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TECHNICAL MEMORANDUM

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From: Chad N Taylor, PG, CHg, Senior Hydrogeologist
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Re: Well Selection for Turlock Irrigation District and Eastside Water District CASGEM Program
Turlock Subbasin of the San Joaquin Groundwater Basin

In response to requirements associated with the recently created California Statewide Groundwater Elevation Monitoring (CASGEM) program, Turlock Irrigation District (TID) and Eastside Water District (Eastside) have retained Todd Engineers to assist in the development of a groundwater elevation monitoring program. This technical memorandum describes historical groundwater elevation monitoring programs in the Turlock Subbasin and presents a methodology for selecting wells in TID and Eastside for the CASGEM program. These wells are being incorporated into a CASGEM Monitoring Plan for submittal to the Department of Water Resources (DWR) by January 1, 2012. The memorandum also includes an analysis of the ongoing TID monitoring program (referred to as the Static Program) and makes recommendations for future monitoring to complement the CASGEM program.

BACKGROUND

The CASGEM program was initiated by the State Legislature in an amendment to the Water Code in late 2009 (California State Senate 2009). This program mandates statewide groundwater elevation monitoring to track seasonal and long-term trends in groundwater elevations in California's designated groundwater basins. To achieve that goal, the amendment requires DWR to seek out voluntary participation by local monitoring entities to collect and publish groundwater elevation data (DWR 2010a). The intent of the CASGEM program is to establish a permanent, locally-managed program of regular and systematic monitoring that builds on established local groundwater monitoring and management programs.

The Turlock Subbasin, part of the larger San Joaquin Valley Groundwater Basin, is designated by DWR as Groundwater Basin Number 5-22.03. The 542 square mile subbasin extends over parts of Merced and Stanislaus Counties with groundwater management and monitoring activities coordinated through the Turlock Groundwater Basin Association (TGBA). The TGBA consists of local agencies including TID and Eastside, the cities within the subbasin, and Merced and Stanislaus counties. The existing TGBA groundwater management plan includes a groundwater level monitoring program, which relies on the collection of data by member agencies in addition to data that has been collected historically by DWR. As the coordinating entity for groundwater management and monitoring, TGBA was originally identified as the monitoring entity for the Turlock Subbasin. However, a monitoring plan has not yet been developed by TGBA. As the two largest districts covering almost three-quarters of the subbasin, TID and Eastside are moving forward with CASGEM compliance for their areas. As such, TID and Eastside have decided to cooperate on a joint monitoring plan to satisfy CASGEM requirements.

DWR has developed requirements for CASGEM submittals to maintain consistency throughout the state (DWR 2010a and 2010b). Monitoring plans are required to describe the basin or subbasin, provide

information about and justification for the wells that will be part of the monitoring program, define the monitoring frequency, document field methods for data collection, and identify any data gaps.

The DWR guidelines (2010a) include a lengthy discussion of monitoring well density. The resulting recommendations for monitoring well density in CASGEM monitoring plans is between 2 and 20 per 100 square miles, depending on geologic complexity, relative volume of groundwater use, slope of groundwater gradient, and the availability of wells.

The guidelines also provide recommendations for frequency of groundwater elevation data collection for CASGEM programs. The goal of the CASGEM program is to track seasonal and long term trends in groundwater elevations in all the designated basins in the state. The guidelines discuss the importance of higher frequency monitoring to accurately characterize these trends. At a minimum, the frequency must be semiannual to coincide with the high and low groundwater elevations in a specific basin.

TID currently maintains a groundwater level monitoring program, the Static Program, which allows for monitoring of their conjunctive use activities, preparing water level contour maps, and addressing specific management issues as they arise. TID intends to maintain the Static program, but wants to revise it as necessary to coordinate with the new CASGEM program. The two programs may share some of the same wells and monitoring events, but the Static Program will likely include more wells that may be monitored more frequently than required for CASGEM.

In order to develop a CASGEM monitoring plan for TID and Eastside and a revised Static program for TID, historical monitoring data were compiled and analyzed systematically to select the most appropriate wells for inclusion in the two programs. As indicated above, DWR has historically monitored wells across most of the subbasin, and TID has monitored a network of wells in their service area. This technical memorandum documents the methodology used to develop a suitable network from the historically monitored wells and provides recommendations for completion of a CASGEM monitoring plan.

HYDROGEOLOGIC SETTING

The Turlock Subbasin is part of the larger San Joaquin Valley Groundwater Basin, which extends from the Coast Ranges to the Sierra Nevada and from the Sacramento-San Joaquin Delta to the San Emigdio and Tehachapi Mountains. In Bulletin 118 (2006) DWR describes the San Joaquin basin as a large trough up to 200 miles long, 70 miles wide, and filled with six miles of sediments from periodic inundation by the Pacific Ocean and from erosion of the surrounding mountains, resulting in varying deposits of marine and continental origin, respectively. The continental deposits form an alluvial wedge that thickens from the valley margins toward the axis of the trough.

The Turlock Subbasin, along with the rest of the northern portion of the basin, drains toward the Delta along the San Joaquin River. The subbasin is bounded by the Tuolumne River to the north, the Merced River to the south, the San Joaquin River to the west, and the crystalline rocks of the Sierra Nevada foothills on the east. The primary hydrogeologic units in the Turlock Subbasin include both consolidated and unconsolidated sedimentary deposits. The unconsolidated continental deposits and older alluvium are the main water-yielding units; the consolidated deposits underlie these units in the west and outcrop in the east. TID developed a regional numerical groundwater model of the subbasin, which simulates flow in the major subbasin hydrostratigraphic units (Durbin, 2008). These units, as described by Durbin, include the shallow unconsolidated Riverbank Formation, Corcoran Clay (aquitard), Turlock Lake Formation, and the consolidated Mehrten Formation (Durbin 2008). Generally, wells in the western portion of the subbasin are screened in the shallow Riverbank Formation and/or the deeper Turlock Lake Formation. Wells in the eastern portion of the subbasin are screened in the Turlock Lake Formation or the deeper Mehrten Formation. Based on Durbin's analysis, hydraulic conductivity is relatively high in the Riverbank Formation, intermediate in the Turlock Lake Formation, and relatively low in the Mehrten Formation. Groundwater flow in the subbasin is generally to the southwest, parallel to the direction of flow in the Tuolumne and Merced Rivers.

HISTORICAL GROUNDWATER MONITORING AND AVAILABLE DATA

The subbasin has been monitored for decades by DWR and TID. Together these entities have collected over 95 years of groundwater elevations with data from more than 700 wells. These data have been incorporated into a comprehensive water level database for ease of access and to assist in the identification of a monitoring network. All the wells that have been historically monitored by either TID or DWR are shown on Figure 1. The symbol size on Figure 1 is scaled by the number of measurements that have been collected for the individual well; i.e., the larger the symbol, the more data available for that well. As shown in the figure, there is a good distribution of wells within TID, fewer wells within Eastside, and very limited data in the eastern portion of the subbasin.

DWR Monitoring Program

The historical DWR monitoring network includes a total of 683 wells; however, less than half of these wells (297) have been monitored since 1999. Many of the wells in DWR's monitoring network are actually owned by TID. We have reviewed DWR Driller's Logs and TID log files showing lithology and well construction as available for the wells in DWR's network and we currently have these data for approximately half of the wells currently monitored by DWR. In general the wells in the current DWR program have long records of groundwater elevation data for comparison to future monitoring results.

TID Static Monitoring Program

TID began the Static Monitoring Program in 1989 and the current network consists of 59 wells, which are generally monitored monthly (Table 1). A subset of the TID wells (26) are also monitored by DWR, with records dating back to 1960. The wells included in both programs were given high priority in the analysis as a result of their long data records.

Well construction information from driller's logs or other sources is available for 23 of the wells in TID's Static program. These data were collected along with other available background information including: identification, location, reference point elevation, construction information, and correlation to DWR wells. A summary of the available background data for these wells is shown on Table 1. The TID Static Program wells that have recorded location information (latitude/longitude) are shown on Figure 2, and those wells in both monitoring programs are shown in blue. There are two wells in the current TID monitoring program that do not have recorded location information; accordingly these wells are not shown on the map.

Available Well Construction Data

We obtained a database from TID with DWR driller's logs for wells in the subbasin and additional well information reports. In addition, we received paper copies of a selection of TID owned wells that could be linked to wells monitored by either DWR or both DWR and TID. These records were searched for data relating to the specific wells in the active DWR and TID monitoring programs described above. In most cases DWR driller's logs did not include key information needed to link them with specific monitoring wells, making the lithologic and construction data they contained unavailable. However, the logs of TID owned wells that could be linked to wells monitored by DWR provided a great deal of supplementary lithologic and construction data. As such, lithologic and construction logs are available for over half of the wells in the active DWR monitoring network and 23 of the 59 wells in the TID monitoring network.

DWR has requested that all wells within a CASGEM program include relevant well construction information. Previous hydrogeologic investigations in the Turlock Subbasin have averaged well construction and subsurface geology on a section-wide basis due to the inability to correlate specific driller's logs to monitored wells. While this method may be appropriate for a basin-wide analysis, such as a groundwater model, the resulting estimates may introduce considerable uncertainty if applied arbitrarily to specific wells that will be used in the monitoring program. However, the general geologic setting of the subbasin can provide qualitative information that informs the interpretation of water levels.

We have included the availability of construction information in our prioritization methods, described below. Nevertheless, there will be wells in the final TID/Eastside CASGEM program that do not have construction information. These data can be identified as a data gap in the CASGEM monitoring plan submittal to DWR. The program does allow for adding new information to fill data gaps as it becomes

available. Additional construction information would help to refine the conceptual model of the basin and allow for a more detailed analysis of water level trends.

INITIAL DATA SCREENING AND ANALYSIS

The groundwater elevation records of the currently monitored wells from both the TID and DWR programs were reviewed to identify any obvious errors or problems that might preclude the individual well from inclusion in the combined CASGEM program. The initial screening and analysis methodology followed the steps below.

1. The records for all wells were collected into a single database allowing for easy access and analysis.
2. Database tools were used to join the records for wells in both programs.
3. Hydrographs (graphs showing changes in groundwater elevation over time) were constructed for each well.
4. The hydrographs were linked to each well location in a Geographic Information System (GIS) software package (ArcGIS by ESRI).
5. Spatial and temporal trends in groundwater elevation were evaluated.
6. Wells with inconsistent data, errors, or other obvious issues were flagged for further evaluation.

Some wells within both the DWR and TID programs show groundwater elevations during the same timeframe that are offset by a fixed amount from one another, resulting in parallel lines on the hydrographs. This appears to be the result of differences in the reference point elevations used by the two monitoring programs. We further evaluated the source of the two reference points for these wells; those documented by TID appear to be more accurate. We recommend that TID data be used where the reference points differ. Wells showing data quality problems resulting from reference point inconsistency, evidence of pumping, and/or multiple outlying data points were flagged for further evaluation.

Generalized Groundwater Surface Elevations

A contour map showing groundwater elevations in Spring 2011 is shown on Figure 3. Water levels from all available wells were combined regardless of screened interval. The resulting contour map represents average groundwater elevations in the subbasin.

The most obvious feature on Figure 3 is the persistent area of low groundwater elevations beneath Eastside that represents a pumping depression from local groundwater production. This pumping depression is relatively large and the surrounding groundwater gradients are steep. The persistence, size, and steep gradients associated with this depression indicate a long duration of intensive pumping in an area of relatively low hydraulic conductivity. Since water levels in and around the depression have the potential for rapid changes, we recommend that a higher density of monitoring wells in this area be included in the CASGEM program.

Within the TID area of the subbasin, groundwater elevations are relatively flat, with a generalized flow direction to the west at an approximate hydraulic gradient of 0.001. However, the groundwater gradient increases to approximately 0.005 in the eastern portion of TID along the border with Eastside.

Groundwater Trends and Fluctuations

As noted above, hydrographs were prepared for each well in both the TID and DWR monitoring programs. These hydrographs were evaluated spatially and temporally to identify trends in groundwater elevation, with a focus on identifying long term regional trends. In addition, historical periods of drought were used to further distinguish regional trends; these would have caused surface water deliveries and natural recharge to decrease and groundwater use to increase. The water level response to dry and wet periods differs regionally in the subbasin. Distinct areas of similar response were identified for three areas: Eastside, the northern and eastern portions of TID, and the central, western, and southern portions of TID. Seasonal changes in water levels in each region were also evaluated. Descriptions of the observed trends are provided below. The locations of wells with hydrographs illustrating these trends are shown on Figure 4, and representative hydrographs are shown on Figures 5 through 8.

Eastside

Hydrographs in Eastside show a long term trend of declining groundwater elevations. Elevations in the area have steadily decreased, with reductions as much as 80 feet over the past 35 years. A brief stabilization of groundwater elevations is noted in the mid-1990s, which is reportedly due to the conversion to high efficiency irrigation practices (Marcotte, 2011). However, this stabilization was short lived and elevations are currently continuing to decline. The return to falling levels in recent years is most likely due to the expansion of agricultural activities east of the Eastside boundaries. This long term decline in water levels indicates that groundwater use in the area is greater than inflow on an average basis. Unlike TID, Eastside does not receive surface water deliveries and relies solely on groundwater pumping for its water supply. In addition, natural areal recharge and agricultural return flows are limited in this area due to relatively impermeable soils and high efficiency irrigation. The effects of this persistent pumping depression are seen throughout the entire Eastside service area and along the border between Eastside and TID. The locations of wells indicating this trend are shown on Figure 4 and representative hydrographs are presented on Figure 5.

TID

Hydrographs for wells in the TID portion of the subbasin show fairly stable water levels over the period of record. Generally, elevations in TID reflect the hydrologic conditions of the subbasin; water levels declined during the droughts of the early 1990's and mid 2000's and recovered in the following years. While this trend is repeated across TID, the severity of the response and the rate of recovery from these droughts vary by area.

Wells located in the northern and eastern portions of TID show a more pronounced response to and slower recovery from drought conditions. Elevations in these areas are still recovering from the most recent drought. These wells are likely screened in geologic formations with lower hydraulic conductivity and are located closer to the pumping depression in Eastside. Elevations in northeastern TID show long term declines in elevation, similar to those in Eastside. This may indicate that the pumping depression is encroaching upon this area of TID. Key wells for this area are also shown on Figure 4, with the corresponding hydrographs presented on Figure 6.

Wells in the central, western, and southern areas of TID show a more muted response to drought and water levels have recovered to the highest elevations for the period of record since the most recent dry period. This muted response may be due to lower amounts of local pumping, increased local recharge, differences in screened intervals, or a combination of these factors. Wells showing these trends are shown on Figure 4, and the corresponding hydrographs are presented on Figure 7.

Seasonal Fluctuations

Seasonal fluctuations in the Turlock Subbasin are quite variable. Groundwater elevations in some wells vary as much as 30 feet between fall and spring, while elevations in other wells show little to no seasonal change. In general, wells in the northern and eastern areas of TID tend to show more seasonal variation (around 5 to 10 feet difference between the dry fall and wet spring). In addition to variable pumping and recharge, changes in hydraulic conductivity may also affect the seasonal variation.

In other areas of the subbasin, seasonal fluctuations are more varied; wells with significant seasonal response are frequently located near wells that show only minor changes in water levels seasonally. One explanation of differences in seasonal changes could be a result of the depth (i.e. formation) at which wells are screened. Based on the few wells for which construction information is available, it appears that deeper wells are slightly more likely to show seasonal variation than are shallow wells. Wells screened in the deeper zones may reflect seasonal pumping, which likely occurs at depth. However, more construction data would be required to refine this hypothesis. Wells showing various seasonal fluctuations are shown on Figure 4, and seasonal hydrographs are presented on Figure 8.

WELL PRIORITIZATION AND SELECTION FOR CASGEM PROGRAM

Wells in the existing TID and DWR monitoring networks were ranked in order to evaluate the current TID Static Program and to identify those most suitable for inclusion in the CASGEM program.

Wells owned by TID, whether historically monitored by TID or DWR or both, will be the basis of the network in the TID service area, so these wells were given high priority. Historically monitored wells that are privately owned were also reviewed to identify additional wells that should remain in the TID monitoring network but not necessarily in the CASGEM program. Prioritization of DWR monitored wells in the Eastside area also provided potential wells to meet CASGEM goals in this area.

Multiple factors were considered for inclusion in the prioritization method. The technique that proved successful utilized the following components:

1. Most recent monitoring event in 2007 or sooner, including wells that were visited but not monitored due to access limitations
2. Length of record
3. Number of measurements
4. Availability of construction information
5. Ownership, with preference given to wells owned by TID
6. Active status in TID's Static Program
7. Continuity of data record and quality of data
8. The number of wells located within a 1-mile radius

Wells that have not been monitored since 2007 were automatically disqualified from the ranking system. A formula was developed to assign numerical scores to each remaining well based on the criteria in 2 through 4 above. A score of 1 to 3 was given for each category. The total scores ranged from 4 to 12 points per well. Additional qualitative scoring was completed through evaluation of the last four items in the list above.

Wells owned by TID were given priority in the selection process, since they do not require the extra effort of obtaining permission for inclusion in CASGEM. Data continuity and quality were evaluated by visual examination of the hydrographs. Preference was also given to those wells with fewer neighboring monitoring points. The outcome of the combined numeric and qualitative prioritization was the division of all the wells into three categories – A, B, and C – based on overall score.

The A wells are the first priority for evaluation for both the TID monitoring program and inclusion in the CASGEM network. This includes 24 DWR monitored wells in Eastside.

REVISION OF CURRENT TID STATIC MONITORING PROGRAM

The priority of each well from the methodology described above was used to evaluate the current TID Static Program (Table 1). The goal of this evaluation was to identify those wells that would be suitable for local monitoring and the CASGEM program. Since it is preferable to use wells that are owned by TID in the CASGEM program, ownership was a primary element of this evaluation. For this reason, the A priority wells in the current TID monitoring program that are owned by TID were automatically included in the revised program and given priority for inclusion in CASGEM.

The methods employed in the rest of the evaluation were primarily geographic in nature. The privately owned wells in the current TID monitoring program were mapped alongside the A priority wells owned by TID and monitored only by DWR. The privately owned wells that were near to TID owned wells in the DWR program were flagged for further evaluation and possible replacement. Flagged wells were further evaluated through comparison of their hydrograph with that of the potential replacement well. If the potential replacement well showed an equal or better data record and a similar groundwater elevation over time, then it was included as a recommended replacement.

This process resulted in the recommended removal of 17 wells from the current TID Static Program, two of which did not have any available location information (Ottman and Swanson-Reed OLD). These wells were initially replaced by the addition of 18 TID owned wells that are currently monitored by DWR. It was not possible, or ultimately necessary, to replace all the privately owned wells in the current TID program with TID owned wells and still maintain adequate data density throughout the entire district. A total of 18 private or Improvement District owned wells were retained in the recommended revised program. During initial review of the revised well network with TID personnel, a few areas of lower data density were identified. A refined search in these areas identified additional DWR monitored wells for inclusion in the program.

The wells for the recommended revised TID Static Monitoring network are listed on Table 2 and shown on Figure 9.

WELL SELECTION FOR CASGEM PROGRAM

The recommended revised TID Static Monitoring network wells served as the starting point for the selection of CASGEM wells in TID. The density of wells in the revised static program was higher than necessary for CASGEM, so we focused on removing wells to achieve an appropriate density. This process was again accomplished primarily based on ownership and followed up by geographic evaluation.

Initially all of the privately owned wells in the revised TID monitoring network were removed and the resulting list of wells was mapped. This resulted in a network of varying density over the area, so wells in areas of higher density were removed as appropriate. This step was guided by careful evaluation of hydrographs to choose those wells with the most representative records. This process was repeated across TID until a relatively uniform density of high data quality wells was identified. The resulting network had some gaps that were necessary to fill with privately owned wells. The number of privately owned wells included in the recommended CASGEM network was kept to a minimum, while providing the most adequate and consistent coverage of the TID service area possible. The resulting recommended network is listed on Table 3 and a map of the wells is shown on Figure 10.

A separate selection for the Eastside portion of the CASGEM program was made from all priority A wells in the district. The list of wells for consideration in Eastside was transmitted to them in mid-October to allow additional time for execution of access agreements with well owners. Since the data submitted to the CASGEM program will be publically available, well owners of the monitored wells must sign access agreements or release forms. Should some of these wells not be accessible as a result of these requirements, additional priority B wells will be considered. The recommended CASGEM wells for Eastside are also listed on Table 3, and shown on Figure 11.

Monitoring Well Density

The recommended well network meets the suggested density from DWR's CASGEM guidelines. We calculated densities separately for TID and Eastside since the geologic complexity, relative volume of groundwater use, and slope of groundwater gradient are dissimilar in these two areas. The relative densities are shown on Table 3.

Monitoring Frequency

The trend analyses presented above described the seasonal and long term trends in the subbasin, which suggests that semiannual monitoring may be sufficient. While seasonal trends are highly variable, the more important trend in the subbasin is response to drought and long term declining water levels. These trends are better tracked with higher monitoring well density than with increased frequency.

RECOMMENDATIONS

Based on the thorough review of available data and prioritization of potential monitoring wells we recommend the following:

- Review and approval (if appropriate) of the wells in the recommended revised TID Static and CASGEM programs.
- Completion of access/release agreements with the owners of private wells in TID and Eastside, with particular priority on the wells in Eastside so that this portion of the network can be included in the CASGEM submittal.
- Compilation of the CASGEM Monitoring Plan, with reference to data gaps for those private wells that are not secured prior to its submittal.

Most of the items required for the CASGEM Monitoring Plan have now been prepared and we have begun to compile the document. An outline for this document is presented below.

Outline for CASGEM Monitoring Plan

1. Introduction
2. Physical Setting
 - 2.1. Hydrology
 - 2.2. Geology
 - 2.3. Groundwater Use
 - 2.4. Groundwater Trends
3. Well Network
 - 3.1. History of Monitoring in Basin
 - 3.2. CASGEM Wells
 - 3.2.1. Map of Network
 - 3.2.2. Table of Wells
4. Monitoring Schedule
5. Field Methods
6. Data Gaps

REFERENCES

California State Senate, 2009, SBX7 6: An act to add Part 2.11 (commencing with Section 10920) to Division 6 of, and to repeal and add Section 12924 of, the Water Code, relating to groundwater, Introduced by Senators Steinberg and Pavley, Filed November 6, 2009.

Durbin, Timothy J., 2008, Groundwater Model Documentation, Turlock Groundwater Basin, December 2008.

Department of Water Resources (DWR), 2006, California's Groundwater, Bulletin 118, San Joaquin River Hydrologic Region, San Joaquin Groundwater Basin – Turlock Subbasin, updated January 20, 2006.

Department of Water Resources (DWR), 2010a, Groundwater Elevation Monitoring Guidelines, December 2010.

Department of Water Resources (DWR), 2010b, California Statewide Groundwater Elevation Monitoring (CASGEM) Program Procedures for Monitoring Entity Reporting, December 2010.

Marcotte, Joseph B. Jr, 2011, Personal communication regarding historical irrigation practices in Eastside Water District, November 2011.

Tables

Table 1: Current TID Static Monitoring Program Wells and Available Construction Information

Local Identification	State Well Number	Log Number ¹	Also Monitored by DWR	Decimal Latitude (degrees)	Decimal Longitude (degrees)	Reference Point Elevation (feet, msl)	Total Depth (feet bgs)	Depth of Screened Intervals (feet bgs)	Casing Diameter (inches)	Date Drilled
TID 92	04S08E13P001M	TID 92	x	121.042778	37.5805556	67	122		16	4/12/1905
TID 111	04S08E27H001M	TID 111	x	121.066111	37.5608333	58	124	0-100	16	1/1/1973
TID 151	04S09E21A001M	TID 151	x	120.974167	37.5780556	79	195	0-195	18	1/1/1940
TID 191	04S09E24G001M	TID 191	x	120.926111	37.5738889	91	245	0-245	16	1/1/1952
TID 34	04S09E30Q001M	TID 34	x	121.015556	37.5516667	67	86	0-86	16	1/1/1965
TID 22	04S09E36E001M	TID 22	x	120.933333	37.5441667	89	49		16	1/1/1923
TID 189	04S11E32P001M	TID 189	x	120.784167	37.5372222	132	225		16	1/1/1951
TID 97	05S09E09A001M		x	120.979444	37.5219444	65				
TID 82	05S09E23K001M	TID 82	x	120.943611	37.4844444	71	126		18	1/1/1927
TID 68	05S09E24J001M	TID 68	x	120.921667	37.4819444	79	64	0-64	16	1/1/1926
TID 61	05S09E33R001M	TID 61	x	120.975833	37.4527778	62	225		16	1/1/1946
TID 300	05S10E01P001M	TID 300	x	120.821667	37.5222222	115	38	0-32	16	1/1/1958
TID 10	05S10E04D001M	TID 10	x	120.883056	37.5361111	98	45		16	1/1/1929
TID 120A	05S10E34J001M	TID 120A	x	120.848333	37.4547222	93	181		14	1/1/1965
TID 144	05S11E06Q001M	TID 144	x	120.801667	37.5219444	119	175	0-175	16	1/1/1938
TID 148 OLD	05S11E19R001M	TID 148 OLD	x	120.796111	37.4783333	116	304	0-304	14	1/1/1939
Holm	06S09E01P001M		x	120.93	37.4372222	70				
TID 177	06S10E05C001M	TID 177	x	120.893889	37.445	79	248	0-248	14	1/1/1948
TID 118	06S10E08H001M	TID 118	x	120.889722	37.4297222	80	128		14	1/1/1933
Baetsaher-Rude	06S10E11J001M		x	120.833056	37.4247222	99				
TID 113A	06S10E15F002M	TID 113A	x	120.859167	37.4147222	90	136	0-136	18	1/1/1957
Seward-Carlquist	06S10E17L001M		x	120.898611	37.4119444	89				
TID 194	06S10E29F001M	TID 194	x	120.894722	37.3827778	79	260	0-260	16	1/1/1954
TID 102	06S11E04C001M	TID 102	x	120.770556	37.445	115	176		18	1/1/1929
TID 155 West	06S11E06Q001M		x	120.798611	37.4375	105				
TID 85B	06S11E17C001M	TID 85A	x	120.787778	37.4177778	107	184	0-184	16	1/1/1984
Chance	05S11E06F			120.804162	37.531434	123.33				
Sperry N/O UL3	04S11E31G			120.801345	37.537682	125.24				
Foster Farms	04S11E34R			120.746373	37.55738	167.62				
O'Brien	04S11E20B			120.780141	37.580017	148.52				
Downie & Whitmore	04S11E17A			120.774035	37.594651	150.29				
Hickman-Lowe No.1	04S11E09E			120.767997	37.605697	158.41				
Dallas-Appling	04S11E04J			120.755613	37.614846	165.31				
Crow-Grugg #2	04S11E07D			120.810727	37.607455	144.59				
Boggeri-Snyder	04S10E11J			120.831867	37.600536	137.12				
Chiesa	04S10E02Q			120.835476	37.613269	137.74				
Conley	04S10E04P			120.879355	37.612611	122.24				
Gilbert	04S10E07C			120.911083	37.608928	109.16				
Barth	04S10E21B			120.85849	37.574897	115.13				
California-Garcia	04S10E27A			120.848428	37.565474	118.4				
Upper Mc Henery	04S10E28A			120.865337	37.562865	113.63				
Margarite	04S10E29D			120.90005	37.565571	102.77				
Gish	04S09E19K			121.018766	37.573139	72.91				
Berryhill-Kaiser	04S09E28K			120.981154	37.556931	74.81				
McKenzie-Davis	05S08E24H			121.031047	37.489612	54.93				
TID 310	05S10E07L			120.912755	37.514237	86.17				
Johnson-Turner	05S10E32C			120.898992	37.463403	83.47				
TID 83	06S09E12G			120.931035	37.430525	72.22				
Ottman	06S10E07A					76.13				
Hultberg&Short	06S10E05R			120.895442	37.426261	81.45				
A. Bettencort	06S09E36H			120.923237	37.372391	72.68				
Lateral 8 # 6	06S10E34D			120.864334	37.374739	90.58				
TID 303	06S11E19M			120.813564	37.39685	96.99				
TID 155 OLD	06S11E06K	TID 155 OLD		120.797186	37.436799		252	0-252	16	1/1/1941
Swanson-ReedOLD	05S11E29R					124.09				
White	05S10E17J			120.88549	37.500299	92.19				
Ferreira	05S10E03B			120.855318	37.536485	109.56				
HL & East				120.752745	37.491992	153.91	91.5	81.5-91.5	2	5/6/2005
HL u/s Merced				120.794676	37.396641	114.73	36	26-36	2	5/4/2005

Notes:

¹: Log numbers refer either to TID Drainage Well construction records or DWR Driller's Logs.

Table 2: Recommended Wells for Revised TID Static Monitoring Program

Local Identification	State Well Number	Well Ownership	In Original Static Program	Also in CASGEM Program	Decimal Latitude (degrees)	Decimal Longitude (degrees)	UTM Northing (NAD 83 Zone 10, meters)	UTM Easting (NAD 83 Zone 10, meters)	Earliest Measurement	Most Recent Measurement	Length of Record (years)	Number of Measurements	Currently Monitored by:	Log Number ¹	Reference Point Elevation ² (feet, msl)	Total Depth (feet bgs)	Depth to Top of Screens (feet bgs)	Casing Diameter (inches)	Date Drilled
04S09E05J001M	04S09E05J001M	Private		YES	37.61521	-120.99604	676867	4165011	11/15/1975	1/1/2010	34	56	DWR		76				
04S10E24B001M	04S10E24B001M	Private			37.57965	-120.81965	692528	4161413	4/11/1974	3/15/2011	37	64	DWR		131				
05S11E07P001M	05S11E07P001M	TID			37.50743	-120.80548	693967	4153428	12/1/1960	3/16/2011	50	62	DWR	87591	115	308	204-232, 235-241 & 270-281	14	2/26/1973
05S11E15M001M	05S11E15M001M	Private		YES	37.49660	-120.75770	698219	4152326	10/7/1975	3/28/2011	35	64	DWR		166				
A. Bettencort		Improvement District	YES		37.37233	-120.92428	683796	4138199	3/1/1989	7/11/2011	22	97	TID		72.68				
Baetsaheer-Rude	06S10E11J001M	Improvement District	YES		37.42466	-120.83409	691649	4144185	3/1/1978	7/12/2011	33	85	TID & DWR		99				
Berryhill-Kaiser		Improvement District	YES		37.55686	-120.98220	678228	4158563	10/11/2007	7/8/2011	4	41	TID		74.81				
Boggeri-Snider		Improvement District	YES	YES	37.60047	-120.83291	691304	4163696	3/1/1989	7/7/2011	22	97	TID		137.12				
Conley		Improvement District	YES		37.61254	-120.88040	687081	4164940	3/1/1999	7/7/2011	12	58	TID		122.24				
Dallas-Appling		Improvement District	YES	YES	37.61478	-120.75665	697999	4165442	3/1/1989	7/7/2011	22	95	TID		165.31				
Ferreira		Improvement District	YES		37.53642	-120.85636	689396	4156541	3/1/1999	7/12/2011	12	67	TID		109.56				
Foster Farms		Private	YES	YES	37.55731	-120.74741	698968	4159085	3/1/1989	7/7/2011	22	96	TID		167.62				
Gilbert		Improvement District	YES	YES	37.60886	-120.91212	684290	4164468	10/10/2007	7/7/2011	4	38	TID		109.16				
Gish		Improvement District	YES		37.57307	-121.01981	674867	4160291	3/1/1989	7/8/2011	22	97	TID		72.91				
Hickman-Lowe No.1		Improvement District	YES		37.60563	-120.76904	696930	4164400	3/1/1989	7/7/2011	22	93	TID		158.41				
Johnson-Turner		Private	YES		37.46334	-120.90003	685718	4148345	10/11/2007	7/8/2011	4	41	TID		83.47				
Lateral 8 # 6		Improvement District	YES		37.37468	-120.86537	689007	4138576	3/1/1989	7/11/2011	22	96	TID		90.58				
McKenzie-Davis		Improvement District	YES		37.48955	-121.03209	673977	4151000	3/1/1989	7/8/2011	22	97	TID		54.93				
O'Brien		Improvement District	YES		37.57995	-120.78118	695925	4161526	3/1/1999	7/7/2011	12	58	TID		148.52				
Seward-Carlquist	06S10E17L001M	Improvement District	YES		37.41188	-120.89965	685879	4142636	3/10/1980	7/11/2011	31	92	TID & DWR		89				
TID 10	05S10E04D001M	TID	YES	YES	37.53604	-120.88410	686946	4156444	12/1/1960	7/12/2011	51	99	TID & DWR	TID 10	98	45	0-45	16	1/1/1929
TID 102	06S11E04C001M	TID	YES		37.44494	-120.77159	697127	4146564	12/1/1960	7/8/2011	51	89	TID & DWR	TID 102	115	176		18	1/1/1929
TID 106	05S09E21B001M	TID		YES	37.48910	-120.98104	678491	4151047	12/1/1960	3/16/2011	50	47	DWR	TID 106	62	145		18	6/1/1930
TID 108B	05S11E30G001M	TID		YES	37.47077	-120.79909	694627	4149373	12/1/1960	3/16/2011	50	55	DWR	TID 108B	112	104		16	4/1/1975
TID 111	04S08E27H001M	TID	YES	YES	37.56077	-121.06716	670714	4158839	12/1/1960	7/8/2011	51	150	TID & DWR	TID 111	58	124	0-100	16	1/1/1973
TID 113A	06S10E15F002M	TID	YES	YES	37.41466	-120.86020	689363	4143022	3/1/1984	7/8/2011	27	108	TID & DWR	TID 113A	90	136	0-136	18	1/1/1957
TID 118	06S10E08H001M	TID	YES	YES	37.42966	-120.89076	686622	4144626	12/1/1960	7/11/2011	51	57	TID & DWR	TID 118	80	128		14	10/1/1933
TID 12	05S10E17M001M	TID		YES	37.49993	-120.90326	685342	4152399	12/1/1960	3/16/2011	50	58	DWR	TID 12	86	100		14	
TID 120A	05S10E34J001M	TID	YES	YES	37.45466	-120.84937	690221	4147483	12/1/1960	7/8/2011	51	132	TID & DWR	TID 120A	93	181		14	1/1/1965
TID 136A	05S11E33N003M	TID			37.45077	-120.77409	696890	4147206	10/18/1979	3/16/2011	31	53	DWR	TID 136A	115	108		16	11/9/1965
TID 137	04S09E27H001M	TID			37.56049	-120.95715	680431	4159013	12/1/1960	3/14/2011	50	59	DWR	TID 137	75	248		16	9/1/1937
TID 144	05S11E06Q001M	TID	YES		37.52188	-120.80270	694175	4155037	12/1/1960	7/7/2011	51	95	TID & DWR	TID 144	119	175	0-175	16	1/1/1938
TID 145	05S10E24C001M	TID		YES	37.49049	-120.82576	692218	4151507	12/1/1960	3/16/2011	50	60	DWR	TID 145	105	310		14	8/1/1938
TID 146A	06S11E05C001M	TID		YES	37.44633	-120.78909	695575	4146681	12/1/1960	3/16/2011	50	54	DWR	TID 146A	108	150		16	12/1/1963
TID 148 OLD	05S11E19R001M	TID	YES		37.47827	-120.79715	694779	4150209	12/1/1960	7/12/2011	51	75	TID & DWR	TID 148 OLD	116	304	0-304	14	1/1/1939
TID 151	04S09E21A001M	TID	YES	YES	37.57799	-120.97521	678795	4160921	1/3/1953	7/8/2011	59	117	TID & DWR	TID 151	79	195	0-195	18	1/1/1940
TID 154	05S08E02R001M	TID		YES	37.52410	-121.05132	672197	4154799	12/1/1960	3/15/2011	50	53	DWR	TID 154	50	222	0-222	18	7/1/1941
TID 170A	04S08E36B002M	TID			37.55132	-121.03938	673190	4157841	12/1/1960	3/14/2011	50	57	DWR	TID 170A	62	122	0-92	16	7/1/1963
TID 18	04S10E21E001M	TID			37.57465	-120.83554	686899	4160729	12/1/1960	3/15/2011	50	63	DWR		102				
TID 184A	05S10E27B001M	TID		YES	37.47688	-120.85826	689378	4149930	12/1/1960	3/16/2011	50	55	DWR	TID 184A	98	278	74-210	14	3/8/1969
TID 186A	04S10E21R002M	TID		YES	37.56632	-120.86798	688293	4159836	12/1/1960	3/15/2011	50	56	DWR	TID 186A	109	100	0-100	16	4/25/1969
TID 189	04S11E32P001M	TID	YES	YES	37.53716	-120.78520	695682	4156769	12/1/1960	7/7/2011	51	80	TID & DWR	TID 189	132	168	21-168	16	1/1/1951
TID 191	04S09E24G001M	TID	YES	YES	37.57382	-120.92715	683049	4160551	12/1/1960	7/8/2011	51	94	TID & DWR	TID 191	91	245	0-174	16	1/1/1952
TID 194	06S10E29F001M	TID	YES	YES	37.38271	-120.89576	686296	4139407	3/10/1987	7/11/2011	24	78	TID & DWR	TID 194	79	260	0-260	16	1/1/1954
TID 195	04S09E11D001M	TID		YES	37.60854	-120.95604	680414	4164348	12/1/1960	3/14/2011	50	35	DWR	TID 195	97	264	0-264	14	12/6/1954
TID 22	04S09E36E001M	TID	YES	YES	37.54410	-120.93437	682484	4157239	12/1/1960	7/7/2011	51	122	TID & DWR	TID 22	89	49		16	1/1/1923
TID 223	06S11E10B001M	TID		YES	37.43355	-120.74798	699246	4145350	12/1/1960	3/16/2011	50	59	DWR		132				
TID 300	05S10E01P001M	TID	YES	YES	37.52216	-120.82271	692406	4155027	12/1/1960	7/7/2011	51	129	TID & DWR	TID 300	115	38	0-32	16	1/1/1958
TID 301	04S10E29B001M	TID			37.56382	-120.89215	686165	4159510	12/1/1960	3/15/2011	50	56	DWR	TID 301	102	120	20-120	16	8/8/1958
TID 303		TID	YES	YES	37.39679	-120.81460	693446	4141132	3/1/1989	7/8/2011	22	96	TID		96.99				
TID 310		TID	YES		37.51417	-120.91380	684376	4153958	10/8/2007	7/12/2011	4	38	TID		86.17				
TID 34	04S09E30Q001M	TID	YES	YES	37.55160	-121.01660	675201	4157915	12/1/1960	7/8/2011	51	129	TID & DWR	TID 34	67	86	0-86	16	1/1/1965
TID 48	05S09E04C001M	TID		YES	37.53660	-120.98521	678010	4156309	3/10/1987	3/15/2011	24	41	DWR	TID 48	65	110	0-110	16	4/1/1924
TID 5	05S10E29A001M	TID			37.47799	-120.88798	686747	4149994	12/1/1960	3/16/2011	50	56	DWR	TID 5	86	70	40-70	16	8/25/1922
TID 61	05S09E33R001M	TID	YES	YES	37.45271	-120.97687	678947	4147017	3/1/1989	7/11/2011	22	103	TID & DWR	TID 61	62	225		16	1/1/1946
TID 63	05S09E07B001M	TID			37.52243	-121.01965	675000	4154673	12/1/1960	3/15/2011	50	52	DWR	TID 63	54	110		14	2/1/1926
TID 68	05S09E24J001M	TID	YES		37.48188	-120.92271	683667	4150357	12/1/1960	7/8/2011	51	98	TID & DWR	TID 68	79	64	0-64	16	1/1/1926
TID 82	05S09E23K001M	TID	YES	YES	37.48438	-120.94465	681720	4150592	3/1/1989	7/8/2011	22	106	TID & DWR	TID 82	71	126		18	1/1/1927
TID 83		TID	YES	YES	37.43046	-120.93207	682964	4144634	3/1/1989	7/11/2011	22	84	TID		72.22				
TID 85B	06S11E17C001M	TID	YES	YES	37.41771	-120.78881	695674	4143507	12/1/1960	7/8/2011	51	58	TID & DWR	TID 85A	107	184	0-184	16	1/1/1984
TID 92	04S08E13P001M	TID	YES	YES	37.58049	-121.04382	672730	4161070	12/1/1960	7/8/2011	51	147	TID & DWR	TID 92	67	122		16	1/1/1929
TID 97	05S09E09A001M	TID			37.52188	-120.98049	678462	4154685	12/1/1960	7/8/2011	51	146	TID & DWR		65				
HL & East		TID	YES		37.49193	-120.75378	698578	4151816	9/5/2008	7/12/2011	3	30	TID	B-3	153.91	91.5	81.5-91.5	2	5/6/2005
HL u/s Merced		TID	YES		37.39658	-120.79571	695118	4141148	9/8/2008	7/8/2									

Table 3: Recommended Wells for CASGEM Program

These 59 wells present a monitoring network density of nearly 11 wells per 100 mi² over the entire 542 mi² area of the Turlock Subbasin and a density of over 15 wells per 100 mi² over the combined area of TID and Eastside (377 mi²)

