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NEEDS AND SOURCES PLANNING IN THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT: AGRICULTURAL LAND AND WATER USE PROJECTIONS FOR 1995 AND 2010

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Completion Report to the St. Johns
River Water Management District

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PREFACE

This study grew out of discussions between Staff of the St. Johns River Water Management District concerned with the Water Supply Needs and Sources Assessment planning effort and Natural Resource and Environmental Economists within the Food and Resource Economics Department at the University of Florida. The District along with the Florida Agricultural Experiment Station funded the effort. The effort provided projections of land and water use, but more importantly provided an analytical system for projecting agricultural land and water use in future planning efforts. Furthermore, limitations in data bases used to project land and water use were identified. Incremental improvements can now be made in both the data bases and the approach to facilitate improved projections in future planning.

ABSTRACT

Agricultural land and water use projections are needed in order to compare water needs (demands) and sources (supplies) in the St. Johns River Water Management District. Agricultural irrigated acreage is projected for 1995 and 2010. Water use under 2-in-10 drought conditions is then projected for both current and future best management practice irrigation technology. Agricultural water use will likely be about 254 bgy, or 25 acre-inches per irrigated acre for a 2-in-10 drought under current technology by the year 2010. Phasing in best management irrigation technology starting in the mid-1990's suggests water use of about 183 bgy, or 18 acre-inches per acre by 2010. Projections could be improved with better information regarding the social, political, and economic factors affecting agricultural water use. Higher diesel fuel/crop price ratios, for example, could reduce irrigation water use. The model used in the study to project water use presumes very favorable (low) input/output price ratios.

Keywords: agricultural water use, water economics, irrigation water use, projected water use.

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Principal Investigator
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EXECUTIVE SUMMARY

The St. Johns River Water Management District is charged with developing a Water Supply Needs and Sources Assessment of water demand and supply as specified in Chapter 17-40, Florida Administrative Code. This Report details efforts at projecting agricultural water use in the District for 1995 and 2010 as a part of the water demand assessment. Projections are provided for both current and future best management practice irrigation technology.

Total farmland in the District decreased about 12 percent while irrigated land remained relatively stable at about 400,000 acres over the period 1978 to 1989. As a result, irrigated land increased in proportion from about 33 to 42 percent of farmland over the period. Agriculture in the District has become somewhat more intensive, with shifts toward a higher proportion of vegetable crops, ornamentals, and sod/turf. Also, a higher proportion of the pasture is now considered improved. More irrigation has also been installed for citrus, with only 55 percent of citrus being irrigated in 1978 and 91 percent in 1989.

Such shifts as well as the stability in irrigated land suggests any change in future irrigation water use will likely have to come primarily from changes in irrigation technology. In fact, growers changed to lower water using irrigation technologies during the 1978 to 1989 period, suggesting somewhat less water being used for irrigation. Little is known about other agricultural water uses (frost/freeze protection, livestock, aquaculture) over the period.

In moving toward projecting land and water use, various data sources were considered. Particular attention was paid to comparing the crop and irrigation system acreage estimates in the District Consumptive Use Permit (CUP) data base with the District Annual Water Use Survey reports and the Telephone Survey of current agricultural producers conducted during this study.

In comparing the current CUP acreage data and the 1990 projected acreage based on the Annual Water Use Survey, fully 89 percent of county acreage estimates lie outside an interval of +/- 10 percent; i.e., only 11 percent of the county wide estimates were similar in the two data bases. The largest differences occurred in Brevard, Indian River, Lake, and Orange counties, suggesting the need for more detailed analyses.

More similarity was found between the CUP data base and the Telephone Survey with regard to both irrigation system and crop acreage. That is, grower provided data in both the CUP data base and in the Telephone Survey compares more favorably than does the CUP data and the Annual Water Use Survey report data. Yet, based on responses given by 28 percent of the Telephone Survey respondents, some updating of the CUP data base may be needed.

The relative stability in irrigated acreage over the period 1978 to 1989 led to projecting very little change in acreage for 1995 and 2010.

As a result, water use projections also suggest very stable water use for the entire period, for any given irrigation technology.

Under current irrigation technology and assuming 2-in-10 drought conditions, water use is projected at about 254 billion gallons per year (bgy) or about 25 acre-inches for each irrigated acre, through 2010. With adoption of best management technology starting in the mid-1990's, water use may decrease to about 183 bgy by 2010 for a 2-in-10 drought, or to 18 acre-inches per irrigated acre.

The projected water use change needs to be considered in light of the fact that reliable research knowledge about best management practice irrigation technologies is lacking. Current models available for projecting land and water use are not sensitive to economic factors, as reflected by input/output price ratios. It might reasonably be expected, for example, that a large diesel fuel/crop price ratio (suggesting fuel prices are high relative to crop prices) would cause less water to be used. The model used in this study to project water use presumes highly favorable (low price ratio) conditions. Economic conditions, as well as District rules and social considerations, will all affect water use and the pace of change to new irrigation technology.

Very little information exists about water used for frost/freeze protection, livestock, and aquaculture. The quantity of water for such purposes may not be large, but further study is needed to determine the significance of such uses.

The distribution of agricultural water use across the District suggests relatively small amounts of water use in the northern regions of the District. Baker, Clay, and Duval combined will be using only about 3 bgy in 2010. In more southern regions, use is significantly higher. In Indian River county alone, use may be 45 bgy under a 2-in-10 drought in 2010, down from 91 bgy for a 2-in-10 drought for 1990 acreage.

Improvements are needed in the crop acreage/irrigation system (and other agricultural activity) data bases available for projecting agricultural water use. District data entry to the CUP data base needs to be standardized. For example, code sheets need to be developed to insure only one name is used for a particular irrigation system. Also, a standard set of crop names needs to be used. Additionally, specific crop acreage and irrigation system data need to be entered by well and surface withdrawal points. Estimates of acreage should also be improved. A collaborative agreement between the District, the Florida Agricultural Statistics Service, and the Food and Resource Economics Department may be helpful. A working relationship could be quite complementary to efforts at using satellite imagery and aerial photos for such data collection.

In-depth studies concerning the agricultural water using activities in areas with inadequate water to meet the 2010 demands will be needed. Improved understanding of the social, environmental, and economic factors affecting agricultural water use in such areas will aid in developing appropriate water management strategies. Projections need to be sensitive

to the social, political, and economic factors and forces affecting agricultural water use.

1 INTRODUCTION

Gary D. Lynne and Clyde F. Kiker

The St. Johns River Water Management District is currently engaged in developing a Water Supply Needs and Sources Assessment as a part of the District Water Management Plan which is established in state water policy (Chapter 17-40, Florida Administrative Code). Water planning facilitates the District's efforts at satisfying the wide range of responsibilities associated with implementing the 1972 Florida Water Resources Act (F.S. Chp. 373). The water planning process reflects an effort aimed at providing broad guidelines for the development, use, preservation, and conservation of water and related land resources in the District.

Generally, the Needs and Sources planning process first involves estimating water demand (needs) and supply (sources). The amount needed can then be compared with the supply, and approaches can be developed for reconciling demand with supply.

This Report summarizes efforts at projecting agricultural water use for 1990, 1995 and 2010. Historical trends in agriculture are identified. Projections assuming 2-in-10 drought conditions are developed both for current technologies and for best management irrigation technologies and practices. The analytical system, which can be used for projecting agricultural water demand during planning efforts in subsequent years, is developed and discussed. Recommendations are provided for improving upon both the approach and the available data bases in order to best accomplish water projections.

2 AGRICULTURAL LAND USE AND IRRIGATION SYSTEM TRENDS IN THE DISTRICT

Frank Casey, Gary D. Lynne, and Nicola Mentonneli

The purpose of this section is to identify and analyze trends in the use of agricultural land and irrigation systems in the St. Johns River Water Management District. The District's Annual Water Use Survey reports (Florence, 1990, and draft, 1991; Marella, 1981,...,1988, 1990; Scott, 1980) provide the data.

Data analysis provides a sense of "what" changes are occurring in the District. Identifying "what" becomes a prelude to asking "why" such changes are taking place, and for addressing "what likely will be" and, possibly, "what ought to be". Is total or irrigated agricultural land area changing for particular crops in particular locations? Are irrigation systems changing for specific crops and areas? What are the likely alternative scenarios? What technologies should be encouraged, and which discouraged? While detailed analysis well beyond the scope of this study is necessary in order to answer these questions, this section gives some basis for reasoned speculation about tendencies.

2.1 Methods Used in the Annual Water Use Survey Reports

In order to place the trend analysis in perspective, it becomes important to understand the character of the data base being used. Significant variability in methods of acreage and water estimation has occurred over the time period covered by the Annual Water Use Survey data series which makes trend analysis difficult.

The Annual Water Use Survey reports employ a two-step process in providing estimated water withdrawals for crop irrigation. First, land use is estimated for the number of acres harvested, both farmed and irrigated, by crop and county. Second, water use is estimated with varying techniques.

With respect to land use, from 1978 to 1985 the District collected data on acres farmed and irrigated from representatives of the Florida Cooperative Extension Service (IFAS), the USDA Soil Conservation Service (SCS), and the USDA Agriculture Stabilization and Conservation Service (ASCS). Beginning in 1986 the District also used data from the Consumptive Use Permit (CUP) data base and the Florida Crop and Livestock Reporting Service to estimate farmed and irrigated crop acreage. Land use for golf courses was reported as a separate category [turf (golf) in the agricultural section of the Survey reports for 1979 and the years 1986-89. The figures reported here for turf acreage do include golf acreage. Golf courses are not analyzed, per se, in this section because of the focus on agriculture (See Appendix 7.5).

The detailed agricultural water use data in the Annual Water Use Survey reports appears to be the most complete source of information available for analyzing past agricultural demand for water and identifying trends. Indeed, this was the intention of the District. According to the

1979 report the purpose of the Survey is "to provide an information base for future water resource decision-making and help identify potential problem areas of water supply and demand imbalance within the St. Johns River Water Management District" (Marella, 1979). Problems with the data make it at best difficult to produce reliable trend estimates and to identify potential supply and demand imbalances. These problems can be understood by reviewing the methods used to make water use estimates between 1978 and 1989.

An important problem arises with the water use estimates as highlighted in the 1978 report. Water use estimates represent the average annual quantities of water withdrawn, not the amount of water consumed by irrigation. In addition, "water use figures in terms of Millions of Gallons per Day (mgd) reflect the amount of water that would be used each day if irrigation occurred every day of the year, although this does not occur in practice" (Scott, 1978).

County Extension Agents also furnish information on the number of crop acres under four major categories of irrigation system. These systems include sprinkler, tile seepage, flood/seepage and low pressure/low volume. In 1986 the tile seepage category was incorporated in the flood/seepage category. The crop and irrigated system information was used to estimate required levels of supplemental irrigation.

Starting in 1978, the modified Blaney-Criddle model for evapotranspiration was used to determine the amount of supplemental water needed for a crop based on the irrigation method employed, the season the crop was grown, general crop location, and associated atmospheric conditions. Supplemental irrigation is defined as that amount of water in addition to rainfall that is required to produce a crop. This includes water to compensate for irrigation system losses and to overcome inefficiencies in the irrigation system. Once the supplemental irrigation requirement is determined a water use value is derived by multiplying the amount of water needed to grow that particular crop by the number of acres irrigated. From 1978 to 1981 estimates of supplemental irrigation requirements used the previous year's atmospheric data (temperature and rainfall). Starting in 1982, supplemental irrigation needs were computed using the 30 year average rainfall and temperature.

Application rates for some crops not provided in the Blaney-Criddle model were obtained from the University of Florida (ornamentals) or from county extension agents (ferns). Improved pasture water estimates were calculated at 50 percent of the optimum allocation rate since improved pasture was noted to be rarely irrigated at optimal levels.

In 1979, two changes in estimating water use were made. First, water use for irrigation was distributed over a monthly basis, but the mgd figure still reflected the amount of water that would be used every day, on average. Second, a new water source referred to as reused water was added. Reused water is defined as treated sewage effluent and is commonly used in turf grass irrigation, irrigated pasture and sod production.

Between 1980 and 1983 there were no significant changes in the methods used by the District in estimating agricultural water use. The 1984 Annual Water Use Survey first mentions the possibility of using pumpage data on actual water consumption as inventoried through the District's Benchmark Farms Program. It was foreseen that these data would enable the District to evaluate actual water use for irrigation purposes and to help determine supplemental irrigation requirements. In 1985 the District started using the Benchmark Farms Program as an additional source of data for estimating total and irrigated land in production. A review of the Survey methodology sections, however, shows that the Benchmark Program has not generally been used to estimate irrigation water use.

Two other significant methodological changes in estimating agricultural water use were adopted in 1985. These changes took the form of additional sources of information and included using Consumptive Use Permit (CUP) data and the Agricultural Field Scale Irrigation Requirement Simulation Model (AFSIRS) (Smajstrla, 1990) for supplemental irrigation.

These additional sources of information illustrate the problem of relying on water use estimates provided in the Annual Water Use Survey reports for trend analysis. First, the Survey reports do not indicate the estimating method used for particular crops or locations. Second, changing the method of estimating water use adds an element of inconsistency to the data set.

The difficulties in using the water use figures from the Annual Survey reports for conducting any sort of trend analysis can be summarized as follows:

1. The modified Blaney-Criddle model estimates supplemental water requirements based on physical and climatic conditions found in the western United States and is generally not suitable for the eastern U.S., especially Florida.

2. Water use estimates for the years 1978-1981 are not comparable to subsequent years because the data for simulating atmospheric conditions are not the same. The period 1978-81 uses the previous years rainfall and temperature, while the latter years use a 30-year average. The reason for using the 30-year mean rainfall for estimating irrigation water use in a particular year is not at all clear.

3. The categories for the types of irrigation systems are not detailed enough. For example, incorporating tile seepage irrigation into the flood/seepage category in 1986 ignores important differences in the amount of water required by the different crops using these systems.

4. Last, the fact that since 1985 both the Blaney-Criddle and the AFSIRS models have been used concurrently by the District, without any detailed explanation of where or on what crops

these models were used, makes both inter-year and inter-crop comparisons of water use somewhat tenuous.

Recommendations regarding improvements in the Survey data are provided in Section 6.0.

2.2 Comparative Uses of Fresh Water in the District

In the first Annual Water Use Survey report (Scott, 1978) the District defined six general use categories for fresh water use. These categories included Public Supply, Domestic Self-Supplied, Industrial Self-Supply, Crop Irrigation, Livestock, and Thermoelectric Power Generation. The definitions of these categories have changed over time.

In 1978, for example, Public Supply water use estimates were based on data from 57 private and municipal utilities each serving a population of over 2000 people. In 1988 the same category included "... water used by both government and privately owned suppliers. Systems that served 400 people or more or used more than 0.01 mgd were considered public supply systems. There were 195 systems inventoried in 1988...." (Florence, 1990). In addition to water use for domestic purposes, the 1988 definition of Public Supply also encompasses water used for commercial, industrial, power generation and agricultural irrigation. There have been similar changes in the Domestic and Commercial/Industrial Self-Supplied over the 1978-88 period. The categories are not as clear-cut as the titles would suggest.

Other changes include the following. First, livestock is no longer considered a separate use category and has been incorporated into the agricultural estimated water use figures as a separate line item. This is unfortunate because earlier reports gave more specific information on the amount of water used by, say, dairy as compared to beef cattle operations. Second, between 1980 and 1985, the reports include data on water from free flowing (artesian) wells, some of which were used for agricultural purposes (Marella, 1985). These figures are no longer reported, due in part to many of such wells having been capped. Third, separate use categories used to be defined for heat pumps, air conditioning, and lawn watering, but all are now included under Miscellaneous.

With the changing definitions of use estimates for various years and categories, and the fact that agricultural water use is not metered, agricultural water use data in comparison with other categories really only represents orders of magnitude. Also, agricultural water use since 1982 has been estimated using the 30 year mean rainfall; thus, year to year fluctuations in estimated agricultural water use really reflect only acreage differences.

Keeping in mind the caveats regarding agricultural water use estimates, overall, total water use appears to have declined somewhat from 1975 to 1989. Estimates of 1500 to 1800 mgd at the beginning of the period reached 1400 to 1500 mgd later in the period. These estimates are for quite comparable rainfall situations, especially in 1975 and 1989

(Table 2.1). Some categories, however, increased while others have decreased. Public and domestic demands have generally increased, from around 300 mgd to 500 mgd, or by about 200 mgd. Withdrawals for commercial and industrial production processes, thermoelectric power, and agriculture uses have generally decreased by about the same amount.

Increases in public and domestic use have probably occurred mainly due to population growth. Decreases in water used in the commercial and industrial production processes may reflect efficiency improvements, although detailed analysis would be needed in order to know for sure. Water use may have declined somewhat for irrigated agriculture. Again, with the foregoing caveats about the way agricultural water use has been estimated, in terms of relative use, agriculture continued to withdraw about 40 percent of the water during much of the period, although withdrawing as much as 60 percent in 1981. Public and domestic use increased relative to all other uses from about 20 to 35 percent.

2.3 Changes in Farmed and Irrigated Acreage

Total farmland in the District as reported in the Survey decreased by 12 percent while irrigated acreage remained relatively stable at about 400,000 acres between 1978 and 1989 (Table 2.2). As a result, the percent of total farm land irrigated increased from 33 to 42 percent. Such stability in irrigated acreage suggests switches in land to urban uses may not have much impact on water used in agriculture.

In order to obtain a clearer picture of how farm acreage has been changing, the evolution of total acres farmed and irrigated by major crop categories is presented. Major crops include vegetables (including sweet corn), citrus, other fruit crops besides citrus, field crops, ornamentals (ferns, shrubs, woody ornamentals), sod and turf (including golf turf) and improved pasture. Citrus and improved pasture are considered as independent crops because for the 1978-89 period together they accounted for 80 to 87 percent of total farmed acres in the District and from 63 to 76 percent of total irrigated acreage. The individual crops included in the categories of vegetables, fruit, and field crops are the same as those in the Annual Water Use Survey reports with the exception of peanuts. For some years the Survey included peanuts under the fruit category, but for purposes here peanuts (which technically are a legume) are considered a field crop.

For the overall 1978-89 period the most telling indicator of changes in water use in agriculture is shown in Table 2.2. Despite a decrease in total acreage devoted to agriculture there has been an increasing percentage of total farmed area under irrigation. Whether or not actual water use has remained stable or has changed depends upon the trends in acreage of specific, irrigable crops and in the types of irrigation systems used.

Table 2.1 Estimated Water Withdrawals By Major Use Category, St. Johns River Water Management District, 1975-1989*

	Annual	Total	Public		Domestic		Commercial/Industrial	
Year	Rainfall[a]	MGD[b]	MGD	Percent	MGD	Percent	MGD	Percent
1975	45.39	1581.67	267.14	16.9	55.21	3.5	193.38	12.2
1978	51.43	1483.99	233.84	15.8	75.29	5.1	198.80	13.4
1979	55.07	1861.51	257.27	13.8	109.67	5.9	172.90	9.3
1980	46.84	1315.48	294.87	22.4	85.35	6.5	163.37	12.4
1981	39.12	1846.57	307.27	16.6	59.80	4.9	160.01	8.7
1982	55.83	1408.93	291.52	20.7	80.99	5.7	169.69	12.0
1983	62.18	1449.31	299.40	20.7	80.99	5.6	163.67	11.3
1984	46.37	1597.05	332.06	20.8	87.72	5.5	150.24	9.4
1985	46.60	1429.85	359.53	25.1	80.76	5.6	172.34	12.1
1986	46.60	1430.72	381.99	26.7	82.33	5.8	148.46	10.4
1987	42.60	1408.89	400.39	28.4	85.71	6.1	145.67	10.3
1988	47.79	1477.08	409.29	27.7	86.73	5.9	150.11	10.2
1989	42.76	1506.01	431.12	28.6	90.60	6.0	148.64	9.9

*Sources: St. Johns River Water Management District, Water Resource Management Plan Phase I, 1975. St. Johns River Water Management District, Annual Water Use Survey, 1975,...,1989.
[a]Annual Rainfall for Crescent City (in inches).
[b]MGD stands for Millions of Gallons per Day.

Table 2.1 (continued)

Year	Annual Rainfall[a]	Total MGD[b]	Power MGD	Power Percent	Miscellaneous MGD	Miscellaneous Percent	Agriculture MGD	Agriculture Percent
1975	45.39	1581.67	519.31	32.8	0.00	0.0	546.63	34.6
1978	51.43	1483.99	308.79	20.8	16.64	1.1	650.63	43.8
1979	55.07	1861.51	154.04	8.3	201.16	10.8	967.01	51.9
1980	46.84	1315.48	92.62	7.0	71.51	5.4	607.68	46.2
1981	39.12	1846.57	40.41	2.2	149.27	8.1	1099.81	59.6
1982	55.83	1408.93	10.79	0.8	149.96	10.6	698.77	49.6
1983	62.18	1449.31	6.84	0.5	149.96	10.3	748.45	51.6
1984	46.37	1597.05	7.12	0.4	176.01	11.0	753.90	47.2
1985	46.60	1429.85	124.68	8.7	108.13	7.6	587.68	40.9
1986	46.60	1430.72	133.72	9.3	66.25	4.6	617.97	43.2
1987	42.60	1408.89	134.37	9.5	61.51	4.4	581.24	41.3
1988	47.79	1477.08	135.78	9.2	64.25	4.3	630.92	42.7
1989	42.76	1506.01	137.11	9.1	98.45	6.5	600.09	39.8

*Sources: St. Johns River Water Management District, Water Resource Management Plan Phase I, 1975. St. Johns River Water Management District, Annual Water Use Survey, 1975,...,1989.
[a]Annual Rainfall for Crescent City (in inches).
[b]MGD stands for Millions of Gallons per Day.

Table 2.2 Acres Farmed and Irrigated in the St. Johns River Water Management District, 1978-89*

YEAR	Total Acres Farmed	Total Acres Irrigated	Percent Irrigated
1978	1086060	362870	33.4
1979	1108413	408963	36.9
1980	1111740	384115	34.6
1981	1104167	388091	35.1
1982	1099172	340489	31.0
1983	1129400	375412	33.2
1984	1129195	382056	33.8
1985	962506	374712	38.9
1986	975377	396505	40.7
1987	979235	403740	41.2
1988	984656	405849	41.2
1989	951317	396270	41.7

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

2.4 Evolution of Farmed Acreage by Major Crop Category

Total farmed acreage between 1978 and 1989 has generally decreased (Table 2.2). Not all crop categories, however, have experienced acreage decreases over this period. In fact, some have increased. Two implications follow. First, even with decreasing farmed acreage, since irrigated acreage is increasing then the total water requirement could well increase. Second, seeking economic efficiency in the cost structure, i.e. lowest cost per unit of output, generally suggests that different irrigation systems will be appropriate on different crops. If the crops expanding in acreage are using less efficient irrigation systems (strictly in the physical sense of using less water per unit of output, which is not necessarily the economically efficient way to irrigate), then water use would increase even more.

Table 2.3 illustrates the evolution of farmed acreage by crop. Vegetables, ornamentals, and sod and turf, have shown substantial increases in total farmed acreage between 1978 and 1989. Still, in 1989, these crops combined only accounted for 14.6 percent of total farmed acres in the District. Land in vegetable production decreased between 1988 and 1989 by about 7000 acres. Almost all of this decline was irrigated acreage. Total acreage in fruit other than citrus has remained constant over the period, but there have been significant decreases in farmed acreage for citrus (130,000 acres), field crops (19,000 acres), and improved pasture (51,000) acres from 1978 to 1989.

Table 2.3 shows over a 30,000 acre increase in total farmed acreage between 1982 and 1983. Most of the increase was due to expanding vegetable production. Specifically, carrots increased by about 7500 acres and sweet corn increased by almost 8600 acres. There were also substantial increases in citrus (8000 acres) and field crops (about 5000 acres).

Another major change in total farmed acreage occurred between 1984 and 1985. Over this period there was a decrease of over 166,000 acres. The majority of the decrease (over 150,000 acres) is attributed to the loss in citrus acreage due to freezes in 1983 and 1984. The bulk of the decrease in citrus acreage appears in 1985 when final damage estimates were accomplished. Of the estimated 150,000 acre decrease in citrus, almost 60,000 acres (39,000 acres alone in Lake County) was under irrigation. The steady increase in citrus acreage since 1985 has been due to replanting.

Other crops that showed substantial decreases between 1984 and 1985 were field crops (17,000 acres) and improved pasture (18,420 acres). The decrease in field crops occurred for field corn, sorghum, soybeans, and miscellaneous grains.

Table 2.3 Total Acres Farmed by Major Crop Category, St. Johns River Water Management District, 1978-1989*

	Total	Vegetables		Citrus		Fruits	
YEAR	Acres	Acres	Percent	Acres	Percent	Acres	Percent
1978	1086060	60839	5.6	268980	24.8	8122	0.7
1979	1108413	63772	5.8	285873	25.8	8230	0.7
1980	1111740	68556	6.2	279557	25.1	9070	0.8
1981	1104167	66713	6.0	279734	25.3	9009	0.8
1982	1099172	66713	6.1	279734	25.4	9009	0.8
1983	1129400	83513	7.4	287072	25.4	7814	0.7
1984	1129195	89613	7.9	276546	24.5	7993	0.7
1985	962506	103147	10.7	126039	13.1	7685	0.8
1986	975377	105213	10.8	133596	13.7	7483	0.8
1987	979235	101692	10.4	138126	14.1	7920	0.8
1988	984656	103632	10.5	142793	14.5	7870	0.8
1989	951317	96832	10.2	137355	14.4	8826	0.9

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

Table 2.3 (continued)

	Total	Field Crops		Ornamentals		Sod and Turf		Improved Pasture	
YEAR	Acres	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
1978	1086060	62444	5.7	9370	0.9	1700	0.2	674605	62.1
1979	1108413	63114	5.7	9873	0.9	15201	1.4	662530	59.8
1980	1111740	62581	5.6	9525	0.9	16521	1.5	665930	59.9
1981	1104167	56830	5.1	1040	0.1	16431	1.5	666680	60.4
1982	1099172	56830	5.2	10040	0.9	16436	1.5	660410	60.1
1983	1129400	61515	5.4	11161	1.0	17225	1.5	661100	58.5
1984	1129195	65105	5.8	11176	1.0	18342	1.6	660420	58.5
1985	962506	48095	5.0	11726	1.2	23814	2.5	642000	66.7
1986	975377	48095	4.9	11996	1.2	27623	2.8	642000	65.8
1987	979235	48899	5.0	12291	1.3	28307	2.9	642000	65.6
1988	984656	46899	4.8	13153	1.3	28309	2.9	642000	65.2
1989	951317	43182	4.5	12619	1.3	29093	3.1	623500	65.5

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

The decreases in total farmed crop acreage between 1984 and 1985 were offset somewhat by continued increases in vegetable production (about 13,500 acres) and in sod and turf (5500 acres). For vegetables, acreage expanded for cucumbers, potatoes, sweet corn, and miscellaneous vegetables.

The overall decreasing trend in total farmed acreage between 1978 and 1989 may be characterized as a decrease in land-extensive crops (citrus, improved pasture, and field crops) accompanied by an increase in more land-intensive crops (vegetables, ornamentals) and sod/turf. Citrus decreased largely because of the 1983 and 1984 freezes. Other factors affecting all land-extensive crops may include increasing urbanization and higher land prices. With urbanization, climatic, and price factors considered, the increase in higher valued vegetable and ornamental crops is more easily understood. Yet another factor, which is specific to the citrus industry and which will be discussed below, is that a switch to micro irrigation systems has allowed some producers to increase yields per acre by about 30 to 40 percent. Thus, fewer acres are required for the same level of output.

2.5 Evolution of Irrigated Acreage By Major Crop Category

Many of the observations with respect to changes in irrigated acreage between 1978 and 1989 parallel those of total farmed acreage. For instance, with only minor exceptions, there has been a steady increase in irrigated acres (as well as total farmed acres) for vegetables, ornamentals, and sod and turf (Table 2.4). In 1978 these three crop categories accounted for 18.7 percent of all irrigated acreage. In 1989 the same crops accounted for 31.2 percent. Even for the period 1984-85 when total farmland decreased by over 166,000 acres, total irrigated acreage declined by about 8000 acres. Between these two years, the loss in irrigated citrus and field crop acreage was offset by large increases in irrigated area for vegetables (about 14,000 acres) and improved pasture (about 41,000 acres).

Citrus and improved pasture still account for the major share of land in irrigation in the District, but their share has decreased. In 1978, citrus and improved pasture accounted for an annual high of 76.3 percent of all land in irrigation. In 1989, they accounted for 63.3 percent (Table 2.4). The decrease is mostly attributed to a lower percentage of irrigated citrus.

A regression model was developed to measure irrigated acreage trends and to isolate the effect of the freeze on irrigated acreage. The linear log version of the model is

Table 2.4 Irrigated Acres by Major Crop Category, St. Johns River Water Management District, 1978-1989*

	Total	Vegetables		Citrus		Fruits	
YEAR	Irrigated Area	Acres	Percent	Acres	Percent	Acres	Percent
1978	362870	60130	16.5	146840	40.5	3569	0.9
1979	408963	62391	15.3	170643	41.7	3819	0.9
1980	384115	66871	17.4	153610	40.0	3729	1.0
1981	388091	65028	16.8	160910	41.5	3686	0.9
1982	340489	65028	19.1	160910	47.3	3686	1.1
1983	375412	81668	21.8	170019	45.3	2799	0.7
1984	382056	86768	22.7	167528	43.8	3301	0.9
1985	374712	100697	26.9	108974	29.1	4035	1.1
1986	396505	102142	25.8	115497	29.1	3820	1.0
1987	403740	99715	24.7	124242	30.8	4800	1.2
1988	405849	98230	24.2	132685	32.7	4680	1.2
1989	396270	91230	23.0	125050	31.6	5491	1.4

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

Table 2.4 (continued)

	Total	Field Crops		Ornamentals		Sod and Turf		Improved Pasture	
YEAR	Irrigated Area	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
1978	362870	13938	3.8	7070	1.9	1200	0.3	130123	35.8
1979	408963	18530	4.5	8063	2.0	9046	2.2	136471	33.4
1980	384115	15163	3.9	7732	2.0	10170	2.6	126825	33.0
1981	388091	17874	4.6	8332	2.1	10080	2.6	122181	31.5
1982	340489	17874	5.2	8332	2.4	10080	3.0	74679	21.9
1983	375412	25684	6.8	9723	2.6	10830	2.9	74679	19.9
1984	382056	28146	7.4	9748	2.6	11566	3.0	74999	19.6
1985	374712	18781	5.0	10808	2.9	15170	4.0	116247	31.0
1986	396505	18780	4.7	11078	2.8	19487	4.9	125719	31.7
1987	403740	16804	4.2	11396	2.8	20131	5.0	126652	31.4
1988	405849	11569	2.9	12358	3.0	20095	5.0	126412	31.1
1989	396270	16209	4.1	11621	2.9	20879	5.3	125790	31.7

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

$$\ln X = \beta_0 + \beta_1 * \ln t + \beta_2 * V + \beta_3 * V * \ln t + E$$

with X = acres,
β_j = estimated parameters,
t = year, 1 = 1978,...,1989 = 12,
v = dummy variable to account for the decrease in acreage between 1984 and 1985 due to the freeze, v = 0 before 1985, v = 1 after 1985,
ϵ = error term.

Results are shown in Table 2.5 for all irrigated crops and for major crop categories. The intercept term for all irrigated crop categories is significant at the 0.05 probability level, which suggests a nearly constant level of irrigated acreage.

The effects of the year and the decrease in acreage due to freezing were significant at the 0.05 level only for citrus and other fruit crops. This is not surprising as citrus was the crop most damaged by the freeze and the fruit crop category is composed of several crops which are sensitive to freezes (blueberries and peaches).

The dummy variable was significant at the 0.10 level for vegetable crops, indicating the substantial increase in irrigated acreage between 1984 and 1985. This increase could reflect a shift in land use of some citrus acreage lost in the 1983 and 1984 freezes to vegetable production.

The only other variable significant at the 0.10 level was the interaction term for field crops, reflecting the high year-to-year variability of irrigated acreage and the large decrease in irrigated acreage between 1984 and 1985. With the exception of the intercept terms, none of the variables for all irrigated crops combined, ornamentals, sod and turf, and improved pasture were significant. A significant intercept with no trend suggests essentially a constant acreage for these crops over the period.

2.6 Comparison of the Evolution of Farmed and Irrigated Acreage by Major Crop Category.

An analysis of the evolution of farmed and irrigated acreage on a crop by crop basis supports some of the findings with respect to land use trends alluded to in the previous sections (Table 2.6). Over the 1978-89 period almost all vegetable production has been irrigated, ranging from a high of 98.8 percent in 1978 to a low of 94.2 percent in 1989. With the exception of 1987-88, all increases in vegetable acreage have been in irrigated acreage. Because the Annual Water Use Survey reports only showed the type of irrigation system used by crop through 1985, it is not possible to analyze the evolution of irrigated acreage by crop and by irrigation system type over the 12 year period.

Table 2.5 Parameter Values and Summary Statistics[a] from a Regression Analysis of Irrigated Acreage Over Time, 1978-89

Crop Type	R-squared	Intercept (Bo)	Log Year (B1)	Dummy (B2)	Interaction Term (B3)
All Crops	0.29	12.5621**	.1418	.2888	-.1511
		(.3719)	(.1619)	(.3744)	(.1648)
Citrus	0.94	10.7425**	.4192**	1.1846**	-.3669**
		(.3431)	(.1406)	(.3252)	(.1432)
Other Fruit	0.79	6.5890**	.7977**	1.6650**	-.8755**
		(.6809)	(.2964)	(.6853)	(.3018)
Vegetables	0.90	12.0111**	-.02247	-1.0646*	.3862
		(.5505)	(.2397)	(.5541)	(.2240)
Field Crops	0.61	11.4907**	-.7846	-2.0014	1.0839*
		(1.2498)	(.5441)	(1.2579)	(.5539)
Improved Pasture	0.71	11.3394**	.1698	.6133	-.5145
		(1.0788)	(.4696)	(1.0852)	(.4781)
Ornamentals	0.94	8.7580**	.2559	.0897	-.1034
		(.3603)	(.1568)	(.3627)	(.1597)
Sod and Turf	0.81	8.2872**	.6834	-.5643	.3077
		(2.8191)	(1.2273)	(2.8374)	(1.2495)

** Significant at the 0.05 probability level
* Significant at the 0.10 probability level
[a]Standard error in parentheses

Table 2.6 Acres Farmed and Irrigated for Major Crop Categories St. Johns River Water Management District, 1978-1989*

	Vegetables			Citrus			Fruit Crops		
YEAR	Total	Irrigated	Percent[a]	Total	Irrigated	Percent	Total	Irrigated	Percent
1978	60839	60130	98.8	268980	146840	54.6	8122	3569	43.9
1979	63772	62391	97.8	285873	170643	59.7	8230	3819	46.4
1980	68556	66871	97.5	279557	153610	54.9	9070	3729	41.1
1981	66713	65028	97.5	279734	160910	57.5	9009	3686	40.9
1982	66713	65028	97.5	279734	160910	57.5	9009	3686	40.9
1983	83513	81668	97.8	287072	170019	59.2	7814	2799	35.8
1984	89613	86768	96.8	276546	167528	60.6	7993	3301	41.3
1985	103147	100697	97.6	126039	108974	86.5	7685	4035	52.5
1986	105213	102142	97.1	133596	115497	86.5	7483	3820	51.0
1987	101692	99715	98.1	138126	124242	89.9	7920	4800	60.6
1988	103632	98230	94.8	142793	132685	92.9	7870	4680	59.5
1989	96832	91230	94.2	137355	125050	91.0	8826	5491	62.2

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total crop acreage that is irrigated.

Table 2.6 (continued)

	Field Crops			Ornamentals		
YEAR	Total	Irrigated	Percent	Total	Irrigated	Percent
1978	62444	13938	22.3	9370	7070	75.5
1979	63114	18530	29.4	9873	8063	81.7
1980	62581	15163	24.2	9525	7732	81.2
1981	56830	17874	31.5	10040	8332	83.0
1982	56830	17874	31.5	10040	8332	83.0
1983	61515	25684	41.8	11161	9723	87.1
1984	65105	28146	43.2	11176	9748	87.2
1985	48095	18781	39.0	11726	10808	92.2
1986	48095	18780	39.0	11996	11078	92.3
1987	48899	16804	34.4	12291	11396	92.7
1988	46899	11569	24.7	13153	12358	94.0
1989	43182	16209	37.5	12619	11621	92.1

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

Table 2.6 (continued)

	Sod and Turf			Improved Pasture		
YEAR	Total	Irrigated	Percent	Total	Irrigated	Percent
1978	1700	1200	70.6	674605	130123	19.3
1979	15201	9046	59.5	662530	136471	20.6
1980	16521	10170	61.6	665930	126825	19.0
1981	16431	10080	61.3	666680	122181	18.3
1982	16436	10080	61.3	660410	74679	11.3
1983	17225	10830	62.9	661100	74679	11.3
1984	18342	11566	63.1	660420	74999	11.4
1985	23814	15170	63.7	642000	116247	18.1
1986	27623	19487	70.5	642000	125719	19.6
1987	28307	20131	71.1	642000	126652	19.7
1988	28309	20095	71.0	642000	126412	19.7
1989	29093	20879	71.8	623500	125790	20.2

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

For citrus, Table 2.6 shows a large percentage increase in irrigated acreage from about 55 percent in 1978 to 91 percent in 1989, with the largest increase in 1985. The increase suggests that irrigation systems may have helped in reducing freeze damage and that systems are being installed in the newly planted groves. Over the 1985-88 period after the freeze the rate of increase of acres in irrigated citrus has exceeded the rate of increase in total citrus acres.

Changes in irrigated acreage as a percentage of total acreage for fruit crops is similar to the trend in citrus. The exception is that fruit crop acreage has remained fairly stable. Before the mid-1980 freezes, 35 to 46 percent of fruit crop acreage was irrigated. Beginning in 1985 over 50 percent of the annual fruit crop acreage was irrigated and reached a high in 1989 of 62 percent. The annual rate of increase in irrigated fruit crop acreage has kept pace with or slightly exceeded the annual rate of increase in total acreage since 1984.

Irrigated field crop acreage as a proportion of total acreage (Table 2.6) has generally increased from 1978 to 1989. The higher proportion is due to total acreage decreasing while irrigated acreage (despite high variability between some years) did not change significantly over the 1978-89 period. In 1978 about 22.3 percent of all field crop acreage (62,444 acres) was irrigated and in 1989 the fraction had increased to 37.5 percent (of 43,182 total acres)

Both ornamental and sod/turf acreage has increased. Additionally, the proportion of irrigated to total acreage has increased.

Finally, with the exception of a large drop in irrigated acreage between 1982 and 1985, the percentage of irrigated acreage for improved pasture has remained virtually unchanged. Most of the 50,000 acre decrease in total improved pasture acreage between 1978 and 1989 has been in rainfed acreage. Although improved pasture accounts for 65 percent of all acreage in the District (Table 2.3) only 20 percent of it is irrigated (Table 2.6).

Farmers are relying less on rainfall for water needs for several crops. The change in the percentage of land irrigated has been especially large for citrus.

2.7 Changes in the Use of Irrigation Systems

Many growers clearly switched to different irrigation technologies over the period 1978 to 1989 (Table 2.7). While total irrigated acreage has remained relatively stable overall, sprinkler acreage has declined while low pressure systems and flood/seepage systems have increased. Most of the change occurred due to a shift from high pressure sprinkler to low pressure (spray and drip) technology. It seems a reasonable expectation that agricultural water use has declined overall, due to the move to lower water using technologies on 10-15 percent of the acreage (i.e., about 50,000 more acres under low pressure technology).

Table 2.7 Acres and Irrigation Systems in the St. Johns River Water Management District, 1978-1989*

	Acres	Acres	Percent	Sprinkler Irrigation		Low Pressure		Flood/Seepage	
YEAR	Farmed	Irrigated	Irrigated	Acres	Percent[a]	Acres	Percent	Acres	Percent
1978	1086060	362870	33.4	115356	31.8	5837	1.6	241657	66.6
1979	1108413	408963	36.9	118648	29.0	16115	3.9	274173	67.0
1980	1111740	384115	34.6	117111	30.5	15386	4.0	251618	65.5
1981	1104167	388091	35.1	124207	32.0	29797	7.7	234087	60.3
1982	1099172	340489	31.0	124207	36.5	21081	6.2	195181	57.3
1983	1129400	375412	33.2	124527	33.2	37319	9.9	213566	56.9
1984	1129195	382056	33.8	122348	32.0	39260	10.3	220448	57.7
1985	962506	374712	38.9	61323	16.4	43961	11.7	269428	71.9
1986	975377	396505	40.7	69914	17.6	47498	12.0	279093	70.4
1987	979235	403740	41.2	76623	19.0	49015	12.1	278102	68.9
1988	984656	405849	41.2	79646	19.6	55998	13.8	270215	66.6
1989	951317	396270	41.7	68928	17.4	63391	16.0	263951	66.6

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total irrigated acreage under the system type.

The drop in irrigated acreage between 1984 and 1985 of about 7000 acres was a result of almost a 50 percent decrease in the amount of land under sprinkler irrigation accompanied by increases in low pressure and flood/seepage acreage. The 61,000 acre decrease in sprinkler irrigation was the result of a 57,000 acre decrease in sprinkler irrigated citrus accompanied by decreasing acreage in field corn, soybeans, ferns, blueberries, and foliage. The large increase in area under flood/seepage between 1984 and 1985 (about 50,000 acres) was almost entirely in improved pasture (see Table 2.6).

A deeper understanding of trends can be obtained with reference to the major agricultural counties in the District. Most of the irrigated acreage in the District occurs in seven counties: Brevard, Indian River, Lake, Orange, Osceola, St. Johns and Volusia. These seven counties account for about 2/3 of the farm land in the District, and over 80 percent of the irrigated land (Tables 2.8 and 2.9). Tables 2.10-2.16 illustrate substantial variability within the counties. Virtually no irrigated acreage changes occurred in Indian River (Table 2.11) and St. Johns (Table 2.15) counties, a substantial decline occurred in Lake county (due largely to the citrus freezes), and significant increases were observed in Orange, Osceola, and Volusia Counties with less substantial increases in Brevard County (Tables 2.13, 2.14, 2.16, and 2.10, respectively).

Percentage increases in low pressure systems have been quite large in Indian River and Lake Counties, at 4965 and 937 percent, respectively. Over 27,000 acres in Indian River county were irrigated with low pressure systems in 1989 as compared to only 534 acres in 1978. Large percentage increases also occurred in Orange and Brevard counties at 652 and 566 percent. Volusia, Osceola and St. Johns counties had no significant acreage increase in low pressure systems, although percentage increases were quite large.

The trends suggest stable irrigated acreage and declining water use in agriculture. More detailed analysis which is sensitive to the economic and political forces at work to influence adoption of irrigation technology and to cause changes in water management practices needs to be conducted to test this hypothesis.

Producer responses from the telephone survey (described in detail in Section 3) regarding planned changes in irrigation systems are highly supportive of the trends suggested above (Table 2.17). None of the producers of vegetables, field crops, sod and turf, or improved pasture in the survey currently use micro (i.e. low pressure) irrigation systems, nor do any plan to do so in the future. Over one-half of the citrus producers indicated current use of some type of micro, low pressure system, and 7 percent indicated a plan to change to micro systems.

Table 2.8 Farm Land in the Seven Largest Agricultural Counties, St. Johns River Water Management District, 1978-1989*

YEAR	Total District Acres	Brevard	Indian River	Lake	Orange	Osceola	St. Johns	Volusia	Total 7 Counties	Percent of District
1978	1086060	140520	119858	179275	53172	125201	38700	28828	685554	63.1
1979	1108413	142146	141312	188083	54500	126001	38805	33065	723912	65.3
1980	1111740	147912	124205	188083	61680	128250	33505	31515	715150	64.3
1981	1104167	147912	124205	183470	62180	128251	34910	31515	712443	64.5
1982	1099172	147912	124205	183470	62180	128251	29915	31515	707448	64.4
1983	1129400	147912	136603	183610	79901	128251	31465	31515	739257	65.5
1984	1129195	156903	137113	183930	79901	128251	32721	26197	745016	66.0
1985	962506	152393	137783	78002	78417	126570	30781	31944	635890	66.1
1986	975377	152766	139371	83823	78918	126950	31972	32390	646190	66.3
1987	979235	151765	139241	91431	78168	126950	32482	32225	652262	66.6
1988	984656	151766	140941	92389	79348	126950	30728	33075	655197	66.5
1989	951317	145907	136346	91203	79348	126950	30462	13540	623756	65.6

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

Table 2.9 Irrigated Acreage in the Seven Largest Agricultural Counties, St. Johns River Water Management District, 1978-89*

YEAR	Total Irrigated	Brevard	Indian River	Lake	Orange	Osceola	St. Johns	Volusia	Total 7 Counties	Percent District
1978	362870	71680	95928	61950	25218	1451	26900	6128	289255	79.7
1979	408963	83220	113216	70338	25967	1451	25621	9661	329474	80.6
1980	384115	120272	62213	63963	32882	2220	23321	7706	312577	81.4
1981	388091	83608	94688	69813	33382	3351	25226	7791	317859	81.9
1982	340489	36106	94688	69813	33382	3351	25226	7791	270357	79.4
1983	375412	36100	108507	69813	51103	3351	26776	7711	303361	80.8
1984	382056	45157	109007	70133	51103	3351	25947	7613	312311	81.7
1985	374712	123084	75480	23850	58261	7470	26100	12088	326333	87.1
1986	396505	105437	96702	31237	59002	12330	26391	11155	342254	86.3
1987	403740	104436	96805	40845	58852	12330	25801	11380	350449	86.8
1988	405849	105198	95474	41803	57592	12330	26001	12200	350598	86.4
1989	396270	99807	96474	39369	57592	12330	25781	9961	341314	86.1

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

Table 2.10 Irrigation System Acreage in Brevard County, 1978-89*

	Total	Total	Percent	Sprinkler		Low Pressure		Flood/Seepage	
YEAR	Acres	Irrigated	Irrigated	Acres	Percent	Acres	Percent	Acres	Percent
1978	140520	71680	51.0	6120	8.5	525	0.7	63035	87.9
1979	142146	83220	58.5	10633	12.8	880	1.1	71707	86.2
1980	147912	120272	81.3	10971	9.1	880	0.7	108421	90.1
1981	147912	83608	56.5	10971	13.1	880	1.1	71757	85.8
1982	147912	36106	24.4	10971	30.4	980	2.7	24255	67.2
1983	147912	36106	24.4	10971	30.4	880	2.4	24255	67.2
1984	156903	45157	28.8	10972	24.3	880	1.9	33305	73.8
1985	152393	123084	80.8	6104	5.0	880	0.7	116100	94.3
1986	152766	105437	69.0	6596	6.3	881	0.8	97960	92.9
1987	151765	104436	68.8	6596	6.3	880	0.8	96960	92.8
1988	151766	105198	69.3	6850	6.5	1134	1.1	97214	92.4
1989	145907	99807	68.4	2947	3.0	3500	3.5	93360	93.5

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.

Table 2.11 Irrigation System Acreage in Indian River County, 1978-89*

YEAR	Total Acres	Total Irrigated	Percent Irrigated	Sprinkler		Low Pressure		Flood/Seepage	
				Acres	Percent[a]	Acres	Percent	Acres	Percent
1978	119858	95928	80.0	4805	5.0	534	0.6	90589	94.4
1979	141312	113216	80.1	2093	1.8	9841	8.7	101282	89.5
1980	124205	62213	50.1	2278	3.7	8500	13.7	51435	82.7
1981	124205	94688	76.2	2278	2.4	8500	9.0	83910	88.6
1982	124205	94688	76.2	2278	2.4	8500	9.0	83910	88.6
1983	136603	108507	79.4	1352	1.2	21500	19.8	85655	78.9
1984	137113	109007	79.5	1047	1.0	23385	21.5	84575	77.6
1985	137783	75480	54.8	1785	2.4	26115	34.6	47580	63.0
1986	139371	96702	69.4	2087	2.2	26115	27.0	68500	70.8
1987	139241	96805	69.5	2085	2.2	26110	27.0	68610	70.9
1988	140941	95474	67.7	2105	2.2	29965	31.4	66404	69.6
1989	136346	96474	70.8	2055	2.1	27050	28.0	67369	69.8

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total irrigated acreage under the system type.

Table 2.12 Irrigation System Acreage in Lake County, 1978-89*

YEAR	Total Acres	Total Irrigated	Percent Irrigated	Sprinkler		Low Pressure		Flood/Seepage	
				Acres	Percent[a]	Acres	Percent	Acres	Percent
1978	179275	61950	34.6	41197	66.5	1762	2.8	18991	30.7
1979	188083	70388	37.4	43248	61.4	1762	2.5	25328	36.0
1980	188803	63963	33.9	43248	67.6	1762	2.8	18953	29.6
1981	183470	69813	38.1	47667	68.3	6715	9.6	15431	22.1
1982	183470	69813	38.1	47667	68.3	6715	9.6	15431	22.1
1983	183610	69813	38.0	47667	68.3	6715	9.6	15431	22.1
1984	183930	70133	38.1	47987	68.4	6715	9.6	15431	22.0
1985	78002	23850	30.6	9220	38.7	5148	21.6	9482	39.8
1986	83823	31237	37.3	12705	40.7	8285	26.5	10247	32.8
1987	91403	40845	44.7	18280	44.8	13065	32.0	9500	23.3
1988	92389	41803	45.2	18874	45.1	13429	32.1	9500	22.7
1989	91203	39369	43.2	12740	32.4	18279	46.4	8350	21.2

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total irrigated acreage under the system type.

Table 2.13 Irrigation System Acreage in Orange County, 1978-89*

	Total	Total	Percent	Sprinkler		Low Pressure		Flood/Seepage	
YEAR	Acres	Irrigated	Irrigated	Acres	Percent[a]	Acres	Percent	Acres	Percent
1978	53172	25218	47.4	15343	60.8	895	3.5	8980	35.6
1979	54500	25967	47.6	16093	62.0	2200	8.5	7647	29.4
1980	61680	32882	53.3	15487	47.1	2000	6.1	15395	46.8
1981	62180	33382	53.7	15787	47.3	2200	6.6	15395	46.1
1982	62180	33382	53.7	15787	47.3	2200	6.6	15395	46.1
1983	79901	51103	64.0	17658	34.6	1450	2.8	31995	62.6
1984	79901	51103	64.0	17658	34.6	1450	2.8	31995	62.6
1985	78417	58261	74.3	8316	14.3	5500	9.4	44445	76.3
1986	78918	59002	74.8	9057	15.4	5500	9.3	44445	75.3
1987	78168	58852	75.3	8917	15.2	5915	10.1	44020	74.8
1988	79348	57592	72.6	9442	16.4	6730	11.7	41420	71.9
1989	79348	57592	72.6	9442	16.4	6730	11.7	41420	71.9

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total irrigated acreage under the system type.

Table 2.14 Irrigation System Acreage in Osceola County, 1978-89*

	Total	Total	Percent	Sprinkler		Low Pressure		Flood/Seepage	
YEAR	Acres	Irrigated	Irrigated	Acres	Percent[a]	Acres	Percent	Acres	Percent
1978	125201	1451	1.2	0	0.0	0	0.0	1451	100.0
1979	126001	1451	1.2	0	0.0	0	0.0	1451	100.0
1980	128250	2220	1.7	0	0.0	0	0.0	2220	100.0
1981	128251	3351	2.6	0	0.0	0	0.0	3351	100.0
1982	128251	3351	2.6	0	0.0	0	0.0	3351	100.0
1983	128251	3351	2.6	0	0.0	0	0.0	3351	100.0
1984	128251	3351	2.6	0	0.0	0	0.0	3351	100.0
1985	126570	7470	5.9	0	0.0	0	0.0	7470	100.0
1986	126950	12330	9.7	150	1.2	230	1.9	11950	96.9
1987	126950	12330	9.7	150	1.2	230	1.9	11950	96.9
1988	126950	12330	9.7	150	1.2	230	1.9	11950	96.9
1989	126950	12330	9.7	150	1.2	230	1.9	11950	96.9

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total irrigated acreage under the system type.

Table 2.15 Irrigation System Acreage in St. Johns County, 1978-89*

YEAR	Total Acres	Total Irrigated	Percent Irrigated	Sprinkler		Low Pressure		Flood/Seepage	
				Acres	Percent[a]	Acres	Percent	Acres	Percent
1978	38700	26900	69.5	0	0.0	0	0.0	26900	100.0
1979	38805	25621	66.0	611	2.4	0	0.0	25010	97.6
1980	33505	23321	69.6	611	2.6	0	0.0	22710	97.4
1981	34910	25226	72.3	611	2.4	5	0.0	24610	97.6
1982	29915	25266	84.5	611	2.4	5	0.0	24610	97.4
1983	31465	26776	85.1	611	2.3	5	0.0	26160	97.7
1984	32721	25947	79.3	882	3.4	5	0.0	25060	96.6
1985	30781	26100	84.8	1035	4.0	5	0.0	25060	96.0
1986	31972	26391	82.5	1226	4.6	5	0.0	25160	95.3
1987	32482	25801	79.4	1251	4.8	30	0.1	24520	95.0
1988	30782	26001	84.5	1251	4.8	30	0.1	24720	95.1
1989	30462	25781	84.6	1226	4.8	55	0.2	24500	95.0

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total irrigated acreage under the system type.

Table 2.16 Irrigation System Acreage in Volusia County, 1978-89*

YEAR	Total Acres	Total Irrigated	Percent Irrigated	Sprinkler		Low Pressure		Flood/Seepage	
				Acres	Percent[a]	Acres	Percent	Acres	Percent
1978	28828	6128	21.3	3484	56.9	144	2.3	2500	40.8
1979	33065	9661	29.2	5137	53.2	144	1.5	4380	45.3
1980	31515	7706	24.5	5451	70.7	95	1.2	2160	28.0
1981	31515	7791	24.7	5551	71.2	80	1.0	1368	17.6
1982	31515	7791	24.7	5551	71.2	80	1.0	1368	17.6
1983	31515	7711	24.5	5631	73.0	180	2.3	1900	24.6
1984	26197	7613	29.1	5613	73.7	0	0.0	1900	25.0
1985	31944	12088	37.8	10628	87.9	0	0.0	1460	12.1
1986	32390	11155	34.4	9695	86.9	0	0.0	1460	13.1
1987	32255	11380	35.3	9860	86.6	520	4.6	1000	8.8
1988	33075	12200	36.9	10500	86.1	700	5.7	1000	8.2
1989	13540	9961	73.6	8869	89.0	297	3.0	795	8.0

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]Percent of total irrigated acreage under the system type.

Table 2.17 Prospective Changes in Irrigation Systems Reported by Agricultural Producers in the Telephone Survey

Crop Type	Number of Producers Surveyed	Major Irrigation Systems Currently Used (Number of producers)	Prospective Irrigation System Changes
Vegetables	26	Flood/Seepage (20)	None
		Multiple Sprinkler (3)	
		Travelling Gun (4)	
Citrus	75	Flood/Seepage (10)	3 Producers to Micro Spray/Drip
		Multiple Sprinkler (21)	2 Producers to Micro Spray/Drip
		Travelling Gun (2)	None
		Micro Spray/Drip (43)	None
Fruit	10	Multiple Sprinkler (6)	1 Producer to Micro Spray/Drip
		Travelling Gun (1)	None
		Micro Spray/Drip (3)	2 Producers to Sprinklers
Field Crops	4	Multiple Sprinkler (4)	None
Ornamentals[a]	40	Multiple Sprinkler (36)	2 Producers to Micro Spray/Drip
		Flood/Seepage (1)	None
		Micro Spray/Drip (14)	None
Sod/Turf	9	Multiple Sprinkler (9)	None
Improved Pasture[b]	15	Flood/Seepage (1)	None
		Travelling Gun (3)	None

[a]Most growers of ornamentals use both micro and sprinkler irrigation systems.
[b]Only 4 of 15 producers interviewed irrigate improved pasture.

About 30 percent of the other fruit producers indicated current use of low pressure micro systems. About 2/3 of the 30 percent, however, indicated plans to change from micro to sprinkler systems. About one-third of the ornamental producers currently use micro systems and two more (5%) plan on switching to the micro systems.

The data are not extensive enough to conclude that there is a definite trend toward low pressure micro systems. It does show that producers are more likely to use water conserving technology in certain situations.

2.8 Water Use by Livestock, Fisheries, and Other Agricultural Activities

As noted, the Annual Water Use Survey estimate of irrigation water use does not lead to definitive conclusions with respect to water use trends. The same proviso holds true for livestock, aquaculture, and other activities. Thus, Table 2.18 should only be considered as indicating orders of magnitude. Water use by livestock appeared to be fairly stable between 1978 and 1985. From 1985 to 1989 it decreased. For 1985-88 there was an increase in water use for other agricultural activities, including fisheries. In 1989 there was a slight decrease in water use for this category, but it is not known if the decrease reflects less water use in fisheries or in the aesthetic/wildlife category.

2.9 Summary of Agricultural Trends

The Annual Water Use Survey reports reflect changing methods from year to year which makes trend analysis tenuous. The data provided in one year may have a different basis than data provided in another for the same category. It does appear that total water use declined somewhat from 1975 to 1989, although some categories of use have increased while others decreased. Agriculture accounted for about 40 percent of the water use by all categories. Public and domestic water use increased relative to all other uses from about 20 to 35 percent.

Generally, citrus, improved pasture, and field crops decreased in acreage while vegetables, ornamentals and sod/turf increased. Nearly all citrus and vegetable acreage is now irrigated. Only 20 percent of improved pasture, although accounting for 65 percent of all acreage in the District, is classified as irrigated (although see Section 5.5.1). There appears to be a definite shift from sprinkler to low pressure systems.

Table 2.18 Estimated Water Use by Livestock, Wildlife, and Fisheries, St. Johns River Water Management District, 1978-89*

Year	Livestock	Aesthetic/Wildlife	Fisheries
	- - - - - - Million gallons per year - - - - - -		
1978	16.64	N/A[a]	N/A
1979	15.17	N/A	N/A
1980	14.14	N/A	N/A
1981	14.93	N/A	N/A
1982	14.14	N/A	N/A
1983	14.14	N/A	N/A
1984	14.14	N/A	N/A
1985	15.93	10.86	2.44
1986	13.01	12.68	b
1987	13.17	14.53	b
1988	13.17	14.53	b
1989	11.60	9.03	b

*Source: St. Johns River Water Management District, Annual Water Use Survey, 1978,...,1989.
[a]N/A: Not Available
[b]Fisheries included as part of Aesthetic/Wildlife

3 COMPARISONS OF AGRICULTURAL IRRIGATED ACREAGE DATA BASES

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An estimate of current and future irrigated acreage by irrigation system type was necessary in order to provide water use projections. Various acreage data bases exist, all somewhat different in character and in reliability. Each source of data has strengths and weaknesses. In addition to the Annual Water Use Survey reports discussed above, other sources of agricultural acreage and irrigation system information include 1) the U.S. Census of Agriculture, 2) the Florida Agricultural Statistics Service (FASS), 3) the District Consumptive Use Permit (CUP) data base, and 4) the telephone survey conducted for this study.

The U.S. Census of Agriculture is conducted every five years. The most recent data is available for 1987. It was decided to not use the census data to develop projections due to the 5-year intervals between measurement points.

The FASS provides yearly estimates of agricultural acreage in each county, but does not generally provide estimates of acreage by irrigation system type. The District's Annual Water Use Survey, in contrast, does provide both the irrigated and system type acreage estimates. Thus, the Survey seemed more appropriate than the FASS statistics.

The CUP data base, while thought to be generally reliable in indicating crop and irrigation system types, may not be current in actual acreage of each crop under each system. While the most accurate source of acreage and system type will be the grower supplying such information through the CUP application or in modifications to the original application, economic conditions change rapidly causing growers to change planting plans. Because of frequent changes, growers may not always keep CUP data up-to-date.

The Annual Water Use Survey does give the most comprehensive estimates of acreage and irrigation system, and the Survey is conducted every year. The Survey data series, however, is not without problems. The estimates come from County Extension offices which may not necessarily be equipped (nor is it their mission) to collect accurate, primary data. Often such data bases that do exist in county extension offices are designed more to identify general tendencies for use in county extension service program development, rather than for use in research efforts. Extension staff are generally not given resources to develop scientific sampling procedures for estimating acreages.

Data from a telephone survey conducted in this study can give some indication of what growers currently are doing. Telephone survey techniques, however, have their own errors due to the need for growers to respond quickly, giving the best estimates possible in a few minutes of conversation. There may also be variability in the way questions are

asked of growers, even when considerable time is spent in interviewer training, as described in the notion of interviewer bias.

Overall, then, none of the various data bases is likely to be entirely appropriate for projecting water use. The purpose of this section is to compare the various data sources with respect to acreage and system type in order to ascertain the relevancy of each data base in projecting future acreage. Projections for 1990 based on the data from the county extension office estimates in the Annual Water Use Survey reports are first compared with the grower estimates in the CUP data base. Grower estimates in the CUP data base are then compared to the grower estimates from the Telephone Survey. Discrepancies will suggest areas for further inquiry in order to identify the data points needing improvement. Similar estimates tend to indicate both data bases are accurate, given that the data are derived from different sources.

