Surface Water/Groundwater Interactions in the Santa Margarita Basin

August 22, 2019

Santa Margarita Groundwater Agency

Balance Hydrologics

Agenda

- Purpose of Surface Water Study
- Project Timeline
- Recent Streamflow Gaging in San Lorenzo Valley
- Accretion Studies
  - Background
  - Goals and Objectives
  - Data Collection
  - Progress Report: Very Preliminary Results
  - Next Steps
- Groundwater Dependent Ecosystems
  - Background
  - Identification and Functional Classification
  - Next Steps

Purpose

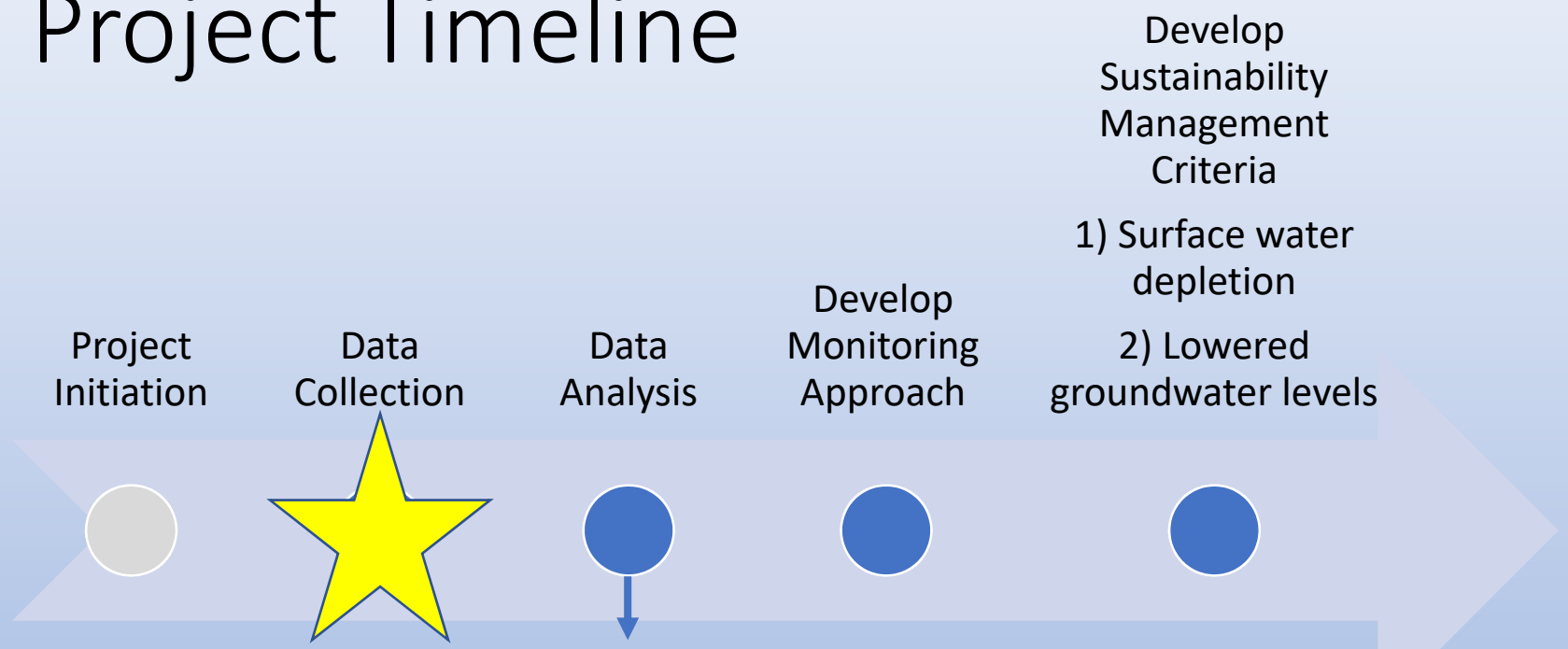
Need to consider impacts on biotic users of water under 2 sustainability indicators:

1. Surface water depletion
2. Lowered groundwater levels

Identify and quantify:

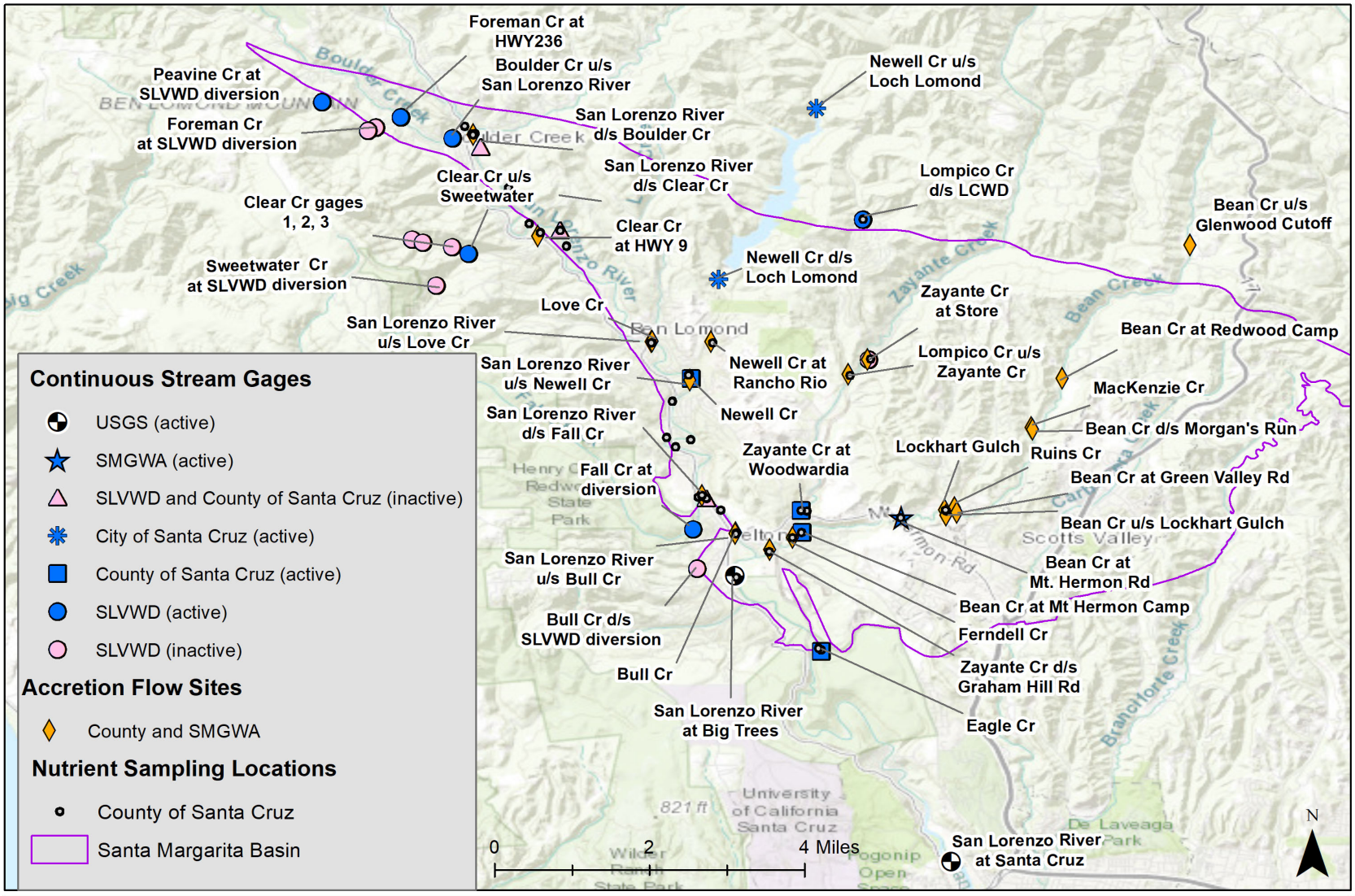
- Relationship between surface water and groundwater (accretion study)
- Relationship between groundwater and environmental users (groundwater dependent ecosystems)

Surface Water Study Project Timeline



Recent Streamflow Gaging in San Lorenzo Valley

- Began streamflow gaging for SLVWD in 2013 -2014
  - Initially had 12 gages
  - Currently have 6 active gages on 6 streams
  - 3 additional seasonal gages on San Lorenzo River (co-operated with County; not presently active)
- Began streamflow gaging for County of Santa Cruz in 2009
  - Currently have 4 active gages on 4 streams
- Began streamflow gaging for SMGWA in 2019
  - Currently have 1 active gage
- 2 active streamflow gages operated by City of Santa Cruz
- 2 active streamflow gages operated by USGS



Balance Hydrologics

U:\gis\Projects\218237 Santa Margarita gaging locations.mxd

Figure 1. Sites with summer flow and specific conductance measurements 2019, San Lorenzo Valley, Santa Cruz County, California
See location table for greater detail.

Source: Balance Hydrologics

What is Accretion?