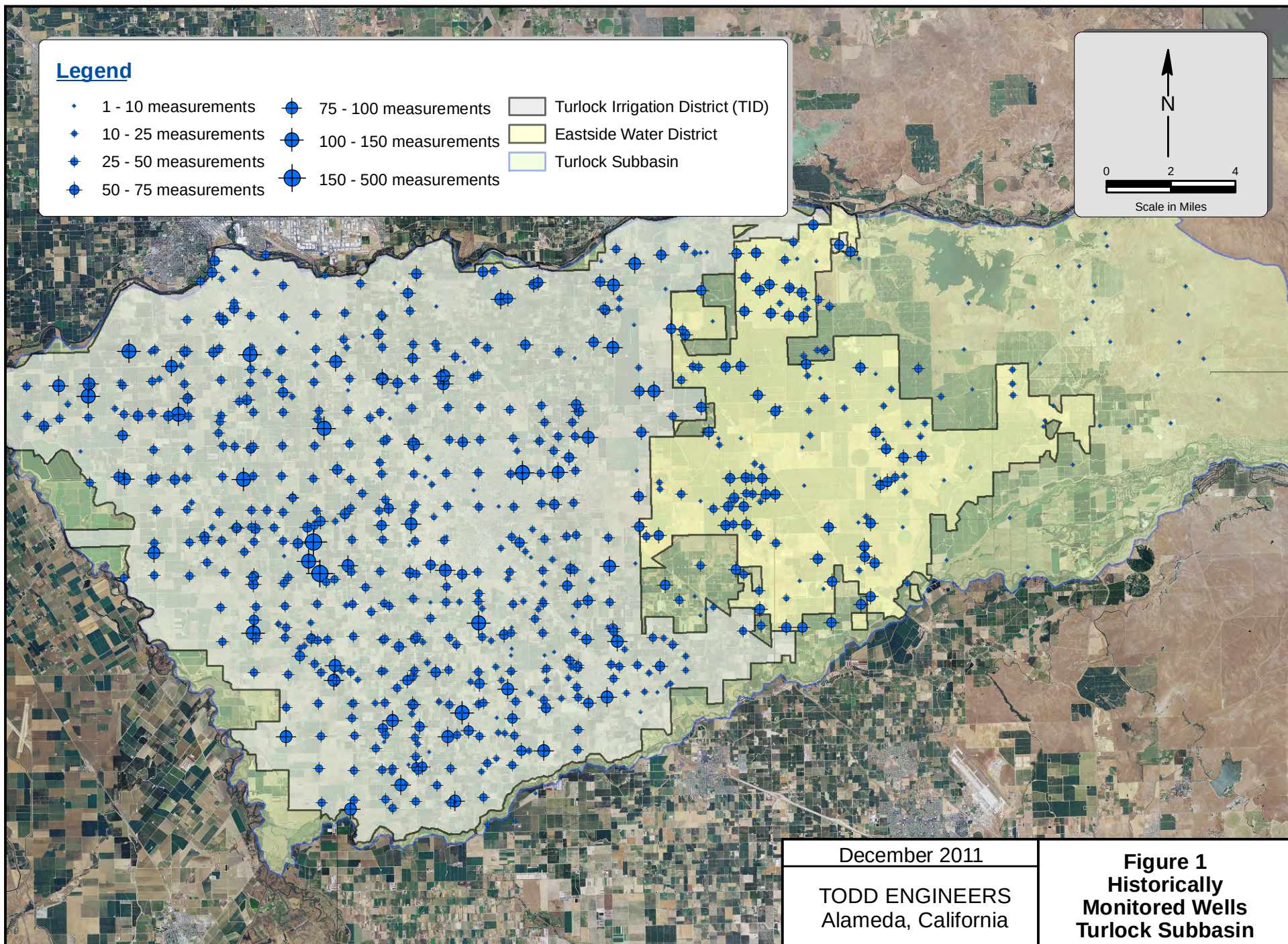
District	Well Identification	Local Identification	Well Ownership	Decimal Latitude (degrees)	Decimal Longitude (degrees)	UTM Northing (NAD 83 Zone 10, meters)	UTM Easting (NAD 83 Zone 10, meters)	Most Recent Measurement	Length of Record (years)	Number of Measurements	Currently Monitored by:	Log Number ¹	Reference Point Elevation ² (feet, msl)	Total Depth (feet bgs)	Depth to Top of Screens (feet bgs)	Casing Diameter (inches)	Date Drilled
Turlock Irrigation District 35 Wells in 291.5 mi ² (12 wells per 100 mi ²)	04S08E13P001M	TID 92	TID	37.58049	-121.04382	672730	4161070	7/8/2011	51	147	TID & DWR	TID 92	67	122		16	1/1/1929
	04S08E27H001M	TID 111	TID	37.56077	-121.06716	670714	4158839	7/8/2011	51	150	TID & DWR	TID 111	58	124	0-100	16	1/1/1973
	04S10E24B001M		Private	37.57965	-120.81965	692528	4161413	3/15/2011	36.9	64	DWR		131				
	04S09E11D001M	TID 195	TID	37.60854	-120.95604	680414	4164348	3/14/2011	50	35	DWR	TID 195	97	264	0-264	14	12/6/1954
	04S09E21A001M	TID 151	TID	37.57799	-120.97521	678795	4160921	7/8/2011	59	117	TID & DWR	TID 151	79	195	0-195	18	1/1/1940
	04S09E24G001M	TID 191	TID	37.57382	-120.92715	683049	4160551	7/8/2011	51	94	TID & DWR	TID 191	91	174	0-245	16	1/1/1952
	04S09E30Q001M	TID 34	TID	37.55160	-121.01660	675201	4157915	7/8/2011	51	129	TID & DWR	TID 34	67	86	0-86	16	1/1/1965
	04S09E36E001M	TID 22	TID	37.54410	-120.93437	682484	4157239	7/7/2011	51	122	TID & DWR	TID 22	89	49		16	1/1/1923
	04S10E21R002M	TID 186A	TID	37.56632	-120.86798	688293	4159836	3/15/2011	50	56	DWR	TID 186A	109	100	0-100	16	4/25/1969
	04S11E32P001M	TID 189	TID	37.53716	-120.78520	695682	4156769	7/7/2011	51	80	TID & DWR	TID 189	132	168	21-168	16	1/1/1951
	05S08E02R001M	TID 154	TID	37.52410	-121.05132	672197	4154799	3/15/2011	50	53	DWR	TID 154	50	222	0-222	18	7/1/1941
	05S09E04C001M	TID 48	TID	37.53660	-120.98521	678010	4156309	3/15/2011	24	41	DWR	TID 48	65	110	0-110	16	4/1/1924
	05S09E21B001M	TID 106	TID	37.48910	-120.98104	678491	4151047	3/16/2011	50	47	DWR	TID 106	62	145		18	6/1/1930
	05S09E23K001M	TID 82	TID	37.48438	-120.94465	681720	4150592	7/8/2011	22	106	TID & DWR	TID 82	71	126		18	1/1/1927
	05S09E33R001M	TID 61	TID	37.45271	-120.97687	678947	4147017	7/11/2011	22	103	TID & DWR	TID 61	62	225		16	1/1/1946
	05S10E01P001M	TID 300	TID	37.52216	-120.82271	692406	4155027	7/7/2011	51	129	TID & DWR	TID 300	115	38	0-32	16	1/1/1958
	05S10E04D001M	TID 10	TID	37.53604	-120.88410	686946	4156444	7/12/2011	51	99	TID & DWR	TID 10	98	45	0-45	16	1/1/1929
	05S10E17M001M	TID 12	TID	37.49993	-120.90326	685342	4152399	3/16/2011	50	58	DWR	TID 12	86	100		14	
	05S10E24C001M	TID 145	TID	37.49049	-120.82576	692218	4151507	3/16/2011	50	60	DWR	TID 145	105	310		14	8/1/1938
	05S10E27B001M	TID 184A	TID	37.47688	-120.85826	689378	4149930	3/16/2011	50	55	DWR	TID 184A	98	278	74-210	14	3/8/1969
	05S10E34J001M	TID 120A	TID	37.45466	-120.84937	690221	4147483	7/8/2011	51	132	TID & DWR	TID 120A	93	181		14	1/1/1965
	05S11E15M001M		Private	37.49660	-120.75770	698219	4152326	3/28/2011	35	64	DWR		166				
	05S11E30G001M	TID 108B	TID	37.47077	-120.79909	694627	4149373	3/16/2011	50	55	DWR	TID 108B	112	104		16	4/1/1975
	06S10E08H001M	TID 118	TID	37.42966	-120.89076	686622	4144626	7/11/2011	51	57	TID & DWR	TID 118	80	128		14	10/1/1933
	06S10E15F002M	TID 113A	TID	37.41466	-120.86020	689363	4143022	7/8/2011	27	108	TID & DWR	TID 113A	90	136	0-136	18	1/1/1957
	06S10E29F001M	TID 194	TID	37.38271	-120.89576	686296	4139407	7/11/2011	24	78	TID & DWR	TID 194	79	260	0-260	16	1/1/1954
	06S11E05C001M	TID 146A	TID	37.44633	-120.78909	695575	4146681	3/16/2011	50	54	DWR	TID 146A	108	150		16	12/1/1963
	06S11E10B001M	TID 223	TID	37.43355	-120.74798	699246	4145350	3/16/2011	50	59	DWR		132				
	06S11E17C001M	TID 85B	TID	37.41771	-120.78881	695674	4143507	7/8/2011	51	58	TID & DWR	TID 85A	107	184	0-184	16	1/1/1984
	TGWB 001	Foster Farms	Private	37.55731	-120.74741	698968	4159085	7/7/2011	22	96	TID		167.62				
	TGWB 002	Dallas-Appling	Improvement District	37.61478	-120.75665	697999	4165442	7/7/2011	22	95	TID		165.31				
	TGWB 003	Bogger-Snyder	Improvement District	37.60047	-120.83291	691304	4163696	7/7/2011	22	97	TID		137.12				
	TGWB 004	Gilbert	Improvement District	37.60886	-120.91212	684290	4164468	7/7/2011	4	38	TID		109.16				
	TGWB 005	TID 83	TID	37.43046	-120.93207	682964	4144634	7/11/2011	22	84	TID		72.22				
	TGWB 006	TID 303	TID	37.39679	-120.81460	693446	4141132	7/8/2011	22	96	TID		96.99				
Eastside Water District 24 Wells in 85.9 mi ² (~28 wells per 100 mi ²) (Historically Monitored by DWR Only)	03S12E33L001M		Private	37.63021	-120.65520	706911	4167373	3/15/2011	35	66	DWR		200				
	04S11E15J001M		Private	37.58521	-120.73715	699800	4162202	3/15/2011	47	71	DWR	46901	174.9	600	330-510 & 510-600	18	8/29/1977
	04S11E24Q001M		Private	37.56743	-120.70659	702546	4160295	3/15/2011	34	61	DWR		213				
	04S12E03G001M		Private	37.61799	-120.63437	708784	4166063	3/15/2011	40	68	DWR		201.7				
	04S12E06E001M		Private	37.61854	-120.69909	703070	4165983	3/15/2011	34	60	DWR		226				
	04S12E07C001M		Private	37.60743	-120.69437	703517	4164760	3/15/2011	34	62	DWR		207.2				
	04S12E08G001M		Private	37.60216	-120.66965	705714	4164228	3/15/2011	35	57	DWR		253.1				
	04S12E17G001M		Private	37.58966	-120.67048	705675	4162839	3/15/2011	35	59	DWR		231				
	04S12E18C001M		Private	37.59216	-120.69548	703460	4163062	3/14/2011	39	63	DWR		188				
	04S12E19N001M		Private	37.56773	-120.69824	703283	4160346	3/28/2011	35	65	DWR		236				
	04S12E21N001M		Private	37.56771	-120.66131	706545	4160424	3/28/2011	34	61	DWR		256				
	04S12E27J001M		Private	37.56577	-120.63048	709274	4160277	3/14/2011	35	65	DWR		265				
	04S12E29D001M		Private	37.54687	-120.67936	705007	4158073	3/28/2011	34	61	DWR	155298	245	457	169-409 & 409-457	16	5/15/1976
	04S12E34F001M		Private	37.54743	-120.64048	708442	4158220	3/29/2011	12	15	DWR		244				
	04S13E28Q001M		Private	37.55132	-120.54492	716873	4158868	3/29/2011	40	22	DWR		256				
	05S11E13A001M		Private	37.50466	-120.70715	702667	4153328	3/28/2011	40	55	DWR	30268	230.5	367	192-360	16	2/20/1971
	05S11E22B001M		Private	37.49216	-120.74687	699189	4151856	3/28/2011	35	68	DWR		185				
	05S12E01M001M		Private	37.52466	-120.60742	711427	4155767	3/14/2011	40	70	DWR		253				
	05S12E07H001M		Private	37.51688	-120.68770	704353	4154726	3/28/2011	40	63	DWR	30265	201	492	198-300 & 300-492	12	#####
	05S12E08P001M		Private	37.50966	-120.68048	705011	4153940	3/28/2011	40	64	DWR	30262	220.3	484	198-300 & 360-480	12	#####
	05S12E18C001M		Private	37.50438	-120.69853	703429	4153315	3/28/2011	40	58	DWR	30269	206	575	167-383 & 395-575	12	3/1/1971
	05S12E21Q001M		Private	37.48021	-120.65742	707130	4150724	3/14/2011	40	67	DWR		193				
	05S12E22H001M		Private	37.48521	-120.63103	709450	4151337	3/14/2011	46	72	DWR		220				
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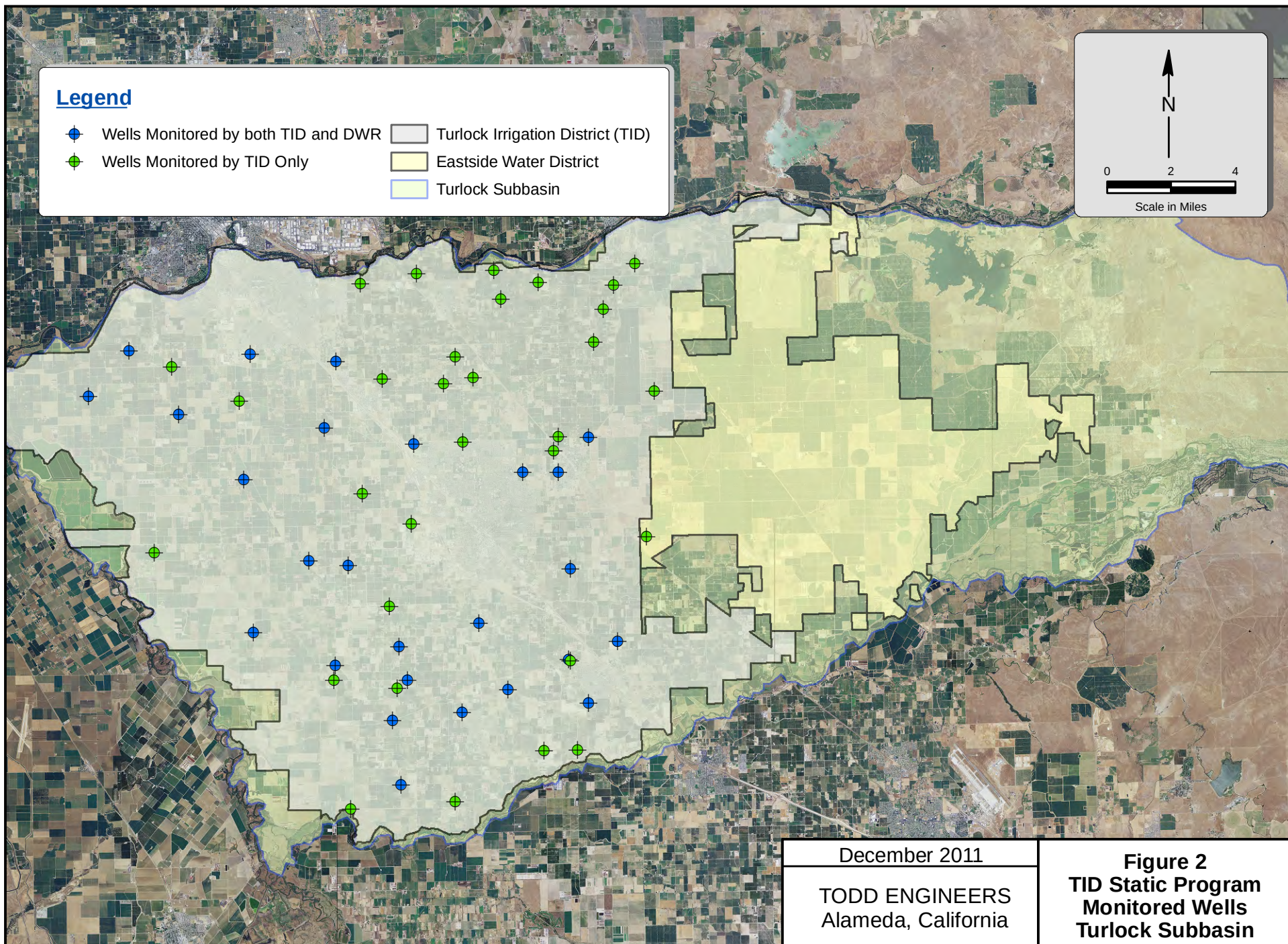
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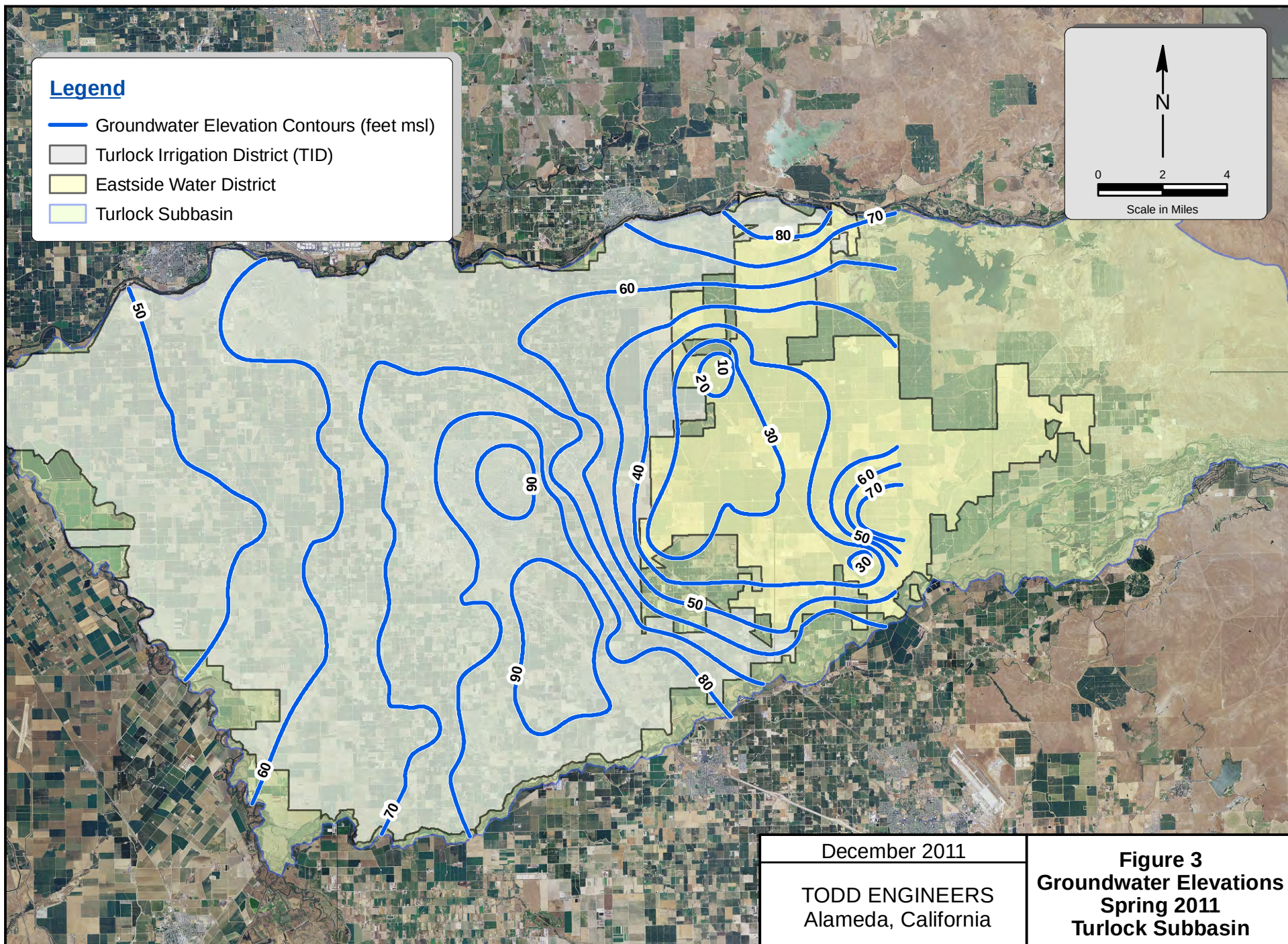
¹: Log numbers refer either to TID Drainage Well construction records or DWR Driller's Logs.

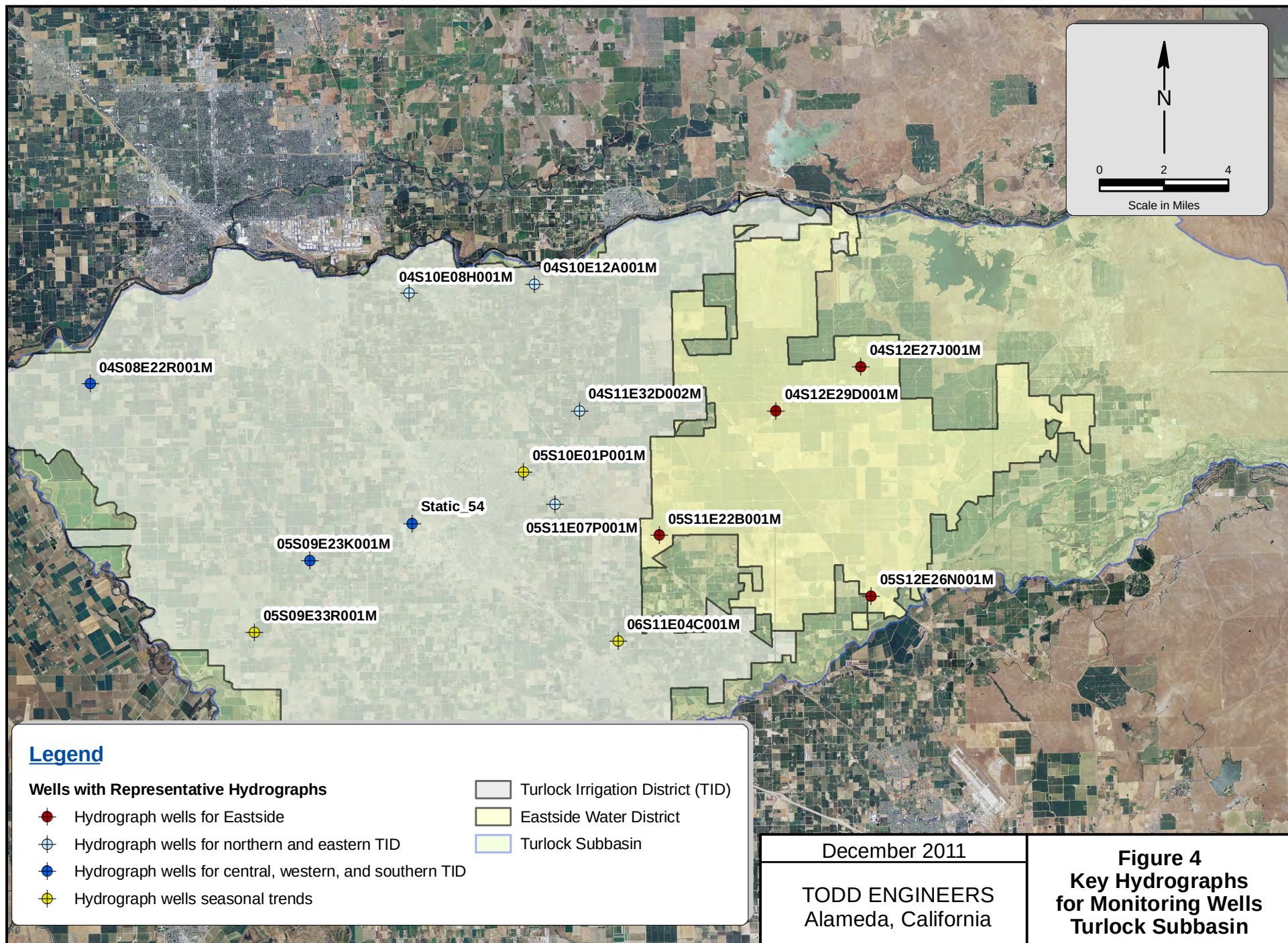
²: Reference point elevations are from the current monitoring entity except where both TID and DWR monitor a well, in which case the TID reference point is used.

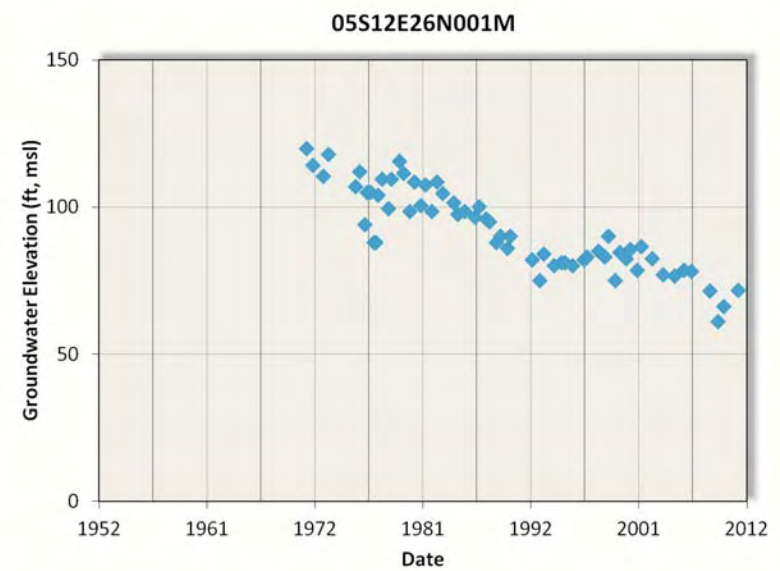
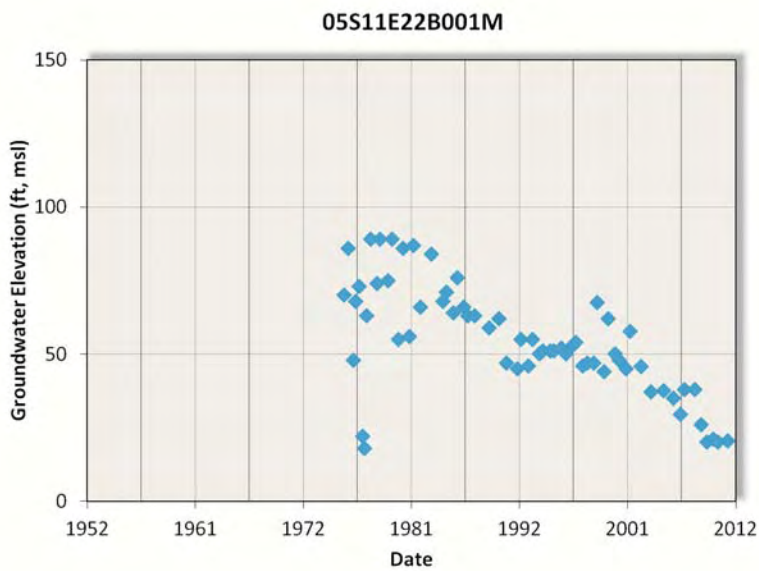
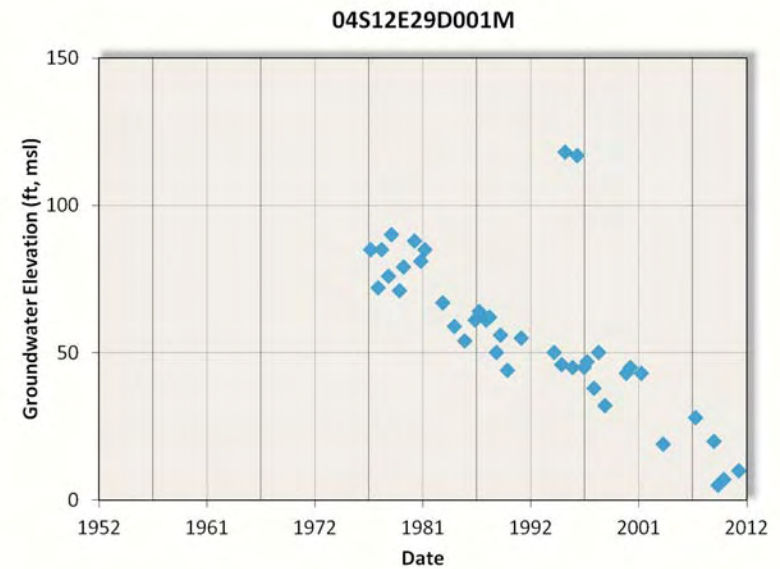
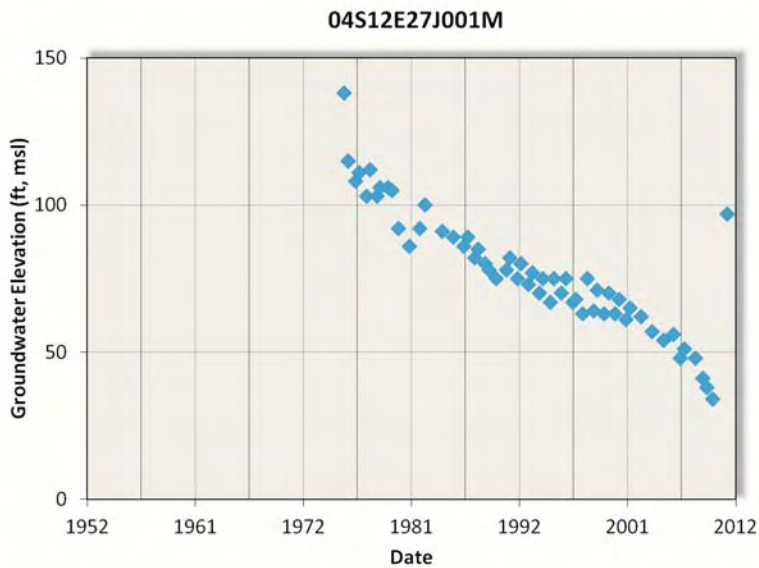
Figures







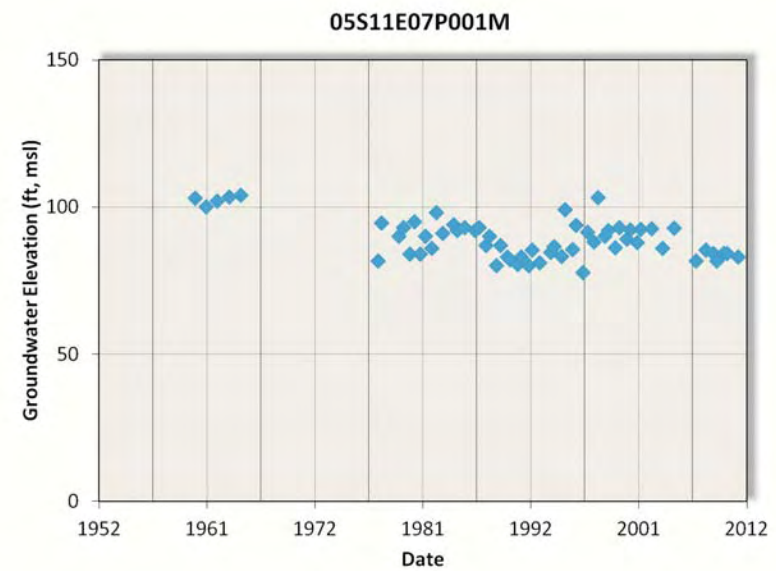
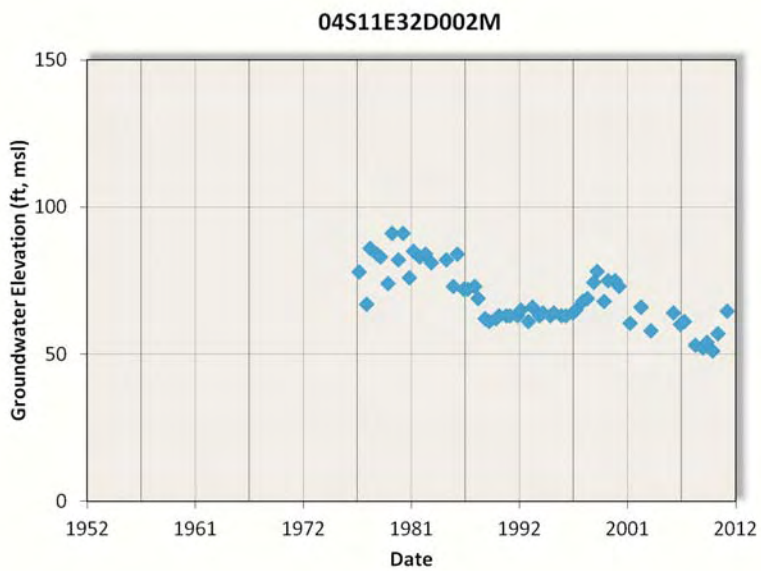
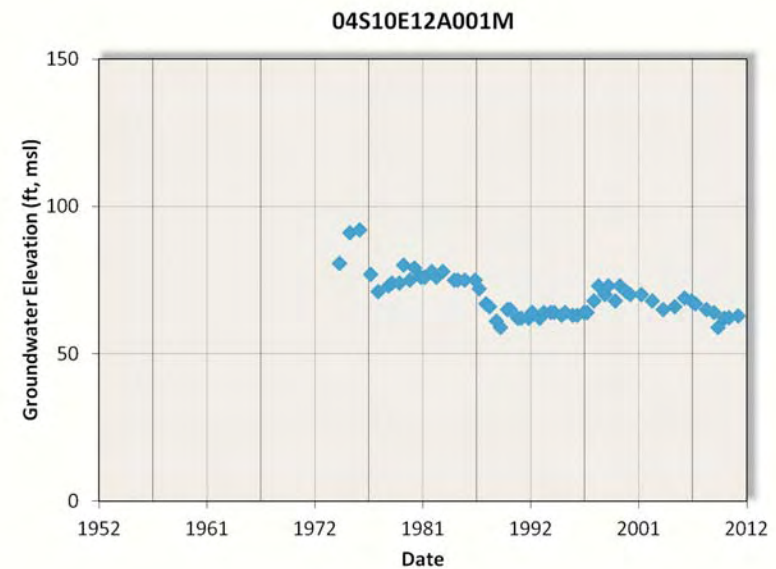




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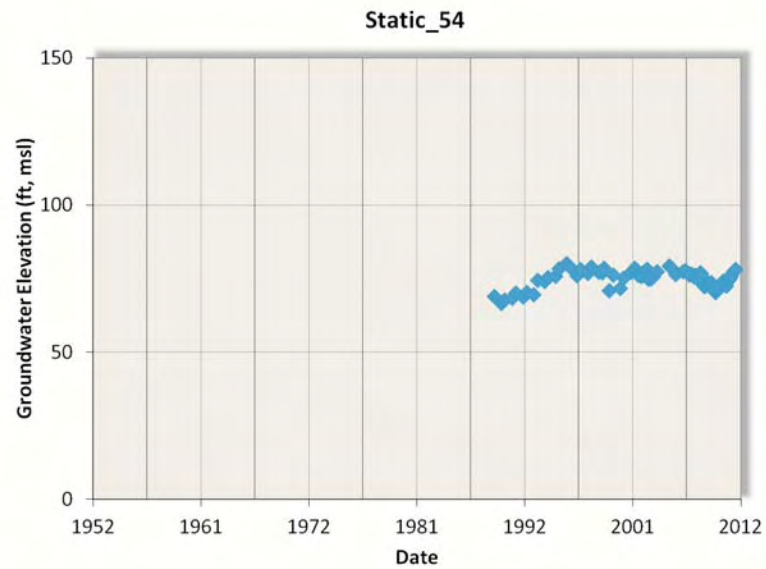
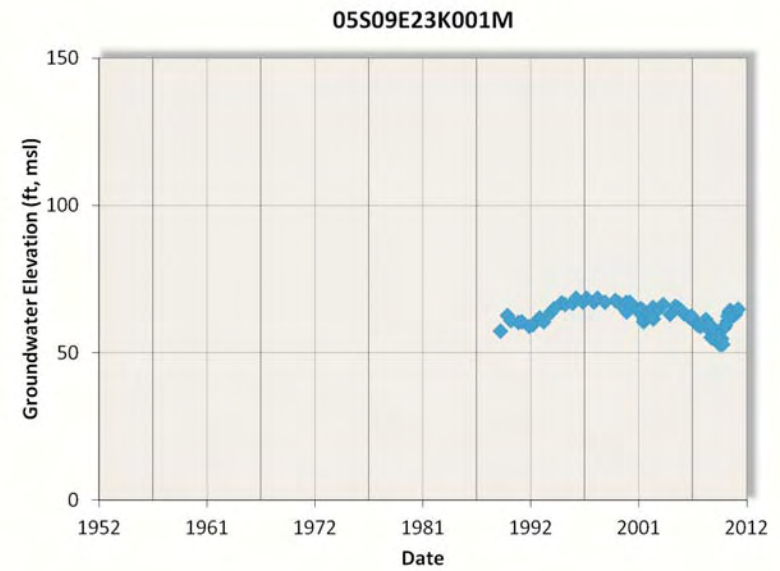
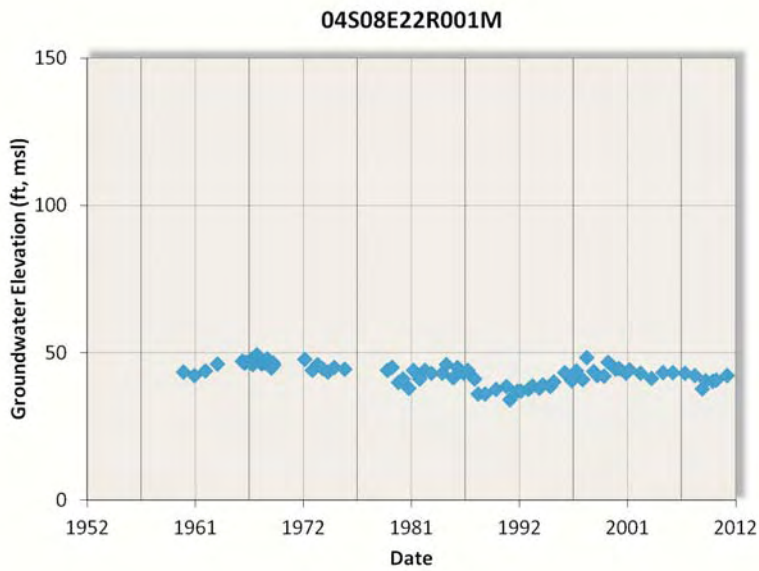
Figure 5
Eastside Water District
Representative
Hydrographs



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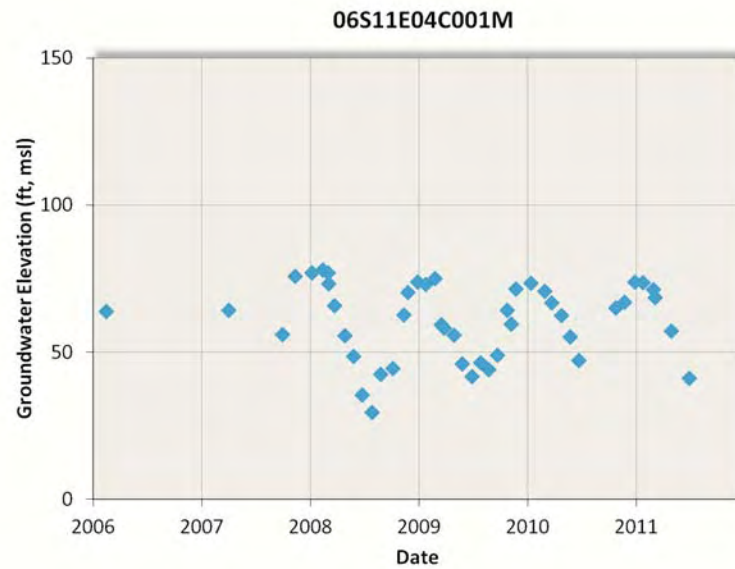
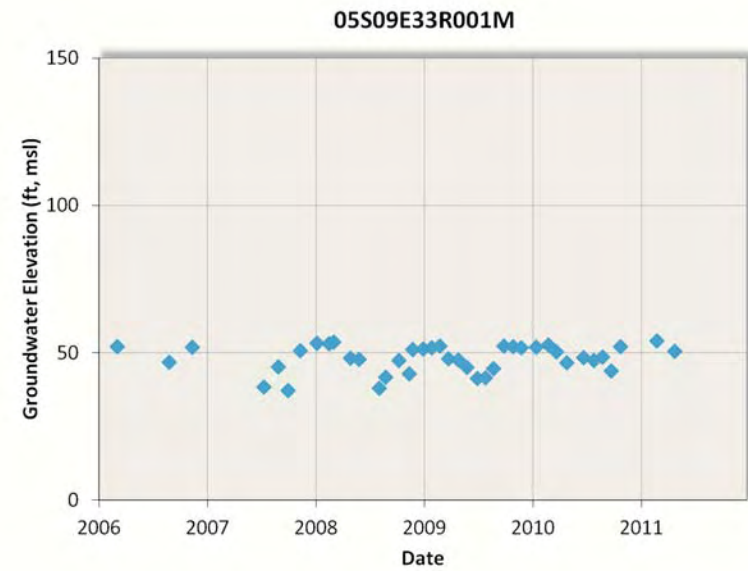
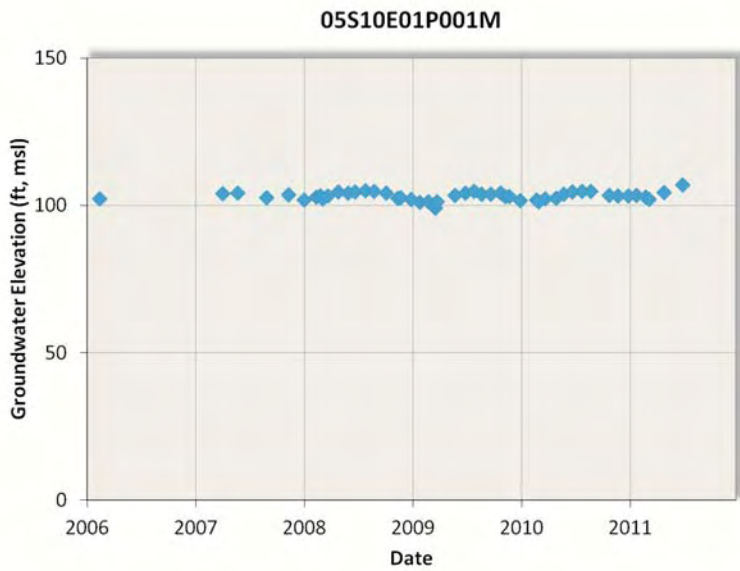
Figure 6
Northern and Eastern
TID Representative
Hydrographs



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Alameda, California

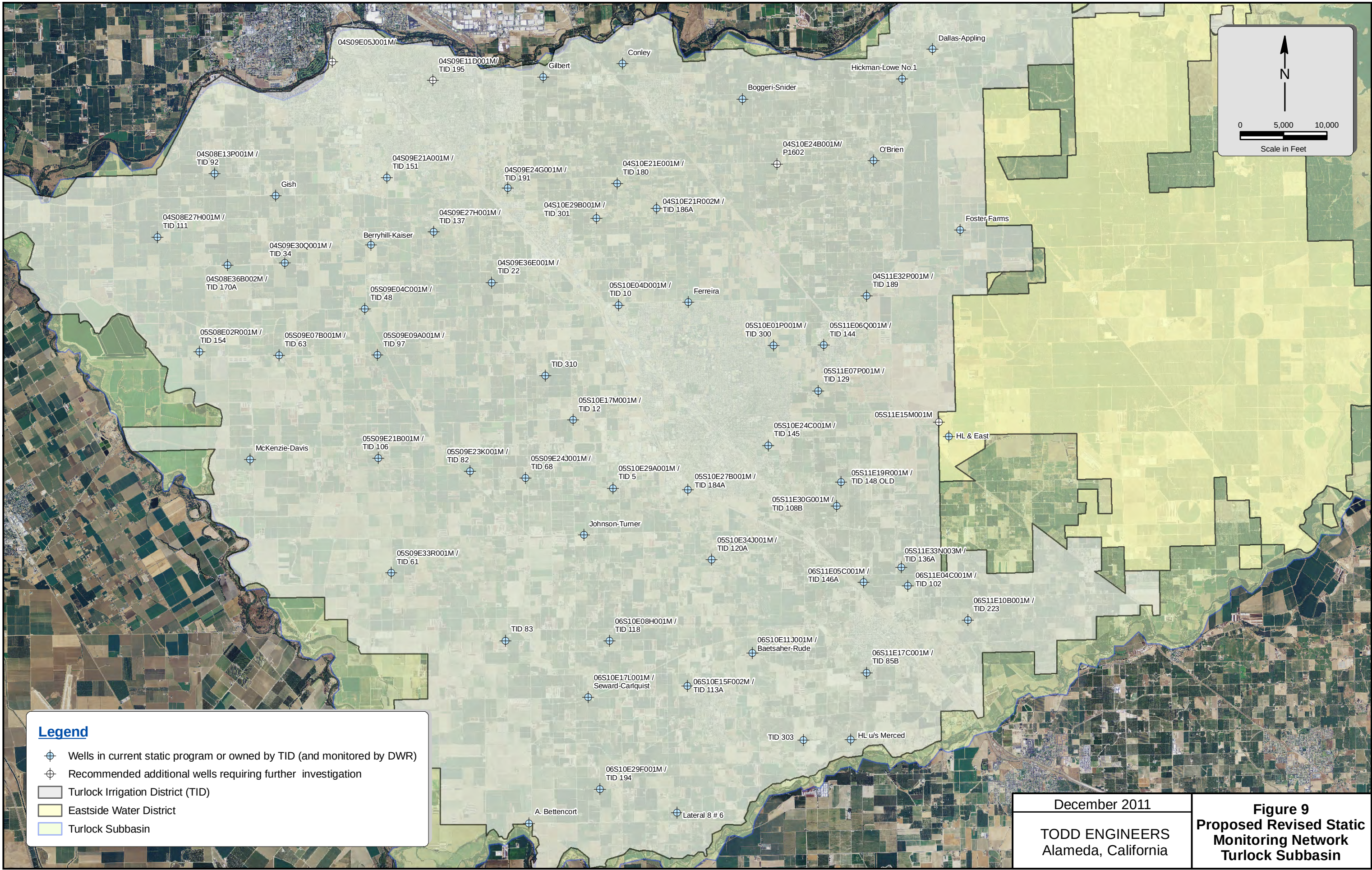
Figure 7
Central, Western, and
Southern TID
Representative
Hydrographs

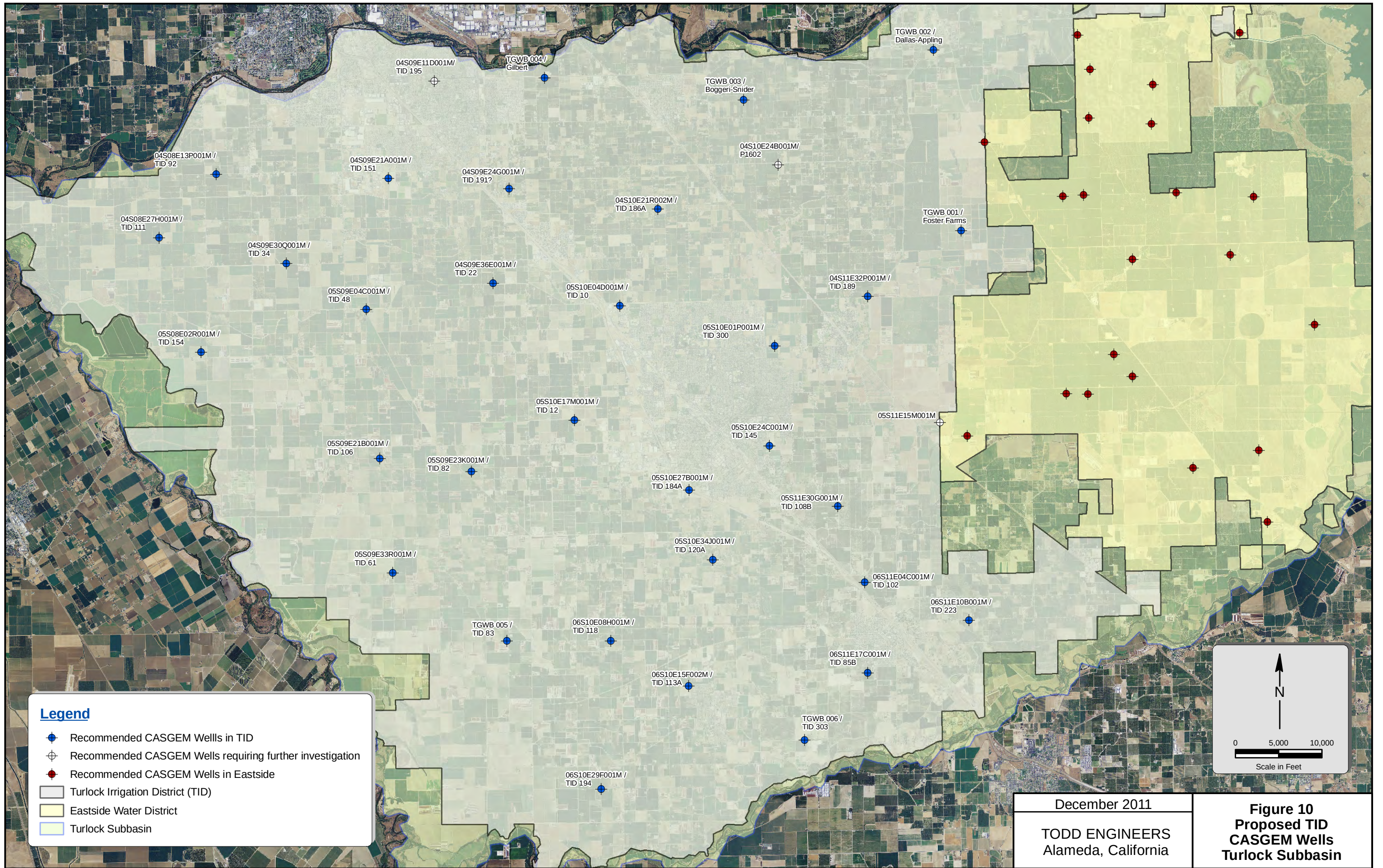


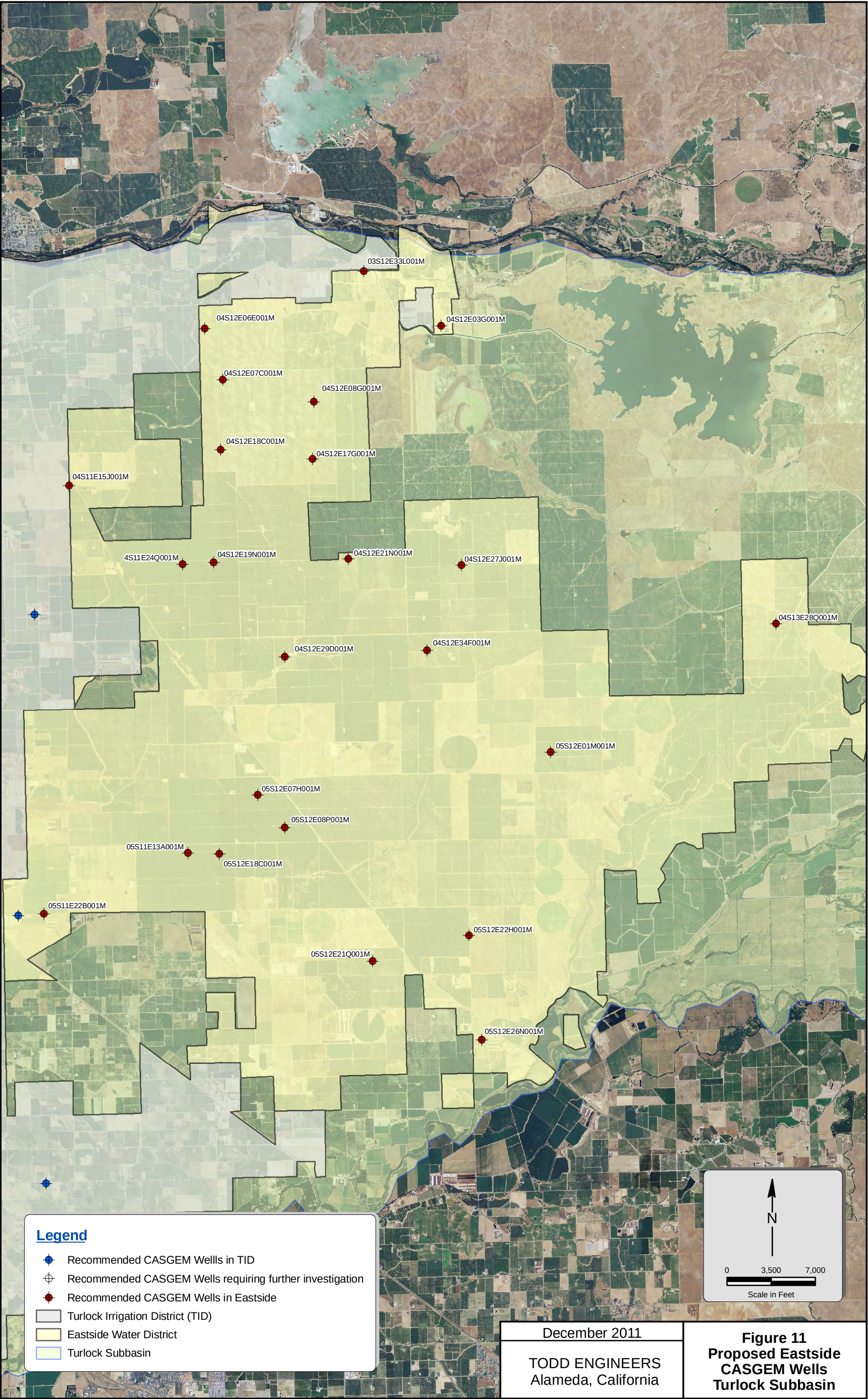
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Figure 8
Seasonal
Hydrographs

