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A User's Manual for the Irrigation Production Data System (IPDS)

Glenn D. Schaible
Marcel P. Aillery
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ABSTRACT

This report is documentation for the Irrigation Production Data System (IPDS), Lotus macros used to perform comparative statics, and IPDS operating procedures. IPDS is a Lotus 1-2-3 microcomputer database developed to help evaluate irrigation returns and breakeven statistics across crops, States, and U.S. farm production regions. The IPDS database incorporates 1984 crop yield, acreage, price, and cost data for 11 dryland and 10 irrigated commodities. The system may be used to perform comparative static analysis with respect to adjustments in selected input and output factors by State and region.

Keywords: Irrigation data, irrigation returns, crop budgets, enterprise budgets, crop cost/returns.

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INTRODUCTION

This report serves as documentation for the Irrigation Production Data System (IPDS). IPDS consists of a crop production database organized by a series of Lotus 1-2-3 spreadsheets and macros for use on a microcomputer. The IPDS database incorporates 1984 production data for 11 commodities (corn for grain, wheat, soybeans, cotton, rice, oats, barley, sorghum for grain, corn silage, alfalfa hay, and other hay). Crop-specific information includes acreage, yield, price, input use, costs, returns, and breakeven statistics for both dryland and irrigated crop production organized by State and U.S. farm production region.

The IPDS data were originally developed for research on the aggregate agricultural sector at USDA's Economic Research Service (ERS). The data are not intended to replace or substitute for the cost of production (COP) statistics published by the Farm Sector Financial Analysis Branch, Agriculture and Rural Economy Division, ERS.

IPDS was developed as a tool to help analyze costs and returns across crops, States, and U.S. farm production regions. IPDS is not a budget generator but rather a framework with which to organize, modify, and display State-level crop production data. Adjustments in selected input and output levels by crop, State, and region may be evaluated in a comparative static framework. Potential user-specified adjustments involve commodity price, yield, water use, land, labor, and various irrigation costs. The system may also be used to compute measures of the value of water used to irrigate crops.

IPDS spreadsheet format enables users to access, modify, and display selected data items relatively easily. Users can perform analyses by accessing crop spreadsheets, either individually or through prepared Lotus macros. Macros are a sequence of keystrokes and commands saved on file that are used to perform complex and/or repetitive computational tasks. Macros, along with a standardized spreadsheet format, allow the user to conduct analysis involving selected variables across multiple crops, and across dryland and irrigated sectors.

IPDS presents and computes 1984 State and/or regional average estimates for:

- o Farm-level costs, selected input use, and net returns for dryland and irrigated crop enterprises (on a per-acre basis, a per-unit yield basis, and a per unit of water applied basis), by State, and by U.S. farm production region.
- o Breakeven commodity prices, yields, and irrigation costs.
- o Absolute and relative differences in costs, returns, and input use between irrigated and dryland crop sectors.
- o Average value of water used for irrigation (on a per-acre basis, a per-unit yield basis, and a per unit of water applied basis).
- o Revised cost/returns, input use, water values, and breakeven values due to factor adjustments in price and/or selected inputs (per acre, per unit of yield, and per unit of water applied).

IPDS STRUCTURE, DATA, AND COMPUTER REQUIREMENTS

IPDS consists of a series of base-year crop spreadsheets which may be used to generate customized spreadsheet displays through a series of Lotus macros.

IPDS Structure

Initial (1984) State-level acreage, production, price, and budget data are assembled in the base-crop spreadsheets (fig. 1, I). Base-year spreadsheets have been prepared for 10 dryland and 11 irrigated crops, stored on a hard disk. Filenames for base-year spreadsheets are listed in table 1.

A value spreadsheet is maintained on the hard disk for each base spreadsheet (fig. 1, II). Value spreadsheets are identical to base spreadsheets except that all spreadsheet cells containing formulas have been converted to computed values. This transformation is necessary to make effective use of information across multiple crop spreadsheets. Several macros use value spreadsheets to perform analysis across spreadsheets and to assemble selected data for display purposes.

Additional spreadsheet files contain specialized IPDS macros, maintained on the hard disk (fig. 1, III-A and III-B). These macros are used to compare selected statistics across crops, to compute differentials in key statistics across crops, and to conduct comparative static evaluation of key statistics across scenarios using selected parameter adjustments.

Customized spreadsheet displays are designed to give the user considerable flexibility for reporting purposes (fig. 1, IV). Spreadsheet displays compare selected statistics across crops, dryland and irrigated sectors, and user-specified scenarios.

Figure 1--Schematic overview of IPDS

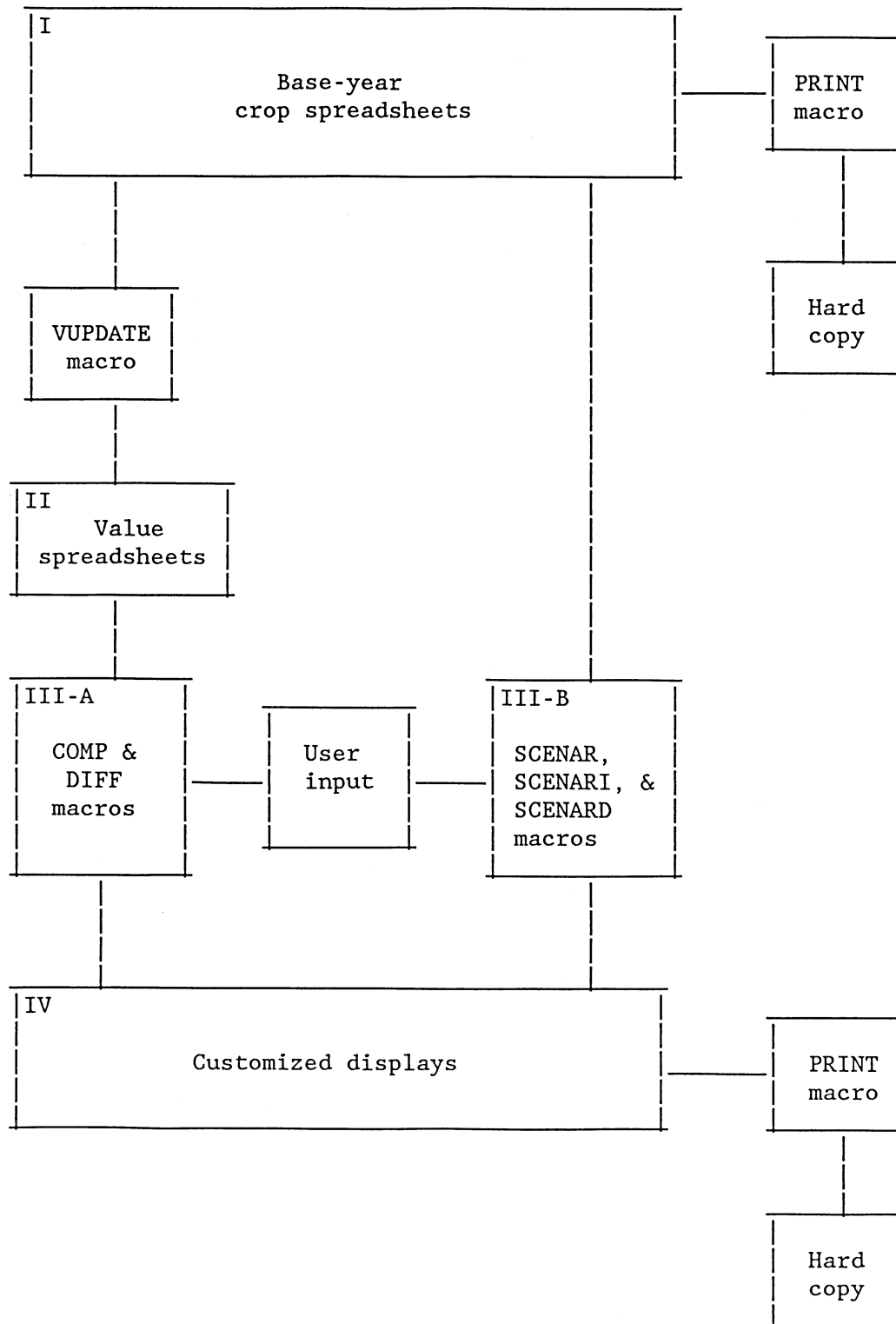


Table 1--IPDS base-year spreadsheet filenames by crop

| Crop | Spreadsheet filename | |
|-------------------|----------------------|----------|
| | Irrigated | Dryland |
| Wheat | IPDS501A | IPDS501B |
| Corn for grain | IPDS502A | IPDS502B |
| Sorghum for grain | IPDS503A | IPDS503B |
| Soybeans | IPDS504A | IPDS504B |
| Cotton | IPDS505A | IPDS505B |
| Rice | IPDS506A | |
| Oats | IPDS507A | IPDS507B |
| Barley | IPDS508A | IPDS508B |
| Corn silage | IPDS509A | IPDS509B |
| Alfalfa hay | IPDS510A | IPDS510B |
| Other hay | IPDS511A | IPDS511B |

IPDS Data

IPDS State-level budget inputs include harvested acres, harvested yields, crop prices (primary and secondary), water applied, water purchase costs, energy and labor costs (irrigated and dryland), other nonirrigation variable costs (pre- and post-harvest), irrigation equipment costs, and other fixed machine costs (pre- and post-harvest). Acreage, yield, price, and water use data are based on the 1984 production year. Field operations and material input use are representative of 1982-84 technology.

IPDS crop enterprise data were initially drawn from representative State-aggregate 1982 Firm Enterprise Data System (FEDS) budgets, updated to 1984 using price indexes in Agricultural Prices - 1986 Summary (2).^{1/} FEDS budget data were based on COP surveys, conducted jointly by ERS and the National Agricultural Statistics Service (NASS) over the 1982-83 production years. Technology data for the 1982 FEDS budgets were supplemented with crop budget data from the Soil Conservation Service (SCS) and numerous State-level crop reports prepared by land-grant universities and State extension offices. For a detailed discussion of the crop budget database, see Documentation for 1982 USMP Crop Enterprise Budgets (1).

^{1/} Underscored numbers in parentheses refer to sources cited in the References.

U.S. Agricultural Statistics, prepared annually by NASS, served as the primary source for 1984 control totals for acreage, production, and yield data as well as crop price data (3). The 1982 U.S. Census of Agriculture provided 1982 dryland/irrigated acreage proportions, which were applied to 1984 total acreage (4). The 1984 Farm and Ranch Irrigation Survey (FRIS) provided farm-level data specific to irrigated production, including water application rates, irrigated yields and acreage, irrigation energy costs (weighted by application system and water source), and irrigation water purchase costs (5,6). FRIS, prepared by the Bureau of the Census, U.S. Department of Commerce, in cooperation with the Resources and Technology Division, ERS, was based on a sample of irrigated farms surveyed in the 1982 national agricultural census.

IPDS Computer Requirements

IPDS was developed in Lotus 1-2-3 for use on an IBM personal computer (PC). Users need the following PC components and software to have full access to IPDS spreadsheets:

- o An IBM microcomputer (or compatible) with hard disk capacity of at least 30 megabytes (MB). IPDS uses 15.5 MB of permanent disk space to store base spreadsheets and 7 MB of permanent disk space to store value spreadsheets (table 2). Macro files require less than 0.1 MB. Temporary working files require an additional 0.4 MB of disk storage.
- o Two floppy disk drives, preferably one of which is a high-density disk drive (1.2 MB).
- o 1.5 MB of memory (0.64 MB conventional, with the remainder as expanded memory).
- o Lotus 1-2-3 software, version 2.0 or higher.

The user may elect to work with portions of the system, thereby minimizing permanent file storage requirements. Single base-crop spreadsheets may be processed individually. Value spreadsheets are required only when using macros that perform analysis across crops to generate customized multicrop displays.

Under the current system configuration, customized display files are stored on diskette in drive A. Output stored directly on diskette helps organize multiple project analyses. A high-density disk drive is advantageous for display applications that reference multiple spreadsheets and column variables, given the potential size and number of customized displays that may be generated. In addition, a double disk-drive system is currently required for selected display applications: one for input data and one for output data. A single disk-drive system could be used, but only if appropriate adjustments were made in macro file references.

The system's internal memory requires 1.5 MB to access and process a single spreadsheet. Expanded memory requirements may be reduced by eliminating selected sections of the base-year spreadsheets or transferring sections to

Table 2--Disk storage requirements for IPDS spreadsheets

| Item | Irrigated | Dryland | Total |
|-----------------------------|-----------|------------------|-------|
| | | <u>Number</u> | |
| IPDS base spreadsheets | 11 | 10 | 21 |
| | | <u>Megabytes</u> | |
| Bytes per base spreadsheet | 0.88 | 0.54 | -- |
| Subtotal | 9.68 | 5.40 | 15.08 |
| | | <u>Number</u> | |
| IPDS value spreadsheets | 11 | 10 | 21 |
| | | <u>Megabytes</u> | |
| Bytes per value spreadsheet | 0.40 | 0.25 | -- |
| Subtotal | 4.40 | 2.50 | 6.90 |
| Macro files | -- | -- | 0.05 |
| Temporary/working files | -- | -- | 0.40 |
| Total bytes | 14.08 | 7.90 | 22.43 |

-- Not applicable.

new spreadsheet files. These options, however, involve tradeoffs. Eliminating sections of the spreadsheets will result in information loss, while partitioning spreadsheet files will require larger and more complex macros to make effective use of all spreadsheet information.

BASE SPREADSHEET STRUCTURE AND VARIABLE DEFINITIONS

Base-crop spreadsheets provide a uniformly organized database across crops. Each crop spreadsheet contains statistics on base-year (1984) acreage, yield, price, input use, and production cost. Spreadsheets for irrigated crops include additional data on irrigation input use, costs, and returns. Table 3 outlines the base spreadsheet structure for dryland and irrigated crops.

Row Structure

Rows within base spreadsheets are organized into four sections. Sections one through four each contain 62 rows consisting of two parts. Part one

Table 3--Row structure of IPDS base crop spreadsheets

| <u>Row sections</u> | <u>Spreadsheet column/row range identifiers</u> | |
|---|---|----------------|
| | <u>Irrigated</u> | <u>Dryland</u> |
| Base values: | | |
| By State | A11..CW58 | A11..BF58 |
| By region | A60..CW74 | A60..BF74 |
| Adjusted values: | | |
| By State | A75..CW122 | A75..BF122 |
| By region | A124..CW138 | A124..BF138 |
| Absolute comparison of base and adjusted values: | | |
| By State | A139..CW186 | A139..BF186 |
| By region | A188..CW202 | A188..BF202 |
| Percent comparison of base and adjusted values: | | |
| By State | A203..CW250 | A203..BF250 |
| By region | A252..CW266 | A252..BF266 |

provides State-level data for each of the 48 conterminous States. Part two provides regional weighted-average values for 14 multi-State production regions. Production regions include the 10 U.S. Department of Agriculture (USDA) farm production regions and subregions for the Mountain and Pacific States. Table 4 lists IPDS production regions and associated States. Appendix I shows a sample row label "stub" for section one of each spreadsheet.

Section one of each spreadsheet contains the base-year input data and computed statistics for 1984. Section two consists of user-specified adjustment factors, adjusted base input data, and adjusted computed statistics. This section permits the user to apply percentage adjustments to base input data without extensive data entry. For example, a 10-percent reduction in crop price may be incorporated by applying a factor of 0.90 to the crop price variable, while a 10-percent increase in energy costs may be incorporated by applying a factor of 1.10 to the irrigation energy cost variable. State-specific adjustment factors may be applied to one or more input variables.

Section three represents the absolute differentials between values in sections one and two: adjusted variable values minus base variable values. Section four represents percentage differentials: the ratio of differential values from section three to base variable values from section one.

Table 4--States by IPDS production region

| <u>Region</u> | | <u>Region</u> | |
|---------------|-----------------|---------------|--------------------|
| ID | Name | ID | Name |
| 01 | Northeast | 08 | Southern Plains |
| | Connecticut | | Oklahoma |
| | Delaware | | Texas |
| | Maine | 09 | Mountain States |
| | Maryland | | Arizona |
| | Massachusetts | | Colorado |
| | New Hampshire | | Idaho |
| | New Jersey | | Montana |
| | New York | | Nevada |
| | Pennsylvania | | New Mexico |
| | Rhode Island | | Utah |
| | Vermont | | Wyoming |
| 02 | Lake States | | Mountain States I |
| | Michigan | | Colorado |
| | Minnesota | | Idaho |
| | Wisconsin | | Montana |
| | | | Utah |
| | | | Wyoming |
| 03 | Corn Belt | | Mountain States II |
| | Illinois | | Arizona |
| | Indiana | | Nevada |
| | Iowa | | New Mexico |
| | Missouri | | |
| | Ohio | | |
| 04 | Northern Plains | 10 | Pacific States |
| | Kansas | | California |
| | Nebraska | | Oregon |
| | North Dakota | | Washington |
| | South Dakota | | |
| | | | Pacific States I |
| | | | Oregon |
| | | | Washington |
| 05 | Appalachia | | Pacific States II |
| | Kentucky | | California |
| | North Carolina | | |
| | Tennessee | | |
| | Virginia | | |
| | West Virginia | | |
| 06 | Southeast | | |
| | Alabama | | |
| | Florida | | |
| | Georgia | | |
| | South Carolina | | |
| 07 | Delta States | | |
| | Arkansas | | |
| | Louisiana | | |
| | Mississippi | | |

Variable (Column) Definitions

Variable items within each spreadsheet are organized by column. Base spreadsheets for dryland crops consist of 59 columns (A..BF), while base spreadsheets for irrigated crops consist of 75 columns (A..CW). Variable (column) definitions for each spreadsheet are of four types: 1) spreadsheet identification, 2) base-year input variables, 3) column variables for adjustment factors, and 4) column variables representing calculated returns and breakeven statistics.

Columns A through D are reserved for the following descriptive information: spreadsheet title (crop, dryland/irrigated), filename, and State and region row-labels. Column E provides the source budget identification (ID) number by State. An asterisk in column E indicates that row data for that State represent a weighted average of multiple budgets. Multiple budgets were developed to reflect cost/return differences for alternative crop varieties, rotation considerations (fallow/crop), and sub-State regional differences. Multiple budget base-year data are included in spreadsheets for dryland and irrigated wheat, dryland barley, and rice. Column F includes a budget flag (value = 1 or 0) signaling the availability of a State's budget data. The budget flag is used in generating computed values.

Data on acreage, yield, production, input use, and various budget cost components are entered in spreadsheet section one. Adjustment factors are entered in spreadsheet section two. Return and breakeven statistics are computed in both sections one and two (section one for base-year values and section two for adjusted values).

Table 5 provides a detailed listing of IPDS spreadsheet variables by column identifier. Column variables are organized in 23 sections for easy reference. Table 6 lists those variables and column identifiers that are related to input data, not computed values. Table 7 identifies those input data items and column identifiers that can be modified through user-specified adjustment factors. Appendix II lists formulas for computed variables.

SYSTEM OPERATION AND IPDS MACROS

Operations may be performed within a single base-crop spreadsheet using standard Lotus commands/functions or across multiple spreadsheets using selected IPDS macros. Because most IPDS applications will involve comparisons across multiple crop spreadsheets, the discussion focuses on the use of macros for multiple spreadsheet applications. Single spreadsheets may be appropriate, however, when the desired analysis involves a limited number of crops, and/or PC hardware configuration limits full use of IPDS macro capabilities. When operating within a single spreadsheet, the user is cautioned not to save the adjusted spreadsheet on permanent disk under its original name because user-specified adjustments will override default values.