3.1 Projected 1990 Acreage Compared to the CUP Data Base Acreage

When the county irrigated acreage from the Annual Water Use Survey is compared with the county aggregate irrigated acreage from the CUP data base, 88.8 percent of the county aggregates lie outside a ± 10 percent level of accuracy. Another way of expressing the accuracy of these data sources is to say that only six counties have acreages given in the Annual Water Use Survey and CUP data base that are within ± 750 acres. The other 12 counties lie outside this range (Bradford county was not included due to insufficient information). Four counties even lie outside a range of ± 10,000 acres. Analysis was performed to determine if there was a systematic error.

The absolute difference (Projected - CUP) and the index (Projected - CUP)/CUP or (D/CUP) was calculated for the 18 counties (Table 3.1). An index of 0.0 suggests no difference. An index close to 0.0 suggests little difference, while a large negative index suggests significantly smaller Projected acreage and a large positive index suggests significantly larger Projected acreage.

The Projected 1990 and CUP acreage, the difference, and the index are all reported for irrigated acreage by crop in each county (Appendix Table 7.6.1) and for total irrigated acreage in each county (Appendix Table 7.6.2). Overall, the 1990 projection based on the Annual Water Use Survey reports suggests 385,630 irrigated acres as compared to the CUP data base showing 275,895 acres (Table 3.1). That is, assuming the Annual Water Use Survey reports are accurate, the CUP data base does not account for 109,735 acres (Table 3.1). Alternatively, the projection based on the Annual Survey reports may be overestimating acreage by 109,735 acres. In any case, the discrepancy suggests the need for further inquiry into why acreage estimates are so different between these two sources.

The largest absolute differences occurred in Brevard, Indian River, Lake and Orange counties (Table 3.1). In Brevard and Indian River, the difference is heavily influenced by the much larger irrigated pasture estimate in the Annual Water Use Survey. The difference is likely due to

Table 3.1 Projected and CUP Data Irrigated Acreage Comparison by Counties, St. Johns River Water Management District, 1990

County	Projected	% of Total	CUP	% of Total	D*	(D/CUP)
Alachua	4259	1.1	1898	0.7	2361	1.24
Baker	677	0.2	407	0.1	270	0.66
Brevard	95926	24.9	66353	23.5	29573	0.45
Clay	429	0.1	206	0.1	223	1.08
Duval	1396	0.4	860	0.3	536	0.62
Flagler	6276	1.6	8103	2.98	-1827	-0.23
Indian River	94364	24.5	53482	18.9	40882	0.76
Lake	39903	10.3	66418	23.5	-26515	-0.40
Marion	6529	1.7	16779	5.8	-9950	-0.60
Nassau	176	0.0	0	0.0	176	-
Okeechobee	7107	1.8	2570	0.9	4537	1.77
Orange	56358	14.6	14298	5.1	42060	2.94
Osceola	10946	2.8	1970	0.7	8976	4.56
Polk	7684	2.0	4364	1.5	3320	0.76
Putnam	9665	2.5	7840	2.8	1825	0.23
St. Johns	25201	6.5	24462	8.7	739	0.03
Seminole	9818	2.5	3249	1.2	6569	2.02
Volusia	8916	2.3	9365	3.3	-449	-0.05
Total	385630	100.0	282324	100.0	103306	0.37

*D is the difference (Projected - CUP) acreage.

the difficulty of defining irrigated, improved pasture. The county extension service offices may be including all drained pasture as irrigated pasture. Farmers, growers, and ranchers reporting acreage in CUP permits may be more inclined to consider such areas as simply drained due to the limited ability to irrigate with drainage canals during droughts. The comparison also suggests 23,520 more acres of irrigated citrus than in the CUP data base in Indian River county, and 31,917 fewer acres of citrus in Lake county (See Section 5.5.4 for further discussion of the differences).

The largest indexes were measured in Okeechobee, Orange, Osceola, and Seminole counties (Table 3.1). The very large index in Nassau County is due to the lack of any CUP acreage, this was due to no CUP acreage being reported in the county. In Okeechobee and Osceola, the large indexes were due to significantly more improved pasture, as projected based on the Annual Survey reports. In Orange County, the large index is due mainly to 40,844 acres of vegetables in the most recent Annual Survey as compared to only 1575 acres in the CUP data base. In Seminole County, the large index is due to the Annual Water Use Survey based projections of 2209 more vegetable acres and 3248 more improved pasture acres than indicated in the CUP data.

The 1990 projection shows less citrus, other fruit and field crops, but more vegetables and pasture than in the CUP data base (Table 3.2). The difference could be due to CUP permit data being older and out-of-date. Freezes removed large acreages of citrus. Vegetable acreage varies considerably from year to year, making it difficult to keep the CUP data base up-to-date. Also, the CUP data base vegetable acreage only represents physical acreage in the farm devoted to vegetable production. The improved pasture differences may be due primarily to county extension personnel and growers having different or varying definitions of an irrigated pasture.

Irrigation system acreage was not projected from the Annual Water Use Survey reports. Table 3.3 instead compares the 1989 Survey estimates with the CUP data estimates. The overall difference is about 90,000 fewer acres in the CUP data. The CUP data shows more sprinkler and low pressure acreage and less flood/seepage acreage than in the 1989 Survey.

3.2 Telephone Survey

The Telephone Survey allows comparing information in the agricultural Consumptive Use Permit (CUP) data base, which was submitted by growers, with grower estimates in the Telephone Survey. Essentially, the following suggests the extent to which the CUP data base is up-to-date and current because the Telephone Survey focused on 1990 acreage.

A survey instrument was designed to obtain all information within a 10 to 15 minute telephone call. The survey primarily addressed information pertaining to 1990 crops, irrigation systems used for each crop, and the total and irrigated acreage associated with each crop. Other questions in the survey included: 1) projected changes in irrigated

Table 3.2 Projected and CUP Data Acreage Comparison for Each Crop, St. Johns River Water Management District, 1990

Crops	Projected	% of Total	CUP	% of Total	D*	(D/CUP)
Citrus	127416	33.0	151646	53.7	-24230	-0.16
Other Fruit	4848	1.3	9948	3.5	-5100	-0.51
Vegetables	94371	24.5	26929	9.5	67442	2.50
Field Crops	16388	4.2	23161	8.2	-6773	-0.29
Improved Pasture	123582	32.0	53231	18.9	70352	1.32
Ornamentals	11352	2.9	12898	4.6	-1546	-0.12
Sod/Turf	7673	2.0	4512	1.6	3161	0.70
Total	385630	100.0	282324	100.0	103306	0.37

*D is the difference (Projected - CUP) acreage.

Table 3.3 **Annual Water Use Survey (1989) and the CUP Data Irrigation System Acreage Comparison by County, St. Johns River Water Management District***

	Acres Irrigated		Sprinkler		Low Pressure		Flood/Seepage	
County	Survey	CUP	Survey	CUP	Survey	CUP	Survey	CUP
Alachua	4123	18511	3593	2092	480	110	50	15500
Baker	825	408	660	408	165	0	0	0
Bradford	40	0	40	0	0	0	0	0
Brevard	99807	68122	2947	2890	3500	22966	93360	42265
Clay	749	206	636	116	3	0	100	90
Duval	2965	860	2891	550	34	310	40	0
Flagler	6785	8776	2385	1225	0	0	4400	7551
Indian River	96474	53947	2055	263	27050	19957	67369	33726
Lake	39369	67728	12740	43638	18279	20475	8350	3615
Marion	7803	17760	6983	14411	820	1737	0	1612
Nassau	770	0	770	0	0	0	0	0
Okeechobee	7250	2570	0	100	4468	1315	2782	1155
Orange	57592	14413	9442	7310	6730	3714	41420	3389
Osceola	12330	1970	150	0	230	1130	11950	840
Polk	7385	4562	6540	2025	745	2538	100	0
Putnam	9707	7965	2677	2022	80	289	6950	5654
St. Johns	25781	27037	1226	443	55	24	24500	26570
Seminole	6554	3294	4324	1667	455	504	1775	1123
Volusia	9961	9474	8869	8537	297	253	795	684
Total	396270	307603	68928	87696	63391	75322	263951	143774

*Source: Florence, Bruce L. Annual Water Use Survey(Draft). Palatka, FL: St. Johns River Water Management District, 1991.

acreage and type of irrigation systems, 2) number and typical capacity of four inch and smaller wells used for agricultural purposes, 3) water withdrawal for frost and freeze protection, aquaculture, and dairy use and the projected changes in water use for each of these categories, and 4) the total acreage of transitional land, defined as land having a high potential of being converted to urban, industrial, and residential purposes. A copy of the survey instrument is provided in Appendix 7.7, Exhibits 7.7.1 and 7.7.2.

Steps for the Telephone Survey included, 1) designing the survey instrument, 2) training telephone surveyors and subsequently pre-testing the instrument to determine its usefulness in obtaining information, 3) developing the survey sample, including obtaining telephone numbers, 4) resolving the multiple permit holders problem, 5) deciding upon survey coverage with respect to numbers of CUP permits, and 6) data analysis.

3.2.1 Designing the Survey Instrument

Questions were first developed, reviewed, and revised by the Food and Resource Economics Department (FRED). The instrument was further refined during the January 17, 1991 meeting with the District. Questions concerning 4-inch wells and transitional land were added at that time. The instrument was then submitted to the University of Florida Institutional Review Board and was subsequently approved for use.

3.2.2 Survey Pre-Test

Undergraduate interviewers were trained to conduct the pre-test. Graduate student interviewers were trained for, and subsequently conducted, the general survey. Training included an overview of the project, explaining survey objectives, familiarizing each interviewer with the survey instrument, and explaining procedures and logistics required for accountability (confidentiality of survey responses, coding responses, logging telephone numbers, information from multiple permits, and consistent entry of data).

The pre-test sample included a cross section of crop types represented in the CUP data base. The pre-test indicated the survey instrument was understood by the agricultural producers. Since no difficulties with the questionnaire were experienced, the completed pre-test surveys were included in the overall survey analyses.

3.2.3 Survey Sample

The survey sample was stratified into ranges of annual permitted water use (mgy, millions of gallons per year). For example, a sample was drawn from permit holders falling within the permitted range of 25 to 49 mgy. The number of permit numbers drawn from a particular mgy range was based upon the proportion that range is of total permitted mgy. Within each stratum two selection procedures were used: first, a purposeful sample was taken across crop types represented in the CUP data base in order to include all crop types using irrigation, and second, a random

sample was selected across the remaining CUP data base. The format used for stratifying the survey sample is presented in Appendix 7.7, Exhibit 7.7.3.

3.2.4 Telephone Numbers and the CUP Data Base

The CUP data base provided by the District did not include a telephone contact number associated with each permit application number. As a result, a list of application numbers was submitted to the District in order to obtain telephone numbers from the original CUP application. Telephone numbers supplied from the District were then entered into the CUP data base. To avoid multiple telephone calls to the same individual or enterprise, duplicate telephone contact numbers and multiple permit holders within the survey sample were deleted from telephone lists.

Duplicate telephone contact numbers could be readily identified via a computer sort, but the numbers could include multiple enterprises or agents managing several enterprises. An agent could give information for all managed properties which might include multiple enterprises as well as multiple permits. Another difficulty encountered was identifying multiple permit holders. A computer sort could identify identical names or enterprises but variations of the same individual name and different enterprise name with the same contact number had to be reviewed individually. (For example, multiple permits issued to Jane Doe could have been entered as Jane R. Doe, Jan Doe, Doe Enterprises, J. R. Doe, JR Doe, or any combinations thereof. All of these are unique entries when conducting a computer sort by name. In addition Jane Doe could have several businesses with different names.)

The survey was conducted from early March through the middle of April, 1991, using a sample of 880 telephone numbers, representing approximately one-third of all agricultural permits (2724). During the pre-test in February, 70 telephone numbers generated 8 completed questionnaires, indicating that as many as nine telephone numbers could be required per survey. Many of the telephone numbers were no longer useful in contacting a permit holder, i.e. as many as 80-85 percent of 305 area codes had changed to 407), numbers were disconnected, no longer in service, or changed, the owner was deceased, among other reasons. Of the original 880 telephone numbers, surveyors found that at least 50 percent of the original numbers could not be used to contact the permit holder. An additional contact number was obtained for some of the inappropriate numbers.

3.2.5 Analyses Using Multiple Permit Holders

The surveyors assured the respondent that all individual responses were strictly confidential. Along with this assurance, no reference was made to information from individual permits and no differentiation was made when requesting information from respondents with multiple permits and respondents with only one permit. For analysis purposes, it is assumed that a permit holder gave information for all issued permits. Thus, for the respondents with multiple permits (identified by name

association in the CUP data base) all of the respondent's permits from the CUP data base were compared to the survey response.

3.2.6 Survey Coverage

Out of a total of 2724 agricultural CUP permits, an estimated 1175 (43%) are individuals or enterprises with multiple permits (having close to the same name), leaving approximately 1549 single permitted enterprises. Of the estimated 1175 multiple permits, approximately 418 were estimated as unique names or enterprises (which does not account for the same owner having several businesses with very different names). Thus, it was estimated that there are close to 2000 (approximately 1967) unique CUP agricultural permits in the District. The Telephone Survey generated 158 usable responses, which gives a 8 percent coverage of unique agricultural permits. Of the 158 survey respondents, 44 (28%) were identified as multiple permit holders.

3.2.7 Comparison of Telephone Survey and CUP Crop Acreage

To compare 1990 irrigated crop acreage with CUP irrigated crop acreage, analyses are presented in three ways: (1) permit-by-permit comparison, (2) crop category comparison, and (3) a frequency distribution.

3.2.7.1 Permit by Permit Comparision of Irrigated Crops

Direct comparison of Telephone Survey reports of crops and CUP acreage indicated that approximately one out of every four (28%) CUP permits do not reflect the current status of irrigated agricultural land. The cases include, 1) the agricultural enterprise is no longer in business (almost 14%), 2) the permit holder is irrigating crops different from the CUP permitted crop (9%), or 3) the crop(s) listed by the permit holders varies to some degree from the CUP listed crop(s) (5%).

Of the permit holders no longer in business, 90 percent were permitted for citrus irrigation. Of the crop listings that varied to some degree, the respondent either identified additional crops not listed on the permit or listed crops similar to, but not exactly the same as, the permitted crop. For example, one respondent itemized small acreages of various fruit trees but the permit indicated nursery production, both with approximately the same amount of acreage.

3.2.7.2 Crop Category Comparison

In terms of irrigated land by crop categories, Telephone Survey data show the ratio (Telephone Survey-CUP)/CUP or (D/CUP), to be 0.11, suggesting very little difference in overall acreage (Table 3.4). The survey had a total of 45,699 irrigated acres across all crops as compared to CUP permit data with a total of 41,116 acres (Table 3.4).

Table 3.4 Irrigated Acreage Comparison, Telephone Survey with CUP Data, St. Johns River Water Management District, 1990

Crop	Telephone Survey	Percent	CUP	Percent	D*	(D/CUP)
Citrus	28399	62.1	23119	56.3	5280	0.23
Other Fruit	445	1.0	344	0.8	101	0.29
Vegetables	7441	16.3	3517	8.6	3924	1.12
Field Crops	772	1.7	714	1.7	58	0.08
Improved Pasture	193	0.4	11948	29.1	-11755	-0.98
Ornamentals	1949	4.3	718	1.7	1231	1.71
Sod/Turf	6500	14.2	710	1.7	5790	8.15
Total	45699	100.0	41070	100.0	4629	0.11

*D is the difference (Telephone Survey-CUP) acreage.

Citrus comprises approximately the same proportion, close to 60 percent, of total acreage in both the survey and CUP data sets. The index is also only 0.23. Other fruit has a similar index of 0.29 and the same relative percentage of all crops at about 1 percent in both data bases.

Considerable differences are shown for vegetables, with 16.3 percent of the acreage being vegetables in the Telephone Survey as compared to only 8.6 percent in the CUP data, and with an index of 1.12. Large differences are also shown for ornamentals (index of 1.71).

Both the percentages and indexes show the most variability between data sets for pasture and sod/turf. The Telephone Survey showed virtually no pasture being irrigated in 1990 with only 0.4 percent of all irrigated acreage, while the CUP data set showed 29.1 percent, with an index of -0.98. This may be explained by 1) terminology differences in the two data sets, 2) pasture being converted to turf production, 3) pasture has been converted to other crops, or 4) the pasture was not irrigated in 1990, simply because rainfall was adequate relative to the amount of water found by growers to be economically justified. For sod/turf, the difference was in reverse, with the Telephone Survey showing considerably more acreage than the CUP data set, as demonstrated by an index of 8.15 (Table 3.4).

Fern, potato, and vegetable crop acreages each show a greater percentage of the total irrigated land in the Telephone Survey data set than the CUP data. This could be due to pasture land conversion that may not yet have been updated on CUP permits.

3.2.7.3 Telephone Survey and CUP Irrigated Acreage Frequency Distributions

Another means of comparing the Telephone Survey and CUP data involves using a frequency distribution of the ratio (Telephone Survey Acreage-CUP)/CUP acreage = (T-CUP)/CUP = (D/CUP), and indicating the general acreage variation between Telephone Survey data and CUP data. The ratio was grouped into three ranges, (1) enterprises permitted for irrigated acreage but currently not irrigating, (T-CUP)/CUP = -1, (2) enterprises that range from less reported irrigated acreage than CUP acreage to 20 percent more acreage, $-1 < (T\text{-}CUP)/CUP < 0.2$, and (3) enterprises that had 20 percent or more reported irrigated acreage than CUP acreage, $0.2 \leq (T\text{-}CUP)/CUP$.

One out of five survey respondents (21%) indicated no irrigated acreage. From the permit by permit comparison, 13 percent of survey respondents said they had gone out of business, explaining in part the lack of irrigated acreage. In addition, a number of respondents indicated non-irrigated pasture and livestock production.

Approximately 43 percent of survey respondents fit in the second range, i.e., irrigating less acreage than permitted to irrigating 20 percent more than permitted. Regarding the third range, approximately one out of every three (35%) survey respondents was irrigating 20 percent or more acreage than in the CUP data. For the third range, 13 percent were

irrigating from two-to-five times more acreage than permitted, and 12 percent were irrigating from five times to over ten times more acreage than permitted by the CUP.

3.2.8 Comparison of Telephone Survey Irrigation System and CUP Irrigation System Acreage

Irrigation systems were grouped into six types, (1) micro, drip, (2) micro, spray, (3) multiple sprinkler, (4) sprinkler, large guns, (5) seepage, and (6) flood. Comparing each questionnaire from the Telephone Survey data with the corresponding CUP, 16 percent (25 responses) of the enterprises were using systems clearly different from the CUP permitted system(s).

The Telephone Survey data show decreased use of flood irrigation and increased usage of micro spray as compared to the CUP data base (Table 3.5), suggesting support for the contention in Section 2 concerning the trend toward low pressure systems. Approximately 19 percent used flood irrigation in 1990, with CUP acreage suggesting 30 percent. At the same time, 35 percent of irrigated acreage from the survey used micro spray systems whereas CUP acreage totalled only 11 percent. The shift has probably occurred mainly in citrus and tree crop enterprises. The (D/CUP) index was the largest for micro spray irrigation, at 2.56, suggesting considerable movement toward that technology and that the CUP data base has not been updated to reflect the change. The change in technology has important consequences for the level of annual water use.

Irrigated acreage associated with multiple sprinkler systems was in approximately equal percentages (23%) and the index was low at 0.13 (Table 3.5). In the survey a greater percentage of irrigated acreage was devoted to seepage (17 percent in survey and 10 percent in CUP). A large proportion of CUP irrigated acreage (almost 17%) had unspecified irrigation systems, primarily comprised of one citrus permit and several small pasture permits. Less irrigated acreage in the survey was devoted to sprinkler, large gun systems (1 percent in the survey and 5.5 percent in CUP) and micro drip systems (1.8 percent in the survey and 3.5 in the CUP).

3.2.9 Other Survey Results

Limited information was collected pertaining to four inch and smaller wells, frost and freeze protection, and transitional land (land being sold for uses other than agriculture). A brief discussion of each of these follows.

3.2.9.1 Use of Four Inch and Smaller Wells

The Telephone Survey questionnaire asked for the number and typical capacity of four inch and smaller wells but only limited information was obtained. Rarely were respondents able to estimate capacity. From the survey, 54 respondents (34%) listed four inch or smaller wells used for agricultural purposes. From the corresponding CUP data, there were 41

Table 3.5 Irrigation System Acreage Comparisons, Telephone Survey with CUP Data, St. Johns River Water Management District, 1990

	Telephone Survey	Percent	CUP	Percent	D*	(D/CUP)
Micro Drip	842	1.8	1452	3.5	-610	-0.42
Micro Spray	16110	35.3	4528	11.0	11582	2.56
Multiple Sprinkler	10779	23.6	9499	23.1	1280	0.13
Sprinkler large guns	477	1.0	2253	5.5	-1776	-0.79
Seepage	7878	17.2	4273	10.4	3605	0.84
Flood	8862	19.4	12171	29.6	-3309	-0.27
Others and Unspecified	751	1.6	6940	16.9	-6190	-0.89
Total	45699	100.0	41116	100.0	4582	0.11

*D is the difference (Telephone Survey-CUP) acreage.

permits (26%) with four inch or smaller wells. In percentage terms, the survey showed 34 percent and the CUP showed 26 percent of permit holders having four inch and smaller wells. From a different perspective, there were 25 respondents (almost 16 percent) from the survey that indicated use of four inch or smaller wells but the corresponding CUP permit(s) showed no small wells. Correspondingly, there were ten CUP permit holders (6 percent of the sample) who were permitted for four inch and smaller wells but no usage of small wells was indicated from the survey.

3.2.9.2 Frost and Freeze Protection

Telephone Survey questions for frost and freeze protection included the crop(s) irrigated, most recent date of use, type of irrigation system used, number of days used, number of hours used, and the hourly flow rate. The latter three questions (days and hours used and flow rate) were included in order to estimate water used for frost and freeze protection. This estimate could then be compared to the amount permitted. Respondents not only had difficulty estimating the typical capacity of four inch and smaller wells, they also had difficulty estimating the hourly pump flow rate. One out of every two respondents who used frost and freeze protection did not identify the hourly flow rate. Due to the inconsistency of information reported by respondents, only very simple analysis of frost and freeze protection is presented.

One out of every two enterprises reported use of frost and freeze protection (49%). By comparison 93 enterprises (59%) had CUP permits which included frost and freeze water use. From a different perspective, there were 16 survey respondents (10%) using frost and freeze protection but having no (CUP) permitted water use for frost and freeze. There were 34 enterprises (21%) permitted for frost and freeze which did not report use.

3.2.9.3 Transitional Land

Transitional land is defined here as land expected to go out of agricultural production. Respondents were specifically asked if any of their land would be sold for development (urban, residential, industrial) purposes within the next five years. Transitional land totalled 4688 acres out of the 60,582 acres in the Telephone Survey, or 7.7 percent. A total of 23 respondents (15%) indicated transitional land.

3.3 Aerial Land Map Comparisons

Another component of the effort to compare data bases included providing an initial assessment of the significance of agricultural water use from 4-inch or smaller wells that are not in the CUP data base. Generally, only 6-inch and larger agricultural wells are currently permitted. The contractual Scope of Work for this study specifies the task as:

The District will be asked to provide the 1989-90 digitized land use maps from ARC/INFO as such maps become available in each county. The District will also be asked to overlay on these maps the acres irrigated under each current CUP permit, by section, township, and range. Additionally, the District will be asked to provide on the same maps the locations and sizes of wells from the Water Well Construction Permit File and the Water Well Completion Reports File, again by section, township, and range. It will then be possible to locate 1) agricultural land uses without matching CUP data, but still likely irrigating crops, probably from older wells not in the CUP or other data bases, 2) the agricultural areas using smaller wells for irrigation, as identified by the Well Construction Permit File data, and 3) CUP permitted acreage that does not appear to be currently irrigated, as identified by changes in land use.

After some ground checking through contact with local agricultural extension agents, an estimate of monthly and yearly water use will be provided. Such use may be so small that it can reasonably be ignored in many areas. On the other hand, if smaller wells result in substantial water use, or are expanding rapidly, more attention will have to be devoted to this use in future water planning efforts.

For various reasons, the steps outlined in the Scope of Work could not be implemented.

Several data base problems and delays precluded conducting the analysis as proposed in the Scope of Work. The primary factor was the delay by the District's contractor in delivering the digitized land use quads. Other factors included difficulty in obtaining complete section-township-range grids, problems with data base quality, and with accessing the Well Completion data files.

As a result of these data base delays and problems, it is currently impossible to assess the extent of the 4-inch well problem. The problem can be addressed at a future date once the land use maps and Well Completion data bases are available. The following describes in detail how such an analysis can be accomplished.

3.3.1 Statistical Analysis

The statistical comparison of CUP acreage estimates with current land use estimates can be used to relate the differences to the number of 4-inch wells reported in the Well Completion File. This procedure presumes an up-to-date CUP data base, or otherwise differences could arise due to a multitude of reasons other than 4-inch wells.

Step 1: Create a data base that contains the acres of crops irrigated by 7 1/2 minute quad and by section/township/range (S/T/R) as reported in the CUP and current land use data

bases. The acreage estimates from each source would need to be aggregated into consistent crop categories. The number of 4-inch wells by quad and by S/T/R from the Well Completion Files should also be included in the data base.

Step 2: Calculate the differences (absolute and percentage) between the two estimates by quad and summarize the differences using a relative frequency distribution. This would initially be done on the basis of total irrigated crop acreage, but individual crop categories could also be evaluated in selected regions.

Step 3: Based on the relative frequency distribution of differences, select, or randomly sample, quads with deviations that exceed a specified threshold.

Step 4: The magnitude of the deviations for the selected quads could then be compared to the number of 4-inch wells to provide an initial correlation and possible explanation.

3.3.2 Graphical Analysis

Plot the selected quads to spatially compare deviations in crop acreages between the CUP and current land use estimates. Use this information to design ground-truthing procedures to resolve the extent of the small wells problem.

Step 1: Plot selected quads with agricultural land uses shaded and with S/T/R boundaries and numbers, county boundaries, major roads and waterways overlaid.

Step 2: For each selected quad, print out a data base by S/T/R with acres of cropland by crop from the CUP and current land use estimates and the number of 4-inch wells.

Step 3: Statistically compare deviations in acreages by crop by S/T/R to identify specific crops and locations where significant discrepancies exist.

Step 4: Identify (overlay) on the quad maps the locations of significant discrepancies and use this information to interview county agents about the problem areas or to design a sampling frame for further data collection.

An attempt was made to test these procedures on a sample quad, but it was not possible to obtain the necessary data base information from the District. It is believed, however, that the proposed procedures provide 1) a systematic way of evaluating the discrepancies between the two data bases, 2) a basis for assessing the potential magnitude of the 4-inch well problem, and 3) a framework for further data collection.

3.4 Summary and Implications for the Land and Water Use Projection Effort

The data base comparisons aided in developing an approach for projecting land and water use. Particularly,

1. The comparision of the 1990 acreage projections based on the Annual Water Use Survey data with that from the CUP data base suggests wide differences: recall that 83 percent of the county categories showed differences between the Annual Survey and the CUP data. Such differences may arise in part from the suggestion (based on the Telephone Survey) that at least 1 out of 4 of the CUP applications may need updating. There may also be problems in the Annual Water Use Survey data, however, as discussed in Section 5.5.4.

2. While more accurate in some ways, water use projections using pasture acreage projected on the basis of the Annual Water Use Survey reports may overestimate water use. The Telephone Survey suggests that very little pasture is being irrigated, at least on a regular basis. The CUP data base also suggests less irrigated pasture. The Annual Water Use Survey also may not be up-to-date on citrus acreage losses from the freezes, and appears to sometimes give higher than expected acreages of vegetables in several counties.

3. Water use projections using the irrigation system configuration from the CUP data base need to be considered in detail due to the disagreement among the various data sources as to the acreage under various system types. The Annual Water Use Survey reports suggest the most acreage under less efficient irrigation systems. The CUP data base suggests somewhat more acreage under the more efficient systems. The Telephone Survey suggests growers have moved much more quickly to the efficient systems than suggested by either of the other data sources.

4. Based on the Telephone Survey data, it does not appear that 4-inch wells represent a serious problem in terms of adding significant amounts of water use. The matter of 4-inch wells could not be explored in-depth, however, due to the lack of the quad maps.

5. The Telephone Survey gave insufficient information for estimating water use for frost and freeze protection.

6. Other agricultural uses (dairy, aquaculture) are not significant users, based on both the CUP data base and the Telephone Survey.

An important overall point: it is impossible to declare either the Annual Water Use Survey reports or the CUP data base superior to one another. In

fact, both data bases have good points. The Telephone Survey tends to support the general accuracy of the CUP data base. Some problems were discovered in the Annual Water Use Survey reports in specific counties. Drawing on the good aspects of both data bases, however, the Annual Water Use Survey reports are used to develop acreage projections and the CUP data base is used to develop per acre estimates of water use. Water use projections come from merging the results.

4 AGRICULTURAL LAND USE PROJECTIONS

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4.1 Introduction

The trend analysis in Section 2 suggested that although there has been a decrease in total farmed acreage, irrigated acreage has remained about the same. Thus, over the period 1978-1989 the percentage of irrigated to total farm acreage has been increasing. Also, the decrease in total farm acreage masks the fact that while there have been decreases in citrus, fruit, field crop, and improved pasture acreage, the acreage in vegetables, ornamentals, and sod and turf has been increasing. That is, there has been a decreasing trend in land-extensive crops accompanied by an increasing trend in land-intensive crops. The largest decreases in land-extensive crops have taken place in citrus and improved pasture.

With these two major tendencies as a backdrop, the purposes of this section are 1) to provide an overview of the methodology, including a discussion of data sources, used to project agricultural land use in the District, 2) to summarize the agricultural land use projections on a county by county basis for 1990, 1995, and 2010, and 3) to indicate the limitations on land use projections imposed by data availability and the methodology used.

4.2 Agricultural Land Use Data

The ability to project agricultural land use and the type of analytical model(s) used to make such projections vitally depends on the existence of historical data at the necessary level of refinement. Within the context of the District's Needs and Sources mandate, data are required at the individual crop and county level. Little historical data exists at such a disaggregated level.

Although land use projections need to be developed at the individual crop level, it is appropriate for present purposes to discuss data availability at a more aggregate level. As such, the remainder of this section adopts the following classification of agricultural land use activities:

1. Fruit: Citrus and Other Fruit
2. Vegetables: Cabbage, Potatoes, and Other
3. Field Crops
4. Improved Pasture
5. Ornamentals: Ferns (or cut foliage, terms used interchangeably, although ferns is a subset) and Other
6. Sod/turf

Data availability for agricultural activities within each of these classifications is discussed in this section. Data were also available in the Annual Water Use Survey reports on golf courses. Projections for golf course acreage changes are presented in Appendix 7.5.

4.2.1 Fruit: Citrus and Other Fruit

Commensurate with the economic importance of citrus to the agricultural economy of Florida, historical data exists at the county level for every county where citrus is grown in any significant amount. The primary source is the Commercial Citrus Inventory (Florida Agricultural Statistics Service, 1965,..., 1990). The data are obtained by aerial survey every two years. Data for non-survey years are obtained by interpolation.

A second source of historical data on citrus acreage at the county level is the Annual Water Use Survey published by the District. The survey data are obtained from county agents within the District. Agents are instructed to provide harvested acreage for the year.

The Other Fruits category contains an assortment of minor fruit crops such as blueberries and peaches. The Annual Water Use Survey reports represent the only historical acreage data available for such activities at the individual crop and county level.

4.2.2 Vegetables: Cabbage, Potatoes, and Other

Historical data for individual vegetable crops at the county level are scattered. For major crops such as cabbage, potatoes, sweet corn, lettuce and watermelons, historical acreage data in counties where significant commercial production occurs are published in annual issues of Vegetable Summary (Florida Agricultural Statistics Service, 1961-1990). Minor crops, and counties where only small acreage occur are generally aggregated with the other crops or other counties category by Florida Agricultural Statistics Service (FASS).

A second source of historical data on vegetable acreage at the individual crop and county level is the Annual Water Use Survey published by the District. As with citrus, data are available from 1978 to 1989 and are obtained by annual surveys of county agents within the District.

The Other category contains an assortment of vegetables such as watercress and carrots. Again, the Annual Water Use Survey represents the only data source.

4.2.3 Field Crops

Historical data on agronomic crops at the individual crop and county level are extremely limited. Some data are available from annual issues of Field Crops Summary (Florida Agricultural Statistics Service, 1919-1990). However, in relation to overall activity with this land use classification, the data published by FAS at the county and crop level are limited.

The only continuous set of data on agronomic crop acreage at the individual crop and county level are contained in the Annual Water Use

Survey reports published by the District. These data are available from 1978 to 1989.

4.2.4 Improved Pasture and Sod/Turf

Little historical county level data on improved pasture and sod/turf exists. The only available data are those reported in the Annual Water Use Survey reports published by the District.

4.2.5 Ornamentals

There are three basic types of ornamentals produced within the District: ferns, foliage, and woody ornamentals. While there are some data available at the county level (see Florida Department of Agriculture and Consumer Services, 1989), the only continuous historical data for specific ornamental crops at the county level are those published by the District in the Annual Water Use Survey reports. As for previous crop classifications, the data are available from 1978 to 1989.

4.2.6 Overall Data Availability on Land Use

With the exception of citrus and commercial vegetable crops, the Annual Water Use Survey reports represent the only available source of historical data at the level of disaggregation necessary to accomplish the objectives of the agricultural land use projection component. The data available from 1978 to 1989 formed the basis for the land use projections.

4.3 Forecasting Methodology

Given sufficient historical data, it is possible to construct statistical forecasting models using a variety of different techniques. As described in the previous section, the existing data places constraints on the choice of the appropriate forecasting methodology. In the present case, constraints are represented by the Annual Water Use Survey reports being the only acceptable data available. Hence the appropriate forecasting methodology should be determined on the basis of extracting the maximum information from these data.

There are basically three types of forecasting models: 1) time series models, 2) econometric models, and 3) smoothing models (Granger and Newbold, 1977). All have strengths and weaknesses depending on the quantity and quality of the data available.

Auto-Regressive Integrated Moving-Average (ARIMA) models are generally considered to be the best means of forecasting in terms of forecast accuracy. Implementation of all but the most naive ARIMA models, however, generally requires series lengths on the order of 100 or more observations before reasonable forecasting accuracy can be obtained. Because the existing data are of insufficient length (12 years) to reasonably develop and estimate ARIMA models, this methodology is not appropriate.

A second means of projecting land use entails specifying econometric models. In contrast to ARIMA models, the specification of econometric forecasting models requires that acreage for a specific crop be expressed as a function of economic variables such as land value, cost of production, and product prices. Thus in addition to historical data on acreage by individual crop and county, data on prices, costs and other economic factors are required. Given the level of disaggregation required for the land use projections, there is virtually no price or cost data available to permit meaningful econometric models to be specified. Further, the rather limited number of historical observations would prohibit accurately estimating model parameters. While a model with economic arguments would likely be most appropriate, currently available data precludes such development.

Smoothing models fall into the class of auto-forecasting models in the sense that such models use past values of a variable to forecast its future values. Smoothing models are commonly used in business forecasting (Nelson, 1973). Such models attempt to breakdown a given historical series of data into two components, its level and a residual (Granger and Newbold, 1977). This is accomplished by using moving averages of past values to "smooth" the series' level component and then allowing variations in this level by forming a weighted average of the most recent observation and the moving average component.

Assume that the t^{th} observation of the series to be forecast is denoted by x_t. One way to express the weighted average of past values is to use the exponentially declining series

$$(4.1) \qquad \bar{x}_t = ax_t + a(1-a)x_{t-1} + a(1-a)^2x_{t-2} + a(1-a)^3x_{t-3} + \ldots \qquad 0 < a < 1.$$

Lagging equation (4.1) by one period and multiplying by 1-a yields

$$(4.2) \qquad (1-a)\bar{x}_{t-1} = a(1-a)x_{t-1} + a(1-a)^2x_{t-2} + a(1-a)^3x_{t-3} + \ldots$$

subtracting (4.2) from (4.1) results in the expression

$$(4.3) \qquad \bar{x}_t = ax_t + (1-a)\bar{x}_{t-1} \ .$$

Equation (4.3) represents the basic algorithm used in forecasting future values. The specific algorithm used depends on the choice of the parameter "a" which weights the current period observation and the level component captured by the moving average of past values. In general, the larger the value of "a" the more volatile will be the forecasts since the level component plays a diminished role.

For a short series of observations a useful modification to the basic algorithm in (4.3) is to use a moving average component of fixed length rather than that being formed using all past observations and to replace x_t on the right hand side of (4.3) with x_{t-1}. This yields the expression

(4.4) $x_t = ax_{t-1} + (1-a)x(m)_{t-2}$

where $x(m)_{t-2}$ denotes a moving average of m periods.

For projecting agricultural land use in the District, an exponential smoothing algorithm as shown in equation (4.4) was used. The value of the constant "a" was taken to be 0.5 and "m" was set to 5. Hence the previous period's observation and the moving average of the previous five periods are given equal weight. Defining "T" as the forecast base period, the forecast value for period (T + h) is thus given by

(4.5) $x_{T+h} = 0.5(x_{T+h-1}) + 0.5(1/5(x_{T+h-2} + \ldots + x_{T+h-6})$.

Note that when forecast beyond the sample, predicted values are fedback into the moving average component. For long forecast horizons, this results in a convergence of forecast values.

The following example shows how to apply the projection methodology. Using Marion County citrus data,

Year	Formula	Citrus Farmed
1978		11000
1979		11000
1980		11272
1981		11272
1982		11272
1983		11272
1984		9000
1985		300
1986		300
1987		310
1988		1210
1989		2000
1990	0.5 * 2000 + 0.5 * ((1210 + 310 + 300 + 300 +9000)/5	2112
1991	0.5 * 2112 + 0.5 * ((2000 + 1210 + 310 + 300 + 300)/5	1468
1992	0.5 * 1468 + 0.5 * ((2112 + 2000 + 1210 + 310 + 300)/5	1327

Acreage is projected to first increase slightly in 1990 to 2112 acres, and then decline to 1468 acres in 1991, and to 1327 acres in 1992.

4.4 Results

This section presents a summary of the forecasted agricultural acreage obtained using the exponential smoothing algorithm depicted in equation (4.5). Results are presented for each county in the District for major crop categories. Projections are provided for 1990, 1995 and 2010.

4.4.1 Alachua County

As suggested by Table 4.1, agricultural activity in Alachua County is quite diverse. Other fruit in the District portion of the county in 1990 was estimated to be about 3707 acres of which 1180 were irrigated. Acreage is projected to decline by 2010 to 3650 acres of which 1171 acres will be irrigated. The production of other vegetables is also projected to decline slightly from 1480 to 1400 acres.

The production of field crops accounts for the greatest share of agricultural land use in the District portion of Alachua County. In 1990, 7570 acres are devoted to field crop production. Of this total, however, only 583 acres were estimated to have been irrigated. Projections for 2010 indicate a nine percent decline in field crop acreage, with the majority due to declining non-irrigated acreage.

The District portion of the county also contains a relatively small acreage devoted to sod and ornamental production. Overall, total acreage devoted to sod and ornamentals is expected to decline.

4.4.2 Baker County

The portion of Baker County within the District is a relatively minor agricultural area (Table 4.2). The major agricultural activities are the production of field crops and pasture, with only the field crops irrigated. Other irrigated crops include fruit, vegetables, and ornamentals. Pasture is projected to decline from 9250 to 9100 acres while field crops will remain constant or increase slightly by 2010.

4.4.3 Bradford County

Only a small portion of Bradford County is located within the District (Table 4.3). Acreage is insignificant.

4.4.4 Brevard County

Brevard County is a significant producer of citrus. Citrus acreage in 1990 was estimated to be 15,321 of which 9063 acres were irrigated (Table 4.4). Total citrus acreage is projected to increase by 336 acres by 2010.

Acreage designated as improved pasture accounted for 121,700 acres in 1990. Total acreage of improved pasture is projected to remain unchanged, while irrigated pasture acreage is projected to increase by about 3000 acres.

4.4.5 Clay County

The majority of agricultural land use in Clay County is designated as improved pasture. As shown in Table 4.5, 40,000 acres of improved pasture were estimated for 1990. Only 160 acres are considered to be irrigated. No change in improved pasture is projected to 2010. Land devoted to other agricultural enterprises is projected to show little change to 2010.

Table 4.1 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Alachua County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	0	0	0	0	0	0
Other	1180	3707	1172	3651	1171	3650
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	1352	1480	1265	1401	1262	1400
Field Crops	583	7570	341	6779	346	6888
Improved Pasture	664	31350	650	29615	646	29640
Ornamentals						
Ferns	0	0	0	0	0	0
Other	59	68	56	66	56	66
Sod/Turf	421	521	436	512	435	512
Total	4259	44696	3920	42024	3914	42156

Table 4.2 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Baker County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	0	0	0	0	0	0
Other	60	475	54	475	48	475
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	123	735	120	733	118	732
Field Crops	80	2896	80	2904	80	2912
Improved Pasture	0	9250	0	9172	0	9100
Ornamentals						
Ferns	0	0	0	0	0	0
Other	414	950	416	976	415	1000
Sod/Turf	0	0	0	0	0	0
Total	677	14306	670	14260	661	14219

Table 4.3 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Bradford County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	0	0	0	0	0	0
Other	0	0	0	0	0	0
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	0	0	0	0	0	0
Field Crops	0	0	0	0	0	0
Improved Pasture	0	0	0	0	0	0
Ornamentals						
Ferns	0	0	0	0	0	0
Other	0	0	0	0	0	0
Sod/Turf	7	7	8	8	7	7
Total	7	7	8	8	7	7

Table 4.4 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Brevard County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	9063	15321	8991	15348	9250	15657
Other	195	195	198	198	198	198
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	2945	2950	3117	3119	3299	3301
Field Crops	4770	4770	4660	4660	4608	4608
Improved Pasture	77071	121700	80617	121700	80671	121700
Ornamentals						
Ferns	0	0	0	0	0	0
Other	201	202	201	202	201	202
Sod/Turf	1681	1773	1598	1651	1589	1646
Total	95926	146911	99382	146878	109816	147312

Table 4.5 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Clay County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	13	15	13	15	13	15
Other	0	0	0	0	0	0
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	58	200	59	200	59	200
Field Crops	5	3300	10	3300	10	3300
Improved Pasture	160	40000	170	40000	173	40000
Ornamentals						
Ferns	0	0	0	0	0	0
Other	50	50	50	50	50	50
Sod/Turf	143	160	144	154	144	154
Total	431	43725	446	43719	449	43719

4.4.6 Duval County

As with Clay County, improved pasture accounts for the largest portion of agricultural land use. As shown in Table 4.6, 12,000 acres, of which 500 were irrigated, were projected for 1990. No change is projected for acreage devoted to improved pasture to 2010. Acreage in all other agricultural activities is projected to remain at current levels.

4.4.7 Flagler County

Flagler County has diverse agricultural production with vegetables and improved pasture accounting for the largest portion of land devoted to agriculture. Improved pasture accounted for 16,500 acres in 1990 of which 566 acres were classified as irrigated (Table 4.7). Total acreage in pasture is projected to remain constant with irrigated acreage increasing by 50 acres.

Located in what is known as the "Hastings" production area, a significant amount of acreage in Flagler County is devoted to cabbage and potato production. In 1990, 2000 acres of cabbage were estimated of which 1880 acres are considered irrigated. Total and irrigated acreage devoted to cabbage production is projected to be constant through the year 2010.

In 1990, 2050 acres of potatoes were estimated. All are considered to be irrigated. Acreage devoted to potato production is not projected to change significantly by the year 2010.

4.4.8 Indian River County

Agricultural activity is diverse in Indian River County. Agricultural land use is dominated, however, by citrus production and improved pasture (Table 4.8). Field crop and vegetable production also account for significant acreage.

Acreage devoted to citrus production in Indian River County accounted for 64,634 acres in 1990 of which 63,607 were irrigated. Total and irrigated citrus acreage is projected to increase by 68 and 71 acres, respectively, by 2010.

In 1990, there were an estimated 62,208 acres of improved pasture of which 22,195 were irrigated. Total acreage is projected to remain constant to 2010 with irrigated acreage declining slightly. Land devoted to all other agricultural activities are projected to show little change from current levels.

4.4.9 Lake County

Agricultural land use in Lake County is diverse with significant acreage devoted to citrus, vegetables, and improved pasture. There is also a sizable acreage used to produce a variety of field crops and ornamentals.

Table 4.6 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Duval County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	20	28	19	27	19	27
Other	0	0	0	0	0	0
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	8	200	9	200	9	200
Field Crops	0	200	0	200	0	200
Improved Pasture	500	12000	500	12000	500	12000
Ornamentals						
Ferns	0	0	0	0	0	0
Other	73	73	73	72	73	72
Sod/Turf	795	795	849	849	841	841
Total	1396	13296	1450	13348	1442	13340

Table 4.7 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Flagler County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	15	15	6	6	6	6
Other	110	110	104	104	104	104
Vegetables						
Cabbage	1880	2000	1872	2000	1880	2000
Potatoes	2050	2050	2060	2060	2044	2044
Other	1020	1020	1018	1018	1020	1020
Field Crops	410	1910	404	1904	404	1904
Improved Pasture	566	16500	620	16500	616	16500
Ornamentals						
Ferns	0	0	0	0	0	0
Other	4	4	4	4	4	4
Sod/Turf	221	265	220	262	219	261
Total	6276	23874	6308	23858	6297	23843

Table 4.8 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Indian River County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	63607	64634	63820	64743	63678	64702
Other	141	166	148	170	146	166
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	2500	2555	2657	2761	2620	2729
Field Crops	4923	5433	4527	5503	4708	5728
Improved Pasture	22195	62208	21827	62208	21716	62208
Ornamentals						
Ferns	0	0	0	0	0	0
Other	57	57	59	59	57	57
Sod/Turf	941	941	1005	1005	1003	1003
Total	93364	133694	94043	136449	93928	136593

As indicated in Table 4.9, 33,565 acres were estimated to have been planted to citrus in 1990. Of these, 25,173 were estimated to be irrigated. Acreage devoted to citrus production is projected to decline by just under 6000 acres by 2010. Irrigated acreage is projected to decline, but by a much smaller amount.

Almost 50,000 acres of improved pasture are estimated in Lake County for 1990. However, only a small fraction of this acreage (2323 acres) was irrigated. Total improved pasture is expected to show little change to 2010, and irrigated pasture is projected to diminish. Acreage devoted to other agricultural activities in the county is projected to exhibit only minor changes from current levels.

4.4.10 Marion County

Marion County has a relatively small amount of acreage in each of a wide variety of agricultural activities. The largest land use activities are devoted to field crops and improved pasture (Table 4.10). Field crops accounted for 6835 acres in 1990 with only a fraction of the land being irrigated. Acreage devoted to the production of field crops is expected to remain constant.

Land designated as improved pasture accounted for 59,230 acres in 1990. Only 787 acres were estimated to be irrigated. Total acreage in improved pasture is projected to remain constant with irrigated pasture exhibiting a very slight increase.

4.4.11 Nassau County

Nassau County has relatively little acreage devoted to agricultural production activities. As shown in Table 4.11, improved pasture represents the largest single land use activity. However, of the 5000 acres estimated in 1990, none were irrigated. In general, agricultural land use in Nassau County to 2010 is expected to show little change from current levels.

4.4.12 Okeechobee County

Only a small portion of Okeechobee County lies with the District. Agricultural land use within the District portion of the county is limited to citrus production and improved pasture.

Table 4.12 indicates that improved pasture accounted for the largest share of agricultural land use in 1990 with 20,000 acres. Just over 4300 acres, all irrigated, were devoted to citrus production. As shown in Table 4.12, there is virtually no change anticipated from current acreage.

Table 4.9 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Lake County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	25173	33565	24179	27976	24005	27846
Other	687	697	687	696	695	703
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	9015	9015	9157	9157	9221	9221
Field Crops	1085	2420	974	2347	1004	2348
Improved Pasture	2323	49732	2002	49895	1998	49893
Ornamentals						
Ferns	0	0	0	0	0	0
Other	1341	1341	1396	1396	1375	1375
Sod/Turf	279	279	308	308	304	304
Total	39903	97049	38703	91775	38602	91690

Table 4.10 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Marion County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	1452	2112	1188	1577	1141	1511
Other	1763	2111	1775	2072	1713	2009
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	988	1782	987	1797	978	1795
Field Crops	735	6835	668	6814	685	6814
Improved Pasture	787	59230	850	59230	844	59230
Ornamentals						
Ferns	0	0	0	0	0	0
Other	82	84	82	85	82	85
Sod/Turf	722	722	730	730	729	729
Total	6529	72876	6280	72305	6172	72173

Table 4.11 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Nassau County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	0	0	0	0	0	0
Other	15	31	15	30	15	30
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	35	100	39	100	38	100
Field Crops	78	1539	81	1539	80	1539
Improved Pasture	0	5000	0	5000	0	5000
Ornamentals						
Ferns	0	0	0	0	0	0
Other	20	23	20	23	20	23
Sod/Turf	28	51	32	56	32	55
Total	176	6744	187	6748	185	6747

Table 4.12 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Okeechobee County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	4325	4325	4341	4341	4327	4327
Other	0	0	0	0	0	0
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	0	0	0	0	0	0
Field Crops	0	0	0	0	0	0
Improved Pasture	2782	20000	2782	20000	2782	20000
Ornamentals						
Ferns	0	0	0	0	0	0
Other	0	0	0	0	0	0
Sod/Turf	0	0	0	0	0	0
Total	7107	24325	7123	24341	7109	24327

4.4.13 Orange County

In terms of acreage, Orange County is the largest vegetable producing county within the District. In 1990, just over 42,404 acres of vegetables were produced, of which almost 41,000 were irrigated (Table 4.13). The most significant vegetables grown are carrots, sweet corn, celery and lettuce (both included in miscellaneous) which are primarily grown on the muck soils surrounding Lake Apopka. Acreage devoted to vegetable production is expected to show little change through 2010.

Orange County continues to have a sizable acreage devoted to citrus production, with just over 14,000 estimated in production in 1990. Citrus acreage is projected to decline by 2010.

Improved pasture accounted for 18,562 acres in 1990, however only a small fraction (217 acres) was irrigated. Improved pasture is projected to remain constant through 2010.

Table 4.13 shows a number of other agricultural land use activities in Orange County. Little change is projected for these activities by 2010.

4.4.14 Osceola County

Roughly one third of Osceola County lies within the District. Improved pasture accounted for the vast majority of land devoted to agricultural activities (Table 4.14). In 1990, there were 125,800 acres of improved pasture of which just over 9700 were irrigated. Improved pasture is projected to remain at current levels through 2010. About 1222 acres were devoted to citrus production in 1990, but is projected to decline to 1164 acres by 2010.

4.4.15 Polk County

Only a very small portion of Polk County is located in the District. Citrus production accounts for the majority of agricultural land use within the District portion of the county (Table 4.15). In 1990, just over 10,000 acres of citrus were produced of which 7079 were estimated to be irrigated. Acreage projections to 2010 indicate that little change from current levels is expected.

4.4.16 Putnam County

The most commercially significant agricultural activities in Putnam County are cabbage and potato production. As shown in Table 4.16, 1280 acres of cabbage and 4850 acres of potatoes were estimated for 1990. Acreage devoted to cabbage is projected to increase slightly to 2010 with acreage in potato production remaining virtually constant.

Table 4.13 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Orange County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	12738	14096	12643	13318	12570	13281
Other	145	160	153	159	154	160
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	40844	42404	41481	43144	41588	43148
Field Crops	580	580	592	592	592	592
Improved Pasture	217	18562	126	18562	135	18562
Ornamentals						
Ferns	0	0	0	0	0	0
Other	1339	1339	1253	1253	1254	1254
Sod/Turf	495	495	534	534	531	531
Total	56358	77636	56872	77562	56824	77528

Table 4.14 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Osceola County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	1197	1222	1155	1165	1154	1164
Other	0	0	0	0	0	0
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	20	20	8	8	8	8
Field Crops	0	0	0	0	0	0
Improved Pasture	9729	125800	10457	125800	10420	125800
Ornamentals						
Ferns	0	0	0	0	0	0
Other	0	0	0	0	0	0
Sod/Turf	0	0	0	0	0	0
Total	10946	127042	11620	126973	11582	126972

Table 4.15 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Polk County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	7079	10924	6855	10622	6856	10626
Other	0	0	0	0	0	0
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	0	0	0	0	0	0
Field Crops	450	900	480	961	480	960
Improved Pasture	100	4500	100	4500	100	4500
Ornamentals						
Ferns	0	0	0	0	0	0
Other	55	55	55	55	55	55
Sod/Turf	0	0	0	0	0	0
Total	7684	16379	7490	16138	7491	16141

Table 4.16 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Putnam County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	46	95	54	103	54	104
Other	360	478	349	474	347	472
Vegetables						
Cabbage	1280	1280	1438	1438	1464	1464
Potatoes	4850	4850	4860	4860	4856	4856
Other	200	200	200	200	200	200
Field Crops	500	4650	517	5432	520	5424
Improved Pasture	914	37000	834	37000	830	37000
Ornamentals						
Ferns	985	985	1003	1003	994	994
Other	304	304	310	310	306	306
Sod/Turf	226	226	241	241	241	241
Total	9395	50068	9806	51061	9812	51061

Putnam County also has a significant amount of land used for the production of field crops and designated as improved pasture. As shown in Table 4.16, acreage devoted to these activities, as well as the other agricultural activities in the county, are projected to change relatively little from current levels.

4.4.17 St. Johns County

As illustrated in Table 4.17, the predominant agricultural land use activity in St. Johns County is potato production. In 1990, an estimated 19,400 acres of potatoes were produced with virtually all being irrigated. Acreage devoted to potato production through 2010 is projected to show little change.

Significant acreage is also devoted to the production of cabbage and field crops. Also, significant acreage is designated as improved pasture. Little change is projected for these activities by 2010.

4.4.18 Seminole County

Table 4.18 illustrates that Seminole County has a diverse set of agricultural land use activities. At present, however, there is no one activity that is predominant in the county. Table 4.18 shows that agricultural land use in these diverse activities in 2010 is projected to be only slightly different from current levels.

4.4.19 Volusia County

As with many other counties in the District, agricultural land use in Volusia County is diverse. As shown in Table 4.19, the predominant irrigated agricultural land use activity is fern production. In 1990, 5611 acres, of which 5166 were irrigated, were devoted to fern production. Acreage in fern production is expected to increase only slightly by 2010. Information available to the District on consumptive use permitting activity in the area, however, suggests the acreage projections may be low. Further detailed study is needed (see Recommendations).

Acreage devoted to other agricultural land uses in Volusia County include citrus, other fruit, other vegetables (peppers), improved pasture, other ornamentals, and sod/turf (Table 4.19). These crops are not projected to change significantly from current levels.

4.5 Summary and Limitations of the Land Use Projection Approach

The results of using the exponential smoothing algorithm to forecast agricultural land use produced similar results for all of the crops and counties considered. Projections from the base year of 1990 generally indicated that agricultural land use will stay stable with little change from current levels through 1995 and out to 2010. While small projected changes may seem surprising, several factors should be kept in mind.

Table 4.17 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, St. Johns County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	0	0	0	0	0	0
Other	30	30	17	17	17	17
Vegetables						
Cabbage	1630	1730	1429	1468	1460	1500
Potatoes	19390	19400	19677	19696	19660	19680
Other	515	665	613	621	632	632
Field Crops	2100	2400	2039	2361	2040	2400
Improved Pasture	1310	5500	1263	5500	1212	5500
Ornamentals						
Ferns	0	0	0	0	0	0
Other	110	110	115	115	116	116
Sod/Turf	116	116	127	127	126	126
Total	25201	29951	25280	29905	25263	29971

Table 4.18 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Seminole County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	2084	2404	1878	2105	1916	2164
Other	24	24	27	27	27	27
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	2608	2650	2464	2523	2505	2570
Field Crops	88	88	84	84	84	84
Improved Pasture	3847	7000	3429	7000	3114	7000
Ornamentals						
Ferns	0	0	0	0	0	0
Other	740	740	740	740	740	740
Sod/Turf	427	427	440	440	439	439
Total	9818	13333	11062	12919	8825	13024

Table 4.19 Projected 1990, 1995, and 2010 Irrigated Acreage by Major Use Categories, Volusia County

Category	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Fruit						
Citrus	637	1636	744	1402	755	1379
Other	105	107	130	132	139	141
Vegetables						
Cabbage	0	0	0	0	0	0
Potatoes	0	0	0	0	0	0
Other	1060	1366	1033	1294	1054	1288
Field Crops	1	1	1	1	1	1
Improved Pasture	417	9260	433	10753	471	11707
Ornamentals						
Ferns	5166	5611	5331	5703	5353	5696
Other	352	352	376	376	377	377
Sod/Turf	1178	1181	1210	1211	1186	1187
Total	8916	19514	9258	20872	9336	21776

4.5.1 Small Variations in Acreage from Survey

The agricultural land use data estimated in the Annual Water Use Survey reports exhibited relatively small variations over the 12-year period for which they were available. The projected values demonstrated only minor variations due to the stable historical record. It may be that county extension offices use similar perceptions of agricultural acreage each year, which would tend to give quite small changes over time.

4.5.2 Forecasts Converge to a Fixed Value

A characteristic of the use of the exponential smoothing algorithm is that forecasts from a fixed base necessarily converge to a fixed value since the algorithm by definition is a convergent geometric function. In most typical applications, forecasts are generated only one or two years beyond the base period. In the present analysis the forecast horizon is extremely long, being twenty years beyond the base. As such, the forecasts must necessarily converge.

It should be noted that the convergent nature of the exponential smoothing algorithm serves to prevent long term projections from exploding to unrealistically large levels or "imploding" to zero levels. In general, the historical data exhibit small acreage changes and the projections are consistent with a continuation of such small changes.

4.5.3 Forecasts Reflect Best Available Information

On the basis of existing historical data at the level of disaggregation required, the methodology used and resulting forecasts of agricultural land use can be argued to be the best available. However, projections are projections, and long term projections must be viewed cautiously.

Typically, forecasting is done on a one or two period ahead basis, with the model being continually updated as new data become available. Forecasting further ahead involves uncertainties and accuracy declines. In the present study, the slowly changing nature of the data suggest that forecasts of up to five years (to 1995) are reasonably reliable. Projections beyond this horizon, however, should be viewed with caution.

5 WATER USE PROJECTIONS

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5.1 Introduction

Several implications can be drawn from Section 2 regarding trends in water use. First, there has been a definite tendency towards decreased use of high pressure irrigation systems and increased acreage of low pressure systems in the District. Thus, it may be reasonable to expect that overall water use by agriculture decreased from 1978 to 1989. The expectation must be tempered with the fact that crops shown to have increased in acreage (vegetables, sod and turf, ornamentals) do not generally use low pressure irrigation systems. Second, the trend analysis based on the data from the Annual Water Use Surveys and the results from the Telphone Survey show that producers will use particular irrigation systems on specific crops and are not likely to change systems at all for certain crop categories. With that backdrop, the water use projection procedure is now presented.

5.2 Methods and Procedures

Water use projections are accomplished by:

1. Using the CUP data base as the source of information on withdrawal points, as well as crop and irrigation system acreage combinations, soil type, and climate zone at each withdrawal point.

2. Using the Agricultural Field Scale Irrigation Requirements Simulator (AFSIRS) to estimate monthly water use for typical crop, irrigation system, soil type, planting date, and climate combinations under 2-in-10 drought (8-in-10 estimates in the AFSIRS model) conditions. That is, water use estimates always reflect certain assumptions about the severity of the drought for which the projection is provided.

3. Using the results from AFSIRS and the crop acreage and irrigation system acreage mix in the CUP data base to estimate the typical monthly and yearly per acre water use for each crop at each withdrawal point, and then aggregating the withdrawal point estimates for each crop to the county level. An average water use per acre for each crop in each county is then calculated.

4. Multiplying the average water use per acre in each month and for the year under current technology in each county, by the crop acreage projection (which is based on the Annual Water Use Survey reports) and providing a projection for each county in 1990, 1995, and 2010.

5. Modifying the CUP data base irrigation system configuration to reflect best management practice irrigation technology.

6. Redoing Steps 3 and 4 under best management practice irrigation technology conditions.

The procedure requires several data manipulation steps as described in Appendices 7.1 and 7.2.

5.3 Schematic Overview of the Analytical System

Figure 5.1 provides an overview of the flow of data in the analysis. It starts with data from the original CUP datafiles, which are compiled into a secondary data base (WD_Desc). The data in this file are disaggregated, supplemented and coded.

AFSIRS is executed as a separate activity for each unique combination of soil, crop, climate and irrigation type extracted from WD_Desc. AFSIRS generates monthly and annual irrigation requirements. The estimates are used in conjuction with an extract of WD_Desc (WD_Afsir) to estimate water needs for agricultural activities in million gallons per month (mgmo) and million gallons per year (mgy) for each withdrawal point in the CUP data set.

To evaluate water needs by county based on acreaged projected for the year 1990, data are aggregated to the county level, and total crop acreage and water needs are summed for each month and for the year. The 1990 water use per acre data are then used in conjunction with land use projections for the District to develop projections for 2010.

