Groundwater Overdraft in the South Santa Rosa Plain

Most landowners in the unincorporated community of Penngrove rely on groundwater for water supply. Rohnert Park and northern Penngrove both share the same groundwater resource, the aquifers located in the southern portion of the Santa Rosa Plain subbasin (DWR 1982; DWR 2003).
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/1-55.01_Santa_Rosa_Plain.pdf
Petaluma and southern Penngrove share the aquifers of the Petaluma Valley basin.
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/2-1V3.1.pdf

However, there are no impervious geological barriers dividing the Santa Rosa Plain and Petaluma Valley aquifer systems. Most of the basins and subbasins in Sonoma County are hydraulically connected below the ground surface, as indicated by U.S. Geological Survey and DWR maps (USGS, 2003; DWR, 1975).
http://ca.water.usgs.gov/groundwater/gwatlas/coastal/aquifers2.html
http://ca.water.usgs.gov/groundwater/gwatlas/coastal/movement2.html
http://www.sonoma.edu/users/n/norwick/Document/Ford/FIGURE20.JPG

Contemporaneously with the Rohnert Park's urban expansion, water levels have declined by as much as 150 feet in Penngrove since the 1960s (RP, 2000).
http://www.penngrove.info/web-pix/pdf-files/rp_eir_groundwater.pdf
Many Penngrove landowners have replaced wells or lowered pumps more than once.
http://www.penngrove.info/GroundWaterOverdraftLetter.htm
http://www.penngrove.info/johnking-profile.htm
As a result of excessive pumping by the City of Rohnert Park and other factors discussed below, more groundwater is being pumped out than what is naturally put back or "recharged" into the aquifers. In hydrologic terms, this is called "overdraft." According to the California Department of Water Resources (DWR,2003):

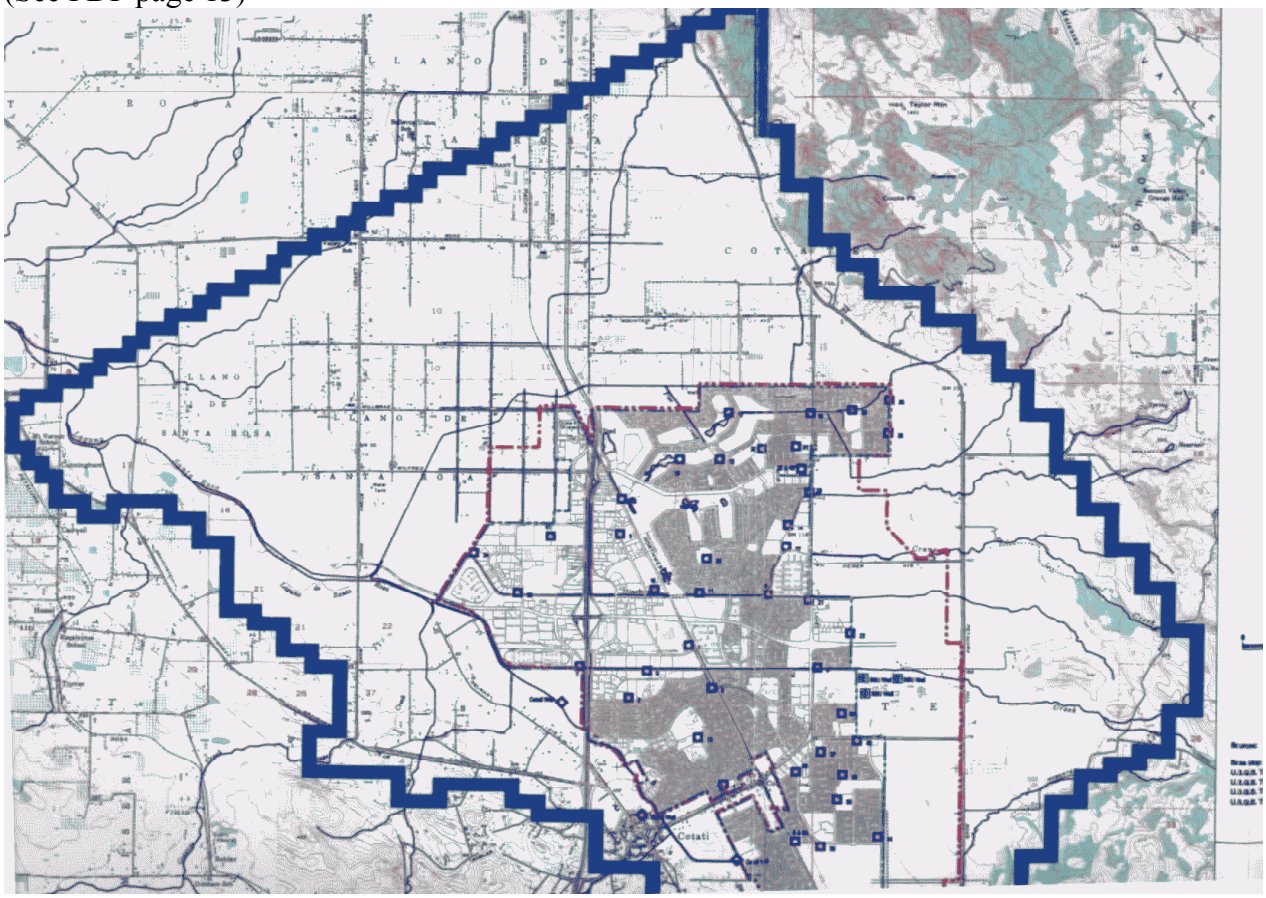
A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts.
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter6.pdf
(See PDF page 20)

