WATER PLANNING AREA #9b -- CRESTON

WPA 9b encompasses that portion of the Paso Robles ground water basin that also coincides with the Huerhuero Creek watershed. The northwestern boundary is generally the boundary between urban land uses of Paso Robles and the agricultural uses surrounding Creston. The southern boundary follows the watershed boundary of the Huerhuero Creek. Purveyors include the Black Mountain RV Resort.

DEMAND

The development of demands for the San Luis Obispo (SLO) MWP Update involved collection and analysis of four types of existing data: 1) urban demand; 2) agricultural demand; 3) rural demand; and 4) environmental demand. Following the review of existing plans and data, existing demands for each of the four categories were prepared for each of the 12 WPAs. Next, data regarding growth and future water use was analyzed to develop a preferred approach for the development of future water demands. These future demands were then prepared and projected by the same four demand categories for each of the WPAs.

The total existing and future demands for WPA 9b are listed in Table 1. A discussion of demands by each category follows.

Table 1
WPA 9b Demand by Category[a]

Category of Demand	Existing Demand (ac-ft/yr)	Projected Demand (ac-ft/yr)
Urban	0	0
Agricultural	4,120	3,810 – 5,750
Rural	3,980	6,230
Environmental	NA	NA
Subtotal	**8,100**	**10,040-11,980**

a. All figures have been rounded to the nearest 10's.

Urban Demand

WPA 9b has no urban demand for the purposes of this study.

Agricultural Demand

This section documents existing and projected Gross Irrigated Water Requirements (GIWRs) for WPA 9b. The existing and projected demand figures relied upon published data and accepted methods, along with information gathered from extension agents, consultants, growers, and irrigation specialists. Tables 2 and 3 summarize the current and projected agricultural water demands for WPA 9b. Anticipated future changes in cropping acreage in the Creston WPA include a significant increase in vineyard coupled with declining alfalfa. The effect of this anticipated change in acreage contributes to projected increases in agricultural water demand.

Table 2
Existing GIWR for WPA 9b (AF/Yr).

Annual Gross Irrigation Water Requirement (AF/Yr)		
Low	**High**	**Average**
3,311	4,935	4,123

Table 3
Projected GIWR for WPA 9b (AF/Yr).

Low	High	Average
3,814	5,747	4,781

Procedures and Concepts

Estimating GIWR for local conditions can be characterized by the following general formula:

$$\text{GIWR} = \frac{\text{Crop ET} - \text{Contrib. from rain or shallow water table}}{(1 - \text{Leaching Requirement}) \times \frac{\text{Irrigation Efficiency}}{100}} + \text{Climate Control}$$

This analysis must be completed for each crop group, acreage, and weather pattern to calculate total GIWR (in AF) by WPA (WPA

Cropping Patterns
Table 4 summarizes estimates of irrigated cropping acreage for WPA 9b.

Table 4
Estimated cropping acreage for WPA 9b

Alfalfa	Permanent		Vineyard	Total
	Citrus	Decid.		
500	0	200	1,500	2,200

Source: Estimated from annual crop report, county GIS records and pesticide use records.

Crop Evapotranspiration
Several UC Cooperative Extension Leaflets describe estimating crop evapotranspiration (ETc) where:

ETc = ETo x Kc

ETc is estimated by multiplying the weather factor (ETo) with the crop coefficient (Kc). ETo values for the Paso Robles(49.2 in/yr) climate group were assigned to WPA 9b and Kc values are specific to the crop groupings (see Chapter 2). Yearly ETc totals for WPA 9b are summarized in Table 5.

Table 5

Yearly crop evapotranspiration (ft) for each crop group in WPA 9b

Alfalfa	Permanent		Vineyard
	Citrus	Decid.	
3.4	NA	3.1	1.4

Effective Rainfall

WPA 9b was assigned the Atascadero rainfall group ((23.1 in/yr) for the purpose of estimating effective rainfall (See chapter 2). Ranges of percentage of effective precipitation were applied to the crop groupings in WPA 9b and are listed in Table 6. Higher percentages were assigned to the deeper rooted crops according to their larger rootzone water holding capacity.