Figure 5.2 illustrates the transfer of original CUP data into the secondary data bases used in making water need estimates and county evaluations and projections. The original CUP files (Cuppd, Cupwd, AWCPumps, AWCWells) combine to make a single data base of all withdrawal points, WDID. To this base are added data from other original CUP files (Cupdesc and Cupwu) and data from the supplementary data sheets (see Appendix Section 7.2.2.2). Descriptive data are coded using codebooks made from the original datafiles. The end result is the secondary datafile, WD_Desc.

A section of WD_Desc is extracted into a file called WD_Afsir. This file is used in conjuction with the AFSIRS output to calculate mgmo and mgy for each line of data in WD_Afsir. Output from WD_Afsir is supplemented with descriptive data from WD_Desc to create a datafile describing water use characteristics for each permit.

Output from WD_Afsir is also aggregated to the county level, to provide the aggregation tables and projections described for Figure 5.1 above. Water use estimates can be obtained for any mix of counties desired. Other aggregations of withdrawal points can also be obtained. For purposes of discussion here, estimates are provided for all 19 counties in the District for two scenarios: 1) 1990 irrigation technology for both 1995 and 2010 and 2) a switch to best management practice (BMP) irrigation technology for 1995 and 2010.

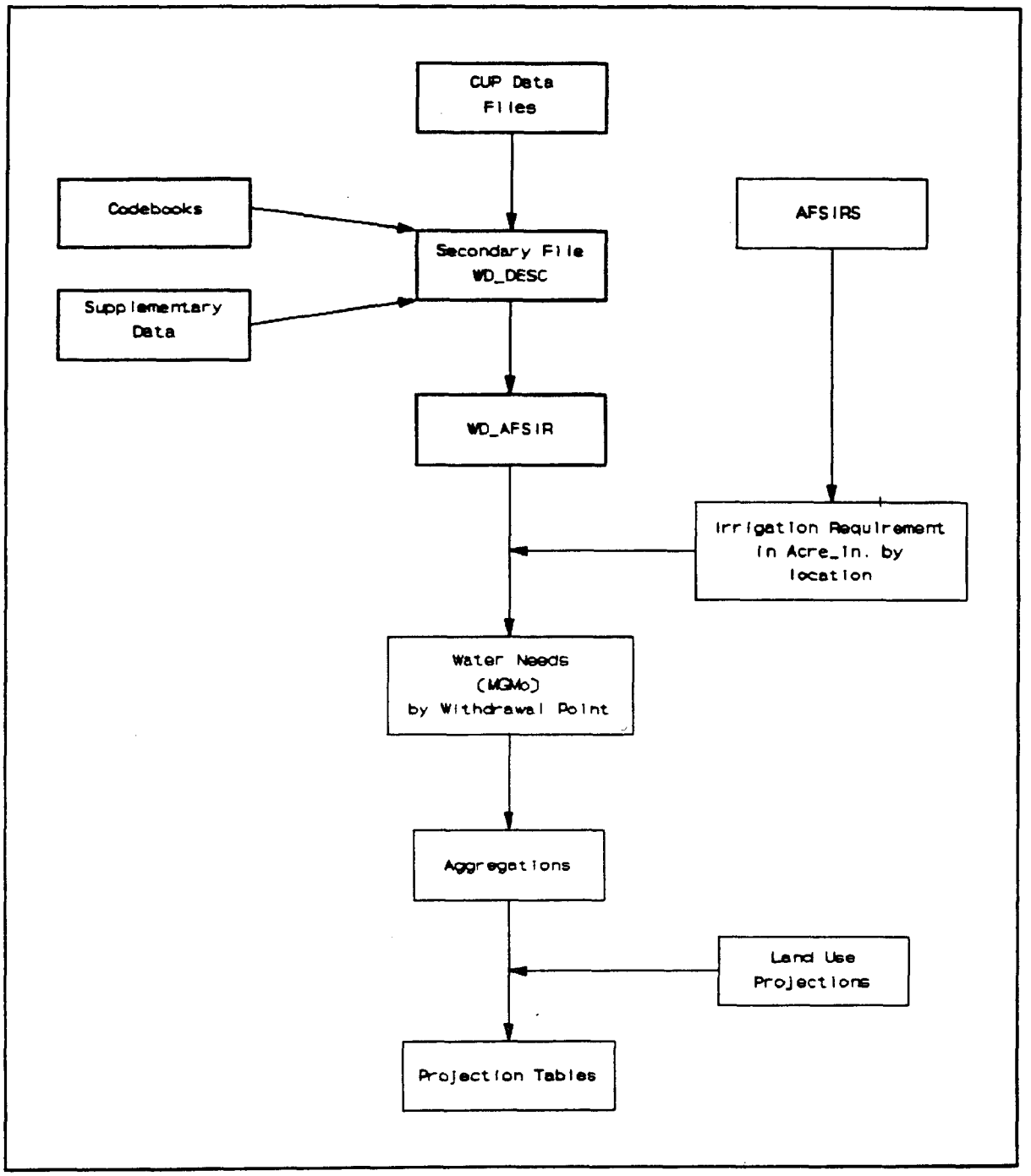

Figure 5.1 Overview of analytical design

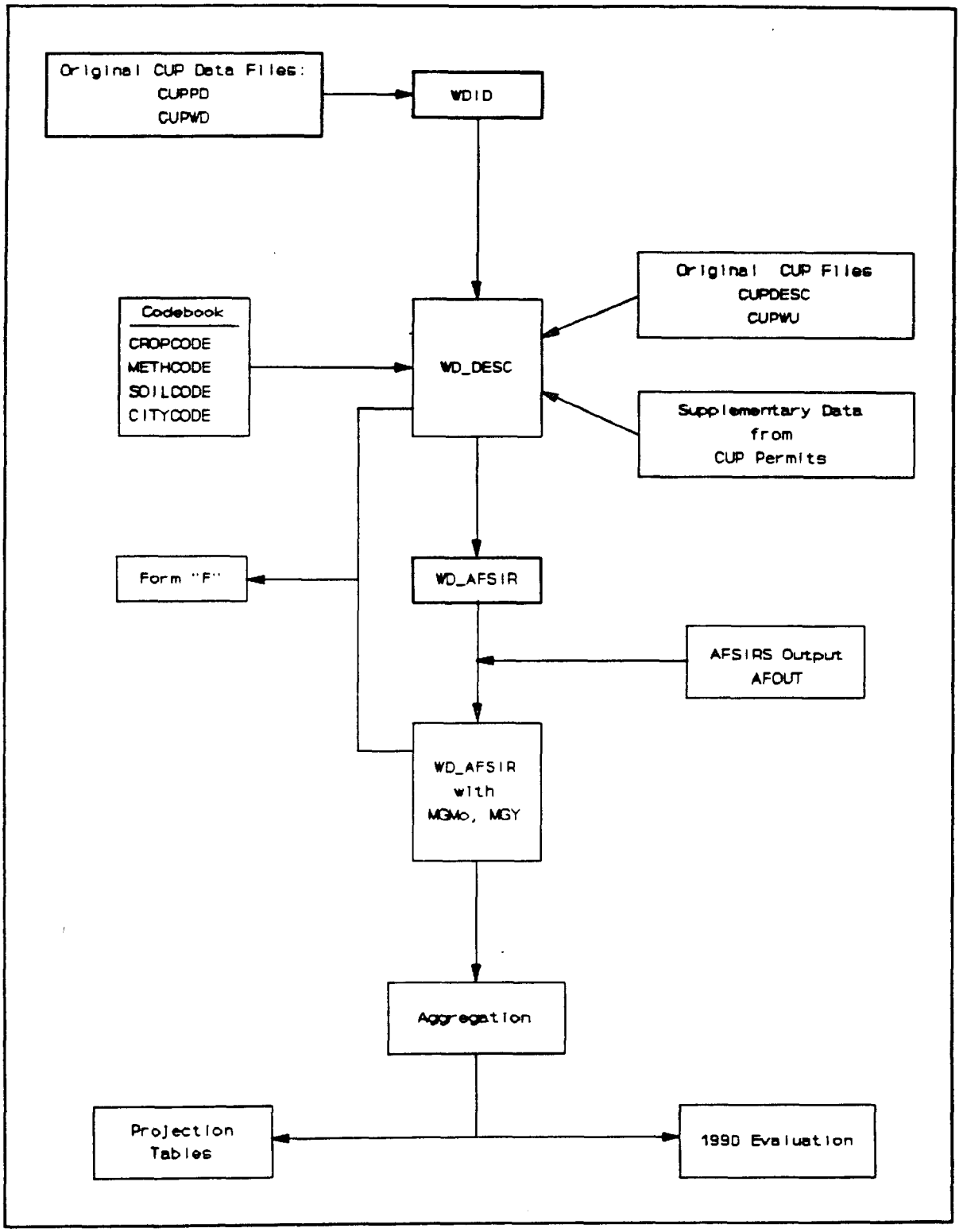

Figure 5.2 Overview of database design

5.4 Best Management Practice Irrigation Technology

A detailed analysis leading to the Best Management Practice pertaining to an irrigation system and how to operate that system for each crop was beyond the scope of this study. Rather, the approach was to contact knowledgeable individuals and to obtain best guesses about the directions of change in the use of irrigation technologies. The following should be considered as speculative, based as it is on very limited knowledge from research on the question of what really is best from technical, economic, and social perspectives.

5.4.1 Citrus

The primary change in the irrigation system type for citrus has been from flood and seepage systems to micro spray and micro drip. Most of the system changes have been to micro spray. The primary reason for the change is that farmers have experienced better yields (30-40 percent increase estimated by one commercial grower) and better frost/freeze protection with micro systems. Thus, it appears the switch may be primarily motivated by higher profits rather than by the desire to conserve water.

The trade-offs from using micro irrigation systems are: 1) installation costs (i.e. initial capital costs) are much higher than for flood/seepage systems and for the traveling gun, but about the same for center pivot systems and 2) micro systems demand more intensive management. Systems tend to get plugged with particulate and algae and need to be cleaned regularly.

The advantage of the micro systems comes in terms of water use efficiency. Efficiency is improved in two ways: 1) less water used on a per tree basis, and 2) micro systems permit the grower to only irrigate that part of the farm needing water rather than the entire grove. Under flood/seepage systems citrus is on average subjected to one irrigation per week. Under micro systems there is more frequent irrigation, but less overall water use.

The best management practice for citrus is assumed to be micro spray with an assumed 80 percent efficiency. It is recognized that some growers have already made the shift to even higher efficiency with micro drip systems (85 percent efficiency).

5.4.2 Other Fruit

Peaches, pecans, and grapes can be efficiently grown using micro systems. Blueberries currently use a combination of sprinkler and micro systems. Sprinkler systems on blueberries are just as efficient as micro systems in terms of water use because of the close spacing of the plants. The best management practice is assumed to be a micro spray with an efficiency of 80 percent.

While not a fruit, per se, watermelons are also included in this section. Generally, the (currently used) traveling gun or other portable systems are the best management practice for watermelons due to the need to change field sites every year to avoid disease problems. Requiring any type of permanently installed system will cause watermelon production to be unprofitable.

5.4.3 Vegetables

The trend in vegetable crops in the District is towards drip, but this is not the system of choice for most growers. There are no perceived yield or frost/freeze advantages. For frost\freeze protection, vegetable growers use mainly seepage systems. Seepage systems raise the water table, which results in heating the soil. The heat is transported from the soil to the air and furnishes freeze protection.

A major difference between citrus and vegetables is that vegetables require more frequent applications of water. Therefore, vegetable micro systems will likely require more intensive management and higher management costs. One major advantage of micro systems for vegetables is that the system allows for more efficient fertilization by adding fertilizer in the irrigation water, i.e. "fertigation". Farmers are apparently adopting fertigation slowly. For tomatoes, growers are adopting drip systems for water conservation purposes. The driving force primarily appears to be District requirements, rather than yield improvements or cost savings.

Cabbage and potatoes are currently under seepage systems. Research in the District (See Haman et al., 1989 and Singleton, 1990) has shown that efficiency of seepage systems can be improved with water recycling. Such an improvement also requires more intensive management, specifically of run-off.

In a typical rainfall year potatoes will only use 30 inches of supplemental water (low). Thus, growers generally see no incentive to go to more costly micro systems for conservation reasons. As noted, vegetable producers are using micro systems mainly due to District requirements. The District point of view suggests reducing water use through recycling of run-off. The financial and economic aspects of such changes in technology have not yet been addressed.

Purely from a physical standpoint, using micro systems on potato and cabbage fields is practical because these crops are grown mostly on sandy soils. Seepage systems will continue to be used, however, in the Lake Apopka area on the muck soils for cucumbers, carrots, and sweet corn.

The best management practice for vegetables currently under seepage/flood systems is assumed to be seepage with recycling, with an assumed 33 percent increase in efficiency (Haman et al., 1989, p. 11) or an overall efficiency of 65 percent. For vegetables currently irrigated with sprinklers, the best management practice is assumed to be sprinklers.

5.4.4 Field Crops

Many field crop growers now use sprinkler systems, either center pivot or traveling gun. Generally these systems are considered the most cost effective and can be viewed as the best management practice. Substantial acreage is under seepage/flood as well. The best management practice for seepage/flood is assumed to include recycling, with an overall efficiency of 65 percent.

5.4.5 Sod Farming, Improved Pasture, and Turf

Seepage represents the main system used for growing turf, largely because plant roots are close to the surface. Some sprinkler systems, however, are being used. Growers of sod, improved pasture, and turf will likely go to micro systems only if the District mandates it for conservation reasons. The trade-off would be initially higher costs for system installation. Due to the problems of having animals in proximity to sprinkler equipment, the best management practice for improved pasture will probably remain the seepage system. The best management practice is presumed to be the current system.

5.4.6 Ornamentals

5.4.6.1 Ferns

It is assumed the best managment practice for ferns is the current sprinkler system.

5.4.6.2 Flowers and Foliage

Currently most growers are using sprinkler systems, but some are investing in micro drip systems, which suggests financial feasibility. One problem with adopting micro systems is that container ornamentals may have very short turn around periods from grower to market outlets (like Publix). Thus, micro systems are not economic because of high capital costs and the need for flexibility. If ornamental growers switch to micro systems it will be because they will be forced to by regulations aimed at reducing polluted run-off. In this case the best system to use will be the micro drip systems which will also be used to fertigate.

5.5 Irrigation Water Use in 1990, 1995, and 2010

Generally, more agricultural inputs such as fertilizer, chemicals, feed, fuel, and water will be used when the prices for such inputs are low relative to the prices for fruit crops, vegetables, field crops, livestock using pasture, ornamentals and sod/turf. That is, as the (input price/product price) ratio drops, the intensity of input (including water) use per acre will increase (see Lynne, Anaman, and Kiker, 1987). For very favorable (low) ratios, growers will move toward maximum yield, and thus toward maximum crop evapotranspiration (ET). Strictly speaking, maximum yield is economically optimal only with a zero ratio, i.e., zero input costs or infinite product prices.

The AFSIRS model estimates water use associated with maximum yield and maximum ET, and thus implicitly AFSIRS estimates water used under highly favorable agricultural economic conditions. The assumption of such conditions also underlies the use of the modified Blaney-Criddle equation, which represents the other main tool used by the District for estimating agricultural water use. In effect, the AFSIRS (or any other maximum ET based) model does not allow directly considering less favorable economic conditions.

In addition to price ratio considerations, another aspect of projecting irrigation water use pertains to the drought frequency. Some frequency has to be chosen: given that most agricultural irrigation systems are designed for 8-in-10 year rainfall events (i.e., droughts occurring with a probability of 2-in-10, or 2/10, or 0.2 of the time), all projections herein were developed accordingly. Projecting water use for a more severe drought may not be really necessary because growers could not easily use current systems to provide that much water to crops. Projecting water use for less severe events may be useful to the District. It seemed more reasonable for the Needs and Sources assessment, however, to project water use for the drought event closest to current agricultural capacity to withdraw water. Agricultural capacity represents an upper, technological bound on agricultural withdrawals. The upper bound on the consumptive use permit may or may not correspond to this technology based bound.

The AFSIRS model allows estimating a range of irrigation water requirements for varying drought probabilities, from 5-in-10 up to the most severe (and less frequent) 9-in-10 (i.e., a 1/10 probability drought). A 5-in-10 year drought represented by average rainfall would suggest the need for less irrigation water. A 2-in-10 drought year would lead to more irrigation water use being predicted. Notably the water use estimates in the District Annual Water Use Survey reports are based on average rainfall conditions. Thus, the water use estimates herein will tend to be somewhat higher than in the Annual Water Use Survey. In fact, based on comparisons of the 5-in-10 to the 2-in-10 simulations (identified as 8-in-10 water use in AFSIRS) from the AFSIRS model it appears 15 to 25 percent more water will be used under 2-in-10 drought conditions, for any given economic situation.

5.5.1 Developing the Base and Adjusted Base Projection

To give a base projection for the 2-in-10 drought, it was first assumed that all irrigated acreage in the District actually received supplemental irrigation water so as to achieve maximum production per acre. That is, it is assumed for the base projection that growers face very favorable (low) input/product price ratios. Projections are provided for both the CUP acreage (Appendix Tables 7.4.1 and 7.4.2) and the projected acreage based on the Annual Water Use Survey reports (Appendix Tables 7.4.3 and 7.4.4). Recall the CUP acreage is used only to establish per acre water use estimates. The Annual Water Use Survey based acreage projection is used to estimate water use: only the latter estimates are discussed here.

Table 5.1 **Irrigation Water Use With Current Technology Assuming 2-in-10 Drought Conditions, Under Varying Assumptions About Pasture Irrigation and 1990 Projected Acreage, St. Johns River Water Management District**

Improved Pasture		Other Crops	Base Water Use[a]	Average Water Use per Acre
Percent[b]	bgy[c]	bgy	bgy	Inches
100	209.0	232.8	441.7	44.2
50	104.5	232.8	337.3	33.7
10	20.9	232.8	253.7	25.4

[a]Based on 368,261 irrigated acres out of the 385,630 acres projected for 1990.
[b]Percent of improved pasture receiving irrigation water.
[c]Billion gallons per year.

As a point of clarification regarding the base projections, merging the acreage projected from the Annual Water Use Survey reports with the CUP data base information on irrigation system and crop mix allowed projection of water use on 368,261 out of the 385,630 acres estimated for 1990. Water use could not be estimated for the difference of 17,369 acres using the per acre per month figures determined with the CUP data base. Generally the estimating process could not be implemented for that acreage due to 1) the lack of information in the AFSIRS model about the crop specified in the CUP data base or 2) the lack of any CUP data at all for a particular crop, e.g., the CUP data base contains no permits for irrigating field crops in Brevard County while the Annual Water Use Survey based projection suggests 4770 acres.

The water use estimates may be slightly lower than the actual water use, as given by (17,369/385,630) = 0.045 or about 4-5 percent. That is, the base estimate of 441.7 bgy (Table 5.1) might be increased by about 4-5 percent: seemingly, however, the error in the estimate could be larger, so the adjustment is not made. Only the water use for the 368,261 acres for which data exists is presented.

A more important adjustment of the base estimate arises because of pasture irrigation. Notably, 47 percent (209.0 bgy) of the 441.7 bgy projection would be needed in order to irrigate all the improved pasture, which suggests the reason for the relatively high estimate of 44.2 acre-inches per acre (Table 5.1). A flood/seepage system for pasture could easily use 50 to 60 acre-inches or more of irrigation water per acre. The AFSIRS estimate is 60.84 acre-inches, on average, for every pasture acre projected here.

With 123,582 acres of improved pasture (calculated from data in Table 7.4.3) representing about one third of all irrigated acreage, and much of it classified as irrigated with flood/seepage systems, clearly the average water use could become quite high. It is equally as clear that not all the irrigated pasture is actually irrigated in any given year.

Another possible scenario evolves from assuming only one half as much water is being used for pasture irrigation, or 104.5 bgy, which represents a number much closer to that predicted for the CUP acreage on improved pasture (50 percent case, Table 5.1). The irrigation water use per acre reduces to 33.7 acre-inches, for an adjusted base use of 337.3 bgy (Table 5.1).

The most realistic scenario is suggested by the Telephone Survey. Less than 1 percent of the pasture was actually irrigated in 1990, which was a somewhat drier year than usual. The low percentage actually irrigated in 1990 suggests that most producers do not find pasture irrigation a profitable activity given contemporary input/output price ratios. Thus, a more realistic estimate given current (albeit limited) knowledge of the economic forces at work in irrigating pasture is represented in the 10 percent case (Table 5.1). Water use for irrigated pasture becomes 20.9 bgy, for an adjusted base water use of 253.7 bgy (Table 5.1). The average water use is 25.4 acre inches.

Growers likely irrigate 10 percent or less of the pasture during 2-in-10 year drought events. The 10 percent assumption is adopted for the remainder of the analysis here, including the projections for 1995 and 2010 and for the best management practice projections. Thus, the estimated water use for improved pasture in Appendix Tables 7.4.3 and 7.4.4 is multiplied by 10 percent, and added to the use for all other crops to establish the adjusted base estimate (Appendix Table 7.4.5).

5.5.2 Annual Water Use Under Current and Best Management Practice Irrigation Technology

The adjusted base water use under current and best management technology for 1990, 1995, and 2010 is illustrated in Figure 5.3 (data in Appendix Table 7.4.5). Water use is essentially constant under current technology, at about 254 bgy, throughout the projection period (Figure 5.3). Recall irrigated acreage is not expected to change substantially even though agricultural acreage may well decline.

If best managment practice irrigation technology could be introduced quickly enough, water use could drop to 183 bgy by 1995 (Appendix Table 7.4.5 and Figure 5.3). More realistically, very little change will occur in the next four years. Rather, Figure 5.3 suggests a phasing in of lower water using irrigation technology starting in the mid-1990s would result in reaching 183 bgd, or 18.2 acre-inches per irrigated acre, by 2010. This represents a 28 percent decline from 1990 use.

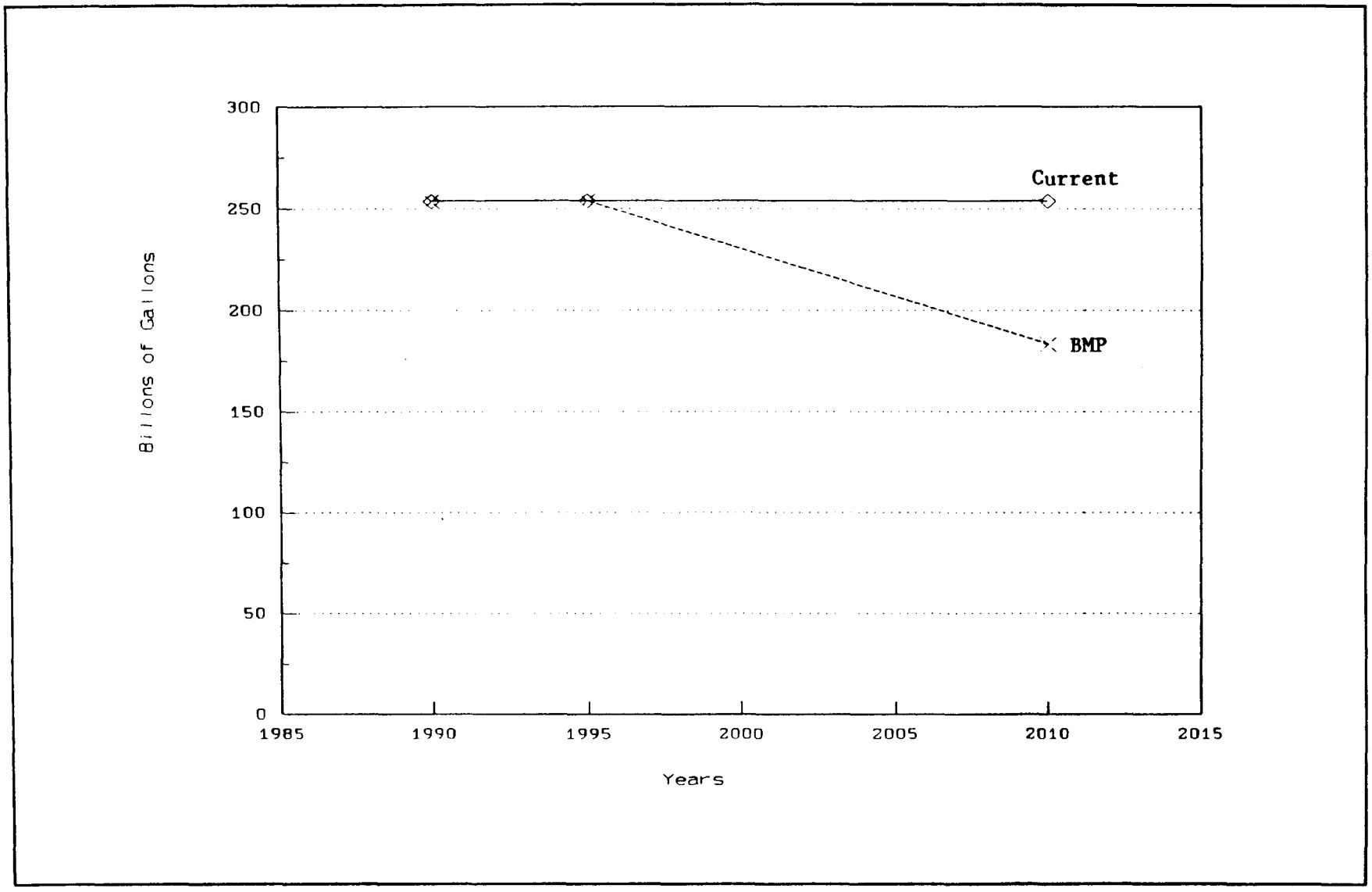

Figure 5.3 Projected water use under current and best management practice (BMP) irrigation technology, assuming 2-in-10 drought conditions, St. Johns River Water Management District, 1990, 1995 and 2010.

As noted in the discussion of best management practices in Section 5.4, research is needed into the question of appropriate irrigation technologies and the socially, politically, and economically optimal pace for adoption of such technologies. The estimates here need to be viewed with a healthy degree of skepticism given the current lack of reliable knowledge about the forces affecting the pace of irrigation technology adoption in Florida.

5.5.3 Distribution of Water Use Within a Year

Monthly water use under current technology is highest in May at 52.2 bgm (billion gallons per month) and lowest in December at 8.0 bgm (Appendix Table 7.4.5, Figures 5.4 and 5.5). Estimates are about the same for 1995 and 2010. As expected, more irrigation water is used during the relatively dry spring months.

While introducing best management practice irrigation technology reduces overall use by 28 percent (70.3 bgy), the percentage decline each month varies somewhat, as shown in Figure 5.6. The largest percentage reduction is in August at 48 percent and the lowest in May at 18 percent.

Absolute declines range from highs of 10.1 bgm in April and 9.2 bgm in May to a low of 2.0 bgm in December (See Appendix Table 7.4.5). Generally BMP technology will reduce water use the most in the dry spring months, as expected.

The relative amounts used each month also change. The largest relative declines occur in April and May, with most other months getting a slight increase in the share overall. That is, introducing BMP irrigation technology tends to even out the distribution of water use during the year, with the proportion used each month now more equal (See Appendix Table 7.4.5).

5.5.4 Distribution of Water Use Across the District

The adjusted base water use for 2010 under both current and best management practices is illustrated in Figures 5.7 and 5.8. Agricultural water use will likely continue to be modest in the northern area of the District. Concentrated irrigation water use will probably continue in the Lake, Orange, Brevard, and Indian River area. Notice the same general tendancies are maintained under best management technology (Figure 5.8), although water use is significantly lower.

Some caution must be used in interpreting the county estimates, however. For example, the District water use estimate for citrus in Lake County is based on the projected acreage of 25,173 acres (from the Annual Water Use Survey reports). The Commercial Citrus Inventory, however, suggests only 6278 acres of bearing trees (due to the freeze losses) and 13,960 acres total for the entire county in 1989. The water use estimate for 2010, then, may be realistic only under the assumption that more acres will continue to be planted.

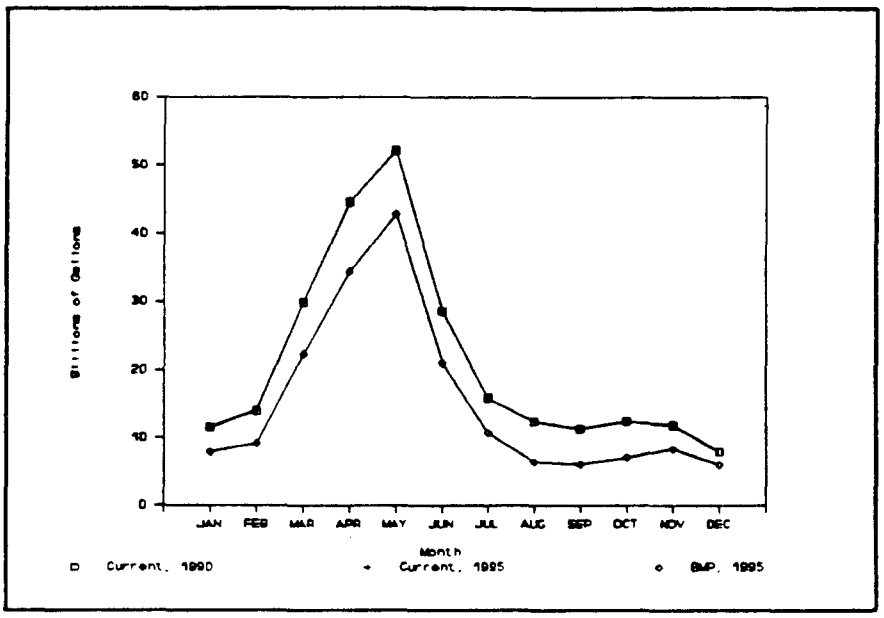

Figure 5.4 Projected water use under current and best management practice (BMP) irrigation technology, assuming 2-in-10 drought conditions, St. Johns River Water Management District, 1990 and 1995.

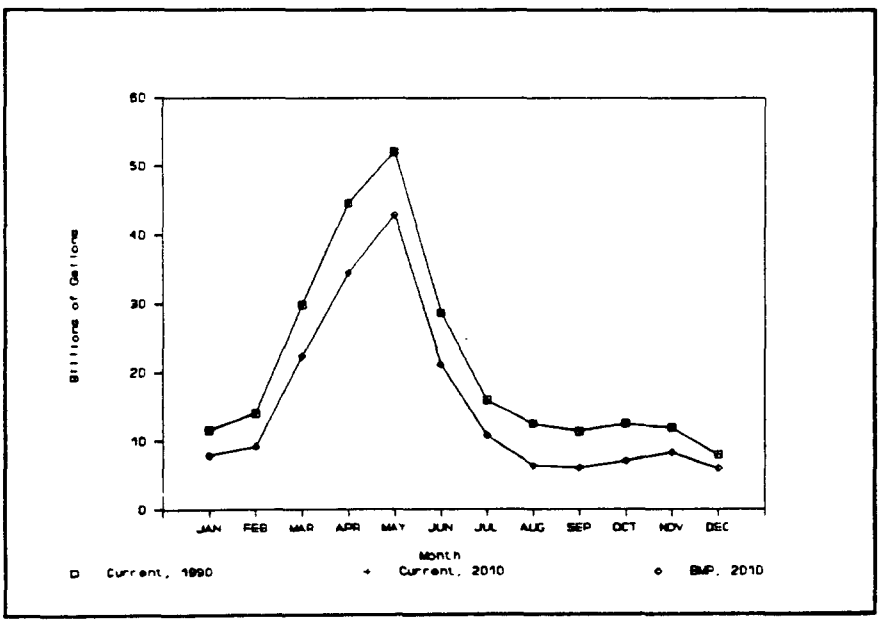

Figure 5.5 Projected water use under current and best management practice (BMP) irrigation technology, assuming 2-in-10 drought conditions, St. Johns River Water Management District, 1990 and 2010.

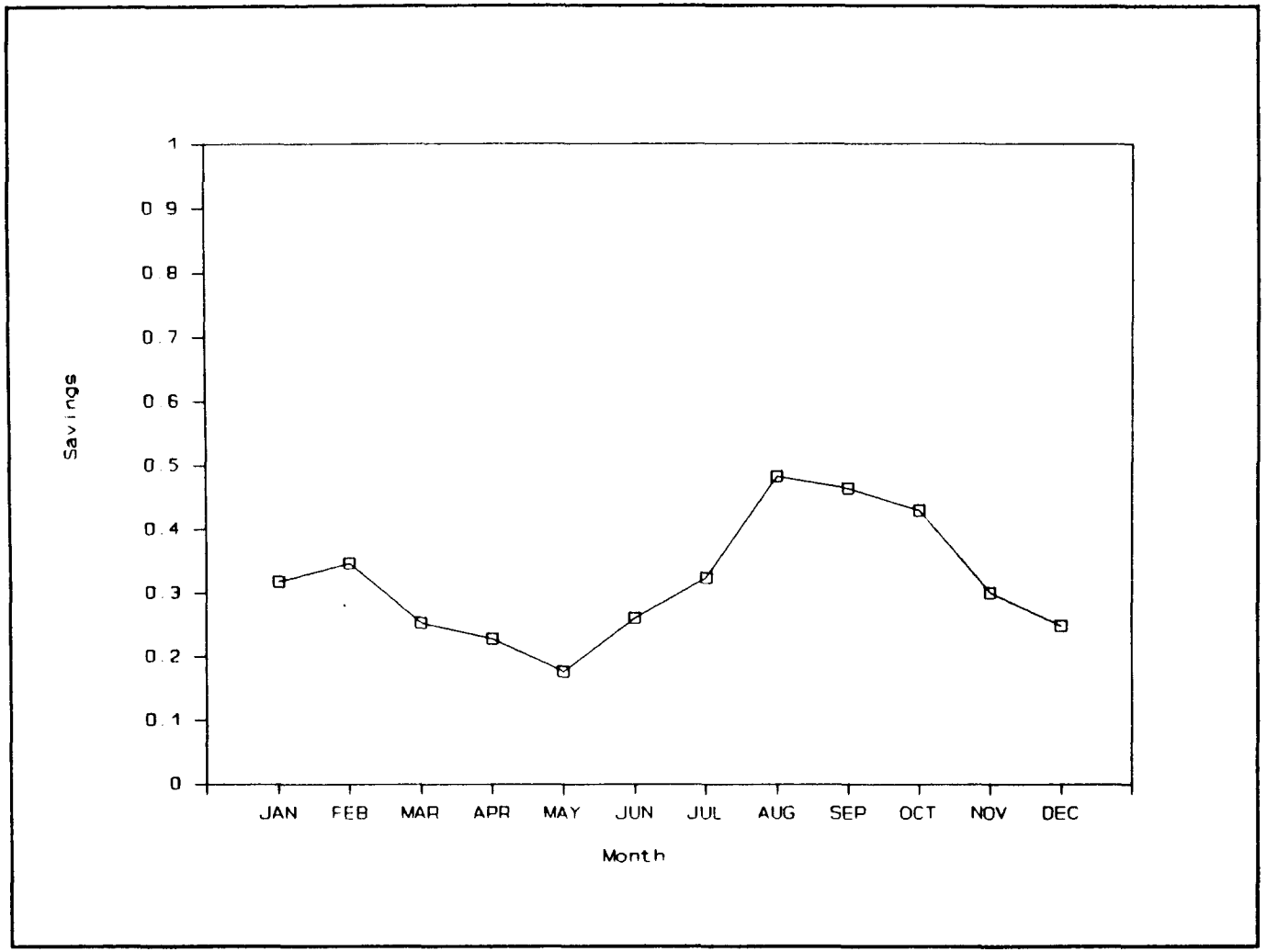

Figure 5.6 Projected savings in water use under best management practice (BMP) irrigation technology, assuming 2-in-10 drought conditions, St. Johns River Water Management District, 1990.

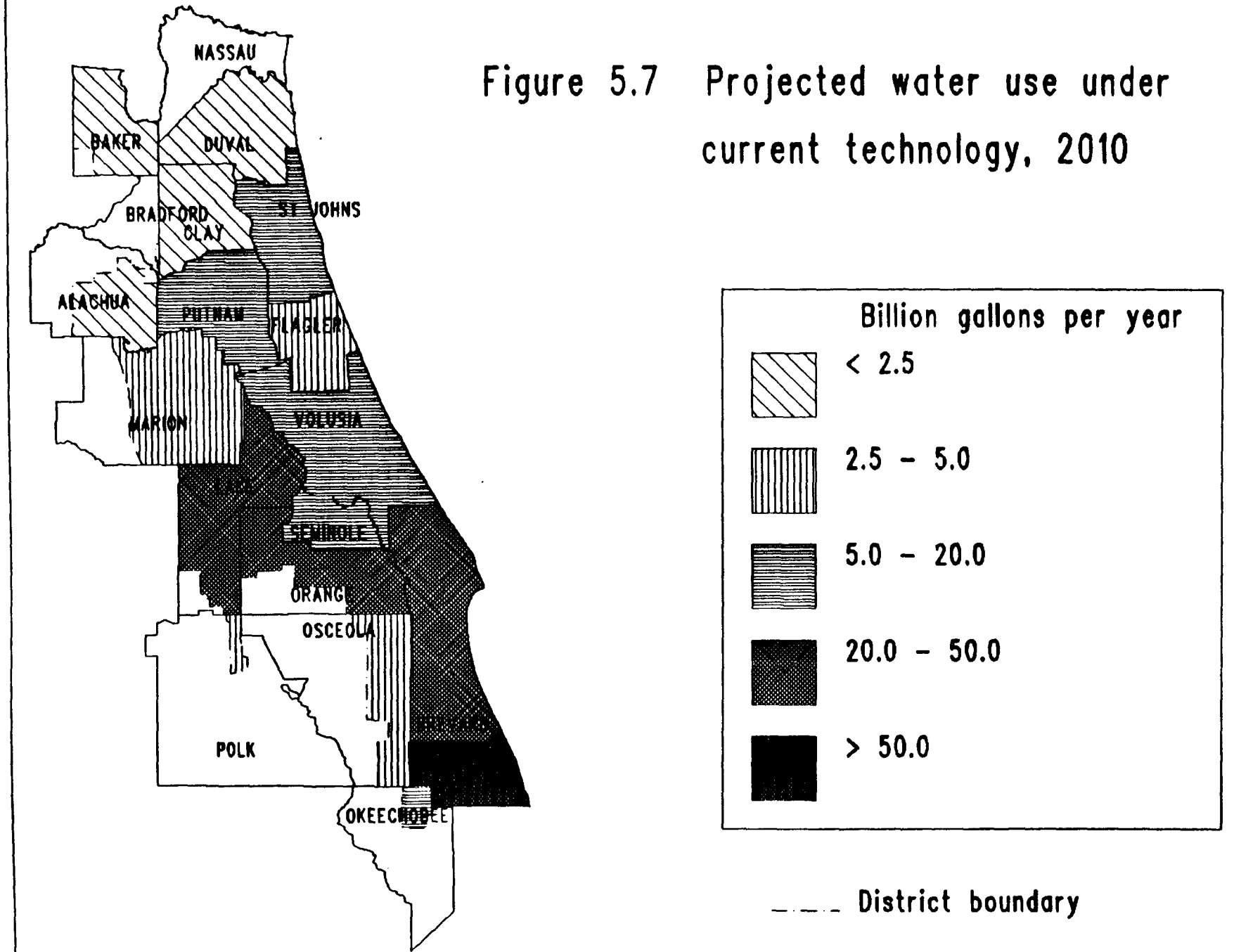

Figure 5.7 Projected water use under current technology, 2010

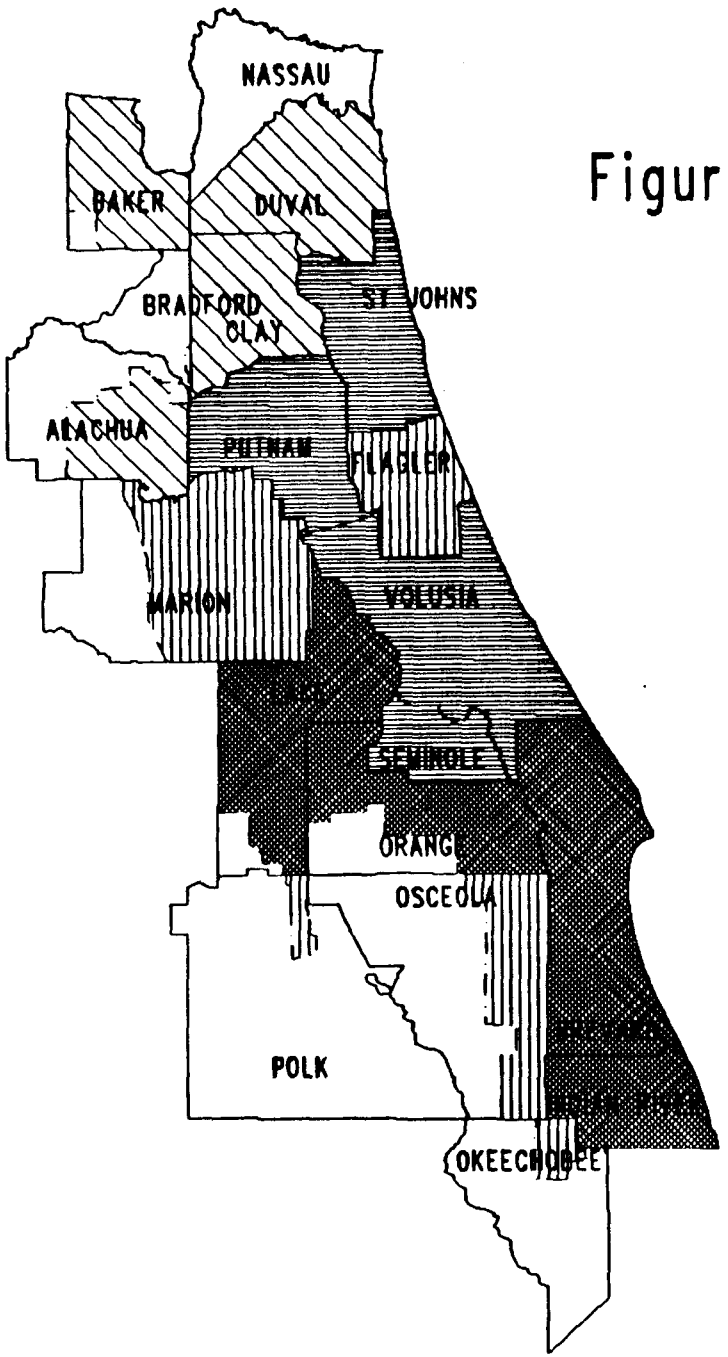

Figure 5.8 Projected water use under BMP technology, 2010

Billion gallons per year

- < 2.5
- 2.5 - 5.0
- 5.0 - 20.0
- 20.0 - 50.0

District boundary

Another large difference occurs for vegetable acreage in Orange County. According to the Florida Agricultural Statistics Service estimates, acreage (counting multiple cropping) may well be in the range of 20,000 to 26,000 acres. In fact, the CUP data base shows only 1575 acres. Yet, the Annual Water Use Survey suggests 40,844 acres. Clearly the vegetable acreage estimate (and the water use estimate) for Orange County needs further consideration.

5.5.5 Comparing Projected Water Use With Permitted Water Use

Comparing projected and permitted water use gives insight into the effects of acreage estimates and irrigation estimates inherent in estimates of agricultural water use. The ratios (Projected-Permitted)/Permitted water use were calculated (see Appendix Table 7.4.6). Considerable variability was discovered. As indicated in Sections 3.1 and 5.3.4, there is substantial disparity between Annual Water Use Survey based acreage projections and the CUP data file acreage. These inherent differences between the projected acreages and the CUP acreages persist in the water use estimates, as reflected by the index (see Appendix Table 7.4.6). Only Lake County shows estimates within +/- 10 percent of each other.

5.6 Other Agricultural Water Use in 1990, 1995, and 2010

Water use was estimated only for plant consumptive use, i.e., irrigation. Water use for frost freeze protection and other agricultural uses was not estimated due to insufficient data or information.

The Benchmark Farm data, which was to provide information for the evaluation of frost freeze, was not available. In any case, frost freeze protection may not be a large user due to the generally very short duration of this use (i.e., a few hours to just a few days).

Evaluating the water needs of other agricultural activities, such as dairy enterprises, would have required additional information, i.e., number of dairy cattle and size of the barn, data which also was not available. The CUP data base indicated dairy cattle were not an important user of water.

5.7 Summary and Limitations of the Water Use Projection Approach

Overall, irrigation water use will likely remain quite stable and possibly decline somewhat. Shifts to lower water using technologies may continue, although little is known about the forces at work to affect adoption of irrigation technology. Agricultural irrigation water use will continue to represent a significant use of water. Other agricultural water uses may be significant, although frost/freeze protection can result in heavy pumping for short periods of time: further inquiry is needed into the matter of other agricultual uses.

Assessing the limitations of the approach involves suggesting ways in which the estimate is likely to be better or worse relative to the next

best alternative estimate. The best alternative estimate is in the Annual Water Use Survey reports, which rely on water use estimated from both the modified Blaney-Criddle and AFSIRS models for a typical crop and irrigation system at the county level of aggregation. Recall the approach used here processes information from both the Annual Water Use Survey reports and the CUP data base as well as the AFSIRS model, and starts at the withdrawal point level. Soil type, planting date and other relevant information is entered for each withdrawal point.

5.7.1 Estimates Sensitive to Soil and Climate

The only way currently feasible for obtaining withdrawal point estimates of water use that are also sensitive to soil type, climate zone, and crop/irrigation system mix is to use the CUP data base. Withdrawal point estimates are necessary in order for the District to be able to identify areas with inadequate water to meet 2010 demands and associate these areas with water supply areas based on hydrologic boundaries. Additionally, soil type and climate zones for each withdrawal type are necessary in order to account for soil water holding capacity and rainfall impacts at a withdrawal point. The number of acres of each crop under each irrigation system at each withdrawal point is only available from the CUP data base. Overall, the approach should give more accurate water estimates than currently available.

5.7.2 Survey Shows More Acreage than the CUP Data Base

The 1990 acreage projection based on the Annual Water Use Survey reports suggests more acreage than does the CUP data base, leading to projecting more water than if the CUP data base had been used (Compare estimates in Appendix Tables 7.4.1 and 7.4.2 with 7.4.3 and 7.4.4). In fact, the projection suggests over 100,000 acres more than in the CUP data base. The higher acreage estimate is likely due in part to the Annual Water Use Survey accounting for harvested vegetable acreage rather than acreage devoted to vegetable production in the CUP data base. The CUP data base, then, does not account for multiple cropping on the same tract of land. Also, the definition of improved pasture apparently needs refinement: the Annual Water Use Survey reports tend to show considerably more irrigated pasture than likely exists, which may simply be due to the way an improved and irrigated pasture is defined, or due to assumptions about the extent of pasture irrigation.

While using considerably higher acreage estimates than in the CUP data base, the approach seems justified. Multiple cropping is real. The pasture problem was handled in a reasonable manner with the adjusted base estimating procedure. The Telephone Survey also showed more acres irrigated overall than suggested in the CUP data base. In addition, currently available water estimates also rely on the acreages in the Annual Water Use Survey, so no less accuracy should be expected.

5.7.3 Less Pasture Probably Being Irrigated

The mix of crops actually being irrigated is likely different from that reported in the CUP data base and in the Annual Water Use Survey. Growers are probably irrigating relatively more vegetables and turf, and relatively less pasture, as suggested by the Telephone Survey. It is not as clear with respect to citrus. Projections based on the Annual Water Use Survey suggest less citrus acreage than in the CUP data base, while the Telephone Survey suggests more acreage. The freeze damage and subsequent replantings have caused problems in the data base. Currently available estimates, however, also rely on the acreages in the Survey.

5.7.4 More Efficient Irrigation Systems Being Used

Recall that the irrigation system and crop acreage mix inherent in the CUP data base affects the water use projections directly: per acre water use for each crop in each county was calculated using CUP data. Further, recall that per acre estimates based on the CUP data were then multiplied by the projected acreages which were based on the Annual Water Use Survey reports. Thus, the system and crop mix in the Annual Survey reports does not affect the water use estimate.

Importantly, the CUP data base shows more efficient irrigation systems overall than does the 1989 Annual Water Use Survey report, which will be a force in causing an estimate lower than that in the 1989 report. The Telephone Survey suggests, however, that growers use an even higher proportion of efficient systems than even suggested by the CUP data base. It may be that county extension offices have underestimated the acreage under the lower water using technologies.

5.7.5 Projections May be Somewhat High Due to AFSIRS Not Accounting for Economic Factors Affecting Grower Irrigation Management Behavior

As noted, the input/output price ratio likely affects how much water is actually used on any given crop or pasture at any point in time. Also as noted, AFSIRS does not account for the economic factors which may influence grower choices regarding irrigation decisions.

AFSIRS, for example, assumes that growers will totally refill the soil profile at each irrigation. Economic simulations of alternative irrigation strategies have suggested, however, that water use may be much higher and costs can be very high with such a strategy (Lynne, Boggess, and Portier, 1984). Refilling the profile insures that most of the rainfall received within a short time thereafter (e.g., the next day) will be lost to deep percolation or runoff. As a result, the marginal (additional) costs of always refilling the soil profile may not justify the benefits of doing so (Lynne, Anaman, and Kiker, 1987). Actual growers, as a result, probably use less water than suggested by the AFSIRS model, given that reducing costs and increasing the profits are both of concern. Research is needed on this matter.

5.7.6 Overall Accuracy

The water use projections are probably more accurate than the currently available projection (in the Annual Water Use Survey reports). Yet, the projections may be somewhat higher than the actual water use by growers. Growers likely do respond to economic factors. Also, using the irrigation system configuration revealed in the Telephone Survey would result in a lower water use projection: growers currently appear to be using more efficient irrigation systems than suggested in the CUP data base.

6 DISCUSSION AND RECOMMENDATIONS

Gary D. Lynne and Clyde F. Kiker (with contributions from William G. Boggess, Frank Casey, Michael Martin, Cynthia Moore, Anne Moseley, and Timothy G. Taylor)

Several recommendations arise from the analyses regarding the 1) Annual Water Use Survey, 2) CUP data base, 3) land use projections, 4) water use projections and the AFSIRS model, and 5) expanded analyses in future Needs and Sources studies. Each is now discussed, with priority research areas highlighted.

6.1 Annual Water Use Survey

6.1.1 Move Toward Appropriate Land Use Classifications

Land and water use estimates are provided in the Annual Water Use Survey reports according to five major categories: vegetable crops, fruit crops, field crops, ornamentals and turf, and miscellaneous agricultural activities. For future Survey reports, it is recommended that the District reconsider the manner for assigning crops to the various categories. Agronomic and water use characteristics should be used as the basis for classifying the crops rather than the marketing or consumption traits.

The District should consider adopting the crop (and other agricultural activity) classification system commonly used in agricultural data bases, e.g., by the Florida Agricultural Statistics Service, by the U. S. Department of Commerce in the Census of Agriculture, and by the Florida Agricultural and Resource Management Laboratory (FARM Lab) in the Food and Resource Economics Department, University of Florida. Using categories with different activity content from what is commonly used complicates projection and economic analysis.

6.1.2 Improving Water Use Estimates

Water use information is collected in the U.S. Agricultural Census. The U. S. Geological Survey also collects such information. The District operates the Benchmark Farm Program for the purpose of obtaining water use data. It seems a coordinated effort needs to be put in place to insure reliable data. Ideally, water use would be measured at each withdrawal point. In the interim, a coordinated effort is needed, possibly involving the Florida Agricultural Statistics Service as well as the Department of Agricultural Engineering and the Food and Resource Economics Department at the University (See Section 6.3.1).

6.1.3 Use the Original Annual Water Use Survey Data Reporting System

Prior to 1985, the District reported the number of acres irrigated by the type of irrigation system by crop for each county in the Annual Water Use Survey reports. Since that time, the number of irrigated acres

by type of system has only been reported at the county level across all crops. The original breakdown by irrigation system and crop would be extremely valuable for determining more detailed trends in system use and technology adoption and for assisting in future conservation efforts. It is recommended the District re-adopt the original reporting system, especially for the priority crops.

6.1.4 Adopt and Adapt AFSIRS

In the absence of actual water use data, only one model for estimating supplemental water requirements should be used. It is recommended that the AFSIRS model be adopted. Efforts at refining and testing AFSIRS should be continued.

In order to use AFSIRS to estimate water use in a particular rainfall year, something other than the default procedure in AFSIRS needs to be used. That is, using mean rainfall for the years of record at a rainfall station (as currently done in AFSIRS) and calculating the expected water use requirement is not useful in estimating water use for a particular year, for example, 1991.

At least two more appropriate ways of using AFSIRS for estimating water use in a particular year exists. First, one could make AFSIRS work as is, without modification, by inserting a rainfall file with only 1991 weather data for every year in the record, when making the 1991 water use estimate. Second, one could determine whether the current year is a 5-in-10, or 8-in-10, or 9-in-10, or some other rainfall year, and simply read the predicted water use associated with the probability level from a recent run of the AFSIRS model for a typical crop.

6.1.5 Use Pump Data

Estimates of agricultural water use by crop should be based, whenever possible, on actual pumping data. Such data can be obtained in part from the Annual Benchmark Farm Survey reports. Ultimately data from primary measurements on all withdrawal points would be preferred.

6.1.6 Show Water Use by Water Supply Area

Despite methodological problems, the earlier Annual Water Use Survey reports are better representations of how land and water use information could be organized to make more relevant comparisons between agricultural water demand and supply. Specifically, in addition to reporting use by county, earlier reports estimated water use for each of the nine surface water hydrological units within the boundaries of the District. In terms of comparing and balancing supply and demand for water in the future, whatever its use, a division of this type (whether based on surface or ground hydrological units, or both) is needed in addition to estimating water use by county. This division would clarify the demand and supply characteristics of the water resource. The concept of a water supply area (WSA) should be clarified, and the District divided into such WSAs.

Reporting irrigation system, land, and water use data according to water supply area is highly recommended.

6.1.7 Priority Recommendation

Of the six recommendations, the last two have the greatest priority. The use of actual pump data, whether from all withdrawal points or from a sampling of points (such as in the District's Benchmark Farms Program), should be a top priority. Actual use can then be compared with available supplies in particular water supply areas. Research could then be focused on improving understanding of and explaining differences in actual use.

6.2 CUP Data Base

6.2.1 Update CUP Data Base Annually

The Telephone Survey suggested the need for regularly updating the CUP data base. To accurately reflect land and water use, CUP applications need to be regularly updated with respect to crops, irrigation systems, use of four inch and smaller wells, and use of frost and freeze protection. Ideally, the data base would be updated annually. Alternatively, the data base needs to be updated at least prior to starting another Needs and Sources planning process.

6.2.2 Restructure and Standardize Data Entry

For the purpose of quantitative analyses, entry of data into the CUP data base needs to be standardized and consistent. Data should be entered using standard crop and irrigation system names commonly used in other agricultural data bases. Applicant specified crops and systems need to be converted into such standard listings of crops and systems in order to make the CUP data base useful for empirical analysis. The listing of crops and systems in the AFSIRS model and used in the FARM Lab for crop budget development purposes is highly recommended as a good starting point. The Florida Agricultural Statistics Service should also be consulted, so that acreage estimates developed by the Service will match with the District data base.

Data should also be entered to relate the actual acres of individual crops under each system type to each withdrawal point. With the ground and surface water modeling effort in the District focusing on withdrawal points, it is also necessary to develop the CUP data base with the focus on withdrawal points. The CUP data base should indicate specifically what activity is associated with each of such points. Additionally, there is no current way to determine what percentage of land, if any, is double cropped or what crops are double cropped. It is also impossible to distinguish the crop season or if all crops listed are actually grown in a single year. While it is likely that certain irrigation methods listed in a permit are used only at distinctive times, such as for planting or frost and freeze protection, information is lacking in the CUP data base for addressing this ambiguity.

Improvements are also needed in the manner of identifying permit applicants. Currently, multiple permit holders can appear in the CUP data base by a variety of spellings and different names. Also, use of agents (e.g., consultants, attorneys) used by some agricultural firms also complicates analyses. A data point identifying the water agent, if one is used, should be added to the CUP data base.

The importance of structuring data entry to meet end user needs cannot be overstressed. The data files created by FRED to evaluate water needs for the Agricultural Needs and Sources project represents a reasonable starting point and will meet some of the future analytical needs of the District. Most likely, the data files will need some revision to meet additional requirements not accounted for in the Needs and Sources project. In the final analysis, the usefulness of the data files will depend on the extent to which their structure is designed and tailored to facilitate end use. Detailed recommendations are presented in Appendices 7.1 and 7.2.

6.2.3 Priority Recommendation

Both of the recommendations (6.2.1 and 6.2.2) are of high priority. Ultimately the CUP data will be of foremost importance in understanding what is occurring in the District. Appropriate analyses of the data can be useful in developing water management strategies and policies.

6.3 Land Use Projections

Two primary recommendations stem from the land use projections portion of the study.

6.3.1 Develop Capability to Collect Agricultural Acreage and Irrigation System Data

A collaborative relationship needs to be developed between the District and the Food and Resource Economics Department (FRED) at the University of Florida, and the Florida Agricultural Statistics Service (FASS) in Orlando to collect annual agricultural land use data. Such data are valuable and will continue to be of importance not only for formulating land use projections but in analyzing numerous other economic issues as well. The current working relationship between FRED and county extension personnel, and between FRED and the FASS, should augment the ability of the District to obtain data and allow for consistent data collection and maintenance of a consistent data base. Such a working relationship could be quite complementary to efforts at using satellite imagery and aerial photos for obtaining such data.

6.3.2 Update Land Use Projections at Least Every Five Years

It is recommended that agricultural land use projections be updated on a systematic basis of not less than every three to five years. Given the apparent stability of agricultural land use in the District over the past 12 years, land use projections out to 1995 can be viewed as

reasonable. Projections that extend much beyond 1995 should be viewed with caution. It seems likely that agricultural land use in 2000 and 2010 may look considerably different when projected from a base year of 1995 as compared to a base year of 1990. While regulatory requirements may require long term projections, statistical and economic prudence suggests updating such forecasts on a regular and systematic basis.

6.3.3 Include Economic Factors in Land Use Projection Models

The District should also consider developing land use projection models that reflect sensitivity to economic factors. Price, cost, and debt considerations may all influence grower decisions. General economic conditions influence the pace of land change, suggesting economic variables should be an important part of land use projection models (Also see Section 6.5.2).

6.4 Water Use Projections and the AFSIRS Model.

Refinement of the AFSIRS model can improve District level water use evaluations. The AFSIRS model does not currently account for economic phenomenon. Recall the AFSIRS model implicitly projects water use for highly favorable economic conditions during which growers would likely seek maximum yields. It may, then, predict water use quite accurately for the high economic value crops. It is likely that the model is less accurate for lower valued crops. Also, even for high valued crops, less favorable agricultural economic conditions cause more focus on profits, and the level of water and other input use would be affected. If such conditions develop, the AFSIRS model will tend to over-predict water use.

6.4.1 District Crops Not Covered by AFSIRS.

The CUP data files list crops not included in the AFSIRS data base. This problem can be remedied by obtaining the necessary data for each crop not listed in CROP.DAT, the AFSIRS crop data file. Parameter requirements for the AFSIRS model consist of coefficients on root zone and water use for each crop.

6.4.2 Streamline AFSIRS Output

AFSIRS output is not readily readable as a data base. The AFSIRS program could be modified to provide only the output needed by water management district personnel to facilitate future in-house estimation.

6.4.3 Synchronize Planting Dates in Accordance with Actual Practices

Planting dates are imprecise. Several crops can be planted at any time during a two to five month period. Planting dates vary per region and many crops are planted twice a year. Accurate planting data can be obtained by surveying CUP holders and extension agents. Planting and harvest date information needs to be added to each of the CUP files. Accurate planting dates are needed in order to accurately account for variation in rainfall and evapotranspiration (ET) patterns.

6.4.4 Align Climate Zones to More Precisely Reflect Rainfall and Evapotranspiration (ET) Rates

The three climate zones used for the study may not sufficiently reflect the rainfall and ET patterns covering the entire District area. Rainfall and ET patterns do vary. While a few simulations using AFSIRS did give quite similar results for the same crop and system configurations in the various climate zones, the influence of varying climate on irrigation water use across the District needs further consideration.

6.4.5 Incorporate All Irrigation System Types into AFSIRS

Further research needs to be conducted regarding irrigation types not covered by AFSIRS. The AFSIRS irrigation data file, IR.DAT, could be expanded to include all systems used in the District. Coefficients are needed regarding efficiency rating, ground area covered, and extraction rates for each system. Generally, the Department of Agricultural Engineering at the University can provide the interpretations needed to establish the coefficients.

6.4.6 Use Types Other Than Plant Consumptive Use

FRED was able to evaluate water needs for plant consumptive purposes only in this part of the study. Insufficient data were available to evaluate water needs for frost and freeze protection, or for other agricultural purposes such as dairy and aquaculture. Data should be collected to permit the evaluation of the water needs of other agricultural activities.

6.4.7 Evaluating the Impact of Best Management Practices

An evaluation of the impact of best management practice irrigation technologies is affected by the criteria used to define "best". The best practice for purposes of water conservation may not be an economic solution for the majority of permit holders. The most economical solutions may not minimize water use and may encourage environmentally unsound practices. A definitive study on the question of socially, politically, institutionally, environmentally, and economically optimal rates of irrigation technology adoption is sorely needed.

