**Baccalaureate Degree Program Proposal**
**Recommendations from the Division of Florida Colleges Baccalaureate Review Team**
**for Consideration by the Commissioner of Education**

**A collaborative review was conducted by the Baccalaureate Review Team members, including staff from the Division of Florida Colleges and the Florida Colleges Budget Office. Written recommendations were submitted to the college by the review team, college staff revised the proposal, and submitted the final proposal, which is now complete and ready for consideration by the Commissioner of Education.**

**Direct questions or concerns to Abbey Ivey at 850-245-9492 or abbey.ivey@fldoe.org.**

| College | Degree Type | Degree Program | Date Submitted to SBOE |
|---|---|---|---|
| **Florida Gateway College** | **BAS** | **Water Resources Management**<br><br>***No alternative proposals were received for this program.*** | **3/18/14** |

"Within 45 days following receipt of a completed proposal by the Division of Florida Colleges, the Commissioner of Education shall recommend approval or disapproval of the proposal to the State Board of Education."
Section 1007.33(5)(e), F.S.

| Comments | | Summary |
|---|---|---|
| **A** | **Planning Process** | Florida Gateway College's (FGC) proposed Bachelor of Applied Science (BAS) in Water Resources Management is designed to prepare highly skilled technicians and mid- to upper-level managers in Florida's water resources industry. The program will complement FGC's successful and growing continuing workforce, certificate, and Associate in Science (AS) programs in this area.<br><br>Planning activities for this program included hiring an external consultant, contacting industry stakeholders, and establishing an advisory committee to assist in the development and implementation of the BAS degree. Meeting minutes and other planning documents are located in the supplemental materials, as well as support letters.<br><br>FGC met with representatives from the University of Florida (UF) and Saint Leo University (SLU) regarding the proposed program in order to avoid duplication of effort and foster collaboration and support where possible. Letters of support for this program from UF and SLU are included in the supplemental materials, as is a letter from Eastern Florida State College. In addition, the Division of Florida Colleges received a letter from the University of South Florida indicating the institution has no concerns regarding this degree proposal. |
| **B** | **Program Implementation Timeline** | The projected implementation date of upper division enrollment is spring 2015. The complete timeline of implementation activities is located in Section B of the proposal. |
| **C** | **Workforce Demand/Unmet Need Specific to Program Area** | FGC's service district counties reside within Workforce Regions 7 and 8. The college notes that although the areas surrounding FGC's service district are rich in water resources and serve as an excellent training ground for the college's water programs, the greatest number of water resource-related jobs are located in the densely populated metropolitan areas outside of the service district. As the lead for the former Water Resource Banner Center, FGC draws students in its related certificate and associate's programs from throughout the state and expects this to be the case for the proposed online program as well. FGC emphasizes the uniqueness of this program in Florida, and thus focuses the workforce analysis on statewide need. |

| | | |
|---|---|---|
| | | FGC cites the Florida Department of Economic Opportunity and reports 842 current jobs within Workforce Regions 7 and 8 and 12,512 current jobs statewide, with 194 projected annual job openings in the state. In addition, the college describes a statewide online job search on May 21, 2013 revealed 43 openings for related positions in Florida. FGC states all listings were less than 30 days old, noting that depending on the renewal rate, the annual listings could be 258 or more.<br><br>There are no public universities in FGC's service district, and the college states there are no directly competing bachelor's degree programs offered in Florida at this time. Florida Gulf Coast University (FGCU) offers a program in Marine Science within a similar Classification of Instructional Programs (CIP) code and produced 14 graduates in 2011-12. However, the college notes this program is in no way comparable in scope, structure or content to the proposed program. Similarly, the college reports several state universities offer programs in Environmental Science, but notes the majority of these programs are primarily academic and/or research-oriented, rather than career-oriented, as is the case with this program. Additionally, the college states no independent universities in FGC's service district offer a bachelor's-level water resource management degree or other program within similar CIP codes. |
| **D** | **Facilities and Equipment Specific to Program Area** | No new facilities will be required as this program will be 100 percent online. The college will purchase two computers and software for student use. |
| **E** | **Library/Media Specific to Program Area** | The college has allocated $10,000 to acquire additional library/media resources to support this program. FGC is also engaged in a pilot for eBooks. |
| **F** | **Academic Resources Specific to Program Area** | There will be one full-time and one part-time faculty member dedicated to this program. Additional full-time faculty will be employed as needed. |
| **G** | **Cost to Students** | The cost for four years of study at FGC and other regional postsecondary institutions, as reported by FGC:<br><br>FGC = $13,199<br>UF = $25,052<br>University of North Florida = $25,410<br>FGCU = $24,472<br>Florida State University = $25,866<br>Jacksonville University = $119,160<br>SLU = $29,520 |
| **H** | **Academic Content** | Admission to this program requires an AS degree, and Associate in Arts degree graduates will be considered on a case-by-case basis. The program will be composed of 36 credits of general education coursework, 44 credits of lower division electives, and 41 credits of upper division coursework. |
| **I** | **Enrollment, Performance and Budget Plan** | FGC anticipates 15 students enrolled during the first year and 45 students enrolled by 2016-17. The program will be supported primarily through tuition and fees, as well as grant and program enhancement funds. After submission of the final program proposal, the college submitted a revised budget form which is included with the proposal. |
| **J** | **Plan of Action if Program Must be Terminated** | In the event of program termination, all students enrolled would be contacted individually and advised of next steps needed to complete the program at FGC or at another accredited partner institution. Proper notification will also be sent to the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). |

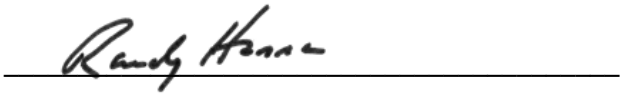
**Recommendation: Approve**

**Vice Chancellor for Academic and Student Affairs, Division of Florida Colleges**

**Date** 2/24/14

**Recommendation: Approve**

**Chancellor, Division of Florida Colleges**



**Date** 2/24/14

# Bachelors of Applied Science

## *Water Resources Management*

# Start Here.
# *Go Anywhere!*

Florida Gateway College
149 SE College Place
Lake City, FL 32025-2007
(386) 752-1822
www.fgc.edu

## THE FLORIDA COLLEGE SYSTEM

## BACCALAUREATE PROPOSAL APPROVAL APPLICATION

**COVER SHEET**

**INSTITUTION:** Florida Gateway College

**BACCALAUREATE DEGREE CONTACTS:**


**PRIMARY**
Name: Dr. Brian Dopson
Title: Vice President, Academic Programs
Phone: 386.754.4209
Email: brian.dopson@fgc.edu

**SECONDARY**
Name: Dr. W. David Shoup
Title: Director, Water Resources Training Pro
Phone: 386.754.4343
Email: william.shoup@fgc.edu


**DEGREE TYPE (BS, BAS, other):** Bachelors of Applied Science
**DEGREE TITLE:** Water Resources Management
**TOTAL NUMBER OF CREDIT HOURS:** 121
**PROPOSED DEGREE SIX-DIGIT CIP CODE: 03.0205** Water, Wetlands, and Marine Management
**PLANNED PROGRAM IMPLEMENTATION DATE:** Spring 2015
**PROGRAM DESCRIPTION/EMPLOYMENT OPTIONS FOR GRADUATES:**

The Bachelor of Applied Science in Water Resources Management (BAS-WRM) degree is designed to prepare highly skilled technicians and mid- to upper-level managers in Florida's water resources industry. The degree will complement Florida Gateway College's successful and growing continuing workforce, certificate, and A.S. in Environmental Science Technology which is designed for individuals wishing to enter the water and wastewater field or operators seeking to advance their careers. Due to the uniqueness of the degree, there exists the potential to serve a statewide need in addition to that of north central Florida.

The BAS-WRM will provide current workers in the field, as well as graduates of related certificate and A.S. programs a pathway to move from the basic technician level to the more flexible and highly compensated water resource management professional.

**BOARD OF TRUSTEES APPROVAL DATE: October 8, 2013**

**PRESIDENT'S SIGNATURE:** Charles W. Hall **Date:** 2/18/2014
*Original application and subsequent revision submission must include a current signature/date.*

## Table of Contents

## EXECUTIVE SUMMARY

**Institution:** Florida Gateway College
**Degree Type:** Bachelors of Applied Science
**Degree Title:** Water Resources Management

Program Description:

The Bachelor of Applied Science in Water Resources Management (BAS-WRM) degree is designed to prepare highly skilled technicians and mid- to upper-level managers in Florida's water resources industry. The degree will complement Florida Gateway College's successful and growing continuing workforce, certificate, and A.S. in Environmental Science Technology which is designed for individuals wishing to enter the water and wastewater field or operators seeking to advance their careers. Due to the uniqueness of the degree, there exists the potential to serve a statewide need in addition to that of north central Florida.

## A. PLANNING PROCESS

Internal

Florida Gateway College (FGC) began offering occupational credit certificates in Water Treatment Plant Operator and Wastewater Treatment Plant Operator in 2000. The certificates were developed in response to the Department of Environmental Protection's mandate that all operators of water and wastewater treatment facilities complete continuing educational credits for state license renewal. FGC began offering a college credit certificate in Water Treatment Technology in Fall, 2010. Industry growth and the success of the college credit certificate prompted the college to develop the AS degree in Environmental Technology. The AS degree program was implemented in Spring, 2011. The success of the AS degree program prompted college administrators and program managers to research industry need for employees in the field with a higher level degree. It was discovered that there was a need in the water industry for graduates with a higher level of technical and management skills.

On June 4, 2012, the director of water resources training programs met with Florida Gateway College (FGC) president, Dr. Charles Hall, and college administrators to seek approval to develop the Bachelors of Applied Science (BAS) in Water Resources Management (WRM). The discussion included a presentation of information from various sources regarding workforce demand, career path or potential opportunities for graduates, and the economic impact of the BAS-WRM in the state of Florida. It was decided that the college would pursue development of the program.

FGC hired a consultant to work with the director of water resources training programs to complete and submit the letter of intent (LOI) to the Division of Florida Colleges (DFC). Completion of the LOI included regular collaborations between the director of water resources training programs, the consultant, and college administrators. The completed LOI was approved by the FGC District Board of Trustees (DBOT) on February 12, 2013, and it was submitted to the DFC.

External

College personnel visited the University of Florida and Saint Leo University campuses to present information about FGC's proposed BAS-WRM program. The purpose of these visits was to gain support from public and regionally accredited private postsecondary institutions in FGC's region.

The purpose was also to avoid duplication of effort and foster collaboration and support where possible. As a result of those presentations, the University of Florida and Saint Leo University administrators pledged their support for the proposed program at FGC.

Industry stakeholders at the local and state level were also contacted to gain their support for the program. The result of those contacts indicated that there is strong industry support. Letters from these stakeholders are attached.

In November, 2013 David Shoup established a Technical Advisory Committee for the Water Resources program to assist in the development and implementation of the BAS degree. People from the Watershed Management, St. Johns River Water Management District, Florida Farm Bureau Federation, Santa Fe River Alliance, Florida Department of Environmental Protection, National Resources Conservation Service, Potash Corporation and Utilities of Lake City FL have accepted the invitation to serve on the committee.

## B. PROGRAM IMPLEMENTATION TIMELINE

Assessment of Need and Demand: February, 2010 – September, 2013
Curriculum Development: May – December, 2013
Accreditation Activities: February 2013- March 2014
Recruitment of Faculty and Staff: July, 2014
Student Recruitment and Advising: July, 2014
Program Implementation: January, 2015

## C. WORKFORCE DEMAND

Florida Gateway College's service district includes Baker, Columbia, Dixie, Gilchrist, and Union counties. The five counties reside within two workforce regions (regions 7 & 8) and two regional water management districts—the Suwannee River Water Management District, which encompasses 15 counties in north central Florida; and northeast Florida's St. John's River Water Management District, which includes the nearby greater Jacksonville metropolitan area. Due to the nature and uniqueness and of the proposed degree, there is strong potential to serve a statewide need in addition to that of north central Florida.

Labor demand projections were determined using a variety of studies. Employment in selected water resource related occupational codes as of October, 2012, in workforce regions 7 & 8 was 842. Employment statewide in related occupations was 12,512. The projected average of annual openings in water-related jobs is estimated at 194. According to the Florida Department of Economic Opportunity (FLDEO), the projected number of job openings in targeted occupations listed as high skill – high wage is expected to grow annually at 2.3% over the next five years. Overall job opportunities are expected to grow annually at 1.5%.

No Florida public or private university offers a BAS-WRM program or one that is comparable in scope, structure, or content. Therefore, there have been no recent graduates from a Florida university. The natural growth of supervisory and managerial positions that accompany expected growth in the industry will require workers with the advanced knowledge and skills that the BAS-WRM graduates will demonstrate. Graduates of the BAS-WRM program will be prepared with additional technical expertise and management skills that will allow them to advance in administration and management positions in the areas of policy, management, sustainability,

analysis and planning in the water resources field. These positions will provide a higher level of responsibility and higher wages. Graduates of the BAS-WRM will also have knowledge and skills that will open career opportunities in the broader water and utility career fields

## D. FACILITIES AND EQUIPMENT

Facilities: Current facilities will adequately support the proposed program.
Equipment: Two computers and software for student support will be purchased.

## E. LIBRARY/MEDIA

FGC's library and media center provides access to adequate current resources to support all programs. The collection includes more than thirty-five thousand print volumes and more than fifty-nine thousand e-books, ensuring service both to on campus students and distance learners. Library collections include a wide range of databases with access to thousands of full text journals, online reference books, newspapers, and statistical data through a formal agreement with the Florida Virtual Campus (FLVC), a service of the Florida College System and State University System. FLVC reports database use by college.

Any new physical resources bought by Florida Gateway College can be shared with any SUS or FCS library through interlibrary loan. The same is true of resources owned by same SUS and FCS Libraries.

The Coordinator of Library Research (CLR) coordinates library orientation for both traditional and distance learning students. FGC's online Orientation Activity and Plagiarism Tutorial offers instruction on the library's comprehensive services and educational opportunities.

Students can currently access the majority of the resources required for the BAS-WRM in electronic format. Additional resources, such as printed industry specific materials are being requested. The college has set aside a budget of $10,000 for enhancement of the existing library resources to support the program.

## F. ACADEMIC RESOURCES

The college is in the process of interviewing and hiring a new full time faculty member, which is a replacement of the previous full time faculty member. There will be one (1) full time faculty member dedicated to the Water Resources Program and one (1) part-time faculty members dedicated to the Water Resources Program.

It is anticipated that additional part-time faculty members will be employed in the year 2014-2015. Program enrollment will be monitored to ensure appropriate faculty-to-student ratios. Additional full-time faculty will be employed as needed as program enrollment increases.

The college's academic support structure is adequate to support the program.

## G. COST TO STUDENTS

Cost to students is estimated to be $13,199 for four years based on Florida resident tuition and fees for credit programs. Estimates do not reflect potential rate increases for tuition and/or fees. Cost to students at Florida public universities for four years of study averages $25,000.

## H. ACADEMIC CONTENT

Applicants must have an associate in science degree of at least sixty (60) hours in a related discipline from a regionally accredited institution. Applicants with a strong mathematics and science background, and who have earned an associate in arts degree or an associate in science in an unrelated degree will be considered on a case-by-case basis and should consult with the Water Resources Management program director for advisement.

At least 25% of all upper division courses will be taught by faculty members holding discipline specific terminal degrees.

The anticipated average student/teacher ratio in the first year will be 15:1.

The program will be approved by the Southern Association of Florida Colleges Commission on Colleges.

The curriculum is aligned with the Common Prerequisites Counseling Manual, CIP 03.0205, with a new proposed track. FGC is requesting that a new track for CIP 03.0205 be developed and titled “Water Resources Management”. Our BAS-WRM program clearly fits into the IPEDS definition of this CIP, yet the current CPCM title of “Marine Science” is unsuitable for our proposed BAS-WRM program.

For AS graduates the program will include a total of 80 lower division credits and 41 upper division credits for a total of 121 credits. For AA graduates the program will include 79-81 lower division credits and 41 upper division credits for a total of 120-122 credits. Students should consult with the program director for curriculum assistance.

## I. ENROLLMENT, PERFORMANCE, BUDGET PLAN

Program development was funded by a grant from the Employ Florida Banner Center for Water Resources. Although the Banner Center grant has ended, the unspent funds were left to the college to support the water programs as it deemed fit. These funds will be utilized through 2014-15. Florida Gateway College’s District Board of Trustees (DBOT) designated funds to support the college’s development and implementation of baccalaureate programs. These funds will be utilized to augment expenditures not covered by student tuition and fees through 2016-17. The program is expected to become self-sustaining in 2017-18

FGC is in the process of interviewing candidates for a full time faculty position and will utilize current part-time faculty to the extent possible for the BAS-WRM program. Additional faculty will be employed as needed, with the next projected full-time instructor needed in the third full year following implementation. The director of water services training programs will serve as the program administrator. The director’s staff assistant will support the faculty and students in the program.

## J. PLAN OF ACTION IF PROGRAM MUST BE TERMINATED

FGC has a plan of action in place in the event that a program must be terminated. Students will be notified as soon as possible and advised on available options that will allow them to complete the program. Students, faculty, and staff will be assisted as much as possible in order to minimize disruption.

## EVALUATION CRITERIA

## A. PLANNING PROCESS

*1. Internal Process and Meetings*

Fall, 2000 – FGC developed Water Treatment Plant Operator and Wastewater Treatment Plant Operator Occupational Credit Certificate Programs in response to the Florida Department of Environmental Protection's mandate that all operators of water and wastewater treatment facilities complete continuing educational credits for state license renewal.

2003 -- The college won the National Council of Public Private Partnership Award for program development in the area of water/wastewater operator training.

2005 – The college won the National Council of Public Private Partnership Award for Innovation in the area of water/wastewater operator training.

2008 -- Water Treatment Plant Operator and Wastewater Treatment Plant Operator Occupational Credit Certificate programs were restructured to be delivered as online programs. (Jan 12, 2010 DBOT Minutes)

January 12, 2010 – FGC District Board of Trustees (DBOT) Regular Meeting-

- Dr. John Rowe, Instructor, and Mr. Tim Atkinson, Director of Special Projects, presented information to FGC DBOT about the college's planning process to expand the Water/Wastewater Treatment programs.
- The college continues to develop partnerships with water/wastewater organizations both statewide and nationally.
- FGC applied for a National Science Foundation grant to expand the certificate program.
- Mr. Atkinson stated the future outlook expects more open positions than licensed operators in the water/wastewater industry.

March 18, 2010 – FGC DBOT Regular Meeting –

- VP Carroll announced that planning is continuing to expand the college's current non-credit water/wastewater programs to a college credit certificate and then to an AS degree program.

April 13, 2010 - FGC DBOT study session-

- The DBOT discussed proposed baccalaureate degree programs, including a baccalaureate program in the water/wastewater treatment area.

April 13, 2010 – FGC DBOT Regular Meeting: The following items were discussed relating to FGC's ongoing planning to expand the water/wastewater treatment program:

- A Community Based Job Training grant in the water resources area with Western Kentucky University and Brevard County Schools with plans to tie in Columbia County Schools, Jacksonville Electric Authority, and Miami/Dade utilities
- LCCC is working with a consortium of Lake Sumter Community College and Indian River State College on a potential energy industries grant.

- LCCC is reapplying for a National Science Foundation grant to support the transition of the noncredit water/wastewater program to an online Associate in Science degree.

April 28, 2010 – FGC Educational Affairs Committee approves the proposed Water Quality Technician College Credit Certificate program.

May 18, 2010 - FGC DBOT Regular Meeting - FGC DBOT approved the college's pursuit of Florida Department of Education approval to offer baccalaureate programs, including the area of water/wastewater.

August, 2010 - The college begins offering the Water Quality Technician college credit certificate program.

October 13, 2010 – FGC EAC approves the proposed Associate in Science (AS) degree in Environmental Science Technology program.

November, 2010 – FGC DBOT Regular Meeting: Tim Atkinson, Director Banner Center Water Resources and Dr. John Rowe, Instructor, announced that the college was awarded the Employ Florida Banner Center for Water Resources grant. Mr. Atkinson and Mr. Rowe received this information when they attended the Water Resources Advisory Council meeting in Orlando. Atkinson said the program plans to begin offering associate degrees in September, and bachelor degrees are on the short list under consideration. FGC is one of only two colleges in the state have two Banner Centers. The next meeting will be held in December; Mr. Atkinson invited Board members to attend.

April, 2011: Hanover Research Environmental Science and Technology Program Demand study for FGC's proposed baccalaureate program

May, 2011: The college begins offering the AS degree in Environmental Science Technology

June 4, 2012 – FGC administrators Tim Atkinson, Brian Dopson, and Patty Anderson met with the college president, Chuck Hall, to discuss the development of a Bachelors of Applied Science in Water Resource Management (BAS-WRM) program. President Hall gave his approval to pursue the degree.

December 7, 2012 – FGC hires a consultant, David Still, P.E. and Associates, LLC to work with the director of water resources training programs and other college personnel to complete and submit the letter of intent (LOI) to the Division of Florida Colleges (DFC).

February 12, 2013 – FGC DBOT approved the LOI at the regular board meeting. The LOI was submitted to the DFC. Tim Atkinson, Director of Water Resources summarized the history of the program since January 2008, with the implementation of the online water/wastewater training courses to the current AS Degree program along with the enrollment growth of the program. He referenced recent studies by both UF and USF with evidence of economic impact and workforce demand. Based on the success of the non-credit Workforce Education courses, the college credit certificate and the AS Degree program, the College requested DBOT approval to apply for DOE approval to offer a Bachelor's of Applied Science in Water Resources Management. (February 12, 2013, DBOT Minutes)

May, 2013 –The consultant was hired as a full-time FGC employee, the coordinator of water resource training programs.

May, 2013 - September 2013 –The director and coordinator met regularly with Dr. Brian Dopson, vice president of academic programs for progress updates.

May, 2013 - September 2013 – Regular planning meetings were held with research and institutional effectiveness staff.

There was a transition of leadership in the Water Resources Program from August, 2013 to December, 2013. Mr. Atkinson left in August for personal reasons and David Still was hired as his replacement. David Still resigned in September for another employment opportunity and David Shoup, the current director, was hired to replace him. The full-time faculty member left December 2013 and the college is in the process of interviewing and hiring a full-time faculty member.

2. *External Process and Meetings*

*The college must engage in discussions and coordination with public universities and regionally accredited private postsecondary institutions, as outlined in section 1007.33, Florida Statutes (5)(a). The proposal must provide evidence of these discussions and coordination.*

FGC's director of water resource training programs and FGC consultant visited the University of Florida and Saint Leo University Lake City campuses to present information about FGC's proposed BAS-WRM program. The purpose of these visits was to gain support from public and regionally accredited private postsecondary institutions in FGC's region. The purpose was also to avoid duplication of effort and foster collaboration and support where possible.

On January 8, 2013, Mr. Tim Atkinson, Director of FGC Water Resources Training Programs, and Mr. David Still, consultant to FGC, met with the University of Florida's dean of the college of agricultural and life sciences, associate dean of the institute of food and agricultural sciences (IFAS), chair of agricultural and biological engineering, and head of the department of environmental engineering.

On January 16, 2013, Mr. Atkinson and Mr. Still met with Saint Leo University's assistant vice president of continuing education and the director of the Lake City education center. Mr. Atkinson and Mr. Still presented FGC's vision for a Bachelor of Applied Science in Water Resource Management program. They explained that the aim of the college was to avoid duplication of effort and foster collaboration and support where possible. Extensive discussions ensued covering workforce demand, curriculum, and potential areas of collaboration and sharing of resources.

As a result of meetings with the University of Florida and Saint Leo University administrators, they encouraged further exploration of areas of collaboration and resource sharing. They also gave their support for the proposed FGC BAS-WRM program.

In November, 2013 David Shoup established a Technical Advisory Committee for the Water Resources program to assist in the development and implementation of the BAS degree. People from the Watershed Management, St. Johns River Water Management District, Florida Farm Bureau Federation, Santa Fe River Alliance, Florida Department of Environmental Protection, National Resources Conservation Service, Potash Corporation and Utilities of Lake City FL have accepted the invitation to serve on the committee.

Further details of meetings and collaboration are included in Appendix C.

## B. PROGRAM IMPLEMENTATION TIMELINE

*1. Provide date or date range for each of the following activities:*

The program implementation timeline is outlined in the table below:

| Summary Timeline for Bachelors of Applied Science – Water Resource Management | |
|---|---|
| FGC DBOT approved baccalaureate programs | May 2010 |
| FGC President approved pursuit of Water/Wastewater | June 2012 |
| **Assessment of Need and Demand** | February 2010 – September 2013 |
| USF Needs Assessment | February 2010 |
| Hanover Research on Environmental Science Demand | April 2011 |
| Career Pathways in Water Resources, Fairfield Index | May 2011 |
| TREEO, UF-EE Needs Report | May 2011 |
| | |
| **Curriculum Development** | May-December 2013 |
| Review of related AS programs on campus | May 2013 |
| Development of Curriculum | December 2013 |
| | |
| **Accreditation Activities** | February 2013-March 2014 |
| Letter of Intent to DOE | February 2013 |
| Draft of DOE Application | September 2013 |
| DBOT Approval | October 2013 |
| DOE Application Submitted | October 2013 |
| Notification letter to SACS | October 2013 |
| Resubmission of DOE Application | January 2014 |
| Preparation of SACS Prospectus | January 2014 |
| Submission of SACS Prospectus | March 2014 |
| | |
| **Recruitment of Faculty and Staff** | Will occur in 2014 as needed |
| | |
| **Systems, Facilities and Resource Upgrades and Development, if needed** | NA-Current facilities & resources are adequate for the program |
| | |
| **Student Recruitment and Advising** | Upon DOE and SACS approval |
| | |
| **Estimated Date Upper Division Courses are to Begin** | Spring 2015-January |

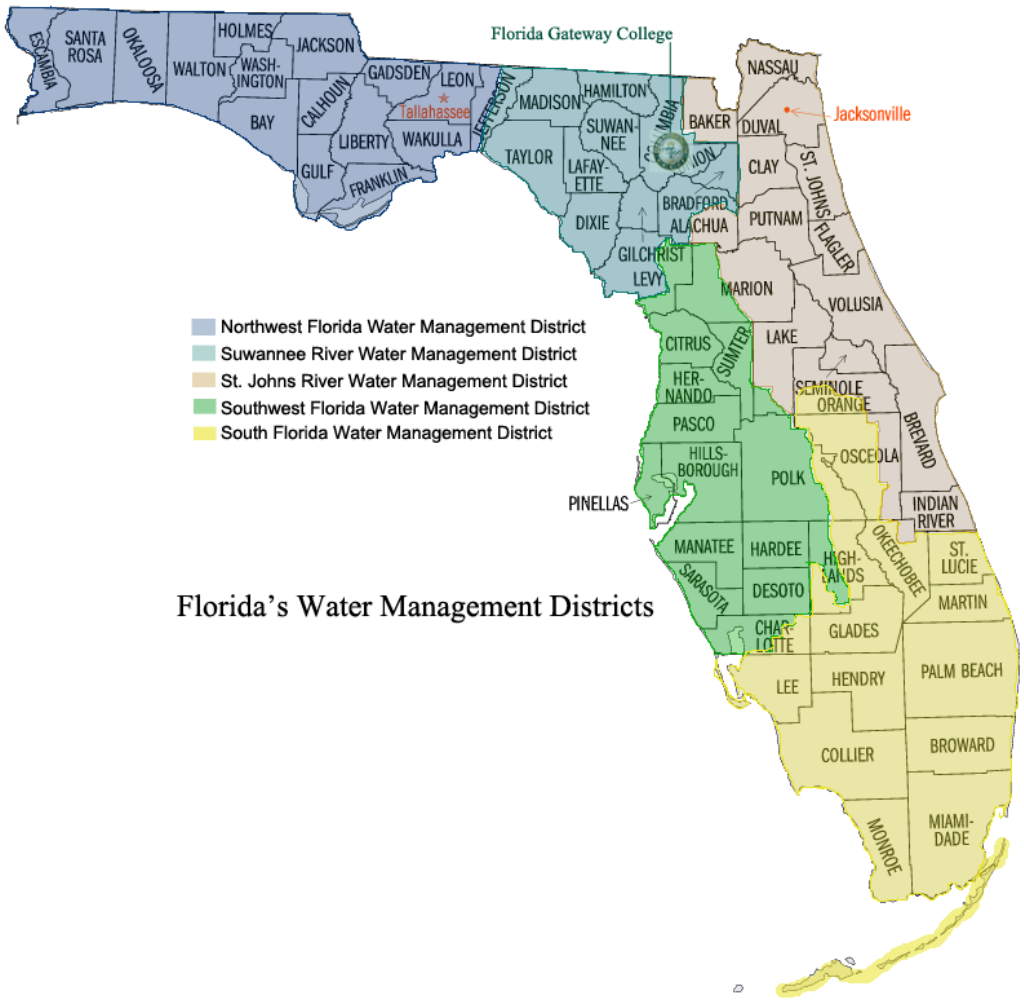
## C. WORKFORCE DEMAND/UNMET NEED SPECIFIC TO PROGRAM AREA

(The Hanover Report provided in Appendix D was completed on April 8, 2011. The information provided in Section C is current.)

1. *Geographic region to be served*

Florida Gateway College's service district includes Baker, Columbia, Dixie, Gilchrist, and Union counties. The five counties reside within two workforce regions (regions 7 & 8) and two regional water management districts—the Suwannee River Water Management District, which encompasses 15 counties in north central Florida; and northeast Florida's St. John's River Water Management District, which includes the nearby greater Jacksonville metropolitan area. Due to the nature and uniqueness and of the proposed degree, there is strong potential to serve a statewide need in addition to that of north central Florida.

The area is home to 21 of the state's 33 first magnitude springs, and the Suwannee River which has the second highest discharge rate in the state. Along with extensive wetland systems and the surface water connection to Georgia, the area is ideally located for educational opportunities. The unique nature and close proximity of the region's water resources will provide our students unparalleled opportunities to gain insight into the works of protecting, managing, and governing the water resources in the region and statewide.



Florida's Water Management Districts

2. *Number of current jobs*

The number of current jobs in *all* occupations for which this degree would prepare a student would be exceptionally large due to the broad background provided by the degree. To narrow this field for the purposes of this analysis, only positions included in the select categories of industrial production manager (SOC 113051), natural sciences manager (SOC 119121), environmental engineering technician (SOC 173025), environmental science technician (SOC 194011), and water/liquid waste treatment operator (SOC 518031) are included. These positions most closely correlate to those found in the job search yielding the current job openings indicated in the next paragraph C.3.

**Number of Workers Employed in Water Industry Related Occupations**
**October 2012**

| Workforce Region | Counties | Number Currently Employed[1] |
|---|---|---|
| 7 | Columbia, Dixie, Gilchrist, Union | 30 |
| 8 | Baker, Putnam, Clay, Duval, Nassau, St Johns | 812 |
| Statewide | | 12,512 |

Although the areas surrounding FGC's service district in rich in water resources and serves as an excellent training grounds for the college's water programs, the greatest number of water resource-related jobs lie in the densely populated metropolitan areas outside of the FGC district workforce regions. As the lead for the former Water Resource Banner Center, FGC draws students in its related certificate and associate's programs from throughout the state. We expect this to be the case for the proposed online bachelor's program as well. The BAS in Water Resource Management is unique in the state of Florida, with greater focus on practical and applied science and management than other academically-oriented programs offered at some institutions; therefore, our analysis focuses on statewide need.

FGC's AS in Environmental Science Technology degree prepares graduates to pursue entry level positions as licensed operator technicians in water treatment plants and wastewater processing. Graduates with the AS degree will be able to articulate directly into the proposed BAS-WRM program. Graduates of the BAS-WRM program will be prepared with additional technical expertise and management skills that will allow them to advance in administration and management positions in the areas of policy, management, sustainability, analysis and planning in the water resources field. These positions will provide a higher level of responsibility and higher wages.

Graduates of the BAS-WRM will also have knowledge and skills that will open career opportunities in the broader water and utility career fields. Jobs in the broader utility career field include water policy; watershed management; environmental conservation management; technical sales; water supply planning; water auditing; Geographical Information Systems management; data analysis; laboratory management; project management; water quality assurance; storm water management; well exploration; wetlands management; ground water remediation; water distribution; permitting; health compliance; construction and corrosion control; and regulatory compliance.

[1] Florida Department of Economic Opportunity, Labor Market Statistics, *Florida Jobs by Occupation– October 2012*, http://www.floridajobs.org/labor-market-information/data-center/statistical-programs/employment-projections

3. *Number of current job openings*

A statewide online job search[2] on May 21, 2013 found **43 openings** in Florida in positions related to the proposed degree. These include water-related titles such as environmental specialist, assistant regulatory administrator, technical assistant, water plant supervisor, water analyst, water treatment specialist, utilities maintenance coordinator, water plant and equipment operators, plant specialist, and others. There were a substantial number of tangentially-related openings which were not counted in this analysis. All listings noted were less than 30 days old.

4. *Projected number of job openings five years from current year*

Water and Liquid Waste Treatment plant Operators are on the 2012-13 Statewide Targeted Occupations list as a high skill-high wage occupation with an anticipated annual growth rate of 2.3%. Overall, the total number of openings in the five selected occupational categories listed in C.2 is expected to grow at an annual rate of 1.5% over the next five years.

**Job Growth Projections in Water Industry Related Occupations – FGC District and Statewide**
**October 2012**

| Workforce Region | Counties | Average Number Annual Openings[3] | Annual Percentage Increase | Anticipated Additional Need through 2017[4] |
|---|---|---|---|---|
| 7 | Columbia, Dixie, Gilchrist, Union | 1 | 2.5% | 5 |
| 8 | Baker, Putnam, Clay, Duval, Nassau, St Johns | 9 | 1.2% | 45 |
| Statewide | | 194 | 1.5% | 968 |

[2] sources include: www.waterjobsnow.com; www.indeed.com; http://irecruit.jea.com; www.monster.com; www.governmentjobs.com; www.dep.state.fl.us/careers/find_job.htm

[3] Florida Department of Economic Opportunity, Labor Market Statistics, *Florida Jobs by Occupation– October 2012,* http://www.floridajobs.org/labor-market-information/data-center/statistical-programs/employment-projections

[4] Anticipated openings are based on the initial five years of the estimated annual **growth** for 2012-2020.

5. *Number of most recent graduates in the discipline area from the State University System, by institution(s) in the geographic region specified in the application*

   There are **no** public universities in the FGC district. The table below lists the number baccalaureate degrees awarded over the last ten years by Florida state universities that have or had a bachelor's program sharing CIPs similar to that of the proposed BAS in Water Resource Management.

**Degrees Awarded by State University System Institutions**[5]
*CIP 03: Natural Resources/Conservation*
Six Digit CIP Codes: *03.0200 – 0299*
Degree Level *Bachelors*

| | 02-03 | 03-04 | 04-05 | 05-06 | 06-07 | 07-08 | 08-09 | 09-10 | 10-11 | 11-12 |
|---|---|---|---|---|---|---|---|---|---|---|
| FAMU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FAU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FGCU | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 7 | 12 | 14 |
| FIU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FSU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NCF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UCF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UNF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UWF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 7 | 12 | 14 |

   It is important to note that the degree offered by Florida Gulf Coast University is a BS in Marine Science, and is in no way comparable in scope, structure, or content to the proposed BAS degree in Water Resource Management (BAS-WRM).

   The University of Florida, University of South Florida, University of West Florida, and Florida International University each have programs in Environmental Science (CIP 03.0104). In 2011-12, a total of 228 students earned a bachelor's degree in programs within this CIP. Investigation into the details of these programs revealed that the majority were primarily academic and/or research-oriented, rather than career-oriented, as is the case with the BAS-WRM. Although these graduates may potentially be employed in water resource management fields, it is unlikely that the majority would be seeking positions likely to be filled by BAS-WRM graduates.

6. *Number of most recent graduates in the discipline area from nonpublic postsecondary institutions in geographic region (if available), by institution*

   A search of the NCES College Navigator Tool for water management-related offerings revealed that there are **no** independent universities in the FGC district offering a bachelor level Water Resource Management degree or other program with CIPs of 03.0200-0299. In addition to the search via the Navigator tool, we researched ICUF schools' websites and found that most offerings were typical of the Marine Science degree offered by Florida Gulf Coast University rather than FGC's proposed degree.

[5] State University System of Florida, Florida Board of Governors, "Degrees Awarded by State University Institutions since 1991", *Resources*, http://www.flbog.org/resources/iud/degrees_search.php, (May 21, 2013)

7. *Data and a one-paragraph description of the employment gap based on 2 through 6*

   It is apparent from a single day's job search that the actual demand for highly skilled workers in the water resource fields meets or exceeds the current 8-year projection model set forth by the Florida Department of Economic Opportunity (FLDEO). The 43 job postings were all less than a month old. Depending on the rate of renewal, the annual listings could be 258 or more (assuming a two month renewal rate), making the FLDEO estimate of 194 annual openings conservative.

   Our research revealed that there are no *directly* competing bachelor's degree programs offered in Florida at this time. Although associate's level graduates and graduates in indirectly-related fields may fulfill some of the demand, over half of the openings located in the May 21, 2013, job search required experience and focused higher education in the field. The natural growth of supervisory and managerial positions that accompany expected growth in the industry will require workers with the advanced knowledge and skills that the BAS-WRM will provide.

8. *Other measures as selected by institutions, which may include brief qualitative or quantitative data/information such as local economic development initiatives or evidence of rapid growth or decline not reflected in local, state, and national data.*

   The imminent workforce crisis in Florida's water/wastewater industry is well documented in recent studies. The "Needs Assessment for Florida's Workforce in the Water Services Industry" conducted by the USF Patel Center for Global Solutions in 2010 reported that "the current workforce is aging…(and) half of current water and wastewater utility operators are projected to retire within the next five years". Further, the study noted that "of those who remain, stricter…regulations will impact their skill requirements". A more recent study conducted in 2011 by the UF Center for Training, Research, and Education for Environmental Occupations confirmed the findings of the Patel Center study: "…the exodus of utility employees due to retirement…will continue over the next 10-15 years (with) an anticipated loss of 30 to 50 percent of the current utility workforce…within 10 years". The UF study also cited increasing demand for water, more rigorous regulatory requirements, and technological advances as major workforce challenges for Florida's water industry.

   With a growing population and resulting expansion of public and private development, water resources are obviously critical for Florida's economy. The pivotal impact of the water resource industry on Florida's economic future is highlighted in the Enterprise Florida "Roadmap to Florida's Future". Sustainable Water Supply is cited as one of five essential Growth Infrastructure recommendations in Florida's 2010-2015 Strategic Plan for Economic Development.[6]

[6] Enterprise Florida, "Roadmap to Florida's Future—2010-2015 Strategic Plan for Economic Development", pp.52-54,61, http://www.eflorida.com/IntelligenceCenter/Reports/flip/roadmap/index.html

## D. FACILITIES AND EQUIPMENT SPECIFIC TO PROGRAM AREA

1. *Provide a brief description of the existing facilities and equipment that will be utilized for the program.*

   There are adequate facilities to support the proposed BAS-WRM program. Granger Hall, formerly an 84-student residence hall, will support all staff, faculty and students for the program. The facility has adequate office space for faculty and staff and study rooms for student use. No new facilities will be required for the program.

2. *Provide a brief description of the new facilities and equipment that will be needed for the program, if any.*

   Current facilities are adequate to support all of the water related programs. The proposed BAS will be 100% online and no new facilities/classroom space will be required. The college will purchase two computers and software for student use. The equipment will be housed in a study room in Granger Hall.

## E. LIBRARY/MEDIA SPECIFIC TO PROGRAM AREA

1. *Provide a brief description of the existing library/media resources that will be utilized for the program.*

   FGC's Wilson Rivers Library and Media Center is a 37,000 square foot facility that opened in 2012. The facility provides electronic and wireless access to digital information, spaces for collaborative learning, an information commons, quiet areas for individual study, and space for art and cultural events.

   The library owns more than thirty-five thousand print volumes and more than fifty-nine thousand electronic books, ensuring service both to on campus students and distance learners. Library collections include a wide range of databases with access to thousands of full text journals, online reference books, newspapers, and statistical data through a formal agreement with the Florida Virtual Campus (FLVC), a service of the Florida College System and State University System. FLVC reports database use by college. This information is documented in the library annual report.

   Any new physical resources bought by Florida Gateway College can be shared with any SUS or FCS library through interlibrary loan. The same is true of resources owned by same SUS and FCS Libraries.

   FGC has a formal agreement with the Northeast Florida Library Information Network (NEFLIN) that specifies public and academic libraries in the North Florida region will work together. This agreement provides free interlibrary loan among the 570 member libraries, and also provides interlibrary loan access through the Online Computer Library Corporation (OCLC).

   The library staff consists of two Master of Library Science (MLS) professionals, paraprofessional library technicians with numerous years of experience, and student workers who assist with circulation and public service. Library staff is available on site to assist students during regular operating hours. The Ask-a-Librarian virtual service is available 24/7 to accommodate traditional and distance learning students.

The Coordinator of Library Research (CLR) coordinates library orientation for both traditional and distance learning students. FGC's online Orientation Activity and Plagiarism Tutorial offers instruction on the library's comprehensive services and educational opportunities. The Orientation Activity and Plagiarism Tutorial can be customized to meet the needs of specific programs. Orientation is also provided in a traditional format in classrooms as requested by faculty.

2. *Provide a brief description of the new library/media resources that will be needed for the program, if any.*

   Requested library/media resources for the BAS-WRM program:

- A collection of local, regional, state, and federal significant printed documents, relevant studies, historic documents [for example, "Florida Model Water Code" by Maloney, Ausness, and Morris; *Four River Basins Project, Florida*, United States Army Corps of Engineers (FGC Reference Library); Comprehensive Everglades Restoration Plan (CERP)]
- Website dedicated to links to state water management districts, Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Affairs, Water Institute at UF, NOAA, Army Corps of Engineers, United States Geologic Survey, U.S.D.A.-N.R.C.S. and A.R.S., U.F. law library for water resources, UF's Oral History of Water Management
- *Paving Paradise: Florida's Vanishing Wetlands and the Failure of No Net Loss*, Craig Pittman and Matthew Waite
- *Manatee Insanity: Inside the War Over Florida's Most Famous Endangered Species*, Craig Pittman
- Groundwater and surface water textbooks

For the first year, the library has access to 4 on-line databases that relate to water resources. There are enough resources to establish a base of information for the program.

FGC is also engaged in a pilot for ebooks. This pilot will last a year, and then FGC will establish an elibrary for reference and text books as needed.

A budget of $10,000 has been set aside to acquire additional library/media resources required to support the BAS-WRM. A detailed list of library resources is included in Appendix E.

## F. ACADEMIC RESOURCES SPECIFIC TO PROGRAM AREA

1. *Number of existing full-time faculty*

   The college is in the process of interviewing and hiring a new full time faculty member. There will be one (1) full time doctorate level faculty member dedicated to Water Resources Program.

2. *Number of existing part-time faculty*

   There is one (1) part-time faculty member dedicated to Water Resources Program.

3. *Provide a brief description of the anticipated additional faculty that will be needed for the program, if any.*

   As the program enrollment increases, additional full-time faculty will be employed as needed. The anticipated program implementation date will be spring 2015. The budget reflects existing full-time faculty at .5 FTE. Part-time FTE is new faculty. The next anticipated new part-time faculty members will be employed in the year 2014-2015. FGC will monitor enrollment to ensure appropriate faculty-to-student ratios and ensure at least 25% of upper division courses are taught by faculty holding discipline specific terminal degrees as required to meet SACS accreditation standards.

4. *Anticipated instructional support personnel needed. List titles of personnel including administrators, advisors, librarians, lab managers, etc.*

   Florida Gateway College acknowledges that the addition of a program will increase student enrollment. The anticipated increase in enrollment brought about by this new degree will be absorbed into the college's existing academic support structure. The Executive Council (President and Vice Presidents) will monitor enrollment and add personnel to the appropriate areas of the college to support students as FTE increases. Once initial advising is provided, a student may register for classes via the Internet through our Banner® system, thus minimizing the immediate need for additional staff in the Registrar's Office and Career Counseling Center.

   Note that the budget includes funding for the program director's staff assistant who will support all water resources programs, including the BAS-WRM. Half of the assistant's salary and benefits is attributed to lower division programs and half to the bachelor's program.

5. *As applicable, provide additional information related to academic resources.*

   Non-applicable

## G. COST TO STUDENTS

1. *Anticipated cost for four years of study at FGC.*

| Estimated 2013/2014: | Lower Division per Credit Hour | Upper Division per Credit Hour |
|---|---|---|
| **Tuition** | $ 78.94 | $ 91.79 |
| **Fees** | $ 24.38 | $ 28.54 |
| **Total** | $ 103.32 | $ 120.33 |
| **4-Year Total Estimated Tuition & Fees**: (80 lower division credit hrs x 103.32) + (41 upper division credit hrs * 120.33) = **$13,199.13** | | |

2. *Estimated cost for four years of study at each state university in service district*

   There are no state universities in the service district; however, the following is presented for purposes of cost comparisons with regional institutions:

University of Florida[7]

| Current (2013/2014): | Cost per Credit Hour |
|---|---|
| **Tuition** (Resident Undergraduate) | $105.07 |
| **Fees** (incl. Tuition Differential) | $103.37 |
| **Total** | $208.77 |
| **4-Year Total Estimated Tuition & Fees**: 120 credit hrs x 208.77 = **$25,052.40** | |

University of North Florida[8]

| Current (2013/2014): | Cost per Credit Hour |
|---|---|
| **Tuition** (Resident Undergraduate) | $105.07 |
| **Fees** (incl. Tuition Differential) | $106.68 |
| **Total** | $211.75 |
| **4-Year Total Estimated Tuition & Fees**: 120 credit hrs x 211.75 = **$25,410.00** | |

Florida Gulf Coast University[9] *(offers degree with same CIP as BAS-WRM)*

| Current (2013/2014): | Cost per Credit Hour |
|---|---|
| **Tuition** (Resident Undergraduate) | $105.07 |
| **Fees** (incl. Tuition Differential) | $98.87 |
| **Total** | $203.94 |
| **4-Year Total Estimated Tuition & Fees**: 120 credit hrs x 203.94 = **$24,472.80** | |

[7] Undergraduate Florida Resident with Differential per UF website http://www.fa.ufl.edu/bursar/current-students/tuition-an-fees-2013-14/fall-2013-students-for-the-2013-14-academic-year/#credit (September 11, 2013)
[8] Undergraduate Florida Resident with Differential per UNF website http://www.unf.edu/tuition/ (September 11, 2013)
[9] Undergraduate Florida Resident with Differential per FGCU website http://www.fgcu.edu/cashiers/tanfdetails.asp (September 11, 2013)

Florida State University[10]

| Current (2013/2014): | Cost per Credit Hour |
|---|---|
| **Tuition** (Resident Undergraduate) | $105.07 |
| **Fees** (incl. Tuition Differential) | $110.48 |
| **Total** | $215.55 |
| **4-Year Total Estimated Tuition & Fees**:<br>120 credit hrs x 215.55 = **$25,866.00** | |

3. *Estimated cost for four years of study at each nonpublic institution in service district, if available.*

There are no non-public institutions offering 4-year degrees in FGC's service district. Jacksonville University offers a degree in Marine Science; however, as in the case of the program offered at Florida Gulf Coast University, the focus is totally dissimilar to the proposed BAS-WRM degree. The following is presented for purposes of cost comparison.

Jacksonville University
2013/14 Tuition: $993/credit hour x 120 credit hours
**4-Year Total Estimated Tuition = $119,160.**

Saint Leo University – Lake City Education Center[11]
2013/14 Tuition: $246/credit hour x 120 credit hours
**4-Year Total Estimated Tuition = $29,520.**

## H. ACADEMIC CONTENT

1. *List the admission requirements for the program.*

a. Complete and submit application for admission to Florida Gateway College.
b. Complete residency affidavit, providing required supporting documentation
c. Request and provide official transcripts from high school and ALL colleges previously attended
d. Official transcript with the following:
   - Associate of Science (AS) degree of at least sixty (60) hours in a related discipline from a regionally accredited institution
     *or*
   - Associate in Arts (AA) degree of at least sixty (60) hours from a regionally accredited institution. (Note: applicants with an AA degree and a strong math and science background will be considered for admission to the program on a case-by-case basis. Students should consult with the program director prior to application.)
e. Cumulative grade point average of 2.00 on a 4.00 scale in all postsecondary coursework
f. Completion of the Florida foreign language upper division admission requirement. If a student has not completed two consecutive years of the same foreign language in high

[10] Undergraduate Florida Resident with Differential per FSU website http://controller.vpfa.fsu.edu/Student-Financial-Services/SFS-For-Students/Tuition-Rates (September 11, 2013)
[11] Undergraduate – Direct Costs Schedule 2013-2014; http://www.saintleo.edu/media/540153/1314_tuition___fees_ed_ctr_ug.pdf

school or eight credits in college, he/she must complete eight credits of foreign language before the program degree is conferred.

2. *Faculty credentials – Estimated percentage of upper division courses in the program to be taught by faculty with a terminal degree*

   In accordance with the requirements set forth by *The Principles of Accreditation 3.5.4, Southern Association of Colleges and Schools (SACS),* at least 25% of all upper division courses will be taught by faculty members holding discipline specific terminal degrees.

3. *Anticipated average student/teacher ratio in first year based on enrollment projections as stated in the* ***Enrollment, Performance and Budget Plan*** *form*

   The anticipated average student/teacher ratio in the first year will be 15:1

4. *Summary of SACS accreditation plan, Florida Teacher Education Program Approval plan, and/or other specialized accreditation plan(s), as appropriate*

   FGC has already been approved as a Level II institution and will submit a prospectus to The Southern Association of Colleges and Schools-Commission on Colleges (SACS-COC) requesting approval for the Bachelor of Applied Science in Water Resources Management following DOE approval. The college will document compliance on all relevant requirements. The college does not plan to pursue any specialized accreditation for the proposed BAS degree.

5. *Curriculum (Course listing format: Course Number (e.g. MAC 1105), Course Title, # of Credits)*

   a. *Are there similar programs listed in the* ***Common Prerequisites Counseling Manual (CPCM)*** *for the CIP code (and track, if appropriate) you are proposing? (Yes/No)*

      No, there are no similar programs, even though the CIP code is being used for a Bachelor's degree in Marine Science offered at Florida Gulf Coast University (FGCU). Our proposed program content uses courses as they are applied to water resources. Both ground and surface water topics will be discussed from the use, management, and protection of water resources. A broad approach to water resources and management of human and natural resources will be covered in this program. The reason this CIP code is appropriate is that the subject matter includes a focus on individuals applying the principles of water supply logistics and wastewater management uses of water resources.

   b. *Include a copy of the latest page from the CPCM for the CIP/Track for this program, as applicable.*

      The page from the CPCM for CIP 03.0205 is included here for reference. However, Florida Gateway College is requesting a new track for this CIP be added to the manual. According to the Integrated Postsecondary Education Data Systems (IPEDS), the title and definition for CIP 03.0205 is as follows[12]:

      ***Detail for CIP Code 03.0205***
      ***Title:*** *Water, Wetlands, and Marine Resources Management.*

[12] *Integrated Postsecondary Education Data Systems (IPEDS)*. National Center for Education Statistics, "CIP 2010 Detail for CIP Code 03.0205." http://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=87198 [September 5, 2013]

***Definition:*** *A program that prepares individuals to apply the principles of marine/aquatic biology, oceanography, natural resource economics, and natural resources management to the development, conservation, and management of freshwater and saltwater environments. Includes instruction in subjects such as wetlands, riverine, lacustrian, coastal, and oceanic water resources; water conservation and use; flood control; pollution control; water supply logistics; wastewater management; aquatic and marine ecology; aquatic and marine life conservation; and the economic and recreational uses of water resources.*

FGC is requesting that a new track for CIP 03.0205 be developed and titled "Water Resources Management". Our BAS-WRM program clearly fits into the IPEDS definition of this CIP, yet the current CPCM title of "Marine Science" is unsuitable for our proposed BAS-WRM program.

Request new track for program titled **Water Resources Management (BAS)**. CIP is the same.

| | | | |
|---|---|---|---|
| **Program:** | Marine Science | **CIP:** | 03.0205 |
| | | **Track:** | 1 |
| **Offered At:** | FGCU | **Program Length:** | 120 Cr. Hrs. |

NEW 5/27/09
Revised Oct. 2010

## LOWER LEVEL COURSES

| | Cr. Hrs. |
|---|---|
| CHMX045C | 4 |
| & CHMX046C | 4 |
| & GLYX000C | 4 |
| & PHYX053C | 4 |
| & MACX311 | 4 |
| or STAX122 (1) | 3 |
| & STAX023 | 3 |
| & Take Either Course | |
| or BSCX010C | 4 |
| or PHYX054C | 4 |
| & BSCX011C | 4 |

FOR ALL MAJORS: Students are strongly encouraged to select required lower division electives that will enhance their general education coursework and that will support their intended baccalaureate degree program. Students should consult with an academic advisor in their major degree area.

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(1) Or an advanced mathematics course.

The prerequisites and suggested wording for the proposed new track are detailed in paragraph *c* below.

*c. If specific courses are listed in the CPCM or as determined appropriate for new programs, list lower division common prerequisites required. If no prerequisites are required for the program, state "No prerequisites."*

As indicated above, FGC is requesting a new track for CIP 03.0205. The BAS-WRM is designed to integrate seamlessly with the Associate in Science degree in Environmental Science Technology program. As an alternative to the AS degree, students with an AA and a strong math and science background could complete the BAS-WRM program without exceeding 120 credits. As such, the following sample is submitted for entry to the CPCM for the BAS-WRM degree:

| | | | |
|---|---|---|---|
| **Program:** | Water Resources Management - BAS | **CIP:** | 03.0205 |
| | | **Track:** | 2 |
| **Offered At:** | FGC | **Program Length:** | 121 Cr. Hrs. |

PROPOSED NEW

## LOWER LEVEL COURSES

None

FOR ALL MAJORS: Students are strongly encouraged to select required lower division electives that will enhance their general education coursework and that will support their intended baccalaureate degree program. Students should consult with an academic advisor in their major degree area.

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d. *List all courses required for the final two years of the baccalaureate program by term, in sequence. For some broad-based programs (e.g., BAS Supervision and Management), a sample curriculum may be appropriate. For degree programs with concentrations, there may be more than one sequence showing courses that are the same and/or different per concentration area. Include credit hours per term, and total credits for the program.*

All students are required to complete a total of 38 credits of General Education (GE) courses for the BAS-WRM degree. Students with an Environmental Science Technology AS degree from Florida Gateway College will have twenty-six (26) GE credits and will need an additional twelve (12) GE credits to complete the bachelor's program with the proper general education distribution.

The proposed curriculum is for students holding an AS degree in Environmental Science Technology or similar associate's degree. A proposed curriculum is also included for those students holding an AA degree. As the upper division coursework for the BAS-WRM will be offered entirely online, there is flexibility in the course sequencing.

# Florida Gateway College
## Bachelor of Applied Science in Water Resource Management
## Proposed Curriculum – A.S. Graduates

CIP Code 03.0205

Students entering with an AS degree in Environmental Science Technology (64 credits) may need to take additional general education courses.

| **TRANSITIONAL SEMESTER** | | **FIRST SEMESTER** | |
|---|---|---|---|
| Humanities Elective (GE) | 3 | PAD 3034 Public Administration and Public Policy | 3 |
| Social Science Elective (GE) | 3 | EVR 3357 Wetland Resources | 3 |
| ACG 2021 Intro to Financial Accounting | 4 | EVR 3858 Environmental Regulation & Compliance | 3 |
| ENC 1102 (Comm. GE) | 3 | Water Resources Elective | 3 |
| STA 2023 (Math GE) | 3 | Management Elective | 3 |
| **Semester Total** | **16** | **Semester Total** | **15** |
| **SECOND SEMESTER** | | **THIRD SEMESTER** | |
| EVR 4035 Environmental Law ***or*** PAD 4620 Natural Resource Law | 3 | PAD 4227 Public Budgeting | 3 |
| PAD 4352 Environmental Policy and Management | 3 | EVR 4949 Environmental Studies Practicum | 2 |
| Management Elective | 3 | Management Elective | 3 |
| Water Resources Elective | 3 | Water Resources Elective | 3 |
| Management or Water Resources Elective | 3 | | |
| **Semester Total** | **15** | **Semester Total** | **11** |
| | | **Total Lower Division** | **80** |
| | | **Total Upper Division** | **41** |
| | | **TOTAL CREDITS FOR GRADUATION** | **121** |

Management Electives
EVR 4032 Ethics
MNA 4403 Human Resources Management Law & Employee Relations
MNA 3037 Project Management and Planning
PAD 4056 Public Management Practices

Water Resources Electives
EVS 3040 Introduction to Water Resources
EVS 3110 Water Technologies
EVS 4883 Environmental Decision Making
EVS 3042 Water Resources with Application in GIS

# Florida Gateway College
## Bachelor of Applied Science in Water Resource Management
## Proposed Curriculum – A.A. Graduates

CIP Code 03.0205

AA graduates will need to complete a minimum of 11 additional lower level environmental Science Technology core credits.

| **FIRST/TRANSITIONAL SEMESTER** | | **SECOND SEMESTER** | |
|---|---|---|---|
| EVR 1001/1001L or Lower Division Focused Elective* | 4 | PAD 3034 Public Administration and Public Policy | 3 |
| EVS 1026C or Lower Division Focused Elective* | 4 | EVR 3858 Environmental Regulation & Compliance | 3 |
| STA 2023 or Lower Division Focused Elective * | 3-4 | EVR 3357 Wetland Resources | 3 |
| ACG 2021 Intro to Financial Accounting | 4 | Lower Division Focused Elective | 3-5 |
| | | Water Resources Elective | 3 |
| **Semester Total** | **15-16** | **Semester Total** | **15-17** |
| **THIRD SEMESTER** | | **FOURTH SEMESTER** | |
| EVR 4035 Environmental Law ***or*** PAD 4620 Natural Resource Law | 3 | PAD 4227 Public Budgeting | 3 |
| PAD 4352 Environmental Policy and Management | 3 | EVR 4949 Environmental Studies Practicum | 2 |
| Management Elective | 3 | Management Elective | 3 |
| Management Elective | 3 | Water Resources Elective | 3 |
| Water Resources Elective | 3 | Water Resources or Management Elective | 3 |
| **Semester Total** | **15** | **Semester Total** | **14** |
| | | **Total Lower Division** | **79-81** |
| | | **Total Upper Division** | **41** |
| | | **TOTAL CREDITS FOR GRADUATION** | **120-122** |

*Students who have previously completed the indicated common prerequisite course will choose from the list of lower division focused electives below.