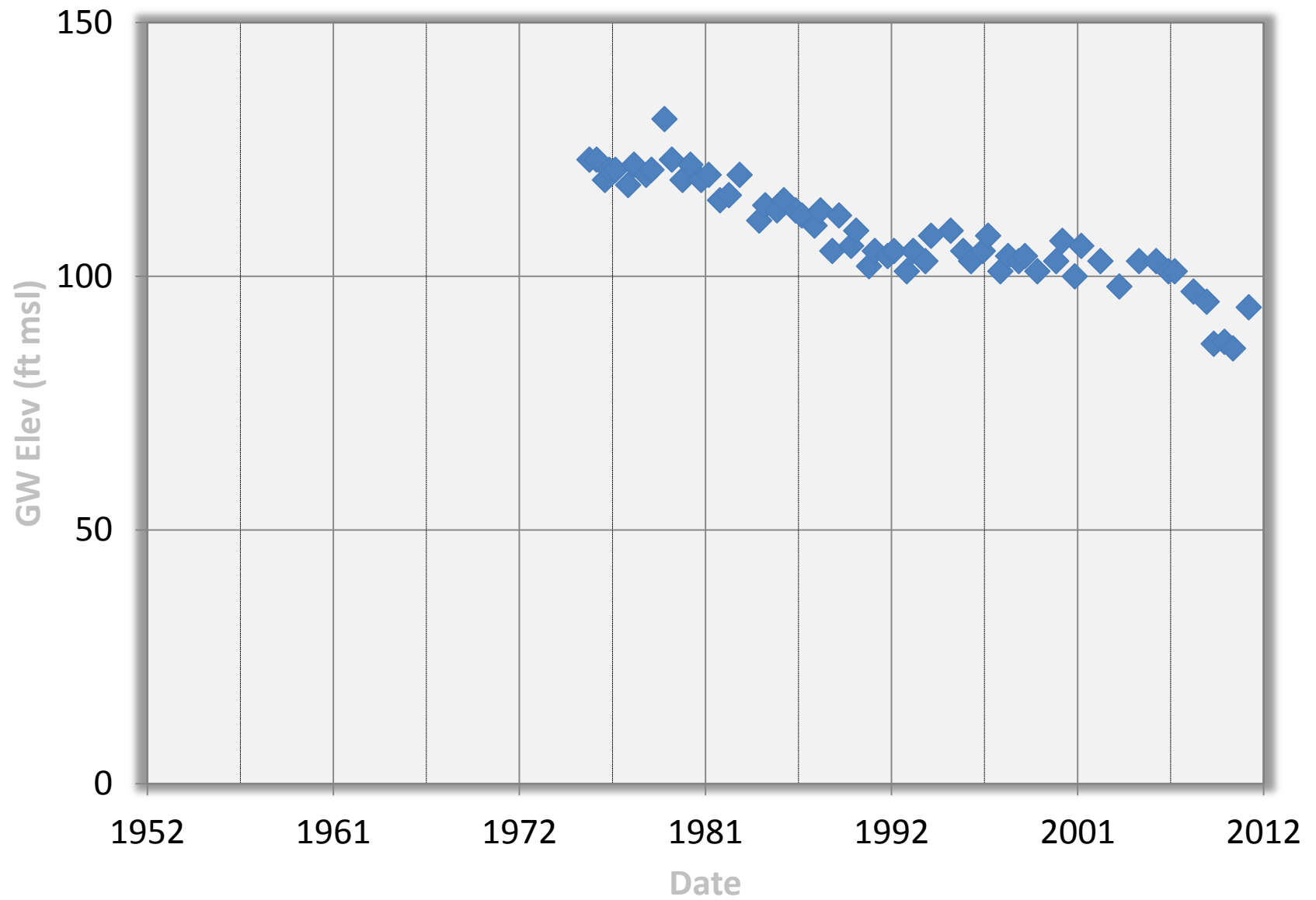




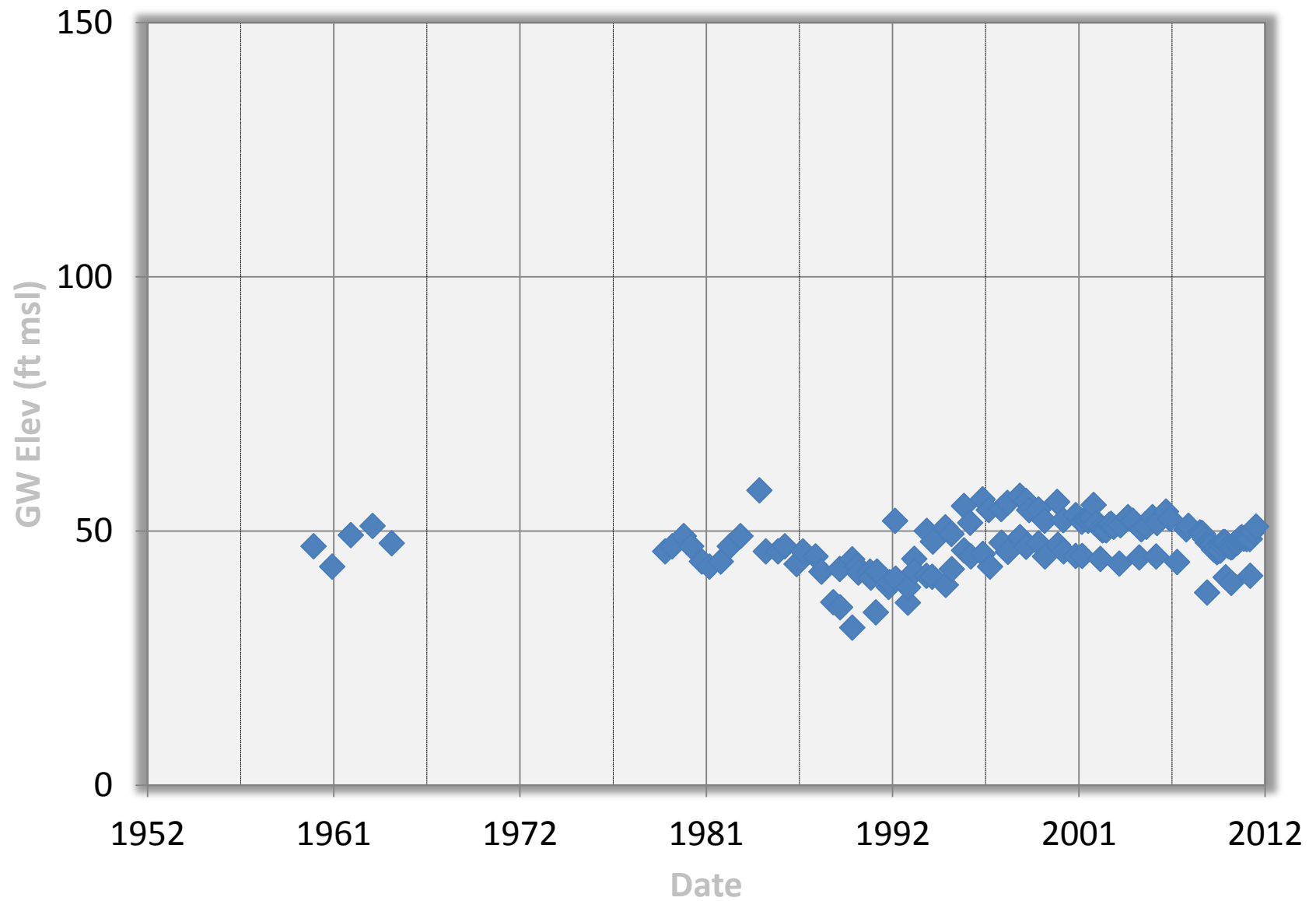


Appendix A

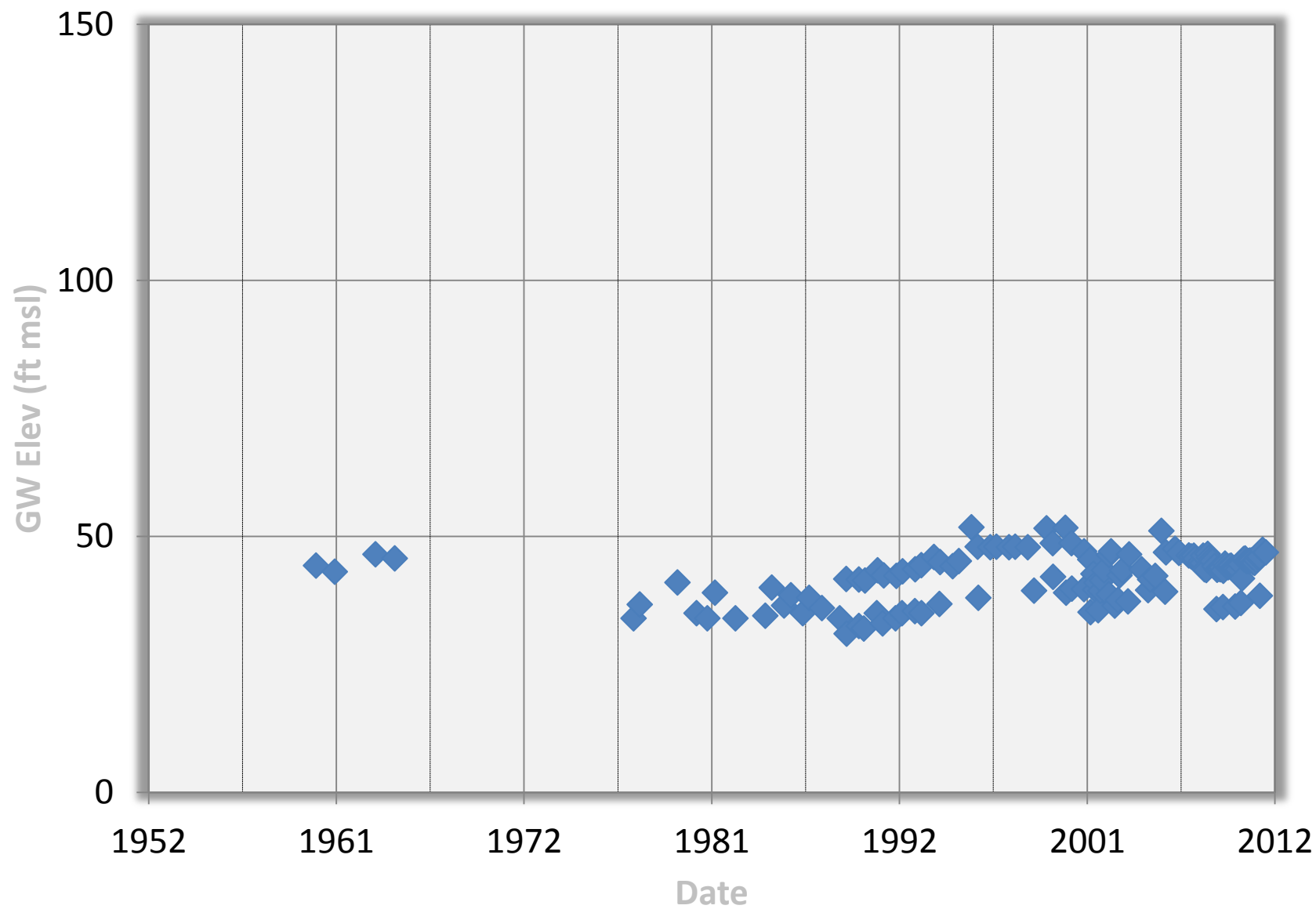
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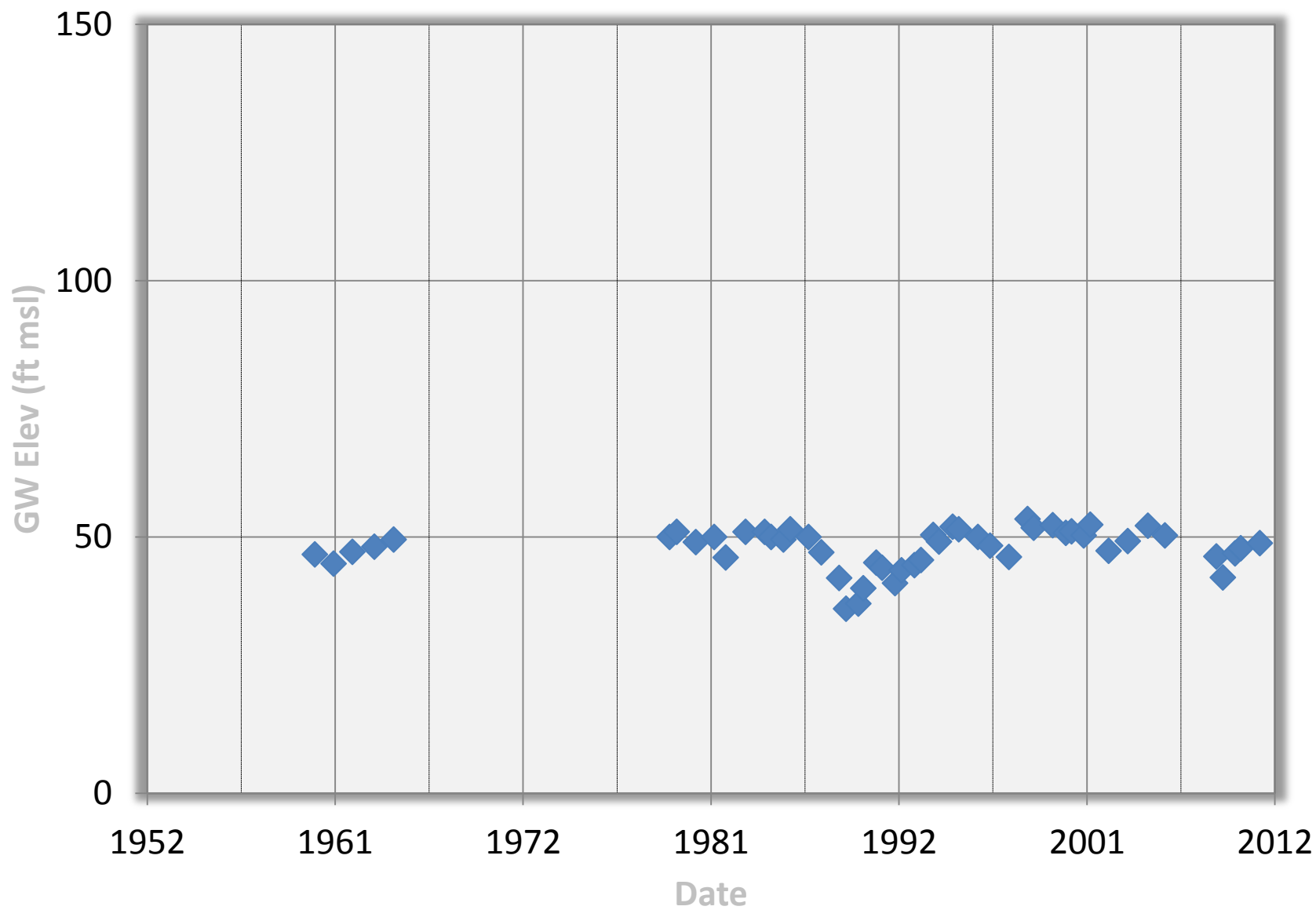
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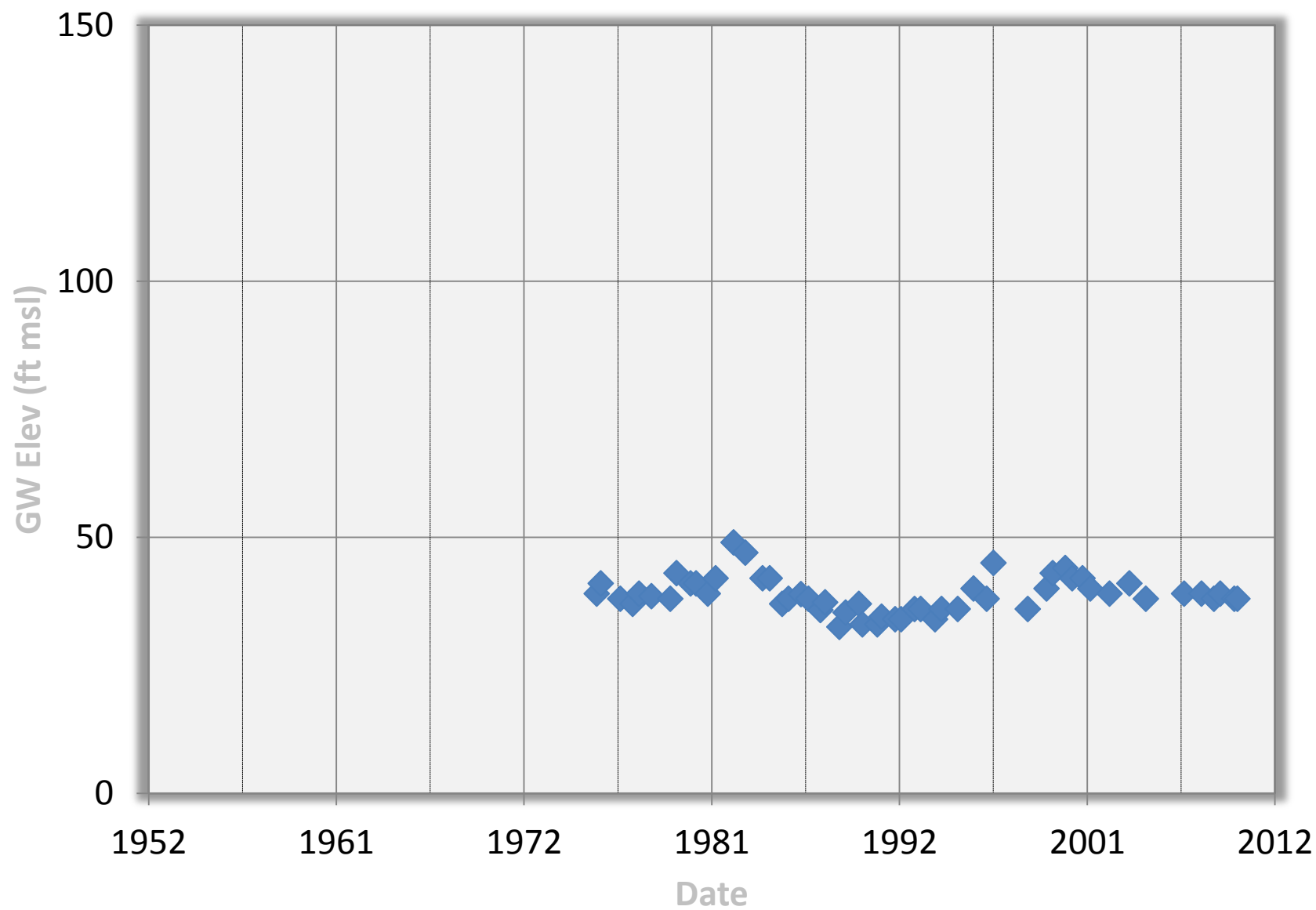
TID 111 / 04S08E27H001M



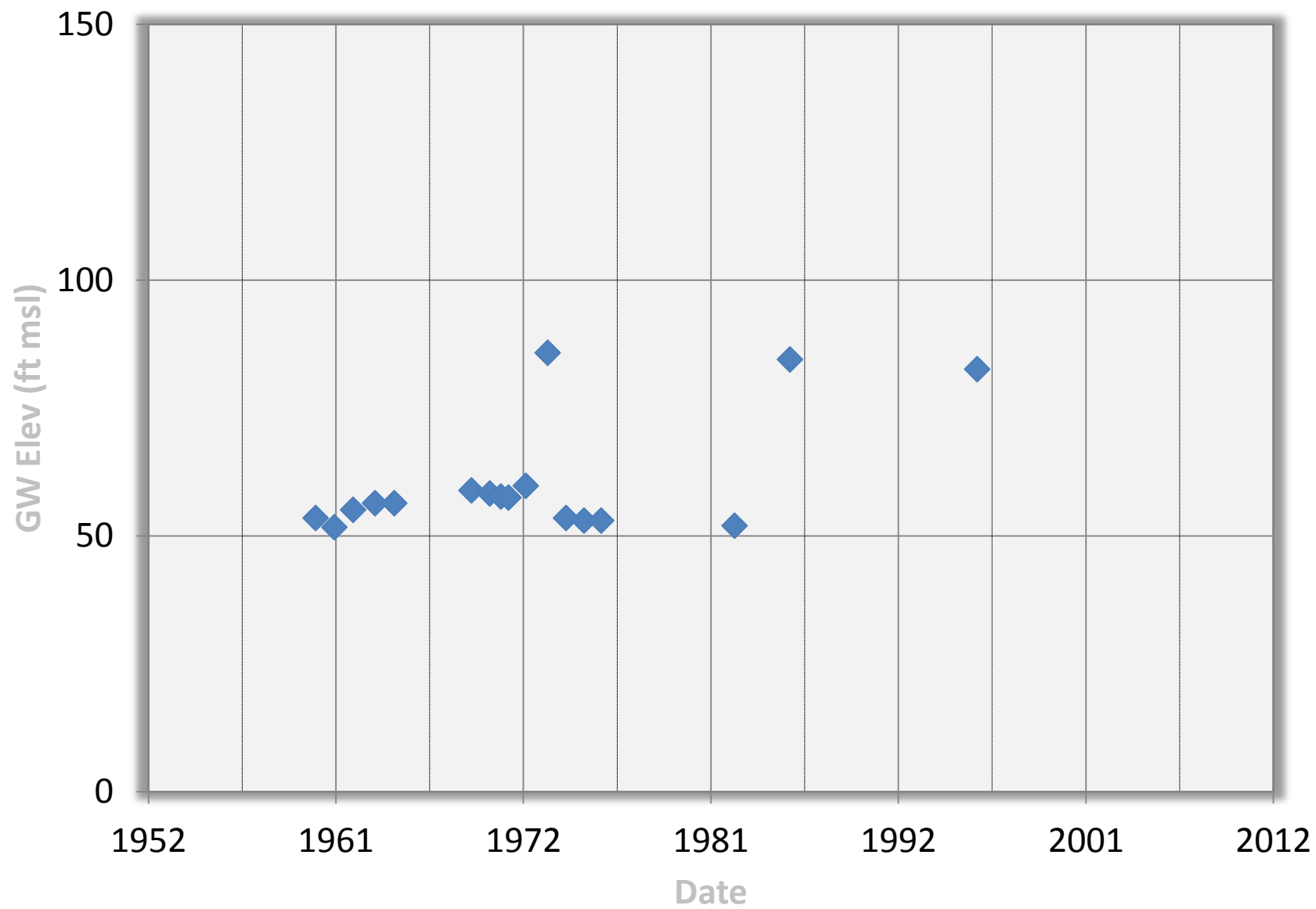
TID 170A / 04S08E36B002M



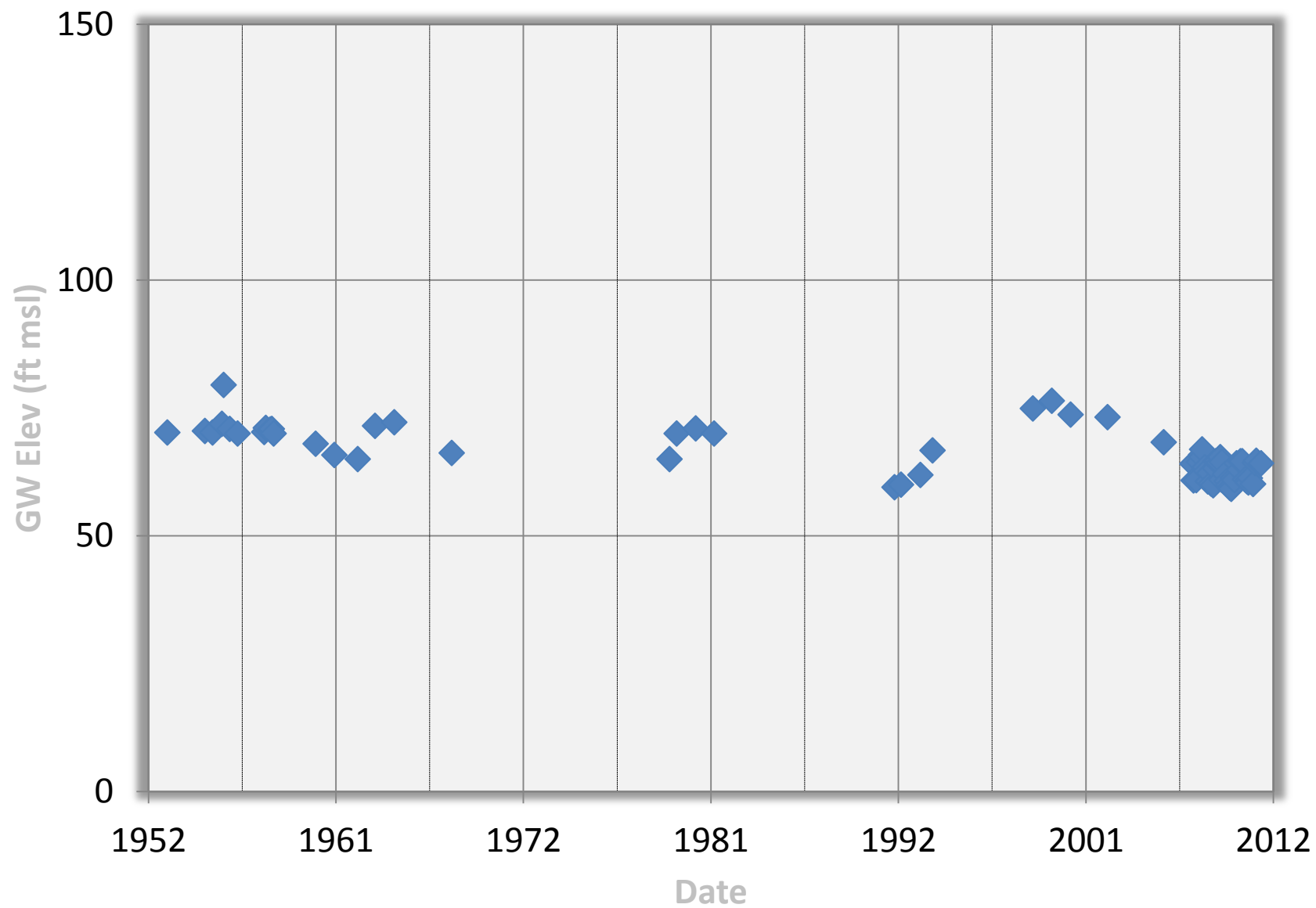
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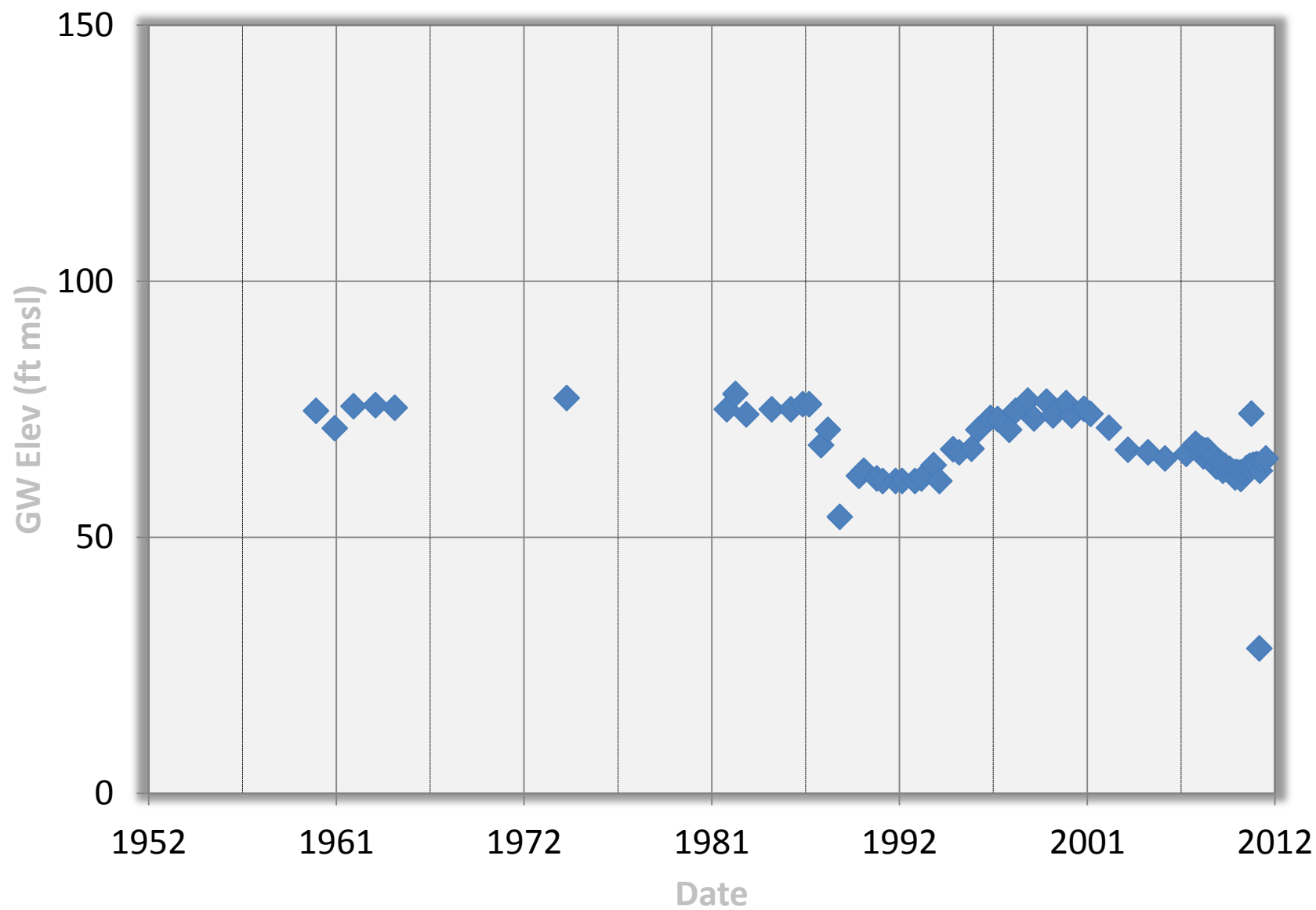
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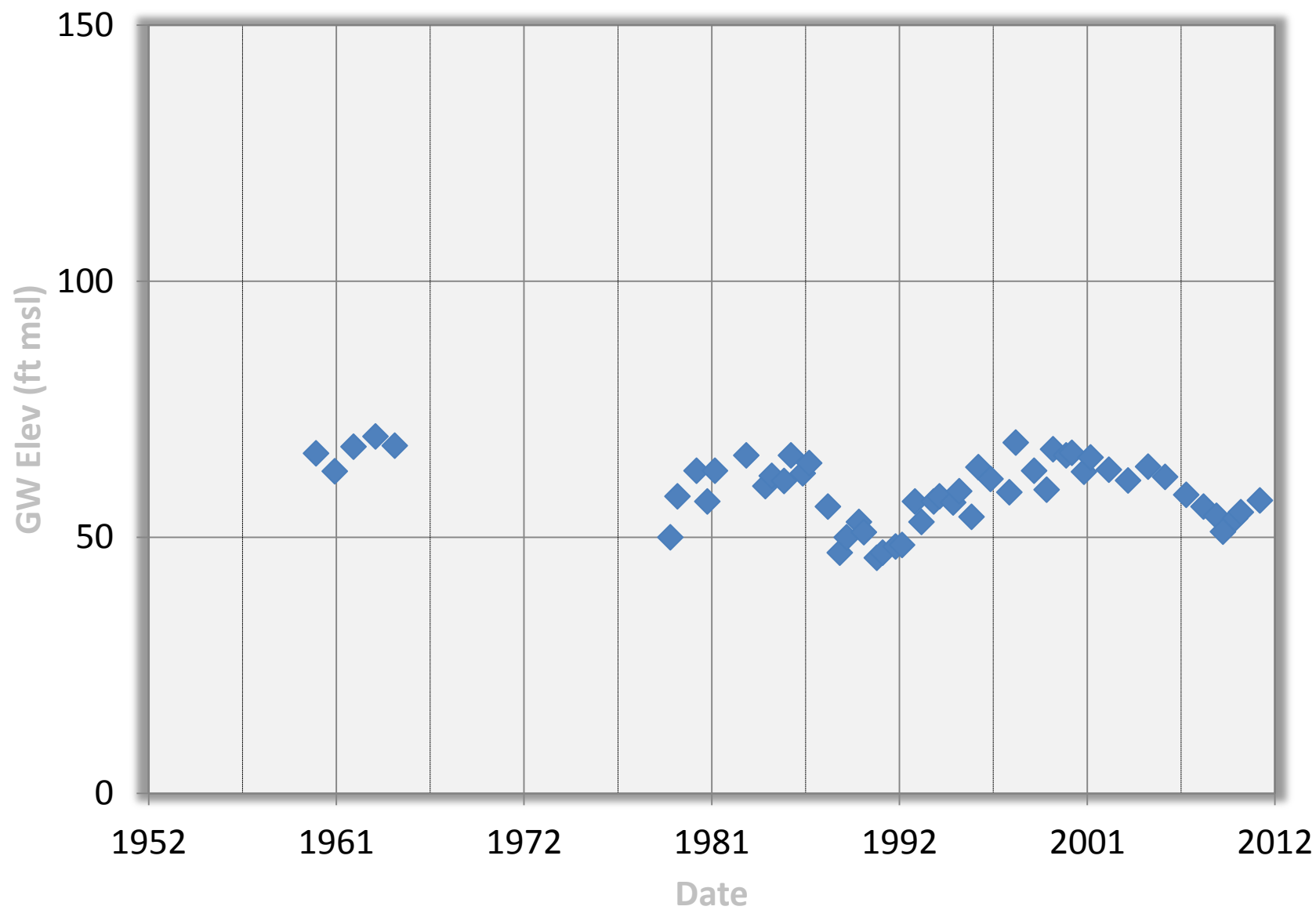
TID 151 / 04S09E21A001M