6.5 Expanded Analysis in Future Needs and Sources Studies

6.5.1 Conduct In-depth Water Use Studies in Areas With Inadequate Water to Meet 2010 Demands

In-depth studies will be needed once the areas with inadequate water have been identified. Management plans will need to be developed in such areas. Topics needing study in any particular area include 1) identifying the impact of water conservation, 2) determining the cost of switching to alternative irrigation methods, 3) deciding on the best way to characterize the technology adoption process, 4) identifying the institutional (laws, rules, regulations, customs, and habits) factors

affecting technology adoption, 5) determining the environmental (and social) impact of alternative irrigation practices, and 6) improving understanding of the economic impacts of allocating water in various ways among the different competing uses.

Considerable variation in both irrigated acreage and system changes occurred across the counties and probably even within counties. In addition to changes in agricultural land and water use in an area with inadequate water, there will also be shifts from agricultural to other land and water uses. Often on a per acre basis, water use is greater than for agriculture. Such changes can create the need for even greater accuracy in long term water use projections. Subareas and subregions of the District will have to be examined in detail in order to understand where and how to balance Needs and Sources pertaining to agriculture and to new uses.

6.5.2 Quantify Social, Environmental, and Economic Factors Affecting Agricultural Water Use

It can reasonably be expected that water use in agriculture will fluctuate in response to economic forces, particularly to changes in commodity prices. Also, the amount of irrigation water used will likely be responsive to input prices, e.g., diesel fuel prices. A convenient way to think about the economic response is to focus on the price ratio. A falling diesel fuel/commodity price ratio would likely lead to more water use. An increase in the ratio due to increasing fuel prices and/or decreasing commodity prices would likely lead to less water used especially given sufficient time to adjust. Thus, the District should consider a research effort into improving on agricultural water need/demand projection models by accounting for the degree to which growers are sensitive to prices and costs.

While not the focus of this study, both agricultural land and water use needs to be viewed in the actual context within which it occurs. In many areas of the District, agriculture is interspersed with urban and industrial land uses. In such areas, there is an ongoing transition from agriculture to other uses. Often such regions of the District are faced with impending water shortages. Accurate projections of overall water use will depend upon ability to project the land use transitions and the associated water demands. Both economic and social factors will be important in such projections.

The District should consider instituting a process for systematically collecting economic data (e.g., product prices, production costs) and start associating that data with water use in the District. Such data could be collected as a part of the Benchmark Farms Program and supplemented with other survey approaches.

It may also be reasonably expected that changes in the CUP rules of the District will affect grower irrigation practices. Changes in social attitudes regarding water conservation in agriculture, for example, may also be a force in irrigation technology adoption behavior and in grower

use of irrigation water. The social, environmental, institutional, and economic impacts of such changes need to be evaluated in focused research efforts. Research should be conducted into the behavioral aspects of irrigation technology adoption not directly related to the profit motive.

Finally, it is important to remember that information on agricultural land and water uses is not only of value to the District. Good information is also important to other entities, both private and public. Other individuals and organizations must make plans and decisions which are substantially conditioned by projection of future water use. Local governments, State agencies, and private firms will be making decisions concerning hundreds of millions of dollars which will be influenced by the planning and regulatory decisions of the District. Overall, the Needs and Sources planning effort must anticipate the information and data needs of such groups. It is recommended that the District planning staff and representatives of the Food and Resource Economics Department establish a working relationship to identify the economic information needs in order to facilitate a broader planning context and process.

7 APPENDICES

7.1 PROCEDURE FOR ESTIMATING WATER USE PER ACRE USING AFSIRS

Michael Martin

Irrigation requirements for a wide variety of agricultural users in the District were estimated by using the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) model, which was developed by Smajstrla (1990a,b). AFSIRS is a numerical simulation model which allows the user to estimate irrigation requirements for Florida crops, soils, irrigation systems, growing seasons, and climate conditions.

The irrigation requirement for crop production is the amount of water, exclusive of precipitation, that must be applied to meet a crop evapotranspiration requirement without significant reduction in yield. Irrigation requirement, as defined by AFSIRS, does not include leaching, freeze protection, or crop cooling requirements, even though water for these purposes may be applied through an irrigation system.

The AFSIRS model uses soil, crop and irrigation method coefficients in conjunction with historical climate data to calculate irrigation requirement estimates. AFSIRS is based on a water budget of the crop root zone and the concept that crop evapotranspiration can be estimated from potential evapotranspiration and crop water use coefficients.

The water budget includes inputs to the crop root zone from rain and irrigation, and losses from the root zone by drainage and evapotranspiration. The water storage capacity in the crop root zone is defined as the multiple of the water-holding capacity of the soil and the depth of the effective root zone for the crop being grown. Irrigations are scheduled based on an allowable level (depth or volume) of soil water depletion from the crop root zone.

7.1.1 Inputs Specific to the District

An explanation of all AFSIRS input settings can be found in the AFSIRS *User's Guide* and *Technical Manual*. Most AFSIRS coefficients were generated using the "batch" mode which allowed for the rapid and successive estimation of various types of irrigation uses[1]. Running several estimations in batches is convenient and less vulnerable to input errors because computer programs permit quick and consistent revisions to be made for all possible characteristics of agricultural water use in the District. All of the batch runs were read by AFSIRS from the following format (coding explained below)

```
line 1:    PLA SSS II CC
line 2:    -1 1 0 0
line 3:    CC BM BD EM ED
line 4:    CLIM.PLA
line 5:    II 1 0
```

[1]A few incidences of "Crown Flood" irrigation were run using the interactive mode. The crown flood system requires the setting of water depth. The depth set for this study was 2.75 feet, the average practice for crown flooding.

line 6: 50.0
line 7: SSS 1

The format represents a complete AFSIRS computer run. Successive runs were made simply by writing the same format for other situations immediately below line 7, the last line of a batch run. The program for all batch runs was written using the "Copy" and "Merge" commands from WordPerfect. The above format was copied in vertical succession as many times as there were cases to run, then merged with Cup data in Dbase.

Only one batch was run per unique setting. In other words, only one batch run was required for observations that had identical settings for the above variables. Size of farm, for example, does not affect the coefficients generated by AFSIRS.

Spacing must remain exactly the same for all runs so that the Fortran program can locate and interpret settings correctly. Letters refer to variables that changed for each run. Numbers refer to settings that remained fixed for all batch runs.

7.1.2 Fixed Settings

Four fixed settings appear in line 2: -1 1 0 0. The first number (-1) is a code which specifies minimal computer output. The second number (1) merely suppresses the printing of zeros to reduce the amount of output. The third digit in line 2 (0) specifies that no graphs be generated in the output. The final number in line 2 (0) designates the default values of the AFSIRS' crop data set (CROP.DAT) to be used in estimation. Different values can be programmed into the model, when more variables are provided than those available in the CUP data base.

The next fixed settings appear in line 5. The first number (1) specifies the estimation of gross irrigation requirements, which allow for losses to be made due to inefficient water application. The gross irrigation requirement is the total requirement divided by the irrigation system application efficiency, a fraction. Gross irrigation requirements thus include irrigation requirements for crop production plus additional water required because of waste during application.

The last number in line 5 (0) specifies that soil will be irrigated at full field capacity for each irrigation. There is some dispute as to whether or not this is the most economical practice. Filling to field capacity is most common (Smajstrla, 1991), and, thus, was assumed for all the AFSIRS runs.

Depth to the water table was fixed at 50.0 feet in the sixth line. For organic (muck) soils, the water table was fixed at zero feet because producers use muck soil for flood irrigation.

The last fixed element appears in line 7 (1), which specifies average soil water capacity be used for each soil type. Minimum or maximum soil water capacities may be used for future sensitivity analyses.

7.1.3 Variable Settings

All letters in the above format refer to variable settings. All letter entries, with the exception of climate data place (PLA), are necessarily replaced by numeric codes. The original data setup designated variable entries as letters to facilitate computer programs that transform letter entries to AFSIRS coefficients.

The number of letters in each entry corresponds to the number of spaces set for it by the Fortran program. If only a one-digit number replaces a letter entry, then enough spaces must precede the number to fill the entire field.

The first line contains all the necessary variable settings needed to identify any particular batch run. Such identification is necessary to link the AFSIRS coefficients to the CUP data base. For example, when the entries in line 1 (PLA SSS II CC) are replaced by actual AFSIRS entries "ORL 1 3 4", a run will be made for a production system in the Orlando climate zone (ORL) on sandy soils (SSS) where a micro-spray system (3) is used to irrigate citrus (4). All variable entries are explained below.

PLA refers to climate zone. It specifies the climate zone pertinent to the District. Long-term records (18 to 25 years) of daily rainfall and potential evapotranspiration for nine Florida locations are included in the AFSIRS model data base. Three of these locations, Orlando, Daytona Beach and Jacksonville were used for agricultural areas in the District. A three letter code replaces PLA to access the corresponding climate data set (ORL for Orlando, DTB for Daytona Beach and JAX for Jacksonville). Future AFSIRS estimations can use different climate data sets as they become available.

Temperature measurements vary within any of the AFSIRS climate zones. Estimates increase in precision as climate zone measurements come closer to the irrigation operation being analyzed. AFSIRS can run off any climate data base. If more localized climate data become available in the District, more precise estimates can be obtained.

SSS represents soil type. The District provided all the necessary data to construct a soil data base consisting of 24 soil types suited to the needs of the CUP data set. The soil data, as all AFSIRS data files, must be input according to the specified FORTRAN program and renamed SOIL.DAT. One can easily copy the format by following the pattern in the data files provided by AFSIRS. AFSIRS supplies two data sets consisting of either eight general (SOIL-GEN.DAT) or 766 specific (SOIL-766.DAT) soil types.

Soil data files provided by AFSIRS include soil identification code, soil series name, textural classification, soil layer dimensions and lower and upper available water contents in each layer. The data set provided by the District consisted of the two variables necessary for this study, lower and upper available water contents. All other information in the soil data files is extraneous to the estimation of irrigation requirements. It is used when one requires more descriptive output.

II is the letter code for irrigation system. The irrigation data set provided by AFSIRS covers eight popular systems. It includes information on irrigation efficiency, the area of soil surface assumed to be irrigated with each type of system and the fraction of evapotranspiration assumed to be extracted from the irrigated portion of the crop root zone for those irrigation systems where the entire crop root zone is not irrigated. As with the climate and soil data bases, specific irrigation data sets can be used with AFSIRS so long as the necessary data are available.

CC refers to the crop being analyzed. Most of the crops from the CUP data set were covered in the AFSIRS data file, IR.DAT. Specialty crops not included in IR.DAT can be run on AFSIRS provided the following information is available for each crop: irrigated and total root zone depths for perennial crops and initial and final root zone depths for annual crops, crop water use coefficients, and allowable soil water depletions before irrigations are scheduled.

BM BD EM ED refer to the beginning month (BM) and day (BD) and ending month (EM) and day (ED) of irrigation or growing seasons. These values were obtained from University of Florida specialists and must be entered for each crop. Except in the case of perennial crops, planting and harvest dates are usually estimated averages based on the characteristics of the crop and general practices in the area. The following dates were entered for each of the following crops:

PERENNIAL CROPS

1 ALFALFA	1/1 - 12/31
2 AVOCADO	1/1 - 12/31
3 BLUEBERRY	1/1 - 12/31
4 CITRUS	1/1 - 12/31
5 FERNS	1/1 - 12/31
6 GENERIC CROP	
7 GRAPES	3/1 - 6/30
8 NURSERY,CNTR	1/1 - 12/31
9 NURSERY,FLD	1/1 - 12/31
10 PASTURE	1/1 - 12/31
11 PEACHES	3/15 - 12/1
12 PECANS	4/1 - 11/15
13 SOD	1/1 - 12/31
14 SUGARCANE	1/1 - 12/31
15 TURF,GOLF	1/1 - 12/31
16 TURF,LNDSCP	1/1 - 12/31

ANNUAL CROPS

17 BARLEY	10/20 - 5/1
18 BEANS,GRN	
NORTH	
SPRING	4/1 - 5/25
FALL	9/1 - 10/25

	SOUTH	
	SPRING	3/1 - 4/24
	FALL	9/15 - 11/10
19	BEANS,DRY	
20	BEETS	
21	BROCCOLI	2/14 - 5/6
22	BRUSSELS SPTS	
23	CABBAGE	
	NORTH	
	SOUTH	9/1 - 4/30
24	CARROTS	10/1 - 5/15
25	CAULIFLOWER	
26	CELERY	
	NORTH	2/1 - 6/20
	SOUTH	
27	CLOVER	
28	CORN,FIELD	3/1 - 7/15
29	CORN,SWEET	2/15 - 7/30
30	COTTON	5/15 - 10/10
31	CUCUMBER	
	NORTH	
	SPRING	3/15 - 4/26
	FALL	9/1 - 10/17
	SOUTH	
	SPRING	3/1 - 4/16
	FALL	9/15 - 11/27
32	EGGPLANT	
33	FIELD CROPS	
34	GENERIC CROP	
35	GREENS,HERBS	
36	LETTUCE	
37	MELONS	
	NORTH	3/15 - 6/23
	SOUTH	3/1 - 6/8
38	MILLET,FORGE[2]	6/7 - 9/25
39	MILLET,GRAIN	6/7 - 9/25
40	OATS	10/20 - 5/1
41	ONION,DRY	
42	ONION,GRN	
43	PEANUTS	5/1 - 9/22
44	PEAS	
45	PEPPERS,GRN	
46	POTATOES	
	NORTH	2/15 - 5/23
	SOUTH	2/1 - 5/8
47	RADISH	
48	RICE	
49	SMALL GRAINS	

[2]Millet and sorghum can be and are planted between the first of May and the middle of July. June 7th was chosen as a compromise.

50	SMALL VEGETS	3/15 - 6/15
51	SORGHUM [1]	6/7 - 9/25
52	SOYBEAN	6/7 - 10/15
53	SPINACH	
54	SQUASH	
	NORTH	
	SPRING	4/1 - 5/18
	SUMMER	8/31 - 10/17
	WINTER	3/15 - 5/1
	SOUTH	
	SPRING	3/1 - 4/18
	SUMMER	8/31 - 10/17
	WINTER	3/1 - 4/16
55	STRAWBERRY	
56	SUNFLOWERS	
57	SWEET POTATO	
58	TOBACCO	4/15 - 7/31
59	TOMATO	9/15 - 5/15
60	WHEAT	10/20 - 5/1

[1]Millet and sorghum can be and are planted between the first of May and the middle of July. June 7th was chosen as a compromise.

7.2 DATA BASE MANAGEMENT

Cynthia Moore

7.2.1 The CUP Data Base

7.2.1.1 List of Files Used in the Data Analysis

The first set of CUP files (Lake County) delivered to the Food and Resource Economics Department (FRED) in October 1990 was in need of fairly extensive clean up and verification. The District began review of the CUP data files for all 19 counties in early January 1991. Parts of the cleaned data set were provided intermittently in late January and February. The final set of CUP files, including the soils data, were delivered to FRED on April 2, 1991.

Filenames appearing in interim data sets varied during the transition period from January to April 1991. All earlier versions of data files were replaced upon receiving the final set on April 2, 1991. The final set was assumed to be cleaned, updated with the latest modifications to permits, and containing only permits used for agricultural purposes with "Current" status.

7.2.1.2 Original CUP files

Appendix Table 7.2.1 lists the final set of CUP files, delivered to FRED on April 2, 1991. It contains the filename, as it appears in the District handout, "Handout of the CUP Datafiles Items" dated November 7, 1990, and the filename assigned to the associated data base file used by FRED. A copy of the "Handout..." appears as Exhibit 7.7.4 of this Appendix. The Handout lists all files of the entire set of CUP Datafiles, of which the agricultural files are a subset, and includes item definition.

Appendix Table 7.2.1 Original CUP Files for the St. Johns River Water Management District Delivered to FRED on April 2, 1991.

Current file name	As referenced in the Handout
Cupdesc.dbf	CUP.Project.Desc
CupMap.dbf	CUP.Mapped
Cuppd.dbf	Pump.Data
Cupwd.dbf	Well.Data
Cup3.dbf	CUP
Cupwu.dbf	CUP.Water.Use
AWCWells.dbf	Not incuded
AWCPumps.dbf	Not included

Files were provided to FRED as ARCINFO transfer files, and were exported to dBase data files using ARCINFO. DBase IV, version 1.1, was used for essentially all of the data base management and information retrieval work done using the original CUP data files. Throughout this appendice, Dbase IV files are referred to by their filenames only; the Dbase file extension ".dbf" is ommitted.

7.2.1.3 Secondary Files Created for Analysis

The files listed in Appendix Table 7.2.2 were created as dBase IV files, using the original CUP files as the base source. The list provides a summary description of the files.

A description of each item (field) of the secondary files listed in Appendix Table 7.2.2 is provided in Exhibit 7.7.5. It is structured in the format used in the "Handout..." (Exhibit 7.7.4), the only difference being that file structure is listed separately.

In the descriptions, the "source" of a field either refers to the data file it originated from, or states if it was derived from other fields. Files belonging to the original CUP data set are distinguished by *. Field definition provides a brief description of the contents of the field.

Appendix Table 7.2.2 Files created from Original CUP Files Used in Analysis

A. Data Bases

Filename	Description
WD_Desc.dbf	Base file, used for analysis
WD_Afsir.dbf	MGMo, (withdrawal point)
WD_Miss.dbf	Missing or insufficient data
WD_Bmp.dbf	MGMo, assuming BMP
WD_Cup.dbf	Comparison of MGY, permitted vs estimated
Afout.dbf	Afoutx, corrected for -1 (insufficient data)
Projcup.dbf	Water use estimations for the district using CUP data for 1990 from Wd_Afsir, aggregated by county and major cropcode, in MGMo
Projacre.dbf	Water use estimations per acre for the district using CUP data for 1990 from Projcup, aggregated by county and major cropcode, in MGMo
Projbmp.dbf	Wd_Bmp, aggregated by county and major crop code, in MGMo
BMPacre.dbf	Water use estimations per acre for the district assuming best management practices with CUP data for 1990 from Projbmp, aggregated by county and major cropcode, in MGMo
Projout.dbf	Land use projections for 1990, 1995 and 2010 by county and major crop category.
Projall.dbf	Water use projections for the district using land projections for 1990, 1995 and 2010, aggregated by county, year and major cropcode, in MGMo
Pallbmp.dbf	Water use projections for the district assuming best management practices, using land projections for 1990, 1995 and 2010, aggregated by county, year and major cropcode, in MGMo

Appendix Table 7.2.2 (Continued)

B. Reference and Codebooks

Filename	Description
WDID.dbf	List of all wells and pumps from CUPPD and CUPWD. The original basis for WD_Desc.dbf.
Location.dbf	Climate, soil, crop with planting dates
Cropcode.dbf	Crop codes, crops listed as they appear in original CUP data file, CUPDESC
Methcode.dbf	Irrigation methods codes and irrigation efficiencies, irrigation methods listed as they appear in original CUP data file, CUPDESC
Ctycode.dbf	County code, with climate and zone codes
Soilcode.dbf	Soil codes, based on lower and upper average water holding capacities
Aggcode.dbf	Cropcodes, aggregated to major crop categories used in projections
Supdata.dbf	Water use data from the Agricultural/Irrigation Type Uses Supplementary Data Sheet"

C. Spreadsheets

Filename	Description
Projcup	Crop acreage and MGMo by crop and county, using original CUP data, aggregated on major crop category
Projall	Crop acreage and MGMo by crop and county, using Annual Water Use Survey projections, aggregated on major crop category
Projbmp	Crop acreage and MGMo by crop and county, using original CUP data, assuming best management practices, aggregated on major crop category
Pallbmp	Crop acreage and MGMo by crop and county, using Annual Water Use Survey projections, aggregated on major crop category
Projdis	Base adjusted water use projections, from Annual Water Use Survey Projections

WD_Desc is the main secondary data file created for analysis. It includes every withdrawal point permitted by the District and listed in the original CUP files Cuppd and Cupwd. It does not include a permit if no withdrawal point for that permit was recorded in either of the above files. The CUP data base contains no permits for Bradford and Nassau counties.

The unit of analysis for purposes of evaluation is the withdrawal point. Because a withdrawal point may be associated with several observations, however, the effective unit of analysis is the record number, referenced in the file by the field ID. This serves to link all information on a single line of data with data in its associated file, WD_Afsir.

WD_Afsir was created to calculate and store estimated irrigation requirements in MGMo and MGY for each observation in WD_Desc. It was created directly from WD_Desc by copying selected fields used in the calculation of MGMo and MGY. Although arranged in a different order, fields ID, APPNUN, WD_ID, CTYCODE, CROPCODE, METHCODE, WD_ACRE and LOCATION contain the same information for that observation in WD_Desc.

7.2.2 Data Manipulation

The progression of the following sections roughly follows the progression in creating the final secondary data files, WD_Desc and WD_Afsir.

7.2.2.1 The Withdrawal Point as Unit of Analysis

The unit of analysis in the original CUP data sets is the permit, referenced in the files as APPNUM. All information relevant to the permit in the original files (crops, irrigated and non irrigated acreage, irrigation methods, sources, permitted MGY) is entered as a single observation.

For example, the field containing information on the crop activity lists one or more item descriptions, as does the field for irrigation method. Irrigated acreage in the original files refers to the total acres for a permit irrigated across all crop and irrigation types.

The exceptions to the format of one line of data per permit in the original CUP files are the files Cupwd, Cuppd and the associated AWCwells and AWCpumps. In these files, which contain information on each well or pump associated with the permit, the unit of analysis is the withdrawal point. These files, however, do not contain information on irrigated acreage, crops or irrigation method for the associated well or pump.

The Scope of Work stated that to the extent possible, the unit of analysis for estimating water use would be the withdrawal point. Furthermore, each withdrawal point would be a separate entry, and assigned a unique identifier. Withdrawal points were interpreted by FRED to be all wells (ground water) and pumps (surface water) included in the original CUP files Cupwd and Cuppd. Since not all permits have a well or an associated pump, not all permits figure in the final analyses.

7.2.2.2 Supplementary Data

AFSIRS requires information on climate, soil type, crop and irrigation methods. The program has a separate data base for each of these inputs. The program is not designed to read data as it appeared in the original data files, where multiple factors appear in a single field.

To modify AFSIRS so that it would read the multiple crops and irrigation methods of the original CUP data bases would have required extensive programming. Furthermore, reprogramming it to read these would not have been a permanent solution. Since crop and irrigation method descriptions were entered inconsistently, it would be impossible to program for all possible future entries. It was decided instead to disaggregate the CUP data base so that predefined codes developed within AFSIRS for climate, crop and irrigation method could be used.

In order to associate a single crop, irrigation method and irrigated acreage for each withdrawal point for permits with multiple item descriptions, data was obtained from the "Agricultural/Irrigation Type Uses Supplementary Data Sheet" from the original permits on file at the District. An example of a "Supplementary Data Sheet" appears in Exhibit 7.7.6.

The District undertook the task of entering the supplementary data in late February, and returned the completed file on March 29, 1991. The file, named SUPDATA, contains 1303 lines of data for 231 withdrawal points. Each observation contains information on a unique combination of crop and irrigation method for a withdrawal point, and the associated irrigated acreage. A withdrawal point with several crops or irrigation systems has a separate line of data for each crop/system combination.

7.2.2.3 Exceptions to Irrigation

Several permits included in the data set have either no irrigation method specified, no withdrawal point permitted, and/or no irrigated acreage. These were excluded from the list because of insufficient data for analysis.[2] Additional cases were added to the list as coding and analysis progressed. A final list of exceptions to irrigation is contained in the file WD_Miss. A discussion of the file is found in Section 7.2.8

7.2.3 Coding the Data Sets

7.2.3.1 Crop and Irrigation Methods Codes

To disaggregate the CUP data base on crop and irrigation method and code these fields for use in the analysis, codebooks were developed for crops and irrigation methods. A listing was extracted of all possible crops and irrigation methods from the original CUP file Cupdesc. Items in the lists were

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[2]. The letter of 4/2/91 from Andrew Lieuwen of the Division of Engineering to Anne Moseley, in reference to a preliminary list of permits, acknowledges that the District was aware of Exceptions.

assigned codes based on the predefined categories in AFSIRS. Many cases were best guess assignments because of the imprecise character of the permit description. The codebooks, Cropcode and Methcode, contain only single crops and irrigation methods.

Some coding for these items was performed manually. For instance, flooding is associated with a variety of crop types in the CUP data base, whereas in AFSIRS, the flood irrigation category refers specifically to crown flood used on citrus. All cases of flood irrigation not associated with citrus were recoded as seepage (subirrigation).

7.2.3.2 Climate codes

Using the Florida Agricultural Statistics Service (FASS) Vegetable Summary (1986-87) map of the production area as a guide, the District was subdivided into three climatic zones. According to this map, district counties fall into parts of the FASS Zones 2, 3, or 5. Each of the three zones encompassses one of the climatic zones used by AFSIRS. The FASS Zones were related to CUP and Climatic Zones as follows:

FAS Zone	CUP Zone	AFSIRS Climatic Zone
2	1	JAX
3	2	DTB
5	3	ORL

A climate code, referencing one of the climatic zones defined by AFSIRS and applicable to the District, was assigned to each permit, based on its county. The codebook, Ctycode, associates each county with a climate code and zone.

7.2.3.3 Soil Codes

A codebook for soils, Soilcode, was created upon receipt of the soils data on April 2, 1991. Soil data, as given to FRED, was tagged to all withdrawal points listed in the original CUP files AWCPumps and AWCWells. Soil data consists of an upper and lower average water holding capacity for the group of agricultural soils found in the vicinity of the withdrawal point. Average water holding capacities were defined by the District, based on interpretation of the STATSCO soils survey. Of a total of 2724 permits and 6685 withdrawal points permitted in the original CUP files, 262 withdrawal points (from 54 permits) have no soils data. Soil codes were derived by listing unique occurences of the combination of lower and upper AWC, and assigning each a sequential number 1 through 24.

7.2.3.4 Source and Use-Type Codes

The final output of the study, as envisioned in the Scope of Work, would include descriptions of the type of agricultural water use and the source of water. Type of agricultural use is defined by three categories:

1. Plant consumptive use.
2. Plant use other than consumptive (i.e. frost freeze).
3. Other agricultural production (dairy, aquaculture).

Source of water refers to a named ground water or surface water source.

Codes for source and use-type are included in the original CUP data files, and were integrated with their original codes into the secondary files. Reliability of the coding, however, may be questionable. It appears from the data, and from informal discussion with members of the District, that code definitions changed over the time period of data collection, 1983-1990.

In particular, the Use-Code appears to vary considerably in its application. It was impossible for FRED to redefine Use_Codes given the information available and the limited time frame left for analysis once the final data files were delivered.

Water needs in the FRED analysis of CUP data were evaluated only for "Plant consumptive use". Frost freeze and other agricultural uses were excluded due to insufficient data or information. The Benchmark Farm Study, which was to provide information for the evaluation of frost freeze, was not made available. Evaluating the water needs of other agricultural activities, such as a dairy enterprise, would have required additional information: i.e., number of dairy cattle and size of the barn.

Permits not included in the analysis because of insufficient data are described in Section 7.2.8 "Exceptions to Irrigation".

7.2.4 Redefining the Data Base with Withdrawal Point as the Unit of Analysis

A data base was created through vertical concatenation of the original CUP files Cuppd and Cupwd. This resulted in a single file in which each pump and well were listed, associated with a permit number, a well/pump number and a soils type and code.

Each withdrawal point was assigned an identifier (WD_ID). WD_ID consists of the appnum, stripped of the leading "2-", the trailing characters, and the hyphenation. To this base was added a three digit code for the well or pump number. The well or pump number is an alphabetic identifier assigned to each well or pump by the District during permitting. The three digit code is the numeric value of the well or pump number, with the distinction that pumps start at 901, and wells start at 001. Thus well number "A" became 001 and pump number "AA" became 927.

This file was the foundation for the data base, WD_Desc. Keeping WD_ID as the unit of analysis, and using APPNUM to link WD_Desc with original CUP files, data was added to describe water use characteristics for each withdrawal point. Additional fields were created for coding and analysis purposes.

With the unit of analysis now the withdrawal point rather than the permit, it was necesary to associate an irrigated acreage with each withdrawal point.

It has been stated above that this level of information was not available in any of the original data files, not even those where the unit of analysis was the withdrawal point.

A field "WD_Acre" was added to WD_Desc to store irrigated acreage associated with each withdrawal point. The value of the field was calculated by dividing the total irrigated acreage for the permit holder by the total number of wells and pumps permitted under that permit.

Through further disaggregation, described below, the value of withdrawal point acreage could have been modified if the permit had, in addition to multiple withdrawal points, multiple crops and/or multiple irrigation systems. For permits with single crops and irrigation systems, there were no further modifications to irrigated acreage.

7.2.5 Disaggregating the Data

Using the codebooks, all crops and methods were computer coded. Items which did not code were flagged for review. Those associated with a multiple crop or method were flagged for further disaggregation, using the Supplementary Datafile.

To the extent possible, "Supplementary" data was integrated into WD_Desc for these lines of data, replacing the original entries. Through this process, irrigated acreage associated with each line of data was updated automatically.

7.2.5.1 ID

As supplementary data was integrated into the data base WD_Desc, WD_ID was no longer a unique identifier for each observation. (This occurs in instances where more than one crop was irrigated from a single withdrawal point.) A new unique line identifier, ID, was introduced. ID is simply the observation number of the line item.

7.2.5.2 Coding of Multiple Items and Exceptions to Coding

Crops and methods were coded again, and those not coded flagged for review. Multiple items were coded manually, using best judgement while trying to maintain consistency. Multiple irrigation items were coded based on the system with the lowest efficiency. Multiple crops appearing on several observations for the same permit were coded based on the county's relative proportion of crops figuring in the description.

The recoding process was repeated several times, until it was reasonably certain that the description of an item without a code was incomplete or was too ambiguous to be coded. Examples of these are:

- livestock with no irrigation method
- crocodile propagation
- no irrigation method recorded
- irrigation method defies categorization

- other agricultural use (dairy, milk, cleaning, and citrus processing)

Items identified as an "exceptions to irrigation" are coded with "E" in the cropcode field.

7.2.6 Estimating Irrigation Requirements

7.2.6.1 Estimates from the Agricultural Field Scale Irrigation Requirements Simulator (AFSIRS)

To estimate monthly irrigation requirements, AFSIRS requires information on climate, soil type, irrigation method and crop. Each of these factors were coded to the extent possible in WD_Desc. When AFSIRS is run in batch mode, as was done by FRED, the factors are referenced by code, and each factor must appear in a specific location in the program. The specifics of working with AFSIRS are discussed in the Appendix 7.1.

7.2.6.2 Planting Dates

In addition, AFSIRS requires information on planting dates. Planting dates are given in the Appendix "AFSIRS Program Codes, Usage". Due to the late date of receiving updated copies of the CUP dataset and soil data, it was not possible to incorporate different planting dates for northern and southern regions, or for spring or fall planting. The analysis assumed all counties to be in the southern zone. If regional effects had been accounted for, counties coded with Zone = 1 would have fallen under the northern region. The remaining counties (Zones 2 and 3) would have fallen under the southern region.

It was impossible to determine planting dates from the CUP data, or how much if any of the land was double cropped. The analysis assumed all crops to be grown in the Spring, and grown only once in a year. Assuming Spring planting leads to suggesting more water use, but not accounting for double cropping suggests less water use. The net effect is unknown.

7.2.6.3 Location

Each combination of climate, soil, irrigation method and crop is associated with an identifier named Location. Location is a concatenation of the fields CLIMATE, SOILTYPE, METHCODE and CROPCODE. The field "location" exists in the data bases WD_Desc and WD_Afsir, and in the AFSIRS output data bases. It serves to relate secondary CUP data files with AFSIRS output files.

7.2.6.4 Aggregating AFSIRS Output into a Data base

AFISRS outputs irrigation requirement data in text file format, with considerable descriptive data and tables. Monthly irrigation requirements, given in acre-inches, are summarized in a single table at several probability levels (mean, 50 percent, 80 percent, 90 percent). The 80 percent probability level was used in the analysis, to maintain consistency with the original CUP estimates.

To extract only the information needed to create a data base associating location with monthly irrigation requirements, a program was written and compiled in Fortran by Robin Mack of the FARM (Florida Agriculture and Resource Management) Lab in FRED. This program, called Afmatrix.exe, extracts the section of the row containing the location code and the data column containing the irrigation needs at the 8-in-10 probability level. It places them in column form by month for each location, readily readable as a data base file.

AFSIRS outputs -1 when there is insufficient historical data to make probability estimates. Dr. Smajstrla, the author of the AFSIRS program, recommended replacing -1's with the mean values for that particular location and month. In several cases, the mean value appeared excessive relative to other month requirements. Nonetheless, mean value were used consistently in the place of -1's in the raw output.

7.2.6.5 Water Use Estimating

The AFSIRS output, AFOUT, is shown in Exhibit 7.7.7. This file has been modified to account for -1 codes in the original output. Modified items are indicated by an asterix.

To calculate the irrigation requirements for each observation in WD_Desc, data for selected fields from WD_Desc were extracted into a smaller file, WD_Afsir. WD_Afsir mirrors its parent line by line, but contains only the fields necessary for the calculation of irrigation requirements. Each observation has as its unique identifier "ID", copied from the parent file and linking it back to the parent, and a link to the AFSIRS output, Location.

Linking WD_Afsir with AFOUT on the field Location, irrigation needs were calculated subject to area (wd_acre) for each observation. In addition, because AFSIRS output is in Acre_in, it was necessary to add an acre_in to the MG conversion factor, converting raw output to the same unit used by the CUP permits (MGMo and MGY).

The conversion factor is:

Acre_ft = 325,851 gallons
Acre_in = 325,851/12
= 27154.25
= .027154 MG

Exhibit 7.7.8 also shows a partial listing of WD_Afsir. The first line of data is for a crop = 3 (blueberrries) irrigated with a micro-drip system, in location JAX 7 2 3. The monthly requirement for January (Jan) in acre-inch is 1.1 (acre_in).

The formula used to calculate the Janaury irrigation requirement shown in the example in Exhibit 7.7.8, line 1, is:

Acre * Acre_in * MG/Acre_in = MGMo

or

26.750 * 1.1 * 0.027154 = 0.799

This gives a total irrigation requirement of 0.799 million gallons for January for Blueberries on 26.750 acres under a micro-drip irrigation system.

7.2.6.6 Comparison of CUP MGY with Estimated CUP MGY

To compare irrigation needs with the amount in the CUP permits, monthly and total estimated irrigation requirements are aggregated for each permit (across all crops and irrigation methods), and compared with the amount permitted in each CUP permit (Perm_MGY). The comparisons are found in file WD_Cup.

7.2.6.7 Irrigation Requirements Assuming Best Management Practices

Irrigation requirements assuming irrigation under a "best management scheme" (BMP) were derived in file WD_Bmp. This file was created from WD_Afsir, copying all data line for line. Millions of gallons per month were calculated assuming best management practice irrigation technologies specified for each crop in Appendix Table 7.2.3.

Appendix Table 7.2.3 Best Management Practice Irrigation Technologies

Crop Category	Best Management Practice
Citrus	To Micro-spray
Other Fruit	To Micro-spray
Vegetables	If currently under Multiple Sprinkler, no change If under seepage, change to seepage with recycling
Potatoes/Cabbage	To seepage with recycling
Field Crops	If currently under seepage, change to seepage with recycling If currently under Multiple Sprinkler, no change
Ornamentals	Unchanged
Grass/Sod	Unchanged
Improved Pasture	Unchanged

7.2.7 Projection Tables

7.2.7.1 Projection Tables Assuming Current Irrigation Practices

Crop acreage and gross monthly irrigation requirements for each crop (disregarding irrigation method) were aggregated by county in a file PROJCUP. Appendix Table 7.4.1 shows the irrigation requirements based on original CUP data, for each county and crops for that county recorded in the CUP data. Water use needs are estimated for the major crop categories used in the projection tables.

Gross monthly irrigation requirements were calculated on a per acre basis to use in association with the projection tables for 1990, 1995 and 2010.

MGMo/Acre were calculated by dividing each of the gross monthly irrigation requirements by the total irrigated acreage in that crop category for each county. MGMo per acre are found in the file Projacre.

Irrigation requirement projections for 1990, 1995 and 2010 are shown in Appendix Table 7.4.2. MGMo were derived by multiplying the crop acreage by MGMo/acre using the dbase files Projall and Projacre. Projall contains the Land Use Projections for 1990, 1995, and 2010 by major crop category and county. The methodology used to calculate these projections is described in Section 4.

7.2.7.2 Projection Tables Assuming Best Management Practices

In the file Projbmp, output from WD_Bmp was aggregated by major crop category to obtain county level crop acreage and MGMo, assuming all crops were grown under best management practices. Per acre water needs assuming best managemnt practices were derived in the file BMPAcre by dividing monthly requirement for each county and crop by the associated irrigated acreage.

Projection tables for 1990 (CUP data) and 1990, 1995 and 2010 were created using the same process as for current practices, multiplying crop acreage by BMP MGMo/acre. Irrigation requirements assuming BMP are shown in Appendix Table 7.4.3 and 7.4.4, respectively.

7.2.8 Missing Data and Exceptions to Irrigation

The file WD_Miss contains all the observations from WD_Desc which, for one or more of several reasons previously discussed, was not included in the evaluation of water needs.

7.3 USER'S GUIDE TO THE DATA BASES

Cynthia Moore

7.3.1 Format of the data bases

The secondary data bases were created using dBase IV, version 1.1. DBase IV files are easily converted to ASCII files, Lotus spreadsheets and SAS datasets. In additon, dBase IV files are readily readable in ARCINFO version 3.4d.

The data needed to produce the output described in the Scope of Work is contained in two secondary files -- WD_Desc and WD_Afsir. The files can be linked by the field ID, which is simply the observation number of the line item from WD_Desc. WD_Desc contains descriptive data characterising water use. WD_Afsir contains a select number of fields from WD_Desc, necssary to calculate the irrigation requirements, along with monthly irrigation requirements calculated through further manipulations. The transfer of data to WD_Afsir from WD_Desc was done interactively in dBase IV.

WD_Desc and WD_Afsir conceivably could be combined into one data base by a simple horizontal concatenation. The output would be a large file, approximately 2.5 megabytes at this stage, with more than 40 fields. As large files are unwieldly to operate on microcomputers, the files were kept separate. In addition, keeping them separate preserves the integrety of WD_Desc from inadvertant input errors affecting previously entered data. Recreating WD_Desc, although not impossible, is to be avoided. Recreating WD_Afsir is a fairly routine operation.

WD_Desc and WD_Afsir contain data from all counties with the permitted withdrawal points. The files were not divided by county because of analysis conducted for the entire district. It was more efficient to query the total data base for information on a particular subset of counties, than to aggregate totals from individual counties to a district total.

7.3.2 Querying the Data base

Each line of the data base has at the very least the permit number of the holder (Appnum). Depending on the information contained in the data base, there may also be other "coded" identifiers, such as Withdrawal id (WD_ID) and County code (CTYCODE). In addition, appnum has embedded in it the county code (the first three digits). WD_ID has embedded in it the county code (first three digits), permit number (first seven digits, minus the hyphenation), and a withdrawal identifier (last three digits).

Using these fields and other coded information (Cropcode, methcode, irrigation efficiency, etc.), the data base can be queried for specific information using filters and/or conditions. Files can be linked together on several codes, and linked files updated or queried. Depending on the software package used, new files can be created from queries on single or linked files. Figures 5.1 and 5.2 in Section 5 illustrate the overall analytical framework and the process of creating the secondary data files.

7.3.3 Adding New Data to the File

The datafiles, WD_Desc and its companion, WD_Afsir, are believed to be up to date for current agricultural permits through December 1990. As described in the first sections of this report, these data bases were created through considerable manipulation of existing data bases. This manipulation was necessary because the original data apparently had not been organized with the intent of using the data for quantitative analysis.

7.3.4 Adding Data in the Immediate Future

To add permits issued since Janaury 1991, or to integrate modifications to existing permits, it is recommended that the data be entered directly, using the structure of the base file WD_Desc. The following points should be kept in mind when entering data:

- Assuming that the intent is to measure irrigation requirements from each withdrawal point using the AFSIRS model, each observation should contain only a single crop irrigated from a single withdrawal point, with irrigated acreage.

- Each observation needs a unique identifier in addition to the Appnum and withdrawal point identifier. The identifier, ID, serves to link WD_Desc with its companion file, WD_Afsir, where monthly irrigation requirements are calculated and stored.

- Nomenclature of crop activity and irrigation systems should be standardized, and entered consistently. The importance of this can not be stressed too strongly. Neglecting to follow standard procedures leads to unnecessary time spent in clean up, and increases the potential for error.

- A decision must be made by the District on how to enter multiple crops and or irrigation systems associated with a single withdrawal point. Which method is chosen depends on the degree of accuracy needed for analysis. The most important thing is to be consistent throughout the analysis.

- In addition to standardization of the crop activity and irrigation systems, other fields included in the CUP and not directly used in this analysis should be reviewed. In particular, the definitions of the Use_Code field need to be revised. As they are now, it appears that definitions changed over the years, and codes do not consistently reflect a use pattern.

Steps in Entering Data:

1. Data should be entered first into a file with the structure of WD_Desc, following standarized procedures for entry of descriptive terms and for codes. The following codebooks should be used when entering data, if coding is to be manually performed as entries are made.

   - Cropcode
   - Soilcode

- Ctycode
- Methcode
- Location

2. A separate file with the structure of WD_Afsir should then be updated with the new additions. Only those fields existing in both files are updated.

3. If the field "Location " is coded manually, care must be taken to respect the position of the characters as they occur.

4. Assuming that the soil code is already found in the soil code codebook, the file of Step 2 is then linked to the file Afoutl00, which contains the water needs in Acre_in for each location (climate, soil and crop). The files are linked on the field "Location".

5. Monthly water needs are calculated in MGMo, using the conversion factor described in Section 7.2.6.5

   WD_Acre * Acre_in * MG/Acre_in

6. Annual water needs are calculated by summing the monthly totals.

7.3.5 Adding Data in the Long Run

In the longer term, it would be advisable to develop a data entry program designed to store data in quantitative as well as qualitative form. Data could be entered in memory fields, and stored in permament files designed to meet their users needs. The procedure of transfering selected data from a master file such as WD_Desc to a smaller file such as WD_Afsir would be the same as described above. Entry would be automated as much as possible to avoid inputer error.

Data stored in qualitative form, used by the permits department, would follow the format of a single line of data for a permit, with the exception for withdrawal points. It would be easily retrievable for print outs of permits.

Data stored for eventual use in quantitative analysis would follow the format of a single line for that combination of inputs needed to determine the output desired. The format would be determined by output needs.

APPENDIX 7.4

PROJECTED 1990, 1995, AND 2010 IRRIGATION WATER USE BY CROPS AND COUNTIES

Appendix Table 7.4.1 Projected Agricultural Water Use for 1990 CUP Acreage Under Current Irrigation Technology, Assuming 2-in-10 Drought Conditions, St. Johns River Water Management District (in Millions of Gallons)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Alachua														
Other Fruit	262.50	6.98	9.83	20.93	31.96	41.64	22.63	16.70	14.10	11.40	14.10	14.10	7.05	211.43
Vegetables	1042.80	0.00	0.00	29.75	95.42	184.16	62.81	0.00	0.00	0.00	0.00	0.00	0.00	372.14
Field crops	46.67	0.00	0.00	0.00	0.00	2.15	1.77	2.28	0.00	0.00	0.00	0.00	0.00	6.21
Imp Pasture	540.00	0.79	2.04	11.87	30.36	41.90	21.70	12.90	10.51	8.83	10.51	4.18	0.11	155.68
Ornamentals	4.00	0.78	0.95	1.49	1.88	2.24	1.87	1.75	1.19	1.29	1.19	0.97	0.68	16.28
Sod/Turf	4.60	0.14	0.20	0.40	0.58	0.78	0.43	0.33	0.27	0.22	0.27	0.27	0.16	4.04
Total	1900.57	8.70	13.01	64.43	160.20	272.88	111.21	33.96	26.07	21.74	26.07	19.53	8.00	765.78
Baker														
Vegetables	5.00	0.00	0.00	0.18	0.49	0.94	0.33	0.00	0.00	0.00	0.00	0.00	0.00	1.93
Field crops	30.00	0.00	0.00	0.00	1.47	3.42	3.42	2.44	0.00	0.00	0.00	0.00	0.00	10.75
Ornamentals	372.66	74.47	89.85	139.45	176.47	207.45	170.59	161.92	112.54	122.42	112.54	90.46	65.97	1524.11
Total	407.66	74.47	89.85	139.62	178.42	211.81	174.34	164.36	112.54	122.42	112.54	90.46	65.97	1536.79
Brevard														
Citrus	27070.65	1149.77	984.06	2350.52	3437.88	4315.21	2367.79	1032.21	1352.03	813.32	1352.03	1591.45	1195.92	21942.16
Other Fruit	5578.47	0.00	0.00	499.32	1134.96	1620.25	1021.64	0.00	0.00	0.00	0.00	0.00	0.00	4276.16
Imp Pasture	33772.27	3524.43	3811.75	6690.21	9066.15	9871.12	5306.48	3230.46	4161.36	3592.88	4161.36	4567.65	3160.49	61144.34
Ornamentals	42.00	6.22	7.50	11.01	14.41	15.61	10.17	7.73	8.12	7.58	8.12	7.62	5.44	109.53
Total	66463.39	4680.42	4803.30	9551.05	13653.40	15822.19	8706.07	4270.39	5521.51	4413.78	5521.51	6166.72	4361.85	87472.18
Clay														
Other Fruit	50.00	6.11	5.84	10.18	12.63	14.12	11.54	8.69	5.84	6.52	5.84	5.70	4.34	97.35
Vegetables	8.00	0.00	0.00	0.28	0.87	1.45	0.50	0.00	0.00	0.00	0.00	0.00	0.00	3.11
Imp Pasture	40.00	1.90	2.44	4.56	7.39	8.20	5.70	4.56	2.99	3.31	2.99	2.39	2.55	48.99
Sod/Turf	35.00	2.28	2.47	4.18	5.61	6.84	4.47	3.52	2.47	3.04	2.47	2.38	1.81	41.53
Total	133.00	10.29	10.75	19.21	26.49	30.62	22.21	16.77	11.30	12.87	11.30	10.47	8.70	190.98

Appendix Table 7.4.1 (Continued)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Duval														
Ornamentals	207.14	43.03	51.46	78.18	99.27	114.46	92.81	89.99	62.43	69.75	62.43	50.62	37.40	851.85
Sod/Turf	610.00	29.06	34.03	62.97	87.00	108.40	67.07	53.88	41.36	41.46	41.36	38.89	27.37	632.83
Total	817.14	72.09	85.49	141.15	186.28	222.86	159.88	143.87	103.79	111.21	103.79	89.51	64.78	1484.68
Flagler														
Other Fruit	80.00	0.00	0.00	2.61	7.17	13.47	5.43	0.00	0.00	0.00	0.00	0.00	0.00	28.67
Vegetables	4204.21	116.62	284.43	506.72	783.94	613.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2305.33
Field crops	1607.43	0.00	0.00	209.84	314.26	493.23	357.97	126.58	0.00	0.00	0.00	0.00	0.00	1501.88
Imp Pasture	270.00	0.73	1.55	13.39	29.87	36.82	20.34	10.10	8.01	6.98	8.01	3.37	0.00	139.17
Sod/Turf	770.00	33.63	39.61	75.77	106.68	137.00	84.64	70.06	53.94	52.84	53.94	52.35	31.57	792.02
Total	6931.64	150.98	325.59	808.32	1241.92	1294.14	468.38	206.75	61.95	59.82	61.95	55.71	31.57	4767.07
Indian River														
Citrus	40087.65	2744.15	2934.96	5226.04	7044.29	7858.40	5649.52	3518.85	3863.31	3340.35	3863.31	3499.57	2300.17	51842.90
Field crops	3409.95	0.00	0.00	475.93	798.16	1050.01	714.83	142.59	0.00	0.00	0.00	0.00	0.00	3181.52
Imp Pasture	10300.12	1023.40	1200.93	1843.55	2699.98	3021.33	1594.00	908.82	1111.39	919.27	1111.39	1276.11	898.59	17608.75
Ornamentals	7.00	1.42	1.70	2.64	3.34	3.92	3.24	2.99	2.16	2.29	2.16	1.73	1.26	28.87
Total	53804.72	3768.97	4137.60	7548.16	10545.76	11933.66	7961.59	4573.26	4976.86	4261.91	4976.86	4777.41	3200.02	72662.05
Lake														
Citrus	57090.51	2390.83	1206.15	4913.18	7086.54	8330.21	5265.46	2487.18	2230.21	2193.03	2230.21	2246.28	1104.29	41683.56
Other Fruit	1732.00	0.92	1.14	77.43	219.56	344.92	173.57	4.56	1.03	1.25	1.03	1.09	0.87	827.37
Vegetables	1676.01	8.42	22.78	120.26	279.61	427.71	189.23	34.61	0.00	0.00	0.00	0.00	0.00	1082.62
Field crops	236.00	0.00	0.00	0.00	0.00	0.00	9.51	17.94	0.00	12.44	0.00	0.00	0.00	39.89
Imp Pasture	3364.52	90.65	199.51	221.18	503.94	632.41	368.74	170.76	72.52	171.27	72.52	108.37	62.09	2673.96
Ornamentals	1950.25	267.12	321.79	481.01	629.08	711.70	535.51	520.81	359.84	418.06	359.84	305.99	233.17	5143.92
Sod/Turf	157.38	8.10	8.98	13.33	24.49	28.33	14.60	11.81	8.18	8.50	8.18	7.73	6.75	148.98
Total	66206.67	2766.04	1760.35	5826.39	8743.22	10475.29	6556.61	3247.66	2671.79	2804.55	2671.79	2669.45	1407.16	51600.30

Appendix Table 7.4.1 (Continued)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Marion														
Citrus	6280.19	53.07	10.15	422.08	650.05	907.43	512.70	247.14	186.73	27.90	186.73	203.38	248.45	3855.81
Other Fruit	1776.00	1.10	1.52	56.05	158.48	289.06	120.12	2.59	2.13	1.74	2.13	2.12	1.20	638.25
Vegetables	935.26	0.00	0.22	26.35	85.80	158.53	52.18	0.00	0.00	0.00	0.00	0.00	0.00	323.09
Field crops	3186.98	0.00	0.00	37.58	76.41	237.40	205.39	189.92	6.84	53.72	6.84	0.00	0.00	814.12
Imp Pasture	1772.24	3.30	12.95	59.24	147.84	221.40	88.16	41.74	3.70	3.02	3.70	1.36	6.11	592.53
Ornamentals	194.90	35.47	42.82	67.81	85.70	102.25	84.64	79.04	54.21	58.51	54.21	44.07	30.99	739.71
Sod/Turf	790.00	28.81	37.23	73.45	111.66	135.44	80.76	62.29	48.39	47.55	48.39	47.38	27.18	748.53
Total	14945.57	121.75	104.89	742.57	1315.95	2051.52	1143.96	622.71	302.00	192.44	302.00	298.31	313.94	7512.03
Okeechobee														
Citrus	2570.06	176.92	194.28	326.44	467.28	509.84	361.74	204.89	248.36	212.16	248.36	225.19	149.79	3325.26
Total	2570.06	176.92	194.28	326.44	467.28	509.84	361.74	204.89	248.36	212.16	248.36	225.19	149.79	3325.26
Orange														
Citrus	10240.70	477.70	365.06	987.50	1410.44	1671.20	1042.52	617.43	468.74	486.03	468.74	445.14	329.32	8769.84
Vegetables	1575.00	52.95	88.96	167.77	248.06	318.98	180.30	93.19	0.00	0.00	0.00	0.00	0.00	1150.21
Field crops	15.00	0.00	0.00	0.00	0.00	0.37	0.53	0.98	0.04	0.57	0.04	0.00	0.00	2.53
Imp Pasture	649.00	54.76	79.65	114.92	155.78	178.31	121.13	99.77	61.54	77.67	61.54	66.61	56.18	1129.89
Ornamentals	1525.95	279.96	338.25	495.72	639.14	721.74	561.42	557.53	386.93	448.74	386.93	317.50	243.36	5377.23
Sod/Turf	157.00	8.14	9.85	17.06	25.14	28.60	17.13	15.79	10.24	12.38	10.24	9.83	7.26	171.65
Total	14162.65	873.52	881.77	1782.98	2478.56	2919.20	1923.04	1384.69	927.50	1025.40	927.50	839.08	638.13	16601.35
Osceola														
Citrus	1170.01	38.97	28.68	86.57	133.30	178.60	88.96	36.41	43.04	21.31	43.04	59.36	44.18	802.41
Imp Pasture	800.00	86.89	112.96	160.75	217.23	234.61	128.17	82.55	104.27	86.89	104.27	112.96	76.03	1507.59
Total	1970.01	125.86	141.64	247.32	350.53	413.21	217.13	118.96	147.31	108.20	147.31	172.32	120.22	2310.00
Polk														
Citrus	4364.39	147.88	129.07	350.19	500.13	615.12	327.72	115.66	132.39	71.73	132.39	199.34	153.46	2875.07
Total	4364.39	147.88	129.07	350.19	500.13	615.12	327.72	115.66	132.39	71.73	132.39	199.34	153.46	2875.07

Appendix Table 7.4.1 (Continued)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Putnam														
Citrus	391.50	7.20	8.30	31.70	47.86	64.88	37.41	23.96	15.67	12.43	15.67	21.03	11.68	297.81
Other Fruit	217.50	1.47	1.83	9.23	20.66	30.49	14.64	9.64	6.11	4.93	6.11	5.30	2.40	112.81
Vegetables	4304.79	54.11	230.81	532.79	928.51	827.04	3.58	2.17	0.00	0.22	0.00	0.00	0.00	2579.22
Field crops	612.09	0.00	0.00	79.43	120.06	188.85	132.98	47.08	0.00	0.00	0.00	0.00	0.00	568.39
Imp Pasture	55.00	3.58	5.38	9.56	12.25	16.13	9.41	8.51	6.12	6.57	6.12	6.12	3.14	92.89
Ornamentals	2322.66	186.55	238.29	402.78	529.92	649.51	438.15	404.68	289.01	308.19	289.01	263.98	164.77	4164.84
Sod/Turf	20.00	0.65	0.98	1.79	2.82	3.42	2.06	1.63	1.36	1.25	1.36	1.30	0.65	19.28
Total	7923.54	253.56	485.59	1067.28	1662.07	1780.31	638.24	497.68	318.28	333.59	318.28	297.73	182.63	7835.25
St Johns														
Citrus	38.01	0.31	0.41	4.23	9.19	10.73	4.54	3.51	1.34	0.72	1.34	3.51	1.76	41.60
Other Fruit	24.00	0.30	0.38	0.94	1.95	2.91	1.45	0.98	0.52	0.46	0.52	0.57	0.33	11.30
Vegetables	17327.13	94.05	699.27	2104.67	3864.86	3882.14	280.63	0.00	0.00	0.00	0.00	0.00	0.00	10925.63
Field crops	3017.62	0.00	0.00	374.22	558.99	900.33	590.53	218.84	1.68	9.91	1.68	0.00	0.00	2656.19
Imp Pasture	81.00	0.66	0.88	9.02	19.58	22.87	9.68	7.48	2.86	1.54	2.86	7.48	3.74	88.64
Ornamentals	7.50	1.49	1.77	2.79	3.52	4.19	3.48	3.26	2.24	2.42	2.24	1.81	1.28	30.51
Sod/Turf	135.00	4.24	6.24	18.47	31.58	38.72	18.97	15.90	8.95	8.09	8.95	13.51	6.83	180.44
Total	20630.26	101.04	708.96	2514.33	4489.67	4861.90	909.28	249.96	17.59	23.15	17.59	26.88	13.93	13934.30
Seminole														
Citrus	1701.44	53.73	34.06	138.99	204.10	248.62	152.09	65.20	54.83	57.05	54.83	51.48	28.62	1143.61
Other Fruit	7.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Vegetables	399.34	0.00	25.34	46.28	90.42	121.50	54.92	0.00	0.00	0.00	0.00	0.00	0.00	338.46
Field crops	29.24	0.00	0.00	0.65	3.33	5.41	2.62	0.78	0.00	0.00	0.00	0.00	0.00	12.78
Imp Pasture	599.94	54.50	70.88	102.82	143.63	162.90	117.66	100.05	61.31	71.20	61.31	61.15	51.03	1058.43
Ornamentals	183.49	38.73	47.00	68.38	87.38	98.01	77.06	77.45	54.17	62.49	54.17	44.10	33.88	742.81
Sod/Turf	331.96	23.70	30.13	48.18	66.12	77.79	50.85	44.93	28.07	33.15	28.07	28.26	21.46	480.68
Total	3252.41	170.73	207.40	405.29	594.97	714.23	455.19	288.41	198.37	223.90	198.37	184.99	135.00	3776.83
Volusia														
Citrus	1093.20	48.80	22.51	96.62	140.97	161.54	103.36	48.56	48.72	42.73	48.72	47.88	22.50	832.91
Other Fruit	8.00	0.08	0.09	0.27	0.65	0.87	0.48	0.38	0.10	0.12	0.10	0.09	0.07	3.30
Vegetables	351.15	16.68	26.37	37.43	56.62	8.09	1.09	0.00	0.00	0.00	0.00	0.00	0.00	146.27
Field crops	83.00	0.00	0.00	11.27	18.03	27.72	17.80	6.99	0.00	0.00	0.00	0.00	0.00	81.81
Imp Pasture	277.34	1.37	12.95	8.00	30.17	35.15	22.24	10.26	2.79	11.36	2.79	0.95	1.23	139.27
Ornamentals	6130.13	421.69	522.41	813.86	1121.10	1305.26	882.17	801.68	525.63	619.14	525.63	509.26	365.90	8413.71
Sod/Turf	1458.07	91.59	116.29	186.15	265.09	303.59	194.64	179.61	111.71	134.12	111.71	109.58	82.20	1886.27
Total	9400.89	580.20	700.63	1153.60	1632.62	1842.23	1221.77	1047.48	688.94	807.46	688.94	667.76	471.91	11503.54

Appendix Table 7.4.2 Projected Agricultural Water Use for 1990 CUP Acreage Under Best Management Practices, Assuming 2-in-10 Drought Conditions, St. Johns River Water Management District (in Millions of Gallons)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Alachua														
Other Fruit	262.50	6.41	8.52	18.93	29.56	40.21	20.93	15.81	13.06	10.02	11.90	13.38	7.71	196.43
Vegetables	1042.80	0.00	0.00	29.75	95.42	184.16	62.81	0.00	0.00	0.00	0.00	0.00	0.00	372.14
Field Crops	46.67	0.00	0.00	0.00	0.00	2.15	1.77	2.28	0.00	0.00	0.00	0.00	0.00	6.21
Imp Pasture	540.00	0.79	2.04	11.87	30.36	41.90	21.70	12.90	10.51	8.83	10.51	4.18	0.11	155.68
Ornamentals	4.00	0.78	0.95	1.49	1.88	2.24	1.87	1.75	1.19	1.29	1.19	0.97	0.68	16.28
Sod/Turf	4.60	0.14	0.20	0.40	0.58	0.78	0.43	0.33	0.27	0.22	0.27	0.27	0.16	4.04
Total	1900.57	8.13	11.70	62.43	157.80	271.45	109.51	33.07	25.03	20.35	23.87	18.80	8.66	750.78
Baker														
Vegetables	5.00	0.00	0.00	0.18	0.49	0.94	0.33	0.00	0.00	0.00	0.00	0.00	0.00	1.93
Field Crops	30.00	0.00	0.00	0.00	1.47	3.42	3.42	2.44	0.00	0.00	0.00	0.00	0.00	10.75
Ornamentals	372.66	74.47	89.85	139.45	176.47	207.45	170.59	161.92	112.54	122.42	112.54	90.46	65.97	1524.11
Total	407.66	74.47	89.85	139.62	178.42	211.81	174.34	164.36	112.54	122.42	112.54	90.46	65.97	1536.79
Brevard														
Citrus	27070.65	960.91	700.01	1991.22	3027.48	3987.23	1950.23	678.24	214.06	432.83	1018.18	1344.08	1078.22	17382.70
Other Fruit	5578.47	0.00	0.00	148.67	477.44	745.04	310.82	0.00	0.00	0.00	0.00	0.00	0.00	1681.96
Imp Pasture	33772.27	3524.43	3811.75	6690.21	9066.15	9871.12	5306.48	3230.46	4161.36	3592.88	4161.36	4567.65	3160.49	61144.34
Ornamentals	42.00	6.22	7.50	11.01	14.41	15.61	10.17	7.73	8.12	7.58	8.12	7.62	5.44	109.53
Total	66463.39	4491.56	4519.26	8841.10	12585.48	14619.00	7577.70	3916.42	4383.54	4033.29	5187.66	5919.36	4244.15	80318.52
Clay														
Other Fruit	50.00	2.72	2.99	5.43	7.33	9.10	5.43	4.34	4.48	3.53	2.99	3.12	2.31	53.77
Vegetables	8.00	0.00	0.00	0.28	0.87	1.45	0.50	0.00	0.00	0.00	0.00	0.00	0.00	3.11
Imp Pasture	40.00	1.90	2.44	4.56	7.39	8.20	5.70	4.56	2.99	3.31	2.99	2.39	2.55	48.99
Sod/Turf	35.00	2.28	2.47	4.18	5.61	6.84	4.47	3.52	2.47	3.04	2.47	2.38	1.81	41.53
Total	133.00	6.90	7.90	14.46	21.19	25.59	16.10	12.42	9.94	9.89	8.45	7.89	6.67	147.40

