Reference Evapotranspiration Maps for Colorado

by
Luc Claessens
Luis Garcia
Robert Lange
Marvin Jensen

January 1994

Completion Report No. 182

Colorado Water
Resources Research Institute

Colorado State University

Reference Evapotranspiration Maps For Colorado

by

Luc Claessens, Luis Garcia, Robert Lange,
and Marvin Jensen.

Agricultural and Chemical Engineering
Colorado State University

January 21, 1994

Grant No. 14-08-001-G2008-2

Project No. 4

The research on which this report is based was financed in part by the U.S. Department of the Interior, Geological Survey, through the Colorado Water Resources Research Institute; and the contents of this publication do not necessarily reflect the views and policies of the U.S. Department of the Interior, nor does mention of trade names or commercial products constitute their endorsement by the United States Government

---

Colorado Water Resources Research Institute
Colorado State University
Fort Collins, Colorado 80523
Robert C. Ward, Director

Abstract

The Integrated Decision Support Group (IDS) at Colorado State University has developed a set of monthly reference evapotranspiration (ETr) maps for the western slope of Colorado. The reference evapotranspiration maps were developed using geographic information systems (GIS) to manipulate spatial data. After the monthly alfalfa-based ETr maps were complete, a Graphical User Interface (GUI) was developed to allow the user to interactively view and query the maps. In accordance with current developments in the irrigation science community, the Penman-Monteith was used to calculate ETr and alfalfa was selected as the reference crop for this study. Data parameters required as input for the Penman-Monteith equation are maximum and minimum temperature, relative humidity (or dew point temperature), solar radiation, and wind-speed. During the course of this project, several data sources have been identified. Where possible, data have been subjected to a quality check.

Index

I. Introduction

The Integrated Decision Support Group (IDS) at Colorado State University has developed a set of monthly reference evapotranspiration (ETr) maps for the western slope of Colorado. The reference evapotranspiration maps were developed using a geographic information systems (GIS) to manipulate spatial data. After the monthly reference maps were complete, a Graphical User Interface (GUI) was developed to allow the user to interactively view and query the maps. This research was jointly sponsored by the Colorado Water Resources Research Institute (CWRRI) and the State Engineer's Office of Colorado. The results of this study could be used as a standard source of evapotranspiration reference maps for the Western Slope of Colorado if adopted by the State Engineer's Office.

During the course of this project, effort was spent in collecting all available sources of climate data for each parameter and consolidating them into one system in the form of spatial data or digital maps. The Penman-Monteith equation was used to produce monthly alfalfa-based ETr maps that can be displayed in a GUI. In combination with crop specific coefficients, these maps can be used to determine crop water requirement estimates that are useful for planning and managing water resources.

The Geographic Resources Analysis Support System (GRASS) is used for the manipulation of spatial information. Individual climatic data types can be displayed spatially in raster maps. In addition to raster maps, vector and site maps are included. Vector maps are used to display county boundaries, roads, river systems, the continental divide, etc. Site data includes the position of weather stations, county capitols, etc. The system also provides analysis capabilities such as "zooming" into areas, interactively querying raster cell values, and displaying more than one map at a time. The GUI is based on a mouse-driven approach with menus and pop-up windows.

II. Reference Evapotranspiration

(i) Introduction

The most important factor in the determination of the expected water use of a land area is evapotranspiration. Evapotranspiration is a combination of water loss through evaporation and plant water use or transpiration. A common method to determine the rate of evapotranspiration of agricultural land, is to estimate the evapotranspiration rate for well-watered reference crop and subsequently apply crop coefficients to determine the evapotranspiration rates of other crops. Crop coefficients are specific for each crop at a given growth stage.

In the literature, several methods can be found for calculating ETr. In accordance with current developments in the irrigation science community, the Penman-Monteith has been adopted for calculation of ETr. The Food and Agricultural Organization of the United Nations (FAO) and the United States Department of Agriculture Soil Conservation Service (USDA-SCS) are currently considering adopting the Penman-Monteith equation as the standard equation for ETr. There are several reference crops that can be used with the Penman-Monteith equation, alfalfa was selected as the reference crop for this study.

(ii) Penman-Monteith Equation

The Penman-Monteith equation, originally proposed in 1965 by J.L. Monteith, is a physically based form of the Penman combination equations. Previous adaptations of the Penman equations required a local calibration of the wind function based on empirical observation. The later Monteith version; however, does not require any calibration, but instead includes a resistance parameterization of the stomatal and aerodynamic resistance.

Data parameters required as input for the Penman-Monteith equation are maximum and minimum temperature, relative humidity (or dew point temperature), solar radiation, and wind-speed. Allen et al. (1989) provides a complete description of the Penman-Monteith equation and an explanation of its computational assumptions.

III. Data Identification

The following data inputs are required by the Penman-Monteith equation:

- Temperature (minimum - maximum)
- Humidity (relative humidity or dew point)
- Solar radiation (global measurements or cloud cover)
- Wind-speed (mean daily)

(i) Data Sources

During the course of this project, several data sources have been identified. The main objectives in source selection were; data format (digital format preferred over hard-copy), data accessibility, and the possible cost of purchasing data.

Weather data have been identified and collected from the following sources (Appendix A, presents an overview of the selected stations):

- COAGMET - Colorado Agricultural Meteorological Network. This network is comprised of stations managed by USDA, USDA-ARS, NCWCD-Loveland, CSU-extension, SCD, Onion Growers, Bean Growers, and others. Data collection and database maintenance are performed by USDA-ARS. This data source can be accessed directly through CSUnet.
- WTHR - Weather Temperature Humidity Radiation. Station maintenance and data collection are performed by Joint Center for Energy Management. Monthly summaries are presented in Colorado Climate, a publication of the Colorado Climate Center.
- RAWS - Remote Automatic Weather Stations. Station maintenance and data collection are performed by both BLM and USFS. Database access is through the Western Regional Climate Center ar Reno, NV, from where data can be purchased.
- UCC - Utah Climate Center. Station and database maintenance are by the Utah Climate Center, from where data purchases can be made.

IV. Data Quality Verification

Where possible, data have been subjected to a quality check. It was determined that two types of parameter data were the most susceptible to measurement errors, solar radiation and relative humidity (dew point).

To quality check solar radiation data, monthly solar radiation reference values obtained from the Colorado Climate Center were compared to data from other sources. WTHR solar radiation data were found to have many errors; therefore, care was taken not to heavily rely on this particular data source for subsequent ET calculations.

To quality check humidity, data from WTHR and UCC were compared. Both sources have relative humidity as well as dew point temperature data. Using the Tetens equations described in Allen et al. (1989), dew point temperature can be estimated given the minimum temperature and corresponding maximum relative humidity. For UCC data, 15% of station-months records were rejected based on a maximum allowable difference of ± 4^{o} C between recorded versus predicted values of dew point temperature. In a similar analysis for WTHR data, it was concluded that only data recorded after August 1988 were valid. Also, since the published monthly summaries revealed many obvious errors in data representatively, the rejection procedure of WTHR data was very rigorous. Only 45% WTHR station-month data were validated.

V. Data Analysis

In the project area, 65 stations were selected to collect most of the input data required for ETr calculations using the Penman-Monteith equation. Of these 65 stations, 52 RAWS stations did not collect solar radiation measurements. In order to come up with predictions for an areal ETr, an approach was sought to allow the extrapolation of point measurements to their appropriate areal representation. The main focus was given to the solar radiation and humidity components.

(i) Cloud-Cover

Within the project area, several National Oceanic and Atmospheric Administration (NOAA) second order weather stations recorded cloud-cover observations. To determine the spatial distribution of solar radiation, cloud-cover can be interpolated. This can be done by using the functional relationship of cloud-cover to extra-terrestrial horizontal radiation, to calculate the desired global horizontal radiation. This relationship is given generally as:

$$Rs = [(a+b)\cdot s]\cdot Ra \tag{1}$$

where; Rs = global horizontal radiation; Ra = extra-terrestrial horizontal radiation; s = cloud-cover; and a and b are constants. The extra-terrestrial radiation, Ra, can be obtained using procedures in Heermann et al.(1985) or Allen et al. (1989).

Based on hourly observations converted to daily weighted averages, a regression analysis was performed for three NOAA first order weather stations. Figures 1, 2 and 3 give the respective graphical presentations, while Table 1 presents the result of this analysis.

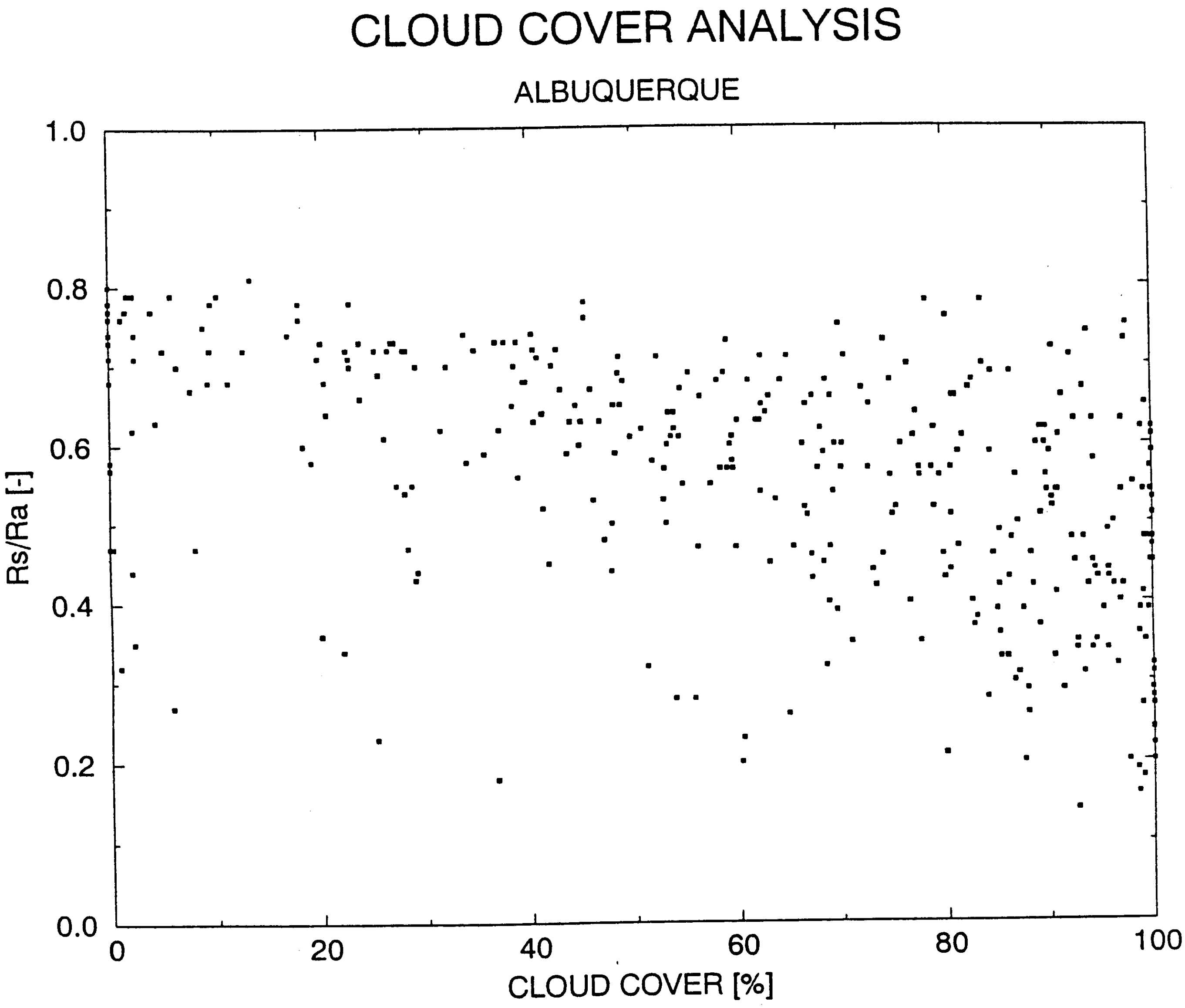


Figure 1: Graphical representation of the regression analysis performed for the Albuquerque, NM, NOAA first order weather station.

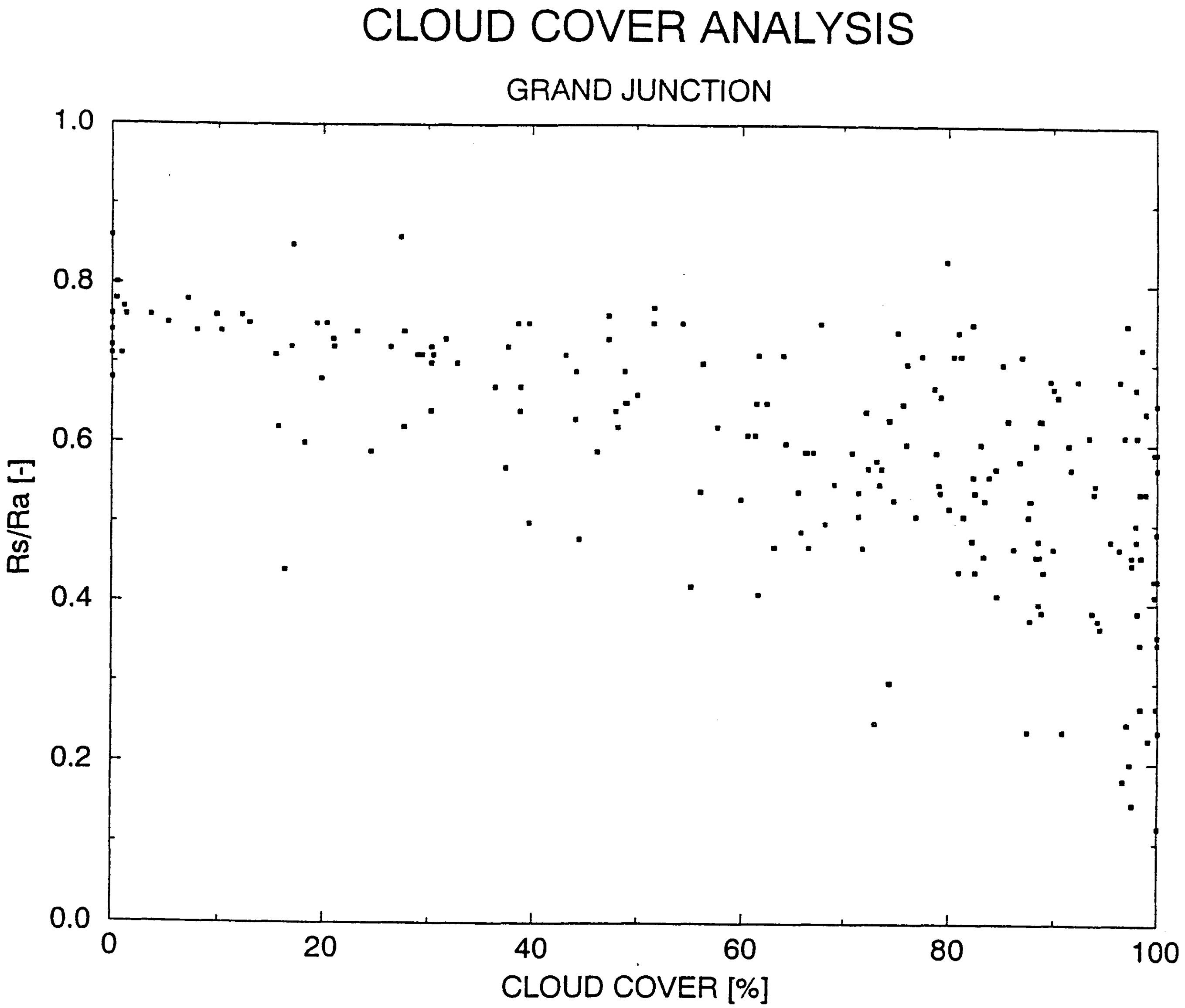


Figure 2: Graphical representation of the regression analysis performed for the Grand Junction, CO, NOAA first order weather station.

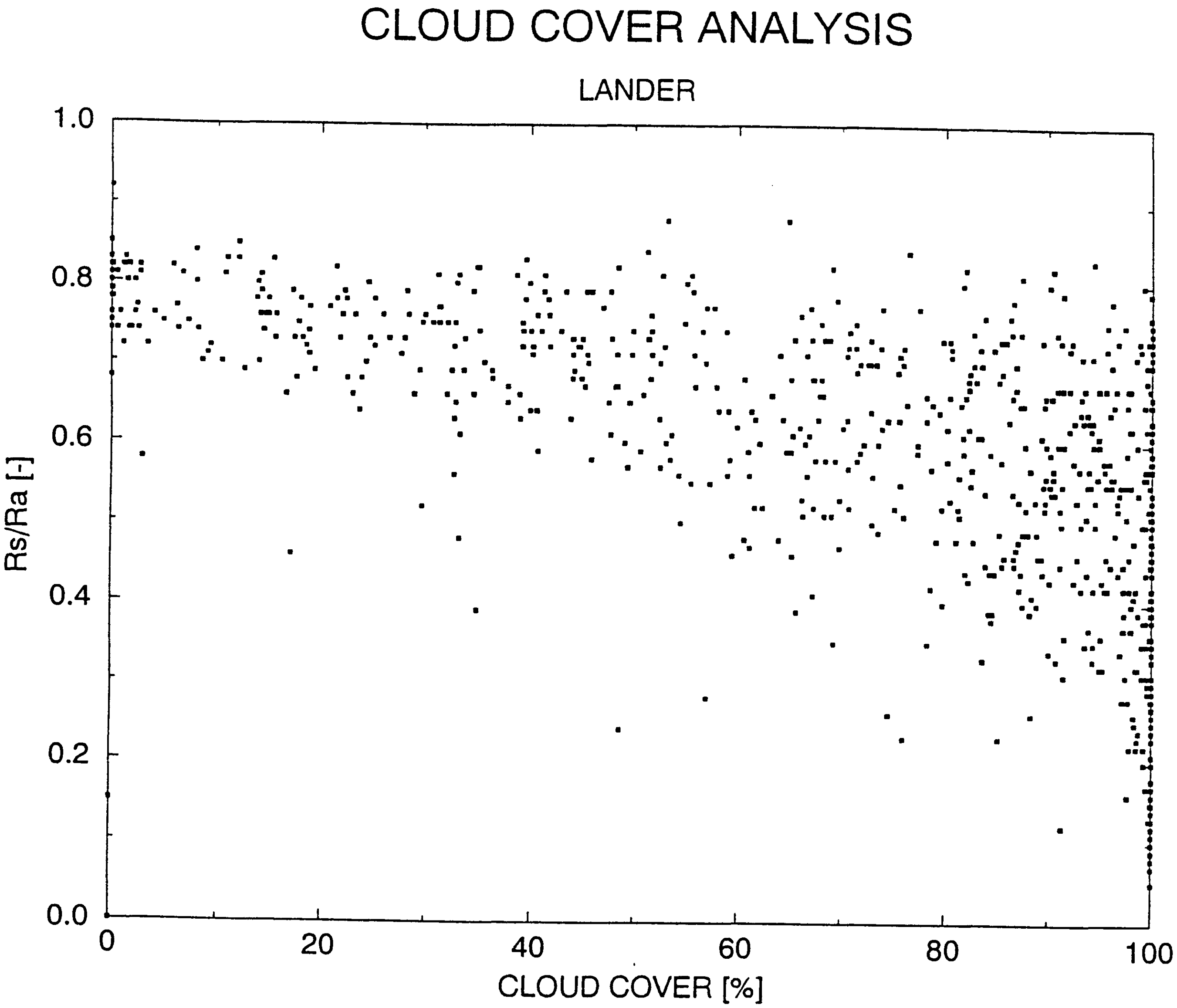


Figure 3: Graphical representation of the regression analysis performed for the Lander, WY, NOAA first order weather station.