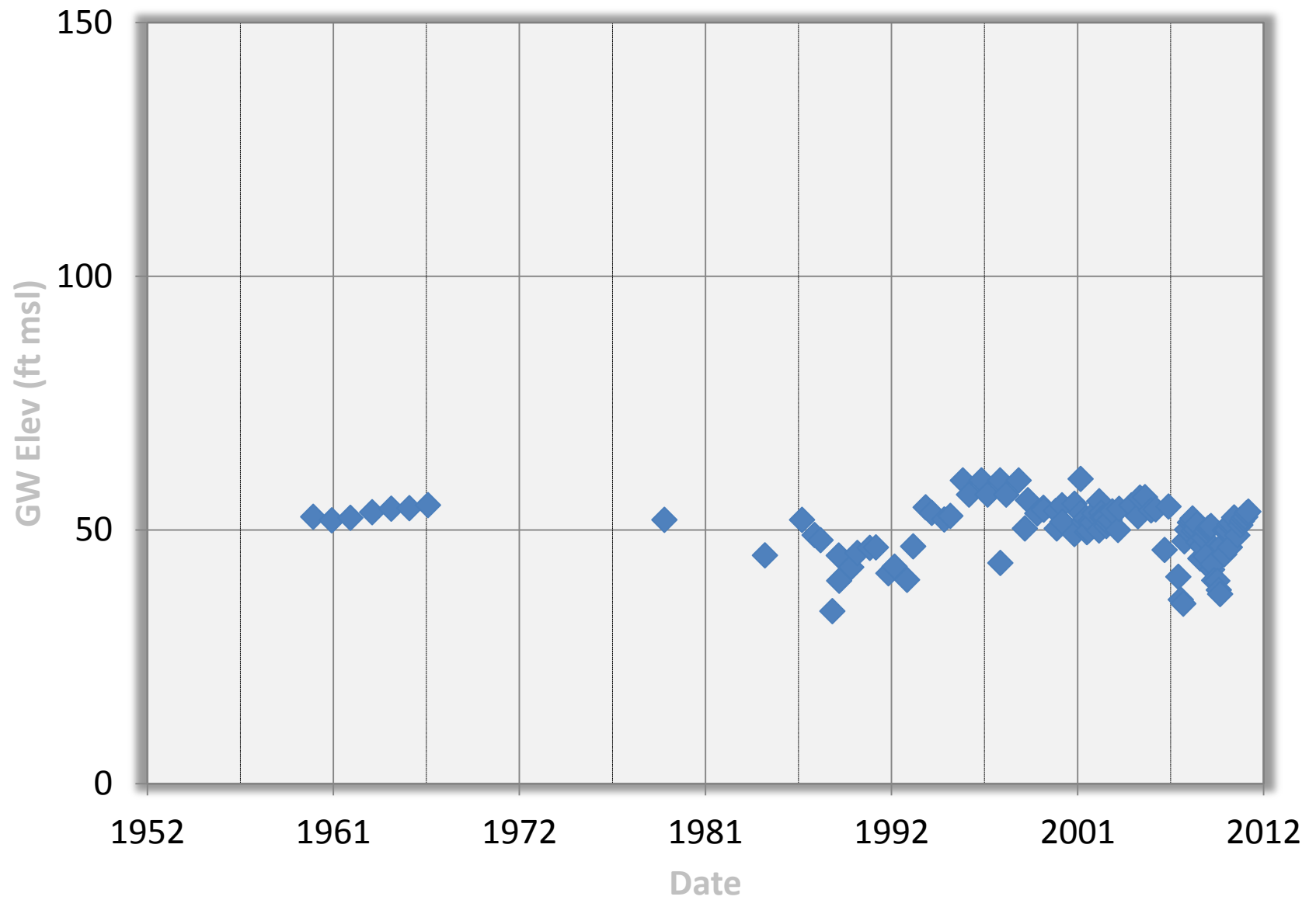
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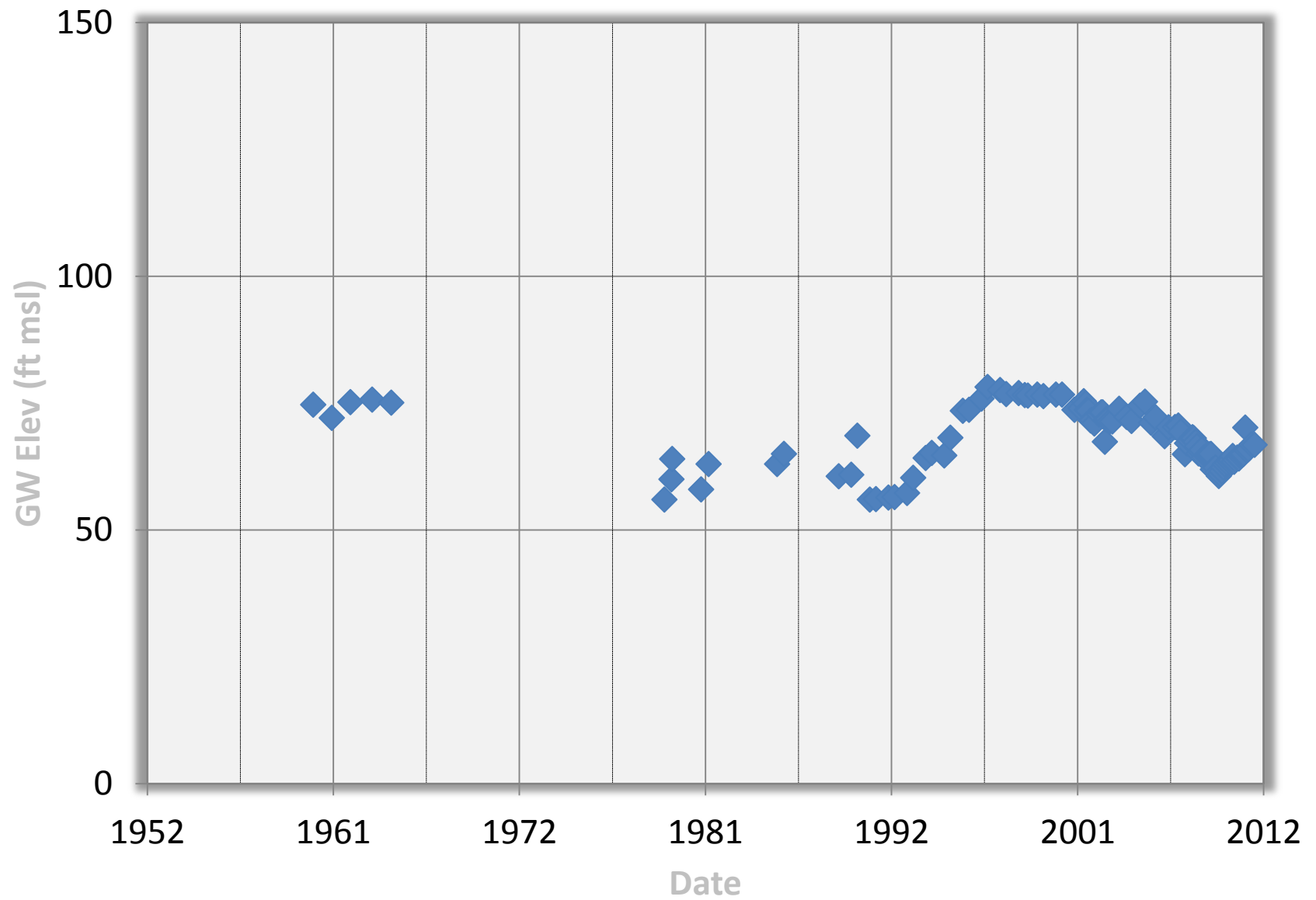
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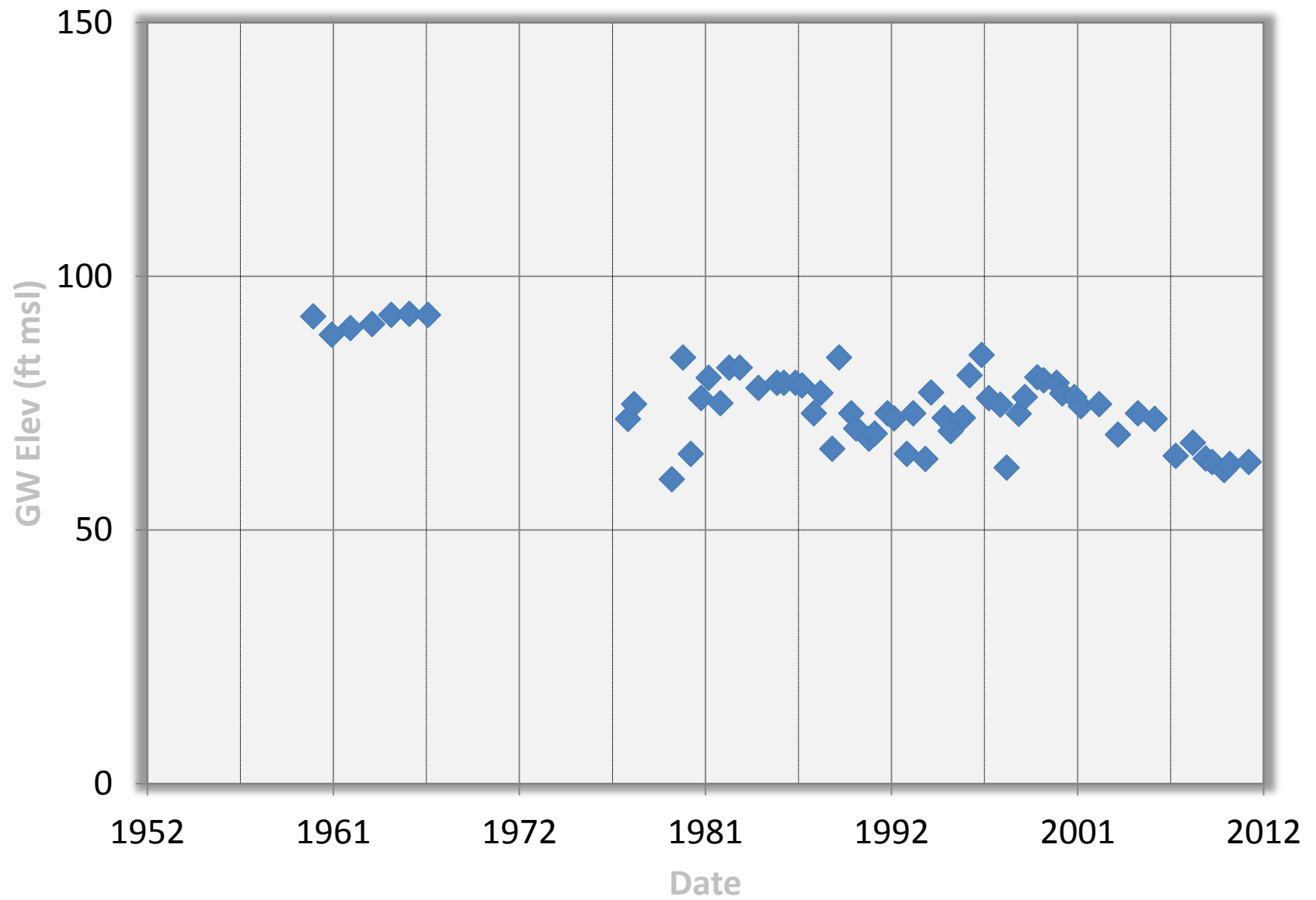
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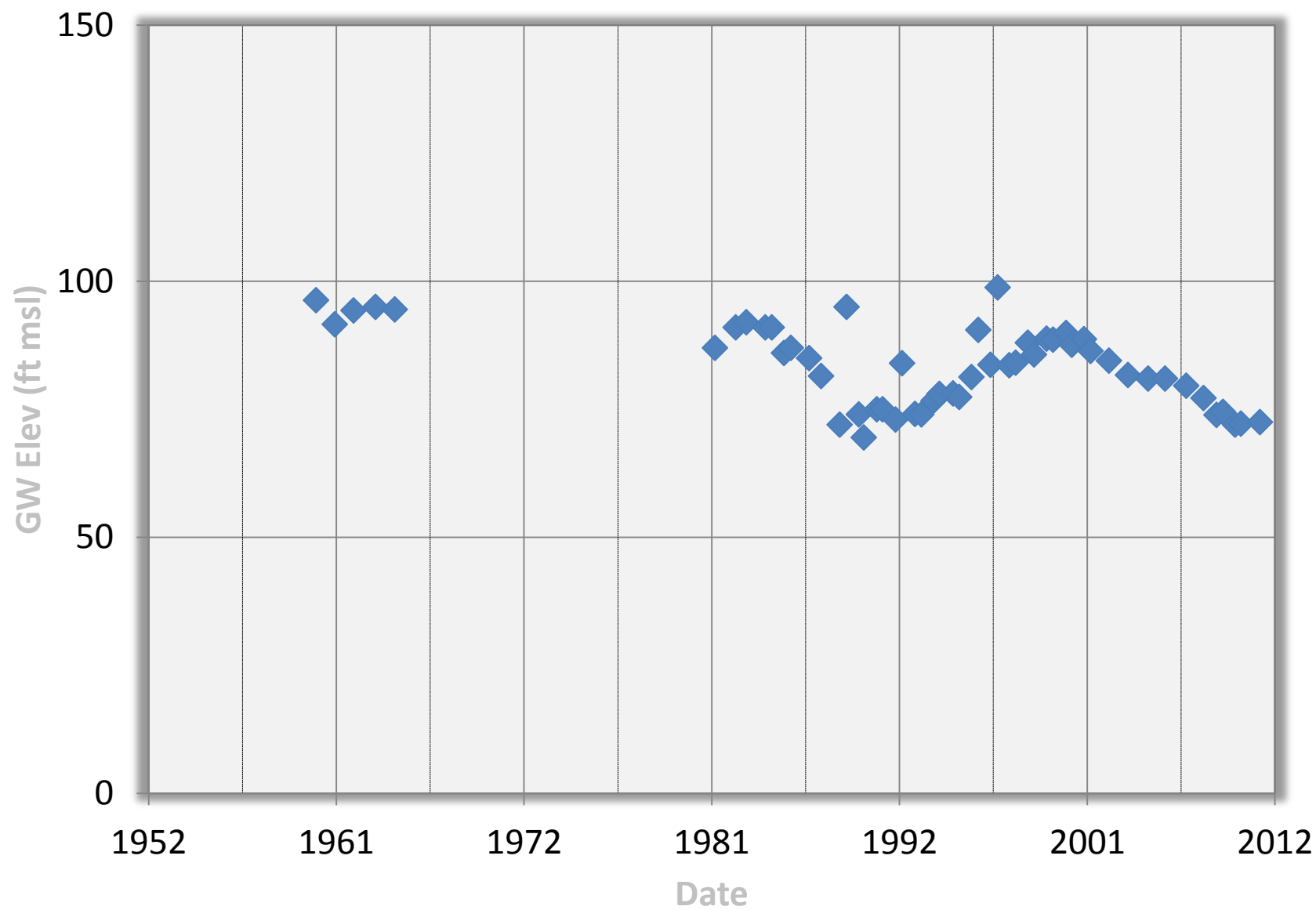
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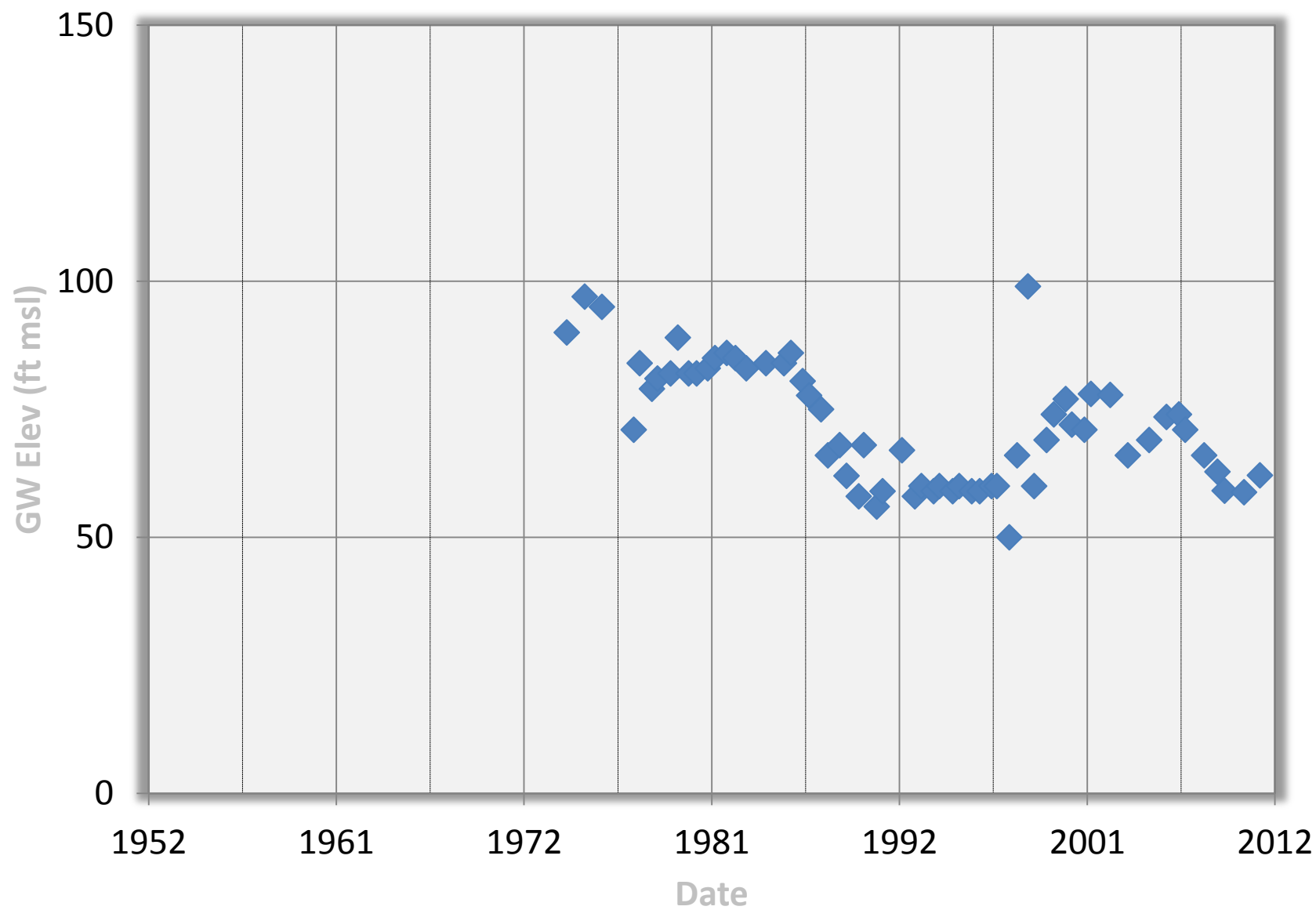
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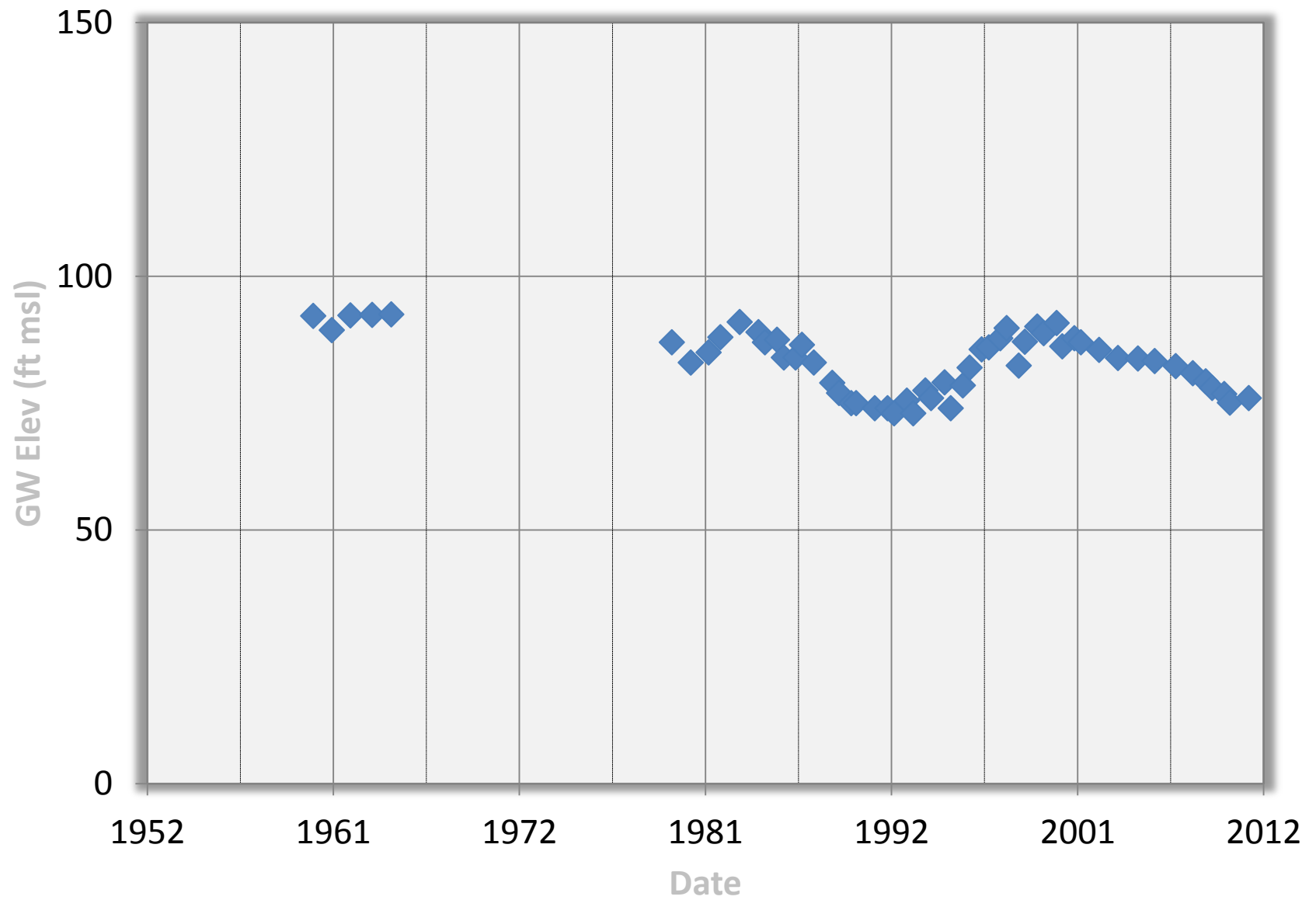
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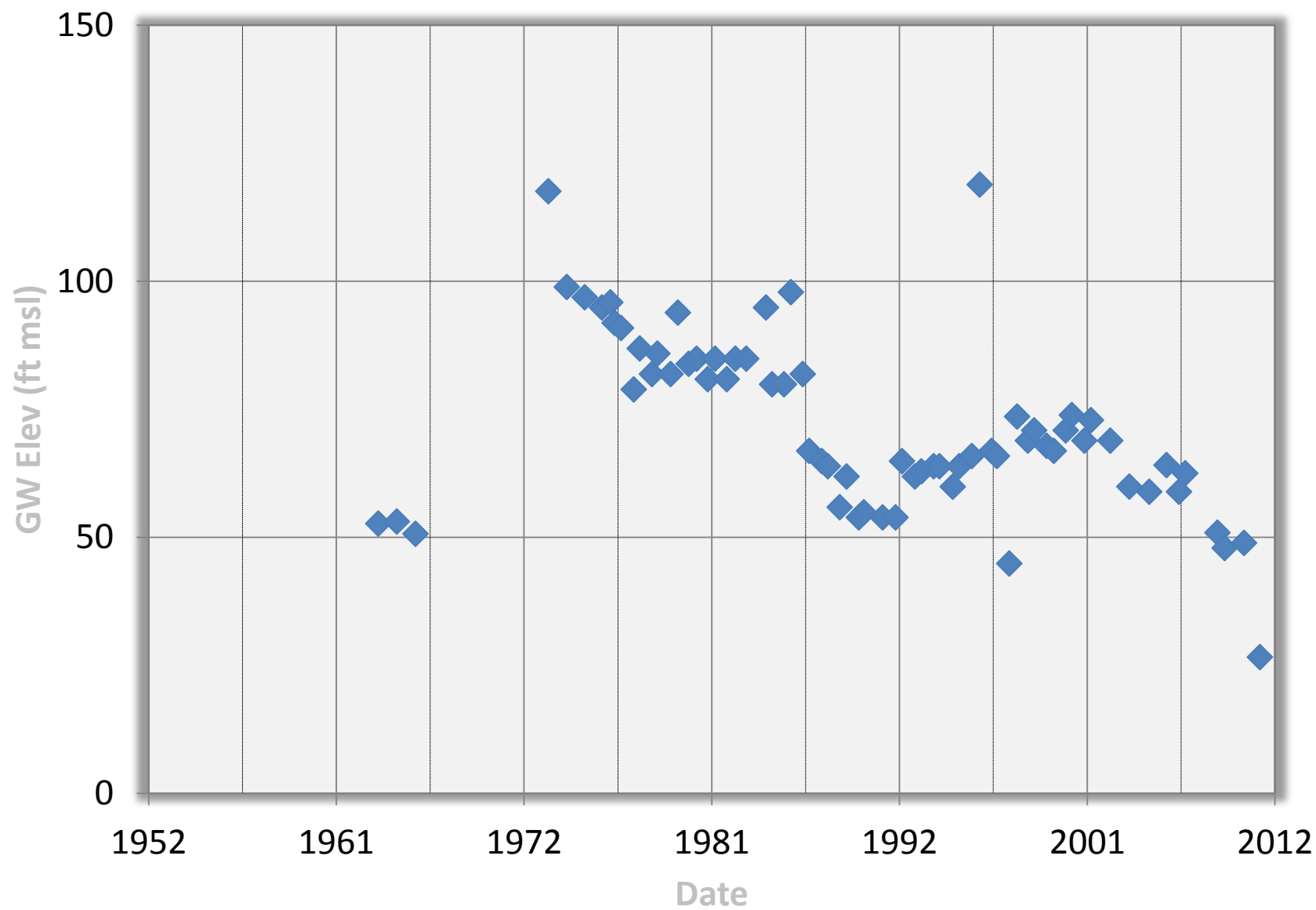
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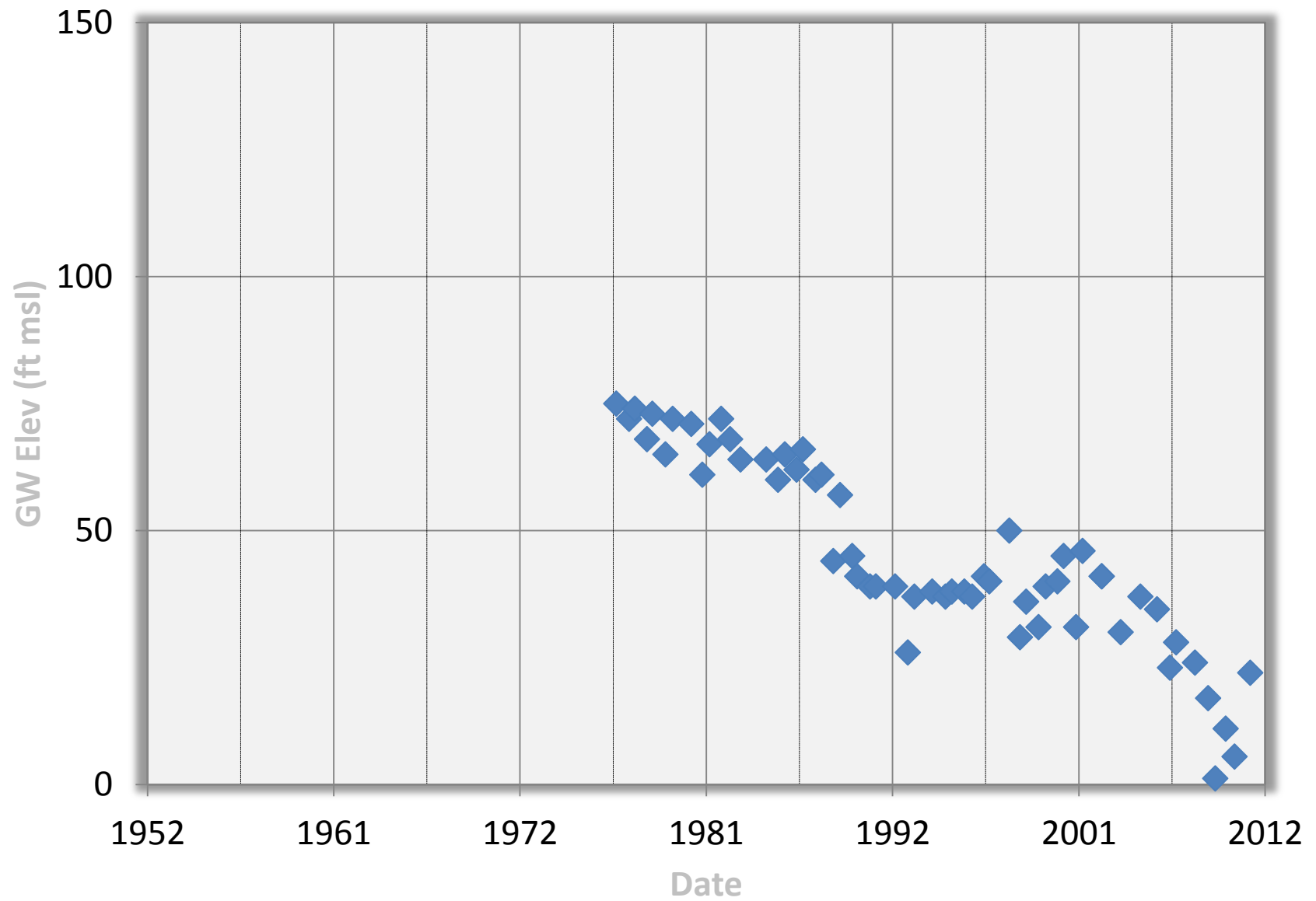
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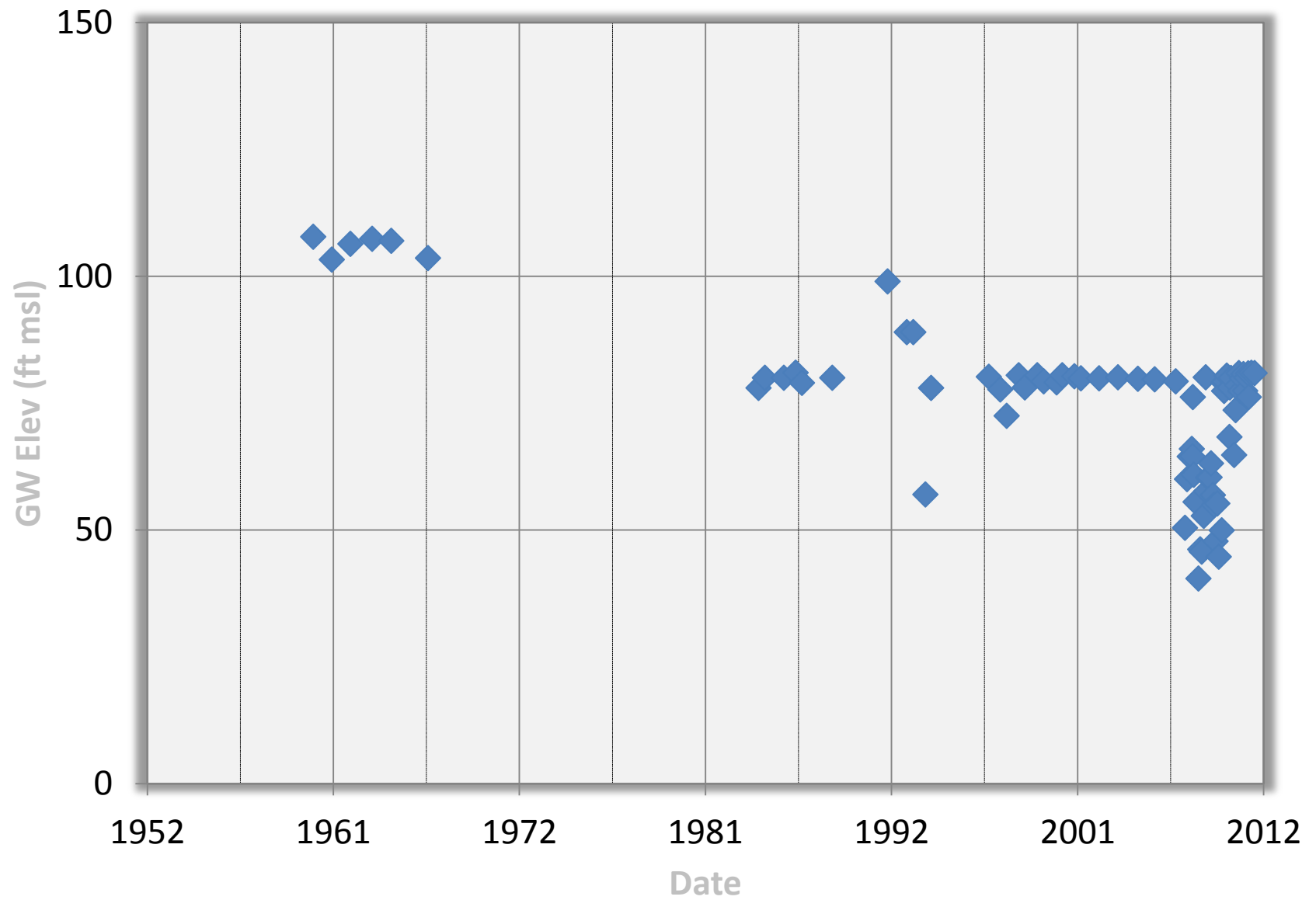
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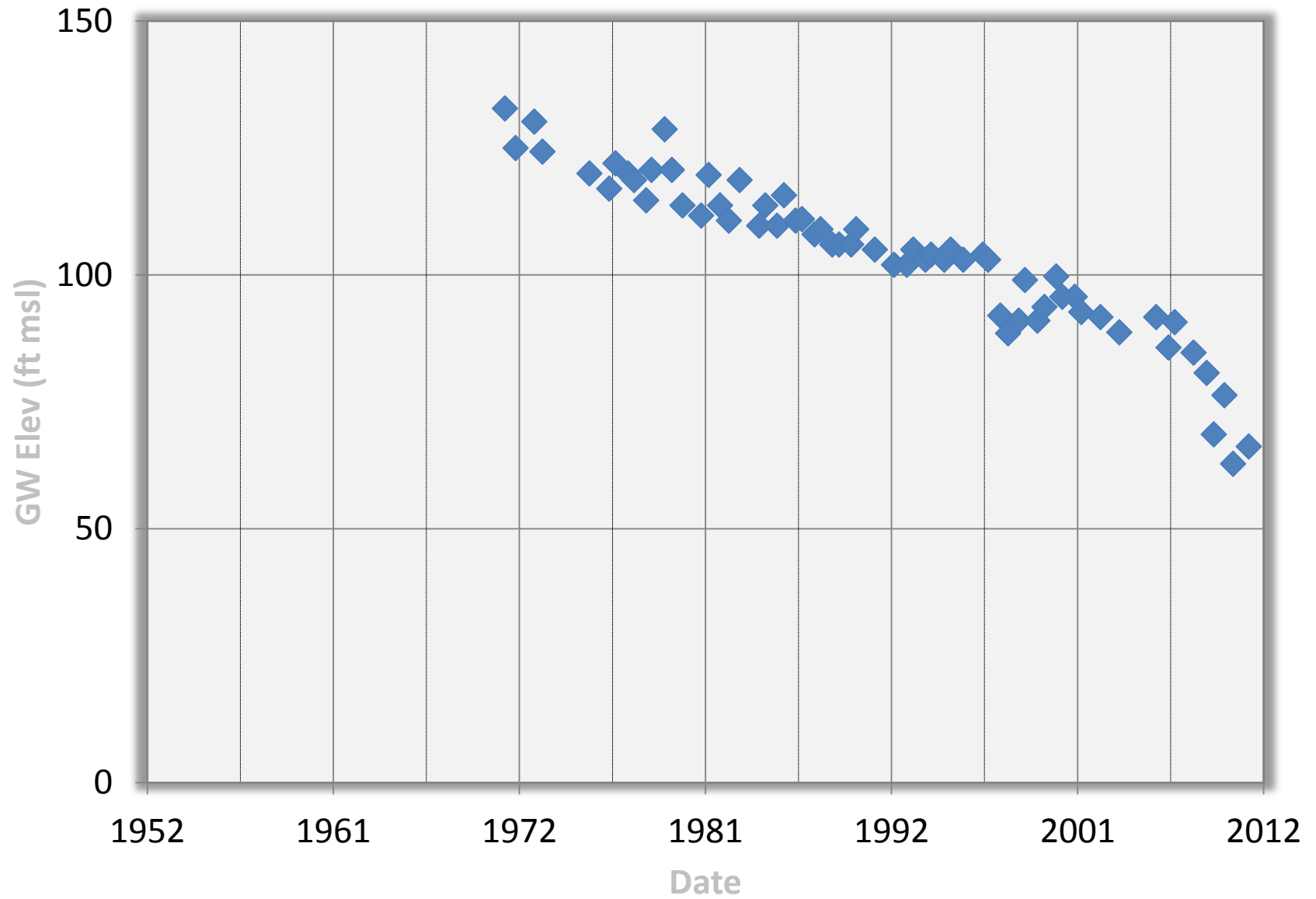
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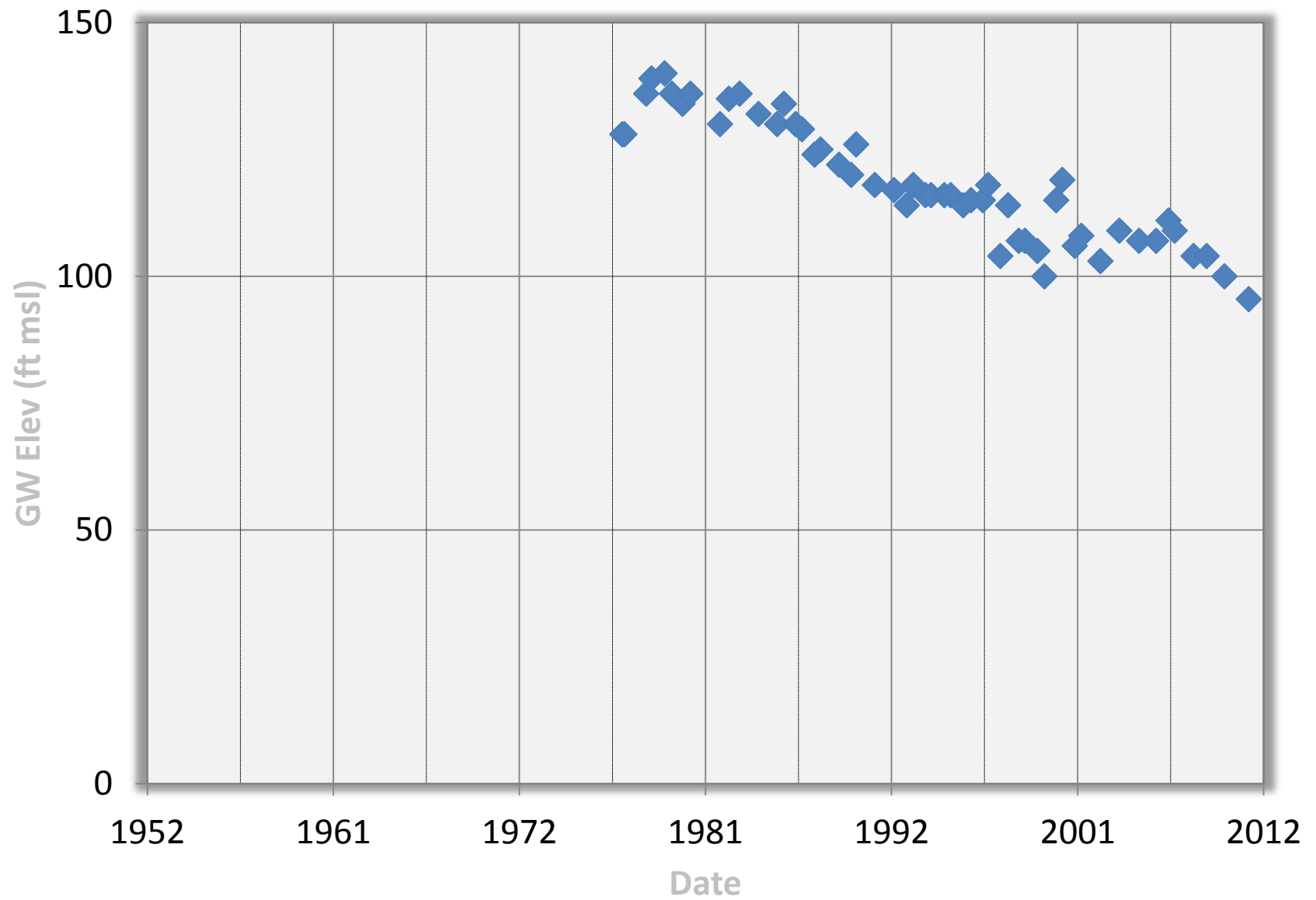
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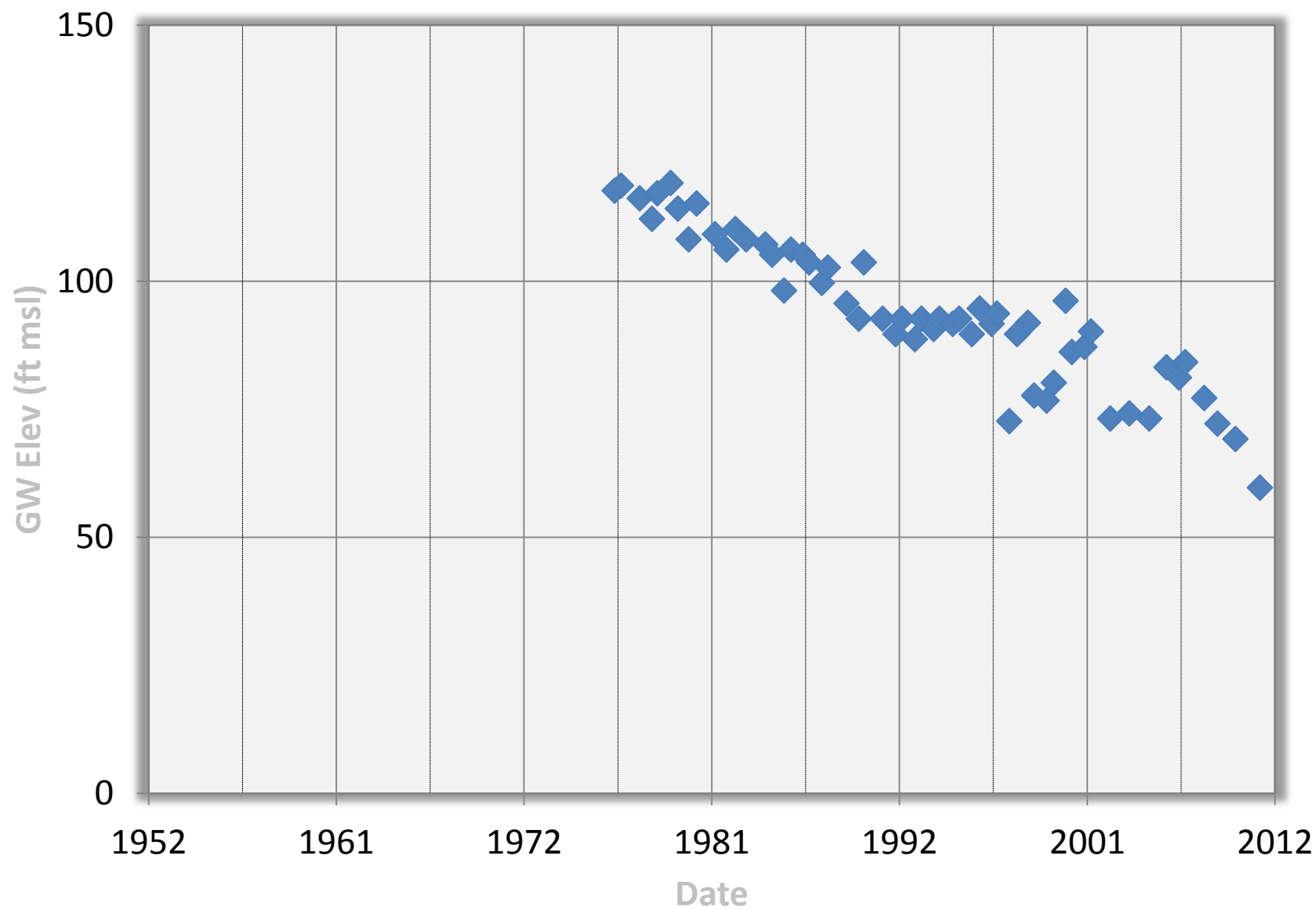
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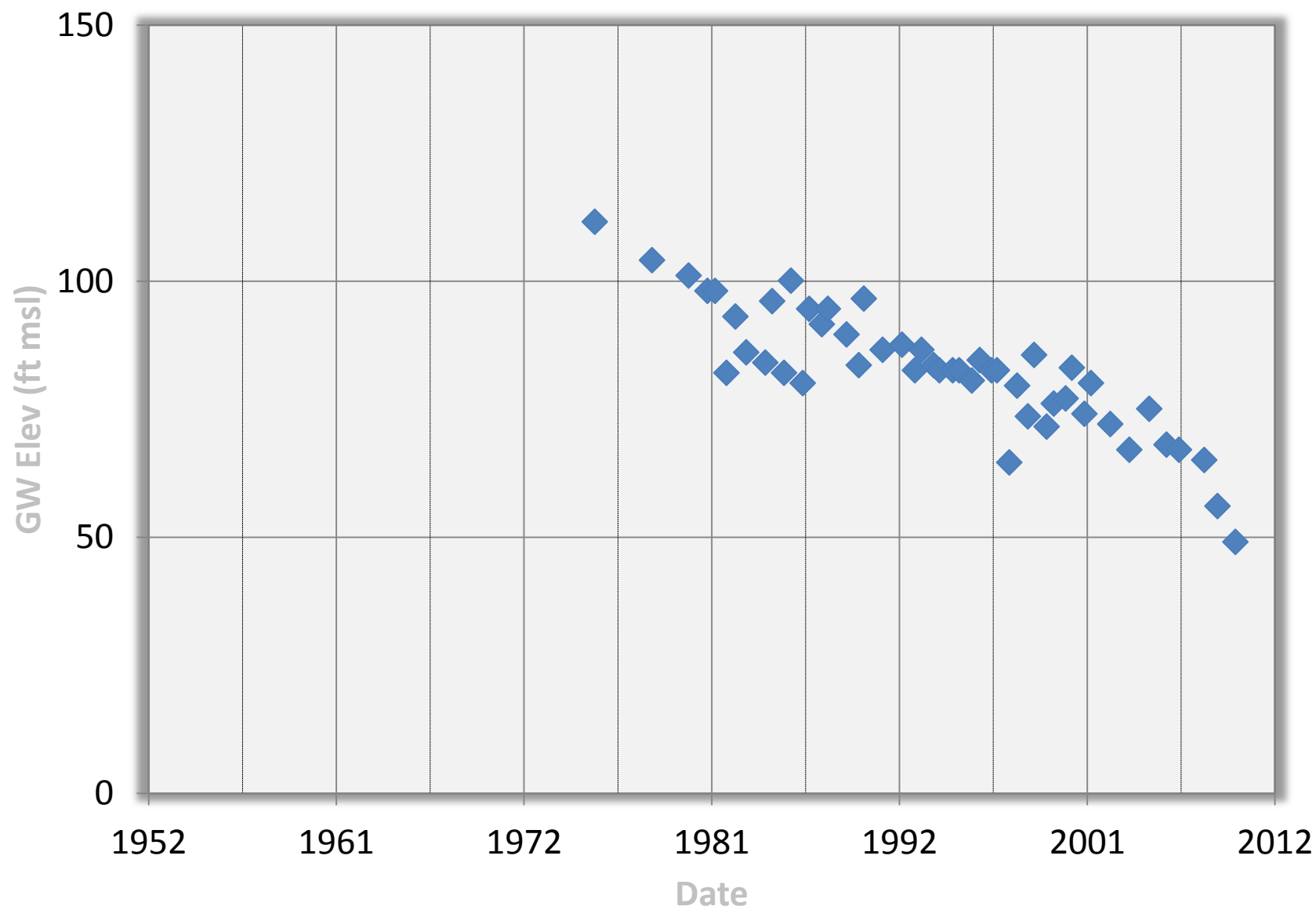
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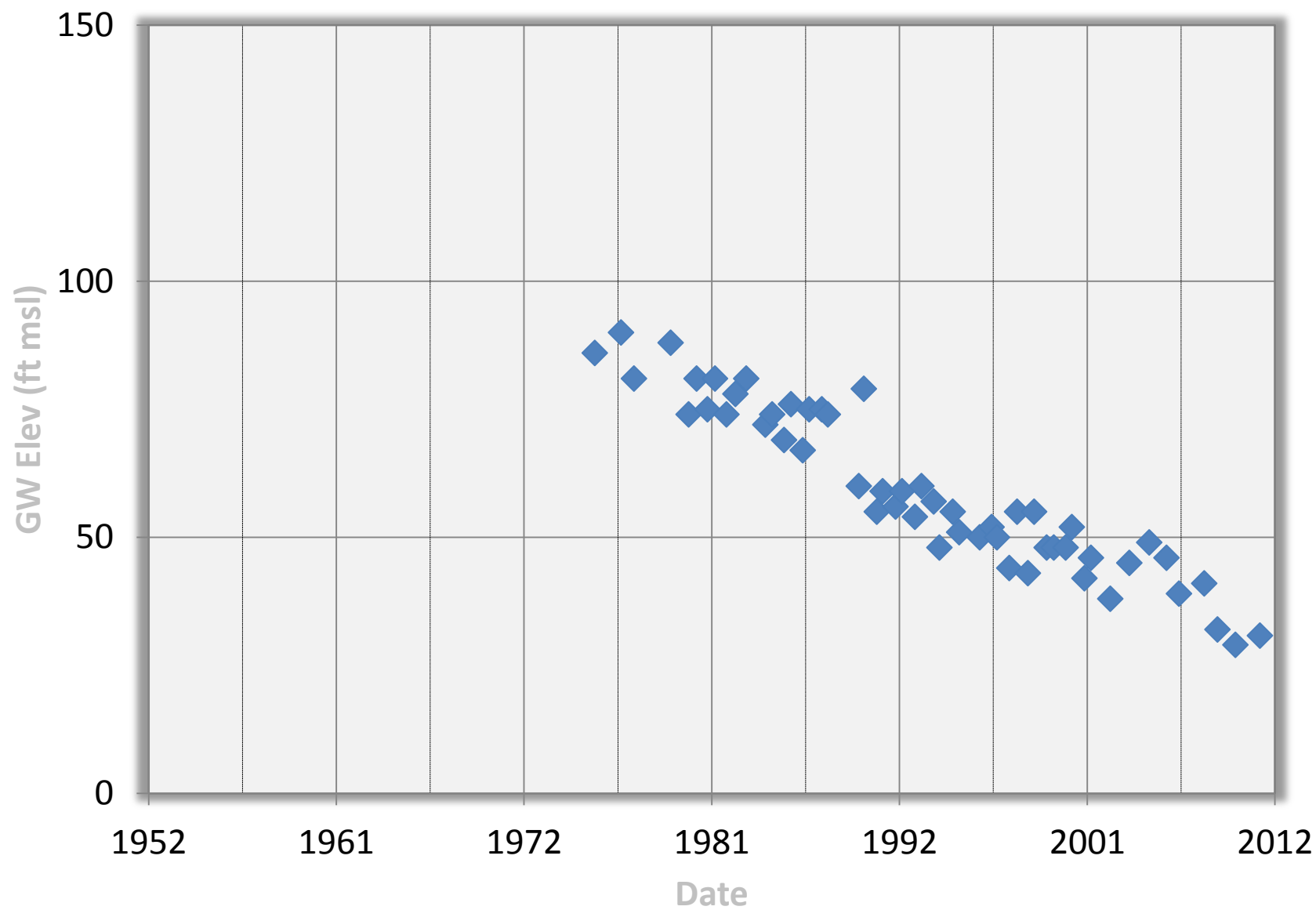
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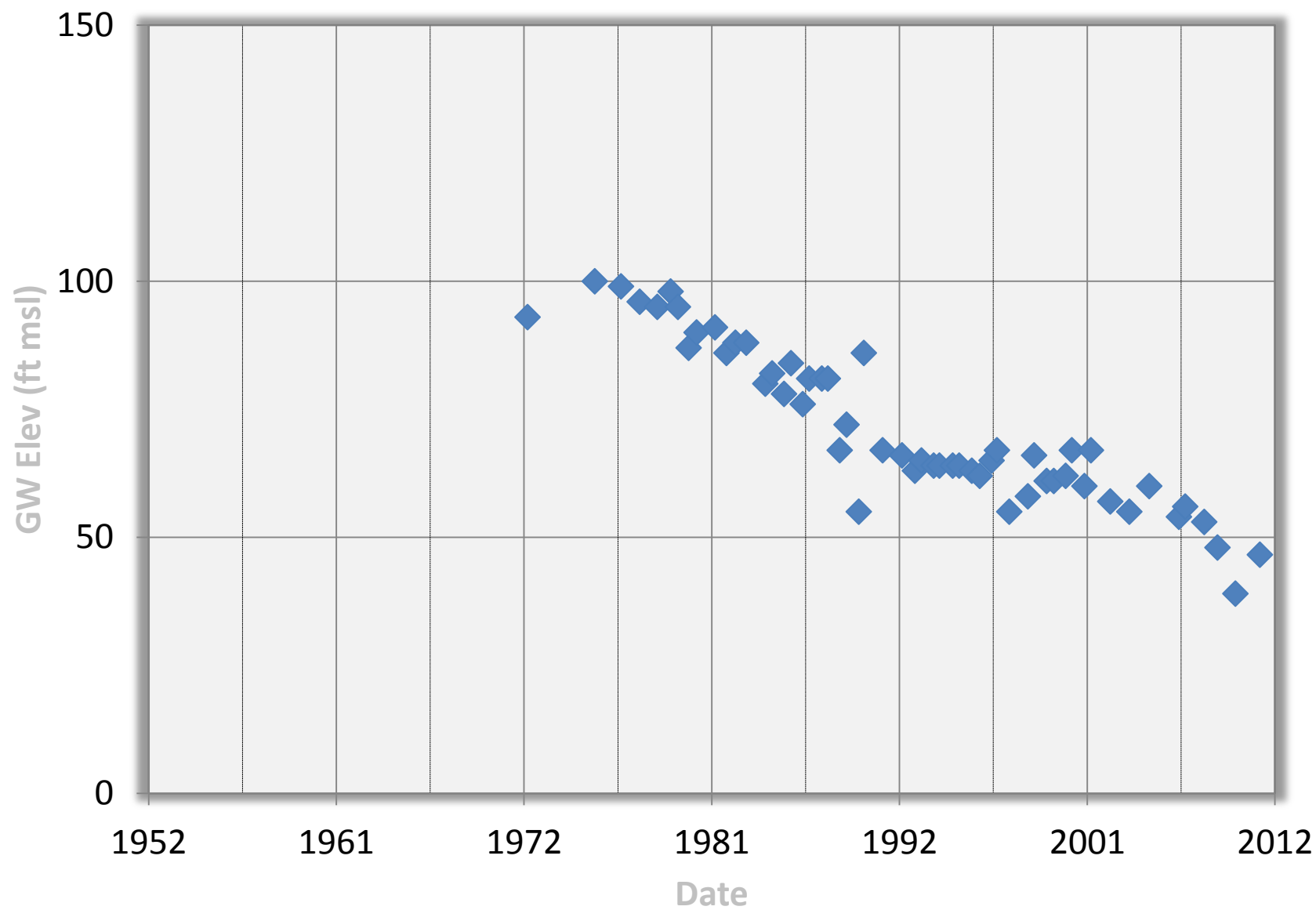
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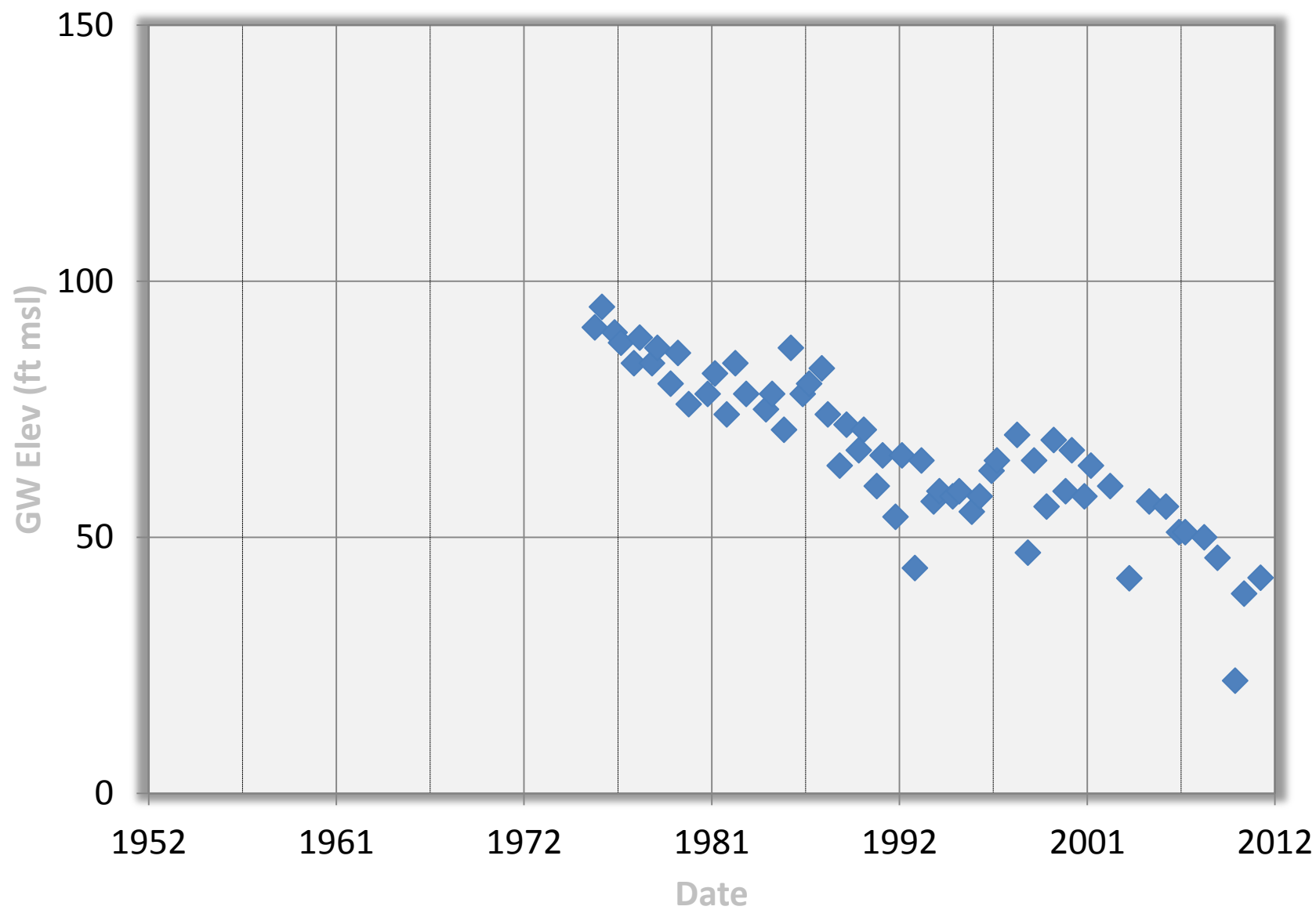
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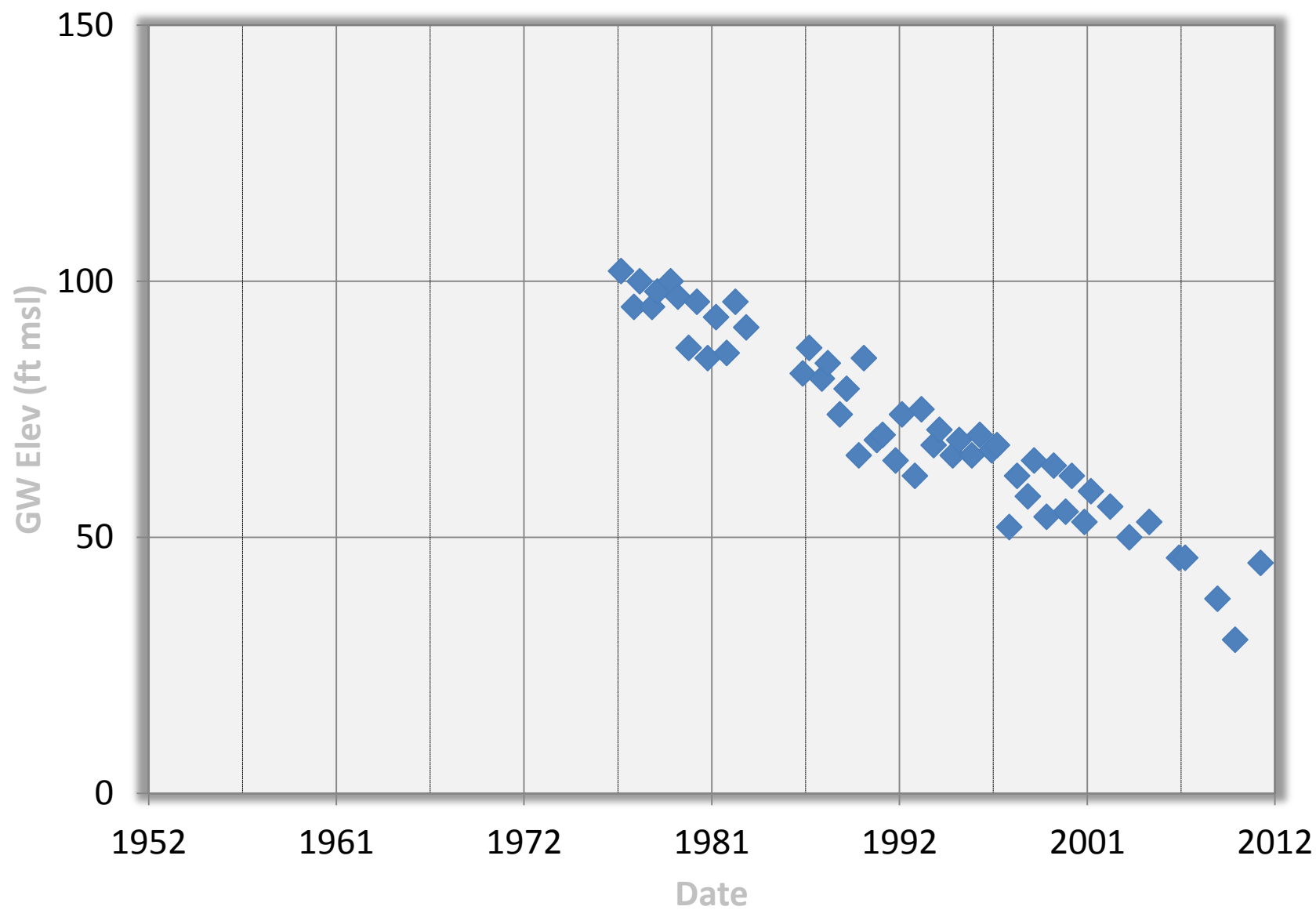
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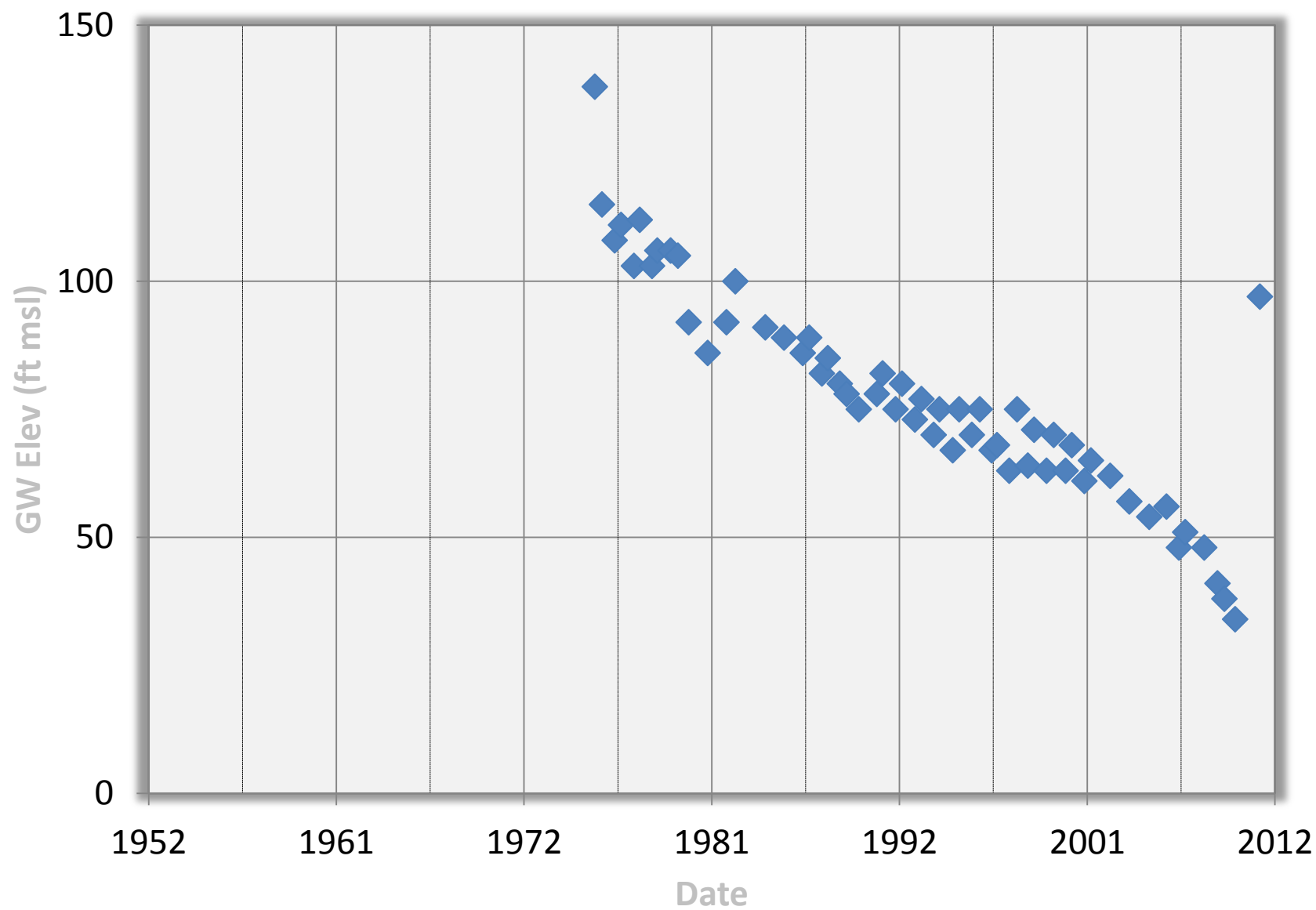
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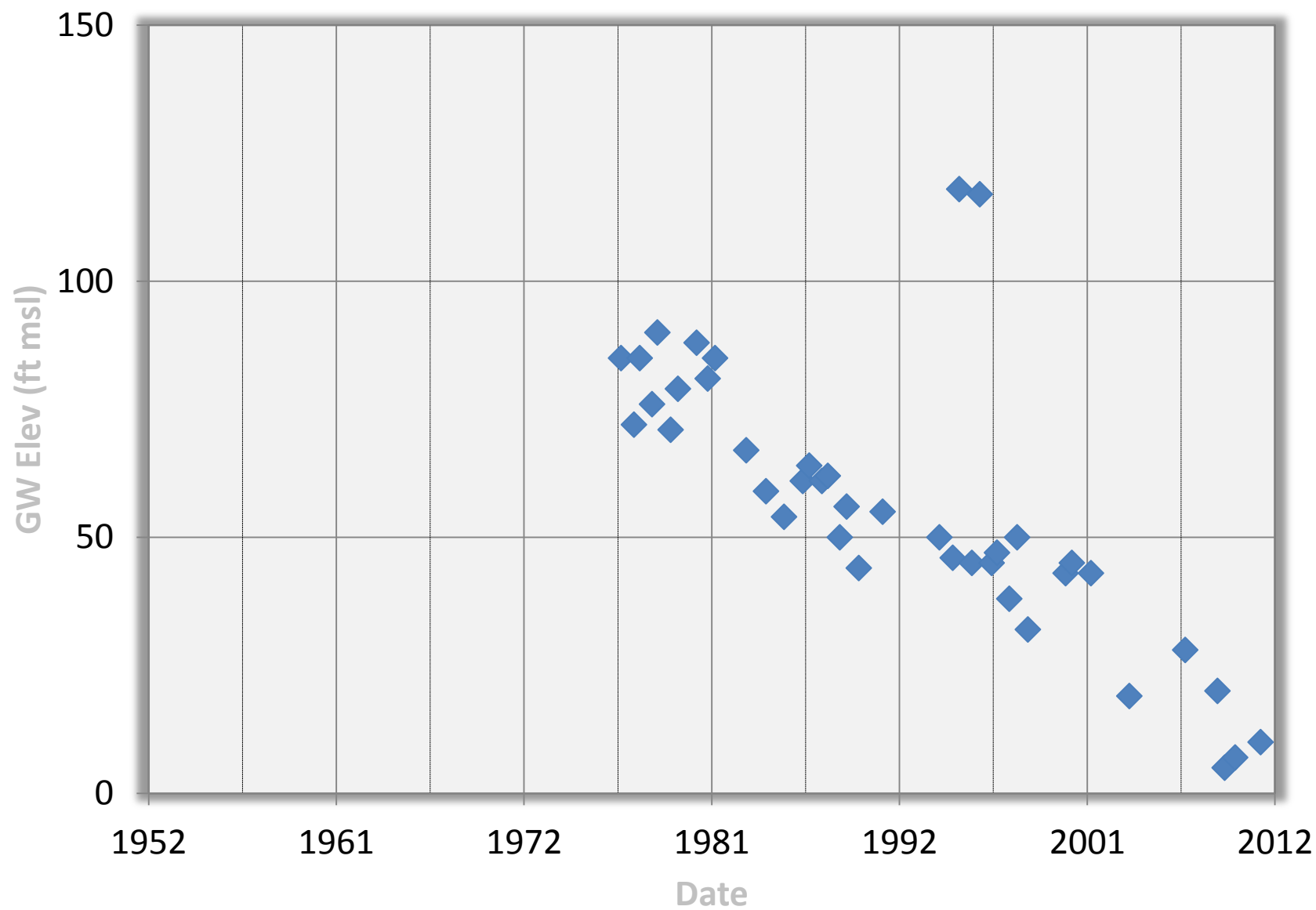
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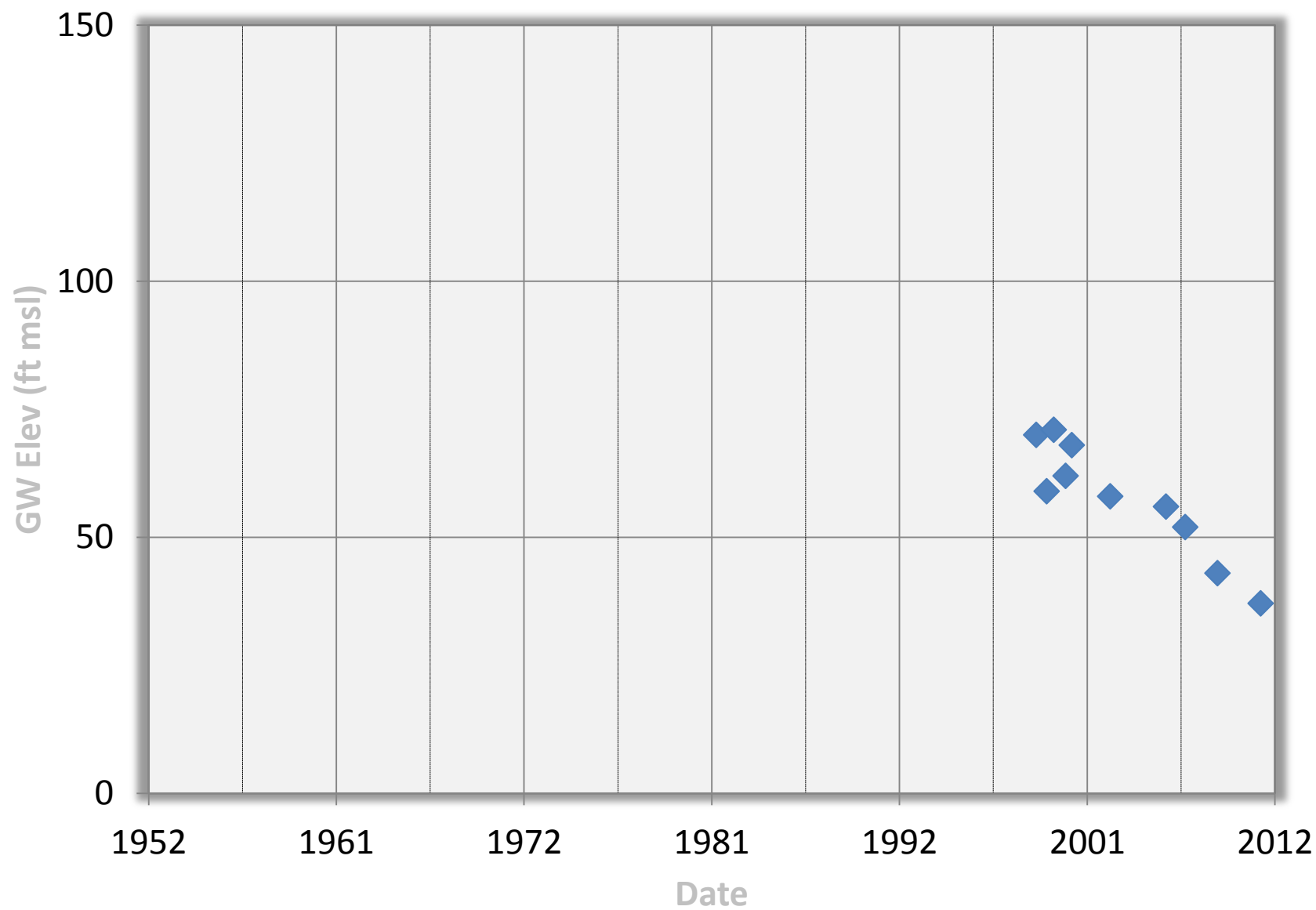
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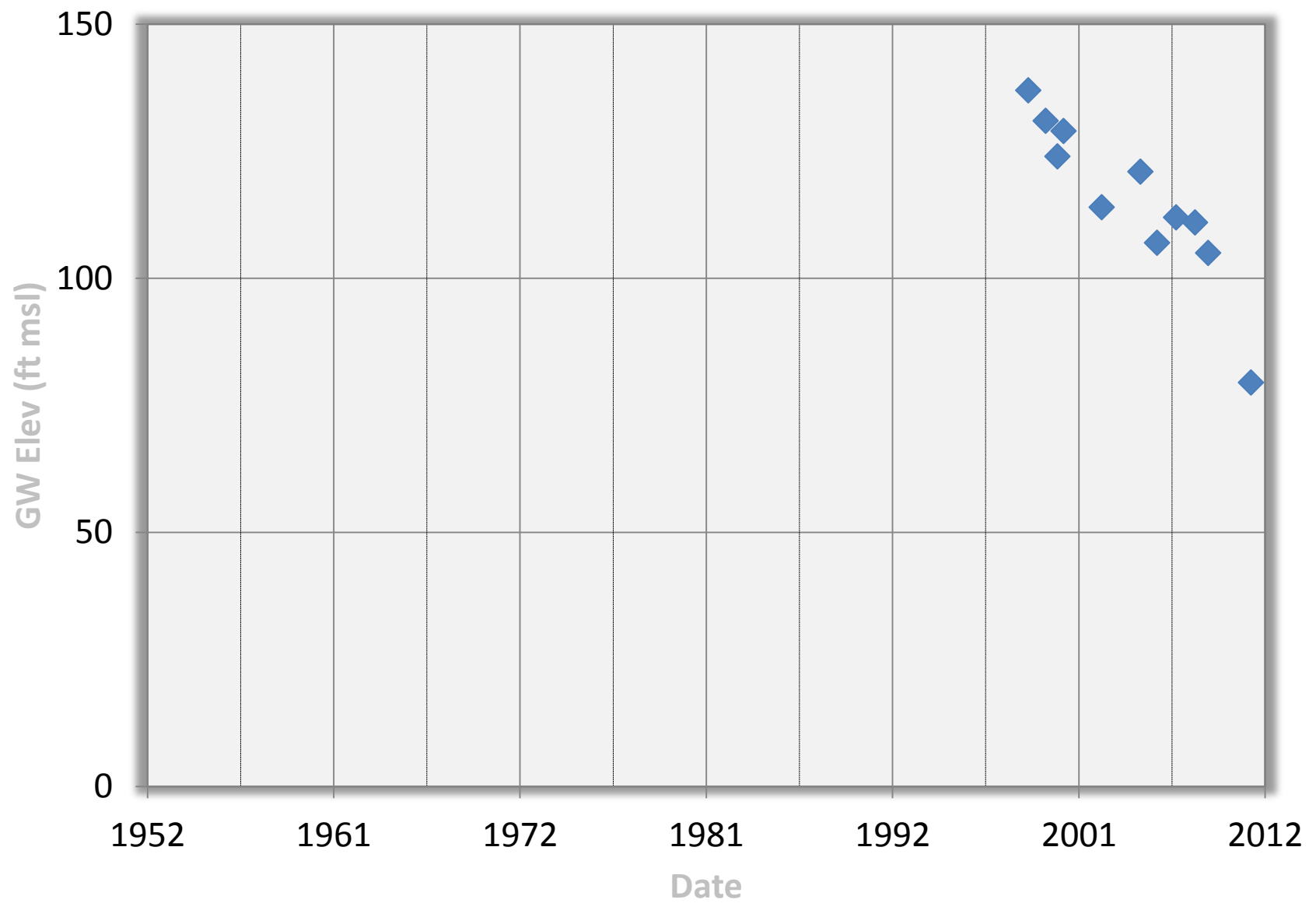
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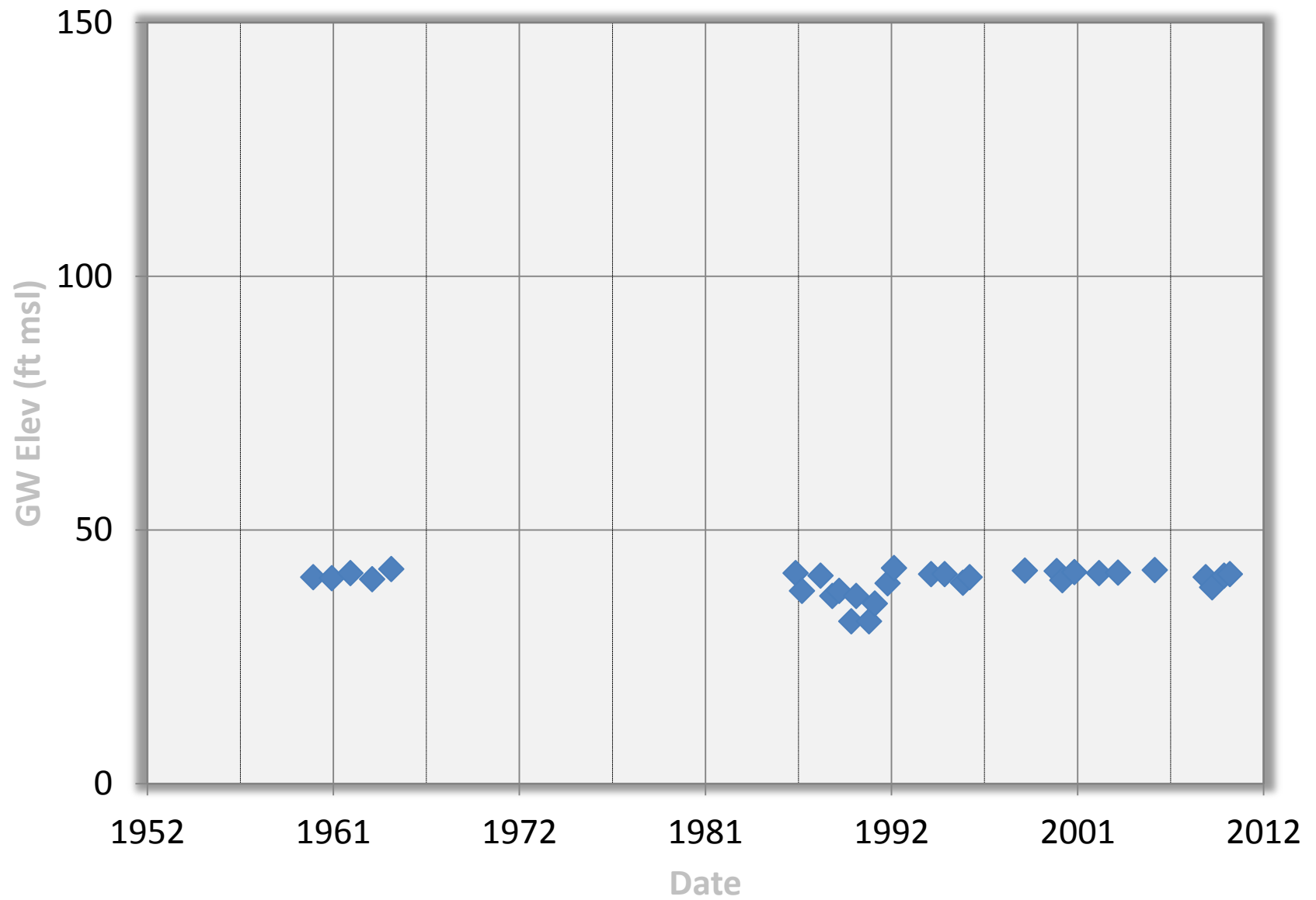
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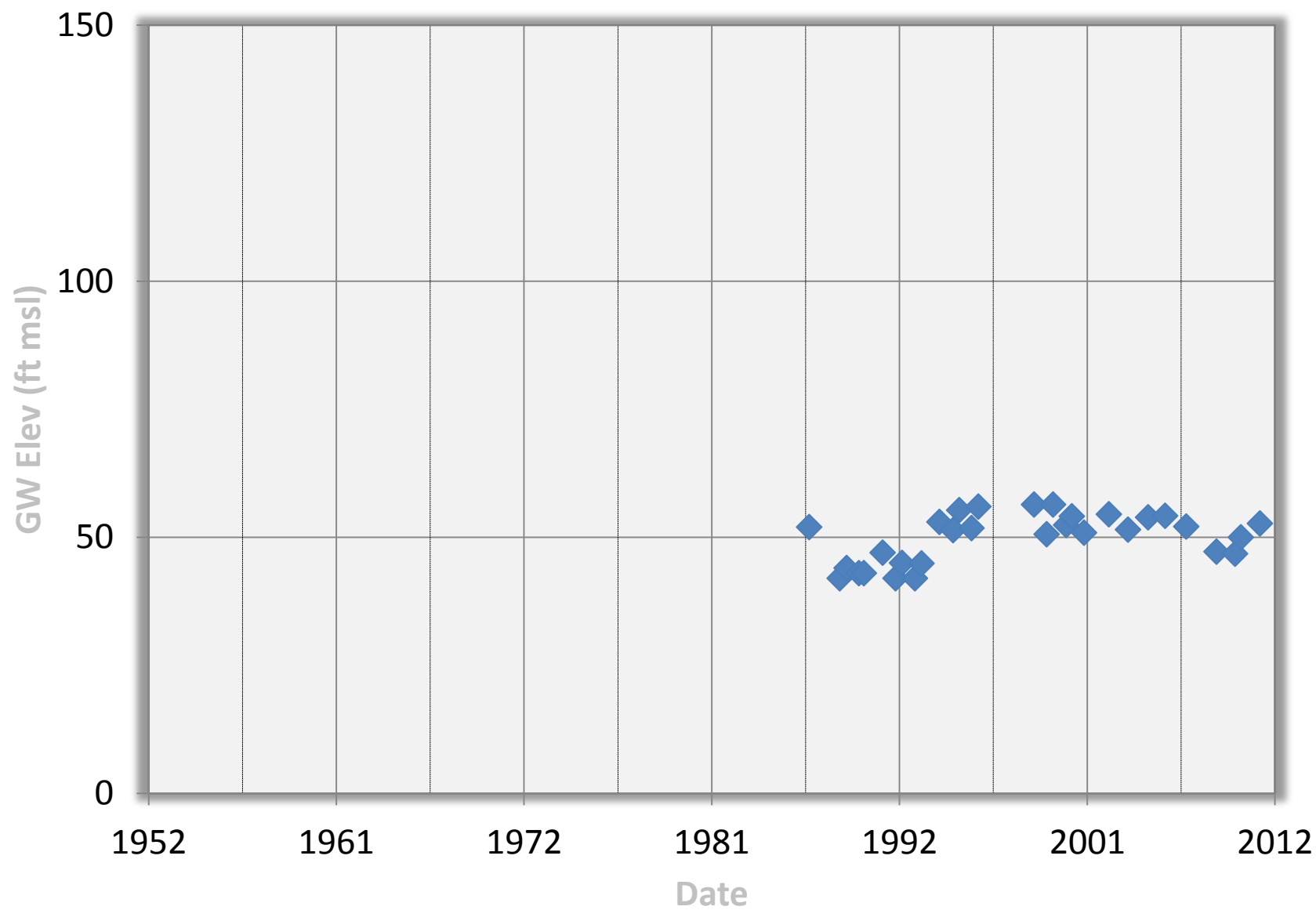
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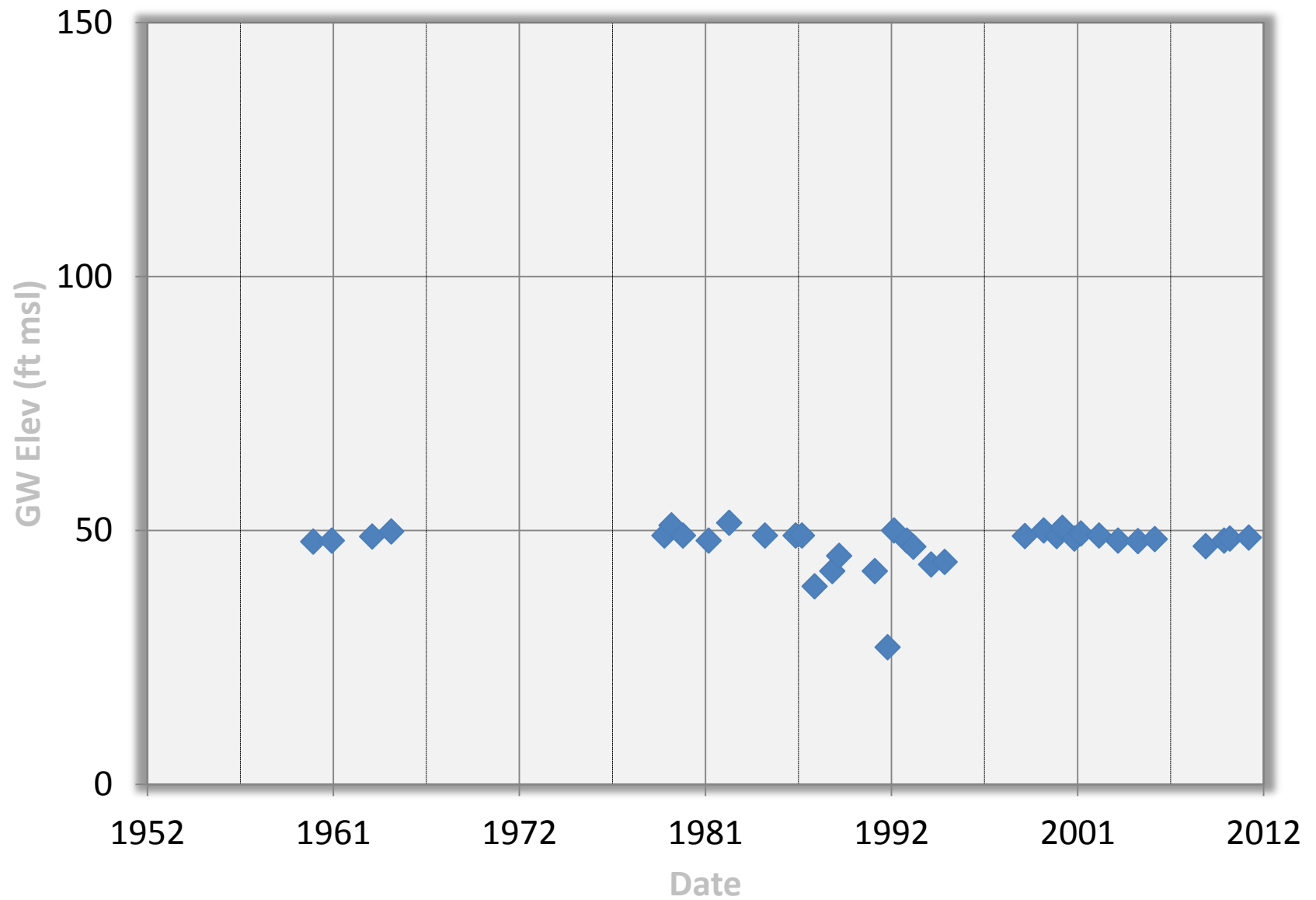
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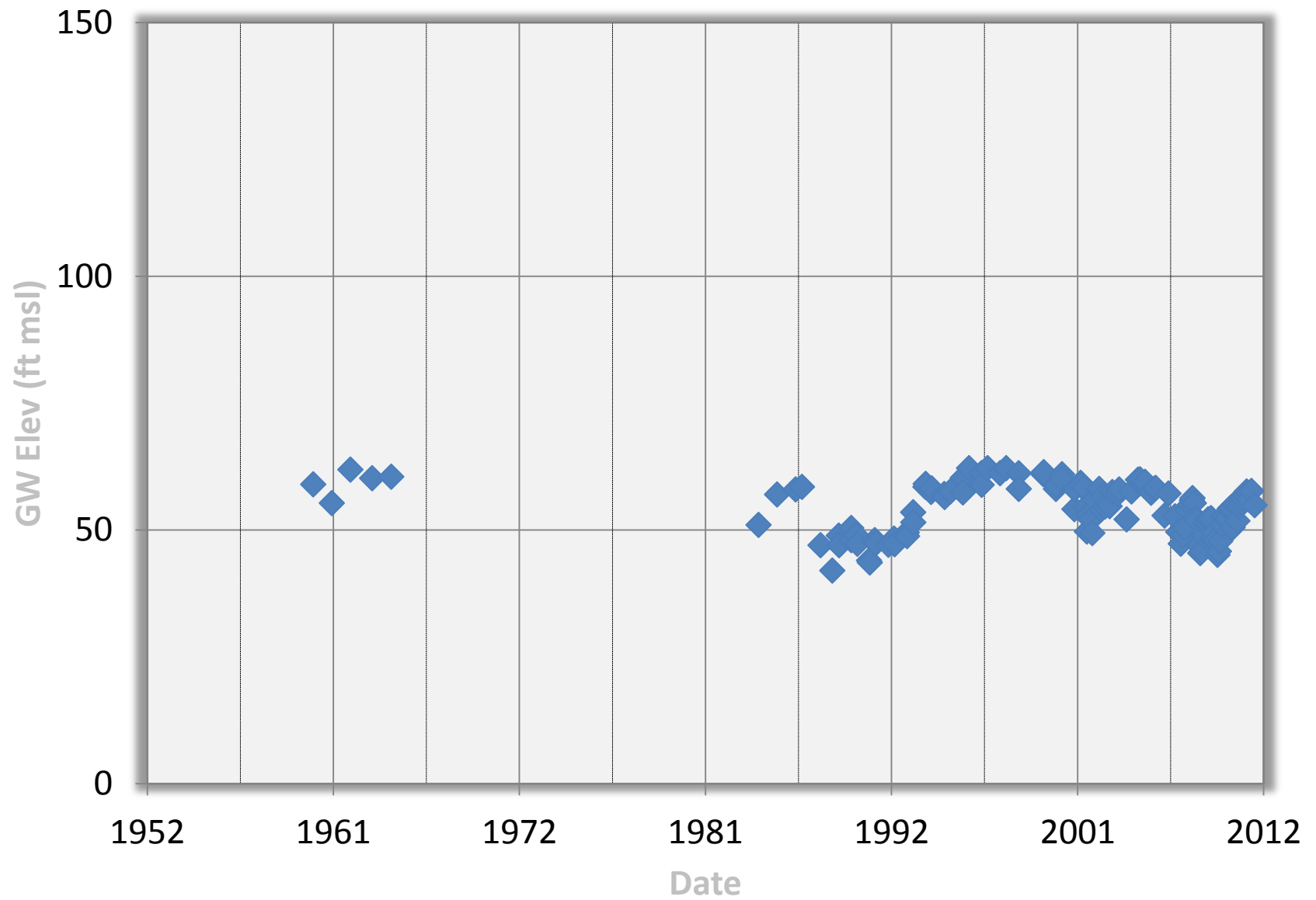
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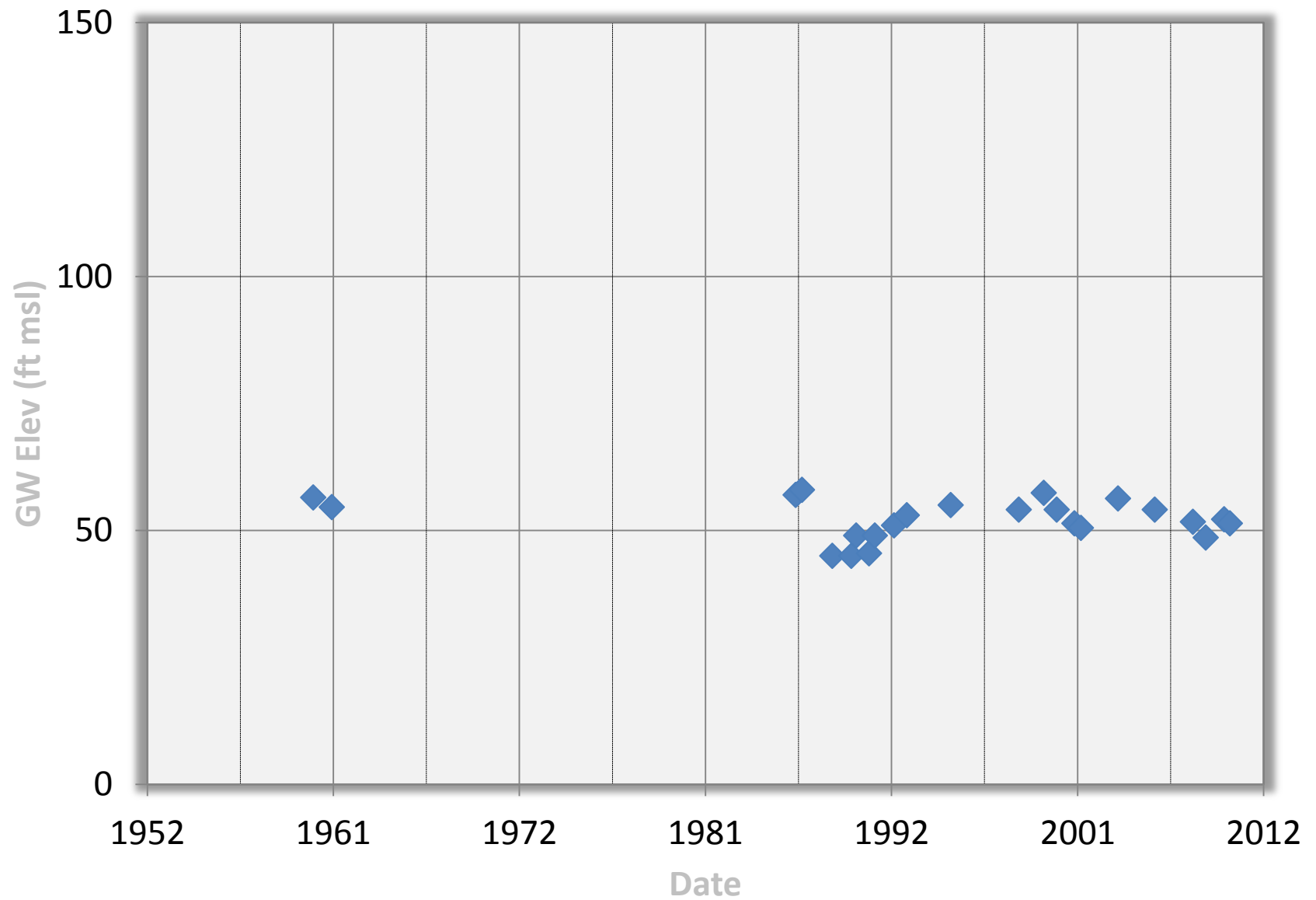
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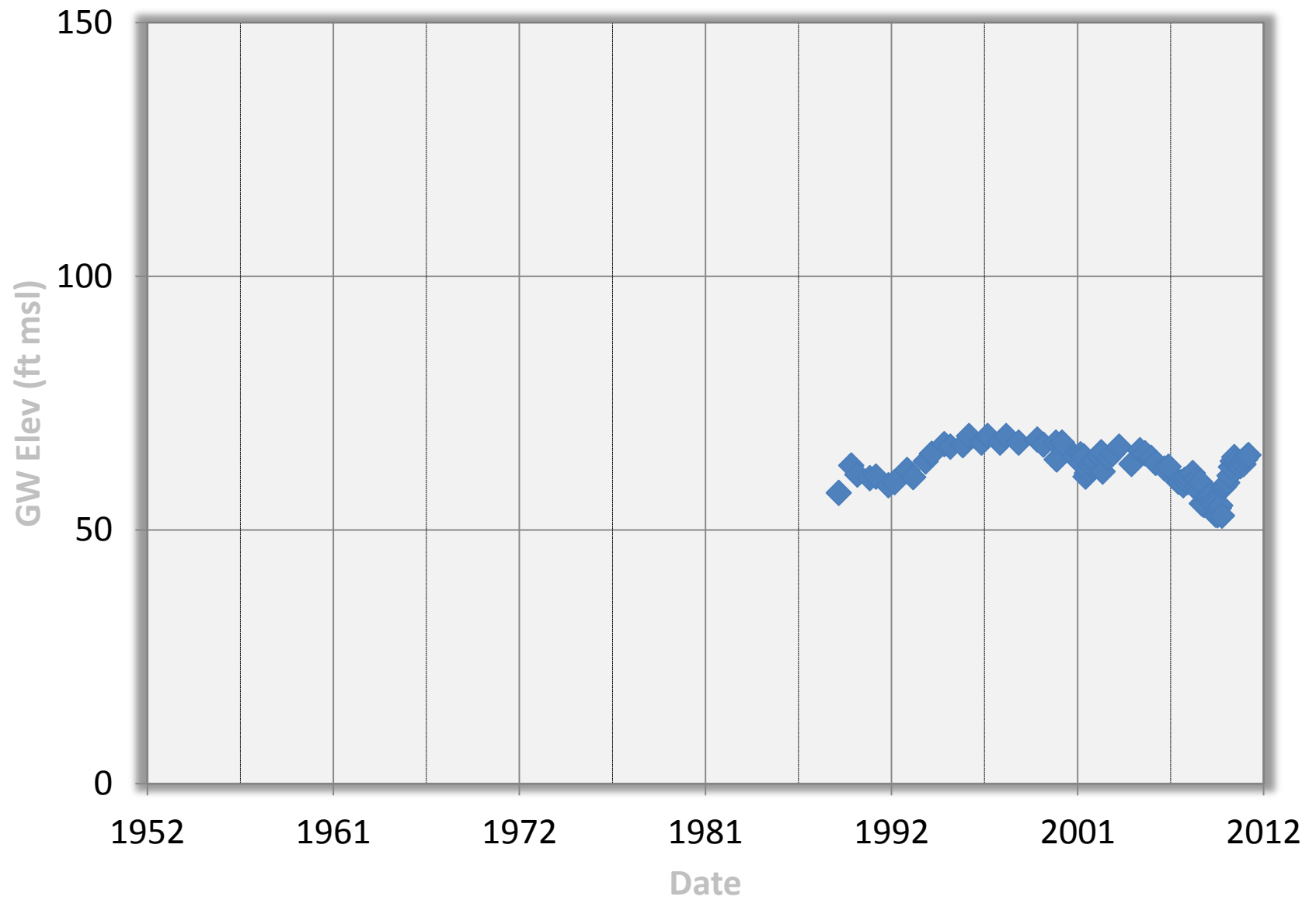
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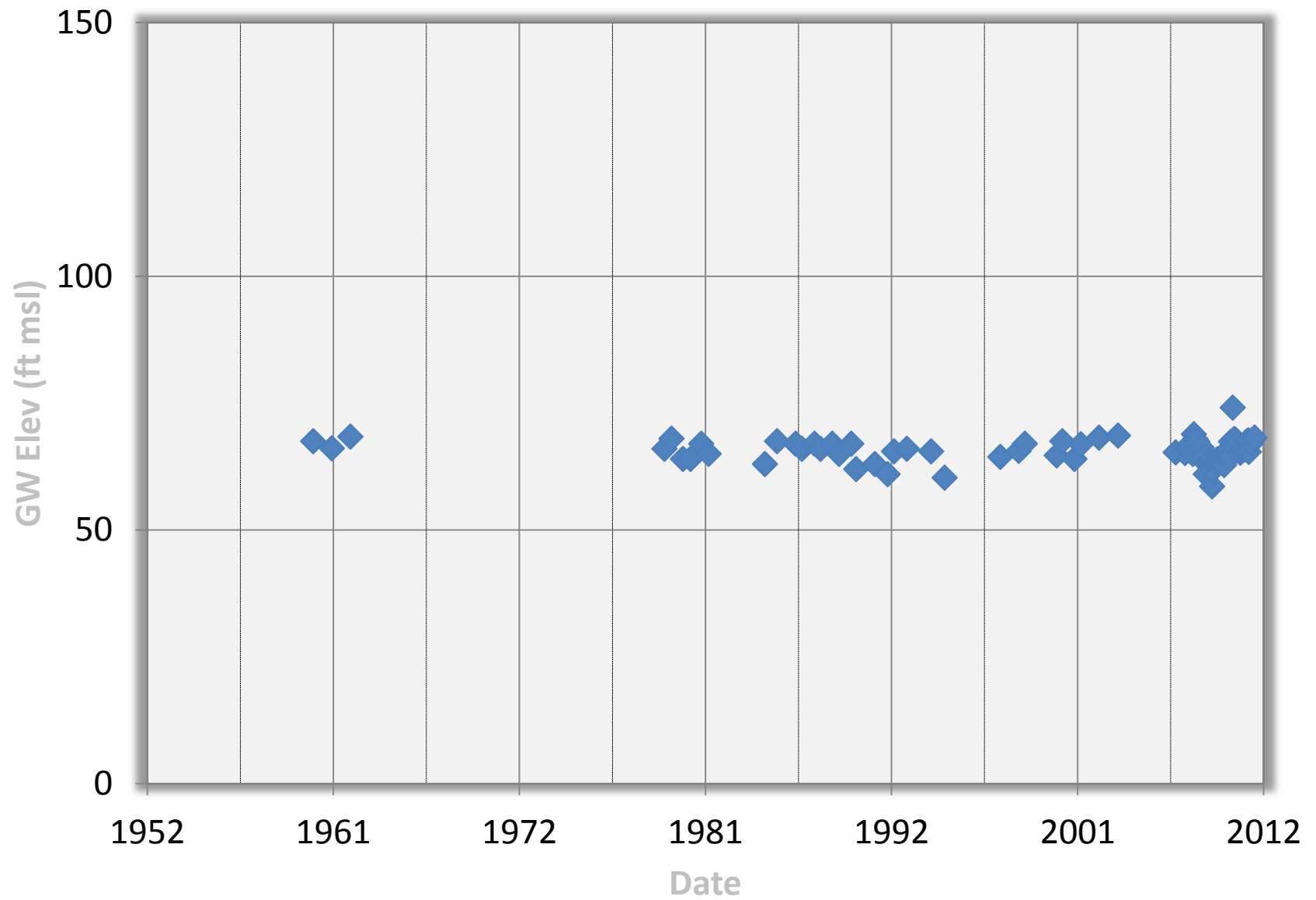
TID 106 / 05S09E21B001M



