Comprehensive Economic Analysis of the SWUCA II Recovery Strategy

Prepared by Hazen and Sawyer

For the Southwest Florida Water Management District

March 15, 2006

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WATER MANAGEMENT DISTRICT
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Comprehensive Economic Analysis
of the SWUCA Recovery Strategy

Dear Mr. Yingling:

We are pleased to submit the report titled "Comprehensive Economic Analysis of the SWUCA Recovery Strategy". This study collected the best available information to estimate the incremental costs of the Recovery Strategy, the impact of these costs on water users in the SWUCA, and the potential economic impact to the SWUCA region. Benefits of the SWUCA Recovery Strategy were also described.

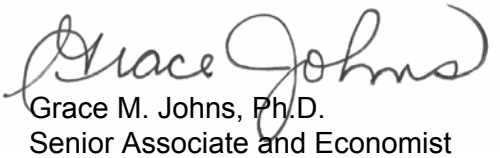
The Statement of Estimated Regulatory Costs (SERC) dated March 14, 2006 prepared by Hazen and Sawyer for the District and this comprehensive economic analysis are Parts 1 and 2, respectively, of the complete economic analysis of the proposed SWUCA rules and the Recovery Strategy. This comprehensive economic analysis uses the information contained in the SERC to estimate the total costs of developing alternative water supplies in the SWUCA through 2025. The report then examines each Use Type within each county to determine where new water supplies will come from and the ability of each Use Type to afford these supplies.

The information in the SERC that was used in this economic analysis includes the cost per 1,000 gallon estimates by source type, the water supply availability by source and county which were updated by the District since the SERC was produced, and the water demand forecasts by Use Type and county. The SERC report concentrated on the potential costs to individuals and entities, not to the entire SWUCA economy. Some aspects of this economic analysis study are also contained in the SERC report. The evaluation of case study utilities, the evaluation of agriculture and the evaluation of golf courses contained in the SERC are also relevant to examining the SWUCA economy.

We thank you, Richard Owen, Gregg Jones, Mark Barcelo, Yassert Gonzalez, Kathy Scott, Ken Weber, Karen Lloyd, Marty Kelly, Doug Leper, Malcolm Castor, David Brown and Carl Wright for assisting us by providing information and answering our questions in a timely manner.

Very truly yours,

HAZEN AND SAWYER, P.C.



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Enclosure
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Comprehensive Economic Analysis of SWUCA II Recovery Strategy

Executive Summary

1.0 Introduction

The Southwest Florida Water Management District (District) has proposed the establishment of minimum flows and levels (MFLs) for the following water resources.

- Upper Peace River
- Floridan Aquifer in the Southern Water Use Caution Area (SWUCA)
- Eight lakes in the SWUCA called Lake Clinch; Lake Eagle; Lake McLeod; Lake Wales; Lake Jackson; Lake Little Jackson; Lake Letta and Lake Lotela.

The District has determined that the existing flow rates and water levels of some of these water resources are below the MFLs established for them. As a result, many requests for permitted quantities from the upper Floridan aquifer will not be permitted and some water users will likely need to obtain water from alternative sources. The Recovery Strategy is a plan to restore the flows and levels to the proposed minimum levels in a manner that ensures there are sufficient water supplies for all existing and projected reasonable-beneficial uses. Thus, the incremental cost of the Recovery Strategy will be due to the development and use of the more expensive alternative water sources.

The goals of this economic analysis were as follows.

(1) Estimate the costs over the next 20 years to develop alternative water supplies and implement additional water conservation measures to achieve the levels of water production and conservation envisioned in the Recovery Strategy. Identify the types of persons and entities who will likely pay these costs. The evaluation period is 2006 to 2025 and all costs are in 2005 dollars.

(2) Describe the process by which the District would address each type of water use permit request. Describe the process by which permitted groundwater quantities and historically used groundwater quantities would be made available to new water uses.

(3) Evaluate the extent to which businesses and households can afford the change in water costs associated with the Recovery Strategy.

(4) Estimate the economic contribution of the funding that is likely to come from the State of Florida to pay for a portion of the SWUCA Recovery Strategy.

(5) Describe the benefits of the SWUCA Recovery Strategy to the regional SWUCA area.

(6) Compare the trends in historic economic data describing the SWUCA counties to the same economic data corresponding to the rest of Florida and determine whether or not the historic water use permitting provisions in the SWUCA had a significant impact on the economy.

The Statement of Estimated Regulatory Costs (SERC) dated March 14, 2006 prepared by Hazen and Sawyer for the District and this comprehensive economic analysis are Parts 1 and 2, respectively, of the complete economic analysis of the proposed SWUCA rules and the Recovery Strategy. This comprehensive economic analysis uses the information contained in the SERC to estimate the total costs of developing alternative water supplies in the SWUCA through 2025. This comprehensive economic analysis then examines each Use Type within each county to determine where new water supplies will come from and the ability of each Use Type to afford these supplies.

The information in the SERC that was used in this economic analysis includes the cost per 1,000 gallon estimates by source type, the water supply availability by source and county which were updated by the District since the SERC was produced, and the water demand forecasts by Use Type and county. The SERC report concentrated on the potential costs to individuals and entities, not to the entire SWUCA economy. Some aspects of this economic analysis study are also contained in the SERC report. The evaluation of case study utilities, the evaluation of agriculture and the evaluation of golf courses contained in the SERC are also relevant to examining the SWUCA economy.

2.0 Overall Conclusions

The purpose of the SWUCA Recovery Strategy is to protect the current and future uses of important water resources throughout the SWUCA area. These resources include the upper Floridan aquifer, the Upper Peace River and the Highlands Ridge lakes. These resources provide inexpensive freshwater supplies, valuable recreation opportunities and aesthetic amenities, and wildlife habitat. Unmanaged withdrawals of water that impact these resources will reduce the ability of these resources to provide the services that almost every resident and visitor in the SWUCA currently enjoys. In most cases these services will be improved through the planned reductions and redistributions of ground water withdrawals.

The SWUCA Recovery Strategy is not expected to have a significant negative economic impact on the regional economy. However, unless certain precautions are taken, there will likely be potential water users who will choose not to locate in the SWUCA due to the incremental water supply costs associated with the Recovery Strategy. To address this issue, the District should spend more time with water use permit applicants to assess

their needs and how they can obtain affordable water supplies. Otherwise, it is very likely new industries interested in locating in the SWUCA will be discouraged as soon as they learn that they cannot obtain water from the upper Floridan aquifer.

This study recommends that the District, local governments, businesses and community groups work together to maximize access to affordable water sources through water resource investigations, water supply and demand planning, regional development of water supplies, and creation of institutions that provide water supply access to small and medium-sized water users. This approach will minimize potential negative economic effects of the SWUCA Recovery Strategy.

These results were based on water demand forecasts that were developed using the best available information. In the event that water demand increases are higher than forecasted, the incremental costs of the Recovery Strategy will be higher than estimated during this study. Also, these costs consider the future water demands up to 2025. As the available ground water sources are allocated to a growing economy, future growth after 2025 will need to rely completely on alternative water sources. For these reasons, water conservation by all Use Types should be encouraged because the costs of conservation are considerably lower than the costs of developing alternative water sources. Water storage should be considered wherever economically, technically and environmentally feasible. Programs such as FARMs and those that facilitate increased landscape irrigation efficiencies will likely be very cost-effective now and in the long run.

This study recommends that the District reassess the economic impact of the SWUCA Recovery Strategy every few years. It is possible that the future economic conditions used in this economic assessment may change over time. This study used the best available public information and information from the District to assess the economic impact of the SWUCA Recovery Strategy. However, it is prudent to revisit this issue on a regular basis and make planning, policy and regulatory adjustments as deemed necessary to be consistent with the goals of the Recovery Strategy.

About $6.6 million per year in State funding will likely be available over the next nine years to pay for some of the construction costs associated with alternative water supply projects in the SWUCA. The present value of this funding is $46 million which covers about 37 percent of the estimated cost of the SWUCA Recovery Strategy. This funding has the potential to turn unaffordable water sources into affordable water sources for many households and new self-supplied businesses. This funding was not considered in estimating the costs of the SWUCA Recovery Strategy.

More specific conclusions of this economic analysis are provided below.

3.0 Costs to Implement the Recovery Strategy

The estimated costs were based on the forecasted changes in demand by county and Use Type from 2005 to 2025 and the amount of water available from traditional ground water and existing surface water sources and from alternative water sources under the SWUCA Recovery Strategy. These alternative sources include water conservation, reclaimed water, new surface water withdrawals including storage, seawater desalination and brackish water desalination. The full costs associated with developing and using these water resources are presented. Funding from the District, the State of Florida, or other source was not deducted from the costs. Outside funding is considered separately in this report. The costs of water supply without the Recovery Strategy were deducted from the costs of water supply with the Recovery Strategy to obtain estimates of the incremental costs of the Recovery Strategy through 2025.

The cost of developing water sources consistent with the Recovery Strategy will depend on the types of sources that are developed. Some water sources cost more than others. For instance, water conservation cost estimates range from $0.11 to $0.67 per 1,000 gallons of water saved while reclaimed water cost estimates average from $1.26 to $1.53 per 1,000 gallons produced (total capital and O&M cost). Seawater desalination cost estimates range from $2.56 to $4.55 per 1,000 gallons.

To obtain an estimate of the cost to develop water sources under the Recovery Strategy, the change in demand from 2005 to 2025 for each Use Type in each county was assigned one or more water sources or water conservation programs. The most appropriate, least cost water source was selected to supply each increase in demand for each Use Type in each county. Water sources and quantities were selected until 100 percent of the change in water demand from 2005 to 2025 was met.

This evaluation distinguished among the demands by county and Use Type and recognizes that the actual choice of an alternative source or available unused permitted quantity will vary from one water user to another within a Use Type and within a county. The analysis is not meant to provide recommendations for what water sources should be developed by each Use Type and county. Instead, it takes the available information obtained from the District to assess the magnitude of incremental costs associated with the SWUCA Recovery Strategy. These allocations are for economic analysis purposes and are not specified in the Recovery Strategy or the District's Regional Water Supply Plan.

The incremental costs of obtaining water supplies under the SWUCA Recovery Strategy are provided in Table ES.1. After subtracting out the cost of obtaining all water from the upper Floridan aquifer, the total incremental capital cost to the entire SWUCA is $116 million and the annual O&M cost is $11.5 million. The weighted average incremental cost per 1,000 gallons over all additional water sources developed to meet 2025 water

demands is $0.40 and ranges from $0.0 per 1,000 gallons in DeSoto County to $0.78 per 1,000 gallons in Hillsborough County.

Table ES.1
Incremental Cost of SWUCA Recovery Strategy - Least Cost Water Sources

County	Total Capital Cost	Total O&M Cost per year	Total cost per kgal
(1)	(2)	(3)	(4)
CHARLOTTE (a)	$8,847,000	$1,327,000	$0.54
DESOTO	$0	$0	$0.00
HARDEE	$31,850,000	$1,345,000	$0.34
HIGHLANDS (a)	$3,104,000	$202,000	$0.26
HILLSBOROUGH (a)	$41,651,000	$4,138,000	$0.78
MANATEE	$10,619,000	$1,824,000	$0.37
POLK (a)	$8,392,000	$133,000	$0.08
SARASOTA	$11,043,000	$2,505,000	$0.49
Total (b)	**$115,506,000**	**$11,474,000**	**$0.40**

(a) Includes only those portions of these counties that are in the SWUCA.
(b) About 145 mgd of water would be supplied from these additional water sources.

The costs of available additional water supplies to meet growing water demands in the SWUCA from 2005 through 2025 include the following projects.

- An additional $525,600 spent in Hardee County each year for agricultural water conservation activities and an additional $8.7 million spent each year for non-agricultural water conservation activities. To save additional ground water quantities for future use, additional water conservation by all Use Types in all counties is recommended.

- About $67.6 million in reclaimed water project capital costs and $2.6 million per year to maintain and operate these projects. All counties, except DeSoto, will need to develop reclaimed water projects to meet growing demands.

- About $31.3 million in capital costs for currently un-permitted new surface water projects and $1.3 million per year to maintain and operate these projects in Hardee and Hillsborough counties.

- About $22.4 million in capital costs for seawater desalination in the SWUCA portion of Hillsborough County and $3.1 million per year to maintain and operate these projects.

- About $7.0 mgd in capital costs to withdraw unused permitted quantities and new permitted ground water quantities in all SWUCA counties and $5.8 million per year to maintain and operate these projects.

4.0 Use Types and Locations Expected to Pay the Incremental Costs

Existing permittees who do not change the Use Type, who do not need additional water supplies, who apply to renew their permits on time, and who continue to put all of their permitted water quantities to reasonable beneficial uses will be least affected by the SWUCA Recovery Strategy and the proposed SWUCA rule revisions.

Water use permittees and applicants who request new water withdrawals will need to comply with the SWUCA rule revisions regarding minimum flows or levels set for the Upper Peace River, eight lakes in the Highlands Ridge and the salt water intrusion minimum aquifer level in the MIA (SWIMAL). Requested new withdrawals that cause a water body's flow or level to fall below the MFL or where the withdrawal reduces the flow or level in water bodies already below the MFL will not be permitted unless a Net Benefit is provided.

Using the methodology described in Chapter 3.0 of this report and summarized in Table 10.3-1 of this report, water users in Charlotte County will need about 10.4 mgd of additional water supplies over the next 20 years. Currently unused permitted quantities from existing surface water sources, non-agricultural water conservation and reclaimed water are the lowest cost options available to supply the additional demands. The annual incremental cost of these supplies is $2.1 million or $0.54 per 1,000 gallons.

Water users in DeSoto County will need about 1.7 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources. The annual incremental cost of these supplies is $0.

Water users Hardee County will need about 32.1 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources, agricultural and non-agricultural conservation, reclaimed water, new surface water sources and the use of reduced ground water withdrawals in other counties through Self-Relocation and Net Benefits. The annual incremental cost of these supplies is $4.0 million or $0.34 per 1,000 gallons. The incremental cost may be higher than that shown here if agricultural permittees need to pay any costs associated with obtaining water via Net Benefits.

Water users in Highlands County will need about 4.8 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources, non-agricultural conservation programs and re-

claimed water. The annual incremental cost of these supplies is $459,000 or $0.26 per 1,000 gallons.

Water users in Hillsborough County will need about 26.8 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground and surface water sources, non-agricultural conservation, reclaimed water, new surface water sources and seawater desalination. The annual incremental cost of these supplies is $7.6 million or $0.78 per 1,000 gallons. IC / MD[1] water users are assigned reclaimed water. The cost under the Recovery Strategy may be a little bit higher than that shown in Table ES.1 if new industrial water users must have high quality water for their operations and more expensive alternative water sources are needed.

Water users in Manatee County will need about 20.3 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground and surface water sources, non-agricultural conservation, and reclaimed water. The annual incremental cost of these supplies is $2.7 million or $0.37 per 1,000 gallons. IC / MD water users are assigned reclaimed water. The cost under the Recovery Strategy may be a little bit higher than that shown in Table ES.1 if new industrial water users must have high quality water for their operations and more expensive alternative water sources are needed.

Water users in Polk County will need about 29.6 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources and reclaimed water. The annual incremental cost of these supplies is $828,000 or $0.08 per 1,000 gallons.

Water users in Sarasota County will need about 19.0 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources, non-agricultural conservation and reclaimed water. The annual incremental cost of these supplies is $3.4 million or $0.49 per 1,000 gallons.

5.0 Public Supply Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Most public supply permittees in the SWUCA are water utilities. Others are homeowner associations, schools, residential developments, and corporations that supply water to

[1] IC / MD stands for industrial / commercial and mining / dewatering Use Types.

fewer than 2,000 people. Four case study utilities were developed and used to evaluate the economic impacts of alternative water source costs. The costs of new water source development and conservation opportunities available to Public Supply Utilities in the SWUCA were estimated. Three different combinations of alternative water sources, additional water conservation and traditional water sources for each case study utility were evaluated to determine the impact of these source combinations on household water bills and their affordability. These three combinations are described as follows.

Water Source Combination Number 1 - Water Sources Developed to Meet Growing Demands Based On Proportion of Additional Supply Available by Source in County. The case study utilities address increases in water demand from 2005 to 2025 by developing alternative water sources and conservation programs in proportion to the amounts available within each county as presented in Table 2.1-2 in Chapter 2.0.

Water Source Combination Number 2 - 100 Percent Alternative Water Sources. The case study utilities supply 100 percent of their customer water demands with water from alternative sources

Water Source Combination Number 3 - Least-Cost Water Sources Used to Meet Growing Demands. The case study utilities use their least-cost water sources to supply growing demands as described in Chapters 2 and 3 of this report.

The calculations and results for Water Source Combination Number 1 are provided for each of the four case study utilities in Table ES.2. If all of the incremental costs are financed through the variable water rate, then this rate would be higher than the rate that would be charged by these case study utilities over the next 20 years if these alternative water sources and conservation projects were not implemented (in 2005 dollars). Depending on the case study utility, the increase would range from $0.09 to $0.53 per 1,000 gallons, in 2005 dollars. This rate increase would be phased in over the period 2005 through 2025 as water sources and conservation programs are developed.

Depending on the case study utility, this translates into an annual water cost increase ranging from $8 per household per year for customers of the large inland utility to $38 per household per year for customers of the large coastal utility. Adding this increase to the existing household water bill, the water bill as a percent of median household income would range from 0.49 percent for customers of the Large Coastal Utility to 0.83 percent for customers of the Small Coastal Utility. According to the U.S. Environmental Protec-

tion Agency, a guideline for determining if a water bill is affordable is that the total water bill is less than two percent of median household income.[2]

The blending of water from diverse sources (blending of ground water, surface water and/or desalinated water) may cause undesirable changes in water chemistry. A potential additional cost not included in the cost estimates is the cost to add certain additional chemicals to the water to prevent these changes. Research by the American Water Works Association Research Foundation and regional water suppliers is addressing this issue[3]. The utility's cost to address this issue is not likely to result in unaffordable potable water supply.

Table ES.2
Water Source Combination Number 1
Cost of New Water Sources to Households and Percent of Median Income That is Water Bill by 2025 (In 2005 Dollars) (a)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Increase in Variable Water Rate over period 2005 to 2025 (dollars per 1,000 gallons)	$0.092	$0.276	$0.532	$0.290
(2)	Residential Per Capita Daily Water Use as % of Gross Water Use, 2001	65%	65%	65%	74%
(3)	Annual Water Use Per Household, kgal	91.06	95.25	72.72	84.34
(4)	Annual Cost Of New Water Supplies per Household, 2025 (4) = (1) x (3) (d)	$8.36	$26.26	$38.67	$24.43
(5)	Annual Water Cost per Household Without Project, 2025	$200	$171	$171	$299
(6)	Annual Water Cost per Household With Project, 2025 (in 2003 dollars) (6) = (4) + (5)	$208	$197	$210	$323
(7)	Median Household Income in 2005	$37,969	$30,735	$43,219	$39,139
(8)	Water Cost with Project as % of Median Hhd Income (8) = (6) / (7)	0.55%	0.64%	0.49%	0.83%

(a) Numbers may not divide to exactly the number shown due to rounding.

[2] U.S. Environmental Protection Agency, *"Affordability of the 1986 Amendments to Community Water Systems"*, Washington, D.C., 1993. See also, U.S. EPA, *"Information for States on Developing Affordability Criteria for Drinking Water"*.

[3] See for example, Rajendra D. Vaidya, John D Dietz and James S. Taylor, University of Central Florida, *"Iron Release in Drinking Water Distribution Systems"*, proceedings of the Florida Section American Water Works Association, November 2005.

The financial impact simulated above may be an overestimate of the impact to water bills because the impact of higher prices in lowering water demand was not considered in this analysis. Customers may be able to lower their water use through increases in efficiency or by reducing waste in response to higher prices.

The results for Water Source Combinations 2 and 3 were also evaluated. For all combinations and case study utilities, the average water bill as a percent of median household income is less than two percent implying that the incremental cost of the Recovery Strategy is affordable to water customers. For low income customers, water rate structures can be designed so that water use below a certain threshold does not pay or pays very little for the incremental cost of these additional water sources.

6.0 Agricultural Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Most water use in agriculture is for crop irrigation. Water is also used in livestock operations but no increases in water demand for this use is forecast over the next 20 years. Overall agricultural irrigation water demand in the SWUCA is expected to fall by 40.2 mgd. In Hardee, Hillsborough and Sarasota counties, agricultural irrigation water demand is expected to increase by 25.6 mgd, 3.6 mgd and 1.3 mgd, respectively for a total increase of 30.5 mgd. Agricultural water demand in the other five SWUCA counties is expected to fall by 70.7 mgd. In the analysis of Chapters 2.0 and 3.0, the 30.5 mgd increased water demand is supplied as follows: 5.6 mgd is supplied by unused permitted quantities, 3.2 mgd is saved from water conservation activities and investments, and 21.7 mgd is supplied by historically used permitted quantities from other agricultural operations that leave production.

If most of the additional agricultural irrigation demands can be supplied with permitted upper Floridan aquifer water quantities from the crops that leave production, then no negative impacts to agriculture from the Recovery Strategy are expected through 2025, the last year evaluated in this study. This result emphasizes the importance of the Self-Relocation and Net Benefits provisions of the proposed SWUCA rule revisions as they are expected to facilitate movement of permitted ground water quantities to new agricultural operations as old operations leave production.

Historically and today, agriculture in the SWUCA relies on relatively inexpensive ground and surface water sources to irrigate cropland. Most of this water, or about 85 percent, is obtained from ground water. If permitted water supplies from relatively inexpensive ground water sources become scarce, new and expanding growers may need to obtain water from projects that are more expensive relative to traditional sources. This study demonstrated that agricultural operators are limited in the amount of money they can

pay for water supply before residual returns to land and risk fall to zero and land leaves production.

The breakeven costs of water among farms were estimated. The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation.[4] As water prices increase, the return to land and risk falls. When the return to land and risk declines and is less than the return that could be gained from another use on that land, the land will be put into that other land use.

In the case where the land has no associated water use permit or feasible water source, alternative land uses may be limited. If the land is located near a growing urban area, the landowner may choose to produce the crop until returns fall to zero, buying time to take advantage of rising land prices before selling. Thus, the breakeven cost provides some idea about how much of the water cost growers might be able to bear before significant quantities of land leave production.

To this end, 11 model farms were chosen that represent the characteristics of farms in the SWUCA. The characteristics are crop type, irrigation system, location, cultural practices and seasonality. The estimated breakeven cost was then calculated for each model farm. The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation. The results are provided in Table ES.3. The estimated breakeven cost per 1,000 gallons of water used above what farmers already pay for water ranges from $0.0 for southwest Florida citrus and strawberries to $5.80 for field woody ornamentals.

For Fall Tomatoes, the estimated breakeven water cost is $0.80 per 1,000 gallons. For cucumbers, a $2.40 per 1,000 gallons water cost would cause the model cucumber farm to leave production permanently. As the return to land and risk falls, the model farm becomes more vulnerable to other events that cause returns to fall such as chronic low commodity prices, increases in other costs, and pest or disease outbreaks. Farm owner reaction to higher water costs will likely be to significantly increase water use efficiency through improved irrigation management and technologies to the extent that they are affordable.

The purpose of presenting the breakeven costs is to demonstrate that most agricultural operations are not likely to be able to afford the full cost of all new water supplies. How-

[4] Return to land and risk is revenue from sales of agricultural products minus all costs of production including the opportunity cost of investments as reflected in the interest cost (average rate of return) and not including land rent (or value of the land).

ever, additional water conservation activities and investments may be economically feasible for many growers. According to the District's 2001 RWSP, page 136, "Although there will be opportunities for agricultural users to make use of alternative sources such as surface water and reclaimed water, in general, they will need to continue to rely to a large degree on access to ground water. This is because the cost of conveying water from alternative sources will, in many cases, be prohibitive."

Table ES.3
Impact of Alternative Water Source Cost on Economic Feasibility of Agricultural Production By Crop Type

Crop	Unit of Measure	Applied Water Needs - Kgal per Unit per Year	Breakeven Cost of Alternative Water Supply, $/kgal (a)	Cost of Alternative Water Supply, $/unit/year (a)	Net Crop Returns After Water Cost, $/unit
				Low	
Sod – St. Augustinegrass	Acres	1,001	$1.40	$1,402	$4
Sod – Bahiagrass	Acres	1,001	$1.05	$1,051	$3
Container Woody Ornamentals	1,000 Sq. Ft.	38	$3.90	$150	$2
Field Woody Ornamentals	1,000 Sq. Ft.	43	$5.80	$250	$0
Flowering Plants	1,000 Sq. Ft.	38	$2.80	$108	$1
Citrus – Central Florida	Acres	429	$1.05	$451	$17
Citrus – Southwest Florida	Acres	325	$0.00	$0	-$127
Tomatoes – Fall	Acres	812	$0.80	$650	$0
Tomatoes – Spring	Acres	1,216	$1.24	$1,508	$10
Strawberries – single cropped	Acres	924	$0.00	$0	-$126
Cucumbers – double cropped	Acres	708	$2.40	$1,700	$39

(a) The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation.
(b) Double cropping strawberries with other crops will increase the overall net returns to the land.

7.0 Industrial/Commercial and Mining/Dewatering Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Industrial/Commercial and Mining/Dewatering businesses within the District that withdraw water directly from water sources[5] include chemical manufacturers, food processors, food packers, mining /dewatering operations, thermoelectric power generators, and

[5] Instead of purchasing water from a water utility.

other types of manufacturers. Much of the food processing industry in the SWUCA is associated with citrus and other agricultural crops. Most of the chemical manufacturing businesses are phosphate fertilizer manufacturers that are closely associated with the local phosphate mining industry. Thermoelectric power generators create the electricity used to supply the regional electric grid and use water for cooling and other purposes involved in the generation of electricity. Water used for mining and dewatering is associated with phosphate, limestone, sand, and shell mining in the SWUCA.

The firms most likely to be negatively impacted by the SWUCA Recovery Strategy are those that:

- Are new to the area or cannot Self Relocate sufficient permitted water quantities, and,
- Have difficulty passing on increased costs to their customers.

Some firms may be able to access affordable alternative water supplies through the Net Benefit provisions of the proposed SWUCA rule revisions.

Phosphate mining and possibly the fertilizer manufacturing industries are expected to move from the northern areas of the SWUCA, particularly Polk County to southern areas of the SWUCA, particularly Hardee County. These firms will be able to move their permitted quantities under the Self-Relocation provision of the proposed SWUCA rule revisions, so these industries are not expected to be negatively affected by the SWUCA Recovery Strategy.

Some electric power generators in the SWUCA have been able to use technologies that significantly reduce the amount of water needed to produce electricity. Thus, the unused permitted quantities on some of the permits of electricity generators may be sufficient to supply power generation needs in the future. In the event that more expensive alternative water sources must be used, the cost increase would be passed on to consumers through higher electricity rates. This study provided an example where the increased water cost would increase the average residential customer's electric bill by $2.68 per year. This additional cost is unlikely to cause undue hardship to electricity customers. Thus, negative impacts to the economy are not expected from the SWUCA Recovery Strategy through 2025 as it affects electric generating companies.

It is likely that some firms may be discouraged from locating in the SWUCA due to the lack of affordable water supplies. If the forecasted SWUCA-wide water demand growth of Industrial/Commercial Use Types is expected to be only 5.8 mgd over the next 20 years, then the impact to the regional SWUCA economy may not be significant. However, if actual water demand growth of Industrial/Commercial Use Types without the Re-

covery Strategy is greater than forecasted, the economy will not grow as fast as it otherwise would have if water users could continue pumping from relatively inexpensive ground and surface water sources.

8.0 Recreation / Aesthetic Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Water demand increases for Recreation and Aesthetic Use Types are expected in all SWUCA counties over the next 25 years. Recreation and Aesthetic Use Types include golf course irrigation, condominium and apartment complex lawn and landscape irrigation, and the irrigation of playing fields, botanical plants and landscapes at public and private parks, schools, and playgrounds.

The SWUCA-wide water demand increase is expected to be 15.3 mgd. About 2.9 mgd might be supplied by unused, permitted water quantities. The remaining 12.4 mgd is expected to be supplied with reclaimed water. Most of the projected additional water demand increase of Recreation / Aesthetic Use Types is comprised of water demand at golf courses as more and more courses are built in the SWUCA.[6]

The incremental costs of water associated with the Recovery Strategy may prevent some new golf course construction particularly where the golf course cannot pass through the incremental water costs due to competition from courses that have sufficient permitted ground water quantities or because the client base is sensitive with respect to green fees. However, for most new golf courses, the demand for golf is expected to be strong enough that golfers will be willing to pay the extra fee needed to recover the incremental water costs and many new golf courses will still be constructed and operated profitably.

New multi-family complexes, public schools and parks will likely need to use alternative water sources in order to obtain new water quantities for landscape irrigation. About 19 new schools, 18 new government parks and 212 new apartments, condominiums and sub-divisions in the SWUCA may request new permitted water quantities for lawn and landscape irrigation. The incremental costs of alternative water sources will likely be paid by the households located in the school districts, park districts, apartments, condominiums and sub-divisions that will used the alternative source water.

[6] From draft Regional Water Supply Plan Update, Southwest Florida Water Management District, Chapter 4, November 2005.

The financial impact of reclaimed water incremental costs for school and park landscape irrigation on the average annual household ad valorem tax bill was estimated to range from $0.34 to $4.08 per year. While the ad valorem tax increases are not significant, the incremental cost is likely to reduce the size of landscaped areas and lawns to those that are necessary for school recreation activities and sports activities. If the proposed withdrawal is relatively small so that it does not impact MFL water bodies, then the water use may be permitted.

The financial impact to households from reclaimed water incremental costs for large landscape irrigation was evaluated. The monthly incremental water cost per household was estimated to be in the neighborhood of $3.07. The impact of having to use more expensive alternative water sources will be smaller and more water efficient landscape areas at new residential developments. If the proposed withdrawal is relatively small so that it does not impact MFL water bodies, then the water use may be permitted.

9.0 Economic Contribution of State Funding to the SWUCA

About $6.6 million per year in State funding will likely be available over the next nine years to pay for some of the construction costs associated with alternative water supply projects in the SWUCA. About 90 percent of this State funding will come from Florida households outside of the SWUCA. This outside funding will generate income, tax revenues and employment to the residents of the SWUCA counties. Outside funding to pay for water supply projects in the SWUCA would generate about $11 million in output, $4 million in labor income, $911,000 in other property type income, and $281,000 in indirect business taxes each year for the next nine years. During this time, about 115 jobs would be created in the SWUCA area due to this funding. Funding sources within the SWUCA were not considered in this study because money would be moving to and from the same group of households and businesses within the SWUCA economy and would not generate additional income, employment and tax revenues to the area.

10.0 Benefits of the SWUCA Recovery Strategy

There are many benefits associated with protecting the water resources addressed in the SWUCA Recovery Strategy. While there is very little data available to estimate the values of these benefits in dollars terms, the benefits are described in this report.

The benefits of the Saltwater Intrusion Minimum Aquifer Level are the future cost savings from avoided membrane treatment to remove salts in the water pumped from the upper Floridan aquifer and the avoided lost income in the SWUCA economy as businesses who cannot afford membrane treatment leave the area. Unmanaged saltwater intrusion threatens the relatively inexpensive water supplies of the upper Floridan aquifer. If significant ground water quantities were to become salty and require membrane treatment, the costs of such treatment would be significantly higher than the costs of the Recovery Strategy. The District has decided to balance the needs of the existing economy with the needs of future generations by setting the Saltwater Intrusion Minimum Aquifer Level so that it slows the rate of saltwater intrusion instead of either completely halting that intrusion or allowing it to continue unmanaged.

The Upper Peace River and the eight Highlands Ridge lakes are popular areas for fishing, canoeing, boating, swimming, and bird watching. They also provide aesthetic amenities. Many of the lakes are urban lakes and support a variety of recreation and aesthetic uses. There is no data or information available regarding the number of person-days spent recreating on the Upper Peace River, the eight lakes or any of the lakes in the Highlands Ridge. Likewise, there is no information regarding the value that residents and visitors place on being able to boat, canoe, swim or fish on these water bodies or bike, walk or bird watch near these water bodies.

A report by the Florida Fish and Wildlife Conservation Commission[7] estimates that each freshwater boat ramp in Florida generates on average $442,000 per year in the value of Florida's output, $42,000 per year in tax revenues collected and 8 jobs. Each freshwater pier in Florida generates on average $623,000 per year in the value of Florida's output, $75,000 per year in tax revenues collected and 10 jobs. Using this information, the 12 public boat ramps and 6 public piers on the Upper Peace River and the eight Highlands Ridge lakes generate $9 million in the value of output each year, 156 jobs, and $951,000 in State and local annual tax revenue collections. These are just a portion of the values that would be protected by the SWUCA Recovery Strategy. Other values include the private waterfront amenities and recreation opportunities enjoyed by residents who live on the Highland Ridge lakes and the additional public recreation values associated with

7 Florida Fish and Wildlife Conservation Commission, *"Assessing the Economic Impact and Value of Florida's Public Piers and Boat Ramps"*, Tallahassee, Florida, March 2001, page 5.

all of the other Highlands Ridge lakes that would be protected by the proposed SWUCA rule and Recovery Strategy.

11.0 Historic Economic Trend Analysis

As requested by the District, an historic analysis was conducted to determine whether or not the historic water use permitting provisions in the SWUCA had a significant impact on the economy. The analysis is provided in Appendix A of this report. Taxable sales, non-agricultural wage and salary employment, number of permanent resident households, labor income and harvested crop acreage by SWUCA County and the rest of Florida were collected and evaluated from 1970 to 2002. The year 2002 is the most recent year for which these data are available. The historic trends for the SWUCA counties are very similar to the trends for the rest of Florida for all of the variables evaluated. From examining these data, there does not appear to be a noticeable impact of the District's historic water use permitting rules in the SWUCA.

Section 1.0
Introduction

This report presents the methods and results of a comprehensive economic analysis of the Southern Water Use Caution Area Recovery Strategy. This Recovery Strategy is described in the proposed Chapter 40D-80, "Recovery and Prevention Strategies for Minimum Flows and Levels" and the document titled, "Southern Water Use Caution Area Recovery Strategy" prepared by the Southwest Florida Water Management District (District), Brooksville, Florida revised draft, March 2004.

1.1 Background

Section 373.042, Florida Statutes, *Minimum Flows and Levels*, requires the Southwest Florida Water Management District (District) to establish minimum flows or levels for ground and surface water sources. The Section states, "(1) Within each section, or the water management district as a whole, the department or the governing board shall establish the following:

(a) Minimum flow for all surface watercourses in the area. The minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area.

(b) Minimum water level. The minimum water level shall be the level of groundwater in an aquifer and the level of surface water at which further withdrawals would be significantly harmful to the water resources of the area.

The minimum flow and minimum water level shall be calculated by the department and the governing board using the best information available."

The District has proposed the establishment of minimum flows and levels (MFLs) for the following water resources.

- Upper Peace River
- Floridan Aquifer in the Southern Water Use Caution Area (SWUCA)
- Eight lakes in the SWUCA called Lake Clinch; Lake Eagle; Lake McLeod; Lake Wales; Lake Jackson; Lake Little Jackson; Lake Letta and Lake Lotela.

These resources are located in the SWUCA which is depicted in Figure 1-1. It includes all or a portion of Polk, Hillsborough, Manatee, Sarasota, Hardee, Highlands, DeSoto and Charlotte counties in Florida.

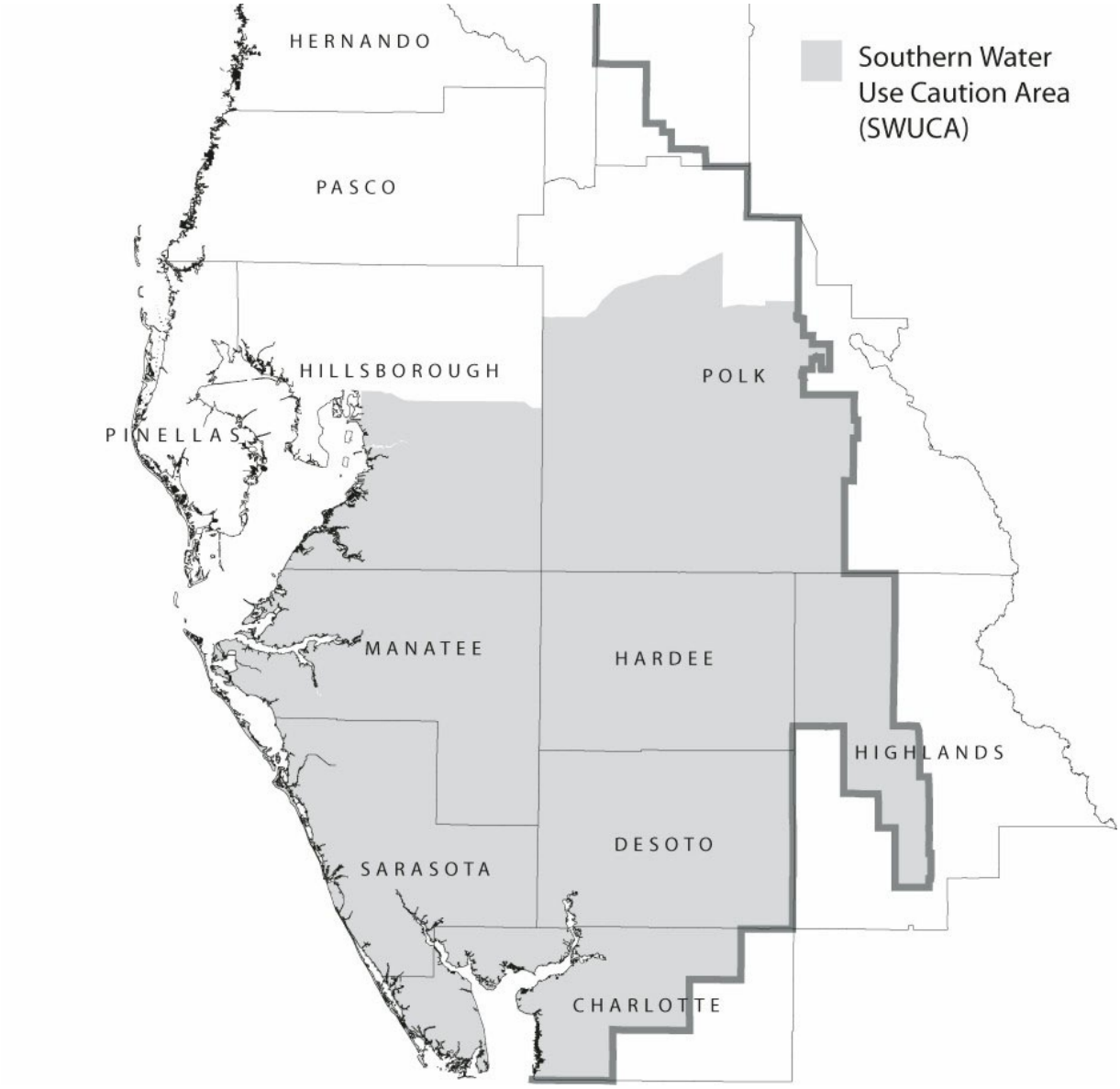
To this end, the District prepared proposed revisions, dated October 3rd, 2005, to the following chapters of Florida Administrative Code:

- Chapter 40D-2, Consumptive Use of Water;
- Chapter 40D-8, Water Levels and Rates of Flow;
- Chapter 40D-80, Recovery And Prevention Strategies For Minimum Flows And Levels; and,
- Basis of Review for Water Use Permit Applications

These proposed rule revisions address saltwater intrusion, protect lake levels, and provide minimum flows for the Upper Peace River as required by Florida Statutes. In addition, rule changes are proposed to improve consistency in reporting public supply service area population and per capita water use.

In addition, consistent with section 373.0421, Florida Statutes, the District has developed a Recovery Strategy because the District has determined that the existing flow rates and water levels of some of these water resources are below the MFLs established for them. As a result, additional requests for permitted quantities from the Floridan aquifer, relative to the existing rule provisions, may not be permitted and some water users will likely need to obtain water from alternative sources. Thus, the incremental cost of the Recovery Strategy will be due to the development and use of the more expensive alternative water sources.

Existing rule provisions in the SWUCA already restrict withdrawals in and around the Most Impacted Area (MIA) and the lakes in the Highlands Ridge area. The District has established MFLs in the SWUCA for other water bodies. The existing flows and levels of these water bodies are above the established MFLs so a recovery strategy for these water bodies is not needed at this time.



40420-005R001.cdr

Figure 1-1
Southern Water Use Caution Area in Florida

The goals of the SWUCA Recovery Strategy are as follows[1].

(1) Restore minimum levels to priority lakes in the Lake Wales Ridge by 2015.

(2) Restore minimum flows to the upper Peace River by 2015.

(3) Reduce the rate of saltwater intrusion in coastal Hillsborough, Manatee and Sarasota counties by achieving the proposed minimum aquifer levels for saltwater intrusion by 2020.

(4) Ensure that there are sufficient water supplies for all existing and projected reasonable-beneficial uses.

A Statement of Estimated Regulatory Costs (SERC) that addresses these proposed rule revisions was prepared and the final report is dated March 14, 2006.[2] Consistent with Section 120.541, Florida Statutes (2005), the SERC document includes:

(a) A good faith estimate of the number of individuals and entities likely to be required to comply with the rule, together with a general description of the types of individuals likely to be affected by the rule.

(b) A good faith estimate of the cost to the agency, and to any other state and local government entities, of implementing and enforcing the proposed rule, and any anticipated effect on state or local revenues.

(c) A good faith estimate of the transactional costs likely to be incurred by individuals and entities, including local government entities, required to comply with the requirements of the rule. As used in this paragraph, "transactional costs" are direct costs that are readily ascertainable based upon standard business practices, and include filing fees, the cost of obtaining a license, the cost of equipment required to be installed or used or procedures required to be employed in complying with the rule, additional operating costs incurred, and the cost of monitoring and reporting.

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[1] Southwest Florida Water Management District, *"Southern Water Use Caution Area Recovery Strategy"*, Brooksville, Florida revised draft, March 2004, page 2.

[2] *"Statement of Estimated Regulatory Costs for Southern Water Use Caution Area II Rule-Making",* prepared by Hazen and Sawyer for the Southwest Florida Water Management District, Brooksville, Florida March 14, 2006.

(d) An analysis of the impact on small businesses as defined by s. 288.703, and an analysis of the impact on small counties and small cities as defined by s. 120.52.

1.2 Economic Analysis Goals

The goals of this economic analysis are as follows.

(1) Estimate the costs over the next 20 years to develop alternative water supplies and implement additional water conservation measures to achieve the levels of water production and conservation envisioned in the Recovery Strategy. Identify the types of persons and entities who will likely pay these costs. The evaluation period is 2006 to 2025 and all costs are in 2005 dollars.

(2) Describe the process by which the District would address each type of water use permit request. Describe the process by which permitted groundwater quantities and historically used groundwater quantities would be made available to new water uses.

(3) Evaluate the extent to which businesses and households can afford the change in water costs associated with the Recovery Strategy.

(4) Estimate the economic contribution of the funding that is likely to come from the State of Florida to pay for a portion of the SWUCA Recovery Strategy.

(5) Describe the benefits of the SWUCA Recovery Strategy to the regional SWUCA area.

(6) Compare the trends in historic economic data describing the SWUCA counties to the same economic data corresponding to the rest of Florida and determine whether or not the historic water use permitting provisions in the SWUCA had a significant impact on the economy.

This Comprehensive Economic Analysis begins with an Executive Summary. Chapter 1.0 is this introduction. Chapter 2.0 evaluates the future water use demands and the available water supplies in the SWUCA through 2025 and provides estimates of the costs to develop alternative water supplies and implement additional water conservation measures by SWUCA county. Chapter 3.0 describes the water use permitting process under the SWUCA Recovery Strategy, identifies the Use Types and locations of persons and entities likely to be paying the costs, and presents the estimated costs by county and Use Type.

Chapters 4.0 through 7.0 evaluate the extent to which each Use Type can afford these costs. Chapter 4.0 addresses water supply utilities. Chapter 5.0 addresses agriculture. Chapter 6.0 addresses industrial, commercial, mining and dewatering self-supplied water users. Chapter 7.0 addresses recreation and aesthetic self-supplied water users.

Chapter 8.0 presents the potential funding from the State of Florida to pay for a portion of the costs associated with the SWUCA Recovery Strategy and the estimated economic contribution of this funding to the regional SWUCA economy. Chapter 9.0 describes the benefits of the SWUCA Recovery Strategy and Chapter 10.0 presents the conclusions of this study. The historic economic analysis is provided in Appendix A.

The Statement of Estimated Regulatory Costs (SERC) dated March 14, 2006 prepared by Hazen and Sawyer for the District and this comprehensive economic analysis are Parts 1 and 2, respectively, of the complete economic analysis of the proposed SWUCA rules and the Recovery Strategy. This comprehensive economic analysis uses the information contained in the SERC to estimate the total costs of developing alternative water supplies in the SWUCA through 2025. This comprehensive economic analysis then examines each Use Type within each county to determine where new water supplies will come from and the ability of each Use Type to afford these supplies.

The information in the SERC that was used in this economic analysis includes the cost per 1,000 gallon estimates by source type, the water supply availability by source and county which were updated by the District since the SERC was produced, and the water demand forecasts by Use Type and county. The SERC report concentrated on the potential costs to individuals and entities, not to the entire SWUCA economy. Some aspects of this economic analysis study are also contained in the SERC report. The evaluation of case study utilities, the evaluation of agriculture and the evaluation of golf courses contained in the SERC are also relevant to examining the SWUCA economy.

Section 2.0
Costs to Implement the Recovery Strategy

This chapter describes the estimated costs to implement the Recovery Strategy in the SWUCA from 2005 to 2025. The estimated costs were based on the forecasted changes in demand by county and Use Type from 2006 to 2025 and the amount of water available from traditional ground water and existing surface water sources and from alternative water sources under the SWUCA Recovery Strategy. These alternative sources include reclaimed water, water conservation, new surface water withdrawals including storage, seawater desalination and brackish water desalination. The costs of water supply without the Recovery Strategy were deducted from the costs of water supply with the Recovery Strategy to obtain estimates of the incremental costs of the Recovery Strategy through 2025. The costs without the Recovery Strategy assume that traditional ground water sources would be used at a cost of $0.22 per 1,000 gallons.

2.1 Water Demand and Supply Balance, 2005 to 2025

The forecasted increases in demands in the SWUCA from 2005 to 2025 by county and Use Type are presented in Table 2.1-1. The additional water available in each county by water source is presented in Table 2.1-2. The total amount of available water supply is provided in the last column of Table 2.1-1 to make it easy to evaluate water demands and supplies in each county. A general supply and demand overview of each county is provided below.

Charlotte County. In Charlotte County, year 2000 water use was 42.2 mgd and 2005 water use was 42.4 mgd. By 2025, water demand is expected to increase to 48.7 mgd. This is a demand increase of 6.6 mgd from 2000 to 2025 and 6.4 mgd from 2005 to 2025. Two use types are expected to grow. Public Supply water demand is expected to grow by 10.3 mgd from 2000 to 2025 and by 8.3 mgd from 2005 to 2025. Recreation / Aesthetic water demand is expected to grow by 2.9 mgd from 2000 to 2025 and by 2.2 mgd from 2005 to 2025. The additional water available from eight sources in the county is 39.5 mgd, which is sufficient to supply projected increased water demands in Charlotte County through 2025. These sources include 17.6 mgd of un-permitted surface water, 7.8 mgd of fresh ground water from the intermediate and surficial aquifers and 6.3 mgd from non-agricultural water conservation.

Table 2.1-1
Water Demand Forecasts in the SWUCA by County Compared to Total Additional Water Available

County and Use Type	Water Demand, mgd					Additional MGD Available
	2000	2005	2025	Change from 2000 to 2025	Change from 2005 to 2025	
CHARLOTTE (a)	**42.2**	**42.4**	**48.7**	**6.6**	**6.4**	**39.5**
Agriculture	18.7	17.6	13.5	-5.2	-4.0	
Public Supply	18.8	21.0	29.2	10.3	8.2	
IC / MD (b)	1.6	0.2	0.2	-1.4	0.0	
Rec./Aesthetic	3.0	3.6	5.8	2.9	2.2	
DESOTO	**82.9**	**59.6**	**48.2**	**-34.7**	**-11.4**	**64.1**
Agriculture	77.7	55.4	42.4	-35.3	-13.1	
Public Supply	3.6	3.8	5.5	1.8	1.6	
IC / MD	1.4	0.1	0.1	-1.3	0.0	
Rec./Aesthetic	0.2	0.2	0.2	0.1	0.1	
HARDEE	**62.9**	**67.1**	**99.1**	**36.2**	**32.1**	**17.6**
Agriculture	54.3	56.6	82.2	27.9	25.6	
Public Supply	2.5	2.5	3.1	0.6	0.6	
IC / MD	5.9	7.7	13.5	7.6	5.8	
Rec./Aesthetic	0.1	0.2	0.3	0.2	0.1	
HIGHLANDS (a)	**56.6**	**60.3**	**53.2**	**-3.5**	**-7.1**	**16.0**
Agriculture	40.3	43.5	31.5	-8.8	-12.0	
Public Supply	12.7	13.1	17.3	4.6	4.2	
IC / MD	0.3	0.2	0.2	-0.1	0.0	
Rec./Aesthetic	3.3	3.5	4.1	0.9	0.7	
HILLSBOROUGH (a)	**77.4**	**81.5**	**108.4**	**31.0**	**26.9**	**38.4**
Agriculture	46.8	47.3	51.0	4.2	3.6	
Public Supply	22.0	24.0	45.1	23.1	21.1	
IC / MD	5.6	6.8	7.7	2.1	0.9	
Rec./Aesthetic	3.0	3.4	4.6	1.6	1.2	
MANATEE	**123.1**	**124.1**	**127.4**	**4.2**	**3.2**	**63.6**
Agriculture	77.0	70.8	53.8	-23.2	-17.0	
Public Supply	39.5	42.5	59.5	20.0	17.0	
IC / MD	1.0	4.3	4.6	3.6	0.3	
Rec./Aesthetic	5.6	6.5	9.4	3.8	3.0	
POLK (a)	**277.1**	**264.6**	**268.3**	**-8.8**	**3.7**	**61.6**
Agriculture	105.7	102.3	77.7	-28.0	-24.6	
Public Supply	81.7	80.9	106.0	24.4	25.1	
IC / MD	81.6	71.9	70.6	-10.9	-1.3	
Rec./Aesthetic	8.1	9.4	13.9	5.8	4.5	
SARASOTA	**57.3**	**67.0**	**86.0**	**28.7**	**19.0**	**87.9**
Agriculture	12.5	12.6	13.9	1.3	1.3	
Public Supply	35.9	44.5	58.7	22.7	14.1	
IC / MD	0.6	0.7	0.8	0.2	0.1	
Rec./Aesthetic	8.2	9.1	12.6	4.4	3.5	
RESTORATION	**0.0**	**0.0**	**50.0**	**50.0**	**50.0**	
TOTAL	**779.5**	**766.6**	**889.3**	**109.8**	**122.7**	**388.7**

Source: From information in District's draft Regional Water Supply Plan Update, November 2005, Chapter 4 and information from District.

(a) The portions of these counties that are in the SWUCA (b) I/C M/D means Industrial / Commercial and Mining / Dewatering Use Types.

Table 2.1-2
Additional Water Available if Developed By County, 2000 to 2025, mgd

County	Total	Conservation		Desalination		Reclaimed Water (offset)	Surface Water		Fresh Ground Water	
		Agricultural	Non-Agricultural	Sea-water	Brackish Ground Water (a)		Permitted / Unused (b)	Un-permitted	IAS and SAS (c)	UFA Unused Permitted (d)
CHARLOTTE (e)	39.5	0.6	6.3	0.0	1.3	4.5	1.4	17.6	7.8	0.0
DESOTO	64.1	1.8	1.0	0.0	0.0	0.8	22.9	35.4	2.2	0.0
HARDEE	17.6	3.2	0.7	0.0	0.0	0.7	0.0	10.0	0.3	2.7
HIGHLANDS (e)	16.0	1.4	3.4	0.0	0.0	1.7	0.0	4.5	1.7	3.3
HILLSBOROUGH (e)	38.4	3.4	6.8	10.0	0.0	4.2	4.3	0.4	3.5	5.8
MANATEE	63.6	4.3	10.4	20.0	0.0	10.2	8.0	3.9	6.7	0.1
POLK (e)	61.6	2.7	20.8	0.0	0.0	5.9	**NA**	**NA**	4.3	27.9
SARASOTA	87.9	1.1	16.9	20.0	7.5	8.2	0.7	25.2	7.6	0.7
TOTAL	388.7	18.5	66.3	50.0	8.8	36.2	37.3	97.0	34.1	40.5

Note: Values are rounded to the nearest 0.1 mgd. NA means not available at this time.

Source: Taken from information in the SWFWMD's Regional Water Supply Plan Update, draft, November 2005, Chapter 5, Table 5-12.

(a) Available potable water supply is the currently unused permitted withdrawal times an assumed treatment efficiency of 0.7.

(b) With the exception of the Alafia River, which is part of Tampa Bay Water's Enhanced Surface Water System, surface water sources were generally assigned to the county and "area" in which the point of withdrawal occurs. A portion of the available flows from the Alafia and Hillsborough Rivers and the Tampa Bypass Canal will be used to complete the replacement of the scheduled reduction in capacities (68 mgd) of the central system wellfields by 2008. *Water from the Peace River was distributed to Polk County for the MFLs restoration effort and Hardee County. (From draft November 2005 Regional Water Supply Plan Update, Chapter 5, Table 5-12.)*

(c) IAS and SAS stand for Intermediate Aquifer System and Surficial Aquifer System. Quantities are based on the projected demand that could be met using lower rates of production from the SAS and IAS. Assumes 30 percent of potable water demand is for outdoor use.

(d) These are quantities from the Upper Floridan aquifer that were estimated by the District and correspond to Public Supply and electric power generation permittees. The unused permitted quantities of electric power generation permittees were estimated to be 5 mgd in Polk County and 1.4 mgd in Hardee County. The rest of the quantities in this column correspond to Public Supply permittees. There are likely unused permitted quantities associated with other Use Types that could be used to supply future water needs.

(e) The portions of these counties that are in the SWUCA.

DeSoto County. In DeSoto County, overall water demand is expected to fall by 11.4 mgd. Water demand in 2005 was 59.6 mgd in 2005 and water demand in 2025 is forecasted to be 48.2 mgd. This reduction is attributed to a 13.1 mgd drop in demand by agriculture with no change in demand expected from Industrial / Commercial and Mining / Dewatering use types. Public Supply demand is expected to increase by 1.6 mgd and Recreation / Aesthetic demand is expected to increase by 0.1 mgd. Total additional available water supplies that could be developed in DeSoto County total 64.1 mgd. These water sources include 35.4 mgd from un-permitted surface water and 22.9 mgd from permitted, unused surface water.

Hardee County. Water demand in Hardee County is projected to increase by 32.1 mgd from 2005 to 2025. Most of this increase, 25.6 mgd, is for agricultural irrigation. Only 17.6 mgd of additional water supplies and water conservation savings is available to supply this demand increase. The District anticipates that some of this demand increase can be met by new ground water withdrawals that are not constrained by the proposed MFLs and meet the other, applicable permitting criteria. Also, self-relocation of permitted quantities from other counties may occur. For other ground water withdrawals that cannot be permitted due to MFL constraints, a Net Benefit would need to be provided in order to access the ground water source. The District anticipates that the Net Benefit could come from reductions in ground water withdrawals in Hardee County, or, more likely, in Manatee, Polk and DeSoto counties where water demand for agricultural production is expected to decrease through 2025.

Highlands County. Highlands County is expected to experience a 7.1 mgd overall reduction in water demand from 2005 to 2025 due to reduced demand for agricultural irrigation water. Water demands for Public Supply and Recreation / Aesthetic use types are expected to increase over the period by 4.2 mgd and 0.7 mgd, respectively. No changes in water demand are expected from Industrial/Commercial and Mining/Dewatering Use Types. Additional available water supplies from six sources in the county total 16.0 mgd so it is likely that there will be significant additional water available through 2025.

Hillsborough County. Water demand is expected to increase significantly in the SWUCA portion of Hillsborough County through 2025. Demand by all use types is expected to increase by 26.9 mgd from 2005 to 2025. Most of this demand increase is attributed to Public Supply. Additional available water supplies from eight sources in the county total 38.4 mgd, which is sufficient to supply projected increased water demands in the county through 2025.

Manatee County. In Manatee County, overall water demand is expected to increase by 3.2 mgd from 2005 to 2025. Public Supply demand is expected to increase by

17.0 mgd through 2025 while Agricultural irrigation demand is expected to fall by 17.0 mgd through 2025. Water demands by Commercial / Industrial water users and Recreation / Aesthetic water users are anticipated to increase by 0.3 mgd and 3.0 mgd, respectively, from 2005 to 2025. Additional available water supplies from nine sources in the county total 63.6 mgd, which are sufficient to supply projected increased water demands in the county through 2025.

Polk County. In Polk County, water demand reductions are expected in Agricultural irrigation and Industrial / Commercial and Mining / Dewatering use types. Public Supply water demand is expected to increase by 25.1 mgd from 2005 to 2025 and Recreation / Aesthetic water demand is expected to increase by 4.5 mgd. Overall water demand is expected to fall by 3.7 mgd from 2005 to 2025. Additional available water supplies from five sources in the county total 61.6 mgd, which is sufficient to supply projected increased water demands in the county through 2025.

Sarasota County. Water demand in Sarasota County is expected to increase by 19.0 mgd from 2005 to 2025. While water demand for all Use Types is expected to grow, Public Supply water demand growth is expected to comprise 14.1 mgd of the growth in water demand. Additional available water supplies from nine sources in the county total 87.9 mgd, which is sufficient to supply projected increased water demands in the county through 2025.

Environmental Restoration. According to the District's draft Regional Water Supply Plan Update, November 2005, Chapter 4, Section 5,

> "Environmental restoration comprises quantities of water that may need to be developed and/or existing quantities that need to be retired to meet established MFLs. The District is in the process of developing a recovery strategy for the SWUCA. One of the requirements of the strategy is a 50 mgd reduction in ground-water withdrawals in order to meet the Salt-Water Intrusion Minimum Aquifer Level in the Upper Floridan aquifer. This 50 mgd is included as a demand in the environmental restoration category. It is anticipated that this demand will be met between 2005 and 2025 by the gradual reduction in agricultural ground-water use as agricultural lands are replaced by urban land uses that will be supplied by alternative sources. Since the 50 mgd reduction will occur gradually, it is divided into increments of 12.5 mgd in each five-year time increment from 2005 to 2025."

Additional Ground Water Quantities From Reductions in Agricultural Irrigation Demand. From Table 2.2-1, the sum of the agricultural demand reductions through 2025 is 70.7 mgd. The Industrial/Commercial and Mining/Dewatering water demand reductions in Polk County are expected to total 1.3 mgd. Assuming that 50.0 mgd of

permitted groundwater quantities are retired for environmental restoration, 22.0 mgd would be available to supply increased demands of other counties and/or Use Types.

Overall Conclusions. Overall, it appears that sufficient water supplies are available to meet all water demands in the SWUCA through 2025 under the Recovery Strategy. A county-by-county analysis shows that only Hardee County has a potential water supply deficit. The District is aware of this issue and expects that the water supply deficit in Hardee County can be met through permitting water quantities from the Floridan aquifer either through self-relocation, Net Benefit, or the requested quantity is not expected to affect MFL water bodies.

2.2 Costs of Alternative Water Sources

The average incremental annualized capital and annual operations and maintenance (O&M) costs per 1,000 gallons of water supplied or saved, as in the case of conservation, for selected water supply projects and water conservation activities are provided in Table 2.2-1. All costs are in 2005 dollars. Incremental costs are provided for projects located in: (1) the Peace River / Manasota Regional Water Supply Area (PR/M RWSA) which includes the counties of Manatee, DeSoto, Sarasota and Charlotte; (2) the Heartland Water Alliance (HWA) area which includes the counties of Polk, Highlands and Hardee; and (3) the portion of Hillsborough County in the SWUCA. These incremental costs were estimated as the difference between the total cost to develop and use the water source minus the cost to use traditional ground and surface water sources

The estimated total costs of developing and using Alternative Water Sources were taken from cost estimates provided in the draft Regional Water Supply Plan Update of November 2005. Projects were chosen that are expected to represent the variety of projects that would likely be available. The costs of the water sources were converted into the annualized capital and O&M costs per 1,000 gallons of water produced or, in the case of water conservation, of water saved. All capital costs were annualized over 20 years at 5.375 percent interest rate.[1] The capital and O&M costs per 1,000 gallons (kgal) for each type of alternative water source are provided in Table 2.2-2.

The costs of a traditional water source that would be developed if protection of water resources was not a concern was deducted from these costs to obtain an incremental cost change associated with the use of alternative water sources in lieu of traditional sources. While the available traditional water source would vary by permittee, the Floridan aquifer was used as the traditional alternative source in this analysis. The estimated cost of this

[1] The 2005 Federal planning rate for water resources projects is 5.375 percent per year. From Federal Register, December 9, 2004, Volume 69, Number 236, pages 71425 to 71426.

source is $0.22 per 1,000 gallons ($0.22 per kgal) which is composed of a $0.02 per kgal annualized capital cost and a $0.20 per kgal O&M cost. This cost estimate is the mid-point of the estimated costs of a one million gallon per day (mgd) Floridan aquifer well and a four mgd Floridan aquifer well. The itemized cost estimates are provided in Table 2.2-3 and Table 2.2-4 for a one mgd well and a four mgd well, respectively.

Table 2.2-1
Incremental Annualized Capital and O&M Costs per 1,000 Gallons of Water Supplied and Conserved Over and Above the Estimated Cost of Non-Alternative Water Supplies, All Water Users, 2005 Dollars (a)

	PR/MRWSA - Manatee, DeSoto, Sarasota, Charlotte			HWA - Polk, Highlands, Hardee			Hillsborough County in SWUCA		
Type of Water Supply	**Capital**	**O&M**	**Total**	**Capital**	**O&M**	**Total**	**Capital**	**O&M**	**Total**
Conservation (b)									
Agriculture	$0.00	$0.23	$0.23	$0.00	$0.23	$0.23	$0.00	$0.23	$0.23
Public Supply	$0.00	$0.45	$0.45	$0.00	$0.45	$0.45	$0.00	$0.45	$0.45
Domestic Self-Supply	$0.00	$0.06	$0.06	$0.00	$0.06	$0.06	$0.00	$0.06	$0.06
Non-Public and Non-Domestic Supply	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Desalination									
Seawater	$1.74	$2.59	$4.33	Not available in area			$0.94	$1.40	$2.34
Brackish Water	$1.38	$0.95	$2.33	Not available in area			Not available in area		
Reclaimed Water	$0.79	$0.25	$1.04	$1.10	$0.21	$1.31	$0.98	$0.15	$1.13
Surface Water – Permitted / Unused	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Surface Water – Unpermitted									
Potable	$1.65	$0.84	$2.49	$1.77	$0.73	$2.50	$1.22	$0.23	$1.45
Urban Irrigation (includes Rec/Aes)	$1.46	$0.40	$1.86	$1.77	$0.73	$2.50	--	--	--
All Other Water Use Permittees	$2.55	$1.15	$3.69	$1.77	$0.73	$2.50	--	--	--
Fresh Ground water									
Intermediate and Surficial Aquifer Systems (c)	$0.48	$0.00	$0.48	$0.48	$0.00	$0.48	$0.48	$0.00	$0.48
Upper Floridan Aquifer, unused permitted	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Rainwater Harvesting - Agriculture (d)	$1.14	$0.80	$1.94	$1.14	$0.80	$1.94	$1.14	$0.80	$1.94

From "Statement of Estimated Regulatory Costs for SWUCA II Rulemaking", prepared by Hazen and Sawyer for the District, March 14, 2006, Chapter 5.0 and based on SWFWMD, draft 2005 Regional Water Supply Plan Update, November 2005, Chapter 7 - Water Supply Development Component, supplemented with information from District staff in early December 2005 and Floridan aquifer cost information from the District..

