive use):** The lowest historical groundwater elevation well minus the maximum of 20 feet or 100% of the historical range in groundwater elevation.
- **Domestic well beneficial use criteria (protect 93% of domestic wells):** The elevation corresponding to the domestic well depth that protects 93% of the domestic wells in the Thiessen polygon around each monitoring well.
- **Environmental beneficial use (GDE vegetation root depth):** Do not consider the GDE criteria. Install shallow monitoring wells in GDEs.
- **Maximum measured depth to groundwater:** Selected if this value was deeper than the shallower of the agricultural or the domestic well beneficial use criteria.
- **Depletion of Interconnected Surface Water:** The elevation corresponding to 10 feet below the minimum measured historic level**.**

Using the shallowest of the criteria ensures that most limiting beneficial use is protected. Local stakeholders may agree on a different balance between beneficial uses. For example, some critically overdrafted basins have set MTs based on the agricultural beneficial use criteria and are developing a program to assist domestic well owners whose wells go dry.

Measurable Objectives

The MOs plotted on the charts are the average of the most recent five years of elevations available at each well. The MO is not a running average and will not be not changed over time in response to additional monitoring results.

Initial Observations and Comments

The following initial observations and comments are provided to guide interpretation of the hydrographs:

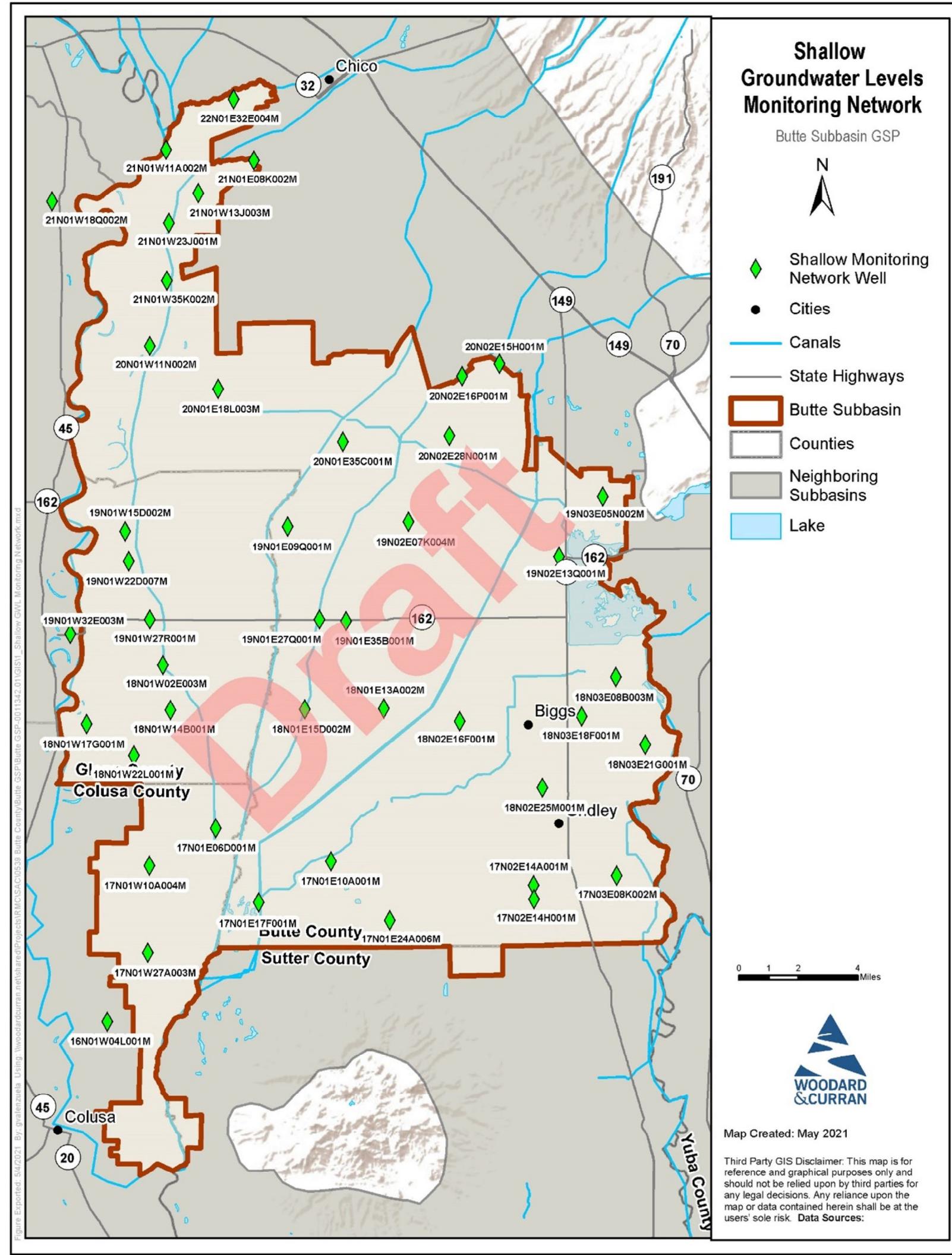
1) The MTs plotted on the shallow and deep monitoring network charts are recommended by the technical team for the groundwater level and storage sustainability indicators. The MTs plotted on the streamflow depletion monitoring network charts are recommended by the technical team for the streamflow depletion sustainability indicator.

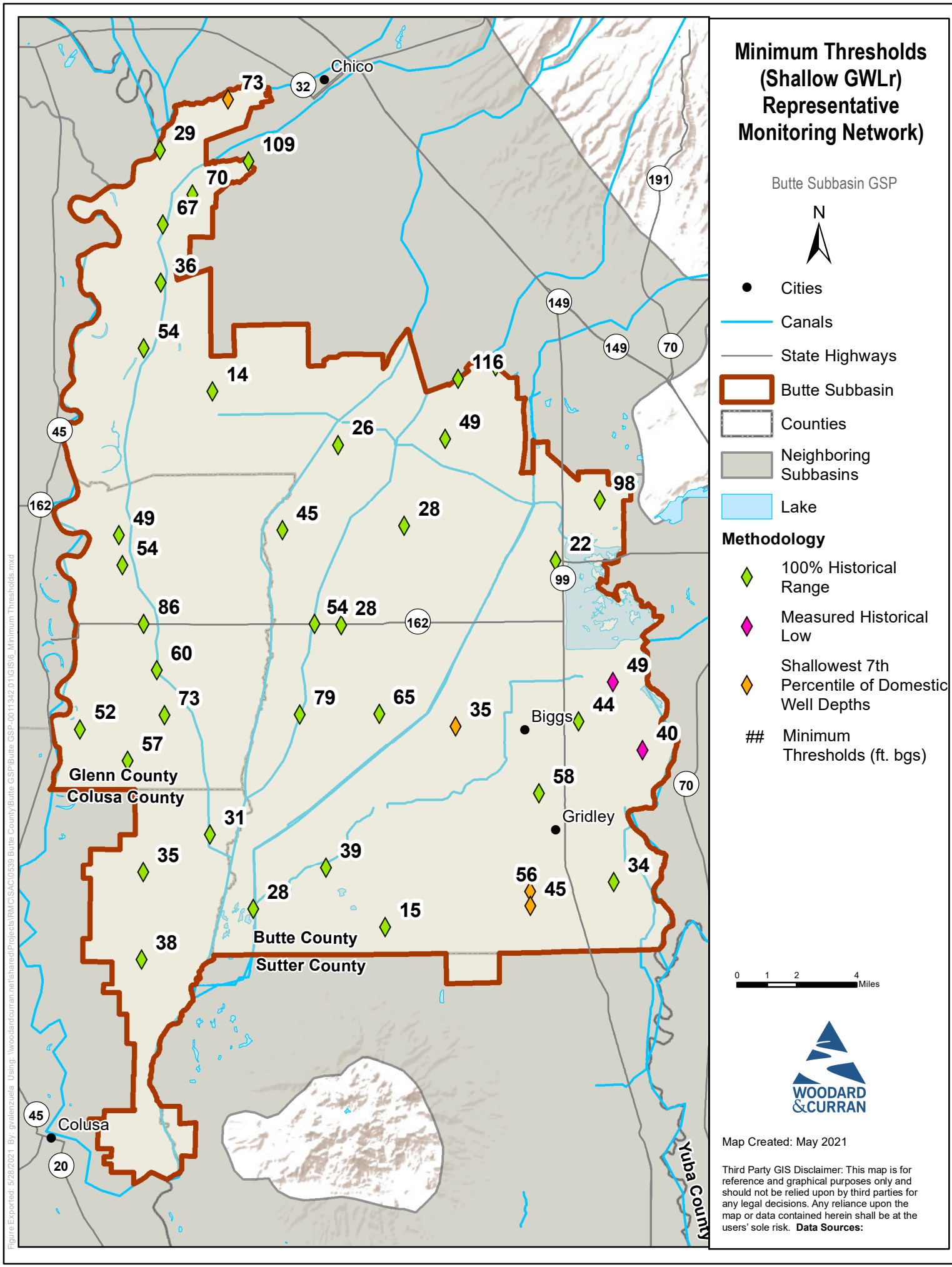
2) For some locations where groundwater levels are very shallow, modeled groundwater levels are sometimes above the ground surface. This condition can exist in a pressurized aquifer system and one very deep well in the subbasin is known to have water levels above ground. This condition can also result from the inherent uncertainty involved with representing complex physical systems with mathematical models.

3) None of the wells have persistent (longer than 3 years) MT exceedances.

4) Two of the wells in the shallow monitoring network have short periods between 2025 and 2070 of projected future water levels at or within a foot or two of the recommended MTs.

5) The technical team has suggested that the Undesirable Result for groundwater levels be based on 25% of the shallow and deep monitoring wells (11 and 3 wells, respectively) exceeding their MT for a 2-year consecutive period. Based on this definition, the exceedances occurring at the shallow monitoring wells described above would not constitute an Undesirable Result.


Shallow Groundwater Levels Monitoring Network
Butte Subbasin GSP
N
Shallow Monitoring Network Well
Cities
Canals
State Highways
Butte Subbasin
Counties
Neighboring Subbasins
Lake
Chico
Biggs
Colusa
Colusa County
Butte County
Sutter County
Yuba County
22N01E32E004M
21N01W11A002M
21N01E08K002M
21N01W18Q002M
21N01W13J003M
21N01W23J001M
21N01W35K002M
20N01W11N002M
20N01E18L003M
20N01E35C001M
20N02E15H001M
20N02E16P001M
20N02E28N001M
19N01W15D002M
19N01W22D007M
19N01E09Q001M
19N02E07K004M
19N03E05N002M
19N02E13Q001M
19N01W32E003M
19N01W27R001M
19N01E27Q001M
19N01E35B001M
18N01W02E003M
18N01E13A002M
18N03E08B003M
18N01W14B001M
18N01E15D002M
18N02E16F001M
18N03E18F001M
18N01W17G001M
18N01W22L001M
18N03E21G001M
18N02E25M001M
17N01E06D001M
17N01W10A004M
17N01E10A001M
17N02E14A001M
17N03E08K002M
17N02E14H001M
17N01E17F001M
17N01E24A006M
17N01W27A003M
16N01W04L001M
Draft
0 1 2 4 Miles
WOODARD &CURRAN
Map Created: May 2021
Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. Data Sources:
Figure Exported: 5/4/2021 By: gvalenzuela Using: \\woodardcurran.net\shared\Projects\RMC\SAC\0539 Butte County\Butte GSP\Butte GSP-0011342.01\GIS\1_Shallow GWL Monitoring Network.mxd


Minimum Thresholds (Shallow GWLr) Representative Monitoring Network)
Butte Subbasin GSP
N
Cities
Canals
State Highways
Butte Subbasin
Counties
Neighboring Subbasins
Lake
Methodology
100% Historical Range
Measured Historical Low
Shallowest 7th Percentile of Domestic Well Depths
Minimum Thresholds (ft. bgs)
0 1 2 4 Miles
WOODARD &CURRAN
Map Created: May 2021
Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. Data Sources:
Chico
Biggs
Gridley
Colusa
Glenn County
Colusa County
Butte County
Sutter County
Yuba County
73
29
109
70
67
36
54
14
116
45
26
49
98
162
49
54
45
28
22
99
86
54
28
162
60
73
79
65
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58
70
31
35
39
34
56
45
28
15
38
45
20
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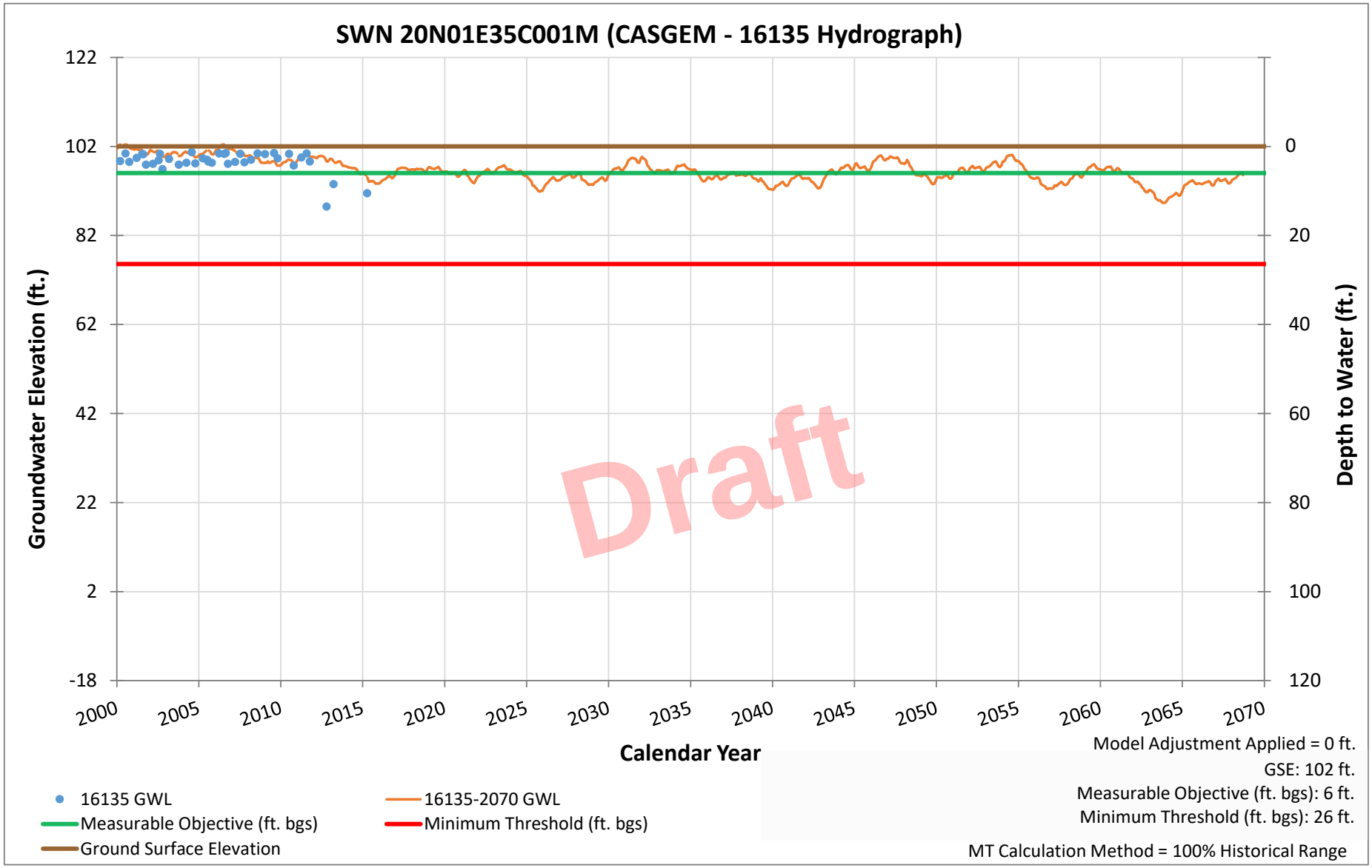
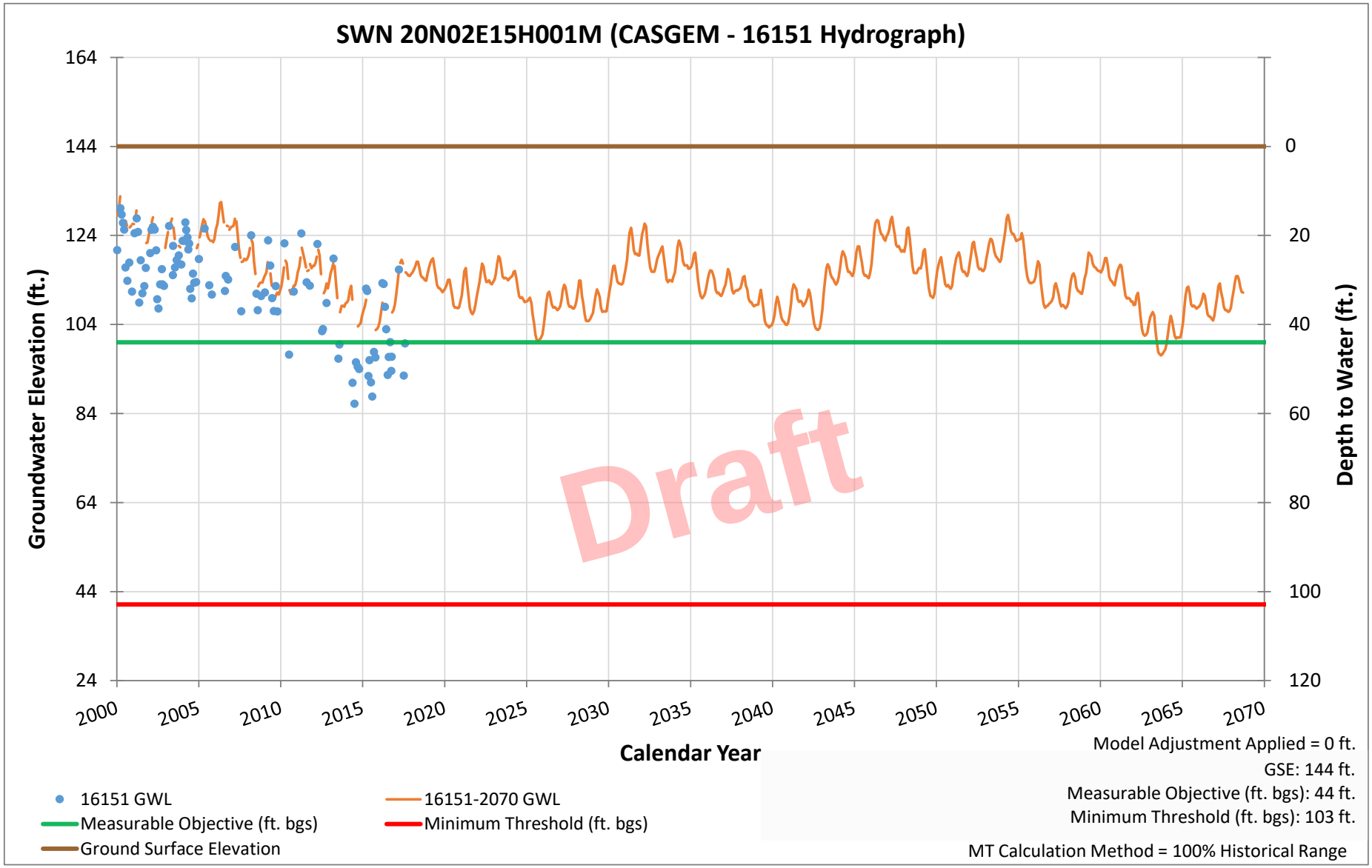
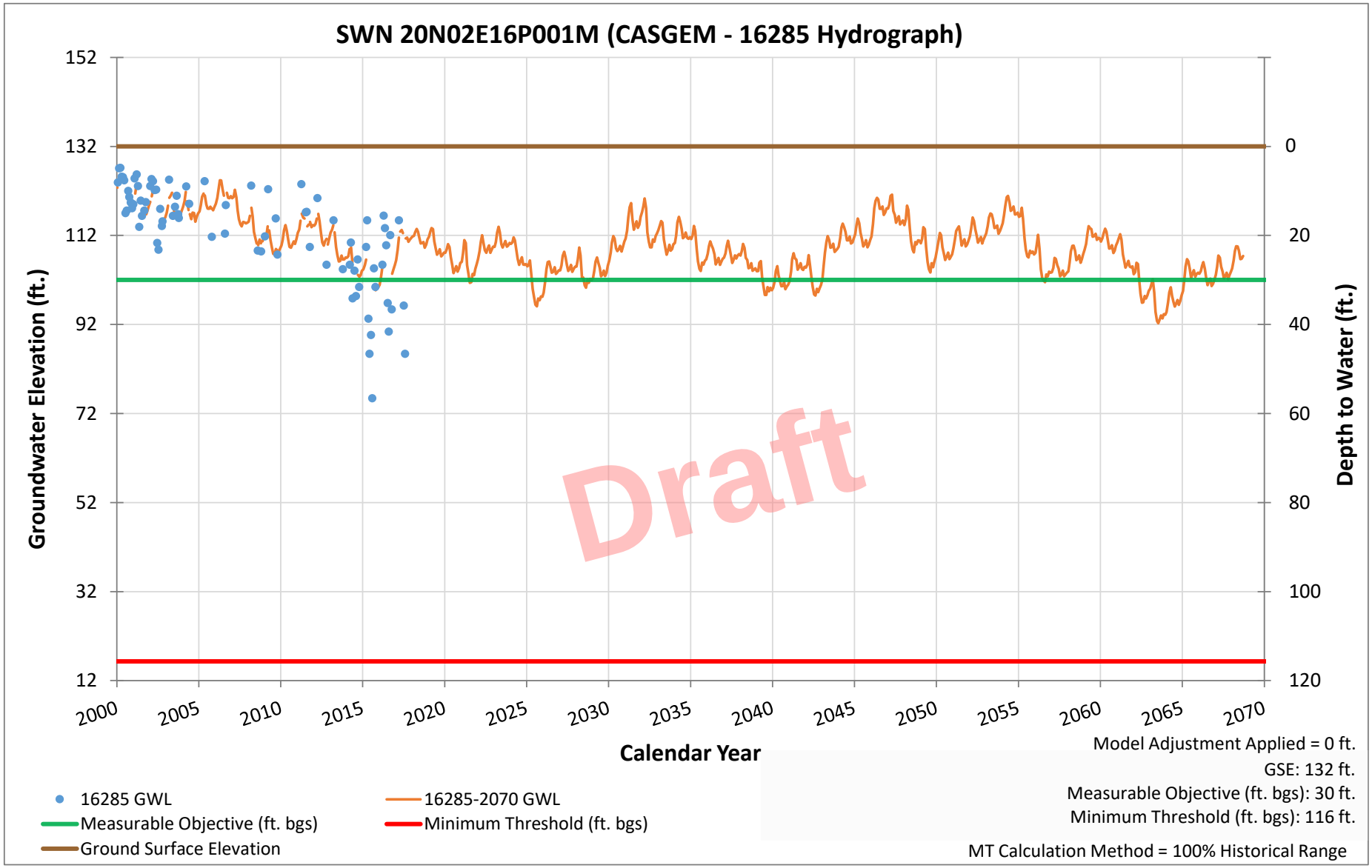
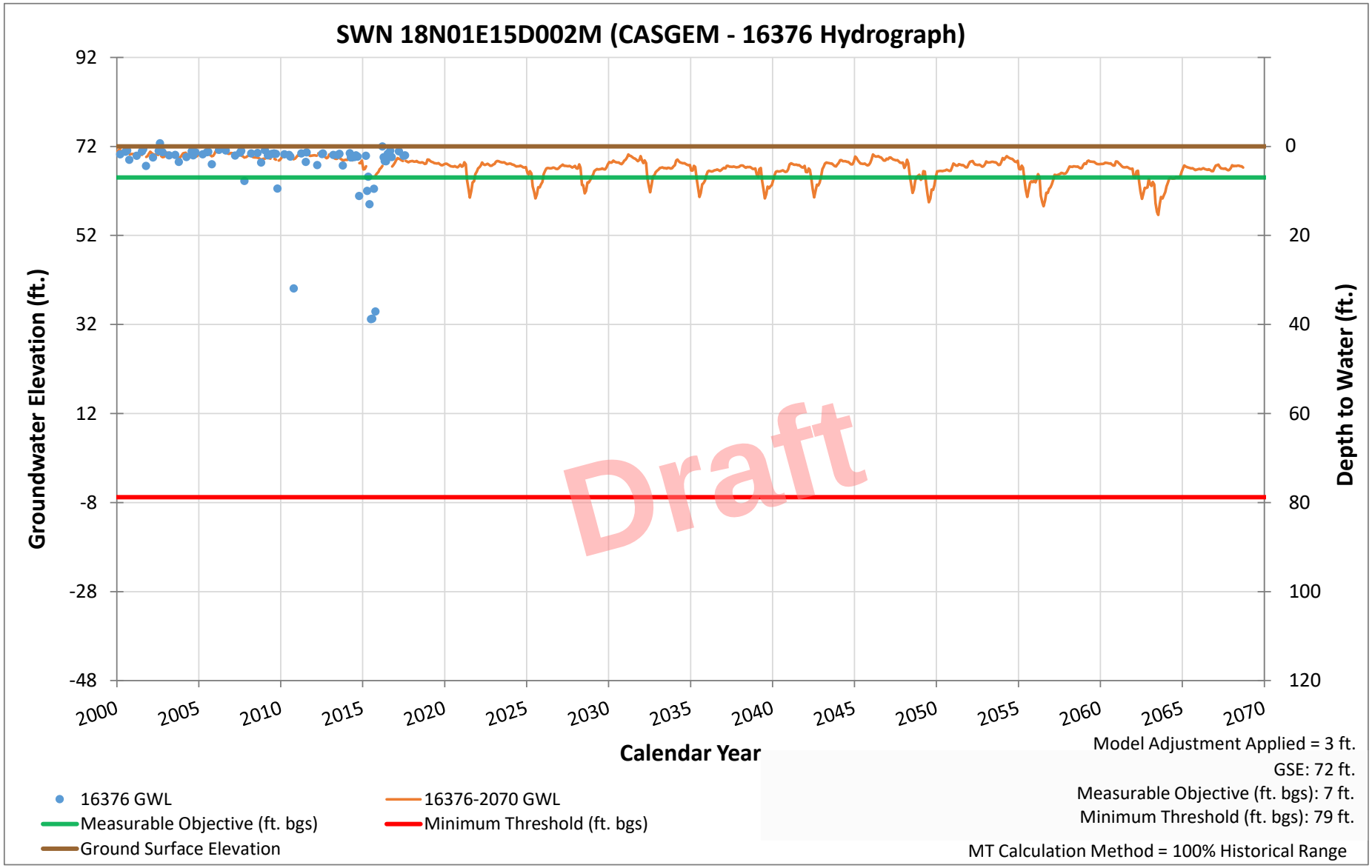
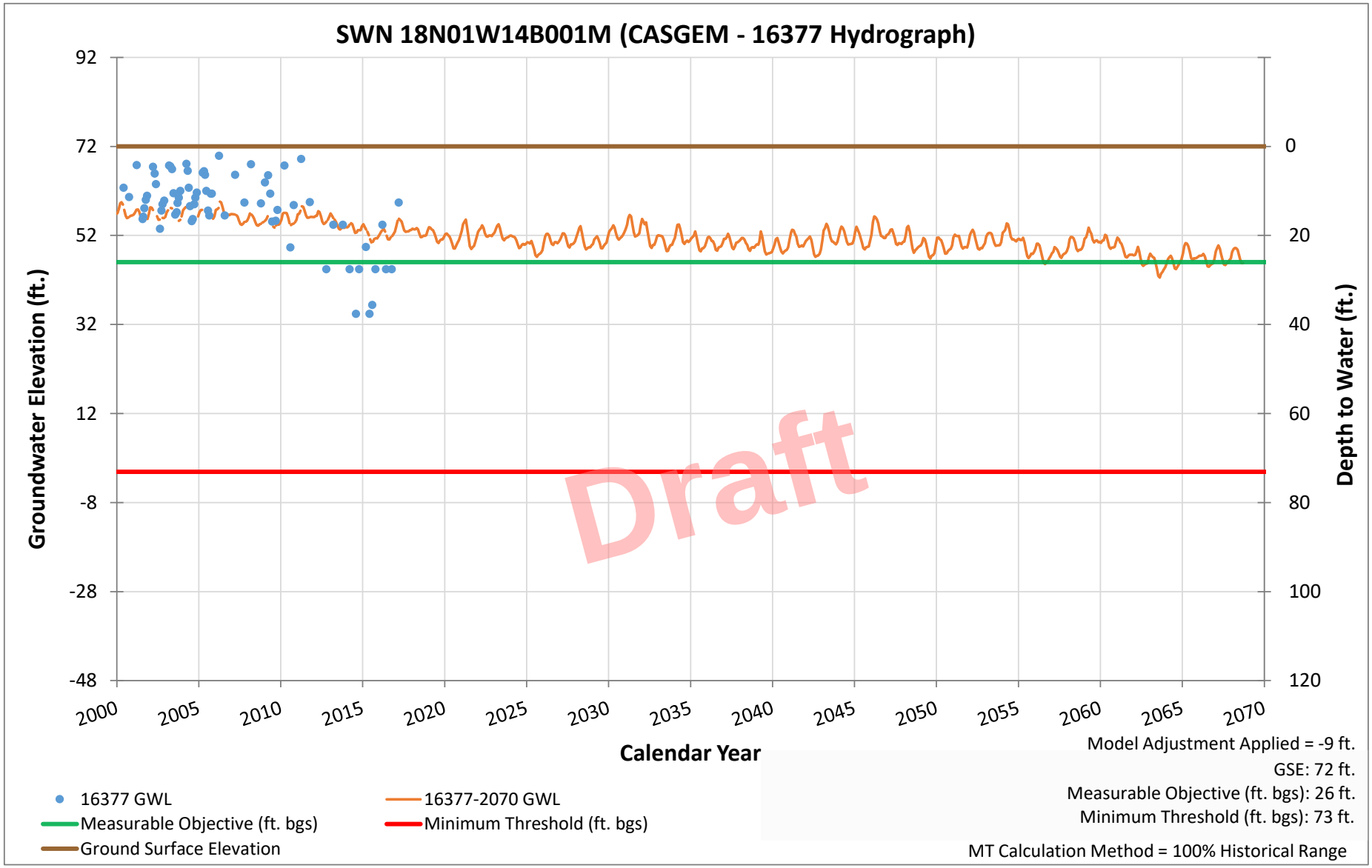
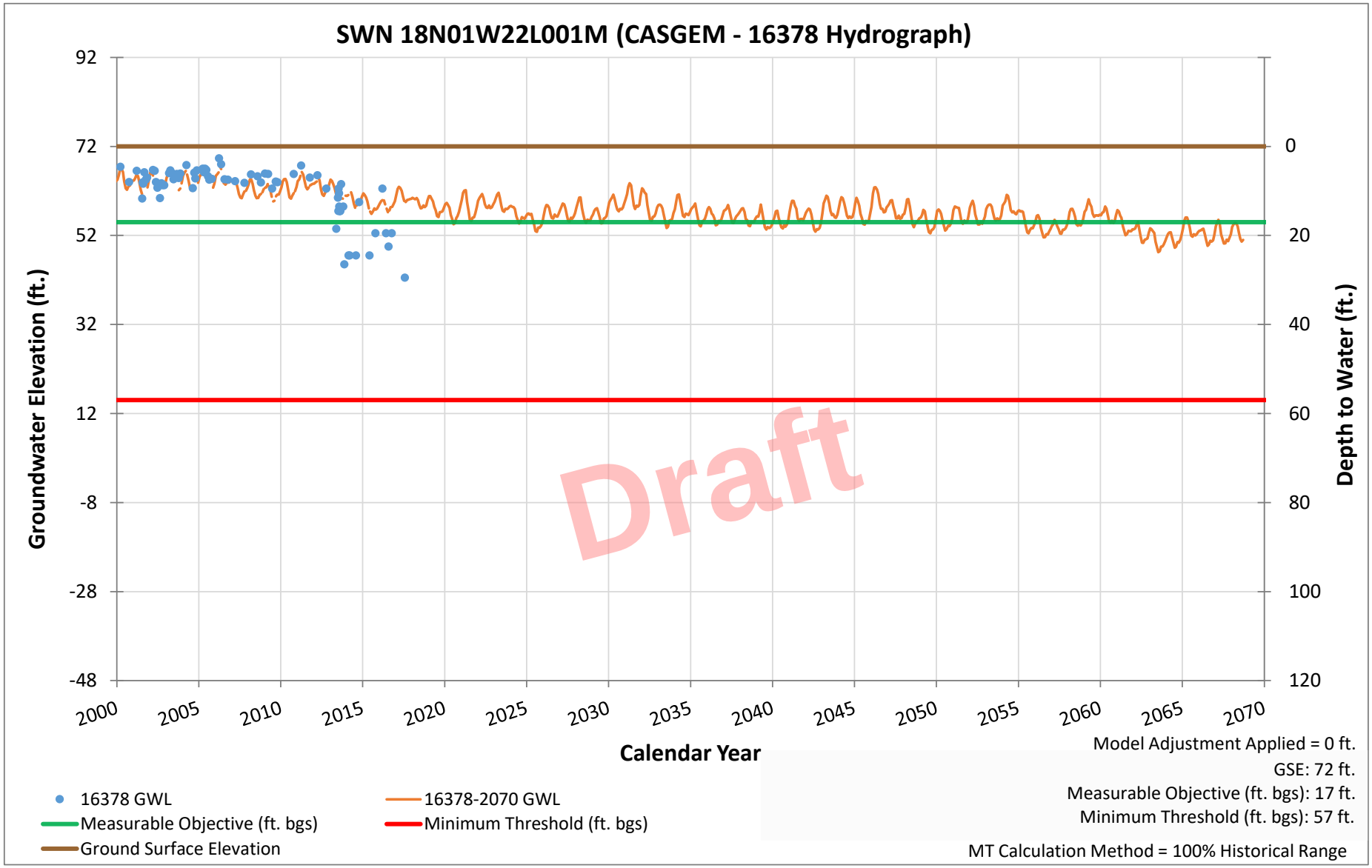

SWN 20N01E35C001M (CASGEM - 16135 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
122
102
82
62
42
22
2
-18
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
16135 GWL
16135-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 102 ft.
Measurable Objective (ft. bgs): 6 ft.
Minimum Threshold (ft. bgs): 26 ft.
MT Calculation Method = 100% Historical Range