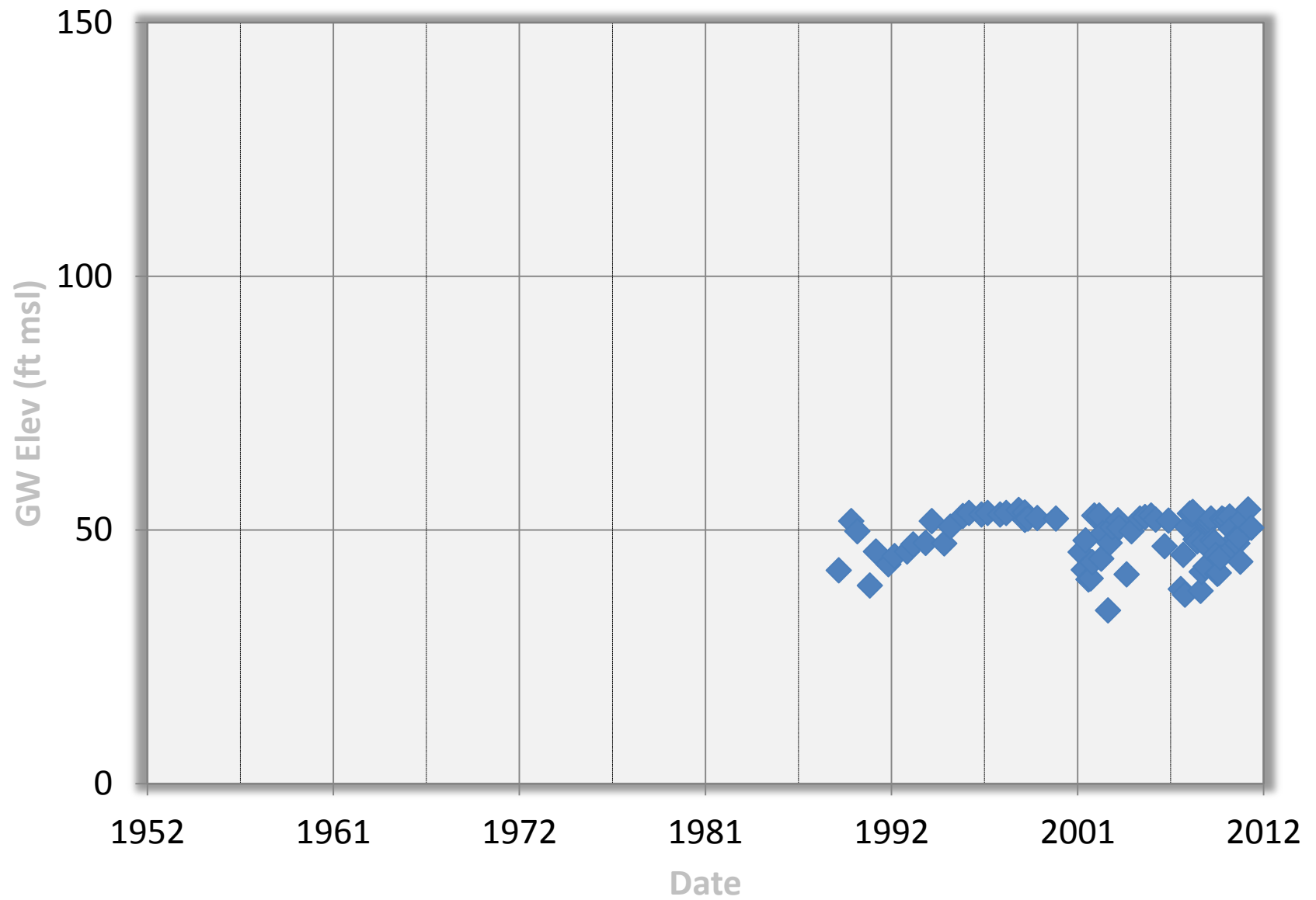
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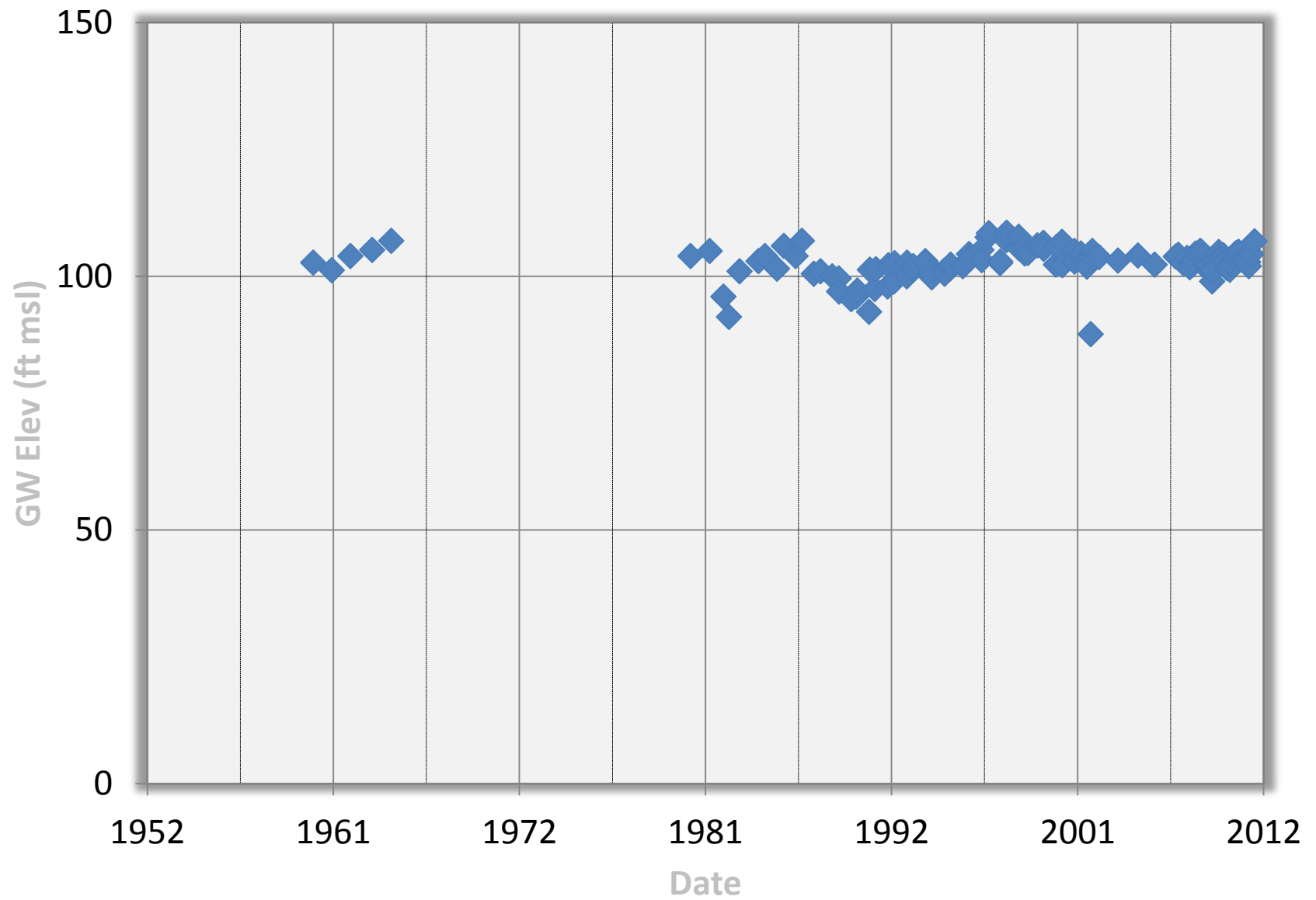
TID 68 / 05S09E24J001M