Table 6
Assigned ranges of typical effective precipitation for crop groups in WPA 9b

Crop Group	Effective Precipitation Range (%) [1]	
	Low	High
Alfalfa	40	60
Permanent		
Deciduous	40	60
Vineyard	30	50

1. As a percentage of total annual rainfall.

Frost Protection

Irrigation water is commonly applied for frost protection on grapes and strawberries in WPA 9b. The amount of water used for frost protection varies from season to season depending on the weather, and it varies from farm to farm depending on the system application rate. For the purpose of calculating applied water, 0.5 AF/Ac/Year is utilized for the water applied for frost protection on grapes. For the purpose of calculating applied water, 0.8 AF/Ac/Year is utilized for the water applied for frost protection on strawberries

Leaching Requirements

The amount of extra irrigation water, which needs to be applied to satisfy the leaching requirement for a particular crop, depends on the salt tolerance of the crop and the irrigation water quality. Ground water quality in San Luis Obispo County is typically adequate for crop production and does not necessitate additional *irrigation* water applied for leaching since it is typically satisfied by normal rainfall. Chipping et al. 1993 reports that of the wells tested in the Paso Robles Ground Water Basin Study, most of the wells tested have EC levels < 1.0 dS/m. Given these water qualities and salt tolerances typical with central coast crops, leaching requirements would be satisfied by rainfall.

Irrigation Efficiencies

Irrigation efficiency can be expressed by the following relationship:

Irrigation Efficiency = Distribution Uniformity x (1 – Losses)

The Cachuma Resource Conservation District routinely conducts irrigation evaluations in Santa Barbara and San Luis Obispo Counties and are excellent resource in describing the actual performances of irrigation systems in the region. Irrigation efficiencies were assigned to crop group according to prevalent irrigation system type and knowledge of typical local uniformities (Table 7).

Table 7
Assigned irrigation efficiency averages for each crop group in WPA 9b

Crop Group	Irrigation Efficiency Range (%)	
	Low	High
Alfalfa	60	70
Permanent	60	70
Vineyard	65	75

Existing Gross Irrigation Water Requirement by Crop Group
Existing GIWRs for WPA 9b are summarized in Table 8. The ranges provided in Table 8 do not represent the extremes in GIWR, but do represent the typical ranges in a normal year given local variations in effective precipitation and irrigation efficiencies. Table 2 summarizes the current agricultural demands for WPA 9b.

Table 8
Summary of Existing GIWR for WPA 9b by crop group (AF/Ac/Yr)

Alfalfa		Permanent-Deciduous		Vineyard	
Low	High	Low	High	Low	High
3.2	4.4	2.7	3.8	1.1	1.8

Future Gross Irrigation Water Requirements by Crop Group
Several issues would affect changes in future irrigation water requirements:

- Changes in cropping acreage and type of crop
- Changes in irrigation methods

Cropping Patterns

Trends in cropping patterns were examined through historical crop reports and previous water use projections completed by the Department of Water Resources. Table 9 summarizes projected crop acreages in WPA 9b.

Table 9
Projected cropping acreage for WPA 9b

Alfalfa	Permanent		Vineyard	Total
	Citrus	Decid.		
400	0	300	2,300	3,000

Irrigation Methods

Table 10 reflects the projected irrigation efficiencies by crop group in WPA 9b.

Table 10
Projected irrigation efficiencies by crop group in WPA 9b

Crop Group	Irrigation Efficiency Range (%)	
	Low	High
Alfalfa	60	70
Permanent	70	80
Vineyard	70	80

The same procedures that were utilized to calculate existing agricultural demands were utilized in estimating projected irrigation water requirements. The projected values reflect the changes in cropping acreage and irrigation efficiencies.

Table 11
Summary of Projected GIWR by crop group for WPA 9b (AF/Ac/Yr)

Alfalfa		Permanent-Deciduous		Vineyard	
Low	High	Low	High	Low	High
3.2	4.4	2.4	3.3	1.1	1.7

Rural Demand

Rural water demands in the Creston WPA include dwelling units scattered throughout the hills and valleys. The commercial areas are not included in Tables 12 and 13 below. Water is produced in private wells from the groundwater basin in the area.

Table 12
Current Demand – 1995

Population	Pop/Du	Houses	Duty (ac-ft/ac)	Demand[a] (ac-ft/yr)
6,832	2.92	2,340	1.7	4,080

a. Demand figure has been rounded to the nearest 10's.

Table 13
Projected Demand – 2020

Population	Pop/Du	Houses	Duty (ac-ft/ac)	Demand[a] (ac-ft/yr)
10,703	2.92	3,665	1.7	6,230

a. Demand figure has been rounded to the nearest 10's.

Data Deficiencies
The following additional data would improve the accuracy of this study:

- **Commercial**. A few commercial activities exist in the rural areas that were not accounted for in the urban demand. It represents a very small percentage of the total water used.

- **Dwelling Units**. The study was based upon population numbers, with an estimate of dwelling units derived from population figures divided by persons per household. Demand should be based upon a count of dwelling units by WPA. This information would be derived from assessor data.

