

## MEMORANDUM

To: Wyandotte Creek GSA Advisory Committee (WAC)  
From: Larry Walker Associates  
Date: November 6, 2025  
Subject: Groundwater Levels

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### Background

The Wyandotte Creek GSP was approved by DWR in July 2023. As part of its review, DWR recommended corrective actions (RCAs). DWR suggested incorporating any improvements resulting from the RCAs into a future update of the GSP. The Wyandotte Creek GSA received funding through the SGM Round 2 grant to support this work, including monitoring network improvements, updating the domestic well data inventory, developing the GSP periodic evaluation and amendments. DWR's RCAs, specifically related to groundwater levels, with proposed responses and amendments to the GSP are summarized below.

### Reponses to DWR's RCAs

The following section summarizes proposed responses to DWR's RCAs.

#### RCA Item 1

1. The non-dry year condition in the undesirable result definition does not offer adequate protection, options are to either:
  - a. Revise the definition to remove the non-dry year condition, or
  - b. Discuss how extractions and recharge will be managed to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other periods.

**It is recommended to remove the non-dry condition from the undesirable result definition.**

## RCA Item 2

2. Quantify the number of domestic wells impacted at minimum thresholds.

The number of domestic wells impacted at current and potential minimum thresholds were estimated based on the following process:

- Compiled / reviewed Well Completion Reports from DWR's Online System for Well Completion Reports (OSWCR) database.
- Removed domestic wells drilled prior to 1980 since wells are likely abandoned or beyond their useful life.
- Removed domestic wells within public water supplier service areas (e.g., Cal Water, TWSD, and SFWPA).
- Updated groundwater level representative monitoring site (RMS) network and defined zones for each RMS well. The selected RMS wells are provided in Attachment B.
- Quantified the number of domestic wells at risk of going dry at current and potential minimum thresholds for each zone using the updated domestic well inventory. The depth of each domestic well, in this case was assumed to be the shallower of:
  - Estimated pump elevation (e.g., bottom of well elevation plus 10 feet).
  - The bottom elevation of the well's deepest perforated interval.

Staff / consultant team recommend proceeding with the updated RMS network and refining MTs based on the updated domestic well risk assessment.

It is recommended to set MTs based on the deeper of two criteria:

- Criterion 1: Set at the 5th to 15th percentile of nearby shallow domestic wells; AND
- Criterion 2: Set to a specified distance below the historic low: the distance is either the range of historically measured groundwater levels or 20 feet, whichever is shallower.

Staff / consultant team is requesting that the WAC provide input on what domestic well protection target should be used in Criterion 1 (e.g., 5<sup>th</sup> to 15<sup>th</sup> percentile). Table 1 summarizes the estimated mitigation costs at different domestic well protection targets. Mitigation costs are based on deepening dry wells if groundwater levels drop to the minimum thresholds. It is assumed to cost \$30,000 to deepen a well.

**Table 1. Estimated mitigation costs.**

MT Approach	Number of Dry Wells	Mitigation Cost at MTs
Current MTs	53 (or 15%)	\$1.59 million
5 <sup>th</sup> Percentile Dry	38 (11%)	\$1.14 million
10 <sup>th</sup> Percentile Dry	46 (13%)	\$1.38 million
15 <sup>th</sup> Percentile Dry	56 (or 16%)	\$1.68 million

**Results are further summarized in Attachments A, B, and C including hydrographs for all the proposed RMS wells with potential MTs.**

**Attachment D summarizes SMC approaches used by other subbasins in the Sacramento Valley. This approach is similar to Butte Subbasin.**

3. Evaluate how proposed MTs impact other beneficial uses and users (public/small water systems, environmental uses, etc.) and sustainability indicators (storage, subsidence, ISW, etc.)

**As described previously, the proposed MTs for groundwater levels are set to minimize risks to domestic wells. Furthermore, a separate RMS network will be established and expanded over the GSP implementation period to assess and protect other beneficial users including interconnected surface waters (ISW) and groundwater dependent ecosystems (GDE). The new groundwater level monitoring wells and stream gages within the Subbasin (expected to be installed by early-2026) will allow the GSA to further assess and minimize impacts for all beneficial uses and users across the Subbasin. Information from the newly installed monitoring sites will be incorporated into the 2032 GSP Periodic Evaluation.**

## **Next Steps and Advisory Committee Input**

GSA staff / consultant team are requesting WAC recommendations on the following items:

- Proceed with the proposed response to DWR’s RCA 1 for groundwater levels.
- Proceed with the updated groundwater level RMS network and zones.
- Select dry well protection target (5%, 10%, or 15%) based on estimated mitigation cost.
- Proceed with the proposed response to DWR’s RCA 3 for groundwater levels.

## **Attachments**

Attachment A: PowerPoint Presentation

Attachment B: Groundwater Monitoring Network & Representative Monitoring Sites

Attachment C: Groundwater Hydrographs

Attachment D: Sacramento Valley Groundwater Level SMC

# Groundwater Level

Prepared by

The LWA Team in coordination with the Wyandotte Creek GSA

Funding provided by the California Department of Water Resources

November 6, 2025



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*Wyandotte Creek*  
GROUNDWATER SUSTAINABILITY  
AGENCY



**LWA**  
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science | policy | solutions

## Agenda

- Today's Sustainability Indicator: **Groundwater Levels**
  - Groundwater Levels in the 2022 Wyandotte Creek GSP
  - DWR's Recommended Corrective Actions
  - Domestic Well Inventory
  - Domestic Well Risk Assessment
  - Groundwater Level Monitoring Network
    - Representative Monitoring Site (RMS) Wells
  - Approach for Groundwater Level SMC
- **Request for Feedback**

# Current Monitoring Network & SMCs

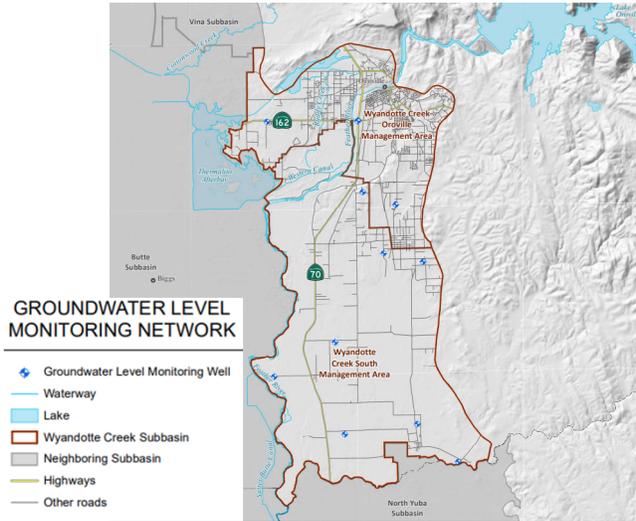
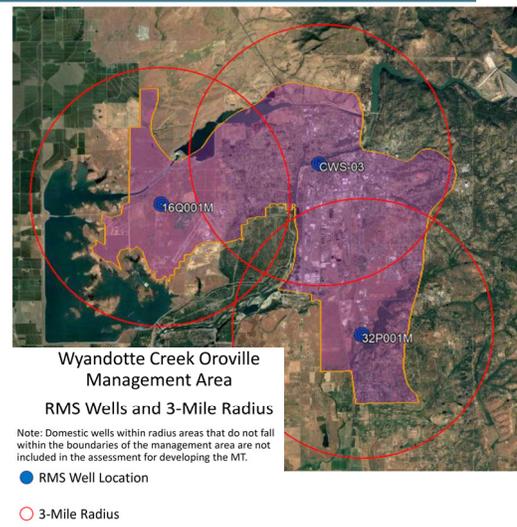
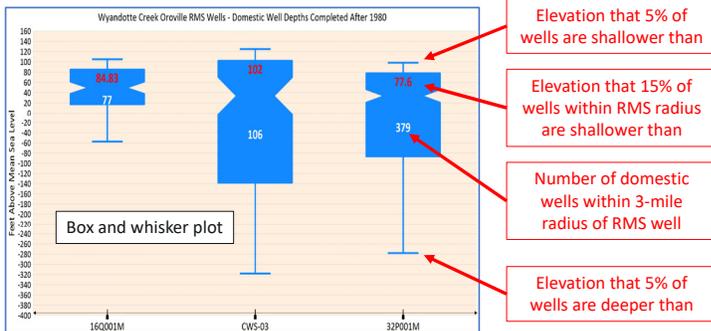


Table 3-1: Groundwater Levels Sustainable Management Criteria by Representative Monitoring Site in Feet Above Mean Sea Level

RMS Well ID	MT	MO	IM		
			2027	2032	2037
Wyandotte Creek Subbasin – Oroville Management Area					
16Q001M	85	133	134	133	133
32P001M	78	107	108	106	106
CWS-03	102	133	135	132	132
Wyandotte Creek Subbasin – South Management Area					
13B002M	35	47	48	46	46
09N002M	35	49	51	47	47
25N001M	37	52	53	52	52
08M001M	59	86	87	85	85
16C001M	71	95	96	95	95
31F001M	76	99	101	98	98

# Groundwater Levels – Current MTs

- Undesirable results occur when two RMS wells within a management area reach their MT for two consecutive **non-dry year-types**.
- MTs set for each RMS well based on bottom elevations of nearby domestic wells to ensure that **85% of domestic wells** are protected from going dry.