Notes: "Not available in area" Means that seawater or brackish water desalination is not available in these counties. "--" means that it is anticipated that the use of this water source in this area to supply additional water demands will be insignificant.

(a) The incremental cost of the alternative source is the cost of the alternative source as presented in the subsequent tables minus the estimated cost to pump water from the Floridan aquifer of $0.22 per kgal total cost ($0.02 per kgal capital cost and $0.20 per kgal O&M cost). The costs of unused permitted quantities from surface water sources were set to zero because they would be the likely source of most new water supplies if protection of water resources was not a concern.

(b) Conservation costs were not broken out by capital and O&M in the draft Regional Water Supply Plan Update. Thus, all costs were entered as O&M costs even though the actual costs are a combination of each.

Table 2.2-2
Annualized Total Capital and O&M Costs per 1,000 Gallons of Water Supplies and Conservation, All Water Users, 2005 Dollars

	PR/MRWSA - Manatee, DeSoto, Sarasota, Charlotte			HWA - Polk, Highlands, Hardee			Hillsborough County in SWUCA		
Type of Water Supply	**Capital**	**O&M**	**Total**	**Capital**	**O&M**	**Total**	**Capital**	**O&M**	**Total**
Conservation (a)									
Agriculture	$0.00	$0.45	$0.45	$0.00	$0.45	$0.45	$0.00	$0.45	$0.45
Public Supply	$0.00	$0.67	$0.67	$0.00	$0.67	$0.67	$0.00	$0.67	$0.67
Domestic Self-Supply	$0.00	$0.28	$0.28	$0.00	$0.28	$0.28	$0.00	$0.28	$0.28
Non-Public and Non-Domestic Supply	$0.00	$0.11	$0.11	$0.00	$0.11	$0.11	$0.00	$0.11	$0.11
Desalination									
Seawater	$1.76	$2.79	$4.55	NA in this area			$0.96	$1.60	$2.56
Brackish Water	$1.40	$1.15	$2.55	NA in this area			NA in this area		
Reclaimed Water	$0.81	$0.45	$1.26	$1.12	$0.41	$1.53	$1.00	$0.35	$1.35
Surface Water – Unpermitted									
Potable	$1.67	$1.04	$2.71	$1.79	$0.93	$2.72	$1.24	$0.43	$1.67
Urban Irrigation (includes Rec/Aes Use Type)	$1.48	$0.60	$2.08	$1.79	$0.93	$2.72	--	--	--
All Other Water Use Permittees	$2.57	$1.35	$3.91	$1.79	$0.93	$2.72	--	--	--
Fresh Ground water									
Intermediate and Surficial Aquifer Systems (b)	$0.50	$0.00	$0.50	$0.50	$0.00	$0.50	$0.50	$0.00	$0.50
Rainwater Harvesting - Irrigated Agriculture (c)	$1.16	$1.00	$2.16	$1.16	$1.00	$2.16	$1.16	$1.00	$2.16

Notes: "NA in this area" Means that seawater or brackish water desalination is not available in these counties. "--" means that it is anticipated that the use of this water source in this area to supply additional water demands will be insignificant.

From "Statement of Estimated Regulatory Costs for SWUCA II Rulemaking", prepared by Hazen and Sawyer for the District, March 14, 2006, Chapter 5.0 and based on SWFWMD, draft 2005 Regional Water Supply Plan Update, November 2005, Chapter 7 - Water Supply Development Component, supplemented with information from District staff in early December 2005.

(a) Conservation costs were not broken out by capital and O&M in the draft Regional Water Supply Plan Update. Thus, all costs were entered as O&M costs even though the actual costs are a combination of each.

(b) From Chapter 7, page 62 of SWFWMD, draft 2005 Regional Water Supply Plan Update, November 2005. Includes only capital cost of horizontal wells to access the surficial aquifer. Unit cost includes well construction, pump, engine, piping, and controls and was estimated using FARMS methodology to be $0.50 per 1,000-gal for a system having a 400 gpm capacity.

(c) From Chapter 7, page 61 of SWFWMD, draft 2005 Regional Water Supply Plan Update, November 2005. Estimated cost of rainwater harvesting.

Table 2.2-3
Estimated Cost to Obtain Water from Fresh Ground Water Well - One MGD (a)

Item	Unit	Unit Cost	No. Of Units	Total Cost
Capital Cost				
I. Construction Costs				
Well Construction	Each	$60,000	1	$60,000
Pump	Each	$20,000	1	$20,000
I. Total Construction Cost				$80,000
II. Total Non-Construction Capital Costs				$36,000
III. Total Capital Cost				$116,000
Operating and Maintenance Cost (annual)				
Fuel ($2.5/gal *12 gal/h)	Hours	$30	2433	$73,000
Total Annual O&M Cost				$73,000
Annualized Total Cost				$82,606
Total Project Cost per 1,000 gallons ADF				**$0.2263**
Annualized Capital Cost per 1,000 gallons ADF				**$0.0263**
Annual O&M Cost per 1,000 gallons ADF				**$0.2000**

Source: SWFWMD Estimate, January 2006

(a) Cost to install a well in Manatee County with 500 feet of casing and approximately 1200 to 1300 feet total depth. Pump capacity is 2,500 gpm. Project life is 20 years. Interest rate is 5.375% per year. Non-Construction cost is 0.45 times Construction cost.

Table 2.2-4
Estimated Cost to Obtain Water from Fresh Ground Water Well - Four MGD (a)

Item	Unit	Unit Cost	No. Of Units	Total Cost
Capital Cost				
I. Construction Costs				
Well Construction	Each	$60,000	1	$60,000
Pump	Each	$20,000	1	$20,000
I. Total Construction Cost				$80,000
II. Total Non-Construction Capital Costs				$36,000
III. Total Capital Cost				$116,000
Operating and Maintenance Cost (annual)				
Fuel ($2.5/gal *12 gal/h)	Hours	$30	9733	$292,000
Total Annual O&M Cost				$292,000
Annualized Total Cost				$301,606
Total Project Cost per 1,000 gallons ADF				**$0.2066**
Annualized Capital Cost per 1,000 gallons ADF				**$0.0066**
Annual O&M Cost per 1,000 gallons ADF				**$0.2000**

Source: SWFWMD Estimate, January 2006

(a) Cost to install a well in Manatee County with 500 feet of casing and approximately 1200 to 1300 feet total depth. Pump capacity is 2,500 gpm. Project life is 20 years. Interest rate is 5.375% per year. Non-Construction cost is 0.45 times Construction cost.

The derivation of the alternative water source and conservation costs presented in Table 2.2-2 is provided in the "Statement of Estimated Regulatory Costs for the Southern Water Use Caution Area II Rulemaking", prepared by Hazen and Sawyer for the District, March 14, 2006, Chapter 5.0.

2.3 Itemized and Total Costs

The cost of developing water sources consistent with the Recovery Strategy will depend on the types of sources that are developed. Some water sources cost more than others. For instance, water conservation cost estimates range from $0.11 to $0.67 per 1,000 gallons of water saved while reclaimed water cost estimates average from $1.26 to $1.53 per 1,000 gallons produced (total capital and O&M cost). Seawater desalination cost estimates range from $2.56 to $4.55 per 1,000 gallons.

To obtain an estimate of the cost to develop water sources under the Recovery Strategy, the change in demand from 2005 to 2025 for each Use Type in each county was assigned one or more water sources or water conservation programs. The most appropriate, least cost water source was selected to supply each increase in demand for each Use Type in each county. Water sources and quantities were selected until 100 percent of the change in water demand from 2005 to 2025 was met. These allocations are for economic analysis purposes and are not specified in the Recovery Strategy or the District's Regional Water Supply Plan.

The prioritization of water sources and water conservation is provided below. If water is available from the first ranked source in the county of interest then it is supplied until 100 percent of the available supply in that county is allocated. Then, the water is allocated from the second ranked source and so on until 100 percent of the additional water demand is met. The ranking is based on least cost per 1,000 gallons except that water from the intermediate and surficial aquifers was ranked the lowest of all water sources due to variations in water yields from these aquifers across each county. However, the amount of water available from these two aquifers is estimated to be 34.1 mgd throughout the SWUCA and may provide affordable water supplies to all types of users.

1. Unused permitted quantities from groundwater or surface sources
2. Conservation
3. Reclaimed water
4. Surface water, unpermitted
5. Desalination of brackish water
6. Desalination of sea water
7. Intermediate and surficial aquifer

In addition to this prioritization, the practical application of the water source to the specific use type was considered.

The selected water sources for each Use Type within each county are provided in Table 2.3-1 along with the amount of water that would be produced (or saved in the case of water conservation programs). Charlotte County is used as an example of how this table is read.

In Charlotte County, the 8.2 mgd water demand growth for Public Supply use types was allocated 1.40 mgd of the unused permitted quantities from surface water sources available in the county; 6.3 mgd of water savings from non-agricultural water conservation programs and 0.5 mgd of reclaimed water. The 2.2 mgd demand growth of Recreation / Aesthetic use types was allocated 2.2 mgd of reclaimed water. As a result, all of the unused permitted quantities available to existing permittees in Charlotte County are being used by 2025. Because Agricultural irrigation demand in Charlotte County is expected to fall by 4.0 mgd during the period, this reduction is accounted for in the last column of the table. The allocated water supplies to each Use Type from each water source were summed together and presented in the row that corresponds to the county's name.

Five of the eight SWUCA counties are expected to experience a reduction in their existing ground water withdrawals by 2025. This is indicated for each county in the last column of the table. This column represents the use of ground water withdrawal reductions associated with agricultural land going out of production and, in the case of Polk County, a reduction in groundwater withdrawals by Industrial/Commercial and Mining/Dewatering permittees. Negative numbers mean that not all of the Use Type's or county's ground water reduction is being used by new water users. Positive numbers mean that the Use Type and county is withdrawing more than it's ground water withdrawal reduction. This water would presumabily come from other Use Types or counties.

Hillsborough County is not expected to see a decline in ground water withdrawals. Hardee County does not have enough available water supplies to satisfy its growing economy. Most of this increased demand is for citrus irrigation.[2] Agricultural irrigation in Hardee County was allocated 2.7 mgd from unused, permitted ground water quantities, 3.2 mgd from agricultural water conservation, 0.7 mgd from reclaimed water, 0.10 mgd from non-agricultural conservation, 3.7 mgd from unpermitted surface water and 21.7 mgd from obtaining permitted quantities through water use reductions in other nearby counties. The latter source is accounted for in the last column of the table and these quantities may come from one of three methods: (1) the requested quantity can be permitted because it does not effect MFL water bodies; (2) existing permittees in other counties self-relocate the permitted quantities as they move their operations to Hardee County; or (3) the water user requesting the permitted quantities provides a Net Benefit

[2] From Table 3.2-2.

by permanently retiring from use the reasonable-beneficially and historically used quantities associated with one or more permits in the SWUCA.

The last row in Table 2.3-1 summarizes the additional water demands and supplies through 2025 in the SWUCA. The increase in water demand from 2005 to 2025 would be supplied with 58.0 mgd of currently unused permitted quantities, 16.8 mgd of reclaimed water, 3.2 mgd from agricultural water conservation, 35.7 mgd from non-agricultural water conservation, 4.1 mgd of currently unpermitted surface water, and 5.3 mgd of seawater desalination. The 50 mgd of environmental restoration quantities and 21.7 mgd of Hardee County's agricultural demand increase would come from reductions in permitted ground water withdrawals of Agricultural Use Types. The water demand increases of other Use Types such as Public Supply would come from the other sources listed above. The net demand increase is 122.7 mgd. The remaining unused permitted quantities of the Public Supply Use Type in the SWUCA would be about 21.2 mgd, all of which is assigned to water use permits in DeSoto County. This quantity could be used for future water demand growth after 2025.

Table 2.3-1
Sources and Quantities of Water Supplied by Source to Each Use Type Within Each SWUCA County, mgd

County and Use Type	Change in Demand 2005 to 2025	Use Unused Permitted Quantities	Reclaimed Water	Conservation		SW - Unpermitted	Desalination		Change in GW Withdrawals	Remaining Unused Permitted GW or SW
				Agricult-ural	Non-Agricultural		Seawater	Brackish Water		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CHARLOTTE (a)	**6.4**	**1.40**	**2.70**	**0.00**	**6.30**	**0.00**	**0.00**	**0.00**	**-4.03**	**0.00**
Agriculture	**-4.0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-4.03**	
Public Supply	**8.2**	**1.40**	**0.50**	0.00	**6.30**	0.00	0.00	0.00	0.00	
IC / MD (a)	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rec./Aesthetic	**2.2**	0.00	**2.20**	0.00	0.00	0.00	0.00	0.00	0.00	
DESOTO	**-11.4**	**1.67**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**-13.09**	**21.23**
Agriculture	**-13.1**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-13.09**	
Public Supply	**1.6**	**1.62**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
IC / MD	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rec./Aesthetic	**0.1**	**0.06**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
HARDEE	**32.1**	**2.70**	**0.70**	**3.20**	**0.10**	**3.69**	**0.00**	**0.00**	**21.70**	**0.00**
Agriculture	**25.6**	**0.70**	0.00	**3.20**	0.00	0.00	0.00	0.00	**21.70**	
Public Supply	**0.6**	**0.60**	0.00	0.00	**0.60**	0.00	0.00	0.00	0.00	
IC / MD	**5.8**	**1.40**	**0.60**	0.00	**0.10**	**3.69**	0.00	0.00	0.00	
Rec./Aesthetic	**0.1**	0.00	**0.10**	0.00	0.00	0.00	0.00	0.00	0.00	
HIGHLANDS (a)	**-7.1**	**3.30**	**0.66**	**0.00**	**0.88**	**0.00**	**0.00**	**0.00**	**-12.00**	**0.00**
Agriculture	**-12.0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-12.00**	
Public Supply	**4.2**	**3.30**	0.00	0.00	**0.88**	0.00	0.00	0.00	0.00	
IC / MD	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rec./Aesthetic	**0.7**	0.00	**0.66**	0.00	0.00	0.00	0.00	0.00	0.00	
HILLSBOROUGH (a)	**26.9**	**10.10**	**4.20**	**0.00**	**6.80**	**0.40**	**5.30**	**0.00**	**0.00**	**0.00**
Agriculture	**3.6**	**3.64**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Public Supply	**21.1**	**6.46**	**2.11**	0.00	**6.80**	**0.40**	**5.30**	0.00	0.00	

Table 2.3-1
Sources and Quantities of Water Supplied by Source to Each Use Type Within Each SWUCA County, mgd

County and Use Type	Change in Demand 2005 to 2025	Use Unused Permitted Quantities	Reclaimed Water	Conservation		SW - Unpermitted	Desalination		Change in GW Withdrawals	Remaining Unused Permitted GW or SW
				Agricult-ural	Non-Agricultural		Seawater	Brackish Water		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
IC / MD	**0.9**	0.00	**0.85**	0.00	0.00	0.00	0.00	0.00	0.00	
Rec./Aesthetic	**1.2**	0.00	**1.23**	0.00	0.00	0.00	0.00	0.00	0.00	
MANATEE	**3.2**	**8.10**	**3.27**	**0.00**	**8.89**	**0.00**	**0.00**	**0.00**	**-17.03**	**0.00**
Agriculture	**-17.0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-17.03**	
Public Supply	**17.0**	8.10	0.00	0.00	**8.89**	0.00	0.00	0.00	0.00	
IC / MD	**0.3**	0.00	**0.32**	0.00	0.00	0.00	0.00	0.00	0.00	
Rec./Aesthetic	**3.0**	0.00	**2.95**	0.00	0.00	0.00	0.00	0.00	0.00	
POLK (a)	**3.7**	**27.90**	**1.73**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**-25.89**	**0.00**
Agriculture	**-24.6**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-24.58**	
Public Supply	**25.1**	**25.10**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
IC / MD	**-1.3**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-1.31**	
Rec./Aesthetic	**4.5**	**2.80**	**1.73**	0.00	0.00	0.00	0.00	0.00	0.00	
SARASOTA	**19.0**	**2.77**	**3.49**	**0.00**	**12.74**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Agriculture	**1.3**	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Public Supply	**14.1**	**1.40**	0.00	0.00	**12.74**	0.00	0.00	0.00	0.00	
IC / MD	**0.1**	**0.10**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rec./Aesthetic	**3.5**	0.00	**3.49**	0.00	0.00	0.00	0.00	0.00	0.00	
RESTORATION	**50.0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**50.00**	
TOTAL	**122.7**	**57.94**	**16.76**	**3.20**	**35.72**	**4.09**	**5.30**	**0.00**	**-0.35**	**21.23**

Note: The numbers in Column (2) are rounded while the numbers in the other columns are not.
(a) Includes only those portions of these counties that are in the SWUCA.

The costs of these water supplies were estimated using the unit costs presented in Table 2.2-2, the $0.22 per 1,000 gallons cost estimate for traditional water sources, and the amount of additional water needed from each source as presented in Table 2.3-1. A summary of the amount of additional water needed in each county by water source from 2005 to 2025 is provided in Table 2.3-2. For each county, the amount of water needed from each source is provided in Columns (2) through (8). The total additional water use is provided in Column (9). The change in ground water withdrawals is provided in Column (10) and the total net change in demand is provided in Column (11). The total remaining unused, permitted ground water (GW) and surface water (SW) quantities is provided in Column (12). The total quantities obtained from alternative water sources are provided in Column (13).

Total additional reclaimed water needs from 2005 through 2025 are about 16.8 mgd (Column (2)). The largest reclaimed water users are Hillsborough, Manatee and Sarasota counties. Agricultural water conservation would save about 3.2 mgd, all of this savings would be in Hardee County (Column (3)). Non-agricultural water conservation savings is about 35.7 mgd, with most if this savings realized in Sarasota, Manatee, Hillsborough and Charlotte counties (Column (4)). About 4.1 mgd of currently un-permitted surface water will be needed, most of which would be developed in Hardee County (Column (5)). About 5.3 mgd of desalinated seawater will be needed, all of which will be used to serve the SWUCA portion of Hillsborough County (Column (6)).

About 79.7 mgd of unused permitted quantities and new permitted ground water quantities would be used throughout the SWUCA by 2025 (Column (8)). Polk and Hardee counties would use most of these quantities. Polk County will use all of its remaining unused permitted quantities from the upper Floridan aquifer. Hardee County will use its remaining unused permitted quantities from the upper Floridan aquifer (2.7 mgd) plus 21.7 mgd of new quantities from the upper Floridan aquifer that would be obtained by the three methods discussed previously. DeSoto County is the only county that will have any remaining unused permitted quantities in 2025 (see Column (12). This county will still have 21.2 mgd of water available.

The total additional water use from 2005 to 2025 other than from currently un-permitted ground water is provided in Column (9). About 123 mgd of additional water demand will need to rely on the additional water sources. In the meantime, there will be a net reduction in ground water withdrawals of 0.3 mgd. This net reduction is presented in Column (10) and includes a 70.7 mgd reduction in ground water quantities from agriculture and a 1.3 mgd reduction in ground water quantities from Industrial/Commercial and Mining/Dewatering water demand reductions in Polk County. These reductions will be offset by the 50 mgd to be used for environmental restoration under the Recovery Strategy and the 21.7 mgd of new water quantities to be withdrawn in Hardee County.

The net change in demand after accounting for changes in ground water withdrawals is provided in Column (11). There will be a 122.7 mgd total net increase in water demand in the SWUCA from 2006 through 2025. The total amount of water provided by alternative sources (the sum of Columns (2) through (7)) is 65.1 mgd as presented in Column (13). Sarasota, Hillsborough and Manatee counties will supply most of these quantities or 45.1 mgd.

Table 2.3-2
Summary of Amount of Additional Water Needed in each County by Water Source from 2006 to 2025

County	Amount of Water Needed by Source, mgd						
	Reclaimed Water	Conservation		Surface Water - Unpermitted	Desalination		Unused Permitted Quantities and New Permitted GW Quantities
		Agricultural	Non-Agricultural		Seawater	Brackish	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CHARLOTTE (a)	2.7	0.0	6.3	0.0	0.0	0.0	1.4
DESOTO	0.0	0.0	0.0	0.0	0.0	0.0	1.7
HARDEE	0.7	3.2	0.1	3.7	0.0	0.0	24.4
HIGHLANDS (a)	0.7	0.0	0.9	0.0	0.0	0.0	3.3
HILLSBOROUGH (a)	4.2	0.0	6.8	0.4	5.3	0.0	10.1
MANATEE	3.3	0.0	8.9	0.0	0.0	0.0	8.1
POLK (a)	1.7	0.0	0.0	0.0	0.0	0.0	27.9
SARASOTA	3.5	0.0	12.7	0.0	0.0	0.0	2.8
Restoration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**16.8**	**3.2**	**35.7**	**4.1**	**5.3**	**0.0**	**79.7**

County	Additional Water Use, 2006 to 2025 (b)	Change in GW Withdrawals	Total Net Change in Demand	Remaining Unused Permitted GW or SW	Total - From Alternative Sources
	(9) = Sum (2) to (8)	(10)	(11) = (9) + (10)	(12)	(13) = Sum (2) to (7)
CHARLOTTE (a)	10.4	-4.0	6.4	0.0	9.0
DESOTO	1.7	-13.1	-11.4	21.2	0.0
HARDEE	10.4	21.7	32.1	0.0	7.7
HIGHLANDS (a)	4.8	-12.0	-7.2	0.0	1.5
HILLSBOROUGH (a)	26.8	0.0	26.8	0.0	16.7
MANATEE	20.3	-17.0	3.2	0.0	12.2
POLK (a)	29.6	-25.9	3.7	0.0	1.7
SARASOTA	19.0	0.0	19.0	0.0	16.2
Restoration	0.0	50.0	50.0	0.0	0.0
Total	**123.017.3**	**-0.3-2.3**	**122.715.0**	**21.221.2**	**65.160.7**

(a) Includes only those portions of these counties that are in the SWUCA.
(b) All sources except currently un-permitted ground water.

The summary of the costs of each water source per 1,000 gallons[1] is provided in Table 2.3-3. These costs were applied to the water quantities presented in Table 2.3-2. The resulting capital and annual operations and maintenance (O&M) costs by county and in total are provided in Table 2.3-4. It shows that the costs of available additional water supplies to meet growing water demands in the SWUCA from 2005 through 2025 include the following projects.

- An additional $525,600 spent in Hardee County each year for agricultural water conservation activities and an additional $8.7 million spent each year for non-agricultural water conservation activities. To save additional ground water quantities for future use, additional water conservation by all Use Types in all counties is recommended.

- About $67.6 million in reclaimed water project capital costs and $2.6 million per year to maintain and operate these projects. All counties, except DeSoto, will need to develop reclaimed water projects to meet growing demands.

- About $31.3 million in capital costs for currently un-permitted new surface water projects and $1.3 million per year to maintain and operate these projects in Hardee and Hillsborough counties.

- About $22.4 million in capital costs for seawater desalination in the SWUCA portion of Hillsborough County and $3.1 million per year to maintain and operate these projects.

- About $7.0 mgd in capital costs to withdraw unused permitted quantities and new permitted ground water quantities in all SWUCA counties and $5.8 million per year to maintain and operate these projects.

The total costs of additional water supplies from 2005 to 2025 by county are provided in Table 2.3-5. The capital and annual O&M costs of the water sources identified under the SWUCA Recovery Strategy to supply the increased demands in the SWUCA from 2006 to 2025 by county are provided in Columns (1) through (4). The capital costs of the water sources total $128 million with annual O&M costs totaling $22 million per year. The average total cost per 1,000 gallons is $0.62. The largest costs will be spent in Hardee and Hillsborough counties. These two counties are expected to experience the largest growth in water demands from 2005 to 2025.

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[1] From Table 2.2-2 in Chapter 2.0 of this report and Table 5.2-2, page 5-9, "*Statement of Estimated Regulatory Costs for the Southern Water Use Caution Area II Rule-Making , Final"*, prepared by Hazen and Sawyer for the Southwest Florida Water Management District, Brooksville, Florida, March 14, 2006.

To obtain the estimated incremental costs associated with the Recovery Strategy, the cost to obtain these same water quantities from the upper Floridan aquifer was estimated. These costs are provided in Columns (5), (6) and (7). They are based on a $0.02 per 1,000 gallon capital cost and a $0.20 per 1,000 gallon annual O&M cost. The total capital cost to obtain all additional water quantities from this source is $12.7 million and the total annual O&M cost is $10.6 million per year.

Table 2.3-3
Summary of Cost per 1,000 Gallons for each County by Water Source

County	Reclaimed Water			Conservation		Surface water - Unpermitted		
	Capital	O&M	Total	Agricultural	Non-Agricultural	Capital	O&M	Total
CHARLOTTE (a)	$0.81	$0.45	$1.26	$0.45	$0.67	$1.67	$1.04	$2.71
DESOTO	$0.81	$0.45	$1.26	$0.45	$0.67	$1.67	$1.04	$2.71
HARDEE	$1.12	$0.41	$1.53	$0.45	$0.67	$1.79	$0.93	$2.72
HIGHLANDS (a)	$1.12	$0.41	$1.53	$0.45	$0.67	$1.79	$0.93	$2.72
HILLSBOROUGH (a)	$1.00	$0.35	$1.35	$0.45	$0.67	$1.24	$0.43	$1.67
MANATEE	$0.81	$0.45	$1.26	$0.45	$0.67	$1.67	$1.04	$2.71
POLK (a)	$1.12	$0.41	$1.53	$0.45	$0.67	$1.79	$0.93	$2.72
SARASOTA	$0.81	$0.45	$1.26	$0.45	$0.67	$1.67	$1.04	$2.71

County	Desalination - Seawater			Desalination - Brackish Water			Unused Permitted Quantities and New Permitted GW Quantities		
	Capital	O&M	Total	Capital	O&M	Total	Capital	O&M	Total
CHARLOTTE (a)	$1.76	$2.79	$4.55	$1.40	$1.15	$2.55	$0.02	$0.20	$0.22
DESOTO	$1.76	$2.79	$4.55	$1.40	$1.15	$2.55	$0.02	$0.20	$0.22
HARDEE	-	-	-	-	-	-	$0.02	$0.20	$0.22
HIGHLANDS (a)	-	-	-	-	-	-	$0.02	$0.20	$0.22
HILLSBOROUGH (a)	$0.96	$1.60	$2.56	-	-	-	$0.02	$0.20	$0.22
MANATEE	$1.76	$2.79	$4.55	$1.40	$1.15	$2.55	$0.02	$0.20	$0.22
POLK (a)	-	-	-	-	-	-	$0.02	$0.20	$0.22
SARASOTA	$1.76	$2.79	$4.55	$1.40	$1.15	$2.55	$0.02	$0.20	$0.22

From Table 5.2-2, page 5-9, "Statement of Estimated Regulatory Costs for the Southern Water Use Caution Area II Rule-Making , Final", prepared by Hazen and Sawyer for the Southwest Florida Water Management District, Brooksville, Florida, March 14, 2006.
(a) Includes only those portions of these counties that are in the SWUCA.

Table 2.3-4
Summary of Total Costs for each County by Water Source, 2005 Dollars

County	Reclaimed Water		Conservation, $ per Year		Surface water – Unpermitted	
	Capital, $	Annual O&M, $/year	Agricul-tural	Non-Agricultural	Capital, $	Annual O&M, $/year
CHARLOTTE (a)	$9,640,000	$444,000	$0	$1,541,000	$0	$0
DESOTO	$0	$0	$0	$0	$0	$0
HARDEE	$3,456,000	$105,000	$526,000	$24,500	$29,072,000	$1,250,000
HIGHLANDS (a)	$3,240,000	$98,000	$0	$216,000	$0	$0
HILLSBOROUGH (a)	$18,511,000	$537,000	$0	$1,663,000	$2,186,000	$62,800
MANATEE	$11,691,000	$538,000	$0	$2,175,000	$0	$0
POLK (a)	$8,545,000	$259,000	$0	$0	$0	$0
SARASOTA	$12,474,000	$574,000	$0	$3,116,000	$0	$0
Total	**$67,557,000**	**$2,555,000**	**$526,000**	**$8,735,500**	**$31,258,000**	**$1,312,800**
County	**Desalination - Seawater**		**Desalination - Brackish Water**		**Unused Permitted Quantities and New Permitted GW Quantities**	
	Capital, $	Annual O&M, $/year	Capital, $	Annual O&M, $/year	Capital, $	Annual O&M, $/year
CHARLOTTE (a)	$0	$0	$0	$0	$123,000	$102,000
DESOTO	$0	$0	$0	$0	$147,000	$122,000
HARDEE	$0	$0	$0	$0	$2,151,000	$1,781,000
HIGHLANDS (a)	$0	$0	$0	$0	$291,000	$241,000
HILLSBOROUGH (a)	$22,425,000	$3,095,000	$0	$0	$890,000	$737,000
MANATEE	$0	$0	$0	$0	$714,000	$591,000
POLK (a)	$0	$0	$0	$0	$2,459,000	$2,037,000
SARASOTA	$0	$0	$0	$0	$244,000	$202,000
Total	**$22,425,000**	**$3,095,000**	**$0**	**$0**	**$7,019,000**	**$5,813,000**

(a) Includes only those portions of these counties that are in the SWUCA.

Table 2.3-5
Comparison of Total Costs of Additional Water Supplies from 2005 to 2025 by Water Source Under SWUCA Recovery Strategy Versus Using Traditional Sources

	Under SWUCA Recovery Strategy			Traditional Sources		
County	Total Capital Cost	Total O&M cost per year	Total cost per kgal	Total Capital Cost	Total O&M cost per year	Total cost per kgal
(1)	(2)	(3)	(4)	(5)	(6)	(7)
CHARLOTTE (a)	$9,764,000	$2,086,000	$0.76	$917,000	$759,000	$0.22
DESOTO	$151,000	$125,000	$0.22	$151,000	$125,000	$0.22
HARDEE	$34,678,000	$3,687,000	$0.56	$2,828,000	$2,342,000	$0.22
HIGHLANDS (a)	$3,531,000	$556,000	$0.48	$427,000	$353,000	$0.22
HILLSBOROUGH (a)	$44,013,000	$6,095,000	$1.00	$2,362,000	$1,956,000	$0.22
MANATEE	$12,405,000	$3,304,000	$0.59	$1,787,000	$1,480,000	$0.22
POLK (a)	$11,004,000	$2,296,000	$0.30	$2,612,000	$2,163,000	$0.22
SARASOTA	$12,718,000	$3,892,000	$0.71	$1,675,000	$1,387,000	$0.22
Total	**$128,264,000**	**$22,041,000**	**$0.62**	**$12,759,000**	**$10,565,000**	**$0.22**

(a) Includes only those portions of these counties that are in the SWUCA.

The incremental costs of obtaining water supplies under the SWUCA Recovery Strategy are provided in Table 2.3-6. After subtracting out the cost of obtaining all water from the upper Floridan aquifer, the total incremental capital cost to the entire SWUCA is $116 million and the annual O&M cost is $11.5 million. The weighted average incremental cost per 1,000 gallons over all additional water sources developed to meet 2025 water demands is $0.40 and ranges from $0.0 per 1,000 gallons in DeSoto County to $0.78 per 1,000 gallons in Hillsborough County.

Table 2.3-6
Incremental Cost of SWUCA Recovery Strategy -
Least Cost Water Sources

County	Total Capital Cost	Total O&M Cost per year	Total cost per kgal
(1)	(2)	(3)	(4)
CHARLOTTE (a)	$8,847,000	$1,327,000	$0.54
DESOTO	$0	$0	$0.00
HARDEE	$31,850,000	$1,345,000	$0.34
HIGHLANDS (a)	$3,104,000	$202,000	$0.26
HILLSBOROUGH (a)	$41,651,000	$4,138,000	$0.78
MANATEE	$10,619,000	$1,824,000	$0.37
POLK (a)	$8,392,000	$133,000	$0.08
SARASOTA	$11,043,000	$2,505,000	$0.49
Total	**$115,506,000**	**$11,474,000**	**$0.40**

(a) Includes only those portions of these counties that are in the SWUCA.
(b) About 145 mgd of water would be supplied from these additional water sources.

Section 3.0
Use Types and Locations of Persons and Entities Paying These Costs

3.1 The Water Use Permitting Process

This subsection describes the processes by which the District would address each type of water use permit request under the SWUCA Recovery Strategy and the proposed SWUCA rule revisions dated October 3, 2005.

3.1.1 Existing Permittees Who Will Not Need Additional Water Supplies

Existing permittees who do not change the Use Type, who do not need additional water supplies, who apply to renew their permits on time, and who continue to put all of their permitted water quantities to reasonable beneficial uses will be least affected by the SWUCA Recovery Strategy and the proposed SWUCA rule revisions.

These types of existing permittees would need to comply with the following SWUCA rule revisions which apply to all water use permittees and applicants.

Alternative Water Supplies. Consideration of the use of alternative water supplies upon permit renewal – Currently, conservation, reclaimed water and seawater desalination must be considered. The new definition of Alternative Water Supplies includes any water supply source that is designated as non-traditional for a water supply planning region. Alternative water sources that are economically, environmentally and technically feasible are to be evaluated by the renewal permittee or applicant to identify sources that could be used. A project is economically feasible if the present value of annual benefits is greater than the present value of annual costs. Benefits can relate to the environment and/or to the water user.

Multiple Water Supply Sources. Permittees with non-alternative and alternative supply shall use alternative supplies to replace non-alternative supplies to the greatest extent practical, based on economic, environmental and technical feasibility.

Gallons per Person Per Day. Public Supply Permittees in the SWUCA who are not in the Eastern Tampa Bay Water Use Caution Area (ETB-WUCA) or the Highlands Ridge Water Use Caution Area (HR-WUCA) must achieve and maintain an adjusted gross per capita water use less than or equal to 150 gallons per person per day. Permittees in the ETB-WUCA and the HR-WUCA are required to comply with this water use standard under existing rule.

A public supply utility may propose a Goal Based Water Conservation Plan in lieu of District water conservation requirements.

In addition, Self-Relocation is available to all water use permittees in the SWUCA. Under self-relocation, permittees may move their permitted water quantities to other areas as long as there are no increased negative impacts to MFL water bodies at the new location above that which existed prior to the move and all other applicable permitting criteria are met.

For renewing permittees who did not use all of their permitted quantities, the best available information will be needed from the permittee to justify the non-use and whether and how the unused quantities will be used in the future.

3.1.2 Existing Permittees and Applicants Who Request New Water Withdrawals

Water use permittees and applicants who request new water withdrawals will need to comply with the SWUCA rule revisions regarding minimum flows or levels set for the Upper Peace River, eight lakes in the Highlands Ridge and the salt water intrusion minimum aquifer level in the MIA (SWIMAL). Requested new withdrawals that cause a water body's flow or level to fall below the MFL or where the withdrawal reduces the flow or level in water bodies already below the MFL will not be permitted unless a Net Benefit is provided.

Under current rule, no minimum or guidance flows are established for the Peace River. The proposed SWUCA rule establishes Minimum Flows at three locations in the upper Peace River. In addition, all applications shall be evaluated to determine whether the proposed withdrawal impacts ground water levels below the Upper Peace River. Where such an impact occurs, the proposed withdrawal can be authorized if the current 10-year moving average monthly water level in the area is above 53.3 feet, NGVD and all other applicable permitting criteria are met.

Under current rule, Guidance Levels are established for the 8 Lakes. Guidance Levels are used as advisory information for the District, lake shore residents and local governments or to aid in the management or control of adjustable structures. The SWUCA rule establishes Minimum Levels for 8 lakes in the Highlands Ridge: Lake Clinch; Lake Eagle; Lake McLeod; Lake Wales; Lake Jackson; Lake Little Jackson; Lake Letta and Lake Lotela. In addition, all applications shall be evaluated to determine whether the proposed withdrawal impacts ground-water levels below Ridge lakes. Where such an impact occurs, the withdrawal can be authorized if the current 10-year moving average monthly water level for the area encompassing the Ridge lakes is above 91.5 feet, NGVD and all other applicable permitting criteria are met.

The proposed salt water intrusion minimum aquifer level in the MIA (SWIMAL) will generally have the same effect as the current MIA constraints as described in the current Basis of Review, page B7.2-5. The difference is that withdrawals can be permitted under the proposed rule if a Net Benefit is provided. The current Basis of Review, page B7.2-5 states "the District presumes that new quantities of ground water use from the confined aquifers shall not be permitted from the Most Impacted Area (MIA) within the WUCA. New quantities outside the MIA shall only be permitted at high efficiency. … B. In order to reduce ground water declines and the inland movement of the saline water interface, the District presumes that proposed new quantities of ground water applied for after March 30, 1993, from confined aquifers from areas outside the MIA, whether inside of or outside of the Eastern Tampa Bay Water Use Caution Area, that cause a potentiometric surface drawdown of 0.2 feet or greater within the MIA will significantly induce saline water intrusion."

According to the District, when comparing the SWUCA rule revisions to current rule, in many cases, existing Chapter 40D-2 criteria are equally limiting in terms of the amount of water that may be permitted.

"Net Benefit" means activities or measures that will result in an improvement to a Minimum Flow or Level water body that more than offsets the impact of a proposed withdrawal. If an applicant must implement a Net Benefit to obtain the permit, the permit can be issued if the applicant provides reasonable assurance that implementation of its proposed Net Benefit will mitigate the predicted impacts by one or more of the options listed below. In order to provide a Net Benefit, the measures proposed by the applicant must offset the predicted impact of the proposed withdrawal and also provide an additional positive effect on the water body equal to or exceeding 10 percent of the predicted impact. For example, if the predicted impact on a water body is 1.0 foot, the mitigation must offset the 1.0 foot impact and provide another 0.1 foot (i.e., 10% of 1.0 foot) of positive effect. There are three forms of Net Benefit, including 1) mitigation plus recovery, 2) use of quantities created by District water resource development projects, and 3) Ground-water Replacement Credits, as described below.

Mitigation Plus Recovery. Mitigation plus recovery involves one or more of the following:

(1) Permanently retiring from use the reasonable-beneficial, historically used quantity associated with one or more permits within the SWUCA that impacts the same Minimum Flow and Level water body. Used quantities are those permitted quantities of water that the District determines have been deemed reasonable-beneficial and historically used by a permittee, but not including Water-Conserving Credits obtained pursuant to 40D-2.621, F.A.C. Used quantities are determined based on documentation previously submitted by a permittee

and available crosschecks. The types of documentation submitted by permittees include seasonal/annual crop reports, metered data, and other information. Crosschecks include aerial photography, receipts for supplies, equipment, and services, property appraisers' records and other methods. For small permits below thresholds for crop reporting and metering, aerial photography and other methods will be used to determine quantities, or

(2) Recharging the aquifer and withdrawing water such that there remains a net positive impact on the Floridan aquifer potentiometric surface at least 10 percent greater than the impact of the proposed withdrawal, or

(3) Undertaking other actions to offset the proposed impact of the withdrawal plus 10 percent.

Mitigation plus recovery must be in reference to the MFL water body that would be impacted by the proposed withdrawals, and must either precede or be coincident with any new permitted withdrawals.

Use of Quantities Created by District Water Resource Development Projects. The District anticipates that its water resource development projects will result in the development of new quantities above and beyond the quantities needed to achieve recovery to Minimum Flows and Levels. All or a portion of these new quantities that are not reserved or otherwise designated for recovery will be made available to permit applicants where a Net Benefit is needed.

If an applicant demonstrates compliance with all applicable permitting criteria and has contributed to a District water resource development project the applicant may apply for the quantities made available through a District water resource development project, provided the applicant demonstrates that:

(1) The proposed withdrawal affects the same MFL water body source associated with the water resource development project;

(2) The quantity developed in excess of the quantity reserved or otherwise designated for the Minimum Flow or Level has been determined; and

(3) Allocating the proposed quantities to the applicant will not interfere with quantities reserved or otherwise designated by the District for water resource development.

Ground-Water Replacement Credit in the SWUCA. To reduce ground-water withdrawals, a Ground-Water Replacement Credit is proposed as an incentive for water users to provide water use permit holders with alternative supplies. The holder of a Ground-Water Replacement Credit can use the Credits to provide a Net Benefit in order to withdraw New Quantities. The process to obtain a Ground-Water Replacement Credit is set forth below.

(1) A Ground-Water Replacement Credit is created when an entity (Supplier) provides an alternative supply that offsets actual withdrawals by an existing permit holder (Receiver) that impact a Minimum Flow or Level water body. A Ground-Water Replacement Credit will be available to either the Supplier or the Receiver, or both.

(2) A Ground-Water Replacement Credit is equal to 50% of the amount that is offset that was reasonable-beneficial historically used.

(3) The Supplier and Receiver will indicate to the District which entity should obtain the credit quantity, or whether the credit quantity will be divided between them or assigned to a third party. To apply for a credit an entity must submit the Ground-Water Replacement Credit Application Form which must be signed by all involved parties.

(4) The District will set aside the ground-water quantities that are discontinued as a result of the offset by alternative water supplies in a standby permit that will be issued to the Receiver to allow withdrawal of all or a portion of such quantities in the event that the alternative water supply is interrupted, becomes unsuitable or is decreased.

(5) The Ground-Water Replacement Credit will exist for only so long as the Receiver maintains its use of the alternative water supplies. The Credit will remain available if the Receiver transfers the standby permit to a new owner at the same site who continues the same water use with the alternative water supplies.

For existing permittees who change their Use Type, the application will be treated as a new application. The Use Types are Public Supply; Commercial/Industrial; Agricultural; Mining/Dewatering; and Recreation/ Aesthetic. This means that the permitted quantity associated with the change in use type will be treated as an application for new quantities. Withdrawal of these new quantities can be permitted only if they comply with the proposed MFLs with or without a Net Benefit and meet all other applicable rule criteria.

3.1.3 Potential Cost of SWUCA Recovery Strategy and Proposed SWUCA Rule Revision

The bulk of the costs associated with the SWUCA Recovery Strategy and Proposed SWUCA Rule Revision is the cost associated with developing alternative water sources. The next section describes these potential costs given the forecasted water demands by county and Use Type.

3.2 Use Types by Location and Water Source

The types of water users who will pay for these additional water supplies were evaluated using the results of the Chapter 2 analysis. Each of the following Use Types was evaluated in turn.

- Agriculture,
- Public Supply,
- Industrial, Commercial, Mining and Dewatering
- Recreation and Aesthetic

3.2.1 Agriculture

The itemization of water source costs to agriculture by water source and county is provided in Table 3.2-1. The estimated costs SWUCA-wide are $2.4 million in capital cost and $2.5 million per year in annual operations and maintenance cost. The average cost per 1,000 gallons is $0.24. Using the $0.22 per 1,000 gallon cost of traditional sources, the incremental cost is $0.02 per 1,000 gallons to obtain the additional water quantities.

Only three counties, Hardee, Hillsborough and Sarasota, are expected to see an increase in water demand for agricultural operations. The water demand increases are 25.6 mgd in Hardee County, 3.6 mgd in Hillsborough County and 1.3 mgd in Sarasota County. Most of this increased water demand could be supplied by water from the upper Floridan aquifer as long as the District monitors and guides the allocation of upper Floridan aquifer withdrawals so that they are redistributed to those reasonable, beneficial uses that cannot afford the more expensive alternative water sources.

This analysis allows water to be accessed from the upper Floridan aquifer through one or a combination of the following methods: (1) use of unused permitted quantities; (2) self-relocation of permitted quantities; (3) provision of a Net Benefit by the water user; and (4) the new requested withdrawal does not affect MFL water bodies.

Only Hardee County will need to implement agricultural water conservation activities in order to make sure water demands can be met. Thus, there is no additional increase in costs expected to agriculture over and above what they would pay without the SWUCA Recovery Strategy except for some growers in Hardee County. These growers would

need to implement additional water conservation in cases where they cannot obtain enough permitted quantities from the upper Floridan aquifer. The average cost of agricultural water conservation per 1,000 gallons of water saved is estimated to be $0.45 (from Table 2.2-2). After subtracting $0.22 per 1,000 gallons as the cost of obtaining this water from the Floridan aquifer, the incremental cost is $0.23 per 1,000 gallons. This incremental cost will apply to about 3.2 mgd (from Table 2.3-1) of water demand.

Farm investments to increase irrigation water use efficiency may be eligible for cost-share reimbursement through the FARMS program. FARMS stands for Facilitating Agricultural Resource Management Systems and is sponsored by the Southwest Florida Water Management District and the Florida Department of Agriculture and Consumer Services. It is a "cost-share reimbursement program for agricultural projects that benefit the environment", according to the program brochure. The State of Florida will reimburse growers for approved investments made to improve water quality; reduce Floridan Aquifer withdrawals; and/or conserve, restore or augment the area's water resources and ecology. The State will reimburse up to 50 percent for water quantity or water quality best management practices (BMPs) and up to 75 percent for water quality and water quantity combination BMPs.

According to the District[1], "FARMS will provide resource benefits that include water quality improvement, reduction of ground-water use from the upper Floridan aquifer, and/or conservation, restoration, or augmentation of the area's water resources. Although the priority areas for the program are the upper Myakka River and Shell, Prairie, and Joshua Creek watersheds, projects can be developed throughout the SWUCA. Funding for the program is provided by the Florida Department of Agriculture and Consumer Services, state appropriations, the District, and participating growers. These sources have contributed approximately $15 million to the program since its inception in 2000. As of 2005, there are 22 FARMS projects that have either been completed, are under construction, or are planned with secured funding. When completed, these projects will result in an annual average water savings of approximately 6.2 mgd."

[1] Southwest Florida Water Management District, *"Regional Water Supply Plan Update",* draft, November 2005, Chapter 5.

Table 3.2-1
Cost of Additional Water Supply to Agricultural Irrigation Operations in the SWUCA, 2005 to 2025, In 2005 Dollars

County	Change in Water Demand 2005 to 2025	Reclaimed Water		Conservation		Surface Water - Unpermitted	
		Capital	Annual O&M	Agricultural	Non-Agricultural	Capital	Annual O&M
CHARLOTTE (a)	-4.0	$0	$0	$0	$0	$0	$0
DESOTO	-13.1	$0	$0	$0	$0	$0	$0
HARDEE	25.6	$0	$0	$525,600	$0	$0	$0
HIGHLANDS (a)	-12.0	$0	$0	$0	$0	$0	$0
HILLSBOROUGH (a)	3.6	$0	$0	$0	$0	$0	$0
MANATEE	-17.0	$0	$0	$0	$0	$0	$0
POLK (a)	-24.6	$0	$0	$0	$0	$0	$0
SARASOTA	1.3	$0	$0	$0	$0	$0	$0
Total	**-40.2**	**$0**	**$0**	**$525,600**	**$0**	**$0**	**$0**

County	Desalination - Seawater		Desalination - Brackish Water		Unused Permitted Quantities and New Permitted GW Quantities		All Sources		
	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Cost per 1,000 Gallons
CHARLOTTE (a)	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
DESOTO	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
HARDEE	$0	$0	$0	$0	$1,974,000	$1,635,000	$1,975,000	$2,161,000	$0.25
HIGHLANDS (a)	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
HILLSBOROUGH (a)	$0	$0	$0	$0	$321,000	$265,000	$321,000	$265,000	$0.22
MANATEE	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
POLK (a)	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
SARASOTA	$0	$0	$0	$0	$112,000	$93,000	$112,000	$93,000	$0.22
Total	**$0**	**$0**	**$0**	**$0**	**$2,407,000**	**$1,993,000**	**$2,408,000**	**$2,519,000**	**$0.24**

(a) Includes only the portion of these counties that are located in the SWUCA.

The conclusion that the SWUCA Recovery Strategy will not negatively affect agriculture rests on the assumption that the available ground water quantities will be allocated to the agricultural industry for crop irrigation. As demonstrated in Chapter 4.0, agriculture is limited in the amount of money available to finance most alternative water source projects. Farmers are unable to pass along increased costs to consumers and the SWUCA's largest crop, citrus, is currently facing disease threats that can significantly reduce net returns to citrus production now and in the future. Two of these disease issues are the prevalence of citrus canker in the State and a recent confirmation that two trees in Homestead Florida have "citrus greening".

According to the University of Florida Institute of Food and Agricultural Sciences in 2001[2], "Citrus canker (*Xanthomonas campestris* pv. *citri*) poses a serious threat to the Florida citrus industry. The bacteria disease was first detected in dooryard citrus trees in the Miami-Dade County area during 1995. The disease has since spread to the commercial groves in southwest Florida where more than 870,000 trees have been destroyed since 1998." Additional citrus acreage may be affected in 2006.[3]

A Florida Department of Agriculture and Consumer Services press release dated September 2, 2005 states that citrus greening disease was recently detected in Homestead, Florida. "Citrus greening, or huanglongbing, is a bacterial disease that attacks the vascular system of plants. Once infected, there is no cure for a tree with citrus greening disease. In areas of the world where citrus greening is endemic, citrus trees decline and die within a few years. There are three forms: Asian, African and Brazilian. The strain found in South Florida appears to be the Asian form."

SWUCA-wide, total acreage in agricultural production is expected to fall by 33,300 acres from 2005 to 2025 with a corresponding 40 mgd reduction in agricultural water use. Acreage reductions are predicted for all crop types except nurseries (986 acre increase), strawberries (576 acre increase) and some vegetables and row crops (853 acre increase). Production of the area's largest crops in terms of acreage, citrus and tomatoes, are expected to fall by 30,000 acres and 2,600 acres, respectively. Forecasts of crop acreage and water demand from 2005 to 2025 are provided in Table 3.2-2. The District provided these forecasts in November 2005. A summary of each county is provided below.

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[2] Ronald P. Muraro, Fritz M. Roka and Thomas H. Spreen, *"Grower Costs of Having Citrus Canker in Florida*", EDIS Document FE 286, Department of Food and Resource Economics, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida, June 2001.

[3] The Tampa Tribune, "*Crippling News for Citrus"*, December 20, 2005.

Charlotte County. Acreage in nurseries is expected to increase by about 154 acres in Charlotte County from 2005 to 2025. The estimated increase in water demand is 0.79 mgd. All other crop types are expected to remain stable or decline, with a net decline of about 4,200 acres and 4 mgd of water use. While some nurseries may be able to afford the cost of alternative water sources, growing nurseries may be able to obtain water from the upper Floridan aquifer as acreages of other crops in the county leave production. This change in crop type irrigated with water from the Floridan aquifer in Charlotte County was taken into account in estimating the costs of the SWUCA Recovery Strategy described in Chapter 2.

DeSoto County. No crop types are expected to grow in acreage in DeSoto County during the next 20 years. The acreages of some crop types are expected to decline while others will remain stable. The 1,200 acres of melon production in DeSoto County are expected to disappear by 2025. Acres in citrus, cucumbers, potatoes and tomatoes are expected to decline. No increases in water demand for agriculture are expected in DeSoto County.

Hardee County. Citrus production in Hardee County is expected to increase by about 35,400 acres over the next 20 years. Water demand for citrus irrigation is expected to grow by 27.6 mgd. The acreage in nurseries is expected to increase by 141 acres with a corresponding water demand increase of 0.70 mgd. All other crop acreages are expected to decline or remain stable. Total water demand for agriculture is expected to increase by 25.6 mgd in Hardee County. Almost all of this increase will be for citrus production. Due to the economic challenges facing the citrus industry in the near future, it is not likely that citrus grove owners will be able to afford the cost of most alternative water sources. The availability of water from the upper Floridan aquifer will be important to protecting the citrus industry in Hardee County. As has been discussed previously, the District expects that this water source will be available to new and expanding growers in Hardee County from the used permitted quantities assigned to permits associated with crops that are expected to leave production in the nearby counties of the SWUCA. In this analysis, 21.7 mgd is assumed to come from this source. A small amount of water, 0.70 mgd, is assumed to come from the unused permitted quantities of existing agricultural permittees[4]. The remaining demand, 3.2 mgd, would be met through water use efficiency increases from agricultural water conservation. Also, the District believes that some of these de-

[4] Hardee County agricultural permittees withdrew 63 mgd of water from the upper Floridan aquifer in 2002 and permitted quantities totaled 77 mgd. (From the District's "Estimated Water Use Report, 2002", Appendices B and C) Some of the unused permitted quantities may be for crop rotation purposes and would not be used each year and some may be quantities that the permittee would grow into.

mands might be met from ground water withdrawals that do not affect MFL water bodies.

Highlands County. Of all the crops produced in Highlands County, only nursery acreage is expected to grow. About 407 acres of new nursery production is expected with a corresponding water demand increase of 2.03 mgd. Overall acreage in the county is expected to fall by 10,600 acres with a corresponding 12 mgd reduction in water use. While some nurseries may be able to afford the cost of alternative water sources, growing nurseries may be able to obtain water from the upper Floridan aquifer as acreages of other crops in the county leave production. This change in crop type irrigated with water from the Floridan aquifer in Highlands County was taken into account in estimating the costs of the SWUCA Recovery Strategy described in Chapter 2.

Hillsborough County in the SWUCA. Overall acreage in this area of Hillsborough County is expected to fall by 2,200 acres. However, overall water demand in agriculture is expected to increase by 3.6 mgd. While the acreages in citrus, cucumbers, field crops and melons are expected to fall over the next 20 years, acreages in nurseries, some vegetables and row crops, strawberries and tomatoes are expected to increase. The increased acreages correspond to a total water demand increase of 8.3 mgd. In order to access affordable water supplies, about 4.7 mgd would need to come from the used permitted quantities of the other crop types that go out of production. The water supply analysis assumed that the net 3.6 mgd increase will be supplied by water from the currently unused permitted water quantities of the upper Floridan aquifer[5]. Under the least cost strategy for allocating water to supply new water demands, the District will need to monitor and guide the allocation of upper Floridan aquifer withdrawals so that they are redistributed to those reasonable, beneficial uses that cannot afford the more expensive alternative water sources.

Manatee County. Of all the crops grown in Manatee County, only acreage in melons is expected to increase with a corresponding water demand increase of about 1.4 mgd. The water supply analysis assumed that this demand would be supplied by the used permitted quantities of crops that go out of production. Acreages in citrus, cucumbers, field crops, nurseries, potatoes and tomatoes are expected to decline.

[5] Agricultural permittees in the SWUCA portion of Hillsborough County withdrew 41 mgd of water from the upper Floridan aquifer in 2002 and permitted quantities totaled 95 mgd. (From the District's "Estimated Water Use Report, 2002", Appendices B and C) Some of the unused permitted quantities may be for crop rotation purposes and would not be used each year and some may be quantities that the permittee would grow into.

Overall agricultural acreage is expected to fall by about 12,700 acres over the next 20 years with an overall water use reduction of 17 mgd.

Polk County. All crop types in Polk County are expected to either decline or remain stable over the next 20 years. Acreage in citrus, field crops, nurseries and tomatoes are expected to fall. Total irrigated crop acreage in the county is expected to fall by about 25,200 acres with a corresponding water demand reduction of 24.6 mgd.

Sarasota County. Acreages in citrus and nurseries are expected to increase in Sarasota County over the next 20 years with a corresponding water demand increase of 0.68 mgd and 0.81 mgd, respectively. About 0.22 mgd of the total 1.5 mgd needed could come from the used permitted quantities of crops that go out of production. Acreage in cucumbers, field crops, melons and tomatoes are expected to fall. Overall, agricultural irrigated acreage in the county is expected to increase by about 800 acres over the next 20 years with a net increase in water demand of 1.27 mgd. The water supply analysis assumed that this increase will be supplied by water from the currently unused permitted water quantities of the upper Floridan aquifer[6]. Under the least cost strategy for allocating water to supply new water demands, the District will need to monitor and guide the allocation of upper Floridan aquifer withdrawals so that they are redistributed to those reasonable, beneficial uses that cannot afford the more expensive alternative water sources.

[6] Agricultural permittees in the SWUCA portion of Sarasota County withdrew 5 mgd of water from the upper Floridan aquifer in 2002 and permitted quantities totaled 28 mgd. (From the District's "Estimated Water Use Report, 2002", Appendices B and C) Some of the unused permitted quantities may be for crop rotation purposes and would not be used each year and some may be quantities that the permittee would grow into.

Table 3.2-2
Irrigated Acreage and Annual Water Demand by Agriculture in the SWUCA and by County, 2005 and 2025

	SWUCA			CHARLOTTE (a)			DESOTO		
	Irrigated Acres								
Major Crop Categories	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**
Citrus	273,210	243,234	-29,976	13,523	9,688	-3,835	46,067	33,941	-12,126
Cucumbers	2,090	1,449	-641	21	15	-6	69	48	-21
Field Crops	2,909	2,818	-91	0	0	0	0	0	0
Melons	4,666	2,575	-2,091	455	0	-455	1,195	0	-1,195
Nurseries	5,535	6,521	986	200	354	154	39	0	-39
Other Veg/Row Crops	12,772	13,625	853	300	300	0	728	728	0
Pasture	4,881	4,881	0	150	150	0	1,200	1,200	0
Potatoes	2,882	2,526	-356	0	0	0	252	221	-31
Sod	14,608	14,608	0	450	450	0	3,660	3,660	0
Strawberries	5,222	5,798	576	12	12	0	100	100	0
Tomatoes	12,819	10,232	-2,587	137	122	-15	447	400	-47
Total	**341,595**	**308,266**	**-33,329**	**15,248**	**11,091**	**-4,157**	**53,757**	**40,298**	**-13,459**
	Annual Water Use Projections - Average Rainfall Conditions (MGD)								
Major Crop Categories	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**
Citrus	250.53	215.03	-35.50	13.39	9.59	-3.80	38.7	28.51	-10.19
Cucumbers	3.45	2.39	-1.06	0.04	0.03	-0.01	0.11	0.08	-0.03
Field Crops	2.64	2.55	-0.09	0	0	0.00	0	0	0.00
Melons	10.16	5.69	-4.47	0.98	0	-0.98	2.53	0	-2.53
Nurseries	26.99	31.94	4.95	1.02	1.81	0.79	0.19	0	-0.19
Other Veg/Row Crops	16.28	17.3	1.02	0.39	0.39	0.00	0.95	0.95	0.00
Pasture	4.42	4.42	0.00	0.14	0.14	0.00	1.08	1.08	0.00
Potatoes	2.34	2.05	-0.29	0	0	0.00	0.24	0.21	-0.03
Sod	36.17	36.17	0.00	1.15	1.15	0.00	9.33	9.33	0.00
Strawberries	11.99	13.3	1.31	0.03	0.03	0.00	0.24	0.24	0.00
Tomatoes	30.61	24.51	-6.10	0.34	0.3	-0.04	1.07	0.96	-0.11
Livestock Demand	10.6	10.6	0.00	0.1	0.1	0.00	1	1	0.00
Total	**406.18**	**365.94**	**-40.24**	**17.57**	**13.53**	**-4.04**	**55.44**	**42.35**	**-13.09**

Table 3.2-2, continued
Irrigated Acreage and Annual Water Demand by Agriculture in the SWUCA and by County, 2005 and 2025

Major Crop Categories	HARDEE			HIGHLANDS (a)			HILLSBOROUGH (a)		
	Irrigated Acres								
	2005	2025	Change	2005	2025	Change	2005	2025	Change
Citrus	56,779	92,163	35,384	25,100	14,123	-10,977	14,952	9,413	-5,539
Cucumbers	692	479	-213	0	0	0	392	272	-120
Field Crops	634	614	-20	53	52	-1	266	258	-8
Melons	993	0	-993	222	179	-43	101	82	-19
Nurseries	405	546	141	1,537	1,944	407	1,413	1,866	453
Other Veg/Row Crops	2,100	2,100	0	34	34	0	1,476	2,329	853
Pasture	300	300	0	210	210	0	816	816	0
Potatoes	0	0	0	0	0	0	0	0	0
Sod	150	150	0	1,090	1,090	0	1,806	1,806	0
Strawberries	300	300	0	6	6	0	4,004	4,580	576
Tomatoes	537	480	-57	0	0	0	2,592	4,163	1,571
Total	**62,890**	**97,132**	**34,242**	**28,252**	**17,638**	**-10,614**	**27,820**	**25,583**	**-2,237**
	Annual Water Use Projections - Average Rainfall Conditions (MGD)								
Major Crop Categories	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**
Citrus	44.29	71.89	27.60	31.88	17.94	-13.94	11.96	7.53	-4.43
Cucumbers	1.15	0.8	-0.35	0	0	0.00	0.65	0.45	-0.20
Field Crops	0.56	0.55	-0.01	0.06	0.06	0.00	0.24	0.23	-0.01
Melons	2.18	0	-2.18	0.49	0.4	-0.09	0.22	0.18	-0.04
Nurseries	1.98	2.68	0.70	7.69	9.72	2.03	6.88	9.09	2.21
Other Veg/Row Crops	2.77	2.77	0.00	0.05	0.05	0.00	1.76	2.77	1.01
Pasture	0.27	0.27	0.00	0.18	0.18	0.00	0.73	0.73	0.00
Potatoes	0	0	0.00	0	0	0.00	0	0	0.00
Sod	0.37	0.37	0.00	2.69	2.69	0.00	4.5	4.5	0.00
Strawberries	0.7	0.7	0.00	0.01	0.01	0.00	9.13	10.44	1.31
Tomatoes	1.3	1.16	-0.14	0	0	0.00	6.25	10.03	3.78
Livestock Demand	1	1	0.00	0.5	0.5	0.00	5	5	0.00
Total	**56.58**	**82.18**	**25.60**	**43.55**	**31.54**	**-12.01**	**47.32**	**50.96**	**3.64**

Table 3.2-2, continued
Irrigated Acreage and Annual Water Demand by Agriculture in the SWUCA and by County, 2005 and 2025

	MANATEE			POLK (a)			SARASOTA		
	Irrigated Acres								
Major Crop Categories	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**
Citrus	20,316	11,855	-8,461	94,107	68,939	-25,168	2,366	3,114	748
Cucumbers	830	575	-255	0	0	0	86	60	-26
Field Crops	455	441	-14	823	797	-26	678	656	-22
Melons	1,579	2,216	637	0	0	0	121	98	-23
Nurseries	935	664	-271	609	584	-25	397	563	166
Other Veg/Row Crops	7,024	7,024	0	537	537	0	573	573	0
Pasture	1,450	1,450	0	200	200	0	555	555	0
Potatoes	2,630	2,305	-325	0	0	0	0	0	0
Sod	4,000	4,000	0	1,452	1,452	0	2,000	2,000	0
Strawberries	500	500	0	300	300	0	0	0	0
Tomatoes	8,561	4,579	-3,982	98	88	-10	447	400	-47
Total	**48,280**	**35,609**	**-12,671**	**98,126**	**72,897**	**-25,229**	**7,223**	**8,019**	**796**
	Annual Water Use Projections - Average Rainfall Conditions (MGD)								
Major Crop Categories	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**	**2005**	**2025**	**Change**
Citrus	16.86	9.84	-7.02	91.28	66.87	-24.41	2.18	2.86	0.68
Cucumbers	1.35	0.94	-0.41	0	0	0.00	0.14	0.1	-0.04
Field Crops	0.39	0.38	-0.01	0.77	0.75	-0.02	0.61	0.59	-0.02
Melons	3.49	4.9	1.41	0	0	0.00	0.26	0.21	-0.05
Nurseries	4.38	3.11	-1.27	2.92	2.8	-0.12	1.93	2.74	0.81
Other Veg/Row Crops	8.92	8.92	0.00	0.71	0.71	0.00	0.74	0.74	0.00
Pasture	1.32	1.32	0.00	0.17	0.17	0.00	0.53	0.53	0.00
Potatoes	2.1	1.84	-0.26	0	0	0.00	0	0	0.00
Sod	9.68	9.68	0.00	3.51	3.51	0.00	4.94	4.94	0.00
Strawberries	1.17	1.17	0.00	0.7	0.7	0.00	0	0	0.00
Tomatoes	20.34	10.88	-9.46	0.24	0.21	-0.03	1.08	0.97	-0.11
Livestock Demand	0.8	0.8	0.00	2	2	0.00	0.2	0.2	0.00
Total	70.81	53.78	-17.03	102.31	77.73	-24.58	12.61	13.88	1.27

Source: Southwest Florida Water Management District, unpublished data received in November 2005.
(a) Includes only the portion of these counties that are located in the SWUCA.

