

Water Conservation FACTSHEET



**BRITISH
COLUMBIA**

Ministry of Agriculture and Food

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WURLD Water Use Reporting and Land-use Database

The Water Use Reporting and Land-use Database (WURLD) is a management system incorporating meter data, climate data, legal property information, physical property information, such as crops, irrigation systems and soils, into one database. This database is used to keep track of land use changes, water meter data and climate data. The climate data and physical property information are used to calculate what the theoretical water requirement for the property would have been during a specified period. The program can calculate a theoretical water requirement on a monthly basis to correspond with the meter reading that are taken monthly, or for any time period where climate data exists. WURLD produces water reports for the district to distribute to growers and provides tools to analyze data. The information from the database also has the potential to be used with a geographical information system to visually display the data gathered in the district.

This program is useful for water conservation programs, allowing the water purveyor to manage the demand on its water supply rather than increasing the supply by expensive upgrades to infrastructure.



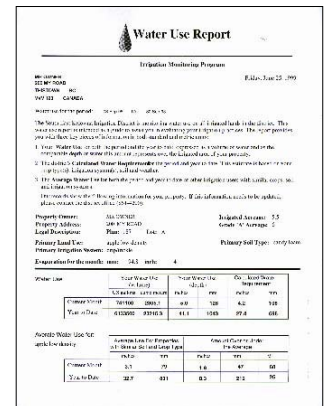
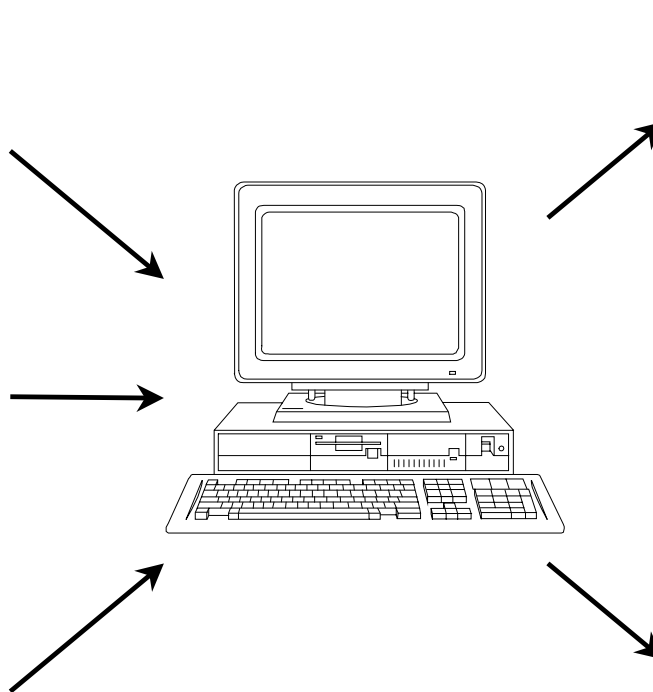
Climate data



Meter data



Land-use information



Water Use Reports

Information
for the
Irrigation
District

Figure 1

Data Management System

The main menu of WURLD shows the options the program offers. There are four main parts; the land-use database, the water use report, the manager's report and data import functions. See Fig. 2. Statistics used in the reporting of the water use information are calculated each month and can be updated from this window at anytime.

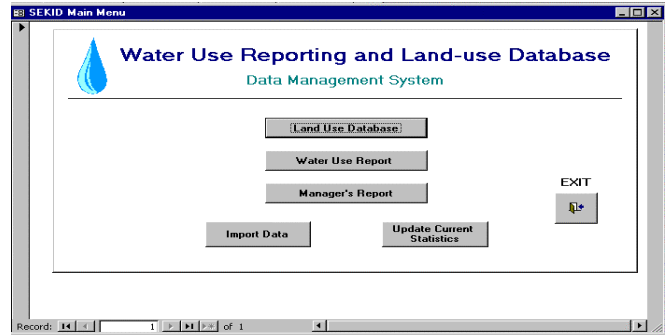


Figure 2. Main menu of the database

Data Collection

A complete land-use survey using recent air photographs and a ground checks can provide the initial land use data required. Information on crop-type, planting density, soil types and irrigation system must be recorded along with legal property information. The land-use data is updated yearly before the irrigation season begins. Up to three crops with two irrigation systems for each crop can be entered for each property. See Fig. 3. Climate data is monitored at a climate station in the irrigation district. Evaporation, measure directly with an atmometer, and precipitation can be recorded on a datalogger. The datalogger can be accessed remotely through a telephone line to downloaded information as required for the water requirement calculations.

