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December 6, 2002

Shannon J. Hudson
Regulatory Analyst
Division of Economic Regulation
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Docket No. 020761-WU - Request for Approval of Revisions to Water Tariff regarding individual metering of multi-family and multi-unit structures by Florida Water Services Corporation

Dear Ms. Hudson:

This letter is written in response to your letter of November 4, 2002, requesting responses and documentation from Florida Water Services Corporation ("Florida Water") to Staff's questions in furtherance of its investigation in the above docket.

1. Has Florida Water applied for approval of a tariff regarding individual tariff metering of multi-family and mult-unit structures in non-jurisdictional counties? If so, please provide the following by county:

AUS ___
CAF ___
CMP ___
COM ___
CTR ___
ECR ___
GCL ___
OPC ___
MMS ___
SEC 1
OTH ___

Response: Yes. Florida Water has applied for, and received approval of a tariff regarding individual metering of multi-family and multi-unit structures in Hernando County and Citrus County.

Hernando County.

a) The date when Florida Water requested approval of the tariff:

Response: July 18, 2002.

b) Copies of any discovery requests by the county and Florida Water's responses:

Response: None.

c) For each tariff that was approved, please provide the tariff and its approval date:

Response: See attached.

Citrus County.

a) The date when Florida Water requested approval of the tariff:

Response: July 18, 2002.

b) Copies of any discovery requests by the county and Florida Water's responses.

Response: None.

c) For each tariff that was approved, please provide the tariff and its approval date.

Response: See attached.

2. Have any non-jurisdictional counties denied Florida Water's request to revise its water tariff to include the individual metering policy? If so, please provide the following by county?

Response: The Collier County Water and Wastewater Authority denied Florida Water's request to revise its water tariff to include individual metering. Florida Water has appealed the Order through a Petition for A Writ of Certiorari filed in Collier County Circuit Court on November 18, 2002. The court, to Florida Water's knowledge has not yet acted upon the Petition.

a) Copies of any discovery requests by the county and Florida Water's responses.

Response: See attached.

b) Copies of any documentation that the county provided explaining its decision to deny the tariff request.

Response: See attached.

3. Are there any non-jurisdictional counties that Florida Water is aware of that prohibit individual metering of multi-family and mult-unit structures? If so, please provide copies of the related ordinances for each county.

Response: Florida Water is not aware of any non-jurisdictional county that prohibits individual metering of mult-family and multi-unit structures.

4. In Florida Water's filing of July 16, 2002, the company cited a permit recently issued by the St. Johns River Water Management as an example that individual metering tariffs are becoming commonplace. Was the permit issued to Florida Water? If not, to whom was the permit issued?

Response: The permit was issued to Florida Water (see Attachment to Response #2).

5. In the filing of July 16, 2002, it was indicated that Florida Water implemented a policy in 1996 mandating individual metering for all multi-residential housing. What prompted Florida Water to codify the policy in its tariff? Has there been any resistance to the policy by builders? Who would be affected by the policy? Please explain.

Response: On March 25, 2002, Mariner Apartments of Marco Island, Inc. ("Mariner"), filed a complaint with the Collier County Water and Wastewater Authority requesting master meters for their existing multi-residential housing. Aquarius Apartments of Marco Island, Inc. ("Aquarius") intervened in the matter. Florida Water appeared before the Authority and advised the Authority that Florida Water's policy is to not allow master metering for multi-residential housing and advised the Authority of the basis for that policy and supporting documentation. Nonetheless, the Authority granted Mariner's and Aquarius' requests, stating that Florida Water's policy of individual metering was not codified in its Collier County tariff and therefore was not recognized as a policy by the Authority. Based upon the Authority's ruling (which Florida Water felt was erroneous) Florida Water made a decision to codify its individual metering policy for all multi-residential housing throughout Florida. (The Collier County Order is enclosed herein as the Attachment to Response to #2.)

Has there been any resistance to the policy by builders?

Response: Four builders from Collier County have sought and received relief from the Collier County Water and Wastewater Authority. Florida Water is aware that one of the Collier County builders is doing a project in Florida Water's Burnt Store Service Territory and has filed a complaint with the FPSC regarding the policy. Florida Water is unaware of any other resistance to the policy.

Who would be affected by the policy?

Response: It is the Company's policy that individual meters be required for all new construction for residential homes and commercial, multi-family (apartments and condominiums) and industrial establishments. This classification includes each separate occupancy unit of commercial and industrial establishments, cooperatives, marinas, and trailer, mobile home and recreational vehicle parks.

Individual meters shall not, however, be required for:

(1) those portions of a commercial establishment where the floor space dimensions or physical configuration of the units are subject to alteration, as evidenced by non-structural element participation walls, unless the company determines that adequate provisions could be made to modify the metering to reflect accurate such alterations;

(2) water used in specialized-use housing accommodations, such as hospitals, nursing homes, living facilities located on the same premises as, and operated in conjunction with, a nursing home or other healthcare facility providing at least the same level and types of services as a hursing home, convalescent homes, facilities certificated under Chapter 651, Florida Statutes, college dormitories, convents, sorority houses, fraternity houses, motels, hotels, and similar facilities;

(3) separate specially-designed areas for overnight occupancy at trailer, mobile home and recreational vehicle parks and marinas where permanent residency is not established;

(4) new and existing time-share plans, provided that all of the occupancy units which are served by the master meter or meters are committed to a time-share plan as defined in Chapter 721, Florida Statutes, and none of the occupancy units are used for permanent occupancy. (See proposed Revised Sheet No. 10.7-a, Original Sheet No. 10-7-b).

If you have any other questions regarding this matter, please feel free to contact me at 850-681-6788.

Sincerely,

Martin P. McDonnell
On Behalf of Florida Water Services Corporation

cc: Division of Economic Regulation
Jennie Lingo; Paul Stallcup and Connie Kummer
Office of General Counsel, Marlene Stern
Division of The Commission Clerk and Administrative Services

Flawater\hudson.ltr

ORIGINAL

ATTACHMENT TO FLORIDA WATER'S RESPONSE TO NUMBER 1

BEFORE THE BOARD OF COUNTY COMMISSIONERS OF HERNANDO COUNTY, FLORIDA

In re: **PROPOSED REVISED TARIFF,** relating to Individual Metering, proposed by **FLORIDA WATER SERVICES CORPORATION,** in Hernando County.

Docket No. 02-05-WS

ORDER APPROVING REVISED TARIFF

THIS MATTER was heard by the Hernando County Board of County Commissioners pursuant to Chapter 28, Hernando County Code of Ordinances, on October 1, 2002, upon notice of public hearing regarding the proposed revisions to previously filed tariff filed by Florida Water Services Corporation, and upon the conclusion of the hearing, including presentation of public testimony by the attorney for Florida Water Services Corporation and the opportunity for and presentation of public input by other affected customers, it is hereby

ORDERED that the filed tariff for Florida Water Services Corporation is revised pursuant to the 1st Revised Sheet Nos. 10.0 and 10.7-A, and pursuant to Original Sheet Nos. 10.7-B and 10.7-C, as attached hereto and incorporated herein, and same revised tariff shall be accepted as filed of record and approved for all purposes.

DONE and ORDERED the 1st day of October, 2002, by action of the Hernando County Board of County Commissioners.

(SEAL)

BOARD OF COUNTY COMMISSIONERS
HERNANDO COUNTY, FLORIDA

Attest: Karen Nicolai
KAREN NICOLAI
Clerk

Hannah M. Robinson
HANNAH M. ROBINSON
Chairperson

APPROVED AS TO FORM
AND LEGAL SUFFICIENCY
BY 10/8/02
County Attorney's Office

ATTORNEY'S CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing Order Approving Revised Tariff was served by Regular U.S. Mail to the following persons at the specified addressees this 11th day of October, 2002.

CARLYN KOWALSKY
Florida Water Services Corporation
P.O. Box 609520
Orlando, FL 32860-9520

MARTIN P. McDONNELL
Rutledge, Ecenia, Purnell
& Hoffman, P.A.
P.O. Box 551
Tallahassee, FL 32302-1900

Kent L. Weissinger
Attorney

INDEX OF SERVICE AVAILABILITY

SERVICE AVAILABILITY POLICY (Cont.)

(Continued from Section IV Sheet No. 10.6)

7. Refusal of Service (Cont.)

e. **Property outside certificated service area.** Property for which service is requested is outside of the Company's certificated service area and the Company has determined that extension of its certificated service area is not economically justified.

8. Individual Metering

a. It is the Company's policy that individual meters shall be required for all new construction for:

(1) Residential homes, and

(2) Commercial, multifamily (apartments and condominiums) and industrial establishments.

(a) This classification includes each separate occupancy unit of commercial and industrial establishments, cooperatives, marinas, and trailer, mobile home and recreational vehicle parks.

b. Individual meters shall not, however, be required for:

(1) Those portions of a commercial establishment where the floor space dimensions or physical configuration of the units are subject to alteration, as evidenced by non-structural element partition walls, unless the Company determines that adequate provisions could be made to modify the metering to reflect accurately such alterations;

(2) Water used in specialized-use housing accommodations, such as hospitals, nursing homes, living facilities located on the same premises as, and operated in conjunction with, a nursing home or other healthcare facility providing at least the same level and types of services as a nursing home, convalescent homes, facilities certificated under Chapter 651, Florida Statutes, college dormitories, convents, sorority houses, fraternity houses, motels, hotels, and similar facilities;

(Continued to Section IV Sheet No. 10.7-B)

SERVICE AVAILABILITY POLICY (Cont.)

(Continued from Section IV Sheet No. 10.7-A)

(3) Separate specially-designated areas for overnight occupancy at trailer, mobile home and recreational vehicle parks and marinas where permanent residency is not established;

(4) New and existing time-share plans, provided that all of the occupancy units which are served by the master meter or meters are committed to a time-share plan as defined in Chapter 721, Florida Statutes, and none of the occupancy units are used for permanent occupancy.

In the case of the conversion of an existing structure (where ordered by the governing regulatory authority), the Customer must follow procedures established by the Company for making the change. In all cases, it is the financial responsibility of the Customer to provide for the metering in accordance with the Meter Agreement and/or the Company's tariff.

(Continued to Section IV Sheet No. 10.7-C)

SERVICE AVAILABILITY POLICY (Cont.)

(Continued from Section IV Sheet No. 10.7-B)

IV. SPECIAL PROVISIONS

This section is the result of FPSC Order No. 22307 in Docket No. 881501-WS and is applicable in the situations described herein. An outcome of Order No. 22307 approving the transfer of ownership of Deltona Corporation's utility operations to Topeka Group Inc. (TGI), was the delineation of several service availability extension situations depending on the timing and terms of property sales contracts related to lots in the certificated area. The reason for such delineation by the Commission was to ensure that people who bought lots in long-term installment sales contracts, and to whom the Deltona Corporation implied that utilities would be provided as part of the real estate transaction would not be adversely affected by the transfer.

Policy provisions are separated into three categories: 1. Contracted lots sold by Deltona Corporation or its successors under contracts prior to September 1, 1989 which generally excluded from the sales price, the cost of extending mains and related utility facilities; 2. Unsold lots sold by Deltona Corporation under contracts after September 1, 1989 which generally include as part of the cost of extending mains and provisions for the buyer to pay a Utility Service Fee and; 3. Any properties not covered in Sub-sections IV-1 or IV-2 including properties which are added to the certificated area as a result of territory expansions. These categories are described in more details as follows:

1. **Contracted lots sold by Deltona Corporation or its successors under contracts prior to September 1, 1989.**

   a. Extensions will be made as soon as reasonably practical following:

      (1) receipt from the Applicant of a completed Application for Service form, and

      (2) receipt from the Applicant of satisfactory evidence that construction of a building is scheduled to commence and,

      (3) the lot is served by an asphalt paved street or road which abuts such lot and,

      (4) receipt of payment for all applicable fees.

   b. TGI will fund, in accordance with a refundable advance for construction agreement, all extensions of less than one-half (½) mile.

(Continued to Section IV Sheet No. 10.8)

FINAL ORDER NO. 02-5
CITRUS COUNTY WATER AND WASTEWATER AUTHORITY

A FINAL ORDER OF THE CITRUS COUNTY WATER AND WASTEWATER AUTHORITY, PURSUANT TO ORDINANCE 99-7 SECTION 1-3 [CITRUS COUNTY WATER AND WASTEWATER AUTHORITY, POWERS AND DUTIES], AND RESOLUTION NO. 99-142, SECTION 9.4 [MIMIMUM FILING REQUIREMENTS TO ACCOMPANY TARIFF FILINGS] , PROVIDING FOR SPECIFIC APPROVAL OF MODIFICATION TO SERVICE AVAILABILITY POLICIES FOR FLORIDA WATER SERVICES FOR WATER SERVICE IN CITRUS COUNTY TO NEW MULTI-FAMILY AND MULTI-UNIT STRUCTURES, AND ESTABLISHING AN EFFECTIVE DATE.

WHEREAS, Ordinance No. 99-07, established the Citrus County Water and Wastewater Authority (AUTHORITY) and specific powers and duties including that of issuing final orders in the matter of tariffs; and

WHEREAS, Section 1-3.A.7, Citrus County Ordinance 99-07 provides that this Authority has the power specifically "To issue a Final Order approving, modifying, or denying any tariff, or other rule or regulation proposed to be established by or on behalf of an applicant or Utility; and

WHEREAS, Resolution No. 99-142, Section 9.4 provides for the minimum filing requirements to accompany any application by a Utility; and

WHEREAS, on July 18, 2002, Rutledge, Ecenia, Purnell & Hoffman did submit an application on behalf of Florida Water Services for approval of modifications to the tariffs of Florida Water Services ; and

WHEREAS, on July 25, 2002 the Office of Utility Regulation of Citrus County determined that this application has met the minimum filing requirements proscribed by County Resolution; and

WHEREAS, Staff recommends approval of the Utility's application for the specific tariff modifications, which have no price changes and apply to new construction only; and

WHEREAS, on August 5, 2002, the Water and Wastewater Authority of Citrus County found that proposed changes were in the public interest; and

WHEREAS, there has been public notice of this proposed Final Order and no timely protest was filed with the Office of Utility Regulation of Citrus County

NOW THEREFORE BE IT ORDERED by the AUTHORITY in public meeting assembled, that:

1. The proposed modification of the service availability tariffs of Florida Water Services to require individual metering to new multi-family and new multi-unit structures and other clarifications as listed in the Service Availability Policy section of the tariffs of Florida Water Services, specifically on tariff pages 10.6-A and 10.6-B as Item 8 (Individual Metering), is hereby approved.

2. For purposes of this Final Order, "new" shall be defined as any proposed or anticipated multi-family or multi-unit structure that has not contacted Florida Water Services in writing to request utility services from Florida Water Services by the effective date of this Final Order. "New" shall not apply in situations where there is simply a change in customer at existing multi-family or multi-unit structures.

3. This Final Order shall become effective immediately upon adoption by the Authority and the tariff modification approved herein shall remain in effect until the Authority authorizes a change.

This Order adopted this 7th day of October, 2002, after motion, second, and majority vote favoring same.

Approved as to form and
legal sufficiency:

MICHELE SLINGERLAND
Assistant County Attorney

CITRUS COUNTY WATER AND
WASTEWATER AUTHORITY

RONALD F. BROADBENT
Chairman

CITRUS COUNTY WATER & WASTEWATER AUTHORITY

APPROVED
Final Order No. 02-15
Approval Date: 10/7/02
Effective Date: 10/7/02
Executive Director
Office of Utility Regulation

SERVICE AVAILABILITY POLICY (Cont.)

(Continued from Section IV Sheet No. 10.5)

7. Refusal of Service (Cont.)

e. Property outside certificated service area. Property for which service is requested is outside of the Company's certificated service area and the Company has determined that extension of its certificated service area is not economically justified.

8. Individual Metering

a. It is the Company's policy that individual meters shall be required for all new construction for:

(1) Residential homes, and

(2) Commercial, multifamily (apartments and condominiums) and industrial establishments.

(a) This classification includes each separate occupancy unit of commercial and industrial establishments, cooperatives, marinas, and trailer, mobile home and recreational vehicle parks.

b. Individual meters shall not, however, be required for:

(1) Those portions of a commercial establishment where the floor space dimensions or physical configuration of the units are subject to alteration, as evidenced by non-structural element partition walls, unless the Company determines that adequate provisions could be made to modify the metering to reflect accurately such alterations;

(2) Water used in specialized-use housing accommodations, such as hospitals, nursing homes, living facilities located on the same premises as, and operated in conjunction with, a nursing home or other healthcare facility providing at least the same level and types of services as a nursing home, convalescent homes, facilities certificated under Chapter 651, Florida Statutes, college dormitories, convents, sorority houses, fraternity houses, motels, hotels, and similar facilities;

(Continued to Section IV Sheet No. 10.6-B)

APPROVED
Final Order No. 02-5
Approval Date: 10/7/02
Effective Date: 10/7/02
Executive Director
Office of Utility Regulation

SERVICE AVAILABILITY POLICY (Cont.)

(Continued from Section IV Sheet No. 10.6-A)

(3) Separate, specially-designated areas for overnight occupancy at trailer, mobile home and recreational vehicle parks and marinas where permanent residency is not established;

(4) New and existing time-share plans, provided that all of the occupancy units which are served by the master meter or meters are committed to a time-share plan as defined in Chapter 721, Florida Statutes, and none of the occupancy units are used for permanent occupancy.

In the case of the conversion of an existing structure (where ordered by the governing regulatory authority), the Customer must follow procedures established by the Company for making the change. In all cases, it is the financial responsibility of the Customer to provide for the metering in accordance with the Meter Agreement and/or the Company's tariff.

(Continued to Section IV Sheet No. 10.6-C)

ATTACHMENT TO FLORIDA WATER'S RESPONSE TO NUMBER 2

RUTLEDGE, ECENIA, PURNELL & HOFFMAN

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GOVERNMENTAL CONSULTANTS
MARGARET A. MENDUNI
M. LANE STEPHENS

September 4, 2002

Thomas C. Palmer
Assistant County Attorney
3301 Tamiami Trail
Building F
Naples, Florida 34112

Re: Documents submitted in evidence by Florida Water Services Corporation to all relevant Florida Water Services Corporation items on the Agenda of Collier County Water and Wastewater Authority, Agenda Conference, August 26, 2002

Dear Mr. Palmer:

As we discussed August 26, 2002, enclosed please find complete copies of all documents entered into evidence by Florida Water Services at the August 26, 2002 Agenda of the Collier County Water and Wastewater Authority. The documents enclosed include:

1. The Florida Water Conservation Initiative Report issued April 2002, by the Florida Department of Environmental Protection;

2. The Submetering, RUBS, and Water Conservation Final Report issued June 19, 1999 by Industrial Economics Incorporated for the National Apartment Association and National Multi Housing Council;

3. Appendix A to the United States Environmental Protection Agency's Water Conservation Plan Guidelines; and

4. The Revised Technical Staff Report of the St. Johns River District regarding consumptive use permit 50087 from the Division of Permit Data Services, St. Johns River Water Management District.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Martin P. McDonnell

MPM/rl

Enclosures

cc: Bleu Wallace, Director, Community Development and Environmental Services Div.
Ms. Maureen Kenyon, Clerk of Courts, Board Records, Collier County
Mr. Tony Isaacs, Florida Water Services Corporation

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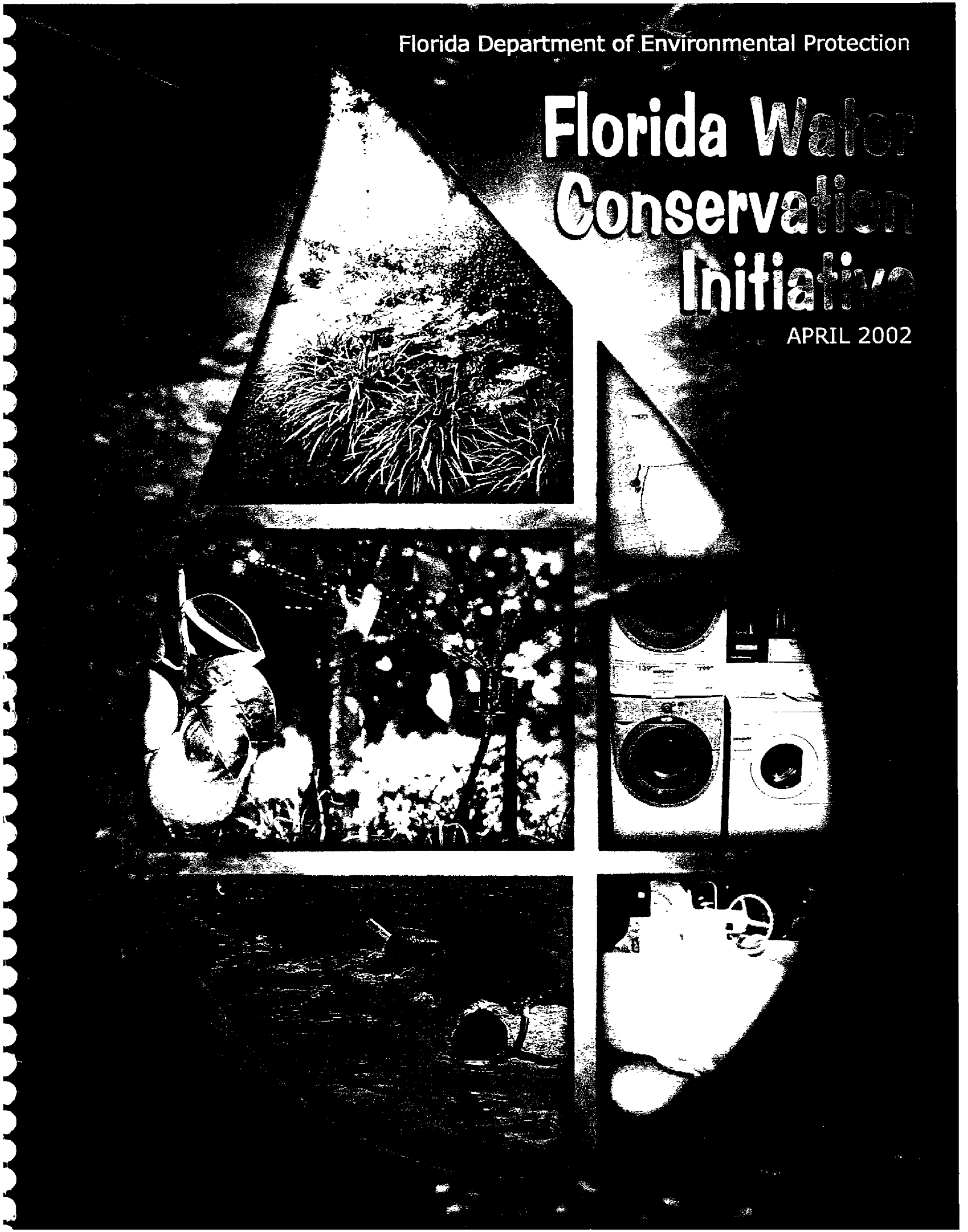
Florida Department of Environmental Protection

Florida Water Conservation Initiative

APRIL 2002



Cover Photos: The illustrations on the cover make a few of the important points about water conservation addressed in the body of the report. Starting from left-center:

Micro-irrigation of citrus: New technologies and Best Management Practices make it possible for agriculture to be one of the most efficient water use sectors.

Residential landscaping: Home landscaping can be installed that is both attractive and water-efficient.

Low-volume toilet: Replacing old high-volume toilets with new low-volume toilets is one of the most cost-effective means of improving indoor water use efficiency.

Efficient clothes washers: New machines that use far less water and energy than traditional models are becoming less expensive and more common.

Reclaimed water main: There is a potential for reclaiming and reusing hundreds of millions of gallons a day of water that otherwise is treated as a disposal problem.

Swimmers in spring: Using water more efficiently will help protect Florida's unique water resources, such as springs, from harm by too much pumping of finite supplies.

Water Conservation: Preventing and reducing wasteful, uneconomical, impractical, or unreasonable use of water resources (Section 62- 40.412(1), F.A.C.)

Acknowledgments

The Department of Environmental Protection very much appreciates the assistance of the Water Management Districts, the Public Service Commission, the Department of Agriculture and Consumer Services, the Work Group participants in the Florida Water Conservation Initiative, and all those who provided comments on the review draft of this report.

For more information, contact: Florida Department of Environmental Protection
Office of Water Policy
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
850-488-0784
http://www.dep.state.fl.us/water/waterpolicy/index.htm

Table of Contents

Executive Summary

In response to growing water demands, water supply problems, and one of the worst droughts in Florida's history, the Florida Department of Environmental Protection led a statewide Water Conservation Initiative (WCI) to find ways to improve efficiency in all categories of water use. The WCI evaluated how Floridians use water, and what can be done to make significant, permanent, cost-effective improvements in water use efficiency. The most important conclusion of the participants was that Florida must and can do more to use water efficiently. Water is a precious resource that should not be wasted, even in times of normal rainfall. The participants developed a large array of conservation alternatives that, if implemented, can significantly improve Florida's water use efficiency.

The volunteer participants at the WCI public workshops formed six Work Groups to identify and investigate a variety of technological, behavioral, educational, regulatory, and economic methods of improving water use efficiency. Each idea was evaluated in terms of how much water it could save, its cost effectiveness, and how easy it would be to implement. Appendix A lists the information that the Work Groups were asked to include in their reports. The Work Group reports served as the primary basis for a Review Draft of this report released in November 2001. Many improvements were made in response to written comments and input obtained at three public workshops on the Review Draft.

A total of 51 recommendations--22 High Priority, 20 Medium Priority, and 9 Low Priority--are included in this report (see the Summary of Recommendations). Some highlights:

Agricultural Irrigation presents many opportunities for improved efficiency. Key among these are cost share programs to implement irrigation Best Management Practices, more use of mobile irrigation labs to evaluate irrigation efficiency, improvements in the recovery and recycling of irrigation water, and greater use of reclaimed water for irrigation.

Landscape Irrigation for watering lawns, ornamental plants, and golf courses can significantly reduce water use through more efficient irrigation system design, installation, and operation, and by reducing the amount of landscaping that requires intensive irrigation.

Water Pricing is fundamentally important. Florida should implement water conserving rate structures that will reduce wasteful use both in ordinary times and during droughts. Conservation and drought rate structures, informative utility billing, and other techniques can send appropriate price signals to encourage water users to conserve water.

Industrial, Commercial, and Institutional users can improve their efficiency through certification programs for businesses that implement industry-specific Best Management Practices, and through water use audits, improved equipment design and installation, and greater use of reclaimed water.

Indoor Water Use is a growing water use sector. The greatest potential for conserving water in this sector is through increasing the proportion of Florida homes and businesses that use water-efficient toilets, clothes washers, showerheads, and dishwashers.

Reuse of Reclaimed Water can be made more widespread and efficient by proper pricing, by more metering of its use, and by making progress on increasing reuse in Southeast Florida.

Increasing water conservation in Florida will require action by many parties. Government will have a large role, but businesses, trade associations, and homeowners must do their part as well. What may be most important, however, is maintaining a long-term focus on increasing water use efficiency. This report provides a framework (see "Next Steps" section), and invites your participation. Appendix B suggests possible roles for the various parties in cooperatively implementing the recommendations in this report. Appendix C is a glossary of terms, and Appendix D is a list of water conservation information resources.

Introduction

Florida must use water more efficiently. Water conservation is emphasized in the Florida Water Resources Act, and is incorporated into the activities of water management districts, public and investor-owned utilities, local governments, and others. Despite this general awareness and many ongoing water conservation activities, there is still much room for improvement. This fact was brought home by the extraordinary drought experienced in the last two years over most of the state. Record low levels for lakes, aquifers, spring discharges, and rivers were experienced across the state. Recent rainfall has improved hydrologic conditions, but we can be sure that natural climatic cycles will someday again bring on a critical drought.

Drought is not the only time when water should be used efficiently. Florida continues to grow rapidly and traditional sources of water are limited. Conservation will be an important way to meet new needs while protecting Florida's water-dependent natural environment. For these reasons, the Florida Department of Environmental Protection (DEP) led a statewide Water Conservation Initiative (Initiative) with the goal of finding ways to use less water while achieving the same beneficial purposes.

This Initiative was not intended to address the need for emergency, short-term water use restrictions (such as water shortage orders issued by the water management districts), but instead, to point the way to achieving additional permanent water use efficiencies in all water use categories in Florida. The Department recognized that there is a very broad base of parties interested and informed about water conservation and has benefited greatly from their participation and assistance. Interested parties volunteered to participate in one or more of six Work Groups:

- **Agricultural Irrigation Work Group** was suggested for those interested or involved in row crops, citrus and tropical fruits, sugarcane, sod, ornamental growers, and any other type of plant production requiring irrigation.

- **Landscape Irrigation Working Group** (formerly Non-Agricultural Irrigation) was suggested for public or private water suppliers, local governments, golf courses, builders and developers, landscapers, irrigation installation and maintenance companies, hotels, and resorts.

- **Indoor Water Use Work Group** (formerly Indoor Use and Water Features) was suggested for public and private water suppliers, local governments, plumbers, builders and developers, pool and water feature companies, hotels, resorts, restaurants and theme parks.

- **Industrial/Commercial/Institutional Work Group** was suggested for industrial, manufacturing and other commercial businesses, paper mills, mining companies, electric utilities, state and federal facilities, schools and other institutions, hotels, resorts, and restaurants.

- **Water Pricing Work Group** was suggested for public and private water suppliers, local governments, economists, and rate consultants.

- **Reuse of Reclaimed Water Work Group** was suggested for public and private water suppliers, wastewater utilities, golf courses, agricultural interests, industry, and manufacturing companies.

The Initiative was an open process where DEP, with indispensable assistance from the five water management districts, the Department of Agricultural and Consumer Services, and the Public Service Commission, facilitated meetings and assisted the Work Groups in preparing reports summarizing their work. The process succeeded with wide participation in Work Groups by water users, local governments, environmental groups, other agencies, and many others. Public workshops on June 29 in Orlando, and August 15 in West Palm Beach, helped focus the Work Groups toward making written

recommendations to the Department by October 1. About 300 people attended and participated in the first workshop; close to 200 participated in the second workshop. In addition to these two events, many people participated in meetings, teleconferences, or e-mail discussions of the Work Groups to which they assigned themselves. (The full reports from each Work Group are available at the DEP Office of Water Policy website at http://www.dep.state.fl.us/water/waterpolicy/index.htm.)

The Department used the Work Group input in the formulation of a Public Review Draft Report distributed in November 2001. In December, public workshops on the Draft Report were held in Largo, West Palm Beach, and Tallahassee. Written comments on the Draft were requested by January 11, 2002. Significant changes were made in response to the suggestions received from many parties.

The Department is greatly appreciative of the time, expertise, and energy expended by all of the participants in the Water Conservation Initiative. The recommendations in this report are immensely stronger and more practical as a result of their participation than they otherwise would be.

Following the issuance of this report, the Department will continue to work with interested parties on implementation of specific recommendations. Another task will be to continue work on topics that were not adequately addressed in the initial phase of the Initiative. Those topics include:

- **Research:** Most of the Work Groups identified at least some areas where additional research is needed. There is a need to develop a research agenda for water conservation, and to identify potential researchers or research institutions to conduct the research.

- **Education and Outreach:** There is a need to further explore the various Work Group recommendations relating to education and outreach, and recommend a more integrated approach to their implementation.

Additional information on the implementation phase of the Initiative can be found in the section of this report entitled *Next Steps: Where Do We Go From Here?* A draft research agenda and a draft education/outreach agenda are included in the appendices.

The recommendations in this report cover a wide range of conservation alternatives, water users, and public and private responsibilities. It may help, in assessing the alternatives, to consider the following basic tenets that guided the initiative.

- **Water conservation is critical to Florida's future.** By water conservation, we mean measures that result in permanent and cost-effective improvements in water use efficiency (not the temporary responses to periods of drought). In meeting the growing demand for water, we must focus our attention on how to use less water to achieve the same or even better results.

- **Water conservation must be practiced by all water users.** We must find opportunities for improved water use efficiency everywhere. Agriculture, industries, golf courses, businesses, homeowners, and all Florida water users must share this objective.

- **Make sure that the biggest opportunities for improved water use efficiency receive the most attention.** Although water conservation is the responsibility of all water users, some categories of use are bigger than others and have more opportunity for improvement. Our recommendations, for example, are categorized as High, Medium, or Low Priority, and assessed according to Amount of Water Saved, Cost-Effectiveness, and Ease of Implementation.

- **Water is undervalued.** Something as indispensable to human life, ecosystem health, and Florida's economy as water should be recognized for being as valuable as it truly is. Undervaluing water leads to wasteful use of water, environmental damage, and inefficient capital investments.

- **Recognize the value of water.** To be used efficiently, the true value of water must be reflected in our programs and policies. For example:

  Educate Floridians on Water: School curricula, government information programs, and other efforts should help inform Floridians on the basic facts of water, the unique circumstances of this state's dependence on and use of water, and how to use water efficiently.

  Water is Water: The hydrologic cycle means that water is always on the move from one place to another, from one physical state to another. Although water is always water, we often fail to value it properly if it is appears to be a little salty, or if it has entered a storm-water management or reclaimed water treatment system. The challenge for Floridians is to recognize and appreciate that all water has value and should be put to the most beneficial and efficient uses.

  Accurately Measure Water Use: We can't gauge the effectiveness of our water conservation efforts, or determine where more work is needed, if we don't even know how much is being used. All big users, and most small users, of water should be required to measure and report regularly, to an appropriate degree of accuracy, on water use. Metering itself is effective in reducing water use.

  Use Market Signals in Pricing Water: Water should be priced appropriately. When it is practicable to do so, users of water should pay for this important resource in accordance with its economic and environmental value and in proportion to the volumes used.

  Reuse Water as Much as Feasible: Florida's program to reuse reclaimed water is a national leader, but there is still a potential to convert hundreds of millions of gallons a day of wastewater into valuable reclaimed water. This reduces wastewater discharge problems and makes very large quantities of water available for other beneficial uses.

- **Be smart when providing financial assistance, subsidies, or incentives for water conservation.** A number of the recommendations call for local, regional, state, or federal government financial assistance. However, as the Report notes in regard to water supply development, such subsidies should satisfy explicit criteria and should not go to water users who do not need the assistance, or who would be making efficiency improvements even without assistance. Additionally, new or significantly expanded cost-share programs may be unrealistic, given current budget constraints. However, assisting conservation is smarter in cases where governmental support of efficiency improvements is more cost-effective than subsidizing the development of new water resources.

- **Measure effectiveness.** As described elsewhere in this report, water conservation effectiveness should be continuously evaluated. We need to know if our efforts to conserve water are making a difference.

- **Recognize the connections between alternatives.** Although the nature of this process focused on discreet alternatives, it is recognized that the most effective water conservation programs are those that carefully combine a mix of separate alternatives. For example, an effective residential water conservation program might include landscape and indoor water use auditing, utility conservation rate structure, education, and financial incentives such as rebates for efficient plumbing fixtures.

- **Regulate when necessary**. Programs for education, financial assistance, and regulatory incentives are valuable tools, but there is still a need for a basic regulatory framework to manage the public resource of Florida's water. From the perspective of the Department of Environmental Protection, for example, we are considering amendments to the Water Resource Implementation Rule (Chapter 62-40, F.A.C.), which would require subsequent regulatory actions by the water management districts.

- **Continue to benefit from partnerships and collaboration.** The Department of Environmental Protection is greatly appreciative of all the good ideas and hard work contributed by WCI participants. The next step—implementing the many good ideas—can also benefit from a collaborative approach.

Background

Florida's demand for water is steadily increasing. The most recent estimate of statewide water use was 7.2 billion gallons a day in 1995 (updated estimates for 2000 water use are expected this summer). By the year 2020, demand is projected to increase to 9.1billion gallons a day. Even higher demands of 10.5 billion gallons a day are forecast under 1-in 10-year drought conditions. There are local and regional plans to attempt to meet this growing demand from a wide mix of alternative sources. One of the most cost-effective and environmentally friendly "sources" of water is water conservation. This part of the report describes the background of water supply and conservation in Florida and explains the benefits of efficient water use.

Water Use in Florida

A few illustrations of the amount of water used in Florida:

- More water is withdrawn and used in Florida than in any other state east of the Mississippi River.
- Sixty percent of all water used for agricultural irrigation east of the Mississippi River is used in Florida.
- Florida is more dependent on groundwater (60% of fresh water use) than any other state east of the Mississippi River.
- Current demands for public water supplies in South Florida are greater than demands for public supplies in thirty-nine individual states.

The main point is that water use in the nation's fourth most-populous state is enormous, and much effort and expense will be necessary to meet new demands.

The Recent Drought

In the last few years, Florida has experienced a historically severe drought across most of the state. In the South Florida Water Management District, the year 2000 was the driest year on record and the period from November 1999 through May 2001 was the driest recorded sequence of dry-wet-dry seasons. Water levels in Lake Okeechobee dropped to the lowest levels ever recorded, making it necessary for some public water supply utilities to modify pumps and intake lines to avoid the risk of not being able to supply water to homes.

In the Southwest Florida Water Management District, the drought began in October 1998, and by March 2000, the U.S. Drought Monitor characterized this region as experiencing the most severe level of drought. District-wide, rainfall during 2000 was the lowest year on record. During January 2000, the Withlacoochee, Hillsborough, and Peace Rivers were at record low levels.

In the St. Johns River Water Management District, the drought began in spring of 1998 and intensified during the first part of 2001. As a result of prolonged dry conditions, groundwater and surface water levels were at or below record low levels in January 2001. In May 2000, over 500 domestic self-supply wells lost natural artesian flow, resulting in a reduction or loss of water supply to homes in the area. Lowered groundwater levels were thought to be a significant factor contributing to the increased sinkhole development noted in May and June 2000.

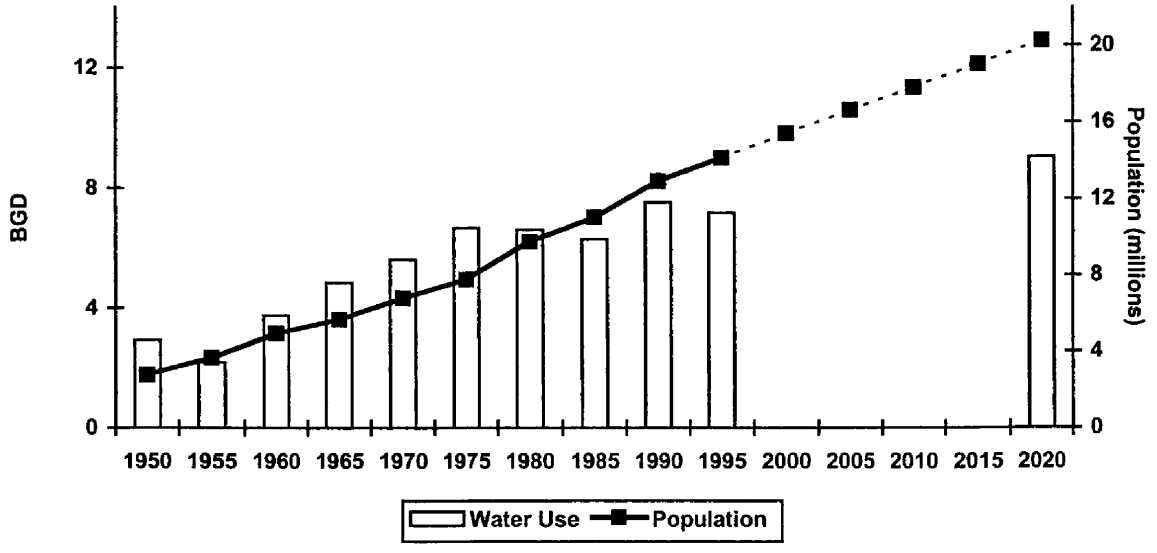
In the Suwannee River Water Management District, the year 2000 was the fourth lowest rainfall year since 1931. In the spring of 2001, most of the gauging stations in the Suwannee, Santa Fe, and Withlacoochee rivers recorded record low flows. Fifty-two of the district's eighty-five Floridan Aquifer Monitoring stations set record low levels. Many of the district's springs had either ceased flowing or had greatly reduced flows.

Florida has largely emerged from this drought, but drought will inevitably return. The state must now work to break what the National Drought Mitigation Center calls the "hydro-illogical" cycle: apathy, drought, awareness, concern, panic, rain, apathy. Breaking this cycle will require a long-term commitment on the part of Florida's water managers to maintain a focus on water use efficiency even during times of normal rainfall.

Statewide Trends in Water Use

Although water use is growing, for the last two decades the rate of increase in total fresh water use has been less than that of population. This trend is expected to continue to the year 2020 (illustrated in Figure 1). By 2020, average year water use is projected to be about 9.1 BGD for a population of about 20.4 million. This represents a projected 26 percent increase in fresh water demand for a projected 43 percent increase in Florida's population. More recent population projections indicate that Florida's 2020 population may be as much as 21.8 million, possibly leading to greater demands than those depicted in Figure 1.

Figure 1. Total Fresh Water Withdrawals and Population

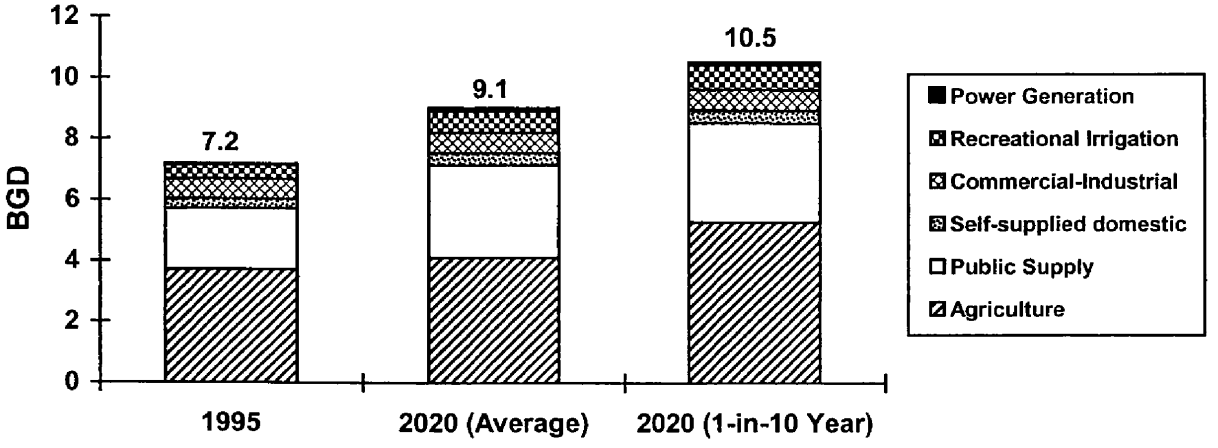


Statewide Water Use Patterns

Statewide, agriculture historically has withdrawn about half of all fresh water used in Florida, while urban demands have steadily increased relative to other uses. This general pattern is expected to continue in 2020 (although agricultural water use as a percentage of total use is expected to decline slightly). An important consideration is that water demands are generally greater during drought than they are under average conditions.

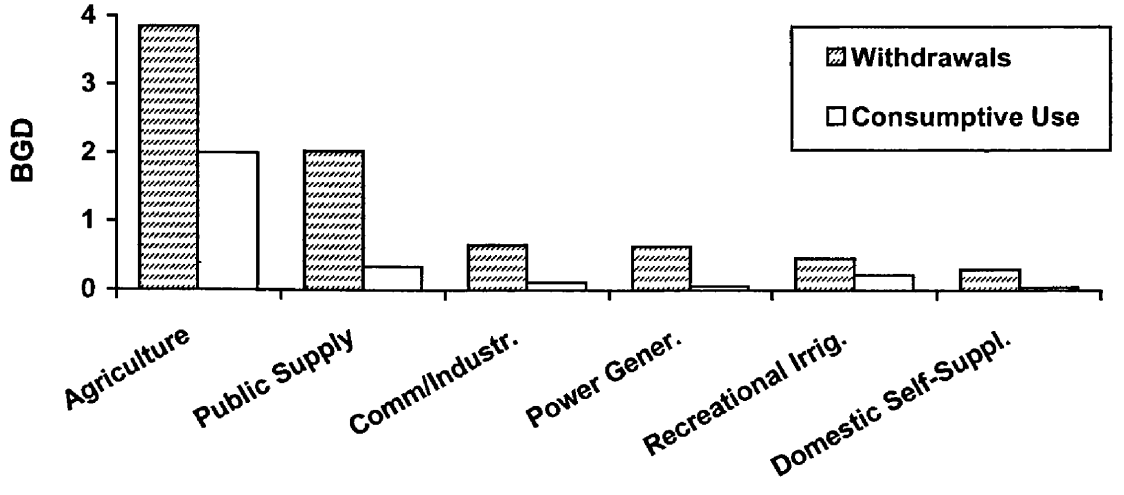
As shown in Figure 2, public water supply is expected to increase as a fraction of total use, from about 28 percent in 1995 to about 34 percent in 2020. While it is estimated that the proportion of water used for agriculture is expected to decline slightly (from about 52 percent in 1995 to about 46 percent in 2020), actual agricultural water use is projected to increase from 3.7 BGD in 1995 to 4.1 BGD in 2020. Otherwise, significant changes are not expected in the fraction of water accounted for by different uses.

Figure 2. Fresh Water Withdrawals by Category: 1995 to 2020 (Billion Gallons Per Day)



Uses of water also vary in the degree to which they "consume" water. All "withdrawals" of water remove water from a source. They vary in the percentage of the water withdrawn that is returned, such as through groundwater recharge, and made available for other uses. Figure 3 below illustrates the difference between withdrawal and consumption for different categories of water use.

Figure 3. Withdrawals and Consumptive Use of Fresh Water in Florida, 1995 (Billion Gallons per Day)

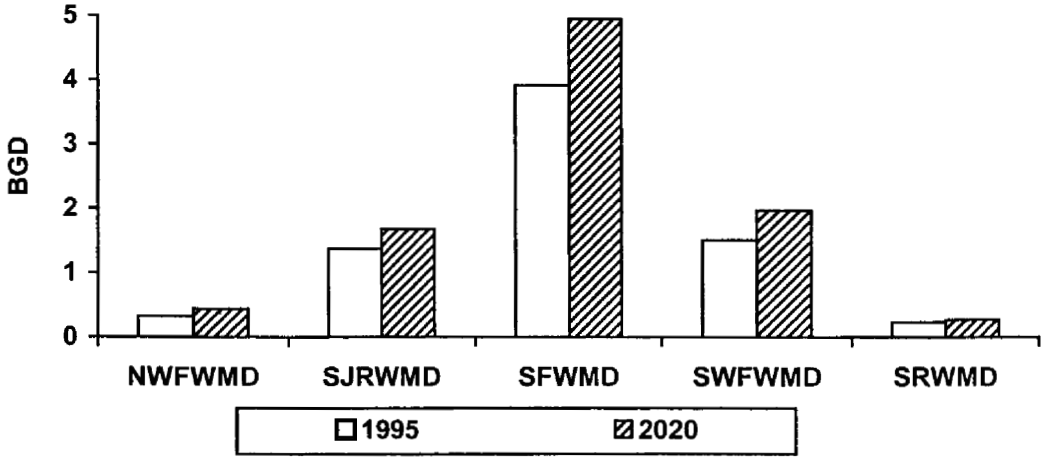


Regional Water Use Patterns

As shown in Figure 4 below, water demands vary greatly by region. By far, the largest water demands are in SFWMD, followed in decreasing order by SWFWMD, SJRWMD, NWFWMD and SRWMD. Total fresh water withdrawals in SFWMD currently are greater than the combined withdrawals in all of the other WMDs.

No fundamental changes are expected in regional water use patterns. Accordingly, it is anticipated that increases in water demand will be much larger in South Florida than in North Florida. As indicated in Figure 4, SFWMD projects an increased demand of about 24 percent (nearly one billion gallons a day) by 2020. This represents almost half of the total projected statewide increase.

Figure 4. Fresh Water Demand by WMD, 1995 and 2020
(Billion Gallons per Day)



The fraction of water used by different use categories is distinctly different between water management districts, reflecting geographic differences and economic activities. For example, as shown in Figure 5, public water supply in the NWFWMD amounted to 49 percent of total fresh water use in 1995, while it was only 6 percent in SRWMD. In some cases, a single type of water use may account for a major portion of the projected future demand. For example, on Florida's lower West Coast, recreational irrigation, primarily for golf courses, is projected to be the largest use of water in 2020.

The current regional differences in how water is used are expected to continue in the future. For instance, as shown in Figure 6, NWFWMD anticipates that public water supply will change only from 43 percent to 49 percent of total use in 2020, and SRWMD anticipates that public water supply will increase only from 6 percent to 7.5 percent of total use. Similarly, the NWFWMD anticipates that agricultural irrigation will increase from 7.4 percent to 8 percent of total use in 2020, and SFWMD expects a slight decrease in agricultural irrigation, from 61 percent to 54 percent of the water used in that district.

Figure 5. Fresh Water Withdrawals by Water Management District and Category: 1995

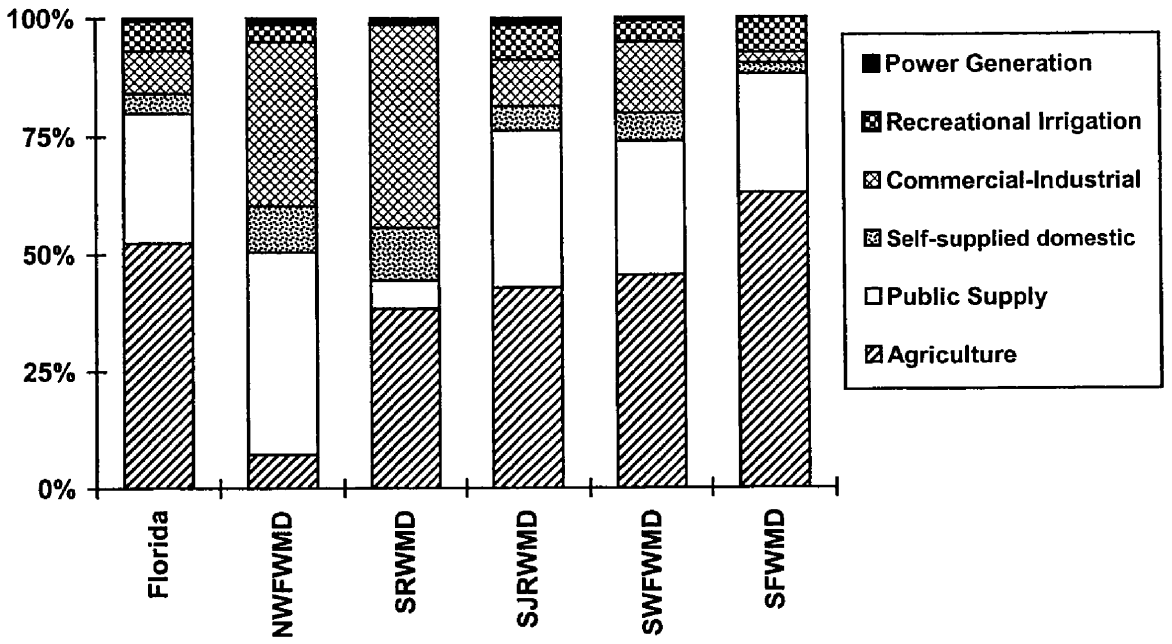
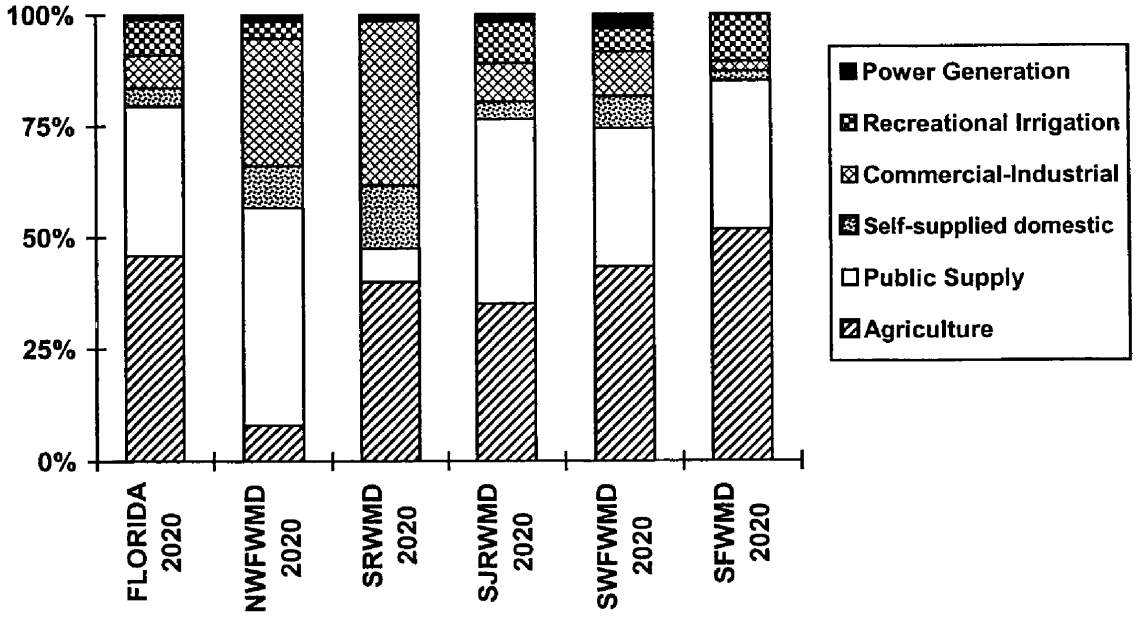


Figure 6. Fresh Water Withdrawals by Water Management District and Category: 2020 Average Demand



Reuse

Water reuse is an important component of both wastewater management and water resource management in Florida. Recognizing this importance, the encouragement and promotion of water reuse have been established as formal state objectives in both Chapters 403 and 373, F.S. Reuse has been identified as a key component of the regional water supply plans prepared by the water management districts. Reuse strategies recommended in the regional water supply plans include further development of urban reuse systems, reuse system interconnections, aquifer storage and recovery (ASR) for storage, and groundwater recharge.

During the past 15 years, Florida has become recognized as a national leader (along with California) in water reuse. Approximately 575 million gallons per day (MGD) of reclaimed water was used for beneficial purposes in 2000. The total reuse capacity of Florida's domestic wastewater treatment facilities has grown from 362 MGD in 1986 to 1,116 MGD in 2000. The current reuse capacity represents about 51 percent of the total permitted domestic wastewater treatment capacity in Florida. Reclaimed water from these systems was used to irrigate 103,660 residences, 401 golf courses, 385 parks, and 159 schools. Irrigation of areas accessible to the public represented about 43 percent of the 575 MGD of reclaimed water reused.

Historically, potable quality water has been inexpensive. As a result, utilities had difficulty motivating potential customers to substitute reclaimed water for potable quality water for irrigation needs. Some of the early pioneers actually provided reclaimed water at no cost to users. Others resorted to very low user charges – charges well below the cost of potable water. In most cases, utilities resorted to flat rates – a fixed monthly fee for the use of reclaimed water, independent of the volume used.

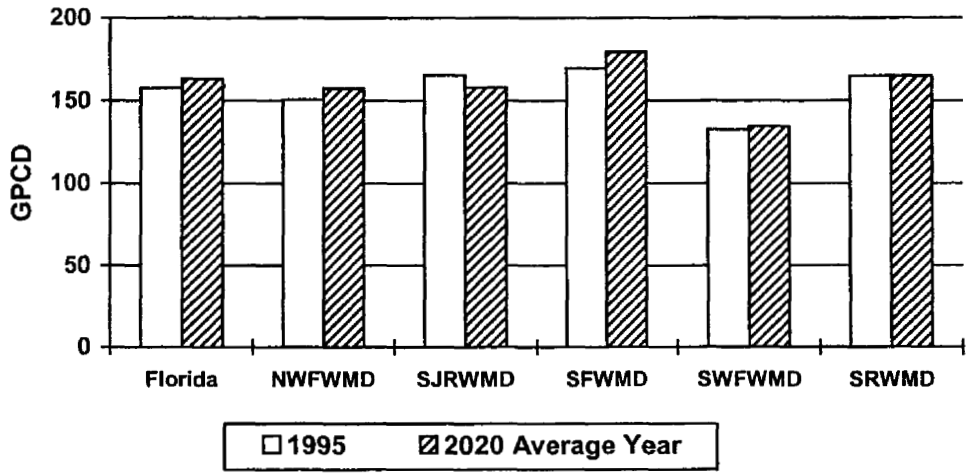
Stimulated by low cost, it is not surprising that many reclaimed water customers over-used reclaimed water. Low rates and flat rates did nothing to encourage conservation and efficient use of reclaimed water. Data assembled by the Southwest Florida Water Management District indicate that in many instances, the use of reclaimed water may only offset about 25 percent of potable water use. That is, if a homeowner was using X gallons of water each month for lawn watering, upon changing to reclaimed water, use may have increased to about 4X gallons a month.

Reuse activities vary, therefore, in the degree to which they "offset" the use of traditional sources of water. They can also vary in the degree to which they recharge aquifers. These differences are illustrated in the Appendix E entitled *Reuse Activities and Relative Desirability of Different Types of Reuse.* State policy is moving toward encouraging those particular reuse activities that have the highest "offset" and/or the highest "recharge fraction."

Changes in Per Capita Use for Public Water Supplies

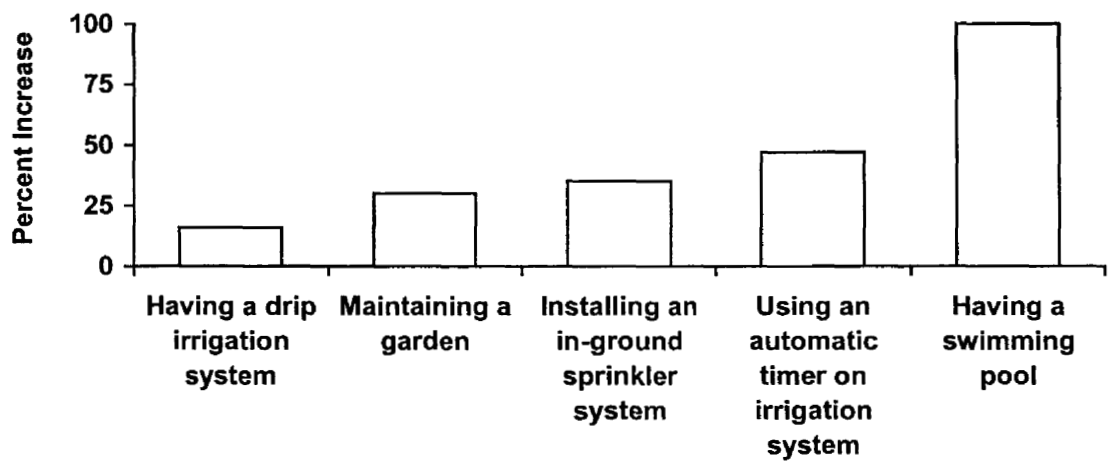
As shown in Figure 7 on the following page, there are regional differences in the current and projected trend in per capita use for public water supply. When combined, the five districtwide water supply assessments project a surprising increase in per capita use from 158 gallons per capita per day (gpcd) in 1995, to 162 gpcd in 2020. The overall projected increase in per capita use may be due to larger population growth in areas of higher per capita demand. With the emphasis on efficient use of water in Florida, and increasingly intense competition for available water supplies, it is hoped this projected increase will not materialize. To different degrees, the water management districts are emphasizing increased efficiency in water use in the recently completed regional water supply plans.