Table 1: Results of the Analysis for Three NOAA First Order Weather Stations

Station	Coverage	Days	Function	R2
Grand Junction, CO	04/05/88 - 08/31/90	210	Rs/Ra =.78 -.31*S	.41
Albuquerque, NM	01/01/88 - 05/31/91	353	Rs/Ra =.70 -.24*S	.24
Lander, WY	01/15/88 - 03/31/92	760	Rs/Ra =.82 -.34*S	.36

From these results, it can be concluded that a strong relationship between Ra/Rs and cloud-cover does not exist and an empirical relationship for global horizontal radiation estimates can not be legitimized.

(ii) Dew point Temperature

In the project area, there exists a dense network of National Weather Station (NWS) weather stations that record precipitation, maximum and minimum temperature. About 120 stations are located within the project area. These stations are located in different soil/vegetation environments, and give a representative picture of temperature on a spatial scale.

Apart from solar radiation, one of the main driving forces in the evapotranspiration process is the vapor pressure deficit. Since the actual vapor pressure is being obtained through the dew point temperature, a regression analysis was performed for dew point temperature versus minimum temperature. The results of this analysis are presented in Table 2. Figures 4 and 5 give the graphical representations. From these results it can be concluded that there does exist a strong linear relationship between dew point temperature and minimum temperature.

Table 2: Dew point Temperature Analysis

Source Station	Months	Equation	R2
WTHR	188	Tdew =.84 * Tmin - 4.36	.92
COAGMET	92	Tdew =.74 * Tmin - 1.11	.83
UCC	223	Tdew =.53 * Tmin - 5.72	.79
RAWS	2920	Tdew =.79 * Tmin - 4.40	.95
Total	**3423**	**Tdew =.78 * Tmin - 4.40**	**.93**

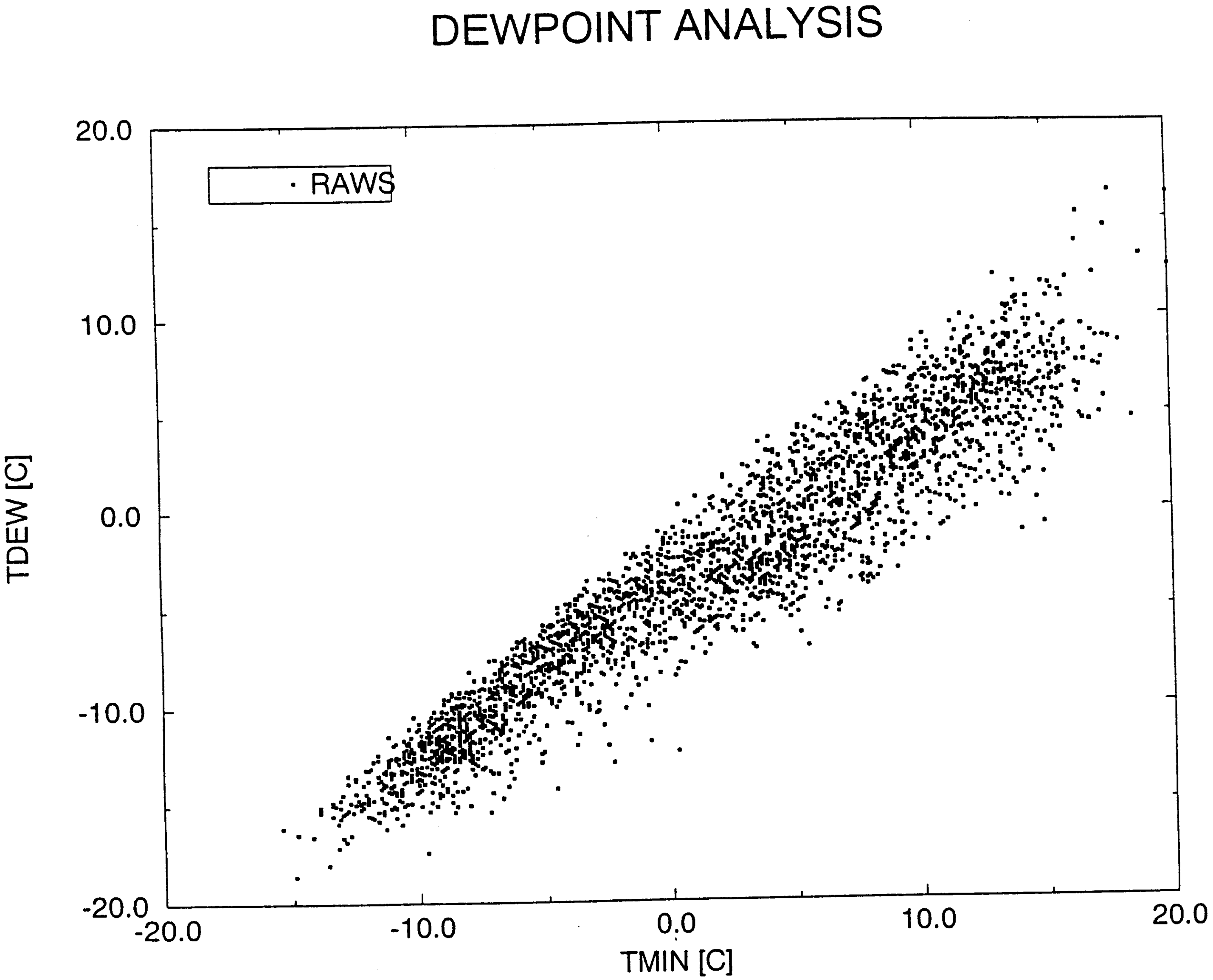


Figure 4: Graphical representation of the regression analysis performed on dew point temperature versus minimum temperature for the RAWS weather stations.

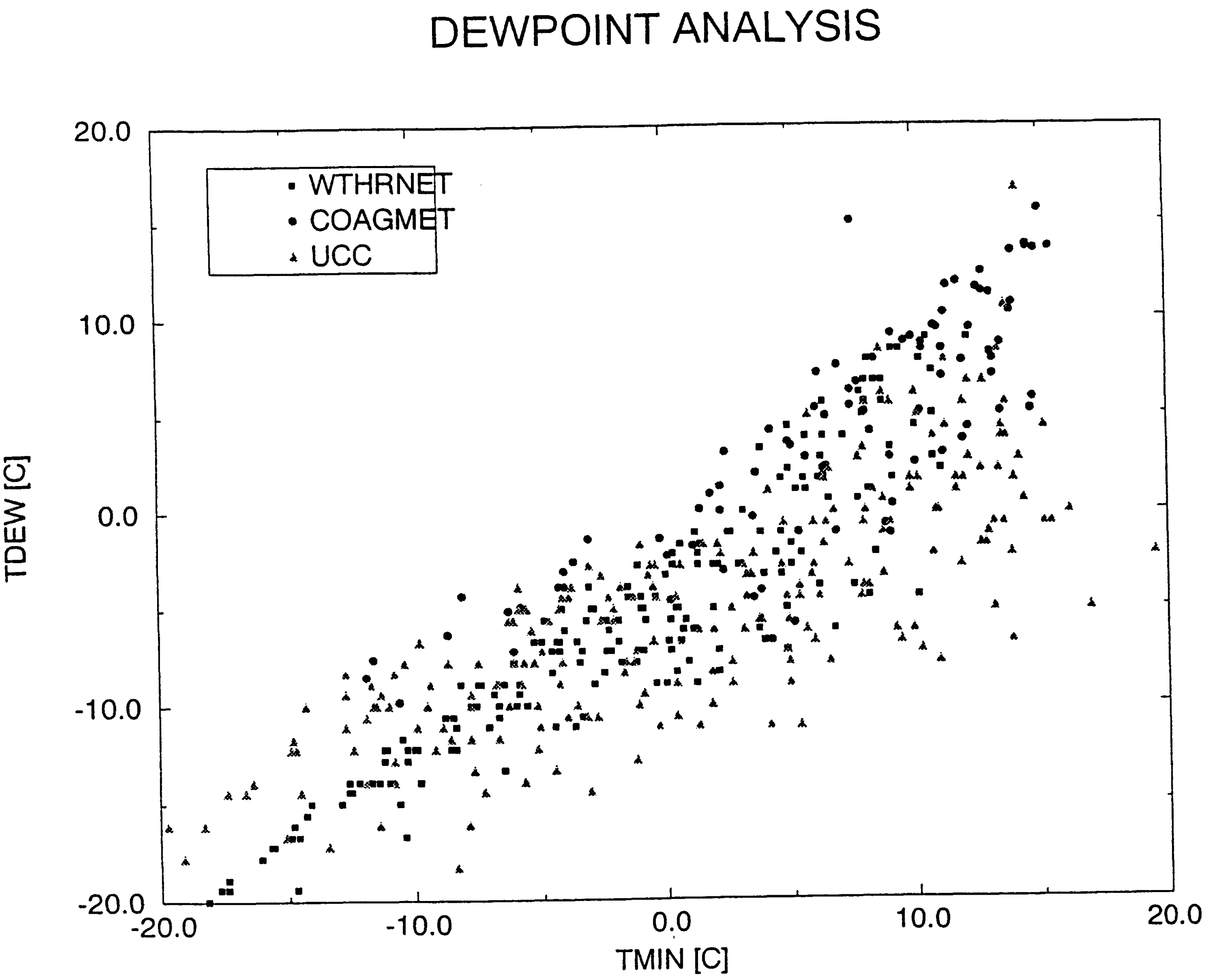


Figure 5: Graphical representation of the regression analysis performed on dew point temperature versus minimum temperature for all weather stations, besides RAWS.

VI. Areal Reference Evapotranspiration

Since one of the main objectives of this research was to provide representative estimates of ETr, effort has been directed toward representing spatial variability. Since the 65 stations used for this study only give point estimates, research was done to determine the best way to use spatial interpolation and regression techniques.

Although many data collection sites only have a relatively short record length, average monthly values were assumed to be representative of the long term average value at a particular data collection site. Differences in record length and their effect on long term variability have not been accounted for in this research. The following sections will give a brief summary of the procedures used with their respective results.

(i) Solar Radiation Zones

In order to obtain ETr estimates for the RAWS sites, solar radiation data have to be generated. From the previous discussion related to the cloud cover in section V, it was decided cloud-cover data could not be used for this purpose.

In 1992, the Colorado Climate Center developed a solar radiation classification for the state of Colorado, dividing the state into 25 climate divisions. For each climate division, monthly average values were given for the global horizontal radiation. These values were based on solar radiation measurements and the effect of topology and precipitation. This regional solar map was overlaid on the RAWS sites, and the corresponding monthly average solar radiation values were adopted.

(ii) Multiple Regression Analysis

After obtaining ETr estimates for all 65 stations, these point estimates have to be transferred to an overall areal representation. Making use of the relatively dense NWS station network, the Colorado Climate Center solar radiation classification, and a digital elevation map (30-second topography data from NOAA); values for the respective data parameters within a functional interpolation scheme were determined.

The next step is to relate these data parameters and other derived parameters to the ETr estimates obtained at each station. Consequently, making use of the results of the dew point analysis, ETr was tested on its correlation with the following parameters:

1) elevation
2) maximum temperature
3) minimum temperature
4) maximum minus minimum temperature
5) average temperature
6) dew point temperature
7) vapor pressure deficit
8) extraterrestial horizontal radiation
9) global horizontal radiation
10) net radiation

The result of this analysis is presented in Appendix B. For each month of the year the correlation matrix is given for ETr versus the above mentioned data parameters.

Because of the high degree of cross correlation and a possible high degree of uncertainty through inclusion of the derived humidity data parameters (dew point temperature and vapor pressure deficit), it was determined that ETr could best be estimated through a multiple regression on maximum temperature, minimum temperature, elevation, and global horizontal solar radiation. However, preliminary ETr contour maps revealed that the combined effect of elevation and solar radiation gave undesirable spatial patterns in some areas. This was due to the generation process of the regional solar maps, which already included a dependency on topological features. As a final result, ETr was solely estimated on the variables maximum temperature, minimum temperature, and elevation.

Table 3 gives the results of the monthly regression analysis. It can be observed that, especially in the late fall/early winter months, the correlation coefficients (R2) are relatively low. However, through combining all the monthly regression relations into an overall yearly comparison, a correlation coefficient (R2) of 0.96 has been obtained.

Table 3: Monthly Reference Evapotranspiration (ETr) Regression Analysis

Month	a[a]	b	c	d	R2[b]
January	0.08970	0.00788	0.00018	1.73711	0.48583
February	0.0645	0.03281	0.00019	1.57022	0.49798
March	0.02516	0.06640	-0.00021	2.55114	0.74777
April	0.14178	0.08252	0.00012	3.10291	0.82140
May	0.17127	0.06661	-0.00035	3.97033	0.70312
June	0.26415	0.03800	0.00020	3.66269	0.76388
July	0.29556	0.07140	0.00039	0.23520	0.73160
August	0.31067	0.06391	0.00052	0.40307	0.69027
September	0.21374	0.06028	0.00031	1.36550	0.56579
October	0.17126	0.01969	0.00018	3.76318	0.50013
November	0.10107	0.01230	0.00019	1.57759	0.36399
December	0.09420	0.01632	0.00020	1.59160	0.37171
				Total	0.95644

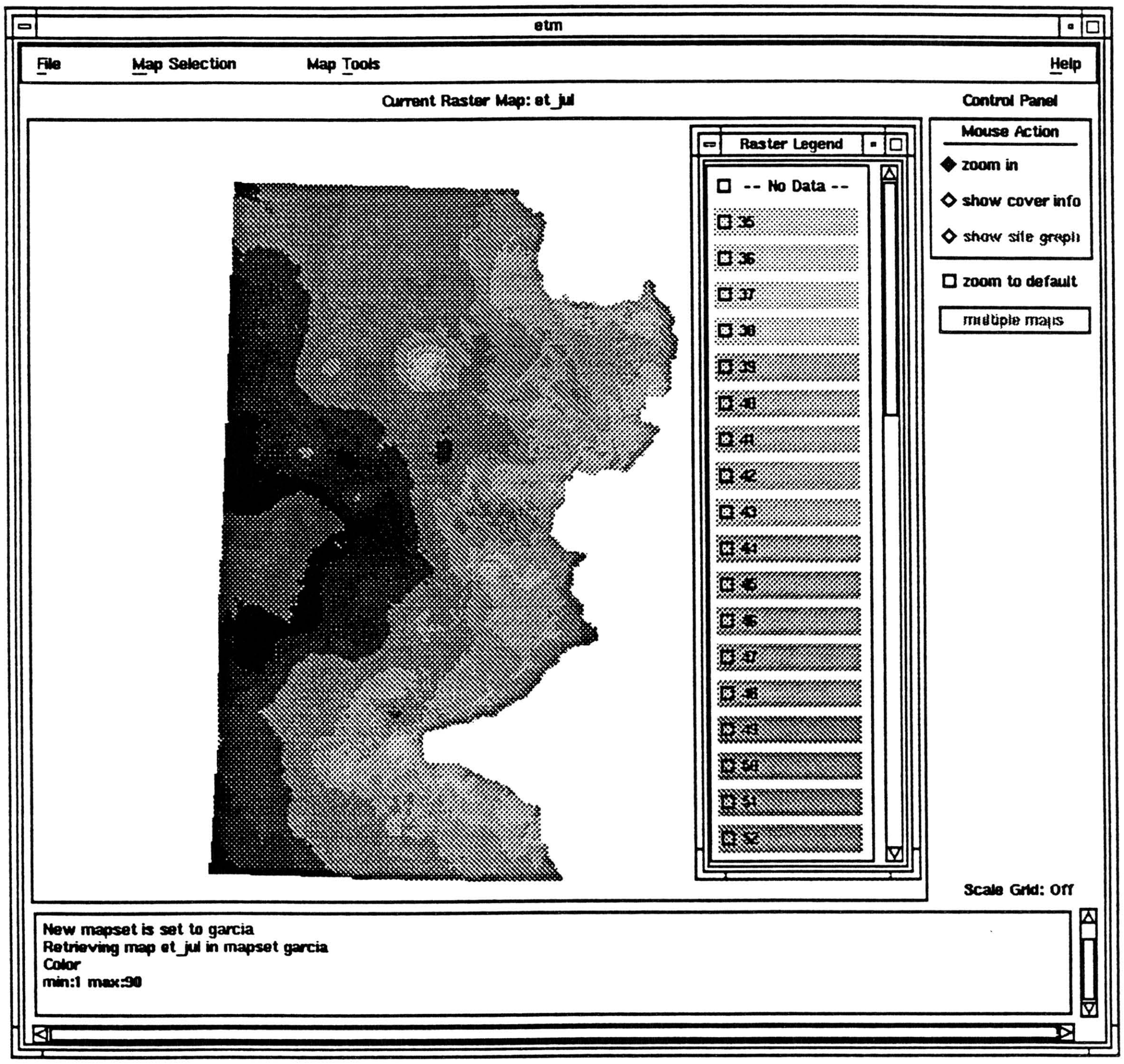
a. The variables a, b, c, and d are from the equation $ETr = a * TMIN + b * TMAX + c * ELEV + d$

b. The correlation coefficient

(iii) Spatial Interpolation

For spatial interpolation purposes the geographic information system ARC/INFO (ESRI 1991) has been used. Since a 30-second digital elevation map corresponds to a cell-size of approximately 600 m by 600 m, a cell-size of 500 m by 500 m has been adopted for subsequent spatial interpolations. After resizing the elevation grid to the desired cell-size, monthly spatial interpolations were performed on the monthly average point values for maximum temperature and minimum temperature. The inverse square distance method was used for this spatial interpolation.