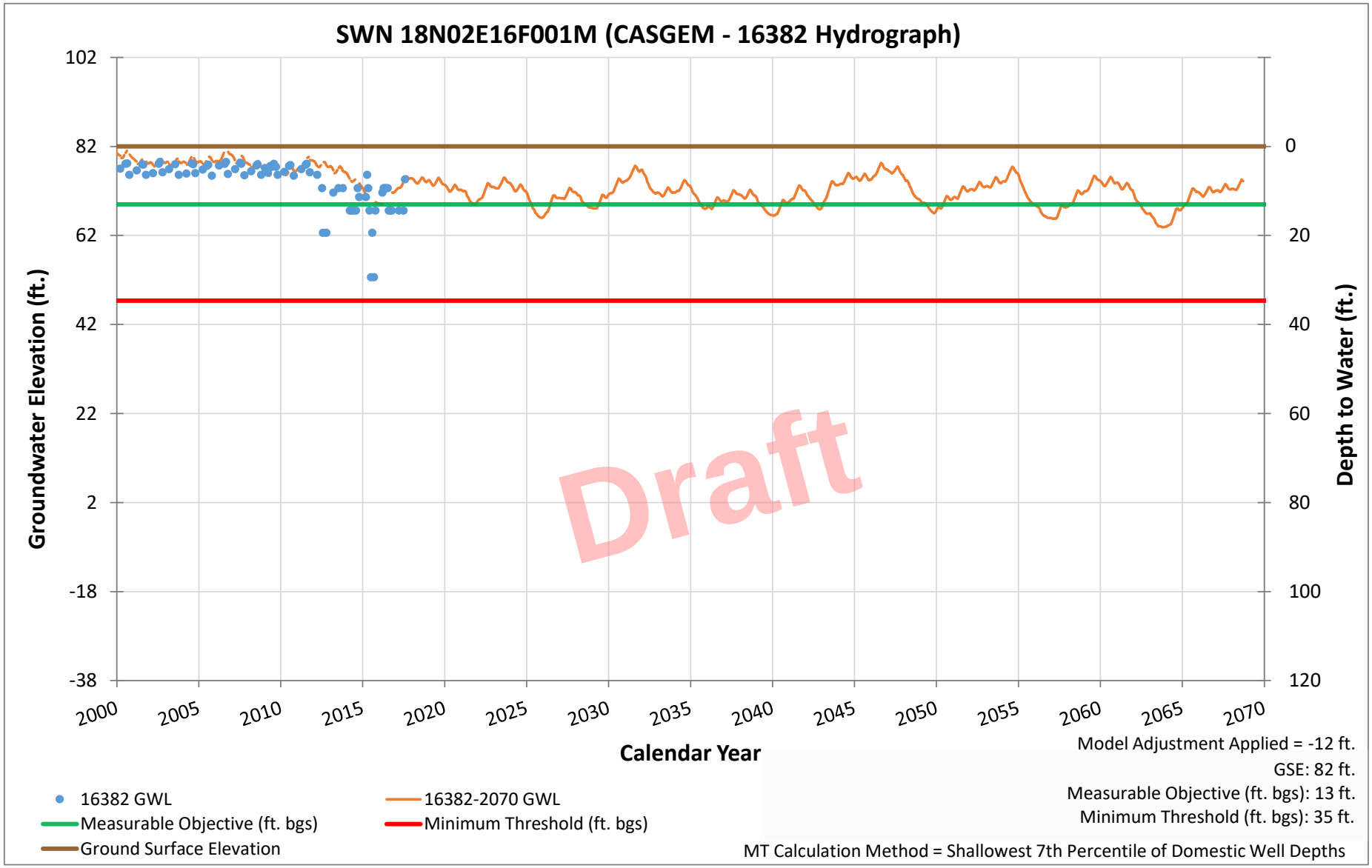

SWN 20N02E15H001M (CASGEM - 16151 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
164
144
124
104
84
64
44
24
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16151 GWL
16151-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 144 ft.
Measurable Objective (ft. bgs): 44 ft.
Minimum Threshold (ft. bgs): 103 ft.
MT Calculation Method = 100% Historical Range

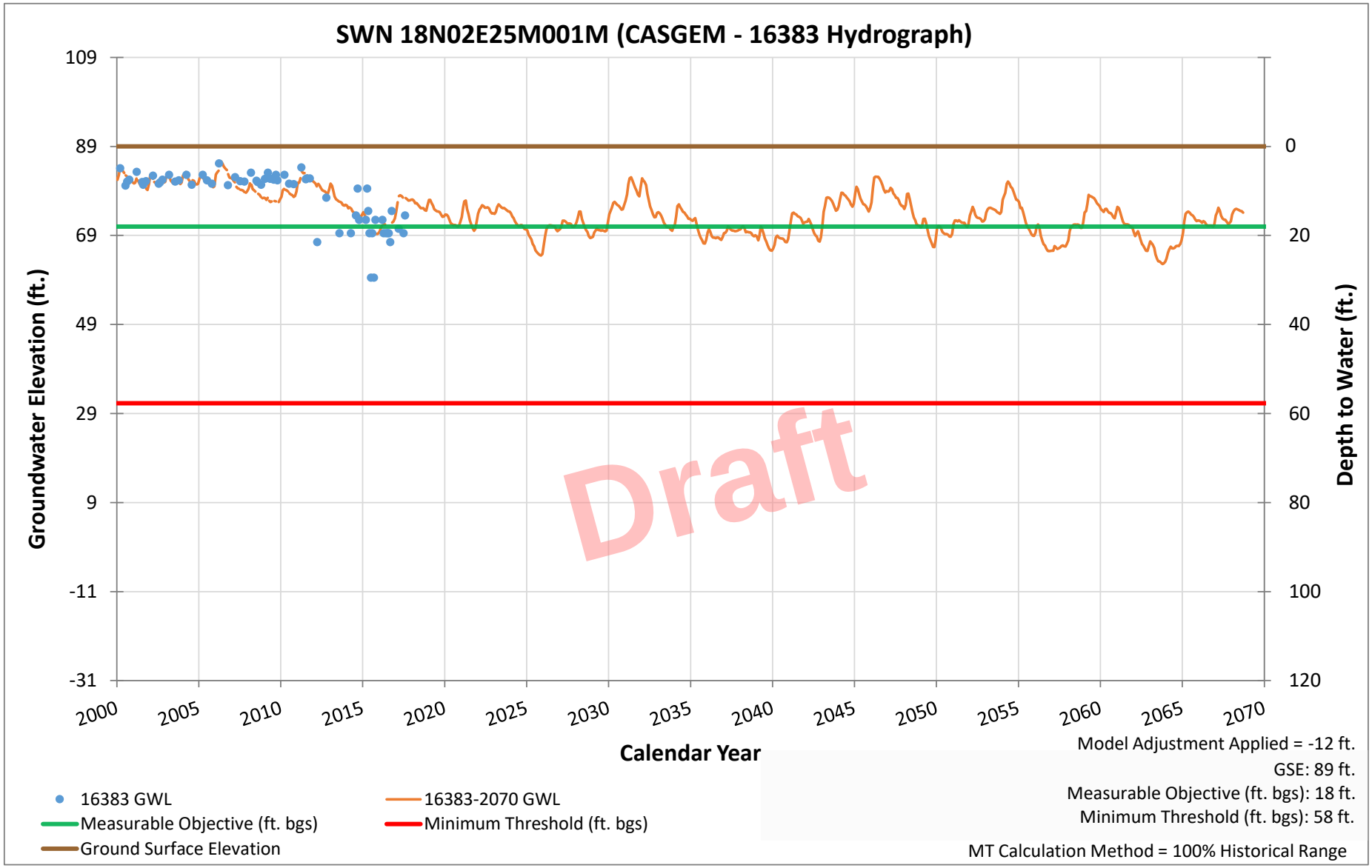

SWN 20N02E16P001M (CASGEM - 16285 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
152
132
112
92
72
52
32
12
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16285 GWL
16285-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 132 ft.
Measurable Objective (ft. bgs): 30 ft.
Minimum Threshold (ft. bgs): 116 ft.
MT Calculation Method = 100% Historical Range

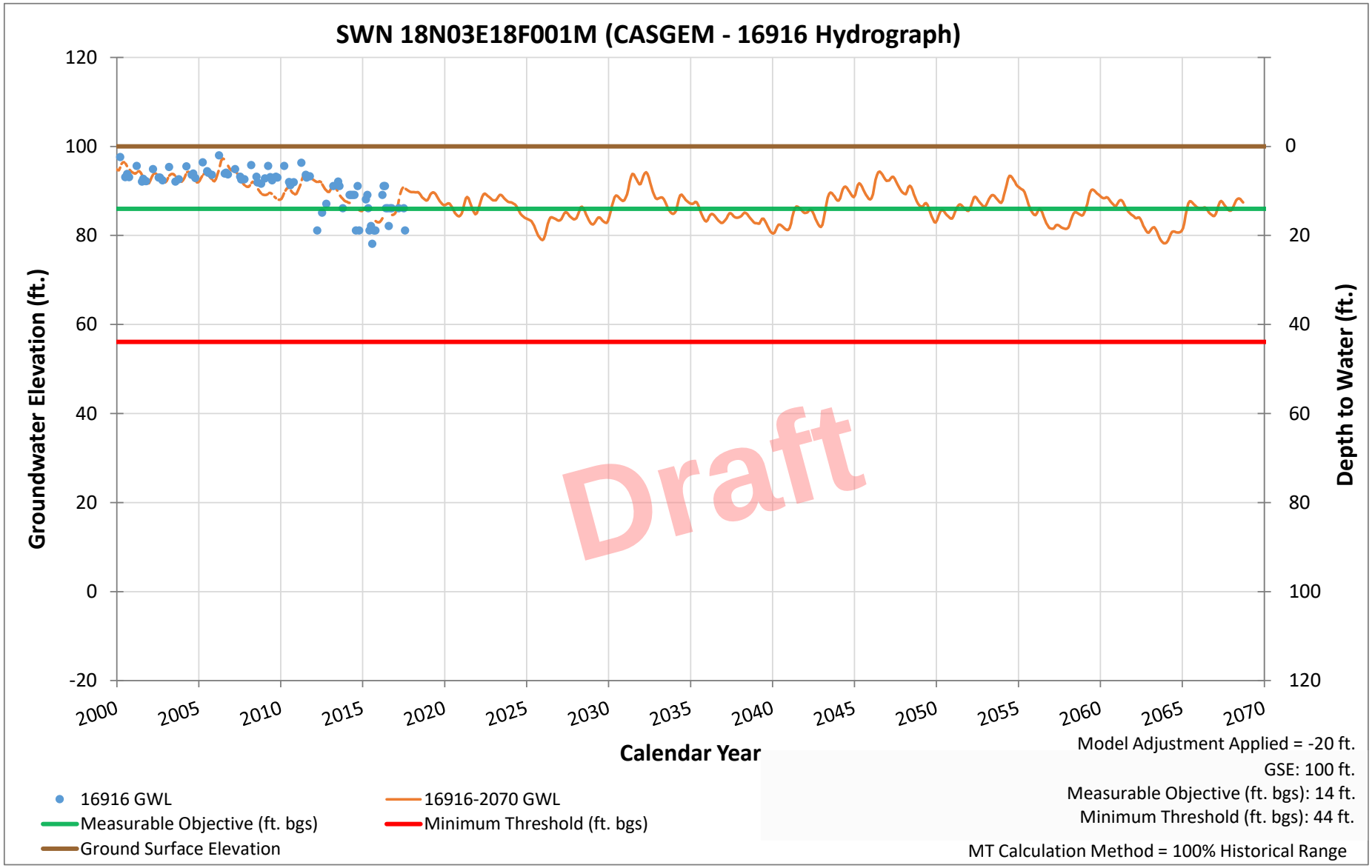

SWN 18N01E15D002M (CASGEM - 16376 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
92
72
52
32
12
-8
-28
-48
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16376 GWL
16376-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 3 ft.
GSE: 72 ft.
Measurable Objective (ft. bgs): 7 ft.
Minimum Threshold (ft. bgs): 79 ft.
MT Calculation Method = 100% Historical Range

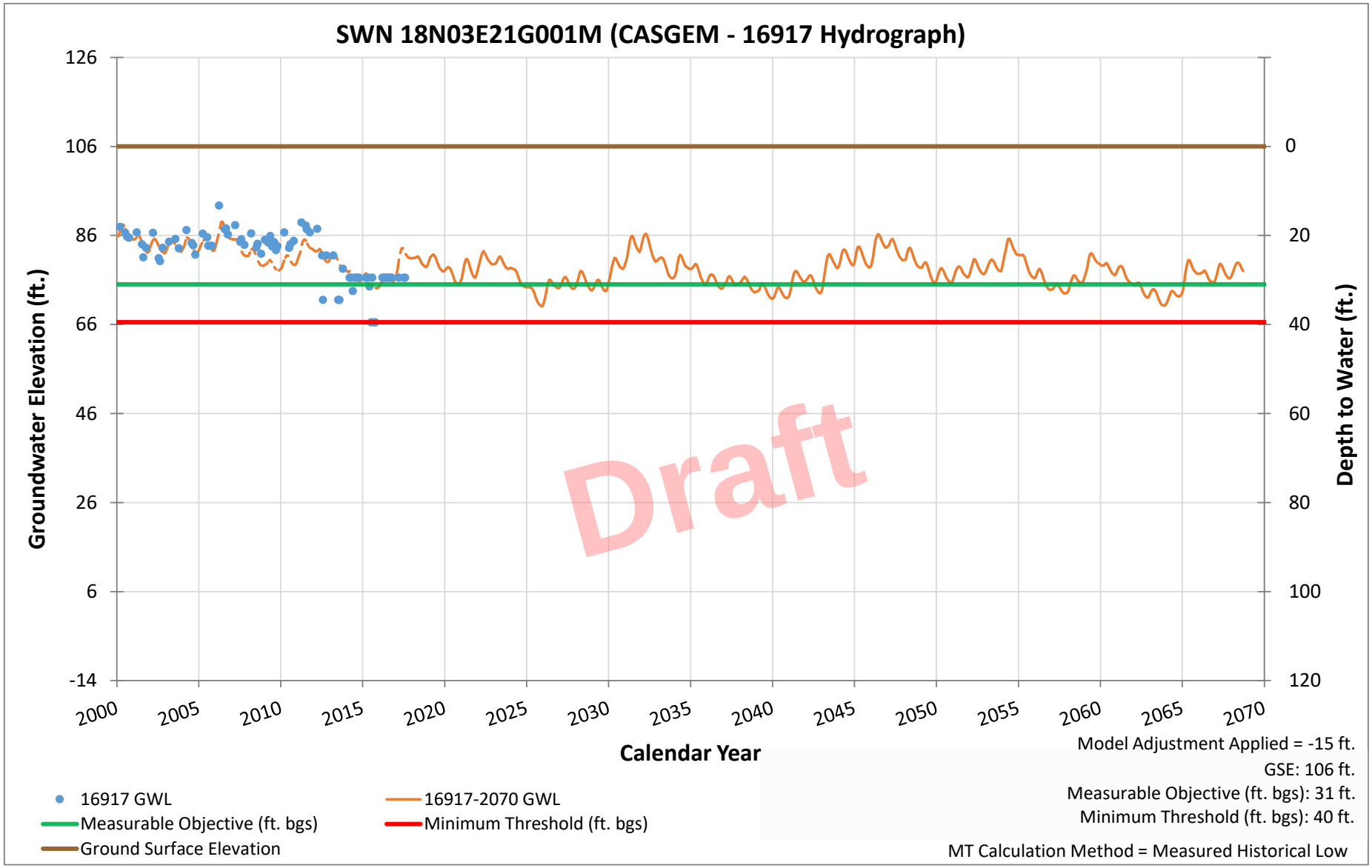

SWN 18N01W14B001M (CASGEM - 16377 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
92
72
52
32
12
-8
-28
-48
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16377 GWL
16377-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -9 ft.
GSE: 72 ft.
Measurable Objective (ft. bgs): 26 ft.
Minimum Threshold (ft. bgs): 73 ft.
MT Calculation Method = 100% Historical Range

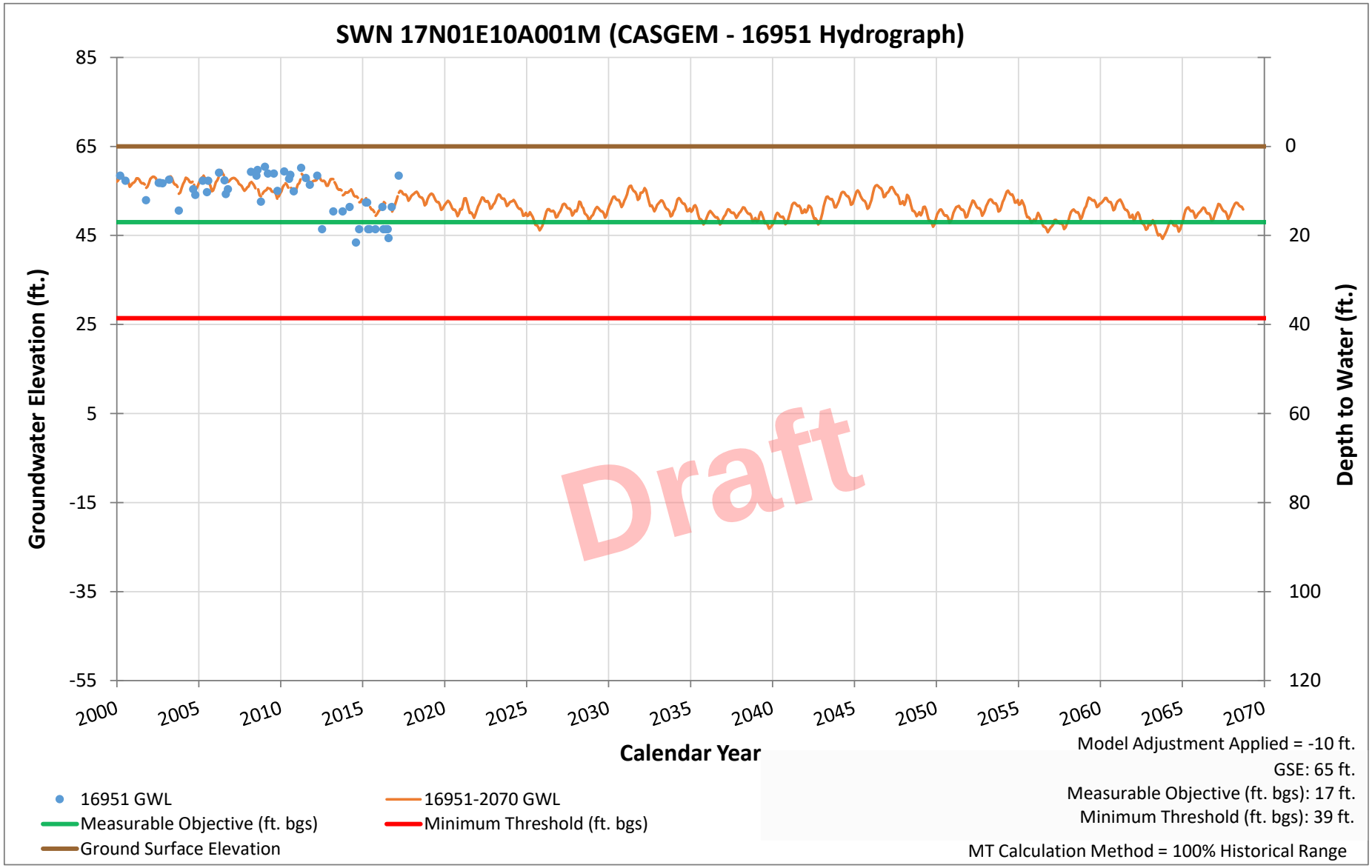

SWN 18N01W22L001M (CASGEM - 16378 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
92
72
52
32
12
-8
-28
-48
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16378 GWL
16378-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 72 ft.
Measurable Objective (ft. bgs): 17 ft.
Minimum Threshold (ft. bgs): 57 ft.
MT Calculation Method = 100% Historical Range

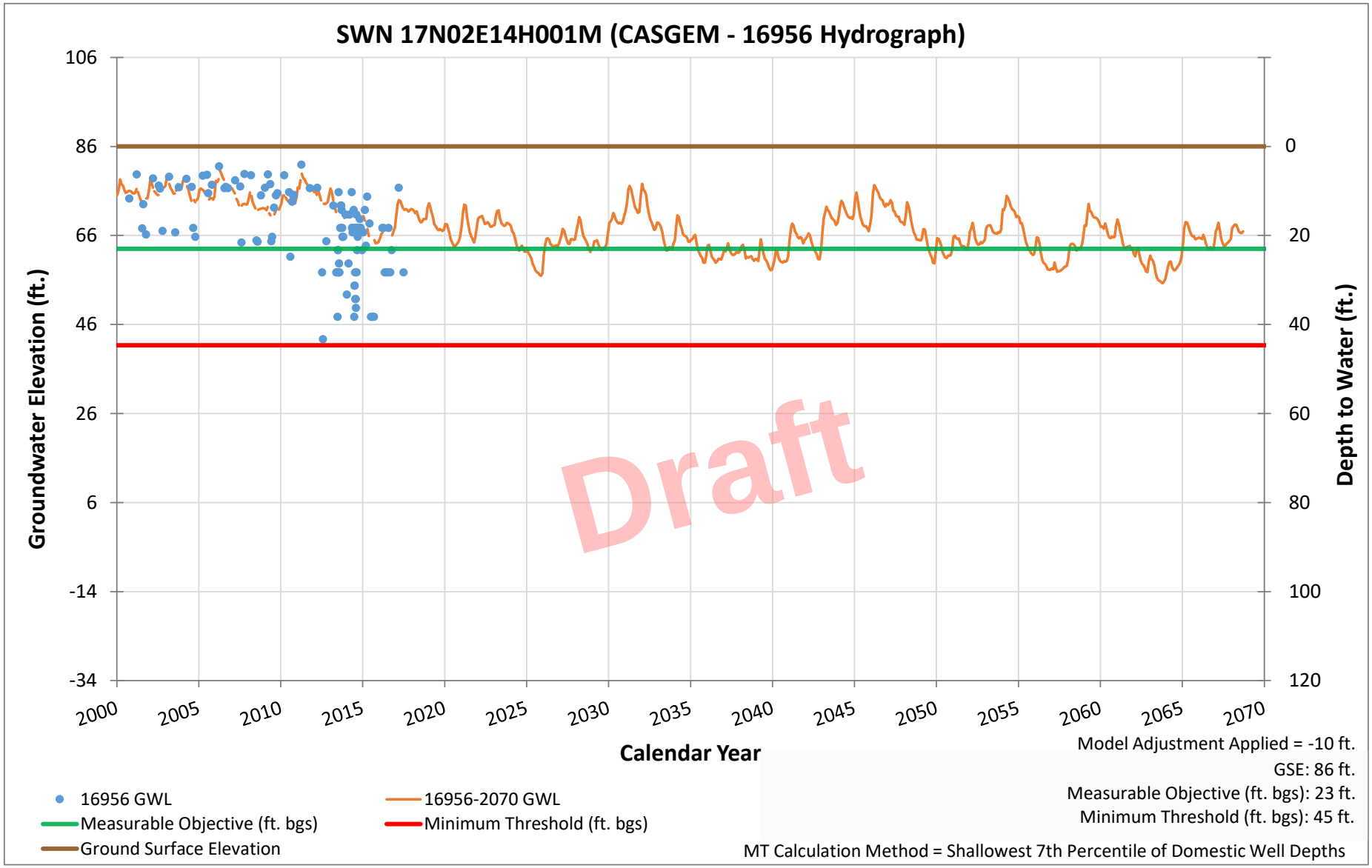

SWN 18N02E16F001M (CASGEM - 16382 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
102
82
62
42
22
2
-18
-38
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
16382 GWL
16382-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -12 ft.
GSE: 82 ft.
Measurable Objective (ft. bgs): 13 ft.
Minimum Threshold (ft. bgs): 35 ft.
MT Calculation Method = Shallowest 7th Percentile of Domestic Well Depths

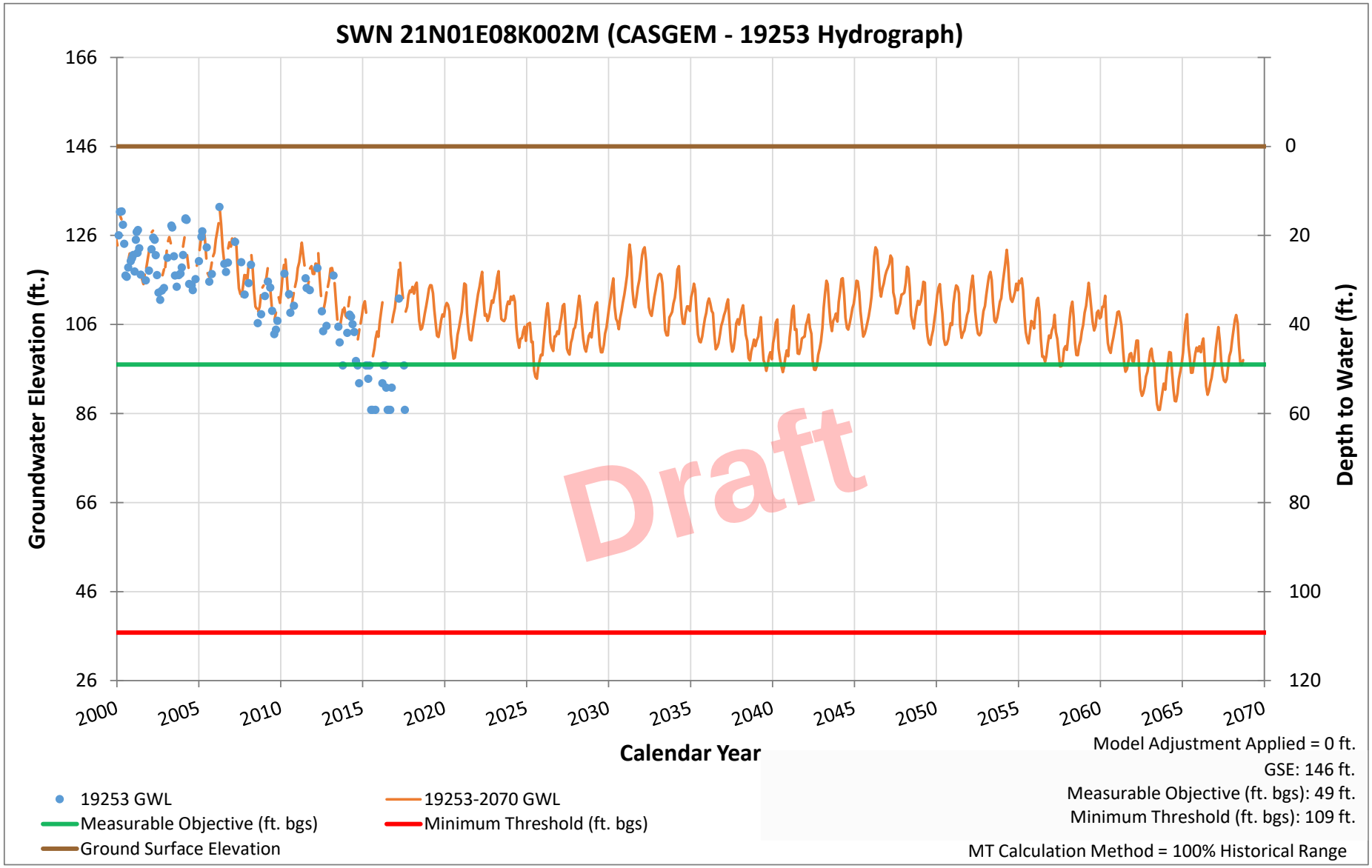

SWN 18N02E25M001M (CASGEM - 16383 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
109
89
69
49
29
9
-11
-31
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16383 GWL
16383-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -12 ft.
GSE: 89 ft.
Measurable Objective (ft. bgs): 18 ft.
Minimum Threshold (ft. bgs): 58 ft.
MT Calculation Method = 100% Historical Range

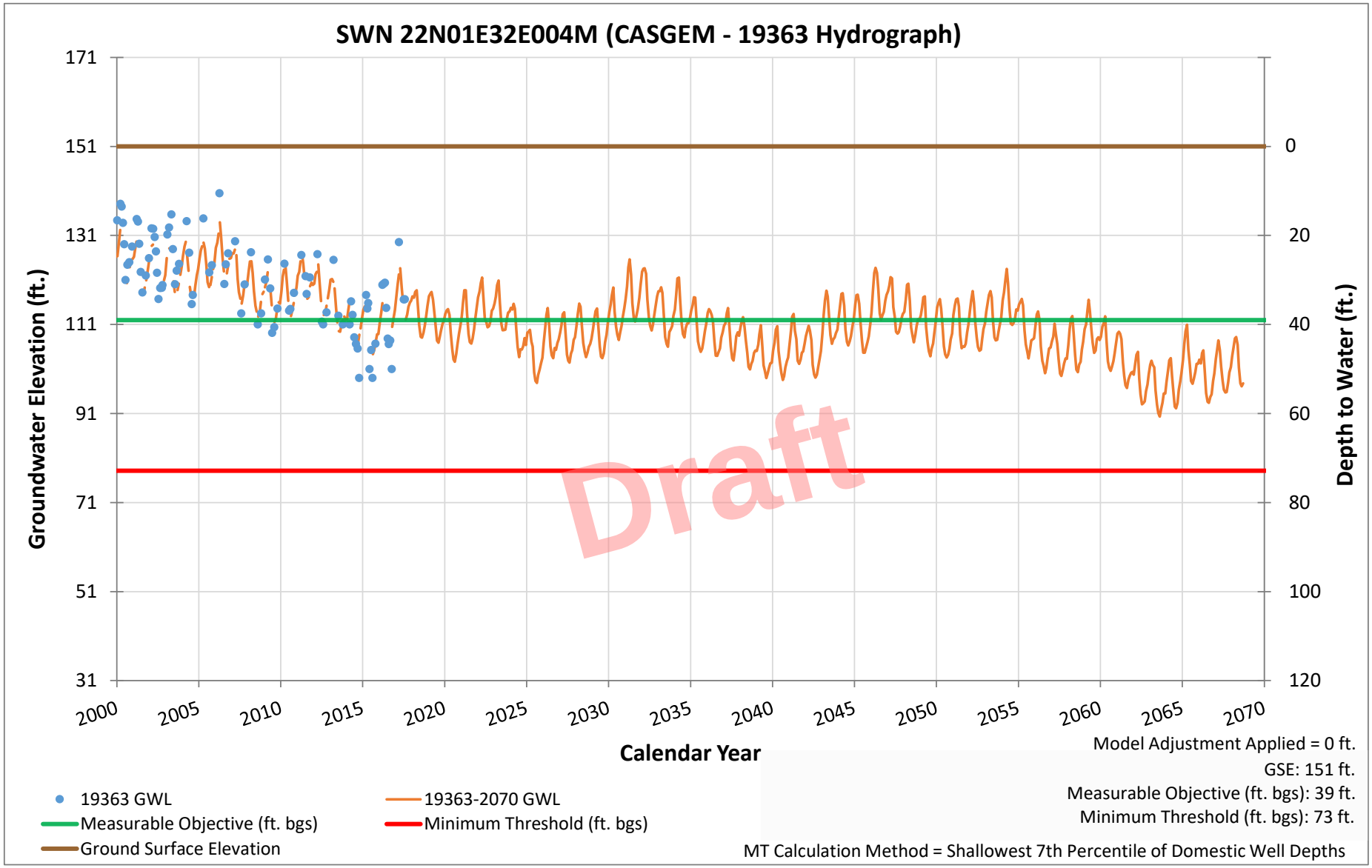

SWN 18N03E18F001M (CASGEM - 16916 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
120
100
80
60
40
20
0
-20
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
16916 GWL
16916-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -20 ft.
GSE: 100 ft.
Measurable Objective (ft. bgs): 14 ft.
Minimum Threshold (ft. bgs): 44 ft.
MT Calculation Method = 100% Historical Range

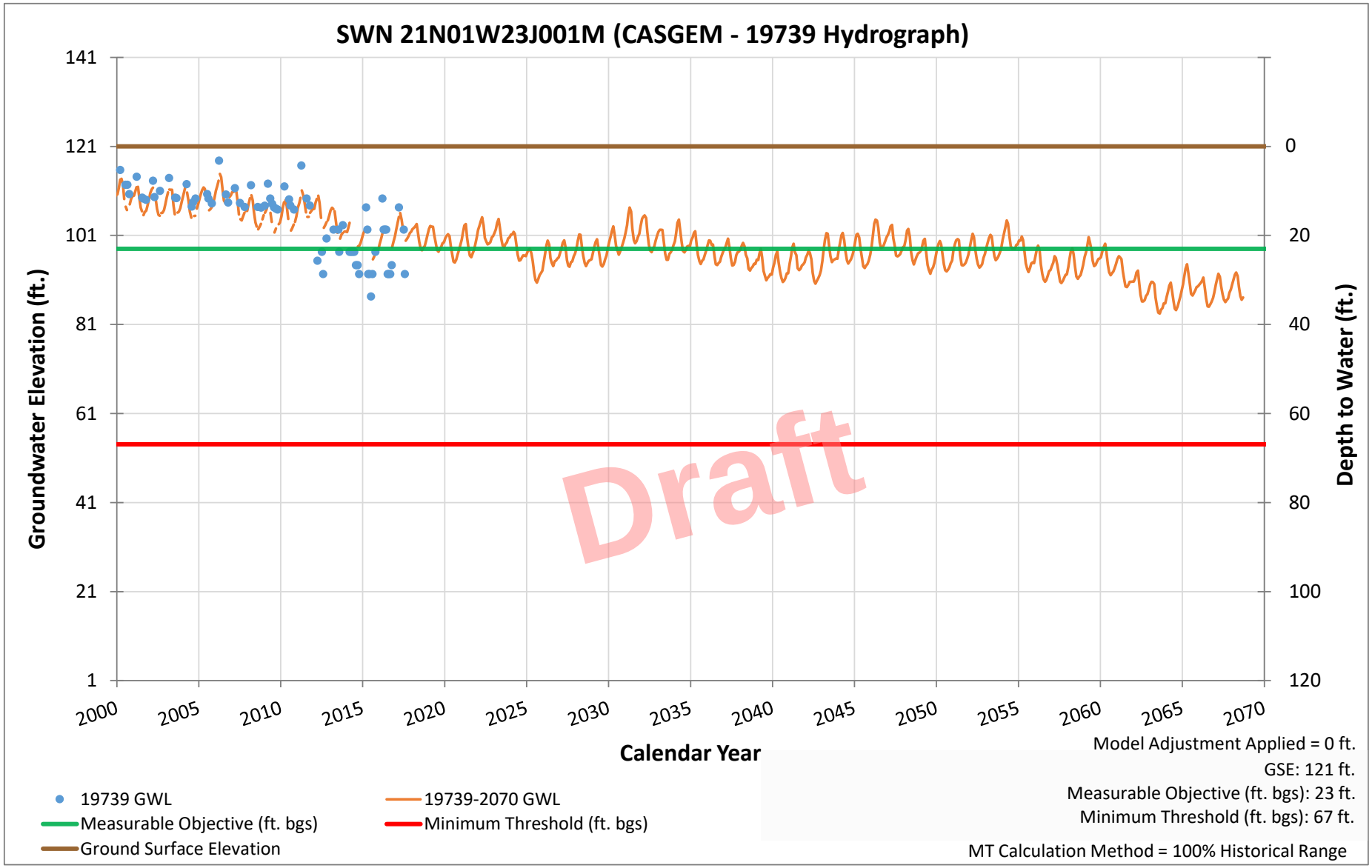

SWN 18N03E21G001M (CASGEM - 16917 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
126
106
86
66
46
26
6
-14
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16917 GWL
16917-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -15 ft.
GSE: 106 ft.
Measurable Objective (ft. bgs): 31 ft.
Minimum Threshold (ft. bgs): 40 ft.
MT Calculation Method = Measured Historical Low

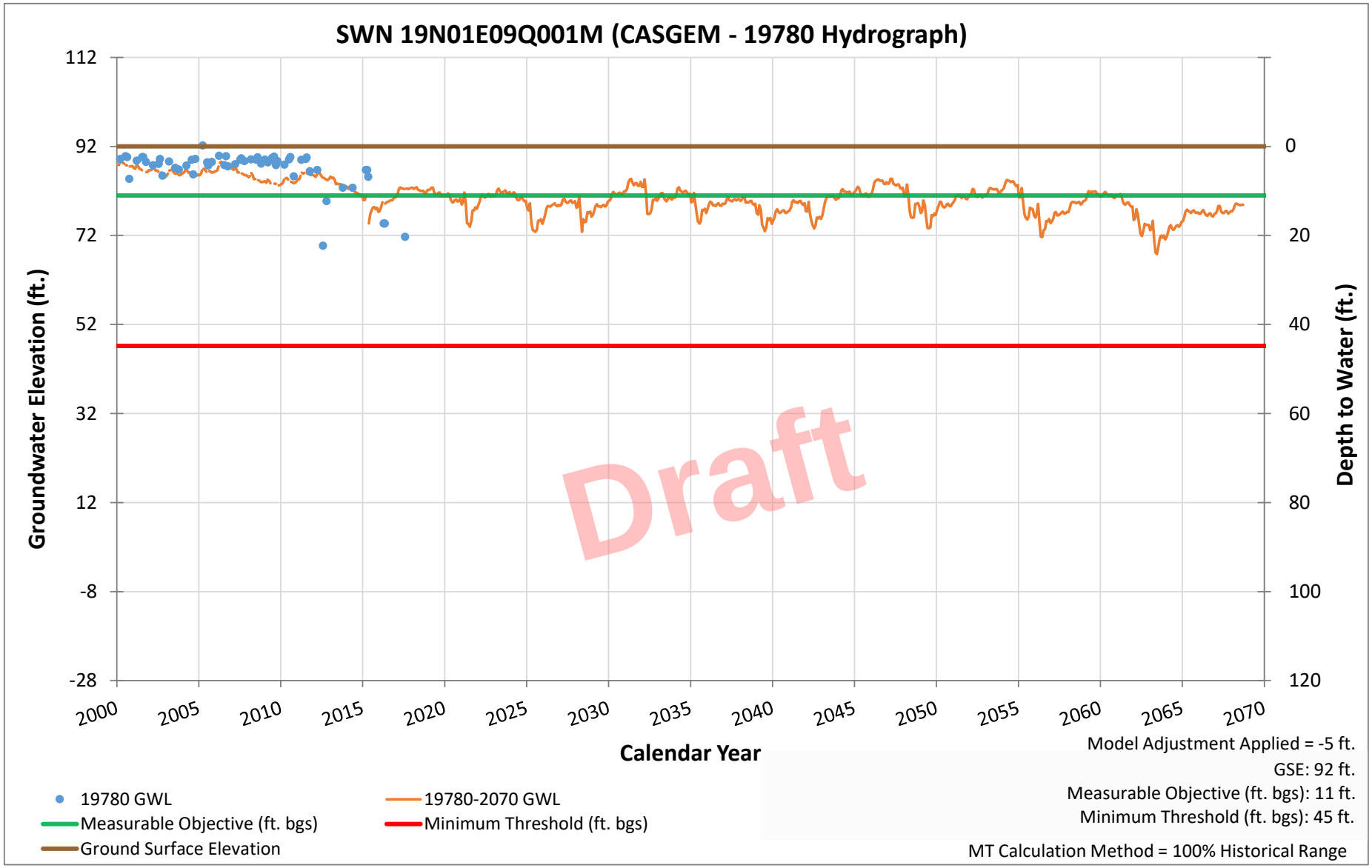

SWN 17N01E10A001M (CASGEM - 16951 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
85
65
45
25
5
-15
-35
-55
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
16951 GWL
16951-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -10 ft.
GSE: 65 ft.
Measurable Objective (ft. bgs): 17 ft.
Minimum Threshold (ft. bgs): 39 ft.
MT Calculation Method = 100% Historical Range