Water meter data is collected monthly, as close to the beginning of the month as possible. The meter data is collected using a meter gun that reads the meter information from a sensor pad installed in the top of the irrigation service box. The information is stored electronically and downloaded to a data file at the district office then imported in to the data management system. Meter and climate information can also be gathered and entered into the database manually.

Land-use

Land-use information is input manually through the Land Use Information form. There are seven sub-forms accessed through this form; Property Information, Crop and Irrigation System Information, Meter Information, Meter Addition, Property Notes and Mailing Address are all used for data input while Water Requirement Specific Time Period allows crop water requirement between two dates to be calculated. The Water Use and Water Use Reports sections are used for data retrieval.

Up to three crops with two irrigation systems for each crop can be entered for each property in the Crop and Irrigation Systems sub-form. See Fig. 3 and Fig 4. This information along with soil and climate data is used to calculate the water requirement for each property.

	<p>Crop and irrigation data input</p> <ul style="list-style-type: none">Apple 60% of the total property area<ul style="list-style-type: none">50% of apples irrigated by drip50% of apple irrigated by sprinklerPasture remaining 40% of the property area<ul style="list-style-type: none">100% of pasture irrigated by sprinkler
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Figure 3. Example of a crop / irrigation system assessment

The Property Information sub form contains legal information, soil type and the irrigated acreage associated with the property. The Meter Information sub-form contains information on all irrigation and domestic meters associated with the property.

A specific property or owner can easily be searched for using the Find Record button.

Property Information
Contains legal and owner information associated with the property. Soil type and the irrigated acreage are also recorded

Water Use
Enter a date, the actual water use for that month is compared to the calculated water requirement.

Calculated the water requirement

Meter Information
All meters associated with the property can be accessed here.

Meter Addition
This form allows new meter to be easily added.

Crop and Irrigation
This is where the crop and irrigation systems on the property are entered.

Search easily for any owner or property

Water Use Reports
A water use report for this specific property can be printed or reviewed from this window. The date in the water use section above determines the period for the report printed. To print water use reports for the entire district at one time go to the Data Management Systems window

Crop and Irrigation : Form

CROP AND IRRIGATION

Crop 1 Type	Crop 1 - % Area	Crop 2 Type	Crop 2 - % Area	Crop 3 Type	Crop 3 - % Area
apple	50	pasture	40		
Irrigation System 1	Irr. 1 - % Area	Irrigation System 1	Irr. 1 - % Area	Irrigation System 1	Irr. 1 - % Area
drip/trickle	50	hand move	100		
Irrigation System 2	Irr. 2 - % Area	Irrigation System 2	Irr. 2 - % Area	Irrigation System 2	Irr. 2 - % Area
hand move	50		0		
Cover Crop		Cover Crop		Cover Crop	
			Total Crop %	100	

Record: 1 of 1 (Filtered)

Figure 4. Land use information - data input forms

Calculated Water Requirement

The water use in the report and on the land use form are calculated on a monthly basis. However irrigation does not always take place in neat monthly packages. For example a farmer may irrigate starting the June 24 and end July 2, the water use for this time period is split between two reports. The district can use the window shown in Fig. 5 to calculate the water requirement for that specific time period.

Water Requirement Calculation

$$\text{Water Requirement} = \frac{S_w * E_T * K_c}{A_e}$$

Where: S_w = soil factor
 E_T = evaporation (measured)
 K_c = crop coefficient
 A_e = irrigation system efficiency

The requirement for each area is calculated taking into account the percent area of land each crop type and irrigation system covers.

