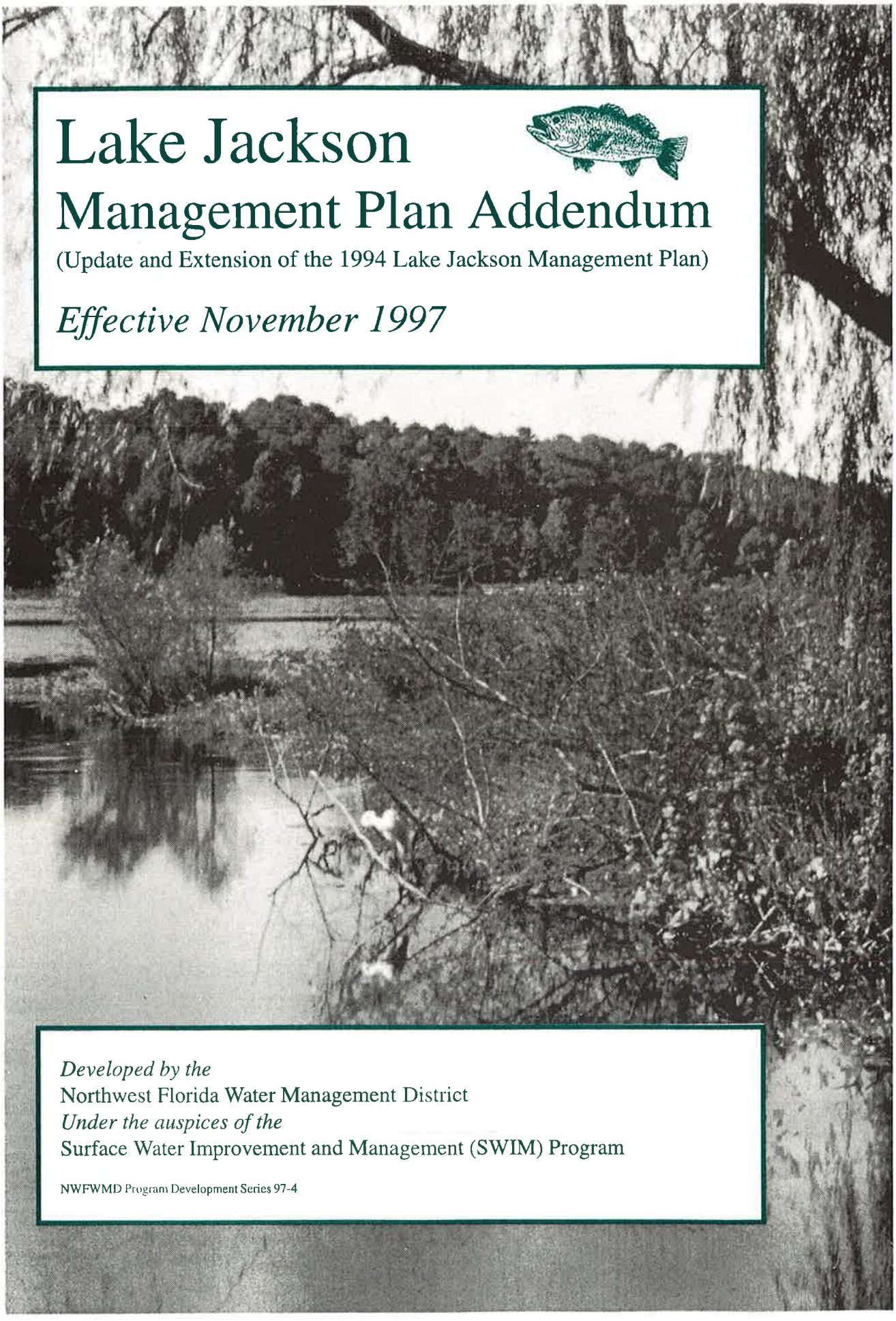

Lake Jackson Management Plan Addendum

(Update and Extension of the 1994 Lake Jackson Management Plan)

Effective November 1997

Developed by the
Northwest Florida Water Management District
Under the auspices of the
Surface Water Improvement and Management (SWIM) Program

NWFWMD Program Development Series 97-4

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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Lake Jackson Management Plan

1997 Revision

Effective November 1997

Prepared by Tyler L. Macmillan, AICP

This document is an addendum to the 1994 Lake Jackson Management Plan (NWFWMD Program Development Series Publication No. 94-2). All parts of the 1994 Lake Jackson Management Plan not specifically revised by this addendum remain in effect.

The components of this plan that are recommended for funding through the Surface Water Improvement and Management (SWIM) Program constitute the Lake Jackson SWIM Plan and have been reviewed pursuant to Sections 373.455 and 373.456, Florida Statutes. The 1994 SWIM plan was approved by the Governing Board of the Northwest Florida Water Management District on April 28, 1994 and was determined to be consistent with State Water Policy and the State Comprehensive Plan by the Florida Department of Environmental Protection on May 18, 1994. The 1997 Revision was accepted as a plan revision and update by the Florida Department of Environmental Protection on November 4, 1997.

LAKE JACKSON MANAGEMENT PLAN

1997 PLAN REVISION

(Addendum to the 1994 Lake Jackson Management Plan)

Introduction

The *Lake Jackson Management Plan* was originally prepared in 1990 as a cooperative effort of the Leon County Lake Jackson Action Team and the Surface Water Improvement and Management (SWIM) Program of the Northwest Florida Water Management District. The 1990 plan replaced and expanded the 1988 SWIM plan by including projects and programs of all agencies and units of government that have a role in the effort to manage, restore, and protect Lake Jackson. Projects within the *Lake Jackson Management Plan* which are proposed for implementation using SWIM funds comprise the Lake Jackson SWIM Plan and are subject to review through the formal SWIM review process which is outlined in Chapter 373, Florida Statutes and Chapter 62-43, Florida Administrative Code.

The 1990 *Lake Jackson Management Plan* had a three-year funding schedule (as required for all SWIM Plans), and underwent a revision in 1994 to update the plan and extend the funding another three years, through 1997. These two revisions to the plan were intensive efforts requiring many hours of staff time from a number of agencies as well as the time of the citizen volunteers who sat on the Lake Jackson Action Team. The results of these efforts are apparent in the 1994 *Lake Jackson Management Plan*— the plan includes a comprehensive overview and analysis of the problems and management issues facing Lake Jackson and a realistic series of strategies for managing, restoring and protecting the lake in the future.

In the years since completion of the 1994 plan revision, work has continued on many fronts to implement the *Lake Jackson Management Plan*; and the plan is now due for another revision to extend the SWIM funding and implementation schedules. Staff from the various agencies that participate in implementation of the plan recently reviewed the 1994 plan and determined that no substantive changes to the strategies and project descriptions were necessary and that the 1997 plan revision could be accomplished with a much less intensive effort that the two previous revision processes.

Thus, this revision has been prepared in the form of an addendum to the 1994 *Lake Jackson Management Plan*. The SWIM plan elements required under Section 62-43.035, F.A.C., (the SWIM Rule) and included in the 1994 plan which are not specifically revised by this addendum are incorporated herein by reference. The plan revision includes a summary of recent research, a series of tables which outline the new implementation schedule, plan for SWIM funding, and the progress of plan implementation. Also included is an appendix which summarizes, on a project-by-project basis, the progress of plan implementation since 1990.

Research Summary

Since the last revision of the *Lake Jackson Management Plan*, considerable research has been conducted on Lake Jackson. The vast majority of this work was undertaken by Robert J. Livingston, Ph.D. of the Florida State University Center for Aquatic Research and Resource Management, under contract to Leon County. A respectable summary of this work would require many more pages than can be provided in this addendum; however, when questioned at a 1996 Lake Jackson SWIM TAC meeting, Dr. Livingston indicated that the *Lake Jackson Management Plan* priorities, to substantially reduce stormwater loading to the lake, were on target to begin addressing the problems identified through his research. Dr. Livingston's work was also reviewed by the Leon County Science Advisory Committee (SAC), which issued a report in agreement with Dr. Livingston's documentation of the increasing state of ecological decline of Lake Jackson and found that "the majority of the problems facing the lake can be attributed to nonpoint pollution (stormwater runoff) entering the lake". The SAC report also included a number of recommendations for future action, all of which, with the exception of the recommended moratorium on development in the watershed, can be, or are being implemented through the projects found in the 1994 *Lake Jackson Management Plan*. A copy of the Leon County SAC report is contained in Appendix 1.

Another significant research effort completed during the plan cycle was a study titled: *The Economic Value of Lake Jackson*, prepared by the A.L. Burruss Institute of Public Service of Kennesaw State College and the Florida State University Department of Economics in 1995. This report indicates that in Leon County, Lake Jackson generated about $10.6 million in lake related purchases in 1993, and that this spending created about $1.9 million in wages, supporting 96 jobs in the county. The report includes considerable economic information about the lake, including such factors as the public's willingness to pay for water quality improvements and peoples perceptions about the quality of the lake resource. A copy of the report summary is included in Appendix B. It should be noted that the surveys that formed the basis of this study were administered during a time when the level of Lake Jackson was low enough to severely limit access to the lake. Thus, many lake managers in the area regard the economic values reported in this study to be quite conservative.

In summary, the research performed over the last three years indicates that the problems and issues identified in the 1994 *Lake Jackson Management Plan* have not changed significantly; thus, the action strategies previously developed in the 1994 plan to address these problems should be implemented as soon as possible.