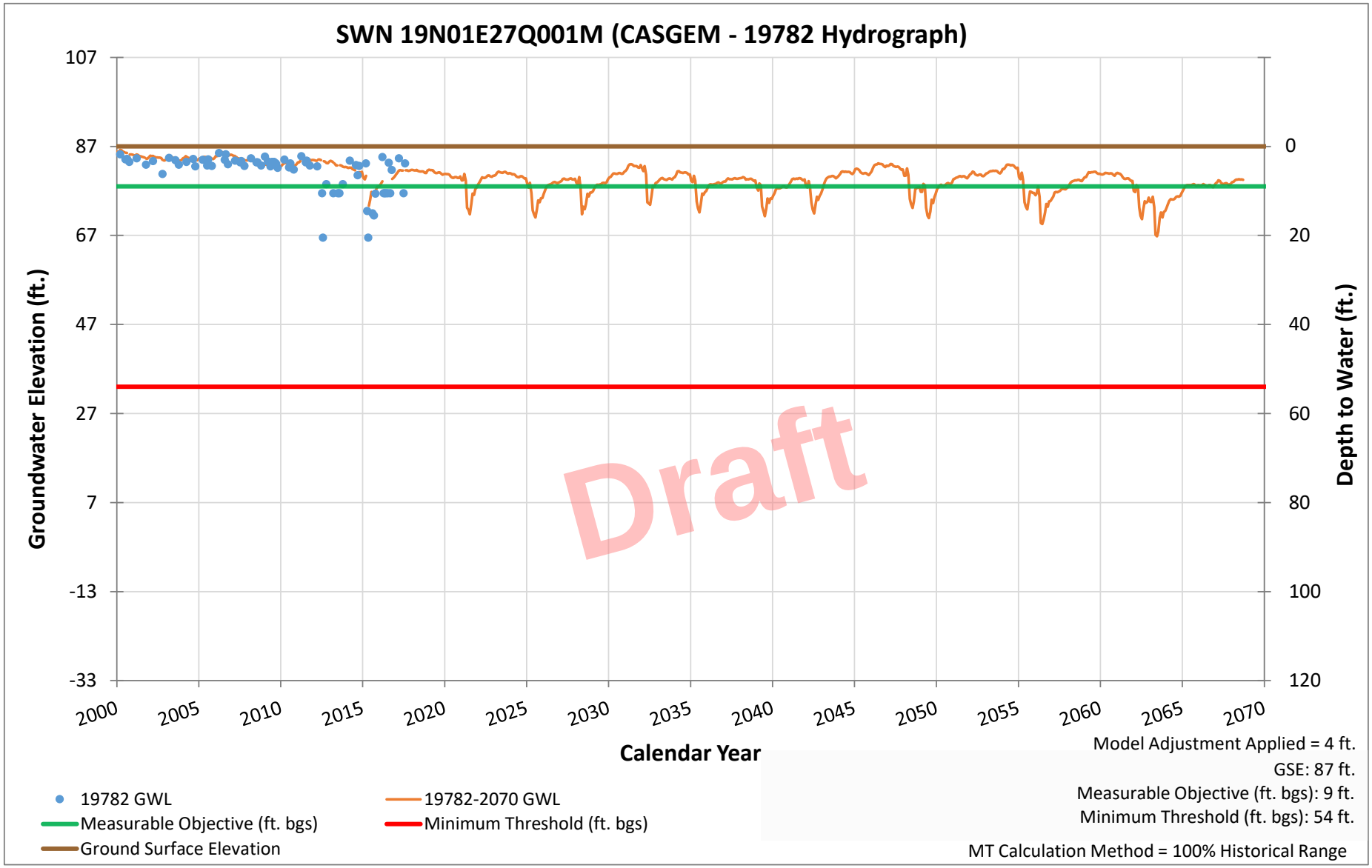

SWN 17N02E14H001M (CASGEM - 16956 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
106
86
66
46
26
6
-14
-34
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16956 GWL
16956-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -10 ft.
GSE: 86 ft.
Measurable Objective (ft. bgs): 23 ft.
Minimum Threshold (ft. bgs): 45 ft.
MT Calculation Method = Shallowest 7th Percentile of Domestic Well Depths

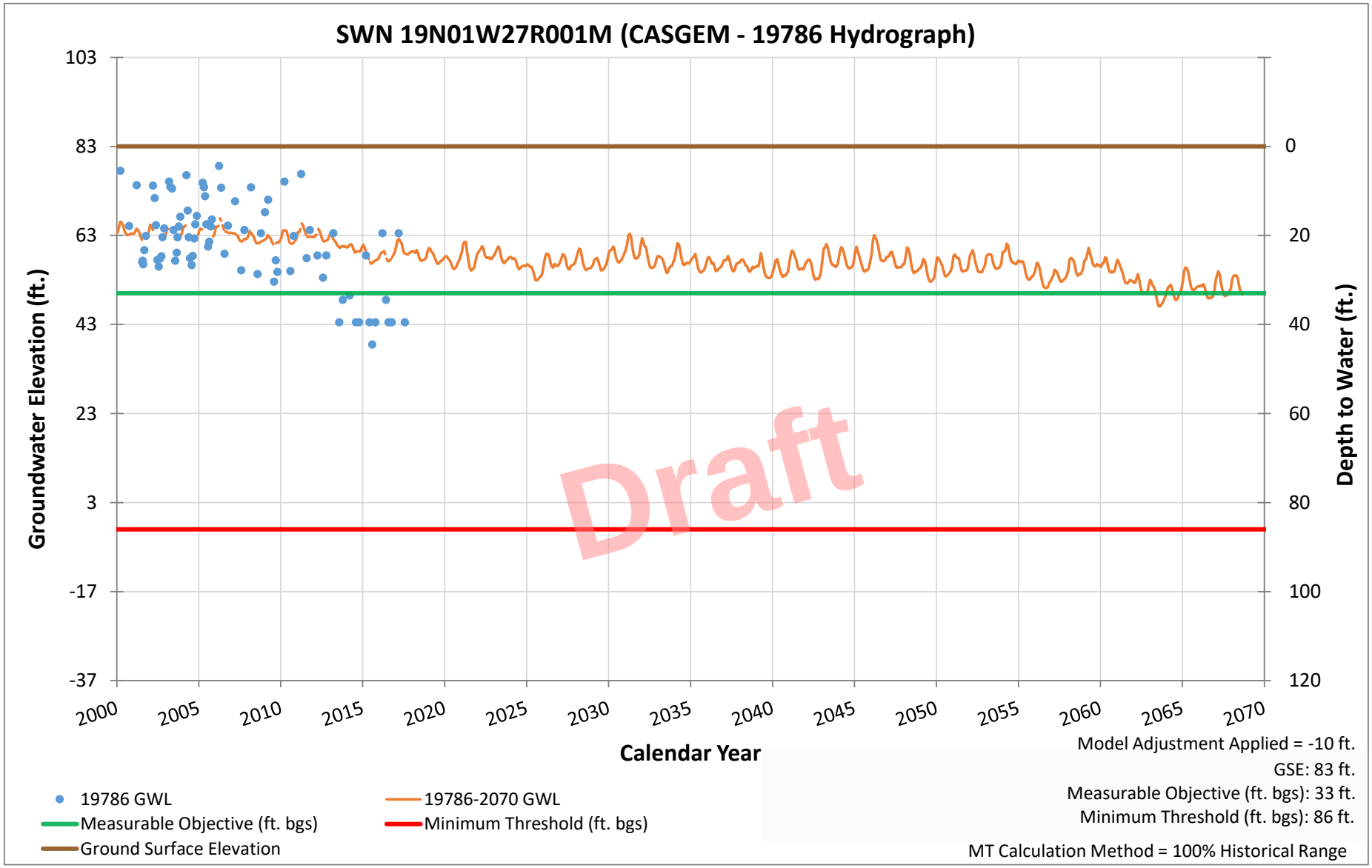

SWN 21N01E08K002M (CASGEM - 19253 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
166
146
126
106
86
66
46
26
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19253 GWL
19253-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 146 ft.
Measurable Objective (ft. bgs): 49 ft.
Minimum Threshold (ft. bgs): 109 ft.
MT Calculation Method = 100% Historical Range

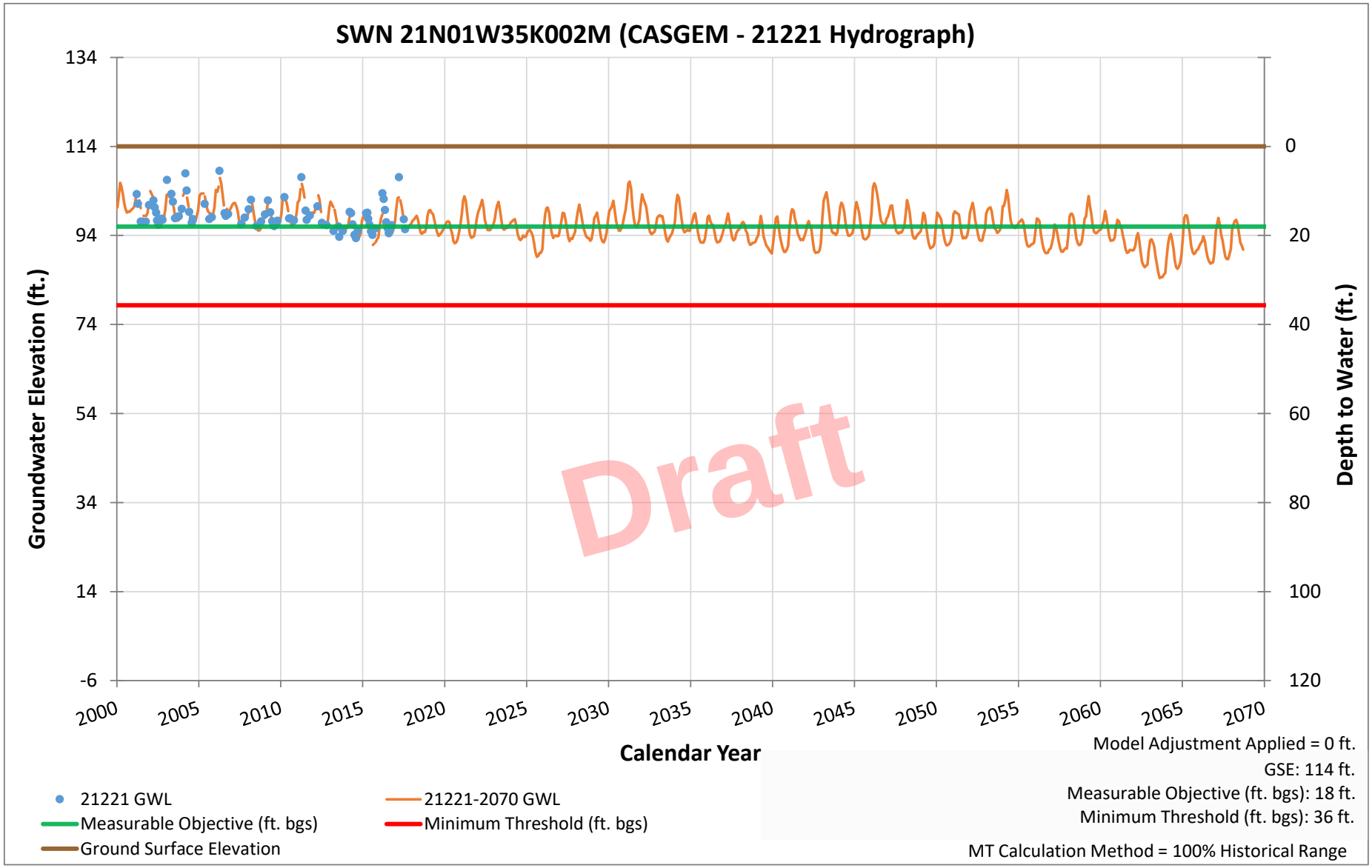

SWN 22N01E32E004M (CASGEM - 19363 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
171
151
131
111
91
71
51
31
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19363 GWL
19363-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 151 ft.
Measurable Objective (ft. bgs): 39 ft.
Minimum Threshold (ft. bgs): 73 ft.
MT Calculation Method = Shallowest 7th Percentile of Domestic Well Depths

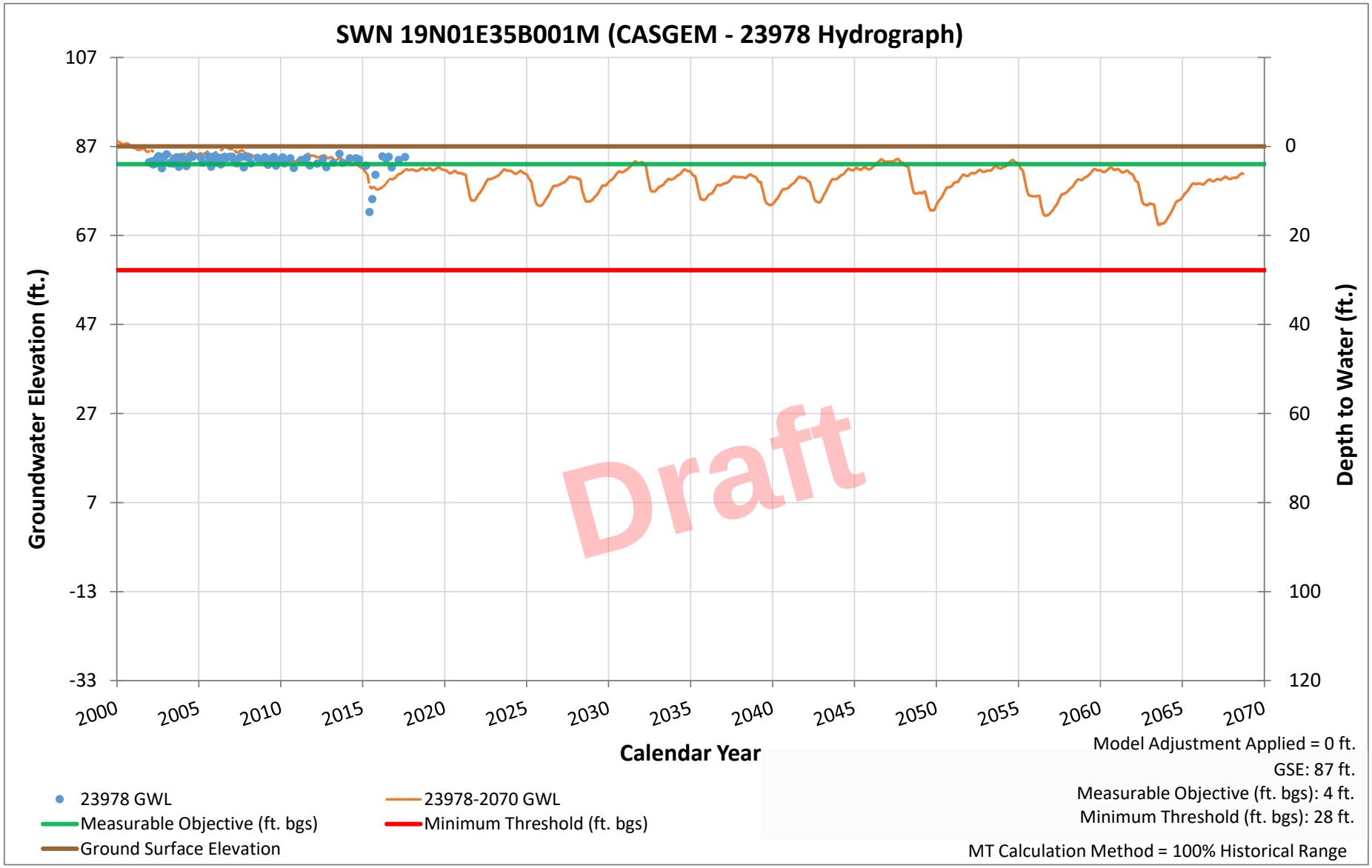

SWN 21N01W23J001M (CASGEM - 19739 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
141
121
101
81
61
41
21
1
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19739 GWL
19739-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 121 ft.
Measurable Objective (ft. bgs): 23 ft.
Minimum Threshold (ft. bgs): 67 ft.
MT Calculation Method = 100% Historical Range

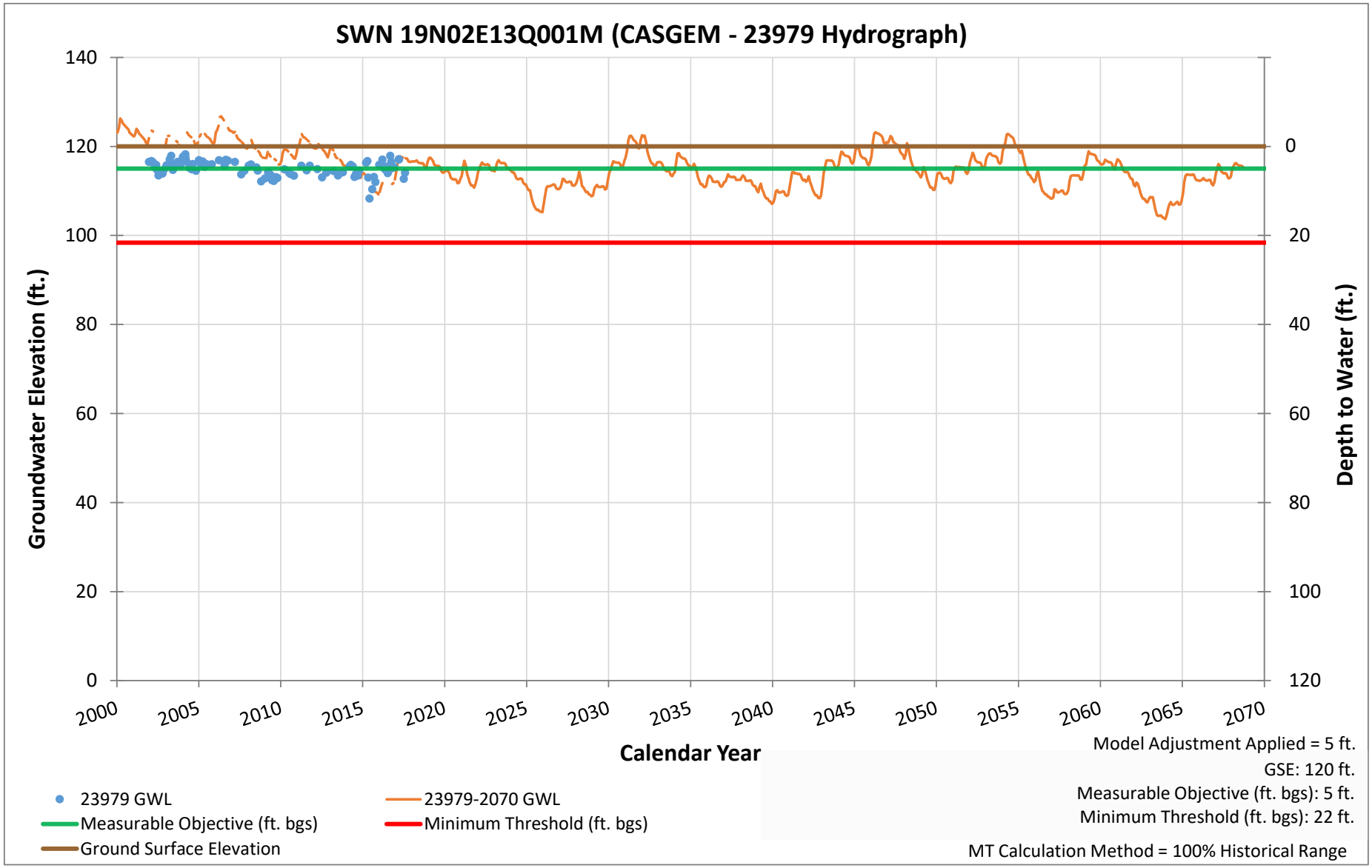

SWN 19N01E09Q001M (CASGEM - 19780 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
112
92
72
52
32
12
-8
-28
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19780 GWL
19780-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -5 ft.
GSE: 92 ft.
Measurable Objective (ft. bgs): 11 ft.
Minimum Threshold (ft. bgs): 45 ft.
MT Calculation Method = 100% Historical Range

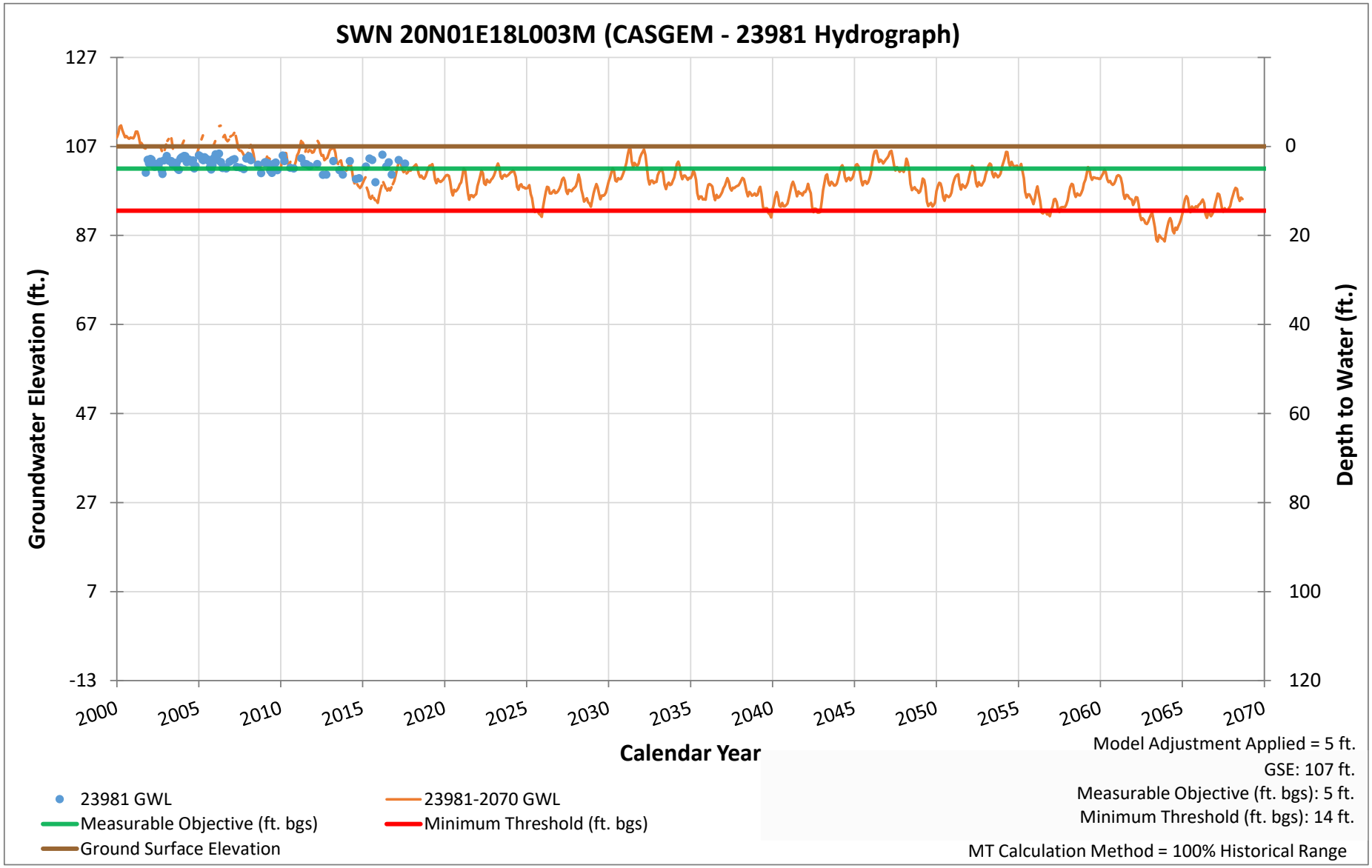

SWN 19N01E27Q001M (CASGEM - 19782 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19782 GWL
19782-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 4 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): 9 ft.
Minimum Threshold (ft. bgs): 54 ft.
MT Calculation Method = 100% Historical Range

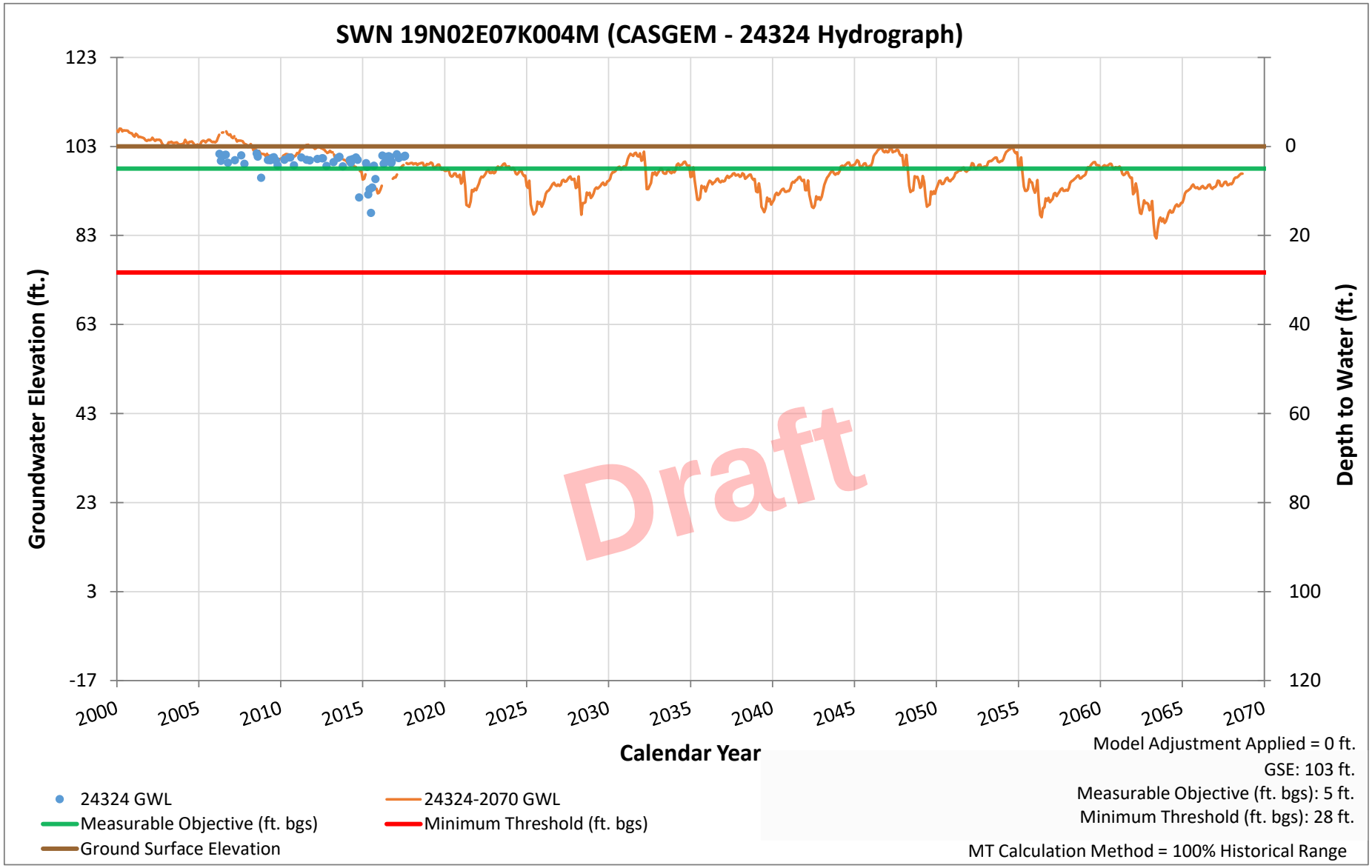

SWN 19N01W27R001M (CASGEM - 19786 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
103
83
63
43
23
3
-17
-37
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19786 GWL
19786-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -10 ft.
GSE: 83 ft.
Measurable Objective (ft. bgs): 33 ft.
Minimum Threshold (ft. bgs): 86 ft.
MT Calculation Method = 100% Historical Range

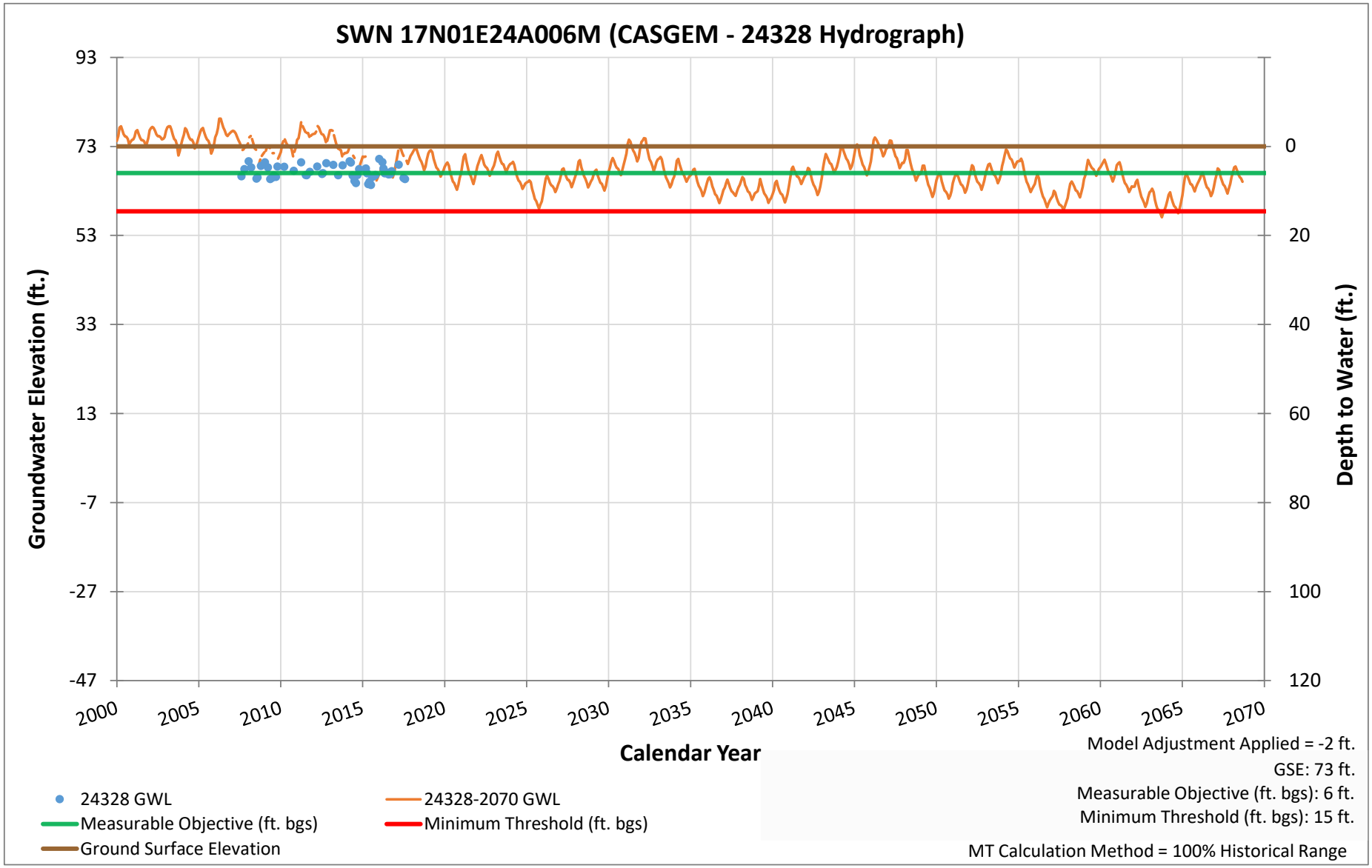

SWN 21N01W35K002M (CASGEM - 21221 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
134
114
94
74
54
34
14
-6
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
21221 GWL
21221-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 114 ft.
Measurable Objective (ft. bgs): 18 ft.
Minimum Threshold (ft. bgs): 36 ft.
MT Calculation Method = 100% Historical Range

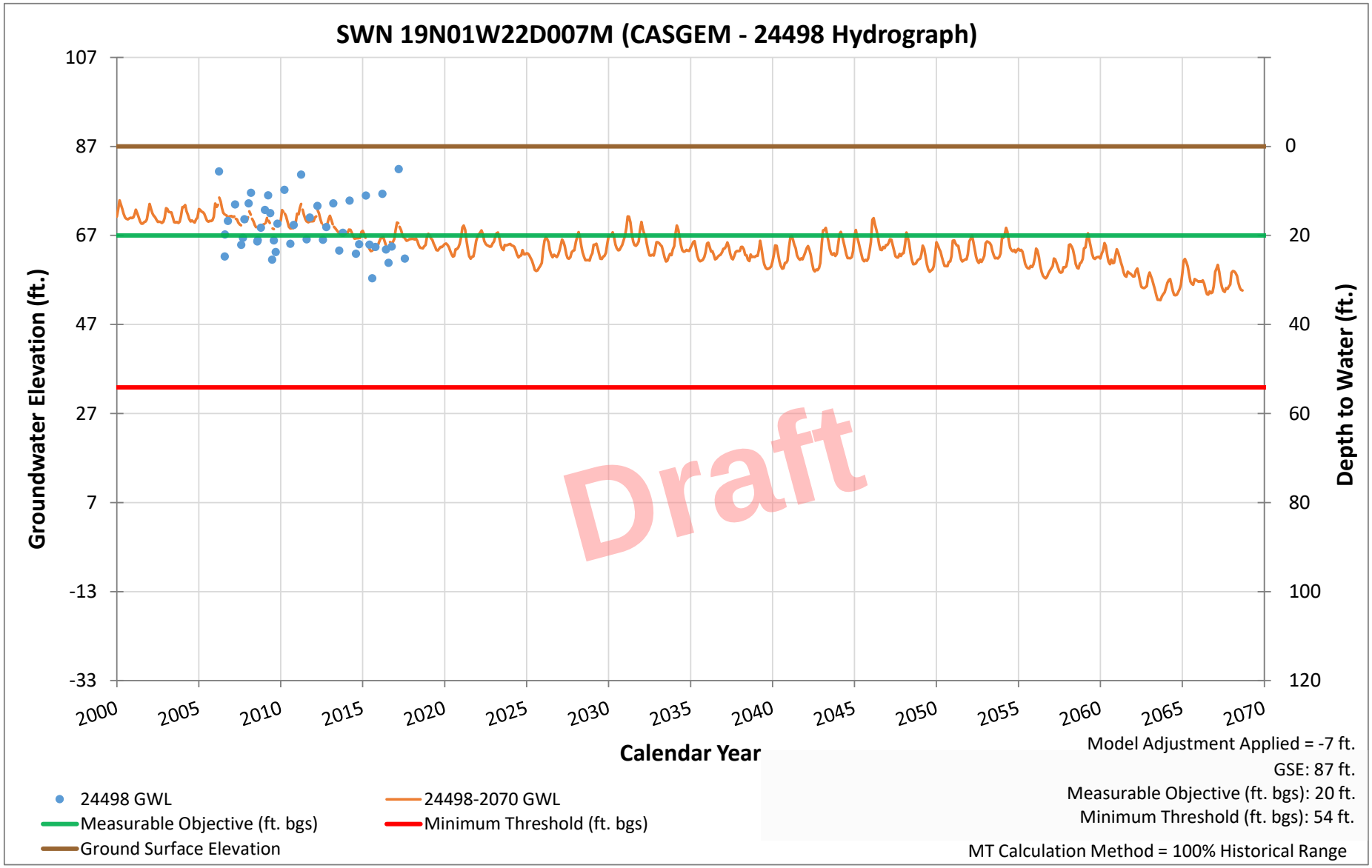

SWN 19N01E35B001M (CASGEM - 23978 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
23978 GWL
23978-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): 4 ft.
Minimum Threshold (ft. bgs): 28 ft.
MT Calculation Method = 100% Historical Range