Lower Division Focused Electives
EVR 1001 Introduction to Environmental Science (3 credits)*
EVR 1001L Introduction to Environmental Science Lab (1 credit)*
EVS 1026C Chemistry and Biology of Natural Waters (4 credits)*
EVS 1183 Intro to Water Treatment Systems (3 credits)
EVS 2005 Treatment of Water and Wastewater (4 credits)
EVS 2179C Water Analysis and Monitoring (3 credits)
EVS 2893C Environmental Sampling and Analysis I (5 credits)
EVS 2894C Environmental Sampling and Analysis II (5 credits)

Management Electives
EVR 4032 Ethics
MNA 4403 Human Resources Management Law & Employee Relations
MNA 3037 Project Management and Planning
PAD 4056 Public Management Practices

Water Resources Electives
EVS 3040 Introduction to Water Resources
EVS 3110 Water Technologies
EVS 4883 Environmental Decision Making
EVS 3042 Water Resources with Application in GIS

| ***Bachelor of Science in-Water Resources Management (BAS-WRM)*** **Credits**<br>**AS Environmental Technology →BAS-WRM** | |
|---|---|
| Required Prerequisite Courses – credits | 0 |
| General Education credits in the lower division that are not counted for prerequisite requirements | 36 |
| Lower Division electives – credits | 44 |
| Total Lower Division credits | 80 |
| Total Upper Division credits | 41 |
| Total Program Credits for ***BAS-WRM*** | 121 |

*e. List specific Associate in Science and/or Associate in Applied Science programs offered at your institution that are aligned with the program, as applicable.*

Environmental Science Technology AS Degree

*f. Is the program being proposed as a Limited Access program? (Yes/No)*

No, this is not a limited access program.

## I. ENROLLMENT, PERFORMANCE AND BUDGET PLAN

1. *Complete Enrollment, Performance, and Budget Plan form.*

   Anticipated budgetary expenditures related to the implementation and operation of the BAS-WRM program are detailed in the Enrollment, Performance, and Budget Plan, included as Appendix B.

2. *Provide a budget narrative justifying the estimated and projected program expenditures as they appear in Section III of the* ***Enrollment, Performance, and Budget Plan*** *form. Include start-up costs, required faculty, library resources, facility renovations/remodeling, and other anticipated operational costs to develop and maintain the program over a four-year period. State funding for baccalaureate program approved pursuant to Section 1007.33, Florida Statutes, shall be as provided in the General Appropriations Act.*

   **History**
   In October 2010, Florida Gateway College's District Board of Trustees (DBOT) initially designated program enhancement funds in the amount of $700,000 to support the implementation of bachelor degree programs at FGC. Additional reserves were added the following year from the college's Unrestricted Fund Balance, bringing the total to $1.2 million. At this time it is estimated that approximately $750,000 of the program enhancement funds will remain available to support new bachelor programs after estimated 2013-14 fiscal year expenditures.

   **Funding the BAS-WRM**
   Ultimately, student fees and tuition and state funding for FTE for enrollment are expected to support the BAS-WRM program. Year one of implementation begins in the spring term of 2014-15. Based on current enrollment in our certificate and associate's FGC anticipates a beginning enrollment of 15 students in year one. The first expected completers will be in 2016-17. In year two, we anticipate 12 of the original class to continue, and 15 new students to begin the program with 80% retained in the following year. The assumption in year three is that one half of the initial class will complete the BAS-WRM degree.

   Initial startup of the program will necessitate that an estimated $339,532 from the unrestricted fund balance reserves will be needed through 2016-17 to augment currently available grant funding and future student tuition and fees. The following table identifies the amount of these funds that will be required in each of the four years noted to cover expenditures for the BAS-WRM through 2016-17:

   Unrestricted Fund Balance (Program Enhancement Funds)

| Projected 2013-2014 | Projected 2014-2015 | Projected 2015-2016 | Projected 2016-2017 |
|---|---|---|---|
| $300 | $86,370 | $132,944 | $119,918 |

   In the first two full years of the program being offered (2015-16 and 2016-17), we estimate that approximately 26% of the budgetary needs will be met through tuition and fees. To offset deficits beyond the initial startup, as well as minimize depleting the reserved funds, a number of grants as well as industry partnerships are currently being pursued.

   **Expenditures**
   Budget planning is a collaborative effort from all impacted areas of the college, with final approval coming from the executive council, the president and the district board of trustees.

The addition of the BAS-WRM program at FGC will have budgetary implications for the areas identified below.

Faculty and Administrative Support

FGC is in the process of interviewing doctoral candidates for a full time faculty position (previous full time faculty member left December 2013) and will utilize current part-time faculty to the extent possible for the BAS-WRM program. Additional faculty will be employed as needed, with the next projected full-time instructor needed in the third full year following implementation. One additional adjunct faculty member will be added in the first full year of the program. Additional faculty will be employed as needed, with the next projected full-time instructor needed in the third full year following implementation.

The college will utilize all current staff with the current director serving as the program administrator. The director's staff assistant will provide secretarial support to the faculty and students in the program. The BAS-WRM program falls under the administrative purview of the Vice President of Academic Programs.

Library Support

The college has a new 37,000 square feet library and media center which provides the most modern resources to all currently offered programs. The majority of the library resources required by the BAS-WRM are already available in electronic format. The startup budget for additional resources, periodicals, etc. is estimated to be approximately $13,000 through program implementation, with $1,500 allocated annually thereafter.

Facility and Equipment Needs

The college will use existing facilities for the BAS-WRM program. No renovations will be necessary as the current facility provides more than adequate facilities to support the program. Minor equipment needs include an additional two computers and software to outfit an area to be designated for student assistance and support that will be purchased in 2014-15.

Academic and Financial Operating Needs

Florida Gateway College maintains all financial and student data using the Banner® enterprise resource planning (ERP) system. Any required updates to support the BAS-WRM can be accomplished by existing personnel.

3. *The last paragraph of this section must include a statement on how the college will fund the program if it is not provided funding by the Legislature, and how that would impact the college's implementation plan. Explain how the college will fund the program if funds are not granted.*

Florida Gateway College is prepared to absorb the BAS-WRM operating costs through 2016-17. Initial startup costs in 2013-14 and 2014-15 will be borne primarily by funds remaining from the Employ Florida Banner Center for Water Resources workforce development grant. Although the Banner Center grant has ended, the unspent funds were left to the college to support the water programs as it deemed fit. Student fees augmented by program enhancement funds from the Unrestricted Fund Balance will be used through 2016-17. Additionally, FGC is actively pursuing multiple grants and partnerships to support the growth of all levels of its water programs, including the BAS-WRM. The program is expected to become self-sustaining in 2017-18.

## J. PLAN OF ACTION IF PROGRAM MUST BE TERMINATED

*Summary of train-out alternatives for students*

If it is necessary to terminate the program, Florida Gateway College will make every effort to assist affected students, faculty and staff so that they experience a minimal amount of disruption. All students enrolled in the program will be contacted individually and advised of the steps needed to complete the program at Florida Gateway College or at another accredited partner institution. Every effort would be made to give students who have completed at least 50% of the program the opportunity to complete the program prior to its discontinuation. Students who have completed less than 50% of the program will be advised of the other Water Resources Management programs in other locations. The Registrar, Admissions, and Advising Office and all other offices will work together to make the transition as easy as possible for all students. Proper notification will also be sent to SACS-COC if the decision is made to close the program.

## K. SUPPLEMENTAL MATERIALS

Supplemental materials supporting this proposal application follow as the below listed appendices:

# Appendix A

Letters of Support

Florida League of Cities, Inc.

City of Lake City

City of Macclenny

Potash Corp

University of Florida-UF

Eastern FL State College

Clay County Utility Authority

St. Leo College

301 South Bronough Street • Suite 300 • P.O. Box 1757 • Tallahassee, FL 32302-1757 • (850) 222-9684 • Fax (850) 222-3806 • www.floridaleagueofcities.com

January 24, 2013

Dr. Charles Hall, President
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

The Florida League of Cities (FLC), Florida's unified voice for municipal government supports Florida Gateway College efforts in creating a Bachelor's Degree in Water Resources. The objective of the degree is to prepare entry-level and experienced workers in advanced water/wastewater operations technology supplemented by course work in management and administration.

The FLC represents over 400 cities, towns, and villages in the state of Florida. We are acutely aware of the critical lack of qualified workers to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic security of our state and its municipalities. Further, our member cities face increasing need for well-trained personnel in mid- to upper-level management positions, not only in water utility operations, but in all areas of municipal management.

Many of our member municipalities operating water and wastewater systems will benefit from your program by providing a trained, skilled workforce to provide needed services to our local communities. This type of training will prepare graduates for a variety of successful career paths in water resources and management. The training will provide them with the skills and knowledge to be prepared as new technology evolves and to deal with increasingly complex water quality regulations and management issues confronting Florida's cities regardless of size.

In conclusion, The Florida League of Cities, fully supports your efforts to develop a robust water resources/management program preparing leaders in advanced water and wastewater technology with a thorough knowledge of issues facing our local governments with water, wastewater and water resource issues.

Florida Gateway College
JAN 29 2013
President's Office

Sincerely,

Michael Sittig
Executive Director

# City of Lake City

205 N. MARION AVE.
LAKE CITY, FLORIDA 32055

TELEPHONE: (386) 752-2031
FAX: (386) 752-4896




January 24, 2013

Dr. Charles Hall, President
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

As the City Manager for the City of Lake City, I understand that Florida Gateway College is interested in creating a new Bachelor of Applied Science Degree in Water Resources Management. I also understand the objective of the degree is to prepare entry-level and experienced workers in advanced water/wastewater operations technology supplemented by course work in management and administration.

As you are aware, the City operates a public water supply as well as a wastewater system. These utilities are very important to the health, safety and welfare of the city as well as protecting the natural resources of the area. The proper operations and management of these utilities are complex and highly technical. As more of our workers in the City and other areas retire, there will be a critical lack of qualified workers to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic security of our area and the state. Further, Lake City needs well-trained personnel in mid- to upper-level management positions, not only in water utility operations, but in all areas our municipal government.

It is for the above reasons, I believe, Lake City and other municipalities operating water and wastewater systems will benefit from your proposed water resources program by providing a trained and skilled workforce to provide effective delivery of services to our local community. This type of training will prepare graduates for a variety of successful career paths in water resources and management. The training will provide them with the skills and knowledge to be prepared as new technology evolves and to deal with increasingly complex water quality regulations and management issues confronting Florida's cities and other local governments.

In conclusion, the City of Lake City fully supports your efforts to develop a comprehensive water resources/management program preparing leaders in advanced water and wastewater technology with a thorough knowledge of issues facing our local governments with water, wastewater and water resource issues. Please contact me should you have questions or need further assistance.

Sincerely,

Wendell Johnson
Lake City Manager

City of Macclenny

118 East Macclenny Avenue
Macclenny, Florida 32063
Telephone 259-6261

January 11, 2013

Dr. Charles Hall, President
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

As the City Manager for Macclenny, I am encouraged that Florida Gateway College is interested in creating a new Bachelor of Applied Science Degree in Water Resources Management. I also understand the objective of the degree is to prepare entry-level and experienced workers in advanced water/wastewater operations technology supplemented by course work in management and administration.

As you are aware, the City operates a public water supply as well as a wastewater system. These utilities are very important to the health, safety and welfare of the city as well as protecting the natural resources of the area. The proper operations of these utilities are complex as well as the management of the systems. As more of our workers in the City and other areas retire, there will be a critical lack of qualified workers to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic security of our area and the state. Further, the City of Macclenny needs well-trained personnel in mid- to upper-level management positions, not only in water utility operations, but in all areas of our municipal government.

It is for the above reasons, I believe, the City of Macclenny and other municipalities operating water and wastewater systems will benefit from your proposed water resource's program by providing a trained and skilled workforce to provide effective delivery of services to our local communities. This type of training will prepare graduates for a variety of successful career paths in water resources and management. The training will provide them with the skills and knowledge to be prepared as new technology evolves and to deal with increasingly complex water quality regulations and management issues confronting Florida's cities and other local governments.

In conclusion, the City of Macclenny, fully supports your efforts to develop a comprehensive water resources/management program preparing leaders in advanced water and wastewater technology with a thorough knowledge of issues facing our local governments with water, wastewater and water resource issues.

Sincerely,

Gerald Dopson
City of Macclenny City Manager

PotashCorp
Helping Nature Provide

PCS Phosphate -White Springs

Terry L. Baker
General Manager

January 31, 2013

Dr. Charles Hall
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall,

We at PotashCorp understand Florida Gateway College (FGC) is pursuing a Letter of Intent through the Florida Department of Education for creating a Bachelor's Degree in Water Resources. The objective of the degree is to prepare individuals to enter the workforce knowledgeable in water quality, wastewater, and environmental sciences with some management level course work.

PotashCorp is the world's largest fertilizer company by capacity, producing the three primary crop nutrients – nitrogen (N), phosphate (P), potash (K). With operations and business interests in seven countries, PotashCorp is an international enterprise and a key player in meeting the growing challenge of feeding the world. Our local phosphate operation, located in White Springs, Florida, employs over 700 highly trained and skilled employees in the area.

PotashCorp endorses and supports FGC's efforts to educate individuals in disciplines that relate to local employment. As a major employer, we are continually seeking individuals who are trained and understand local, regional and international issues related to water resources. Trained and skilled personnel with knowledge in these areas are essential to our future success.

In conclusion, we at PotashCorp, fully support your efforts to develop a robust water resources program training individuals who can enter the workforce with a working knowledge of issues facing a major company in today's economic and political climate.

Sincerely,

Terry L. Baker

Terry Baker, General Manager


PO Box 300, 15843 SE 78th Street, White Springs, FL USA 32096 Phone: (386) 397-8101 Fax: (386)397-8165
White Springs Agricultural Chemicals, Inc. | www.potashcorp.com

UF UNIVERSITY of FLORIDA

IFAS
*College of Agricultural and Life Sciences*

**Office of the Dean**

2002 McCarty Hall
PO Box 110270
Gainesville, FL 32611-0270
352-392-1963
352-392-8988 Fax
www.cals.ufl.edu

January 31, 2013

Dr. Charles Hall
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

As you are aware, I received a presentation from Mr. Tim Atkinson and Mr. David Still regarding Florida Gateway College's intent to develop a Bachelor's Degree of Applied Science in Water Resources Management. The objective of the degree is to prepare incumbent and entry level workers for mid- to upper-level technical and managerial positions in Florida's water resources industry.

The University of Florida is aware of the critical lack of qualified workers to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic security of our state and its municipalities. Further, we know that with a retirement rate of about 50% expected within the next decade this problem is not only acute, but also chronic, and will only get worse.

Many of the state's municipalities operating water and wastewater systems will benefit from your program by providing a trained, skilled workforce to provide needed services to local communities and other service providers. This type of training will prepare graduates for many potential successful career paths in water resources. The training will provide them with the ability and foresight to be prepared as new technology improves and potentially lowers the cost of many of the current expensive processes.

It is my hope that our institutions can work together in this endeavor. We believe there may be some courses taught by faculty at Florida Gateway College that could be taken by students at the University of Florida. We also believe that there may be courses taught at the University of Florida that could be taken by student at Florida Gateway College. In addition, many of your graduates could pursue admission to UF for advanced degrees in similar water resources areas.

In conclusion, we fully support your efforts to develop a robust water resources program training individuals who can enter the workforce with a thorough knowledge of issues in the area of water, wastewater and water resource.

Sincerely,

Teri C. Balser
Dean

Eastern Florida
STATE COLLEGE
Explore. Achieve. Succeed.



**District Administration**
1519 Clearlake Road
Cocoa, Florida 32922
321/632-1111
Fax: 321/433-7065

**Cocoa Campus**
1519 Clearlake Road
Cocoa, Florida 32922
321/433-7060
Fax: 321/433-7064

**Melbourne Campus**
3865 N. Wickham Road
Melbourne, Florida 32935
321/433-5502
Fax: 321/433-5618

**Palm Bay Campus**
250 Community College Pkwy.
Palm Bay, Florida 32909
321/433-5150
Fax: 321/433-5305

**Titusville Campus**
1311 North U.S. 1
Titusville, Florida 32796
321/433-5078
Fax: 321/433-5113

**Website**
www.easternflorida.edu

July 30, 2013

Dr. Charles Hall, President
Florida Gateway College
14 SE College Place
Lake City, FL 32025-2007

Dear Dr. Hall,

Dr. Richey referred your letter of July 18th to me as Vice President of Academic Affairs. Eastern Florida State College does not offer a Water Resources program and we do not have plans to start one in the near term. We would support your efforts to renew the Water Resources articulation agreement with Brevard Public Schools. We want to ensure that our students receive the appropriate credit for the work they are doing.

If you have any questions or if I may be of further assistance, please feel free to contact me at miedemal@easternflorida.edu or (321) 433-7380. Thank you and I wish you all the best.

Sincerely,

Linda L. Miedema, PhD, MSA, BSN
Vice President Academic Affairs
Chief Learning Officer

**Clay County Utility Authority**
3176 Old Jennings Road
Middleburg, Florida 32068-3907
Telephone (904) 272-5999
Facsimile (904) 213-2498
www.clayutility.org

*Working together to protect public health, conserve our natural resources, and create long-term value for our ratepayers.*

June 26, 2013

Dr. Charles Hall, President
Florida Gateway College
149 SE College Place
Lake City, Florida 32025

Dear Dr. Hall:

I understand the Florida Gateway College is interested in creating a new Bachelor's Degree in Water Resources. I also understand the objective of the degree is to prepare entry-level and experienced workers in advanced water/wastewater operations technology supplemented by course work in management and administration.

As you know, the Clay County Utility Authority (CCUA) operates and maintains public water, wastewater, and reclaimed water supply systems. These utilities are very important to public health and safety. In addition, they play an absolutely critical role in helping to protect our natural resources and our environment.

The proper operation and management of these utilities is complex, and the level of complexity seems to expand each year. As more of our workers in the county and other areas retire, there will be a critical shortfall of qualified, licensed operators to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic vitality of our community. Furthermore, CCUA will benefit from well-trained personnel in mid to upper level management positions, not only in water and wastewater utility operations, but in all areas of our operation.

Based on these reasons, I believe CCUA and other utilities operating water and wastewater systems will benefit from your proposed water resources program. The program will provide a well-trained and skilled workforce that will effectively deliver services to communities throughout the state of Florida. This focused training will provide a capable and well informed pool of eager candidates prepared to leverage technological advances to efficiently address increasingly complex water quality, conservation, and environmental regulations as well as intricate management issues confronting Florida's counties and local governments.

In conclusion, CCUA fully supports your efforts to develop a comprehensive water resources/management program preparing leaders in advanced water and wastewater technology with a thorough knowledge of issues facing our local governments with water, wastewater, and water resources issues.

Very truly yours,
CLAY COUNTY UTILITY AUTHORITY

Ray O. Avery
Executive Director



ROA/sla

*Conservation • Commitment • Community*

X:\Service Availability\Susan\Letters 2013\Charles Hall - Florida Gateway College Bachelor's Degree in Water Resources 6.23.13_WTM1.docx

LAKE CITY CENTER

SAINT LEO UNIVERSITY

149 SE College Place
Lake City, FL 32025-8703
Office: (386) 752-6866
Fax: (386) 752-6776

June 18, 2013

Dr. Charles Hall
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

As you are aware, I received a presentation from Mr. Tim Atkinson and Mr. David Still regarding Florida Gateway College's intent to develop a Bachelor's Degree of Applied Science in Water Resources Management. The Objective of the degree is to prepare incumbent and entry level workers for mid- to upper-level technical and managerial positions in Florida's water resources industry.

The University is aware of the critical lack of qualified workers to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic security of our state. These trained individuals are needed to secure the future of Florida with water resources issues.

We understand the proposed curriculum will be composed of general education courses, discipline-specific technical courses, and management/leadership courses. Specific courses will focus on emerging technology, industry certification, licensure and standards. As technology in water and wastewater emerges, new rules, regulations, and permitting requirements will change. Courses will be centered on private and public sector management in areas with emphasis on those changes.

This type of training will prepare graduates for many possible successful career paths in water resources. The training will provide them with the ability and foresight to be prepared as new technology improves and potentially lower the cost of many of the current expensive processes.

In conclusion, we fully support your efforts to develop a robust water resources program training individuals who can enter the workforce with a thorough knowledge of issues in the area of water, wastewater and water resource.

Sincerely,

Julie Turk

Julie Turk
Center Director

# Appendix B

Enrollment, Performance and Budget Plan

**FLORIDA COLLEGE SYSTEM**
**ENROLLMENT, PERFORMANCE AND BUDGET PLAN**
**(NEW BACCALAUREATE PROPOSALS ONLY)**

**COLLEGE NAME:** *FLORIDA GATEWAY COLLEGE* **CONTACT NAME: Dr. Brian Dopson**

**DEGREE NAME:** B.A.S. Water Resources Management **PHONE NUMBER: 386-754-4209**

| | PROJECTED | PROJECTED | PROJECTED | PROJECTED |
|---|---|---|---|---|
| **I. PLANNED STUDENT ENROLLMENT** | **2013-14** | **2014-15** | **2015-16** | **2016-17** |
| A. Student Headcount | 0 | 15 | 24 | 36 |
| | | | | |
| B. Upper Division Student Credit Hours Generated **(Resident)** | 0 | 90 | 288 | 432 |
| Upper Division Student Credit Hours Generated **(Nonresident)** | 0 | 0 | 0 | 0 |
| Upper Division Total Student Credit Hours Generated **(Resident and Nonresident)** | **0** | **90** | **288** | **432** |
| | | | | |
| C. Upper Division Student FTE (30 Credit Hours) - **(Resident)** | 0.0 | 3.0 | 9.6 | 14.4 |
| Upper Division Student FTE (30 Credit Hours) - **(Nonresident)** | 0.0 | 0.0 | 0.0 | 0.0 |
| Upper Division Student FTE (30 Credit Hours) - **(Resident and Nonresident)** | **0.0** | **3.0** | **9.6** | **14.4** |
| | | | | |
| **II. PLANNED PERFORMANCE** | **2013-14** | **2014-15** | **2015-16** | **2016-17** |
| A. Number of Degrees Awarded | 0 | 0 | 0 | 7 |
| B. Number of Placements | 0 | 0 | 0 | 7 |
| C. Projected Annual Starting Salary | $0 | $0 | $0 | $37,500 |
| | | | | |
| **III. PROJECTED PROGRAM EXPENDITURES** | **2013-14** | **2014-15** | **2015-16** | **2016-17** |
| **INSTRUCTIONAL** | | | | |
| 1. Faculty Full-Time FTE | 0.0 | 0.5 | 1.0 | 1.0 |
| 2. Faculty Part-Time FTE | 0.0 | 0.2 | 0.5 | 0.5 |
| | | | | |
| 1. Faculty Full-Time Salaries/Benefits | 0 | 45,000 | 92,500 | 95,000 |
| 2. Faculty Part-Time Salaries/Benefits | 0 | 4,200 | 8,400 | 8,400 |
| 3. Faculty Support: Lab Assistants, etc | 0 | 0 | 0 | 0 |
| | | | | |
| **OPERATING EXPENSES** | | | | |
| 1. Academic Administration | 35,000 | 40,000 | 41,200 | 42,500 |
| 2. Materials/Supplies | 1,000 | 1,000 | 1,000 | 1,000 |
| 3. Travel | 2,500 | 3,000 | 3,000 | 3,000 |
| 4. Communication/Technology | 0 | 0 | 0 | 0 |
| 5. Library Support | 0 | 0 | 0 | 0 |
| 6. Student Services Support | 0 | 0 | 0 | 0 |
| 7. Professional Services | 10,000 | 5,000 | 0 | 0 |
| 8. Accreditation | 300 | 0 | 0 | 0 |
| 9. Support Services | 17,500 | 18,000 | 18,500 | 19,000 |
| | | | | |
| **CAPITAL OUTLAY** | | | | |
| 1. Library Resources | 10,000 | 3,000 | 1,500 | 1,500 |
| 2. Information Technology Equipment | 1,500 | 3,000 | 1,500 | 1,500 |
| 3. Other Equipment | 0 | 0 | 0 | 0 |
| 4. Facilities/Renovation | 0 | 0 | 0 | 0 |
| **TOTAL PROJECTED PROGRAM EXPENDITURES** | **$77,800** | **$122,200** | **$167,600** | **$171,900** |
| | | | | |
| **IV. NATURE OF EXPENDITURES** | | | | |
| 1. Recurring | 55,000 | 110,200 | 163,600 | 167,900 |
| 2. Nonrecurring | 22,800 | 12,000 | 4,000 | 4,000 |
| **TOTAL** | **$77,800** | **$122,200** | **$167,600** | **$171,900** |
| | | | | |
| **V. SOURCES OF FUNDS** | | | | |
| **A. REVENUE** | | | | |
| 1. Special State Nonrecurring | 0 | 0 | 0 | 0 |
| 2. Upper Level - Resident Student Tuition Only | 0 | 8,261 | 26,436 | 39,653 |
| Upper Level - Nonresident Student Fees Only | 0 | 0 | 0 | 0 |
| Upper Level - Other Student Fees | 0 | 2,569 | 8,220 | 12,329 |
| 3. Contributions or Matching Grants | 0 | 0 | 0 | 0 |
| 4. Other Grants or Revenues | 77,500 | 25,000 | 0 | 0 |
| 5. Florida College System Program Funds (formerly Community College Program Fund) | 0 | 0 | 0 | 0 |
| 6. Unrestricted Fund Balance | 300 | 86,370 | 132,944 | 119,918 |
| 7. Interest Earnings | 0 | 0 | 0 | 0 |
| 8. Auxiliary Services | 0 | 0 | 0 | 0 |
| 9. Federal Funds - Other | 0 | 0 | 0 | 0 |
| | | | | |
| **B. CARRY FORWARD** | 0 | 0 | 0 | 0 |
| **TOTAL FUNDS AVAILABLE** | **$77,800** | **$122,200** | **$167,600** | **$171,900** |
| **TOTAL UNEXPENDED FUNDS (CARRY FORWARD)** | **$0** | **$0** | **$0** | **$0** |

**NOTE: THIS FORM IS EFFECTIVE UNTIL JUNE 30, 2014 (FOR FISCAL YEAR JULY 1, 2013 TO JUNE 30, 2014)**

**DO NOT DELETE** #DIV/0! 91.79 91.79 91.79

2013-14 TUITION RATE ESTABLISHED IN THE GENERAL APPROPRIATION ACT

# Appendix C

Meetings and Collaboration

Water Resources Technical Advisory Committee

DBOT Meeting Minutes

SACS Notifications and Approvals

**2010**

May 18 – FGC District Board of Trustees (DBOT) approved the pursuit of 5 proposed Baccalaureate Programs. Water/Wastewater was one of the 5 programs.

**2012**

June 4 – Tim Atkinson (Director of Water Resources Program), Brian Dopson (VP of Academic Programs), Patty Anderson (Director of RIE), Chuck Hall( President) – Discussion about the BS in Water/Wastewater, Environmental Science Technology. The President gave his approval to pursue the degree.

November 9 - Phone conference with Tim Atkinson and Abbey Cunningham regarding issues for the BAS-WRM

December – David Still, previous Executive Director Suwannee River Water Management District, was hired as a consultant to assist with the DOE Letter of Intent

**2013**

January 8 – Tim Atkinson, David Still, Dr. Paul Chadic (Department Chair, Environmental Engineering) and Dr. Joe Delfino, Professor, Department of Environmental Engineering. A meeting at the University of Florida was held to discuss the Letter of Intent and request support for the Bachelors of Applied Science in Water Resource Management (BAS-WRM).

January 8 – Tim Atkinson, David Still, Dr. Dorota Haman (Chair, Agricultural and Biological Engineering) A meeting at the University of Florida was held to discuss the Letter of Intent and request support for the BAS-WRM.

January 8 – Tim Atkinson, David Still, Dr. Teri Balser (Dean, College of Agricultural and Life Sciences), Dr. Allen Wysocki (Associate Dean, CALS) A meeting at the University of Florida was held to discuss the Letter of Intent and request support for the BAS-WRM.

January 16 – Tim Atkinson, David Still, Stephen J. Hess (Assistant Vice President St Leo University, Satellite campus Lake City FL) and Julie Turk (St Leo Center Director, Satellite campus Lake City FL). A meeting and presentation on the proposed BAS was held. The aim of the college was not only to avoid duplication of effort but to foster collaboration and support where possible.

Meetings with St. Leo University and University of FL encouraged further exploration of areas of collaboration and resource sharing.

February 12 - Letter of Intent approved by FGC DBOT and sent to the DOE

February 21 email between Abbey Cunningham and Tim Atkinson regarding timeline and possible inclusion in SBOE in September.

April 21- David Still met with VP Dopson

May 2013 – David Still hired as Coordinator of Water Resources Training Program

May 8 – Tim Atkinson, David Still met with VP Dopson

May 9 David Still met with Abbey Cunningham with Department of Education regarding the process for application for the BAS degree.

May 21 – David Still met with VP Dopson

June 5 David Still met with VP Dopson regarding budget and curriculum.

June 12 Tim Atkinson met with VP Dopson

June 13 David Still, phone conference with VP Dopson

July 9 Tim Atkinson met with VP Dopson

July 11-Tim Atkinson, David Still met with VP Dopson-Budget

August 14 Tim Atkinson, David Still met with VP Dopson

August 22 Conversation with Abbey Cunningham concerning the addition of a new track for the selected CIP.

September 13 – David Still resigns from FGC for another employment opportunity

September 17- David Still phone conversation with Dr. W. David Shoup, Professor Emeritus and statewide water consultant for FDEP water management districts regarding key elements for a BAS water degree. The topics discussed were:

1. The need for GIS/GPS education and access to data layers used in decision making surrounding water permits, point pollution sources.
2. Watershed management principles and sources of information for course development.
3. Core courses needed to support upper division water management, policy, and environmental decision making
4. Identifying existing rubric and courses from the Florida Statewide Course Numbering Systems
5. Key prerequisites from general education delivery
6. Inclusion of Springs Ecology
7. New technologies utilized in water management

8. Links and access to Florida water districts
9. Other water programs in the state
10. Sources of students and employers
11. Technologies the degree should supply and support to the industry
12. Relationships with water alliances, FDEP, Florida Farm Bureau, school districts, universities, Association of colleges, SACS requirements

September 17-20- Writing of draft document by David Still and FGC staff. Review of drafts with administration.

September 20- Meeting with David Shoup to discuss parts of the draft. He suggested several changes and inclusions. Some of the suggestions were to cite verbiage for:

1. who teaches what
2. relationships with dual enrollment high schools
3. other area and regional programs
4. minor editorial changes
5. adjunct instructor needs

September 24- David Shoup hired to replace David Still. David Shoup to start September 30th.

September 24- David Shoup reviewed document for submission

September 25- David Shoup Meeting with VP Dopson to discuss submission

September 26- NSF grant writing to support alternative water programs curriculum for BAS program support. David Shoup and Laurel Semmes, Director Grants

September 27-29- Expansion of course details in the submission plan

September 30- David Shoup assumes duties as new Director of Water Resources Training Program. Solicits program comments from Ron McCulley, Director of Operator Licensing, Florida Department of Environmental Protection. Contacts St. Johns River Water Management District for comments on degree and service area from five of the division and department managers.

October 1- David Shoup meets with VP Dopson to discuss faculty and instructor coverage and expansion to cover new degree program courses. Discussion of budget.

October 2-17 David Shoup and Laurel Semmes write NSF grant and form partnership with the International Ultraviolet Association to construct alternative water processing curricula to support new BAS

October 3&4- David Shoup and VP Dopson meet to discuss several issues with the BAS degree application. The following items were discussed:

1. Capstones of A. S. and A.A. degree students
2. Plans of Study for matriculating students
3. Dual enrollment student progression through BAS degree program
4. Level of mathematics
5. Inserting principles of Water Ethics, Watershed management, private wells, septic planning, springs ecology, Information tech. grid management, and GIS.
6. Existing course numbers in the system
7. Core course addition to A. S. degree program for matriculation to BAS
8. Degree requirements for instructors

October 10- David Shoup meets with Christine Boatright, Director of Library to discuss reference purchases to support degree. Wrote addition for reference support to submission document. Cited software loans available from Florida Water District Libraries.

October 11- Gave document to Dr. John Rowe, Faculty for Water Resources, for comments and review

October 14- David Shoup solicited comments from FDEP Operator Training Director- Ronald McCulley.

October 15- David Shoup met with former Water Resources Director, Tim Atkinson to discuss the following items:

1. Pearson educational platform expansion to include additional courses for BAS
2. Employer expectations
3. Student expectations and program acceptance to On-line deliveries
4. Program supporters
5. Industry hiring

October 16- Plan rewrites by David Shoup

October 19- David Shoup met with key group representatives at the Florida Clean Water Summit in Orlando, FL to solicit input on the BAS degree and its goals. Some groups represented were:

1. Florida Audubon Society
2. Itchetucknee Alliance
3. Howard T. Odum Florida Springs Institute
4. St. Johns River Keepers
5. Santa Fe Springs Alliance
6. Sierra Club
7. University of Central Florida

October 29- David Shoup met with Ron McCulley of FDEP in Tallahassee to garner additional comments regarding BAS and student recruitment.

October 29- David Shoup met with Mr. Gary Williams, CEO, of Florida Rural Water Association to discuss goals of new BAS programs, serving Florida's water users, and interfacing with the Association.

October 29- David Shoup met with FDACS Aquaculture Director Paul Zajicek to discuss BAS and interface with aquaculture clientele

November 4- David Shoup hired Dr. Ali Messenger, a Ph. D. environmental epidemiologist, to reinforce needs in disease control in water processing instruction. She would teach the water chemistry and instrumentation courses needed in the A. S. and BAS degrees.

November 4- David Shoup and VP Dopson meet to begin hiring process for associate professor in Water Resources to develop additional BAS courses and enhance instruction.

November 13- David Shoup met with Mr. Charles Shinn, Policy Director-Florida Farm Bureau to discuss the framework of the new BAS curriculum and solicit comment that represented the agricultural community of Florida.

November 14- David Shoup contacted Dr. Donald Brandes of the St. Johns River Water Management District to discuss skillsets needed for a BAS Water Resources graduate and employment in a state water district.

November 18- David Shoup established a new Technical Advisory Committee for the Water Resources program that will assist development and implementation of the BAS. The committee is reflective of the industry and consists of:

| | | |
|---|---|---|
| Dr. A. B. Bottcher | Consultant | Watershed Management |
| Dr. Donald Brandes | Director of Conservation | St. Johns River Water Mgt. District |
| Charles Shinn, MS | Director of Policy | Florida Farm Bureau Federation |
| Merrillee Jipson | Director | Santa Fe River Alliance |
| Ronald McCulley | Director | Florida Depart. of Env. Protection |
| Tony Harvey | State Engineer | Nat. Resource. Con. Service |
| David A. Still, MS, PE | Director, Lab. Services | Potash Corp. |
| Steve Roberts, MS | Exe. Director | Utilities, Lake City, FL |

November 25- David Shoup met with Dr. Lash Larson, CTO of Siemens Corp.- California, regarding new grid control training support for BAS courses for water plant operators.

December 8-11- Rewrites on submission to DOE

December 11- Group revision meeting for BAS. David Shoup and Research and Institutional Effectiveness office.

**Water Resources Technical Advisory Commitee**

| Name | Title | Organization/Company |
|---|---|---|
| Dr. A. B. Bottcher | Consultant | Watershed Management |
| Dr. Donald Brandes | Director of Conservation | St. Johns River Water Mgt. District |
| Charles Shinn, MS | Director of Policy | Florida Farm Bureau Federation |
| Merrillee Jipson | Director | Santa Fe River Alliance |
| Ronald McCulley | Director | Florida Depart. of Env. Protection |
| Tony Harvey | State Engineer | Nat. Resource. Con. Service |
| David A. Still, MS, PE | Director, Lab. Services | Potash Corp. |
| Steve Roberts, MS | Exe. Director | Utilities, Lake City, FL |

**AGENDA ITEM: IV**

# MINUTES
## LAKE CITY COMMUNITY COLLEGE
## BOARD OF TRUSTEES
## *REGULAR MEETING*
## LCCC Board Room
## January 12, 2010

**I. Call to Order**

The regular meeting of the District Board of Trustees was called to order on January 12, 2010, at 4:00 p.m. in the LCCC Board Room by Chairperson Suzanne Norris. All Trustees were present. All votes were unanimous unless otherwise stated.

**II. Pledge of Allegiance**

Alisha Williams, Student Government Association Secretary, led the Board in the Pledge of Allegiance.

**III. Introduce Visitors**

No visitor's were in attendance.

**IV. Approval of Minutes**

The minutes of the November 10, 2009, Board meeting were approved.
***Approved as presented.***
**MOTION BY: Tom Riherd SECOND BY: Jim Surrency**

**V. Audience of Any Citizen**

The Chairperson asked if there was anyone in the audience who would like to address the Board. There was no response.

**VI. President's Report**

President Hall began by introducing Dr. John Rowe, Instructor, and Mr. Tim Atkinson, Director of Special Projects, to present on the Water Treatment Technology Programs. Dr. Rowe started by giving a brief background and PowerPoint presentation. The program started in 2000 in response to the Department of Environmental Protection mandating that all operators of water and wastewater treatment facilities complete continuing educational credits for state license renewal. In 2003, LCCC won the National Council of Public Private Partnership Award for program development in the area of water/wastewater operator training. In 2005, LCCC won the National Council of Public Private Partnership Award for Innovation; LCCC is the only entity to win this national award twice.

In 2008, the number of students began to decline and an online program was developed to improve enrollment. By going online, the program trained 150 operators over the last two years. Presently the water/wastewater program continues to develop partnerships with organizations both statewide and nationally. LCCC has applied for a National Science Foundation grant, which if approved, would allow us to develop this certificate program into a degree program. Rowe has also produced two textbooks for the courses. Chairperson

Norris asked what the job outlook is and Atkinson stated it is almost recession proof; the future outlook expects more open positions than licensed operators.

Hall then introduced, Elaine Puri, Director Banner Center, to give an update on the Employ Florida Banner Center for Logistics & Distribution Program. Since 2007, the Banner Center has provided value to Florida's logistics industry by:

- Offering global logistics and supply chain technology curriculum for Florida High Schools
- Offering an A.S., A.A.S., and College Credit Certificate for Supply Chain and Logistics program
- Brazil-Jacksonville Entrepreneurship training
- Providing training for WINGS Grant awarded to the Florida Crown Workforce Board, $402,000
- Truck Driver Safety Training programs
- Partnered with industry and academic training providers such as SE Toyota, DOT, TDT Enterprises, Wal-Mart, Blue Linx, Hunter Panel, JAXPORT

Ms. Puri closed by stating that Florida is the only state in the nation that has 14 deep-water seaports which could establish it as the national leader in the logistics and distribution industries. She also has been appointed to the American Society of Transportation and Logistics as a board examiner.

Hall then introduced Mike Lee, Executive Director of the Foundation. Lee discussed the Library and Media Center Commemorative naming opportunities that will be available to all. He thanked Charles and Robin Hall for their generous donation by committing to the naming of the café in the new Library and Media Center.

Hall closed with three additional items. The Florida Board of Education has postponed their meeting until March where we request approval of our name change. He invited the Trustees to the upcoming Annual Legislative Summit on February 2. He then discussed with the Board if they would like to have a Board Retreat and what topics they would like to discuss.

## VII. Student Government Report

Alisha Williams, Student Government Association Secretary, updated the Board on upcoming events:

- Legislative Assembly will be held on January 20, 2010
- Black History Month Proclamation will be held on February 1, 2010 in the Library at 10:30 a.m.
- Black History Month Quiz will be on February 3, 2010 in the Lobo Café at 11:30 a.m.
- A Legislative Forum will be held on February 10 & 11, from 10:00 a.m. to 1:00 p.m. in the Library

- FJCC-SGA annual conference will be held on February 12th-14th, in St. Petersburg, FL.

**VIII. Consent Agenda**

The College requested approval for the following items:

A. *Personnel Matters
B. *Routine Contracts and Agreements
C. *Approval of Course Changes
D. *Approval of New AA Degree Track
E. *Approval of Deletion of Education Tracks
F. *Approval of New Courses & Fees
G. *Approval of Program Changes
H. *Approval of Program Deletion
I. *Authorized List for Deferment Approval

***All items approved as presented.***

**MOTION BY: Tom Riherd SECOND BY: Marcelle Richardson**

**IX. Instructional and Student Services**

Charles Carroll, Vice President, Instruction and Student Services, began by introducing Brian Dopson, Dean of Arts and Sciences. Dean Dopson was happy to announce that LCCC won first place in the National Council of Instructional Administrators, for the mathematics department in the curriculum and program innovation category of the 2009 Exemplary Initiative Competition. The College received the award for its Quality Enhancement Plan program "Math Up LC³." He expressed his gratitude to all that worked so hard on this project.

Mr. Carroll gave the Board some preliminary numbers on enrollment for Spring 2010 compared to Spring 2009. Enrollment is up by 8% in headcount and 17% in student semester hours. Dual enrollment for the college's district is up 10.2% and by 16.3% student semester hours. He noted that student enrollment numbers in all districts are up and the College has 34 home schooled students in dual enrollment.

**X. Business Services Report**

Marilyn C. Hamm, Vice President for Business Services began by giving an update on several building projects. Building 17 is on schedule to be completed January 19 and building 16 is on schedule to be completed August 10. Final details are being worked out on the Stormwater Project with Suwannee River Water Management.

Vice President Hamm asked the Board to approve the following items:

**B. *Budget Amendment #3, Fund 2, FY 09-10**
***Item was approved as presented.***
**MOTION BY: Marcelle Richardson SECOND BY: Athena Randolph**

**C. *Architectural Affairs**
***Item was approved as presented.***
**MOTION BY: Kathryn McInnis SECOND BY: Marcelle Richardson**

**XI. Topics for Future Meetings**

**XII. Inspect Warrant Register**

**XIII. Set Time for the Next Meeting**

The next meeting is scheduled for February 9, 2010, 4:00 p.m., TBA

**Items provided to the Board at the Board meeting:**

- LCCC Year to Date Financial Report month ending 11/30/09
- LCCC Year to Date Financial Report month ending 12/31/09
- LCCC Library and Media Center Commemorative Naming Opportunities
- Water2go, Online Water/Wastewater Operator Pre-Licensure and CEU Courses
- Surviving Math, Surviving College Article in Campus Technology
- Various LCCC articles in the Lake City Reporter
- Employ Florida Banner Center Logistics and Distribution handouts

**AGENDA ITEM: IV**

# MINUTES
## LAKE CITY COMMUNITY COLLEGE
## BOARD OF TRUSTEES
## *REGULAR MEETING*
## Baker County Sheriff's Complex
## March 16, 2010

**I. Call to Order**

The regular meeting of the District Board of Trustees was called to order on March 16, 2010, at 4:12 p.m. in the Training Room at the Baker County Sheriff's Complex by Chairperson Suzanne Norris. Trustee Tom Riherd was absent. All votes were unanimous unless otherwise stated.

**II. Pledge of Allegiance**

Chairperson Suzanne Norris led the Board in the Pledge of Allegiance.

**III. Introduce Visitors**

Chairperson Suzanne Norris introduced the following visitors: Mr. Joey Dobson, Baker County Sheriff; Mr. Gerald Dopson, Mayor; Mr. Philip Stambaugh Sr.; Mr. Philip Stambaugh Jr.

**IV. Approval of Minutes**

The minutes of the February 9, 2010, Board meeting were approved.
***Approved as presented.***
**MOTION BY: Don Kennedy SECOND BY: Harriet Wall**

**V. Audience of Any Citizen**

The Chairperson asked if there was anyone in the audience who would like to address the Board. There was no response.

**VI. President's Report**

President Hall invited Mike Lee, executive director LCCC Foundation to report on his items first.

Mike Lee asked the Board to approve the following item:

**B. *2010 State of Florida Dr. Philip Benjamin Matching Funds Request**
***Item was approved as presented.***
**MOTION BY: Kathryn McInnis SECOND BY: Jim Surrency**

Lee then announced the establishment of the Sylvia Davis Stambaugh Endowed Scholarship. Phil Stambaugh and his son Phil, Jr. contributed $30,000 in stock, that will be matched with Federal Title III endowment matching funds to create a $60,000 endowed scholarship in memory of Sylvia Davis Stambaugh to benefit our students in perpetuity. Lee along with Dr. Hall and Chairperson Norris expressed their appreciation and presented them with a plaque.

President Chuck Hall then announced some important dates coming up for the College:

- On March 18, the Columbia School Board will hold their retreat on the College's campus for the first time.
- On April 6, at 7 p.m. the nationwide program "Call Me MISTER" (Mentors Instructing Students Toward Effective Roll Models) of LCCC will hold a pinning ceremony in the Lake City Medical Center Auditorium for the first graduates.
- Graduation will be held on May 7, the nurses pinning will be at 2 p.m. and the commencement ceremony at 5 p.m.
- He also reminded the Board of the last event of the Lyceum Series, "Broadway Tonite", on March 18.

President Hall noted the State Board of Education meeting where LCCC will request the approval for the name change has been changed several times; it is currently rescheduled for March 26, 2010 in Tampa.

## VII. Student Government Report

Linda Croley, Dean Student Services, provided the Student Government report as the Student Activities Coordinator was out sick and the student representative had a class conflict due to the out of town meeting.

- On February 24, 2010 a Black History Month festival and talent show was held on Pine Square at 11:30 a.m., with a large turnout.
- March 3, 2010 a Women's History Quiz was held in Lobo Café for Women's History Month.
- On March 31st the Spring Fling will be held on Pine Square from 11 a.m. to 1 p.m.

## VIII. Consent Agenda

The College requested approval for the following items:

A. *Personnel Matters
B. *Routine Contracts and Agreements
C. *Surplus Property

D. *Audio Visual Duplication Fees
E. *Approval of 2010-11 Academic Calendar
F. *Approval of Course Changes
G. *Approval of Course Deletions
H. *Approval of Non-Credit Training Courses and Fees
I. *Quick Response Training (QRT) Grant Courses

***All items approved as presented.***

**MOTION BY: Marcelle Richardson SECOND BY: Athena Randolph**

## IX. Instructional and Student Services

Charles Carroll, Vice President, Instruction and Student Services, gave an update on several initiatives, the Federal Earmark grant that LCCC received for $200,000 to support Allied health programs and equipment, paperwork was received and completed and we should receive those funds soon. LCCC is working closely with Representative Crenshaw's office on the next round of grant submissions. We continue to support the Rural Broadband Initiative that will expand broadband in our rural areas.

Vice President Carroll, stated that new programs are being explored within the energy area. Deans Tracy Hickman and Brian Dopson are looking at several different courses including: energy, water treatment, and environmental concerns. The College is currently discussing a "laddered" process that will take the current noncredit wastewater treatment program to a college credit certificate, an Applied Technology diploma, an Associate in Applied Science degree and finally to an Associate in Science degree.

## X. Business Services Report

Marilyn C. Hamm, Vice President for Business Services began by giving an update on several building projects. The foundation work can start on the new Library; all unsuitable materials have been removed. Building 17 should be completed and open in the next few weeks. Vice President Hamm offered a tour at the next meeting. There was an open bid today for the Learning Lab remodeling project, seven bids were received. The storm water project has also begun on campus.

Vice President Hamm asked the Board to approve the following items:

**B. *Budget Amendment Number Four (Fund 1) FY 09-10**
***Item was approved as presented.***
**MOTION BY: Marcelle Richardson SECOND BY: Kathryn McInnis**

**C. *Budget Amendment Number Five (Fund 7) FY 09-10**
***Item was approved as presented.***
**MOTION BY: Jim Surrency SECOND BY: Marcelle Richardson**

**D. *Architectural Affairs**
***Item was approved as presented.***
**MOTION BY: Don Kennedy SECOND BY: Harriet Wall**

## XI. Topics for Future Meetings

Trustee Norris asked if the Board would like to have the tour of Building 17 at May's meeting, everyone was in agreement.

## XII. Inspect Warrant Register

## XIII. Set Time for the Next Meeting

The next meeting is scheduled for April 13, 2010, 4:00 p.m., LCCC Board Room.

**Items provided to the Board at the Board meeting:**

- LCCC Year to Date Financial Report month ending 02/28/10
- LCCC Revised Agenda
- "Natural Learning" article in the Lake City Reporter.

**AGENDA ITEM: IV**

# MINUTES
## LAKE CITY COMMUNITY COLLEGE
## BOARD OF TRUSTEES
## *REGULAR MEETING*
## LCCC Board Room
## April 13, 2010

**I. Call to Order**

The regular meeting of the District Board of Trustees was called to order on April 13, 2010, at 4:01 p.m. in the LCCC Board Room by Chairperson Suzanne Norris. Trustee Chuck Brannan was absent. All votes were unanimous unless otherwise stated.

**II. Pledge of Allegiance**

Jennifer Green, Student Government Association President, led the Board in the Pledge of Allegiance.

**III. Introduce Visitors**

Trustee Suzanne Norris introduced the following visitors: Matthew Jerry, Call Me Mister Program; Ulysees Gilbert, Project Director/Call Me Mister Florida, North East Florida Educational Consortium (NEFEC); Anthony Newton, Call Me Mister Program; Chris Martinez, Call Me Mister Program; Joshua Sorrell, Call Me Mister Program and Ron Lee, Call Me Mister Program.

**IV. Approval of Minutes**

The minutes of the March 16, 2010, Board meeting were approved.
***Approved as presented.***
**MOTION BY: Don Kennedy** **SECOND BY: Athena Randolph**

**V. Audience of Any Citizen**

The Chairperson asked if there was anyone in the audience who would like to address the Board. There was no response.

**VI. President's Report**

President Hall began by reminding the Board of Graduation on May 7th, with the nurses pinning beginning at 2:00 p.m. and commencement at 5:00 p.m. The annual ACCT convention will be held this year in Toronto, Canada on October 20-23, Trustees Jim Surrency and Kathryn McInnis are preparing a presentation to present at the conference. The name change was approved in the House, now waiting on the final step in this process which is approval from Governor Crist.

Hall then introduced Tracy Hickman, Dean of Occupational Programs. Dean Hickman invited Pam Carswell, Executive Director of the Teaching Academy, to introduce visitors from the Call Me Mister Program. Ms. Carswell stated what a great experience she has had working with this program and then introduced Ulysees Gilbert, Project Director/Call Me Mister Florida, NEFEC. Mr. Gilbert gave a brief summary on the program, this program

originated ten years ago in South Carolina at Clemson University to address the shortage of minority role models in communities especially in elementary education. The mission of this program is to increase the pool of available teachers from a broader, more diverse background particularly among the state's lowest performing elementary schools in Northeast Florida. He then introduced LCCC's five members and each had the opportunity to discuss their work in the community and how they became involved in the program.

## VII. Student Government Report

Jennifer Green, Student Government Association President, updated the Board on upcoming and recent events:

- Barry Congressi was voted in as the new SGA President.
- On April 2, 2010 SGA officers met with Dr. Hall on several topics.
- On April 7-8, SGA attended the "Rally-n-Tally", in Tallahassee. They were able to meet with Senators and Representatives on several issues including: supporting the 8% increase in student tuition, returning the Correction Training to Olustee, and supporting the inland port to the Baker Columbia County area.

## VIII. Consent Agenda

The College requested approval for the following items:

A. *Personnel Matters
B. *Routine Contracts and Agreements
C. *Amended Surplus Property
D. *Quick Response Training (QRT) Training Courses
E. *2010-2011 Academic Calendar Revision

***All items approved as presented.***

**MOTION BY: Tom Riherd SECOND BY: Kathryn McInnis**

## IX. Instructional and Student Services

Charles Carroll, Vice President, Instruction and Student Services, began by updating the Board on several grants and project's that the college is currently working on.

- A Community Based Job Training grant in the water resources area with Western Kentucky University and Brevard County Schools with plans to tie in Columbia County Schools, Jacksonville Electric Authority, and Miami/Dade utilities.
- LCCC is working with a consortium of Lake Sumter Community College and Indian River State College on a potential energy industries grant.
- Paperwork is being finalized for the $250,000 federal earmark for Allied Health program equipment.
- LCCC is reapplying for a National Science Foundation grant to support the transition of the noncredit water/wastewater program to an online Associate in Science degree.
- The College is working on an application with Plum Creek Development for Sustainable Florida which will tie into a grant from the golf course industry to build

three holes of golf on campus and with the Suwannee River Water Management District to create hiking trails in the area of the new Library and Media Center.

- Several staff members met with Senator Wise to look at creating a new program at Baker Correctional Institution. This would be certificate program that would give some job training skills and assist in transition back into society.
- The Small Business Resource Fair will be held in Lake City again this year; Mr. Carroll is working at having this event in the Howard Conference Center.
- Vice President Carroll and Laurel Semmes, Grants Director, are working with Trustee Athena Randolph on a summer program that will be specific to address nutritional needs and obesity in children.

## X. Business Services Report

Vice President Hamm asked the Board to approve the following items:

**B. *Architectural Affairs**

a) The College advertised and received bids for ITB 10-1-03 *Building 059 IMTS Renovation Project*. The bid was advertised on the College website, the Lake City Reporter and various construction plan rooms. Bids were received, opened and tabulated on March 16, 2010. The Notice of Intent to Recommend an Award was posted on March 22, 2010 and expired on March 25, 2010. No protest of the Recommendation was filed.

The President recommends that, pending the review and approval of the construction documentation by Counsel, the Board award the bid to the apparent lowest and best bidder, Core Construction of Jacksonville, Florida, for the bid amount of $457,000.00. A motion was made by Harriet Wall and a second by Don Kennedy. The item was then opened for discussion at which time questions were raised requiring further assessment of the bidder. Ms. Wall and Mr. Kennedy asked to amend their motion to postpone this item to the May meeting allowing time for the College to further assess the bidder and validate current references assuring this to be the lowest and best bidder. Motion to postpone this item to the May meeting was approved.

***Item was postponed to May meeting.***
**MOTION BY: Harriet Wall SECOND BY: Don Kennedy**

b) The College requests approval of Final Completion of the *Building #17 Renovations Project* on the main campus of Lake City Community College, in accordance with Florida Statute 1013.50, pending the review and approval of all close-out documentation by Board Counsel.

***Item was approved as presented.***
**MOTION BY: Kathryn McInnis SECOND BY: Marcelle Richardson**

## XI. Personnel

Marlin Feagle, Lake City Community College Board of Trustees attorney, stated that the annual evaluation of President Hall was completed. He provided Trustees with a handout of the compiled results. All of the scores and comments were positive about Hall and his leadership of LCCC. He went on to read some of the comments Board members made on their evaluations.

***Annual Evaluation of President Hall was approved as presented.***
**MOTION BY: Tom Riherd SECOND BY: Jim Surrency**

## XII. Topics for Future Meetings

## XIII. Inspect Warrant Register

## XIV. Set Time for the Next Meeting

The next meeting is scheduled for May 18, 2010, 4:00 p.m., TBA

**Items provided to the Board at the Board meeting:**

- LCCC Year to Date Financial Report month ending 03/30/10
- Letter to Dr. Hall from FDLE on audit
- "Board approves LCCC name change" article in the Lake City Reporter
- Addendum to the April 13, 2010 Board Agenda
- Discover the Power of Call Me Mister Program, handout
- Compiled results of Dr. Hall's annual evaluation

**AGENDA ITEM: IV**

# MINUTES
## FLORIDA GATEWAY COLLEGE
## BOARD OF TRUSTEES
## *REGULAR MEETING*
## FGC Board Room
## November 9, 2010

**I. Call to Order**

The regular meeting of the District Board of Trustees was called to order on November 9, 2010, at 4:00 p.m. in the FGC Board Room by Vice Chairperson Tom Riherd. Trustees Harriet Wall and Chuck Brannan were absent. All votes were unanimous unless otherwise stated.

**II. Pledge of Allegiance**

Barry Congressi, Student Government Association President, led the Board in the Pledge of Allegiance.

**III. Introduce Visitors**

Vice Chairperson Tom Riherd introduced the following visitors, Anne Ceccato, SunGard Higher Education; Jason Buckley, SunGard Higher Education and Tony Britt, Lake City Reporter.

**IV. Approval of Minutes**

The minutes of the October 12, 2010, Board meeting were approved.

***Approved as presented.***

**MOTION BY: Jim Surrency** **SECOND BY: Don Kennedy**

**V. Audience of Any Citizen**

The Chairperson asked if there was anyone in the audience who would like to address the Board, there was no response.

**VI. President's Report**

President Hall invited Board members to attend the annual Holiday Employee Luncheon and Dessert Reception on December 13, in the Howard Conference Center.

Hall presented the Board members with the 2009-2010 College Fact Book. This includes information on student enrollment, demographics and performance, programs, finance and budget, and profiles of the district.

Hall then introduced Bob Deckon, Director of Engineering Technology, to discuss the new mobile technology lab. He discussed the advantages of having the lab, which serves as a mobile classroom and training center. This mobile lab was recently in the Columbia High School Homecoming Parade and at the Columbia County Fair. He invited Board members to take a tour following the meeting.

President Hall invited Trustees Jim Surrency and Kathryn McInnis to share about their recent trip to the Association of Community College Trustees Leadership Conference.

They presented a roundtable discussion on college and career readiness. Both thanked the Board for sending them and stated it was good to talk with other college trustees.

Dr. Hall then invited Tim Atkinson, Director Banner Center Water Resources and Dr. John Rowe, Instructor to discuss the new Banner Center. The College was recently awarded the Employ Florida Banner Center for Water Resources; this announcement was made during the Water Resources Advisory Council meeting in Orlando. Atkinson said the program plans to begin offering associate degrees in September, and bachelor degrees are on the short list under consideration. FGC is one of only two colleges in the state have two Banner Centers. The next meeting will be held in December; Mr. Atkinson invited Board members to attend.

## VII. Student Government Report

Barry Congressi, Student Government Association President, updated the Board on upcoming and recent events:

- November 4 & 5, SGA President and Vice President traveled to Daytona Beach, FL, for the Presidents Assembly. They were able to meet with other SGA's in the state and go over upcoming legislative issues that will affect students this year.
- November 12, the Anime Club & Library will host a Game Night in the Library.
- SGA is hosting a canned food drive for Thanksgiving.
- November 19, a Fall Festival will be held at 11:30 on Pine Square.
- November 29 to December 8, SGA will be taking donations of toys for "Toys for Tots".

## VIII. Consent Agenda

The College requested approval for the following items:

A. *Personnel Matters
B. *Routine Contracts and Agreements
C. *Surplus Property
D. *Authorized List for Deferment Approval
E. *Approval of Non-Credit Courses
F. *Approval of Testing Fees

***All items approved as presented.***

**MOTION BY: Kathryn McInnis SECOND BY: Suzanne Norris**

## IX. Instructional and Student Services

Charles Carroll, Vice President, Instruction and Student Services, highlighted a Sustainable Florida Project that FGC is currently working on. We have received two $10,000 grants to help with this project. The first grant was from Golf Course Association and will help design a master plan for a green golf course. The second from Plum Creek to help develop the land

behind the new Library. This will be in conjunction with Suwannee River Water Management District and will have a number of green homes and buildings.

Carroll then shared information on the Board's Top 20% scholarships. In 2005 40% of students accepted this scholarship; in 2010 49% accepted it, with 43% of these students registering. Trustee Norris asked if we could make more students aware of this scholarship.