3.2.2 Public Supply

Of all Use Types, Public Supply water users will need the most additional water supplies through 2025. The public supply water demand in the SWUCA is expected to increase by 84.1 mgd from 2005 through 2025. The Public Supply water demand forecasts by county are summarized in Table 3.2-3.

Table 3.2-3
Public Supply Water Demand Forecasts by County
2005 to 2025, mgd

County	2005	2025	Change
CHARLOTTE (a)	21.0	29.2	8.2
DESOTO	3.8	5.4	1.6
HARDEE	2.5	3.1	0.6
HIGHLANDS (a)	13.1	17.3	4.2
HILLSBOROUGH (a)	24.0	45.1	21.1
MANATEE	42.5	59.5	17.0
POLK (a)	80.9	106.0	25.1
SARASOTA	44.6	58.7	14.1
TOTAL	232.4	324.3	91.9

(a) Includes only those portions of these counties that are in the SWUCA.

The cost of additional water to supply the increased Public Supply demands from 2005 to 2025 is provided in Table 3.2-4. The estimated costs SWUCA-wide are $40 million in capital cost and $16 million per year in annual operations and maintenance cost. The average cost per 1,000 gallons is $0.57. Using the $0.22 per 1,000 gallon cost of traditional sources, the incremental cost is $0.35 per 1,000 gallons to obtain the additional water quantities. These costs would be paid by water utility customers and could be financed through bonds and/or utility revenues. A summary of the additional water demands and supplies of water users who provide water to the public from 2006 to 2025 is provided below for each county.

Table 3.2-4
Cost of Additional Water Supply to Public Supply Permittees in the SWUCA, 2006 to 2025, In 2005 Dollars

County	Change in Water Demand 2005 to 2025	Reclaimed Water		Conservation		Surface Water - Unpermitted	
		Capital	Annual O&M	Agricultural	Non-Agricultural	Capital	Annual O&M
CHARLOTTE (a)	8.2	$1,785,000	$82,000	$0	$1,541,000	$0	$0
DESOTO	1.6	$0	$0	$0	$0	$0	$0
HARDEE	0.6	$0	$0	$0	$0	$0	$0
HIGHLANDS (a)	4.2	$0	$0	$0	$216,000	$0	$0
HILLSBOROUGH (a)	21.1	$9,320,000	$270,000	$0	$1,663,000	$2,186,000	$63,000
MANATEE	17.0	$0	$0	$0	$2,175,000	$0	$0
POLK (a)	25.1	$0	$0	$0	$0	$0	$0
SARASOTA	14.1	$0	$0	$0	$3,116,000	$0	$0
Total	91.9	$11,105,000	$352,000	$0	$8,711,000	$2,186,000	$63,000

County	Desalination - Seawater		Desalination - Brackish Water		Unused Permitted Quantities and New Permitted GW Quantities		All Sources		
	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Cost per 1,000 Gallons
CHARLOTTE (a)	$0	$0	$0	$0	$123,000	$102,000	$1,908,000	$1,725,000	$0.63
DESOTO	$0	$0	$0	$0	$142,000	$118,000	$142,000	$118,000	$0.22
HARDEE	$0	$0	$0	$0	$53,000	$44,000	$53,000	$44,000	$0.22
HIGHLANDS (a)	$0	$0	$0	$0	$291,000	$241,000	$291,000	$457,000	$0.32
HILLSBOROUGH (a)	$22,425,000	$3,095,000	$0	$0	$570,000	$472,000	$34,501,00	$5,563,000	$1.09
MANATEE	$0	$0	$0	$0	$714,000	$591,000	$714,000	$2,766,000	$0.46
POLK (a)	$0	$0	$0	$0	$2,212,000	$1,832,000	$2,212,000	$1,832,000	$0.22
SARASOTA	$0	$0	$0	$0	$123,000	$102,000	$123,000	$3,218,000	$0.63
Total	$22,425,000	$3,095,000	$0	$0	$4,229,000	$3,502,000	$39,946,000	$15,723,000	$0.57

(a) Includes only the portion of these counties that are located in the SWUCA.

Charlotte County. Charlotte County will need an additional 8.2 mgd for public supply uses over the next 20 years. This demand could be supplied with currently unused quantities of water from the upper Floridan aquifer, non-agricultural conservation and reclaimed water. The capital and annual O&M costs to supply 8.2 mgd of water are estimated to be $1.9 million and $1.7 million, respectively. The cost per 1,000 gallons is $0.63. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.41 per 1,000 gallons to obtain the additional water quantities.

DeSoto County. DeSoto County will need an additional 1.6 mgd for public supply uses over the next 20 years. This demand could be supplied with currently unused quantities of water from the upper Floridan aquifer. The capital and annual O&M costs to supply 1.6 mgd of water are estimated to be $142,000 and $118,000, respectively. The cost per 1,000 gallons is $0.22. This would be the water source without the SWUCA Recovery Strategy so no incremental costs to public supply water users in DeSoto County are expected.

Hardee County. Hardee County will need an additional 0.6 mgd for public supply uses over the next 20 years. This demand could be supplied with currently unused quantities of water from the upper Floridan aquifer. The capital and annual O&M costs to supply 0.6 mgd of water are estimated to be $53,000 and $44,000, respectively. The cost per 1,000 gallons is $0.22. This would be the water source without the SWUCA Recovery Strategy so no incremental costs to public supply water users in Hardee County are expected.

Highlands County. Highlands County will need an additional 4.2 mgd for public supply uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with 3.3 mgd of currently unused, permitted quantities and 0.9 mgd can be met through additional water conservation programs. The total capital and annual O&M costs are estimated to be $291,000 and $457,000, respectively. The cost per 1,000 gallons is $0.32. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.10 per 1,000 gallons for the additional water supplies.

Hillsborough County. Hillsborough County will need an additional 21.1 mgd for public supply uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with 6.5 mgd of unused, permitted quantities, 2.1 mgd of reclaimed water, 6.8 mgd saved from additional water conservation programs, 0.40 mgd in currently unpermitted surface water sources and 5.3 mgd from seawater desalination. The total capital and annual O&M costs are estimated to be $34.5 million and $5.6 million, respectively. The cost per 1,000 gallons is $1.09. Subtracting out

the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.87 per 1,000 gallons for the additional water supplies.

Manatee County. Manatee County will need an additional 17.0 mgd for public supply uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with 8.1 mgd from currently unused, permitted water quantities and 8.9 mgd in additional water conservation programs. The total capital and annual O&M costs are estimated to be $714,000 and $2.8 million per year, respectively. The cost per 1,000 gallons is $0.46. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.24 per 1,000 gallons for the additional water supplies.

Polk County. Polk County will need an additional 25.1 mgd for public supply uses over the next 20 years. This demand could be supplied with currently unused quantities of water from the upper Floridan aquifer. The capital and annual O&M costs to supply 25.1 mgd of water are estimated to be $2.2 million and $1.8 million, respectively. The cost per 1,000 gallons is $0.22. This would be the water source without the SWUCA Recovery Strategy so no incremental costs to public supply water users in Polk County are expected.

Sarasota County. Sarasota County will need an additional 14.1 mgd for public supply uses over the next 20 years. About 1.4 mgd of this demand could be supplied with currently unused quantities of water from the upper Floridan aquifer. The District estimates that non-agricultural water conservation programs can save about 12.7 mgd in Sarasota County. The capital and annual O&M costs to supply 14.1 mgd of water are estimated to be $123,000 and $3.2 million, respectively. The cost per 1,000 gallons is $0.63. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.41 per 1,000 gallons for the additional water supplies.

3.2.3 Industrial, Commercial, Mining and Dewatering Self-Supplied Water Users

Water demand for Industrial, Commercial, Mining and Dewatering (I/C and M/D) self-supplied water users is expected to increase by 5.8 mgd SWUCA-wide over the next 20 years. Water demand for this Use Type will increased in four SWUCA counties: Hardee, Hillsborough, Manatee and Sarasota.

The cost of additional water to supply these increased water demands from 2005 to 2025 is provided in Table 3.2-5. The estimated total capital and annual operations and maintenance costs SWUCA-wide are $37.1 million and $1.6 million, respectively. Most of this cost will be incurred by water users in Hardee County as 3.7 mgd of surface water sources are developed. The average cost per 1,000 gallons is $2.32. Using the $0.22 per 1,000 gallon cost of traditional sources, the incremental cost is $2.10 per 1,000 gal-

lons. These costs would be paid by those I/C and M/D self-supplied water users who are expanding or are new to the area, such as electric power generators and manufacturers. If the proposed withdrawal is relatively small so that it does not impact MFL water bodies, then the water use may be permitted. A summary of the additional water demands and supplies of these self-supplied water users from 2006 to 2025 is provided below for each county.

Charlotte County. No additional water demands for I/C and M/D Use Types in Charlotte County are anticipated over the next 20 years. Therefore, no incremental costs of the SWUCA Recovery Strategy are anticipated.

DeSoto County. No additional water demands for I/C and M/D Use Types in DeSoto County are anticipated over the next 20 years. Therefore, no incremental costs of the SWUCA Recovery Strategy are anticipated.

Hardee County. Hardee County will need an additional 5.8 mgd for I/C and M/D uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with 1.4 mgd of currently unused permitted quantities, 0.6 mgd of reclaimed water, 0.1 mgd of water conservation, and 3.7 mgd of currently unpermitted surface water. The total capital and annual O&M costs are estimated to be $32.2 million and $1.5 million, respectively. The cost per 1,000 gallons is $1.96. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.74 per 1,000 gallons.

Highlands County. No additional water demands for I/C and M/D Use Types in Highlands County are anticipated over the next 20 years. Therefore, no incremental costs of the SWUCA Recovery Strategy are anticipated.

Hillsborough County. Hillsborough County will need an additional 0.9 mgd for I/C and M/D uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with 0.9 mgd of reclaimed water. The total capital and annual O&M costs are estimated to be $3.8 million and $109,000, respectively. The cost per 1,000 gallons is $1.35. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.13 per 1,000 gallons.

Manatee County. Manatee County will need an additional 0.3 mgd for I/C and M/D uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with 0.3 mgd of reclaimed water. The total capital and annual O&M costs are estimated to be $1.1 million and $53,000, respectively. The cost per 1,000 gallons is $1.26. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.04 per 1,000 gallons.

Polk County. Water demands for I/C and M/D Use Types in Polk County are expected to decline by 1.3 mgd over the next 20 years. Therefore, no incremental costs of the SWUCA Recovery Strategy are anticipated.

Sarasota County. Sarasota County will need an additional 0.1 mgd for I/C and M/D uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with currently unused permitted quantities. The total capital and annual O&M costs are estimated to be $8,800 and $7,300 per year, respectively. The cost per 1,000 gallons is $0.22. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.0 per 1,000 gallons so no incremental costs are expected for I/C and M/D users in Sarasota County.

Table 3.2-5
Cost of Additional Water Supply to Industrial, Commercial, Mining and Dewatering Permittees in the SWUCA, 2006 to 2025, In 2005 Dollars

County	Change in Water Demand 2005 to 2025	Reclaimed Water		Conservation		Surface Water - Unpermitted	
		Capital	Annual O&M	Agricultural	Non-Agricultural	Capital	Annual O&M
CHARLOTTE (a)	0.0	$0	$0	$0	$0	$0	$0
DESOTO	0.0	$0	$0	$0	$0	$0	$0
HARDEE	5.8	$2,962,000	$90,000	$0	$24,500	$29,072,000	$1,251,000
HIGHLANDS (a)	0.0	$0	$0	$0	$0	$0	$0
HILLSBOR-OUGH (a)	0.9	$3,760,000	$109,000	$0	$0	$0	$0
MANATEE	0.3	$1,150,000	$53,000	$0	$0	$0	$0
POLK (a)	-1.3	$0	$0	$0	$0	$0	$0
SARASOTA	0.1	$0	$0	$0	$0	$0	$0
Total	5.8	$7,871,000	$252,000	$0	$24,500	$29,072,000	$1,251,000

County	Desalination – Seawater		Desalination – Brackish Water		Unused Permitted Quantities and New Permitted GW Quantities		All Sources		
	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Cost / kgal
CHARLOTTE (a)	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
DESOTO	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
HARDEE	$0	$0	$0	$0	$123,000	$102,000	$32,158,000	$1,467,000	$1.96
HIGHLANDS (a)	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
HILLSBOR-OUGH (a)	$0	$0	$0	$0	$0	$0	$3,760,000	$109,000	$1.35
MANATEE	$0	$0	$0	$0	$0	$0	$1,150,000	$53,000	$1.26
POLK (a)	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
SARASOTA	$0	$0	$0	$0	$8,800	$7,300	$8,800	$7,300	$0.22
Total	$0	$0	$0	$0	$131,800	$109,300	$37,076,000	$1,637,000	$1.83

(a) Includes only the portion of these counties that are located in the SWUCA.

3.2.4 Recreation and Aesthetic Self-Supplied Water Users

Water demand for recreation and aesthetic self-supplied water users is expected to increase by 15.3 mgd SWUCA-wide over the next 20 years. Water demand in all counties will increase. As was indicated in Table 2.3-1, most of this water demand can be supplied with reclaimed water. The rest would come from currently unused, permitted water quantities.

The cost of additional water to supply these increased water demands from 2005 to 2025 is provided in Table 3.2-6. The estimated capital and annual operations and maintenance costs SWUCA-wide are $48.8 million and $2.2 million, respectively. Most of this cost is for reclaimed water facilities in all counties except DeSoto. The average cost per 1,000 gallons is $1.12. Using the $0.22 per 1,000 gallon cost of traditional sources, the incremental cost is $0.89 per 1,000 gallons for the additional water supply.

These costs would be paid by those Recreation and Aesthetic self-supplied water users who are expanding or are new to the area, such as golf course owners, school districts, apartment owners, condominium owners and park owners. Golf course owners would likely pass these costs onto the golf course users. School districts would obtain this additional funding from local property owners through taxes. Owners of apartments and condominiums would likely recover this expense through increases in apartment rents and monthly condominium association fees. Park owners would likely recover these expenses through park admission fees. If the proposed withdrawal is relatively small so that it does not impact MFL water bodies, then the water use may be permitted.

A summary of the additional water demands and supplies of these self-supplied water users from 2005 to 2025 is provided below for each county.

Charlotte County. Charlotte County will need an additional 2.2 mgd for Recreation and Aesthetic uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with reclaimed water. The total capital and annual O&M costs are estimated to be $7.9 million and $361,000, respectively. The cost per 1,000 gallons is $1.26. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.04 per 1,000 gallons for the additional water supply.

DeSoto County. DeSoto County will need an additional 0.1 mgd for Recreation and Aesthetic uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met using currently unused permitted quantities. The total capital and annual O&M costs are estimated to be $4,900 and $4,100, respectively. The cost per 1,000 gallons is $0.22. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.00 per 1,000

gallons so no incremental costs are expected for Recreation and Aesthetic self-supplied water users in Sarasota County.

Hardee County. Hardee County will need an additional 0.1 mgd for Recreation and Aesthetic uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with reclaimed water. The total capital and annual O&M costs are estimated to be $494,000 and $15,000 per year, respectively. The cost per 1,000 gallons is $1.53. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.31 per 1,000 gallons for the additional water.

Highlands County. Highlands County will need an additional 0.7 mgd for Recreation and Aesthetic uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with reclaimed water. The total capital and annual O&M costs are estimated to be $3.2 million and $98,000, respectively. The cost per 1,000 gallons is $1.53. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.31 per 1,000 gallons for the additional water.

Hillsborough County. Hillsborough County will need an additional 1.2 mgd for Recreation and Aesthetic uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with reclaimed water. The total capital and annual O&M costs are estimated to be $5.4 million and $157,000, respectively. The cost per 1,000 gallons is $1.35. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.13 per 1,000 gallons.

Manatee County. Manatee County will need an additional 3.0 mgd for Recreation and Aesthetic uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with reclaimed water. The total capital and annual O&M costs are estimated to be $10.5 million and $485,000, respectively. The cost per 1,000 gallons is $1.26. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.04 per 1,000 gallons.

Polk County. Polk County will need an additional 4.5 mgd for Recreation and Aesthetic water uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with 2.8 mgd of currently unused permitted quantities and 1.7 mgd of reclaimed water. The total capital and annual O&M costs are estimated to be $8.8 million and $463,000, respectively. The cost per 1,000 gallons is $0.72. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $0.50 per 1,000 gallons for the additional water supply.

Sarasota County. Sarasota County will need an additional 3.5 mgd for Recreation and Aesthetic uses over the next 20 years. As was indicated in Table 2.3-1, this additional demand can be met with reclaimed water. The total capital and annual O&M costs are estimated to be $12.5 million and $574,000, respectively. The cost per 1,000 gallons is $1.26. Subtracting out the $0.22 per 1,000 gallons cost of traditional water sources yields an incremental cost estimate of $1.04 per 1,000 gallons.

Table 3.2-6
Cost of Additional Water Supply to Recreation and Aesthetic Permittees in the SWUCA, 2006 to 2025, In 2005 Dollars

County	Change in Water Demand 2005 to 2025	Reclaimed Water		Conservation		Surface Water - Unpermitted	
		Capital	Annual O&M	Agricultural	Non-Agricultural	Capital	Annual O&M
CHARLOTTE (a)	2.2	$7,855,000	$361,000	$0	$0	$0	$0
DESOTO	0.1	$0	$0	$0	$0	$0	$0
HARDEE	0.1	$494,000	$15,000	$0	$0	$0	$0
HIGHLANDS (a)	0.7	$3,240,000	$98,000	$0	$0	$0	$0
HILLSBOROUGH (a)	1.2	$5,432,000	$157,000	$0	$0	$0	$0
MANATEE	3.0	$10,542,000	$485,000	$0	$0	$0	$0
POLK (a)	4.5	$8,545,000	$259,000	$0	$0	$0	$0
SARASOTA	3.5	$12,474,000	$574,000	$0	$0	$0	$0
Total	15.3	$48,582,000	$1,949,000	$0	$0	$0	$0

County	Desalination - Seawater		Desalination - Brackish Water		Unused Permitted Quantities and New Permitted GW Quantities		All Sources		
	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Capital	Annual O&M	Cost per 1,000 Gallons
CHARLOTTE (a)	$0	$0	$0	$0	$0	$0	$7,855,000	$361,000	$1.26
DESOTO	$0	$0	$0	$0	$9,000	$7,000	$9,000	$7,000	$0.40
HARDEE	$0	$0	$0	$0	$0	$0	$494,000	$15,000	$1.53
HIGHLANDS (a)	$0	$0	$0	$0	$0	$0	$3,240,000	$98,000	$1.53
HILLSBOROUGH (a)	$0	$0	$0	$0	$0	$0	$5,432,000	$157,000	$1.35
MANATEE	$0	$0	$0	$0	$0	$0	$10,542,000	$485,000	$1.26
POLK (a)	$0	$0	$0	$0	$247,000	$204,000	$8,792,000	$463,000	$0.72
SARASOTA	$0	$0	$0	$0	$0	$0	$12,474,000	$574,000	$1.26
Total	$0	$0	$0	$0	$256,000	$211,000	$48,838,000	$2,160,000	$1.12

(a) ncludes only the portion of these counties that are located in the SWUCA.

Section 4.0
Public Supply Water Users – Potential Economic Impact of SWUCA Recovery Strategy

This Chapter describes the potential costs and economic impacts of developing and using alternative water sources to water utilities and households. Development of the case study utilities used to evaluate the economic impacts of alternative water source costs is provided in Chapter 4.1. Descriptions and estimated costs of new water source development and conservation opportunities available to Public Supply Utilities in the SWUCA are provided in Chapter 4.2. Here the case study utilities address increases in water demand from 2005 to 2025 by developing alternative water sources and conservation programs in proportion to the amounts available as presented in Table 2.1-2 in Chapter 2.0. The financial impact of these alternative water sources and conservation programs on residential water utility customers is provided in Chapter 4.3.

The potential financial impact of 100 percent alternative water source use to supply all the water demands of residential water utility customers is provided in Chapter 4.4. The final section, 4.5, presents the financial impact associated with the water supply allocation described in Chapters 2 and 3 of this report.

Most water supply permittees in the SWUCA are water utilities. Others are homeowner associations, schools, residential developments, and corporations that supply water to fewer than 2,000 people.

4.1 Case Study Utilities

The financial impacts of alternative water source development on water supply utilities and their customers in the SWUCA were modeled by simulating the actions that utilities might need to take to obtain sufficient water supplies from alternative sources and the estimated costs. To this end, four case study utilities were chosen that represent the types of utilities in the SWUCA. This sub-section summarizes the characteristics of water supply permittees in the SWUCA and presents the case study utilities.

The utilities were stratified based on whether the utility was located along the coast or inland; whether the utility was large or small; and whether the utility's population served is expected to grow over the next 20 years. The distinction between inland and coastal is because all inland utilities rely exclusively on ground water while the coastal utilities rely on a combination of ground water and surface water.

The distribution of gross water use among the water utilities in the SWUCA by county is provided in Table 4.1-1. Gross water use is withdrawals minus treatment losses plus imports minus exports.

In the SWUCA portion of Polk County, the largest utilities are City of Lakeland and Polk County. In 2002, gross water use in the Lakeland service area was 24.27 mgd and the population served was 157,094.[1] In the Polk County service area, gross water use was 14.30 mgd and the population served was 86,205. Lakeland provided 36 percent of all utility-supplied potable water in Polk County while Polk County provided 21 percent of utility-supplied potable water in the county. Polk County has many smaller utilities including Lake Wales, Winter Haven, Bartow, Auburndale, Fort Meade and Mulberry, among others.

In the SWUCA portion of Highlands County, the largest utilities are the City of Sebring and the City of Avon Park. In 2002, each utility supplied 3.61 mgd and 2.32 mgd of gross water to their customers, respectively. The populations served by these utilities were 32,558 and 14,150 people, respectively. Other SWUCA utilities in Highlands County include Lake Placid and Sebring Ridge.

There are three water utilities in Hardee County. The largest is the City of Wauchula with a population served of 4,377 people. In 2002, gross water use was 0.83 mgd. The other two utilities are City of Bowling Green and Town of Zolfo Springs. DeSoto County has one water utility, the City of Arcadia that supplied 1.09 mgd of water to its customers in 2002. The utility's population served was 7,371 people.

Moving to the coastal counties, the largest SWUCA utility permit in the SWUCA portion of Hillsborough County is Tampa Bay Water's Hillsborough County South Central wellfield, providing 96 percent of the utility-supplied water in the SWUCA portion of the county. Each of the other permittees provided from three percent to less than one percent of the utility-supplied potable water to the SWUCA portion of Hillsborough County.

Manatee County is the largest utility in that county followed by the City of Bradenton. Manatee County provided 28.85 mgd to its customers in 2002. The utility's population served is 226,483 people. Bradenton provided 5.7 mgd and served 49,958 people. The other two utilities in Manatee County are Longboat Key and City of Palmetto.

About 73 percent of utility-supplied potable water provided to those who live in Sarasota County comes from either the county-owned utility or the City of Sarasota. Other smaller

[1] Data representing the year 2002 was used in Table 5.3-1 because this was the most recent year available at the time this table was produced.

utilities are Englewood Water District, City of Venice, Siesta Key Utilities Authority and the City of Northport.

In Charlotte County about 66 percent of the utility-supplied potable water is from the county-owned utility. The county provided 9.83 mgd of water to 81,702 people. Another 24 percent is supplied by the City of Punta Gorda. In 2002, gross water use in Punta Gorda was 3.54 mgd and the population served was 27,514.

Table 4.1-1
Distribution of Utility Gross Water Use by County (SWUCA Only) – 2002 (a)

Utility	Gross Water Use (mgd) (b)	Population Served	% of Total Gross Use Supplied by Utilities in County
Polk County (SWUCA)			
Lakeland, City of	24.268	157,094	36%
Polk County	14.300	86,205	21%
All Other Utilities	29.737	186,881	44%
Total	**68.305**	**430,180**	**100%**
Highlands County (SWUCA)			
Sebring, City of	3.612	32,558	44%
Avon Park, City of	2.319	14,150	28%
All Other Utilities	2.362	18,989	28%
Total	**8.293**	**65,697**	**100%**
Hardee And Desoto Counties			
Wauchula, City of	0.827	4,377	34%
Bowling Green, City of	0.271	2,191	11%
Zolfo Springs, Town of	0.195	1,560	8%
Arcadia, City of (Desoto County)	1.09	7,371	45%
All Other Utilities	0.063	1,289	3%
Total	**2.446**	**16,789**	**100%**
Hillsborough County (SWUCA)			
TNW / Hills. Co. S. Central	24.389	208,307	96%
FLA Water Services / Seaboard (C)	0.636	8,542	3%
FLA Water Services / Valrico Hills	0.09	876	<1%
FLA Water Services / Hershel Heights	0.09	797	<1%
All Other Utilities	0.109	1,005	<1%
Total	**25.314**	**219,527**	**100%**

Table 4.1-1
Distribution of Utility Gross Water Use by County (SWUCA Only) – 2002 (a)

Utility	Gross Water Use (mgd) (b)	Population Served	% of Total Gross Use Supplied by Utilities in County
Manatee County			
Manatee County	28.846	226,483	75%
Bradenton, City of	5.673	49,958	15%
Longboat Key	2.358	15,977	6%
Palmetto, City of	1.438	11,608	4%
Total	**38.315**	**304,026**	**100%**
Sarasota County			
Sarasota Co. / Univ. Parkway (14)	15.809	186,265	50%
Sarasota, City of	7.187	70,569	23%
Englewood Water District	2.608	35,599	8%
Venice, City of	2.246	22,090	7%
Siesta Key Utilities Authority	1.674	16,473	5%
Northport, City of	1.954	18,863	6%
All Other Utilities	0.229	4,576	1%
Total	**31.707**	**354,435**	**100%**
Charlotte County (SWUCA)			
Charlotte County Utility	9.83	81,702	66%
Punta Gorda, City of	3.543	27,514	24%
Gasparilla Island Water Assn Inc	0.938	3,744	6%
FLA Water Services/Burnt Store	0.319	4,375	2%
Charlotte Harbor Water Assoc Inc	0.346	4,866	2%
Total	14.976	122,201	100%

Source: SFWMD, "Estimated Water Use, 2002", Table A-1, Brooksville, Florida.

(a) Data representing the year 2002 was used in this table because this was the most recent data available at the time this table was produced.

(b) Gross Water Use is Withdrawals plus Imports minus Exports minus Treatment Losses.

(c) Florida Water Services has since sold its water utilities.

The SWUCA utilities were further evaluated with respect to size, water source and per capita water use. The utility stratification by size, water source and per capita water use is provided in Table 4.1-2. Most utilities are relatively small in that they serve fewer than 30,000 people.

The per capita water use of most utilities is lower than 150 gallons per capita per day (gpcd). For these utilities that are located inland, the per capita water usage ranges from 47 to 147 gpcd, gross use less significant use.[2] The range for the coastal utilities is 56 to 148 gpcd. Fourteen inland and two coastal utilities have per capita water usage above 150 gpcd. For these utilities, the range is 158 to 551 gpcd for the inland utilities and 161 to 458 gpcd for the coastal utilities.

[2] Significant use is the sum of annual average water consumption of each non-residential customer that uses at least 25,000 gpd or 5 percent of system use.

Table 4.1-2
SWUCA Public Water Supply Permittees: Location, Water Sources, Per Capita Water Use, Population Served, County and Permittee Name, 2002

Inland Utilities Relying on Ground water
>150 gpcd
Large (>30,000): none
Small (<30,000): *Polk County:* City of Haines City; City of Bartow; City of Frostproof; Century Realty Fund – CHC VII; Winter Haven/Garden Grove; Mountain Lake Corp.; Sports Shinko (Fla)/Grenelefe; Polk County / NE Regional SA *Highlands County:* City of Avon Park; Sebring Land/Highlands Ridge Association; Country Club of Sebring; Crystal Lake Club; Town of Lake Placid *Hardee County:* City of Wauchula
<150 gpcd
Large (>30,000): *Polk County:* City of Lakeland; City of Winter Haven; Polk County Utilities *Highlands County:* City of Sebring
Small (<30,000) *Polk County:* City of Lake Wales; City of Auburndale; City of Fort Meade; City of Lake Alfred; Town of Dundee; City of Davenport; City of Mulberry; Cypress Lakes Utilities, Inc.; Florida Water Services / Lake Gibson; City of Eagle Lake; Crooked Lake Park Water Co, Inc.; Town of Lake Hamilton; Century Realty Funds / Swiss Village; Sweetwater Coop, Inc.; Cypres Lakes Venture; Lake Region Mobile Homeowners, Four Lake Golf Club; Sweetwater East/Lake Henry; Orchid Springs Development Corp.; Saddlebag Lake Owners Assn, Inc.; Plantation Landings, Ltd. *Highlands County:* Sun'n Lake of Sebring Impr.; Lake Placid Holding Company; Highlands County / Tomoka Heights; Sebring Ridge Utilities; The Woodlands of Lake Placid; Buttonwood Bay / Pugh Utilities; Lake Josephine Heights Water *Hardee County:* City of Bowling Green; Town of Zolfo Springs *DeSoto County:* City of Arcadia; PRMRWSA/ Lake Suzy
Coastal Utilities Relying on Ground water and Reverse Osmosis
>150 gpcd
Large (>30,000): None
Small (<30,000): *Charlotte County:* Gasparilla Island Water Association, Inc.
<150 gpcd
Large (>30,000): Sarasota County: Englewood Water District;
Small (<30,000): *Charlotte County:* Charlotte Harbor Water Association, Inc.; Florida Water Services / Burnt Store *Sarasota County:* City of Venice; Royalty Resorts/ Sun 'n Fun RV; ELL-CAP 66 / Camelot Lakes
Coastal Utilities Relying on Ground water and Surface Water
>150 gpcd
Large (>30,000): None
Small (<30,000): None

Table 4.1-2
SWUCA Public Water Supply Permittees: Location, Water Sources, Per Capita Water Use, Population Served, County and Permittee Name, 2002

<150 gpcd
Large (>30,000): Charlotte County Utilities; Manatee County Utilities
Small (<30,000): *Hillsborough County:* Florida Water Services / Hershel Heights
Coastal Utilities Relying on Ground water Only
>150 gpcd
Large (>30,000): None
Small (<30,000): CAX Riverside LLC
<150 gpcd
Large (>30,000) Sarasota County: City of Sarasota; Sarasota County *Hillsborough County:* Tampa Bay Water / Hillsborough County South Central
Small (<30,000) Sarasota County: Siesta Key Utilities Authority *Hillsborough County:* Florida Water Services / Seaboard; Florida Water Services / Valrico Hills; Wilder Mobile Homes
Coastal Utilities Relying on Surface Water Only
>150 gpcd
Large (>30,000): None
Small (<30,000): None
<150 gpcd
Large (>30,000): *Manatee County:* City of Bradenton
Small (<30,000): *Charlotte County:* City of Punta Gorda *Manatee County:* Longboat Key; City of Palmetto *Sarasota County:* City of Northport

Source: Southwest Florida Water Management District, "2002 Estimated Water Use", Brooksville, Florida
Note: Tampa Bay Water / Brandon Urban Wellfield and Tampa Bay Water / Alafia River had no reported gross use or population in 2002.

County-wide functional population projections developed by the District in 2005 are provided in Table 4.1-3. The SWUCA population is expected to increase by 452,000 people between 2000 and 2025. Overall growth rates from 2000 to 2025 range from 22 percent in Hardee County to 46 percent in Manatee County. The change in population from 2000 to 2025 in terms of number of persons is expected to be greatest in Manatee County, where 170,000 more people are expected.

The second greatest population increase is expected in the SWUCA portion of Polk County where 169,000 more people are expected between 2000 and 2025, or a 37 percent overall increase. About 149,000 more people are expected in Sarasota County. An additional 110,000 people are expected in the SWUCA portion of Hillsborough County,

an additional 79,000 people are expected in the SWUCA portion of Charlotte County, an additional 34,000 people are expected in the SWUCA portion of Highlands County and about 20,000 more people are expected in DeSoto County. The smallest increase of 7,300 people is expected in Hardee County.

Table 4.1-3
Projected County-Wide Functional Population By Year in the SWUCA (a)

COUNTY (c)	Number of Persons				Change in Population 2000 to 2025 (b)		
	2000	2005	2020	2025	Persons	%	% / Year
Charlotte	154,870	168,078	217,899	233,553	78,683	41%	1.64%
DeSoto	35,717	39,072	51,837	55,389	19,672	44%	1.76%
Hardee	29,160	29,867	34,880	36,480	7,320	22%	0.90%
Highlands	87,278	91,598	113,910	120,859	33,581	33%	1.30%
Hillsborough	204,802	230,634	294,714	314,547	109,745	43%	1.72%
Manatee	291,524	329,914	430,241	461,704	170,180	46%	1.84%
Polk	380,402	419,215	518,183	549,195	168,793	37%	1.47%
Sarasota	358,227	385,173	478,400	507,520	149,293	35%	1.39%
TOTAL	1,541,980	1,693,550	2,140,064	2,279,247	451,922	39%	1.56%

Source: SWFWMD, "Regional Water Supply Plan", Brooksville, Florida, draft November 2005, Table 4-4 with adjustments to Hillsborough and Polk counties to reflect the portions of these counties within the District that are in the SWUCA (0.2008 for Hillsborough County and 0.8003 for Polk County).

(a) Functional population includes the permanent and seasonal populations.

(b) Percent change in population was calculated using the formula: Population t = Populationt-1 x ert, where r is the growth rates and t is time. Therefore, the percent change in population from 2000 to 2005 is Ln(population2025) - Ln(population2000) and the average annual percent change is [Ln(population2025) - Ln(population2000)]/25.

(c) The populations of Charlotte, Highlands, Hillsborough and Polk Counties include only those portions located in the District and in the SWUCA. The entire areas of the other counties are located in the District and in the SWUCA.

The choice of the case study utilities was based on an attempt at choosing four utilities that represent the population of utilities in the SWUCA in terms of their need for and accessibility to alternative water sources. To this end, a description of the four case study utilities is provided in Tables 4.1-4 through 4.1-7. The four utilities include a large inland utility, a small inland utility, a large coastal utility and a small coastal utility. The tables describe the characteristics of each case study utility. The county, water source, current water supply and historic gross water use of each case study utility are provided in Table 4.1-4. The historic and forecasted populations of each case study utility are provided in Table 4.1-5. The historic per capita water use of each case study utility is provided in Table 4.1-6. The projected water demand and the amount of additional water needed in the year 2025 for each case study utility are provided in Table 4.1-7.

Each utility was modeled using the water use characteristics of a chosen SWUCA utility. However, the evaluation of each model utility is not meant to provide recommendations

to any specific utility. Instead, it is meant to identify the actions that the utility might need to take to obtain sufficient water supplies and the associated cost.

Large Inland Utility. The large inland utility is located in Polk County. Water is supplied from the Floridan Aquifer. Its available water supply is 27.22 mgd which is equal to permitted water quantity minus treatment losses plus net imports. In 2002, the utility served a population of 157,094 people and supplied 24.27 mgd of water to its customers. Gross water use per person per day averaged 156 gallons over the six year period from 1997 through 2002. In 2001, gross per capita water use was 152 gallons per person (capita) per day (gpcd). This is the gross water use value used in the water use projections consistent with the District's methodology. The year 2001 was an average rainfall year.

The service area population of the large inland utility is projected to increase by 35 percent between 2000 and 2025. By 2025, gross water use is projected to be 34.14 mgd while existing supplies are 27.22 mgd. Thus, the utility would like to increase water supply and/or reduce water demand by 9.64 mgd over the next 20 years. This amount is equal to 2025 projected gross water use minus 90 percent of the existing water supply. The value of 90 percent was used to provide a water supply cushion in the event that actual 2025 water use is higher than the projections. It provides a high-end estimate of future water needs.

Small Inland Utility. The small inland utility is located in Hardee County. Water is supplied from the Floridan Aquifer. Its available water supply is 0.95 mgd which is equal to permitted water quantity minus treatment losses plus net imports. In 2002, the utility served a population of 4,377 people and supplied 0.83 mgd of water to its customers. Gross water use per person per day has averaged 156 gallons over the six year period from 1997 through 2002. In 2001, gross per capita water use was 131 gallons per person (capita) per day (gpcd). This is the gross water use value used in the water use projections consistent with the District's methodology. The year 2001 was an average rainfall year.

The service area population of the small inland utility is projected to increase by 29 percent between 2000 and 2025. By 2025, gross water use is projected to be 1.00 mgd while existing supplies are 0.95 mgd. Thus, the utility would like to increase water supply and/or reduce water demand by 0.15 mgd over the next 20 years. This amount is equal to 2025 projected gross water use minus 90 percent of the existing water supply. The value of 90 percent was used to provide a water supply cushion in the event that actual 2025 water use is higher than the projections. It provides a high-end estimate of future water needs.

Large Coastal Utility. The large coastal utility is located in Manatee County. Water is supplied from the Floridan Aquifer and from surface water sources. Its available water supply is 35.6 mgd which is equal to permitted water quantity minus treatment losses plus net imports. In 2002, the utility served a population of 226,483 people and supplied 28.85 mgd of water to its customers. Gross water use per person per day has averaged 132 gallons over the six year period from 1997 through 2002. In 2001, gross per capita water use was 133 gallons per person (capita) per day (gpcd). This is the gross water use value used in the water use projections consistent with the District's methodology. The year 2001 was an average rainfall year.

The service area population of the large coastal utility is projected to increase by 43 percent between 2000 and 2025. By 2025, gross water use is projected to be 44.18 mgd while existing supplies are 35.60 mgd. Thus, the utility would like to increase water supply and/or reduce water demand by 12.14 mgd over the next 20 years. This amount is equal to 2025 projected gross water use minus 90 percent of the existing water supply. The value of 90 percent was used to provide a water supply cushion in the event that actual 2025 water use is higher than the projections. It provides a high-end estimate of future water needs.

Small Coastal Utility. The small coastal utility is located in Charlotte County. Water is supplied from surface water sources. Its available water supply is 5.25 mgd which is equal to permitted water quantity minus treatment losses plus net imports. In 2002, the utility served a population of 27,514 people and supplied 3.54 mgd of water to its customers. Gross water use per person per day has averaged 133 gallons over the six year period from 1997 through 2002. In 2001, gross per capita water use was 143 gallons per person (capita) per day (gpcd). This is the gross water use value used in the water use projections consistent with the District's methodology. The year 2001 was an average rainfall year.

The service area population of the small coastal utility is projected to increase by 39 percent between 2000 and 2025. By 2025, gross water use is projected to be 5.86 mgd while existing supplies are 5.25 mgd. Thus, the utility would like to increase water supply and/or reduce water demand by 1.14 mgd over the next 20 years. This amount is equal to 2025 projected gross water use minus 90 percent of the existing water supply. The value of 90 percent was used to provide a water supply cushion in the event that actual 2025 water use is higher than the projections. It provides a high-end estimate of future water needs.

Table 4.1-4
Description of Case Study Water Utilities

Water Utility	County	Water Source	Net Permitted Water (e)	Available Water Supply (f)	Gross Water Use, mgd (g)				
					1998	1999	2000	2001	2002
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility(a)	Polk	GW	27.26	27.22	24.58	24.52	25.52	23.92	24.27
Small Inland Utility(b)	Hardee	GW	0.95	0.95	1.02	0.88	0.87	0.75	0.83
Large Coastal Utility(c)	Manatee	GW/SW	48.30	35.60	25.43	27.86	28.37	28.69	28.85
Small Coastal Utility(d)	Charlotte	SW	5.25	5.25	3.18	3.49	3.78	3.97	3.54

(a) Modeled using water use characteristics of City of Lakeland Water Utility. Permit numbers 4912 and 8468.
(b) Modeled using water use characteristics of City of Wauchula, Florida. Permit number 4461.
(c) Modeled using water use characteristics of Manatee County Utilities. Permit numbers 5387 and 7470.
(d) Modeled using water use characteristics of City of Punta Gorda Utilities. Permit number 871.
(e) Permitted Water Quantity Minus Treatment Losses. From "SWUCA Recovery Strategy - Revised", draft, Appendix 4, Southwest Florida Water Management District, Brooksville, Florida, March 2004.
(f) Permitted Water Quantity Minus Treatment Losses Plus Net Imports. From "SWUCA Recovery Strategy - Revised", draft, Appendix 4, Southwest Florida Water Management District, Brooksville, Florida, March 2004.
(g) Data from Estimated Water Use 1998, 1999, 2000, 2001 and 2002, Appendix A, Southwest Florida Water Management District, Brooksville, Florida. Gross water use is withdrawals minus treatment losses plus imports minus exports.

Table 4.1-5
Population of Case Study Water Utilities

Water Utility	Population (a)						
	1998	1999	2000	2001	2002	2025	% Change from 2000 to 2025 (b)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Large Inland Utility	158,416	161,141	155,567	157,566	157,094	224,596	37%
Small Inland Utility	5,838	6,000	6,121	5,735	4,377	7,658	22%
Large Coastal Utility	198,943	204,251	209,746	215,124	226,483	332,187	46%
Small Coastal Utility	25,726	26,425	27,193	27,758	27,514	41,009	41%

(a) Data from Estimated Water Use 1998, 1999, 2000, 2001 and 2002, Southwest Florida Water Management District, Brooksville, Florida. 2025 Population is equal to 2000 population increased each year by the average annual growth rate of county in the SWUCA area from 2000 to 2025.
(b) Percent change in population calculated using the formula: Popt = Popt-1 x ert, where r is the growth rate and t is time. Therefore, the percent change in population from 2000 to 2025 is Ln(pop2025) – Ln(pop2000) and the average annual percent change is [Ln(pop2025) – Ln(pop2000)]/25.

Table 4.1-6
Per Capita Water Use of Case Study Utilities

Water Utility	Gross Water Use Per Person Per Day (a)						
	1997	1998	1999	2000	2001	2002	6-Year Average
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Large Inland Utility	156	155	152	164	152	154	155.63
Small Inland Utility	152	175	146	142	131	189	155.82
Large Coastal Utility	131	128	136	135	133	127	131.76
Small Coastal Utility	132	124	132	139	143	129	133.15

(a) Gross use from Table 4.1-4 in gallons per day divided by population from Table 5.3-5. In gallons per capita per day (gpcd).

Table 4.1-7
Projected Water Demand and New Water Needed in 2025

Water Utility	Projected Gross Water Use in 2025, mgd (a)	% Change in Water Use - 2000 to 2025, mgd (b)	Water Use Growth Rate Per Year - 2000 to 2025	New Water Needed, mgd (c)	Water Needed as % of Current Water Available (d)
(1)	(2)	(3)	(4)	(5)	(6)
Large Inland Utility	34.14	29%	1.16%	9.64	35%
Small Inland Utility	1.00	14%	0.57%	0.15	16%
Large Coastal Utility	44.18	44%	1.77%	12.14	34%
Small Coastal Utility	5.86	44%	1.76%	1.14	22%

(a) Year 2001 average gross per person water use per day from Table 4.1-6 times 2025 population from Table 4.1-5 divided by 1,000,000. Use of the year 2001 in this calculation is consistent with the District's methodology. The year 2001 was an average rainfall year.

(b) Percent change in water use calculated using the formula: Water use$_t$ = Water use$_{t-1}$ x e^{rt}, where r is the growth rate and t is time. Therefore, the percent change in water use from 2000 to 2025 is Ln(water use$_{2025}$) – Ln(water use$_{2000}$).

(c) 2025 projected gross water use (Column 2) minus 90% of Available Supply (from Column (5) of Table 4.1-4).

(d) Column (5) divided by Available Water Supply in Table 4.1-4.

Note: All calculations in this report were made using computer spreadsheets. The values in the tables are rounded for presentation purposes. Thus, using the values reported in the tables to compute other values reported in the tables may result in slightly different values than those reported in the tables.

4.2 New Water Source Development and Conservation Opportunities Available to Public Supply Utilities

The decisions regarding what water sources to access and what types of water conservation methods to employ require significant time and effort for a water utility. Many factors must be considered including degree of access to additional water sources, ability to team with other utilities or purchase additional water from the regional water authority, customer-specific characteristics, and existing financial position of the utility, among other factors.[3] This financial analysis does not attempt to provide a water master plan for each of the case study utilities. Instead, it uses data and information from publicly available sources, in particular, documents of the Southwest Florida Water Management District (District), to provide an overall assessment of water supply and conservation opportunities, their potential costs, and the financial impacts to households.

The water sources that would be used by the case study utilities to obtain additional water are those identified for the case study's county in Chapter 2, Table 2.1-2. The amount of additional water that the case study utility obtains from each source matches the distribution of water found in this table. These sources are seawater desalination, brackish ground water desalination, reclaimed water[4], surface water, fresh ground water and non-agricultural water conservation. Thus, the total mgd of additional water supply/conservation needed by a case study utility was allocated across the sources based on the proportion of the mgd provided by that source in the county where the case study utility is located.

For example, the large coastal utility is located in Manatee County. For this county, Table 2.1-2 identified 10.4 mgd of water to be saved via additional non-agricultural conservation, 20 mgd of water to be provided by seawater desalination, 10.2 mgd of water to be provided by reclaimed water, 8.0 mgd of water from permitted, unused surface water sources, 3.9 mgd from un-permitted surface sources, 6.7 mgd from the intermediate and/or surficial aquifers and 0.1 mgd of permitted, unused water from the Floridan Aquifer. This is a total of 59.3 mgd of water supply/conservation options identified by the District for Manatee County.

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[3] The estimated increased cost of additional time and effort due to the proposed rule revision was presented in Table 5.1-1, item number 2.

[4] The reclaimed water would be either (1) used directly in place of potable water or (2) a ground water offset. A ground water offset is a quantity of ground water available to the utility for potable use after providing reclaimed water to non-potable water users who would then be able to reduce ground water pumpage.

Thus, the 12.14 mgd of water identified as needed by the Large Coastal Utility is allocated as follows: 4.10 mgd from seawater desalination (12.14 x 20/59.3), 2.09 mgd from reclaimed water (12.14 x 10.2/59.3), 1.64 mgd from permitted, unused surface water (12.14 x 8/59.3), 0.80 mgd from un-permitted surface water (12.14 x 3.9/59.3), 1.37 mgd from the intermediate and/or surficial aquifers (12.14 x 6.7/59.3), 0.02 mgd from permitted, unused quantities in the Florida Aquifer (12.14 x 0.1/59.3), and 2.13 mgd from non-agricultural conservation (12.14 x 10.4/59.3).

The water source/conservation options for each case study utility are provided in Table 4.2-1[5]. The inland utilities would rely on reclaimed water, un-permitted surface water, ground water and conservation to meet water demands through 2025. Additional surface water sources are being investigated by the District for inland counties. The coastal utilities would rely on all of the potential water sources: desalination, reclaimed water, surface water, ground water and conservation. Alternatively, depending on the situation of each utility, one or two of these options might be used instead of all four. Distributing the water source/conservation options in proportion to availability within each county provides a weighted average cost of these options.

The incremental capital cost and the annual O&M cost were calculated for each case study utility and each water source using the cost per 1,000 gallons (kgal) information presented in Table 2.2-1 in Chapter 2.0 and the mgd needed from each source as presented in Table 4.2-1. These costs are net of the estimated cost of using the Floridan aquifer, which is the traditional or non-alternative water source used for the cost analyses. All references to costs throughout the remainder of this chapter refer to the incremental costs (water source costs net of the cost to obtain water from the Floridan aquifer).

The total incremental capital costs of additional water supplies needed to meet 2025 water demands in 2005 dollars for each water source and case study utility are provided in Table 4.2-2. For the large inland utility, the total capital cost to obtain 9.64 mgd of additional water is estimated to be $6.2 million. For the small inland utility, the total capital cost to obtain 0.15 mgd of additional water is estimated to be $858,000. For the large coastal utility, the total capital cost to obtain 12.14 mgd of additional water is estimated to be $47 million. For the small coastal utility, the total capital cost to obtain 1.14 mgd of additional water is estimated to be $4.9 million. These incremental capital costs were

[5] The quantities associated with each source are a little different than what was presented in the SERC due to changes in the estimated unused permitted quantities provided by the District.

annualized over 20 years at 5.375 percent interest rate.[6] The annualized values for each supply source and utility are provided in Table 4.2-3.

The incremental annual O&M costs of additional water supplies needed to meet 2025 water demands in 2005 dollars for each water source and case study utility are provided in Table 4.2-4. The annualized capital costs in Table 4.2-3 were added to the annual O&M costs in Table 4.2-4 to obtain the total annualized incremental cost of each water source to the case study utility presented in Table 4.2-5. For the large inland utility, the total annualized incremental capital and O&M cost to obtain 9.64 mgd of additional water is estimated to be $1.1 million per year. For the small inland utility, the total annualized incremental capital and O&M cost to obtain 0.15 mgd of additional water is estimated to be $101,000. For the large coastal utility, the total annualized incremental capital and O&M cost to obtain 12.14 mgd of additional water is estimated to be $8.6 million. For the small coastal utility, the total annualized incremental capital and O&M cost to obtain 1.14 mgd of additional water is estimated to be $620,000.

The average incremental annualized capital and O&M cost per 1,000 gallons to obtain water from these new sources for each case study utility is provided in Table 4.2-6. The average cost per 1,000 gallons of the 9.64 mgd of additional water produced and conserved over all projects to be developed by the large inland utility is $0.33 per 1,000 gallons. This relatively low cost is due to the use of permitted, unused quantities that are available to supply almost one-half of the additional water demand which has a net cost of $0 and the reliance on relatively low cost conservation programs to reduce demand. The average cost per 1,000 gallons of the 0.15 mgd of additional water produced and conserved over all projects to the small inland utility is $1.86 per 1,000 gallons. The average cost per 1,000 gallons of the 12.14 mgd of additional water produced and conserved over all projects to the large coastal utility is $1.93 per 1,000 gallons. For the small coastal utility, the average cost per 1,000 gallons of the 1.14 mgd of additional water produced and conserved over all projects is $1.49 per 1,000 gallons. These costs reflect the distribution of the relatively high cost and low cost water sources and conservation programs used.

[6] The 2005 Federal planning rate for water resources projects is 5.375 percent per year. From Federal Register, December 9, 2004, Volume 69, Number 236, pages 71425 to 71426.

Table 4.2-1
Amount of Water To Be Obtained from New Sources by 2025, mgd (a)

Water Utility	Seawater Desal	Brackish Desal	Reclaimed Water	Surface Water		Ground Water		Conserv-ation	All Sources - Total	New Conservation - % of 2025 Demand
				Permitted / Unused (b)	Un-permitted	IAS and SAS (c)	UFA Unused Permitted			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Large Inland Utility	0.00	0.00	0.97	0.00	0.00	0.70	4.56	3.40	9.64	10%
Small Inland Utility	0.00	0.00	0.01	0.00	0.11	0.00	0.03	0.01	0.15	1%
Large Coastal Utility	4.10	0.00	2.09	1.64	0.80	1.37	0.02	2.13	12.14	5%
Small Coastal Utility	0.00	0.04	0.13	0.04	0.52	0.23	0.00	0.18	1.14	3%

(a) The total amount of water needed by the utility was distributed to new water supplies based on the distribution of new water supplies by source and county provided in Table 2.1-2.

Table 4.2-2
Total Incremental Capital Cost of New Water Supplies to Meet 2025 Water Demand, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv-ation	All Sources - Total
				Permitted / Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$4,663,472	$0	$0	$1,488,418	$0	$0	$6,151,890
Small Inland Utility	$0	$0	$35,634	$0	$822,215	$0	$0	$0	$857,849
Large Coastal Utility	$31,402,923	$0	$7,306,289	$0	$5,804,812	$2,902,686	$0	$0	$47,416,709
Small Coastal Utility	$0	$230,678	$460,613	$0	$3,743,375	$482,889	$0	$0	$4,917,555

Source: Each entry is calculated as follows. The total annualized capital cost is the present value of the amount of water needed from that water source as indicated in Table 4.2-1 times the annualized incremental capital cost per 1,000 gallons associated with the source type from Table 2.2-1 in Chapter 2.0 over 20 years at 5.375% annual interest.

Table 4.2-3
Annualized Incremental Capital Cost of New Water Supplies to Meet 2025 Water Demand, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv - ation	All Sources - Total
				Permitted / Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$386,199	$0	$0	$123,261	$0	$0	$509,460
Small Inland Utility	$0	$0	$2,951	$0	$68,091	$0	$0	$0	$71,042
Large Coastal Utility	$2,600,591	$0	$605,060	$0	$480,718	$240,382	$0	$0	$3,926,751
Small Coastal Utility	$0	$19,103	$38,145	$0	$310,003	$39,990	$0	$0	$407,241

Source: Each entry calculated as the amount water needed from that water source as indicated in Table 4.2-1 times the annualized incremental capital cost per 1,000 gallons associated with the source type from Chapter 2.0, Table 2.2-1.

Table 4.2-4
Annual Incremental O&M Cost of New Water Supplies to Meet 2025 Water Demand, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv - ation	All Sources - Total
				Permitted / Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$75,275	$0	$0	$0	$0	$559,293	$634,568
Small Inland Utility	$0	$0	$575	$0	$28,123	$0	$0	$1,212	$29,910
Large Coastal Utility	$3,866,127	$0	$189,111	$0	$243,794	$0	$0	$350,008	$4,649,041
Small Coastal Utility	$0	$13,250	$11,922	$0	$157,217	$0	$0	$30,298	$212,686

Source: Each entry calculated as the amount water needed from that water source as indicated in Table 4.2-1 times the annual incremental O&M cost per 1,000 gallons associated with the source type from Chapter 2.0, Table 2.2-1

Table 4.2-5
Annual Total Annualized Incremental Cost of New Water Supplies to Meet 2025 Water Demand, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv - ation	All Sources - Total
				Permitted / Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$461,474	$0	$0	$123,261	$0	$559,293	$1,144,028
Small Inland Utility	$0	$0	$3,526	$0	$96,214	$0	$0	$1,212	$100,952
Large Coastal Utility	$6,466,718	$0	$794,172	$0	$724,512	$240,382	$0	$350,008	$8,575,792
Small Coastal Utility	$0	$32,353	$50,067	$0	$467,219	$39,990	$0	$30,298	$619,927

Source: Each entry is the sum of the incremental annualized capital and annual O&M costs presented in Table 4.2-3 and Table 4.2-4.

Table 4.2-6
Average Incremental Cost of Additional Water Produced and Saved Per 1,000 Gallons, 2005 dollars

Water Utility	Total Water Produced or Saved		Total Annualized Cost (b)	Cost per 1,000 Gallons (c)
	Million gallons per day (mgd) (a)	1,000 gallons per year		
(1)	(2)	(3) = (2) x 365 days/year x 1,000,000 / 1,000	(4)	(5) = (4) / (3)
Large Inland Utility	9.64	3,517,486	$1,144,028	$0.33
Small Inland Utility	0.15	54,231	$100,952	$1.86
Large Coastal Utility	12.14	4,432,417	$8,575,792	$1.93
Small Coastal Utility	1.14	415,492	$619,927	$1.49

(a) From Table 4.2-1. (b) From Table 4.2-5. (c) Includes capital and O&M costs.

4.3 Financial Impact of New Water Sources and Conservation Programs on Water Utility Customers

The financial impact of these costs on households was evaluated under two scenarios that define how these projects would be financed. Under Scenario 1, all of the costs would be spread throughout the rate base and paid by all water utility customers. The annual cost per household was calculated and compared to the median annual household income for the county. Scenario 2 assumes that all of the capital costs are recovered through impact fees charged to new residential and commercial development, instead of through the water utility customer rate base. Here the absolute and percent increase in the monthly mortgage payment of new home owners was calculated. The annual O&M cost would be recovered through the water rate.

The calculations and results for Scenario 1 are provided for each of the four case study utilities in Table 4.3-1. If all of the incremental costs are financed through the variable water rate, then this rate would be higher than the rate that would be charged by these case study utilities over the next 20 years if these alternative water sources and conservation projects were not implemented (in 2005 dollars). Depending on the case study utility, the increase would range from $0.09 to $0.53 per 1,000 gallons, in 2005 dollars. This rate increase would be phased in over the period 2005 through 2025 as water sources and conservation programs are developed.

Depending on the case study utility, this translates into an annual water cost increase ranging from $8.36 per household per year for customers of the large inland utility to $39 per household per year for customers of the large coastal utility. Adding this increase to the existing household water bill, the water bill as a percent of median household income would range from 0.49 percent for customers of the Large Coastal Utility to 0.83 percent for customers of the Small Coastal Utility. According to the U.S. Environmental Protection Agency, a guideline for determining if a water bill is affordable is that the total water bill is less than two percent of median household income.[1] The average household size and median household income for each SWUCA county are presented in Table 4.3-2. Each case study utility was assigned one of these values depending on the utility's county.

The blending of water from diverse sources (blending of ground water, surface water and/or desalinated water) may cause undesirable changes in water chemistry. A potential additional cost not included in the cost estimates is the cost to add certain additional

[1] U.S. Environmental Protection Agency, *"Affordability of the 1986 Amendments to Community Water Systems"*, Washington, D.C., 1993. See also, U.S. EPA, *"Information for States on Developing Affordability Criteria for Drinking Water"*.

chemicals to the water to prevent these changes. Research by the American Water Works Association Research Foundation and regional water suppliers is addressing this issue[2]. The utility's cost to address this issue is not likely to result in unaffordable potable water supply.

The financial impact simulated above may be an overestimate of the impact to water bills because the impact of higher prices in lowering water demand was not considered in this analysis. Customers may be able to lower their water use through increases in efficiency or by reducing waste in response to higher prices.

The calculations and results for Scenario 2 are provided for each of the four case study utilities in Table 4.3-3. The capital cost per 1,000 gallons per day of capacity ranges from $53 for the Large Inland Utility to $478 for the Small Inland Utility. Using the average daily household water use of each utility, the estimated increase in the impact fee per new homeowner would range from $13 to $125, depending on the case study utility. If the fee is financed through a mortgage, then the monthly mortgage payment would increase by $0.09 to $0.85 per month, depending on the case study utility. This amount would increase the monthly mortgage payment by 0.01 percent to 0.10 percent, depending on the case study utility.

The annual O&M cost under Scenario 2 would be financed through the water bill. The impact of this cost on the annual water bill and the affordability of the water bill are provided in Table 4.3-4. The increase in the variable water rate in over the period 2005 to 2025 would range from $0.051 per 1,000 gallons to $0.288 per 1,000 gallons. For the average household, the annual water bill would increase in the range of $4.64 to $21 depending on the case study utility. The total water bill would range from 0.44 percent to 0.78 percent of median household income. According to the U. S. Environmental Protection Agency, the guideline for determining if a water bill is affordable is that the total water bill is less than two percent of median household income.[3]

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[2] See for example, Rajendra D. Vaidya, John D Dietz and James S. Taylor, University of Central Florida, *"Iron Release in Drinking Water Distribution Systems*", proceedings of the Florida Section American Water Works Association, November 2005.

[3] U.S. Environmental Protection Agency, *"Affordability of the 1986 Amendments to Community Water Systems"*, Washington, D.C., 1993. See also, U.S. EPA, "Information for States on Developing Affordability Criteria for Drinking Water".

Table 4.3-1
Cost of New Water Sources to Households and Percent of Median Income That is Water Bill by 2025 – Scenario 1 (In 2005 Dollars)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Increase in Variable Water Rate over period 2005 to 2025 (dollars per 1,000 gallons) (a)	$0.092	$0.276	$0.532	$0.290
(2)	Residential Per Capita Daily Water Use as % of Gross Water Use, 2001 (b)	65%	65%	65%	74%
(3)	Annual Water Use Per Household, kgal (c)	91.06	95.25	72.72	84.34
(4)	Annual Cost Of New Water Supplies per Household, 2025 (4) = (1) x (3) (d)	$8.36	$26.26	$38.67	$24.43
(5)	Annual Water Cost per Household Without Project, 2025 (e)	$200	$171	$171	$299
(6)	Annual Water Cost per Household With Project, 2025 (in 2003 dollars) (6) = (4) + (5)	$208	$197	$210	$323
(7)	Median Household Income in 2005 (f)	$37,969	$30,735	$43,219	$39,139
(8)	Water Cost with Project as % of Median Hhd Income (8) = (6) / (7) (g)	0.55%	0.64%	0.49%	0.83%

(a) Total Annual Cost of New Water Supplies divided by the product of Projected Gross Water Use in mgd in 2025, 365 and 1,000.

(b) From Table A-2 of "Estimated Water Use 2001", Southwest Florida Water Management District, Brooksville, Florida. Small inland utility value from City of Wauchula water use information reported to the District in 2001 as fax'd to Hazen and Sawyer from Andy Maddox, Supervisor of Water/Wastewater Services at City of Wauchula, Florida.

(c) Per capita water use times percent that is residential per capita use times average household size in county times 365 divided by 1,000.

(d) Numbers may not multiply to exactly the number shown due to rounding.