For over 25 years, excessive groundwater pumping within the City of Rohnert Park has induced critical conditions of overdraft, causing outrageous water level declines and dry wells in Penngrove.

Rohnert Park EIR Groundwater Modeling Study

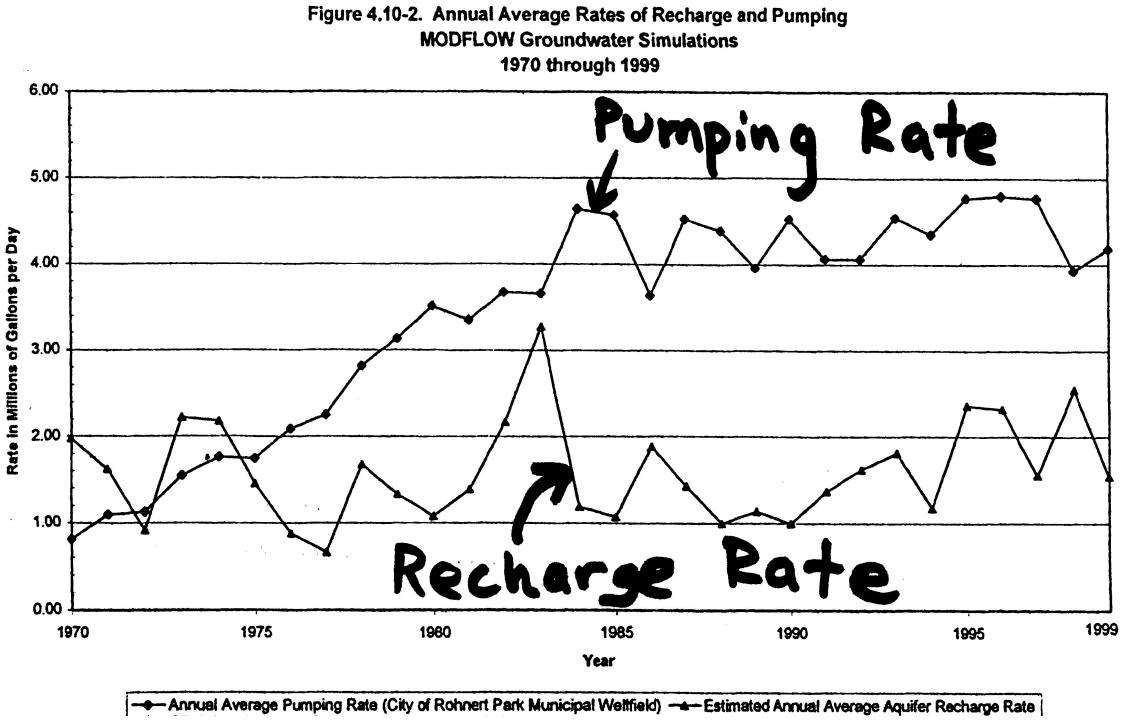
In the process of expanding its "Sphere of Influence" into Penngrove and other unincorporated areas, the City of Rohnert Park had to evaluate cumulative long-term impacts of its groundwater pumping from over 40 municipal wells since the late 1950s. A groundwater modeling study was included in the "Hydrology, Flooding, and Water Quality" section of the "Revised Draft Environmental Impact Report" (EIR) for the City