Table 5--IPDS variable definitions

| Column section/Lotus column ID/IPDS column title | Unit |
|--|----------------|
| 1. Spreadsheet descriptive information: | |
| A Title (crop, irrigated/dryland) filename ("IPDS5xxA/IPDS5xxB") where (xx) represents a crop ID # | |
| B Row numbers | |
| C Row section descriptions | |
| D State/region identifications | |
| 2. Budget identifier: | |
| E Budget ID number | |
| 3. Budget flag: | |
| F Budget = 1, no budget = 0 | |
| 4. Crop acres: | |
| G FEDS 1982 representative acres | (1,000) |
| H 1984 IPDS harvested acres (only for States with budgets) | (1,000) |
| I 1984 IPDS harvested acres (all States) | (1,000) |
| J Acreage adjustment factor | (x.xx) |
| 5. Crop yield/production data, primary crop: | |
| K 1982 FEDS budget yields | (unit/ac.) |
| L 1984 IPDS harvested yields | (unit/ac.) |
| M Yield adjustment factor | (x.xx) |
| N Total production | (1,000) |
| 6. Crop price, primary crop | |
| O Season average crop price (Agricultural Statistics) | (\$/unit yld.) |
| P Crop price adjustment factor | (x.xx) |
| 7. Production costs: | |
| Q Total variable cost (TVC) | (\$/ac.) |
| R Pre-harvest energy cost, nonirrigation | (\$/ac.) |
| S Post-harvest energy cost, nonirrigation | (\$/ac.) |
| T Total energy cost, nonirrigation | (\$/ac.) |
| U Energy cost adjustment factor, nonirrigation | (x.xx) |
| V Other variable operating cost, nonirrigation | (\$/ac.) |
| W Adjustment factor for other variable operating cost, nonirrigation | (x.xx) |
| X Total fixed cost | (\$/ac.) |
| Y Land charge | (\$/ac.) |
| Z Land charge adjustment factor | (x.xx) |
| AA Other fixed cost, nonirrigation | (\$/ac.) |
| AB Factor for other fixed cost, nonirrigation | (x.xx) |
| AC Total production cost (TC) | (\$/ac.) |

Continued--

Table 5--IPDS variable definitions--Continued

| Column section/Lotus column ID/IPDS column title | Unit |
|--|-----------------|
| 8. Returns, primary crop (excluding secondary outputs): | |
| AD Gross revenue | (\$/ac.) |
| AE Return over TVC | (\$/ac.) |
| AF Return to land and management (RTLTM) | (\$/ac.) |
| 9. Cost/return statistics per unit yield (excluding secondary outputs): | |
| AG Variable cost per unit yield | (\$/unit yld.) |
| AH Total cost per unit yield | (\$/unit yld.) |
| AI Return per unit yield over TVC | (\$/unit yld.) |
| AJ RTLTM per unit yield | (\$/unit yld.) |
| 10. Breakeven statistics (excluding returns to secondary outputs): | |
| AK Crop price change required to break even at TVC | (\$/unit yld.) |
| AL Percentage change in price needed to break even at TVC | (.xx) |
| AM Breakeven crop price at TVC | (\$/unit yld.) |
| AN Yield change required to break even at TVC | (unit yld./ac.) |
| AO Percentage change in yield required to break even at TVC | (.xx) |
| AP Breakeven yield at TVC | (unit yld./ac.) |
| 11. Secondary outputs/prices: | |
| AQ Yield for secondary output | (unit yld./ac.) |
| AR Adjustment factor for secondary output yield | (x.xx) |
| AS Price for secondary output | (\$/unit yld.) |
| AT Adjustment factor for secondary output price | (x.xx) |
| AU Total value of secondary output | (\$/ac.) |
| 12. Returns (including secondary outputs): | |
| AV Gross revenue | (\$/ac.) |
| AW Return over TVC | (\$/ac.) |
| AX RTLTM | (\$/ac.) |
| AY Return per unit yield over TVC | (\$/unit yld.) |
| AZ RTLTM per unit yield | (\$/unit yld.) |

Continued--

Table 5--IPDS variable definitions--Continued

| Column section/Lotus column ID/IPDS column title | Unit |
|--|-----------------|
| 13. Breakeven statistics (including secondary outputs): | |
| BA Crop price change required to break even at TVC | (\$/unit yld.) |
| BB Percentage change in price required to break even at TVC | (.xx) |
| BC Breakeven crop price at TVC | (\$/unit yld.) |
| BD Yield change required to break even at TVC | (unit yld./ac.) |
| BE Percentage change in yield required to break even at TVC | (.xx) |
| BF Breakeven yield at TVC | (unit yld./ac.) |
| <u>Irrigation statistics (irrigated crop spreadsheets only)</u> | |
| 14. Irrigation water use: | |
| BG Per-acre water application | (af/ac.) |
| BH Adjustment factor for water application | (x.xx) |
| BI Total water use | (af) |
| 15. Purchased irrigation water: | |
| BJ Purchased water cost per acre for acreage using purchased water | (\$/ac.) |
| BK Purchased water price | (\$/af) |
| BL Adjustment factor for purchased water price | (x.xx) |
| BM Percentage of acres using purchased water | (.xx) |
| BN Adjustment factor for percentage of acres using purchased water | (x.xx) |
| BO Weighted purchased water cost per acre | (\$/ac.) |
| BP Total acres using purchased water | (1,000) |
| 16. Irrigation energy, lube and repair costs: | |
| BQ Irrigation energy cost | (\$/ac.) |
| BR Adjustment factor for irrigation energy cost | (x.xx) |
| BS Irrigation lube cost | (\$/ac.) |
| BT Adjustment factor for irrigation lube cost | (x.xx) |
| BU Irrigation repair cost | (\$/ac.) |
| BV Adjustment factor for irrigation repair cost | (x.xx) |
| 17. Irrigation labor: | |
| BW Irrigation labor use | (man-hrs./ac.) |
| BX Adjustment factor for irrigation labor use | (x.xx) |
| BY Wage rate | (\$/man-hr.) |
| BZ Adjustment factor for wage rate | (x.xx) |
| CA Irrigation labor cost per acre | (\$/ac.) |

Continued--

Table 5--IPDS variable definitions--Continued

| Column section/Lotus column ID/IPDS column title | Unit |
|--|----------------|
| 18. Irrigation costs (totals): | |
| CB Total variable irrigation cost | (\$/ac.) |
| CC Total fixed irrigation equip. cost | (\$/ac.) |
| CD Adjustment factor for fixed irrigation equipment cost | (x.xx) |
| CE Total irrigation cost | (\$/ac.) |
| 19. Share of irrigation costs assumed by landlord (share-rental arrangement): | |
| CF Share of fixed irrigation cost | (.xx) |
| CG Share of variable irrigation cost | (.xx) |
| 20. Irrigation cost ratios: | |
| CH Ratio of irrigation energy costs to TVC | (.xx) |
| CI Ratio of total variable irrigation cost to TVC | (.xx) |
| CJ Ratio of total irrigation cost to TC | (.xx) |
| 21. Irrigation cost and yield per acre-foot of water applied: | |
| CK Total variable irrigation cost per acre-foot | (\$/af) |
| CL Total irrigation cost per acre-foot | (\$/af) |
| CM Yield of primary crop per acre-foot | (unit yld./af) |
| 22. Value of production and breakeven water cost (excluding secondary output): | |
| CN Value of production per acre-foot | (\$/af) |
| CO Variable irrigation cost change required to break even | (\$/af) |
| CP Percentage change in variable irrigation cost per acre-foot to break even | (.xx) |
| CQ Breakeven water cost (given crop price) | (\$/af) |
| CR Ratio of purchased water price to breakeven total variable irrigation cost (water cost) per acre-foot | (.xx) |
| 23. Value of production and breakeven water cost (including secondary output): | |
| CS Value of production per acre-foot | (\$/af) |
| CT Variable irrigation cost change required to break even | (\$/af) |
| CU Percentage change in variable irrigation cost per acre-foot to break even | (.xx) |
| CV Breakeven water cost (given crop price) | (\$/af) |
| CW Ratio of purchased water price to breakeven total variable irrigation cost (water cost) per acre-foot | (.xx) |

Table 6--IPDS input data items

| Lotus column ID | IPDS column title | Unit |
|-----------------------|--|----------------|
| I | Crop acres | (1,000) |
| L | Primary crop yield | (units/ac.) |
| O | Primary crop price | (\$/unit) |
| R | Pre-harvest energy cost, nonirrigation | (\$/ac.) |
| S | Post-harvest energy cost, nonirrigation | (\$/ac.) |
| V | Other variable operating costs, nonirrigation | (\$/ac.) |
| Y | Land charge | (\$/ac.) |
| AA | Other fixed cost, nonirrigation | (\$/ac.) |
| AQ | Yield for secondary output | (units/ac.) |
| AS | Price of secondary output | (\$/unit yld.) |
| BG | Per-acre water application | (AF/ac.) |
| BK | Purchased water price | (\$/af.) |
| BM | Percent of acres using purchased water | (.xx) |
| BQ | Irrigation energy cost | (\$/ac.) |
| BS | Irrigation lube cost | (\$/ac.) |
| BU | Irrigation repair cost | (\$/ac.) |
| BW | Irrigation labor use | (man-hrs./ac.) |
| BY | Irrigation labor wage rate | (\$/man-hr.) |
| CC | Fixed irrigation (equip.) cost | (\$/ac.) |
| CF | Landlord share of fixed irrigation cost | (.xx) |
| CG | Landlord share of variable irrigation cost | (.xx) |

Multispreadsheet Analysis and IPDS Macros

Analysis across spreadsheets may involve three types of comparisons using prepared IPDS macros. IPDS macros are stored on permanent disk under the filenames COMP, DIFF, SCENAR, SCENARI, and SCENARD. These macros generate comparisons of selected statistics across crops, across dryland and irrigated sectors by crop, and across scenarios that incorporate selected parameter adjustments by crop. Macros may be used to evaluate various cost, return, water value, and/or breakeven statistics across crop spreadsheets by State and region.

Operation of some IPDS macros requires that base spreadsheet cell contents be converted to values. Macros SCENAR, SCENARI, and SCENARD reference base spreadsheets directly and convert cell entries to parameter values within the macro. Macros COMP and DIFF reference base "value" spreadsheets

Table 7--IPDS variables incorporating user specified adjustment factors

| Lotus column ID | IPDS column title | Unit |
|-----------------|---|----------------|
| J | Crop acreage | (1,000) |
| M | Crop yield (primary output) | (unit/ac.) |
| P | Crop price (primary output) | (\$/ac.) |
| U | Energy cost per acre (nonirrigation) | (\$/ac.) |
| W | Other variable operating cost (nonirrigation) | (\$/ac.) |
| Z | Land charge | (\$/ac.) |
| AB | Other fixed cost (nonirrigation) | (\$/ac.) |
| AR | Crop yield (secondary output) | (unit/ac.) |
| AT | Crop price (secondary output) | (\$/ac.) |
| BH | Water application | (AF/ac.) |
| BL | Purchased water price | (\$/AF) |
| BN | Share of acreage using purchased water | (.xx) |
| BR | Irrigation energy cost | (\$/ac.) |
| BT | Irrigation lube cost | (\$/ac.) |
| BV | Irrigation repair cost | (\$/ac.) |
| BX | Irrigation labor use | (man-hrs./ac.) |
| BZ | Irrigation wage rate | (\$/hr.) |
| CD | Fixed irrigation cost | (\$/ac.) |

created for each crop and stored on permanent file. Base and value spreadsheets are identical except that formulas are replaced with their value equivalents within value spreadsheets. To maintain consistency in filenaming, value spreadsheet names are preceded by a "V." For example, V501A is the value filename for irrigated wheat.

Comparisons Across Crops

To compare selected spreadsheet statistics across crops (or within a single crop), the user invokes the macro COMP. Using data stored in value files, the macro formulates a customized display (table 8). The user specifies crop(s) and variable(s). The display is organized by variable and crop, with alternative crops displayed in adjacent columns by variable. Column headings indicate the variable name, the Lotus column (letter) identifier from the base spreadsheets, and the crop name. Row labels, which identify data by State and region, are similar to those in the base-crop spreadsheets. Appendix III-A lists the COMP macro command stream.

Table 8--Customized display of comparisons across irrigated crop sectors for wheat, corn, sorghum, soybeans and cotton, using macro COMP

| State/region | IRRIGATED | | | | | IRRIGATED | | | | |
|----------------|--|---|--|---|---|--|---|--|---|---|
| | WHEAT AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | CORN AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | SORGHUM AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | SOYBEANS AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | COTTON AY Per Unit Yld. Return over TVC with Sec. Output (\$/lb.) | WHEAT BE Percent Change in Yield required to Break Even at TVC | CORN BE Percent Change in Yield required to Break Even at TVC | SORGHUM BE Percent Change in Yield required to Break Even at TVC | SOYBEANS BE Percent Change in Yield required to Break Even at TVC | COTTON BE Percent Change in Yield required to Break Even at TVC |
| Connecticut | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Delaware | 0.00 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | -0.40 | 0.00 | 0.00 | 0.00 |
| Maine | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maryland | 0.00 | 1.16 | 0.00 | 0.00 | 0.00 | 0.00 | -0.39 | 0.00 | 0.00 | 0.00 |
| Massachusetts | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Hampshire | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Jersey | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New York | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pennsylvania | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rhode Island | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vermont | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Michigan | 0.00 | 1.00 | 0.00 | 3.42 | 0.00 | 0.00 | -0.39 | 0.00 | -0.60 | 0.00 |
| Minnesota | 0.00 | 0.99 | 0.00 | 3.27 | 0.00 | 0.00 | -0.40 | 0.00 | -0.60 | 0.00 |
| Wisconsin | 0.00 | 1.07 | 0.00 | 3.25 | 0.00 | 0.00 | -0.42 | 0.00 | -0.58 | 0.00 |
| Illinois | 0.00 | 1.40 | 0.00 | 3.86 | 0.00 | 0.00 | -0.53 | 0.00 | -0.66 | 0.00 |
| Indiana | 0.00 | 1.35 | 0.00 | 3.78 | 0.00 | 0.00 | -0.52 | 0.00 | -0.64 | 0.00 |
| Iowa | 0.00 | 1.24 | 0.00 | 0.00 | 0.00 | 0.00 | -0.50 | 0.00 | 0.00 | 0.00 |
| Missouri | 1.28 | 1.40 | 1.00 | 3.28 | 0.30 | -0.40 | -0.52 | -0.44 | -0.57 | -0.52 |
| Ohio | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kansas | 1.52 | 1.14 | 0.80 | 2.35 | 0.00 | -0.46 | -0.41 | -0.36 | -0.41 | 0.00 |
| Nebraska | 0.90 | 1.07 | 0.68 | 2.71 | 0.00 | -0.28 | -0.42 | -0.31 | -0.49 | 0.00 |
| North Dakota | 1.36 | 1.08 | 0.00 | 3.42 | 0.00 | -0.38 | -0.43 | 0.00 | -0.62 | 0.00 |
| South Dakota | 1.62 | 0.74 | 0.00 | 1.66 | 0.00 | -0.47 | -0.30 | 0.00 | -0.30 | 0.00 |
| Kentucky | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| North Carolina | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Virginia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.40 | 0.00 |
| Tennessee | 0.00 | 0.00 | 0.00 | 2.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| West Virginia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Alabama | 0.00 | 1.07 | 0.00 | 2.85 | 0.00 | 0.00 | -0.38 | 0.00 | -0.47 | 0.00 |
| Florida | 0.00 | 1.00 | 0.00 | 1.89 | 0.00 | 0.00 | -0.33 | 0.00 | -0.30 | 0.00 |
| Georgia | -0.19 | 0.98 | 0.00 | 1.63 | 0.23 | 0.06 | -0.33 | 0.00 | -0.27 | -0.40 |
| South Carolina | 0.00 | 0.67 | 0.00 | 1.68 | 0.00 | 0.00 | -0.24 | 0.00 | -0.28 | 0.00 |
| Arkansas | 1.34 | 1.27 | 0.94 | 2.57 | 0.23 | -0.41 | -0.44 | -0.41 | -0.43 | -0.42 |
| Louisiana | 0.00 | 1.49 | 0.00 | 3.15 | 0.26 | 0.00 | -0.44 | 0.00 | -0.53 | -0.48 |
| Mississippi | 0.00 | 0.00 | 0.00 | 2.62 | 0.21 | 0.00 | 0.00 | 0.00 | -0.43 | -0.39 |
| Oklahoma | 1.04 | 1.60 | 0.46 | 1.19 | 0.13 | -0.31 | -0.52 | -0.18 | -0.21 | -0.27 |
| Texas | 0.64 | 1.26 | 0.78 | 2.09 | 0.17 | -0.19 | -0.41 | -0.30 | -0.38 | -0.32 |
| Arizona | 0.85 | 0.96 | 0.47 | 0.00 | 0.17 | -0.21 | -0.31 | -0.14 | 0.00 | -0.28 |
| Colorado | 1.43 | 1.00 | 1.06 | 0.00 | 0.00 | -0.45 | -0.38 | -0.45 | 0.00 | 0.00 |

Continued--

Table 8--Customized display of comparisons across irrigated crop sectors for wheat, corn, sorghum, soybeans and cotton, using macro COMP--Continued

| State/region | IRRIGATED | | | | | IRRIGATED | | | | |
|-----------------|--|---|--|---|---|--|---|--|---|---|
| | WHEAT AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | CORN AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | SORGHUM AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | SOYBEANS AY Per Unit Yld. Return over TVC with Sec. Output (\$/bu.) | COTTON AY Per Unit Yld. Return over TVC with Sec. Output (\$/lb.) | WHEAT BE Percent Change in Yield required to Break Even at TVC | CORN BE Percent Change in Yield required to Break Even at TVC | SORGHUM BE Percent Change in Yield required to Break Even at TVC | SOYBEANS BE Percent Change in Yield required to Break Even at TVC | COTTON BE Percent Change in Yield required to Break Even at TVC |
| Idaho | 1.53 | 1.19 | 0.00 | 0.00 | 0.00 | -0.46 | -0.42 | 0.00 | 0.00 | 0.00 |
| Montana | 1.02 | 1.62 | 0.00 | 0.00 | 0.00 | -0.29 | -0.52 | 0.00 | 0.00 | 0.00 |
| Nevada | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | -0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Mexico | 0.75 | 0.91 | 0.74 | 0.00 | 0.20 | -0.22 | -0.31 | -0.28 | 0.00 | -0.33 |
| Utah | 1.17 | 1.53 | 0.00 | 0.00 | 0.00 | -0.35 | -0.49 | 0.00 | 0.00 | 0.00 |
| Wyoming | 1.08 | 1.06 | 0.00 | 0.00 | 0.00 | -0.34 | -0.39 | 0.00 | 0.00 | 0.00 |
| California | 0.64 | 1.26 | 0.26 | 0.00 | 0.25 | -0.17 | -0.37 | -0.09 | 0.00 | -0.37 |
| Oregon | 1.31 | 0.74 | 0.00 | 0.00 | 0.00 | -0.38 | -0.24 | 0.00 | 0.00 | 0.00 |
| Washington | 1.74 | 0.90 | 0.00 | 0.00 | 0.00 | -0.51 | -0.30 | 0.00 | 0.00 | 0.00 |
| Northeast | 0.00 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | -0.40 | 0.00 | 0.00 | 0.00 |
| Lake States | 0.00 | 1.01 | 0.00 | 3.32 | 0.00 | 0.00 | -0.40 | 0.00 | -0.59 | 0.00 |
| Corn Belt | 1.28 | 1.37 | 1.00 | 3.43 | 0.30 | -0.40 | -0.52 | -0.44 | -0.59 | -0.52 |
| Northern Plains | 1.41 | 1.07 | 0.78 | 2.61 | 0.00 | -0.43 | -0.41 | -0.35 | -0.47 | 0.00 |
| Appalachia | 0.00 | 0.00 | 0.00 | 2.36 | 0.00 | 0.00 | 0.00 | 0.00 | -0.40 | 0.00 |
| Southeast | -0.19 | 0.97 | 0.00 | 1.85 | 0.23 | 0.06 | -0.33 | 0.00 | -0.30 | -0.40 |
| Delta | 1.34 | 1.33 | 0.94 | 2.61 | 0.24 | -0.41 | -0.44 | -0.41 | -0.44 | -0.43 |
| Southern Plains | 0.69 | 1.26 | 0.74 | 1.93 | 0.16 | -0.20 | -0.42 | -0.29 | -0.35 | -0.31 |
| Mountain | 1.28 | 1.03 | 0.89 | 0.00 | 0.17 | -0.38 | -0.38 | -0.36 | 0.00 | -0.29 |
| Mountain I | 1.41 | 1.04 | 1.06 | 0.00 | 0.00 | -0.43 | -0.39 | -0.45 | 0.00 | 0.00 |
| Mountain II | 0.76 | 0.93 | 0.67 | 0.00 | 0.17 | -0.20 | -0.31 | -0.25 | 0.00 | -0.29 |
| Pacific | 1.06 | 1.10 | 0.26 | 0.00 | 0.25 | -0.30 | -0.34 | -0.09 | 0.00 | -0.37 |
| Pacific I | 1.60 | 0.86 | 0.00 | 0.00 | 0.00 | -0.46 | -0.29 | 0.00 | 0.00 | 0.00 |
| Pacific II | 0.64 | 1.26 | 0.26 | 0.00 | 0.25 | -0.17 | -0.37 | -0.09 | 0.00 | -0.37 |

Comparisons Across Dryland and Irrigated Sectors

For comparisons across dryland and irrigated sectors by crop, the user invokes the macro DIFF. Using value spreadsheets, this macro generates absolute and percentage differences between dryland and irrigated variable values by crop. Absolute differences represent the value of the irrigated variable minus the corresponding dryland value. The percentage difference is computed as the ratio of the absolute difference to the corresponding dryland value.