(e) For Large Inland Utility, the City of Lakeland's rate structure as of December 2005 was used: $200 = ($5.78 + $1.43 x (91.06/12)) x 12. For Small Inland Utility, City of Wauchula's rate structure as of January 2006 was used: $171 = ($7.18 (for 1st 3,000 gallons) + $1.04 x 3 + $2.04 x (95.25/12 - 6)) x 12. For Large Coastal Utility, Manatee County's rate structure as of December 2005 was used: $171 = ($6.25 + $1.32 x 6 + $1.64 x (72.72/12 - 6)) x 12. For Small Coastal Utility, City of Punta Gorda's rate structure as of December 2005 was used: $299 = ($5.78 + $2.72 x 84.34/12) x 12.

(f) See Tables 4.3-2.

(g) Numbers may not divide to exactly the number shown due to rounding.

Table 4.3-2
Average Household Size and Median Household Income of SWUCA Counties

Item	Polk	Highlands	Hardee	DeSoto
Average household size, 2003 (a)	2.52	2.30	3.06	2.68
Median Household Income, 1993 (b)	$26,244	$21,592	$21,182	$20,515
Median Household Income, 2002 (c)	$34,620	$28,718	$28,004	$27,850
% Annual Growth in Median Income, 1993 to 2002 (d)	3.08%	3.17%	3.10%	3.40%
Est. Median Household Income in 2005	$37,969	$31,582	$30,735	$30,837
Median Household Income Per Month, 2005	$3,164	$2,632	$2,561	$2,570
Item	**Hillsborough**	**Manatee**	**Sarasota**	**Charlotte**
Average household size, 2003 (a)	2.50	2.29	2.13	2.18
Median Household Income, 1993 (b)	$30,354	$27,633	$30,710	$26,217
Median Household Income, 2002 (c)	$42,407	$38,647	$41,360	$35,408
% Annual Growth in Median Income, 1993 to 2002 (d)	3.72%	3.73%	3.31%	3.34%
Est. Median Household Income in 2005	$47,407	$43,219	$45,675	$39,139
Median Household Income Per Month, 2005	$3,951	$3,602	$3,806	$3,262

(a) Average household size by county from University of Florida Bureau of Economic and Business Research, Florida Statistical Abstract, Gainesville, Florida, 2004, pg. 78.

(b) Median household income 1993 by county from University of Florida Bureau of Economic and Business Research, Florida Statistical Abstract, Gainesville, Florida, 1998, pg. 198.

(c) Median household income 2002 by county from University of Florida Bureau of Economic and Business Research, Florida Statistical Abstract, Gainesville, Florida, 2004, pg. 223.

(d) Percent annual growth in median income calculated using the formula: Median Income$_t$ = Median Income$_{t-1}$ x e^{rt}, where r is the growth rate and t is time. Therefore, the average percent change in median income from 1993 to 2002 is [Ln(median income2002) – Ln(median income$_{1993}$)] / 9.

Table 4.3-3
Simulation of How Impact Fees To Finance New Water Sources Affect Monthly Home Mortgage Payment – Scenario 2 (In 2005 Dollars)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Annualized Capital Cost of New Water Supplies (From Table 5.3-10)	$509,460	$71,042	$3,926,751	$407,241
(2)	Total New Water Capacity, 1,000 gallons per day (From Table 5.3-8 times 1,000)	9,637	149	12,144	1,138
(3)	Capital Cost Per 1,000 GPD of Capacity (3) = (1)/(2)	$53	$478	$323	$358
(4)	Household Water Use, 1,000 gallons per day (From Table 5.3-14 / 365)	0.2495	0.2610	0.1992	0.2311
(5)	Increase in Impact Fee per New Homeowner (5) = (3) x (4)	$13	$125	$64	$83
(6)	Annualized Impact Fee (Row (5) amortized at 7.10% per year over 30 years)(a)	$1.07	$10.15	$5.24	$6.73
(7)	Increase in Monthly Mortgage Payment (7) = (6) / 12	$0.09	$0.85	$0.44	$0.56
(8)	Purchase Price of New Home in County, 2000 (b)	$137,508	$128,255	$154,961	$140,450
(9)	Average Monthly Mortgage Payment Before Increase (a)	$932	$870	$1,051	$952
(10)	% Increase in Monthly Mortgage Payment Due to Impact Fee (10) = (7) / (9)	0.01%	0.10%	0.04%	0.06%

(a) Mortgage calculation assumes a 7.10 percent interest rate per year and a 30 year loan. The 7.10 percent interest rate is the average 30-year mortgage interest rate over the past 10 years (1995 to 2004) from the Federal Home Mortgage Corporation www.federalreserve.gov/releases/h15/data/a/cm.txt).

(b) From University of Florida, Bureau of Economic and Business Research, "Florida Statistical Abstract 2004", Gainesville, Florida, Table 2.10, page 81. Values represent purchase price of new homes. Excludes mobile homes. For Large Inland Utility, Polk County value was used. For Small Inland Utility, Hardee County value was used. For Large Coastal Utility, Manatee County value was used. For Small Coastal Utility, Charlotte County value was used.

Table 4.3-4
Annual O&M Cost of New Water Sources to Households and Percent of Median Income That is Water Bill by 2025 – Scenario 2 (In 2005 Dollars)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Increase in Variable Water Rate Over Period 2005 to 2025 to Pay for Annual O&M Cost (dollars per 1,000 gallons) (a)	$0.051	$0.082	$0.288	$0.099
(2)	Residential Per Capita Daily Water Use as % of Gross Water Use, 2001 (b)	65%	65%	65%	74%
(3)	Annual Water Use Per Household, kgal (c)	91.06	95.25	72.72	84.34
(4)	Annual O&M Cost Of New Water Supplies per Household, 2025 (4) = (1) x (3) (d)	$4.64	$7.78	$20.96	$8.38
(5)	Annual Water Cost per Household Without Project, 2025 (e)	$200	$171	$171	$299
(6)	Annual Water Cost per Household With Project, 2025 (in 2003 dollars) (6) = (4) + (5)	$204	$179	$192	$307
(7)	Median Household Income in 2005 (f)	$37,969	$30,735	$43,219	$39,139
(8)	Water Cost with Project as % of Median Hhd Income (8) = (6) / (7) (g)	0.54%	0.58%	0.44%	0.78%

(a) Annual incremental O&M Cost of New Water Supplies (Table 4.2-4) divided by the product of Projected Gross Water Use in mgd in 2025, 365 and 1,000.

(b) From Table A-2 of "Estimated Water Use 2001", Southwest Florida Water Management District, Brooksville, Florida. Small inland utility value from City of Wauchula water use information reported to the District in 2001 as fax'd to Hazen and Sawyer from Andy Maddox, Supervisor of Water/Wastewater Services at City of Wauchula, Florida.

(c) Per capita water use times percent that is residential per capita use times average household size in county times 365 divided by 1,000.

(d) Numbers may not multiply to exactly the number shown due to rounding.

(e) For Large Inland Utility, the City of Lakeland's rate structure as of December 2005 was used: $200 = ($5.78 + $1.43 x (91.06/12)) x 12. For Small Inland Utility, City of Wauchula's rate structure as of January 2006 was used: $171 = ($7.18 (for 1st 3,000 gallons) + $1.04 x 3 + $2.04 x (95.25/12 - 6)) x 12. For Large Coastal Utility, Manatee County's rate structure as of December 2005 was used: $171 = ($6.25 + $1.32 x 6 + $1.64 x (72.72/12 - 6)) x 12. For Small Coastal Utility, City of Punta Gorda's rate structure as of December 2005 was used: $299 = ($5.78 + $2.72 x 84.34/12) x 12.

(f) See Table 4.3-2.

(g) Numbers may not divide to exactly the number shown due to rounding.

4.4 Potential Financial Impact of 100 Percent Alternative Water Source Use to Residential Water Utility Customers

The proposed rule addresses the use of alternative water sources to replace non-alternative supplies "to the greatest extent practical, based on economic, environmental and technical feasibility." This section provides an example of the impact of replacing all of the non-alternative source water of a utility with alternative water supplies. This example is not meant to reflect the requirements of any particular water utility and may never actually be required of a water utility. Each utility or permittee would be evaluated on a case-by-case basis.

The example uses the four case study utilities described previously in this Chapter: a large inland utility; a small inland utility; a large coastal utility and a small coastal utility. The new distribution of all water sold by the utility over all of the alternative water sources available to the utility is provided in Table 4.4-1 for each case study utility. In the same manner that was used in the case study analysis described previously in this Chapter, the total incremental capital costs, the annualized incremental capital costs, the annual incremental O&M costs and the total annualized incremental costs are provided in Tables 4.4-2 to 4.4-5.

The average incremental cost of water produced and saved per 1,000 gallons is provided in Table 4.4-6. The average cost of all water supplies to each utility ranges from $2.16 per 1,000 gallons for the large inland utility to $3.84 per 1,000 gallons to the large coastal utility. These incremental costs would increase the annual residential customer water bill by $183 per year for the small coastal utility to $279 per year for the large coastal utility (See Table 4.4-7). These costs would result in water bills that are from 1.04 percent to 1.32 percent of median household income. Relative to the guidance value of 2.0 percent of median household income, the costs would be affordable to the utility's customers.

In the event that the capital costs are financed through an impact fee and the annual O&M costs are financed through the variable water rate, the financial results are provided in Table 4.4-8 and 4.4-9. The monthly mortgage payment would increased by 0.07 percent for customers of the large coastal utility to 0.13 percent for customers of the small inland utility. Including the annual O&M cost in the variable rate results in the new water bill increasing so that the total bill becomes 0.68 percent of median household income for customers of the large inland utility to 0.95 percent for customers of the small coastal utility.

This analysis demonstrates that use of alternative water supplies with costs as summarized in Table 4.4-6 is likely to be affordable to customers of water supply utilities. Concerns regarding the affordability of alternative water sources to relatively low income customers can be addressed through the rate structure design.

Table 4.4-1
Amount of Water To Be Obtained from Alternative Sources by 2025
When All Water Use Is From Alternative Sources, mgd (a)

Water Utility	Seawater Desal	Brackish Desal	Reclaimed Water	Surface Water		Fresh Ground		Conserv-ation	All Sources - Total	New Conservation - % of 2025 Demand
				Permitted / Unused (b)	Un-permitted	IAS and SAS (c)	UFA Unused Permitted			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Large Inland Utility	0.00	0.00	1.16	0.00	27.93	0.86	0.00	4.18	34.14	12%
Small Inland Utility	0.00	0.00	0.01	0.00	0.98	0.00	0.00	0.01	1.00	1%
Large Coastal Utility	37.86	0.00	2.07	0.00	0.79	1.36	0.00	2.11	44.18	5%
Small Coastal Utility	0.00	4.76	0.13	0.04	0.51	0.23	0.00	0.18	5.86	3%

(a) Total 2025 water use allocated to all available alternative sources for the utility.

Table 4.4-2
Total Incremental Capital Cost of 100 Percent Alternative Water Source Use in 2025, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv-ation	All Sources - Total
				Permitted /Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$5,625,478	$0	$217,969,993	$1,826,412	$0	$0	$225,421,884
Small Inland Utility	$0	$0	$43,120	$0	$7,638,273	$0	$0	$0	$7,681,393
Large Coastal Utility	$290,253,956	$0	$7,233,104	$0	$5,746,667	$2,873,611	$0	$0	$306,107,337
Small Coastal Utility	$0	$28,886,882	$459,432	$0	$3,733,776	$481,650	$0	$0	$33,561,741

Source: Each entry calculated as follows. The total annualized capital cost is the amount water needed from that water source as indicated in Table 4.4-1 times the annualized capital cost per 1,000 gallons associated with the source type from Table 2.2-1 in Chapter 2.0. This value is then converted to the total capital cost by calculating the present value of the total annualized capital cost over 20 years at 5.375% annual interest.

Table 4.4-3
Annualized Incremental Capital Cost of 100 Percent Alternative Water Source Use in 2025, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv-ation	All Sources – Total
				Permitted / Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$465,866	$0	$18,050,891	$151,252	$0	$0	$18,668,009
Small Inland Utility	$0	$0	$3,571	$0	$632,553	$0	$0	$0	$636,124
Large Coastal Utility	$24,036,990	$0	$599,000	$0	$475,902	$237,974	$0	$0	$25,349,867
Small Coastal Utility	$0	$2,392,228	$38,047	$0	$309,208	$39,887	$0	$0	$2,779,370

Source: Each entry calculated as the amount water needed from that water source as indicated in Table 4.4-1 times the annualized capital cost per 1,000 gallons associated with the source type from Chapter 2.0, Table 2.2-1.

Table 4.4-4
Annual Incremental O&M Cost of 100 Percent Alternative Water Source Use in 2025, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv-ation	All Sources - Total
				Permitted / Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$90,803	$0	$7,455,454	$0	$0	$686,300	$8,232,556
Small Inland Utility	$0	$0	$696	$0	$261,260	$0	$0	$1,467	$263,423
Large Coastal Utility	$35,734,209	$0	$187,217	$0	$241,352	$0	$0	$346,503	$36,509,281
Small Coastal Utility	$0	$1,659,183	$11,892	$0	$156,814	$0	$0	$30,220	$1,858,109

Source: Each entry calculated as the amount water needed from that water source as indicated in Table 4.4-1 times the annual O&M cost per 1,000 gallons associated with the source type from Chapter 2.0, Table 2.2-1.

Table 4.4-5
Total Annualized Incremental Cost of 100 Percent Alternative Water Source Use in 2025, 2005 dollars

Water Utility	Seawater Desal	Brackish Ground Water Desal	Reclaimed Water	Surface Water		Fresh Ground Water		Conserv - ation	All Sources - Total
				Permitted / Unused	Un-permitted	IAS and SAS	UFA Unused Permitted		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Large Inland Utility	$0	$0	$556,669	$0	$25,506,345	$151,252	$0	$686,300	$26,900,566
Small Inland Utility	$0	$0	$4,267	$0	$893,813	$0	$0	$1,467	$899,547
Large Coastal Utility	$59,771,199	$0	$786,217	$0	$717,255	$237,974	$0	$346,503	$61,859,148
Small Coastal Utility	$0	$4,051,412	$49,939	$0	$466,021	$39,887	$0	$30,220	$4,637,479

Source: Each entry is the sum of the capital and O&M costs presented in Table 4.4-3 and Table 4.4-4.

Table 4.4-6
Average Incremental Cost of Additional 100 Percent Alternative Water Source Use in 2025, 2005 dollars

Water Utility	Total Water Produced or Saved		Total Annualized Cost (b)	Cost per 1,000 Gallons (c)
	Million gallons per day (mgd) (a)	1,000 gallons per year		
(1)	(2)	(3) = (2) x 365 days/year x 1,000,000 / 1,000	(4)	(5) = (4) / (3)
Large Inland Utility	34.14	12,460,570	$26,900,566	$2.16
Small Inland Utility	1.00	364,749	$899,547	$2.47
Large Coastal Utility	44.18	16,126,032	$61,859,148	$3.84
Small Coastal Utility	5.86	2,140,446	$4,637,479	$2.17

(a) From Table 4.4-1. (b) From Table 4.4-5. (c) Includes capital and O&M costs.

Table 4.4-7
Cost of 100 Percent Alternative Sources to Households and Percent of Median Income That is Water Bill by 2025 (In 2005 Dollars)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Increase in Variable Water Rate over period 2005 to 2025 (dollars per 1,000 gallons) (a)	$2.159	$2.457	$3.836	$2.167
(2)	Residential Per Capita Daily Water Use as % of Gross Water Use, 2001 (b)	65%	65%	65%	74%
(3)	Annual Water Use Per Household, kgal (c)	91.06	95.25	72.72	84.34
(4)	Annual Cost Of New Water Supplies per Household, 2025 (4) = (1) x (3) (d)	$197	$234	$279	$183
(5)	Annual Water Cost per Household Without Project, 2025 (e)	$200	$171	$171	$299
(6)	Annual Water Cost per Household With Project, 2025 (in 2003 dollars) (6) = (4) + (5)	$396	$405	$450	$482
(7)	Median Household Income in 2005 (f)	$37,969	$30,735	$43,219	$39,139
(8)	Water Cost with Project as % of Median Hhd Income (8) = (6) / (7) (g)	1.04%	1.32%	1.04%	1.23%

(a) Total Annual Cost of New Water Supplies divided by the product of Projected Gross Water Use in mgd in 2025, 365 and 1,000.

(b) From Table A-2 of "Estimated Water Use 2001", Southwest Florida Water Management District, Brooksville, Florida. Small inland utility value from City of Wauchula water use information reported to the District in 2001 as fax'd to Hazen and Sawyer from Andy Maddox, Supervisor of Water/Wastewater Services at City of Wauchula, Florida.

(c) Per capita water use times percent that is residential per capita use times average household size in county times 365 divided by 1,000.

(d) Numbers may not multiply to exactly the number shown due to rounding.

(e) For Large Inland Utility, the City of Lakeland's rate structure as of December 2005 was used: $200 = ($5.78 + $1.43 x (91.06/12)) x 12. For Small Inland Utility, City of Wauchula's rate structure as of January 2006 was used: $171 = ($7.18 (for 1st 3,000 gallons) + $1.04 x 3 + $2.04 x (95.25/12 - 6)) x 12. For Large Coastal Utility, Manatee County's rate structure as of December 2005 was used: $171 = ($6.25 + $1.32 x 6 + $1.64 x (72.72/12 - 6)) x 12. For Small Coastal Utility, City of Punta Gorda's rate structure as of December 2005 was used: $299 = ($5.78 + $2.72 x 84.34/12) x 12.

(f) See Tables 4.3-2.

(g) Numbers may not divide to exactly the number shown due to rounding.

Table 4.4-8
Simulation of How Impact Fees To Finance 100 Percent Alternative Water Sources Affect Monthly Home Mortgage Payment, 2005 Dollars

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Annualized Capital Cost of New Water Supplies (From Table 5.3-20)	$18,668,009	$636,124	$25,349,867	$2,779,370
(2)	Total New Water Capacity, 1,000 gallons per day (From Table 5.3-18 times 1,000)	34,139	999	44,181	5,864
(3)	Capital Cost Per 1,000 GPD of Capacity (3) = (1)/(2)	$547	$637	$574	$474
(4)	Household Water Use, 1,000 gallons per day (From Table 5.3-24 / 365)	0.2495	0.2610	0.1992	0.2311
(5)	Increase in Impact Fee per New Homeowner (5) = (3) x (4)	$136	$166	$114	$110
(6)	Annualized Impact Fee (Row (5) amortized at 7.10% per year over 30 years) (a)	$11.10	$13.51	$9.30	$8.91
(7)	Increase in Monthly Mortgage Payment (7) = (6) / 12	$0.92	$1.13	$0.78	$0.74
(8)	Purchase Price of New Home in County, 2000 (b)	$137,508	$128,255	$154,961	$140,450
(9)	Average Monthly Mortgage Payment Before Increase (a)	$932	$870	$1,051	$952
(10)	% Increase in Monthly Mortgage Payment Due to Impact Fee (10) = (7) / (9)	0.10%	0.13%	0.07%	0.08%

(a) Mortgage calculation assumes a 7.10 percent interest rate per year and a 30 year loan. The 7.10 percent interest rate is the average 30-year mortgage interest rate over the past 10 years (1995 to 2004) from the Federal Home Mortgage Corporation www.federalreserve.gov/releases/h15/data/a/cm.txt).

(b) From University of Florida, Bureau of Economic and Business Research, "Florida Statistical Abstract 2004", Gainesville, Florida, Table 2.10, page 81. Values represent purchase price of new homes. Excludes mobile homes. For Large Inland Utility, Polk County value was used. For Small Inland Utility, Hardee County value was used. For Large Coastal Utility, Manatee County value was used. For Small Coastal Utility, Charlotte County value was used.

Table 4.4-9
Annual O&M Cost of New Water Sources to Households and Percent of Median Income That is Water Bill by 2025 – 100 Percent Alternative Water Sources (In 2005 Dollars)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Increase in Variable Water Rate Over Period 2005 to 2025 to Pay for Annual O&M Cost (dollars per 1,000 gallons) (a)	$0.661	$0.719	$2.264	$0.868
(2)	Residential Per Capita Daily Water Use as % of Gross Water Use, 2001 (b)	65%	65%	65%	74%
(3)	Annual Water Use Per Household, kgal (c)	91.06	95.25	72.72	84.34
(4)	Annual O&M Cost Of New Water Supplies per Household, 2025 (4) = (1) x (3) (d)	$60.16	$68.53	$164.64	$73.22
(5)	Annual Water Cost per Household Without Project, 2025 (e)	$200	$171	$171	$299
(6)	Annual Water Cost per Household With Project, 2025 (in 2003 dollars) (6) = (4) + (5)	$260	$240	$336	$372
(7)	Median Household Income in 2005 (f)	$37,969	$30,735	$43,219	$39,139
(8)	Water Cost with Project as % of Median Hhd Income (8) = (6) / (7) (g)	0.68%	0.78%	0.78%	0.95%

(a) Annual O&M Cost of New Water Supplies (Table 4.4-4) divided by the product of Projected Gross Water Use in mgd in 2025, 365 and 1,000.

(b) From Table A-2 of "Estimated Water Use 2001", Southwest Florida Water Management District, Brooksville, Florida. Small inland utility value from City of Wauchula water use information reported to the District in 2001 as fax'd to Hazen and Sawyer from Andy Maddox, Supervisor of Water/Wastewater Services at City of Wauchula, Florida.

(c) Per capita water use times percent that is residential per capita use times average household size in county times 365 divided by 1,000.

(d) Numbers may not multiply to exactly the number shown due to rounding.

(e) For Large Inland Utility, the City of Lakeland's rate structure as of December 2005 was used: $200 = ($5.78 + $1.43 x (91.06/12)) x 12. For Small Inland Utility, City of Wauchula's rate structure as of January 2006 was used: $171 = ($7.18 (for 1st 3,000 gallons) + $1.04 x 3 + $2.04 x (95.25/12 - 6)) x 12. For Large Coastal Utility, Manatee County's rate structure as of December 2005 was used: $171 = ($6.25 + $1.32 x 6 + $1.64 x (72.72/12 - 6)) x 12. For Small Coastal Utility, City of Punta Gorda's rate structure as of December 2005 was used: $299 = ($5.78 + $2.72 x 84.34/12) x 12.

(f) See Table 4.3-2.

(g) Numbers may not divide to exactly the number shown due to rounding.

4.5 Financial Impact Associated with the Water Supply Allocation Described in Chapters 2 and 3

Chapters 2 and 3 of this report described a least cost water supply allocation. The available water source with the lowest cost per 1,000 gallons, including conservation, was chosen first until the amount of water from that source was exhausted. Then the next most cost-effective source was used, and so on, until the additional water demand from 2006 to 2025 was met in each county.

The Public Supply water sources that would be developed in each county from Chapters 2 and 3 of this report were input into the public supply utility model described previously in this chapter to determine whether household water bills would still be affordable. The results are provided in Table 4.5-1. Utilities in five of the eight SWUCA counties would need to develop alternative water sources from 2006 to 2025 to meet growing Public Supply water demand. Each county is listed in a column of the table: Hardee, Highlands, Hillsborough, Manatee and Sarasota counties.

The annual capital and O&M costs of the alternative sources that would need to be developed and the annual capital and O&M costs of the traditional sources that might be used without a Recovery Strategy are provided in the table for each county. As discussed in Chapter 2.0, the upper Floridan aquifer was used as the traditional water source in this study. The annual incremental capital and O&M cost is the difference between these two values and is provided in the table. This incremental cost was used to calculate the increased variable water rate in $ per 1,000 gallons.

This variable water rate was multiplied by the annual water use per household to obtain the increase in the annual per household water bill. This increase is added to the existing water bill of the model utility that most represents the utilities in the county. The adjusted water bill was then compared to the median household income of the county as was presented previously in this chapter to obtain the percent of median household income that is the water bill.

The results in Table 4.5-1 indicated that after financing the incremental water supply costs associated with the SWUCA Recovery Strategy, the water bill as a percent of median household income remains less than two percent. The percentages range from 0.47 percent for Manatee County to 0.70 percent for Hillsborough County. Relative to

the guidance value of 2.0 percent of median household income, the costs would be affordable to the utility's customers[1].

Table 4.5-1
Impact of SWUCA Recovery Strategy on Water Utility Customer Bills,
Least-Cost Water Sources (a)

Item	County				
	Hardee (b)	Highlands (b)	Hillsborough (c)	Manatee (d)	Sarasota (c)
Annual Costs					
Alternative Sources	$48,180	$481,417	$8,420,172	$2,825,268	$3,228,287
Traditional Sources	$48,180	$336,055	$1,698,307	$1,364,556	$1,135,540
Incremental Cost	$0	$145,361	$6,721,865	$1,460,712	$2,092,746
Increase in Variable Water Rate	$0.00	$0.02	$0.41	$0.42	$0.10
Annual Water Use per Household, kgal	95.25	95.25	84.34	72.72	84.34
Increase in Annual Water Bill	$0.00	$2.19	$34.41	$30.80	$8.24
Annual Water Bill Without Recovery Strategy	$171.00	$171.00	$299.00	$171.00	$299.00
Annual Water Bill With Recovery Strategy	$171.00	$173.19	$333.41	$201.80	$307.24
Median Household Income	$30,735	$31,582	$47,407	$43,219	$45,675
Water Bill as % of Median hhd income	0.56%	0.55%	0.70%	0.47%	0.67%

(a) Costs are from Table 3.2-4
(b) Modeled using the characteristics of a small inland utility.
(c) Modeled using the characteristics of a small coastal utility.
(d) Modeled using the characteristics of a large coastal utility.

[1] U.S. Environmental Protection Agency, "*Affordability of the 1986 Amendments to Community Water Systems"*, Washington, D.C., 1993. See also, U.S. EPA, *"Information for States on Developing Affordability Criteria for Drinking Water"*.

Section 5.0
Agricultural Water Users Potential Economic Impact of SWUCA Recovery Strategy

5.1 Summary of Potential Economic Impacts

Most water use in agriculture is for crop irrigation. Water is also used in livestock operations but no increases in water demand for this use is forecast over the next 20 years. Overall agricultural irrigation water demand in the SWUCA is expected to fall by 40.2 mgd. In Hardee, Hillsborough and Sarasota counties, agricultural irrigation water demand is expected to increase by 25.6 mgd, 3.6 mgd and 1.3 mgd, respectively for a total increase of 30.5 mgd. Agricultural water demand in the other five SWUCA counties is expected to fall by 70.7 mgd. In the analysis of Chapters 2.0 and 3.0, the 30.5 mgd increased water demand is supplied as follows: 4.6 mgd is supplied by unused permitted quantities, 3.2 mgd is saved from water conservation activities and investments, and 21.7 mgd is supplied by historically used permitted quantities from other agricultural operations that leave production.

If most of the additional agricultural irrigation demands can be supplied with permitted upper Floridan aquifer water quantities from the crops that leave production, then no negative impacts to agriculture from the Recovery Strategy are expected through 2025, the last year evaluated in this study. This result emphasizes the importance of the Self-Relocation and Net Benefits provisions of the proposed SWUCA rule revisions as they are expected to facilitate movement of permitted ground water quantities to new agricultural operations as old operations leave production.

Historically and today, agriculture in the SWUCA relies on relatively inexpensive ground and surface water sources to irrigate cropland. Most of this water, or about 85 percent, is obtained from ground water.[1] If permitted water supplies from relatively inexpensive ground water sources become scarce, new and expanding growers may need to obtain water from projects that are more expensive relative to traditional sources. This section demonstrates that agricultural operators are limited in the amount of money they can pay for water supply before residual returns to land and risk fall to zero and land leaves production.

[1] Southwest Florida Water Management District, Regulatory Database as of November 2005.

It is useful to compute and examine estimates of the breakeven cost of water among farms. The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation.[2] As water prices increase, the return to land and risk falls. When the return to land and risk declines and is less than the return that could be gained from another use on that land, the land will be put into that other land use.

In the case where the land has no associated water use permit or feasible water source, alternative land uses may be limited. If the land is located near a growing urban area, the landowner may choose to produce the crop until returns fall to zero, buying time to take advantage of rising land prices before selling. Thus, the breakeven cost provides some idea about how much of the water cost growers might be able to bear before significant quantities of land leave production.

To this end, 11 model farms were chosen that represent the characteristics of farms in the SWUCA. The characteristics are crop type, irrigation system, location, cultural practices and seasonality. This sub-section summarizes the characteristics of farms in the SWUCA, crop acreage projections, and the model farms chosen.

5.2 Crop Acreage Projections

Year 2000 and 2005 and projections of irrigated acreage through 2025 by major crop type are presented in Table 5.2-1. These are recent projections from the District that represent the SWUCA area. The acreages for an individual crop may be less than the permitted acreage for that crop because permitted crops are not produced every year.

[2] Return to land and risk is revenue from sales of agricultural products minus all costs of production including the opportunity cost of investments as reflected in the interest cost (average rate of return) and not including land rent (or value of the land).

Table 5.2-1
Irrigated Crop Acreage Projections in the SWUCA

Major Crop Categories	Year						% Growth from 2005 to 2025
	2000	2005	2010	2015	2020	2025	
Citrus	303,383	273,210	258,058	253,202	248,873	243,234	-11%
Cucumbers	3,023	2,090	1,449	1,449	1,449	1,449	-31%
Field Crops	2,971	2,909	2,818	2,818	2,818	2,818	-3%
Melons	5,013	4,666	3,536	2,937	2,538	2,575	-45%
Nurseries	4,878	5,535	6,086	6,231	6,377	6,521	18%
Other Veg./Row Crops	12,911	12,772	13,380	13,473	13,551	13,625	7%
Pasture	4,873	4,881	4,881	4,881	4,881	4,881	0%
Potatoes	3,288	2,882	2,526	2,526	2,526	2,526	-12%
Sod	14,608	14,608	14,608	14,608	14,608	14,608	0%
Strawberries	4,746	5,222	5,798	5,798	5,798	5,798	11%
Tomatoes	13,942	12,819	11,791	11,313	10,762	10,232	-20%
Total	373,634	341,595	324,930	319,235	314,180	308,266	-10%

Source: Southwest Florida Water Management District, unpublished data, December 2005.

The acreages of three major crop categories are expected to grow through the year 2025. Nursery production is expected to grow by 18 percent between the year 2005 and 2025 while strawberries and other vegetable and row crops (primarily peppers and squash) are expected to grow by 11 percent and 7 percent, respectively, over the same period. Pasture and sod acreages are not expected to grow while acreages in all other crops are expected to fall.

5.3 Selection of 11 Model Farms

Given the crop water use characteristics in the SWUCA and the crop acreage projections, eleven model farms were chosen. These 11 model farms are described in Table 5.3-1. These model farms address those crops that are predominant in the SWUCA.

Table 5.3-1
Description of Model Farms

Farm #	Crop Type	Season	Irrigation System (a)	Location or Soil
1	Sod – St. Augustine grass	Year round	Seepage or sprinkler	SWUCA
2	Sod – Bahia grass	Year round	Seepage or sprinkler	SWUCA
3	Container Woody Ornamentals	Year round	Micro-jet, drip or sprinkler	SWUCA
4	Field Woody Ornamentals	Year round	Seepage, microjet, drip or sprinkler	SWUCA
5	Flowering Plants		Micro-jet, drip or sprinkler	
6	Citrus - ridge	Year round	Microjet or sprinkler	Highlands and Polk
7	Citrus - flatwoods	Year round	Microjet or sprinkler	Hillsborough, Manatee, Hardee, DeSoto, Charlotte and Sarasota
8	Tomatoes - Fall	Fall	Seepage or drip	Myakka soil (mulched)
9	Tomatoes - Spring	Spring	Seepage or drip	Myakka soil (mulched)
10	Strawberries	Year round	Drip	Hillsborough, Manatee, Polk
11	Cucumbers	Spring and Fall	Seepage or drip	SWUCA

(a) Listed in order of predominance. From HSW Engineering, Inc. in association with Gary Bethune, P.E., Hazen and Sawyer and Water Resources Associates, Inc., "Irrigation Water Conservation Options and Water Resource / Water Supply Development Opportunities for Agricultural Water Users", August 2000, Appendix A of Technical Memorandum No. 1, Prepared for the Southwest Florida Water Management District. Tables 2.4A through 2.10A.

5.4 Breakeven Cost of Water for Irrigation

The data needed to estimate breakeven costs are the returns to land and risk per acre by crop type and the irrigation water requirement by crop type. Each is discussed in turn below.

In order to estimate the breakeven cost for irrigation, estimates of revenues and costs of agricultural products grown in the SWUCA must be obtained. The best available estimates are from the University of Florida, Institute of Food and Agricultural Sciences, Extension Service. These were used in this analysis. However, bear in mind that agricultural practices are very diverse in the SWUCA even within a crop category.

A summary of the revenues and costs for the 11 model farms is provided in Table 5.4-1. The value per unit is the expected revenue per acre or per 1,000 square feet from selling the commodity. The cost per unit is the expected costs of production, management, taxes, regulations, interest, and depreciation. The net value per acre is the return to land and risk. When the return to land and risk is less than zero, the land leaves production and converts to a more profitable land use or becomes fallow if no other land uses are profitable. Estimated net values per unit range from -$221 per acre for southwest Florida citrus production to $1,519 per acre for Spring Tomatoes.

Table 5.4-1
Estimated Revenues and Costs of Agricultural Products Grown in the SWUCA, 2005

Crop	Unit of Measure	Value per Unit	Cost per Unit	Net Value per Unit
Sod - St. Augustine grass	Acres (a)	$4,675	$3,269	$1,406
Sod – Bahia grass	Acres (a)	NA	NA	$1,054
Container Woody Ornamentals	1,000 Square Feet (b)	$838	$682	$157
Field Woody Ornamentals	1,000 Square Feet (b)	$872	$615	$257
Flowering Plants	1,000 Square Feet (b)	$4,092	$3,980	$112
Citrus – Central Florida (c)	Acres	$1,819	$1,351	$468
Citrus – Southwest Florida (d)	Acres	$1,295	$1,423	-$127
Tomatoes – Fall	Acres	$12,017	$11,367	$650
Tomatoes – Spring	Acres	$13,118	$11,599	$1,519
Strawberries – single cropped (e)	Acres	$24,597	$24,723	-$126
Cucumbers - double cropped	Acres	$6,683	$4,944	$1,739

(a) This is a gross acre and equals 4,840 square yards. The land use includes sod, canals, roads and ditches. The net value per unit for Bahia grass is from telephone conversation with Dr. Alan Hodges, University of Florida Institute of Food and Agricultural Sciences, January 2006.

(b) A square foot includes net usable growing area and includes production plus space within growing beds and fields and excludes space in aisles, driveways, and other service areas. Revenue and cost data from Alan W. Hodges, Loretta N. Satterthwaite and John J. Haydu, "Business Analysis of Ornamental Plant Nurseries in Florida, 1998", University of Florida, Institute of Food and Agricultural Sciences, Food and Resource Economics Department, pages 9 and 13. Costs include labor, supplies, facility and equipment operaton, repair and maintenance, overhead, depreciation and interest. Revenue and costs converted from 1998 dollars to 2005 dollars using the GDP chained price index (1998 value x 1.12 = 2005 value). Net returns were verified by Dr. Alan Hodges except that his estimate of net value per unit for Flowering Plants is higher than that reported here.

(c) Central Florida includes the counties of Polk, Highlands, Hardee and Hillsborough.

(d) Southwest Florida includes the counties of Desoto and Charlotte.

(e) Double cropped strawberry production would be more profitable.

These estimates of net revenue were calculated as the average real price of the product over the past five years minus the most recent costs of production. Using this method, single-cropped strawberries and southwest Florida citrus were found to have negative returns to land and risk. Strawberry production in southwest Florida is often part of a double crop system where cucumbers, onions, radishes, cherry tomatoes or cantaloupe is grown after the strawberries are harvested to take advantage of the mulch and soil nutrients provided during strawberry production. This lowers the production cost of the second crop and increases its returns such that the double crop combination may be profitable. Due to differences in production and management practices among growers, the net returns to some strawberry and southwest Florida citrus growers may be positive. If net returns remain negative for several years, industry contraction is expected.

The sources of these estimates are provided in Tables 5.4-2 through 5.4-5, except for the ornamentals and flowering plants which are from Hodges, Satterthwaite and Haydu as indicated in footnote (b) of Table 5.4-1. For southwest Florida citrus and central Flor-

ida citrus, the itemized revenue and cost data are presented in Table 5.4-2 and Table 5.4-3, respectively. For fall and spring tomatoes, the revenue and cost data are presented in Table 5.4-4. For strawberries, cucumbers and sod, the revenue and cost data are presented in Table 5.4-5.

Table 5.4-2
Revenue and Costs of Southwest Florida Hamlin Oranges Grown for Processed Market, 2004-2005 Season [(a)]

Item	$ per Acre
Revenue, on-tree, 506 boxes at $2.56 per box [(b)]	$1,295
Costs [(c)]	
Production & Cultural Costs	$833
Interest on Production & Cultural Costs	$42
Management Costs	$48
Taxes / Regulatory Costs	$66
Depreciation and Interest [(d)]	$435
Total Cost	$1,423
Returns to Land, Trees and Risk [Revenue - Total Cost]	**-$127**

(a) Represents a mature (10+ years old) Southwest Florida orange grove.

(b) On-tree price per box is average price for Hamlin oranges (early-midseason excluding navel) in Florida from 1999-2000 to 2003-2004 from Florida Agricultural Statistics Service, preliminary Citrus Summaries 2002-2003, 2003-2004. All nominal prices were converted to 2005 dollars using the GDP Chained Price Index. According to page 2 of the FASS "Florida Citrus Summary, 2003-2004" report, "All prices ... are on-tree prices representing the average price received by growers for their fruit. The term "on-tree" relates to fruit returns to the grower after the costs of picking, hauling, and packing have been removed. Prices are based on records of commmercial fresh fruit sales and processed fruit returns." Yield of 506 boxes per acre is based on distribution of trees by age and boxes per tree by age and is from Ronald P. Muraro, Fritz M. Roka, Robert E. Rouse, "Budgeting Costs and Returns for Southwest Florida Citrus Production, 2003-2004, University of Florida IFAS Extension, EDIS FE 528, September 2004, page 14.

(c) Costs from: Muraro, Ronald P., "Summary of 2004-2005 Citrus Budgets for the Southwest Forida Production Region." University of Florida, IFAS, CREC, Lake Alfred, Florida. August 2005. Table 3. Processed Hamlin oranges, low cost cultural program, online version available from EDIS).

(d) Page 7 of Muraro, Roka and Rouse, September 2003, "Also, average annual debt payment (principal and interest) may be as high as $435 per acre ($3,700 average debt per acres @ 10 percent interest amortized over 20 years) …" This value was used as an estimate for depreciation and interest.

Table 5.4-3
Revenue and Costs of Central Florida Valencia Oranges Grown for Processed Market, 2003-2004 Season [(a)]

Item	$ per Acre per Year
Revenue, on-tree, 450 boxes at $4.04 per box [(b), (c)]	$1,819
Costs [(d)]	
Production & Cultural Costs	$774
Interest on Production & Cultural Costs	$21
Management Costs	$48
Taxes / Regulatory Costs	$67
Depreciation and Interest [(e)]	$440
Total Cost	$1,351
Returns to Land, Trees and Risk [Revenue - Total Cost]	$468

(a) Represents a mature (10+ years old) Central Florida (Ridge) Orange Grove.

(b) On-tree price per box is average price in Florida from 1999-2000 to 2003-2004 adjusted to 2004 dollars; obtained from Ronald P. Muraro, W. Greg Hartt and W.C. Oswalt, "Budgeting Costs and Returns for Central Florida Citrus, 2003-04", page 9, EDIS FE 526, University of Florida, IFAS Extension, Food and Resource Economics Department, September 2004 and represent Florida Valencia oranges for processing.

(c) From page 2 of the FASS "Florida Citrus Summary, 2003-04" report, "All prices ... are on-tree prices representing the average price received by growers for their fruit. The term "on-tree" relates to fruit returns to the grower after the costs of picking, hauling, and packing have been removed. Prices are based on records of commmercial fresh fruit sales and processed fruit returns." Average yield from 1999-2000 season through 2003-2004 season of 450 boxes per acre is based on distribution of trees by age and boxes per tree by age and is from Ronald P. Muraro, W. Greg Hartt, Robert E. Rouse, "Budgeting Costs and Returns for Southwest Florida Citrus Production, 2002-2003, University of Florida IFAS Extension, EDIS FE 526, September 2004, page 8.

(d) Costs from: Ronald P. Muraro, W. Greg Hartt, and W.C. Oswalt, "Budgeting Costs and Returns for Central Florida Citrus Production, 2003-2004, University of Florida IFAS Extension, EDIS FE 526, September 2004, page 7 (Table 4).

(e) Page 5 of Muraro, Hartt and Oswalt September 2004, "Also, average annual debt payment (principal and interest) may be as high as $440 per acre ($3,750 average debt per acres @ 10 percent interest amortized over 20 years) …" This value was used as an estimate for depreciation and interest on capital investments.

Table 5.4-4
Revenue and Costs of Tomatoes Grown in the Manatee/ Ruskin Area of Florida, 2003-2004

Item	$ per Acre per Year		
	Fall - Single Crop	**Fall - Double Crop**	**Spring - Single Crop**
Revenue (Cartons per acre times Price per Carton) (a)	$12,017	$12,017	$13,118
Costs (b)			
Operating Costs	$3,515	$3,515	$3,297
Plant Management	$1,283	$1,152	$1,252
Fixed Costs, excluding land rent (c)	$1,925	$1,886	$1,796
Harvest and Marketing Costs	$4,644	$4,644	$5,255
Total Cost	**$11,367**	**$11,196**	**$11,599**
Returns to Land and Risk	**$650**	**$820**	**$1,519**

(a) Price is $8.90 per carton for Fall tomatoes and $8.46 per carton for Spring tomatoes from Florida Agricultural Statistics Service, "Florida Agricultural Facts 2003", page E-17, National Agricultural Statistics Service, www.nass.usda.gov. Weighted average price per 25 pound carton in Fall (Sept through Feb) and in Spring (Mar through Aug) averaged over 1999 to 2003. Prices converted to 2003 dollars using the GDP chained price index. Yield per acre is 1,350 cartons for Fall tomatoes and 1,550 for Spring tomatoes from Scott and Taylor, 2005, as cited in the next footnote, no page or table number. The five year yield per acre from 1999 to 2003 is 1,385 cartons per acre over both the Fall and Spring seasons (source is page E-17 of Florida Agricultural Facts 2003 cited above).

(b) From Scott Smith and Timothy Taylor, "Cost of Production for Florida Vegetables, 2003-04", Department of Food and Resource Economics, Florida Cooperative Extension Service, UF/IFAS, University of Florida, Gainesville, Florida, 2005. Website: http://www.agbuscenter.ifas.ufl.edu/ cost/cop03-04/tableofcontents.htm.

(c) Includes machinery fixed cost, farm management and overhead.

Table 5.4-5
Revenue and Costs of Strawberries, Cucumbers and Sod in Southwest Florida, 2003-2004

Item	$ per Acre		
	Strawberries in Plant City, single crop (a)	**Cucumbers, SW Fla, double crop (b)**	**Sod - St. Augustine Grass (c)**
Revenue			
Pricing Units	12 lb Flats	55 lb-bushel	square yard
Price	$11.22	$11.72	$1.22
Yield per acre	2,192	570	3,848
Total Revenue	**$24,597**	**$6,683**	**$4,675**
Costs			
Variable Costs	$5,025	$1,160	$1,111
Plant Management	$2,351	$289	
Operator Labor Management	$0	$0.00	$124
Fixed Costs, excluding land rent	$2,787	$700	$1,022
Harvest and Marketing Costs	$14,560	$2,796	$1,012
Total Cost	**$24,723**	**$4,944**	**$3,269**
Returns to Land and Risk (Total Revenue minus Total Cost)	**-$126**	**$1,739**	**$1,406**

(a) Strawberry costs from Scott Smith and Timothy Taylor, "Strawberries: Estimated Production Costs in the Plant City Area - 2003-2004." Department of Food and Resource Economics, Florida Cooperative Extension Service, UF/IFAS, University of Florida, Gainesville, Florida, December 2005. Strawberry prices and yields are 5 year averages from 1999 to 2003 and are from Florida Agricultural Statistics Service, "Florida Agricultural Facts 2003", page E-16, National Agricultural Statistics Service, www.nass.usda.gov. Nominal prices were converted to 2005 dollars. Double cropping strawberries with other crops will increase the overall net returns to the land.

(b) Cucumber costs from Scott Smith and Timothy Taylor, "Cucumbers: Estimated Production Costs in a Double-Crop System for the Southwest Florida Area - 2003-2004." Department of Food and Resource Economics, Florida Cooperative Extension Service, UF/IFAS, University of Florida, Gainesville, Florida, December 2005. Cucumber prices and yields are 5 year averages from 1999 to 2003 and are from Florida Agricultural Statistics Service, "Florida Agricultural Facts 2003", page E-11, National Agricultural Statistics Service, www.nass.usda.gov. Nominal prices were converted to 2003 dollars.

(c) Costs based on Hazen and Sawyer, SWUCA Economic Impact Statement prepared for the Southwest Florida Water Management District, November 1994. Table 2-13 in Appendix 9.3-B, Summary Budgets for Model Farms and Irrigation Systems. Costs include labor, supplies, facility and equipment operation, repair and maintenance, overhead, depreciation and interest. Updated to 2003 using information from JJ. Haydu, L.N. Satterthwaite and J.L. Cisar, "An Economic and Agronomic Profile of Florida's Sod Industry in 2003", April 2005, University of Florida IFAS, Food and Resource Economics Department, Gainesville, Florida, page 22 and "An Economic and Agronomic Profile of Florida's Sod Industry in 2000", July 2002, page 22. Prices from Haydu, et.al, April 2005, page 13. The square yards harvested per acre are also from Haydu, et.al., April 2005, page 11 and from Haydu, July 2002.

The estimated water use per acre was obtained from a source document to the District's 2001 Regional Water Supply Plan that estimated the water savings from water conservation in irrigated agriculture. The supplemental crop water requirements per year per acre for each model farm are summarized in Table 5.4-6. For each model farm, the wa-

ter requirements are based on the weighted average acreages in each type of irrigation system in the SWUCA as well as the weighted average of other factors that affect supplemental water requirements and include crop establishment quantities.

Table 5.4-6
Estimated Water Use per Acre from AGMOD Using Water Use Efficiencies Implied from Distribution of Irrigation System in Each County

Crop	County	Acres in 2000	Water Need For Crop		
			MGD in 5-in-10 Rainfall Year	Kgal per day per acre	Kgal per year per acre
Citrus	Highlands	42,896	61.01	1.42	519
Citrus	Polk	101,699	109.08	1.07	391
Citrus - Ridge	Highlands and Polk	144,595	170.09	1.18	429
Citrus	SWUCA	323,180	329.10	1.02	372
Citrus - Flatwoods	Rest of SWUCA	178,585	159.01	0.89	325
Tomatoes - Fall	SWUCA	6,600	14.69	2.23	812
Tomatoes - Spring	SWUCA	9,866	32.88	3.33	1,216
Sod	SWUCA	23,029	63.17	2.74	1,001
Strawberries	SWUCA	1,789	4.53	2.53	924
Cucumbers - Fall	SWUCA	3,193	4.95	1.55	566
Cucumbers - Spring	SWUCA	2,909	6.89	2.37	865
Cucumbers - Fall and Spring	SWUCA	6,102	11.84	1.94	708
Container Nurseries	SWUCA	2,084	9.55	4.58	1,673
Field Nurseries	SWUCA	4,275	21.99	5.14	1,878

Source: HSW Engineering, Inc. in association with Gary Bethune, P.E., Hazen and Sawyer and Water Resources Associates, Inc., "Irrigation Water Conservation Options and Water Resource / Water Supply Development Opportunities for Agricultural Water Users", August 2000, Appendix A of Technical Memorandum No. 1, Prepared for the Southwest Florida Water Management District. Tables 2.4A, 2.4B, 2.9A, 2.9B, 2.15A and 2.15B. Includes crop establishment quantities.

The estimated breakeven cost was then calculated for each model farm. The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation. The results are provided in Table 5.4-7. The estimated breakeven cost per 1,000 gallons of water used above what farmers already pay for water ranges from $0.0 for southwest Florida citrus and strawberries to $5.80 for field woody ornamentals.

For Fall Tomatoes, the estimated breakeven water cost is $0.80 per 1,000 gallons. For cucumbers, a $2.40 per 1,000 gallons water cost would cause the model cucumber farm to leave production permanently. As the return to land and risk falls, the model farm becomes more vulnerable to other events that cause returns to fall such as chronic low

commodity prices, increases in other costs, and pest or disease outbreaks. Farm owner reaction to higher water costs will likely be to significantly increase water use efficiency through improved irrigation management and technologies to the extent that they are affordable.

The purpose of presenting the breakeven costs is to demonstrate that most agricultural operations are not likely to be able to afford the full cost of all new water supplies. However, additional water conservation activities and investments may be economically feasible for many growers. According to the District's 2001 RWSP, page 136, "Although there will be opportunities for agricultural users to make use of alternative sources such as surface water and reclaimed water, in general, they will need to continue to rely to a large degree on access to ground water. This is because the cost of conveying water from alternative sources will, in many cases, be prohibitive."

Table 5.4-7
Impact of Alternative Water Source Cost on Economic Feasibility of Agricultural Production by Crop Type

Crop	Unit of Measure	Applied Water Needs - Kgal per Unit per Year	Breakeven Cost of Alternative Water Supply, $/kgal (a)	Cost of Alternative Water Supply, $/unit/year (a)	Net Crop Returns After Water Cost, $/unit
				Low	
Sod – St. Augustinegrass	Acres	1,001	$1.40	$1,402	$4
Sod – Bahiagrass	Acres	1,001	$1.05	$1,051	$3
Container Woody Ornamentals	1,000 Sq. Ft.	38	$3.90	$150	$2
Field Woody Ornamentals	1,000 Sq. Ft.	43	$5.80	$250	$0
Flowering Plants	1,000 Sq. Ft.	38	$2.80	$108	$1
Citrus – Central Florida	Acres	429	$1.05	$451	$17
Citrus – Southwest Florida	Acres	325	$0.00	$0	-$127
Tomatoes – Fall	Acres	812	$0.80	$650	$0
Tomatoes – Spring	Acres	1,216	$1.24	$1,508	$10
Strawberries – single cropped	Acres	924	$0.00	$0	-$126
Cucumbers – double cropped	Acres	708	$2.40	$1,700	$39

(a) The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation.
(b) Double cropping strawberries with other crops will increase the overall net returns to the land.

5.5 Irrigation Districts

To achieve economies of scale in obtaining new water supplies, growers may wish to form a water district for the purpose of developing and financing water sources. Such districts could be created under Chapter 298, Florida Statutes, "Drainage and Water Control" or under Chapter 190, Florida Statutes, "Community Development Districts."[3]

Historically, most Chapter 298 districts were created for both flood control and irrigation, beginning with the Everglades Drainage District. The Chapter 298 districts in the agricultural parts of Florida still perform these functions. For example, there are Chapter 298 Districts in the Everglades Agricultural Area and in several citrus growing areas of Florida. Chapter 190 Districts also have the authority to provide irrigation water but, in practice, rarely use it. As Community Development Districts they are used more frequently for flood control, roads, bridges, sewage disposal, recreation, and the like for new communities.

Chapter 298 Districts are created by a special act of the Legislature. If there is no controversy, they are usually fairly simple to create. The basic steps to create a Chapter 298 district are: (a) identify the lands to be included and get the consent of all landowners, (b) request and obtain a letter of support or no objection from the local general purpose government where the district will be located, (c) draft legislation and request sponsorship by members of county legislative delegation, (d) obtain approval for introduction of legislation by county legislative delegation, (e) lobby passage of bill through the Legislature and approval by the Governor.

If a Chapter 190 District is formed, the area must be larger than 1,000 acres. The process is: (a) identify the lands to be included and get the consent of all landowners, (b) prepare a petition and various plan documents and file them with The Florida Land and Water Adjudicatory Commission (FLAWAC), (c) conduct a hearing on the matter of creation before a Department of Administrative Hearing officer, (d) prepare a proposed order creating the District by rule, and (e) appear before the FLAWAC for final hearing and adoption of a rule creating the district.

The biggest obstacles to creating a Chapter 298 or 190 district would be any citizen or political opposition to its creation. Either type of district can accept grants.

For a Chapter 298 district, if there is no opposition, the cost has typically run $20,000 to $35,000. For a Chapter 190 district, creation is more costly because of the need for de-

[3] We thank Mr. Terry Lewis, J.D., of Lewis, Longman and Walker for providing valuable information regarding Chapter 298 and Chapter 190 Districts.

tailed engineering and planning documents and expert testimony at the hearing. With lawyers, engineers, planners, economists, etc, creation could cost from $50,000 to $100,000.

Section 6.0
Industrial/Commercial and Mining Dewatering Water Users – Potential Economic Impact of SWUCA Recovery Strategy

Industrial/Commercial and Mining/Dewatering businesses within the District that withdraw water directly from water sources[1] include chemical manufacturers, food processors, food packers, mining /dewatering operations, thermoelectric power generators, and other types of manufacturers. Much of the food processing industry in the SWUCA is associated with citrus and other agricultural crops. Most of the chemical manufacturing businesses are phosphate fertilizer manufacturers that are closely associated with the local phosphate mining industry. Thermoelectric power generators create the electricity used to supply the regional electric grid and use water for cooling and other purposes involved in the generation of electricity. Water used for mining and dewatering is associated with phosphate, limestone, sand, and shell mining in the SWUCA.

6.1 Water Demand Increases from 2005 to 2025

As presented in Chapters 2 and 3 of this report, four of the eight SWUCA counties will see an increase in water demand by industrial/commercial and mining/dewatering self-supplied water users over the next 20 years. SWUCA-wide water demand for these uses will increase 5.8 mgd. Water demand increases are expected in Hardee County (5.8 mgd) Hillsborough County (0.9 mgd), Manatee County (0.3 mgd) and Sarasota County (0.1 mgd). These water demands can be supplied through water conservation and with reclaimed water, currently unpermitted surface water, and unused permitted water quantities. A water demand reduction is expected in Polk County and no changes are expected in Charlotte, DeSoto and Highlands counties.

In Hardee County, 3.7 mgd of currently unpermitted surface water may need to be developed to supply this need at a cost of about $2.72 per 1,000 gallons, which is about $2.50 more than the cost of pumping water from the Floridan aquifer. About 0.6 mgd of water could be supplied with reclaimed water at a cost of about $1.53 per 1,000 gallons (see Table 2.2-2 under HWA), which is about $1.31 more than the cost of pumping water from the Floridan aquifer. Another 0.1 mgd would be water saved through non-agricultural conservation and the rest, 1.4 mgd would be provided by unused permitted quantities.

[1] Instead of purchasing water from a water utility

In Hillsborough County, about 0.9 mgd of reclaimed water may need to be developed at a cost of about $1.35 per 1,000 (See Table 2.2-2 under Hillsborough County in SWUCA), which is about $1.13 more than the cost of pumping water from the Floridan aquifer. In Manatee County, about 0.3 mgd of reclaimed water may need to be developed at a cost of about $1.26 per 1,000 gallons, which is about $1.04 more than the cost of pumping water from the Floridan aquifer. Water users in Sarasota County, may be able to access currently unused, permitted quantities to supply the estimated 0.1 mgd increase in water demand.

This chapter presents an evaluation of the financial impact of alternative water source costs to all manufacturers, fertilizer manufacturers, food processors, electric power generators, phosphate mining companies and sand and gravel mining companies.

6.2 Financial Impact of Alternative Water Source Costs to Manufacturing and Mining Firms in the SWUCA

The potential financial impacts of alternative water source costs to Industrial/Commercial and Mining/Dewatering self-supplied water users were estimated. To this end, the average net incomes before taxes of manufacturing and mining businesses in the SWUCA counties were estimated using the available manufacturing and mining economic data from the U.S. Bureau of the Census. Then the incremental costs of alternative water sources were compared to the estimated net incomes.

The available data for the SWUCA counties and industries is provided in Table 6.1-1. The data represents the year 2002 which is the most recent year available. This table shows, for each industry type and location, the number of firms or establishments, the value added[2], the number of employees, employee payroll, and total capital expenditures in 2002. This data is from the U.S. Bureau of the Census. The net income before taxes was calculated using these data and the result is provided in Column (9) of the table. Net income before taxes was estimated as the Value Added minus two times Employee Payroll minus Total Capital Expenditures. Employee payroll was doubled to represent the payroll and benefits to employees plus overhead not accounted for in Value Added. The average net income per firm is provided in Column (10).

[2] (a) Valued added is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories. This definition is from the U.S. Census.

The potential financial impacts of alternative water source costs to Industrial / Commercial and Mining / Dewatering self supplied water users are provided in Table 6.1-2. The county and industry type are provided in Columns (1) and (2). The average net incomes per firm are provided in Column (3). These values were taken from Table 6.1-1. The average permitted water uses per firm in gallons per day by industry type are provided in Column (4) and were taken from Hazen and Sawyer[3]. The highest incremental cost of reclaimed water per 1,000 gallons presented in Chapter 6.1 is $1.31 and corresponds to Hardee County. This cost was applied to the permitted average daily quantities of all industries except the three food processing industries to obtain a potential cost of reclaimed water to each industry if all of the water supply comes from reclaimed water. For the three food processing industries, the incremental cost of surface water to Hardee County, $2.50 per 1,000 gallons, was used. This is annual cost presented in Column (5).

[3] *"Statement of Estimated Regulatory Costs for SWUCA II Rule-Making",* prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, pages 3-9 and 3-10 (Tables 3.2-4 and 3.2-5, Column (4))

Table 6.1-1
Available Industry Statistics for SWUCA Counties - 2002: Manufacturing and Mining

County	NAICS Code	Industry	No. of Firms	Value Added ($1,000) (a)	Employees		Total Capital Expenditures ($1,000)	Net income Before Taxes ($1,000) (b)	Average Net Income per Firm ($)
					Number	Payroll ($1,000)			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) = (5) - ((7) x 2.0) - (8)	(10) = (9) / (4)
Charlotte	31-33	Manufacturing	86	$64,113	638	$21,602	$1,906	$19,003	$220,965
Highlands	31-33	Manufacturing	49	$96,027	996	$29,580	$3,011	$33,856	$690,939
Hillsborough	31-33	Manufacturing	930	$3,157,296	29,054	$1,032,341	$200,814	$891,800	$958,925
Manatee	31-33	Manufacturing	268	$1,009,947	9,640	$340,163	$129,526	$200,095	$746,623
Polk	31-33	Manufacturing	452	$2,229,138	16,088	$599,415	$207,531	$822,777	$1,820,303
Sarasota	31-33	Manufacturing	386	$631,906	7,803	$271,420	$36,485	$52,581	$136,220
Hillsborough	32531	Fertilizer Manufacture	7	$193,977	990	$56,608	$45,584	$35,177	$5,025,229
Polk	325312	Phos. Fert. Manufact.	5	$475,392	1,843	$98,006	$78,921	$200,459	$40,091,856
Polk	311	Food Manufacturing	30	$838,536	3,638	$153,700	$34,793	$496,343	$16,544,767
Polk	311411	Frozen Fruit, Juice, & Vegetable Mfg.	5	$229,111	626	$29,692	$6,868	$162,859	$32,571,800
Polk	311421	Fruit and Vegetable Canning	5	$365,028	1,217	$62,689	$16,270	$223,380	$44,676,000
Florida	212392	Phosphate Rock Mining	7	$381,779	2,129	$99,180	$65,116	$118,303	$16,900,429
Florida	212321	Construction: Sand & Gravel Mining	68	$86,221	547	$17,529	$4,248	$46,915	$689,926

(a) Valued added is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories. This definition is from the U.S. Census.

(b) Total employee costs are total payroll times 2.0 to account for benefits and overhead.

(c) From United States Census Bureau, "2002 Economic Census: Sector 31: Manufacturing: Geographic Area Series: Industry Statistics for the States, Metropolitan and Micropolitan Statistical Areas, Counties, and Places (Table 3)." Release Date: September 28, 2005. AND United States Census Bureau, "2002 Economic Census: Sector 21: Mining: Geographic Area Series: Industry Statistics for the State or Offshore Areas: 2002 ." Census Bureau Release Date - September 16, 2005 [Accessed via American FactFinder].

Table 6.1-2
Potential Financial Impact of the Alternative Water Source Costs to Industrial/Commercial and Mining/Dewatering Self-Supplied Water Users

County	Industry	Average Net Income per Firm ($) (a)	Average Water Use Per Firm in gpd (b)	Water Cost per Year when Incremental Cost of all Water is $1.31 per kgal		Water Cost per Year when Incremental Cost of 25% of Water is $1.31 per kgal	
				Annual Cost	Cost as % of Net Returns	Annual Cost	Cost as % of Net Returns
(1)	(2)	(3)	(4)	(5) = 365 x (4) x $1.31 or $2.50 / 1000	(6) = (5) / (3)	(7) = 0.25 x 365 x (4) x $1.31 or $2.50 / 1000	(8) = (7) / (3)
Charlotte	Manufacturing (c)	$220,965	748,000	$358,000	162%	$89,500	41%
Highlands	Manufacturing (c)	$690,939	748,000	$358,000	52%	$89,500	13%
Hillsborough	Manufacturing (c)	$958,925	748,000	$358,000	37%	$89,500	9%
Manatee	Manufacturing (c)	$746,623	748,000	$358,000	48%	$89,500	12%
Polk	Manufacturing (c)	$1,820,303	748,000	$358,000	20%	$89,500	5%
Sarasota	Manufacturing (c)	$136,220	748,000	$358,000	263%	$89,500	66%
Hillsborough	Fertilizer Manufacture (c)	$5,025,229	2,295,840	$1,098,000	22%	$274,500	5%
Polk	Phos. Fert. Manufacture (c)	$40,091,856	2,295,840	$1,098,000	2.74%	$274,500	0.68%
Polk	Food Manufacturing (d)	$16,544,767	150,400	$137,000	0.83%	$34,250	0.21%
Polk	Frozen Fruit, Juice, & Vegetable Mfg. (d)	$32,571,800	519,000	$474,000	1.46%	$118,500	0.36%
Polk	Fruit and Vegetable Canning (d)	$44,676,000	150,400	$137,000	0.31%	$34,250	0.08%
Florida	Phosphate Rock Mining (c)	$16,900,429	18,967,000	$9,069,000	54%	$2,267,250	13%
Florida	Construction: Sand & Gravel Mining (c)	$689,926	262,100	$125,000	18%	$31,250	5%

(a) From Table 6.1-1
(b) From "Statement of Estimated Regulatory Costs for SWUCA II Rule-Making", prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, pages 3-9 and 3-10 (Tables 3.2-4 and 3.2-5)
(c) Reclaimed water is used at an incremental cost of $1.31 per 1,000 gallons.
(d) Surface water is used at an incremental cost of $2.50 per 1,000 gallons.

