



# **CGA/GGA Joint Technical Advisory Committee Meeting**

Land Subsidence Benchmarks and  
Hydrogeologic Investigation Work Plan Updates

May 13, 2022

# Introductions

**Grant Davids, PE**  
Davids Engineering

**Ken Loy, PG, CEG, CHG**  
West Yost

**Katie Klug, PhD**  
Davids Engineering

**Anna Reimer, PG**  
West Yost

# Outline

- 1. Land Subsidence Benchmark Update**
  - Overview
  - Glenn County Discussion Areas
  - Colusa County Discussion Areas
- 2. Hydrogeologic Investigation Work Plan Update**
- 3. Questions and Answers**

# Land Subsidence Benchmark Update

**Ken Loy, PG, CEG, CHG**

West Yost

**Anna Reimer, PG**

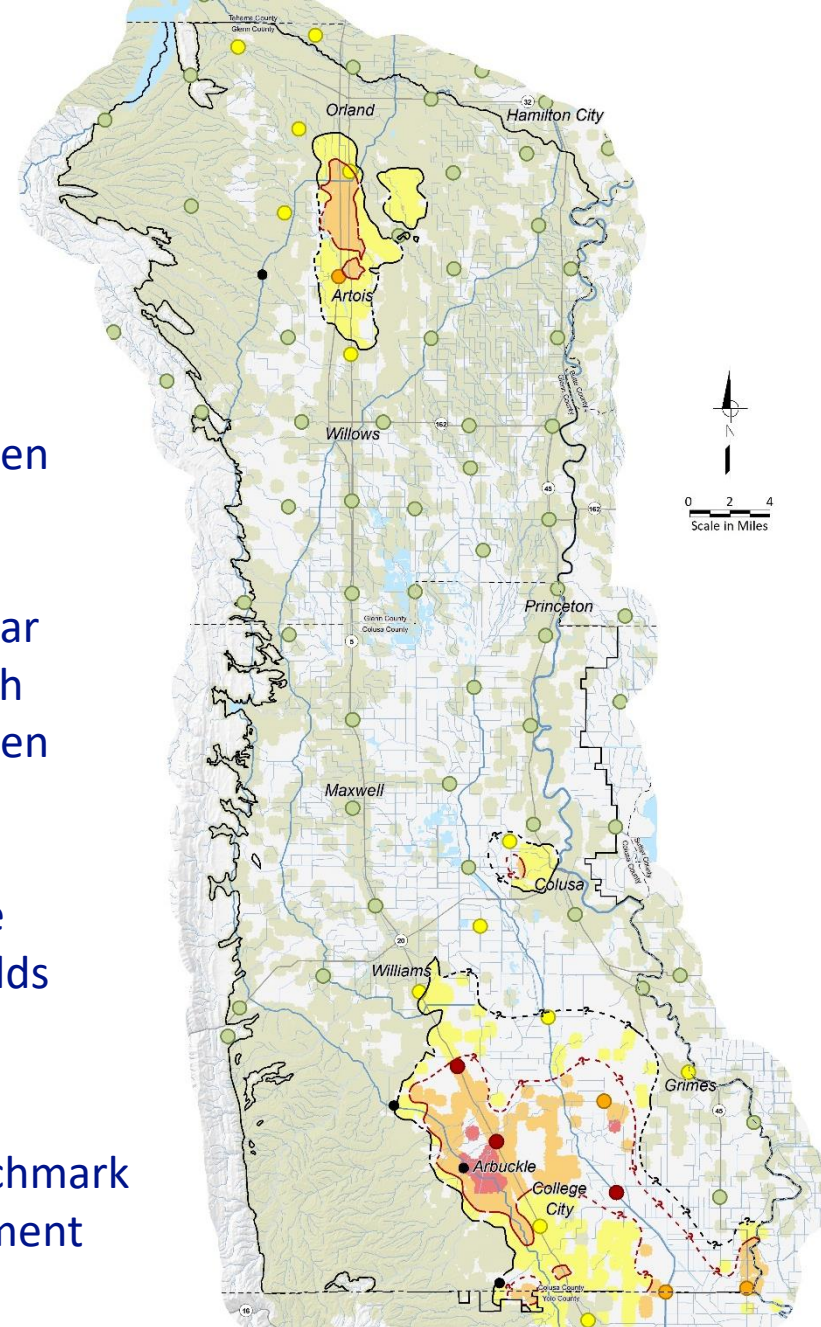
West Yost

# Measured Subsidence

Map to the right shows:

- Existing benchmarks color coded with change in land surface elevation between 2008 and 2017 surveys (9 years)
- Interferometric Synthetic Aperture Radar (InSAR) satellite results color coded with change in land surface elevation between 2016 and 2021 surveys (5 years)
- Delineation of areas where measurable objectives (MO) and minimum thresholds (MT) may be exceeded based on InSAR results

Additional benchmarks and a repeat survey of the benchmark network are needed to assess the sustainable management criteria (SMC) for land subsidence.



## Benchmark Net Displacement 2008 to 2017 (9-Year Period)

- $\geq 1$  ft
- 0.5 - 1.0 ft
- 0.25 - 0.5 ft
- $< 0.25$  ft
- New Benchmark (No Repeat Survey)

## InSAR Net Displacement 2016 to 2021 (5-Year Period)

- $\geq 1$  ft (Apparent MT Exceedance)
- 0.5 - 1.0 ft (Apparent MT Exceedance)
- 0.25 - 0.5 ft (Apparent MO Exceedance)
- $< 0.25$  ft (Apparent Compliance with MO)
- No InSAR Data Reported

## Apparent Subsidence SMC Extents

- ?--  
Extent of Apparent MO Exceedance (Dashed Where Approximate, Queried Where Uncertain)
- ?--  
Extent of Apparent MT Exceedance (Dashed Where Approximate, Queried Where Uncertain)