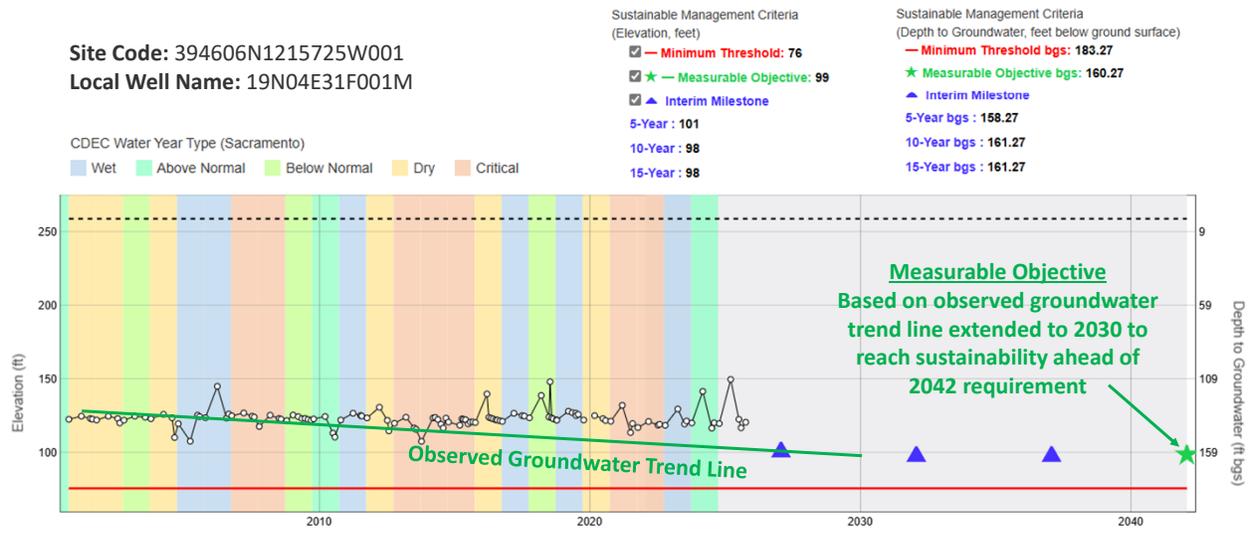


Wyandotte Creek Oroville Management Area  
RMS Wells and 3-Mile Radius

Note: Domestic wells within radius areas that do not fall within the boundaries of the management area are not included in the assessment for developing the MT.  
● RMS Well Location  
○ 3-Mile Radius

## Groundwater Levels – Current SMCs

Site Code: 394606N1215725W001  
Local Well Name: 19N04E31F001M



## Groundwater Levels – DWR Corrective Actions

1. The non-dry year condition does not offer adequate protection, options are to:
  - I. Revise the definition of undesirable results to remove the non-dry year condition, or
  - II. Discuss how extractions and recharge will be managed to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other periods.
2. Quantify the number of domestic wells impacted at MTs.
3. Evaluate how proposed MTs impact other:
  - I. Beneficial uses and users (public/small water systems, environmental uses, etc.)
  - II. Sustainability indicators (storage, subsidence, ISW, etc.)

## DWR's Recommended Corrective Action

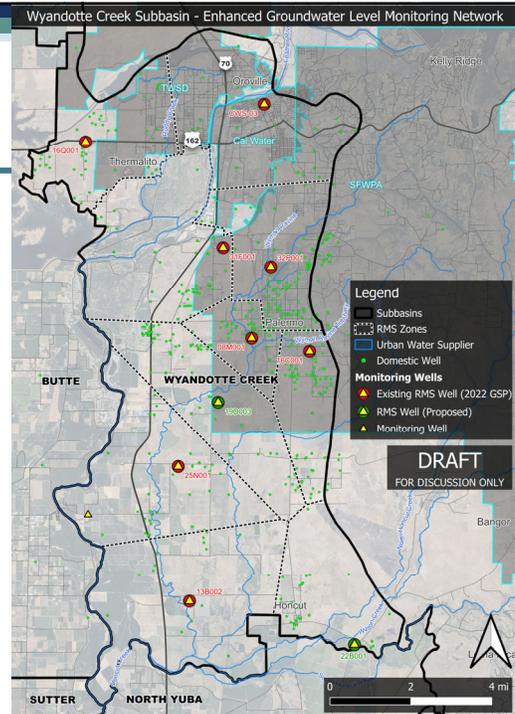
RCA	Suggested Response	Timeline
1. The non-dry year condition does not offer adequate protection, options are to: <ol style="list-style-type: none"> <li>I. Revise the definition of undesirable results to remove the non-dry year condition, or</li> <li>II. Discuss how degradation during dry periods will be managed as necessary to ensure that adverse water quality conditions are offset during other periods.</li> </ol>	Remove non-dry year condition	January 2026

## DWR's Recommended Corrective Action

RCA	Suggested Response	Timeline
2. Quantify the number of domestic wells impacted at MTs.	<ul style="list-style-type: none"> <li>➤ Update RMS network</li> <li>➤ Update the GSA's inventory of domestic wells</li> <li>➤ Complete the domestic well risk assessment to quantify impacts to domestic wells at MTs</li> </ul>	January 2026

## Groundwater Level Monitoring Network Update

- **Goal:** Assess and evaluate the impact from declining GWL on all wells, including domestic and irrigation wells
- 10 RMS Locations Proposed
  - 8 from the original network
  - 2 added based on site selection process
- Selected to be representative of:
  - Domestic wells
  - Upper and lower aquifer conditions (similar to irrigation wells)



## Proposed Groundwater Levels SMC



- **Undesirable Results** – Two RMS wells within a management area reach their MT for two consecutive years. (remove dry year criteria)
- **Measurable Objective (MO) / Interim Milestone (IM)** – No Change
- **Minimum Threshold (MT)** – MTs are set to deeper value based on:
  - Criterion 1: Set at the 5th to 15th percentile of nearby shallow domestic wells; **AND**
  - Criterion 2: Set to a specified distance below the historic low: the distance is either the range of historically measured groundwater levels or 20 feet, whichever is shallower.

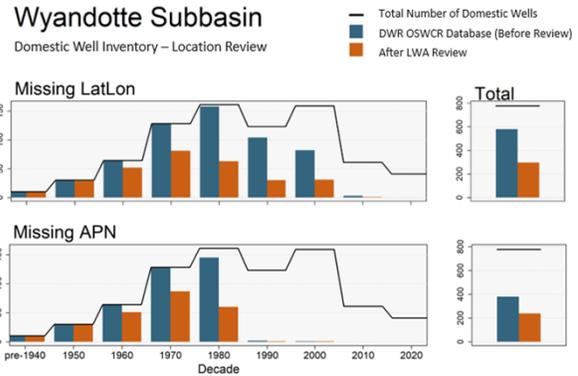
*\*\*MT uses similar approach as Butte Subbasin to support inter-basin coordination and use similar approaches across the County.*

# Domestic Well Inventory

- Goal: Develop an inventory of all active domestic wells (and their depths) within the Wyandotte Creek Subbasin.
- The following information was collected using DWR's OSWCR database (as feasible):
  - Drill / completion depth of well,
  - Location,
  - Screened interval(s),
  - Pump depth,
  - Age / status (e.g., active vs abandoned),
  - Water level,
  - Number of domestic wells per parcel, &
  - Other well specifications.

Reviewed WCRs to identify domestic well locations:

- Before: ~75% missing location
- After: ~39% missing location

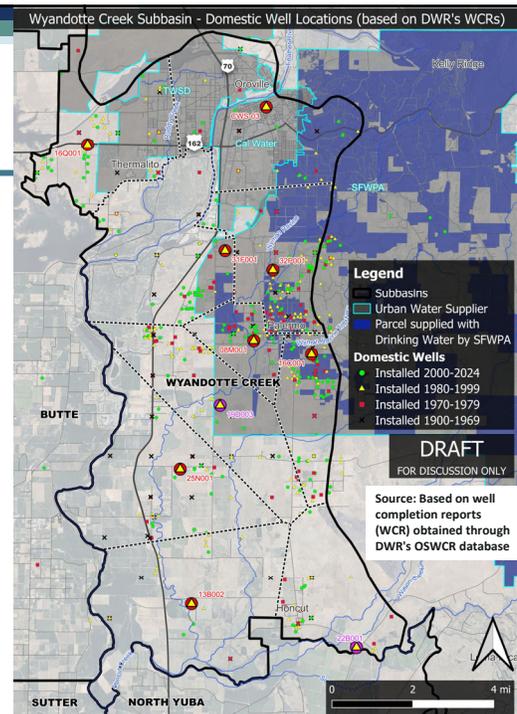


# Domestic Well Inventory – Updated Well Locations

- Map shows updated domestic well locations
- 482 wells (61%) have parcel information
- 303 (39%) wells assigned to centroid of PLSS section (1-mile by 1-mile area)

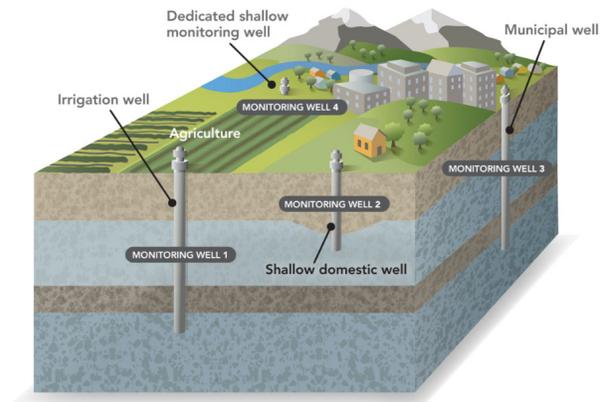
Year Installed	Number of WCRs <sup>1</sup>	Well Depth Range
1900 – 1969	108	25' – 440'
1970 – 1979	129	44' – 350'
1980 – 1999	287	48' – 575'
2000 – 2024	261	14' – 990'
<b>Total<sup>2</sup>:</b>	<b>785</b>	

1. WCR = Well Completion Report  
 2. Totals exclude 7 wells that did not contain installation date



## Domestic Well Risk Assessment

- Goal: Identify domestic wells at risk of groundwater levels drop, and use this information to evaluate impacts to set Minimum Threshold (MT)
  - Supporting information for consideration of Sustainable Management Criteria (SMC) amendments
- Use list of all active domestic wells that shows:
  - How deep the well was drilled
  - Where the well is located
  - Elevation of ground surface at the well location
  - Historical groundwater elevations in the area



## Domestic Well Risk Assessment Assumptions

- Total number of WCRs in Wyandotte Creek = 792 domestic wells.
- Groundwater elevations measured at each RMS well are representative across the RMS zone.
- Removed 31 domestic wells with estimated bottom elevations above historical minimum groundwater levels.
- Excluded all domestic wells within public water supplier service areas.
  - 8 wells from California Water Company – Oroville
  - 25 wells from Thermalito Water & Sewer District
  - 135 wells from South Feather Water & Power Agency (including newly annexed domestic parcels)
- Assumed all wells pre-1980 are no longer in use (i.e. past useful life).
  - Excluded 237 wells installed prior to 1980
- 360 total domestic wells included in risk assessment.