southern portion of the Santa Rosa Plain subbasin (the Subbasin) outlined in blue in Figure 4.10-3 of the EIR and shown below.
http://www.penngrove.info/web-pix/pdf-files/rp_eir_groundwater.pdf
(See PDF page 13)



The Subbasin encompasses the City of Rohnert Park, the City of Cotati, Sonoma State University, and outlying unincorporated areas including the northern portion of Penngrove (est. 1882). Rohnert Park (est. 1957), with a population of 42,500 in January 2003, is by far the largest water user within the Subbasin. Rohnert Park currently relies primarily on groundwater and secondarily on contracts from the Sonoma County Water Agency (SCWA) for water supplies.

http://www.rpcity.org/services/pwater.cfm



In Figure 4.10-2 of the EIR (see above), average annual recharge rates are compared with annual average pumping rates for the City of Rohnert Park's municipal wellfield. Since 1975, the pumping rate has exceeded the recharge rate, increasing from 1.7 mgd to an average of about 4.3 mgd since 1984. By its own admission, Rohnert Park extracts groundwater in gross excess of the estimated average recharge rate of 1.60 mgd (RP, 2000, p. 4-146).
http://www.penngrove.info/web-pix/pdf-files/rp_eir_groundwater.pdf
(see PDF page 15)

The modeling study indicates that the cumulative overdraft between 1975 and 1999 exceeds 20 billion gallons. Unfortunately, the modeling study ignored groundwater level declines and pumping in areas in rural areas within the Subbasin such as northern Penngrove. Adding up pumping by the City of Cotati (~0.4 mgd), Sonoma State University (~0.16 mgd), and northern Penngrove (~0.45 mgd), total pumping within the Subbasin in 1999 is conservatively estimated at 5.3 mgd, which is over three times greater than the modeling study's estimated recharge rate of 1.60 mgd. Considering areas outside the Rohnert Park limits and within the Subbasin, the cumulative overdraft between 1975 and 1999 may exceed 30 billion gallons.

Why "Safe Yield" is not Sustainable

Most policymakers assume that "safe yield" is a "sustainable" pumping rate equivalent to natural recharge. However, this assumption is flawed because it does not take into account discharges of groundwater into streams, springs, or marshes. An editorial by Marious Sophocleous in the prestigious hydrogeology journal, *Ground Water,* explains (Sophocleous, 1997):