Lake Jackson Management Plan Implementation

The following pages include tables that outline the proposed implementation schedule of the *Lake Jackson Management Plan* through the year 2002 (Table 1), the proposed SWIM funding plan for these years (Table 2), and the status of all projects found in the 1994 version of the *Lake Jackson Management Plan* (Table 3).

TABLE 1. FIVE YEAR IMPLEMENTATION SCHEDULE FOR THE LAKE JACKSON MANAGEMENT PLAN [1, 2]

ID#[3]	PROJECT NAME	SWIM Funding[4]	FISCAL YEAR 1997-98	1998-99	1999-00	2000-01	2001-02
Water Quality Program							
Q1	Eval. & App. of WQ Data (Lake Model)	Yes					
Q1a	Development of PLRGs	Yes					
Q2	Long-term Water Quality Monitoring	No					
Q4	Regional Stormwater Retrofit	Yes[5]					
Q4b	Okeeheepkee Stormwater Retrofit	Yes[5]					
Q4c	Megginnis Arm Creek Basin Diagnosis	Yes					
Q5	Megginnis Arm Facility Improvement	Yes					
Q6	Megginnis Arm Facility O&M	No					
Q7	On-site Design Criteria/Effectiveness	Possible					
Q8	Nonconforming Site Retrofit	No					
Q9	Evaluation of Septic/Sewer Issues	Yes					
Q10	Agricultural Impacts	Yes					
Preservation/Restoration Program							
R1	Long-term Habitat Monitoring	No					
R3	Additional Megginnis Arm Restoration	Yes[5]					
R4	Fords Arm Restoration	Yes[5]					
R5	Upland & Aquatic Areas Restoration	Possible					
Watershed Management Program							
M1	System Analysis of LJ Watershed	No					
M2	Land Acquisition	Yes[5]					
M3	Park Design Committee	No					
M4	Aquatic Preserve Management	No					
M5	Fish & Wildlife Management	No					
M6	Aquatic Plant Management	No					
M9	Ordinary High Water Line	No					
M11	Management Plan Coord./Update	Yes					
M12	Cont. Mgt. Plan for Natural Drawdown	Yes					
Public Education/Awareness Program							
E1-12	Public Education & Awareness	Yes					

= Target year for implementation

[1] This table extends Table E-1 of the 1994 *Lake Jackson Management Plan*.

[2] This table reflects the proposed schedule for projects in the *Lake Jackson Management* Plan for the years 1997 through 2002. Actual implementation of these projects is subject to a number of factors including availability of funding from SWIM, local governments, federal, state and regional agencies, and the Florida Legislature. Any or all of these factors can affect plan implementation progress. Also, the *Lake Jackson Management Plan* may be amended during these years if necessary to address the findings of ongoing or new research.

[3] The project numbering sequence is broken because completed projects are not reflected on this table.

[4] A "yes" in the "SWIM Funding" column indicates that the project is eligible and planned for implementation using SWIM funds.

[5] Partial Funding from SWIM - substantial additional funding will need to be provided from other sources, including grants and/or local government.

TABLE 2. SWIM FUNDING PLAN[1]

ID#	PROJECT	FUNDING (Fiscal Year)				
		1997-98	1998-99	1999-00	2000-01	2001-02
Water Quality Program						
Q1	Eval. & App. of WQ Data (Lake Model)		$ 100,000	$ 80,000	$ 80,000	
Q1a	Development of PLRGs	$ 21,000	$ 40,000	$ 55,000	$ 20,000	
Q4	Regional Stormwater Retrofit[2]		$ 50,000	$ 50,000	$ 500,000	$ 500,000
Q4b	Okeeheepee Subbasin Stormwater Retrofit[2]	$ 84,000	$ 440,000	$ 80,000		
Q4c	Megginnis Arm Creek Basin Diagnosis	$ 31,000	$ 40,000	$ 40,000	$ 40,000	
Q5	Megginnis Arm Facility Improvement		$ 30,000			
Q9	Evaluation of Septic/Sewer Issues	$ 23,000	$ 20,000			
Q10	Agricultural Impacts					$ 20,000
Preservation/Restoration Program						
R3	Additional Megginnis Arm Restoration	$ 25,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000
R4	Fords Arm Restoration[2]		$ 60,000	$ 60,000	$ 60,000	$ 60,000
Watershed Management Program						
M11	Management Plan Coordination & Update	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000
M12	Contingency Mgt. Plan for Natural Drawdown	$ 20,000	$ 20,000	$ 40,000		
Public Education/Awareness Program						
E1-12	Public Education & Awareness	$ 31,250	$ 50,000	$ 50,000	$ 50,000	$ 50,000

[1] This table reflects the proposed funding plan for *Lake Jackson Management Plan* projects which are eligible to receive funding through the SWIM program. All figures are preliminary estimates based upon best available information and are subject to refinement and revision as better information becomes available. Funding for the SWIM program is provided on an annual basis by the Florida Legislature and can be subject to wide fluctuations from year to year. As such, the amount of SWIM funding available for implementation of the *Lake Jackson Management Plan* may vary from year to year and may not fully fund SWIM projects as outlined in this table. Funding from the SWIM Trust Fund requires at least 20% match. For the Lake Jackson SWIM program, this match has been provided in the past by the NWFWMD, with assistance from Leon County and the City of Tallahassee.

[2] Partial Funding from SWIM - substantial additional funding will need to be provided from other sources, including grants and/or local government. Figures in this table are the proposed level of SWIM funding and do not reflect the full cost of projects that will require substantial non-SWIM funds.

TABLE 3. LAKE JACKSON MANAGEMENT PLAN PROJECT STATUS[1]

ID#	PROJECT NAME	SWIM Funding[2]	PROJECT STATUS			
			Completed	Continuing	Ongoing	Unscheduled
Water Quality Program						
Q1	Eval. & App. of WQ Data (Lake Model)	Yes			✓	
Q1a	Development of PLRGs	Yes		✓		
Q2	Long-term Water Quality Monitoring	No			✓	
Q3	Citizen Water Quality Monitoring	No				✓[3]
Q4	Regional Stormwater Retrofit	Yes[4]		✓		
Q4a	I-10/Megginnis Ck. Stormwater Facility	Yes[4]	✓			
Q4b	Okeeheepkee Stormwater Retrofit	Yes[4]		✓		
Q4c	Megginnis Arm Creek Basin Diagnosis	Yes		✓		
Q5	Megginnis Arm Facility Improvement	Yes[4]		✓		
Q6	Megginnis Arm Facility O&M	No			✓	
Q7	On-site Design Criteria & Effectiveness	Possible				✓
Q8	Nonconforming Site Retrofit	No				✓
Q9	Evaluation of Septic/Sewer Issues	Yes		✓		
Q10	Agricultural Impacts	Yes				✓
Q11	Recreational Impacts	Yes	✓			
Preservation/Restoration Program						
R1	Long-term Habitat Monitoring	No			✓	
R2	Megginnis Arm Sediment Removal	Yes[4]	✓			
R3	Additional Megginnis Arm Restoration	Yes[4]		✓		
R3a	Megginnis Arm Revegetation	Yes[4]	✓			
R4	Fords Arm Restoration	Yes[4]		✓		
R5	Upland & Aquatic Areas Restoration	Possible				✓
R6	Timberlane Creek Berm Removal	Yes	✓			
R7	Yorktown Pond Restoration	Yes[4]	✓			
Watershed Management Program						
M1	System Analysis of LJ Watershed	No				✓
M2	Land Acquisition	Yes[4]		✓		
M3	Park Design Committee	No				✓
M4	Aquatic Preserve Management	No			✓	
M5	Fish & Wildlife Management	No			✓	
M6	Aquatic Plant Management	No			✓	
M7	Regulatory Assessment & Coordination	Yes			✓	
M8	Recreational Uses Regulation	Yes	✓			
M9	Ordinary High Water Line	No				✓
M10	A-Team as Oversight/Advocacy Comm.	No	✓			
M11	Coordinate and Update Mgt. Plan	Yes			✓	
M12	Cont. Mgt. Plan for Natural Drawdown	Yes		✓		
Public Education/Awareness Program						
E1-12	Public Education & Awareness	Yes			✓	

Project Status Key:

Completed - Project has been completed as planned.
Continuing - Project has begun and is scheduled for completion in this plan cycle (1997-2002).
Ongoing - Project is necessary for long-term management of Lake Jackson.
Unscheduled - Project is not yet scheduled for implementation.

[1] See Appendix 3 for additional information regarding the status of specific projects.

[2] Funding from the SWIM Trust Fund requires at least 20% match. For the Lake Jackson SWIM program, this match has been provided in the past by the NWFWMD, with assistance from Leon County and the City of Tallahassee.

[3] Has been combined with Project E-10

[4] Partial Funding from SWIM - substantial additional funding has been or will need to be provided from state or federal grants and/or local government.

APPENDIX 1

"The Ecological Condition of Lake Jackson Leon County, Florida"

Leon County Science Advisory Committee

Report to the

Leon County Board of County Commissioners

THE ECOLOGICAL CONDITION

OF LAKE JACKSON

LEON COUNTY, FLORIDA

1996

Prepared by

The Leon County Science Advisory Committee

for the

Leon County Board of County Commissioners

March 1996

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Executive Summary

Task: The Leon County Board of County Commissioners charged the Science Advisory Committee (SAC) with the task to review studies conducted on the health of Lake Jackson and report to the Board on the soundness of the reports and the condition of the lake.