# Criterion 1: Set to Protect Domestic Wells

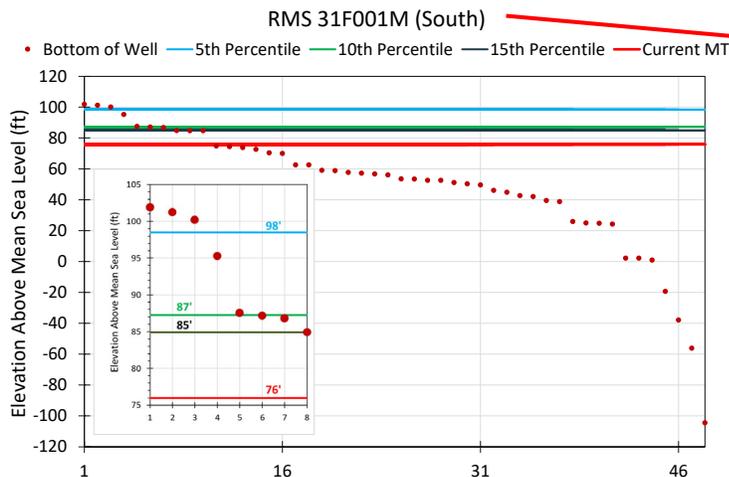
Table 1. Estimated impacts to dry wells based on protection target (e.g., 5th, 10th, or 15th percentiles).

RMS	Current MT	Domestic Well Count	Historical Low	Trend (ft/yr)	5% of Domestic Wells Dry			10% of Domestic Wells Dry			15% of Domestic Wells Dry		
					Potential MT	Low to GWL (ft)	Years to MT	Potential MT	Low to GWL (ft)	Years to MT	Potential MT	Low to GWL (ft)	Years to MT
16Q001M	85	41	131.3	0.07	108	23	-	97	34	-	94	38	-
32P001M	78	64	108.8	-0.19	103	6	30	95	14	70	87	22	>100
CWS-03	102	1	114	0.11	-83	-	-	-83	-	-	-83	-	-
31F001M	76	48	108.1	-0.11	98	10	80	87	21	>100	85	23	>100
25N001M	37	23	46.3	-0.44	25	22	50	16	30	70	10	36	80
19D003M	-	59	53.2	-2.35	44	9	4	40	14	6	34	19	8
13B002M	35	14	42.2	-0.28	11	31	>100	9	33	>100	9	33	>100
22B001M	-	32	49.8	-0.96	48	2	2	42	8	8	39	11	10
16C001M	71	74	94.4	-0.59	70	24	40	63	31	50	60	35	60
08M001M	59	35	76.1	-0.05	69	7	>100	62	14	>100	55	21	>100

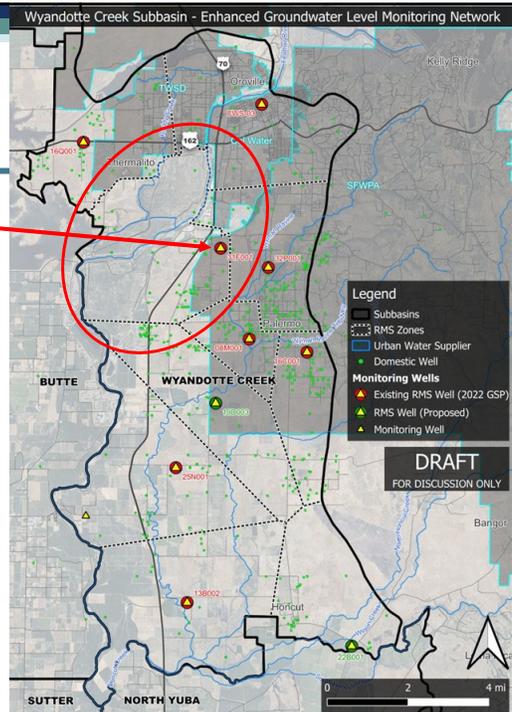
Notes:

- 1.) The MT for RMS CWS-03 will be set using criterion 2 due to only having 1 domestic well in the RMS zone.
- 2.) The MT for RMS wells with a potential MT above (or near) the historical low will be set using criterion 2 (e.g., 32P001M, 19D003M, and 22B001M).
- 3.) Green highlighted RMS wells may be set using criterion 1 (assuming deeper than resulting MT based on criterion 2)

## Domestic Well Risk Assessment Results



\*Domestic well ground surface elevations used to determine bottom of well elevations; in 2022 GSP, domestic well elevations were assumed same as RMS well elevation



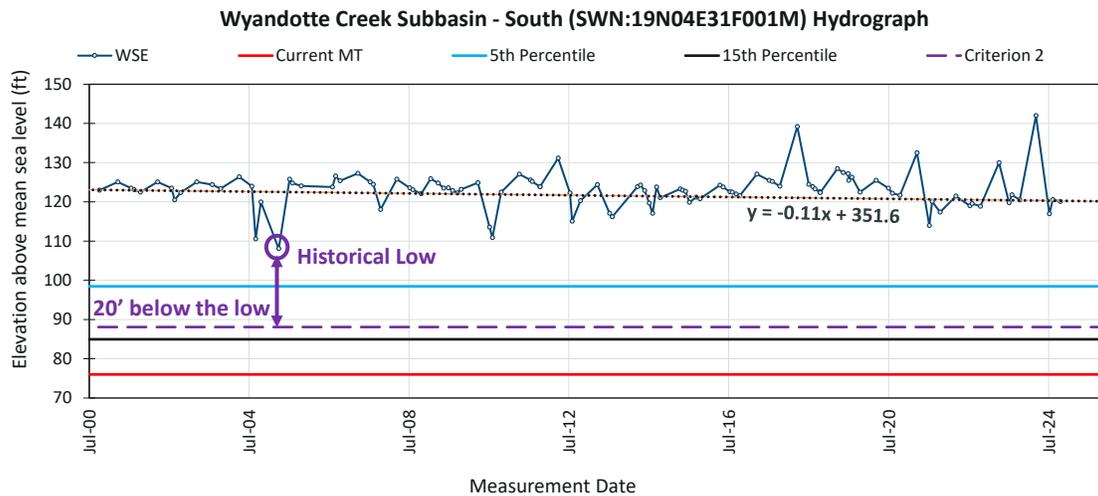
## Criterion 2: Set to Ensure Operational Flexibility

**Table 1. Summary of Potential MTs expressed as feet above mean sea level (using Criterion 2).**

RMS	Current MT	Historical Minimum	Potential MT (Historical Minimum minus 20 feet)	Range of Historically Measured GW Levels, feet	Potential MT (Historical Minimum Minus Range)
16Q001M	85	131.3	111.3	131.3 – 140.4 (9.1)	122.2
32P001M	78	108.8	88.8	109 – 153 (44)	64.8
CWS-03	102	114.0	94.0	114 – 139 (25)	89.0
31F001M	76	108.1	88.1	108 – 150 (42)	66.1
25N001M	37	46.3	26.3	46 – 80 (34)	12.3
19D003M	N/A	53.2	33.2	55.5 – 90.5 (35)	18.2
13B002M	35	42.2	22.2	42.2 – 69.1 (26.9)	15.3
22B001M	N/A	49.8	29.8	49 – 108 (59)	-9.2
16C001M	71	94.4	74.4	94.3 – 130 (35.7)	58.7
08M001M	59	76.1	56.1	81.2 – 120 (38.8)	37.3

Note: potential MTs are highlighted in green (selected as the shallower value of historical minimum minus 20 feet and historical minimum minus range); set to the deepest value between criterion 1 and 2 to ensure operational flexibility.

## Domestic Well Risk Assessment Results: Hydrograph Example



## Domestic Well Mitigation Cost

**Table 1. Summary of domestic well impacts adjusting threshold used in Criterion 1.**

MT Approach	Number of Dry Wells	Mitigation Cost at MTs
Current MTs	53 (or 15%)	\$1.59 million
5 <sup>th</sup> Percentile Dry	38 (11%)	\$1.14 million
10 <sup>th</sup> Percentile Dry	46 (13%)	\$1.38 million
15 <sup>th</sup> Percentile Dry	56 (or 16%)	\$1.68 million

**Assumptions:**

- 1.) MT approach changes the criterion 1 dry well threshold only; includes criterion 2 to ensure operation flexibility. Estimated number of dry wells is more than the percentile due to criterion 2 which ensures operational flexibility.  
 2.) Mitigation costs assume \$30,000 per well to deepen.