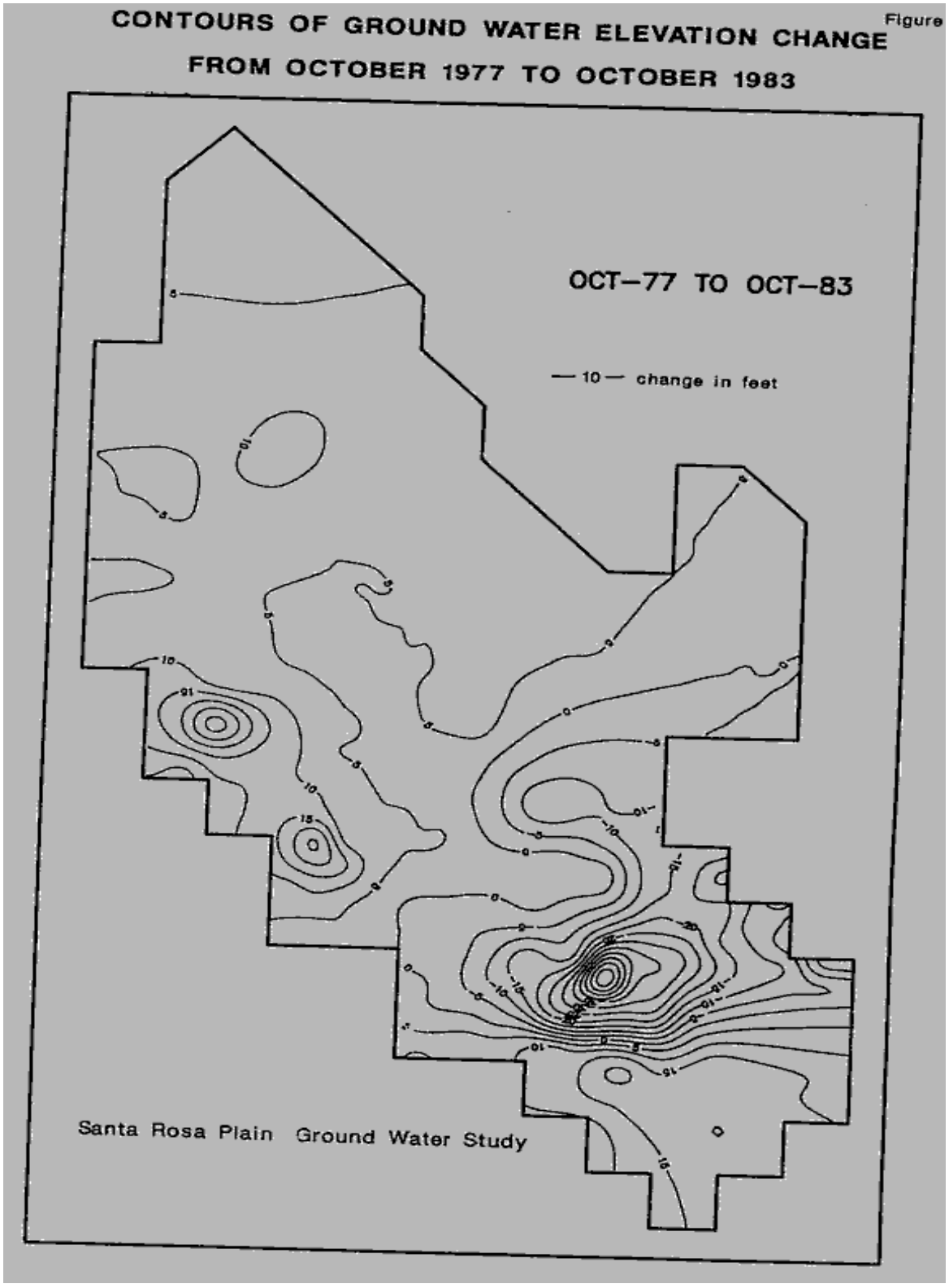
If pumping equals recharge, eventually streams, marshes, and springs dry up. Continued pumping in excess of recharge also eventually depletes the aquifer.

A better definition of safe yield would address the sustainability of the system – not just the trees, but the whole forest; not just the fish, but the marine food chain; not just the ground water, but the running streams, wetlands, and all the plants and animals that depend on it.

According to its own EIR, the City of Rohnert Park's groundwater pumping is in gross excess of safe yield defined by either natural recharge or Sophocleous's "sustainability of the system" concept.

Water Level Declines

In the 1950s, groundwater levels ranged from 5 to 20 feet below ground surface in the vicinity of Rohnert Park (Cardwell 1958). DWR (1987) mapped a "cone of depression" in the vicinity of Rohnert Park, including the largest water level declines between 1977 and 1983 shown below:



Parsons Engineering Science, Inc. (1995) noted drops in water levels as much as 130 feet between the 1960s and 1983. Between 1975 and 1999, water levels declined by 100-150 feet along the eastern boundary of the proposed Urban Growth Boundary, most of which presently consists of rural lands within the Penngrove community (RP, 2000, p. 4-146).
http://www.penngrove.info/web-pix/pdf-files/rp_eir_groundwater.pdf
(see PDF page 15)

According to unpublished 1996-2002 data from the City of Rohnert Park, water levels in some municipal wells occasionally drop to over 300 feet below ground surface. The full scope of the impact on outlying areas, including Penngrove remains uncertain due to lack

of a coordinated effort by local agencies and DWR to examine existing data and collect new monitoring data.

Adverse impacts to landowners are extensively documented by well surveys conducted by Penngrove resident John King in 1999 and 2003. In recent years, some Penngrove residents have resorted to trucking in water.