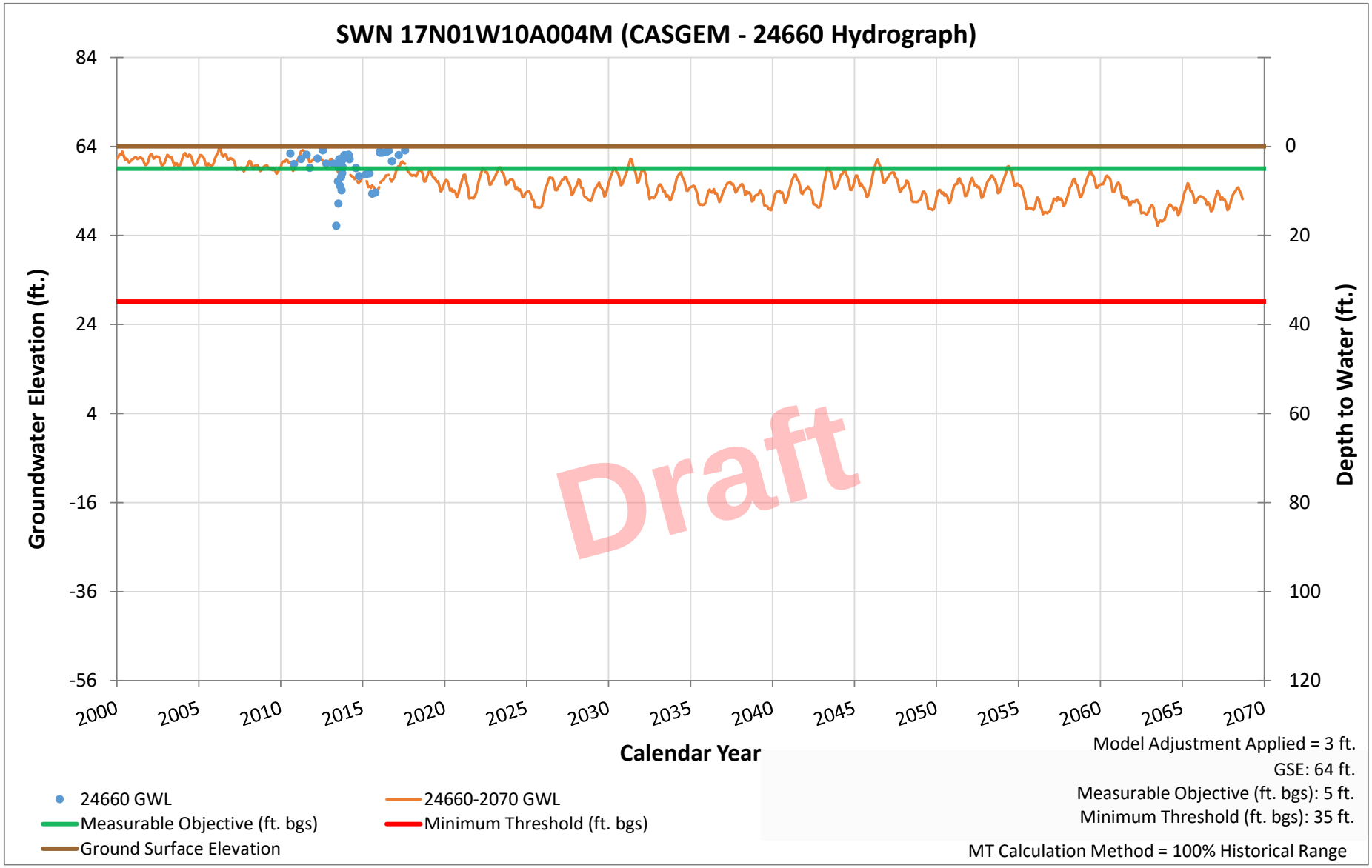

SWN 19N02E13Q001M (CASGEM - 23979 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
140
120
100
80
60
40
20
0
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
23979 GWL
23979-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 5 ft.
GSE: 120 ft.
Measurable Objective (ft. bgs): 5 ft.
Minimum Threshold (ft. bgs): 22 ft.
MT Calculation Method = 100% Historical Range

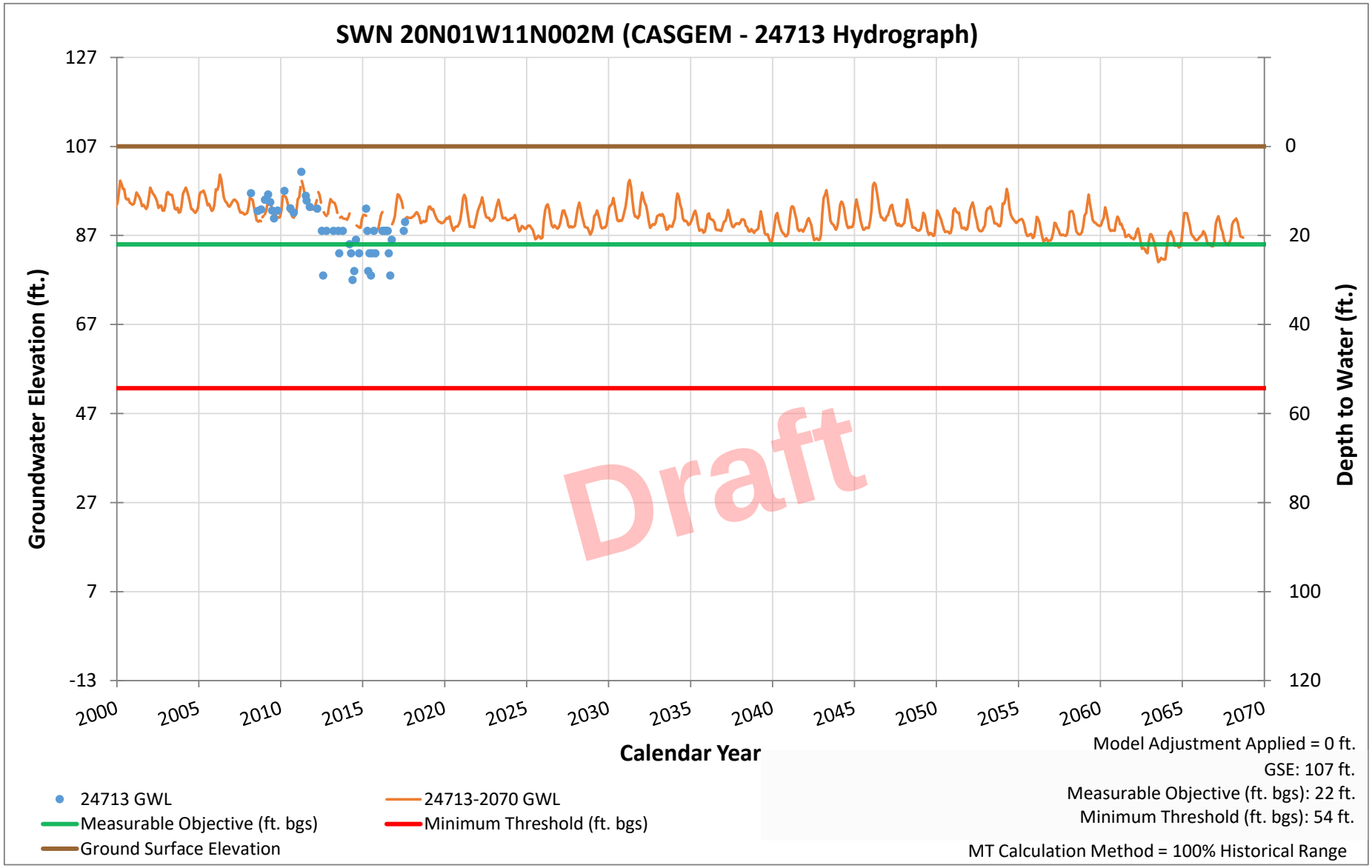

SWN 20N01E18L003M (CASGEM - 23981 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
127
107
87
67
47
27
7
-13
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
23981 GWL
23981-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 5 ft.
GSE: 107 ft.
Measurable Objective (ft. bgs): 5 ft.
Minimum Threshold (ft. bgs): 14 ft.
MT Calculation Method = 100% Historical Range

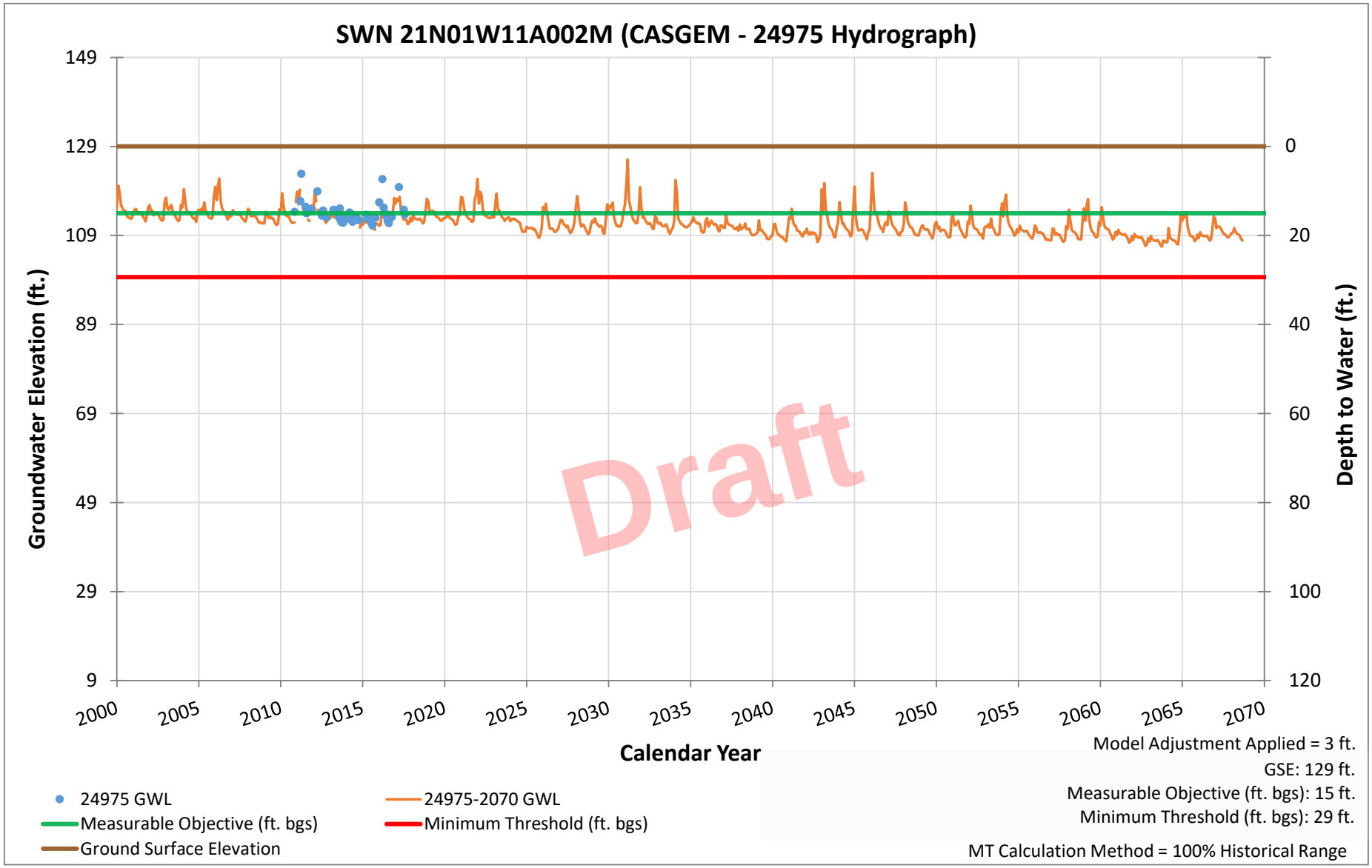

SWN 19N02E07K004M (CASGEM - 24324 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
123
103
83
63
43
23
3
-17
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24324 GWL
24324-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 103 ft.
Measurable Objective (ft. bgs): 5 ft.
Minimum Threshold (ft. bgs): 28 ft.
MT Calculation Method = 100% Historical Range

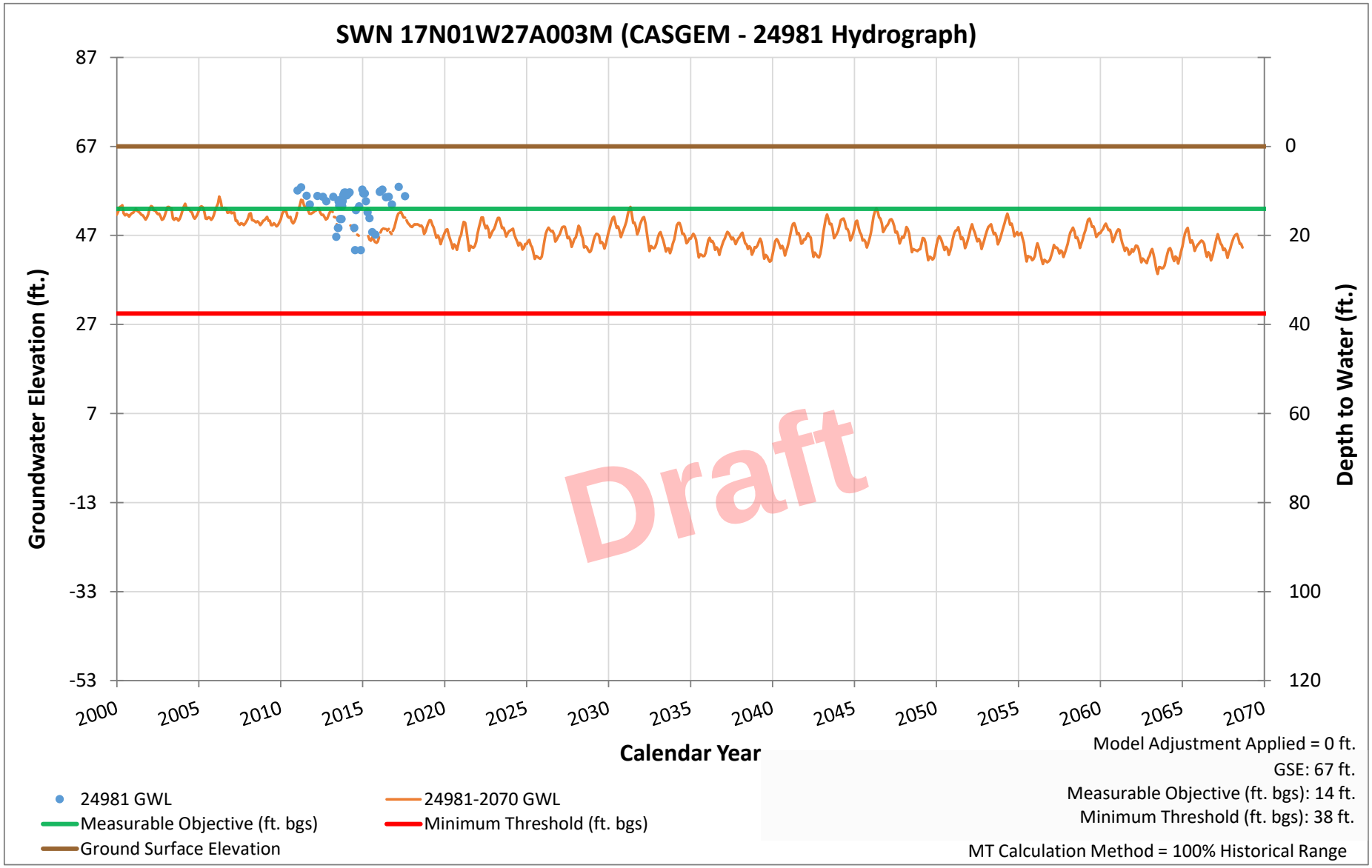

SWN 17N01E24A006M (CASGEM - 24328 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
93
73
53
33
13
-7
-27
-47
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
24328 GWL
24328-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -2 ft.
GSE: 73 ft.
Measurable Objective (ft. bgs): 6 ft.
Minimum Threshold (ft. bgs): 15 ft.
MT Calculation Method = 100% Historical Range

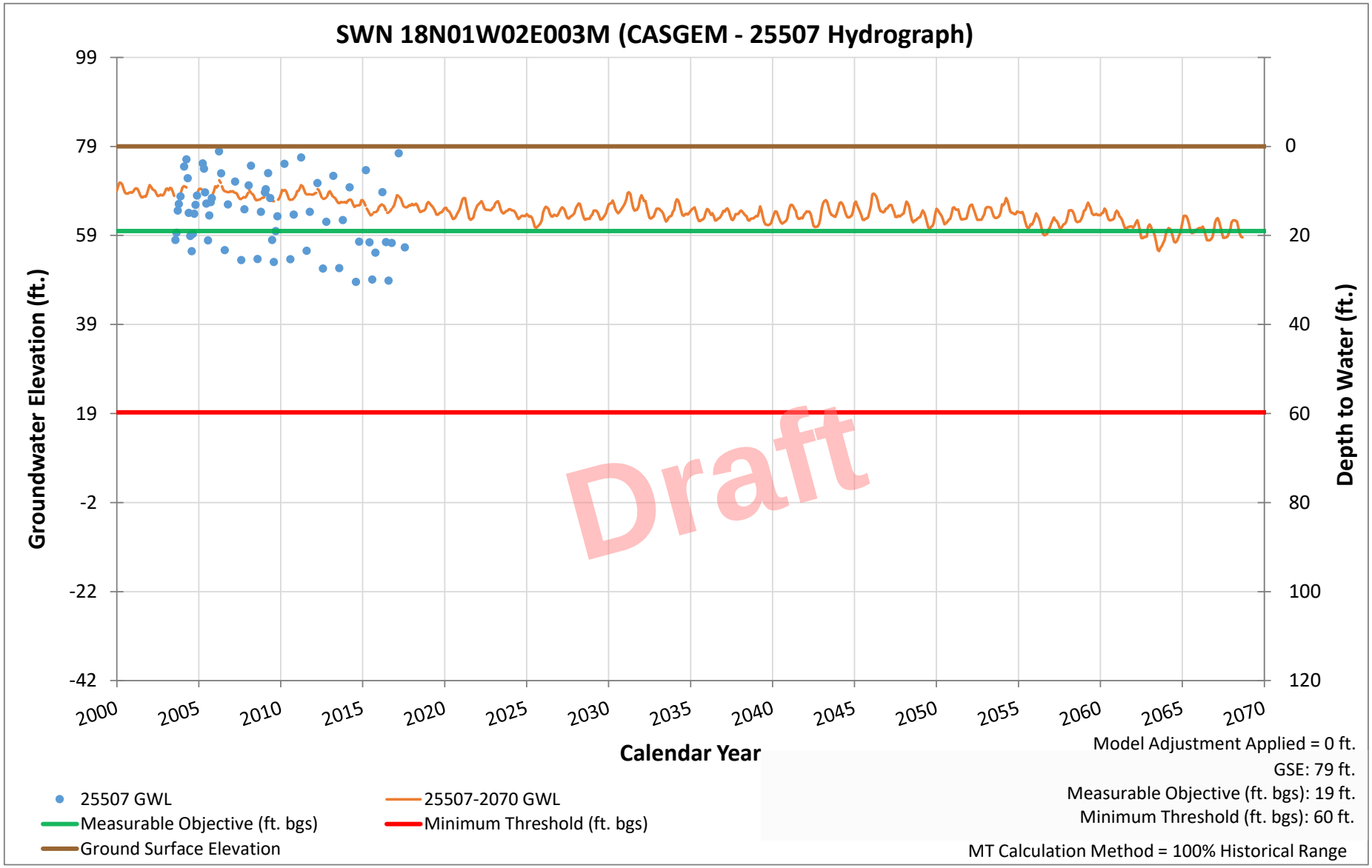

SWN 19N01W22D007M (CASGEM - 24498 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
24498 GWL
24498-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -7 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): 20 ft.
Minimum Threshold (ft. bgs): 54 ft.
MT Calculation Method = 100% Historical Range

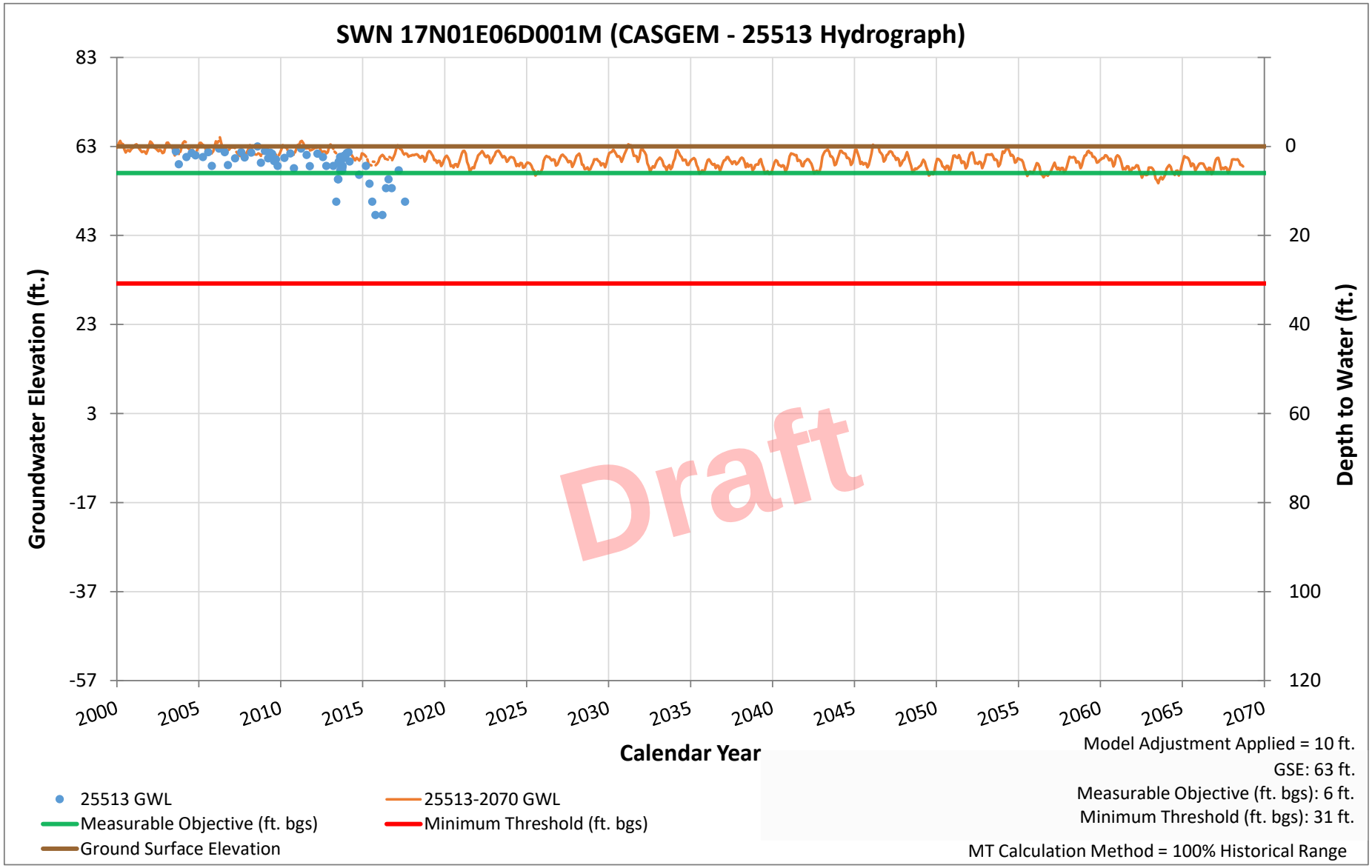

SWN 17N01W10A004M (CASGEM - 24660 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
84
64
44
24
4
-16
-36
-56
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24660 GWL
24660-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 3 ft.
GSE: 64 ft.
Measurable Objective (ft. bgs): 5 ft.
Minimum Threshold (ft. bgs): 35 ft.
MT Calculation Method = 100% Historical Range

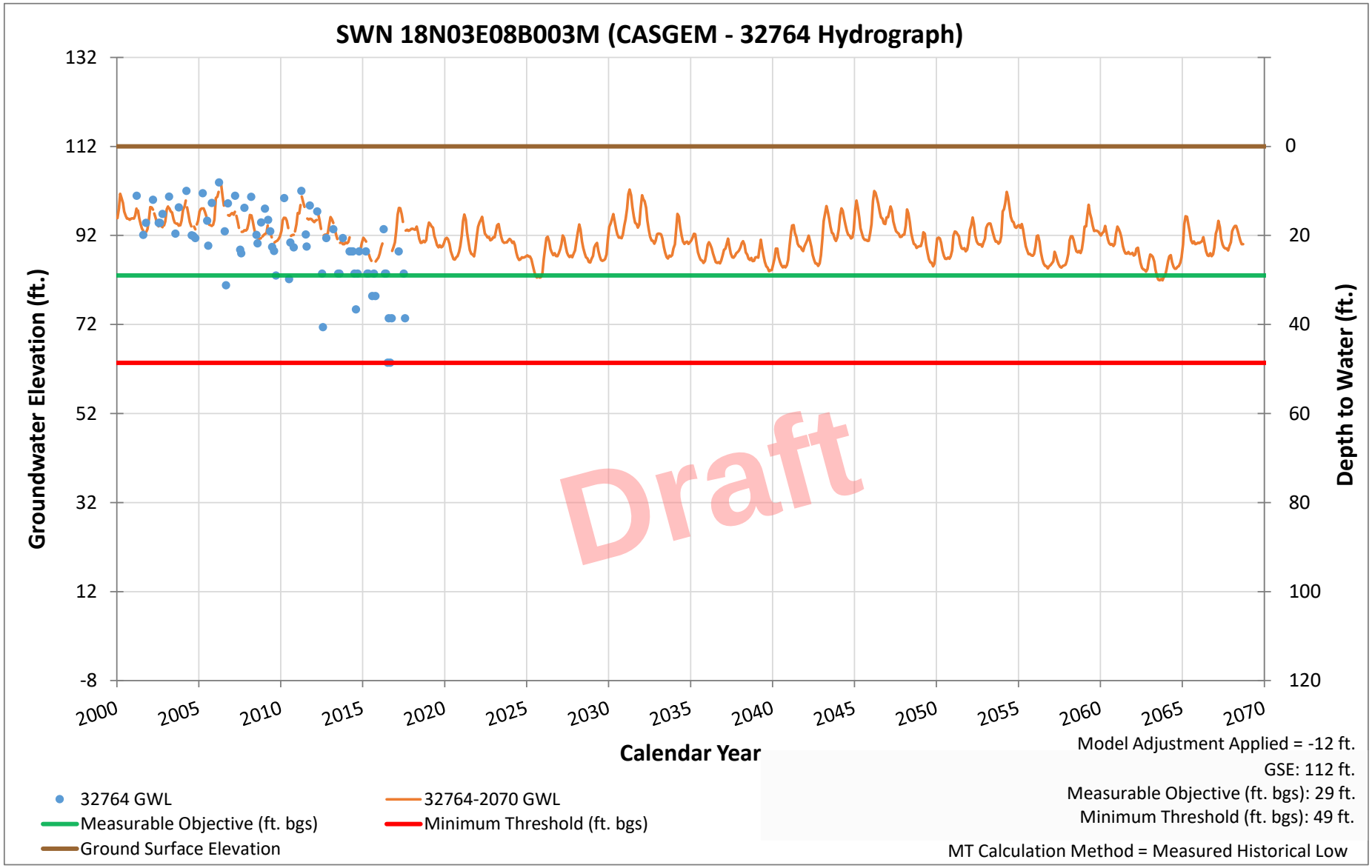

SWN 20N01W11N002M (CASGEM - 24713 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
127
107
87
67
47
27
7
-13
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
24713 GWL
24713-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 107 ft.
Measurable Objective (ft. bgs): 22 ft.
Minimum Threshold (ft. bgs): 54 ft.
MT Calculation Method = 100% Historical Range

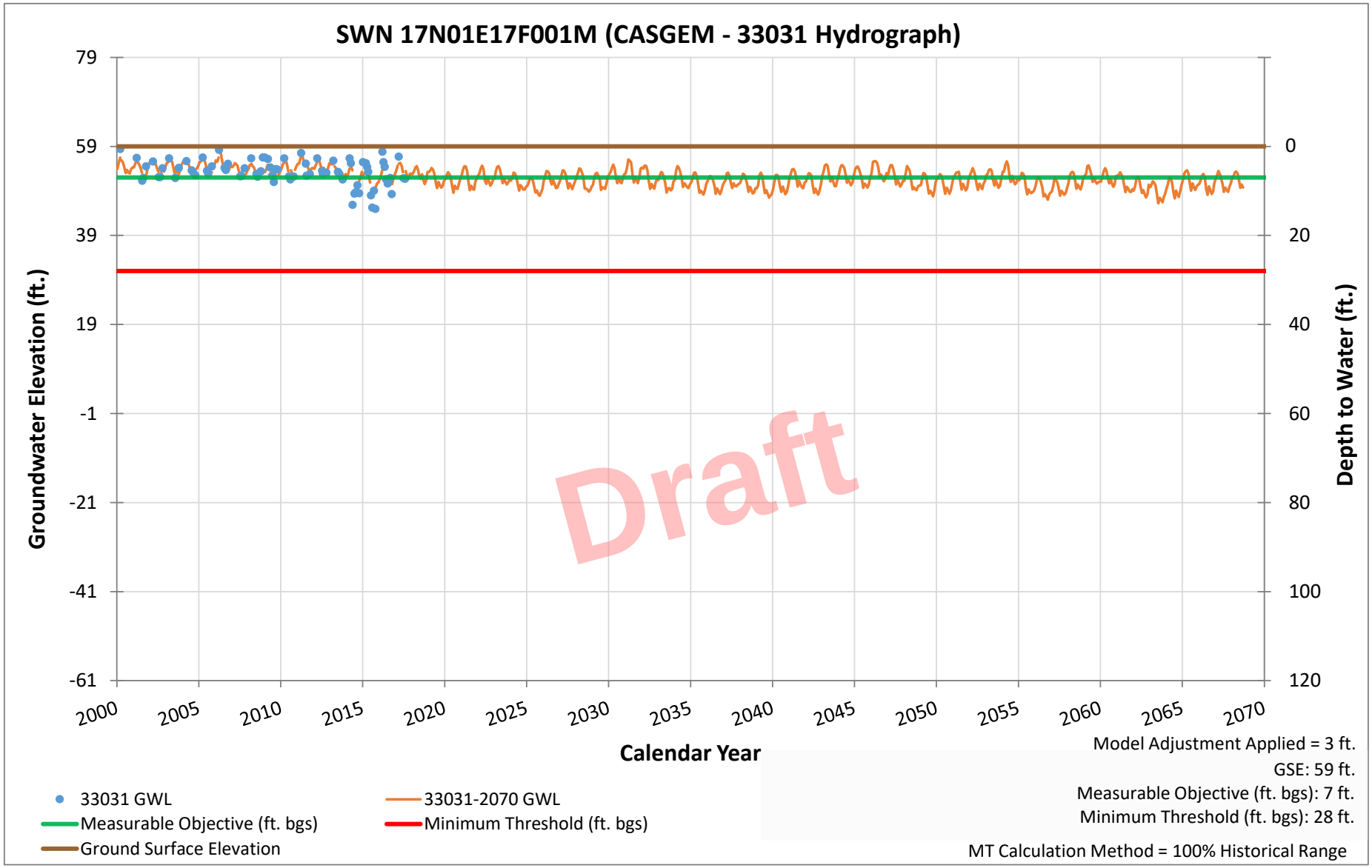

SWN 21N01W11A002M (CASGEM - 24975 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
149
129
109
89
69
49
29
9
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24975 GWL
24975-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 3 ft.
GSE: 129 ft.
Measurable Objective (ft. bgs): 15 ft.
Minimum Threshold (ft. bgs): 29 ft.
MT Calculation Method = 100% Historical Range

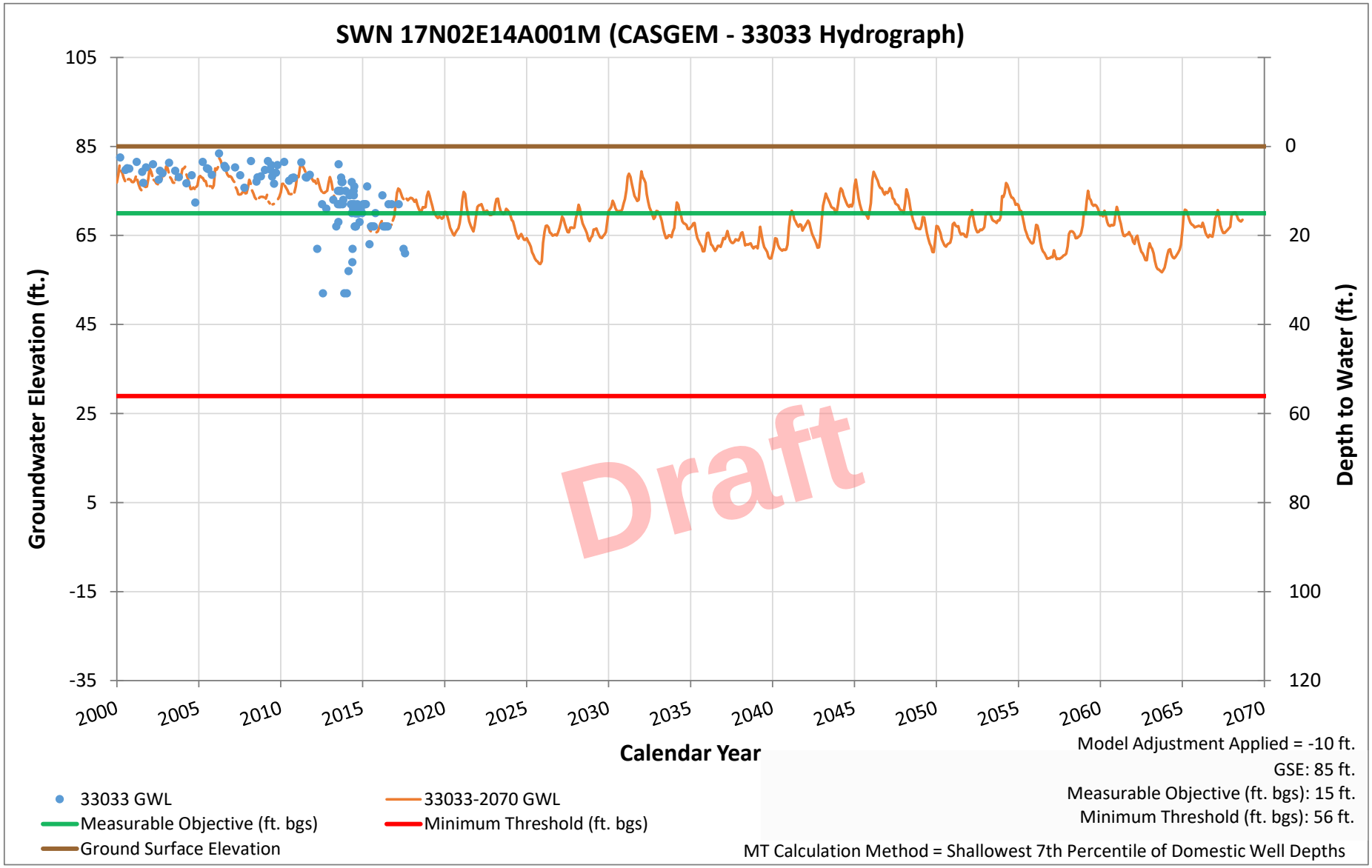

SWN 17N01W27A003M (CASGEM - 24981 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
87
67
47
27
7
-13
-33
-53
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24981 GWL
24981-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 67 ft.
Measurable Objective (ft. bgs): 14 ft.
Minimum Threshold (ft. bgs): 38 ft.
MT Calculation Method = 100% Historical Range