How and where water enters the river

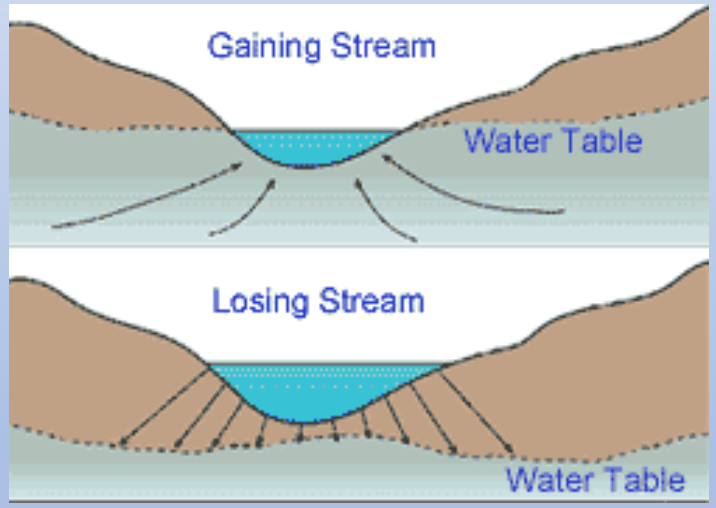


Image from: http://forestandrange.org/modules/streamriparianarea/strm-wtrshds/pg5-strmclass.htm

Accretion Study Goals

- Is reach “gaining” or “losing” flow?

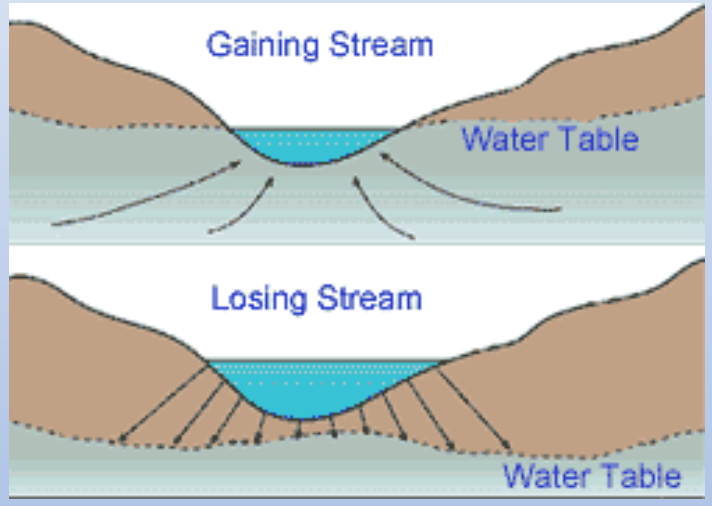


Image from: http://forestandrange.org/modules/streamriparianarea/strm-wtrshds/pg5-strmclass.htm

- How is groundwater supporting flow in streams?
- What are surface water/ groundwater interactions within basin?

Accretion Study Objectives

- Identify locations where Santa Margarita formation is contributing to San Lorenzo River:
  - Water
  - Temperature
  - Dissolved Solids
  - Nutrients

Streamflow Gaging Protocol/Methods

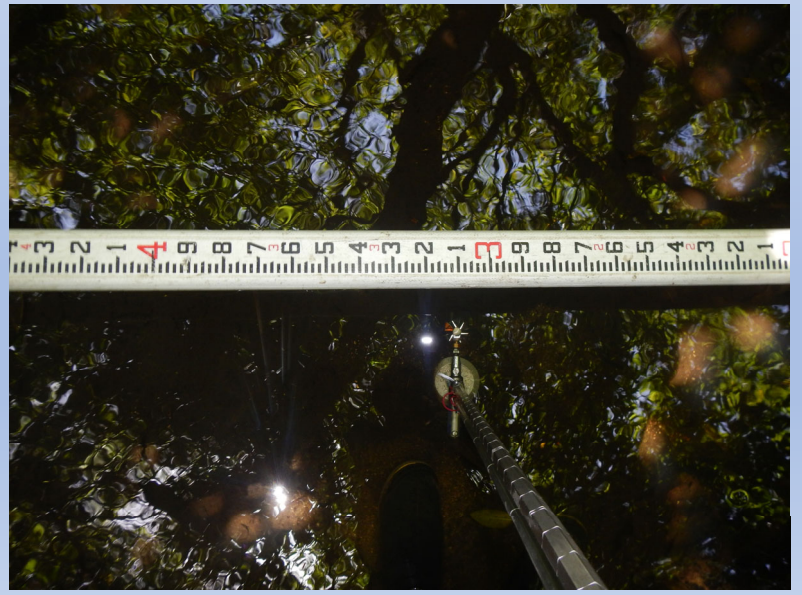
- Equipment in creek
- Collect data every 15 min
  - Water depth
  - Temperature

Streamflow Gaging Protocol/Methods

- Measure flow
  - "USGS Methodology"
- Measure stage (water depth)
- Measure dissolved solids
- Make observations