Appendix Table 7.4.2 (Continued)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Duval														
Ornamentals	207.14	43.03	51.46	78.18	99.27	114.46	92.81	89.99	62.43	69.75	62.43	50.62	37.40	851.85
Sod/Turf	610.00	29.06	34.03	62.97	87.00	108.40	67.07	53.88	41.36	41.46	41.36	38.89	27.37	632.83
Total	817.14	72.09	85.49	141.15	186.28	222.86	159.88	143.87	103.79	111.21	103.79	89.51	64.78	1484.68
Flagler														
Other Fruit	80.00	0.00	0.00	1.74	5.65	11.08	4.56	0.00	0.00	0.00	0.00	0.00	0.00	23.03
Vegetables	4204.21	116.62	284.43	506.72	783.94	613.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2305.33
Field Crops	1607.43	0.00	0.00	209.84	314.26	493.23	357.97	126.58	0.00	0.00	0.00	0.00	0.00	1501.88
Imp Pasture	270.00	0.73	1.55	13.39	29.87	36.82	20.34	10.10	8.01	6.98	8.01	3.37	0.00	139.17
Sod/Turf	770.00	33.63	39.61	75.77	106.68	137.00	84.64	70.06	53.94	52.84	53.94	52.35	31.57	792.02
Total	6931.64	150.98	325.59	807.45	1240.40	1291.75	467.51	206.75	61.95	59.82	61.95	55.71	31.57	4761.42
Indian River														
Citrus	40087.65	1127.93	867.29	2662.61	4075.79	5615.79	2744.90	1076.94	564.86	495.49	1254.98	1773.36	1303.47	23563.42
Field Crops	3409.95	0.00	0.00	475.93	798.16	1050.01	714.83	142.59	0.00	0.00	0.00	0.00	0.00	3181.52
Imp Pasture	10300.12	1023.40	1200.93	1843.55	2699.98	3021.33	1594.00	908.82	1111.39	919.27	1111.39	1276.11	898.59	17608.75
Ornamentals	7.00	1.42	1.70	2.64	3.34	3.92	3.24	2.99	2.16	2.29	2.16	1.73	1.26	28.87
Total	53804.72	2152.75	2069.92	4984.73	7577.27	9691.06	5056.96	2131.35	1678.42	1417.05	2368.53	3051.20	2203.32	44382.56
Lake														
Citrus	57090.51	1835.41	1095.35	4269.85	6131.11	7958.46	4743.49	2564.40	2547.56	1846.41	1193.21	1551.04	924.34	36660.61
Other Fruit	1732.00	0.92	1.14	39.09	135.28	221.68	105.03	4.56	1.68	1.25	1.03	1.09	0.87	513.62
Vegetables	1676.01	8.42	22.78	120.26	279.61	427.71	189.23	34.61	0.00	0.00	0.00	0.00	0.00	1082.62
Field Crops	236.00	0.00	0.00	0.00	0.00	0.00	9.51	17.94	0.00	12.44	0.00	0.00	0.00	39.89
Imp Pasture	3364.52	90.65	199.51	221.18	503.94	632.41	368.74	170.76	72.52	171.27	72.52	108.37	62.09	2673.96
Ornamentals	1950.25	267.12	321.79	481.01	629.08	711.70	535.51	520.81	359.84	418.06	359.84	305.99	233.17	5143.92
Sod/Turf	157.38	8.10	8.98	13.33	24.49	28.33	14.60	11.81	8.18	8.50	8.18	7.73	6.75	148.98
Total	66206.67	2210.62	1649.55	5144.72	7703.50	9980.29	5966.10	3324.88	2989.79	2457.92	1634.79	1974.21	1227.22	46263.59

Appendix Table 7.4.2 (Continued)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Marion														
Citrus	6280.19	66.90	21.35	334.75	546.94	794.17	450.77	210.45	149.55	93.59	138.98	208.20	126.89	3142.52
Other Fruit	1776.00	1.03	1.34	38.60	121.26	240.73	100.16	2.42	2.01	1.56	1.86	2.04	1.26	514.27
Vegetables	935.26	0.00	0.22	26.35	85.80	158.53	52.18	0.00	0.00	0.00	0.00	0.00	0.00	323.09
Field Crops	3196.98	0.00	0.00	37.58	76.41	237.40	205.39	189.92	6.84	53.72	6.84	0.00	0.00	814.12
Imp Pasture	1772.24	3.30	12.95	59.24	147.84	221.40	88.16	41.74	3.70	3.02	3.70	1.36	6.11	592.53
Ornamentals	194.90	35.47	42.82	67.81	85.70	102.25	84.64	79.04	54.21	58.51	54.21	44.07	30.99	739.71
Sod/Turf	790.00	28.81	37.23	73.45	111.66	135.44	80.76	62.29	48.39	47.55	48.39	47.38	27.18	748.53
Total	14945.57	135.52	115.91	637.78	1175.61	1889.92	1062.08	585.86	264.69	257.95	253.97	303.05	192.43	6874.77
Okeechobee														
Citrus	2570.06	97.70	69.79	192.54	297.10	383.83	185.58	59.95	14.07	36.24	94.95	132.60	101.92	1666.27
Total	2570.06	97.70	69.79	192.54	297.10	383.83	185.58	59.95	14.07	36.24	94.95	132.60	101.92	1666.27
Orange														
Citrus	10240.70	313.66	185.80	748.31	1095.40	1432.11	860.63	461.92	489.54	332.61	220.50	265.70	200.80	6606.98
Vegetables	1575.00	52.95	88.96	167.77	248.06	318.98	180.30	93.19	0.00	0.00	0.00	0.00	0.00	1150.21
Field Crops	15.00	0.00	0.00	0.00	0.00	0.37	0.53	0.98	0.04	0.57	0.04	0.00	0.00	2.53
Imp Pasture	649.00	54.76	79.65	114.92	155.78	178.31	121.13	99.77	61.54	77.67	61.54	66.61	58.18	1129.89
Ornamentals	1525.95	279.96	338.25	495.72	639.14	721.74	561.42	557.53	386.93	448.74	386.93	317.50	243.36	5377.23
Sod/Turf	157.00	8.14	9.85	17.06	25.14	28.60	17.13	15.79	10.24	12.38	10.24	9.83	7.26	171.65
Total	14162.65	709.48	702.51	1543.79	2163.52	2680.10	1741.14	1229.17	948.30	871.97	679.25	659.64	509.60	14438.48
Osceola														
Citrus	1170.01	36.14	26.29	83.09	127.06	171.86	85.70	34.67	12.98	19.25	41.03	56.97	41.63	736.67
Imp Pasture	800.00	86.89	112.96	160.75	217.23	234.61	128.17	82.55	104.27	86.89	104.27	112.96	76.03	1507.59
Total	1970.01	123.03	139.25	243.84	344.29	406.47	213.87	117.22	117.25	106.14	145.30	169.93	117.66	2244.26
Polk														
Citrus	4364.39	131.49	95.73	306.78	437.68	588.23	292.65	80.90	30.64	55.28	126.60	171.63	141.19	2458.80
Total	4364.39	131.49	95.73	306.78	437.68	588.23	292.65	80.90	30.64	55.28	126.60	171.63	141.19	2458.80

Appendix Table 7.4.2 (Continued)

CROP	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Putnam														
Citrus	391.50	5.10	2.42	20.51	34.96	49.29	29.33	14.34	8.53	5.80	7.14	13.59	9.14	200.16
Other Fruit	217.50	2.69	2.24	8.22	18.31	27.22	14.93	10.03	6.11	4.11	4.48	5.70	3.22	107.26
Vegetables	4304.79	54.11	230.81	532.79	928.51	827.04	3.58	2.17	0.00	0.22	0.00	0.00	0.00	2579.22
Field Crops	612.09	0.00	0.00	79.43	120.06	188.85	132.98	47.08	0.00	0.00	0.00	0.00	0.00	568.39
Imp Pasture	55.00	3.58	5.38	9.56	12.25	16.13	9.41	8.51	6.12	6.57	6.12	6.12	3.14	92.89
Ornamentals	2322.66	186.55	238.29	402.78	529.92	649.51	438.15	404.68	289.01	308.19	289.01	263.98	164.77	4164.84
Sod/Turf	20.00	0.65	0.98	1.79	2.82	3.42	2.06	1.63	1.36	1.25	1.36	1.30	0.65	19.28
Total	7923.54	252.68	480.12	1055.08	1646.82	1761.44	630.45	488.44	311.13	326.15	308.11	290.70	180.91	7732.05
St Johns														
Citrus	38.01	0.00	0.21	1.55	2.37	3.72	1.96	0.00	0.00	0.00	0.21	0.00	0.00	10.01
Other Fruit	24.00	0.30	0.38	0.94	1.95	2.91	1.45	0.98	0.52	0.46	0.52	0.57	0.33	11.30
Vegetables	17327.13	94.05	699.27	2104.67	3864.86	3882.14	280.63	0.00	0.00	0.00	0.00	0.00	0.00	10925.63
Field Crops	3017.62	0.00	0.00	374.22	558.99	900.33	590.53	218.84	1.68	9.91	1.68	0.00	0.00	2656.19
Imp Pasture	81.00	0.66	0.88	9.02	19.58	22.87	9.68	7.48	2.86	1.54	2.86	7.48	3.74	88.64
Ornamentals	7.50	1.49	1.77	2.79	3.52	4.19	3.48	3.26	2.24	2.42	2.24	1.81	1.28	30.51
Sod/Turf	135.00	4.24	6.24	18.47	31.58	38.72	18.97	15.90	8.95	8.09	8.95	13.51	6.83	180.44
Total	20630.26	100.73	708.76	2511.65	4482.85	4854.88	906.70	246.45	16.25	22.43	16.46	23.37	12.18	13902.72
Seminole														
Citrus	1701.44	38.09	45.94	119.45	169.94	225.37	134.57	66.15	74.85	64.11	27.07	32.57	24.01	1022.13
Other Fruit	7.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
Vegetables	399.34	0.00	25.34	46.28	90.42	121.50	54.92	0.00	0.00	0.00	0.00	0.00	0.00	338.46
Field Crops	29.24	0.00	0.00	0.65	3.33	5.41	2.62	0.78	0.00	0.00	0.00	0.00	0.00	12.78
Imp Pasture	599.94	54.50	70.88	102.82	143.63	162.90	117.66	100.05	61.31	71.20	61.31	61.15	51.03	1058.43
Ornamentals	183.49	38.73	47.00	68.38	87.38	98.01	77.06	77.45	54.17	62.49	54.17	44.10	33.88	742.81
Sod/Turf	331.96	23.70	30.13	48.18	66.12	77.79	50.85	44.93	28.07	33.15	28.07	28.26	21.46	480.68
Total	3252.41	155.06	219.29	385.75	560.81	690.98	437.67	289.36	218.39	230.95	170.61	166.08	130.39	3655.34
Volusia														
Citrus	1093.20	34.27	20.55	82.44	117.98	153.92	92.26	51.04	51.47	35.58	23.48	29.10	19.49	711.58
Other Fruit	8.00	0.07	0.08	0.25	0.62	0.87	0.48	0.36	0.12	0.10	0.07	0.09	0.06	3.16
Vegetables	351.15	16.68	26.37	37.43	56.62	8.09	1.09	0.00	0.00	0.00	0.00	0.00	0.00	146.27
Field Crops	83.00	0.00	0.00	11.27	18.03	27.72	17.80	6.99	0.00	0.00	0.00	0.00	0.00	81.81
Imp Pasture	277.34	1.37	12.95	8.00	30.17	35.15	22.24	10.26	2.79	11.36	2.79	0.95	1.23	139.27
Ornamentals	6130.13	421.69	522.41	813.86	1121.10	1305.26	882.17	801.68	525.63	619.14	525.63	509.26	365.90	8413.71
Sod/Turf	1458.07	91.59	116.29	186.15	265.09	303.59	194.64	179.61	111.71	134.12	111.71	109.58	82.20	1886.27
Total	9400.89	565.67	698.65	1139.41	1609.61	1834.60	1210.67	1049.92	691.71	800.30	663.68	648.97	468.89	11382.07

Appendix Table 7.4.3 Projected Agricultural Water Use for Annual Water Use Survey Acreage Under Current Irrigation Technology, Assuming 2-in-10 Drought Conditions, Unadjusted Base, St Johns River Water Management District, 1990, 1995, 2010 (in Millions of Gallons)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ALACHUA															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	1180	31.40	44.20	94.08	143.68	187.21	101.73	75.06	63.38	51.25	63.38	63.40	31.69	950.45
Vegetables	1990	1352	0.00	0.00	38.57	123.72	238.76	81.43	0.00	0.00	0.00	0.00	0.00	0.00	482.48
Field Crops	1990	583	0.00	0.00	0.00	0.00	26.91	22.16	28.50	0.00	0.00	0.00	0.00	0.00	77.56
Imp. Pasture	1990	664	0.97	2.50	14.59	37.33	51.52	26.68	15.86	12.92	10.85	12.92	5.14	0.13	191.42
Ornamentals	1990	59	11.55	13.94	21.95	27.72	33.00	27.55	25.80	17.63	19.06	17.63	14.26	10.09	240.16
Sod/Turf	1990	421	13.00	18.03	36.33	52.63	71.39	39.72	30.20	24.53	20.32	24.53	24.89	14.55	370.12
Total		4259	56.91	78.68	205.52	385.07	608.78	299.27	175.42	118.45	101.47	118.45	107.70	56.47	2312.20
ALACHUA															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	1172	31.19	43.90	93.44	142.70	185.94	101.04	74.55	62.95	50.90	62.95	62.97	31.48	944.01
Vegetables	1995	1265	0.00	0.00	36.09	115.76	223.40	76.19	0.00	0.00	0.00	0.00	0.00	0.00	451.44
Field Crops	1995	341	0.00	0.00	0.00	0.00	15.74	12.96	16.67	0.00	0.00	0.00	0.00	0.00	45.37
Imp. Pasture	1995	650	0.95	2.45	14.28	36.54	50.43	26.12	15.53	12.65	10.62	12.65	5.03	0.13	187.38
Ornamentals	1995	56	10.96	13.23	20.83	26.31	31.32	26.15	24.49	16.73	18.09	16.73	13.54	9.58	227.95
Sod/Turf	1995	436	13.46	18.67	37.63	54.50	73.93	41.14	31.28	25.40	21.04	25.40	25.78	15.07	383.31
Total		3920	56.56	78.26	202.27	375.81	580.76	283.60	162.51	117.73	100.65	117.73	107.32	56.26	2239.45
ALACHUA															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	1171	31.16	43.87	93.36	142.58	185.78	100.95	74.49	62.89	50.86	62.89	62.92	31.45	943.21
Vegetables	2010	1262	0.00	0.00	36.00	115.49	222.87	76.01	0.00	0.00	0.00	0.00	0.00	0.00	450.37
Field Crops	2010	346	0.00	0.00	0.00	0.00	15.97	13.15	16.91	0.00	0.00	0.00	0.00	0.00	46.03
Imp. Pasture	2010	646	0.94	2.44	14.19	36.32	50.12	25.96	15.43	12.57	10.56	12.57	5.00	0.13	186.23
Ornamentals	2010	56	10.96	13.23	20.83	26.31	31.32	26.15	24.49	16.73	18.09	16.73	13.54	9.58	227.95
Sod/Turf	2010	435	13.43	18.63	37.54	54.38	73.76	41.04	31.21	25.34	20.99	25.34	25.72	15.04	382.43
Total		3916	56.49	78.16	201.93	375.07	579.82	283.26	162.53	117.54	100.49	117.54	107.18	56.20	2236.21

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
BAKER															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	123	0.00	0.00	4.35	12.03	23.05	8.02	0.00	0.00	0.00	0.00	0.00	0.00	47.45
Field Crops	1990	80	0.00	0.00	0.00	3.91	9.12	9.12	6.52	0.00	0.00	0.00	0.00	0.00	28.67
Imp. Pasture	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1990	414	82.73	99.82	154.91	196.04	230.46	189.52	179.87	125.02	136.00	125.02	100.50	73.28	1693.18
Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		677	82.73	99.82	159.27	211.98	262.63	206.66	186.39	125.02	136.00	125.02	100.50	73.28	1769.31
BAKER															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	120	0.00	0.00	4.25	11.74	22.49	7.82	0.00	0.00	0.00	0.00	0.00	0.00	46.30
Field Crops	1995	80	0.00	0.00	0.00	3.91	9.12	9.12	6.52	0.00	0.00	0.00	0.00	0.00	28.67
Imp. Pasture	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1995	416	83.13	100.30	155.66	196.99	231.57	190.43	180.74	125.62	136.66	125.62	100.98	73.64	1701.36
Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		670	83.13	100.30	159.91	212.63	263.19	207.38	187.26	125.62	136.66	125.62	100.98	73.64	1776.33
BAKER															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	118	0.00	0.00	4.18	11.54	22.11	7.69	0.00	0.00	0.00	0.00	0.00	0.00	45.52
Field Crops	2010	80	0.00	0.00	0.00	3.91	9.12	9.12	6.52	0.00	0.00	0.00	0.00	0.00	28.67
Imp. Pasture	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	2010	415	82.93	100.06	155.29	196.52	231.02	189.97	180.31	125.32	136.33	125.32	100.74	73.46	1697.27
Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		661	82.93	100.06	159.47	211.96	262.25	206.79	186.83	125.32	136.33	125.32	100.74	73.46	1771.47

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
BREVARD															
Citrus	1990	9063	384.91	329.44	786.94	1151.00	1444.73	792.74	345.57	452.61	272.25	452.61	532.81	400.40	7346.01
Other Fruit	1990	195	0.00	0.00	17.45	39.67	56.64	35.71	0.00	0.00	0.00	0.00	0.00	0.00	149.48
Vegetables	1990	2945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	4770	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	77071	8043.13	8699.00	15267.77	20689.71	22526.31	12110.17	7371.84	9496.69	8199.58	9496.69	10423.85	7212.30	139537.05
Ornamentals	1990	201	29.78	35.91	52.67	68.96	74.70	48.65	36.97	38.87	36.26	38.87	36.48	26.05	524.17
Sod/Turf	1990	1681	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		95926	8457.82	9064.35	16124.83	21949.35	24102.38	12987.27	7754.38	9988.16	8508.10	9988.16	10993.15	7638.76	147556.71
BREVARD															
Citrus	1995	8991	381.85	326.82	780.69	1141.86	1433.26	786.44	342.83	449.01	270.09	449.01	528.58	397.22	7287.66
Other Fruit	1995	198	0.00	0.00	17.72	40.28	57.51	36.26	0.00	0.00	0.00	0.00	0.00	0.00	151.78
Vegetables	1995	3117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	4660	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	80617	8413.19	9099.24	15970.23	21641.63	23562.74	12667.35	7711.02	9933.63	8576.84	9933.63	10903.45	7544.14	145957.08
Ornamentals	1995	201	29.78	35.91	52.67	68.96	74.70	48.65	36.97	38.87	36.26	38.87	36.48	26.05	524.17
Sod/Turf	1995	1598	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		99382	8824.82	9461.97	16821.31	22892.74	25128.20	13538.71	8090.81	10421.50	8883.19	10421.50	11468.51	7967.41	153920.68
BREVARD															
Citrus	2010	9250	392.85	336.24	803.18	1174.75	1474.54	809.10	352.70	461.95	277.87	461.95	543.81	408.66	7497.59
Other Fruit	2010	198	0.00	0.00	17.72	40.28	57.51	36.26	0.00	0.00	0.00	0.00	0.00	0.00	151.78
Vegetables	2010	3299	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	4608	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	80671	8418.83	9105.34	15980.93	21656.13	23578.52	12675.83	7716.18	9940.28	8582.59	9940.28	10910.75	7549.19	146054.85
Ornamentals	2010	201	29.78	35.91	52.67	68.96	74.70	48.65	36.97	38.87	36.26	38.87	36.48	26.05	524.17
Sod/Turf	2010	1589	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		99816	8841.46	9477.48	16854.50	22940.13	25185.27	13569.85	8105.85	10441.09	8896.72	10441.09	11491.04	7983.91	154228.38

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
CLAY																
	Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1990	13	1.59	1.52	2.65	3.28	3.67	3.00	2.26	1.52	1.69	1.52	1.48	1.13	25.31
	Vegetables	1990	58	0.00	0.00	2.04	6.30	10.55	3.63	0.00	0.00	0.00	0.00	0.00	0.00	22.52
	Field Crops	1990	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1990	160	7.60	9.78	18.25	29.54	32.80	22.81	18.25	11.95	13.25	11.95	9.56	10.21	195.95
	Ornamentals	1990	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1990	143	9.32	10.10	17.09	22.91	27.96	18.25	14.37	10.10	12.43	10.10	9.71	7.38	169.69
	Total		429	18.51	21.39	40.03	62.04	74.98	47.68	34.87	23.56	27.37	23.56	20.75	18.72	413.47
CLAY																
	Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1995	13	1.59	1.52	2.65	3.28	3.67	3.00	2.26	1.52	1.69	1.52	1.48	1.13	25.31
	Vegetables	1995	59	0.00	0.00	2.08	6.41	10.73	3.69	0.00	0.00	0.00	0.00	0.00	0.00	22.91
	Field Crops	1995	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1995	170	8.08	10.39	19.39	31.39	34.86	24.23	19.39	12.70	14.08	12.70	10.16	10.85	208.20
	Ornamentals	1995	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1995	144	9.38	10.17	17.21	23.07	28.15	18.38	14.47	10.17	12.51	10.17	9.78	7.43	170.88
	Total		446	19.05	22.07	41.32	64.15	77.41	49.30	36.11	24.38	28.29	24.38	21.42	19.41	427.29
CLAY																
	Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	2010	13	1.59	1.52	2.65	3.28	3.67	3.00	2.26	1.52	1.69	1.52	1.48	1.13	25.31
	Vegetables	2010	59	0.00	0.00	2.08	6.41	10.73	3.69	0.00	0.00	0.00	0.00	0.00	0.00	22.91
	Field Crops	2010	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	2010	173	8.22	10.57	19.73	31.94	35.47	24.66	19.73	12.92	14.33	12.92	10.34	11.04	211.87
	Ornamentals	2010	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	2010	144	9.38	10.17	17.21	23.07	28.15	18.38	14.47	10.17	12.51	10.17	9.78	7.43	170.88
	Total		449	19.20	22.26	41.66	64.71	78.03	49.73	36.46	24.60	28.54	24.60	21.60	19.60	430.97

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DUVAL															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1990	73	15.16	18.14	27.55	34.99	40.34	32.71	31.72	22.00	24.58	22.00	17.84	13.18	300.21
Sod/Turf	1990	795	37.87	44.35	82.07	113.38	141.27	87.41	70.21	53.90	54.04	53.90	50.68	35.67	824.75
Total		1396	53.03	62.48	109.62	148.37	181.61	120.12	101.93	75.90	78.62	75.90	68.52	48.85	1124.96
DUVAL															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1995	73	15.16	18.14	27.55	34.99	40.34	32.71	31.72	22.00	24.58	22.00	17.84	13.18	300.21
Sod/Turf	1995	849	40.44	47.36	87.64	121.08	150.87	93.35	74.98	57.56	57.71	57.56	54.12	38.09	880.77
Total		1450	55.60	65.49	115.20	156.07	191.21	126.05	106.70	79.57	82.29	79.57	71.96	51.28	1180.98
DUVAL															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	2010	73	15.16	18.14	27.55	34.99	40.34	32.71	31.72	22.00	24.58	22.00	17.84	13.18	300.21
Sod/Turf	2010	841	40.06	46.91	86.82	119.94	149.45	92.47	74.28	57.02	57.16	57.02	53.61	37.74	872.47
Total		1442	55.22	65.05	114.37	154.93	189.78	125.17	105.99	79.02	81.74	79.02	71.45	50.92	1172.68

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLAGER															
Citrus	1990	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	110	0.00	0.00	3.58	9.86	18.52	7.47	0.00	0.00	0.00	0.00	0.00	0.00	39.43
Vegetables	1990	4950	137.31	334.87	596.62	923.03	722.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2714.28
Field Crops	1990	410	0.00	0.00	53.52	80.15	125.80	91.31	32.29	0.00	0.00	0.00	0.00	0.00	383.08
Imp. Pasture	1990	566	1.53	3.24	28.06	62.62	77.19	42.63	21.18	16.79	14.63	16.79	7.06	0.00	291.73
Ornamentals	1990	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1990	221	9.65	11.37	21.75	30.62	39.32	24.29	20.11	15.48	15.17	15.48	15.02	9.06	227.32
Total		6276	148.50	349.48	703.54	1106.27	983.29	165.70	73.58	32.27	29.80	32.27	22.08	9.06	3655.84
FLAGER															
Citrus	1995	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	104	0.00	0.00	3.39	9.32	17.51	7.06	0.00	0.00	0.00	0.00	0.00	0.00	37.27
Vegetables	1995	4950	137.31	334.87	596.62	923.03	722.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2714.28
Field Crops	1995	404	0.00	0.00	52.74	78.98	123.96	89.97	31.81	0.00	0.00	0.00	0.00	0.00	377.47
Imp. Pasture	1995	620	1.68	3.55	30.74	68.59	84.56	46.70	23.20	18.40	16.03	18.40	7.73	0.00	319.57
Ornamentals	1995	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1995	220	9.61	11.32	21.65	30.48	39.14	24.18	20.02	15.41	15.10	15.41	14.96	9.02	226.29
Total		6308	148.60	349.74	705.14	1110.40	987.62	167.91	75.03	33.81	31.12	33.81	22.69	9.02	3674.89
FLAGER															
Citrus	2010	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	104	0.00	0.00	3.39	9.32	17.51	7.06	0.00	0.00	0.00	0.00	0.00	0.00	37.27
Vegetables	2010	4944	137.15	334.46	595.90	921.91	721.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2710.99
Field Crops	2010	404	0.00	0.00	52.74	78.98	123.96	89.97	31.81	0.00	0.00	0.00	0.00	0.00	377.47
Imp. Pasture	2010	616	1.67	3.53	30.54	68.15	84.01	46.40	23.05	18.28	15.92	18.28	7.68	0.00	317.50
Ornamentals	2010	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	2010	219	9.57	11.27	21.55	30.34	38.96	24.07	19.93	15.34	15.03	15.34	14.89	8.98	225.27
Total		6297	148.38	349.26	704.12	1108.70	986.02	167.50	74.79	33.62	30.95	33.62	22.57	8.98	3668.51

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
INDIAN RIVER															
Citrus	1990	63607	4353.90	4656.67	8292.44	11177.02	12468.88	8964.13	5583.42	6129.81	5300.37	6129.81	5552.89	3649.77	82259.12
Other Fruit	1990	141	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	2500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	4923	0.00	0.00	687.10	1152.33	1515.94	1032.01	205.88	0.00	0.00	0.00	0.00	0.00	4593.26
Imp. Pasture	1990	22195	2205.30	2587.72	3972.46	5817.98	6510.46	3434.90	1958.26	2394.84	1980.90	2394.84	2749.74	1936.29	37943.68
Ornamentals	1990	57	11.57	13.84	21.54	27.21	31.95	26.36	24.36	17.60	18.68	17.60	14.10	10.28	235.09
Sod/Turf	1990	941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		94364	6570.77	7258.23	12973.55	18174.54	20527.23	13457.40	7771.93	8542.24	7299.95	8542.24	8316.73	5596.34	125031.15
INDIAN RIVER															
Citrus	1995	63820	4368.48	4672.26	8320.21	11214.45	12510.63	8994.15	5602.12	6150.33	5318.12	6150.33	5571.49	3661.99	82534.58
Other Fruit	1995	148	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	2657	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	4527	0.00	0.00	631.83	1059.63	1394.00	948.99	189.32	0.00	0.00	0.00	0.00	0.00	4223.78
Imp. Pasture	1995	21827	2168.73	2544.81	3906.60	5721.51	6402.51	3377.95	1925.80	2355.13	1948.06	2355.13	2704.15	1904.19	37314.57
Ornamentals	1995	59	11.98	14.33	22.29	28.17	33.07	27.28	25.22	18.21	19.33	18.21	14.60	10.64	243.34
Sod/Turf	1995	1005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		94043	6549.19	7231.40	12880.94	18023.77	20340.22	13348.38	7742.45	8523.68	7285.52	8523.68	8290.23	5576.82	124316.27
INDIAN RIVER															
Citrus	2010	63678	4358.76	4661.87	8301.70	11189.50	12482.80	8974.14	5589.65	6136.85	5306.29	6136.85	5559.09	3653.84	82350.94
Other Fruit	2010	146	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	2620	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	4708	0.00	0.00	657.10	1102.00	1449.73	986.94	196.89	0.00	0.00	0.00	0.00	0.00	4392.66
Imp. Pasture	2010	21716	2157.70	2531.87	3886.73	5692.42	6369.95	3360.77	1916.00	2343.16	1938.15	2343.16	2690.40	1894.50	37124.81
Ornamentals	2010	57	11.57	13.84	21.54	27.21	31.95	26.36	24.36	17.60	18.68	17.60	14.10	10.28	235.09
Sod/Turf	2010	1003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		93928	6528.03	7207.58	12867.06	18011.13	20334.44	13348.21	7726.91	8497.40	7263.12	8497.40	8263.59	5558.62	124103.49

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
LAKE																
	Citrus	1990	25173	1054.25	531.91	2166.39	3124.72	3672.99	2321.71	1096.79	983.26	966.89	983.26	990.56	486.85	18379.56
	Other Fruit	1990	687	0.36	0.45	30.71	87.09	136.82	68.84	1.81	0.41	0.49	0.41	0.43	0.34	328.18
	Vegetables	1990	9015	45.26	122.51	646.83	1503.97	2300.63	1017.79	186.16	0.00	0.00	0.00	0.00	0.00	5823.15
	Field Crops	1990	1085	0.00	0.00	0.00	0.00	0.00	43.71	82.46	0.00	57.20	0.00	0.00	0.00	183.38
	Imp. Pasture	1990	2323	62.58	137.75	152.71	347.94	436.63	254.60	117.89	50.08	118.24	50.08	74.82	42.86	1846.20
	Ornamentals	1990	1341	183.68	221.27	330.74	432.55	489.37	368.21	358.11	247.43	287.46	247.43	210.40	160.33	3536.98
	Sod/Turf	1990	279	14.36	15.92	23.63	43.41	50.23	25.89	20.93	14.50	15.07	14.50	13.70	11.97	264.10
	Total		39903	1360.48	1029.81	3351.02	5539.69	7086.66	4100.76	1864.15	1295.68	1445.36	1295.68	1289.91	702.35	30361.56
LAKE																
	Citrus	1995	24179	1012.62	510.90	2080.84	3001.34	3527.96	2230.03	1053.48	944.43	928.72	944.43	951.44	467.62	17653.81
	Other Fruit	1995	687	0.36	0.45	30.71	87.09	136.82	68.84	1.81	0.41	0.49	0.41	0.43	0.34	328.18
	Vegetables	1995	9153	45.95	124.39	656.73	1527.00	2335.85	1033.37	189.01	0.00	0.00	0.00	0.00	0.00	5912.29
	Field Crops	1995	974	0.00	0.00	0.00	0.00	0.00	39.24	74.02	0.00	51.35	0.00	0.00	0.00	164.62
	Imp. Pasture	1995	2002	53.93	118.72	131.61	299.86	376.30	219.42	101.60	43.16	101.90	43.16	64.48	36.94	1591.09
	Ornamentals	1995	1396	191.21	230.34	344.31	450.29	509.44	383.31	372.80	257.58	299.25	257.58	219.03	166.91	3682.05
	Sod/Turf	1995	308	15.85	17.58	26.09	47.92	55.45	28.58	23.10	16.01	16.64	16.01	15.12	13.21	291.56
	Total		38699	1319.92	1002.38	3270.29	5413.50	6941.80	4002.80	1815.83	1261.59	1398.35	1261.59	1250.51	685.02	29623.59
LAKE																
	Citrus	2010	24005	1005.33	507.23	2065.87	2979.74	3502.57	2213.98	1045.90	937.64	922.03	937.64	944.60	464.26	17526.77
	Other Fruit	2010	695	0.37	0.46	31.07	88.11	138.41	69.65	1.83	0.42	0.50	0.42	0.44	0.35	332.00
	Vegetables	2010	9221	46.29	125.31	661.61	1538.34	2353.20	1041.05	190.41	0.00	0.00	0.00	0.00	0.00	5956.21
	Field Crops	2010	1004	0.00	0.00	0.00	0.00	0.00	40.45	76.30	0.00	52.93	0.00	0.00	0.00	169.69
	Imp. Pasture	2010	1998	53.83	118.48	131.35	299.26	375.54	218.98	101.40	43.08	101.70	43.08	64.36	36.86	1587.91
	Ornamentals	2010	1375	188.33	226.88	339.13	443.52	501.78	377.55	367.19	253.70	294.74	253.70	215.74	164.39	3626.66
	Sod/Turf	2010	304	15.64	17.35	25.75	47.30	54.73	28.21	22.80	15.80	16.42	15.80	14.92	13.04	287.77
	Total		38602	1309.79	995.70	3254.77	5396.27	6926.23	3989.86	1805.84	1250.63	1388.33	1250.63	1240.05	678.90	29487.01

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
MARION															
Citrus	1990	1452	12.27	2.35	97.59	150.30	209.80	118.54	57.14	43.17	6.45	43.17	47.02	57.44	845.22
Other Fruit	1990	1763	1.09	1.52	55.64	157.33	286.95	119.23	2.57	2.12	1.73	2.12	2.12	1.20	633.60
Vegetables	1990	988	0.00	0.23	27.84	90.64	167.48	55.13	0.00	0.00	0.00	0.00	0.00	0.00	341.31
Field Crops	1990	735	0.00	0.00	8.64	17.57	54.58	47.22	43.67	1.57	12.35	1.57	0.00	0.00	187.17
Imp. Pasture	1990	787	1.46	5.75	26.31	65.65	98.32	39.15	18.53	1.64	1.34	1.64	0.61	2.72	263.13
Ornamentals	1990	82	14.92	18.01	28.53	36.05	43.02	35.61	33.25	22.81	24.62	22.81	18.54	13.04	311.22
Sod/Turf	1990	722	26.33	34.03	67.13	102.05	123.79	73.80	56.93	44.22	43.45	44.22	43.31	24.84	684.10
Total		6529	56.08	61.89	311.68	619.59	983.93	488.69	212.09	115.53	89.93	115.53	111.58	99.24	3265.77
MARION															
Citrus	1995	1188	10.04	1.92	79.85	122.97	171.65	96.99	46.75	35.32	5.27	35.32	38.47	47.00	691.55
Other Fruit	1995	1775	1.10	1.53	56.02	158.40	288.90	120.04	2.59	2.13	1.74	2.13	2.13	1.21	637.92
Vegetables	1995	987	0.00	0.23	27.81	90.55	167.31	55.07	0.00	0.00	0.00	0.00	0.00	0.00	340.97
Field Crops	1995	668	0.00	0.00	7.85	15.97	49.61	42.92	39.69	1.43	11.22	1.43	0.00	0.00	170.11
Imp. Pasture	1995	850	1.58	6.21	28.42	70.91	106.19	42.29	20.02	1.78	1.44	1.78	0.65	2.93	284.20
Ornamentals	1995	82	14.92	18.01	28.53	36.05	43.02	35.61	33.25	22.81	24.62	22.81	18.54	13.04	311.22
Sod/Turf	1995	730	26.62	34.40	67.88	103.18	125.16	74.62	57.56	44.71	43.93	44.71	43.79	25.12	691.68
Total		6280	54.27	62.31	296.35	598.02	951.84	467.54	199.86	108.17	88.23	108.17	103.58	89.30	3127.64
MARION															
Citrus	2010	1141	9.64	1.85	76.69	118.10	164.86	93.15	44.90	33.92	5.07	33.92	36.95	45.14	664.19
Other Fruit	2010	1713	1.06	1.47	54.06	152.87	278.81	115.85	2.50	2.06	1.68	2.06	2.06	1.16	615.64
Vegetables	2010	978	0.00	0.22	27.56	89.72	165.78	54.57	0.00	0.00	0.00	0.00	0.00	0.00	337.86
Field Crops	2010	685	0.00	0.00	8.05	16.37	50.87	44.01	40.70	1.47	11.51	1.47	0.00	0.00	174.44
Imp. Pasture	2010	844	1.57	6.17	28.21	70.41	105.44	41.99	19.88	1.76	1.43	1.76	0.65	2.91	282.19
Ornamentals	2010	82	14.92	18.01	28.53	36.05	43.02	35.61	33.25	22.81	24.62	22.81	18.54	13.04	311.22
Sod/Turf	2010	729	26.59	34.36	67.78	103.04	124.99	74.52	57.48	44.65	43.87	44.65	43.73	25.08	690.74
Total		6172	53.78	62.09	290.88	586.56	933.77	459.70	198.71	106.66	88.18	106.66	101.92	87.34	3076.26

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
NASSAU																
	Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1990	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1990	35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1990	78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	1990	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1990	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		176	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NASSAU																
	Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1995	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1995	39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1995	81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	1995	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1995	32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		187	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NASSAU																
	Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	2010	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	2010	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	2010	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	2010	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	2010	32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
OKEECHOBEE															
Citrus	1990	4325	297.73	326.93	549.36	786.37	857.99	608.74	344.79	417.97	357.03	417.97	378.96	252.06	5595.90
Other Fruit	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	2782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		7107	297.73	326.93	549.36	786.37	857.99	608.74	344.79	417.97	357.03	417.97	378.96	252.06	5595.90
OKEECHOBEE															
Citrus	1995	4341	298.83	328.14	551.39	789.28	861.17	611.00	346.06	419.51	358.35	419.51	380.36	252.99	5616.60
Other Fruit	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	2782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		7123	298.83	328.14	551.39	789.28	861.17	611.00	346.06	419.51	358.35	419.51	380.36	252.99	5616.60
OKEECHOBEE															
Citrus	2010	4327	297.87	327.08	549.62	786.74	858.39	609.03	344.95	418.16	357.19	418.16	379.13	252.18	5598.49
Other Fruit	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	2782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		7109	297.87	327.08	549.62	786.74	858.39	609.03	344.95	418.16	357.19	418.16	379.13	252.18	5598.49

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ORANGE																
	Citrus	1990	12738	594.23	454.11	1228.33	1754.40	2078.71	1296.73	767.97	583.02	604.55	583.02	553.72	409.65	10908.44
	Other Fruit	1990	145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1990	40844	1373.18	2306.87	4350.70	6432.93	8271.73	4675.82	2416.74	0.00	0.00	0.00	0.00	0.00	29827.96
	Field Crops	1990	580	0.00	0.00	0.00	0.00	14.19	20.49	37.82	1.58	22.04	1.58	0.00	0.00	97.71
	Imp. Pasture	1990	217	18.31	26.63	38.43	52.09	59.62	40.50	33.36	20.58	25.97	20.58	22.27	19.45	377.80
	Ornamentals	1990	1339	245.67	296.82	434.99	560.84	633.32	492.64	489.23	339.53	393.76	339.53	278.61	213.54	4718.48
	Sod/Turf	1990	495	25.68	31.05	53.80	79.25	90.16	53.99	49.77	32.29	39.04	32.29	30.99	22.88	541.21
	Total		56358	2257.06	3115.48	6106.24	8879.51	11147.74	6580.18	3794.89	977.00	1085.36	977.00	885.59	665.54	46471.59
ORANGE																
	Citrus	1995	12643	589.80	450.72	1219.16	1741.32	2063.21	1287.06	762.25	578.67	600.04	578.67	549.59	406.60	10827.09
	Other Fruit	1995	153	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1995	41481	1394.59	2342.85	4418.56	6533.26	8400.73	4748.74	2454.43	0.00	0.00	0.00	0.00	0.00	30293.16
	Field Crops	1995	592	0.00	0.00	0.00	0.00	14.49	20.92	38.60	1.62	22.50	1.62	0.00	0.00	99.73
	Imp. Pasture	1995	126	10.63	15.46	22.31	30.24	34.62	23.52	19.37	11.95	15.08	11.95	12.93	11.30	219.36
	Ornamentals	1995	1253	229.89	277.75	407.05	524.82	592.64	461.00	457.81	317.72	368.47	317.72	260.71	199.83	4415.42
	Sod/Turf	1995	534	27.70	33.50	58.04	85.49	97.27	58.25	53.69	34.84	42.12	34.84	33.43	24.69	583.85
	Total		56782	2252.61	3120.28	6125.12	8915.14	11202.96	6599.49	3786.15	944.80	1048.20	944.80	856.67	642.41	46438.61
ORANGE																
	Citrus	2010	12570	586.39	448.12	1212.13	1731.27	2051.30	1279.63	757.85	575.33	596.57	575.33	546.42	404.25	10764.57
	Other Fruit	2010	154	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	2010	41588	1398.19	2348.89	4429.95	6550.11	8422.40	4760.99	2460.76	0.00	0.00	0.00	0.00	0.00	30371.30
	Field Crops	2010	592	0.00	0.00	0.00	0.00	14.49	20.92	38.60	1.62	22.50	1.62	0.00	0.00	99.73
	Imp. Pasture	2010	135	11.39	16.57	23.91	32.41	37.09	25.20	20.75	12.80	16.16	12.80	13.86	12.10	235.03
	Ornamentals	2010	1254	230.07	277.97	407.37	525.24	593.12	461.37	458.17	317.98	368.76	317.98	260.92	199.99	4416.95
	Sod/Turf	2010	531	27.54	33.31	57.71	85.01	96.72	57.92	53.39	34.64	41.88	34.64	33.25	24.55	580.57
	Total		56824	2253.58	3124.86	6131.07	8924.03	11215.12	6606.03	3789.53	942.37	1045.87	942.37	854.44	640.89	46470.15

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
OSCEOLA																
	Citrus	1990	1197	39.86	29.34	88.57	136.37	182.71	91.01	37.25	44.04	21.81	44.04	60.72	45.20	820.91
	Other Fruit	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1990	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1990	9729	1056.76	1373.73	1954.95	2641.81	2853.22	1558.68	1003.94	1268.08	1056.76	1268.08	1373.73	924.64	18334.40
	Ornamentals	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		10946	1096.62	1403.07	2043.51	2778.19	3035.93	1649.69	1041.19	1312.12	1078.57	1312.12	1434.46	969.84	19155.31
OSCEOLA																
	Citrus	1995	1155	38.46	28.31	85.46	131.59	176.30	87.81	35.94	42.49	21.04	42.49	58.59	43.61	792.11
	Other Fruit	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1995	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1995	10457	1135.84	1476.53	2101.23	2839.49	3066.72	1675.32	1079.06	1362.97	1135.84	1362.97	1476.53	993.83	19706.32
	Ornamentals	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		11620	1174.30	1504.84	2186.69	2971.08	3243.02	1763.13	1115.00	1405.46	1156.88	1405.46	1535.12	1037.45	20498.43
OSCEOLA																
	Citrus	2010	1154	38.43	28.28	85.38	131.48	176.15	87.74	35.91	42.46	21.03	42.46	58.54	43.57	791.42
	Other Fruit	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	2010	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	2010	10420	1131.82	1471.30	2093.79	2829.45	3055.87	1669.39	1075.24	1358.14	1131.82	1358.14	1471.30	990.32	19636.59
	Ornamentals	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		11582	1170.25	1499.59	2179.18	2960.92	3232.02	1757.13	1111.15	1400.60	1152.85	1400.60	1529.85	1033.89	20428.02

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
POLK																
	Citrus	1990	7079	239.84	209.33	568.02	811.18	997.71	531.56	187.59	214.71	116.38	214.71	323.37	248.90	4663.29
	Other Fruit	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1990	450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1990	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	1990	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		7684	239.84	209.33	568.02	811.18	997.71	531.56	187.59	214.71	116.38	214.71	323.37	248.90	4663.29
POLK																
	Citrus	1995	6855	232.25	202.70	550.05	785.51	966.14	514.74	181.66	207.91	112.70	207.91	313.14	241.02	4515.73
	Other Fruit	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1995	480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1995	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	1995	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		7490	232.25	202.70	550.05	785.51	966.14	514.74	181.66	207.91	112.70	207.91	313.14	241.02	4515.73
POLK																
	Citrus	2010	6858	232.28	202.73	550.13	785.63	966.28	514.82	181.68	207.94	112.71	207.94	313.18	241.06	4516.39
	Other Fruit	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	2010	480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	2010	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	2010	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		7491	232.28	202.73	550.13	785.63	966.28	514.82	181.68	207.94	112.71	207.94	313.18	241.06	4516.39

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
PUTNAM																
	Citrus	1990	46	0.85	0.98	3.72	5.62	7.62	4.40	2.82	1.84	1.46	1.84	2.47	1.37	34.99
	Other Fruit	1990	360	2.43	3.03	15.28	34.19	50.46	24.24	15.96	10.11	8.16	10.11	8.77	3.98	186.71
	Vegetables	1990	6330	79.57	339.41	783.46	1365.32	1216.12	5.25	3.16	0.00	0.32	0.00	0.00	0.00	3792.62
	Field Crops	1990	500	0.00	0.00	64.88	98.07	154.27	108.63	38.46	0.00	0.00	0.00	0.00	0.00	464.30
	Imp. Pasture	1990	914	59.56	89.34	158.83	203.50	268.05	156.34	141.45	101.77	109.21	101.77	101.77	52.12	1543.73
	Ornamentals	1990	1289	103.53	132.25	223.53	294.09	360.46	243.16	224.58	160.39	171.04	160.39	146.49	91.44	2311.34
	Sod/Turf	1990	226	7.37	11.05	20.25	31.91	38.66	23.32	18.41	15.35	14.11	15.35	14.72	7.37	217.86
	Total		9665	253.30	576.07	1269.97	2032.70	2095.63	565.33	444.84	289.46	304.30	289.46	274.23	156.28	8551.57
PUTNAM																
	Citrus	1995	54	0.99	1.14	4.37	6.60	8.95	5.16	3.31	2.16	1.71	2.16	2.90	1.61	41.08
	Other Fruit	1995	349	2.35	2.94	14.82	33.15	48.92	23.49	15.47	9.80	7.91	9.80	8.50	3.86	181.01
	Vegetables	1995	6498	81.68	348.42	804.26	1401.55	1248.40	5.39	3.25	0.00	0.32	0.00	0.00	0.00	3893.28
	Field Crops	1995	517	0.00	0.00	67.09	101.40	159.51	112.32	39.77	0.00	0.00	0.00	0.00	0.00	480.09
	Imp. Pasture	1995	834	54.34	81.52	144.93	185.69	244.59	142.66	129.07	92.87	99.65	92.87	92.87	47.55	1408.61
	Ornamentals	1995	1313	105.46	134.71	227.69	299.56	367.17	247.68	228.76	163.38	174.22	163.38	149.22	93.14	2354.38
	Sod/Turf	1995	241	7.86	11.78	21.59	34.03	41.22	24.87	19.63	16.36	15.05	16.36	15.70	7.86	232.32
	Total		9806	252.69	580.53	1284.75	2061.99	2118.75	561.58	439.25	284.57	298.88	284.57	269.19	154.02	8590.77
PUTNAM																
	Citrus	2010	54	0.99	1.14	4.37	6.60	8.95	5.16	3.31	2.16	1.71	2.16	2.90	1.61	41.08
	Other Fruit	2010	347	2.34	2.93	14.73	32.96	48.64	23.36	15.38	9.75	7.86	9.75	8.45	3.83	179.97
	Vegetables	2010	6520	81.96	349.60	806.98	1406.30	1252.62	5.41	3.26	0.00	0.33	0.00	0.00	0.00	3906.46
	Field Crops	2010	520	0.00	0.00	67.48	101.99	160.44	112.97	40.00	0.00	0.00	0.00	0.00	0.00	482.88
	Imp. Pasture	2010	830	54.08	81.13	144.24	184.80	243.41	141.97	128.45	92.42	99.18	92.42	92.42	47.33	1401.85
	Ornamentals	2010	1300	104.42	133.38	225.43	296.59	363.53	245.23	226.50	161.76	172.50	161.76	147.74	92.22	2331.07
	Sod/Turf	2010	241	7.86	11.78	21.59	34.03	41.22	24.87	19.63	16.36	15.05	16.36	15.70	7.86	232.32
	Total		9812	251.64	579.97	1284.83	2063.28	2118.82	558.98	436.52	282.45	296.63	282.45	267.22	152.85	8575.63

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ST JOHNS																
	Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1990	30	0.37	0.47	1.17	2.44	3.63	1.81	1.23	0.64	0.58	0.64	0.71	0.41	14.13
	Vegetables	1990	21535	116.94	869.15	2615.86	4803.38	4824.92	348.87	0.00	0.00	0.00	0.00	0.00	0.00	13579.11
	Field Crops	1990	2100	0.00	0.00	260.42	389.00	626.56	410.97	152.29	1.18	6.91	1.18	0.00	0.00	1848.50
	Imp. Pasture	1990	1310	10.68	14.23	145.83	316.60	369.94	156.52	120.94	46.26	24.89	46.26	120.94	60.47	1433.55
	Ornamentals	1990	110	21.82	26.00	40.92	51.66	61.51	51.08	47.78	32.87	35.55	32.87	26.58	18.83	447.48
	Sod/Turf	1990	116	3.64	5.37	15.87	27.14	33.27	16.30	13.66	7.69	6.95	7.69	11.61	5.87	155.04
	Total		25201	153.45	915.22	3080.07	5590.22	5919.83	985.55	335.91	88.63	74.88	88.63	159.84	85.58	17477.81
ST JOHNS																
	Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1995	17	0.21	0.27	0.67	1.38	2.06	1.03	0.70	0.37	0.33	0.37	0.40	0.23	8.01
	Vegetables	1995	21719	117.93	876.58	2638.21	4844.42	4866.14	351.85	0.00	0.00	0.00	0.00	0.00	0.00	13695.13
	Field Crops	1995	2039	0.00	0.00	252.86	377.70	608.36	399.03	147.87	1.14	6.71	1.14	0.00	0.00	1794.81
	Imp. Pasture	1995	1263	10.29	13.72	140.60	305.24	356.67	150.90	116.60	44.60	24.00	44.60	116.60	58.30	1382.11
	Ornamentals	1995	115	22.82	27.19	42.78	54.00	64.31	53.41	49.96	34.36	37.17	34.36	27.78	19.69	467.82
	Sod/Turf	1995	127	3.99	5.88	17.37	29.71	36.43	17.84	14.96	8.42	7.61	8.42	12.71	6.42	169.75
	Total		25280	155.24	923.63	3092.48	5612.47	5933.96	974.06	330.08	88.88	75.81	88.88	157.50	84.64	17517.63
ST JOHNS																
	Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	2010	17	0.21	0.27	0.67	1.38	2.06	1.03	0.70	0.37	0.33	0.37	0.40	0.23	8.01
	Vegetables	2010	21752	118.11	877.91	2642.22	4851.78	4873.54	352.38	0.00	0.00	0.00	0.00	0.00	0.00	13715.94
	Field Crops	2010	2040	0.00	0.00	252.98	377.89	608.65	399.23	147.94	1.14	6.71	1.14	0.00	0.00	1795.68
	Imp. Pasture	2010	1212	9.88	13.16	134.92	292.92	342.27	144.81	111.89	42.80	23.03	42.80	111.89	55.95	1326.30
	Ornamentals	2010	116	23.01	27.42	43.15	54.47	64.87	53.87	50.39	34.66	37.49	34.66	28.03	19.86	471.89
	Sod/Turf	2010	126	3.95	5.83	17.23	29.48	36.14	17.70	14.84	8.35	7.55	8.35	12.61	6.37	168.41
	Total		25263	155.17	924.59	3091.17	5607.92	5927.52	969.02	325.76	87.31	75.11	87.31	152.93	82.41	17486.24

Appendix Table 7.4.3 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
SEMINOLE															
Citrus	1990	2084	65.81	41.72	170.24	250.00	304.53	186.29	79.86	67.17	69.88	67.17	63.06	35.05	1400.78
Other Fruit	1990	24	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Vegetables	1990	2608	0.00	165.50	302.27	590.48	793.48	358.68	0.00	0.00	0.00	0.00	0.00	0.00	2210.41
Field Crops	1990	88	0.00	0.00	1.94	10.03	16.27	7.88	2.35	0.00	0.00	0.00	0.00	0.00	38.47
Imp. Pasture	1990	3847	349.50	454.48	659.34	920.97	1044.58	754.44	641.56	393.12	456.56	393.12	392.09	327.23	6786.99
Ornamentals	1990	740	156.21	189.54	275.75	352.40	395.26	310.78	312.34	218.45	252.04	218.45	177.85	136.64	2995.71
Sod/Turf	1990	427	30.49	38.75	61.97	85.05	100.06	65.40	57.79	36.10	42.64	36.10	36.36	27.61	618.30
Total		9818	602.20	890.00	1471.51	2208.92	2654.19	1683.46	1093.90	714.84	821.11	714.84	669.36	526.53	14050.86
SEMINOLE															
Citrus	1995	1878	59.31	37.60	153.41	225.28	274.43	167.87	71.96	60.53	62.97	60.53	56.83	31.59	1262.32
Other Fruit	1995	27	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
Vegetables	1995	2464	0.00	156.37	285.58	557.87	749.67	338.87	0.00	0.00	0.00	0.00	0.00	0.00	2088.36
Field Crops	1995	84	0.00	0.00	1.86	9.57	15.53	7.52	2.25	0.00	0.00	0.00	0.00	0.00	36.72
Imp. Pasture	1995	3429	311.52	405.10	587.70	820.90	931.08	672.46	571.85	350.41	406.95	350.41	349.48	291.67	6049.54
Ornamentals	1995	740	156.21	189.54	275.75	352.40	395.26	310.78	312.34	218.45	252.04	218.45	177.85	136.64	2995.71
Sod/Turf	1995	440	31.42	39.93	63.85	87.63	103.11	67.39	59.55	37.20	43.93	37.20	37.47	28.45	637.13
Total		9062	558.67	828.53	1368.15	2053.67	2469.08	1564.90	1017.95	666.59	765.89	666.59	621.63	488.35	13070.00
SEMINOLE															
Citrus	2010	1816	60.51	38.36	156.52	229.84	279.99	171.27	73.42	61.75	64.24	61.75	57.98	32.23	1287.86
Other Fruit	2010	27	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
Vegetables	2010	2505	0.00	158.97	290.33	567.16	762.15	344.51	0.00	0.00	0.00	0.00	0.00	0.00	2123.11
Field Crops	2010	84	0.00	0.00	1.86	9.57	15.53	7.52	2.25	0.00	0.00	0.00	0.00	0.00	36.72
Imp. Pasture	2010	3114	282.91	367.89	533.71	745.49	845.54	610.69	519.32	318.22	369.57	318.22	317.38	264.88	5493.81
Ornamentals	2010	740	156.21	189.54	275.75	352.40	395.26	310.78	312.34	218.45	252.04	218.45	177.85	136.64	2995.71
Sod/Turf	2010	439	31.34	39.84	63.71	87.44	102.87	67.24	59.41	37.12	43.83	37.12	37.38	28.38	635.68
Total		8825	531.19	794.59	1321.87	1991.90	2401.34	1512.01	966.74	635.54	729.68	635.54	590.59	462.13	12573.11

Appendix Table 7.4.3 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
VOLUSIA																
	Citrus	1990	637	28.44	13.12	56.30	82.14	94.13	60.23	28.30	28.38	24.90	28.38	27.90	13.12	485.33
	Other Fruit	1990	105	1.01	1.23	3.53	8.48	11.46	6.31	4.99	1.29	1.55	1.29	1.23	0.91	43.28
	Vegetables	1990	1060	50.34	79.60	113.00	170.91	24.42	3.28	0.00	0.00	0.00	0.00	0.00	0.00	441.54
	Field Crops	1990	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1990	417	2.06	19.47	12.03	45.36	52.86	33.44	15.43	4.19	17.08	4.19	1.43	1.86	209.40
	Ornamentals	1990	5518	379.58	470.24	732.57	1009.13	1174.95	794.10	721.64	473.11	557.32	473.11	458.44	329.37	7573.57
	Sod/Turf	1990	1178	74.00	93.96	150.40	214.17	245.27	157.25	145.11	90.26	108.35	90.26	88.53	66.42	1523.97
	Total		8916	535.43	677.62	1067.82	1530.20	1603.09	1054.60	915.46	597.24	709.20	597.24	577.53	411.66	10277.08
VOLUSIA																
	Citrus	1995	744	33.21	15.32	65.75	95.94	109.94	70.35	33.05	33.15	29.08	33.15	32.59	15.32	566.85
	Other Fruit	1995	130	1.25	1.53	4.37	10.50	14.19	7.82	6.18	1.59	1.92	1.59	1.53	1.12	53.58
	Vegetables	1995	1033	49.06	77.57	110.12	166.56	23.80	3.19	0.00	0.00	0.00	0.00	0.00	0.00	430.30
	Field Crops	1995	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1995	433	2.14	20.22	12.49	47.10	54.89	34.72	16.02	4.36	17.74	4.36	1.48	1.93	217.44
	Ornamentals	1995	5707	392.58	486.35	757.66	1043.70	1215.19	821.29	746.36	489.32	576.41	489.32	474.14	340.65	7832.97
	Sod/Turf	1995	1210	76.01	96.51	154.48	219.99	251.93	161.52	149.05	92.71	111.30	92.71	90.93	68.22	1565.36
	Total		9258	554.26	697.50	1104.88	1583.78	1669.94	1098.89	950.65	621.13	736.44	621.13	600.67	427.24	10666.50
VOLUSIA																
	Citrus	2010	755	33.70	15.55	66.73	97.36	111.57	71.39	33.54	33.64	29.51	33.64	33.07	15.55	575.23
	Other Fruit	2010	139	1.34	1.63	4.67	11.22	15.17	8.36	6.60	1.70	2.05	1.70	1.63	1.20	57.29
	Vegetables	2010	1054	50.05	79.14	112.36	169.95	24.28	3.26	0.00	0.00	0.00	0.00	0.00	0.00	439.04
	Field Crops	2010	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	2010	471	2.33	22.00	13.59	51.23	59.70	37.76	17.43	4.74	19.29	4.74	1.62	2.10	236.52
	Ornamentals	2010	5730	394.17	488.31	760.71	1047.90	1220.09	824.60	749.37	491.29	578.73	491.29	476.05	342.02	7864.54
	Sod/Turf	2010	1186	74.50	94.60	151.42	215.63	246.94	158.32	146.09	90.87	109.09	90.87	89.13	66.87	1534.32
	Total		9336	556.09	701.23	1109.48	1593.29	1677.75	1103.69	953.03	622.25	738.67	622.25	601.49	427.73	10706.94

Appendix Table 7.4.4 Projected Agricultural Water Use for Annual Water Use Survey Acreage Under Best Management Practices, Assuming 2-in-10 Drought Conditions, Unadjusted Base, St. Johns River Water Management District, 1990, 1995 and 2010 (in Millions of Gallons)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ALACHUA															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	1180	28.83	38.29	85.10	132.88	180.78	94.08	71.07	58.68	45.03	53.49	60.12	34.64	882.99
Vegetables	1990	1352	0.00	0.00	38.57	123.72	238.76	81.43	0.00	0.00	0.00	0.00	0.00	0.00	482.49
Field Crops	1990	583	0.00	0.00	0.00	0.00	26.91	22.16	28.50	0.00	0.00	0.00	0.00	0.00	77.56
Imp. Pasture	1990	664	0.97	2.50	14.59	37.33	51.52	26.68	15.86	12.92	10.85	12.92	5.14	0.13	191.42
Ornamentals	1990	59	11.55	13.94	21.95	27.72	33.00	27.55	25.80	17.63	19.06	17.63	14.26	10.09	240.16
Sod/Turf	1990	421	13.00	18.03	36.33	52.63	71.39	39.72	30.20	24.53	20.32	24.53	24.89	14.55	370.12
Total		4259	54.34	72.76	196.54	374.27	602.35	291.63	171.43	113.76	95.25	108.56	104.42	59.42	2244.74
ALACHUA															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	1172	28.63	38.03	84.52	131.98	179.55	93.44	70.59	58.28	44.72	53.13	59.71	34.41	877.01
Vegetables	1995	1265	0.00	0.00	36.09	115.76	223.40	76.19	0.00	0.00	0.00	0.00	0.00	0.00	451.44
Field Crops	1995	341	0.00	0.00	0.00	0.00	15.74	12.96	16.67	0.00	0.00	0.00	0.00	0.00	45.37
Imp. Pasture	1995	650	0.95	2.45	14.28	36.54	50.43	26.12	15.53	12.65	10.62	12.65	5.03	0.13	187.38
Ornamentals	1995	56	10.96	13.23	20.83	26.31	31.32	26.15	24.49	16.73	18.09	16.73	13.54	9.58	227.95
Sod/Turf	1995	436	13.46	18.67	37.63	54.50	73.93	41.14	31.28	25.40	21.04	25.40	25.78	15.07	383.31
Total		3920	54.00	72.39	193.35	365.09	574.37	276.00	158.55	113.06	94.47	107.91	104.06	59.19	2172.45
ALACHUA															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	1171	28.61	38.00	84.45	131.87	179.40	93.36	70.53	58.23	44.69	53.08	59.66	34.38	876.26
Vegetables	2010	1262	0.00	0.00	36.00	115.49	222.87	76.01	0.00	0.00	0.00	0.00	0.00	0.00	450.37
Field Crops	2010	346	0.00	0.00	0.00	0.00	15.97	13.15	16.91	0.00	0.00	0.00	0.00	0.00	46.03
Imp. Pasture	2010	646	0.94	2.44	14.19	36.32	50.12	25.96	15.43	12.57	10.56	12.57	5.00	0.13	186.23
Ornamentals	2010	56	10.96	13.23	20.83	26.31	31.32	26.15	24.49	16.73	18.09	16.73	13.54	9.58	227.95
Sod/Turf	2010	435	13.43	18.63	37.54	54.38	73.76	41.04	31.21	25.34	20.99	25.34	25.72	15.04	382.43
Total		3916	53.94	72.30	193.02	364.35	573.44	275.68	158.57	112.88	94.32	107.73	103.92	59.12	2169.26