- **Certificate Lots**. Many parcels of land in the area may be buildable. It is difficult to ascertain how many will be built upon.

Environmental Demand

Current Demands
Information on current environmental water demands is available from two sources:
1) conditions on water rights permits and licenses and associated orders on file with the State

Water Resources Control Board, and 2) agreements between the California Department of Fish and Game and other entities. A discussion of current environmental demands in WPA 1, as reflected in actual permit conditions, is presented below.

Huerhuero Creek (Unnamed stream tributary to Middle Branch Huerhuero Creek thence Huerhuero Creek)

"Should a continuous surface flow of water not occur at least once during the period of November 1 to May 1 of each season in the natural stream channel between licensee's dam and the State Highway 58 crossing in Section 5, T29S, R14E, MDBM, licensee shall release from his reservoir as soon after May 1 as feasible, all water collected in his reservoir during the November 1 to May 1 period. Licensee shall maintain a staff gage in his reservoir and shall report the staff gage reading as of November 1 of each year to the Board as soon as feasible thereafter (App. 23940, 16592, Per.Lic 11124). On or before June 1 of each year, licensee shall report to the State Water Resources Control Board whether release of water was required by the preceding paragraph, and if so, date that said release was completed."

Future Demands

The CDFG is currently developing a protocol for determining stream flow needs to protect environmental values (Waithman, CDFG, Yountville, personal communication, February 1998). This protocol is under development and has not been formally accepted or even formally proposed. It is presented here to indicate one estimate of possible future demand. This protocol has not been adopted by CDFG and if it were, other groups or agencies may not accept it. Key provisions may include the following:

- Reservation of 60% of the average annual unimpaired wet-season flow for instream habitat.
- Bypass of all natural flow during dry season (June to September).
- No diversions until stream flows to the ocean (sandbar breached).

WPA 9b is dryer than most of the other WPAs and many streams dry seasonally or during drought periods. None of the streams in this area support steelhead, resident rainbow trout, or other protected fish species. Many of the smaller streams probably do not support fish though western pond turtle, red-legged frog, and other aquatic dependant species may use ponded areas even during low flow periods. Stream flow is highly variable and runoff tends to be rapid after rainfall events. Future environmental water demand may be as low as 0 in drought years (similar to existing conditions). Based on the fact that these streams do not support protected fish species and given their intermittent nature the upper estimate for environmental water demand was relaxed to 60% of unimpaired average annual runoff.

Data Deficiencies

There has been no organized complete effort to quantify instream flow needs in streams of San Luis Obispo County. Studies have been conducted on some streams and restrictions have been placed on certain water rights permit holders to protect instream uses but these have generally focused on the needs of one or a few key species and have not resulted in clear, objective assessments of instream flow needs.

There is not sufficient data to complete a detailed analysis of environmental water demands for all streams in the County. There is no known data for unimpaired runoff for any stream though it is possible estimates could be developed from available rainfall data. The only readily available (electronic) data is from USGS and County maintained streamflow gaging stations. The USGS data presents average runoff estimates as well as minimum and

maximum runoff for each station but this data reflects existing water use and water project operations and in most cases does not reflect unimpaired conditions. Average runoff estimates could also be developed for the SLO gage data and discontinued USGS gages but the information would need to be in an accessible database.

A generic approach to instream flow needs assessment may be useful and data for such an assessment may be available. The County should consider a Tennant type approach using unimpaired runoff estimates generated from rainfall data. Given the wide annual variability in rainfall and runoff, an instream flow needs assessment should account for differences in normal, wet, and dry year flow needs. The County should also have all streamflow data entered in a computer database to facilitate its use.

Uncertainties

In many cases permit or license conditions do not specify a reservation of stream flow for environmental benefit. Rather, they are restrictions on use by individual rights holders. These restrictions are intended to provide benefits to fish and wildlife. However, it is not usually clear how restrictions on an individual water right interact with other water rights and effect streamflows. In addition, it is not always clear how permit conditions are interpreted in terms of an environmental demand. For example, many of the permit conditions call for a "visible surface flow" in a given stream but it is not clear how much water this represents.

Future environmental water demand is subject to great uncertainty due to lack of knowledge of instream flow needed to protect the aquatic resources, lack of information on existing runoff conditions and diversions, and the inherent annual variability in rainfall and runoff. For planning purposes, one could assume that the upper range of future demand will be defined by a percentage of the average annual unimpaired runoff (UAAR) during the wet season and no diversion during the dry season. This task is complicated since many streams are not gaged streams and unimpaired flow must be estimated using hydrologic modeling. This information is not presently available.

