Lower Cienega Creek Walk Through

Pima Association of Governments' Wet/Dry Mapping Protocol

Documenting the intermittent flowing segments of the Pima County Cienega Creek Natural Preserve

Project Purpose:

The main objective of this monitoring project is to create a map that shows where water is present, and where it is absent, along 9 miles of Cienega Creek and the Davidson tributary on the Pima County Cienega Creek Natural Preserve, during 4 times of year. PAG and Pima County staff and community members will travel along the creek on foot using GPS units to mark the locations where water is present. The June walk is planned immediately prior to the Monsoon rains of summer. By mapping during the dry season, the minimal perennial extent of the creek flow is identified. By mapping at least 3 days after a storm when there is no runoff, information about river base-flow and the interrelationship between surface water and ground water is clarified. The goal of monitoring is to create a long-term record of flow trends, and a base dataset from which changes to water levels can be identified.

The purpose of this hydrologic monitoring program is to provide Pima County Regional Flood Control District with baseline information about groundwater levels and surface water flows in the Cienega Creek Natural Preserve. PAG has conducted this program since the late 1980s. The intent of the on-going program is to detect changes in the hydrology of the Preserve due to changes in land use in the surrounding area, such as increased development and groundwater pumping, and changes in climate, such as drought.

Mapping Protocol:

The segments of flow are GPSed as we walk the 9 mile length of the stream. The mapping may begin either at the upstream or downstream end, and noted as such. The GPS unit is loaded with datasets for orientation in the field. Prior to 2006, flowing lengths were been hand drawn onto aerial photo printouts during the hike. Locations were recognized by the meander of the creek and the land markers on the photo.

Wetted Length and Pools

GPS data collection will be taken either as points marking beginning or end of flow. The first GPS measurement should be taken at the beginning point of your monitoring segment on the creek. Include both ponded (stagnant) water and flowing/running water. Do not include wet dirt or stained area; map only the water surface. The last point should be where flow ends on the creek, including flow downstream of the dam.

The NEMO Guide describes the protocol for mapping in illustrated detail. PAG follows nearly the same protocol with a few more details and was a source of the protocol used by NEMO. Several other rivers are mapped each June throughout the state, using this protocol. Breaks in flow greater than 20 feet are GPSed as dry segments. Any breaks in flow less than 20 feet are noted, but they are not marked on the map or GPSed. Continuous flowing water that is greater than 20 feet is GPSed as flowing stream line

segments. Isolated pools within dry segments are GPSed as pool points if they are less than 20 feet in length. (>20 ft = flowing or dry segment, <20 wet ft = pool.) Pools within flowing sections of the stream are GPsed as points and noted as to their location in stream channel (for example, off channel, non-flowing, edge of stream, mid channel) . The approximate length of pools in the field is determined by pacing them off. One large stride is equal to about 3 feet.

Secondary Channels
We attempt to check all of the creek's channels. Sometimes the flow of the creek will be divided (with islands, etc. in the middle). The group spreads out as we move along the creek to make sure that we don't miss a parallel channel. Braided channels and multiple channels are marked as notes in the GPS database forms, but do not get counted as additional length if they parallel flow in the main channel. Side channels are mapped only if there is no flow in the primary channel.

Photos
Selected sites are photographed on a repeated schedule annually. Repeat photo locations are available on maps and stored in the GPS unit. Photo forms are filled out noting the photo number against the photo name, location, and description on the form. For additional photos featuring non-repeat sites, the subject matter is noted and a GPS location is taken if necessary. Past photos have occurred at varied frequency. In earlier year, they were not photographed regularly and for a period of a few years around 2010 they were repeated quarterly.