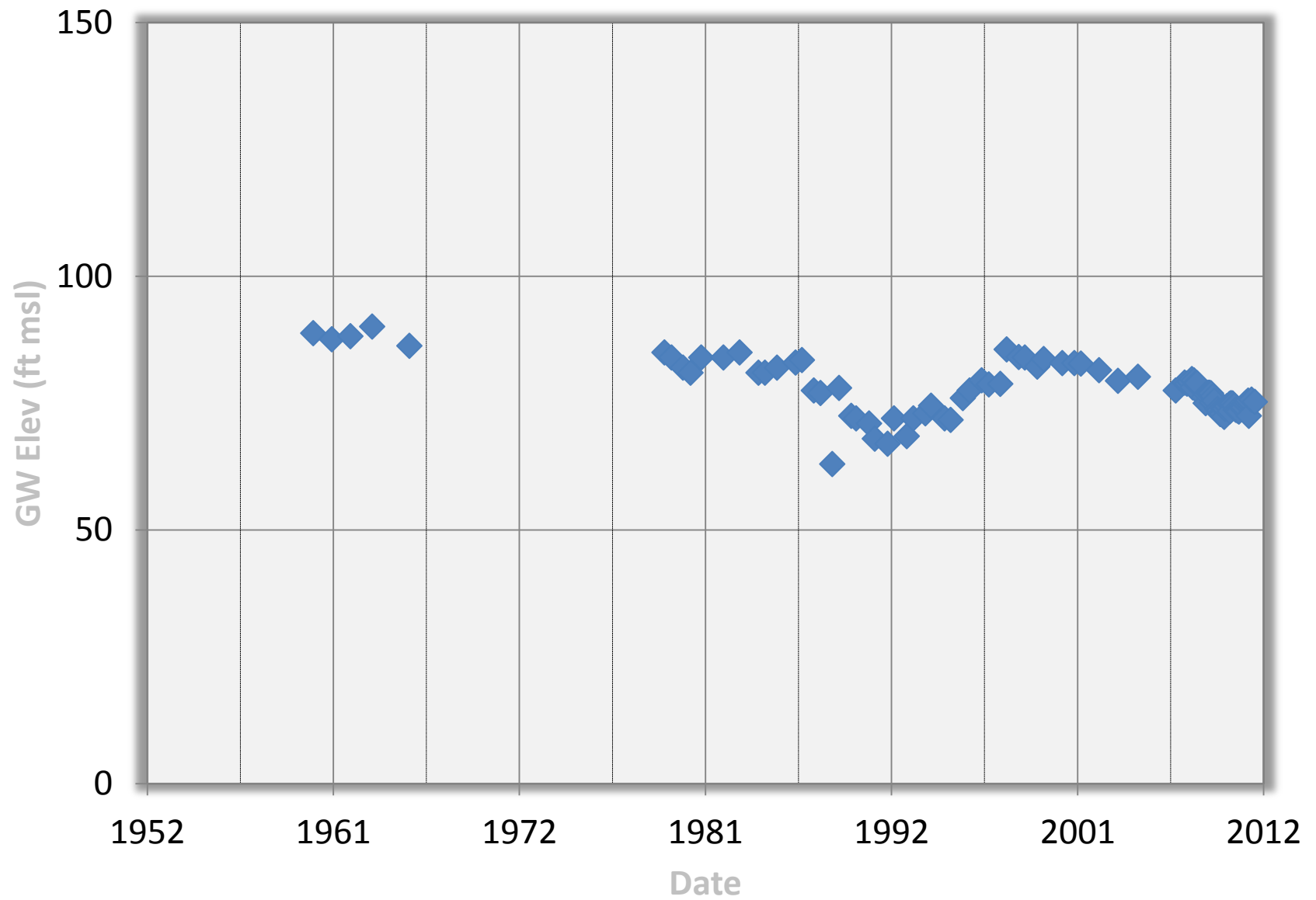
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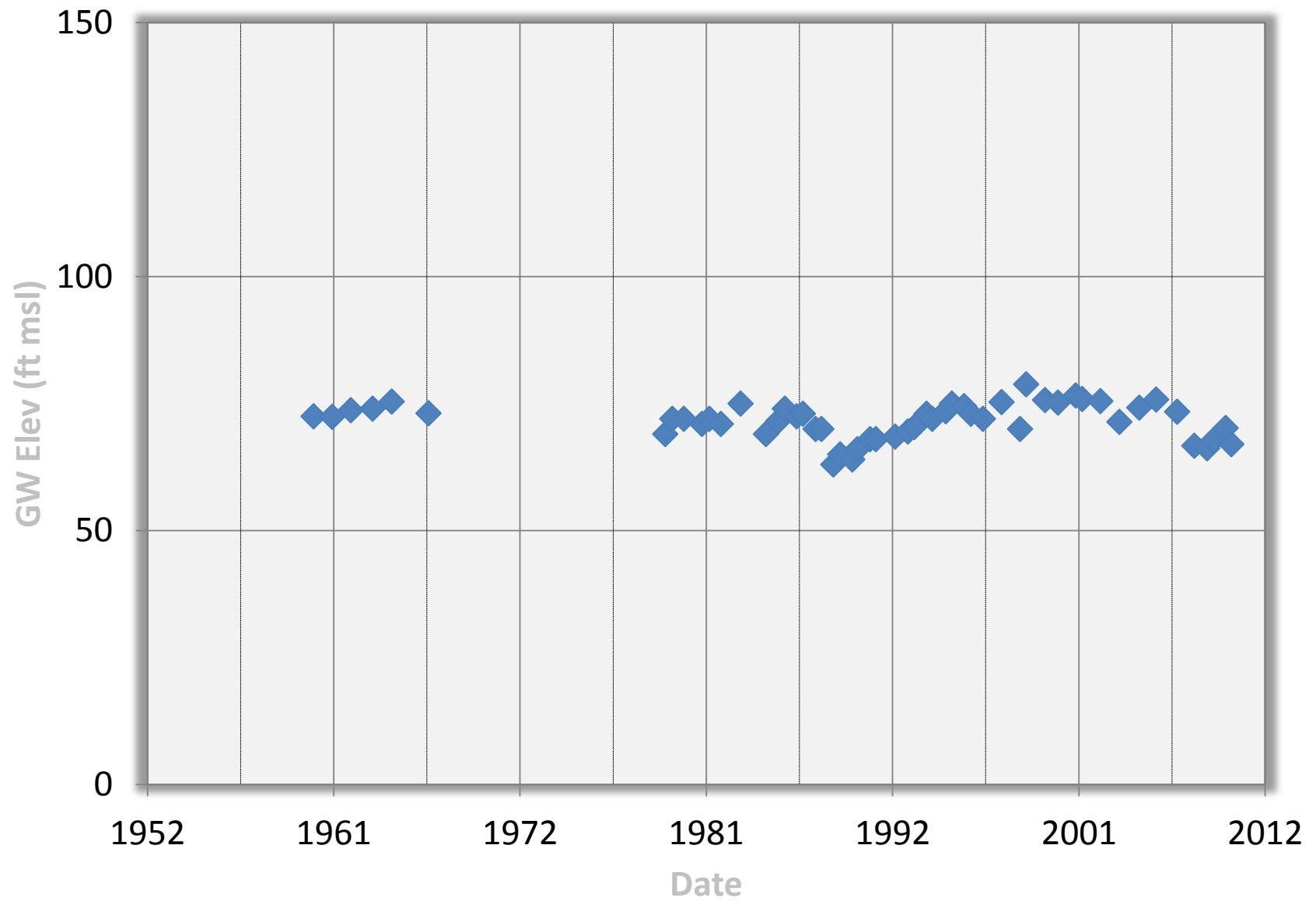
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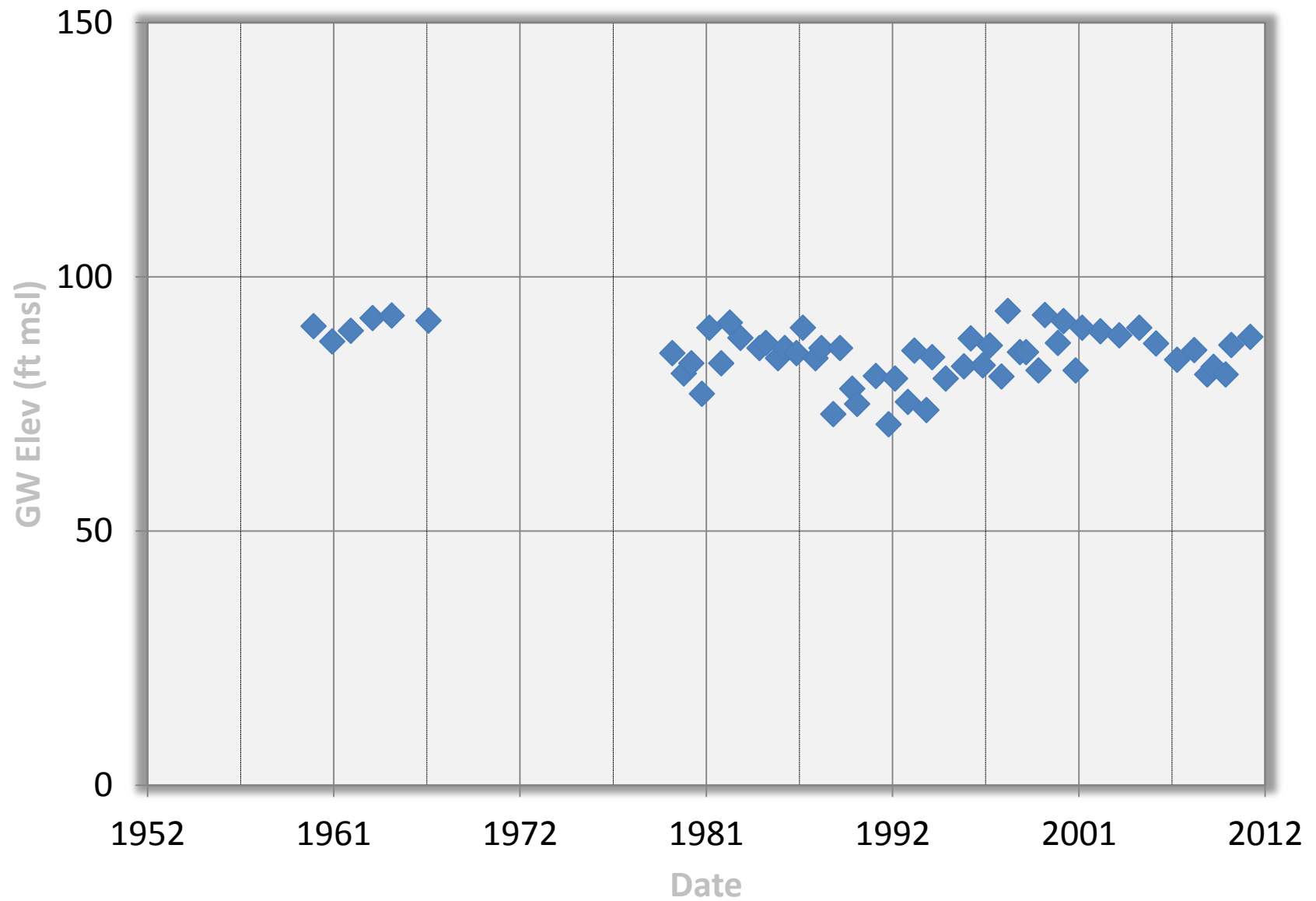
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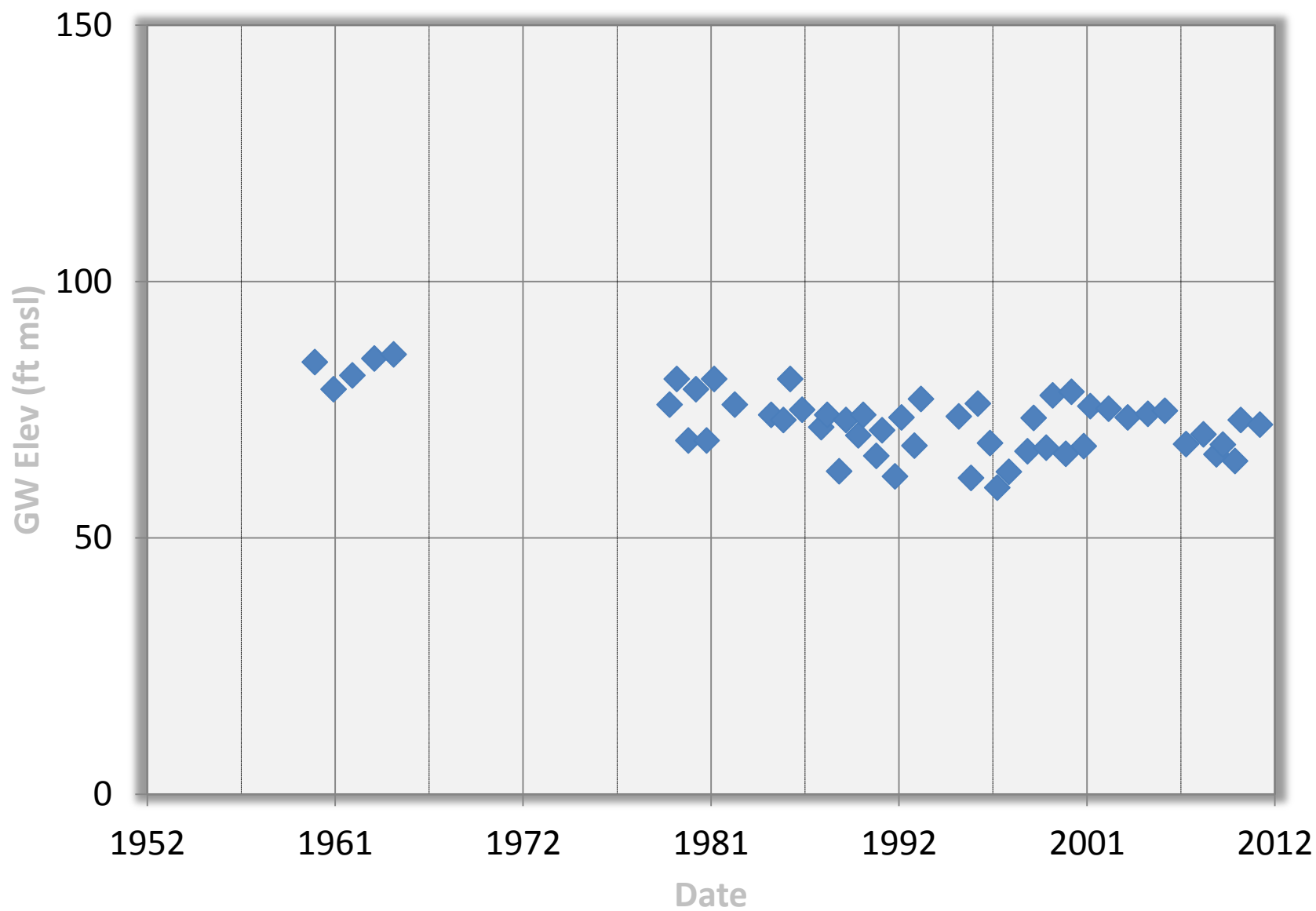
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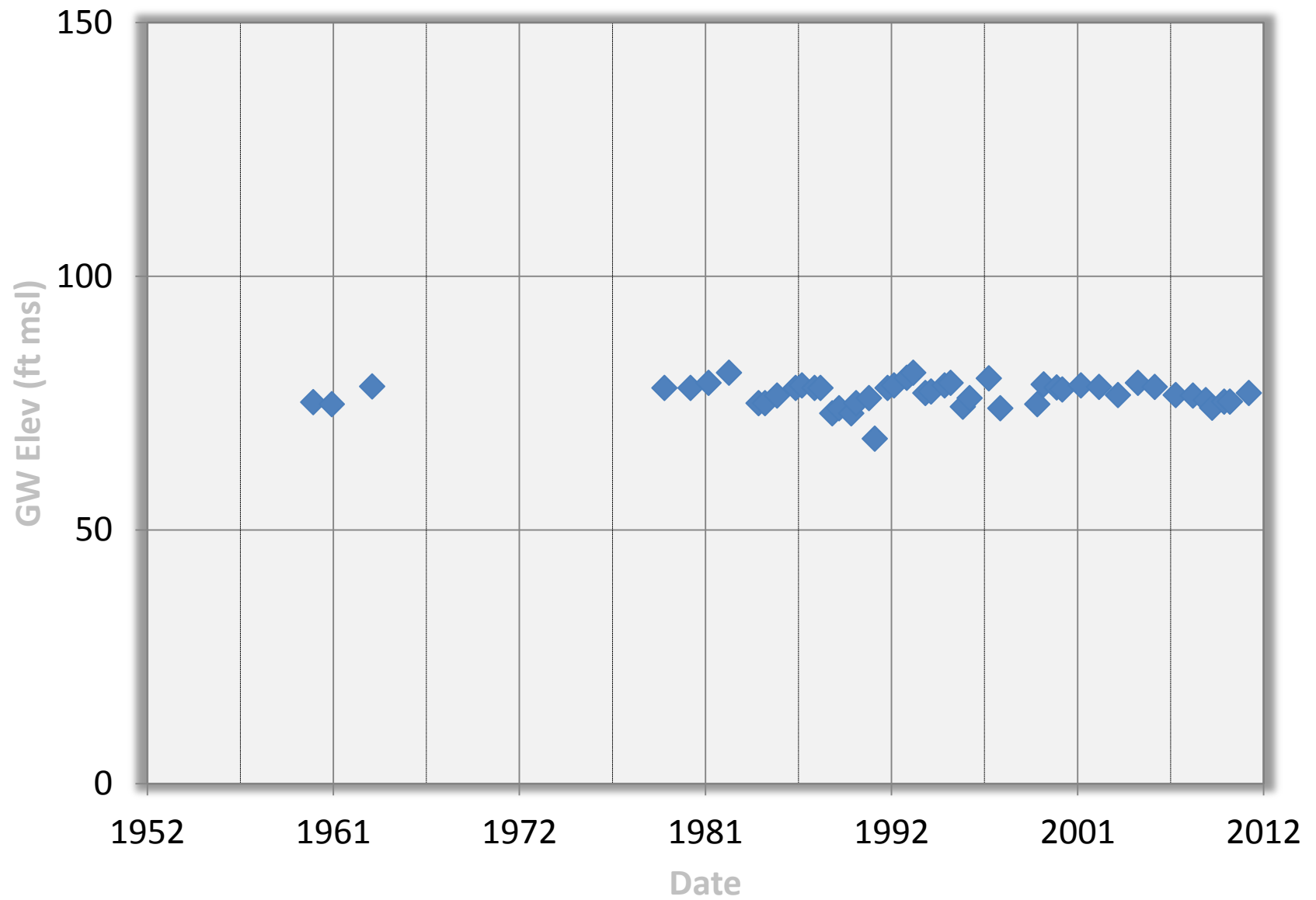
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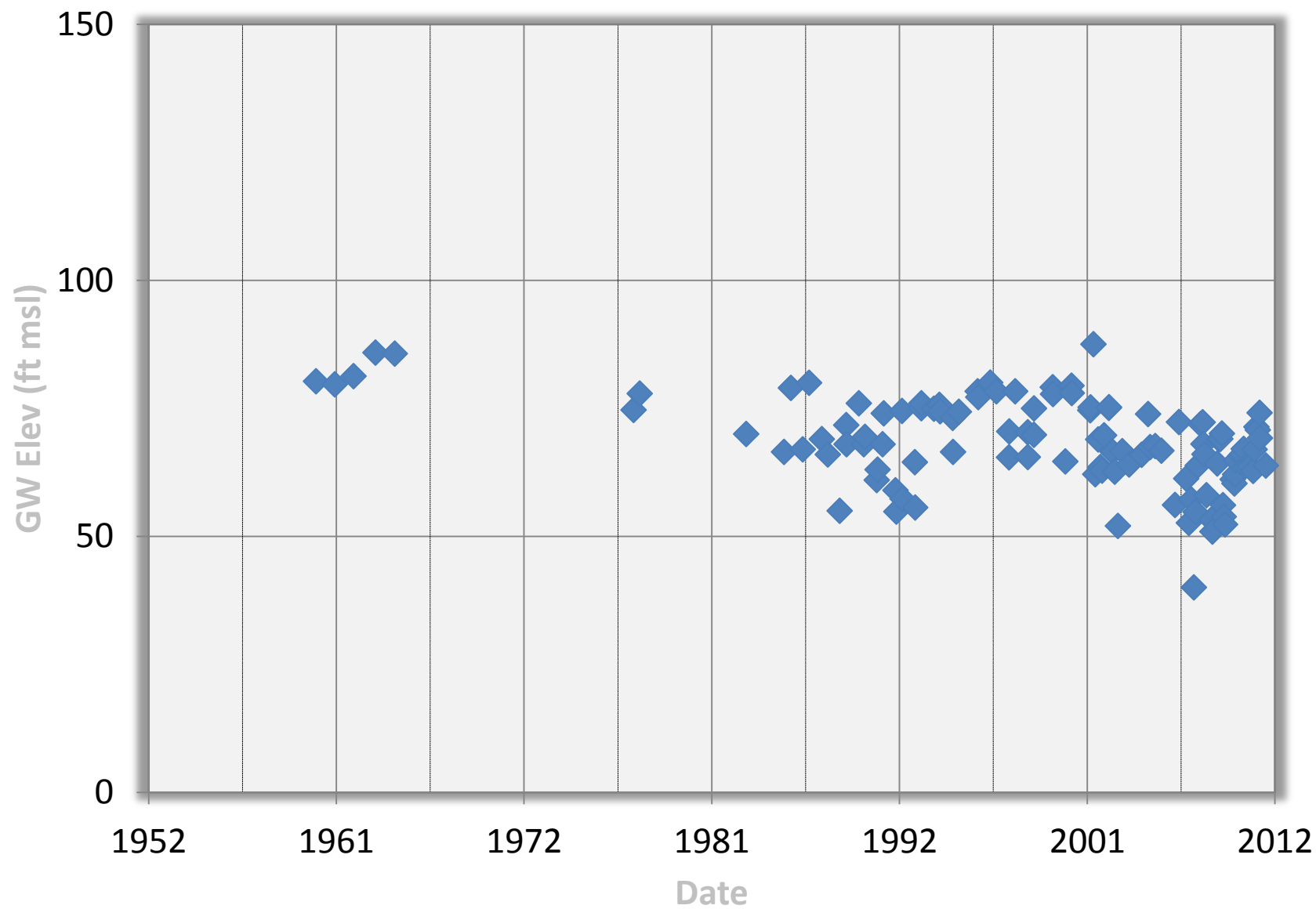
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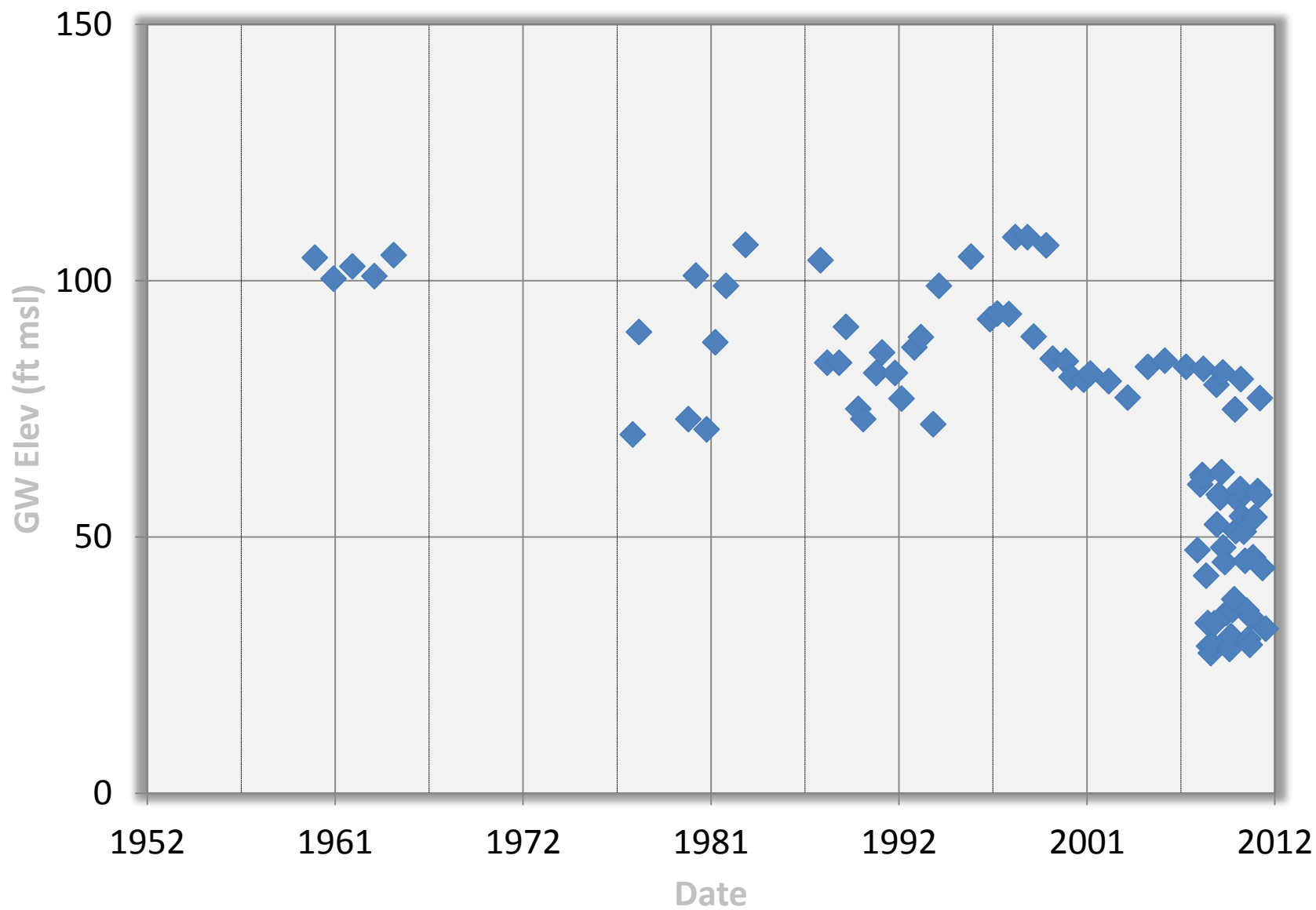
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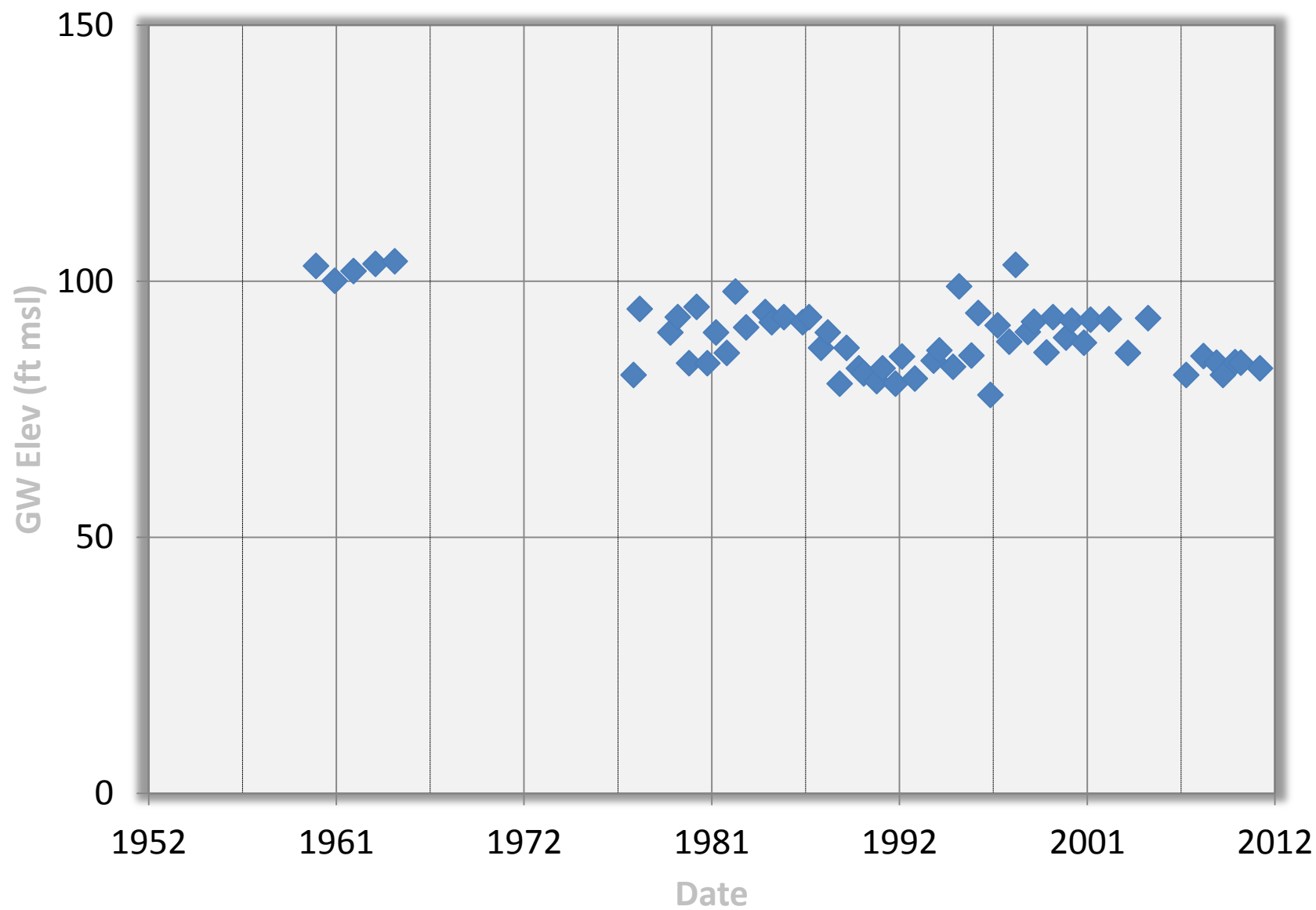
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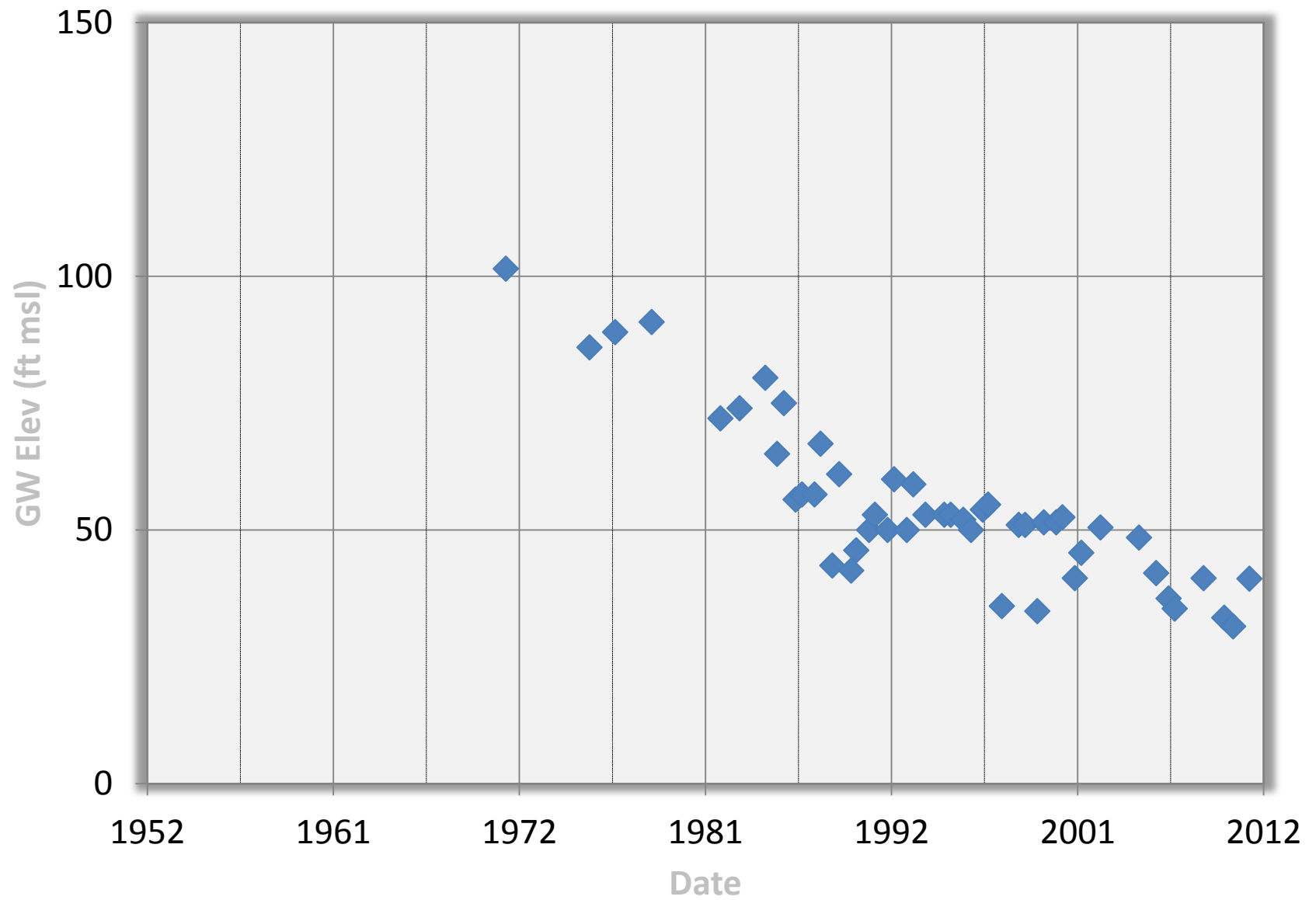
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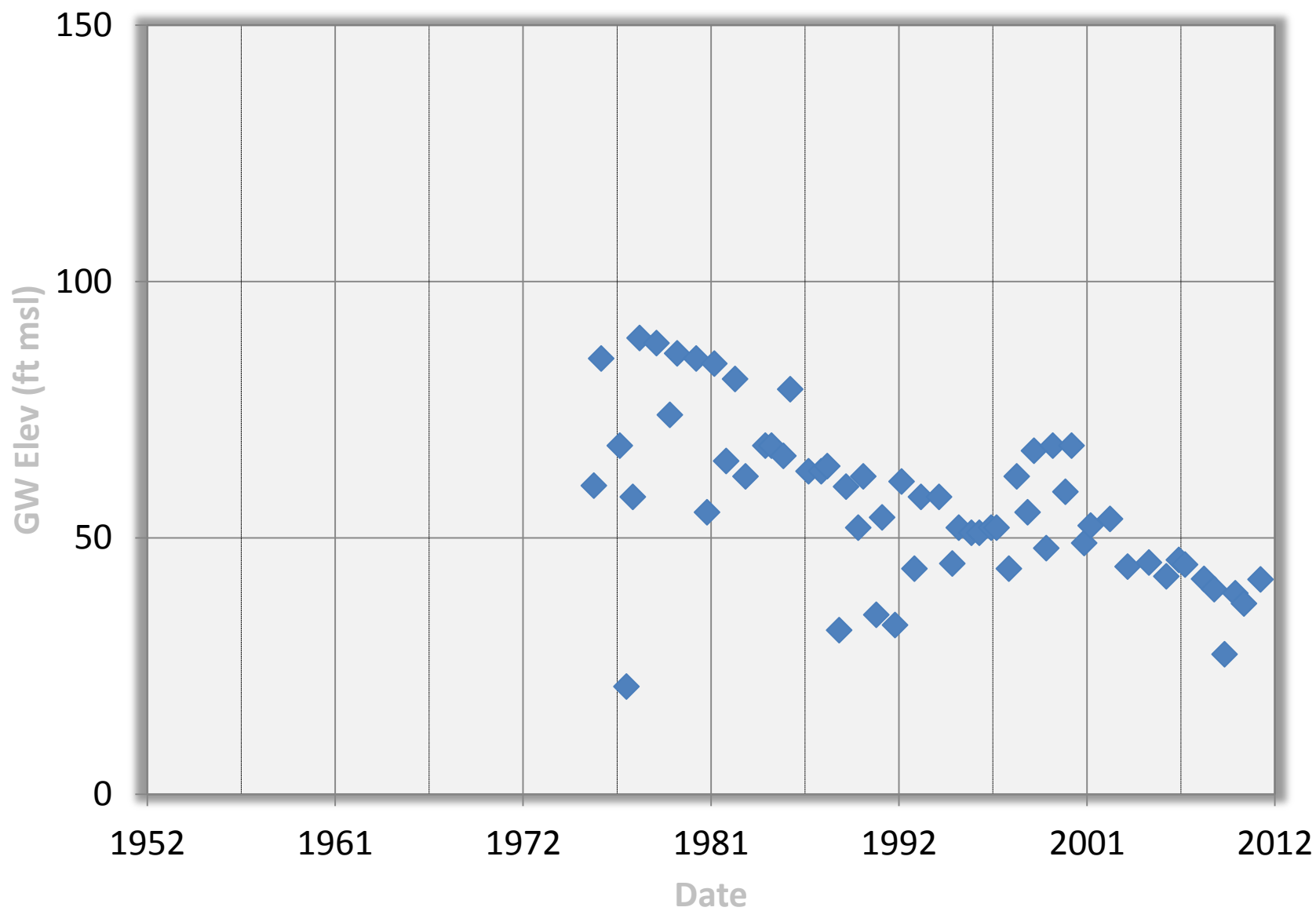
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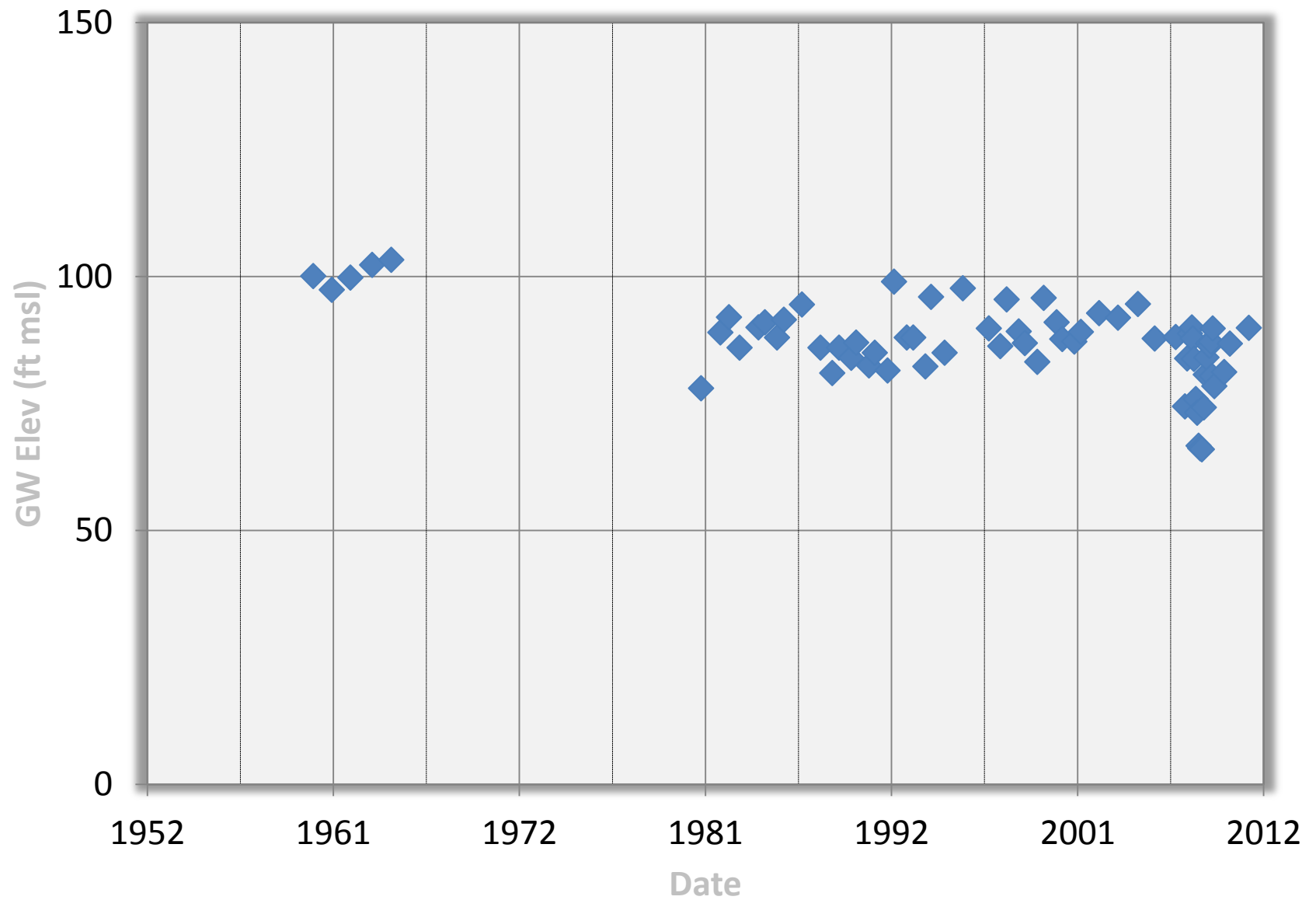
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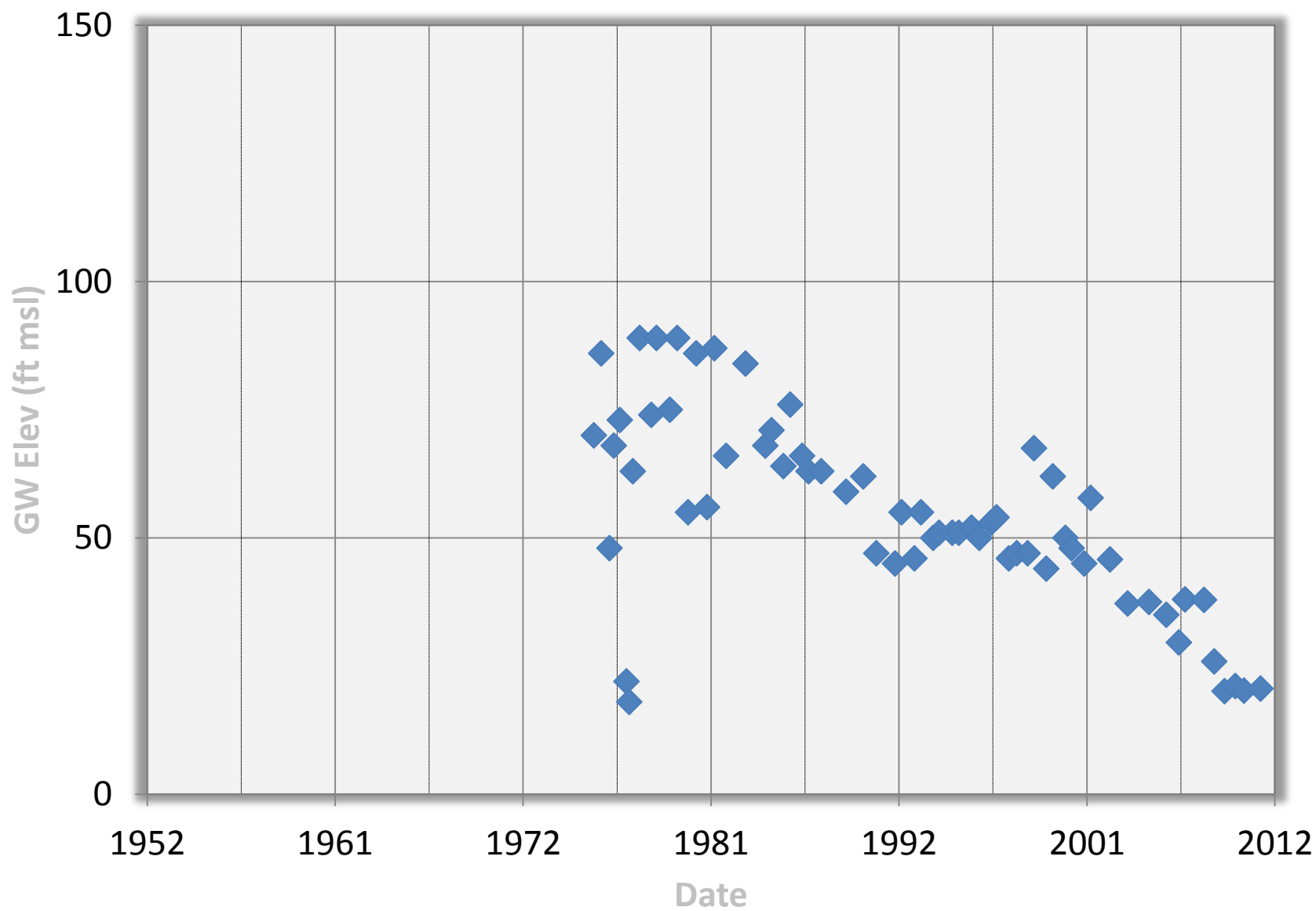
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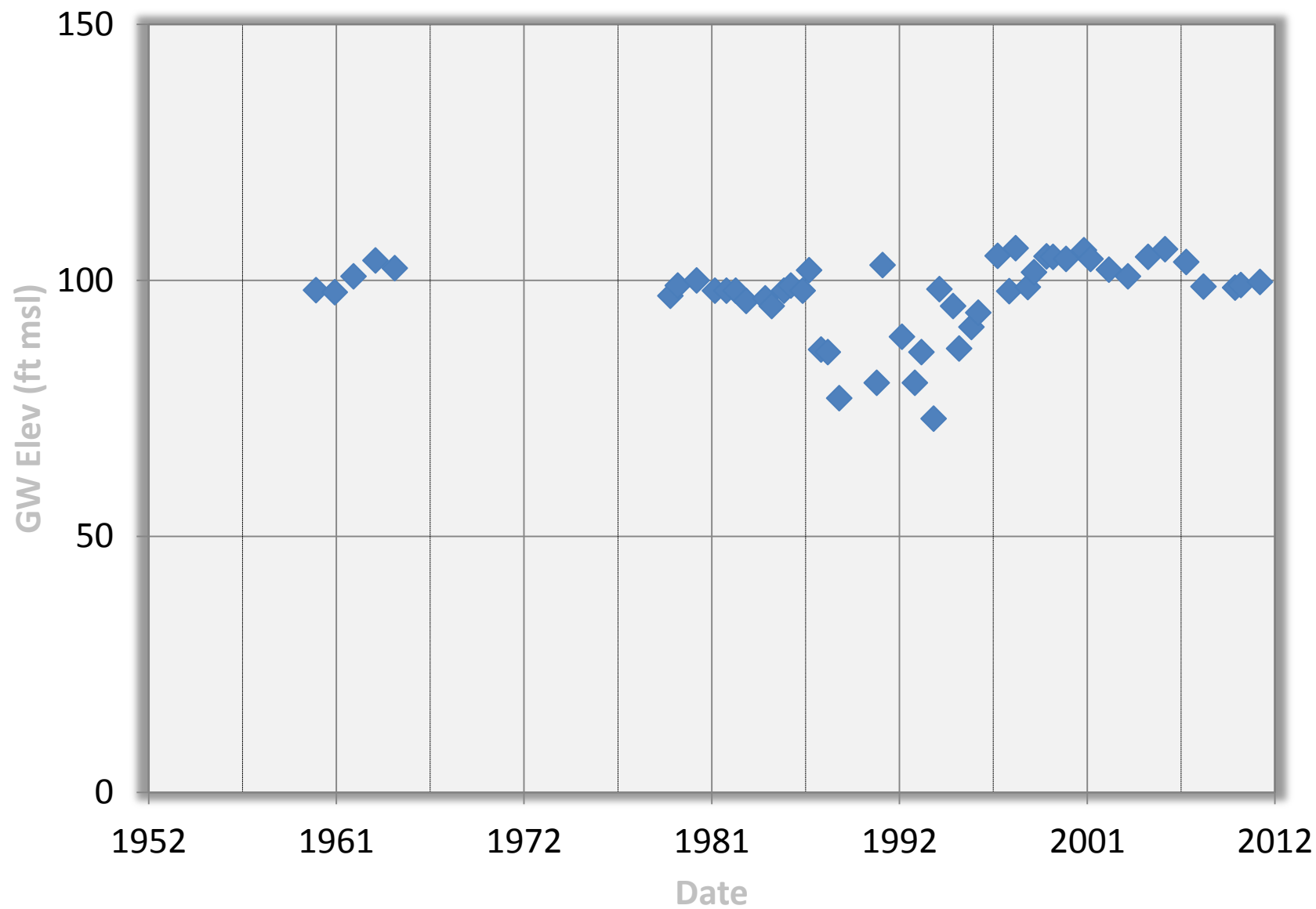
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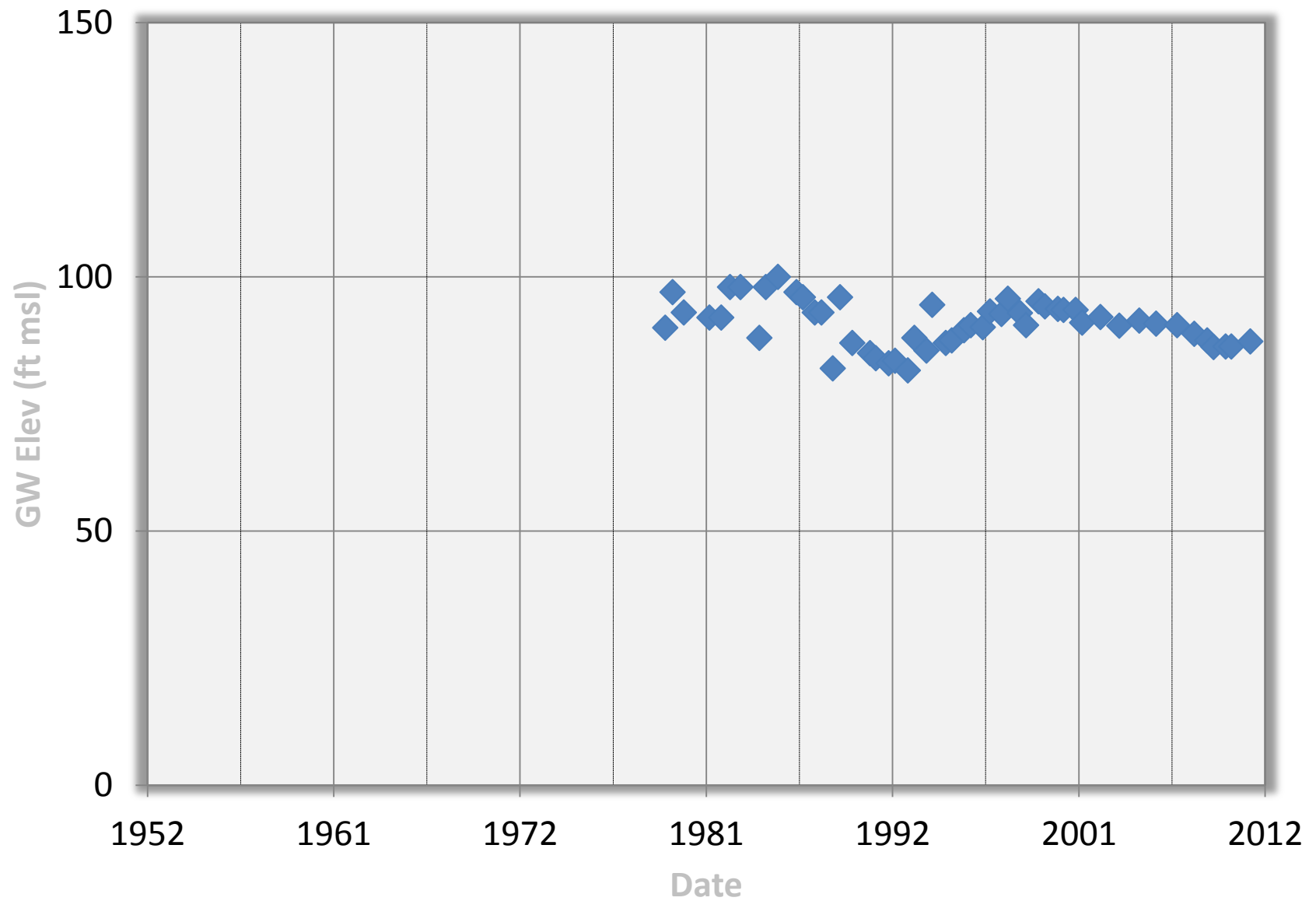
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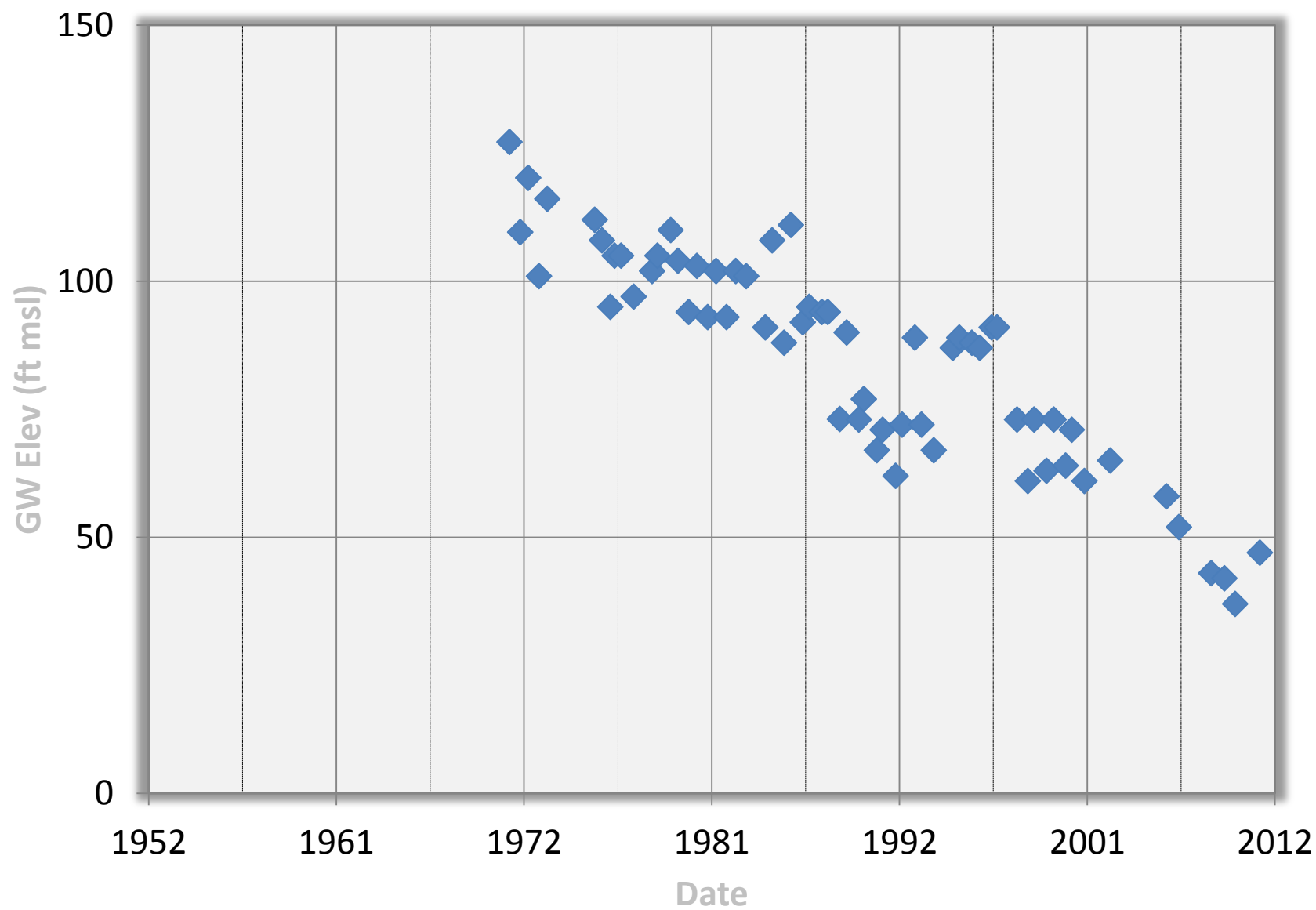
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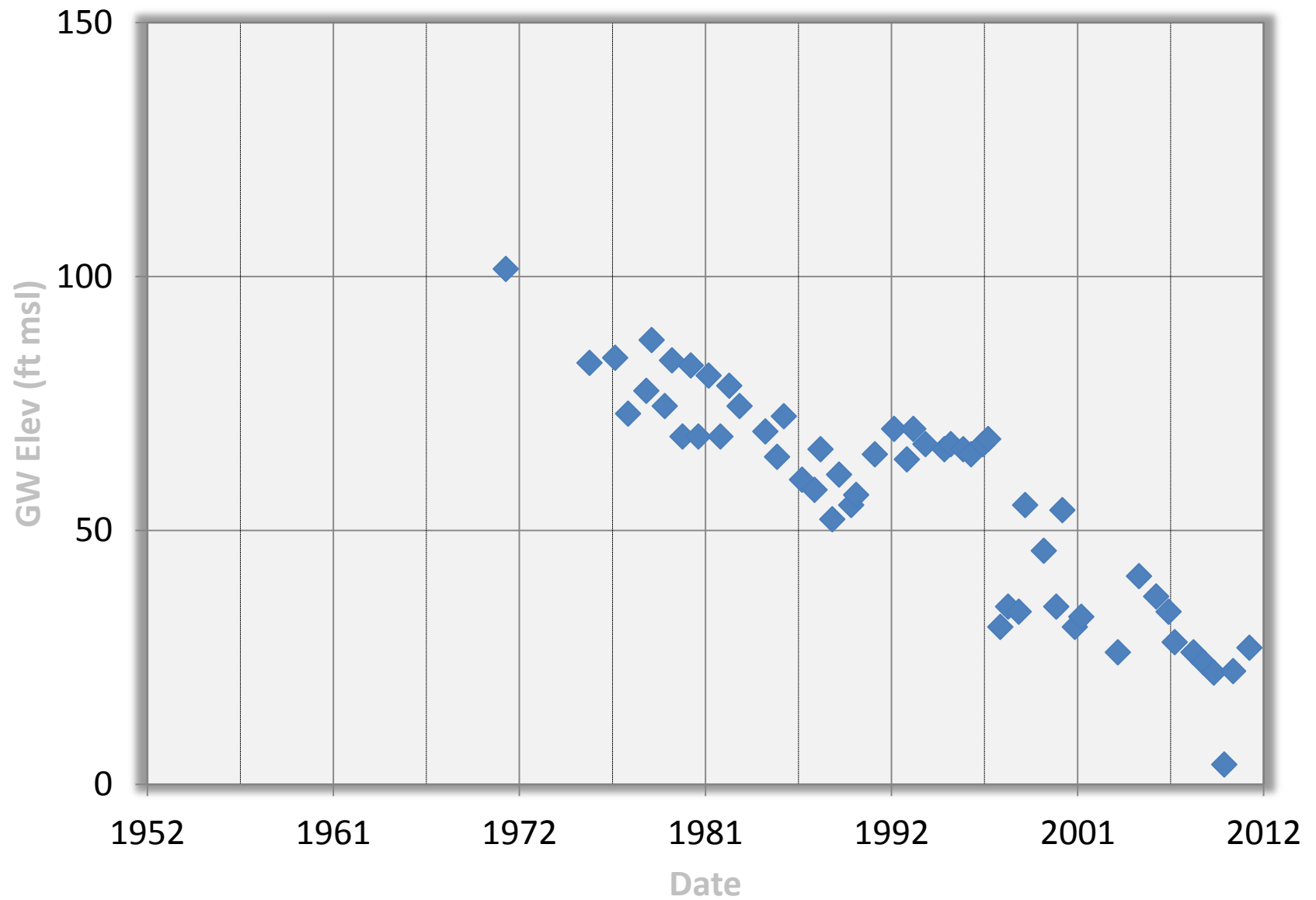