The user identifies the crop(s) and variable(s) to be evaluated and displayed. Absolute differences and percentage differences are processed by variable. In the customized display (table 9), four columns of information are presented by crop/variable combination: irrigated value, dryland value, absolute difference, and the percentage difference. The column headings indicate the crop, variable name, Lotus column (letter) identifier from the base spreadsheets, and the column information. State and region row labels are similar to those in the base spreadsheets. Appendix III-B lists the DIFF macro command stream.

Comparisons Across Scenarios

The final macros, SCENAR, SCENARI, and SCENARD, perform comparisons across input adjustment scenarios for selected variables and crops. SCENAR is used to make comparisons across scenarios for dryland crops and irrigated crops. SCENARI may be used for comparisons across scenarios for irrigated crops only, while SCENARD may be used for similar comparisons for dryland crops only.

Scenario analysis allows the user to conduct sensitivity analysis in which one or more policy parameters are adjusted. Adjustments may be expressed as values overriding base variable values or as parameter adjustments applied to selected base values. Adjustments for each scenario are specified by State and variable within a scenario input spreadsheet. The user prepares the input spreadsheet before invoking macros SCENAR, SCENARI, or SCENARD.

Only output from SCENAR involves three displays. In display one, output is organized by scenario, crop, and variable (table 10). User-specified variables by scenario, for a given crop, are organized in adjacent columns. SCENAR display two (optional) incorporates features of COMP, in which output is organized by scenario and variable, and values by crop are positioned in adjacent columns (table 11). SCENAR display three (optional) incorporates features of DIFF, in which output is organized by crop and variable for a given scenario, and corresponding dryland and irrigated values are positioned in adjacent columns (table 12). Column headings for the scenario displays indicate the crop, variable name, Lotus column (letter) identifier from the base spreadsheet, and the scenario identifier (SNxx). State and region row labels are similar to base spreadsheets. Appendix III-C lists the macro command stream for SCENAR. Command streams for SCENARI and SCENARD are similar to those for SCENAR, except that SCENARI and SCENARD do not include the command streams for the additional displays.

Table 9--Customized display of comparisons across dryland and irrigated sectors for wheat, using macro DIFF

| State/region | IRRIGATED BASE AW WHEAT | DRYLAND BASE AW WHEAT | IRR-DRY | (IRR-DRY)/ DRY BASE | IRRIGATED BASE BC WHEAT | DRYLAND BASE BC WHEAT | IRR-DRY | (IRR-DRY)/ DRY BASE |
|----------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------|---|---|--------------------------|-------------------------|
| | TVC with Sec. Output (\$/ac.) | TVC with Sec. Output (\$/ac.) | ABSOLUTE DIFFERENTIAL | PERCENT DIFFERENTIAL | Breakeven Crop Price at TVC (\$/bu.) | Breakeven Crop Price at TVC (\$/bu.) | ABSOLUTE DIFFERENTIAL | PERCENT DIFFERENTIAL |
| Connecticut | 0.00 | 0.00 | NA* | NA | 0.00 | 0.00 | NA | NA |
| Delaware | 0.00 | 38.55 | NA | NA | 0.00 | 2.36 | NA | NA |
| Maine | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| Maryland | 0.00 | 46.44 | NA | NA | 0.00 | 2.25 | NA | NA |
| Massachusetts | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| New Hampshire | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| New Jersey | 0.00 | 96.57 | NA | NA | 0.00 | 1.15 | NA | NA |
| New York | 0.00 | 89.65 | NA | NA | 0.00 | 1.30 | NA | NA |
| Pennsylvania | 0.00 | 87.17 | NA | NA | 0.00 | 1.31 | NA | NA |
| Rhode Island | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| Vermont | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| Michigan | 0.00 | 106.68 | NA | NA | 0.00 | 1.31 | NA | NA |
| Minnesota | 0.00 | 94.87 | NA | NA | 0.00 | 1.40 | NA | NA |
| Wisconsin | 0.00 | 110.71 | NA | NA | 0.00 | 1.22 | NA | NA |
| Illinois | 0.00 | 74.04 | NA | NA | 0.00 | 1.59 | NA | NA |
| Indiana | 0.00 | 80.37 | NA | NA | 0.00 | 1.50 | NA | NA |
| Iowa | 0.00 | 40.71 | NA | NA | 0.00 | 2.13 | NA | NA |
| Missouri | 68.97 | 53.79 | 15.17 | 0.28 | 1.91 | 1.87 | 0.04 | 0.02 |
| Ohio | 0.00 | 86.13 | NA | NA | 0.00 | 1.35 | NA | NA |
| Kansas | 84.88 | 71.27 | 13.61 | 0.19 | 1.80 | 1.42 | 0.38 | 0.27 |
| Nebraska | 42.43 | 65.30 | -22.88 | -0.35 | 2.38 | 1.43 | 0.94 | 0.66 |
| North Dakota | 76.02 | 66.49 | 9.53 | 0.14 | 2.17 | 1.50 | 0.67 | 0.45 |
| South Dakota | 69.50 | 78.05 | -8.54 | -0.11 | 1.84 | 1.19 | 0.65 | 0.55 |
| Kentucky | 0.00 | 38.46 | NA | NA | 0.00 | 2.29 | NA | NA |
| North Carolina | 0.00 | 48.30 | NA | NA | 0.00 | 2.23 | NA | NA |
| Virginia | 0.00 | 63.53 | NA | NA | 0.00 | 1.94 | NA | NA |
| Tennessee | 0.00 | 46.66 | NA | NA | 0.00 | 2.13 | NA | NA |
| West Virginia | 0.00 | 46.78 | NA | NA | 0.00 | 2.18 | NA | NA |
| Alabama | 0.00 | 31.68 | NA | NA | 0.00 | 2.44 | NA | NA |
| Florida | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| Georgia | -7.13 | 15.77 | -22.90 | -1.45 | 3.39 | 2.75 | 0.64 | 0.23 |
| South Carolina | 0.00 | 25.95 | NA | NA | 0.00 | 2.62 | NA | NA |
| Arkansas | 69.49 | 65.84 | 3.65 | 0.06 | 1.95 | 1.79 | 0.16 | 0.09 |
| Louisiana | 0.00 | 67.25 | NA | NA | 0.00 | 1.86 | NA | NA |
| Mississippi | 0.00 | 57.37 | NA | NA | 0.00 | 1.89 | NA | NA |
| Oklahoma | 52.21 | 68.06 | -15.85 | -0.23 | 2.32 | 1.45 | 0.86 | 0.59 |
| Texas | 34.53 | 42.39 | -7.86 | -0.19 | 2.75 | 1.68 | 1.07 | 0.64 |
| Arizona | 76.82 | 0.00 | NA | NA | 3.23 | 0.00 | NA | NA |
| Colorado | 85.92 | 64.55 | 21.36 | 0.33 | 1.76 | 1.25 | 0.51 | 0.41 |

See footnotes at end of table

Continued--

Table 9--Customized display of comparisons across dryland and irrigated sectors for wheat, using macro DIFF--Continued

| State/region | IRRIGATED | DRYLAND | IRR-DRY | (IRR-DRY)/ | IRRIGATED | DRYLAND | IRR-DRY | (IRR-DRY)/ |
|-----------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------|---|---|--------------------------|-------------------------|
| | BASE AW WHEAT | BASE AW WHEAT | | DRY BASE | BASE BC WHEAT | BASE BC WHEAT | | DRY BASE |
| | TVC with Sec. Output (\$/ac.) | TVC with Sec. Output (\$/ac.) | ABSOLUTE DIFFERENTIAL | PERCENT DIFFERENTIAL | Breakeven Crop Price at TVC (\$/bu.) | Breakeven Crop Price at TVC (\$/bu.) | ABSOLUTE DIFFERENTIAL | PERCENT DIFFERENTIAL |
| Idaho | 130.26 | 95.18 | 35.08 | 0.37 | 1.77 | 1.24 | 0.52 | 0.42 |
| Montana | 55.94 | 30.43 | 25.51 | 0.84 | 2.50 | 2.10 | 0.40 | 0.19 |
| Nevada | 21.34 | 0.00 | NA | NA | 2.72 | 0.00 | NA | NA |
| New Mexico | 39.71 | 35.86 | 3.85 | 0.11 | 2.61 | 1.49 | 1.12 | 0.75 |
| Utah | 84.10 | 47.58 | 36.52 | 0.77 | 2.21 | 1.69 | 0.53 | 0.31 |
| Wyoming | 60.42 | 41.59 | 18.82 | 0.45 | 2.09 | 1.64 | 0.45 | 0.27 |
| California | 56.57 | 121.40 | -64.83 | -0.53 | 3.07 | 1.71 | 1.35 | 0.79 |
| Oregon | 119.26 | 119.29 | -0.03 | 0.00 | 2.16 | 1.40 | 0.76 | 0.54 |
| Washington | 167.27 | 129.27 | 38.00 | 0.29 | 1.71 | 1.20 | 0.51 | 0.43 |
| Northeast | 0.00 | 75.37 | NA | NA | 0.00 | 1.59 | NA | NA |
| Lake States | 0.00 | 98.34 | NA | NA | 0.00 | 1.37 | NA | NA |
| Corn Belt | 68.97 | 69.87 | -0.90 | -0.01 | 1.91 | 1.64 | 0.28 | 0.17 |
| Northern Plains | 77.56 | 70.10 | 7.46 | 0.11 | 1.90 | 1.42 | 0.49 | 0.35 |
| Appalachia | 0.00 | 47.46 | NA | NA | 0.00 | 2.18 | NA | NA |
| Southeast | -7.13 | 21.84 | -28.97 | -1.33 | 3.39 | 2.65 | 0.74 | 0.28 |
| Delta | 69.49 | 63.66 | 5.83 | 0.09 | 1.95 | 1.83 | 0.13 | 0.07 |
| Southern Plains | 36.69 | 56.69 | -20.00 | -0.35 | 2.70 | 1.55 | 1.14 | 0.73 |
| Mountain | 96.58 | 47.83 | 48.75 | 1.02 | 2.11 | 1.70 | 0.41 | 0.24 |
| Mountain I | 106.45 | 48.33 | 58.12 | 1.20 | 1.89 | 1.71 | 0.18 | 0.11 |
| Mountain II | 58.36 | 35.86 | 22.50 | 0.63 | 2.96 | 1.49 | 1.47 | 0.99 |
| Pacific | 98.26 | 125.97 | -27.71 | -0.22 | 2.53 | 1.29 | 1.24 | 0.96 |
| Pacific I | 151.02 | 126.33 | 24.69 | 0.20 | 1.86 | 1.26 | 0.60 | 0.48 |
| Pacific II | 56.57 | 121.40 | -64.83 | -0.53 | 3.07 | 1.71 | 1.35 | 0.79 |

* NA indicates that the statistic does not apply for the particular crop, State, or Region. The statistic does not apply because either irrigated, dryland or both budgets do not apply for the particular State or Region.

Table 10--Customized display of comparisons across scenarios for selected variables for irrigated corn, using macro SCENAR, display one

| State/region | Scenario One | | | | | Scenario Two | | | | |
|----------------|------------------------------------|--|--|--|--|------------------------------------|--|--|--|--|
| | SN1 CORN IRRIGATED | | | | | SN2 CORN IRRIGATED | | | | |
| | Crop Price Adjustment Factor | Factor for Irrigation Fuel Costs | Return over TVC (Prim. Crop) (\$/ac.) | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Water Cost (given price) (\$/AF) | Crop Price Adjustment Factor | Factor for Irrigation Fuel Costs | Return over TVC (Prim. Crop) (\$/ac.) | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Water Cost (given price) (\$/AF) |
| SN1 P75 | SN1 BR75 | OUTPUT AE75..AE138 | OUTPUT AM75..AM138 | OUTPUT CQ75..CQ138 | SN2 P75 | SN2 BR75 | OUTPUT AE75..AE138 | OUTPUT AM75..AM138 | OUTPUT CQ75..CQ138 | |
| Connecticut | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Delaware | 0.90 | 0.95 | 118.66 | 1.78 | 243.96 | 1.10 | 0.85 | 199.93 | 1.76 | 376.71 |
| Maine | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Maryland | 0.90 | 0.95 | 117.27 | 1.77 | 242.97 | 1.10 | 0.85 | 198.18 | 1.75 | 374.82 |
| Massachusetts | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| New Hampshire | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| New Jersey | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| New York | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Pennsylvania | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Rhode Island | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Vermont | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Michigan | 0.90 | 0.95 | 107.54 | 1.55 | 208.26 | 1.10 | 0.85 | 182.95 | 1.53 | 312.13 |
| Minnesota | 0.90 | 0.95 | 110.56 | 1.45 | 199.42 | 1.10 | 0.85 | 184.11 | 1.44 | 302.32 |
| Wisconsin | 0.90 | 0.95 | 116.88 | 1.49 | 210.37 | 1.10 | 0.85 | 191.73 | 1.48 | 314.64 |
| Illinois | 0.90 | 0.95 | 169.40 | 1.24 | 277.31 | 1.10 | 0.85 | 249.69 | 1.23 | 389.37 |
| Indiana | 0.90 | 0.95 | 162.65 | 1.24 | 310.02 | 1.10 | 0.85 | 241.32 | 1.23 | 438.29 |
| Iowa | 0.90 | 0.95 | 146.74 | 1.25 | 235.25 | 1.10 | 0.85 | 221.38 | 1.24 | 340.25 |
| Missouri | 0.90 | 0.95 | 167.29 | 1.27 | 167.27 | 1.10 | 0.85 | 248.43 | 1.26 | 232.93 |
| Ohio | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Kansas | 0.90 | 0.95 | 122.70 | 1.62 | 108.97 | 1.10 | 0.85 | 202.79 | 1.60 | 157.44 |
| Nebraska | 0.90 | 0.95 | 110.99 | 1.48 | 146.32 | 1.10 | 0.85 | 182.59 | 1.46 | 209.15 |
| North Dakota | 0.90 | 0.95 | 93.76 | 1.45 | 144.97 | 1.10 | 0.85 | 152.56 | 1.43 | 208.19 |
| South Dakota | 0.90 | 0.95 | 60.69 | 1.69 | 120.43 | 1.10 | 0.85 | 121.26 | 1.66 | 178.50 |
| Kentucky | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| North Carolina | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Virginia | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Tennessee | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| West Virginia | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| Alabama | 0.90 | 0.95 | 96.33 | 1.77 | 190.25 | 1.10 | 0.85 | 167.81 | 1.75 | 288.78 |
| Florida | 0.90 | 0.95 | 69.27 | 2.05 | 104.66 | 1.10 | 0.85 | 131.49 | 2.03 | 165.05 |
| Georgia | 0.90 | 0.95 | 83.72 | 2.00 | 169.29 | 1.10 | 0.85 | 158.20 | 1.98 | 272.66 |
| South Carolina | 0.90 | 0.95 | 48.81 | 2.07 | 115.12 | 1.10 | 0.85 | 116.77 | 2.06 | 210.19 |
| Arkansas | 0.90 | 0.95 | 135.14 | 1.60 | 143.11 | 1.10 | 0.85 | 215.37 | 1.58 | 208.39 |
| Louisiana | 0.90 | 0.95 | 129.73 | 1.86 | 291.39 | 1.10 | 0.85 | 205.56 | 1.85 | 441.47 |
| Mississippi | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |

Continued--

Table 10--Customized display of comparisons across scenarios for selected variables for irrigated corn, using macro SCENAR, display one--Continued

| State/region | Scenario One | | | | | Scenario Two | | | | |
|-----------------|------------------------------------|--|--|--|--|------------------------------------|--|--|--|--|
| | SN1 CORN IRRIGATED | | Return over TVC (Prim. Crop) (\$/ac.) | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Water Cost (given price) (\$/AF) | SN2 CORN IRRIGATED | | Return over TVC (Prim. Crop) (\$/ac.) | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Water Cost (given price) (\$/AF) |
| | Crop Price Adjustment Factor | Factor for Irrigation Fuel Costs | | | | Crop Price Adjustment Factor | Factor for Irrigation Fuel Costs | | | |
| SN1 P75 | SN1 BR75 | OUTPUT AE75..AE138 | OUTPUT AM75..AM138 | OUTPUT CQ75..CQ138 | SN2 P75 | SN2 BR75 | OUTPUT AE75..AE138 | OUTPUT AM75..AM138 | OUTPUT CQ75..CQ138 | |
| Oklahoma | 0.90 | 0.95 | 197.12 | 1.48 | 130.20 | 1.10 | 0.85 | 294.88 | 1.46 | 177.01 |
| Texas | 0.90 | 0.95 | 143.93 | 1.75 | 126.71 | 1.10 | 0.85 | 239.58 | 1.71 | 176.53 |
| Arizona | 0.90 | 0.95 | 100.95 | 2.15 | 72.84 | 1.10 | 0.85 | 202.89 | 2.10 | 105.32 |
| Colorado | 0.90 | 0.95 | 100.53 | 1.64 | 96.29 | 1.10 | 0.85 | 175.68 | 1.61 | 138.09 |
| Idaho | 0.90 | 0.95 | 108.54 | 1.60 | 78.43 | 1.10 | 0.85 | 177.70 | 1.57 | 108.36 |
| Montana | 0.90 | 0.95 | 160.80 | 1.46 | 94.18 | 1.10 | 0.85 | 237.72 | 1.45 | 128.46 |
| Nevada | 0.90 | 0.95 | 0.00 | 0.00 | 0.00 | 1.10 | 0.85 | 0.00 | 0.00 | 0.00 |
| New Mexico | 0.90 | 0.95 | 96.16 | 2.04 | 64.78 | 1.10 | 0.85 | 190.84 | 2.02 | 96.12 |
| Utah | 0.90 | 0.95 | 144.66 | 1.61 | 89.79 | 1.10 | 0.85 | 221.95 | 1.58 | 123.58 |
| Wyoming | 0.90 | 0.95 | 84.57 | 1.62 | 65.52 | 1.10 | 0.85 | 143.85 | 1.60 | 93.87 |
| California | 0.90 | 0.95 | 125.55 | 2.12 | 64.09 | 1.10 | 0.85 | 220.88 | 2.09 | 92.57 |
| Oregon | 0.90 | 0.95 | 62.78 | 2.30 | 48.19 | 1.10 | 0.85 | 152.21 | 2.28 | 81.51 |
| Washington | 0.90 | 0.95 | 93.91 | 2.09 | 65.40 | 1.10 | 0.85 | 189.80 | 2.08 | 102.60 |
| Northeast | | | 118.48 | 1.77 | 243.83 | | | 199.70 | 1.76 | 376.46 |
| Lake States | | | 110.39 | 1.50 | 205.68 | | | 185.06 | 1.49 | 309.30 |
| Corn Belt | | | 164.69 | 1.25 | 253.22 | | | 244.21 | 1.24 | 356.83 |
| Northern Plains | | | 110.52 | 1.50 | 140.81 | | | 182.64 | 1.49 | 201.72 |
| Appalachia | | | 0.00 | 0.00 | 0.00 | | | 0.00 | 0.00 | 0.00 |
| Southeast | | | 78.81 | 1.99 | 152.49 | | | 149.70 | 1.97 | 245.14 |
| Delta | | | 133.71 | 1.67 | 182.16 | | | 212.79 | 1.65 | 269.78 |
| Southern Plains | | | 145.07 | 1.75 | 126.78 | | | 240.77 | 1.71 | 176.54 |
| Mountain | | | 101.56 | 1.67 | 90.56 | | | 177.17 | 1.64 | 129.58 |
| Mountain I | | | 101.93 | 1.63 | 92.69 | | | 175.65 | 1.60 | 132.37 |
| Mountain II | | | 97.45 | 2.07 | 66.95 | | | 194.08 | 2.04 | 98.60 |
| Pacific | | | 110.37 | 2.13 | 63.11 | | | 205.36 | 2.10 | 94.68 |
| Pacific I | | | 87.03 | 2.14 | 61.59 | | | 181.49 | 2.12 | 97.94 |
| Pacific II | | | 125.55 | 2.12 | 64.09 | | | 220.88 | 2.09 | 92.57 |