Charlie Carroll, Vice President, Instruction and Student Services, asked the Board to approve the following item:

**B. *2010-2011 Academic Calendar Revision**

***Item was approved as presented.***
**MOTION BY: Dr. Randolph SECOND BY: Marcelle Richardson**

**X. Business Services Report**

Marilyn Hamm, Vice President, Business Services, asked the Board to approve the following items:

**B. *Architectural Affairs**

1. Acceptance of final completion of the *Stormwater Improvements Mitigation Project*, in accordance with Florida Statute 1013.50, pending the review and approval of all close-out documentation by Board Counsel. The General Contractor for the project is Art Walker Construction, Inc. The Certificate of Final Inspection (CFI) is included for review.

   ***Item was approved as presented.***
   **MOTION BY: Jim Surrency SECOND BY: Suzanne Norris**

2. Acceptance of final completion of the *Steam Condensate Upgrade Project*, in accordance with Florida Statute 1013.50, pending the review and approval of all appropriate close-out documentation by Board Counsel. The General Contractor for the project is Shine & Company, Inc. A final walk-through inspection for this project was conducted and accepted by Jones Edmunds, Engineers, and the Director of College Facilities on September 22, 2010. No CFI is required as the project is under the $300,000 project cost threshold requirement per the State Requirements for Educational Facilities (SREF).

   ***Item was approved as presented.***
   **MOTION BY: Kathryn McInnis SECOND BY: Athena Randolph**

3. Acceptance of final completion of the *Overhead to Underground Utilities Project – Phase One (1)*, in accordance with Florida Statute 1013.50, pending the review and approval of all appropriate close-out documentation by Board Counsel. The General Contractor for the project is Heart Utilities, Inc. The final walk-through inspection

was conducted and accepted by Jones Edmunds, Engineers and the Director of College Facilities on October 21, 2010. No CFI is required as the project is under the $300,000 project cost threshold requirement per SREF.

***Item was approved as presented.***
**MOTION BY: Marcelle Richardson SECOND BY: Kathryn McInnis**

**C. *Budget Amendment Number Three (3), Current Unrestricted Fund, FY 2010-2011**
***Item was approved as presented.***
**MOTION BY: Suzanne Norris SECOND BY: Jim Surrency**

**D. *Adjunct Overload Pay Review and Proposal**
***Item was approved as presented.***
**MOTION BY: Kathryn McInnis SECOND BY: Suzanne Norris**

**XII. Topics for Future Meetings**

**XIII. Inspect Warrant Register**

**XIV. Set Time for the Next Meeting**

The next meeting is scheduled for January 11, 2011, 11:00 a.m., FGC Board Room.

**Items provided to the Board at the Board meeting:**

- Addendum to the November 9, 2010 Board Meeting with a revised Agenda
- Water Resources Banner Center Advisory Council, Agenda and Members Handout
- FGC Year to Date Financial Report Monthly Ending October 2010
- FGC 2009-2010 Fact Book

**AGENDA ITEM: IV**

# MINUTES
## FLORIDA GATEWAY COLLEGE
## BOARD OF TRUSTEES
***REGULAR MEETING***
***FGC Board Room***
**February 12, 2013**

**I. Call to Order**

The regular meeting of the District Board of Trustees was called to order on February 12, 2013, at 4:04 p.m. in the FGC Board room by Chairperson Tom Riherd. All votes were unanimous unless otherwise stated.

**II. Pledge of Allegiance**

Joe Cervinka, Student Government Association President, led the Board in the Pledge of Allegiance.

**III. Introduce Visitors**

Chairperson Riherd introduced the following visitors: David Still, Engineering Consultant for FGC and Zack Paulk, Wal-Mart Alachua Distribution Center Manager.

**IV. Approval of Minutes**

The minutes of the January 8, 2013, Board meeting were approved.

***Approved as presented.***
**MOTION BY: Athena Randolph SECOND BY: Marcelle Richardson**

**V. Audience of Any Citizen**

The Chairperson asked if there was anyone in the audience who would like to address the Board, there was no response.

**VI. President's Report**

President Hall thanked Board members for their time and hard work at today's retreat.

Hall noted the next concert in the entertainment series is Stayin' Alive, tribute to the Bee Gees, this show will be held on March 8th, 7:30 P.M. in the Howard Conference Center. Natalie Stovall will be on March 15th at 7:30 P.M. in the Levy Performing Arts Center. If you would like tickets to these events please see Karyn Congressi. The Audio Visual department provided an autographed poster by performer Tracy Lawrence to each of the Trustees. Dr. Hall thanked that department for their hard work on the entertainment series.

President Hall thanked Trustees Jim Surrency and Kathryn McInnis for attending the ACCT Trustee Legislative Conference and Governor's Reception on February 5-6, in Tallahassee Fl.

He then invited Mike Lee, Executive Director of the Foundation to address the Board. Lee thanked Zack Paulk, Wal-Mart Alachua Distribution Center Manager, for being at today's meeting and representing Wal-Mart. Mr. Paulk has been actively involved with FGC

for several years and has committed to fund three scholarships to benefit FGC students. The Paulk Family FGC Scholarship at Columbia High School, the Paulk Family FGC Scholarship and the Zack Paulk District 12 Scholarship. Today, he was representing the Wal-Mart Transportation #7835 for their generous gift to sponsor the Study Niche Area 122 in the Wilson S. Rivers Library and Media Center. Mr. Lee asked the Board to approve the naming of the above study niche to "Wal-Mart Transportation #7835 Study Niche".

**B. *Recognition and Approval of New Library and Media Center Naming Donor**
**Item was approved as presented.**
**MOTION BY: Don Kennedy SECOND BY: Kathryn McInnis**

## VII. Student Government Report

Joe Cervinka, Student Government Association President, updated the Board on recent and upcoming activities. On February 4, Black History Month Proclamation was held. Eugene Jefferson, District 10 City Councilmen read the proclamation. The Latin Dance Club will be performing at the Olustee Festival at 1:10 P.M. on Saturday February 16. On February 27, SGA will host a Black History Month Festival and Talent Show. This year's theme will be black women and their influence on American culture. On March 1, the Brain Bowl team will be taking five students to St Louis to participate in the National Association Quiz Tournament. Today, at the Hall Student Center, the history of Mardi Gras was celebrated.

## VIII. Consent Agenda

The College requested approval for the following items:

A. *Personnel Matters
B. *Routine Contracts and Agreements
C. *Surplus Property
D. *Approval of Academic Calendar
E. *Foundation Donations
F. *Approval of New Program
G. *Approval of New Course
H. *Approval of Workforce Non-Credit Courses
I. *Approval of Revision to Policy 6Hx12:6-07
J. *Approval of Revision to Policy 6Hx12:6-10
K. *Approval of Revision to Policy 6Hx12:6-20
L. *Approval of Revision to Policy 6Hx12:6-23
M. *Approval to Delete Policy 6Hx12:04-15
N. *Approval of New Policy 6Hx12:09-38

***All items approved as presented.***

**MOTION BY: Jim Surrency SECOND BY: Don Kennedy**

**X. Business Services Report**

Marilyn Hamm, Vice President, Business Services, asked the Board to approve the following items following a brief review and discussion of each.

**B. *Annual Comprehensive Safety Inspection Report**
**Item was approved as presented.**
**MOTION BY: Suzanne Norris SECOND BY: Athena Randolph**

**C. *Unarmed Security Services Agreement**
**Item was approved as presented.**
**MOTION BY: Marcelle Richardson SECOND BY: Jim Surrency**

**IX. Instructional and Student Services**

Linda Croley, Vice President of Student Services, provided a handout and discussed dual enrollment numbers for Spring 2013. They are up 7.1 percent with a total of 846 students and course enrollment is at 2,036 hours which is up 8.5 percent from last spring. Board members discussed dual enrollment and continually looking for ways to increase students especially with minority students.

Vice President Croley noted, the College has been approved for three new nursing simulation mannequins, these mannequins are a huge help in training nursing students. This is funded by the H-1B grant.

Croley shared with Board members, Owen Wingate and the College choir competed earlier this month at the National Associate of Teachers Singing competition and had five students place. Also, Janis Brothers, FGC Professor, received recognition for her art work at a national art competition that was held at Valdosta State University in January.

Croley concluded her report by introducing Tim Atkinson, Director of Water Resources. Mr. Atkinson reviewed the Water Resource Management Letter of Intent request. He summarized the history of the program since January 2008, with the implementation of the first online water/wastewater training courses to the current AS Degree program along with the enrollment growth of the program. He referenced recent studies by both UF and USF with evidence of economic impact and workforce demand. Based on the success of the non-credit Workforce Education courses, the new certificate and the AS Degree program, the College with Board authorization would like to submit a Letter of Intent to apply for DOE approval of a Bachelor's of Applied Science in Water Resources Management.

Tim Atkinson, Director of Water Resources, asked the Board to approve the following item:

**B. *Authorization to Submit Letter of Intent for Bachelor of Applied Science in Water Resource Management**
**Item was approved as presented.**
**MOTION BY: Kathryn McInnis SECOND BY: Suzanne Norris**

**XII. Topics for Future Meetings**

**XIII. Inspect Warrant Register**

**XIV. Set Time for the Next Meeting**

The next meeting is scheduled for March 12, 2013, 4:00 p.m., Baker County Emergency Operations Center.

**Items provided to the Board at the Board meeting:**

- FGC Year to Date Financial Report Monthly Ending January, 2012
- FGC Entertainment Series handout
- Spring 2013 Student Enrollment, handout
- FGC Dual Enrollment and Course Enrollments, handout

LAKE CITY
COMMUNITY COLLEGE

*From the Office of the President*

May 3, 2010

Belle S. Wheelan, Ph.D.
President
Southern Association of Colleges and Schools
Commission on Colleges
1866 Southern Lane
Decatur, GA 30033-4097

RE: Water Quality Technician College Credit Certificate

Dear Dr. Wheelan:

I am writing to inform the Commission on Colleges that Lake City Community College (LCCC) plans to add the Water Quality Technician college credit certificate to its current program offerings beginning Fall, 2010. Two closely related occupational credit certificates in Water/Wastewater Operator Training are currently offered at LCCC.

Program information is included on the attached Substantive Change Letter of Notification. Course descriptions and a faculty roster are also attached.

Please let me know if you need any further information. I can be reached by phone at (386) 754-4200 and by email at hallc@lakecitycc.edu.

Sincerely,

Charles W. Hall, Ed.D.
President
Lake City Community College

cc: Mr. Charles Carroll

149 S.E. College Place
Lake City, FL 32025-2007
386-754-4200
386-754-4593 FAX
www.lakecitycc.edu

**Southern Association of Colleges and Schools**
**Commission on Colleges**
**Substantive Change Letter of Notification**

**The Letter of Notification** must include the following information.

**Name of institution**: Lake City Community College

**Name of the change proposed**: Water Quality Technician College Credit Certificate
**Credential(s) involved**: 12 Credit - College Credit Certificate

**Starting date:** Fall, 2010

**If the change involves an off-campus site**: N/A

Name and physical address of the site: NA

**If the change involves a new program**, what closely related programs are already approved for the institution?

Occupational Credit Certificates in:

1. Water Treatment Plant Operator
2. Wastewater Treatment Plant Operator

Lake City Community College
New Program Proposal
Approved by the Educational Affairs Committee
April 28, 2010

Name of Program: Water Quality Technician College Credit Certificate
Proposed Implementation Date: Fall, 2010

## Course Descriptions

EVS1026C Chemistry and Biology of Natural Waters (4 credits)
This course provides an introduction to the biological and chemical processes present in water and wastewater treatment systems. It emphasizes the unit operations and analysis of water and wastewater treatment processes. Attention is placed on the assessment of natural waters with regard to raw water quality and the impact of wastewater effluent.

EVS2005 Water and Wastewater Treatment: Scientific and Mathematical Basis (4 Credits)
This course examines the mathematical, chemical, physical, and biological treatment of water and wastewater. It emphasizes unit operations analysis of water treatment systems, and the field evaluation of their operation.

EVS2930 Special Topics: Wastewater Treatment Operator C (4 Credits)
This course is the preparation for the student to pass the state certification examination for Wastewater Treatment Plant Operator C. Wastewater processes and laws are covered as well as a review of necessary topics associated with wastewater treatment in order to prepare the student for obtaining a job in the industrial or municipal wastewater treatment industry. Case studies, process flows and problem solving, workshops, types of wastewater treatment facilities are presented during the course.

EVS2931 Special Topics: Water Treatment Operator C Course (4 Credits)
This course is the preparation for the student to pass the state certification examination for Water Treatment Plant Operator C. Drinking water processes and laws are covered as well as a review of necessary topics associated with drinking water treatment in order to prepare the student for obtaining a job in the industrial or municipal water treatment industry. Case studies, process flows and problem solving, workshops, types of water treatment facilities are presented during the course.

# Faculty Roster Form

Date Form Completed: 4/22/2010

Name of Institution: Lake City Community College

Program: Water Quality Treatment College Credit Certificate -- Proposed Fall, 2010

| Name<br>F = Full-time P = Part-time | CoursesTaught<br>T=Transfer N=Non-transfer D=Developmental | Relevant Academic Degrees and Course Credits Earned | Other Qualifications |
|---|---|---|---|
| Rowe, John<br><br>F | EVS 1026C Chemistry and Biology of Natural Waters<br><br>EVS 2005 Treatment of Water and Wastewater<br><br>EVS 2930 Special Topics: Wastewater Treatment Operator C Course<br><br>EVS 2931 Special Topics: Water Treatment Operator C Course | BS Science - Dental University of Tennessee<br><br>DDS DDS Dental Surgery University of Tennessee<br><br>**Graduate Hours:**<br><br>University of Tennessee<br><br>1D Pathology 1D Pathology 4<br>1D Microbiology 1D Microbiology 4<br>2D Anatomy 2D Anatomy 5.33<br>1D Anatomy 1D Anatomy 4<br>1D Bio Chem 1D Bio Chem 4.66<br>1D Oral Path 1D Oral Path 4<br>1D Physiology 1D Physiology 3.33<br>1D Pcology 1D Pcology 2.66 | ProfCert Advanced Waste Treatment California State University<br>ProfCert Operation of Wastewater Treatment Plants Vol. I California State University<br>ProfCert Operation of Wastewater Treatment Plants Vol. II California State University<br>ProfCert Water Treatment Plant Operation I California State University<br>License Public Health Pest Control Florida Dept. Agriculture & Consumer Services<br>License Class A Drinking Water Treatment Plant Operator Florida Dept. Environmental Protection<br>License Class A Wastewater Treatment Plant Operator Florida Dept. Environmental Protection<br>ProfCert Water Treatment Plant Operation II California State University<br>ProfCert Facility Management Florida Water & Pollution Control Operators Association |
| Sierra, Edward<br><br>P | EVS 1026C Chemistry and Biology of Natural Waters<br><br>EVS 2005 Treatment of Water and Wastewater<br><br>EVS 2930 Special Topics: Wastewater Treatment Operator C Course<br><br>EVS 2931 Special Topics: Water Treatment Operator C Course | AAS Chemistry Bronx Comm College of the City Univ of New Yo<br>BSc Environmental Engineering Technology Florida International University<br>MS Environmental Systems Florida International University<br>PhD Engineering Management Southwest University | |

SOUTHERN ASSOCIATION OF COLLEGES AND SCHOOLS
COMMISSION ON COLLEGES
1866 Southern Lane • Decatur, Georgia 30033-4097
Telephone 404/679-4500 Fax 404/679-4558
www.sacscoc.org

May 24, 2010

Dr. Charles W. Hall
President
Lake City Community College
149 S.E. College Place
Lake City, FL 32025

Dear Dr. Hall:

Thank you for your letter of May 3, 2010, notifying the Commission of the intent to offer the Water Quality Technician Certificate to the curriculum as of fall, 2010. As this is not a significant departure from the approved curriculum, **I accept notification and require no additional information.**

Best regards,

Belle S. Wheelan

Belle S. Wheelan, Ph.D.
President

BSW/SLA:efk

cc: Mr. Charles E. Carroll, Vice President for Instruction and Student Services
Dr. Rudolph S. Jackson

FLORIDA GATEWAY COLLEGE

*From the Office of the President*

October 14, 2010

Belle S. Wheelan, Ph.D.
President
Southern Association of Colleges and Schools
Commission on Colleges
1866 Southern Lane
Decatur, GA 30033-4097

RE: Environmental Science Technology AS Degree

Dear Dr. Wheelan:

I am writing to inform the Commission on Colleges that Florida Gateway College (FGC) plans to add the Environmental Science Technology AS Degree to its current program offerings beginning Spring, 2011. FGC's currently approved curriculum includes closely related programs as indicated on the enclosed notification form.

Please let me know if you need any further information. I can be reached by phone at (386) 754-4200 and by email at charles.hall@fgc.edu.

Sincerely,

Charles W. Hall, Ed.D.
President
Florida Gateway College

cc: Mr. Charles Carroll

FLORIDA GATEWAY COLLEGE

## SACS Substantive Change Notification Form

**Proposal type:** New Program

**Date of implementation:** Spring, 2011

**Program name**: Environmental Science Technology AS Degree

**Degree type:** Associate in Science Degree

**Proposal description:** The Environmental Science Technology AS degree program will be added to the college's current offerings. This program is not a significant departure from FGC's approved curriculum.

**Closely related programs already approved for the institution**:

| |
|---|
| *Water Quality Technician College Credit Certificate |
| Water Treatment Plant Operator PSAV Certificate |
| Wastewater Treatment Plant Operator PSAV Certificate |

**Faculty:** Current faculty are qualified to teach courses in this program.

*Students completing the Water Quality Technician College Credit Certificate may articulate those credits towards the Environmental Science Technology AS Degree program.

**Approved by the Florida Gateway College Educational Affairs Committee:**

**Date**: October 13, 2010

SOUTHERN ASSOCIATION OF COLLEGES AND SCHOOLS
COMMISSION ON COLLEGES
1866 Southern Lane • Decatur, Georgia 30033-4097
Telephone 404/679-4500 Fax 404/679-4558
www.sacscoc.org

November 15, 2010

Dr. Charles W. Hall
President
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

Thank you for your letter of October 14, 2010, notifying the Commission on Colleges that Florida Gateway College plans to offer the Environmental Science Technology AS Degree, effective Spring 2011. The College currently offers the Water Treatment Plant Operator PSAV Certificate, Water Quality Technician College Credit Certificate, and several engineering AS degrees.

**Since the program does not represent a significant departure from your approved curriculum, we accept the notification and require no additional information.**

Best regards,

Belle S. Wheelan

Belle S. Wheelan, Ph.D.
President

BSW/LBA:jdw

cc: Mr. Charles Carroll, VP for Instruction and Student Services
Dr. Rudolph S. Jackson

# Appendix D

Hanover Research Report Baccalaureate Program Demand

Needs Assessment: The Center for Training, Research and Education for Environmental Occupations (TREEO)

Needs Assessment: Patel Center for Global Solution

Career Pathways Water Resources Report

FGC Presidential Initiatives 2013-2014

# Environmental Science and Technology Program Demand

Prepared for Florida Gateway College

In this report, Hanover Research conducts a program demand study for Florida Gateway College's proposed baccalaureate program in Environmental Science and Technology with an emphasis on Water. We begin by assessing the current supply of recent graduates based on degree conferral data for the past five years. We follow with an overview of the demand for program graduates based on employment projections for related occupations. Finally, we provide profiles of three existing baccalaureate programs in related areas.

## Introduction and Key Findings

In this report, Hanover Research conducts a program demand study for Florida Gateway College's (FGC) proposed baccalaureate program in Environmental Science and Technology with an emphasis on Water. We begin with an analysis of the current supply of recent graduates of related disciplines nationwide and within the State of Florida in efforts to demonstrate an inadequate supply line to the labor force. Based on these program areas, we evaluate the demand for graduates by forecasting employment growth for related occupations. Finally, we provide overviews of three existing baccalaureate programs in similar disciplines. **The concluding appendix provides completed sections of Florida's baccalaureate proposal approval application that are relevant to this report.**

### Scope

Information on existing educational opportunities and employment demand was gathered for the following geographic areas: the United States, the State of Florida, the Florida Agency for Workforce Innovation (FAWI) Workforce Regions 6 through 10, and the area surrounding Florida Gateway College (the FGC Region). Below, we outline the five FAWI Workforce Regions profiled in this report. FGC is located in Region 7.

- Region 6: Hamilton, Jefferson, Lafayette, Madison, Suwannee, Taylor
- Region 7: Columbia, Dixie, Gilchrist, Union
- Region 8: Baker, Clay, Duval, Nassau, Putnam, St. Johns
- Region 9: Alachua, Bradford
- Region 10: Citrus, Levy, Marion

### Summary of Key Findings

*Degree Completions*

- Of the three disciplines related to Environmental Science and Technology (Water focus), the most common baccalaureate program nationwide was Environmental Science.

- In 2009, 305 institutions offered a bachelor's degree in Environmental Science, an increase of 52 percent since 2005.

- The total number of bachelor's degree conferrals in Environmental Science increased 56 percent during the five-year period, from 1,638 in 2005 to 2,550 in 2009.

- ❖ As of 2009, ten institutions in the State of Florida offered a bachelor's degree in Environmental Science, all of which are four-year universities.

- ❖ In 2009, there were 131 bachelor's degree conferrals in Environmental Science in the State of Florida, up from 59 in 2005. Degree conferrals decreased at only two Florida institutions during this period.

- ❖ Six institutions nationwide offer a baccalaureate degree in Water, Wetlands, and Marine Resources Management, and conferred a total of 31 bachelor's degrees in 2009; in 2005, these programs conferred a total of just 16 degrees.

- ❖ Only one Florida institution offers a bachelor's degree in Water, Wetlands, and Marine Resources Management: Florida Gulf Coast University. This program has conferred a total of 9 degrees from AY 2008 to 2009.

- ❖ The only institution within the FGC region offering a baccalaureate program in a related discipline was the University of Florida, which conferred 42 bachelor's degrees in Environmental Science in 2009 (up from 26 in 2005).

*Projecting Employment Demand*

- ❖ Among related occupations, Civil Engineers are expected to have the largest nationwide increase in job openings, while Environmental Scientists and Specialists and Environmental Science Technicians will have the greatest growth as a percentage of 2010 employment.

- ❖ In Florida, Civil Engineers are expected to have the most growth both in the number of jobs and as a percentage of 2010 employment. The only related occupational title that is expected to experience a decrease in employment is Forest and Conservation Technicians.

- ❖ At the local level, Civil Engineers will see the most openings in Workforce Regions 8 and 9, typically due to job growth. Environmental Scientists and Specialists can expect the most growth in Regions 9 and 10, generally due to job separations.

- ❖ Seven of the nine current job openings related to Environmental Science and Water within the state of Florida are for local government agencies.

*Program Profiles*

- Common prerequisites for related programs include biology, chemistry, physics, and mathematics.

- Many programs incorporate field visits and laboratory research to provide practical experience.

- Courses often focus on environmental issues specific to the geographic location of the institution.

## Index of Tables and Figures

## Section One: Degree Completions

Our assessment of the need for a new baccalaureate program in Environmental Science and Technology begins with an analysis of the supply of recent graduates in related fields. In this section, we compare conferral data between three related disciplines and across three degree levels (associate, bachelor's, and master's) to demonstrate how various degree programs compare to one another. Using NCES data from academic years 2005 to 2009, we examine degree conferrals at the national, state, and local levels. These data are intended to provide insight into recent trends in program growth as well as the current supply of graduates in similar fields of study.

### Methodology

Although we were unable to identify an exact match to FGC's proposed baccalaureate program in Environmental Science and Technology (with a Water focus), we identified three disciplines with similar descriptions. The first, **Environmental Science** (CIP code 03.0104), was by far the most prevalent degree program of the three. The National Center for Educational Statistics (NCES) describes Environmental Science as:

> A program that focuses on the application of biological, chemical, and physical principles to the study of the physical environment and the solution of environmental problems, including subjects such as abating or controlling environmental pollution and degradation; the interaction between human society and the natural environment; and natural resources management. Includes instruction in biology, chemistry, physics, geosciences, climatology, statistics, and mathematical modeling.[1]

The next program for which we compiled conferral data was **Water, Wetlands, and Marine Resources Management** (CIP code 03.0205). NCES defines this discipline as:

> A program that prepares individuals to apply the principles of marine/aquatic biology, oceanography, natural resource economics, and natural resources management to the development, conservation, and management of freshwater and saltwater environments. Includes instruction in subjects such as wetlands, riverine, lacustrian, coastal, and oceanic water resources; water conservation and use; flood control; pollution control; water supply logistics; wastewater management; aquatic and marine ecology; aquatic and marine life conservation; and the economic and recreational uses of water resources.[2]

[1] National Center for Education Statistics. "Detail for CIP Code 03.0104." CIP 2010. http://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=87195
[2] National Center for Education Statistics. "Detail for CIP Code 03.0205." CIP 2010. http://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=87198

**Water Resources Engineering** (CIP code 14.0805) is the third and final discipline examined in this report; NCES describes it as:

> A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for collecting, storing, moving, conserving and controlling surface- and groundwater, including water quality control, water cycle management, management of human and industrial water requirements, water delivery, and flood control.[3]

## Environmental Science Degree Completions

Of the three disciplines examined in this report, Environmental Science programs were significantly more common than the other two. To demonstrate this discipline's prevalence, we provide conferral data at the aggregate level for all Environmental Science degrees conferred nationwide. The data are further broken down by degree level, demonstrating the supply of recent graduates at the associate, bachelor's, and master's levels. Following national conferrals, we provide data for each institution in the State of Florida offering an Environmental Science degree.

*National*

For Environmental Science degree completions, we provide data at the aggregate level because of the significant amount of institutions offering this program at the associate, bachelor's, and master's degree levels. In Tables 1.1, 1.2, and 1.3, we show the total number of degrees conferred at each degree level as well as the number of institutions that offer an Environmental Science degree. We also include the mean and median number of degrees conferred among institutions. The total change for mean and median values was calculated based on an individual institution, whereas the overall change for total degrees conferred and number of schools represents an aggregate change from 2005 to 2009.

Table 1.1 provides an overview of degree completions at the associate level. As shown, the number of institutions offering this degree more than doubled in the past five years—from 14 in 2005 to 29 in 2009—with most of the growth occurring between the 2008 and 2009 academic years. Meanwhile, the total number of degrees conferred increased from 37 in 2005 to 71 in 2009, representing a growth rate of 92 percent. The average institution conferred between two and three associate degrees each year, and the decreasing mean between 2008 and 2009 suggests that the new institutions offering the degree may have been smaller than average during that initial year. Over the five-year period, the mean increased 1.2 degree completions per institution, representing an average of 58 percent growth per institution.

[3] National Center for Education Statistics. "Detail for CIP Code 14.0805." CIP 2010. http://nces.ed.gov/ipeds/cipcode/CIPDetail.aspx?y=55&cipid=88216

**Table 1.1: National Environmental Science Degree Completions, Associate**

| Associate Degree Conferrals | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| **Total Degrees Conferred** | **37** | **42** | **55** | **51** | **71** | **34** | **91.9%** |
| Mean | 2.6 | 2.3 | 3.2 | 3.0 | 2.4 | 1.2 | 57.7% |
| Median | 2 | 2 | 3 | 2 | 2 | 1 | -12.5% |
| **Number of Schools** | **14** | **18** | **17** | **17** | **29** | **15** | **107.1%** |

Source: NCES IPEDS Data Center

Next, Table 1.2 provides completion data for Environmental Science degrees at the bachelor's level. Compared to associate degrees, bachelor's degrees in this discipline are significantly more common. The number of institutions nationwide that offered this degree increased from 201 in 2005 to 305 in 2009, representing a 52 percent growth in the number of institutions. The total number of degrees conferred also grew by a similar margin, from 1,638 in 2005 to 2,550 in 2009. The mean number of degrees conferred at each institution was generally around eight, while the median was between four and five—this difference suggests the mean may have been skewed upward by a few institutions conferring more degrees while most programs were somewhat smaller in size. The change in the mean number of degrees conferred at each institution was three; however, the median growth figures suggest that institutions may have been somewhat equally distributed in terms of growing, declining, and stagnant conferral figures.

**Table 1.2: National Environmental Science Degree Completions, Bachelor's**

| Bachelor's Degree Conferrals | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| **Total Degrees Conferred** | **1,638** | **1,723** | **1,913** | **2,076** | **2,550** | **912** | **55.7%** |
| Mean | 8.1 | 7.9 | 8.1 | 8.4 | 8.4 | 3.0 | 34.4% |
| Median | 5 | 4 | 4 | 5 | 5 | 1 | 0% |
| **Number of Schools** | **201** | **218** | **235** | **246** | **305** | **104** | **51.7%** |

Source: NCES IPEDS Data Center

Finally, we examine national Environmental Science degree completions at the master's level. While the number of institutions offering this degree increased by 53 percent during the five year period (from 49 in 2005 to 75 in 2009), the total number of degrees conferred across all institutions increased by only 19 percent overall. In addition, the mean number of degrees conferred at each institution decreased from 10.8 in 2005 to 8.4 in 2009 while the overall mean change in degrees was an increase of 1.3 (1.2 percent). This suggests that the new degree programs established since 2005 may have been smaller in size than existing programs.

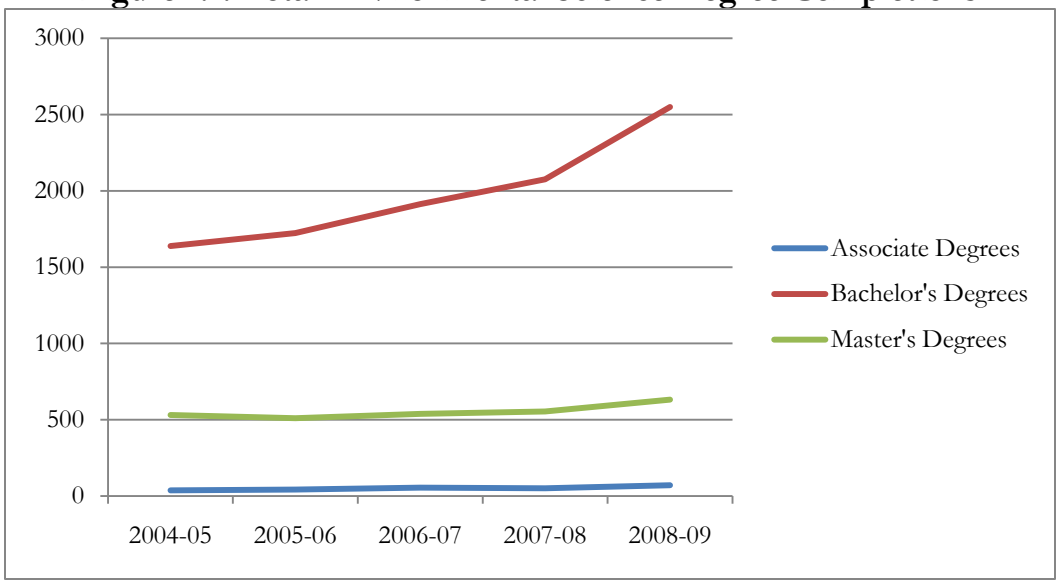
**Table 1.3: National Environmental Science Degree Completions, Master's**

| Master's Degree Conferrals | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| **Total Degrees Conferred** | **531** | **510** | **538** | **554** | **632** | **101** | **19.0%** |
| Mean | 10.8 | 9.1 | 8.8 | 8.8 | 8.4 | 1.3 | 1.21% |
| Median | 6 | 6 | 6 | 6 | 5 | 1 | -13.3% |
| **Number of Schools** | **49** | **56** | **61** | **63** | **75** | **26** | **53.1%** |

Source: NCES IPEDS Data Center

Finally, we illustrate the five-year change in the supply of recent graduates of Environmental Science programs, demonstrating the large difference in the number of degrees conferred between bachelor's degree programs and associate and master's level programs. While associate degree programs saw the greatest percentage growth in degrees conferred (92 percent), the actual numeric increase over the five-year period (34) was quite small. Meanwhile, the total number of bachelor's degrees conferred grew by just 56 percent, while the total number of conferrals increased by 912. Overall, the field of Environmental Science has experienced considerable growth over the past five years, with most of the expansion occurring at the bachelor's level. In addition, the growth rate was highest between 2008 and 2009, indicating an increasing supply of very recent graduates with bachelor's degrees in Environmental Science.

**Figure 1.1: Total Environmental Science Degree Completions**




*Florida*

Next, we analyzed degree completion data in the field of Environmental Science among institutions located in Florida. As of the 2009 academic year, just ten institutions in Florida offered a bachelor's degree in Environmental Science, all of

which are four-year universities.[4] The total number of bachelor's degree completions increased from 59 in 2005 to 131 in 2009, demonstrating an increase of 122 percent. This increase was largely due to the addition of three new baccalaureate programs, one of them with an initial graduating class of 35. Four institutions increased the number of program completions during the five-year period by margins of 50 percent to 200 percent (or numeric changes of one to 16 degree completions). Two institutions, the University of West Florida and Florida Institute of Technology, saw small decreases in the number of degree completions during that time.

Table 1.4 also portrays the same information for master's degree programs. The seven Florida institutions offering an Environmental Science degree at the master's level conferred 21 degrees in 2009, up from seven in 2005. This growth rate of 200 percent was largely due to the addition of four new degree programs during the five-year period. There were no institutions in Florida offering Environmental Science degrees at the associate level.

**Table 1.4: Florida Environmental Science Degree Completions**

| Institution Name | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| **Bachelor's Degrees** | | | | | | | |
| Barry University | 0 | 0 | 2 | 3 | 3 | 3 | – |
| Florida Agricultural and Mechanical University | 2 | 4 | 5 | 4 | 6 | 4 | 200% |
| Florida Institute of Technology | 4 | 3 | 0 | 2 | 1 | -3 | -75 |
| Nova Southeastern University | 0 | 0 | 0 | 7 | 7 | 7 | – |
| Saint Leo University | 2 | 2 | 3 | 8 | 3 | 1 | 50% |
| Stetson University | 3 | 6 | 3 | 5 | 5 | 2 | 66.7% |
| The University of West Florida | 22 | 23 | 19 | 26 | 21 | -1 | -4.6% |
| University of Florida | 26 | 22 | 25 | 24 | 42 | 16 | 61.5% |
| University of South Florida-Main Campus | 0 | 0 | 0 | 0 | 35 | 35 | – |
| University of South Florida-St. Petersburg Campus | 0 | 0 | 0 | 0 | 8 | 8 | – |
| **Total** | **59** | **60** | **57** | **79** | **131** | **72** | **122%** |
| **Master's Degrees** | | | | | | | |
| Florida Agricultural and Mechanical University | 3 | 0 | 3 | 1 | 1 | -2 | -66.7% |
| Florida Atlantic University | 3 | 4 | 5 | 5 | 2 | -1 | -33.3% |

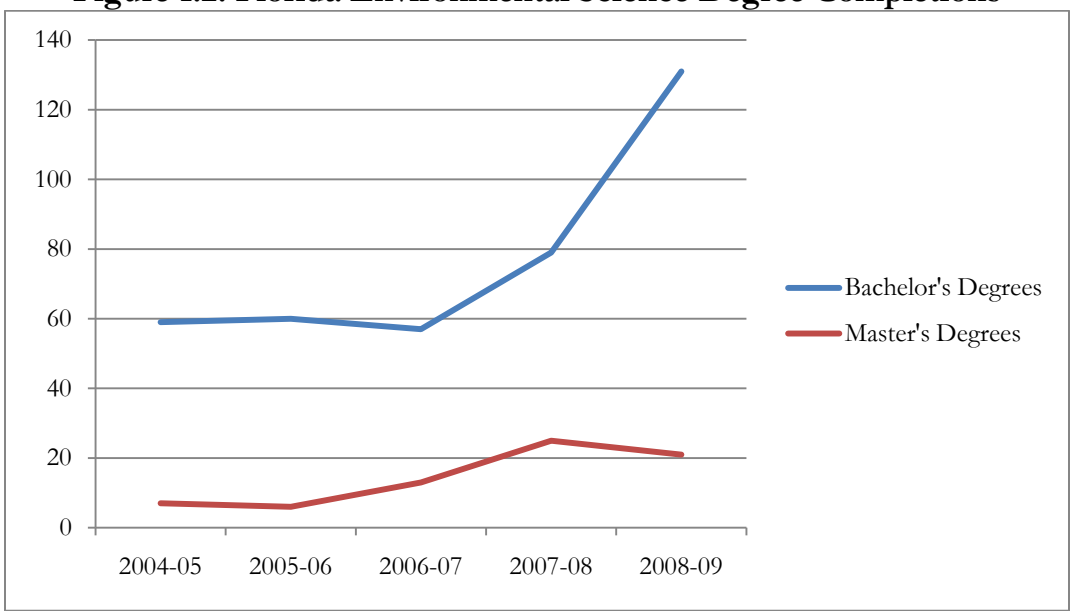
[4] According to current listings of approved baccalaureate programs at Florida community colleges, it does not appear that there are any existing programs in similar fields. The closest match may be St. Petersburg College's Bachelor of Applied Science in Sustainability Management but its curriculum does not focus on water. For more information see: "Florida College Bachelor's Degree Programs." Florida Department of Education. http://www.fldoe.org/cc/students/bach_degree.asp

| Institution Name | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| Florida Gulf Coast University | 0 | 1 | 2 | 9 | 4 | 4 | – |
| Florida Institute of Technology | 1 | 1 | 0 | 0 | 0 | -1 | -100% |
| The University of West Florida | 0 | 0 | 3 | 10 | 9 | 9 | – |
| University of South Florida-Main Campus | 0 | 0 | 0 | 0 | 4 | 4 | – |
| University of South Florida-St. Petersburg Campus | 0 | 0 | 0 | 0 | 1 | 1 | – |
| **Total** | **7** | **6** | **13** | **25** | **21** | **14** | **200%** |

Source: NCES IPEDS Data Center

Figure 1.2 portrays total Environmental Science degree completions in the State of Florida over the five-year period. As shown, the supply of recent graduates in Florida increased considerably between 2005 and 2009. While master's programs have increased more in terms of percentage growth, numeric growth was much higher for Florida's bachelor's degree programs. Overall, the supply of recent graduates in Environmental Science may be somewhat low compared to nationwide figures—2009 bachelor's degrees conferred in Florida represent 5.1 percent of the national total, despite having a state population constituting of 6.1 percent of the nation.[5]

**Figure 1.2: Florida Environmental Science Degree Completions**




[5] Calculated based on data from: "2010 Census Data." United States Census 2010. http://2010.census.gov/2010census/data/

## Water, Wetlands, and Marine Resources Management Degree Completions

The next discipline analyzed for this report was Water, Wetlands, and Marine Resources Management (WWMRM). Compared to Environmental Science, this field is offered by a very small selection of institutions and only confers a limited number of degrees. As shown in Table 1.5, just two institutions each offer degrees in WWMRM at the bachelor's and master's levels, and six institutions offer bachelor's degrees in this area. The total number of bachelor's degrees in WWMRM conferred nationwide nearly doubled between 2005 and 2009 despite two schools experiencing a decrease in the number of completions during that time. The only institution located in Florida was Florida Gulf Coast University (FGCU), which conferred degrees in this area only during the 2008 and 2009 academic years. As of 2009, FGCU conferred six bachelor's degrees in WWMRM, indicating that the Florida supply of recent graduates in this field is very low.

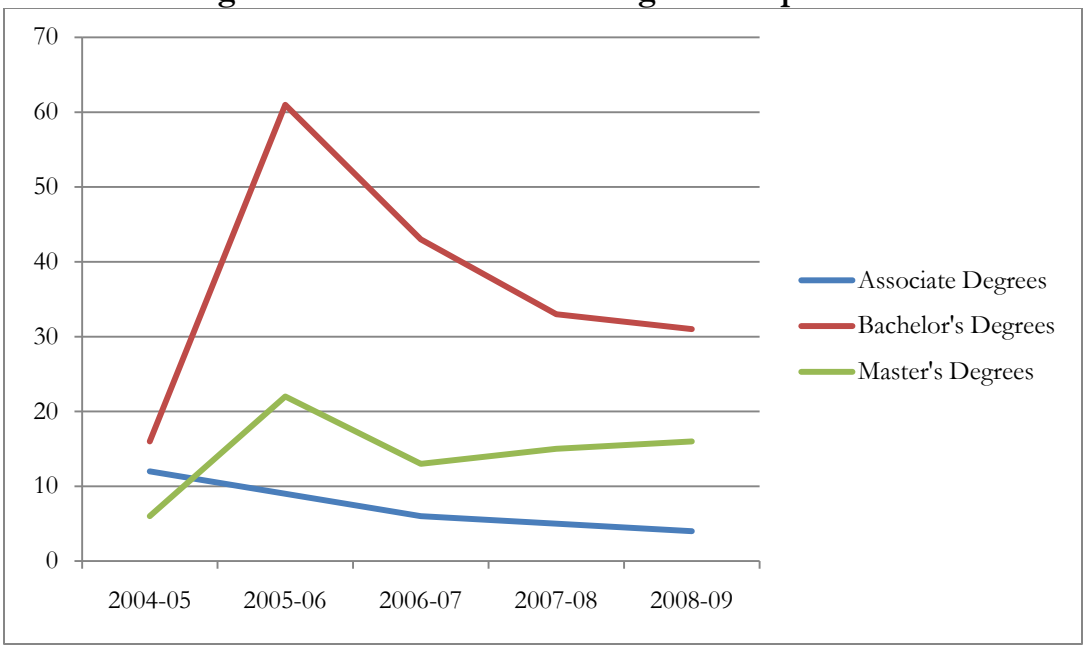
**Table 1.5: National WWMRM Degree Completions**

| Institution Name | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| **Associate Degrees** | | | | | | | |
| Green River Community College | 2 | 4 | 0 | 2 | 0 | -2 | -100% |
| Spokane Community College | 10 | 5 | 6 | 3 | 4 | -6 | -60% |
| **Total** | **12** | **9** | **6** | **5** | **4** | **-8** | **-66.7%** |
| **Bachelor's Degrees** | | | | | | | |
| Colorado State University | 10 | 10 | 10 | 10 | 5 | -5 | -50% |
| Florida Gulf Coast University | 0 | 0 | 0 | 3 | 6 | 6 | – |
| Heidelberg University | 0 | 0 | 1 | 4 | 6 | 6 | – |
| Texas A&M University at Galveston | 0 | 24 | 11 | 13 | 8 | 8 | – |
| Texas State University-San Marcos | 2 | 5 | 4 | 1 | 6 | 4 | 200% |
| University of Rhode Island | 4 | 22 | 17 | 2 | 0 | -4 | -100% |
| **Total** | **16** | **61** | **43** | **33** | **31** | **15** | **93.8%** |
| **Master's Degrees** | | | | | | | |
| Colorado State University | 6 | 10 | 5 | 10 | 5 | -1 | -16.7% |
| Texas A&M University at Galveston | 0 | 12 | 8 | 5 | 11 | 11 | – |
| **Total** | **6** | **22** | **13** | **15** | **16** | **10** | **166.7%** |

Source: NCES IPEDS Data Center

Figure 1.3 illustrates total degree completions in WWMRM at each degree level. As shown, the number of bachelor's degrees conferred nationwide peaked during the 2006 academic year before steadily decreasing, resulting in an overall growth of just 15 degree completions. The number of associate degrees conferred at the two community colleges decreased by 67 percent during the five-year period. Meanwhile, the number of master's degree conferrals increased by 167 percent, representing a numeric increase of just 10 degree completions between the two universities with this program.

**Figure 1.3: Total WWMRM Degree Completions**




## Water Resources Engineering Degree Completions

Finally, we compiled degree completion data for the field of Water Resources Engineering (WRE), as demonstrated in Table 1.6. Similar to WWMRM, only a limited number of institutions offered this program as of 2009, but none of them were at the associate degree level. Only three institutions offered a bachelor's degree in WRE: the University of Arizona, the University of Nevada, Reno, and Central State University (Ohio). All three of these programs were small in size, conferring between one and seven bachelor's degrees in 2009. Overall, the total number of bachelor's degree conferrals increased by five between 2005 and 2009, demonstrating a growth rate of 83 percent.

Master's degrees, compared to bachelor's degrees, were slightly more common nationwide: six institutions offered a master's level program in WRE in 2009, providing a combined total of 45 degree completions that year. The total number of conferrals grew from 34 in 2005 to 45 in 2009, representing a five-year growth rate of 32 percent.

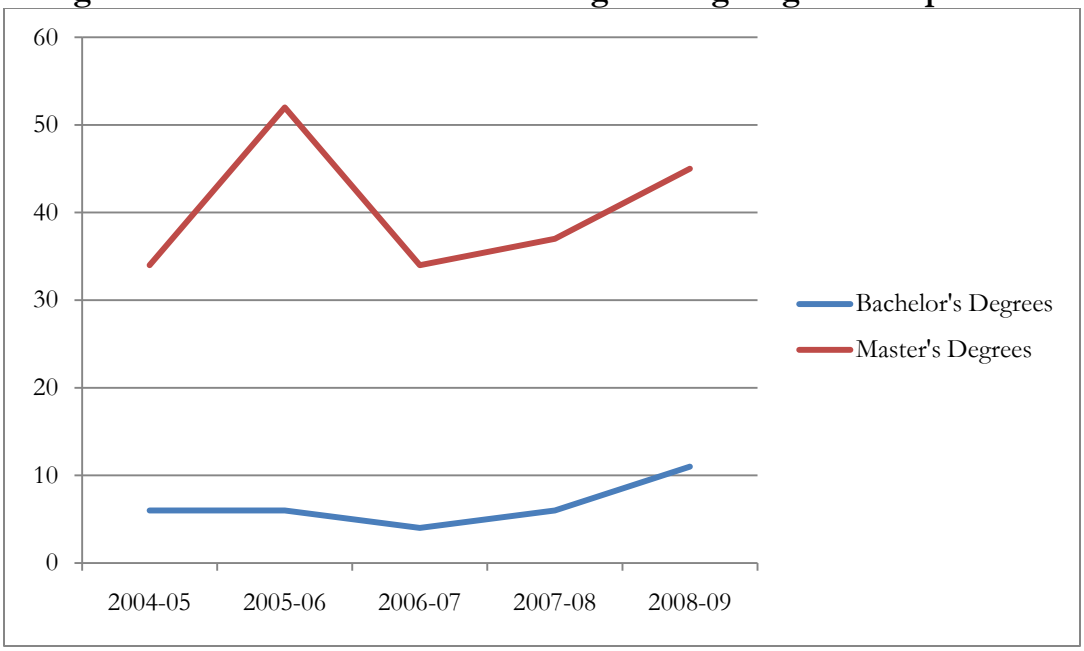
**Table 1.6: National Water Resources Engineering Degree Completions**

| Institution Name | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| **Bachelor's Degrees** | | | | | | | |
| Central State University | 4 | 1 | 2 | 2 | 3 | -1 | -25% |
| University of Arizona | 2 | 2 | 2 | 2 | 7 | 5 | 250% |
| University of Nevada-Reno | 0 | 3 | 0 | 2 | 1 | 1 | – |
| **Total** | **6** | **6** | **4** | **6** | **11** | **5** | **83.3%** |
| **Master's Degrees** | | | | | | | |
| Oregon State University | 3 | 1 | 0 | 2 | 3 | 0 | 0% |
| Prescott College | 0 | 0 | 0 | 0 | 1 | 1 | – |
| University of Arizona | 12 | 14 | 9 | 7 | 12 | 0 | 0% |
| University of Idaho | 5 | 5 | 4 | 6 | 6 | 1 | 20% |
| University of Nevada-Reno | 6 | 14 | 13 | 6 | 12 | 6 | 100% |
| University of New Mexico-Main Campus | 8 | 18 | 8 | 16 | 11 | 3 | 37.5% |
| **Total** | **34** | **52** | **34** | **37** | **45** | **11** | **32.4%** |

Source: NCES IPEDS Data Center

As illustrated in Figure 1.4, master's degree conferrals in WRE peaked in 2006 and then returned to original levels in 2007, before increasing at a slower rate between 2007 and 2009. Bachelor's degree conferrals, conversely, remained fairly constant between 2005 and 2008 before reaching a five-year high in 2009.

**Figure 1.4: Total Water Resources Engineering Degree Completions**



## Local Competition

Based on data gathered from NCES and the Florida Department of Education, it appears that local competition (i.e., within FAWI Workforce Areas 6 through 10) for a baccalaureate program in Environmental Science and Technology is almost entirely nonexistent. Among the ten institutions offering a bachelor's degree in Environmental Science, only the University of Florida is located in the FGC region (Region 9, specifically). There are no institutions offering bachelor's degrees in either WWMR or WRE that are located in the FGC region.

Local degree completion data is presented in Table 1.7. Based on conferrals from the University of Florida exclusively, we see that the local supply of recent graduates in Environmental Science has grown from 26 in 2005 to 42 in 2009, after a substantial increase in graduates between the 2008 and 2009 academic years.

**Table 1.7: Local Environmental Science Degree Completions**

| Institution Name | 2005 | 2006 | 2007 | 2008 | 2009 | Total Change 2005-09 | 5-Year Growth |
|---|---|---|---|---|---|---|---|
| University of Florida | 26 | 22 | 25 | 24 | 42 | 16 | 61.5% |

Source: NCES IPEDS Data Center

## Section Two: Projecting Employment Demand

In this section, we gauge the market demand for graduates of degree programs related to Environmental Science and Technology with a focus on Water. Employment projections were collected from the Bureau of Labor Statistics (BLS) and Florida's Agency for Workforce Innovation (FAWI). This section also includes information on current job openings in Florida.

### Methodology

Using the occupational crosswalk from NCES, we identified six occupational titles associated with the three program areas reviewed in Section One. For each occupation, we include the three most common educational attainment levels as reported by O*Net Online,[6] as well as the job description provided in the BLS's Occupational Outlook Handbook.

**Table 2.1: CIP-SOC Crosswalk of Relevant Areas**

| CIP Code | Related SOC Code(s) | Common Degree Levels |
|---|---|---|
| **03.0104**: Environmental Science | **19-2041**: Environmental Scientists and Specialists, Including Health | ❖ **71 % Bachelor's Degree**<br>❖ 16% Master's Degree<br>❖ 9% Associate Degree |
| | **Environmental scientists and specialists** use their knowledge of the natural sciences to protect the environment by identifying problems and finding solutions that minimize hazards to the health of the environment and the population. They analyze measurements or observations of air, food, water, and soil to determine the way to clean and preserve the environment. Understanding the issues involved in protecting the environment—degradation, conservation, recycling, and replenishment—is central to the work of environmental scientists. They often use this understanding to design and monitor waste disposal sites, preserve water supplies, and reclaim contaminated land and water. They also write risk assessments, describing the likely affect [*sic*] of construction and other environmental changes; write technical proposals; and give presentations to managers and regulators.[7] | |
| | **19-4091**: Environmental Science and Protection Technicians, Including Health | ❖ **44 % Bachelor's Degree**<br>❖ 20% Master's Degree<br>❖ 13% Associate Degree |

[6] O*Net Online. http://www.onetonline.org/find/

[7] Bureau of Labor Statistics. "Environmental Scientists and Specialists." Occupational Outlook Handbook, 2010-11 Edition. http://www.bls.gov/oco/ocos311.htm

| CIP Code | Related SOC Code(s) | Common Degree Levels |
|---|---|---|
| | **Environmental science and protection technicians** perform laboratory and field tests to monitor environmental resources and determine the contaminants and sources of pollution in the environment. They may collect samples for testing or be involved in abating and controlling sources of environmental pollution. Some are responsible for waste management operations, control and management of hazardous materials inventory, or general activities involving regulatory compliance. Many environmental science technicians employed at private consulting firms work directly under the supervision of an environmental scientist.[8] | |
| | **25-1053**: Environmental Science Teachers, Postsecondary | ❖ 97% Doctoral Degree<br>❖ 3% Master's Degree |
| | No occupation description available. | |
| **03.0205**: Water, Wetlands, and Marine Resources Management | **19-1031**: Conservation Scientists | No degree information available |
| | **Conservation scientists** manage, improve, and protect the country's natural resources. They work with landowners and Federal, State, and local governments to devise ways to use and improve the land while safeguarding the environment. Conservation scientists advise farmers, farm managers, and ranchers on how they can improve their land for agricultural purposes and to control erosion. A growing number of conservation scientists also are advising landowners and governments on recreational uses for the land.[9] | |
| | **19-4093**: Forest and Conservation Technicians | ❖ 40% High School Diploma<br>❖ 36% Associate Degree<br>❖ 20% Some College, No Degree |
| | No occupation description available. | |
| **14.0805**: Water Resources Engineering | **17-2051**: Civil Engineers | ❖ **86 % Bachelor's Degree**<br>❖ 10% Doctoral Degree<br>❖ 5% Master's Degree |
| | **Civil engineers** design and supervise the construction of roads, buildings, airports, tunnels, dams, bridges, and water supply and sewage systems. They must consider many factors in the design process from the construction costs and expected lifetime of a project to government regulations and potential environmental hazards such as earthquakes and hurricanes. Civil engineering, considered one of the oldest engineering disciplines, encompasses many specialties. The major ones are structural, water resources, construction, transportation, and geotechnical engineering. Many civil engineers hold supervisory or administrative positions, from supervisor of a construction site to city engineer. Others may work in design, construction, research, and teaching.[10] | |

Source: National Crosswalk Service Center, O*Net Online

We elected not to provide employment projections for Environmental Science Teachers at the postsecondary level because O*Net reports that this position generally requires a doctoral degree. For the remaining five occupational titles, we present employment projections where available at the national, state, and local levels.

[8] Bureau of Labor Statistics. "Science Technicians." Occupational Outlook Handbook, 2010-11 Edition. http://www.bls.gov/oco/ocos115.htm

[9] Bureau of Labor Statistics. "Conservation Scientists and Foresters." Occupational Outlook Handbook, 2010-11 Edition. http://www.bls.gov/oco/ocos048.htm

[10] Bureau of Labor Statistics. "Engineers." Occupational Outlook Handbook, 2010-11 Edition. http://www.bls.gov/oco/ocos027.htm

## National Employment Projections

Table 2.2 displays national employment projections through 2018 for the five occupational titles. The largest expected numeric increase in jobs is expected for Civil Engineers, which may add nearly 70,000 jobs nationwide by 2018. The most growth in terms of percentage is expected for the two occupations associated with Environmental Science: Environmental Scientists and Specialists, and Environmental Science Technicians. In total, the BLS projects that there will be 106,700 openings for these five occupations between 2008 and 2018—an increase of 24 percent.

**Table 2.2: National Employment Projections**

| Occupation Title | Employment | | Eight-Year Change | |
|---|---|---|---|---|
| | 2008 | 2018 (Est.) | Number | Percent |
| Environmental Scientists & Specialists, Including Health | 85,900 | 109,800 | 23,900 | 28% |
| Environmental Science Technicians, Including Health | 35,000 | 45,200 | 10,100 | 29% |
| Conservation Scientists | 18,300 | 20,500 | 2,200 | 12% |
| Forest and Conservation Technicians | 34,000 | 36,900 | 2,900 | 9% |
| Civil Engineers | 278,400 | 345,900 | 67,600 | 24% |
| **Total** | **451,600** | **558,300** | **106,700** | **24%** |

Source: U.S. Bureau of Labor Statistics

## State Employment Projections

At the state level, Civil Engineers are expected to see the most growth both in the number of jobs and as a percentage of existing employment levels. Notably, the majority of the projected increase in employment is expected to be due to growth rather than separations. Environmental Scientists and Specialists, and Environmental Science Technicians, also are expected to grow through 2018, at average annual growth rates of 1.2 percent and 1.8 percent, respectively. The only occupational title expected to lose jobs by 2018 is Forest and Conservation Technicians. Collectively, the amount of these jobs is expected to rise from 22,882 in 2010 to 26,996 by 2018. This amounts to a total increase of nearly 18 percent, and an average annual increase of 2.25 percent.

**Table 2.3: Florida Employment Projections**

| Occupation Title | Employment | | Annual % Change | Average Annual Openings | | |
|---|---|---|---|---|---|---|
| | 2010 | 2018 (Est.) | | Growth | Separations | Total |
| Environmental Scientists & Specialists, Including Health | 6,460 | 7,079 | 1.20% | 77 | 181 | 258 |
| Environmental Science Technicians, Including Health | 1,700 | 1,945 | 1.80% | 31 | 74 | 105 |
| Conservation Scientists | 225 | 227 | 0.11% | 0 | 2 | 2 |
| Forest and Conservation Technicians | 200 | 195 | -0.31% | 0 | 9 | 9 |
| Civil Engineers | 14,297 | 17,550 | 2.84% | 407 | 234 | 641 |
| **Total** | **22,882** | **26,996** | **2.25%** | **515** | **500** | **1,015** |

Source: Florida Agency for Workforce Innovation

## Local Employment Projections

Data at the local level were only available for the occupational titles of Civil Engineers and Environmental Scientists and Specialists. We present employment projections for both occupations for Workforce Regions 6 through 10 in Tables 2.4 and 2.5. As shown in Table 2.4, Civil Engineers are expected to see the most employment growth in Region 8 and Region 9. Region 8, in particular, is expected to increase employment for Civil Engineers by over 300 jobs until 2018, due largely to growth rather than separations.

**Table 2.4: Local Employment Projections, Civil Engineers**

| Workforce Region | Employment | | Annual % Change | Average Annual Openings | | |
|---|---|---|---|---|---|---|
| | 2010 | 2018 (Est.) | | Growth | Separations | Total |
| 6 | 122 | 128 | 0.61% | 1 | 2 | 3 |
| 7 | 108 | 117 | 1.04% | 1 | 2 | 3 |
| 8 | 1,462 | 1,772 | 2.65% | 39 | 24 | 63 |
| 9 | 398 | 470 | 2.26% | 9 | 7 | 16 |
| 10 | 95 | 101 | 0.79% | 1 | 2 | 3 |
| **Total** | **2,185** | **2,588** | **2.31%** | **51** | **37** | **88** |

Source: Florida Agency for Workforce Innovation

On the following page, Table 2.5 shows that Environmental Scientists and Specialists are expected to experience the most job growth in Regions 9 and 10. It is noteworthy that projected annual job openings across all regions are expected be due to separations more often than growth.

**Table 2.5: Local Employment Projections, Environmental Scientists and Specialists**

| Workforce Region | Employment | | Annual % Change | Average Annual Openings | | |
|---|---|---|---|---|---|---|
| | 2010 | 2018 (Est.) | | Growth | Separations | Total |
| 6 | 30 | 30 | 0.00% | 0 | 1 | 1 |
| 7 | 34 | 36 | 0.74% | 0 | 1 | 1 |
| 8 | 435 | 454 | 0.55% | 2 | 12 | 14 |
| 9 | 241 | 288 | 2.44% | 6 | 7 | 13 |
| 10 | 163 | 189 | 1.99% | 3 | 5 | 8 |
| **Total** | **903** | **997** | **1.30%** | **11** | **26** | **37** |

Source: Florida Agency for Workforce Innovation

## Job Postings

Table 2.6 provides recent job postings in order to illustrate the current employment demand in Florida for water-related occupations requiring a bachelor's degree. Postings were compiled on April 7, 2011 from several online job sites related to water and the environment, including the Florida Water Resources Journal, the American Water Works Association, the Florida Water and Pollution Control Operators Association, and www.waterandwastewaterjobs.com.