## DWR's Recommended Corrective Action

RCA	Response	Timeline
3. Evaluate how proposed MTs impact other: <ul style="list-style-type: none"> <li>○ Beneficial uses and users (public/small water systems, environmental uses, etc.)</li> <li>○ Sustainability indicators (storage, subsidence, ISW, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reviewed RMS network</li> <li>➤ Updated Groundwater Level Monitoring network</li> <li>➤ New wells to be drilled in strategic locations to fill data gaps in Groundwater Level and ISW Monitoring Networks</li> </ul>	February 2026

## WAC Requested Input and Potential Recommendations

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- Proceed with the proposed response to DWR's RCA 1 for groundwater levels.
- Proceed with the updated groundwater level RMS network and zones.
- Select dry well protection target (5%, 10%, or 15%) based on estimated mitigation cost.
- Proceed with the proposed response to DWR's RCA 3 for groundwater levels.

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Discussion

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Appendix B  
Groundwater Monitoring Network & Representative Monitoring Sites

# Groundwater Level Monitoring Network Wells

Management Area	Well ID	SWN	Well Use	Aquifer Category	Drill Depth	Date of First Meas.	RMS?
Oroville	32P001M	19N04E32P001M	Residential	shallow	150	8/29/1959	Yes
	16Q001M	19N03E16Q001M	Residential	shallow	120	10/3/2000	Yes
	CWS-03		Public Supply	shallow	150	2/1/1978	Yes
	CWS-02		Public Supply	both	340	2/1/1978	No
	CWS-01		Public Supply	shallow	186	2/1/1978	No
South	31F001	19N04E31F001M	Residential	shallow	200	10/3/2000	Yes
	08M001	18N04E08M001M	Irrigation	deep	656	5/2/1961	Yes
	16C001	18N04E16C001M	Irrigation	both	165	10/20/1947	Yes
	19D003	18N04E19D003M	Observation	both	200	6/14/2021	Yes
	25N001	18N03E25N001M	Irrigation	shallow	164	3/9/1976	Yes
	13B002	17N03E13B002M	Irrigation	deep	320	3/20/2001	Yes
	22B001	17N04E22B001M	Residential	shallow	80	3/8/1976	Yes
	09N002	17N04E09N002M	Irrigation	deep	325	3/20/2001	No
	03D001	17N03E03D001M	Irrigation	shallow	179	4/10/1947	No
	19D001	18N04E19D001M	Observation	deep	720	6/14/2021	No
	19D002	18N04E19D002M	Observation	both	570	6/14/2021	No

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## Appendix C

### Groundwater Hydrographs

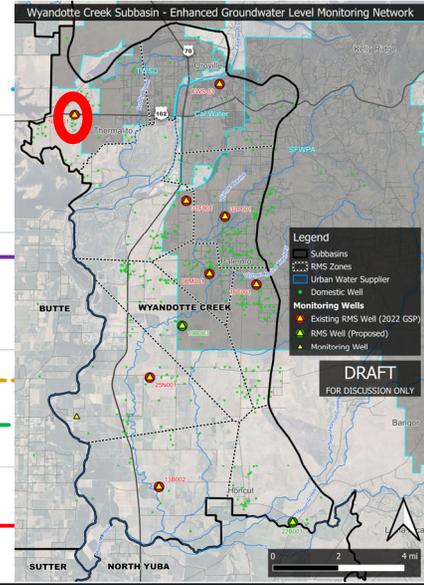
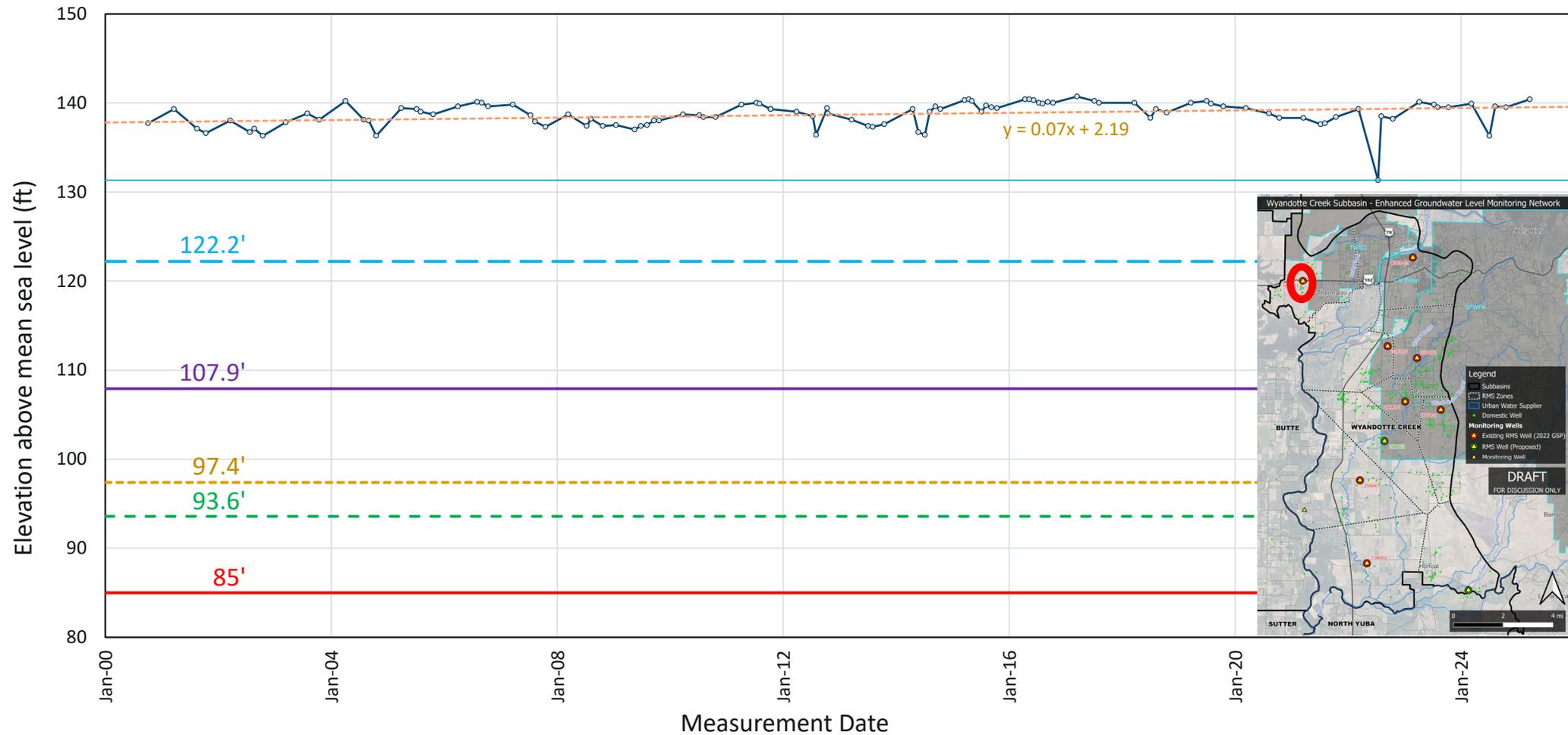
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Criterion 1 Governs @ 5th Percentile

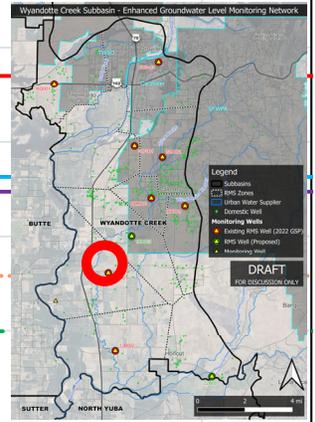
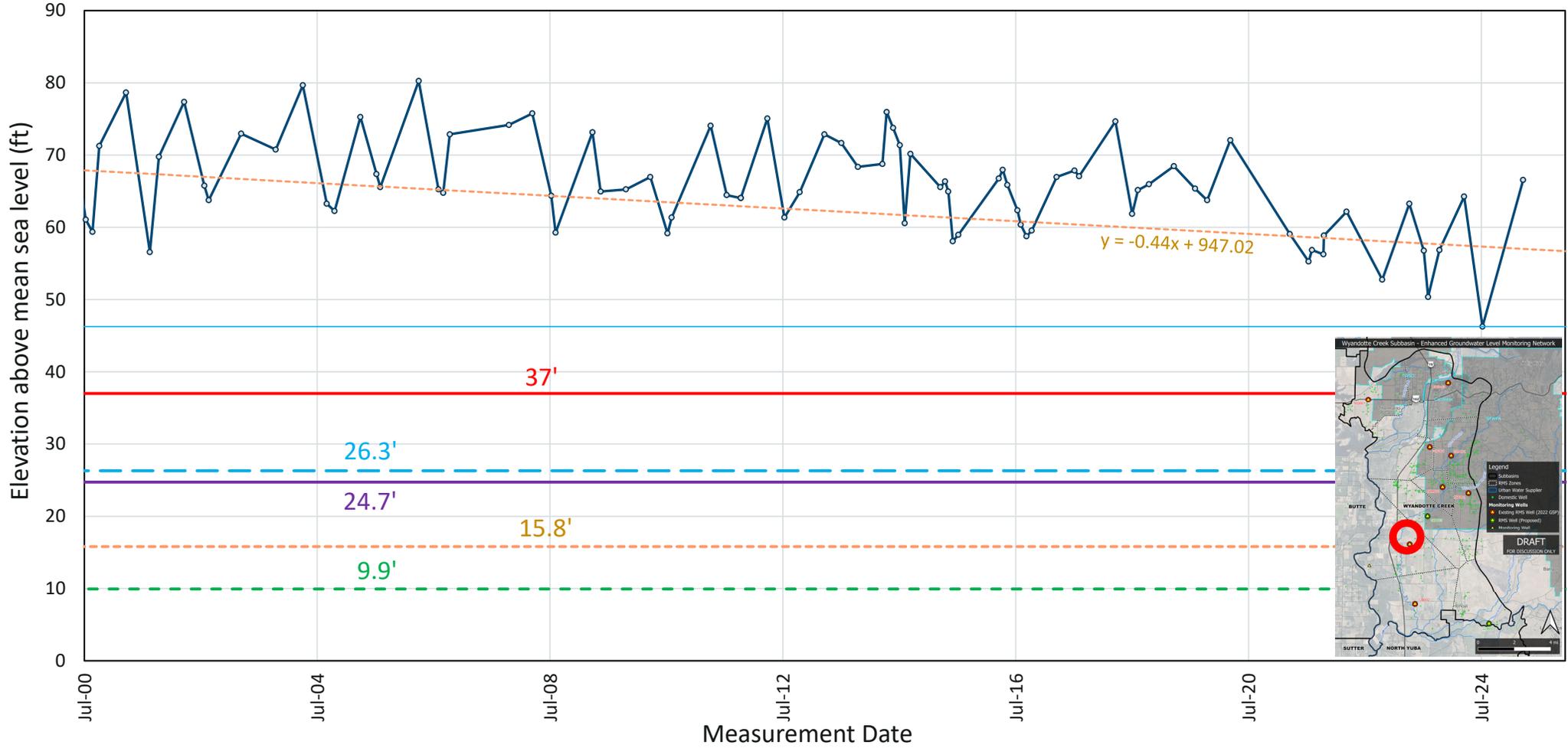
### Wyandotte Creek Subbasin - Oroville (SWN: 19N03E16Q001M) Hydrograph