The annual incremental cost as a percent of net returns per firm is provided in Column (6). This incremental cost is a significant percentage of estimated net returns before taxes for all industries and locations except the food manufacturing and fertilizer manufacturing firms in Polk County. For these firms, the incremental costs represent less than 10 percent of net returns. While industry standards regarding the required minimum net return on investment varies among industries and firms, increased costs that represent less than 10 percent of net returns are not likely to keep that industry from growing in the area. If costs greater than 10 percent of net returns increase the likelihood that industries will locate elsewhere, most manufacturers in the SWUCA may not be able to afford to obtain all of their water supplies from any source with incremental cost as high as $1.31 per 1,000 gallons.

When only 25 percent of the water used comes from alternative water sources, the cost impact falls significantly. The average manufacturing firm in Hillsborough and Polk counties and the average sand and gravel mining firm in the SWUCA are more likely to be able to afford the cost.

Financial data for firms in Hardee County are not published by the U.S. Government due to individual firm disclosure concerns. While it is not known exactly what types of new firms and industries will locate in Hardee County, it seems probable at this time that the phosphate mining, fertilizer manufacturing, and electric power generation industries will grow. Phosphate mining and possibly the fertilizer manufacturing industries are expected to move from the northern areas of the SWUCA, particularly Polk County to southern areas of the SWUCA, particularly Hardee County. These firms will be able to move their permitted quantities under the Self-Relocation provision of the proposed SWUCA rule revisions, so these industries are not expected to be negatively affected by the SWUCA Recovery Strategy.

6.3 Financial Impact of Alternative Water Source Costs to Electric Power Generating Firms in the SWUCA

There are 19 water use permits for electric power generation in the SWUCA. The District forecasts no increase in water demand for power generation in the SWUCA through 2025.

Additional generating units are anticipated to be built in the SWUCA through 2014. These units are summarized in Table 6.3-1. Of the 15 electric generation companies in the SWUCA, six of these companies are included in the Florida Public Service Commission (FPSC) report, titled “A Review of Florida Electric Utility 2005 Ten-Year Site Plans”, Tallahassee, Florida, December 2006. Of these companies, four are anticipating the construction of additional power generating units in the SWUCA over the next ten years. These companies are Progress Energy Florida, Florida Power and Light Company,

Tampa Electric Company and Seminole Electric Cooperative. Review of the permit files of these permittees found that from 1.5 mgd to 7.3 mgd of the average daily permitted quantity was not used during 2005. For Progress Energy Florida, the most recent year for which water use estimates were available was 2002.

Some of these permittees have been able to use technologies that significantly reduce the amount of water needed to produce electricity. Thus, the unused permitted quantities may be sufficient to supply power generation needs in the future. In the event that more expensive alternative water sources must be used, the cost increase would be passed on to consumers through higher electricity rates.

Table 6.3-1

Summary of Florida Electricity Demand and Planned Electric Generation Expansion of Major Electricity Companies in the SWUCA

Utility Company Name	Florida Counties Served (a)	Electricity Sales to Ultimate Customers, mWh (a)	Annual Percentage Growth Rate, 2005 to 2014 (b)		New Generating Units Planned in Florida through 2014 (b)	Water Source Notes (b)
			Winter Demand	Summer Demand		
Progress Energy Florida	34 including Hardee, Highlands and Polk	37,956,700	2.78%	2.90%	Hines Units 3, 4, 5 and 6 in 2005, 2007, 2009, 2010, respectively. Three new units at undetermined sites, one each in 2012, 2013, and 2014.	According to the District, Hines energy complex is permitted as a 0 discharge site. As future units are added to the site, cooling and process water are expected to come from stormwater runoff and reclaimed water. Additional sites, such as Anclote and Bartow, are also expected to use sources other than groundwater from expansion.
Florida Power and Light	33 including Charlotte, DeSoto, Hardee, highlands, Manatee and Sarasota	99,635,281	4.03%	2.25%	The only expansion in the SWUCA is Manatee Unit 3 in 2005.	According to the SWFWMD, Manatee Unit 3 incorporates water conservation efforts and uses water sources other than groundwater.
Tampa Electric Company	Hillsborough, Pasco, Pinellas and Polk	18,242,316	3.31%	3.29%	Three units in Polk County in 2010, 2011, and 2013 and one unit at an unspecified site.	According to the SWFWMD, the planned units are combustion turbine (CT) units, which require relatively less water for cooling purposes.
City of Lakeland	Polk	2,736,686	2.03%	2.12%	None	
Seminole Electric Cooperative	Provides bulk supplies of electricity to distribution coops serving 45 counties. One Hardee Co. plant is in SWUCA.		4.13%	4.04%	Five units at the Payne Creek site in Hardee County in 2006. 14 additional units are planned at unspecified sites from 2007 to 2014.	The SWFWMD has expressed concerns over potential for additional water usage.
Calpine	Independent Power Producer				No units planned in SWUCA	

(a) From University of Florida, Bureau of Economic and Business Research, "Florida Statistical Abstract - 2004", Gainesville, page 476. SEC information from their web site, www.seminole-electric.com.

(b) From Florida Public Service Commission, "A Review of Florida Electric Utility 2005 Ten-Year Site Plans", Tallahasse, December 2006.

For example, the incremental cost of obtaining 2.3 mgd of water from alternative sources could be as high as $3.69 per 1,000 gallons. The 2.3 mgd is the average permitted quantity of water used per permit for consumptive cooling in the SWUCA. A $3.2 million per year increase in the incremental cost of water supply for a company that sells 18,242,316 mWh per year (such as Tampa Electric Company), would likely result in a request to the Florida Public Service Commission for a rate increase of $0.000173 per kWh. For a family consuming 15,500 kWh per year, which is the case for Tampa Electric Company's residential customers, the increased water cost would increase the average residential customer's water bill by $2.68 per year. These calculations are provided in Table 6.3-2. This additional cost is unlikely to cause undue hardship to electricity customers. Thus, negative impacts to the economy are not expected from the SWUCA Recovery Strategy through 2025 as it affects electric generating companies.

Table 6.3-2
Impact of Incremental Alternative Water Source Cost on Electric Utility Customers

Item	Value
Average gallons per day for consumptive cooling (a)	2,345,000
Incremental cost of currently un-permitted surface water at $3.91 per kgal less $0.22 per kgal (b)	$3.69
Annual incremental cost of currently un-permitted surface water	$3,158,363
Annual mwh sold (TECO, for example) (c)	18,242,316
Annual kwh sold, 1 mWh = 1,000 kWh	18,242,316,000
Incremental Water Cost per kwh sold	$0.000173
Average kwh used per year per residence (residential consumption) in Florida (d)	15,500
Annual increase in electricity bill	$2.68

(a) "Statement of Estimated Regulatory Costs for SWUCA II Rule-Making", prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, page 5-78.
(b) Ibid. page 5-8.
(c) From Table 6.3-1.
(d) From Florida Statistical Abstract, University of Florida Bureau of Economic and Business Research Gainesville, Florida, 2004, page 485.

6.4 Conclusions

The firms most likely to be negatively impacted by the SWUCA Recovery Strategy are those that:

- Are new to the area or cannot Self Relocate sufficient permitted water quantities, and,
- Have difficulty passing on increased costs to their customers.

Some firms may be able to access affordable water supplies through the Net Benefit provision. It is likely that some firms may be discouraged from locating in the SWUCA due to the lack of affordable water supplies. If the forecasted SWUCA-wide Industrial/ Commercial water demand growth is expected to be only 5.8 mgd over the next 20 years, then the impact to the regional SWUCA economy may not be significant. However, if actual water demand growth of Industrial/Commercial Use Types is greater than forecasted, the economy will not grow as fast as it otherwise would have if water users could continue pumping from relatively inexpensive ground and surface water sources.

Section 7.0
Recreation and Aesthetic Water Users – Potential Economic Impact of SWUCA Recovery Strategy

7.1 Summary of Potential Financial Impacts

Water demand increases for Recreation and Aesthetic Use Types are expected in all SWUCA counties over the next 25 years. Recreation and Aesthetic Use Types include golf course irrigation, condominium and apartment complex lawn and landscape irrigation, and the irrigation of playing fields, botanical plants and landscapes at public and private parks, schools, and playgrounds.

The SWUCA-wide water demand increase is expected to be 15.3 mgd. About 3.9 mgd might be supplied by unused, permitted water quantities. The remaining 11.4 mgd is expected to be supplied with reclaimed water. The estimated average capital and O&M cost of reclaimed water is $1.26 per 1,000 gallons (from Table 2.2-2 corresponding to PR/MRWSA). The incremental cost is $1.04 per 1,000 gallons after subtracting an estimated $0.22 per 1,000 gallons cost of non-alternative sources. The following sections evaluate the potential economic impact as the incremental cost of water supply becomes $1.04 per 1,000 gallons for recreation and aesthetic water users who do not have access to non-alternative water supplies such as ground water pumping.

Using the current distribution of Recreation / Aesthetic permittees by type of entity and the estimate of about 153 applicants for new permitted quantities over the next 20 years,[1] the estimated numbers of applicants for new permitted quantities by type of entity are provided in Table 7.1-1. This distribution is consistent with the SWUCA-wide water demand increase of 15.3 mgd. While golf courses will use more additional water, there will be more applications for irrigation of large urban landscaping at apartments, subdivisions and condominiums (62 applicants versus 37 applicants). There could be as many as 19 new schools requesting new permitted water quantities.

Potential financial impacts of the incremental reclaimed water costs to new golf courses, public parks and schools and multi-family households that are expected to locate in the SWUCA over the next 20 years are provided in the following sections.

[1] From *"Statement of Estimated Regulatory Costs for SWUCA II Rule-Making"*, prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, Table 3.3-8, page 3-31.

Table 7.1-1
Estimated Number of Applicants for New Quantities in the SWUCA for Recreation / Aesthetic Uses from 2006 to 2025

Type of Entity	Number of Rec/Aes Permittees in SWUCA, 2005	% of Rec / Aes Permittees	Number of New Applicants, 2006 to 2025
Golf Courses	126	24.14%	**37**
Schools			**19**
Charlotte in SWUCA	1	0.19%	0
DeSoto	1	0.19%	0
Hardee	0	0.00%	0
Highlands in SWUCA	11	2.11%	3
Hillsborough in SWUCA	4	0.77%	1
Manatee	20	3.83%	6
Polk in SWUCA	21	4.02%	6
Sarasota	7	1.34%	2
Colleges	4	0.77%	**1**
Parks - Government owned	18	3.45%	**5**
Cemeteries	7	1.34%	**2**
Large Urban landscaping for Apartments, Sub-Divisions, Condos	212	40.61%	**62**
Commercial establishments	44	8.43%	**13**
Churches	14	2.68%	**4**
Private parks	7	1.34%	**2**
Fire Station	1	0.19%	**0**
Manatee Co SPCA	1	0.19%	**0**
Unknown	23	4.41%	**7**
Total	522	100.00%	**153**

7.2 Potential Economic Impacts to Golf Courses

Golf course irrigation in the SWUCA currently comprises 56 percent of the total permitted quantities for Recreation / Aesthetic Use Types[2]. There are currently 126 water use permits assigned to golf courses in the SWUCA. Most of the projected additional water demand increase of Recreation / Aesthetic Use Types is comprised of water demand at golf courses as more and more courses are built in the SWUCA[3].

The financial impacts to an average golf course of using reclaimed water sources and surface water sources to supply ALL of the irrigation water needs of the golf course are provided in Table 7.2-1 and Table 7.2-2. The tables simulate the impact of the incremental water costs on the green fees and net operating income of a golf course of similar characteristics to those in the SWUCA. The information used for this evaluation is from the National Golf Foundation.

When reclaimed water costs $1.26 per 1,000 gallons as presented in Table 7.2-1, the incremental cost increase is $1.04 per 1,000 gallons assuming that ground water source cost is $0.22 per 1,000 gallons. Using the average permitted water quantity per permittee of 240,000 gallons per day[4] or 87,600,000 gallons per year, the increase in the annual water cost is $91,104. This represents from 3.52 percent to 4.26 percent of the median daily green fees of daily fee and municipal golf courses and annual membership fee of private golf courses. The increased water cost as a percent of net operating income is 16 to 35 percent. The daily fee would need to increase by about $2.02 per round of golf at daily fee courses and about $1.27 per round of golf at municipal golf courses to recover the incremental water costs. The annual membership dues at private golf courses would need to increase by about $232.

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[2] From *"Statement of Estimated Regulatory Costs for SWUCA II Rule-Making"*, prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, Table 3.2-6, page 3-11.

[3] From draft Regional Water Supply Plan Update, Southwest Florida Water Management District, Chapter 4, November 2005.

[4] From *"Statement of Estimated Regulatory Costs for SWUCA II Rule-Making*", prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, Table 3.2-6, page 3-11.

When the surface water source costs $2.08 per 1,000 gallons (from Chapter 2.0) as presented in Table 7.2-2, the incremental cost increase is $1.86 per 1,000 gallons assuming that the ground water source cost is $0.22 per 1,000 gallons. Using the average permitted water quantity per permittee of 240,000 gallons per day or 87,600,000 gallons per year, the increase in annual water cost is $163,000. This represents 6.3 to 7.6 percent of the median daily green fees of daily fee and municipal golf courses and annual membership fee of private golf courses. The increased water cost as a percent of net operating income is 28 to 62 percent. The daily fee would need to increase by about $3.62 per round of golf at daily fee courses and about $2.26 per round of golf at municipal golf courses to recover the incremental water costs. The annual membership dues at private golf courses would need to increase by about $416.

In 2004, the highest reclaimed water charge to golf courses documented in the 2004 Reuse Inventory prepared by the Florida Department of Environmental Protection is $0.79 per 1,000 gallons. This implies an incremental cost of $0.57 per 1,000 gallons. Thus, it appears that, historically, golf courses have not had to pay more than this amount for reclaimed water. Alternatively, golf course owners may be able to access the surficial aquifer using horizontal wells at a cost that is significantly lower than the costs evaluated here. The District estimates that the capital cost to access the surficial aquifer is about $0.50 per 1,000 gallons. This cost is more in line with what is paid by some golf courses in Florida.

The incremental costs of water evaluated here may prevent some new golf course construction particularly where the golf course cannot pass through the incremental water costs due to competition from courses that have sufficient permitted ground water quantities or because the client base is sensitive with respect to green fees. It is also likely that the demand for golf will be strong enough so that golfers will be willing to pay the extra fee needed to recover the incremental water costs and many golf courses will still be constructed and operated profitably.

Table 7.2-1
Financial Impact of Reclaimed Water Supply Costs
on Golf Fees and Net Operating Income, 2005 Dollars
Water Cost is $1.26 per 1,000 gallons
18-Hole Golf Facilities in South Florida

Item	Type of Golf Course		
	Daily Fee	**Municipal**	**Private**
Cost of Alternative Water Source per 1,000 gallons	$1.26	$1.26	$1.26
Cost Of Ground water per 1,000 gallons	$0.22	$0.22	$0.22
Water Cost Increase Per 1,000 Gallons	$1.04	$1.04	$1.04
Water Use Per Year in kgal, avg per golf course	87,600	87,600	87,600
Increase in Annual Water Cost	$91,104	$91,104	$91,104
Annual Rounds of Golf Per Course in south Florida	45,000	72,000	30,000
Number of Members Estimate			392
Water Cost Per Round of Golf	$2.02	$1.27	$3.04
Annual Water Cost Per Member - Private Golf Course			$232
Median Daily Weekend Fee In south Florida	$48	$36	
Water Cost as Percent of Median Daily Weekend Fee	**4.26%**	**3.52%**	
New Daily Fee to Recover Increased Water Cost	$49.57	$37.19	
Median Annual Dues			$5,494
Water Cost as Percent of Annual Dues			**4.23%**
Net Operating Income (median)	$369,803	$581,120	$263,089
Water Cost As % of Net Operating Income[(a)]	**24.64%**	**15.68%**	**34.63%**

[(a)] Net operating income is total revenue less total expenses, before taxes, debt service and depreciation.

Source: National Golf Foundation, "Operating and Financial Performance Profiles of 18-Hole Golf Facilities in the U.S., Climate Region 1", Jupiter, Florida, 2001 (Climate Region 2 includes all of southeastern U.S. so the smaller Climate Region 1, which is Florida from just north of Lake Okeechobee to Key West was used.) Pages 57, 38, 58, 60, 11, 23, 35, 20, 32. All 2001 dollar values converted to 2005 dollars using GDP Chained Price Index Factor of 1.06.

Table 7.2-2
Financial Impact of Surface Water Source Costs
on Golf Fees and Net Operating Income, 2005 Dollars
Water Cost is $2.08 per 1,000 gallons
18-Hole Golf Facilities in South Florida

Item	Type of Golf Course		
	Daily Fee	**Municipal**	**Private**
Cost of Alternative Water Source per 1,000 gallons	$2.08	$2.08	$2.08
Cost Of Ground water per 1,000 gallons	$0.22	$0.22	$0.22
Water Cost Increase Per 1,000 Gallons	$1.86	$1.86	$1.86
Water Use Per Year in kgal, avg per golf course	87,600	87,600	87,600
Increase in Annual Water Cost	$162,936	$162,936	$162,936
Annual Rounds of Golf Per Course in south Florida	45,000	72,000	30,000
Number of Members Estimate - Private Golf Course			392
Water Cost Per Round of Golf	$3.62	$2.26	$5.43
Annual Water Cost Per Member - Private Golf Course			$416
Median Daily Weekend Fee In south Florida	$48	$36	
Water Cost as Percent of Median Daily Weekend Fee	**7.62%**	**6.30%**	
New Daily Fee to Recover Increased Water Cost	$51.17	$38.19	
Median Annual Dues - Private Golf Course			$5,494
Water Cost as Percent of Annual Dues			7.57%
Net Operating Income (median)	$369,803	$581,120	$263,089
Water Cost As % of Net Operating Income[(a)]	**44.06%**	**28.04%**	**61.93%**

[(a)] *Net operating income is total revenue less total expenses, before taxes, debt service and depreciation.*

Source: National Golf Foundation, "Operating and Financial Performance Profiles of 18-Hole Golf Facilities in the U.S., Climate Region 1", Jupiter, Florida, 2001 (Climate Region 2 includes all of southeastern U.S. so the smaller Climate Region 1, which is Florida from just north of Lake Okeechobee to Key West was used.) Pages 57, 38, 58, 60, 11, 23, 35, 20, 32. All 2001 dollar values converted to 2005 dollars using GDP Chained Price Index Factor of 1.06.

7.3 Potential Economic Impacts to Households

New multi-family complexes, public schools and parks will likely need to use alternative water sources in order to obtain new water quantities for landscape irrigation. As was presented in Table 7.1-1, about 19 new schools, 18 new government parks and 212 new apartments, condominiums and sub-divisions in the SWUCA may request new permitted water quantities for lawn and landscape irrigation. The incremental costs of alternative water sources will likely be paid by the households located in the school districts, park districts, apartments, condominiums and sub-divisions that will used the alternative source water. This section evaluates the potential impact of reclaimed water incremental costs to households.

The financial impact of reclaimed water incremental costs for school and park landscape irrigation on the average annual household ad valorem tax bill is provided in Table 7.3-1. Each county in the SWUCA was assigned the number of new schools as was presented in Table 7.1-1 except that one school each was added for Charlotte, DeSoto and Hardee counties. These three counties are associated with zero new schools in Table 7.1-1. In reality, while new schools are expected to be built, the location of new schools is not known with certainty and could be located in one of these three counties. The number of government owned parks is 5 and was taken from Table 7.3-1. For the financial evaluation, each SWUCA county was assigned one new park. This information is presented in Columns (1) and (2) of Table 7.3-1.

The average daily water use per applicant is provided in Column (3). The average daily water use of each school was estimated to be 55,000 gallons per day. The average daily water use of each government owned park was estimated to be 33,000 gallons per day. These values were taken from Table 3.2-6 of the "Statement of Estimated Regulatory Costs for SWUCA II Rule-Making", prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, Table 3.2-6, page 3-11. The total average daily water use for each school district and for the government owned parks is provided in Column (4).

The annual incremental water costs to the school districts and to the parks when all of the applied water is reclaimed water are presented in Column (5). The numbers of occupied housing units in each county are presented in Column (6). The annual ad valorem tax increases per household are presented in Column (7) and were calculated as the annual incremental cost divided by the number of occupied housing units. For new schools, the estimated annual ad valorem tax increase per household ranges from $0.06 in Hillsborough County to $2.55 in Hardee County. For new government owned parks, the estimated annual ad valorem tax increase per household ranges from $0.03 in Hillsborough County to $1.53 in Hardee County.

While the ad valorem tax increases are not significant, the incremental cost is likely to reduce the size of landscaped areas and lawns to those that are necessary for school recreation activities and sports activities. If the proposed withdrawal is relatively small so that it does not impact MFL water bodies, then the water use may be permitted.

Table 7.3-1
Financial Impact of Reclaimed Water Incremental Costs for School and Park Landscape Irrigation on Average Annual Household Ad Valorem Tax Bill

Type of Entity	Number of New Applicant, 2006-2025	Avg. Water Use per Applicant, gpd (a)	Water Use All Applicants, mgd	Annual Incremental Cost of Reclaimed Water, $1.04 per kgal	No. of Occupied Housing Units in County (b)	Annual Ad Valorem Tax Increase per Household
(1)	(2)	(3)	(4) = (3) x (2)	(5) = (4) x 1.04 x 365 / 1000	(6)	(7) = (5) / (6)
Schools						
Charlotte in SWUCA	1	55,000	55,000	$20,878	68,647	$0.30
DeSoto	1	55,000	55,000	$20,878	11,343	$1.84
Hardee	1	55,000	55,000	$20,878	8,192	$2.55
Highlands in SWUCA	3	55,000	177,328	$67,314	38,776	$1.74
Hillsborough in SWUCA	1	55,000	64,483	$24,478	434,440	$0.06
Manatee	6	55,000	322,414	$122,388	132,215	$0.93
Polk in SWUCA	6	55,000	338,534	$128,508	200,593	$0.64
Sarasota	2	55,000	112,845	$42,836	161,937	$0.26
Parks - Government owned	5	33,000	174,103	$66,090		
Charlotte in SWUCA	1	33,000	33,000	$12,527	68,647	$0.18
DeSoto	1	33,000	33,000	$12,527	11,343	$1.10
Hardee	1	33,000	33,000	$12,527	8,192	$1.53
Highlands in SWUCA	1	33,000	33,000	$12,527	38,776	$0.32
Hillsborough in SWUCA	1	33,000	33,000	$12,527	434,440	$0.03
Manatee	1	33,000	33,000	$12,527	132,215	$0.09
Polk in SWUCA	1	33,000	33,000	$12,527	200,593	$0.06
Sarasota	1	33,000	33,000	$12,527	161,937	$0.08

(a) *From "Statement of Estimated Regulatory Costs for SWUCA II Rule-Making", prepared by Hazen and Sawyer for the Southwest Florida Water Management District, March 14, 2006, Table 3.2-6, page 3-11.*

(b) *The number of occupied housing units in the entire county. From 2003 and 2004 American Community Survey, U.S. Census Bureau.*

The financial impact to households from reclaimed water incremental costs for large landscape irrigation is evaluated in Table 7.3-2. Because actual data on the size of large landscaped areas, the amount of water used per acre on large landscaped areas and the number of households associated with these large landscaped areas are not available, an example was used to illustrate the cost impact. The average daily water use per acre of landscaping is presumed to be about ¾ inches per week as recommended by the University of Florida Institute of Food and Agricultural Sciences. For one acre of landscaping, this equates to 20,366 gallons per acre per week5 or 2,910 gallons per day per acre.

When all of this water demand is supplied with reclaimed water at an incremental cost of $1.04 per 1,000 gallons, then the annual incremental water cost is $1,105 per acre of landscaping. If 30 households are associated with each acre of landscaping, then the monthly incremental water cost per household would be $3.07.

The impact of having to use more expensive alternative water sources will be smaller and more water efficient landscape areas at the new developments.

Table 7.3-2
Financial Impact of Reclaimed Water Incremental Costs for Large Landscape Irrigation To Households

Item	Value
Average daily water use per acre of landscaping (3/4 inch per week), gpd[(a)]	2,910
Annual Incremental Cost of Using Reclaimed Water per Acre ($1.04 /kgal)	$1,105
Number of Multi-Family Households per Acre of Landscaping	30
Annual Incremental Cost per Household	$36.82
Monthly Incremental Cost per Household	$3.07

[(a)] *3/4 inch per week based on "Watering Your Florida Lawn", L.E. Trenholm, J.B. Unruh, and J.L. Cisar, University of Florida, Institute of Food and Agricultural Sciences Extension Service, ENH 9, May 2003.*

[5] One acre-inch equals 27,154 gallons per acre.

Section 8.0
Economic Contribution of State Funding to the SWUCA

About $6.6 million per year in State funding[1] will likely be available over the next nine years to pay for some of the construction costs associated with alternative water supply projects in the SWUCA. The present value of this funding is $46 million which covers about 37 percent of the estimated cost of the SWUCA Recovery Strategy.[2] This funding has the potential to turn unaffordable water sources into affordable water sources for many households and new self-supplied businesses.

About 90 percent of this State funding would come from Florida households outside of the SWUCA. This outside funding will generate income, tax revenues and employment to the residents of the SWUCA counties and this economic contribution is the focus of this Chapter. Funding from sources within the SWUCA is not considered here because it would not generate additional income, tax revenue or employment to the SWUCA area. Instead it is a transfer of money from one person to another within the SWUCA economy. The following definitions will assist in interpreting how the economic contribution was estimated and the meaning of the results.

Economic Contribution. Economic contribution is the contribution of outside funding to output, labor and proprietor's income, other property type income, employment and tax revenues. Economic contribution is comprised of direct, indirect and induced economic contributions.

Direct Economic Contribution. A water utility uses outside funding to hire a firm to build a water project. This firm is called the direct firm and the output of this firm, the income paid to the firm's owners and employees, the firm's employment and the firm's tax payments that result from being paid to build the project are the direct economic contributions.

Indirect and Induced Economic Contribution. The indirect and induced economic contributions capture the "multiplier effect" of spending.

[1] From Senate Bill 444.

[2] The present value of $6.6 million per year for 9 years at 5.375% discount rate is $46 million. The estimated incremental cost of the Recovery Strategy is $124 million from Chapter 2.0 of this report.

Indirect Economic Contribution. In order to build the water project, the direct firm buys goods and services from businesses. These businesses purchase goods and services from their own employees and from "other" businesses in order to serve the direct business.

Induced Economic Contribution. The income earned by these "other" businesses and all of the affected employees continues to be re-spent in the economy.

Example of the Multiplier Effect. An employee earns income and spends it on goods and services. Those who sold him the goods and services receive a portion of the employee's income as their own income which they spend on their own goods and services and so on. Thus, when an employee spends $50,000, this expenditure is worth even more money in the economy.

Output. The value of the goods and services produced in the SWUCA as a result of the outside funding.

Labor and Proprietor's Income. Income generated as a result of the outside funding. Labor income is total payroll costs including benefits such as the costs of health and life insurance, retirement payments, and non-cash compensation. Proprietary income consists of payments received by self-employed individuals as income, including income received by private business owners, doctors, lawyers and so forth.

Other Property Type Income. Payments for rents, profits, royalties, and dividends generated as a result of the outside funding.

Tax Revenue. Also called indirect business taxes and is the sum of the excise taxes, property taxes, fees, licenses, and sales taxes collected as a result of the outside funding. It excludes taxes on profit and income because these taxes are accounted for in the income categories.

The IMPLAN Regional Economic Input Output Model was used to estimate the economic contribution of the outside funding to construct water supply projects. This computer model simulates the supply of and demand for goods and services within a county, within groups of counties and within the State of Florida. It allows the user to estimate the extent to which new investments or increases in demand affect a region's economy in terms of output, income, employment and tax revenues. The IMPLAN model used in this study represents the economic conditions of the year 2000. Economic data representing 2003 is the most recent year available for purchase from IMPLAN.

IMPLAN stands for IMpact Analysis for PLANning and was originally developed by the USDA Forest Service in cooperation with the Federal Emergency Management Agency

and the USDI Bureau of Land Management to assist the Forest Service in land and resource management planning. The developers of this model formed the Minnesota IMPLAN Group in 1993 to privatize the development of IMPLAN data and software. They are located in Stillwater, Minnesota. Information regarding this company can be found at www.IMPLAN.com.

IMPLAN is an input-output accounting model that describes the flow of commodity values from producers to intermediate and final consumers. It is both a database of county-specific values and an economic model. According to the Minnesota IMPLAN Group's document titled The IMPLAN Input-Output System, "purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services…The indirect and induced effects can be mathematically derived. The derivation is called the Leontief inverse. The resulting set of multipliers describe the change in output3 for each and every regional industry caused by a one dollar change in final demand for any given industry…The IMPLAN accounts closely follow the accounting conventions used in the "Input-Output Study of the US Economy" by the Bureau of Economic Analysis (1980) and the rectangular format recommended by the United Nations. The IMPLAN system was designed to serve three functions: (1) data retrieval, (2) data reduction and model development, and (3) impact analysis."

The economic contribution to the SWUCA of outside funding to pay for the construction of SWUCA water projects is summarized in Table 8.1. Of the $6.6 million per year in State of Florida funding, about $5.96 million per year would come from households outside of the SWUCA.4 This is based on the percent of the Florida population that live outside the SWUCA as presented in the table. The $5.96 million was entered into the IMPLAN model that represents the combined economies of the eight counties that are in the SWUCA. The funding was entered under IMPLAN industry code 50 – New Utility Structures. This industry sector includes the construction of new water and sewer facilities, new communication facilities, new electric utility facilities, new gas and utility pipeline facilities, and new local transit facilities. The study area includes 100 percent of all counties and not just that portion of the county located in the SWUCA.

The resulting estimates of economic contribution are provided in Table 8.1. Outside funding to pay for water supply projects in the SWUCA would generate about $11 million

[3] The model also produces multipliers for income, employment and tax revenues.

[4] Only the SWUCA portions of the counties are considered when determining how much State funding would come from SWUCA households. However, the economic contribution corresponds to 100 percent of all the counties in the SWUCA, not just that portion in the SWUCA. This is due to constraints with the IMPLAN model in that the smallest geographic area that can be modeled is a county.

in output, $4 million in labor income, $911,000 in other property type income, and $281,000 in indirect business taxes each year for the next nine years. During this time, about 115 jobs would be created in the SWUCA area due to this funding.

Table 8.1
Economic Contribution of Water Supply Development Funding from the State of Florida to the SWUCA Regional Economy, 2005 Dollars

Item	Value
Annual State Funding Allocation to SWUCA, 2006 to 2014[a]	$6,600,000
Population in the SWUCA, 2000[b]	1,541,980
Population in Florida, 2000[c]	15,982,824
Percent of Population Not in the SWUCA	90.35%
Annual State Funding from Outside of SWUCA	**$5,963,250**

Economic Contribution, 2005 Dollars[d]				
Measure of Contribution	**Direct**	**Indirect**	**Induced**	**Total**
Output	$5,963,000	$2,699,000	$2,302,000	$10,964,000
Labor Income	$2,091,000	$1,077,000	$861,000	$4,029,000
Other Property Type Income	$204,000	$264,000	$443,000	$911,000
Tax Revenues	$30,000	$103,000	$148,000	$281,000
Employment	54	32	29	115

[a] *From Southwest Florida Water Management District in February 2006.*

[b] *From "Statement of Estimated Regulatory Costs for SWUCA II Rule-Making", prepared by Hazen and Sawyer for the Southwest Florida Water Management District, February 6, 2006, Table 5.3-3, page 5-34.*

[c] *From "Florida Statistical Abstract, 2004", University of Florida Bureau of Economic and Business Research, Gainesville, Florida, page 10.*

[d] *From IMPLAN Model representing the eight SWUCA counties in 2000.*

Section 9.0
Benefits of SWUCA Recovery Strategy

The SWUCA Recovery Strategy is intended to manage ground and surface water withdrawals so that the water levels and rates of flow of valuable water resources in the SWUCA may support current and future uses of these resources. The benefits of the SWUCA Recovery Strategy are described in this Chapter. These benefits stem from the establishment of minimum flows and levels for the following water resources.

- Floridan Aquifer in the Southern Water Use Caution Area (SWUCA)
- Upper Peace River
- Eight lakes in the SWUCA called Lake Clinch; Lake Eagle; Lake McLeod; Lake Wales; Lake Jackson; Lake Little Jackson; Lake Letta and Lake Lotela.

A description of the benefits associated with the minimum flows and levels proposed for these water resources is provided below.

9.1 Floridan Aquifer in the SWUCA

According to the District's Southern Water Use Caution Area Recovery Strategy, "saltwater intrusion has been occurring in the coastal areas of the SWUCA for over a half-century due to extensive withdrawals from the Floridan aquifer throughout the groundwater basin. Recent analysis indicates that ground-water withdrawals in the SWUCA are about 650 mgd during an average year, and can exceed 800 mgd during a 1-in-10 year drought event. These withdrawals provide over 80 percent of the area's water supply and provide the lifeblood to the local economy. Detailed modeling predicts that it would take a reduction in withdrawals of more than two-thirds to cease intrusion of saltwater, a reduction that would have dire consequences. Fortunately, this same modeling verifies that saltwater intrusion is a very long-term issue that can be effectively managed in decade long intervals."[1]

[1] Southwest Florida Water Management District, *"Southern Water Use Caution Area Recovery Strategy"*, revised draft, Brooksville, Florida, March 2004, page 25.

The Recovery Strategy summarizes the results of the District's three-dimensional ground water modeling effort as follows: "if average annual withdrawals from the Floridan aquifer in the SWUCA were maintained at 600 mgd, [which is] approximately 90 percent of current average annual withdrawals, 104 wells that have a permitted use of 17.4 mgd and an estimated use of 12.0 mgd would be at risk. Further if average annual withdrawals from the Floridan aquifer were allowed to increase to 800 mgd an additional 22 wells with additional permitted use of 3.5 mgd and actual use of 2.0 mgd would be at risk. A review of these results could lead one to conclude that there is not much value in slowing the rate of saltwater intrusion over the next 50 years. However, actions taken during this recovery period will make it easier for future generations to ultimately halt the inland movement of saltwater intrusion through advances in technology (e.g., advances in membrane technology and development of alternative energy supplies). This long-term management can be complemented with short-term measures to address localized problems. Examples of short-term measures include back plugging wells and providing alternative sources such as surface or reclaimed water to wells that experience water quality degradation.[2]"

According to District scientists, it is much more difficult to reverse saltwater intrusion than it is to prevent it from happening in the first place. Also, the ground water modeling effort uses a homogenous underground media because the actual heterogeneity of the media is not known. Changes in the porosity of the media as water moves through the MIA and the SWUCA will significantly affect the rate and extent of saltwater intrusion as more and more ground water is withdrawn.

The benefits of the Saltwater Intrusion Minimum Aquifer Level are the future cost savings from avoided membrane treatment to remove salts in the water pumped from the upper Floridan aquifer and the avoided lost income in the SWUCA economy as businesses who cannot afford membrane treatment leave the area. Unmanaged saltwater intrusion threatens the relatively inexpensive water supplies of the upper Floridan aquifer. If significant ground water quantities were to become salty and require membrane treatment, the costs of such treatment would be significantly higher than the costs of the Recovery Strategy. The District has decided to balance the needs of the existing economy with the needs of future generations by setting the Saltwater Intrusion Minimum Aquifer Level so that it slows the rate of saltwater intrusion instead of either completely halting that intrusion or allowing it to continue unmanaged.

[2] Ibid. Page 26 and 27.

9.2 The Upper Peace River

According to the District's Recovery Strategy document[3], "The proposed minimum flows for the Upper Peace River are focused on returning the perennial conditions to the upper Peace River. Specifically, they are based on maintaining the higher of the water elevations needed for fish passage (0.6 feet or 7.2 inches) or the lowest wetted perimeter inflection point (as much stream bed coverage as possible for the least amount of flow). This approach yielded minimum low flows of 17 cfs (10.2 mgd), 27 cfs (16.2 mgd), and 45 cfs (27 mgd) at the Bartow, Ft. Meade and Zolfo Springs USGS stream gages, respectively. These flows are required to be exceeded at least 95 percent of the time on an annual basis."

These minimum flows are expected to maintain and in some cases improve the accessibility and value of the river for recreation.

The Peace River begins at Lake Hancock and runs south for over 100 miles to Charlotte Harbor. A map of the Peace River is provided in Figure 9.3-1. The Peace River Canoe Trail is officially designated as part of Florida's Statewide System of Greenways and Trails with a total of 11 launching sites from Fort Meade to Arcadia. Recreational anglers fish the Peace River for largemouth bass, bluegill (bream), catfish, black crappie (speckled perch), brown bullhead, tarpon and snook.[4]

The sources of information regarding the uses of the Upper Peace River are as follows.

- Allen, Herb, "Florida's Bass Capital. Will the Real 'Bass Capital' Please Stand Up?" Florida Fish and Wildlife Conservation Commission. FWC Archive. 1999.
- Florida Department of Environmental Protection, Office of Greenways and Trails, informational material from www.floridagreenwaysandtrails.org.
- Florida Fish and Wildlife Conservation Commission, informational material from www.myfwc.com.
- Polk County, Division of Natural Resources, "Polk County Water Atlas."

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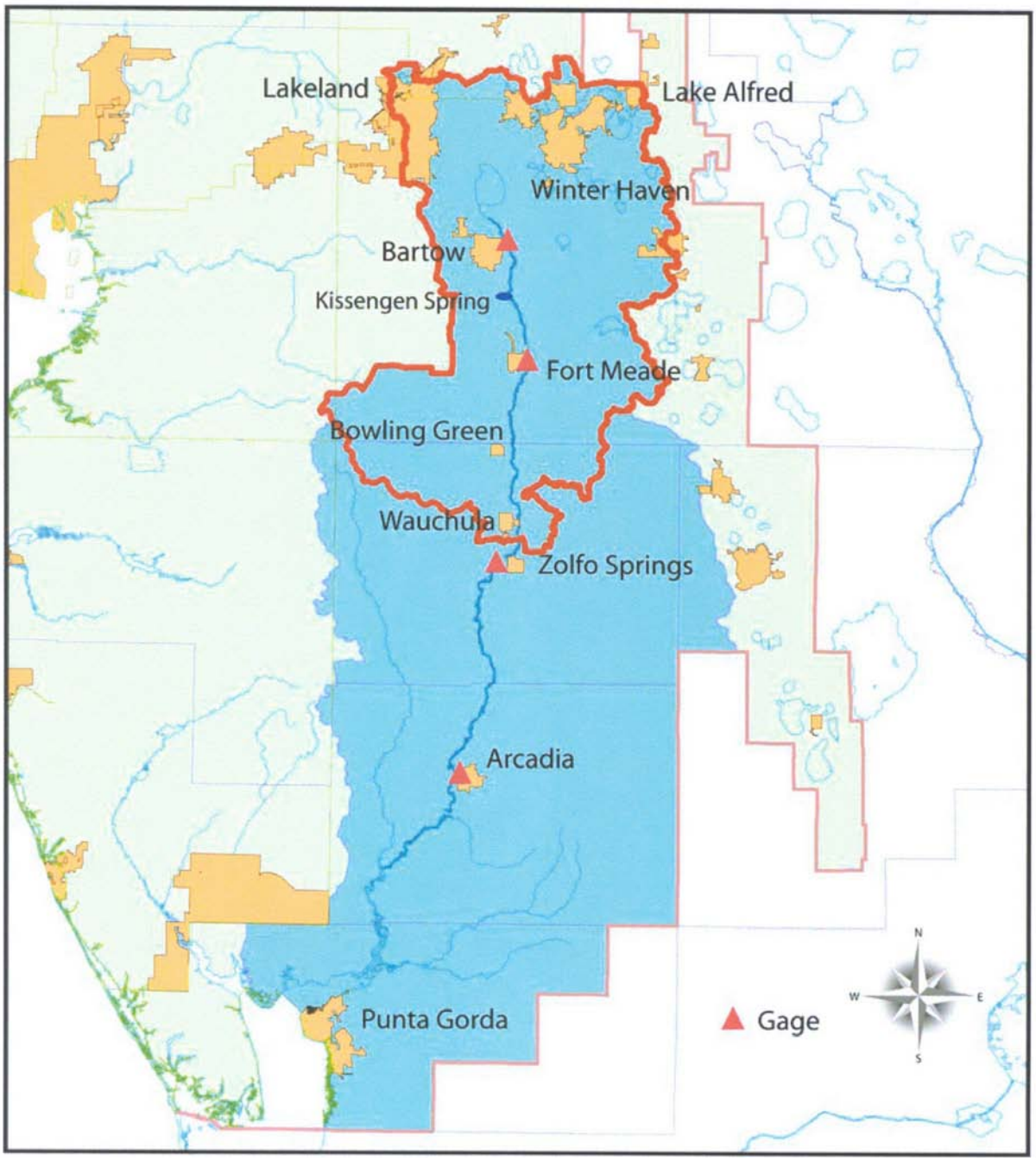
[3] Ibid. Page 32.

[4] Snook migrate from Charlotte Harbor and are caught year round and as far north as Fort Meade. Bass, snook, and catfish are known to prefer deep holes around tree snags where flow is strong. Tarpon are typically caught in the lower Peace River regions. Florida Fish and Wildlife Conservation Commission, *"Freshwater Fishing Sites and Quarterly Forecasts – Southwest Region."*, January to March 2006.



a) The thick lines identify the Upper Peace River and its watershed.

This map is from Southwest Florida Water Management District, "Upper Peace River: An Analysis of Minimum Flows and Levels (Draft)." August 25, 2002.

Figure 9.3-1
Map of Peace River Basin Showing Locations of District Gages (a)

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- Southwest Florida Water Management District, "Upper Peace River: An Analysis of Minimum Flows and Levels (Draft)." August 25, 2002.

- Microsoft Windows Live Local (Website), "Real-Time Topographical Maps and Aerial Photographs." URL: http://Local.live.com.

Lake Hancock and the Peace River are fed by a 7,300 acre recreational area named Tenoroc located near Lakeland, Florida. The former phosphate mining area consists of loosely connected old mining lands, mostly man-made lakes and former clay settling ponds all in various states of reclamation. These water retention areas spill over into Saddle Creek, the northernmost of the Peace River tributaries. From Tenoroc, the Peace River begins its 105-mile journey in a generally southwesterly direction to Charlotte Harbor, where it empties into the Gulf of Mexico.[5]

The Upper Peace River is defined as that portion of the Peace River watershed north of the USGS Zolfo Springs gage leading up through Fort Meade and into Bartow. The Upper Peace River, therefore, snakes its way south through two-thirds the length of Polk County and half the length of Hardee County. Some of the cities adjacent to Peace River within the Upper Peace River basin include, Bartow, Bowling Green, Kissengen Spring, Medulla, Homeland, Fort Green and Wauchula.

According to the District, there are now periods during the year when there is no water flow in portions of the river upstream of Ft. Meade. The proposed minimum flow for the upper Peace River is intended to return perennial conditions to this section of the river[6].

Access Points

Most of the access points to the Peace River are affiliated with the towns and cities that are dotted along the river. In certain cases a boat or canoe launch site may be complemented with a historically significant landmark, park, or other recreational facilities. The following paragraphs list major access points to the Peace River and provide a brief description of the available amenities.

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[5] Hoppe, Mary Kelly, *"Tenoroc: Land of Lakes, Living Laboratory"*, Bay Soundings, Volume 4, #4, Fall 2005, baysoundings.com. The Tenoroc site is currently managed by the Florida Fish and Wildlife Conservation Commission (FFWCC) as a recreational fishing site with other activities such as horseback riding, hiking trails, and a shooting range. Tenoroc currently has 14 lakes open to the public with seven public boat ramps, four fishing platforms, abundant bank-fishing access, picnic facilities and rest rooms. In fiscal year 1997-98, Tenoroc had nearly 19,000 visitors the vast majority of whom were anglers.

[6] Southwest Florida Water Management District, *"SWUCA Recovery Strategy"*, revised draft, March 2004, pages 9 and 32.

Tenoroc Fish Management Area

The Tenoroc [Coronet spelled backwards] fish management area was one of the initial phosphate rock mining sites in Polk County. All 7,300 acres are managed by the Florida Fish and Wildlife Conservation Commission (FFWCC), which plans to continue reclaiming and developing the recreational area. The area is highly touted for its trophy bass fishing and has been known to host up to 20,000 visitors annually. Access and recreational amenities include: boat ramps; boat docks; fishing piers; picnic areas and restrooms. The fishing is ranked as "excellent" and the ramp accesses are ranked as "fair". Bank fishing is allowed and a shooting range is located on the site.

The recreational amenities along the Upper Peace River beginning with Bartow and moving south are provided as follows.

Peace River Canoe Launch

The Peace River canoe launch is located in the Town of Bartow in Polk County. Its basic amenities include a canoe launch site and access to bird watching.

IMC Agrico Peace River Park

The IMC Agrico Peace River Park is a 400-acre riverside preserve located in the Town of Homeland in Polk County (about six miles south of Bartow). Its basic amenities include a picnic area, restrooms, a one-mile scenic boardwalk into the Peace River Swamp; and access to bird watching (August to October).

Fort Meade Outdoor Recreation Area

The Fort Meade Outdoor Recreation Area is located east of the Fort Meade city limits on US 98 East (on Peace River). The recreation area covers approximately 125 acres and abuts the river. Amenities include two group pavilions - one 200-person one 50-person. There is an open air stage for festivals. River-related attractions include a ¼ mile nature walk and a canoe-launching area (with parking). Other recreational amenities include picnic benches, restrooms, grilling areas, an archery range; volleyball, soccer and child and adult playground facilities.

Fort Meade Canoe Launch Site (at CR-657 Bridge)

The Fort Meade canoe launch site is located in Polk County and can be accessed from US 17, two miles south of Ft. Meade. From Ft. Meade take CR 657 (Mt. Pisgah Road) southeast one mile to the CR-657 bridge (3 miles).

Bowling Green Canoe Launch Site (at CR-664 Bridge)

This Bowling Green canoe launch site is located in Hardee County and can be accessed from US 17, 1/2 mile north of Bowling Green. To access the site go one mile on County Line Road to the CR-664 bridge to Paynes Creek Historical Site (7 miles).

Bowling Green Canoe Launch Site (at CR-664-A Bridge)

This Bowling Green canoe launch site is located in Hardee County and can be accessed from US 17 in Bowling Green. To access this site take SR 664-A (Lake Branch Road) east two miles to the bridge (2 miles).

Wauchula Canoe Launch Site (at CR 664-A Bridge)

This City of Wauchula canoe launch site at the CR-664-A bridge is located in Hardee County and can be accessed from northern Wauchula as follows: From Wauchula go south 1.5 miles on US 17 to Rea Road. Turn right (east) and follow Rea Road to intersection with CR 664-A. Turn left (north) on 664-A and go 0.5 mile to CR-664A bridge (4 miles).

Wauchula Boat Ramp and Canoe Launch Site (at Crews Park)

This City of Wauchula boat ramp and canoe launch site at Crews Park are located in Hardee County and can be accessed by taking SR 64A (Main Street) east to boat ramp (2 miles). The amenities offered include boat ramp; canoe launch; a picnic area; playground and restrooms.

Wauchula Canoe Launch Site (at CR-652 Bridge)

This City of Wauchula canoe launch site at CR652 bridge is located on the southeast side of the City in Hardee County and can be accessed by taking SR 64-A 1/2 mile east to CR 652. Turn south on SR 652 and continue to bridge (1 mile). The amenities offered include a boat ramp; a canoe launch; a primitive camping area; a scenic trail; and bank fishing. The boat ramp is described as “fair” and there are 20 parking spaces available.

Pioneer Park Canoe Launch Site (at Zolfo Springs)

This City of Zolfo Springs (Pioneer Park) canoe launch is located in Hardee County and can be accessed from Wauchula by heading south on US 17 to SR 64 in Zolfo Springs. Turn right (west) on SR 64 and look for park and boat ramp (1 mile). The amenities offered include boat ramp; canoe launch; a picnic area; and playground.

A summary of the recreation amenities at these sites is provided in Table 9.2-1.

Table 9.2-1
Recreational Public Access Characteristics of the Upper Peace River (a)

Item	Descriptions										
Site Name	**Tenoroc (b)**	**Peace River Canoe Launch**	**IMC Agrico**	**Fort Meade (Rec. Park)**	**Fort Meade (CR-657 Bridge)**	**Bowling Green (CR-664 Bridge)**	**Bowling Green (CR-664A Bridge)**	**Wauchula (CR-664A Bridge)**	**Wauchula (Crews Park)**	**Wauchula CR-652 Bridge)**	**Pioneer Park**
County	Polk	Polk	Polk	Polk	Polk	Hardee	Hardee	Hardee	Hardee	Hardee	Zolfo Springs
City	Lakeland	Bartow	Homeland	Fort Meade	Fort Meade	Bowling Green	Bowling Green	Wauchula	Wauchula	Wauchula	Wau-chula
Site Surface Area (Acres)			400	125							
Max. Depth											
Amenities:											
Boat Ramp	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes
Boat Dock (Pier)	Yes										
Canoe Launch		Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Camping									No	Yes	
Shelters			Yes	Yes							
Picnic Area	Yes			Yes					Yes		Yes
Playground				Yes					Yes		Yes
Path (Ped./Bike)				Yes						Yes	
Beach											
Swimming		No	No								
Restrooms	Yes	Yes	Yes	Yes					Yes	No	

Table 9.2-1
Recreational Public Access Characteristics of the Upper Peace River (a)

Item	Descriptions										
Site Name	Tenoroc (b)	Peace River Canoe Launch	IMC Agrico	Fort Meade (Rec. Park)	Fort Meade (CR-657 Bridge)	Bowling Green (CR-664 Bridge)	Bowling Green (CR-664A Bridge)	Wauchula (CR-664A Bridge)	Wauchula (Crews Park)	Wauchula CR-652 Bridge)	Pioneer Park
Electricity	Yes	Yes	Yes								
Birding		Yes									
Fishing (dock/pier)	Yes										
Other: (List)	Gun Range		Swamp Access	Arch-ery							
Fishing (Bank)	Yes	Yes	No							Yes	
Fishing Quality	Excellent										
Ramp Quality	Fair									Fair	
Parking Spaces		200	40							20	
Hours of Operation		8am - 8pm	7am - Sundown								

(a) Blank means unknown.
(b) Tenoroc will not be affected by the minimum flows established for the Upper Peace River.

9.3 The Highlands Ridge Lakes

According to the District's Southern Water Use Caution Area Recovery Strategy[7], "Minimum levels are proposed in the Lake Wales Ridge … All eight lakes are designated "Category 3" lakes, i.e., lakes that do not have contiguous cypress-dominated wetlands. Minimum levels for Category 3 lakes are developed based on potential change in a number of parameter including: (1) lake mixing and susceptibility to sediment resuspension, (2) water depth associated with docks, (3) basin connectivity, (4) species richness, (5) coverage of herbaceous wetland vegetation, (6) coverage of aquatic macrophytes, and (7) non-consumptive uses."

These lakes provide a variety of recreational and aesthetic uses. They are accessible to the public, they have public recreation facilities and most of these lakes abut residential properties with private docks. A summary of the recreation amenities and land uses is provided as follows.

Of the eight lakes, four are located within Polk County and four are located in Highlands County. They display diverse characteristics in size, proximity to each other, accessibility, and amenities. The sources of the information regarding the lakes are as follows:

- Southwest Florida Water Management District, "Proposed Minimum and Guidance Levels for Lakes Clinch. Eagle, McLeod and Wales in Polk County, Florida and Lakes Jackson, Little Jackson, Letta and Lotela in Highlands County, Florida." DRAFT. October 21, 2002.
- Polk County, Division of Natural Resources, "Polk County Water Atlas."
- Polk County, Division of Natural Resources, "Polk County's Boat Access Lake Directory." Bartow, Florida. Spring 2004.
- Microsoft Windows Live Local (Website), "Real-Time Topographical Maps and Aerial Photographs." URL: http://Local.live.com.
- Florida Atlas and Gazetteer, DeLorme Mapping Company, 1999.

[7] Southwest Florida Water Management District, *"Southern Water Use Caution Area Recovery Strategy"*, revised draft, Brooksville, Florida, March 2004, page 36.

Polk County Lakes. Of the 550 lakes in Polk County, 80 provide public access[8]. The Polk County lakes for which minimum levels are being proposed are Clinch, Eagle, McLeod and Wales. The land use characteristics of each of these lakes are described below.

Lake Clinch. Lake Clinch is located in the City of Frostproof, due west of Lake Reedy and between US 27 and US 27-Alternate. It has a total surface area of 1,207 acres and an average depth of 30 feet. About 30 percent of the Lake Clinch shoreline consists of a combination of single family and multifamily residences. The northeast shore has mainly single family residences; some with boat ramps and the southern end of the lake has mainly multifamily residential facilities. The north western and western shorelines are predominantly agricultural with row and orchard crops. The southeast shoreline is bordered by South Clinch Lake Boulevard, which is bordered to the east by more agricultural properties.

The Lake has a picnic area, a boating access ramp and a public dock/pier, which are maintained by the City of Frostproof. Park hours are from 10:00 a.m. to midnight. Park amenities include: shelters, electricity, restrooms, fishing pier, and 14 parking spaces. The quality[9] of the ramp access is "fair" with a gradual incline and sport fishing is rated as "good".

Eagle Lake. Eagle Lake is situated on the north side of the City of Eagle Lake, which is located to the southwest of the City of Winter Haven and northeast of the City of Bartow, heading along US-17. To the north, Eagle Lake is connected to Little Eagle Lake; to the south, it is subtended by Eagle Lake Cemetery. The southeastern and southwestern shorelines are predominantly abutted by single family residences with several boat docks. About 60 percent of the northern shoreline is dedicated to agricultural land uses or other open spaces. The predominant land use of northern lake shoreline is single family residences.

Eagle Lake has a total surface area of 651 acres and an average depth of 24 feet. The Lake has the following amenities: boat ramp, picnic area, and beach. The park

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[8] Florida Fish and Wildlife Conservation Commission, *"South Region Fishing Guide"*, Tallahassee, Florida, 2006.

[9] Ramp Quality Ratings explained: **Excellent** – 4x4 vehicle not necessary; optimal launching depth; generally smooth surface; good parking. **Good** - 4x4 vehicle not generally necessary; good launching depth; ramp surface fairly smooth; adequate parking. **Fair** 4x4 vehicle recommended; less than optimal launching depth; ramp surface may be rough; minimal parking area. **Poor** - 4x4 vehicle needed; poor launching depth; ramp surface rough or uneven; may have pot-holes; minimal to no designated parking area. Source: Polk County Natural Resources Division, *"Polk County Lakes Directory."* Bartow, Florida.

amenities/activities include: shelters 30 parking spaces, restrooms, electricity, playground, bank fishing, and swimming. These are maintained by the City of Eagle Lake. Park hours are from 8:00 a.m. to 8:00 p.m. The quality of the ramp access is considered to be "good" with a steep incline and sport fishing is rated as "excellent".

Lake McLeod. Lake McLeod is situated on the south side of the City of Eagle Lake, which is located to the southwest of the City of Winter Haven and northeast of the City of Bartow, heading along US-17. To the northwest and east, Lake McLeod is bounded mainly by residential property. On the southern and western banks the main land use is agriculture.

The Lake receives water inflows from the northeast by a canal and has no outflow. On the eastern and northeastern boundaries of the lake is a perimeter road called Eagle Lake Loop Road, which runs east through more agriculture properties.

The lake has a total surface area of 512 acres and an average depth of 20 feet. The Lake has the following amenities: a fishing pier; a boat dock, and a paved boat ramp. Bank fishing is allowed. There are 11 parking spaces, but there are no shelters or restrooms. These facilities are maintained by the City of Eagle Lake. Park hours are from sunrise to sunset. The quality of the ramp access is considered to be "good" with a paved steep incline and sport fishing is rated as "good".

Lake Wales (also spelled Wailes). Lake Wales is situated in the City of Lake Wales, which is just northwest of the City of Highland Park. The lake is in the northeast quadrant of the junction formed by US-27-Alternate and SR-60. The lake has mainly residential properties around the entire perimeter. However, only those residential properties on the eastern and southeastern shores directly abut the lake. The remaining two-thirds of the lake's shoreline are bordered by a perimeter road called Lakeshore Boulevard, which is also buffered by open spaces and windbreaks. A few boat docks are sparsely distributed along the north eastern shorelines.

The Lake Wales boat ramp is located on the northern boundary and there is a baseball park at the northeast corner of the lake. The lake has a total surface area of 326 acres and an average depth of 10 feet. The lake shares the following amenities with the adjoining ball park: restrooms, playground, picnic area, and walking path. There is a public dock/pier. The boat ramp is maintained by the City of Lake Wales and operates between the hours of 6:00 a.m. and 10:30 p.m. The quality of the ramp access is considered to be "good" with a paved steep incline and sport fishing is rated as "good".

Highlands County Lakes. Highlands County is home to 95 lakes, 17 parks, and 39 boat ramps. The Highlands County lakes for which minimum flows and levels are be-

ing proposed are: Jackson, Little Jackson, Letta and Lotela. The land use characteristics of each lake are described below.

Lake Jackson. Lake Jackson is in the City of Sebring. The southwestern boundaries of the lake are abutted by US-27 (US-98). At the southwestern boundary the lake drains into Little Lake Jackson via a canal underneath US-27. Inflows to Lake Jackson are conveyed via canal from Lake Sebring to the north. Lake Jackson is an urban lake, desirable for its views from the highway, residences, businesses and other public access points. Around the entire shoreline of the Lake are numerous private docks adjoining private residences. These properties are accessed by a perimeter road called Lakeview Drive. Lake Jackson boasts an eleven mile pathway, facilitating hiking, bicycle riding, strolling and nature viewing. Other activities on the lake include: boating, swimming (on sandy beaches), fishing from the City's pier, birding, pontoon and dinner tours (affiliated with a riverfront restaurant) and airboat rides. Lake Jackson has a total surface area of 3,221 acres and a maximum depth of 102 feet. The boat ramp, beaches and recreational areas are maintained by the City of Sebring.

Little Lake Jackson. Little Lake Jackson is in the City of Sebring, just south of Lake Jackson. US-27 (US-98) is on the north side of the lake. Water from Lake Jackson flows into the lake via a canal that runs under the highway (US-27). Other inflows come from several smaller canals, draining an adjoining golf course and residential areas. Little Lake Jackson has two major outflow points; (a) an outlet along the eastern shore that drains into Jackson Creek and (b) a weir structure that empties from the southern shore and fingers into the adjoining neighborhoods. Little Lake Jackson is an urban lake with many resort-type facilities on the northern and western shores. Private lakefront residences with private boat docks are located along the southern and southeastern shorelines. The lake is relatively small and there is a limited amount of public access. Little Lake Jackson has a total surface area of 141 acres and a maximum depth of 102 feet. The areas and facilities are maintained by the City of Sebring.

Lake Letta. Lake Letta is in the City of Avon Park. The Lake sits on the southeastern boundary of the City and is due north of the City of Sebring. The eastern and northern boundaries of the lake are bordered by SR-17 (East Cornell Street). Inflow to Lake Letta comes via an inlet from Little Bonnet Lake, which is due west of Lake Letta. Outflow leaves the southeastern shore and connects to Bonnet Lake, which is to the south. On its northeastern and eastern boundaries the lake is abutted by residential properties some of which have boat docks. The northern, western and southern boundaries are devoted to agricultural operations. There is a public access boat ramp at this lake. Lake Letta has a total surface area of 477 acres and a maximum depth of 99 feet.

Lake Lotela. Lake Lotela is in the City of Avon Park. The lake sits in the southeast quadrant of the intersection of SR-17 (E. Cornell St.) and SR-17A (South Highlands Avenue). Northern boundaries of the lake are abutted by US-27 (US-98). The lake receives inflow from Lake Lelia along the western shore; outflows are drained to Little Bonnet Lake from the southeast shore. About 80 percent of the lake boundary is abutted by residential single family or resort-type residential facilities. A golf course is located near the entire eastern shore of the lake and agricultural operations exist along the northeastern shore of the lake. There is a public access boat ramp on the northwest shore. Lake Lotela has a total surface area of 800 acres and a maximum depth of 105 feet. The public areas and facilities are maintained by the City of Avon Park.

A summary of the recreation amenities at these lakes is provided in Table 9.3-1.

Table 9.3-1
Recreational Public Access Characteristics of the Eight Highlands Ridge Lakes (a)

Item	Descriptions							
Lake Name	**Clinch**	**Eagle**	**McLeod**	**Wales**	**Jackson**	**Little Jackson**	**Letta**	**Lotela**
County	Polk	Polk	Polk	Polk	Highlands	Highlands	Highlands	Highlands
City	Frostproof	Eagle Lake		Lake Wales	Sebring		Avon Park	
Surface Area	1,207	651	512	326	3,221	141	477	800
Depth in Feet	30	24	20	10	102	102	99	105
Amenities:								
Boat Ramp	1	1	1	1	2	0	1	1
Boat Dock (Pier)	Yes	None	Yes	Yes	Yes	None	None	None
Shelters	Yes	Yes	None	None				
Picnic Area	Yes	Yes	None	Yes				
Playground	None	Yes	None	Yes				
Path (Ped/Bike)	None	None	None	Yes	Yes	None		
Beach	None	Yes	None	None	Yes	None		
Swimming	N/A	Yes	None	None				
Restrooms	Yes	Yes	None	Yes				
Electricity	Yes	Yes	None	None	Yes	Yes		
Fishing (dock/pier)	Yes	Yes	None	None	Yes			
Fishing (Bank)	None	Yes	Yes	None				
Fishing Quality	Good	Excellent	Good	Good	Excellent			
Ramp Quality	Fair	Good	Good	Good				
Parking Spaces	14	30	11	N/A				
Hours	10am to Mid-Night	8am to 8pm	Sunrise to Sunset	6am to 10:30pm				

(a) Blank means unknown.

9.4 Information Regarding the Recreational Uses and Values of the Upper Peace River and the Highlands Ridge Lakes

There is no data or information available regarding the number of person-days spent recreating on the Upper Peace River, the eight lakes or any of the lakes in the Highlands Ridge. Likewise, there is no information regarding the value that residents and visitors place on being able to boat, canoe, swim or fish on these water bodies or bike, walk or bird watch near these water bodies.

A report by the Florida Fish and Wildlife Conservation Commission[10] estimates that each freshwater boat ramp in Florida generates on average $442,000 per year in the value of Florida's output, $42,000 per year in tax revenues collected and 8 jobs. Each freshwater pier in Florida generates on average $623,000 per year in the value of Florida's output, $75,000 per year in tax revenues collected and 10 jobs. Using this information, the 12 public boat ramps and 6 public piers on the Upper Peace River and the eight Highlands Ridge lakes generate $9 million in the value of output each year, 156 jobs, and $951,000 in State and local annual tax revenue collections. These are just a portion of the values that would be protected by the SWUCA Recovery Strategy. Other values include the private waterfront amenities and recreation opportunities enjoyed by residents who live on the Highland Ridge lakes and the additional public recreation values associated with all of the other Highlands Ridge lakes that would be protected by the proposed SWUCA rule and Recovery Strategy. The calculations are provided in Table 9.4-1.