References

Stalnaker, C., B.L.Lamb, J. Henriksen, K. Bovee, and J. Bartholow. 1995. The Instream Flow Incremental Methodology: A primer for IFIM. Biological Report 29. U.S.D.I., National Biological Survey, Washington, D.C.

SWRCB, 1997. Staff Report Russian River Watershed. Proposed Actions to be taken by the Division of Water Rights on Pending Water Right Applications within the Russian River Watershed. Division of Water Rights. Sacramento, California

Supply

Water service to the Creston area is provided by small, isolated water systems that lack interties.

Groundwater Supply

Table 14 lists the ground water basins in WPA 9b. WPA 9b includes the Paso Robles ground water basin and the upstream basins of Pozo and Cholame. Agricultural water uses are predominant. The Regional Water Quality Control Board had a study of the Paso Robles ground water basin performed by the Coastal Resources Institute at Cal Poly State University for the purpose of establishing best management practices and salt objectives on which the

basin plan was to be based. This report identifies the water quality issues within particular areas of the Paso Robles basin. Some of these issues include native boron and salinity, geothermal waters, and agricultural and municipal salt loading and locally high nitrate concentrations. Water planning will need to include the impact of future uses and management strategies on water quality as it relates to the basin objectives.

Table 14
WPA 9b Ground Water Basins

Basin Name	Basin Area in Square Miles	Basin yield with original descriptive term in acre-feet per year	Production - year in acre-feet
Paso Robles	640 [16]	47,000 total annual recharge [16]	104,621 - 1986[17]
Pozo	5.6 [6]	1,000 safe available storage [6]	300 - 1958 [6]
Cholame			

6. California Department of Water Resources, 1958, San Luis Obispo County Investigation: State Water Resources Board Bulletin No. 18, vol. I and II.
16. California Department of Water Resources, 1979, Ground Water in the Paso Robles Basin: Southern District Report.
17. San Luis Obispo County, Department of Planning and Building, 1991 Annual Resources Summary Report.

Data Deficiencies

The estimates in Table 14 represent the results of published data from numerous sources, some of which are as much as 40 years old. It is also important to note that most of the basins have not been studied in detail, and true perennial yield values are not known. Thus, much of the information does not reflect current conditions, population, water usage, and agricultural trends. It also tends to point out the necessity of developing new data to more accurately describe the hydrologic conditions of the basins. Most of the estimates of ground water extraction are at least 10 years old.

Uncertainties

The Paso Robles ground water basin has been broken into three different sub-basins (WPAs 9a, 9b, and 9c) based on geologic structure, hydrology and water use. The level of investigation done by previous studies (DWR, 1979 and DWR 1958) performed for the entire Paso Robles ground water basin does not appear to provide sufficient detail for planning purposes. The entire Paso Robles basin yield of 47,000 AF/yr is shared among the three sub-basins and the percentage of yield each has access to is undetermined.

The “basin yield” values described in the table reflect the results of a variety of methods of determining yield, including annual recharge, safe yield, seasonal replenishment, and net safe annual extractions, and thus may or may not reflect an accurate perennial yield value for the basin.

Surface Water Supply

In addition to ground water, an estimated 263 AF/yr of appropriated flows along the Huerhuero Creek supplies water to WPA 9b. (Source: Water Rights Information Management System printout Dated April 23, 1998 from the State Water Resources Control Board for all water rights in SLO County.)

Uncertainties

While the water rights information states the amount of water individuals and agencies are entitled to withdraw, it does not tabulate actual withdrawals. For example, an owner may be entitled to divert 86,000 gallons per day from May through October of each year. This does not mean that the owner typically diverts this each and every day for six months. On the other hand, this same owner may, in a dry year, want to divert his full entitlement over the six month period. However, if there is not enough water in the creek to support his diversion, it may not be physically possible to divert the full amount.

The reader is alerted to this especially when interpreting the estimates of appropriated stream flows stated in Table 14.

DEFICIENCIES

The Creston area has relatively small demand, but is seeing an increase in vineyard development. It has no practicable alternative supply options.

Table 15
Existing (ac-ft/yr)

Demand	Grndwater Supply	NonGrndwater Supply	Total Supplies	Balance (Deficiency)
8,100	48,000	263	48,263	40,952-39,328

a. Balance (Deficiency) figure has been rounded to the nearest 10's.

Table 16
Projected (ac-ft/yr)

Demand	Grndwater Supply	NonGrndwater Supply	Total Supplies	Balance (Deficiency)
10,040-11,980	48,000	263	48,263	38,220-36,280

a. Balance (Deficiency) figure has been rounded to the nearest 10's.

Alternatives

No future water supply options for WPA 9b were considered for the purposes of this study.