Findings: The SAC finds that:

(1) based on the Livingston and other studies reviewed by the SAC, Lake Jackson is in an increasing state of ecological decline;

(2) the majority of the problems facing the lake can be attributed to non-point pollution (stormwater runoff) entering the lake;

(3) the current condition of the lake is also the result of the failure to implement a comprehensive lake management program for the entire watershed; and

(4) increased development in lake basins is adversely affecting the ecological integrity of Lake Jackson as well as most of the lakes in the County.

Recommendations: In light of these findings, the SAC recommends that the Board of County Commissioners develop and implement an integrated and coordinated management program for water quality restoration and retrofit. To begin this effort and to underscore the critical nature of this undertaking, we recommend an immediate moratorium on any new development (excluding one house on existing lots) should be imposed on the Lake Jackson basin. This moratorium on any new development activity should remain in effect until monitoring and evaluation results indicate that positive results are being achieved. The above referenced program should contain, at a minimum, the following actions:

(1) retrofit existing built out areas of the basin for stormwater treatment, as provided by Section 10-189e in the Code of Laws of Leon County and in the Northwest Water Management District's stormwater plans;

(2) examine current facilities as to their treatment efficiencies as a part of the EPA NPDES (water quality monitoring) and the Northwest Water Management District's SWIM program;

(3) strictly enforce maintenance of treatment facilities as provided in Section 10-331 of the Leon County Code;

(4) continue *Hydrilla* control program with close monitoring of effects and effectiveness through a management team consisting of the County, the City, the Northwest Water Management District, the Department of Environmental Protection, the Florida Game and Fish Commission, and other parties;

(5) support the planning for the removal of nutrient-laden sediments from the lake bottom during the next natural drawdown, as well as during periods of lower water elevation, and develop a contingency plan if warranted;

(6) continue general chemical and biological monitoring of lake, but reevaluate design to assess need of additional components (or if any existing components may be eliminated);

(7) establish a new position in the County for the purpose of monitoring, coordinating and communicating among many agencies and groups collecting and interpreting scientific data on Leon County water bodies and related resources;

(8) develop a preliminary Leon County and Northwest Water Management District working model of the lake ecosystem coupled with watershed loading inputs to be used to: (a) direct and modify, if needed, future research/monitoring efforts and (b) predict effectiveness of any proposed facilities/activities;

(9) sponsor, with SAC taking the lead, an annual information sharing symposium on the ecology of Leon County surface waters and other local environmental issues;

(10) implement a comprehensive lake management program for all urbanized watersheds;

(11) devise and implement plans guiding development in all lake basins to ensure their future ecological integrity; and

(12) direct the Water Resources Committee, in conjunction with appropriate County and City legal and program staff, to conduct an administrative analysis and a legal review of the the proposed moratorium and its associated restoration program.

Lake Jackson is one of Leon county's most precious natural resources, and is listed as an "Outstanding Florida Water" with the State of Florida. In addition to its use for boating, swimming, and fishing by the residents of Leon county, tourism and local spending associated with lake Jackson generate an estimated $10.6 million annually into our local economy (McGinnis and Bell, 1993). Its natural beauty is a source of pleasure and inspiration for everyone, especially those fortunate enough to live along its shore. Unfortunately, Lake Jackson faces an uncertain future due to the accumulated effects of years of pollution.

Over the past year the Leon County Science Advisory Committee (SAC) has reviewed, at the request of the Board of County Commissioners, a variety of scientific studies, including those of Dr. R.J. Livingston, concerning the ecological status of Lake Jackson. In conjunction with this review, we held a workshop/mini-symposium in December 1995 to obtain and discuss local and state agency data on the lake. Based on the information gleaned from these endeavors, we present the following consensus observations, statements of fact, and recommendations as to the overall health and well-being of the lake.

In our opinion, portions of Lake Jackson have been in a state of ecological decline for the last twenty years, beginning with the construction of Interstate 1- 10 and the Tallahassee Mall and continuing to this day concurrent with the increased development in its watershed. This decline, however, appears to have accelerated over the past five years, leaving the lake currently in a relatively precarious position. There are several indicators of this decline that have been documented by several sources (including the recent Livingston studies). These indicators include marked declines in a variety of water and sediment quality characteristics and dramatic changes in the nature of the submerged aquatic vegetation over major portions of the lake. Particularly troublesome are increases in the infestation of the exotic weed *Hydrilla* and the appearance of large scale algal blooms.

The consensus technical opinion is clear and unequivocal: the majority of problems facing Lake Jackson can be attributed both directly and indirectly to past and present amounts of non-point pollution (in stormwater runoff) entering the lake, despite considerable effort and finances directed toward the construction of stormwater treatment facilities within the basin. The current *Hydrilla* condition, although no doubt exacerbated by stormwater nutrient inputs, may now be a problem unto itself. That is, we may remove all of the stormwater inputs and *Hydrilla* will likely still remain, affecting the habitat structure and the ecological integrity of the lake.

There are several observations made in recent studies on Lake Jackson (Livingston, 1995, LaRock and Landing, 1991) (see references for works reviewed and Appendix A for other studies and reports on Lake Jackson), to which the SAC agrees, that should be brought to the attention of the Board. Volume I of the Ecology of Lake Jackson study clearly documents some undesirable changes in a variety of water quality characteristics over the past five to six years. Among the more ecologically important changes noted in water chemistry were: elevated ammonia concentrations, increased frequency and duration of hypoxic conditions (very low oxygen concentrations) in bottom waters, and increased concentrations of chlorophyll-a (an indicator of phytoplankton biomass). Additionally, concentrations of some important water quality characteristics have become more variable; many of the constituents, while relatively low overall in concentration, had high values observed sporadically (e.g., chlorophyll-a concentrations were noted on several occasions to exceed those levels indicative of blooms). It is the opinion of the SAC that this testing needs to continue in order to establish long-term tends. Due to the fact that this lake draws down periodically, as it did last in 1982, continued collection of water and sediment data must be conducted over the long-run.

This latter observation of generally low nutrient concentrations has led to some serious misconceptions about the health of the lake. Looking only at water chemistry, one might conclude that while occasionally high levels of some constituents were observed (which should be a warning sign), overall lake conditions are not too bad. This conclusion ignores two important components of lake environment: sediments and vegetation. While sediments are discussed only briefly in Livingston's recent research reports (Ecology of Lake Jackson Vol. 2: Supplement; Habitat Mapping Study: Aquatic Vegetation and Sediments), considerable information is presented on the vegetation of Lake Jackson and its current status. [Note: Sediments and vegetation were examined previously with similar conclusions by Landing and LaRock (1991); this work is cited but not specifically reviewed here by the SAC.] In fact, increases in vegetation, both microscopic (as indicated by chlorophyll-a values) and macroscopic (both submergent and emergent plants) are closely linked to at least some of the low water column nutrient concentrations observed in recent years. Nutrient inputs to the lake appear to be transformed relatively quickly into increased plant biomass (and ultimately deposited in sediments) as opposed to increased concentrations in the water column. This has led over the years to an accumulation of nutrients and organic matter in the lake either in the form of living plant biomass or dead and decaying organic materials in the sediments. Except for limited losses via the lake's sinkholes, these substances generally accumulate and recycle within the system. Though many of the studies referenced in this review have examined water quality, sediments, plant and other aquatic life, more work needs to be done, for it is clear that the lake must be examined as a whole and that the assessment of any one or a few separate aspects of lake ecology can lead to potentially erroneous conclusions concerning how the system operates.

One of the more troubling aspects of the recent vegetation surveys is that *Hydrilla* was observed as the dominant plant type over roughly 60% of the lake, and as a subdominant in another 37%. This clearly demonstrates the plant's presence throughout the lake, and in high biomass in many areas. *Hydrilla*'s range has expanded in the lake over the last ten years, despite control efforts to keep it in check. This has occurred for two primary reasons: the ready availability of nutrients (e.g., continued stormwater inputs and internal lake recycling from the large accumulated sediment reservoir) and the highly competitive growth habits of the plant (e.g., vegetative propagation from small plant fragments, adaptation to low light levels, and a growth form that includes profusely branching canopy that may overshadow native species).

The recently noted algal bloom may be as troubling for Lake Jackson as the proliferation of *Hydrilla*. Certainly blooms have occurred in the past; J. Van Dyke (Aquatic Plant Control, Department of Environmental Protection) documented these as early as 1986, warning of things to come. The most recent bloom (spring/summer 1995) is worthy of note for two reasons: the large extent of the lake covered by the bloom and its occurrence during a time when the lake was relatively high (presumably the higher the water stage, the more water for dilution of nutrient input concentrations). It is unclear as to the causes of the bloom: we do not have enough information to assess the influence of herbicide treatment or other factors such as water temperature or critical nutrient thresholds, nor can we predict when or where the next will recur. However, we do predict that these blooms will recur, perhaps with greater frequency and/or magnitude in the future.