[10] Florida Fish and Wildlife Conservation Commission, *"Assessing the Economic Impact and Value of Florida's Public Piers and Boat Ramps"*, Tallahassee, Florida, March 2001, page 5.

Table 9.4-1
Estimated Economic Contribution of the Public Boat Ramps, Piers and Docks of the Upper Peace River and the Eight Highlands Ridge Lakes

Item	Upper Peace River	Eight Lakes	Total
Number of Public: (a)			
Boat Ramps	4	8	12
Piers or Docks	1	5	6
Annual Value of Output Per Public: (b)			
Boat Ramp	$441,780	$441,780	$441,780
Pier	$622,920	$622,920	$622,920
Employment Per Public: (b)			
Boat Ramp	8	8	8
Pier	10	10	10
State and Local Tax Revenues Collected Per Public: (b)			
Boat Ramp	$41,565	$41,565	$41,565
Pier	$75,350	$75,350	$75,350
Total Annual Values			
Output			
From Public Boat Ramps	$1,767,120	$3,534,240	$5,301,360
From Public Piers/Docks	$622,920	$3,114,600	$3,737,520
Total	**$2,390,040**	**$6,648,840**	**$9,038,880**
Employment			
From Public Boat Ramps	32	64	96
From Public Piers/Docks	10	50	60
Total	**42**	**114**	**156**
Tax Revenues Collected			
From Public Boat Ramps	$166,260	$332,520	$498,780
From Public Piers/Docks	$75,350	$376,750	$452,100
Total	**$241,610**	**$709,270**	**$950,880**

(a) From the Southwest Florida Water Management District, Resource Conservation and Development Department, March 2006.

(b) Florida Fish and Wildlife Conservation Commission, "Assessing the Economic Impact and Value of Florida's Public Piers and Boat Ramps", Tallahassee, Florida, March 2001, page 5.

Section 10.0
Conclusions

This Chapter summarizes the results of a comprehensive economic analysis of the Southern Water Use Caution Area Recovery Strategy. This Recovery Strategy is described in the proposed Chapter 40D-80, "Recovery and Prevention Strategies for Minimum Flows and Levels" and the document titled, "Southern Water Use Caution Area Recovery Strategy" prepared by the Southwest Florida Water Management District (District), Brooksville, Florida revised draft, March 2004.

The Recovery Strategy exists because the District has proposed the establishment of minimum flows and levels (MFLs) for the following water resources.

- Upper Peace River
- Floridan Aquifer in the Southern Water Use Caution Area (SWUCA)
- Eight lakes in the SWUCA called Lake Clinch; Lake Eagle; Lake McLeod; Lake Wales; Lake Jackson; Lake Little Jackson; Lake Letta and Lake Lotela

The District has determined that the existing flow rates and water levels of some of these water resources are below the MFLs established for them. As a result, many requests for permitted quantities from the upper Floridan aquifer will not be permitted and some water users will likely need to obtain water from alternative sources. The Recovery Strategy is a plan to restore the flows and levels to the proposed minimum levels in a manner that ensures there are sufficient water supplies for all existing and projected reasonable-beneficial uses. Thus, the incremental cost of the Recovery Strategy will be due to the development and use of the more expensive alternative water sources.

10.1 Study Goals

The goals of this economic analysis were as follows.

(1) Estimate the costs over the next 20 years to develop alternative water supplies and implement additional water conservation measures to achieve the levels of water production and conservation envisioned in the Recovery Strategy. Identify the types of persons and entities who will likely pay these costs. The evaluation period is 2006 to 2025 and all costs are in 2005 dollars.

(2) Describe the process by which the District would address each type of water use permit request. Describe the process by which permitted groundwater

quantities and historically used groundwater quantities would be made available to new water uses.

(3) Evaluate the extent to which businesses and households can afford the change in water costs associated with the Recovery Strategy.

(4) Estimate the economic contribution of the funding that is likely to come from the State of Florida to pay for a portion of the SWUCA Recovery Strategy.

(5) Describe the benefits of the SWUCA Recovery Strategy to the regional SWUCA area.

(6) Compare the trends in historic economic data describing the SWUCA counties to the same economic data corresponding to the rest of Florida and determine whether or not the historic water use permitting provisions in the SWUCA had a significant impact on the economy.

10.2 Costs to Implement the Recovery Strategy

The estimated costs were based on the forecasted changes in demand by county and Use Type from 2006 to 2025 and the amount of water available from traditional ground water and existing surface water sources and from alternative water sources under the SWUCA Recovery Strategy. These alternative sources include water conservation, reclaimed water, new surface water withdrawals including storage, seawater desalination and brackish water desalination. The full costs associated with developing and using these water resources are presented. Funding from the District, the State of Florida, or other source was not deducted from the costs. The costs of water supply without the Recovery Strategy were deducted from the costs of water supply with the Recovery Strategy to obtain estimates of the incremental costs of the Recovery Strategy through 2025. The costs without the Recovery Strategy assume that traditional ground water sources would be used at a cost of $0.22 per 1,000 gallons.

The cost of developing water sources consistent with the Recovery Strategy will depend on the types of sources that are developed. Some water sources cost more than others. For instance, water conservation cost estimates range from $0.11 to $0.67 per 1,000 gallons of water saved while reclaimed water cost estimates average from $1.26 to $1.53 per 1,000 gallons produced (total capital and O&M cost). Seawater desalination cost estimates range from $2.56 to $4.55 per 1,000 gallons.

To obtain an estimate of the cost to develop water sources under the Recovery Strategy, the change in demand from 2005 to 2025 for each Use Type in each county was assigned one or more water sources or water conservation programs. The most appropriate, least cost water source was selected to supply each increase in demand for each

Use Type in each county. Water sources and quantities were selected until 100 percent of the change in water demand from 2005 to 2025 was met.

This evaluation distinguished among the demands by county and Use Type and recognizes that the actual choice of an alternative source or available unused permitted quantity will vary from one water user to another within a Use Type and within a county. The analysis is not meant to provide recommendations for what water sources should be developed by each Use Type and county. Instead, it takes the available information obtained from the District to assess the magnitude of incremental costs associated with the SWUCA Recovery Strategy. These allocations are for economic analysis purposes and are not specified in the Recovery Strategy or the District's Regional Water Supply Plan.

A comparison of the total costs of additional water supplies from 2005 to 2025 by water source under the SWUCA Recovery Strategy versus using traditional ground water sources is provided in Table 10.2-1. The capital and annual O&M costs of the water sources identified under the SWUCA Recovery Strategy to supply the increased demands in the SWUCA from 2005 to 2025 by county are provided in Columns (1) through (4). The capital costs of the water sources total $128 million with annual O&M costs totaling $22 million per year. The average total cost per 1,000 gallons is $0.62 for these additional water supplies. The largest costs will be spent in Hardee and Hillsborough counties. These two counties are expected to experience the largest growth in water demands from 2005 to 2025.

The itemized total costs of available additional water supplies to meet growing water demands in the SWUCA from 2005 through 2025 were provided in Table 2.3-4 and include the following projects.

- An additional $525,600 spent in Hardee County each year for agricultural water conservation activities and an additional $8.7 million spent each year for non-agricultural water conservation activities. To save additional ground water quantities for future use, additional water conservation by all Use Types in all counties is recommended.

- About $67.6 million in reclaimed water project capital costs and $2.6 million per year to maintain and operate these projects. All counties, except DeSoto, will need to develop reclaimed water projects to meet growing demands.

- About $31.3 million in capital costs for currently un-permitted new surface water projects and $1.3 million per year to maintain and operate these projects in Hardee and Hillsborough counties.

- About $22.4 million in capital costs for seawater desalination in the SWUCA portion of Hillsborough County and $3.1 million per year to maintain and operate these projects.

- About $7.0 mgd in capital costs to withdraw unused permitted quantities and new permitted ground water quantities in all SWUCA counties and $5.8 million per year to maintain and operate these projects.

To obtain the estimated incremental costs associated with the Recovery Strategy, the cost to obtain these same water quantities from the upper Floridan aquifer was estimated. These costs are provided in Columns (5), (6) and (7) of Table 10.2-1. They are based on a $0.02 per 1,000 gallon capital cost and a $0.20 per 1,000 gallon annual O&M cost. The total capital cost to obtain all additional water quantities from this source is $12.8 million and the total annual O&M cost is $10.6 million per year.

Table 10.2-1
Comparison of Total Costs of Additional Water Supplies from 2005 to 2025 by Water Source Under SWUCA Recovery Strategy (Least Cost Water Sources) Versus Using Traditional Sources

	Under SWUCA Recovery Strategy			Traditional Sources		
County	Total Capital Cost	Total O&M cost per year	Total cost per kgal	Total Capital Cost	Total O&M cost per year	Total cost per kgal
(1)	(2)	(3)	(4)	(5)	(6)	(7)
CHARLOTTE (a)	$9,764,000	$2,086,000	$0.76	$917,000	$759,000	$0.22
DESOTO	$151,000	$125,000	$0.22	$151,000	$125,000	$0.22
HARDEE	$34,678,000	$3,687,000	$0.56	$2,828,000	$2,342,000	$0.22
HIGHLANDS (a)	$3,531,000	$556,000	$0.48	$427,000	$353,000	$0.22
HILLSBOROUGH (a)	$44,013,000	$6,095,000	$1.00	$2,362,000	$1,956,000	$0.22
MANATEE	$12,405,000	$3,304,000	$0.59	$1,787,000	$1,480,000	$0.22
POLK (a)	$11,004,000	$2,296,000	$0.30	$2,612,000	$2,163,000	$0.22
SARASOTA	$12,718,000	$3,892,000	$0.71	$1,675,000	$1,387,000	$0.22
Total	**$128,264,000**	**$22,041,000**	**$0.62**	**$12,759,000**	**$10,565,000**	**$0.22**

(a) Includes only those portions of these counties that are in the SWUCA.

The incremental costs of obtaining water supplies under the SWUCA Recovery Strategy are provided in Table 10.2-2. After subtracting out the cost of obtaining all water from the upper Floridan aquifer, the total incremental capital cost to the entire SWUCA is $116 million and the annual O&M cost is $11.5 million. The incremental cost per 1,000 gallons averages $0.40 and ranges from $0.0 per 1,000 gallons in DeSoto County to $0.78 per 1,000 gallons in Hillsborough County.

Table 10.2-2
Incremental Cost of SWUCA Recovery Strategy -
Least Cost Water Sources

County	Total Capital Cost	Total O&M Cost per year	Total cost per kgal
(1)	(2)	(3)	(4)
CHARLOTTE (a)	$8,847,000	$1,327,000	$0.54
DESOTO	$0	$0	$0.00
HARDEE	$31,850,000	$1,345,000	$0.34
HIGHLANDS (a)	$3,104,000	$202,000	$0.26
HILLSBOROUGH (a)	$41,651,000	$4,138,000	$0.78
MANATEE	$10,619,000	$1,824,000	$0.37
POLK (a)	$8,392,000	$133,000	$0.08
SARASOTA	$11,043,000	$2,505,000	$0.49
Total	**$115,506,000**	**$11,474,000**	**$0.40**

(a) Includes only those portions of these counties that are in the SWUCA.
(b) About 145 mgd of water would be supplied from these additional water sources.

These results were based on water demand forecasts that were developed using the best available information. In the event that water demand increases are higher than forecasted, the incremental costs of the Recovery Strategy will be higher than estimated during this study. Also, these costs consider the future water demands up to 2025. As the available ground water sources are allocated to a growing economy, future growth after 2025 will need to rely completely on alternative water sources. For these reasons, water conservation by all use types should be encouraged because the costs of conservation are considerably lower than the costs of developing alternative water sources. Water storage should be considered wherever economically, technically and environmentally feasible. Programs such as FARMs and those that facilitate increased landscaping efficiencies will likely be very cost-effective now and in the long run.

About $6.6 million per year in State funding[1] will likely be available over the next nine years to pay for some of the construction costs associated with alternative water supply projects in the SWUCA. The present value of this funding is $46 million which covers about 37 percent of the estimated cost of the SWUCA Recovery Strategy.[2] This funding has the potential to turn unaffordable water sources into affordable water sources for

[1] From Senate Bill 444.
[2] The present value of $6.6 million per year for 9 years at 5.375% discount rate is $46 million. The estimated incremental cost of the Recovery Strategy is $124 million from Chapter 2.0 of this report.

many households and new self-supplied businesses. This funding was not considered in estimating the costs of the SWUCA Recovery Strategy because the specific projects that would be funded are not known at this time.

10.3 Use Types and Locations Expected to Pay the Incremental Costs

Existing permittees who do not change the Use Type, who do not need additional water supplies, who apply to renew their permits on time, and who continue to put all of their permitted water quantities to reasonable beneficial uses will be least affected by the SWUCA Recovery Strategy and the proposed SWUCA rule revisions.

Water use permittees and applicants who request new water withdrawals will need to comply with the SWUCA rule revisions regarding minimum flows or levels set for the Upper Peace River, eight lakes in the Highlands Ridge and the salt water intrusion minimum aquifer level in the MIA (SWIMAL). Requested new withdrawals that cause a water body's flow or level to fall below the MFL or where the withdrawal reduces the flow or level in water bodies already below the MFL will not be permitted unless a Net Benefit is provided.

An overall summary of the additional water demands and the available least-cost water supplies by county and Use Type along with the annual capital and O&M costs with and without the Recovery Strategy and the costs per 1,000 gallons are summarized in Table 10.3-1.

Using the methodology described in Chapter 3.0 of this report, water users in Charlotte County will need about 10.4 mgd of additional water supplies over the next 20 years. Currently unused permitted quantities from existing ground and surface water sources, non-agricultural water conservation and reclaimed water are the lowest cost options available to supply the additional demands. The annual incremental cost of these supplies is $2.1 or $0.54 per 1,000 gallons.

Water users in DeSoto County will need about 1.7 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources. The annual incremental cost of these supplies is $0.

Water users Hardee County will need about 32.1 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources, agricultural and non-agricultural conservation, reclaimed water, new surface water sources and the use of reduced ground water withdrawals in other counties through Self-Relocation and Net Benefits. The annual incremental cost of these supplies is $4.0 million or $0.34 per 1,000 gallons. The incremental

cost may be higher than that shown here if agricultural permittees need to pay any costs associated with obtaining water via Net Benefits.

Water users in Highlands County will need about 4.8 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources, non-agricultural conservation programs and reclaimed water. The annual incremental cost of these supplies is $459,000 or $0.26 per 1,000 gallons.

Water users in Hillsborough County will need about 26.8 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground and surface water sources, non-agricultural conservation, reclaimed water, new surface water sources and seawater desalination. The annual incremental cost of these supplies is $7.6 million or $0.78 per 1,000 gallons. IC / MD water users are assigned reclaimed water. The cost under the Recovery Strategy may be a little bit higher than that shown here if new industrial water users must have high quality water for their operations and more expensive alternative water sources are needed.

Water users in Manatee County will need about 20.3 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground and surface water sources, non-agricultural conservation, and reclaimed water. The annual incremental cost of these supplies is $2.7 million or $0.37 per 1,000 gallons. IC / MD water users are assigned reclaimed water. The cost under the Recovery Strategy may be a little bit higher than that shown here if new industrial water users must have high quality water for their operations and more expensive alternative water sources are needed.

Water users in Polk County will need about 29.6 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources and reclaimed water. The annual incremental cost of these supplies is $828,000 or $0.08 per 1,000 gallons.

Water users in Sarasota County will need about 19.0 mgd of additional water supplies over the next 20 years. This quantity can come from currently unused permitted quantities from existing ground water sources, non-agricultural conservation and reclaimed water. The annual incremental cost of these supplies is $3.4 million or $0.49 per 1,000 gallons.

Table 10.3-1
Summary of Estimated Total and Incremental Costs of the SWUCA Recovery Strategy by Use Type and SWUCA County (a)

County, Use Type and Water Source	Water Demand		Cost With Recovery Strategy		Cost Without Recovery Strategy		Incremental Cost of Recovery Strategy	
	Additional, 2005 to 2025	Additional as % of 2025 Demand	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal
Charlotte County								
Agriculture	-4.0	-30%	$0	$0.00	$0	$0.00	$0	$0.00
Public Supply	8.2	28%						
Use Unused Permitted Q	1.4	5%	$112,420	$0.22	$112,420	$0.22	$0	$0.00
Non-Agricultural Conservation	6.3	22%	$1,540,665	$0.67	$505,890	$0.22	$1,034,775	$0.45
Reclaimed Water	0.5	2%	$229,950	$1.26	$40,150	$0.22	$189,800	$1.04
IC / MD	0.0	0%						
Recreation and Aesthetic	2.2	38%						
Reclaimed Water	2.2	38%	$1,011,910	$1.26	$176,683	$0.22	$835,227	$1.04
Total - Charlotte County	**10.4**		**$2,894,945**	**$0.76**	**$835,143**	**$0.22**	**$2,059,802**	**$0.54**
DeSoto County								
Agriculture	-13.1	-31%						
Public Supply	1.6	30%						
Use Unused Permitted Q	1.6	30%	$129,758	$0.22	$129,758	$0.22	$0	$0.00
IC / MD	0.0	0%						
Recreation and Aesthetic	0.1	23%						
Use Unused Permitted Q	0.1	23%	$8,030	$0.22	$8,030	$0.22	$0	$0.00
Total - DeSoto County	**1.7**		**$137,788**	**$0.22**	**$137,788**	**$0.22**	**$0**	**$0.00**

Table 10.3-1
Summary of Estimated Total and Incremental Costs of the SWUCA Recovery Strategy by Use Type and SWUCA County (a)

County, Use Type and Water Source	Water Demand		Cost With Recovery Strategy		Cost Without Recovery Strategy		Incremental Cost of Recovery Strategy	
	Additional, 2005 to 2025	Additional as % of 2025 Demand	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal
Hardee County								
Agriculture	25.6	31%						
Use Unused Permitted Q	0.7	1%	$56,210	$0.22	$56,210	$0.22	$0	$0.00
Agricultural Conservation	3.2	4%	$525,600	$0.45	$256,960	$0.22	$268,640	$0.23
Reduction in GW Withdrawals (b)	21.7	26%	$1,742,224	$0.22	$1,742,224	$0.22	$0	$0.00
Public Supply	0.6	18%						
Use Unused Permitted Q	0.6	18%	$48,180	0.22	$48,180	$0.22	$0	$0.00
IC / MD	5.8	43%						
Use Unused Permitted Q	1.4	10%	$112,420	0.22	$112,420	$0.22	$0	$0.00
Reclaimed Water	0.6	4%	$335,070	1.53	$48,180	$0.22	$286,890	$1.31
Non-Agricultural Conservation	0.1	1%	$24,455	0.67	$8,030	$0.22	$16,425	$0.45
New Surface Water Sources	3.7	27%	$3,658,468	2.72	$295,906	$0.22	$3,362,563	$2.50
Recreation and Aesthetic	0.1	41%						
Reclaimed Water	0.1	41%	$55,845	1.53	$8,030	$0.22	$47,815	$1.31
Total - Hardee County	**32.1**		**$6,558,472**	**0.56**	**$2,576,140**	**$0.22**	**$3,982,333**	**$0.34**
Highlands County								
Agriculture	-12.0	-38%						
Public Supply	4.2	24%						
Use Unused Permitted Q	3.3	19%	$264,990	$0.22	$264,990	$0.22	$0	$0.00
Non-Agricultural Conservation	0.9	5%	$216,427	$0.67	$71,065	$0.22	$145,361	$0.45
IC / MD	0.0	0%						
Recreation and Aesthetic	0.7	16%						
Reclaimed Water	0.7	16%	$366,499	$1.53	$52,699	$0.22	$313,800	$1.31
Total - Highlands County	**4.8**		**$847,916**	**$0.48**	**$388,755**	**$0.22**	**$459,161**	**$0.26**

Table 10.3-1
Summary of Estimated Total and Incremental Costs of the SWUCA Recovery Strategy by Use Type and SWUCA County (a)

County, Use Type and Water Source	Water Demand		Cost With Recovery Strategy		Cost Without Recovery Strategy		Incremental Cost of Recovery Strategy	
	Additional, 2005 to 2025	Additional as % of 2025 Demand	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal
Hillsborough County								
Agriculture	3.6	7%						
Use Unused Permitted Q	3.6	7%	$291,911	$0.22	$291,911	$0.22	$0	$0.00
Public Supply	21.1	47%						
Use Unused Permitted Q	6.5	14%	$519,119	$0.22	$519,119	$0.22	$0	$0.00
Reclaimed Water	2.1	5%	$1,041,973	$1.35	$169,803	$0.22	$872,170	$1.13
Non-Agricultural Conservation	6.8	15%	$1,662,940	$0.67	$546,040	$0.22	$1,116,900	$0.45
New Surface Water Sources	0.4	1%	$243,820	$1.67	$32,120	$0.22	$211,700	$1.45
Seawater Desalination	5.3	12%	$4,952,320	$2.56	$425,590	$0.22	$4,526,730	$2.34
IC / MD	0.9	11%						
Reclaimed Water (c)	0.9	11%	$420,316	$1.35	$68,496	$0.22	$351,820	$1.13
Recreation and Aesthetic	1.2	27%						
Reclaimed Water	1.2	27%	$607,261	$1.35	$98,961	$0.22	$508,300	$1.13
Total – Hillsborough County	**26.8**		**$9,739,660**	**$1.00**	**$2,152,040**	**$0.22**	**$7,587,620**	**$0.78**
Manatee County								
Agriculture	-17.0	-29%						
Public Supply	17.0	29%						
Use Unused Permitted Q	8.1	14%	$650,430	$0.22	$650,430	$0.22	$0	$0.00
Non-Agricultural Conservation	8.9	15%	$2,174,838	$0.67	$714,126	$0.22	$1,460,712	$0.45
IC / MD	0.3	7%						
Reclaimed Water (c)	0.3	7%	$148,088	$1.26	$25,857	$0.22	$122,231	$1.04
Recreation and Aesthetic	3.0	31%						
Reclaimed Water	3.0	31%	$1,357,978	$1.26	$237,107	$0.22	$1,120,871	$1.04
Total – Manatee County	**20.3**		**$4,331,334**	**$0.59**	**$1,627,520**	**$0.22**	**$2,703,814**	**$0.37**

Table 10.3-1
Summary of Estimated Total and Incremental Costs of the SWUCA Recovery Strategy by Use Type and SWUCA County (a)

County, Use Type and Water Source	Water Demand		Cost With Recovery Strategy		Cost Without Recovery Strategy		Incremental Cost of Recovery Strategy	
	Additional, 2005 to 2025	Additional as % of 2025 Demand	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal	Annualized Cost	Cost per kgal
Polk County								
Agriculture	-24.6	-32%						
Public Supply	25.1	24%						
Use Unused Permitted Q	25.1	24%	$2,015,294	$0.22	$2,015,294	$0.22	$0	$0.00
IC / MD	-1.3	-2%						
Recreation and Aesthetic	4.5	33%						
Use Unused Permitted Q	2.8	20%	$224,840	$0.22	$224,840	$0.22	$0	$0.00
Reclaimed Water	1.7	12%	$966,662	$1.53	$138,997	$0.22	$827,665	$1.31
Total - Polk County	**29.6**		**$3,206,796**	**$0.30**	**$2,379,131**	**$0.22**	**$827,665**	**$0.08**
Sarasota County								
Agriculture	1.3	9%						
Use Unused Permitted Q	1.3	9%	$101,839	$0.22	$101,839	$0.22	$0	$0.00
Public Supply	14.1	24%						
Use Unused Permitted Q	1.4	2%	$112,420	$0.22	$112,420	$0.22		
Non-Agricultural Conservation	12.7	22%	$3,115,867	$0.67	$1,023,120	$0.22	$2,092,746	$0.45
IC / MD	0.1	11%						
Use Unused Permitted Q	0.1	11%	$8,030	$0.22	$8,030	$0.22	$0	$0.00
Recreation and Aesthetic	3.5	28%						
Reclaimed Water	3.5	28%	$1,606,954	$1.26	$280,579	$0.22	$1,326,374	$1.04
Total - Sarasota County	**19.0**		**$4,945,110**	**$0.71**	**$1,525,989**	**$0.22**	**$3,419,121**	**$0.49**

(a) This table includes only the portions of Charlotte, Polk, Highlands, and Hillsborough counties that are in the SWUCA. All of the other counties are in the SWUCA. IC / MD means industrial, commercial, mining and dewatering water users.

(b) The cost under the Recovery Strategy may be higher than that shown here if agricultural permittees need to pay any costs associated with obtaining water via Net Benefits.

(c) The cost under the Recovery Strategy may be higher than that shown here if new industrial water users must have high quality water for their operations and more expensive alternative water sources are needed.

10.4 Public Supply Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Most water supply permittees in the SWUCA are water utilities. Others are homeowner associations, schools, residential developments, and corporations that supply water to fewer than 2,000 people. This report describes the potential costs and economic impacts of developing and using alternative water sources to water utilities and households. Four case study utilities were developed and used to evaluate the economic impacts of alternative water source costs. The costs of new water source development and conservation opportunities available to Public Supply Utilities in the SWUCA were estimated. Three different combinations of alternative water sources, additional water conservation and traditional water sources for each case study utility were evaluated to determine the impact of these source combinations on household water bills and their affordability. These three combinations are described as follows.

Water Source Combination Number 1 - Water Sources Developed to Meet Growing Demands Based On Proportion of Additional Supply Available by Source in County. The case study utilities address increases in water demand from 2005 to 2025 by developing alternative water sources and conservation programs in proportion to the amounts available within each county as presented in Table 2.1-2 in Chapter 2.0.

Water Source Combination Number 2 - 100 Percent Alternative Water Sources. The case study utilities supply 100 percent of their customer water demands with water from alternative sources

Water Source Combination Number 3 - Least-Cost Water Sources Used to Meet Growing Demands. The case study utilities use their least-cost water sources to supply growing demands as described in Chapters 2 and 3 of this report.

The results of each combination are provided in Table 10.4-1 through Table 10.4-3. The calculations and results for Water Source Combination Number 1 are provided for each of the four case study utilities in Table 10.4-1. If all of the incremental costs are financed through the variable water rate, then this rate would be higher than the rate that would be charged by these case study utilities over the next 20 years if these alternative water sources and conservation projects were not implemented (in 2005 dollars). Depending on the case study utility, the increase would range from $0.09 to $0.53 per 1,000 gallons, in 2005 dollars. This rate increase would be phased in over the period 2005 through 2025 as water sources and conservation programs are developed.

Table 10.4-1
Water Source Combination Number 1
Cost of New Water Sources to Households and Percent of Median Income That is Water Bill by 2025 (In 2005 Dollars) (a)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Increase in Variable Water Rate over period 2005 to 2025 (dollars per 1,000 gallons)	$0.092	$0.276	$0.532	$0.290
(2)	Residential Per Capita Daily Water Use as % of Gross Water Use, 2001	65%	65%	65%	74%
(3)	Annual Water Use Per Household, kgal	91.06	95.25	72.72	84.34
(4)	Annual Cost Of New Water Supplies per Household, 2025 (4) = (1) x (3) (d)	$8.36	$26.26	$38.67	$24.43
(5)	Annual Water Cost per Household Without Project, 2025	$200	$171	$171	$299
(6)	Annual Water Cost per Household With Project, 2025 (in 2003 dollars) (6) = (4) + (5)	$208	$197	$210	$323
(7)	Median Household Income in 2005	$37,969	$30,735	$43,219	$39,139
(8)	Water Cost with Project as % of Median Hhd Income (8) = (6) / (7)	0.55%	0.64%	0.49%	0.83%

(a) Numbers may not divide to exactly the number shown due to rounding.

Depending on the case study utility, this translates into an annual water cost increase ranging from $8 per household per year for customers of the large inland utility to $38 per household per year for customers of the large coastal utility. Adding this increase to the existing household water bill, the water bill as a percent of median household income would range from 0.49 percent for customers of the Large Coastal Utility to 0.83 percent for customers of the Small Coastal Utility. According to the U.S. Environmental Protection Agency, a guideline for determining if a water bill is affordable is that the total water bill is less than two percent of median household income.[3]

The blending of water from diverse sources (blending of ground water, surface water and/or desalinated water) may cause undesirable changes in water chemistry. A potential additional cost not included in the cost estimates is the cost to add certain additional chemicals to the water to prevent these changes. Research by the American Water Works Association Research Foundation and regional water suppliers is addressing this

[3] U.S. Environmental Protection Agency, *"Affordability of the 1986 Amendments to Community Water Systems"*, Washington, D.C., 1993. See also, U.S. EPA, "Information for States on Developing Affordability Criteria for Drinking Water".

issue4. The utility's cost to address this issue is not likely to result in unaffordable potable water supply.

The financial impact simulated above may be an overestimate of the impact to water bills because the impact of higher prices in lowering water demand was not considered in this analysis. Customers may be able to lower their water use through increases in efficiency or by reducing waste in response to higher prices.

The results for Water Source Combinations 2 and 3 are provided in Tables 10.4-2 and 10.4-3. For all combinations and case study utilities, the average water bill as a percent of median household income is less than two percent implying that the incremental cost of the Recovery Strategy is affordable to water customers. For low income customers, water rate structures can be designed so that water use below a certain threshold does not pay or pays very little for the incremental cost of these additional water sources.

Table 10.4-2
Water Source Combination Number 2
Cost of 100 Percent Alternative Sources to Households and Percent of Median Income That is Water Bill by 2025 (In 2005 Dollars) (a)

Row No.	Item	Large Inland Utility	Small Inland Utility	Large Coastal Utility	Small Coastal Utility
(1)	Increase in Variable Water Rate over period 2005 to 2025 (dollars per 1,000 gallons)	$2.159	$2.457	$3.836	$2.167
(2)	Residential Per Capita Daily Water Use as % of Gross Water Use, 2001	65%	65%	65%	74%
(3)	Annual Water Use Per Household, kgal	91.06	95.25	72.72	84.34
(4)	Annual Cost Of New Water Supplies per Household, 2025 (4) = (1) x (3)	$197	$234	$279	$183
(5)	Annual Water Cost per Household Without Project, 2025	$200	$171	$171	$299
(6)	Annual Water Cost per Household With Project, 2025 (in 2003 dollars) (6) = (4) + (5)	$396	$405	$450	$482
(7)	Median Household Income in 2005	$37,969	$30,735	$43,219	$39,139
(8)	Water Cost with Project as % of Median Hhd Income (8) = (6) / (7)	1.04%	1.32%	1.04%	1.23%

(a) Numbers may not multiply or divide to exactly the number shown due to rounding.

[4] See for example, Rajendra D. Vaidya, John D Dietz and James S. Taylor, University of Central Florida, *"Iron Release in Drinking Water Distribution Systems",* proceedings of the Florida Section American Water Works Association, November 2005.

Table 10.4-3
Water Source Combination Number 3
Impact of SWUCA Recovery Strategy (Least Cost Sources) on Water Utility Customer Bills (a)

Item	County				
	Hardee[(b)]	Highlands[(b)]	Hillsborough[(c)]	Manatee[(d)]	Sarasota[(c)]
Annual Costs					
Alternative Sources	$48,180	$481,417	$8,420,172	$2,825,268	$3,228,287
Traditional Sources	$48,180	$336,055	$1,698,307	$1,364,556	$1,135,540
Incremental Cost	$0	$145,361	$6,721,865	$1,460,712	$2,092,746
Increase in Variable Water Rate	$0.00	$0.02	$0.41	$0.42	$0.10
Annual Water Use per Household, kgal	95.25	95.25	84.34	72.72	84.34
Increase in Annual Water Bill	$0.00	$2.19	$34.41	$30.80	$8.24
Annual Water Bill Without Recovery Strategy	$171.00	$171.00	$299.00	$171.00	$299.00
Annual Water Bill With Recovery Strategy	$171.00	$173.19	$333.41	$201.80	$307.24
Median Household Income	$30,735	$31,582	$47,407	$43,219	$45,675
Water Bill as % of Median hhd income	0.56%	0.55%	0.70%	0.47%	0.67%

(a) Costs are from Table 3.2-4
(b) Modeled using the characteristics of a small inland utility.
(c) Modeled using the characteristics of a small coastal utility.
(d) Modeled using the characteristics of a large coastal utility.

10.5 Agricultural Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Most water use in agriculture is for crop irrigation. Water is also used in livestock operations but no increases in water demand for this use is forecast over the next 20 years. Overall agricultural irrigation water demand in the SWUCA is expected to fall by 40.2 mgd. In Hardee, Hillsborough and Sarasota counties, agricultural irrigation water demand is expected to increase by 25.6 mgd, 3.6 mgd and 1.3 mgd, respectively for a total increase of 30.5 mgd. Agricultural water demand in the other five SWUCA counties is expected to fall by 70.7 mgd. In the analysis of Chapters 2.0 and 3.0, the 30.5 mgd increased water demand is supplied as follows: 4.6 mgd is supplied by unused permitted quantities, 3.2 mgd is saved from water conservation activities and investments, and 21.7 mgd is supplied by historically used permitted quantities from other agricultural operations that leave production.

If most of the additional agricultural irrigation demands can be supplied with permitted upper Floridan aquifer water quantities from the crops that leave production, then no negative impacts to agriculture from the Recovery Strategy are expected through 2025,

the last year evaluated in this study. This result emphasizes the importance of the Self-Relocation and Net Benefits provisions of the proposed SWUCA rule revisions as they are expected to facilitate movement of permitted ground water quantities to new agricultural operations as old operations leave production.

Historically and today, agriculture in the SWUCA relies on relatively inexpensive ground and surface water sources to irrigate cropland. Most of this water, or about 85 percent, is obtained from ground water.[5] If permitted water supplies from relatively inexpensive ground water sources become scarce, new and expanding growers may need to obtain water from projects that are more expensive relative to traditional sources. This study demonstrated that agricultural operators are limited in the amount of money they can pay for water supply before residual returns to land and risk fall to zero and land leaves production.

The breakeven costs of water among farms were estimated. The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation.[6] As water prices increase, the return to land and risk falls. When the return to land and risk declines and is less than the return that could be gained from another use on that land, the land will be put into that other land use.

In the case where the land has no associated water use permit or feasible water source, alternative land uses may be limited. If the land is located near a growing urban area, the landowner may choose to produce the crop until returns fall to zero, buying time to take advantage of rising land prices before selling. Thus, the breakeven cost provides some idea about how much of the water cost growers might be able to bear before significant quantities of land leave production.

To this end, 11 model farms were chosen that represent the characteristics of farms in the SWUCA. The characteristics are crop type, irrigation system, location, cultural practices and seasonality. The estimated breakeven cost was then calculated for each model farm. The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation. The results are provided in Table 10.5-1. The estimated breakeven cost per 1,000 gallons of water used above what farmers already pay for water ranges from $0.0 for southwest Florida citrus and strawberries to $5.80 for field woody ornamentals.

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[5] Southwest Florida Water Management District, Regulatory Database as of November 2005.

[6] Return to land and risk is revenue from sales of agricultural products minus all costs of production including the opportunity cost of investments as reflected in the interest cost (average rate of return) and not including land rent (or value of the land).

For Fall Tomatoes, the estimated breakeven water cost is $0.80 per 1,000 gallons. For cucumbers, a $2.40 per 1,000 gallons water cost would cause the model cucumber farm to leave production permanently. As the return to land and risk falls, the model farm becomes more vulnerable to other events that cause returns to fall such as chronic low commodity prices, increases in other costs, and pest or disease outbreaks. Farm owner reaction to higher water costs will likely be to significantly increase water use efficiency through improved irrigation management and technologies to the extent that they are affordable.

The purpose of presenting the breakeven costs is to demonstrate that most agricultural operations are not likely to be able to afford the full cost of all new water supplies. However, additional water conservation activities and investments may be economically feasible for many growers. According to the District's 2001 RWSP, page 136, "Although there will be opportunities for agricultural users to make use of alternative sources such as surface water and reclaimed water, in general, they will need to continue to rely to a large degree on access to ground water. This is because the cost of conveying water from alternative sources will, in many cases, be prohibitive." The Net Benefit and Self-Relocation features of the proposed SWUCA rule revisions will assist water users in obtaining relatively low cost ground water sources.

Table 10.5-1
Impact of Alternative Water Source Cost on Economic Feasibility of Agricultural Production by Crop Type

Crop	Unit of Measure	Applied Water Needs - Kgal per Unit per Year	Breakeven Cost of Alternative Water Supply, $/kgal (a)	Cost of Alternative Water Supply, $/unit/year (a)	Net Crop Returns After Water Cost, $/unit
				Low	
Sod – St. Augustinegrass	Acres	1,001	$1.40	$1,402	$4
Sod – Bahiagrass	Acres	1,001	$1.05	$1,051	$3
Container Woody Ornamentals	1,000 Sq. Ft.	38	$3.90	$150	$2
Field Woody Ornamentals	1,000 Sq. Ft.	43	$5.80	$250	$0
Flowering Plants	1,000 Sq. Ft.	38	$2.80	$108	$1
Citrus – Central Florida	Acres	429	$1.05	$451	$17
Citrus – Southwest Florida	Acres	325	$0.00	$0	-$127
Tomatoes – Fall	Acres	812	$0.80	$650	$0
Tomatoes – Spring	Acres	1,216	$1.24	$1,508	$10
Strawberries – single cropped	Acres	924	$0.00	$0	-$126
Cucumbers – double cropped	Acres	708	$2.40	$1,700	$39

(a) The breakeven cost of water is the cost per 1,000 gallons of water that extracts all return to land and risk from the farming operation.
(b) Double cropping strawberries with other crops will increase the overall net returns to the land.

10.6 Industrial/Commercial and Mining/Dewatering Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Industrial/Commercial and Mining/Dewatering businesses within the District that withdraw water directly from water sources[7] include chemical manufacturers, food processors, food packers, mining /dewatering operations, thermoelectric power generators, and other types of manufacturers. Much of the food processing industry in the SWUCA is associated with citrus and other agricultural crops. Most of the chemical manufacturing businesses are phosphate fertilizer manufacturers that are closely associated with the local phosphate mining industry. Thermoelectric power generators create the electricity used to supply the regional electric grid and use water for cooling and other purposes involved in the generation of electricity. Water used for mining and dewatering is associated with phosphate, limestone, sand, and shell mining in the SWUCA.

[7] Instead of purchasing water from a water utility

The firms most likely to be negatively impacted by the SWUCA Recovery Strategy are those that:

- Are new to the area or cannot Self Relocate sufficient permitted water quantities, and,
- Have difficulty passing on increased costs to their customers.

Some firms may be able to access affordable water supplies through the Net Benefit provision. Phosphate mining and possibly the fertilizer manufacturing industries are expected to move from the northern areas of the SWUCA, particularly Polk County to southern areas of the SWUCA, particularly Hardee County. These firms will be able to move their permitted quantities under the Self-Relocation provision of the proposed SWUCA rule revisions, so these industries are not expected to be negatively affected by the SWUCA Recovery Strategy.

Some electric power generators in the SWUCA have been able to use technologies that significantly reduce the amount of water needed to produce electricity. Thus, the unused permitted quantities on some of the permits of electricity generators may be sufficient to supply power generation needs in the future. In the event that more expensive alternative water sources must be used, the cost increase would be passed on to consumers through higher electricity rates. This study provided an example where the increased water cost would increase the average residential customer's electric bill by $2.68 per year. This additional cost is unlikely to cause undue hardship to electricity customers. Thus, negative impacts to the economy are not expected from the SWUCA Recovery Strategy through 2025 as it affects electric generating companies.

It is likely that some firms may be discouraged from locating in the SWUCA due to the lack of affordable water supplies. If the forecasted SWUCA-wide water demand growth of Industrial/Commercial Use Types is expected to be only 5.8 mgd over the next 20 years, then the impact to the regional SWUCA economy may not be significant. However, if actual water demand growth of Industrial/Commercial Use Types without the Recovery Strategy is greater than forecasted, the economy will not grow as fast as it otherwise would have if water users could continue pumping from relatively inexpensive ground and surface water sources.

The Net Benefit provision will likely minimize negative economic impacts because it allows ground water to be used under certain conditions. Negative economic impacts could also be minimized if the District could develop projects where individual water users buy into them on a per 1,000 gallon basis. Also, if the proposed withdrawal is relatively small so that it does not impact MFL water bodies, then the water use may be permitted.

10.7 Recreation / Aesthetic Water Users – Potential Economic Impact of the SWUCA Recovery Strategy

Water demand increases for Recreation and Aesthetic Use Types are expected in all SWUCA counties over the next 25 years. Recreation and Aesthetic Use Types include golf course irrigation, condominium and apartment complex lawn and landscape irrigation, and the irrigation of playing fields, botanical plants and landscapes at public and private parks, schools, and playgrounds.

The SWUCA-wide water demand increase is expected to be 15.3 mgd. About 3.9 mgd might be supplied by unused, permitted water quantities. The remaining 11.4 mgd is expected to be supplied with reclaimed water. Most of the projected additional water demand increase of Recreation / Aesthetic Use Types is comprised of water demand at golf courses as more and more courses are built in the SWUCA[8].

The incremental costs of water associated with the Recovery Strategy may prevent some new golf course construction particularly where the golf course cannot pass through the incremental water costs due to competition from courses that have sufficient permitted ground water quantities or because the client base is sensitive with respect to green fees. However, for most new golf courses, the demand for golf is expected to be strong enough that golfers will be willing to pay the extra fee needed to recover the incremental water costs and many new golf courses will still be constructed and operated profitably.

New multi-family complexes, public schools and parks will likely need to use alternative water sources in order to obtain new water quantities for landscape irrigation. About 19 new schools, 18 new government parks and 212 new apartments, condominiums and sub-divisions in the SWUCA may request new permitted water quantities for lawn and landscape irrigation. The incremental costs of alternative water sources will likely be paid by the households located in the school districts, park districts, apartments, condominiums and sub-divisions that will used the alternative source water.

The financial impact of reclaimed water incremental costs for school and park landscape irrigation on the average annual household ad valorem tax bill was estimated to range from $0.34 per year to $4.08. While the ad valorem tax increases are not significant, the incremental cost is likely to reduce the size of landscaped areas and lawns to those that are necessary for school recreation activities and sports activities.

[8] From draft Regional Water Supply Plan Update, Southwest Florida Water Management District, Chapter 4, November 2005.

The financial impact to households from reclaimed water incremental costs for large landscape irrigation was evaluated. The monthly incremental water cost per household was estimated to be in the neighborhood of $3.07. The impact of having to use more expensive alternative water sources will be smaller and more water efficient landscape areas at new residential developments.

If the proposed withdrawal is relatively small so that it does not impact MFL water bodies, then the water use may be permitted.

10.8 Economic Contribution of State Funding to the SWUCA

About $6.6 million per year in State funding will likely be available over the next nine years to pay for some of the construction costs associated with alternative water supply projects in the SWUCA. About 90 percent of this State funding will come from Florida households outside of the SWUCA. This outside funding will generate income, tax revenues and employment to the residents of the SWUCA counties. Outside funding to pay for water supply projects in the SWUCA would generate about $11 million in output, $4 million in labor income, $911,000 in other property type income, and $281,000 in indirect business taxes each year for the next nine years. During this time, about 115 jobs would be created in the SWUCA area due to this funding.

10.9 Benefits of the SWUCA Recovery Strategy

There are many benefits associated with protecting the water resources addressed in the SWUCA Recovery Strategy. While there is very little data available to estimate the values of these benefits in dollars terms, the benefits are described in this report.

The benefits of the Saltwater Intrusion Minimum Aquifer Level are the future cost savings from avoided membrane treatment to remove salts in the water pumped from the upper Floridan aquifer. Unmanaged saltwater intrusion threatens the relatively inexpensive water supplies of the upper Floridan aquifer. If significant ground water quantities were to become salty and require membrane treatment, the costs of such treatment would be significantly higher than the costs of the Recovery Strategy. The District has decided to balance the needs of the existing economy with the needs of future generations by setting the Saltwater Intrusion Minimum Aquifer Level so that it slows the rate of saltwater intrusion instead of either completely halting that intrusion or allowing it to continue unmanaged.

The Upper Peace River and the eight Highlands Ridge lakes are popular areas for fishing, canoeing, boating, swimming, and bird watching. They also provide aesthetic amenities. Many of the lakes are urban lakes and support a variety of recreation and aesthetic uses. There is no data or information available regarding the number of person-days spent recreating on the Upper Peace River, the eight lakes or any of the lakes

in the Highlands Ridge. Likewise, there is no information regarding the value that residents and visitors place on being able to boat, canoe, swim or fish on these water bodies or bike, walk or bird watch near these water bodies.

A report by the Florida Fish and Wildlife Conservation Commission[9] estimates that each freshwater boat ramp in Florida generates on average $442,000 per year in the value of Florida's output, $42,000 per year in tax revenues collected and 8 jobs. Each freshwater pier in Florida generates on average $623,000 per year in the value of Florida's output, $75,000 per year in tax revenues collected and 10 jobs. Using this information, the 12 public boat ramps and 6 public piers on the Upper Peace River and the eight Highlands Ridge lakes generate $9 million in the value of output each year, 156 jobs, and $951,000 in State and local annual tax revenue collections. These are just a portion of the values that would be protected by the SWUCA Recovery Strategy. Other values include the private waterfront amenities and recreation opportunities enjoyed by residents who live on the Highland Ridge lakes and the additional public recreation values associated with all of the other Highlands Ridge lakes that would be protected by the proposed SWUCA rule and Recovery Strategy.

[9] Florida Fish and Wildlife Conservation Commission, *"Assessing the Economic Impact and Value of Florida's *Public Piers and Boat Ramps"*, Tallahassee, Florida, March 2001, page 5.

Appendix A
Historic Analysis of the SWUCA Economy

This Appendix compare the trends in historic economic data describing the SWUCA counties to the same economic data corresponding to the rest of Florida. The purpose of this analysis is to determine whether or not the historic water use permitting provisions in the SWUCA had a significant impact on the economy.

A.1 Overall SWUCA Economy

This section provides an historic perspective regarding the economies of the eight counties that comprise the Southern Water Use Caution Area (SWUCA). These counties are as follows.

- Hardee
- DeSoto
- Charlotte
- Highlands
- Hillsborough
- Manatee
- Polk
- Sarasota

The intent of this historic perspective is to identify if there have been noticeable economic impacts associated with the District's historic water use permitting rules.

The historic perspective is provided in graphics that plot annual data on the following economic variables from 1970 to 2002, the latest year for which economic information is available.

- Taxable sales, in millions of 2005 dollars
- Non-agricultural wage and salary employment, 1,000s of jobs
- Number of permanent resident households, 1,000s of households
- Labor income, millions of 2005 dollars

The SWUCA includes the entire counties of Hardee, DeSoto, Manatee, and Sarasota and large portions of Charlotte, Highlands, Hillsborough and Polk counties. The economic data by county presented in this section represent the entire county and not just that portion in the SWUCA. These data are from the Data Appendices of the 1997 and

2002 “Florida Long Term Economic Forecast”, prepared by the University of Florida, Bureau of Economic and Business Research, Gainesville, Florida (BEBR). Unfortunately this agency no longer collects and publishes these economic data. The last year of economic data that is available by county is 2002. According to BEBR, the data representing each county in Florida was estimated independently of each other. Therefore, trends in data for an individual county or groups of counties may be compared to trends in the rest of the State.

Taxable Sales. Graphical plots of the taxable sales data are provided in Figures 1 through 9. In Figure 1, the total taxable sales of the SWUCA counties were compared to the total taxable sales in the rest of Florida from 1970 to 2002.[1] The trends in both data series are identical. This indicates that economic growth in the SWUCA counties was affected by the same factors that affected the rest of Florida. A comparison of the taxable sales of each SWUCA county to that of the rest of Florida found that each of the eight SWUCA counties followed a trend that is very similar to the rest of Florida. The taxable sales data is graphed for each SWUCA county and compared to taxable sales in the rest of Florida in Figures 2 through 9.

Non-Agricultural Employment. Graphical plots of the non-agricultural wage and salary employment data are provided in Figures 10 through 18. In Figure 10, total non-agricultural employment in the SWUCA counties was compared to the total non-agricultural employment in the rest of Florida from 1970 to 2002. The trends in both data series are identical. This indicates that job creation in the SWUCA counties was affected by the same factors that affected the rest of Florida. The non-agricultural employment data is graphed for each SWUCA county and compared to the non-agricultural employment in the rest of Florida in Figures 11 through 18. A comparison of the non-agricultural employment of each SWUCA county to the rest of Florida found that seven of the eight SWUCA counties followed a trend that is very similar to the rest of Florida. The exception is DeSoto County where employment was unchanged from 1993 to 2003.

Number of Households. Graphical plots of the number of permanent resident households are provided in Figures 19 through 27. In Figure 19, the total number of households in the SWUCA counties was compared to the total number of households in the rest of Florida from 1970 to 2002. The trends in both data series are identical. This indicates that residential development in the SWUCA counties was affected by the same factors that affected the rest of Florida. The number of households was graphed for each SWUCA county and compared to the number of households in the rest of Florida in Figures 20 through 27. A comparison of the number of households in each SWUCA county to that of the rest of Florida found that seven of the eight SWUCA counties fol-

[1] Florida taxable sales less taxable sales in the SWUCA counties.

lowed a trend very similar to the rest of Florida. The exception is Hardee County where the number of households leveled off from 1981 to 1991 and increased after 1991.

Labor Income. Graphical plots of labor income are provided in Figures 28 through 36. In Figure 28, total labor income in the SWUCA counties was compared to total labor income in the rest of Florida from 1970 to 2002. The trends in both data series are identical. This indicates that economic growth in the SWUCA counties was affected by the same factors that affected the rest of Florida. Labor income was graphed for each SWUCA county and compared to labor income in the rest of Florida in Figures 29 through 36. A comparison of labor income in each SWUCA county to that of the rest of Florida found that all of the eight SWUCA counties followed a trend very similar to the rest of Florida.

Conclusions. Taxable sales, non-agricultural employment, number of households, and labor income have grown in each of the SWUCA counties and in the rest of Florida from 1970 to 2002. Trends in the counties of the SWUCA are very similar to the trends for the rest of the State indicating that the economies of the SWUCA counties were affected by the many of the same factors affecting the overall Florida economy. From examining these data, there does not appear to be a noticeable impact of the District's historic water use permitting rules.

Figure 1
SWUCA Counties and Florida Outside of SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

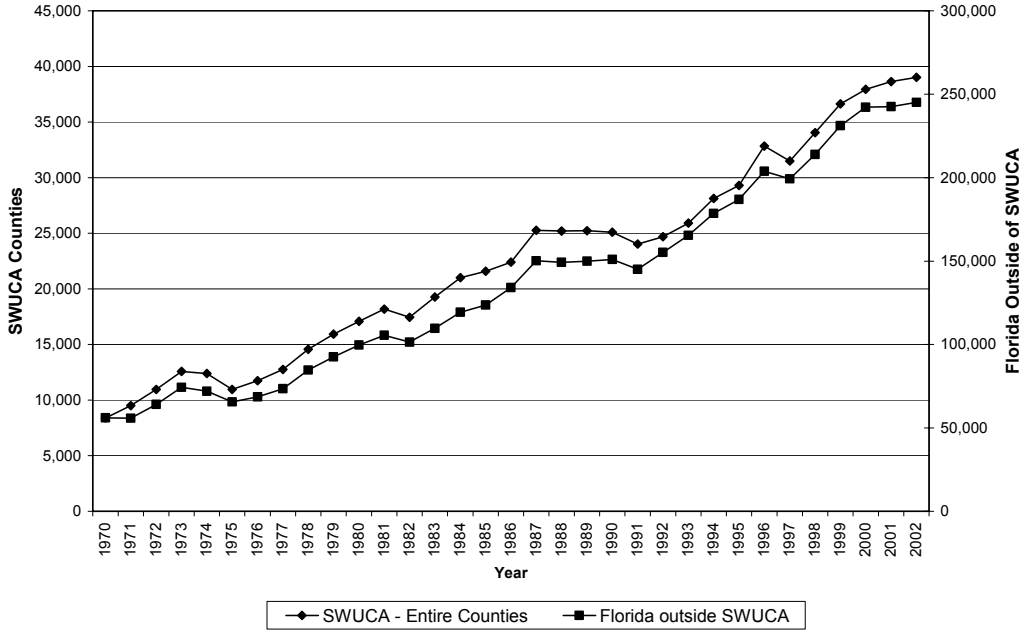

Figure 2
Hardee County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

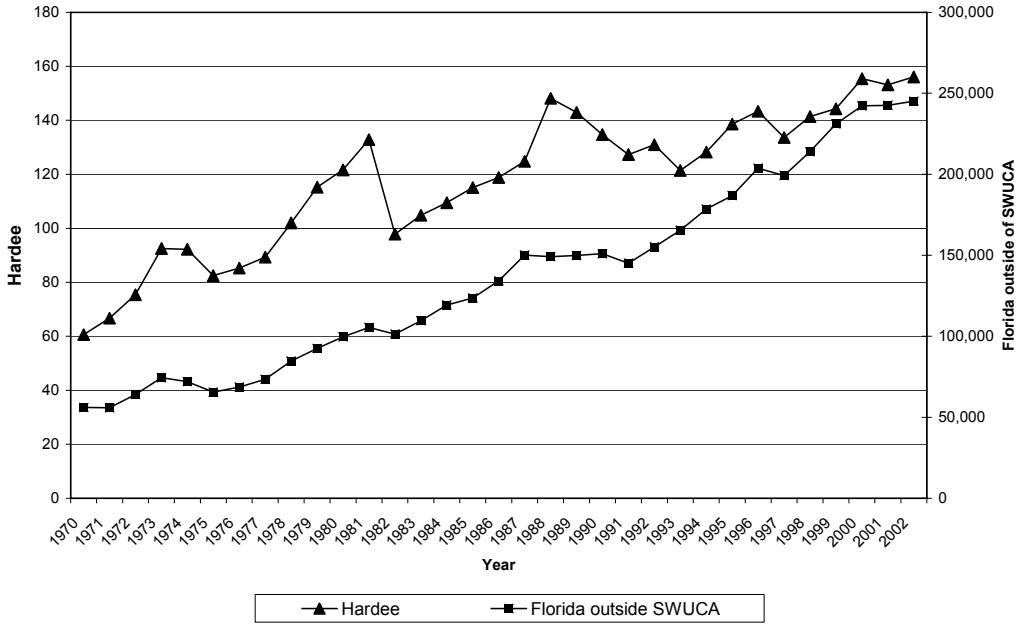

Figure 3
DeSoto County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

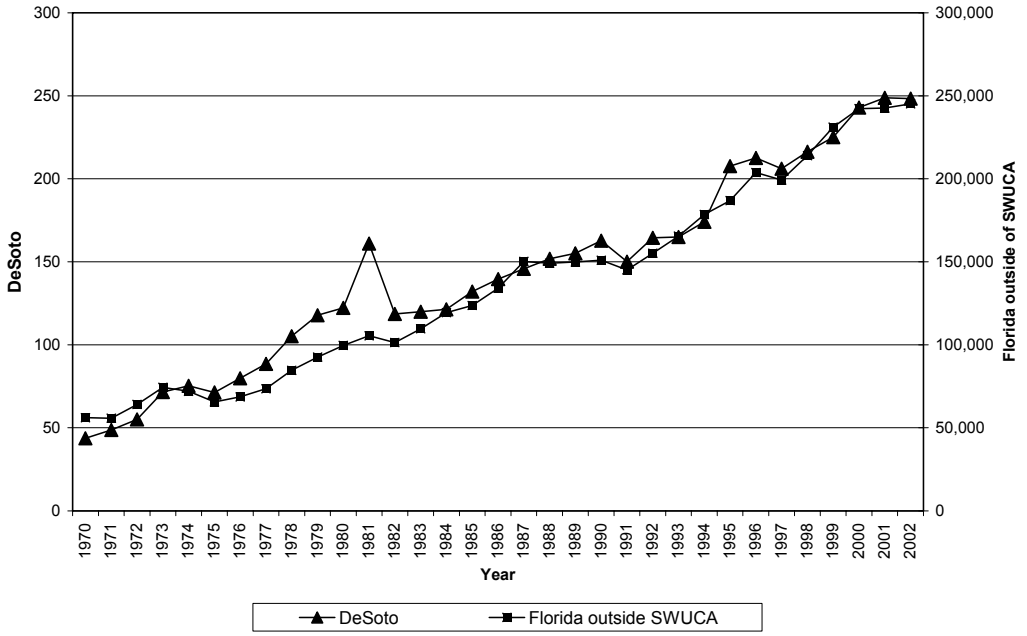

Figure 4
Charlotte County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

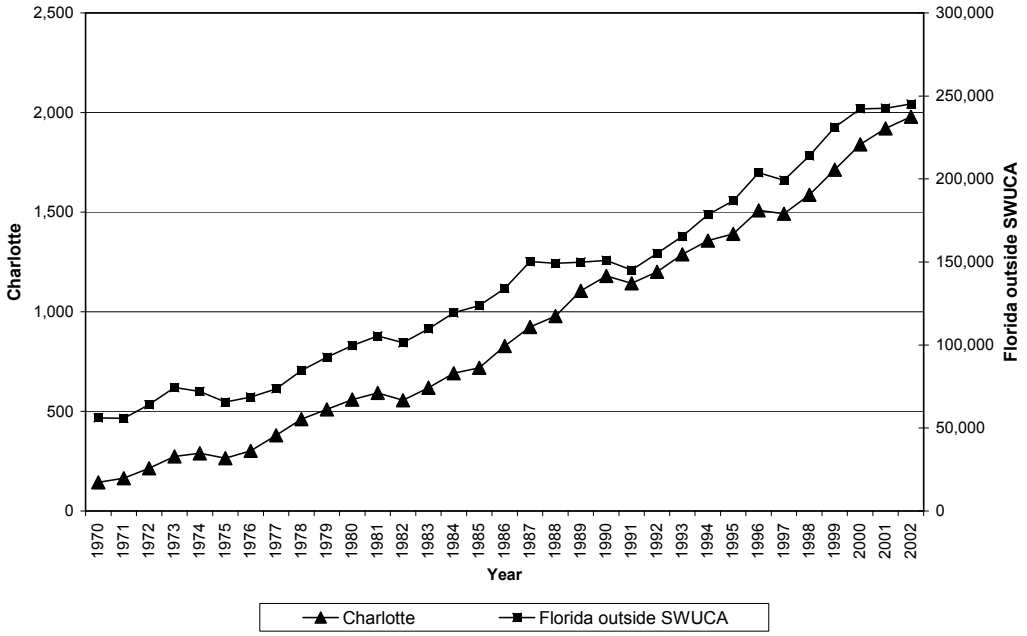

Figure 5
Highlands County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

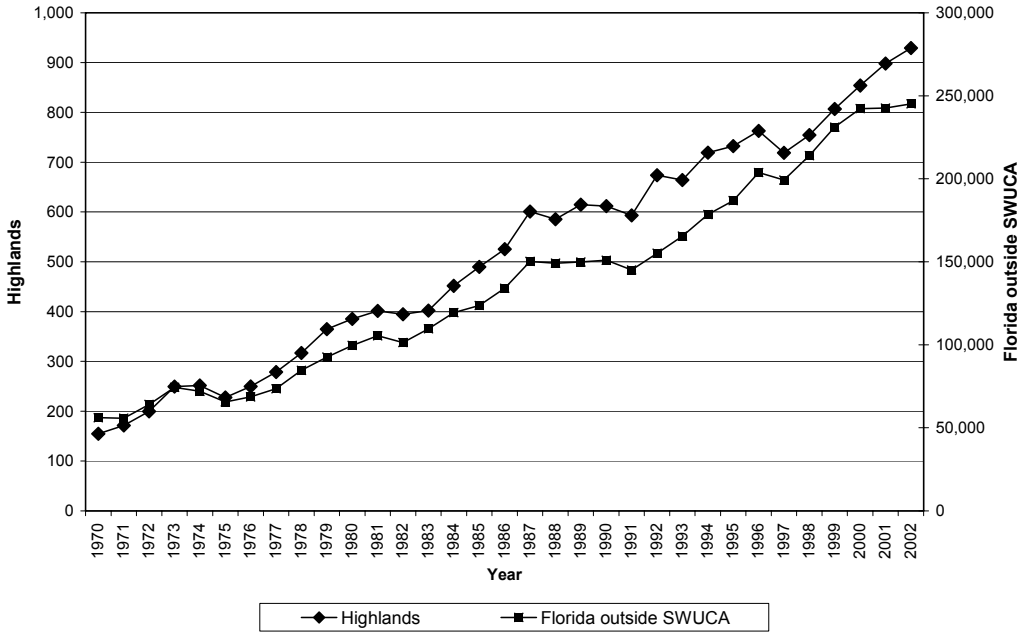

Figure 6
Hillsborough County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