**Table 2.6: Sample Job Postings in Florida**

| Job Title | Employer | Education Requirement |
|---|---|---|
| Assistant Water Utilities Director | City of Green Cove Springs | Bachelor's Degree |
| Water Resources and Utilities Director | County of Volusia | Bachelor's Degree |
| Field Service Engineer, Desalination | Confidential | Bachelor's Degree |
| Utilities Facilities Manager | City of Ocoee | Bachelor's Degree (Preferred) |
| Water/Reuse Distribution Supervisor | City of Pompano Beach | Associate Degree |
| Plant Manager | Collier County Government | Some College |
| Manager, Wellfield | Collier County Government | Bachelor's Degree |
| Senior Project Manager | Baskerville Donovan | Bachelor's Degree |
| Division Director, Utilities | Lee County Board of County Commissioners | Bachelor's Degree |

As shown in Table 2.6, seven of the nine current openings are for local government agencies, suggesting that this may be the most common industry employing workers in occupations related to environmental science and water.

## Section Three: Program Profiles

In this section, we provide program profiles for three existing programs related to FGC's proposed baccalaureate degree in Environmental Science and Technology. Programs included in this section were chosen for having an emphasis on Water.

### University of Florida, Bachelor of Science in Soil and Water Science (Specialization: Water Science)

The University of Florida's Soil and Water Science Department (SWSD) is targeted at students interested in managing land and water resources. The Bachelor of Science in Soil and Water Science allows students to specialize in water during their junior and senior years. According to SWSD, the water specialization track prepares students for careers in government and the private sector.[11]

*Degree Requirements*

- Critical Courses: Integrated Principles of Biology, General Chemistry 1 and 2, Analytic Geometry and Calculus, Applied Physics

- Approved Electives: Agriculture and Environment Quality; Agriculture Water Management; Environmental Hydrology: Principles and Issues; Introduction to Fisher Science; Forest Water Resources; Introduction to Coastal and Oceanographic Engineering; Soil, Water, and Land Use; Soils, Water, and Public Health; Environmental Pedology; GIS in Soil and Water Science; Hydric Soils

*Selected Course Descriptions*

**Table 3.1: Selected Coursework for the University of Florida's Bachelor of Science in Soil and Water Sciences**[12]

| Course Title | Course Description |
|---|---|
| SWS 2007: World of Water | This is an introductory course intended to acquaint students with many of the essential roles of water in the environment. Topics range from fundamental properties of water to the importance of water and water quality to society. Course topics also will include water in oceans, lakes, rivers, soils, and the atmosphere as well as the importance of water in various physical and chemical processes. |

[11] "Soil and Water Science." University of Florida Undergraduate Catalog 2010-11. http://www.registrar.ufl.edu/catalog/programs/majors/soilsci.html#2

[12] Quoted verbatim from: "Undergraduate Courses." Soil and Water Science, UF. http://soils.ifas.ufl.edu/academics/ugcourses.htm

| Course Title | Course Description |
|---|---|
| SWS 4932: Perspectives in Florida Lake Management | This seminar- and field-based course provides students with an overview of management issues in Florida lakes including (i) Hydrology (water budget); (ii) Chemistry (nutrients, metals, organics, etc.); (iii) Ecology (plants, animal); and (iv) Watershed Management (land-use, restoration). In addition to the instructors listed below, several distinguished guest experts will provide lectures on course topics throughout the semester. This course is intended for graduate students interested in the interactions between humans and lake systems and should be of interest to agricultural, Earth, and environmental scientists and engineers, and natural resource managers. |
| SWS 4233: Soil and Water Conservation | Soil/water resources, historical erosions and sediment problems, geologic vs. accelerated erosion, erosion prediction equations, government conservation programs; and water conservation, irrigation, drainage and salinity; storm water management; case studies in erosion and sedimentation. The objective is to acquaint the students with conservation practices for both soil and water and their effect on environmental quality. |
| SWS 4244: Wetlands | Introduction to wetland ecosystems with emphasis on principles and problems associated with their functions and values related to water quality. Students will become familiar with basic and applied concepts in hydrology, soils and vegetation of both constructed and natural wetlands. Objectives are (A) To familiarize the student with the structure and function of wetlands; (B) To familiarize the student with ecological processes in wetlands related to succession, habitat and change in response to changes in environmental forcing parameters; (C) To acquaint the student with basic policy and regulatory issues related to wetlands; and (D) To acquaint the student with concepts of wetlands mitigation, restoration, and integration of constructed wetlands to address water quality and quantity issues in urban and agricultural landscapes. |
| SWS 4245: Water Resource Sustainability | There is demand for expanding freshwater resources to provide drinking water for the growing population, while at the same time preventing pollution and leaving enough water for natural ecosystem functions. These combined pressures define the need for sustainable water resource management. This course describes the effects of human impacts on hydrologic ecosystems (aquifers, watersheds, coastal zones, lakes, and wetlands) with quantitative measures of impacts and mitigation/attenuation efforts. Case studies from around the world will be used to illustrate both the detrimental effects of unsustainable resource utilization and the benefits of implementing sustainable resource management strategies. This course is intended for graduate and undergraduate students interested in the interactions between human civilization and hydrologic systems and should be of interest to agricultural and environmental scientists and engineers, and natural resource managers. |

Source: University of Florida, Soil and Water Science Department

## Florida Gulf Coast University, Bachelor of Science in Marine Science

Florida Gulf Coast University's (FGCU) Bachelor of Science in Marine Science "integrates traditional scientific disciplines by focusing them on the study of the world's oceans and coastal waters." The curriculum combines coursework in biology, chemistry, geology, mathematics, and physics to provide students with "a well grounded education in the natural sciences, and it applies a systems approach to

identifying and understanding the roles that the oceans play in the functioning of our planet."[13]

This program is designed to prepare graduates for careers related to science and technology within the government as well as industry, careers as educators in the natural and environmental sciences, and other jobs in the environmental field. Since the Marine Science major employs concepts from many different scientific disciplines, students entering the program should already have had an introductory exposure to geology, biology, physics, chemistry, and mathematics.

*Degree Requirements*[14]

- Common Prerequisites: General Biology 1 and 2, General Chemistry 1 and 2, Physical and Historical Geology, College Physics 1 and 2, Statistical Methods, Calculus or Social Science Statistics

- Required Courses in the Major: Environmental Chemistry, Coastal and Watershed Geology, Foundations of Civic Engagement, Scientific Process, Senior Seminar in Marine Science, Marine Ecology, Marine Chemistry, Oceanography, Physical Oceanography

- Required Elective: Senior Project Research Environmental Studies *or* Internship in Environmental Studies

- 15 hours of electives

*Selected Course Descriptions*

**Table 3.2: Selected Coursework for Florida Gulf Coast University's Bachelor of Science in Marine Science**[15]

| Course Title | Course Description |
|---|---|
| GLY 4074C: Meteorology & Climatology | Atmospheric processes of weather and climate and their effects upon marine and terrestrial systems are explored. Historical records of climate and the methods employed in their study are introduced and used to understand modeling of future climate change. |
| GLY 4702C: Coastal & Watershed Geology | Considers those geological and hydrological processes that occur at the Earth's surface. Topics include: physical and chemical weathering, soil formation, sedimentology and stratigraphy, geomorphology and physiography, surface and groundwater hydrology, and human-induced effects and environmental problems. |

[13] "Marine Science (BS)." Florida Gulf Coast University. http://www.fgcu.edu/CAS/MarineScience/index.asp
[14] "Program Requirements for 2010-2011 Catalog Year." Florida Gulf Coast University. http://www.fgcu.edu/CAS/MarineScience/degreq.asp
[15] Quoted from: "Course Descriptions." Florida Gulf Coast University. http://www.fgcu.edu/CAS/MarineScience/marinecourses.html

| Course Title | Course Description |
|---|---|
| GLY 5575C: Sediment Dynamics | Surveys theoretical description of fluid and sediment dynamics, fundamental sedimentary processes (erosion, transport and deposition) of coastal and estuarine environments, and their effects on the geomorphic features such as estuaries, deltas and coasts. |
| OCB 4043C: Marine Ecology | Investigates the interactions of biotic (living) and abiotic (nonliving) factors in a marine setting. Diverse environments such as sea grasses, mud flats, coral and mollusk reefs, and the impact of pollution will be examined. |
| OCE 1001C: Marine Systems | Interdisciplinary introduction (for non-majors) to the study of the world's oceans. Students become acquainted with basic scientific and oceanographic concepts through a hands-on exploration of the marine environments of Southwest Florida. Topics may include the role of the oceans in determining weather and climate; environmental stress and marine mammals; building on moving beaches; and estuaries nurseries of the sea. Lecture, laboratory and field experiences are fully integrated in this general education course designed primarily for students with a concentration other than in the natural sciences. |
| OCE 3008C: Oceanography | A systems approach to the study of the world's oceans integrating elements of biological, chemical, geological and physical oceanography. Examination of basic oceanographic principals and processes, with a focus on marine ecosystems of Southwest Florida. |
| PCB 3460C: Ecosystem Monitoring & Research Method | Overview of ecological concepts and basic methods of inventorying, monitoring, and conducting research on terrestrial, freshwater, and marine ecosystems. Emphasis on hands-on experiences. Methods will include those used in describing climatic, chemical, and physical features as well as biotic features, including field identification. The field emphasis will be on Southwest Florida ecosystems. |
| PCB 4303C: Limnology | An interdisciplinary approach to the examination of inland waters including lakes, streams, marshes, and swamps. Emphasis on the biotic, chemical and geological components of these aquatic ecosystems using Florida wetlands as models. The course is intended for students with interests in biology, environmental studies, and/or interdisciplinary natural sciences. Permission of instructor required. |

Source: Florida Gulf Coast University, Department of Marine and Ecological Sciences

## University of Arizona, Bachelor of Science in Environmental Hydrology and Water Resources (B.S.E.Hy.)

The Bachelor of Science in Environmental Hydrology and Water Resources curriculum provides students with a basic knowledge of environmental hydrology and its related subjects, which include the basic environmental sciences, hydrologic modeling, and computer applications. The University of Arizona defines Environmental Hydrology as "the applied science that investigates and characterizes the environmental state of our water and related land and ecological resources."[16] A hydrologist is someone who works "with water resource problems related to pollution, its prevention and clean-up, and natural disasters, such as floods, droughts,

[16] "Hydrology and Water Resources." The University of Arizona. http://catalog.arizona.edu/2008-09/dept/HWRx.shtml

and water management concerns, including water supply, the design of wells and reservoirs, recreation, and environmental impacts on water quality."

The program offers flexible coursework as well as field courses and a senior capstone course that "provide direct experience with hydrologic measurements, testing, and data gathering. Students apply these techniques at field sites and in research laboratories and process the resulting measurement data using computer models."[17]

*Degree Requirements*[18]

Supporting Course Work:

- Six Preparatory Courses
  - Mechanics of Fluids (Civil Engineering)
  - Natural History of the Southwest (Ecology and Evolutionary Biology)
  - Technical Writing (English)
  - Introduction to Engineering (Engineering and Mines)
  - Physical Geology (Geosciences)
  - Introduction to Engineering Probability and Statistics (Systems and Industrial Engineering)
- One Preparatory Course from Agricultural and Biosystems Engineering, Civil Engineering, Engineering and Mines, or Renewable Natural Resources
- One Geosciences Course
- Three Mathematics Courses
- Three Chemistry Sets (Lecture and Lab)
- Two Physics Courses
- Two Core Courses: Fundamentals of the Atmospheric Sciences and Soil Physics

Major Courses:

- Eight Core Courses: Principles of Hydrology, Field Hydrology, Introduction to Water Resources Policy, Hydrology, Hydrogeology, Environmental Risk and Economic Analysis in Water Resources, Statistical Hydrology, Environmental Hydrology
- Three Core Elective Courses: Geomorphology, Computer Applications in Hydrolics, Advanced Watershed Hydrology, Applied Groundwater Modeling

[17] Ibid.
[18] "Academic Program Requirements Report." The University of Arizona. http://aprr.web.arizona.edu/data/084/EGzEHYxzEHYzxxx.html

**Table 3.3: Selected Coursework for the University of Arizona Bachelor of Science in Environmental Hydrology and Water Resources**[19]

| Course Title | Course Description |
|---|---|
| HWR 202: The Water Cycle | The purpose of this course is to help students gain a quantitative understanding of the relationship between the hydrosphere and atmosphere and their impact on hydrologic systems, with emphasis on environmental effects. Field trips to the National Weather Service and Tucson Water Purification Plant. Honors section available. |
| HWR 203: Arizona Water Issues | Study of the use and misuse of water throughout Arizona and the fundamental tools used to study water supply, quality, and conservation. Introduction to basic hydrologic principles to help students deal with issues they will encounter later as public citizens in their own communities. |
| HWR 413: Field Hydrology | Introduction to instruments and methods for conducting and interpreting subsurface and surface hydrological field investigations. Subsurface field methods include tensiometers, gravimetric methods, neutron probes, time domain reflectometry, lysimeters and infiltrometers. Surface field methods include stream gaging, indirect discharge measurements, and micrometeorological instruments and methods. Daily field work and preparation of lab and field reports. |
| HWR 415: Introduction to Water Resources Policy | Water resources policy including the identification of regional problems of water use, the elements of water planning, water rights, and a consideration of institutional structures and processes. This is a Writing Emphasis Course. |
| HWR 417A: Fundamentals of Water Quality | Introduction to chemical processes affecting the behavior of major and minor chemical species in the aquatic environment. Physical, equilibrium, inorganic/ organic, and analytical principles as applied to natural waters. |
| HWR 456A: Watersheds and Ecosystem Function | Natural resource managers and policymakers are increasingly encountering the mandate for maintenance of ecosystem function in watersheds. What does this mean? How do we measure ecosystem function? How do we measure positive or negative changes in ecosystems? This course will examine the structure and function of watershed ecosystems with emphasis on the ecosystem and geomorphic processes shaping watersheds. Students are introduced to the processes that shape the structure and functioning of ecosystems and watersheds, their responses to natural and anthropogenic change and recovery to these disturbances. Student will compare different ecosystems to watershed responses to anthropogenic changes and collect data from selected field sites to explore the relationship among ecosystem processes and changing climate (or other disturbances). Students will develop the writing skills necessary to communicate technical information, the ability to integrate and contextualize the principles of natural resource management by class field work, and gain an understanding of the importance of proper ecologic functioning to the maintenance of healthy watershed systems. |

[19] Quoted verbatim from: "Fall 2008 Course Listings." The University of Arizona. http://catalog.arizona.edu/2008-09/courses/084/HWRx.html

| Course Title | Course Description |
|---|---|
| HWR 478: Global Change | Analysis of the Earth system through an examination of its component parts (particularly climate and biogeochemistry) and their interactions with human activities, emphasizing information needed to understand modern and future environmental changes. |
| HWR 479: Economics of Water Management and Policy | This course focuses on economic tools and methods useful to water managers and policymakers. Case studies focus on water supply and demand, pricing and transactions, river basin management, recreation and environmental uses, inter-jurisdictional conflicts. |
| HWR 496M: Application and Theory of Decision Support Models | Introduction to basic principles of system dynamics modeling with application to water resource planning. Focus on system dynamics, interrelationships rather than elements, patterns of change rather than static snapshots, and processes rather than data. Implementation of techniques within context of public-mediated decision making and policy analysis. |

Source: The University of Arizona, Department of Hydrology and Water Resources

- **Degree Type:** Bachelor of Science
- **Degree Title:** Environmental Science and Technology
- **Proposed Degree Six-Digit CIP Code:** 03.0104
- **Program Description/Employment Options For Graduates:**
  *The description should be brief, but stand-alone. The first sentence should include degree type, degree title, areas of concentration (if applicable), and geographic region to be served. (Limit 200 words)*

The Bachelor of Science in Environmental Science and Technology at Florida Gateway College would serve students in Workforce Region 7, which consists of Columbia, Dixie, Gilchrist, and Union counties. This Environmental Science and Technology program would place an emphasis on Water. Currently, Florida Gateway College has several Associate in Science and Associate in Applied Science degree programs; an Environmental Science and Technology program would serve to enhance the college's current program offerings.

Graduates of the Environmental Science and Technology program would be qualified to pursue numerous occupations, including jobs as Environmental Scientists and Specialists, Environmental Science and Protection Technicians, Conservation Scientists, and Civil Engineers. Regarding Environmental Scientists and Specialists, the U.S. Bureau of Labor Statistics states that, "Employment of environmental scientists and specialists is expected to increase by 28 percent between 2008 and 2018, much faster than the average for all occupations… Growth in employment will be spurred largely by the increasing demands placed on the environment by population growth and increasing awareness of the problems caused by environmental degradation. Further demand should result from the need to comply with complex environmental laws and regulations, particularly those regarding ground-water decontamination and clean air."[20]

**C. Workforce Demand/Unmet Need Specific to Program Area**
*Include an analysis for the geographic region to be served.*
Guidelines for Demand and Supply

1. Geographic region to be served:
   - Workforce Region 7 (Columbia, Dixie, Gilchrist, and Union counties)

2. Number of current jobs:
   - 142 in 2010.

[20] U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook, 2010-11 Edition.* http://www.bls.gov/oco/ocos311.htm

3. Number of current job openings:
   - ❖ 1.3 in 2011.

4. Projected number of job openings five years from current year:
   - ❖ 8.1 in 2016.

5. Number of most recent graduates in the discipline area from the State University System, by institution(s) in the geographic region specified in the application
   Degrees Awarded by State University System
   - ❖ 0 graduates in AY 2008-09 (Workforce Region 7).
   - ❖ 42 graduates in AY 2008-09 (Workforce Regions 6-10).

6. Number of most recent graduates in the discipline area from nonpublic postsecondary institutions in geographic region *(if available)*, by institution
   - ❖ None.

7. Data and a one-paragraph description of the employment gap based on 2 through 6.
   *Provide the gap between employment numbers needed and graduates in the programs in the geographic region. (Limit 300 words)*
   - ❖ There is potential for growth for Environmental Scientists and Civil Engineers within the Florida Gateway College region, with ample projected openings in Workforce Region 7. Florida's Agency for Workforce Innovation projects that there will be an annual average of three job openings for Civil Engineers and one job opening for Environmental Scientists in Workforce Region 7 through 2018; however, there are presently no institutions in this region that confer Environmental Science degrees. The Agency estimates that there were 142 Environmental Science and Civil Engineering jobs in the area in 2010, and projects that this will increase to 153 jobs by 2018—resulting in an overall rate increase of nearly one percent annually. According to these estimates, there will be a total of 143 such jobs in 2011 and 150 in 2016.

8. Other measures as selected by institutions, which may include brief qualitative or quantitative data/information such as local economic development initiatives or evidence of rapid growth or decline not reflected in local, state, and national data. *(Limit 300 words)*
   - ❖ In 2010, there were 116,400 residents in Workforce Region 7; that number is expected to reach 124,200 by 2015 (a growth rate of 1.3 percent per year).[21] While Florida's large population suggests great

[21] Florida's Office of Economic and Demographic Research.

potential in supplying the workforce necessary to sustain its growth, its statistics on education speak otherwise. The U.S. Census Bureau's 2009 Survey showed that Florida ranked 32nd among all states and eighth among the ten largest states in the percentage of the population that was at least 25 years old and held the equivalent of a bachelor's degree or higher. These rankings suggest that there is a dire need to increase the rate of degree conferrals to match Florida's rapid population growth.

## G. Cost to Students

1. Anticipated cost for four years of study at FCS institution
   *(Tuition and fees x credit hours)*
   - ❖ Florida Gateway College
     - o 2009/10 Tuition: $81.58/credit hour
     - o 2009/10 Tuition x 120 credit hours = **$9,789.60**

   - Estimation is based upon tuition and fees for full-time (15 credits) Florida residents for the 2009/10 academic year (does not apply to postsecondary/adult courses), and does not reflect possible rate increases for tuition and/or fees. Further, this estimation does not reflect living costs (e.g., room, board) and other costs (e.g., books).

2. Estimated cost for four years of study at each state university in service district.
   - ❖ Florida State College at Jacksonville
     - o 2010/11 Tuition: $92.10/credit hour
     - o 2010/11 Tuition x 120 credit hours = **$11,052.00**
   - ❖ Santa Fe College
     - o 2010/11 Tuition: $69.43/credit hour
     - o 2010/11 Fees: $20.89/credit hour
     - o (2010/11 Tuition + Fees) x 120 credit hours = **$10,838.40**
   - ❖ University of Florida
     - o 2010/11 Tuition: $95.67/credit hour
     - o 2010/11 Fees: $72.48/credit hour
     - o (2010/11 Tuition + Fees) x 120 credit hours = **$20,178.00**
   - ❖ University of North Florida
     - o 2010/11 Tuition: $95.67/credit hour
     - o 2010/11 Fees: $45.61/credit hour
     - o (2010/11 Tuition + Fees) x 120 credit hours = **$16,953.60**

http://edr.state.fl.us/Content/area-profiles/county/index.cfm

- Estimation is based upon tuition and fees for full-time (15 credits) Florida residents for the 2010/11 academic year, and does not reflect possible rate increases for tuition and/or fees. Further, this estimation does not reflect living costs (e.g., room, board) and other costs (e.g., books).

3. Estimated cost for four years of study at each nonpublic institution in service district, if available (private, nonprofit institutions).
   - ❖ Edward Waters College
     - o 2010/11 Tuition: $349.00/credit hour
     - o 2010/11 Tuition x 120 credit hours = **$41,880**
   - ❖ Flagler College
     - o 2010/11 Tuition: $462.00/credit hour
     - o 2010/11 Tuition x 120 credit hours = **$55,440.00**
   - ❖ Jacksonville University
     - o 2010/11 Tuition: $886.67/credit hour
     - o 2010/11 Tuition x 120 credit hours = **$106,400.00**
   - ❖ Jones College (Jacksonville)
     - o 2010/11 Tuition: $275.00/credit hour
     - o 2010/11 Tuition x 120 credit hours = **$33,000.00**
   - ❖ Trinity Baptist College
     - o 2010/11 Tuition: $241.67/credit hour
     - o 2010/11 Tuition x 120 credit hours = **$29,000.00**

   - Estimation is based upon tuition and fees for full-time (15 credits) Florida residents for the 2010/11 academic year, and does not reflect possible rate increases for tuition and/or fees. Further, this estimation does not reflect living costs (e.g., room, board) and other costs (e.g., books).

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# WORKFORCE NEEDS ASSESSMENT FOR FLORIDA WATER RESOURCES SECTOR

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20 May 2011

# INTRODUCTION

***Context***

In the next 5 to 10 years the stormwater, drinking water and wastewater utility industries are anticipating a growing demand for workers.

There is a workforce crisis in these utility industries caused by impending retirements and shifting demographics, increasing diversity, and a declining number of science and technical students receiving degrees. In fact, many young people are moving towards non-technical skills.

The challenges facing these three utility sectors mirror the shift in the U.S. labor force, and to an extent utilities are facing the baby-boomer exodus earlier than the general population. In the utility sector, it is projected that the exodus of utility employees due to retirement and private sector employment that began approximately five years ago will continue over the next 10 – 15 years. This represents an anticipated loss of 30 to 50 percent of the current utility workforce to retirement within 10 years.

This leaves a large gap in terms of manpower for plant operations and management, but also poses challenges for the knowledge management. Knowledge management strategies and initiatives need to be planned soon. At the same time, younger generations are not attracted to jobs in the stormwater, drinking water and wastewater industry.

New stricter national and state regulations will impact these industries, in particular the stormwater and wastewater sectors, encouraging the development of a new integrated approach to water resources management focused on sustainability of the urban hydrologic cycle. Innovative approaches in these industry's services will be required to face increasing consumer demands, increasing urbanization, emerging pollutants control, stormwater control and climate change that may affect water availability and contaminant loading. In Florida infrastructures will need to be upgraded to face continuous aging and the necessity for advanced water and wastewater treatment such as membranes and ultraviolet disinfection to respond to regulatory requirements. Consequently, the technological skills of the workforce in the overall urban water sector will have to be similarly upgraded through education and training.

Florida is challenged by many interrelated, competing demands for water, including domestic, industrial, agricultural and environmental. Balancing these demands to promote public health, environmental stewardship, and sustained growth of the Florida economy requires integrated planning and implementation by all stakeholders.

Integrated water resources management and hydrologic cycle sustainability is the practice of making decisions and taking actions while considering multiple viewpoints of how water should be managed. These decisions and actions relate to situations such as river basin planning, organization of task forces, planning of new capital facilities, controlling reservoir releases, regulating floodplains, and developing new laws and regulations. The need for multiple viewpoints is caused by competition for water and by complex institutional constraints. In general, water agencies deal with water supply, wastewater and water quality services, stormwater and flood control, hydropower, navigation, recreation, and water for the environment, fish, and wildlife. As the practice of water resources management evolved, the term "multipurpose" (or "multi-objective") water resources development (or management) came to refer to projects with more than one purpose. Later, the term "comprehensive" water planning and management came into use to describe management practices that consider different viewpoints.

This report analyzes the workforce needs in the water resources industries (comprised of stormwater, drinking water and wastewater) in Florida focusing on three categories that resulted from previous studies as more critical: Water/Wastewater Treatment Operators, Collection/Distribution/Transmission System Operator and Mechanic/Other Maintenance Position. After a brief description of the previous studies, the results of a survey that reached 116 utilities are reported in this study. Furthermore three future challenges for the Florida water sector that will impact occupations in the next decade are here discussed.

***Previous Studies***

A Water Research Foundation/WERF study (*1*) reported in 2005 that the current average age of water utility workers was 44.7 and the age of wastewater workers was 45.4. The average retirement age for utility personnel was 56.

Considering the workers age, the situation was more severe for plant operators in the Northeast and the West than in the South and Midwest regions. It was also more of an issue for utilities in metropolitan areas than in non-metropolitan areas

In the American Water Works Association (AWWA) “State of the Industry Report” published in 2008 (*2*) it was projected that in the next ten years, 37% of water utility workers and 31% of wastewater utility workers will retire.

Utilities will feel the impact of these retirements most severely in areas requiring technical skills and knowledge such as Engineering, Plant Operations, Water Quality, and other technical areas that have become increasingly difficult to recruit. A growing need for additional employees potentially by 45% in coming years is due to new regulations, infrastructure growth, security challenges and customer demands (Bureau Labor Statistics).

According to a 2005 Water Research Foundation study (*3*), retiring utility workers have worked an average of 24 years in the same utility.
In addition to the shortage in the number of workers to recruit and the need for updated recruiting methods, utilities face the risk of critical knowledge loss from employees who are exiting the organization to retirement or other options.

Utility culture is not typically focused on process and procedural documentation, knowledge sharing, or knowledge transfer – particularly in recent times of budget restrictions.

The mass exodus of utility employees together with the increasing diversity in the current workforce, the decreasing graduates in technical degrees and value differences in the younger generation of employees requires a shift in approach to operations and to move away from the "lean operation" mentality that has been forced upon utilities in recent years. A research project on *Successful Recruiting, Training and Retaining Operators and Engineers to Meet Future Challenges* was created in 2008 by the AWWA Research Foundation to identify practical methods that utilities can implement to address these issues on their organization (*4*).

In this research utilities report they have been operating well below their funded staffing level for some number of years, a factor that directly impacts training and retention of staff. Utility employees are not taking advantage of training that is offered and for which employees will be reimbursed. The same study shows that more operators than engineers are eligible to retire sooner which indicates operators as the most urgent staffing need that utilities must address.

The research indicates that utilities do track indicators of workforce changes but workforce planning (including knowledge retention) is not viewed as "strategic" within most organizations and is not given the same attention as regulatory and infrastructure issues – even though workforce planning directly addresses sustainability of the organization. Salary and benefits offered by a utility were the primary retention factor for both engineers and operators currently employed. A demographic research identified three new pools of potential workers: retirees working full or part-time, displaced workers as a result of plant closing or layoffs and military veterans, ranging in age from 25 through 54.

The importance of the knowledge management in the water industry, considering the workforce crisis just described has been addressed in the research *Organizational Development for Knowledge Management at Water Utilities* carried out by the Water Research Foundation in 2010 (*5*). The project had the objective of identifying the benefits and costs of implementing a knowledge management (KM) initiative, investigating organizational characteristics and processes critical to the success of implementing a knowledge management initiative.

Involved in the study were 207 separate drinking water utilities providing information about their organizations and KM and KM-related strategies and projects underway. The survey revealed that Knowledge Sharing, Team Decision-Making, and Knowledge Retention represent the largest number of KM strategies underway in these utilities. The largest focus in the "planning" stage is on Knowledge Retention, followed closely by Knowledge Base development and Expert Locator. More than 50% of the utilities are currently doing Knowledge Sharing and Team Decision-Making.

Thirty-three projects were collected from 22 utilities all over the country. These projects include a wide range of initiatives connected to the increasing recognition of knowledge in drinking water utilities. These initiatives not only included development of a KM plan, knowledge sharing, retaining retiree knowledge and organizational learning, but also included developing and updating manuals, professional and leadership development, public relations, work performance improvement, succession and talent resource planning, workforce planning, quality based documentation, training, communications, developing document repositories, process and operational improvements and the use of social network analysis. Three core areas have been analyzed: leadership and management; organizational structure in support of KM and critical success factors, barriers, alignment and underdevelopment. Interestingly, the results showed that the perception of responders was that the organizational structure supports the sharing of information and knowledge better than the human resources department. Any potential significant organizational change creates uncertainty, concern and fear resulting in workforce resistance that is challenging to leadership and management. The level of information system integration (consistent and accessible) and the quality of information contained in IT systems are not satisfying as perceived by responders in drinking water utilities. Barriers to the successful implementation of a KM strategy or initiative were identified as financial resources, time, resistance to change, lack of manpower, politics, leadership and management, public perception, resistance to technology, regulations and law, and culture.

Two specific tools resulted from this research project. The first is an assessment tool for utilities to identify their readiness to plan and implement KM strategies. The second is a toolkit for planning and implementing the organizational changes needed for a successful KM strategy or initiative in utilities.

The AWWA conducted a national survey in 2008 to determine water sector workforce needs and in 2009 the report of the study known as the Water Sector Workforce Sustainability Initiative (WSWSI) was published (*6*). The survey conducted by the Steering Committee volunteers targeted 40 utilities on the workforce development issues facing water and wastewater utilities. Fifty-two percent of the survey respondents were public agencies that are part of a city, county, or enterprise fund while 24% were public with independent governance. The remaining 24 % of respondents were investor owned or special operating districts.

For mission critical classifications, Water/Wastewater Treatment Operators and Collection/Distribution/ Transmission System Operators were the classifications at highest risk followed by Engineers. The operational functions most at risk for utilities were listed as Water Delivery Reliability, Customer Service, Environmental Stewardship, and Safety, Security, and Emergency Response. The highest reported workforce development challenges within mission critical positions are Recruitment and Selection, and Knowledge Retention, followed by Classification issues and Staff Training. Also this research focused on identifying utility and other industry collaborative programs that may serve as models or resources to help define collaborative water sector initiatives.

Florida's workforce needs in the water sector was the focus of the 2007 report of the Florida's Water Future, consisting of a group of industry experts, state water associations and agencies (*7*). In this report, the greatest need is identified as water and wastewater treatment plant operators and engineers. The major challenges were: Florida demographics showing that the majority of the population is projected to move towards the retirement age by 2020 without a corresponding population moving into the workforce age; the increasingly complex technical and regulatory requirements; the knowledge management; the increasing population growth and increasing water demand and climate change for the increasing intensity of tropical storms and hurricanes.

The five utilities in Florida participating at the 2009 survey of the Water Sector Workforce Sustainability Initiative (WSWSI) identified Water/Wastewater Treatment Operators, Collection/Distribution/Transmission System Operator and Mechanic/Machinist/Other Maintenance Technician as their most critical occupations followed by Electrician/Electronic Maintenance and Engineer. Retirement was considered the highest risk factor in ensuring an adequate and prepared workforce in these positions, followed by inadequate documentation on facilities, processes, procedures, technologies and equipment and changing regulatory requirements. As for the recruitment challenges the lack of an adequate labor pool with appropriate qualifications was the higher risk factor, followed by recruitment/selection process and uncompetitive pay and/or fringe benefits.

In 2009 the Employ Florida Banner Center for Water Resources (Banner Center) was created by Workforce Florida, the State's board for carrying out workforce policy, programs and services with the aim to address both the lack of potential employees in the field as well as the need to upgrade the skills of those already working in the water and wastewater sectors. In order to systematically address the workforce shortage in the water sector, a study to assess the state of the workforce in Florida was conducted by the University of South Florida Dr. Kirian C. Patel Center for Global Solutions in 2010 (*8*). A survey was conducted in this study to identify the workforce gaps in the water sector and determine the causes of those gaps.

The survey was sent to the memberships of the Florida Rural Water Association (FRWA), the Florida Section of the AWWA (FSAWWA) Utility Council and the Utility Council of the

Florida Water Environment Association (FWEA). Ultimately, 65 utilities responded. Six of the responses came from the FSAWWA/FWEA membership and the rest came from the FRWA membership.
In particular, the top three occupations in which growth is anticipated in the next five to ten years include Water/Wastewater Treatment Operators, Collection/Distribution/Transmission System Operator and Mechanic/Other Maintenance Position. These were similarly the top three occupations for which the highest retirement is projected followed by Electrician/Electronic and also they were the top three positions for which utilities experienced or anticipated problems with quantity in terms of ability to recruit staff with adequate qualifications and/or staff work preparedness.

For these three categories the bigger challenges in hiring new employees are lack of proper training, uncompetitive salaries and poor perception of job/industry and career opportunities and followed by changing regulatory requirements.

The sector-wide initiatives that were considered to be potentially helpful in closing the workforce gap were a standardized apprenticeship program for the water sector and an internship program. Utilities also indicated that reciprocity among all states for existing certified personnel, and industry-wide credentials for the water sector would help close the workforce gap in the water industry.

In this study an educational inventory was conducted. The results showed the necessity to strengthen high school and post-secondary course offerings throughout Florida and the necessity to have more accessible training (especially for small utilities).

Finally the potential benefit from a state-wide initiative to make water jobs and careers more attractive, both materially and in terms of prestige would benefit the water industry. The results of this study pointed to the need for reviving the state-wide Banner Center for Water Resources to coordinate efforts for workforce development in the water sector.

***Objectives***

Over the last few years several studies have been conducted on the workforce issues for water and wastewater utilities both at the state and national level. This study follows up on these findings to investigate the future hiring trends and to determine if workforce needs have changed due to retirement age workers delaying their retirement because of economic conditions.

Many utilities have internship programs for engineering students, but this study objective is to determine how many utilities have internship and apprenticeship programs for technical/operational positions, analyzing the barriers for these programs such as age, insurance, curriculum available and lack of resources to implement.

This study investigates the actual and past enrollment in courses for operators in the water sector that are offered by state colleges and technical institutes in Florida.

Another objective of this study is to investigate the potential that ex-offenders have in filling the need for operator/technical employees. This assessment also looked at the future hiring needs of the Water Management Districts and the consulting companies that work for them.

If drinking water and wastewater are well known industries, even if continuously evolving, the stormwater sector is definitely increasing in relevance in the last decades in an integrated approach to water management. This study analyzes the perspective on rainfall-runoff control and treatment by presenting recent regulations and ongoing projects in Florida. Also the relevance of emerging pollutants is addressed.

# SYSTEM OVERVIEW

***Water, Wastewater, Distribution Operators***

In this paragraph an overview of the critical occupational categories in the water sector in Florida is presented. According to the Florida Department of Labor, the operators in the category Water and Liquid Waste Treatment Plant and System Operators in 2010 held 5560 jobs. The historical employment and hourly mean wage since 1999 are reported in Figure 1. It is important to notice that the number of employees did not increase greatly in the past decade going from 4940 to 5560 with an increase rate of 56 jobs per year. The projection for 2018 instead shows an increase of the jobs in this category of a rate 130 jobs per year, categorizing this job together with civil engineers among the fastest growing occupations.

The distribution of this category within different industries is shown in Figure 2. In this category 74% of the employees are working in the Public Administration, followed by Utilities for 16% of the employees. A small percentage is working in Construction and Administrative and Support and Waste Management and Remediation Services, while other industries include Manufacturing, Educational Services and other Services (except Public Administration).

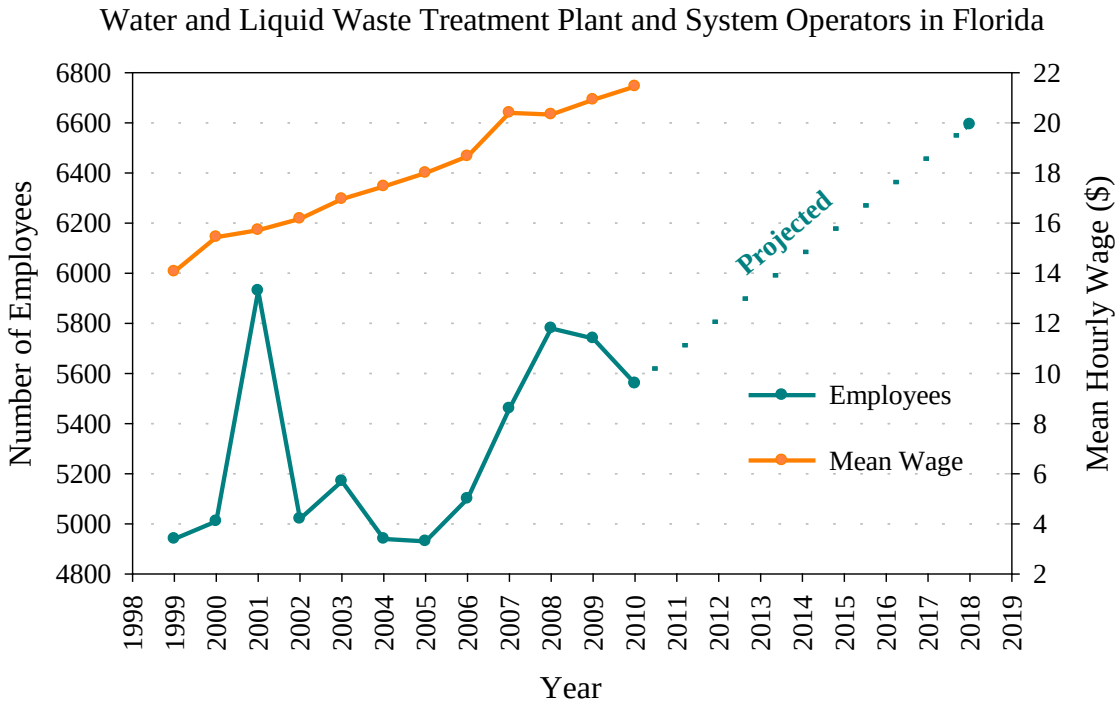


**Figure 1. Historical data and occupation projection for the job category Water and Liquid Water Treatment Plant and System Operators in Florida (Census 2010).**

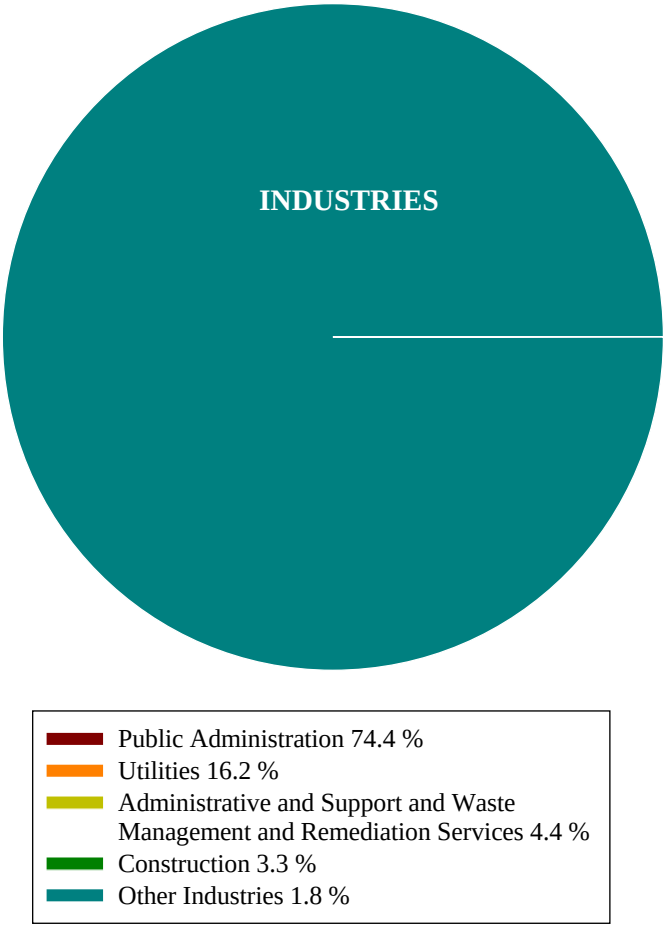


**Figure 2. Distribution of the occupation category Water and Liquid Water Treatment Plant and System Operators in 2010 in Florida (Census 2010).**

A more detailed analysis of the actual situation of the employees working in the water and wastewater utility industry in Florida is provided. There are three license requirements for employees working in this industry: drinking water (DW) operator license (Classes A, B, C and D), wastewater (WW) treatment plant operator license (Classes A, B, C and D) and water distribution (DS) operator license (Classes 1, 2, 3 and 4).

The average age of active and inactive drinking water and wastewater license holders in 2007 was 50 while in 2011 the average age is 51. By the age distribution reported in Table 1 it is possible to observe that 70% of the license holders were equally distributed between the two age ranges 41-50 and 51- 60 in 2007. In 2011 almost 40% of the license holders are in the 51- 60

range with 30% in the 41- 50. These results also show the small percentage of operators younger than 30 years.

The State of Florida currently has 9,321 active licensed operators (FDEP May 2011). As reported in Table 2 of these 9,321, 2,238 have drinking water licenses, 2,450 have wastewater licenses and 2,817 have water distribution licenses. There are 1748 operators holding dual licenses and 68 operators holding three licenses.

As of May 2011 there are 12,394 active and inactive licenses. Of the active licenses, as reported in Table 3, 4015 are drinking water licenses, 4192 wastewater licenses and 2998 water distribution licenses. The different classes are also reported, showing that the majority of the licenses are classes C and A for drinking water and wastewater and for water distribution classes 3 and 1 are the majority.

The number of exams administered by FDEP during five license cycles starting from 2001are reported in Table 4 together with the new licenses issued and the expired ones. The number of exams administered is comprehensive of exams to change the class within the same license type. It is interesting to note that before 2009 this number was continuously increasing. In the last two license cycles it is encouraging to note the number of new licenses if compared with the operators leaving the profession.

As for courses offered for operators in the water industry, there are currently a few public service education curriculum frameworks available in the State of Florida. These programs were developed through business and industry and are approved by the state of Florida. Enrollment in these programs is very low and has decreased significantly in the last years.

Figure 3 shows the enrollment data provided by the State of Florida Department of Education for the years 2003-2004, 2006-2007 and 2009-2010. Only 97 students took courses in the year 2009-2010 and Colleges and Institutes offering these courses were the Community School North in Broward County, the Palm Harbor Community School in Pinellas County and the Sarasota County Technical Institute. Several Florida Community Colleges offered Water/Wastewater Operator training courses in the 1970s, however, due to lack of instructors and low enrollment, most of them no longer offer these programs (*7*).

Table 5 data was provided by the State of Florida Department of Environmental Protection Operators Certification Program for the license renewal periods 2007-2009 and 2009-2011. This shows that the majority of people sitting for the state licensure exams took their required pre-licensure courses by correspondence from California State University System, often referred to as the “Sacramento courses”.

**Table 1. Drinking water and wastewater license holders in 2007 and 2011 (Source: FDEP)**

| Age | License Holders 2007 % | License Holders 2011 % |
|---|---|---|
| 30 and under | 3.2 | 4.2 |
| 31-40 | 14.5 | 13.1 |
| 41-50 | 34.9 | 28.3 |
| 51-60 | 35.0 | 38.4 |
| 61-70 | 10.8 | 14.3 |
| 71-80 | 1.4 | 1.4 |
| 81 and over | 0.2 | 0.2 |

**Table 2. Active licensed operators in Florida as of May 2011.**

| # of Held Licenses | Active Licensed Operators | | | |
|---|---|---|---|---|
| | DW | WW | DS | Total Operators |
| 1 | 2238 | 2450 | 2817 | 7505 |
| 2 | 1709 | 1674 | 113 | 1748 |
| 3 | 68 | 68 | 68 | 68 |
| Total | 4015 | 4192 | 2998 | 9321 |

**Table 3. Active licenses in Florida as of May 2011.**

| License Type | CLASS | | | | Total Licenses |
|---|---|---|---|---|---|
| | A/1 | B/2 | C/3 | D/4 | |
| DW | 1027 | 779 | 1979 | 230 | 4015 |
| WW | 1386 | 833 | 1875 | 98 | 4192 |
| DS | 667 | 586 | 1731 | 14 | 2998 |
| % of total DW | 25.6 | 19.4 | 49.3 | 5.7 | |
| % of total WW | 33.1 | 19.9 | 44.7 | 2.3 | |
| % of total DS | 22.2 | 19.5 | 57.7 | 0.5 | |

**Table 4. Historical data since 2001 relative to drinking water and wastewater licenses**
(FDEP May 2011)

| License Cycle | Exams administered | Exams administered compared to previous exam cycle (%) | New Licenses Issued | Licenses expired | Difference between new licenses issued & expired |
|---|---|---|---|---|---|
| May 1, 2009 - April 30, 2011 | 3389 | -0.09 | 939 | 587 | 352 |
| May 1, 2007 - April 30, 2009 | 3707 | 14 | 970 | 685 | 285 |
| May 1, 2005 - April 30, 2007 | 3266 | 6 | 754 | 790 | -36 |
| May 1, 2003 - April 30, 2005 | 3067 | 22 | 722 | 1391 | -669 |
| May 1, 2001 - April 30, 2003 | 2507 | 20 | 542 | 687 | -145 |

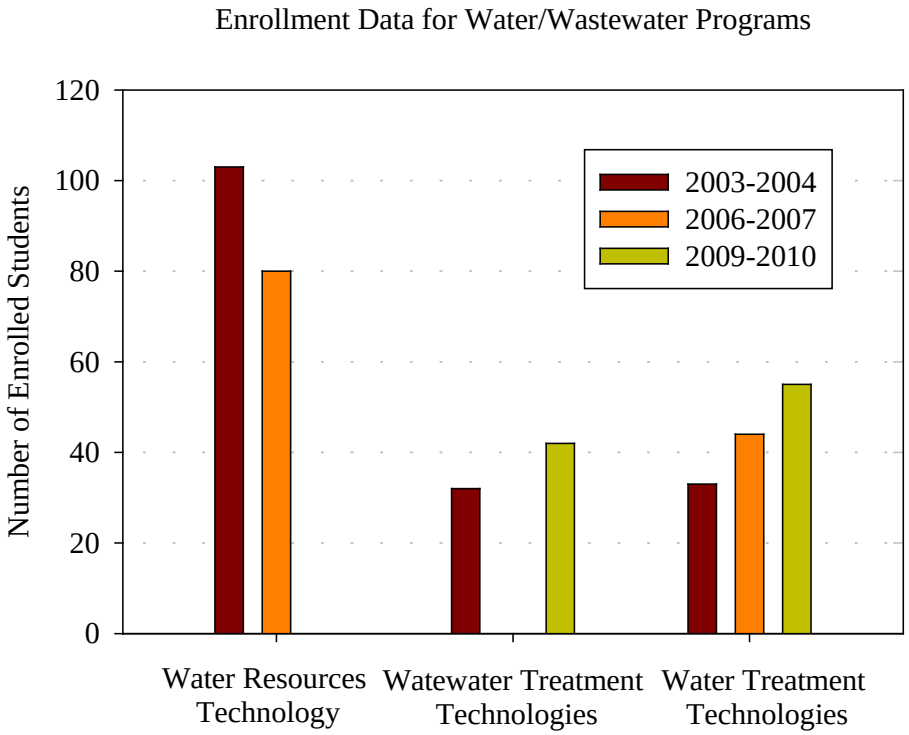


**Figure 3. Enrollment data for courses offered by Community Colleges and Institutes (State of Florida Department of Education)**

**Table 5. 2011Providers of Required Courses for Licensure Candidates 5/1/2008-4/30/11 (State of Florida Department of Environmental Protection)**

| Provider | No of Students |
|---|---|
| ATC | 1 |
| BROWARD COLLEGE | 6 |
| CALIFORNIA STATE UNIVERSITY, SACRAMENTO | 3817 |
| EXAM REVIEW BOOKS | 98 |
| FLORIDA GATEWAY COLLEGE | 186 |
| FRWA | 55 |
| FS/AWWA | 161 |
| FT PIERCE UTILITY | 17 |
| FWPCOA WATER | 688 |
| HILLSBOROUGH COMMUNITY COLLEGE | 40 |
| INDIANA STATE UNIVERSITY | 4 |
| LAKE CORRECTIONAL INSTITUTION | 8 |
| LAKE TECHNICAL CENTER | 13 |
| MARION CORRECTIONAL INSTITUTION | 3 |
| MICHIGAN STATE UNIVERSITY | 187 |
| MID FLORIDA TECH | 12 |
| PALM BEACH STATE COLLEGE | 90 |
| PALM HARBOUR COMMUNITY SCHOOL | 74 |
| PIPER COMMUNITY SCHOOL. | 164 |
| PINELLAS TECHNICAL EDUCATION CENTERS | 77 |
| SARASOTA CTY TECH. INST. | 30 |
| UNIV. OF FLORIDA (TREEO and CORRESPONDENCE) | 215 |

***Water Management Sector***

The future for careers at the Water Management Districts has been greatly affected by the changing economic and political climate. During this past legislative session, water management districts were directed to slash their budgets by an average of 30%. The current priority of District leadership is to deliver their core mission without having to initiate layoffs. As job vacancies are created by retirements, the positions are being eliminated or filled internally.

In the past when positions have opened up, a lot of the qualified applicants in specialized information technology or scientific fields are not citizens and the Districts had to go through the process of getting appropriate immigration documentation. With the current economic conditions, the few positions that are posted have a good pool of qualified applicants.

# SURVEY

### *Methodology*

The survey was conducted online using the software Survey Monkey. This necessitated acquiring email addresses of primary contacts at utilities. The Florida Department of Environmental Protection list of permitted drinking and domestic wastewater facilities was the first data source used. The drinking water treatment plants were sorted by population and the utilities that served a population over 3000 were chosen to receive a survey. Correspondingly, the FDEP list of wastewater facilities was sorted and utilities that produced over .100 MGD were added. Since all utilities on the FDEP lists did not have an email address listed, the FlaWARN (Florida's Water/Wastewater Agency Response Network) primary contacts were added as well as the Water Wastewater Banner Center Steering Committee contacts. The link to the survey was posted on the Banner Center website and representatives from the state associations were also encouraged to distribute to their membership. After sorting for duplications the final list had 428 contacts. To encourage participation in the study, a $250 certificate for training at the University of Florida TREEO Center was offered as an incentive to complete the survey. The survey was active for five days. Ultimately, 116 unique responses were received.

### *Background of Responding Utilities*

The majority of the responding utilities, 77%, are publically owned, 20% are privately owned and 2.6% are contract operated as shown in Figure 4. Most of the utilities (51%) that responded to the survey are small sized with less than 50 employees as shown in Figure 5. The figure shows that 20% have between 51 and 100 employees and 16% between 101 and 250. Four utilities have more than 1000 employees. As shown in Figure 6, 36.5% of the responding utilities serve a population from 10,000 to 50,000 and 27% of the utilities serve less than 10,000 people. Geographically the responding utilities are equally distributed (between 23 and 27%) among the four Florida Water Management Districts: Northwest Florida, St. Johns River, Southwest Florida and South Florida. Only two utilities belong to Suwannee River Water Management District (Figure 7). As shown in Figure 8 the 86% of the utilities provide both drinking water and wastewater services, 9.6% only drinking water and 4.3% wastewater only.

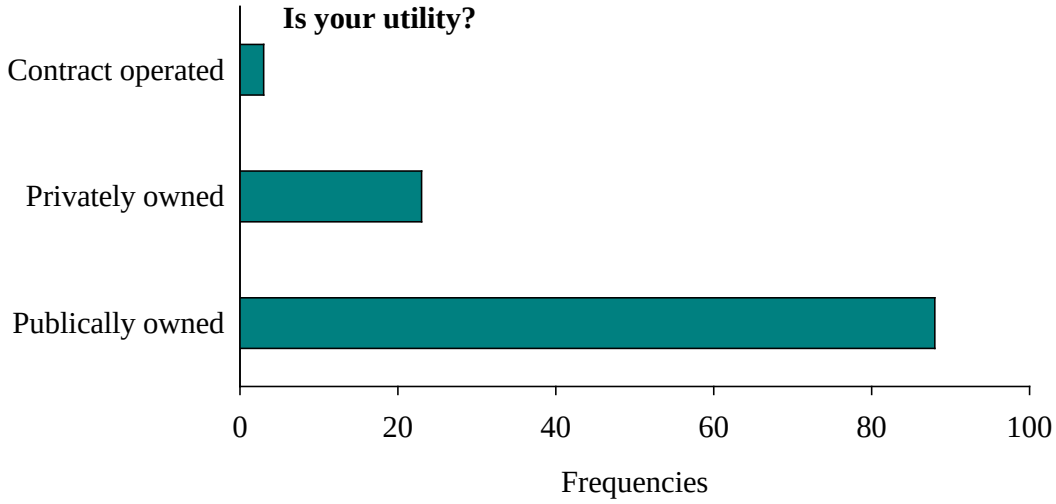


**Figure 4. Characteristics of the respondent utilities**

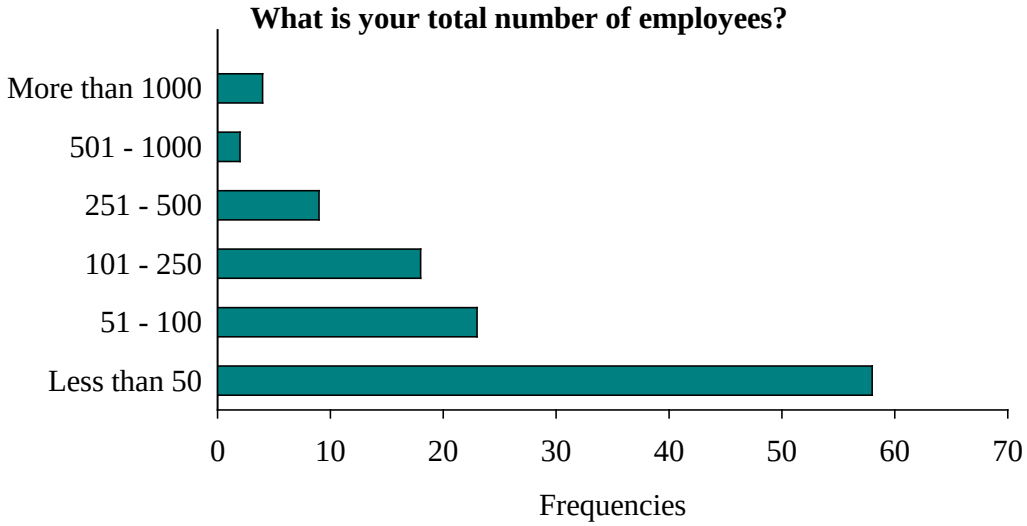


**Figure 5. Number of employees at water utilities in respondent sample**

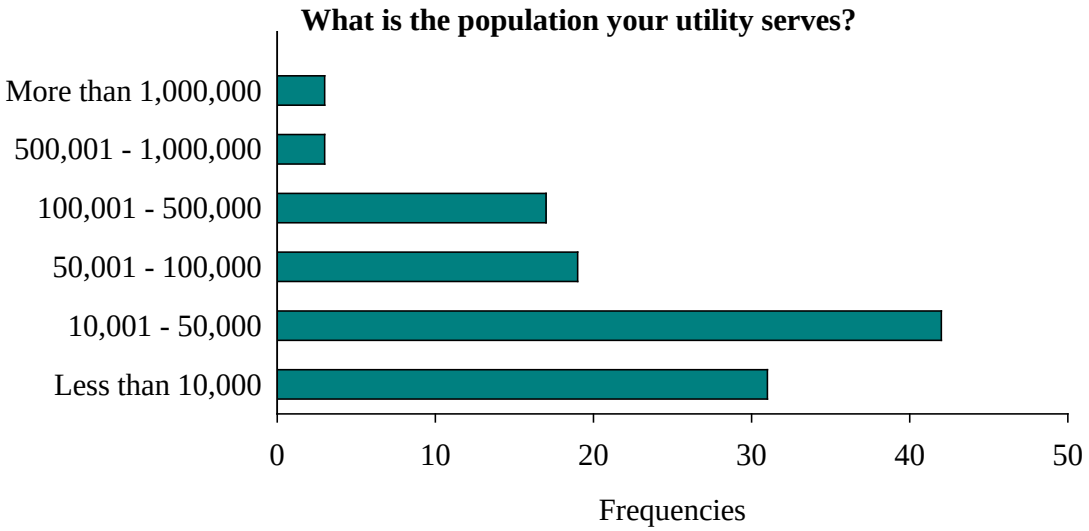


**Figure 6. Population served at water utilities in respondent sample**

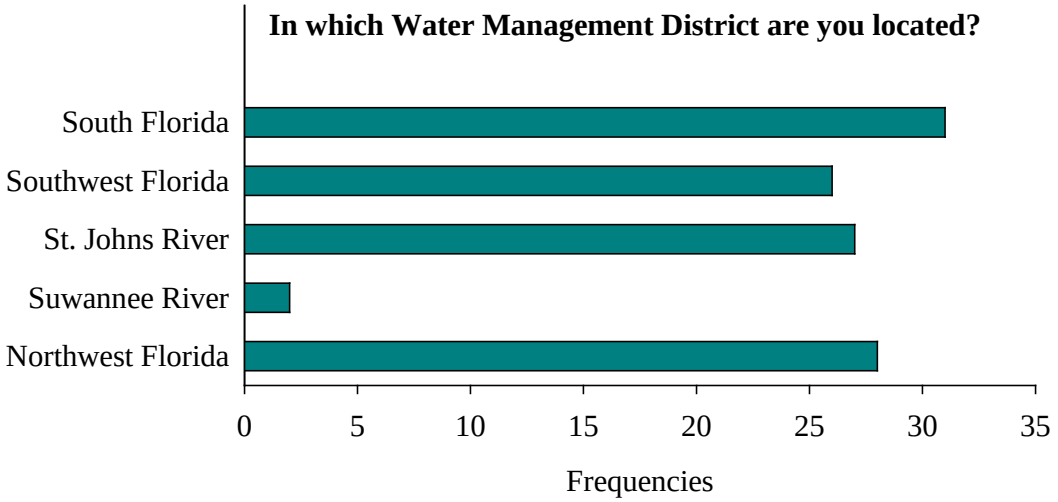


**Figure 7. Number of utilities belonging to each Water Management District**

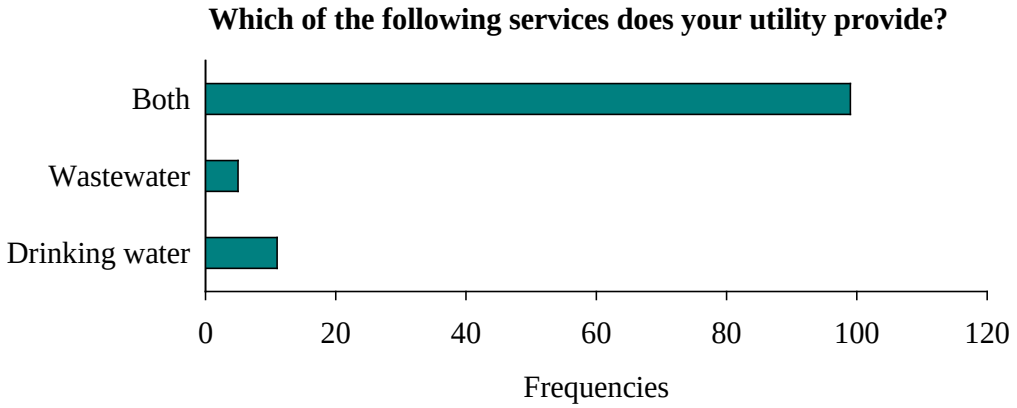


**Figure 8. Services provided by the respondent utilities**

***Critical Occupations***

From the findings of the previous Banner Center survey (*8*) and the Water Research Foundation WSWSI survey (*6*) five critical positions emerged and these positions are here further investigated. These positions are: Collection/Distribution/Transmission System Operator, Electrician/Electronic Maintenance Technician/Instrument Technicians, Lab Technicians, Water/Wastewater Treatment Operators and Mechanic/Other Maintenance Position. The utilities were asked if they were planning on hiring these positions in the next five years and the reasons for hiring them. Results of the survey are shown in Figure 9 to Figure 18. It clearly emerges that the top three required occupations in the next 5 years are the following: Collection/Distribution/Transmission System Operator, Water/Wastewater Treatment Operators and Mechanic/Other Maintenance Position. As for the other positions, 54% of the utilities will hire Electrician/Electronic Maintenance Technician/Instrument Technicians and 25 % will hire Lab Technician Positions. It also clearly emerged that the reason for hiring is mainly for future retirement more than the necessity of new positions within the utilities.

