Riparian Health Assessment Summary

Monitoring Year 2019-20: Perennial flows decrease, but native wildlife persists

Cienega Creek is one of the few remaining perennial lowland streams in the region. Cienega Creek and Davidson Canyon are stunning examples of what many riverbeds could look like if similar preservation efforts are employed. These shallow groundwater-dependent systems and Outstanding Arizona Waters support wildlife habitat and human activity alike. Cienega Creek and Davidson Canyon are among the 18 priority waterbodies identified in PAG's 208 Plan for protection. However, declining flows observed over the past two decades provide a reminder of the ecosystem's vulnerability to declining water tables and drought.

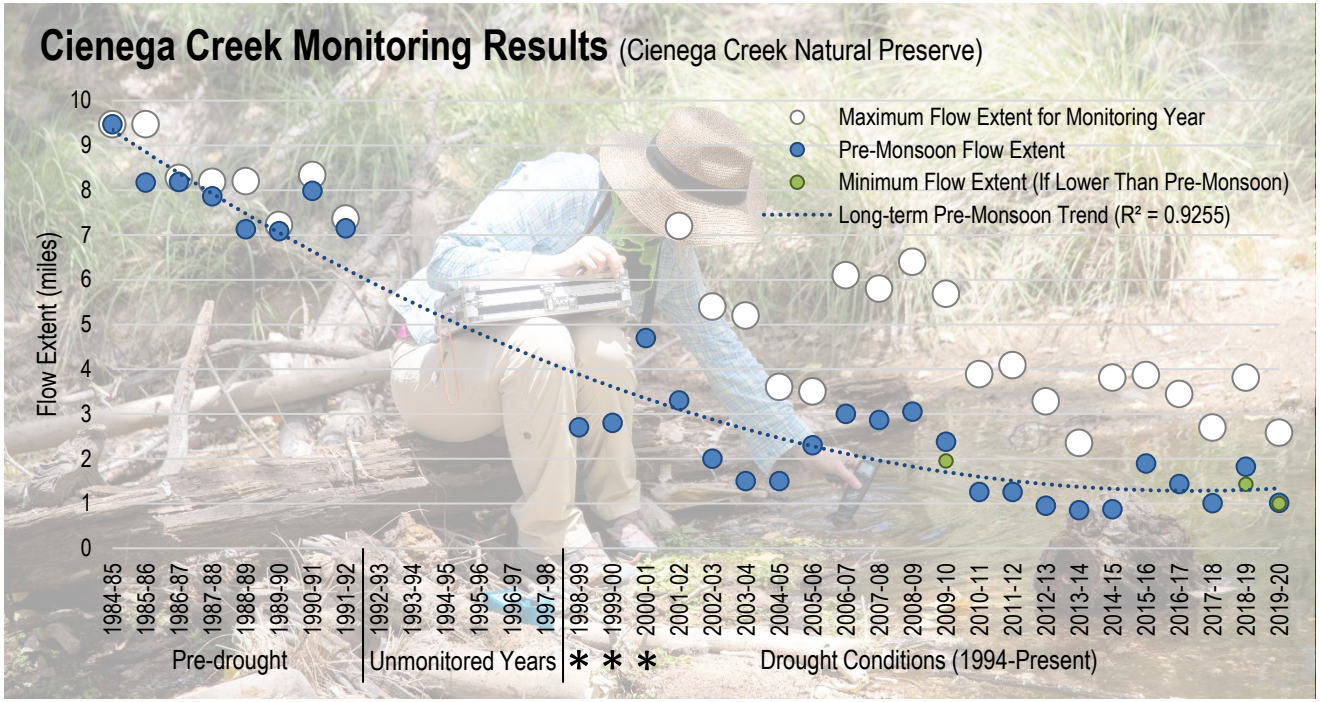
PAG has monitored hydrologic conditions in Pima County's Cienega Creek Natural Preserve (CCNP) since 1989. The CCNP is in the lower part of the Cienega Creek Watershed. Every quarter, PAG maps baseflow in the reaches of Cienega Creek and Davidson Canyon that fall within the CCNP. The charts display the time of year that is usually driest (May/June) to reflect the minimal perennial (year-round) extent of surface water. The annual maximum flow extents reflect the greater aquatic habitat present in wetter seasons.