Groundwater Management

According to DWR (2003):

Groundwater management …is the planned and coordinated monitoring, operation, and administration of a groundwater basin or portion of a groundwater basin with the goal of long-term sustainability of the resource.
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter2.pdf

According to State law, groundwater management in California is the responsibility of cities, water districts or agencies, and the County (DWR, 1999).
http://www.groundwater.water.ca.gov/technical_assistance/gw_management/index.cfm
http://www.dpla2.water.ca.gov/publications/groundwater/gwm_report.pdf

Penngrove straddles the watershed divide between the Santa Rosa Plain subbasin and the Petaluma Valley basin. Penngrove is also vulnerably sandwiched between two large pro-growth oriented municipalities, Rohnert Park and Petaluma.

DWR (2003) identifies the Sonoma County Water Agency and the cities of Rohnert Park and Petaluma as the local agencies responsible for groundwater management in the regions near Penngrove.
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/1-55.01_Santa_Rosa_Plain.pdf
(see PDF page 4)
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/2-1V3.1.pdf
(see PDF page 5)

No groundwater management plans have been initiated by any of the responsible local agencies in Sonoma County (DWR (2003). In fact, SCWA and the North Marin Water District (which consumes 23% of SCWA's water allocation) are two of the few water agencies in California on record as having "no interest" in groundwater management (DWR, 1999).
http://www.dpla2.water.ca.gov/publications/gwm_report.pdf
(see PDF page 34)

Groundwater management is not even mentioned in the "Revised Draft Sonoma County Water Agency Water Policy Statement 2002."
http://www.penngrove.info/download_SCWA_Water_Policy_Draft.htm
Yet SCWA currently pumps over 5 million gallons per day, enough to supply about 30,000 residents, from its three "emergency wells" in the Santa Rosa Plain. And why are these emergency water supplies being pumped out (and exported to Marin) without a drought and without a plan for groundwater resource sustainability?

Sonoma County's local governmental power structure facilitates an opportunity for cities to overdraft the groundwater resource to the detriment of the rural areas because the Supervisors, who have the ultimate power in land use decisions, also serve as the Board of Directors for the SCWA:

- The cities vote in the Supervisors (the Water Board).
- The Water Board (the Supervisors) rules SCWA, which supplies water to the cities.
- The cities rely on growth for revenue, and the Supervisors (the Water Board) oblige on land use decisions.
- The Cities want more water, and the Water Board (the Supervisors) obliges on water supply decisions.
- The urban thirst for water induces groundwater overdraft into rural areas, and the Water Board, Supervisors, and cities shirk responsibility for groundwater management despite having the legal authority to do so.

It remains to be seen whether new state laws requiring proof of sufficient water supplies for new developments will have any impact on the power alliance between the Cities and the SCWA.
http://www.penngrove.info/sb610sb221explained.htm
The State has provided the County, cities, and SCWA with a step-by-step guidebook to integrating water and land use planning and groundwater management.
http://www.owue.water.ca.gov/Guidebook_101003.pdf
http://wwwdpla.water.ca.gov/cd/groundwater/gwab3030.html
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter2.pdf
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter3.pdf
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter4.pdf
The State also offers generous funding opportunities to local governmental agencies.
http://www.groundwater.water.ca.gov/financial_assistance_programs/index.cfm

Alternatives to local management of groundwater resources are lawsuits and adjudication. Adjudication is a court decision to strip local agencies of control and govern the basin through a court-appointed watermaster. Seventeen basins in California are adjudicated.
http://www.groundwater.water.ca.gov/technical_assistance/gw_management/index.cfm

Penngrove Lawsuit

The only effective groundwater management action to date has been a lawsuit filed in August 2000 by John King and the South County Resources Preservation Committee of Penngrove over the Rohnert Park EIR.
http://www.penngrove.info/johnking-profile.htm
As a condition of a settlement agreement, the City of Rohnert Park was required cut pumping in half before developing outside 1999 city limits and to request that SCWA develop a groundwater management plan for Rohnert Park. SCWA rejected this request, confirming that neither Rohnert Park nor the SCWA are willing to take on their

responsibility to manage groundwater resources in a sustainable manner.
http://www.penngrove.info/RP-demands-groundwater-Mgt-Plan.htm