Figure 7. Per Capita Public Water Supply Use (Gallons Per Capita Per Day)



One of the biggest obstacles to reducing per capita use of water is change in the ways in which home-owners use water. For example, an increasing number of Floridians are installing automatic landscape irrigation systems. Although the systems may irrigate efficiently, even the best automatic systems can result in much more water being applied to a home's lawn and ornamental plants (see Figure 8). If the system has inefficient features, like automatic timers for irrigation, even more water is used (and wasted). Preventing increases in water use resulting from increased use of water-intensive technologies like in-ground irrigation systems at homes will be a significant challenge.

Figure 8. Modeled Difference in Water Use with Different Residential Practices (National Results) (AWWA 1999)



Benefits of Water Conservation

Put most simply, water conservation is preventing wasteful use of water. Done the right way, water conservation has great potential to deliver multiple benefits:

- **Saving dollars.** Many water conservation measures can meet new demands less expensively than developing new supplies. This is because significant efficiency improvements make more water available without the development of new infrastructure. All of the recommendations in this report are intended to be cost-effective (depending on actual program design).

- **Expanding supplies.** If increased demands can be met from existing supplies of water, then the effect is the same as developing new supplies.

- **Environmental protection.** Water conservation can help protect Florida's natural systems from both the negative effects of over-withdrawals and the disturbances associated with the development of reservoirs, pipelines, and wellfields. Conservation can also improve water quality by reducing wastewater discharges and, in the case of irrigation, by reducing the potential for fertilizer and chemical leaching and runoff.

Potential for Water Conservation

Clearly, Florida faces water supply challenges. To meet these challenges, the water management districts have developed regional water supply plans. These plans identify a variety of alternatives crucial to meeting these needs. Conservation is a part of all these plans.

SWFWMD's Regional Water Supply Plan considered conservation in detail as an alternative water supply. The water supply plan evaluated two categories of conservation: non-agricultural and agricultural conservation. The plan provides a list of technically feasible and publicly acceptable non-agricultural conservation projects that cost less than $2.00 per 1,000 gallons saved. The district estimated that between 75 mgd and 95 mgd could be saved if all the options were implemented. To evaluate the potential costs and savings for agricultural conservation options, the district developed 20 'model' farms that were typical of a variety of different practices in the region. The district estimated that potential water savings from implementing the agricultural conservation options could be as much as an additional 41 mgd. Figure 9 depicts how conservation combined with reuse has the potential to more than meet can meet 2020 demand.

The district's analysis shows that implementation of both non-agricultural and agricultural conservation options will significantly contribute to meeting the 2020 demands. Implementation of conservation and reuse options in fact have the theoretical potential to exceed the projected additional demand.

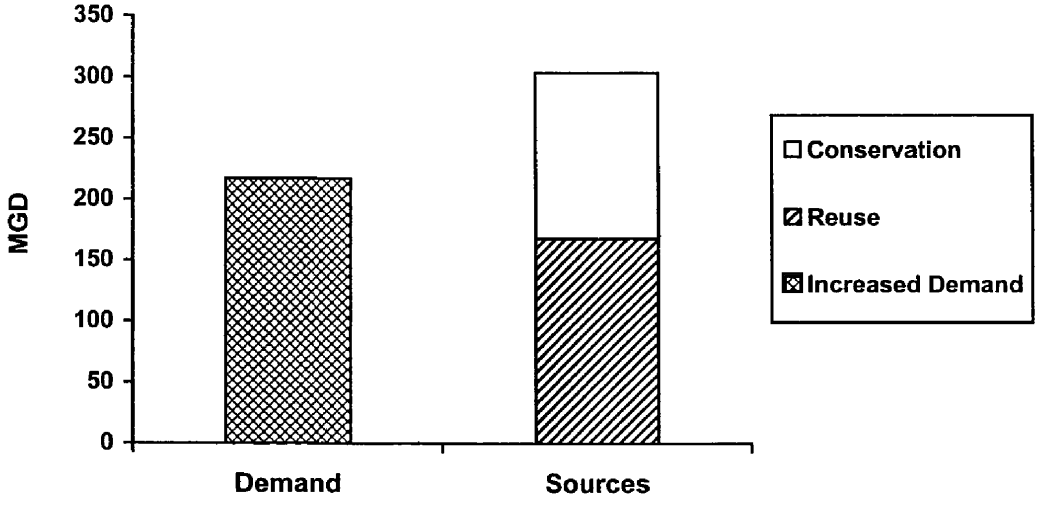
During development of its districtwide water supply plan, the SJRWMD assumed that current conservation practices would continue through the year 2020. Without this assumption, the district's 2020 demand estimates would have been 10% higher. In the water supply plan, the district proposed to develop a new Water Conservation Plan. The plan will identify water conservation strategies and projects that could be implemented to further reduce water demands.

In the development of its four regional water supply plans, the SFWMD estimated that implementation of current conservation strategies could result in a 10% reduction of public water supply and domestic self-supply demands (approximately 17 mgd.). The district estimated that the conversion of 10,000 acres of citrus from flood irrigation to micro-irrigation could save approximately 6.3 mgd. The SFWMD also plans to develop a comprehensive water conservation program.

In its planning region, the NWFWMD identified six conservation practices that have been implemented or could be implemented: residential conservation rate structure, leak detection programs by the utilities, public education, landscape irrigation restrictions, low volume plumbing codes, and xeriscape landscape

ordinances. The district estimated that if each utility implemented all these conservation measures, that the maximum amount of water saved could be 2.6 mgd.

Figure 9. SWFWMD: 2020 Increased Demand vs. Potential Conservation and Reuse



Cost-Effectiveness of Water Conservation

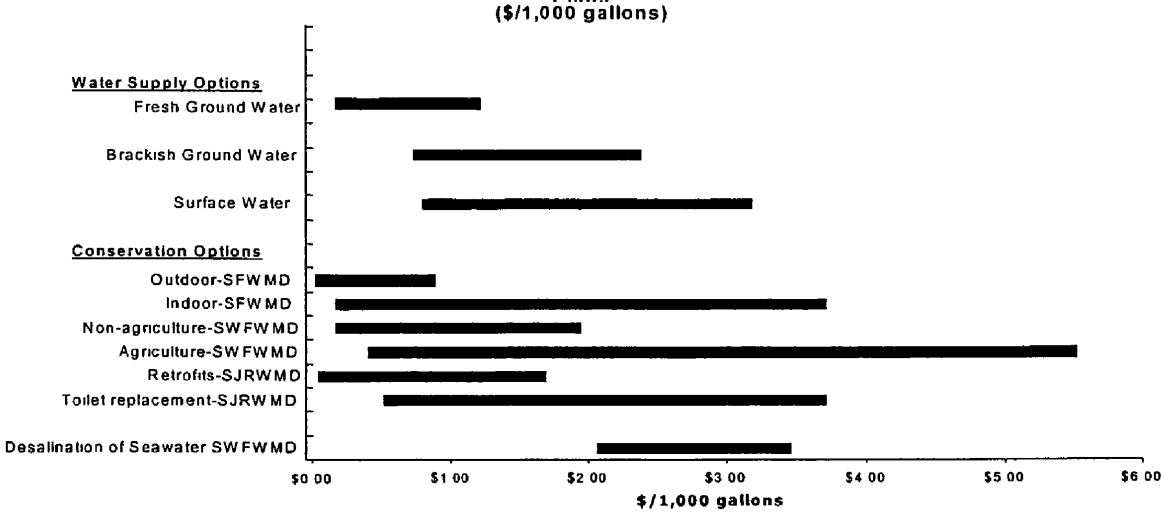
Historically, Florida has been able to rely on the least expensive sources of ground and surface water to meet its needs without significantly degrading natural systems. As Florida looks for additional supplies of water to satisfy future demand, the state will have to develop new and perhaps more expensive sources. Conservation reduces the need to develop these new supplies and can be considered a new "source" of water.

Figure 10 displays the estimated range in unit cost ($/1,000 gallons) for a variety of water supply alternatives presented in regional water supply plans. While many of these costs were estimated differently and may not be directly comparable, this figure illustrates the variation in the cost of developing different water supply sources and the expected increase in the cost of meeting future needs. As this illustrates, water can often be conserved at a cost lower than new water supply development. The wide range in cost, however, underscores the importance of carefully evaluating conservation alternatives in lieu of water supply options. Additionally, water resources such as fresh groundwater or surface water may be fully developed or not available in many areas of the state, making conservation and reuse options the most cost-effective alternatives.

Public Support for Water Conservation

Generally, there appears to be widespread public support for water conservation. When surveyed on various water conservation issues, respondents favored policies and programs, including increased prices for water, to improve water conservation. An interesting observation from a survey conducted by Tampa Bay Water is that while 87 percent of respondents agreed more should be done to conserve water, 93 percent also believed that they, personally, are already doing all they can to conserve water. A sampling of questions and answers from public opinion surveys conducted by Tampa Bay Water and The Nature Conservancy are in Appendix F.

Figure 10. Estimated Costs of Selected Water Supply Alternatives Identified in Regional Water Supply Plans
($/1,000 gallons)



Water Conservation and Utility Rate Structures

The cost of water and the design of utility rate structures send influential price signals to water users. Sending the appropriate price signals strongly encourages water conservation. Opportunities exist in Florida to strengthen the economic incentive for utility customers to more carefully evaluate their water use habits.

As price increases, water demand tends to decrease. There are four basic utility rate structures:

- *Flat rate*: the consumer's cost of water for a given billing period is fixed regardless of the level of use.
- *Declining block*: comprised of a fixed customer charge per month, plus two or more usage blocks, with the price per unit of water consumed decreasing in each subsequent block.
- *Uniform rate:* comprised of a fixed customer charge per month, plus a constant, uniform charge for each unit of water consumed (e.g., $1.50 for the first ten thousand gallons, the same $1.50 for the second ten thousand gallons, and so on).
- *Inclining block*: comprised of a fixed customer charge per month, plus two or more usage blocks, with the price per unit of water consumed increasing in each subsequent block. (An example: $1.25 for the first ten thousand gallons, $1.50 for the second ten thousand gallons, $2.00 for the third ten thousand gallons, etc.)

Flat rates and declining block rates are not regarded as water conserving and do not provide incentives to use water efficiently. A utility with one of these rate structures that changes to a uniform rate or an inclining block rate is moving toward a water conserving rate structure. Today, uniform rates are regarded as meeting only the minimum standards for such a rate structure and the trend is toward implementing inclining block rate structures to promote water use efficiency.

Allocation of Utility Costs Between Fixed and Variable Charges

A customer's bill is usually the sum of two different charges: a "*fixed charge*" (also called a "customer charge" or a "base facility charge") and a "*variable charge*". Very importantly, the portion of the bill that varies with water use is critical in reducing water use demand. The greater the percentage of the utility bill that is variable--dependent on how much water is used--the more powerful the incentive to conserve.

For example, long-term water consumption may be cut by as much as a third by moving from a 50 percent to a 25 percent fixed charge. Rates made up entirely of variable charges may reduce consumption up to one-half. Thus, it is possible to reduce water use by large amounts simply by changing to a rate structure where the largest part of a customer's bill is proportional to water use. However, some caution is necessary in implementation of such a rate structure. For many utilities, especially small ones, fixed charges are designed to recover fixed costs, which is essential for the continued viability of the utility. It is important to consider a utility's unique characteristics when determining the optimum cost allocation to promote water conservation so that long-term viability is maintained.

The allocation of costs between fixed and variable charges for residential customers differs a great deal among utilities. In the Southwest Florida Water Management District (1997 data) about 80% of the utilities get 31% or more of their revenues from fixed charges. More than 50% get more than 40% of their rate revenues from fixed charges. Commercial and industrial water users would also be expected to respond to price incentives and changes in cost allocation.

The redesign of some utility rate structures, to rely less on fixed charges to recover costs, can induce considerable conservation for some utilities, while not adversely affecting revenues. The ability to reduce fixed charges, however, may vary somewhat depending on the fixed costs of the utility (such as fixed debt), and variable costs (such as purchased water). Care must be taken to consider the revenue impact of rate structure modification on a utility-by-utility basis.

Funding Water Conservation Programs

Many recommendations in this report will require funding. Examples include: cost-share for agricultural irrigation improvements, additional mobile irrigation labs, rebates for water efficient landscaping, replacement of inefficient toilets, incentives for purchase of efficient clothes washers, and additional research, education, and outreach. Some of these recommendations are already being implemented on a limited basis, but if they are to be expanded, additional staffing and financial resources will be needed.

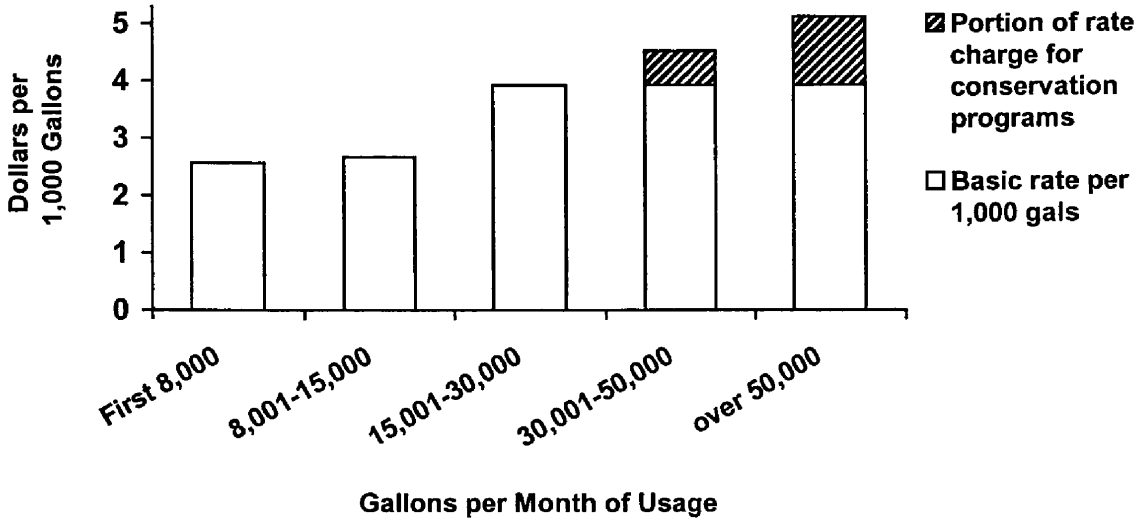
In Florida, water supply and water resource development projects have consistently received greater funding than water conservation. This is partly due to differences in financing mechanisms that make conservation less attractive. New water supply projects are typically paid for with public bonds (or a government revolving loan program) which are repaid over time, reducing up-front costs.

Water conservation programs are usually paid for up-front, which can make them less appealing, even though they may be more cost-effective and environmentally beneficial than new supply projects. To be more attractive, conservation programs need a mechanism to amortize the implementation costs over a longer period (i.e., the life of the benefits received). If water conservation alternatives are less costly than new supply alternatives, it makes sense to fund water conservation first.

Several options for financing water conservation programs were discussed. Funding needs to be consistent and significant, and it needs to allow for financing comparable to a traditional water supply project. At present, the following appear to have the greatest potential:

- **A portion of the revenues from water conserving rate structures could be used to fund utility conservation programs.** Conservation rates usually include inclining blocks or tiered rates to discourage excessive water use. Revenues from the upper tiers (from this excessive use) could be used by utilities to establish their own water conservation trust fund. Utilities and/or local governments could then develop and finance a variety of conservation programs best suited for their needs. Hillsborough County established its own water conservation fund in 1993, which is funded by upper tiers of its conservation rate structure (see Figure 11).

Figure 11: Example of "Conservation Rate" on Upper Tiers of Water Use Being Allocated for Utility Conservation Programs (Hillsborough County)



As shown in Figure 11 above, a portion of the bill for customers in Hillsborough County that use more than 30,000 gallons a month is used to fund water conservation programs. These funds can be used for activities such as toilet replacement programs, efficient clothes washer rebates, Xeriscape education, irrigation efficiency programs, and home water use audits. Other communities in Florida are considering similar approaches.

- **A Revolving Loan Fund could be made available to water utilities, and possibly agriculture and other water users, to finance cost-effective water conservation projects.** DEP currently administers a revolving loan fund that is used by public utilities to finance water supply projects, wastewater treatment, and reuse projects. The possibility of using this fund, or establishing a separate revolving fund dedicated for water conservation programs, should be explored. A revolving loan fund would address the issue of front-loaded costs for new conservation programs and allow utilities and others to pay for water conservation programs like water supply projects, that is, amortizing costs over the life of the project benefits.

- **Water management districts could increase funding assistance for water conservation through ad valorem revenues.** Traditionally, the WMDs have focused their limited funding to water supply and water resource development. With the exception of SWFWMD, the districts currently allocate only a small fraction of their budgets (less than 1%) to water conservation programs. Regional water supply planning could identify more cost-effective water conservation projects. In addition to ad valorem revenues, administrative fines collected from consumptive use permit violations could be used to establish district water conservation funds.

Other ideas may merit further investigation. Federal grants, state general revenue, a conservation license plate, and a tax on bottled water were some of the suggestions at the public workshops on the draft report. But if Florida is going to increase water-use efficiency, funding for conservation must be put on a level playing field with funding for new water supply. The funding sources that are available to pay for new supply projects should also be available to fund cost-effective conservation projects and programs.

Summary of Recommendations By Work Group Area

The six Work Groups provided extremely valuable input. The ranking and scoring below was based largely on the informed professional judgment of the Work Group participants, rather than on empirical data, which was often unavailable. DEP staff adjusted some of the Work Group rankings and scores to provide greater consistency among the groups, and to incorporate input received during public review of the draft report. The body of this report describes each of the recommendations. Readers are also encouraged to review the Work Group reports which are available on the Department's website.

The reader will note that there is some overlap among the recommendations in this report. For example, several Work Groups endorsed similar alternatives involving public education, outreach, or technical assistance. Other related recommendations address topics like improved measurement of water use, implementation of conservation rate structures, and reuse of reclaimed water. In most cases the Department combined similar alternatives into a single recommendation and simply noted that another Work Group had a comparable recommendation.

Recommended Water Conservation Alternatives[1]

Water Conservation Alternative	Priority	Total Score	Amount of Water Saved (1 to 5)[2]	Cost-Effectiveness (1 to 3)[3]	Ease of Implementing (1 to 3)[4]
Agricultural Irrigation					
AI-1: Cost share and other incentives	High	10	💧💧💧💧💧	$ $ $	✓ ✓
AI-2: More mobile irrigation labs to achieve water conservation BMPs	High	10	💧💧💧💧💧	$ $ $	✓ ✓
AI-3: Increase rainfall harvesting and recycling of irrigation water	High	9	💧💧💧💧💧	$ $ $	✓
AI-4: Increase the reuse of reclaimed water	High	9	💧💧💧💧💧	$ $ $	✓
AI-5: Improve methods for measuring water use and estimating agricultural water needs	Medium	8	💧💧💧💧	$ $	✓ ✓
AI-6: Conduct additional research to improve agricultural water use efficiency	Medium	8	💧💧💧💧	$ $	✓ ✓
AI-7: Increase education and information dissemination	Medium	8	💧💧💧	$ $	✓ ✓ ✓
AI-8: Amend WMD rules to create incentives for water conservation	Medium	8	💧💧💧💧	$ $	✓ ✓

[1] The "scores" assigned to each alternative have been made by the Department of Environmental Protection, with the benefit of the recommendations of participants in the Water Conservation Initiative.

[2] A score of 1 indicates the least water saved, 5 the most.

[3] A score of 1 indicates the least cost-effective, 3 the most cost-effective.

[4] A score of 1 indicates relatively difficult to implement, 3 relatively easy.

Water Conservation Alternative	Priority	Total Score	Amount of Water Saved (1 to 5)[2]	Cost-Effectiveness (1 to 3)[3]	Ease of Implementing (1 to 3)[4]
Landscape Irrigation					
LI-1: Develop and adopt state irrigation design & installation standards and require inspection.	High	10	💧💧💧💧💧	$ $ $	✓ ✓
LI-2: Expand and coordinate educational/outreach programs on water-efficient landscaping.	High	9	💧💧💧💧	$ $ $	✓ ✓
LI-3: Establish a statewide training and certification program for irrigation design and installation professionals.	High	9	💧💧💧💧	$ $ $	✓ ✓
LI-4: Develop environmentally sound guidelines for the review of site plans	Medium	8	💧💧💧💧	$ $ $	✓
LI-5: Conduct applied research to improve turf and landscape water conservation	Medium	8	💧💧💧💧	$ $	✓ ✓
LI-6: Establish a training and certification program for landscape maintenance workers.	Medium	7	💧💧💧💧	$ $	✓
LI-7: Evaluate the use of water budgeting as an effective water conservation practice	Low	6	💧💧💧💧	$	✓
LI-8: Evaluate the need to establish consistent statewide watering restrictions for landscape irrigation	Low	6	💧💧💧	$ $	✓
Water Pricing					
WP-1: Phase in conservation rate structures	High	10	💧💧💧💧💧	$ $ $	✓ ✓
WP-2: Require drought rates as part of utility conservation rate structures	Medium	8	💧💧💧	$ $ $	✓ ✓
WP-3: Consider using market principles in the allocation of water, while still protecting the fundamental principles of Florida water law	Medium	7	💧💧💧	$ $ $	✓
WP-4: Improve cost-effectiveness in the next cycle of regional water supply plans	Medium	7	💧💧	$ $ $	✓ ✓
WP-5: Phase in informative billing	Medium	7	💧💧	$ $ $	✓ ✓
WP-6: Require more measurement of water use, including metering and sub-metering					
a) Sub-metering of new multi-family residences	Medium	7	💧💧💧	$ $	✓ ✓
b) Sub-metering retrofit of existing multi-family residences	Low	6	💧💧💧💧	$	✓
WP-7: Adopt additional state guidance on water supply development subsidies	Low	6	💧💧	$ $	✓ ✓

Water Conservation Alternative	Priority	Total Score	Amount of Water Saved (1 to 5)[2]	Cost-Effectiveness (1 to 3)[3]	Ease of Implementing (1 to 3)[4]
Industrial/Commercial/Institutional					
ICI-1: Consider establishing a "Conservation Certification" program	High	10	💧💧💧💧	$ $ $	✓ ✓ ✓
ICI-2: Consider a range of financial incentives and alternative water supply credits	High	10	💧💧💧💧	$ $ $	✓ ✓ ✓
ICI-3: Consider cooperative funding for the use of alternative technologies to conserve water	High	9	💧💧💧💧	$ $ $	✓ ✓
ICI-4: Implement additional water auditing programs	Medium	8	💧💧💧💧	$ $	✓ ✓
ICI-5: Promote utilization of reclaimed water	Medium	8	💧💧💧💧	$ $	✓ ✓
ICI-6: Investigate methods of assuring that large users from public suppliers have the same conservation requirements as users with individual permits	Low	6	💧💧💧	$ $	✓
Indoor Water Use					
IWU-1: Expand programs to replace inefficient toilets	High	10	💧💧💧💧💧	$ $ $	✓ ✓
IWU-2: Require that inefficient plumbing fixtures be retrofitted at time of home sale	High	9	💧💧💧💧	$ $ $	✓ ✓
IWU-3: Provide incentives to retrofit inefficient home plumbing fixtures	High	9	💧💧💧💧	$ $ $	✓ ✓
IWU-4: Support national dishwasher and clothes washer standards; offer incentives for purchasing efficient washers	High	9	💧💧💧💧	$ $ $	✓ ✓
IWU-5: Create a water auditor inspection program for the sale of new and existing homes, supported by a refundable utility service fee	Medium	8	💧💧💧💧	$ $ $	✓
IWU-6: Coordinate and expand the statewide water conservation campaigns	Medium	8	💧💧💧💧	$ $	✓ ✓
IWU-7: Evaluate the potential for gray water use	Low	5	💧💧💧	$	✓
IWU-8: Investigate the potential for cisterns	Low	4	💧💧	$	✓

Water Conservation Alternative	Priority	Total Score	Amount of Water Saved (1 to 5)[2]	Cost-Effectiveness (1 to 3)[3]	Ease of Implementing (1 to 3)[4]
Reuse of Reclaimed Water					
RW-1: Encourage metering and volume-based rate structures for reclaimed water service	High	10	💧 💧 💧 💧 💧	$ $ $	✓ ✓
RW-2: Education and Outreach	High	9	💧 💧 💧 💧	$ $	✓ ✓ ✓
RW-3: Facilitate seasonal reclaimed water storage (including ASR)	High	9	💧 💧 💧 💧	$ $ $	✓ ✓
RW-4: Link reuse to regional water supply planning	High	9	💧 💧 💧 💧	$ $ $	✓ ✓
RW-5: Implement viable funding programs	High	9	💧 💧 💧 💧 💧	$ $	✓ ✓
RW-6: Promote agency support of groundwater recharge and indirect potable reuse	High	9	💧 💧 💧 💧 💧	$ $	✓ ✓
RW-7: Encourage reuse in Southeast Florida	High	9	💧 💧 💧 💧 💧	$ $	✓ ✓
RW-8: CUP incentives for utilities that implement reuse programs	Medium	8	💧 💧 💧 💧	$ $	✓ ✓
RW-9: Encourage use of supplemental water supplies	Medium	7	💧 💧 💧	$ $	✓ ✓
RW-10: Assist in ensuring economic feasibility for reuse utilities and end users	Medium	7	💧 💧 💧	$ $	✓ ✓
RW-11: Encourage reuse system interconnects	Medium	7	💧 💧 💧	$ $	✓ ✓
RW-12: Enable redirection of existing reuse systems to more desirable reuse options	Low	6	💧 💧 💧	$ $	✓
RW-13: Facilitate permitting of backup discharges	Low	6	💧 💧	$ $	✓ ✓

Agricultural Irrigation

AI-1: Cost share incentives to promote water conservation

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦	♦	$	$	$	✓	✓	

Background and general information

Cost-share is the co-funding of conservation measures to improve the efficient use of water in agricultural that might otherwise be unaffordable. Projects can include the conversion to more efficient irrigation systems, such as micro-irrigation, recycling of irrigation water, rainfall harvesting and the use of reclaimed water for irrigation. Cost share projects could also help implement technologies that improve the management of existing irrigation systems, such as water table monitoring wells and soil moisture sensors. The cost of implementing these measures is usually shared between some governmental agency and the grower. Currently, cost share programs are available to support selected water conservation measures through the U. S. Department of Agriculture (USDA/Natural Resources Conservation Service). Modest cost share programs are also in place at SJRWMD and the SWFWMD. Existing programs are usually targeted to support the implementation of selected Best Management Practices (BMPs) that address both water quality and water quantity issues. Funds are advertised by the agency and disbursed on a competitive basis.

Specific recommendation

Cost share programs administered by the USDA/NRCS, state agencies, regional water management districts, and the local Soil and Water Conservation Districts should be expanded to include additional practices emphasizing water conservation and increased irrigation efficiency. These programs should also be flexible and user friendly to encourage grower participation. Recognizing regional costs and needs, agencies should work cooperatively to make cost share rates uniform on a statewide basis. This will prevent unnecessary competition and conflicts between programs. Regulatory incentives (discussed as a separate recommendation) should also be created to reward growers who voluntarily implement new water conservation measures. Additional financial incentives should also be built into programs to reward growers who utilize both federal and state cost share dollars.

What are the advantages and disadvantages?

The potential for water savings is great because agriculture is the largest category of water use in the state (52% in 1995). Many growers already recognize the advantages of water conservation as a way to enhance production and increase profitability. This is illustrated by the fact that over 85% of the citrus industry and nearly all of the strawberry growers in Florida are using efficient technology. Many more growers are interested in implementing water conservation measures but lack the financial resources to make the improvements. Cost-share could provide the incentive to overcome the short-term costs of making these improvements.

More efficient irrigation can also have substantial water quality benefits by preventing or reducing fertilizer and pesticide runoff and leaching, thus improving adjacent surface and groundwater quality. Growers may benefit from increased growth rates and productivity. Costs for chemical inputs and energy for pumping may also be substantially reduced.

Disadvantages could include temporary increased costs for implementing the improvement and possibly increased maintenance of more efficient irrigation systems depending on the type of system installed. However, long-term savings and increased production might offset these costs.

All cost share incentives must be carefully evaluated to ensure they are cost-effective and save water.

Who should implement it?

The Florida Department of Agriculture and Consumer Services (DACS) is attempting to establish agreements with the water management districts that will provide the framework to expand existing agricultural cost share programs and develop new cost share programs in each district. Memoranda of Agreement have been signed with SWFWMD and are currently being drafted with SJRWMD and SFWMD. These agreements will provide the framework for cooperative cost share programs. DACS is also attempting to develop financial incentives to encourage cost share recipients to also participate in federal programs, when they are available.

What must be overcome for this alternative to succeed?

Funding to support cost share programs is the primary impediment. Several agencies have identified funding for this purpose; however, the amount of funding available is limited, and this will limit the rate at which conservation improvements can be made. Better coordination between the funding agencies could maximize the usage of currently available dollars. Because the programs identified in this section require recipients to pay a portion of the cost, the amount of money that will be provided by the agricultural community is also an impediment. In addition, some of the funding agency requirements (e.g., fertilizer application rates, long-term commitments to use the BMPs) are sometimes not acceptable to the growers.

What mix of incentives and mandates would be best?

Increasing the availability of cost share programs to co-fund conservation projects would be a powerful incentive to implement efficiency improvements. Long-term loans should also be considered. Some of the regulatory relief measures discussed elsewhere might be an incentive to implement a cost-share efficiency improvement. Permitting requirements for more efficient water use also serve as a strong incentive to implement conservation measures and/or participate in a cost-share program.

Agricultural Irrigation

AI-2: More mobile irrigation labs to achieve water conservation Best Management Practices (BMPs)

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦	♦	$	$	$	✓	✓	

Background and general information

A Mobile Irrigation Lab (MIL) typically consists of a one or two-person field team, a vehicle, and specialized equipment that are used in evaluating the efficiency of irrigation systems. MIL teams provide free irrigation system evaluations and educational information related to water conservation opportunities. MIL teams also identify and solve problems with existing irrigation systems, provide guidance regarding the selection and installation of new systems, and provide assistance with irrigation management and planning. The primary goal of every MIL is to educate irrigation system operators on the efficient use of irrigation water.

Florida currently has 15 functioning labs providing services in 36 counties. Eight of the fifteen labs are located within the boundaries of the SFWMD (see Appendix G for more information on existing MILs).

Specific recommendation

Additional MILs are needed to make MIL service available on a consistent and statewide basis. This will require the formation of several additional labs to provide services in regions that currently have no labs, and the identification of a dedicated source of funding to support all the labs. Existing MIL programs should continue to be fully funded.

Because agricultural MIL evaluations tend to be disproportionately requested by growers of certain crops, incentives should be designed to encourage all growers to request MIL services.

Preliminary data suggests that MILs do result in significant water conservation but due to inconsistencies in evaluation and reporting procedures, a reliable estimate was not available for this report. As a condition of increased funding, a consistent methodology for estimating water savings should be used by all MILs so their effectiveness can be evaluated on a regular basis.

What are the advantages and disadvantages?

Greater use of MILs could provide many benefits to growers, water resources, and the environment. Growers benefit from an on-site analysis of existing irrigation practices, which often results in improved productivity and profitability. MILs could play a crucial role in the implementation of several agricultural water conservation priorities discussed in this report. As examples, the MIL teams could:

- Assist with the delivery of cost share programs.

- Provide technical information and identify opportunities for the recovery and recycling of irrigation water, rainfall harvest, and the use of reclaimed water for irrigation.
- Provide educational information related to water conservation opportunities.
- Facilitate the collection of water use information and improve the measurement of water use.

Who should implement it?

Water management districts have partnered with the USDA/NRCS and have funded the MIL programs for over ten years. DACS should increase its involvement and pursue partnerships with the water management districts, USDA/NRCS, local governments, and the Soil and Water Conservation Districts to support a comprehensive MIL program designed to provide services to agriculture producers statewide. DACS should continue to seek funding to support this initiative. Agricultural producers should fully utilize MIL services when they are available and should readily participate in cost share programs to support the implementation of water conservation measures. Water management districts should continue to allocate funds to support existing MIL activities and should pursue financial partnerships with the agencies and organizations mentioned above.

What must be overcome for this alternative to succeed?

Funding to support the establishment and operation of existing and new MILs is the primary impediment. It costs approximately $100,000 to $150,000 per year to operate a MIL. Continued dedicated funding to support the existing and new labs should be secured.

Another obstacle to realizing the water conservation benefits of MILs is that the recommendations offered by MILs are often not implemented, especially if they involve increased costs. Cost-share programs or other incentives would help.

The waters savings of MILs must be evaluated on a consistent statewide basis.

What mix of incentives and mandates would be best?

The free services that mobile irrigation labs provide are a powerful incentive for this alternative. The water use permitting process can also direct applicants to MILs as a method of conserving water.

AI-3: Increase rainfall harvesting and recycling of irrigation water

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦	♦	$	$	$	✓		

Background and general information

Average annual rainfall in mainland Florida varies across the state from approximately 47 to 68 inches. The bulk of the rainfall events are intense storms, concentrated during the summer months from June through September. More than fifty percent of our total annual rainfall commonly occurs during these four months. Because of the seasonal pattern of rainfall events, the significant runoff generated in the summer months could be collected and reused during the remainder of the year.

Farming systems can be designed or modified to capture and store this rainfall and recycle the water that is applied for irrigation. These collection and recovery systems can greatly reduce the need for irrigation water from traditional surface and groundwater resources.

Specific recommendation

The DEP and water management districts should create incentives and provisions to allow the agricultural community to capture, store, and recycle more of the excess runoff water generated by rainfall events, while still protecting natural systems. This effort will enable the agricultural community to make better use of rainfall-generated runoff and thereby conserve valuable groundwater resources. These provisions should incorporate the latest information regarding the interaction between rainfall, irrigation, drainage, farming practices, and the surrounding natural systems. DACS, DEP, the water management districts, and the Soil and Water Conservation Districts are also encouraged to facilitate recycling by providing technical information and minimizing the financial constraints associated with these improvements. Mobile Irrigation Labs and the University of Florida Institute of Food and Agricultural Sciences could play a critical role in providing technical support and delivering cost share programs.

What are the advantages and disadvantages?

Expanding recycling can dramatically reduce agriculture's consumption of more valuable groundwater from deep aquifers and reduce the potential for saltwater intrusion in coastal areas. The agricultural community could benefit from increased productivity, reduced energy costs by not pumping deep groundwater, and reduced costs of fertilizers because unused nutrients are recycled with the irrigation water. Surface storage facilities could also provide a reliable water source during drought and environmental benefits from reduced farm runoff.

The cost of retrofitting and the loss of productive acreage by the construction of water storage facilities may be constraints. Recycling of irrigation water may not be possible for some types of plants, particularly those sensitive to higher concentrations of salts. There is also some concern that plant

pathogens could be spread through the recovery and recycling of irrigation water. This could be addressed through research and/or treatment.

Who should implement it?

The DEP and water management districts should create incentives and provisions to allow the agricultural community to capture, store, and recycle water. Mobile Irrigation Labs could play a critical role in providing technical support and delivering cost share programs.

What must be overcome for this alternative to succeed?

The amount of surface runoff that can be captured and recycled depends on a number of factors including: topography, amount of rainfall, crop in production, type of irrigation system, land availability, regulatory constraints, and financial constraints. The removal of water from streams and lakes must be in accordance with established minimum flows and levels and not harm water resources. Recognizing that opportunities for efficient recycling will be highly variable and site specific, the primary constraints are the costs associated with system retrofits, physical alterations, and, in some cases, lost production acreage.

What mix of incentives and mandates would be best?

Regulatory incentives, greater availability of MILs, IFAS research, and funding to implement projects could assist with this alternative.

AI-4: Increase the use of reclaimed water for agricultural irrigation

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦	♦	$	$	$	✓		

Background and general information

Reclaimed water is successfully being used for agricultural irrigation in lieu of surface or groundwater resources in many areas of the state.

Currently, the reuse capacity in Florida totals about 1.1 billion gallons per day, or about 51 percent of the state's total domestic wastewater treatment plant capacity. About 575 million gallons per day (MGD) of reclaimed water was used for beneficial purposes. Agriculture used about 19% of this reclaimed water, which came from 117 wastewater treatment facilities. A total of 35 MGD was used to irrigate edible crops and an additional 73 MGD was used to irrigate feed, fodder, and pasture crops. While citrus accounts for the majority of edible crops irrigated, a number of other edible crops (including tomatoes, cabbage, peppers, watermelon, corn, eggplant, strawberries, peas, beans, herbs, squash, and cucumbers) also are irrigated with reclaimed water.

Sections 373.250 and 403.064 of Florida Statutes established water reuse (the use of reclaimed water) as a state objective. These sections also conclude that the use of reclaimed water, in concert with DEP rules, will protect public health and environmental quality. Chapter 62-610 of the Florida Administrative Code contains detailed rules governing a wide range of reuse activities. Chapter 62-40, F.A.C., currently requires the use of reclaimed water in lieu of other water sources within Water Resource Caution Areas designated by the water management districts.

Specific recommendation

Florida should continue to expand beneficial uses of reclaimed water, and should implement program refinements recommended in this report by the Water Reuse Work Group. When economically and technically feasible, reclaimed water should be used in lieu of other water sources for agricultural irrigation, thereby reducing the consumption of higher quality sources.

What are the advantages and disadvantages?

Expanding reuse can dramatically reduce agriculture's consumption of higher quality sources of water, and can also reduce saltwater intrusion in coastal areas caused by groundwater withdrawals. By reducing its use of deep groundwater, the agricultural community will also benefit from reduced energy costs, and the nutrients in reclaimed water can also supplement plant growth reducing fertilizer inputs. Since reclaimed water is usually located in urbanized areas agricultural reuse is site specific and may not be economically feasible if the source of reclaimed water is distant from agricultural areas.

Who should implement it?

DEP should continue to play a lead role in encouraging the implementation of reuse programs. The Department should provide program leadership and should continue to require reuse feasibility studies for domestic wastewater treatment facilities. DACS should encourage the agricultural community to participate by using reuse water when it is available and technically and economically feasible. The water management districts should fully implement the mandatory reclaimed water use provisions of Chapter 62-40, F.A.C., and should initiate and expand funding programs to support water reuse. Utilities should provide the treatment, disinfection, and operational control facilities, and should also provide prospective users with information on the wise and responsible use of reclaimed water. Utilities should also follow the "*Code of Good Practices for Water Reuse,*" and should develop partnerships with reuse customers, the water management districts, and the DEP.

Agricultural water users should be receptive to information about reclaimed water, and should further recognize the water conservation opportunities that it can provide. Agricultural water users should also use reclaimed water in a wise and responsible manner, and should develop a partnership with nearby utilities that provide reclaimed water.

What must be overcome for this alternative to succeed?

Given the extent of reuse activity in Florida, it is obvious that water reuse can be acceptable, appropriate, and technically feasible in many situations. However, reuse is site specific and the cost of building transmission lines to agricultural areas may be a constraint if reclaimed water is not nearby.

Growers need sound technical information related to the use and quality of reclaimed water. Many growers are concerned about possible public health and associated liability issues. These concerns could be largely addressed through the dissemination of sound technical information.

Some agricultural producers also expressed concern about the consistent availability of reclaimed water and the potential loss of groundwater allocations. Growers who agree to use reclaimed water should be provided with backup allocations for those occasions when reclaimed water is not available.

What mix of incentives and mandates would be best?

Water users may experience costs in changing from the use of other water sources to the use of reclaimed water. Viable funding programs have been recommended by the Water Reuse Work Group in an effort to alleviate some of the financial burden in moving toward the use of reclaimed water.

AI-5: Improve methods for measuring water use and estimating agricultural water needs

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$		✓	✓	

Background and general information

Measuring agricultural water use and estimating crop water needs are fundamental to improving water use efficiency in the agricultural sector and are the basis for effectively implementing many of the other agricultural recommendations in this report. The concept of measuring water use for irrigation management is not new to the agricultural community. The methods used have varied depending on the type of irrigation system being used and the agricultural commodity. There are many farms that use flow meters for irrigation water. Most of the water management districts have been requesting measurement of irrigation water since at least the 1980s (see Appendix H).

Equally important to measuring water use is estimating the annual water needs of different agricultural commodities. This information is essential for the WMDs to allocate the appropriate quantity of water for a particular crop through consumptive use permitting. Over-allocation wastes water and under-allocation might harm agricultural production. The calculation of annual water needs includes supplemental irrigation needs, water used for land preparation, crop establishment, and cold protection.

The Districts have used various methodologies for estimating supplemental irrigation needs developed as early as the 1940's, based on empirical data and/or energy transfer laws. Some of these methodologies have been updated and improved (see Appendix I). Currently, the SJRWMD is funding research to better estimate agricultural water needs, seeking to improve their water allocation methods and climatic data collection process. The SWFWMD has developed and implemented an agricultural water use estimation process that accounts for all agricultural water uses (irrigation, cold protection, crop establishment, etc.). This method uses regional climatic conditions and flow meter data where available. The SFWMD has taken some steps to incorporate more agricultural climatic weather stations in its jurisdictional area. Much work is being done, but there needs to be a unified and coordinated effort.

Specific recommendation

Accurate agricultural water use information is needed by the districts for the efficient allocation of water resources and for planning for future water needs. This information is also useful for agricultural producers to manage irrigation more efficiently. Since the measurement techniques used by the agricultural community vary considerably throughout the state, a statewide maintenance and calibration process needs to be developed for these techniques. The WMDs should work closely with the agricultural community and the irrigation industry in establishing this maintenance and calibration process.

Section 570.085, F.S., calls for the water management districts to strive for a consistent methodology to estimate agricultural water use needs. The districts should develop consistent statewide water planning tools that use both selective metering and more consistent methodologies for estimating agricultural

water needs. Each effort depends on the other and, when used in combination, these efforts could result in water conservation benefits.

The accuracy of water need estimates should also be improved by better measurement of key climatic conditions within the agricultural areas of the state. Currently, many of these estimates are obtained by using climatic data from within cities or other urban areas, which can differ significantly from agricultural areas. There has been great improvement in measuring basic climatic data such as rainfall and temperature in agricultural areas, but significant improvement is needed for measuring other key agricultural climatic factors such as solar radiation, wind speed, and relative humidity.

The Water Pricing Work Group also recommended more accurate and widespread measurement of agricultural water use. That recommendation was eliminated from the Water Pricing section to avoid duplication, but is noted here to inform the reader that both Work Groups supported this action.

What are the advantages and disadvantages?

Excessive irrigation results in higher energy costs, and higher overall costs of production. Appropriate levels of irrigation minimize field runoff and leaching of fertilizer. Benefits associated with this effort will include: savings of surface and groundwater resources, improved information to be used in planning and management, energy savings, and reduced operation and maintenance expenses.

Who should implement it?

The water management districts, with the assistance of the mobile irrigation labs, should work closely with the agricultural community to improve accuracy of water use measurement. A first priority should be consistent statewide maintenance and calibration of water use measurement equipment.

The water management districts and DACS should form a work group to develop a consistent methodology for estimating agricultural water use needs. This group should also identify the specific improvements needed in climatic monitoring for agricultural operations.

What must be overcome for this alternative to succeed?

Estimating agricultural water needs and measuring water use is not simple. Many variables are involved including crop type and acreage, solar radiation, temperature, wind, humidity, soil types, hydrologic characteristics, and the type of irrigation system and irrigation management. However, it should be possible for the WMDs to develop consistent methodologies, which use local data. Interagency coordination may be the largest impediment to developing a consistent methodology. Additional funding may be needed for new climatic data collection stations. Another potential impediment is the concern of some in the agricultural community that increased metering will eventually result in water use billing for agricultural producers, but that is not the intent of this recommendation.

What mix of incentives and mandates would be best?

Rule making may be needed to standardize water measurement procedures.

AI-6: Conduct additional research to improve agricultural water use efficiency

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$		✓	✓	

Background and general information

Scientific research has played a significant role in the development of agriculture. This university research has been responsible for numerous advances in agriculture in such areas as pest resistance, production, quality, nutrient use, and cultivation and irrigation techniques. The university system has produced many publications on irrigation and drainage issues as they apply to agricultural commodities produced in Florida.

Specific recommendation

The State University System should work closely with the agricultural community to pursue applied research in agricultural water conservation. This research should be specific to particular commodities and locations of the state, and target agricultural areas with limited water resources. Research should focus on:

- Determining the most efficient irrigation management practices for specific crops.
- Development and testing of new efficient irrigation technologies.
- Field-testing and/or development of more drought-tolerant and water-efficient crop varieties.
- Development of cost-effective freeze protection measures that use less water.
- Development of methods to reduce water use for crop establishment.

What are the advantages and disadvantages?

Based on past success, research can result in significant long-term water conservation benefits. Previous advances have significantly reduced water use for certain agricultural commodities while maintaining productivity and product quality, and reducing costs.

Research requires long-term monetary commitments, and the benefits of this work (water savings) may not be realized for many years.

Who should implement it?

Institutions like the University of Florida and Florida Agricultural and Mechanical University are available to conduct research for improving agricultural water conservation. They should continue to work closely with the water management districts to target water conservation research to agricultural areas of the state with limited water resources. Additionally, they could work closely with the agricultural community to ensure that projects selected for research are applicable and realistic. DACS, the water management districts, and grower organizations should collectively fund these research efforts.

What must be overcome for this alternative to succeed?

Research often requires long-term monetary commitments. Additional funding may be needed.

Even the best research on efficient irrigation will fail unless the findings are properly implemented. Efficient systems that are used improperly will still result in inefficient use. Research must be connected to actual irrigation management in Florida.

AI-7: Increase education and information dissemination to water users, water managers, and the public

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦			$	$		✓	✓	✓

Background and general information

Agricultural water users, policy makers, and the general pubic need to be informed about agricultural water conservation opportunities. Many agricultural producers still lack the information about conservation measures that can be taken to improve irrigation efficiency and the costs/benefits associated with these measures. As previously mentioned, Mobile Irrigation Labs (MILs) are an excellent mechanism for transferring this type of information to growers.

Specific recommendation

Educational programs related to agricultural water conservation should be improved and expanded. The Florida Cooperative Extension Service, MILs, and grower organizations should play a more active role in this arena.

What are the advantages and disadvantages?

Educational programs could result in significant long-term water savings; however, education by itself may not be adequate to motivate agricultural producers to change irrigation practices. Education will work best when combined with regulatory and financial incentives.

Who should implement it?

Water management districts, the University of Florida Cooperative Extension Service, NRCS, public utilities, and the Mobile Irrigation Lab operators currently provide educational information on water conservation opportunities. Information developed through these programs (which typically includes reports, posters, brochures, fliers and other informational materials) is provided to the agricultural community through WMD and state funded programs.

Trained MIL operators should be the primary means of providing irrigation system operators with technical information.

What must be overcome for this alternative to succeed?

Programs must be consistently funded and funding should be increased to make MILs available to all agricultural producers using irrigation. Interagency cooperation and coordination could be improved to maximize delivery of conservation information and avoid duplication of educational materials.

What mix of incentives and mandates would be best?

As previously stated, education will be most effective if combined with regulatory programs and incentives for water use efficiency, and financial assistance when appropriate.

AI-8: Consider amending water use permitting rules to create incentives for water conservation

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$		✓	✓	

Background and general information

The state's water management districts have the authority to promulgate rules to allocate water and to ensure that it is used efficiently through consumptive use permitting. Varying degrees of water use efficiency may be included in consumptive use permits as conditions for issuance. The water management districts also have authority to promulgate rules to address the need for temporary water use reduction in times of drought through the declaration of water shortage orders and phased water use restrictions. All of these rules affect agriculture. This recommendation relates to both 1) improving consistency in regard to the districts' water shortage rules, plans, and orders (s. 373.175, F.S.), and 2) possibly amending the water use permitting rules of the districts.

Specific recommendation

In regard to possible amendments to water use permitting rules, the districts should consider placing additional incentives in the permitting process that would encourage agricultural water users to move toward the most efficient techniques of irrigation and the recovery and recycling of water. This could include districts issuing longer-term water use permits, or reducing permitting fees for agricultural producers employing significant water conserving irrigation technologies, surface water reuse, compliance reporting data, best management practices, and/or Whole Farm Conservation Planning measures. As a possible further incentive, the water management districts could grant preferential treatment in water shortage orders to growers who have implemented the most effective measures for water use efficiency.

Short-term water conservation during times of water shortage could also be streamlined and improved by developing a more uniform set of irrigation restrictions, as well as standard prohibition time periods, to be employed statewide. This common set of agricultural water shortage rules/restrictions, with some regional considerations, would create predictability for farm production managers, efficiencies for large agribusiness spanning multiple water management districts' jurisdictional boundaries, and clearly promote a consistent water conservation message statewide.

What are the advantages and disadvantages?

Incentive-based, regulatory streamlining that "rewards" deliberate agricultural conservation measures might significantly improve agricultural water use efficiency. Longer term permits or fee reductions for efficient water use could also reward conservation efforts. However, it is uncertain whether these types of regulatory relief would provide sufficient incentive for widespread participation or significant conservation improvements. The water management districts must be very careful in issuing longer term permits, given growing demands in other use sectors and because irrigation technologies are rapidly

improving. Nonetheless, the current statutory provisions for long-term water use permits can be appropriate, with adequate review at 5-year intervals to ensure the use of current efficient practices.

This recommendation only addresses regulatory incentives. These incentives may not be adequate to induce widespread participation or result in significant water conservation. The districts should also carefully review agricultural water use permitting requirements to ensure that all economically and environmentally feasible water conservation measures are implemented as a condition for permit issuance.

Who should implement it?

The water management districts, DEP, and DACS may be able to collectively design a rulemaking template, which addresses efficiency requirements for long term permits. The water management districts are already reviewing the existing water shortage rules to determine what improvements should be made.

What must be overcome for this alternative to succeed?

Amending water use permitting regulations to provide sufficient incentive to conserve, while ensuring water resources and the environment are protected, will be challenging and require close inter-agency coordination and participation from the agricultural community.

What mix of incentives and mandates would be best?

Regulatory incentives, coupled with agricultural cost share programs and improved water conservation information, could result in significant long-term savings of water.

Landscape Irrigation

LI-1: Develop and adopt state irrigation design and installation standards and require inspection

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦	♦	$	$	$	✓	✓	

Background and general information

Landscape irrigation accounts for one of the largest uses of water in Florida and includes irrigation for ornamental plants, lawns, and golf courses. Currently the state has no required landscape irrigation system efficiency standards. The efficiency of irrigation systems could be improved significantly. This could result in as much as a two-fold reduction in water usage under similar management patterns. Irrigation contractors often report having to compromise quality to compete with unqualified low bidders. Irrigation standards would ensure more efficient systems and eliminate competition from unskilled, irresponsible contractors.

Specific recommendation

Adopt the standardized irrigation code defined in the Statewide Construction Code, Appendix F, the Plumbers Code, and amend the five 'should' statements in Part II – Design Criteria, to be 'shall' statements, so the code must be adhered to, rather than being voluntary.

Additionally, modify the rain sensor requirement in F.S. 373.62, to require rain sensors on all automatic irrigation systems, (not just 1991 and after), including golf courses and other commercial landscapes, to be effective after a reasonable time period (like five years). Consideration should also be given to requiring soil moisture sensors instead of rain sensors because of the potential for even greater water savings. The Reuse of Reclaimed Water Work Group recommended that rain sensors or soil moisture sensors should also be a requirement on irrigation systems that use reclaimed water. Inspection of the rain or soil moisture sensors could be conducted at the same time as the required annual inspection of the cross connection control devices.

What are the advantages and disadvantages?

Automatic irrigation systems are the "water guzzlers" of urban water use. They are now being installed as a standard feature in many new homes and developments in Florida. Unless efficiency standards are adopted, the state may actually see an increase in per capita water consumption. Fortunately, the water savings opportunity is great if systems are properly designed and installed.

Making the rain sensor requirement retroactive might be difficult to strictly enforce. An incentive-based rebate program would encourage people to install rain sensors or soil moisture sensors.

Who should implement it?

Once the State Construction Code is amended, local governments should adopt these standards while recognizing local demographic, climate, soils, and water resource characteristics.

Local governments should require landscape irrigation system plans before construction is allowed. Because plans are often altered in the field and systems may not be installed correctly, inspection of installed system will be essential to ensure the system meets code standards.

Building inspectors could be trained to inspect irrigation installation; however, it is recommended that landscape architects or other properly trained irrigation professionals perform this task. Landscape architects are specifically trained in efficient system design and are licensed by the Florida Department of Business and Professional Regulations. Local governments could use them to develop and/or review irrigation system plans, inspect installed systems, and ensure compliance with any other landscaping requirements.

The Florida Yards and Neighborhoods Program (FYN) and Mobile Irrigation Labs (MILs) could also assist in informing the public about efficient irrigation and rain sensor requirements for existing systems.

Implementing landscape ordinances would require landscape and irrigation professionals to become more knowledgeable in water-efficient irrigation evaluations, repairs, and retrofits. Training and certification opportunities should be made widely available through the county cooperative extension service, community colleges, technical education centers, and professional associations.

Home improvement centers, hardware, and irrigation supply stores should post irrigation standards at the point of purchase and inform customers about services available from MILs and Florida Yards and Neighborhoods.

What must be overcome for this alternative to succeed?

Some homebuilders may object to improved efficiency standards because it might increase the price of new homes. However, the savings to homebuyers in reduced water bills would be a good selling point.

The results of any standards will depend on the ability to effectively enforce them. Concurrent education of affected users will aid in compliance. Enforcement through building permits and/or certificates of occupancy may be good opportunities.

What mix of incentives and mandates would be best?

Funding assistance to develop a training and certification program for irrigation professionals would assist in implementing irrigation standards. Effective conservation rate structures would also strongly encourage efficient lawn and landscape irrigation.

Landscape Irrigation

LI-2: Expand and coordinate current educational and outreach programs on water-efficient landscaping and irrigation, including the use of mobile irrigation labs

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

Landscape irrigation accounts for one of the largest uses of water in Florida (30-70% of publicly supplied drinking water). The need to educate the public on efficient irrigation and landscaping is critical. Currently, three education and outreach programs exist: the Urban Mobile Irrigation Labs (MILs) sponsored by the USDA Natural Resource Conservation Service, the WaterWise/Xeriscape program through the Water Management Districts (WMDs); and the Florida Yards and Neighborhoods (FYN) program through the University of Florida Cooperative Extension Service.

Urban MILs consist of trained teams that visit residential and commercial landscapes and provide site-specific landscape irrigation evaluations. These voluntary evaluations allow the homeowner or property manager to irrigate more efficiently. These evaluations can also protect water quality by encouraging efficient irrigation techniques that limit leaching of fertilizers and pesticides into the environment. MILs also deliver related educational information. MILs are usually operated by the local Soil and Water Conservation Districts and blocks of time are purchased from the MILs by utilities and other local governmental entities that offer free irrigation audits. MILs have also received extensive financial support from some of the WMDs. Urban MILs currently serve twenty-two counties around the state (see Appendix G for information on currently operating MILs).

Xeriscapes are quality landscapes that conserve water and protect the environment (section 373.185, Florida Statutes). The objective of Xeriscape is to establish and maintain a healthy landscape by matching the right plants with the existing site conditions so that the use of additional resources, such as water, fertilizer, pesticides, and labor is minimized. WMDs offer Xeriscape education in many areas of the state, albeit inconsistently. While the SFWMD initiated the Xeriscape concept in Florida 15 years ago, the SWFWMD and SJRWMD currently have the most active programs.

FYN is a public outreach educational program that encourages homeowners, landscape maintenance personnel, and others to practice environmentally sensitive landscape techniques to conserve water and protect water quality. FYN is the source of the term "Florida-Friendly Landscaping." FYN incorporates the principles of Xeriscape but goes one step further by focusing on all aspects of water quality and quantity that relate to urban landscape systems and the natural systems they impact. The Cooperative Extension Service presently provides programs in 48 counties around the state making this program one of the most intensive outreach efforts. Initial FYN program funding came from EPA non-point source pollution monies administered by the DEP. These grants generally last for three years. Thereafter, local and WMD monies have been sought. FYN thus far has subsisted on shoestring budgets but has proven to be successful.

Specific recommendation

These proven programs should be expanded to provide adequate statewide coverage. The WMDs should coordinate and integrate these existing programs to complement each other and enhance their effectiveness. Funding should be increased and provided on a consistent basis through cost sharing with state, federal, and local partners, including utilities. Local governments should adopt landscaping ordinances based on Xeriscape or Florida Friendly Landscaping and also consider providing rebates to residents as an incentive to convert to more water-efficient irrigation and landscaping.

What are the advantages and disadvantages?

While the potential water savings are great, converting an existing landscape to Florida Friendly or Xeriscape can be laborious and expensive. Participation in these programs is currently limited to those with the time and interest in water-efficient landscaping (probably a relatively small percentage of Floridians). An effective multimedia campaign is an important first step in raising awareness. Most existing landscapes could use less water by following just some of the FYN and MIL best management practices. Significant water savings could be achieved by simply assisting utility customers in adjusting their automatic irrigation timers to prevent over-irrigation. Storm water and surface water quality improvement are an additional benefit from landscape water conservation.

Who should implement it?

The state should provide consistent cost-share funding to support FYN programs and Urban MILs for adequate statewide coverage. The WMDs should: 1) administer regional funding support and seek funding partners from local governments, water utilities and water users; 2) take the lead in coordinating FYN, MIL, and Xeriscape programs to enhance their effectiveness; 3) develop a multimedia campaign to raise public awareness and publicize local FYN educational opportunities and MIL services; and 4) evaluate the effectiveness of outreach programs.

University of Florida-CES should continue to lead educational outreach efforts by providing staffing and scheduling of FYN workshops throughout the state. The Soil and Water Conservation Districts should continue to provide Urban MILs and expand this service for statewide coverage. Both FYN and MILs should publicize and reinforce each other's services and consider partnering on outreach.

Local governments and water utilities should: 1) co-fund FYN and MILs and provide rebates for water efficient landscaping and irrigation retrofits; 2) promote local FYN educational opportunities and MIL services using WMD media materials; and 3) assist in identifying audiences in their communities, particularly targeting commercial and residential customers using unusually large amounts of water. These activities can help meet consumptive use and storm water permitting requirements

What must be overcome for this alternative to succeed?

Programmatic obstacles to success include insufficient funding, poorly executed public awareness campaigns, and poor coordination among existing education and outreach programs.

What mix of incentives and mandates would be best?

Effective conservation rates structures and rebates for irrigation and landscape efficiency improvements would be excellent incentives. Adoption of landscape ordinances based on Xeriscape or Florida Friendly landscaping would be useful mandates. Section 373.185, F.S. was recently amended to prevent new communities from prohibiting Xeriscape or Florida-friendly landscaping through deed restrictions or covenants. Legislation should be considered to eliminate this prohibition retroactively and apply to all existing development with a reasonable phase in period of five years.

LI-3: Establish a statewide training and certification program for irrigation design and installation professionals

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

Training in the proper design and installation of irrigation systems can significantly reduce lawn and landscape water use. Certification would provide homeowners, builders, and other customers with a mechanism to identify properly trained irrigation professionals and ensure they are getting an efficient and quality product.