After obtaining a value for each parameter (elevation, maximum and minimum temperature) for each grid-cell, monthly estimates of ETr were calculated through the use of respective multiple regression equations. This resulted in monthly grid-maps of ETr. Finally, using geographic information systems, the ETr contour maps were created, and subsequently included in the GUI. Figure 6 shows a typical ETr map for July displayed with the GUI.



```
New mapset is set to garcia
Retrieving map et_jul in mapset garcia
Color
min:1 max:90
```

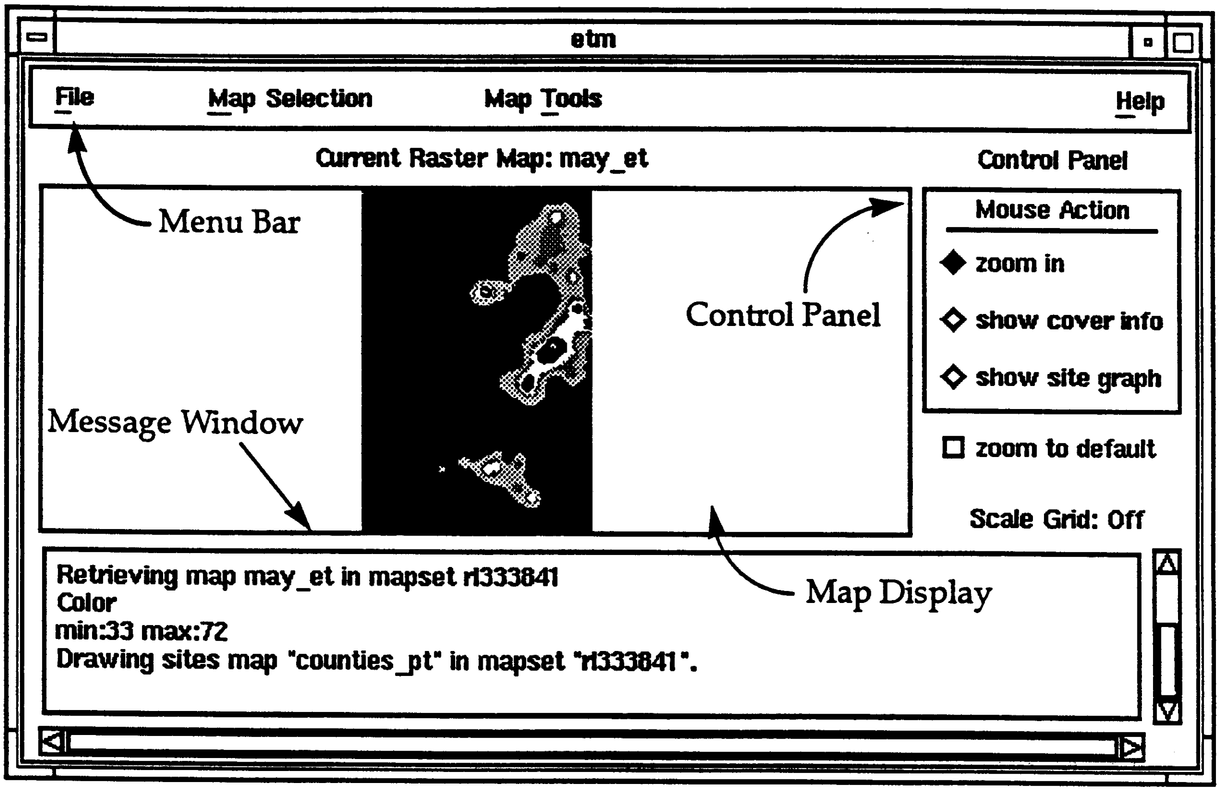
Figure 6: Reference Evapotranspiration Map for July

VII. Reference Guide

This section is designed as a reference, it goes through each part of the interface in detail. There is a table of contents at the beginning of this manual that lists the order of the items in this section.

(i) GUI Design

The main window allows the user to display the various maps. There are four pull-down menus in the menu bar along the top of the window. The common options are provided on the right-hand side of the main window in the control panel. Under the control panel is a scale for the grid and near the bottom of the main window is a message display window (Figure 7).



```
Retrieving map may_et in mapset rl333841
Color
min:33 max:72
Drawing sites map "counties_pt" in mapset "rl333841".
```

Figure 7: GUI design.

(ii) The Motif Window Manager

Window-based graphical interfaces have become a common feature of most software systems. These interfaces use window managers to take care of some of the more general operations, such as resizing the window and iconifying it. This application can be used with a number of window managers, including the Motif Window Manager. The Motif Window Manager is displayed in Figure 8, most of the operations are common to any window manager.

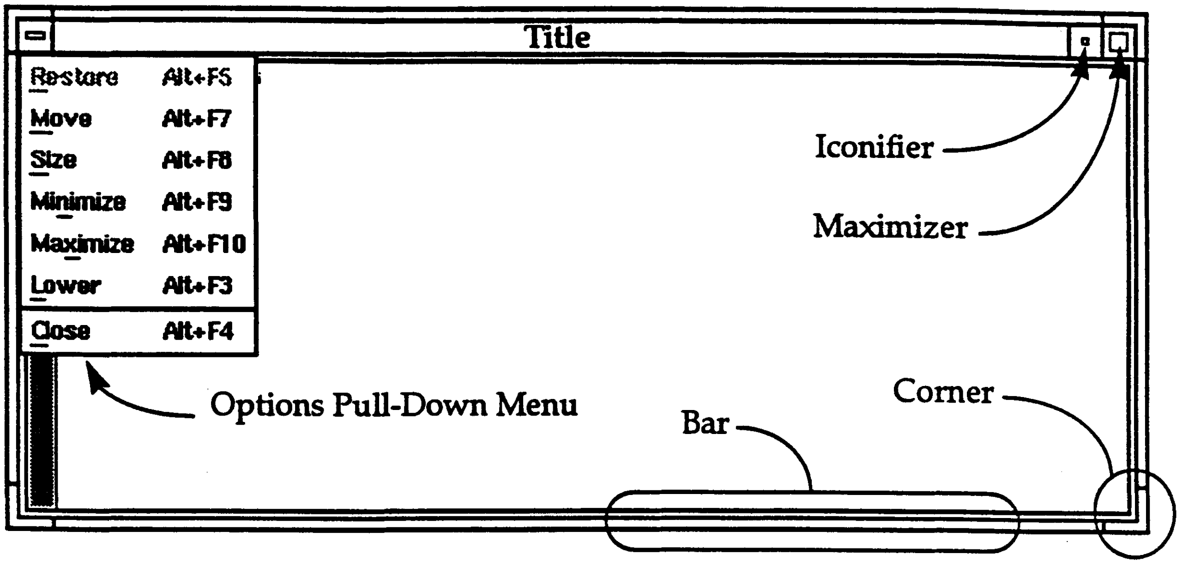


Figure 8: Basic Motif Window Manager.

Window Operations

To resize the window the corners and the bars can be "grabbed" with the mouse and pushed in or out. Grabbing consists of clicking and holding on a bar or corner and pulling or dragging it to a new position.

Options Menu

Restore will restore a window that has been iconified, move is for repositioning windows, size allows you to resize the window, minimize iconifies the window, maximize enlarges a window to the size of the full-screen, lower puts the window behind any other windows, and close will close the window.

(iii) Types of Maps for Display

There are three types of maps available for display. Raster maps are based on a grid system, each square made by the grid can have one value. These are the maps used for temperature values or evapotranspiration values. Vector maps are line segments that are defined by their end points, one vector map can have a large number of line segments. Roads, rivers, the continental divide, and other linear features are displayed with vector maps. Site maps consist of icons that are placed in the location where data were gathered, such as the location of different types of weather stations.

(iv) Selecting Mapsets in the Map Selection Pull-Down Menu

The first option in the map selection pull-down menu is *select mapset.* This option will display a menu with the different mapsets. GRASS uses the idea of mapsets to ensure trust in the reliability of data contained in maps. Since this system is designed for more than one user the integrity of data needs to be ensured by restricting a user from changing another user's data. Each user has a mapset that is set up in a resource file accessed when ET Maps begins. This mapset is a group of maps for which the user has read and write privileges. There is also a PERMENANT mapset with only read privileges. Users can alter the maps using an interactive GRASS session outside the interface, ET Maps displays maps from different mapsets.

(v) Selecting Raster Maps

After a mapset has been selected you can select a raster map. All maps cover the Western Slope region of Colorado, bordered on the east by the Continental Divide and by Colorado's boundaries in the other directions. By using the mouse to select multiple maps in the raster map selection window all maps selected will be displayed in a separate pop-up window. Individual maps can be displayed in their full-size by selecting the smaller versions (Figure 9).

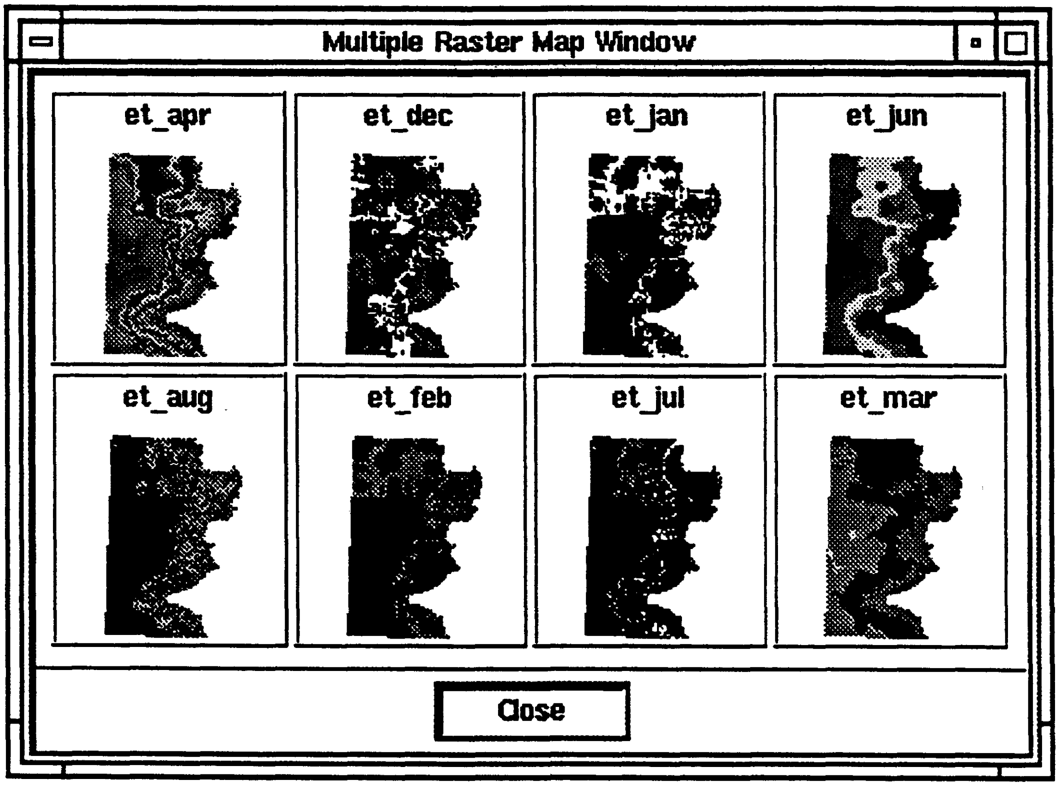


Figure 9: Pop-up window with multiple raster maps displayed.

(vi) Selecting a Portion of the Map with the Zoom-In Option

The *zoom in* option in the control menu fills the display area with a smaller portion of the map. When this option is selected, the cursor changes into a small hand with a pointing finger. An area of the map can be selected by holding the mouse button down in the upper left hand corner of the area and then dragging diagonally (Figure 10). The *zoom to default* option in the lower right side of the screen under the control panel will return the original display.

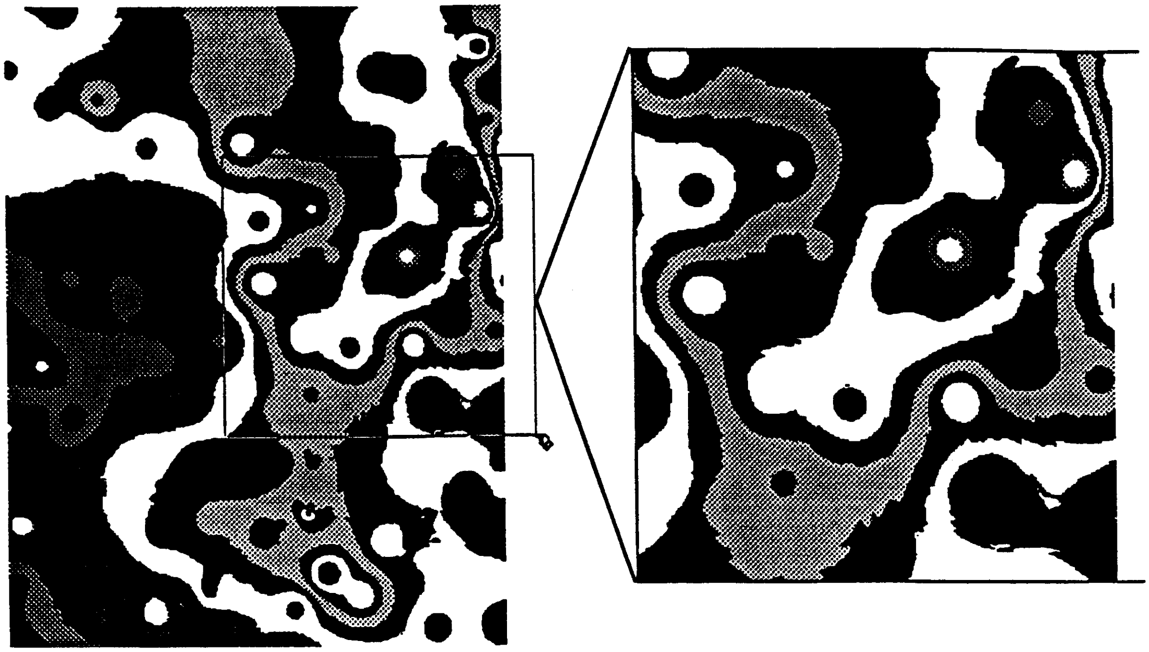
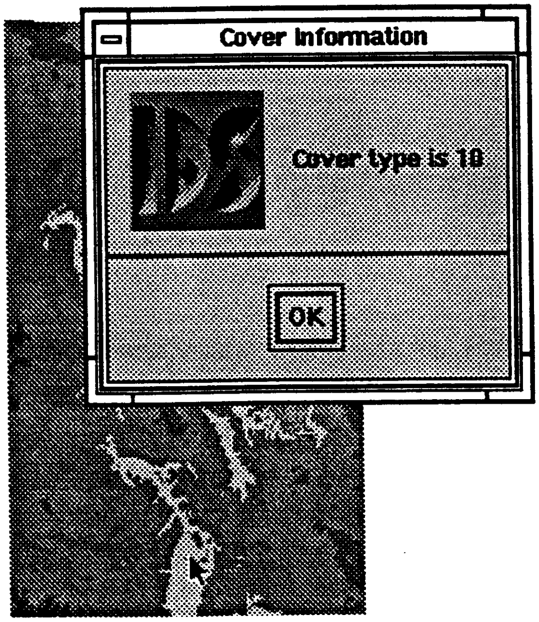


Figure 10: Selecting a portion of the map with the zoom-in option.

(vii)Showing Cover Information

When this option is selected information on the value of the raster map can be shown at any one point. When the cursor is placed in a position on the raster map and the left mouse button is selected the value of the raster map at the selected point will be displayed (Figure 11)



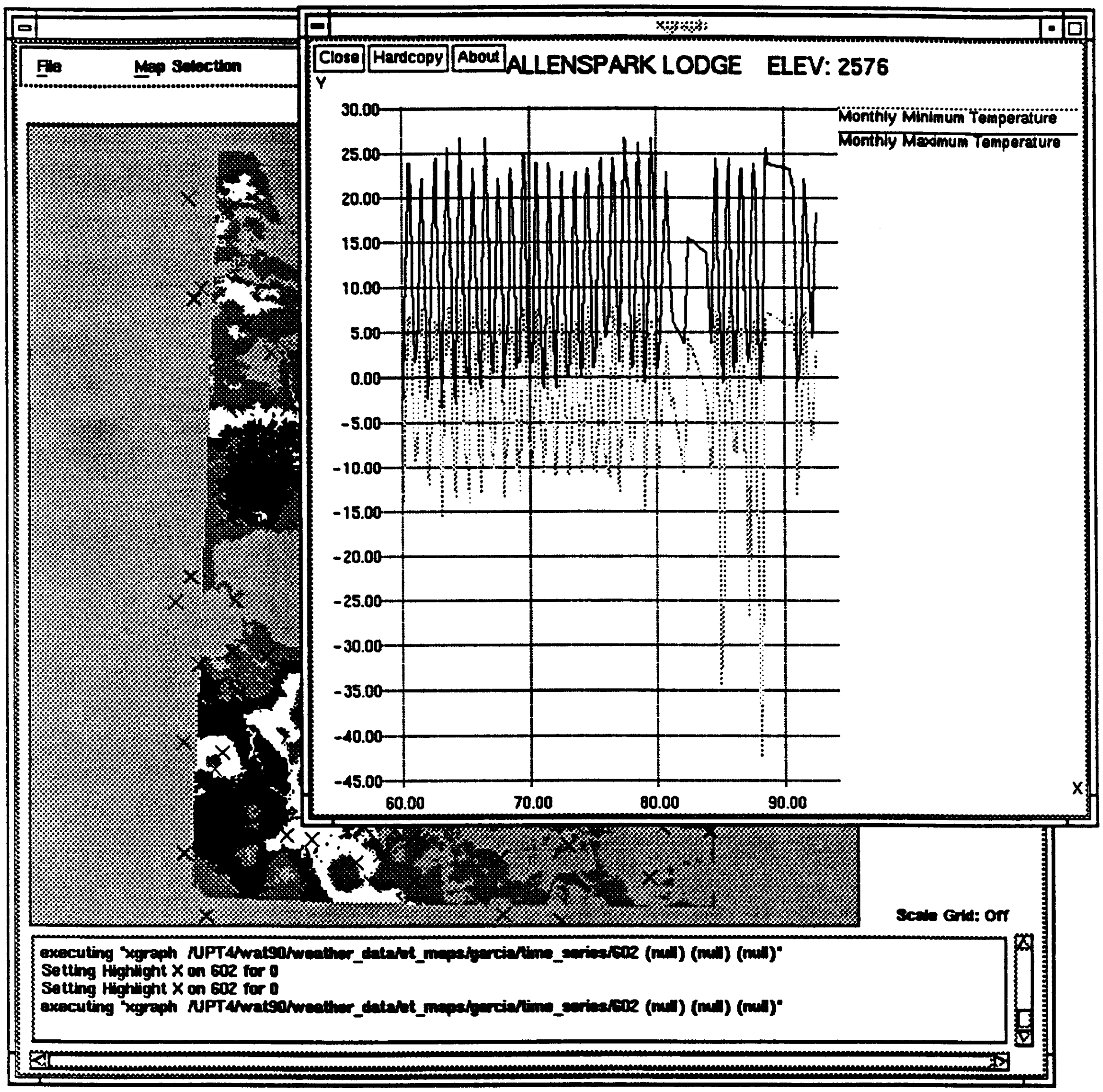
Cover Information

Cover type is 18

Figure 11: Cover type information displayed.

(viii)Displaying Site Maps

Site maps are selected in the same way as vector maps, more than one site map can be displayed at a time using the *shift* and *control keys*. Different site maps are shown by different icons. When a location is selected with the mouse, the graph corresponding to this location will be displayed (Figure 12).



```
executing "xgraph /UPT4/wat90/weather_data/et_maps/garcia/time_series/602 (null) (null) (null)"
Setting Highlight X on 602 for 0
Setting Highlight X on 602 for 0
executing "xgraph /UPT4/wat90/weather_data/et_maps/garcia/time_series/602 (null) (null) (null)"
```

Figure 12: Site graph for temperature and elevation.

(ix) Selecting Vector Maps

More than one vector map can be selected at one time, but multiple vector maps are selected in a different way from multiple raster maps. To select more than one vector map press the *control key* and select individual maps. The *shift key* can be used to select maps in a series. With the shift key depressed, select the maps on the top and the bottom of the series, all the maps in between will be selected. To deselect individual maps use the *control key,* and for groups use the *shift key.* The colors of vector maps can be selected on the right side of the menu. They will be displayed in the same order they appear in the maps list. For example, in Figure 13 the *major roads* vector map will appear in red and the *solar regions* vector map will be in green. When a vector maps is selected it will be highlighted, pressing *OK* will select the highlighted maps. *Clear selected maps* will clear all the vector maps displayed.