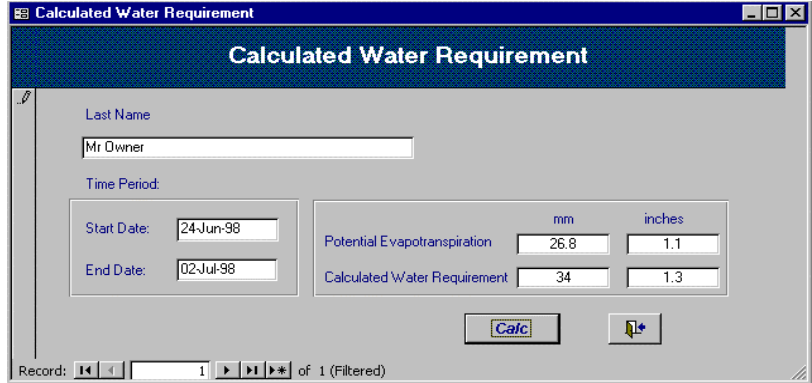
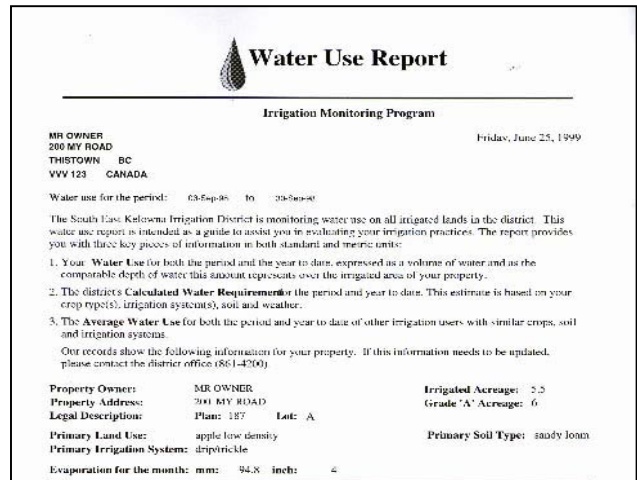


Figure 5. Calculate the water requirement for any date

Water Use Report

The water use report provides information on the monthly water use, the water use to date for the present irrigation season (calculating from the first irrigation of the season) and the calculated water use requirement. The actual water use is also compared to the average water use in the district for properties with similar crops and soil types, see Fig. 6. This can be modified to include the average for properties with similar crops, soil and irrigation systems.



Water Use	Your Water Use (volume)		Your Water Use (depth)		Calculated Water Requirement	
	US gallons	cubic meters	inches	mm	inches	mm
Current Month	741100	2805.06	4.96	126	4.85	123
Year to Date	6133500	23215.3	41.07	1043	32.33	821

Average Water Use for: apple low density	Average Use for Properties with Similar Soil and Crop Type		Amount Over or Under the Average		
	inches	mm	inches	mm	%
Current Month	3.12	79	1.84	47	60
Year to Date	32.73	831	8.34	212	25

Figure 6. Example of a water use report

Geographical Information Systems (GIS)

The database has the potential to be linked with a GIS for further data analysis or to visually display information. This is useful to see the distribution of land uses or irrigation systems. By separating the information into different layers information can be cross-referenced. An example of this would be looking at the soil information layer and the water use distribution to compare high water use areas to areas that have course soils.