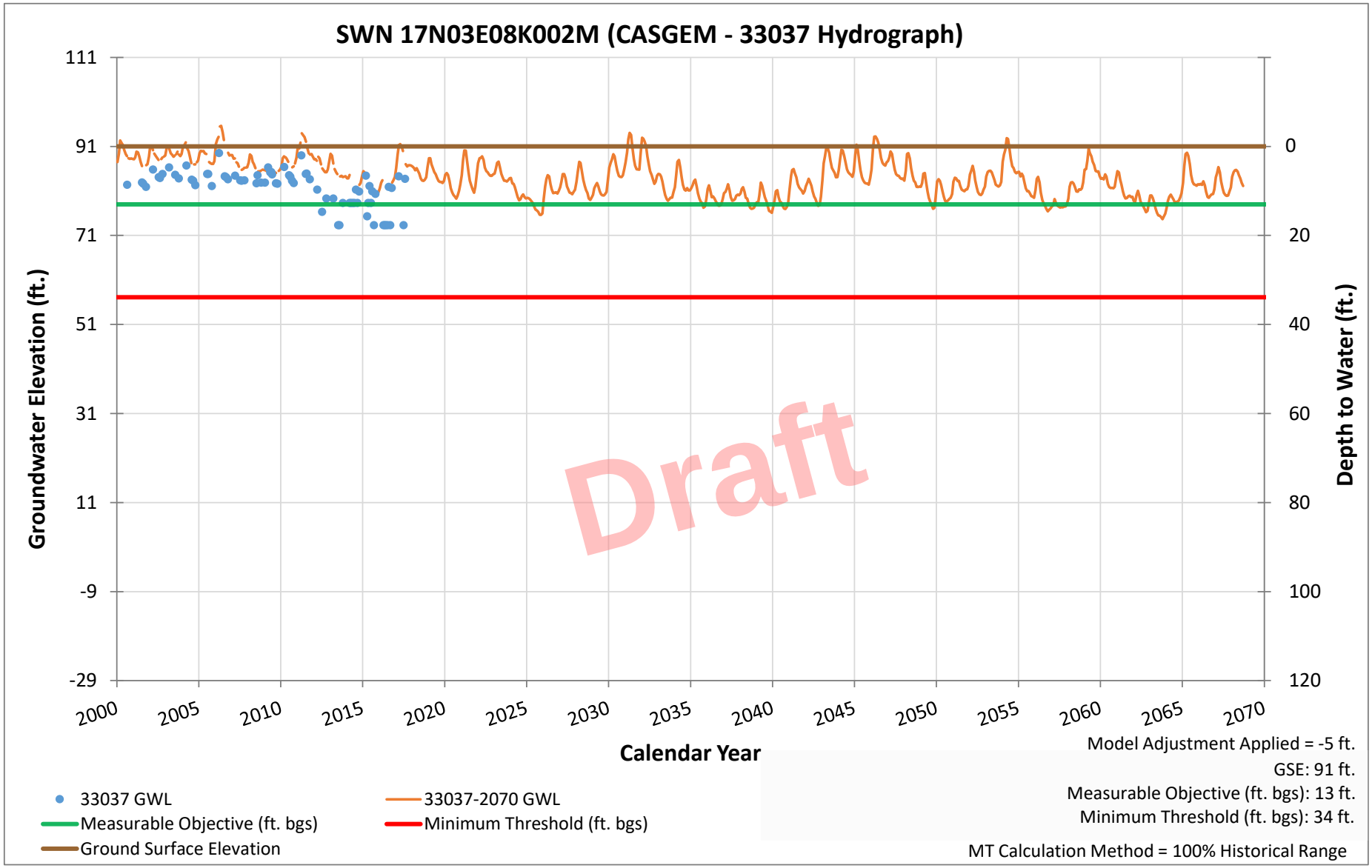

SWN 18N01W02E003M (CASGEM - 25507 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
99
79
59
39
19
-2
-22
-42
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
25507 GWL
25507-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 79 ft.
Measurable Objective (ft. bgs): 19 ft.
Minimum Threshold (ft. bgs): 60 ft.
MT Calculation Method = 100% Historical Range

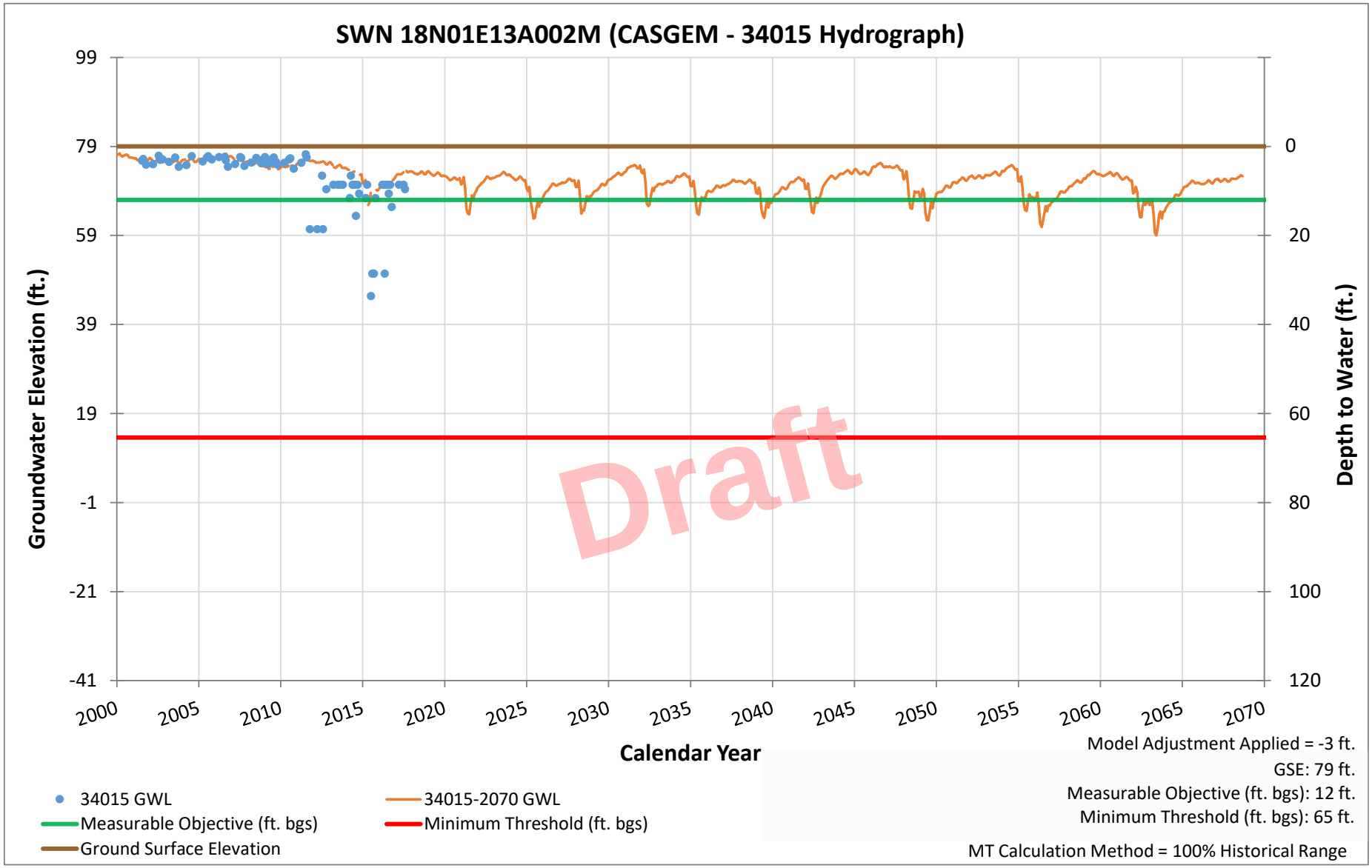

SWN 17N01E06D001M (CASGEM - 25513 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
83
63
43
23
3
-17
-37
-57
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
25513 GWL
25513-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 10 ft.
GSE: 63 ft.
Measurable Objective (ft. bgs): 6 ft.
Minimum Threshold (ft. bgs): 31 ft.
MT Calculation Method = 100% Historical Range

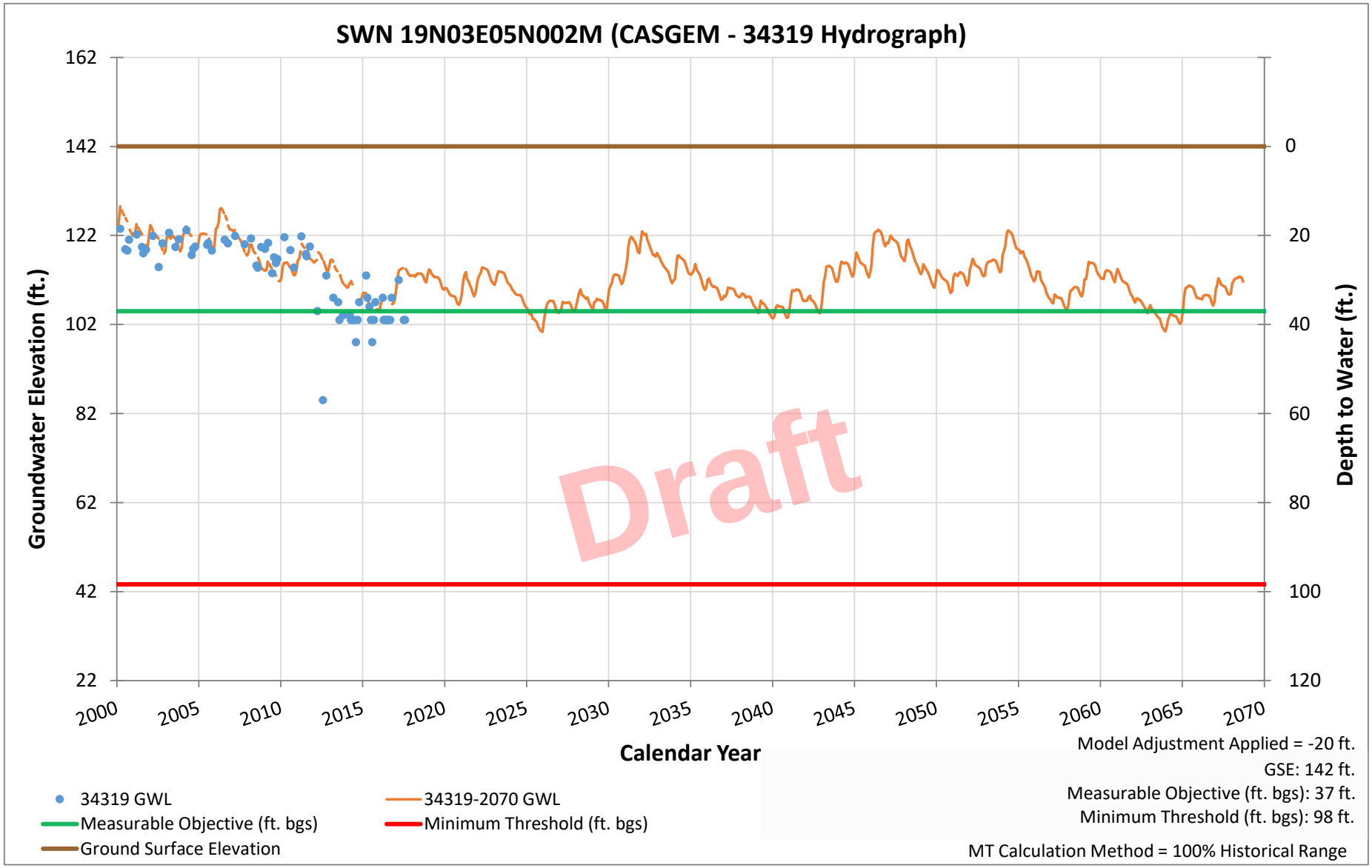

SWN 18N03E08B003M (CASGEM - 32764 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
132
112
92
72
52
32
12
-8
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
32764 GWL
32764-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -12 ft.
GSE: 112 ft.
Measurable Objective (ft. bgs): 29 ft.
Minimum Threshold (ft. bgs): 49 ft.
MT Calculation Method = Measured Historical Low

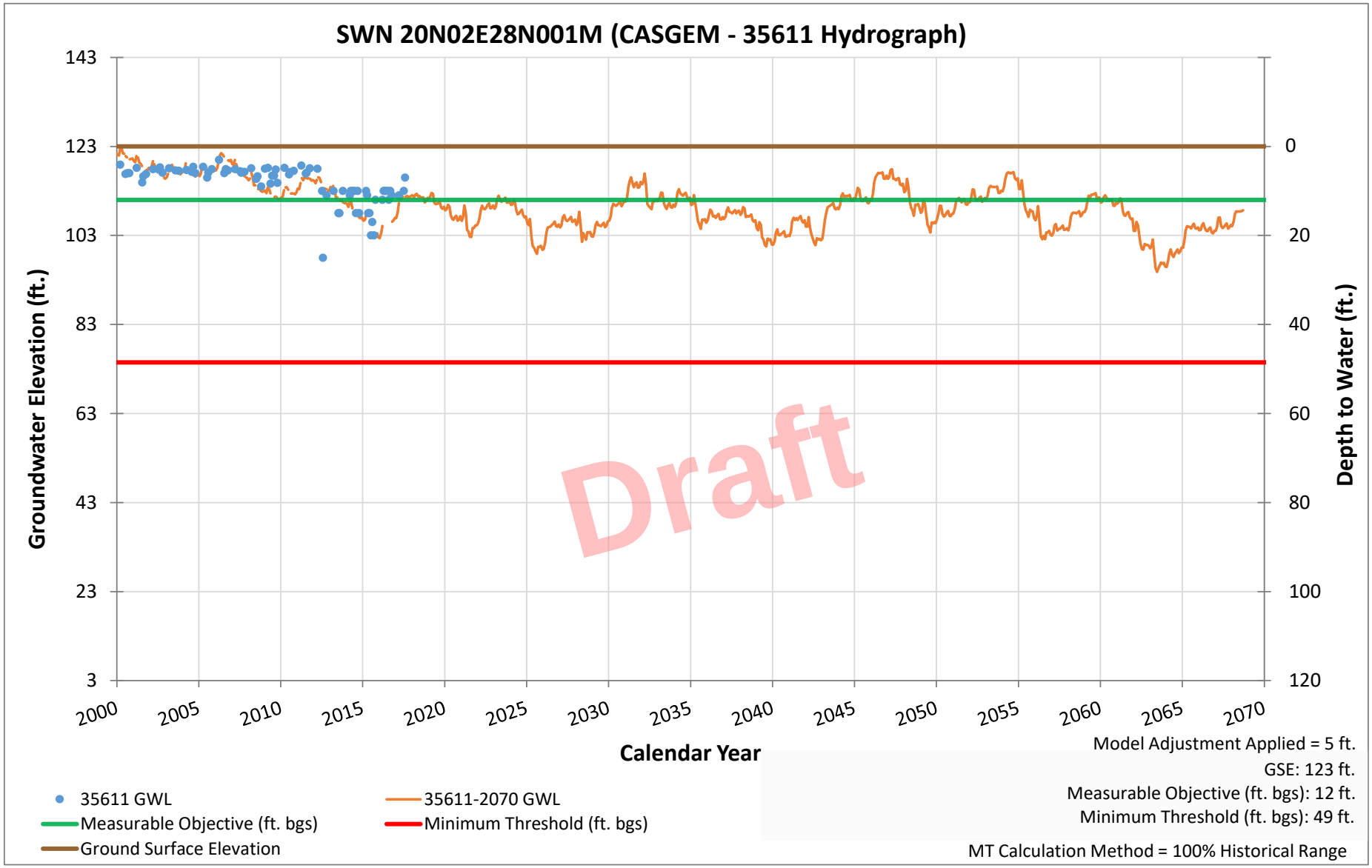

SWN 17N01E17F001M (CASGEM - 33031 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
79
59
39
19
-1
-21
-41
-61
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
33031 GWL
33031-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 3 ft.
GSE: 59 ft.
Measurable Objective (ft. bgs): 7 ft.
Minimum Threshold (ft. bgs): 28 ft.
MT Calculation Method = 100% Historical Range

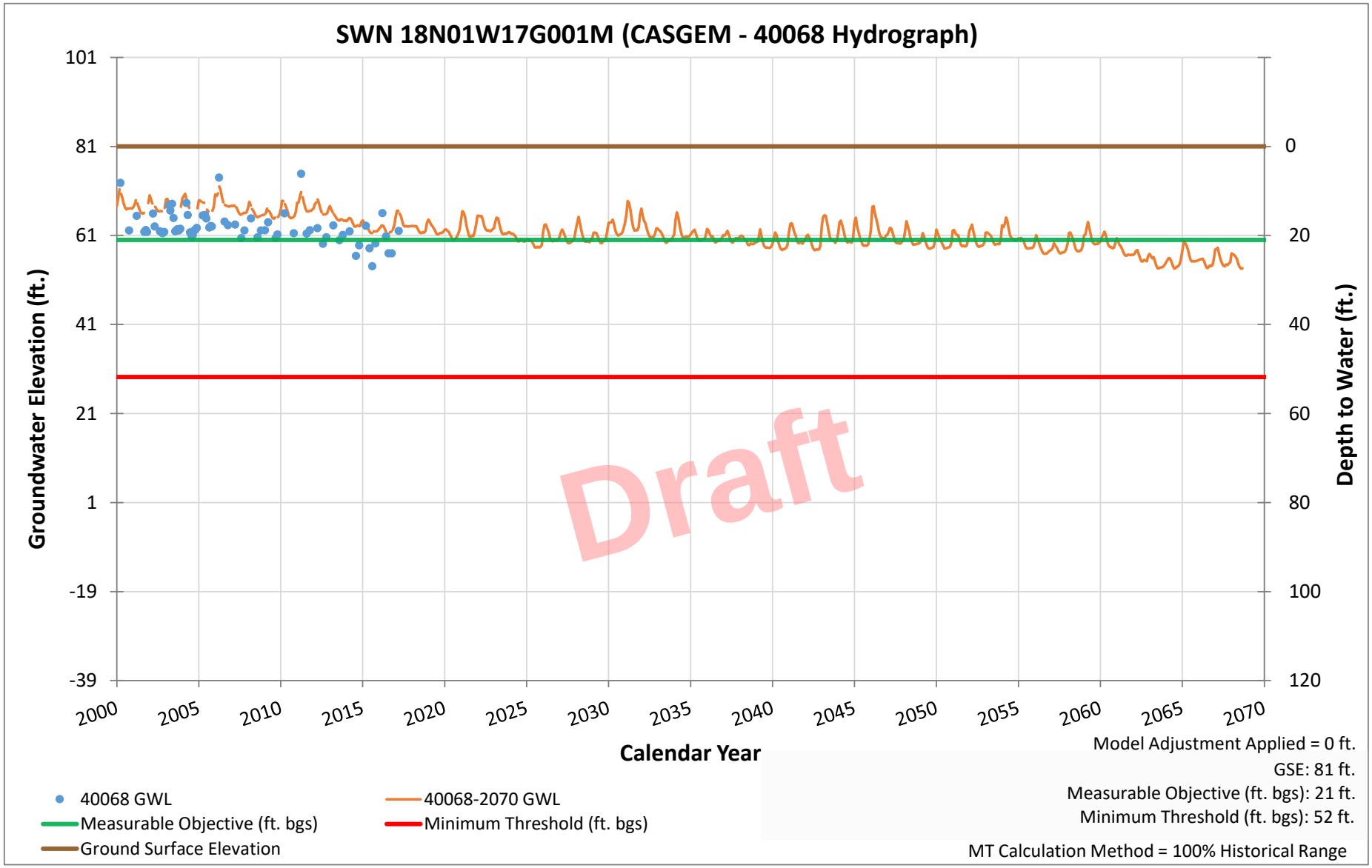

SWN 17N02E14A001M (CASGEM - 33033 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
105
85
65
45
25
5
-15
-35
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
33033 GWL
33033-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -10 ft.
GSE: 85 ft.
Measurable Objective (ft. bgs): 15 ft.
Minimum Threshold (ft. bgs): 56 ft.
MT Calculation Method = Shallowest 7th Percentile of Domestic Well Depths

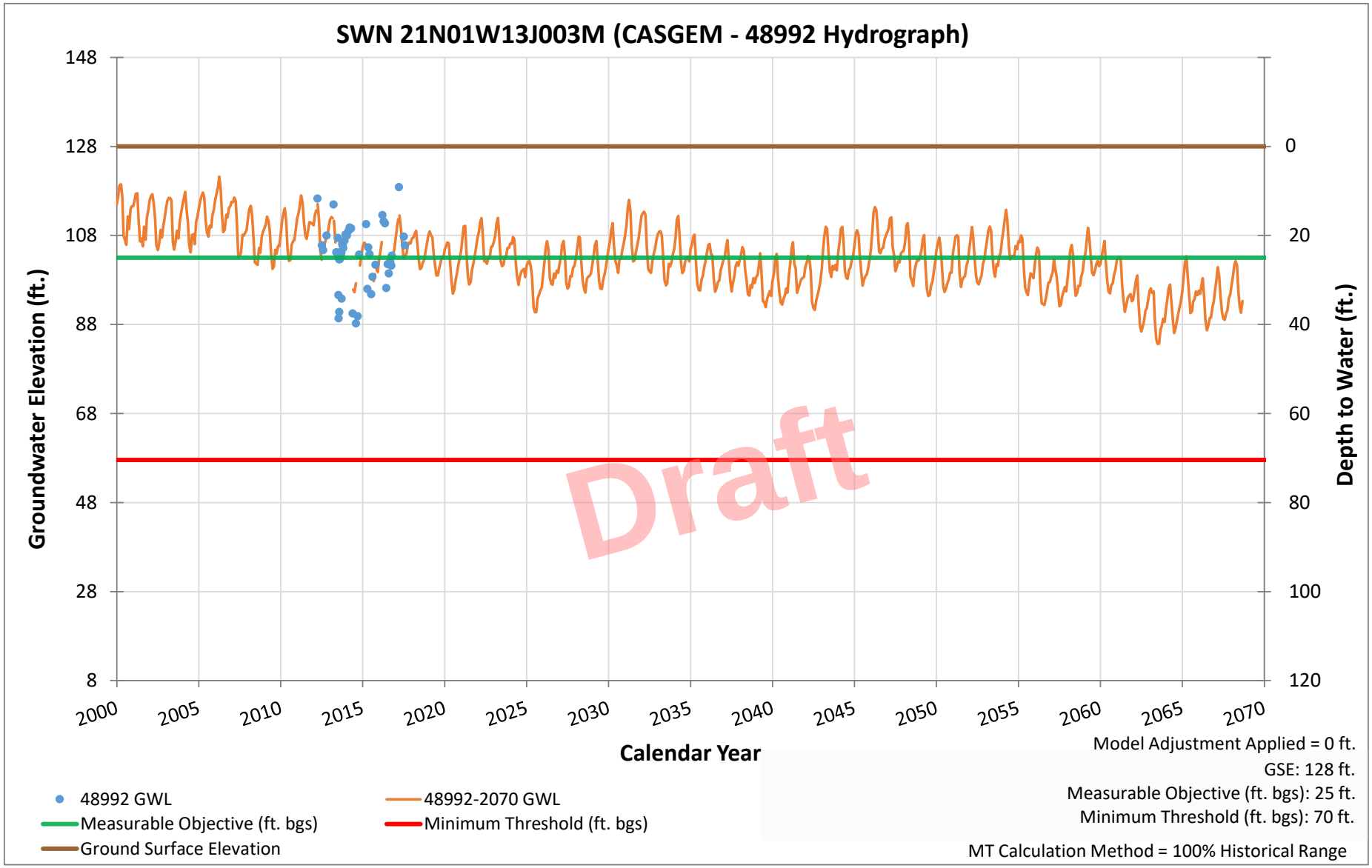

SWN 17N03E08K002M (CASGEM - 33037 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
111
91
71
51
31
11
-9
-29
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
33037 GWL
33037-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -5 ft.
GSE: 91 ft.
Measurable Objective (ft. bgs): 13 ft.
Minimum Threshold (ft. bgs): 34 ft.
MT Calculation Method = 100% Historical Range

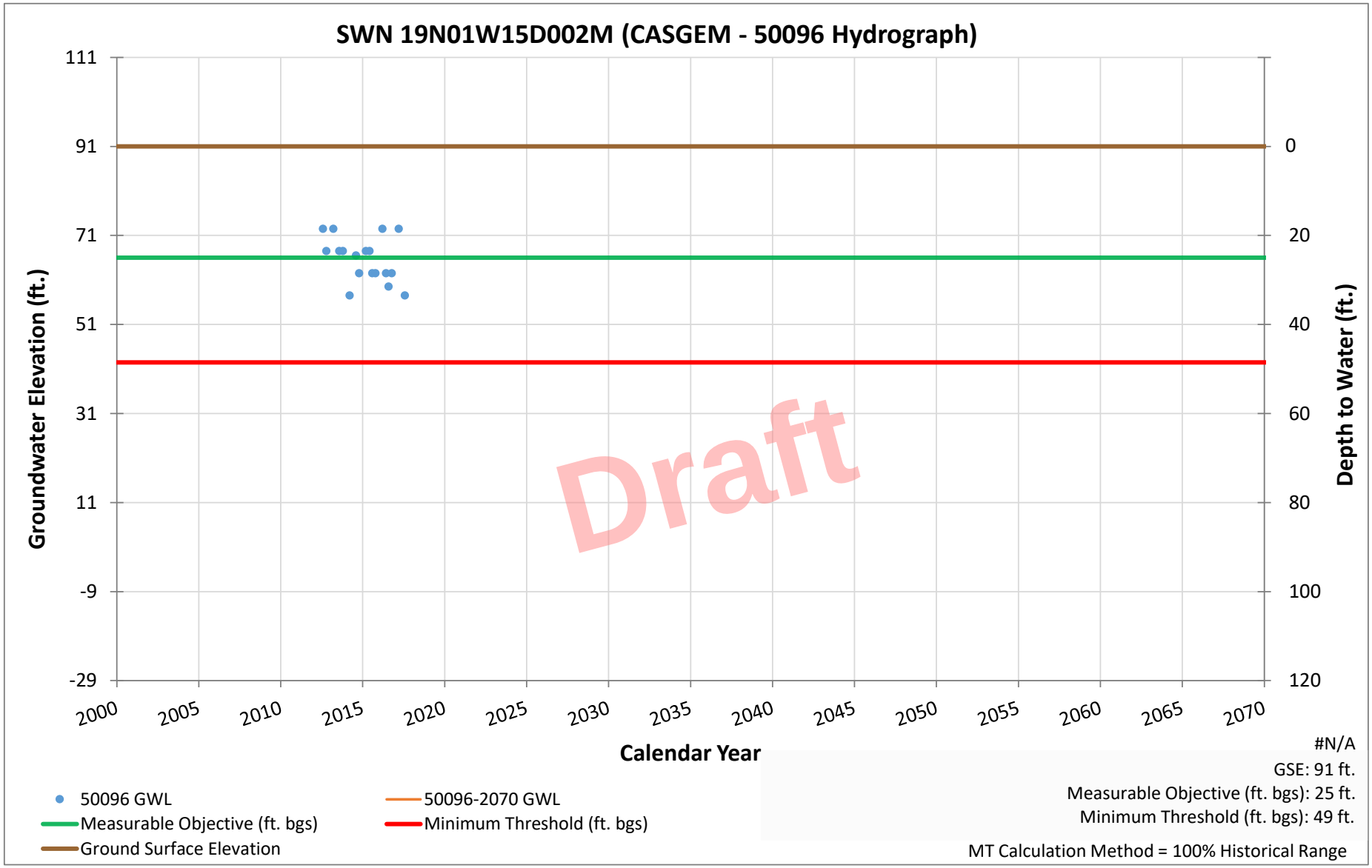

SWN 18N01E13A002M (CASGEM - 34015 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
99
79
59
39
19
-1
-21
-41
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
34015 GWL
34015-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -3 ft.
GSE: 79 ft.
Measurable Objective (ft. bgs): 12 ft.
Minimum Threshold (ft. bgs): 65 ft.
MT Calculation Method = 100% Historical Range

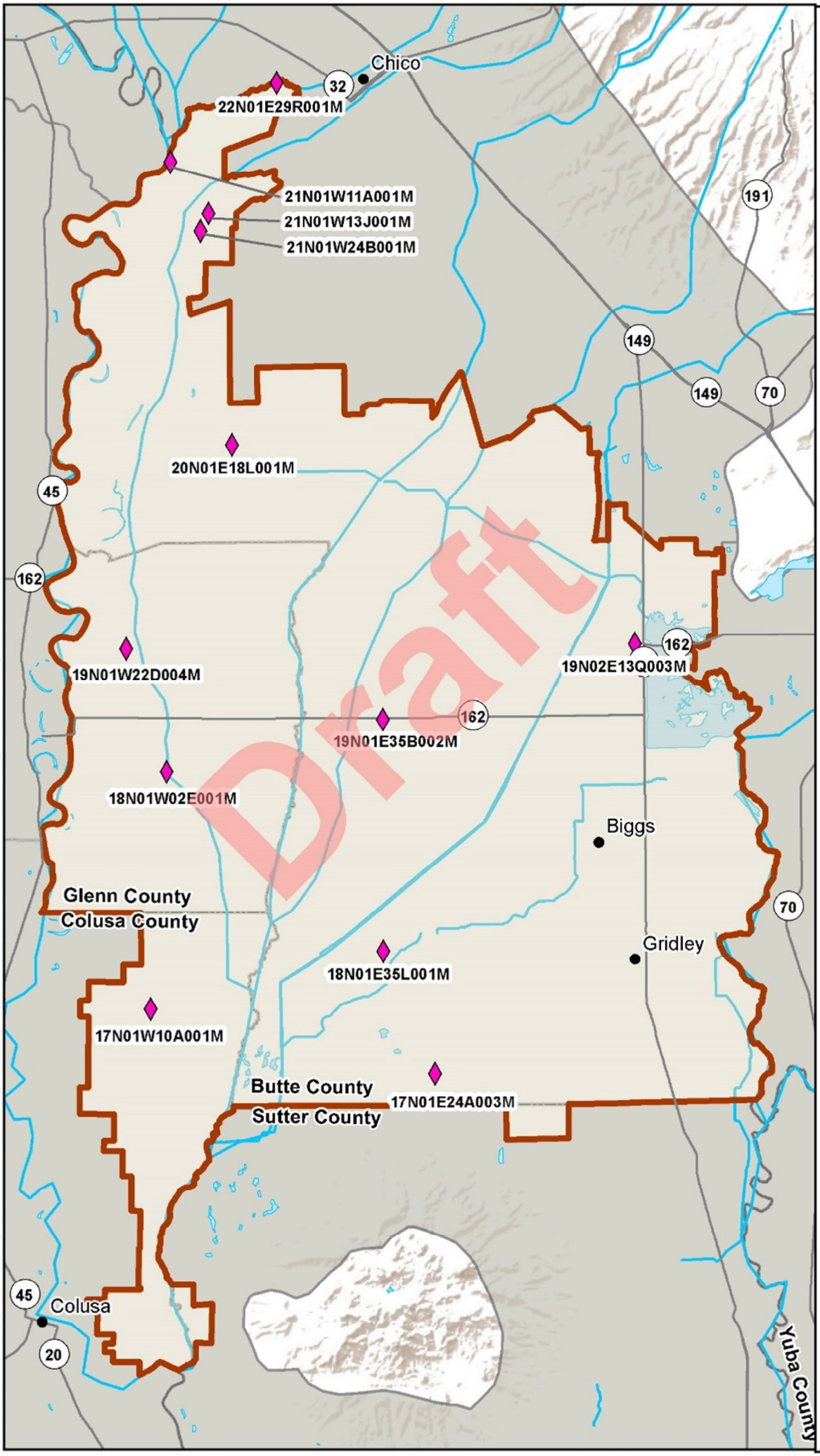

SWN 19N03E05N002M (CASGEM - 34319 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
162
142
122
102
82
62
42
22
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
34319 GWL
34319-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = -20 ft.
GSE: 142 ft.
Measurable Objective (ft. bgs): 37 ft.
Minimum Threshold (ft. bgs): 98 ft.
MT Calculation Method = 100% Historical Range


SWN 20N02E28N001M (CASGEM - 35611 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
143
123
103
83
63
43
23
3
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
35611 GWL
35611-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 5 ft.
GSE: 123 ft.
Measurable Objective (ft. bgs): 12 ft.
Minimum Threshold (ft. bgs): 49 ft.
MT Calculation Method = 100% Historical Range


SWN 18N01W17G001M (CASGEM - 40068 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
101
81
61
41
21
1
-19
-39
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
40068 GWL
40068-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 81 ft.
Measurable Objective (ft. bgs): 21 ft.
Minimum Threshold (ft. bgs): 52 ft.
MT Calculation Method = 100% Historical Range


SWN 21N01W13J003M (CASGEM - 48992 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
148
128
108
88
68
48
28
8
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
48992 GWL
48992-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 0 ft.
GSE: 128 ft.
Measurable Objective (ft. bgs): 25 ft.
Minimum Threshold (ft. bgs): 70 ft.
MT Calculation Method = 100% Historical Range


SWN 19N01W15D002M (CASGEM - 50096 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
111
91
71
51
31
11
-9
-29
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
50096 GWL
50096-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
#N/A
GSE: 91 ft.
Measurable Objective (ft. bgs): 25 ft.
Minimum Threshold (ft. bgs): 49 ft.
MT Calculation Method = 100% Historical Range



Deep Groundwater Levels Monitoring Network

Butte Subbasin GSP

N

- Deep Monitoring Network Well
- Cities
- Canals
- State Highways
- Butte Subbasin
- Counties
- Neighboring Subbasins
- Lake