In light of these findings, the SAC recommends that the Board of County Commissioners develop and implement an integrated and coordinated management program for water quality restoration and retrofit. To begin this effort and to underscore the critical nature of this undertaking, we recommend an immediate moratorium on any new development (excluding one house on existing lots) should be imposed on the Lake Jackson basin. This moratorium on any new development activity should remain in effect until monitoring and evaluation results indicate that positive results are being

achieved. The above referenced program should contain, at a minimum, the following actions:

(1) retrofit existing built out areas of the basin for stormwater treatment, as provided by Section 10-189e in the Code of Laws of Leon County and in the Northwest Water Management District's stormwater plans;

(2) examine current facilities as to their treatment efficiencies as a part of the EPA NPDES (water quality monitoring) and the Northwest Water Management District's SWIM program;

(3) strictly enforce maintenance of treatment facilities as provided in Section 10-331 of the Leon County Code;

(4) continue *Hydrilla* control program with close monitoring of effects and effectiveness through a management team consisting of the County, the City, the Northwest Water Management District, the Department of Environmental Protection, the Florida Game and Fish Commission, and other parties;

(5) support the planning for the removal of nutrient-laden sediments from the lake bottom during the next natural drawdown, as well as during periods of lower water elevation, and develop a contingency plan if warranted;

(6) continue general chemical and biological monitoring of lake, but reevaluate design to assess need of additional components (or if any existing components may be eliminated);

(7) establish a new position in the County for the purpose of monitoring, coordinating and communicating among many agencies and groups collecting and interpreting scientific data on Leon County water bodies and related resources;

(8) develop a preliminary Leon County and Northwest Water Management District working model of the lake ecosystem coupled with watershed loading inputs to be used to: (a) direct and modify, if needed, future research/monitoring efforts and (b) predict effectiveness of any proposed facilities/activities;

(9) sponsor, with SAC taking the lead, an annual information sharing symposium on the ecology of Leon County surface waters and other local environmental issues;

(10) implement a comprehensive lake management program for all urbanized watersheds;

(11) devise and implement plans guiding development in all lake basins to ensure their future ecological integrity; and

(12) direct the Water Resources Committee, in conjunction with appropriate County and City legal and program staff, to conduct an administrative analysis and a legal review of the proposed moratorium and its associated restoration program.

While the SAC did not undertake a comprehensive review of existing programs and possible funding sources for accomplishing these recommendations, we are aware of some programs that may assist the implementation of certain components of the water management plan referenced above. However, it is clear that a major commitment of local funding will be required to accomplish the necessary stormwater retrofits, continue aquatic plant management, and perform associated diagnostic research

and monitoring. Accordingly, we recommend, first, that the Board direct the Water Resources Committee to undertake a comprehensive analysis of financial mechanisms that could be employed to fund the recommendations contained in this report, and, second, that the Board and county staff coordinate closely with other agencies to implement the water management program while providing sufficient funds to complete the capital projects and associated scientific efforts.

We believe the current situation to be the result of a failure to implement comprehensive water quality retrofit and in-lake management programs for all urbanized water sheds and receiving water bodies. Past efforts in the areas of regulation, planning, and water management, while commendable, on the one hand, fell well short of those which should have been required. Population growth, with its associated urban and suburban development, has has occurred to such an extent that the environmental health of Lake Jackson has continued to worsen.

The suite of pollution problems facing Lake Jackson, which are the result of poorly controlled development in the closed drainage basin, are also beginning to affect all the other closed basin lakes of Leon County. While the problems in Lake Jackson may be more severe, many other lakes are experiencing similar impacts from increasing development. Lake Jackson's problems and the measures that must be undertaken to resolve them, therefore, are an example of things to come in the other basins. The SAC urges the County Commission to recognize that Lake Jackson is only part of a larger problem involving all the lakes of the County. It is time to devise and implement plans guiding development in all the lake basins of the County to insure their future ecological integrity. Otherwise, the problems facing Lake Jackson, and the cost of their mitigation, will be repeated over and over.

APPENDIX 2

Executive Summary:

"The Economic Value of Lake Jackson"

by

A.L. Burruss Institute of Public Service

Kennesaw State College

and

Department of Economics

Florida State University

THE ECONOMIC VALUE OF LAKE JACKSON

by

A. L. Burruss Institute of Public Service
Kennesaw State College

and

Department of Economics
Florida State University

Recreational Use

- 53,441 people visit Lake Jackson yearly (1993).
- Of these visitors, 28,843 are from Leon County while 24,598 are from outside Leon County.
- One out of five residents in Leon County visited Lake Jackson in 1993.
- Based on days of use, visitors to Lake Jackson had more activity picnicking, boating, and swimming/sunbathing than fishing last year.
- About 11% of the recreational fishermen at Lake Jackson depend on the lake for their regular food supply.

Spending, Wages and Employment

- In 1993, Leon County residents spent about $2.7 million in Lake Jackson-related goods and services.
- All other visitors to Lake Jackson are regarded as "tourists" to Leon County. In 1993, lake tourists injected about $4.9 million into the Leon County economy.
- For every dollar spent by a tourist to Leon County, $1.61 is created by a ripple or multiplier effect. Thus, lake tourist spending created a total of $7.9 millions.

- When lake tourist spending effects ($7.9 million) are added to local resident spending ($2.7 million), Lake Jackson generated about $10.6 million in lake-related purchases in 1993.

- Total Lake Jackson spending ($10.6 million) generated about $1.9 million in wages supporting 96 jobs in Leon County.

Recreational Value

- The recreational services of Lake Jackson are by and large free to the public (e.g., picnicking, boating). Economists call these recreational services non-market goods that are not bought and sold in an organized market yet have substantial value!

- It is estimated that the daily recreational value received by a visitor to Lake Jackson is $3.68 (1993).

- In 1993, about 480.7 thousand recreational days were spent by over 53,000 visitors to Lake Jackson.

- Aggregate recreational value amounted to about $1.77 million in 1993 for all users to Lake Jackson. Such recreational value is a perpetual flow every year into the foreseeable future for visitors to the lake.

- Decreasing water quality will lower recreational value from the natural resources of Lake Jackson.

Perception of Water Quality

- Perception of water quality at Lake Jackson were examined using a scale from 1 (bad) to 10 (excellent). Most users rated lake Jackson as a 6 or a little above average water quality.

- As an alternative measure of water quality, users were asked to place Lake Jackson on a "water quality ladder" or

Rung	Use of Water
5	Drinkable
4	Swimmable
3	Fishable
2	Boatable
1	Not Usable

83% of the users felt that Lake Jackson was on rung 3 (fishable) or above (i.e., swimmable and drinkable).

- In general, perception of existing water quality are on the favorable side despite recent biological and chemical evidence that might place Lake Jackson at a lower rung on the water quality ladder.

- Users are willing to pay for improvements in water quality. This amounts to moving up the water quality ladder. The rating of water quality would place it on the fishable rung of the water quality ladder. 22.5% of users (12,024) agree that the lake is on this rung (i.e., .225 x 53,441) while others perceived a higher rung. To move from just fishable to swimmable, these individuals would be willing to pay $185 per year per household or a total of $2.22 million. Although such numbers cannot be precise, it does show a willingness on the part of the users of Lake Jackson to pay for improved water quality.

- Non-users of Lake Jackson were also interviewed. Despite not using the lake, nonusers rated the water quality about the same as users. These non-users are important to analyze since they may have an interest in using the resource in the future (i.e., they have option value) or just want natural resources preserved (i.e., they have existence value).

- 9.8% of non-users had option value and it was found they would be willing to contribute to advancing up the water quality ladder for Lake Jackson from $217 to $276 per year per household. The researchers feel such values may be inflated since respondents could not be as easily held to such payments since they do not visit the lake.

- Of the 77.6% of the non-users having existence value, their willingness to pay to move up the water quality ladder ranged from $159 to $241 per year per household, somewhat less than option value. The same reservation for option value applies to existence value.

Financing the Lake

- We posed the suggestion to Lake Jackson users that they purchase an annual pass to use the lake with revenue going to maintain the lake and its facilities. The response was that users would pay $39.97 (mean) and $10 (medium) respectively for such a pass raising from $1.7 to $.5 million in revenue. Few (17.1%) users refused to pay for an annual pass, citing no trust in government or inability to pay.

- Of all users of Lake Jackson, 64.1% preferred access fees and licenses for specific recreation as a means of funding to maintain (i.e., stay on the same rung of the water quality ladder) water quality.

- Nearly one-half of the lake users preferred local government to be responsible for maintaining water quality.

- Non-users agreed with users that access fees are better means of raising revenue to maintain water quality, but the former preferred the state while the latter felt local government should handle the problem.

Study Methodology

- Five concentric zones were drawn around Lake Jackson. Zone 5, the most distant zone from the lake, had a radius of 150 miles from the lake. Each zone was defined as a geographic market area served by Lake Jackson with Zone 1 being Leon County. There are 52 counties in Zones 1-5. Within these five market areas, 639 phone contacts were made using a random sample of non-business telephone numbers. Of the total contacts, only 40 adults (18 years or older) used the natural resources of Lake Jackson over the last 12 months (1993). Over one million people live in the market area served by Lake Jackson. This area covers the tri-state region of Florida, Georgia and Alabama. An on-site survey of 1,134 individuals was made to ascertain the percent of Lake Jackson users coming to the lake from beyond 150 miles (tourists). Only 3.9% of all individuals visiting the lake come from beyond Zone 5. Both in the phone and on-site surveys, individuals were extensively interviewed on primarily economic factors (e.g., expenditures while at the lake, willingness to pay for improved water quality, etc.) surrounding Lake Jackson.

Copies of Study

- To obtain a copy of the entire study and survey instruments, call or write

Dr. Harry McGinnis
Director
A. L. Burruss Institute of Public Service
Kennesaw State College
Marietta, GA 30061

Phone: 404-423-6464
Fax: 404-423-6395

Please enclose $15 per copy for reproduction, handling and mailing.

- Other inquires: Call Dr. Frederick W. Bell, Department of Economics, Florida State University, Tallahassee, FL 32306-2045

Phone: 904-644-7092
Fax: 904-644-4535

APPENDIX 3

"Progress of the

Lake Jackson Management Plan

1990 through 1997"

PROGRESS OF THE LAKE JACKSON MANAGEMENT PLAN 1990 THROUGH 1997

Introduction

The Lake Jackson Management Plan was adopted in December 1990, and since then substantial progress has been made toward its implementation. This section provides brief project-by-project reports of implementation activities. Readers may wish to consult the project descriptions found in the 1990 and 1994 editions of the Lake Jackson Management Plan for additional information concerning the scope of each project.