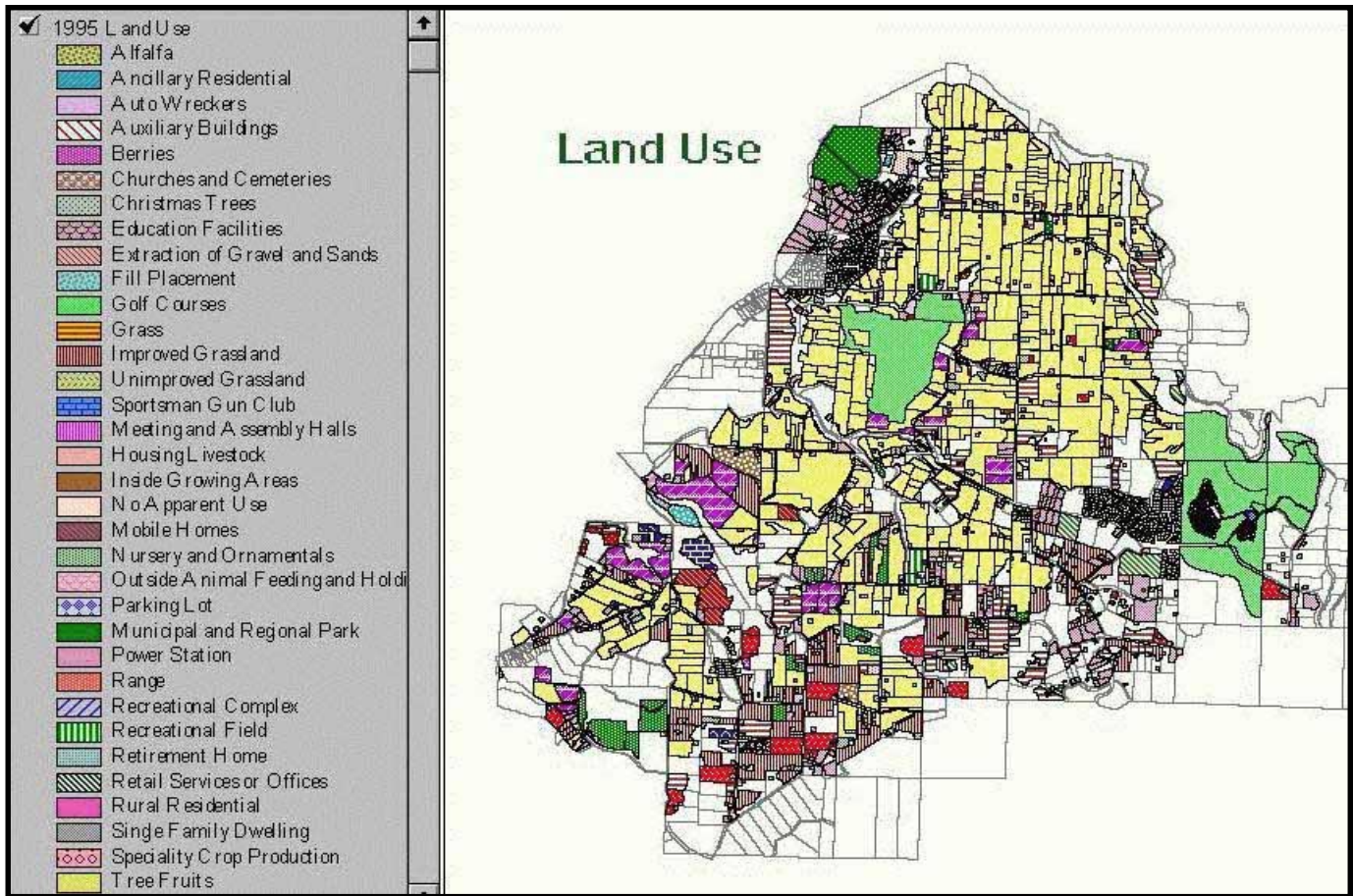


Figure 7. An example of land use information displayed using ArcView

Managers Report

The manager's report can be tailored to the requirements of the irrigation district manager. The manager may want to know what the average water use for each crop is and what the highest water use for each crop is. The report can also list the highest water users for each crop and the irrigation district can then direct irrigation scheduling advice to these properties.

The actual water use is compared between properties using the depth of water applied on average to the crop. The volume of water applied, recorded by the meter, is divided by the irrigated area. It is therefore important that the irrigated area is recorded correctly in the database. If the irrigated area is recorded as higher than it actually is the water use in depth would look lower than it actually is. The irrigated area is printed on the water use reports and the property owners are encouraged to keep the district staff updated if they make any changes.

Product Availability

This program can be used by metered irrigation districts to monitor water use and provide water use reports to landowners in the district. The program can be adapted to work with any metering system.

The WURLD program has been developed by the Resource Management Branch of the Ministry of Agriculture and Food. It is available FREE for use with the provision that any improvements on the database are made available to the Ministry to add to future versions of WURLD.

FOR MORE INFORMATION CONTACT

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