—○— WSE  
 — Historical Low  
 — Current MT  
 — 5th Percentile  
 - - - 10th Percentile  
 - - - 15th Percentile  
 - - - Criterion 2

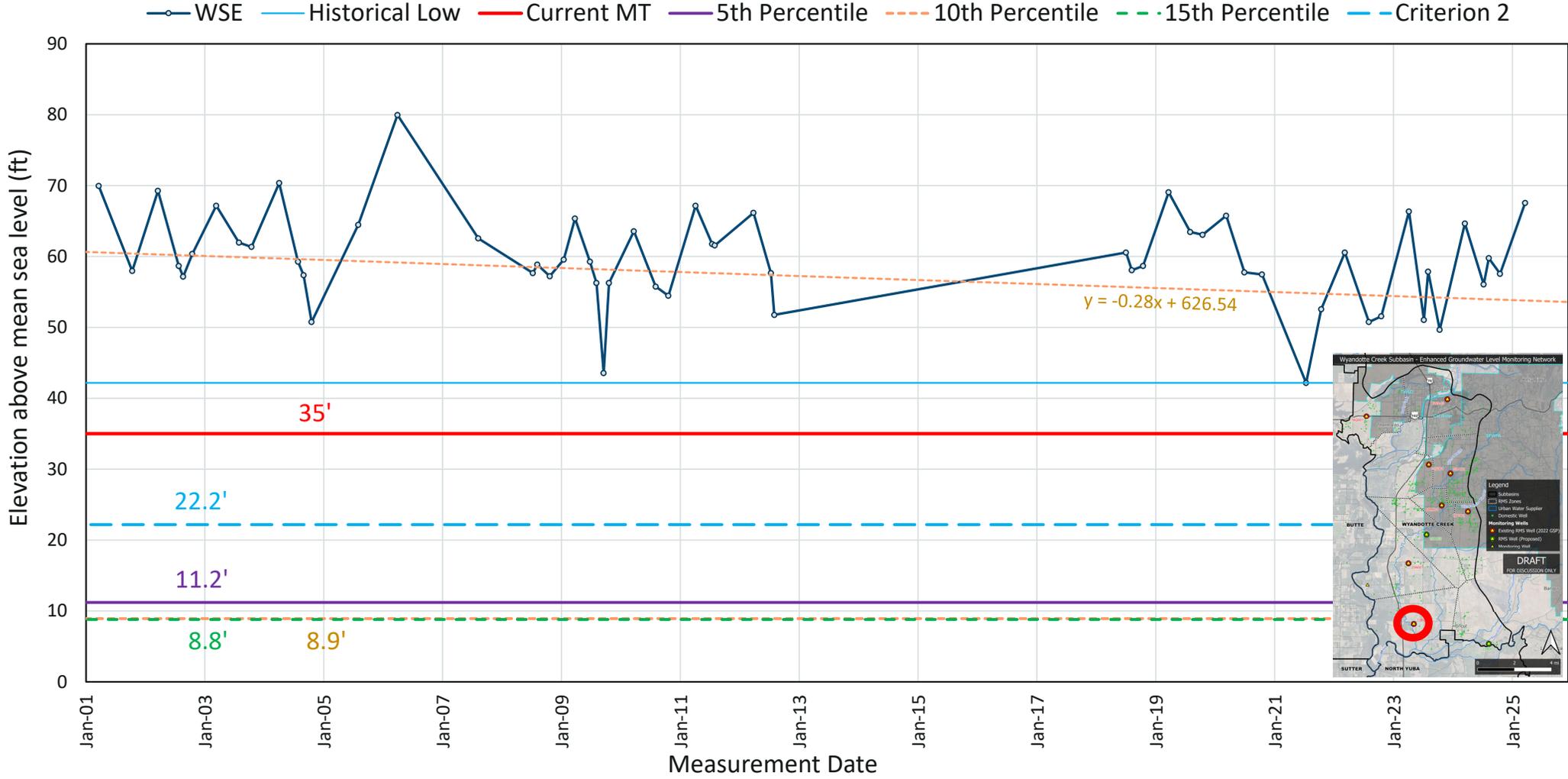


### Wyandotte Creek Subbasin - South (SWN: 18N03E25N001M) Hydrograph

—○— WSE   
 — Historical Low   
 — Current MT   
 — 5th Percentile   
 - - - 10th Percentile   
 - - - 15th Percentile   
 - - - Criterion 2

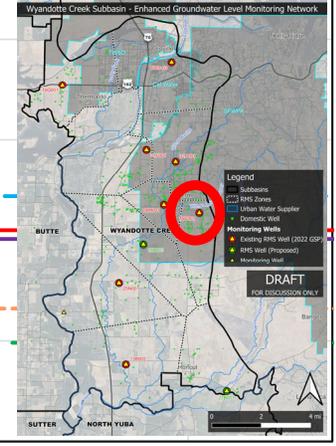
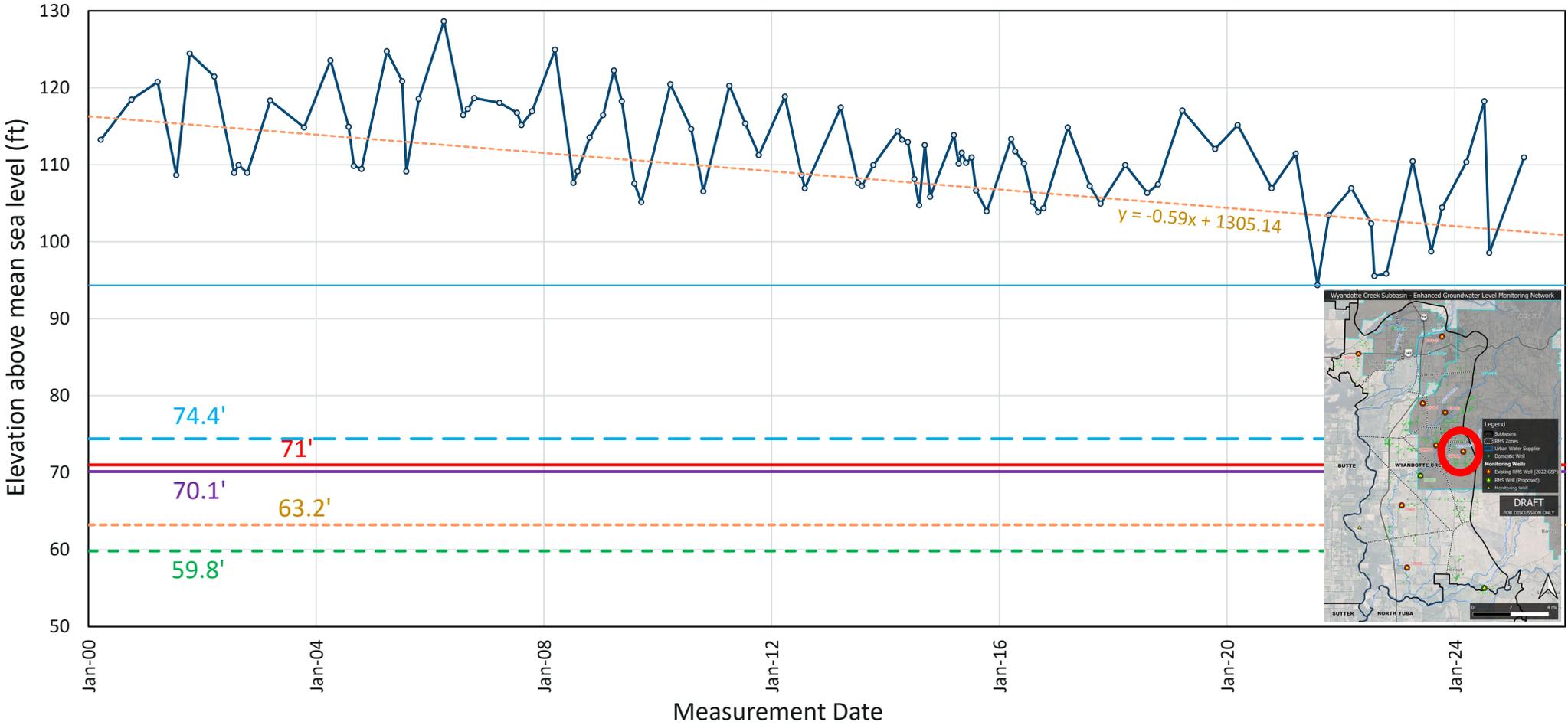