Pre-Monsoon Flows

In monitoring year (MY) 2019-20 (July 2019 – June 2020), PAG observed a decrease in Cienega Creek's perennial flow extent, with June flows along 11% of the 9.5-mile monitoring extent. As shown on the linear comparison chart on page 2, decreased flows were observed in all creek reaches. Perennial flows were not observed in lower Davidson Canyon, near its confluence with Cienega Creek.

While pre-monsoon flows were lower than they were in MY 2018-19, the lowest flow extent for MY 2019-20 occurred in Sept. 2019. This is likely due to a below average monsoon season in 2019. PAG has only observed this pattern three times, all likely the results of poor monsoon seasons (2009, 2019) or above average winter rains (2018). These patterns highlight the importance of consistent seasonal monitoring.

Davidson Canyon was dry upstream of Interstate 10 (I-10) in June 2020, following sustained flows in Sept., Dec. and March. This was an improvement from MY 2018-19, during which flow was only observed in March 2019.



✱ Only pre-monsoon data available for these monitoring years

Wildlife Observations

PAG also records sightings of species covered by Pima County's Multi-Species Conservation Plan, other species of conservation interest and invasive species. In MY 2019-20, PAG recorded the following aquatic species of interest in Cienega Creek:

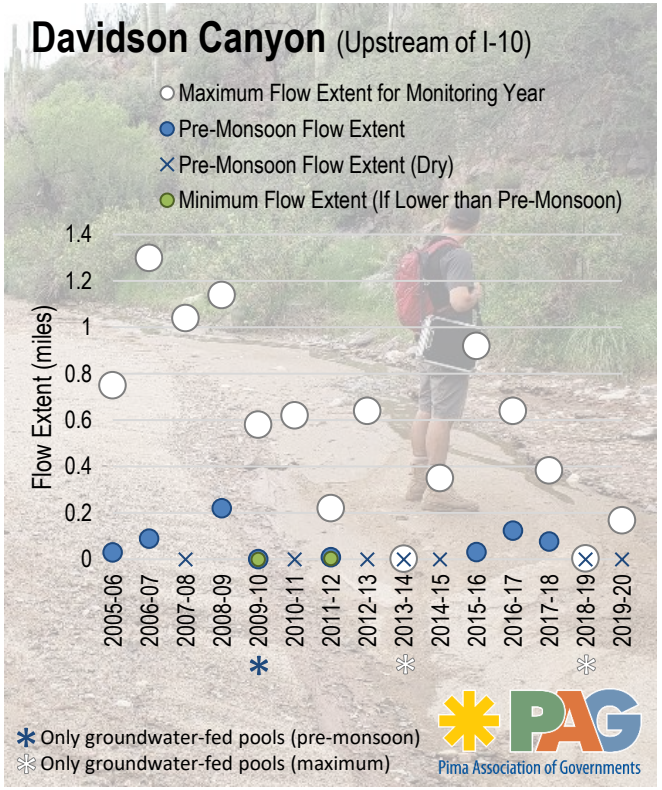
- Gila Chub (March 2020*)
- Gila Topminnow (Sept. 2019, Dec. 2019, March 2020*, June 2020)
- Longfin Dace (Sept. 2019, Dec. 2019, March 2020, June 2020)
- Lowland Leopard Frog (Sept. 2019, March 2020, June 2020)
- Sonora Mud Turtle (Sept. 2019, March 2020)

*Tentative identification

Example photos are shown on page 3. PAG also records observations of bird species of interest, including Bell's vireo, gray hawk and Abert's towhee.