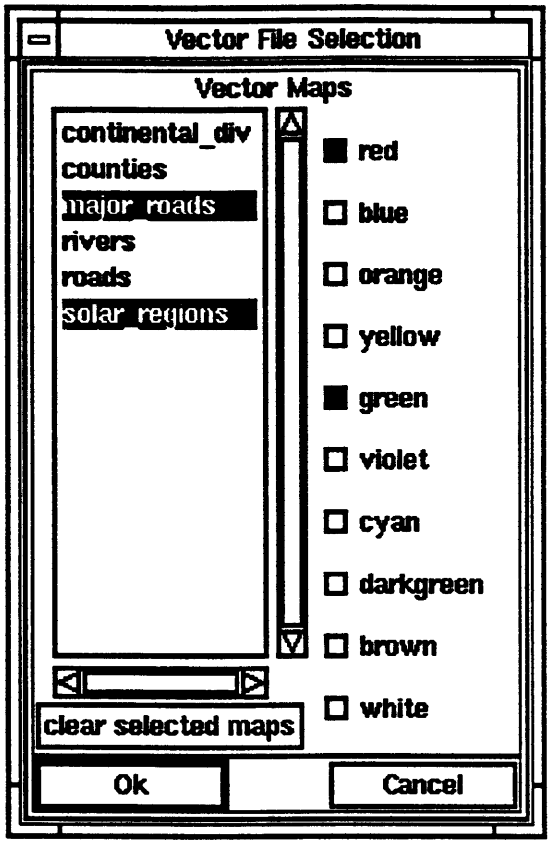
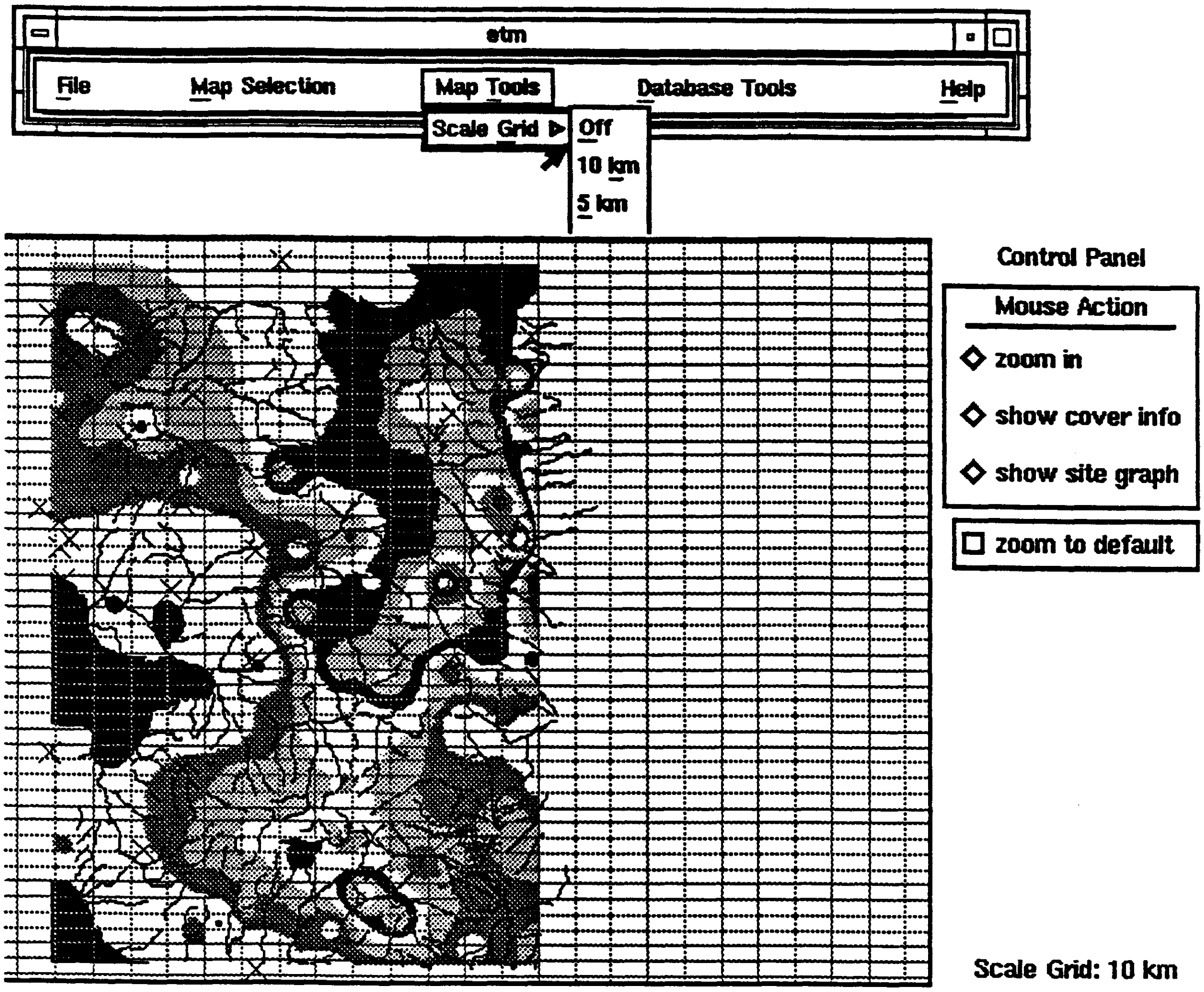


Figure 13: Vector map menu with color selection

(x) Map Tools Pull-Down Menu

This pull-down menu only has two options, displaying the grid and specifying the size of the grid. By holding the left mouse button down and selecting the arrow next to the scale grid option a menu will pull-down to the right with options for selecting the size of the grid. When one of these dimensions are chosen a grid is displayed on top of whatever maps are currently displayed (Figure 14)



Scale Grid: 10 km

Figure 14: Map with 10 kilometer grid selected and displayed.

(xi) Help Pull-Down Menu

Help has two options. The first, About will display a title screen and the second option is a help Index. The Help Index displays a window with information on the top and a list of topics on the bottom. When one of these topics is selected the Help Index displays the text associated with the new topic.

VIII. References

Allen, R.G., M.E. Jensen, J.L. Wright and R.D. Burman (1989). "Operational estimates of reference evapotranspiration." Agron.J., 81:650-662.

ESRI (Environmental Systems Research Institute, Inc.). 1991. ARC/INFO User's Guide. Environmental Systems Research Institute, Redlands, CA.

Heermann, D.F., G.J. Harrington and K.M. Stahl (1985). "Empirical estimates of clear sky solar radiation." J.Climate and Applied Meteorol., 24(3):206-214.

OSF (Open Software Foundation) (1991). OSF/Motif Programmer's Guide. Prentice Hall, Inc. Englewood Cliffs, NJ.

Quercia, V. and T. O'Reilly (1990). X Window System User's Guide. O'Reilly & Associates, Inc. Sebastopol, CA.

USACERL (U.S. Army Corps of Engineers Construction Engineering Laboratory), (1991). GRASS 4.0 User's Reference Manual.

Appendix A: Station Information

Network	Name	State	Long.	Lat.	Elev. [m]	Coverage
WTHR	Carbondale	CO	107.23	39.40	1884	1988-1992
	Durango	CO	107.88	37.27	1985	1988-1992
	Montrose	CO	107.88	38.48	1766	1988-1992
	Steamboat	CO	106.83	40.48	2041	1988-1992
COAGMET	Cortez	CO	108.67	37.22	1804	1991-1992
	Delta	CO	108.07	38.75	1503	1992-1992
	Fruita	CO	108.75	39.17	1372	1982-1992
	Yellojacket	CO	108.73	37.55	2121	1991-1992
UCC	La Sal	UT	109.23	38.32	2146	1987-1992
	Maeser	UT	109.58	40.45	1771	1987-1992
	Manila	Ut	109.73	40.99	1111	1989-1992
	Moab	UT	109.55	38.57	1227	1989-1992
	Pelican Lake	UT	109.67	40.18	1466	1987-1992
RAWS	Blue Park	CO	106.78	37.79	3140	1990-1992
	Taylor Park	CO	106.60	38.91	3174	1987-1992
	Soda Creek	CO	105.98	39.57	2927	1986-1992
	Sanborn Park	CO	108.22	38.19	2418	1985-1992
	McClure Pass	CO	107.28	39.13	2749	1985-1992
	Salter	CO	108.54	37.66	2485	1985-1992
	Porcupine Cr.	CO	106.68	40.08	2713	1992-1992
	Dry Lake	CO	106.77	40.53	2536	1985-1992
	Willow Creek	CO	106.20	40.36	2963	1985-1992
	Dead Horse	CO	107.37	40.07	2732	1987-1992
	Red Feather	CO	105.58	40.83	2500	1985-1992
	Devil Mtn.	CO	107.31	37.23	2244	1989-1992
	Willis Creek	CO	105.06	38.00	2805	1990-1992
	Cheeseman	CO	105.27	39.19	2286	1987-1992
	Dowd Junction	CO	106.45	39.63	2743	1986-1992
	Red Deer	CO	106.22	38.85	2683	1985-1992
	Hunter Creek	CO	108.32	39.77	2232	1984-1992
	Rifle	CO	107.73	39.50	1866	1984-1992
	Rangely	CO	108.78	40.17	1977	1984-1992
	Ernie Gulch	CO	108.20	40.05	2134	1985-1992
	Jay	CO	107.74	38.84	1890	1984-1992
	Cedar Knob	CO	108.27	40.43	1920	1990-1992
	Gunsight	CO	106.33	40.21	2567	1987-1992
	Pine Ridge	CO	108.39	39.24	2012	1988-1992
	Ladore	CO	108.80	40.70	1799	1989-1992
	Pinto	CO	108.47	40.02	2116	1990-1992
	Penasco	NM	105.67	36.17	2377	1986-1992
	Saw Mill Park	WY	106.14	41.07	2760	1988-1992
	Cart Creek	UT	109.42	40.88	2103	1985-1992
	Yampa Plateau	UT	109.29	40.28	1597	1984-1992

Network	Name	State	Long.	Lat.	Elev. [m]	Coverage
RAWS	Sweetwater Canyon	UT	109.19	39.52	2359	1983-1991
	Rio Grande Gorge	NM	107.67	36.68	2316	1984-1988
	Albino Canyon	NM	107.66	36.96	2012	1986-1992
	Upper P.R. Canyon	UT	109.27	39.47	2512	1983-1992
	Winter Ridge	UT	109.56	39.50	2237	1983-1992
	McCook Ridge	UT	109.27	39.63	2039	1983-1992
	Upper Sand Wash	UT	109.44	39.71	1957	1983-1992
	Cottonwood Wash	UT	109.58	39.84	1814	1983-1992
	Crow Knolls	UT	109.99	39.96	1695	1983-1991
	Diamond Rim	UT	109.24	40.62	2356	1983-1991
	Little Mtn.	UT	109.65	40.54	1999	1991-1992
	Kane Gulsh	UT	109.89	37.53	2012	1991-1992
	Sego Canyon	UT	109.71	39.12	2438	1991-1992
	Big Indian Valley	UT	109.28	38.22	2121	1987-1992
	Ute Lookout	UT	109.79	40.88	2693	1987-1992
	Bryson Canyon	UT	109.22	39.28	1622	1987-1992
	Miners Draw	UT	109.08	40.38	2469	1987-1992
	Dodge Creek	WY	105.52	41.96	2164	1988-1992
	Cow Creek	WY	107.58	41.27	2205	1988-1992
	Snow Springs Creek	WY	109.04	41.42	2301	1988-1992
	Rock Springs	WY	109.23	41.63	1966	1990-1992
	Kings Point	UT	109.10	40.86	1728	1985-1992

WTHR	temperature,relativehumidity,windspeed,solarradiation
COAGMET	temperature,dewpoint,windspeed,solarradiation
UCC	temperature,dewpoint,windspeed,solarradiation
RAWS	temperature,relativehumidity,windspeed

Appendix B: Monthly Correlation Matrices for Monthly Averaged Data

MONTH 1 - 58 Station-months

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	0.30	0.38	0.65	-0.18	0.55	0.20	0.48	-0.05	0.06	-0.19
0.30	1.00	-0.18	-0.07	-0.15	-0.15	-0.37	-0.02	0.11	-0.13	0.17
0.38	-0.18	1.00	0.60	0.60	0.92	0.52	0.90	0.48	0.40	0.20
0.65	-0.07	0.60	1.00	-0.27	0.87	0.63	0.60	0.07	0.13	-0.14
-0.18	-0.15	0.60	-0.27	1.00	0.24	0.00	0.49	0.51	0.36	0.39
0.55	-0.15	0.92	0.87	0.24	1.00	0.63	0.86	0.33	0.30	0.05
0.20	-0.37	0.52	0.63	0.00	0.63	1.00	0.19	0.26	0.25	0.25
0.48	-0.02	0.90	0.60	0.49	0.86	0.19	1.00	0.35	0.27	0.01
-0.05	0.11	0.48	0.07	0.51	0.33	0.26	0.35	1.00	0.63	0.89
0.06	-0.13	0.40	0.13	0.36	0.30	0.25	0.27	0.63	1.00	0.56
-0.19	0.17	0.20	-0.14	0.39	0.05	0.25	0.01	0.89	0.56	1.00

MONTH 2 - 57 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.03	0.48	0.61	-0.03	0.59	0.38	0.47	0.10	0.16	0.08
-0.03	1.00	-0.50	-0.50	-0.12	-0.55	-0.60	-0.32	0.12	-0.20	-0.11
0.48	-0.50	1.00	0.66	0.59	0.93	0.58	0.90	0.42	0.36	0.31
0.61	-0.50	0.66	1.00	-0.22	0.89	0.81	0.52	0.15	0.28	0.24
-0.03	-0.12	0.59	-0.22	1.00	0.24	-0.12	0.60	0.39	0.17	0.14
0.59	-0.55	0.93	0.89	0.24	1.00	0.75	0.80	0.33	0.36	0.30
0.38	-0.60	0.58	0.81	-0.12	0.75	1.00	0.23	0.14	0.23	0.34
0.47	-0.32	0.90	0.52	0.60	0.80	0.23	1.00	0.39	0.34	0.18
0.10	0.12	0.42	0.15	0.39	0.33	0.14	0.39	1.00	0.71	0.84
0.16	-0.20	0.36	0.28	0.17	0.36	0.23	0.34	0.71	1.00	0.92
0.08	-0.11	0.31	0.24	0.14	0.30	0.34	0.18	0.84	0.92	1.00

MONTH 3 - 58 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.63	0.80	0.77	0.36	0.82	0.69	0.72	0.05	0.18	0.11
-0.63	1.00	-0.68	-0.72	-0.22	-0.72	-0.64	-0.59	0.17	-0.02	0.07
0.80	-0.68	1.00	0.85	0.61	0.97	0.79	0.96	0.12	0.15	0.09
0.77	-0.72	0.85	1.00	0.11	0.95	0.92	0.79	0.00	0.06	0.04
0.36	-0.22	0.61	0.11	1.00	0.41	0.12	0.64	0.23	0.20	0.11
0.82	-0.72	0.97	0.95	0.41	1.00	0.88	0.92	0.07	0.11	0.07
0.69	-0.64	0.79	0.92	0.12	0.88	1.00	0.66	-0.09	0.12	0.15
0.72	-0.59	0.96	0.79	0.64	0.92	0.66	1.00	0.14	0.10	0.02
0.05	0.17	0.12	0.00	0.23	0.07	-0.09	0.14	1.00	0.52	0.60
0.18	-0.02	0.15	0.06	0.20	0.11	0.12	0.10	0.52	1.00	0.97
0.11	0.07	0.09	0.04	0.11	0.07	0.15	0.02	0.60	0.97	1.00

MONTH 4 - 62 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.65	0.81	0.81	0.39	0.85	0.59	0.74	0.07	0.71	0.57
-0.65	1.00	-0.74	-0.67	-0.44	-0.74	-0.35	-0.71	0.09	-0.34	-0.14
0.81	-0.74	1.00	0.83	0.70	0.97	0.58	0.95	0.24	0.64	0.46
0.81	-0.67	0.83	1.00	0.18	0.94	0.64	0.81	0.08	0.59	0.43
0.39	-0.44	0.70	0.18	1.00	0.50	0.20	0.63	0.33	0.37	0.26
0.85	-0.74	0.97	0.94	0.50	1.00	0.63	0.93	0.18	0.65	0.46
0.59	-0.35	0.58	0.64	0.20	0.63	1.00	0.35	0.05	0.44	0.54
0.74	-0.71	0.95	0.81	0.63	0.93	0.35	1.00	0.23	0.60	0.33
0.07	0.09	0.24	0.08	0.33	0.18	0.05	0.23	1.00	0.47	0.52
0.71	-0.34	0.64	0.59	0.37	0.65	0.44	0.60	0.47	1.00	0.94
0.57	-0.14	0.46	0.43	0.26	0.46	0.54	0.33	0.52	0.94	1.00

MONTH 5 - 62 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.65	0.77	0.79	0.25	0.82	0.26	0.83	0.03	0.54	0.38
-0.65	1.00	-0.80	-0.65	-0.49	-0.77	-0.29	-0.78	0.02	-0.33	-0.18
0.77	-0.80	1.00	0.80	0.62	0.96	0.50	0.93	0.02	0.45	0.34
0.79	-0.65	0.80	1.00	0.02	0.94	0.61	0.75	0.04	0.36	0.29
0.25	-0.49	0.62	0.02	1.00	0.37	0.04	0.56	-0.02	0.28	0.17
0.82	-0.77	0.96	0.94	0.37	1.00	0.57	0.90	0.03	0.43	0.34
0.26	-0.29	0.50	0.61	0.04	0.57	1.00	0.19	-0.02	-0.12	0.11
0.83	-0.78	0.93	0.75	0.56	0.90	0.19	1.00	0.04	0.57	0.35
0.03	0.02	0.02	0.04	-0.02	0.03	-0.02	0.04	1.00	0.03	0.02
0.54	-0.33	0.45	0.36	0.28	0.43	-0.12	0.57	0.03	1.00	0.92
0.38	-0.18	0.34	0.29	0.17	0.34	0.11	0.35	0.02	0.92	1.00

MONTH 6 - 61 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.58	0.74	0.86	0.01	0.84	0.32	0.79	-0.03	0.50	0.24
-0.58	1.00	-0.82	-0.63	-0.46	-0.77	-0.28	-0.78	-0.06	-0.16	0.12
0.74	-0.82	1.00	0.80	0.52	0.96	0.45	0.95	-0.10	0.33	0.05
0.86	-0.63	0.80	1.00	-0.10	0.94	0.48	0.81	-0.01	0.37	0.13
0.01	-0.46	0.52	-0.10	1.00	0.25	0.06	0.42	-0.16	0.02	-0.10
0.84	-0.77	0.96	0.94	0.25	1.00	0.49	0.93	-0.06	0.37	0.09
0.32	-0.28	0.45	0.48	0.06	0.49	1.00	0.21	0.15	-0.10	0.19
0.79	-0.78	0.95	0.81	0.42	0.93	0.21	1.00	-0.13	0.45	0.06
-0.03	-0.06	-0.10	-0.01	-0.16	-0.06	0.15	-0.13	1.00	-0.20	-0.08
0.50	-0.16	0.33	0.37	0.02	0.37	-0.10	0.45	-0.20	1.00	0.83
0.24	0.12	0.05	0.13	-0.10	0.09	0.19	0.06	-0.08	0.83	1.00