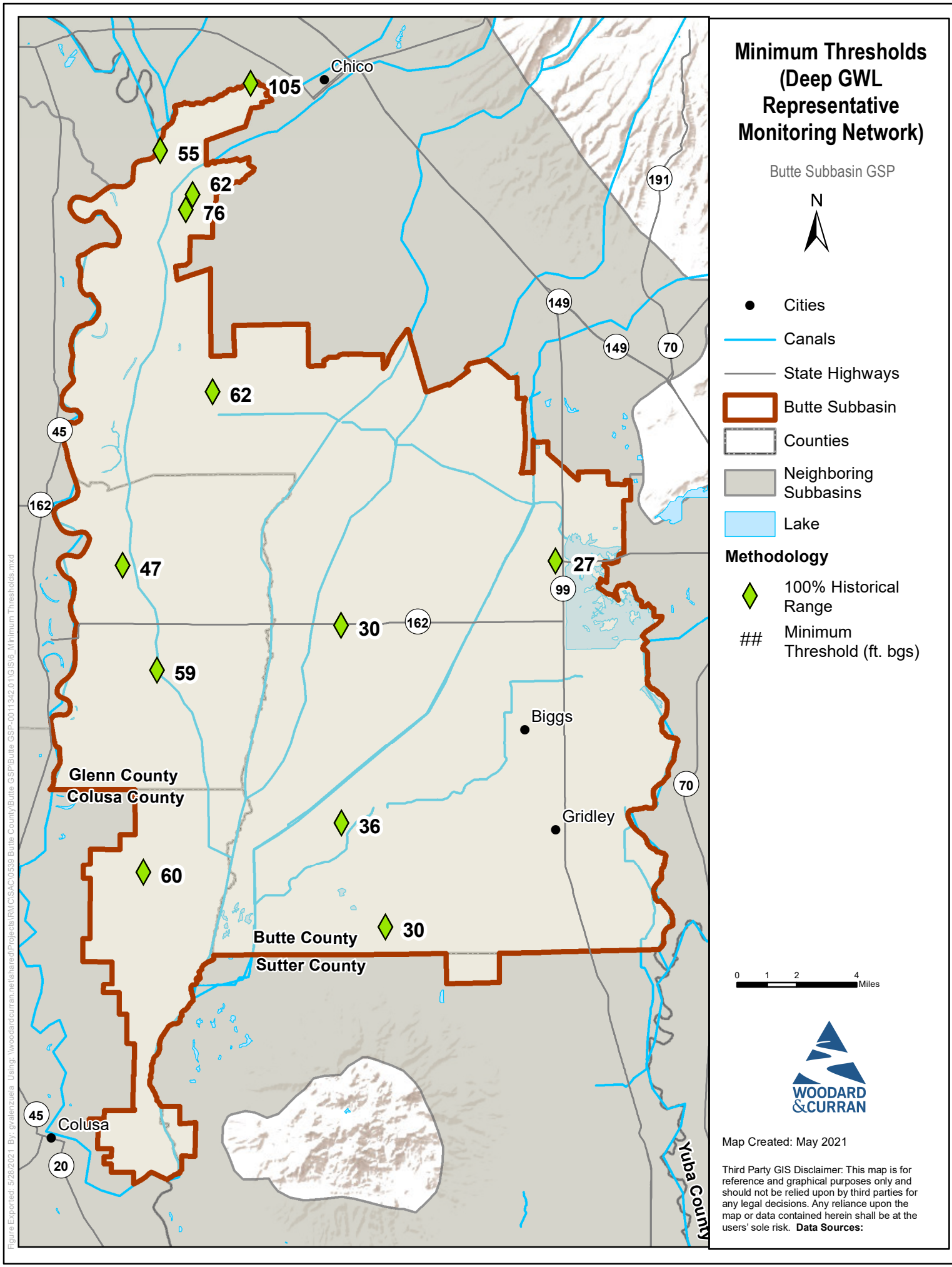
0 1 2 4 Miles

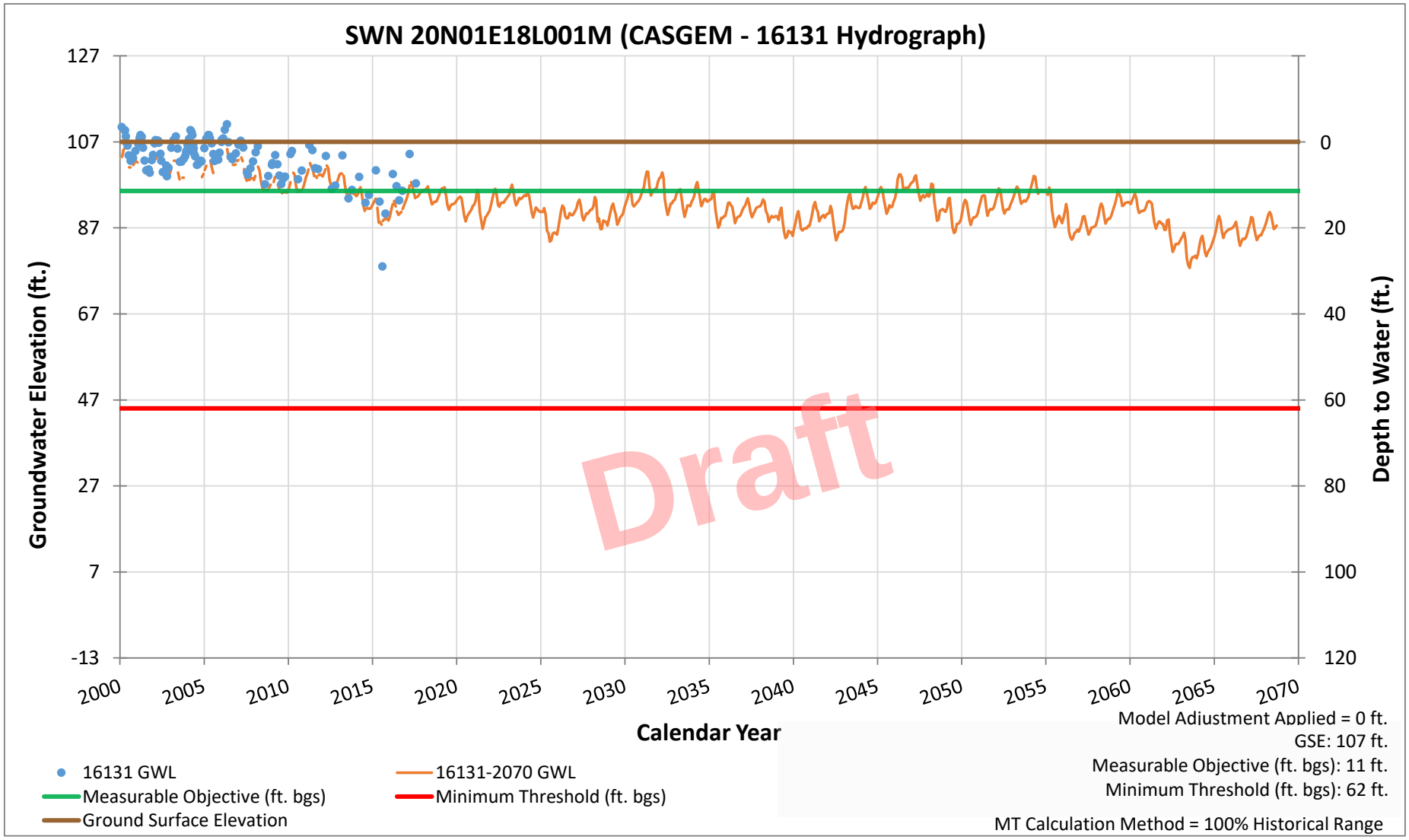
WOODARD &CURRAN

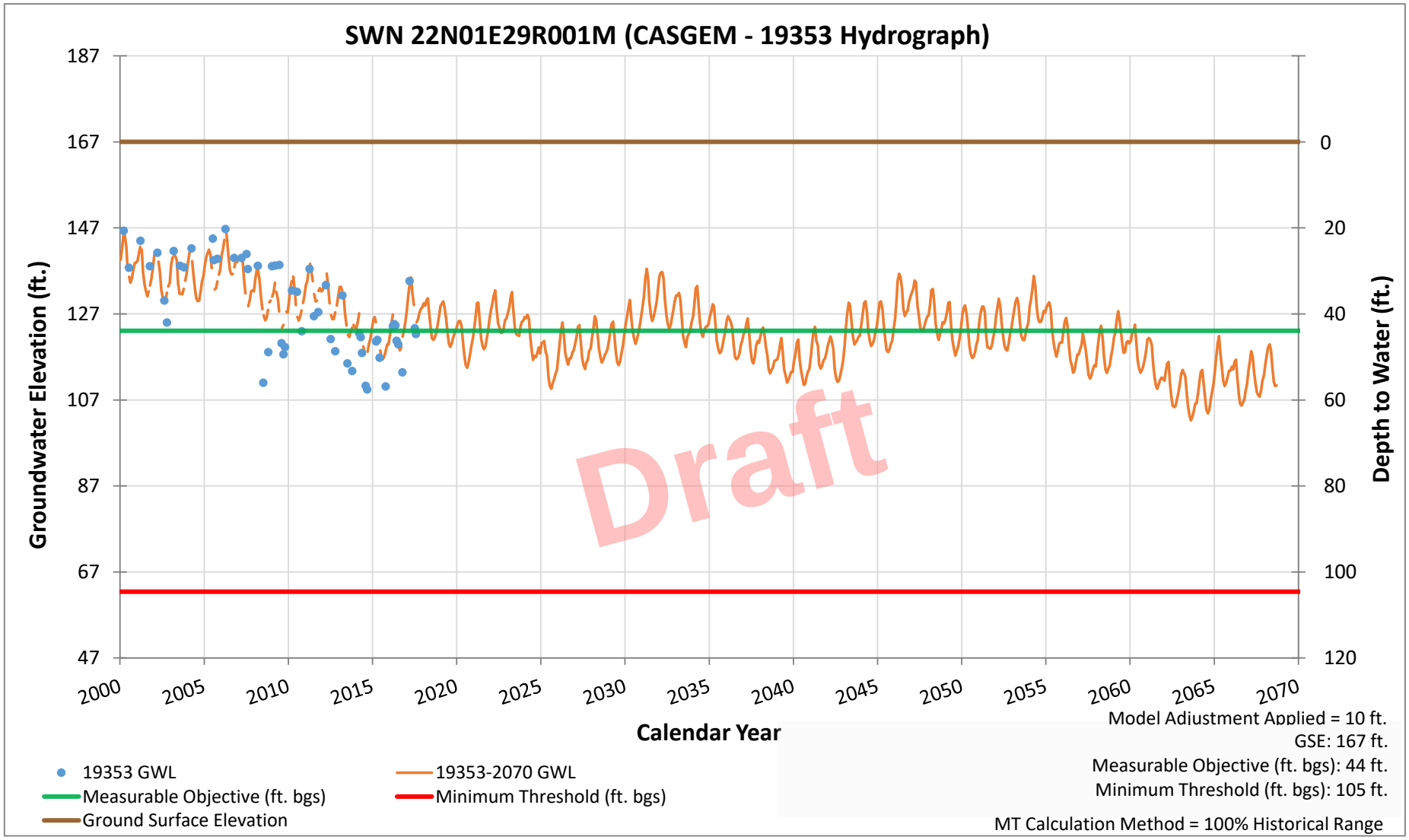
Map Created: May 2021

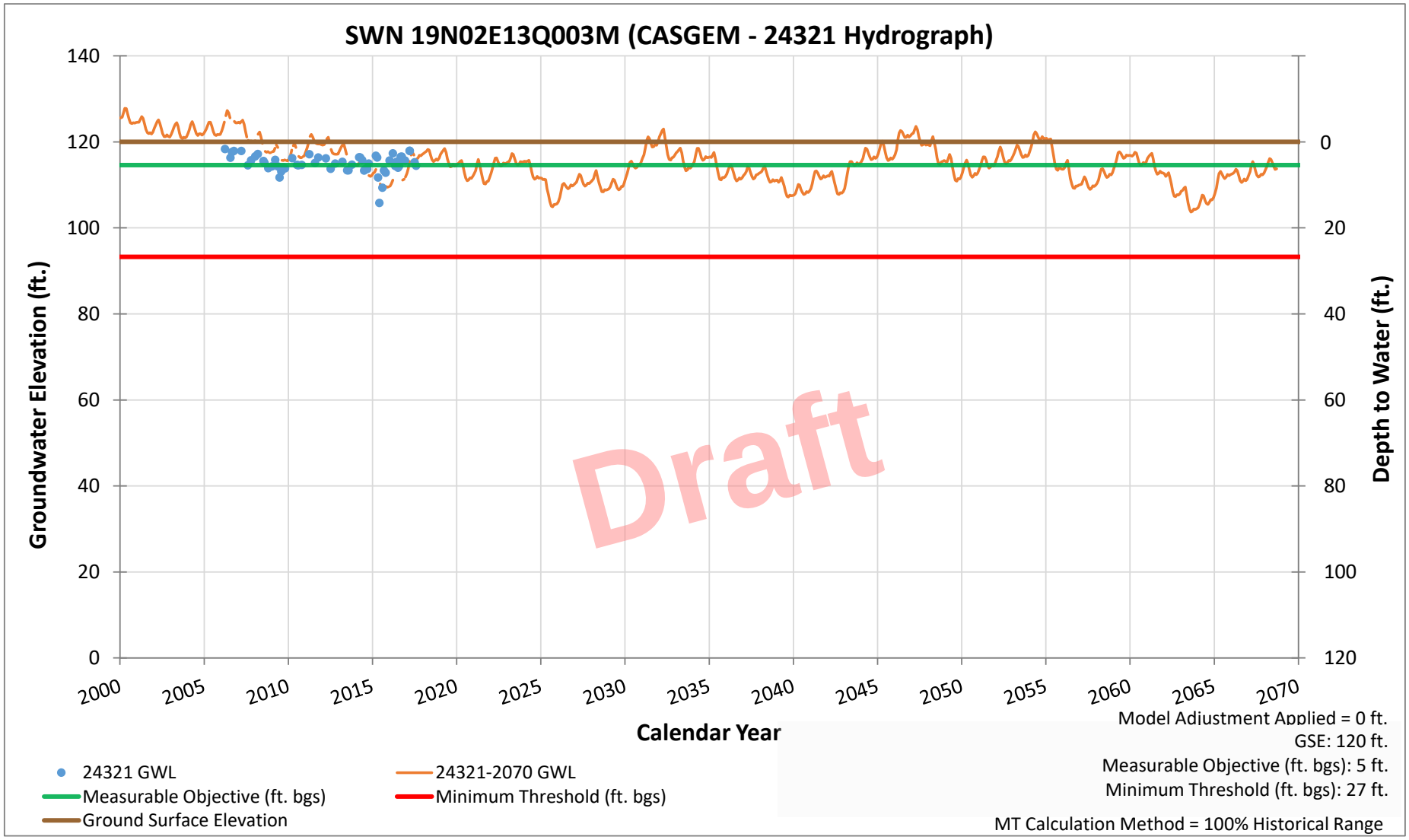
Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data Sources:**

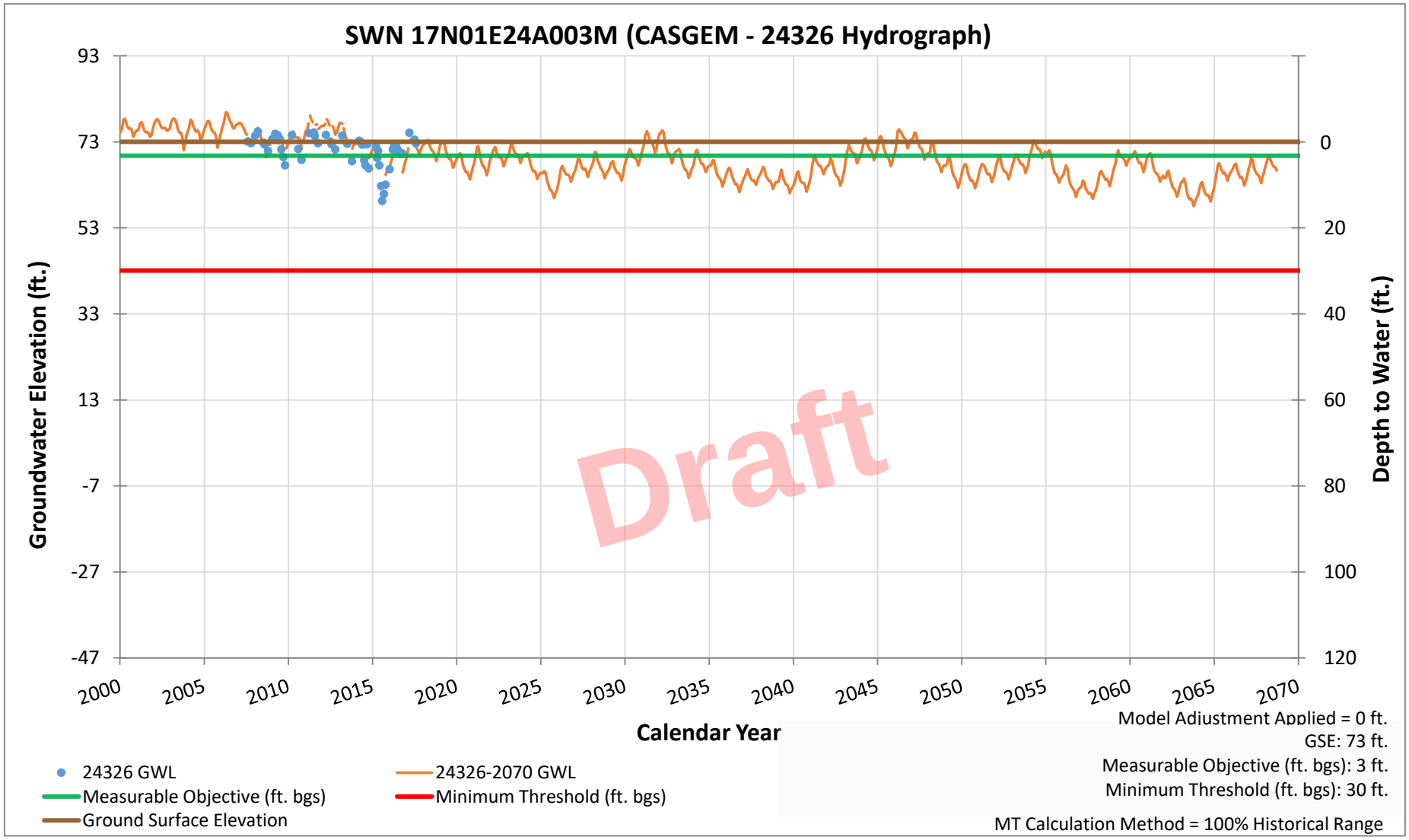
Figure Exported: 5/4/2021 By: gvalenzuela Using: \\woodardcurran.net\shared\Projects\IRM\CSA\CW0539 Butte County\Butte GSP\Butte GSP-00113421.01\GIS\1_Deep GWL Monitoring Network.mxd

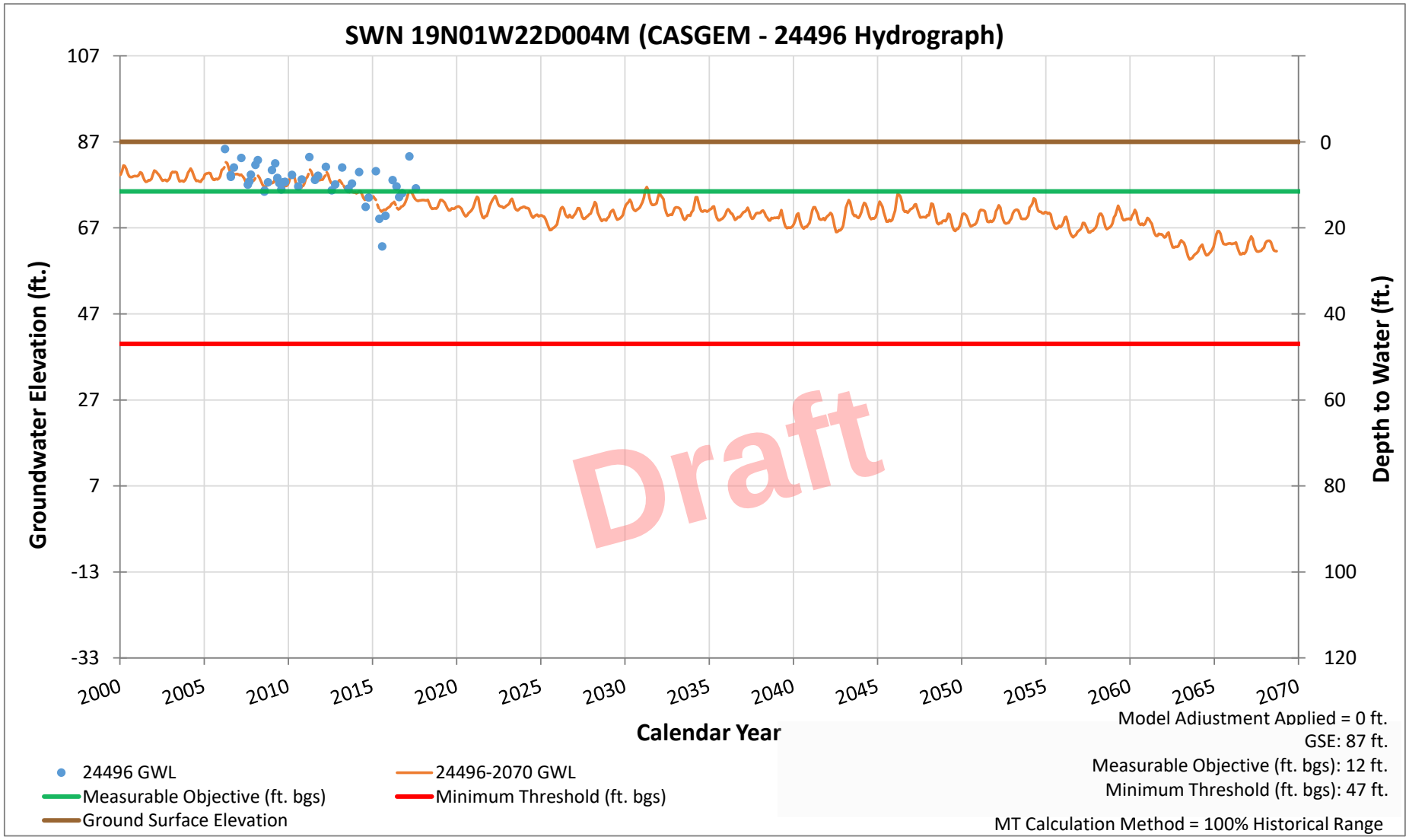

Minimum Thresholds (Deep GWL Representative Monitoring Network)
Butte Subbasin GSP
N
Cities
Canals
State Highways
Butte Subbasin
Counties
Neighboring Subbasins
Lake
Methodology
100% Historical Range
Minimum Threshold (ft. bgs)
105
55
62
76
62
47
30
59
27
36
60
30
Chico
Biggs
Gridley
Colusa
Glenn County
Colusa County
Butte County
Sutter County
Yuba County
45
162
99
149
70
191
20
0 1 2 4 Miles
WOODARD &CURRAN
Map Created: May 2021
Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. Data Sources:
Figure Exported: 5/28/2021 By: gvalenzuela Using: \\woodardcurran.net\shared\Projects\RMC\SAC\0539 Butte County\Butte GSP\Butte GSP-0011342.01\GIS\6_Minimum Thresholds.mxd

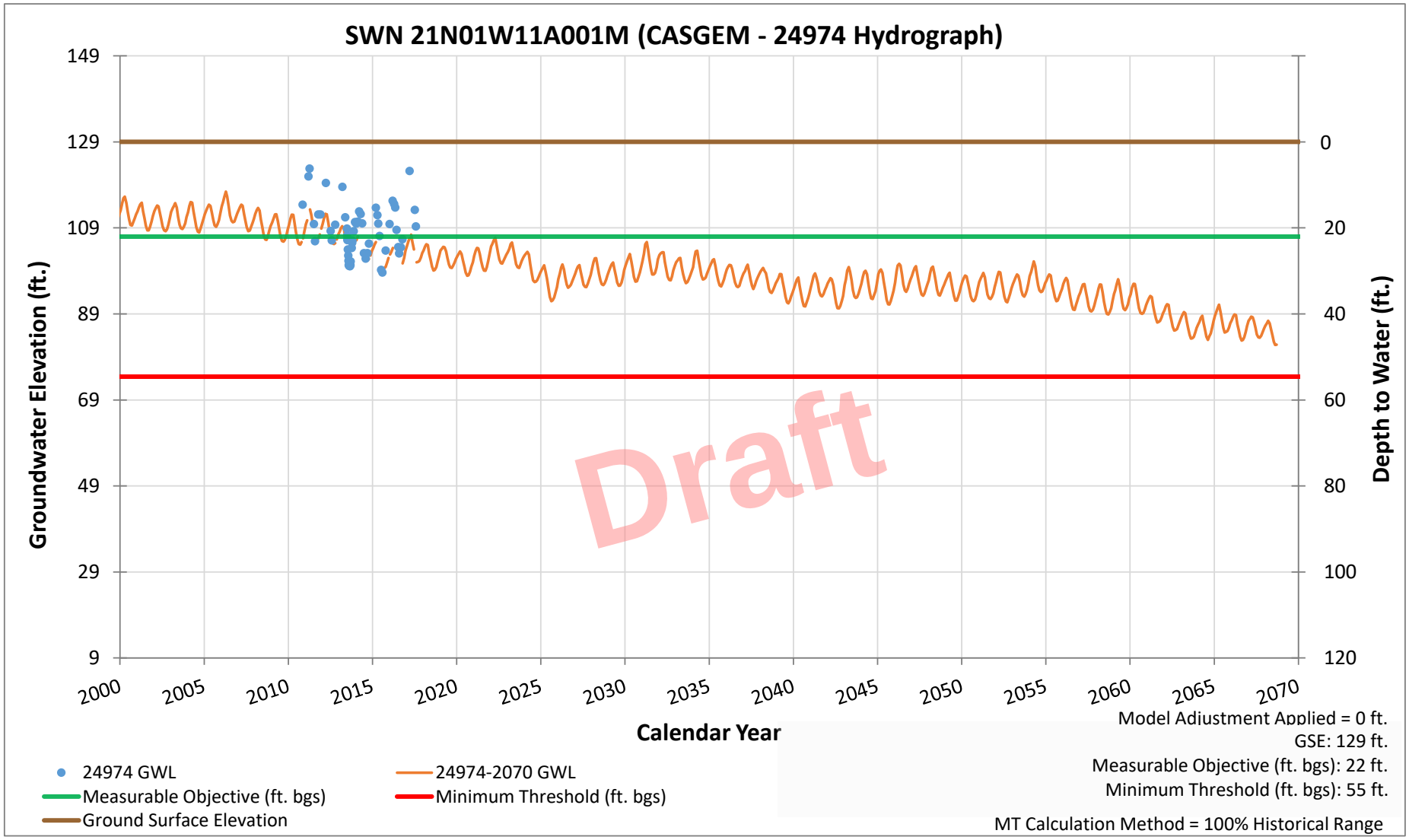

SWN 20N01E18L001M (CASGEM - 16131 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
127
107
87
67
47
27
7
-13
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16131 GWL
16131-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 107 ft.
Measurable Objective (ft. bgs): 11 ft.
Minimum Threshold (ft. bgs): 62 ft.
MT Calculation Method = 100% Historical Range

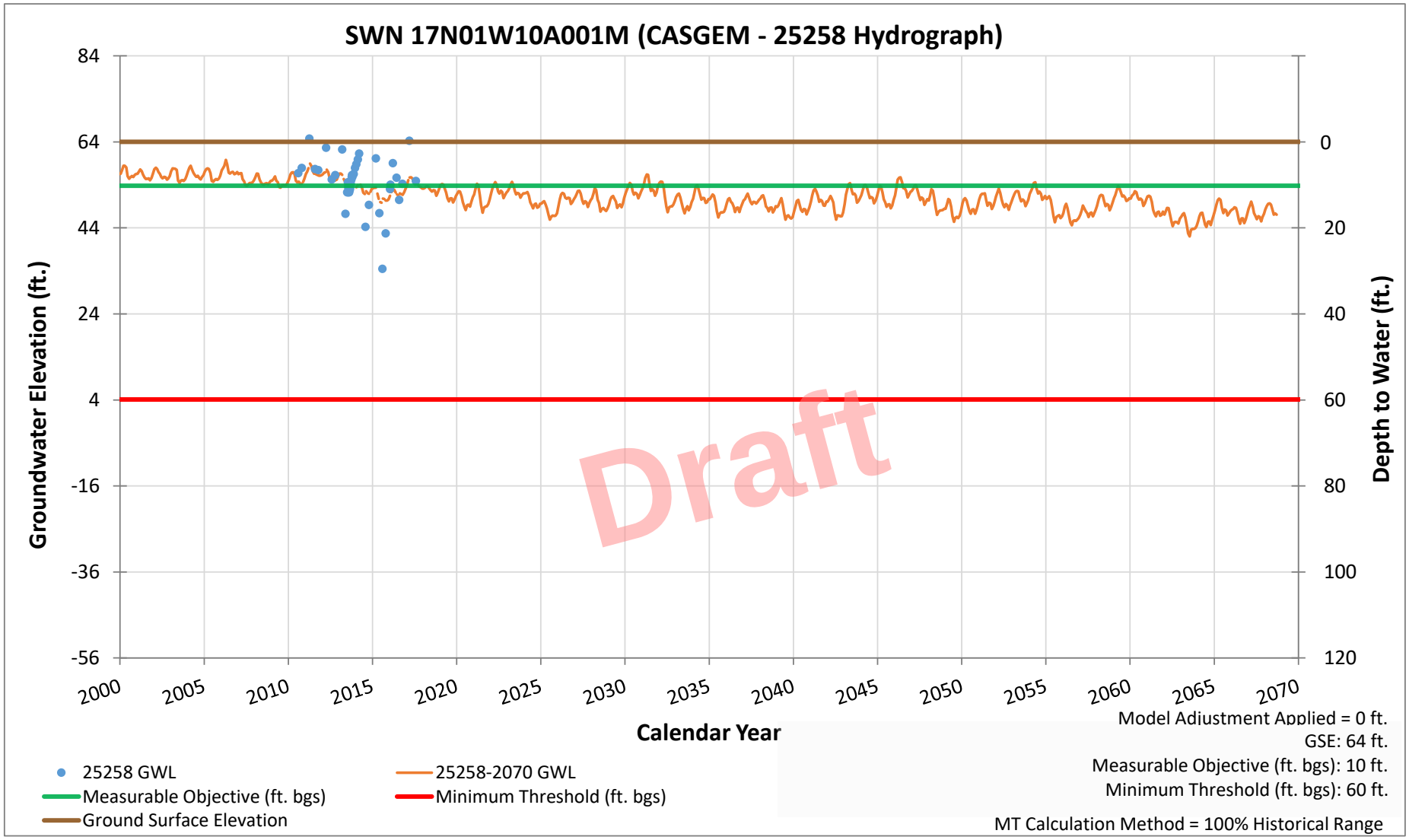

SWN 22N01E29R001M (CASGEM - 19353 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
187
167
147
127
107
87
67
47
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19353 GWL
19353-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adjustment Applied = 10 ft.
GSE: 167 ft.
Measurable Objective (ft. bgs): 44 ft.
Minimum Threshold (ft. bgs): 105 ft.
MT Calculation Method = 100% Historical Range

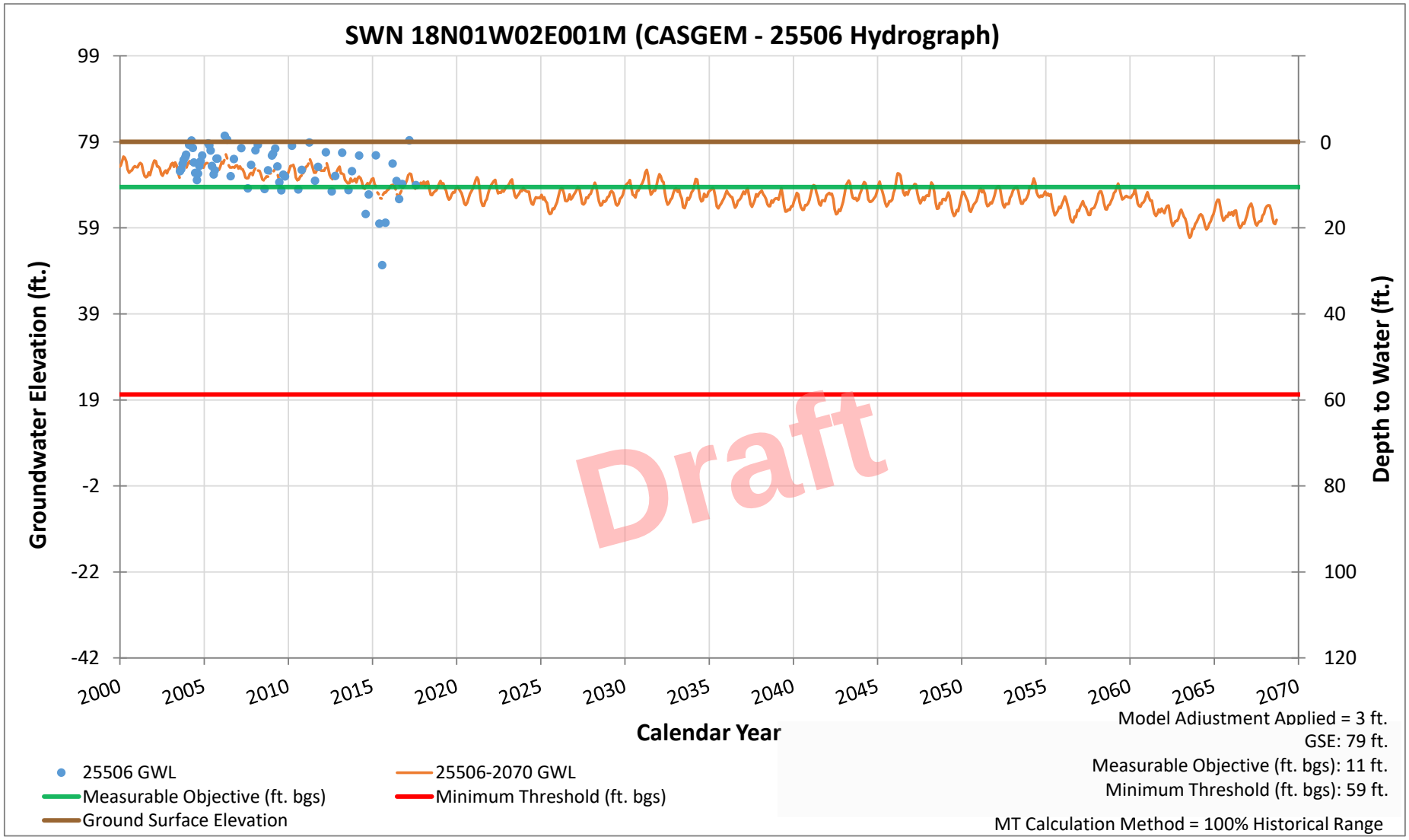

SWN 19N02E13Q003M (CASGEM - 24321 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
140
120
100
80
60
40
20
0
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
24321 GWL
24321-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 120 ft.
Measurable Objective (ft. bgs): 5 ft.
Minimum Threshold (ft. bgs): 27 ft.
MT Calculation Method = 100% Historical Range

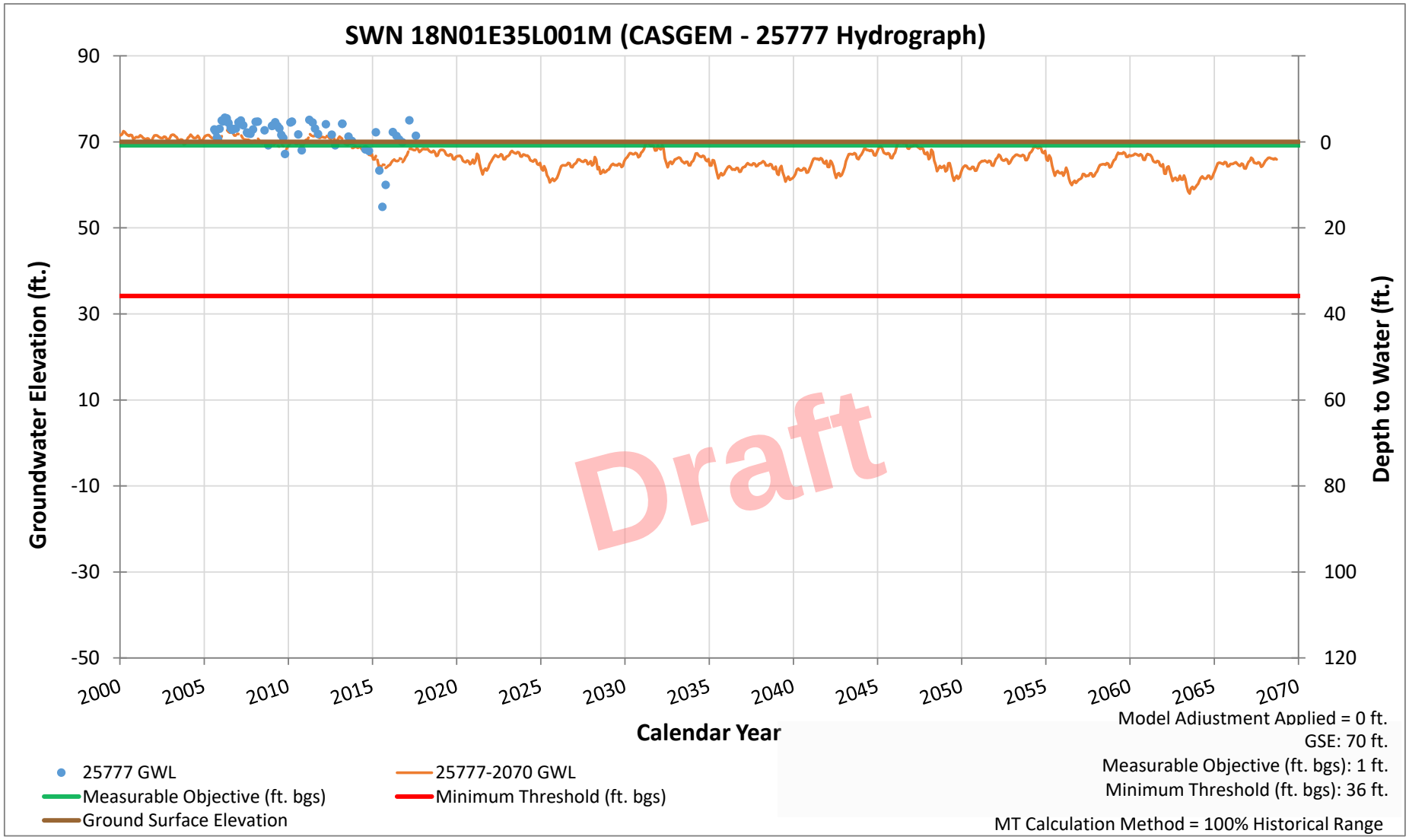

SWN 17N01E24A003M (CASGEM - 24326 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
93
73
53
33
13
-7
-27
-47
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24326 GWL
24326-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 73 ft.
Measurable Objective (ft. bgs): 3 ft.
Minimum Threshold (ft. bgs): 30 ft.
MT Calculation Method = 100% Historical Range