Clear Creek 3/19/2017


Zayante Creek
5/31/2019



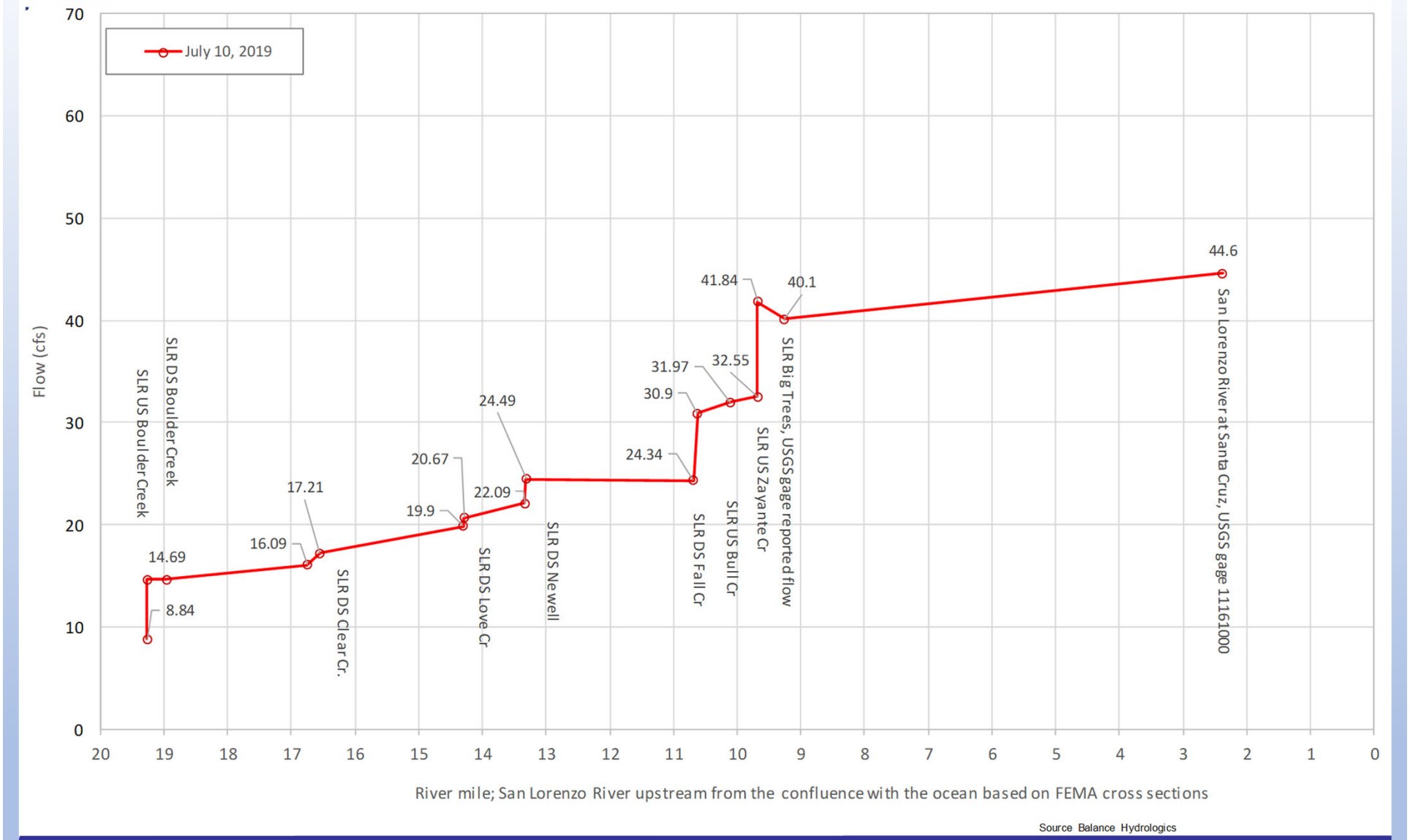
Accretion Study

- Collected measurements along San Lorenzo River mainstem since 2017
- Collect flow and water quality data at locations throughout watershed on a single day (or 2)
- Provide snapshot of flow conditions within the watershed

Accretion Study, 2019

- Accretion Measurements
  - May 30 – 31st , 2019
    - Visited 18 sites on Bean, Zayante and Lompico Creeks
  - July 10, 2019
    - Visited 15 sites on San Lorenzo River and tributaries
    - Visited 9 sites on Bean, Zayante and Lompico Creeks
- Nutrient and Dissolved Solids Sampling
  - June 19,2019
    - Collected 38 water quality samples throughout San Lorenzo River watershed

Progress Report:
Very Preliminary Accretion Results



Source Balance Hydrologics

Balance Hydrologics

Figure 1. **San Lorenzo River downstream changes in flow, Santa Cruz County, CA**
Data are very preliminary and will be soon augmented by additional work during different seasons.