MONTH 7 - 63 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.54	0.72	0.84	0.00	0.82	0.40	0.77	-0.21	0.55	0.33
-0.54	1.00	-0.85	-0.66	-0.49	-0.80	-0.33	-0.82	0.08	-0.12	0.04
0.72	-0.85	1.00	0.81	0.52	0.96	0.52	0.96	0.03	0.26	0.06
0.84	-0.66	0.81	1.00	-0.08	0.94	0.57	0.81	0.01	0.34	0.17
0.00	-0.49	0.52	-0.08	1.00	0.26	0.05	0.44	0.05	-0.07	-0.14
0.82	-0.80	0.96	0.94	0.26	1.00	0.57	0.94	0.02	0.31	0.12
0.40	-0.33	0.52	0.57	0.05	0.57	1.00	0.30	0.19	0.25	0.43
0.77	-0.82	0.96	0.81	0.44	0.94	0.30	1.00	-0.03	0.28	0.00
-0.21	0.08	0.03	0.01	0.05	0.02	0.19	-0.03	1.00	-0.32	-0.25
0.55	-0.12	0.26	0.34	-0.07	0.31	0.25	0.28	-0.32	1.00	0.91
0.33	0.04	0.06	0.17	-0.14	0.12	0.43	0.00	-0.25	0.91	1.00

MONTH 8 - 61 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.46	0.66	0.82	-0.07	0.77	0.31	0.73	-0.25	0.54	0.30
-0.46	1.00	-0.84	-0.65	-0.48	-0.80	-0.32	-0.81	0.06	-0.12	-0.01
0.66	-0.84	1.00	0.80	0.53	0.96	0.51	0.95	0.05	0.31	0.20
0.82	-0.65	0.80	1.00	-0.09	0.94	0.53	0.81	-0.01	0.42	0.29
-0.07	-0.48	0.53	-0.09	1.00	0.26	0.09	0.43	0.10	-0.08	-0.09
0.77	-0.80	0.96	0.94	0.26	1.00	0.54	0.93	0.02	0.38	0.25
0.31	-0.32	0.51	0.53	0.09	0.54	1.00	0.26	0.39	0.43	0.67
0.73	-0.81	0.95	0.81	0.43	0.93	0.26	1.00	-0.10	0.28	0.04
-0.25	0.06	0.05	-0.01	0.10	0.02	0.39	-0.10	1.00	-0.12	0.16
0.54	-0.12	0.31	0.42	-0.08	0.38	0.43	0.28	-0.12	1.00	0.89
0.30	-0.01	0.20	0.29	-0.09	0.25	0.67	0.04	0.16	0.89	1.00

MONTH 9 - 63 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.33	0.47	0.68	-0.10	0.61	0.31	0.47	-0.16	0.62	0.37
-0.33	1.00	-0.80	-0.61	-0.42	-0.78	-0.35	-0.74	0.04	-0.20	-0.02
0.47	-0.80	1.00	0.69	0.61	0.94	0.40	0.92	0.18	0.37	0.15
0.68	-0.61	0.69	1.00	-0.15	0.90	0.50	0.69	0.11	0.62	0.41
-0.10	-0.42	0.61	-0.15	1.00	0.30	0.00	0.50	0.12	-0.17	-0.24
0.61	-0.78	0.94	0.90	0.30	1.00	0.48	0.89	0.16	0.53	0.29
0.31	-0.35	0.40	0.50	0.00	0.48	1.00	0.08	0.33	0.35	0.72
0.47	-0.74	0.92	0.69	0.50	0.89	0.08	1.00	0.07	0.39	-0.03
-0.16	0.04	0.18	0.11	0.12	0.16	0.33	0.07	1.00	0.27	0.51
0.62	-0.20	0.37	0.62	-0.17	0.53	0.35	0.39	0.27	1.00	0.79
0.37	-0.02	0.15	0.41	-0.24	0.29	0.72	-0.03	0.51	0.79	1.00

MONTH 10 - 64 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.25	0.35	0.66	-0.21	0.54	0.33	0.41	-0.14	0.50	0.21
-0.25	1.00	-0.72	-0.41	-0.48	-0.65	-0.42	-0.67	0.06	-0.22	-0.05
0.35	-0.72	1.00	0.60	0.63	0.92	0.58	0.95	0.29	0.36	0.26
0.66	-0.41	0.60	1.00	-0.24	0.87	0.64	0.65	0.12	0.62	0.43
-0.21	-0.48	0.63	-0.24	1.00	0.27	0.09	0.53	0.24	-0.16	-0.10
0.54	-0.65	0.92	0.87	0.27	1.00	0.68	0.91	0.24	0.53	0.37
0.33	-0.42	0.58	0.64	0.09	0.68	1.00	0.39	0.21	0.48	0.64
0.41	-0.67	0.95	0.65	0.53	0.91	0.39	1.00	0.25	0.38	0.15
-0.14	0.06	0.29	0.12	0.24	0.24	0.21	0.25	1.00	0.33	0.64
0.50	-0.22	0.36	0.62	-0.16	0.53	0.48	0.38	0.33	1.00	0.83
0.21	-0.05	0.26	0.43	-0.10	0.37	0.64	0.15	0.64	0.83	1.00

MONTH 11 - 62 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	-0.08	0.33	0.52	-0.06	0.45	0.27	0.36	0.02	0.31	0.04
-0.08	1.00	-0.60	-0.53	-0.29	-0.63	-0.58	-0.43	0.09	-0.11	0.03
0.33	-0.60	1.00	0.67	0.69	0.94	0.58	0.89	0.45	0.53	0.34
0.52	-0.53	0.67	1.00	-0.07	0.88	0.74	0.58	0.09	0.31	0.09
-0.06	-0.29	0.69	-0.07	1.00	0.40	0.06	0.64	0.51	0.41	0.36
0.45	-0.63	0.94	0.88	0.40	1.00	0.71	0.83	0.33	0.48	0.25
0.27	-0.58	0.58	0.74	0.06	0.71	1.00	0.21	0.08	0.26	0.23
0.36	-0.43	0.89	0.58	0.64	0.83	0.21	1.00	0.42	0.47	0.20
0.02	0.09	0.45	0.09	0.51	0.33	0.08	0.42	1.00	0.78	0.91
0.31	-0.11	0.53	0.31	0.41	0.48	0.26	0.47	0.78	1.00	0.80
0.04	0.03	0.34	0.09	0.36	0.25	0.23	0.20	0.91	0.80	1.00

MONTH 12 - 60 STATION-MONTHS

ET	ELEV	TMAX	TMIN	TDIF	TAVG	TDEW	VDIF	Ra	Rs	Rn
1.00	0.31	0.17	0.53	-0.33	0.38	0.08	0.31	-0.13	0.31	-0.23
0.31	1.00	-0.22	-0.09	-0.17	-0.18	-0.32	-0.04	0.11	-0.13	0.23
0.17	-0.22	1.00	0.58	0.59	0.90	0.47	0.83	0.52	0.56	0.21
0.53	-0.09	0.58	1.00	-0.31	0.87	0.63	0.50	0.16	0.41	-0.03
-0.33	-0.17	0.59	-0.31	1.00	0.20	-0.07	0.48	0.45	0.25	0.28
0.38	-0.18	0.90	0.87	0.20	1.00	0.62	0.76	0.40	0.55	0.11
0.08	-0.32	0.47	0.63	-0.07	0.62	1.00	-0.02	0.28	0.28	0.31
0.31	-0.04	0.83	0.50	0.48	0.76	-0.02	1.00	0.35	0.49	-0.04
-0.13	0.11	0.52	0.16	0.45	0.40	0.28	0.35	1.00	0.53	0.89
0.31	-0.13	0.56	0.41	0.25	0.55	0.28	0.49	0.53	1.00	0.29
-0.23	0.23	0.21	-0.03	0.28	0.11	0.31	-0.04	0.89	0.29	1.00

COLORADO WATER RESOURCES RESEARCH INSTITUTE

LIST OF PUBLICATIONS

AVAILABLE FROM:

Bulletin Room
171 Aylesworth Hall
Colorado State University
Fort Collins, CO 80523

PLEASE ENCLOSE PAYMENT & POSTAGE
FOR ORDERS OF $25.00 OR LESS.

Amount of Order	Postage
$1.00 to $4.99	$1.00
$5.00 to $9.99	$2.00
$10.00 and over	$3.00

COMPLETION REPORT SERIES

Number		Date	Price
1.	BACTERIAL RESPONSE TO THE SOIL ENVIRONMENT, by J.W. Boyd, T. Yoshida, L.E. Vereen, R.L. Cada, and S.M. Morrison.	June 1969	4.50
2.	COMPUTER SIMULATION OF WASTE TRANSPORT IN GROUNDWATER AQUIFERS, by D.L. Reddell and D.K. Sunada.	June 1969	3.00
3.	SNOW ACCUMULATION IN RELATION TO FOREST CANOPY, by J. Meiman, H. Froehlich and R.E. Dils.	June 1969	2.50
4.	RUNOFF FROM FOREST AND AGRICULTURAL WATERSHEDS, by M.E. Holland.	June 1969	4.00
5.	SOIL MOVEMENT IN AN ALPINE AREA, by W.D. Striffler.	June 1969	2.00
6.	STABILIZATION OF ALLUVIAL CHANNELS, by N.G. Bhowmik and D.B. Simons.	June 1969	4.00
7.	STABILITY OF SLOPES WITH SEEPAGE, by C.D. Muir and D.B. Simons.	June 1969	4.00
8.	IMPROVING EFFICIENCY IN AGRICULTURAL WATER USE, by W.D. Kemper and R.E. Danielson.	June 1969	2.00
9.	CONTROLLED ACCUMULATION OF BLOWING SNOW, by J.L. Rasmussen.	June 1969	3.50
10.	ECONOMICS AND ADMINISTRATION OF WATER RESOURCES, by J. Ernest Flack.	June 1969	3.50
11.	ORGANIZATIONAL ADAPTATION TO CHANGE IN PUBLIC OBJECTIVES FOR WATER MANAGEMENT OF CACHE LA POUDRE RIVER SYSTEM, by D. Hill, P.O. Foss and R.L. Meek.	June 1969	4.00
12.	ECONOMICS AND ADMINISTRATION OF WATER RESOURCES, by K.C. Nobe.	June 1969	4.00
13.	ECONOMICS OF GROUNDWATER DEVELOPMENT IN THE HIGH PLAINS OF COLORADO, by D.D. Rohdy.	June 1969	2.50
14.	HYDROGEOLOGY AND WATER QUALITY STUDIES IN THE CACHE LA POUDRE BASIN, COLORADO, by James P. Waltz.	June 1969	6.00
15.	HYDRAULIC OPERATING CHARACTERISTICS OF LOW GRADIENT BORDER CHECKS IN THE MANAGEMENT OF IRRIGATION WATER, by D. Heermann and N.A. Evans.	June 1968	4.00
16.	EXPERIMENTAL INVESTIGATION OF SMALL WATERSHED FLOODS, by George L. Smith, V. Yevjevich, and M.E. Holland.	June 1968	3.00
17.	AN EXPLORATION OF COMPONENTS AFFECTING AND LIMITING POLICYMAKING OPTIONS IN LOCAL WATER AGENCIES, by Duane W. Hill, C.L. Garrison and P.O. Foss.	Nov. 1968	6.00
18.	EXPERIMENTAL INVESTIGATION OF SMALL WATERSHED FLOODS, by E.F. Schulz and V.M. Yevjevich.	June 1970	6.00
19.	HYDRAULICS OF LOW GRADIENT BORDER IRRIGATION SYSTEMS, by Norman A. Evans, Dale F. Heermann, Orlando W. Howe and Dennis C. Kincaid.	June 1970	4.00
20.	IMPROVING EFFICIENCY IN AGRICULTURAL WATER USE, by W.D. Kemper.	July 1970	4.00
21.	WATERFOWL-WATER TEMPERATURE RELATIONS IN WINTER, by Ronald A. Ryder.	June 1970	6.00
22.	AN EXPLORATION OF COMPONENTS AFFECTING AND LIMITING POLICYMAKING OPTIONS IN LOCAL WATER AGENCIES, by Duane W. Hill and R.L. Meek.	June 1970	4.00
23.	A SYSTEMATIC TREATMENT OF THE PROBLEM OF INFILTRATION, by H.J. Morel-Seytoux.	June 1971	4.00
24.	STUDIES OF THE ATMOSPHERIC WATER BALANCE, by J.L. Rasmussen.	Aug. 1971	6.00
25.	EVAPORATION OF WATER AS RELATED TO WIND BARRIERS, by S.B. Verma and J.E. Cermak.	June 1971	6.00
26.	WATER TEMPERATURE AS A QUALITY FACTOR IN THE USE OF STREAMS AND RESERVOIRS, by John C. Ward.	Dec. 1971	4.00

27.	LOCAL WATER AGENCIES, COMMUNICATION PATTERNS, AND THE PLANNING PROCESS, by Duane M. Hill and R.L. Meek.	Sept. 1971	6.00
28.	COMBINED COOLING AND BIO-TREATMENT OF BEET SUGAR FACTORY CONDENSER WATER AFFLUENT, by George O.G. Lof.	June 1971	6.00
29.	IDENTIFICATION OF URBAN WATERSHED UNITS USING REMOTE MULTISPECTRAL SENSING, by R.R. Root and L.D. Miller.	June 1971	6.00
30.	GEOHYDRAULICS AT THE UNCONFORMITY BETWEEN BEDROCK AND ALLUVIAL AQUIFERS, by J.P. Waltz and D.K. Sunada.	June 1972	6.00
31.	SEDIMENTATION AND CONTAINMENT CRITERIA FOR WATERSHED PLANNING AND MANAGEMENT, by Hsieh W. Shen.	June 1972	6.00
32.	BACTERIAL MOVEMENT THROUGH FRACTURED BEDROCK, by S.M. Morrison and Martin J. Allen.	July 1972	6.00
33.	THE MECHANISM OF WASTE TREATMENT AT LOW TEMPERATURE, PART A: MICROBIOLOGY, by S.M. Morrison, Gary C. Newton, George D. Boone and Kirke L. Martin.	Aug. 1972	6.00
34.	THE MECHANISM OF WASTE TREATMENT AT LOW TEMPERATURE, PART B: SANITARY ENGINEERING, by John C. Ward, John S. Hunter and Richard P. Johansen.	Aug. 1972	6.00
35.	AN APPLICATION OF MULTI-VARIATE ANALYSIS IN HYDROLOGY, by V. Yevjevich, M. Dynr-Nielsen, and E.F. Schulz.	Aug. 1972	6.00
36.	URBAN-METROPOLITAN INSTITUTIONS FOR WATER PLANNING DEVELOPMENT AND MANAGEMENT: AN ANALYSIS OF USAGES OF THE TERM "INSTITUTIONS," by N. Wengert.	Sept. 1972	6.00
37.	SEARCHING IN SOCIAL SCIENCE LITERATURE ON WATER: A GUIDE TO SELECTED INFORMATION STORAGE AND RETRIEVAL SYSTEMS - PRELIMINARY VERSION, by Fred Hogge and Norman Wengert.	Sept. 1972	6.00
38.	WATER QUALITY MANAGEMENT DECISIONS IN COLORADO, by Steven R. Nichols, Gaylord V. Skogerboe and Robert C. Ward.	June 1972	6.00
39.	INSTITUTIONS FOR URBAN-METROPOLITAN WATER MANAGEMENT: ESSAYS IN SOCIAL THEORY, by Norman Wengert.	Nov. 1972	6.00
40.	SELECTION OF TEST VARIABLE FOR MINIMAL TIME DETECTION OF BASIN RESPONSE TO NATURAL OF INDUCED CHANGES, by H.J. Morel-Seytoux.	Dec. 1972	4.00
41.	GROUND WATER RECHARGE AS AFFECTED BY SURFACE VEGETATION AND MANAGEMENT, by A. Klute, R.E. Danielson, D.R. Linden and Philip Hamaker.	Dec. 1972	6.00
42.	THEORY AND EXPERIMENTS IN THE PREDICTION OF SMALL WATERSHED RESPONSE, by E.F. Schulz and V. Yevjevich.	Dec. 1972	6.00
43.	EXPERIMENTS IN SMALL WATERSHED RESPONSE, by E.F. Schulz and V. Yevjevich.	Dec. 1972	6.00
44.	ECONOMIC, POLITICAL, AND LEGAL ASPECTS OF COLORADO WATER LAW, by G.E. Radosevich, K.C. Nobe. R.L. Meek and J.E. Flack.	Feb. 1973	6.00
45.	MATHEMATICAL MODELING OF WATER MANAGEMENT STRATEGIES IN URBANIZING RIVER BASINS, by Wynn R. Walker and G.V. Skogerboe (Partial Completion Report).	June 1973	8.50
46.	EVALUATION OF URBAN WATER MANAGEMENT POLICIES IN THE DENVER METROPOLITAN AREA, by W. Walker, R. Ward, and G. Skogerboe (Partial Completion Report).	June 1973	8.50
47.	COORDINATION OF AGRICULTURAL AND URBAN WATER QUALITY MANAGEMENT IN THE UTAH LAKE DRAINAGE AREA, by W.R. Walker, T.L. Huntzinger, and G.V. Skogerboe (Partial Completion Report).	June 1973	8.50
48.	INSTITUTIONAL REQUIREMENTS FOR OPTIMAL WATER QUALITY MANAGEMENT IN ARID URBAN AREAS, by W.R. Walker, G.V. Skogerboe, R.C. Ward and T.L. Huntzinger.	June 1973	4.00
49.	IMPROVEMENTS IN MOVING SPRINKLER IRRIGATION SYSTEMS FOR CONSERVATION OF WATER, by Donald J. Miles.	June 1973	8.50
50.	SYSTEMATIC TREATMENT OF INFILTRATION WITH APPLICATIONS, by H.J. Morel-Seytoux.	June 1973	6.00
51.	AN EXPERIMENTAL STUDY OF SOIL WATER FLOW SYSTEMS INVOLVING HYSTERESIS, by A. Klute and R.W. Gillham.	Aug. 1973	8.00
52.	CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1 - ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR FACILITATORS, by Gaylord V. Skogerboe, George E. Radosevich, and Evan C. Vlachos.	June 1973	25.00
53.	SYSTEMATIC DESIGN OF LEGAL REGULATIONS FOR OPTIMAL SURFACE - GROUNDWATER USAGE - PHASE 1, by H.J. Morel-Seytoux, R.A. Young and G.E. Radosevich.	Aug. 1973	8.00
54.	GEOLOGICAL FACTORS IN THE EVALUATION OF WATER POLLUTION POTENTIAL AT MOUNTAIN DWELLING SITES, by L.K. Burns, D.R. McCrumb, and S.M. Morrison.	Dec. 1973	11.00