Table 11--Customized display of comparisons across crops for selected variables, using macro Comp within macro SCENAR, display two of SCENAR

| State/region | IRRIGATED ADJUSTED SN1 WHEAT | IRRIGATED ADJUSTED SN1 CORN | IRRIGATED ADJUSTED SN1 SORGHUM | IRRIGATED ADJUSTED SN1 SOYBEANS | IRRIGATED ADJUSTED SN1 COTTON | IRRIGATED ADJUSTED SN1 WHEAT | IRRIGATED ADJUSTED SN1 CORN | IRRIGATED ADJUSTED SN1 SORGHUM | IRRIGATED ADJUSTED SN1 SOYBEANS | IRRIGATED ADJUSTED SN1 COTTON |
|----------------|--|--|--|--|--|--|--|--|--|--|
| | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) |
| | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 |
| Connecticut | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Delaware | 0.00 | 118.66 | 0.00 | 0.00 | 0.00 | 0.00 | 243.96 | 0.00 | 0.00 | 0.00 |
| Maine | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maryland | 0.00 | 117.27 | 0.00 | 0.00 | 0.00 | 0.00 | 242.97 | 0.00 | 0.00 | 0.00 |
| Massachusetts | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Hampshire | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Jersey | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New York | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pennsylvania | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rhode Island | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vermont | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Michigan | 0.00 | 107.54 | 0.00 | 120.46 | 0.00 | 0.00 | 208.26 | 0.00 | 290.65 | 0.00 |
| Minnesota | 0.00 | 110.56 | 0.00 | 120.75 | 0.00 | 0.00 | 199.42 | 0.00 | 279.96 | 0.00 |
| Wisconsin | 0.00 | 116.88 | 0.00 | 118.80 | 0.00 | 0.00 | 210.37 | 0.00 | 275.80 | 0.00 |
| Illinois | 0.00 | 169.40 | 0.00 | 144.70 | 0.00 | 0.00 | 277.31 | 0.00 | 275.35 | 0.00 |
| Indiana | 0.00 | 162.65 | 0.00 | 134.86 | 0.00 | 0.00 | 310.02 | 0.00 | 376.95 | 0.00 |
| Iowa | 0.00 | 146.74 | 0.00 | 0.00 | 0.00 | 0.00 | 235.25 | 0.00 | 0.00 | 0.00 |
| Missouri | 47.68 | 167.29 | 74.85 | 97.74 | 170.82 | 67.95 | 167.27 | 116.55 | 168.06 | 246.35 |
| Ohio | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kansas | 65.31 | 122.70 | 57.63 | 71.89 | 0.00 | 96.36 | 108.97 | 76.15 | 89.33 | 0.00 |
| Nebraska | 25.67 | 110.99 | 46.33 | 78.32 | 0.00 | 83.35 | 146.32 | 114.16 | 161.46 | 0.00 |
| North Dakota | 56.47 | 93.76 | 0.00 | 112.83 | 0.00 | 93.78 | 144.97 | 0.00 | 170.15 | 0.00 |
| South Dakota | 54.30 | 60.69 | 0.00 | 36.28 | 0.00 | 144.65 | 120.43 | 0.00 | 106.26 | 0.00 |
| Kentucky | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| North Carolina | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Virginia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tennessee | 0.00 | 0.00 | 0.00 | 74.79 | 0.00 | 0.00 | 0.00 | 0.00 | 168.76 | 0.00 |
| West Virginia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Alabama | 0.00 | 96.33 | 0.00 | 78.87 | 0.00 | 0.00 | 190.25 | 0.00 | 188.30 | 0.00 |
| Florida | 0.00 | 69.27 | 0.00 | 45.07 | 0.00 | 0.00 | 104.66 | 0.00 | 114.55 | 0.00 |
| Georgia | -19.63 | 83.72 | 0.00 | 37.01 | 128.66 | -0.73 | 169.29 | 0.00 | 124.49 | 310.71 |
| South Carolina | 0.00 | 48.81 | 0.00 | 38.24 | 0.00 | 0.00 | 115.12 | 0.00 | 116.98 | 0.00 |
| Arkansas | 47.91 | 135.14 | 67.83 | 65.88 | 116.60 | 117.22 | 143.11 | 92.29 | 115.96 | 178.56 |
| Louisiana | 0.00 | 129.73 | 0.00 | 92.43 | 166.19 | 0.00 | 291.39 | 0.00 | 121.77 | 275.60 |
| Mississippi | 0.00 | 0.00 | 0.00 | 69.10 | 105.89 | 0.00 | 0.00 | 0.00 | 111.18 | 203.86 |

Continued--

Table 11--Customized display of comparisons across crops for selected variables, using macro Comp within macro SCENAR, display two of SCENAR--Continued

| State/region | IRRIGATED ADJUSTED SN1 WHEAT | IRRIGATED ADJUSTED SN1 CORN | IRRIGATED ADJUSTED SN1 SORGHUM | IRRIGATED ADJUSTED SN1 SOYBEANS | IRRIGATED ADJUSTED SN1 COTTON | IRRIGATED ADJUSTED SN1 WHEAT | IRRIGATED ADJUSTED SN1 CORN | IRRIGATED ADJUSTED SN1 SORGHUM | IRRIGATED ADJUSTED SN1 SOYBEANS | IRRIGATED ADJUSTED SN1 COTTON |
|-----------------|--|--|--|--|--|--|--|--|--|--|
| | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Return over TVC (Prim. Crop) (\$/ac.) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) | Break-Even Water Cost (given price) (\$/AF) |
| | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT AE75..AE138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 | OUTPUT CQ75..CQ138 |
| Oklahoma | 18.04 | 197.12 | 17.97 | 21.53 | 22.13 | 61.29 | 130.20 | 52.47 | 50.17 | 59.73 |
| Texas | -2.62 | 143.93 | 50.56 | 69.28 | 40.18 | 56.91 | 126.71 | 91.76 | 91.20 | 92.27 |
| Arizona | 41.98 | 100.95 | 14.18 | 0.00 | 54.60 | 41.17 | 72.84 | 33.86 | 0.00 | 39.59 |
| Colorado | 55.83 | 100.53 | 61.87 | 0.00 | 0.00 | 83.45 | 96.29 | 84.63 | 0.00 | 0.00 |
| Idaho | 98.85 | 108.54 | 0.00 | 0.00 | 0.00 | 95.36 | 78.43 | 0.00 | 0.00 | 0.00 |
| Montana | 34.03 | 160.80 | 0.00 | 0.00 | 0.00 | 46.83 | 94.18 | 0.00 | 0.00 | 0.00 |
| Nevada | -6.84 | 0.00 | 0.00 | 0.00 | 0.00 | 22.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Mexico | 10.34 | 96.16 | 44.91 | 0.00 | 49.36 | 45.33 | 64.78 | 66.38 | 0.00 | 55.04 |
| Utah | 57.69 | 144.66 | 0.00 | 0.00 | 0.00 | 54.72 | 89.79 | 0.00 | 0.00 | 0.00 |
| Wyoming | 43.67 | 84.57 | 0.00 | 0.00 | 0.00 | 45.26 | 65.52 | 0.00 | 0.00 | 0.00 |
| California | 19.48 | 125.55 | -0.74 | 0.00 | 101.76 | 36.56 | 64.09 | 23.79 | 0.00 | 56.97 |
| Oregon | 78.34 | 62.78 | 0.00 | 0.00 | 0.00 | 71.35 | 48.19 | 0.00 | 0.00 | 0.00 |
| Washington | 129.35 | 93.91 | 0.00 | 0.00 | 0.00 | 103.02 | 65.40 | 0.00 | 0.00 | 0.00 |
| Northeast | 0.00 | 118.48 | 0.00 | 0.00 | 0.00 | 0.00 | 243.83 | 0.00 | 0.00 | 0.00 |
| Lake States | 0.00 | 110.39 | 0.00 | 120.16 | 0.00 | 0.00 | 205.68 | 0.00 | 282.64 | 0.00 |
| Corn Belt | 47.68 | 164.69 | 74.85 | 110.23 | 170.82 | 67.95 | 253.22 | 116.55 | 208.31 | 246.35 |
| Northern Plains | 58.51 | 110.52 | 55.28 | 76.19 | 0.00 | 94.75 | 140.81 | 84.05 | 146.26 | 0.00 |
| Appalachia | 0.00 | 0.00 | 0.00 | 74.79 | 0.00 | 0.00 | 0.00 | 0.00 | 168.76 | 0.00 |
| Southeast | -19.63 | 78.81 | 0.00 | 44.37 | 128.66 | -0.73 | 152.49 | 0.00 | 132.60 | 310.71 |
| Delta | 47.91 | 133.71 | 67.83 | 67.86 | 129.10 | 117.22 | 182.16 | 92.29 | 115.41 | 220.41 |
| Southern Plains | -0.10 | 145.07 | 46.85 | 60.76 | 39.49 | 57.44 | 126.78 | 87.28 | 83.89 | 91.02 |
| Mountain | 66.64 | 101.56 | 51.25 | 0.00 | 53.86 | 74.65 | 90.56 | 73.26 | 0.00 | 41.78 |
| Mountain I | 77.11 | 101.93 | 61.87 | 0.00 | 0.00 | 83.37 | 92.69 | 84.63 | 0.00 | 0.00 |
| Mountain II | 26.09 | 97.45 | 37.06 | 0.00 | 53.86 | 40.89 | 66.95 | 58.07 | 0.00 | 41.78 |
| Pacific | 60.35 | 110.37 | -0.74 | 0.00 | 101.76 | 61.16 | 63.11 | 23.79 | 0.00 | 56.97 |
| Pacific I | 112.09 | 87.03 | 0.00 | 0.00 | 0.00 | 92.30 | 61.59 | 0.00 | 0.00 | 0.00 |
| Pacific II | 19.48 | 125.55 | -0.74 | 0.00 | 101.76 | 36.56 | 64.09 | 23.79 | 0.00 | 56.97 |

Table 12--Customized display of comparisons across dryland and irrigated sectors, by scenario and crop, for selected variables, using macro DIFF within macro SCENAR, display three of SCENAR

| State/region | IRRIGATED ADJUSTED SN1 WHEAT | DRYLAND ADJUSTED SN1 WHEAT | IRR-DRY | (IRR-DRY)/ DRYLAND | IRRIGATED ADJUSTED SN1 CORN | DRYLAND ADJUSTED SN1 CORN | IRR-DRY | (IRR-DRY)/ DRYLAND |
|----------------|--|--|--------------|-------------------------|--|--|--------------|-------------------------|
| | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Crop Price at TVC (\$/bu.) | | | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Crop Price at TVC (\$/bu.) | | |
| | OUTPUT AM75..AM138 | OUTPUT AM75..AM138 | DIFFERENTIAL | PERCENT DIFFERENTIAL | OUTPUT AM75..AM138 | OUTPUT AM75..AM138 | DIFFERENTIAL | PERCENT DIFFERENTIAL |
| Connecticut | 0.00 | 0.00 | NA* | NA | 0.00 | 0.00 | NA | NA |
| Delaware | 0.00 | 3.17 | -3.17 | NA | 1.78 | 1.60 | 0.17 | 0.11 |
| Maine | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| Maryland | 0.00 | 3.02 | -3.02 | NA | 1.77 | 1.22 | 0.54 | 0.44 |
| Massachusetts | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| New Hampshire | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| New Jersey | 0.00 | 2.84 | -2.84 | NA | 0.00 | 1.47 | -1.47 | NA |
| New York | 0.00 | 2.23 | -2.23 | NA | 0.00 | 1.61 | -1.61 | NA |
| Pennsylvania | 0.00 | 3.22 | -3.22 | NA | 0.00 | 1.42 | -1.42 | NA |
| Rhode Island | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| Vermont | 0.00 | 0.00 | NA | NA | 0.00 | 0.00 | NA | NA |
| Michigan | 0.00 | 1.54 | -1.54 | NA | 1.55 | 1.72 | -0.17 | -0.10 |
| Minnesota | 0.00 | 1.44 | -1.44 | NA | 1.45 | 1.26 | 0.19 | 0.15 |
| Wisconsin | 0.00 | 1.25 | -1.25 | NA | 1.49 | 1.32 | 0.17 | 0.13 |
| Illinois | 0.00 | 1.80 | -1.80 | NA | 1.24 | 1.47 | -0.23 | -0.16 |
| Indiana | 0.00 | 1.92 | -1.92 | NA | 1.24 | 1.36 | -0.12 | -0.09 |
| Iowa | 0.00 | 2.24 | -2.24 | NA | 1.25 | 1.29 | -0.04 | -0.03 |
| Missouri | 1.99 | 1.97 | 0.01 | 0.01 | 1.27 | 1.69 | -0.42 | -0.25 |
| Ohio | 0.00 | 1.99 | -1.99 | NA | 0.00 | 1.41 | -1.41 | NA |
| Kansas | 1.82 | 1.44 | 0.38 | 0.26 | 1.62 | 0.93 | 0.69 | 0.74 |
| Nebraska | 2.41 | 1.52 | 0.88 | 0.58 | 1.48 | 0.99 | 0.49 | 0.50 |
| North Dakota | 2.17 | 1.52 | 0.65 | 0.43 | 1.45 | 1.31 | 0.14 | 0.11 |
| South Dakota | 1.85 | 1.21 | 0.64 | 0.53 | 1.69 | 1.15 | 0.54 | 0.47 |
| Kentucky | 0.00 | 2.47 | -2.47 | NA | 0.00 | 1.59 | -1.59 | NA |
| North Carolina | 0.00 | 2.23 | -2.23 | NA | 0.00 | 1.87 | -1.87 | NA |
| Virginia | 0.00 | 1.94 | -1.94 | NA | 0.00 | 1.52 | -1.52 | NA |
| Tennessee | 0.00 | 2.34 | -2.34 | NA | 0.00 | 1.63 | -1.63 | NA |
| West Virginia | 0.00 | 2.18 | -2.18 | NA | 0.00 | 1.57 | -1.57 | NA |
| Alabama | 0.00 | 2.45 | -2.45 | NA | 1.77 | 2.35 | -0.58 | -0.25 |
| Florida | 0.00 | 0.00 | NA | NA | 2.05 | 2.21 | -0.16 | -0.07 |
| Georgia | 3.40 | 2.77 | 0.63 | 0.23 | 2.00 | 1.63 | 0.37 | 0.23 |
| South Carolina | 0.00 | 2.63 | -2.63 | NA | 2.07 | 2.04 | 0.03 | 0.01 |
| Arkansas | 2.04 | 1.79 | 0.25 | 0.14 | 1.60 | 2.15 | -0.55 | -0.26 |
| Louisiana | 0.00 | 1.86 | -1.86 | NA | 1.86 | 1.28 | 0.58 | 0.45 |
| Mississippi | 0.00 | 1.89 | -1.89 | NA | 0.00 | 1.94 | -1.94 | NA |

See footnotes at end of table

Continued--

Table 12--Customized display of comparisons across dryland and irrigated sectors, by scenario and crop, for selected variables, using macro DIFF within macro SCENAR, display three of SCENAR--Continued

| State/region | IRRIGATED ADJUSTED SN1 WHEAT | DRYLAND ADJUSTED SN1 WHEAT | IRR-DRY | (IRR-DRY)/ DRYLAND | IRRIGATED ADJUSTED SN1 CORN | DRYLAND ADJUSTED SN1 CORN | IRR-DRY | (IRR-DRY)/ DRYLAND |
|-----------------|--|--|--------------|-------------------------|--|--|--------------|-------------------------|
| | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Crop Price at TVC (\$/bu.) | | | Break-Even Crop Price at TVC (\$/bu.) | Break-Even Crop Price at TVC (\$/bu.) | | |
| | OUTPUT AM75..AM138 | OUTPUT AM75..AM138 | DIFFERENTIAL | PERCENT DIFFERENTIAL | OUTPUT AM75..AM138 | OUTPUT AM75..AM138 | DIFFERENTIAL | PERCENT DIFFERENTIAL |
| Oklahoma | 2.66 | 1.71 | 0.96 | 0.56 | 1.48 | 1.10 | 0.38 | 0.34 |
| Texas | 3.10 | 2.06 | 1.04 | 0.51 | 1.75 | 2.15 | -0.40 | -0.19 |
| Arizona | 3.21 | 0.00 | 3.21 | NA | 2.15 | 2.87 | -0.72 | -0.25 |
| Colorado | 1.94 | 1.29 | 0.65 | 0.50 | 1.64 | 0.00 | 1.64 | NA |
| Idaho | 1.81 | 1.26 | 0.55 | 0.44 | 1.60 | 0.00 | 1.60 | NA |
| Montana | 2.55 | 2.12 | 0.43 | 0.20 | 1.46 | 0.00 | 1.46 | NA |
| Nevada | 2.79 | 0.00 | 2.79 | NA | 0.00 | 0.00 | NA | NA |
| New Mexico | 2.83 | 1.75 | 1.08 | 0.62 | 2.04 | 2.53 | -0.49 | -0.19 |
| Utah | 2.24 | 1.74 | 0.51 | 0.29 | 1.61 | 0.00 | 1.61 | NA |
| Wyoming | 2.07 | 1.64 | 0.43 | 0.26 | 1.62 | 0.86 | 0.77 | 0.90 |
| California | 3.12 | 1.71 | 1.40 | 0.82 | 2.12 | 1.31 | 0.82 | 0.63 |
| Oregon | 2.26 | 1.43 | 0.83 | 0.58 | 2.30 | 1.91 | 0.39 | 0.20 |
| Washington | 1.76 | 1.21 | 0.54 | 0.45 | 2.09 | 0.00 | 2.09 | NA |
| Northeast | 0.00 | 2.88 | -2.88 | NA | 1.77 | 1.43 | 0.34 | 0.24 |
| Lake States | 0.00 | 1.46 | -1.46 | NA | 1.50 | 1.37 | 0.13 | 0.09 |
| Corn Belt | 1.99 | 1.93 | 0.06 | 0.03 | 1.25 | 1.39 | -0.14 | -0.10 |
| Northern Plains | 1.92 | 1.44 | 0.48 | 0.33 | 1.50 | 1.07 | 0.43 | 0.40 |
| Appalachia | 0.00 | 2.28 | -2.28 | NA | 0.00 | 1.69 | -1.69 | NA |
| Southeast | 3.40 | 2.66 | 0.73 | 0.27 | 1.99 | 1.92 | 0.07 | 0.04 |
| Delta | 2.04 | 1.83 | 0.21 | 0.11 | 1.67 | 1.64 | 0.02 | 0.01 |
| Southern Plains | 3.05 | 1.86 | 1.19 | 0.64 | 1.75 | 2.11 | -0.36 | -0.17 |
| Mountain | 2.18 | 1.74 | 0.45 | 0.26 | 1.67 | 2.16 | -0.49 | -0.23 |
| Mountain I | 1.97 | 1.74 | 0.23 | 0.13 | 1.63 | 0.86 | 0.78 | 0.91 |
| Mountain II | 3.03 | 1.75 | 1.28 | 0.73 | 2.07 | 2.65 | -0.58 | -0.22 |
| Pacific | 2.59 | 1.31 | 1.28 | 0.98 | 2.13 | 1.35 | 0.78 | 0.58 |
| Pacific I | 1.93 | 1.28 | 0.65 | 0.51 | 2.14 | 1.91 | 0.23 | 0.12 |
| Pacific II | 3.12 | 1.71 | 1.40 | 0.82 | 2.12 | 1.31 | 0.82 | 0.63 |

*NA indicates that the statistic does not apply for the particular crop, State, or Region. The statistic does not apply because either irrigated, dryland or both budgets do not apply for the particular State or Region.