Specific recommendation

A statewide training and certification program should be developed to ensure that irrigation installers, designers, and managers are aware of the most up-to-date technologies and practices for water efficient design, installation and operation of an irrigation system. The state and the WMDs should support the start up of these programs until they become self-sufficient through tuition. This recommendation would work best if implemented with recommendation LI-6 (training and certification of landscape maintenance workers). The Reuse of Reclaimed Water Work Group also made this recommendation.

What are the advantages and disadvantages?

A training and certification program would enhance the level of professionalism of the irrigation industry which carries out installation, repairs, maintenance, and landscape/site management in both residential and commercial markets. Training and certification would:

- Save significant quantities of water assuming that systems are properly designed and installed.
- Provide a mechanism for customers to identify professionals certified in efficient design.
- Provide marketing mechanisms for certified installers.

Who should implement it?

The St. Petersburg Junior College (SPJC) was developing an irrigation training and certification program in consultation with the WMDs, the Florida Irrigation Society, University of Florida, and other interested parties. Unfortunately, this program was discontinued due to state budget cuts. The St. Petersburg Junior College program would have included:

- An A.S. degree in Irrigation, with a state standardized curriculum.

- Course materials and "test site" to train irrigation auditors and code enforcement personnel.
- An "Irrigation Institute" with the Florida Irrigation Society and local utilities to provide non-credit training for the "Green Industry."
- A certification program with trade associations.

If completed, this training program could be adapted for use by other community colleges and vocational schools around the state.

The Florida Nurserymen & Growers Association currently offers several training and certification programs including Florida Certified Landscape Technician. The FNGA could assist in the training and certification of irrigation professionals.

What must be overcome for this alternative to succeed?

Funding assistance to implement a training program is the biggest challenge at this time.

Voluntary certification will still allow untrained irrigation contractors to install cheaper wasteful systems, which will still undercut certified contractors installing more efficient systems. Making certification a professional requirement to work in Florida should be considered.

What mix of incentives and mandates would be best?

Adopting irrigation system efficiency requirements (rather than just encouraging them) in the Florida Statewide Construction Code would be a powerful incentive for irrigation contractors to seek out training and certification. Local governments could require irrigation system plans, designed by either a certified professional or by a Landscape Architect, prior to construction.

The certification program should also develop an emblem and publicity materials to inform potential customers that certified professionals would provide a higher quality product that will save water and lower utility bills.

LI-4: Develop environmentally sound guidelines for the review of site plans

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$	$	✓		

Background and general information

Florida continues to develop rapidly. Building practices that completely clear the land and then landscape using excessive amounts of irrigated turf are putting a growing burden on Florida's water supply. These practices often destroy native plants that do not require irrigation and could be incorporated into the final landscape. In some communities, there are site development requirements, such as local tree ordinances or development reviews, which result in preservation of some native vegetation and limit the area of irrigation in the final landscape. However, there are no statewide standards ensuring that these water conserving development practices occur in Florida.

Specific recommendation

Guidelines should be developed that assist local governments in developing their own site plan review standards, which recognize local conditions, while still addressing key issues. A statewide committee should be formed to draw up guidelines for review of development site plans. This committee should include representatives from builder/developers, landscape architects, water management districts, DEP, Florida Irrigation Society, UF-IFAS, Florida Green Building Coalition, environmental groups, and other stakeholders.

What are the advantages and disadvantages?

New development in Florida could realize significant water savings by having sensible site plan review requirements. Preserving existing native vegetation to the reasonable extent possible during construction would lessen many erosion and planting issues and result in more water-efficient and Florida-friendly landscaping. The subsequent buyers will not have to expend nearly as much water to establish and maintain new plant materials that result from land scraping development practices. There are many potential site development standards that could result in more attractive and water-efficient landscaping including:

- Limiting site clearing in order to preserve existing plant communities.
- Retaining topsoil on the site.
- Limiting permanently irrigated areas to a maximum of 50 percent of the property or lot, not to exceed more than half an acre for residential development (at least seven counties have already adopted similar ordinances).

- Use of appropriate plant materials and turf.
- Use of porous paving materials.
- Creation of stormwater parks and on-site water detention.
- Using greenways and preserved vegetated buffers, which can reduce erosion and evaporative losses while providing energy conservation benefits and habitat for wildlife.
- Using Xeriscape or Florida Friendly landscaping techniques for residential and commercial landscapes.

Who should implement it?

The statewide committee would develop model guidelines or ordinances for construction site plan review. Cost/benefit analysis on potential site plan review requirements could be performed by WMDs or DCA. Local governments would be encouraged to implement necessary changes to the planning and zoning standards. Changes to state building standards would need to be considered as well.

What must be overcome for this alternative to succeed?

Site clearing and scraping is often cheaper than preservation. Incentives could tip the balance to make it profitable and beneficial to developer, builder, buyer, and the community at large to use environmentally wise development and building practices.

In the construction of a new home, the landscape is frequently the final job to be completed. Any cost overruns occurring during constructions often result in fewer dollars available for landscaping. Another impediment to establishing Xeriscape or Florida Friendly landscapes is the higher "up front" cost of establishing planting beds instead of wide-open turf areas. Traditional landscapes frequently have a high percent of turf grass, which is often less expensive to install than shrubs and trees but has higher water and maintenance needs. Leaving as much of the native landscape as practical would lower installation and maintenance costs.

What mix of incentives and mandates would be best?

Incentives should be used to establish environmentally sound development practices. Perhaps infra-structure contributions to the development, tax breaks or CUP credits could be used as incentives to go beyond required standards and reduce future water supply demands of new development. Local governments could also recognize developers with awards for environmentally sound landscaping.

LI-5: Conduct applied research to improve turf and landscape water conservation

Priority	Total Score	Amount of Water Saved (1 to 5)	Cost-Effectiveness (1 to 3)	Ease of Implementation (1 to 3)
Medium	8	♦ ♦ ♦ ♦	$ $	✓ ✓

Background and general information

Horticultural research has resulted in significant advancements in the quality, aesthetic characteristics and disease resistance of ornamental landscaping and turf in Florida. Unfortunately, the research on drought tolerance and efficient irrigation of turf and landscape plants is very limited.

Specific recommendation

Research is needed to develop specific guidelines for the efficient use of water in residential, golf course, and commercial landscapes. Research is needed to:

- Develop more efficient automatic irrigation systems based on the water needs of plants and turf, and by using soil moisture sensors or other technology.
- Determine minimal and optimal irrigation needs for commonly used turf grasses and landscaping plants, including establishment periods.
- Cost/benefit analysis comparing typically irrigated traditional landscaping with efficiently irrigated landscaping and Xeriscaping and Florida Friendly landscaping.
- Testing and/or development of more drought tolerant turf varieties.
- The feasibility of using brackish water for irrigating turf and landscape plants.

What are the advantages and disadvantages?

As Florida continues to develop, more turf and landscape plants are being installed and must be maintained. Water managers, developers, landscape professionals, golf course managers, and homeowners need better information on water-efficient irrigation and landscaping. Significant water savings could be realized.

Who should implement it?

The University of Florida Horticultural Department or IFAS could conduct this research. The researchers should work closely with the WMDs, developers, landscape architects, and nursery and turf growers to ensure that projects selected for research are applicable and realistic. The state, the water management districts, and grower organizations should collectively fund these research efforts.

What must be overcome for this alternative to succeed?

Research often requires long-term monetary commitments and water savings may not realized for several years. Additional funding will be needed.

Established industries may object to changing current landscaping practices.

What mix of incentives and mandates would be best?

Agency financial support should initiate the research, while the marketplace should help guide the implementation.

LI-6: Establish a training and certification program for landscape maintenance workers

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦	♦	♦		$	$		✓		

Background and general information

Successful landscape water conservation must address three things: improved design, proper installation, and proper maintenance. If there is breakdown in any of these, the full water conservation benefits will not be achieved. Unfortunately, lawn and landscape maintenance workers often have no training and suggest to homeowners that more frequent watering will solve landscape problems. Maintenance workers often repair irrigation systems incorrectly and set automatic timers to waste water. These problems could be reduced through better outreach, training, and certification of landscape maintenance workers.

Specific recommendation

Programs to train and certify landscape maintenance workers should be expanded. The goals of training efforts would be to train landscapers in Best Management Practices for irrigation and landscape maintenance. The training and certification should provide a mechanism for the customer to identify landscapers that emphasize water efficiency. This recommendation would work best if implemented with recommendation LI-3 (training and certification of irrigation design and installation professionals).

What are the advantages and disadvantages?

Training workers in landscape BMPs will not only maintain the water efficiency of new landscapes, but will reach large numbers of existing landscapes. Training will also inform workers on fertilizer and pesticide BMPs, thereby improving water quality. Reaching the many small lawn and landscape businesses in the state is a big task.

Who should implement it?

Water management districts, in conjunction with the University of Florida Extension Service, community colleges, and professional associations could jointly implement a statewide training program to include:

- Course curriculum for technical education certification.
- Create teaching tools and educational materials based on the principles of Florida Yards & Neighborhoods.
- Course outline for Continuing Education Units.

- Outreach and promotion of program.

Participating partners should provide consistent funding to support the training program until tuition and CEU fees can support the programs. The University of Florida, Institute of Food and Agricultural Sciences, could administer regional funding to support training and evaluate the accomplishments of these programs. Once the training and certification program is established, an evaluation should be done by the water management districts to determine if additional improvements are needed.

The Florida Nurserymen & Growers Association already has several training and certification programs, including Florida Certified Landscape Technician, which could be modified to emphasize water conservation, and assist in this effort.

What must be overcome for this alternative to succeed?

Offering free training statewide might require significant funding. A reasonable fee for training and certification could help fund the program. Voluntary certification may result in low participation. Requiring certification would ensure that all workers have knowledge of landscape best management practices and should be considered, but training must be easily accessible and low cost to not put a burden on small businesses.

What mix of incentives and mandates would be best?

Positive publicity might be a strong incentive for landscape maintenance workers to enter a certification program. By informing homeowners (possibly through utility billing notices) that certified landscape workers are properly trained and would likely save them water and money, their services might be more attractive.

To date, voluntary education programs targeting landscape workers outside of trade organizations have not been very successful. The most effective method for educating and training these workers may be to require the education and training as part of the acquisition and renewal of occupational licenses. Local governments through landscape ordinances could also require landscape workers be trained and certified in order to do business.

LI-7: Evaluate the use of water budgeting as an effective water conservation practice

Overall Score: 6 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Low	6	♦	♦	♦	♦		$			✓		

Background and general information

"Water Budgeting" is an annually calculated and metered allocation of water needed to maintain a specific landscape. A water use "goal" or Landscape Conservation Standard is developed and businesses and homeowners are issued an annual water use budget, expressed as gallons per 1000 square feet of landscape area. As an illustration: homeowners would receive a water budget for a set amount of landscaped area. Homeowners would be free to irrigate whenever they want, but once they exceed their water budget, the cost of water would increase significantly.

Specific recommendation

Investigate the feasibility of using "water budgeting" as an effective water conservation strategy. Implement pilot water budgeting projects, which target large landscapes such as golf courses and subdivision common areas.

What are the advantages and disadvantages?

This strategy has the potential to save a lot of water. The Landscape Water Budget Pilot Project Final Report (SWFWMD, March 2000) reported that, during the three years of study, the 19 participating properties conserved 40 million gallons of water, compared to the historical water use. The amount of irrigation water used was reduced by 48 percent. (It should be noted that a portion of these savings is attributed to intense education and close communication with each participant. Effective monitoring and enforcement would also be necessary to build upon this experimental study.) This study could form the basis of a feasibility investigation. Additionally, California has reported great success in utilizing this strategy. One advantage of water budgeting is that it usually eliminates the need for day-of-week watering restrictions.

The main disadvantage of water budgeting appears to be the complexity of implementing such a program on a widespread basis. The staff and financial resources that might be needed would be a significant constraint for utilities and/or local governments. However, water budgeting may be quite cost-effective if it is applied to large metered commercial landscapes, golf courses, and subdivision greenspace.

Who should implement it?

WMDs, utilities, and/or local governments should evaluate the feasibility of using water budgets as a water conservation tool. As a first step, pilot projects could be implemented with the assistance of IFAS or county cooperative extension agents. These projects would determine water budgets for specific landscapes and evaluate water savings. County cooperative extension agents were critical to the success of the SWFWMD/Tampa Bay Water pilot project. If pilot projects prove successful, wider application of water budgeting should be considered. Issues of education, monitoring, and enforcement would have to be addressed.

What must be overcome for this alternative to succeed?

Research is needed to determine accurate water use rates for various landscape components. Specific research that should be done includes determining the establishment periods for new lawns and landscapes, frequency of irrigation needed during the various seasons, and cost comparisons between installing and maintaining typical turf-dominated landscapes and Xeriscape or Florida Friendly landscapes.

Self-supplied users could not be included in water budgeting since they are unmetered. If water budgets are too strict, public supply customers might install private irrigation wells to avoid budgeting.

What mix of incentives and mandates would be best?

Properly structured conservation rates for water would be a powerful adjunct and incentive for water budgeting.

LI-8: Evaluate the need to establish consistent statewide watering restrictions for landscape irrigation

Overall Score: 6 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Low	6	♦	♦	♦			$	$		✓		

Background and general information

Many people over-irrigate their lawns or irrigate during the hottest time of the day. Both of these practices waste a lot of water in Florida. The water management districts have both permanent "year-round" rules for efficient irrigation and temporary restrictions that are imposed during periods of water shortage (e.g., drought). Currently, there are significant differences in both types of restrictions between the water management districts. The variability in restrictions and enforcement, especially in areas served by more than one WMD, is often confusing to water users. There may be ways to improve statewide consistency and conserve additional water.

Specific recommendation

DEP and WMDs should evaluate the need to improve consistency in irrigation restrictions, including consistent days and times for watering and year-round conservation measures. Temporary water shortage restrictions should still be implemented based on local climatic and hydrologic conditions as determined by the WMDs. Consistent minimum year-round irrigation restrictions, such as a 2 or 3 day-per-week maximum between the hours of 4:00 pm and 10:00 am, should also be considered and possibly adopted on a statewide basis. Any irrigation restrictions should allow for case-by-case exemptions.

What are the advantages and disadvantages?

Restricting landscape irrigation to the cooler hours of the day conserves water by minimizing evaporation. Restricting the frequency of irrigation saves water by preventing over-irrigation. Two days-per-week irrigation has been shown to significantly reduce water use and maintain a healthy landscape. A simple restriction like this may be easier to implement than other, more complex conservation approaches, such as water budgeting or Xeriscaping (see the related recommendations). For example, in the Orange County Water Watch Program, residents shifted from no restrictions on irrigation to 2-day-a-week restrictions, which resulted in a 17.8% pumpage reduction.

Even more significantly, since 1992, the entire Southwest Florida Water Management District has been on 2-day-a-week restrictions. During the recent drought, Tampa Bay area counties went to one-day-a week. Residents who had observed the 2-day-a-week restrictions had prepared their plants for drought and most apparently suffered little plant loss. SWFWMD is proposing to make 2-days-a-week restrictions a permanent water conservation measure across the District.

Problems may occur if consistent restrictions are applied over too large an area, not taking into account the local variability in climate and irrigation needs. There is also some uncertainty about the minimum

water requirements for sod and other ornamental plants that should be addressed through research. Water budgeting may be a better approach for professionally managed turf areas such as parks, ball fields, and golf courses, because it allows greater flexibility while meeting water reduction goals.

Who should implement it?

WMDs, utilities, local governments, and private citizens would be responsible for implementing any recommendations.

What must be overcome for this alternative to succeed?

Institutional coordination and cooperation may be difficult. A consistent methodology for quantifying savings from particular watering restrictions needs to be developed. The University of Florida Institute of Food and Agricultural Sciences could do this research. There is always some opposition to watering restrictions.

What mix of incentives and mandates would be best?

The exact mix of incentives and mandates would depend on the outcome of the research on the effects from particular types of restrictions on landscape irrigation. Equitable restrictions should be established for all water users, including agriculture, recreational and aesthetic uses.

Water Pricing

Water Pricing

WP-1: Phase in conservation rate structures

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦	♦	$	$	$	✓	✓	

Background and general information

Conservation rate structures are utility rates designed to promote more efficient use of water than the rate structure they replace by providing economic incentive for consumers to limit water use. To the extent possible, they should achieve similar results in all customer classes, be equitable within and between customer classes, support the utility's financial requirements, and can be revenue neutral. In general, conservation rates work by charging customers more when they use excessive amounts of water.

Specific recommendation

Conservation rates should be phased in, concentrating on the largest utilities first, as one of the best tools available to promote water use efficiency. Full implementation would require statutory or rule changes that apply to all of the affected regulatory agencies. One option is to authorize the WMDs to specifically order conservation rates. Another option is to require all utilities in the state to adopt conservation rates, including approval from the appropriate rate-setting authority. It is recommended that a water use objective be established for each utility, which must be consistent with the utility's consumptive use permit, the relevant WMD policies, and any water shortage order declared by the WMD. Rates should be designed to help achieve the utility's water use objective, and the base rate (fixed portion of the bill) usually should not represent more than 40% of the utility's total revenues.

Inclining block rates should be used unless specific circumstances warrant an alternative rate structure, and only if the utility can demonstrate that it will be able to achieve its water use objective under that rate structure.

Legislative consideration of revenue stability or rate stabilization funds as a means for addressing potential revenue instability is recommended. Statutory or rule changes may be needed to provide guidelines for the establishment and use such funds.

Although most conservation rate structures are oriented towards residential usage, it is recommended that all rate classes be subject to conservation rates. Rates for commercial classes may be designed specifically for various types of businesses, or may be set using meter sizes as a proxy for the rate blocks used in setting residential rate structures. Because a one-size-fits-all rate structure for all utilities is impractical, it is recommended that the WMDs, PSC, and local governments be given the latitude to determine the best rate structure on a case-by-case basis.

The PSC has broad statutory authority in Chapter 367, F.S., to set conservation oriented rate structures, as well as stabilize revenues that may result from conservation or drought rates. However, a policy statement from the Legislature that incentive-based regulation and performance-based approaches

should be used to promote conservation and reuse could be beneficial in the PSC's efforts to promote water conservation.

What are the advantages and disadvantages?

Water conserving rate structures can significantly reduce water use without government expenditure or new regulation, while helping to protect both the quantity and quality of water resources. This has benefits for both natural systems and future generations. Conservation can also delay or perhaps eliminate a utility's need to develop new, and potentially more costly, water supplies. Also, relative to other alternatives, conservation rates may be easier and more cost effective to implement.

A possible disadvantage is that improperly set rates or unanticipated changes in demand can unacceptably affect revenues either through excessive or inadequate revenues.

Who should implement it?

Once the statutory or rule changes have been made, implementation should be accomplished through WMD water use permit conditions, PSC certificate and rate proceedings, and city and county government rate proceedings. The utilities should implement the rate changes with monitoring by the applicable regulatory agency. Implementation should be phased in. The WMDs should provide the cities, counties, and PSC with a prioritized list of utilities needing rate structure changes. The criteria for determining the priority should be determined by the WMDs, but should take into account such factors as the utility's current rate structure and level of customer usage.

What must be overcome for this alternative to succeed?

There is a general reluctance by many entities to implement conservation rates without a clear legislative mandate. Conservation rates will require at least some high-use customers to reduce usage or incur higher bills. This could be unpopular with some customers. There is also concern about potential impacts on low-income families. This can be addressed by incorporating "lifeline" rates in the conservation rate structure. This means that the first block is large enough to meet an average family's water needs, and the rate for that block is set at a level that is affordable to average and low income families.

A number of potential impediments relate to difficulties in accurately projecting changes in demand that will result from rate changes, and the effects this may have on revenues. Also, some cities and counties use utility revenues or taxes on utility revenues to fund other public services that could be adversely affected if revenues decline.

In some areas, the availability of alternative water sources such as private wells may allow customers a cheaper alternative for irrigation than the conservation rate. Local ordinances can address this.

What mix of incentives and mandates would be best?

Conservation rate structures would largely be implemented through statutory and rule changes (mandates, standards and guidelines), but financial incentives in the form of cooperative funding for conservation projects, and subsidies to utilities that meet specified conservation goals, should also be considered.

WP-2: Require drought rates as part of utility conservation rate structures

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦			$	$	$	✓	✓	

Background and general information

Drought rates are intended to achieve a targeted reduction in water use proportionate to the severity of a drought. They may take the form of a surcharge added to the utility's existing rate structure, or a separate rate structure implemented during the water shortage. They are a subset of conservation rates; however, they have special characteristics that may not be present in typical conservation rate structures. For example, drought rates may depart from strict cost of service guidelines, and they are typically triggered by an external event, such as the declaration of a water shortage by a WMD.

Drought rates can include more than one set of rates depending on the severity of the drought, and are not permanent. The rates would be increased in increments as the drought becomes more severe, and decreased in increments as the drought situation improves. When the drought ends, the pre-drought rates would be reinstated.

Specific recommendation

All utilities should adopt drought rate structures to use during a declared water shortage. Each utility, in coordination with the WMD, should develop rate structures that are appropriate for its service area. Drought rates should be implemented immediately upon declaration of a water shortage by the WMD. The water shortage declaration should be based upon pre-determined "triggers" established by the WMDs and utilities, such as the level of the aquifer, reservoir, or river. Since the triggers would be pre-approved, no additional approval would be needed once the trigger is activated. Consideration should be given to developing statutory language that defines what may be used to trigger a water shortage order and subsequent incremental rate increases.

Utilities should develop drought emergency plans, subject to approval by the WMDs, which include advanced approval of drought rates. The WMDs could develop guidelines to assist utilities in the development of the drought plans and drought rates.

Drought rates should be designed to be revenue neutral. The PSC has broad statutory authority in Chapter 367, F.S., to set conservation oriented rate structures and to stabilize revenues that may result from conservation or drought rates for private or investor-owned utilities. However, a pronouncement from the legislature that incentive-based regulation and performance-based approaches should be used to promote conservation and reuse could be beneficial in the PSC's efforts to promote water conservation. The process to obtain approval for rate changes from the PSC can be lengthy. Consideration should be given to statutory changes to streamline the process for drought emergencies while still providing protection for customers.

What are the advantages and disadvantages?

Drought rates have been used successfully in California and in limited cases in Florida. By reducing water consumption they can help mitigate the environmental and economic impacts of a drought. If designed properly, they have the added benefit of helping utilities remain financially viable during times of mandatory usage restrictions. Pre-determined drought rates triggered by an external event have the advantage of targeting high usage in times of greatest need for conservation.

A possible disadvantage is that improperly set rates or unanticipated changes in demand can unacceptably affect revenues either through excessive or inadequate revenues.

Who should implement it?

Drought rates should be implemented by the utilities, with oversight by the WMDs and/or the Public Service Commission as applicable.

What must be overcome for this alternative to succeed?

As with conservation rates in general, there are concerns related to the impact of the higher drought rates on individual customers. Drought pricing must be not penalize customers for essential water usage, but at the same time, the level of usage or rate blocks to which drought rates are applicable should not be so high so as to negate the incentive to conserve.

Concerns over revenue fluctuations are likely to foster a reluctance to implement drought rates without a legislative mandate.

Research is needed to address the development of triggers for various levels of drought severity and determine what drought rates should be implemented. Efforts are already underway to develop triggers through the Tampa Bay Water/Member Government drought planning activities. The progress in that area should be monitored, as it may provide guidance in the development of triggers for other areas of the state.

The process to obtain approval from the PSC for rate changes can be lengthy and could hamper quick implementation of drought rates during a drought emergency.

What mix of incentives and mandates would be best?

There is a need for a legislative mandate for utilities to develop drought rates as part of a broader statewide conservation rate structure. Increased cooperative funding for drought planning activities could be an incentive for utilities.

WP-3: Consider the use of market principles in the allocation of water, while still protecting the fundamental principles of Florida water law

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1-3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦	♦			$	$	$	✓		

Background and general information

Market principles could aid in efficient transfers of water from one user to another. However, this topic is controversial. Any specific alternative must be evaluated carefully and designed to fit unique Florida circumstances if it is to be an improvement over the current system. Water must continue to be a public resource and water resources must be sustained for future generations.

The Water Pricing Work Group favored careful evaluation of a range of possible measures to emphasize market principles in the transfer of water. These could include market transfer of historically used and/or conserved water, short-term reallocation, reallocation for environmental protection, and allowing one water user to pay for another water user's conservation investments in exchange for the water saved. A market approach to water resource allocation is only applicable within those geographic areas where the limits of available water supplies have been defined and actual water use has reached or exceeded these limits.

There are several ways to incorporate the goal of reducing historic water use within a water market system. For example, the permitted quantities of both the source permit and the application permit could be reduced to reflect additional conservation standards. In addition, permit transfers to highly stressed areas could be prohibited, while transfers out of highly stressed areas into less-stressed areas could be encouraged.

The full Work Group report contains a detailed discussion of the voluntary reallocation method developed in a rule by the Southwest Florida Water Management District for the Southern Water Use Caution Area. Interested parties should refer to that report for specific information.

Specific Recommendation

Water management districts could be given specific statutory authority to implement water market principles. It is not proposed that the law require such systems, but that it allow them if a WMD determines they are desirable. Consideration should be given to limiting that authority to only those areas subject to a recovery or prevention strategy for an established minimum flow or level.

What are the advantages and disadvantages?

The primary benefit of market transfers is to establish an appropriate price for water. The potential benefits of voluntary reallocation are increased water use efficiency among all water use permittees, equitable access to water from restricted sources, and efficient transfer of water from one user to another user as the economy changes over time.

A potential disadvantage is that, if not implemented carefully, creating water markets could undermine the principle of water as a public resource to be sustained for future generations.

Who should implement?

Water market strategies would be implemented by the WMDs. Assuming statutory changes are made, the Southwest Florida Water Management District may seek to implement the voluntary reallocation provisions it previously developed for the SWUCA. Implementation would occur through revisions to the Florida Administrative Code, approved by the District's Governing Board. Costs could be recovered through fees levied on both the water use permittee and the voluntary reallocation applicant.

The water management districts would have to develop appropriate water market rules as the need arises. The rules would have to be approved by the Governing Boards. Water markets should only be developed if they improve water management. The exact design of the system will depend on the water resource issue to be addressed and the hydrogeology of the water source.

What must be overcome for this alternative to succeed?

Specific statutory authority would be needed to allow water management districts to consider market approaches. The controversy over creating water markets is likely to be the largest obstacle to implementation. Some basic questions need to be answered before implementation can proceed.

- Is the amount available to be reallocated the amount issued in water use permits or the amount historically used? (One concern about allowing reallocation of permitted amounts is that it could tend to increase overall water use from a source under stress from current withdrawals.)
- What is the necessary extent of Governing Board review of transfer proposals?
- Would the new permittee receive any extension of the permit duration assigned to the previous permittee?
- Would a transfer create a property right in the water use permit and contradict the principle in Florida that water is a public resource?

What mix of incentives and mandates are best?

Market approaches provide direct financial and economic incentives to conserve water and develop alternative water sources when the cost to the permittee is less than the market price of water that would evolve from the market.

WP-4: Improve cost-effectiveness analysis in the next cycle of regional water supply plans

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦				$	$	$	✓	✓	

Background and general information

This option would involve the development by the water management districts of a uniform framework for cost-effectiveness analysis of water supply options, specifically including conservation options, in the preparation of the next update of Regional Water Supply Plans due in 2004-2005.

Such analyses may be conducted in a multiple objective or integrated resource-planning framework so that other non-monetary objectives may be considered. Consideration in developing the framework should be given to developing a numeric credit for beneficial environmental effects from water conservation.

Some cost-effectiveness analyses were performed for the current regional water supply plans. By the time of the next cycle of updates for the plans, it should be possible to improve that framework and establish statewide consistency on the framework for analyses.

Specific Recommendation

The WMDs, with DEP, PSC, and other parties, should develop a common statewide framework for assessing the cost-effectiveness of alternatives, including water conservation, in regional water supply planning. This can build upon the work already underway. Factors to be considered include: applicability, estimated savings per unit in likely applications, timing of savings, estimated useful lifetimes, and relevant existing rules, ordinances, and statutes. For all conservation and water supply options, costs should include capital, operation and maintenance, planning and implementation. The present value of costs per thousand gallons conserved or produced should be calculated using a common discount rate.

What are the advantages and disadvantages?

The primary benefit of improved cost-effectiveness would be determining the cost-effectiveness of applicable conservation alternatives relative to new water supply options. Conservation is often less costly than other water supply options. Improved methods of determining cost-effectiveness may also have applications outside regional water supply planning.

Who should implement it?

This recommendation applies only to the water management districts and only to their work in developing the next cycle of regional water supply plans, but would benefit from collaboration with the water

users. If the framework for cost-effectiveness analysis for updating the regional water supply plans is well accepted, it could find other uses by local providers, in water use permitting, etc.

What must be overcome for this alternative to succeed?

There are no statutory impediments to developing this methodology. This would impose a cost burden on the water management districts, but it is a task that will save money in the long term. Both the Southwest and the St. Johns River Water Management Districts retained consultants to assess cost-effectiveness for the current regional water supply plans. The South Florida Water Management District developed such analyses in-house. The recommendation calls for strengthening and coordinating this effort in the next cycle of regional water supply plans.

What mix of incentives and mandates would be best?

The incentive would be the desire of the water management districts and other parties for more accurate evaluation of the cost-effectiveness of water conservation and other water supply alternatives.

WP-5: Phase in informative billing

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦				$	$	$	✓	✓	

Background and general information

Informative billing provides customers with information that shows the relationship between the amount of water they use and the amount of their water bill.

Specific Recommendation

Informative billing should be required on a statewide basis. Many customers are not aware of their utility's rate structure or rates, how much water they use, how their bill is calculated, how much they could reduce their bill by reducing water consumption, or how their usage compares to others in the same customer class.

At a minimum, customers' bills should include the rate structure, monthly rates, amount of water used this month, amount of water used last month, and amount of water used this month in the previous year. Information showing the average usage of all customers in that same customer class would also be very beneficial. Other information such as seasonal rates, the applicable months, and whom to contact to learn more about water conservation, may be included as well. When the new billing format is implemented, customers should be educated on how their bills are calculated and how to use the information to understand how the utility's rate structure affects their bills. It may also be helpful to provide this information as a reminder on an annual basis thereafter.

Bills should be issued on a monthly basis, particularly for utilities exhibiting excessive consumption. However, because some situations may warrant longer billing cycles, utilities should be given the opportunity to provide justification for retaining longer billing cycles. Requests for longer billing cycles should be considered on a case-by-case basis.

Large utilities should be required provide the required information on the customers' monthly bills. Small utilities may be permitted to provide the required information in a separate notice on an annual basis. The notice should include, at a minimum, the rate structure, rates, and a sample bill calculation. All utilities should provide some form of informative billing within five years.

What are the advantages and disadvantages?

Informative billing should increase the effectiveness of water conservation rate structures. It enables customers to see a relationship between the level of their water usage and total water bill. When customers have a clear understanding of that relationship, they can make informed decisions regarding steps that can be taken to reduce their consumption. Additionally, leaks in customers' homes can be quickly detected and corrected under a monthly meter reading and billing cycle.

Who should implement it?

Informative billing would be implemented at the utility level at the direction of the appropriate WMD, local government, or the PSC. Because most billing programs and formats are unique for each utility, the details of how to implement the requirement at the utility level should be determined by the individual utilities. The State's role would be to establish statutory guidelines requiring the implementation of informative billing and authorizing funding to assist small utilities. Statutory authority could be given to the WMDs to make this requirement and determine the need for funding. The PSC and local governments would then need to make any necessary rule or ordinance changes.

What must be overcome for this alternative to succeed?

There appear to be no statutory or rule impediments to the implementation of informative billing. There are financial constraints. Many utilities use customized billing programs, some of which are linked to other programs. Consequently, altering some billing programs will require significant programming changes by trained computer professionals. In some cases, utilities will not be able to update existing billing programs, and will instead need to purchase or create new billing programs to meet this requirement. Also, Florida has many small utilities, some of which still produce bills by hand. Requiring monthly informative billing of such utilities could be very burdensome.

Regardless of the size of the utility or type of existing billing program, all utilities will incur some cost in implementing this requirement. Typically, utilities are allowed to recover billing expenses through the customers' rates.

Regarding the smallest utilities, the cost to implement such a system may prove to be excessive especially considering the size and usage patterns of the customer base, and potential water savings that may be achieved. In those cases, the WMDs, PSC, and local governments should have the discretion to require that billing information be provided to customers in a separate notice at least once each calendar year rather than through monthly bills.

Also, in order to mitigate the financial impact to small utilities, the WMD could offer cooperative funding, provided that the utilities meet certain criteria established by the WMD. Additionally, allowing a phased-in approach would be helpful. For example, small utilities could be allowed to implement annual notification of billing information in the short-term, but continue to work toward implementation of monthly informative billing. Finally, producing this type of bill requires regular meter readings. (The need for improved measurement of water use is addressed in a separate recommendation.)

What mix of incentives and mandates would be best?

Incentives could be provided through WMD funding. Potentially, higher cost shares could be offered for conservation projects if a utility's billing information exceeds minimum standards. Steps have already been taken by SJRWMD and SWFWMD to improve the billing information provided to customers; however, there is room for improvement. For example, the SWFWMD is adopting rules that will require all utilities under its jurisdiction to provide specific billing information to each customer, but will only require that the information be provided once each year. Similarly, the PSC has established minimum billing information for jurisdictional water utilities, but currently does not require the level of detail contemplated by this alternative. Although informative billing could possibly be required through rule changes, a statutory mandate requiring the implementation of informative billing on a statewide basis would be highly beneficial.

WP-6: Require more accurate and widespread measurement of water use, including metering and sub-metering

Sub-Metering of New Multi-Family Residences

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1-3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦	♦			$	$		✓	✓	

Sub-Metering Retrofit of Existing Multi-Family Residences

Overall Score: 6 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1-3)			Ease of Implementation (1 to 3)		
Low	6	♦	♦	♦	♦		$			✓		

Background and general information

Accurate measurement of water use gives consumers a reliable accounting of the water they use. In order for consumers to effectively conserve water, they need the month-to-month comparison data that metering provides. Sub-metering refers to installing secondary meters to capture water use data for multiple uses or users deriving water from a single source. An example is installing individual meters at apartments in a multifamily housing complex served by a single metered well. It could also be installing a second meter at a residence or business to separate indoor use from outdoor irrigation.

Specific Recommendation

It is recommended that Florida pursue more widespread use of water meters, and that meters and sub-meters for water utility customers be read and billed on a bimonthly basis at a minimum. The Work Group suggested separating users into six categories: single-family residential, multifamily residential (with possible sub-groups), commercial/industrial/institutional (with possible sub-groups), large landscape, agricultural, and private wells. It was thought that these categories would be useful in designing conservation rate structures, targeting water conservation programs, tracking and forecasting water use trends, and designing and implementing water permitting programs.

It is believed there is already a high degree of metering of potable water use in investor owned utilities and public utilities in urban areas. However, there appear to be many small utilities and private residential and agricultural wells that do not meter water use. Further, there appears to be very little sub-metering of condominiums and apartment units, which are believed to represent about 30% of the dwelling units in Florida. In total, the Work Group estimated that possibly as much as 50% of Florida's water consumption is completely unmeasured and/or is not metered with a bill. The Work Group's research indicated that a realistic estimate of water savings that could be achieved through metering and sub-metering of urban uses is between 15 and 35 percent.

Requirements for installing meters and sub-meters into existing residential sites could be required during remodels or reconstruction, which would also provide for a phasing in timeline. Sub-meter retrofitting of remodeled and reconstructed multi-family residential, commercial/ industrial/ institutional, large landscape, trailer parks, and boat marinas with individual boat slips should occur and can be assumed to be cost-effective except when a site specific and credible cost analysis demonstrates it would not be cost-effective at the specific site.

The benefits of measuring the use of reclaimed water are addressed separately in that section of the Report. The Work Group also recommended improved measurement of agricultural water use. That recommendation has been incorporated into a similar recommendation in the Agricultural Irrigation section of this report to avoid duplication.

What are the advantages and disadvantages?

The primary advantage of metering is its known ability to improve water conservation. Better residential water metering allows consumers to see how much water they are using, and more importantly, how much they are saving by implementing conservation practices. Also, it allows more equitable billing of customers. For other large, currently unmetered uses, it would provide the WMDs with information useful in permitting decisions and in administering incentive programs to reward conservation. The Work Group concluded that substantial water conservation would result from accurate measurement of all water uses.

A disadvantage is the cost of retrofitting some older buildings with sub-meters. In some cases, subsidies may be needed to offset those costs. Also, for some of the smaller utilities, there may be a cost associated with upgrading computer capability for tracking and billing customers that were previously unmetered.

In some cases, retrofitting existing buildings will be prohibitively expensive due to site-specific layout of the existing plumbing configuration. For example, in some cases the plumbing for existing individual apartment units may have three or more entry points necessitating multiple sub-meters. Also, the plumbing may not be easily accessible for installing sub-meters or for reading them. It seems likely that, without subsidies for these exceptional situations, there will need to be flexibility to exempt these structures from metering requirements.

Who should implement it?

The state could require additional use of meters, sub-meters, and other measurement techniques. The water management districts could support this by requiring meters and sub-meters as conditions of consumptive use permits. In many cases, local water retailers will need to actually install the meters and provide reading and billing services. Local municipalities will need to require sub-metering in their building and plumbing codes. The state and water management districts could support statewide "best management practices" that, in addition to meters and sub-meters, could require billing records to track customer classes.

What must be overcome for this alternative to succeed?

As previously mentioned, there will be costs associated with retrofitting some structures, that will need to be offset in some way, or exemptions provided. There will likely be resistance to metering of previously unpermitted uses by the affected users.

What mix of incentives and mandates would be best?

Financial incentives could be of assistance. It appears that the current state revolving loan fund would not be suitable to assist with the retrofit of meters and sub-meters in existing sites. Other sources should be investigated. Water meters and sub-meters in select circumstances could be included in a

set of water conservation "best management practices." The best management practices for water conservation could be developed for residential, landscape, agricultural, commercial, industrial, and institutional water use. Chapter 373, Florida Statutes, could be amended specifically to require metering, sub-metering, or other methods to measure water use. Language modeled after electric industry requirements was drafted by the Public Service Commission several years ago but not submitted to the legislature. (The draft language is shown on the next page.) Local building ordinances could require the use of sub-meters in new construction and major remodeling projects. Metering and sub-metering of new sites should occur since it is generally less costly than retrofitting existing sites.

Programs and measures to require meters, sub-meters, and other methods to measure water use should be implemented at multiple levels. Water management districts should review current requirements to measure water use to determine if improvements are needed. Building departments should require sub-meters in appropriate settings as a part of building and plumbing permits. Retail water utilities should require water meters and sub-meters in appropriate settings as a condition of water service agreements and should be responsible for installing water meters and reading the meters.

Conceptual Language Drafted by the Public Services Commission Staff as

Possible State Legislation Requiring Sub-meters

Amendment to Chapter 373, Florida Statutes:

373. Individual water metering

Chapter 373 - Individual water meters shall be required for each separate occupancy unit of new commercial establishments, residential buildings, condominiums including resort condominiums and timeshares, cooperatives, marinas, and trailer, mobile home and recreational vehicle parks for which construction is commenced after July 1, 2002. This requirement shall apply whether or not the facility is engaged in a time-sharing plan. Individual water meters shall not, however, be required:

(1) In those portions of a commercial establishment where the floor space dimensions or physical configuration of the units are subject to alteration as evidenced by non-structural element partition walls, unless the utility determines that adequate provisions can be made to modify the metering to accurately reflect such alterations.

(2) For water used in specialized- use housing such as hospitals, nursing homes, living facilities located on the same premises as, and operated in conjunction with a nursing home or other health care facility providing at least the same level and types of service as a nursing home, convalescent homes, facilities certified under Chapter 651, Florida Statutes, college dormitories, convents, sorority houses, fraternity houses, motels, hotels, and similar facilities.

(3) For separate specifically designated areas for overnight occupancy at trailer, mobile home and recreational vehicle parks where permanent residency is not established and for marinas where living on board is prohibited by ordinance, deed restriction or other permanent means.

WP-7: Adopt additional state guidance on water supply development subsidies

Overall Score: 6 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1-3)			Ease of Implementation (1 to 3)		
Low	6	♦	♦				$	$		✓	✓	

Background and general information

This alternative addresses the use of subsidies for reducing the user cost of water supply development. Such subsidies have the potential to further reduce the cost of water relative to its value and may be counterproductive to encouraging increased water use efficiency. Under this alternative, the state and the water management districts would develop guidelines for subsidization of water supply development.

Specific recommendation

In order for a water supply development project to be eligible for funding assistance from state sources, at least one of the following criteria must apply:

- **Affordability.** The water supply development is needed but will increase the user cost of water to the point where water becomes unaffordable (more than two percent of the median household income for the area).
- **Beneficiaries.** Non-water users will receive significant and specific benefits from the project such as, but not limited to, environmentally sound wastewater disposal, environmental improvements, and/or increased recreation.
- **Fairness.** The affected water users are being asked to abandon existing facilities that will be replaced by the new water supply development in order to improve the sustainability of existing water supply sources.
- **Alternative Supplies.** The new source of water is from non-traditional sources that offer environmental advantages or resistance to drought.

This alternative is similar to existing Florida law. The only difference is that projects that meet one or more of the above criteria should receive priority in funding from state. It does not preclude the state from funding water supply development projects that do not meet the criteria.

What are the advantages and disadvantages?

The benefit of improved guidelines for subsidizing water supply development is increased water use efficiency when water costs vary with the amount of water consumed. For example, if the water utility finances all of its water supply development through water bills that are based on the amount of water consumed, then customers will have a choice of using more water and paying for that additional water or foregoing that water and paying a lower bill. Economic efficiency in the use of a good or service is obtained when goods and services are paid for based on the amount consumed and the payment reflects the full cost of providing that good or service. The guidelines simply try to promote economic efficiency in the use of water by avoiding unnecessary subsidization of water supply development.

The Federal Government through the U.S. EPA uses a guideline that a water bill is affordable if it is less than two percent of median household income for the area. Wastewater service affordability is also evaluated using this two percent criterion. This criterion has been used by the government to evaluate regulations and in justifying financial assistance.

Who should implement it?

The State of Florida, the water management districts, and any other state agency with authority to fund water supply development should finalize and implement the guidelines and only fund water supply development projects that are consistent with the guidelines. These agencies may wish to further define the guidelines as deemed necessary.

What must be overcome for this alternative to succeed?

This alternative is consistent with Florida Statutes as discussed above.

What mix of incentives and mandates would be best?

The state and the water management districts should each develop a statute, rule, or document consistent with the guidelines recommended in this alternative.

Industrial/Commercial/Institutional

Industrial/Commercial/Institutional

ICI-1: Consider establishing a "Conservation Certification" program

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦		$	$	$	✓	✓	✓

Background and general information

Recognition can be an effective tool to promote water conservation among industrial, commercial, and institutional (ICI) users. Certification of ICI users that implement Best Management Practices (BMPs), and other water conserving measures can provide a market advantage for certified businesses among consumers who prefer to do business with companies that have good environmental records. Since the type and size of a business dictate the amount of water used, BMPs need to be designed on an industry-by-industry basis.

Specific recommendation

Develop a Conservation Certification program for industrial, commercial, and institutional (ICI) water users to provide an incentive to conserve water and recognition for positive conservation actions on the part of ICI users. The certification program would involve participation by businesses, business associations, water management districts, and water utilities. Certification could be provided for implementation of best management practices for year-round water efficiency. Certified businesses would be able to display signage showing their status. WMD rules could be amended to provide appropriate regulatory incentives for certified businesses.

To promote active participation, the Certification Program should be designed with input from the targeted industries. Potential industries for a first phase of Certification Programs in Florida include professional car washes, hotels, resorts, and laundromats. The International CarWash Association believes that this alternative has a high water saving potential for their user group.

The Work Group gave this recommendation a high ranking based on the belief that it could save significant amounts of water in a cost-effective manner. However, information was not provided to substantiate potential water savings or cost-effectiveness. Pilot projects are needed to better demonstrate this alternative's benefits.

Industry specific criteria could include the following:

- Install equipment that meets or exceeds best management standards.
- Conduct regular maintenance, leak detection, and repair.
- Recycle water to the greatest extent possible.
- Provide quantitative evidence of actual water use efficiency beyond normal levels.

- Conduct water use audits followed up with inspections by outside parties

For a certification program to be successful, it is important to develop benchmarks and statewide and industry specific Best Management Practices. Doing this would increase the potential for this type of program to actually save water.

What are the advantages and disadvantages?

For the facility that meets the certification requirements, there could be benefits like the following:

- Display appropriate signage advertising the fact that the facility has been certified as a water conservation facility by the water utility.
- Be identified in a list of facilities that have been certified for water conservation compliance.
- Utilize a logo or approved phrase in advertising and other promotional material.
- Recognition for year-round conservation during drought, and appropriate consideration in the rules for Water Shortage Orders.
- Savings on water and sewer bills.

More generally, there could be broader benefits, such as:

- Water savings from year round conservation.
- Delaying implementation of drought phases.
- Managing peak demand.

Who should implement it?

The program should be developed by the industry and trade associations in cooperation with the DEP and the WMDs. The car wash industry could be used as a pilot program.

What must be overcome for this alternative to succeed?

Since this program is voluntary, participation and water savings might be minimal. To be successful, business and industry groups need to take the lead in developing BMPs. There would be some financial costs, both for the facility, industry associations, and for overseeing agencies. Costs of this program are dependent upon the actual implementation design. Also, the WMDs, utilities, or local governments should document evidence of the pilot program's effectiveness in achieving significant water conservation before implementing this alternative beyond the pilot program.

What mix of incentives and mandates would be best?

This would be a voluntary program. The certification signage and recognition could provide a positive incentive for business owners to participate. Efficiency improvements could also be recognized in permitting decisions.

ICI-2: Consider a range of financial and regulatory incentives and alternative supply credits

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦		$	$	$	✓	✓	✓

Background and general information

Tax and regulatory incentives can be an effective tool to encourage water conservation. The Work Group gave this recommendation a high ranking based on the belief that it could save significant amounts of water in a cost-effective manner. However, information was not provided to substantiate potential water savings or cost-effectiveness. More work is needed to verify this alternative's benefits.

Specific recommendation

Investigate the feasibility of tax and regulatory incentives (corporate income tax, sales tax, property tax, or environmental permitting) to encourage implementation of water conservation measures. These incentives would be available to industries that: a) use less water, or are projected to use less water than the national industry standard for that type of use, b) propose to reduce water use from the previous permitted quantity, or c) voluntarily undertake actions that significantly improve water conservation. The types of regulatory or financial incentives that should be investigated include:

- Longer duration consumptive use permits.
- State tax credits for installing water conservation equipment in the same manner for which credits are allowed for pollution control equipment.
- Waivers of permit fees or ad valorem taxes.
- NPDES variances or waivers for facilities using sources of lower quality water.
- "Water credits" for areas where minimum flows and levels (MFL) are not being met and the WMD has implemented a MFL recovery program

What are the advantages and disadvantages?

The Work Group noted that it would be difficult to quantify potential water savings because they would be case-specific.

Who should implement it?

This would depend on the type of incentive or tax relief, but could be considered by state and regional agencies, as well as the legislature. Federal financial assistance for this purpose would require amending federal law.

What must be overcome for this alternative to succeed?

Any tax incentive would lead to revenue losses for the agency extending them. For such a program to be successful, it would be necessary to document the water savings by the industry receiving assistance and develop industry-specific benchmarks. Evidence of cost-effectiveness should be developed prior to implementation.

ICI-3: Consider cooperative funding for the use of alternative technologies to conserve water

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

Self-supplied facilities that use large quantities of water often have little incentive to conserve water if the efficiency improvements cost more than conventional technology. For example, subsurface cooling systems are more efficient, but also more expensive than conventional cooling towers. Since water is very inexpensive for self-supplied facilities (the only cost is to pump and treat the water), there may be inadequate financial incentives to invest in the more efficient technology. There are, however, benefits that would accrue to society at large if these water-intensive facilities could be induced to conserve significant amounts of water.

Specific recommendation

Investigate the feasibility of a program to identify and fund water conservation projects that are not economically feasible for self-supplied facilities to undertake due to the low cost of water compared to the higher cost of more efficient technology.

The Work Group gave this recommendation a high ranking based on the belief that it could save significant amounts of water in a cost-effective manner. However, information was not provided to substantiate potential water savings or cost-effectiveness. More work is needed to verify this alternative's benefits.

For such a program to work, it will be necessary to put a higher value on the water (the Work Group used the term "unit value") than its actual cost to the facility. This value would represent the benefit to society of the conserved water. It could be set, for example, at a value that reflects the average cost to produce potable water for public supply. Conservation projects could then be evaluated against this higher cost. Projects that conserved the most water for the lowest cost when compared against the "unit value" would be considered for funding.

Implementation would require determining a "unit value" for water, establishing a technical approval process for evaluating projects, and identifying a funding source. For projects that were determined to be technically feasible and cost-effective, the cost share would be for the difference in price between the more efficient alternative technology and the conventional technology it replaces. For example, if a company installs an efficient subsurface cooling system at a cost of 15 million dollars instead of conventional cooling towers at a cost of 10 million dollars, the cost share would be 5 million dollars.

What are the advantages and disadvantages?

Potentially, this could reduce excessive groundwater pumping at the facility location, and so directly improve aquifer levels. This could help restore surface water levels.

Who should implement it?

Not identified.

What must be overcome for this alternative to succeed?

It could be very difficult to determine what is the "infeasible" level of costs for a facility and to find sources of financial assistance. There are instances where providing financial assistance may be a more cost-effective means for improving conservation. However, it is important that such programs satisfy explicit criteria and assistance should not go to users who do not need the assistance or those who would be making the improvements without the assistance. Industries or facilities that conserved before funding was available may feel their competitors had an unfair financial advantage.

ICI-4: Implement additional water auditing programs

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$		✓	✓	

Background and general information

Utilities or businesses that have to obtain a Consumptive Use Permit (CUP) are usually required to conduct a water audit as part of their CUP application process. ICI users that get their water from a public supplier only have to conduct a water audit if they are a "secondary user" as defined by the SJRWMD and SWFWMD (in the water resource caution areas), or are required to do so by a local water conservation ordinance.

Water use audits are systematic appraisals of opportunities for improved efficiency. They have been clearly documented to be very effective in reducing water use (estimates range from 15% to 50%) and costs for businesses.

Specific recommendation

Increase water auditing in the ICI water use sector. The Work Group evaluated three alternatives for accomplishing this:

- Additional regulation.
- Additional education.
- Economic incentives (beyond the inherent cost savings).

This Work Group recommended, as a first preference, the education alternative. Industry benchmarks and industry-specific and statewide Best Management Practices should be developed along with this alternative.

The Work Group ranked this alternative as medium. The Department believes that this alternative deserves further analysis and may merit a higher priority.

What are the advantages and disadvantages?

The Work Group concluded that typical water savings for businesses that implement the recommendations of water audits range between 15% and 50% with a payback period between one and four years. This potential water savings can only be realized if the recommendations are implemented. Some of the other alternatives in this report provide some incentives for implementing the results of the water audit. Other benefits may include reduced wastewater generation and cost savings from treatment and disposal of wastewater.

Who should implement it?

A program for additional voluntary water auditing could be patterned after SWFWMD's program and applied statewide. The water management district and business could each pay part of the cost to conduct a water audit. The program could be promoted through informational flyers and other publications distributed to the businesses through chambers of commerce, professional associations, utilities, and on-site visits with businesses.

The Work Group noted that the program would probably need to be mandatory if the goal was for all ICI users to participate.

Water auditing programs could also be coordinated with the Florida DEP Pollution Prevention (P2) program. The P2 Program is a non-regulatory program that offers "opportunity assessments" to businesses and industries. These involve facility specific assessments to look for opportunities to minimize the generation of pollution and increase the efficiency of water and energy use. The assessments are offered at no cost to the company. A report with facility-specific recommendations is provided, which also includes estimated economic and environmental benefits of implementing the changes. The water management districts could direct large ICI water users to this program to assess water savings opportunities.

What must be overcome for this alternative to succeed?

There are no regulatory or statutory impediments to an educational auditing program. There are the usual financial constraints in the public and private sectors.

What mix of incentives and mandates would be best?

The primary incentives to this program are cost-share opportunities and potential cost savings to the ICI business. The cost savings can be in water cost, sewer cost, and possible impact fee rebates. Partnerships among various agencies should be sought to the maximum extent to which mutual goals exist. For example, the SWFWMD is pursing partnerships with the major energy suppliers in the region to evaluate opportunities where both water and energy savings exist.

ICI-5: Promote the utilization of reclaimed water

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$		✓	✓	

Background and general information

Potable quality water is not needed for many industrial, commercial, and institutional activities. Substitution of high-quality reclaimed water offers significant opportunities to conserve potable quality water. The Work Group did not discuss this alternative in any depth. Nonetheless, the Department believes that there is a significant opportunity for reuse of reclaimed water in this sector.

Specific recommendation

Industrial, commercial, and institutional entities should use reclaimed water in lieu of other water sources when potable quality water is not required. Chapter 62-40, F.A.C., currently requires the use of reclaimed water in lieu of other water sources within Water Resource Caution Areas designated by the water management districts. Four water management districts (Northwest, St. Johns River, South Florida, and Southwest) have designated Water Resource Caution Areas.

What are the advantages and disadvantages?

Reclaimed water can be used for a wide range of commercial and institutional activities. Reclaimed water can be and has been used in Florida to flush sewers, to clean streets and sidewalks, to mix pesticides, and to wash vehicles. Reclaimed water is used to wash animals in a zoo. A fire-training center uses reclaimed water. Reclaimed water can be used for toilet flushing, for fire protection in hydrants and sprinkler systems, and for control of dust at construction sites. The Florida Department of Corrections uses reclaimed water for flushing toilets and in laundry facilities in correctional institutions. Reclaimed water is routinely used in decorative water features. A number of municipalities have used reclaimed water to create, enhance, or restore wetlands.

In 2000, a total of 93 domestic wastewater treatment facilities provided reclaimed water for a range of industrial uses. About 87 MGD was used for industrial activities.

Who should implement it?

DEP – Provide leadership in the area of water reuse. Continue to require reuse feasibility studies for domestic wastewater treatment facilities and encourage implementation of reuse programs. Implement a reuse funding program.

WMDs – Fully implement the mandatory reclaimed water use provisions of Chapter 62-40, F.A.C. Implement funding programs for water reuse.

Utilities – Continue the move toward water reuse. Provide the treatment, disinfection, and operational control facilities needed and work with prospective users to enable wise and responsible use of reclaimed water. Implement quality cross-connection control, inspection, and public notification and education programs. Follow the *Code of Good Practices for Water Reuse*. Develop partnerships with reclaimed water customers, the water management district, and the DEP.

Water Users – Recognize the water conservation advantages of reuse and be receptive to possible use of reclaimed water. Use reclaimed water in a wise and responsible manner. Develop a partnership with the reclaimed water utility.

What must be overcome for this alternative to succeed?

There are few impediments. Detailed rules address these types of reuse activities. Part VII of Chapter 62-610, F.A.C., establishes the framework for dealing with industrial uses. Part VII addresses water quality issues related to the handling of the resulting industrial wastewater (water flowing out of an industrial process). A number of commercial and institutional uses of reclaimed water are specifically addressed in Part III of Chapter 62-610, F.A.C.

There are costs involved in water reuse. The utility incurs costs of additional treatment and disinfection and costs associated with the distribution of reclaimed water. Water users may experience costs in changing from the use of other water sources to the use of reclaimed water. Funding programs have been recommended by the WCI Water Reuse Work Group in an effort to alleviate some of the financial burden in moving toward the use of reclaimed water.

What mix of incentives and mandates would be best?

The water management districts could offer longer duration water use permits for the use of reclaimed water. Using reclaimed water provides greater protection against water restrictions during times of drought. Nutrients contained in reclaimed water offer advantages to individuals and entities using water for irrigation.

The mandate to use reclaimed water within Water Resource Caution Areas already exists within Chapter 62-40, F.A.C.

Industrial/Commercial/Institutional

ICI-6: Investigate methods of assuring that large users from a public supply implement the same conservation measures as users with individual permits

Overall Score: 6 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Low	6	♦	♦	♦			$	$		✓		

Background and general information

Some large water users receiving their water from a permitted public supplier are not required to do as much water conservation as individual permit holders. Public water suppliers are responsible for meeting the conservation requirements of their permits, but there are inadequate mechanisms to ensure that large, "secondary" users follow Best Management Practices.

Specific recommendation

Mechanisms, including incentives, should be put in place to ensure that large commercial users of water from permitted public suppliers implement Best Management Practices. Actions to be considered include:

- Educate the secondary users about the benefits of conservation;
- Establish clear guidelines for Best Management Practices that are monitored by the permit holders;
- Consider requiring individual consumptive use permits for commercial users that use more than 50,000 gallons per day;
- Provide financial or public recognition benefits to businesses that implement Best Management Practices and take steps toward water conservation;
- Investigate the feasibility of establishing a tiered conservation rate; and
- Provide financial or regulatory incentives for voluntary water audits.

06

Indoor Water Use

Indoor Water Use

IWU-1: Expand programs to replace inefficient toilets

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦	♦	$	$	$	✓	✓	

Background and general information

Pursuant to federal and state law, efficient toilets have been required in new construction since 1995. Plumbing codes also require the installation of efficient toilet models anytime a toilet is replaced. The replacement of older, high-volume toilets with water-efficient models meeting current manufacturing standards is a very attractive option for water conservation in Florida.

The potential savings are tremendous, considering that toilets account for about 26% of the water use in homes. The implementation of toilet replacement programs is an accepted conservation option used nationwide, and by several utilities in Florida. Toilet replacement programs in southwest Florida have demonstrated savings of about 36 gallons per day per household in southwestern Florida. Data collected in the same region indicate that if utilities in the 10-county region implement toilet rebate programs, the 2020 savings potential is estimated to be 13.5 MGD.

Specific recommendation

This proposal is to replace old and inefficient toilets with new and efficient models. It should be noted that the recommendation is for toilet replacement, not modification with after-market devices. There are currently no devices that can reduce the amount of water per flush by more than one gallon without adversely affecting the functioning of the toilet. Also, these devices can be removed at any time and do not have the long-term conservation potential of total toilet replacement.

What are the advantages and disadvantages?

In the Southwest Florida Water Management District (SWFWMD) alone, the implementation of toilet replacement programs by nine utilities has resulted in more than 4.3 MGD in water savings. According to Tampa Bay Water's five-year conservation plan, toilet replacement programs are one of the top ten measures for saving water in the region. It is estimated that toilet replacement programs can save about 8.75 MGD among their customers, at a cost of $0.67 per thousand gallons saved.

Ultra-low flush toilets are readily available, and consumers have a wide selection of toilets from which to choose. Also, there is plenty of information on-line and in resources such as *Consumer Reports*. Unlike clothes washers and other major appliances, toilets are not mobile, thereby providing continual water savings for one region over the 20-year life of the fixture.

Who should implement it?

Successful toilet replacement programs in Florida have been implemented by several utilities, in some cases with cost sharing from the WMD. Incentives typically offered in Florida include rebates and billing credits, although vouchers and toilet giveaways are widely utilized in California, Texas, and other states. The Tampa Bay area offers a good example of toilet rebate programs, with three water utilities offering

rebates to residential and commercial customers for more than six years. More than 122,000 toilets have been replaced in SWFWMD, with customer satisfaction rates between 87% and 98%.