55.	WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY, by David R. Allardice, George C. Radosevich, Kenneth R. Kobel, and Gustav A. Swanson.	Mar. 1974	30.00
56.	EVALUATION AND IMPLEMENTATION OF URBAN DRAINAGE AND FLOOD CONTROL PROJECTS, by Neil S. Grigg, Leonard R. Rice, Leslie H. Bothan, and W.J. Shoemaker.	June 1974	9.00
57.	SNOW-AIR INTERACTIONS AND MANAGEMENT OF MOUNTAIN WATERSHED SNOWPACK, by James R. Meiman and Lewis O. Grant.	June 1974	4.00
58.	PRIMARY DATA ON ECONOMIC ACTIVITY AND WATER USE IN PROTOTYPE OIL SHALE DEVELOPMENT AREAS OF COLORADO: AN INITIAL INQUIRY, by S. Lee Gray.	June 1974	3.00
59.	A SYSTEM FOR GEOLOGIC EVALUATION OF POLLUTION AT MOUNTAIN DWELLING SITES, by James P. Waltz.	Jan. 1975	4.50
60.	RESEARCH NEEDS AS RELATED TO THE DEVELOPMENT OF SEDIMENT STANDARDS IN RIVERS, by Johannes Gessler.	Mar. 1975	4.00
61.	ECONOMIC AND INSTITUTIONAL ANALYSIS OF COLORADO WATER QUALITY MANAGEMENT, by Robert A. Young, G.E. Radosevich, S.L. Gray, and Kenneth Leathers.	Mar. 1975	6.00
62.	FEASIBILITY AND POTENTIAL AND ENHANCING WATER RECREATION OPPORTUNITIES ON HIGH COUNTRY RESERVOIRS, by Robert Aukerman.	June 1975	5.00
63.	ANALYSIS OF COLORADO PRECIPITATION, by Marie Kuo and Stephen Cox.	June 1975	3.00
64.	COMPUTER ESTIMATES OF NATURAL RECHARGE FROM SOIL MOISTURE DATA- HIGH PLAINS OF COLORADO, by Robert A. Longenbaugh.	July 1975	5.00
65.	URBAN DRAINAGE AND FLOOD CONTROL PROJECTS: ECONOMIC, LEGAL AND FINANCIAL ASPECTS, by Neil S. Grigg, L.S. Tucker, Leonard Rice, and J. Shoemaker.	July 1975	11.00
66.	INDIVIDUAL HOME WASTEWATER CHARACTERIZATION AND TREATMENT, by Edwin R. Bennett and K. Daniel Linstedt.	July 1975	9.00
67.	TOXIC HEAVY METALS IN GROUNDWATER OF A PORTION OF THE FRONT MINERAL BELT, by Kenneth W. Edwards and Ronald W. Klusman.	July 1975	4.00
68.	SYSTEMATIC DESIGN OF LEGAL REGULATIONS FOR OPTIMAL SURFACE-GROUNDWATER USAGE - PHASE 2, by H.J. Morel-Seytoux.	Sept. 1975	13.00
69.	ENGINEERING AND ECOLOGICAL EVALUATION OF ANTITRANSPIRANTS FOR INCREASING RUNOFF IN COLORADO WATERSHEDS, by Frank Kreith.	Sept. 1975	3.50
70.	AN ECONOMIC ANALYSIS OF WATER USE IN COLORADO'S ECONOMY, by S. Lee Gray.	Dec. 1975	6.00
71.	SALT TRANSPORT IN SOIL PROFILES WITH APPLICATION TO IRRIGATION RETURN FLOW - THE DISSOLUTION AND TRANSPORT OF GYPSUM IN SOILS, by T.K. Glas and D.B. McWhorter.	Jan. 1976	6.00
72.	TOXIC HEAVY METALS IN GROUNDWATER OF A PORTION OF THE FRONT RANGE MINERAL BELT, by Ronald W. Klusman and Kenneth W. Edwards.	June 1976	5.00
73.	PRODUCTION OF MUTANT PLANTS CONDUCIVE TO SALT TOLERANCE, by M.W. Nabors.	July 1976	5.00
74.	THE RELEVANCE OF TECHNOLOGICAL CHANGE IN LONG TERM WATER RESOURCES PLANNING, by Roger G. Kraynick and Charles W. Howe.	Oct. 1976	4.50
75.	PHYSICAL AND ECONOMIC EFFECTS ON THE LOCAL AGRICULTURAL ECONOMY OF WATER TRANSFER TO CITIES, by R.L. Anderson, N.I. Wengert, and R.D. Heil.	Oct. 1976	4.00
76.	DETERMINATION OF SNOW DEPTH AND WATER EQUIVALENT BY REMOTE SENSING, by Harold W. Steinhoff and Albert H. Barnes.	June 1976	3.00
77.	EVAPORATION OF WASTEWATER FROM MOUNTAIN CABINS, by John C. Ward.	Mar. 1977	9.00
78.	SELECTING AND PLANNING HIGH COUNTRY RESERVOIRS FOR RECREATION WITHIN A MULTIPURPOSE MANAGEMENT FRAMEWORK, by R. Aukerman, C.A. Carlson, R.L. Hiller and J.W. Labadie.	July 1977	7.00
79.	EVALUATION OF THE STORAGE OF DIFFUSE SOURCES OF SALINITY IN THE UPPER COLORADO RIVER BASIN, by J.B. Laronne and S.A. Schumm.	Sept. 1977	5.00
80.	ACHIEVING URBAN WATER CONSERVATION, A HANDBOOK, by Ernest J. Flack, Wade P. Weakley and Duane W. Hill.	Sept. 1977	7.00
81.	ACHIEVING URBAN WATER CONSERVATION: TESTING COMMUNITY ACCEPTANCE, by Robert W. Snodgrass and Duane W. Hill	Sept. 1977	6.00
82.	DEVELOPMENT OF A SUBSURFACE HYDROLOGIC MODEL AND USE FOR INTEGRATED MANAGEMENT OF SURFACE AND SUBSURFACE WATER RESOURCES, by H.J. Morel-Seytoux.	Dec. 1977	4.00

83.	MODELING THE DYNAMIC RESPONSE OF FLOODPLAINS TO URBANIZATION IN EASTERN NEW ENGLAND, by Donald O. Doehring and Mark E. Smith.	Jan. 1978	7.50
84.	POLLUTIONAL CHARACTERISTICS OF STORMWATER RUNOFF, by Edwin R. Bennett and K. Daniel Linstedt.	Sept. 1978	8.00
85.	DEVELOPMENT OF A DRAINAGE AND FLOOD CONTROL MANAGEMENT PROGRAM FOR URBANIZING COMMUNITIES - PART I, by E.J. Riordan, N.S. Grigg and R.L. Hiller.	Sept. 1978	3.00
86.	DEVELOPMENT OF A DRAINAGE AND FLOOD CONTROL MANAGEMENT PROGRAM FOR URBANIZING COMMUNITIES - PART II, by E.J. Riordan, N.S. Grigg and R.L. Hiller.	Sept. 1978	8.00
87.	DEVELOPMENT OF A STREAM-AQUIFER MODEL SUITED FOR MANAGEMENT, by H.J. Morel-Seytoux.	Aug. 1978	4.00
88.	INSTITUTIONAL ARRANGEMENTS FOR EFFECTIVE WATER MANAGEMENT IN COLORADO, by Phillip O. Foss.	Nov. 1978	5.00
89.	SYNTHESIS AND CALIBRATION OF A RIVER BASIN WATER MANAGEMENT MODEL, by John M. Shafer and John W. Labadie.	Oct. 1978	4.00
90.	MODELS FOR SYSTEM WATER PLANNING WITH SPECIAL REFERENCE TO WATER REUSE, by D.W Hendricks and H.J. Morel-Seytoux.	June 1978	6.00
91.	ECONOMIC BENEFITS FROM INSTREAM FLOW IN A COLORADO MOUNTAIN STREAM, by John T. Daubert, Robert A. Young and S. Lee Gray.	June 1979	6.00
92.	HYDRAULIC CONDUCTIVITY OF MOUNTAIN SOILS, by Owen R. Williams, Stanley L. Ponce, James R. Meiman and Mark Spearnak.	Sept. 1978	4.00
93.	APPLICATION OF GEOMORPHIC PRINCIPLES TO ENVIRONMENTAL MANAGEMENT IN SEMI-ARID REGIONS, by S.A Schumm, M.T. Bradley and Z.B. Begin.	Feb. 1980	4.00
	WATER RESOURCES FOR URBAN LAWNS, by W.R. Kneebone, I.L. Pepper, R.E. Danielson, W.E. Hart, L.O. Pochop and J. Borelli (Regional Project - CWIC).	Sept. 1979	5.00
	SALINITY MANAGEMENT OPTIONS FOR THE COLORADO RIVER, by Jay C. Anderson and Alan P. Kleinman (Regional Project - B-107-Utah).	June 1978	6.00
94.	CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE II, ENGINEERING, ECONOMIC, LEGAL, AND SOCIOLOGICAL REQUIREMENTS, by E.C. Vlachos, P.C. Huszar, G.E. Radosevich and G.V. Skogerboe.	May 1980	9.00
95.	DROUGHT-INDUCED PROBLEMS AND RESPONSES OF SMALL TOWNS AND RURAL WATER ENTITIES IN COLORADO: THE 1976-1978 DROUGHT, by Charles W. Howe.	June 1980	5.00
96.	THE PRODUCTION OF AGRICULTURALLY USEFUL MUTANT PLANTS WITH CHARACTERISTICS CONDUCIVE TO SALT TOLERANCE AND EFFICIENT WATER UTILIZATION, by Murray W. Nabors.	Oct. 1979	4.00
97.	WATER REQUIREMENTS FOR URBAN LAWNS IN COLORADO, by Robert E. Danielson, William E. hart, Charles M. Feldhake and Peter M. Haw.	Aug. 1980	4.00
98.	THE EFFECT OF ALGAL INHIBITORS ON HIGHER PLANT TISSUES, by Paul Kugrens.	July 1980	3.50
99.	APPLICATIONS OF REMOTE SENSING IN HYDROLOGY, by William D. Striffler and Diana C. Fitz.	Sept. 1980	4.00
100.	A WATERSHED INFORMATION SYSTEM, by Anton G. Thomsen and William D. Striffler.	Sept. 1980	5.00
101.	AN EMPIRICAL APPLICATION OF A MODEL FOR ESTIMATING THE RECREATION VALUE OF INSTREAM FLOW, by R.G. Walsh, R.K. Ericson, D.J. Arosteguy, and M.P. Hansen.	Oct. 1980	4.00
102.	MEASURING BENEFITS AND THE ECONOMIC VALUE OF WATER IN RECREATION ON HIGH COUNTRY RESERVOIRS, by R.G. Walsh, R. Aukerman, and R. Milton.	Sept. 1980	4.00
103.	EMPIRICAL APPLICATION OF A MODEL FOR ESTIMATING THE RECREATION VALUE OF WATER IN RESERVOIRS COMPARED TO INSTREAM FLOW, by Richard G. Walsh.	Dec. 1980	4.00
104.	DETECTION OF WATER QUALITY CHANGES THROUGH OPTIMAL TESTS AND RELIABILITY TESTS, by Roy W. Koch, Thomas G. Sanders, and H.J. Morel-Seytoux.	Sept. 1980	5.00
105.	MUNICIPAL WATER USE IN NORTHERN COLORADO: DEVELOPMENT OF EFFICIENCY-OF-USE CRITERION, by A.U. White, A.N. DiNatale, J. Greenbert, and J.E. Flack.	Sept. 1980	5.00
106.	URBAN LAWN IRRIGATION AND MANAGEMENT PRACTICES FOR WATER SAVING WITH MINIMUM EFFECT ON LAWN QUALITY, by R.E. Danielson and C.M. Feldhake.	May 1981	7.00
107.	ROLE OF SEDIMENT IN NON-POINT SOURCE SALT LOADING WITHIN THE UPPER COLORADO RIVER BASIN, by H.W. Shen, J.B. Laronne, E.D. Enck, G. Sunday, K.K. Tanji, L.D. Whittig, and J.W. Biggar.	Aug. 1981	9.00
108.	WATERLOGGING CONTROL FOR IMPROVED WATER AND LAND USE EFFICIENCIES: A SYSTEMATIC ANALYSIS, by A. Simpson, H.J. Morel-Seytoux, R.A. Young, G.E. Radosevich, and W.T. Franklin.	Dec. 1981	6.00

109.	SALT- AND DROUGHT-TOLERANT CROP PLANTS FOR WATER CONSERVATION, by Murray W. Nabors.	Oct. 1981	6.00
110.	GEOMORPHIC AND LITHOLOGIC CONTROLS OF DIFFUSE-SOURCE SALINITY, GRAND VALLEY, WESTERN COLORADO, by R.K. Johnson and S.A. Schumm.	Apr. 1982	6.00
111.	INVESTIGATION OF OBJECTIVE FUNCTIONS AND OPERATION RULES FOR STORAGE RESERVOIRS, by V. Yevjevich, W.A. Hall and J.D. Salas.	Sept. 1981	4.00
112.	DAILY OPERATIONAL TOOL FOR MAXIMUM BENEFICIAL USE MANAGEMENT OF SURFACE AND GROUNDWATERS IN A BASIN, by H.J. Morel-Seytoux, Kristine L. Verdin and T.H. Illangasekare.	Mar. 1982	4.00
113.	A WATER HANDBOOK FOR METAL MINING OPERATIONS, by Thomas R. Wildeman.	Nov. 1981	6.00
114.	PLANNING WATER REUSE: DEVELOPMENT OF REUSE THEORY AND THE INPUT-OUTPUT MODEL, VOL. I: FUNDAMENTALS, by D. Klooz and D.W. Hendricks.	Sept. 1980	13.00
115.	PLANNING WATER REUSE: DEVELOPMENT OF REUSE THEORY AND THE INPUT-OUTPUT MODEL, VOL. II: APPLICATION, by D. Klooz and D.W Hendricks.	Sept. 1980	6.00
116.	EFFECTS OF RELEASES OF SEDIMENT FROM RESERVOIRS ON STREAM BIOTA, by James V. Ward.	Sept. 1982	4.00
117.	DYNAMIC WATER ROUTING USING A PREDICTOR-CORRECTOR METHOD WITH SEDIMENT ROUTING, by D.B. Simons, R. M. Li, J. Garbrecht and R. K. Simons.	Sept. 1982	6.00
118.	ECONOMIC ASPECTS OF COST-SHARING ARRANGEMENTS FOR FEDERAL IRRIGATION PROJECTS: A CASE STUDY, by G. Keleta, R.A. Young and E. Sparling.	Dec. 1982	4.00
119.	ECONOMIC ISSUES IN RESOLVING CONFLICTS IN WATER USE, by S. Lee Gray and Robert A. Young.	Feb. 1983	4.00
120.	THE EFFECTS OF WATER CONSERVATION ON NEW WATER SUPPLY FOR URBAN COLORADO UTILITIES, by Carol Ellinghouse and George McCoy.	Dec. 1982	9.00
121.	SOLAR HEATING OF WASTEWATER STABILIZATION PONDS, by Stanley L. Klemetson.	Mar. 1983	5.00
122.	ECONOMIC IMPACTS OF TRANSFERRING WATER FROM AGRICULTURE TO ALTERNATIVE USES IN COLORADO, by Robert A. Young.	Apr. 1983	6.00
123.	ARTIFICIAL GROUNDWATER RECHARGE, SAN LUIS VALLEY, COLORADO, by Dan Sunada.	May 1983	7.00
124.	EFFECTS OF WILDERNESS LEGISLATION ON WATER PROJECT DEVELOPMENT IN COLORADO, by Glen D. Weaver.	May 1983	8.00
125.	A RIVER BASIN NETWORK MODEL FOR CONJUNCTIVE USE OF SURFACE AND GROUNDWATER: PROGRAM CONSIM, by J.W. Labadie, S. Phamwon and R.C. Lazaro.	May 1983	8.00
126.	INCREASING THE ECONOMIC EFFICIENCY AND AFFORDABILITY OF STORM DRAINAGE PROJECTS, by Harold C. Cochrane and Paul C. Huszar.	Sept. 1983	4.00
127.	MATHEMATICAL MODELS FOR PREDICTION OF SOIL MOISTURE PROFILES, by H.J. Morel-Seytoux.	July 1983	4.00
128	DISSOLVED SOLIDS HAZARDS IN THE SOUTH PLATTE BASIN, VOL. I: SALT TRANSPORT IN THE RIVER, by Ramon V. Gomez-Ferrer and David W. Hendricks.	Dec. 1983	7.00
129.	DISSOLVED SOLIDS HAZARDS IN THE SOUTH PLATTE RIVER BASIN, VOL. II: SALT BALANCE ANALYSIS, by C.D. Turner and D.W. Hendricks.	Dec. 1983	7.00
130.	CONJUNCTIVE OPERATION OF A SURFACE RESERVOIR AND THE GROUNDWATER STORAGE THROUGH A HYDRAULICALLY CONNECTED STREAM, by H.J. Morel-Seytoux.	Feb. 1984	3.00
131.	THE EFFECT OF LITHOLOGY AND CLIMATE ON THE MORPHOLOGY OF DRAINAGE BASINS IN NORTHWESTERN COLORADO, by Sandra L. Eccker.	June 1984	7.00
132.	SPECIFIC YIELD BY GEOPHYSICAL LOGGING POTENTIAL FOR THE DENVER BASIN, by David B. McWhorter.	July 1984	4.00
133.	VOLUNTARY BASINWIDE WATER MANAGEMENT: SOUTH PLATTE RIVER BASIN, COLORADO, by N.S. Grigg, H.P Caulfield, Jr., N.A. Evans, J.E. Flack, D.W. Hendricks, J.W. Labadie, D.B. McWhorter, H.J. Morel-Seytoux, W.L. Raley and R.A. Young.	Oct. 1984	5.00
134.	EFFECTS OF ALTERNATIVE ELECTRICITY RATES AND RATE STRUCTURES ON ELECTRICITY AND WATER USE ON THE COLORADO HIGH PLAINS, by R.L. Gardner, R.A. Young and Lawrence Conklin.	Oct. 1984	4.00
135.	COST-EFFECTIVE DESIGN AND OPERATION OF URBAN STORMWATER CONTROL SYSTEMS: DECISION-SUPPORT SOFTWARE, by John W. Labadie, Neil S. Grigg, Dennis M. Morrow, and David K. Robinson.	Oct. 1984	7.00