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
BAKER															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	123	0.00	0.00	4.35	12.03	23.05	8.02	0.00	0.00	0.00	0.00	0.00	0.00	47.45
Field Crops	1990	80	0.00	0.00	0.00	3.91	9.12	9.12	6.52	0.00	0.00	0.00	0.00	0.00	28.67
Imp. Pasture	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1990	414	82.73	99.82	154.91	196.04	230.46	189.52	179.87	125.02	136.00	125.02	100.50	73.28	1693.18
Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		677	82.73	99.82	159.27	211.98	262.63	206.66	186.39	125.02	136.00	125.02	100.50	73.28	1769.31
BAKER															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	120	0.00	0.00	4.25	11.74	22.49	7.82	0.00	0.00	0.00	0.00	0.00	0.00	46.30
Field Crops	1995	80	0.00	0.00	0.00	3.91	9.12	9.12	6.52	0.00	0.00	0.00	0.00	0.00	28.67
Imp. Pasture	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1995	416	83.13	100.30	155.66	196.99	231.57	190.43	180.74	125.62	136.66	125.62	100.98	73.64	1701.36
Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		670	83.13	100.30	159.91	212.63	263.19	207.38	187.26	125.62	136.66	125.62	100.98	73.64	1776.33
BAKER															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	118	0.00	0.00	4.18	11.54	22.11	7.69	0.00	0.00	0.00	0.00	0.00	0.00	45.52
Field Crops	2010	80	0.00	0.00	0.00	3.91	9.12	9.12	6.52	0.00	0.00	0.00	0.00	0.00	28.67
Imp. Pasture	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	2010	415	82.93	100.06	155.29	196.52	231.02	189.97	180.31	125.32	136.33	125.32	100.74	73.46	1697.27
Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		661	82.93	100.06	159.47	211.96	262.25	206.79	186.83	125.32	136.33	125.32	100.74	73.46	1771.47

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
BREVARD															
Citrus	1990	9063	321.74	234.37	666.67	1013.61	1334.89	652.90	227.03	71.69	144.92	340.86	449.98	360.98	5819.62
Other Fruit	1990	195	0.00	0.00	5.20	16.69	26.04	10.87	0.00	0.00	0.00	0.00	0.00	0.00	58.80
Vegetables	1990	2945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	4770	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	77071	8043.13	8699.00	15267.77	20689.71	22526.31	12110.17	7371.84	9496.69	8199.58	9496.69	10423.85	7212.30	139537.05
Ornamentals	1990	201	29.78	35.91	52.67	68.96	74.70	48.65	36.97	38.87	36.26	38.87	36.48	26.05	524.17
Sod/Turf	1990	1681	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		95926	8394.65	8969.28	15992.31	21788.97	23961.94	12822.58	7635.84	9607.24	8380.76	9876.41	10910.31	7599.34	145939.64
BREVARD															
Citrus	1995	8991	319.18	232.51	661.38	1005.55	1324.28	647.71	225.22	71.12	143.77	338.15	446.40	358.11	5773.39
Other Fruit	1995	198	0.00	0.00	5.28	16.95	26.44	11.03	0.00	0.00	0.00	0.00	0.00	0.00	59.70
Vegetables	1995	3117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	4660	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	80617	8413.19	9099.24	15970.23	21641.63	23562.74	12667.35	7711.02	9933.63	8576.84	9933.63	10903.45	7544.14	145957.08
Ornamentals	1995	201	29.78	35.91	52.67	68.96	74.70	48.65	36.97	38.87	36.26	38.87	36.48	26.05	524.17
Sod/Turf	1995	1598	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		99382	8762.15	9367.65	16689.55	22733.10	24988.17	13374.75	7973.21	10043.61	8756.87	10310.64	11386.33	7928.30	152314.34
BREVARD															
Citrus	2010	9250	328.38	239.20	680.43	1034.52	1362.43	666.37	231.71	73.17	147.91	347.89	459.28	368.43	5939.70
Other Fruit	2010	198	0.00	0.00	5.28	16.95	26.44	11.03	0.00	0.00	0.00	0.00	0.00	0.00	59.70
Vegetables	2010	3299	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	4608	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	80671	8418.83	9105.34	15980.93	21656.13	23578.52	12675.83	7716.18	9940.28	8582.59	9940.28	10910.75	7549.19	146054.85
Ornamentals	2010	201	29.78	35.91	52.67	68.96	74.70	48.65	36.97	38.87	36.26	38.87	36.48	26.05	524.17
Sod/Turf	2010	1589	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		99816	8776.98	9380.45	16719.30	22776.56	25042.10	13401.89	7984.86	10052.31	8766.76	10327.04	11406.50	7943.67	152578.42

Appendix Table 7.4.4 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
CLAY																
	Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1990	13	0.71	0.78	1.41	1.91	2.36	1.41	1.13	1.16	0.92	0.78	0.81	0.60	13.98
	Vegetables	1990	58	0.00	0.00	2.04	6.30	10.55	3.63	0.00	0.00	0.00	0.00	0.00	0.00	22.52
	Field Crops	1990	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1990	160	7.60	9.78	18.25	29.54	32.80	22.81	18.25	11.95	13.25	11.95	9.56	10.21	195.95
	Ornamentals	1990	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1990	143	9.32	10.10	17.09	22.91	27.96	18.25	14.37	10.10	12.43	10.10	9.71	7.38	169.69
	Total		429	17.63	20.65	38.79	60.66	73.68	46.10	33.74	23.21	26.60	22.82	20.08	18.19	402.14
CLAY																
	Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	1995	13	0.71	0.78	1.41	1.91	2.36	1.41	1.13	1.16	0.92	0.78	0.81	0.60	13.98
	Vegetables	1995	59	0.00	0.00	2.08	6.41	10.73	3.69	0.00	0.00	0.00	0.00	0.00	0.00	22.91
	Field Crops	1995	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1995	170	8.08	10.39	19.39	31.39	34.86	24.23	19.39	12.70	14.08	12.70	10.16	10.85	208.20
	Ornamentals	1995	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1995	144	9.38	10.17	17.21	23.07	28.15	18.38	14.47	10.17	12.51	10.17	9.78	7.43	170.88
	Total		446	18.17	21.33	40.09	62.77	76.10	47.71	34.98	24.03	27.51	23.64	20.75	18.88	415.96
CLAY																
	Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Fruit	2010	13	0.71	0.78	1.41	1.91	2.36	1.41	1.13	1.16	0.92	0.78	0.81	0.60	13.98
	Vegetables	2010	59	0.00	0.00	2.08	6.41	10.73	3.69	0.00	0.00	0.00	0.00	0.00	0.00	22.91
	Field Crops	2010	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	2010	173	8.22	10.57	19.73	31.94	35.47	24.66	19.73	12.92	14.33	12.92	10.34	11.04	211.87
	Ornamentals	2010	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	2010	144	9.38	10.17	17.21	23.07	28.15	18.38	14.47	10.17	12.51	10.17	9.78	7.43	170.88
	Total		449	18.31	21.51	40.43	63.33	76.72	48.14	35.33	24.25	27.76	23.86	20.93	19.07	419.64

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DUVAL															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1990	73	15.16	18.14	27.55	34.99	40.34	32.71	31.72	22.00	24.58	22.00	17.84	13.18	300.21
Sod/Turf	1990	795	37.87	44.35	82.07	113.38	141.27	87.41	70.21	53.90	54.04	53.90	50.68	35.67	824.75
Total		1396	53.03	62.48	109.62	148.37	181.61	120.12	101.93	75.90	78.62	75.90	68.52	48.85	1124.96
DUVAL															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1995	73	15.16	18.14	27.55	34.99	40.34	32.71	31.72	22.00	24.58	22.00	17.84	13.18	300.21
Sod/Turf	1995	849	40.44	47.36	87.64	121.08	150.87	93.35	74.98	57.56	57.71	57.56	54.12	38.09	880.77
Total		1450	55.60	65.49	115.20	156.07	191.21	126.05	106.70	79.57	82.29	79.57	71.96	51.28	1180.98
DUVAL															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	2010	73	15.16	18.14	27.55	34.99	40.34	32.71	31.72	22.00	24.58	22.00	17.84	13.18	300.21
Sod/Turf	2010	841	40.06	46.91	86.82	119.94	149.45	92.47	74.28	57.02	57.16	57.02	53.61	37.74	872.47
Total		1442	55.22	65.05	114.37	154.93	189.78	125.17	105.99	79.02	81.74	79.02	71.45	50.92	1172.68

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLAGER															
Citrus	1990	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	110	0.00	0.00	2.39	7.77	15.23	6.27	0.00	0.00	0.00	0.00	0.00	0.00	31.66
Vegetables	1990	4950	137.31	334.87	596.62	923.03	722.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2714.28
Field Crops	1990	410	0.00	0.00	53.52	80.15	125.80	91.31	32.29	0.00	0.00	0.00	0.00	0.00	383.08
Imp. Pasture	1990	566	1.53	3.24	28.06	62.62	77.19	42.63	21.18	16.79	14.63	16.79	7.06	0.00	291.73
Ornamentals	1990	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1990	221	9.65	11.37	21.75	30.62	39.32	24.29	20.11	15.48	15.17	15.48	15.02	9.06	227.32
Total		6276	148.50	349.48	702.35	1104.18	980.00	164.50	73.58	32.27	29.80	32.27	22.08	9.06	3648.08
FLAGER															
Citrus	1995	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	104	0.00	0.00	2.26	7.34	14.40	5.93	0.00	0.00	0.00	0.00	0.00	0.00	29.94
Vegetables	1995	4950	137.31	334.87	596.62	923.03	722.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2714.28
Field Crops	1995	404	0.00	0.00	52.74	78.98	123.96	89.97	31.81	0.00	0.00	0.00	0.00	0.00	377.47
Imp. Pasture	1995	620	1.68	3.55	30.74	68.59	84.56	46.70	23.20	18.40	16.03	18.40	7.73	0.00	319.57
Ornamentals	1995	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1995	220	9.61	11.32	21.65	30.48	39.14	24.18	20.02	15.41	15.10	15.41	14.96	9.02	226.29
Total		6308	148.60	349.74	704.01	1108.42	984.52	166.78	75.03	33.81	31.12	33.81	22.69	9.02	3667.55
FLAGER															
Citrus	2010	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	104	0.00	0.00	2.26	7.34	14.40	5.93	0.00	0.00	0.00	0.00	0.00	0.00	29.94
Vegetables	2010	4944	137.15	334.46	595.90	921.91	721.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2710.99
Field Crops	2010	404	0.00	0.00	52.74	78.98	123.96	89.97	31.81	0.00	0.00	0.00	0.00	0.00	377.47
Imp. Pasture	2010	616	1.67	3.53	30.54	68.15	84.01	46.40	23.05	18.28	15.92	18.28	7.68	0.00	317.50
Ornamentals	2010	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	2010	219	9.57	11.27	21.55	30.34	38.96	24.07	19.93	15.34	15.03	15.34	14.89	8.98	225.27
Total		6297	148.38	349.26	702.99	1106.72	982.92	166.37	74.79	33.62	30.95	33.62	22.57	8.98	3661.17

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
INDIAN RIVER															
Citrus	1990	63607	1789.90	1375.82	4224.78	6466.92	8910.70	4355.17	1708.48	896.22	786.18	1991.54	2813.97	2068.50	37388.19
Other Fruit	1990	141	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	2500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	4923	0.00	0.00	687.10	1152.33	1515.94	1032.01	205.88	0.00	0.00	0.00	0.00	0.00	4593.26
Imp. Pasture	1990	22195	2205.30	2587.72	3972.46	5817.98	6510.46	3434.90	1958.26	2394.84	1980.90	2394.84	2749.74	1936.29	37943.68
Ornamentals	1990	57	11.57	13.84	21.54	27.21	31.95	26.36	24.36	17.60	18.68	17.60	14.10	10.28	235.09
Sod/Turf	1990	941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		94364	4006.77	3977.38	8905.88	13464.44	16969.06	8848.44	3896.99	3308.66	2785.77	4403.97	5577.82	4015.07	80160.23
INDIAN RIVER															
Citrus	1995	63820	1795.89	1380.43	4238.92	6488.58	8940.54	4369.76	1714.21	899.22	788.82	1998.20	2823.40	2075.43	37513.40
Other Fruit	1995	148	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	2657	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	4527	0.00	0.00	631.83	1059.63	1394.00	948.99	189.32	0.00	0.00	0.00	0.00	0.00	4223.78
Imp. Pasture	1995	21827	2168.73	2544.81	3906.60	5721.51	6402.51	3377.95	1925.80	2355.13	1948.06	2355.13	2704.15	1904.19	37314.57
Ornamentals	1995	59	11.98	14.33	22.29	28.17	33.07	27.28	25.22	18.21	19.33	18.21	14.60	10.64	243.34
Sod/Turf	1995	1005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		94043	3976.60	3939.57	8799.65	13297.89	16770.13	8723.98	3854.54	3272.57	2756.21	4371.55	5542.14	3990.25	79295.08
INDIAN RIVER															
Citrus	2010	63678	1791.90	1377.36	4229.49	6474.14	8920.65	4360.03	1710.39	897.22	787.06	1993.76	2817.11	2070.81	37429.93
Other Fruit	2010	146	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	2620	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	4708	0.00	0.00	657.10	1102.00	1449.73	986.94	196.89	0.00	0.00	0.00	0.00	0.00	4392.66
Imp. Pasture	2010	21716	2157.70	2531.87	3886.73	5692.42	6369.95	3360.77	1916.00	2343.16	1938.15	2343.16	2690.40	1894.50	37124.81
Ornamentals	2010	57	11.57	13.84	21.54	27.21	31.95	26.36	24.36	17.60	18.68	17.60	14.10	10.28	235.09
Sod/Turf	2010	1003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		93928	3961.17	3923.07	8794.86	13295.77	16772.29	8734.10	3847.65	3257.98	2743.89	4354.51	5521.61	3975.59	79182.48

Appendix Table 7.4.4 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
LAKE																
	Citrus	1990	25173	809.31	483.07	1882.69	2703.33	3509.12	2091.62	1130.77	1123.22	814.09	526.12	683.95	407.55	16164.84
	Other Fruit	1990	687	0.36	0.45	15.51	53.66	87.93	41.66	1.81	0.67	0.49	0.41	0.43	0.34	203.73
	Vegetables	1990	9015	45.26	122.51	646.83	1503.97	2300.63	1017.79	186.16	0.00	0.00	0.00	0.00	0.00	5823.15
	Field Crops	1990	1085	0.00	0.00	0.00	0.00	0.00	43.71	82.46	0.00	57.20	0.00	0.00	0.00	183.38
	Imp. Pasture	1990	2323	62.58	137.75	152.71	347.94	436.63	254.60	117.89	50.08	118.24	50.08	74.82	42.86	1846.20
	Ornamentals	1990	1341	183.68	221.27	330.74	432.55	489.37	368.21	358.11	247.43	287.46	247.43	210.40	160.33	3536.98
	Sod/Turf	1990	279	14.36	15.92	23.63	43.41	50.23	25.89	20.93	14.50	15.07	14.50	13.70	11.97	264.10
	Total		39903	1115.55	980.98	3052.11	5084.87	6873.90	3843.49	1898.13	1435.90	1292.56	838.54	983.31	623.05	28022.39
LAKE																
	Citrus	1995	24179	777.35	463.99	1808.35	2596.58	3370.55	2009.03	1086.12	1078.87	781.95	505.34	656.94	391.46	15526.54
	Other Fruit	1995	687	0.36	0.45	15.51	53.66	87.93	41.66	1.81	0.67	0.49	0.41	0.43	0.34	203.73
	Vegetables	1995	9153	45.95	124.39	656.73	1527.00	2335.85	1033.37	189.01	0.00	0.00	0.00	0.00	0.00	5912.29
	Field Crops	1995	974	0.00	0.00	0.00	0.00	0.00	39.24	74.02	0.00	51.35	0.00	0.00	0.00	164.62
	Imp. Pasture	1995	2002	53.93	118.72	131.61	299.86	376.30	219.42	101.60	43.16	101.90	43.16	64.48	36.94	1591.09
	Ornamentals	1995	1396	191.21	230.34	344.31	450.29	509.44	383.31	372.80	257.58	299.25	257.58	219.03	166.91	3682.05
	Sod/Turf	1995	308	15.85	17.58	26.09	47.92	55.45	28.58	23.10	16.01	16.64	16.01	15.12	13.21	291.56
	Total		38699	1084.66	955.47	2982.59	4975.32	6735.51	3754.62	1848.47	1396.28	1251.58	822.50	956.01	608.85	27371.87
LAKE																
	Citrus	2010	24005	771.76	460.66	1795.33	2577.90	3346.30	1994.58	1078.30	1071.10	776.32	501.70	652.22	388.64	15414.81
	Other Fruit	2010	695	0.37	0.46	15.69	54.29	88.95	42.14	1.83	0.67	0.50	0.42	0.44	0.35	206.10
	Vegetables	2010	9221	46.29	125.31	661.61	1538.34	2353.20	1041.05	190.41	0.00	0.00	0.00	0.00	0.00	5956.21
	Field Crops	2010	1004	0.00	0.00	0.00	0.00	0.00	40.45	76.30	0.00	52.93	0.00	0.00	0.00	169.69
	Imp. Pasture	2010	1998	53.83	118.48	131.35	299.26	375.54	218.98	101.40	43.08	101.70	43.08	64.36	36.86	1587.91
	Ornamentals	2010	1375	188.33	226.88	339.13	443.52	501.78	377.55	367.19	253.70	294.74	253.70	215.74	164.39	3626.66
	Sod/Turf	2010	304	15.64	17.35	25.75	47.30	54.73	28.21	22.80	15.80	16.42	15.80	14.92	13.04	287.77
	Total		38602	1076.22	949.13	2968.86	4960.61	6720.50	3742.96	1838.25	1384.36	1242.62	814.70	947.67	603.29	27249.15

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
MARION															
Citrus	1990	1452	15.46	4.94	77.39	126.45	183.62	104.22	48.66	34.57	21.63	32.13	48.13	29.34	726.57
Other Fruit	1990	1763	1.02	1.34	38.31	120.38	238.97	99.43	2.40	1.99	1.55	1.85	2.03	1.25	510.53
Vegetables	1990	988	0.00	0.23	27.84	90.64	167.48	55.13	0.00	0.00	0.00	0.00	0.00	0.00	341.31
Field Crops	1990	735	0.00	0.00	8.64	17.57	54.58	47.22	43.67	1.57	12.35	1.57	0.00	0.00	187.17
Imp. Pasture	1990	787	1.46	5.75	26.31	65.65	98.32	39.15	18.53	1.64	1.34	1.84	0.81	2.72	263.13
Ornamentals	1990	82	14.92	18.01	28.53	36.05	43.02	35.61	33.25	22.81	24.62	22.81	18.54	13.04	311.22
Sod/Turf	1990	722	26.33	34.03	67.13	102.05	123.79	73.80	56.93	44.22	43.45	44.22	43.31	24.84	684.10
Total		6529	59.21	64.30	274.15	558.79	909.78	454.58	203.44	106.81	104.94	104.23	112.61	71.20	3024.03
MARION															
Citrus	1995	1188	12.65	4.04	63.32	103.46	150.23	85.27	39.81	28.29	17.70	26.29	39.38	24.01	594.46
Other Fruit	1995	1775	1.03	1.35	38.57	121.20	240.60	100.11	2.41	2.01	1.56	1.86	2.04	1.26	514.00
Vegetables	1995	987	0.00	0.23	27.81	90.55	167.31	55.07	0.00	0.00	0.00	0.00	0.00	0.00	340.97
Field Crops	1995	668	0.00	0.00	7.85	15.97	49.61	42.92	39.69	1.43	11.22	1.43	0.00	0.00	170.11
Imp. Pasture	1995	850	1.58	6.21	28.42	70.91	106.19	42.29	20.02	1.78	1.44	1.78	0.65	2.93	284.20
Ornamentals	1995	82	14.92	18.01	28.53	36.05	43.02	35.61	33.25	22.81	24.62	22.81	18.54	13.04	311.22
Sod/Turf	1995	730	26.62	34.40	67.88	103.18	125.16	74.62	57.56	44.71	43.93	44.71	43.79	25.12	691.68
Total		6280	56.81	64.25	262.37	541.31	882.12	435.90	192.74	101.02	100.48	98.88	104.41	66.36	2906.64
MARION															
Citrus	2010	1141	12.15	3.88	60.82	99.37	144.29	81.90	38.23	27.17	17.00	25.25	37.82	23.06	570.95
Other Fruit	2010	1713	0.99	1.30	37.22	116.96	232.20	96.61	2.33	1.94	1.51	1.80	1.97	1.22	496.05
Vegetables	2010	978	0.00	0.22	27.56	89.72	165.78	54.57	0.00	0.00	0.00	0.00	0.00	0.00	337.86
Field Crops	2010	685	0.00	0.00	8.05	16.37	50.87	44.01	40.70	1.47	11.51	1.47	0.00	0.00	174.44
Imp. Pasture	2010	844	1.57	6.17	28.21	70.41	105.44	41.99	19.88	1.76	1.43	1.76	0.65	2.91	282.19
Ornamentals	2010	82	14.92	18.01	28.53	36.05	43.02	35.61	33.25	22.81	24.62	22.81	18.54	13.04	311.22
Sod/Turf	2010	729	26.59	34.36	67.78	103.04	124.99	74.52	57.48	44.65	43.87	44.65	43.73	25.08	690.74
Total		6172	56.23	63.95	258.17	531.92	866.59	429.22	191.87	99.79	99.94	97.74	102.71	65.31	2863.44

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
NASSAU															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1990	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1990	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		176	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NASSAU															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1995	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1995	32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		187	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NASSAU															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	2010	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	2010	32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
OKEECHOBEE															
Citrus	1990	4325	164.39	117.47	324.03	499.97	645.94	312.31	100.90	23.66	60.98	159.81	223.13	171.53	2804.11
Other Fruit	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	2782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		7107	164.39	117.47	324.03	499.97	645.94	312.31	100.90	23.66	60.98	159.81	223.13	171.53	2804.11
OKEECHOBEE															
Citrus	1995	4341	165.00	117.90	325.23	501.82	648.33	313.46	101.28	23.75	61.21	160.40	223.95	172.16	2814.49
Other Fruit	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	2782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		7123	165.00	117.90	325.23	501.82	648.33	313.46	101.28	23.75	61.21	160.40	223.95	172.16	2814.49
OKEECHOBEE															
Citrus	2010	4327	164.47	117.52	324.18	500.20	646.24	312.45	100.95	23.67	61.01	159.88	223.23	171.61	2805.41
Other Fruit	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	2782	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ornamentals	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		7109	164.47	117.52	324.18	500.20	646.24	312.45	100.95	23.67	61.01	159.88	223.23	171.61	2805.41

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ORANGE															
Citrus	1990	12738	390.16	231.07	930.77	1362.46	1781.28	1070.50	574.61	608.88	413.73	274.25	330.55	249.79	8218.05
Other Fruit	1990	145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	40844	1373.18	2306.87	4350.70	6432.93	8271.73	4675.82	2416.74	0.00	0.00	0.00	0.00	0.00	29827.96
Field Crops	1990	580	0.00	0.00	0.00	0.00	14.19	20.49	37.82	1.58	22.04	1.58	0.00	0.00	97.71
Imp. Pasture	1990	217	18.31	26.63	38.43	52.09	59.62	40.50	33.36	20.58	25.97	20.58	22.27	19.45	377.80
Ornamentals	1990	1339	245.67	296.82	434.99	560.84	633.32	492.64	489.23	339.53	393.76	339.53	278.61	213.54	4718.48
Sod/Turf	1990	495	25.68	31.05	53.80	79.25	90.16	53.99	49.77	32.29	39.04	32.29	30.99	22.88	541.21
Total		56358	2052.99	2892.44	5808.68	8487.56	10850.31	6353.96	3601.53	1002.86	894.54	668.23	662.42	505.67	43781.20
ORANGE															
Citrus	1995	12643	387.26	229.34	923.82	1352.30	1768.00	1062.52	570.33	604.34	410.64	272.20	328.09	247.93	8156.76
Other Fruit	1995	153	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	41481	1394.59	2342.85	4418.56	6533.26	8400.73	4748.74	2454.43	0.00	0.00	0.00	0.00	0.00	30293.16
Field Crops	1995	592	0.00	0.00	0.00	0.00	14.49	20.92	38.60	1.62	22.50	1.62	0.00	0.00	99.73
Imp. Pasture	1995	126	10.63	15.46	22.31	30.24	34.62	23.52	19.37	11.95	15.08	11.95	12.93	11.30	219.36
Ornamentals	1995	1253	229.89	277.75	407.05	524.82	592.64	461.00	457.81	317.72	368.47	317.72	260.71	199.83	4415.42
Sod/Turf	1995	534	27.70	33.50	58.04	85.49	97.27	58.25	53.69	34.84	42.12	34.84	33.43	24.69	583.85
Total		56782	2050.06	2898.91	5829.78	8526.11	10907.75	6374.95	3594.23	970.46	858.81	638.33	635.16	483.74	43768.28
ORANGE															
Citrus	2010	12570	385.02	228.02	918.49	1344.49	1757.79	1056.38	567.03	600.85	408.27	270.63	326.19	246.50	8109.66
Other Fruit	2010	154	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	41588	1398.19	2348.89	4429.95	6550.11	8422.40	4760.99	2460.76	0.00	0.00	0.00	0.00	0.00	30371.30
Field Crops	2010	592	0.00	0.00	0.00	0.00	14.49	20.92	38.60	1.62	22.50	1.62	0.00	0.00	99.73
Imp. Pasture	2010	135	11.39	16.57	23.91	32.41	37.09	25.20	20.75	12.80	16.16	12.80	13.86	12.10	235.03
Ornamentals	2010	1254	230.07	277.97	407.37	525.24	593.12	461.37	458.17	317.98	368.76	317.98	260.92	199.99	4418.95
Sod/Turf	2010	531	27.54	33.31	57.71	85.01	96.72	57.92	53.39	34.64	41.88	34.64	33.25	24.55	580.57
Total		56824	2052.21	2904.76	5837.43	8537.25	10921.61	6382.78	3598.71	967.88	857.57	637.67	634.21	483.14	43815.24

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
OSCEOLA															
Citrus	1990	1197	36.98	26.90	85.01	129.98	175.83	87.68	35.48	13.27	19.69	41.98	58.28	42.59	753.67
Other Fruit	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1990	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	9729	1056.76	1373.73	1954.95	2641.81	2853.22	1558.68	1003.94	1268.08	1056.76	1268.08	1373.73	924.64	18334.40
Ornamentals	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		10946	1093.74	1400.63	2039.96	2771.79	3029.05	1646.36	1039.41	1281.35	1076.45	1310.06	1432.02	967.23	19088.07
OSCEOLA															
Citrus	1995	1155	35.68	25.95	82.03	125.42	169.66	84.60	34.23	12.81	19.00	40.51	56.24	41.09	727.22
Other Fruit	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	1995	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	10457	1135.84	1476.53	2101.23	2839.49	3066.72	1675.32	1079.06	1362.97	1135.84	1362.97	1476.53	993.83	19706.32
Ornamentals	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		11620	1171.52	1502.48	2183.26	2964.92	3236.38	1759.92	1113.29	1375.77	1154.84	1403.47	1532.77	1034.93	20433.54
OSCEOLA															
Citrus	2010	1154	35.65	25.93	81.96	125.31	169.51	84.53	34.20	12.80	18.98	40.47	56.19	41.06	726.59
Other Fruit	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	2010	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Field Crops	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	10420	1131.82	1471.30	2093.79	2829.45	3055.87	1669.39	1075.24	1358.14	1131.82	1358.14	1471.30	990.32	19636.59
Ornamentals	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		11582	1167.47	1497.23	2175.75	2954.76	3225.38	1753.92	1109.44	1370.94	1150.80	1398.61	1527.49	1031.38	20363.19

Appendix Table 7.4.4 (Continued)

	CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
POLK																
	Citrus	1990	7079	213.29	155.24	497.58	709.88	954.11	474.65	131.24	49.69	89.69	205.36	278.35	229.01	3988.10
	Other Fruit	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1990	450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1990	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	1990	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		7684	213.29	155.24	497.58	709.88	954.11	474.65	131.24	49.69	89.69	205.36	278.35	229.01	3988.10
POLK																
	Citrus	1995	6855	206.54	150.33	481.84	687.42	923.92	459.63	127.09	48.12	86.85	198.86	269.54	221.76	3861.90
	Other Fruit	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	1995	480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	1995	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	1995	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		7490	206.54	150.33	481.84	687.42	923.92	459.63	127.09	48.12	86.85	198.86	269.54	221.76	3861.90
POLK																
	Citrus	2010	6856	206.57	150.35	481.91	687.52	924.05	459.69	127.11	48.13	86.87	198.89	269.58	221.79	3862.46
	Other Fruit	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vegetables	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Field Crops	2010	480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imp. Pasture	2010	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Ornamentals	2010	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sod/Turf	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		7491	206.57	150.35	481.91	687.52	924.05	459.69	127.11	48.13	86.87	198.89	269.58	221.79	3862.46

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
PUTNAM															
Citrus	1990	46	0.60	0.28	2.41	4.11	5.79	3.45	1.69	1.00	0.68	0.84	1.60	1.07	23.52
Other Fruit	1990	360	4.45	3.71	13.60	30.31	45.05	24.72	16.60	10.11	6.81	7.42	9.44	5.33	177.53
Vegetables	1990	6330	79.57	339.41	783.46	1365.32	1216.12	5.25	3.16	0.00	0.32	0.00	0.00	0.00	3792.62
Field Crops	1990	500	0.00	0.00	64.88	98.07	154.27	108.63	38.46	0.00	0.00	0.00	0.00	0.00	464.30
Imp. Pasture	1990	914	59.56	89.34	158.83	203.50	268.05	156.34	141.45	101.77	109.21	101.77	101.77	52.12	1543.73
Ornamentals	1990	1289	103.53	132.25	223.53	294.09	360.46	243.16	224.58	160.39	171.04	160.39	146.49	91.44	2311.34
Sod/Turf	1990	226	7.37	11.05	20.25	31.91	38.66	23.32	18.41	15.35	14.11	15.35	14.72	7.37	217.86
Total		9665	255.07	576.05	1266.97	2027.31	2088.38	564.87	444.35	288.62	302.17	285.76	274.03	157.33	8530.91
PUTNAM															
Citrus	1995	54	0.70	0.33	2.83	4.82	6.80	4.05	1.98	1.18	0.80	0.98	1.88	1.26	27.61
Other Fruit	1995	349	4.31	3.59	13.18	29.39	43.67	23.97	16.09	9.80	6.60	7.19	9.15	5.17	172.11
Vegetables	1995	6498	81.68	348.42	804.26	1401.55	1248.40	5.39	3.25	0.00	0.32	0.00	0.00	0.00	3893.28
Field Crops	1995	517	0.00	0.00	67.09	101.40	159.51	112.32	39.77	0.00	0.00	0.00	0.00	0.00	480.09
Imp. Pasture	1995	834	54.34	81.52	144.93	185.69	244.59	142.66	129.07	92.87	99.65	92.87	92.87	47.55	1408.61
Ornamentals	1995	1313	105.46	134.71	227.69	299.56	367.17	247.68	228.76	163.38	174.22	163.38	149.22	93.14	2354.38
Sod/Turf	1995	241	7.86	11.78	21.59	34.03	41.22	24.87	19.63	16.36	15.05	16.36	15.70	7.86	232.32
Total		9806	254.36	580.37	1281.57	2056.45	2111.35	560.93	438.55	283.59	296.65	280.78	268.82	154.98	8568.40
PUTNAM															
Citrus	2010	54	0.70	0.33	2.83	4.82	6.80	4.05	1.98	1.18	0.80	0.98	1.88	1.26	27.61
Other Fruit	2010	347	4.29	3.57	13.11	29.22	43.42	23.83	16.00	9.75	6.56	7.15	9.10	5.14	171.12
Vegetables	2010	6520	81.96	349.60	806.98	1406.30	1252.62	5.41	3.26	0.00	0.33	0.00	0.00	0.00	3906.46
Field Crops	2010	520	0.00	0.00	67.48	101.99	160.44	112.97	40.00	0.00	0.00	0.00	0.00	0.00	482.88
Imp. Pasture	2010	830	54.08	81.13	144.24	184.80	243.41	141.97	128.45	92.42	99.18	92.42	92.42	47.33	1401.85
Ornamentals	2010	1300	104.42	133.38	225.43	296.59	363.53	245.23	226.50	161.76	172.50	161.76	147.74	92.22	2331.07
Sod/Turf	2010	241	7.86	11.78	21.59	34.03	41.22	24.87	19.63	16.36	15.05	16.36	15.70	7.86	232.32
Total		9812	253.30	579.81	1281.66	2057.75	2111.45	558.33	435.81	281.47	294.41	278.68	266.84	153.80	8553.31

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ST JOHNS															
Citrus	1990	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1990	30	0.37	0.47	1.17	2.44	3.63	1.81	1.23	0.64	0.58	0.64	0.71	0.41	14.13
Vegetables	1990	21535	116.94	869.15	2615.86	4803.38	4824.92	348.87	0.00	0.00	0.00	0.00	0.00	0.00	13579.11
Field Crops	1990	2100	0.00	0.00	260.42	389.00	626.56	410.97	152.29	1.18	6.91	1.18	0.00	0.00	1848.50
Imp. Pasture	1990	1310	10.68	14.23	145.83	316.60	369.94	156.52	120.94	46.26	24.89	46.26	120.94	60.47	1433.55
Ornamentals	1990	110	21.82	26.00	40.92	51.66	61.51	51.08	47.78	32.87	35.55	32.87	26.58	18.83	447.48
Sod/Turf	1990	116	3.64	5.37	15.87	27.14	33.27	16.30	13.66	7.69	6.95	7.69	11.61	5.87	155.04
Total		25201	153.45	915.22	3080.07	5590.22	5919.83	985.55	335.91	88.63	74.88	88.63	159.84	85.58	17477.81
ST JOHNS															
Citrus	1995	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	1995	17	0.21	0.27	0.67	1.38	2.06	1.03	0.70	0.37	0.33	0.37	0.40	0.23	8.01
Vegetables	1995	21719	117.93	876.58	2638.21	4844.42	4866.14	351.85	0.00	0.00	0.00	0.00	0.00	0.00	13695.13
Field Crops	1995	2039	0.00	0.00	252.86	377.70	608.36	399.03	147.87	1.14	6.71	1.14	0.00	0.00	1794.81
Imp. Pasture	1995	1263	10.29	13.72	140.60	305.24	356.67	150.90	116.60	44.60	24.00	44.60	116.60	58.30	1382.11
Ornamentals	1995	115	22.82	27.19	42.78	54.00	64.31	53.41	49.96	34.36	37.17	34.36	27.78	19.69	467.82
Sod/Turf	1995	127	3.99	5.88	17.37	29.71	36.43	17.84	14.96	8.42	7.61	8.42	12.71	6.42	169.75
Total		25280	155.24	923.63	3092.48	5612.47	5933.96	974.06	330.08	88.88	75.81	88.88	157.50	84.64	17517.63
ST JOHNS															
Citrus	2010	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fruit	2010	17	0.21	0.27	0.67	1.38	2.06	1.03	0.70	0.37	0.33	0.37	0.40	0.23	8.01
Vegetables	2010	21752	118.11	877.91	2642.22	4851.78	4873.54	352.38	0.00	0.00	0.00	0.00	0.00	0.00	13715.94
Field Crops	2010	2040	0.00	0.00	252.98	377.89	608.65	399.23	147.94	1.14	6.71	1.14	0.00	0.00	1795.69
Imp. Pasture	2010	1212	9.88	13.16	134.92	292.92	342.27	144.81	111.89	42.80	23.03	42.80	111.89	55.95	1326.30
Ornamentals	2010	116	23.01	27.42	43.15	54.47	64.87	53.87	50.39	34.66	37.49	34.66	28.03	19.86	471.89
Sod/Turf	2010	126	3.95	5.83	17.23	29.48	36.14	17.70	14.84	8.35	7.55	8.35	12.61	6.37	168.41
Total		25263	155.17	924.59	3091.17	5607.92	5927.52	969.02	325.76	87.31	75.11	87.31	152.93	82.41	17486.24

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
SEMINOLE															
Citrus	1990	2084	46.66	56.27	146.32	208.15	276.05	164.82	81.03	91.68	78.53	33.16	39.89	29.41	1251.94
Other Fruit	1990	24	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Vegetables	1990	2608	0.00	165.50	302.27	590.48	793.48	358.68	0.00	0.00	0.00	0.00	0.00	0.00	2210.41
Field Crops	1990	88	0.00	0.00	1.94	10.03	16.27	7.88	2.35	0.00	0.00	0.00	0.00	0.00	38.47
Imp. Pasture	1990	3847	349.50	454.48	659.34	920.97	1044.58	754.44	641.56	393.12	456.56	393.12	392.09	327.23	6786.99
Ornamentals	1990	740	156.21	189.54	275.75	352.40	395.26	310.78	312.34	218.45	252.04	218.45	177.85	136.64	2995.71
Sod/Turf	1990	427	30.49	38.75	61.97	85.05	100.06	65.40	57.79	36.10	42.64	36.10	36.36	27.61	618.30
Total		9818	582.99	904.54	1447.59	2167.08	2625.70	1662.00	1095.07	739.35	829.76	680.83	646.18	520.88	13901.96
SEMINOLE															
Citrus	1995	1878	42.05	50.71	131.85	187.57	248.76	148.53	73.02	82.61	70.76	29.88	35.94	26.50	1128.19
Other Fruit	1995	27	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Vegetables	1995	2464	0.00	156.37	285.58	557.87	749.67	338.87	0.00	0.00	0.00	0.00	0.00	0.00	2088.36
Field Crops	1995	84	0.00	0.00	1.86	9.57	15.53	7.52	2.25	0.00	0.00	0.00	0.00	0.00	36.72
Imp. Pasture	1995	3429	311.52	405.10	587.70	820.90	931.08	672.46	571.85	350.41	406.95	350.41	349.48	291.67	6049.54
Ornamentals	1995	740	156.21	189.54	275.75	352.40	395.26	310.78	312.34	218.45	252.04	218.45	177.85	136.64	2995.71
Sod/Turf	1995	440	31.42	39.83	63.85	87.63	103.11	67.39	59.55	37.20	43.93	37.20	37.47	28.45	637.13
Total		9062	541.34	841.64	1346.59	2015.96	2443.41	1545.56	1019.00	688.67	773.69	635.94	600.75	483.26	12935.80
SEMINOLE															
Citrus	2010	1916	42.90	51.73	134.52	191.37	253.79	151.54	74.49	84.28	72.19	30.48	36.67	27.03	1151.02
Other Fruit	2010	27	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Vegetables	2010	2505	0.00	158.97	290.33	567.16	762.15	344.51	0.00	0.00	0.00	0.00	0.00	0.00	2123.11
Field Crops	2010	84	0.00	0.00	1.86	9.57	15.53	7.52	2.25	0.00	0.00	0.00	0.00	0.00	36.72
Imp. Pasture	2010	3114	282.91	367.89	533.71	745.49	845.54	610.69	519.32	318.22	369.57	318.22	317.38	264.88	5493.81
Ornamentals	2010	740	156.21	189.54	275.75	352.40	395.26	310.78	312.34	218.45	252.04	218.45	177.85	136.64	2995.71
Sod/Turf	2010	439	31.34	39.84	63.71	87.44	102.87	67.24	59.41	37.12	43.83	37.12	37.38	28.38	635.68
Total		8825	513.50	807.96	1299.88	1953.43	2375.15	1492.28	967.81	658.07	737.64	604.27	569.28	456.93	12436.20

Appendix Table 7.4.4 (Continued)

CROP	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
VOLUSIA															
Citrus	1990	637	19.97	11.97	48.04	68.74	89.68	53.76	29.74	29.99	20.73	13.68	16.96	11.36	414.63
Other Fruit	1990	105	0.96	1.06	3.32	8.11	11.35	6.26	4.66	1.55	1.29	0.96	1.13	0.80	41.45
Vegetables	1990	1060	50.34	79.60	113.00	170.91	24.42	3.28	0.00	0.00	0.00	0.00	0.00	0.00	441.54
Field Crops	1990	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1990	417	2.06	19.47	12.03	45.36	52.86	33.44	15.43	4.19	17.08	4.19	1.43	1.86	209.40
Ornamentals	1990	5518	379.58	470.24	732.57	1009.13	1174.95	794.10	721.64	473.11	557.32	473.11	458.44	329.37	7573.57
Sod/Turf	1990	1178	74.00	93.96	150.40	214.17	245.27	157.25	145.11	90.26	108.35	90.26	88.53	66.42	1523.97
Total		8916	526.91	676.30	1059.36	1516.43	1598.54	1048.08	916.57	599.11	704.77	582.21	566.48	409.80	10204.56
VOLUSIA															
Citrus	1995	744	23.32	13.98	56.11	80.29	104.75	62.79	34.73	35.03	24.22	15.98	19.81	13.27	484.28
Other Fruit	1995	130	1.19	1.32	4.11	10.04	14.06	7.75	5.77	1.92	1.59	1.19	1.40	0.99	51.32
Vegetables	1995	1033	49.06	77.57	110.12	166.56	23.80	3.19	0.00	0.00	0.00	0.00	0.00	0.00	430.30
Field Crops	1995	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	1995	433	2.14	20.22	12.49	47.10	54.89	34.72	16.02	4.36	17.74	4.36	1.49	1.93	217.44
Ornamentals	1995	5707	392.58	486.35	757.66	1043.70	1215.19	821.29	746.36	489.32	576.41	489.32	474.14	340.65	7832.97
Sod/Turf	1995	1210	76.01	96.51	154.48	219.99	251.93	161.52	149.05	92.71	111.30	92.71	90.93	68.22	1565.36
Total		9258	544.30	695.95	1094.98	1567.68	1664.62	1091.27	951.93	623.33	731.25	603.55	587.76	425.05	10581.67
VOLUSIA															
Citrus	2010	755	23.67	14.19	56.94	81.48	106.30	63.72	35.24	35.55	24.58	16.22	20.10	13.46	491.44
Other Fruit	2010	139	1.27	1.41	4.40	10.74	15.03	8.29	6.17	2.05	1.70	1.27	1.49	1.06	54.88
Vegetables	2010	1054	50.05	79.14	112.36	169.95	24.28	3.26	0.00	0.00	0.00	0.00	0.00	0.00	439.04
Field Crops	2010	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imp. Pasture	2010	471	2.33	22.00	13.59	51.23	59.70	37.76	17.43	4.74	19.29	4.74	1.62	2.10	236.52
Ornamentals	2010	5730	394.17	488.31	760.71	1047.90	1220.09	824.60	749.37	491.29	578.73	491.29	476.05	342.02	7864.54
Sod/Turf	2010	1186	74.50	94.60	151.42	215.63	246.94	158.32	146.09	90.87	109.09	90.87	89.13	66.87	1534.32
Total		9336	545.99	699.64	1099.41	1576.92	1672.34	1095.96	954.30	624.50	733.39	604.39	588.38	425.51	10620.73

Appendix Table 7.4.5 **Adjusted Base Agricultural Water Use Projections for Annual Water Use Survey Acreage, Assuming 2-in-10 Drought Conditions, St. Johns River Water Management District, 1990, 1995, 2010 (in Millions of Gallons)**

1. Assuming Current Irrigation Technology

	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Base	1990	368261	22240	26140	50136	72814	83124	45533	26333	24929	22263	24929	25734	17559	441734
Pasture			11819	13424	22450	31231	34382	18631	11479	13819	12029	13819	15283	10590	208955
Base adjusted			11603	14059	29931	44706	52180	28765	16003	12492	11437	12492	11980	8028	253675
Base	1995	370203	22590	26560	50756	73620	83927	45879	26583	25335	22587	25335	26171	17856	447201
Pasture			12173	13798	23111	32099	35306	19104	11749	14245	12368	14245	15746	10904	214845
Base adjusted			11634	14142	29957	44731	52152	28686	16010	12515	11456	12515	12000	8043	253840
Base	2010	370034	22543	26512	50706	73563	83873	45831	26513	25273	22523	25273	26109	17811	446530
Pasture			12135	13750	23036	31991	35183	19024	11685	14201	12324	14201	15698	10867	214095
Base adjusted			11622	14137	29974	44771	52208	28709	15997	12491	11432	12491	11981	8030	253844

2. Assuming Best Management Irrigation Technology

	YEAR	ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Base	1990	368261	18561	21267	42567	62616	73911	38041	21161	18902	16954	19568	22142	15564	371255
Pasture			11819	13424	22450	31231	34382	18631	11479	13819	12029	13819	15283	10590	208955
Base Adjusted			7923	9186	22362	34508	42967	21273	10831	6465	6127	7131	8387	6033	183195
Base	1995	370203	18908	21670	43186	63422	74708	38394	21398	19292	17267	19984	22586	15866	376681
Pasture			12173	13798	23111	32099	35306	19104	11749	14245	12368	14245	15746	10904	214845
Base Adjusted			7952	9252	22386	34533	42932	21201	10825	6472	6136	7164	8415	6053	183320
Base	2010	370034	18867	21626	43133	63357	74637	38341	21332	19231	17212	19933	22530	15826	376025
Pasture			12135	13750	23036	31991	35183	19024	11685	14201	12324	14201	15698	10867	214095
Base Adjusted			7945	9251	22401	34566	42972	21219	10815	6450	6120	7152	8402	6045	183339

Appendix Table 7.4.6 **Projected and Permitted Water Use Comparison, 1990 Acreage, St. Johns River Water Management District (in Millions of Gallons)**

	Projected	Permitted	D[a]	(D/Permitted)
Alachua	2139.9	1529.8	610.1	0.10
Baker	1769.3	3854.7	-2085.4	-0.54
Brevard	21973.4	42465.6	-20492.2	-0.48
Clay	237.1	733.8	-496.7	-0.68
Duval	1225.0	793.6	431.4	0.54
Flagler	3393.3	5102.3	-1709.1	-0.34
Indian River	90881.8	37178.8	53703.0	1.44
Lake	28700.0	31378.9	-2678.9	-0.08
Marion	3029.0	6532.4	-3503.5	-0.54
Nassau	0	38.3	-38.3	-1.00
Okeechobee	5596.0	4754.7	841.2	0.18
Orange	46131.6	8449.0	37682.5	4.46
Osceola	2654.4	3297.6	-643.3	-0.20
Polk	4663.3	2336.1	2327.2	1.00
Putnam	7162.2	9630.4	-2468.2	0.26
St. Johns	16187.6	20208.3	-4020.7	0.20
Seminole	7942.6	2071.5	5871.1	2.83
Volusia	10088.6	11968.2	1879.6	0.16

[a]D is the difference (Projected-Permitted) water use.

APPENDIX 7.5

PROJECTED 1990, 1995, AND 2010 GOLF COURSE ACREAGE

Appendix Table 7.5 Projected 1990, 1995, and 2010 Golf Course Acreage in the St. Johns River Water Management District

Counties	1990		1995		2010	
	Irrigated	Total	Irrigated	Total	Irrigated	Total
	Acres					
Alachua	262	384	291	426	289	422
Baker	64	124	62	124	62	124
Bradford	31	40	30	40	30	40
Brevard	1058	1354	1174	1501	1164	1489
Clay	281	424	292	470	288	466
Duval	1413	2992	1413	2992	1413	2992
Flagler	290	290	321	321	319	319
Indian River	1220	1625	1249	1642	1247	1644
Lake	772	1512	765	1555	764	1553
Marion	500	1500	500	1500	500	1500
Nassau	512	614	538	628	536	627
Okeechobee	0	0	0	0	0	0
Orange	915	1509	925	1519	925	1519
Osceola	0	0	0	0	0	0
Polk	0	0	0	0	0	0
Putnam	74	184	75	191	75	191
St. Johns	976	1166	993	1177	992	1176
Seminole	1536	2667	1608	2780	1605	2776
Volusia	1659	2844	1740	2911	1765	2910
Total	11563	19229	11976	19777	11974	19748

APPENDIX 7.6

COMPARING PROJECTED 1990 AND CUP DATA BASE

ACREAGE BY COUNTIES AND CROPS

Appendix Table 7.6.1 Irrigated Acreage Comparison, Land Use Projection with CUP Data, St. Johns River Water Management District, 1990

County Crop	Citrus				Field Crops			
	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Alachua					583	46	537	11.67
Baker					80	30	50	1.67
Brevard	9063	27070	-18007	-0.67	4770	1[b]	4769	4769.00
Clay					5	1[b]	4	4.00
Duval					0		0	
Flagler	15	1[b]	14	14.00	410	1607	-1197	-0.74
Indian River	63607	40087	23520	0.59	4923	3409	1514	0.44
Lake	25173	57090	-31917	-0.56	1085	236	849	3.60
Marion	1425	6280	-4828	-0.77	735	3197	-2462	-0.77
Nassau					78	1[b]	77	77.00
Okeechobee	4325	2570	1755	0.68	0		0	
Orange	12738	10240	2498	0.24	580	15	565	37.67
Osceola	1197	1170	27	0.02	0		0	
Polk	7079	4364	2715	0.62	450	1[b]	449	449.00
Putnam	46	392	-346	-0.88	500	612	-112	-0.18
St. Johns	0	38	-38	-1.00	2100	3018	-917	-0.30
Seminole	2084	1701	383	0.23	88	29	59	2.03
Volusia	637	1093	-456	-0.42	1	83	-82	-0.99
Total	127416	152096	-24680	-0.16	16388	12286	4102	0.33

County Crop	Improved Pasture				Ornamentals			
	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Alachua	664	540	124	0.23	59	4	55	13.75
Baker	0		0		414	372	42	0.11
Brevard	77071	33772	43299	1.28	201	42	159	3.80
Clay	160	40	120	3.00	50	1[b]	49	49.00
Duval	500	1[b]	499	499.00	73	207	-134	-0.65
Flagler	566	270	296	1.10	4	1[b]	3	3.00
Indian River	22195	10300	11895	1.15	57	7	50	7.14
Lake	2323	3364	-1041	-0.31	1341	1950	-609	-0.31
Marion	787	1772	-985	-0.56	82	195	-113	-0.58
Nassau	0		0		20	1[b]	19	19.00
Okeechobee	2782	1[b]	2781	2781.00	0		0	
Orange	217	649	-432	-0.67	1339	1526	-187	-0.12
Osceola	9729	800	8929	11.16	0		0	
Polk	100	1[b]	99	99.00	55	1[b]	54	54.00
Putnam	914	55	859	15.62	1289	2322	-1033	-0.44
St. Johns	1310	81	1229	15.17	110	7	103	14.71
Seminole	3847	599	3248	5.42	740	183	557	3.04
Volusia	417	277	140	0.51	5518	6130	-612	-0.10
Total	123582	52522	71060	1.35	11352	12949	-1597	-0.12

[a]D is the difference (projected-CUP) acreage.
[b]This number was actually zero, but the zero gives a problem in calculation, so a 1 was used in its place.

Appendix Table 7.6.1 (continued)

County Crop	Other Fruit				Sod/Turf			
	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Alachua	1180	262	918	3.50	421	4	417	104.25
Baker	60	1[b]	59	59.00	0		0	
Brevard	195	5578	-5383	-0.97	1681	1[b]	1680	1680.00
Clay	13	50	-37	-0.74	143	35	108	3.09
Duval	20	1[b]	19	19.00	795	610	185	0.30
Flagler	110	80	30	0.38	221	770	-549	-0.71
Indian River	141	1[b]	140	140.00	941	1[b]	940	940.00
Lake	687	1732	-1045	-0.60	279	157	122	0.78
Marion	1763	1776	-13	-0.01	722	790	-68	-0.09
Nassau	15	1[b]	14	14.00	28	1[b]	27	27.00
Okeechobee	0		0		0		0	
Orange	145	1[b]	144	144.00	495	157	338	2.15
Osceola	0		0		0		0	
Polk	0		0		0		0	
Putnam	360	217	143	0.66	226	20	206	10.30
St. Johns	30	24	6	0.25	116	135	-19	-0.14
Seminole	24	7	17	2.43	427	331	96	0.29
Volusia	105	8	97	12.13	1178	1458	-280	-0.19
Total	4848	9739	-4891	-0.50	7673	4470	3203	0.72

County Crop	Vegetables			
	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)
Alachua	1352	1042	310	0.30
Baker	123	5	118	23.60
Brevard	2945	1[b]	2944	2944.00
Clay	58	8	50	6.25
Duval	8	1[b]	7	7.00
Flagler	4950	4204	746	0.18
Indian River	2500	1[b]	2499	2499.00
Lake	9015	1676	7339	4.38
Marion	988	935	53	0.06
Nassau	35	1[b]	34	34.00
Okeechobee	0		0	
Orange	40844	1575	39269	24.93
Osceola	20	1[b]	19	19.00
Polk	0		0	
Putnam	6330	4305	2025	0.47
St. Johns	21535	17327	4208	0.24
Seminole	2608	399	2209	5.54
Volusia	1060	351	709	2.02
Total	94371	31832	62539	1.96

[a]D is the difference (projected-CUP) acreage.
[b]This number was actually zero, but the zero gives a problem in calculation, so a 1 was used in its place.

Appendix Table 7.6.2 Irrigated Acreage Comparison, Land Use Projection with CUP Data, St. Johns River Water Management District, 1990

County	Alachua				Baker			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	0		0		0		0	
Other Fruit	1180	262	918	3.50	60	1[b]	59	59.00
Vegetables	1352	1042	310	0.30	123	5	118	23.60
Field Crops	583	46	537	11.67	80	30	50	1.67
Imp. Pasture	664	540	124	0.23	0		0	
Ornamentals	59	4	55	13.75	414	372	42	0.11
Sod/Turf	421	4	417	104.25	0		0	
Total	4259	1898	2361	1.24	677	408	269	0.66

County	Brevard				Clay			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	9063	27071	-18008	-0.67	0		0	
Other Fruit	195	5578	-5383	-0.97	13	50	-37	-0.74
Vegetables	2945	1[b]	2944	2944.00	58	8	50	6.25
Field Crops	4770	1[b]	4769	4769.00	5	1[b]	4	4.00
Imp. Pasture	77071	33772	43299	1.28	160	40	120	3.00
Ornamentals	201	42	159	3.79	50	1[b]	49	49.00
Sod/Turf	1681	1[b]	1680	1680.00	143	35	108	3.09
Total	95926	66466	29460	0.44	429	135	294	2.18

County	Duval				Flagler			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	0		0		15	1[b]	14	14.00
Other Fruit	20	1[b]	19	19.00	110	80	30	0.38
Vegetables	8	1[b]	7	7.00	4950	4204	746	0.18
Field Crops	0		0		410	1607	-1197	-0.74
Imp. Pasture	500	1[b]	499	499.00	566	270	296	1.10
Ornamentals	73	207	-134	-0.65	4	1[b]	3	3.00
Sod/Turf	795	610	185	0.30	221	770	-549	-0.71
Total	1396	820	576	0.70	6276	6933	-657	-0.09

[a]D is the difference (projected-CUP) acreage.
[b]This number was actually zero, but the zero gives a problem in calculation, so a 1 was used in its place.

Appendix Table 7.6.2 (continued)

County	Indian River				Lake			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	63607	40087	23520	0.59	25173	57090	-31917	-0.56
Other Fruit	141	1[b]	140	140.00	687	1732	-1045	-0.60
Vegetables	2500	1[b]	2499	2499.00	9015	1676	7339	4.38
Field Crops	4923	3409	1514	0.44	1085	236	849	3.60
Imp. Pasture	22195	10300	11895	1.15	2323	3364	-1041	-0.31
Ornamentals	57	7	50	7.14	1341	1950	-609	-0.31
Sod/Turf	941	1[b]	940	940.00	279	157	122	0.78
Total	94364	53806	40558	0.75	39903	66205	-26302	-0.40

County	Marion				Nassau			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	1452	6280	-4828	-0.77	0		0	
Other Fruit	1763	1776	-13	-0.01	15	1[b]	14	14.00
Vegetables	988	935	53	0.06	35	1[b]	34	34.00
Field Crops	735	3197	-2462	-0.77	78	1[b]	77	77.00
Imp. Pasture	787	1772	-985	-0.56	0		0	
Ornamentals	82	195	-113	-0.58	28	1[b]	19	19.00
Sod/Turf	722	790	-68	0.09	0		0	
Total	6529	14945	-8416	-0.56	176	4	172	43.00

County	Okeechobee				Orange			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	4325	2570	1755	0.68	12738	10241	2497	0.24
Other Fruit	0		0		145	1[b]	144	144.00
Vegetables	0		0		40844	1575	39269	24.93
Field Crops	0		0		580	15	565	37.67
Imp. Pasture	2782	1[b]	2781	2781.00	217	649	-432	-0.67
Ornamentals	0		0		1339	1526	-187	-0.12
Sod/Turf	0		0		495	157	338	2.15
Total	7107	2571	4536	1.76	56358	14164	42194	2.98

[a]D is the difference (projected-CUP) acreage.
[b]This number was actually zero, but the zero gives a problem in calculation, so a 1 was used in its place.

Appendix Table 7.6.2 (continued)

County	Osceola				Polk			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	1197	1170	27	0.02	7079	4364	2715	0.62
Other Fruit	0		0		0		0	
Vegetables	20	1[b]	19	19.00	0		0	
Field Crops	0		0		450	1[b]	449	449.00
Imp. Pasture	9729	800	8929	11.16	100	1[b]	99	99.00
Ornamentals	0		0		55	1[b]	54	54.00
Sod/Turf	0		0		0		0	
Total	10946	1971	8975	4.55	7684	4367	3317	0.76

County	Putnam				St. Johns			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	46	392	-346	-0.88	0	38	-38	-1.00
Other Fruit	360	217	143	0.66	30	24	6	0.25
Vegetables	6330	4304	2026	0.47	21535	17327	4208	0.24
Field Crops	500	612	-112	-0.18	2100	3018	-918	-0.30
Imp. Pasture	914	55	859	15.62	1310	81	1229	15.17
Ornamentals	1289	2322	-1033	-0.44	110	7	103	14.71
Sod/Turf	226	20	206	10.30	116	135	-19	-0.14
Total	9665	7922	1743	0.22	25201	20630	4571	0.22

County	Seminole				Volusia			
Crop	Projected	CUP	D[a]	(D/CUP)	Projected	CUP	D[a]	(D/CUP)
	----------acres----------			(D/CUP)	----------acres----------			(D/CUP)
Citrus	2084	1701	383	0.23	637	1094	-457	-0.42
Other Fruit	24	7	17	2.43	105	8	97	12.13
Vegetables	2608	399	2209	5.54	1060	351	709	2.02
Field Crops	88	29	59	2.03	1[b]	83	0	-0.99
Imp. Pasture	3847	599	3248	5.42	417	277	140	0.51
Ornamentals	740	183	557	3.04	5518	6130	-612	-0.10
Sod/Turf	427	331	96	0.29	1178	1458	-280	-0.19
Total	9818	3249	6569	2.02	8916	9401	-485	-0.05

[a]D is the difference (projected-CUP) acreage.
[b]This number was actually zero, but the zero gives a problem in calculation, so a 1 was used in its place.

APPENDIX 7.7

EXHIBITS

Exhibit 7.7.1

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
TELEPHONE SURVEY

I. Introduction

Hello. My name is _____. Could I speak to _____, please?

If "NO": **Is there a convenient time I could reach him/her ?**

If "YES": **Good morning (good evening, etc.) My name is _____. I'm an agricultural economics student at the University of Florida, conducting a survey of agricultural water users in the St. Johns River Water Management District. This is a voluntary survey that takes 10 to 15 minutes to complete. All responses are strictly confidential and will be available only to the research team. We need your help. More accurate water use estimates can benefit farmers during critical water supply seasons because the District will have a better understanding of agriculture's water needs. Would you be willing to help us by answering a few questions about your farm?**

If "NO": **Thank you for your time.**

If "YES": **We're trying to determine 1990 agricultural water use in the District. Our questions concern crops irrigated, type of irrigation systems used, and number of small wells. Only the University research team will know individual reponses. You do not have to answer any question you do not want to answer. Dr. Lynne is overseeing all facets of this study. If you have any questions, Dr. Lynne will be glad to contact you.**

II. Survey Questions:

U = UNKNOWN when the person does not know the answer to the question.
WNR = WILL NOT RESPOND write WNR in the space when the person being surveyed will not respond or does not want to answer a question.
NA = NOT APPLICABLE/APPROPRIATE write NA when the person indicates that a question does not apply to his/her kind of operation/enterprise.

FOR 1990:

A. **The first two questions pertain to acreage of crops you grew in 1990 and water use for the crops you irrigated.**

Record on TABLE 1.

NOTE: (I) Citrus acreage is recorded as number of acres of trees. (II) Lists of type of crop and irrigation system are provided. (III) If the farm has NO CROPS: Dairy, aquaculture (fish ponds), and other water use activities are asked in question #7. FERNS are NOT a crop for which we want information. (4/91 update: Fern enterprises willing to give information were included in the survey.)