Tampa Bay Area utilities use an application and inspection system, to ensure the new toilet has been installed and the old toilet has been destroyed, or picked up and recycled for road product. This procedure ensures water savings will occur, and eliminates the potential for both a "black market" of older toilets, and the multiple rebating of new toilets.

The SWFWMD has initiated an education program for consumers, retailers, plumbers, and developers regarding the selection of appropriate low-volume fixtures. Similar programs developed by the WMDs or the utilities should be implemented with or without rebate programs.

What must be overcome for this alternative to succeed?

Institutional replacement of toilets can be costly, but the payback period is relatively short. For lower-income customers, assistance programs through utilities, HUD, or other agencies may be required. The limiting factor affecting participation is the availability of funds for the program. Adequate funding to offer enough rebates to meet customer demand has been an issue in a few communities. Cost-sharing programs through agencies such as WMDs can help ensure more toilets are replaced more quickly.

One of the biggest impediments is the public's perception that low-volume toilets don't work. The data suggest just the opposite, with high customer satisfaction ratings and high water savings. It is believed that much of the perception is due to misinformation and leftover opinions from the initial low-volume plumbing products that did not perform nearly as well as the later models. One example of the effect of such opinions is the bill introduced in Congress for the fourth time in 2001 (H.R. 1479) to repeal the plumbing efficiency standards and other water-conserving elements of federal law. The proposed legislation has been strenuously opposed by water agencies across the nation, including local utilities, the American Water Works Association, and the Plumbing Manufacturers Institute.

Because of the perception problem noted above, and the fact that many different models are available, an education program aimed at customers, retailers, plumbers, and developers would be helpful to counter negative perceptions and to direct consumers toward the best performing models.

All toilets that use a flapper (both old models and new ones) must be maintained because their flappers will degrade and leak due to chlorine compounds used in water treatment. All homeowners must be educated about proper maintenance and replacement of flappers to prevent leaks.

What mix of incentives and mandates would be best?

Rebates, billing credits, vouchers, and giveaways are commonly used incentives to encourage the replacement of high-volume toilets with ultra-low flush toilets. In the programs implemented in the SWFWMD, rebates are generally around $100. This level of rebate encourages the purchase of good quality toilets. Voucher and billing credit systems are also effective. Giveaway programs allow an agency to purchase toilets in bulk, and provide a standard model to customers. This is used primarily as an incentive in Enterprise Zones or low-income portions of a customer base, where making a purchase up-front and having to wait to realize the financial benefit can be a hardship.

One existing mandate, which should not be repealed, is the national requirement for the manufacture only of water-efficient toilets.

IWU-2: Require that inefficient plumbing fixtures be retrofitted at time of home sale

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

This recommendation is to require the retrofitting of older homes with new, low-volume plumbing fixtures consistent with the latest building codes before completion of the sale. This would result in older homes gradually becoming as water-efficient as newer homes.

Specific recommendation

Adopt legislation to require retrofitting at the time of sale.

What are the advantages and disadvantages?

Requirements for low-volume plumbing fixtures in all new development and remodeling came into effect in 1994. As a result, development occurring in 1995 and later contains efficient plumbing fixtures, while pre-1995 development offers an opportunity to reduce water demand. The replacement of higher-volume plumbing fixtures with water-efficient ones saves water regardless of the decisions or habits of the user. This has great potential for saving water in Florida. It also offers the opportunities to make pre-1995 housing as water-efficient indoors as modern housing.

Toilet replacement and plumbing programs in southwest Florida, together with some national data, indicate savings could be about 40 gallons per day per household. The replacement of older toilets with newer, low-volume equivalents saves an average of 36 gallons per day per household, according to data from toilet rebate programs in SWFWMD. The retrofit of showerheads and faucet aerators is estimated to save roughly 4 gallons per day per household. Therefore, it is estimated that an average of 40 gallons per household per day could be saved if, upon sale, older homes were required to replace existing, pre-1995 plumbing fixtures with newer, water-saving models.

Who should implement it?

Appropriate statewide and local requirements for the replacement of pre-1995 plumbing fixtures with newer, low-volume models at the time of home sale would need to be adopted. The Work Group generally agreed that the onus of meeting the requirement should be on the homebuyer, to ensure the installation of quality products that save water and satisfy the buyer. However, it was also pointed out that it may be best to leave the responsibility for meeting fixture replacement requirements up to the parties as part of the purchase/sale negotiations, as long as devices that work well and save water are installed. The Work Group thought the enforcement of compliance with such legislation would be the responsibility of local agencies, such as building code inspectors. The City of San Diego and Marin County, California have similar requirements. There, the seller is responsible for implementation,

unless otherwise specified in the sales instrument, and city staff enforces via an inspection process. In Florida, Sarasota County has drafted a similar ordinance.

Legislation requiring the replacement of inefficient plumbing fixtures with efficient models should be statewide. Leadership of the effort should be from a state agency, such as the DEP. The state should seek opportunities to dovetail the program into related programs such as Energy Star, or incorporate the Florida Green Home Designation Standard. Water management districts should participate with financial incentives, where appropriate. Local agencies will be relied upon to enforce compliance, and are in the best position to offer incentives to homeowners.

What must be overcome for this alternative to succeed?

The Work Group did not determine how best to enforce this measure. Local building inspectors currently only inspect new development or renovation projects requiring a permit. To utilize building inspectors, it may be necessary to establish a permitting process related to home sales. As an alternative, private building inspectors could be used, since they often do inspections at the time of resale. Compliance with the efficient plumbing standards could be a condition for securing the mortgage. Statewide legislation may be prudent, but enforcement is the crux of implementation of this measure and should be evaluated before proceeding. (See recommendation IWU-5 for an approach that seeks to avoid these problems.)

The cost of compliance to the home buyers/sellers might be a burden to lower-income homeowners. Rebate or cost-share programs for toilet replacement should be targeted to them. National and state organizations, such as the Energy Star Program or the Florida Green Building Coalition may offer opportunities to provide assistance. The cost of enforcement to local agencies may be another consideration, depending on the process for inspection and applying penalties for noncompliance. Some will be able to easily incorporate the process into existing procedures, while others may not.

A more limited approach could be considered. Rather than requiring individual homeowners to retrofit, commercial and residential buildings that are "plumbing intensive" could be targeted. For example, all hotels and condominiums could be required to retrofit inefficient plumbing fixtures over a time period of ten years. This would be easier for local governments to implement than individual homes and could save a lot of water in many communities around the state.

What mix of incentives and mandates would be best?

Incentives may or may not be appropriate when statewide requirements exist, as long as adequate disincentives associated with noncompliance exist. To encourage compliance with statewide legislation, incentives offered by local agencies may include a toilet replacement or plumbing retrofit program to encourage early compliance, such that plumbing fixtures in older homes will be replaced regardless of intent to sell. For example, customers may be notified of legislation pending in two years, and then offered incentives to replace fixtures as part of a two-year program offered by a local government or local utility. Incentives may also be offered for a period of time prior to the effective date of the legislation by state agencies. Examples of such incentives include cash rebates, generic product vouchers, and tax relief on water-efficient plumbing products.

IWU-3: Provide incentives to retrofit inefficient home plumbing fixtures

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

Plumbing fixture retrofit incentives is the distribution of free kits typically containing low-volume plumbing fixtures such as showerheads, faucet aerators, toilet water-displacement bags, leak detecting dye tablets, and other materials like conservation literature and promotional items.

Specific recommendation

Local and regional agencies and utilities should provide incentives to retrofit inefficient home plumbing fixtures. The replacement of older, high-volume plumbing fixtures, such as showerheads and faucet aerators, with current water-efficient models has potential for saving water in Florida, is easy to implement, and can be cost-effective. The replacement of hardware is relatively inexpensive and easy to install, and water savings are achieved regardless of the habits of the user. Plumbing retrofit programs in Southwest Florida indicate savings could be about 11 gallons per day per household. The data collected through the programs indicate the average cost to purchase in bulk and distribute a retrofit kit is $11.79. Assuming a 5-year life of kit materials, the cost effectiveness is about $0.62 per 1,000 gallons saved. The SWFWMD's Regional Water Supply Plan suggests that by 2020, if all potential plumbing fixture incentive programs are implemented, up to eight million gallons per day can be saved in the ten-county region addressed by the plan.

In this way, the use of water inside older homes can become as efficient as that in newer homes, which are subject to more stringent building codes requiring water-efficient plumbing fixtures. Compared to toilet and major appliance replacements, the implementation costs are less, and the devices easier to install, but the resulting savings have a shorter life.

What are the advantages and disadvantages?

The costs of plumbing retrofit programs are relatively low, considering the resulting savings, and have been demonstrated to be cost-effective. There is no monetary cost to the water-user. A disadvantage is that the savings are short-term in nature if the homeowner does not replace the free fixtures with water-efficient ones when they wear out.

Who should implement it?

Implementation should be through the utilities and local governments, possibly with financial assistance from the state or the WMDs. Local governments and local and regional water suppliers are in the best position to assess local needs and use the method(s) most suitable for their communities in order to achieve the highest savings.

Plumbing fixture retrofit kits can be distributed in a variety of ways. In the drop-and-canvass method, kits are placed on door handles, and a follow-up visit and/or phone call (canvass) is made to determine if the kit was installed, followed by another call some time later to determine if the devices were still in place. Depot programs require the pick-up of the kits, and exchanges require the participant to bring in older, high-volume fixtures in exchange for a kit containing new, water-efficient ones.

What must be overcome for this alternative to succeed?

Plumbing fixture retrofit programs are cost-effective. Implementation is straightforward with programs in Florida, California, Texas, and other states, which can serve as models. A good assessment of the potential for savings is necessary, so that kits are only given to water-users that have pre-1995 housing. A significant consideration is the fact that the water savings are based on willingness to install and retain the devices. Therefore, education regarding the need for and benefits of water conservation is important. Easy-to-understand installation information is critical, particularly regarding the installation of toilet water displacement bags. Also important in realizing potential savings is a sound canvassing or other follow-up effort. Finally, the purchase and distribution of quality plumbing fixtures will likely result in high installation and retention rates, and therefore higher water savings.

What mix of incentives and mandates would be best?

Incentives for public and investor-owned utilities, or local governments, to engage in a plumbing fixture retrofit programs can include grants from water management districts and state agencies like the DEP. Through its Cooperative Funding Program, the Southwest Florida Water Management District offers financial assistance of up to 50 percent of the costs of such programs, and has provided $2.4 million to date for the distribution of more than 490,000 plumbing fixture retrofit kits in communities in six counties, resulting in nearly 5.4 million gallons per day in savings since 1994.

IWU-4: Support the adoption of national standards for more water efficient clothes washers, dishwashers and plumbing devices; offer incentives for purchasing efficient washers

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

Clothes washers account for about 22% of water used in homes. Existing federal standards for the water and energy efficiency of clothes washers and other appliances have saved billions of gallons of water. More efficient appliance models have been developed that meet the EPA Energy Star rating standards. If all appliances met the higher Energy Star rating and the inefficient models were phased out significant additional water (and energy) could be saved.

Specific recommendation

Adoption of higher efficiency standards for major appliances sold in the United States, such as clothes washers and dishwashers should be supported. National standards for major water-using appliances should be increased first, then later phasing in standards for additional fixtures. Financial incentives should also be considered to promote the replacement of inefficient models with Energy Star Models.

What are the advantages and disadvantages?

According to data from the national Energy Star program, a traditional clothes washer in a home does nearly 400 loads of laundry per year, and uses about 40 gallons per load, or 16,000 gallons per year. With an efficient clothes washer (18 - 25 gallons per load) the same household uses only 9,000 gallons per year. In addition to 43% water savings, these models use 60% less energy and less detergent. The new and efficient appliances are reported to work as well, or better, than conventional appliances and are now widely available from both domestic and foreign manufacturers starting at about $600.

Benefits in multi-family and commercial settings are potentially even greater. A study by the Multi-housing Laundry Association indicated that, in a direct comparison, in-apartment-unit clothes washers use nearly 12,000 gallons per year, and coin-operated, common-area machines use 3,270 gallons per year per unit served. While the study uses the data to argue the benefits of common-area versus in-apartment machines, the data also indicate the high volume of water used in the settings, and the potential for water savings if efficient models were required.

The costs of efficient clothes washers are currently much higher than those of their less efficient counterparts. However, costs are coming down as the units become more popular, and the payback can be rapid considering financial savings from water, sewer and heating costs, as well as chemicals, and the wear-and-tear on clothing and other articles. If national standards were raised and all washers

met Energy Star ratings, costs would come down, as the units are mass-produced. State and local enforcement would not be necessary if federal standards are raised.

Who should implement it?

State agencies, local governments, WMDs, trade associations and others should support legislation raising the national efficiency standards for clothes washers, dish washers and other water consuming appliances and fixtures. Leadership of the effort should be from a state agency, such as the DEP. Water management districts, local governments and utilities should cooperatively fund rebate programs, where appropriate, to replace existing inefficient appliances with Energy Star washers.

What must be overcome for this alternative to succeed?

Possible resistance from some appliance manufacturers to higher standards might occur. However, most major manufacturers already sell models that meet the Energy Star Standards. The current higher cost of more efficient models could be an impediment for lower income households. Rebate programs that make up the cost difference could address this concern.

What mix of incentives and mandates would be best?

The water and energy savings of Energy Star models are already a strong financial incentive. However, as already discussed, financial incentives could be offered by utilities and local agencies to promote the early replacement of inefficient models with efficient ones. Examples of such incentives include cash rebates, generic product vouchers, and tax relief on water-efficient plumbing products. Utilities, through informative billing, could educate customers of the water, energy, and money savings of choosing Energy Star appliances for their next purchase. The state could exempt the Energy Star rated appliances from the state sales tax as an incentive.

Indoor Water Use

IWU-5: Create a water auditor inspection program for the sale of new and existing homes, supported by a refundable utility service fee

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$	$	✓		

Background and general information

This recommendation calls for a new program for professional auditing of water use at the of time home sale, combined with a refundable utility service fee for water-efficient homes. This recommendation was prepared by DEP, after discussion with some members of the Work Group, and could be an alternative to recommendation IWU-2, "Require that inefficient plumbing fixtures be retrofitted at the time of home sale."

Specific recommendation

This recommendation is to encourage, via professional water audits and the rebate of a utility fee, the retrofitting of older homes with water-efficient equipment consistent with the latest building codes. This would result in older homes gradually becoming as water-efficient as newer homes, as well as ensuring that new homes achieve designed water conservation levels. Such water audits could include both indoor and outdoor water use, since irrigation often comprises the largest residential water use.

Water utilities could be required or encouraged to charge a one-time "commencement of service fee" for new customers and a one-time "relocation of service" fee for existing customers that have changed addresses within the utility's territory. The fee would be reduced if the customer allows a certified water auditor to inspect the home for inefficient water use practices and make recommendations to conserve water. The fee would be reduced proportionate to how close the home came to meeting current Florida Building Code requirements and utility conservation programs. If the home met all current water conservation practices, most or all of the fee would be rebated. If the home did not meet current requirements, most or all of the fee would be made available, at the option of the homeowner, for retrofitting inefficient water-using devices, via the utility's water conservation programs.

This recommended water audit program would build upon Florida's current energy conservation measures already in the state's Building Energy-Efficiency Rating Act (s. 553.990, F.S.) and the Florida Building Energy Rating System (DCA Rule 9B.60). Florida would create a new certification and training program for state certified water auditors. Certified water auditors could draw from professions such as county extension agents, plumbers, irrigation professionals, and utility installers.

What are the advantages and disadvantages?

This program would result in older homes gradually becoming as water-efficient as newer homes, as well as ensuring that all new homes are actually as water-efficient as they are designed to be. Owners

of both older and newer homes would learn of water conservation opportunities and the related programs offered by their local utilities.

A particular strength of this recommendation is that the water auditing process could address all water use in a home and not just the fraction represented by "indoor" use.

A potential disadvantage is adverse customer reaction to the new fee, even if it is reduced or eliminated once the homeowner demonstrates water efficiency.

Who should implement it?

The program should be implemented as a standardized statewide program to assure quality training. Alternatively, individual programs could be adopted by each utility. Even in the case of a statewide program, the elements of the fee structure should be determined by individual utilities in order to be consistent with their conservation goals. For example, some utilities may allow both indoor and outdoor conservation measures to reduce the fee, while others may focus on only one of the two.

A training program for the certified water auditors could be based on how to complete a standardized inspection of a home to collect detailed information on indoor and outdoor water use, including fixtures, leaks, irrigation systems, and landscape design. Training may also include performance testing such as calibration of irrigation systems and detection of under slab leaks. Training may also include utilization of standardized water audit software (to be created as part of this program) that will quantify results of the audit in terms of the homes water efficiency, and conduct cost-benefit analyses of the recommended improvements. This analysis could include the installed cost of efficiency upgrades, the effect they have on a home's water bill, and the effect they have on the refundable fee.

To promote the program, real estate contracts would require providing an informative brochure about this program (along with the current brochure that explains the state's Energy-Efficient Rating act).

What must be overcome for this alternative to succeed?

The details of the standardized program for training and certification of auditors must be developed. Software must also be created for the auditors to use as a tool. Affected homebuyers must be educated about the program and understand that bringing a home to a high level of water use efficiency can significantly reduce the fee.

Funding to start the program will also have to be secured. However, once initiated, a portion of the service fees could be apportioned to support the program.

What mix of incentives and mandates would be best?

The Legislature could require utilities to institute these programs, but with substantial flexibility. Utilities should determine the necessary "service fees," and allow participation in the water auditor inspection program to be voluntary. Even though the homeowner's implementation of recommended water efficiency measures is completely voluntary, the provision of useful water conservation information and the availability of a rebate in the service fee should lead to substantial water conservation improvements. The distribution of brochures that detail the program at contract signing should also be mandated, as is currently the Energy Rating brochure.

IWU-6: Coordinate and expand the statewide water conservation education campaigns

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$		✓	✓	

Background and general information

All of the Work Groups recognized that an educational component associated with each of the measures recommended in this report is critical. In addition, Work Groups recognized the need for a statewide, consistent message to Florida citizens, businesses, and visitors regarding the need for, and benefits of, long-term water conservation strategies. The concept of a statewide water conservation education campaign is for a state agency such as DEP to take the lead and work with water management districts, water suppliers and others, to send this consistent message. The message should be sent often–not just when drought conditions exist--using a variety of media.

Specific recommendation

Maintaining a continued focus on water conservation is critically important. A new Work Group should be formed to address this topic, using the ideas in Appendix K as a starting point.

IWU-7: Evaluate the potential for gray water use

Overall Score: 5 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Low	5	♦	♦	♦			$			✓		

Background and general information

The plumbing code defines gray water as wastewater from bathtubs, showers, lavatories, clothes washers and laundry sinks. However, Department of Health rules only allow the use of wastewater from clothes washers for gray water applications.

Although a few states allow the use of gray water for some applications, at present, the use of gray water in Florida does not appear to be a viable option for water conservation. State regulations only allow the use of gray water for subsurface drip irrigation, and customers on sewer systems can only apply for a permit if the use of gray water does not affect sewer flows. Also, subsurface irrigation is often costly because of the necessary filtration systems, pumps, and ongoing maintenance. Water savings resulting from using gray water for subsurface irrigation are estimated to be about 33 gallons per household per day. A residential gray water infiltration system is estimated to cost about $1,000 to install.

Specific recommendation

The Department of Health should evaluate the results of gray water use in states that allow it, and determine if there are greater opportunities for using gray water Florida. If gray water use is found to have practical application in Florida, the DOH should modify its rules, if necessary, to facilitate greater use of gray water.

What are the advantages and disadvantages?

The cost-benefit does not appear to be attractive; however, the volume of gray water is large and it should not be ignored as a potential opportunity. Care must be taken to ensure public health is protected.

Who should implement it?

Modifications to existing legislation and/or rules would be needed to allow the use of gray water in a manner that offsets traditional water uses in Florida.

Indoor Water Use

IWU-8: Cisterns

Overall Score: 4 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Low	4	♦	♦				$			✓		

Background and general information

Cisterns are not legally used in Florida as a source of potable water supply. Florida allows the use of cisterns for non-potable use only, and some local regulations do not even allow them at all. A report published by the Southwest Florida Water Management District in 1997, "Cisterns in the State of Florida," provides information about the apparently low potential of cistern use in Florida. Nonetheless, the topic of cisterns is often brought up in discussions on water conservation.

The disadvantages related to the use of cisterns include:

- It is difficult to make and site a large enough cistern to meet most single-family residential irrigation demands, and many deed restrictions do not allow aboveground vessels.
- The availability of water from rainfall is seasonal. During wet seasons, the cistern is full, but supplemental irrigation is not necessary. During dry times, the cistern is empty when irrigation is needed.
- If Florida law did allow the use of cisterns for potable water, residences or businesses using them would need on-site water treatment systems to make the water drinkable.
- Cisterns are not cost-effective compared to other conservation measures. Assuming a large enough cistern could be constructed and sited for irrigation purposes, it was estimated that a $2,700 rebate would be needed to make it worthwhile to a homeowner. The cistern would save an average of 76 gallons per day per household--a savings that could be achieved by the replacement of two or three toilets at a cost of about $400.

Specific recommendation

It is not recommended that cisterns to store rainfall be further evaluated. This recommendation is provided primarily to inform the reader that cisterns were analyzed as part of the WCI and determined to be of very low value for cost-effective water conservation.

Reuse of Reclaimed Water

Based on the work of the Water Reuse Work Group, there are three primary areas of emphasis:

1. **Encourage and Promote Reuse** – To maximize the ***Utilization Rate*** (see Glossary for this and other terms) for all domestic wastewater treatment facilities (WWTPs) having capacities of 0.1 MGD or larger. Ideally, the ***Utilization Rate*** would be 100 percent. This reflects the state objectives established in s. 403.064 and s. 373.250, F.S.

2. **Efficient Reuse** – To maximize the ***Offset*** and/or ***Recharge Fraction***. Ideally, ***Offset*** or ***Recharge Fraction*** would be 100 percent.

3. **Effective Reuse** – To direct reuse activity toward uses that offer the greatest benefits. This is concerned with ***Utilization Rate***, ***Offset***, and ***Recharge Fraction***.

As shown in the Appendix E, the universe of reuse activities allowed by DEP rules is very wide and diverse. Reuse projects featuring these types of activities and discharges and complying with DEP rule requirements can be readily permitted in Florida. Of course, not all reuse activities are created equal from the perspective of water conservation. Also contained in Appendix E is a preliminary assessment of the relative desirability of various reuse activities based of their average "Offset" and "Recharge Fractions."

Reuse of Reclaimed Water

RW-1: Encourage metering and volume-based rate structure for reclaimed water service

Reuse Area of Emphasis: **Encourage Efficient Reuse of Reclaimed Water**

Overall Score: 10 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	10	♦	♦	♦	♦	♦	$	$	$	✓	✓	

Background and general information

Metering is a method to measure reclaimed water use. A volume-based rate structure assesses a charge for the water in proportion to the amount of water used. It is not the same as a "conservation rate structure" recommended for pricing potable water elsewhere in this report. When metering of the reclaimed water service and a corresponding volume-based rate structure is in place, significantly less reclaimed water is used for irrigation.

Specific recommendation

While rates for reclaimed water service should be less than that of potable water, the rates should not be in the form of a flat monthly fee. The charge for service should be based upon the volume that is used by the customer. If not, there will be a disincentive for the customer to use a reasonable amount of reclaimed water and overuse will occur.

Metering is a key element of any rate structure that is based on the volume of water used, and should be more widely implemented. DEP and the WMDs should implement effective funding programs that include grants for installing meters in existing areas served by reuse systems. Grants for new reuse systems should require meters and volume-based rate structures. While DEP rules governing reuse are silent on requirements for rate structures and the need for metering, the DEP should consider implementing a system where long-term permits are available to utilities with efficient and effective reuse systems.

Rate structures for investor-owned utilities that implement a reuse system come under the purview of the Public Service Commission (PSC). At this time, volume-based rate structures for reclaimed water are encouraged, but not required, by the PSC. The PSC should continue to encourage greater implementation of volume-based rate structures.

Conditions are often placed on grants from the SWFWMD for construction of reuse systems. The SWFWMD requires metering, at least at the subdivision level, and encourages metering at the customer level. Additional requirements include reuse education, dual construction of lines in new developments in reclaimed water service areas, and water offsets of not less than 50 percent. Practices like these could be employed by the other WMDs to increase reuse efficiency.

The WMDs also evaluate rate structures as part of the consumptive use permitting process. Utilities are required to develop a water conservation plan when applying for a permit to withdraw water for use. Therefore, when supplemental supplies are utilized, a consumptive use permit must be obtained from the appropriate WMD. The WMD currently requires conservation measures to be implemented for

reuse systems when a supplemental supply is necessary. Incentives for metering and volume-based rate structures could be incorporated into this process. WMDs should consider long-term permits for consumptive use of supplemental supplies where volume-based rate structures are implemented by the utility.

Existing systems that currently have a flat monthly fee could be encouraged to adopt volume-based rate structures by means of funding assistance for the installation of meters in existing areas currently served by reuse systems. A condition of the funding could be the adoption of the rate structure that would reflect the volume of reclaimed water utilized by the customer.

What are the advantages and disadvantages?

Most utilities in Florida currently charge a flat monthly fee for reclaimed water service. This is due to the fact that many systems began implementing reuse at a time when it was important to have use of reclaimed water be more attractive to the customer than the use of potable water for irrigation, to encourage growth of the customer base. In addition, there was generally a much greater volume of reclaimed water available than the customer base could support and overuse was not discouraged.

As a reuse system with this type of rate structure becomes mature, shortages of reclaimed water become prevalent. The recent drought exacerbated this situation and shortages of reclaimed water became even more prevalent in mature reuse systems. Many systems sought approval for supplemental water supplies from the DEP and WMDs. Observations made in the SWFWMD indicate that, before efficiency standards were implemented, when a customer switches from potable water to reclaimed water for irrigation, the volume used for irrigation is often as much as four times greater than that observed for potable water. This is due to the cost differential between the two sources, and the fact that there is often no additional cost to the customer for using greater amounts.

Who should implement it?

As noted above, the DEP, the WMDs, and the PSC all have a role in the implementation of this recommendation.

What must be overcome for this alternative to succeed?

Metering of reclaimed water usage and consequent volume-based rate structures can be an expensive option for the utility – both for the cost of meter installation and the staff required to implement the billing system (meter readers, etc.). Funding assistance could help utilities implement these improvements. Another alternative would be to phase in the metering requirements.

What mix of incentives and mandates would be best?

Funding assistance for installation of meters in existing systems, and requiring a volume-based rate structure would be instrumental to changing the current system for existing customers. Where funding assistance is granted to a utility for new construction, require metering and appropriate volume-based rate structures as a condition of the grant. Permits for consumptive use of a supplemental supply could be issued for a greater duration for those utilities with volume-based rate structures. Another incentive that may be worth pursuing is consideration of long term DEP permits for utilities with efficient and effective reuse systems. Volume-based rate structures could be a factor taken into consideration in issuing longer term DEP permits for such systems.

Mandates are not warranted at this time.

RW-2: Education and Outreach

Reuse Area of Emphasis: **Encourage and Promote Reuse**
Encourage Efficient Reuse of Reclaimed Water
Effective Reuse of Reclaimed Water

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$		✓	✓	✓

Background and general information

This strategy relates to overall water management. It involves a long-term strategy to educate the public, water professionals, utilities, politicians, and news media about water resources, conservation, reuse, and management. This strategy probably will not result in immediate increases in the use of reclaimed water.

Specific recommendation

The regulatory agencies (DEP, WMDs, PSC, Department of Health, and others) have a range of public education activities. When dealing with water issues, these agencies need to coordinate their efforts to maximize effectiveness. Partnerships also should be formed with professional organizations like the Florida Water Environment Association, Florida Section of the American Water Works Association, the Water Reuse Association, the Florida Department of Education, and the State University System.

Education activities should include the following concepts:

- The fundamental nature of water, its origins, availability, and fate in the hydrologic cycle.
- The intrinsic value of high-quality water supplies.
- Wastewater management concepts – including water reclamation and reuse.
- Recognition of the fact that water supplies are finite. This must include clear recognition of the fact that some areas in Florida are beginning to face water shortages.
- Recognition of the fact that "water is water." Regardless of water's "origin" or current location in the hydrologic cycle, it remains water. Even untreated domestic wastewater is over 99.9 percent water by weight.
- The benefits of, need for, and opportunities for water conservation.
- The benefits of, need for, and opportunities for water reuse.

Education activities related to water need to be tailored for several target audiences:

- The adult public.
- School aged children.
- Water professionals.
- Politicians and other decision-makers.
- The news media.

Several key elements that need to be integrated into the overall strategy are outlined below:

- *Water curricula* – This includes development of an integrated water resource management curriculum for elementary and secondary schools. This also should target university students studying environmental engineering, water resources, environmental science, and other water-related fields.
- *Educational Displays and Materials* – Professional quality displays should be developed for use at the State Fair, at science museums, and other locations. There should also be the development of related and integrated materials – brochures, videos, posters, and public service announcements for radio and television.
- *Reuse Website* – DEP should maintain a comprehensive website devoted to water reuse as a resource for utilities, engineers and scientists, educators, students, and the public.
- *Seminars for Teachers* – Seminars for elementary and secondary school teachers may serve to facilitate water curriculums within the state's school system.
- *Seminars for the News Media* – This will feature seminars and workshops designed to educate the news media about water resources and water reuse issues facing Florida. The sensitivity of terminology used in reporting needs to be effectively communicated.
- *Seminars for Elected Officials* – Seminars targeted at the issues and concerns of elected officials at the local, regional, state, and national levels are needed.

What are the advantages and disadvantages?

Some agencies may face financial and/or staff resource limitations. Pooling and coordination of resources should enable production of more and better materials at lower total costs.

Who should implement it?

State Agencies and WMDs – Development of integrated educational materials and seminars, especially by the Department of Education.

Local Governments – Development of project specific materials.

What must be overcome for this alternative to succeed?

Inertia and funding constraints also must be overcome if new partnerships and joint ventures are to be pursued. No new incentives or mandates are needed. A new Work Group should be formed to address this topic using the ideas in Appendix K as a starting point.

RW-3: Facilitate seasonal reclaimed water storage

Reuse Area of Emphasis: **Encourage and Promote Reuse**

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

A major issue faced by most reuse utilities involves the need to match demands for reclaimed water with available supplies of reclaimed water. This includes both daily considerations and long-term or seasonal considerations. Seasonal issues are key, because landscape irrigation and agricultural irrigation involve significant seasonal fluctuations in the need for water. To effectively meet peak seasonal demands, large volumes of storage typically will be needed.

The development of storage techniques and an institutional framework that facilitates economical provision of seasonal storage will enable better utilization of reclaimed water. Better utilization of reclaimed water translates into greater conservation of potable quality water that alternatively would have been used for irrigation.

Specific recommendation

One of the promising technologies for provision of seasonal storage is aquifer storage and recovery (ASR). This alternative involves the use of an underground formation to store reclaimed water during low demand periods with subsequent recovery of the stored water to meet high demands for water.

The regulatory agencies need to be active in enabling use of reclaimed water. ASR projects, for example, should be monitored and possible refinements to state rules should be identified and adopted.

DEP should continue to be proactive when considering storage options for possible reuse projects.

What are the advantages and disadvantages?

The primary impediments are economic. Effective funding programs will be of assistance.

In the past, the key impediment to the use of ASR for reclaimed water has been the lack of rules dealing with ASR. That changed in 1999 with the addition of Rule 62-610.466, F.A.C., which regulates ASR for reclaimed water. While that rule probably is not perfect, it represents an important first step toward facilitating the use of ASR for reclaimed water.

As a result of the discussion of ASR using surface waters during the 2001 Legislative Session, a number of misconceptions and negative images have been formed related to ASR in general. Effective education and outreach will be needed to promote public acceptance of reclaimed water ASR.

The use of lakes for seasonal storage as part of a stormwater management system (like many lakes on golf courses) pose concerns for possible discharges to surface waters. Such surface water discharges

must be permitted under the federal National Pollutant Discharge Elimination System (NPDES). Florida has implemented a process for permitting the use of lakes that discharge intermittently to waters of the state in Rule 62-610.830, F.A.C. The approach contained in this rule meets the NPDES requirements, is acceptable to EPA, imposes minimal requirements on the reuse utility, and probably represents an optimal approach for dealing with this issue.

Chapter 62-610, F.A.C., provides for the use of lakes that are part of the stormwater management system to store reclaimed water. This requires interaction with the state stormwater program. The DEP and the WMDs are encouraged to work together to facilitate and streamline this permitting arrangement.

Who should implement it?

WMDs: Implement effective funding programs. Work with DEP on projects involving the use of lakes that are part of the stormwater management system to store reclaimed water.

DEP: Implement effective funding programs. Be proactive and encourage ASR and other storage solutions.

Utilities: Actual implementation of storage systems is the responsibility of the utilities. Provision of sufficient seasonal storage to enable full utilization of reclaimed water supplies is encouraged.

What must be overcome for this alternative to succeed?

As noted, the primary impediments are economic. Financial assistance will be very helpful.

A potential impediment to reclaimed water ASR would be a constitutional amendment or legislation banning all ASR in Florida.

What mix of incentives and mandates would be best?

Mandates are not merited. The key incentives that should be considered include:

- Provision of effective funding programs.
- Cultivating a proactive mindset within the regulatory agencies -- particularly related to ASR.

RW-4: Link reuse to regional water supply planning

Reuse Area of Emphasis: **Effective Reuse of Reclaimed Water**

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦		$	$	$	✓	✓	

Background and general information

State policy encourages reuse of reclaimed water in regional water supply planning.

Specific recommendation

Reclaimed water reuse and water use efficiency should be integral parts of regional water supply planning efforts. The WMDs and DEP already encourage reuse to be considered in regional water supply planning and this practice should continue and be intensified.

Funding for reuse projects and system improvements should be targeted at projects that are developed as part of a regional water supply planning effort. The WMDs and the DEP should place a high priority on projects that are an integral part of a water supply planning effort.

In addition, long-term DEP permits could also be made available to utilities that implement reuse projects linked with regional water supply planning. Utilities with reuse systems whose projects are described in regional water supply plans as effective and necessary for meeting future water demand could be eligible for long-term DEP permits.

What are the advantages and disadvantages?

Regional water supply planning should identify locations and specific projects where reuse activities can have a positive impact on reduction of water demand and augmentation of the potable water resource. Implementing projects that assist in meeting future water demands and reducing future impacts on potable water resources can result in maximum water conservation benefits. Because reclaimed water reuse activities can have such an impact on future availability of water resources, it is vital that they be considered as an integral part of regional water supply planning.

Funding of reuse system improvements is costly. The economic constraints need to be resolved to make real progress on this strategy.

Who should implement it?

DEP – Implement effective funding programs targeted at reuse projects that are linked to regional water supply planning. Consider long-term permits for utilities that have effective reuse programs that are reflected in regional water supply plans.

WMDs – Emphasize reclaimed water reuse as a key part of regional water supply planning. Implement effective funding programs targeted at reuse projects that are linked to regional water supply planning.

What must be overcome for this alternative to succeed?

Effective reuse projects that can have a positive impact on future water supplies are expensive. Effective funding programs that will enable adequate assistance to utilities for construction of effective reuse projects are not existing in all of the WMDs, nor do they exist within the DEP.

What mix of incentives and mandates would be best?

Adequate funding programs to assist utilities in implementation of reuse projects linked to water supply planning is necessary to achieve the potential benefits that exist. Long-term DEP permits are another incentive that would encourage utilities to implement reuse projects that are included in regional water supply planning.

Mandates are not necessary at this time.

RW-5: Implement viable funding programs

Reuse Area of Emphasis: **Encourage and Promote Reuse**
Encourage Efficient Reuse of Reclaimed Water
Effective Reuse of Reclaimed Water

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦	♦	$	$		✓	✓	

Background and general information

Funding programs can serve to actively encourage and promote water reuse.

Specific recommendation

Viable funding programs are needed in all five water management districts. This will result in increased recharge of available water resources and increased conservation of potable quality water. In addition, funding programs offer opportunities to impose grant or loan conditions that will encourage efficient and effective use of reclaimed water. Assistance need not be limited to conventional grants or loans. Low interest, zero interest, or even negative interest loans may be appropriate.

The Southwest Florida Water Management District already has implemented a successful grant program that has resulted in significant reuse activity within this water management district. Section 373.1961, F.S., requires other water management districts that have designated Water Resource Caution Areas to implement funding programs for reuse projects and for other alternative water sources projects. Other WMDs with projected supply shortages should consider implementing funding programs similar in scope and scale to the existing program in the Southwest Florida Water Management District.

The Northwest Florida Water Management District has designated water resource caution areas. However, this water management district faces significant financial limitations, which preclude full funding of such a program using normal water management district funding sources. Hence, supplemental state funding could be provided. This could be either a state appropriation directly to the Northwest Florida Water Management District for this purpose, or the development of a "set aside" within a state grant program. The funding programs should be directed at projects that will involve efficient and effective use of reclaimed water. Grant conditions designed to ensure efficient and effective reuse should be implemented.

The Suwannee River Water Management District has not designated water resource caution areas. As a result, a funding program in this district probably is not warranted.

The Work Group recommended development of a state grants program for reuse projects. This would include a set aside targeted specifically for projects within the Northwest Florida Water Management District. It also should include funding for other projects having statewide significance. The program should be directed at projects that will involve efficient and effective use of reclaimed water. Grant conditions designed to ensure efficient and effective reuse should be implemented. Finally, the state funding program should include provisions for a small research funding program designed to support

the state's reuse program. Creative financing options should be considered if this alternative is to be feasible.

What are the advantages and disadvantages?

An effective funding program of grants or loans, with adequate resources, could have multiple benefits: more reuse of reclaimed water, more recharge, and more supplies of water to meet growing demand. Such a program could be tailored to meet the diverse needs of different parts of the state.

A disadvantage of this proposal, or an obstacle, is the limited financial resources available for such a program. A loan program for this purpose should be at a smaller disadvantage than a grant program.

Who should implement it?

State Legislature – Provide authorizing legislation and needed appropriations.

DEP – Implement a state grant program for water reuse projects within the Bureau of Water Facilities Funding. Rule making will be needed. Implement a reuse research program within the Bureau of Water Facilities Regulation.

WMDs – Implement expanded funding programs in the WMDs where appropriate. Continue the funding program in the Southwest Florida Water Management District.

What must be overcome for this alternative to succeed?

The major impediment is availability of state funds to finance a state funding program. In addition, the St. Johns River Management District and South Florida Water Management District may face difficulties in targeting funds for these programs. State legislation may be needed. Rulemaking at the state level and within the water management districts will be needed.

What mix of incentives and mandates would be best?

Establishment of viable funding programs would be a major incentive for encouraging and promoting water reuse. In addition, viable funding programs at the state level and within the water management districts could be structured to encourage efficient and effective use of reclaimed water.

A small research component will be useful in addressing key issues that will arise within the reuse program.

State legislation and appropriations will be needed to fund a viable state grant program.

RW-6: Promote agency support of groundwater recharge and indirect potable reuse

Reuse Area of Emphasis: **Effective Reuse of Reclaimed Water**

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦	♦	$	$		✓	✓	

Background and general information

Groundwater recharge involves the discharge of reclaimed water into rapid infiltration basins or after additional treatment, through injection wells to recharge the underlying groundwater source. Indirect potable reuse involves discharging reclaimed water that has received additional treatment into a surface water body that serves as a potable water source. Education of staff in each agency that is involved in public health and water supply issues can help promote effective water reuse.

Specific recommendation

All agencies must support the concept if public support is to be obtained for these types of projects. Since requirements for these projects are contained in Chapter 62-610, F.A.C., training on the requirements of the rule and the research that went into development of the rule should be provided to each agency involved in water supply and public health issues. The WMDs, PSC, DOH, and perhaps the DCA are key agencies that should be targeted for training.

Training could be accomplished through annual meetings or workshops for each of the agencies or through special training events. The need for augmentation of potable water sources is a critical element that should be included as well as the research aspects and regulatory requirements.

A demonstration project where representatives from each agency are part of the project team would be beneficial in promoting agency support. Data from the demonstration project could be utilized to demonstrate the benefits of an augmentation project as well as to demonstrate the safeguards that protect public health. Once all agencies involved agree on the appropriateness of these projects in augmenting potable water supplies, a statement of public support could be developed.

What are the advantages and disadvantages?

Groundwater recharge and indirect potable reuse offer some of the greatest water conservation benefits of all reclaimed water reuse activities. Augmenting the potable water supply with reclaimed water without losses that can occur through evaporation conserves the reclaimed water so that it can be most effective in supplementing potable water sources. Unfortunately, public perception of utilizing reclaimed water to augment potable water sources in even an indirect manner has prevented some projects from implementation.

Who should implement it?

DEP – Continue to provide leadership in the water reuse arena. Consider sponsoring a demonstration project where all agencies are involved and distribute information about the project through the media. Provide training for staff involved in water supply and water treatment and distribution. Employ the team permitting concept for these types of projects

WMDs – Provide funding for training appropriate staff involved in water supply planning.

PSC - Provide funding for training appropriate staff involved in water supply planning.

DOH - Provide funding for training appropriate staff involved in public health issues including potable water regulatory programs.

What must be overcome for this alternative to succeed?

Funding assistance for a targeted training program would be necessary to develop it adequately, but is most likely not included in agency budgets at this time.

Acceptance of the groundwater recharge and indirect potable reuse concepts as well as recognition of the need for these projects by the agencies involved is crucial to receiving public acceptance. Many individuals in the agencies involved, as with the general public do not currently support the need for augmentation of potable supplies with reclaimed water.

What mix of incentives and mandates would be best?

Providing funding to agencies for training activities related to groundwater recharge and indirect potable reuse would assist in implementing this strategy. All agencies involved in water supply and public health issues should be required to provide training for appropriate staff involved in decision making related to implementation of groundwater recharge and indirect potable reuse projects.

Reuse of Reclaimed Water

RW-7: Encourage reuse in Southeast Florida

Reuse Area of Emphasis: Encourage and Promote Reuse

Overall Score: 9 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
High	9	♦	♦	♦	♦	♦	$	$		✓	✓	

Background and general information

In 2000, reuse capacity in Florida totaled about 1.1 billion gallons per day (51 percent of the state's total permitted capacity for domestic wastewater plants). This represented about 74 gallons per day of capacity for each Floridian. Unfortunately, when it comes to embracing water reuse, Broward and Dade Counties have lagged behind the rest of the state. As an example, per capita reuse capacity in these two counties is less than 12 gallons per person per day. Efforts to increase reuse in Southeast Florida recently have focused on the concept of using reclaimed water to recharge the aquifer via canal discharges.

Specific recommendation

Means should be found to dramatically increase reuse in Southeast Florida. Recommended steps relating to increasing reuse by aquifer recharge via canal discharge include:

- *Making a solid technical demonstration that the area's groundwater needs to be augmented and that discharge to canals can effect this augmentation.* This is essential for this type of project to be considered as "reuse."

- *Water quality based effluent limitations (WQBELs) will be needed.* These will define the quality of reclaimed water needed to protect water quality in the canals. The canals are Class III waters and any discharge will have to ensure that surface water and groundwater standards are met. Given that the canals are largely stagnant during dry weather periods and that many of the canals are listed as "impaired waters" for nutrients, it is likely that WQBELs will place stringent limits on discharge of nutrients.

A team permitting approach for canal discharge to augment aquifer levels is suggested in an effort to maintain communication and coordination among the various permitting agencies and to facilitate the permitting process.

The Comprehensive Everglades Restoration Project (CERP) includes two major reuse projects in West Dade County and South Dade County. These may be as large as 100 MGD each. Federal and state funding for these facilities should be pursued and secured.

Other more traditional reuse opportunities also should be pursued. This would provide benefits from a water management perspective. It also would serve to promote public familiarity with water reuse, which could play an important role in generating public support for some of the large-scale reuse

options that will be pursued. Industrial uses of reclaimed water, particularly for cooling water applications, should be pursued, as well as the potential for using reclaimed water to retard saltwater intrusion. There is also a potential for reclaimed water ASR projects. Provision of reclaimed water to the agricultural areas in Dade and Broward Counties should also be evaluated.

The major utilities should investigate the possibility of developing "skimming" water reclamation facilities. These would be subregional treatment facilities located in the developing areas – within areas offering significant potential demands for reclaimed water. Untreated domestic wastewater would be extracted from the sewerage system and treated to produce reclaimed water. Residuals (sludge) and any unused reclaimed water would be returned to the sewerage system for conveyance to the existing, large, regional treatment facilities. Demonstration projects may be beneficial in generating public support.

What are the advantages and disadvantages?

In 2000, about 494 MGD of domestic wastewater was treated in Broward and Dade counties – about 33 percent of the state's total. Of the domestic wastewater treated, only about six percent was reused in 2000. In Broward and Dade Counties, over 460 MGD is routinely lost through effluent disposal facilities – notably ocean outfalls and deep well injection facilities.

Although achieving this alternative may be difficult and expensive, it provides a means to an enormous amount of water by encouraging Southeast Florida to implement the types of reclaimed water programs already successful in other parts of Florida.

Who should implement it?

A partnership between the DEP, the South Florida Water Management District, the EPA, the Corps of Engineers, and the utilities is needed. A team permitting approach should be implemented.

What must be overcome for this alternative to succeed?

The densely populated character of the area, coupled with the location of several of the large regional wastewater treatment facilities near the coast, makes it difficult to convey reclaimed water back to the developing areas to the west. Subregional skimming facilities may offer significant potential for overcoming some of these difficulties. The volumes of wastewater flows involved also pose challenges. There simply are not enough golf courses in this area to handle the entire flow. Large regional options, like canal discharge, need to be evaluated. Other smaller scale options involving more traditional forms of reuse (landscape irrigation, agricultural irrigation, industrial uses, toilet flushing, etc.) also should be pursued.

A Water Quality Based Effluent Limitation for proposed canal discharge is urgently needed.

The economic constraints are real. In addition to local funding sources, funding options through the CERP, the water management district, and the state should be pursued.

What mix of incentives and mandates would be best?

Financial assistance may be helpful as Southeast Florida moves toward implementation of water reuse on a larger scale. Possibly, additional regulatory requirements could be imposed.

RW-8: Consider consumptive use permitting incentives for utilities that implement reuse programs

Reuse Area of Emphasis: **Encourage and Promote Reuse**

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	8	♦	♦	♦	♦		$	$		✓	✓	

Background and general information

Incentives offered by the water management districts through their consumptive use permitting programs may serve to encourage utilities to implement reuse and to encourage water users to use reclaimed water.

Specific recommendation

The water management districts could consider offering credits or other incentives to utilities that implement reuse programs and to users of water who opt to use reclaimed water. Such incentives could take the form of:

- Reduced fees for consumptive use permits (CUPs).
- Longer durations for CUPs.
- Recognition of reclaimed water use when calculating per capita water consumption. This should include allowance for reuse systems like groundwater recharge and industrial reuse that do not directly influence per capita water use by residential customers. Where one utility provides reclaimed water for use by a second utility, the two utilities could share in such a credit.

In all cases, credits and incentives could be conditioned on making efficient and effective use of reclaimed water.

What are the advantages and disadvantages?

Providing incentives for implementing reuse could help motivate both reclaimed water utilities and water users to use reclaimed water.

Any incentives must be carefully designed to assure that they are likely to change behavior and are not simply awarded to parties for what they would be doing in any event, as a permitting requirement or for other reasons.

Who should implement it?

WMDs – Investigate and evaluate possible incentives related to consumptive use permits that might encourage utilities to implement reuse programs and water users to use reclaimed water. Viable credits and incentives should be implemented.

Reuse Coordinating Committee – Could serve as a forum for framing a consistent statewide approach.

What must be overcome for this alternative to succeed?

There may be policies of the water management districts or statutory provisions that may impose limitations on what the water management districts can do.

What mix of incentives and mandates would be best?

Incentives related to consumptive use permits may serve to encourage utilities to implement reuse programs and water users to use reclaimed water.

No mandates are recommended.

RW-9: Encourage use of supplemental water supplies

Reuse Area of Emphasis: Encourage and Promote Reuse

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦	♦			$	$		✓	✓	

Background and general information

Use of another water source (surface water, groundwater, stormwater, or treated drinking water) to augment supplies of reclaimed water—largely to meet peak demands.

Specific recommendation

The regulatory agencies (DEP and the water management districts) should be proactive in response to requests from reclaimed water utilities to use supplemental water supplies as part of their reuse systems. Once reclaimed water efficiency and seasonal storage options have been implemented, the agencies should avoid placing unwarranted restrictions on use of supplemental water supplies.

What are the advantages and disadvantages?

The use of supplemental water supplies to meet peak demands for reclaimed water may enable a reclaimed water utility to be more aggressive in implementing its reclaimed water system. More customers can be served with reclaimed water and less "excess" reclaimed water will need to be disposed of. Numerous reclaimed water utilities already use supplemental water supplies to aid in meeting peak demands for reclaimed water:

- **Water Conserv II** – Uses groundwater as a supplemental water supply. Their groundwater wells are used to provide freeze protection services to citrus growers using their reclaimed water.
- **Cape Coral** – Makes extensive use of water from their network of fresh water canals to augment supplies of reclaimed water.
- **Altamonte Springs** – Uses treated drinking water and stormwater to supplement reclaimed water supplies.

Who should implement it?

DEP – Be proactive in enabling reclaimed water utilities to use supplemental water supplies to meet peak demands for reclaimed water.

WMDs – Be proactive in enabling reclaimed water utilities to use supplemental water supplies to meet peak demands for reclaimed water.

Utilities – Consider using supplemental water supplies to meet peak demands for reclaimed water.

What must be overcome for this alternative to succeed?

There are no major regulatory impediments. Before 1999, utilities faced uncertainty in implementing supplemental water supplies due to a lack of state rules governing supplemental water supplies. However, Rule 62-610.472, F.A.C., was established in 1999 to facilitate the use of supplemental water supplies. (In some areas, groundwater may not be available as a supplemental source in times of drought.)

What mix of incentives and mandates would be best?

No incentives or mandates are needed.

RW-10: Assist in ensuring economic feasibility for reuse utilities and end users

Reuse Area of Emphasis: **Encourage and Promote Reuse**

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦	♦			$	$		✓	✓	

Background and general information

Funding programs will serve to actively encourage and promote reuse.

Specific recommendation

For reuse systems to be implemented successfully, end users (home owners, golf courses, farmers, industries, and others users of water) must agree to use reclaimed water in lieu of other water supplies. Hence, ensuring that use of reclaimed water is feasible for the end users ensures successful reuse system implementation. Similarly, implementation of reuse programs must be feasible for domestic wastewater utilities to ensure availability of sufficient supplies of reclaimed water. Water reuse systems are relatively expensive. Financial assistance in the form of grants or low-interest rate loans may serve as major incentives for municipalities and utilities to implement reuse programs.

Funding programs will serve to actively encourage and promote water reuse. This will result in increased recharge of available water resources and in increased conservation of potable quality water. In addition, funding programs offer opportunities to impose grant or loan conditions that will encourage efficient and effective use of reclaimed water. Viable water management district funding programs could be used to provide financial assistance to end users (both residential customers and major users like golf courses, farms, and industries) as they convert to the use of reclaimed water. A state loan program, with zero interest or negative interest rates, should also be considered.

Utilities are encouraged to implement viable reclaimed rate structures that will encourage water users to use reclaimed water, but must avoid overpricing reclaimed water. The water management districts should fully implement the mandatory reuse provisions in Chapter 62-40, F.A.C.

Education and outreach will play key roles.

What are the advantages and disadvantages?

Implementation of reuse systems by utilities will conserve potable quality water while recharging available water resources. For reuse systems to be implemented successfully, end users (home owners, golf courses, farmers, industries, and others users of water) must agree to use reclaimed water in lieu of other water supplies. Hence, ensuring that use of reclaimed water is feasible for the end users ensures successful reuse system implementation.

Who should implement it?

WMDs – Implement viable funding programs.

Utilities – Institute viable reclaimed rate structures that will encourage water users to use reclaimed water. Avoid overpricing of reclaimed water.

Water Users – Use reclaimed water.

What must be overcome for this alternative to succeed?

Limitations on available funds within the water management districts.

Costs of converting from use of other water sources to reclaimed water may constrain some water users.

What mix of incentives and mandates would be best?

Financial assistance from the water management districts will aid water users in converting from use of other water sources to the use of reclaimed water. This will encourage users to switch the reclaimed water.

As noted previously, legislative mandates may encourage the water management districts to implement viable funding programs.

A zero or negative interest state loan program could also be very helpful.

RW-11: Encourage reuse system interconnects

Reuse Area of Emphasis: **Encourage Efficient Reuse of Reclaimed Water**

Overall Score: 7 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Medium	7	♦	♦	♦			$	$		✓	✓	

Background and general information

This alternative refers to enhancing the connection between reclaimed water systems to facilitate reuse. More specifically, a connection between two or more reclaimed water distribution systems (may be owned or operated by different utilities) or between two or more domestic wastewater treatment facilities that provide reclaimed water for reuse activities.

Specific recommendation

Reuse system interconnects offer a means to increase both the efficiency and reliability of reuse systems. When two or more reuse systems are interconnected, there is additional flexibility present in meeting the demand of the reuse system customers, as well as an increase in the reliability of providing acceptable reclaimed water for reuse.

There are several mechanisms that could be utilized to encourage reuse system interconnects.

- Funding of reuse system improvements is always problematic for utilities. Grant funding could be made available to utilities specifically for interconnects between reuse systems.
- Conditions could be also be placed on grants for reuse system construction that would require interconnects between reuse systems, either within a utility's overall service area if several facilities exist, or between neighboring utilities.

What are the advantages and disadvantages?

Reuse system interconnects offer a means to increase both the efficiency and reliability of reuse systems. When two or more reuse systems are interconnected, there is additional flexibility present in meeting the demand of the reuse system customers, as well as an increase in the reliability of providing acceptable reclaimed water for reuse. For example:

- One system may be newer with fewer customers and be adjacent to a more mature system that could utilize additional reclaimed water to meet the needs of its customers.
- An interconnect between a mature reuse system and a system that has no reuse or limited reuse customers can help avoid or limit the need for a supplemental ground or surface water supply to meet seasonal demands in the more mature system.

- If one reclaimed water facility experiences a temporary problem with producing reclaimed water of acceptable quality, the interconnect with another facility can provide a means to enable continued delivery of reclaimed water to system customers while the problem is resolved.

Who should implement it?

WMDs – Implement funding programs that place an emphasis on interconnects between reuse systems and other measures to increase system efficiency and effectiveness.

DEP – Implement funding programs that place an emphasis on interconnects between reuse systems and other measures to increase system efficiency and effectiveness.

What must be overcome for this alternative to succeed?

Funding of reuse system interconnections either within a single utility or between utilities is almost always an impediment to their implementation. Seasonal storage is a critical component for maximizing benefits to the interconnected systems and ensuring the availability of reclaimed water.

What mix of incentives and mandates would be best?

Funding assistance can offer an incentive for reuse system interconnections. Mandates are not warranted at this time.

RW-12: Enable redirection of existing reuse systems to more desirable reuse options

Reuse Area of Emphasis: **Effective Reuse of Reclaimed Water**

Overall Score: 6 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Low	6	♦	♦	♦			$	$		✓		

Background and general information

Reuse activities are not all equally effective in conserving potable water sources or offsetting existing potable quality water use. Reuse is defined in Chapter 62-610, F.A.C., as "the deliberate application of reclaimed water, in compliance with Department and District rules, for a beneficial purpose." This definition results in many activities being considered as reuse. Rule 62-610.810, F.A.C., provides further guidance on which types of projects are considered "reuse" versus "effluent disposal."

Some existing reuse systems do not provide for a significant reduction in water demand and may not serve to effectively recharge or supplement water sources. If these existing systems (and new ones as well) could be directed to implement reuse projects that are more desirable from a water conservation perspective, additional water conservation benefits could be realized.

Specific recommendation

Section 403.064, F.S., requires that DEP permits for domestic wastewater facilities be consistent with requirements for reuse contained in water use permits issued by the WMDs. This statutory directive could be used to guide utilities in the direction of the most efficient and effective types of reuse.

Rule 62-610.800(10), F.A.C., provides clarification of how the DEP will apply the requirement in Section 403.064, F.S., for consistency between water use permits and DEP's domestic wastewater and reuse permits. Currently, this rule stipulates that DEP will not force abandonment of an existing permitted reuse system with a reuse system that is judged to be more efficient or effective. This rule should be revised to enable re-directing of less efficient reuse systems toward more efficient reuse systems that will result in increased water savings or more effective water management.

Utilities that have existing reuse systems that do not contribute significantly to water conservation or assist in recharging our potable water sources should be encouraged to implement projects that are more effective and desirable from a water conservation perspective. Funding assistance will also be likely to be necessary to enable redirection, due to the investment that has already been made by the utility in many cases. Appendix E contains a listing of reuse activities allowed by DEP rules and table showing the relative desirability of different reuse activities.

Another strategy that could be utilized would be the option of long-term DEP permits for wastewater utilities that implement effective and efficient reuse programs.

What are the advantages and disadvantages?

Some existing reuse systems may not provide for a significant reduction in potable water demand or may not serve significantly recharge or augment potable water resources. If these existing systems and new ones as well, could be directed to implement projects that are more desirable from a water conservation perspective, additional water conservation benefits could be realized.

Funding of new improvements to re-direct an existing system is problematic.

Who should implement it?

DEP – Consider revising Rule 62-610.800(10), F.A.C., to enable re-directing of existing inefficient reuse systems to more efficient reuse types. Consider proposing legislation to modify Section 403.087, F.S., to enable long-term permits for effective and efficient reuse systems.

WMDs – Implement effective funding programs that target the most effective forms of reuse.

What must be overcome for this alternative to succeed?

Funding of the most conservation-oriented and desirable reuse systems is an impediment. If changes were made to 62-610, F.A.C. to simply require that all reuse systems be comprised of the most effective and desirable forms of reuse the most significant impediment would be funding of the new improvements. In some cases, utilities would have to abandon the existing system and implement an entirely new reuse system.

If the statute and appropriate DEP rules such as Chapter 62-620, and 62-610, F.A.C., were revised to allow the issuance of long-term permits for utilities with systems that incorporate the most effective and desirable reuse activities, the impediments would be greatly reduced. Implementing long term permits with funding assistance to implement projects, and both reclaimed water conservation, as well as conservation of potable water sources would be maximized.

What mix of incentives and mandates would be best?

Long term DEP permits for wastewater utilities implementing effective and desirable reuse programs would be a great incentive to re-direct existing reuse systems to more effective reuse activities. Changes to the statute governing the issuance of ten-year permits would be necessary.

Funding assistance would also be a necessary incentive to enable redirection of existing reuse systems to more effective reuse options.

Mandates are not necessary at this time.

RW-13: Facilitate permitting of backup discharges

Reuse Area of Emphasis: **Encourage and Promote Reuse**

Overall Score: 6 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)					Cost-Effectiveness (1 to 3)			Ease of Implementation (1 to 3)		
Low	6	♦	♦				$	$		✓	✓	

Background and general information

When reuse systems first come on-line, the supply of reclaimed water exceeds demand requiring the utility to discharge or store (which can involve considerable expense) the reclaimed water. The purpose of this recommendation is to facilitate the permitting of temporary discharge sites that can be phased out as the reuse facility matures and demand catches up with supply.