The utilities were asked if during the last two years any employee in the described critical positions deferred retirement due to the economy. As shown in Figure 19, of the 58 responding utilities from 47% to 62% observed that employees from the three categories Collection/Distribution/Transmission System Operator, Water/Wastewater Treatment Operators and Mechanic/Other Maintenance Position deferred their retirement due to the recession period.

The utilities were also asked if in the last two years they experienced delaying filling any of the critical positions due to the lower revenue projections. Interestingly, as shown from Figure 20, besides for Collection/Distribution/Transmission System Operators and partially for Water/Wastewater Treatment Operators and Mechanic/Other Maintenance Position, utilities hiring policy and needs were not greatly affected by the economy.

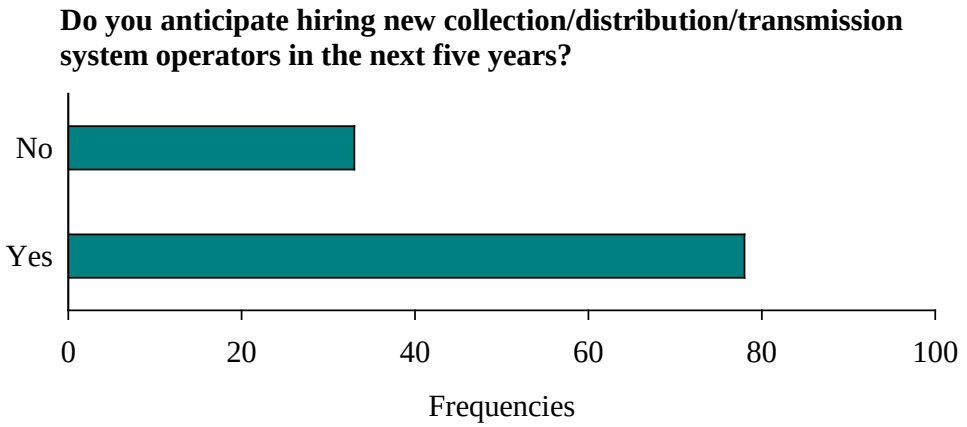


**Figure 9. Hiring projection for Collection/Distribution/Transmission System Operators**

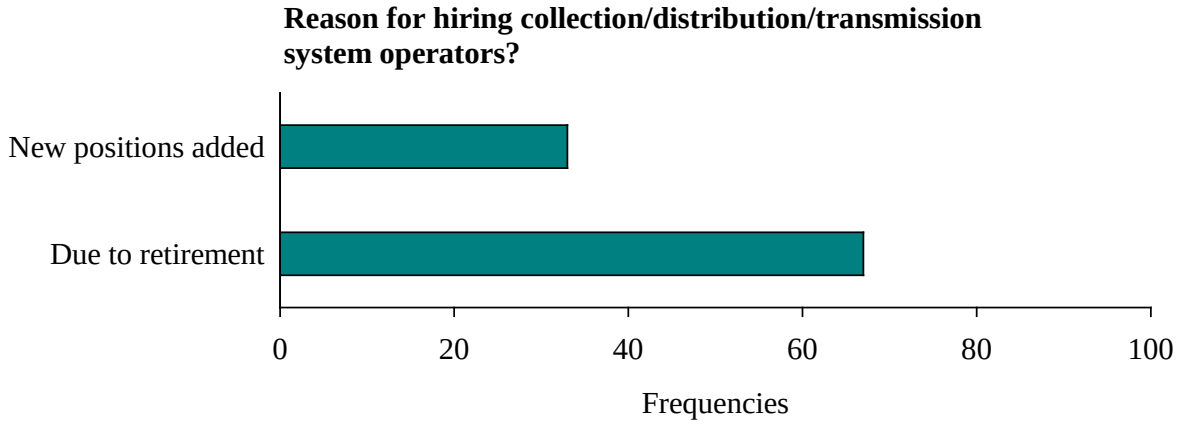


**Figure 10. Reasons for hiring Collection/Distribution/Transmission System Operators**

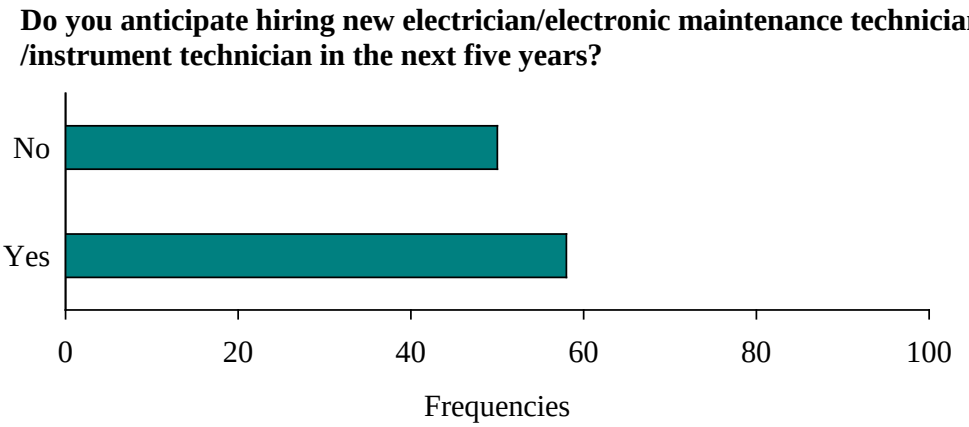


**Figure 11. Hiring projection for Electrician/Electronic Maintenance Technician/Instrument Technicians**

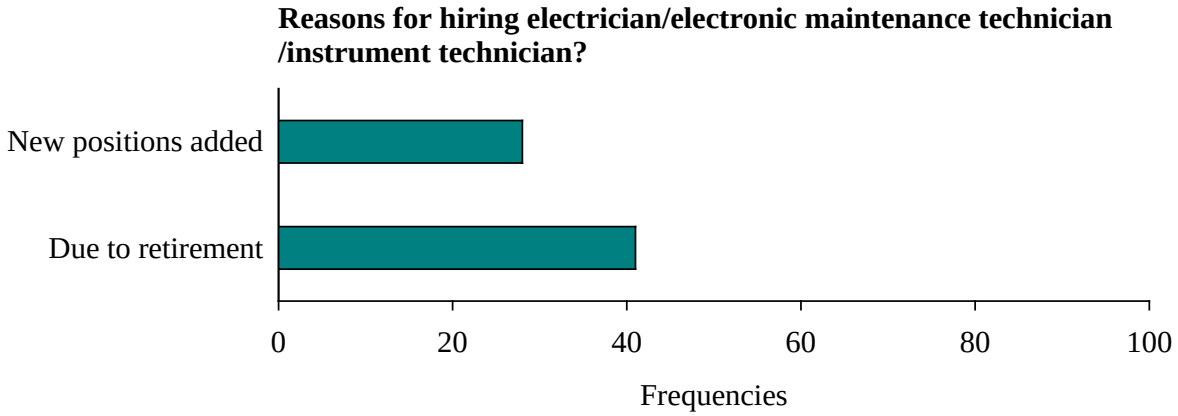


**Figure 12. Reasons for hiring Electrician/Electronic Maintenance Technician/Instrument Technicians**

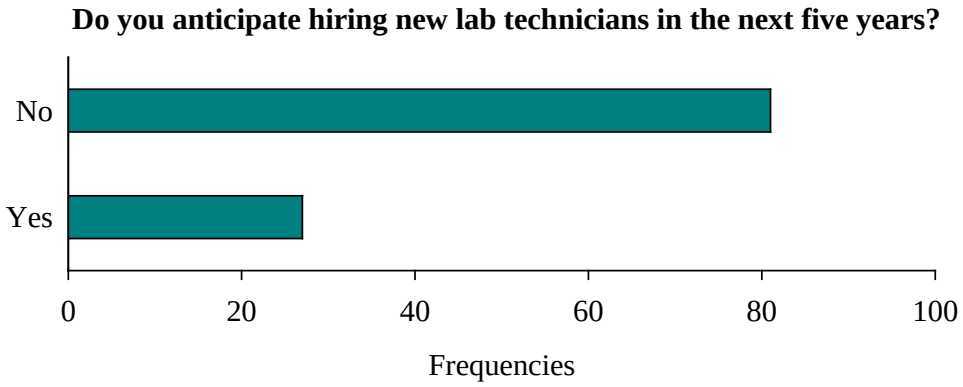


**Figure 13. Hiring projection for Lab Technicians**

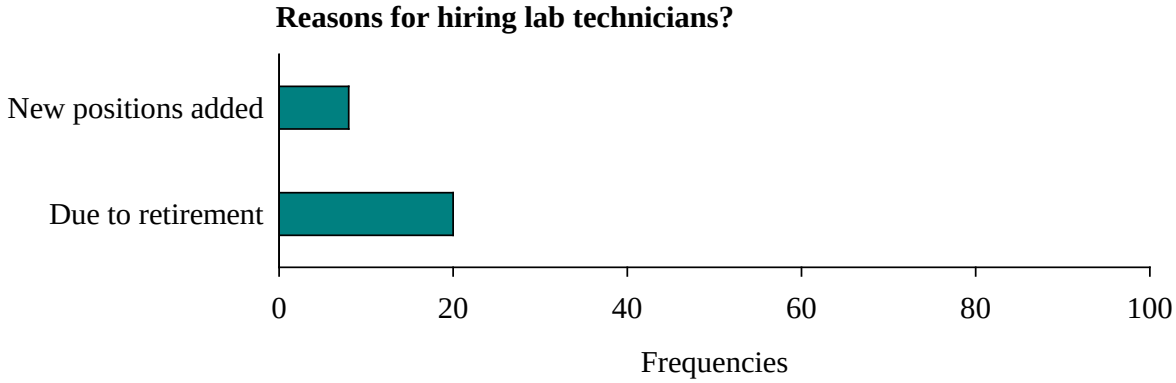


**Figure 14. Reasons for hiring Lab Technicians**

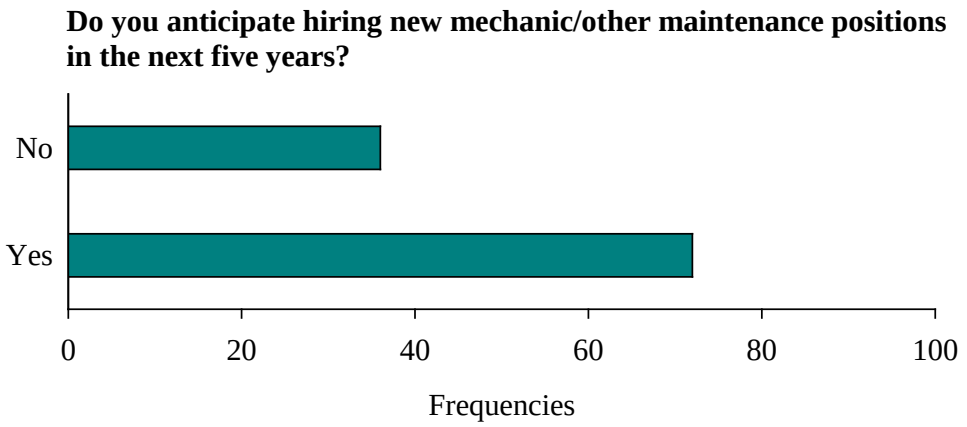


**Figure 15. Hiring projection for Mechanic/Other Maintenance Position**

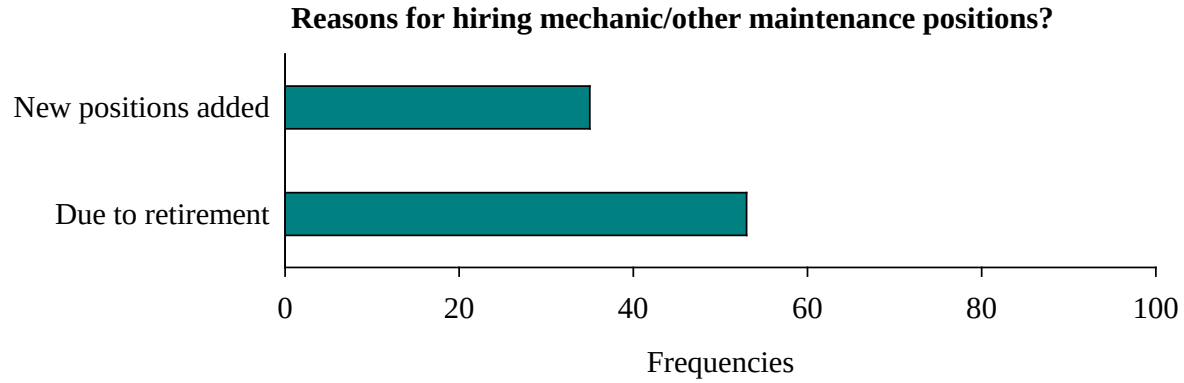


**Figure 16. Reasons for hiring Mechanic/Other Maintenance Position**

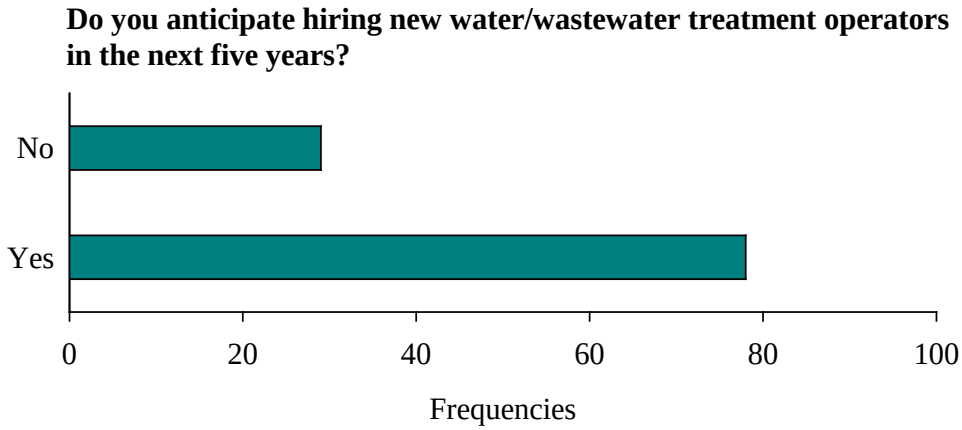


**Figure 17. Hiring projection for Water/Wastewater Treatment Operators**

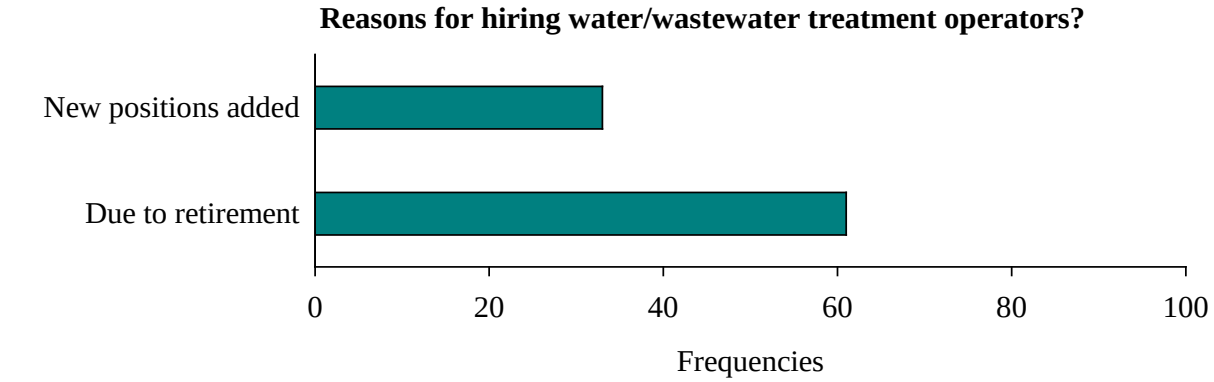


**Figure 18. Reasons for hiring Water/Wastewater Treatment Operators**

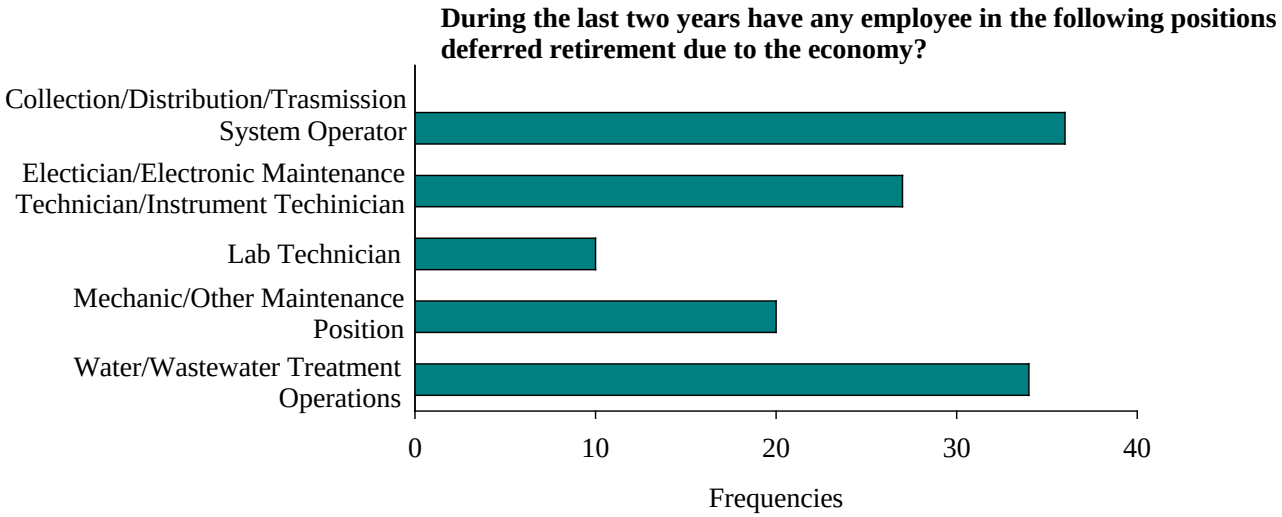


**Figure 19. Influence of the economy in retirement projections**

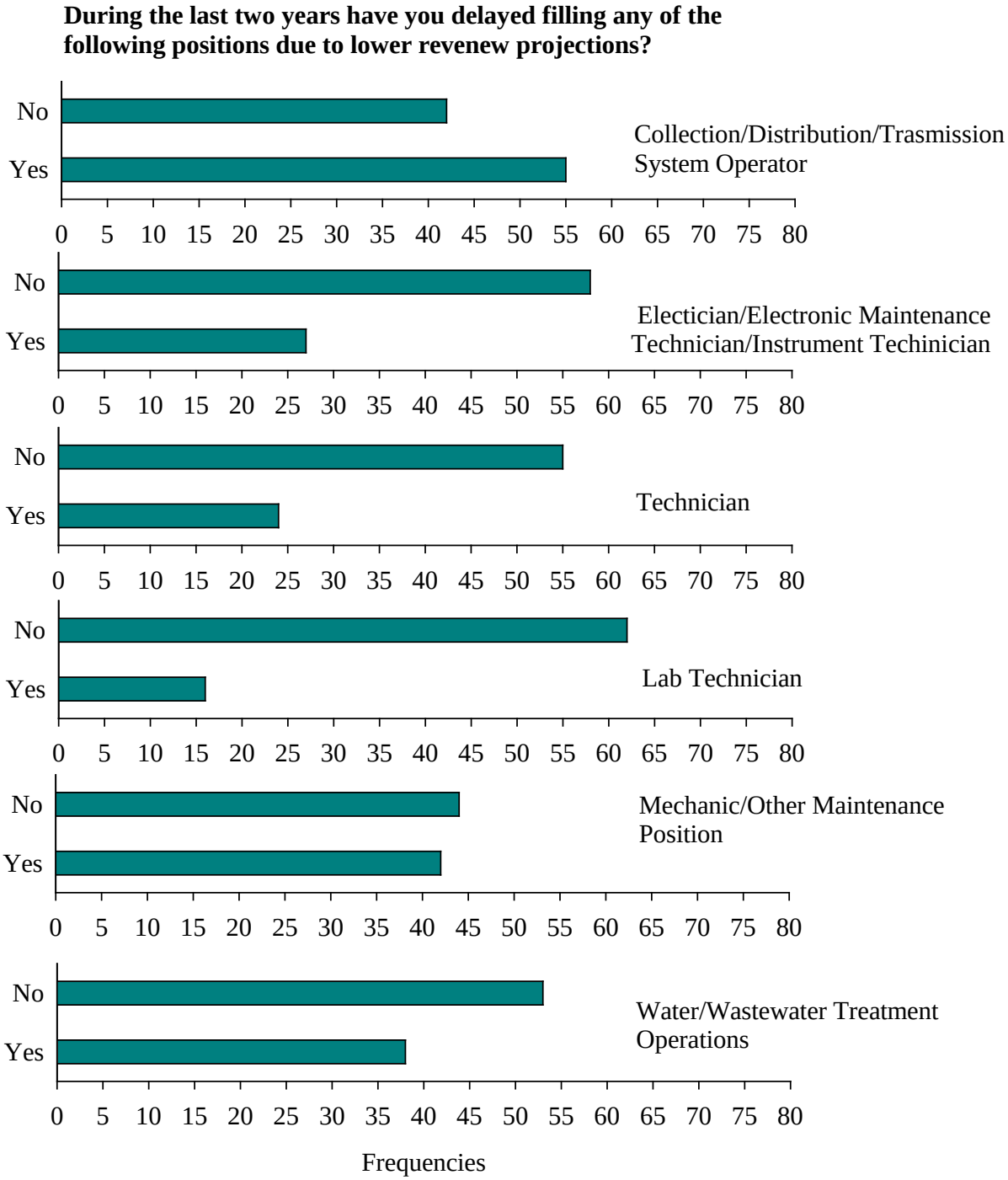


**Figure 20. Influence of the economy in hiring planning**

***Apprenticeship and Internship Programs***

In the Banner Center survey of 2010 eight apprenticeship programs emerged as the best sector wide initiative to help closing the gap in the water industry. From the results of this survey it is shown that 84.3% of the utilities do not have a registered program (Figure 21). Also for 12 utilities out of 18 apprenticeship programs are not the main source to hire trained operators (Figure 22). The utilities were asked to list the barriers to implementing apprenticeship programs. From Figure 23 it emerges that the lack of staff to supervise the programs as well as the lack of curriculum and prohibitive costs are seen as barriers. For few utilities the insurance or workers compensation as well as the age restrictions are considered barriers for this initiative. Among the other impediments or difficulties listed by the utilities there were the small size (that is related to lack of staff and costs) or the management that does not value this initiative. Other utilities do not see the need for these programs having enough already trained applicants to positions.

Some of the utilities showed a lack of knowledge on the requirements to start this program. Other utilities had an apprenticeship program in the past and think it is not needed now or did not benefit from it at the time.
As for internship programs for operators, 70% of the responding utilities do not have one (Figure 24).

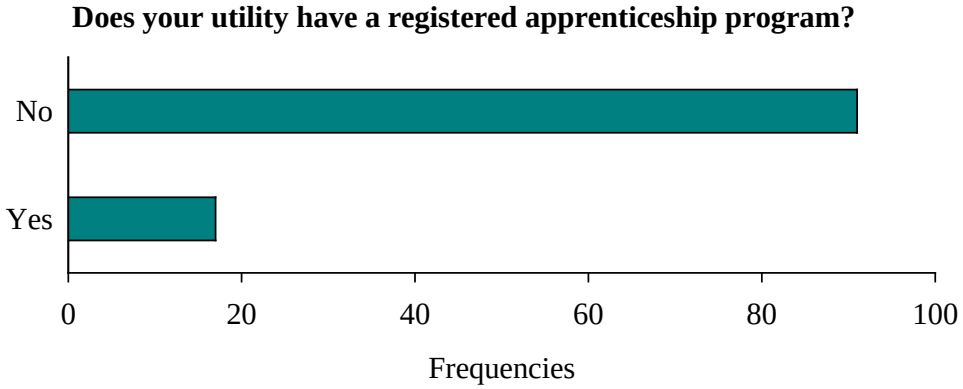


**Figure 21. Apprenticeship programs at respondent utilities**

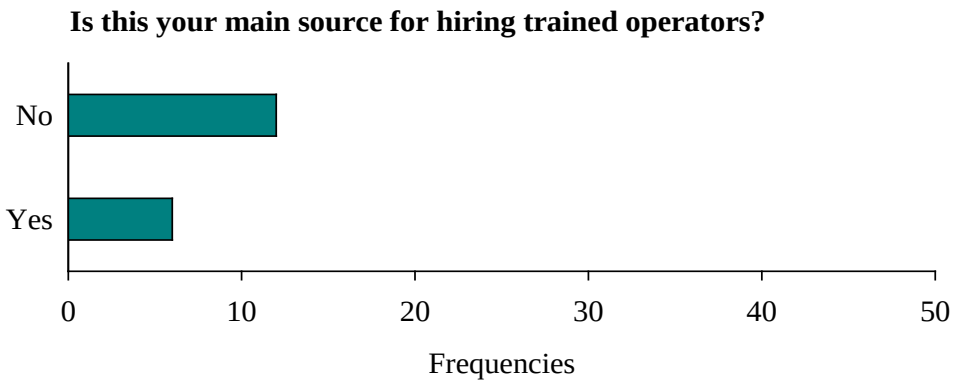


**Figure 22. Utility Sources for hiring trained operators**

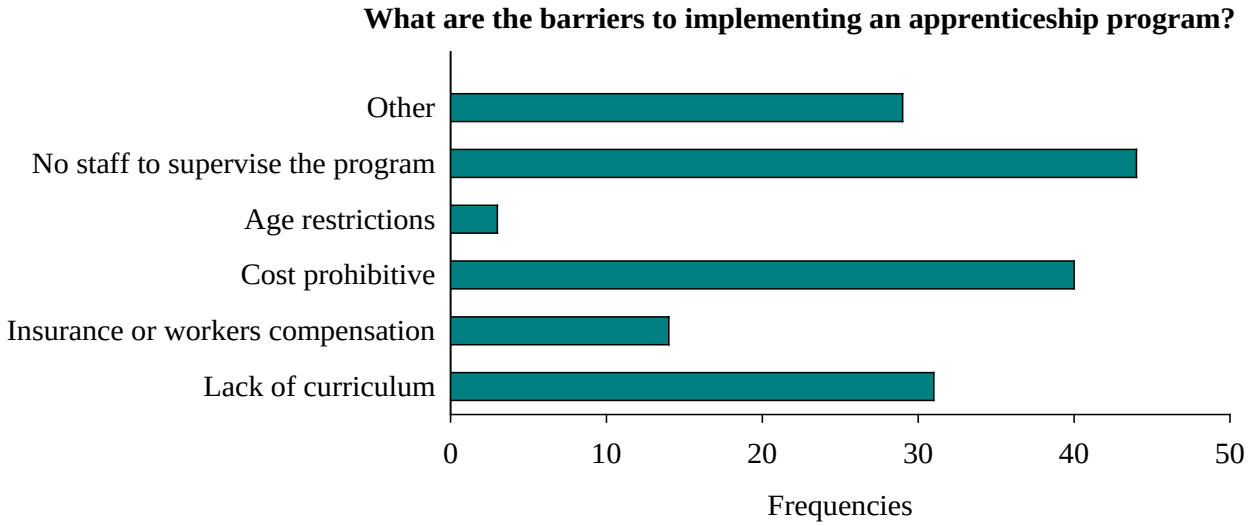


**Figure 23. Barriers to implementing apprenticeship programs**

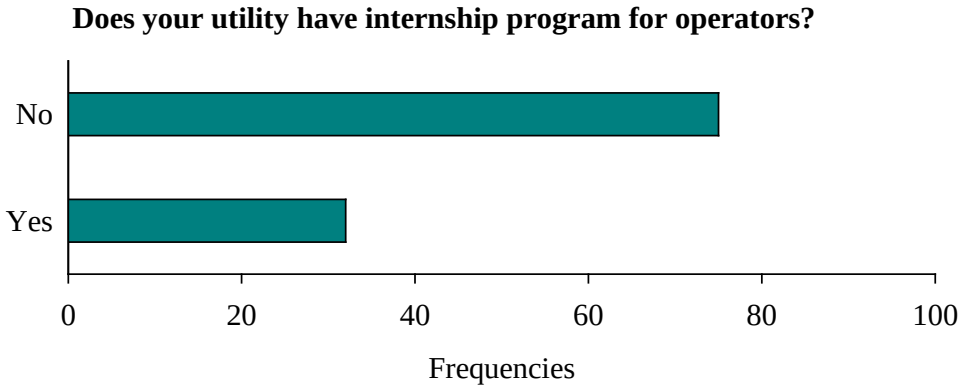


**Figure 24. Internship programs at respondent utilities**

***Hiring Policy for Ex-offenders***

This survey investigates the potential that ex-offenders have in filling the workforce needs in the water industry. The majority of the utilities, 60% do not hire ex-offenders, but 41 of 102 responding utilities do hire ex-offenders (Figure 25). When hiring ex-offenders, only 30% of the utilities require operator licenses (Figure 26). In terms of retention rate of ex-offenders compared to non-ex-offenders, the 70% of the utilities expressed no difference (Figure 27).

The utilities were also asked to list the challenges to hiring ex-offenders. Few utilities (six out of 59) do not see any challenge. For the rest, the main challenges noted include, reliability, trust, public relations, and security issues (26 utilities). For few utilities (seven) it depends on the nature of the offense and the nature of the position. For some utilities it is against the management/human resources policy to hire ex-offenders. Some utilities reported non-satisfactory past experiences. Others had limited experience with this situation. Some other utilities express the fact that there are sufficient non-ex-offenders applicants. The lack of driver license is mentioned by one utility as a challenge. Only one utility mentioned that holding an operator license can definitely help. The fact that utility crosses multiple counties that could result in violation of terms of probation was listed by one utility. One utility mentioned a past experience rated above satisfactory.

The utilities were also asked if the Banner Center could offer any assistance in the future to encourage hiring ex-offenders. Only few utilities proposed to offer training and certify ex-offender as well as provide a list of certified ex-offenders to the utilities. A proposed initiative from one utility is to provide initial trial funding for a period of one to six months.

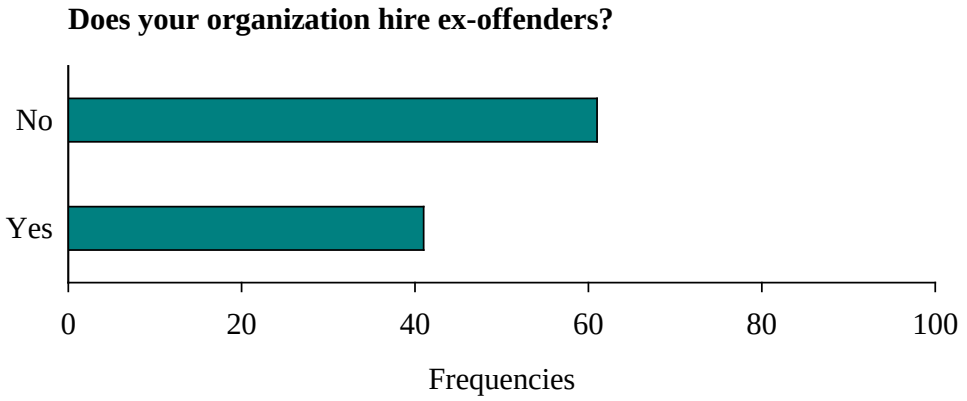


**Figure 25. Hiring policy for ex-offenders at respondent utilities**

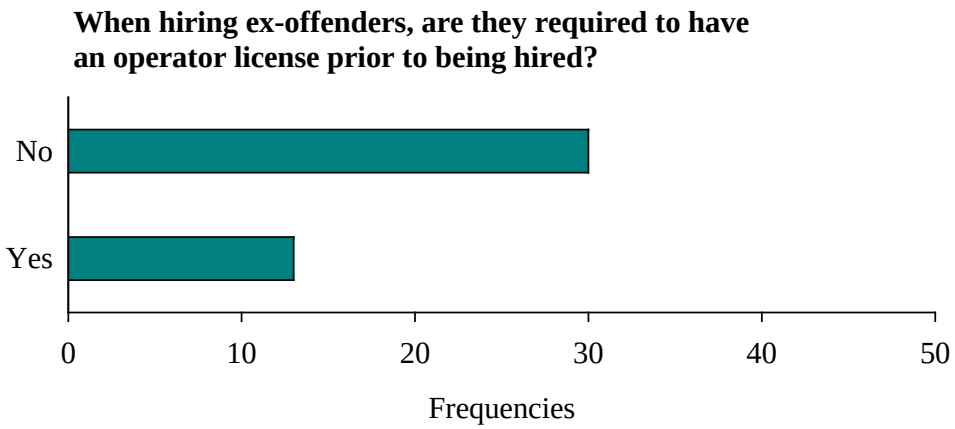


**Figure 26. Licenses requirement in hiring ex-offenders**

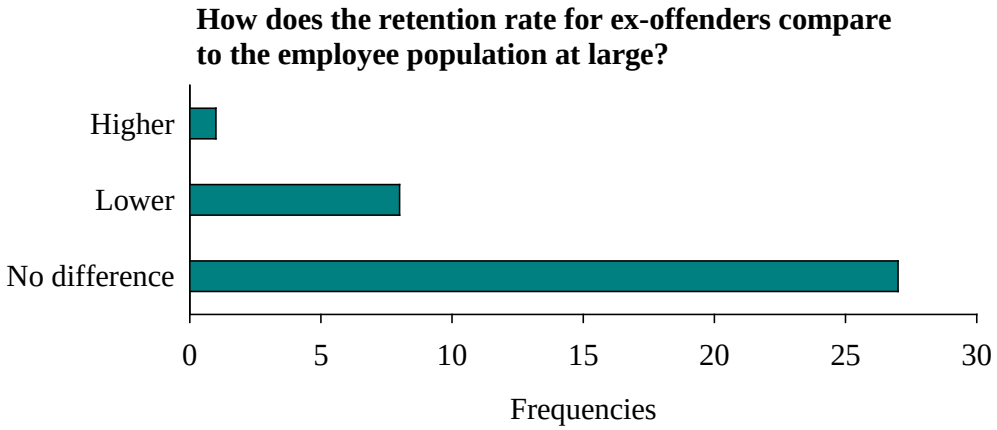


**Figure 27. Retention rate for ex-offenders**

# FUTURE CHALLENGES IN THE WATER SECTOR

In this section three future challenges that will impact the water industry in the years in terms also of occupation are reported and ongoing projects in Florida are highlighted. In particular the increasing population growth and water demand, the consequent increasing urbanization and stormwater control for the protection of water bodies and the emerging pollutants are discussed in detail.

***Population growth and water demand***

The main future challenge in the water industry is the increasing population growth in Florida and the consequent water demand and wastewater treatment with more rigorous regulatory requirements for drinking water, wastewater effluent and stormwater discharges. Florida population in millions is reported in Figure 28 from 1900 to 2010 with a projection for population growth until 2030 (Census Bureau Data).

In a 2009 study of the U.S. Geological Survey on water use and trends in Florida in 2005 (*9*) it was reported that between 1950 and 2005, the population of Florida increased by 15.15 million (550 %), and the total water withdrawals (fresh and saline) increased 15,700 Mgal/d (600 %).

Between 1990 and 2005, saline-water withdrawals increased 1,120 Mgal/d (million gallons per day) (11 %), whereas between 2000 and 2005, they decreased 470 Mgal/d (4 %). Between 1990 and 2005, freshwater withdrawals decreased 710 Mgal/d (9 %), whereas between 2000 and 2005, they decreased 1,320 Mgal/d (16 %).

The use of highly mineralized groundwater as a source of supply, primarily for public supply, also has increased in Florida. This water, referred to as non-potable water, increased from just less than 2 Mgal/d in 1970, to 142 Mgal/d in 2005. Non-potable water is treated to meet drinking-water standards and is mostly used along the east and west coasts of central and south Florida.

It is noticeable that the use of reclaimed wastewater increased from 206 Mgal/d in 1986 to nearly 660 Mgal/d in 2005. About one-half of the reclaimed wastewater flow in 2005 was used to reduce potable-quality water withdrawals for urban irrigation, agricultural irrigation, and industrial use, but one-third of the reclaimed wastewater was returned to available water supplies as aquifer recharge.

Water re-use is increasing and it is interesting to observe the creation of initiatives like the South Tampa Area Reclaim (STAR) Project (*10*). It is an innovative approach to reduce the City of Tampa's potable water demands by using the high quality reclaimed water from the Howard F. Curren Advanced Wastewater Treatment Plant (AWTP) to satisfy the water demands of high-

volume irrigation users in South Tampa. After two summers of drought the City recognized the opportunity to conserve its valuable and limited potable water resources by expanding the existing reclaimed water systems.

The reclaimed water produced at the plant meets criteria established by the Florida Department of Environmental Protection (FDEP) for public access reuse for irrigation, as well as, for other non-potable uses. The AWTP currently receives and treats an annual average flow of approximately 55 – 60 million gallons per day (MGD). Much of this treated wastewater was at the time discharged to Hillsborough Bay through a permit from FDEP.

The City had existing reclaimed water systems that used approximately 2 MGD for irrigation and cooling, which is a small fraction of the reclaimed water produced.

In 1999, the STAR project evolved into a team effort between the Water Department and the City's Wastewater Department. This joint venture completed several preliminary design efforts, including a financial feasibility analysis and a preliminary route study. Both departments have received favorable response from the public to the project through neighborhood meetings, communication with civic associations, and a public opinion survey. Very clear information are available on the City of Tampa website with a brochure and frequently asked questions. The price for a unit of reclaimed water consisting in 748 gallons is $1.20.

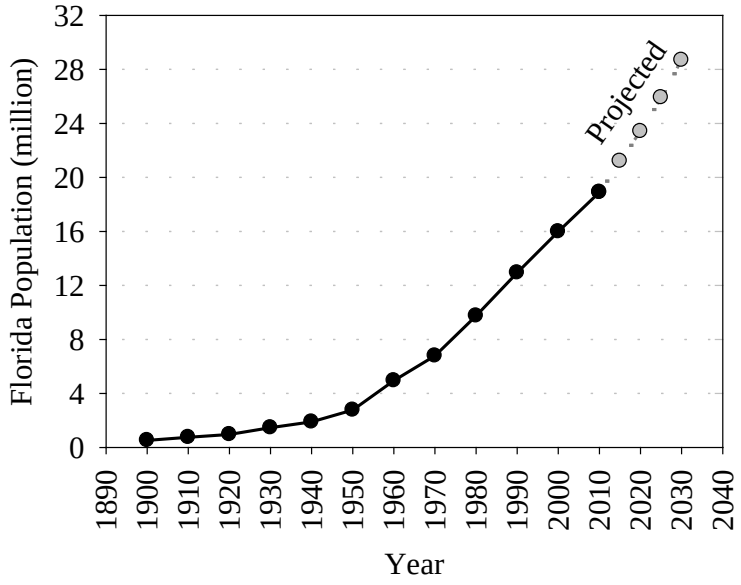


**Figure 28. Population growth in Florida (U.S. Census Bureau)**

***Impacts of rainfall-runoff control and treatment on workforce needs***

Since the passage of the 1972 Clean Water Act, control and treatment of rainfall-runoff (storm water) discharges became the most recent water treatment and reuse challenge (*11*).

As a consequence of population growth, urbanization has increased. In 1965, 1.2 million acres of land in the State of Florida were urbanized. By 1997 more than 5 million acres of land had been converted for urban use (Figure 29). Between 2000 and 2020 other 2.6 million acres of land are expected to become impervious urbanized areas (*12*). With urbanization, stormwater control became an issue in terms of quantity and quality. Stormwater runoff discharges from the urban environment have been identified as one of the major causes of quality deterioration in receiving water bodies. Rainfall-runoff from urbanized areas transports significant loads of particulate solids, metals, nutrients, pathogens, as well as inorganic and organic compounds. Loads and concentrations of these constituents are significantly above ambient background levels and, for many land uses, can exceed surface water discharge criteria on an event or long-term basis.

Since the National Pollutant Discharge Elimination System (NPDES) Stormwater Phase I permitting regulations in the 1980s, there has been a proliferation of stormwater control systems, including the Best Management Practices (BMP). However, experience over the last decade has demonstrated that there continues to be a significant gap in knowledge between BMP design/analysis/monitoring and the hydrologic, physical, and chemical processes in rainfall-runoff loadings. Such knowledge is critical to the success of a new generation of control strategies, BMPs, sustainable urban development (SUD) or low impact development (LID) concepts that will develop in response to ecological, environmental, and regulatory conditions, for example, the recent Phase II Storm Water Final Rule. The future challenge is to control storm water runoff while restoring the pre-development/urbanization hydrology.

Why monitoring and controlling stormwater is more challenging compared to wastewater or drinking water? First of all there is lack of knowledge of the pollutants that need to be targeted in stormwater runoff and the nature of these constituents is site specific and secondly the volume that requires control and treatment is unknown depending on rainfall events, catchment characteristics, land use, anthropogenic activities (like vehicular traffic), pollutant transport process and nature of pollutants (dissolved or bound to particles). Flow and loading variability in rainfall runoff can change by orders of magnitude during an event.

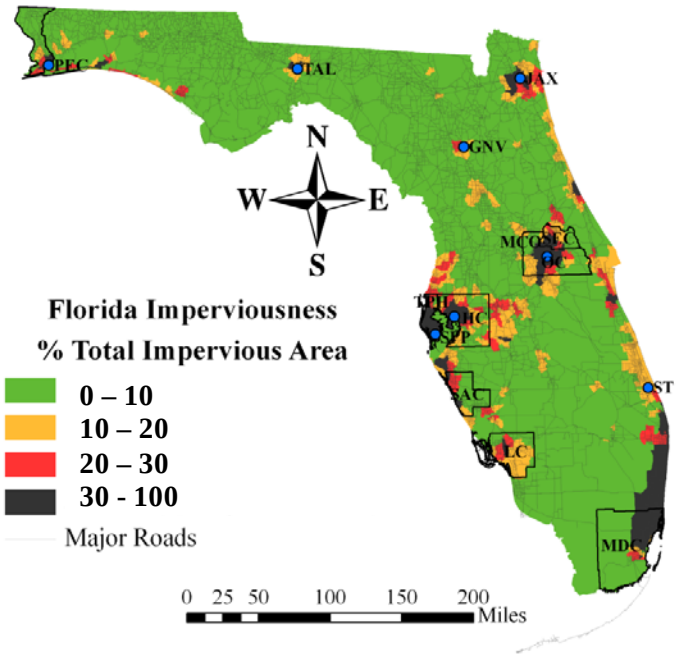


**Figure 29 % Total Impervious Area for the State of Florida**

Structural rainfall runoff treatment systems are needed and will become a permanent component of rainfall-runoff treatment, control, and reuse, but structural solutions alone are not economically sustainable and often difficult to realize. Source control must be an integral part of rainfall-runoff treatment, control, and reuse. Non-structural solutions like street sweeping, catch basin cleaning can provide a great source control. Also regular maintenance of existing BMPs has to be included in the operations for stormwater control.

In Florida new restrictive regulations will impact the future of the water management industry. In particular great attention has been given to nutrients. The U.S EPA's Final Rule for Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters (*13*) poses big challenge for the stormwater and waste water sector. Stormwater and wastewater discharges are at the moment one order of magnitude higher than some of the criteria for lakes, springs and streams. In the future source control and more efficient treatment solutions will need to be implemented with a projected need of researchers, civil and environmental engineers, lab technicians, maintenance positions and treatment operators.

Phosphorus (P) is a limiting nutrient and is considered a major constituent of concern for the ecological health of surface and groundwater. Urban anthropogenic activities and urban design practices within the built environments, such as the proliferation of imperviousness, significantly

increase nutrient inputs such that eutrophication is now regarded as a significant stressor to inland and coastal ecosystem health

In a recent study sponsored by the Florida Department of Environmental Protection (FDEP) (*14*, *15*), Berretta and Sansalone showed the high concentration of phosphorus in rainfall runoff from a landscaped parking lot at the University of Florida. A mean total phosphorus concentration of 3.6 mg/L resulted from 15 monitored rainfall events. Phosphorus in the urban environment resulted to be mainly bound to particulate matter while 30% is in dissolved form. By analyzing the dissolved form, that requires more advanced treatment systems, it resulted that more of the 90% of dissolved phosphorus consist of orthophosphates, which are the most direct bioavailable form for algae.

As an example of conjunct effort for stormwater source control, in 2010 the Department of Environmental Engineering Sciences (EES) of the University of Florida conducted a study sponsored by the Florida Stormwater Association Educational Foundation (FSAEF) and the Florida Department of Environmental Protection (FDEP) to quantify the nutrient loads associated with urban particulate matter and biogenic/litter recovery through maintenance practices of stormwater management systems (*16*).

This knowledge represents a defensible foundation to build the allocation of stormwater load reduction credits for maintenance practices. These maintenance practices remove particulate matter (PM) from the urban inventory of solids that are transported and stored in stormwater management systems. Importantly, this particulate matter contains nutrients (and other constituents, like metals) that result from the interaction and imposition of anthropogenic activities and urban infrastructure design practices/materials on the hydrologic cycle. Particulate Matter samples were collected from fourteen MS4s (municipal separate storm sewer systems) across Florida (Gainesville, Hillsborough County, Jacksonville, Lee County, Miami-Dade County, Orange County, Orlando, Pensacola/Escambia County, Sarasota County, Seminole County, St. Petersburg/Pinellas County, Stuart, Tallahassee, Tampa), from three different maintenance practices, in particular, street sweeping, catch basins cleaning, and BMPs maintenance, and in three independent locations in areas characterized by different land uses (commercial, residential and highways) for a total of 27 particulate samples per MS4. Three of these MS4s collected another set of 27 samples in areas characterized by the use of reclaimed wastewater. The samples were analyzed for nutrients, total phosphorus and nitrogen to measure for Florida the amount of nutrients removed by removing particles through maintenance practices.

In the Florida Stormwater Association 2011 Stormwater Utilities Survey is reported that there are 154 local governments that have established stormwater utilities pursuant to Chapter 403, Florida Statutes or their own home rule powers. The number of stormwater utilities is expected to continue to increase for several reasons: The Florida Supreme Court has consistently upheld the validity of stormwater fees; there is more public support for funding programs with users' fees as opposed to ad valorem or other general taxes; the process of implementing the multi-billion dollar Total Maximum Daily Loads (TMDL) program in Florida that is now beginning to take full effect.

Eighty-one utilities responded to the survey. The highest percentage of the total stormwater program's annual budget is allocated to the Operation and Maintenance (Field Activities) Personnel.

In this framework rainfall runoff control has an important future as an environmental discipline, as a research direction, and as an industry. As an industry, the market for rainfall-runoff treatment systems is doubling every three to four years and is currently a $100+ million treatment industry. Rainfall-runoff treatment, control, and reuse will become the environmental industry of this century in the U.S.

There will be a need for researchers, engineers, and operators in the stormwater industry and new curricula need to be implemented to address this new challenge. The technological skills of the workforce in the overall urban water sector will have to be upgraded through education and training, so new courses and training programs need to be developed.

***Impacts of Emerging Pollutants on Workforce Needs***

Emerging pollutants are pollutants that have been recently discovered in the environment such as endocrinal disruptors resulting of some organic compounds degradation or introduction of medicine in the natural environment (*17*). Emerging Contaminants are suspected of causing adverse effects in humans and wildlife. Active hormonal substances are being widely used in human and veterinary medicine such as estrogens, anti-inflammatory cortico-steroids and anabolic androgens.

Surface water contaminated by municipal and industrial sources, and diffuse pollution sources from urban and agricultural areas continue to build up pollution levels in the environment. Numerous field studies, designed to provide basic scientific information related to the occurrence and potential transport of contaminants in the environment are being continuously conducted with the aim to identify which contaminants enter the environment, at what concentrations, and in what combinations. A large body of literature exists on occurrence of specific groups of organic contaminants in the environment. However, in the past research priorities have focused on priority pollutants, such as POPs, pesticides, toxic metals, radionuclides. Only recently, the attention of the scientific community has started to shift to emerging contaminants. Therefore, a major challenge will be to identify the chemicals which potentially will become dangerous in the

future. It has to be cleared if it is sufficient to look (just) for persistent, high flux, toxic, endocrine active compounds.

The major sources of environmentally relevant emerging contaminants are primarily wastewater treatment plants effluents, and secondarily terrestrial run-offs (roofs, pavement, roads, agricultural land) including atmospheric deposition. Characteristic of some contaminants is that they do not need to be persistent in the environment to cause negative effects since their high transformation/removal rate is compensated by their continuous introduction into the environment. For most of the occurring emerging contaminants, risk assessment and ecotoxicological data are not available and therefore it is difficult to predict which health effects they may have on humans, terrestrial and aquatic organisms, and ecosystems. Also the budgets (sources, entry routes, and fate) for environmental pollutants would be of importance. Table. 6 summarizes the data regarding the occurrence of several emerging contaminants in the environment.

**Table 6. Selected emerging contaminants.**

| **Compound** | **Origin** | **Persistence Bioaccumulation** | **Observed in environment** |
|---|---|---|---|
| Nonylphenol | Degradation product of non ionic surfactants | Medium persistent Bioaccumulative | Soil Sediment Sludge Water |
| Bisphenol A | Plastics | Not bioaccumulative | Surface water Groundwater |
| Phthalates | Plastics | Low to medium persistent atmospheric deposition | Water Sediment Sludge |
| PBDE | Flame retardant | Persistent/highly accumulative atmospheric deposition | Sediment Soil Sludge |
| $C_{10}$-$C_{13}$ chloroalkanes | Flame retardant | Persistent/ bioaccumulative | Surface water |
| Sulphonamides | Human and veterinary drug | Slightly-very persistent | Groundwater |
| Tetracyclines | Human and veterinary drug | Moderately-very persistent | Groundwater Soil Sludge |
| Steroid sex hormones | Contraceptives | Moderately persistent | Water Sediment Sludge |
| MTBE | Gasoline additive | Persistent Not bioaccumulative - but ubiquitous in the atmosphere | Groundwater |

In Florida in 2004 the U.S. Geological Survey, in cooperation with the Comprehensive Everglades Restoration Plan Wastewater Reuse Technology Pilot Project Delivery Team, initiated a study to assess the presence of emerging contaminants of concern in the South District Wastewater Treatment Plant influent and effluent using current wastewater-treatment methods (*18*).

The Comprehensive Everglades Restoration Plan has identified highly treated wastewater as a possible water source for the restoration of natural water flows and hydroperiods in selected coastal areas, including the Biscayne Bay coastal wetlands. One potential source of reclaimed wastewater for the Biscayne Bay coastal wetlands is the effluent from the South District Wastewater Treatment Plant in southern Miami-Dade County. Samples were tested for detection of household and industrial (organic) wastewater compounds, pharmaceutical compounds, antibiotic compounds, and hormones in influent. Two "known" endocrine disrupting compounds (17 beta-estradiol (E2) and diethoxynonylphenol) and four "suspected" endocrine-disrupting compounds(1,4-dichlorobenzene, benzophenone, tris(2-chloroethyl) phosphate, and tris(dichloroisopropyl) phosphate) were detected during these sampling events. Phenanthrene and indole showed the greatest concentration ranges and highest concentrations for the organic wastewater compounds. Acetaminophen showed the greatest concentration range and highest concentration, and warfarin showed the smallest concentration range for the pharmaceutical compounds. Sulfamethoxazole (a sulfonamide) showed the greatest concentration range and highest concentration, and sulfathiozole (also a sulfonamide) showed the smallest concentration range for the antibiotic compounds. Two hormones, 17 beta-estradiol (E2) and estrone (E1), were detected in influent. Samples were also tested for detection of organic wastewater compounds, pharmaceutical compounds, antibiotic compounds, and hormones in effluent. Indole showed the greatest concentration range and highest concentration, and triphenyl phosphate showed the smallest concentration range for the organic wastewater compounds. Dehydronifedipine showed the greatest concentration range and highest concentration, and warfarin had the smallest concentration range for the pharmaceutical compounds. Anhydro-erythromycin (a macrolide degradation product) showed the greatest concentration range, and sulfadiazine (a sulfonamide) and tetracycline showed the lowest concentration ranges for the antibiotic compounds. One hormone, 17 beta-estradiol (E2), was detected in effluent.

More advanced targeted treatment will be needed in order to meet new criteria for water bodies and for drinking water and control emerging pollutants. The necessity for advanced water and wastewater treatment such as membranes and ultraviolet disinfection to respond to regulatory requirements will require upgraded technological skills of the workforce. Education and training programs that include these technologies and emerging pollutants knowledge need to be developed. It is projected there will be a need for researchers, civil and environmental engineers, lab technicians, maintenance positions and treatment operators.

Furthermore, in the next years, due to the new regulations on water quality, stormwater control and emerging pollutants, there will be an increasing effort in monitoring programs. Monitoring discharges from urban environment or industrial sites as well as water bodies' quality will be the instrument to address current issues as well as control new treatments and initiatives' efficiency.

# CONCLUSIONS

This study investigated the workforce needs in Florida in the water industry sector by reviewing previous studies, analyzing statistics and projections, conducting a survey that reached 116 utilities and by looking at the future challenges that will impact the water industry in the coming years.

Findings of this study revealed that the demand of operators in the category Water and Liquid Waste Treatment Plant and System Operators in Florida is projected to increase significantly in the next 7 years with an increase rate of 130 jobs per year. In the field of water this job category together with civil engineers are considered among the fastest growing occupations.

By observing the actual workforce in the state of Florida, and in particular the category of operators in the water industry it emerges that the average age of active and inactive drinking water and wastewater license holders in 2007 was 50 years while in 2011 is 51. In 2011 almost 40% of the license holders are in the 51- 60 years range with 30% in the range 41 - 50 years. The results of this study also show the small percentage of operators younger than 30 years.
In the last two license cycles from 2007 it is promising to observe that the number of new licenses issued is higher if compared with the operators leaving the profession.

From the data of the State of Florida Department of Education it emerges that the enrollment in technical programs for operators is very low and has decreased significantly in the last years from 2003.

Findings of the survey showed that the top three required occupations in the next 5 years are the following: Collection/Distribution/Transmission System Operator, Water/Wastewater Treatment Operators and Mechanic/Other Maintenance Position. The main reason for future hiring is the retirement of the actual employees and not the need for new positions. The employees in these three categories chose to defer their retirement due to the recession period.

The majority of the utilities responding to the survey do not have apprenticeship and internship programs. It emerged that the lack of staff to supervise the programs as well as the lack of curriculum and prohibitive costs are seen as the major barriers for developing these programs.

This survey investigated the potential ex-offenders have in filling the workforce need in the water industry. The results show that the majority of the utilities do not hire ex-offenders. The main challenges in hiring them were the reliability, trust, the need to work in contact with public and security issues.

A future need of researchers, engineers, and operators is projected in Florida to address the increasing population growth and water demand, the consequent increasing urbanization and stormwater control for the protection of water bodies, also according to the new regulations, and the emerging pollutants.

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UNIVERSITY OF SOUTH FLORIDA

DR. KIRAN C. PATEL CENTER FOR

Global Solutions

# Needs Assessment for Florida's Workforce in the Water Services Industry

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February 10, 2010

**Abstract**: This study was performed as part of the Employ Florida Banner Center for Water Resources, in order to assess the current state of the workforce in the water services industry in the State of Florida. Industry experts, both in Florida and nation-wide, have predicted an imminent shortfall in the number of workers available to fill jobs in the water services industry. Evidence from previous studies, conversations with industry experts, and a survey confirm that the three most vulnerable occupations are *Water/Wastewater Treatment Operators*; *Collection/Distribution/ Transmission System Operator*; and, *Lab Technician/Mechanic/ Other Maintenance Position*. These shortfalls can be ameliorated with improved training and better marketing, as well as improved compensation packages. Much of the workforce development should take place as a state-wide effort, for which the Banner Center is aptly suited.

**Needs Assessment for Florida's Workforce in the Water Services Industry**

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## Needs Assessment for Florida's Workforce in the Water Services Industry[1]

### I. Introduction

Recognizing an impending shortage in the labor market for Florida's water and wastewater operations, Workforce Florida, the State's board for carrying out workforce policy, programs and services, created an Employ Florida Banner Center for Water Resources in 2009. The task of the Banner Center was to address both the lack of potential employees in the field as well as the need to upgrade the skills of those already working in the water and wastewater sectors.