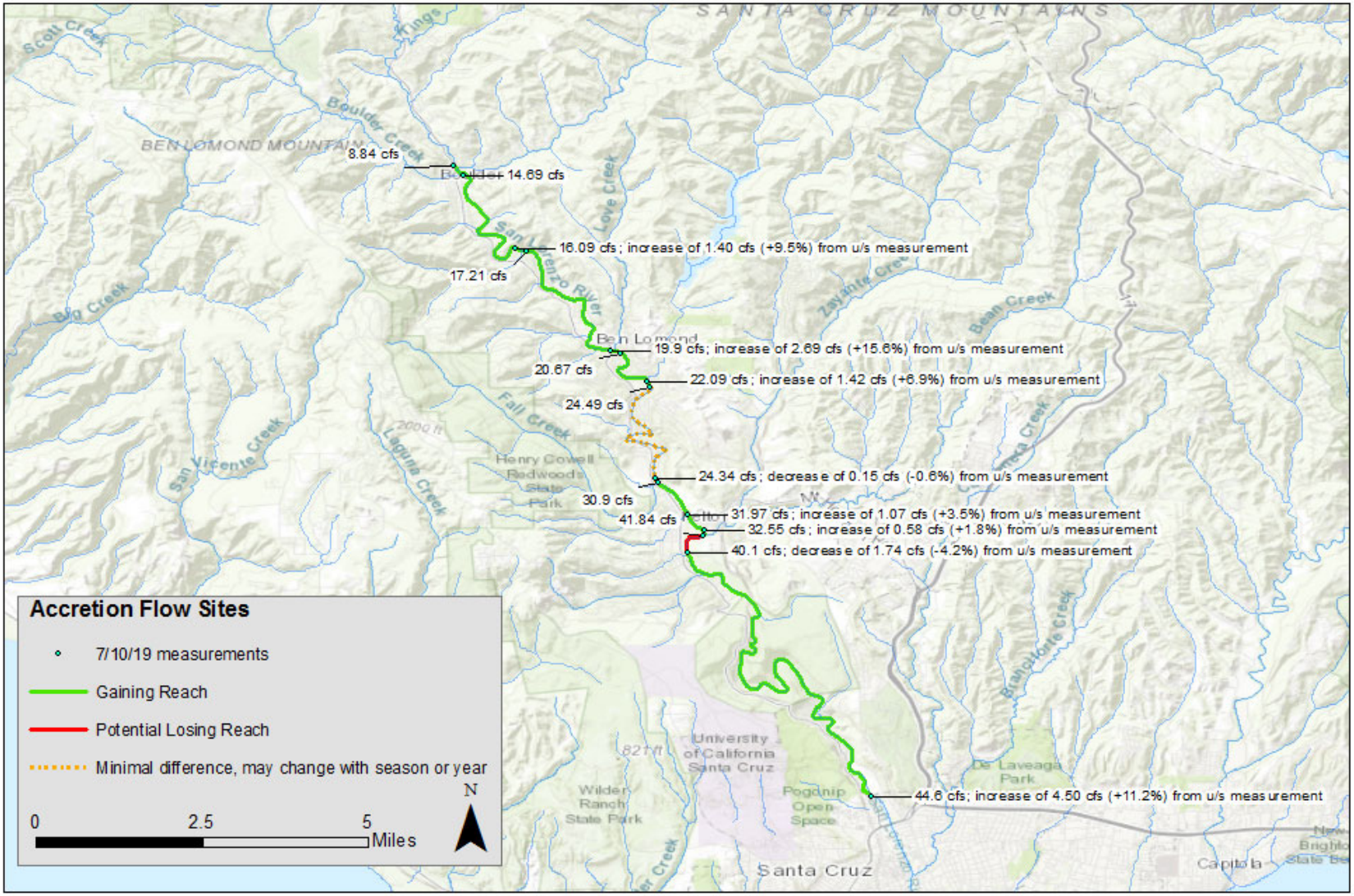
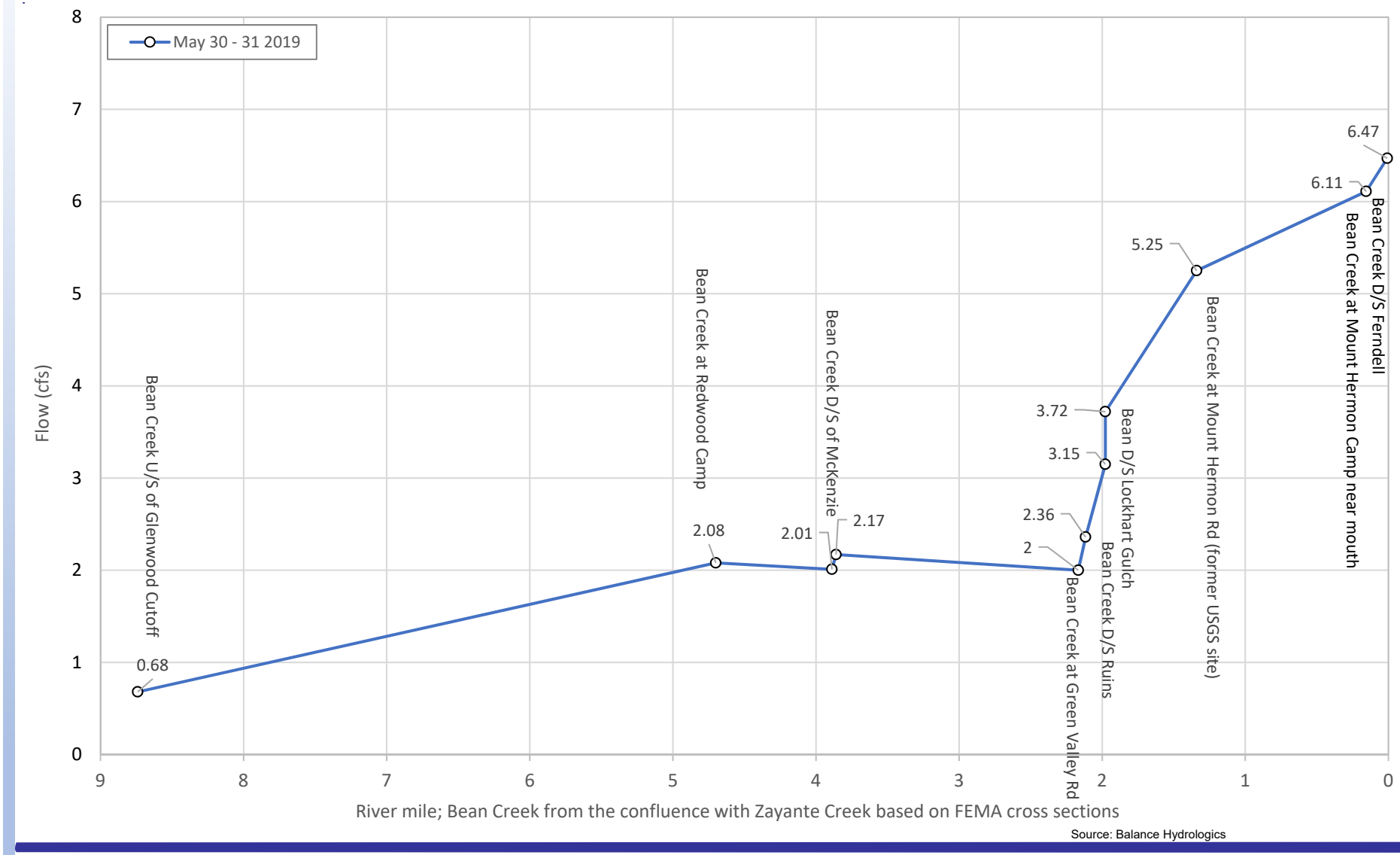