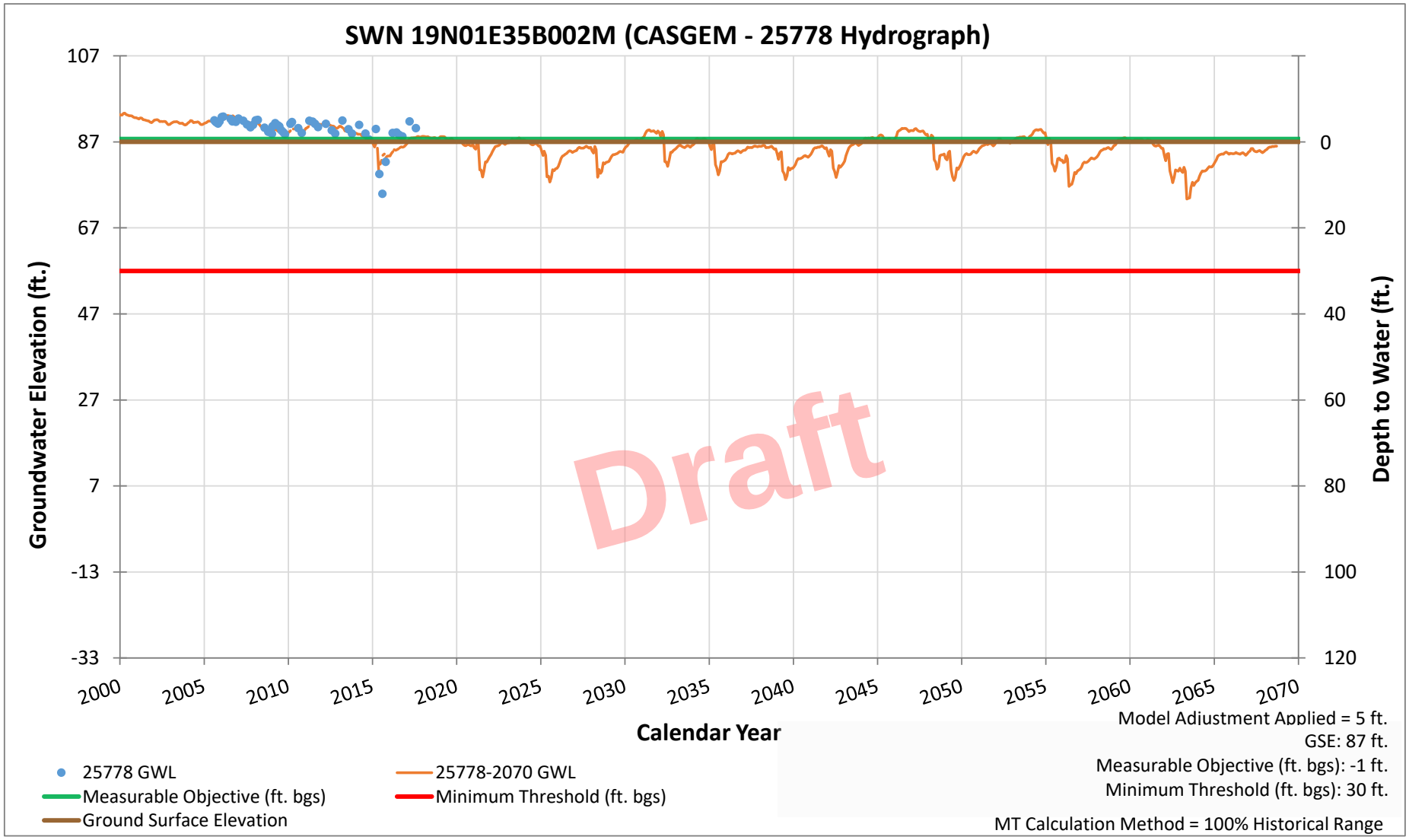

SWN 19N01W22D004M (CASGEM - 24496 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24496 GWL
24496-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): 12 ft.
Minimum Threshold (ft. bgs): 47 ft.
MT Calculation Method = 100% Historical Range

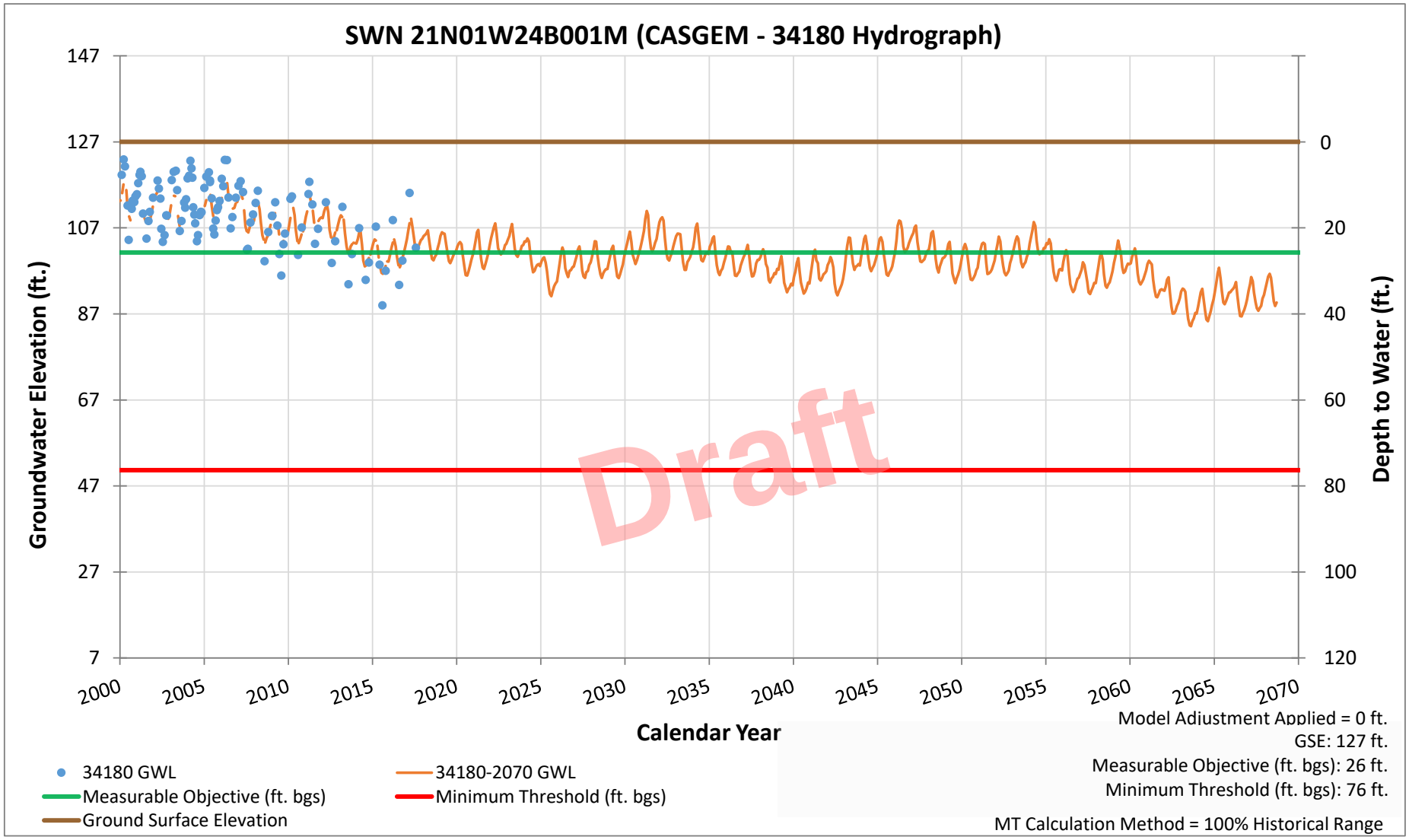

SWN 21N01W11A001M (CASGEM - 24974 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
149
129
109
89
69
49
29
9
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24974 GWL
24974-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 129 ft.
Measurable Objective (ft. bgs): 22 ft.
Minimum Threshold (ft. bgs): 55 ft.
MT Calculation Method = 100% Historical Range

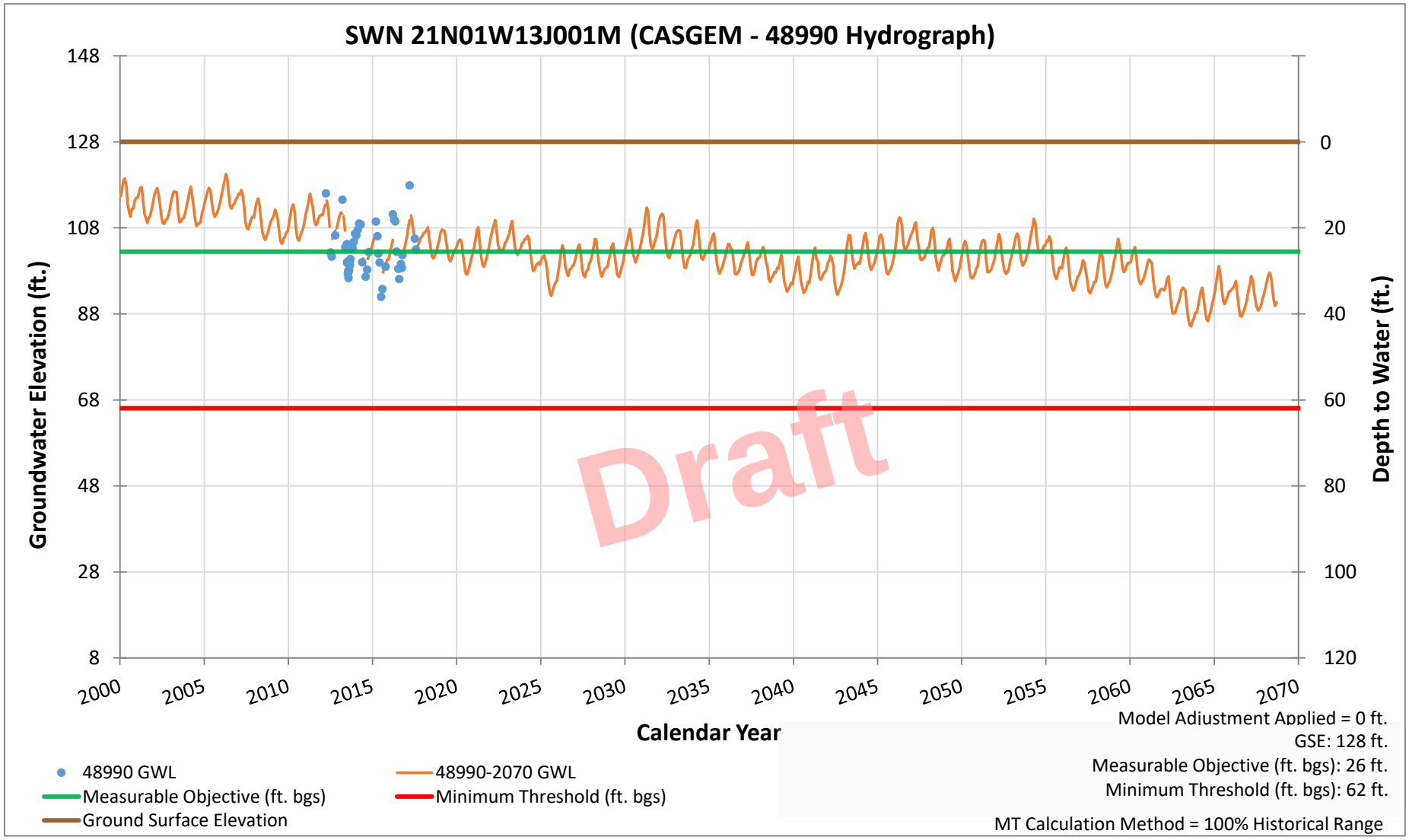

SWN 17N01W10A001M (CASGEM - 25258 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
84
64
44
24
4
-16
-36
-56
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
25258 GWL
25258-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 64 ft.
Measurable Objective (ft. bgs): 10 ft.
Minimum Threshold (ft. bgs): 60 ft.
MT Calculation Method = 100% Historical Range

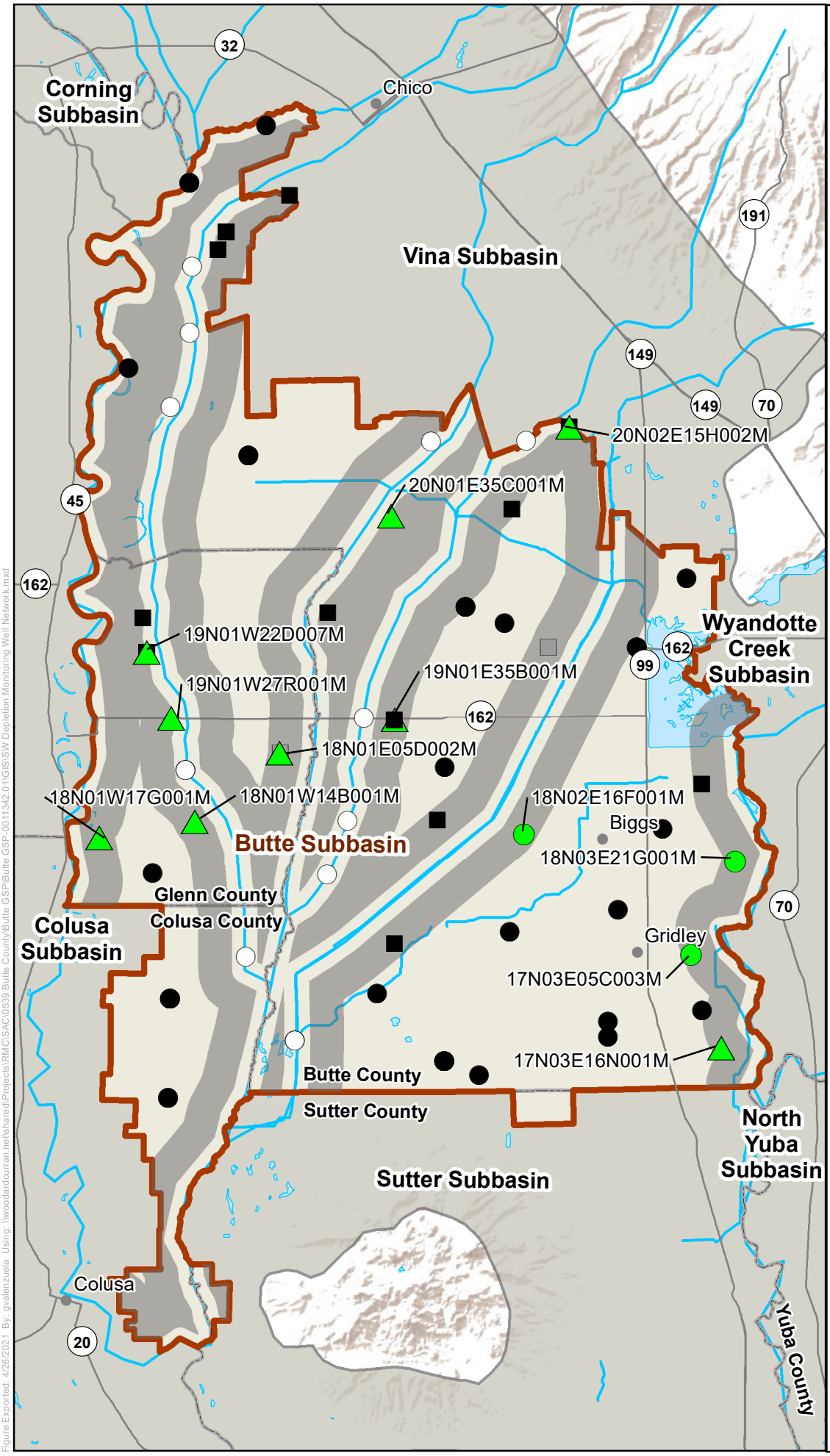

SWN 18N01W02E001M (CASGEM - 25506 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
99
79
59
39
19
-2
-22
-42
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
25506 GWL
25506-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 3 ft.
GSE: 79 ft.
Measurable Objective (ft. bgs): 11 ft.
Minimum Threshold (ft. bgs): 59 ft.
MT Calculation Method = 100% Historical Range


SWN 18N01E35L001M (CASGEM - 25777 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
90
70
50
30
10
-10
-30
-50
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
25777 GWL
25777-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 70 ft.
Measurable Objective (ft. bgs): 1 ft.
Minimum Threshold (ft. bgs): 36 ft.
MT Calculation Method = 100% Historical Range


SWN 19N01E35B002M (CASGEM - 25778 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
25778 GWL
25778-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 5 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): -1 ft.
Minimum Threshold (ft. bgs): 30 ft.
MT Calculation Method = 100% Historical Range


SWN 21N01W24B001M (CASGEM - 34180 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
147
127
107
87
67
47
27
7
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
34180 GWL
34180-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 127 ft.
Measurable Objective (ft. bgs): 26 ft.
Minimum Threshold (ft. bgs): 76 ft.
MT Calculation Method = 100% Historical Range


SWN 21N01W13J001M (CASGEM - 48990 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
148
128
108
88
68
48
28
8
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
48990 GWL
48990-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Ground Surface Elevation
Model Adiustment Applied = 0 ft.
GSE: 128 ft.
Measurable Objective (ft. bgs): 26 ft.
Minimum Threshold (ft. bgs): 62 ft.
MT Calculation Method = 100% Historical Range



Stream Depletion Representative Monitoring Network

Butte Subbasin GSP

N

Analysis

- Between 2,000' and 7,280' from streams with total depth less than 150' bgs
- Between 2,000' and 7,280' from streams with top of screen above 100' bgs, and bottom of screen above 200' bgs
- Between 2,000' and 7,280' from streams with top of screen below 100' bgs or total depth greater than 150' bgs
- Between 2,000' and 7,280' from streams but no well construction data
- Less than 2,000' from streams
- Greater than 7,280' from streams

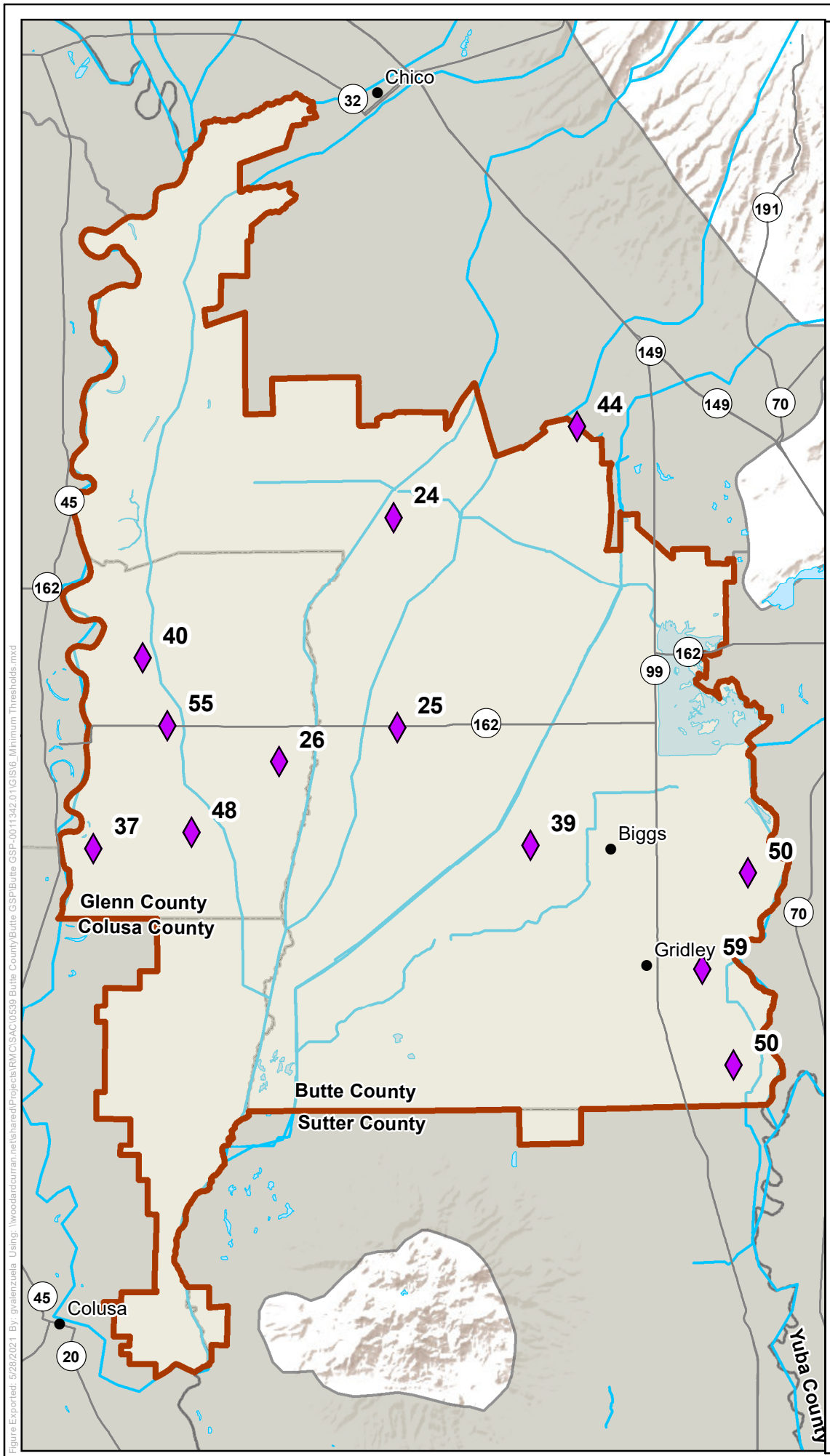
0 1 2 4 Miles

WOODARD &CURRAN

Map Created: April 2021

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data Sources:**

Figure Exported: 4/26/2021 By: gvalenzuela Using: \\woodardcurran.net\shared\Projects\RMC\SAC\0539 Butte County\Butte GSP\Butte GSP-0011342.01\GIS\SW Depletion Monitoring Well Network.mxd



Minimum Thresholds (Interconnected Surface Water) Representative Monitoring Network)

Butte Subbasin GSP

N

- Cities
- Canals
- State Highways
- Butte Subbasin
- Counties
- Neighboring Subbasins
- Lake

Methodology

- 10-feet Deeper Than Historical Low
- ## Minimum Threshold (ft. bgs)

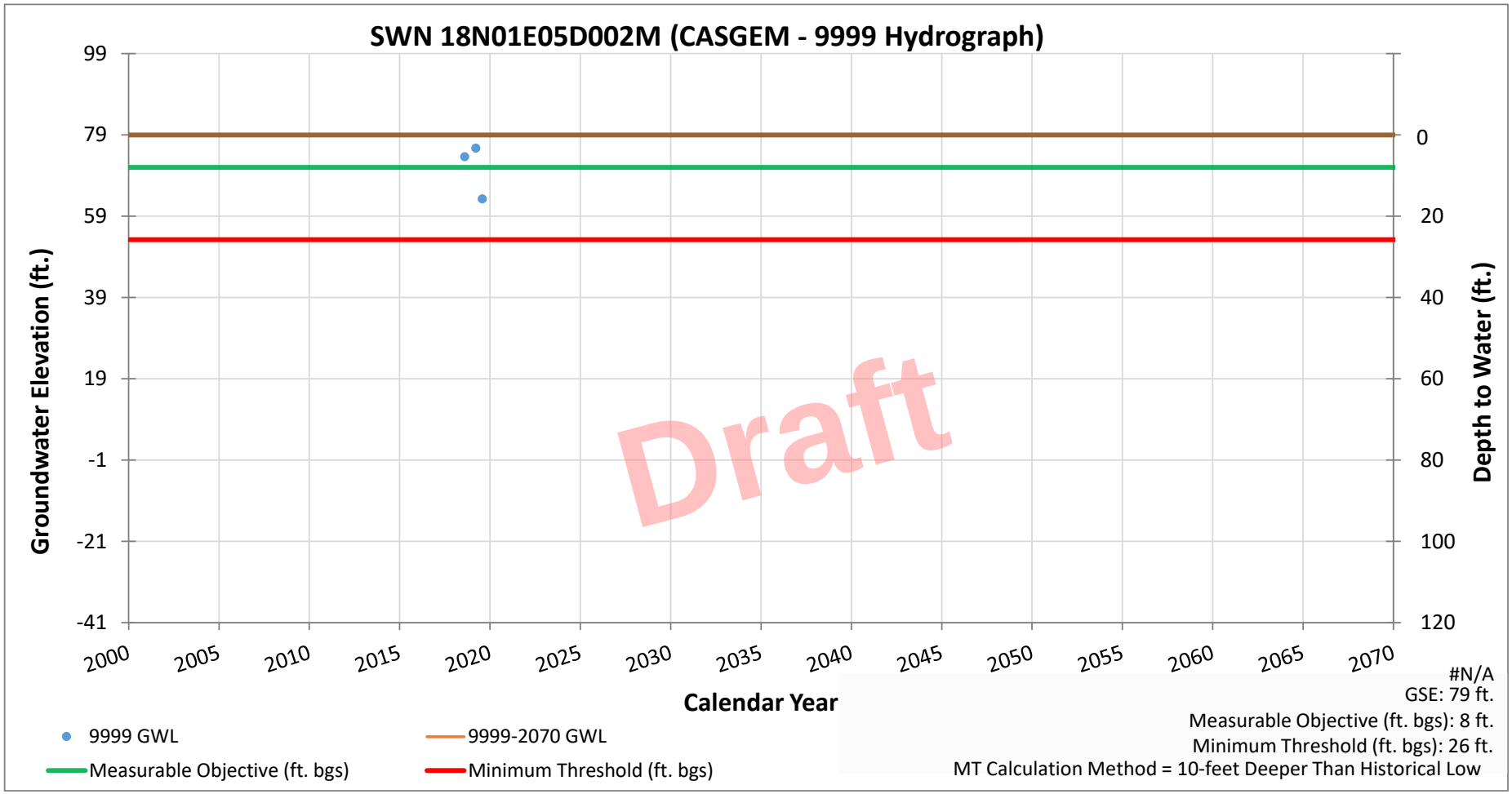
0 1 2 4 Miles

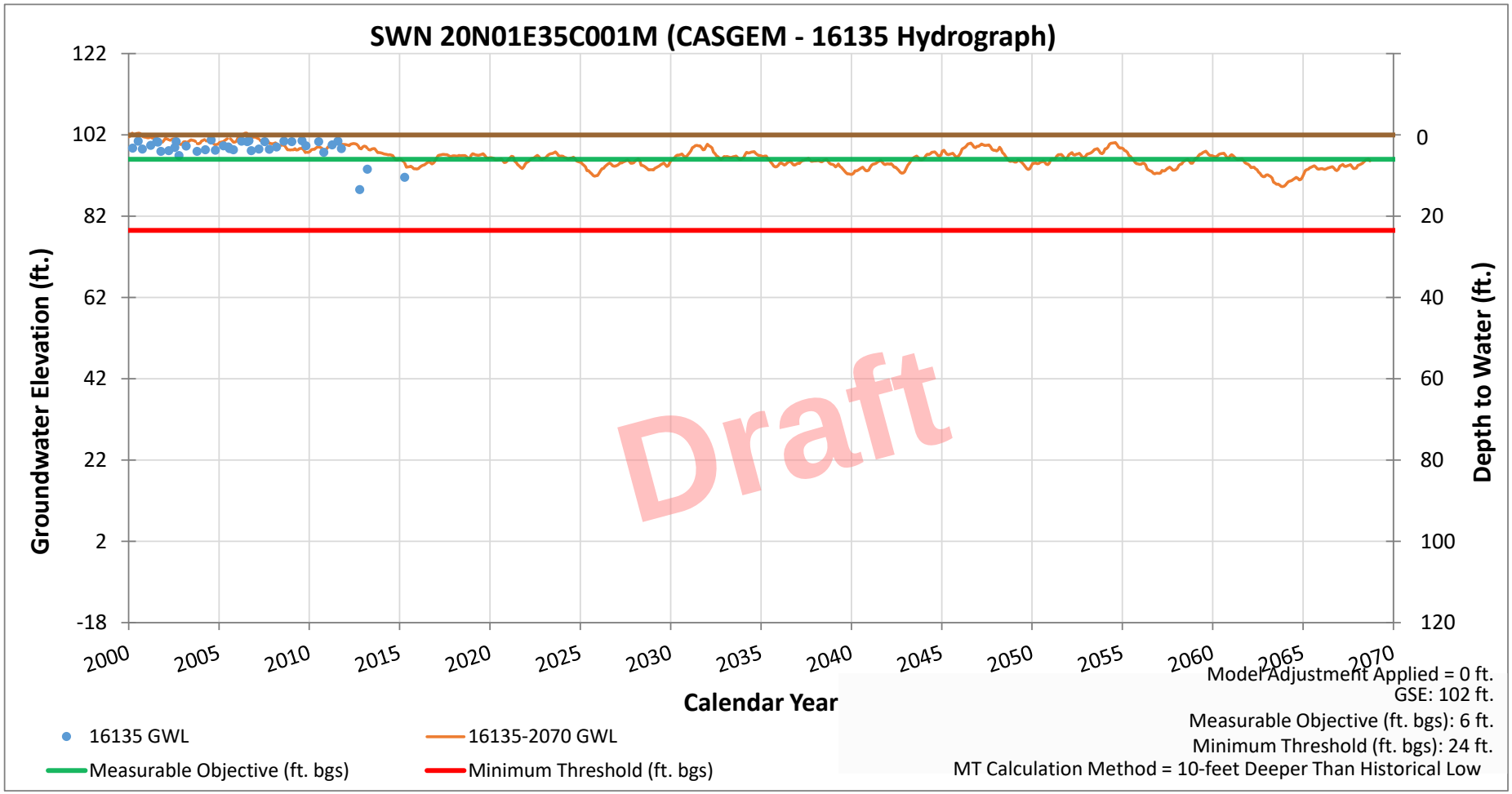
WOODARD &CURRAN

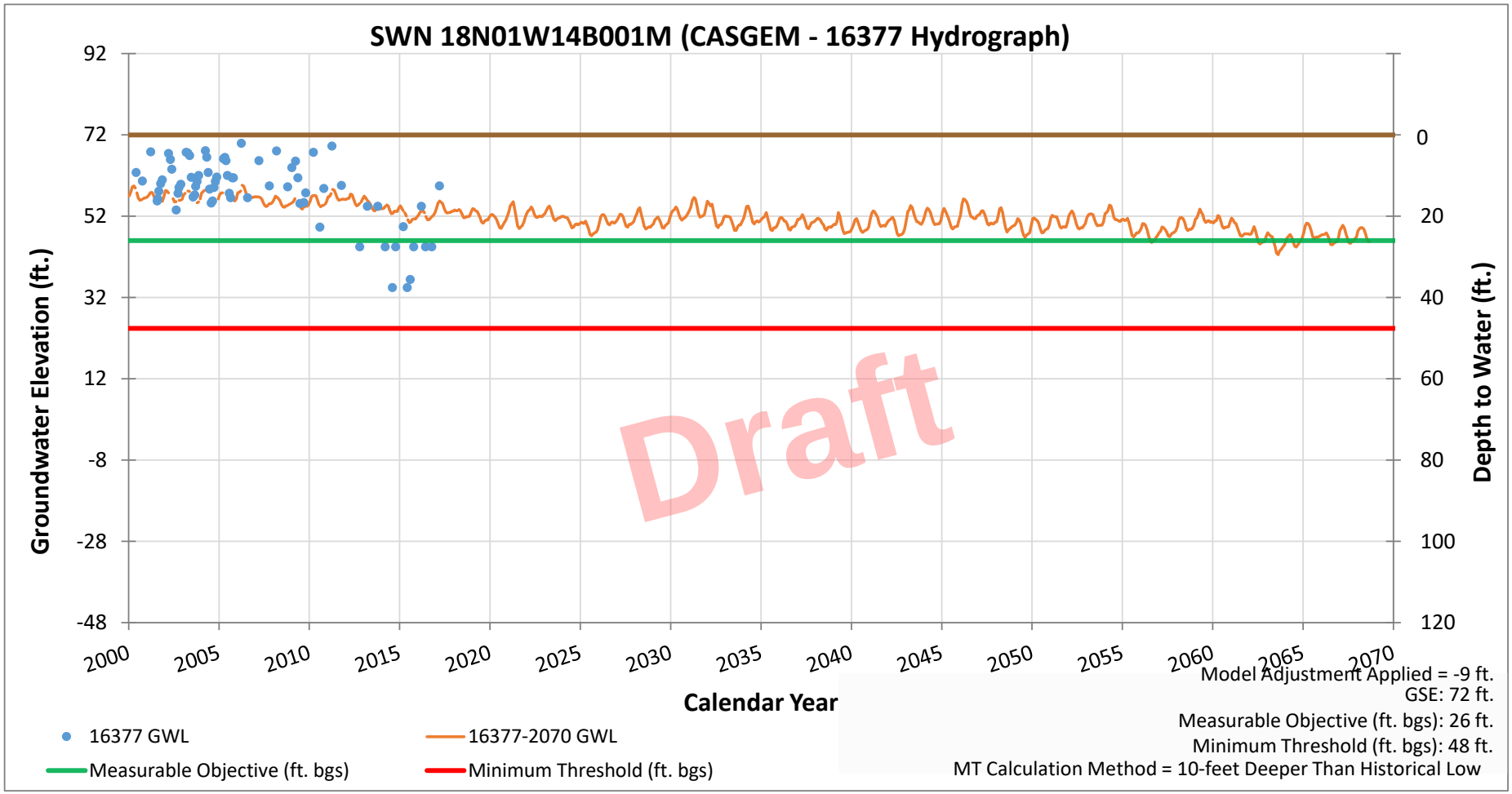
Map Created: May 2021

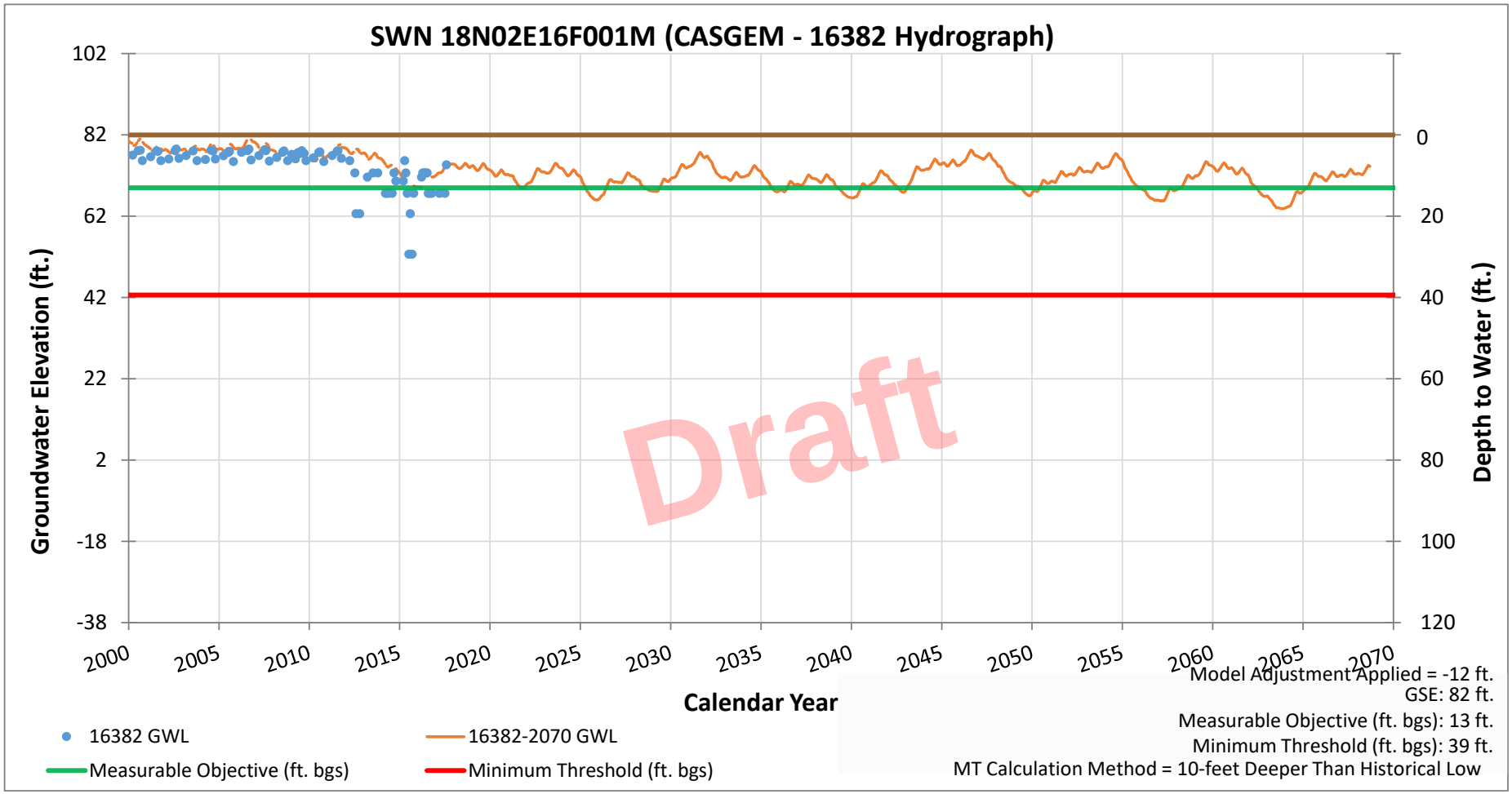
Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data Sources:**

