Groundwater-Surface Water Interaction and Potential Groundwater Dependent Ecosystems (GDEs)

Jeff Barry
Surface Water and Groundwater Interactions

Tom Barnes
Identification of potential GDEs
Sustainability Plan Pyramid

- Stakeholder Engagement and Dialogue
- Basin Geology and Groundwater Conditions
- Water Budgets and Modeling
- Sustainable Mgt. Criteria
- Projects and Mgt. Actions
- Monitoring
- GSP

- Groundwater-Surface Water Interaction
- Due Jan. 2022

- May – June 2020
- Mar. – June 2021
- May – Dec. 2020
- July – Sept. 2020
- May – June 2020
- Ongoing
Outline

• Meaning of interconnected surface water
• Interconnected Surface Water and Groundwater in the Santa Clarita Valley
• Questions
• Potential Groundwater Dependent Ecosystems
• Next Steps
• Questions

Santa Clara River – Photo Credit: The Nature Conservancy
Interconnected Surface Water and Groundwater
What is Interconnected Surface Water and Groundwater?

- Refers to surface water that is directly connected at any point by a continuous saturated zone to the underlying aquifer.
- A major source of recharge to underlying aquifers.
- Groundwater pumping can affect surface water flows in interconnected streams.
- Interconnected groundwater may support GDEs.
- Required by SGMA to be described.
Interconnected Surface Water and Groundwater

• Groundwater discharges (flows) to surface water when groundwater level is above river level (or above thalweg during low flows)

• Discharge is variable depending on groundwater depth and river stage

Gaining Stream

USGS Circular 1376, Barlow and Leake (2012). Figure modified from Winter and others (1998).
Interconnected Surface Water and Groundwater

• Surface water recharges (flows) groundwater through a direct connection when river level is above groundwater level

• Recharge is variable depending on groundwater level and river stage

Losing Stream

USGS Circular 1376, Barlow and Leake (2012). Figure modified from Winter and others (1998).
Interconnected Surface Water and Groundwater

- No Direct connection between groundwater and surface water
- Recharge is constant

Disconnected Stream

USGS Circular 1376, Barlow and Leake (2012). Figure modified from Winter and others (1998).
Surface Water and Tributary Watersheds

- Surface Water bodies that are significant to the management of the basin

- Primary tributary watersheds – branches that feed the main part of the basin
FIGURE 2
Conceptual Surface Water and Groundwater Flow Diagram
Santa Clara River Valley Groundwater Basin, East Subbasin
Selected Hydrographs
VWD-S7

- VWD-S7 shows little to no correlation with WRP discharges. Well is located approximately 130 feet north of the main river channel and may not be sensitive to WRP discharges.

- VWD-S7 shows strong correlation with rainfall.
NLF-C4

- NLF-C4 shows a strong correlation with Castaic releases.
- Correlation with WRF discharges is unclear.
- Water levels may not be static in this well.
- The reference point elevation of the well may be inaccurate because the water levels are deeper than expected at this location.

- GW elevation spikes coincide with the rainy season of each year, but water levels seem to stay relatively stable during drought conditions.
- Water levels may not be static in this well.
- The reference point elevation of the well may be inaccurate because the water levels are deeper than expected at this location.
Effects of Precipitation, WRP Discharges, and Pumping on River Flow at the County Line
Monthly Streamflow vs. WRP Discharge
Monthly Streamflow vs. East Subbasin Pumping

Historical Summer Monthly Flow Volumes at County Line and Piru Stream Gages

- Saugus WRP Comes Online (1963)
- Valencia WRP Comes Online (1967)

- East Subbasin Pumping (Alluvium-Saugus)
- County Line Stream Gage
- Piru Stream Gage
Questions?
Identification of Potential GDEs

- Presentation by Tom Barnes - ESA
Santa Clara River Watershed
SGMA GSP Requirement 10727.4 (I)
  • A GSP should include impacts on groundwater dependent ecosystems.

The Nature Conservancy Guidelines for Preparing GSPs

• Step 1 – Identify GDEs;
  • Step 1.1 - Map GDEs
  • Step 1.2 - Characterize GDE Condition

• Step 2 – Determine Potential Effects of Groundwater Management on GDEs;

• Step 3 – Consider GDEs when Establishing Sustainable Management Criteria

• Step 4 – Incorporate GDEs into the Monitoring Network; and

• Step 5 – Identify Projects and Management Actions to Maintain or Improve GDEs.
GDE Identification Process

- Compiled Available Vegetation Mapping (KMZ1)
  - Natural Communities Commonly Associated with Groundwater (NCCAG) dataset (DWR 2019a) (same as iGDE)

- Field-Verified a Subset of Polygons (KMZ2)
  - Areas where at least one of each habitat type reflected in the original iGDE database
  - Areas where vegetation type or hydrology was unclear based on the aerial imagery analysis (i.e., isolated tree clusters with no obvious connection to a water source)

- Refined Polygons (KMZ3)
  - Removed Upland Habitats, Barren River Wash, Riversidean Scrub Habitat
  - Removed Manmade Features (golf course ponds, Castaic Lake shoreline, etc)

- Vegetation Reclassified per A Manual of California Vegetation, Second Edition (KMZ4)
KMZ1: NCCAG Dataset
KMZ2: Field Verified
KMZ3:
Upland Habitats Removed
KMZ4: Vegetation Reclassified
Next Steps

• Refine GDEs based on depth to groundwater utilizing modeling and monitoring data
• Refine GDEs based on studies on gaining and losing segments of the river
• Determine potential impacts to GDEs
Questions?

Surface Water and Groundwater Interactions and Potential GDEs

Jeff Barry
Surface Water and Groundwater Interactions

Tom Barnes
Identification of potential GDEs