Wildlife
Note the presence of fish for every segment of flow and pool.
Incidental detections of species of interest are reported to the Office of Conservation Science for the Multi Species Conservation Plan. Note the person who helped to positively identify them. Species to GPS which may occur on Cienega include:

- Plants: Huachuca water umbel
- Mammals: Mexican long-tongued bat, Allen's big-eared bat, western red bat, southern yellow bat, lesser long-noesd bat, California leaf-nosed bat, Merriam's mouse (and tracks of large mammals)
- Birds: Burrowing owl, cactus ferruginous pygmy owl, Rufous winged sparrow, Swainson's hawk, Western yellow billed cuckoo, southwestern willow flycatcher, Abert's towhee, Bell's vireo
- Amphibians: Lowland Leopard Frog and the Canyon Tree Frog (and the invasive Bull Frog)
- Reptiles: the Mexican Garter Snake, Sonoran Desert Tortoise, Desert Box Turtle, the Sonoran Mud Turtle (and non-native turtles)
- Fish: Longfin Dace, Gila Top Minnow and Gila Chub.

Water Quality
A water quality measurement is taken with the Ultrameter before and after the Davidson confluence as well as in Davidson Canyon (sites descriptions and maps are on data forms).

Davidson Canyon
Upper Davidson Canyon, within the Pima County Preserve south of I-10, is mapped on a separate day.

<u>Target Conditions for Sampling:</u>
The hydrologic monitoring program is designed to collect water level and streamflow data during baseflow conditions. Baseflows are produced by discharges from the aquifer into the stream channel. For the purposes of this program, baseflows are considered to be flows without the direct influence from surface runoff. Streamflow measurements will not be collected during or immediately after a significant rainfall event. If rainfall occurs within three days prior to a scheduled field event, the sampling will be postponed until drier conditions prevail and runoff no longer has a direct influence on stream flow in the canyon. Field staff will not conduct field monitoring under hazardous conditions, such as during flood flows or lightning storms.

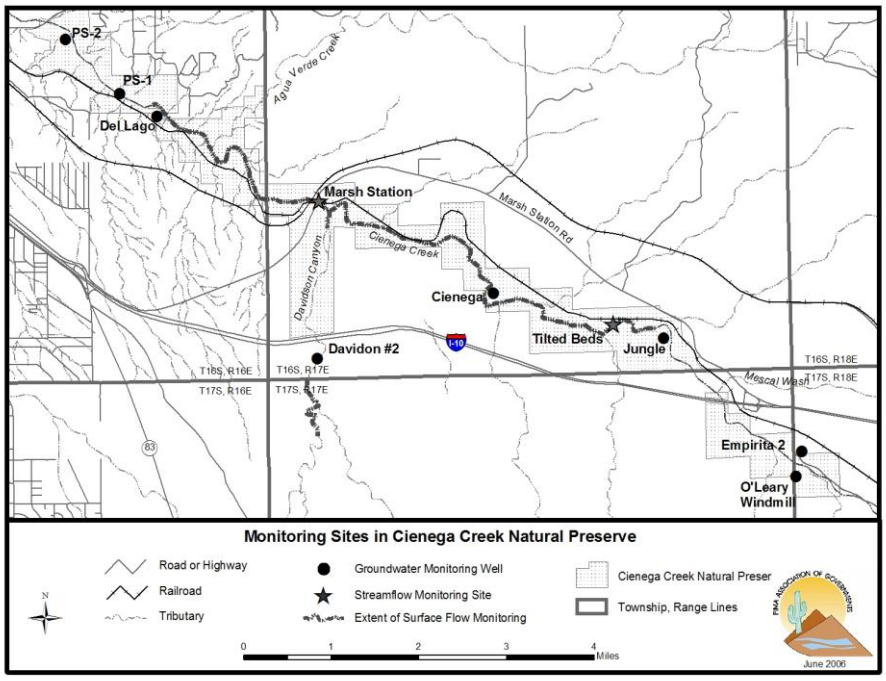
Base flow can be determined through County gages on the PC ALERT Web site. The USGS gage '09484600 Pantanto Wash is being decommissioned (2007). This gage was also used for at least one PAG report: 1998 Cienega Creek Surface Storm Flow Frequency Analysis. For monitoring purposes, we now refer to the PC Alert gages 4280, 4310, 4220, and/or 4250 for rainfall events and PCALERT stream gauge numbers 4283 (Cienega at I-10), 4313 (Davidson Canyon), and 4253 (Pantano at Vail). On the Web site http://alert.rfcd.pima.gov/scripts/pima.pl select stage, a time period, hit display and select a map.