Paper Water

The Sonoma County Local Agency Formation Commission (LAFCO) is charged with a state-mandated oversight role to stop misuse of land resources by discouraging urban sprawl and preserving agricultural land resources.
http://www.calafco.org/about.htm
LAFCO approved a gross misrepresentation available water resources with complete ignorance of the location of State-identified natural recharge areas. The Rohnert Park EIR erroneously stated a "planned" average *annual* allocation of 15 mgd from future SCWA contracts.
http://www.penngrove.info/web-pix/pdf-files/rp_eir_groundwater.pdf
(see PDF pages 8, 11)
According to SCWA (2000), Rohnert Park is allotted a "maximum *monthly* delivery rate" of 15 mgd with an *annual* limit of 6.7 mgd (not 15 mgd), which is less than 1999 demand of 6.9 mgd (RP, 2000).
http://www.penngrove.info/web-pix/pdf-files/UrbanWaterManagementPlan2000.PDF

Rohnert Park trumped up so-called "planned" future annual SCWA allocations by a factor of 2.5. However, both the 15 mgd and 6.7 mgd "planned" future SCWA allocation figures have proven to be "paper water" since the Friends of the Eel River Appellate Court decision of May 16, 2003.
http://www.penngrove.info/Eel-River-suit-impact.htm
http://www.penngrove.info/Eel-River-court-opinion.htm
http://www.penngrove.info/web-pix/pdf-files/Eel-River-decision-A098118.pdf

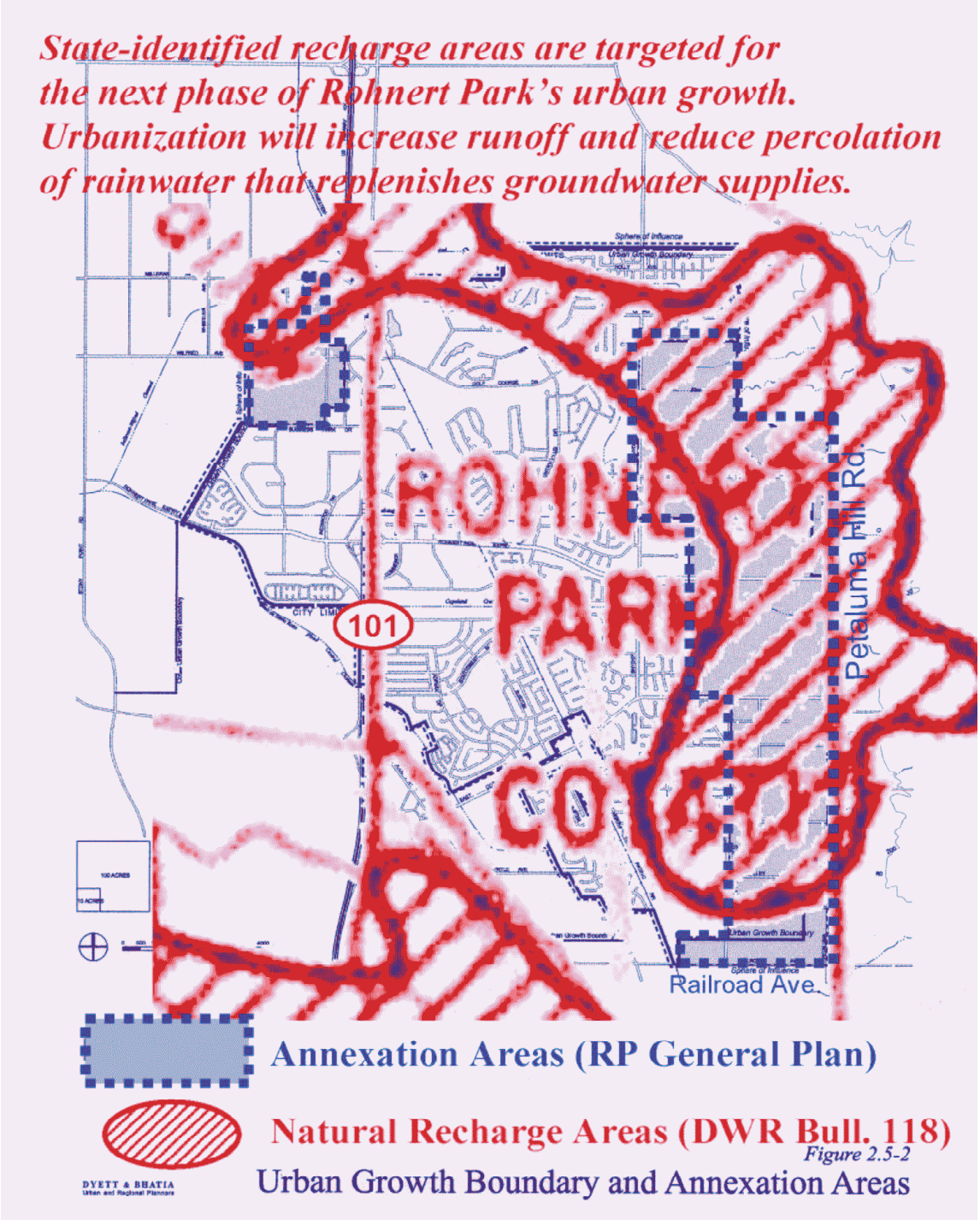
Rohnert Park's 2003 SCWA allocation remains only 5.2 mgd due to "temporary impairment" (SCWA, 2001).
http://www.scwa.ca.gov/newagreementhome.html
SCWA General Manager Randy Poole admits that the cause of "temporary impairment" is no longer only a matter of transmission capabilities, but of water rights.
"Contemplated" SCWA water supply increases of 35% are not legally secure (they never were), and current SCWA water rights may only suffice for a few more years of urban growth in Sonoma and Marin counties.
http://www.penngrove.info/SCWA-sets-limits.htm
Cities like Rohnert Park, Petaluma, and Santa Rosa based their urban growth plans through 2020 on the paper water of "contemplated" Eel River diversions - water supply projections that were not legally secure.