Specific recommendation

DEP should remain proactive in review of permit applications for new and expanded surface water discharges that serve as needed backups to reuse systems. This should include looking at ways to permit surface water discharges that serve as backups to reuse systems during the initial periods of surplus supplies of reclaimed water. Existing mechanisms for permitting backup discharges should be explored with permit applicants. Available mechanisms include:

- Limited wet weather discharges allowed under Rule 62-610.850, F.A.C.
- Backup discharges authorized by the APRICOT Act (Section 403.086, F.S.).
- Discharges authorized by the Grizzle-Figg Act (Section 403.086, F.S.).
- Backup discharges authorized by the Indian River Lagoon and Basin Act.
- Discharges permitted under the provisions of Chapter 62-650, F.A.C. This includes the possibility of seasonal discharge limits.

As the reuse system matures and demands for reclaimed water grow, backup discharges may represent a waste of the reclaimed water product. As a result, the DEP should consider including permit conditions that reduce the availability of the backup discharge mechanism, as demand for reclaimed water increases.

What are the advantages and disadvantages?

During the first several years of operation, a new or expanded reuse system probably will face a period during which supplies of reclaimed water will exceed demands. As the reuse system matures and demands increase, the surplus of reclaimed water will tend to decline.

During the initial period of surplus reclaimed water supplies, the utility will benefit from an alternate disposal system. Alternatively, large storage systems could be used. However, such storage would be expensive and would have limited utility as water demands grow and the initial surplus of reclaimed water diminishes. During this initial period of surplus supplies, alternate disposal mechanisms, like a permitted surface water discharge, will facilitate implementation of the reuse system.

Who should implement it?

DEP – Be proactive in allowing use of available mechanisms for permitting backup discharges. Consider permit conditions designed to encourage aggressive expansion of demands for reclaimed water within the utilities' service areas.

What must be overcome for this alternative to succeed?

Any surface water discharge is subject to NPDES permitting and must be predicated on ensuring compliance with applicable water quality standards. The backup discharge mechanisms outlined above represent constraints on the permitting of backup discharge mechanisms.

Any new or expanded surface water discharge, including backup discharges, is subject to the Antidegradation Policy. The Antidegradation Policy includes provisions that favor implementation of reuse over a new or expanded surface water discharge. Hence, the permittee must demonstrate that the proposed backup discharge is clearly in the public interest. While this test is easier for a surface water discharge that serves as a backup to a reuse system than it would be for a pure disposal system, it is not an automatic. Normally, the permittee will be called upon to demonstrate that more aggressive implementation of reuse would not reasonably reduce the need for the backup discharge.

Handling of excess supplies of reclaimed water may pose significant financial constraints on a utility implementing a reuse system. As noted, this is particularly true for new or expanded reuse systems that initially face significant excess supplies of reclaimed water.

What mix of incentives and mandates would be best?

Where warranted, issuance of a permit with a backup discharge mechanism may serve as an incentive to the utility to implement a worthwhile reuse project.

Permit conditions reducing the availability of a backup discharge as demands for reclaimed water grow may serve as incentives for utilities to aggressively pursue increasing demands for reclaimed water within their service area.

Mandates are not needed.

Next Steps: Where Do We Go From Here?

Following the release of the public review draft of this report in November 2001, the Department held three public workshops to solicit input on the recommendations in the draft, and ideas on how best to implement them. The draft was also widely distributed with a request for written comments to be submitted by January 11, 2002. The Department proposes both a set of guiding principles and a framework for implementation as a starting point for the discussion of future action.

Guiding Principles

The Department believes that the principles with which the Water Conservation Initiative began must be continued in subsequent activities:

- **Facilitate participation by all interested parties.** The Water Conservation Initiative was open to all parties. This was facilitated by holding meetings in different parts of the state, by posting information on the Department's website, and by accepting comments at public meetings, through e-mail, and in written correspondence. The Initiative benefited greatly from this inclusiveness.

- **Continue to work toward a goal of consensus.** Most of the recommendations in this report are the consensus of the Work Group participants. The Department believes that the best ideas will generally be those on which there is wide consensus among those with knowledge of the topic.

- **Organize future work on water conservation by topic or type of water use.** The initial work groups were organized around specific use sectors or topics of interest across sectors, such as reuse of reclaimed water and water pricing. This served well to keep the Work Groups focused, and to allow participants to join groups where their expertise could be most effective.

- **Focus on cost-effective conservation measures.** Participants in the Initiative were asked to evaluate their recommendations on, among other things, cost effectiveness. The Department believes that future work should continue this emphasis on promoting conservation measures that are more cost effective than developing new supplies.

- **Focus on measures that result in permanent water savings.** From the beginning, the Initiative sought to develop recommendations that would conserve water in times of plenty as well as during drought. There was wide consensus among the participants that permanent measures (such as improved technology, water pricing and appliance standards) that do not rely on personal sacrifice or voluntary compliance would save the most water in the long term.

Implementation Framework

The Department proposes an implementation framework to secure the genuine commitment of those who choose to participate. That framework includes:

- **A statement of formal commitment.** Participants will be asked to "pledge" their continued support for water conservation, to name a representative who will participate in future meetings and activities, to choose on which of the Work Group(s) they would like to participate in the future, and, where possible, to state what actions the participating individual or group will take to further the Initiative.

- **Tracking progress**. We must monitor progress in implementing our recommendations. The DEP, in cooperation with the WMDs and others, will prepare periodic progress reports on the Initiative.

- **Revision of recommendations over time.** The Initiative will continue to revise recommendations as new information is developed.

- **Periodic public meetings.** This will allow interested parties an opportunity to review progress and reevaluate priorities. Three such meetings are anticipated during the summer and fall of 2002.

- **Continued overall coordination by DEP.** This next phase of the WCI places a great deal of reliance upon other agencies, private organizations, and individuals to move from discussing water conservation to actual implementation. This new emphasis is necessary because the authority and ability to implement most of the recommendations lies with those other parties. The DEP will work to implement those recommendations that fall within its scope of responsibility, and will continue to oversee the general progress of the initiative, arranging meetings and other communications between the participants, and reporting on the progress being made.

Implementation Work Groups

The Initiative will continue to address the topic areas of the original six Work Groups: Agricultural Irrigation, Landscape Irrigation (formerly Non-Agricultural Irrigation), Water Pricing, Industrial/Commercial/Institutional Use, Indoor Water Use (formerly Indoor Use and Water Features), and Reuse of Reclaimed Water. In addition, the two new Work Groups discussed below will be created.

Research Agenda Work Group

A common theme across Work Groups was the need for additional research in various areas relating to water conservation. Appendix J is a first draft of a research agenda. Interested parties will be asked to refine and further develop the agenda.

Education/Outreach Work Group

Every Work Group had recommendations relating to the need for improved education and outreach. Some participants felt there was a need for a coordinated statewide effort, while others thought that regionally tailored programs were preferred, or that outreach should be regarded as a regular component of all water conservation measures. The issue was not discussed in sufficient detail to reach consensus on a course of action, so a new Work Group is being created to address the issue. Appendix K is a list of preliminary topics for the Work Group.

Water Conservation at State Facilities

No Work Group will be formed to address this issue, but the DEP, at the Governor's request, will track and periodically report on water conservation at state facilities. Appendix L is the initial report on this topic.

Appendices

Appendix A: Outline of Information Requested in the Reports of the Water Conservation Initiative Work Groups

Each Work Group was requested to prepare the following final report and recommendations:

1. Completion of scoring table below.
2. For each water conservation alternative recommended as either "high" or "medium" priority, an evaluation of each of the following characteristics of the alternative:
    a. What are the *benefits* of the conservation alternative (environmental, economic, other)?
    b. How should the conservation alternative be implemented? Who should implement it?
    c. Are there statutory, rule or ordinance *impediments* that prevent water use efficiency in this use sector?
    d. Are there statutory, rule or ordinance *incentives* that could be added to promote water use efficiency in this use sector?
    e. Are there statutory, rule or ordinance *mandates* that would be appropriate to add to increase water use efficiency in this use sector?
    f. Are there *Financial or economic constraints* that impede progress in water use efficiency in this area? How could these impediments be addressed?
    g. What is the appropriate *state role* for water conservation in this use area? WMD role? Local Government Role? Private Sector Role?
    h. Are there any *similar alternatives* that have been implemented in some parts of the state or other states that have proven to be successful? Could these be implemented statewide?
    i. *Research needs* that could provide benefits for water conservation in this use sector?
3. Any general recommendations that do not fit within any single water conservation alternative.
4. Any other information or recommendations deemed helpful by the Work Group (e.g., conflicting alternative recommendations)

			A					B			C		
Water Conservation Alternative	**Priority**	**Total Score**	**Amount of Water Saved (1 to 5)**					**Cost-Effec-tiveness (1 to 3)**			**Ease of Imple-menting (1 to 3)**		
	High, Medium or Low	(A + B + C)[1]											

[1] The initial direction to the Work Groups was to score column C from 3 to 1, in terms of "ease of implementing the alternative, and then subtract the score from the sum of the two other scoring factors. Some of the Work Groups and this report simplified the scoring by changing the directions of the assigned score, and adding that score to the other two. It was also necessary in the DEP report to convert the decimal scorings assigned by two Work Groups into integers.

Appendix B: Suggested Roles for Key Parties in Implementing Water Conservation Recommendations

Water conservation is the shared responsibility of all levels of government, businesses, private groups, and individuals. This summary table shows only some of the parties that may have an important role in improving the efficiency of water use.

			Key Parties								
			Legislature								
Water Conservation Alternative	Priority	Score	Funds	Laws	DACS	DEP, WMDs	Local Govt	Other St. Agencies	Univ. Syst.	Private Assocs.	USDA/ EPA
Agricultural Irrigation											
AI-1: Cost share and other incentives	High	10	✓		✓	✓					✓
AI-2: More mobile irrigation labs to achieve water conservation BMPs	High	10	✓		✓	✓					✓
AI-3: Increase rainfall harvesting and recycling of irrigation water	High	9			✓	✓					✓
AI-4: Increase the reuse of reclaimed water	High	9	✓	✓	✓	✓	✓	✓ (PSC)			✓
AI-5: Improve methods to measure water use and estimating agricultural water needs	Medium	8			✓	✓			✓	✓	✓
AI-6: Conduct additional research to improve agricultural water use efficiency	Medium	8	✓		✓	✓			✓		✓
AI-7: Increase education and information dissemination	Medium	8	✓		✓	✓	✓	✓	✓	✓	✓
AI-8: Amend water management district rules to create incentives for water conservation	Medium	8				✓					

Water Conservation Alternative	Priority	Score	Legislature		Key Parties						
			Funds	Laws	DACS	DEP, WMDs	Local Govt	Other St. Agencies	Univ. Syst.	Private Assocs.	USDA/ EPA
Landscape Irrigation											
LI-1: Develop and adopt state irrigation design & installation standards and require inspection.	High	10		✓		✓		✓		✓	
LI-2: Expand and coordinate current educational and outreach programs on water-efficient landscaping and irrigation	High	9	✓		✓	✓	✓		✓	✓	✓
LI-3: Establish a statewide training and certification program for irrigation design and installation professionals.	High	9	✓	✓		✓		✓	✓	✓	
LI-4: Develop environmentally sound guidelines for review of site plans	Medium	8				✓	✓	✓	✓	✓	
LI-5: Conduct applied research to improve turf and landscape water conservation	Medium	8	✓		✓	✓			✓		✓
LI-6: Establish a training and certification program for landscape maintenance workers.	Medium	7		✓		✓	✓		✓	✓	
LI-7: Evaluate the use of "water budgeting" as an effective water conservation strategy	Low	6				✓	✓		✓	✓	
LI-8: Evaluate the need to establish consistent statewide watering restrictions for landscape irrigation	Low	6				✓	✓			✓	
Water Pricing to Promote Conservation											
WP-1: Phase In Conservation Rate Structures	High	10		✓		✓		✓ (PSC)			
WP-2: Require Drought Rates as part of utility conservation rate structures	Medium	8		✓		✓		✓ (PSC)			

Water Conservation Alternative	Priority	Score	Legislature		Key Parties						
			Funds	Laws	DACS	DEP, WMDs	Local Govt	Other St. Agencies	Univ. Syst.	Private Assocs.	USDA/ EPA
WP-3: Consider using market principles in the allocation of water, while still protecting the fundamental principles of Florida water law	Medium	7		✓		✓					
WP-4: Improve Cost-Effectiveness in the Next Cycle of Regional Water Supply Plans	Medium	7				✓					
WP-5: Phase In Informative Billing	Medium	7		✓		✓	✓	✓			
WP-6: Require more accurate and widespread measurement of water use, including metering and sub-metering											
a) Sub-Metering of New Multi-Family Residences	Medium	7		✓		✓	✓			✓	
b) Sub-Metering Retrofit of Existing Multi-Family Residences	Low	6	✓			✓	✓			✓	
WP-7: Adopt Additional State Guidance on Water Supply Development Subsidies	Low	6		✓		✓					
Industrial/Commercial/Institutional											
ICI-1: Consider establishing a "Conservation Certification" Program	High	10		✓	✓	✓	✓		✓	✓	
ICI-2: Consider a range of financial incentives and alternative water supply credits	High	10	✓			✓					
ICI-3: Consider cooperative funding for the use of alternative technologies to conserve water	High	9	✓			✓					✓
ICI-4: Implementation of additional water auditing programs	Medium	8				✓	✓			✓	✓
ICI-5: Promote utilization of reclaimed water	Medium	8	✓			✓	✓	✓ (PSC)			✓

Water Conservation Alternative	Priority	Score	Key Parties: Legislature: Funds	Legislature: Laws	DACS	DEP, WMDs	Local Govt	Other St. Agencies	Univ. Syst.	Private Assocs.	USDA/ EPA
ICI-6: Investigate methods of assuring that large users from public suppliers have the same conservation requirements as individual permittees	Low	6				✓	✓				
Indoor Use and Water Features											
IWU-1: Expand programs to replace inefficient toilets	High	10	✓			✓	✓				✓
IWU-2: Require that inefficient plumbing fixtures be retrofitted at time of home sale.	High	9		✓			✓	✓			
IWU-3: Provide incentives to retrofit inefficient home plumbing fixtures	High	9				✓	✓	✓			✓
IWU-4: Support national dishwasher and clothes washer standards; offer incentives for purchasing efficient washers	High	9		✓		✓		✓		✓	
IWU-5: Create a water auditor inspection program for the sale of new and existing homes, supported by a refundable utility service fee	Medium	8		✓		✓	✓	✓		✓	
IWU-6: Coordinate and intensify the statewide water conservation education campaigns	Medium	8	✓		✓	✓	✓	✓	✓	✓	✓
IWU-7: Evaluate the potential for gray water use	Low	5		✓	✓	✓	✓	✓ (DOH)			✓
IWU-8: Investigate the potential for cisterns	Low	4				✓	✓				

Water Conservation Alternative	Priority	Score	Legislature		Key Parties						
			Funds	Laws	DACS	DEP, WMDs	Local Govt	Other St. Agencies	Univ. Syst.	Private Assocs.	USDA/ EPA
Reuse of Reclaimed Water											
RW-1: Encourage metering and volume-based rate structures for reclaimed water service	High	10		✓	✓	✓	✓	✓ (PSC)			
RW-2: Education and Outreach	High	9	✓		✓	✓	✓	✓	✓	✓	✓
RW-3: Facilitate seasonal reclaimed water storage (including ASR)	High	9				✓	✓				✓
RW-4: Link Reuse to Regional Water Supply Planning	High	9		✓	✓	✓	✓				
RW-5: Implement viable funding programs	High	9	✓		✓	✓	✓				✓
RW-6: Promote agency support of groundwater recharge and indirect potable reuse	High	9				✓					✓
RW-7: Encourage reuse in Southeast Florida	High	9	✓		✓	✓	✓				✓
RW-8: Consider CUP incentives for utilities that implement reuse programs	Medium	8				✓					
RW-9: Encourage use of supplemental supplies	Medium	7				✓					
RW-10: Assist in ensuring economic feasibility for reuse utilities and end users	Medium	7	✓			✓	✓	✓			✓
RW-11: Encourage reuse system interconnects	Medium	7				✓	✓	✓ (PSC)			
RW-12: Enable redirection of existing reuse systems to more desirable reuse options.	Low	6		✓		✓	✓				✓
RW-13: Facilitate permitting of backup discharges	Low	6				✓	✓				✓

Appendix C: Glossary[1]

Water Conservation: Preventing and reducing wasteful, uneconomical, impractical, or unreasonable use of water resources (Section 62: 40.412(1), F.A.C.)

Alternative sources: Sources other than traditional ground or surface water sources, which do not contribute to, and may alleviate, impacts to water resources.

Alternative Supplies Credits: Incentives to water suppliers and users for developing sustainable, alternative sources such as reuse, desalination, and stormwater ASR.

Artificial recharge: The intentional addition of water to an aquifer by injection or infiltration (e.g., directing surface water onto spreading basins).

ASR: Aquifer storage and recovery.

Audit (end use): A systematic accounting of water uses by end users (e.g., residential, landscape, commercial, industrial, institutional, or agricultural customers), usually conducted to identify potential opportunities for water use reduction through efficiency measures or improvements.

Audit (system): A systematic accounting of water throughout the production, transmission, and distribution facilities of a water supply system.

Avoided cost: The financial savings achieved by undertaking a given activity, such as implementing a water efficiency measure, which eliminates, reduces or postpones other, greater costs; can be used to establish the least cost means of achieving a specified goal.

Best Management Practice (BMP): a conservation measure or system of business procedures that is beneficial, empirically proven, cost effective, and accepted in the user community.

Budget (water use): An accounting of total water use or projected water use for a given activity, facility, or location.

Building and plumbing code improvements: Changes to codes that require the installation of water-efficient equipment and use of construction techniques that reduce water needs in new and remodeled structures.

Conservation rate structures: Design of water rates that promote the efficient use of water, such as inclining block rates, marginal cost pricing, and seasonal surcharges.

Consumptive Use Permit (CUP): Use of any water which reduces the supply from which it is withdrawn or diverted. (See "Water Use Permit")

Consumptive Use: Use of any water which reduces the supply from which it is withdrawn or diverted.

Cost-effectiveness: The comparison of total costs relative to benefits; costs are usually expressed in dollars, but benefits can be expressed in other units (e.g., a quantity of water).

Crop research: Conducting scientific research into ways to reduce the amount of water required by agricultural crops.

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[1] This Glossary was developed from a number of sources, including the Work Group Reports, the SWFWMD glossary of terms (http://www.swfwmd.state.fl.us/faqgloss/glossary/d_dictac.htm), and Amy Vickers, *Handbook of Water Use and Conservation*, 2001.

DACS: Florida Department of Agriculture and Consumer Services

DCA: Florida Department of Community Affairs

Declining (or decreasing) block rate: A pricing structure in which the amount charged per unit of water (e.g., dollars per 1,000 gallons) decreases as customer water consumption increases. This type of rate structure is not considered to be water conserving.

Dedicated metering: Metering water service for a single type of use (e.g., landscape irrigation).

Demand management: Water efficiency measures, practices, or incentives implemented by water utilities to reduce or change the volume and/or pattern of customer water demand.

DEP: Florida Department of Environmental Protection

DOE: Florida Department of Education

DOH: Florida Department of Health

Domestic use: The use of water for the individual personal household purposes of drinking, bathing, cooking, or sanitation.

Drip irrigation: A type of microirrigation system that operates at low pressure and delivers water in slow, small drips to the root zones of individual plants or groups of plants through a network of plastic conduits and emitters; also called trickle irrigation.

Drought rates: Rate structures that impose higher rates during water shortages in order to reduce water use.

Drought: An extended period of below normal precipitation that can result in water supply shortages, increased water demand, or both.

Dual flush toilet: A toilet designed to use a lower volume of water (partial flush) to flush a toilet bowl containing liquid-only wastes and a higher volume (full flush) to remove solid wastes.

End use: The ultimate destination of water; fixtures, appliances, equipment, and activities that use water.

End user: The ultimate consumer of water (e.g., a residential, commercial, industrial, or agricultural water customer).

F.A.C.: Florida Administrative Code

F.S.: Florida Statutes

Fixed charge: The portion of a water or reclaimed water bill that does not vary with water use.

Flat rate: A fee structure in which the price of water or reclaimed water per unit is constant, regardless of consumption. This type of rate structure is not considered to be water conserving.

FYN: Florida Yards and Neighborhoods program.

GPD: Gallons per day

GPCD: Gallons per capita per day

Gray water: Untreated, used water from a household or small commercial establishment (excluding that from toilets or other fixtures and appliances whose wastewater might have come into contact with human waste); conceptually, could be used for non-potable purposes, such as irrigation and industrial purposes.

Groundwater: Water beneath the surface of the ground, whether or not flowing through known and definite channels.

Inclining block (or increasing block) rate: A pricing structure in which the amount charged per unit of water or reclaimed water (e.g., dollars per 1,000 gallons) increases as customer water consumption increases.

Indoor water use audits: Systematic study that evaluates indoor water usage and ways to improve water conservation. May include an inspection of plumbing devices to determine if more efficient fixtures can be used and the provision of water conservation literature and giveaways such as low-flow shower-heads, faucet aerators, and watering schedules.

Informative billing: Including information on water bills that educates water users on their patterns of water use, the cost of water, and ways in which to conserve water.

In-school education: Methods to enhance local school systems' exposure to water resource and water conservation information in the classroom.

Irrigation: The application of water to soil with the intent to meet the water needs of crops, turf, shrubbery, gardens, or wildlife food and habitat, not satisfied by rainfall.

Irrigation audit: An onsite evaluation of an irrigation system to assess its water use efficiency as measured by distribution uniformity, irrigation schedule, and other factors.

Irrigation efficiency: The efficiency of irrigation water application and use, determined by calculating the amount of water beneficially applied divided by the total volume applied, expressed as a percentage, decimal, or ratio.

Irrigation plan and installation approval: Local ordinances and code practices to ensure that new irrigation systems are designed and installed to maximize efficiency (e.g., to Xeriscape standards).

Irrigation recovery: Programs that encourage the return of irrigation water leaving a field to be returned for additional beneficial use.

Irrigation return flow: Applied water that is not transpired, evaporated, or infiltrated into a ground-water basin but that returns to a surface water source.

Leak detection and repair: A routine and systematic search for leaks in a distribution system using equipment to pinpoint the location of the leaks. May also refer to detecting leaks inside the home or office, and the immediate repair of located leaks.

Lifeline rate: A minimum, sometimes subsidized, rate for an adequate amount of water to meet basic human needs.

Low volume showerhead: A showerhead that uses no more than 2.5 gallons per minute at 80 pounds of pressure per square inch; also referred to as low flow or efficient showerhead.

Low volume or water-efficient toilet (water closet): A toilet that uses no more than 1.6 gallons per flush; also referred to as low flow or efficient toilet.

Manufacturing or industrial process improvements: Equipment improvements or process changes for industrial, manufacturing, mining process, or thermoelectric power generation that result in reductions in water use without reducing production.

Marginal cost pricing: A rate design method in which prices reflect the costs associated with producing the next increment of supply.

Market transfers of conserved quantities: Within a permitting and market framework, allowing water allocated to one water user to be transferred to another water user.

Master meter: A large meter located upstream of other smaller meters and used for water accounting or billing purposes.

Meter: An instrument that measures water use; often installed by a water utility to measure end uses, such as uses by a household, building, facility, or irrigation system.

Metering, submetering, and other methods to measure water use: Monitoring of water and reclaimed water use to provide baseline information on quantities of overall water use, which informs the user on how much they actually use.

MGD: Million gallons per day

Micro irrigation: Low volume, efficient irrigation systems and hardware, which apply water directly or very close to the plant's root system, without runoff or waste.

MILs (Mobile Irrigation Labs) and irrigation evaluations: Evaluations of irrigation systems and practices with advice for improving water use efficiency.

Nonconsumptive use: Water withdrawn for use but not consumed and thus returned to the source.

NRCS: Natural Resource Conservation Service.

NWFWMD: Northwest Florida Water Management District

Offset: The amount of potable quality water saved through the use of reclaimed water. Expressed as a percentage of the amount of reclaimed water used.

Peak demand: The highest total water use experienced by a water supply system measured on an hourly, daily, monthly, or annual basis.

Plumbing retrofits at time of home sale: The replacement of plumbing fixtures in older (pre-1995) homes with newer plumbing fixtures meeting 1994 plumbing code requirements before it can be marketed, sold or occupied.

Plumbing Code: A statute or regulation that may require the installation of plumbing equipment and use of construction techniques that reduce water needs in new and remodeled structures.

Price elasticity of demand: A measure of the responsiveness of customer water use to changes in the price of water; measured by the percentage change in use divided by the percentage change in price.

Pricing signals: Rate structures that encourage water conservation

PSC: Public Service Commission

Public information/education: Enhancing the awareness and understanding of the importance of water conservation and the availability of practical solutions. Providing action steps for the public to practice conservation.

Rain sensors: Devices that automatically shut off automatic irrigation systems when they detect a preset amount of rainfall.

Rate structures: Water rates that are set at levels designed by utilities to provide necessary cost recovery for the utility and to encourage water conservation by water users.

Reasonable-beneficial use: The use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and consistent with the public interest.

Recharge fraction: The portion of reclaimed water used in a reuse system that recharges an underlying potable quality groundwater (Class F-I, G-I, or G-II groundwater) that is used for potable supply, or augments a Class 1 surface water, expressed as a percentage of the amount of reclaimed water used.

Reclaimed water: Water that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility.

Regional water supply planning: Process by which the water management districts develop twenty-year water supply plans.

Retrofit kits (showerheads, etc.): Programs in which homeowners are given plumbing retrofit kits that contain water saving, easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices.

Retrofit: To change, alter, adjust, or replace parts of plumbing fixtures or other equipment or appliances to save water or make them operate more efficiently.

Return flow: Water that reaches a surface water or groundwater source after being released from its point of use; thus it become available for further use.

Reuse: The deliberate application of reclaimed water, in compliance with Department and District rules, for a beneficial purpose. Criteria used to classify projects as "reuse" or "effluent disposal" are contained in Rule 62-610.810, F.A.C. (12).

Seasonal rates: The unit price of water increases during the peak seasonal use period.

SFWMD: South Florida Water Management District

SJRWMD: St. Johns River Water Management District

Soil moisture sensors: Devices that automatically trigger irrigation when necessary, based on the soil moisture as determined by several related factors (eT, soil type, etc.).

SRWMD: Suwannee River Water Management District.

Submeter: A water meter that records water use by a specific process, by a building within a larger facility, or by a unit within a larger service connection (such as apartments in a multifamily building).

Surcharges: An additional monetary charge levied by a utility over and above the fixed and variable charge portions of the rate structure.

SWFWMD: Southwest Florida Water Management District

Tailwater recovery system: A system used to collect, store, and recycle irrigation water and other runoff.

Toilet water displacement device: A toilet retrofit device (e.g., a dam, bag, or bottle) designed to displace water in the toilet tank in order to reduce the volume required for flushing.

Training and certification for irrigation professionals: Programs requiring designers, installers, and maintenance personnel for irrigation systems to be trained and certified to meet appropriate standards.

Ultralow volume toilet: See low volume toilet.

Unaccounted for water: Water that does not go through meters (e.g., water lost from leaks or theft) and thus cannot be accounted for by the utility.

Uniform rate: A pricing structure in which the price per unit of water is constant, regardless of the amount used.

Utilization rate: The ratio of the amount of reclaimed water used to the amount of domestic wastewater being treated. This can be expressed as a percentage, and may be used to describe an individual wastewater treatment plant or to describe a collection of treatment facilities (such as those in a county, water management district, or state).

Variable charge: The portion of a water bill that varies with water use; also known as a commodity charge.

Volume-based rates: Rates for water that are based on the amount of water used. May or may not be water-conserving rates.

Water audit: An examination of system records and equipment that may be used to identify, quantify, and verify how much water passes through the system and where it goes. Water audits are beneficial in identifying the amount of unaccounted-for water.

Water budgeting: Programs that limit the total amount of water to be used for irrigation to an annual budget, based on water needs, soil moisture, and other characteristics of a landscape.

Water conservation: Preventing and reducing wasteful, uneconomical, impractical, or unreasonable use of water resources (Section 62-40.412(1), F.A.C.)

Water conservation incentive: A policy or regulation, rate strategy, or public education, campaign designed to promote customer awareness about the value of reducing water use and to motivate consumers to adopt specific water conservation measures.

Water conservation measure: An action, behavioral change, device, technology, or improved design or process implemented to reduce water loss, waste, or use.

Water-efficient clothes washers: New water and energy efficient clothes washers to replace conventional, high water use models. Usually implemented through incentive programs such as rebates to homeowners.

Water-efficient dishwashers: New water and energy efficient dishwashers to replace conventional, high water use models. Usually implemented through incentive programs such as rebates to homeowners.

Water feature: A pool, fountain, water sculpture, waterfall, constructed pond or lake, canal, channel, or other decorative feature that uses water as part of its design composition.

Water harvesting: The capture and use of runoff from rainfall and other precipitation

Water transfers: Selling or exchanging water or water rights among individuals or agencies.

Water Use Permit (WUP): A permit issued by a water management district authorizing the use of water from a groundwater or surface water source for a specific need. (Also termed a Consumptive Use Permit (or CUP).)

Water use efficiency: The water use requirements of a particular device, fixture, appliance, process, piece of equipment, or activity usually compared with its optimal (minimum) water use requirements.

Water use survey: See water audit

Whole Farm Planning alternative to traditional regulation: An alternative regulatory process that would functionally combine "Water Use" and "ERP" permitting into a single, streamlined process that could be made available to agricultural producers who implement and maintain BMPs.

WMD: Water management district.

Xeriscape: A type of quality landscaping that conserves water and protects the environment by using site-appropriate plants, an efficient watering system, proper planning and design, soil analysis, practical use of turf, the use of mulches (which may include the use of solid waste compost), and proper maintenance.

Year-round water use restrictions: Water use restrictions, such as the timing and frequency of lawn irrigation, which could be adopted as permanent restrictions instead of temporary measures during times of water shortage.

Appendix D: Selected Information Resources[1]

Water Conservation

Southwest Florida Water Management District- Water Conservation website: Florida's most extensive source of information on conserving water for agricultural, residential, industrial, and commercial water use. Includes on-line library of water conservation research and program model for estimating savings and costs of various water conservation programs. Each of the other WMD websites also have substantial information on water conservation. www.conservationinfo.org

DEP Water Reuse Program: Complete information on reuse of reclaimed water in Florida. www.dep.state.fl.us/water/reuse

AWWA WaterWiser - The Water Efficiency Clearinghouse: American Water Works Association and Bureau of Reclamation website containing water conservation research, calendar of conservation events, links to other water conservation information, product information, conservation contractors and more. www.waterwiser.org

***Handbook of Water Use and Conservation: Homes, Landscapes, Businesses, Industries and Farms*, by Amy Vickers, 2001:** A comprehensive guide to all aspects of water conservation, available from WaterPlow Press, Amherst, MA. www.waterplowpress.com

EPA's Water Efficiency Program: This website provides an overview of EPA's Water Efficiency Program which is primarily concerned with municipal water use. A broad spectrum of stakeholders, from homeowners to state governments, can find information here that can help them become more water-efficient. www.epa.gov/OWM/genwave.htm

EPA Energy Star Program: A certification program that identifies and promotes energy and water efficient appliances and building practices. www.energystar.gov

EPA Water Conservation Plan Guidelines, 1998: Helpful guidelines for small, medium and large utilities to develop their own customized water conservation plan/program. Document EPA-832-D-98-001, August, 1998.

Florida Yards and Neighborhoods Program: A University of Florida, Cooperative Extension Service program that can transform your yard into a beautiful oasis that will not only conserve water and reduce pollution, but will also help you save time, energy and money. www.hort.ufl.edu/fyn

Other informative water conservation websites:

- Tampa Bay Water www.tampabaywater.org/Conservation/Conservation
- North Miami Beach www.nmbworks.net
- Sarasota County www.co.sarasota.fl.us/environmental_services/savewater
- Marin Municipal Water District www.marinwater.org/waterconservation.html
- Los Angles Conservation Services, www.ladwp.com/water/conserv

[1] This abbreviated list of water conservation information resources does not include many worthwhile resources. It is intended to provide a starting point to learn more.

- Scottsdale, Arizona www.ci.scottsdale.az.us/water/conservation.asp
- Metropolitan Water District of Southern California www.mwd.dst.ca.us/mwdh2o/pages/conserv/conserv01.html
- Albuquerque, New Mexico www.cabq.gov/waterconservation/program.html

Water Resources Information

DEP Division of Water Resource Management: Information regarding water quality, drinking water protection, wastewater treatment, reuse of reclaimed water and state water policy. 2600 Blair Stone Road, Tallahassee FL 32399, Telephone (850) 487-1855. www.dep.state.fl.us/water

Florida's five water management districts: Extensive information regarding water resource management including water supply planning, regional hydrology, wetlands protection and permitting for the consumptive use of water:

Northwest Florida Water Management District: 81 Water Management Drive, Havana, Florida 32333-4712. Telephone: 850-539-5999, Fax: 850-539-4380, www.state.fl.us/nwfwmd

Suwannee River Water Management District: 9225 County Road 49, Live Oak, FL 32060, Phone: (386) 362-1001 or 1-800-226-1066, www.srwmd.state.fl.us

St. Johns River Water Management District: P.O. Box 1429, Palatka, FL 32178-1429, Telephone: (386) 329-4500 or (800) 451-7106, http://sjr.state.fl.us.

South Florida Water Management District: 3301 Gun Club Road, West Palm Beach, Florida 33416-4680, Telephone (561) 686-8800 or 1-800-432-2045, www.sfwmd.gov

Southwest Florida Water Management District: 2379 Broad Street, Brooksville, Fl 34604-6899, Phone: 352-796-7211, 800-423-1476 (FL only), www.swfwmd.state.fl.us or www.watermatters.org

DEP Office of Water Policy, Division of Water Resource Management: Helps implement state water policy with Florida's five water management districts. The Office of Water Policy coordinated the Florida Water Conservation Initiative. This report as well as the six WCI work group reports are available on the OWP website. The Florida Water Plan, the Annual Status Report on Regional Water Supply Planning, and other reports are also available. 2600 Blair Stone Road, Tallahassee FL 32399, Telephone (850) 488-0784 www.dep.state.fl.us/water/waterpolicy/index.htm

Appendix E: Reuse Activities and Relative Desirability of Different Types of Reuse

Reuse Activities Allowed by DEP Rules

Reuse Activity	Regulated by Which Part in Chapter 62-610	Other F.A.C. Chapter
Agricultural Irrigation		
Feed & fodder crops	II	
Edible crops	III	
Public access areas		
Irrigation of residential properties	III	
Irrigation of golf courses	III	
Irrigation of parks, athletic fields, schools	III	
Irrigation of other landscaped areas	III	
Toilet flushing	III	
Fire protection facilities	III	
Vehicle washing	III	
Decorative water features (indoor & outdoor)	III	
Construction dust control	III	
Commercial laundries	III	
Flushing of sewers	III	
Cleaning roads and sidewalks	III	
Making ice for ice rinks	III	
Industrial uses		
Cooling water	VII	
Process water	VII	
Wash water	VII	
Uses at wastewater treatment plants	VII	
Mixing concrete	III, VII	
Mixing pesticides	III, VII	
Ground water recharge & indirect potable reuse		
Rapid infiltration basins for recharge	IV	
Injection to recharge ground water	V	
Augmentation of Class I surface waters	V	
Canal discharge in SE Florida (for recharge)	V	
Create barriers to control saltwater intrusion	V	
Wetlands creation, restoration, & enhancement	--	62-611

Relative Desirability of Reuse Activities

Desirability	Reuse Activity	Offset	Recharge Fraction
High	Indirect potable reuse	--	100
	Ground water recharge – injection to potable ground water	--	100
	Industrial uses	100	0
	Toilet flushing	100	0
	Rapid Infiltration Basins (where ground water is used)	0	90
	Efficient agricultural irrigation where irrigation is needed	75	25
	Efficient landscape irrigation (golf courses, parks, etc.)	75	10
	Efficient residential irrigation	60	40
	Cooling towers	100	0
	Vehicle washing	100	0
	Commercial laundries	100	0
	Cleaning of roads, sidewalks, & work areas	100	10
	Fire protection	100	10
	Construction dust control	100	0
	Mixing of pesticides	100	0
Moderate	Inefficient landscape irrigation (parks and other landscaped areas)	50	50
	Inefficient agricultural irrigation	50	50
	Surface water with direct connection to ground water (canals of SE Florida)	0	75
	Wetlands restoration (when additional water is needed)	75	10
	Inefficient residential irrigation	25	50
	Flushing & testing of sewers and reclaimed water lines	50	0
	Rapid Infiltration Basins where ground water is currently not used	0	25
Low	Aesthetic features (ponds, fountains, etc.)	75	10
	Sprayfields (irrigation of grass or other cover crop when irrigation would not normally be practiced)	0	50
	Wetlands when additional water is not needed	0	10

Appendix F: Surveys of Public Opinion on Water Conservation

Recent surveys touch on the question of Floridian's beliefs and attitudes toward water conservation. In general, they show strong support for a wide range of water conservation measures. Some key results are summarized below.

Tampa Bay Water, 2001

In December 2001, Tampa Bay Water released the results of survey of 1,100 residents of Hillsborough, Pinellas, and Pasco Counties. Some key results:

For you personally, what is the most important reason for conserving water?	Percent
Protect/sustain water supply	58%
Save money by lowering water bill	8%
Preserve the environment	16%
Lower the cost of water in the future	3%
Maintain our quality of life	12%
Economic development	1%
Other	1%

Viewpoint	Strongly Agree	Agree	Disagree	Strongly disagree	No opinion, Don't know
Residents of this area can and should do more to conserve.	32%	55%	11%	0%	2%
I am personally doing as much as I can to conserve.	24%	69%	5%	1%	2%

Q. I would like to read you a list of potential water conservation programs that could or may be offered by your water utility.	Very willing	Willing	Unwilling	Very unwilling	No opinion, Don't know
Rebate program for low flow toilets	8%	67%	19	2%	4%
Rebate for rain shutoff devices	8%	59%	24%	2%	7%
Rebate program for high efficiency clothes washers	8%	66%	20%	2%	5%
Reclaimed water for sprinkling	10%	54%	28%	2%	5%
How willing would you be to support a program that required new sprinkler systems to be efficient in using water?	24%	51%	23%	2%	1%

Appendix G: Summary Information About Existing Mobile Irrigation Labs

NAME AND LOCATION	Type	Contact & Phone #	Counties Served	Cooperating Organizations
Suwannee River MIL Live Oak	Agricultural	Dale Bryant 904/ 364-4278	Columbia, Hamilton, Jefferson, Lafayette, Madison, Taylor, Suwannee	Florida Department of Community Affairs (Energy Office) - $75,000/yr Suwannee River RC&D - In kind
SWFWMD MIL Wauchula	Agricultural	David Sleeper 863/ 773-9644	Levy, Marion, Citrus, Sumter, Hernando, Lake, Pinellas, Pasco, Hillsb., Polk, Hardee, Highlands, Manatee, Sarasota, DeSoto, Charlotte	SWFWMD - $ 23,500/yr during 4 yr contract period. (Total: $93,000) NRCS - In kind
Lower West Coast MIL Naples	Agricultural and Urban	Robert Beck 941/ 455-4100	Lee, Charlotte, Collier, Glades, Hendry	SFWMD - Approx. $80,000/yr NRCS - In kind
Miami-Dade Co. MIL Homestead	Agricultural and Urban	Robert Carew 305/ 242-1288	Dade	SFWMD - Approx. $97,000/yr NRCS - In kind
Palm Beach MIL West Palm B.	Urban	David DeMaio 561/ 683-2285	Palm Beach	SFWMD - Approx. $55,000/yr NRCS - In kind
Lee County MIL Fort Myers	Urban	James Nikolich 941/ 995-5678	Lee	SFWMD - Approx. $56,000/yr NRCS - In kind
Indian River MIL Vero Beach	Agricultural and Urban	Paul Vainio 561/ 562-1923	Brevard, Indian River	USDA-NRCS - Approx. $70,000 per year. *Both IRL labs budgeted together - $140,000/yr*
Indian River MIL Fort Pierce	Agricultural and Urban	Paul Vainio, 561/ 461-4546(3)	St. Lucie, Okeechobee, Martin *(Ag. only in Martin County)*	USDA-NRCS - Approx. $70,00 per year. *Both IRL labs budgeted together - $140,000/yr*
Sarasota Bay MIL Sarasota, Florida	Urban / Agricultural	Jack Creighton 941/ 907-0011	Sarasota, Manatee *(not limited to these counties)*	USDA - NRCS - Approx. $75,000 per year.
Tampa Bay MIL Plant City	Urban / Agricultural	Gail Huff 813/ 759-6450	Hillsborough, Pinellas *(limited services in Pinellas)*	Hillsborough Co. SWCD - $ 60,000 NRCS - In kind
Martin County MIL Stuart	Urban	Charles Lambert 561/ 221-1303	Martin	DEP Grant administered by Martin County SWCD $55,000/ yr. NRCS - In Kind
St. Lucie County MIL Fort Pierce	Urban	John Spades 561/ 461-4546 (113)	St. Lucie	DEP Grant administered by St. Lucie County SWCD $55,000/yr. NRCS - In Kind
East Central FL MIL Orlando	Urban	Steve Cox 407/ 896-0353	Orange, Seminole (Benchmark farms work in Polk, Lake, and Brevard)	SJRWMD - $135,000 in 2000 and $40,000/yr starting in 2001 Local Govts - $ 75,000/yr NRCS, SWCD, IFAS - In-Kind
Big Cypress Basin MIL Naples	Urban	David Rodrigues 941/ 455-4100	Big Cypress Basin (Naples / Marco Island)	Big Cypress Basin Board agreement with the Collier SWCD
Manatee County MIL	Urban	Brenda Rogers 941/ 722-4524	Manatee	

Appendix H: Measurement of Agricultural Water Use

District	Measurement Required	Method	Frequency	Comments
SFWMD	Yes	Varies/ District Approved	Monthly / Reported Quarterly	All users need to measure, independently of amount of water used. Measurement method requires calibration every two years.
SWFWMD	Yes	Flow Meters	Monthly	Metering and reporting required for permitted withdrawals of over 500,000 gpd, 100,000 gpd in water resource caution areas.
SJRWMD	Yes	Flow Meters/ District Approved	Monthly/ Bi-annual Report	All users need to meter. Other measurement methods acceptable, only if flow metering is cost-prohibitive or impractical.
SRWMD	Voluntary	Varies	Varies	Can require measurements, per general language in their CUP rules.
NWFWMD	Yes/No	Varies	Varies	Estimates required in some instances. Metering required in Water Use Caution Areas

Appendix I: Methodologies Used by WMDs to Estimate Agricultural Water Needs

District	Methodology
SFWMD	Modified Blaney Criddle
SWFWMD	Modified-Modified Blaney Criddle / Reported Water Use
SJRWMD	AFSIRS / Blaney Criddle
SRWMD	Modified Blaney Criddle
NWFWMD	Benchmark Farms

Appendix J: Preliminary Topics of a Research Agenda

More research is needed in various areas of water conservation. This appendix is a compilation of topics potentially needing further research, ordered by Work Group. It is intended as the initial draft of an overall research agenda to be developed collaboratively by interested parties in the next phase of the Water Conservation Initiative. The topics in the table below are not listed in priority order.

Research Topics	Goal	Potentially Responsible Parties
Agricultural Irrigation		
Enhanced Mobile Irrigation Labs	Assess cost effectiveness of different MIL programs and extent of compliance with MIL recommendations.	WMDs, DACS.
Enhanced recovery and recycling of irrigation water and rainfall.	Evaluate potential cost effectiveness and effect on reducing groundwater withdrawals.	IFAS, DACS, WMDs.
Improving measurement of agricultural water use.	Improve technology and methods to achieve greater accuracy in measuring agricultural water use.	WMDs, DACS, IFAS, DEP, Private Associations, Universities.
Improve methods of estimating water needs.	Develop a consistent methodology for assessing needs and improve climatic monitoring.	WMDs, DACS, IFAS, Private Associations, Universities.
Increase agricultural water use efficiency.	Identify crop-specific water needs, improve irrigation technology, develop drought tolerant and water efficient crops, reduce water needs for freeze protection and crop establishment.	WMDs, DACS, IFAS, Universities.
Landscape Irrigation		
Improving education and outreach for water efficient landscaping and irrigation.	Evaluate cost effectiveness and effect on behavior of education and outreach programs.	WMDs, IFAS, Universities, DEP.
Determining feasibility of water budgeting for non-agricultural irrigation.	Evaluate feasibility of water budgeting as a water conservation strategy.	WMDs, IFAS, Universities.
Assessing cost effectiveness of water efficient landscapes.	Conduct long-term (10-year) cost comparison between traditional and water efficient landscapes.	WMDs, IFAS, Universities.

Research Topics	Goal	Potentially Responsible Parties
Designing improved turf and landscape water conservation.	Develop more efficient automatic irrigation systems based on soil moisture, determine water needs for specific grasses and plants, develop new water efficient turf varieties, evaluate feasibility of using brackish water for irrigation.	WMDs, DACS, IFAS, Universities.
Evaluating watering restrictions for landscape irrigation.	Evaluate need for more consistency in watering restrictions.	WMDs, DEP.
Improve the estimates of water withdrawals from private wells.	Develop improved methods of estimating water withdrawn from private wells that are not required to report water use.	WMDs, DEP, Utilities, Universities.
Improve water use efficiency at golf courses.	Evaluate current golf course water use and identify means of improving irrigation efficiency.	WMDs, DEP, Utilities, Universities.
Water Pricing		
Improving design of conservation rate structures.	Develop methodologies to accurately project changes in demand and revenues from changes in rate structures.	WMDs, PSC, DEP, Utilities, Local Governments.
Improve design of drought rates.	Develop recommendations on "triggers" for various levels of drought severity and determine optimal drought rates.	WMDs, PSC, DEP, Utilities, Local Governments.
Designing a cost-effective framework for Regional Water Supply Plans	Develop a common statewide framework for analyzing the cost effectiveness of water supply alternatives including conservation.	WMDs, DEP.
Industrial, Commercial, Institutional		
Evaluating a Conservation Certification program for industrial, commercial, and institutional users.	Evaluate the cost effectiveness of a certification program to recognize leaders in water conservation.	WMDs, Private Associations, DEP, DACS, Universities.
Evaluating cooperative funding of alternative technologies for industrial, commercial, and institutional uses.	Evaluate cost effectiveness and the feasibility of cost sharing of water conserving technology.	WMDs, Private Associations, Utilities, DEP, Universities.
Evaluating financial incentives to encourage industrial, commercial, and institutional users to conserve water.	Develop methods to quantify potential water savings so that cost effectiveness could be determined.	WMDs, Private Associations, Utilities, DEP, Universities.

Research Topics	Goal	Potentially Responsible Parties
Designing benchmarks and BMPs for industrial, institutional, and commercial users.	Evaluate the need for and feasibility of more widespread use of benchmarks and BMPs for ICI uses.	WMDs, Private Associations, Utilities, DEP, Universities.
Improving cooling tower efficiency.	Evaluate the potential for significant improvement in efficiency through better training and monitoring of operators.	WMDs, Private Associations, Utilities, DEP, Universities.
General Topics		
Evaluating funding mechanisms.	Identify the advantages and disadvantages of alternative mechanisms to fund a broad array of water conservation measures.	DEP, WMDs, PSC, Utilities, DACS.

Appendix K: Preliminary Topics of an Education/Outreach Agenda

Additional education and outreach is needed in various areas of water conservation. This appendix is a compilation of potential areas where additional education and outreach is needed, ordered by Work Group. It is intended as the initial draft of an overall education/outreach agenda to be developed collaboratively by interested parties in the next phase of the Water Conservation Initiative. The topics in the table below are not listed in priority order.

Education/Outreach Topics	Goal	Potentially Responsible Parties
Agricultural Irrigation		
Increasing use of reclaimed water for agricultural irrigation.	Provide growers with sound technical information relative to the use and quality of reclaimed water.	DACS, WMDs, USDA, DEP, Utilities.
Increasing awareness of agricultural water conservation opportunities.	Provide agricultural water users, policy makers, and the general public with better information on agricultural water conservation opportunities.	DACS, WMDs, USDA, DEP, Utilities.
Landscape Irrigation		
Increasing public awareness of methods and technology to improve landscape irrigation efficiency.	Improve programs to make the public aware of quality differences in irrigation systems and installation practices, and the benefits of technologies such as soil moisture sensors.	WMDs, Utilities, Local Governments, Professional Associations.
Increasing public awareness of water efficient plants and turf grasses.	Continue and expand programs such as the Florida Yards and Neighborhoods program to educate people on how to landscape using plants more suitable to Florida's environment.	WMDs, Cooperative Extension Service, USDA.
Increasing water conservation knowledge and skills of irrigation design and installation professionals.	Establish a statewide training and certification program to educate irrigation professionals on the latest water conservation technologies and methods.	WMDs, Universities, Florida Irrigation Society.
Increasing water conservation knowledge and skills of landscape maintenance workers.	Establish a statewide training and certification program to educate landscape maintenance workers on proper irrigation system maintenance and landscape BMPs.	WMDs, Universities, Florida Irrigation Society.

Education/Outreach Topics	Goal	Potentially Responsible Parties
Water Pricing		
Improving utility customers' knowledge of their water use.	Design a template for informative billing to allow customers to see how their water use varies from month to month and year to year, and how much water they use compared to other users,	PSC, Utilities, Local Governments, WMDs, DEP.
Industrial, Commercial, Institutional		
Increasing awareness of opportunities to improve water use efficiency in industrial, commercial, and institutional settings.	Evaluate the effectiveness of water auditing programs to identify opportunities for improving water use efficiency in industrial, commercial, and institutional settings.	WMDs, Utilities.
Indoor Water Use		
Increasing awareness of new water efficient fixtures and appliances.	Expand the dissemination of information on effectiveness and reliability of water efficient toilets and other fixtures to counteract the perception that they do not work as well as older models.	WMDs, Utilities.
Increasing general public awareness of the need for better water conservation.	Coordinate and expand current conservation programs, possibly through a statewide program, to send a consistent message regarding the need for and benefits of long-term conservation strategies.	WMDs, Utilities, DEP.
Reuse of Reclaimed Water		
Increasing general public awareness and acceptance of reclaimed water.	Include information on the nature and value of reclaimed water in meeting Florida's water needs in ongoing education and outreach programs.	WMDs, DEP, Utilities.

Appendix L: Summary of Water Conservation Activities at State Facilities

During the spring of 2001, Governor Bush directed the Department of Environmental Protection to encourage state agencies to be leaders in water conservation. The Department began this project by working with some of the larger water users, including the Department of Management Services, Department of Agriculture and Consumer Services, Department of Corrections, Department of Juvenile Justice, Department of Transportation, Department of Children and Families, DEP Division of Recreation and Parks, and all of the state universities.

The Department provided guidance to the agencies and universities on water conservation measures for office facilities. Agency heads provided specific guidance to their facility managers to implement water conservation measures. The Department of Agriculture and Consumer Services also included a flyer with its employees' August paychecks stressing the importance of water conservation at work and at home and providing conservation tips.

DEP specifically requested:

- An initial report on water use data from the past few years to serve as a baseline for evaluating conservation efforts.
- An analysis of the data that describes any significant increases or decreases in water use.
- A description of current water conservation practices or technology utilized in facilities.
- Monthly water use reporting, to include a description of any successes or failures in reducing water use.
- Any additional actions proposed to further conserve water.

DEP has recently expanded this reporting effort to all state agencies. Agencies will track their water use on a monthly basis and report on their water consumption and conservation efforts twice a year, unless more regular reporting is warranted.


DEPARTMENT OF ENVIRONMENTAL PROTECTION
FLORIDA

Submetering, RUBS, and Water Conservation

Prepared for:

National Apartment Association
(Alexandria, VA)
National Multi Housing Council
(Washington, DC)

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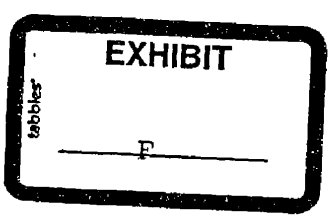
June 1999

FINAL REPORT



ACNOWLEDGMENTS

This report was prepared by Doug Koplow and Alexi Lownie of Industrial Economics, Inc., in Cambridge, MA. Barbara Vassallo oversaw the work for the National Apartment Association, with additional support from Eileen Lee and Jack Goodman, both of the National Multi Housing Council.

Although concerns over data confidentiality preclude us from listing the many individuals who supported us in this effort, we do want to extend our general thanks to them here. Many property managers, building owners, and management company staff --already with more to do than they could possibly fit into a day -- nonetheless took time to speak with us and give us detailed information on their properties. Representatives from billing companies around the country were equally generous with their time, helping to identify properties that met our study criteria, and in one case even driving to a municipality to collect last minute data that we had been unable to obtain at a distance. Finally, we would like to thank the many employees of municipal water and sewer agencies who patiently explained their rate structures to us and provided us with historical data on properties that was sometimes quite difficult for them to access.

We hope that this analysis provides a starting point for a broader discussion on innovative and mutually beneficial ways to encourage water conservation for the millions of apartment residents across the country.

Additional copies of this report can be obtained from the National Apartment Association, either by phone (703/518-6141) or on their web site (http://www.naahq.org). Comments and suggestions can be sent to NAA (Barbara@naahq.com) or the authors (koplow@indecon.com).

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LIST OF EXHIBITS

EXECUTIVE SUMMARY

To better understand how billing methods affect water consumption patterns, we examined detailed water and wastewater billing information for 32 properties across three states. The properties represented a mix of sizes, ages, and management companies. In addition, properties were grouped by whether they charged tenants directly for water using meters on each apartment; allocated water and sewer charges based on some mix of apartment size or number of people (referred to as Ratio Utility Billing Systems, or RUBS); or simply recovered these costs indirectly from tenants through the rents they charged (referred to as "in-rent").

To enable comparisons across this diverse sample, we developed a number of standardized metrics. These included cost and consumption per resident and per occupied square foot. Properties were also paired with a building of similar age, location, and size, but with a different method of charging for water, in order to compare consumption patterns.

Our key findings are presented below. All statistics refer to median values unless otherwise noted.[1]

- **Tenants who pay for their water use less.** Water consumption is generally lower in buildings where tenants pay for their own water than in buildings where costs are indirectly recovered through rents. Submetered properties, which have the most direct link between consumption within a single apartment and the monthly bills, used 18-39 percent less water than did in-rent properties. RUBS properties used 6-27 percent less than the in-rent sample.

- **Billing type is a more important influence on consumption patterns than either the cost of water/sewer or the age of the building.** Lower consumption per person for submetered and RUBS properties held true across a fairly wide range of water costs, suggesting that the impact of having to pay for water and wastewater directly affects behavior more strongly than changes in the unit cost of water. Because monthly water bills tend to be low (less than $20 per unit), we hypothesize that price increases do not affect monthly costs enough to trigger behavioral change. There was also no indication that older buildings were less efficient overall, or that in-rent properties were significantly older than the RUBS/submetered sample.

- **Incremental conservation within a building that converted to submetering or RUBS was not as large as expected.** Trends over time within a single building did not show a clear pattern. For example, we did not see clear evidence that shifting from including water charges within rent to submetering or RUBS led to decreased water use within that building. Given the clear finding that consumption per capita and per occupied square foot were both significantly lower in submetered and RUBS properties than in those without charge backs, the lack of clear trend data within

[1] Median values were used instead of average values because the sample population included a number of outliers.

converted properties was surprising. We hypothesize that the discrepancy is primarily the result of imprecise data. In many cases, our trend calculations do not include the full period of billing conversion. In addition, we had trouble obtaining precise historical data on headcount and common area water usage from property managers or billing companies. Further analysis of intra-property trends to more clearly identify the factors contributing to increased conservation within an apartment building would be warranted.

- **Billing system conversion needs to be carefully thought out and managed.** Our property sample included a wide range of experiences regarding conversion to either submetering or RUBS systems. Among the most common lessons mentioned: advance education of tenants is critical, as is the careful choice of a competent billing company. Testing of the billing system for a month or two before presenting tenants with bills is a useful exercise as there are often transitional problems. Many property managers also noted that perceived fairness was extremely important during the transition process. Costs charged back to tenants need to be decided with caution; for example, many properties chose not to charge tenants for common area water consumption since the tenants had no direct control over this demand. Where the transition was carefully managed, we heard of no examples of tenant dissatisfaction with the changeover.

- **Even with RUBS or submetering in place, price signals to consumers may be muted.** Municipalities add inaccuracies to water/sewer prices that can't be corrected even with allocated billing *within* the apartment building. For example, one locality in Florida bases a large part of its charges on the number of toilets in an apartment. This variable is unlikely to be well correlated with actual consumption. A number of towns in California include sewer charges with property taxes, breaking the link between consumption and cost. Bimonthly or quarterly billing also hides important information (e.g., new leaks) that consumers can use to modify water use. These types of factors will depress the observed conservation response relative to what would occur with accurate price signals. State apartment associations may find a joint strategy of correcting prices within the municipality and the building concurrently useful in encouraging increased conservation.

- **Despite rising water and sewer costs, few properties have effectively used available information to carefully manage these costs.** In many of the properties we examined water consumption trend data were not tracked and monthly spikes, often indicative of new leaks or other problems, were not brought to management's attention by billing companies. Many available and cost effective water conservation equipment options were not being installed in either apartment units or common areas. More complicated conservation techniques such as modifying landscapes to species requiring little water in water scarce regions (xeriscape), or requiring efficient washing machines from laundry room vendors, were not done at any of the properties we spoke with.

- **Current gaps in water conservation management offer large opportunities for the future.** Much can be done to expand the scope, and improve the efficiency, of water conservation options. This includes continuing efforts to demonstrate the efficacy and equity of RUBS systems. An expansion in the relatively straightforward billing services now provided by billing companies to a more comprehensive business model that offers enhanced water cost management services (as has occurred in the energy sector) would also be beneficial.

OVERVIEW

The cost of water and wastewater treatment services have risen rapidly in recent years. This trend reflects a number of factors, including the scarcity of clean water, an increasing share of delivery and treatment costs being passed onto the final consumer, and the elimination of declining block rates by many municipalities. Declining block rates provided volume discounts for bulk water consumers. In many cases, these have been replaced by increasing block rates, where bulk consumers of scarce water resources pay more, not less, for this privilege.

Rising prices have made these services more difficult for owners of multi-unit housing to ignore. Rather than continuing to absorb them in their general operating overhead costs, owners have attempted to control these rising costs by investing in water conserving capital, and by shifting the costs of water and wastewater services onto tenants. This is similar to a process that occurred in the early 1970s when rapidly rising oil prices drove up electricity charges.

Advocates of charging tenants for these services argue that only when tenants pay the costs of the resources will they change their behavior to conserve water. This change can be an extremely important component of efficient water use in many water-scarce regions of the country. The purpose of this study was to evaluate whether tenants paying for their water directly use less than those for whom water costs are a part of their rent.