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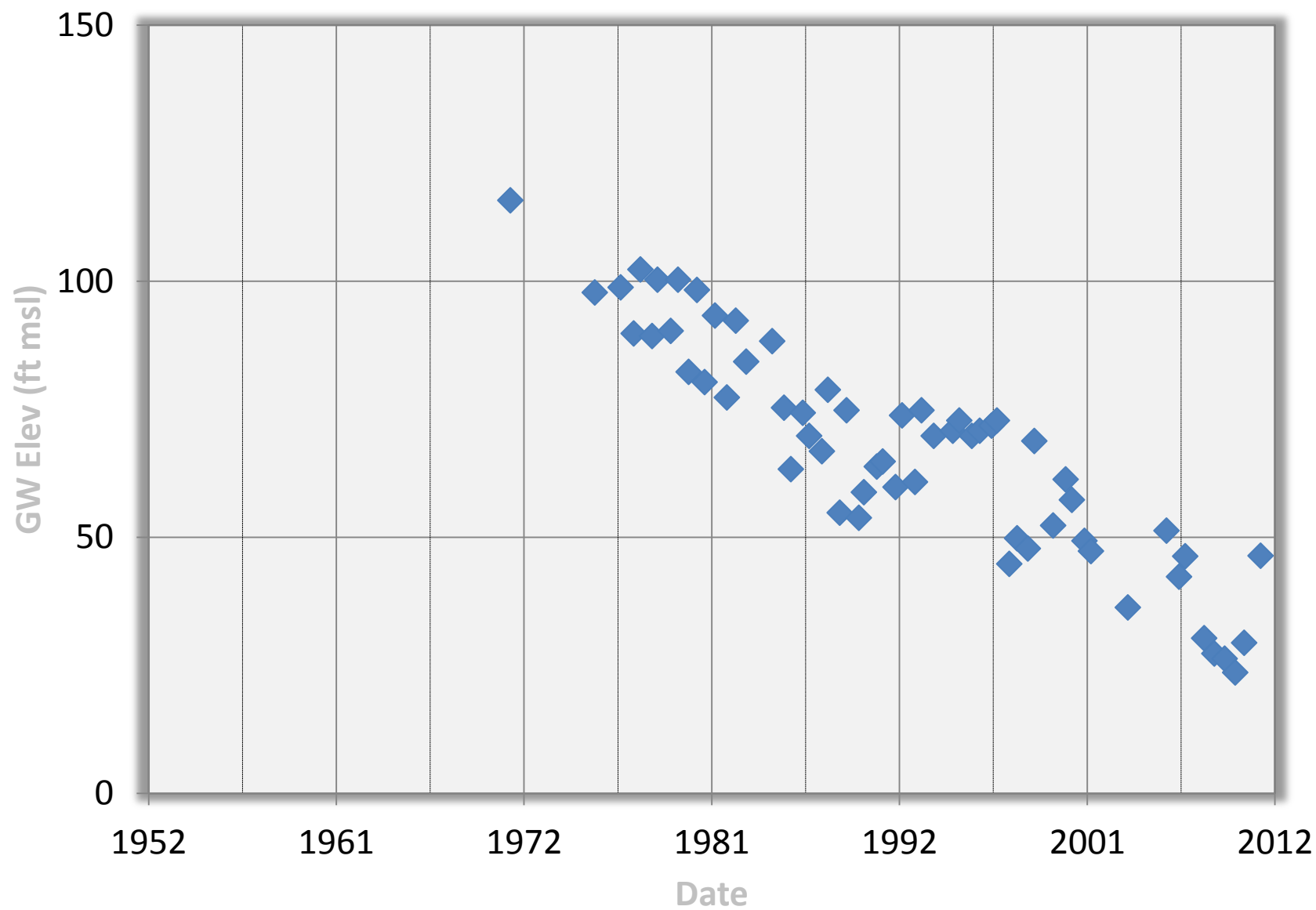
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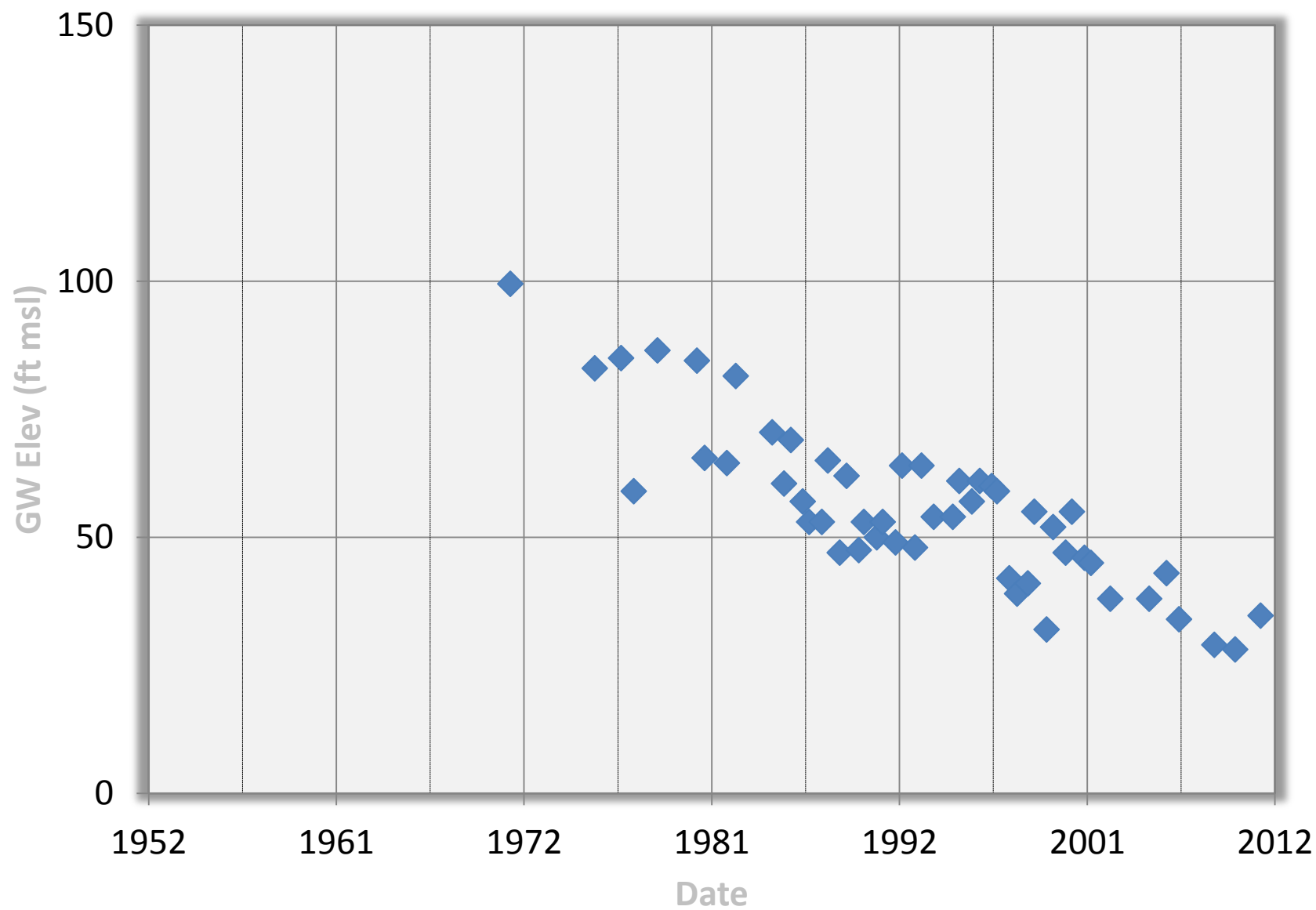
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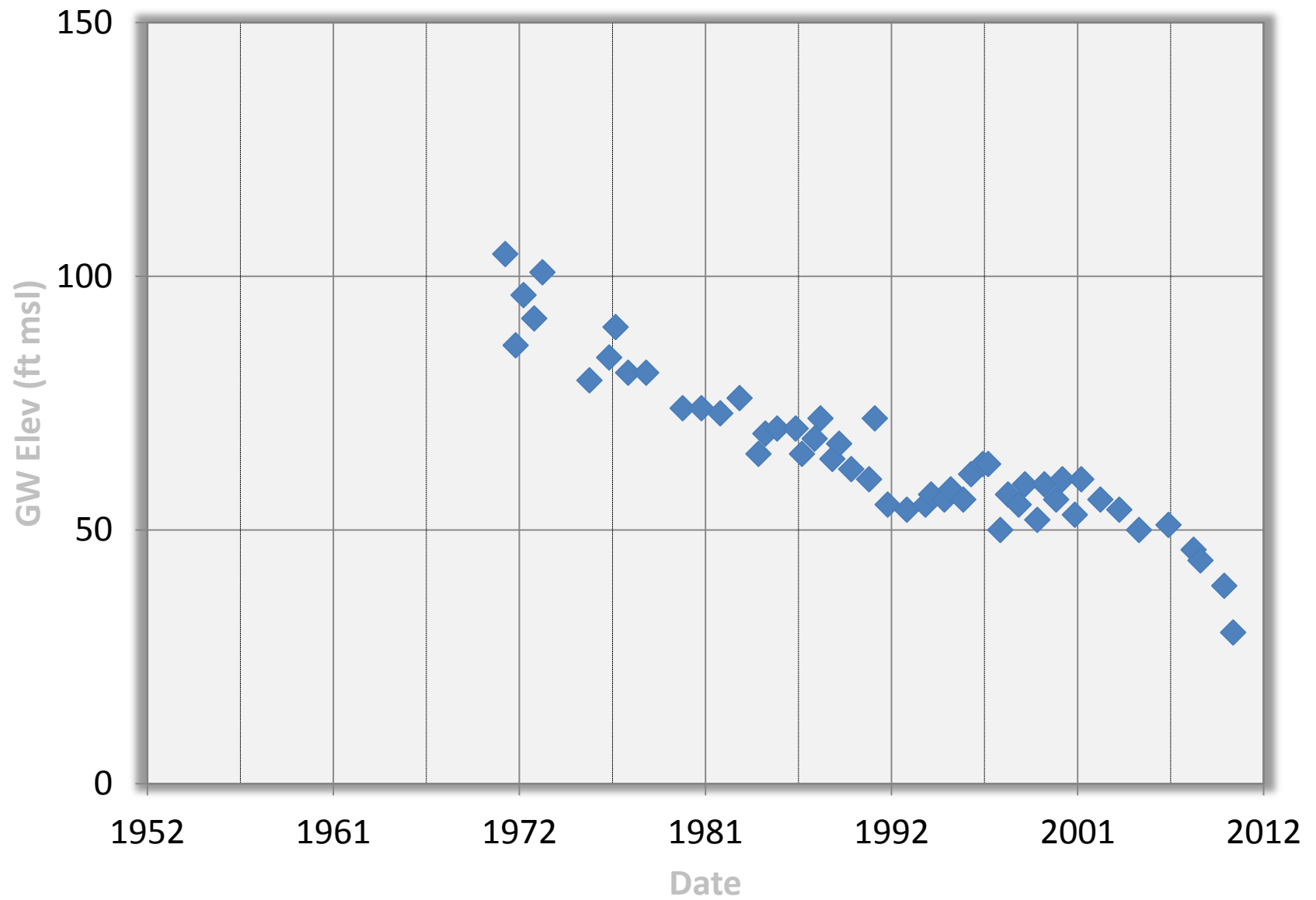
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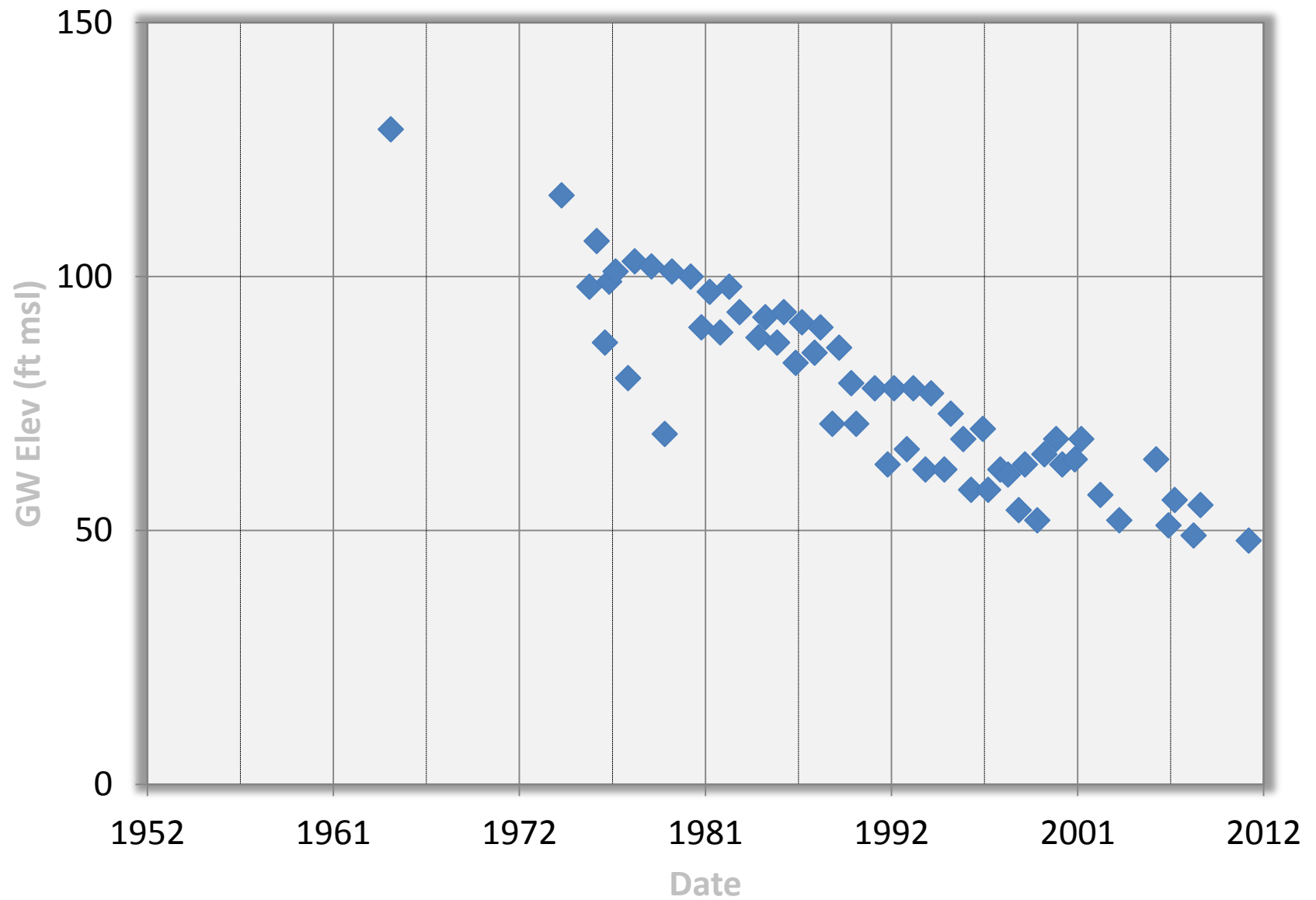
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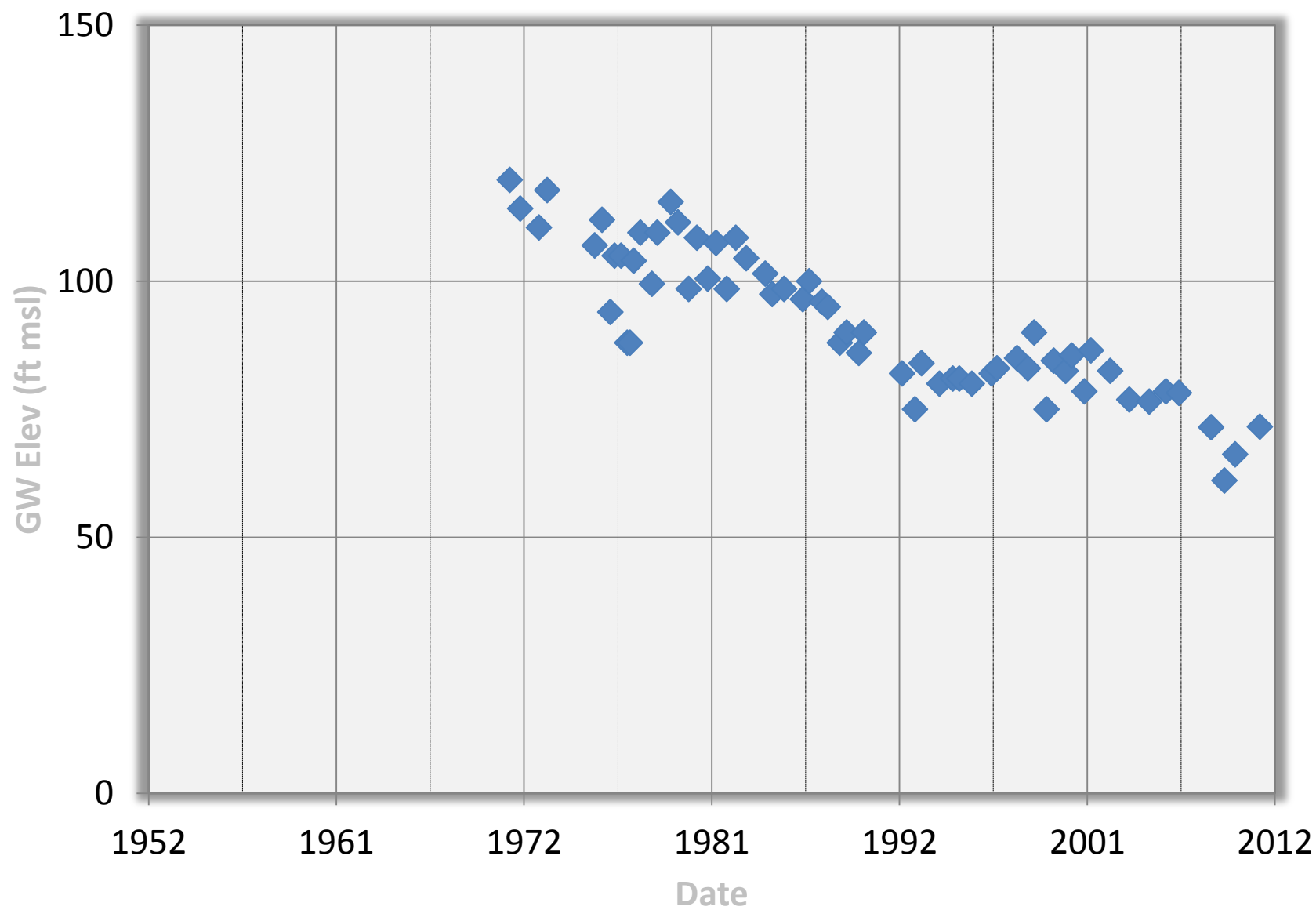
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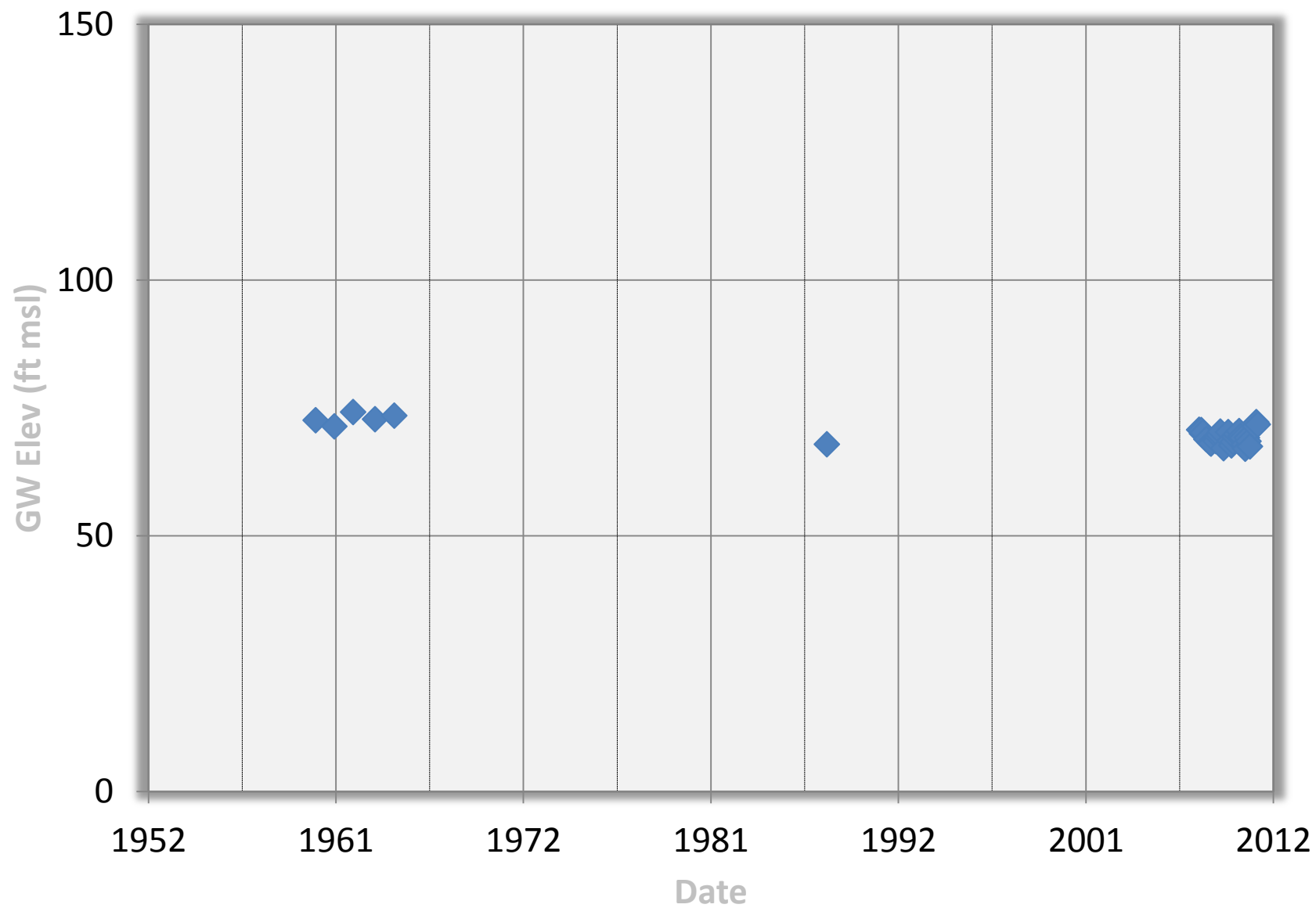
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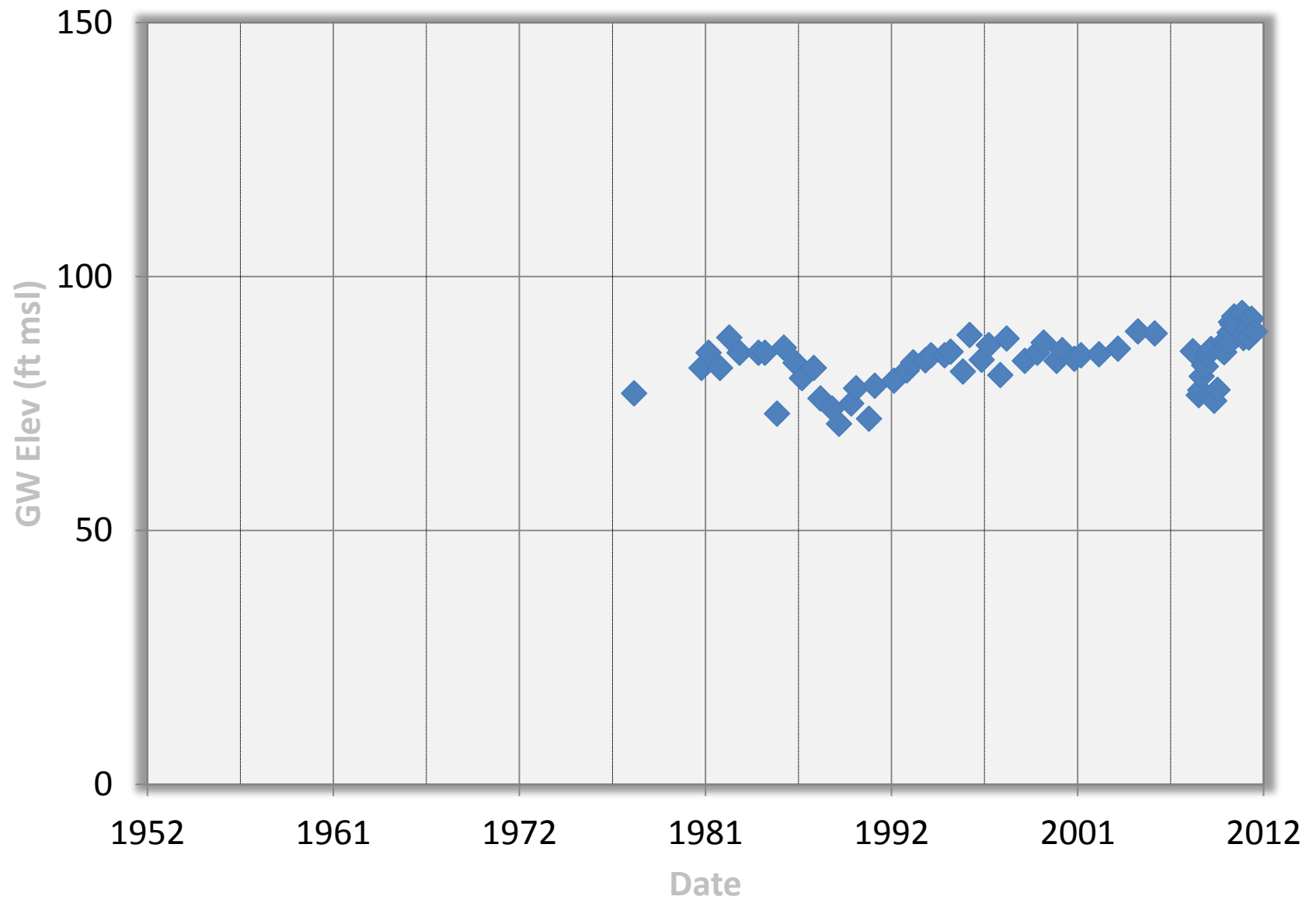
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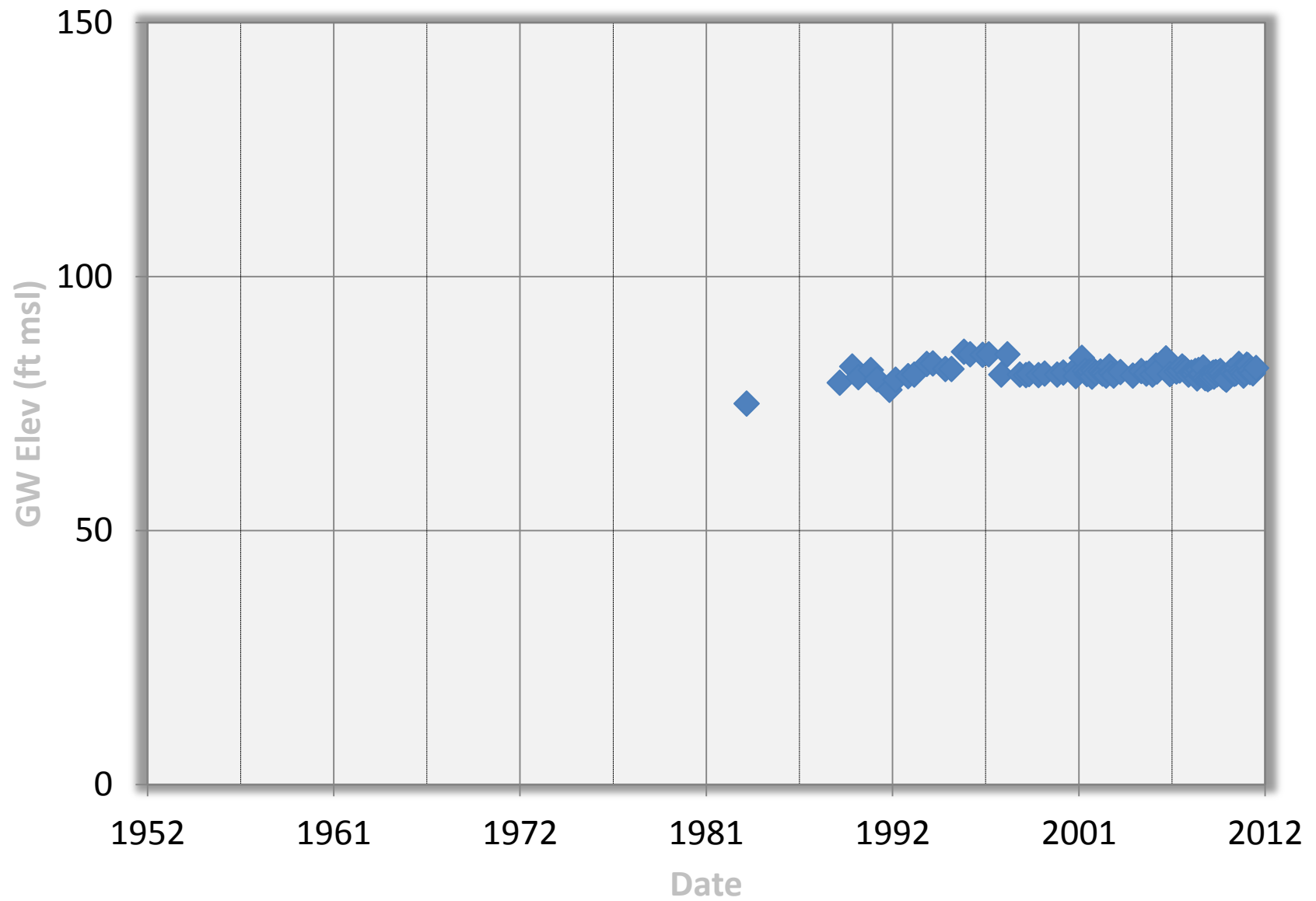
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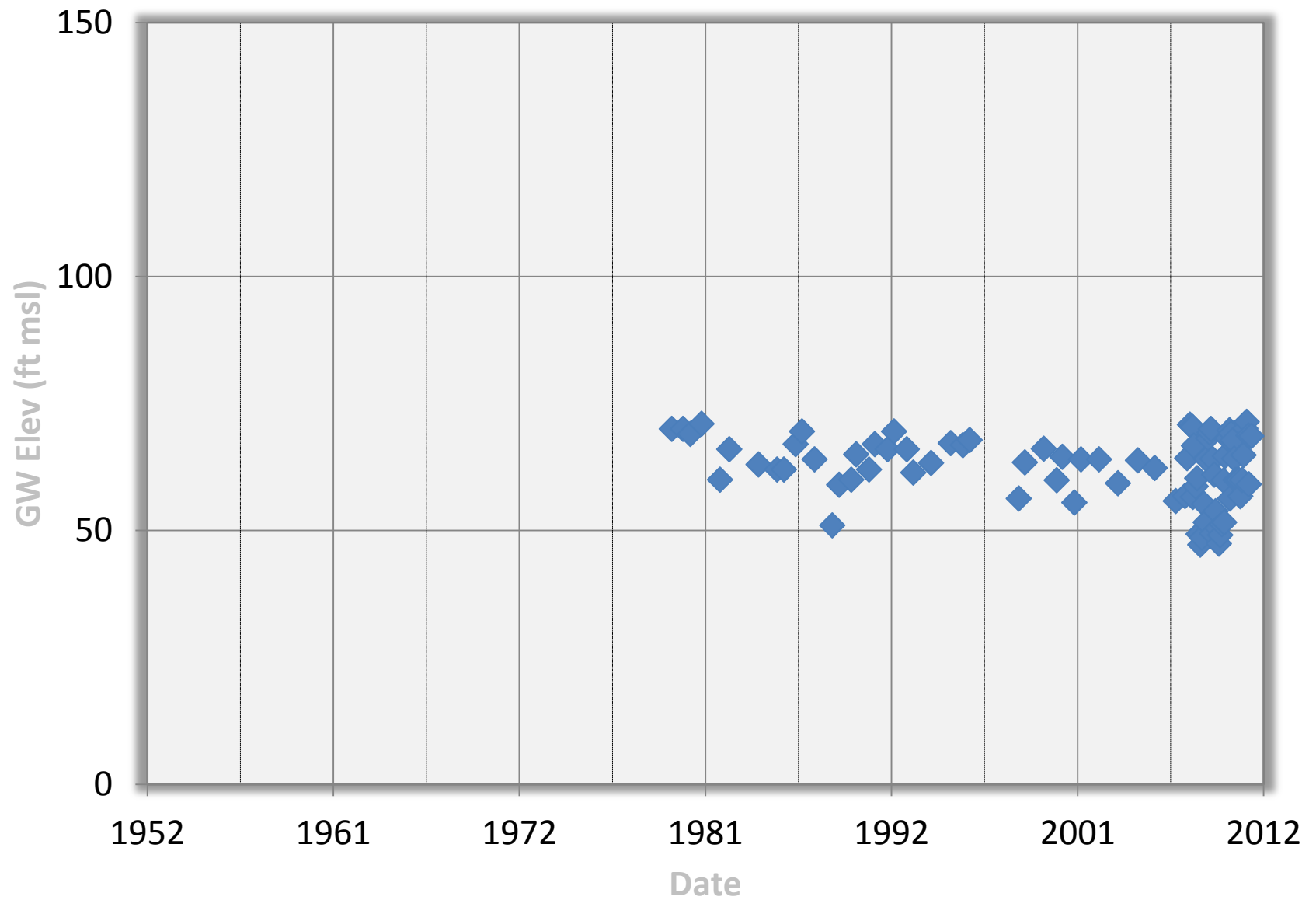
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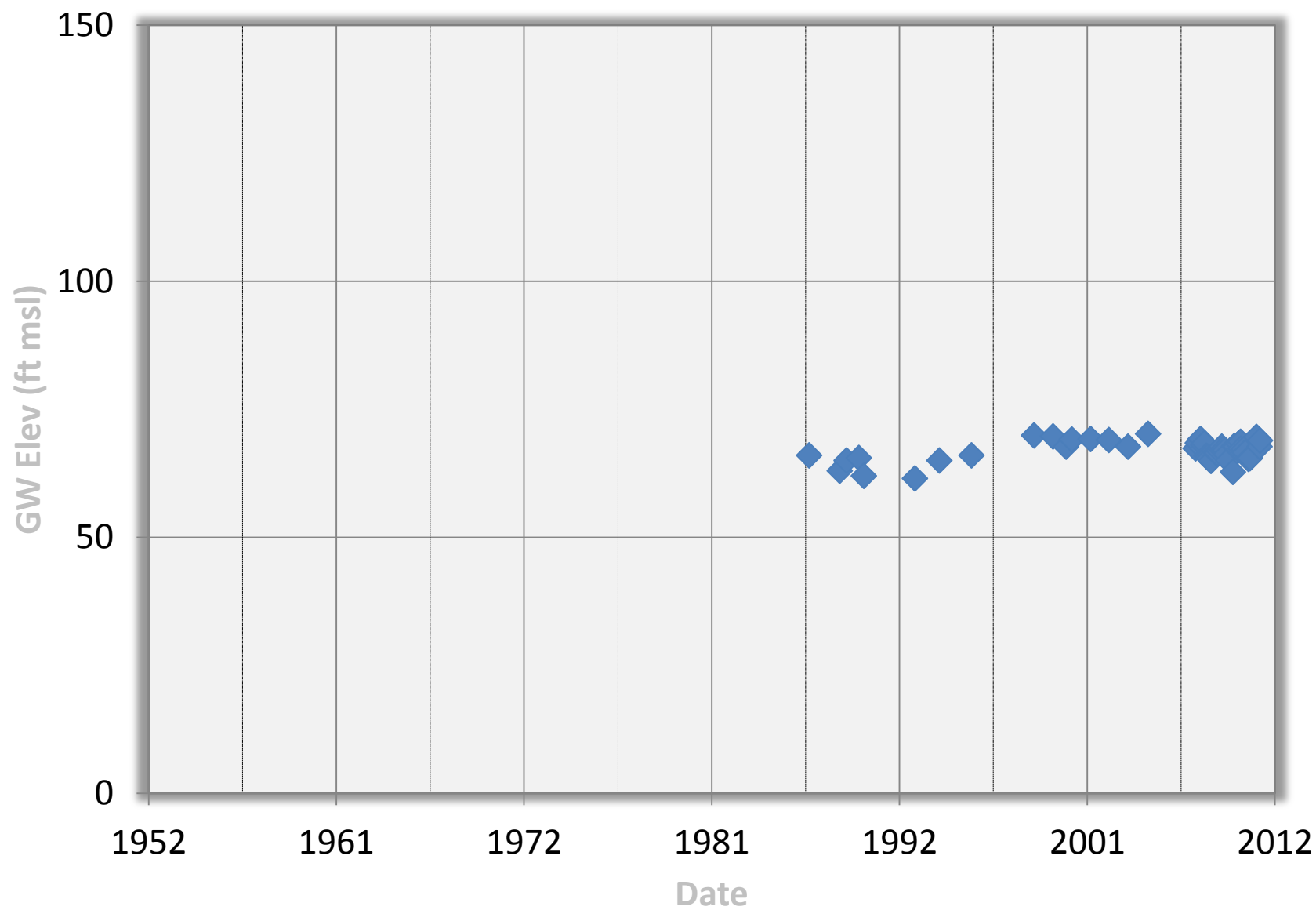
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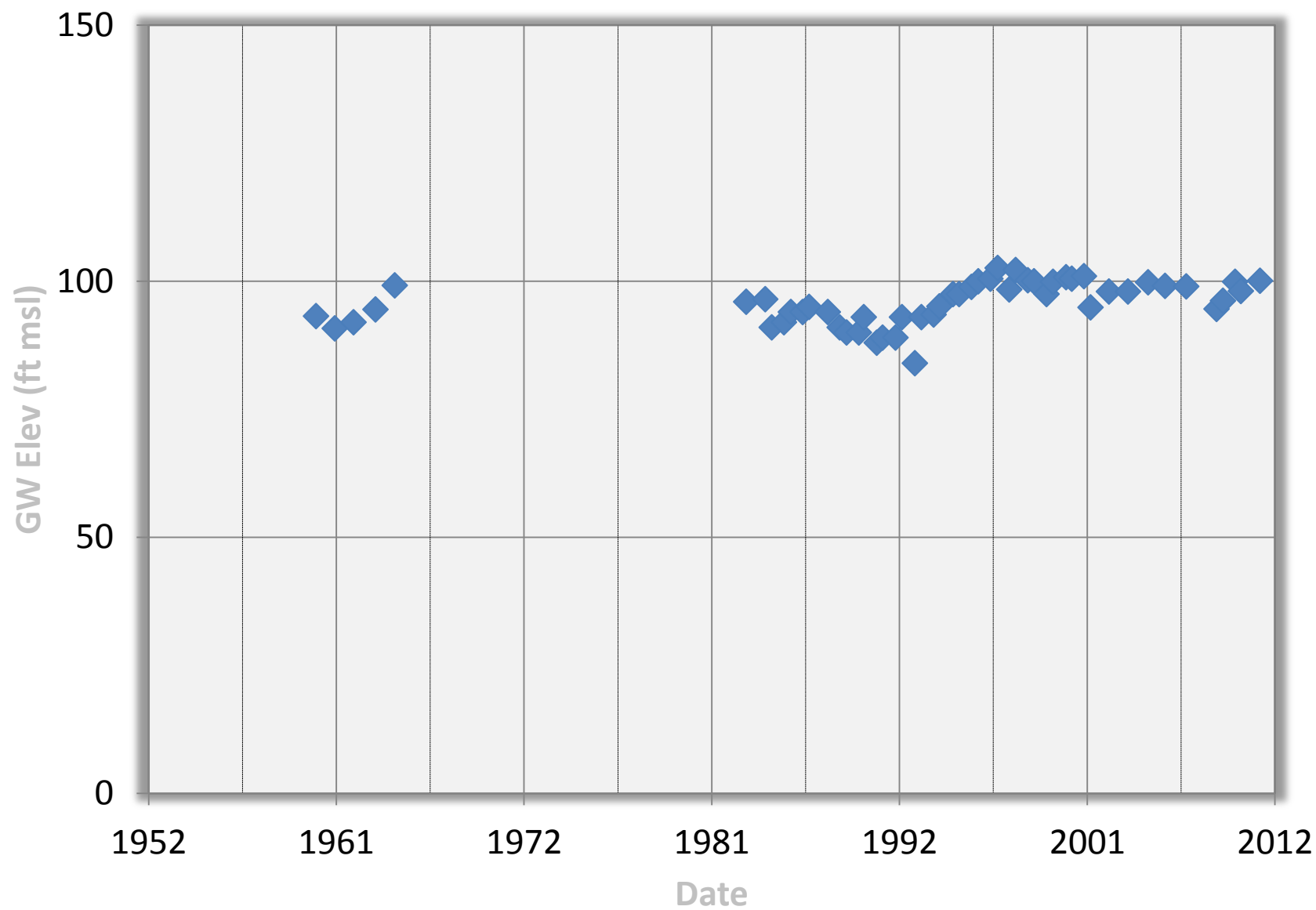
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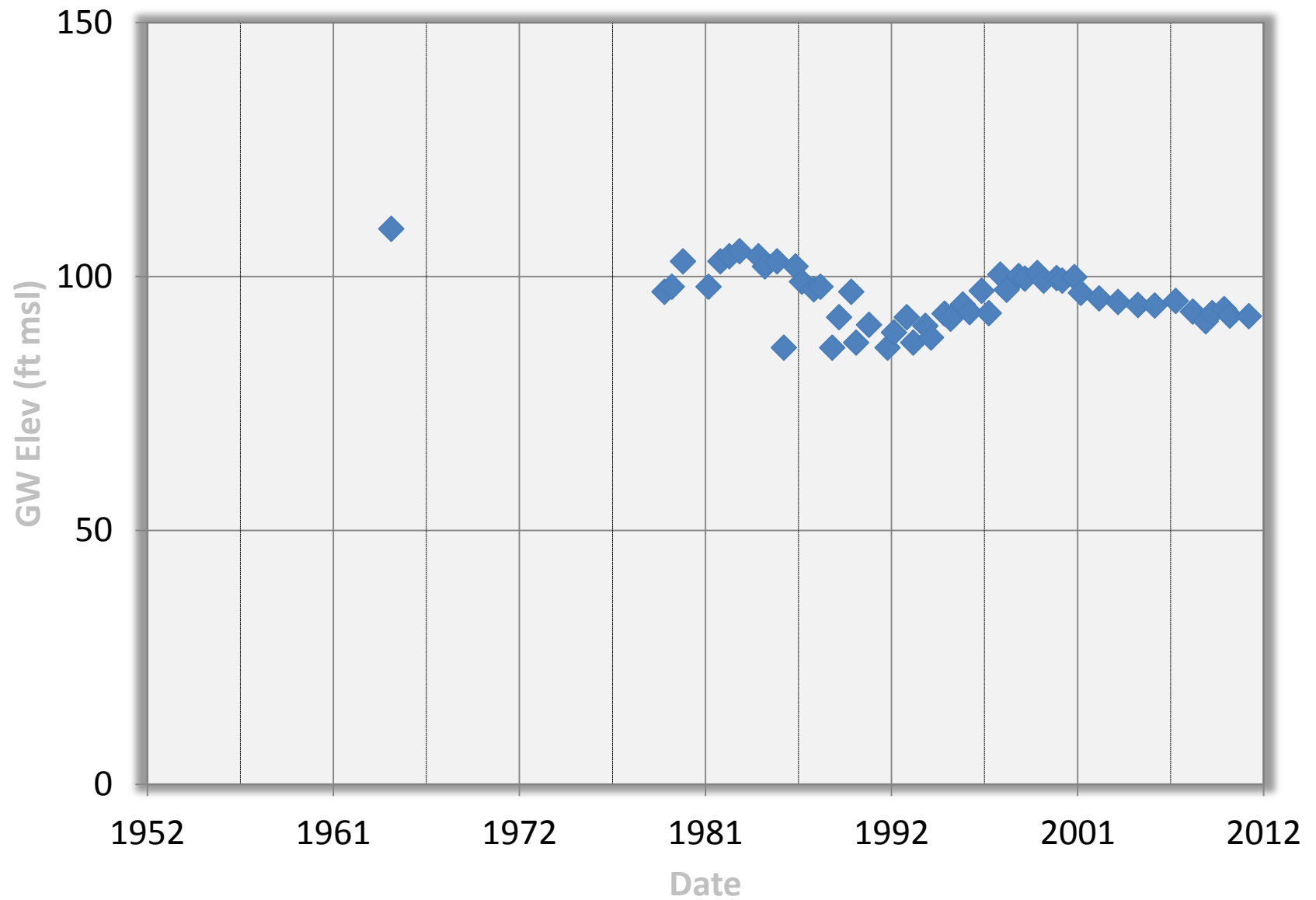
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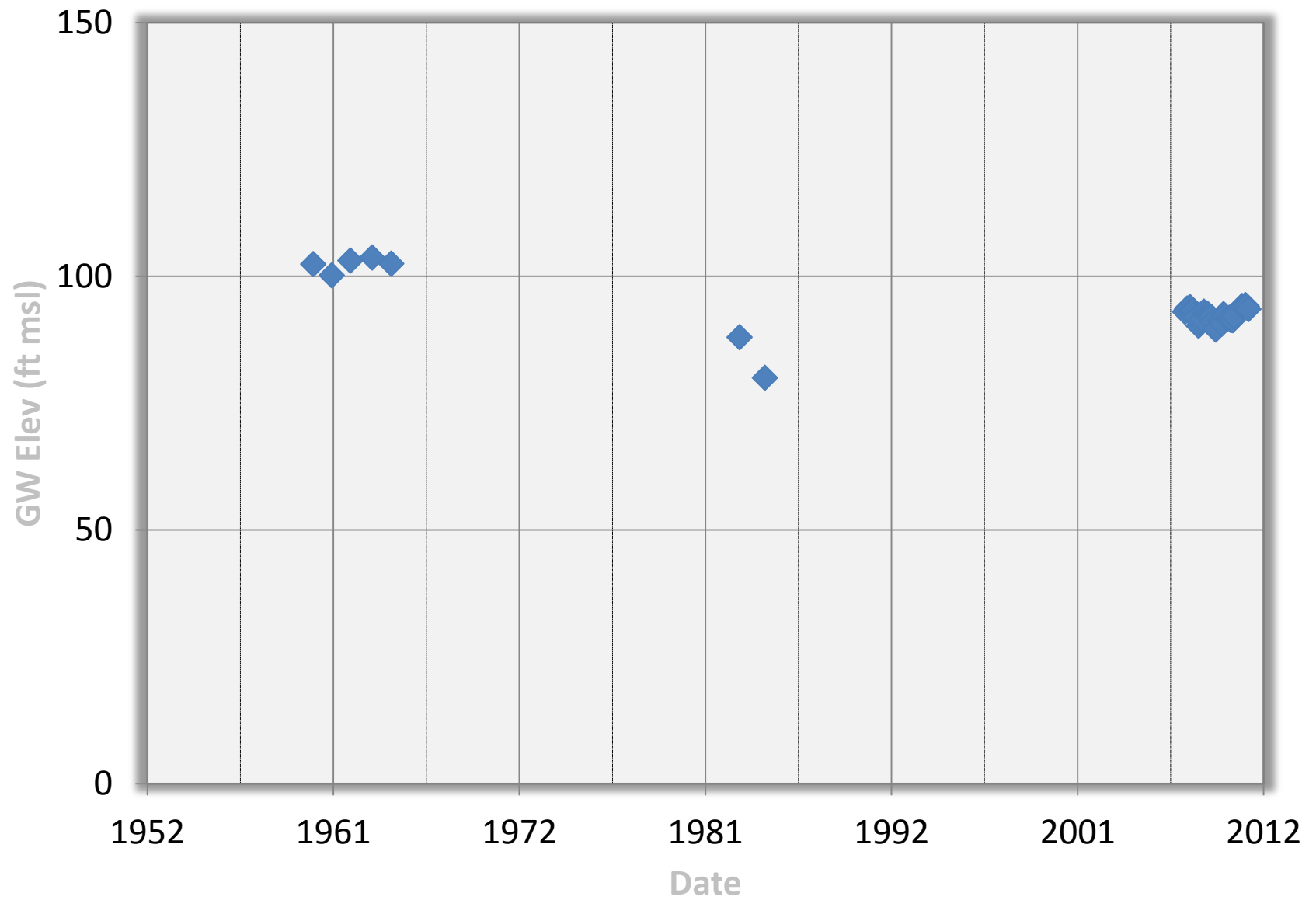
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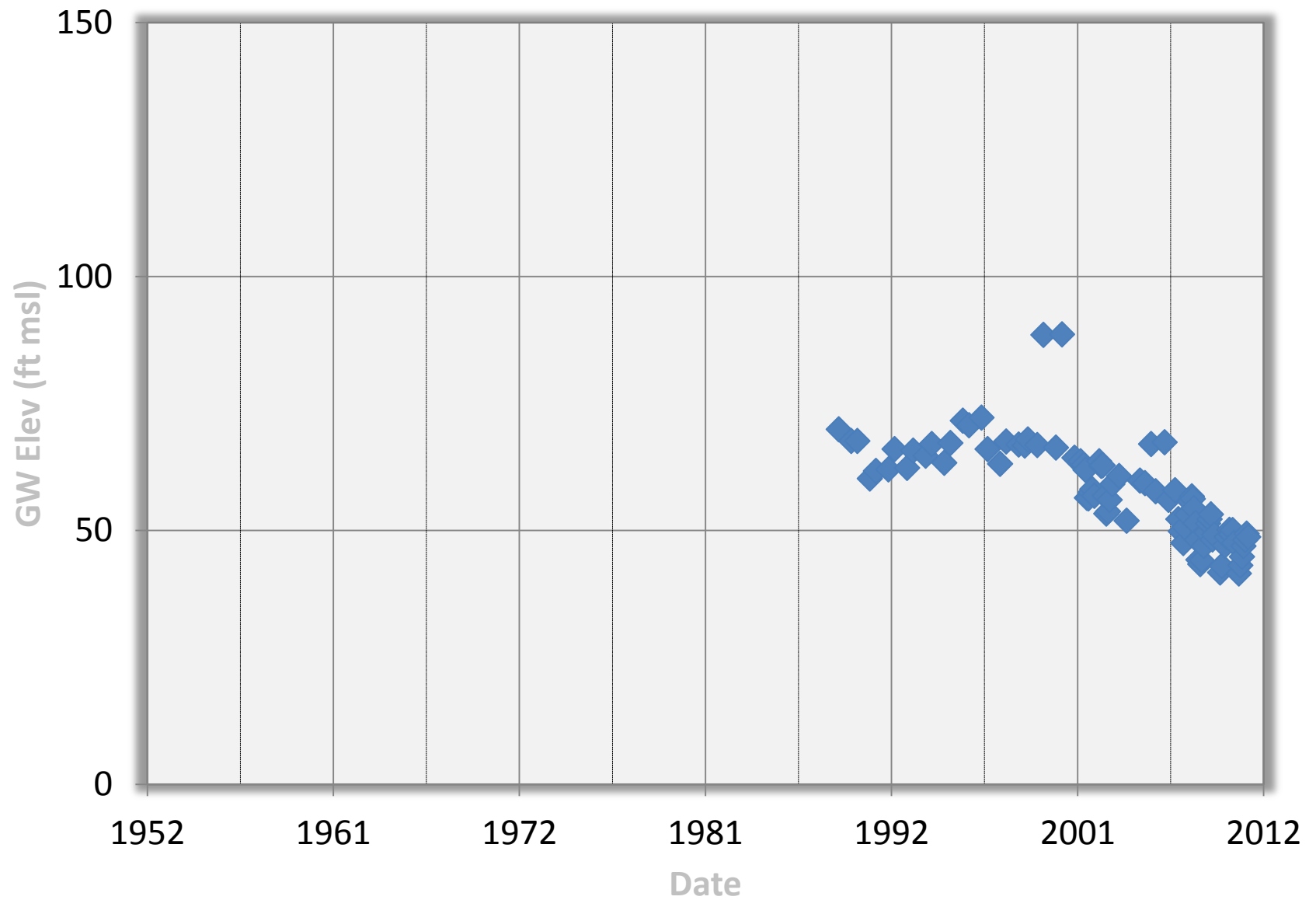
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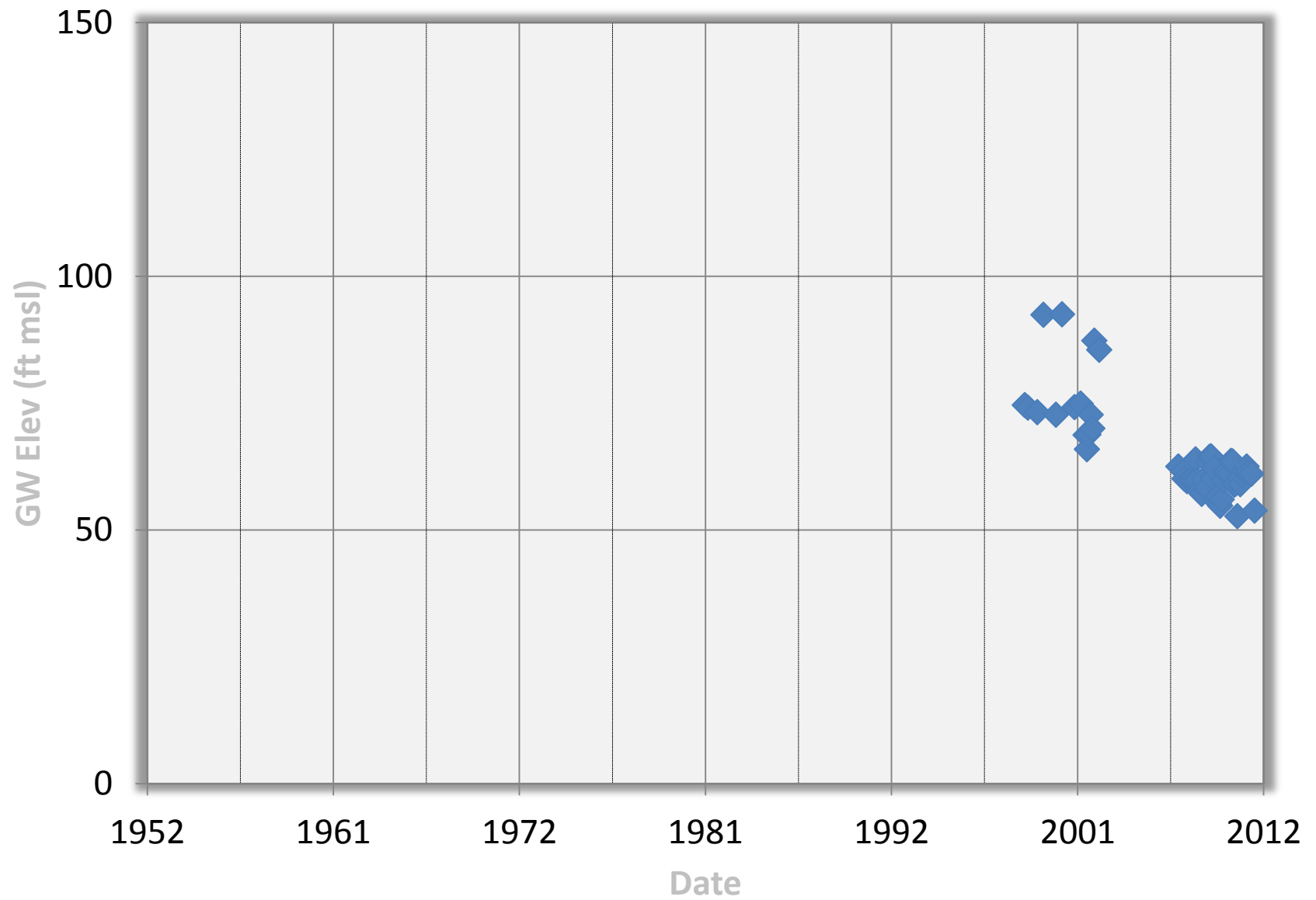
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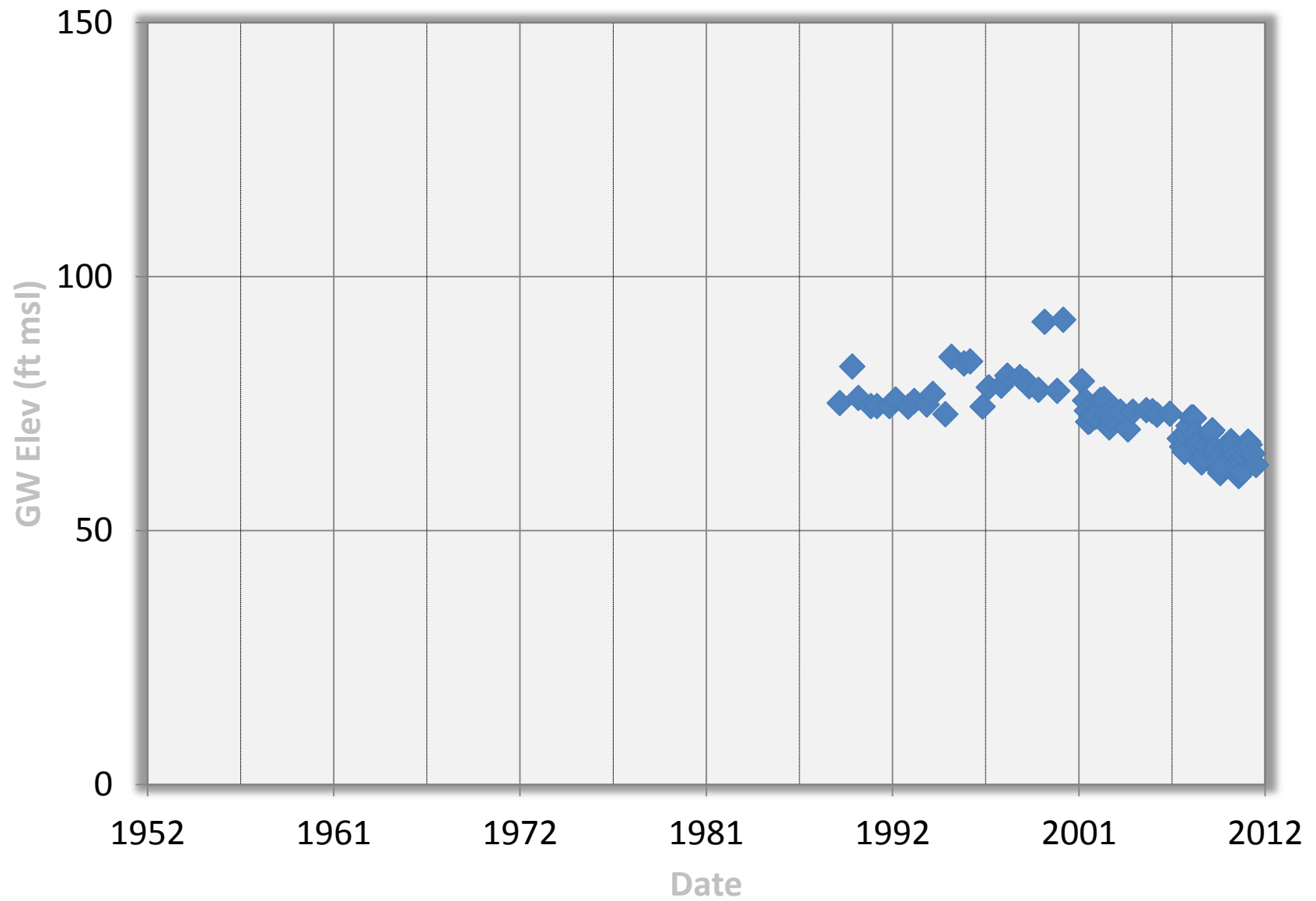
Foster Farms / TGWB 001