Print Macros

Print macros are available to print standardized spreadsheets and customized displays. Standardized spreadsheets--base crop spreadsheets, value spreadsheets, and adjusted base spreadsheets--may be printed using the BPRINT macro stored on permanent file. The macro is designed to print all four sections of each spreadsheet. Appendix IV lists the command streams for the BPRINT macro.

Lotus command streams used to print customized displays are incorporated as subroutines in the COMP, DIFF, SCENAR, SCENARI, and SCENARD macros. These macros allow the software to display variable spreadsheet sizes. Column dimensions of each display are determined by the number of crops, variables, and scenarios referenced. Users may print selected row sections (I-IV) of the customized displays.

MACRO PROCEDURES

IPDS macros for generating customized spreadsheet displays were developed using the command language available in version 2.1 of Lotus 1-2-3. IPDS macros were developed to automate analysis across crop spreadsheets and the processing of standardized reports while minimizing user input tasks. To minimize user input, some compromise in macro processing time was necessary. Macros nonetheless provide considerable efficiency in processing IPDS spreadsheet data for analysis and display purposes.

Processing time varies by macro. The COMP macro generally requires the least processing time, SCENAR the most. Processing time for each macro run varies with the amount of output the user requests when the desired macro is activated. Processing time will also vary somewhat depending on the computer configuration. IPDS currently operates on an IBM PS/2 80. Each macro is also designed so that the user specifies all input before activating the macro. This enables the user to leave the PC unattended while the macro program is in progress.

All five macros store output on the diskette in drive A. We recommend that the user define a high-density disk drive as drive A if output is expected to be large. The user specifies the name of the output file. The output filename is limited to eight characters and must differ from existing filenames on the target diskette. To avoid potential errors, output filenames and user input information should be made with the "Caps Lock" key on. At no time is it necessary for the user to save output files because the macro automatically saves the output file. When the macro operations are complete, the user may retrieve the output file using normal Lotus file retrieval procedures.

After retrieving a macro or after a macro has finished processing its tasks, the user should not save the macro using its original name. Saving a macro under its original name can damage the original macro by incorporating "counter" parameters that apply only to options chosen with the most

recent scenario. If a second copy of a macro is desired, use the DOS copy command.

What follows is a step-by-step user's guide for each of the three macros: COMP, DIFF, and SCENAR. (Procedures for SCENARI and SCENARD are similar to SCENAR.) The discussion assumes that the user has entered Lotus 1-2-3 and is familiar with file retrieval procedures. For a detailed listing of macro command streams, see Appendixes III-A to III-C.

Macro COMP

The macro COMP, used to compare selected variables across crops, extracts the values for these variables from value spreadsheets and displays the output by variable across crops (see table 8). Here is how to operate the macro COMP:

- o Insert a formatted high-density diskette in drive A. Macro output is to be stored on this diskette.
- o Retrieve the file COMP from the Lotus spreadsheet directory on the hard disk (C drive).
- o Activate the macro by simultaneously pressing the "Alt" and "A" keys.
- o Follow the instructions appearing at the top of the screen.

The macro queries the user for input information. Inputs include: 1) the output filename, 2) selection of output variables, 3) selection of irrigated and/or dryland sectors, and 4) selection of crops to be included in the analysis. The first query is:

- o ENTER TITLE OF OUTPUT FILE:

The user should type in an appropriate output filename that identifies the project for which the analysis is being performed. The output filename should follow Lotus filenaming rules. After typing the output filename, enter the filename with the "Return" key. The second query is:

- o ENTER COLUMN LETTER OR X IF FINISHED:

This query refers to the variables to be compared across crops. A complete list of variables with corresponding column ID's is found in table 5. The user determines which variables from this list to include in the analysis, types the corresponding column letter (ID) of the first variable, and enters the ID of the variable with the "Return" key. The macro responds with the following query, asking whether the user wants the variable being compared to represent irrigated or dryland production:

- o IRRIGATED(A) OR DRY(B):

The letter "A" should be typed and entered if the irrigated spreadsheet is desired, "B" if the dryland spreadsheet is desired. The macro repeats the

above two queries, allowing the user to specify additional variables to be included in the analysis. Variables from table 5 may be entered in any order. If irrigated and dryland data are desired for a specific variable, the variable must be entered twice. For instance, if irrigated and dryland values for "breakeven yield at total variable costs" are desired in the analysis, the entry would be BF{Enter}, A{Enter}, BF{Enter}, B{Enter}. When all desired variables have been entered, the letter "X" (in caps) should be typed and entered in response to the following query:

- o ENTER COLUMN LETTER OR X IF FINISHED:

The final queries prompt the user to indicate for which of the 11 crops the above variables are to be compared. Each query indicates the crop to be included in the analysis by referencing the crop ID number (for example, #501-#511). The final query is:

- o WORKSHEET #501 Y OR N:

After responding yes (Y) or no (N), the user is prompted to make a similar response for the remaining 10 crops. Table 1 lists each of the 11 crops with their corresponding ID number.

Once the crop ID's are entered, the macro automatically begins processing and the user is free to leave the PC unattended. A message will appear on the screen signifying that a macro is in progress. When the macro finishes processing, the output file is automatically stored on the diskette in drive A.

After retrieving the output file, the user can generate a printout by activating a print macro stored within the output file (the print macro was written to the output file by the macro COMP). The print macro is activated by simultaneously pressing the "Alt" and "P" keys. Before activating the print macro, the user should make sure the printer is stocked with wide (8½ x 14 inch) paper and that the paper is aligned so that printing begins just below the paper perforation.

After activating the print macro, the user is asked which section of the output file is to be printed. The print query is:

- o ENTER SECTION TO PRINT:

The sections to be printed refer to the four row sections (see table 3). Section one refers to State and regional base-year values. Section two refers to State and regional adjusted values. Sections three and four refer to State and regional absolute and percentage differences between sections one and two. The user may print all sections or each section separately except for sections three and four, which are printed as a set. After determining which sections are desired, the user responds to the above query by entering either a "1" for section one; "2" for section two; "3" for sections three and four; "12" for sections one and two; "23" for sections two, three, and four; or "123" for sections one, two, three, and four.

If desired outputs are not contiguous (as in the case for sections one, three, and four), they must be printed separately. This operation involves retrieving the output file twice; once to print section one, and once to print sections three and four. The user must retrieve the output file twice so that print parameters in the macro are automatically reset to the default values.

Macro DIFF

The macro DIFF is designed to provide comparisons across dry and irrigated values for selected variables by crop. The output for each comparison of variables contains the irrigated base value, the dryland base value, the difference between irrigated and dryland base values (Irr-Dry), and the percentage difference between irrigated and dryland base values $((\text{Irr-Dry})/(\text{Dry}))$ (see table 9). These comparisons can be performed for all crops except rice, which has no dryland spreadsheet, in a single macro run. If a large number of variables are selected for comparison, however, the number of crops included in a single macro run may be limited because of the Lotus column limit (columns A-IV).

Like the COMP macro, DIFF extracts the values for the selected variables from the value spreadsheets and stores the output file on diskette in drive A. Because DIFF computes two comparison values for each variable, (Irr-Dry) and $((\text{Irr-Dry})/(\text{Dry}))$, processing time for DIFF will be greater than for COMP if there are an equal number of selected variables and crops. DIFF is set up such that any variable may be selected for comparison, and the combination of variables compared does not have to be the same across crops in a single macro run. To operate DIFF, follow these steps:

- o Insert a formatted high-density diskette in drive A.
- o Retrieve the Lotus file DIFF, stored on the hard disk (C drive).
- o Activate DIFF by simultaneously pressing the "Alt" and "A" keys.
- o Respond to the query ENTER TITLE OF OUTPUT FILE:

The user types in an appropriate output filename. The filename should reference the project for which the analysis is being performed. The user then responds to the following query to identify those crops for which the macro will compare irrigated and dryland values:

- o ENTER FILE # OR X IF FINISHED:

File numbers range from 501 for wheat to 511 for other hay, as listed in table 1.

After the user enters the first crop ID number, the macro responds with the following request for the variable (column) ID's to be compared across dryland/irrigated values:

- o ENTER COLUMNS, X IF FINISHED, OR "SAME" IF SAME AS LAST FILE:

Each variable ID (from table 5) is typed and then entered by pressing the Return key. ID's of variables are entered consecutively. After all variable ID's are entered, type an X (in caps) to signal the macro for the next query. The macro then asks the user to identify an additional crop for which the macro will perform comparisons. Respond to the query:

o ENTER FILE # OR X IF FINISHED:

After the user enters the second crop ID number, the macro again requests variable (column) ID's. If these are the same as the variables considered for the first crop, the user should type and enter SAME. If variables for the second crop are different from those for the first crop, each ID will need to be entered as described previously, ending with the user entering an X.

If a third crop is to be included in the analysis, repeat the procedure. Otherwise, enter a final X to start macro processing. The user may leave the PC unattended while the macro is processing. The output file will automatically be saved on diskette in drive A. A print macro is included with the output file. The same procedure used to print COMP output should be followed when printing DIFF output.

Macros SCENAR, SCENARI, and SCENARD

SCENAR, SCENARI, and SCENARD are the most comprehensive macros. They allow the user to evaluate cost and input use adjustments in a comparative static framework. The SCENAR macro also incorporates features of both COMP and DIFF so that the user can make comparisons across crops and across irrigated and dryland sectors for scenarios including parameter adjustments. Parameter adjustments may be specified as either values overriding base values (in section 1 of base spreadsheets) or as factor adjustments (section 2) applied to the base values. The user is allowed to apply multiple parameter adjustments to base-year data, subject to the system's memory limits. The macros compute revised spreadsheet statistics for each crop included in the analysis. The macros then extract user-specified output variables to separate "intermediate" spreadsheet files on the hard disk. The macros use the intermediate files to generate the final output file. The final output file contains the comparative statics of interest to the user.

A single run of either SCENAR, SCENARI, or SCENARD may incorporate several scenarios, each containing any combination of parameter adjustments and crops. When multiple scenarios are included in a single run, output variables included in the final output file are constant across scenarios. The SCENAR macro is used for applications pertaining to both irrigated and dryland crops. For applications limited to irrigated crops, use the SCENARI macro. For applications limited to dryland crops, use the SCENARD macro.

Like the COMP and DIFF macros, each of the scenario macros requires the user to store the final output file on diskette in drive A. Intermediate data files stored on the hard disk during macro processing should not

exceed 400K of memory, and are automatically erased before the macro is completed. Scenario macros can take a long time to process because a single analysis may involve multiple parameter adjustments, crops, output variables, and scenarios. To reduce processing time, the user should consider which output variables are most relevant for a set of scenario parameter adjustments. The user may be required to partition the analysis and process the macro more than once (for example, by crop and/or by scenario) for some applications.

Before running the scenario macros, the user must create an input file and save the file under an appropriate input filename, such as SCN#1, on diskette in drive A. The input file contains information on parameter adjustment settings, input and output addresses, and scenario headings. The structure of this file is simple, but the user must follow a few guidelines exactly:

- o For each scenario, decide what factor adjustments are to be included in the analysis by crop and which set of variables is to be reported in the output file.

Refer to table 7 for a list of IPDS variables incorporating user-specified adjustment factors and to table 5 for a listing of output variables. Table 1 lists crop ID numbers. For example, spreadsheet filenames for irrigated and dryland wheat are IPDS501A and IPDS501B, respectively. The ID number for wheat is 501.

- o Make a list of the column ID's for each variable "value" adjustment and/or factor adjustment to be included in the analysis.

For a selected variable "value" adjustment (table 5), the variable's address should reference the first row cell of section one of the base-year spreadsheet (for example, L11 for crop yield per acre, and Y11 for land charge per acre). For factor adjustments (table 7) the cell address should reference the first row cell of section two of the base-year spreadsheet (for example, M75 for the crop yield adjustment factor, and Z75 for the land charge adjustment factor).

- o Make a list of the column/cell addresses for each output variable, by base spreadsheet section, desired in the output file.

Each output variable's address should reference one section range of sections one through four of the base spreadsheet (see table 3). If two or more sections of the base spreadsheet are desired as output for an output variable, you should list variable/section combinations separately. For example, the column/cell address range for output variable "Return over Total Variable Cost" (column AW) would be "AW75..AW138" for section two of the base spreadsheet, "AW139..AW202" for section three, and "AW203..AW266" for section four.

- o Create the input file using input and output variables as determined above. Then save the file under a user-specified filename (SCN#1, for example) on diskette in drive A.

Table 13 illustrates a sample input file. The sample input file includes the information required for two scenarios, each containing "factor" adjustments (no variable "value" adjustments) to crop price and irrigation energy cost per acre. The factor adjustments can be applied to multiple crops.

Users must follow certain format conventions for an input file. Rows 1-8 are reserved for file descriptive information, which the user determines. The file title is included in rows 1-3. To improve readability, variable names are placed in rows 5-8, starting with column B. State names are placed in column A, rows 12-59.

The user must place scenario headings in row 10. Short scenario headings, such as those shown in table 13, are recommended. Each column parameter adjustment within the same scenario must use the same scenario identification. All parameter adjustment columns for a specific scenario must be listed consecutively. For example, columns two and three of table 13 refer to factor adjustments for scenario one (SN1), while columns four and five refer to scenario two (SN2). No blank columns are permitted either between parameter adjustment columns for a single scenario or between scenarios. Input variable addresses, which indicate the variable adjusted and type of adjustment ("factor" or "value"), must be placed in row 11.

Factor and/or value adjustments begin in column B, row 12. If you are using variables modified through factor adjustments, a factor adjustment must be entered for each State, Connecticut through Washington (see table 4 for a list of the 48 conterminous States). If crop prices for only Connecticut and Washington, for example, are to be adjusted by a factor of +25 percent, then the adjustment value in column B for rows 12 and 59 is 1.25. The adjustment value for the intermediate cells (States) is 1.0, signifying no adjustment to base-year values.

When the scenario analysis includes adjustments in selected base variable "values," adjusted values must be assigned for each State (rows 12-59) for which a budget flag exists in column F, section 1 of the base spreadsheet.

The final input file entries consist of a list of column/cell address ranges for each output variable, by base spreadsheet section. The first output variable's address range should begin two rows below the last entry in column B, row 61. (Column A is used for a short descriptive title of each output variable.) All output variable entries must be contiguous and use the address format shown in table 13. After all output variable address ranges have been entered, the user defines a "named-range" for the output variable address list. To do this, place the cursor on the first output variable address, invoke the Lotus menu, then invoke the options "Range," "Name," and "Create." At the prompt, enter the name DATA. Again, at the prompt, use the "down" arrow key to highlight all address ranges and

Table 13--Sample SCENAR input file

| Row # | Lotus column ID | | | | |
|-------|------------------------------------|-------------|---------|--------|---------|
| | A | B | C | D | E |
| 1 | Sample SCENAR run for User Manual. | | | | |
| 2 | | | | | |
| 3 | Crops included in | | | | |
| 4 | scenario analysis: | | | | |
| 5 | Wheat, Corn, Sorg., | CROP | FACTOR | CROP | FACTOR |
| 6 | Soybeans, Cotton | PRICE | FOR IRR | PRICE | FOR IRR |
| 7 | | ADJ. | FUEL | ADJ. | FUEL |
| 8 | FILE ID: SCN#1 | FACTOR | COSTS | FACTOR | COSTS |
| 9 | | | | | |
| 10 | | SN1 | SN1 | SN2 | SN2 |
| 11 | | P75 | BR75 | P75 | BR75 |
| 12 | Connecticut | .90 | .95 | 1.10 | .85 |
| 13 | Delaware | .90 | .95 | 1.10 | .85 |
| 14 | Maine | .90 | .95 | 1.10 | .85 |
| 15 | Maryland | .90 | .95 | 1.10 | .85 |
| 16 | Massachusetts | .90 | .95 | 1.10 | .85 |
| 17 | New Hampshire | .90 | .95 | 1.10 | .85 |
| 18 | New Jersey | .90 | .95 | 1.10 | .85 |
| 19 | New York | .90 | .95 | 1.10 | .85 |
| 20 | Pennsylvania | .90 | .95 | 1.10 | .85 |
| 21 | Rhode Island | .90 | .95 | 1.10 | .85 |
| 22 | Vermont | .90 | .95 | 1.10 | .85 |
| 23 | Michigan | .90 | .95 | 1.10 | .85 |
| 24 | Minnesota | .90 | .95 | 1.10 | .85 |
| 25 | Wisconsin | .90 | .95 | 1.10 | .85 |
| 26 | Illinois | .90 | .95 | 1.10 | .85 |
| 27 | Indiana | .90 | .95 | 1.10 | .85 |
| 28 | Iowa | .90 | .95 | 1.10 | .85 |
| 29 | Missouri | .90 | .95 | 1.10 | .85 |
| 30 | Ohio | .90 | .95 | 1.10 | .85 |
| 31 | Kansas | .90 | .95 | 1.10 | .85 |
| 32 | Nebraska | .90 | .95 | 1.10 | .85 |
| 33 | North Dakota | .90 | .95 | 1.10 | .85 |
| 34 | South Dakota | .90 | .95 | 1.10 | .85 |
| 35 | Kentucky | .90 | .95 | 1.10 | .85 |
| 36 | North Carolina | .90 | .95 | 1.10 | .85 |
| 37 | Virginia | .90 | .95 | 1.10 | .85 |
| 38 | Tennessee | .90 | .95 | 1.10 | .85 |
| 39 | West Virginia | .90 | .95 | 1.10 | .85 |
| 40 | Alabama | .90 | .95 | 1.10 | .85 |
| 41 | Florida | .90 | .95 | 1.10 | .85 |
| 42 | Georgia | .90 | .95 | 1.10 | .85 |
| 43 | South Carolina | .90 | .95 | 1.10 | .85 |
| 44 | Arkansas | .90 | .95 | 1.10 | .85 |
| 45 | Louisiana | .90 | .95 | 1.10 | .85 |
| 46 | Mississippi | .90 | .95 | 1.10 | .85 |
| 47 | Oklahoma | .90 | .95 | 1.10 | .85 |
| 48 | Texas | .90 | .95 | 1.10 | .85 |
| 49 | Arizona | .90 | .95 | 1.10 | .85 |
| 50 | Colorado | .90 | .95 | 1.10 | .85 |
| 51 | Idaho | .90 | .95 | 1.10 | .85 |
| 52 | Montana | .90 | .95 | 1.10 | .85 |
| 53 | Nevada | .90 | .95 | 1.10 | .85 |
| 54 | New Mexico | .90 | .95 | 1.10 | .85 |
| 55 | Utah | .90 | .95 | 1.10 | .85 |
| 56 | Wyoming | .90 | .95 | 1.10 | .85 |
| 57 | California | .90 | .95 | 1.10 | .85 |
| 58 | Oregon | .90 | .95 | 1.10 | .85 |
| 59 | Washington | .90 | .95 | 1.10 | .85 |
| 60 | | | | | |
| 61 | RETURN OVER TVC | AE75..AE138 | | | |
| 62 | B-E CROP PRICE | AM75..AM138 | | | |
| 63 | B-E WATER COST | CQ75..CQ138 | | | |

press Enter. Finally, save this file on diskette in drive A, using a user-specified input filename (for example, SCN#1). After saving the input file, continue with the following procedures:

- o Retrieve one of the scenario macro files stored on the hard disk (drive C). (Retrieve SCENAR for analysis involving both dryland and irrigated crops, SCENARI for irrigated crops only, or SCENARD for dryland crops only.)
- o Activate the scenario macro by simultaneously pressing the "Alt" and "A" keys.