In Sept. 2019, toad tadpoles and juvenile toads, likely red-spotted toads, were observed by PAG in upper Davidson Canyon for the first time since Sept. 2014. No invasive bullfrogs were observed by PAG during MY 2019-20, but an adult was removed by Pima County in June 2020.

A more detailed look at aquatic habitat and wildlife distribution in Cienega Creek is presented on page 4.



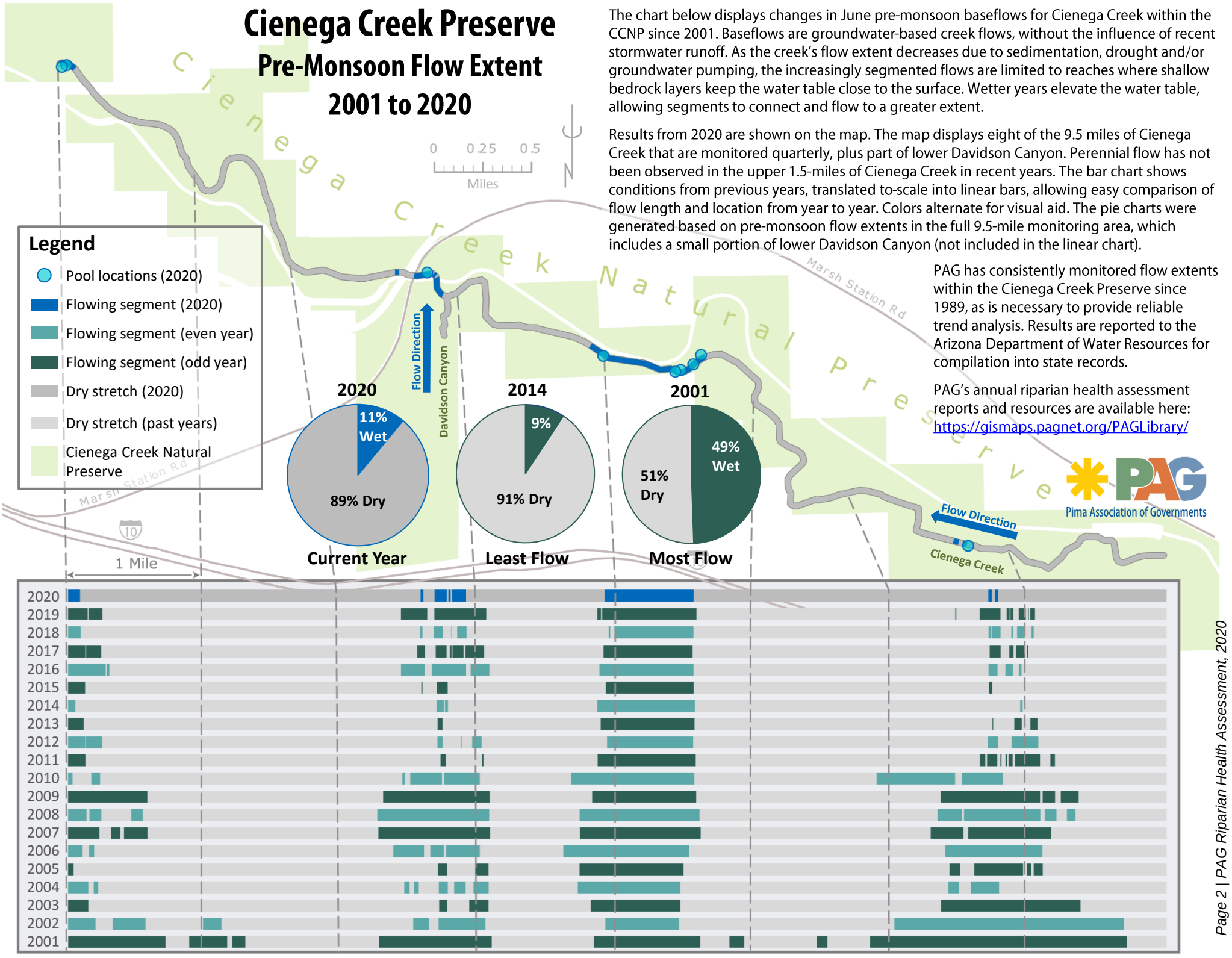
Cienega Creek Preserve
Pre-Monsoon Flow Extent
2001 to 2020