1 & 2. **For 1990 we'd like to know first, what crops you grew, would you please list them for me. Now there are three parts to this question: first, for each of these crops, what was the total crop acreage, including irrigated and non-irrigated acreage; second, we'd like to know how much acreage of each crop was irrigated, and third, we'd like to know what type or multiple types of irrigation systems were used for each crop.**

(Column #1a) - **Please list the crops you grew in 1990 and for the first crop you grew:** (name the crop for the farmer)

(Column #1b) **what was the total crop acreage, both irrigated and/or nonirrigated,**

(Column #1c) **what was the total irrigated acreage of this crop, and**

(Column #2a & #2b) **what was the type of irrigation system used? If there was more than one type of irrigation system per crop, how many acres of the crop was irrigated with each particular irrigation system?**

For the next crop.....(continue as above)

FOR EXAMPLE: **Farmer has 3 crops: 1. potatoes - 100 total acres, 50 of these acres are irrigated, 35 acres are irrigated with overhead sprinklers and 15 acres are irrigated with drip irrigation; 2. cabbage - 10 total acres, all acreage is irrigated with overhead sprinklers; 3. pasture has 200 acres, 0 irrigated acres, etc...**

FOR THE NEAR FUTURE (NEXT 5 YEARS)

B. For the next two questions, we'd like you to project what changes you think may occur in the next 5 years in irrigated acreage and types of irrigation systems used.

(name each crop for the farmer and ask #3 then #4)

3. **Do you think the irrigated acreage of the crops for this farm will change (Column #3) within the next 5 years?** IF YES: **What would you project as the change in acreage of each of the irrigated crops for this farm (list by crop)?**

4. **What would you project as the types of irrigation systems (Column #4) that will be used on this farm five years from now?**

C. The next two questions concern 4 inch or smaller wells used for irrigation.

Record answers on TABLE 2:

5. **In 1990 did you have any four inch or smaller wells used for irrigation?**

IF YES: **How many 4 inch wells did you have?**
How many 3 inch wells did you have?
How many 2 inch wells did you have?
How many 1 inch wells did you have?

6. **For each of these sizes of wells, please estimate the typical or average pump capacity.**

Record on TABLE 3:

NOTE: Write U = unknown, WNR = will not respond, or NA = not applicaple in the TABLE 3 column if the question is not answered for this farm operation.

7. **We'd like to know for what other agricultural activities you withdraw water in 1990.**

Frost - Feeze Protection (Table 3, Part 1)

A. Did you use frost/freeze protection for any of your crops?

IF YES:

(a) **What was the crop and when was the last time you used frost/freeze protection?**
(record actual dates or "Christmas 1989", etc.)

(b) **What type of frost/freeze irrigation system was used for each crop?**

(c) **What did you do to frost/freeze protect each crop?:**

- **how many days did you frost-freeze protect?**
- **how many hours did you frost-freeze protect?**
- what do you estimate as the hourly flow rate?

(for example, "using overhead irrigation, I irrigated for four hours the first night and 3 hours the next two nights, at about 100,000 gallons per hour."

(d) **What would you project as a change in frost-freeze protection in the next 5 years?**

Aquaculture (Table 3, Part 2)

B. Did you have any fish ponds in 1990? IF YES:

(a) What was the total acreage of ponds used for aquacultural water use in 1990?

(b) What is the average depth of your ponds?

(c) How many times during 1990 did you flush your pond(s)?

(d) Can you, please, estimate the amount of supplemental water pumped into the pond(s) to maintain the average depth? (in gallons)

(e) What do you project as the change in amount of acreage devoted to aquaculture in the next 5 years?

Dairy (Table 3, Part 3)

C. For your dairy operation:

(a) What was the average number of cows milked per day, in 1990?

(b) What do you project as the change in number of cows milked per day in the next five years?

Other (Table 3, Part 4)

(a) What was the total area used for other water use activities in 1990? (specify each activity and the unit of measurement)

(b) What do you project as the change in this (or these) other water use(s) five years from now?

8. Do you have any acreage that is transitional? That is, do you have any acreage going out of agricultural production, being sold for development (urban, residential, industrial, etc.) purposes within the next 5 years?

IF YES: How many acres total?

Identification Code :_____
Telephone # :_____
Contact Date :_____
Interviewer :_____

Exhibit 7.7.2

Table 1. 1990 and Projected Water Use by Enterprise

	1990						PROJECTED	
			(#2) Type of Irrigation System					
(#1a) Crop	(#1b) Total Acreage	(#1c) Irrigated Acreage	Acres	(#2a) Type	Acres	(#2b) Type	(#3) Change in Irrigated Acreage	(#4) Type of Irrigation System(s)
1.								
2.								
3.								
4.								
5.								
6.								
7.								

Table 2. Record of Withdrawal Points.

(#5) No. of 4 inch or Smaller Wells	(#6) Typical Capacity
4"	
3"	
2"	
1"	

Identification Code :_____
Telephone # :_____
Contact Date :_____
Interviewer :_____

(#7)

Table 3. Water Withdrawal for Other Agricultural Activities in 1990 and Projections for 1995.

Activity		Unit of Measurement				Type of Irrigation 1990 System Used	# of Days	# of Hours	Hourly Flow Rate	Projected Change in Water Use - 1995
Frost Freeze Protection	Crop	Dates of Use								
	1									
	2									
	3									
	4									
	5									
Aquaculture		Acres of Ponds	Average Depth	# Times Flushed Per Yr.	Amount Supplemental Water					Change in Acreage
Dairy		# of Animals								Changed in Cows Milked
Other		Specify								Specify

(#8)
Total Acreage of Transitional Land:_____acres.

Exhibit 7.7.3

Strategy for Calculating a Distribution From Which To Choose Phone Survey Sample

Col. (1)	(2)	(3)	(4)	(5)		(6)	(7)
Range In Water Use (MGY)	# of Permits per Range	Total MGY per Range	% of District Total	MGY/Crop/Range:		% Crop Use of MGY of Range Total	% Crop Use of MGY of District Total
				(5a)	(5b)		
0-1000				Crop	MGY		
TOTAL:							

Exhibit 7.7.4

HANDOUT OF THE CUP DATAFILES ITEMS

DATED NOVEMBER 7, 1990

DATAFILE NAME: CUP

27 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	F.O.R.	15	15	C	-	FILE OF RECORD
36	ENFORCE.FILE	3	3	C	-	ENFORCEMENT FILE (YES/NO)
39	DATE-REC	8	8	D	-	DATE RECEIVED
47	LEGAL-NOTICED	8	8	D	-	LEGAL NOTICE DATE
55	DATE-APPEARED	8	8	D	-	DATE NOTICE IN PAPER
63	ACTION-NOTICED	8	8	D	-	BOARD ACTION NOTICE DATE
71	DATE-APPEARED2	8	8	D	-	DATE NOTICE IN PAPER
79	OWNER	50	50	C	-	OWNER
129	AGENT	50	50	C	-	AGENT
179	APPLICANT	50	50	C	-	APPLICANT
229	COUNTY.USE	3	3	I	-	COUNTY NUMBER
232	COUNTY.W/D	3	3	I	-	
235	COUNTY2.USE	3	3	I	-	
238	COUNTY2.W/D	3	3	I	-	
241	PROJ-NAME	75	75	C	-	PROJECT NAME
316	COMP.APP	8	8	D	-	COMPLETED APP DATE
324	REL-PERMIT	20	20	C	-	RELATED PERMIT
344	REVIEWER	3	3	I	-	REVIEWER NUMBER
347	REVIEWER2	3	3	I	-	REVIEWER NUMBER
350	PERNUM	20	20	C	-	PERMIT NUMBER
370	DATE-ISSUED	8	8	D	-	DATE PERMIT ISSUED
378	DATE-EXP	8	8	D	-	DATE PERMIT EXPIRES
386	AUTHORIZING	400	200	C	-	PERMIT STATEMENT
786	COMMENTS	200	200	C	-	
986	DATE-ENTERED	8	8	D	-	DATE ENTERED
994	STATUS	1	1	C	-	STATUS CODE

DATAFILE NAME: CUP.PROJECT.DESC

14 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	ACREAGE-OWNED	16	16	N	3	ACREAGE OWNED
37	PROJ-ACREAGE	16	16	N	3	PROJECT ACREAGE
53	IMP.ACRES.LAKE	16	16	N	3	IMPOUNDED ACREAGE
69	PROJ-DESC	100	100	C	-	PROJECT DESCRIPTION
169	REQ.MGD	16	16	N	3	APPLICANTS REQUEST
185	SOURCE-DESC	125	125	C	-	DESCRIPTION OF SOURCE
310	DESC.FACIL	125	125	C	-	FACILITY DESCRIPTION
435	NO.WELLS	3	3	I	-	NUMBER OF WELLS
438	NO.PUMPS	3	3	I	-	NUMBER OF PUMPS
441	IRRIG-METHOD	125	125	C	-	IRRIGATION METHOD
566	GW-BASIN	10	10	C	-	GROUNDWATER BASIN
576	SW-BASIN	10	10	C	-	SURFACEWATER BASIN
586	BASIN.CRITERIA	10	10	C	-	BASIN CRITERIA

DATAFILE NAME: CUP.LOCATION

5 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	SECTION	30	30	C	-	SECTION
51	TOWNSHIP	2	2	I	-	TOWNSHIP
53	TWSHP.DIR	1	1	C	-	DIRECTION (S/N)
54	RANGE	2	2	I	-	RANGE

DATAFILE NAME: WELL.DATA

15 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	WELL.NO	5	5	C	-	WELL NUMBER
26	LONG-LAT	18	18	C	-	LONGITUDE/LATITUDE
44	DIA	4	4	N	1	DIAMETER OF WELL
48	DEPTH	10	10	C	-	DEPTH OF WELL
58	EFFICIENCY	3	3	C	-	EFFICIENCY OF USE
61	CAP-FR	10	10	C	-	FLOW RATE
71	STATUS	8	8	C	-	WELL STATUS
79	WWC.PERMIT#	20	20	C	-	WATER WELL PERMIT NUMBER
99	DATE.CONST	8	8	D	-	DATE WELL CONSTRUCTED
107	LOCATION	75	75	C	-	QUARTER/QUARTER INFO
182	SECTION	30	30	C	-	SECTION
212	TOWNSHIP	2	2	I	-	TOWNSHIP
214	TWSHP.DIR	1	1	C	-	DIRECTION (S/N)
215	RANGE	2	2	I	-	RANGE

DATAFILE NAME: PUMP.DATA

12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	PUMP.NO	5	5	C	-	PUMP NUMBER
26	LONG-LAT	18	18	C	-	LONGITUTE/LATITUDE
44	SW.BODY	20	20	C	-	SURFACEWATER BODY
64	CAP-FR	10	10	C	-	CAPACITY
74	STATUS	8	8	C	-	STATUS OF PUMP
82	DATE.INSTALLED	8	8	D	-	DATE PUMP INSTALLED
90	LOCATION	75	75	C	-	QUARTER/QUARTER INFO
165	SECTION	30	30	C	-	SECTION
195	TOWNSHIP	2	2	I	-	TOWNSHIP
197	TWSHP.DIR	1	1	C	-	DIRECTION (N/S)
198	RANGE	2	2	I	-	RANGE

DATAFILE NAME: CUP.ADDRESS

19 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	OWNER	50	50	C	-	OWNER
71	ADDRESS1	35	35	C	-	OWNER ADDRESS
106	ADDRESS2	35	35	C	-	OWNER ADDRESS
141	CITY	25	25	C	-	CITY
166	STATE	2	2	C	-	STATE
168	ZIP	10	10	C	-	ZIP
178	AGENT	50	50	C	-	AGENT
228	ADDRESS3	35	35	C	-	AGENT ADDRESS
263	ADDRESS4	35	35	C	-	AGENT ADDRESS
298	CITY2	25	25	C	-	CITY
323	STATE2	2	2	C	-	STATE
325	ZIP2	10	10	C	-	ZIP
335	APPLICANT	50	50	C	-	APPLICANT
385	ADDRESS5	35	35	C	-	APPLICANT ADDRESS
420	ADDRESS6	35	35	C	-	APPLICANT ADDRESS
455	CITY3	25	25	C	-	CITY
480	STATE3	2	2	C	-	STATE
482	ZIP3	10	10	C	-	ZIP

DATAFILE NAME: CUP.TSR.INFO

11 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	REQ.MGY	16	16	N	3	APPLICANTS REQUEST
37	YR.ACRE.FT	16	16	N	3	YEARLY ACRE-FEET
53	BOARD-DATE	8	8	D	-	BOARD DATE
61	REC-ACTION	8	8	C	-	RECOMMENDED BOARD ACTION
69	REC-DURATION	8	8	D	-	RECOMMENDED DURATION
77	STAN-CONDITIONS	49	49	C	-	STANDARD CONDITIONS
126	SPEC-CONDITIONS	50	50	C	-	SPECIAL CONDITIONS
176	USER.CODE	3	3	C	-	USER CLASS CODES
179	REUSE	3	3	C	-	REUSE (YES/NO)
182	APT	3	3	C	-	AQUIFER PERFORMANCE TEST (YES/NO)

DATAFILE NAME: CUP.WATER.USE

16 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	SOURCE.CODE	3	3	C	-	SOURCE CODE
24	USE.CODE	3	3	C	-	USE CODE
27	USE.DESC	30	30	C	-	DESCRIPTION OF USE
57	PERCENTAGE	5	5	N	1	PERCENTAGE OF USE
62	PROJ.ACREAGE	16	16	N	3	PROJECT ACREAGE
78	REC.MGY	16	16	N	3	RECOMMENDED MGY
94	REC.ACRE.FT	16	16	N	3	RECOMMENDED ACRE-FT
110	REC.BY	30	30	C	-	RECOMMENDED BY
140	PERM.MGD	16	16	N	3	PERMITTED MGD
156	PERM.MGMO	16	16	N	3	PERMITTED MG MONTH
172	MO.ACRE.FT	16	16	N	3	MONTHLY ACRE-FEET
188	PERM.MGY	16	16	N	3	PERMITTED MGY
204	YR.ACRE.FT	16	16	N	3	YEARLY ACRE-FEET
220	PERM.F&F	16	16	N	3	PERMITTED FROST/FREEZE
236	FF.ACRE.FT	16	16	N	3	FROST/FREEZE ACRE-FT

DATAFILE NAME: CUP.PS.WATER.USE

10 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	APPNUM	20	20	C	-	APPLICATION NUMBER
21	SOURCE.CODE	3	3	C	-	SOURCE CODE
24	USE.CODE	3	3	C	-	USE CODE
27	USE.DESC	30	30	C	-	DESCRIPTION OF USE
57	PERCENTAGE	5	5	N	1	PERCENTAGE OF USE
62	POPULATION	10	10	I	-	POPULATION AFFECTED
72	ALLOC.DATE	8	8	D	-	ALLOCATION DATE
80	PERM.MGD	16	16	N	3	PERMITTED MGD
96	PERM.MGMO	16	16	N	3	PERMITTED MG MONTH

CUP USE CODES

AE	AESTHETIC USE
AG	AGRICULTURAL IRRIGATION USE
CI	COMMERCIAL AND INDUSTRIAL PROCESS USE
CA	COOLING AND AIR CONDITIONING USE
DW	DEWATERING USE
DI	DIVERSION AND IMPOUNDMENT INTO NON-DISTRICT FACILITIES
ES	ESSENTIAL USE (FIRE PROTECTION)
FP	FREEZE PROTECTION
GC	GOLF COURSE
HT	HOUSEHOLD TYPE USE
LS	LIVESTOCK USE
NV	NAVIGATION USE
NS	NURSERY USE
OU	OUTSIDE USES
PP	POWER PRODUCTION
RA	RECREATION AREA USE
SF	SOIL FLOODING
UL	URBAN LANDSCAPE IRRIGATION
WR	WATER BASED RECREATION USE
WU	WATER UTILITY USE

CUP SOURCE CODES

SS	STREAM OR OTHER WATERCOURSE
SL	LAKES OR OTHER IMPOUNDMENTS
GU	UNCONFINED AQUIFER
GC	CONFINED OR SEMI-CONFINED AQUIFER
SG	SURFACE WATER IS PRIMARY SOURCE WITH GROUND WATER AS BACKUP
GS	GROUND WATER IS PRIMARY SOURCE WITH SURFACE WATER AS BACKUP
ES	EFFLUENT WITH SURFACE WATER AS BACKUP
EG	EFFLUENT WITH GROUND WATER AS BACKUP

COUNTY CODES

001	ALACHUA
003	BAKER
007	BRADFORD
009	BREVARD
019	CLAY
031	DUVAL
035	FLAGER
061	INDIAN RIVER
069	LAKE
083	MARION
089	NASSAU
093	OKEECHOBEE
095	ORANGE
097	OSCEOLA
105	POLK
107	PUTNAM
109	ST. JOHNS
117	SEMINOLE
127	VOLUSIA

CUP STATUS CODES

P	PENDING APPLICATION
C	CURRENT PERMITTED APPLICATION
D	DELETED APPLICATION/PERMIT (EX: NO PERMIT REQUIRED, WITHDRAWN APPLICATION, COMBINED FILE, PERMIT MODIFIED/RENEWED)

WELL/PUMP STATUS CODES

PROPOSED	PROPOSED WELL/PUMP AT TIME OF APPLICATION
EXISTING	EXISTING WELL/PUMP AT TIME OF APPLICATION

USE CLASSIFICATION CODES AND STATEMENTS

FOR TECHNICAL STAFF REPORTS

AN CODE: 1

STATEMENT: THIS IS A NEW USE.

ANV CODE: 2

STATEMENT: THIS IS A NEW USE THAT REQUIRED A PERMIT PRIOR TO INITIATING THE WITHDRAWAL. A PERMIT WAS NOT SECURED PRIOR TO COMMENCING THE USE, THEREFORE, THE WATER USE IS IN VIOLATION OF 40C-2 AND HAS BEEN REVIEWED AS A NEW USE.

ANM CODE: 3A

STATEMENT: THIS IS A MODIFICATION OF A PREVIOUSLY ISSUED PERMIT WITH A REQUEST FOR AN INCREASE IN ALLOCATION. THE PORTION OF THE USE WHICH WAS AUTHORIZED BY THE PREVIOUS PERMIT HAS BEEN REVIEWED AS EXISTING COMMENCING THE DATE OF THE ORIGINAL PERMIT AND THE REQUESTED INCREASE IN ALLLOCATION HAS BEEN REVIEWED AS A NEW USE.

ANM CODE: 3B

STATEMENT: THIS IS A MODIFICATION OF A PREVIOUSLY ISSUED PERMIT WITH A REQUEST FOR A CHANGE IN USE. THE PORTION OF THE USE WHICH WAS AUTHORIZED BY THE PREVIOUS PERMIT HAS BEEN REVIEWED AS EXISTING COMMENCING THE DATE OF THE ORIGINAL PERMIT AND THE REQUESTED CHANGE IN USE HAS BEEN REVIEWED AS A NEW USE.

ANM CODE: 3C

STATEMENT: THIS IS A MODIFICATION OF A PREVIOUSLY ISSUED PERMIT WITH A REQUEST FOR A CHANGE IN SOURCE. THE PORTION OF THE USE WHICH WAS AUTHORIZED BY THE PREVIOUS PERMIT HAS BEEN REVIEWED AS EXISTING COMMENCING THE DATE OF THE ORIGINAL PERMIT AND THE REQUESTED CHANGE OF SOURCE HAS BEEN REVIEWED AS A NEW USE.

AU CODE: 4

STATEMENT: THIS IS AN EXISTING USE.

AUM CODE: 5A

STATEMENT: THIS IS AN EXISTING USE WITH A REQUEST FOR AN INCREASE IN ALLOCATION. THE PORTION WHICH WAS AN EXISTING USE HAS BEEN REVIEWED AS EXISTING AND THE REQUESTED INCREASE IN ALLOCATION HAS BEEN REVIEWED AS A NEW USE.

AUM CODE: 5B

STATEMENT: THIS IS AN EXISTING USE WITH A REQUEST FOR A CHANGE IN USE. THE PORTION WHICH WAS AN EXISTING USE HAS BEEN REVIEWED AS EXISTING AND THE REQUESTED CHANGE IN USE HAS BEEN REVIEWED AS A NEW USE.

AUM CODE: 5C

STATEMENT: THIS IS AN EXISTING USE WITH A REQUEST FOR A CHANGE OF SOURCE. THE PORTION WHICH WAS AN EXISTING USE HAS BEEN REVIEWED AS EXISTING AND THE REQUESTED CHANGE OF SOURCE HAS BEEN REVIEWED AS A NEW USE.

AUM/ANM CODE: 6A

STATEMENT: THIS IS A MODIFICATION ADDING A NEW WELL OR PUMP. THERE WILL BE NO INCREASE IN ALLOCATION. THIS PORTION WILL BE REVIEWED AS A NEW USE.

AUM/ANM CODE: 6B

STATEMENT: THIS IS A MODIFICATION ADDING A NEW WELL OR PUMP. THERE WILL BE NO CHANGE IN USE. THIS PORTION WILL BE REVIEWED AS A NEW USE.

AUM/ANM CODE: 6C

STATEMENT: THIS IS A MODIFICATION ADDING A NEW WELL OR PUMP. THERE WILL BE NO CHANGE IN SOURCE. THIS PORTION WILL BE REVIEWED AS A NEW USE.

AUV CODE: 7

STATEMENT: THIS IS AN EXISTING USE THAT DID NOT TIMELY FILE FOR EXISTING USE STATUS. BECAUSE AN APPLICATION WAS NOT SUBMITTED TIMELY, THE USE CAN NOT BE CLASSIFIED AS EXISTING AND HAS BEEN REVIEWED AS A NEW USE.

AUF/ANF CODE: 8

STATEMENT: THIS APPLICATION WAS RECEIVED AFTER A PREVIOUSLY ISSUED PERMIT EXPIRED AND CONSEQUENTLY, THE APPLICANT HAS NO PERMIT TO RENEW. THEREFORE, THE APPLICATION HAS BEEN REVIEWED AS A NEW USE.

ANMR

ANR CODE: 9

STATEMENT: THIS IS A RENEWAL OF A PREVIOUSLY ISSUED PERMIT. THE USE HAS BEEN REVIEWED AS AN EXISTING USE FOR THE PERIOD COMMENCING WITH THE ISSUANCE OF THE ORIGINAL PERMIT.

AUR CODE: 10

STATEMENT: THIS IS A RENEWAL OF A PREVIOUSLY ISSUED PERMIT. THE USE HAS BEEN REVIEWED AS EXISTING PURSUANT TO CHAPTER 373.226, F.S.

AUMR CODE: 11A

STATEMENT: THIS IS A RENEWAL OF A PREVIOUSLY ISSUED PERMIT. THE PORTION WHICH IS AN EXISTING USE HAS BEEN REVIEWED AS AN EXISTING USE PURSUANT TO CHAPTER 373.226, F.S., AND THE MODIFICATION HAS BEEN REVIEWED AS AN EXISTING USE COMMENCING WITH THE ISSUANCE OF THE PERMIT FOR THE INCLUSION OF THE MODIFICATION.

AUMR CODE: 11B

STATEMENT: THIS IS A RENEWAL OF A PREVIOUSLY ISSUED PERMIT. THE PORTION WHICH IS AN EXISTING USE HAS BEEN REVIEWED AS AN EXISTING USE PURSUANT TO CHAPTER 373.226, F.S., AND THE MODIFICATION HAS BEEN REVIEWED AS A NEW USE.

AUS CODE: 12

STATEMENT: THIS USE HAS BEEN REVIEWED AS AN EXISTING USE RATHER THAN A NEW USE SOLELY AS A RESULT OF THE EMERGENCY CONSUMPTIVE USE RULE.

AUVR CODE: 13A

STATEMENT: THIS IS A RENEWAL OF A PREVIOUSLY ISSUED PERMIT. THE USE HAS BEEN REVIEWED AS AN EXISTING USE FOR THE PERIOD COMMENCING WITH THE ISSUANCE OF THE ORIGINAL PERMIT.

AUVR CODE: 13B

STATEMENT: THIS IS A RENEWAL OF A PREVIOUSLY ISSUED PERMIT. THE USE HAS BEEN REVIEWED AS AN EXISTING USE FOR THE PERIOD COMMENCING WITH THE ISSUANCE OF THE ORIGINAL PERMIT. THE REQUESTED INCREASED ALLOCATION HAS BEEN REVIEWED AS A NEW USE.

AUVF CODE: 14

STATEMENT: THIS IS AN EXISTING USE THAT DID NOT TIMELY FILE FOR EXISTING USE STATUS. THIS APPLICATION WAS RECEIVED AFTER A PREVIOUSLY ISSUED PERMIT EXPIRED AND CONSEQUENTLY, THE APPLICANT HAS NO PERMIT TO RENEW. THEREFORE, THE APPLICATION HAS BEEN REVIEWED AS A NEW USE.

AUFMR CODE: 15

STATEMENT: THIS APPLICATION HAS BEEN MODIFIED TO COMBINE TWO FILES. PERMIT WAS ISSUED AND IS AN EXISTING USE AND PART OF THE APPLICATION HAS BEEN COMBINED WITH THIS FILE AND WAS RECEIVED AFTER A PREVIOUSLY ISSUED PERMIT EXPIRED AND CONSEQUENTLY, THE APPLICANT HAS NO PERMIT TO RENEW. THEREFORE, THIS PORTION OF THE USE HAS BEEN REVIEWED AS A NEW USE.

ANFM CODE: 16

STATEMENT: APPLICATION WAS RECEIVED AFTER A PREVIOUSLY ISSUED PERMIT EXPIRED AND CONSEQUENTLY, THE APPLICANT HAS NO PERMIT TO RENEW. THEREFORE, THIS PORTION OF THE USE HAS BEEN REVIEWED AS A NEW USE. IN ADDITION, PERMIT ISSUED HAS BEEN COMBINED UNDER THE APPLICATION REVISION. THE USE UNDER PERMIT HAS BEEN REVIEWED AS AN EXISTING USE COMMENCING WITH THE DATE OF ISSUANCE.

AUSMV CODE: 17

STATEMENT: THIS IS AN EXISTING USE WITH A REQUEST FOR AN INCREASE IN ALLOCATION. THE ALLOCATION REQUESTED FOR THE INCREASE IN USE IS AN EXISTING USE THAT DID NOT TIMELY FILE FOR EXISTING USE STATUS.

AUFM CODE: 18A

STATEMENT: THIS APPLICATION WAS RECEIVED AFTER A PREVIOUSLY ISSUED PERMIT EXPIRED AND CONSEQUENTLY, THE APPLICANT HAS NO PERMIT TO RENEW. IN ADDITION, THIS IS A MODIFICATION FOR AN INCREASE IN ALLOCATION. THEREFORE, THE APPLICATION HAS BEEN REVIEWED AS A NEW USE.

AUFM CODE: 18B

STATEMENT: THIS APPLICATION WAS RECEIVED AFTER A PREVIOUSLY ISSUED PERMIT EXPIRED AND CONSEQUENTLY, THE APPLICANT HAS NO PERMIT TO RENEW. IN ADDITION, THIS IS A MODIFICATION FOR A CHANGE IN USE. THEREFORE, THE APPLICATION HAS BEEN REVIEWED AS A NEW USE.

AUFM CODE: 18C

STATEMENT: THIS APPLICATION WAS RECEIVED AFTER A PREVIOUSLY ISSUED PERMIT EXPIRED AND CONSEQUENTLY, THE APPLICANT HAS NO PERMIT TO RENEW. IN ADDITION, THIS IS A MODIFICATION FOR A CHANGE OF SOURCE. THEREFORE, THE APPLICATION HAS BEEN REVIEWED AS A NEW USE.

APPLICATION NUMBER:	2-069-0247AU		
OWNER:	ORANGE-CO OF FLORIDA INC.	QUAD:	L-NELLIE
APPLICANT:	ORANGE-CO OF FLORIDA INC.	MAP:	60
AGENT:	ERROLL FIELDING		
COUNTY:	LAKE		
ACREAGE ZONED:	60.000		
PROJECT ACREAGE:	60.000		
SOURCE DESC.:	GROUNDWATER FROM THE FLORIDAN AQUIFER		
PROJECT DESC.:	CITRUS		
TOTAL NO. OF WELLS:	1 TOTAL NO. OF PUMPS: 0		
USE CODE:	AG SOURCE CODE: GC		
PERCENT:	100.0		
RECOMMENDED (MGY):	28.800	ACRE-FT:	88.400
RECOMMENDED BY:	BLANEY CRIDDLE		
WITHDRAWAL (MGD):	0.000		
WITHDRAWAL (MGMO):	4.700	ACRE-FT:	14.400
WITHDRAWAL (MGY):	23.000	ACRE-FT:	70.600
FROST & FREEZE:	8.600	ACRE-FT:	26.300

WELL & PUMP INFORMATION:

WELL #/ PUMP #	LONGITUDE/LATITUDE	DIA.	TOTAL DEPTH	EFFICIENCY OF SYSTEM	PUMP CAPACITY OR FLOW RATE	STATUS OF WELL/PUMP	WMC PERMIT/ SW BODY	DATE INSTALLED
A	81 46 46 28 29 55	10.0	561	80%	399 GPM	EXISTING		/ /

Exhibit 7.7.5 Item Description of FRE Data Files

A. File Structure

1. AFOUT.DBF

Number of data records: 399
Date of last update : 05/30/91

Field	Field Name	Type	Width	Dec	Index
1	LOCATION	Character	12		N
2	CLI	Character	3		N
3	SS	Character	2		N
4	II	Character	2		N
5	CC	Character	2		Y
6	JAN	Numeric	6	1	N
7	FEB	Numeric	6	1	N
8	MAR	Numeric	6	1	N
9	APR	Numeric	6	1	N
10	MAY	Numeric	6	1	N
11	JUN	Numeric	6	1	N
12	JUL	Numeric	6	1	N
13	AUG	Numeric	6	1	N
14	SEP	Numeric	6	1	N
15	OCT	Numeric	6	1	N
16	NOV	Numeric	6	1	N
17	DEC	Numeric	6	1	N
** Total **			94		

2. AGGCODE.DBF

Number of data records: 7
Date of last update : 05/21/91

Field	Field Name	Type	Width	Dec	Index
1	AGGCODE	Character	2		Y
2	AGGCROP	Character	15		N
** Total **			18		

3. CROPCODE.DBF

Number of data records: 192
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	PROJ_DESC	Character	50		N
2	CROPCODE	Character	2		Y
3	AGGCODE	Character	2		N
4	BM	Character	2		N
5	BD	Character	2		N
6	EM	Character	2		N
7	ED	Character	2		N
** Total **			63		

4. CTYCODE.DBF
Number of data records: 19
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	COUNTY	Character	15		Y
2	CTYCODE	Character	3		N
3	CLIMATE	Character	3		N
4	ZONE	Character	1		N
5	AGCOUNTY	Numeric	1		N
** Total **			24		

5. METHCODE.DBF
Number of data records: 412
Date of last update : 06/03/91

Field	Field Name	Type	Width	Dec	Index
1	IRRIG_METH	Character	50		N
2	METHCODE	Character	2		N
** Total **			53		

6. SOILCODE.DBF
Number of data records: 24
Date of last update : 04/09/91

Field	Field Name	Type	Width	Dec	Index
1	AWC_LO	Numeric	4	2	N
2	AWC_HI	Numeric	4	2	N
3	SOILCODE	Character	2		N
** Total **			11		

7. SUPDAT.DBF
Number of data records: 1303
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	APPNUM	Character	12		N
2	WD_ID	Character	11		N
3	CROP	Character	25		N
4	METHOD	Character	22		N
5	AREA	Numeric	9	2	N
6	WELL_NO	Character	7		N
7	MULTIPLE	Character	9		N
8	DONE	Numeric	1		N
** Total **			97		

8. PROJCUP.DBF

Number of data records: 79

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	CTYCODE	Character	3		N
2	AGGCODE	Character	2		Y
3	ACRES	Numeric	10	3	N
4	JAN	Numeric	12	3	N
5	FEB	Numeric	12	3	N
6	MAR	Numeric	12	3	N
7	APR	Numeric	12	3	N
8	MAY	Numeric	12	3	N
9	JUN	Numeric	12	3	N
10	JUL	Numeric	12	3	N
11	AUG	Numeric	12	3	N
12	SEP	Numeric	12	3	N
13	OCT	Numeric	12	3	N
14	NOV	Numeric	12	3	N
15	DEC	Numeric	12	3	N
16	TTL	Numeric	15	3	N
** Total **			175		

9. PROJACRE.DBF

Number of data records: 79

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	CTYCODE	Character	3		N
2	AGGCODE	Character	2		Y
3	JAN	Numeric	12	5	N
4	FEB	Numeric	12	5	N
5	MAR	Numeric	12	5	N
6	APR	Numeric	12	5	N
7	MAY	Numeric	12	5	N
8	JUN	Numeric	12	5	N
9	JUL	Numeric	12	5	N
10	AUG	Numeric	12	5	N
11	SEP	Numeric	12	5	N
12	OCT	Numeric	12	5	N
13	NOV	Numeric	12	5	N
14	DEC	Numeric	12	5	N
** Total **			150		

10. PROJBMP.DBF

Number of data records: 79

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	CTYCODE	Character	3		N
2	AGGCODE	Character	2		N
3	ACRES	Numeric	10	3	N
4	JAN	Numeric	12	3	N
5	FEB	Numeric	12	3	N
6	MAR	Numeric	12	3	N
7	APR	Numeric	12	3	N
8	MAY	Numeric	12	3	N
9	JUN	Numeric	12	3	N
10	JUL	Numeric	12	3	N
11	AUG	Numeric	12	3	N
12	SEP	Numeric	12	3	N
13	OCT	Numeric	12	3	N
14	NOV	Numeric	12	3	N
15	DEC	Numeric	12	3	N
16	TTL	Numeric	15	3	N
** Total **			185		

11. BMPACRE.DBF

Number of data records: 80

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	CTYCODE	Character	3		N
2	AGGCODE	Character	2		Y
3	JAN	Numeric	12	5	N
4	FEB	Numeric	12	5	N
5	MAR	Numeric	12	5	N
6	APR	Numeric	12	5	N
7	MAY	Numeric	12	5	N
8	JUN	Numeric	12	5	N
9	JUL	Numeric	12	5	N
10	AUG	Numeric	12	5	N
11	SEP	Numeric	12	5	N
12	OCT	Numeric	12	5	N
13	NOV	Numeric	12	5	N
14	DEC	Numeric	12	5	N
** Total **			150		

12. PROJALL.DBF

Number of data records: 378

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	CTYCODE	Character	3		N
2	COUNTY	Character	15		N
3	AGGCODE	Character	2		Y
4	AGGCROP	Character	15		N
5	YR	Numeric	5		Y
6	ACRES	Numeric	7		N
7	JAN	Numeric	10	4	N
8	FEB	Numeric	10	4	N
9	MAR	Numeric	10	4	N
10	APR	Numeric	10	4	N
11	MAY	Numeric	10	4	N
12	JUN	Numeric	10	4	N
13	JUL	Numeric	10	4	N
14	AUG	Numeric	10	4	N
15	SEP	Numeric	10	4	N
16	OCT	Numeric	10	4	N
17	NOV	Numeric	10	4	N
18	DEC	Numeric	10	4	N
19	TTL	Numeric	13	4	N
** Total **			181		

13. PALLBMP.DBF

Number of data records: 378

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	CTYCODE	Character	3		N
2	COUNTY	Character	15		N
3	AGGCODE	Character	2		N
4	AGGCROP	Character	15		N
5	YR	Numeric	5		N
6	ACRES	Numeric	7		N
7	JAN	Numeric	10	4	N
8	FEB	Numeric	10	4	N
9	MAR	Numeric	10	4	N
10	APR	Numeric	10	4	N
11	MAY	Numeric	10	4	N
12	JUN	Numeric	10	4	N
13	JUL	Numeric	10	4	N
14	AUG	Numeric	10	4	N
15	SEP	Numeric	10	4	N
16	OCT	Numeric	10	4	N
17	NOV	Numeric	10	4	N
18	DEC	Numeric	10	4	N
19	TTL	Numeric	13	4	N
** Total **			181		

14. PROJOUT.DBF
Number of data records: 126
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	CTYCODE	Character	3		N
2	CROP	Character	19		N
3	AGGCODE	Character	2		Y
4	YR90	Numeric	7		N
5	YR95	Numeric	9		N
6	YR2010	Numeric	9		N
** Total **			50		

15. WD_DESC.DBF
Number of data records: 7262
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	APPNUM	Character	20		N
2	WD_ID	Character	11		N
3	CTYCODE	Character	3		N
4	CLIMATE	Character	3		N
5	ZONE	Character	1		N
6	PROJ_ACREA	Numeric	16	3	N
7	PROJ_DESC	Character	50		N
8	CROPCODE	Character	2		N
9	AGGCODE	Character	2		N
10	IRRIG_METH	Character	50		N
11	METHCODE	Character	2		N
12	SP_CODE	Character	2		N
13	SOURCE_COD	Character	3		N
14	USE_CODE	Character	3		N
15	LONG_LAT	Character	18		N
16	AWC_LO	Numeric	4	2	N
17	AWC_HI	Numeric	4	2	N
18	SOILCODE	Character	2		N
19	LOCATION	Character	12		N
20	DONE	Numeric	1		N
21	WD_ACRE	Numeric	10	3	N
22	ID	Numeric	5		N
** Total **			225		

16. WD_AFSIR.DBF
Number of data records: 7262
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	ID	Numeric	5		Y
2	APPNUM	Character	20		N
3	WD_ID	Character	11		N
4	CTYCODE	Character	3		N
5	CROPCODE	Character	2		N
6	AGGCODE	Character	2		N
7	METHCODE	Character	2		N
8	WD_ACRE	Numeric	10	3	N
9	LOCATION	Character	12		N
10	CONVERSION	Numeric	10	7	N
11	JAN	Numeric	12	3	N
12	FEB	Numeric	12	3	N
13	MAR	Numeric	12	3	N
14	APR	Numeric	12	3	N
15	MAY	Numeric	12	3	N
16	JUN	Numeric	12	3	N
17	JUL	Numeric	12	3	N
18	AUG	Numeric	12	3	N
19	SEP	Numeric	12	3	N
20	OCT	Numeric	12	3	N
21	NOV	Numeric	12	3	N
22	DEC	Numeric	12	3	N
23	TTL	Numeric	15	3	N
** Total **			237		

17. WD_BMP.DBF
Number of data records: 7262
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	ID	Numeric	5		Y
2	APPNUM	Character	20		N
3	WD_ID	Character	11		N
4	CTYCODE	Character	3		N
5	CROPCODE	Character	2		N
6	AGGCODE	Character	2		N
7	METHCODE	Character	2		N
8	WD_ACRE	Numeric	10	3	N
9	LOCATION	Character	12		N
10	CONVERSION	Numeric	10	7	N
11	JAN	Numeric	12	3	N
12	FEB	Numeric	12	3	N
13	MAR	Numeric	12	3	N
14	APR	Numeric	12	3	N
15	MAY	Numeric	12	3	N
16	JUN	Numeric	12	3	N
17	JUL	Numeric	12	3	N
18	AUG	Numeric	12	3	N
19	SEP	Numeric	12	3	N
20	OCT	Numeric	12	3	N
21	NOV	Numeric	12	3	N

22	DEC	Numeric	12	3	N
23	TTL	Numeric	15	3	N
** Total **			237		

18. WD_MISS.DBF

Number of data records: 810

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	ID	Numeric	5		N
2	APPNUM	Character	20		N
3	WD_ID	Character	11		N
4	CTYCODE	Character	3		N
5	CROPCODE	Character	2		N
6	AGGCODE	Character	2		N
7	METHCODE	Character	2		N
8	WD_ACRE	Numeric	10	3	N
9	LOCATION	Character	12		N
10	CONVERSION	Numeric	10	7	N
11	JAN	Numeric	12	3	N
12	FEB	Numeric	12	3	N
13	MAR	Numeric	12	3	N
14	APR	Numeric	12	3	N
15	MAY	Numeric	12	3	N
16	JUN	Numeric	12	3	N
17	JUL	Numeric	12	3	N
18	AUG	Numeric	12	3	N
19	SEP	Numeric	12	3	N
20	OCT	Numeric	12	3	N
21	NOV	Numeric	12	3	N
22	DEC	Numeric	12	3	N
23	TTL	Numeric	15	3	N
** Total **			237		

19. WD_CUP.DBF

Number of data records: 2716

Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	APPNUM	Character	20		Y
2	PROJ_ACREA	Numeric	16	3	N
3	PROJ_DESC	Character	100		N
4	IRRIG_METH	Character	125		N
5	SOURCE_COD	Character	3		N
6	PERM_MGY	Numeric	16	3	N
7	EST_MGY	Numeric	15	3	N
** Total **			296		

20. LOCATION.DBF
Number of data records: 393
Date of last update : 05/30/91

Field	Field Name	Type	Width	Dec	Index
1	LOCATION	Character	12		N
2	CLI	Character	3		N
3	SS	Character	2		N
4	II	Character	2		N
5	CC	Character	2		N
6	BM	Character	2		N
7	BD	Character	2		N
8	EM	Character	2		N
9	ED	Character	2		N
** Total **			30		

21. WDID.DBF
Number of data records: 6685
Date of last update : 06/06/91

Field	Field Name	Type	Width	Dec	Index
1	APPNUM	Character	20		N
2	WELL_NO	Character	5		N
3	PUMP_NO	Character	5		N
4	WD_ID	Character	11		Y
5	COORDS	Character	18		N
6	AWC_LO	Numeric	4	2	N
7	AWC_HI	Numeric	4	2	N
8	SOILCODE	Character	2		N
9	WDID	Character	11		N
** Total **			81		

B. Item Definition

1. AFOUT.DBF (AFSIRS output, in Acre_in)

Field	Field Name	Item Description
1	LOCATION	Location code, Cli + SS + II + CC
2	CLI	Climate code (AFSIRS)
3	SS	Soil code
4	II	Irrigation method code
5	CC	Crop code
6	JAN	Irrigation requirements, in Acre_in: January
7	FEB	Irrigation requirements, in Acre_in: February
8	MAR	Irrigation requirements, in Acre_in: March
9	APR	Irrigation requirements, in Acre_in: April
10	MAY	Irrigation requirements, in Acre_in: May
11	JUN	Irrigation requirements, in Acre_in: June
12	JUL	Irrigation requirements, in Acre_in: July
13	AUG	Irrigation requirements, in Acre_in: August
14	SEP	Irrigation requirements, in Acre_in: September
15	OCT	Irrigation requirements, in Acre_in: October
16	NOV	Irrigation requirements, in Acre_in: November
17	DEC	Irrigation requirements, in Acre_in: December

2. AGGCODE.DBF

Field	Field Name	Item Description
1	AGGCODE	Crop code, aggregated to major crop category
2	AGGCROP	Description of major crop category

3. CROPCODE.DBF

Field	Field Name	Item Description
1	PROJ_DESC	Project description (crop), from CUPDESC
2	CROPCODE	Crop code
3	AGGCODE	Crop code, major crop category
4	BM	Planting date, Beginning month
5	BD	Planting date, Beginning day
6	EM	Planting date, End month
7	ED	Planting date, End day

4. CTYCODE.DBF

Field	Field Name	Item Description
1	COUNTY	County name
2	CTYCODE	County code
3	CLIMATE	Climate zone (AFSIRS)
4	ZONE	Climate zone (FAS, Vegetable Summary)
5	AGCOUNTY	1= Agricultural county within district

5. METHCODE.DBF

Field	Field Name	Item Description
1	IRRIG_METH	Irrigation method, from CUPDESC
2	METHCODE	Irrigation method code

6. SOILCODE.DBF

Field	Field Name	Item Description
1	AWC_LO	Average water holding capacity, low
2	AWC_HI	Average water holding capacity, high
3	SOILCODE	Soilcode

7. SUPDAT.DBF (from Supplementary Data Sheet)

Field	Field Name	Item Description
1	APPNUM	Applicant number (from CUPDESC)
2	WD_ID	Withdrawal point identifier
3	CROP	Crop description
4	METHOD	Irrigation method description
5	AREA	Project area
6	WELL_NO	Well/Pump number
7	MULTIPLE	X = Multiple irrigation system
8	DONE	Dummy code

8. PROJCUP.DBF (Estimated water needs from CUP data, current technology, in MG)

Field	Field Name	Item Description
1	CTYCODE	County code
2	AGGCODE	Crop code, major crop category

3	ACRES	Crop acreage (irrigated only)
4	JAN	Irrigation requirements, MGMo, January
5	FEB	Irrigation requirements, MGMo, February
6	MAR	Irrigation requirements, MGMo, March
7	APR	Irrigation requirements, MGMo, April
8	MAY	Irrigation requirements, MGMo, May
9	JUN	Irrigation requirements, MGMo, June
10	JUL	Irrigation requirements, MGMo, July
11	AUG	Irrigation requirements, MGMo, August
12	SEP	Irrigation requirements, MGMo, September
13	OCT	Irrigation requirements, MGMo, October
14	NOV	Irrigation requirements, MGMo, November
15	DEC	Irrigation requirements, MGMo, December
16	TTL	Irrigation requirements, MGY, Annual Total

9. PROJACRE.DBF (Irrigation requirements from CUP data, current technology, in Acre_in)

Field	Field Name	Item Description
1	CTYCODE	County code
2	AGGCODE	Crop code, major crop category
3	JAN	Irrigation requirements, Acre_in, January
4	FEB	Irrigation requirements, Acre_in, February
5	MAR	Irrigation requirements, Acre_in, March
6	APR	Irrigation requirements, Acre_in, April
7	MAY	Irrigation requirements, Acre_in, May
8	JUN	Irrigation requirements, Acre_in, June
9	JUL	Irrigation requirements, Acre_in, July
10	AUG	Irrigation requirements, Acre_in, August
11	SEP	Irrigation requirements, Acre_in, September
12	OCT	Irrigation requirements, Acre_in, October
13	NOV	Irrigation requirements, Acre_in, November
14	DEC	Irrigation requirements, Acre_in, December

10. PROJBMP.DBF (Estimated water needs from CUP data, assuming best management practices, in MG)

Field	Field Name	Item Description
1	CTYCODE	County code
2	AGGCODE	Crop code, major crop category
3	ACRES	Crop acreage (irrigated only)
4	JAN	Irrigation requirements, MGMo, January
5	FEB	Irrigation requirements, MGMo, February
6	MAR	Irrigation requirements, MGMo, March
7	APR	Irrigation requirements, MGMo, April
8	MAY	Irrigation requirements, MGMo, May
9	JUN	Irrigation requirements, MGMo, June
10	JUL	Irrigation requirements, MGMo, July
11	AUG	Irrigation requirements, MGMo, August
12	SEP	Irrigation requirements, MGMo, September
13	OCT	Irrigation requirements, MGMo, October
14	NOV	Irrigation requirements, MGMo, November
15	DEC	Irrigation requirements, MGMo, December
16	TTL	Irrigation requirements, MGY, Annual Total

11. BMPACRE.DBF (Irrigation requirements from CUP data assuming best management practices, in Acre_in)

Field	Field Name	Item Description
1	CTYCODE	County code
2	AGGCODE	Crop code, major crop category
3	JAN	Irrigation requirements, Acre_in, January
4	FEB	Irrigation requirements, Acre_in, February
5	MAR	Irrigation requirements, Acre_in, March
6	APR	Irrigation requirements, Acre_in, April
7	MAY	Irrigation requirements, Acre_in, May
8	JUN	Irrigation requirements, Acre_in, June
9	JUL	Irrigation requirements, Acre_in, July
10	AUG	Irrigation requirements, Acre_in, August
11	SEP	Irrigation requirements, Acre_in, September
12	OCT	Irrigation requirements, Acre_in, October
13	NOV	Irrigation requirements, Acre_in, November
14	DEC	Irrigation requirements, Acre_in, December

12. PROJALL.DBF

(Estimated water needs from Annual Water Use Survey, current technology, in MG)

Field	Field Name	Item Description
1	CTYCODE	County code
2	COUNTY	County name
3	AGGCODE	Crop code, major crop category
4	AGGCROP	Major crop category, descriptive
5	YR	Year
6	ACRES	Acres in crop category
7	JAN	Irrigation requirements, MGMo, January
8	FEB	Irrigation requirements, MGMo, February
9	MAR	Irrigation requirements, MGMo, March
10	APR	Irrigation requirements, MGMo, April
11	MAY	Irrigation requirements, MGMo, May
12	JUN	Irrigation requirements, MGMo, June
13	JUL	Irrigation requirements, MGMo, July
14	AUG	Irrigation requirements, MGMo, August
15	SEP	Irrigation requirements, MGMo, September
16	OCT	Irrigation requirements, MGMo, October
17	NOV	Irrigation requirements, MGMo, November
18	DEC	Irrigation requirements, MGMo, December
19	TTL	Irrigation requirements, MGY, Annual Total

13. PALLBMP.DBF

(Estimated water needs from Annual Water Use Survey, assuming best management practices, in MG)

Field	Field Name	Item Description
1	CTYCODE	County code
2	COUNTY	County name
3	AGGCODE	Crop code, major crop category
4	AGGCROP	Major crop category, descriptive
5	YR	Year
6	ACRES	Acres in crop category
7	JAN	Irrigation requirements, MGMo, January
8	FEB	Irrigation requirements, MGMo, February
9	MAR	Irrigation requirements, MGMo, March
10	APR	Irrigation requirements, MGMo, April
11	MAY	Irrigation requirements, MGMo, May
12	JUN	Irrigation requirements, MGMo, June
13	JUL	Irrigation requirements, MGMo, July
14	AUG	Irrigation requirements, MGMo, August
15	SEP	Irrigation requirements, MGMo, September
16	OCT	Irrigation requirements, MGMo, October
17	NOV	Irrigation requirements, MGMo, November
18	DEC	Irrigation requirements, MGMo, December
19	TTL	Irrigation requirements, MGY, Annual Total

14. PROJOUT.DBF — (Land use projections from the Annual Water Use Survey, for 1990, 1995 and 2010)

Field	Field Name	Item Description
1	CTYCODE	County code
2	CROP	Crop description
3	AGGCODE	Crop code, major crop category **invalid**
4	YR90	Acres
5	YR95	Acres
6	YR2010	Acres

15. WD_DESC.DBF — (Characteristics of water use from withdrawal points, CUP data)

Field	Field Name	Item Description
1	APPNUM	Applicant number
2	WD_ID	Withdrawal point identifier
3	CTYCODE	County code
4	CLIMATE	Climate zone code (AFSIRS)
5	ZONE	Climate zone code (FAS Veg. Summary)
6	PROJ_ACREA	Project acres
7	PROJ_DESC	Project description (crop)
8	CROPCODE	Crop code
9	AGGCODE	Crop code, major crop category
10	IRRIG_METH	Irrigation method
11	METHCODE	Irrigation method code
12	SP_CODE	Special code, adjusted acreage (multiple desc.)
13	SOURCE_COD	Source code
14	USE_CODE	Use Type code
15	LONG_LAT	Longitude & latitudes coordinates
16	AWC_LO	Average water holding capacity, low
17	AWC_HI	Average water holding capacity, high
18	SOILCODE	Soil code
19	LOCATION	Cli + soilcode + methcode + cropcode
20	DONE	Dummy
21	WD_ACRE	Acreage, for observation (ID)
22	ID	Observation number

16. WD_AFSIR.DBF — (Estimated water use for all observations in WD_Desc, CUP data, in MG)

Field	Field Name	Item Description
1	ID	Observation number (from WD_Desc)
2	APPNUM	Applicant number
3	WD_ID	Withdrawal indentifier
4	CTYCODE	County code
5	CROPCODE	Crop code
6	AGGCODE	Crop code, major crop category
7	METHCODE	Irrigation method code
8	WD_ACRE	Acreage, for observation
9	LOCATION	Cli + Soilcode + methcode + cropcode
10	CONVERSION	Conversion factor (Acre_in to MG)
11	JAN	Irrigation requirements, MGMo, January
12	FEB	Irrigation requirements, MGMo, February
13	MAR	Irrigation requirements, MGMo, March
14	APR	Irrigation requirements, MGMo, April
15	MAY	Irrigation requirements, MGMo, May
16	JUN	Irrigation requirements, MGMo, June
17	JUL	Irrigation requirements, MGMo, July
18	AUG	Irrigation requirements, MGMo, August
19	SEP	Irrigation requirements, MGMo, September
20	OCT	Irrigation requirements, MGMo, October
21	NOV	Irrigation requirements, MGMo, November
22	DEC	Irrigation requirements, MGMo, December
23	TTL	Irrigation requirements, MGY, Annual Total

17. WD_BMP.DBF — (Estimated water needs for all observations in WD_Desc, assuming best management practices, CUP data, in MG)

Field	Field Name	Item Description
1	ID	Observation number (from WD_Desc)
2	APPNUM	Applicant number
3	WD_ID	Withdrawal indentifier
4	CTYCODE	County code
5	CROPCODE	Crop code
6	AGGCODE	Crop code, major crop category
7	METHCODE	Irrigation method code
8	WD_ACRE	Acreage, for observation
9	LOCATION	Cli + Soilcode + methcode + cropcode
10	CONVERSION	Conversion factor (Acre_in to MG)
11	JAN	Irrigation requirements, MGMo, January
12	FEB	Irrigation requirements, MGMo, February
13	MAR	Irrigation requirements, MGMo, March
14	APR	Irrigation requirements, MGMo, April
15	MAY	Irrigation requirements, MGMo, May
16	JUN	Irrigation requirements, MGMo, June
17	JUL	Irrigation requirements, MGMo, July

18	AUG	Irrigation requirements, MGMo, August
19	SEP	Irrigation requirements, MGMo, September
20	OCT	Irrigation requirements, MGMo, October
21	NOV	Irrigation requirements, MGMo, November
22	DEC	Irrigation requirements, MGMo, December
23	TTL	Irrigation requirements, MGY, Annual Total

18. WD_MISS.DBF (Observations from WD_Afsirs for which no water needs were calculated due to insufficient data)

Field	Field Name	Item Description
1	ID	Observation number (from WD_Desc)
2	APPNUM	Applicant number
3	WD_ID	Withdrawal indentifier
4	CTYCODE	County code
5	CROPCODE	Crop code
6	AGGCODE	Crop code, major crop category
7	METHCODE	Irrigation method code
8	WD_ACRE	Acreage, for observation
9	LOCATION	Cli + Soilcode + methcode + cropcode
10	CONVERSION	Conversion factor (Acre_in to MG)
11	JAN	Irrigation requirements, MGMo, January
12	FEB	Irrigation requirements, MGMo, February
13	MAR	Irrigation requirements, MGMo, March
14	APR	Irrigation requirements, MGMo, April
15	MAY	Irrigation requirements, MGMo, May
16	JUN	Irrigation requirements, MGMo, June
17	JUL	Irrigation requirements, MGMo, July
18	AUG	Irrigation requirements, MGMo, August
19	SEP	Irrigation requirements, MGMo, September
20	OCT	Irrigation requirements, MGMo, October
21	NOV	Irrigation requirements, MGMo, November
22	DEC	Irrigation requirements, MGMo, December
23	TTL	Irrigation requirements, MGY, Annual Total

19. WD_CUP.DBF (Comparison of permitted MGY from original CUP files and estimated MGY using AFSIRS for all Applicants in CUPDESC)

Field	Field Name	Item Description
1	APPNUM	Applicant number
2	PROJ_ACREA	Project area
3	PROJ_DESC	Project description
4	IRRIG_METH	Irrigation method
5	SOURCE_COD	Source code
6	USE_CODE	Use Type code

7	PERM_MGY	Permitted MGY (from CUPWU)
8	EST_MGY	Estimated MGY (using AFSIRS)

20. LOCATION.DBF — (Location codes used with AFSIRS, with planting dates)

Field	Field Name	Item Description
1	LOCATION	Location code (CLI+SS+II+CC)
2	CLI	Climate zone
3	SS	Soil code
4	II	Irrigation method code
5	CC	Crop code
6	BM	Planting date, beginning month
7	BD	Planting date, beginning day
8	EM	Planting date, end month
9	ED	Planting date, end day

21. WDID.DBF — (Withdrawal point identifiers, from CUPWD and CUPPD)

Field	Field Name	Item Description
1	APPNUM	Applicant number
2	WELL_NO	Well number
3	PUMP_NO	Pump number
4	WD_ID	Withdrawal point identifier
5	COORDS	Longitude-latitude coordinates
6	AWC_LO	Average water holding capacity, low
7	AWC_HI	Average water holding capacity, high
8	SOILCODE	Soil code

Exhibit 7.7.6

AGRICULTURAL/IRRIGATION TYPE USES SUPPLEMENTARY DATA SHEET

Complete the appropriate sections only. Type or print legibly. Attach additional sheets if space provided below is not sufficient.

Crop	Irrigation Method	Acres Irrigated	Amount of water applied per application or annually	Source or well number	Average number of applications or month irrigated: normal year (indicate months irrigated)	dry year (indicate months irrigated)
Peanuts	Walking Gun	10	92.9 Acre In.	A	Feb	May
Hay	"	25	889.5 Acre In.	A	Feb	Nov
			Acre In.			
			Acre In.			

Generally describe any surface runoff of irrigation water including amounts, receiving body and conditions when runoff occurs NONE

Describe in detail any water use for freeze protection NONE

If any part of the property is in a drainage district, give the district's name NONE

Attach any available water quality data —

System efficiency (Based on system type) 70%

Describe method of determining system efficiency: IFAS pump efficiency test ____ Industry standards ✓ Other ____

Explain water conservation measures implemented or planned for implementation in the near future Nighttime or evening, early Morning

* Estimated use based on pasture from B/C.