The threats to the future of the workforce in water and wastewater in Florida are not unique to our state. As seen throughout the country, the current workforce is aging and faces a large wave of retirements in the near future. According to the Florida Department of Environmental Protection, half of current water and wastewater utility operators are projected to retire within the next five years. This leaves a large gap not just in terms of manpower for plant operations and management, but also in terms of the knowledge and experience that will leave with these workers. Of those who remain, stricter national and state regulations will impact their skill requirements. Providing water and wastewater services in the face of climate change, urbanization and increasing consumer demands will require innovative approaches which will add to the burdens on current and future workers. As necessary upgrades are made to Florida's infrastructure, the technological skills of the workforce will have to be similarly upgraded. Terrorism and natural disasters provide further challenges to the existing and incoming workforce. At the same time, younger generations of would-be employees are not attracted to jobs in the industry.

This description is based largely on anecdotal evidence, heard around the State as well as around the country. In order to systematically address these workforce shortages, a first step is to determine more precisely what the workforce gaps are. Thus the USF Patel Center conducted a survey of water and wastewater utilities in December 2009-January 2010 to get more concrete evidence of the workforce needs throughout the State. In addition, the Patel Center took an inventory of current education programs throughout Florida to see if they adequately address those needs.

This report is organized as follows: the next section identifies previously conducted studies and surveys, while identifying key organizations that led to the formation of the Banner Center. The third section offers further information collected from industry experts at a Banner Center workshop held in December 2009. The survey design and results are presented in the fourth section. Section five reviews the curriculum offered throughout the State. The sixth section summarizes the research and makes recommendations on next steps to improve the workforce, and the final section concludes

Before discussing the specific workforce issues, it is useful to have a brief background on the structure of the State's water and wastewater provision systems.

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[1] While initially conducted under the auspices of the Banner Center for Water Resources, this needs assessment was fully funded by the USF Patel Center.

A. Structure of Public Water Systems in Florida

The Florida Department of Environmental Protection defines a public water system as one that provides water to at least 25 people for at least 60 days per year, or provides at least 15 service connections. Drinking water utilities in Florida can be either privately or publicly owned. Private companies may provide the water service itself, or they may be involved in the design and/or construction of a utility's facility. Public utilities tend to operate under the jurisdiction of a county or a municipality. Florida also allows regional entities to provide wholesale water (e.g., Tampa Bay Water) (FDEP website).

All utilities are responsible for providing water using Best Management Practices, as defined by the Florida Department of Environmental Protection, in the short term and they are responsible for planning for future demand and infrastructure development. All areas of a utilities' practice are subject to regulations at the federal, state, district, and local levels. Utilities are regulated and partially funded by the regional Water Management Districts and the Florida Department of Environmental Protection. Co-funding can also come from the US EPA, the US Army Corps of Engineers, and other public entities (Florida 2030 Task Force).

There are five Water Management Districts (WMDs) in Florida: Northwest Florida, Suwannee River, St. Johns River, Southwest Florida and South Florida. These WMDs follow watershed boundaries rather than political demarcations. They are responsible for managing water supply throughout their respective districts, including managing storm water and flooding, protecting against and planning for droughts, and acquiring and managing lands in support of the Save Our Rivers program. The WMDs have regulatory responsibilities, as directed by the FDEP, and they work with local governments in their comprehensive plans. They are also responsible for some environmental resource and water permitting (Florida 2030 Task Force).

The Florida Department of Environmental Protection is the primary organization responsible for enacting the Florida Safe Drinking Water Act, with support from the Florida Department of Health (which also regulates very small water systems). FDEP also provides permits for certain water supply projects. FDEP establishes and monitors quality standards for drinking water, ground and surface water and reclaimed water (FDEP website).

In sum, utilities operating in Florida must contend with the overlapping and sometimes conflicting rules and regulations of their municipalities and local governments, their districts, the State and the federal government.

B. Structure of Wastewater Management

There are over 3,000 individually permitted wastewater facilities in Florida, about ¾ of which are domestic/municipal, and the rest of which are industrial. The Office of Wastewater Management, in the Florida Department of Environmental Protection, is responsible for overseeing all of these facilities and ensuring state and federal compliance. This includes permitting, compliance and enforcement, as well as developing policy and offering technical support. Where there are five Water Management Districts in the state, there are six Wastewater

Management Districts (Central, Northeast, Northwest, South, Southeast, and Southwest), adding to the complexity of the entire water and wastewater system (FDEP website).

## II. Review of literature and previous studies

A. Measurement challenges

Reliable data on the size and characteristics of the workforce in the water sector is difficult to find at the national or state level. The sector has myriad components which overlap geographically, by government level, and by types of service. Grigg (2007) attempts to describe the organization of the water sector in order to estimate the size of the workforce nationally. He outlines a general organization of the water sector that centers around service providers who are overseen by regulators and supported by suppliers, associations, contractors, etc. Service providers themselves may have multiple responsibilities within the water sector or may provide water-related services with other utility services. Some providers belong to a particular firm or enterprise, such as a manufacturer, large farm or private community (such as a mobile home park or a gated residential community). Regulation takes place at all levels of government and the government entities, themselves, may have more than one function (regulation, service provision and support).

As mentioned above, Florida's water and wastewater sector is part of a complex web of five water management districts, six wastewater management districts, 36 water utility companies, and 3,000 wastewater management facilities, all which are subject to the various levels of government regulation. The complex organization of the sector is further compounded by a national accounting system that does not adequately capture all of the activity of the industry. Grigg counts no less than 19 NAICS (North American Industrial Classification System) sectors compiled by the US Bureau of Economic Analysis that include water industry activity. These range from government activity in water (Public Administration category) to water and waste utilities (Utilities category) to irrigation (Agriculture, Forestry, Hunting, and Fishing, and Aquaculture category) to water financiers (Finance and Insurance category). Thus Grigg must take certain liberties when estimating the number of water industry establishments, while recognizing that it is impractical to measure the number of "smaller" establishments nor the number of support sector establishments.

Grigg then attempts to estimate the number of workers in the water sector. This estimation relies on data from the Bureau of Labor and Statistics (BLS) – which does not offer the detail needed to get at the many sectors of the economy related to water- the American Water Works Association, and data on government operations and data. Government employment is not always defined by specific water occupation; Grigg's estimates are based on the total workforce in particular agencies with water responsibilities, from which he estimates how many work specifically in water (based on his own estimate of the percentage of employees directly working in water). For example, he assumes that half of the 10,000 US Geological Service employees are involved in water, to come up with 5,000 water employees there. He makes similar estimates for state and local agencies. His final nation-wide estimate of employment in the water sector is around 1,000,000.

Within Florida, the Employ Florida database contains workforce data based on Labor Market Statistics. The database estimates that 5,667 workers were employed as Water and Liquid Waste Treatment Plant and System Operators in Florida in 2008, with average annualized wage of $42,110 (Employ Florida website). The number of employees is likely an underestimate (FWF 2007). Of the estimated 185 openings per year, 48.1 percent are due to growth (new positions) and 51.9 percent are due to replacements (workers leaving this occupation).

B. Relevant organizations and previous studies

1. AWWA and FSAWWA

The initial concern over workforce issues in the water and wastewater industry was brought to light following the 2006-07 Annual Report of the Florida Section of the American Water Works Association (FSAWWA). This report noted that the AWWA State of the Industry Report cited workforce needs as one of the top 5 areas of concern for the first time.

The American Water Works Association has 60,000 members and 4,700 utility members across the country. (AWWA website) Its annual report, *The State of the Industry* (SOTI), has been published since 2004, to identify the current challenges faced by the water industry. The 2008 SOTI survey (Runge and Mann) was sent to over 12,000 AWWA members in March 2008, and by late April 2008, 1,800 surveys were received. The results indicated that, as a separate category, concern about the workforce was the 4th highest long-term (three-to-five years) challenge. This area has been growing in importance since the surveys began. The other top challenges – source water availability, regulatory concerns, and aging or failing infrastructure – are all intimately related to the availability and quality of the workforce.

Workforce shortages were blamed largely on the high number of retiring baby boomers and that younger worker were leaving for higher paying and higher-prestige jobs. Survey respondents were asked to project retirement levels in various occupations by 2012 and answered that1/3 of executives and managers and ¼ utility operators would retire. 46% of utility managers reported increased difficulty in replacing operators since the previous year.

The AWWA conducted a national survey in 2008 to determine water sector workforce needs. The Florida Section of the AWWA participated in the study, also known as the Water Sector Workforce Sustainability Initiative (WSWSI). Although the Florida leadership was quite strong, they still had a difficult time getting potential respondents to answer the survey – ultimately, just 5 Florida utilities answered the survey. Possible factors that deterred a healthier response included difficulty in obtaining answers to some very detailed questions and the length of the survey.

2.Results from the Water Sector Workforce Sustainability Initiative

Two representatives from the Jacksonville Electric Authority (JEA), Scott Kelly, Vice President for Water and Wastewater Systems, and Carol Higley, Manager of Corporate Workforce Planning, have played a key role in raising workforce concerns, not just within JEA, but also

state-wide and nationally. As one of Florida's largest water utilities, JEA provides electricity, water, wastewater, reuse and chilled water to its service area. Specifically, it has about 240,000 water customers and 186,000 wastewater customers, making it one of Florida's largest water utilities. Mr. Kelly and Ms. Higley were instrumental in getting the WSWSI survey responses from utilities located in Florida. In spite of their personal contacts and efforts, the response rate was still quite low, with just 5 Florida utilities answering the survey. It should be noted, however, that these 5 utilities – Jacksonville Electric Authority, Orange County, Palm Beach County, Tampa Wastewater, and Toho Water Authority – provide services to about 75% of the state's population. Interviews and secondary research confirmed for them that workforce needs are high on the list of challenges that water and wastewater utilities face throughout the state. Indeed the results of the study were used as justification for the creation of the Banner Center on Water Resources.

According to their survey responses, each of these utilities serves between 100,000 to 1,000,000 residents, though within that, there is a wide range. The Toho Water Authority, according to its website (www.tohowater.com) serves 73,000 water customers, 71,000 wastewater customers, and 10,000 reclaimed water customers in Osceola County. The Jacksonville Electric Authority serves 240,000 water customers and 186,000 wastewater customers, in Jacksonville and environs. (www.jea.com) The Palm Beach County Water Utilities provides service to about 500,000 customers in that county. (http://www.pbcgov.com/waterutilities/) . The City of Tampa Water has a service area with 652,000 customers and the Wastewater Department services 98,000 customers (www.tampagov.net). The Water Division of Orange County Utilities provides water to nearly 144,000 customers , while the Water Reclamation Division provides wastewater services to about 136,000 customers (https://utilities.ocfl.net/OCUD/).

These utilities also range by the number of workers they employ: one responded that it employed 101-250 employees , one answered 251-500 employees, two have 500 – 1,000 employees, and one responded that it has over 1,000 employees. Survey respondents were asked to identify their utility's critical occupations according to given classifications. Three utilities answered this question, and the following were chosen by all three: Water/Wastewater Treatment Operators; Collection/Distribution/ Transmission System Operator; and, Mechanic/Machinist/Other Maintenance Technician. The positions of Electrician/Electronic Maintenance and Engineer were mentioned by two of the three utilities.

In response to the question of which factors increased the difficulty in ensuring an adequate and prepared workforce in these position, all four utilities that responded to this question answered *Retirement* as a "high" risk factor. *Inadequate Documentation on Facilities, Processes, Procedures, Technologies and Equipment* was considered a high risk factor by one utility and *Changing Regulatory Requirements* by another. In terms of recruitment challenges, all four utilities that responded to this part of the survey considered *Lack of an adequate labor pool with appropriate qualifications* as a "high" risk factor. Two utilities marked *Recruitment/Selection Process* as a high risk factor, and one utility considered *Uncompetitive Pay and/or Fringe Benefits* as a high risk factor.

3. Florida's Water Future

Following the AWWA study identifying workforce as an upcoming concern in the water industry, a group of industry experts, state water associations and agencies formed "Florida's Water Future" to examine workforce issues. Their 2007 report provides some background on Florida's workforce generally, and the water industry in particular. It also outlines challenges and provides recommendations to meet those challenges.

One challenge that Florida workforce faces generally is related to the demographics of the state. The age distribution of the population is projected to be skewed toward the retirement age category without a commensurate increase in the workforce age category. The report also references the other challenges mentioned in the Introduction to this paper: tighter regulations; increased water demand combined with an increased necessity to conserve water; and, impacts of climate change.

The FWF group ultimately recommended the formation of the Banner Center for Water Resources.

4. San Francisco Bay report

A recent effort in the San Francisco Bay region serves as an example of how to successfully study water workforce issues. The California Community Colleges Centers of Excellence (COE) from San Francisco Bay and Greater Silicon Valley and Baywork (the Bay Area Water/Wastewater Workforce Development Collaborative) worked together in 2009 to study workforce issues of water and wastewater agencies. Baywork grew out of a workforce development workshop in 2008 and the subsequent formation of a regional workforce task force, with the mission of taking stock of the area's water and wastewater workforce.

Their study was confined to six Bay area counties (San Francisco, Marin, Alameda, Contra Costa, San Mateo, and Santa Clara) and seven occupations that were deemed to be critical both in terms of their impacts on water and wastewater operations and the potential difficulties about filling future vacancies. These occupations included: water treatment operator; water distribution operator; wastewater treatment operator; wastewater collections operator; mechanic/machinist; electrician/electrician technician; and, electronic maintenance technician/instrument technician.

The challenges to California's water and wastewater workforce are similar to those in Florida, as the Baywork report attests. Stricter regulations, need for more technically savvy workers, increased demand for services, environmental threats, and baby boomer retirements all present concern for the future workforce.

The Baywork team sent out a workforce survey to 77 area water and wastewater utilities and agencies and received responses from 45 of them. The relatively small survey area and well-defined occupations probably contributed to the high response rate. The overwhelming majority of upcoming job vacancies (600 of the estimated 677 openings arising in the next 5 years) were due to retirements, while the rest came from new job creation. Wastewater treatment operators

and water treatment operators were the two occupations with the biggest hiring needs, though respondents answered that they were experiencing hiring challenges in all 7 occupations listed in the survey.

The Baywork study also examines the community college programs that are available to prepare current and future workers in the 7 critical occupations. Identifying such programs required careful analysis, since many courses and programs are not specifically targeted towards these jobs. The study found deficiencies in specific preparation for the two most vulnerable occupations – water treatment operators and wastewater treatment operators; however, in general, the authors of the report were able to create a rich database of pertinent coursework offered by 11 of the 19 community colleges in the study area. Linkages to community, such as internships, high school outreach, and industry partnerships, was highlighted as an area that could use improvement.

**III. Banner Center Advisory Council Meeting**

The Advisory Council to the Banner Center met at the St. Pete College Collaborative Labs, in December 2009, to discuss, among other topics, workforce needs in the sector. Drawing from the USF Patel Center survey, four groups of up to 8 people met in breakout sessions to talk about critical occupations at risk and how to grow and train the workforce. The list of potential critical occupations to choose from mirrored the list in the written survey (described in the next section): collection/distribution/transmission operators; electrician/electronic maintenance technician/instrument technician; engineers; information technology specialist; lab technicians; mechanic/other maintenance; water/wastewater treatment operators. With the exception of mechanic/other maintenance, each of these occupations showed up in at least one group's "top three" list.

The biggest challenges in filling these jobs tended to be related to high retirements; newer and more stringent standards and licensing requirements; lack of education and training opportunities; poor public image and low pay.

Participants had several ideas on how to grow and train the workforce, including providing improved information among counselors, parents and mentors; identifying qualified teachers who can translate textbooks into real world applications; developing apprenticeship programs that are tied to 2 or 4 year degrees or certificates; ensuring that internship programs that have reciprocity across states; offering continuing education units with trainings; developing "Portable training" and on-line training; and improving public awareness of job openings and marketing the positive aspects of these careers.

In terms of which currently available resources are used for training and knowledge enhancement participants highlighted the following: in-house training programs; technical centers and high schools, on-the-road training, such as that offered by Florida Water Pollution Control Operators Association (FWPCOA). Community colleges played a lesser role, as most participants identified a high school degree as the minimum educational requirement.

## IV. Banner Survey

A. Survey Design

The Banner Survey was designed with the following goals in mind: to identify the workforce gaps in the water sector, determine the causes of those gaps, and then utilize the Banner Center to help fill those workforce needs. It was based loosely on the much longer Water Sector Workforce Sustainability Initiative (WSWSI) survey conducted in 2008 by the AWWA and AWWA Research Foundation. As mentioned above, only 5 utilities responded to the WSWSI survey. The Banner Survey was greatly simplified in hopes of increasing the response rate. An initial draft of the survey was first circulated for comment among the Banner Center advisory board, consisting of about 65 individuals who are involved in the Florida water sector coming from the industry, government and academia. About 22 Board members made comments on the survey, which was amended accordingly. See Appendix A for the final survey instrument.

B. Survey Implementation

The survey was first sent out in early December, 2010, and it was closed on January 21, 2010.

There was no way to directly access contact information for all of the water utilities of Florida. In consultation with Scott Kelly, of JEA (mentioned above), it was decided that the best way to reach utilities was to use the state-wide professional associations. This meant that the survey did not come directly from the authors of this study, but rather through an intermediary. The Survey was sent to the memberships of the Florida Rural Water Association (FRWA), the Florida Section of the AWWA (FSAWWA) Utility Council and the Utility Council of the Florida Water Environment Association (FWEA). For proprietary and privacy reasons, a representative of the associations, rather than the survey authors, forwarded the survey information. This made it difficult to do any personal follow-up with potential respondents.

The total membership of the FRWA numbers about 1,700, mostly smaller and rural, utilities. The database does not contain many email addresses, so FRWA faxed a letter to its membership that provided the web address of the survey. Ultimately, the fax was successfully sent to 664 different fax numbers. In some instances, FRWA members contacted the study authors if they had difficulty accessing the web address, and they were mailed or faxed a hard copy of the survey instead. FRWA did not want to send a follow-up reminder fax to the membership.

The total membership of the FSAWWA Utility Council (comprised largely of drinking water utilities) is about 130 and the FWEA Utility Council (comprised largely of wastewater utilities) is about 60. The same representative emailed the survey to the membership of both of these organizations, which totaled 142 unique email utilities. A reminder email was sent out about four weeks after the initial email.

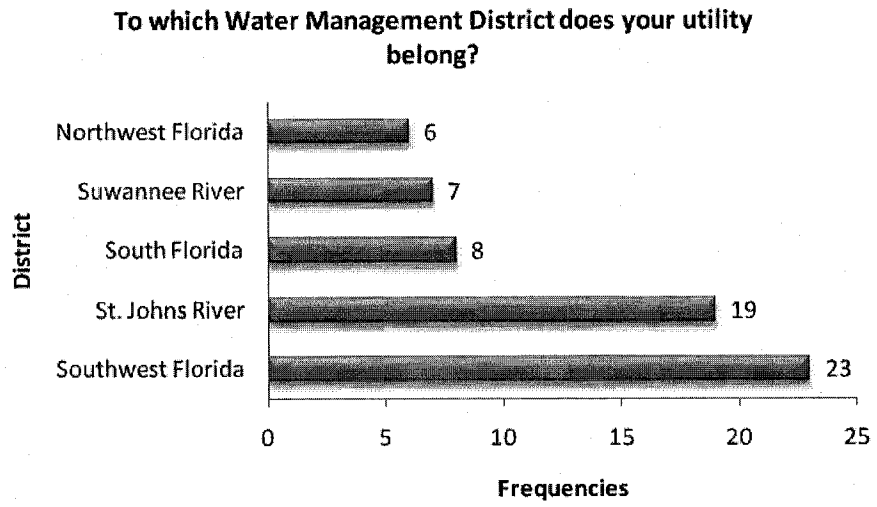
Ultimately, 65 unique responses were received. Just six of the responses came from the FSAWWA/FWEA membership and the rest came from the FRWA membership.

C. Survey results

*Background of Responding Utilities*

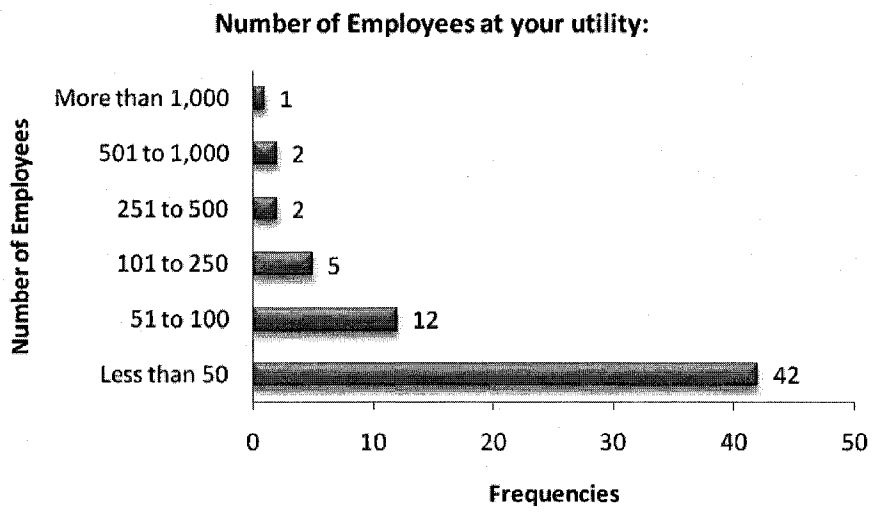
As Figure 1 shows, the majority of the responding utilities – 67% - belong to two water management districts: Southwest Florida (23 utilities) and St. Johns River (19 utilities). Six responding utilities belong to Northwest Florida, 7 belong to Suwannee River, and 8 to South Florida. Two utilities did not respond to this question because they overlap districts.

Figure 1.
*Number of Utilities Belonging to Each Water Management District*




In a change from the WSWSI survey, in which all five respondents were from among the largest utilities in the State, most of the utilities that participated in the Banner survey are small sized. 83% of respondents come from utilities with fewer than 50 employees and 57% served populations lower than 10,000, as seen in Figure 2.

Figure 2.
*Number of Employees at Water Utilities in Respondent Sample*




*Critical Occupations*

In terms of anticipated workforce needs, the results of the Banner survey mirrored those of the WSWSI survey. In particular, the top three occupations in which growth is anticipated in the next five to ten years include *Water/Wastewater Treatment Operators*; *Collection/Distribution/ Transmission System Operator*; and, *Lab Technician/Mechanic/ Other Maintenance Position* (See Figure 3). These were similarly the top three occupations for which the highest retirement is projected. However, for all occupational areas except *Collection/Distribution/Transmission System Operator* and *Water/Wastewater Treatment Operations*, most utilities (40% - 51%) reported no projected retirements for a given occupation. For *Collection/Distribution/Transmission System Operator,* 60 percent of the utilities projected either no retirement at or most 10% of the utility workforce retiring within the next 5 years. The case was different for *Water/Wastewater Treatment Operations,* where only 22% of the utilities projected no retirements and there were several utilities that projected retirements along the continuum with 3 projecting more that 50% of its workforce retiring within the next 5 years (See Figure 4)

Figure 3.
Occupations in which Growth is Anticipated in Next 5-10 Years : Number of Utilities Reporting

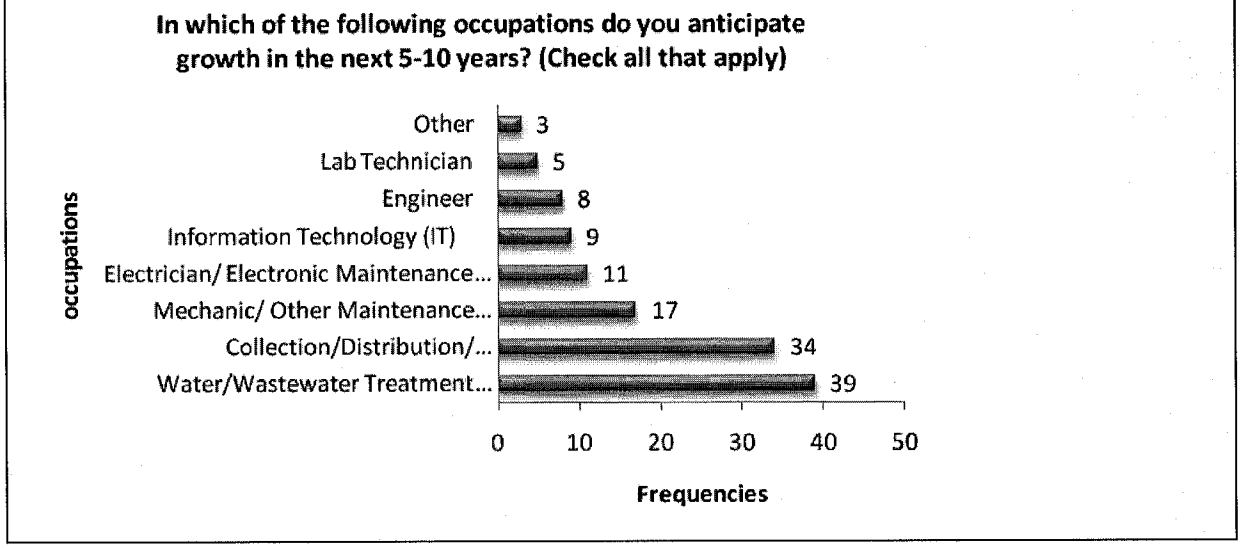
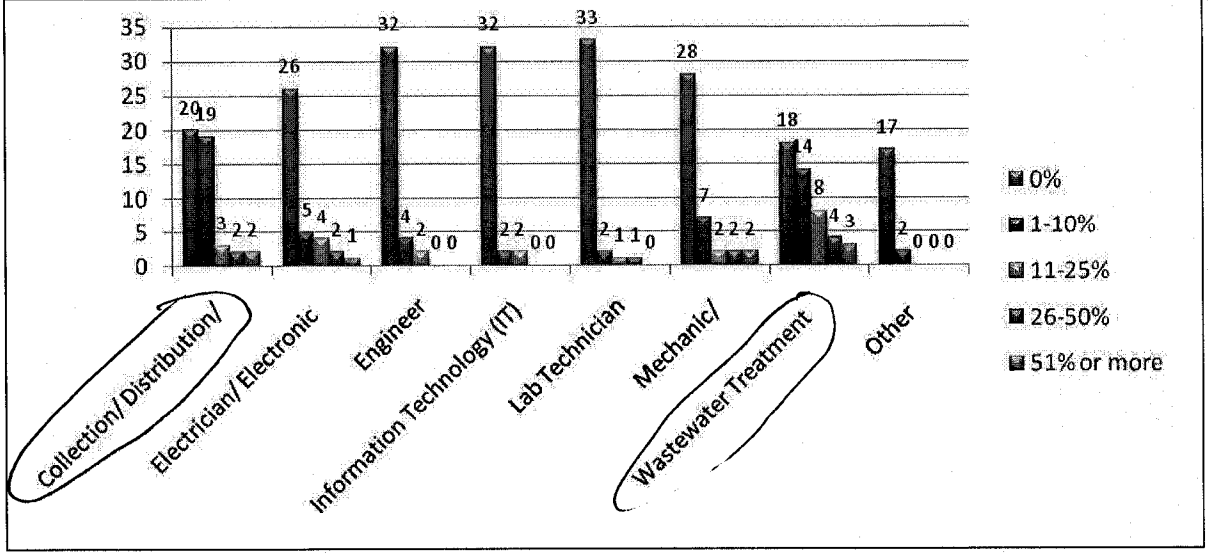



Figure 4: Number of Utilities Reporting Retirement Projections (as % of Workforce) by Occupation




Respondents were asked to select the top three occupations in which they experienced or anticipate problems with the quantity in terms of ability to recruit staff with adequate qualifications and/or staff work preparedness. As is shown in Figure 5, the top three occupations identified by the utilities that responded to the survey were:

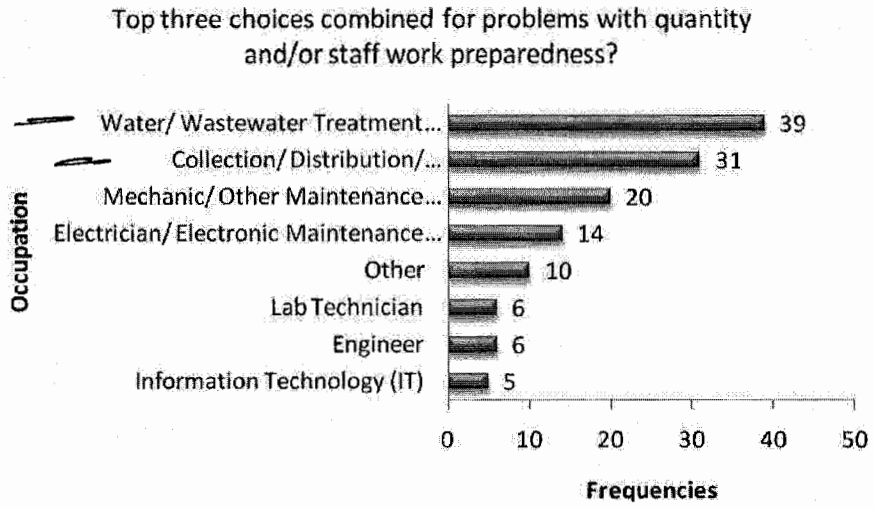
1) Water/Wastewater Treatment Operations (identified by 60% of utilities that responded)

2) Collection/Distribution/Transmission System Operator (48% of utilities)

3) Mechanic/Other Maintenance Position (31 % of utilities)

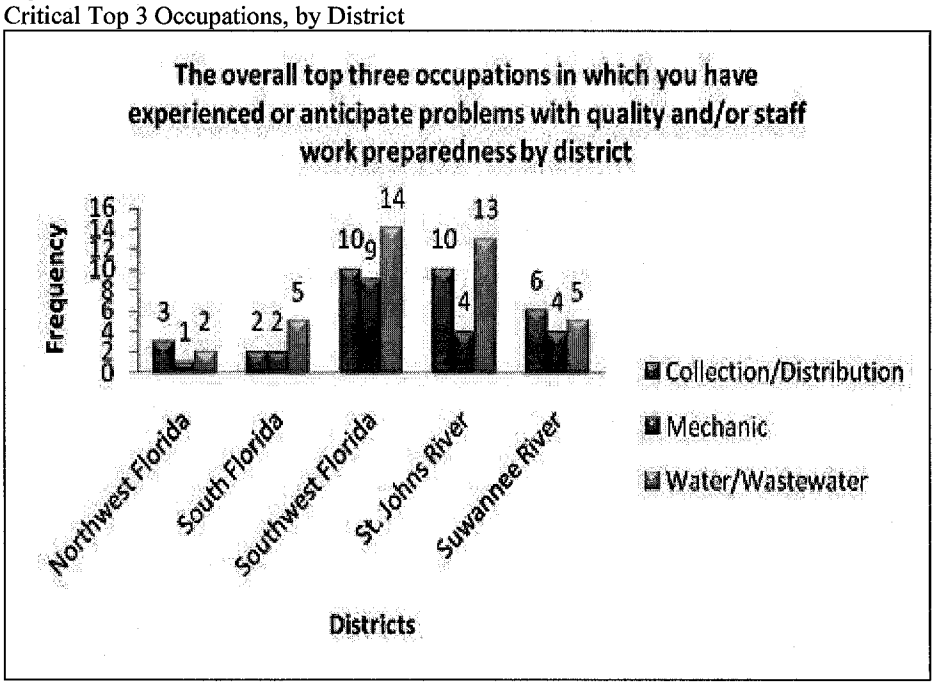
It is noteworthy that these were the three occupations identified in the WSWSI survey as well.

Figure 5.
Number of Utilities Reporting Occupation in Top 3 for Problems with Quantity and/or Staff Work Preparedness?




Although the sample was not representative, when broken out by water management district, the data revealed that in South Florida, Southwest Florida, and St. Johns River, *Water/Wastewater Treatment Operators* is the most vulnerable occupation, while *Collection/Distribution* is more critical in Northwest Florida and Suwannee River.

Figure 6.
Critical Top 3 Occupations, by District




*Workforce Preparedness*

Respondents were then asked about the challenges involved in ensuring an adequate and prepared workforce in each of their selected critical occupations. For all three of the top critical occupations - *Water/Wastewater Treatment Operators*, *Collection/Distribution /Transmission System Operator*; and *Lab Technician/ Mechanic/ Other Maintenance Position*, the minimum qualifications are high school diploma and certificate/license.

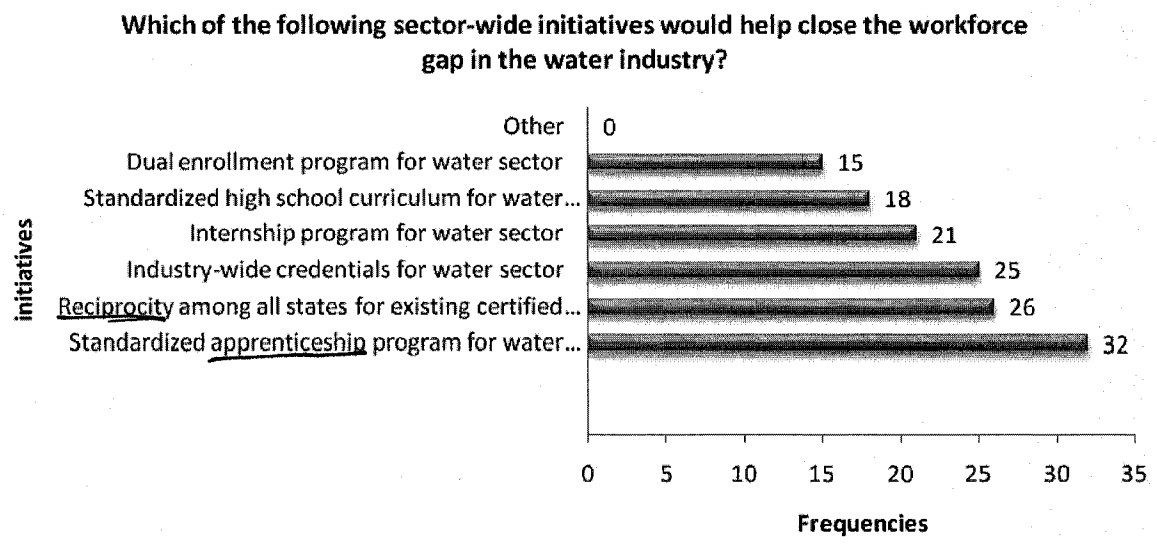
For **Water/Wastewater Treatment Operators**, lack of training is the biggest challenge in hiring new employees (42%), followed by *uncompetitive salaries (32%); poor perception of job/industry and career opportunities (26%);* and *changing regulatory requirements (22%).* The workforce shortages in this sector will threaten a number of operational challenges. In particular, respondents reported anticipating resulting problems in *wastewater treatment* (according to 43% of respondents), *water quality* (35%), *water delivery reliability* (28%) and *water supply (quantity)* (26%).

For **Collection/Distribution/Transmission System Operator**, again, *lack of proper training and qualifications for new hires (35%)* is the most important challenge. The next three challenges indicated were *uncompetitive salaries (18%); poor perception of job/industry and career opportunities (18%);* and *changing regulatory requirements (18%).* According to respondents, these shortages will result in threats to *water delivery reliability* (34%) and *wastewater collection* (25%) in particular.

For **Lab Technician/ Mechanic/ Other Maintenance Position**, as well, the *lack of proper training and qualifications for new hires* (20%) is the biggest challenge. The next two most cited challenges were *poor perception of job/industry and career opportunities* (14%); and *uncompetitive salaries* (11%). The shortages leave vulnerable *safety, security and emergency response* (17%) and *water delivery reliability* (17%).

Figure 7 shows the response to the question of sector-wide initiatives to close the workforce gap. The most frequently cited (49% of respondents) sector-wide initiative that was considered to be potentially helpful in closing the workforce gap was a *standardized apprenticeship program for the water sector;* 32 % of the respondents indicated an *internship program for the water sector.* Forty percent of the respondents indicated that *reciprocity among all states for existing certified personnel*, and 38% *industry-wide credentials for the water sector* would help close the workforce gap in the water industry. These answers are consistent across all regions, underscoring the importance of state-wide coordination of workforce development.

Figure 7.
Number of Respondents Reporting Sector-Wide Initiatives to Close Workforce Gap




Respondents were asked about which local sites they utilize for training for growing their workforce. The most popular answer was "in-house training" (27% of respondents), followed by community college (20%) and high school/technical secondary schools (16%). There was some mention (in the "*other*" category, 5%) of professional association offerings, with little importance given to 4-year colleges (3%). The results for training incumbent workers are similar, with "in-house training" coming in first (24%) followed by community colleges (17%). The "other" category received a large response (13%), with comments including trainings offered by the water associations (e.g., FRWA, WPCOA, FSAWWA), The Center for Training, Research, and Education for Environmental Occupations (TREEO Center) at University of Florida, and conferences. See Tables 1 and 2.

Table 1.
Number and Percent Reporting Sites that Offer Local Training to Grow Workforce

| Site | Number | Percent |
|---|---|---|
| In-house Training at Your Utility | 27 | 42 |
| High School/Technical Secondary Schools | 16 | 25 |
| Community College | 20 | 31 |
| Four-Year Institution of Higher Education | 3 | 5 |
| Other | 5 | 8 |

Table 2.
Number and Percent Reporting Sites that Offer Local Training to Improve Knowledge and Skills of Incumbent Workers

| Site | Number | Percent |
|---|---|---|
| In-house Training at Your Utility | 24 | 37 |
| High School/Technical Secondary Schools | 9 | 14 |
| Community College | 17 | 26 |
| Four-Year Institution of Higher Education | 4 | 6 |
| Other | 13 | 20 |

Although the Water Management Districts did not respond equally to the survey (see Figure 1, above), the importance of community college training was disproportionally higher in the Southwest Florida (chosen by 8 of the 23 respondents) and St. John's (chosen by 6 out of 19 respondents) and disproportionally lower in South Florida (chosen by 1 out of the 8 respondents) and Suwannee River (chosen by 2 out of 7 respondents).

## V. Review of curriculum offered in Florida

A significant portion of the BCWR survey of Florida's water utilities was dedicated to the issue of training and education available to current industry professionals as well as the educational barriers to entry for individuals interested in joining the workforce. To that end, the Patel Center investigated the education options currently offered at the vocational, community college, university, and association level. The result of this search indicated that, while some on-site training is available, it is scattered between only a handful of organizations and not easily accessible to many parts of the state.

The survey results indicated that the most vulnerable occupations are *Water/Wastewater Treatment Operators*; *Collection/Distribution/ Transmission System Operator*; and, *Lab Technician/Mechanic/ Other Maintenance Position*. The highest barrier to entry appears to be lack of training, in which high school preparation and certification play a major role. The educational inventory was conducted with these factors in mind.

A. High School/Vocational Institutions

There are a number of Career Academies within the State. These are small schools located within high schools, which have a specialized career theme and have strong connections with local employers and the community. Some high schools are made up of multiple academies and each student belongs to one; in other schools, there is a career academy inside of a larger, comprehensive school. (Florida Department of Education) Among the programs offered, those relevant to the water industry include: Agriculture, Food and Natural Resources, Information Technology, Construction, and Manufacturing. Within the Agriculture, Food and Natural Resources Academies, there are about a dozen that focus on environmental science: five are in the St. John's Water Management District; four are in the South Florida Water Management District; and three are in the South West Florida Water Management District.

Information on vocational education pertaining to the water industry was difficult to find, though some survey respondents mentioned those as being sources for new talent. The Public Works Academy at the Pinellas Technical Education Center in St. Petersburg is one such example that offers career training in a number of fields, including water treatment and distribution and wastewater collection and treatment.

B. Certification

For individuals interested in working within the water sector, the Florida Department of Environmental Protection offers certification examinations on four levels (from entry-level to most experienced, classified as "Class D" through "Class A"). These exams are offered state-wide. Many utilities require that employees obtain at least a Class D license before being able to work in some occupations. To be eligible to take the Class D exam, a person must possess a high school diploma or its equivalent and at least three months' experience in the field. Approved training courses can be substituted for field experience, however.

wrong!

Once a person has received his or her Class D license and has one year of experience, he or she becomes eligible to take the Class C exam. After three years of experience, license-holders are eligible to take the Class B exam; after five years, they may take the Class A exam.

C. Higher Education Institutions

Higher education institutions at both the community college and university level offer on-site, online and correspondence courses on subjects spanning multiple occupations. For individuals already employed in the water sector, there are a number of training/continuing education courses available to enhance or refresh knowledge about a variety of functions. See Appendix 2 for a detailed listing of coursework offered in the state; this section provides a summary of those findings as they relate to the cirtical occupations identified in this study.

Hillsborough Community College in Tampa, Florida, offers an Associate in Applied Science degree in Advanced Water Treatment, which includes 42 degree-specific courses on topics such

as Membrane Technologies, High Purity Water Technologies, Water Analysis & Monitoring, and Environmental Sampling & Analysis.

Lake City Community College (Lake City, Florida) ("LCCC") offers separate water and wastewater operator training courses broken down into three modules and taking approximately four months to complete. These courses are designed for the Class D license holder and successful completion of all three modules satisfies course requirements to sit for the water or wastewater operator certification examination, Class C. LCCC also offers a Wastewater Treatment Plant Operator Class B course that fulfills requirements to sit for the Wastewater Operator Class B certification examination.

The Center for Training, Research & Education for Environmental Occupations (TREEO) at the University of Florida is the only university-level institution in the state to offer significant water industry-specific training. In addition to offering Class C certification courses, TREEO makes available extensive course selection for the three occupations identified as being in-demand in the future.

D. Industry Associations

Specialized training is also available through many of the industry-specific professional associations located in Florida, including the Florida Section of the American Water Works Association (FSAWWA), Florida Rural Water Association (FRWA), and Florida Water & Pollution Control Operators Association (FWPCOA). See Appendix 2 for a detailed listing of their course offerings, most of which are offered on-line, or are available for on-site trainings.

The FSAWWA offers the most diverse and comprehensive selection of education courses among the associations, with courses covering topics from basic chemistry to counterterrorism and security in the water industry. Many of their courses can be applied to all three of the identified positions of need.

**VI. Recommendations**

The recommendations are gleaned from the previous studies and current survey, and can be grouped into the following four (overlapping) categories: improvements in curriculum, training and other types of preparation; coordination efforts by the State; improving public information and marketing about the sector; and making material changes to compensation packages.

A. Types of Preparation

The Banner Center Advisory Council meeting discussions underscore the importance of a solid foundation at the high school level, particularly in the science, technology, engineering and mathematics (STEM) fields. One survey respondent favored including industry certifications as part of the high school curriculum. More co-operative opportunities for students would also help introduce high school students, technical students and community college students learn about water careers. In addition, and related to point (C) below, there is high value in developing tutor/mentorship programs to encourage new entrants to join and stay in field.

B. Statewide coordination of training, education and certification programs

Several industry comments and studies (e.g., FWF 2007) highlight that workforce needs should be coordinated at the State level. In particular, certification reciprocity with other states would help increase the available pool of workers, as well as entice potential workers who are not sure of where they would like to ultimately reside. FDEP, which is responsible for licensing plan operators, should also consider recognizing certifications through the Association of Boards of Certifiers, a national association representing more than 40 states.

Much of the coordinating role such as promoting common curricula and tracking job trainings and job openings, will take place through the Banner Center.

C. Public relations campaign

Many survey respondents and Advisory Board members have noted that the industry faces a big public relations challenge, in which potential job candidates do not find the idea of working in water or wastewater to be very interesting or enticing. However, there are certainly arguments for packaging the jobs as "green", stressing their importance to society, and underlining the technological skills required. Some industry participants already provide tours of plants for high school students – though this is more difficult in a post-911 world – which are helpful in attracting them.

The Florida Water Pollution Control Operators Association (FWPCOA) created its own promotional video showing young people who work at a water plant, talking about what their jobs mean to them. This kind of publicity piece can be very helpful in attracting new employees. The Banner Center can create a similar piece or its website can be a repository for such materials. Certainly defining a common public relations campaign should be a component of the Banner Center.

D. Compensation and benefits

Improved education and training, state-wide coordination and attractive literature on jobs in the industry cannot cover up the reality that current wage and benefits packages need to adjust in order to bring in future workers. Job prestige as well as a higher skilled labor force will come more easily with higher compensation.

## VII. Conclusions

The results of the survey certainly point to the need for reviving the State-wide Banner Center to coordinate efforts for workforce development in the water sector. The three "critical occupations" identified: *Water/Wastewater Treatment Operators*; *Collection/Distribution/ Transmission System Operator*; and, *Lab Technician/Mechanic/ Other Maintenance Position* all have similar challenges that can be addressed by a State-wide institution. In particular, relevant high school and post-secondary course offerings need to be strengthened throughout the State and should take advantage of the on-line courses which are more easily accessible. In addition,

all utilities would benefit from a State-wide initiative to make water jobs and careers more attractive, both materially and in terms of prestige.

A. Size Matters

Any recommendations must recognize the difference in needs and ability to respond according to the size of the utility. JEA, as one of the state's largest utilities, has been able to be quite proactive in responding to the upcoming workforce shortages. They have devoted resources toward developing new recruitment and training tools and have an entire training team to facilitate participation in a state-certified apprentice program. JEA is already receiving the positive results of this investment with a larger and improved applicant pool, increased success rate of its employees, and decreased turnover. JEA is also promoting its job opportunities by working with local career academies, developing a JEA summer camp for high school students, and even providing outreach efforts to regional middle schools.

On the other hand, written comments by some of the smaller utilities surveyed highlight that the cost of technical education and even trade-organized trainings can be too expensive for them to underwrite. Furthermore, the rural utilities have a difficult time accessing trainings that take place far from their locations.

B. Improvements to Study and Survey Response

The broad task of the current study – to determine the workforce needs and opportunities throughout the State of Florida – made it difficult to gather in precise data in a short amount of time. The San Francisco Bay study provides a model for a more targeted study that is able to get in-depth information, by focusing on geographic area with natural partnerships. By presenting seven already-identified "critical occupations", the researchers were able to put parameters on the survey to offer better guidance to survey respondents. The geographic focus and strong partnerships ensured that all stakeholders understood the importance of participating in the study.

Once the Banner Center is firmly established and running, it will be easier to get a better response to the survey. The survey can be linked to the Banner website, which, once fully functional, can be the "go to" site for water-related employment. The Advisory Council and 5 district-wide councils can provide much needed support for the Banner Center and further research, though populating these councils has been difficult.

At the Banner Center Advisory Council meeting, Ronald McCulley, from FDEP, suggested offering continuing education units as an incentive to complete the survey. This is an excellent suggestion, although offering CEUs could compromise the confidentiality requirements of the survey, so it would have to be done carefully. Also, for larger utilities, it is unclear if this incentive would work, since it is more likely to be human resource managers who have the information necessary for filling out the survey.

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**Appendix 1: Survey Instrument**

# Services in the Water Industry Survey

Directions: Please mark your response(s) with an (X) or supply the information requested for each item.

**I. Background: This section asks for general information about your utility.**

**1. Please provide the following information:**

Name of Utility _____

Address of Utility _____

**2. To which Water Management District does your utility belong?**

O Northwest Florida O St. Johns River O South Florida

O Suwannee River O Southwest Florida

**3. Which classification best describes your utility?**

O Public O Private O Other

If you selected 'Other' (please specify)_____

**4. Number of Employees at your utility:**

O Less than 50 O 101 to 250 O 501 to 1,000

O 51 to 100 O 251 to 500 O More than 1,000

**5. Size of population served by your utility:**

O Less than 10,000 O 50,001 to 100,000 O More than 1,000,000

O 10,001 to 50,000 O 100,001 to 1,000,000

6. **Services Provided by your Utility. (Check all that apply)**

O Potable Water Treatment
O Potable Water Distribution
O Raw Water Transmission
O Solid Waste Treatment
O Wastewater Collection
O Stormwater Collection
O Natural Gas Distribution
O Desalination
O Stormwater Treatment
O Reclaimed Water Treatment
O Reclaimed/Irrigation Water Distribution
O Solid Waste Transfer
O Wastewater Treatment
O Electric Generation
O Electric Distribution
O Other (Please specify below)

If you selected 'Other' (please specify)_____

**II. General Workforce Information, by Occupation**

Note: If your utility provides multiple services, please respond to items 7 and 8 as they relate to the **water and wastewater services only)**

7. **In which of the following occupations do you anticipate growth in the next 5-10 years? (Check all that apply)**

O Collection/Distribution/ Transmission System Operator
O Electrician/ Electronic Maintenance
O Technician/Instrument Technician
O Engineer
O Information Technology (IT)
O Lab Technician Mechanic/ Other Maintenance Position
O Water/Wastewater Treatment Operations
O Other (Please specify below)

If you selected 'Other' (please specify)_____

8. **For each of the occupations listed below, please indicate the retirement projections at your utility in the next 5 years <u>as a percent of the number of workers in that occupation.</u> If you do not anticipate anyone retiring in a occupation listed, please enter 0.**

Collection/Distribution/Transmission System Operator _____

Electrician/Electronic Maintenance Technician/Instrument Technician _____

Engineer _____

Information Technology (IT) _____

Lab Technician _____

Mechanic/Other Maintenance Position _____

Water/Wastewater Treatment Operations _____

Other (please provide occupations and projections) _____

## III. Critical Occupations at Risk

(Note: If your utility provides multiple services, please respond to items 9 through 18 as they relate to the **water and wastewater services only**)

9. **From the occupations given below, please select the top 3 in which you have experienced or anticipate problems with quantity (ability to recruit staff with adequate qualifications) and/or staff work preparedness? If an occupation is not listed, please select 'Other' and provide the occupation in the space below.**

| | Collection/ Distribution/ Transmission System Operator | Electrician/ Electronic Maintenance Technician/ Instrument Technician | Engineer | Information Technology (IT) | Lab Technician | Mechanic/ Other Maintenance Position | Water/ Wastewater Treatment Operations | Other |
|---|---|---|---|---|---|---|---|---|
| 1st Choice | O | O | O | O | O | O | O | O |
| 2nd Choice | O | O | O | O | O | O | O | O |
| 3rd Choice | O | O | O | O | O | O | O | O |

If you selected 'Other' (please specify)_____

Think about your **1st critical occupation** in item 9 above. Please respond to questions 10 - 12, relative to this occupation.

**10. What are the minimum educational qualifications necessary for this occupation?**

O High school diploma
O Two-year Associate's degree
O Four-year Bachelor's degree
O Certificate (please specify)
O Continuing Education/refresher courses
O Other (please specify)

If you selected 'Certificate' or 'Other' (please specify) -

_____

**11. What are the biggest challenges in hiring qualified employees for this occupation? (Check all that apply)**

O Lack of proper training and qualifications for new hires
O Lack of continuing education for current employees
O Lack of training for new technology and equipment
O Lack of leadership training
O Lack of training in critical thinking skills
O Uncompetitive Salary
O Retirement
O Other Personnel Turnover
O Poor perception of job/industry and career opportunities
O Changing Regulatory Requirements
O Other (Please specify below)

If you selected 'Other' (please specify)_____

**12. What operational functions are or would be most impacted due to the shortages or inadequate training in this occupation?**

O Customer Service
O Environmental Stewardship
O Safety, Security and Emergency Response
O Water Supply (quantity)
O Water Delivery Reliability
O Water Quality
O Wastewater Collection
O Wastewater Treatment

If you selected 'Other' (please specify)_____

Think about your **2nd critical occupation** in item 9 above. Please respond to questions 13 - 15, relative to this occupation.

**13. What are the minimum educational qualifications necessary for this occupation?**

O High school diploma
O Two-year Associate's degree
O Four-year Bachelor's degree
O Certificate (please specify)
O Continuing Education/refresher courses
O Other (please specify)

If you selected 'Certificate' or 'Other' (please specify) -

_____

**14. What are the biggest challenges in hiring qualified employees for this occupation? (Check all that apply)**

O Lack of proper training and qualifications for new hires
O Lack of continuing education for current employees
O Lack of training for new technology and equipment
O Lack of leadership training
O Lack of training in critical thinking skills
O Uncompetitive Salary
O Retirement
O Other Personnel Turnover
O Poor perception of job/industry and career opportunities
O Changing Regulatory Requirements
O Other (Please specify below)

If you selected 'Other' (please specify)_____

**15. What operational functions are or would be most impacted due to the shortages or inadequate training in this occupation?**

O Customer Service
O Environmental Stewardship
O Safety, Security and Emergency Response
O Water Supply (quantity)
O Water Delivery Reliability
O Water Quality
O Wastewater Collection
O Wastewater Treatment

If you selected 'Other' (please specify)_____

Think about your **3rd critical occupation** in item 9 above. Please respond to questions 16 - 18, relative to this occupation.

**16. What are the minimum educational qualifications necessary for this occupation?**

O High school diploma
O Two-year Associate's degree
O Four-year Bachelor's degree
O Certificate (please specify)
O Continuing Education/refresher courses
O Other (please specify)

If you selected 'Certificate' or 'Other' (please specify) -

_____

**17. What are the biggest challenges in hiring qualified employees for this occupation? (Check all that apply)**

O Lack of proper training and qualifications for new hires
O Lack of continuing education for current employees
O Lack of training for new technology and equipment
O Lack of leadership training
O Lack of training in critical thinking skills
O Uncompetitive Salary
O Retirement
O Other Personnel Turnover
O Poor perception of job/industry and career opportunities
O Changing Regulatory Requirements
O Other (Please specify below)

If you selected 'Other' (please specify)_____

**18. What operational functions are or would be most impacted due to the shortages or inadequate training in this occupation?**

O Customer Service
O Environmental Stewardship
O Safety, Security and Emergency Response
O Water Supply (quantity)
O Water Delivery Reliability
O Water Quality
O Wastewater Collection
O Wastewater Treatment

If you selected 'Other' (please specify)_____

## IV. Growing/Training Your Workforce

(Note: If your utility provides multiple services, please respond to items 19 through 21 as they relate to the water and wastewater services only)

**19. Which of the following sector-wide initiatives would help close the workforce gap in the water industry?**

O Standardized high school curriculum for water sector

O Industry-wide credentials for water sector

O Standardized apprenticeship program for water sector

O Dual enrollment program for water sector

O Internship program for water sector

O Reciprocity among all states for existing certified personnel

O Other

If you selected 'Other' (please specify)_____

**20. Which of the following offer <u>local</u> training to help you grow your workforce (expand the pool of potential employees) (Check all that apply)**

O In-house training at your utility

O High schools/technical secondary schools

O Community college

O Four-year institution of higher education

O Other

If you selected 'Other' (please specify)_____

**21. Which of the following offer <u>local</u> training to help you improve the knowledge and skills of <u>incumbent</u> workers? (Check all that apply)**

O In-house training at your utility

O High schools/technical secondary schools

O Community college

O Four-year institution of higher education

O Other

If you selected 'Other' (please specify)_____

**22. Other comments**

_____

_____

**Appendix 2. Education Programs available in Florida**

| **Broward College** (Fort Lauderdale)<br>www.broward.edu | | |
|---|---|---|
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| Select courses in Water / Wastewater Management offered in the past | Select courses in Water / Wastewater Management offered in the past | |
| **Hillsborough Community College** (Tampa) | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| **Associate in Applied Science (AAS) in Advanced Water Treatment**<br><br>- Introduction to Environmental Science<br>- Introduction to Water Treatment Systems<br>- Conventional and Pre-Treatment Water Technologies<br>- Membrane Technologies I & II<br>- Water Treatment Plant Equipment<br>- Advanced Membrane Monitoring<br>- High Purity Water Technologies<br>- Ion Exchange Technology<br>- Membrane Unit Monitoring & Troubleshooting<br>- Pre-Treatment Troubleshooting<br>- Water Analysis & Monitoring<br>- Environmental Sampling & Analysis I & II | | |
| **Center for Training, Research & Education for Environmental Occupations @ the University of Florida** (Gainesville)<br>treeo.ufl.edu | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| - Coagulation / Flocculation in Water | - Wastewater Collection Systems | - Lift Station Maintenance |

| | | |
|---|---|---|
| Treatment Process<br>- Disinfection & Chlorination of Wastewater<br>- Fixed Film Processes<br>-Fluoridation of Potable Water<br>- Iron & Manganese Removal<br>- Pollution Control & Wastewater Treatment<br>- Pond Systems<br>- Preliminary Treatment<br>- Primary Treatment<br>- Process Filtration in Water Treatment<br>- Regulation of Water Quality<br>- Sedimentation Basins<br>- Suspended Growth Systems<br>- Wastewater Analysis<br>- Wastewater Treatment Plant Operations D-Licensure<br>- Water Analysis<br>- Water Sources & Treatment – An Introduction<br>- Water Treatment Plant Operations D-Licensure<br>- Advanced Sludge Process Control & Troubleshooting<br>- Biological & Chemical Nutrient Removal: A Study of Nitrogen & Phosphorus Removal<br>- Microbiology of Activated Sludge<br>- Sequencing Batch Reactor Operation, Make It Work For You<br>- Water Reclamation & Treatment Processes<br>- Chlorine Safety & Emergency Response<br>- Hazardous Materials Chemistry for the Non-Chemist<br>- Introduction to DEP SOP's for Groundwater & Soil Sampling / Calibration & Verification | - Water Distribution Systems Level 2 & 3<br>- Maintaining Wastewater Collection Systems<br>- Water Reclamation & Treatment Processes<br>- Performing Successful Distribution System Flushing<br>- Water Distribution System Pipes & Valves<br>- Water Distribution System Security<br>- Water Distribution Systems Operator Level 2 & 3 Training<br>- Chemical Compatibility & Storage<br>- Excavation & Trenching Safety Procedures<br>- Excavation & Trenching: Competent Person Training<br>- Pumping System Operation & Maintenance<br>- Train-the-Trainer for Environmental Occupations | - Maintaining Wastewater Collection Systems<br>- Energy Conservation at Water & Wastewater Treatment Facilities<br>- Excavation & Trenching Safety Procedures<br>- Excavation & Trenching: Competent Person Training<br>- Hazardous Materials Chemistry for the Non-Chemist.<br>- Heavy Equipment Safety<br>- Introduction to Electrical Maintenance<br>- Introduction to Heavy Equipment & Skill Training<br>- Permit Required Confined Space Awareness<br>- Pumping Systems Operation & Maintenance<br>- Train-the-Trainer for Environmental Occupations<br>- Water Facilities Security & Response Systems Training |

| | | |
|---|---|---|
| of Field Testing meters<br>- Introduction to DEP SOP's for Surface Water, Wastewater, Drinking Water, Ultra-Trace Metals & Sediment Sampling / Calibration & Verification of Field Testing Meters<br>- Sodium Hypochlorite Operations Level Training<br>- The Science of Disinfection<br>- Train-the-Trainer for Environmental Occupations | | |
| **Lake City Community College** (Lake City)<br>www.lakecitycc.edu | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| - Wastewater Treatment Plant Operation Levels B & C, Module 1<br>- Wastewater Treatment Plant Operation Levels B & C, Module 2<br>- Wastewater Treatment Plant Operation Levels B & C, Module 3<br>- Wastewater Treatment Plant Operation Level C, Module 1<br>- Wastewater Treatment Plant Operation Level C, Module 2<br>- Wastewater Treatment Plant Operation Level C, Module 3<br>- Wastewater Treatment Plant Operation Level B | | |
| **Florida Section of the American Water Works Association** (On-Site Training, Statewide)<br>www.fsawwa.org | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |

| | | |
|---|---|---|
| - Basic Chemistry<br>- Chemical Safety<br>- Chemical Seminar<br>- Chlorine & Ammonia Safety<br>- Chlorine Safety<br>- Chlorine Safety / PPE<br>- Filtration Basics<br>- Harmful Algai Blooms: Cyanobacteria<br>- Lime Softening<br>- Membrane Cleaning<br>- Reverse Osmosis & Nanofiltration<br>- Stage 2 Disinfection<br>- UV & Disinfection<br>- Water Sampling | - Basic Chemistry<br>- Chemical Safety<br>- Chemical Seminar<br>- Chlorine & Ammonia Safety<br>- Chlorine Safety<br>- Chlorine Safety / PPE<br>- Distribution System Materials & Equipment<br>- Fire Hydrant Operations & Maintenance<br>- Implementing Alternative Water Supplies<br>- Storm Water Pollution Prevention<br>- Surface Water Treatment Process<br>- Unidirectional Flushing<br>- Using Alternative Water Supplies<br>- Water Sampling | - Advanced Disinfection of Pipelines & Storage Facilities<br>- Backflow Prevention Assembly Repair Seminar<br>- Chemical Safety<br>- Chemical Seminar<br>- Chlorine & Ammonia Safety<br>- Chlorine Safety<br>- Chlorine Safety / PPE<br>- Corrosion Control<br>- Counter Terrorism & Security in the Water Industry<br>- Crane & Hoist Safety<br>- Distribution System Materials & Equipment<br>- Distribution System Water Loss Control & Systems Maintenance Workshop<br>- Excavation & Trenching<br>- Excavation & Welding<br>- Fire Hydrant Operations & Maintenance<br>- Pumps & Hydraulics<br>- Steel Storage Tank Seminar<br>- Understanding Water Cooling Towers |
| **Florida Section of the American Water Works Association** (Online Training, Statewide)<br>www.fsawwa.org | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| Laboratory Training<br>- Filtering, Mixing & Sampling<br>- Glassware & Pipetting<br>- Math & Metric System<br>- Safety Practices<br>- Standard Lab Equipment & pH Measurement<br>- Understanding Data & SQC | Profession-Specific OSHA Training Courses | Profession-Specific OSHA Training Courses |

| | | |
|---|---|---|
| - Weighing & Use of Syringes<br>Profession-Specific OSHA Training Courses | | |
| **Florida Rural Water Association** (Online Training, Statewide)<br>www.frwa.net | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| - Wastewater Treatment (Introductory)<br>- Basic Environmental Chemistry<br>- Surface Water Treatment | - Wastewater Collection (Introductory)<br>- Water Conservation & Drought Management<br>- Basic Environmental Chemistry<br>- Maintaining Water Quality in Distribution Systems<br>- Introduction to Water Processing<br>- Small Water Systems I & II<br>- Water Transmission & Distribution (Introductory) | - Valve & Hydrant Maintenance<br>- Corrosion Control<br>- Chlorinator Maintenance<br>- Pumps & Motors<br>- Water Utility Calculations<br>- Small Water Systems I & II |
| **Florida Water & Pollution Control Operators Association** (On-Site Training, Statewide)<br>www.fwpcoa.org | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| - Reverse Osmosis<br>- Wastewater Troubleshooting | - Backflow Tester<br>- Water Distribution 3, 2 & 1<br>- Wastewater Collection, C, B & A<br>- Stormwater Management C, B & A<br>- Reclaimed Water Distribution C<br>- Wastewater Troubleshooting<br>- Wastewater Process Control<br>- Reclaimed Water Field Inspector | - Backflow Tester<br>- Backflow Repair<br>- Facility Management Module I & II |
| **Florida Water & Pollution Control Operators Association** (Correspondence Programs, Statewide)<br>www.fwpcoa.org | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| | | - Facility Management<br>- Supervision |

| **Florida Water & Pollution Control Operators Association** (On-the-Road Programs, Statewide) www.fwpcoa.org | | |
|---|---|---|
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| - Chlorine Safety<br>- Respiratory Safety<br>- Laboratory Safety & Analysis<br>- Water Operator Exam Review | - Chlorine Safety<br>- Respiratory Safety<br>- Laboratory Safety & Analysis | - Backflow Tester<br>- Backflow Repair<br>- Introduction to Backflow Prevention<br>- Chlorine Safety<br>- Respiratory Safety<br>- Confined Space Safety<br>- Hazards Communication<br>- Trench & Evacuation Safety<br>- Maintenance of Traffic |
| **Florida Water & Pollution Control Operators Association** (Online Programs Offered Through FlexTraining.com, Statewide) www.fwpcoa.org | | |
| **Water / Wastewater Treatment Operators** | **Collection / Distribution / Transmission System Operators** | **Mechanics / Other Maintenance Positions** |
| - Chlorine Safety<br>- Respiratory Safety<br>- Confined Space Safety<br>- Laboratory Sampling & Analysis<br>- Wastewater Level A Operator Exam Review<br>- Wastewater Level B Operator Exam Review | - Chlorine Safety<br>- Respiratory Safety<br>- Confined Space Safety | - Chlorine Safety<br>- Respiratory Safety<br>- Confined Space Safety<br>- Hazards Communication<br>- Trench & Excavation Safety<br>- Maintenance of Traffic |

# CAREER PATHWAYS

## In the **Water Resources Industry**

| | |
|---|---|
| Prepared for: | Florida Gateway College<br>Employ Florida Banner Center<br>for Water Resources |
| Prepared by: | Fairfield Index, Inc. |
| Date: | May 16, 2011 |

# Narrative and Situation Assessment

## What was the assignment?

The Banner Center for Water Resources (Banner Center) requires a marketing plan which includes content on career pathways in the water resources industry through connections of education, training, work experiences and on-the-job training. This document and its attachments have been designed to demonstrate the most promising career opportunities in the state of Florida with information provided by the large-scale employers such as the Southwest Florida Water Management District and Orange County Government; O*Net, and the Bureau of Labor Statistics. Included in each Position Description, (PD), is a detail on job, education/training that is needed, and wages.