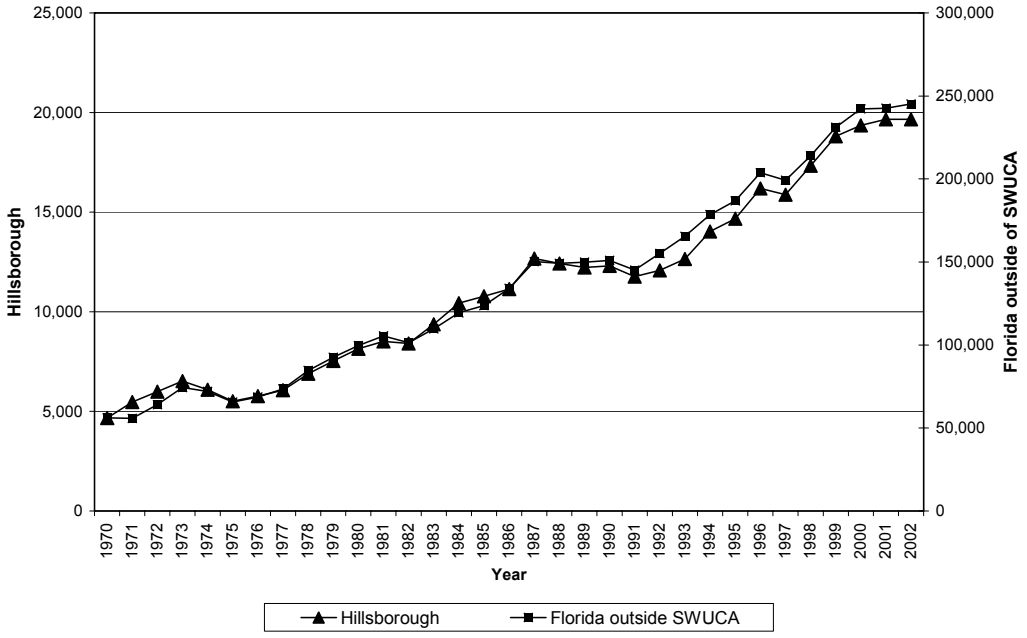

Figure 7
Manatee County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

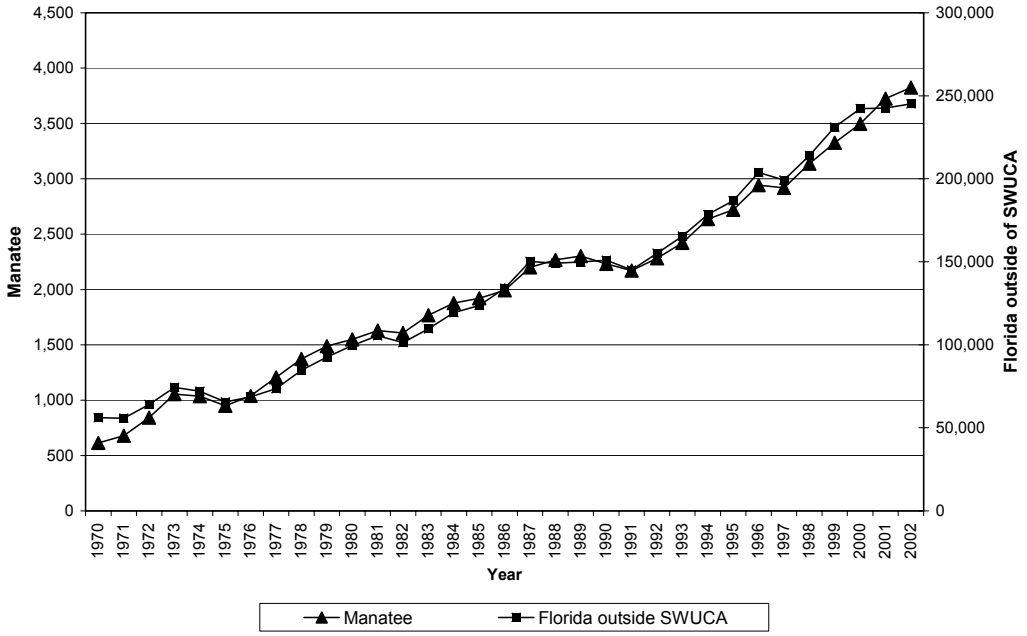

Figure 8
Polk County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

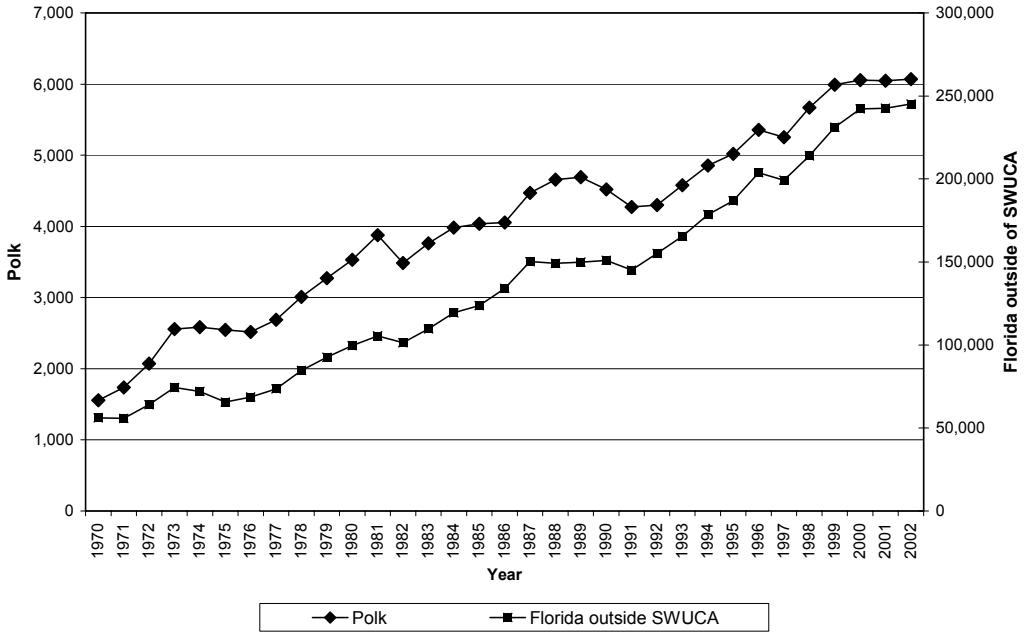

Figure 9
Sarasota County and Florida Outside the SWUCA
Taxable Sales in Million Dollars (2005 Dollars)

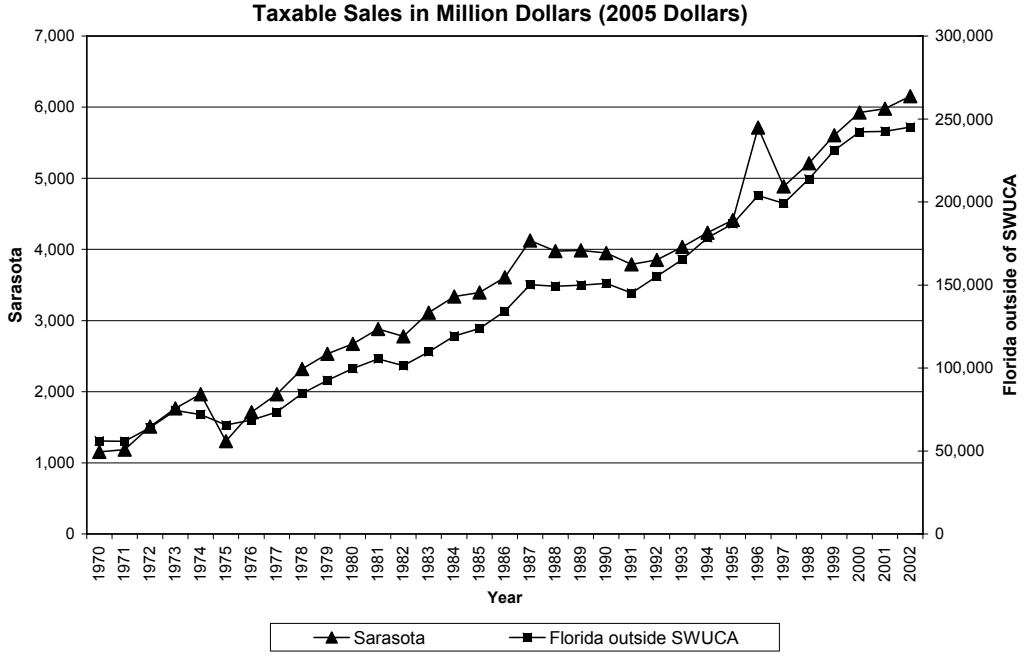

Figure 10
SWUCA Counties and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

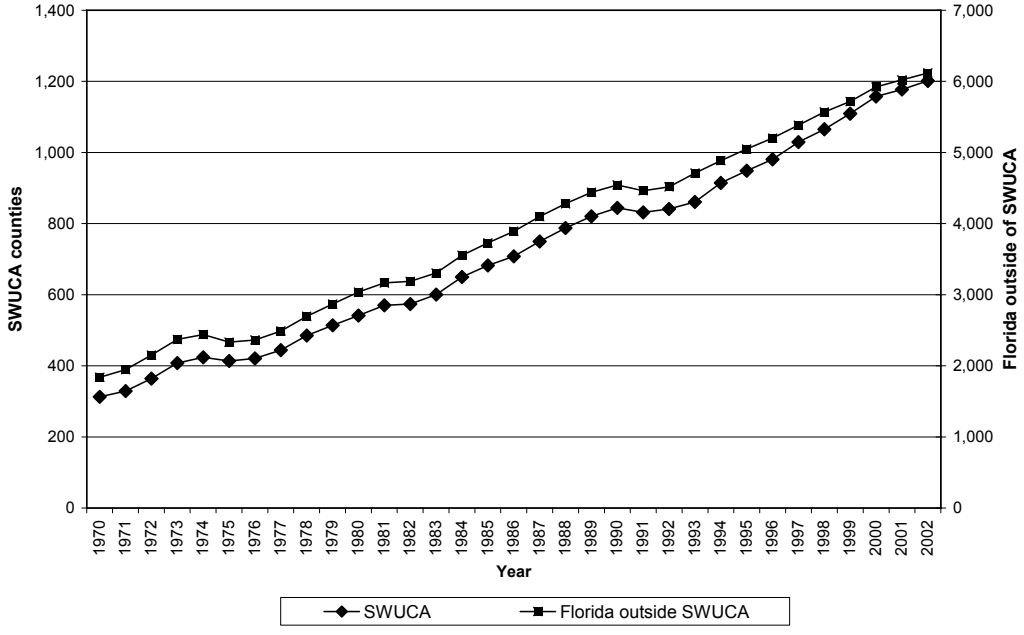

Figure 11
Hardee County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

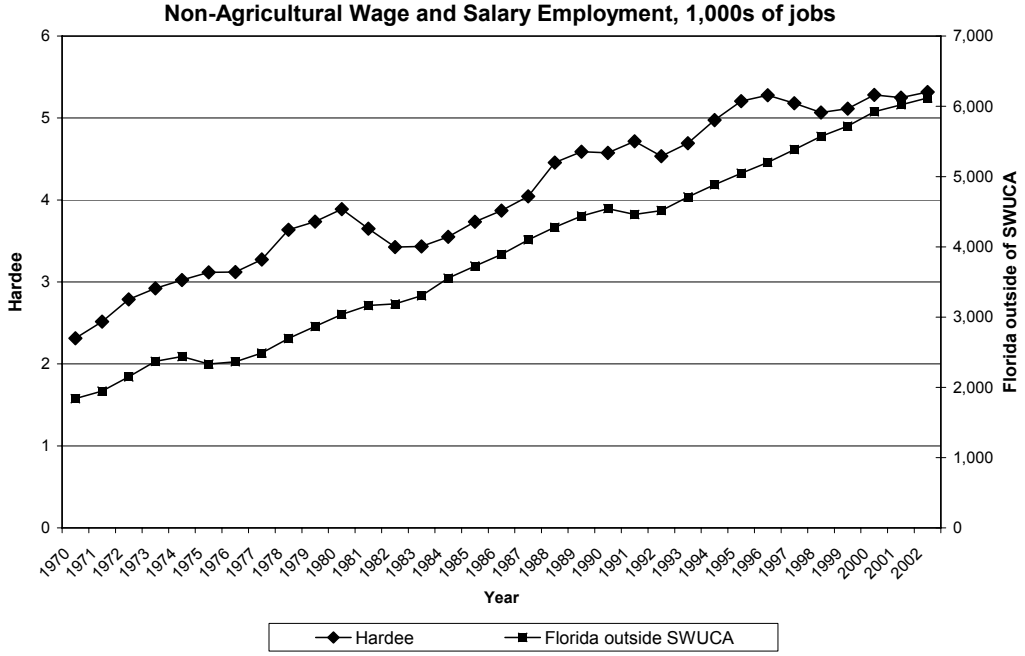

Figure 12
DeSoto County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

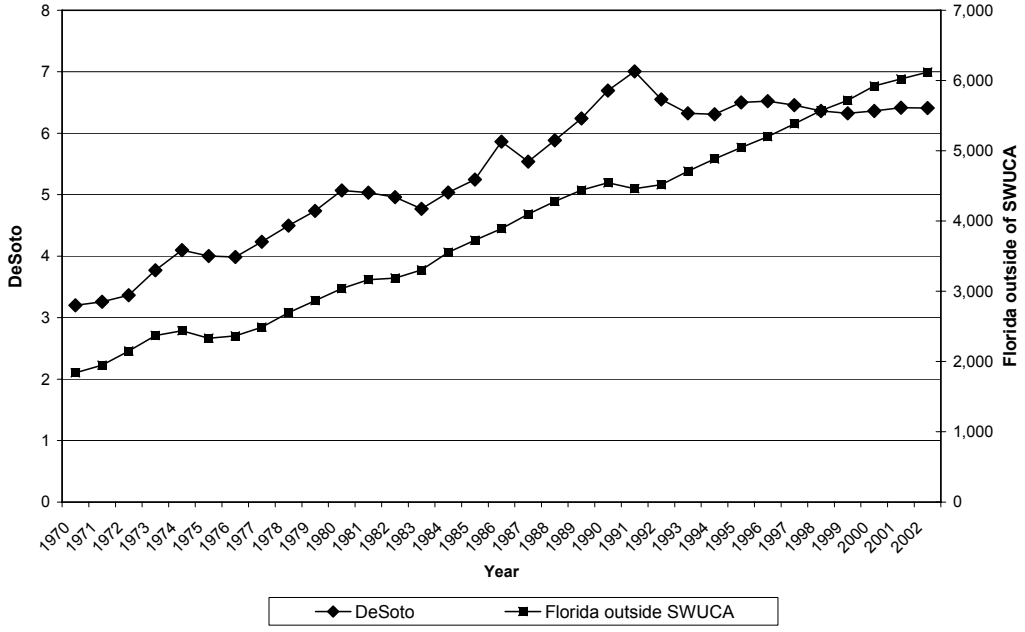

Figure 13
Charlotte County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

Figure 14
Highlands County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

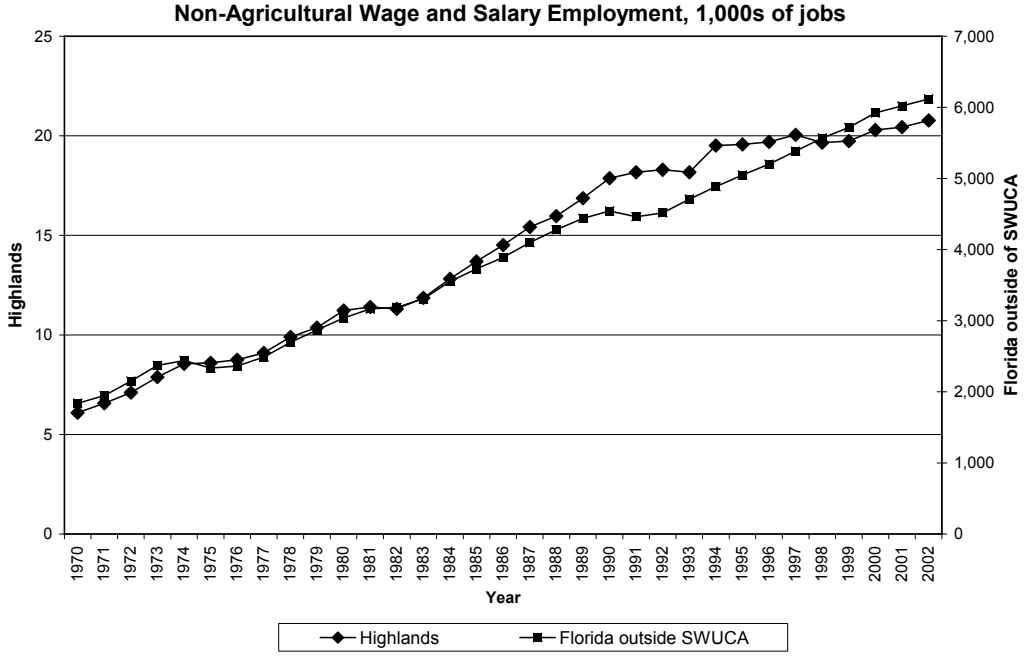

Figure 15
Hillsborough County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

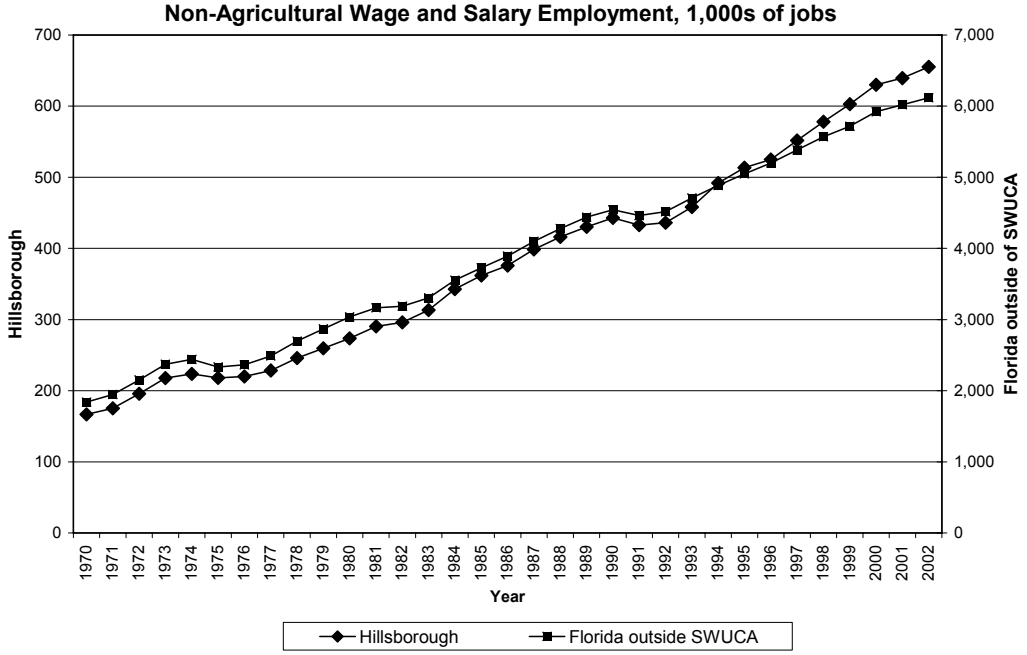

Figure 16
Manatee County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

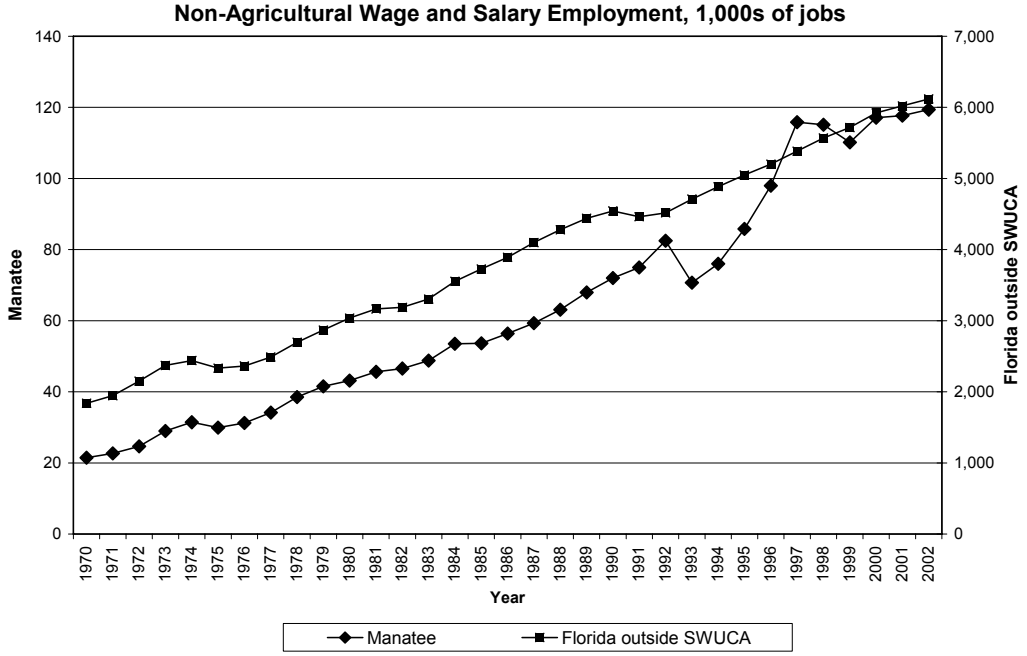

Figure 17
Polk County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

Figure 18
Sarasota County and Florida Outside the SWUCA
Non-Agricultural Wage and Salary Employment, 1,000s of jobs

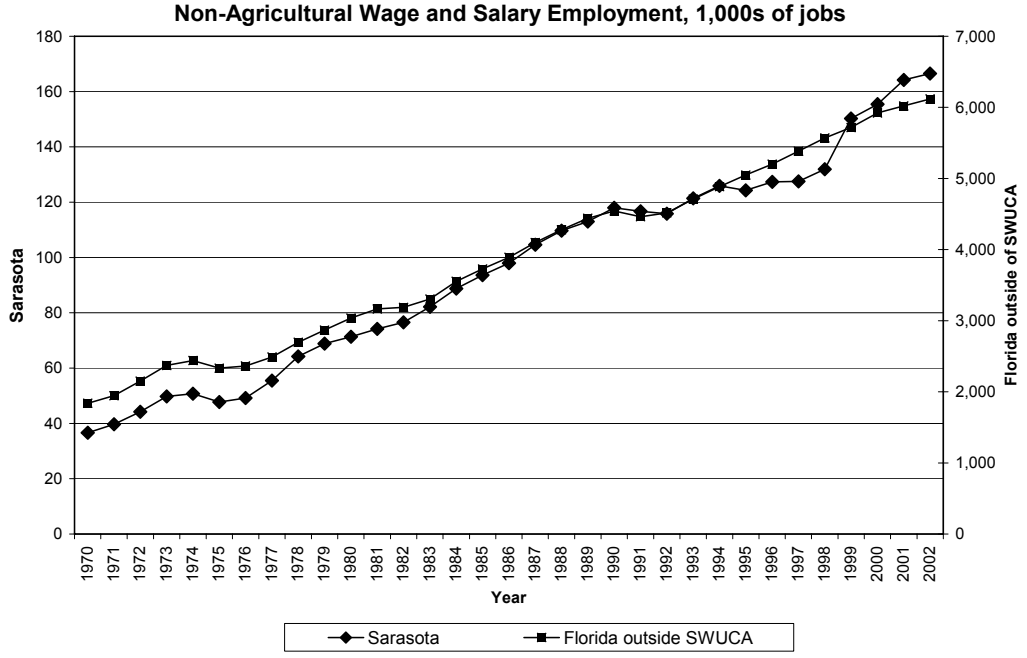

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Figure 19
SWUCA Counties and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

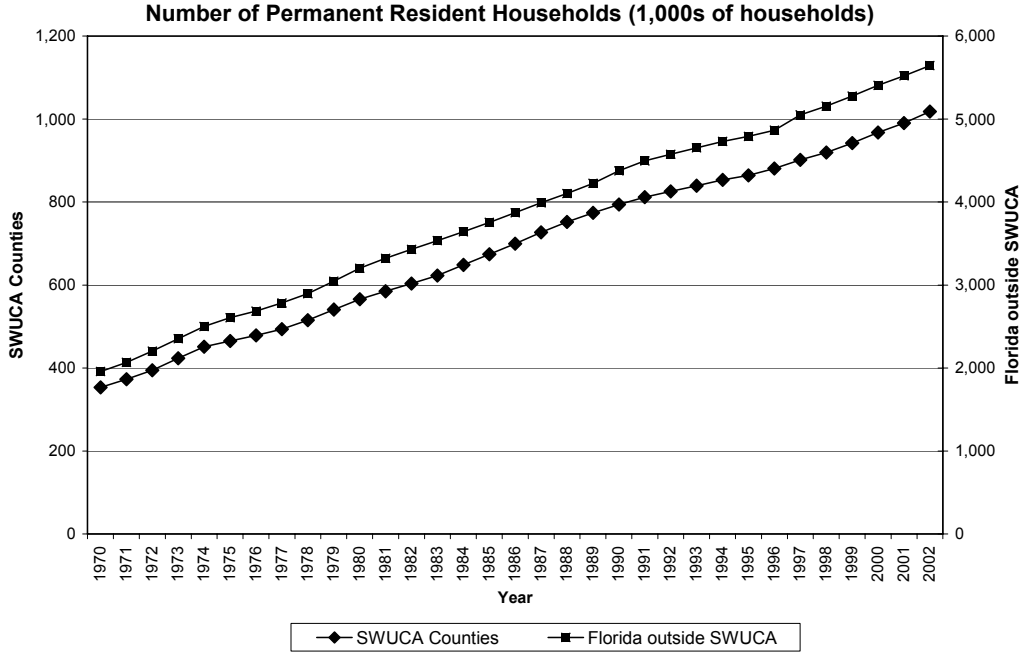


Figure 20
Hardee County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

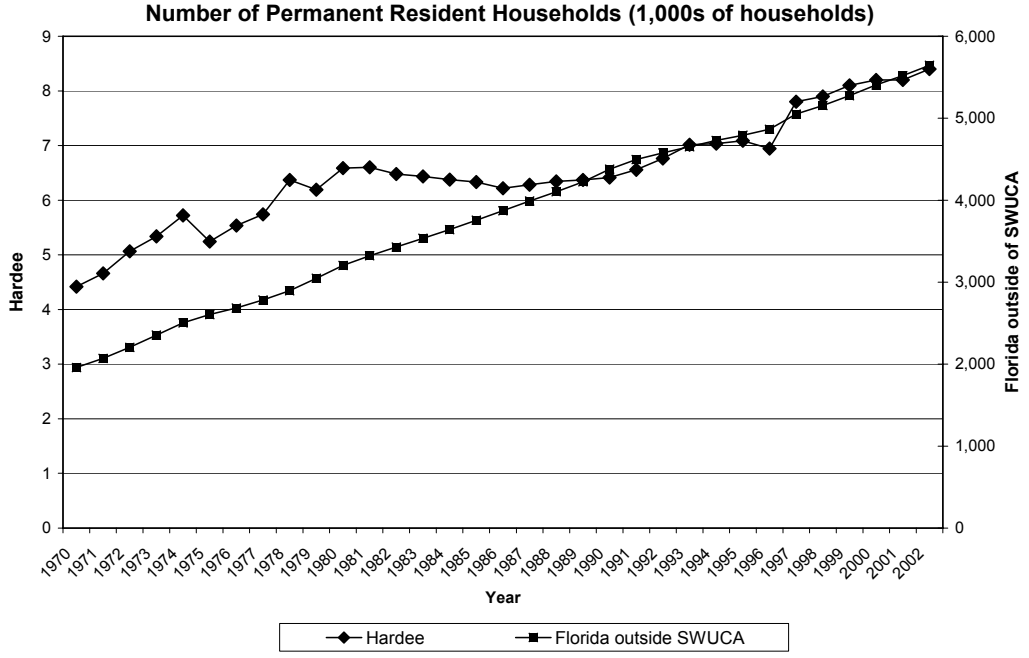


Figure 21
DeSoto County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

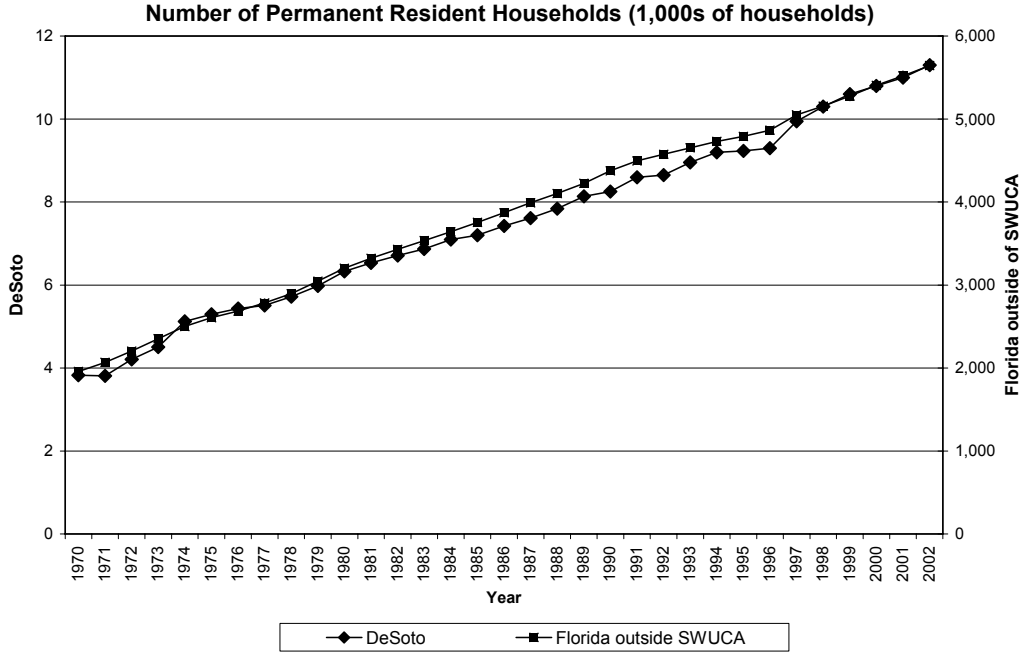


Figure 22
Charlotte County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

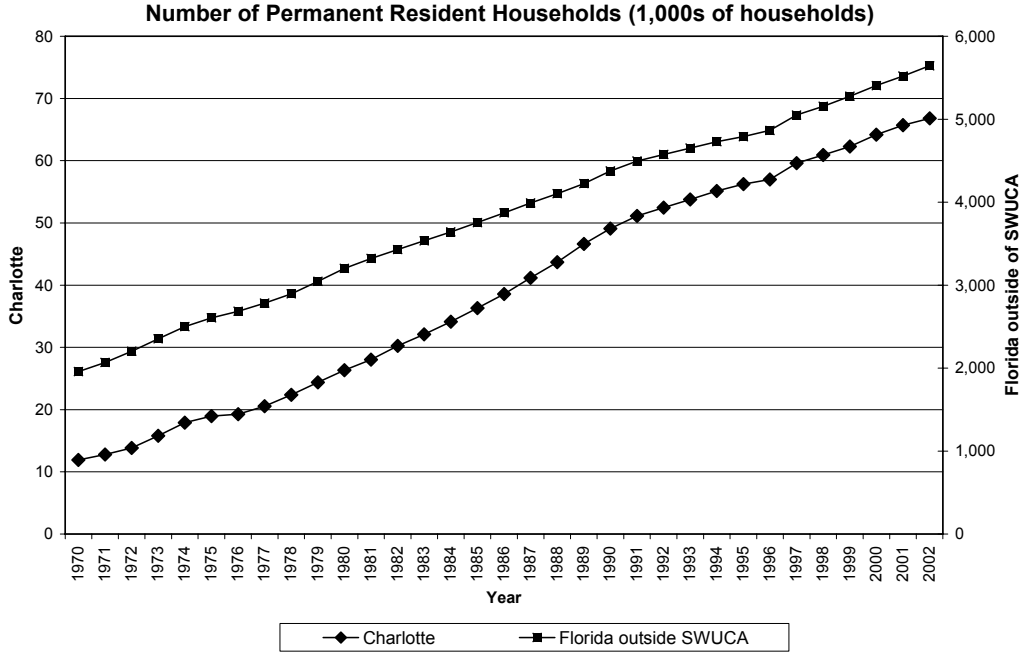


Figure 23
Highlands County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

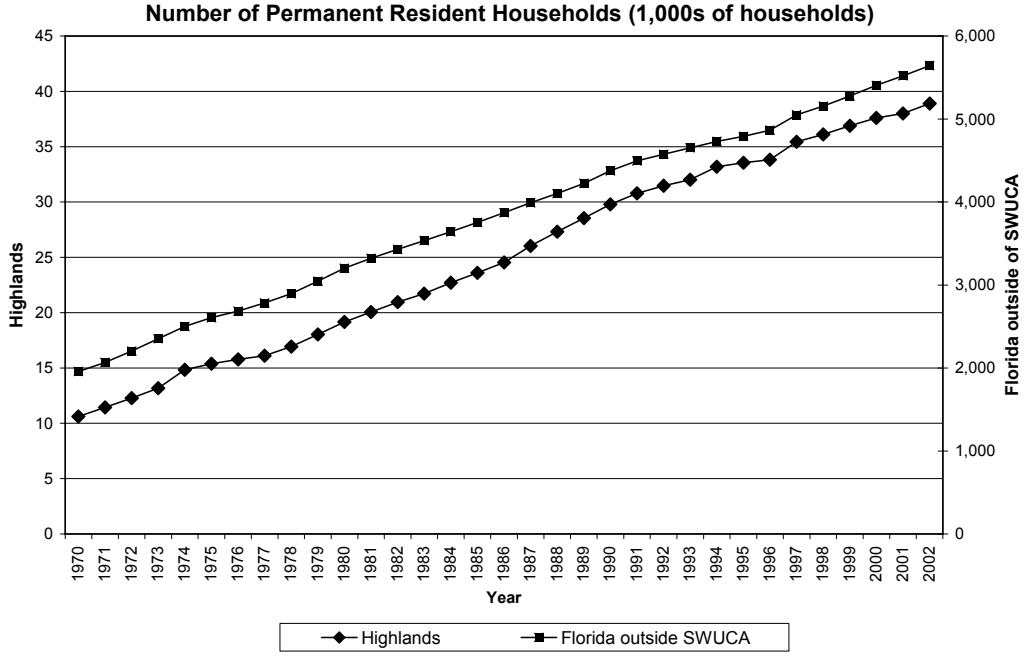


Figure 24
Hillsborough County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

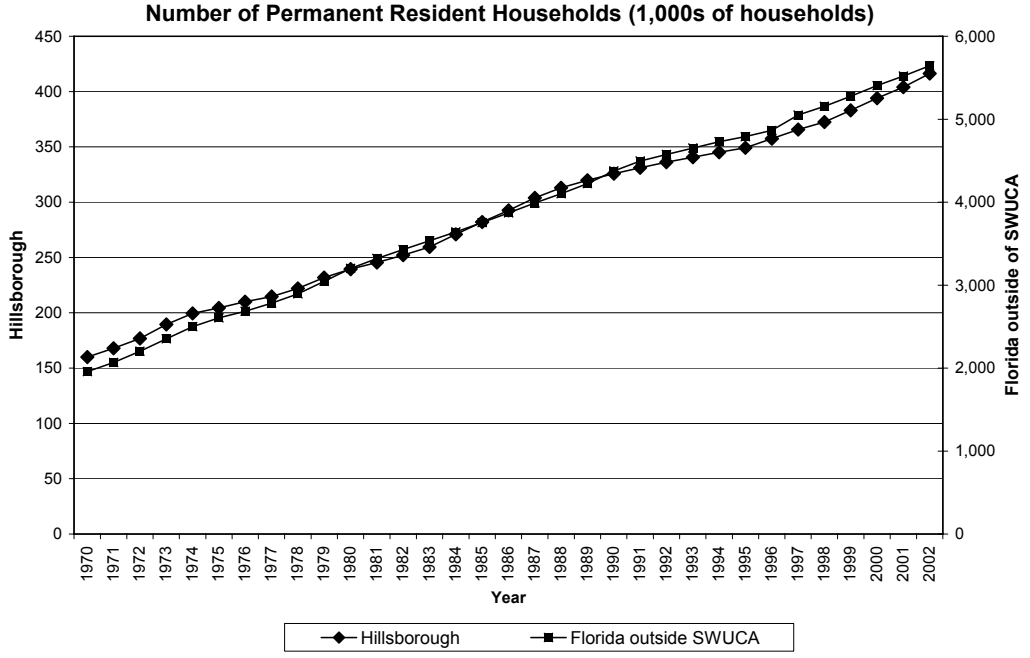


Figure 25
Manatee County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

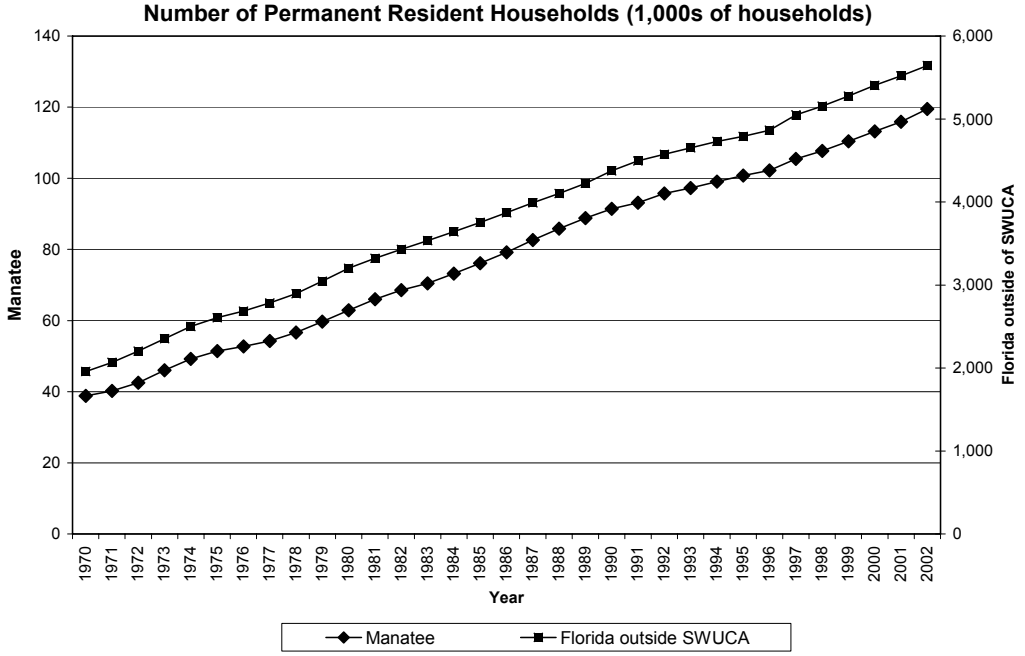


Figure 26
Polk County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

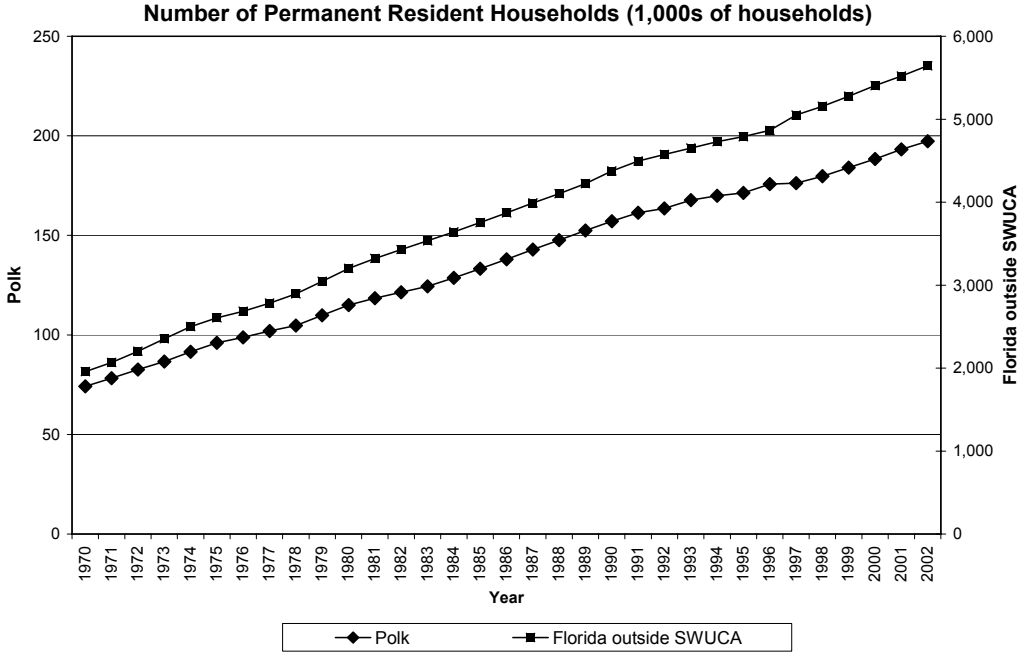


Figure 27
Sarasota County and Florida Outside the SWUCA
Number of Permanent Resident Households (1,000s of households)

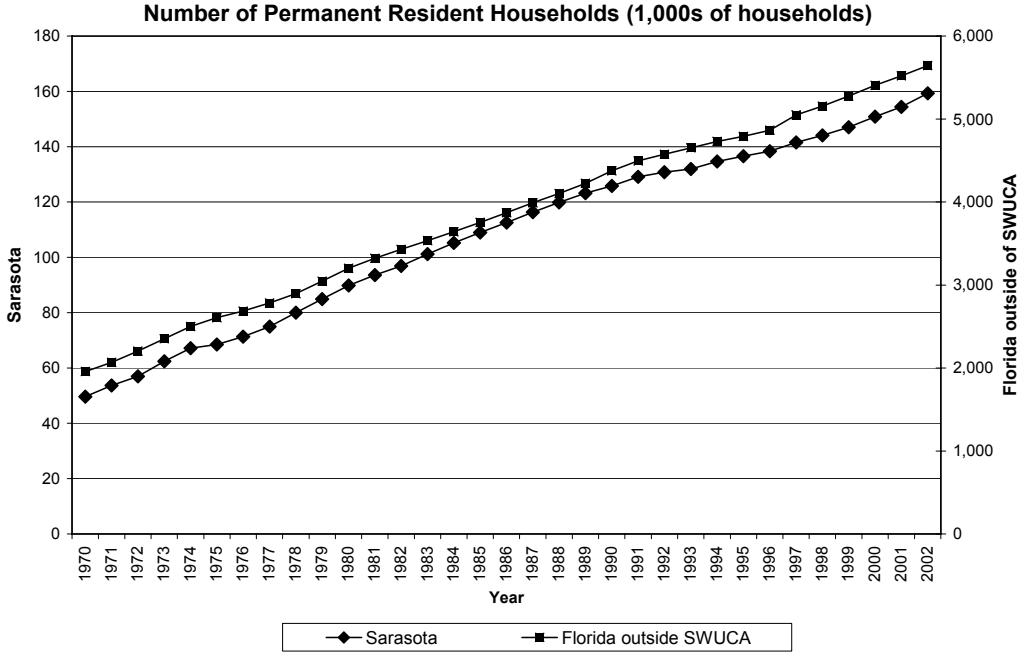


Figure 28
SWUCA Counties and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

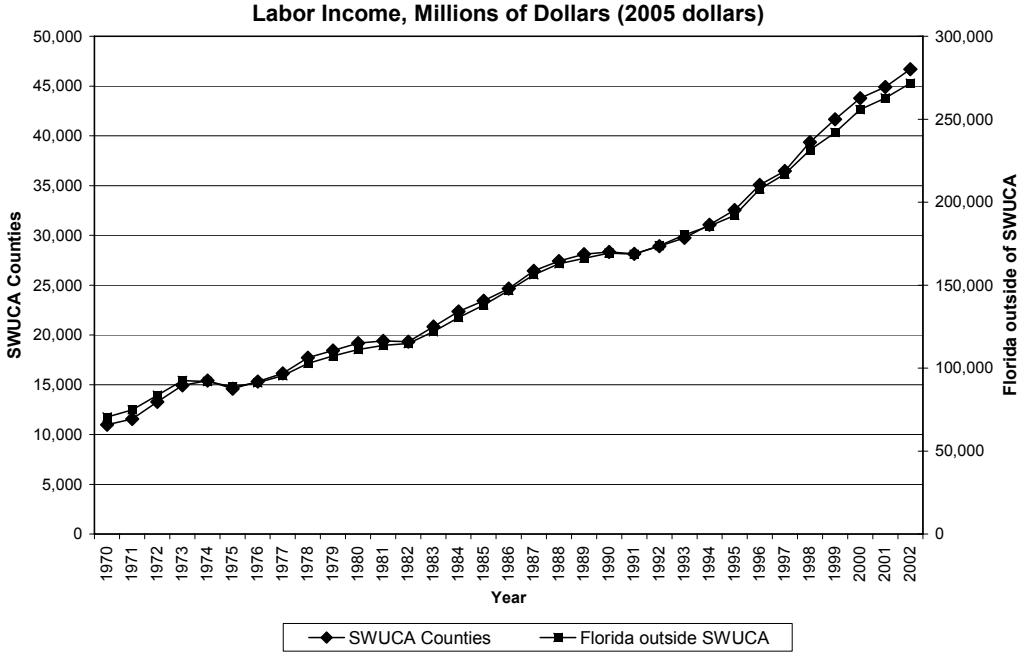


Figure 29
Hardee County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

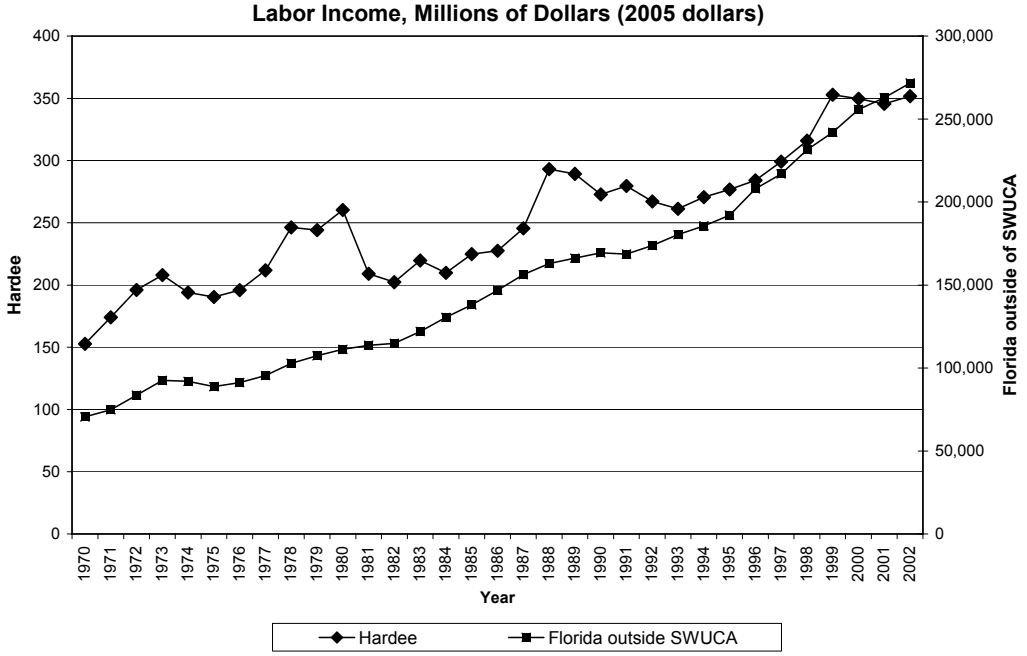


Figure 30
DeSoto County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

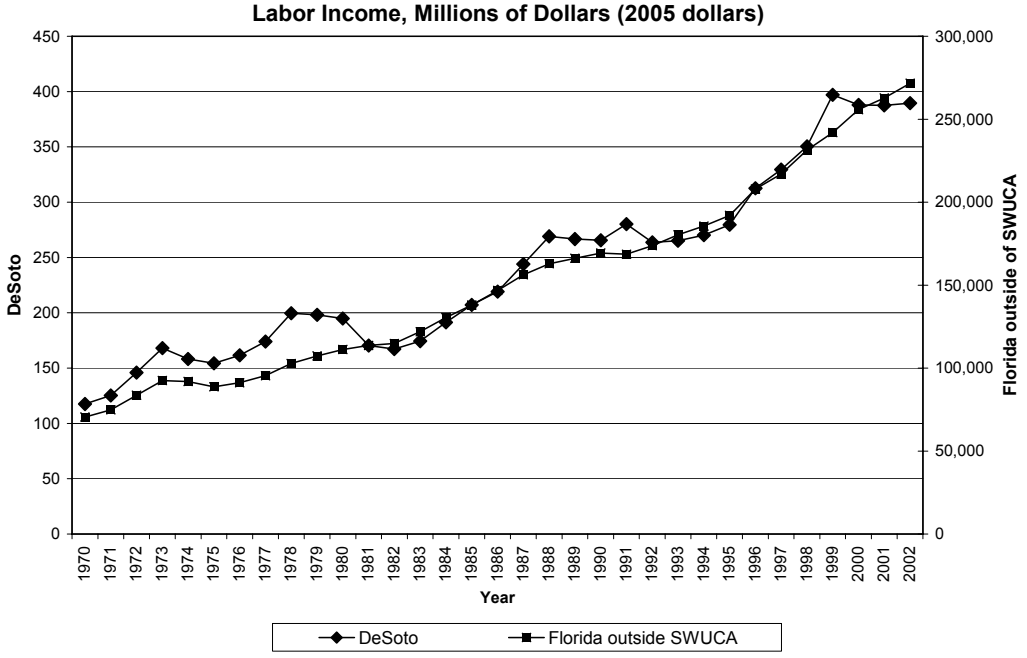


Figure 31
Charlotte County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

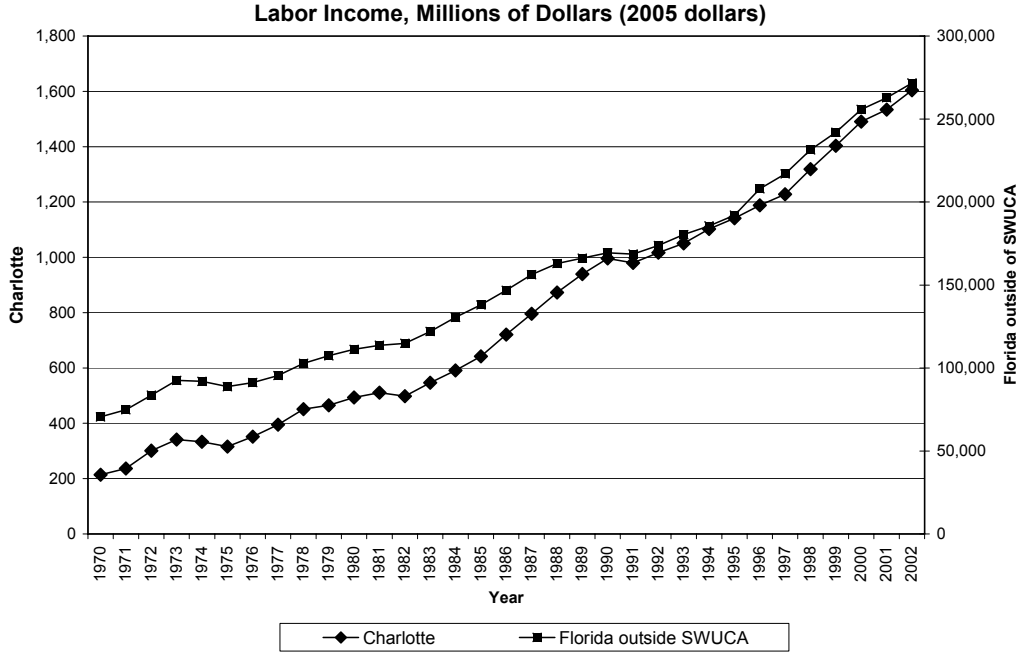


Figure 32
Highlands County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

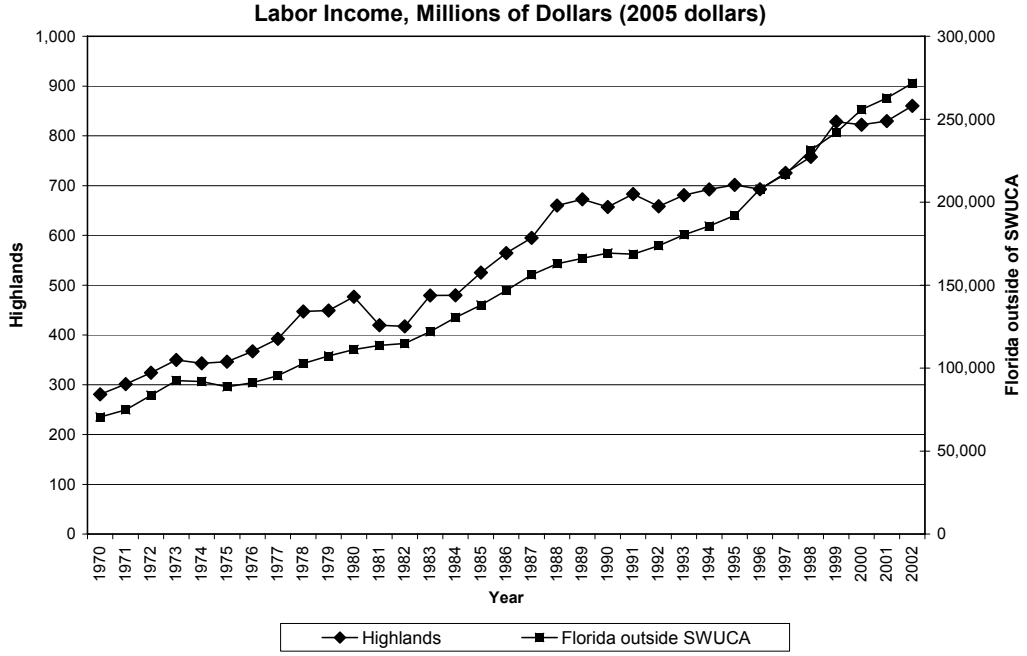


Figure 33
Hillsborough County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

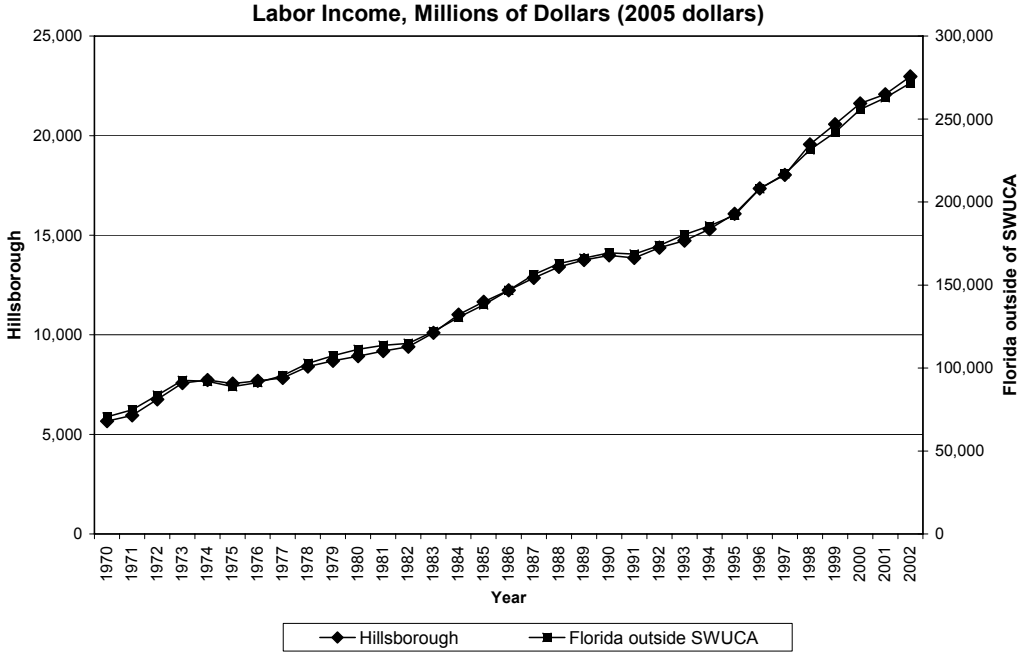


Figure 34
Manatee County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

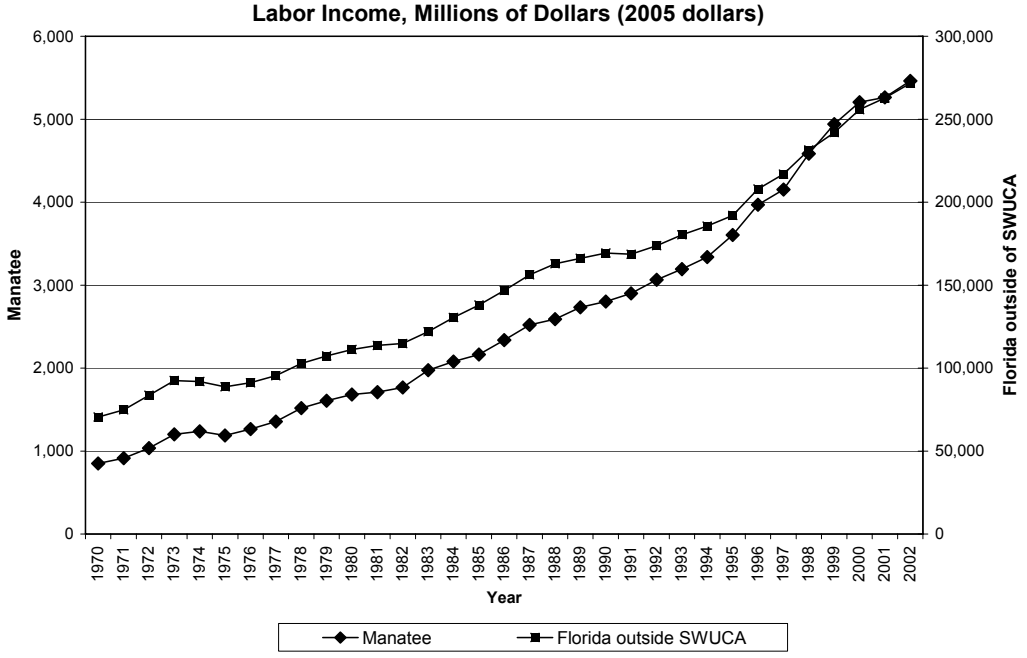


Figure 35
Polk County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)

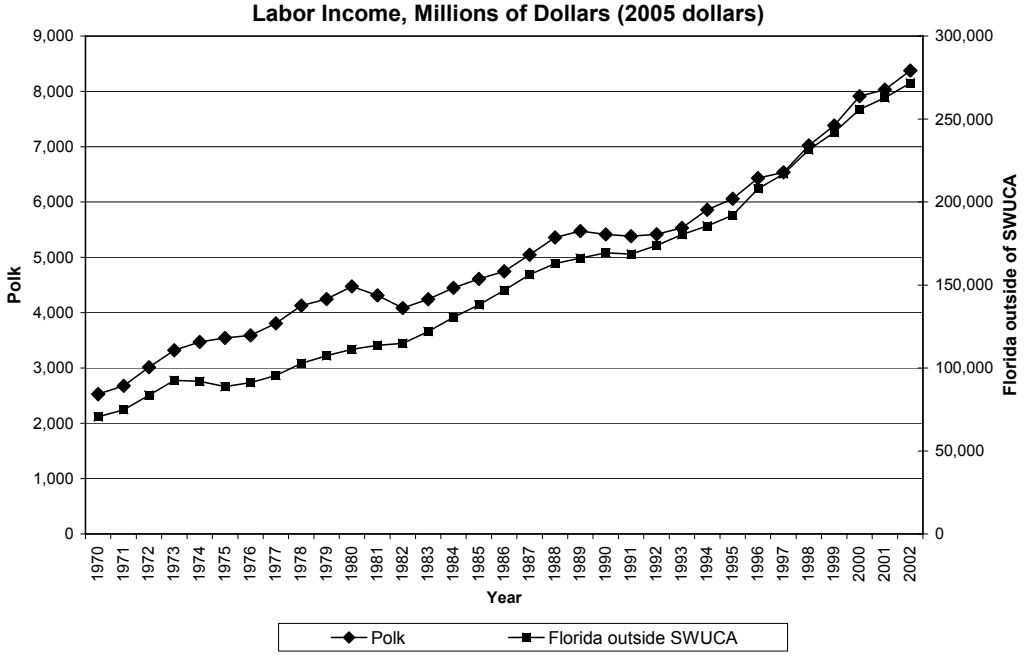
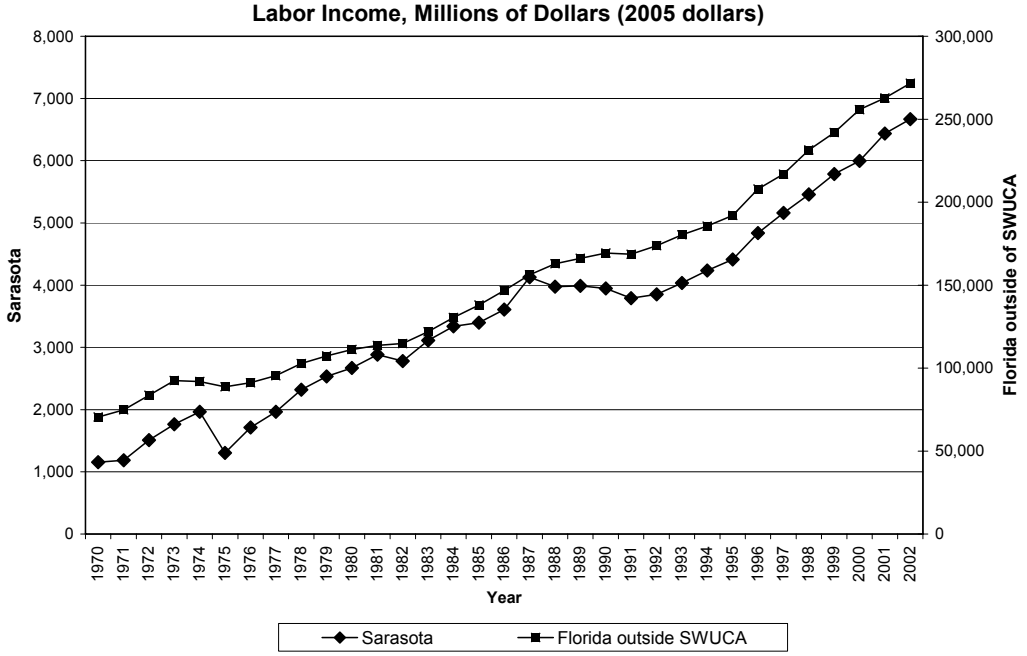


Figure 36
Sarasota County and Florida Outside the SWUCA
Labor Income, Millions of Dollars (2005 dollars)



A.2 Agriculture in the SWUCA

This section provides an historic perspective regarding the agricultural economies of the eight counties that comprise the Southern Water Use Caution Area (SWUCA). These counties are as follows.

- Charlotte
- DeSoto
- Hardee
- Highlands
- Hillsborough
- Manatee
- Polk
- Sarasota

The intent of this historic agricultural perspective is to identify if there have been noticeable economic impacts associated with the District's historic water use permitting rules.

The historic perspective is provided in graphics that plot annual harvested agricultural acreage data from 1970 to 2002. There are years beyond 2002 for which data are available. However data beyond 2002 is generally fragmented and is considered to be preliminary estimates that are subject to change. The selected economically significant crop categories whose acreage has been plotted include the following:

- All Citrus
- Melons
- Tomatoes
- Cucumber
- Strawberries
- Nurseries

The SWUCA includes the entire counties of Hardee, DeSoto, Manatee, and Sarasota and large portions of Charlotte, Highlands, Hillsborough and Polk counties. The harvested acreage data by county presented in this section represent the entire county and not just that portion in the SWUCA. These data were obtained from Florida Agricultural Statistics Service (FASS) publications, found on the National Agricultural Statistics Service (NASS) website. Unfortunately county data are no longer collected on an annual basis and future publications will now coincide with the five-year Census of Agriculture, whose next publication will be available in 2008 – with the 2007 agricultural data. The data representing each county in Florida was estimated independently of each other by personnel from FASS regional field offices. Therefore, trends in agricultural economic data for an individual county or groups of counties may be compared to trends in the rest of the State. A total of 33 graphical plots were generated to facilitate the comparisons.

The figures are presented below as Figures 1 through 33. In each figure, the historic crop acreages in the SWUCA or in each county were compared to the historic acreages associated with the rest of Florida. Examination of these plots finds that the harvested crop acreages in the SWUCA counties do not appear to have been influenced by the historic water use permitting rules in the SWUCA. The trends for each SWUCA county and the SWUCA as a whole either mirror the trends for the rest of the State or, as in the case of citrus acreage, have increased over time.