Exhibit 7.7.7 Afsirs output from the file AFOUT.dbf, in Acre_in at 80% probability level[1]

LOCATION	CLI	SS	II	CC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DTB 1 3 37	DTB	1	3	37	0.0	0.0	1.2	3.6	5.8	2.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 1 7 10	DTB	1	7	10	4.5	4.3	7.5	9.3	10.4	8.5	6.4	5.8	4.8	4.3	4.2	3.2
DTB 1 7 37	DTB	1	7	37	0.0	0.0	3.0	7.1	11.6	6.3	0.0	0.0	0.0	0.0	0.0	0.0
DTB 1 7 50	DTB	1	7	50	0.0	0.0	3.0	7.0	11.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 2 3 4	DTB	2	3	4	1.1	1.3	2.8	4.3	5.6	3.4	2.4	2.3	1.8	1.1	1.6	1.3
DTB 2 4 5	DTB	2	4	5	2.4	2.8	4.4	6.1	7.0	4.8	4.0	3.9	3.4	3.0	2.7	2.0
DTB 2 4 8	DTB	2	4	8	11.8*	3.1	4.8	6.3	7.0	4.9	4.6	4.4	3.8	3.5	2.9	2.3
DTB 2 5 8	DTB	2	5	8	8.0	9.7	14.1	18.0	20.1	15.9	16.0	14.4	12.9	11.2	9.1	7.0
DTB 2 6 4	DTB	2	6	4	1.4	1.1	3.9	5.3	6.5	4.0	2.5	2.6	2.1	1.4	1.8	1.5
DTB 3 4 16	DTB	3	4	16	2.2	2.6	4.2	6.1	6.6	4.6	3.7	3.7	3.0	2.6	2.5	1.9
DTB 4 3 4	DTB	4	3	4	1.1	0.8	2.8	4.2	5.5	3.4	2.1	2.1	1.4	1.0	1.2	1.0
DTB 4 4 4	DTB	4	4	4	1.4	1.0	3.5	4.8	5.8	3.5	2.3	2.2	1.7	1.3	1.5	1.1
DTB 4 4 5	DTB	4	4	5	2.2	2.7	4.2	6.1	6.9	4.7	4.1	3.7	3.3	2.6	2.6	1.9
DTB 4 4 8	DTB	4	4	8	11.5*	3.0	4.8	6.3	7.0	4.8	4.5	4.4	3.8	3.5	3.0	2.3
DTB 4 4 9	DTB	4	4	9	2.3	2.8	4.4	6.0	6.8	4.6	4.0	3.9	3.4	2.9	2.6	2.1
DTB 4 5 8	DTB	4	5	8	8.0	9.6	14.1	18.0	20.1	15.9	16.0	14.4	12.9	11.2	9.1	7.0
DTB 4 5 9	DTB	4	5	9	8.0	9.6	14.1	18.0	20.1	15.9	16.0	14.4	13.0	11.2	9.1	7.0
DTB 4 6 4	DTB	4	6	4	1.5	1.1	3.8	5.1	6.2	3.7	2.4	2.3	1.8	1.3	1.6	1.2
DTB 4 6 10	DTB	4	6	10	0.1*	0.3	1.8	4.5	5.3	2.9	1.5	1.9	1.4	1.6	0.7	0.0
DTB 4 7 10	DTB	4	7	10	3.6	4.5	6.6	9.1	10.3	7.6	6.6	5.8	4.6	4.1	4.0	3.3
DTB 6 2 4	DTB	6	2	4	0.9	0.7	2.5	3.7	4.9	3.0	1.8	1.9	1.1	0.8	0.9	0.8
DTB 6 3 3	DTB	6	3	3	1.7	2.1	3.6	5.2	6.0	3.8	3.2	3.1	2.3	1.9	2.0	1.6
DTB 6 3 4	DTB	6	3	4	1.0	0.7	2.7	3.9	5.2	3.2	1.9	2.0	1.2	0.8	0.9	0.9
DTB 6 3 37	DTB	6	3	37	0.0	0.0	0.8	3.0	5.1	2.4	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 4 4	DTB	6	4	4	1.6	0.9	3.3	4.6	5.6	3.1	1.7	2.0	1.9	1.5	1.6	0.9
DTB 6 4 5	DTB	6	4	5	2.1	2.6	4.2	5.8	7.1	4.5	4.0	3.8	3.2	2.5	2.5	1.9
DTB 6 4 8	DTB	6	4	8	11.3*	3.1	4.7	6.3	7.0	4.8	4.5	4.4	3.8	3.4	2.9	2.4
DTB 6 4 9	DTB	6	4	9	2.3	2.8	4.3	6.0	6.8	4.5	4.0	3.8	3.3	2.9	2.6	2.0
DTB 6 4 16	DTB	6	4	16	2.0	2.5	4.0	5.8	6.5	4.2	3.7	3.4	2.9	2.4	2.3	1.8
DTB 6 4 28	DTB	6	4	28	0.0	0.0	0.8	4.2	6.8	3.3	1.0	0.0	0.0	0.0	0.0	0.0
DTB 6 4 29	DTB	6	4	29	0.0	0.2*	1.7	3.8	6.5	4.4	3.4	0.0	0.0	0.0	0.0	0.0
DTB 6 4 50	DTB	6	4	50	0.0	0.0	1.2	3.9	6.2	2.3	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 5 8	DTB	6	5	8	8.0	9.7	14.1	18.0	20.2	15.9	16.0	14.4	12.9	11.2	9.1	7.0
DTB 6 5 9	DTB	6	5	9	8.0	9.7	14.1	18.0	20.1	15.9	16.0	14.4	13.0	11.2	9.1	7.0
DTB 6 6 4	DTB	6	6	4	1.8	1.0	3.6	4.9	6.0	3.3	1.8	2.2	2.0	1.6	1.7	1.0
DTB 6 6 10	DTB	6	6	10	0.2*	2.0*	1.1	3.8	5.6	2.7	1.4	2.2	1.2	0.2*	1.8	0.1*
DTB 6 6 13	DTB	6	6	13	2.2	2.8	4.3	6.1	7.4	4.7	4.3	3.7	3.3	2.6	2.7	1.8
DTB 6 6 16	DTB	6	6	16	2.1	2.7	4.3	6.2	6.9	4.5	4.0	3.7	3.1	2.5	2.5	1.9
DTB 6 6 28	DTB	6	6	28	0.0	0.0	0.8	4.5	7.3	3.6	1.1	0.0	0.0	0.0	0.0	0.0
DTB 6 6 29	DTB	6	6	29	0.0	0.2*	1.8	4.1	7.0	4.7	3.7	0.0	0.0	0.0	0.0	0.0
DTB 6 6 37	DTB	6	6	37	0.0	0.0	1.2	4.0	6.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 6 50	DTB	6	6	50	0.0	0.0	1.2	4.1	6.6	2.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 7 4	DTB	6	7	4	3.2	4.2	6.7	9.1	10.3	6.9	6.7	6.3	4.5	4.1	3.9	3.1
DTB 6 7 10	DTB	6	7	10	3.2	4.2	6.7	9.1	10.3	6.9	6.7	6.3	4.5	4.1	3.9	3.1
DTB 6 7 13	DTB	6	7	13	3.2	4.2	6.7	9.1	10.3	6.9	6.7	6.3	4.5	4.1	3.9	3.1
DTB 6 7 21	DTB	6	7	21	0.0	2.1	5.1	9.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 7 23	DTB	6	7	23	3.7	4.8	4.2	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 7 26	DTB	6	7	26	0.0	3.3	5.0	9.2	11.7	5.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 7 28	DTB	6	7	28	0.0	0.0	5.0	8.0	12.3	7.9	3.1	0.0	0.0	0.0	0.0	0.0
DTB 6 7 29	DTB	6	7	29	0.0	2.3	5.0	7.1	12.1	8.0	6.8	0.0	0.0	0.0	0.0	0.0
DTB 6 7 31	DTB	6	7	31	0.0	0.0	2.9	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 6 7 50	DTB	6	7	50	0.0	0.0	2.9	7.0	11.6	4.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 2 4	DTB	7	2	4	1.1	0.6	2.6	3.7	4.9	2.9	1.6	1.6	1.2	0.7	1.0	0.6
DTB 7 2 5	DTB	7	2	5	1.7	2.1	3.6	5.0	5.9	3.7	3.2	3.1	2.4	1.9	2.0	1.6
DTB 7 2 8	DTB	7	2	8	2.3	2.5	4.1	5.3	6.0	4.0	3.6	3.7	3.0	2.7	2.4	1.9
DTB 7 2 9	DTB	7	2	9	1.8	2.1	3.6	5.0	5.8	3.7	3.0	3.0	2.5	2.1	2.1	1.6
DTB 7 2 50	DTB	7	2	50	0.0	0.0	0.7	3.0	5.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0

1. Entries flagged with asterix are the mean value for that month, used to replace a dummy code (-1), where insufficient historical data was available for AFSIRS to calculate irrigation requirements.

Exhibit 7.7.7 (Continued)

LOCATION	CLI	SS	II	CC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DTB 7 3 3	DTB	7	3	3	1.8	2.0	3.6	5.2	6.5	3.9	3.1	2.9	2.4	1.8	2.1	1.5
DTB 7 3 4	DTB	7	3	4	1.2	0.7	2.8	4.0	5.2	3.1	1.7	1.7	1.2	0.8	1.0	0.6
DTB 7 3 5	DTB	7	3	5	1.9	2.2	3.8	5.3	6.3	4.0	3.4	3.3	2.5	2.1	2.1	1.7
DTB 7 3 7	DTB	7	3	7	0.0	0.0	0.6	2.3	3.4	1.8	1.3	0.0	0.0	0.0	0.0	0.0
DTB 7 3 8	DTB	7	3	8	2.5	2.7	4.3	5.6	6.3	4.3	3.9	3.9	3.2	2.9	2.6	2.1
DTB 7 3 9	DTB	7	3	9	1.9	2.3	3.8	5.3	6.2	3.9	3.2	3.2	2.6	2.2	2.2	1.7
DTB 7 3 16	DTB	7	3	16	1.8	2.0	3.6	5.2	6.5	3.9	3.1	2.9	2.4	1.8	2.1	1.5
DTB 7 3 37	DTB	7	3	37	0.0	0.0	0.8	3.0	5.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 3 55	DTB	7	3	55	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 4 3	DTB	7	4	3	1.9	2.3	4.0	5.9	6.7	4.0	3.7	3.2	2.9	2.4	2.3	1.7
DTB 7 4 4	DTB	7	4	4	1.7	0.7	3.3	4.8	5.3	3.5	1.5	1.9	1.4	1.8	1.7	0.7
DTB 7 4 5	DTB	7	4	5	2.1	2.7	4.2	5.9	6.9	4.5	4.0	3.7	3.0	2.6	2.6	1.8
DTB 7 4 8	DTB	7	4	8	11.1	3.1	4.8	6.3	7.1	4.9	4.6	4.4	3.8	3.5	2.9	2.3
DTB 7 4 9	DTB	7	4	9	2.3	2.7	4.3	6.0	6.9	4.6	4.0	3.8	3.3	2.9	2.5	2.0
DTB 7 4 10	DTB	7	4	10	0.2	2.0	0.9	3.8	4.4	2.9	1.3	1.2	1.5	0.1	0.0	0.2
DTB 7 4 13	DTB	7	4	13	2.1	2.5	4.0	5.7	7.0	4.3	3.8	3.6	3.0	2.4	2.4	1.7
DTB 7 4 16	DTB	7	4	16	1.9	2.3	4.0	5.9	6.7	4.0	3.7	3.2	2.9	2.4	2.3	1.7
DTB 7 4 37	DTB	7	4	37	0.0	0.0	1.1	3.6	5.7	2.6	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 4 50	DTB	7	4	50	0.0	0.0	1.0	3.8	6.1	2.2	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 4 55	DTB	7	4	55	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 5 4	DTB	7	5	4	7.1	8.0	13.3	16.1	20.2	15.7	15.3	14.5	11.9	9.8	9.0	7.2
DTB 7 5 5	DTB	7	5	5	8.0	9.7	14.2	18.1	20.2	15.8	15.9	14.2	12.8	11.0	9.2	6.9
DTB 7 5 8	DTB	7	5	8	8.0	9.7	14.1	18.0	20.2	15.9	16.0	14.4	12.9	11.2	9.1	7.0
DTB 7 5 9	DTB	7	5	9	8.0	9.7	14.1	18.0	20.1	15.9	16.0	14.4	13.0	11.2	9.1	7.0
DTB 7 6 4	DTB	7	6	4	1.9	0.8	3.5	5.1	5.7	3.7	1.7	2.1	1.5	1.9	1.8	0.8
DTB 7 6 5	DTB	7	6	5	2.3	2.9	4.5	6.3	7.4	4.9	4.2	4.0	3.2	2.8	2.8	2.0
DTB 7 6 8	DTB	7	6	8	11.9	3.3	5.1	6.8	7.6	5.2	4.9	4.7	4.1	3.7	3.2	2.4
DTB 7 6 10	DTB	7	6	10	0.2	2.1	0.9	4.1	4.8	3.1	1.4	1.3	1.6	0.1	0.0	0.2
DTB 7 6 16	DTB	7	6	16	2.1	2.5	4.3	6.4	7.2	4.3	4.0	3.4	3.1	2.6	2.4	1.9
DTB 7 6 28	DTB	7	6	28	0.0	0.0	0.8	4.7	7.0	3.4	0.5	0.0	0.0	0.0	0.0	0.0
DTB 7 7 29	DTB	7	7	29	0.0	1.8	5.0	7.1	12.1	8.0	6.8	0.0	0.0	0.0	0.0	0.0
DTB 7 6 30	DTB	7	6	30	0.0	0.0	0.0	0.0	0.9	1.3	2.4	2.8	1.4	0.1	0.0	0.0
DTB 7 6 37	DTB	7	6	37	0.0	0.0	1.2	3.8	6.1	2.8	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 6 50	DTB	7	6	50	0.0	0.0	1.1	4.1	6.6	2.4	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 6 51	DTB	7	6	51	0.0	0.0	0.0	0.0	0.0	0.7	2.1	2.3	1.2	0.0	0.0	0.0
DTB 7 7 4	DTB	7	7	4	3.2	4.6	6.7	9.0	10.3	7.0	5.8	5.3	4.5	3.6	3.9	3.4
DTB 7 7 8	DTB	7	7	8	3.2	4.6	6.7	9.0	10.3	7.0	5.8	5.3	4.5	3.6	3.9	3.4
DTB 7 7 10	DTB	7	7	10	3.2	4.6	6.7	9.0	10.3	7.0	5.8	5.3	4.5	3.6	3.9	3.4
DTB 7 7 13	DTB	7	7	13	3.2	4.6	6.7	9.0	10.3	7.0	5.8	5.3	4.5	3.6	3.9	3.4
DTB 7 7 26	DTB	7	7	26	0.0	3.3	5.0	9.2	11.7	5.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 7 28	DTB	7	7	28	0.0	0.0	5.0	8 0	12.3	7.9	3.1	0.0	0.0	0.0	0.0	0.0
DTB 7 7 29	DTB	7	7	29	0.0	1.8	5.0	7.1	12.1	8.0	6.8	0.0	0.0	0.0	0.0	0.0
DTB 7 7 50	DTB	7	7	50	0.0	0.0	2.9	7.0	11.6	4.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 7 7 51	DTB	7	7	51	0.0	0.0	0.0	0.0	0.0	4.4	5.4	6.1	4.7	0.0	0.0	0.0
DTB 7 9 50	DTB	7	9	50	0.0	0.0	3.7	9.5	10.6	3.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 11 2 4	DTB	11	2	4	1.1	0.4	2.2	3.6	4.6	2.7	1.0	1.6	1.0	0.7	0.8	0.7
DTB 11 3 4	DTB	11	3	4	1.2	0.4	2.4	3.8	4.9	2.9	1.0	1.6	1.1	0.7	0.8	0.7
DTB 11 3 37	DTB	11	3	37	0.0	0.0	0.6	2.8	4.7	2.3	0.0	0.0	0.0	0.0	0.0	0.0
DTB 11 4 4	DTB	11	4	4	2.0	2.1	3.1	4.7	5.3	3.0	1.3	2.1	1.2	2.1	0.8	2.0
DTB 11 4 10	DTB	11	4	10	0.1	2.4	0.0	4.2	4.2	1.6	0.4	2.6	2.1	0.2	0.2	0.0
DTB 11 6 4	DTB	11	6	4	2.2	2.3	3.3	5.0	5.7	3.2	1.4	2.3	1.3	2.3	0.9	2.1
DTB 11 6 37	DTB	11	6	37	0.0	0.0	1.1	3.7	5.9	2.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 11 6 46	DTB	11	6	46	0.0	0.3	2.2	5.9	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 11 7 4	DTB	11	7	4	3.1	3.7	6.9	8.9	10.4	7.4	5.6	5.3	3.9	3.6	3.9	2.6
DTB 11 7 13	DTB	11	7	13	3.1	3.7	6.9	8.9	10.4	7.4	5.6	5.3	3.9	3.6	3.9	2.6
DTB 11 7 26	DTB	11	7	26	0.0	3.3	5.0	9.2	11.7	5.5	0.0	0.0	0.0	0.0	0.0	0.0
DTB 15 7 26	DTB	15	7	26	0.0	3.2	5.0	9.2	11.7	5.6	0.0	0.0	0.0	0.0	0.0	0.0
DTB 16 3 4	DTB	16	3	4	0.0	0.1	2.3	3.3	4.1	2.6	0.8	1.2	1.1	0.1	0.6	1.5
DTB 16 5 8	DTB	16	5	8	7.9	9.7	14.3	18.0	20.2	15.9	16.0	14.3	12.9	11.0	9.0	6.9
DTB 16 7 4	DTB	16	7	4	2.7	2.9	4.0	8.9	11.0	6.6	4.9	4.5	2.6	2.3	3.5	2.3
DTB 16 7 8	DTB	16	7	8	2.7	2.9	4.0	8.9	11.0	6.6	4.9	4.5	2.6	2.3	3.5	2.3
DTB 17 2 4	DTB	17	2	4	1.5	1.4	2.0	3.3	3.8	2.4	0.6	1.3	1.2	0.0	1.5	0.0
DTB 17 3 4	DTB	17	3	4	1.5	1.5	2.1	3.5	4.1	2.5	0.6	1.3	1.3	0.0	1.6	0.0
DTB 17 4 4	DTB	17	4	4	0.0	3.0	2.9	4.3	5.0	2.8	0.0	3.3	3.3	0.1	0.0	0.3
DTB 17 4 5	DTB	17	4	5	1.9	2.1	3.8	5.5	6.5	3.9	3.3	2.9	2.5	2.0	2.1	1.4
DTB 17 4 8	DTB	17	4	8	3.3	3.2	4.7	6.4	7.1	5.2	4.5	4.3	3.9	3.4	3.0	2.3
DTB 17 5 8	DTB	17	5	8	7.9	9.7	14.3	18.0	20.3	15.9	16.0	14.4	12.9	11.1	8.9	7.1

Exhibit 7.7.7 (Continued)

LOCATION	CLI	SS	II	CC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DTB 17 6 4	DTB	17	6	4	0.0	0.3	3.1	4.6	5.4	3.0	0.0	3.5	3.5	0.2	0.0	0.3
DTB 17 7 23	DTB	17	7	23	3.8	4.6	4.1	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 17 7 26	DTB	17	7	26	0.0	3.1	5.0	9.1	11.7	5.6	0.0	0.0	0.0	0.0	0.0	0.0
DTB 17 7 29	DTB	17	7	29	0.0	1.6	4.8	7.1	10.8	8.2	6.6	0.0	0.0	0.0	0.0	0.0
DTB 18 3 4	DTB	18	3	4	0.0	1.8	2.1	2.9	4.0	2.3	0.5	1.1	1.9	0.0	0.0	0.0
DTB 18 4 4	DTB	18	4	4	0.0	0.0	2.3	3.7	4.9	2.8	0.3	0.0	0.0	0.3	0.0	0.0
DTB 18 4 5	DTB	18	4	5	1.6	1.9	3.9	5.5	5.9	3.7	3.1	2.8	2.3	1.5	2.2	1.3
DTB 18 6 4	DTB	18	6	4	0.0	0.0	2.4	4.0	5.3	3.0	0.4	0.0	0.0	0.4	0.0	0.0
DTB 18 7 10	DTB	18	7	10	2.6	2.4	5.6	9.0	10.1	5.4	3.5	3.4	1.7	1.3	2.5	1.8
DTB 18 7 26	DTB	18	7	26	0.0	3.0	4.9	9.1	10.4	5.7	0.0	0.0	0.0	0.0	0.0	0.0
DTB 19 3 4	DTB	19	3	4	0.1	0.0	1.8	2.5	2.8	1.2	0.1	0.0	0.3	0.2	0.3	0.3
DTB 19 4 4	DTB	19	4	4	0.0	0.3	2.3	2.1	2.7	3.8	0.0	0.6	0.0	0.0	0.3	0.3
DTB 19 4 5	DTB	19	4	5	2.0	1.4	2.8	5.1	5.0	3.3	1.9	1.3	1.4	1.9	1.4	1.9
DTB 19 4 8	DTB	19	4	8	3.3	3.1	4.6	6.4	7.0	4.8	4.3	4.2	3.7	3.1	3.0	2.2
DTB 19 5 8	DTB	19	5	8	7.9	9.7	14.1	18.2	20.2	15.9	15.8	14.4	12.7	11.0	9.0	6.9
DTB 20 2 4	DTB	20	2	4	0.1	0.1	1.8	2.5	2.7	1.1	0.3	0.0	0.0	0.3	0.1	0.1
DTB 20 3 4	DTB	20	3	4	0.1	0.1	1.9	2.7	2.9	1.1	0.3	0.0	0.0	0.3	0.1	0.1
DTB 20 3 9	DTB	20	3	9	1.4	1.5	2.7	4.3	5.5	3.5	2.5	2.3	1.9	1.3	1.4	1.0
DTB 20 3 37	DTB	20	3	37	0.0	0.0	0.5	1.6	2.3	1.2	0.0	0.0	0.0	0.0	0.0	0.0
DTB 20 4 4	DTB	20	4	4	0.3	0.0	2.7	2.0	4.5	3.7	0.3	0.3	0.0	0.3	0.3	0.0
DTB 20 4 5	DTB	20	4	5	1.9	1.3	2.8	5.1	5.6	3.0	1.6	1.3	1.3	1.1	1.6	1.8
DTB 20 4 13	DTB	20	4	13	1.7	0.9	2.6	5.4	5.1	2.4	2.3	1.2	1.7	0.9	1.0	0.3
DTB 20 6 50	DTB	20	6	50	0.0	0.0	0.0	3.3	5.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0
DTB 20 7 4	DTB	20	7	4	0.8	1.2	4.1	8.3	9.8	4.8	0.9	2.3	0.8	0.2	0.2	0.7
DTB 20 7 13	DTB	20	7	13	0.8	1.2	4.1	8.3	9.8	4.8	0.9	2.3	0.8	0.2	0.2	0.7
DTB 20 7 24	DTB	20	7	24	3.1	3.7	3.6	4.5	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTB 20 7 29	DTB	20	7	29	0.0	1.5	4.1	7.1	10.7	8.2	6.4	0.0	0.0	0.0	0.0	0.0
DTB 20 7 37	DTB	20	7	37	0.0	0.0	2.7	6.8	10.2	6.4	0.0	0.0	0.0	0.0	0.0	0.0
DTB 20 7 50	DTB	20	7	50	0.0	0.0	2.7	6.9	10.2	4.1	0.0	0.0	0.0	0.0	0.0	0.0
DTB 23 3 4	DTB	23	3	4	0.2	0.2	1.1	2.3	2.9	1.1	0.2	0.2	0.4	0.0	0.2	0.2
DTB 23 4 5	DTB	23	4	5	2.3	0.0	2.9	4.3	5.6	3.3	1.7	2.4	2.4	0.0	2.4	2.4
DTB 23 4 8	DTB	23	4	8	3.3	2.9	4.4	6.6	6.7	4.7	4.5	3.8	3.4	3.1	2.6	2.1
DTB 23 4 13	DTB	23	4	13	2.1	2.2	1.5	4.5	5.2	1.8	1.9	1.0	1.0	2.2	2.1	2.2
DTB 23 5 8	DTB	23	5	8	7.9	9.5	14.4	18.0	20.9	15.9	16.1	14.5	12.5	11.1	9.2	6.8
DTB 23 6 4	DTB	23	6	4	0.4	0.0	2.5	5.3	5.2	4.8	0.0	0.0	0.0	0.0	0.4	0.0
DTB 23 7 10	DTB	23	7	10	1.1	1.0	2.9	7.4	9.6	4.7	0.1	1.2	1.2	0.2	0.0	0.2
JAX 1 3 3	JAX	1	3	3	2.0	2.2	4.0	5.4	6.7	4.0	3.2	3.3	2.6	2.2	2.3	1.7
JAX 1 3 13	JAX	1	3	13	2.0	2.3	3.9	5.4	6.2	4.0	3.4	3.3	2.7	2.3	2.2	1.8
JAX 1 4 16	JAX	1	4	16	2.4	2.6	4.4	5.9	7.2	4.7	3.7	3.8	3.2	2.6	2.5	1.9
JAX 1 7 3	JAX	1	7	3	4.5	4.3	7.5	9.3	10.4	8.5	6.4	5.8	4.8	4.3	4.2	3.2
JAX 2 4 5	JAX	2	4	5	2.4	2.8	4.4	6 1	7.0	4.8	4.0	3.9	3.4	3.0	2.7	2.0
JAX 2 7 28	JAX	2	7	28	0.0	0.0	5.1	8.0	12.3	8.0	3.1	0.0	0.0	0.0	0.0	0.0
JAX 2 7 52	JAX	2	7	52	0.0	0.0	0.0	0.0	0.0	4.6	5.6	6.8	6.0	2.8	0.0	0.0
JAX 3 4 8	JAX	3	4	8	11.6	3.2	4.7	6.3	7.0	4.8	4.6	4.4	3.8	3.5	2.9	2.3
JAX 3 4 10	JAX	3	4	10	0.0	0.1	1.8	4.4	4.8	3.0	1.8	1.8	1.5	1.4	0.3	1.4
JAX 3 4 16	JAX	3	4	16	2.2	2.6	4.2	6.1	6.6	4.6	3.7	3.7	3.0	2.6	2.5	1.9
JAX 3 4 50	JAX	3	4	50	0.0	0.0	1.3	4.0	6.7	2.3	0.0	0.0	0.0	0.0	0.0	0.0
JAX 3 4 58	JAX	3	4	58	0.0	0.0	0.0	1.8	4.2	4.2	3.0	0.0	0.0	0.0	0.0	0.0
JAX 3 5 8	JAX	3	5	8	8.0	9.6	14.1	18.0	20.1	15.9	16.0	14.4	12.9	11.2	9.1	7.0
JAX 3 7 10	JAX	3	7	10	3.5	4.4	6.6	9.2	10.3	7.5	6.6	5.7	4.6	4.1	4.1	3.3
JAX 4 2 4	JAX	4	2	4	1.1	0.8	2.6	4.0	5.2	3.2	2.0	2.0	1.3	1.0	1.2	0.9
JAX 4 3 4	JAX	4	3	4	1.1	0.9	2.8	4.2	5.5	3.4	2.1	2.1	1.4	1.0	1.2	1.0
JAX 4 4 4	JAX	4	4	4	1.4	1.0	3.5	4.8	5.8	3.5	2.3	2.2	1.7	1.3	1.5	1.1
JAX 4 4 5	JAX	4	4	5	2.2	2.7	4.2	6.1	6.9	4.7	4.1	3.7	3.3	2.6	2.6	1.9
JAX 4 4 8	JAX	4	4	8	11.5	3.2	4.8	6.3	7.0	4.8	4.5	4.4	3.8	3.5	3.0	2.3
JAX 4 4 10	JAX	4	4	10	0.1	0.3	1.7	4.2	5.0	2.7	1.4	1.8	1.3	1.5	0.6	0.0
JAX 4 4 16	JAX	4	4	16	2.1	2.5	4.1	5.8	6.6	4.4	3.7	3.6	3.0	2.5	2.4	1.8
JAX 4 4 50	JAX	4	4	50	0.0	0.0	1.2	4.0	6.6	2.4	0.0	0.0	0.0	0.0	0.0	0.0
JAX 4 5 8	JAX	4	5	8	8.0	9.6	14.1	18.0	20.1	15.9	16.0	14.4	12.9	11.2	9.1	7.0
JAX 4 6 4	JAX	4	6	4	1.5	1.1	3.8	5.1	6.2	3.7	2.4	2.3	1.8	1.3	1.6	1.2
JAX 4 6 10	JAX	4	6	10	0.1	0.3	1.8	4.5	5.3	2.9	1.5	1.9	1.4	1.6	0.7	0.0
JAX 4 6 13	JAX	4	6	13	2.3	2.7	4.4	6.2	7.2	4.9	4.2	3.8	3.3	2.8	2.6	2.0
JAX 4 6 23	JAX	4	6	23	1.9	2.8	2.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 4 6 50	JAX	4	6	50	0.0	0.0	1.3	3.6	6.9	2.4	0.0	0.0	0.0	0.0	0.0	0.0
JAX 4 7 4	JAX	4	7	4	2.5	3.3	6.3	8.3	10.8	6.4	5.3	4.4	4.0	4.5	4.2	2.5
JAX 4 7 23	JAX	4	7	23	2.9	4.0	3.9	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 4 7 28	JAX	4	7	28	0.0	0.0	4.9	7.2	11.3	8.2	2.9	0.0	0.0	0.0	0.0	0.0

Exhibit 7.7.7 (Continued)

LOCATION	CLI	SS	II	CC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
JAX 4 7 46	JAX	4	7	46	0.0	1.7	4.9	9.2	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 5 4 8	JAX	5	4	8	11.4	2.8	4.6	5.8	6.9	5.2	4.1	3.9	3.3	3.7	3.1	2.1
JAX 5 4 16	JAX	5	4	16	1.5	1.8	3.7	5.1	6.9	4.1	3.1	3.1	2.3	2.7	2.5	1.5
JAX 5 5 8	JAX	5	5	8	7.2	8.7	13.7	17.3	20.6	17.1	16.0	13.9	11.9	11.1	8.9	6.4
JAX 6 2 3	JAX	6	2	3	1.2	1.5	3.0	4.4	5.5	3.2	2.5	2.3	1.7	2.0	2.0	1.3
JAX 6 3 3	JAX	6	3	3	1.2	1.6	3.2	4.6	5.9	3.4	2.6	2.4	1.8	2.1	2.2	1.3
JAX 6 3 4	JAX	6	3	4	0.2	0.2	2.1	3.2	5.1	2.8	1.6	0.6	0.6	0.7	1.5	0.7
JAX 6 4 5	JAX	6	4	5	1.7	2.1	4.0	5.3	6.8	4.3	3.5	3.2	2.8	2.9	2.6	1.6
JAX 6 4 13	JAX	6	4	13	1.7	2.0	3.7	5.1	6.5	4.1	3.5	3.3	2.7	2.8	2.5	1.6
JAX 6 4 16	JAX	6	4	16	1.4	1.9	3.7	5.0	6.7	3.8	2.9	3.1	2.3	2.6	2.5	1.4
JAX 6 4 50	JAX	6	4	50	0.0	0.0	1.2	3.3	6.3	2.2	0.0	0.0	0.0	0.0	0.0	0.0
JAX 6 5 8	JAX	6	5	8	7.2	8.7	13.7	17.3	20.6	17.1	16.0	13.9	11.9	11.1	8.9	6.4
JAX 6 6 10	JAX	6	6	10	0.1	0.0	2.0	3.4	4.7	2.7	1.2	0.5	0.0	0.0	0.0	0.0
JAX 6 6 50	JAX	6	6	50	0.0	0.0	1.2	3.6	6.8	2.3	0.0	0.0	0.0	0.0	0.0	0.0
JAX 6 6 52	JAX	6	6	52	0.0	0.0	0.0	0.0	0.0	1.0	1.9	3.0	1.7	1.0	0.0	0.0
JAX 6 7 4	JAX	6	7	4	2.4	3.6	6.4	8.2	10.8	6.3	5.7	4.1	4.4	4.1	4.1	2.1
JAX 6 7 5	JAX	6	7	5	2.4	3.6	6.4	8.2	10.8	6.3	5.7	4.1	4.4	4.1	4.1	2.1
JAX 6 7 8	JAX	6	7	8	2.4	3.6	6.4	8.2	10.8	6.3	5.7	4.1	4.4	4.1	4.1	2.1
JAX 6 7 10	JAX	6	7	10	2.4	3.6	6.4	8.2	10.8	6.3	5.7	4.1	4.4	4.1	4.1	2.1
JAX 6 7 16	JAX	6	7	16	2.4	3.6	6.4	8.2	10.8	6.3	5.7	4.1	4.4	4.1	4.1	2.1
JAX 6 7 21	JAX	6	7	21	0.0	2.0	4.9	8.8	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 6 7 23	JAX	6	7	23	2.8	3.9	3.9	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 6 7 28	JAX	6	7	28	0.0	0.0	4.8	7.2	11.3	8.2	2.9	0.0	0.0	0.0	0.0	0.0
JAX 6 7 30	JAX	6	7	30	0.0	0.0	0.0	0.0	4.2	5.3	5.6	6.2	4.9	1.9	0.0	0.0
JAX 6 7 46	JAX	6	7	46	0.0	1.7	4.8	9.2	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 6 7 50	JAX	6	7	50	0.0	0.0	2.9	6.4	10.6	4.9	0.0	0.0	0.0	0.0	0.0	0.0
JAX 6 7 51	JAX	6	7	51	0.0	0.0	0.0	0.0	0.0	4.5	4.8	5.8	3.9	0.0	0.0	0.0
JAX 7 2 3	JAX	7	2	3	1.1	1.4	2.9	4.4	5.8	3.1	2.5	2.2	1.7	1.9	2.1	1.2
JAX 7 2 4	JAX	7	2	4	0.4	0.1	1.9	3.1	4.5	2.5	1.2	0.9	0.5	0.8	1.2	0.7
JAX 7 3 3	JAX	7	3	3	1.2	1.5	3.1	4.7	6.2	3.3	2.6	2.3	1.8	2.0	2.2	1.3
JAX 7 3 4	JAX	7	3	4	0.4	0.1	2.0	3.3	4.8	2.7	1.3	0.9	0.6	0.9	1.3	0.8
JAX 7 3 7	JAX	7	3	7	0.0	0.0	0.4	2.0	3.5	1.6	0.8	0.0	0.0	0.0	0.0	0.0
JAX 7 3 8	JAX	7	3	8	2.3	2.3	4.0	5.2	6.1	4.4	3.5	3.3	2.8	3.1	2.7	1.8
JAX 7 3 10	JAX	7	3	10	0.1	0.1	0.7	2.7	4.0	2.0	1.2	0.6	0.0	0.1	0.2	0.9
JAX 7 3 11	JAX	7	3	11	0.3	0.1	1.0	2.8	4.3	2.4	1.7	0.9	0.5	0.5	0.8	0.4
JAX 7 3 37	JAX	7	3	37	0.0	0.0	0.8	2.6	5.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 4 3	JAX	7	4	3	1.4	1.8	3.7	5.2	7.0	4.0	3.2	2.9	2.3	2.5	2.5	1.4
JAX 7 4 4	JAX	7	4	4	0.3	0.0	2.7	3.9	5.3	3.0	1.6	0.8	0.0	1.2	1.1	1.7
JAX 7 4 5	JAX	7	4	5	1.7	2.1	4.1	5.3	6.7	4.2	3.6	3.2	2.7	2.8	2.7	1.5
JAX 7 4 8	JAX	7	4	8	11.1	2.7	4.6	5.8	6.9	5.2	4.1	3.9	3.3	3.6	3.1	2.1
JAX 7 4 9	JAX	7	4	9	2.0	2.2	4.0	5.4	6.7	4.6	3.7	3.3	2.8	3.0	2.7	1.8
JAX 7 4 10	JAX	7	4	10	0.1	0.2	2.0	3.1	4.6	1.9	1.2	0.5	0.0	0.0	0.0	0.0
JAX 7 4 11	JAX	7	4	11	0.0	0.0	1.2	3.3	5.0	2.3	1.6	0.8	0.7	0.9	0.7	0.2
JAX 7 4 16	JAX	7	4	16	1.4	1.8	3.7	5.2	7.0	4.0	3.2	2.9	2.3	2.5	2.5	1.4
JAX 7 4 28	JAX	7	4	28	0.0	0.0	0.6	3.6	6.4	3.0	1.1	0.0	0.0	0.0	0.0	0.0
JAX 7 4 31	JAX	7	4	31	0.0	0.0	1.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 4 37	JAX	7	4	37	0.0	0.0	1.1	3.1	5.8	2.3	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 4 43	JAX	7	4	43	0.0	0.0	0.0	0.0	2.1	1.8	2.2	2.3	0.4	0.0	0.0	0.0
JAX 7 4 50	JAX	7	4	50	0.0	0.0	1.1	3.3	6.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 5 8	JAX	7	5	8	7.3	8.7	13.7	17.3	20.6	17.1	16.0	13.9	11.9	11.0	8.9	6.3
JAX 7 5 9	JAX	7	5	9	7.2	8.7	13.7	17.3	20.7	17.3	16.1	13.9	12.0	11.0	8.9	6.3
JAX 7 6 4	JAX	7	6	4	0.3	0.0	2.9	4.1	5.7	3.2	1.7	0.9	0.0	1.3	1.2	1.8
JAX 7 6 10	JAX	7	6	10	0.1	0.2	2.1	3.3	5.0	2.1	1.3	0.5	0.0	0.0	0.0	0.0
JAX 7 6 13	JAX	7	6	13	1.7	2.1	4.0	5.4	7.2	4.4	3.6	3.3	2.8	2.9	2.6	1.7
JAX 7 6 37	JAX	7	6	37	0.0	0.0	1.2	3.3	6.2	2.5	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 6 38	JAX	7	6	38	0.0	0.0	0.0	0.0	0.0	0.6	2.0	2.4	0.0	0.0	0.0	0.0
JAX 7 6 43	JAX	7	6	43	0.0	0.0	0.0	0.0	2.3	1.9	2.3	2.5	0.4	0.0	0.0	0.0
JAX 7 6 46	JAX	7	6	46	0.0	0.4	2.1	5.3	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 6 50	JAX	7	6	50	0.0	0.0	1.1	3.5	6.7	2.2	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 7 23	JAX	7	7	23	2.8	3.9	3.9	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 7 28	JAX	7	7	28	0.0	0.0	4.8	7.2	11.3	8.3	2.9	0.0	0.0	0.0	0.0	0.0
JAX 7 7 37	JAX	7	7	37	0.0	0.0	2.9	6.4	10.6	6.2	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 7 46	JAX	7	7	46	0.0	1.7	4.8	9.2	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 7 7 50	JAX	7	7	50	0.0	0.0	2.9	6.3	10.6	5.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 9 2 4	JAX	9	2	4	0.2	0.1	1.7	3.0	4.1	2.6	1.1	0.6	0.4	0.7	1.2	0.8
JAX 9 3 4	JAX	9	3	4	0.2	0.1	1.8	3.2	4.4	2.7	1.2	0.7	0.4	0.7	1.3	0.8
JAX 9 3 7	JAX	9	3	7	0.0	0.0	0.6	1.8	3.1	1.6	0.7	0.0	0.0	0.0	0.0	0.0

Exhibit 7.7.7 (Continued)

LOCATION	CLI	SS	II	CC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
JAX 9 4 5	JAX	9	4	5	1.6	2.0	3.7	5.2	6.6	4.0	3.5	3.0	2.5	2.7	2.6	1.5
JAX 9 4 7	JAX	9	4	7	0.0	0.0	1.2	2.3	3.7	1.7	1.0	0.0	0.0	0.0	0.0	0.0
JAX 9 4 8	JAX	9	4	8	10.8%	2.7	4.5	5.9	6.9	5.1	4.2	3.9	3.3	3.6	3.1	2.1
JAX 9 4 16	JAX	9	4	16	1.2	1.8	3.3	5.2	6.3	3.8	3.0	2.8	2.3	2.5	2.4	1.2
JAX 9 4 54	JAX	9	4	54	0.0	0.3	1.8	2.9	5.0	3.3	2.0	0.0	0.0	0.0	0.0	0.0
JAX 9 5 8	JAX	9	5	8	7.2	8.7	13.7	17.3	20.6	17.2	16.0	13.9	11.9	11.0	8.9	6.3
JAX 9 7 28	JAX	9	7	28	0.0	0.0	4.7	7.2	11.3	8.3	2.8	0.0	0.0	0.0	0.0	0.0
JAX 9 7 46	JAX	9	7	46	0.0	1.8	4.8	9.1	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 9 7 50	JAX	9	7	50	0.0	0.0	2.9	6.3	10.6	5.1	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 2 3	JAX	11	2	3	1.0	1.3	2.7	4.1	5.6	3.1	2.3	2.0	1.5	1.8	1.9	1.2
JAX 11 2 8	JAX	11	2	8	2.1	2.2	3.8	5.0	5.8	4.3	3.4	3.2	2.6	2.9	2.5	1.7
JAX 11 3 3	JAX	11	3	3	1.0	1.4	2.9	4.4	6.0	3.3	2.5	2.2	1.5	1.9	2.0	1.2
JAX 11 3 4	JAX	11	3	4	0.4	0.0	1.8	2.9	4.6	2.7	1.2	0.7	0.1	0.4	1.3	0.6
JAX 11 3 8	JAX	11	3	8	2.3	2.3	4.1	5.3	6.2	4.6	3.7	3.4	2.8	3.1	2.7	1.8
JAX 11 3 10	JAX	11	3	10	0.1%	0.0	1.2	2.2	3.6	1.7	1.1	0.2	0.0	0.0	0.0	0.0
JAX 11 3 13	JAX	11	3	13	1.2	1.5	2.9	4.5	6.0	3.2	2.5	2.3	1.8	2.0	2.0	1.3
JAX 11 3 16	JAX	11	3	16	1.0	1.4	2.9	4.4	6.0	3.3	2.5	2.2	1.5	1.9	2.0	1.2
JAX 11 3 37	JAX	11	3	37	0.0	0.0	0.7	2.3	4.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 4 4	JAX	11	4	4	0.0	0.0	2.4	3.9	5.0	2.8	0.8	0.6	0.0	0.8	2.2	1.9
JAX 11 4 8	JAX	11	4	8	10.7%	2.7	4.6	5.9	6.8	5.1	4.2	3.9	3.4	3.6	3.1	2.1
JAX 11 4 10	JAX	11	4	10	0.0	1.0	0.0	2.8	4.2	1.3%	0.0	2.1	0.2 %	0.2 %	0.0	0.0
JAX 11 4 28	JAX	11	4	28	0.0	0.0	0.6	3.2	6.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 4 37	JAX	11	4	37	0.0	0.0	0.9	2.9	5.4	2.2	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 4 43	JAX	11	4	43	0.0	0.0	0.0	0.0	1.7	1.4	1.8	2.2	0.0	0.0	0.0	0.0
JAX 11 4 50	JAX	11	4	50	0.0	0.0	1.0	3.2	6.3	2.1	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 5 8	JAX	11	5	8	7.2	8.7	13.7	17.3	20.6	17.2	16.1	13.9	11.9	11.0	8.9	6.3
JAX 11 5 46	JAX	11	5	46	0.0	3.5	8.4	18.2	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 6 10	JAX	11	6	10	0.0	0.1%	0.0	3.0	4.4	1.4%	0.0	2.3	0.2 %	0.2 %	0.0	0.0
JAX 11 6 13	JAX	11	6	13	1.5	1.8	3.9	5.3	6.8	4.0	3.6	3.1	2.5	3.0	2.6	1.6
JAX 11 6 28	JAX	11	6	28	0.0	0.0	0.7	3.4	6.7	2.8	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 6 37	JAX	11	6	37	0.0	0.0	1.0	3.2	5.7	2.4	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 6 38	JAX	11	6	38	0.0	0.0	0.0	0.0	0.0	0.5	1.7	1.6	0.0	0.0	0.0	0.0
JAX 11 6 43	JAX	11	6	43	0.0	0.0	0.0	0.0	1.8	1.5	2.0	2.4	0.0	0.0	0.0	0.0
JAX 11 6 46	JAX	11	6	46	0.0	0.1	2.0	5.2	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 11 6 50	JAX	11	6	50	0.0	0.0	1.0	3.4	6.7	2.3	0.0	0.0	0.0	0.0	0.0	0.0
JAX 13 2 3	JAX	13	2	3	0.9	1.2	2.7	4.3	5.8	3.0	2.2	2.0	1.4	1.7	1.8	1.0
JAX 13 3 3	JAX	13	3	3	0.9	1.3	2.8	4.6	6.2	3.2	2.4	2.1	1.5	1.8	2.0	1.1
JAX 13 3 37	JAX	13	3	37	0.0	0.0	0.6	2.2	4.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0
JAX 13 3 55	JAX	13	3	55	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 13 4 3	JAX	13	4	3	1.1	1.5	3.6	4.8	6.5	3.5	2.7	2.5	2.0	2.3	2.4	1.0
JAX 13 4 50	JAX	13	4	50	0.0	0.0	0.8	3 1	6.2	2.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 13 4 55	JAX	13	4	55	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 13 6 37	JAX	13	6	37	0.0	0.0	0.9	2.9	5.6	2.3	0.0	0.0	0.0	0.0	0.0	0.0
JAX 13 7 28	JAX	13	7	28	0.0	0.0	4.7	7.2	11.3	8.4	2.9	0.0	0.0	0.0	0.0	0.0
JAX 15 3 3	JAX	15	3	3	0.9	1.2	2.8	4.3	6.0	3.1	2.3	2.0	1.4	1.7	2.0	1.2
JAX 15 3 4	JAX	15	3	4	1.1	0.D	1.3	3.0	4.2	2.4	0.8	0.4	0.0	0.1	1.1	1.2
JAX 15 4 3	JAX	15	4	3	1.0	1.6	3.2	5.1	6.4	3.6	2.5	2.4	1.7	2.3	2.1	1.0
JAX 15 4 10	JAX	15	4	10	0.1%	0.0	0.3%	1.7%	4.2	3.1	0.0	0.0	0.0	0.3%	0.1%%	0.1%%
JAX 15 4 50	JAX	15	4	50	0.0	0.0	0.7	2.9	6.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
JAX 15 7 4	JAX	15	7	4	1.1	1.9	5.6	8.1	10.7	5.5	4.6	3.4	2.2	3.4	4.2	1.7
JAX 15 7 46	JAX	15	7	46	0.0	1.5	4.7	9.1	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 18 3 4	JAX	18	3	4	0.0	0.2%	1.5	2.3	3.6	1.9	0.0	0.0	0.0	0.2%	0.0	0.0
JAX 18 4 16	JAX	18	4	16	0.5%	0.9	2.6	4.6	5.8	3.0	1.9	1.2	1.3	1.8	1.9	0.6
JAX 18 7 1	JAX	18	7	1	0.3	0.4	4.1	8.9	10.4	4.4	3.4	1.5	0.7	1.3	3.4	1.7
JAX 18 7 4	JAX	18	7	4	0.3	0.4	4.1	8.9	10.4	4.4	3.4	1.5	0.7	1.3	3.4	1.7
JAX 18 7 10	JAX	18	7	10	0.3	0.4	4.1	8.9	10.4	4.4	3.4	1.5	0.7	1.3	3.4	1.7
JAX 18 7 13	JAX	18	7	13	0.3	0.4	4.1	8.9	10.4	4.4	3.4	1.5	0.7	1.3	3.4	1.7
JAX 18 7 21	JAX	18	7	21	0.0	1.8	4.7	8.6	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 18 7 23	JAX	18	7	23	2.7	3.8	3.8	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 18 7 28	JAX	18	7	28	0.0	0.0	4.7	7.0	11.3	7.0	2.5	0.0	0.0	0.0	0.0	0.0
JAX 18 7 30	JAX	18	7	30	0.0	0.0	0.0	0.0	4.0	4.3	5.2	5.8	4.3	1.5	0.0	0.0
JAX 18 7 42	JAX	18	7	42	2.0	3.2	3.4	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 18 7 46	JAX	18	7	46	0.0	1.4	4.8	8.9	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 18 7 50	JAX	18	7	50	0.0	0.0	2.8	6.1	10.6	4.4	0.0	0.0	0.0	0.0	0.0	0.0
JAX 18 7 51	JAX	18	7	51	0.0	0.0	0.0	0.0	0.0	3.8	4.4	5.7	3.3	0.0	0.0	0.0
JAX 19 3 4	JAX	19	3	4	0.0	0.1%	0.7	1.7	2.7	1.1	0.2%%	0.2 %%	0.0	0.1%%	0.1%%	0.1%%
JAX 19 6 4	JAX	19	6	4	0.0	0.3	0.0	4.1	4.6	0.0	0.0	0.3	0.0	0.0	0.3	0.0

Exhibit 7.7.7 (Continued)

LOCATION	CLI	SS	II	CC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
JAX 20 3 4	JAX	20	3	4	0.0	0.3	1.7	1.8	2.7	1.3	0.1	0.2	0.0	0.1	0.1	0.1
JAX 20 4 4	JAX	20	4	4	0.0	0.3	0.0	3.8	4.1	3.7	0.0	0.0	0.0	0.3	0.0	0.0
JAX 20 6 4	JAX	20	6	4	0.0	0.3	0.0	4.1	4.4	4.0	0.0	0.0	0.0	0.3	0.0	0.0
JAX 20 7 51	JAX	20	7	51	0.0	0.0	0.0	0.0	0.0	3.5	3.9	3.9	3.0	0.0	0.0	0.0
JAX 20 7 28	JAX	20	7	28	0.0	0.0	4.3	7.0	11.5	6.6	2.2	0.0	0.0	0.0	0.0	0.0
DTB 20 7 51	DTB	20	7	51	0.0	0.0	0.0	0.0	0.0	3.5	3.9	3.9	3.0	0.0	0.0	0.0
JAX 23 3 4	JAX	23	3	4	0.0	0.2	0.6	2.2	2.2	2.1	0.0	0.4	0.0	0.0	0.2	0.0
JAX 23 4 4	JAX	23	4	4	0.0	0.0	0.0	0.0	4.9	0.4	0.0	0.0	0.0	0.0	0.0	0.4
JAX 23 4 5	JAX	23	4	5	0.2	0.0	1.4	4.1	4.9	2.5	1.7	0.9	0.0	0.0	1.2	0.0
JAX 23 4 10	JAX	23	4	10	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
JAX 23 4 13	JAX	23	4	13	0.2	0.0	1.5	3.5	4.7	2.1	1.0	1.3	0.0	0.0	2.2	0.0
JAX 23 4 23	JAX	23	4	23	0.1	0.0	2.6	2.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
JAX 23 6 50	JAX	23	6	50	0.0	0.0	0.0	2.3	4.7	1.9	0.0	0.0	0.0	0.0	0.0	0.0
JAX 23 7 23	JAX	23	7	23	2.3	3.4	4.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 23 7 28	JAX	23	7	28	0.0	0.0	4.2	7.1	11.4	6.4	2.0	0.0	0.0	0.0	0.0	0.0
JAX 23 7 46	JAX	23	7	46	0.0	1.3	4.1	8.6	8.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAX 23 7 50	JAX	23	7	50	0.0	0.0	2.8	6.0	10.7	4.3	0.0	0.0	0.0	0.0	0.0	0.0
ORL 4 2 4	ORL	4	2	4	0.4	0.4	2.1	3.2	5.0	2.7	1.6	1.0	0.7	1.0	1.5	0.9
ORL 4 3 4	ORL	4	3	4	0.5	0.4	2.2	3.3	5.3	2.8	1.7	1.0	0.7	1.1	1.6	0.8
ORL 4 4 4	ORL	4	4	4	0.7	0.8	2.8	4.0	5.8	3.1	1.7	0.8	0.8	1.3	2.1	1.0
ORL 4 4 8	ORL	4	4	8	11.6	2.8	4.6	5.8	6.9	5.2	4.1	3.9	3.3	3.7	3.1	2.1
ORL 4 5 8	ORL	4	5	8	7.2	8.7	13.7	17.3	20.6	17.1	16.0	13.9	11.9	11.1	8.9	6.4
ORL 4 7 4	ORL	4	7	4	2.5	3.3	6.3	8.3	10.8	6.4	5.3	4.4	4.0	4.5	4.2	2.5
ORL 4 7 10	ORL	4	7	10	2.5	3.3	6.3	8.3	10.8	6.4	5.3	4.4	4.0	4.5	4.2	2.5
ORL 6 2 4	ORL	6	2	4	1.3	1.0	2.6	4.0	5.2	2.6	0.9	0.3	0.7	1.4	1.8	1.5
ORL 6 3 4	ORL	6	3	4	1.4	1.0	2.8	4.2	5.5	2.7	0.9	0.3	0.7	1.5	1.9	1.6
ORL 6 4 4	ORL	6	4	4	1.6	1.7	3.3	5.1	5.9	2.8	1.6	1.4	0.9	1.8	2.5	1.7
ORL 6 7 4	ORL	6	7	4	4.0	4.6	7.3	10.0	10.7	6.9	4.2	3.5	4.0	4.8	5.2	3.5
ORL 6 7 10	ORL	6	7	10	4.0	4.6	7.3	10.0	10.7	6.9	4.2	3.5	4.0	4.8	5.2	3.5
ORL 7 2 4	ORL	7	2	4	1.3	0.9	2.6	4.1	5.2	2.5	0.8	0.2	0.6	1.3	1.7	1.4
ORL 7 3 4	ORL	7	3	4	1.4	1.0	2.8	4.3	5.5	2.7	0.9	0.2	0.6	1.4	1.9	1.5
ORL 7 4 4	ORL	7	4	4	1.8	1.8	3.3	5.1	5.7	3.0	1.7	0.3	1.0	1.5	2.5	1.8
ORL 7 4 8	ORL	7	4	8	12.4	3.5	5.2	6.7	6.9	4.7	3.5	3.6	3.6	4.0	3.6	2.8
ORL 7 4 10	ORL	7	4	10	0.0	0.0	1.0	4.2	5.1	1.7	0.2	0.0	0.0	2.1	1.9	2.0
ORL 7 5 8	ORL	7	5	8	9.1	10.4	15.2	19.3	20.9	16.6	14.2	14.2	13.1	13.0	10.4	8.1
ORL 7 6 4	ORL	7	6	4	1.9	1.9	3.6	5.5	6.1	3.2	1.8	0.3	1.0	1.6	2.7	1.9
ORL 7 7 4	ORL	7	7	4	4.0	5.2	7.4	10.0	10.8	5.9	3.8	3.1	4.0	4.8	5.2	3.5
ORL 7 7 9	ORL	7	7	9	4.0	5.2	7.4	10.0	10.8	5.9	3.8	3.1	4.0	4.8	5.2	3.5
ORL 7 7 10	ORL	7	7	10	4.0	5.2	7.4	10.0	10.8	5.9	3.8	3.1	4.0	4.8	5.2	3.5
ORL 7 7 28	ORL	7	7	28	0.0	0.0	5.5	8.5	11.4	8.2	2.8	0.0	0.0	0.0	0.0	0.0
ORL 8 2 4	ORL	8	2	4	1.3	1.0	2.5	3.9	5.1	2.5	0.7	0.2	0.3	1.2	1.8	1.3
ORL 8 3 4	ORL	8	3	4	1.4	1.0	2.7	4.2	5.5	2.6	0.8	0.2	0.4	1.3	1.9	1.4
ORL 8 3 37	ORL	8	3	37	0.0	0.0	1.0	3.2	5.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
ORL 8 4 4	ORL	8	4	4	1.9	1.0	3.6	5.0	5.1	3.1	0.0	0.2	0.7	1.3	2.4	1.3
ORL 8 4 8	ORL	8	4	8	12.3	3.5	5.1	6.7	7.0	4.8	3.5	3.6	3.6	4.0	3.6	2.8
ORL 8 5 8	ORL	8	5	8	9.1	10.4	15.2	19.3	20.9	16.6	14.2	14.2	13.1	13.0	10.4	8.1
ORL 8 7 4	ORL	8	7	4	3.9	4.1	7.6	10.0	10.8	5.9	3.7	2.8	4.2	4.8	5.2	3.5
ORL 8 7 10	ORL	8	7	10	3.9	4.1	7.6	10.0	10.8	5.9	3.7	2.8	4.2	4.8	5.2	3.5
ORL 8 7 37	ORL	8	7	37	0.0	0.0	3.3	7.5	10.7	6.8	0.0	0.0	0.0	0.0	0.0	0.0
ORL 9 2 4	ORL	9	2	4	1.2	0.9	2.4	3.9	4.7	2.5	0.7	0.2	0.4	0.7	1.8	1.2
ORL 9 3 4	ORL	9	3	4	1.2	0.9	2.6	4.2	5.0	2.6	0.7	0.2	0.4	0.8	1.9	1.3
ORL 9 7 4	ORL	9	7	4	3.9	4.0	7.9	10.0	10.8	5.8	3.3	2.7	3.9	4.8	5.2	3.4
ORL 14 3 4	ORL	14	3	4	1.4	1.2	2.3	3.7	4.8	2.4	0.9	0.0	0.0	1.4	1.3	1.4
ORL 15 3 4	ORL	15	3	4	0.9	0.9	2.3	3.7	4.8	2.4	1.1	0.0	0.0	0.9	1.3	1.8
ORL 16 2 4	ORL	16	2	4	0.8	1.0	2.1	3.2	4.3	2.1	1.0	0.0	0.0	1.4	0.8	1.4
ORL 16 3 4	ORL	16	3	4	0.8	1.0	2.2	3.4	4.5	2.3	1.0	0.0	0.0	1.5	0.9	1.5
ORL 16 4 4	ORL	16	4	4	0.3	2.9	3.0	4.3	5.4	2.6	0.0	0.3	0.3	0.0	3.2	3.1
ORL 18 3 4	ORL	18	3	4	1.8	1.8	2.0	3.0	4.5	2.1	0.0	0.0	0.0	0.0	1.9	0.0
ORL 18 4 4	ORL	18	4	4	0.0	0.2	3.3	4.1	5.0	2.8	0.0	0.0	0.2	0.2	4.0	3.3
ORL 18 7 10	ORL	18	7	10	3.0	2.4	6.3	11.2	10.1	5.2	1.3	0.3	1.0	2.8	6.1	3.2
ORL 20 3 4	ORL	20	3	4	0.0	0.3	1.6	2.4	3.3	1.6	0.0	0.0	0.2	0.0	0.3	0.2
ORL 20 4 4	ORL	20	4	4	0.0	0.4	3.4	3.9	3.9	3.6	0.0	0.0	0.0	0.0	0.4	0.4
ORL 21 2 4	ORL	21	2	4	0.0	0.2	1.5	2.4	3.1	1.2	0.0	0.0	0.0	0.0	0.3	0.0
ORL 21 3 4	ORL	21	3	4	0.0	0.2	1.6	2.5	3.3	1.3	0.0	0.0	0.0	0.0	0.3	0.0
ORL 21 3 37	ORL	21	3	37	0.0	0.0	0.5	1.9	2.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0
ORL 21 7 4	ORL	21	7	4	2.7	1.5	3.1	8.2	10.4	4.0	0.3	0.0	0.0	0.2	1.4	2.6
ORL 21 7 10	ORL	21	7	10	2.7	1.5	3.1	8.2	10.4	4.0	0.3	0.0	0.0	0.2	1.4	2.6

Exhibit 7.7.7 (Continued)

LOCATION	CLI	SS	II	CC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ORL 21 7 37	ORL	21	7	37	0.0	0.0	3.2	7.3	10.6	5.3	0.0	0.0	0.0	0.0	0.0	0.0
ORL 22 2 4	ORL	22	2	4	0.2	0.4	1.6	2.3	3.0	1.0	0.0	0.0	0.0	0.0	0.2	0.4
ORL 22 3 4	ORL	22	3	4	0.2	0.4	1.7	2.4	3.2	1.1	0.0	0.0	0.0	0.0	0.2	0.4
ORL 22 7 10	ORL	22	7	10	2.6	1.5	2.9	8.2	11.0	4.0	0.1	0.0	0.0	0.1	1.4	2.1
ORL 22 7 28	ORL	22	7	28	0.0	0.0	4.9	8.7	11.3	7.4	0.7	0.0	0.0	0.0	0.0	0.0
ORL 23 3 4	ORL	23	3	4	0.2	0.2	2.0	1.7	3.3	1.8	0.0	0.0	0.0	0.0	0.0	0.2
ORL 23 3 8	ORL	23	3	8	2.7	3.1	4.8	6.4	6.6	4.5	3.2	2.9	3.1	3.4	3.5	2.3
ORL 23 4 4	ORL	23	4	4	0.0	0.0	4.4	4.8	5.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0
ORL 23 5 8	ORL	23	5	8	9.1	9.9	15.3	19.2	20.9	16.4	14.2	14.1	13.3	12.9	10.4	7.9
ORL 23 6 4	ORL	23	6	4	0.0	0.0	4.7	5.1	5.3	4.8	0.0	0.0	0.0	0.0	0.0	0.0
ORL 24 3 4	ORL	24	3	4	0.2	0.5	2.2	1.1	3.5	2.4	0.0	0.0	0.0	0.0	0.0	0.0
ORL 4 8 4	ORL	4	8	4	4.2	4.7	7.7	9.2	9.5	8.0	6.5	6.0	6.0	6.2	5.1	3.3
ORL 6 8 4	ORL	6	8	4	4.1	4.8	7.2	8.9	9.3	8.2	6.1	5.6	6.0	6.2	5.0	3.0
ORL 7 8 4	ORL	7	8	4	3.8	4.9	7.3	9.2	9.5	8.2	6.0	5.3	5.9	6.1	4.8	3.0
ORL 8 8 4	ORL	8	8	4	3.9	4.9	6.9	9.6	9.5	8.2	5.3	5.2	6.0	6.2	4.8	2.9
ORL 9 8 4	ORL	9	8	4	3.6	4.6	7.1	9.7	9.3	8.1	5.0	4.7	5.6	6.2	4.5	3.1
ORL 14 8 4	ORL	14	8	4	3.7	3.4	6.8	9.3	9.1	8.0	4.2	4.2	4.3	5.1	4.5	2.8
ORL 16 8 4	ORL	16	8	4	3.4	3.3	6.6	9.0	9.3	7.9	4.2	4.0	4.1	4.9	4.2	2.9
ORL 22 8 4	ORL	22	8	4	3.6	0.4	4.5	6.7	8.8	4.8	0.0	0.0	3.0	4.1	2.9	2.9

Exhibit 7.7.8 Sample of WD_Afsir, with monthly water use in MGMo

ID	APPNUM	WD_ID	County Code	Crop Code	Aggr Code	Meth Code	WD_ACRE	LOCATION				CONVERSION	JAN	FEB	MAR	APR	MAY	JUN
1	001-0002	0010002001	001	3	2	2	26.750	JAX	7	2	3	0.0271540	0.799	1.017	2.106	3.196	4.213	2.252
2	001-0002	0010002002	001	3	2	2	26.750	JAX	7	2	3	0.0271540	0.799	1.017	2.106	3.196	4.213	2.252
3	001-0002	0010002003	001	3	2	2	26.750	JAX	13	2	3	0.0271540	0.654	0.872	1.961	3.123	4.213	2.179
4	001-0002	0010002904	001	3	2	2	26.750	JAX	13	2	3	0.0271540	0.654	0.872	1.961	3.123	4.213	2.179
5	001-0004	0010004001	001	16	7	3	3.000	JAX	11	3	16	0.0271540	0.081	0.114	0.236	0.358	0.489	0.269
6	001-0008	0010008001	001	10	5	4	40.000	JAX	15	4	10	0.0271540	0.109	0.000	0.326	1.846	4.562	3.367
7	001-0009	0010009001	001	10	5	4	250.000	JAX	23	4	10	0.0271540	0.000	0.000	0.000	0.000	3.394	0.000
8	001-0009	0010009002	001	10	5	4	250.000	JAX	4	4	10	0.0271540	0.879	2.037	11.540	28.512	33.943	18.329
9	001-0019	0010019901	001	50	3	4	160.000	JAX		4	50	0.0271540	0.000	0.000	0.000	0.000	0.000	0.000
10	001-0020	0010020001	001	50	3	4	65.000	JAX	7	4	50	0.0271540	0.000	0.000	1.942	5.825	10.943	3.707
11	001-0020	0010020902	001	50	3	4	65.000	JAX	7	4	50	0.0271540	0.000	0.000	1.942	5.825	10.943	3.707
12	001-0028	0010028001	001	3	2	4	21.000	JAX	13	4	3	0.0271540	0.627	0.855	2.053	2.737	3.707	1.996
13	001-0028	0010028002	001	3	2	4	21.000	JAX	13	4	3	0.0271540	0.627	0.855	2.053	2.737	3.707	1.996
14	001-0032	0010032001	001	10	5		31.000	JAX	15		10	0.0271540	0.000	0.000	0.000	0.000	0.000	0.000
15	001-0032	0010032002	001	10	5		31.000	JAX	15		10	0.0271540	0.000	0.000	0.000	0.000	0.000	0.000

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