### Wyandotte Creek Subbasin - South (SWN: 17N03E13B002M) Hydrograph



## Wyandotte Creek Subbasin - South (SWN: 18N04E16C001M) Hydrograph

—○— WSE   
 — Historical Low   
 — Current MT   
 — 5th Percentile   
 - - - 10th Percentile   
 - - - 15th Percentile   
 - - - Criterion 2



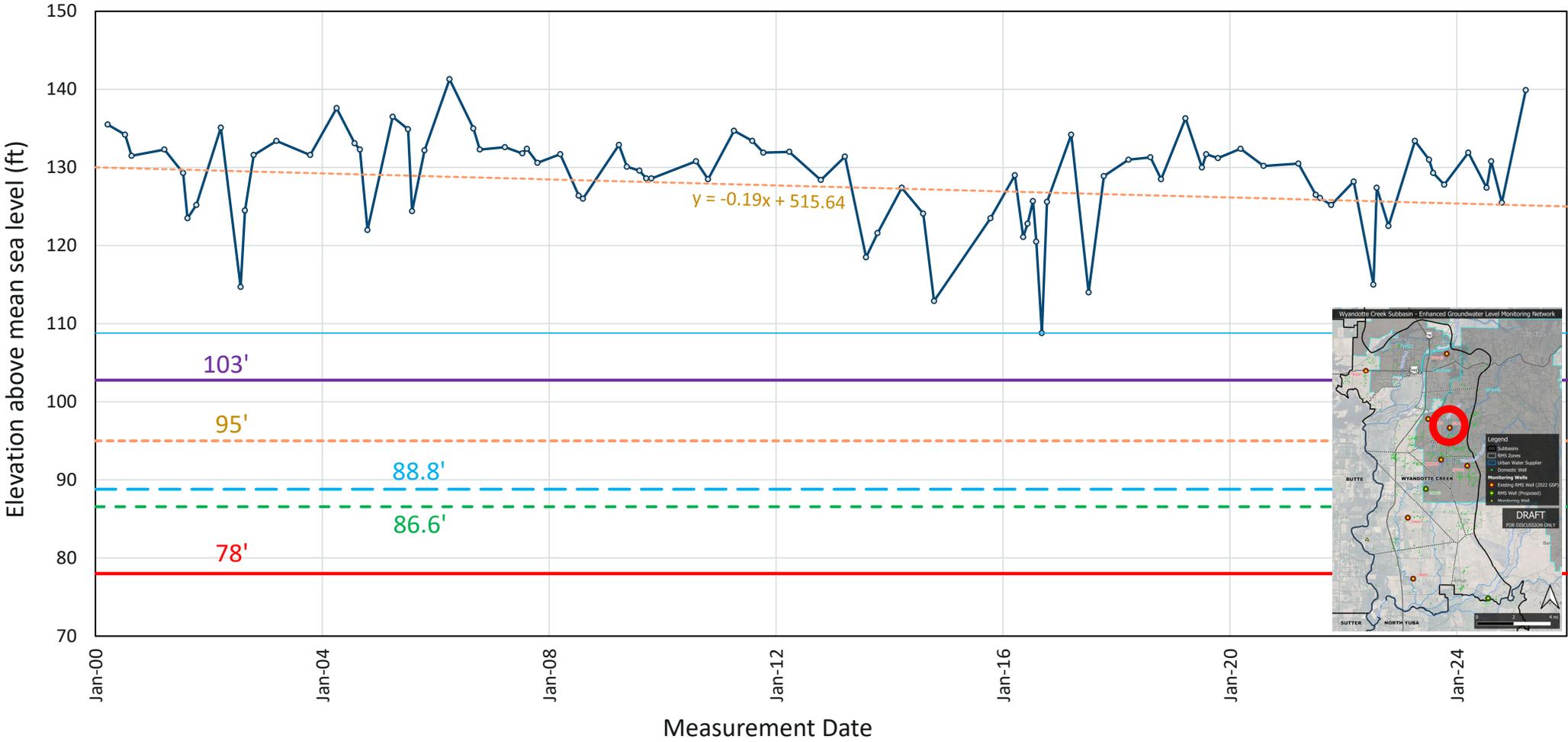
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## Criterion 2 Historical Low minus a Buffer Governs

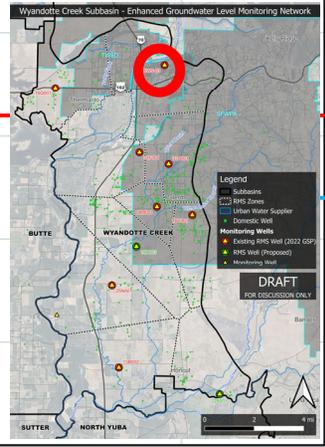
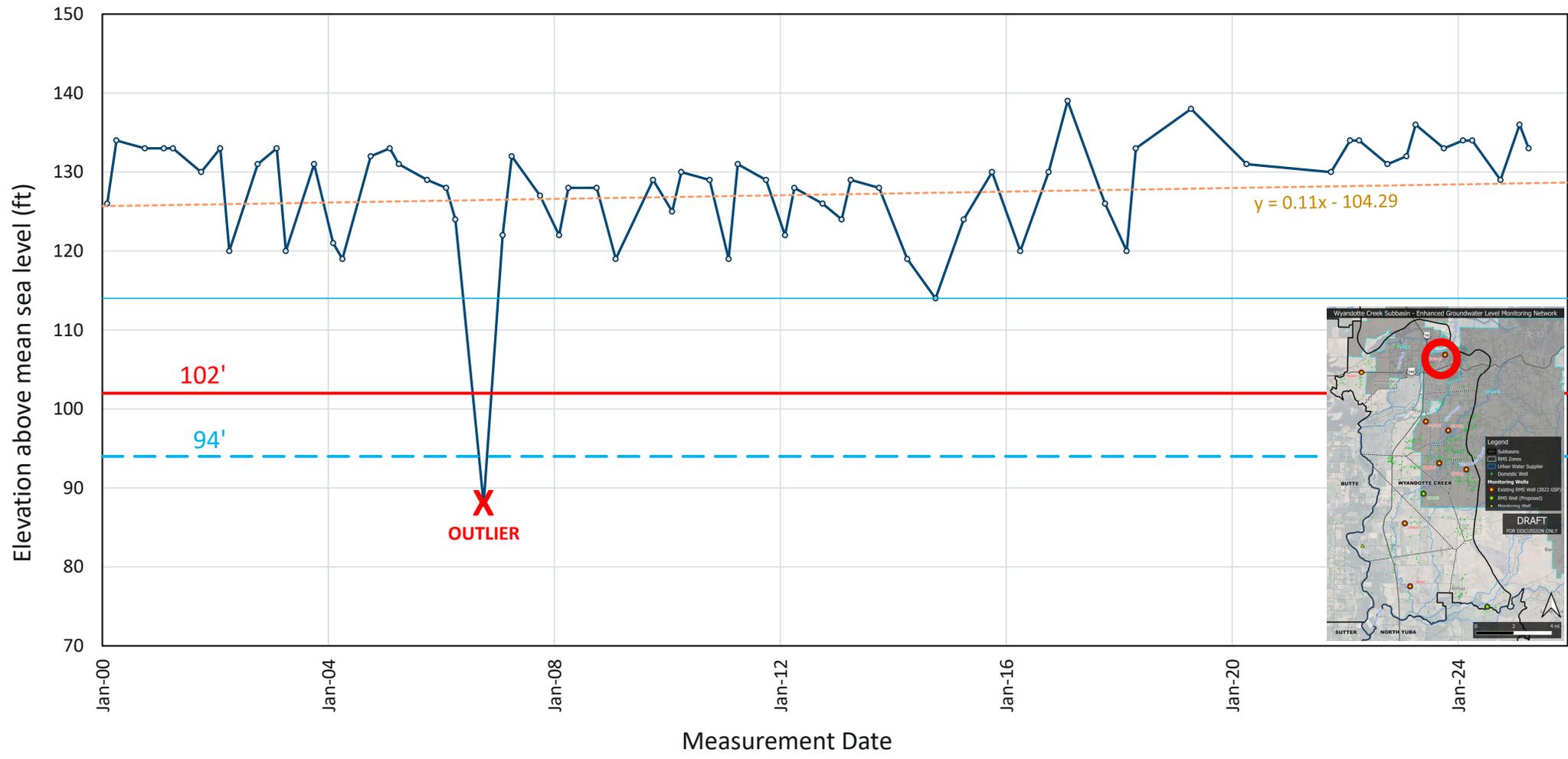
### Wyandotte Creek Subbasin - Oroville (SWN: 19N04E32P001M) Hydrograph

WSE Historical Low Current MT 5th Percentile 10th Percentile 15th Percentile Criterion 2