The report begins with a discussion of the study approach, the sample profile, and the metrics used to enable cross-property comparisons. We then present our quantitative results based on our analysis of property-specific billing data. The primary focus of this discussion is on the multi-state results, since the sample population within any single state was relatively small. However, we do discuss some state-specific findings as well.

In the process of researching this report, we spoke to scores of people involved with different parts of the water billing issue. These included municipalities, property managers, maintenance staff, and billing companies. The experiences, suggestions, and unmet needs that these people communicated to us are included in the next section of the report. Our findings are summarized in the last section. A data appendix contains additional detailed exhibits related to our analysis that may be of special interest to people within the three states we analyzed.

STUDY APPROACH

The study involved evaluating a cross-section of properties in three states: Florida, Texas, and California. The target sample size was 12 properties per state, though we were not able to obtain a full sample for California. In total, we examined detailed billing and demographic information for 32 properties.

The sample properties represent a mix of sizes, billing types, and ages in order to examine water consumption patterns across a spectrum of market conditions. In addition, the samples were paired, so that one building of a particular size and age that does not charge tenants directly

for water and wasterwater utilities could be compared to a similar building in the region that does.

Of the 12 properties in each state, six do not charge tenants directly, three have installed submeters on each unit to charge tenants based on actual measurements, and three use some form of a ratio utility billing system (RUBS) to allocate the total water and sewer bills back to the tenants.[2] Buildings using the RUBS approach generally deduct a portion of the water/sewer bill to account for common area usage, then allocate the remainder among the tenants based on some mix of unit square footage and the number of residents.

Sample Selection Criteria

Properties evaluated volunteered to participate in the NAA/NMHC study. NAA gathered a pool of candidate properties for the study through an outreach campaign, and through discussions with specific members. Industrial Economics chose the final set of participants based on a number of property characteristics, such as geography, demographics, ownership, and extent of conversion. Our objectives for each one are described below:

- **Geography.** Water and sewer rates and policies are often made at the city, county, or water district level. We chose as many properties as possible clustered in a single area, so that the consumption patterns we observed across properties were not influenced by exogenous factors such as water/sewer rates or local programs such as conservation incentives. Because clustered properties were not always available, we tried to choose municipalities that didn't differ markedly in their water policies. In addition, we included price as a dimension in our results, to illustrate both the impacts of billing type and water/sewer rates on observed consumption levels.

- **Demographics.** Property characteristics such as age, number of units, and market position (e.g., luxury, moderate income) can also affect consumption patterns. For example, newer buildings are more likely to have better water conservation equipment installed. Luxury properties are likely to be less sensitive to water prices overall. We tried to have a mix of building sizes and ages across our property sample.

- **Ownership.** The management company affects observed water consumption patterns in a number of ways. They often have cross-property programs related to installing water conservation equipment, fixing leaks, or managing irrigation. They may choose a single RUBS method, or a single billing company, both of which can affect the price signals sent to tenants. Again, to the extent possible, we tried to have a mix of property owners to reduce the impact of cross-property policies on our results.

[2] The California sample includes three RUBS properties, three submetered properties, and two in-rent properties.

- **Extent of Conversion.** Once a property decides to move to a submetering or RUBS system, there is a transition period that can sometimes last a couple of years. This is because most property managers will not begin charging tenants for water until move-in or lease renewal. Some California properties will only charge new tenants; in these situations it can be many years before all tenants are paying for their water. When a portion of the tenants are still not incurring the water/sewer costs, and therefore haven't adjusted their consumption patterns, the observed reduction in water consumption is likely to be less than what will eventually be realized. For this reason, we wanted to have properties that were fully converted for at least a year whenever possible. The full year of data is important in order to avoid distortions from seasonal variations in water consumption.

Establishing a Common Basis of Comparison

In order to draw any general conclusions about the relationship between billing type and water consumption levels, it was first necessary to establish standardized metrics that would allow data from very different types of properties to be compared. The two metrics chosen were:[3]

- **Per capita consumption.** Consumption data were divided by the average number of residents living in the property during a particular year. This adjustment ensured that observed patterns related to consumption were not related to independent factors such as occupancy levels. Per capita metrics are useful because there is a strong relationship between the number of people living in an apartment and the amount of water that gets used. Unfortunately, many properties do not have an accurate count of all their residents, especially for past years.

- **Consumption per occupied square foot.** This metric also takes account of differing occupancy levels, by scaling down the total square footage in apartment units based on vacancies. Properties generally had more accurate information regarding the number of units occupied in a particular year than they did on the average number of residents. However, the linkage between apartment size and water consumption is not as strong as with the number of residents.

One factor that these metrics were unable to control for was differing costs of water/sewer across the municipalities in which we had sample properties. As a result, we have generally included the cost of service information with each consumption value, ensuring that links between cost and consumption levels would be visible. We also adjusted water charges to reflect costs directly related to water and sewer use. Specifically, we included any taxes on the services,

[3] These metrics have the added advantage that both are commonly used as allocation bases in RUBS programs around the country. We were not able to evaluate any of the RUBS approaches in detail to identify how closely the allocations mirror actual usage patterns, but this may be an area worthy of additional research.

since these are reflected in the prices charged to apartment owners and users. However, we excluded unrelated charges, such as the cost of maintaining a fire line or stormwater fees, since these costs have no direct relationship to tenant behavior.

QUANTITATIVE RESULTS

Our sample data are presented using three evaluative frameworks: the first evaluates consumption intensity across the sample population; the second compares pairs of similar properties; and the third looks at time trends within a single property. As noted above, most of our discussion focuses on multi-state results, since the sample size within a single state was relatively small.

- **Consumption intensity.** Average gallons of water consumed per person and per occupied square foot are compared for different billing systems, and different water/wastewater costs. This presentation provides a useful overview of trends across all of the properties examined.

- **Pair comparisons.** As noted above, each property using either RUBS or submetering has been paired with a control property of similar size, age, and location so that consumption levels can be compared. This presentation provides a more localized comparison among properties within the sample.

- **Self comparisons.** For each property, we have evaluated consumption trends over the time period for which we have data (one to five years, depending on the site). This presentation is useful for comparing consumption trends over time, and for evaluating changes as a new billing system is implemented.

One additional data variant is worth mentioning. A number of the exhibits include consumption values with and without common area consumption. Common area consumption refers to water use in parts of an apartment complex outside of the actual apartments, such as pools and landscaping. Water demand in these external areas is not influenced by whether or not tenants are charged for water and sewer directly. Thus, by excluding common area usage, we hoped to provide a clearer picture of the demand response to RUBS and submetering systems. Unfortunately, the data on the common area share were not precise enough -- especially historically -- to further clarify consumption trends as hoped. This issue is discussed in greater detail later in the report.

Consumption Intensity Significantly Lower in Submetered and RUBS Properties

Overall, water consumption was significantly lower in properties that allocated water and sewer charges back to tenants than in properties that did not. These results are summarized in Exhibit 1.

The median submetered property used between 18 and 39 percent less water than the in-rent sample. The median RUBS property used between 20 and 27 percent less. When common area usage estimates were excluded, the savings were lower, with the median RUBS property using between 6 and 22 percent less than the in-rent sample. Because we were not able to get accurate common area usage values for many of the properties in the sample, we have less confidence in these values than in the total consumption values. Savings were higher on a per capita basis for submetered properties, and higher on a per occupied square foot basis for the RUBS properties.

Exhibit 2 provides another way to view the consumption intensity of the sample. Of the ten *most* efficient properties we examined on a per occupied square footage basis, only 20 percent did not charge tenants for water. This value was 40 percent for the per capita consumption measure. Yet, for the ten *least* efficient properties, the in-rent sites dominated, comprising 80 percent on a per occupied square foot basis and 70 percent on a per capita consumption basis.

Exhibit 1
Multi-State Consumption Patterns, by Billing Type
(Median Values)

	Submetered		*RUBS*		*In-Rent*
	Values	Versus In-Rent	Values	Versus In-Rent	Values
Consumption (1,000 gpy/resident)					
All consumption	28	-39%	37	-20%	46
Excluding common areas	23	-33%	32	-6%	34
Estimated common area share	25%		15%		18%
Consumption (gpy per occupied sf)					
All consumption	73	-18%	65	-27%	89
Excluding common areas	57	-22%	57	-22%	73
Building Age (years)	12		14		15
Cost					
Average cost (cents/gallon)	0.27		0.50		0.32
Cost per apartment ($/month)	$12.4		$18.8		$17.4
Sample Size (# properties)	9		9		9

Notes:
Abbreviations: sf = square foot; gpy = gallons per year.

PR.SumType

Exhibit 2

Distribution of Sample Population, by Billing Type

	Submetered	RUBS	In-Rent
Per Capita Water Consumption			
10 Most Efficient Properties	50%	10%	40%
10 Least Efficient Properties	10%	20%	70%
Consumption per Occupied Square Foot			
10 Most Efficient Properties	30%	50%	20%
10 Least Efficient Properties	10%	10%	80%

Notes:
(1) Consumption rankings based on total water consumed, including in common areas.
(2) Total number of properties in sample equals 32.

PRSumDistr

Consumption Trends Not Due to Differential Cost or Age

Although the patterns regarding direct charges for water are fairly strong, we wanted to explore a couple of possible explanations other than billing type for the observed results: cost of service and property age.

Cost of Service

Under this hypothesis, the most efficient properties would be the ones with the highest cost of service. Although these might also be RUBS/submetered (since properties with a higher cost would have a larger incentive to switch billing systems), it would be the cost, rather than the method of charging, that drove the consumption efficiency.

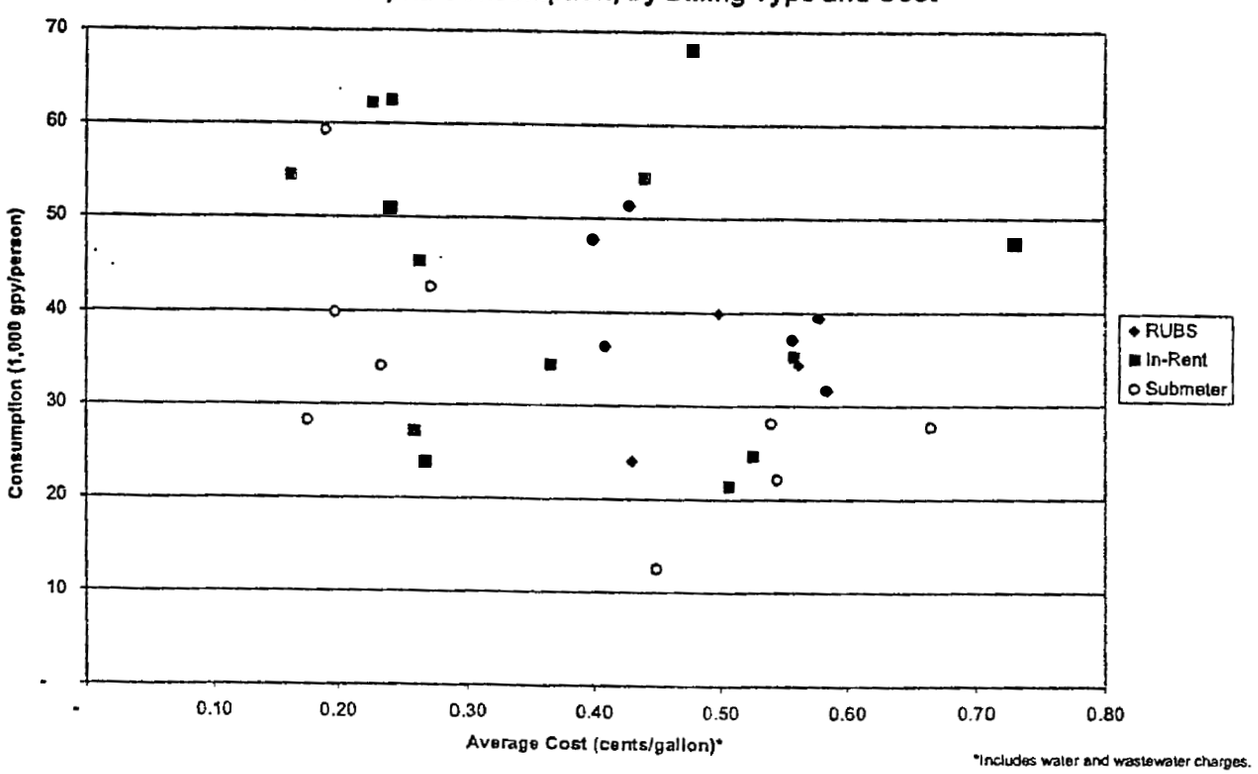
To evaluate this possibility, we plotted per capita consumption against the average cost per gallon of service at each property.[4] These results are shown in Exhibit 3. The plot distribution shows no clear link between cost and consumption. Although there are more low

[4] The average price was used instead of the marginal price for a number of reasons. First, we did not have data on marginal prices. Second, both submetering and RUBS systems generally charge tenants the average rather than the marginal cost, with higher cost water under increasing block rates averaged across all users. Thus, the actual price signal that tenants are responding to is, in fact, the average price.

efficiency properties in lower cost water districts, and more high efficiency properties in higher cost water districts, there is a fairly wide dispersion. Median costs for each grouping (see Exhibit 1) show that submetered properties have both lower costs, and lower consumption than in-rent sites.

RUBS properties are located in districts with higher average costs of service. However, when costs are viewed on a monthly charge per apartment, there is a difference of only $1.40 per month between the RUBS and in-rent populations. It is the monthly bill, not the average cost per gallon, that tenants see and that drives changes in consumption patterns. In this case, the prices are too similar to explain the difference in observed consumption behavior described above.

Exhibit 3
Per Capita Consumption, by Billing Type and Cost

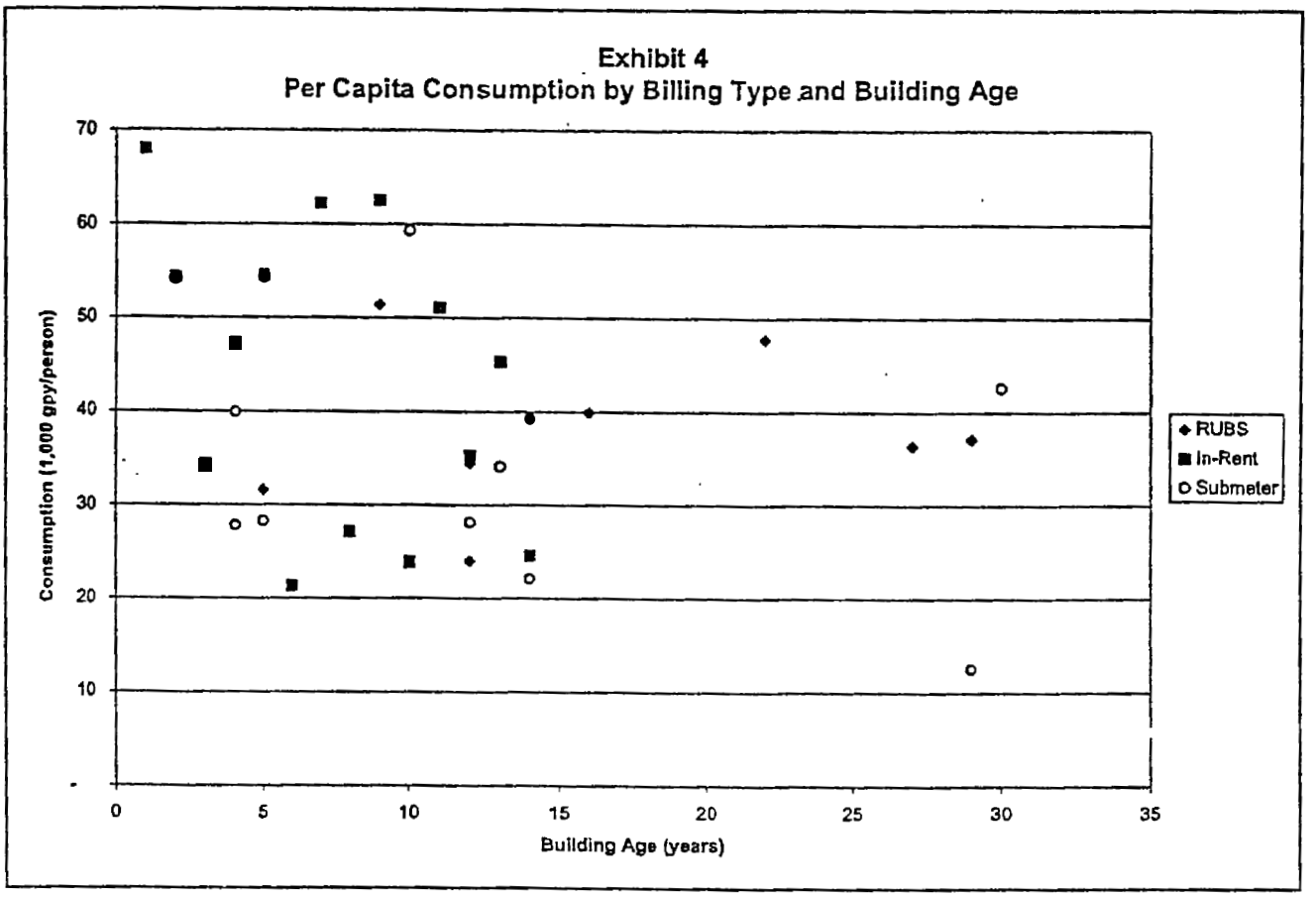


*Includes water and wastewater charges.

Age of Water Infrastructure

The second factor we considered as an alternative explanation for lower water consumption in submetered and RUBS properties is the age of water infrastructure, for which we use building age as a proxy. If submetered and RUBS properties were significantly newer, they would potentially have more efficient water-related infrastructure installed, and performance of this equipment would be closer to the optimum than in older buildings.

In Exhibit 4, we plot per capita consumption against building age. There is a slight difference in the median age of the building populations, with the in-rent locations being one to three years older than the RUBS and submetered properties. However, this is a very small age difference, and the available construction technologies are unlikely to have differed markedly across the sub-sample groupings. Furthermore, as shown in Exhibit 4, the oldest buildings are not the least efficient from a water use perspective; in fact, the most efficient property shown is nearly 30 years old.



Consumption in RUBS and Submetered Properties Lower than In-Rent Pairings

The goal of the property pairings was to compare the water consumption profile of two similar properties, one with direct charges for water (i.e., RUBS or submetering) and one without them. Thus, for each property with direct charges for water, we chose an in-rent match that was located in the vicinity, and was roughly the same age and size. Because of the smaller California sample, we have only 14, rather than 18, pair comparisons.

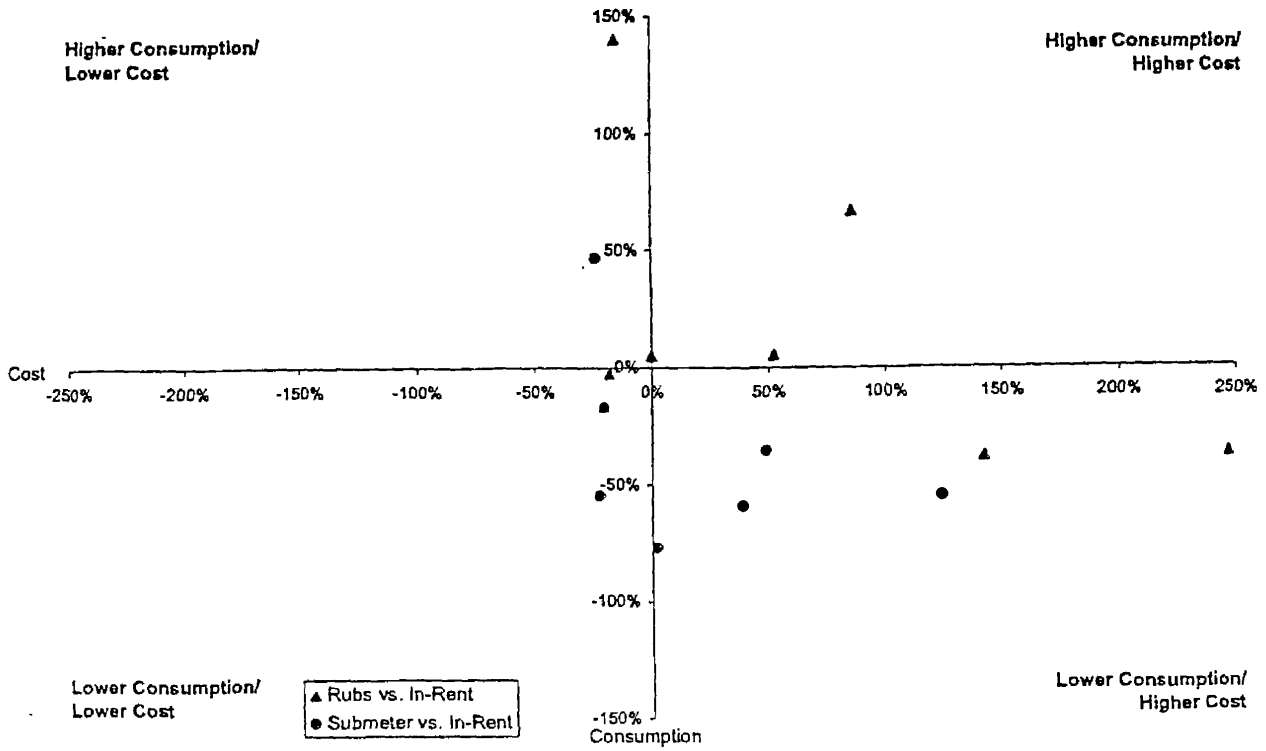
Consumption per capita and per occupied square foot were compared across each pair, with the results shown in Exhibits 5 and 6. Each quadrant of Exhibit 5 represents a mix of cost/consumption comparisons. Where a RUBS property had both lower consumption and lower

cost than its in-rent pair, it would be plotted in the lower left-hand quadrant. If the consumption was lower but the cost higher, it would show up in the lower right-hand quadrant.

Overall, in-rent properties were significantly more efficient than their submetered or RUBS pairs in only three of the 14 pairs evaluated. As shown in Exhibit 6, the median submetered property used 50-55 percent less water per capita, and 26 percent less per occupied square foot. The RUBS properties showed mixed results, with no significant difference on a per capita basis, but 30 percent lower median usage on a per occupied square footage basis.[5]

Some caveats are in order regarding these results. First, average costs were also higher (by about 20-25 percent) in the RUBS/submetered sample, suggesting that at least a portion of the observed consumption differential could be due to prices rather than billing type. Second, there are many possible reasons that water consumption in two buildings may differ independent of age, size, and billing type. Because the sample size was so small, care should be taken in generalizing the findings from the pairs analysis too broadly.

Exhibit 5
Comparative Consumption by Paired Properties
(% Difference from In-Rent Control Property)



[5] This difference is driven by a lower relative headcount/square foot in the RUBS sample than in the in-rent sample.

Exhibit 6

Paired Properties, Multi-State

(Median Values)

	Submetered vs. In-Rent	*RUBS vs. In-Rent*
Per Capita Consumption (% difference in per capita consumption)		
All Consumption	-55%	1%
Excluding common areas	-50%	-5%
Consumption per Occupied Square Foot (% difference in consumption per occ. sf)		
All Consumption	-26%	-32%
Cost Differential % difference in average cost per gallon	21%	26%
Sample Size (# pairs)	6	8

PRSumPair

Intra-Property Consumption Over Time Shows No Clear Trend

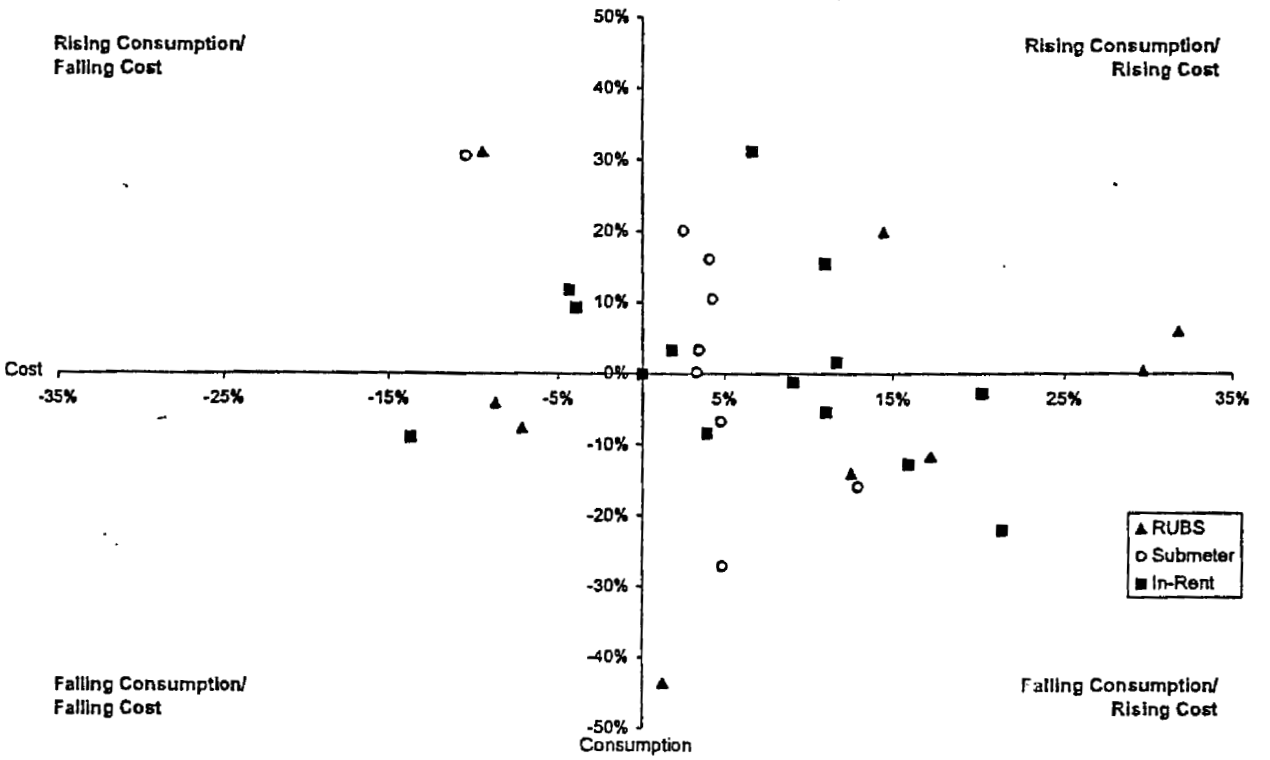
The final framework used to evaluate the impact of billing methods on water consumption was to look at consumption patterns within a single property over time. Ostensibly, many of the differences between two buildings (location, management, etc.) would not differ within a single property over time, providing a cleaner view of how consumption changes with the billing method. The intra-property time trend approach seemed especially promising where a property has recently switched from indirect charges for water and sewer to direct charges.

What we expected to find was a drop in the consumption intensity as properties shifted from in-rent recovery of water and sewer to RUBS or submetering systems. This drop would reflect the conservation response to new charges borne by the tenants.

What we actually found (Exhibits 7 and 8) is much less clear. Of the 32 properties evaluated, 14 actually showed and *increase* in per capita consumption over the period of data availability. Fifteen showed decreasing per capita consumption, but even this trend is at least

partly explained by the fact that the vast majority also faced rising costs. The remaining properties either showed no change or had only a single year of data, precluding a trend analysis.

Exhibit 7
Change In Per Capita Consumption over Time
(% Change Over Period of Available Data)



Given that there was a strong linkage between billing type and overall efficiency, the lack of clear improvements within at least a majority of the properties was surprising. The most likely explanation is that our trend analysis was simply unable to capture the conservation improvements due to limitations in the data available to us. This explanation makes sense for a number of reasons.

- **Limited Years of Data.** Depending on the particular property, our time trend metric is comprised of two to five years of data. The shorter the period of analysis, the more likely the period of analysis missed much of the conservation response.

- **Baseline Problems.** Conservation improvements begin when the changeover to a RUBS or submetered system is announced, and end after all apartments are paying for their water. Many of the properties in our sample had already begun the conversion at the point our data started. Others still had not converted everybody over by the end of 1998, when our trend analysis ended. In either case, the conservation response will tend to be understated in our data. Though we tried up-front to choose properties that

did not have baseline problems with conversion, we were simply unable to get enough properties that met these criteria.

- **Sensitivity to Headcount and Occupancy Information.** In standardizing the data across properties, accurate information on headcount and occupancy levels is critical in adjusting the per capita and per occupied square footage values. These data tended to be less available and less accurate the more years back we went; these inaccuracies also affect the baseline of our trend analysis.

- **Common Area Usage Data.** Because tenants only control consumption in their own apartments, the conservation response will be strongest for this portion of total consumption within the property. Though we tried to focus our analysis on just the consumption in the apartment units, data on common area usage were not precise enough to support the breakout. As with headcount and occupancy, data were less accurate the more years back we went. In almost no case were we able to obtain precise common area consumption estimates over time.

Demonstrating the conservation benefits of billing conversion may be important in overcoming resistance to direct billing for water and sewer in some locations. As a result, additional research on intra-property trends to address these data limitations may be warranted.

Exhibit 8

Intra-Property Time Trends, by Billing Type

(Median Values)

	Submetered	RUBS	In-Rent
Per Capita Consumption			
% (decrease) increase in per capita consumption	13%	-4%	-1%
Cost Trend			
% (decrease) increase in average cost per gallon	4%	8%	8%

Notes:

(1) Because both occupied square feet and headcount are pro-rated based on the same changes in occupancy within a property, results on a per occupied square footage basis did not differ from those on a per capita basis for this table, and were excluded.

(2) Time trends span a period of one to five years, depending on the property and the availability of the necessary data.

(3) Values are sensitive to data quality. Many properties within the sample had already shifted to charging tenants at the beginning of the time period analyzed, or have not yet completed this conversion. In either case, the conservation benefits of a change in billing methods will be understated.

PRSumTime

Single State Findings

Exhibit 9 provides an overview of the key findings by state. The Florida sample generally had the lowest consumption and the highest prices of the three states examined. It's properties also tended to be newer than those in Texas or California. Despite more expensive cost of service in Florida, the median monthly bill was still only $19, about the cost of basic cable. The fact that monthly costs are so low even in water scarce regions underscores the relative lack of responsiveness in consumption levels as unit costs rise. In fact, despite the higher prices, consumption in Florida was generally close to that in the other states.[6]

Rate structures did vary widely across the states. In California, for example, water costs were often two to three times as high as sewer charges. In Florida, the reverse is true, with sewer costs dominating. Sewer fees also dominated in the Texas sample, but by a much smaller margin. There is no obvious reason for these differences, and it is possible that water charges are too low in Florida, and sewer charges are too low in California. The existing rate structures can certainly encourage counterproductive behavior. For example, in one Florida community, water charges are heavily based on the number of toilets within an apartment, even though many other factors affect overall consumption. Our sample property was thus able to begin irrigating its grounds with city water with little change in their monthly cost of service despite large shifts in gallons used.

A detailed presentation of the state-by-state findings can be found in the data appendix tables and graphs. In all states, the general trends brought out in the multi-state summary were also evident: median consumption was lower in the RUBS and submetered properties in both the overall sample and in the pairs analysis; and there were no clear trends in the intra-property analysis.

One thing that a detailed look at the individual property data does show is that in each state there are some very efficient properties that do not direct bill for water or sewer. These examples highlight the importance of a strong commitment to water conservation by either the municipality, the property management, or both. For example, one of the most efficient properties examined in California is an in-rent property located in San Diego. It is likely that education and public attention about the need to conserve water induced this property and its residents to change water use patterns even without direct billing for water usage.

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[6] Note that this *incremental* cost differs from the change in *total* cost associated with billing conversion (which shifts the monthly cost for water from zero to between $10 and $35, a much larger jump). This difference likely explains why consumption is lower in direct billed properties than in-rent properties even though there is little behavior change associated with higher average costs per gallon.

Exhibit 9

Consumption Patterns, by State

(Median Values)

	Florida	Texas	California
Consumption (1,000 gpy/resident)			
All consumption	37	36	39
Excluding common areas	32	31	32
Consumption (gpy per occupied sf)			
All consumption	66	79	78
Excluding common areas	46	65	63
Building Age (years)	13	15	22
Cost			
Average cost (cents/gallon)	0.49	0.26	0.34
Cost per apartment ($/month)	$19.0	$15.9	$14.4
Sample Size (# properties)	12	12	8

Notes:
Abbreviations: sf = square foot; gpy = gallons per year.

PRStateSum

Common Area Water Use Estimates Generally Too Low

One peripheral finding of our analysis is that estimates of common area water consumption are generally too low. As shown in Exhibit 10, it is when consumption in common areas is actually metered that the values are the highest (this is also the reason that the common area share is higher in our submetered population). Property managers tend to estimate the common area share at the lowest level, with median values only one-third as high as the actual meter reads.

The implications of understanding common area shares are multi-fold:

- **Tracking the conservation benefits of RUBS/submetering is more difficult.** Unless common area usage can be accurately segregated from tenant usage, tracking the conservation response in tenant water consumption behavior becomes much more difficult. As a result, the benefits of converting to direct charges for water are likely to be understated.

Exhibit 10
Common Area Water Usage
(Median Values)

	Percentage of Total Water Consumed			
	All States	FL	TX	CA
Summary by Billing Type				
Submetered	25%	30%	27%	21%
RUBS	15%	20%	12%	10%
In-Rent	18%	18%	12%	30%
Summary by Basis of Estimate				
Meter Reads	30%	36%	23%	30%
Meter Reads Plus Management Estimate (note 1)	23%		25%	
Property Manager Estimate	10%	10%	11%	10%
Billing Company Estimate	18%	18%	10%	20%
Industrial Economics Estimate (note 2)	20%	20%	15%	26%

Notes:

(1) Some properties have separate meters for a portion of their common area use, such as irrigation, but rely on judgment to estimate other common area applications.

(2) Industrial Economics estimates were developed by comparing the common area water amenities with common area estimates at other properties with similar amenities.

PRSumCommArea

- **RUBS systems are less equitable than they would otherwise be.** Underestimating common area usage generally results in a higher portion of total water/sewer costs being passed back to tenants in the form of user charges, even for properties that had intended to pay for common area usage themselves. Since tenants have no control over common area usage, this is less equitable and can potentially cause resentment about the RUBS system overall.

- **Conservation incentives.** Tenants are more likely to modify their consumption behavior when they pay for their own water and sewer. So too with management. When management pays for the full cost of common area usage, they are more likely to investigate ways to bring these costs down, and to implement improved systems to conserve water.

QUALITATIVE FINDINGS: SUGGESTIONS AND OPPORTUNITIES

Common Challenges Facing Property Managers

In the course of gathering quantitative data on water consumption and billing, we had the opportunity to speak with numerous people involved with water billing issues. These contacts included a variety of perspectives, such as building managers, building maintenance staff, tenants, and public officials. A number of useful common themes and suggestions emerged from these conversations and are summarized here.

Phase-in Strategies: Suggestions for Shifting to Direct Billing

We found a surprising consensus among building managers on how a transition to charging tenants for their water should be managed. This consensus included not only managers who had implemented their system the way we describe, but a few who had done it other ways but ran into problems. Elements to a successful program transition include:

- **Advance notice and education.** In every case, managers thought it was extremely important to provide their tenants with advance notice of the pending change in their water and sewer charges. Coupled with information on what would happen, how large the charges were likely to be, and ways tenants could reduce their charges, most of the transitions were made with little tenant resentment. Describing how the change would encourage additional conservation of scarce water resources carried substantial weight with tenants in arid parts of the country such as Texas.

- **Transition period retrofits.** During the period between when the change in water/sewer billing was announced and when it was to take effect, many building managers took steps to help tenants conserve water. This involved, at a minimum, fixing leaks within the units. However, some buildings actually retrofitted key water consuming equipment such as toilets, faucet aerators, and shower heads. These changes not only helped reduce the costs that the tenants would eventually bear, but greatly enhanced tenant goodwill and reduced the feeling by tenants that their building was just "dumping" costs on them. Though toilet retrofits can be expensive, some regions of the country have low-flow toilet rebates that make the upgrades extremely cost-effective.

- **Charge back of common area water use.** Many states that allow tenants to be charged for water allow the full costs of water/sewer to be shifted to residents. This includes both water consumption within the apartments as well as that in common areas. Despite the fact that charging tenants for common area water use is generally *legal*, there was fairly broad consensus that it was a bad idea. In one building, the owner very much wanted to charge through all costs, but the property manager was concerned that this incremental additional charge was going to greatly increase the number of complaints he would have to deal with. Among the other reasons not to allocate through common area water/sewer charges:

- Tenants broadly perceived this as unfair, and it could undermine their support for the rest of the allocated system.

- Tenants would get very upset any time they saw an incident of water waste in common areas (e.g., a broken sprinkler), and would not want to be charged for something they viewed as a management lapse.

- In addition to tenant perceptions, having management continue to pay the common area costs mirrors the way most apartments treat other utilities such as gas and electric. Furthermore, it retains the proper incentives to building management to implement common area retrofits and conservation, something they can control, but over which tenants have little influence.

- **Pay attention to market conditions.** Many building managers noted that market conditions mattered in terms of their ability to change the billing system for water and sewer. Part of this is intuitive: in general, high vacancy rates will preclude shifting any additional costs to tenants, including water charges. This applies to vacancy rates within a particular class of rental property for a given city. However, even in markets with low vacancies, common practice influences how easy it is to modify the charges. If no other properties charge for water, it may be necessary to reduce rents slightly to adjust for the new cost to tenants. Where a change in billing approaches is important for environmental reasons as well as cost control, such as in water-scarce regions, local apartment associations can work with the local water authority to make a change in billing mandatory, thereby eliminating a potentially large barrier to the shift.

While less attractive than being able to simply change who pays the bills, shifting water and sewer costs can still make sense even if rents need to be reduced slightly. This is because the aggregate costs of the building will decline as improved water conservation takes place. Thus, rents can be reduced less than the current cost of water/sewer paid by management. In addition, because rents can be adjusted yearly, much of the slight drop in rent can be recovered in future years once people are used to the water/sewer charges.

Use of Billing Companies

Many apartments like to use billing companies because they reduce the administrative burden associated with direct billing for water, and avoid the impression that the management company is earning a profit from water charges (this is not generally allowed, but the perception can still be damaging). However, building managers who have used the billing companies had a number of suggestions to help the process go more smoothly:

- **Choose carefully.** Where billing companies were good, properties thought that they helped tremendously with the conversion to RUBS or submetering. However, a number of the sample properties had bad experiences with their initial billing company choice. In some cases, the problems had actually triggered tenant

resentment, making the allocation program more difficult to implement. Check references and research the company you will be using carefully.

- **Conduct initial "dry runs" of the new system.** It is important to test the new system before you send bills to tenants, since the billing system rarely works well the first month or two. Dry runs help identify problems and aberrations that would cause tenant ill-will if not caught, such as excessively high and incorrect bills.

- **Don't ignore the cost of the billing service.** Charges tend to be as a fixed rate per bill. These fees for billing and collection can be quite high, up to nearly $3 per bill. With water charges sometimes only $8-10 per month, the administrative overhead becomes a significant drain on net revenues collected. It is important to consider this overhead up-front. Bi-monthly rather than monthly billing may make sense in these circumstances.

Last Month Issues

Collecting unpaid water and sewer bills associated with the last month of a tenant's occupancy is a problem for many properties. Managers need to think about this problem up-front as well, in order to build a solution into the water/sewer billing system from the outset. We encountered a number of techniques managers had developed to address the problem. Some instituted a water deposit of $25 or $50, applicable to any unpaid bills. Many others modified lease language so that unpaid bills could be deducted from the general security deposit.

These solutions work only where there is some type of security collected from the tenant. A few apartments we visited in Texas mentioned that they regularly run "sales" to attract new tenants where the security deposit is waived. In these cases, pro-rating the utilities in advance of the tenant's departure is one technique that has been applied with some success.

Cost Control

Properties are concerned about controlling their rising water and sewer bills. There are a number of easy-to-implement approaches that we encountered to control costs, that could be adopted more widely.

Improved Metering

It is increasingly common for sewer charges to actually exceed the water bill. Nonetheless, sewer charges are generally derived directly from water consumption data, with the assumption that all water (or some fixed proportion of the water) taken into a property is later returned to the sewers for wastewater treatment.

In reality, not all water consumption follows this pattern. Irrigation water, often the largest common area water use, is not returned to the sewers at all. In many cities, if you install a

separate water meter on the irrigation portion of your water consumption, you don't have to pay sewer charges on this portion of your bill. While the potential savings can be large, many apartment managers were not aware they could do this.

One other area where separate metering would be useful is pools. In southern climates, a significant amount of pool water is lost through evaporation and also does not require treatment. No apartment complexes we visited had tried to install a separate outflow meter on their pools to ensure that they were only charged sewage fees on actual discharges. In fact, this is an area where there is little information on whether the water utility would even allow it. However, the savings could be large enough to warrant trade association inquiry into the matter.

Appliance Strategies

There is a wide variation in the water efficiency of common appliances such as dishwashers and washing machines. Our research indicated that the water conservation profile of these appliances is generally ignored when purchase decisions are made. Rather, capital cost and reliability are the only two factors evaluated. Where machines are used in common areas (e.g., laundry rooms), cost considerations should be done on a life cycle basis, with operating as well as capital costs are considered. Ideally, these considerations should go into in-unit appliance purchase and replacement decisions as well. There are likely numerous models that are water efficient while at the same time being reliable and reasonably priced.

The costs associated with many other water saving devices such as flow aerators, low flow showerheads, and toilet flapper retrofits, are generally a secondary issue. Most of the devices have a relatively fast payback. The key issue noted by a number of building managers is the quality of the devices: if the tenants are dissatisfied (such as by a poor quality shower), there is little to be gained by installing the equipment in the first place.

Cost Centers for High Volume, Specialized Uses

We saw an extremely wide variation in common area water use applications. Outside of irrigation, the largest uses for common area water were often specialized applications such as car washing, clothes washing, and in one case, a marina for boat washing. These are all examples where managers may want to separate all of the costs associated with these services (including separate water metering), and recover them through special charges on the users. While many properties do charge for using common washing machines, there has been little effort to better manage other specialized uses.

Learning from Your Bills

A final way to better control costs is to pay closer attention to the water and sewer bills you receive. By tracking patterns, properties can quickly spot changes in consumption levels, often indicative of leaks. The bills will need to be standardized to per capita or per square foot

measures in order for real trends to be evident. Despite the large cost savings associated with more careful tracking of costs, a surprising number of properties in our sample had periods when per capita water consumption actually doubled without anybody noticing.

New Opportunities for Improved Cost Management

There is much to do to make water and sewer costs easier to manage. While some of these unmet needs may require additional effort by trade associations, many of them represent business opportunities for water utilities and billing companies.

Facilitating Conversion to Direct Charges for Water

Many states impede or prohibit direct billing of water and sewer costs to tenants. Our analysis has shown that there are significant water conservation benefits from a move to direct charges, and that the actual tenant costs involved are smaller than most other utility bills already paid by the tenant. However, moving the policy debate forward may require some additional effort:

- **Prove that RUBS systems are equitable.** Additional work needs to be done to analyze existing RUBS programs. Common area usage estimates need to become more rigorous, and efforts should be made to evaluate how much allocated charges differ from actual use. If it can be documented that the inaccuracies in RUBS systems versus actual use are only a few dollars per month, resistance to the RUBS approach will likely lessen substantially

- **Know the local policy environment.** Property managers don't have time to learn the state and local regulations, water conservation programs, and the required process for converting properties to RUBS or submetering. Trade associations and billing companies do have an interest in knowing this information, and can do a better job making conversion to direct billing easier to do.

Enhanced Billing Services

Many billing companies provide extremely basic services to their properties. They read meters in occupied apartments and send bills to tenants; or they allocate the total water charges to a property using a RUBS formula, and send bills to tenants. They have part of the information needed to really help the properties understand their waters costs, and could take some additional steps to make this data much more usable -- and hence more valuable -- to the properties.

- **Meter consolidation.** One of the reasons that properties don't spot changes in their water consumption is that the information they receive from municipalities is often quite difficult to use. If they have multiple meters, they may receive as many as 60 different bills. Data are rarely totaled in useful ways. Billing companies (as well as

municipalities) could consolidate meters in ways that help the properties track trends over time, across properties, and between tenant use and common area use.

- **Bill consolidation.** Many states also fragment the full cost of water and sewer by sending up to three separate bills: one for water, one for sewer, and one for the capital costs of the sewer (which comes on the regular property tax bill). Integrating these charges for properties would help them develop more efficient RUBS programs and identify promising opportunities for cost control.

- **Standardized comparative metrics.** Raw data are rarely useful in identifying trends or problems. The water utility industry should develop industry-wide standardized metrics that help users interpret the data. Values per capita and per occupied square foot are obvious examples. Others may be more sophisticated. For example, gas utilities use a measure called the "degree-day" which estimates the demand for heating services. This metric adjusts consumption values for changes in the weather. A similar metric could be used to measure the demand for outdoor watering, helping to identify changes in common area usage patterns.

- **Variance analysis and benchmarking.** Many of the enhanced billing services will help identify changes in usage patterns. Billing companies can provide near-real time notification for such variances from past patterns, helping their clients find problems early. The use of standardized metrics will also enable the companies to compare consumption profiles across similar buildings, identifying properties are either lag or lead in the water conservation area.

- **Benchmarking and utility rate structures.** Benchmarking does not just help the property, but can also identify municipalities with particularly bad rate structures based on observed consumption patterns. Careful benchmarking can help improve regional planning efforts aimed at increasing water conservation.

Demand-side Management: From Information to Action

Better data helps properties identify where they have problems. Determining how to rectify them can be extremely difficult as well, but offers another potentially large market for water service companies.

- **Communicate key options for cost-effective retrofits.** By collecting and tracking data on water usage, billing companies can be the first to identify opportunities for changes in equipment or operations to save money. This information is extremely valuable to the properties, and can become an important competitive advantage for billing companies that do it well.

- **Know the details about key retrofit areas.** Billing companies or their affiliates should have detailed cost and performance data on key water consuming appliances. This information can both help property managers to integrate the water-related

operating costs of particular equipment into their purchase decision, and reduce the amount of work that property staff need to do to in order to identify and install high quality, money saving equipment.

- **Shared-saving retrofits.** In the energy industry, many energy service companies will pay a portion of the cost of installing high efficiency equipment in another company, in return for a share of the savings in utility bills over a period of years. This arrangement can be especially attractive to smaller companies that don't have adequate capital to pay for the entire retrofit up front. There is no reason that a similar arrangement can't become widespread in the water arena as well.

- **Landscaping.** The largest use of common area water in many apartment buildings is to irrigate the grounds. In water scarce regions, this can be a large cost item, yet none of the properties we spoke with had planned their landscapes with the goal of water conservation in mind. The use of native plants that require little water, known as xeriscape, offers potentially large cost savings to many properties. However, the knowledge required to implement it effectively makes independent action by a property unlikely. Again, billing companies or their affiliates can provide this specialized expertise to a range of customers.

The combination of refined data collection and increased expertise regarding cost-effective water retrofit options offer tremendous opportunities for billing companies or other water service companies over the next decade.

SUMMARY

Based on our analysis of 32 properties in three states, properties that charge their tenants directly for their water and sewer costs have significantly lower water consumption. The median submetered property used between 18 and 39 percent less water, depending on the metric used; the value for RUBS properties was 6 to 27 percent less. The method of billing for water affects consumption levels more strongly than either the unit cost of water or the building age. Of the ten least efficient properties in our sample, between 70 and 80 percent did not charge tenants directly for water.

When direct charge properties were paired with in-rent properties of a similar age, size, and location, we saw similar results. The median submetered property used between 26 and 55 percent less water than its in-rent pair; the median RUBS property used a roughly equivalent amount of water on a per capita basis, but 32 percent less on a per occupied square footage basis.

Our analysis intra-property time trends in consumption did not show any particular patterns linking improvements in water use efficiency with billing systems. We hypothesize that this was due to limitations in our data which did not allow us to measure changes in consumption over the entire period of conversion from in-rent to RUBS or submetering. Additional work in tracking intra-property trends, as well as in establishing the equity of RUBS systems, would likely help to overcome some of the political resistance to these systems that currently exists.

Despite the lower water consumption associated with RUBS and submetering properties, there remained a wide range of consumption levels even within the direct charge group. This range is indicative of the substantial opportunities that exist for additional, cost-effective, improvements in water use efficiency. Enhanced billing services and demand-side management services both offer broad market opportunities for billing companies or other water service companies over the coming decade.

DATA APPENDIX

Multi-State Appendix Exhibits

Exhibit ALL-1: Per Capita Consumption by Billing Type and Cost, Excluding Common Areas (graph)
Exhibit ALL-2: Consumption per Square Foot, by Billing Type
Exhibit ALL-3: Consumption per Square Foot, Excluding Common Areas, by Billing Type
Exhibit ALL-4: Comparative Consumption by Paired Properties, Excluding Common Areas
Exhibit ALL-5: Intra Property Time Trends, State Detail

Florida Summary Data

FL-1a: Per Capita Consumption, by Billing Type and Cost
FL-1b: Per Capita Consumption by Billing Type and Cost, Excluding Common Areas
FL-2: Per Capita Consumption by Billing Type and Building Age
FL-3a: Consumption Per Square Foot, by Billing Type
FL-3b: Consumption Per Square Foot, Excluding Common Areas, by Billing Type
FL-4a: Comparative Consumption by Paired Properties
FL-4b: Comparative Consumption by Paired Properties, Excluding Common Areas
FL-5: Change in Per Capita Consumption Over Time

Texas Summary Data

TX-1a: Per Capita Consumption, by Billing Type and Cost
TX-1b: Per Capita Consumption by Billing Type and Cost, Excluding Common Areas
TX-2: Per Capita Consumption by Billing Type and Building Age
TX-3a: Consumption Per Square Foot, by Billing Type
TX-3b: Consumption Per Square Foot, Excluding Common Areas, by Billing Type
TX-4a: Comparative Consumption by Paired Properties
TX-4b: Comparative Consumption by Paired Properties, Excluding Common Areas
TX-5: Change in Per Capita Consumption Over Time

California Summary Data

CA-1a: Per Capita Consumption, by Billing Type and Cost
CA-1b: Per Capita Consumption by Billing Type and Cost, Excluding Common Areas
CA-2: Per Capita Consumption by Billing Type and Building Age
CA-3a: Consumption Per Square Foot, by Billing Type
CA-3b: Consumption Per Square Foot, Excluding Common Areas, by Billing Type
CA-4: Change in Per Capita Consumption Over Time

Exhibit ALL-1
Per Capita Consumption by Billing Type and Cost, Excluding Common Areas

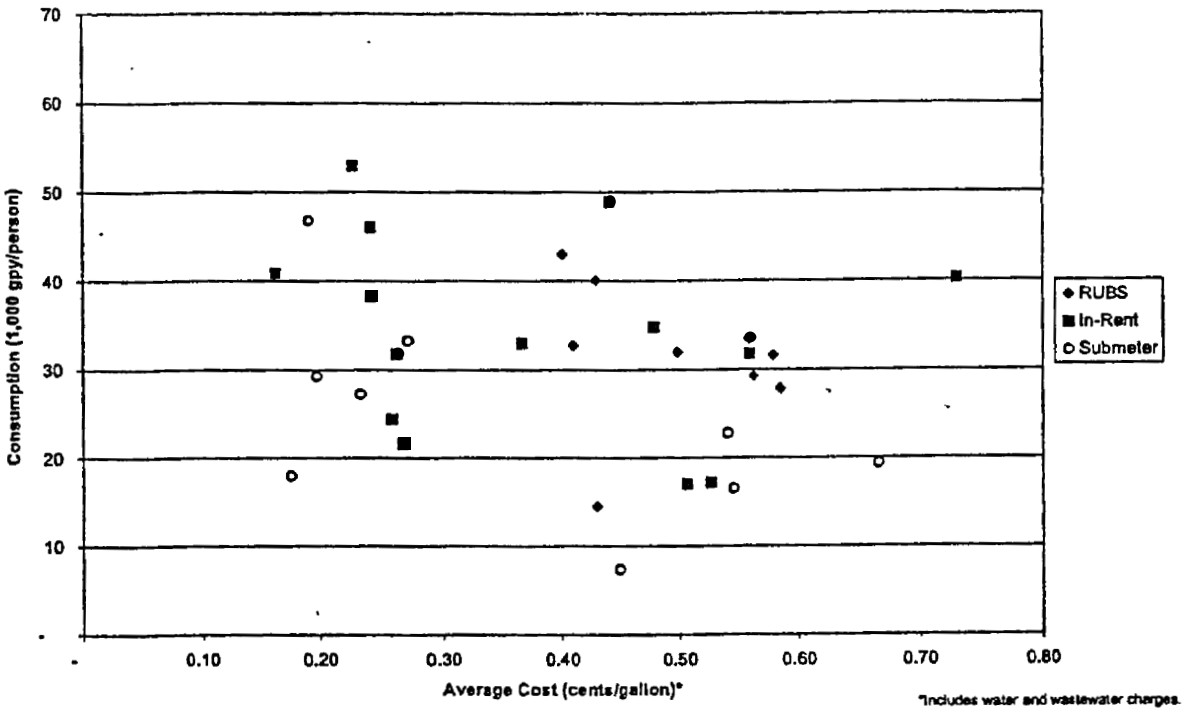


Exhibit ALL-2
Consumption per Square Foot, by Billing Type

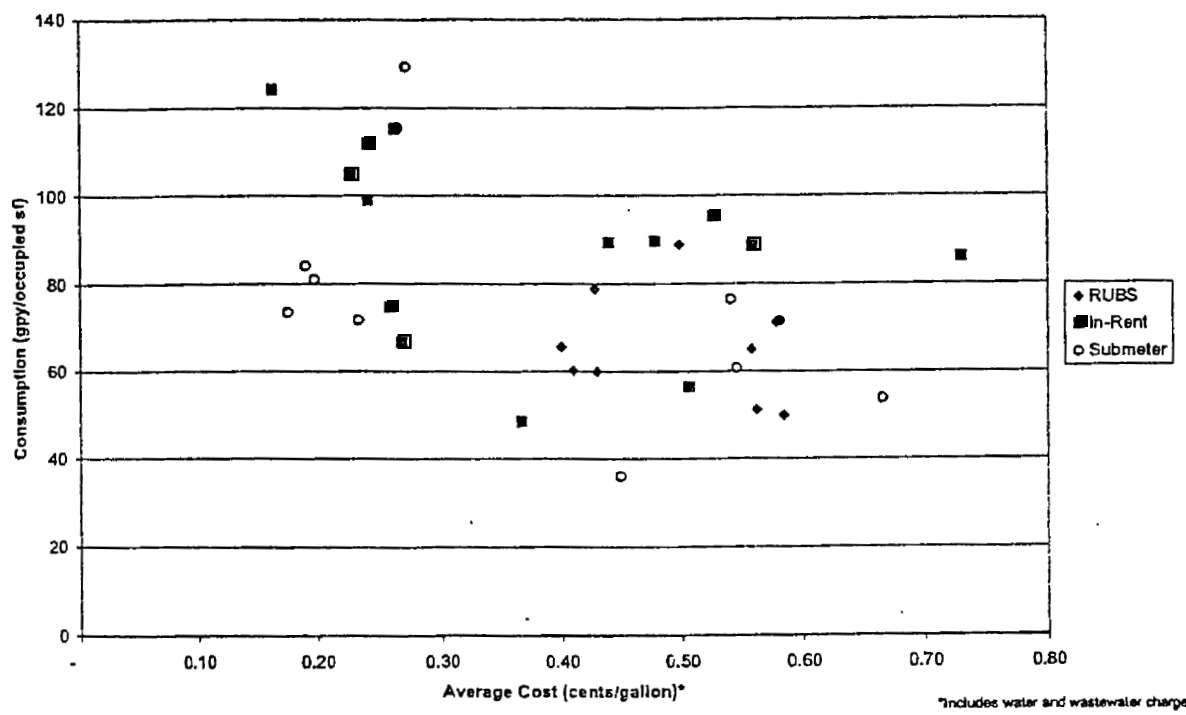


Exhibit ALL-3
Consumption per Square Foot, Excluding Common Areas, by Billing Type

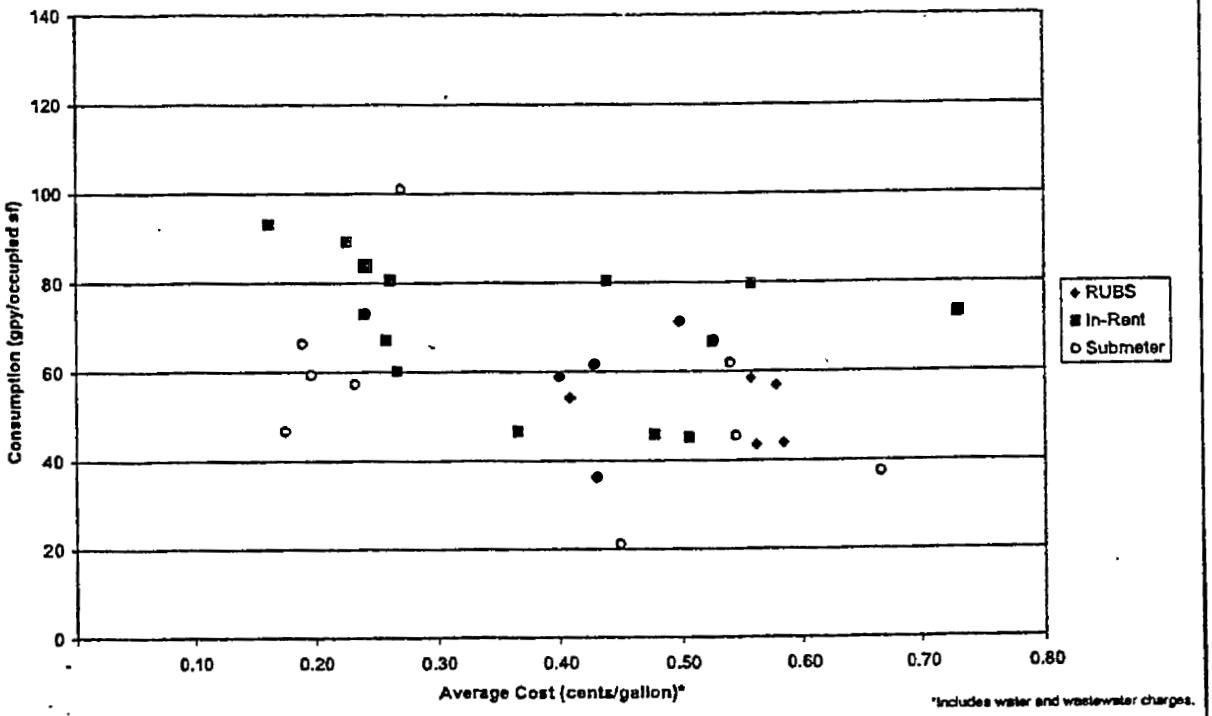


Exhibit ALL-4
Comparative Consumption by Paired Properties, Excluding Common Areas
(% Difference from In-Rent Control Property)

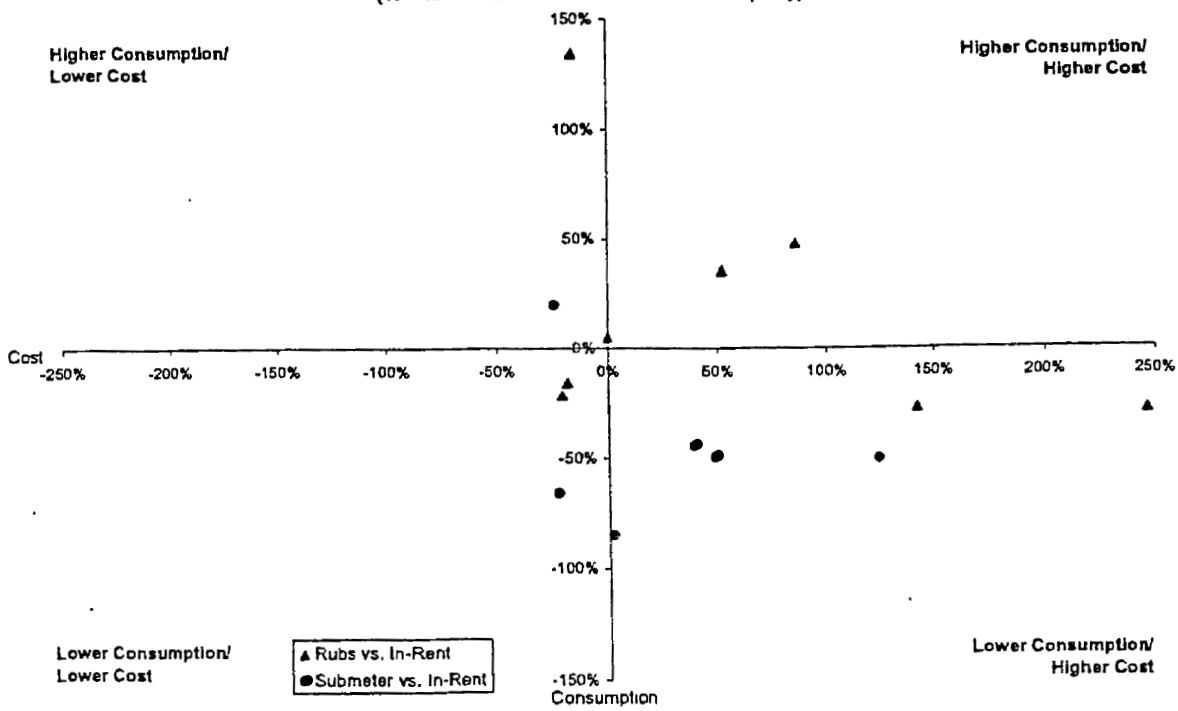


Exhibit ALL-5

Intra-Property Time Trends, State Detail

(Median Values)

	Florida	Texas	California
Per Capita Consumption			
% (decrease) increase in per capita consumption	2%	1%	-4%
Cost Trend			
% (decrease) increase in average cost per gallon	4%	5%	11%

Notes:

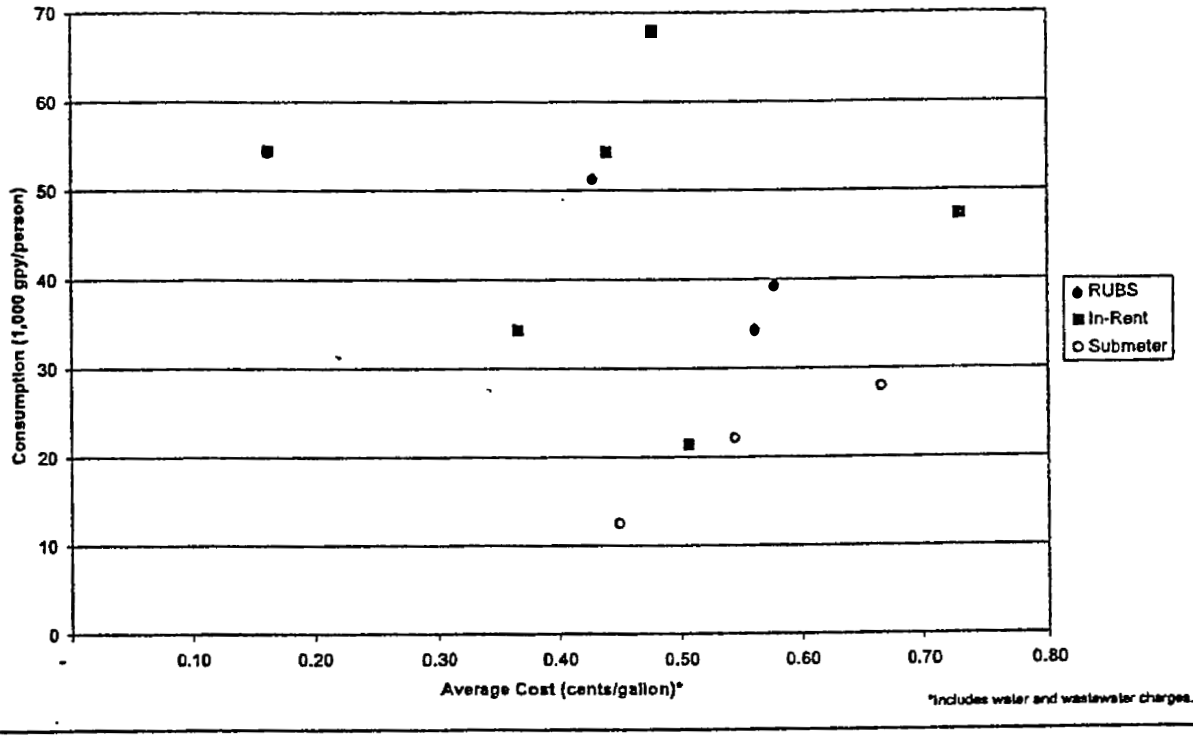
(1) Because both occupied square feet and headcount are pro-rated based on the same changes in occupancy within a property, results on a per occupied square footage basis did not differ from those on a per capita basis for this table, and were excluded.