Next Development Target: Natural Recharge Areas

Much of the past, current, and future environmental impacts related to groundwater overdraft hinges on the fate of future land use decisions in State-identified natural recharge areas. Rohnert Park hopes to bail itself out of a multi-million dollar budget crisis, in large part, by developing lands identified by DWR (1975) as natural recharge areas.

http://www.sonoma.edu/users/n/norwick/Document/Ford/FIGURE15B.JPG
http://www.sonoma.edu/users/n/norwick/Document/Ford/FIGURE15A.JPG
The impact of covering over prime natural recharge areas with urban sprawl was not evaluated by Rohnert Park's EIR, either.

Large tracts of State-identified recharge areas are now engulfed by Rohnert Park's "Sphere of Influence." The City of Rohnert Park has specific plans to pave over these recharge areas with urban sprawl.
http://www.rpcity.org/cityhall/specificplans.cfm
As shown below, the recharge areas striped in red are targeted for future development within the "annexation areas" shaded in light blue with dashed borders:



If the current groundwater management policy of "no action" by local agencies continues, the recharge areas necessary for sustainability of the groundwater resource will

be covered over by urban sprawl. An unknown portion of Penngrove's groundwater resources will be permanently choked off, and future groundwater quality will be threatened.
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter2.pdf
(see PDF pages 20-21)

As explained by the State (DWR, 2003), safe yield is the amount of groundwater that can be withdrawn from a basin without adverse impact. Safe yield is reduced by urban development:

"One of the common misconceptions is that safe yield is a static number. That is, once it has been calculated, safe yield is the amount of water that can be extracted annually from the basin without any adverse impacts. An example of a situation in which this assumption could be problematic is when land use changes. In some areas, where urban development has replaced agriculture, surface pavement, storm drains, and sewers have increased runoff and dramatically reduced recharge into the basin. If extraction continues at the predetermined safe yield of the basin, water level decline and other negative impacts could occur."
http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter6.pdf
(see PDF page 21)
Rohnert Park's plans to urbanize recharge areas will drastically reduce safe yield.