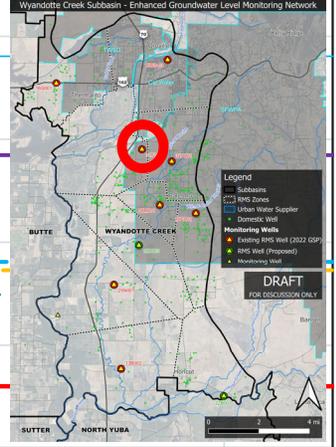
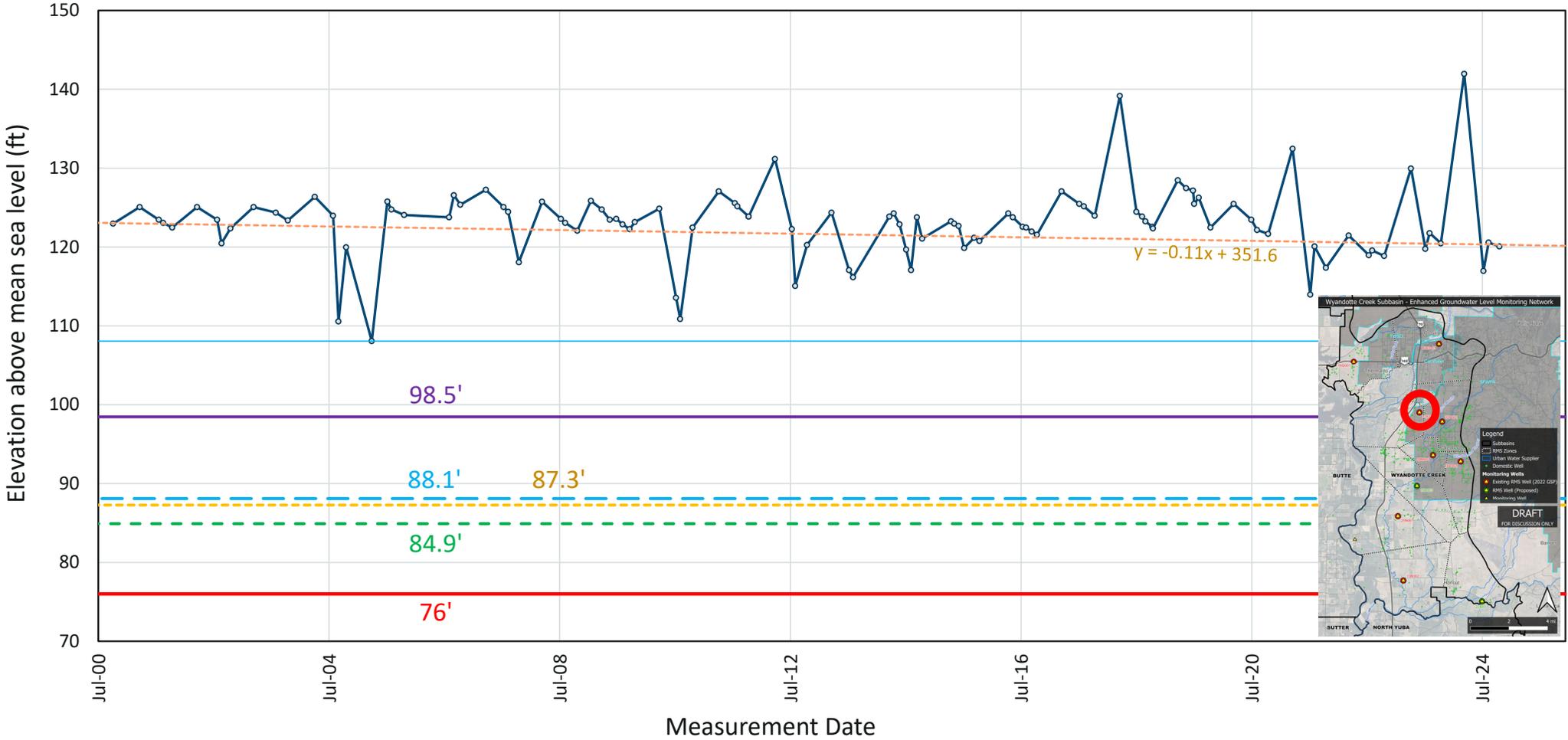
# Wyandotte Creek Subbasin - Oroville (SWN: CWS-03) Hydrograph

WSE      Historical Low      Current MT      Criterion 2

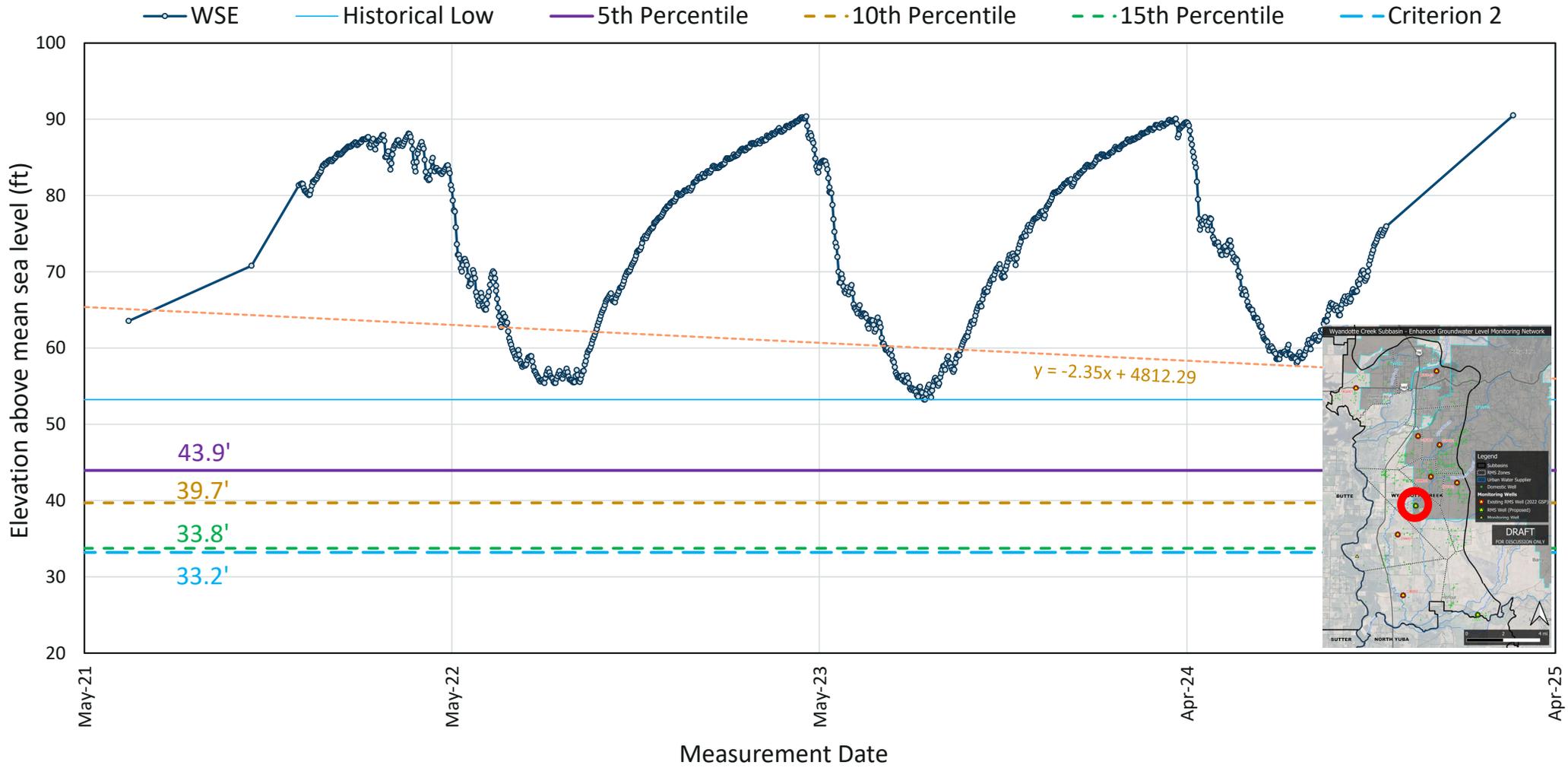


### Wyandotte Creek Subbasin - South (SWN:19N04E31F001M) Hydrograph

—○— WSE  
 — Historical Low  
 — Current MT  
 — 5th Percentile  
 - - - 10th Percentile  
 - - - 15th Percentile  
 - - - Criterion 2