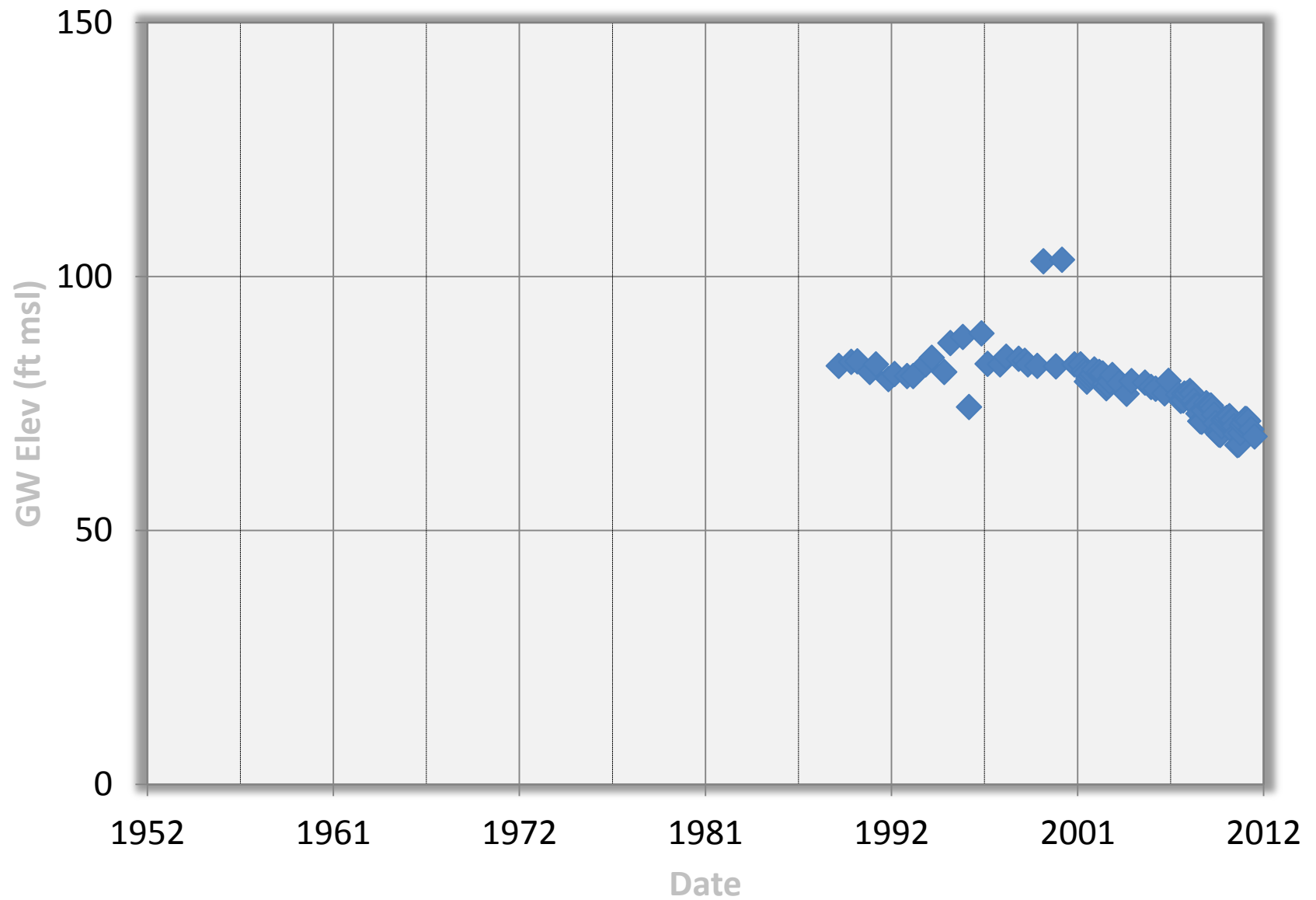
O'Brien



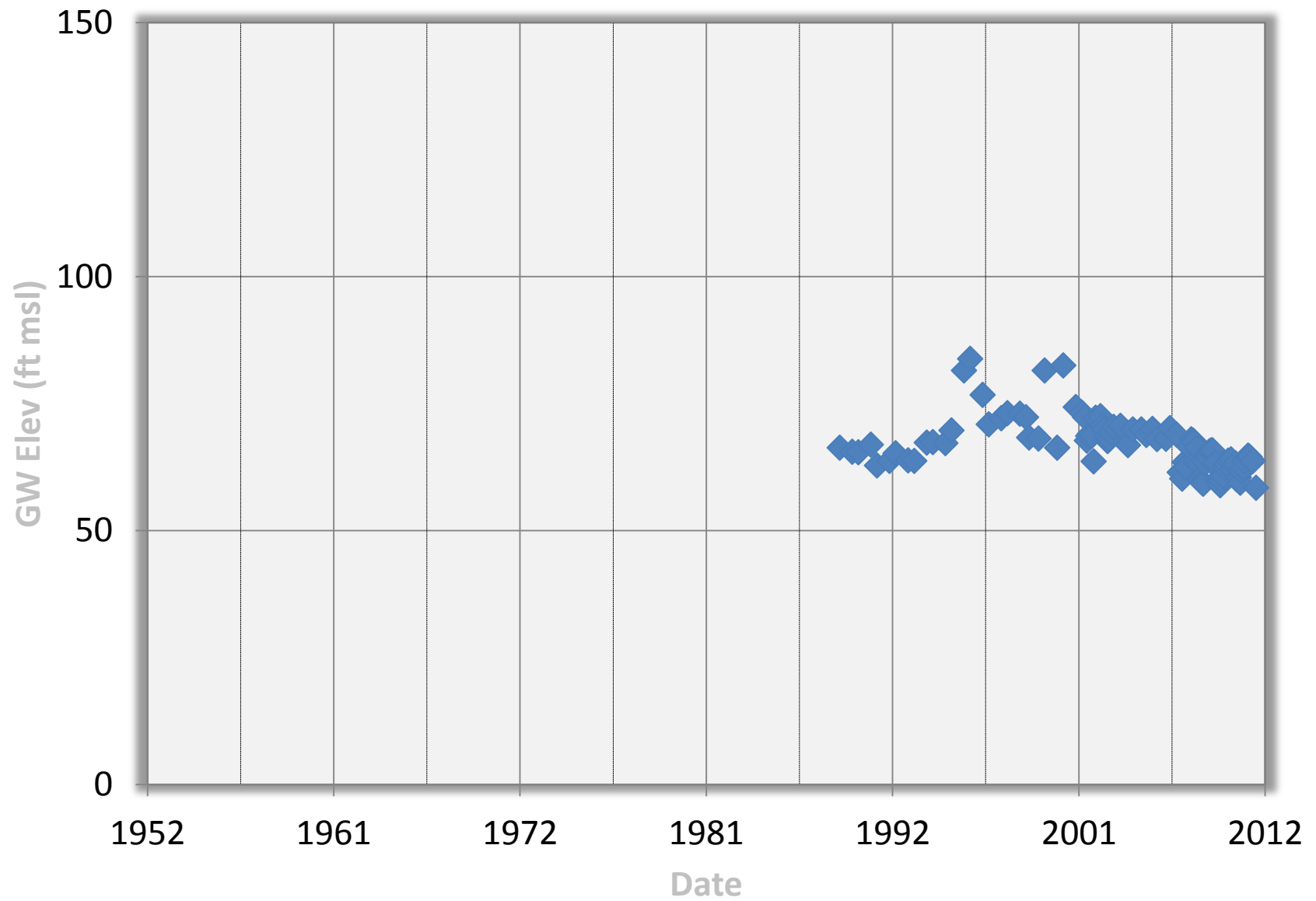
Hickman-Lowe No. 1



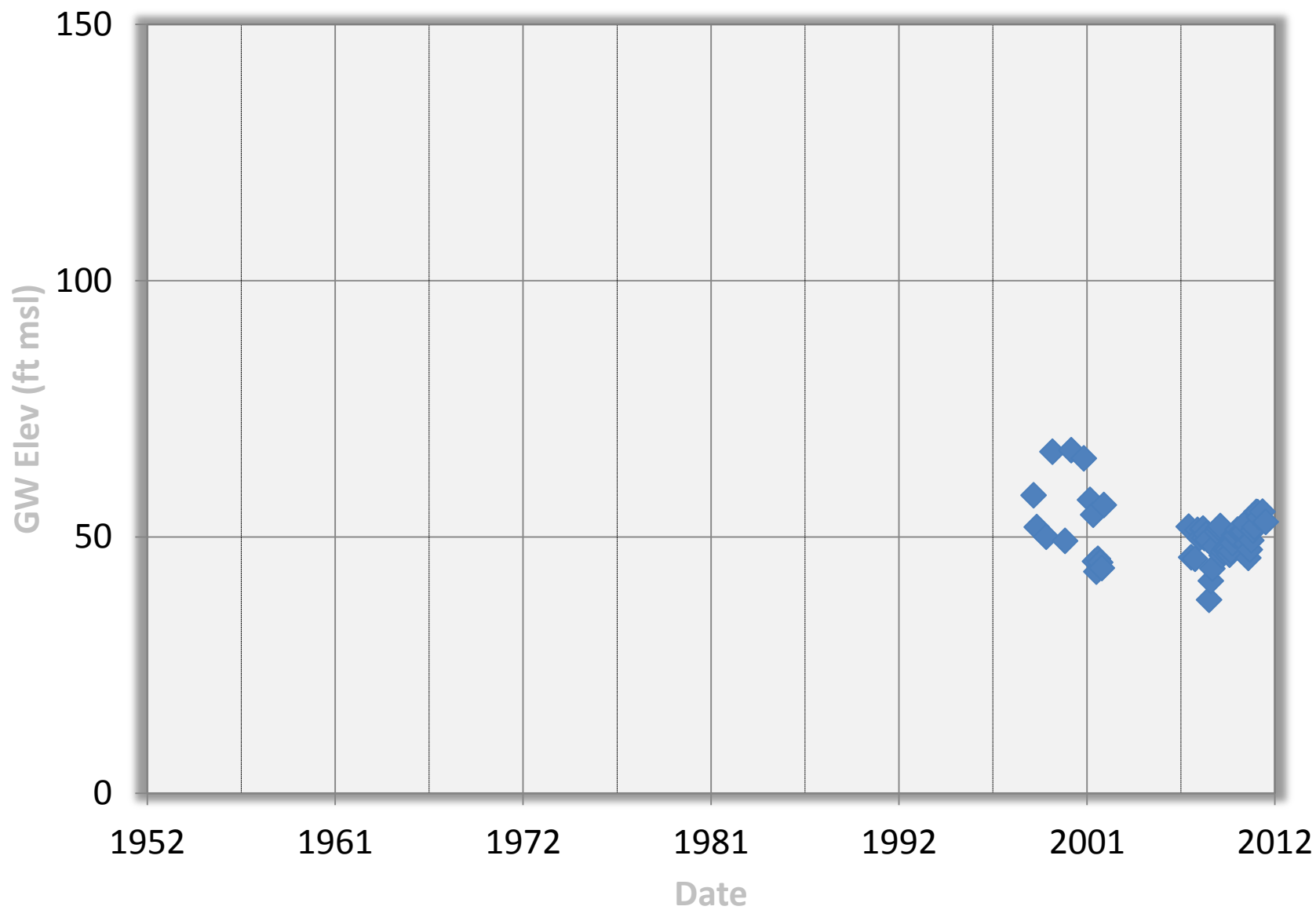
Dallas-Appling / TGWB 002



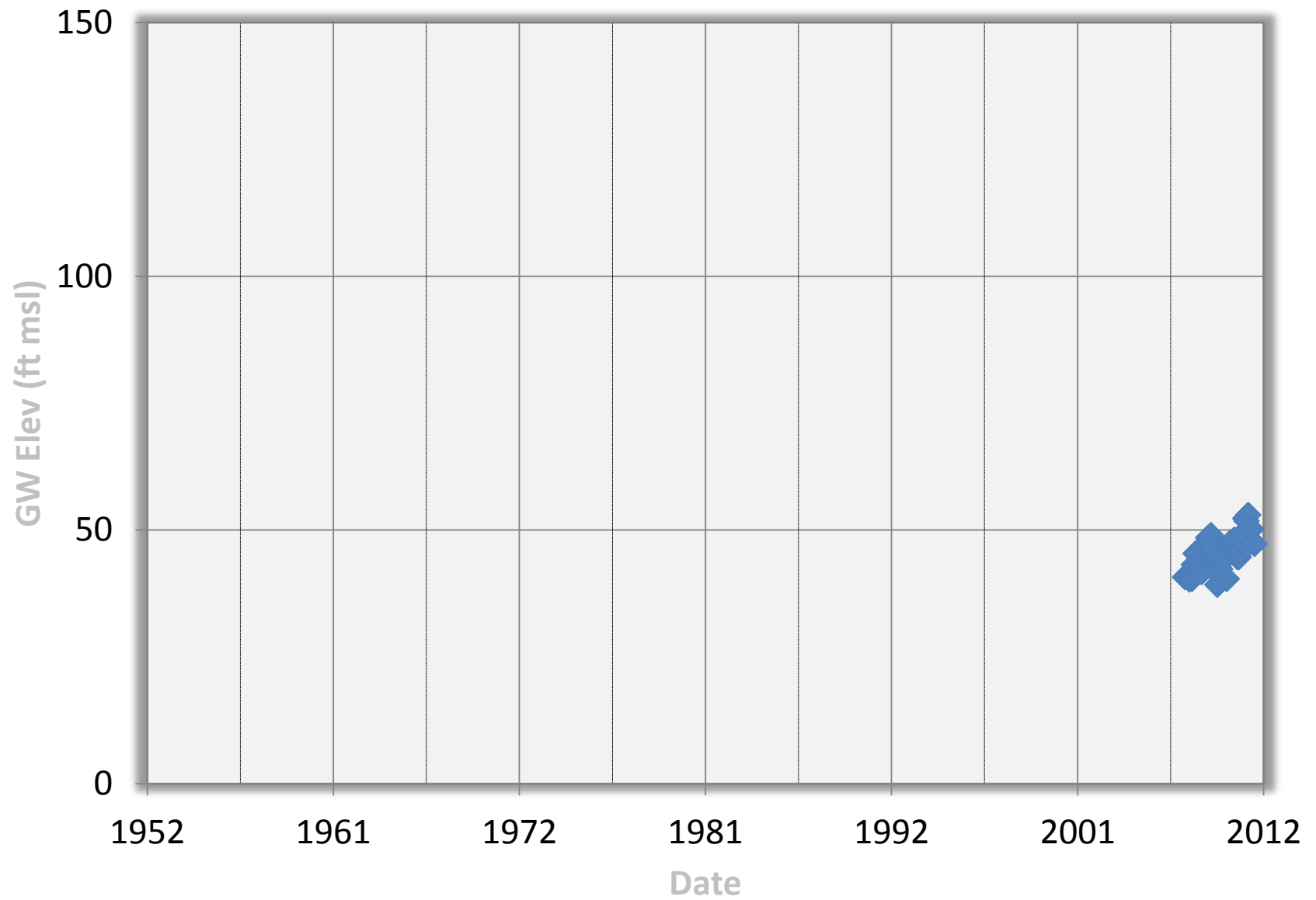
Boggeri-Snider / TGWB 003



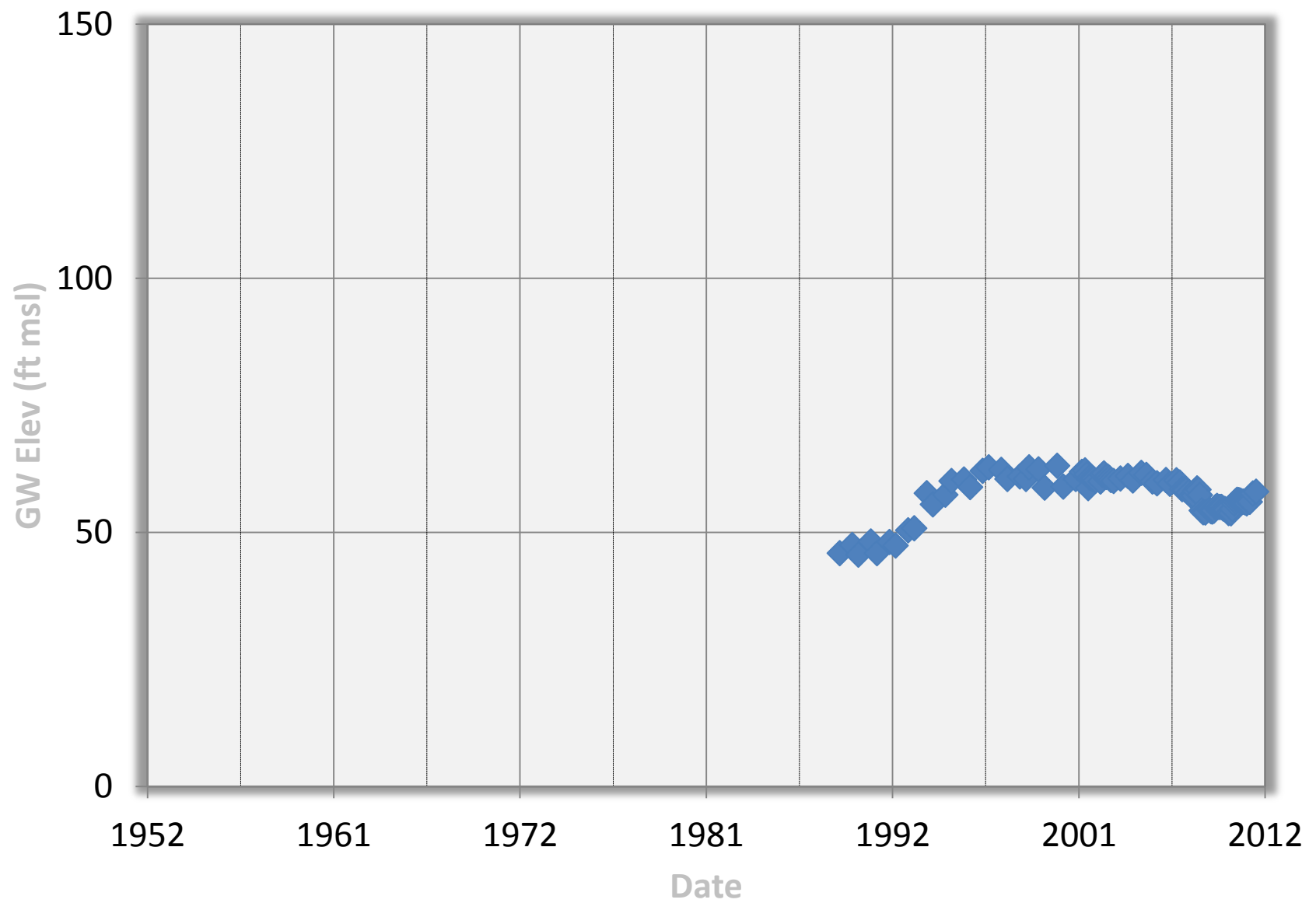
Conley



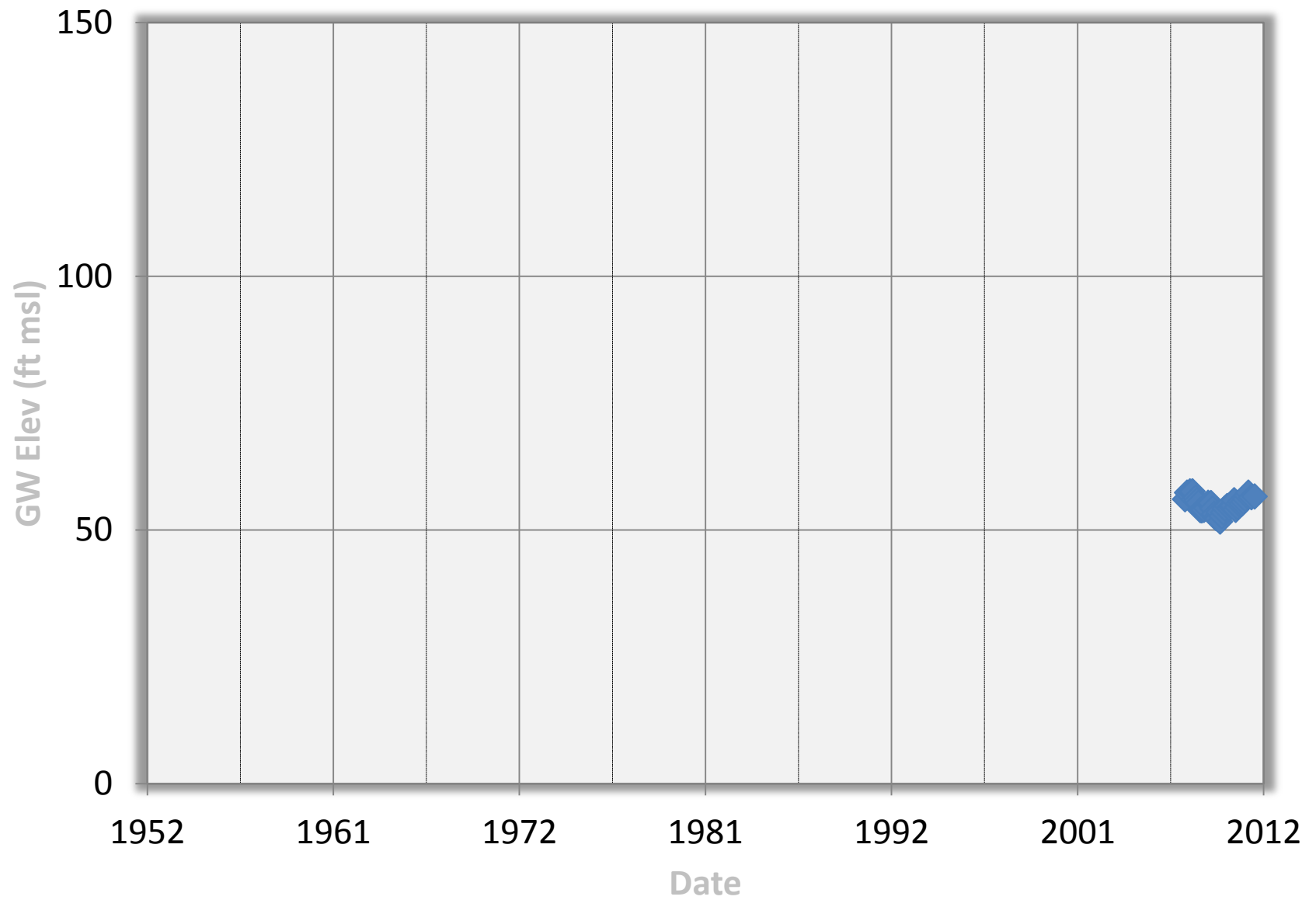
Gilbert / TGWB 004



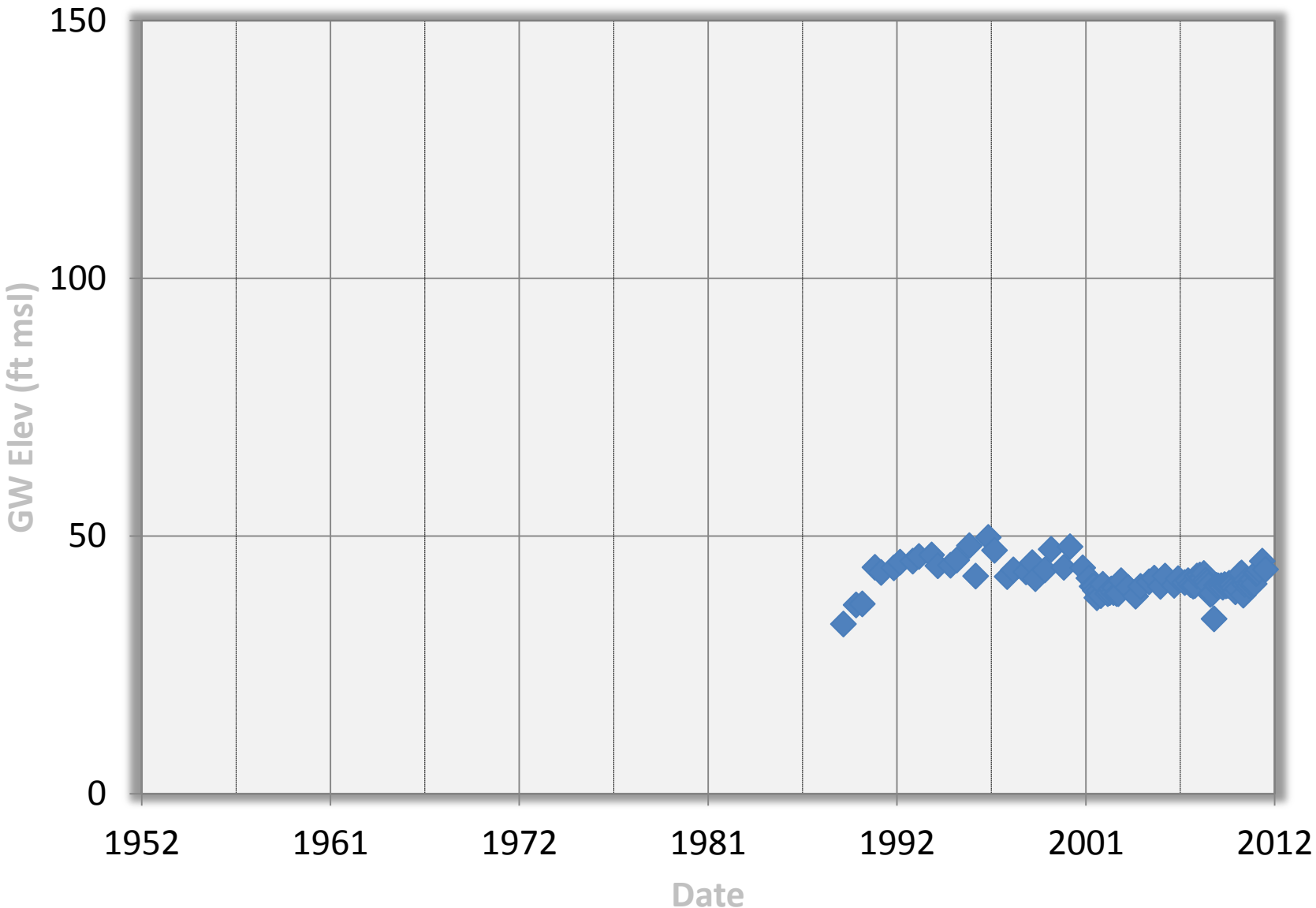
Gish



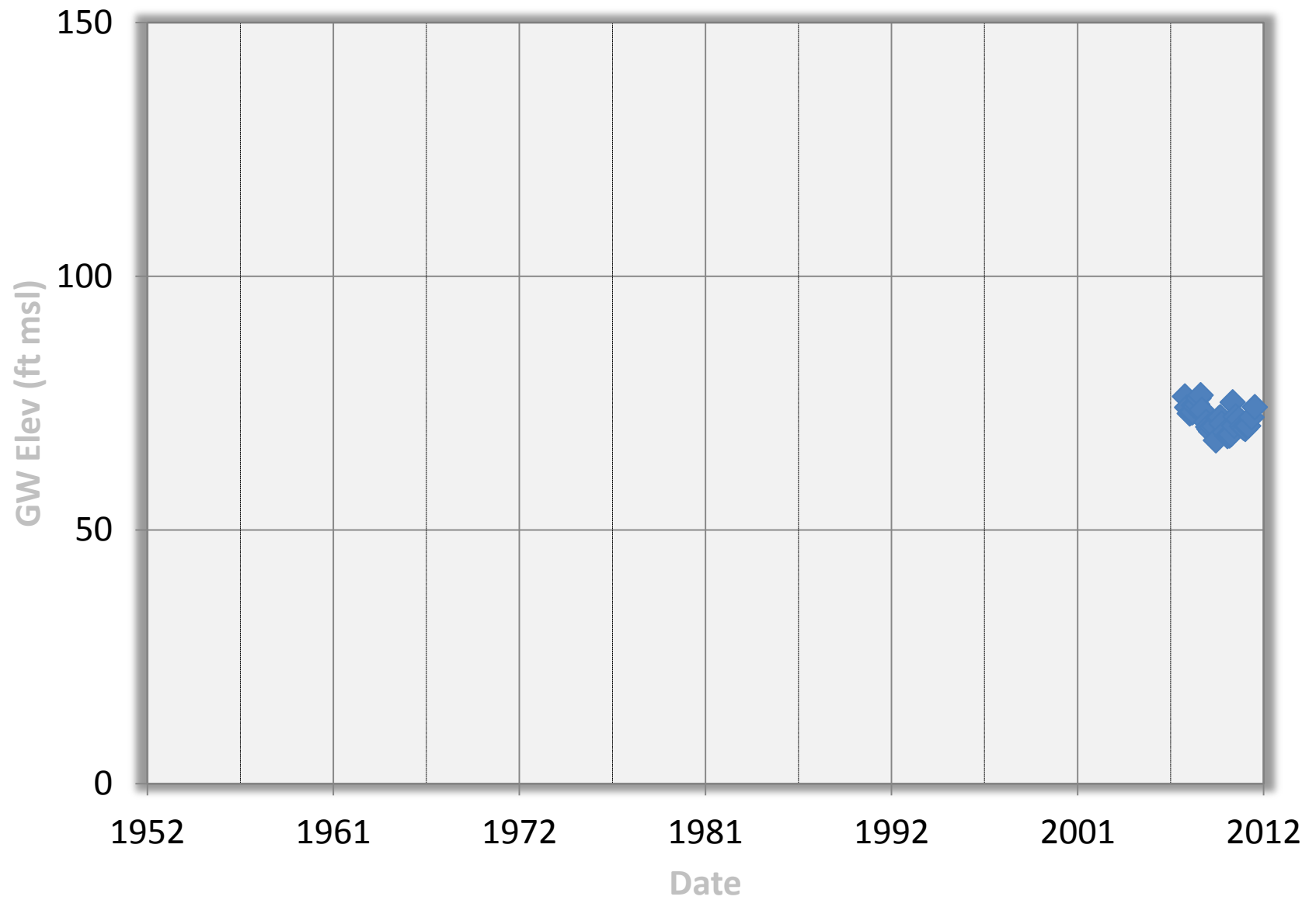
Berryhill-Kaiser



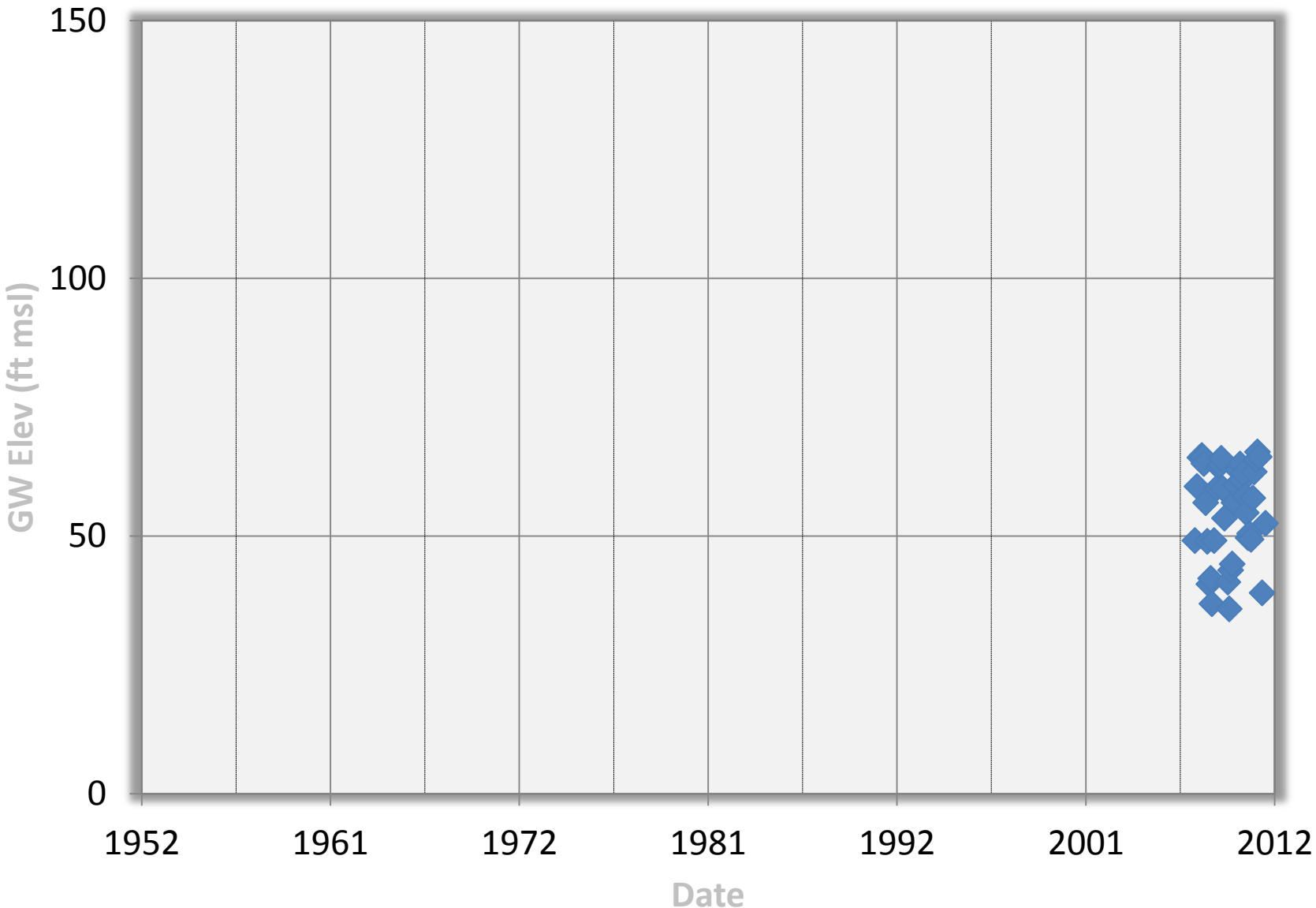
McKenzie-Davis



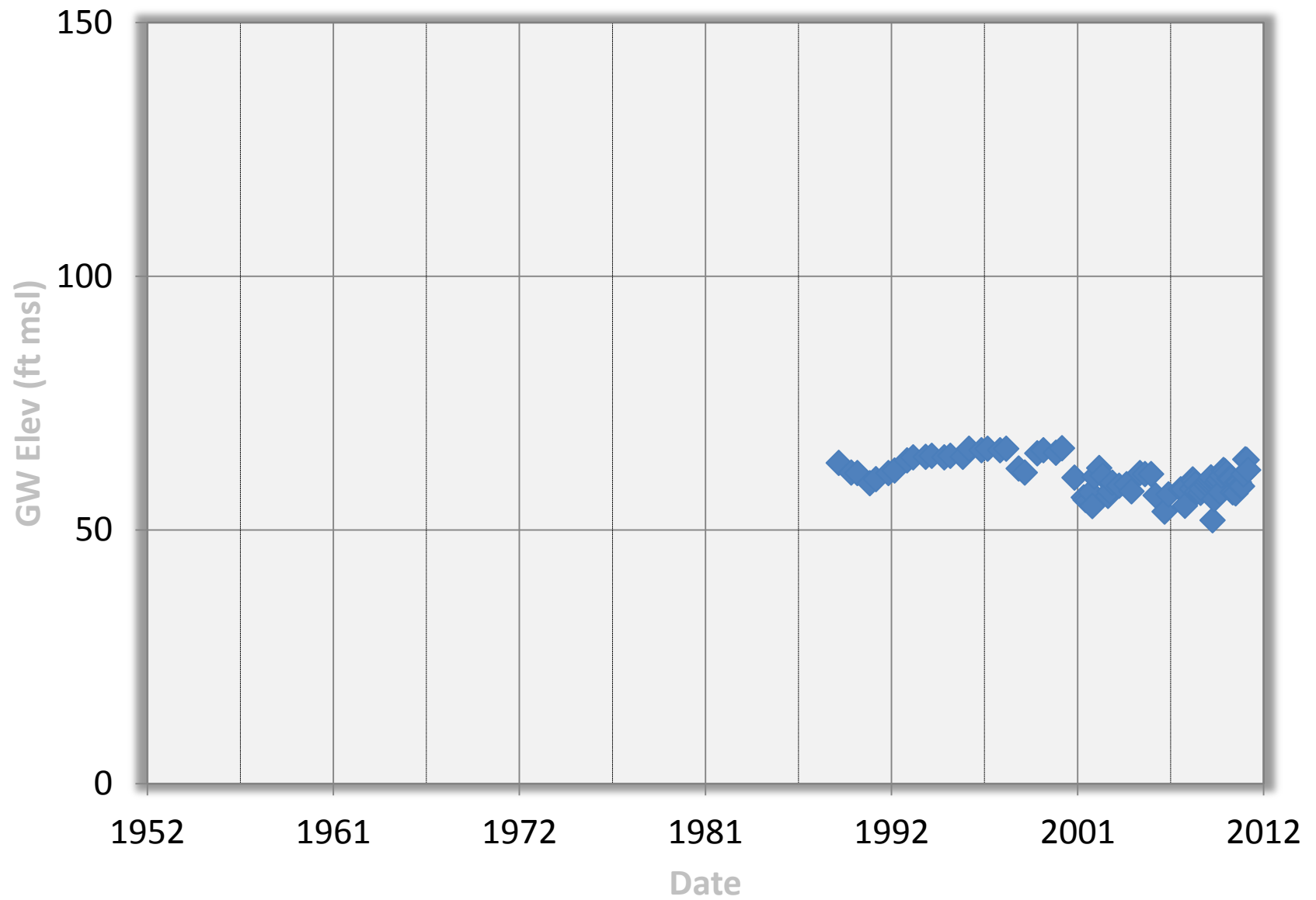
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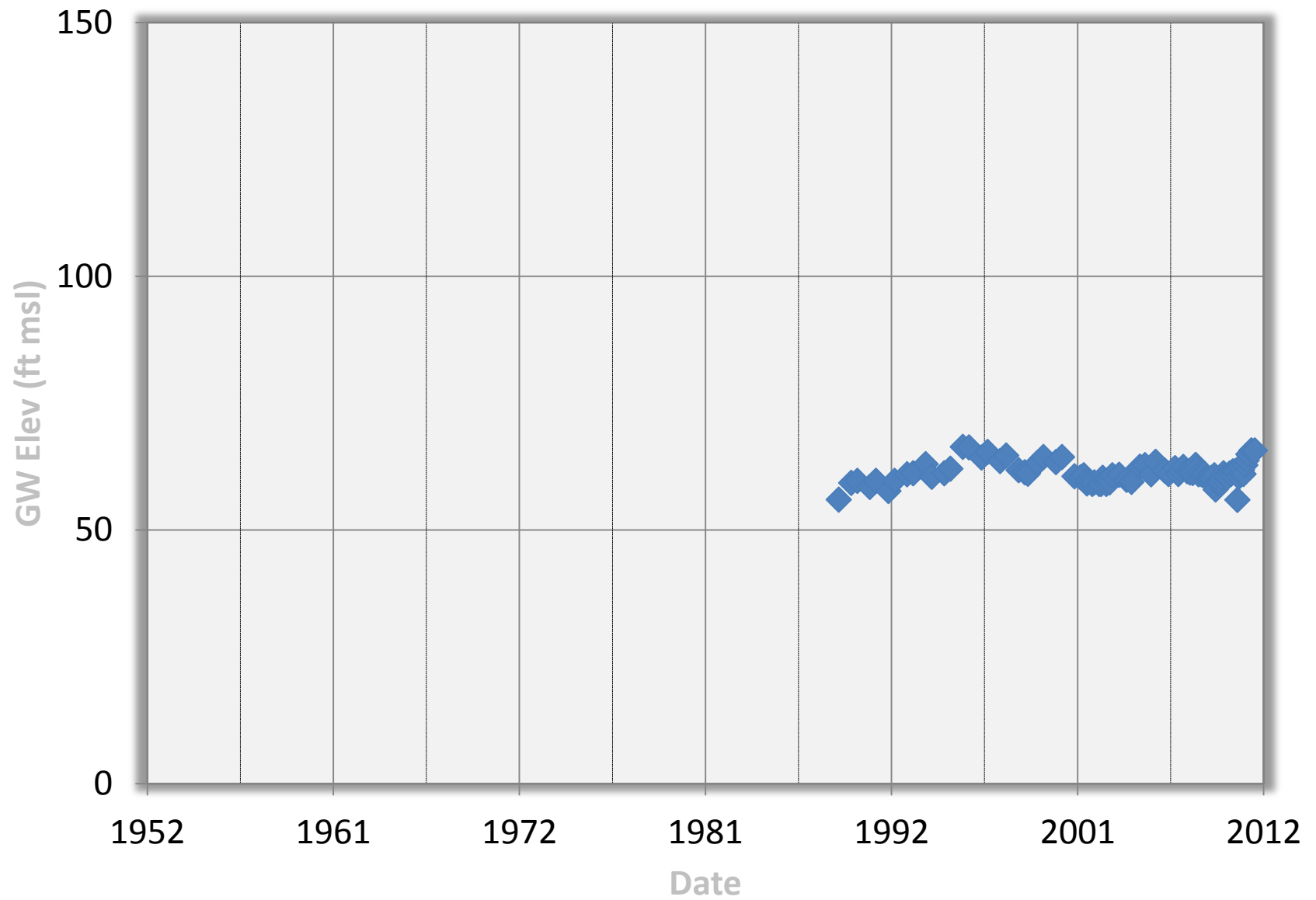
Johnson-Turner



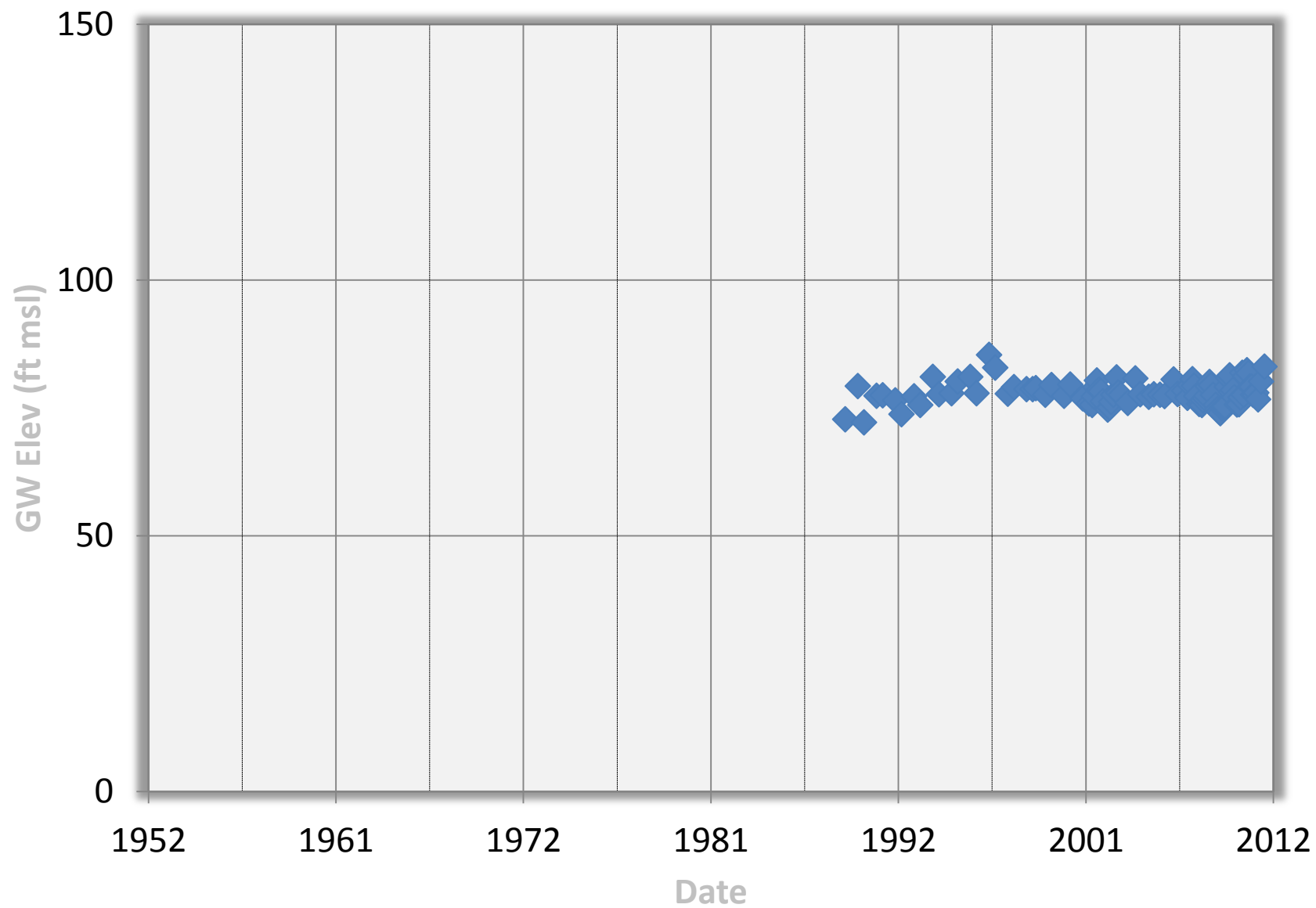
TID 83 / TGWB 005



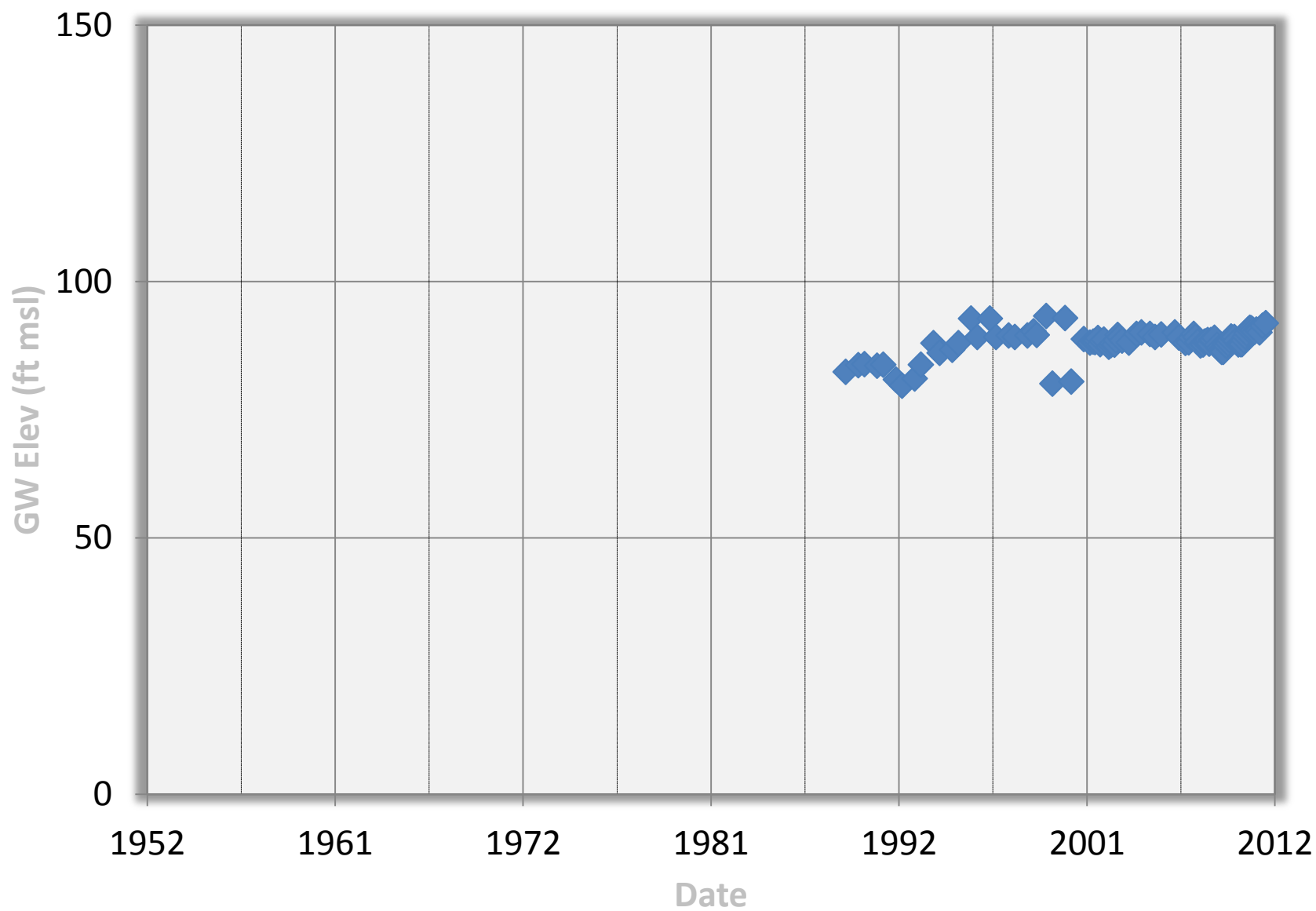
A. Bettencort



Lateral 8 #6



TID 303 / TGWB 006



Ferreira