Adverse Impacts

Groundwater levels beneath the Subbasin have steadily declined since the 1970s despite many years of average or above-average rainfall. Overdraft and lack of management have imparted and will impart substantial water quantity-related adverse impacts:

- Expansion of urban sprawl into recharge areas will reduce safe yield of groundwater pumping and will exacerbate flooding along the Russian River.
- Most of the Penngrove community has no water supply alternative, unlike Rohnert Park, which is a SCWA contractor. The domestic, agricultural, and business interests of the greater Penngrove community cannot risk degradation of the groundwater resource.
- Penngrove residents have endured the brunt of the financial burden of the overdraft through well replacement and pumping costs, while Rohnert Park residents have paid small flat fees for un-metered water usage with no penalty for waste.
- The City of Rohnert Park is situated over a 100 to 200 foot thickness of fine-grained basin deposits. Land subsidence is a possibility (Parsons Engineering Science, Inc., 1995). At least one municipal well has collapsed (verbal communication, City of Rohnert Park).
- Viability of agriculture, perceived as a primary attraction to Sonoma County, depends on shifting economics tied to both water quantity and quality.

Water quality issues cannot be ignored:

- Overdraft threatens intrusion of groundwater of inferior quality.
  http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter1.pdf
  (see PDF page 11)

- Seawater intrusion problems are occurring in the nearby Petaluma Valley and Sonoma Valley basins (UGSG, 2003).
  http://ca.water.usgs.gov/groundwater/gwatlas/coastal/quality2.html
- Water level decline has forced many Penngrove landowners to drill into the deeper Petaluma Formation, which produces poorer quality brackish water (DWR, 1982).
- Relatively high levels of arsenic and nitrate have been detected in some Rohnert Park city wells.
  http://www.rpcity.org/services/wquality.cfm
- Urbanization of recharge areas threatens water quality through infiltration of contaminants such as solvents and MTBE.
  http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118-Chapter2.pdf
  (see PDF pages 20-21)

Ignoring Past State Recommendations

The threat of critical conditions of overdraft is not new. According to DWR (1979):

- *The City of Rohnert Park has generated a composite pumping depression in the vicinity of its wells.*
- *The size of the pumping depression is dependent on the volume and rate of water pumped, and the rate of recharge.*
- *If future studies indicate that the basin is in a state of overdraft, a recharge program should be implemented.*

DWR (1982) identified a potential overdraft problem in the south Santa Rosa Plain over 20 years ago:

Care should be exercised regarding reliance on ground water as an unlimited source in the Santa Rosa Plain. Potential problems related to movement of fresh ground water and increases in pumping costs should be recognized, and further planning for water resources management should be initiated to better foresee and optimize the hydraulic and economic responses to water use in the entire Santa Rosa Plain.

Currently, the cities, county, and water suppliers lack technical expertise and genuine interest for groundwater sustainability. The City of Rohnert Park is now experiencing a multi-million dollar fiscal crisis, in large part because of unrealistic growth projections based on "paper water."
http://www.imakenews.com/calrac/e_article000131611.cfm
http://www.wbcounsel.com/Upload_Content/Pdfs/SB221legalelitePEG0202.pdf
Rohnert Park is finally installing water meters after being forced to do so (SCWA, 2001), at a cost of $2.55 million.
http://www.owue.water.ca.gov/finance/docs/PSP_114.PDF

Much of Rohnert Park's financial predicament originates from its unmanaged exploitation of groundwater resources. New State laws now reduce opportunity for receiving State funding for water projects and drought assistance if groundwater management plans are deficient or lacking.
http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab_0901-0950/ab_901_bill_20011009_chaptered.pdf
http://www.leginfo.ca.gov/pub/01-02/bill/sen/sb_1901

1950/sb_1938_bill_20020916_chaptered.pdf
Are Sonoma County's local governmental agencies responsibly preparing for the next drought?

What Next?

The SCWA, the cities, and the County must realize their responsibility to maintain sufficient and sustainable water supplies of potable quality for all citizens in Sonoma County. At present, private citizens are expending large amounts of time, effort, and money to convince local governmental agencies to assume their duty and responsibility for protecting water supplies, despite great resistance from those agencies. Eventually, a groundwater management plan and program must be developed by the SCWA, cities, and the County to ensure sustainability of the groundwater resources.

You can help!

Please contribute generously to the **O.W.L. Foundation** to ensure substantive action and wise decision-making for open space, water resources protection, and land use changes affecting Penngrove and other rural communities in Sonoma County.

Steven F. Carle, Ph. D.
Penngrove, California

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