The user must respond to three queries before the macro begins processing. The first query is:

- o ENTER TITLE OF INPUT FILE:

The user should type in the name of the input filename SCN#1, or any other name previously assigned to the scenario input file. The second query is:

- o ENTER TITLE OF OUTPUT FILE:

The user should type in an appropriate output filename, one that references the project for which the analysis is being conducted. The third query is:

- o ENTER FILE # OR X IF FINISHED:

The user types in a crop ID number, (for example, 501 for wheat or 508 for barley (see table 1)), presses the Enter key, and repeats this procedure for each crop to be included in the analysis. After all crop ID numbers are entered, the user types in X (in caps), which initiates macro processing. The user is free at this time to leave the PC unattended while the macro generates the scenario output file.

If a macro error occurs after the macro begins processing (an ERROR message will flash in the upper right corner), end the session by striking the CNTL and BREAK keys simultaneously. Before reactivating the macro, the user must erase the temporary file (TITLE.WK1) in the subdirectory WKSFILES.

Output will automatically be saved on diskette in drive A along with a print macro. The user should ignore the results indicated on the monitor screen. To print the output file, use the same procedure as described earlier for the macros COMP and DIFF. The print macro is activated after first retrieving the SCENAR output file from the diskette in drive A, and then simultaneously pressing the "Alt" and "P" keys.

The SCENAR macro also saves on each output file a print macro to generate COMP and DIFF displays using the information in the output file. (However, this is not the case for SCENARI or SCENARD.) After retrieving the SCENAR output file, activate the macro that generates COMP and DIFF displays by simultaneously pressing the "Alt" and "A" keys. At the prompt, enter output filenames for COMP and DIFF output files. Both COMP and DIFF output

files are automatically saved on diskette in drive A, along with a print macro for each file. After retrieving the COMP output file, a print macro is activated by simultaneously pressing the "Alt" and "P" keys. After retrieving the DIFF output file a macro (within the output file) will automatically be activated to complete several file editing procedures. The DIFF output file is then automatically saved on diskette in drive A and retrieved for the user to review and/or print. Subsequent retrievals of the DIFF output file will not activate a macro. To print the DIFF output file, simultaneously press the "Alt" and "P" keys.

IPDS APPLICATIONS

IPDS is designed for use in a variety of research and staff analysis activities. IPDS may be used:

- o as a primary analytical tool for research on comparative static analysis of economic statistics across dry and irrigated crop sectors, States, and regions,
- o as a secondary analytical tool used to generate coefficients for aggregate agricultural sector models, and
- o as an analytical tool for quick turnaround staff analysis.

Examples of each application are presented below.

Primary Research

IPDS will be used to evaluate the effect of commodity program payments on the value of water in western irrigated agriculture. State average water values will be defined using a crop budgeting approach, based on average dollar return (receipts less production costs) per unit of water. Water value will be computed as the difference in returns to land and management between irrigated and dryland cropping activities.

This research will produce estimates of the value of water used to irrigate crops in the 1984 production year. Water values will be compared across geographic regions and across program crops. The effect of commodity program payments will be evaluated based on the difference in alternative measures of crop water value using market prices and market prices adjusted for program payments.

Model Support

IPDS data will be used in at least four aggregate agricultural sector models. These models are: 1) the Project W-178 model being developed by cooperating researchers from western land grant universities under the auspices of the Western Regional Research Committee; 2) a commodity program policy model being developed by the Resources Policy Branch, Resources and

Technology Division of ERS, in cooperation with the University of California-Davis; 3) the Western Agricultural Water Analysis (WAWA) model being developed by the Soil and Water Branch, Resources and Technology Division, ERS; and 4) the U.S. Mathematical Programming (USMP) model of the U.S. agricultural sector, developed by the U.S. Agricultural Policy Branch, Agriculture and Trade Analysis Division, ERS.

Cooperating researchers on Project W-178 will use an aggregate agricultural sector model to evaluate effects of implementing improved water management in the agricultural sector. The goal of this research is to respond to anticipated Environmental Protection Agency (EPA) ground water pollution control regulations and their effect on western irrigated agriculture.

The Resources Policy Branch (ERS) commodity policy model is being designed primarily to evaluate regional effects of changes in farm programs. The model will be a price-endogenous model of the U.S. agricultural sector explaining alternative production levels for farm program crops. The model will address issues of commodity price policy, trade liberalization, and the Conservation Reserve Program.

The WAWA model will be used to address western water conservation and reallocation issues. The model is a longrun static equilibrium model that incorporates dryland and irrigated crop sectors as well as detailed water supply sectors. It will examine research issues involving U.S. Department of Interior, Bureau of Reclamation policies on water price and allocation, conservation of irrigation water, mandatory reduction of water demand, and development of water marketing institutions.

The USMP model is an aggregate, price-endogenous model of the U.S. agricultural sector. The model incorporates crop and livestock sectors, secondary agricultural commodity markets, and agricultural import and export markets. This model assesses regional effects of domestic commodity policy alternatives and agricultural export shifts.

Staff Analysis

An example of how IPDS was used for staff analysis involved an evaluation of a proposed two-tiered payment structure for irrigated and dryland acres enrolled in the Conservation Reserve Program. ERS used the system to generate returns per unit of yield by crop and State for irrigated and dryland activities in the West. The information was displayed in a series of tables. Data were used to assess relative program costs per unit of commodity supply reduced under the Conservation Reserve Program.

REFERENCES

1. Aillery, Marcel P., G. D. Schaible, and T. L. Hickenbotham. Documentation for 1982 USMP Crop Enterprise Budgets. U.S. Dept. Agr., Econ. Res. Serv. Unpublished. March 1988.
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3. U.S. Department of Agriculture, Statistical Reporting Service. Agricultural Statistics. 1984, 1985, and 1986 editions.
4. U.S. Department of Commerce, Bureau of the Census. 1982 Census of Agriculture. Geographic Area Series, Vol. 1, Parts 1-50, Sept. 1984.
5. _____. 1984 Farm and Ranch Irrigation Survey. Special Report Series AG84-SR-1. June 1986.
6. _____. "1984 Farm and Ranch Irrigation Survey." Special tabulations prepared for the Econ. Res. Serv., U.S. Dept. Agr., 1987.

Appendix I

Row label "stub" for section 1 of base crop spreadsheets

IRRIGATED WHEAT:
 1984 Irrigated acres, production,
 cost/returns and water use statistics
 Filename: IPDS501A

| Row # | State/region | Budget ID | Budget flag |
|-------|--------------|----------------|-------------|
| 11 | Irrigated | Connecticut | 0 |
| 12 | Base Values | Delaware | 0 |
| 13 | By State | Maine | 0 |
| 14 | A-1 | Maryland | 0 |
| 15 | | Massachusetts | 0 |
| 16 | | New Hampshire | 0 |
| 17 | | New Jersey | 0 |
| 18 | | New York | 0 |
| 19 | | Pennsylvania | 0 |
| 20 | | Rhode Island | 0 |
| 21 | | Vermont | 0 |
| 22 | | Michigan | 0 |
| 23 | | Minnesota | 0 |
| 24 | | Wisconsin | 0 |
| 25 | | Illinois | 0 |
| 26 | | Indiana | 0 |
| 27 | | Iowa | 0 |
| 28 | | Missouri | WSR102 |
| 29 | | Ohio | 0 |
| 30 | | Kansas | FED707 |
| 31 | | Nebraska | FED712 |
| 32 | | North Dakota | WSR090 |
| 33 | | South Dakota | WSR091 |
| 34 | | Kentucky | 0 |
| 35 | | North Carolina | 0 |
| 36 | | Virginia | 0 |
| 37 | | Tennessee | 0 |
| 38 | | West Virginia | 0 |
| 39 | | Alabama | 0 |
| 40 | | Florida | 0 |
| 41 | | Georgia | WSR101 |
| 42 | | South Carolina | 0 |
| 43 | | Arkansas | NEW102 |
| 44 | | Louisiana | 0 |
| 45 | | Mississippi | 0 |
| 46 | | Oklahoma | FED717 |
| 47 | | Texas | FED719 |

Continued--

Appendix I--Continued

IRRIGATED WHEAT:
 1984 Irrigated acres, production,
 cost/returns and water use statistics
 File name: IPDS501A

| Row # | | State/region | Budget ID | Budget flag |
|-------|--------------|-----------------|-----------|-------------|
| 48 | | Arizona | FED724 | 1 |
| 49 | | Colorado | FED704 | 1 |
| 50 | | Idaho | (*) | 1 |
| 51 | | Montana | FED701 | 1 |
| 52 | | Nevada | WSR099 | 1 |
| 53 | | New Mexico | FED714 | 1 |
| 54 | | Utah | WSR097 | 1 |
| 55 | | Wyoming | WSR094 | 1 |
| 56 | | California | FED727 | 1 |
| 57 | | Oregon | FED734 | 1 |
| 58 | | Washington | (*) | 1 |
| 60 | Irrigated | Northeast | | |
| 61 | base values: | Lake States | | |
| 62 | weighted | Corn Belt | | |
| 63 | average | Northern Plains | | |
| 64 | by region | Appalachia | | |
| 65 | A-2 | Southeast | | |
| 66 | | Delta | | |
| 67 | | Southern Plains | | |
| 68 | | Mountain | | |
| 69 | | Mountain I | | |
| 70 | | Mountain II | | |
| 71 | | Pacific | | |
| 72 | | Pacific I | | |
| 73 | | Pacific II | | |

(*) Indicates that budget information represents a weighted average of multiple budgets.

Appendix II

Equation Listing for Computed Spreadsheet Statistics

Spreadsheet Section 1, Row 11, Columns N - CW:

| Column row/ID | Cell formula |
|------------------|--|
| N11: | (I11*L11) |
| Q11: | (+T11+V11+CB11) |
| T11: | (R11+S11) |
| X11: | (+Y11+AA11+CC11) |
| AC11: | (+Q11+X11) |
| AD11: | (L11*O11)*F11 |
| AE11: | (AD11-Q11)*F11 |
| AF11: | (AD11-AC11+Y11)*F11 |
| AG11: | @IF(@ISERR((Q11/L11)*F11),0,(Q11/L11)*F11) |
| AH11: | @IF(@ISERR((AC11/L11)*F11),0,(AC11/L11)*F11) |
| AI11: | @IF(@ISERR((AE11/L11)*F11),0,(AE11/L11)*F11) |
| AJ11: | @IF(@ISERR((AF11/L11)*F11),0,(AF11/L11)*F11) |
| AK11: | @IF(@ISERR(((Q11-AD11)/L11)*F11),0,((Q11-AD11)/L11)*F11) |
| AL11: | @IF(@ISERR((AK11/O11)*F11),0,(AK11/O11)*F11) |
| AM11: | (O11+AK11)*F11 |
| AN11: | @IF(@ISERR(((Q11-AD11)/O11)*F11),0,((Q11-AD11)/O11)*F11) |
| AO11: | @IF(@ISERR((AN11/L11)*F11),0,(AN11/L11)*F11) |
| AP11: | (L11+AN11)*F11 |
| AU11: | (AQ11*AS11) |
| AV11: | (AD11+AU11)*F11 |
| AW11: | (AE11+AU11)*F11 |
| AX11: | (AF11+AU11)*F11 |
| AY11: | @IF(@ISERR((AW11/L11)*F11),0,(AW11/L11)*F11) |
| AZ11: | @IF(@ISERR((AX11/L11)*F11),0,(AX11/L11)*F11) |
| BA11: | @IF(@ISERR(((Q11-AV11)/L11)*F11),0,((Q11-AV11)/L11)*F11) |
| BB11: | @IF(@ISERR((BA11/O11)*F11),0,(BA11/O11)*F11) |
| BC11: | (O11+BA11)*F11 |
| BD11: | @IF(@ISERR(((Q11-AV11)/O11)*F11),0,((Q11-AV11)/O11)*F11) |
| BE11: | @IF(@ISERR((BD11/L11)*F11),0,(BD11/L11)*F11) |
| BF11: | (L11+BD11)*F11 |
| BI11: | (BG11*H11) |
| BJ11: | +BK11*BG11 |
| BO11: | (BJ11*BM11) |
| BP11: | (H11*BM11) |
| CA11: | (BW11*BY11) |
| CB11: | (BO11+BQ11+BS11+BU11+CA11) |
| CE11: | (CB11+CC11) |
| CH11: | @IF(@ISERR((BQ11/Q11)*F11),0,(BQ11/Q11)*F11) |
| CI11: | @IF(@ISERR((CB11/Q11)*F11),0,(CB11/Q11)*F11) |
| CJ11: | @IF(@ISERR((CE11/AC11)*F11),0,(CE11/AC11)*F11) |
| CK11: | @IF(@ISERR((CB11/BG11)*F11),0,(CB11/BG11)*F11) |
| CL11: | @IF(@ISERR((CE11/BG11)*F11),0,(CE11/BG11)*F11) |

Continued--

Appendix II--Continued

Spreadsheet Section 1, Row 11, Columns N - CW --Continued

| Column row/ID | Cell formula |
|------------------|--|
| CM11: | @IF(@ISERR((L11/BG11)*F11),0,(L11/BG11)*F11) |
| CN11: | @IF(@ISERR((AD11/BG11)*F11),0,(AD11/BG11)*F11) |
| CO11: | @IF(@ISERR(((AD11-Q11)/BG11)*F11),0,((AD11-Q11)/BG11)*F11) |
| CP11: | @IF(@ISERR((CO11/CK11)*F11),0,(CO11/CK11)*F11) |
| CQ11: | (CK11+CO11)*F11 |
| CR11: | @IF(@ISERR((BK11/CQ11)*F11),0,(BK11/CQ11)*F11) |
| CS11: | @IF(@ISERR((AV11/BG11)*F11),0,(AV11/BG11)*F11) |
| CT11: | @IF(@ISERR(((AV11-Q11)/BG11)*F11),0,((AV11-Q11)/BG11)*F11) |
| CU11: | @IF(@ISERR((CT11/CK11)*F11),0,(CT11/CK11)*F11) |
| CV11: | (CK11+CT11)*F11 |
| CW11: | @IF(@ISERR((BK11/CV11)),0,BK11/CV11) |

Spreadsheet Section 1, Rows 60 - 73, Columns I and L,

Column I--Formulas for regional totals:

| | |
|------|-----------------------|
| I60: | @SUM(I11..I21) |
| I61: | @SUM(I22..I24) |
| I62: | @SUM(I25..I29) |
| I63: | @SUM(I30..I33) |
| I64: | @SUM(I34..I38) |
| I65: | @SUM(I39..I42) |
| I66: | @SUM(I43..I45) |
| I67: | @SUM(I46..I47) |
| I68: | @SUM(I48..I55) |
| I69: | (I49+I50+I51+I54+I55) |
| I70: | (I48+I52+I53) |
| I71: | @SUM(I56..I58) |
| I72: | (I57+I58) |
| I73: | (I56) |

Column L--Formulas for regional weighted averages:

| | |
|------|---|
| L60: | IF(\$H\$60=0,0,(((L11*\$H\$11+L12*\$H\$12+L13*\$H\$13 +L14*\$H\$14+L15*\$H\$15+L16*\$H\$16+L17*\$H\$17 +L18*\$H\$18+L19*\$H\$19+L20*\$H\$20+L21*\$H\$21)/\$H\$60))) |
| L61: | @IF(\$H\$61=0,0,((L22*\$H\$22+L23*\$H\$23+L24*\$H\$24)/\$H\$61)) |
| L62: | @IF(\$H\$62=0,0,((L25*\$H\$25+L26*\$H\$26+L27*\$H\$27 +L28*\$H\$28+L29*\$H\$29)/\$H\$62)) |
| L63: | @IF(\$H\$63=0,0,((L30*\$H\$30+L31*\$H\$31+L32*\$H\$32 +L33*\$H\$33)/\$H\$63)) |
| L64: | @IF(\$H\$63=0,0,((L34*\$H\$34+L35*\$H\$35+L36*\$H\$36 +L37*\$H\$37+L38*\$H\$38)/\$H\$64)) |
| L65: | @IF(\$H\$65=0,0,((L39*\$H\$39+L40*\$H\$40 +L41*\$H\$41+L42*\$H\$42)/\$H\$65)) |
| L66: | @IF(\$H\$66=0,0,((L43*\$H\$43+L44*\$H\$44+L45*\$H\$45)/\$H\$66)) |

Continued--

Appendix II--Continued

Column L--Formulas for regional weighted averages--Continued

| Column row/ID | Cell formula |
|---------------|--|
| L67: | @IF(\$H\$67=0,0,((L46*\$H\$46+L47*\$H\$47)/\$H\$67)) |
| L68: | @IF(\$H\$68=0,0,((L69*\$H\$69+L70*\$H\$70)/\$H\$68)) |
| L69: | @IF(\$H\$69=0,0,((L49*\$H\$49+L50*\$H\$50+L51*\$H\$51+L54*\$H\$54+L55*\$H\$55)/\$H\$69)) |
| L70: | @IF(\$H\$70=0,0,((L48*\$H\$48+L52*\$H\$52+L53*\$H\$53)/\$H\$70)) |
| L71: | @IF(\$H\$71=0,0,((L72*\$H\$72+L73*\$H\$73)/\$H\$71)) |
| L72: | @IF(\$H\$72=0,0,((L57*\$H\$57+L58*\$H\$58)/\$H\$72)) |
| L73: | @IF(\$H\$73=0,0,(L56*\$H\$56)/\$H\$73) |

Spreadsheet Section 2, Row 75, Columns H - CW:

| | |
|-------|--|
| H75: | (H11*J75) |
| I75: | (I11*J75) |
| L75: | (L11*M75) |
| N75: | (I75*L75) |
| O75: | (O11*P75) |
| Q75: | (T75+V75+CB75) |
| T75: | (T11*U75) |
| V75: | (V11*W75) |
| X75: | (Y75+CC75+AA75) |
| Y75: | (Y11*Z75) |
| AA75: | (AA11*AB75) |
| AC75: | (Q75+X75) |
| AD75: | (L75*O75)*F11 |
| AE75: | (AD75-Q75)*F11 |
| AF75: | (AD75-AC75+Y75)*F11 |
| AG75: | @IF(@ISERR((Q75/L75)*F11),0,(Q75/L75)*F11) |
| AH75: | @IF(@ISERR((AC75/L75)*F11),0,(AC75/L75)*F11) |
| AI75: | @IF(@ISERR((AE75/L75)*F11),0,(AE75/L75)*F11) |
| AJ75: | @IF(@ISERR((AF75/L75)*F11),0,(AF75/L75)*F11) |
| AK75: | @IF(@ISERR(((Q75-AD75)/L75)*F11),0,((Q75-AD75)/L75)*F11) |
| AL75: | @IF(@ISERR((AK75/O75)*F11),0,(AK75/O75)*F11) |
| AM75: | (O75+AK75)*F11 |
| AN75: | @IF(@ISERR(((Q75-AD75)/O75)*F11),0,((Q75-AD75)/O75)*F11) |
| AO75: | @IF(@ISERR((AN75/L75)*F11),0,(AN75/L75)*F11) |
| AP75: | (L75+AN75)*F11 |
| AQ75: | (AQ11*AR75) |
| AS75: | (AS11*AT75) |
| AU75: | (AQ75*AS75) |
| AV75: | (AD75+AU75)*F11 |
| AW75: | (AE75+AU75)*F11 |
| AX75: | (AF75+AU75)*F11 |