Water Quality Program

Project Q-1: Evaluation and Application of Water Quality Data

District staff utilized data compiled through a SWIM contract with the Florida State University Department of Oceanography and through a U.S. EPA Clean Lakes study to analyze historic and current water quality conditions of the lake. This information is useful for tracking plan implementation, for development of pollution load reduction goals, and for integration with other data to determine changes in the ecological characteristics of the lake.

In 1993 staff compiled long-term water quality data (1971 through 1991) into two sets of databases, one a series of spreadsheets containing station data (by parameter) and the other containing the following statistical information: raw parameter concentrations, log-transformed concentrations, monthly stage data, approximate volume-normalized concentrations based on stage, season and lake location. Staff conducted analyses of variance, by season, sampling station and study period. The District's Geographic Information System (GIS) was used to develop a series of maps of the lake that depict the mean raw and volume-normalized concentrations at each sampling station over time. Staff also determined long-term trends at selected stations and lakewide for several parameters.

In 1994 water quality data from six historic studies were evaluated together to measure relative trends in water quality. This involved examination of 20 years of data for eight water quality parameters taken from seven lake sampling stations. In 1994, the result of the water quality data analysis, a draft report titled *Lake Jackson: Evaluation of Water Quality Data* (Water Resources Special Report 95-4) was distributed for review by members of the Lake Jackson Technical Advisory Committee. In 1995 final changes to the report were completed, and the report was printed for final distribution. As new water quality data become available, it will be periodically combined with the historical data and used to monitor water quality trends. In the future, this project will undertake the development of a lake ecological model to assist with the development of future goals and strategies, including Pollution Load Reduction Goals (PLRGs).

Project Q-1a: Development of Pollutant Load Reduction Goals (PLRGs)

During December 1994, proposed interim PLRGs were developed for total phosphorus (TP) and total suspended solids (TSS), based upon analyses prepared for the *Lake Jackson Regional Stormwater Retrofit Plan* (Water Resources Special Report 92-1). A draft report was prepared for review by the Technical Advisory Committee. The proposed PLRGs were considered to be reasonably attainable reductions that would suffice until appropriate information was developed based on more resource oriented information. In February 1995 the draft report containing proposed interim PLRGs for Lake Jackson was submitted to the Florida Department of Environmental Protection (FDEP). Comments received from the FDEP suggested extensive revision. The NWFWMD is currently awaiting clarification and a guidance manual prior to proceeding with further revisions.

Project Q-2: Long-Term Water Quality Monitoring

Leon County has contracted with the Florida State University Center for Aquatic Research and Resource Management (CARRMA) to monitor a number of lakes in the county, including Lake Jackson. A report covering the first year of this effort was produced in the summer of 1993. Subsequent reports were produced in 1995 and 1996. Continuation of such monitoring is essential to determine the results of water quality improvement strategies.

Project Q-3: Citizen Water Quality Monitoring

This project has not been implemented, largely because a more reliable water quality monitoring program has been underway.

Project Q-4: Regional Stormwater Retrofit Planning and Implementation

The *Lake Jackson Regional Stormwater Retrofit Plan* (Water Resources Special Report 92-1)(Bartel et al. 1992) was completed by the District in the spring of 1993 and submitted to Leon County and the City of Tallahassee for adoption pursuant to a local comprehensive plan policy. Major retrofit projects completed in the Megginnis Creek subbasin, include the SWIM/Leon County/DOT I-10/Megginnis Creek Pond (see project Q-4a below); and the City of Tallahassee John Knox Road and Boone Boulevard facilities. As a condition of permits needed for a major expansion project, a stormwater retrofit of the approximately 100-acre Tallahassee Mall property was completed by the mall-owners. These retrofits, in concert with the District's existing Megginnis Arm treatment system (see project Q5), have had noticeable effects on the timing and quality of stormwater runoff which flows to Megginnis Arm. The SWIM program has monitored these systems to document and quantify the hydrologic and water quality changes which have resulted from their construction (see project Q-4a). Through the SWIM Retrofit project, District staff have explored a number of strategies for funding land acquisition and construction of facilities recommended in the Retrofit Plan. Progress was also made on the retrofit of Yorktown Pond (see project R-7 below).

Early in 1993 the Lake Jackson Regional Stormwater Retrofit Plan was reviewed, printed, and distributed. In June, the plan was submitted to Leon County and the City of Tallahassee for adoption pursuant to a policy in the local government comprehensive plan. Neither local government has adopted the retrofit plan as envisioned by the local comprehensive plan. Following completion of the retrofit plan District activities shifted to implementation, focusing upon land acquisition for construction of the recommended regional stormwater treatment facilities. Staff explored a number of methods for funding land acquisition for such purposes and determined that Save Our Rivers (SOR) and Preservation 2000 (P2000) funds were possibilities as well as grants, SWIM funds, and local government funds.

During 1994, Regional Stormwater Retrofit project efforts were focused on the Okeeheepkee subbasin project which is discussed separately below (see project Q-4b). This project also facilitated coordination efforts with Leon County concerning the Yorktown Pond restoration/stormwater retrofit effort (project R-7). During 1995, project efforts were focused on completing the Okeeheepkee subbasin project (see project Q-4b).

Project Q-4a: I-10/Megginnis Creek Pond

The District SWIM program, Leon County, and the Florida Department of Transportation worked together to construct a regional stormwater treatment facility to enhance the treatment efficiency of existing facilities and treat runoff from a 120-acre basin.

Construction of the Interstate 10/Megginnis Creek regional stormwater treatment facility was the most significant accomplishment of the Lake Jackson SWIM program in 1992. A detailed description of the facility and the development, funding, and implementation of this project can be found in the NWFWMD publication: *I-10/Megginnis Creek Stormwater Treatment Facility: Project Completion Report* (Macmillan 1993). In early 1993, operation of the pond was transferred to Leon County pursuant to the project agreement. District staff also completed project closure activities and prepared a project completion report. Since the project was completed well under budget, the District refunded excess funds totaling approximately $88,000 to Leon County. At a ribbon-cutting ceremony held in January, the Department of Transportation and Leon County were recognized for their participation in the project. Later in 1993, the Apalachee Land Conservancy, a local environmental organization, recognized the District, Leon County, and the Department of Transportation staff with a Special Appreciation Award for the intergovernmental cooperation and coordination associated with this project. The I-10/Megginnis Creek Pond is an excellent example of the type of success that the SWIM program can accomplish through cooperative projects with local government and other state agencies.

Project Q-4b: Okeeheepkee Basin

A detailed stormwater retrofit plan for the Okeeheepkee subbasin was deemed necessary, so the District worked with other state agencies and Leon County to perform the needed analysis. A plan of study was developed for the

project by the parties and work started in 1994 with monitoring of flow stage at five sites throughout the basin. A stormwater management model was developed and the analysis of alternative solutions for stormwater treatment was under way at the end of the year.

In 1995 the District completed the calibration and verification of the computer model to analyze stormwater drainage under existing and future development conditions in the basin. This model was applied to the analysis of nine alternative plan scenarios previously developed and approved by the Okeeheepkee Design Team. The alternative analysis phase of the project was completed for existing conditions and then the preferred alternative plan was selected based on projected water quality improvements and environmental and fiscal responsibility. The selected alternative was also analyzed under future development conditions. A draft final report was prepared and presented to the public and the Board of County Commissioners for review. Workshops and hearings were held to receive input from the public and the ISCC and the revised plan was presented to the Board of County Commissioners for consideration. In June 1995, the Board of County Commissioners approved the recommended plan and directed Leon County staff to begin implementation. District and county staff coordinated efforts to secure land in the basin for nonpoint source pollution reduction and prevention. These efforts were quite successful, with two grants totaling $500,000 being secured to acquire land for a planned regional stormwater treatment facility in the Okeeheepkee basin near Megginnis Arm. One grant was secured by the District from the U.S. EPA Section 319(h) program, and matching funds were secured by Leon County from the Florida Communities Trust Program. Two additional grants were secured to acquire approximately 30 acres of sensitive ravine area in the upper part of the basin for preservation purposes.

Project Q4c: Megginnis Arm Basin Diagnosis

In 1994 a water quality monitoring program was developed to monitor the effectiveness of stormwater treatment facilities in the Megginnis Arm basin and monitoring equipment was installed. In 1995 water quality sampling and monitoring efforts were undertaken. During 1996 water quality sampling and monitoring efforts were completed. Analysis of the data collected through this project has been delayed, but completion is expected in 1998.

Project Q-5: Improvement of Megginnis Arm Facility

In 1991, the District utilized SWIM funds to improve the sand filter and irrigation system of the District's stormwater treatment facility. This effort also included an unsuccessful attempt to seed the surface of the filter with grass to prevent clogging by fine clay particles. Following the refurbishment of the filter, data was collected to be used in the development of an operation and maintenance manual and permit.

Operation of the sand filter and pumping system were assessed during the final quarters of 1992 and throughout 1993, and a operations and maintenance manual which incorporates the proposed improvements was developed and is in final form with the exception of a detailed analysis of flow data. Efforts to complete the flow analysis have been ongoing, and it has been determined that additional data is required in order to develop a schedule for filter maintenance.