The chart below displays changes in June pre-monsoon baseflows for Cienega Creek within the CCNP since 2001. Baseflows are groundwater-based creek flows, without the influence of recent stormwater runoff. As the creek's flow extent decreases due to sedimentation, drought and/or groundwater pumping, the increasingly segmented flows are limited to reaches where shallow bedrock layers keep the water table close to the surface. Wetter years elevate the water table, allowing segments to connect and flow to a greater extent.

Results from 2020 are shown on the map. The map displays eight of the 9.5 miles of Cienega Creek that are monitored quarterly, plus part of lower Davidson Canyon. Perennial flow has not been observed in the upper 1.5-miles of Cienega Creek in recent years. The bar chart shows conditions from previous years, translated to-scale into linear bars, allowing easy comparison of flow length and location from year to year. Colors alternate for visual aid. The pie charts were generated based on pre-monsoon flow extents in the full 9.5-mile monitoring area, which includes a small portion of lower Davidson Canyon (not included in the linear chart).

PAG has consistently monitored flow extents within the Cienega Creek Preserve since 1989, as is necessary to provide reliable trend analysis. Results are reported to the Arizona Department of Water Resources for compilation into state records.

PAG's annual riparian health assessment reports and resources are available here: https://gismaps.pagnet.org/PAGLibrary/



Key Native Aquatic Species

for the Cienega Creek Natural Preserve

Sonora Mud Turtle

Lowland Leopard Frog

Photo © Brian Powell

Gila Topminnow (females & breeding male)