Continued--

Appendix II--Continued

Spreadsheet Section 2, Row 75, Columns H - CW --Continued

| Column row/ID | Cell formula |
|------------------|--|
| AY75: | @IF(@ISERR((AW75/L75)*F11),0,(AW75/L75)*F11) |
| AZ75: | @IF(@ISERR((AX75/L75)*F11),0,(AX75/L75)*F11) |
| BA75: | @IF(@ISERR(((Q75-AV75)/L75)*F11),0,((Q75-AV75)/L75)*F11) |
| BB75: | @IF(@ISERR((BA75/O75)*F11),0,(BA75/O75)*F11) |
| BC75: | (O75+BA75)*F11 |
| BD75: | @IF(@ISERR(((Q75-AV75)/O75)*F11),0,((Q75-AV75)/O75)*F11) |
| BE75: | @IF(@ISERR((BD75/L75)*F11),0,(BD75/L75)*F11) |
| BF75: | (L75+BD75)*F11 |
| BG75: | (BG11*BH75) |
| BI75: | (BG75*H75) |
| BJ75: | (BG75*BK75) |
| BK75: | (BK11*BL75) |
| BM75: | (BM11*BN75) |
| BO75: | (BJ75*BM75) |
| BP75: | (H75*BM75) |
| BQ75: | (BQ11*BR75) |
| BS75: | (BS11*BT75) |
| BU75: | (BU11*BV75) |
| BW75: | (BW11*BX75) |
| BY75: | +BY11*BZ75 |
| CA75: | (BW75*BY11) |
| CB75: | (BO75+BQ75+BS11+BU11+CA75) |
| CC75: | (CC11*CD75) |
| CE75: | (CB75+CC75) |
| CH75: | @IF(@ISERR((BQ75/Q75)*F11),0,(BQ75/Q75)*F11) |
| CI75: | @IF(@ISERR((CB75/Q75)*F11),0,(CB75/Q75)*F11) |
| CJ75: | @IF(@ISERR((CE75/AC75)*F11),0,(CE75/AC75)*F11) |
| CK75: | @IF(@ISERR((CB75/BG75)*F11),0,(CB75/BG75)*F11) |
| CL75: | @IF(@ISERR((CE75/BG75)*F11),0,(CE75/BG75)*F11) |
| CM75: | @IF(@ISERR((L75/BG75)*F11),0,(L75/BG75)*F11) |
| CN75: | @IF(@ISERR((AD75/BG75)*F11),0,(AD75/BG75)*F11) |
| CO75: | @IF(@ISERR(((AD75-Q75)/BG75)*F11),0,((AD75-Q75)/BG75)*F11) |
| CP75: | @IF(@ISERR((CO75/CK75)*F11),0,(CO75/CK75)*F11) |
| CQ75: | (CK75+CO75)*F11 |
| CR75: | @IF(@ISERR((BK75/CQ75)*F11),0,(BK75/CQ75)*F11) |
| CS75: | @IF(@ISERR((AV75/BG75)*F11),0,(AV75/BG75)*F11) |
| CT75: | @IF(@ISERR(((AV75-Q75)/BG75)*F11),0,((AV75-Q75)/BG75)*F11) |
| CU75: | @IF(@ISERR((CT75/CK75)*F11),0,(CT75/CK75)*F11) |
| CV75: | (CK75+CT75)*F11 |
| CW75: | @IF(@ISERR((BK75/CV75)*F11),0,(BK75/CV75)*F11) |

Appendix III-A

Automated Command Stream for Macro COMP

```

\A  {GETLABEL "ENTER TITLE OF OUTPUT FILE: ",TITLE}
     {GETLABEL "ENTER COLUMN LETTER OR X IF FINISHED: ",COLUMN}
     {GOTO}COLUMN~{LEFT}{END}{RIGHT}{RIGHT}+COLUMN~
     /RV~~{IF COLUMN="X"}{BRANCH \B}
     {GETLABEL "IRRIGATED(A) OR DRY(B): ",TYPE}
     {GOTO}TYPE~{LEFT}{END}{RIGHT}{RIGHT}+TYPE~/RV~~{BRANCH \A}

\B  {GOTO}C1~/RNCMARK~~
     {GETLABEL "WORKSHEET #501,Y OR N: ",ONE}
     {GETLABEL "WORKSHEET #502,Y OR N: ",TWO}
     {GETLABEL "WORKSHEET #503,Y OR N: ",THREE}
     {GETLABEL "WORKSHEET #504 Y OR N: ",FOUR}
     {GETLABEL "WORKSHEET #505 Y OR N: ",FIVE}
     {GETLABEL "WORKSHEET #506 Y OR N: ",SIX}
     {GETLABEL "WORKSHEET #507 Y OR N: ",SEVEN}
     {GETLABEL "WORKSHEET #508 Y OR N: ",EIGHT}
     {GETLABEL "WORKSHEET #509 Y OR N: ",NINE}
     {GETLABEL "WORKSHEET #510 Y OR N: ",TEN}
     {GETLABEL "WORKSHEET #511 Y OR N: ",ELEVEN}

\Z  {LET RUN,+RUN+1}{GOTO}COLUMN~
     {RIGHT}/C{END}{RIGHT}~{LEFT}~
     {GOTO}TYPE~{RIGHT}/C{END}{RIGHT}~{LEFT}~
     {IF COLUMN="X"}{BRANCH \F}{GOTO}MARK~
     {IF TYPE="A"}IRRIGATED~{DOWN}
     {IF TYPE="B"}DRYLAND~{DOWN}
     {IF ONE="Y"}WHEAT~/FCCN{COLUMN}~V501{TYPE}~{RIGHT}{UP}{LET
     COUNTER,+COUNTER+1}
     {IF TWO="Y"}CORN~/FCCN{COLUMN}~V502{TYPE}~{RIGHT}{UP}{LET
     COUNTER,+COUNTER+1}
     {IF THREE="Y"}SORGHUM~/FCCN{COLUMN}~V503{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF FOUR="Y"}SOYBEANS~/FCCN{COLUMN}~V504{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF FIVE="Y"}COTTON~/FCCN{COLUMN}~V505{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF SIX="Y"}RICE~/FCCN{COLUMN}~V506{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF SEVEN="Y"}OATS~/FCCN{COLUMN}~V507{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF EIGHT="Y"}BARLEY~/FCCN{COLUMN}~V508{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF NINE="Y"}SILAGE~/FCCN{COLUMN}~V509{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF TEN="Y"}HAY-ALF~/FCCN{COLUMN}~V510{TYPE}~{RIGHT}{UP}
     {LET COUNTER,+COUNTER+1}
     {IF ELEVEN="Y"}HAY-OTHER~/FCCN{COLUMN}~V510{TYPE}~

```

Appendix III-A --Continued

```
{RIGHT}{UP}{LET COUNTER,+COUNTER+1}
/WCS1~:~
/C~{DOWN}..{DOWN 267}~{RIGHT}{END}{UP}/RNDMARK~
/RNCMARK~{BRANCH \Z}
```

```
\F /WDRA4..A6~
{GOTO}A8~/FCCNC9..D265~V501B~
/FS{ESC 3}A:{TITLE}~
```

RUN
COUNTER
ONE
TWO
THREE
FOUR
FIVE
SIX
SEVEN
EIGHT
NINE
TEN
ELEVEN
TYPE

COLUMN

```
\X {LET CX,+CX+1}
{IF ((COUNTER)/(RUN)+1)*3<16}{BRANCH \T}
{IF ((COUNTER)/(RUN)+1)*2<16}{BRANCH \W}
{BRANCH \O}
```

```
/P {GETNUMBER "ENTER SECTION TO PRINT: ",SECT}
{IF SECT=1}{LET BORDER,"A8..B72"}
{IF SECT=1}{LET RANGE,"{DOWN 8}..{LEFT (RANGE2)}{LEFT 2}{RIGHT 2}
{DOWN 63}"}{IF SECT=2}{LET BORDER,"A74..B136"}
{IF SECT=2}{LET RANGE,"{DOWN 72}..{LEFT (RANGE2)}
{LEFT 2}{RIGHT 2}{DOWN 63}"}
{IF SECT=3}{LET BORDER,"A138..B265"}
{IF SECT=3}{LET RANGE,"{DOWN 136}..{LEFT (RANGE2)}
{LEFT 2}{RIGHT 2}
{DOWN 127}"}{IF SECT=12}{LET BORDER,"A8..B136"}
{IF SECT=12}{LET RANGE,"{DOWN 8}..{LEFT (RANGE2)}
{LEFT 2}{RIGHT 2}
{DOWN 127}"}{IF SECT=23}{LET BORDER,"A74..B265"}
{IF SECT=23}{LET RANGE,"{DOWN 72}..{LEFT (RANGE2)}
{LEFT 2}{RIGHT 2}
{DOWN 191}"}{IF SECT=123}{LET BORDER,"A8..B264"}
{IF SECT=123}{LET RANGE,"{DOWN 8}..{LEFT (RANGE2)}
{LEFT 2}{RIGHT 2}
{DOWN 255}"}{BRANCH \X}
```

Appendix III-A --Continued

```

\S      /PPCAOBC{BORDER}~
        {ESC 4}{END}{HOME}{RIGHT}{END}{UP}{DOWN}{END}{LEFT}
        /PPR{RANGE}{RIGHT}~
        OBR{UP}..{DOWN 8}{LEFT (RANGE2)}{RIGHT}{LEFT 2}{RIGHT 2}~
        OAOFGQ{BRANCH \X}

\Q      /PPPAR{LEFT (RANGE2)}{LEFT (RANGE2)}{RIGHT}{LEFT 2}
        {RIGHT 2}~R{LEFT}~
        OBR{ESC}{LEFT}..{DOWN 8}{LEFT (RANGE2)}{RIGHT}{LEFT 2}
        {RIGHT 2}~QGQ{BRANCH \X}

CX

SECT

BORDER

RANGE

RANGE2

\T      {LET RANGE2, (COUNTER/RUN)*3+3}
        {IF COUNTER<1}{QUIT}
        {LET COUNTER, (+COUNTER-RANGE2)+3}
        {LET RUN, +RUN-3}
        {IF CX=1}{BRANCH \S}
        {BRANCH \Q}

\W      {LET RANGE2, (COUNTER/RUN)*2+2}
        {LET COUNTER, (+COUNTER-RANGE2)+2}
        {LET RUN, +RUN-2}
        {IF CX=1}{BRANCH \S}
        {BRANCH \Q}

\O      {LET RANGE2, (COUNTER/RUN)+1}
        {LET COUNTER, (+COUNTER-RANGE2)+1}
        {LET RUN, +RUN-1}
        {IF CX=1}{BRANCH \S}
        {BRANCH \Q}

TITLE

```

Appendix III-B

Automated Command Stream for Macro DIFF

```

\A  {GOTO}COLUMN~
    /RNCWORK~~
    {LET COUNTER,0}
    {GETLABEL "ENTER TITLE OF OUTPUT FILE: ",TITLE}
    {GOTO}LABEL~{RIGHT}/RNCWORK2~~

\B  /RNCWORK2~{RIGHT}~
    {GETLABEL "ENTER FILE # OR X IF FINISHED: ",LABEL}+LABEL~
    /RV~~
    {IF LABEL="X"}{BRANCH \X}
    {GOTO}WORK~{DOWN}/RNDWORK~/RNCWORK~~

\C  {GETLABEL "ENTER COLUMNS, X IF FINISHED OR 'SAME' IF
    SAME AS LAST FILE: ",COLUMN}+COLUMN~
    /RV~~{RECALC COLUMN}
    {IF COLUMN="SAME"}{UP}/C{END}{RIGHT}~{DOWN}~{BRANCH \D}
    {IF COLUMN<>"X"}{RIGHT}{BRANCH \C}

\D  {GOTO}WORK2~
    {BRANCH \B}

\X  {GOTO}LABEL~{RIGHT}/C{END}{RIGHT}~{LEFT}~
    {RECALC LABEL}
    {IF LABEL="X"}{BRANCH \I}
    {GOTO}COLUMN~{DOWN}/C{END}{DOWN}{END}{RIGHT}~{UP}~
    {RECALC COLUMN}{RECALC COLUMN2}{GOTO}COLUMN2~
    /RV~{DOWN 2}~
    {RECALC COLUMN3}
    {IF COUNTER<0}{GOTO}WORK3~/RNDWORK3~{RETURN}
    {GOTO}C1~
    {FOR COUNTER,1,999,1,SUB}

SUB  {DOWN 2}/FCCN{COLUMN3}1..{COLUMN3}265~
    V{LABEL}A~
    {END}{UP}IRRIGATED~{DOWN}BASE~
    {DOWN}{RIGHT}/FCCN{COLUMN3}1..{COLUMN3}265~
    V{LABEL}B~
    {END}{UP}"DRYLAND
    {DOWN}"BASE
    {RIGHT}{UP}"IRR-DRY~
    {DOWN 12}@IF(+{LEFT}=0/#OR#/{LEFT 2}=0,@NA,+{LEFT 2}-{LEFT})~
    /C~..{DOWN 254}~
    {RIGHT}+{LEFT}/{LEFT 2}~
    /C~..{LEFT}{END}{DOWN}{RIGHT}~
    {END}{UP}"(IRR-DRY)/
    {DOWN}"DRY BASE~
    {DOWN 8}{LEFT}ABSOLUTE{DOWN}DIFFERENTIAL{RIGHT}

```

Appendix III-B --Continued

```

DIFFERENTIAL{UP}PERCENT
{UP 5}{LEFT 3}/RE{DOWN 2}{RIGHT}~
{DOWN 7}/C~..{RIGHT 3}~
{UP 11}/M{DOWN 2}{RIGHT 3}~{DOWN 2}~
{BRANCH \J}

\K {UP 5}{RIGHT 4}/WCS1~:/C~..{LEFT}{PGDN}{END}{DOWN}{RIGHT}~
{RIGHT}/RNCWORK3~
{GOTO}COLUMN~{RIGHT}/C{END}{RIGHT}~{LEFT}~
{RECALC COLUMN}{RECALC COLUMN2}{GOTO}COLUMN2~/RV~{DOWN 2}~
{RECALC COLUMN3}
{IF COLUMN3<>"X"}{GOTO}WORK3~/RNDWORK3~{RETURN}
{BRANCH \X}

\I {GOTO}A11~/FCCNC9..D265~IPDS501B~
/REA13~/REA17..A19~/REA62~/REA77~/REA126~/REA143~/REA194~
/REA207~/REA258~
{GOTO}A61~/C~..{END}{RIGHT}~
{GOTO}A76~/C~..{END}{RIGHT}~
{GOTO}A125~/C~..{END}{RIGHT}~
{GOTO}A140~/C~..{END}{RIGHT}~
{GOTO}A189~/C~..{END}{RIGHT}~
{GOTO}A204~/C~..{END}{RIGHT}~
{GOTO}A253~/C~..{END}{RIGHT}~
/MPRINT~A300~
/FXV{ESC 2}A:{TITLE}~
A1..IV349~{QUIT}

```

TITLE
LABEL

COLUMN
0.00
COLUMN2
COLUMN3
FIELD
FILE

```

\P {GETNUMBER "ENTER SECTION TO PRINT: ",SECT}
{IF SECT=1}{LET BORDER,"A13..B75"}
{IF SECT=1}{LET RANGE,"{DOWN 10}..{LEFT 14}{DOWN 62}"}
{IF SECT=2}{LET BORDER,"A77..B139"}
{IF SECT=2}{LET RANGE,"{DOWN 74}..{LEFT 14}{DOWN 62}"}
{IF SECT=3}{LET BORDER,"A141..B267"}
{IF SECT=3}{LET RANGE,"{DOWN 138}..{LEFT 14}{DOWN 126}"}
{IF SECT=12}{LET BORDER,"A13..B139"}
{IF SECT=12}{LET RANGE,"{DOWN 10}..{LEFT 14}{DOWN 126}"}
{IF SECT=23}{LET BORDER,"A77..B267"}
{IF SECT=23}{LET RANGE,"{DOWN 74}..{LEFT 14}{DOWN 190}"}
{IF SECT=123}{LET BORDER,"A13..B267"}
{IF SECT=123}{LET RANGE,"{DOWN 10}..{LEFT 14}{DOWN 254}"}

```

Appendix III-B --Continued

```
/PPCAOBC{BORDER}~
{ESC 4}{END}{HOME}{RIGHT}{END}{UP}{DOWN 2}{END}{LEFT}/PPR{RANGE}~
OBR..{DOWN 9}{LEFT 14}~
OAOFGQ{BRANCH \Q}
```

```
\Q {LET COUNTER,+COUNTER-3}
{IF COUNTER=0}{QUIT}
{IF COUNTER<3}{BRANCH \W}
/PPPAR{LEFT 29}~R{LEFT}~
OBR{ESC}{LEFT}..{DOWN 9}{LEFT 14}~QGQ
{BRANCH \Q}
```

```
\W /PPPAR{LEFT 29}{RIGHT 2}~R{LEFT}~
OBR{ESC}{LEFT}..{DOWN 9}{END}{LEFT}{RIGHT 2}~QGQ
{QUIT}
```

COUNTER
SECT
BORDER
RANGE

```
\J {DOWN 5}{IF LABEL="501"}WHEAT~/C~{RIGHT}~
{IF LABEL="502"}CORN~/C~{RIGHT}~
{IF LABEL="503"}SORGHUM~/C~{RIGHT}~
{IF LABEL="504"}SOYBEANS~/C~{RIGHT}~
{IF LABEL="505"}COTTON~/C~{RIGHT}~
{IF LABEL="506"}RICE~/C~{RIGHT}~
{IF LABEL="507"}OATS~/C~{RIGHT}~
{IF LABEL="508"}BARLEY~/C~{RIGHT}~
{IF LABEL="509"}SILAGE~/C~{RIGHT}~
{IF LABEL="510"}HAY-ALF~/C~{RIGHT}~
{IF LABEL="511"}HAY-OTHER~/C~{RIGHT}~
{BRANCH \K}
```


Appendix III-C

Automated Command Stream for Macro SCENAR

```
\A /WGDD{ESC}C:\123\WKSFILES~UQ
  {GOTO}SCENARIO~
  {GETLABEL "ENTER TITLE OF INPUT FILE: ",SCENARIO}
  {GOTO}FOR~
  /FCCNDATA~
  {ESC 2}A:{SCENARIO}~{GOTO}FOR~{UP}X~
  {END}{DOWN}{DOWN}X~
  {GOTO}TITLE~
  {GETLABEL "ENTER TITLE OF OUTPUT FILE: ",TITLE}
  /FXVTITLE~~
  {GOTO}FILE~

\B {RIGHT}
  {GETLABEL "ENTER FILE # OR X IF FINISHED: ",FILE}
  +FILE~
  /RV~~
  {IF FILE<"X"}{BRANCH \B}
  {HOME}{WINDOWSOFF}/RE{DOWN 19}~
  {GOTO}CX1~X~
  /RNCBEGIN~~
  {DOWN 4}X~

\C {LET TYPE,A}
  {GOTO}FILE~
  {RIGHT}/C{END}{RIGHT}~
  {LEFT}~
  {IF FILE="X"}{BRANCH EDIT}

\D {HOME}/REA1..CW325~/FCCEIPDS{FILE}{TYPE}~
  {GOTO}A450~X~{RIGHT}
  /FCCNB10..DD59~{ESC 2}A:{SCENARIO}~{LEFT}
  {END}{RIGHT}{END}{DOWN}{RIGHT}X~
  {GOTO}A450~{END}{RIGHT}{RIGHT}X~{RIGHT}X~
  {LEFT}{END}{DOWN}{RIGHT}X~
  {GOTO}B450~/C{END}{RIGHT}{END}{DOWN}~{LEFT}~
  {END}{RIGHT}/RE{END}{DOWN}~

\E {IF A450="X"}{BRANCH \F}
  {RECALC WHERE}{GOTO}{WHERE}~
  /RNCTRICK..{END}{HOME}{RIGHT}{END}{UP}~
  /RNCTRICK~{ESC}~
  {GOTO}TRICK~
  /RNDTRICK~
  {DOWN 4}/C..{DOWN 4}~
  {END}{HOME}{RIGHT}{END}{UP}{DOWN 4}{END}{LEFT}{RIGHT}~
  {GOTO}A450~
  /C{END}{DOWN}~
```