(2) Time trends span a period of one to five years, depending on the property and the availability of the necessary data.

(3) Values are sensitive to data quality. Many properties within the sample had already shifted to charging tenants at the beginning of the time period analyzed, or have not yet completed this conversion. In either case, the conservation benefits of a change in billing methods will be understated.

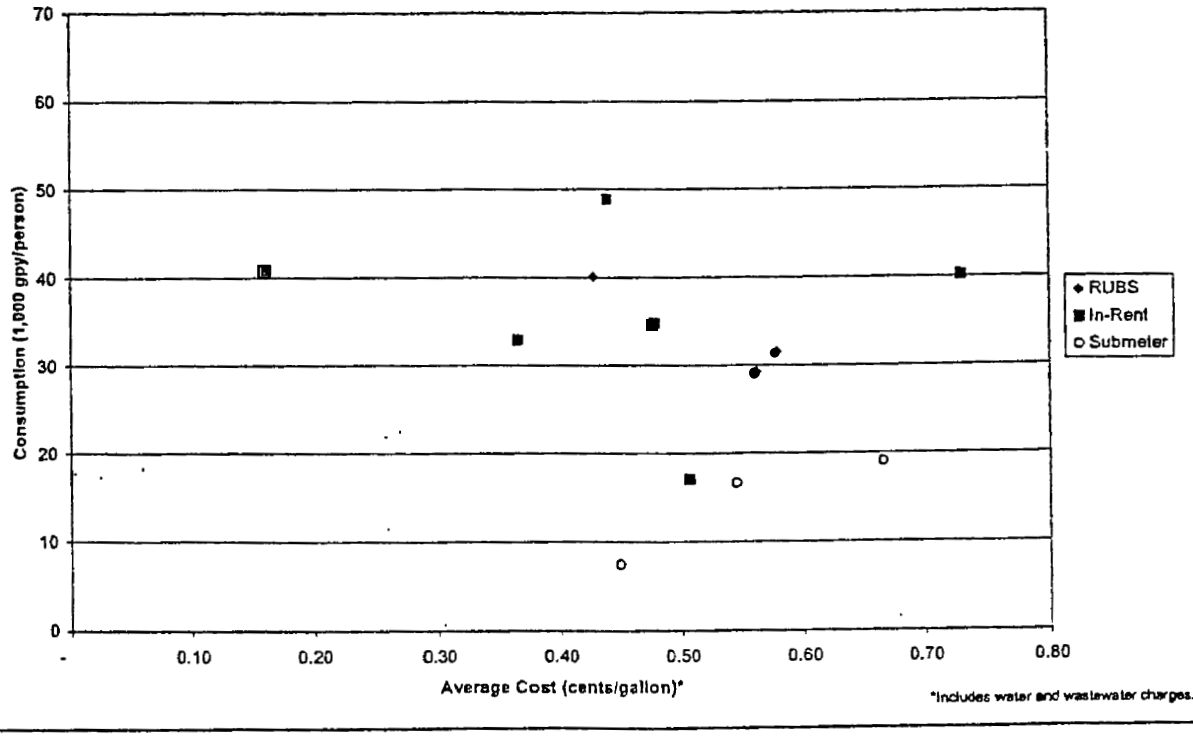
PRStateTime

Exhibit FL-1A
Per Capita Consumption, by Billing Type and Cost



*Includes water and wastewater charges.

Exhibit FL-1B
Per Capita Consumption by Billing Type and Cost, Excluding Common Areas



*Includes water and wastewater charges.

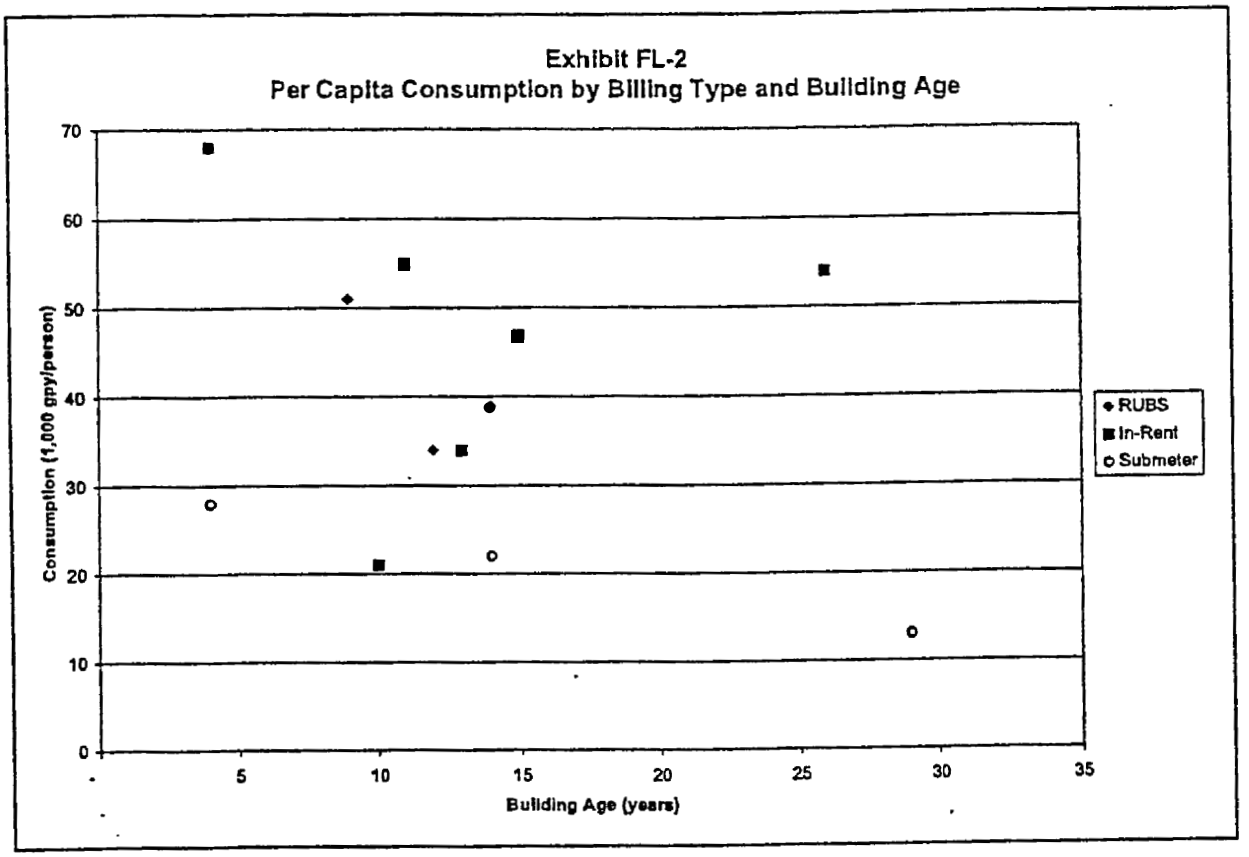


Exhibit FL-2
Per Capita Consumption by Billing Type and Building Age
Consumption (1,000 gpy/person)
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
Building Age (years)
RUBS
In-Rent
Submeter

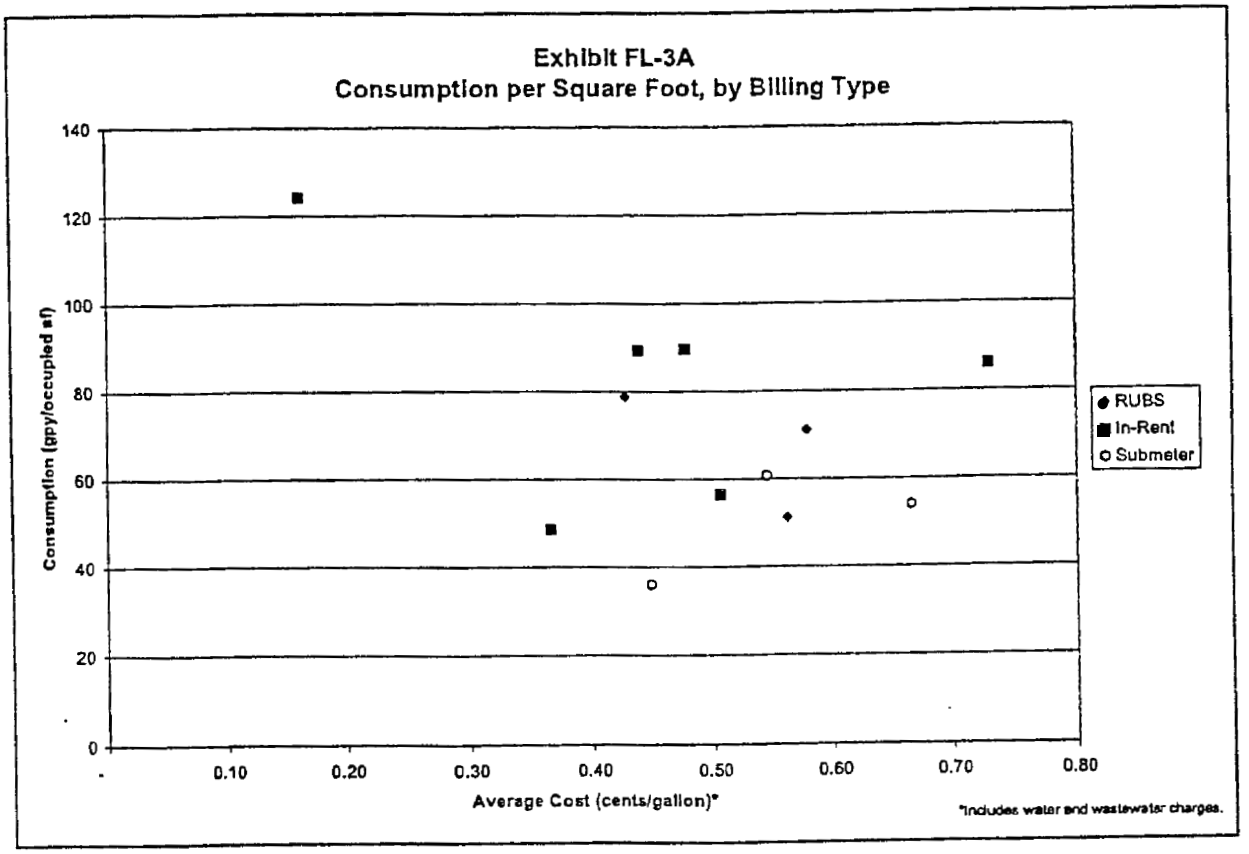
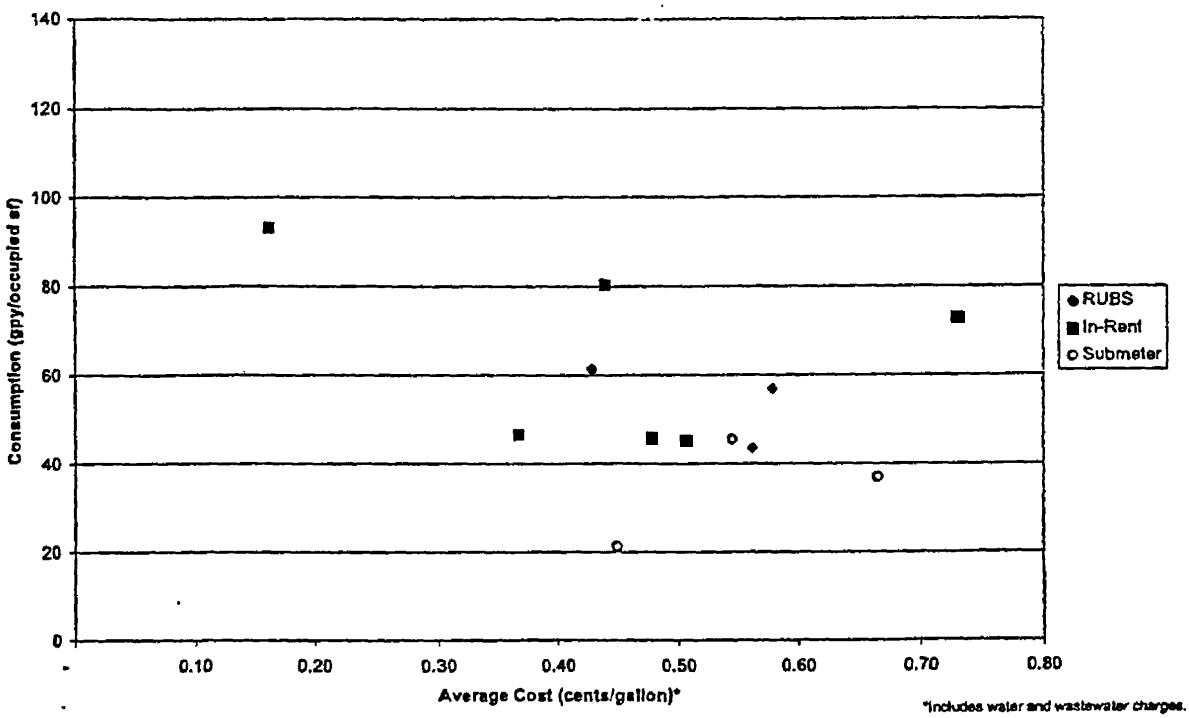


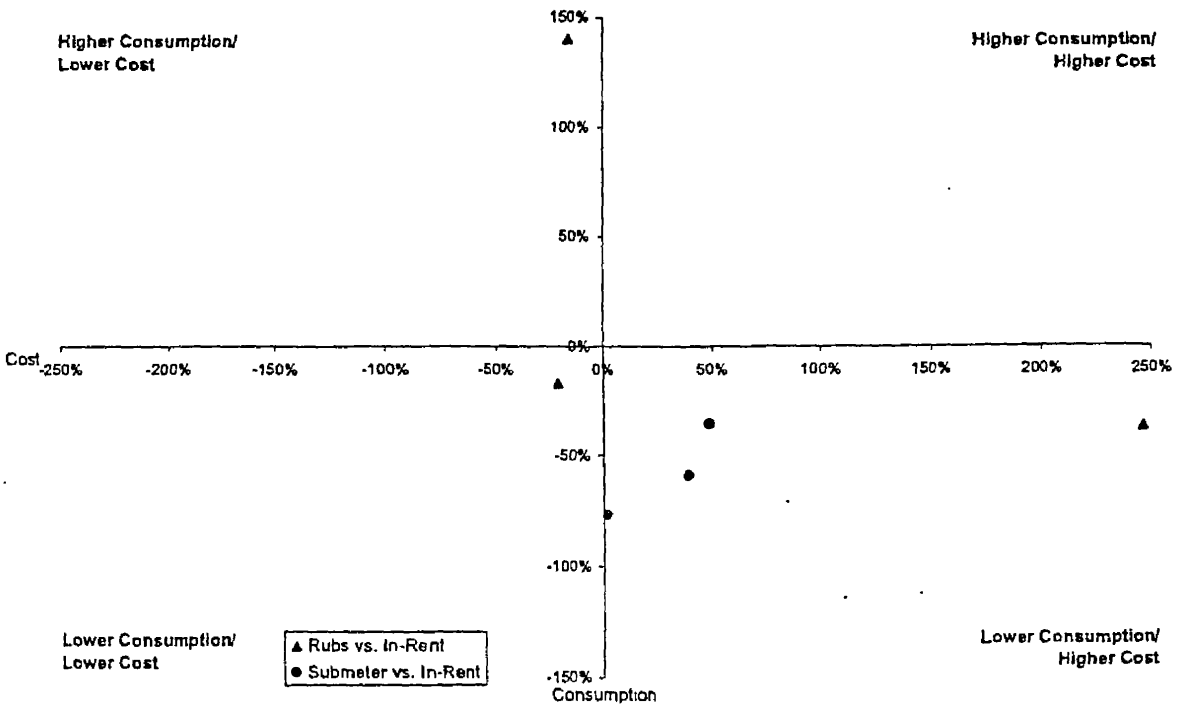
Exhibit FL-3A
Consumption per Square Foot, by Billing Type
Consumption (gpy/occupied sf)
140
120
100
80
60
40
20
0
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Average Cost (cents/gallon)*
*Includes water and wastewater charges.
RUBS
In-Rent
Submeter

Exhibit FL-3B
Consumption per Square Foot, Excluding Common Areas, by Billing Type



*Includes water and wastewater charges.

Exhibit FL-4A
Comparative Consumption by Paired Properties
(% Difference from In-Rent Control Property)



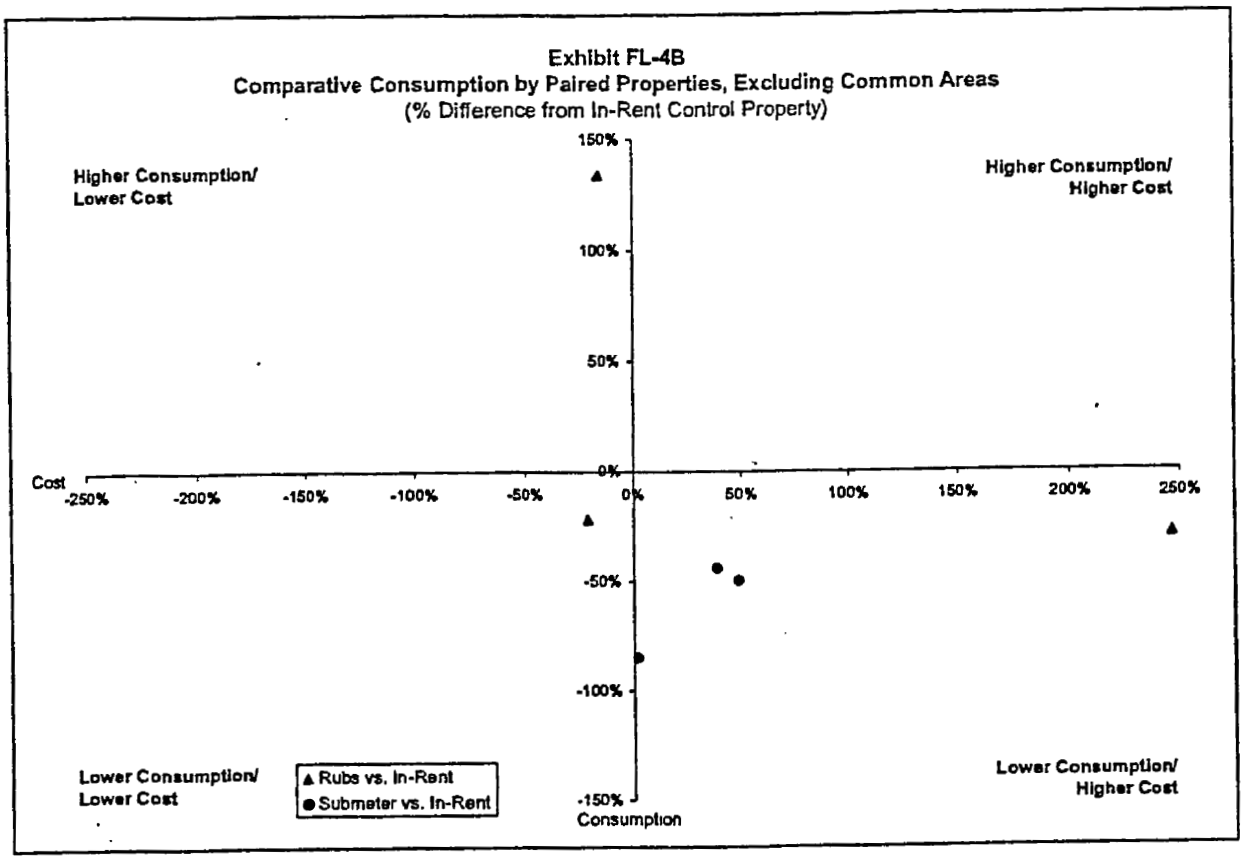


Exhibit FL-4B
Comparative Consumption by Paired Properties, Excluding Common Areas
(% Difference from In-Rent Control Property)
Higher Consumption/
Lower Cost
Higher Consumption/
Higher Cost
Lower Consumption/
Lower Cost
Lower Consumption/
Higher Cost
Rubs vs. In-Rent
Submeter vs. In-Rent
Cost
Consumption
150%
100%
50%
0%
-50%
-100%
-150%
-250%
-200%
-150%
-100%
-50%
0%
50%
100%
150%
200%
250%

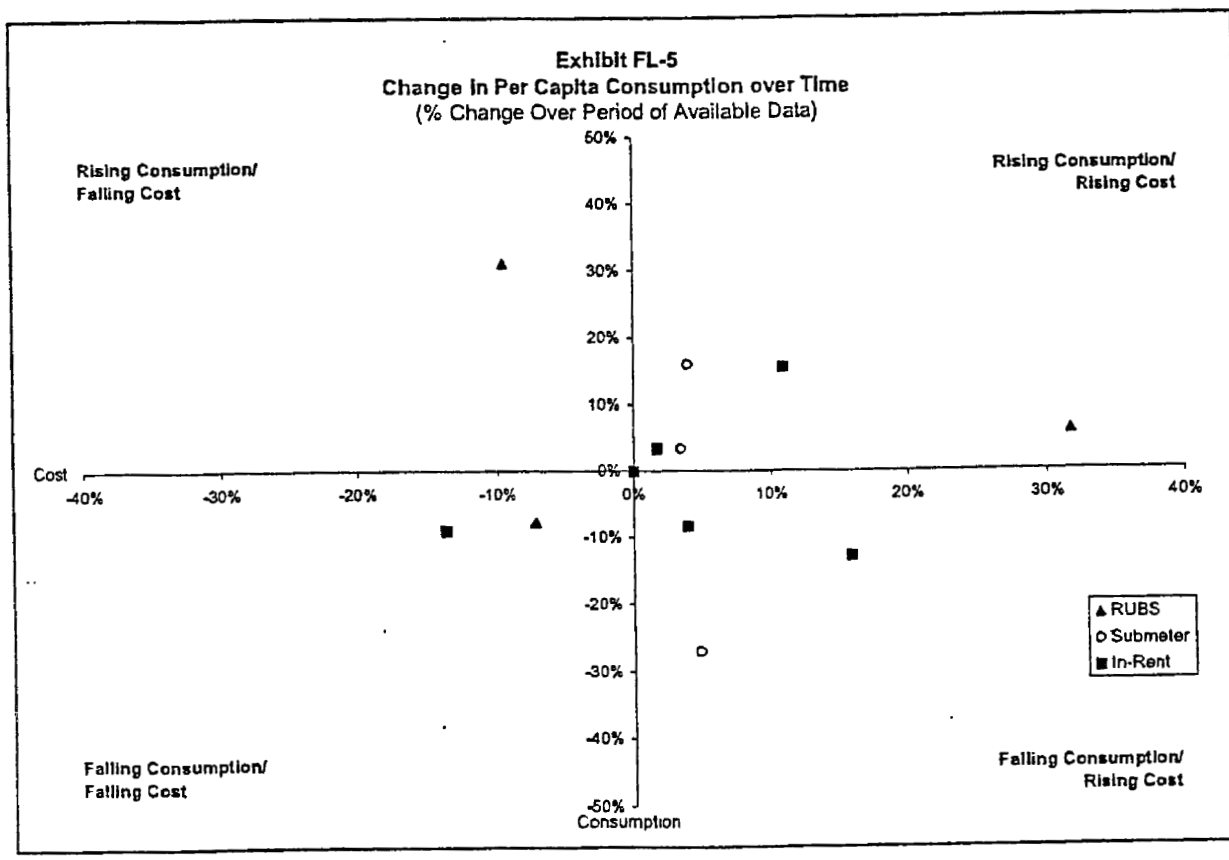
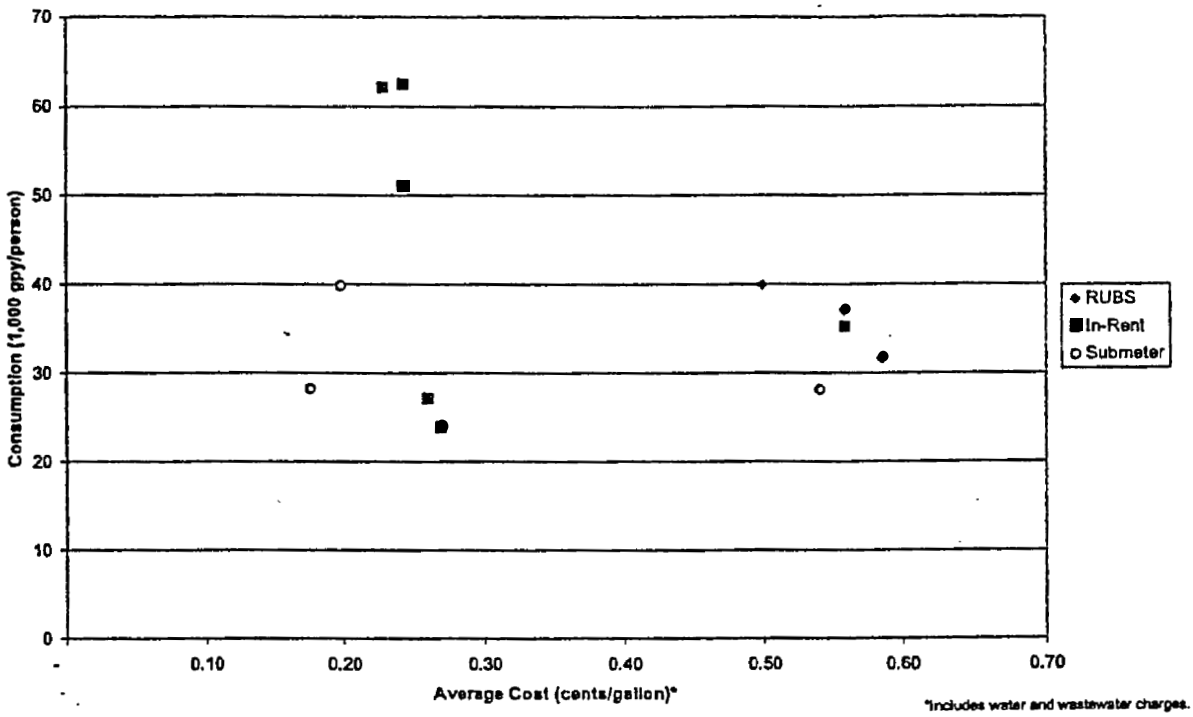


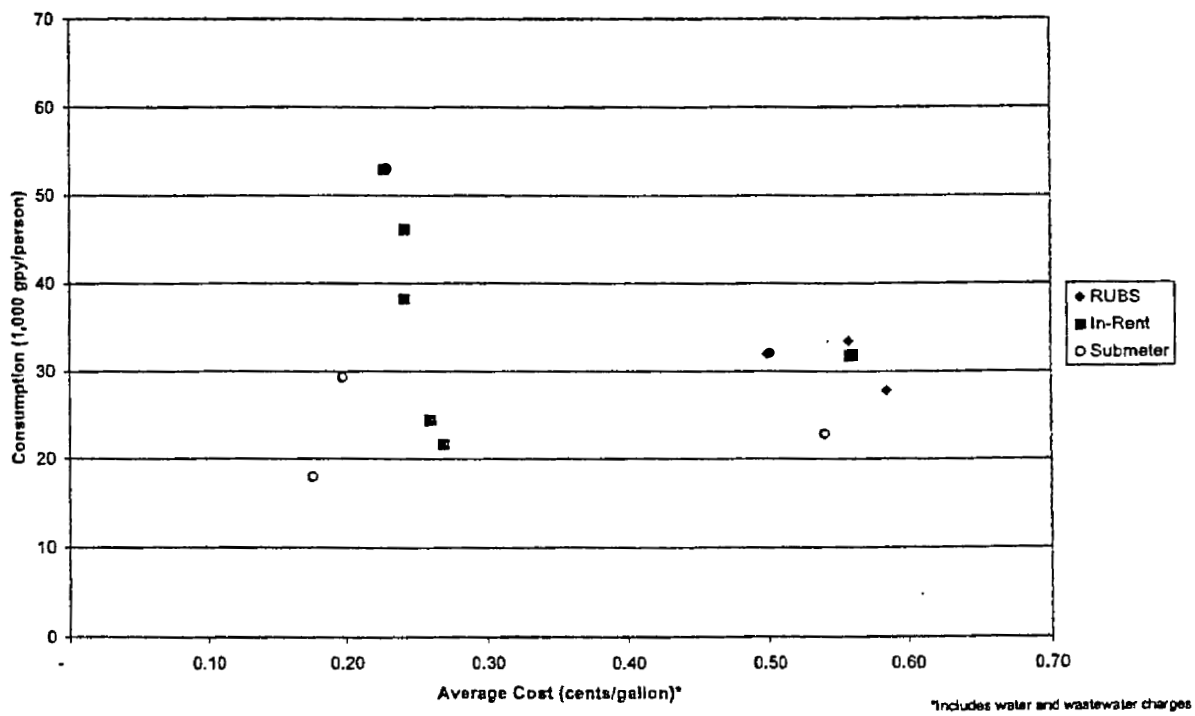
Exhibit FL-5
Change in Per Capita Consumption over Time
(% Change Over Period of Available Data)
Rising Consumption/
Falling Cost
Rising Consumption/
Rising Cost
Falling Consumption/
Falling Cost
Falling Consumption/
Rising Cost
RUBS
Submeter
In-Rent
Cost
Consumption
50%
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-50%
-40%
-30%
-20%
-10%
0%
10%
20%
30%
40%

Exhibit TX-1A
Per Capita Consumption, by Billing Type and Cost



*Includes water and wastewater charges.

Exhibit TX-1B
Per Capita Consumption by Billing Type and Cost, Excluding Common Areas



*Includes water and wastewater charges

Exhibit TX-2
Per Capita Consumption by Billing Type and Building Age

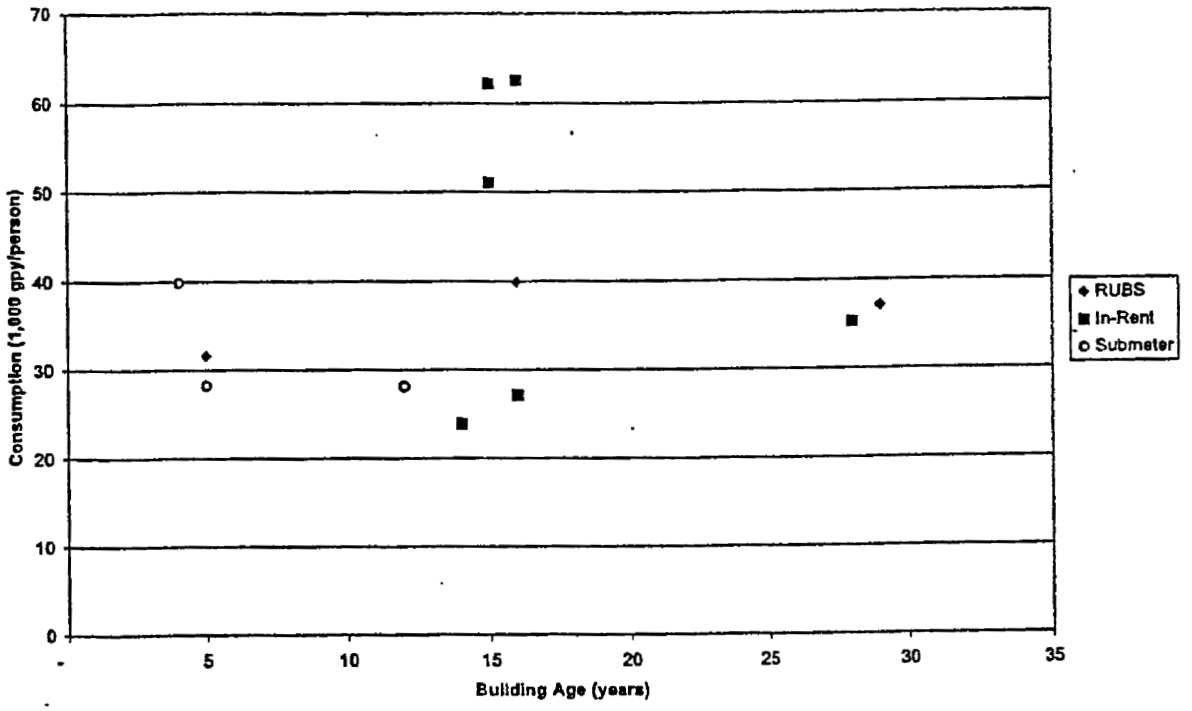


Exhibit TX-3A
Consumption per Square Foot, by Billing Type

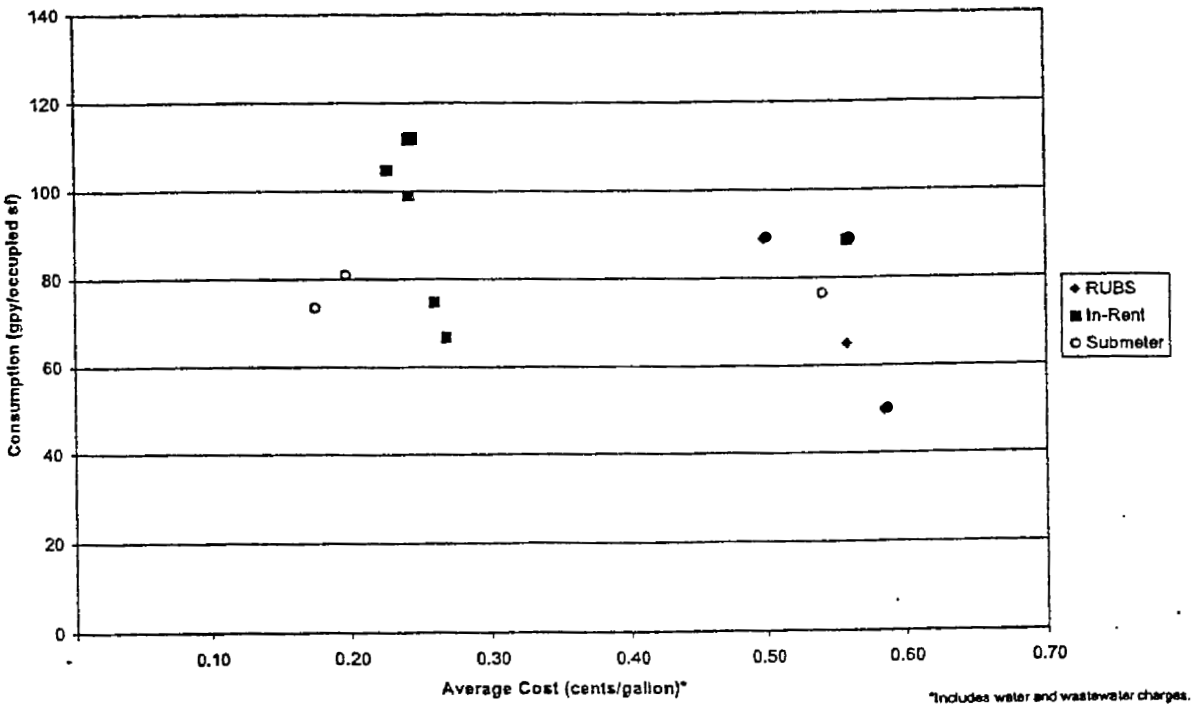


Exhibit TX-3B
Consumption per Square Foot, Excluding Common Areas, by Billing Type

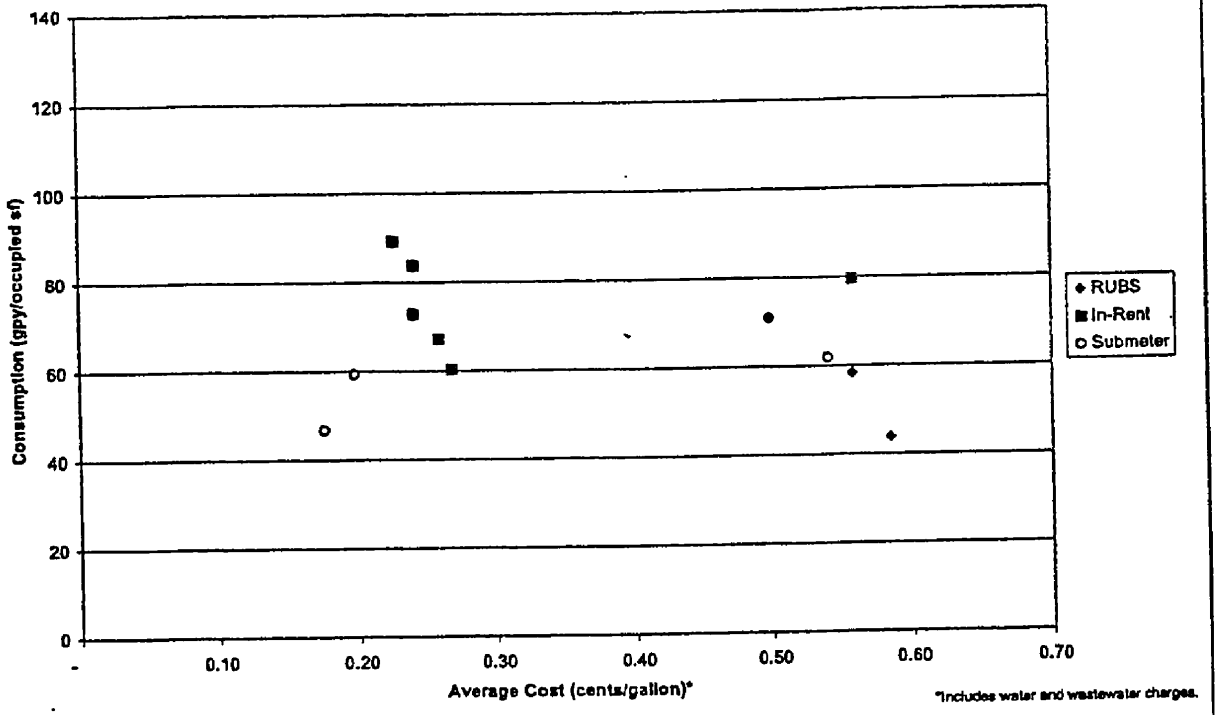


Exhibit TX-4A
Comparative Consumption by Paired Properties
(% Difference from In-Rent Control Property)

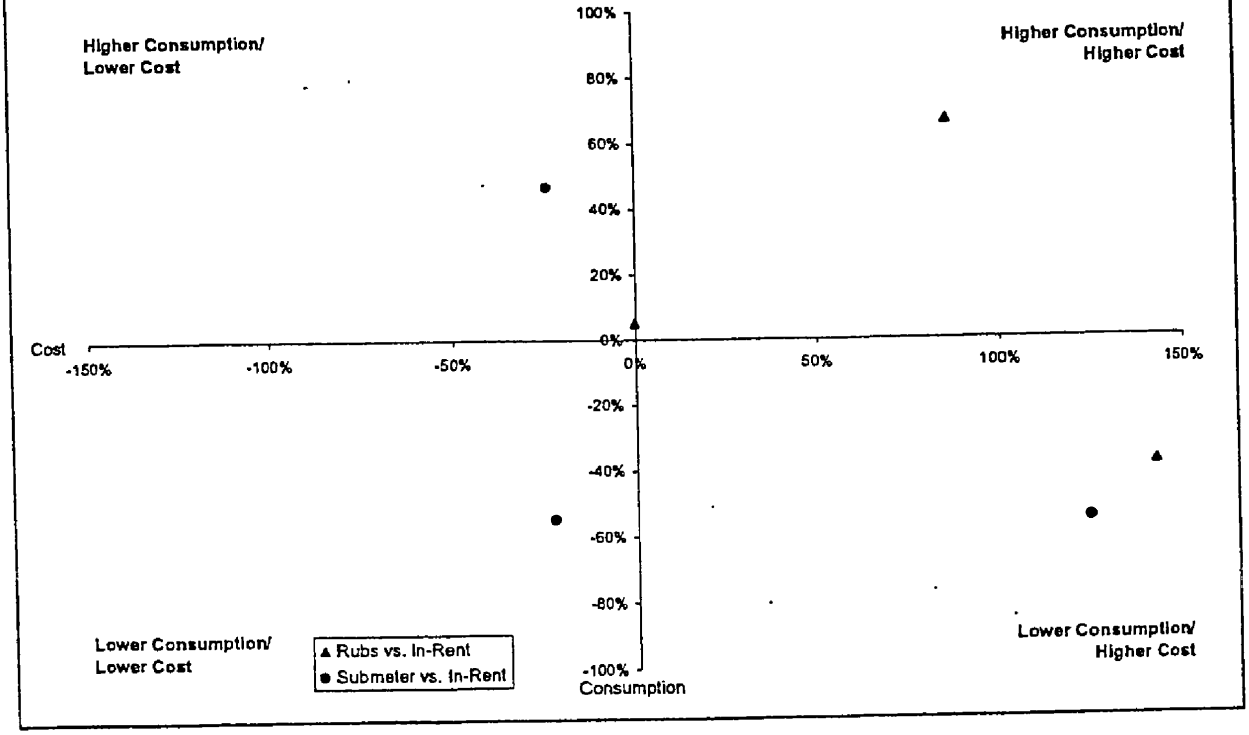


Exhibit TX-4B
Comparative Consumption by Paired Properties, Excluding Common Areas
(% Difference from In-Rent Control Property)

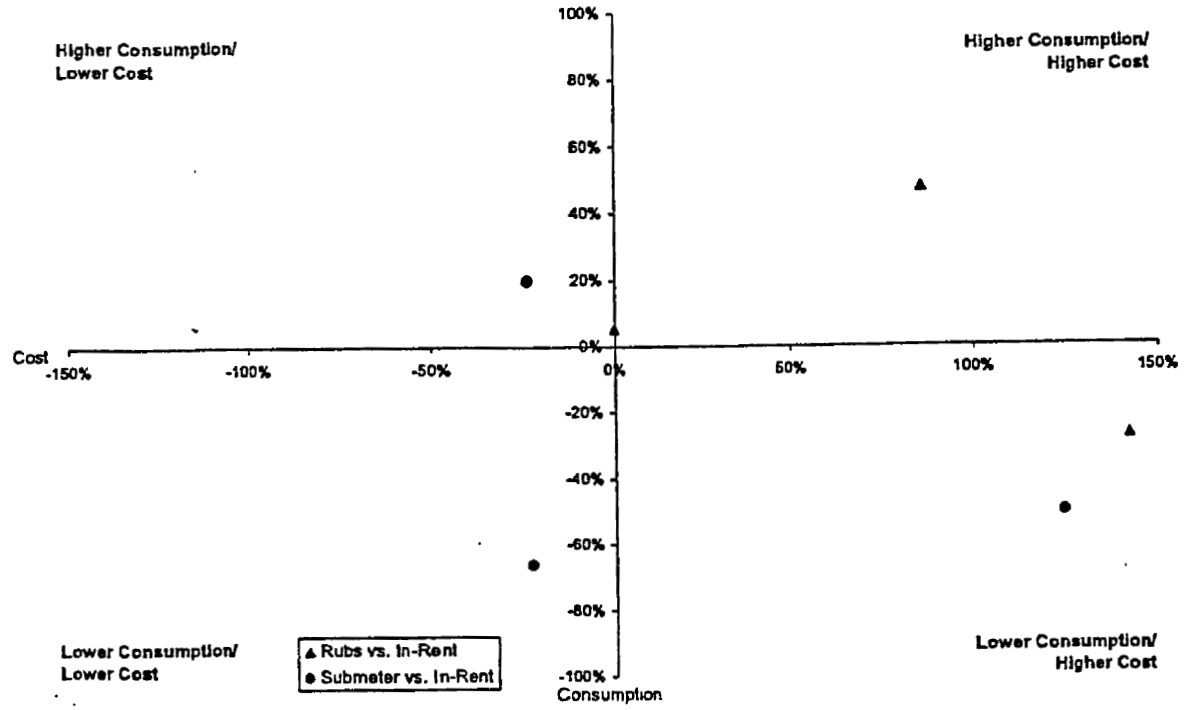


Exhibit TX-5
Change in Per Capita Consumption over Time
(% Change Over Period of Available Data)

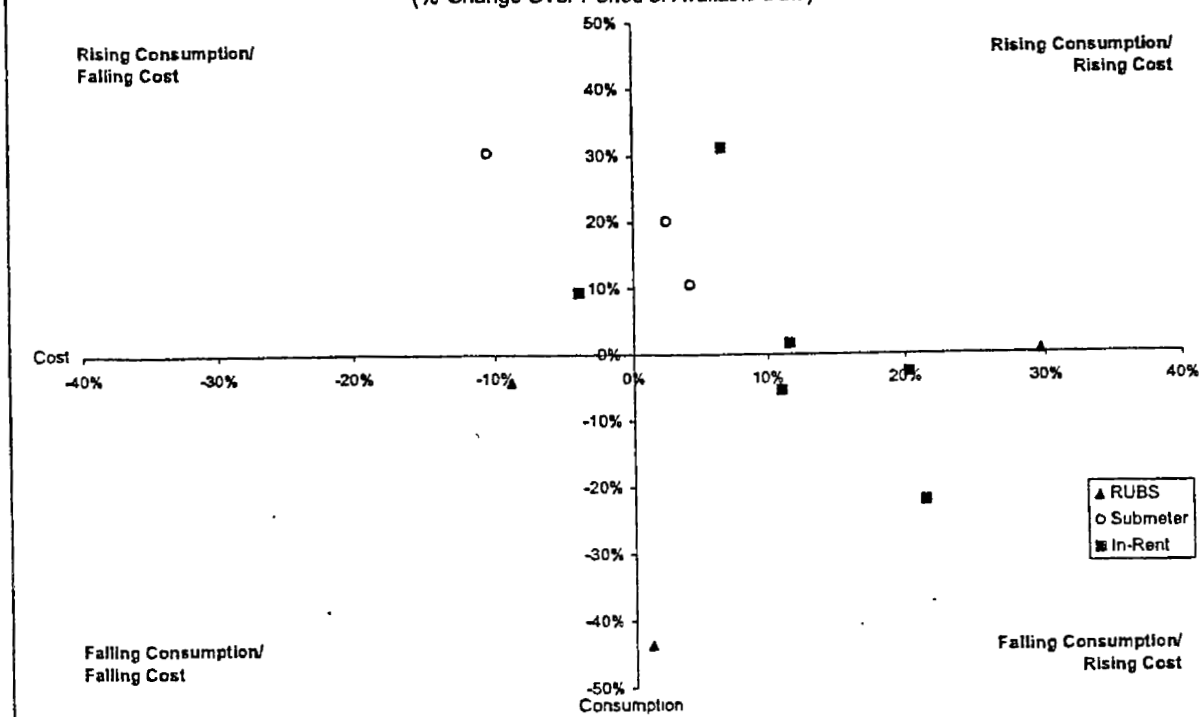


Exhibit CA-1A
Per Capita Consumption, by Billing Type and Cost

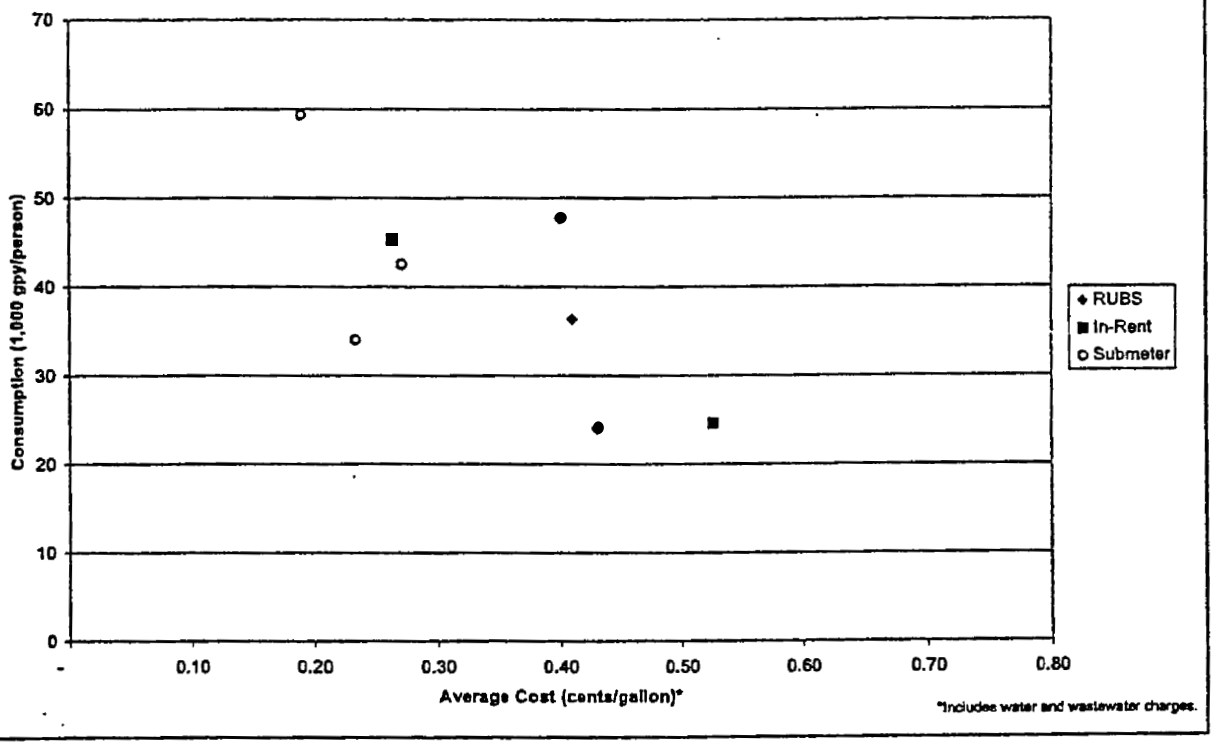


Exhibit CA-1B
Per Capita Consumption by Billing Type and Cost, Excluding Common Areas

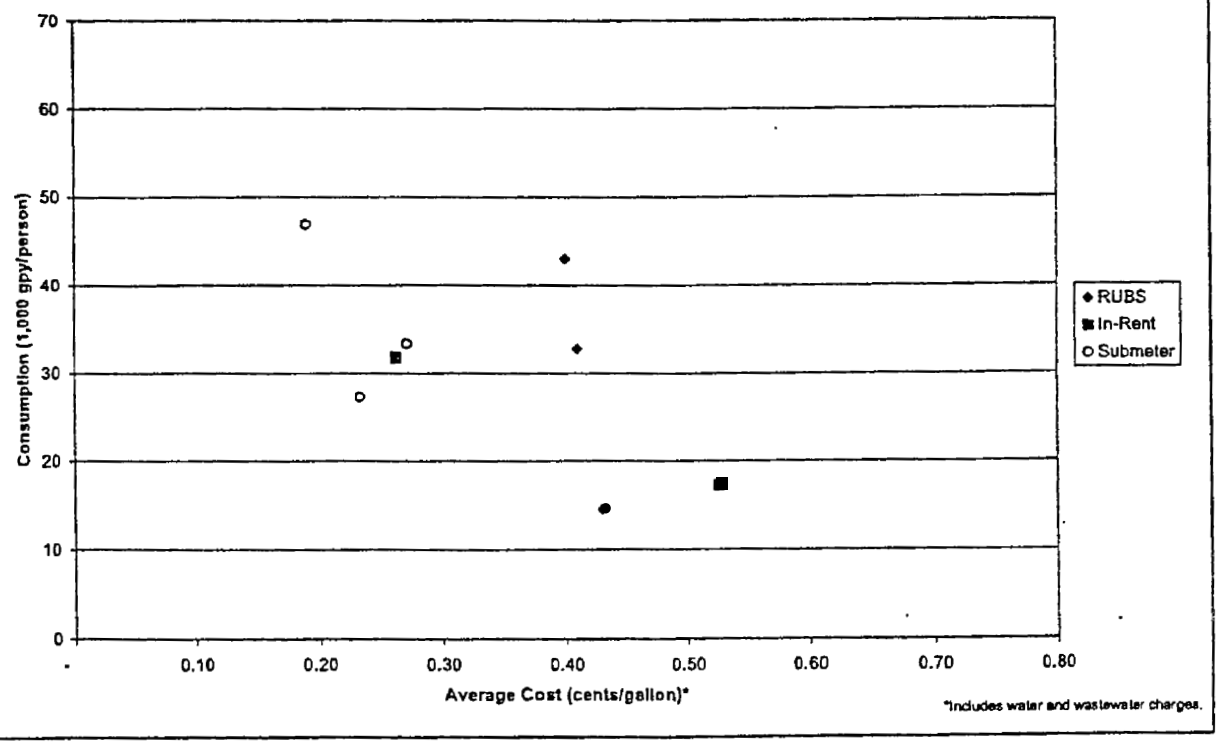


Exhibit CA-2
Per Capita Consumption by Billing Type and Building Age

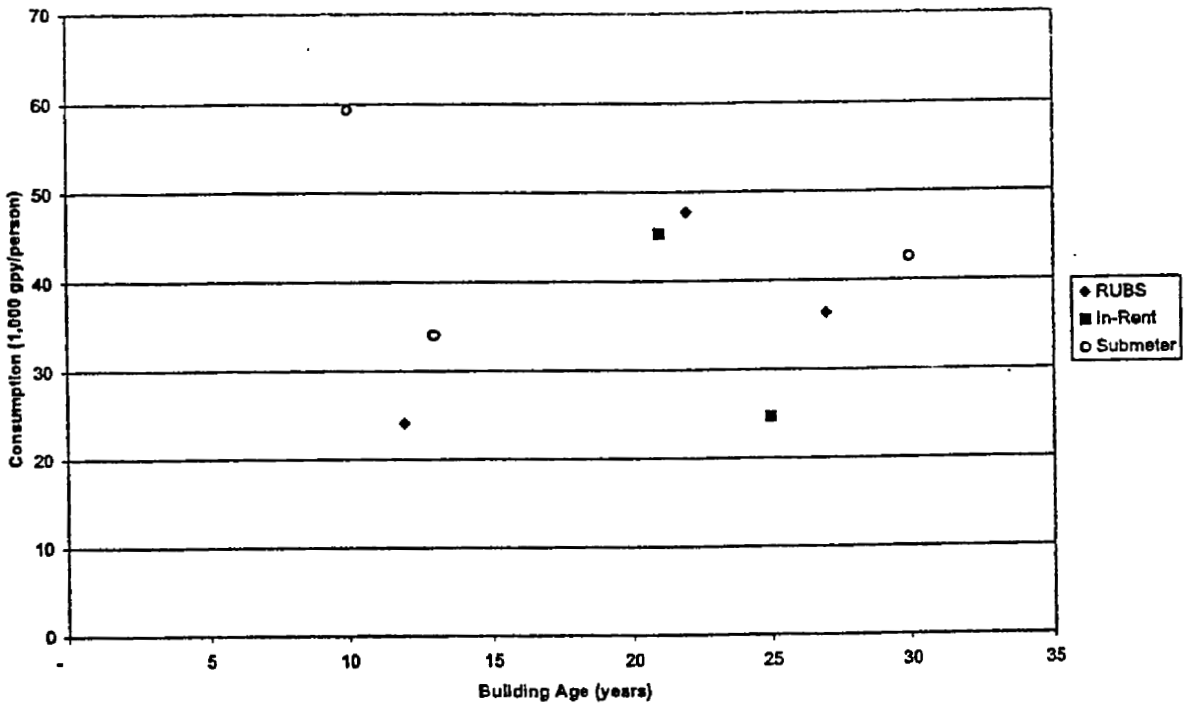
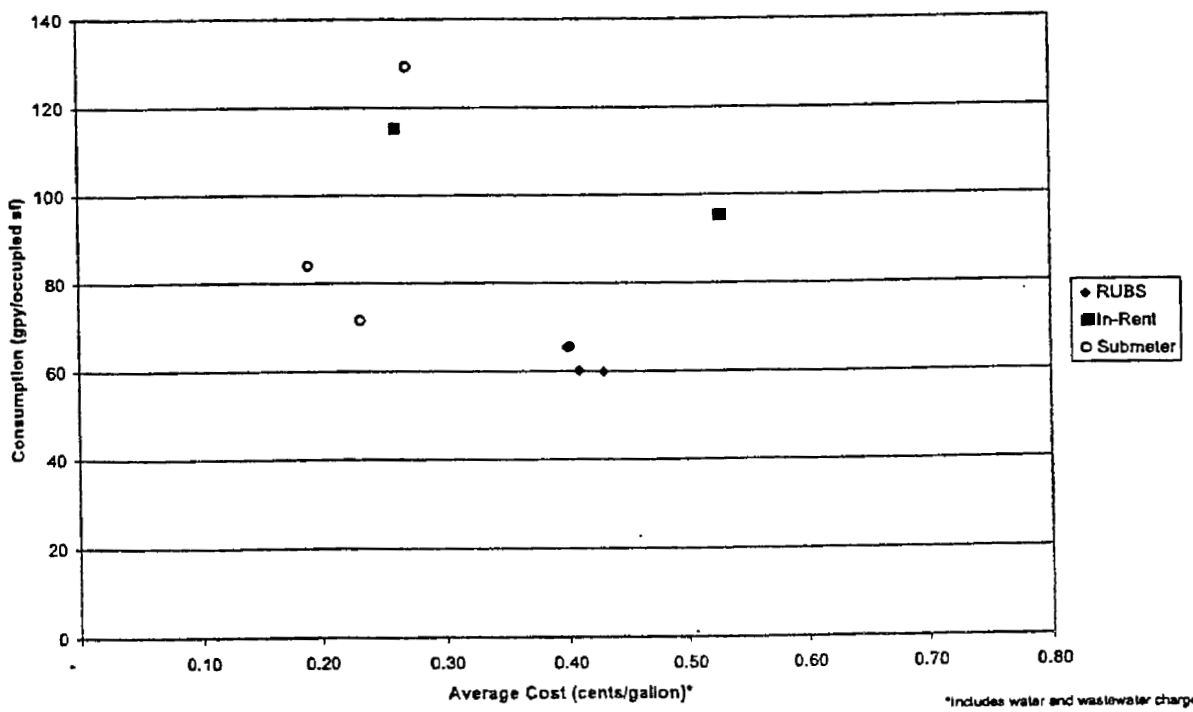


Exhibit CA-3A
Consumption per Square Foot, by Billing Type



*Includes water and wastewater charges.