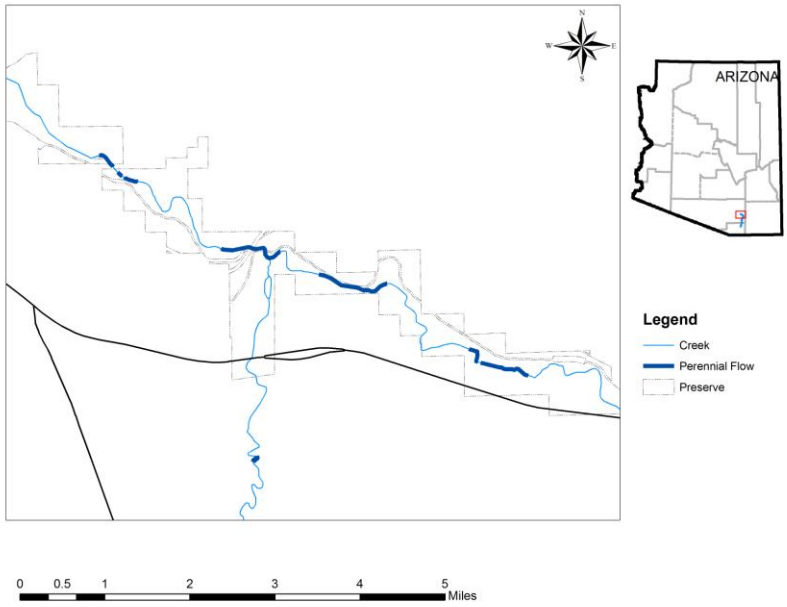
Monitoring Frequency:
Streamflow extent monitoring will occur on a quarterly basis. The quarterly monitoring will occur during the following months of the fiscal year: September, December, March and June. These months represent the Autumn, Winter, Spring and Summer seasons, respectively. Monitoring could occur during different months if necessary and appropriate. June walk through should be coordinated to occur near the same dates as the BLM walk through of upper Cienega.

Field notes:
Field notes will be written in pen. Field data sheets will accompany PAG personnel to each monitoring site. Field data sheets contain the following information per wet or dry reach: News / Outreach, Reporting of Human Activity / NPS Pollution, Seasonal Notes, Weather / Evidence, Pools Size (H x W x D), Head Cuts, Water Conditions, Odor /Color Changes, Flowing or Dry, Wildlife Visual Encounters, Riparian Community, Vegetation Health, Aquatic Life, Other Animals, Changes in Morphology, Banks, and Deposition.

Extra Precautions Taken by Field Crew:
Field personnel will carry a mobile phone while in the field. A first aid kit will be available in the vehicle. Notify Claire and PC that we will be out. Pack Monitoring Guide for emergency numbers. Call Claire by 1 and by 5 to check in. Take training by PC in criminal, wildlife, heat, and CPR matters.

Maps:


PS-2
PS-1
Del Lago
Agua Verde Creek
Marsh Station
Marsh Station Rd
Cienega Creek
Davidson Canyon
Cienega
Tilted Beds
Jungle
Davidon #2
I-10
T16S, R16E
T17S, R16E
T16S, R17E
T17S, R17E
T16S, R18E
T17S, R18E
Mescal Wash
Empirita 2
O'Leary Windmill
Monitoring Sites in Cienega Creek Natural Preserve
Road or Highway
Railroad
Tributary
Groundwater Monitoring Well
Streamflow Monitoring Site
Extent of Surface Flow Monitoring
Cienega Creek Natural Preser
Township, Range Lines
0 1 2 3 4 Miles
June 2006


ARIZONA
Legend
Creek
Perennial Flow
Preserve
0 0.5 1 2 3 4 5 Miles