A model that is used to show career pathways in the water resources industry must be a comprehensive look at the many opportunities in the industry and provide a credible ladder for success by highlighting a clear sequence of progression obtained through experience and education/training. The choice to include the numerous pathways was made to give a larger and more realistic scope of the industry rather than a glimpse of possible occupations and singular jobs. The resulting model stays true to the Banner Center's emphasis on education and the needed continuing education for the industry. In order to sustain and grow the model, organizations within the industry need to partner with the Banner Center and share information that can be accessed publically. Over time, the model will change and expand as new opportunities come to the state, regulation and compliance regimes change, and the economy continues to re-structure. The May 2003, Fairfield Index, Inc. "Marketing Plan and Creative Brief, Employ Florida Banner Center for Water Resources" emphasizes a lack of definition and understanding of real jobs in the industry, shallow and narrow understanding of employer industries, and stereotypes of "dead-end", low-pay jobs. As a result, career seekers require tangible evidence of meaningful wages and career progression, rather than just a solid theory.

Using the career pathways model will give individuals the opportunity to see and have high confidence in what can be offered in the water resources industry. Possessing an education and accessing meaningful, additional training are highly valued assets by employers in the industry. The baby boomer phenomenon will be lead to a wave of retirements in all sectors of the aging industry, with the threat of an unexpectedly higher spike in exits due to the extension of careers due to deep recessionary conditions. There is also an underlying threat of talent churn or "cannibalization" for incremental wage increases in occupations like Water Resources Operators. Because the industry is an essential service or utility, the threat of near-term talent predation could overwhelm Florida's value opportunity to create an industry culture of learning and ladders, and a reputation for what Workforce Florida, Inc. references as "Florida's Infrastructure Innovatorsi" (Creating the Strategy for Today's Needs and Tomorrow's Talent, Workforce Florida's Five-year Strategic Plan).

It is important to distinguish between the career pathways model for the Banner Center and references to the US Department of Labor's Career Pathways Model, which requires further monitoring and development over time.

## Are there any situational matters or assessments needed for context?

In 2010, University of South Florida's Dr. Kiran C Patel's Center for Global Solutions conducted a study to access the state of the workforce in the water resources industry in Florida. Their conclusions were that the three most vulnerable occupations in the water resources industry were Water/Wastewater Treatment

Operators; Collection/Distribution/ Transmission System Operator; and, Lab Technician/Mechanic/ Other Maintenance Position. One way to tackle this issue of vulnerable occupations was to "ameliorate(d) with improved training and better marketing, as well as improved compensation packages[ii]." A more recent study being conducted in May 2011 (not completed) by University of Florida's TREEO Center has discovered that out of those three vulnerable occupations listed in Patel's study, Water/Wastewater Treatment Operators, Collection/Distribution/ Transmission System Operator; and, Lab Technician/Mechanic/ Other Maintenance Position, all have delayed filling positions in the last two years due to lower revenue projections[iii]. Patel's study (2010) indicated "The biggest challenges in filling these jobs tended to be related to high retirements; newer and more stringent standards and licensing requirements; lack of education and training opportunities; poor public image and low pay;" with the most current TREEO study has indicated that one of the biggest reasons for hiring is "due to retirement."

With retirement becoming a near-term option (or a delayed option due to the deep recession and slow recovery) for baby boomers, industry research has shown that close to half of the careers in water resources industry will open. Greg Kail, Director of Public Affairs for the American Water Works Association, explains the importance of developing a new, educated workforce, "The impact of the recession may delay some retirements, but people of retirement age aren't getting any younger, and when the economy does recover we will need a new workforce to continue to deliver water services.[iv]" A 2010 survey by Manpower, Inc. showed that in the Americas, 34 percent of the region's employers are having difficulty filling positions due to the lack of suitable talent available in their markets[v]." In an article for WaterWorld, AWWA President Andrew Richardson, noted that one of the difficulties in the water resources industry is "the lack of younger engineers and operators coming into the industry. 'A huge percentage of utility employees are eligible to retire. Unfortunately in many cases we have not identified their replacements,' [...] Part of the problem is the water industry's image […] People don't understand what a 'rich and rewarding career' the industry offers."[vi]

## Why was this model for career pathways selected and developed? Were there other options?

After a process of surveying other career pathways both within and outside of the industry, it was observed that a clear, sequential ladder of success for the water resources industry was needed for anyone who has a potential interest or wishes to continue a career in the industry. The career ladder needs to be on-point and trustworthy; therefore, the descriptions within the career pathways ladder are actual position descriptions used in the industry. Two priority/weighted contacts were established and information was shared over several weeks. By establishing those contacts, a cross-agency partnership began relative to the Southwest Florida Water Management District and Orange County Government. Their "cross-walking" data was an important step in the information sharing process. Position descriptions from Southwest Florida Water Management District and the Orange County Government were used with national level scans through O*NET and SOC codes. Other resources included engineering firms, offices of policy and associational advocacy, and the Banner Center's highly diversified Advisory Council.

A list of position descriptions from all agencies was complied and organized by agency. The model was developed in this way to reflect the position descriptions (PD) and where descriptions were obtained. Each PD consists of a 1) job description (based on agency in most cases), 2) education and training, and 3) wages in the state of Florida. Other career pathways models and communications often lack all the critical information. For instance, there might be a job description but not actual wages. There may be historical job descriptions that

create a library over time with no connection to near-term trends and realistic job opportunities. Due diligence for the Marketing Plan revealed target groups well-suited for education, certification and career development who have not patience for libraries and career theories, and carry limited and negatively biased views of the industry.

Another avenue that was considered was using the U.S. Department of Labor's (USDOL) Competency Model for the industry. This modeling service offers a detailed approach to career pathways and is accessible online[vii]. The Competency Model demonstrates the skill sets and education needed for industries in a pyramid-like fashion, beginning from start to finish. It can be applied to the industry as a whole, or more specifically, to a particular career pathway. For internships, externships, and mentorships, it identifies where applied experience helps leap careers. Many workforces and industries in the country have used the USDOL model, including, American Water Works Association and Water Environment Federation.

be developed and embedded on the Banner Center's Advisory Council—It is an interdisciplinary and active community that needs to be engaged full time. The career pathways model has a dual purpose: to increase awareness of the water resources industry and demonstrate the ladder of opportunities within the industry. To ensure the model is kept up-to-date, create awareness with educational and training facilities and partner with local businesses and companies; market the opportunities and target the specific audiences of the industry—students, boomers, military, and others.

### How should the Banner Center engage in/utilize the USDOL Competency Model over time? What values make this worthwhile?

- Encourage and lead, if necessary, national industry users' group
- Encourage and encourage funding of data warehousing at state and national level to track competency model evolution, application and impact
- Encourage utilization of model by employers, and related to item 2
- Tie Banner Center's national and international training and curriculum markets to items 1, 2 and 3
- Consider Florida employer adoption of model and sharing of data to beta or demonstration site for national warehouse
- Develop draft, comprehensive return on investment using career pathways model
- Conduct industry, trade media, and associational briefings in the context of and to advance item 1

### Where has there been a lack of understanding and breakage on understanding and communicating career paths, and why?

Communications about career paths and the rewards of understanding them require defining the right targets, investment in marketing communications, and refining or reforming perceptions about employers, wages and responsibilities. The "super-heated" job market of the early to mid-2000s sidelined entry and second-level water resources jobs from the public eye. The retrenching of the aging workforce in recessionary conditions provided a false sense of stability. Traditional negative perceptions about the quality, wages and upward career opportunities in water resources were not countered with meaningful communications and credible examples of service and wealth. With some exceptions, the human resources culture of the industry tends to renew perceptions by posting/filling positions instead of seeking new members of a robust, growing industry that serves the health of the community and planet. There are no common messages or images to link all sectors, companies, and jobs. This is an extraordinary exception to the cultures of other science, technology, engineering and math (STEM) enabled industries. Life sciences, healthcare, aerospace and aviation, and information technology have established powerful reputations for career ladders linked to certifications, internships and externships, great brands, and a broad range of lifelong choices.

Florida is a test bed and center of global case studies in water resources. Banner Center partner Florida Earth Foundation, a UNESCO participant in best practice programs, continuously positions student programs, think tanks, and symposia on water resources policies and solutions on behalf of the state. They now seek connections through Florida Water Choices Forums to the need for great industry talent and innovation to solve the complex water challenges of the future. Florida's population ranks the state at #4 in the U.S. with

over 18 million people[viii]. In 2009, 85% of people over the age of 25 had at least a high school diploma but only 26% had a bachelor's degree or higher[ix]. According to the Beacon Hill Index, Florida ranks 43rd in the nation for the percentage of its population enrolled in degree granting institutions while the neighbors, Louisiana, Mississippi, Texas, and South Carolina ranked higher[x]. Florida's career and adult education enrollment was well over 1 million in 2009-10 according to the Florida Department of Education but Secondary Job Preparatory Program Enrollment was a mere 345,399[xi]. The projected staff patterns of one of the water industries (Water, Sewage, and Other Systems) increases in every occupational title, with some almost doubling by 2018[xii]. In one month alone (from February 2010 to March 2010), we've seen an over 10,000 increase in online job ads but still does not meet the labor demands[xiii]. Out of the 78 position descriptions surveyed in the career pathways, only 2 have beginning salaries of $80,000 and 4 are between $60,000-$80,000. 18 mention either a Master's or Doctoral degree in lieu of experience and out of those 18 only two say a Master's preferred and two say a Doctoral degree is preferred. Higher education pedigree in the water resources industry is highly prevalent with occupations ranging from Staff Engineer to Chemist to Scientist, yet Florida ranks 46th in the nation on the number of science and engineering degrees awarded[xiv]. The Kauffman Foundation puts Florida 32nd in the nation – for engineers and scientists as a percentage of the population and 27th for the number of high technology jobs that exist in the state[xv].

## How will this add value for different kinds of employers?

Direction is value for employers. Employees who have direction will most likely find satisfaction in their work and satisfaction in work means more productivity. Barry J. Halm's article in the *International Journal of Training and Development* states [that] "business teams with 'higher levels of expressed positivity among group members have been linked to greater behavioral variability with moment-to-moment interaction as well as to long-range indicators of business success'[xvi]." The plug-and-play mentality was designed so that the model could be used in any environment or for any position.

Employers who use the career pathways model will create longstanding, cross-agency partnerships. The career pathways model is good for a sense of community and removes those barriers and lack of direction for the employee who might feel "trapped" in their current position. The model will create revenue—it will create cost savings for the industry as a whole. As the model is adapted and becomes more accessible, employees who once had to go from job to job can find opportunities within their company they might not have even known existed. Having a career pathways model is an investment for the employer and employee.

## How will this improve the Banner Center's performance?

- Ensures Banner Center is NOT the product
- Transitions Banner Center to consultative resource focused on fulfilling the career assessment needs of targets and other individuals
- Leaps Banner Center to national convener and collaborator at low cost
- Transforms Banner Center to subject expert before policy leaders in Florida
- Prepares Banner Center to grow on-line market on a multi-state, multi-national basis

## What does this reveal about career pathways in water resources otherwise not in plain view to educators, employers, etc.?

The career pathways model reveals the barriers that are in place within the water resources industry but also highlights the opportunities that are available. The model shows the depth of the water resources industry, beyond the stereotypical images and ideals. The water resources industry is a complex, interdisciplinary ladder. Some of the avenues require very specific training whereas others recommend graduate even doctoral degrees. It is a reminder that the industry is much more mature than other Florida infrastructure and target industries where career movement often requires movement from region to region and even exit from the state.

## What does this teach us about communicating to youth, "boomers", retirees, and transitioning military personnel?

What this teaches us about communicating to the youth especially is to examine the outlook of the job itself. What is the perception of wages to the recent college grad? Is this a job that is in high demand? Will this job allow for growth? These are all the types of questions those entering the workforce ask. Within the water resources industry, leaders know that wages can go from entry level to a higher level within a company. Leaders know that many of the jobs within the water resources industry are in high demand because as the slogan goes, water is life. The growth in the industry is substantial. A person can go from being in the trenches to the lab to managing a group of engineers within their lifetime with the right education and training. The sky is the limit in this industry. These are the approaches that are needed to be marketed. The veteran coming home from overseas has a job waiting for them in this industry, the retirees, the youth; all of these people have jobs waiting for them. Reaching out to these targeted audiences can be achieved through networking, social media platforms, within the community colleges and universities, even certain agencies.

## Water Resources PDs by Wages (Entry / Starting Pay)

| | | |
|---|---|---|
| **$15,000-$30,000** | • Pollution Control Technician<br>• Waste Minimization Technician<br>• Infectious Waste Technician<br>• Wastewater Treatment Plant Operator<br>• Plumber Assistant<br>• Water Main Pipe Layer<br>• Earth Drillers, Except Oil and Gas<br>• Field Technician (Resource Management)<br>• Field Technician, Staff (Resource Management) | • Field Technician Assistant (Resource Regulation)<br>• Aquatic Plant Management Technician<br>• Aquatic Plant Management Technician (Certified)<br>• Equipment Operator I<br>• Equipment Operator II<br>• Equipment Operator III<br>• Equipment Operator IV<br>• Industrial Mechanic I |

| | | |
|---|---|---|
| **$30,000-$45,000** | • Hydrologist (Resource Management)<br>• Environmental Scientist (Resource Management)<br>• Water Conservation Analyst (Entry-level)<br>• Water Conservation Analyst, Staff (Mid-level)<br>• Chemist (Entry-level)<br>• Engineer (Resource Regulation)<br>• Environmental Scientist (Resource Regulation)<br>• Hydrologist (Resource Regulation)<br>• Field Technician (Resource Management)<br>• Field Technician, Staff (Resource Management)<br>• Senior Field Technician (Resource Management) | • Field Technician (Resource Regulation)<br>• Field Technician Staff (Resource Regulation)<br>• Well Driller Aquatic Plant Management Crew Leader<br>• Master Electrician<br>• Control Room Operator<br>• Industrial Mechanic II<br>• Industrial Electrician I<br>• Industrial Electrician II<br>• Plant Specialist I<br>• Senior Utilities Maintenance Coordinator |

| | | |
|---|---|---|
| **$45,000-$60,000** | • Water/Wastewater Engineers<br>• Soil and Water Conservationists<br>• Staff Engineer (Resource Management—Projects and Research)<br>• Engineer, Professional (Resource Management)<br>• Staff Hydrologist (Resource Management)<br>• Professional Geologist/Engineer (Resource Management)<br>• Environmental Scientist (Staff) (Resource Management)<br>• Environmental Scientist (Senior) (Resource Management)<br>• Environmental Scientist (Chief) (Resource Management)<br>• Staff Chemist (Mid-level)<br>• Senior Chemist (Senior-level)<br>• Staff Engineer (Resource Regulation)<br>• Engineer, Professional (Resource Regulation)<br>• Staff Environmental Scientist (Resource Regulation)<br>• Environmental Scientist, Senior (Resource Regulation)<br>• Hydrologist Staff (Resource Regulation)<br>• Geologist/Engineer, Professional (Resource Regulation)<br>• Demand Management Program Manager | • Surface Water Regulation Manager (Resource Regulation)<br>• Water Use Regulation Manager (Resource Regulation)<br>• Environmental Manager (Resource Management)<br>• Aquatic Plant Manager<br>• Field Operations Manager<br>• Water Supply and Resource Development Manager<br>• Geohydrologic Data (ROMP) Manager<br>• Structure Operations Manager<br>• Surface Water Improvement and Management Program Manager<br>• Field Technician Supervisor (Resource Management)<br>• Structure Control Analyst<br>• FARMS Project Manager (Agricultural Projects)<br>• Environmental Manager<br>• Water Quality Monitoring Program Manager<br>• SCADA Administrator<br>• Utilities Supervisor |

| | |
|---|---|
| **$60,000-$80,000** | • Senior Professional Engineer (Resource Management) |

| | |
|---|---|
| | • Senior Professional Engineer (Modeling)<br>• Senior Professional Engineer (Resource Regulation)<br>• Geologist/Engineer, Senior Professional (Resource Regulation) |

| | |
|---|---|
| **$80,000+** | • Water Resource Specialists<br>• Regulation Director |

# Career Pathways

## SOC (Standard Occupational Classification) Occupations:

**19-4091 Environmental Science and Protection Technicians, Including Health**

*Perform laboratory and field tests to monitor the environment and investigate sources of pollution, including those that affect health, under the direction of an environmental scientist, engineer, or other specialist. May collect samples of gases, soil, water, and other materials for testing.

**Illustrative examples: Pollution Control Technician, Waste Minimization Technician, Infectious Waste Technician, Groundwater Monitoring Technician.

**51-8031 Water and Wastewater Treatment Plant and System Operators**

*Operate or control an entire process or system of machines, often through the use of control boards, to transfer or treat water or wastewater.

**Illustrative examples: Sewage Plant Operator, Liquid Waste Treatment Plant Operator.

**47-3015 Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters**

*Help plumbers, pipefitters, steamfitters, or pipelayers by performing duties requiring less skill. Duties include using, supplying or holding materials or tools, and cleaning work area and equipment. Construction laborers who do not primarily assist plumbers, pipefitters, steamfitters, or pipelayers are classified under "Construction Laborers" (47-2061). Apprentice workers are classified with the appropriate skilled construction trade occupation (47-2011 through 47-2231).

**Illustrative examples: Water Main Installer Helper, Plumber Assistant, Marine Pipefitter Helper, Industrial Gas Fitter Helper.

**47-2151 Pipelayers**

*Lay pipe for storm or sanitation sewers, drains, and water mains. Perform any combination of the following tasks: grade trenches or culverts, position pipe, or seal joints. Excludes "Welders, Cutters, Solderers, and Brazers" (51-4121).

**Illustrative examples: Water Main Pipe Layer, Trench Pipe Layer, Cast-Iron Drain Pipe Layer.

## O*NET Careers

**11-9121.02 - Water Resource Specialists**

*Design or implement programs and strategies related to water resource issues such as supply, quality, and regulatory compliance issues.

**This title represents an occupation for which data collection is currently underway.

**17-2051.02 - Water/Wastewater Engineers**

*Design or oversee projects involving provision of fresh water, disposal of wastewater and sewage, or prevention of flood-related damage. Prepare environmental documentation for water resources, regulatory program compliance, data management and analysis, and field work. Perform hydraulic modeling and pipeline design.

**This title represents an occupation for which data collection is currently underway.

**19-1031.01 - Soil and Water Conservationists**

*Plan and develop coordinated practices for soil erosion control, soil and water conservation, and sound land use.

**Sample of reported job titles: Soil Conservationist, Conservationist, Land Reclamation Specialist, Land Resource Specialist, Resource Conservation Specialist, Environmental Analyst, Erosion Control Specialist, Land Manager, Resource Conservationist, Watershed Program Manager.

**47-5021.00 - Earth Drillers, Except Oil and Gas**

*Operate a variety of drills--such as rotary, churn, and pneumatic--to tap sub-surface water and salt deposits, to remove core samples during mineral exploration or soil testing, and to facilitate the use of explosives in mining or construction. May use explosives. Includes horizontal and earth boring machine operators.

**Sample of reported job titles: Driller, Blaster, Blast Hole Driller, Drill Operator, Well Driller, Blasting Production Technician, Hard Rock Drill Operator, Highwall Drill Operator, Overburden Drill Operator, Rock Drill Operator.

## Southwest Florida Water Management District PD's (Position Descriptions)

*based on EEO's (Source: EEO Index, http://www.census.gov/hhes/www/eeoindex/jobgroups.pdf)

**EEO 02 Occupation Group Titles: Science, Engineering, and Computer Professionals**

**Job Category Titles: Professionals**

02 Staff Engineer (Resource Management—Projects and Research)

02 Engineer, Professional (Resource Management)

02 Senior Professional Engineer (Resource Management)

02 Senior Professional Engineer (Modeling)

02 Hydrologist (Resource Management)

02 Staff Hydrologist (Resource Management)

02 Professional Geologist/Engineer (Resource Management)

02 Environmental Scientist (Resource Management)

02 Environmental Scientist (Staff) (Resource Management)

02 Environmental Scientist (Senior) (Resource Management)

02 Environmental Scientist (Chief) (Resource Management)

02 Water Conservation Analyst (Entry-level)

02 Water Conservation Analyst, Staff (Mid-level)

02 Water Conservation Analyst, Senior (Senior-level)

02 Chemist (Entry-level)

02 Staff Chemist (Mid-level)

02 Senior Chemist (Senior-level)

02 Engineer (Resource Regulation)

02 Staff Engineer (Resource Regulation)

02 Environmental Scientist (Resource Regulation)

02 Engineer, Professional (Resource Regulation)

02 Senior Professional Engineer (Resource Regulation)

02 Staff Environmental Scientist (Resource Regulation)

02 Environmental Scientist, Senior (Resource Regulation)

02 Hydrologist (Resource Regulation)

02 Hydrologist Staff (Resource Regulation)

02 Geologist/Engineer, Professional (Resource Regulation)

02 Geologist/Engineer, Senior Professional (Resource Regulation)

02 Demand Management Program Manager

02 Surface Water Regulation Manager (Resource Regulation)

02 Water Use Regulation Manager (Resource Regulation)

02 Environmental Manager (Resource Management)

02 Aquatic Plant Manager

02 Field Operations Manager

02 Water Supply and Resource Development Manager

02 Geohydrologic Data (ROMP) Manager

02 Structure Operations Manager

02 Surface Water Improvement and Management Program Manager

**EEO 03 Occupation Group Titles: Healthcare Practitioner Professionals**

**Job Category Titles: Technicians**

03 Field Technician (Resource Management)

03 Field Technician, Staff (Resource Management)

03 Senior Field Technician (Resource Management)

03 Field Technician Assistant (Resource Regulation)

03 Field Technician (Resource Regulation)

03 Field Technician Staff (Resource Regulation)

03 Field Technician Senior (Resource Regulation)

03 Field Technician Supervisor (Resource Management)

**EEO 07 Occupation Group Titles: Administrative Support Workers**

**Job Category Titles: Operatives**

07 Structure Control Analyst

07 Well Driller

07 Well Driller, Senior

07 Aquatic Plant Management Technician

07 Aquatic Plant Management Technician (Certified)

07 Aquatic Plant Management Crew Leader

**EEO 01 Occupational Group Titles: Management, Business, and Financial Workers**

**Job Category Titles: Officials and Managers**

01 FARMS Project Manager (Agricultural Projects)

01 Regulation Director

01 Environmental Manager

01 Water Quality Monitoring Program Manager

**Orange County Government (Union) PD's (Position Descriptions)**
Master Electrician

Control Room Operator

Equipment Operator I

Equipment Operator II

Equipment Operator III

Equipment Operator IV

Industrial Mechanic I

Industrial Mechanic II

Industrial Electrician I

Industrial Electrician II

Plant Specialist I

**Orange County Government (Regular) PD's (Position Descriptions)**
SCADA Administrator

Senior Utilities Maintenance Coordinator

Utilities Supervisor

**SOC and O*NET Job Descriptions, Education, Wages**

**19-4091 Environmental Science and Protection Technicians, Including Health**

## Pollution Control Technician

**Job description.** Develops methods and devices used in the prevention, control, and correction of environmental hazards, working closely with environmental engineers and scientists. Uses principles and theories of science and engineering to solve technical problems. Work is more limited in scope and more practically oriented than that of scientists and engineers. Companies prefer at least a two-year associate's degree in engineering technology with college courses in science, engineering, mathematics, and courses in field of specialty; however, some companies may accept equivalent education and experience combined. Inspects and maintains equipment affecting air pollution and recycling. Conducts tests and field investigations to obtain data for use by environmental, engineering, and scientific personnel in determining sources and methods of controlling pollutants in air, water, and soil, utilizing knowledge of agriculture, chemistry, meteorology, and principles of applied technologies. Performs quantitative and qualitative analyses according to prescribed standards to determine characteristics or composition of solid, liquid, or gaseous materials and substances. Collects samples of gases from smokestacks, and collects other air samples and meteorological data to assist in evaluation of atmospheric pollutants. Collects water samples from streams and lakes, or raw, semi-processed or processed water, industrial waste water, or water from other sources to assess pollution problem. Collects soil, silt, or mud to determine chemical composition and nature of pollutants. Prepares sample for testing, records data, and prepares summaries and charts for review. Sets monitoring equipment to provide flow of information. Installs, operates, and performs routine maintenance on gas and fluid flow systems, chemical reaction systems, mechanical equipment, and other test instrumentation. May inspect water and wastewater treatment systems to ensure pollution control requirements are met. May operate fixed or mobile monitoring or data collection station. May conduct bacteriological or other tests related to research in environmental or pollution control activity. May collect and analyze engine exhaust emissions to determine type and amount of pollutants. May specialize in one phase or type of environmental pollution or protection and be identified according to specialty. (Source: eDOT Job Description)

**Education and training.** There are many ways to qualify for a job as a science technician. Most employers prefer applicants who have at least 2 years of specialized postsecondary training or an associate degree in applied science or science-related technology. Some science technicians have a bachelor's degree in the natural sciences, while others have no formal postsecondary education and learn their skills on the job.

Some science technician specialties have higher education requirements. For example, biological technicians often need a bachelor's degree in biology or a closely related field. Forensic science positions also typically require a bachelor's degree, either in forensic science or another natural science. Knowledge and understanding of legal procedures also can be helpful. Chemical technician positions in research and development also often require a bachelor's degree, but most chemical process technicians have a 2-year degree instead, usually an associate degree in process technology.

Many technical and community colleges offer programs in a specific technology or more general education in science and mathematics. A number of associate degree programs are designed to provide easy transfer to

bachelor's degree programs at colleges or universities. Technical institutes usually offer technician training, but they provide less theory and general education than community colleges. The length of programs at technical institutes varies, although 1-year certificate programs and 2-year associate degree programs are common. Some schools offer cooperative-education or internship programs, allowing students the opportunity to work at a local company or some other workplace while attending classes during alternate terms. Participation in such programs can significantly enhance a student's employment prospects.

Whatever their formal education, science technicians usually need hands-on training, which they can receive either in school or on the job. Job candidates with extensive hands-on experience using a variety of laboratory equipment, including computers and related equipment, usually require only a short period of on-the-job training. Those with a high school diploma and no college degree typically have a more extensive training program where they work as trainees under the direct supervision of a more experienced technician.

People interested in careers as science technicians should take as many high school science and math courses as possible. Science courses taken beyond high school, in an associate or bachelor's degree program, should be laboratory oriented, with an emphasis on bench skills. A solid background in applied chemistry, physics, and math is vital.

**Other qualifications.** Communication skills are important because technicians are often required to report their findings both orally and in writing. In addition, technicians should be able to work well with others. Because computers often are used in research and development laboratories, technicians should also have strong computer skills, especially in computer modeling. Organizational ability and skill in interpreting scientific results are important as well, as are high mechanical aptitude, attention to detail, and analytical thinking.

**Advancement.** Technicians usually begin work as trainees in routine positions under the direct supervision of a scientist or a more experienced technician. As they gain experience, technicians take on more responsibility and carry out assignments under only general supervision, and some eventually become supervisors. Technicians who have a bachelor’s degree often are able to advance to scientist positions in their field after a few years of experience working as a technician or after earning a graduate degree (Source: Occupational Outlook Handbook).

**Wages & employment (in Florida)**
Entry level: $27,484.74
Mean (average): $40,722.82
Median: $38,813.62
Experienced: $47,341.85
*Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program*

## Waste Minimization Technician

**Job description.** Performs laboratory and field tests to monitor the environment and investigate sources of pollution, including those that affect health. Under direction of an environmental scientist or specialist, may collect samples of gases, soil, water, and other materials for testing and take corrective actions as assigned. Record test data and prepare reports, summaries, and charts that interpret test results. Collect samples of

gases, soils, water, industrial wastewater, and asbestos products to conduct tests on pollutant levels and identify sources of pollution. Respond to and investigate hazardous conditions or spills, or outbreaks of disease or food poisoning, collecting samples for analysis. Provide information and technical and program assistance to government representatives, employers and the general public on the issues of public health, environmental protection or workplace safety.

**Education and training.** Most of these occupations require a four - year bachelor's degree, but some do not. A minimum of two to four years of work-related skill, knowledge, or experience is needed for these occupations. For example, an accountant must complete four years of college and work for several years in accounting to be considered qualified. (Source: AOL Jobs)

**Wages & employment (in Florida)**
Entry level: $27,484.74
Mean (average): $40,722.82
Median: $38,813.62
Experienced: $47,341.85
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

## Infectious Waste Technician

**Job description.** Performs laboratory and field tests to monitor the environment and investigate sources of pollution, including those that affect health. Under direction of an environmental scientist or specialist, may collect samples of gases, soil, water, and other materials for testing and take corrective actions as assigned. Record test data and prepare reports, summaries, and charts that interpret test results. Collect samples of gases, soils, water, industrial wastewater, and asbestos products to conduct tests on pollutant levels and identify sources of pollution. Respond to and investigate hazardous conditions or spills, or outbreaks of disease or food poisoning, collecting samples for analysis. Provide information and technical and program assistance to government representatives, employers and the general public on the issues of public health, environmental protection or workplace safety.

**Education and training.** Most of these occupations require a four - year bachelor's degree, but some do not. A minimum of two to four years of work-related skill, knowledge, or experience is needed for these occupations. For example, an accountant must complete four years of college and work for several years in accounting to be considered qualified. (Source: AOL Jobs)

**Wages & employment (in Florida)**
Entry level: $27,484.74
Mean (average): $40,722.82
Median: $38,813.62

Experienced: $47,341.85
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

## 51-8031 Water and Wastewater Treatment Plant and System Operators

### Wastewater Treatment Plant Operator

**Job description.** Operates sewage treatment, sludge processing, and disposal equipment in wastewater treatment plant to control flow and processing of sewage. Monitors control panels and adjust valves and gates manually or by remote control to regulate flow of sewage. Observes variations in operating conditions and interprets meter and gage readings and tests results to determine load requirements. Starts and stops pumps, engines, and generators to control flow of raw sewage through filtering, settling, aeration, and sludge digestion processes. Maintains log of operations and records meter and gage readings. Gives directions to wastewater treatment plant attendants in performing routine operations and maintenance. (Source: eDOT Job Description)

**Education and training.** A high school diploma is usually required for an individual to become a water or wastewater treatment plant operator. Some applicants complete certificate or associate degree programs in water-quality and wastewater-treatment technology. Employers prefer to hire such candidates, because completion of a program minimizes the training needed at the plant and also shows a commitment to working in the industry. These programs are offered by community colleges, technical schools, and trade associations, and can be found throughout the country. In some cases, a degree or certificate program can be substituted for experience, allowing a worker to become licensed at a higher level more quickly.

Trainees usually start as attendants or operators-in-training and learn their skills on the job under the direction of an experienced operator. They learn by observing and doing routine tasks such as recording meter readings, taking samples of wastewater and sludge, and performing simple maintenance and repair work on pumps, electric motors, valves, and other plant equipment. Larger treatment plants generally combine this on-the-job training with formal classroom or self-paced study programs.

**Licensure and certification**. Both water and liquid waste plant and system operators must be certified by their States. Requirements and standards vary widely depending on the State. Most States have four different levels of certification, depending on the operator's experience and training. Although some States will honor licenses from other States, operators who move may have to take a new set of exams to become certified in a different State. The Association of Boards of Certification (ABC) offers a certificate program that may be helpful for operators who plan to move to a different State.

**Other qualifications**. Water and wastewater treatment plant operators need mechanical aptitude and the ability to solve problems intuitively. They also should be competent in basic mathematics, chemistry, and biology. They must have the ability to apply data to formulas that determine treatment requirements, flow levels, and concentration levels. Some basic familiarity with computers also is necessary, because operators generally use them to record data. Some plants also use computer-controlled equipment and instrumentation.

**Advancement**. Most States have four levels of certification for water and liquid waste treatment plant and system operators. On the basis of criteria such as the size of the plant and the treatment processes employed, each plant is given a corresponding level. A small system may only require the lowest level of certification. An operator who has that certification would be able to operate the plant without any supervision. In some States, operators in small plants can earn higher certifications through knowledge tests, while in other States; experience in a larger plant is required. Either way, operators in these plants will find it difficult to advance in their careers without moving to a larger plant.

As plants get larger and more complicated, operators need more skills before they are allowed to work without supervision. At the largest plants, operators who have the highest level of certification work as shift supervisors and may be in charge of large teams of operators. Operators in these plants can start as trainees and work through the different levels of certification until they advance to the level of shift supervisor.

Some experienced operators get jobs as technicians with State drinking-water-control or water-pollution-control agencies. In that capacity, they monitor and provide technical assistance to plants throughout the State. Vocational-technical school or community-college training generally is preferred for technician jobs. Experienced operators may transfer to related jobs with industrial liquid-waste treatment plants, water or liquid waste treatment equipment and chemical companies, engineering consulting firms, or vocational-technical schools (Source: Occupational Outlook Handbook).

**Wages (in Florida)**
Entry level: $28,133.20
Mean (average): $39,584.46
Median: $38,126.06
Experienced: $45,310.09
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

## 47-3015 Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters

## Plumber Assistant

**Job description.** Specific description information on the selected job has not been found and is replaced by the OES Job Group/Class for this position: Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters Help plumbers, pipefitters, steamfitters, or pipelayers by performing duties of lesser skill. Duties include using, supplying or holding materials or tools, and cleaning work area and equipment. Exclude apprentice workers and report them with the appropriate skilled construction trade occupation (47-2011 through 47-2221). Exclude construction laborers who do not primarily assist plumbers, pipefitters, steamfitters, or pipelayers, and classify them under 'Construction Laborers' (47-2061). (Source: OES/BLS/ETA Description)

**Education and training.** Most common education is short-term, on-the-job-training (Source: US Dept. of Labor). 46% had some college, no degree; 34 % had only a high school diploma or equivalent; and 20% had less than a high school education (Source: O*NET).

**Wages (in Florida)**
Entry level: $17,320.55
Mean (average): $26,436.63
Median: $26,177.63
Experienced: $30,995.69
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

## 47-2151 Pipelayers

### Water Main Pipe Layer

**Job description.** Lay pipe for storm or sanitation sewers, drains, and water mains. Perform any combination of the following tasks: grade trenches or culverts, position pipe, or seal joints.

**Education and training.** Plumbers, pipelayers, pipefitters, and steamfitters enter into the occupation in a variety of ways. Most plumbers, pipefitters, and steamfitters get their training in jointly administered apprenticeships or in technical schools and community colleges. Pipelayers typically receive their training on the job. Apprenticeship programs generally provide the most comprehensive training available for these jobs. Such programs are, for the most part, administered jointly by union locals and their affiliated companies or by nonunion contractor organizations. Organizations that sponsor apprenticeships include the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada; local employers of either the Mechanical Contractors Association of America or the National Association of Plumbing-Heating-Cooling Contractors; a union associated with a member of the National Fire Sprinkler Association; the Associated Builders and Contractors; the National Association of Plumbing-Heating-Cooling Contractors; the American Fire Sprinkler Association; and the Home Builders Institute of the National Association of Home Builders. Apprenticeships—both union and nonunion—consist of 4 or 5 years of paid on-the-job training and at least 144 hours of related classroom instruction per year. Classroom subjects include drafting and blueprint reading, mathematics, applied physics and chemistry, safety, and local plumbing codes and regulations. On the job, apprentices first learn basic skills, such as identifying grades and types of pipe, using the tools of the trade, and unloading materials safely. As apprentices gain experience, they learn how to work with various types of pipe and how to install different piping systems and plumbing fixtures. Apprenticeship gives trainees a thorough knowledge of all aspects of the trade. Although most plumbers, pipefitters, and steamfitters are trained through apprenticeships, some still learn their skills informally on the job or by taking classes on their own.

**Licensure.** Although there are no uniform national licensing requirements, most States and communities require plumbers to be licensed. Licensing requirements vary, but most localities require workers to have 2 to 5 years of experience and to pass an examination that tests their knowledge of the trade and of local plumbing codes before they are permitted to work independently. Several States require a special license to work on gas lines. A few States require pipefitters to be licensed. Licenses usually require a test, experience, or both.

**Other qualifications.** Applicants for union or nonunion apprentice jobs must be at least 18 years old and in good physical condition. A drug test may be required. Apprenticeship committees may require applicants to

have a high school diploma or its equivalent. For jointly administered apprenticeships approved by the U.S. Department of Labor, a high school diploma is mandatory, because these programs can earn credit from community colleges and, in some cases, from 4-year colleges. Armed Forces training in plumbing, pipefitting, and steam fitting are considered very good preparation. In fact, people with this background may be given credit for previous experience when they enroll in a civilian apprenticeship program. High school or postsecondary courses in shop, plumbing, general mathematics; drafting, blueprint reading, computers, and physics also are good preparation.

**Certification and advancement.** With additional training, some plumbers, pipefitters, and steamfitters become supervisors for mechanical and plumbing contractors. Others, especially plumbers, go into business for themselves, often starting as a self-employed plumber working from home. Some eventually become owners of businesses employing many workers and may spend most of their time as managers rather than as plumbers. Others move into closely related areas such as construction management or building inspection.

For those who would like to advance, it is becoming increasingly important to be able to communicate in both English and Spanish in order to relay instructions and safety precautions to workers with limited understanding of English; Spanish-speaking workers make up a large part of the construction workforce in many areas. Supervisors and contractors need good communication skills to deal with clients and subcontractors.

In line with new opportunities arising from the growing need to conserve water, the Plumbing-Heating-Cooling Contractors—National Association has formed a partnership with GreenPlumbers USA to train and certify plumbers across the Nation on water-saving technologies and energy efficiency. Attainment of this certification may help people trained in this area to get more jobs and advance more quickly.

**Wages (in Florida)**
Entry level: $25,670.84
Mean (average): $31,969.50
Median: $30,709.15
Experienced: $35,118.32
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

## 11-9121.02 - Water Resource Specialists

**Job description.** Design or implement programs and strategies related to water resource issues such as supply, quality, and regulatory compliance issues.

**Education and training.** This occupation may require a background in the following science; technology, engineering, and mathematics (STEM) educational disciplines:

Engineering — Water Resources Engineering.

**Wages (in Florida)**
Entry level: $83,490.41

Mean (average): $105,296.70
Median: $101,748.05
Experienced: $116,199.34
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

### 17-2051.02 - Water/Wastewater Engineers

**Job description.** Design or oversee projects involving provision of fresh water, disposal of wastewater and sewage, or prevention of flood-related damage. Prepare environmental documentation for water resources, regulatory program compliance, data management and analysis, and field work. Perform hydraulic modeling and pipeline design.

**Education and training.** This occupation may require a background in the following science, technology, engineering, and mathematics (STEM) educational disciplines: Engineering — Water Resources Engineering.

**Wages (in Florida).**
Entry level: $53,839.65
Mean (average): $76,942.61
Median: $76,647.16
Experienced: $88,494.59
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

### 19-1031.01 - Soil and Water Conservationists

**Job description.** Plan and develop coordinated practices for soil erosion control, soil and water conservation, and sound land use.

**Education and training.** This occupation may require a background in the following science, technology, engineering, and mathematics (STEM) educational disciplines: Life Sciences — Forest Sciences and Biology; Forestry; Natural Resources and Conservation, Other; Natural Resources Management and Policy; Natural Resources/Conservation, General; Wildlife and Wildlands Science and Management.

**Wages (in Florida).**
Entry level: $49,996.80
Mean (average): $75,659.96
Median: $75,757.76
Experienced: $88,490.52
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

### 47-5021.00 - Earth Drillers, Except Oil and Gas

**Job description.** Operate a variety of drills--such as rotary, churn, and pneumatic--to tap sub-surface water and salt deposits, to remove core samples during mineral exploration or soil testing, and to facilitate the use of explosives in mining or construction. May use explosives. Includes horizontal and earth boring machine operators.

**Education and training.** These occupations usually require a high school diploma. Employees in these occupations need anywhere from a few months to one year of working with experienced employees. A recognized apprenticeship program may be associated with these occupations.

**Wages (in Florida)**
Entry level: $23,786.44
Mean (average): $33,639.76
Median: $32,447.73
Experienced: $38,566.93
Source: FL Labor Market Statistics, Occupational Employment Statistics & Wages Program

## 02 Staff Engineer (Resource Management—Projects and Research)

**Job Description.** This is technical work in water resource and/or civil engineering involving conventional engineering practices in water resources, and project management involved in implementation of the Comprehensive Watershed Management (CWM) initiative addressing flood protection, water quality, natural systems and water supply. This is accomplished through a watershed management program (WMP) that includes five elements, topographic information, watershed evaluation, watershed management plan, implementation of best management practices and the maintenance of watershed parameters and models. Involved in the planning and budgeting processes. Coordinates with local governments and other cooperators through the cooperative funding program to develop and implement watershed-based projects that address water resource issues. Performs parameterization of watershed information using the geographical information system (GIs) to process data, and develop watershed computer models, perform analyses to provide projections of watershed conditions. Performs reviews of information developed for the WMP by District consultants. Conducts field investigations and verification. Responds to information requests on watersheds, special flood hazard zones for flood insurance, and base flood elevations. Manages and assists project managers with District projects from concept to implementation, which includes preparation of requests for proposals, and in development of contracts with consultants and contractors. Conducts technical review of water resource management information that includes the review and maintenance of watershed parameters and modeling developed to understand the present watershed condition, and to project a future watershed condition to determine if the desired watershed condition is obtainable. This watershed information is incorporated into the District's spatial decision support system. Inspects construction projects. Prepares and manages agreements and projects between the District and local governments for cooperatively funded projects. Makes presentations to District boards, technical advisory groups, and general public. Participates in departmental projects, conducts special studies or projects and performs other duties as needed. Employee may be required to perform duties, which may include the employee's normal work functions or other emergency support functions as determined necessary by the District, as assigned before, during and after major storm events and emergency situations such as hurricanes or other declared emergencies. Participates in departmental projects and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university in engineering, and three years' experience involving water resource management, regulation, development or related activity are

required. Possession of a valid Florida Driver License is required. Nine hours of hydrology or water-resource related courses are preferred. Successful completion of the Engineering Intern Exam or the ability to sit for the Engineering Intern Exam is preferred. A master's degree in a related field will be considered in lieu of one year's experience. A doctorate degree in a related field will be considered in lieu of two years' experience.

**Wages (in Florida)**
Minimum – 52,145.60 Midpoint – 67,371.20 Maximum – 82,576.00
*(Source: Southwest Florida Water Management District)

## 02 Engineer, Professional (Resource Management)

**Job Description.** This is professional work in water resource and/or civil engineering involving conventional engineering_practices in water resources, and project management and involved in implementation of the District's_Strategic Plan addressing flood protection, water quality, natural systems and water supply. This is accomplished through the Watershed Management Program that includes five elements, topographic information, watershed evaluation, watershed management plan, implementation of best management practices and the maintenance of watershed parameters and model updates. Involved in the planning and budgeting processes. Coordinates with local governments and other cooperators through the cooperative funding program to develop and implement watershed...based projects that address water resource issues. Prepares and manages agreements and projects between the District and local governments for cooperatively funded projects. Performs watershed computer modeling analyses. Conducts field investigations and verification. Responds to information requests on watersheds, flood hazard zones for flood insurance, and base flood elevations. Prepares requests for proposals and develops contracts with consultants and contractors. Manages District projects from concept to implementation. Conducts technical review of water resource management information that includes the review and maintenance of watershed parameters and modeling `developed to understand the present watershed condition, and to project a future watershed condition to determine if the desired watershed condition is obtainable. This watershed information will be incorporated into the District's spatial decision support system. Inspects and approves construction projects. Makes presentations to Governing Board, Basin Boards, technical advisory groups, and the general public. Participates in District emergency operations and departmental projects, conducts special research and performs other duties as required.

**Education and Training.** Current registration as a Professional Engineer in the State of Florida is required.

*Professional Engineers licensed in other states who are eligible to apply for Licensure By Endorsement in accordance with Section 61G15-20.0015 of the Florida Administrative Code will be considered. Continued employment would be contingent on obtaining a license as a Professional Engineer in the State of Florida within 180 days of hire. Failure to do so will result in demotion or administrative separation from employment. Possession of a valid driver license is required.

**Wages (in Florida)**
Minimum – 58,156.80 Midpoint – 76,356.80 Maximum – 94,536.00
*(Source: Southwest Florida Water Management District)

## 02 Senior Professional Engineer (Resource Management)

**Job description.** This is complex professional work in water resource and/or civil engineering involving advanced engineering practices, technical research and project management. Employee performs technical research and analysis on assigned projects. Tracks project costs against budgeted funds for the project. Tests new methods and sets technological standards to address water resource management. Applies hydraulic and hydrologic analytical techniques to water resource studies, summarizes analysis and makes recommendations. Performs field inspections to verify hydrologic divides and to determine the nature of hydraulic connections in waterways. Uses computer models to generate hydraulic and hydrologic simulations of surface water systems. Plans, manages and performs special projects or activities relative to water resources management, regulation and development. Provides technical support to Regulatory. Coordinates with local governments on jointly funded projects. Develops agreements between District and local governments. Prepares the scopes of work relative to District projects. Provides technical and non-technical direction to other section staff. Assists section manager in budget-related activities. Negotiates and manages engineering consultant contracts. Works with project managers to plan and coordinate project work schedules. Reviews and presents project results to technical and policy groups, Governing Basin Boards, and general public as appropriate. Participates in departmental projects and performs other duties as needed.

**Education and Training.** Current registration as a Professional Engineer in the State of Florida AND seven years' experience involving water resource management, regulation, development or related activity is required. Possession of a valid driver license is rewired. A master's degree in a related field will be considered in lieu of one year's experience. A doctorate degree in a related field will be considered in lieu of two years' experience.

**Wages (in Florida)**

Minimum – 65,000.00 Midpoint –86,590.40 Maximum – 108,160.00

*(Source: Southwest Florida Water Management District)

## 02 Senior Professional Engineer (Modeling)

**Job Description.** This is highly-technical professional work in water resource engineering involving conventional engineering practices, technical research, analysis, project management and assistance in policy development. Applies and/or develops surface water models for the establishment of Pollutant Load Reductions Goals (PLRGs) and minimum flows for SWIM and other 'priority water bodies. Plans, schedules, perform and coordinates detailed hydrologic, hydraulic, hydrodynamic, and/or water quality analyses, using standard techniques, procedures, and/or methodologies, adapting them as. May be required. Develops computer programs and documentation in support of section, departmental, or District projects. Serves as project manager for assigned projects. Makes recommendations to Executive Staff and the Boards and assists in policy development. Participates in departmental projects and performs other duties as needed.

**Education and Training.** Current registration as a Professional Engineer in the State of Florida, AND seven years' experience involving water resource management, regulation, development or related activity are required. Possession of a valid Florida Driver License is required.

**Wages (in Florida)**
Minimum – 65,000.00 Midpoint –86,590.40 Maximum – 108,160.00
*(Source: Southwest Florida Water Management District)

## 02 Hydrologist (Resource Management)

**Job Description.** This is technical work involving preparation, analysis, and interpretation of hydrologic and geologic data. Employee provides as-needed technical support to other Section personnel on water resource assessment, water supply, and resource development projects; conducts, prepares, and valuates water resource studies and field investigations; manages outside consulting and Cooperative Funding Initiative contracts; compiles technical reports or memoranda on project and presents project work products to technical and citizen groups. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in physical or natural sciences or eng nearing is required. Water resources related experience and nine hours of hydrology or Water-resource related courses from an accredited college or university are preferred. A master' degree in a related field will be considered in lieu of one year's experience. A doctorate degree in a related field will be considered in lieu of two year's experience. Possession of valid Florida Driver License is required.

**Wages (in Florida)**
Minimum – 42,224.00 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

## 02 Staff Hydrologist (Resource Management)

**Job Description.** This is professional, technical work supporting data collection needs including collection, maintenance, analysis, reporting, quality control and special project investigations associated with hydrologic data. Analyzes hydrologic, hydrogeologic, and hydrochemical data in support of District projects using the District's Geographic Information System (GIs) and related graphical, analytical, and statistical tools, and develops standards for use and, comparison. Produces reports, summaries, statistics, and recommendations from these analyses. Maintains Hydrologic Data Collection GIs map library database. Assists in production of the monthly Hydrologic Conditions Report through analysis of current conditions, including text preparation, and produces relevant interpretive maps on the District's GIs. Assists in the operation and management of the Supervisory Control and Data Acquisition (SCADA) system computer network. Formalizes and assists in the implementation of QCIQA procedures for the SCADA system. Provides technical data, advice, and interpretations to consultants, public agencies, and private individuals. Employee may be required to perform duties, which may include the employee's normal work functions or other emergency support functions as determined necessary by the District, as assigned before, during and after major storm events and emergency situations such as hurricanes or other declared emergencies. Participates in departmental projects and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university in physical or natural science or engineering AND three years' experience involving water resource management, regulation,

development or related activity are required. A master's degree in a related field will be considered in lieu of one year's experience; OR a doctorate degree in a related field will be considered in lieu of two years' experience. Possession of a valid driver license is required. College level course work in hydrology is preferred. Experience using GIs and statistical analysis software in both mainframe and personal computer environments and three years' experience involving sophisticated statistical data analysis and data processing is preferred.

**Wages (in Florida)**
Minimum –46,862.40 Midpoint –59,529.60 Maximum – 72,196.80
*(Source: Southwest Florida Water Management District)

## 02 Professional Geologist/Engineer (Resource Management)

**Job Description.** This is advanced technical work involving preparation, analysis, and interpretation of hydrologic and geologic data. Employee manages water resource assessment, water supply, and resource development projects; conducts, prepares, and evaluates water resource studies and field investigations; manages outside consulting contracts; compiles technical reports or memoranda on project work for presentation and presents project work products to boards and citizen groups. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Current registration as a Professional Geologist in the State of Florida is required. Water resources related experience and nine hours of hydrology or water-resource related courses from an accredited college or university are preferred. A master's degree in a related field will be considered in lieu of one year's experience. A doctorate degree in a related field will be considered in lieu of two years experience. Possession of a valid Florida Driver License is required.

**Wages (in Florida)**
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
*(Source: Southwest Florida Water Management District)

## 02 Environmental Scientist (Resource Management)

**Job Description.** This is an entry level position involving the restoration, preservation, and management of fresh and estuarine surface waters in the SWIM Section of the Resource Management Department. Assists with design, implementation of diagnostic, monitoring, research and restoration projects. Conducts routine statistical analyses of water quality data. Collects, processes, identifies and evaluates community structure of aquatic plant and animal populations in lakes, rivers, and estuaries. Assists with developing recommendations and policies in the assessment and implementation of SWIM Management Plans and the Comprehensive Water Management Initiative. Implements, and manages habitat restoration, water quality improvement, and research projects in estuarine and fresh water systems. Prepares Requests for Proposals (RFPs) and Bids (RFBs) and manages related contracts. Coordinates with local governments, universities, contractors, and other technical personnel to ensure compliance with technical standards and timely project completion. Assists other section and department staff with environmental evaluations. Makes presentations to boards, local governments, citizen groups, and scientists regarding surface water projects and participates in workshops and

public meetings. May be required to perform duties, which may include the normal work functions or other emergency support functions as determined necessary by the district, as assigned before, during and after major storm events and emergency situations such as hurricanes or other declared emergencies. Participated in other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in environmental science, marine science, biology, botany, ecology, zoology, chemistry or other related science is required. Possession of a valid driver license is required. Project management experience is preferred.

**Wages (in Florida)**
Minimum –42,224.00 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

### 02 Environmental Scientist (Staff) (Resource Management)

**Job Description.** This is professional-level technical/scientific and administrative work. Designs and conducts moderately complex scientific research in area(s) of expertise. Develops project reports and other documents. Reviews project reports for accuracy and completeness. Works with legal staff on relevant rule development as needed. Coordinates project activities and technical work of less experienced Environmental Scientists and Student Interns, including oversight of field data collection and preparation of related reports and materials. Develops and implements environmental and water management related projects, and cooperative funding agreements with various public entities. Prepares Requests for Proposals (RFPs) and manages consultant contracts related to area(s) of expertise. Participates in District emergency operations, departmental projects and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university in environmental science, biology, ecology, or zoology or other natural science and three years' experience in environmental work relating to water management is required. Additional years of related education will be considered in lieu of required experience on a year-for-year basis. Course work and/or experience in geology, hydrology, chemistry, agriculture, wetland assessments, limnology, aquatic ecology or engineering are preferred. Possession of a valid driver license is required.

**Wages (in Florida)**
Minimum –46,862.40 Midpoint –59,529.60 Maximum –72,196.80
*(Source: Southwest Florida Water Management District)

### 02 Environmental Scientist (Senior) (Resource Management)

**Job Description.** This is complex professional-level technical/scientific and administrative work. Designs and conducts complex scientific research in area(s) of expertise. Develops project reports and other documents. Reviews other project reports for accuracy and completeness. Works with legal staff on relevant rule development as needed and assists regulatory staff in the review of water use and environmental resources permits Coordinates project activities and technical work of less experienced Environmental Scientists and Student Interns, including oversight of field data collection and preparation of related reports and materials

Develops and implements environmental and water management related projects, and cooperative funding agreements with various public entities Prepares Requests for Proposals (RFPs) and manages consultant contracts related to area(s) of expertise. Plays a major leadership and mentoring role within the Department and throughout the District. Participates in District emergency operations, departmental projects and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university in environmental science, biology, ecology, or zoology or other natural science and five years' experience in environmental work relating to water management is required. Additional years of related education will be considered in lieu of required experience on a year-for-year basis. Masters/Doctoral Degree in related field is preferred Course work and/or experience in geology, hydrology, chemistry, agriculture, wetland assessments, limnology, aquatic ecology or engineering is preferred. Possession of a valid driver license is required.