## Benchmark Net Displacement 2008 to 2017 (9-Year Period)

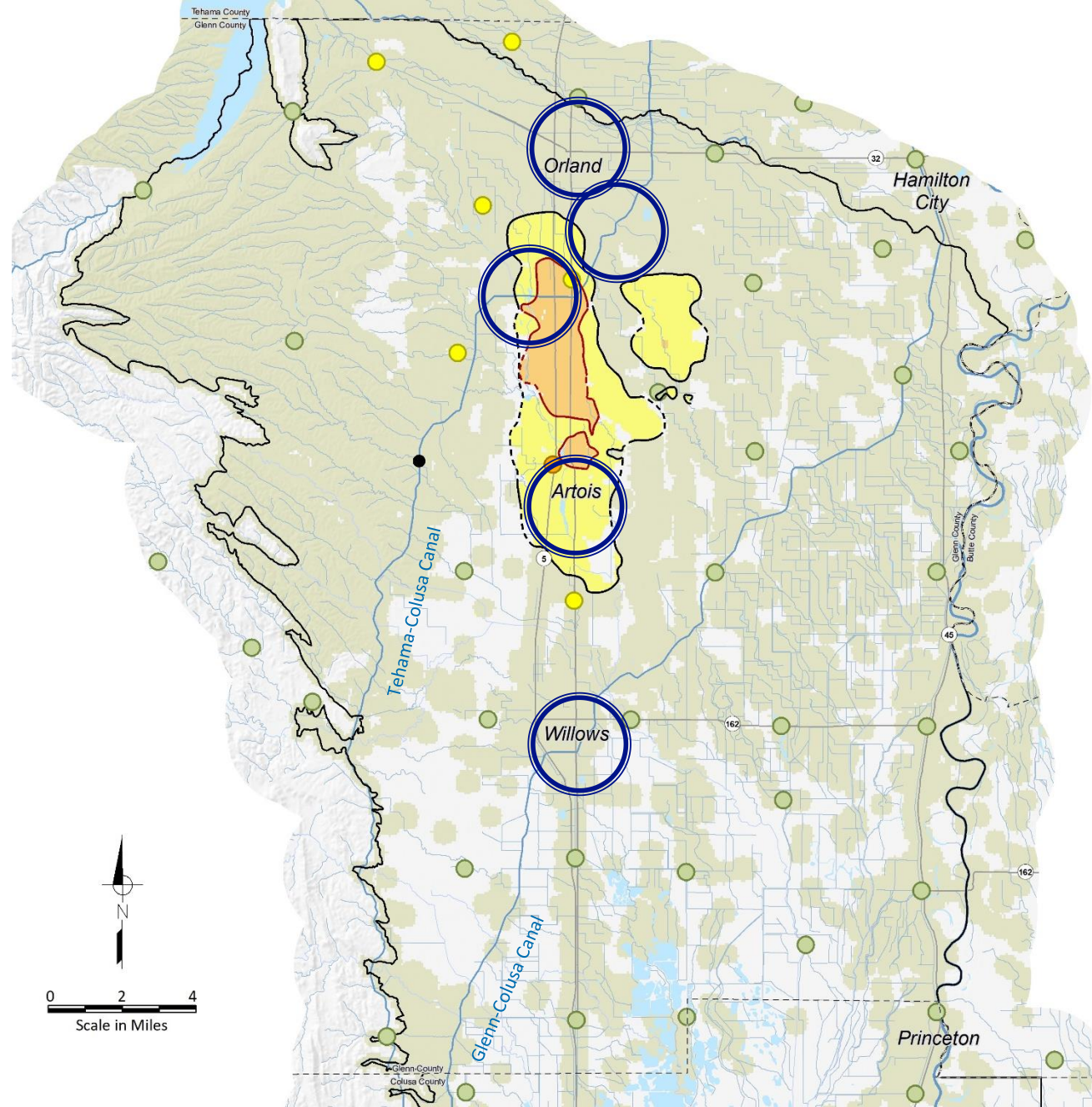
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- New Benchmark  
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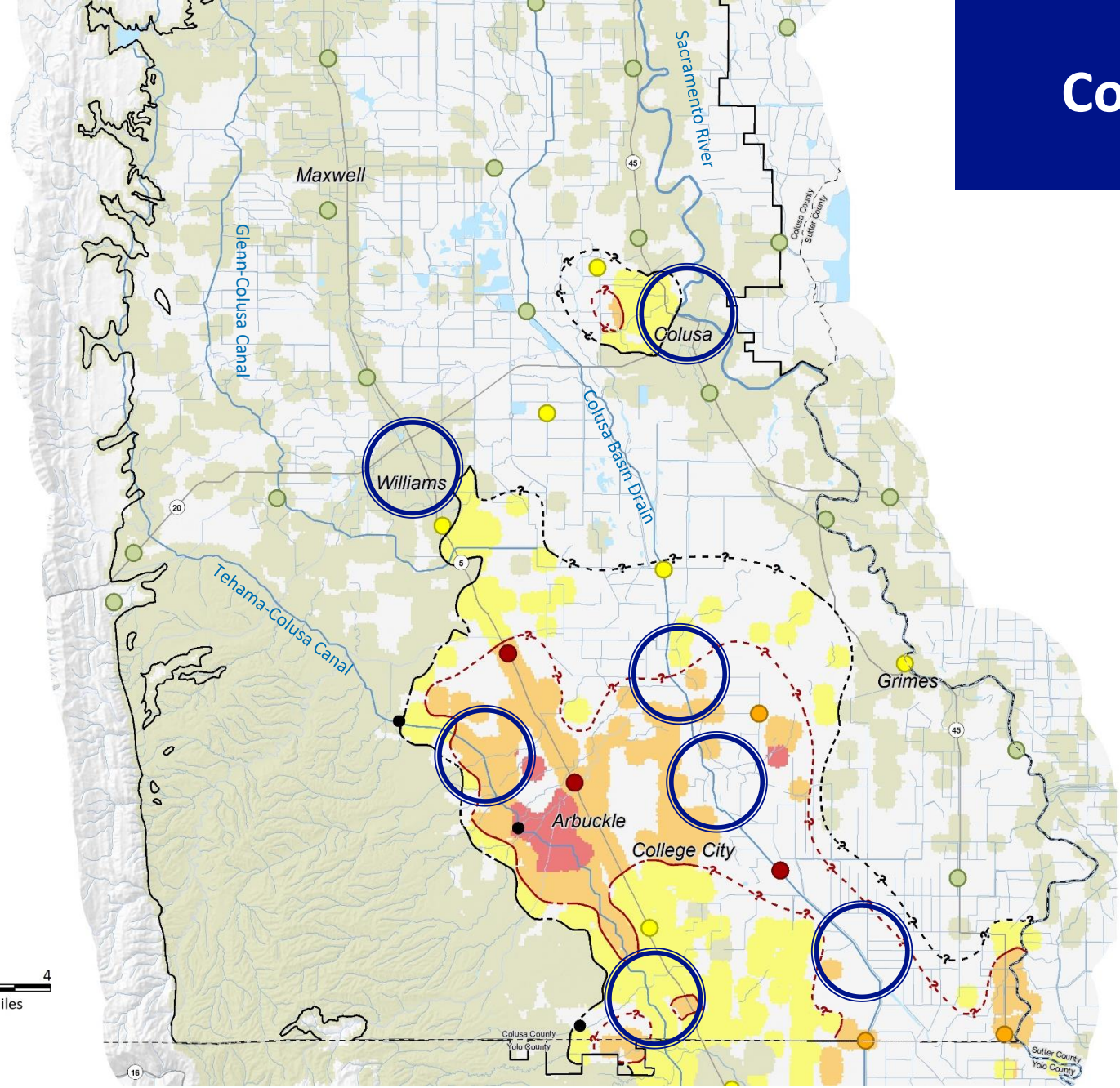
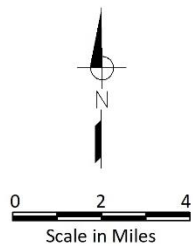
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# Hydrogeologic Investigation Work Plan Update