Longfin Dace

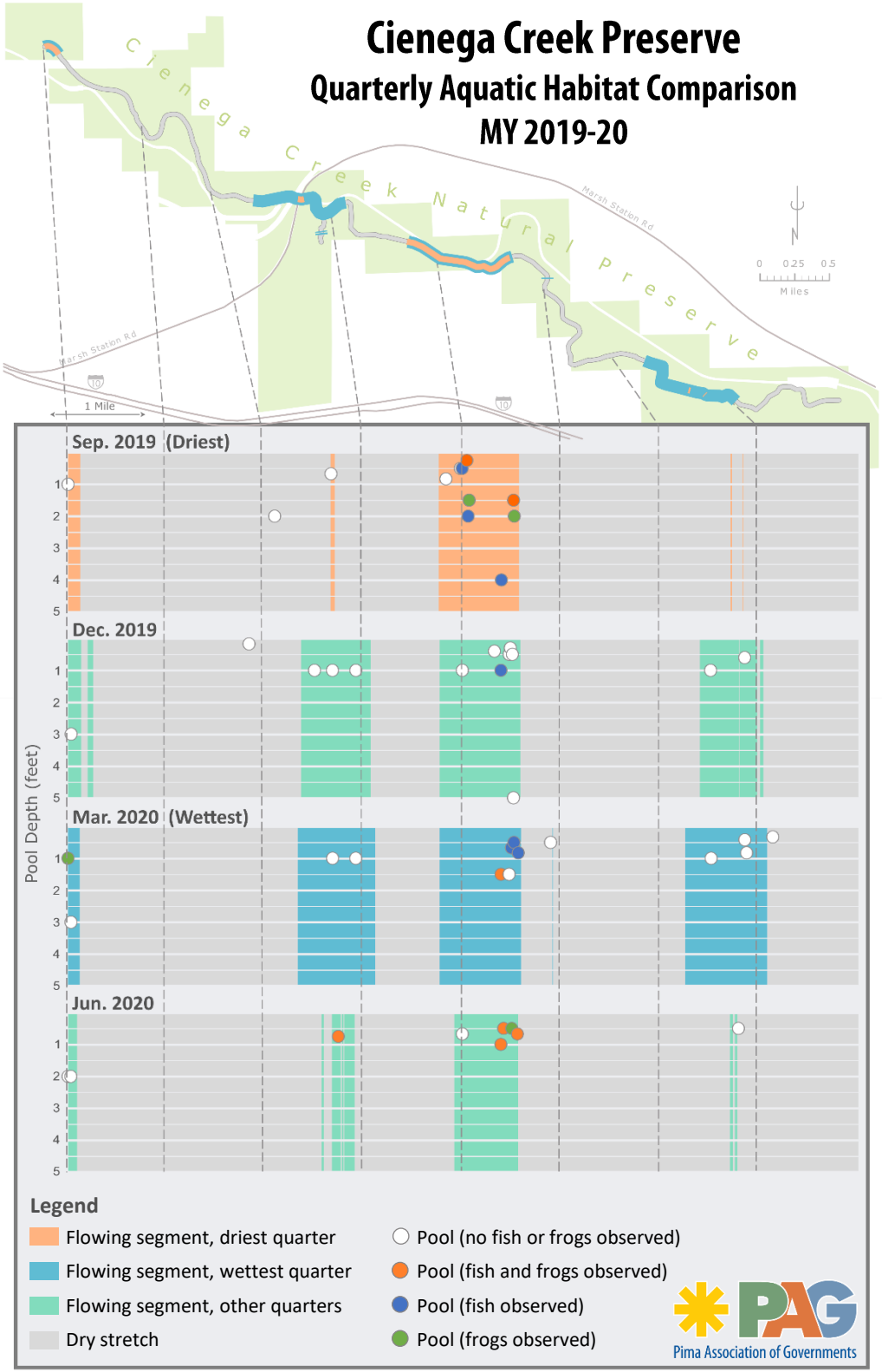
Photo © Jeff Simms

Gila Chub

Other species of conservation interest include Huachuca water umbel, canyon tree frog, Mexican garter snake, Sonoran Desert tortoise and the desert box turtle. If you observe any of these species or any nonnative species within the CCNP, please send photos and GPS coordinates to 208info@pagregion.com. We share wildlife observations with Pima County.

Cienega Creek Preserve

Quarterly Aquatic Habitat Comparison MY 2019-20



Seasonal Monitoring and Aquatic Habitat

In addition to flow extents, PAG monitors pool locations and depths within the CCNP. Depths are measured at the deepest point of pools. The chart at left provides a linear representation of flowing segments, pool locations and pool depths observed in Cienega Creek during MY 2019-20. The chart highlights the perennial and intermittent flowing reaches and pools across the seasons. Most pools occur within flowing reaches (see chart).

While fish and frogs are frequently seen in both flowing reaches and pools, PAG has observed the greatest diversity of fish species in pools. Pools can also more readily foster invasive aquatic species such as bullfrogs and some nonnative fish, so regular monitoring is imperative. The aquatic habitat provided by pools is particularly important in drier seasons, when flowing reaches are often shorter and more segmented. The unique geomorphology of pools is essential for supporting various life phases of many species.

No fish or frogs were observed in the upstream reaches during MY 2019-20. Species were confined to small segments of flow in September 2019, when minimal flow was observed following low monsoon precipitation. The fewest aquatic species were observed in December 2019. Some aquatic wildlife populations returned to the lower reaches after winter rains likely provided connectivity in stormflows and contributed to the maximal extent of baseflow observed in March 2020.

The chart below shows seasonal changes in pool depths since MY 2016-17. While most pools are relatively shallow (contributing to an average pool depth less than or equal to 2 feet deep), there are usually a few considerably deeper pools in the CCNP. These deep pools are especially important to the continued success of native fishes, leopard frogs and other aquatic species. During the past four monitoring years, maximum pool depths were seen in December, although December did not reflect the maximum flow extent for those years.