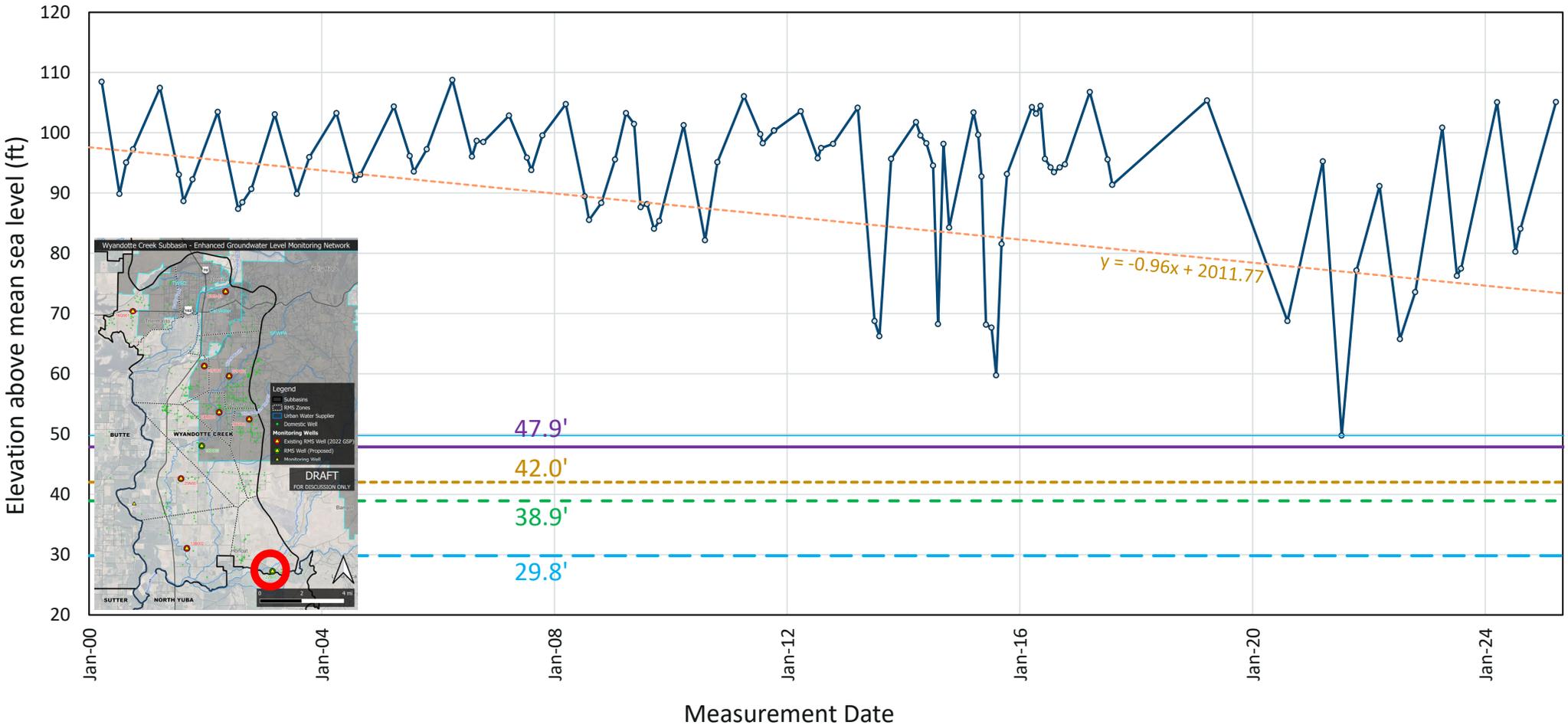


## Wyandotte Creek Subbasin - South (SWN: 18N04E19D003M) Hydrograph



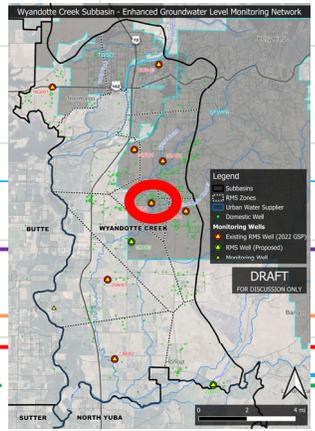
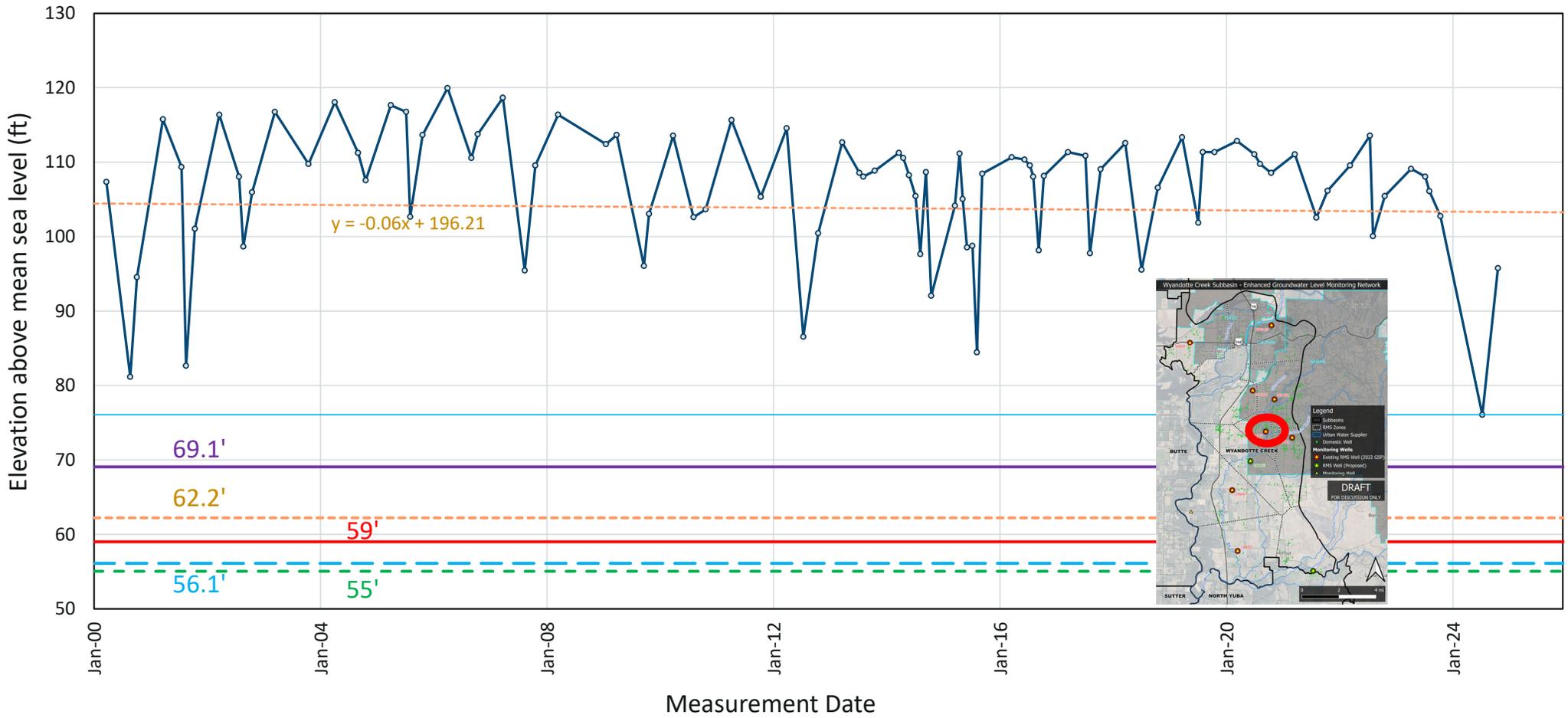
## Wyandotte Creek Subbasin - South (SWN: 17N04E22B001M) Hydrograph

—○— WSE
— Historical Low
— 5th Percentile
- - - 10th Percentile
- - - 15th Percentile
- - - Criterion 2



## Wyandotte Creek Subbasin - South (SWN: 18N04E08M001M) Hydrograph

—○— WSE   
 — Historical Low   
 — Current MT   
 — 5th Percentile   
 - - - 10th Percentile   
 - - - 15th Percentile   
 - - - Criterion 2



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Appendix D  
Sacramento Valley Groundwater Level SMC

Subbasin	Minimum Thresholds (MTs) Definition
Butte	<p>Primary Aquifer MT: Based on the shallowest of two criteria.</p> <ul style="list-style-type: none"> <li>• If this value is shallower than the observed historic low, the MT is adjusted to be 10 feet deeper than the historic low for operational flexibility (e.g., to protect agricultural use during droughts).</li> <li>• MTs are either: <ul style="list-style-type: none"> <li>➤ Criterion 1: Set at the 7th percentile of nearby shallow domestic wells, ensuring that 93% of these wells are protected.</li> <li>➤ Criterion 2: Set to either the range of historically measured groundwater levels or 20 feet below the historic low, whichever is greater.</li> </ul> </li> <li>• Deep Aquifer MT: Calculated similarly to the primary aquifer, designed to protect up to 93% of supply wells deeper than 700 feet.</li> </ul>
Colusa	<ul style="list-style-type: none"> <li>• Focus RMS wells: MTs set to 2020-2022 minimum groundwater elevation.</li> <li>• Non-focus RMS wells: MTs set to 2020-2022 minimum groundwater elevation, minus a 15-25 ft margin (set based on local analyses of potential well impacts and subsidence risk, whichever is limiting).</li> </ul>
Corning	<ul style="list-style-type: none"> <li>• Focus Areas: Five (5) feet higher than MTs as published in the 2022 GSP, where the 2022 GSP defined this MT as, "The minimum threshold for wells with declining groundwater levels was set to the minimum fall groundwater elevation since the 2012 measurement, minus 20% of the depth to water"</li> <li>• Outside Focus Areas: MTs as published in the 2022 GSP, where the 2022 GSP defined this MT as, "Minimum fall groundwater elevation since 2012 minus 20-foot buffer"</li> </ul>
Sutter	<p>The minimum threshold for chronic lowering of groundwater levels is established as the deepest of the following:</p> <ol style="list-style-type: none"> <li>1. The historic low for the available record at each representative monitoring site; or</li> <li>2. 90% of the average groundwater elevation from the projected water budget (baseline condition over 60-year period using C2VSimFG-Sutter) at each representative monitoring site with an artificial increase in evapotranspiration (ET) of 50%; or</li> <li>3. The average operating range (difference between measurable objective and minimum threshold) for all representative monitoring sites using the above criteria for the following aquifer zones (AZs), applied based on the available screen interval or well depth information for each representative monitoring site: <ol style="list-style-type: none"> <li>a. Shallow AZ and AZ-1 = 8.0 feet</li> <li>b. AZ-2 and AZ-3 = 16.5 feet</li> </ol> </li> </ol>
North Yuba	<p>The deeper of either:</p> <ol style="list-style-type: none"> <li>1. The bottom of the shallowest domestic well near a monitoring well, adjusted for March measurements; or</li> <li>2. The historical low March groundwater level from 1985 to present (incorporating recent monitoring and HUR interpolated values) at the monitoring well was identified as the local management level.</li> </ol>