Figure 2. Results of San Lorenzo River Accretion Measurements, July 10, 2019, San Lorenzo Valley, Santa Cruz County, California

Balance Hydrologics

W:\gis\Projects\218237 Santa Margarita gaging locations.mxd

Source: ESRI 2019, Balance Hydrologics 2019



Balance Hydrologics

Figure 3. Bean Creek downstream changes in flow, Santa Cruz County, CA
Data are very preliminary and will be soon augmented by additional work during different seasons.

Accretion Study Next Steps

- Collect measurements along San Lorenzo River and Bean Creek watersheds prior to rain
- Continue and finalize preliminary analysis
- Compare results to previous year (different types)
- Consider changes have we seen over time in streamflow
- Consider how groundwater pumping may influence streamflow
- Consider potential impacts to surface water users (human, animals, special status species, etc)
- Develop sustainability management criteria

Groundwater Dependent Ecosystems

What are Groundwater Dependent Ecosystems (GDEs)?

- Plant and animal communities that require groundwater to meet all or some of their needs
- Need to maintain groundwater levels and the connection between groundwater and surface water
- Concern about GDEs includes species they support (fish and aquatic animals) particularly special status species (steelhead and coho)

Groundwater Dependent Ecosystems

- Compiled GDEs from:
  - The Nature Conservancy
    - National Hydrology Dataset (NHD)
    - National Wetlands Inventory (NWI)
    - CalVeg
    - VegCamp
  - Known GDEs

