

Interim Findings from the Hydrologic Monitoring Program

The objective of the CCRN hydrologic monitoring program is to quantify and continuously improve the design and effectiveness of CCRN aquifer recharge projects, and to address legal and regulatory compliance.

Hydrologic monitoring was conducted at CCRN project sites during 2018 including the City of Sierra Vista Environmental Operations Park, Bella Vista, Riverstone, Palominas, and Horseshoe Draw. The characteristics of these sites vary widely, as do the types of data collected. However, some of the key findings and lessons learned during 2018 are summarized below.

Key Findings

Urbanization within a watershed influences how much stormwater runoff may be available for groundwater recharge. Urban enhanced runoff is generated from impervious surfaces such as streets, parking lots, and roof tops. The more impervious surfaces, the more runoff will be produced over and beyond natural watershed conditions. This “extra water” can cause erosion and flooding downstream of developed areas if not properly managed, so capturing this extra water and using it for recharge can address multiple water management challenges simultaneously. The watershed for the Bella Vista project includes downtown Sierra Vista and has 22% impervious surface area, compared to Horseshoe Draw, which has less than 1% impervious surfaces. Low-density residential land uses in the Riverstone and Palominas watersheds translate to an intermediate level of impervious surfaces, around 8%.

Recent climate trends are likely influencing the amount of runoff conveyed to lower portions of the watershed. The amount of runoff produced by individual storms at recharge projects has been lower

than predicted. A primary factor is likely the long-term drought, which has a cumulative effect of drying out soils, ephemeral washes, and channel beds. Greater infiltration and storage capacity due to drier conditions could significantly decrease stormwater runoff rates compared to those calculated during previous non-drought periods. Additional monitoring data during 2019 will help determine the impact - if any - the wetter winter of 2018-2019 had on these relationships.

The temporal and spatial variability of precipitation significantly impacts the water available for recharge, in addition to many other factors. Precipitation can vary at the same site from year to year, as well as between sites during any given year.



The Palominas Flood Control and Recharge Project collects stormwater from the watershed and infiltrates it into the ground.

For example, at the Palominas facility, the estimated annual surface water flow volume was only 5.3 acre-feet in 2017, as compared to 40.6 acre-feet at that site during the 12 months from July 2014 to June 2015. In addition, the annual precipitation at the Horseshoe Draw project was 11.19 inches in 2018, as compared to 19.25 inches at the Palominas project site, only a few miles away.

Recharge project design influences performance.

The Palominas Flood Control and Recharge Project was constructed by Cochise County in 2014, with the aim of collecting and conveying sheetflow to a constructed channel that had various types of infrastructure to enhance the infiltration of the water into the soil profile for aquifer recharge. Hydrologic monitoring equipment was installed to compare the performance of simple basins to single chamber and double chamber dry wells, and gravel infiltration trenches. A primary purpose of this project was to serve as a testing site for methods to enhance

infiltration of stormwater, serving to inform the design at future CCRN projects. The table below summarizes some of the trade-offs between these different types of infrastructure that have been observed so far.

Monitoring over the long term will help to further quantify the performance of CCRN projects within the regional network, to evaluate both hydrologic trends and the cost-effectiveness of the CCRN facilities.

Palominas Flood Control and Recharge Facility: Infrastructure Comparisons			
	Dry Wells	In-channel Basins	Gravel Infiltration Trenches
Infiltration rates (ft/day)	✓✓✓	✓✓	✓✓
Vulnerability to sediment clogging	✓✓	✓✓	✓
Ease of sediment removal	✓	✓	✓✓✓
Cost of construction	✓	✓	✓✓✓

Relative Performance

✓✓✓ High

✓✓ Middle

✓ Low

About the CCRN

The purpose of the Cochise Conservation and Recharge Network (CCRN) is to implement a regional network of water-management projects that meet the long-term needs of the Sierra Vista Subwatershed. The vision of the CCRN is a flowing San Pedro River, the conservation of water resources, and a vibrant local economy. The CCRN members are Cochise County, City of Sierra Vista, The Nature Conservancy, Hereford Natural Resources Conservation District, and City of Bisbee.