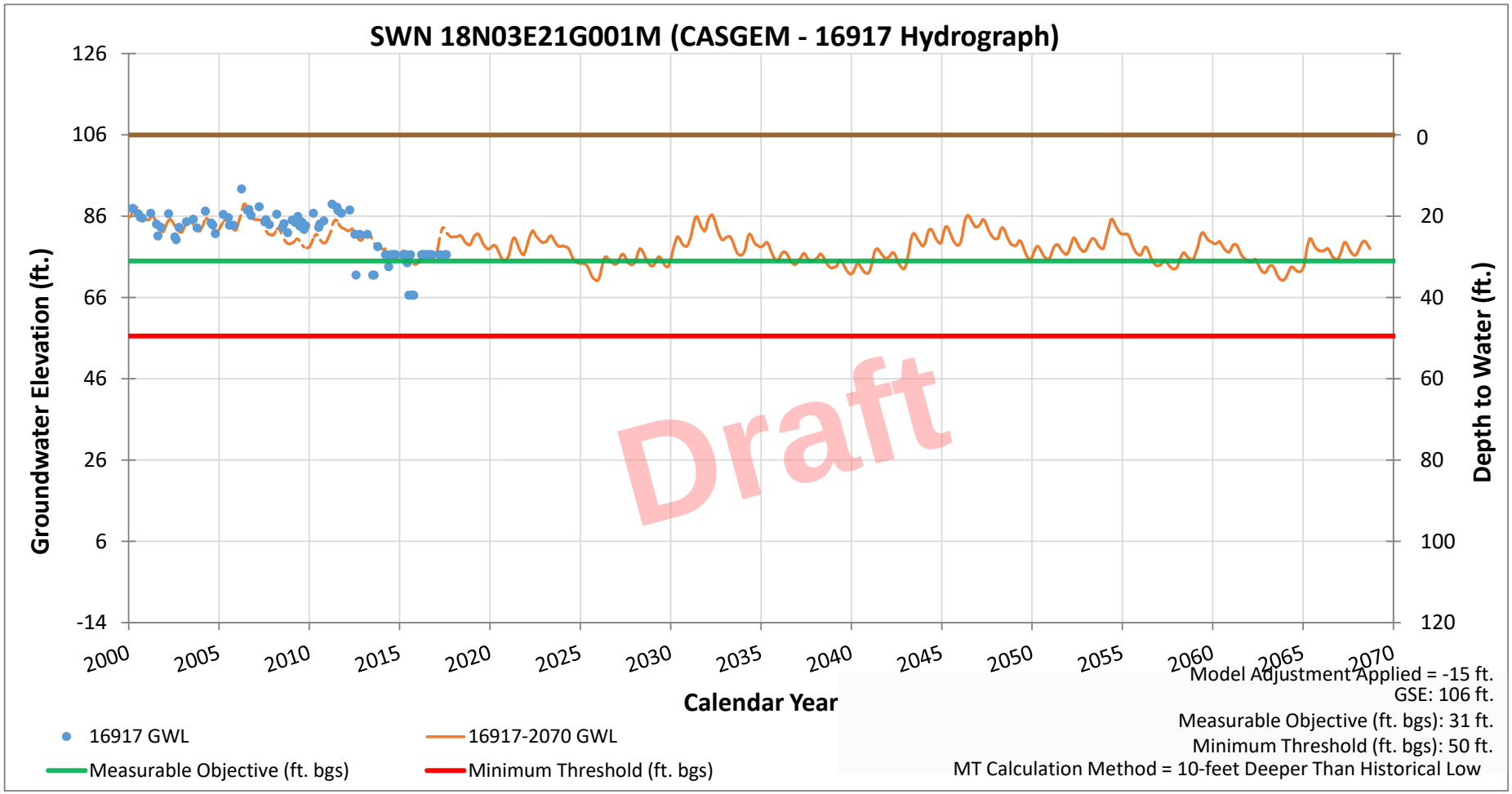
Figure Exported: 5/28/2021 By: gvalenzuela Using: \\woodardcurran.net\shared\Projects\RMC\SAC\0539 Butte County\Butte GSP\Butte GSP-0011342.01\GIS\6_Minimum Thresholds.mxd

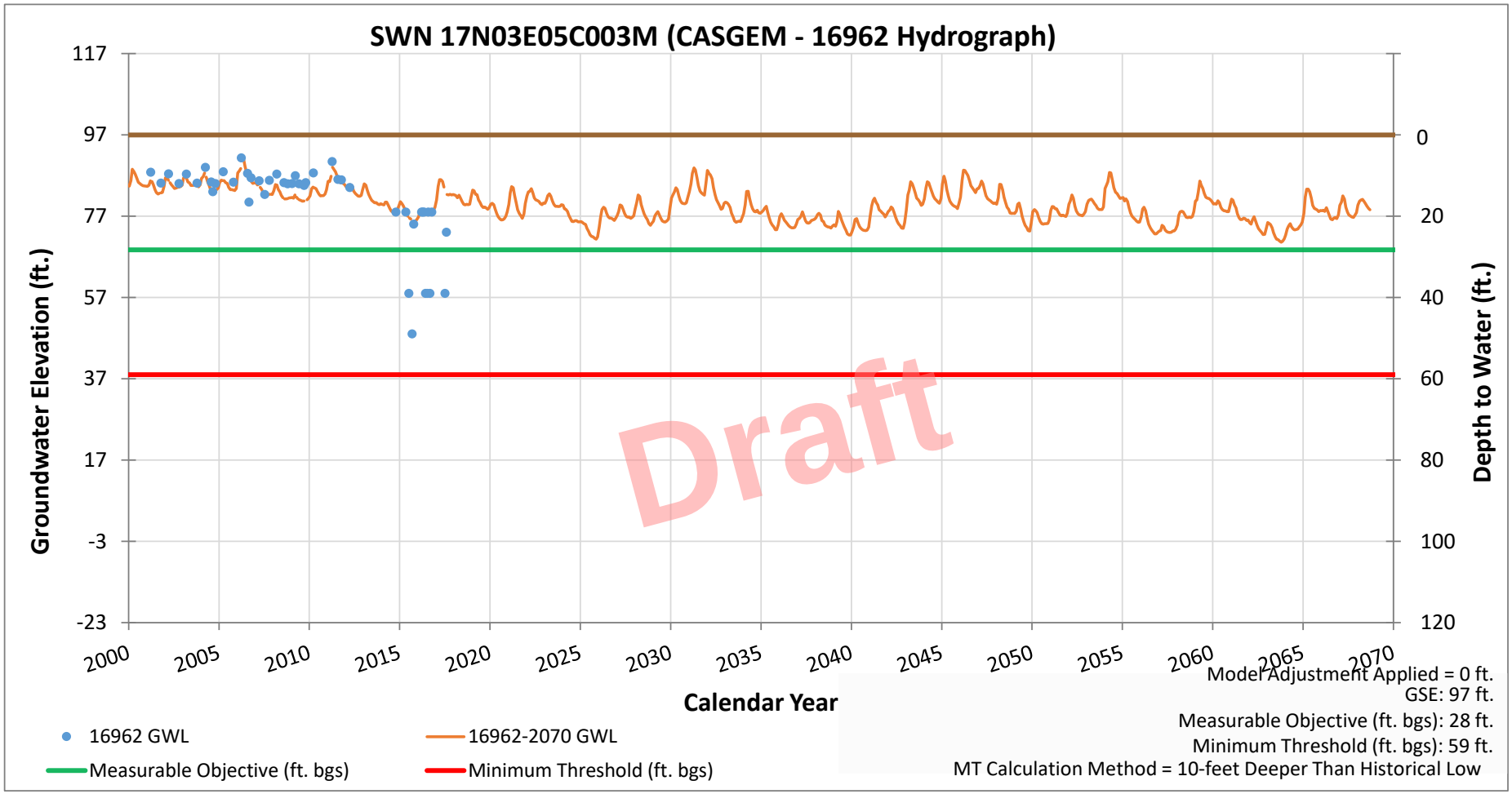

SWN 18N01E05D002M (CASGEM - 9999 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
99
79
59
39
19
-1
-21
-41
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
9999 GWL
9999-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
#N/A
GSE: 79 ft.
Measurable Objective (ft. bgs): 8 ft.
Minimum Threshold (ft. bgs): 26 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low

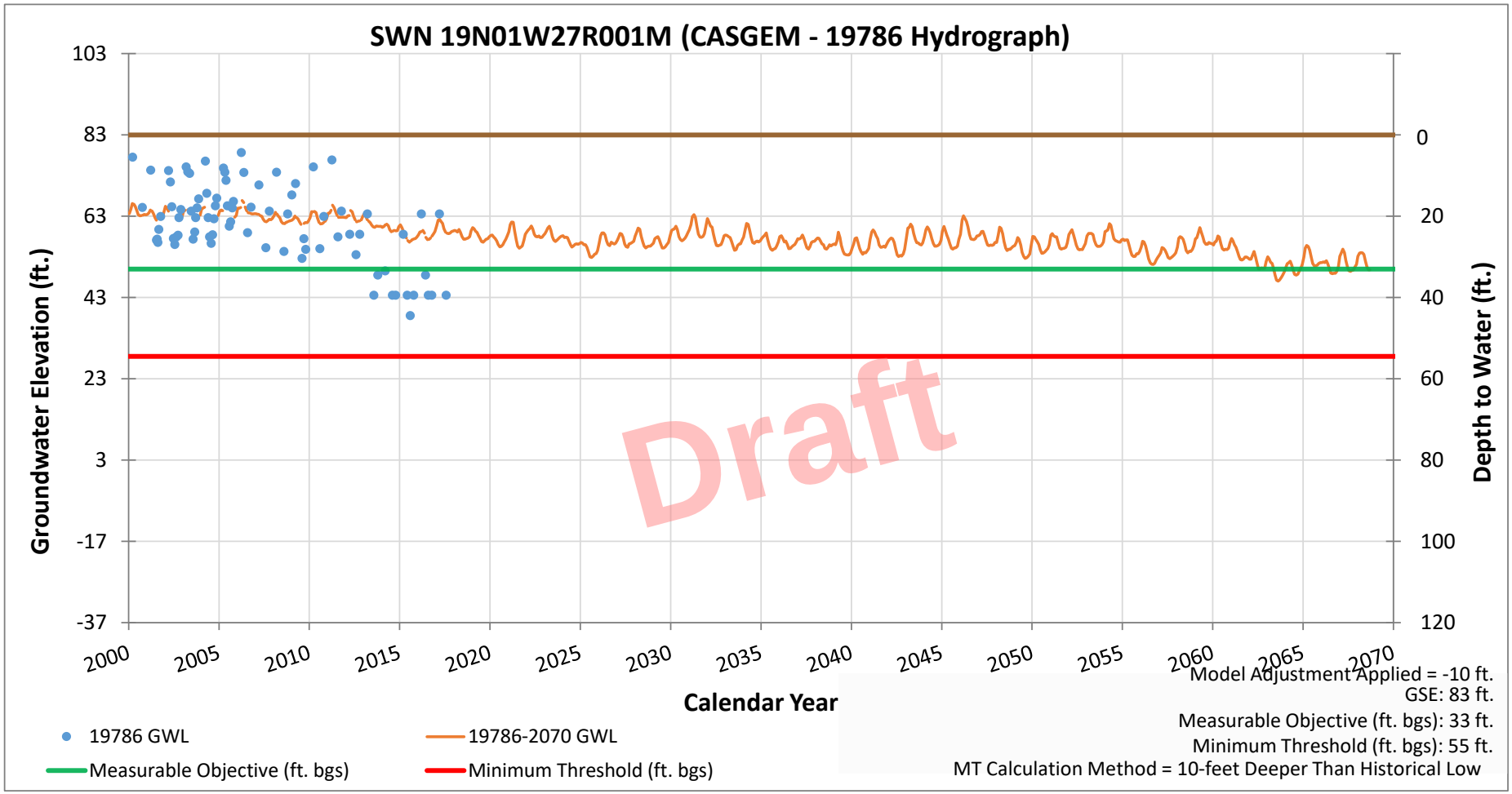

SWN 20N01E35C001M (CASGEM - 16135 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
122
102
82
62
42
22
2
-18
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16135 GWL
16135-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = 0 ft.
GSE: 102 ft.
Measurable Objective (ft. bgs): 6 ft.
Minimum Threshold (ft. bgs): 24 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low

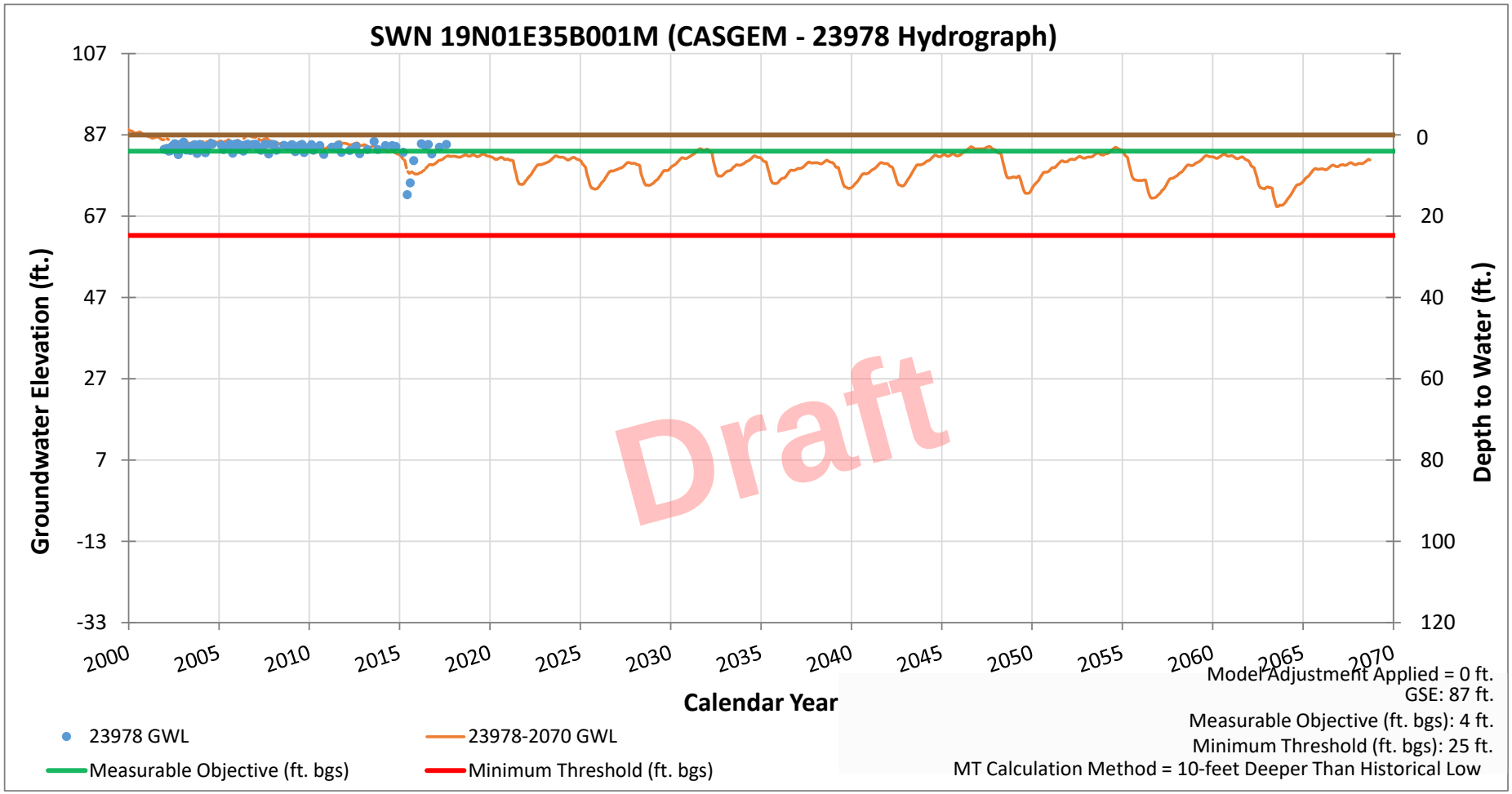

SWN 18N01W14B001M (CASGEM - 16377 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
92
72
52
32
12
-8
-28
-48
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16377 GWL
16377-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = -9 ft.
GSE: 72 ft.
Measurable Objective (ft. bgs): 26 ft.
Minimum Threshold (ft. bgs): 48 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low

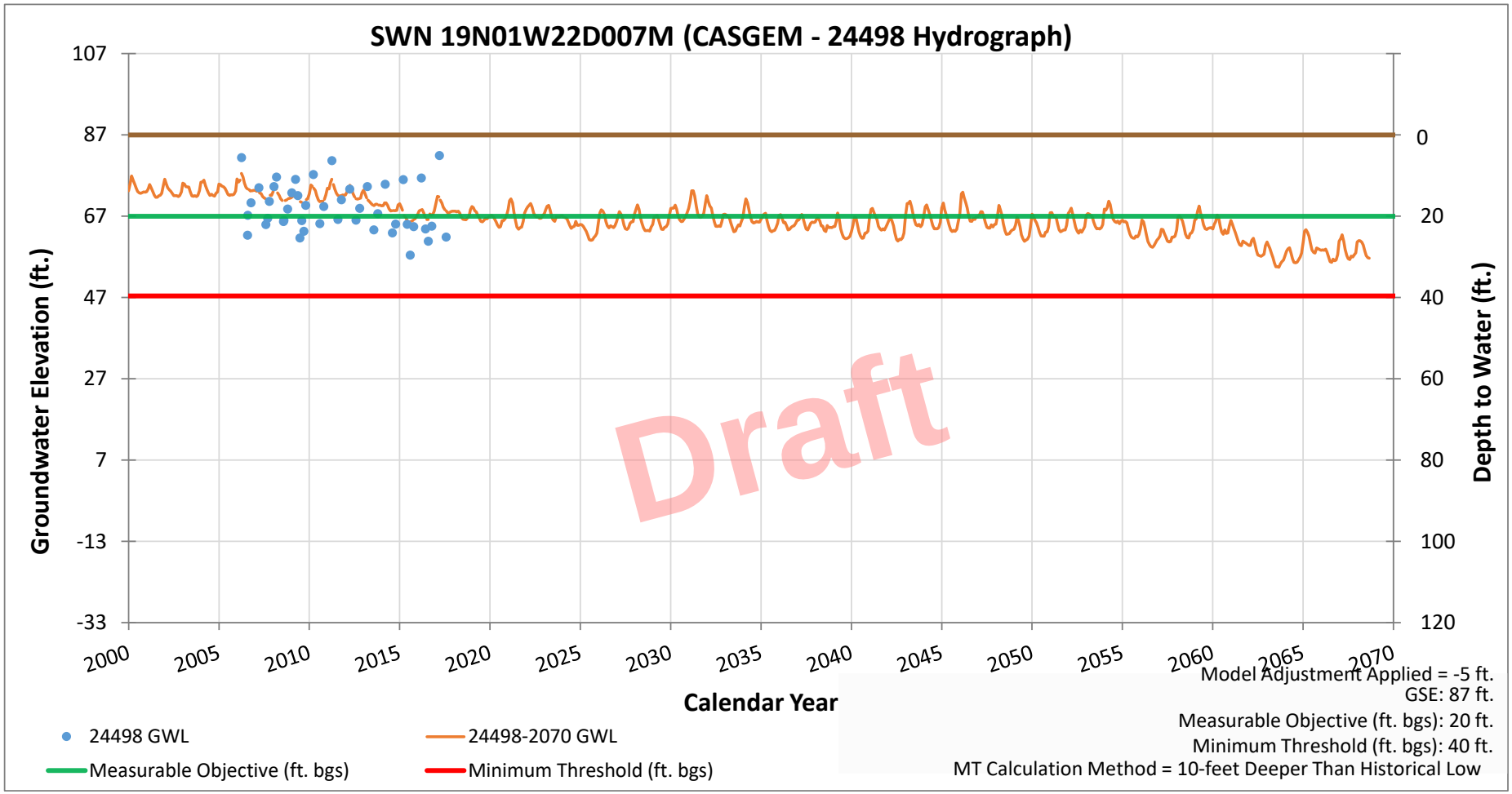

SWN 18N02E16F001M (CASGEM - 16382 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
102
82
62
42
22
2
-18
-38
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
16382 GWL
16382-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = -12 ft.
GSE: 82 ft.
Measurable Objective (ft. bgs): 13 ft.
Minimum Threshold (ft. bgs): 39 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low

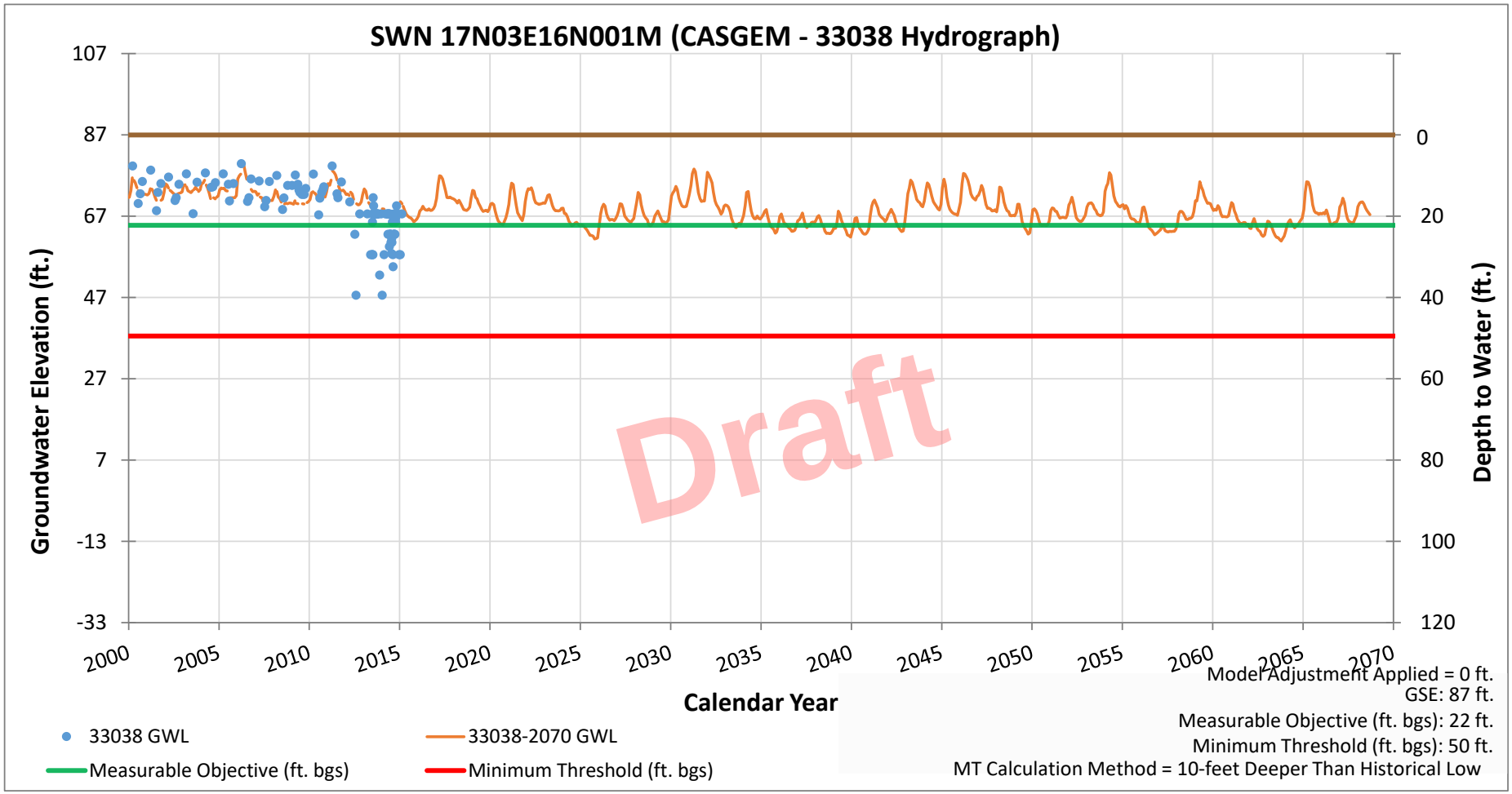

SWN 18N03E21G001M (CASGEM - 16917 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
126
106
86
66
46
26
6
-14
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
16917 GWL
16917-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = -15 ft.
GSE: 106 ft.
Measurable Objective (ft. bgs): 31 ft.
Minimum Threshold (ft. bgs): 50 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low

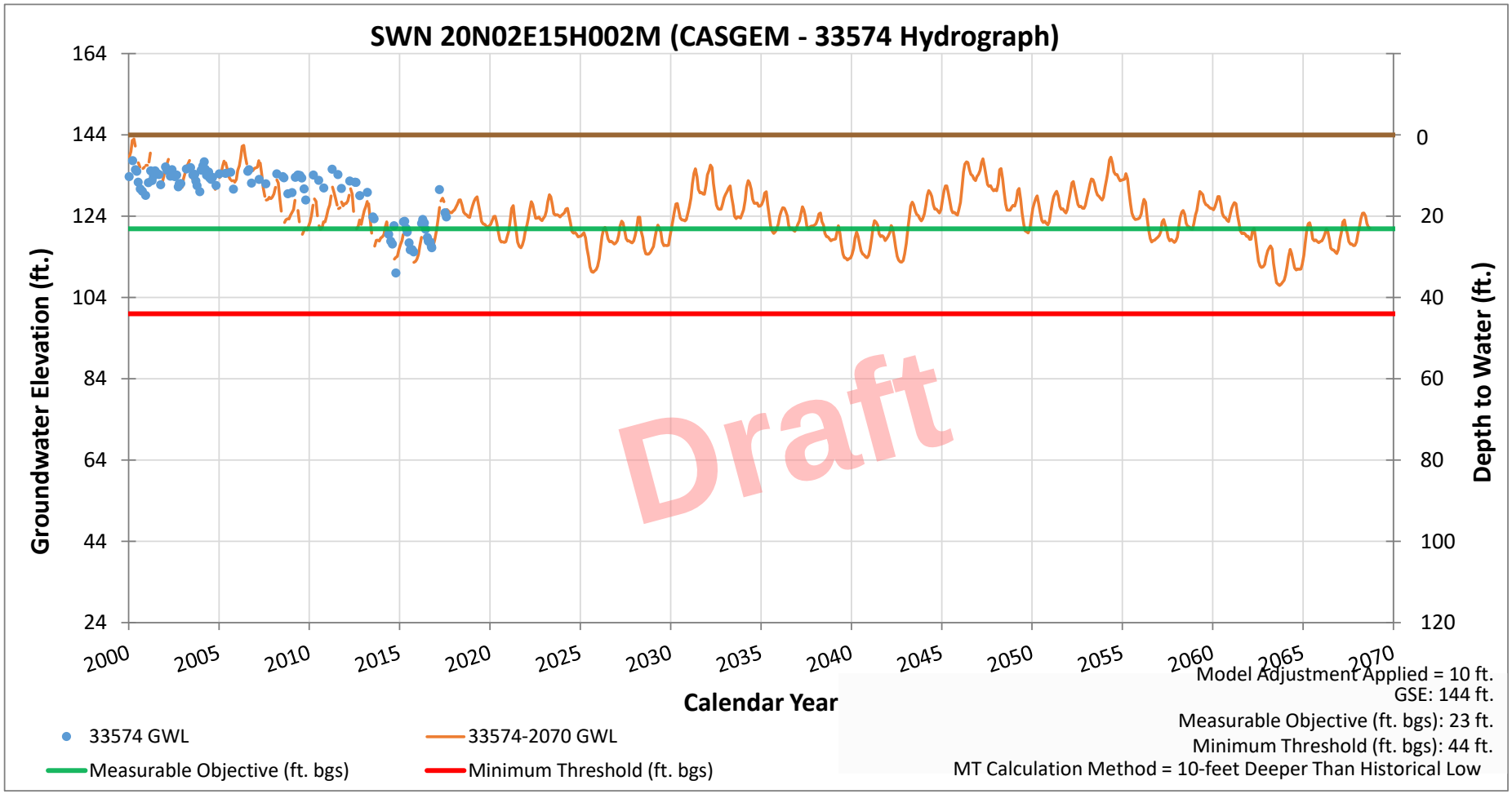

SWN 17N03E05C003M (CASGEM - 16962 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
117
97
77
57
37
17
-3
-23
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Draft
16962 GWL
16962-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = 0 ft.
GSE: 97 ft.
Measurable Objective (ft. bgs): 28 ft.
Minimum Threshold (ft. bgs): 59 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low

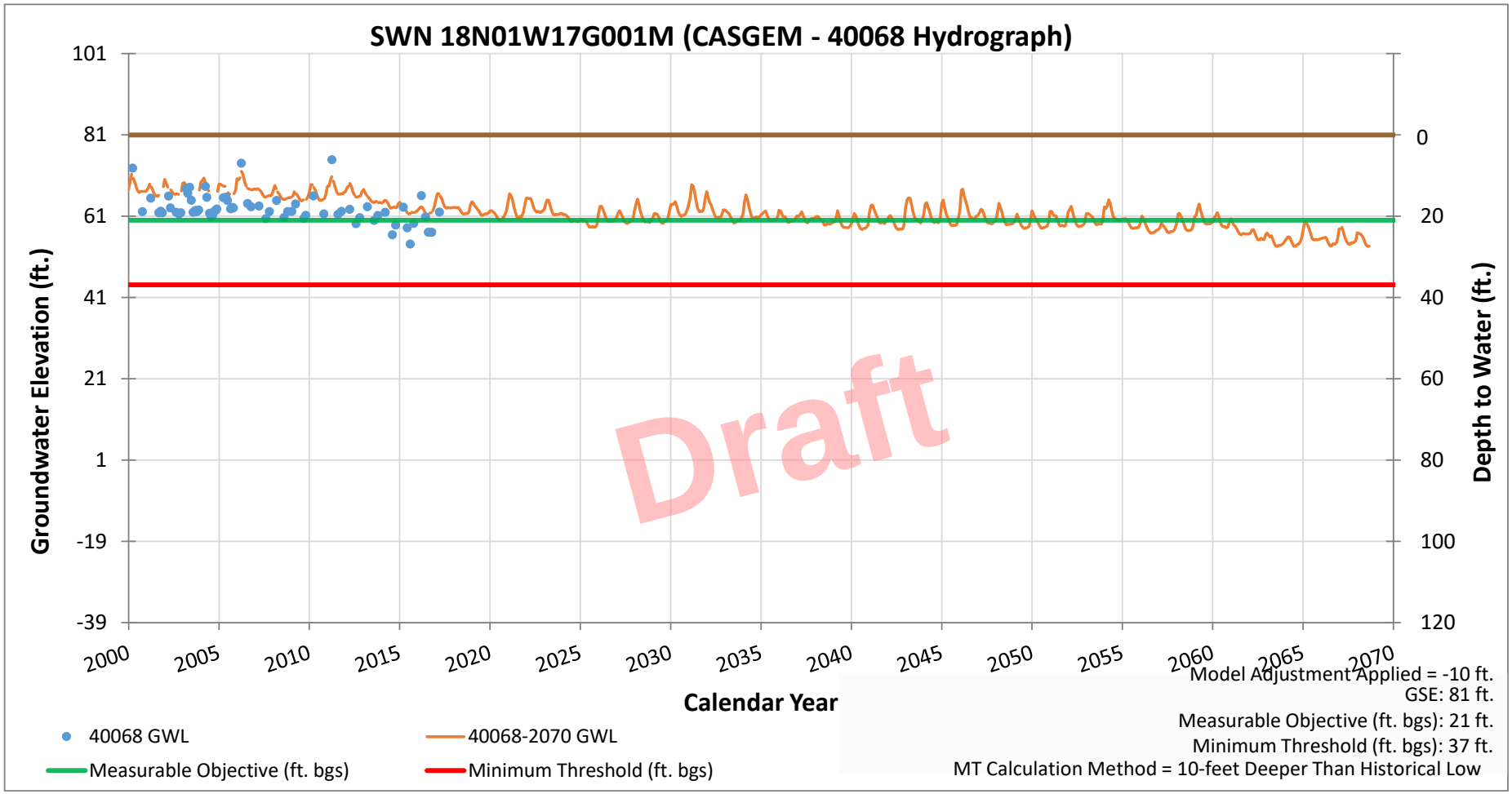

SWN 19N01W27R001M (CASGEM - 19786 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
103
83
63
43
23
3
-17
-37
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
19786 GWL
19786-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = -10 ft.
GSE: 83 ft.
Measurable Objective (ft. bgs): 33 ft.
Minimum Threshold (ft. bgs): 55 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low


SWN 19N01E35B001M (CASGEM - 23978 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
23978 GWL
23978-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = 0 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): 4 ft.
Minimum Threshold (ft. bgs): 25 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low


SWN 19N01W22D007M (CASGEM - 24498 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
24498 GWL
24498-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = -5 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): 20 ft.
Minimum Threshold (ft. bgs): 40 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low


SWN 17N03E16N001M (CASGEM - 33038 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
107
87
67
47
27
7
-13
-33
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
33038 GWL
33038-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = 0 ft.
GSE: 87 ft.
Measurable Objective (ft. bgs): 22 ft.
Minimum Threshold (ft. bgs): 50 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low


SWN 20N02E15H002M (CASGEM - 33574 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
164
144
124
104
84
64
44
24
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
33574 GWL
33574-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = 10 ft.
GSE: 144 ft.
Measurable Objective (ft. bgs): 23 ft.
Minimum Threshold (ft. bgs): 44 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low


SWN 18N01W17G001M (CASGEM - 40068 Hydrograph)
Groundwater Elevation (ft.)
Depth to Water (ft.)
101
81
61
41
21
1
-19
-39
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Calendar Year
Draft
40068 GWL
40068-2070 GWL
Measurable Objective (ft. bgs)
Minimum Threshold (ft. bgs)
Model Adjustment Applied = -10 ft.
GSE: 81 ft.
Measurable Objective (ft. bgs): 21 ft.
Minimum Threshold (ft. bgs): 37 ft.
MT Calculation Method = 10-feet Deeper Than Historical Low