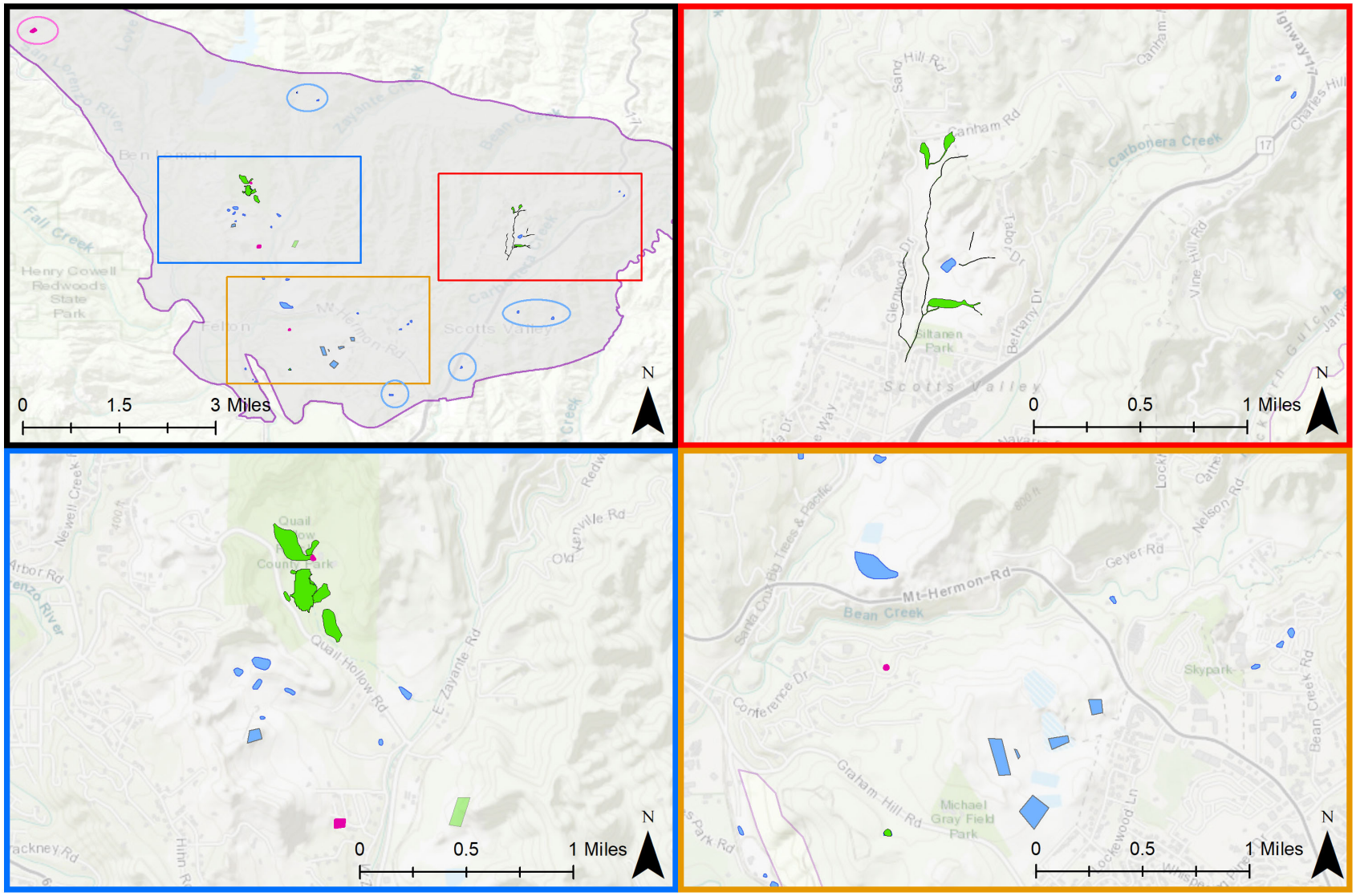
GDE Classification: 4 Categories

Open Water

Riverine and Riparian

Springs

Other Groundwater Dependent Wetlands

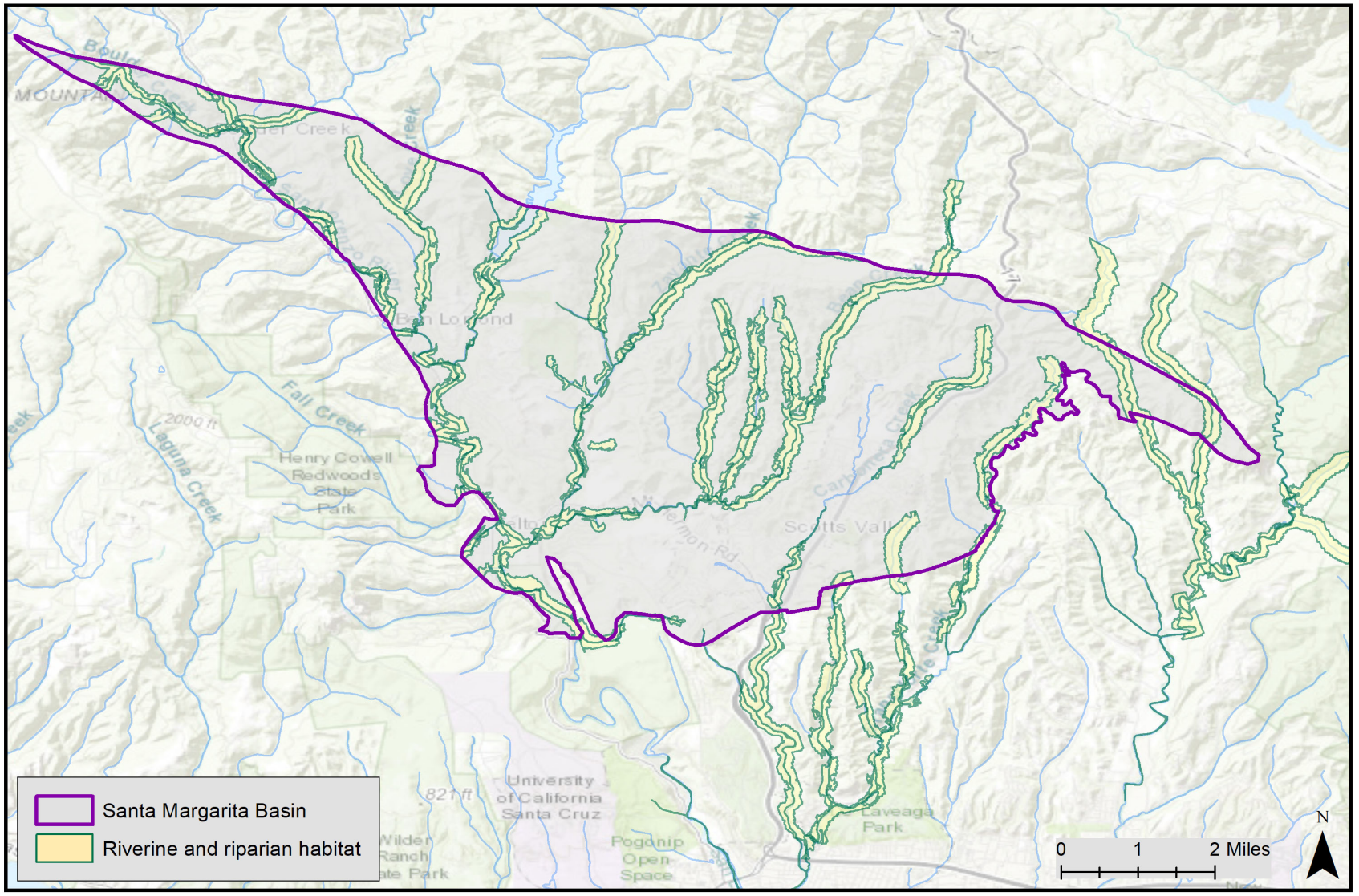


Balance Hydrologics

U:\gis\Projects\218237 Santa Margarita GDE locations.mxd

Figure 1. Santa Margarita basin springs, open water, and other ground-water supported wetland GDE types, Santa Cruz County, California

Source: Balance Hydrologics, the Nature Conservancy (NHD, NWI, CALVEG, VEGCAMP)



Balance Hydrologics

U:\gis\Projects\218237 Santa Margarita GDE locations.mxd

Figure 2. Santa Margarita basin riverine and riparian GDEs, Santa Cruz County, California

Source: Balance Hydrologics, the Nature Conservancy (NHD, NWI, CALVEG, VEGCAMP)

Groundwater Dependent Ecosystems Next Steps

- Verify GDEs
- Map locations of wells in relation to GDEs
- Consider potential impact from groundwater pumping
- Compile County Ordinances and regulations protecting GDEs
- Finalize list of GDEs subject to management under SGMA
- Develop and finalize monitoring program
- Quantify groundwater elevations necessary to maintain GDEs and beneficial users
- Develop sustainability management criteria

Summary

- Purpose of Surface Water Study
- Project Timeline
- Recent Streamflow Gaging in San Lorenzo Valley
- Accretion Studies
  - Background
  - Goals and Objectives
  - Data Collection
  - Progress Report: Very Preliminary Results
  - Next Steps
- Groundwater Dependent Ecosystems
  - Background
  - Identification and Functional Classification
  - Next Steps

Questions?