In 1995 the filter was disced to improve flow, and measurements were undertaken within the Megginnis Arm Basin Diagnosis Project. When available, information and analyses from the Diagnosis will be incorporated where applicable, and efforts to complete the manual will resume at that time.

Project Q-6: Megginnis Arm Facility Operation and Maintenance

In 1991, approximately 9,000 cubic yards of accumulated material was removed from the facility heavy sediment basin. Other routine maintenance tasks have been performed as needed during the three-year plan cycle.

Project Q-7: Onsite Design Criteria & Effectiveness

To date this project has not been implemented. The project was intended to determine the effect of recent stormwater management system design criteria changes to local environmental ordinances. Since relatively few new stormwater systems have been constructed in the Lake Jackson watershed since the ordinances were revised, it was decided to delay implementation of this project until a later date.

Project Q-8: Retrofit of Nonconforming Sites

This project has not been implemented as designed, however, some nonconforming sites have been retrofitted through expansion or redevelopment projects.

Project Q-9: Evaluation of Septic Tank and Sewer Issues

Due to funding limitations, this project had minimal work performed through SWIM until fiscal year 1993-94. Based on site visits and a preliminary assessment of site characteristics using GIS, the original proposed sampling strategy was modified to better identify any likely differences in the quality of surface waters draining sewered and unsewered areas in the western sub-basins of the Lake Jackson watershed. Also, the proposed strategy for characterizing drainfield conditions was modified to account for local differences in soil type, residential density and slope.

The study area was delineated to include five sub-basins along the western shore of the lake: Sunset, Harbinwood, Marshside, Jackson Mounds and Okeeheepkee. Except for those properties abutting US 27, which are generally commercial and sewered, these sub-basins consist primarily of single-family residential lots. Two minor sub-basins in the general study area (Little Lake Jackson and Harbinwood West) were not included, because they have a much greater proportion of non-residential land uses and include many sewered properties.

A homeowner survey instrument was developed to characterize wastewater loadings and septic tank and drainfield maintenance within various site classes. The survey also addressed the extent of fertilizer use and presence of outdoor pets. This latter information will be applied to an assessment of the nutrients and bacteria measured in the surface water sampling program. Last, a draft scope of services was developed to contract with the Leon County Health Unit (District II HRS) to conduct soil and drainfield analyses on improved properties within the study area. The survey responses and soil assessments will be linked to the results of the surface water quality sampling program to characterize any relationships among wastewater loads, septic tank and drainfield history, site conditions, and surface water quality.

In 1994, the homeowner survey was mailed to 1,016 residences in the five sub-basins in the project area. A database was established to analyze information from the approximately 399 survey responses. Initial statistics, including means and frequencies, were calculated for all survey variables. Additional analysis indicated that the pattern of returns were not different from a random distribution, which assisted with the selection of appropriate statistical tools. Preliminary correlations between water use, number of residents, washing load frequency, and frequency of irrigation were evaluated; as were associations between washer disconnections, drainfield alterations, and septic tank pumping frequency. Survey results were merged with property information and incorporated into the District's geographic information system (GIS).

Soil and topography data for the five sub-basins of the study area were obtained and imported into the District's GIS. The soils coverage was partitioned into three drainfield suitability classes: severe, moderate and slight, depending primarily on the ponding characteristics of the soils and seasonal water tables. The topographic coverage was analyzed for slope (percent grade) and partitioned into two classes: slopes between 0 and 2 percent and slopes greater than 2 percent. The drainfield suitability and topographic coverages were then merged to create six site classes to describe suitability for septic systems. Interim results included overlays of soils, slopes, site classes, distribution of graywater disconnects, and distributions of pumped and/or replaced septic systems.

Following field research, a letter was mailed to 120 improved properties requesting participation in a drainfield and soil survey. Approximately 20 homeowners indicated a desire not to participate. The drainfield survey was completed by Department of Health and Rehabilitative Services (HRS) field personnel in August 1994. The final report was completed and submitted to the District in September 1994.

A water quality monitoring design was developed and distributed for internal technical review. A Quality Assurance Plan was written and submitted to the Department of Environmental Protection (DEP) and discussions were conducted with the DEP chemistry lab concerning sample processing.

Revisions to the Quality Assurance Project Plan (QAPP) were submitted and subsequently approved by FDEP. The design of the water quality monitoring component of the plan was completed and reviewed internally by the NWFWMD Technical Review Committee (TRC). A pilot study was completed March 27-29, 1995 which

included three replicates per sample to provide an estimate of variation. A total of three sampling events were conducted over five subbasins of the western Lake Jackson watershed during the spring of 1995.

After further review by the TRC, the sampling design was revised to include three sets of samples across the study area during dry conditions (already complete) and three sets during saturated conditions. The primary reason for this revision is to allow some discrimination between water quality effects caused by surface runoff and those caused by septic system leachate. If, during saturated conditions, enough time is allowed to lapse following cessation of precipitation, it is considered likely that surface runoff contamination and dilution (first flush) will be largely removed from streams being sampled, and effects due to residential septic systems will be observable. A series of monitoring sites for saturation condition sampling were agreed upon, and ongoing saturation monitoring was commenced.

It was also agreed upon by the TRC to explore alternative means of testing for septic effluent contamination of surface waters. Techniques considered for further evaluation vary, and range from testing for caffeine to signature lipid biomarker analysis (preliminary information provided by Dr. D.C. White, ORNL). The feasibility of such alternatives may be evaluated for a follow-up study.

Because of sustained dry conditions throughout the watershed, adequate saturation was not achieved during the summer and early fall of 1995 to perform saturated condition sampling. The first set of saturated condition samples were conducted on October 12, 1995, following 3.19 inches of rain between October 3 and 11 (including 1.23 inches during October 11). Two more sets of saturated condition samples were to be taken for completion of water quality monitoring. Water quality sampling was completed in the Spring of 1996, and all water quality results were received from the DEP laboratory. Additional work performed included data compilation, limited qualitative data assessment, and final analysis and report design. Completion of the final analysis was postponed due to other project demands and limitations in staff resources.

Specific accomplishments during Calendar Year 1996 are detailed below.

- Final water quality samples were collected from Lake Jackson tributary streams on February 21-22 and March 19-20.
- Final results on all water quality samples were received from the DEP laboratory.
- Initial, qualitative review of water quality data was performed, and results were presented to the Lake Jackson SWIM TAC.
- Final plans for water quality, statistical, and geographic analyses were completed, as well as the final report outline.

Project Q-10: Agricultural Impacts

Because of perceived minimal impacts from agricultural activities in the watershed, this project has not been implemented.

Project Q-11: Recreational Impacts

A literature review performed through SWIM concluded that determination of water quality impacts from recreational activities would require site-specific research.

Restoration & Preservation Program

Project R-1: Long-term Monitoring of Habitat

The Florida Department of Natural Resources (now Department of Environmental Protection) developed a GIS map of the Lake Jackson watershed which provides baseline habitat information and the Tallahassee-Leon County Planning Department has undertaken county-wide upland and wetland habitat assessment projects.

Project R-2: Megginnis Arm Sediment Removal

This major restoration project ($1.13 million) involved removal of approximately 112,000 cubic yards of contaminated sediments from Megginnis Arm. It was implemented in 1990 through 1992, utilizing funds from SWIM, U.S. EPA, the Florida Pollution Recovery Trust Fund, a special legislative appropriation, and local

government. Satisfaction of final contract requirements with DEP and submission of the final report was accomplished in 1993.

Project R-3: Additional Megginnis Arm Restoration

In 1992, this project was successful in securing a $300,000 U.S. EPA grant to further restore Megginnis Arm by replanting portions of the arm with desirable native vegetation. The project also provided administrative support for completion of the sediment removal project.

During the initial quarter of the 1993 calendar year, activities were limited to coordination of restoration activities associated with the development of the EPA funded revegetation project; however, limited charges were made to this project directly. Additional coordination efforts were made with the public education activities regarding restoration projects in the watershed and within Megginnis Arm. Later in 1993 activities involved development of a monitoring program to determine the efficacy of the restoration activities within Megginnis Arm. The additional Megginnis Arm Restoration project is focused upon monitoring in the open water of the arm and evaluating the success of removing accumulated degraded sediments from the arm. All monitoring within this project is integrated with monitoring efforts of other Lake Jackson projects, including the Megginnis Arm Basin Diagnosis, the Okeeheepkee Watershed Study, and the Lake Jackson Septic Tank Survey. In 1994 project activities involved continued coordination with other watershed projects, and in 1995, monitoring activities were started and have continued since then.

Project R-4: Fords Arm Restoration

SWIM funding was used in 1991-92 to contract with Dr. William Landing of Florida State University to determine interrelationships between sediments and water quality in Fords Arm. The District also performed work which documents historic conditions of the arm and its watershed. Both of these efforts will be used in the development of future restoration strategies.

During the initial quarter of 1993 specific diagnostic and analytical evaluation activities associated with the restoration and preservation alternatives for Fords Arm were suspended due to a lack of funds and staff; however, limited planning efforts for future activities were undertaken. Diagnostic activities and mapping efforts associated with the restoration/preservation of this portion of Lake Jackson were initiated late in the second quarter. Emphasis was placed on analysis of recent studies as well as historical data to determine changes in water level elevations and associated vegetation and land use. These activities resulted in a report entitled Lake Jackson Watershed: Fords Arm Interim Report (NWFWMD 1993), which details historic diagnoses and mapping efforts. In 1995 activities associated with the restoration/preservation of this portion of Lake Jackson were indefinitely postponed. Future activities will be closely tied to Project M12 for contingencies associated with natural drawdown.