136.	VARIABILITY OF UNUTILIZED SURFACE WATER SUPPLIES FROM THE YAMPA AND WHITE RIVER BASINS, by H.S. When, R. Anderson, H.P. Caulfield, Jr., and S.K. Yan.	Jan. 1985	7.00
137.	THE ENDANGERED SPECIES ACT AND WATER DEVELOPMENT WITHIN THE SOUTH PLATTE BASIN, by Lawrence J. MacDonnell.	Aug. 1985	6.00
138.	THE POTENTIAL OF MODIFIED FLOW-RELEASE RULES FOR KINGSLEY DAM IN MEETING CRANE HABITAT REQUIREMENTS--PLATTE RIVER, NEBRASKA, by Hsieh Wen Shen, Kim Loi Hiew and Eric Loubser.	Nov. 1985	7.00
139.	GUIDELINES FOR DEVELOPING AREA-ORIGIN COMPENSATION, by L.J. MacDonnell, Charles W. Howe, James N. Corbridge, Jr. and W. Ashley Ahrens.	Dec. 1985	5.00
140.	MONITORING STRATEGIES FOR GROUNDWATER QUALITY MANAGEMENT, by J.C. Loftis, R.H. Montgomery, J. Harris, D. Nettles, P.S. Porter, R.C. Ward and T.G. Sanders.	Apr. 1986	5.00
141.	POTENTIAL GROUNDWATER IMPACTS FROM CHEMIGATION, by James W. Warner and Kit Nielsen.	Sept. 1986	5.00
142.	THE EFFECT OF CONSERVATION PROGRAMS ON THE QUALITY OF URBAN LAWNS, by Andrew	Sept. 1986	5.00
143.	EVAPOTRANSPIRATION OF NATIVE VEGETATION IN THE CLOSED BASIN OF THE SAN LUIS VALLEY, COLORADO, by F.L. Charles, J.A. Morgan and W.C. Bausch.	June 1987	5.00
144.	RECHARGE AS AUGMENTATION IN THE SOUTH PLATTE RIVER BASIN, by James W. Warner, Daniel Sunada and Anne Hartwell.	Nov. 1987	5.00
145.	IMPACTS OF WASTEWATER DISCHARGE TO FOUNTAIN CREEK ON NITRATE CONTAMINATION IN THE WIDEFIELD AQUIFER, by Kimball Stark Loomis and James W. Warner.	Feb. 1990	7.00
146.	GEOCHEMICAL ASSESSMENT OF AQUIFER RECHARGE EFFECTS IN THE SOUTHWEST DENVER BASIN, by Andrea R. Aikin and A. Keith Turner.	Aug. 1987	4.00
147.	EVALUATION OF DESIGN FLOW CRITERIA FOR EFFLUENT DISCHARGE PERMITS IN COLORADO, by Cynthia L. Paulson and Thomas G. Sanders.	Aug. 1987	15.00
148.	INTEGRATING TRIBUTARY GROUNDWATER DEVELOPMENT INTO THE PRIOR APPROPRIATION SYSTEM: THE SOUTH PLATTE EXPERIENCE, by Lawrence J. MacDonnell.	Aug. 1988	4.00
149.	THE ECONOMIC ROLE OF WATER IN COLORADO: AN INPUT-OUTPUT ANALYSIS, by S. Lee Gray, John R. McKean and Thomas A. Miller.	Sept. 1988	6.00
150.	GROUNDWATER FAUNAS AS INDICATORS OF GROUNDWATER QUALITY: THE SOUTH PLATTE RIVER SYSTEM, by J.V. Ward, Neal J. Voelz, and James H. Harvey.	Feb. 1989	4.00
151.	WATER QUALITY AND WATER RIGHTS IN COLORADO, by Lawrence J. MacDonnell.	July 1989	4.00
152.	ENHANCED MICROBIAL RECLAMATION OF WATER POLLUTED WITH TOXIC ORGANIC CHEMICALS, by Steven K. Schmidt.	Sept. 1989	5.00
153.	BIOLOGICAL DENITRIFICATION OF POLLUTED GROUNDWATER, by Nevis E. Cook, Jr. and JoAnn Silverstein.	Nov. 1989	5.00
154.	ACID MINE DRAINAGE; STREAMBED SORPTION OF COPPER, CADMIUM AND ZINC, by Donald L. Macalady, Kathleen S. Smith and James F. Ranville.	Jan. 1990	5.00
155.	RIVINT - AN IMPROVED CODE FOR SIMULATING SURFACE/GROUNDWATER INTEREACTIONS WITH MODFLOW, by Judith Schenk and Eileen Poeter.	Mar. 1990	25.00
156.	POTENTIAL PESTICIDE TRANSPORT IN COLORADO AGRICULTURE: A MODEL COMPARISON, by Walter L. Niccoli, Jim C. Loftis and Deanna S. Durnford.	Mar. 1990	5.00
157.	SCREENING METHODS FOR GROUNDWATER POLLUTION POTENTIAL FROM PESTICIDE USE IN COLORADO AGRICULTURE, by Deanna S. Durnford, Kirk R. Thompson, David A. Ellerbroek, Jim C. Loftis, G. Scott Davies, and Kenneth W. Knutson.	Dec. 1990	6.00
158.	URBAN WATER SUPPLY RELIABILITY: PREFERENCES OF MANAGERS, ELECTED OFFICIALS AND WATER USERS IN BOULDER, COLORADO, by Charles W. Howe, Lynne Bennett, Charles M. Brendecke, J. Ernest Flack, Robert M. Hamm, Roger Mann, Lee Rozaklis, Mark Griffin Smith, and Karl Wunderlich.	Dec. 1990	4.00
159.	ADSORPTION OF COPPER, CADMIUM, AND ZINC ON SUSPENDED SEDIMENTS IN A STREAM CONTAMINATED BY ACID MINE DRAINAGE: THE EFFECT OF SEASONAL CHANGES IN DISSOLVED ORGANIC CARBON, by Donald L. Macalady James F. Ranville, Kathleen S. Smith, and Stephen R. Daniel.	Jan. 1991	5.00
160.	A MODELING APPROACH FOR ASSESSING THE FEASIBILITY OF GROUNDWATER WITHDRAWAL FROM THE DENVER BASIN DURING PERIODS OF DROUGHT, by Sigurd Jaunarajs and Eileen Poeter.	Apr. 1991	16.00
161.	ECONOMIC IMPACTS OF ALTERNATIVE WATER ALLOCATION INSTITUTIONS IN THE COLORADO RIVER BASIN, by James F. Booker and Robert A. Young.	Aug. 1991	7.00
162.	FIELD DEMONSTRATION OF BIOLOGICAL DENITRIFICATION OF POLLUTED GROUNDWATER AND PILOT SCALE FIELD TESTING OF BIOLOGICAL DENITRIFICATION WITH WIDELY VARIED	Dec. 1991	5.00

	HYDRAULIC LOADING RATES, by Nevis E. Cook, Jr., JoAnn Silverstein, Bill Veydovec, Maria Marcia de Mendonca, and Roger Sydney.		
163.	FATE AND EFFECTS OF HEAVY METALS ON THE ARKANSAS RIVER, by William H. Clements.	Dec. 1991	5.00
164.	FORECASTING STREAMFLOW FOR COLORADO RIVER SYSTEMS, by D.C. Wang and J.D. Salas.	Dec. 1991	10.00
165.	ESTIMATION OF GROUNDWATER RECHARGE USING NEUTRON PROBE MOISTURE READINGS NEAR GOLDEN, COLORADO, by Nicholas J. Kiusalaas and Eileen P. Poeter.	Nov. 1992	10.00
166.	MUTUAL IRRIGATION COMPANY MONITORING OF MAIN CANAL NITROGEN LEVELS, by John Wilkins-Wells and David Freeman.	Dec. 1992	5.00
167.	BIOACCUMULATION OF HEAVY METALS BY BROWN TROUT (SALMO TRUTTA) IN THE ARKANSAS RIVER: IMPORTANCE OF FOOD CHAIN TRANSFER, by William H. Clements.	Dec. 1992	5.00
168.	FATE OF HEAVY METALS IN COLORADO WATERS AND RIVERS, by E.W. Brennan and W. L. Lindsay.	Dec. 1992	5.00
169.	FIELD VERIFICATION OF STREAM/AQUIFER INTERACTION, COLORADO SCHOOL OF MINES SURVEY FIELD, GOLDEN, COLORADO, by Evan R. Anderman and Eileen Poeter.	In print	
170.	AN APPROACH TO MODELING A STREAM-AQUIFER SYSTEM FOR CONJUNCTIVE MANAGEMENT, by H.J. Morel-Seytoux, Chuanmian Zhang and R.A. Young.	In print	
171.	SOME ECONOMIC IMPACTS OF A RURAL-TO-URBAN WATER TRANSFER: A CASE STUDY OF CROWLEY COUNTY, COLORADO, by R.G. Taylor, R.A. Young and J.R. McKean.	In print	
172.	ENHANCED MICROBIAL RECLAMATION OF GROUNDWATER POLLUTED WITH TOXIC ORGANIC by S.K. Schmidt.	In print	
173.	THE ROLE OF THE SOUTH PLATTE TRIBUTARY AQUIFER IN NE COLORADO IRRIGATED AGRICULTURE: RESULTS OF A SURVEY, by P.K. Bash and R.A. Young.	In print	
174.	THE ECONOMIC IMPACT DUE TO DRAWDOWN ON COLORADO'S RECREATION RESERVOIRS, by K-Lynn Cameron and Robert Aukerman.	In print	
175.	ECONOMIC FACTORS AFFECTING RESIDENTIAL WATER DEMAND IN COLORADO, by R.A. Young.	In print	
176.	EFFECTS OF FLOW DIVERSION ON DOWNSTREAM CHANNEL FORM IN MOUNTAIN STREAMS, by Sandra Ryan and Nel Caine.	In print	
177.	AGRICULTURAL TO URBAN WATER TRANSFERS IN COLORADO: AN ASSESSMENT OF THE ISSUES AND OPTIONS, by Teresa A. Rice and Lawrence J. MacDonnell.	In print	
178.	IMPROVEMENTS IN THE COLORADO AMMONIA MODEL BY SIMULTANEOUS COMPUTATION OF EXTREMES IN FLOW AND WATER CHEMISTRY, by William M. Lewis and James F. Saunders, III.	In print	
179.	IMPACT OF IRRIGATION WATER USE ON WATER QUALITY IN THE CENTRAL COLORADO WATER CONSERVANCY DISTRICT, by Henriette Emond, Jim C. Loftis, and Terence Podmore.	In print	
180.	HEAVY METAL REMOVAL FROM WATERS BY MOUNTAIN MEADOW BOGS, by E.W. Brennan and W.L. Lindsay.	In print	
181.	SPATIAL DISTRIBUTION OF NITRATE LEACHING 'HOT SPOTS' AND NITRATE CONTRIBUTIONS TO THE SOUTH PLATTE RIVER BASIN AQUIFERS, by B.K. Wylie, D.G. Wagner, R.M. Hoffer, S. Maxwell and M.J. Shaffer.	In print	
182.	REFERENCE EVAPOTRANSPIRATION MAPS FOR COLORADO, by Luc Claessens, Luis Garcia and Marvin Jensen.	In print	

INFORMATION SERIES

No.			
1.	INVENTORY OF ENVIRONMENTAL RESOURCES RESEARCH IN PROGRESS - 1971, 1972, 1973, CSU; 1,3,8 OUT OF PRINT		
2.	ECONOMICS OF WATER QUALITY--SALINITY POLLUTION - Abridged Bibliography, Constance A. Miller.	June	12.00
4.	PROCEEDINGS, WORKSHOP ON HOME SEWAGE DISPOSAL IN COLORADO, edited by Robert C. Ward.	June 1972	Free
5.	DIRECTORY OF ENVIRONMENTAL RESEARCH FACULTY - 1972, CSU; OUT OF PRINT		
6.	WATER LAW AND ITS RELATIONSHIP TO ENVIRONMENTAL QUALITY: A BIBLIOGRAPHY OF SOURCE MATERIAL, by G. E. Radosevich, D.R. Allardice, G.A. Swanson and K.R. Koebel.	Jan. 1973	8.00
7.	WILDLIFE AND THE ENVIRONMENT, Proceedings of the Governor's Conference, March, 1973 (Loan copy available from Morgan Library, CSU)	Mar. 1973	Out of print
9.	PROCEEDINGS OF THE SYMPOSIUM ON LAND TREATMENT AND SECONDARY EFFLUENT.	Nov. 1973	4.00

10.	PROCEEDINGS OF A WORKSHOP ON REVEGETATION OF HIGH-ALTITUDE DISTURBED LANDS, Co-Chairmen: W.A. Berg, J.A. Brown and R.L. Cuany.	July 1973	6.00
11.	SURFACE REHABILITATION OF LAND DISTURBANCES RESULTING FROM OIL SHALE DEVELOPMENT, by Wayne C. Cook (Executive Summary).	June 1974	Free
12.	WATER QUALITY CONTROL AND ADMINISTRATION LAWS AND REGULATIONS, by G.E. Radosevich and Peggy Allen.	1974	16.00
13.	FLOOD PLAIN MANAGEMENT OF THE CACHE LA POUDRE RIVER NEAR FORT COLLINS, COLORADO, by G.L. Combs, R.A. McDonald, M.R. Martens and G.M. Rowe.	Aug. 1974	3.75
14.	BIBLIOGRAPHY PERTINENT TO DISTURBANCE AND REHABILITATION OF ALPINE AND SUBALPINE LANDS IN THE SOUTHERN ROCKY MOUNTAINS, by O. Steen and W.A. Berg.	Feb. 1975	4.00
15.	PROCEEDINGS OF THE SYMPOSIUM ON WATER POLICIES ON U.S. IRRIGATED AGRICULTURE: ARE INCREASED ACREAGES NEEDED TO MEET DOMESTIC OR WORLD NEEDS? by Victor A. Koelzer.	Mar. 1975	5.00
16.	ANNOTATED BIBLIOGRAPHY ON TRICKLE IRRIGATION, by Stephen W. Smith and Wynn R. Walker.	June 1975	Free
17.	CACHE LA POUDRE RIVER NEAR FORT COLLINS, COLO. - FLOOD MANAGEMENT ALTERNATIVES - RELOCATIONS AND LEVIES, by Robert E. Koirtyohann, Ronald L. Miller, Loren W. Pope and Charles C. Stein.	Aug. 1975	6.00
18.	MINIMUM STREAM FLOWS AND LAKE LEVELS IN COLORADO, by Charles G. Rhinehart.	Aug. 1975	9.00
19.	THE ENVIRONMENTAL QUALITY OBJECTIVE OF PRINCIPLES AND STANDARDS FOR PLANNING, by G.D. McGinnis, R.W. Plott and Richard D. Swanson.	Aug. 1975	8.00
20.	PROCEEDINGS, SECOND WORKSHOP ON HOME SEWAGE DISPOSAL IN COLORADO, edited by Robert Ward.	Sept. 1975	4.00
21.	PROCEEDINGS: HIGH ALTITUDE REVEGETATION WORKSHOP NO. 2, edited by R.H. Zuck and L.F. Brown.	Aug. 1976	6.00
22.	IMPLEMENTATION OF THE NATIONAL FLOOD INSURANCE PROGRAM IN LARIMER COUNTY, COLORADO, by Dwayne A. Landenberger and Howard M. Whittington.	Sept. 1976	5.00
23.	INVENTORY OF COLORADO'S FRONT RANGE MOUNTAIN RESERVOIRS, by R. Aukerman, William T. Springer and James F. Fudge.	May 1977	6.00
24.	FACTORS AFFECTING PUBLIC ACCEPTANCE OF FLOOD INSURANCE IN LARIMER AND WELD COUNTIES, by Joel W. James, Joel B. Kreger and R. Dru Barrineau.	Sept. 1977	4.00
25.	SURVEILLANCE DATA, PLAINS SEGMENT OF THE CACHE LA POUDRE RIVER, COLORADO, 1970-1977, by S.M. Morrison.	Jan. 1978	6.00
26.	WATER USE AND MANAGEMENT IN AN ARID REGION (Fort Collins, Colorado and Vicinity), by J.W. Anderson, C.W. DeRemer and R.S. Hall.	Sept. 1977	6.00
27.	PROCEEDINGS, COLORADO DROUGHT WORKSHOPS, Sponsored by Colorado Water Conservation Board and Colorado Drought Board.	Nov. 1977	Free
28.	PROCEEDINGS: HIGH ALTITUDE REVEGETATION WORKSHOP NO. 3, edited by S.T. Kenny.	June 1978	6.00
29.	PROCEEDINGS, THIRD WORKSHOP ON HOME SEWAGE DISPOSAL IN COLORADO - COMMUNITY MANAGEMENT, by Robert C. Ward.	July 1978	5.00
30.	THE LARIMER-WELD COUNCIL OF GOVERNMENTS 208 WATER QUALITY PLAN: AN ASSESSMENT AND SUGGESTIONS FOR FUTURE DIRECTIONS, by Leonard F. Bryniarski, Kenneth W. Carter, Howard D. Danley, and Joseph E. Gurule.	Aug. 1978	3.00
31.	THE DENVER BASIN: ITS BEDROCK AQUIFERS, by M.W. Bittinger.	Jan. 1979	Free
32.	SNOWPACK AUGMENTATION BY CLOUD SEEDING IN COLORADO AND UTAH, by Roderick A. Chisholm II and Ronald L. Grimes.	Aug. 1979	5.00
33.	THE IMPACTS OF IMPROVING EFFICIENCY IN IRRIGATION SYSTEMS ON WATER AVAILABILITY IN THE LOWER SOUTH PLATTE RIVER BASIN, by H.J. Morel-Seytoux, T. Illangasekare, M.W. Bittinger and Norman A. Evans.	Jan. 1979	Free
34.	SAN LUIS VALLEY WATER PROBLEMS: A LEGAL PERSPECTIVE, by G.E. Radosevich and R.W. Rutz.	Jan. 1979	5.00
35.	FEDERAL WATER STORAGE PROJECTS: PLUSES AND MINUSES, by C.W. Howe.	June 1979	Free
36.	CUTTING CITY WATER DEMAND, by J. Ernest Flack.	May 1979	Free
37.	WATER FOR THE SOUTH PLATTE BASIN, by D.W. Hendricks, H.J. Morel-Seytoux and C. Turner.	Mar. 1979	Free
38.	PUBLIC PARTICIPATION PRACTICES OF THE U.S. ARMY CORPS OF ENGINEERS, by Charles E. Christ and Ronald Lanier.	July 1979	4.00