Exhibit CA-3B
Consumption per Square Foot, Excluding Common Areas, by Billing Type

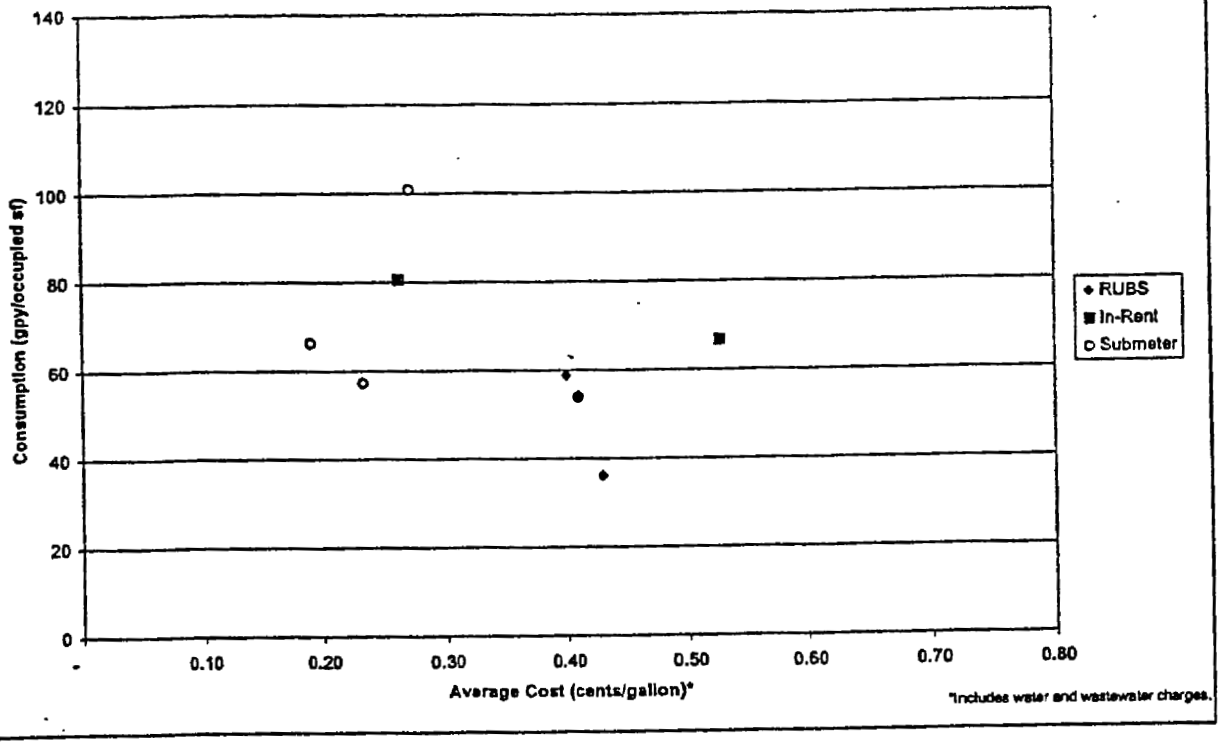
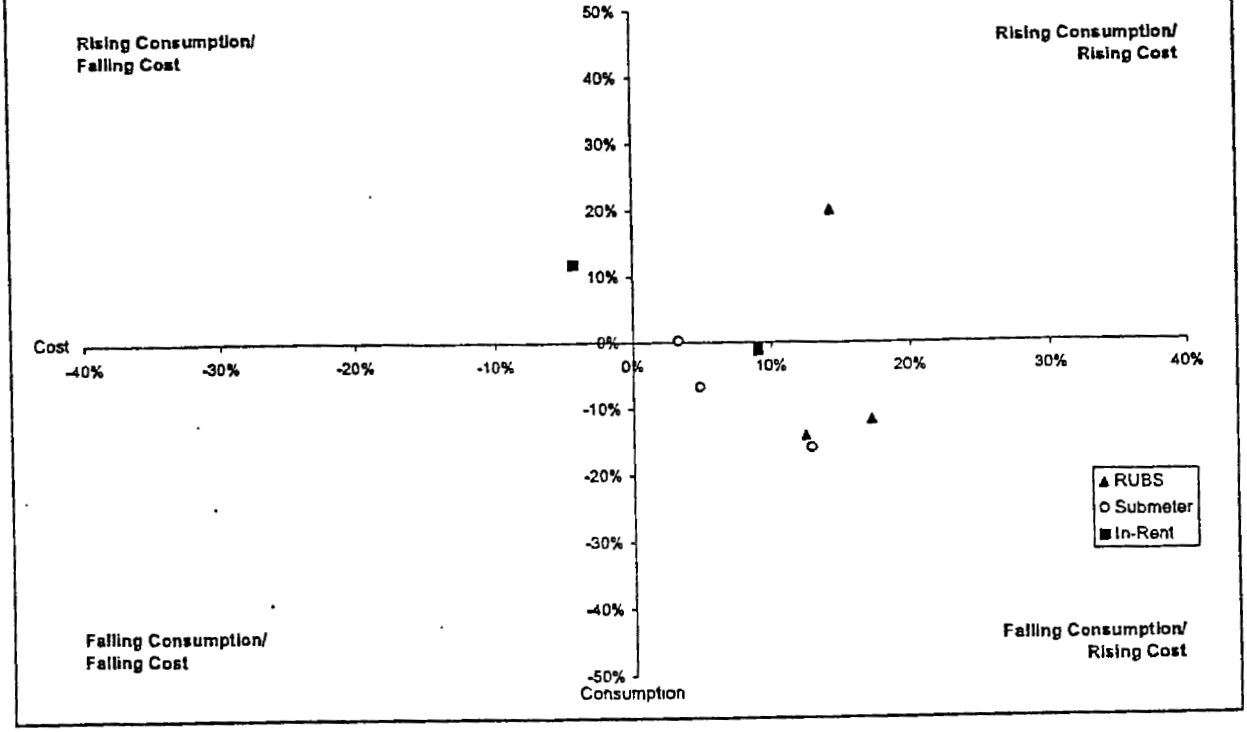


Exhibit CA-4
Change in Per Capita Consumption over Time
(% Change Over Period of Available Data)



APPENDIX A
WATER CONSERVATION MEASURES

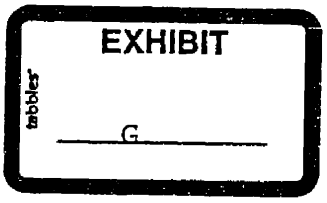
This Appendix to the EPA Guidelines for Preparing Water Conservation Plans describes the water conservation measures that water utilities can use in designing water conservation programs. As part of their conservation plans, planners should consider, *at a minimum,* each of the measures specified in the Basic, Intermediate, or Advanced Guidelines, depending on which set of Guidelines apply to the water system.

The measures are organized into three general categories: Level 1, Level 2, and Level 3. Within each level are four subcategories that are used to organize a variety of specific conservation measures:

- Level 1 Measures
  - Universal metering
  - Water accounting and loss control
  - Costing and pricing
  - Information and education
- Level 2 Measures
  - Water-use audits
  - Retrofits
  - Pressure management
  - Landscape efficiency
- Level 3 Measures
  - Replacements and promotions
  - Reuse and recycling
  - Water-use regulation
  - Integrated resource management

This system of organizing the conservation measures recognizes that the measures considered can vary with the size and capability of the system. *Water systems are strongly encouraged to explore the fullest range of conservation measures practical, including measures beyond the minimum measures suggested in the Guidelines that they are following.* Many smaller and middle-sized utilities have been very successful in implementing a wide range of beneficial conservation programs.

What follows is a description of each of the twelve subcategories of measures. The Guidelines provide checklists that planners can use in reviewing measures. However, planners are encouraged to consider as many measures as practical given their capability and the conditions they seek to address. In some cases, planners may choose to consider and implement selected measures beyond those minimally recommended for consideration.



Although this list of conservation measures is relatively current and comprehensive, planners should not limit their analysis only to the measures mentioned here. Planners also should consider new technologies and approaches as they become available. Letters next to each category indicate whether the measures in that category are considered particularly useful in reducing average-day demand [A], maximum-day or peak demand [P], both [B]. Worksheets for some of the conservation measures are provided at the end of this Appendix.

Level 1 Measures

Universal Metering [B]

Measures	← Basic Guidelines →	← Intermediate Guidelines →	← Advanced Guidelines →
Universal metering [B]	• Source-water metering • Service-connection metering and reading • Meter public-use water	• Fixed-interval meter reading • Meter-accuracy analysis	• Test, calibrate, repair, and replace meters

Metering is a very fundamental tool of water system management and conservation. Worksheet A-1 can be used by systems to assess their metering practices.

Source-water metering. Both the supplier and the customer benefit from metering. Source metering is essential for water accounting purposes.

Service-connection metering. Service-connection metering is needed to inform customers about how much water they are using; suppliers use metering data to more accurately track water usage and bill customers for their usage.

Public-use water metering. All water provided free of charge for public use should be metered and read at regular intervals. This will allow the utility to more accurately account for water. Lack of metering undermines loss control, costing and pricing, and other conservation measures.

Fixed-interval meter reading. A program of fixed-interval meter reading is essential to determine the amount of nonrevenue-producing water. Source meters and service connection meters should be read at the same relative time in order to facilitate accurate comparisons and analysis. Readings generally should occur at regular intervals, preferably monthly or bimonthly. Estimated bills should be kept at a minimum, subject to state and local regulations.

Meter accuracy. Water meters can be damaged and deteriorate with age, thus producing inaccurate readings. Inaccurate readings will give misleading information regarding water

COLLIER COUNTY GOVERNMENT
COMMUNITY DEVELOPMENT AND ENVIRONMENTAL SERVICES DIVISION

Operations Department
Collier Business Plaza, Suite 210
3050 North Horseshoe Drive
Naples, Florida 34104

July 24, 2002

Martin P. McDonnell
Rutledge, Ecenia, Purnell & Hoffman
P.O. Box 551
Tallahassee, Florida 32302-0551

Re: Florida Water Services Corporation Proposed Revised Tariff for Collier County

Dear Mr. McDonnell:

Please have Florida Water Services Corporation deliver to me its records reflecting the amounts of total building cumulative potable water consumption for multi-unit residential buildings that are occupied by permanent or semi-permanent occupants.

These records should establish the total building-wide consumption of potable water before and after the residential units were changed from receiving potable water service through a master meter to receiving such service through individual unit potable water meters. Where possible the "before and after" time periods should be for two years before and two years after the master meter was eliminated and the individual residential unit meters were installed, especially recent water consumption comparisons for these types of residential occupancy buildings on Marco Island.

Thank you for your assistance in this matter.

Sincerely,

D.E. "Bleu" Wallace, Director

Cc:
David E. Schmitt, P.E. (Aquarius Apartments)
Ashley Lupo, Esq. (Mariner Apartments)
Donald G. Childs, Esq. (WCI Communities)

St. Johns River Water Management District

Kirby B. Green III, Executive Director • John R. Wehle, Assistant Executive Director

Post Office Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500

June 28, 2002

Florida Water Service
Attn: Christine Russell
P O Box 609520
Orlando FL 32860-9520

Subject: Consumptive Use Permit 50087
FWS Amelia PWS

Dear Ms. Russell:

Enclosed, please find a **courtesy** copy of the above referenced **revised** Technical Staff report. You will find the revisions in the following section(s):

Date
Authorization Statement: corrected 2020 to 2021
Permit Application Review, Section III, corrected the spelling of occuring to occurring
Other Condition 19: inserted "and similar type uses"
Other Condition 20: corrected the spelling of analyz to analyze

If you have any questions, please do not hesitate to contact Jay Lawrence in the Jacksonville Service Center at (904) 448-7918.

Sincerely,

Gloria Lewis, Director
Division of Permit Data Services
Department of Resource Management

Enclosure

LM/s

cc: District File
Lynn Minor
Jay Lawrence
Andreyev Engineering
Nicolas Andreyev
4055 St. Johns Parkway
Sanford Fl 32771

EXHIBIT
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CONSUMPTIVE USE TECHNICAL STAFF REPORT
HOUSEHOLD, WATER UTILITY AND ESSENTIAL TYPE USES
June ~~29~~28, 2002
2-089-50087-5
(formerly 2-089-0006)

APPLICANT:
Florida Water Services
Attn: Ms. Christine Russell, P.E.
1000 Color Place
PO Box 609520
Orlando, FL 32860-9520
Ph: (407) 598-4100

AGENT:
Andreyev Engineering, Inc.
Attn: Mr. Nicolas E. Andreyev, P.E.
4055 St. Johns Parkway
Sanford, FL 32771
Ph: (407) 330-7763

COMPLIANCE CONTACT:
Florida Water Services
Attn: Ms. Christine Russell, P.E.
1000 Color Place
PO Box 609520
Orlando, FL 32860-9520
Ph: (407) 598-4100

PROJECT NAME: FWS Amelia Island PWS

LOCATION: Amelia Island - Nassau County
Section 14, Township 2N, Range 28E

ACREAGE: Total Acres Owned: 22.07

WATER USE:

Requested Use: 1,060.325 million gallons per year (MGY) of ground water from the Floridan aquifer to serve an estimated population of 9,986 in 2021 with water for household, commercial/industrial, essential and water utility uses, and unaccounted for water losses.

Recommended Allocation: 1,060.325 million gallons per year (MGY) of ground water from the Floridan aquifer to serve an estimated population of 9,986 in 2021 with water for household, commercial/industrial, essential and water utility uses, and unaccounted for water losses.

Allocation Based On: Historic Use/Industry Standards/Staff

Recommended Permit Duration and Compliance Reporting: 20 year permit with 5 year compliance reports required pursuant to section 373.236(3), Florida Statutes. In addition to submittal of the compliance reports, the permittee is also required to comply with, and submit all information and data required by the limiting conditions set forth in the permit.

Objectors: No

PREVIOUSLY PERMITTED USE:

CUP Number:	2-089-0006
Date Initial Permit Issued:	June 11, 1985
Date Previous Permit Issued:	September 9, 1997
Expiration Date:	June 9, 2007
Allocation:	683.43 million gallons per year (MGY) of groundwater from the Floridan aquifer in 2007 for household use and 4.032 million gallons per day for essential use
Associated Permits:	FDEP Public Water Supply Identification No. 2450022 FDEP Wastewater Site Identification No. 3145P04522

USE STATUS:

This is a renewal of a previously issued permit with a request for an increase in allocation.

AUTHORIZATION:

This District authorizes, as limited by the attached conditions, the use of 1,060.325 million gallons per year (MGY) of ground water from the Floridan aquifer to serve an estimated population of 9,986 with potable water for household, commercial/industrial, water utility and essential uses, and unaccounted for water losses in ~~2020~~2021.

PROJECT DESCRIPTION:

Timeframes:

Date application received:	July 24, 2001
Date of 1st RAI:	August 14, 2001
Date of response to 1st RAI:	November 16, 2001
Did the response complete the application:	No
Date of 2nd RAI:	December 11, 2001
Date of response to 2nd RAI:	April 12, 2002
Did the response complete the application:	Yes
Date application deemed complete by reviewer:	April 12, 2002
90th day:	July 11, 2002
Last possible board date:	July 9, 2002

Background and Project Location:
Florida Water Services provides water and wastewater services to more than 120 different communities throughout the State. The service area under consideration in this application covers the southern portion of Amelia Island in Nassau County. The service area is limited to the coastal barrier island that extends from the southern boundary of the Fernandina airport to the northern edge of the Nassau Sound and Crane Island, excluding the American Beach subdivision. Water use within the service area is primarily for household and limited commercial uses. There is one secondary user (The Ritz-Carlton) connected to the distribution system.

Water Supply System Description:
Currently, raw water is withdrawn from 2 Floridan aquifer wells located at the water treatment facility. The applicant is proposing to construct 2 additional wells within the confines of the site in order to increase capacity and improve reliability. All ground water withdrawn is processed through aeration and chlorination chambers and then supplied to the potable distribution system. The distribution system grids the southern portion of the coastal barrier island community that measures approximately 6 miles long by 1 mile wide. There are approximately 20 lineal miles of water mains within the grid.

The water and wastewater treatment facilities were constructed and placed into initial operation in 1974. Since then there have been 2 major improvement projects at the site with the upgrades authorized in this permit constituting the 3rd.

A water audit of the distribution system is conducted annually. The last audit was conducted by the Florida Rural Water Association and reflected an unaccounted for water loss of 4.1%. Since operations began in 1974, unaccounted for water has remained below 5%.

Water Use Information:
The applicant's water use has steadily increased due to resort and residential development associated with projected growth. The County Planning Department is projecting population increases of approximately 220 people per year in this service area through 2020, which equates to approximately 5% per year. Historic growth has averaged approximately 5% during the past 10 years. Due to the attractive living environment of the area, growth is expected to be steady through the duration of this permit.

Water Use Trends	2001	2021
Population Served	6,038	9,986
Average daily use (mgd) (household + comm/industrial)	1.637	2.763
Water Utility daily (mgd)	.008	.013
Unaccounted for Water Loss (mgd)	.081	.129
Total Average Daily Use	1.726	2.906
Average gpcd (household)	177	177
Use Classifications (2020):		
Household and Commercial/Industrial:	94.5%	94.5%
Water Utility:	.5%	.5%
Unaccounted for Water:	5%	5%

Well Information: (PS=Public Supply, ESS=Fire Protection, Well, WU=Unaccounted/Water Utility, MW+ Monitoring Well)

Well ID	SFWMD ID	Casing Diameter (inches)	TOTAL DEPTH (feet)	PUMP RATE (gpm)	Existing or Proposed	Type Use
1-AI	11419	16	1016	1400	Existing	PS, WU, ESS
2-AI	11420	16	759	1400	Existing	PS, WU, ESS
3-AI	33941	16	1000	1500	Proposed	PS, WU, ESS
4-AI	33942	16	1000	1500	Proposed	PS, WU, ESS
5-Monitoring Well	34637	4	1000	N/A	Proposed	MW

PERMIT APPLICATION REVIEW:

Section 373.223, Florida Statutes, and Section 40C-2.301, Florida Administrative Code (F.A.C.), require an applicant to establish that the proposed use of water:

(a) is a reasonable-beneficial use;
(b) will not interfere with any presently existing legal use of water; and,
(c) is consistent with the public interest.

In addition, the above requirements are further interpreted in chapter 40C-2, F.A.C., and in the District's Applicant's Handbook: Consumptive Uses of Water, April 10, 2002. District staff have reviewed the consumptive use permit application pursuant to the above described requirements and have determined that the application meets the conditions for issuance of this permit, as limited by the attached permit conditions.

Subsection 373.019(4), Florida Statutes, defines "Reasonable Beneficial Use" as "the use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and consistent with the public interest." In order to establish that the proposed use is a reasonable beneficial use, the applicant must meet the criteria in section 10 of the Applicant's Handbook (A.H.). In reviewing the applicant's request, staff determined that the applicant has demonstrated that the requested use is necessary and the environmental or economic harm caused

by the consumptive use requested for public supply use would be reduced to an acceptable amount as required by paragraph 10.3 (d), A.H. Highlights of the staff's review are discussed below.

I. Description of Ground Water Resources: At this site the surficial aquifer extends from land surface to approximately 90 feet below land surface (BLS). Surficial deposits consist of interbedded sands, hardpan, clay and occasional limestone lenses. Due to the proximity of seawater surrounding the barrier island, water quality is generally poor. The Hawthorn Formation underlies the surficial system to a depth of 470 feet BLS. The Hawthorn serves collectively as a confining unit for the Floridan aquifer and is comprised primarily of clay and silt deposits with occasional sand and limestone lenses. The top of the Floridan aquifer is encountered at a depth of 470 feet below land surface. It consists of two primary flow zones, the Upper and Lower Floridan aquifers, which are separated by approximately 400 feet of the lower producing dolomitic/limestone layers. The Floridian aquifer is the area's primary freshwater production aquifer.

II. Groundwater Impacts: Staff have evaluated whether the proposed withdrawal of water meets the requirements of subsection 10.3(c), (d) and (j), A.H. Subsection 10.3(c)(d) and (j), A.H., provides that the source of the water be capable of producing the requesting amounts and there be no water quality degradation or saline water intrusion. Raw water samples have been collected and analyzed for naturally occurring inorganic compounds on an annual basis. These analyses reflect that chloride values (as well as others) have remained stable over the past ten years and have ranged from 15 to 29 milligrams per liter (mg/l). Total dissolved solids have remained equally as low, in the range of 400 mg/l. Also, water levels within the upper zone of the Florida aquifer have averaged 20 feet above sea level (15 feet above ground level) for the same period.

Based on historic water quality analyses and aquifer potentiometric levels, staff have concluded that the ground water resources in the area will not be adversely impacted by the applicant's proposed use. However, the applicant has agreed to construct a dedicated Floridan aquifer monitoring well in order to obtain real time water level data and to obtain water samples that are not affected by well field operational schedules. The monitoring of a dedicated well will allow for a higher quality of data collection.

III. Saline Water Intrusion: Section 9.4.2, A.H. provides that the issuance of a permit may be denied if the permit would allow withdrawals of water that would cause significant saline water intrusion. Significant saline water intrusion is defined as saline water encroachment, which detrimentally affects the applicant or other existing legal users of water, or is detrimental to the public interest. Additionally, subsection 10.3(h) of the Applicant's Handbook requires that the consumptive use not cause significant saline water intrusion or further aggravates currently existing saline water intrusion problems. After a review of the applicant's water quality analysis reports and reports from adjacent CUP holders, staff have concluded that there is no evidence of saline water encroachment in this area. In addition, the use of a dedicated monitoring well will

provide an enhanced capability for assessing any trends or changes in water quality that may indicate saline water intrusion is ~~occuring~~occurring.

IV. Interference with Existing Legal Uses: Staff have evaluated whether the proposed withdrawal of ground water from the Floridan aquifer would interfere with existing legal uses. Section 9.4.4, A.H. provides that the issuance of a permit will be denied as inconsistent with the public interest if the permit would allow withdrawals of water that would cause an interference with a legal use of water that existed at the time of the permit application. Section 9.4.4, A.H. also provides that interference occurs when the withdrawal capability of any individual withdrawal facility of a presently existing legal use of water experiences a 10% or greater reduction in withdrawal capacity or when the existing legal users experiences economic, health, or other type of hardship as a result of the new use.

The Fernandina Beach area has historically experienced drawdowns in the Floridan aquifer in the range of 60 to 110 feet due to two pulp processing mills (Rayonier and Jefferson Smurfit) located in the northern portions of the island. In the summer of 1980, drawdowns in some of the mills production wells were up to 346 feet below sea level (Brown 1984, pg. 64). At current pumping rates, drawdowns average approximately 50 to 60 feet at the well fields and during peak pumping periods drawdowns can be as much as 120 feet. The area of influence is very broad and encompasses the entire Amelia Island community. The pulp mills collectively account for approximately 89% of the permitted water use on Amelia Island, with the remainder being accounted for by public supply and golf course irrigation uses.

The applicant has requested to continue to withdraw ground water at the existing Water Treatment Plant site. This site is within the area of influence of the pulp mills. An aquifer performance test was conducted at the site in October of 2000. The aquifer parameters that were calculated from the evaluation of the aquifer performance test were input into a MODFLOW numerical ground water model. The MODFLOW model was run at withdrawal rates that correspond to 2020 population projections. At these withdrawal rates, the applicant's wells will increase the existing drawdown impacts of the paper mills by approximately 4.5 feet at the applicant's wells. At a distance of ½ mile the drawdown is approximately 2 feet and reduces to 1 foot, approximately 1 mile from the site.

Based on an analysis of the calibrated MODFLOW modeling runs, and an analysis of the existing adjacent users wells and withdrawal capabilities, staff has concluded that the drawdown due to the withdrawals authorized by this permit will not interfere with any existing legal uses pursuant to section 9.4.4, A.H. The additional drawdown is considered minor compared to the historic fluctuations of the potentiometric surface in this area.

WATER CONSERVATION:

The staff evaluated whether the proposed withdrawals of water by the applicant for public supply type use meets the District's water conservation requirements set forth in

section 10.3 and 12.2.5, of the Applicant's Handbook. Subsection 10.3(e), A.H., provides that all available water conservation measures must be implemented unless the applicant demonstrates that implementation is not economically, environmentally or technologically feasible. The rule, however, provides that satisfaction of this criterion may be met by demonstration that the applicant is meeting, or will meet, the water conservation requirements set forth in subsection 12.2.5, A.H.

Florida Water Services provides water and wastewater services to more than 120 different communities throughout the state. Because of this unique statewide service area, the company is able to initiate conservation programs on a uniform basis. This is more efficient for the utility than implementing measures on a system-by-system basis.

The applicant has created one of Florida's leading public information/education programs on water conservation. The program has received the Governor's Environmental Education award, sponsored by the Education Foundation of Florida and first place in the Innovative Water Conservation Competition, sponsored by the American Water Works Association. Through the use of the following educational approaches, this program is designed to continuously educate and enhance Florida's water customers on the critical need to protect and conserve our precious water resources.

Current Measures: The following components are highlighted in the applicant's SJRWMD Water Conservation Plan:

1. A comprehensive water audit has been conducted annually for the past several years. The last audit was performed by the Florida Rural Water Association and reflected an unaccounted for water loss of 4.1%. Since operations began in 1974, unaccounted for water has remained below 5%.

2. A leak detection survey of the entire distribution system was conducted by the Florida Rural Water Association in the summer of 1999. No major leaks were found.

3. The applicant has a statewide water conserving rate structure that has been approved by the District.

4. All service meters are replaced on a 10-year schedule and production meters are calibrated annually.

5. Low flow plumbing fixtures and/or low-flow restriction devices have been retrofitted at all of the production facilities and at the utility office.

6. The installation of low-flow plumbing fixtures is mandated through the enforcement of the state building code in all newly constructed houses and commercial buildings,

7. All utility customers are encouraged to use water-conserving practices through the distribution of brochures and other printed materials.

8. As discussed above, an intensive educational program has been developed on the critical need to protect and conserve Florida's water resources. This program is highlighted with:
    - regular correspondence with customers through publications and billing messages,
    - a speakers bureau for adult and children presentations,
    - media, opinion leader, and legislative programs,
    - facility open houses, customer meetings, and plant tours,
    - landscaping programs which promotes a xeriscape concept,.
    - maintaining a conservation library,
    - educational videos,
    - educational advertising and placement of published articles,
    - resources and programs for teachers,
    - media tracking,
    - web site information,
    - home water use audit kits, and
    - the willingness to take on special water use and conservation projects.

9. 100% of the discharge from the associated wastewater treatment facility is used to irrigate 3 adjacent golf courses.

Proposed Measures: The applicant has updated their water conservation plan during the submittal of this permit application. They have committed to continue to employ all existing water conservation measures throughout the duration of this permit.

USE OF REUSE:
The District requires the reuse of reclaimed water as stated in Section 10.3(f) A.H., when it is readily available unless the applicant demonstrates that its use is not economically, environmentally or technologically feasible. The applicant supplies 100% of their treated wastewater to three local golf facilities comprising 54 holes of golf and two driving and putting ranges. Contracts exist to supply 100% of their reclaimed water for irrigation projects, through permit duration.

LOWEST QUALITY SOURCE:
Staff have evaluated whether the proposed withdrawal of water meets the requirements of subsection 10.3(g) of the Applicant's Handbook. Subsection 10.3(g), A.H., provides that the lowest quality water source be utilized for each consumptive use whenever feasible. Based on this requirement, in order to use a higher quality water source, an applicant must establish that the use of all available lower quality water sources will not be economically, environmentally, or technologically feasible. The applicant is requesting water primarily for household and commercial uses, which require potable water. Ground water from the Floridan aquifer is currently the only economically feasible source in the region that can meet this need. Therefore, staff has concluded

that the lowest acceptable water source that is feasibly available is being used for this application.

COMPLIANCE REPORTS:
The District is authorized to require the submittal of compliance reports pursuant to section 6.5.4, A.H., when it has been determined necessary in order to maintain reasonable assurance that the conditions for permit issuance of a twenty year permit can continue to be met during the term of the permit. Staff believes that the compliance reports are necessary in accordance with section 6.5.4, A.H., in order to verify that changes in water quality and potentiometric levels are not occurring due to cumulative withdrawals in the area, and to verify that that the unaccounted for water losses in excess of 10% are adequately addressed. Therefore, staff is recommending that the applicant be required to submit a compliance report 5, 10, and 15 years from the date of issuance of this permit.

PERMIT DURATION:
The applicant has requested a 20-year permit. Section 6.5.1, A.H., states that when requested by an applicant, a consumptive use permit shall have a duration of 20 years provided that the applicant provides reasonable assurance that the proposed use meets the conditions for issuance in section 40C-2.301, F.A.C., and the criteria in part II, A.H., for the requested 20-year permit duration. Staff has concluded that the applicant has met the above requirements and is therefore recommending issuance of a 20-year permit.

RECOMMENDATION:
Staff have concluded that the proposed use, as limited by the attached permit conditions, is reasonable-beneficial, will not cause or contribute to interference with existing legal uses, and is consistent with the public interest. Staff, therefore, recommends approval of this application.

GENERAL CONDITIONS: 1-4, 6-9, 12 and 13

SPECIAL CONDITIONS:

OTHER CONDITIONS:

1. All submittals made to demonstrate compliance with this permit must include the CUP number 50087-5 plainly labeled on the submittals.

2. This permit will expire December 31, 2021.

3. Maximum annual groundwater withdrawals from the Floridan aquifer for household and commercial/industrial uses must not exceed:

623.420 million gallons in 2002	652.985 million gallons in 2003
683.280 million gallons in 2004	713.210 million gallons in 2005
743.505 million gallons in 2006	767.960 million gallons in 2007

793.145 million gallons in 2008 826.360 million gallons in 2009
848.625 million gallons in 2010 871.620 million gallons in 2011
894.615 million gallons in 2012 909.215 million gallons in 2013
923.815 million gallons in 2014 938.780 million gallons in 2015
954.475 million gallons in 2016 977.835 million gallons in 2017
987.690 million gallons in 2018 997.910 million gallons in 2019
1,008.495 million gallons in 2020 and 1,008.495 million gallons in 2021.

4. Maximum annual groundwater withdrawals from the Floridan aquifer for water utility use must not exceed:
2.290 million gallons in 2002 3.285 million gallons in 2003
3.285 million gallons in 2004 3.650 million gallons in 2005
3.650 million gallons in 2006 4.015 million gallons in 2007
4.015 million gallons in 2008 4.015 million gallons in 2009
4.380 million gallons in 2010 4.380 million gallons in 2011
4.380 million gallons in 2012 4.380 million gallons in 2013
4.745 million gallons in 2014 4.745 million gallons in 2015
4.745 million gallons in 2016 4.745 million gallons in 2017
4.745 million gallons in 2018 4.745 million gallons in 2019
4.745 million gallons in 2020 and 4.745 million gallons in 2021.

5. Maximum annual groundwater withdrawals from the Floridan aquifer for unaccounted for losses must not exceed:
31.390 million gallons in 2002 33.215 million gallons in 2003
34.310 million gallons in 2004 36.135 million gallons in 2005
37.960 million gallons in 2006 39.055 million gallons in 2007
40.515 million gallons in 2008 41.610 million gallons in 2009
42.705 million gallons in 2010 43.800 million gallons in 2011
44.895 million gallons in 2012 45.625 million gallons in 2013
45.990 million gallons in 2014 46.355 million gallons in 2015
46.720 million gallons in 2016 47.085 million gallons in 2017
47.085 million gallons in 2018 47.085 million gallons in 2019
47.085 million gallons in 2020 and 47.085 million gallons in 2021.

6. Maximum annual groundwater withdrawals from the Floridan aquifer for all uses must not exceed:
657.100 million gallons in 2002 689.485 million gallons in 2003
720.875 million gallons in 2004 752.995 million gallons in 2005
784.845 million gallons in 2006 811.030 million gallons in 2007
837.675 million gallons in 2008 871.985 million gallons in 2009
895.710 million gallons in 2010 919.800 million gallons in 2011
943.890 million gallons in 2012 959.220 million gallons in 2013
974.550 million gallons in 2014 989.880 million gallons in 2015
1,005.940 million gallons in 2016 1,029.665 million gallons in 2017
1,039.520 million gallons in 2018 1,049.740 million gallons in 2019
1,060.325 million gallons in 2020 and 1,060.325 million gallons in 2021.

7. Maximum daily groundwater withdrawals from the Floridan aquifer for essential (fire protection) use must not exceed 4.03 million gallons.

8. Legal uses of water existing at the time of the permit application may not be significantly impacted as a result of the consumptive use. If significant impacts occur (including interference with other existing legal users), the District may revoke the permit in whole or in part to abate the adverse impact unless otherwise mitigated by the permittee. In those cases, where other permit holders are identified by the District as also contributing to the adverse impact, the permittee may choose to mitigate in a cooperative effort with these other permittees. The permittee must submit a mitigation plan to the District for approval prior to implementing such mitigation.

9. Whenever feasible, the permittee must use native or drought tolerant vegetation that requires little supplemental irrigation for landscaping within the service area of this project.

10. The permittee must ensure that each potable service connection and each reclaimed water connection point (each discharge location or distribution point) is individually metered with a totalizing flow meter by December 31, 2002. There must be no unmetered uses or discharges from the reclaimed water distribution system after December 31, 2002. Each of these totalizing flow meters must remain for the duration of the permit, must maintain 95% accuracy, be verifiable and be installed according to manufacturer specifications.

11. Ground water wells "1-AI" (GRS ID 11419) and "2- AI" (GRS ID 11420), as listed on the application, have each been equipped with a mechanical compound flow meter. Ground water wells "3- AI" (GRS ID 33941) and "4- AI" (GRS ID 33942), as listed on the application, must each be equipped with a totalizing flow meter prior to being placed into service. These master totalizing flow meters must remain for the duration of the permit, must maintain 95% accuracy, be verifiable and be installed according to manufacturer specifications.

12. Total withdrawals from ground water wells "1-AI" (GRS ID 11419), "2- AI" (GRS ID 11420), "3- AI" (GRS ID 33941) and "4- AI" (GRS ID 33942), as listed on the application, must be recorded continuously, totaled monthly, and reported to the District at least every six months from the initiation of the monitoring using Form #EN-50. The reporting dates each year will be as follows for the duration of the permit:

Reporting Period	Report Due Date
January - June	July 31
July - December	January 31

13. Permittee must maintain all flow meters for the duration of this permit. In case of failure or breakdown of any master meter, the District must be notified in writing within 5 days of its discovery. Any defective meter must be repaired or replaced within 30 days of its discovery.

14. Permittee must have all ground water source flow meters (master meters) and reclaimed water distribution meters checked for accuracy at least once every 3 years within 30 days of the anniversary date of permit issuance, and recalibrated if the difference between the actual flow and the meter reading is greater than 5%. District Form #EN-51 must be submitted to the District within 10 days of the inspection/calibration.

15. The permittee must implement the Water Conservation Plan submitted to the District on July 24, 2001, in accordance with the schedule contained therein.

16. A dedicated Floridan aquifer monitoring well ("5-Monitoring Well", GRS ID 34637) must be constructed at the water treatment plant site at a centrally located position relative to the four Floridan aquifer production wells. The monitoring well must be cased to the top of the Floridan aquifer and completed to a minimum total depth of 700 feet below land surface. The construction of the monitoring well must be completed by December 31, 2002.

17. The Permittee must collect a water quality sample from wells "1-AI" (GRS ID 11419), "2- AI" (GRS ID 11420), "3- AI" (GRS ID 33941) and "4- AI" (GRS ID 33942), quarterly, in February, May, August and November of each year, and have the sample analyzed for the following:

Chlorides	Total Iron
Sulfates	Total Hardness
Calcium	Magnesium
Field Temperature	Sodium
Specific Conductance	Potassium
Field pH	Carbonate - field & lab

Bi-carbonate - total alkalinity if pH is 6.9 or lower
Total dissolved solids

Quality Assurance
Prior to sample collection, a minimum of 3-5 casing volumes must be removed from each well. All major ion analyses must be checked for anion-cation balance and must balance within 5%. It is recommended that duplicates be taken to allow for laboratory errors or data loss.

All sampling and water quality analysis shall be performed by organizations with District approved comprehensive or generic quality assurance plans (COMQAPS) on file with the Department of Environmental Protection or a laboratory having DHRS certification. A report including all sample analysis and

an evaluation of the data must be submitted to the District within 30 days of receipt from the laboratory.

If the District determines that unacceptable saline water intrusion or any other water quality degradation trends are occurring as a result of the withdrawals authorized by this permit, the District shall revoke the permit in whole or in part to curtail or abate the water quality degradation.

18. The Permittee must continually record the water level or pressure level of the dedicated Floridan aquifer monitoring well "5-Monitoring Well" (GRS ID 34637) for the duration of this permit. All water levels must be measured to NGVD. All data must be tabulated daily, analyzed for water level trends and compared against chloride concentration and submitted to the District every five years, or sooner if specifically requested, as part of the Compliance Report.

19. The use of master meters to supply potable water to any new multi-family or multi-unit structure (excluding hospitals, hotels and similar type uses) connected to this system after the issuance date of this permit is prohibited. All individually occupied units must be individually metered for water use.

20. The permittee must begin conducting and submitting water audits for the potable and reuse distribution systems, using the Districts current water audit form, annually for permit duration. The annual water audits must span a 12-month period from January 1 through December 31 and must be submitted to the District every five years with the submission of the compliance report. If unaccounted for water losses exceed 10% a leak detection/leak identification program must be initiated within 30 days of the 10% exceedance, in order to determine the source of the water losses. A detailed schedule for leak repair must be submitted to the District within 30 days of audit completion.

21. The Permittee shall submit to the District, a compliance report pursuant to subsection 373.236(3), Florida Statutes. The Permittee shall submit a report 5, 10 and 15 years from the date of issuance of this permit. Specifically, the reports shall be submitted on July 1st of years 2007, 2012 and 2017. The reports shall contain sufficient information to demonstrate that the Permittee's use of water will continue, for the remaining duration of the permit, to meet the conditions for permit issuance set forth in the District rules that existed at the time the permit was issued for 20 years by the District. In providing such assurance, the compliance report must, at a minimum:

    (a) meet the submittal requirements of section 4.2 of the Applicant's Handbook: Consumptive Uses of Water, April 10, 2002;
    (b) must provide a summary of the previous water audits (potable and reuse) and what actions, if any, are needed to address unaccounted for water loss in excess of 10%;

(c) evaluate all water quality data previously collected in an updated trend analysis;

(d) analyze all water level/pressure level data previously collected in an updated trend analysis format, and

(e) tabulate and total the volumes of reclaimed water distributed to each connection point or discharge point

Lawrence

COLLIER COUNTY GOVERNMENT
COMMUNITY DEVELOPMENT AND ENVIRONMENTAL SERVICES DIVISION

Operations Department
Collier Business Plaza, Suite 210
3050 North Horseshoe Drive
Naples, Florida 34104

October 18, 2002

Mr. Tony Isaacs, Vice-President
Florida Water Services Corporation
P.O. Box 609520
Orlando, Florida 32860

RE: Transmittal of Final Order No. 02-05

Dear Mr. Isaacs:

Transmitted herewith is a copy of Final Order No. 02-05, adopted on August 26, 2002, by the Collier County Water and Wastewater Authority.

If you need additional assistance, you may contact me at 403-2302.

Sincerely,

D. E. "BLEU" WALLACE
Director

Enclosure

CC: Donald Childs, Esq.
John L.Nolan, Volhr Corporation
Emilio J. Robau, P.E. – representing Cornerstone Real Estate Advisors, Inc.
David W. Schmitt, P.E. – representing WCI Communities/Hammock Bay Development

FINAL ORDER NO. 02-05

COLLIER COUNTY WATER AND WASTEWATER AUTHORITY

FINAL ORDER OF THE COLLIER COUNTY WATER AND WASTEWATER AUTHORITY, PURSUANT TO ORDINANCE NO. 96-6, AS AMENDED, AND SUPPLEMENTAL RULES OF THE BOARD; REQUIRING UTILITY TO PROVIDE POTABLE WATER SERVICE IN ACCORDANCE WITH ITS EXISTING COLLIER COUNTY TARIFFS; PROVIDING AN EFFECTIVE DATE

WHEREAS, Florida Water Services Corporation (UTILITY) is the holder of a water and wastewater certificate issued by the Collier County Board of Commissioners; and

WHEREAS, Ordinance No. 96-6, as amended, established the Collier County Water and Wastewater Authority (AUTHORITY) and its duties and powers; and

WHEREAS, Resolution No. 96-103, Supplemental Rules of the Board, established detailed rules to be followed by regulated utilities; and

WHEREAS, on May 30, 2002, staff received a formal complaint written by David W. Schmitt, P.E., on behalf of the **WCI Communities/Hammock Bay Development** ("HB") regarding UTILITY'S refusal to agree to provide potable water service to HB through master metered service; and

WHEREAS, on August 12, 2002, staff received a formal complaint written by Emilio J. Robau, P.E., on behalf of **Cornerstone Real Estate Advisors, Inc., ("Cornerstone")** regarding UTILITY'S refusal to agree to provide potable water service to Cornerstone through master metered service; and

WHEREAS, on August 16, 2002, staff received a formal complaint written by John L. Nolan, property Manager of **Volhr Corporation, with regard to Dela Park Place** regarding UTILITY'S refusal to agree to provide potable water service to DPP through master metered potable water service; and

WHEREAS, the asserted basis for the UTILITY'S policy on these conservation measures was that individual water meters for potable water service results in lesser quantities of water being used by the ultimate users, and that potable water service through a master meter results in greater usage of such water; and

WHEREAS, on August 26, 2002, without objection by UTILITY, these three cases were brought before the AUTHORITY for decision on the merits, at which time and place representatives of the UTILITY and on behalf of each of the three complainants presented testimony and documentary evidence regarding each of these three complaints, and

WHEREAS, at the hearing of August 26, 2002, AUTHORITY considered testimony from each applicant and from the UTILITY, and additional written materials submitted by the

parties, plus arguments of counsel, before deliberating on the disposition of each complaint on its merits.

NOW, THEREFORE, IT IS HEREBY ORDERED by the AUTHORITY in public meeting assembled, on the basis of the testimony and evidence presented by the parties, staff, public, and by an affirmative vote of four to zero, **ORDERS AND DIRECTS:**

1. The WHEREAS Clauses are incorporated herein as if here set out in their entirety.

2. Each applicant's request that UTILITY must provide portable water service to the respective developments (noted above) through master meters **IS GRANTED.**

3. UTILITY shall fully, promptly, an in good faith, cooperate fully with representative from each of the three applicants/complainants to effectuate the respective requested potable water service through master-meters.

5. The representatives of each applicant shall abide by the prerequisite requirements specified in UTILITY'S tariffs.

6. UTILITY and representatives of the three applicants are encouraged to promptly enter into service agreements (to resolve all issues) and submit such proposed agreements to the Executive Director of the AUTHORITY for approval on behalf of the AUTHORITY.

7. UTILITY shall in good faith accept applications for potable water service through master meters, and UTILITY shall provide potable water service through master meters if such service is requested by the respective applicant.

8. Nothing herein shall affect UTILITY'S authority to enter into service agreements to provide potable water service by means of individually metered units provided such agreements are in accordance with UTILITY'S Tariff(s).

FINDINGS OF FACT:

1. Subsection 134-356 (D) of the Code of Laws and Ordinances of Collier County reads: "Each Utility then current rates, charges, and customer service policies must be contained in tariff sheets approved by the Authority and filed with the Authority."

2. Subsection 134-359 (C) of the Code of Laws and Ordinances of Collier County reads: The Authority may set or approve just and reasonable charges and conditions for service availability."

3. Subsection 134-359 (B) of the Code of Laws and Ordinances of Collier County reads in relevant part: The Authority, upon request or upon its own motion, may investigate service agreements or proposals for charges and conditions for service availability."

4. Subsection 134-359(A) of the Code of Laws and Ordinances of Collier County reads: "No utility shall create or give an undue or reasonable preference or advantage to any person or locality, or subject any person or locality to any undue or unreasonable prejudice or disadvantage in any respect."

5. Subsection 134-353(A) and (A)(7) of the Code of Laws and Ordinances of Collier County reads in relevant part: (A) "The Authority ... has the ... power to ... (7) To issue a Final Order approving, modifying, or denying any tariff, or other rule or regulation proposed to be established by or on behalf of an applicant or Utility.

6. In late 1996 or early 1997 UTILITY amended its policy whereby, among other things, residential condominiums were denied the pre-existing opportunity to elect to be supplied with potable water service thru master-meter(s).

7. UTILITY applied for and had all of its Tariffs applicable within Collier County approved by the Collier County Water and Wastewater Authority by adoption of FINAL ORDER No. 99-09, dated June 28, 1999. UTILITY'S asserted now existing policies vis-à-vis accessibility to being provided with potable water service thru master-meter(s) have not been filed with the AUTHORITY.

8. The subject changes in the UTILITY'S policy were made unilaterally by the UTILITY. No request for any changes to UTILITY'S Tariff(s) has ever been submitted to the Authority for approval.

9. UTILITY did not offer into evidence before the AUTHORITY any written policies vis-à-vis accessibility to master-metered service for potable water, and, therefore, insofar as the record indicates, these asserted policies have not been reduced to writing by UTILITY. These asserted policies have not been approved by the AUTHORITY.

10. As to each of the three applicants, the annual cumulative costs (payable to UTILITY) by the ultimate customers (end-users) of potable water in each respective multi-unit residential condominium development from the UTILITY is greater than would be payable by obtaining said service through master metered service.

11. Failure by UTILITY to reduce its policy changes to writing affords UTILITY opportunities to apply its unwritten policy in discriminatory ways.

12. Prior to UTILITY'S purported change in policy in late 1996 or early 1997, all three applicants, but for such asserted change in utility's policies, would have been eligible to avail each respective development with master-metered service for potable water from UTILITY, because the only asserted impediment to availability of such service was the UTILITY'S asserted changes to its policies.

13. On August 26, 2002, this Authority, subsequent to deciding that each of the three applicants are entitled to potable water service through master meters, denied UTILITY'S

request to amend its Tariffs. The applied-for Tariff amendments were to authorize UTILITY to refuse to provide specified buildings and structures with potable water service except through individually metered units.

CONCLUSIONS OF LAW:

1. UTILITY'S purported change in policy to thereby render each of the three (above listed) applicants ineligible for potable water service thru master-meter(s) violated Subsection 134-356 (D) of the Code of Laws and Ordinances of Collier County, which reads: "Each Utility then current rates, charges, and customer service policies must be contained in tariff sheets approved by the Authority and filed with the Authority."

This ORDER adopted nunc pro tunc the 26th day of August, 2002.

Approved as to form
and legal sufficiency:

Thomas C. Palmer
Assistant County Attorney

COLLIER COUNTY WATER AND WASTEWATER AUTHORITY

Chairman

CERTIFICATE OF MAILING

I hereby that a true copy of the foregoing was depositing in the U.S. Mails, proper postage prepaid, this _____day of _____, 2002, addressed to each of the below-listed addressees.

By: _____

_____
Print/Type name of person certifying

cc: Florida Water Service Corporation
WCI Communities/Hammock Bay Development
Cornerstone Real Estate Advisors, Inc., ("Cornerstone")
Volhr Corporation ("Dela Park Place")

COLLIER COUNTY GOVERNMENT
COMMUNITY DEVELOPMENT AND ENVIRONMENTAL SERVICES DIVISION

Operations Department
Collier Business Plaza, Suite 210
3050 North Horseshoe Drive
Naples, Florida 34104

October 18, 2002

Mr. Tony Isaacs, Vice-President
Florida Water Services Corporation
P.O. Box 609520
Orlando, Florida 32860

RE: Transmittal of Final Order No. 02-06

Dear Mr. Isaacs:

Transmitted herewith is a copy of Final Order No. 02-06, adopted on August 26, 2002, by the Collier County Water and Wastewater Authority.

If you need additional assistance, you may contact me at 403-2302.

Sincerely,

D. E. "BLEU" WALLACE
Director

Enclosure

CC: Donald Childs, Esq.
John L.Nolan, Volhr Corporation
Emilio J. Robau, P.E. – representing Cornerstone Real Estate Advisors, Inc.
David W. Schmitt, P.E. – representing WCI Communities/Hammock Bay Development

FINAL ORDER NO. 02-06

COLLIER COUNTY WATER AND WASTEWATER AUTHORITY

FINAL ORDER OF THE COLLIER COUNTY WATER AND WASTEWATER AUTHORITY, PURSUANT TO ORDINANCE NO. 96-6, AS AMENDED, AND SUPPLEMENTAL RULES OF THE BOARD; DENYING UTILITY'S REQUEST TO AMEND ITS TARIFFS REGARDING PROVIDING POTABLE WATER SERVICE TO SPECIFIED BUILDINGS AND STRUCTURES ONLY THROUGH INDIVIDUALLY METERED UNITS; PROVIDING AN EFFECTIVE DATE

WHEREAS, Florida Water Services Corporation (UTILITY) is the holder of a water and wastewater certificate issued by the Collier County Board of Commissioners; and

WHEREAS, Ordinance No. 96-6, as amended, established the Collier County Water and Wastewater Authority (AUTHORITY) and its duties and powers; and

WHEREAS, Resolution No. 96-103, Supplemental Rules of the Board, established detailed rules to be followed by regulated utilities; and

WHEREAS, UTILITY applied to the Authority to amend its Tariffs (applicable only in Collier County); and

WHEREAS, the asserted basis for the UTILITY'S policy on these conservation measures was primarily that individual water meters for potable water service results in lesser quantities of water being used by the ultimate users, and that potable water service through a master meter results in greater usage of such water; and

WHEREAS, at the AUTHORITY'S hearing conducted on Monday, August 26, 2002, AUTHORITY considered testimony from UTILITY and from representatives on behalf of entities opposed to the AUTHORITY approving the UTILITY'S requested amended Tariffs, and considered written material submitted by UTILITY and the opponents, plus arguments of counsel for UTILITY and representative of the opponents, before deliberating on the disposition of UTILITY'S requested Tariff amendments. Staff did not present any evidence or make any recommendation pro or con to the Authority.

FINDINGS OF FACT OR MIXED QUESTIONS OF LAW AND FACT:

1. A Report entitled "Submetering, RUBS, and Water Conservation", dated June 1999, written by authors Koplow and Lownie, along with its Executive Summary, were entered into evidence by the UTILITY.

2. The Executive Summary to the Koplow and Lownie Report (at its page 1) reads:

"Trends over time within a single building did not show a clear pattern. For example, we did not see clear evidence that shifting from including water charges within rent to submetering or RUBS led to decreased water use within that building. Given the clear finding that consumption per capita and per occupied square foot were both significantly

lower in submetered and RUBS properties that in those with charge backs, the lack of clear trend data within converted properties was surprising. We hypothesize that the discrepancy is primarily the result of imprecise data. In many cases, our trend calculations do not include the full period of building conversion. In addition, we had trouble obtaining precise historical data on headcount and common area water usage from property managers or billing companies. Further analysis of intra-property trends to more clearly identify the factors that contribute to increased conservation with an apartment building would be warranted."

3. That Executive Summary to said Report also reads that: "Submetered properties, which have the most direct link between consumption within a single apartment and the monthly bills, used 18-39 percent less water than did in-rent properties." ("In rent properties" refers to apartments where the tenant's water bill is included in the apartment rent payment, and the landlord pays the bills.)

4. The Executive Summary to that Report reads that there is no clear evidence that changing a building from water service through a master meter to service through individual unit meters results in reduced total consumption of water in the building. The Executive Summary also reads: "Further analysis of intra-property trends to more clearly identify the factors contributing to increased conservation within a apartment building would be warranted."

5. Koplow and Lownie contemplated that their study did not prove that changing a master metered building to individual unit submeters throughout the building was primarily the result of imprecise data.

6. An "Appendix A to USEPA Water Conservation Plan Guidelines" was entered into evidence at the request of the Utility.

7. Said Appendix contains no proof, nor even purports to argue, that the total water usage within multi-unit condominiums is reduced as the result of mandating that individual condominium units be submetered for potable water. The gist of said Appendix A is only that there is too much water that is not being metered at all.

8. The Utility entered into evidence specified laws and/or rules that have been proposed or adopted by some governmental entities, including Bills proposed to the Texas Legislature and to the Mississippi Legislature - to require or allow submetering of water and/or wastewater service. The fact that a law or a rule has been proposed for adoption or enactment proves only that the respective proposed law(s) or rule(s) have been proposed. The fact that a policy rule has been adopted by another governmental agency has not in this instanced persuaded the AUTHORITY that such policy should be tariff approved for application in the Utility's certificated area within the City of Marco Island or the Utility's certificated area environs in unincorporated Collier County.

9. There are significant developer (or condominium association) capital costs to install many individual water meters in multi-unit condominiums. There are also significant developer (or condominium association) maintenance costs to repair and maintain many individual water meters in multi-unit residential condominiums.

10. There are significant potential problems regarding reading individual unit meters in multi-unit condominium buildings, especially such buildings that are more then three (3) stories in height except where the configuration affords the Utility ability to read all such meters on or below the first floor of the building.

11. The total costs for consumption of a given quantity of potable water supplied by Utility in any 365 day time period can cost more than an additional $50,000.00 for service through individually metered residential condominium units as compared to master metered service.

12. The Authority is not persuaded that if the Utility is authorized to mandate that individual condominium unit meters for potable water must be used for individual residential condominium units on Marco Island or environs in unincorporated Collier County will likely have any material beneficial effects in conserving the total usage of potable water by the condominium unit owners/occupants.

NOW, THEREFORE, IT IS HEREBY ORDERED by the AUTHORITY in public meeting assembled, on the basis of the testimony, evidence and argument presented to the AUTHORITY on Monday, August 26, 2002, by affirmative vote of four to zero, the AUTHORITY **HEREBY ORDERS:**

1. UTILITY'S request to have the Authority approve its requested Tariff amendments **IS DENIED** pursuant to Subsection 134-353(A) and (A)(7) of the Code of Laws and Ordinances of Collier County, which reads in relevant part as follows: (A) "The Authority ... has the .., power ... (7) To issue a Final Order approving, modifying, or denying any tariff ,.. proposed to be established by or on behalf of an applicant or Utility.

This ORDER adopted nunc pro tunc Monday, the 26th day of August, 2002.

Approved as to form
and legal sufficiency:

Tom Palmer
Thomas C. Palmer
Assistant County Attorney

COLLIER COUNTY WATER AND WASTEWATER AUTHORITY

Fay R. Biles, Ph.D.
Dr. Fay R. Biles, Vice Chairman

CERTIFICATE OF MAILING

I hereby that a true copy of the foregoing was deposited in the U.S. Mails, proper postage prepaid, this _____ day of _____, 2002, properly addressed to each of the below-listed addressees.

By: _____

_____
Print or type name of person certifying

cc: Florida Water Services Corporation
WCI Communities/Hammock Bay Development
Cornerstone Real Estate Advisors, Inc., ("Cornerstone")
Volhr Corporation, "(Dela Park Place")