Project R-5: Restoration of Upland & Aquatic Areas

Other than the Megginnis Arm project, no major restoration projects have been implemented in the watershed. However, the Tallahassee-Leon County Planning Department has recently developed resource information which will be helpful in the identification of areas needing restoration.

Project R-6: Timberlane Creek Berm Removal

Through SWIM, the District performed a detailed analysis of conditions in Timberlane Creek between Meridian and Timberlane roads. The study concluded that removal of a spoil berm on the creek bank would provide only minimal benefits. See NWFWMD document titled: Timberlane Creek Berm Removal Analysis (Arteaga 1992) for additional information on this project.

Project R-7: Yorktown Pond Restoration

Yorktown Pond is an impoundment in the southern portion of the Lake Jackson watershed which receives runoff from Interstate 10 and a residential area. The SWIM *Lake Jackson Regional Stormwater Retrofit Plan* recommended restoring the pond and adding features which would enhance its water quality treatment functions. In 1993, Leon County worked with the SWIM Program and homeowners adjacent to Yorktown Pond and developed a plan to restore the pond to provide treatment of stormwater runoff. This plan was implemented in 1994, utilizing funds from SWIM, Leon County, and the homeowners. The pond was drained and re-contoured,

and repairs were made to the dam and outfall structure. The pond was vegetated with native aquatic vegetation when the pond was re-flooded. The restoration project, completed in 1995, is managed by Leon County.

Watershed Management Program

Project M-1: Ecological Analysis of Lake Jackson Watershed

Through the Leon County contract with CARRMA (see Project Q-2 above) substantial information is being collected on the ecology of the lake, however, substantial additional funding would be required to perform a comprehensive watershed ecological analysis as envisioned by this project.

Project M-2: Land Acquisition

The committee to recommend land acquisition for the Lake Jackson watershed was not activated, however two major parcels of land were acquired. The District and the City of Tallahassee purchased the 670-acre Phipps parcel in the summer of 1992. The parcel was eligible for purchase through the District's Save Our Rivers program because of Lake Jackson's SWIM priority status. The District's interest in the purchase was to preclude development of this waterfront site which includes an extensive natural ravine system. The City of Tallahassee was interested in the purchase because the parcel included an existing recreational soccer complex and areas which could be used for additional active recreational uses (baseball fields). A second major (890± acres) parcel, the Lake Overstreet property, was purchased by the Department of Environmental Protection and the City of Tallahassee. These two large purchases will preserve a continuous swath of land between Lake Jackson to the west and Thomasville Road to the east. This area is one of the most rapidly growing portions of Leon County and, if developed, would have resulted in increased pollution to Lake Jackson from stormwater runoff. Two other land acquisition projects were developed through the SWIM Program and Leon County for properties in the Okeeheepkee Basin. These projects are outlined in the report for Project Q-4b.

Project M-3: Park Design Committee

The Leon County Public Works Department agreed to set up ad hoc committees to assist in the design of parks in the Lake Jackson watershed. At the time that the Public Works Department begins planning for a new park or for major renovations to an existing park, a committee will be appointed to assist with the design and ensure that the park will be developed in an environmentally sensitive manner.

Project M-4: Aquatic Preserve Management

The Lake Jackson Aquatic Preserve Management Plan was completed and adopted by the Governor and Cabinet on July 23, 1991. Since there is no dedicated funding for the Lake Jackson Aquatic Preserve, no proactive management activities have been implemented. Staff from the statewide Aquatic Preserve program respond to permit requests and have assisted Leon County in the development of design criteria for new docks.

Project M-5: Fish and Wildlife Management and Research

The Florida Game and Fresh Water Fish Commission has been implementing a study of the effect of a protective slot limit on largemouth bass population structure and angler yields. To date, results of the study indicate that the slot limit is having a favorable impact on the population size structure, and that angler catch success is excellent.

Project M-6: Aquatic Plant Management

The Florida Department of Environmental Protection (DEP) continues routine treatment of the lake for the nuisance aquatic plant water hyacinth and fluctuations in state funds available for the aquatic plant management program have required the DEP to periodically request funds from local governments to continue this relatively expensive program.

In 1994, the NWFWMD used SWIM funds to implement a project to review aquatic plant management alternatives for Lake Jackson. Project activities during calendar year 1994 included: a literature review and bibliography preparation, discussions with staff from the DEP Bureau of Aquatic Plant Management, a review of documents on hand at the Bureau of Aquatic Plant Management, the initial design of a policy analysis and decision spreadsheet model, a report outline and the writing of several sections. Staff also requested a

bibliography search by the University of Florida/IFAS Bibliography Service and performed a conceptual design of the GIS/Map products.

In 1995, a draft report was developed, and a series of graphic depictions of changes in hydrilla coverage over time were completed, using the District's GIS. A series of GIS layers were created, depicting changes in Lake Jackson hydrilla coverage between 1986 and 1994. A spreadsheet quantitative decision model was developed. The literature review was completed, and telephone interviews with external agency personnel were conducted. The preliminary draft report was developed for review internally and by agency experts. Revisions were made based upon comments received and a final draft report was completed for the Technical Advisory Committee (TAC) review. After TAC review and discussion at a TAC meeting the report: Evaluation of Alternatives for the Control of Invasive Exotic Plants in Lake Jackson, Florida was finalized, printed, and distributed to the TAC and other interested parties.

Project M-7: Regulatory Assessment & Coordination

The purpose of this project is to coordinate with local governments and other agencies concerning regulatory and land use issues which could affect Lake Jackson. Consequently, District staff has coordinated with local government and other agencies in the development and review of various regulatory strategies for protecting the lake.

In 1993 review of proposed changes to Leon County and the City of Tallahassee land use regulations (local comprehensive plan and land development regulations) were undertaken by District staff to determine possible impacts or benefits to Lake Jackson. The regulatory issue which received the most attention in 1993 dealt with interpretation of the Leon County Environmental Management Act (EMA) standards for permitting structures in the 100-year floodplain of the lake. A literal interpretation of the EMA would preclude the installation of new docks on Lake Jackson. Recognizing that exclusion of docks was not the intent of the Board of County Commissioners, Leon County permitting staff held a series of meetings with staff from state agencies to develop criteria for dock construction. District staff participated in these meetings and also developed a short paper that analyzed lake stages over the period of record.

Project activity has been limited in recent years because proposed changes to the local government comprehensive plan and land development regulations have been limited in quantity and scope. There were relatively few comprehensive plan amendments affecting areas within the Lake Jackson watershed, and those reviewed were of a minor nature. A number of proposed changes to various land development regulations were reviewed and comments were provided as necessary.

Project M-8: Regulation of Recreational Uses

District staff performed a review of programs which regulate recreational uses. A short report summarizing existing regulations for a number of recreational activities was prepared. The report was reviewed by the Lake Jackson Action Team, and the Action Team felt that enhanced enforcement of existing regulations would be preferable to developing new regulations.

This project was substantially completed in 1991. However, in 1993 District staff participated in meetings of the Lake Jackson Action Team Recreation subcommittee. This subcommittee examines issues related to recreational uses of the lake and use and operation of county-owned recreation facilities around the lake. District staff also participated in the development and review of a management plans for Elinor Klapp-Phipps Park and the Lake Overstreet addition to Maclay Gardens State Park and assisted Leon County staff with permitting issues at Sunset Landing Park.

Project M-9: Ordinary High Water Line

This project has had no activity.

Project M-10: Action Team as an Oversight/Advocacy Committee

The Lake Jackson Action Team has served in an oversight/advisory capacity throughout the plan cycle. This has included review and coordination of various aspects of the plan, and providing advisory recommendations to the Leon County Board of County Commissioners (BCC) and the agencies involved in implementation of the plan. In

February 1993, the Action Team prepared and presented to the BCC a status report with a series of recommendations. The Lake Jackson Action Team was dissolved by the BCC in 1995 and replaced by a county-wide water resources committee.

Project M-11: Coordinate & Update Management Plan

District staff has continued to administer the SWIM portions of the Lake Jackson Management Plan through this project. Ongoing tasks include project development and budgeting; development of requests for state and federal grants and matching funds from local government; coordination with the Lake Jackson Action Team and local and state agencies; revision of the Lake Jackson Management Plan; quarterly and annual reporting; and general program oversight, and various other administration and coordination duties.

Project M-12: Contingency Management Plan for Natural Drawdown

This project consists of planning and coordination with various agencies to take advantage of the unpredictable, natural drawdown of Lake Jackson. Several times in the past century, the water in the lake has disappeared as a result of sinkholes in the bottom of the lake and evaporation, following a period of below normal rainfall. In the recent past, pollutant laden sediments have built up in the bottom of the lake, especially in the southern portion. As part of the Lake Jackson Management Plan, this contingency plan will be prepared so that state and local agencies will be able to act quickly when this natural phenomenon occurs.

Coordination meetings and appointments have been undertaken to educate and inform state and local staff of this opportunity to work with nature to facilitate the removal of bottom sediments of the lake. These meetings included discussion of public safety and public education objectives. One meeting was held with staff from the Florida Department of Environmental Protection (FDEP), the Division of Forestry (DOF), the Florida Game and Fresh Water Fish Commission (FGFWFC) and local governments to prepare initial goals and objectives. Preliminary assignments for responsibilities of tasks for when the drawdown occurs have been reviewed. A preliminary schedule of events related to the level of water in the lake have been reviewed.