39.	ADMINISTRATION OF THE SMALL WATERSHED PROGRAM, 1955-1978, - AN ANALYSIS, by WIldon J. Fontenot.	Aug. 1979	4.00
40.	PROCEEDINGS OF THE WORKSHOP ON INSTREAM FLOW HABITAT CRITERIA AND MODELING, edited by George L. Smith.	Dec. 1979	6.00
41.	EXPLORING WAYS OF INCREASING THE USE OF SOUTH PLATTE WATER, by John Labadie and John Shafer.	1980	Free
42.	PROCEEDINGS: HIGH-ALTITUDE REVEGETATION WORKSHOP NO. 4, edited by Charles L. Jackson, and Mark A. Schuster (Climax Molybdenum Company).	June 1980	6.00
43.	AN EVALUATION OF THE CACHE LA POUDRE WILD AND SCENIC RIVER DRAFT ENVIRONMENTAL IMPACT STATEMENT AND STUDY REPORT, by Michael J. Eubanks.	Aug. 1980	6.00
44.	THE NATIONAL FLOOD INSURANCE PROGRAM IN THE LARIMER COUNTY, COLORADO AREA, by Harry Shoudy.	Aug. 1980	4.00
45.	PROCEEDINGS: FOURTH WORKSHOP ON HOME SEWAGE DISPOSAL IN COLORADO - STATE/ COUNTY COOPERATION IN MANAGING SMALL WASTEWATER FLOWS, by Robert C. Ward.	Aug. 1981	5.00
46.	THE DECLINING ROLE OF THE U.S. ARMY CORPS OF ENGINEERS IN THE DEVELOPMENT OF THE NATION'S WATER RESOURCES, by Charles Yoe.	Aug. 1981	8.00
47.	SECTION 404 OF THE CLEAN WATER ACT - AN EVALUATION OF THE ISSUES AND PERMIT PROGRAM IMPLEMENTATION IN WESTERN COLORADO, by Dennis W. Barnett.	Aug. 1982	6.00
48.	PROCEEDINGS, HIGH-ALTITUDE REVEGETATION WORKSHOP NO. 5, edited by Robin L. Cuany and Julie Etra.	Dec. 1982	6.00
49.	PROCEEDINGS: FIFTH WORKSHOP ON HOME SEWAGE DISPOSAL IN COLORADO: OPERATION AND MAINTENANCE OF ON-SITE WASTEWATER TREATMENT SYSTEMS, by Robert C. Ward.	June 1983	5.00
50.	POSSIBLE CAPTURE OF THE MISSISSIPPI BY THE ATCHAFALAYA RIVER, by John D. Higby, Jr.	Aug. 1983	5.00
51.	ENVIRONMENTAL REGULATION: APPLICANT BEHAVIOR AS A FACTOR IN OBTAINING PERMITS, by Barney M. Opton.	July 1984	8.00
52.	A CRITICAL ASSESSMENT OF METHODOLOGIES FOR ESTIMATING URBAN FLOOD DAMAGES-PREVENTED BENEFITS, by David Plazak.	July 1984	3.00
53.	PROCEEDINGS: HIGH-ALTITUDE REVEGETATION WORKSHOP NO. 6, edited by Thomas A. Colbert and Robin L. Cuany.	Dec. 1984	8.00
54.	ARTIFICIAL AQUIFER RECHARGE IN THE COLORADO PORTION OF THE OGALLALA AQUIFER, by R. Longenbaugh, D. Miles, E. Hess and J. Rubingh.	Nov. 1984	2.00
55.	WORKSHOP ON WATER QUALITY MONITORING IN COLORADO, edited by Robert C. Ward and William L. Raley.	July 1985	5.00
56.	GROUNDWATER QUALITY PROTECTION POLICIES FOR THE ROCKY MOUNTAIN REGION AND THE NATION, Transcript of Proceedings.	Apr. 1986	6.00
57.	PROCEEDINGS: SIXTH WORKSHOP ON ON-SITE WASTEWATER TREATMENT IN COLORADO, edited by Robert C. Ward.	May 1986	5.00
58.	PROCEEDINGS: HIGH ALTITUDE REVEGETATION WORKSHOP NO. 7, edited by Mark A. Schuster and Ronald H. Zuck.	Oct. 1986	10.00
59.	PROCEEDINGS: HIGH ALTITUDE REVEGETATION WORKSHOP NO. 8, edited by Warren R. Keammerer and Larry F. Brown.	July 1988	12.00
60.	PROCEEDINGS: SEVENTH WORKSHOP ON ON-SITE WASTEWATER TREATMENT IN COLORADO, edited by Robert C. Ward.	June 1989	3.00
61.	PROCEEDINGS: INTERNATIONAL SYMPOSIUM ON THE DESIGN OF WATER QUALITY INFORMATION SYSTEMS, edited by Robert C. Ward, Jim C. Loftis, and Graham B. McBride.	June 1989	25.00
62.	HYDROLOGIC ASPECTS OF DAM SAFTY, Edited by Neil S. Grigg.	Feb. 1990	8.00
63.	PROCEEDINGS: HIGH ALTITUDE REVEGETATION WORKSHOP NO. 9, Edited by Warren R. Keammerer and Jeffrey Todd.	July 1990	12.00
64.	PROCEEDINGS: COLORADO WATER WORKSHOP, JULY 22-24, 1990, "COLORADO WATER INSTITUTIONS, VALUABLE TRADITIONS - NEW FRONTIERS.	Nov. 1990	30.00
65.	PROCEEDINGS: WATER PROJECT DEVELOPMENT AND FINANCING IN THE 1990S, Edited by Kate A. Berry.	Feb. 1991	5.00
66.	SOUTH PLATTE RIVER RESOURCE MANAGEMENT; FINDING A BALANCE, by R. Craig Woodring, Editor.	June 1991	5.00
67.	COLORADO CITIZENS WATER HANDBOOK - Colorado, The Next 100 Years - by George Vranesh.	Nov. 1991	7.00
68.	PROCEEDINGS: COLORADO WATER WORKSHOP, July 21-23, 1992, "From the Dome to the Ditches: Translating Environmental Legislation Into Practice"	Nov. 1991	30.00

69.	PROCEEDINGS: WATER RESOURCES AND ENVIRONMENT: EDUCATION, TRAINING AND RESEARCH	July 1992	*
70.	PROCEEDINGS: SOUTH PLATTE RIVER BASIN: USES, VALUES, RESEARCH AND MANAGEMENT, CURRENT AND FUTURE, R. Craig Woodring, Editor.	June 1992	6.00
71.	PROCEEDINGS: HIGH ALTITUDE REVEGETATION WORKSHOP, Edited by Wendell G. Hassell, Susan K. Nordstrom, Warren R. Keammerer, and Jeffrey Todd.	Mar. 1992	13.00
72.	PROCEEDINGS: DEFINING ECOLOGICAL AND SOCIOLOGICAL INTEGRITY FOR THE SOUTH PLATTE BASIN, R. Craig Woodring, Editor.	Feb. 1993	7.00
73.	PROCEEDINGS: BASIN PLANNING AND MANAGEMENT: WATER QUANTITY AND QUALITY, Edited by David K. Mueller.	Mar. 1993	7.00
74.	PROCEEDINGS: 1993 COLORADO WATER CONVENTION	Jan. 1993	10.00
75.	PROCEEDINGS: COLORADO WATER WORKSHOP, SHOWDOWN ON THE COLORADO RIVER	July 1993	30.00
76.	SEEKING AN INTEGRATED APPROACH TO WATERSHED MANAGEMENT IN THE SOUTH PLATTE by Kathleen C. Klein, Ed.	Dec. 1993	

*Contact Civil Engineering Department, Colorado State University, Fort Collins, CO 80523, Phone: 303/491-5049.

TECHNICAL REPORT SERIES

1.	SURFACE REHABILITATION OF LAND DISTURBANCES RESULTING FROM OIL SHALE DEVELOPMENT, by C. Wayne Cook.	June 1974	11.00
2.	ESTIMATED AVERAGE ANNUAL WATER BALANCE FOR PICEANCE AND YELLOW CREEK WATERSHEDS, by Ivan F. Wymore.	Aug. 1974	Free
3.	IMPLEMENTATION OF THE FEDERAL WATER PROJECT RECREATION ACT IN COLORADO, by John A. Spence.	June 1974	Free
4.	VEGETATION STABILIZATION OF SPENT OIL SHALES, by H.P. Harbert and W.A. Berg.	Dec. 1974	4.00
5.	REVEGETATION OF DISTURBED SOILS IN VARIOUS VEGETATION ECOSYSTEMS OF THE PICEANCE BASIN, by P.L. Sims and E.F. Redente.	Dec. 1974	5.25
6.	COLORADO ENVIRONMENTAL DATA SYSTEMS (abridged), by Ross A,. Whaley and A.A. Dyer.	Oct. 1972	6.00
7.	MANUAL FOR TRAINING IN THE APPLICATION OF PRINCIPLES AND STANDARDS (Water Resources Council), by Henry Caulfield, Jr.	Dec. 1974	11.00
8.	MODELS DESIGNED TO EFFICIENTLY ALLOCATE IRRIGATION WATER USE BASED ON CROP RESPONSE TO SOIL MOISTURE STRESS, by R.L. Anderson, D. Yaron and R. Young.	May 1977	5.00
9.	THE 1972 FEDERAL WATER POLLUTION CONTROL ACT'S AREA-WIDE PLANNING PROVISION: HAS EXECUTIVE IMPLEMENTATION MET CONGRESSIONAL INTENT? by D.F. Stark.	Nov. 1977	6.00
10.	EFFICIENCY OF WASTEWATER DISPOSAL IN MOUNTAIN AREAS, by Richard G. Walsh, Jared P. Soper and Anthony A. Prato.	Jan. 1978	6.00
11.	FEDERAL WATER RECREATION IN COLORADO: COMPREHENSIVE VIEW AND ANALYSIS, by Kharol E. Stefanec.	May 1978	6.00
12.	RECREATION BENEFITS OF WATER QUALITY: ROCKY MOUNTAIN NATIONAL PARK, SOUTH PLATTE RIVER BASIN, COLORADO, by R.G. Walsh, R.K. Ericson, J.R. McKean and R.A. Young.	May 1978	5.00
13.	IMPACT OF IRRIGATION EFFICIENCY IMPROVEMENTS ON WATER AVAILABILITY IN THE SOUTH PLATTE RIVER BASIN, by M.W. Bittinger, R.E. Danielson, N.A. Evans, W.E. Hart, H.J. Morel-Seytoux and M.M. Skinner.	Jan. 1979	6.00
14.	ECONOMIC VALUE OF BENEFITS FROM RECREATION AT HIGH MOUNTAIN RESERVOIRS, by Richard G. Walsh, Robert Aukerman and Dean Rudd.	Dec. 1978	4.00
15.	WEEKLY CROP CONSUMPTIVE USE AND PRECIPITATION IN THE LOWER SOUTH PLATTE RIVER BASIN (Fort Morgan, Sterling and Julesburg) 1947-1975.	Feb. 1979	Free
16.	WATER MANAGEMENT MODEL FOR FRONT RANGE RIVER BASINS, by John W. Labadie and John M. Shafer.	Apr. 1979	6.00
17.	LAND TREATMENT OF MUNICIPAL SEWAGE EFFLUENT AT HAYDEN, COLORADO, by K.A. Barbarick, B.R. Sabey, and N.A. Evans.	Oct. 1977	4.00
18.	AN INTERACTIVE RIVER BASIN WATER MANAGEMENT MODEL: SYNTHESIS AND APPLICATION, by John M. Shafer.	Aug. 1979	5.00

19.	AN ECONOMIC EVALUATION OF THE GENERAL MANAGEMENT FOR YOSEMITE NATIONAL PARK, by Richard G. Walsh.	Mar. 1980	5.00
20.	DEVELOPMENT OF METHODOLOGIES FOR DETERMINING OPTIMAL WATER STORAGE STRATEGIES, by Darrell G. Fontane and John W. Labadie.	Sept. 1980	3.00
21.	THE ECONOMY OF ALBANY, CARBON, AND SWEETWATER COUNTIES, WYOMING - DESCRIPTION AND ANALYSIS, by John R. McKean and Joseph C. Weber.	Jan. 1981	4.00
22.	AN INPUT-OUTPUT STUDY OF THE UPPER COLORADO MAIN STEM REGION OF WESTERN COLORADO, by John R. McKean and Joseph C. Weber.	Jan. 1981	5.00
23.	THE ECONOMY OF MOFFAT, ROUTT AND RIO BLANCO COUNTIES, COLORADO - DESCRIPTION AND ANALYSIS, by John R. McKean and Joseph C. Weber.	Jan. 1981	5.00
24.	THE SURVEY-BASED INPUT-OUTPUT MODEL AS A RESOURCE PLANNING TOOL, by John R. McKean.	Jan. 1981	4.00
25	THE ECONOMY OF NORTHWESTERN COLORADO - DESCRIPTION AND ANALYSIS, by S.L. Gray, J.R. McKean and J.C. Weber.	Jan. 1981	5.00
26.	AN INPUT-OUTPUT ANALYSIS OF SPORTSMAN EXPENDITURES IN COLORADO, by John R. McKean.	Jan. 1981	5.00
27.	AN INPUT-OUTPUT STUDY OF THE KREMMLING REGION OF WESTERN COLORADO, by John R. McKean and Joseph Weber.	Mar. 1981	4.00
28.	AN ASSESSMENT OF WATER USE AND POLICIES IN NORTHERN COLORADO CITIES, by Kelly N. DiNatale.	Mar. 1981	6.00
29.	AN ECONOMIC INPUT-OUTPUT STUDY OF THE HIGH PLAINS REGION OF EASTERN COLORADO, by J.R. McKean, R.K. Ericson and J.C. Weber.	Feb. 1982	8.00
30.	ENERGY PRODUCTION AND USE IN COLORADO'S HIGH PLAINS REGION, by Emm McBroom.	Feb. 1982	8.00
31.	COMMUNITY AND SOCIO-ECONOMIC ANALYSIS OF COLORADO'S HIGH PLAINS REGION, by Robert Burns.	Feb. 1982	8.00
32.	HYDROLOGIC AND PUMPING DATA FOR COLORADO'S OGALLALA AQUIFER REGION, 1979, by Robert Longenbaugh.	Feb. 1982	8.00
33.	PROJECTED POPULATION, EMPLOYMENT, AND ECONOMIC OUTPUT IN COLORADO'S EASTERN HIGH PLAINS, 1979-2020, by John R. McKean.	Feb. 1982	8.00
34.	ENERGY AND WATER SCARCITY AND THE IRRIGATED AGRICULTURAL ECONOMY OF THE COLORADO HIGH PLAINS: DIRECT ECONOMIC-HYDROLOGIC IMPACT FORECASTS (1979-2020), by R.A. Young, L.R. Conklin, R.A. Longenbaugh and R.L. Gardner.	Feb. 1982	8.00
35.	THE ECONOMIES OF MESA COUNTY AND GARFIELD, MOFFAT, RIO BLANCO AND ROUTT COUNTIES, COLORADO, by J.R. McKean, J.C. Weber and R.K. Ericson.	Apr. 1981	5.00
36.	THE ECONOMY OF THE POWDER RIVER BASIN REGION OF EASTERN WYOMING: DESCRIPTION AND ANALYSIS, by J.R. McKean, J.C. Weber and R.K. Ericson.	Jan. 1981	4.00
37.	AN INTERINDUSTRY ANALYSIS OF THREE FRONT RANGE FOOTHILLS COMMUNITIES: ESTES PARK, GILPIN COUNTY AND WOODLAND PARK, COLORADO, by John R. McKean, Warren Trock and David R. Senf.	July 1982	6.00
38.	GROUNDWATER QUALITY REGULATION IN COLORADO, by Thomas J. Looft.	Dec. 1982	6.00
39.	SPORTSMEN EXPENDITURES FOR HUNTING AND FISHING IN COLORADO - 1981, by John R. McKean and Kenneth C. Nobe.	Jan. 1983	5.00
40.	THE ECONOMY OF LINCOLN, SUBLETTE, SWEETWATER AND UINTA COUNTIES, WYOMING, ROCK SPRINGS BLM DISTRICT, by J.R. McKean and J.C. Weber.	May 1983	5.00
41.	THE ECONOMY OF ALBANY, CARBON AND FREMONT COUNTIES, WYOMING, RAWLINS BLM DISTRICT, by John R. McKean and Joseph C. Weber.	May 1983	5.00
42.	THE ECONOMY OF BIG HORN, HOT SPRINGS, PARK AND WASHAKIE COUNTIES, WYOMING, WORLAND BLM DISTRICT, by John R. McKean and Joseph C. Weber.	May 1983	5.00
43.	THE ECONOMY OF EASTERN WYOMING, CASPER BLM DISTRICT, by John R. McKean and Joseph C. Weber.	May 1983	5.00
44.	DIRECT AND INDIRECT ECONOMIC EFFECTS OF HUNTING AND FISHING IN COLORADO - 1981, by John R. McKean and Kenneth C. Nobe.	Jan. 1984	5.00
45.	THE ECONOMY OF SOUTHWEST COLORADO, DESCRIPTION AND ANALYSIS, by John R. McKean and Wendell D. Winger.	May 1984	5.00
46.	EXPANSION OF WATER DELIVERY BY MUNICIPALITIES AND SPECIAL WATER DISTRICTS IN THE NORTHERN FRONT RANGE, COLORADO, 1972-1982, by Raymond L. Anderson.	Oct. 1984	4.00
47.	MANAGING AN INTERRELATED STREAM-AQUIFER SYSTEM: ECONOMICS, INSTITUTIONS, HYDROLOGY,by J.T. Daubert, R.A. Young and H.J. Morel-Seytoux.		

48.	EVAPOTRANSPIRATION OF PHREATOPHYTES IN THE SAN LUIS VALLEY, COLORADO, by Frederick L. Charles.	June 1987	5.00
49.	ECONOMIC BENEFITS AND COSTS OF THE FISH STOCKING PROGRAM AT BLUE MESA RESERVOIR, COLORADO, by Donn M. Johnson and Richard G. Walsh.	Dec. 1987	4.00
50.	WILDLIFE AND FISH USE ASSESSMENT: LONG-RUN FORECASTS OF PARTICIPATION IN FISHING, HUNTING AND NONCONSUMPTIVE WILDLIFE RECREATION, by R.G. Walsh, D.A. Harpman, K.H. John, J.R. McKean and Lauren LeCroy.	Dec. 1987	5.00
51.	STATUS, ISSUES AND IMPACTS OF COAL SLURRY PIPELINES ON AGRICULTURE AND WATER, by Ari M. Michelsen and John W. Green.	Jan. 1988	5.00
52.	COUNTY INPUT-OUTPUT MODELS FOR THE STATE OF WYOMING: WITH ANALYSIS OF NEW INDUSTRIES AND NEW CONSTRUCTION IMPACTS, by J.R. McKean and Agricultural Enterprises, Inc.	Oct. 1987	5.00
53.	GUNNISON COUNTY INTERINDUSTRY SPENDING AND EMPLOYMENT ATTRIBUTED TO FISHING AT BLUE MESA RESERVOIR, by J.R. McKean, D.M. Johnson and R.G. Walsh.	Dec. 1988	5.00
54.	REVIEW OF OUTDOOR RECREATION ECONOMIC DEMAND STUDIES WITH NONMARKET BENEFIT ESTIMATES, 1968-1988, by R.G. Walsh, D.M. Johnson and J.R. McKean.	Dec. 1988	6.00
55.	A COMPARISON OF LONG-RUN FORECASTS OF DEMAND FOR FISHING, HUNTING, AND NON-CONSUMPTIVE WILDLIFE RECREATION BASED ON THE 1980 AND 1985 SURVEYS, by Richard G. Walsh, Kun H. John and John R. McKean.	Dec. 1988	4.00
56.	MULTIVARIATE METHODS FOR DETECTING WATER QUALITY TRENDS, by Jim C. Loftis, Charles H. Taylor and Phillip L. Chapman.	Feb. 1990	5.00
57.	REAL-TIME RESERVOIR OPERATION DECISION SUPPORT UNDER THE APPROPRIATION DOCTRINE, by John R. Eckhardt.	May 1991	10.00
58.	VALUING TIME IN TRAVEL COST DEMAND ANALYSIS BY VISITORS TO BLUE MESA RESERVOIR, by John R. McKean, Richard G. Walsh and Donn M. Johnson.	June 1991	5.00
59.	WATER QUALITY DATA MANAGEMENT, by Laurel Saito.	July 1992	9.00
60.	A FRAMEWORK FOR DEVELOPMENT OF DATA ANALYSIS PROTOCOLS FOR GROUNDWATER QUALITY MONITORING, by Nadine Adkins	June 1993	TBA

SPECIAL REPORT SERIES

1.	DESIGN OF WATER AND WASTEWATER SYSTEMS FOR RAPID GROWTH AREAS AND RESORTS, by J. Ernest Flack.	1976	5.00
2.	ENVIRONMENT AND COLORADO - A HANDBOOK, edited by Phillip O. Foss.	1976	5.00
3.	IRRIGATION DEVELOPMENT POTENTIAL IN COLORADO, by Norman K. Whittlesey.	May 1977	5.00
4.	ENVIRONMENTAL INVENTORY OF A PORTION OF PICEANCE BASIN IN RIO BLANCO COUNTY, COLORADO.	Dec. 1971	11.00
5.	A GUIDE TO COLORADO WATER LAW, by Ward H. Fischer, Steven B. Ray, Glen D. Rask and Windol L. Wyatt.	Sept. 1978	3.50
6.	NETWORK ANALYSIS OF RAW WATER SUPPLIES UNDER COMPLEX WATER RIGHTS AND EXCHANGES: DOCUMENTATION FOR PROGRAM MODSIM3, by J.W. Labadie, Andrew M. Pineda and Dennis A. Bode.	Mar. 1984	5.00
7.	THE COLORADO WATER RESOURCES RESEARCH INSTITUTE - 25 Years of Research, Training and Scientific Publications	Mar. 1990	Free
8.	COLORADO'S WATER: CLIMATE, SUPPLY AND DROUGHT	June 1990	Free
9.	1990 FLOODS IN THE U.S., A Descriptive Report of Flooding in the Southern States	Nov. 1992	Free
10.	DELPH CARPENTER - FATHER OF COLORADO RIVER TREATIES	Sept. 1992	Free