**Ken Loy, PG, CEG, CHG**

West Yost



# Work Plan Outline

- I. Introduction
- II. Subbasin Overview
- III. Hydrogeologic Investigations
  - Each Investigation Task to Include:
    - Description
    - Investigation Approach
    - Investigation Methods
    - Reporting

## Methods to be Provided as Attachments

- Permitting
- Drilling Methods
- Logging Methods
- Coordinate Surveys
- Monitoring Well Design/Construction
- Monitoring Well Development
- Monitoring Well Sampling
- Monitoring Well Equipping
- Benchmark Installation
- Benchmark Surveying

# Hydrogeologic Investigation Tasks

Expand Shallow Groundwater Monitoring Network	<ul style="list-style-type: none"><li>• Stream-Aquifer Interactions and GDEs</li></ul>
Expand Water Quality Monitoring Network	<ul style="list-style-type: none"><li>• Primary Aquifer Water Quality and Potential Upwelling</li></ul>
Expand Land Subsidence Monitoring Network	<ul style="list-style-type: none"><li>• Land Subsidence and Critical Infrastructure</li></ul>
Expand Surface Water Monitoring Network	<ul style="list-style-type: none"><li>• Stream-Aquifer Interactions and Recharge Potential</li></ul>
Well Inventory Program	<ul style="list-style-type: none"><li>• Hydrogeologic Framework and Monitoring Network</li></ul>
Colusa Subbasin Western Boundary Investigation	<ul style="list-style-type: none"><li>• Hydrogeologic Framework</li></ul>
Colusa Subbasin Model Update	<ul style="list-style-type: none"><li>• Stream-Aquifer Interactions, Hydrogeologic Framework, and Change in Storage Calculations</li></ul>

# Questions and Answers