California State Parks
Inventory, Monitoring, and Assessment Program

Topic: Groundwater Monitoring

Unit: Wilder Ranch State Park

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I. Introduction

The effect of fluctuating groundwater levels on stream watercourses in Wilder Ranch State Park is the main investigative concern of this study plan. Wilder Ranch State Park is notable because it encloses two other properties: the Santa Cruz City Landfill and Granite Rock Sand Quarry. Agriculture is also practiced year round on most of the park land between Highway 1 and the Pacific Ocean. Several wells have been drilled at various sites throughout the lower elevations of the park, and groundwater pumping for both agriculture and the sand quarry has been practiced for years.

As water is pumped from an aquifer, a cone shaped depression in the water table is created. If the rate of aquifer recharge is slower than the rate of extraction, a lowering of the water table will result, which may affect the level of associated surface water. In the case of wells situated close to marine waters, the lowering water table may lead to saltwater intrusion in both ground and surface waters. The wells at Wilder Ranch State Park pump slightly more water than is recharged in a given year, creating a "pumping trough" that extends about 100ft. below sea level. It is presumed that a mudstone layer has protected the aquifer from saltwater intrusion, but lack of a full knowledge of the subsurface geology precludes an assumption that this won't happen in the future.

The lower reaches of the perennial streams in Wilder Ranch State Park form small estuaries near the ocean. These small ecosystems have their own unique flora and fauna, including the potential role of nursery for fish species. To assure that these waters are not adversely affected by the overdraft of local groundwater, a monitoring program for groundwater is being implemented. The first step for such a program is to acquire an inventory of present day groundwater use in the park.

II. Study Objectives:

1.) Locate each operational well on Wilder Ranch State Park.
2.) Record who operates each well and what the water is used for.
3.) Determine trends in water pumping for each well and amount of water being drawn over time.
4.) Record what geologic layers are present and which aquifer is being drawn by each well.
5.) If possible, keep track of aquifer levels for each well.

III. Study Site(s)

Many of the wells drilled on Wilder Ranch State Park are private and permission must be obtained to use them for groundwater level monitoring.

Permission was obtained for:

- Route 1 Farms unused well

Stream study sites:

- Wilder Creek
- Sandy Flat Creek
- Lombardi Creek
- Baldwin Creek
- Majors Creek

IV. Methodology

1.) Before speaking to any of the farmers leasing land on Wilder Ranch State Park, the district land officer is consulted and a list of lessees is obtained.
2.) Each farmer is contacted and the project is explained briefly. Information on well location, water level depth, and amount of water pumped per month through the season is requested. Pumping capacity for each well should be noted. With the farmer's permission, a sample can be taken while the well is pumping to obtain an estimate of gallons/minute. The electric bill for each pump can also be used to get kilowatt-hour information; from that the amount of water pumped can be calculated by the following formula:

(#Watts used by pump/1000) x (# of kilowatt-hours used that month) x (# gallons pumped per minute) x 60 min./hour = # gallons pumped that month

A more accurate (and expensive) option is to install water flow meters on each well. This way water flow can be monitored more precisely while the pumps are operating.

3.) Drilling records are obtained. If they can be found, they are a source of information on total well depth, the geologic layers drilled through, and where the aquifer is located. A cross-section of each well can be made.

4.) Also, it is necessary to know which wells are screened and at what level. This will allow the investigator to know whether or not the cone of depression is influencing shallower aquifers or water tables near streams. This information may be found in drilling records or by contacting the well drillers. Those streams whose water tables might be influenced by groundwater pumping should be considered for future monitoring. Test wells are drilled in strategic locations to assure accurate groundwater level monitoring. A qualified geologist should be consulted for an accurate assessment.
5.) Groundwater levels can be monitored twice per year, before and after the growing season, to correlate those overall fluctuations with an estimate of the total water pumped that year. This is accomplished by using a water level meter. Note that all wells in question should be measured on the same day. Since doing this is predicated on whether or not permission is given by the owner of the well, this may or may not be part of the regular protocol.

V. Data Analysis and Archiving

All information pertaining to wells will be kept in both hand-written and word processor forms. If groundwater levels are monitored, the data will be stored in Excel and can be graphed over time for appraisal. All well pumping data will also be stored on Excel.
A summary will be written and given to the district Senior Ecologist, covering all groundwater wells and pertinent information concerning them. This will be considered an inventory of all operational wells in the park.

VI. Materials Needed

1.) Topo map of the area
2.) Datasheets to record information
3.) Water Level Meter (optional)
4.) Water Flow Meter (optional)

VII. Estimated Field Time and Staffing

Assuming full cooperation from the farmers, the baseline inventory could feasibly be done by one person in about sixty hours. If water level monitoring is done, it will take twenty or thirty hours more.