Figure 1
SWUCA Counties and Florida Outside of SWUCA
CITRUS ACREAGE

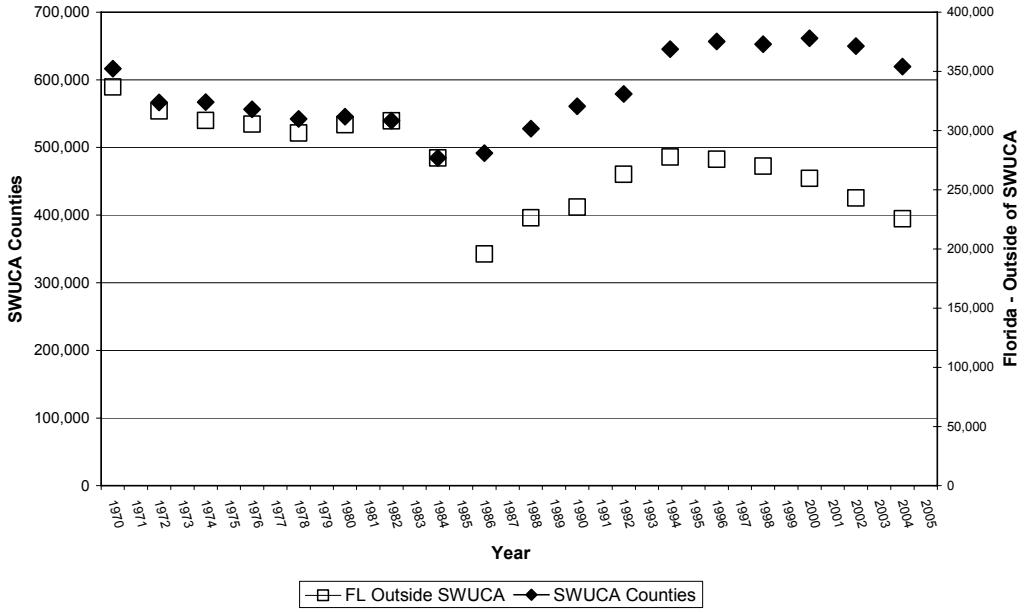


Figure 2
Charlotte County and Florida Outside of SWUCA
CITRUS ACREAGE

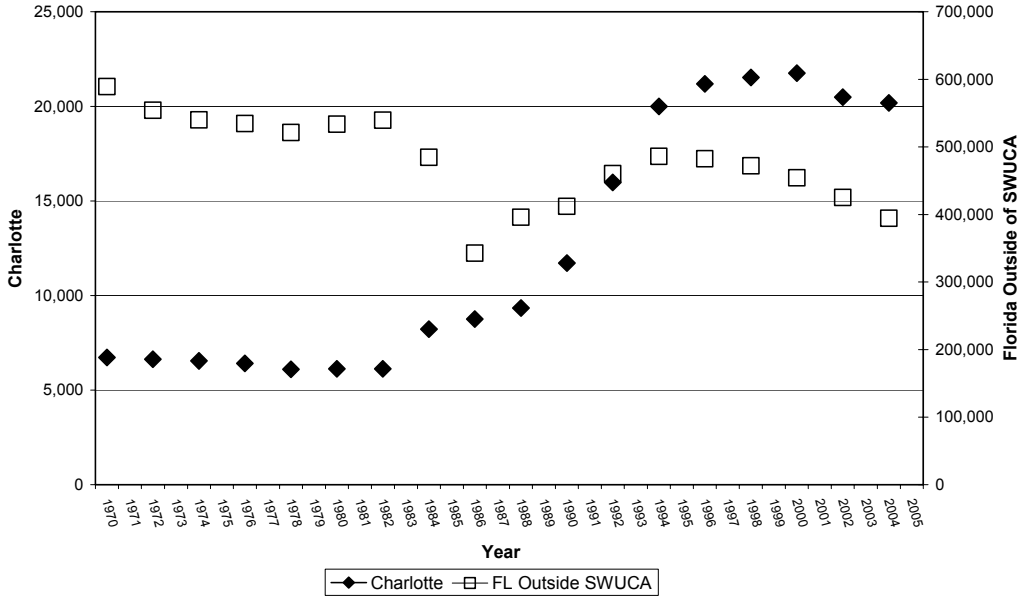


Figure 3
De Soto County and Florida Outside of SWUCA
CITRUS ACREAGE

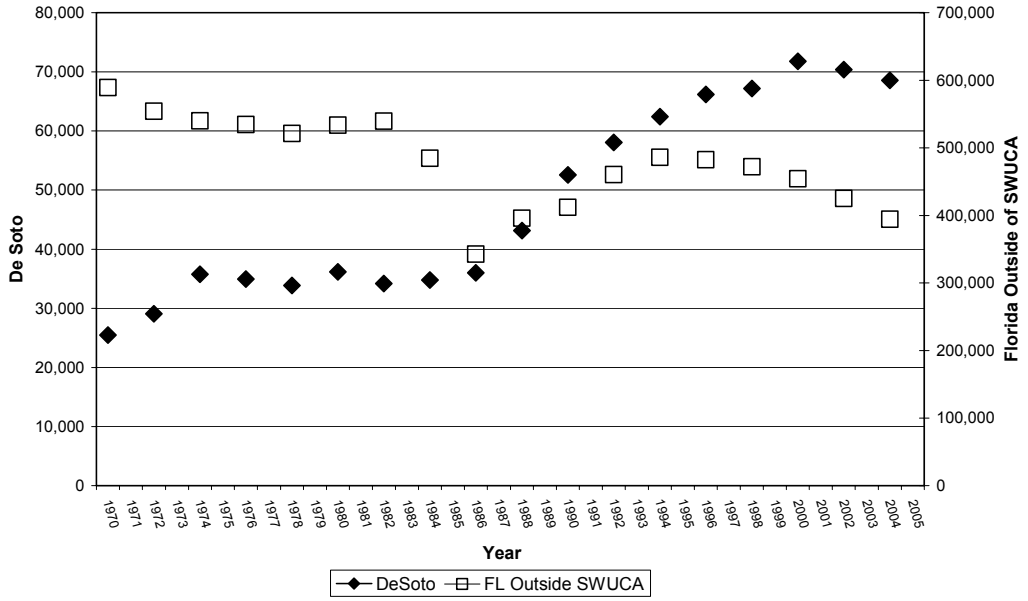


Figure 4
Hardee County and Florida Outside of SWUCA
CITRUS ACREAGE

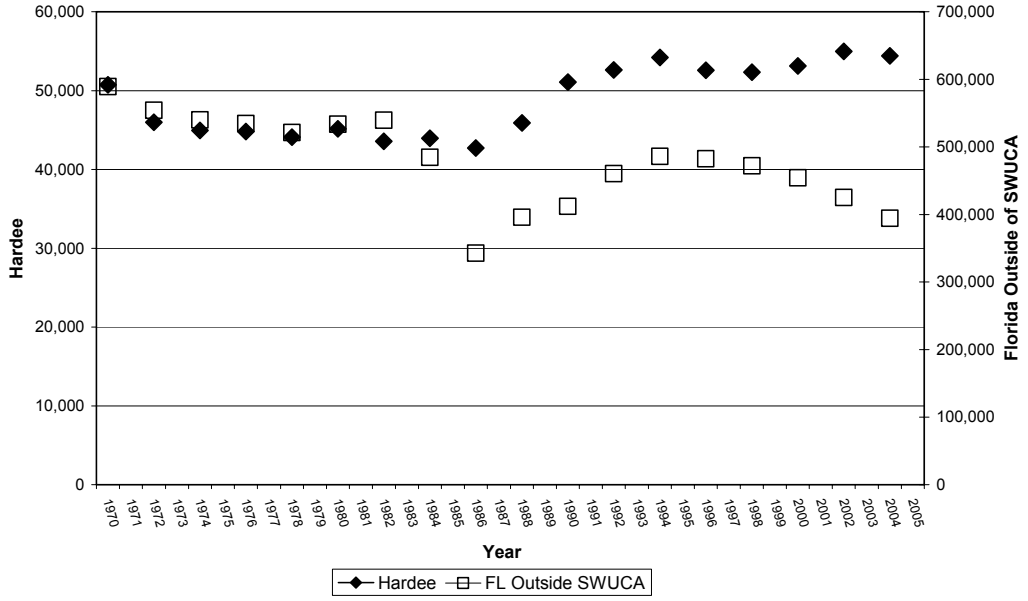


Figure 5
Highlands County and Florida Outside of SWUCA
CITRUS ACREAGE

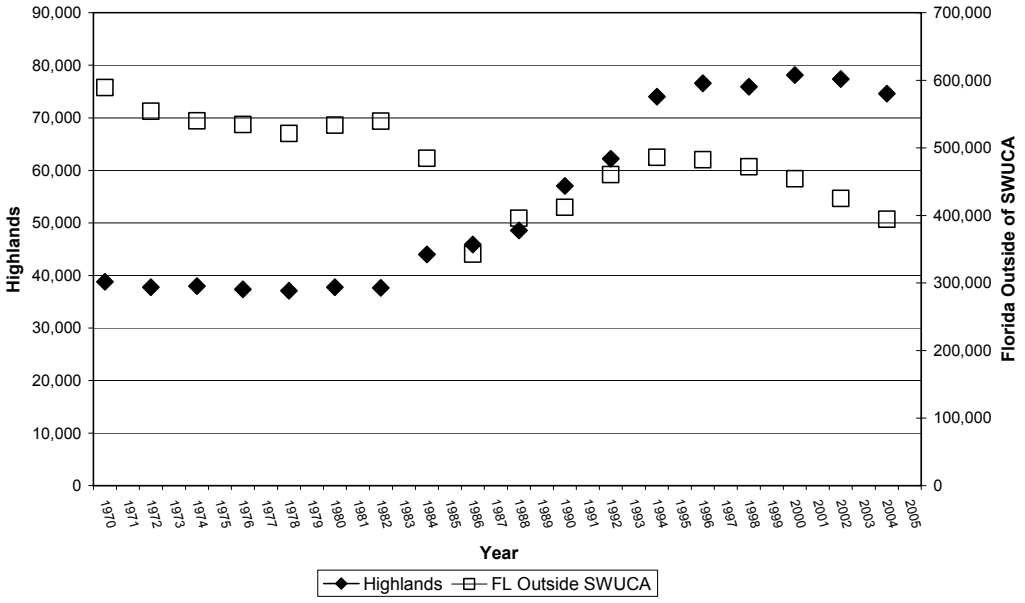


Figure 6
Hillsborough County and Florida Outside of SWUCA
CITRUS ACREAGE

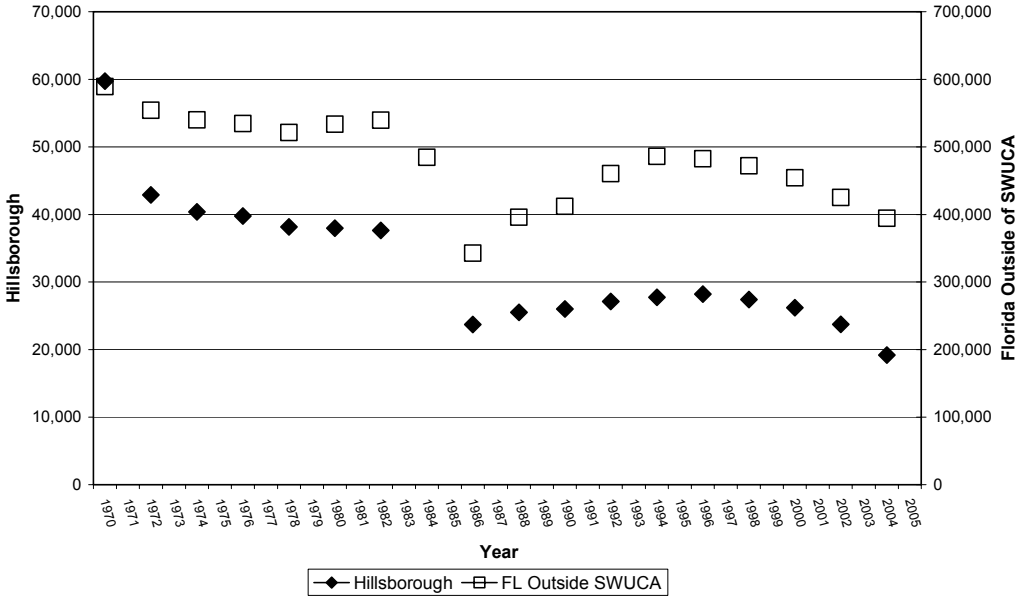


Figure 7
Manatee County and Florida Outside of SWUCA
CITRUS ACREAGE

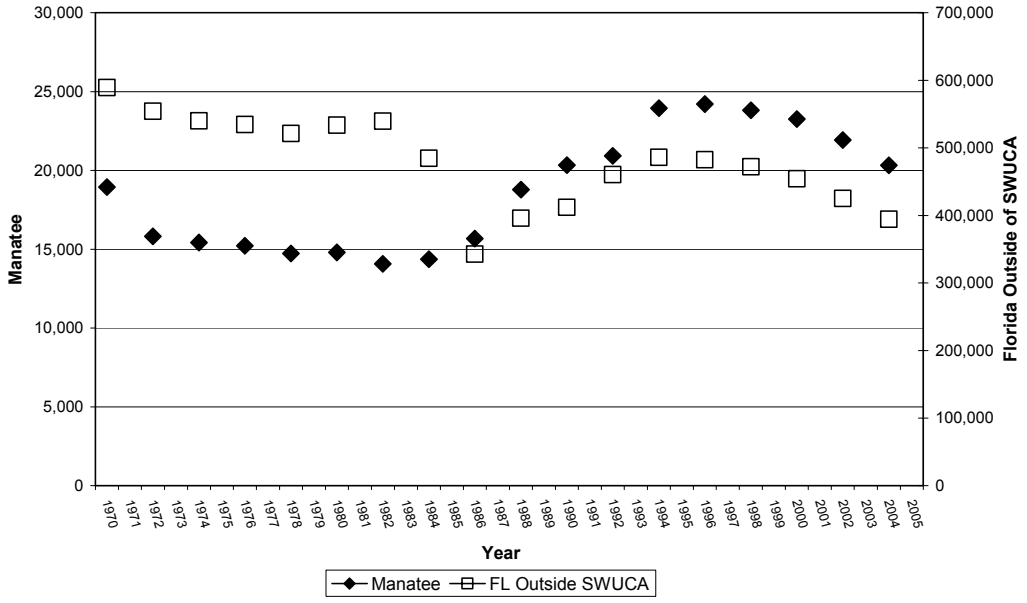


Figure 8
Polk County and Florida Outside of SWUCA
CITRUS ACREAGE

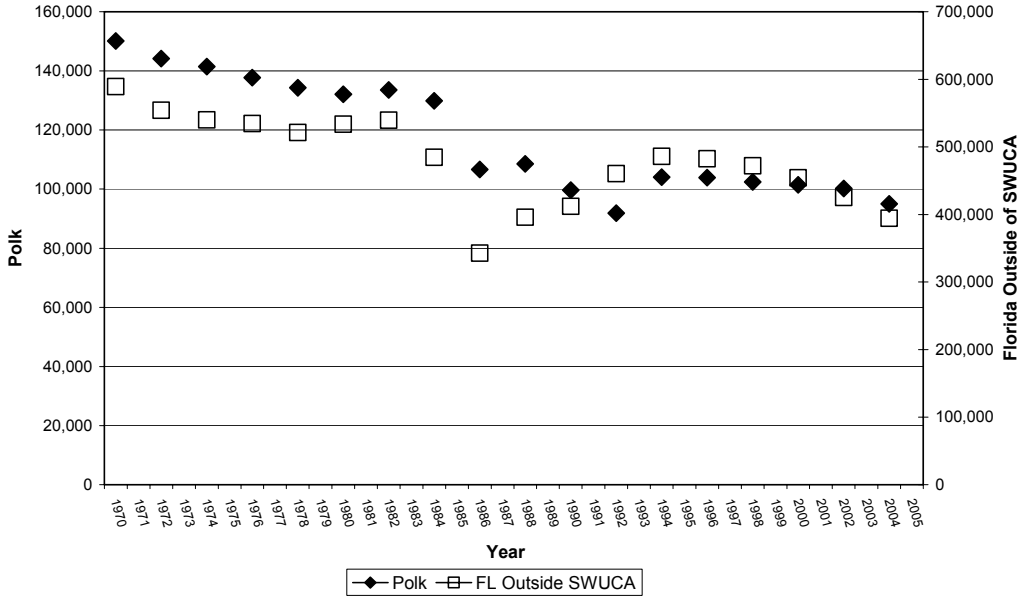


Figure 9
Sarasota County and Florida Outside of SWUCA
CITRUS ACREAGE

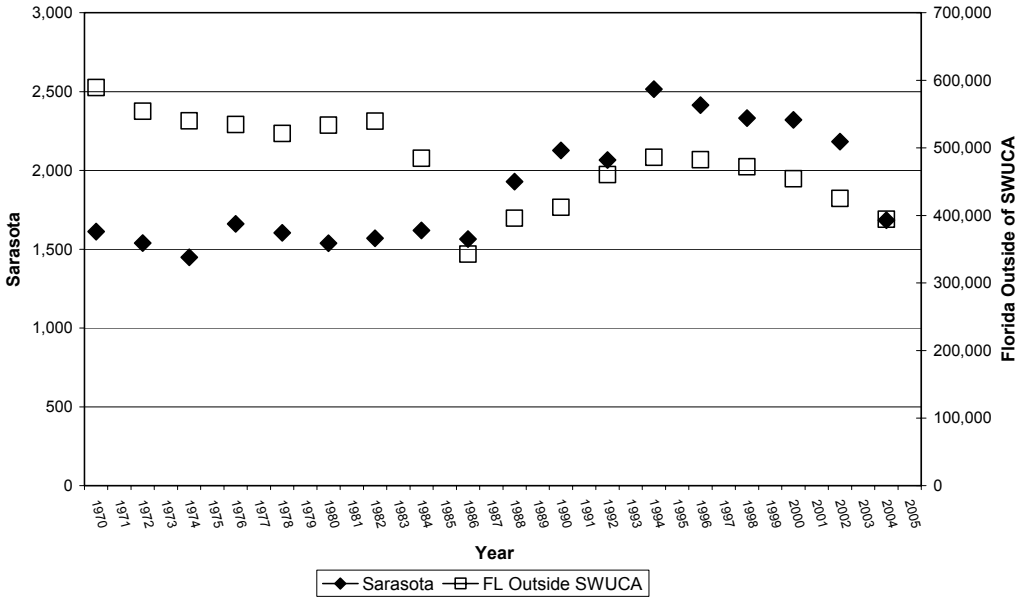


Figure 10
SWUCA Counties and Florida Outside of SWUCA
CUCUMBER ACREAGE

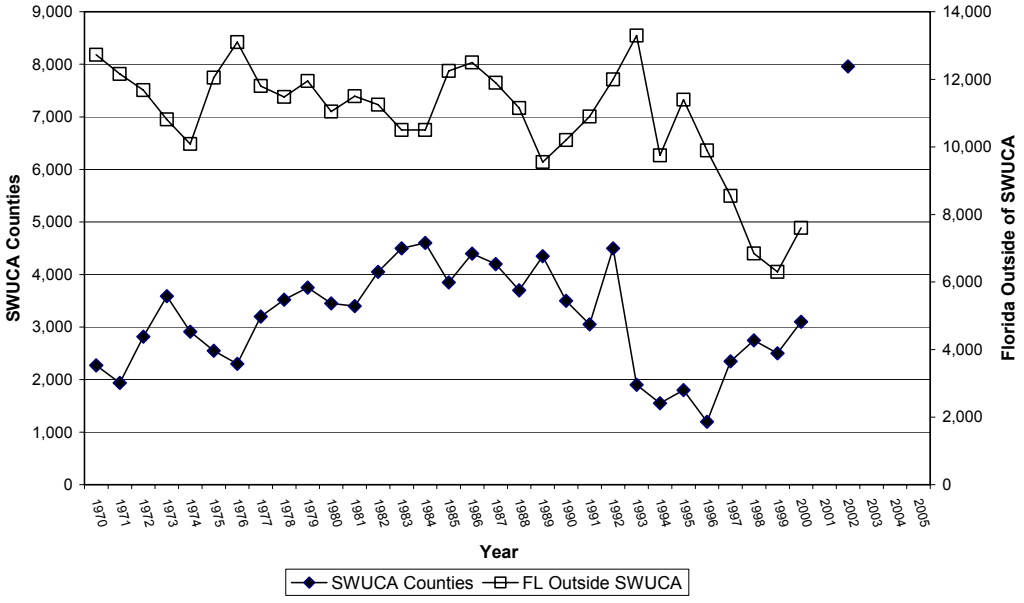


Figure 11
DeSoto County and Florida Outside of SWUCA
CUCUMBER ACREAGE

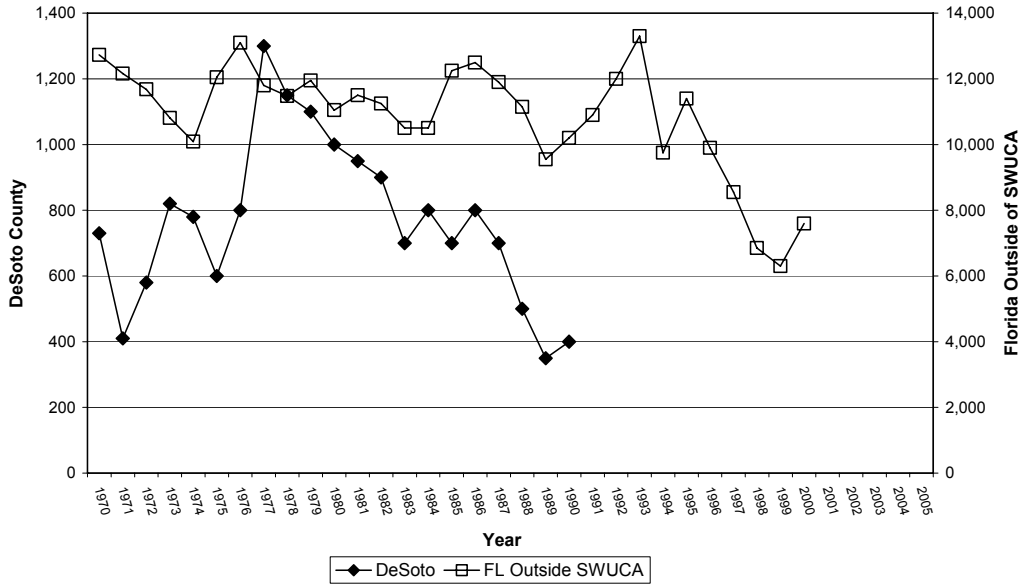


Figure 12
Hardee County and Florida Outside of SWUCA
CUCUMBER ACREAGE

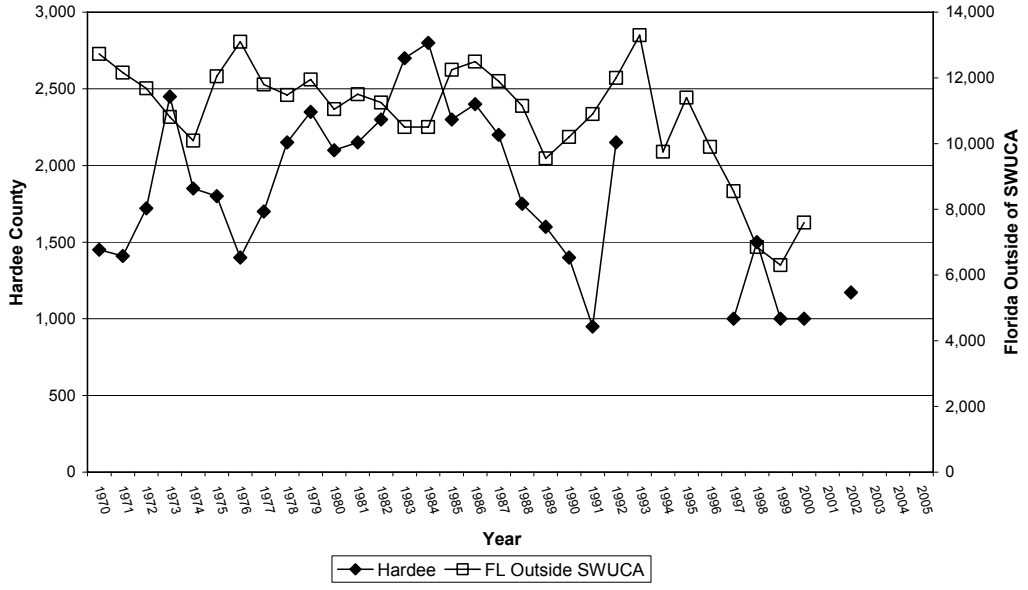


Figure 13
Hillsborough County and Florida Outside of SWUCA
CUCUMBER ACREAGE

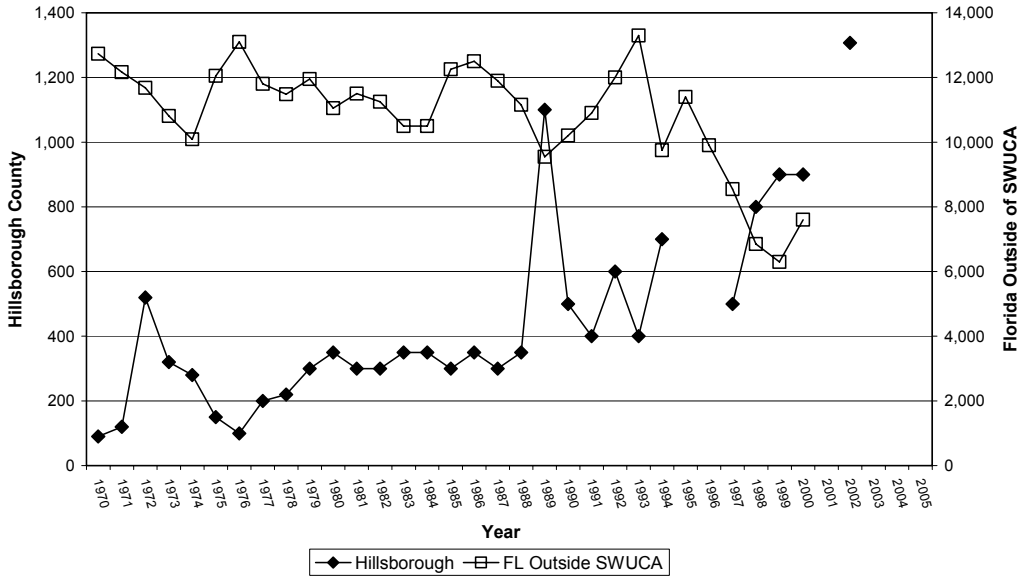


Figure 14
Manatee County and Florida Outside of SWUCA
CUCUMBER ACREAGE

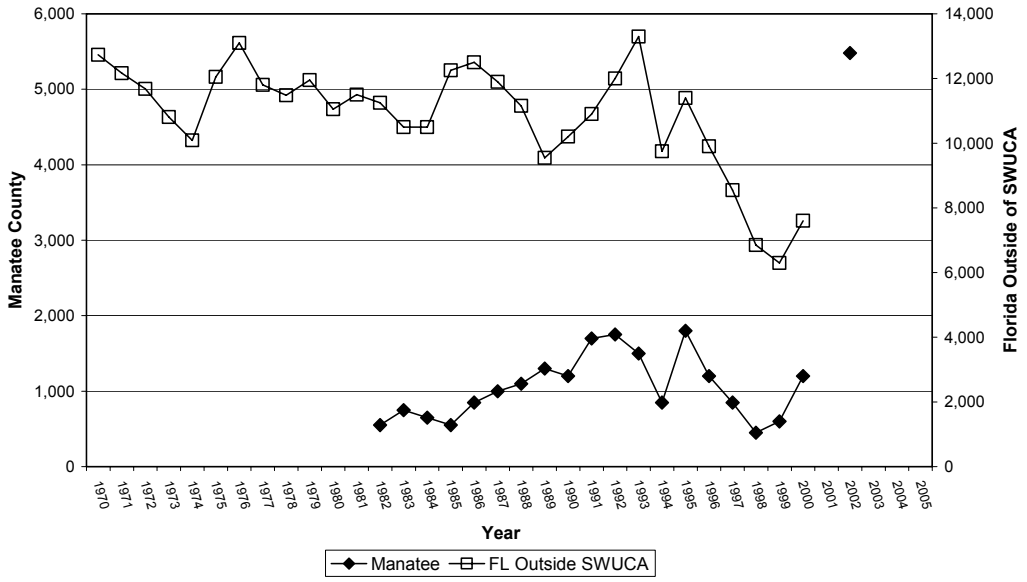


Figure 15
SWUCA Counties and Florida Outside of SWUCA
MELON ACREAGE

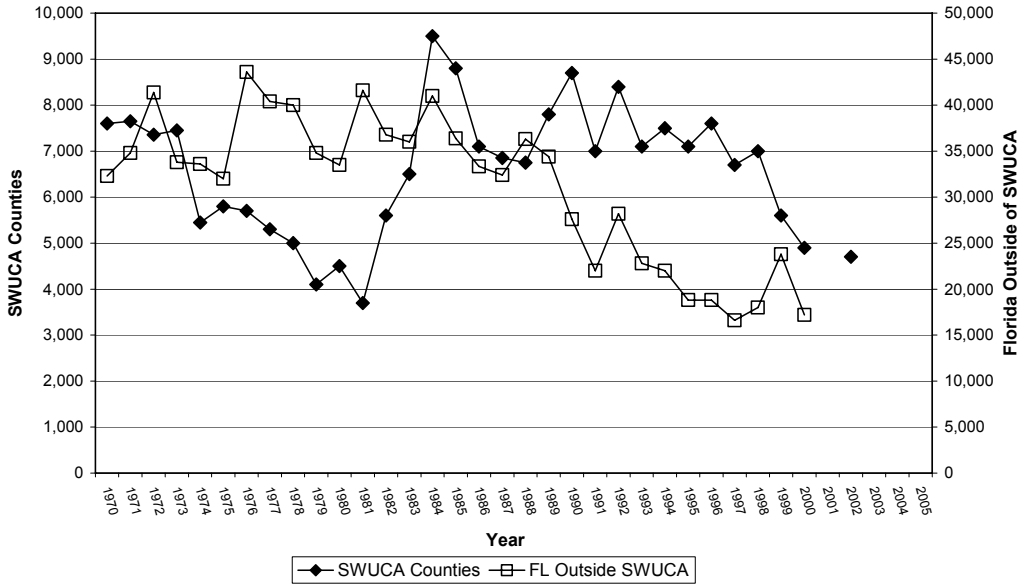


Figure 16
Charlotte County and Florida Outside of SWUCA
MELON ACREAGE

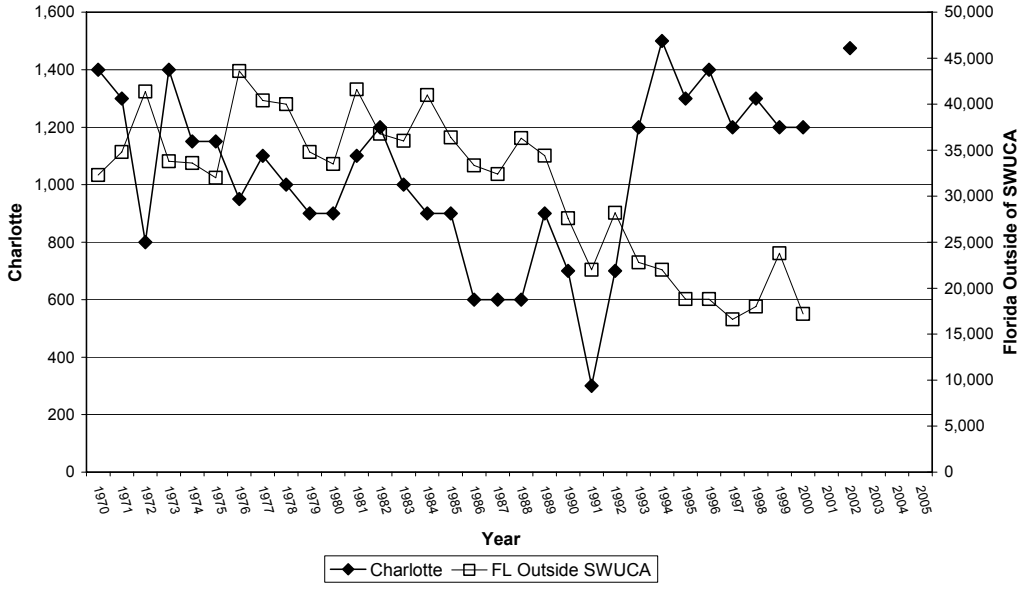


Figure 17
De Soto County and Florida Outside of SWUCA
MELON ACREAGE

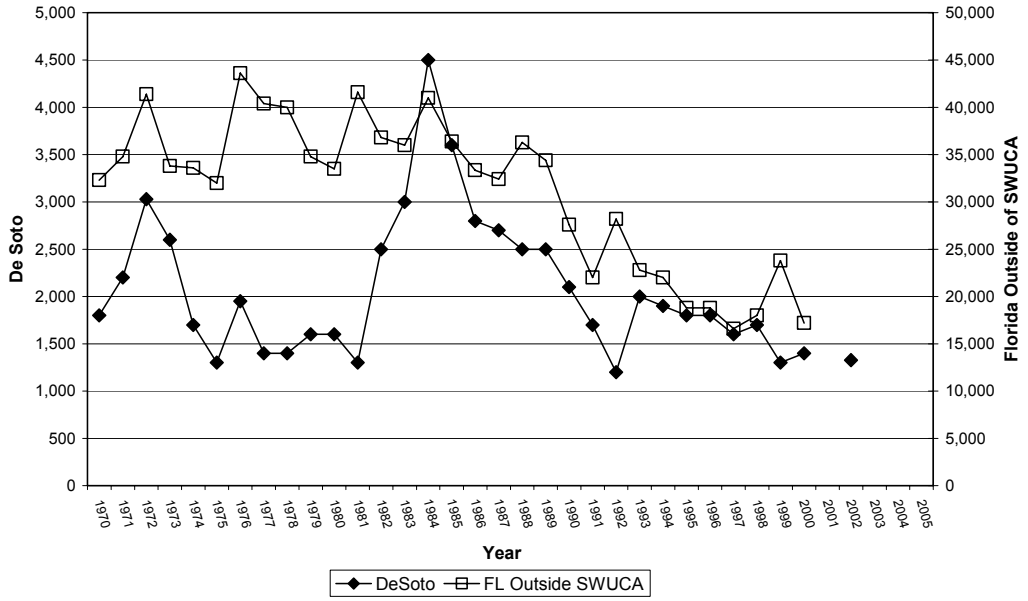


Figure 18
Hardee County and Florida Outside of SWUCA
MELON ACREAGE

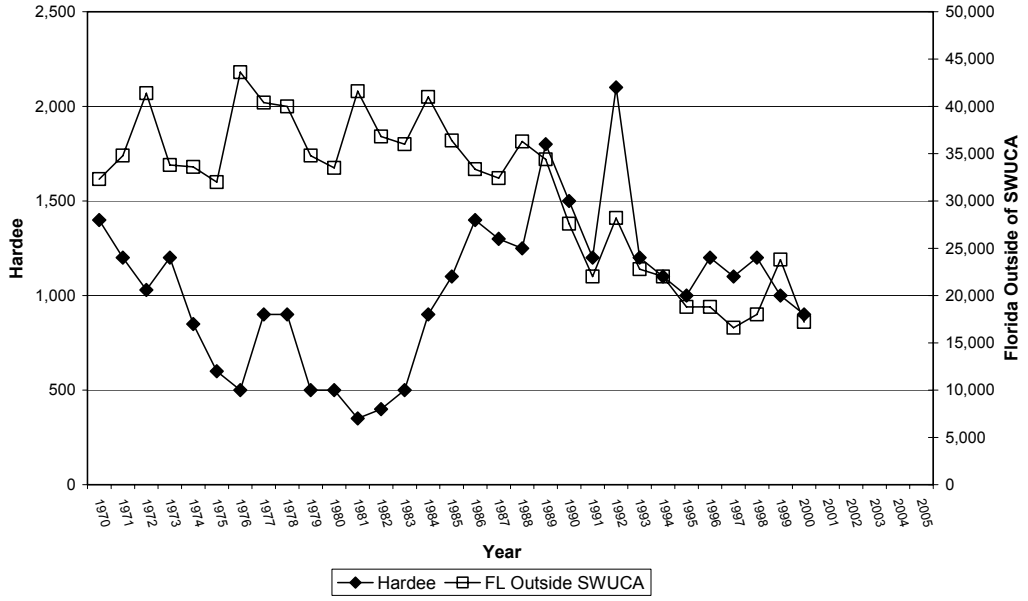


Figure 19
Highlands County and Florida Outside of SWUCA
MELON ACREAGE

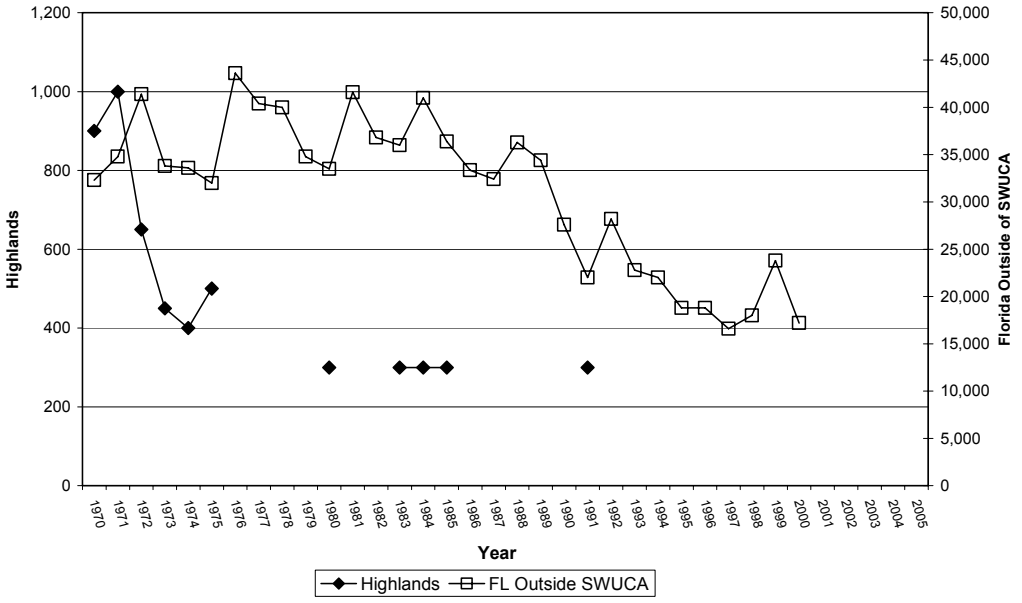


Figure 20
Hillsborough County and Florida Outside of SWUCA
MELON ACREAGE

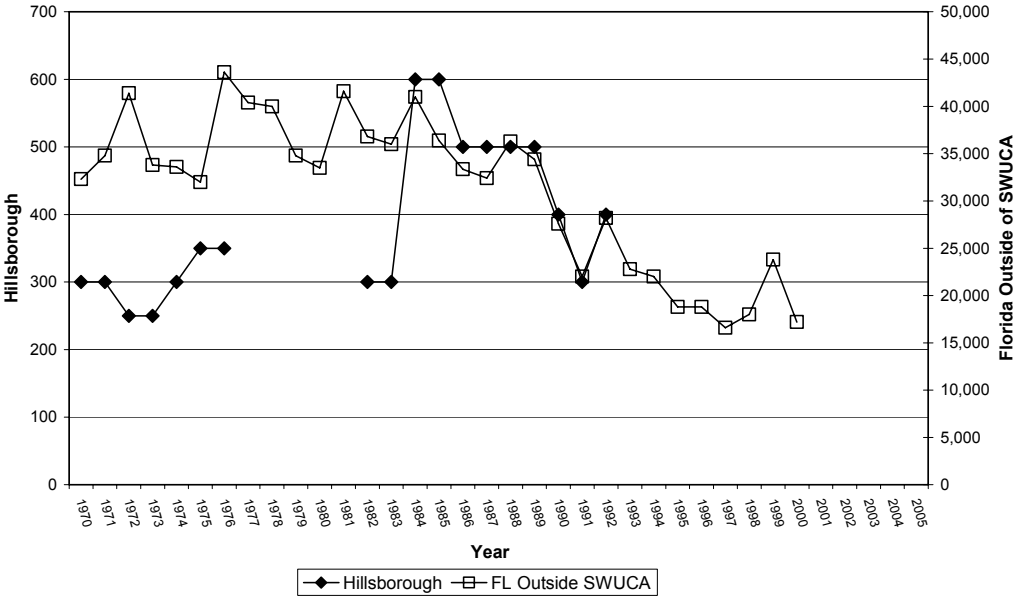


Figure 21
Manatee County and Florida Outside of SWUCA
MELON ACREAGE

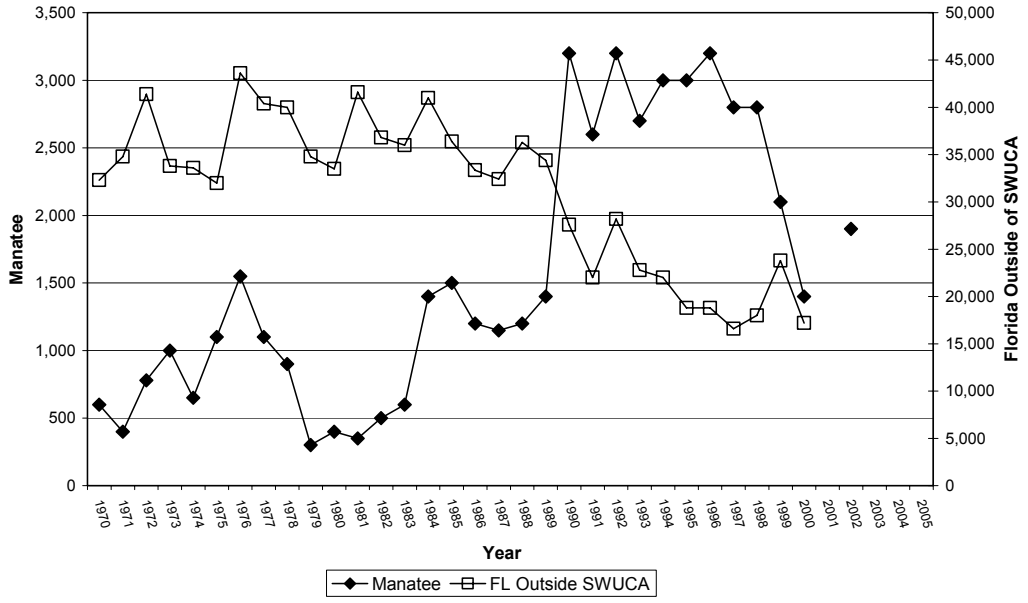


Figure 22
Polk County and Florida Outside of SWUCA
MELON ACREAGE

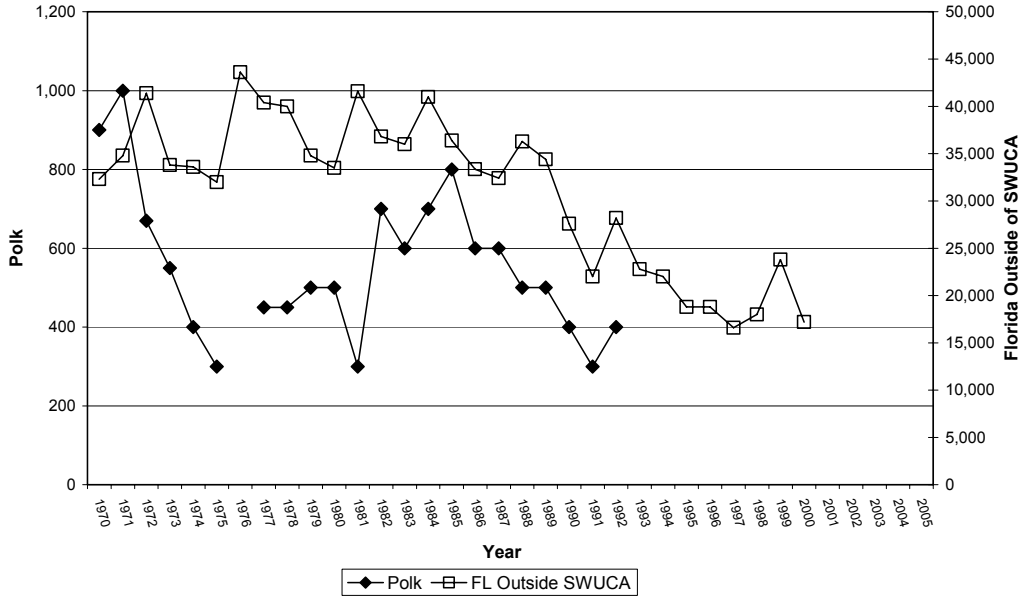


Figure 23
Sarasota County and Florida Outside of SWUCA
MELON ACREAGE

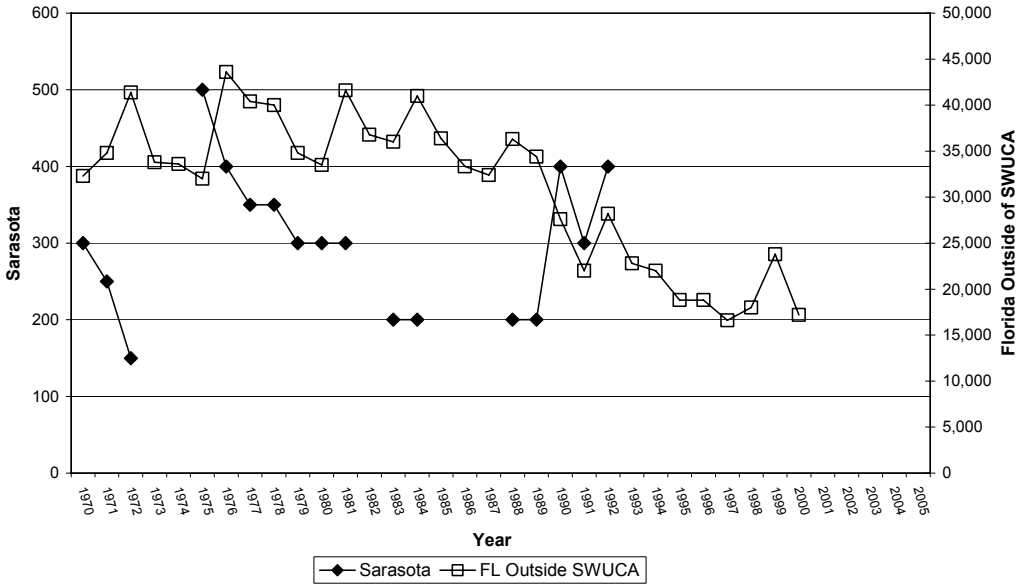


Figure 24
SWUCA Counties and Florida Outside of SWUCA
STRAWBERRY ACREAGE

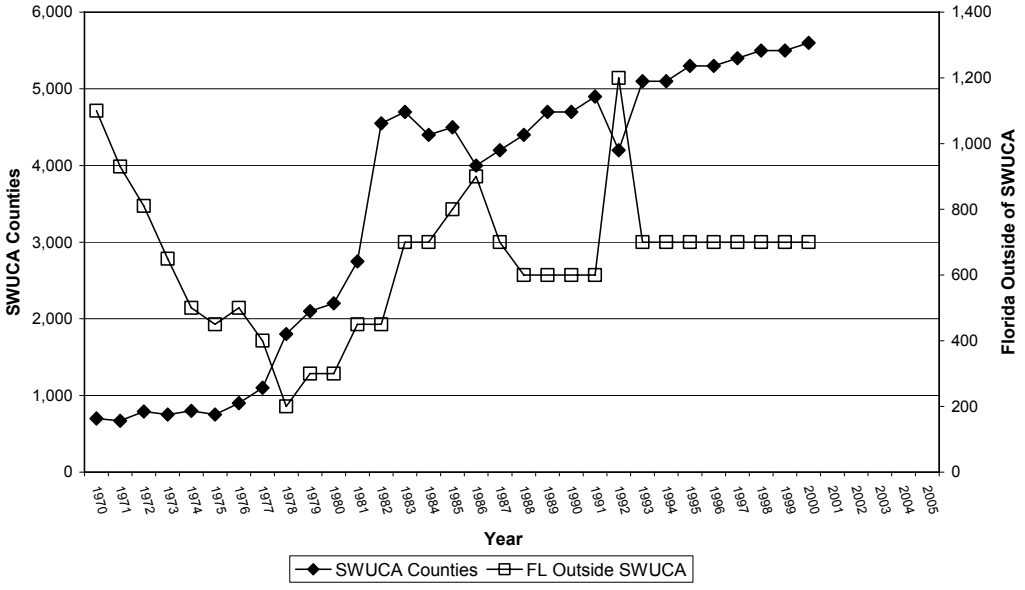


Figure 25
Hillsborough & Manatee Counties and Florida Outside of SWUCA
STRAWBERRY ACREAGE

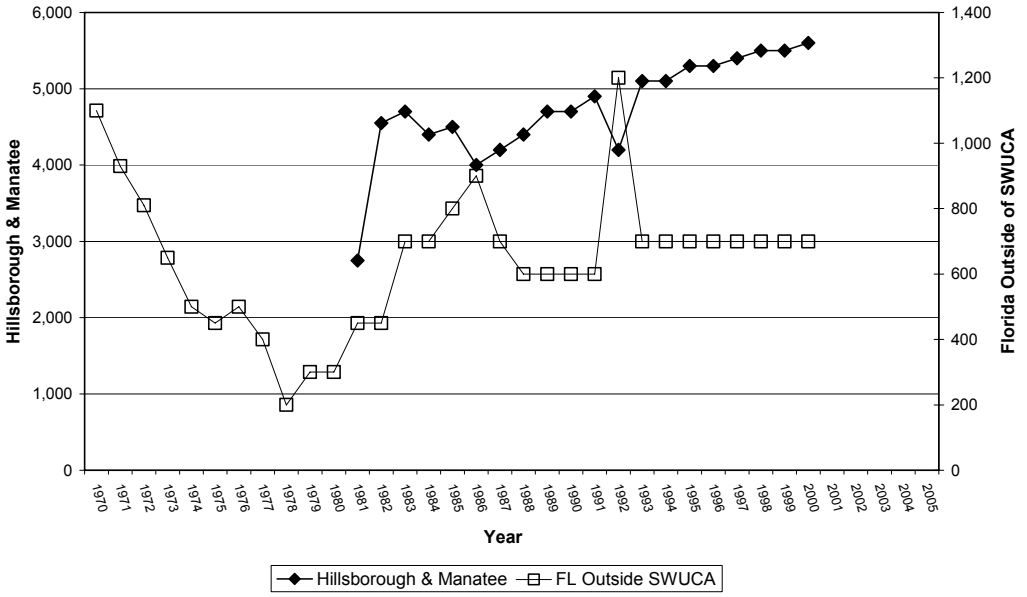


Figure 26
SWUCA Counties and Florida Outside of SWUCA
TOMATO ACREAGE

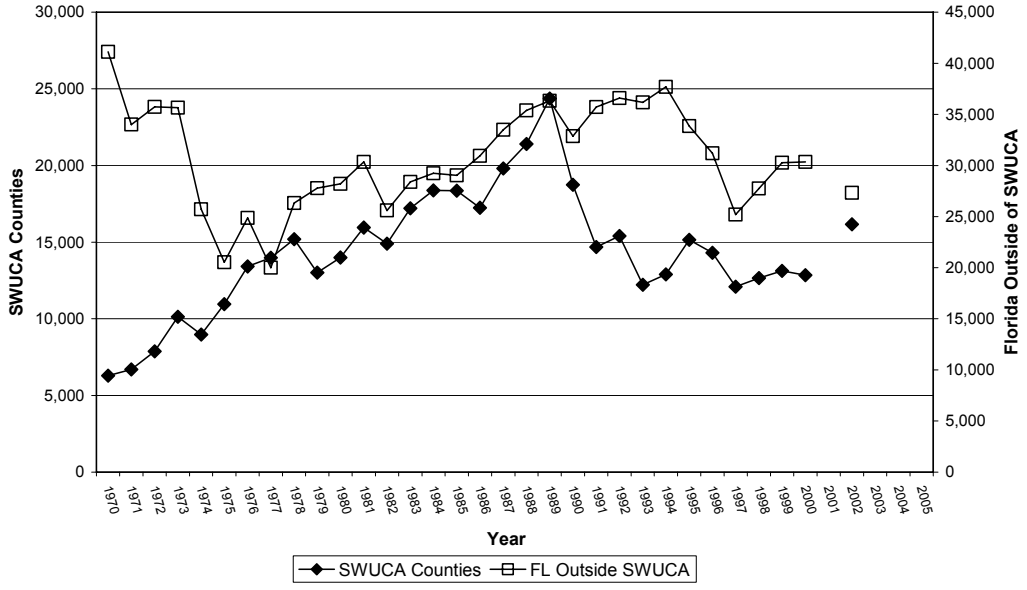


Figure 27
Hillsborough County and Florida Outside of SWUCA
TOMATO ACREAGE

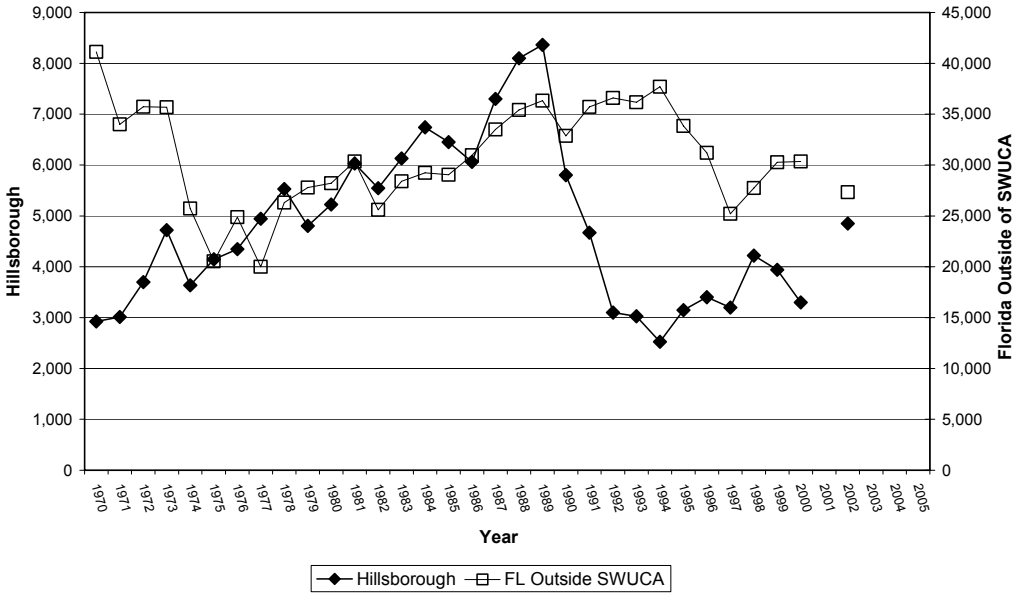


Figure 28
Manatee County and Florida Outside of SWUCA
TOMATO ACREAGE

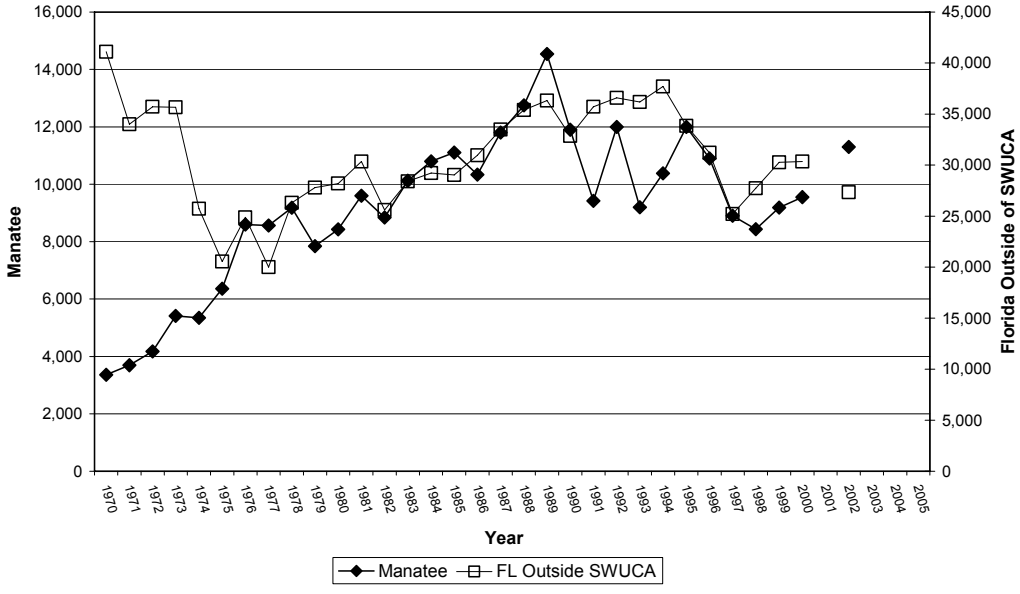


Figure 29
Sarasota County and Florida Outside of SWUCA
TOMATO ACREAGE

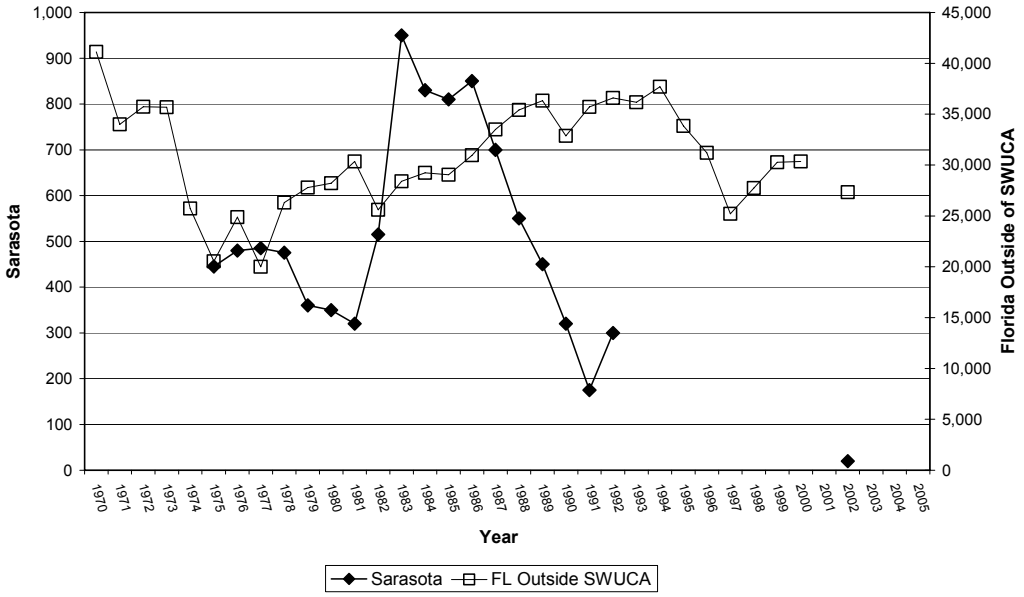


Figure 30
SWUCA Counties and Florida Outside of SWUCA
NURSERY ACREAGE

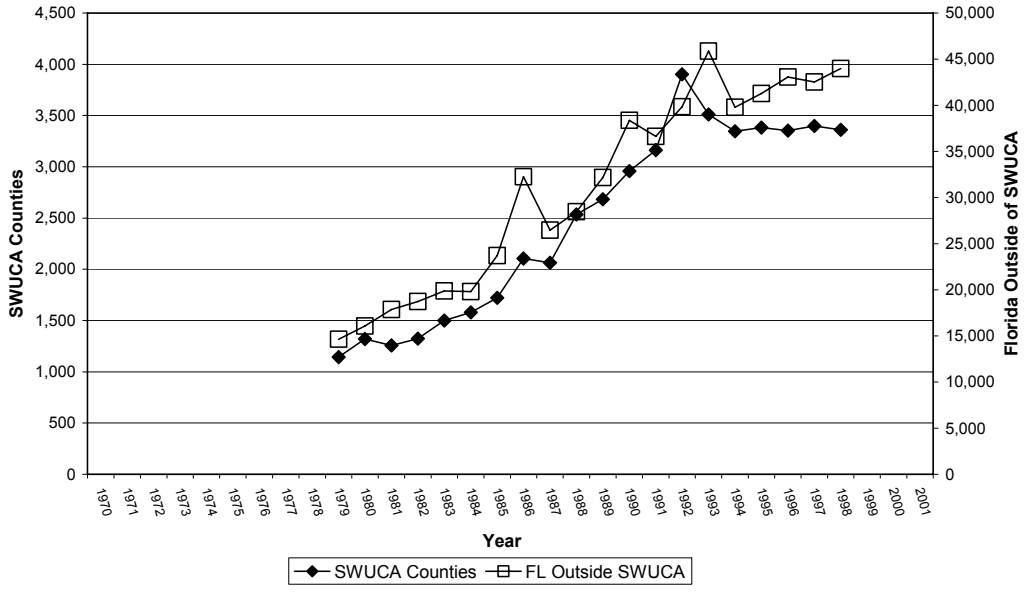


Figure 31
Hillsborough County and Florida Outside of SWUCA
NURSERY ACREAGE

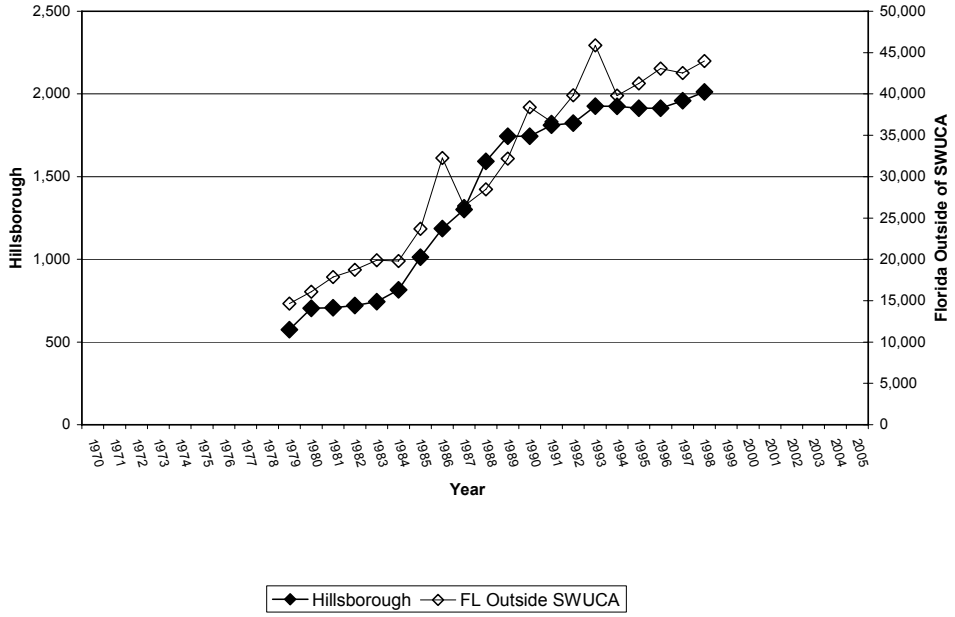


Figure 32
Manatee County and Florida Outside of SWUCA
NURSERY ACREAGE