Appendix III-C --Continued

```

        {END}{HOME}{RIGHT}{END}{UP}{DOWN 4}
        {END}{LEFT}{DOWN 6}~

\E (Continued):
    {DOWN 2}/C{END}{DOWN}~
    {WHERE}~
    {END}{HOME}{RIGHT}{END}{UP}{DOWN 4}
    {END}{LEFT}{DOWN 6}/M..{DOWN}~{UP}~
    {DOWN}\-~
    {IF A450=B450}{BRANCH SUB1}
    {IF FOR<>"X"}{CALC}{BRANCH SUB2}

\F {IF FILE="506"}{LET TYPE,B}
    {IF TYPE="A"}{LET TYPE,B}{BRANCH \D}
    {BRANCH \C}

SUB1    {GOTO}B450~
        /C{END}{RIGHT}{END}{DOWN}~{LEFT}~
        {END}{RIGHT}/RE{END}{DOWN}~
        {LEFT}{END}{LEFT}{BRANCH \E}

SUB2    {RECALC FORT}{GOTO}FORT~
        /RV~{DOWN 2}~
        /RNCTRICK~{FORTY}~
        /RNCTRICK~{ESC}~
        {GOTO}TRICK~
        /RNCTRICK~..{END}{HOME}{RIGHT}{END}{UP}~
        /RNCTRICK~{ESC}~
        {GOTO}TRICK~
        /RNDTRICK~
        {DOWN 4}/C..{DOWN 4}~
        {END}{HOME}{RIGHT}{END}{UP}{DOWN 4}{END}{LEFT}{RIGHT}~
        /RV{FORTY}~
        {END}{HOME}{RIGHT}{END}{UP}{DOWN 4}
        {END}{LEFT}{DOWN 8}~
        {END}{HOME}{RIGHT}{END}{UP}{DOWN 4}
        {END}{LEFT}{DOWN 5}OUTPUT~
        {DOWN}+FORTY~/RV~~
        {DOWN}\-~
        {GOTO}FOR~
        /C{END}{DOWN}~{UP}~
        {RECALC FOR}
        {IF FOR="X"}/RE{END}{UP}~/FCCNDATA~
        {ESC 2}A:{SCENARIO}~{GOTO}FOR~{UP}X~{BRANCH SUB3}
        {BRANCH SUB2}

SUB3    {END}{HOME}{RIGHT}{END}{UP}{END}{LEFT}{RIGHT}+A450~
        /RV~~
        {DOWN}{IF FILE="501"}WHEAT~
        {IF FILE="502"}CORN~

```

Appendix III-C --Continued

SUB3 (Continued):

```
{ IF FILE="503" }SORGHUM~
{ IF FILE="504" }SOYBEANS~
{ IF FILE="505" }COTTON~
{ IF FILE="506" }RICE~
{ IF FILE="507" }OATS~
{ IF FILE="508" }BARLEY~
{ IF FILE="509" }SILAGE~
{ IF FILE="510" }HAY-ALF~
{ IF FILE="511" }HAY-OTHER~
{DOWN}{ IF TYPE="A" }IRRIGATED~
{ IF TYPE="B" }DRYLAND~
{END}{DOWN}{END}{RIGHT}{RIGHT}{END}{UP}/WCS1~
:~/C~..{DOWN 74}~
{BRANCH SUB1}
```

```
EDIT {GOTO}BEGIN~
{DOWN 12}{RIGHT}/WIC~
/CD11..D73~
{END}{DOWN}{DOWN 2}/MPRMACRO~
{GOTO}BEGIN~
{RIGHT}/FXVTEMP~
..{END}{HOME}~
/FRPART2~
```

WHERE 0

FILE

TYPE

FOR

FORT 0

FORTY

TITLE

```
\P {END}{HOME}{RIGHT}{END}{UP}
{END}{LEFT}{LEFT}/RE{RIGHT}~/WIR~
X~{DOWN}{RIGHT}X~{UP}X~
{LEFT 2}/DF..{HOME}{RIGHT}~1~
{GOTO}B2~/RNCSTART~{ESC}{UP}~
/RNCSTOP~{ESC}{END}{RIGHT}{UP}~
```

```
BACK { IF +STOP-START+1>16 }{BRANCH SUB10}
{ IF +STOP-START+1<16 }{BRANCH SUB20}
{BRANCH PRINT2}
```

Appendix III-C --Continued

```

SUB10   {GOTO}STOP~
        {END}{DOWN}{DOWN}X~
        {GOTO}START~
        {DOWN}/PPCAOS{ESC}\015~
        MLO~MR240~MB1~
        BCA14..A76~
        QR..{DOWN 75}{END}{RIGHT}{UP}~
        AGPQ{GOTO}STOP~
        /RNDSTART~
        /RNGSTART~
        {ESC}{RIGHT}~
        {IF START="X"}{QUIT}
        /RNGSTOP~{DOWN}{RIGHT}{END}{RIGHT}{UP}~
        {IF STOP="X"}/RNCSTOP~{LEFT 2}~
        {BRANCH BACK}

SUB20   {LET COUNTS,0}
SUB21   /RNCSTOP~{DOWN}{RIGHT}{END}{RIGHT}{UP}~
        {IF STOP="X"}/RNCSTOP~{LEFT 2}~
        {IF COUNTS<0}{BRANCH PRINT2}
        {IF COUNTS=0}{IF +STOP-START+1>16}{BRANCH SUB10}
        {IF +STOP-START+1<16}{LET COUNTS,1}
        {RECALC COUNTS}{BRANCH SUB21}
        {IF +STOP-START+1>16}/RNCSTOP~{DOWN}
        {END}{LEFT}{LEFT}{UP}~
        {BRANCH PRINT2}

COUNTS

SUB30   {GOTO}STOP~
        /RNDSTART~
        /RNGSTART~
        {ESC}{RIGHT}~
        {IF START="X"}/PPPQ{QUIT}
        {BRANCH SUB20}

PRINT2  {GOTO}STOP~
        {END}{DOWN}{DOWN}X~
        {GOTO}START~
        {DOWN}/PPCAOS{ESC}\015~
        MLO~MR240~
        BCA14..A76~
        QR..{DOWN 75}{END}{RIGHT}{UP}~
        AGPQ{BRANCH SUB30}

\A     {GETLABEL "ENTER TITLE OF COMP OUTPUT: ",TITLE1}
        {GETLABEL "ENTER TITLE OF DIFF OUTPUT: ",TITLE2}
        {WINDOWSOFF}/WGRM
        {END}{HOME}{RIGHT}{END}{UP}{END}{LEFT}
        {LEFT}/RE{RIGHT}~X~

```

Appendix III-C --Continued

```

\A (Continued):
  /RNCBEGIN~~
  {END}{HOME}{DOWN 2}{END}{LEFT}TESTA~
  /RNLR~
  {DOWN 2}TESTB~
  /RNLR~
  {HOME}{DOWN 9}{RIGHT}/RNCTEMP~~

\B /RNCTEMP~{RIGHT}~
  {IF TEMP="OUTPUT"}{BRANCH EDIT1}
  {IF TEMP=":"}/RNDTEMP~{BRANCH EDIT2}
  {BRANCH \B}

EDIT1 {GOTO}TEMP~
  {DOWN}/C~TESTA~
  {GOTO}TESTA~
  /C~{LEFT}{END}{RIGHT}{RIGHT}~
  {BRANCH \B}

EDIT2 {HOME}{RIGHT}/RNCTEMP~~
  /C~TESTB~
\C /RNCTEMP~{END}{RIGHT}{RIGHT}~
  {IF TEMP=TESTB}/RNDTEMP~{BRANCH SUB1}
  {GOTO}TESTB~
  {LEFT}{END}{RIGHT}{RIGHT}/CTEMP~~
  {BRANCH \C}

SUB1 {GOTO}TESTA~
  {END}{RIGHT}{RIGHT}X~
  {END}{LEFT}{RIGHT 2}/C{END}{RIGHT}~
  {UP}~
  {GOTO}TESTB~
  {END}{RIGHT}{RIGHT}X~
\D {GOTO}TESTA~
  {RIGHT}/C{END}{RIGHT}~{LEFT}~
  {RECALC TESTA}
  {IF TESTA="X"}{BRANCH EDIT3}
  {HOME}{RIGHT}/RNCTEMP1~~
\F {IF TEMP1=TESTB}{DOWN 10}/RNCTEMP2~~{BRANCH SUB2}
  {IF TEMP1="X"}/RNDTEMP1~{BRANCH \D}
\G /RNCTEMP1~{END}{RIGHT}{RIGHT}~
  {GOTO}TEMP1~
  {BRANCH \F}

SUB2 /RNCTEMP2~{RIGHT}~
  {IF TEMP2<>TESTA}{BRANCH SUB2}
  {GOTO}TEMP2~
  {PGUP}/C{ESC}{END}{LEFT}..{DOWN}~{DOWN}~
  {DOWN}/C..{DOWN 73}~
  {END}{HOME}{RIGHT}{END}{UP}{END}{LEFT}{RIGHT}~

```

Appendix III-C --Continued

SUB2 (Continued):

```
/RNDTEMP2~(GOTO)TEMP1~
(BRANCH \G)
```

```
EDIT3 (UP)/C(END)(RIGHT)~(DOWN)~
(GOTO)TESTB~
(RIGHT)/C(END)(RIGHT)~(LEFT)~
(RECALC TESTB)
(IF TESTB="X"){BRANCH EDIT4}
(BRANCH \D)
```

```
EDIT4 (GOTO)BEGIN~
/FXVTEMP~
(ESC)(RIGHT)..(END)(HOME)~
/REAL..IV99~
(HOME)/FCCETEMP~
/FEWTEMP~Y
(END)(HOME)(RIGHT)(END)(UP)
(END)(LEFT)(RIGHT 2)(DOWN)Y(LEFT)X~
(UP)/WIR(DOWN)~
(END)(LEFT)/RNCTEST1~(ESC)(DOWN 3)~
\H (IF TEST1="X"){BRANCH COMP}
(IF TEST1="RICE"){BRANCH XRICE}
(BRANCH DIFF)
```

```
DIFF IRRIGATED~
(DOWN)ADJUSTED(RIGHT)ADJUSTED(UP)DRYLAND~
(RIGHT)/WIC(RIGHT 2)~
IRR-DRY(DOWN 11)DIFFERENTIAL~
(DOWN)/C(ESC)(LEFT)~..(RIGHT)~
(DOWN)@IF(@ROUND(+{LEFT }-{LEFT},2)=0,
@NA,@ROUND(+{LEFT 2}-{LEFT},2))~
/C~..(DOWN 62)~
(RIGHT){PGUP}"(IRR-DRY)/(DOWN)DRYLAND~
(END)(DOWN){UP 2}PERCENT(DOWN)DIFFERENTIAL~
(DOWN 2)@IF(+{LEFT 3}=0#OR#
+{LEFT 2}=0,@NA,@ROUND(+{LEFT}/{LEFT 2},2))~
/C~..(LEFT){END}{DOWN}{RIGHT)~
(PGUP){RIGHT)/WCS1~:/C~..(LEFT){PGDN}
(END){DOWN}{RIGHT)~(RIGHT)/RNCTEST1~(RIGHT 5)~
(BRANCH \H)
```

```
XRICE IRRIGATED(DOWN)ADJUSTED~
(RIGHT)/WIC(RIGHT 3)~(DOWN 2)RICE
(UP 2)ADJUSTED(UP)DRYLAND(RIGHT)
IRR-DRY(DOWN 11)DIFFERENTIAL~
(DOWN){LEFT)/C(ESC)(LEFT)~..(RIGHT 2)~
(DOWN)@NA~
/C~..(DOWN 62)~
/C(END){DOWN)~..(RIGHT 2)~
```

Appendix III-C --Continued

```

XRICE (Continued):
    (RIGHT 2){UP 2}DIFFERENTIAL {UP}PERCENT~
    {END}{UP}"(IRR-DRY)/(DOWN)DRYLAND~
    {RIGHT}{UP}/WCS1~
    :~/C~..{LEFT}{PGDN}{END}{DOWN}{RIGHT}~
    {RIGHT}/RNCTEST1~{RIGHT 5}~
    {BRANCH \H}

COMP    {HOME}
        /RNCBEGIN2~{ESC}{END}{HOME}{DOWN}{END}{RIGHT}~
        /RNCTEST2~{ESC}{DOWN 3}~
    \I  {IF TEST2="X"}{BRANCH COMP2}
        {IF TEST2="Y"}{BRANCH EDIT5}
        /C~..{DOWN 75}~BEGIN2~
        {GOTO}BEGIN2~
        /C~..{DOWN 75}~{END}{LEFT}{RIGHT}~
        {GOTO}TEST2~{PGUP}
        {RIGHT 5}/RNCTEST2~{RIGHT 5}~
        {BRANCH \I}

COMP2   {GOTO}BEGIN2~
        /RNCHERE~{ESC}{END}{LEFT}{RIGHT}~
        {HOME}
        {RIGHT}/RNDTEST2~
        /RNCTEST2~{ESC}{DOWN 3}~
        {BRANCH \I}

EDIT5   {GOTO}A62~
        /C~..{END}{RIGHT}~
        {HOME}{END}{RIGHT}{RIGHT}X~{HOME}/RNCTEST3~~
    \J  /RNCTEST3~{RIGHT}~
        {RIGHT}{IF TEST3="X"}{BRANCH EDIT6}
        {IF TEST3=":"}{BRANCH \J}
        /WCS15~
        {BRANCH \J}

EDIT6   {DOWN}/MMOVE~~
        {DOWN 2}/RNLR~
        /RLC{ESC}{HOME}..{DOWN 12}{END}{RIGHT}{UP}~
        {DOWN 73}{RIGHT}/FXV{ESC 2}A:{TITLE2}~
        ..{HOME}~
        {GOTO}HERE~
        {END}{RIGHT}{RIGHT}{DOWN 3}X~
        {UP 3}{LEFT}{END}{LEFT}{DOWN 3}/RNCTEST4~~
    \K  /RNCTEST4~{RIGHT}~
        {RIGHT}{IF TEST4="X"}{BRANCH EDIT7}
        {IF TEST4=":"}/WCS1~{BRANCH \K}
        /WCS15~
        {BRANCH \K}

```

Appendix III-C --Continued

```

EDIT7  {LEFT}{UP 3}/RLC(DOWN 11){END}{LEFT}~
        {END}{LEFT}/RNCTEST5~{ESC}{DOWN 3}~
        /WDCIV1~{RIGHT}/RNCTEST6~{ESC}{DOWN 3}~
\L {RIGHT}/RNCTEST6~{RIGHT}~
    {IF TEST5=TEST6}{BRANCH SUB3}
    {IF TEST6<"X"}{BRANCH \L}
    {LEFT}{END}{LEFT}{LEFT}{DOWN 13}/FCCND11..D73~V501A~
    {END}{DOWN}{DOWN 2}/FCCNAUGMENT~
    {ESC 2}C:SCENAR~
    /RNL{PGDN 3}~
    {UP 2}{END}{UP}{UP 13}/FXV{ESC 2}A:{TITLE1}~
    ..{RIGHT}{END}{RIGHT}{DOWN 75}{END}{DOWN}~
    {WINDOWSON}{QUIT}

```

TITLE1

TITLE2

```

\0 {HOME}{DOWN 13}/WIC~
    /FCCND11..D73~
    {ESC 2}C:\123\WKSFILES\V501A~
    /WCS17~
    {END}{HOME}{DOWN}{END}{LEFT}/FCCNAUGMENT~
    {ESC 2}C:\123\WKSFILES\SCENAR~
    /RNL{PGDN 3}~
    {GOTO}MOVE~/RND\0~
    {PGDN}{END}{DOWN}{LEFT}/FXV{ESC 2}A:{TITLE2}~
    ..{HOME}~R
    /FR{ESC 2}A:{TITLE2}~

```

```

SUB3  /WIC~
        /WCS1~
        :~/C~..{DOWN 75}~
        {RIGHT}{BRANCH \L}

```

```

\P {END}{HOME}{RIGHT}{END}{UP}
    {END}{LEFT}{RIGHT}{DOWN 4}X~
    {PGUP}/WIR~X~
    {LEFT}/DF..{HOME}{RIGHT}~1~
    {HOME}{DOWN 5}{RIGHT}/RNCSTART~{ESC}{PGUP}~
    /RNCSTOP~{ESC}{END}{RIGHT}{PGUP}~
    {IF STOP="X"}/RNCSTOP~{LEFT}~
    {IF STOP-START+1>16}{BRANCH SUB100}
    {IF STOP-START+1<16}{BRANCH SUB200}
    {BRANCH PRINT20}

```

```

SUB100 {GOTO}STOP~
        {DOWN 77}X~
        {GOTO}START~
        {DOWN}/PPCAOS{ESC}\015~

```


Appendix III-C --Continued

```

SUB100 (Continued):
  MLO~MR240~MBO~P67~
  BC{HOME}{END}{DOWN}..{END}{DOWN}~
  QR..{DOWN 76}{END}{RIGHT}{UP}~
  AGPQ{GOTO}STOP~
  /RNDSTART~
  /RNCSTART~
  {ESC}{RIGHT}~
  {IF START="X"}{QUIT}
  /RNCSTOP~{DOWN 5}{END}{RIGHT}{PGUP}~
  {IF STOP="X"}/RNCSTOP~{LEFT}~
  {BRANCH \Q}

SUB200  /RNCSTOP~{DOWN 5}{END}{RIGHT}{PGUP}~
  {IF STOP="X"}/RNCSTOP~{LEFT}~{BRANCH PRINT20}
  {IF +STOP-START+1<16}{BRANCH SUB200}
  {IF +STOP-START+1>16}/RNCSTOP~
  {DOWN 5}{END}{LEFT}{UP 5}~
  {BRANCH PRINT20}

SUB300  {GOTO}STOP~
  /RNDSTART~
  /RNCSTART~
  {ESC}{RIGHT}~
  {IF START="X"}{QUIT}
  {BRANCH SUB200}

PRINT20 {GOTO}STOP~
  {DOWN 77}X~
  {GOTO}START~
  {DOWN}/PPCAOS{ESC}\015~
  MLO~MR240~MBO~P67~
  BC{HOME}{END}{DOWN}..{END}{DOWN}~
  QR..{DOWN 76}{END}{RIGHT}{UP}~
  AGPQ{BRANCH SUB300}

SCENARIO

OUTPUTL

INPUTL

PART2 \0 {HOME}/RE{DOWN 19}~
  /FCCETEMP~
  /FEWTEMP~Y~
  {GOTO}A76~/RNLR{PGDN 12}~
  /RND\0~
  {GOTO}TITLE2~
  {LEFT}/RNCMOVE~{RIGHT}{DOWN 12}~
  /WGFF~

```

Appendix III-C --Continued

```
PART2 \0 (Continued):
  {END}{HOME}{RIGHT}{END}{UP}{END}{LEFT}{RIGHT}X~
  {HOME}/RNCTEST~~
  /WCS15~
\T /RNCTEST~{RIGHT}~
  {IF TEST="  "}{RIGHT}/WCS15~{BRANCH \T}
  {IF TEST=":"}{RIGHT}/WCS1~{BRANCH \T}
  {IF TEST="X"}/RNDTEST~{BRANCH \U}
  {RIGHT}/WCS15~
  {BRANCH \T}
\U {GOTO}B5~
  /RLC..{DOWN 6}{END}{RIGHT}~
  {END}{HOME}{RIGHT}{END}{UP}{END}{LEFT}
  {RIGHT}/FCCTITLE~
  /RNCA~~
  {LEFT 2}{END}{DOWN}{DOWN}/WDR~/WIR~
  /FXV{ESC 2}A:{A}~
  A399..IV1~
  /FEWTITLE~Y~
  {HOME}{QUIT}
```

Appendix IV

Print Macro for Base-Year Crop Spreadsheets

\A /PPCAOML0~s\015~
MR240~
OUQ
OBCA1..E265~
BRE1..CW10~Q
RF11..R59~AG
PRF60..R110~AG
PRF111..R160~AG
PRF161..R202~AG
PRF203..R251~AG
PRF252..R265~AG
PRS11..AE59~AG
PRS60..AE110~AG
PRS111..AE160~AG
PRS161..AE202~AG
PRS203..AE251~AG
PRS252..AE265~AG
PRAF11..AR59~AG
PRAF60..AR110~AG
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PRAS11..BE59~AG
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