Recent activities have focused on requirements for a conceptual permit from the FDEP for the removal/dredging of bottom sediments. Staff have met with FDEP representatives from the Lake Jackson Aquatic Preserve section, Bureau of Plant Management, the permitting section and the Ecosystem Management section to prepare information which will be needed for the conceptual permit, which will hopefully extend for at least ten years. A preliminary field inspection was done in the fall of 1995 to determine what would be needed to estimate the volume of sediment material that will need to be disposed of.

Activities during 1996 focused on requirements for a conceptual permit from FDEP for the removal/dredging of bottom sediments. Staff have met with the FDEP representatives from the Lake Jackson Aquatic Preserve section, the Aquatic Plant Management section, the permitting section and the Ecosystem Management section to prepare for what will be needed for the conceptual permit. In June of 1996, field work was done with the assistance of the DEP Bureau of Aquatic Plant Management to obtain a rough estimate of the volume of sediment and map the priority areas. A follow-up analysis was completed by DEP. The preliminary plan should be completed in 1998 and tasks associated with implementing the plan will likely continue until the next drawdown occurs.

Public Education & Awareness Program

Project E-1: Planning & Administration

The Public Education Working Group, organized the Lake Jackson Action Day in 1992. The group's work has contributed substantially toward increasing the public understanding of Lake Jackson. To represent the District's SWIM Program, staff attended several quarterly meetings of the State Committee for Environmental Education (SCENE) each year since 1994. The informal group, which includes representatives from environmental resource agencies, government agencies and organizations, serves as a valuable vehicle for facilitating environmental education throughout Florida. In addition, staff participated in the Community Classroom Consortium, which serves as a regional network for providing resource information and support services to area educators and staff was involved in the group's 1996 Resource Fair, titled "Beyond the Blackboard."

Project E-2: Printed Materials

A pamphlet entitled "Lake Jackson and Clean Water...You Can Make a Difference", was published in 1992 with funding provided by Tallahassee Mall and distributed widely through direct mailings and community events. In 1993 staff completed the Lake Jackson poster/brochure entitled "Looking at the Big Picture: The Lake Jackson Watershed". Seven thousand copies were printed and distributed to Leon County public school teachers, students, and residents in subsequent years. Due to high demand for this item and a diminished supply, 7,000 additional copies were printed in 1997. The brochures delivered to teachers included flyers advertising field trips to the District's stormwater runoff treatment facility.

Project E-3: Media Relations

The media relations program has attracted attention to Lake Jackson because of the District's promotional efforts and local media interest and involvement. Local media covered the official opening of the I-10/Megginnis Creek Pond Stormwater Treatment Facility. National Public Radio aired statewide a segment of the Florida Crossroads show which featured stormwater and Lake Jackson. Public Radio also aired a story on the Megginnis Arm Sediment Removal Project. Staff wrote several articles on native shoreline plants which were published in the Tallahassee Democrat in September, 1991. In addition, an article about Lake Jackson and how SWIM projects have helped the lake was written for *Florida Water*, a magazine published as a joint effort by all five water management districts. During 1994, local media representatives accompanied District staff and the Lake Jackson Action Team on a tour of the lake to learn about its problems. Local media produced stories on the Lake Jackson septic tank survey. Also in 1994 staff prepared a story for the *Tallahassee Democrat's* Sunday gardening section on steps that homeowners can take to protect water resources. A news release on the revegetation project at Megginnis Arm was completed and forwarded to media representatives in Leon County. In 1995 a feature article about the Megginnis Arm field trip program was written and submitted to *Florida Water* magazine for publication in a 1996 issue.

Project E-4: Corporate/Private Sponsorship

The Tallahassee Mall donated $5,000 to Leon County for the working group to use for environmental awareness and education programs, which was used to supplement the projects developed in 1992.

Project E-5: Miscellaneous Awareness Activities

This program has incorporated several tours, including field trips by Leon County students, to the District's Lake Jackson stormwater treatment facility. In February of 1993 a ribbon-cutting event to officially open the Interstate 10/Megginnis Creek Pond Stormwater Treatment Facility. Approximately 50 people attended the event and the event was widely covered by area media. Beginning in the spring of 1994, a substantial amount of time was devoted to coordinating and conducting school field trips to the Megginnis Arm Stormwater Treatment facility. The environmental-education outings, which include a variety of hands-on activities, demonstrations and lectures, continued to increase in popularity and reach a large audience. More than 1,000 Leon County school children, representing 49 classes in grades K-12, participated during the 1995 spring and fall academic sessions. The overall demographics showed that the group consisted of a diverse array of area youngsters, all with varied socioeconomic backgrounds, cultures and learning capabilities. Feedback from area teachers, based on evaluations received, indicated that the tours and activities were very successful and well received. Moreover, considering the positive response to the program, the District expanded the program to include schools in Gadsden, Liberty and Wakulla counties as well as those located within District boundaries in Jefferson County. In September, staff submitted to the U.S. Environmental Protection Agency (EPA) a final report on the Lake Jackson field-trip program. The project period covered by the $5,000 EPA grant, which was used to purchase field equipment and supplies, officially concluded in October. However, due to the success and popularity of the field trips, the program was continued for the 1995-96 and 1996-97 fiscal years through SWIM.

Project E-6: School Programs

Coordination with schools continued. Flyers advertising a field trip to the District's stormwater runoff treatment facility were sent to teachers in conjunction with the "Big Picture" brochure. The WaterWays middle school educational video on water resources and concerns included Lake Jackson information. In 1995 to publicize the Lake Jackson field trips among area educators, new promotional fliers and informational guides were designed and distributed to area elementary school teachers as well as middle and high-school science teachers.

Project E-7: Educational Materials

In 1993 EnviroScape I, a tabletop model that demonstrates how stormwater runoff degrades waterbodies and how best management practices can clean it up, was purchased and used at several events and locations. Some of the events the model was shown at included: EcoFest I, an event organized by the Department of State and attended by over 350 Boy Scouts and Girl Scouts from several counties; Springtime Tallahassee; the Leon Association for Science Teaching Conference, which was attended by approximately 800 teachers; the Florida Marine Science Educators Conference held at the Apalachicola National Estuarine Research Reserve; the Earth Day celebration event; and a presentation for Leon County Growth Management Office staff. In addition this model is used during all of the Lake Jackson stormwater facility fieldtrips.

A $5,000 grant from the U.S. Environmental Protection Agency was submitted and secured for the Lake Jackson fieldtrips, providing for the purchase of scientific equipment for use in public education activities. In addition, staff initiated and administered a contract with a professional educator to develop a teacher's supplementary curriculum guide to stormwater runoff. This process entailed providing editorial direction, budgeting, developing the guide's content and form, determining specifications and conducting the bidding process, reviewing material and printing. The *Teacher's Guide to Stormwater Runoff in the Lake Jackson Watershed* was designed for elementary, middle and high school teachers. It has been used separately and in conjunction with *In Search of Ol' Bigmouth*, the District's recently produced educational video about Lake Jackson and related environmental issues. The 65-page publication, which includes classroom lessons and hands-on activities, has proven to be valuable in preparing students for the District's field trip program at Lake Jackson as well. The guide was funded in part through the SWIM Program and a Section 319 Nonpoint Source Management Program Grant from the U.S. Environmental Protection Agency through a contract with the Stormwater/Nonpoint Management Section of the Florida Department of Environmental Protection.

Project E-8: Outdoor Educational Displays

Outdoor educational signs were installed at five Lake Jackson boat landings and at the Marjorie Turnbull Park on Old Bainbridge Road. The informative signs, which are about Lake Jackson, its plant and animal life, stormwater runoff and its effects and responsible personal and recreational behaviors, were installed in 1992 at Sunset Landing, Highway 27 Landing, Megginnis Arm Canoe Landing, Rhoden Cove Landing and Miller's Landing. Funding for the signs at boat landings was provided by a $20,000 grant from the U.S. EPA and the Turnbull Park signs were funded through SWIM. A news release was issued at the completion of this project and two local television stations aired a segment about the signs. Arrangements were made with Leon County for the maintenance and repair of the signs. The signs contain information about Lake Jackson's watershed, the littoral zone, and wildlife found at the lake.

Project E-9: Community Activities

Springtime Tallahassee Jubilee, an event attended by thousands, has been a good forum for Lake Jackson exhibits and for using the EnviroScape model to demonstrate the effects of stormwater runoff to the lake. Since 1989 District staff have attended this annual event to inform people about the lake. Another community event attended by the District was the Lake Jackson Action Day in October, 1992. In 1994 Native Nurseries invited district staff to a lecture on ways nurseries and homeowners can protect water resources. To continue District efforts to inform the public about nonpoint source pollution and the value of protecting our water resources, staff wrote two articles for the *Tallahassee Democrat's* home gardening section. In both 1994 and 1996 district staff worked with Keep Tallahassee-Leon County Beautiful for the organization's trash tournament. Staff assisted with the identification of trash pick-up and adopt-a-shore locations. In 1994, volunteers picked up trash at 11 locations around Lake Jackson and staff helped net 42 bags of trash from the District's stormwater treatment facility. In 1996, staff assisted with "Jammin' on Jackson II," sponsored by Fox 49 radio station and Keep Tallahassee-Leon County Beautiful to help clean up Lake Jackson. Hundreds of volunteers spent the morning removing trash and litter from the Lake Jackson vicinity, including Megginnis Arm, the District's stormwater treatment facility and boat landings.

Project E-10: Citizen Water Quality Monitoring

This project has not been implemented for the general public but water quality monitoring is part of the Lake Jackson fieldtrip program.

Project E-11: Public Awareness Survey
This project has not been implemented.

Project E-12: Lake User Survey
This project has not been implemented.