**Wages (in Florida)**
Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00
*(Source: Southwest Florida Water Management District)

## 02 Environmental Scientist (Chief) (Resource Management)

**Job Description.** This is highly advanced professional-level technical/scientific and administrative work. Position is expected to play a major role in program development, and is expected to be the District's lead technical authority in area(s) of expertise. This position will serve as the chief liaison with other districts and agencies in area(s) of expertise. Designs and conducts complex scientific research in area(s) of expertise. Develops project reports and other documents and reviews other project reports for accuracy and completeness Works with legal staff on relevant rule development as needed and assists regulatory staff in the review of water use and environmental resources permits Coordinates project activities and technical work of less experienced Environmental Scientists and Student Interns, including oversight of field data collection and preparation of related reports and materials Prepares Requests for Proposals (RFPs) and manages consultant contracts related to area(s) of expertise. A Chief Environmental Scientist is an established and recognized expert in their area(s) of expertise and is consulted by Executive staff and others outside of the organization for technical and policy advice and direction. Incumbent plays a major leadership role and is responsible for mentoring and training less experienced staff. As a Chief Scientist, the incumbent is expected to represent the Program Director, the Department and District at public workshops or meetings, and at all levels of government as needed Participates in District emergency operations, departmental projects and performs other duties as required.

**Education and Training.** A M.S. or Ph.D. from an accredited college or university in environmental science, biology, ecology, or zoology or other natural science and eight years' experience in environmental work relating to water management is required. Additional years of related education will be considered in lieu of required experience on a year-for-year basis. Course work and/or experience in geology, hydrology, chemistry, agriculture, wetland assessments, limnology, aquatic ecology or engineering are preferred. Possession of a valid driver license is required.

**Wages (in Florida)**
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
*(Source: Southwest Florida Water Management District)

## 02 Water Conservation Analyst (Entry-level)

**Job Description.** This is technical and professional work collecting, managing, analyzing and disseminating data pertaining one or more of these areas: water supply planning, water use, water conservation, water reuse and water resource development. Manages projects involving local government, public utilities, industry, agriculture, recreation, and mining interests Develops negotiates and administers project contracts timelines and budgets Reviews and approves project deliverables Monitors new and pending legislation pertaining to conservation. Helps stakeholders identify and implement sound water supply planning, water use, water conservation, water reuse and water resource development measures and evaluates measures relative to water use permitting requirements Prepares reports participates in workshops committees and public speaking engagements related to water resource and water conservation programs Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in biology, geography, hydrology, engineering, planning, or environmental science, or a related degree, an equivalent combination of education and directly related work experience is required. Additional directly related work experience similar to the types of work described within this position description is preferred. Possession of a valid driver license is required.

**Wages (in Florida)**
Minimum –38,147.20 Midpoint –48,068.80 Maximum –57,990.40
*(Source: Southwest Florida Water Management District)

## 02 Water Conservation Analyst, Staff (Mid-level)

**Job Description.** This is professional analytical work collecting, managing and analyzing data in one or more of these areas: water supply planning, water use, water conservation, water reuse and water resource development. Plans, coordinates, and manages projects in area(s) assigned. Develops, negotiates, and administers project contracts and budgets. Participates in planning activities related to assigned area(s). Implements cooperatively funded projects with local governments, utilities, industry, agriculture, recreation and mining interests as appropriate. Uses statistical and other methods to analyze and present data and assumptions` required identifying trends and to determine, confirm, dispute or justify proposed or completed measures. Evaluates and maintains information databases and web site materials. Prepares and presents written and verbal technical reports. Assists local governments with ordinance development and reviews water-related elements of local codes and ordinances. Provides technical assistance and actively promotes water conservation and reuse internally with other departments and externally with governments, utilities, and green industry representatives. Participates in meetings, conferences, and public speaking engagements. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in biology, geology, hydrology, engineering, planning, or environmental science, or a related field, and three years' directly. Related work experience similar to the types of work described within this position description or an equivalent combination of education and experience is required. Possession of a valid driver license is required.

**Wages (in Florida)**
Minimum –42,224.00 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

## 02 Water Conservation Analyst, Senior (Senior-level)

**Job Description.** This is advanced professional work planning, coordinating, and managing complex projects in one or more of these areas: water supply planning, water use, water conservation, water reuse and water resource development. Develops, negotiates, and administers project contracts and budgets. Participates in planning activities related to assigned area(s). Implements cooperatively funded projects with local governments, utilities, industry, agriculture, recreation and mining interests as appropriate. Researches and evaluates data and provides technical information for District publications. Provides guidance to staff and assists the management in identifying appropriate standards and goals. Prepares and gives public presentations. Coordinates activities and exchange of information with the other departments, including Regulation, Communications and Community and Legislative Affairs. Makes recommendations for improvements in section procedures. Prepares technical reports. Participates in District emergency operations and other department activities as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in biology, geography, hydrology, engineering, planning, or environmental science, or a related field and three years' directly—related work experience similar to the types of work described within this position description, or an equivalent combination of education and experience is required. Possession of a valid Florida Driver License is required.

**Wages (in Florida)**
Minimum –46,862.40 Midpoint –59,529.60 Maximum – 72,196.80
*(Source: Southwest Florida Water Management District)

## 02 Chemist (Entry-level)

**Job Description.** This is routine chemistry work performing quantitative and qualitative sample preparation and testing according to established regulatory or scientific methods. The employee conducts preventive maintenance on laboratory equipment and cross trains at all laboratory workstations. Records and enters laboratory activities, methods, and sample results entered in laboratory notebooks, computer files and sample records. Charts quality control data to monitor data integrity and maintain fixed levels of precision and accuracy within the laboratory. Compares test data to limits of detection. Uses manual and automated methods of data acquisition, manipulation and storage. Solves routine analytical problems, including those

related to reagent contamination, interference from sample matrix effects, instrument malfunction or other determinate errors. Prepares chemical standards and reagents. Neutralizes and disposes of laboratory waste. Cross-checks chain—of custody forms with samples to determine and correct errors of omission and/or inaccuracy; tracks, preserves, labels and disposes of samples. Participates in District emergency management activities, departmental activities, occasionally meets with other individuals to discuss laboratory practices, and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university with a major in chemistry or biochemistry, an equivalent combination or education and experience, is required.

**Wages (in Florida)**
Minimum –38,147.20 Midpoint –48,068.80 Maximum –57,990.40
*(Source: Southwest Florida Water Management District)

## 02 Staff Chemist (Mid-level)

**Job Description.** This is professional chemistry work performing routine or advanced quantitative and qualitative sample preparation and testing according to established regulatory or scientific procedures. The employee works at an assigned work station, establishes preventive maintenance schedules and conducts preventive maintenance on laboratory equipment. Cross-trains at all laboratory work stations. Enters data and records laboratory activities, methods, and sample results. Charts quality-control data; recommends and takes corrective action for aberrant quality control measurements; Compares test data to detection limits, regression curves, historical data, and charge balances. Develops, configures, and uses manual and computerized methods of data acquisition, manipulation and storage. Compiles summary statistics validating methodology, quality control, and sample data. Assists in resolution of sophisticated analytical problems related to reagent contamination, interference from sample matrix effects, instrument malfunction or other determinate errors. Prepares and reviews the preparation of chemical standards and reagents. Recommends cost effective methods to neutralize and dispose of laboratory waste. Logs, tracks, preserves, labels and disposes of samples. Employee may be required to perform duties, which may include the employee's normal work functions or other emergency support functions as determined necessary by the District, as assigned before, during and after major storm events and emergency situations such as hurricanes or other declared emergencies. Participates in departmental activities, meets with other individuals to discuss laboratory practices, and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university with a major in chemistry or biochemistry AND three years' experience as a chemist, an equivalent combination of education and experience, is required. Possession of a valid diver license is required.

**Wages (in Florida)**
Minimum –46,862.40 Midpoint –59,529.60 Maximum –72,196.80
*(Source: Southwest Florida Water Management District)

## 02 Senior Chemist (Senior-level)

**Job Description.** This is advanced professional laboratory work as the Quality Assurance Officer for all water quality testing at the District, The employee serves as the focal point for QA/QC activities and training. The Incumbent functions independently from laboratory operations for which he has quality assurance oversight: objectively evaluates data and performs assessments/reviews without outside influence. Documents training and/or QA/QC procedures and has advanced knowledge of the quality system: has responsibility for performance of the District's Quality Assurance program: has general knowledge and cross-trains on the analytical test methods for which data reviews are performed. Arranges for and conducts internal audits and notifies laboratory management of audit findings and monitors corrective action. Submits requests for certification to the accrediting agency. Charts quality control data to monitor data integrity and maintain fixed levels of precision and accuracy within the laboratory. Compares test data to limits of detection. Uses manual and automated methods of data acquisition, manipulation and storage. Ensures that Standard Operating Procedures are current and accurately reflect daily activities. Crosschecks documents to determine and correct errors of omission and/or inaccuracy. Participates in departmental activities and District emergency management activities, occasionally meets with other individuals to discuss laboratory practices, and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university with a major in chemistry, biochemistry, microbiology, or biology and five years experience involving water-resource related chemistry an equivalent combination or education and experience, is required. Possession of a valid driver license is required.

**Wages (in Florida)**
Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00
*(Source: Southwest Florida Water Management District)

## 02 Engineer (Resource Regulation)

**Job Description.** Conducts entry level technical and administrative engineering work related to surface water permitting and compliance in the District's Resource Regulation Division. Evaluates Environmental Resource Permit (ERP) applications, and requests for exemptions from ERP requirements, that are limited complexity. Reviews permit related documents in support of permit and compliance related activities within mandated completeness. Monitors construction activities, inspects permitted surface water management systems and investigates complaints. Answers questions and performs activities relating to permitting, compliance, and other resource regulation activities. Undertakes permit compliance and enforcement activities, resolves permit compliance overrule violations and participates in Regulation Department Projects generally under the Staff Engineer, Senior Professional Engineer or Surface Water Regulation Manager. Coordinates with other local, state and federal regulatory agencies and governmental organizations as necessary. Provides assistance to applicants and consultants. Coordinates with hydrologists and environmental scientists as necessary when performing reviews and other related job duties. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in engineering required. Possession of a valid driver license is required. Registration or certification as an Engineer Intern, or an

Engineer-In-Training, in the State of Florida is preferred. Experience and/or training involving surface water hydrology, hydraulics and drainage as it relates to residential, commercial and industrial is preferred.

**Wages (in Florida)**
Minimum –42,224.40 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

## 02 Staff Engineer (Resource Regulation)

**Job Description.** Conducts moderately complex technical and administrative engineering work related to surface water permitting and compliance in the District's Resource Regulation Division. Evaluates Environmental Resource Permit (ERP) applications, and requests for exemptions from ERP requirements, exhibiting a moderate level of complexity. Reviews permit related documents in support of permit and compliance related activities within mandated deadlines. Generates written correspondence regarding permit application deficiencies and completeness. Monitors construction activities, inspects permitted surface water management systems and investigates complaints. Answers questions and performs activities relating to permitting, compliance, and other resource regulation activities. Undertakes permit compliance and enforcement activities, resolves permit compliance or rule violations and participates in Regulation Department projects generally under the direction of a Professional Engineer, Senior Professional Engineer or Surface Water Regulation Manager. Coordinates with other local, state, federal regulatory agencies and governmental organizations as necessary. Provides assistance to applicants and consultants. Coordinates with hydrologists and environmental scientists as necessary when performing reviews and other related job duties. Assists with the coverage of pre-application meetings as assigned. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's Degree from an accredited college or university in engineering three years of experience involving water resource management, regulation, development or related activity is required. A master's degree in a related field will be considered in lieu of one year of experience. A doctorate degree in a related field will be considered in lieu of two years of experience. Possession of a valid driver license is required. Registration or certification as an Engineer Intern, or an Engineer-In-Training, in the State of Florida is preferred. Experience and/or training involving surface water hydrology, hydraulics and drainage as it relates to residential, commercial and industrial development is preferred. Experience in engineering work relating to water management, with at least one year of experience in design or review, construction or operation of surface water management facilities is preferred. Current registration as a Professional Engineer in the State of Florida is preferred.

**Wages (in Florida)**
Minimum – 52,145.60 Midpoint – 67,371.20 Maximum – 82,576.00
*(Source: Southwest Florida Water Management District)

## 02 Environmental Scientist (Resource Regulation)

**Job Description.** This is entry-level technical/scientific and administrative work. Participates in and conducts moderately complex scientific research in area(s) assigned. Assists in the development of project reports and other documents and reviews other project reports for accuracy and completeness. Participates in the coordination of project activities and technical work under the guidance of more senior level scientists. Responsible for the collection of field data and for insuring data quality. Is responsible for data entry and manipulation. Assists in preparation of Requests for Proposals (RFPs) and manages consultant contracts related to area(s) assigned. Also assists in the development and implementation of environmental and water management related projects, and cooperative funding agreements with various public entities. Participates in District emergency operations, departmental projects and performs other duties as required.

**Education and Training.** Bachelor's degree from an accredited college or university in environmental science, biology, ecology, or zoology or other natural science is required. Possession of a valid driver license is required. Course work and/or experience in geology, hydrology, chemistry, agriculture, wetland assessments, limnology, aquatic ecology or engineering are preferred.

**Wages (in Florida)**
Minimum –42,224.00 Midpoint –53,435.20 Maximum –64,625.60
*(Source: Southwest Florida Water Management District

## 02 Engineer, Professional (Resource Regulation)

**Job Description.** Conducts complex technical and administrative engineering work related to surface water permitting and compliance in the District's Resource Regulation Division. Evaluates Environmental Resource Permit (ERP) applications, and requests for exemptions from ERP requirements, exhibiting a high level of complexity. Reviews permit related documents in support of permit and compliance related activities. Generates written correspondence regarding permit application deficiencies and completeness within mandated deadlines. Monitors construction activities, inspects permitted surface water management systems and investigates complaints. Answers questions and performs activities relating to permitting, compliance, and other resource regulation activities. Undertakes permit compliance and enforcement activities, resolves permit compliance or rule violations and participates in Regulation Department projects generally under the direction of a Senior Professional Engineer or Surface Water Regulation Manager. Coordinates with other local, state, federal regulatory agencies and governmental organizations as necessary. Provides assistance to applicants and consultants. Coordinates with hydrologists and environmental scientists as necessary when performing reviews and other related job duties. Assists with the coverage of pre-application meetings as assigned Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's Degree from an accredited college or university in engineering is required. Current registration as a Professional Engineer in the State of Florida AND experience involving water resource management, regulation, development or related activity is required. Possession of a valid driver license is required. Experience and/or training involving surface water hydrology, hydraulics and drainage as it relates to residential, commercial and industrial development is preferred. Experience in engineering work

relating to water management, with at least one year of experience in design or review, construction or operation of surface water management facilities is preferred.

**Wages (in Florida)**
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
*(Source: Southwest Florida Water Management District)

## 02 Senior Professional Engineer (Resource Regulation)

**Job Description.** Conducts highly complex technical and administrative engineering work related to surface water permitting and compliance in the District's Resource Regulation Division. Evaluates Environmental Resource Permit (ERP) applications, and requests for exemptions from ERP requirements, exhibiting the highest level of complexity. Reviews permit related documents in support of permit and compliance related activities. Generates written correspondence regarding permit application deficiencies and completeness within mandated deadlines. Monitors construction activities, inspects permitted surface water management systems and investigates complaints. Answers questions and performs activities relating to permitting, compliance, and other resource regulation activities. Undertakes permit compliance and enforcement activities, resolves permit compliance or rule violations and participates in Regulation Department projects under the direction of the Surface Water Regulation Manager. Coordinates with other local, state, federal regulatory agencies and governmental organizations as necessary. Provides assistance to applicants and consultants. Coordinates with hydrologists and environmental scientists as necessary when performing reviews and other related job duties. Expected to perform work duties with minimal oversight from management, provide technical assistance to their peers, provide leadership to the section in following District policies, guidelines, and protocols, and provides backup to the Surface Water Regulation Manager when requested. Assists with the coverage of pre-application meetings as assigned. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's Degree from an accredited college or university in engineering is required. Current registration as a Professional Engineer in the State of Florida seven years experience involving water resource management, regulation, development or related activity is required. A master's degree in a related field will be considered in lieu of one year of experience. A doctorate degree in a related field will be considered in lieu of two years of experience. Possession of a valid driver license is required. Experience and/or training involving surface water hydrology, hydraulics and drainage as it relates to residential, commercial and industrial development is preferred. Experience in engineering work relating to water management, with at least one year of experience in design or review, construction or operation of surface water management facilities is preferred. Experience as a supervisor or lead worker is preferred.

**Wages (in Florida)**
Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00
*(Source: Southwest Florida Water Management District)

## 02 Staff Environmental Scientist (Resource Regulation)

**Job Description.** This is mid-level environmental, technical and administrative work performing permit review, compliance, enforcement, and/or other related tasks in support of permitting activities. Works in a team environment and reviews or assists in reviewing the environmental aspects of permit inquiries, proprietary sovereign submerged lands, exemptions, and formal wetland/surface water petitions. Works closely with District staff, permit applicants, government officials, and the public to ensure effective and efficient implementation of permit processes. Conducts pre-application, application, dispute resolution, and compliance and enforcement meetings. Prepares letters, notices, permits, electronic correspondence and/or technical reports. Conducts site visits and field inspections. Evaluates environmental factors, with emphasis on the ecological value of wetlands and surface waters, and habitats. Establishes and verifies the landward extent of wetlands and surface waters. Serves as a resource to District staff and the public on environmental aspects of the District's permitting, compliance and enforcement activities. Assesses environmental impacts and proposed compensation measures in relation to environmental impacts. Prepares presentation materials for board information and action. Actively participates with the management team in managing projects, goals and mission. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in environmental science, biology, biological or natural sciences or related field and three years experience in wetlands ecology OR an equivalent combination of education and experience is required. Possession of a valid driver license is required. Wetland Professional in Training and/or Associate Professional Soil Scientist certification is preferred. Additional experience or academic work and/or experience in agricultural, surface water management, geology, hydrology, chemistry or engineering is preferred.

**Wages (in Florida)**

Minimum –46,862.40 Midpoint –59,529.60 Maximum – 72,196.80

*(Source: Southwest Florida Water Management District)

## 02 Environmental Scientist, Senior (Resource Regulation)

**Job Description.** This is senior-level environmental, technical and administrative work performing permit review, compliance, enforcement, and/or other related tasks in support of permitting activities. Works in a team environment and reviews or assists in reviewing the environmental aspects of permit inquiries, proprietary sovereign submerged lands, exemptions, and formal wetland/surface water petitions. Works closely with District staff, permit applicants, government officials, and the public to ensure effective and efficient implementation of permit processes. Conducts pre-application, application, dispute resolution, and compliance and enforcement meetings. Prepares letters, notices, permits, electronic correspondence and/or technical reports. Reviews and comments on other environmental team members' draft letters, reports and permit documents. Develops and recommends updates and improvements to internal procedures. Conducts site visits and field inspections. Evaluates environmental factors, with emphasis on the ecological value of wetlands, surface waters and associated natural habitats. Establishes and verifies the landward extent of wetlands and surface waters. Serves as a resource to District staff and the public on environmental aspects of the District's permitting, compliance and enforcement activities. Serves a leadership role on the environmental

team and in the service office. Assesses environmental impacts and proposed compensation measures in relation to environmental impacts. Prepares presentation materials for board information and action. Attends and/or makes presentations for various educational programs, public meetings and workshops. Actively participates with the management team in managing projects, goals and mission. Actively participates in other departmental water resource planning, outreach/education, innovative projects, and operational and mission support activities as needed. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in environmental science, biology, biological or natural sciences or related field and five years experience in wetlands ecology OR an equivalent combination of education and experience is required. Possession of a valid driver license is required. Masters/Doctoral degree in a related field is preferred. Professional Wetland Scientist and/or Certified Professional Soil Scientist certification is preferred. Additional experience or academic work and/or experience in agricultural sciences, surface water management, geology, hydrology, chemistry or engineering is preferred.

**Wages (in Florida)**
Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00
*(Source: Southwest Florida Water Management District)

## 02 Hydrologist (Resource Regulation)

**Job Description.** Conducts routine water use permitting and compliance activities. Answers questions and performs activities relating to permitting, compliance, and other resource regulation activities. Evaluates General and Small General Water Use Permit (WUP) applications related to agricultural, recreation/aesthetic, public supply, mining/dewatering, and industrial/ commercial activities. May evaluate Individual WUP applications, coordinating with more experienced staff as necessary. Undertakes permit compliance activities, resolves permit compliance or violation problems and participates in Regulation Department projects. Observes, investigates and evaluates site conditions and operations related to WUPs and WUP applications, and reports the findings to the Manager and other appropriate staff. Reviews draft technical memorandum and procedures or other technical documents. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's Degree from an accredited college or university in geology, hydrology or engineering required. College-level coursework in hydrology or water-resource related courses preferred. Experience involving water management activities preferred. Experience involving public contact regarding governmental regulations preferred.

**Wages (in Florida)**
Minimum –42,224.00 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

## 02 Hydrologist Staff (Resource Regulation)

**Job Description.** Conducts moderately complex water use permitting and compliance activities. Evaluates simple to moderately complex Water Use Permit (WUP) applications. Answers questions and performs activities relating to permitting, compliance, and other resource regulation activities. Evaluates Individual, General and Small General WUP applications related to agricultural, recreation/aesthetic, public supply, mining/dewatering and industrial/commercial activities. Undertakes permit compliance and enforcement activities, resolves permit compliance or violation problems, and participates in Regulation Department projects. Observes, investigates and evaluates site conditions and operations related to WUPs and WUP applications, and reports the findings to the Manager and other appropriate staff. Reviews draft technical memorandum and procedures or other technical documents. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's Degree from an accredited college or university in geology, hydrology or engineering AND three years' experience involving water-resource management, regulation, development or related activity required. A Master's degree in a related field will be considered in lieu of one year's experience; or a Doctorate degree in a related field will be considered in lieu of two years' experience. Possession of a valid driver License required. College-level coursework in hydrology or water-resource related courses preferred. Experience involving public contact regarding governmental regulation activities preferred.

**Wages (in Florida)**
Minimum –46,862.40 Midpoint –59,529.60 Maximum – 72,196.80
*(Source: Southwest Florida Water Management District)

## 02 Geologist/Engineer, Professional (Resource Regulation)

**Job Description.** Conducts complex water use permitting and compliance activities. Evaluates Water Use Permit (WUP) applications ranging from simple to highly complex. Answers complex questions and performs activities relating to permitting, compliance, and other resource regulation activities. Evaluates Individual/General WUP applications related to agricultural, recreation/aesthetic, public supply, mining/dewatering, and industrial/commercial activities. Undertakes permit compliance and enforcement activities, resolves permit compliance or violation problems, and participates in Regulation Department projects and other District projects associated with regulation activities. Provides guidance, peer review and training to field technicians, hydrologists and staff hydrologists. Signs and seals geologic- and hydrologic related work as legally required. Assists regulation and legal staff in preparing for Board presentations and legal proceedings May provide expert testimony on water use, hydrology or geology. Observes, investigates and evaluates site conditions and operations related to WUPs and WUP applications, and reports the findings to the manager and other appropriate staff. Writes and reviews draft technical memoranda and procedures or other technical documents Provides input and feedback on department business processes currently in place and assists in the development and establishment of new business processes Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Current license as a Professional Geologist or Professional Engineer in the State of Florida is required. Possession of a valid driver's license is required. A minimum of nine hours of hydrology, geology, or water-resource related college-level courses in some combination is preferred. Experience involving water management activities is required. Experience involving public contact regarding governmental

regulations or controversial issues is preferred. Experience involving administrative hearings and providing expert geologic and hydrologic testimony is preferred. Experience in writing and reviewing complex technical documents is preferred.

**Wages (in Florida)**
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
*(Source: Southwest Florida Water Management District)

## 02 Geologist/Engineer, Senior Professional (Resource Regulation)

**Job Description.** Conducts highly complex water use permitting and enforcement activities. Evaluates complex, controversial, and difficult Water Use Permit (WUP) applications. Answers complex questions and performs complicated activities relating to permitting, compliance, and other resource regulation activities. Evaluates a high ratio of Individual/General WUP applications related to agricultural, recreation/aesthetic, public supply, mining/dewatering, and industrial/commercial activities. Undertakes and directs permit compliance and enforcement activities, resolves permit compliance or violation problems, and participates and advises less experienced personnel in Regulation Department projects. Provides guidance, peer review and training to field technicians, hydrologists, staff hydrologists, and Professional Geologists. Signs and seals geologic- and hydrologic-related work performed by hydrologists and staff hydrologists. May review the signed and sealed work of Professional Geologists. Assists the Manager in section administration and oversight, including providing input to annual performance appraisals of water-use staff. Assists regulation and legal staff in preparing for Board presentations and legal hearings. Provides specific training related to project tasks to other water-use staff. Observes, investigates, and evaluates site conditions and operations related to WUPs and WUP applications and reports the findings to the Manager and other appropriate staff. Organizes, writes, and reviews draft technical memorandum and procedures or other technical documents. Provides input and feedback on business processes currently in place and develops or assists in developing new business processes. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Current registration as a Professional Geologist or Professional Engineer in the State of Florida AND seven years' experience involving water resource management, regulation, development or related activity is required. A Master's degree in a related field will be considered in lieu of one year's experience; or a Doctorate degree in a related field will be considered in lieu of two years' experience. Possession of a valid driver License is required. A minimum of nine hours of hydrology, geology, or water-resource related in some combination is Preferred. Experience involving water management activities is required. Experience in training on complex geologic and hydrologic topics is preferred. Experience in writing and reviewing complex technical documents is required. Experience involving public contact regarding governmental regulations or controversial issues is preferred. Experience involving administrative hearings and providing expert geological testimony is preferred. Experience in development and reviewing of business processes related to water-use processes and procedures is preferred. Experience in administrative oversight or supervision of technical staff is preferred.

**Wages (in Florida)**
Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00
*(Source: Southwest Florida Water Management District)

## 02 Demand Management Program Manager

**Job Description.** This professional position is responsible for developing, managing, maintaining and promoting the District's Water Shortage Plan (Rule 40D-22, F.A.C.) and Year Round Water Conservation Measures (Rule 40D-21, F.A.C.). Coordinates and leads on the internal Water Shortage Advisory Committee to develop, evaluate and submit recommendations to the Executive Director and the Governing Board regarding Water Shortage Orders and other Demand Management activities. Communicated with Governing Board members and various District departments to determine what needs to be done to integrate water shortage restrictions and year-round water conservation measures with other regulatory programs, communication efforts and legislative affairs. Employee communicates and coordinates with other water management districts to develop criteria for dealing with shared counties during periods of water shortage, development of state-wide consistency in policies regarding water shortage management including, year-round water conservation, and public supply water conservation . Provides presentations and seeks input from Basin Boards, District advisory committees, local government groups, industry associations and civic organizations. Assumes lead coordination responsibilities during water shortage events and rule making updates for Rule 40D-21 or Rule 40D-22. Consistently demonstrates quality service and excellent communications with a focus upon continuous process improvement in the conduct of all job duties. Participates in District emergency management activities and other departmental activities, and provides input and feedback on business processes currently in place and assists in the development of business processes for the WMIS (Water Management Information System) as the relate to Demand Management, and performs other duties as needed.

**Education and Training.** A bachelor's degree from an accredited college or university and three years experience in administration and management of natural resource related projects or comparable education and experience. Possession of a valid Florida Driver License is required. College level course work in hydrology or water-resource related courses are preferred. A master's degree in public administration, business administration or water resource management is preferred. Experience involving public contact regarding regulation or controversial issues is preferred.

**Wages (in Florida as Manager Grades 18-21).**
Grade 18
Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00
Grade 19
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
Grade 20
Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00
Grade 21
Minimum –72,820.80 Midpoint –98,238.40 Maximum – 123,656.00
*(Source: Southwest Florida Water Management District)

## 02 Surface Water Regulation Manager (Resource Regulation)

**Job Description.** Manages and supervises work of professional and technical staff engaged in Environmental Resource Permitting (ERP), Compliance, and Enforcement activities. Works closely with staff, permit applicants, other Department staff, and the public to ensure effective and efficient implementation of the Environmental Resource Permitting program. Maintains excellent technical and communication skills in conducting job duties, including assuming proper implementation of permitting, compliance and enforcement processes, procedures, and performance-related standards. Ensures compliance with personnel and other guidelines, and conducts disciplinary activities. Reviews and comments on letters, reports, and draft permits prepared by subordinates. Conducts efficient and effective pre-application, application, dispute" resolution, and compliance and enforcement meetings. Conducts site visits and field inspections. Develops and recommends updates and improvements to internal procedures. Acts as a resource to engineering and technical staff and the public on all engineering aspects of the Environmental Resource Permitting program. Imparts knowledge and provides technical expertise. Maintains and promotes a solution oriented culture through cooperation, collaboration, assistance and public outreach. Actively participates in Regulation Managers' and ERP Advisory Group meetings. Investigates and recommends practical and reasonable solutions to permit and compliance related issues. Coordinates work activities closely with the Strategic Program Office, Legal, and Community Affairs Departments' staff on permitting, compliance, enforcement, public outreach and related issues. Prepares presentation materials for Board information and action. Assists in setting Departmental goals and objectives, and closely monitors the Division's goals and performance standards. Actively participates with the Department's Management Team in managing the Department's day-to-day operations. Participates in interviews, employee selection, and conducts performance evaluations of staff. Updates and monitors section budget. Performs all duties in a customer friendly and solution" oriented manner. Consistently demonstrates quality service with a focus upon continuous process improvement in the conduct of all job duties. Attends Staff training related to technical, administrative and managerial responsibilities associated with the position. Participates in District emergency management activities and other departmental activities, and provides input and feedback on business processes currently in place and assists in the development of new business processes for WMIS (Water Management Information System); and performs other duties as needed.

**Education and Training.** Current registration as a Professional Engineer in the State of Florida AND seven years' experience involving water resource management, regulation, development or related activities is required. Possession of a valid Florida Driver License is required. College level course work in hydrology or water-resource related courses are preferred. Experience involving public contact regarding regulation or controversial issues is preferred. Supervisory experience is preferred. A master s degree in a related field may be considered in lieu of one year's required experience. A doctorate degree in a related field may be considered in lieu of two years' required experience.

**Wages (in Florida as Manager Grades 18-21)**

Grade 18

| | | |
|---|---|---|
| Minimum –52,145.60 | Midpoint –67,371.20 | Maximum – 82,576.00 |

Grade 19

| | | |
|---|---|---|
| Minimum –58,156.80 | Midpoint –76,356.80 | Maximum – 94,536.00 |

Grade 20

| | | |
|---|---|---|
| Minimum –65,000.00 | Midpoint –86,590.40 | Maximum – 108,160.00 |
| Grade 21 | | |
| Minimum –72,820.80 | Midpoint –98,238.40 | Maximum – 123,656.00 |

*(Source: Southwest Florida Water Management District)

## 02 Water Use Regulation Manager (Resource Regulation)

**Job Description.** Manages and supervises work of professional and technical staff engaged in Water Use Permitting (WUP), compliance, and enforcement activities. Works closely with staff, permit applicants, other Department staff, and the public to ensure effective and efficient implementation of the WUP program. Maintains excellent technical and communication skills in conducting job duties, including assuring proper implementation of permitting, compliance and enforcement processes, procedures, and performance-related standards. Ensures compliance with personnel and other guidelines, and conducts disciplinary activities. Reviews and comments on letters, reports, and draft permits prepared by subordinates. Conducts efficient and effective pre-application, application, dispute-resolution, and compliance and enforcement meetings. Conducts site visits and field inspections. Develops and recommends updates and improvements to internal procedures. Acts as a resource to geologist/engineering and technical staff and the public on all technical aspects of the WUP program. Imparts knowledge and provides technical expertise. Maintains and promotes a solution-oriented culture through cooperation, collaboration, assistance and public outreach. Actively participates in Regulation Managers_ and WUP Discussion Group meetings. Investigates and recommends practical and reasonable solutions to permit and - compliance... related issues. Coordinates work activities closely with the Strategic Program Office, Legal, and Community Affairs Departments' staff on permitting, compliance, enforcement, public outreach and related issues. Coordinates with Resource Projects as appropriate within assigned service area. Prepares presentation materials for Governing Board information and action. Assists in setting Departmental goals and objectives, and closely monitors the Division's goals and performance standards. Actively participates with the Department's Management Team in managing the Department's day-to-day operations. Participates in interviews, employee selection, and conducts objective, constructive performance evaluations of staff. Performs all duties in a customer friendly and solution-oriented manner. Consistently demonstrates quality service with a focus upon continuous process improvement in the conduct of all job duties. Attends staff training related to technical, administrative and managerial responsibilities.

**Education and Training.** Current registration as a Professional Geologist/Engineer in the State of Florida AND seven years of experience involving water resource management, regulation, development or related activities is required. Possession of a valid Florida Driver License is required. College level course work in hydrogeology, geology, or water-resource related courses is preferred Experience involving public contact regarding regulation or controversial issues is preferred Supervisory experience is preferred A masters degree in a related field may be considered in lieu of one year of required experience. A doctorate degree in a related field may be considered in lieu of two years of required experience.

**Wages (in Florida as Manager Grades 18-21)**

Grade 18

Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00

Grade 19

Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00

Grade 20

Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00

Grade 21

Minimum –72,820.80 Midpoint –98,238.40 Maximum – 123,656.00

*(Source: Southwest Florida Water Management District)

## 02 Environmental Manager (Resource Management)

**Job Description.** This is advanced administrative and technical work managing a complex environmental program focusing on overseeing and, in some cases, performing technical research and project evaluations of water-management problems and other water-resource related activities (supervising technical and professional staff). Selects, trains, supervises and evaluates professional and technical employees. Designs and conducts diagnostic, monitoring, research, and restoration projects. Presents, conducts, or interprets statistical analyses of water quality data. Analyzes, presents, collects, processes, identifies and evaluates community structure of aquatic plant and animal populations in lakes, rivers, and estuaries. Develops water quality and natural systems recommendations and works in the assessment and implementation of SWIM Management Plans and the Citrus/Hernando Waterways Restoration Council. Selects, designs, implements, and manages habitat restoration and/or estuarine research projects. Prepares Requests for Proposals (RFPs) and manages consultant contracts. Coordinates with local governments, universities, contractors, and other technical and administrative personnel to ensure compliance with technical standards and timely project completion. Assists other staff with environmental evaluations. Makes presentations to boards, local governments, citizen groups, and scientists regarding surface water projects; participates in workshops and public meetings. Develops and manages a complex budget and reporting system. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** A bachelor's degree in environmental science or other natural science relating to water resources from an accredited college or university AND six years' related experience, including experience in a supervisory or managerial capacity, is required. A valid driver license is required. A Master's Degree or Doctorate Degree is preferred. Additional years of related education will be considered in lieu of required experience on a year for year basis.

**Wages (in Florida as Manager Grades 18-21)**

Grade 18

Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00

Grade 19

Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00

Grade 20

Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00

Grade 21
Minimum –72,820.80 Midpoint –98,238.40 Maximum – 123,656.00
*(Source: Southwest Florida Water Management District)

## 02 Aquatic Plant Manager

**Job Description.** This is professional, administrative and technical work managing the District's aquatic and upland vegetation management programs to insure that operations are conducted using the most effective and environmentally sound methods possible. Employee plans, schedules and supervises aquatic plant management operations on District-owned flood control systems including the Tampa By Pass Canal; twenty-five, large public lake and river systems; around District-maintained lake level gauges; and within District-managed wetland restoration areas. Prioritizes, plans, schedules and supervises upland invasive species control operations on District-owned lands totaling more than 250,000 acres and other District managed restoration projects. Coordinates operations with funding and permitting agencies, the District's Land Resources Department, affected water treatment plant operators, property owners and other citizens who may be affected by water use restrictions. Compiles annual work plans, submits applications for funding to local and state agencies, secures the required permits and completes management plans for the management of potable water and other ecological sensitive systems. Measures and quantifies the section's performance using GIs and other available data. Supervises and evaluates Aquatic Plant Management Section staff and performs necessary administrative duties including budget management, project reporting, correspondence and contract management. Prepares and gives formal and informal presentations to citizen groups, District boards, governmental bodies and commissions, etc. Serves as the District's representative on technical committees and task forces relating to invasive species management issues. Resolves issues with concerned citizens relating to District operations, plant problems and lake and pond management issues. Participates in departmental projects and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in biology, limnology, ecology, environmental science or related field and five years' vegetation management related experience involving work contained in this document, including experience in a supervisory or managerial capacity, or an equivalent combination of education and experience is required. Possession of a valid driver license is required. Within six months of appointment to the position, possession of a valid State of Florida Class D Driver License is required. Possession of a current Aquatic Pest Control or Natural Areas Weed Management Public Applicator License issued by the State of Florida Department of Agriculture is required. Within six months of appointment to the position, successful completion of the District's airboat operator certification, first aid and CPR courses is required. Experience with public speaking, aquatic and invasive plant species identification and a personal computer is preferred.

**Wages (in Florida as Manager Grades 18-21)**
Grade 18
Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00
Grade 19
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
Grade 20

Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00
Grade 21
Minimum –72,820.80 Midpoint –98,238.40 Maximum – 123,656.00
*(Source: Southwest Florida Water Management District)

## 02 Field Operations Manager

**Job Description.** This is professional, administrative and highly technical multidiscipline engineering position managing field and equipment operations activities r6lated to the upkeep of District lands and the Tampa By-Pass Canal. Manages and supervises the maintenance of roads, culverts, trails and bridges. Plans, schedules, determine priorities, coordinate and supervises scheduled. Maintenance on over 250,000 acres of District land and the Tampa By-Pass Canal. Produces engineering sketches and drawings, as well as construction estimating (takeoffs) to be used for construction projects and field modifications. Develops drainage and open channel flow models. Performs engineering analysis review and limited design of road and bridges. Designs and oversees repairs and construction of light duty roads and trails. Performs engineering field work associated with assigned Florida Department of Transportation mitigation projects, Surface Water Improvement Projects and Save Our Rivers Projects. Employee also acts as project engineer in selected construction projects and assists in the Emergency Operations Center.

**Education and Training.** Bachelor's degree in civil or related field of engineering AND five years' field operations experience is required. Two years' experience in a supervisor or managerial capacity is preferred. Possession of a valid driver license is required. Registration as a Professional Engineer in Civil Engineering in the State of Florida is preferred.

**Wages (in Florida as Manager Grades 18-21)**
Grade 18
Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00
Grade 19
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
Grade 20
Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00
Grade 21
Minimum –72,820.80 Midpoint –98,238.40 Maximum – 123,656.00
*(Source: Southwest Florida Water Management District)

## 02 Water Supply and Resource Development Manager

**Job Description.** This is advanced, professional, multi-disciplinary water resource work involving management and development of water supply water resource development programs, close coordination with water-supply authorities and wafer-supply utilities, and managerial level administrative and supervisory work. Plans, develops and directs water supply projects and supervises hydrologists, geologists, engineers, and water conservation analysts involved in all phases of water supply analysis, development, and implementation. Has an understanding of the operational, technical, and financial aspects of water supply utilities and authorities that supply potable water from diverse sources. Works with local governments, water supply utilities,

authorities and other users to develop major water supply infrastructure projects, and review and comment on water supply development planning documents developed by these entities. Involved in the development d these projects from Conceptual planning, design and construction through the operation and maintenance plans. Regularly attends 8oard meetings of the water supply authorities and is expected to present issues and respond to inquiries from District Governing and Basin Board members. Makes presentations on plans, projects, and proposals to public and private groups Reviews and coordinates all section contracts for consistency with District and Basin policies. Responsible for section administration, including supervising and evaluating staff and developing and maintaining the budget Responsible for the production of various water supply planning documents. This position may be required to perform duties, which may include the employee's normal work functions or other emergency support functions as determined necessary by the District, as assigned before, during, and after major storm events and emergency situations such as hurricanes or other declared emergencies. Participates in departmental projects and performs other duties as required.

**Education and Training.** Current registration as a Professional Engineer or Professional Geologist in the State of Florida AND sever years' experience involving water resource management, regulation, development or related activity is required. A driver's license is required. Three years' experience at a high-level project management or supervisory level is required. A substantial understanding of the operational, technical, and financial aspects of water supple utilities and authorities that supply potable water from diverse sources is required. A master's degree in a related field will be considered in lieu of one years' experience. A doctorate degree in a related field will be considered in lieu of two years' experience.

**Wages (in Florida as Manager Grades 18-21)**

Grade 18

| | | |
|---|---|---|
| Minimum –52,145.60 | Midpoint –67,371.20 | Maximum – 82,576.00 |

Grade 19

| | | |
|---|---|---|
| Minimum –58,156.80 | Midpoint –76,356.80 | Maximum – 94,536.00 |

Grade 20

| | | |
|---|---|---|
| Minimum –65,000.00 | Midpoint –86,590.40 | Maximum – 108,160.00 |

Grade 21

| | | |
|---|---|---|
| Minimum –72,820.80 | Midpoint –98,238.40 | Maximum – 123,656.00 |

*(Source: Southwest Florida Water Management District)

## 02 Geohydrologic Data (ROMP) Manager

**Job Description.** This is technical, administrative, and supervisory work involving hydrologic investigations with the Regional Observation Monitor Well Program (ROMP). ROMP staff develop and implements hydrologic investigations through exploratory coring/dulling, monitor well construction, geophysical logging, aquifer testing, and other data collection and analysis techniques. The ROMP Manager provides oversight of section staff and projects, policy direction, high-level technical and administrative assistance, and promotes the implementation of the ROMP through public and private outreach. Selects, trains, supervises, and evaluates the work of section staff, providing coaching and counseling, and ensuring staff compliance with technical guidelines. Provides oversight of well construction design and drilling activities, exploratory coring and aquifer performance tests. Provides oversight of the Quality of Water Improvement Program (QWIP), including budget

tracking and Program performance. Writes and reviews contracts and reviews ROMP site reports. Also ensures staff compliance with personnel and administrative procedural requirements. Develops section budgets and tracks project funding, including oversight of District contractors. Oversees and evaluates long-term performance of ROMP activities and reports on Program status to the Governing, Basin Boards, and other groups. Provides oversight of District ROMP site land acquisition efforts. Fosters positive interaction between District staff. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Current registration as a Professional Geologist or Professional Engineer in the State of Florida AND seven years' experience involving water resource management, regulation, development or related activity is required. Supervisory experience is preferred. A master s degree in a related field will be considered in lieu of one year s experience. A doctorate degree in a related, field will be considered in lieu of two years' experience.

**Wages (in Florida as Manager Grades 18-21)**

| | | |
|---|---|---|
| Grade 18 | | |
| Minimum –52,145.60 | Midpoint –67,371.20 | Maximum – 82,576.00 |
| Grade 19 | | |
| Minimum –58,156.80 | Midpoint –76,356.80 | Maximum – 94,536.00 |
| Grade 20 | | |
| Minimum –65,000.00 | Midpoint –86,590.40 | Maximum – 108,160.00 |
| Grade 21 | | |
| Minimum –72,820.80 | Midpoint –98,238.40 | Maximum – 123,656.00 |

*(Source: Southwest Florida Water Management District)

## 02 Structure Operations Manager

**Job Description.** This is a professional, administrative and highly technical multidiscipline engineering position managing a staff of trades/technical personnel responsible for the operation, maintenance, instrumentation and automation of the District's water control structures. Participates in development and review of engineering, water resource and environmental studies involving District flood control and water conservation structures. Participates in the development, updating, and testing of Emergency Actions Plans (EAP) for the District’s four critical water impoundment facilities. Prepares/manages the development of plans and technical specifications for construction projects involving the District water control structures. Prepares Request for Proposals (RFP) for the Department s general engineering services contracts. Prepares reports to the U.S. Army Corp of Engineers (Corps). Performs engineering analyses and limited design involving District water control structures. Reviews and provides input to permit applications and/or proposed work adjacent to District water control/flood control facilities that may potentially impact those facilities. Produces engineering sketches, drawings, and cost estimates for modifications to existing District water control facilities. Performs drainage, open channel flow, and hydraulic calculations in support of structure operations and operational decisions. Develops and maintains the Section budget, including staff time allocation. Makes presentations to the District

Governing Board, Basin Boards, and public and private groups. Functions as the primary Operations Section Chief in the District's Emergency Operations Organization.

**Education and Training.** Bachelor's degree from an accredited college or university in engineering. A five years' water-resource related experience involving work contained in this document, or an equivalent combination of education and experience is required. Two years in a supervisory or managerial capacity, is preferred Registration as a Professional Engineer in the State of Florida is required. Applicants capable of obtaining registration within a one year timeframe from employment will be given consideration; however, continued employment beyond one year will be contingent on obtaining their registration.

**Wages (in Florida as Manager Grades 18-21)**

| | | |
|---|---|---|
| Grade 18 | | |
| Minimum –52,145.60 | Midpoint –67,371.20 | Maximum – 82,576.00 |
| Grade 19 | | |
| Minimum –58,156.80 | Midpoint –76,356.80 | Maximum – 94,536.00 |
| Grade 20 | | |
| Minimum –65,000.00 | Midpoint –86,590.40 | Maximum – 108,160.00 |
| Grade 21 | | |
| Minimum –72,820.80 | Midpoint –98,238.40 | Maximum – 123,656.00 |

*(Source: Southwest Florida Water Management District)

## 02 Surface Water Improvement and Management Program Manager

**Job Description.** Develops plans, programs and projects in accord with SWIM legislation criteria designed to improve and/or manage surface water conditions in water bodies selected for inclusion under the SWIM program. Provides administrative expertise, policy direction and technical assistance to project managers handling on-going SWIM projects. Coordinates program activities with other department sections and District departments. Handles section administration. Selects, trains, supervises and evaluates the work of section staff, providing technical guidance and advice, coaching and counseling, and ensuring staff compliance with personnel and administrative procedural requirements and paperwork. Develops supports and enhances the section's quality service program. Develops and maintains strong working relationships with local governments, other agencies anal environmentally-focused public interest groups and entities to obtain local funding matches for SWIM projects, to review and expedite project activities and to resolve specific concerns and issues. Participates in developing and implementing public awareness/education programs through public presentations, responding to public enquiries, and making presentations at special events. Reviews staff developed Requests for Proposals and participates in project and/or consultant selection, negotiation and contract management activities. Prepares and monitors the SWIM section's annual budget and obtains matching funds and other outside funds to support program activities. Reviews section project-cost tracking activities to ensure appropriate and accurate reporting. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in physical or natural sciences, engineering, water resources management or water-resource related field or six years' experience relating to water resources and including project management and managerial or supervisory experience, or

an equivalent combination of education and experience, is required. Possession of a valid Driver License is required.

**Wages (in Florida as Manager Grades 18-21)**

Grade 18
Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00
Grade 19
Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00
Grade 20
Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00
Grade 21
Minimum –72,820.80 Midpoint –98,238.40 Maximum – 123,656.00
*(Source: Southwest Florida Water Management District)

## 03 Field Technician (Resource Management)

**Job Description.** This is technical monitoring and data collection field work that also requires some technical office work. Position conducts water quality sampling in support of the District's Water Quality Monitoring Program (WQMP). Samples District monitor wells, springs, and surface water sites for a comprehensive list of water quality parameters per WQMP and FDEP Standard Operating Procedure requirements. Functions as sample collection team leader and provides training and oversight of newly hired field technician staff. Maintains field and observation equipment. Contacts federal, state and local governments as well as private industry for hydrologic and water quality data, and site access. Assists Hydrologists Environmental Scientists and Geologists by preparing hydrologic data for their use. Participates in District emergency management activities and in department projects and performs other duties as required.

**Education and Training.** Associate's degree ` or certificate AND two years' experience in technical field work, including collecting and recording scientific field data, entering/retrieving data into/from a computerized data base, installing and calibrating scientific field devices, participating in field inspections, or related activities, o an equivalent combination of education and experience, is required. Possession of a valid driver license is required. College level course work in physical or natural science or engineering, computer information systems or technology, construction technology, electronics technology, or engineering technology is preferred. Training/experience in collecting and recording scientific field data, especially in collecting water quality samples and/or conducting basic research is preferred. Experience using a personal computer, preferably in entering scientific field data into a computerized data base is preferred.

**Wages (in Florida)**

Minimum –31,345.60 Midpoint –39,187.20 Maximum – 47,028.80
*(Source: Southwest Florida Water Management District)

## 03 Field Technician, Staff (Resource Management)

**Job Description.** This is technical monitoring and data collection fieldwork that also requires some technical office work. Position conducts water quality sampling in support of the District's Water Quality Monitoring Program (WQMP) and Facilitating Agricultural Resource Management Systems (FARMS) Program. Collects water quality samples from wells and surface-water stations for a comprehensive list of water quality parameters. Assists scientific and engineering staff by collecting and preparing hydrologic data for their use. Maintains field and observation equipment. Contacts federal, state and local governments as well as private industry for hydrologic water quality data Utilizes the District's Geographic Information System (GIS), Water Management Information System (WMIS), and other software packages. Provides background research and on-site oversight of activities associated with monitoring wells and surface water stations. Assists in the collection of geophysical logs on wells. Maintains liaison with other departments and outside agencies on FARMS and WQMP projects. Works closely with the WQMP's field technician supervisor and provides training and oversight of newly hired field technician staff. Participates in District emergency management activities and in departmental projects and performs other duties as required.

**Education and Training.** Associate's degree or certificate  three years' experience in technical field work, including collecting and recording scientific field data, entering/retrieving data into/from a computerized data base, installing and calibrating scientific field devices, participating in field inspections, or related activities,  an equivalent combination of education and experience, is required. Possession of a valid driver license is required. College-level course work in physical or natural science or engineering, computer information systems or technology, construction technology electronics technology or engineering technology is preferred. Training/experience in collecting and recording scientific field data, especially in collecting water quality samples and/or conducting basic research is preferred.

**Wages (in Florida)**

Minimum –34,528.00 Midpoint –43,347.20 Maximum – 52,145.60

*(Source: Southwest Florida Water Management District)

## 03 Senior Field Technician (Resource Management)

**Job Description.** This is independent technical monitoring and data collection fieldwork that also requires some technical office work. Position conducts water quality sampling, primarily in the southern portion of the District, in support of the District's Water Quality Monitoring Program (WQMP) and Facilitating Agricultural Resource Management Systems (FARMS) Program. Collects water quality samples from wells and surface-water stations for a comprehensive list of water quality parameters. Deploys, maintains, and downloads remote data logging instruments. Assists scientific and engineering staff by collecting and preparing hydrologic data for their use. Maintains field and observation equipment. Contacts federal, state and local governments as well as private industry for hydrologic water quality data. Utilizes the District's Geographic Information System (GIS), Water Management Information System (WMIS), and other software packages. Provides background research and on-site oversight of activities associated with monitoring wells and surface water stations. Assists in the collection of geophysical logs on wells. Maintains liaison with other departments and outside agencies on FARMS and WQMP projects. Works closely with the WQMP's field technician supervisor

and assists with weekly scheduling. Performs internal field audits and provides training and oversight of newly hired field technician staff. Participates in District emergency management activities and in departmental projects and performs other duties as required.

**Education and Training.** Associate's degree or certificate AND five years' public contact work involving general/technical field work including collecting and recording scientific field data, installing and calibrating scientific field devices, conducting inspections, and entering/retrieving data into/from a computerized data base, an equivalent combination of education and experience, is required. Possession of a valid driver license is required. Experience performing biological monitoring and conducting ground-water and surface-water quality sampling including well-purging procedures, operation of sampling pumps and meters, and quality-control/quality-assurance is preferred.

**Wages (in Florida)**
Minimum –42,224.00 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

## 03 Field Technician Assistant (Resource Regulation)

**Job Description.** This position assists with technical work supporting permitting and compliance activities pertaining to Resource Regulation. Conducts or assists with conducting routine field investigations related to projects involving well construction, water use and/or environmental resource permitting. Compiles and reviews data from established files, databases, maps, and publications, and contacts involved parties to document information relative to environmental resource permitting, water use or well construction permitting complaints or violations under investigation. Collects project site information during field inspections, noting and documenting relevant findings. Attends meetings and participates in discussions related to regulatory matters and corrective actions needed to resolve issues of noncompliance. Information gathered may be used as evidence in administrative hearings or court cases. Reviews conditions placed on existing permits, compares to existing conditions, and notes discrepancies. Prepares and submits reports. Conducts routine surveillance to identify possible noncompliance with District rules while en route to designated sites and handles follow-up investigations as necessary. Compares construction activity to construction plans and permit conditions, notes deviations, prepares a summary report and recommendations. May participate in aerial surveillance to document unauthorized activities. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** High school diploma and one year experience in technical fieldwork, including work described in the position description o an equivalent combination of education and experience is required. Possession of a valid driver license is required. Experience conducting reviews of construction drawings with subsequent construction inspections, or field inspections pertaining to environmental resource, water use and/or well construction permitting is preferred.

**Wages (in Florida)**
Minimum –26,000.00 Midpoint –32,240.00 Maximum – 38,480.00
*(Source: Southwest Florida Water Management District)

## 03 Field Technician (Resource Regulation)

**Job Description.** This is technical work supporting permitting and compliance activities pertaining to Resource Regulation. Conducts routine field investigations related to projects involving well construction, water use and/or environmental resource permitting. Compiles and reviews data from established files, databases, maps, and publications, and contacts involved parties to document information relative to environmental resource, water use or well construction permitting complaints or violations under investigation. Collects project site information during field inspections, noting and documenting relevant findings. Attends meetings and participates in discussions related to regulatory matters and necessary corrective actions needed to resolve issues of noncompliance. Information gathered may be used as evidence in administrative hearings or court cases. Reviews conditions placed on existing permits, compares to existing conditions, notes discrepancies and assists in recommending corrective actions. Prepares and submits reports. Conducts routine surveillance to identify possible noncompliance with District rules while en route to designated sites and handles follow-up investigations as necessary. Compares construction activity to construction plans and permit conditions, notes deviations, prepares a summary report and recommendations. May participate in aerial surveillance to document unauthorized activities. Serves as back up to other section staff as needed, and Field Technician Supervisor if required. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Associates Degree/Certificate and two years experience in technical fieldwork, including work described in the position description an equivalent combination of education and experience is required. Possession of a valid driver license is required. College-level course work in natural or physical science, construction or engineering technology from an accredited college or university is preferred. Experience conducting reviews of construction drawings with subsequent construction inspections, or field inspections pertaining to environmental resource, water use and/or well construction permitting is preferred.

**Wages (in Florida)**

Minimum –31,345.60 Midpoint –39,187.20 Maximum –47,028.80

*(Source: Southwest Florida Water Management District)

## 03 Field Technician Staff (Resource Regulation)

**Job Description.** This is technical work supporting permitting and compliance activities pertaining to Resource Regulation. Conducts moderately complex field investigations and may assist in the oversight of subordinate staff related to projects involving well construction, water use and/or environmental resource permitting. Compiles and reviews data from established files, databases, maps, and publications, and contacts involved parties to document information relative to environmental resource, water use or well construction permitting complaints or violations under investigation. Collects project site information during field inspections, noting and documenting relevant findings. Attends meetings and participates in discussions related to regulatory matters and corrective actions needed to resolve issues of noncompliance. Information gathered may be used as evidence in administrative hearings or court cases. Reviews conditions placed on existing permits, compares to existing conditions, notes discrepancies and assists in recommending corrective actions. Prepares and submits reports. Conducts routine surveillance to identify possible noncompliance with District rules while en route to designated sites and handles follow-up investigations as necessary. Compares construction activity to

construction plans and permit conditions, notes deviations, prepares a summary report and recommendations. May participate in aerial surveillance to document unauthorized activities. Serves as back up to other section staff as needed, and Field Technician Supervisor if required. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Associates Degree/Certificate and three years experience in technical fieldwork, including work described in the position description an equivalent combination of education and experience is required. Possession of a valid driver license is required. College-level course work in natural or physical science, construction or engineering technology from an accredited college or university is preferred. Experience conducting reviews of construction drawings with subsequent construction inspections, or field inspections pertaining to environmental resource, water use and/or well construction permitting is preferred.

**Wages (in Florida)**
Minimum –34,528.00 Midpoint –43,347.20 Maximum – 52,145.60
*(Source: Southwest Florida Water Management District)

## 03 Field Technician Senior (Resource Regulation)

**Job Description.** This is technical work supporting permitting and compliance activities pertaining to Resource Regulation. Conducts complex field investigations and provides oversight to subordinate staff related to projects involving well construction, water use and/or environmental resource permitting and compliance. Compiles and reviews data from established files, databases, maps, and publications, and contacts involved parties, to document information relative to environmental resource, water use or well construction permitting complaints or violations under investigation. Collects project site information during field inspections, noting and documenting relevant findings. Attends meetings and participates in discussions related to regulatory matters and corrective actions needed to resolve issues of noncompliance. Information gathered may be used as evidence in administrative hearings or court cases. Reviews conditions placed on existing permits, compares to existing conditions, notes discrepancies and recommends corrective actions. Prepares and submits reports. Conducts routine surveillance to identify possible noncompliance with District rules while en route to designated sites and handles follow-up investigations as necessary. Compares construction activity to construction plans and permit conditions, notes deviations, prepares a summary report and recommendations. May participate in aerial surveillance to document unauthorized activities. Serves as back up to other section staff and Field Technician Supervisor as needed. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Associates Degree/Certificate and five years experience in technical fieldwork, including work described in the position description an equivalent combination of education and experience is required. Possession of a valid driver license is required. College-level course work in natural or physical science, construction or engineering technology from an accredited college or university is preferred. Experience conducting reviews of construction drawings with subsequent construction inspections, or field inspections pertaining to environmental resource, water use and/or well construction permitting is preferred.

**Wages (in Florida)**
Minimum –42,224.00 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

## 03 Field Technician Supervisor (Resource Management)

**Job Description.** Supervises and trains staff supporting the continuous operation and maintenance of remote data collection sites utilizing Supervisory Control And Data Acquisition (SCADA) electronic data collection system. Provides technical support for calibration, verification, troubleshooting, maintenance and repair of SCADA and other electronic data logging equipment. Designs, coordinates, and assists in construction of new SCADA data collection sites. Assists in developing standard operating procedures for SCADA equipment field installation, grounding, maintenance and use. Coordinates ongoing system field maintenance through implementation of detached maintenance schedules. Analyzes and interprets incoming data to maintain the constant accuracy of data. Determines and coordinates resolution of system hardware, mechanical or procedural problems that arise. Performs diagnostic testing of SCADA field equipment. Develops and maintains thorough system documentation. Serves as backup to the SCADA Administrator for on-site support in the District's Emergency Operations Center (EOC) during designated storm events. Participates in departmental projects and performs other duties as assigned.

**Education and Training**. Associate's degree or certificate from an accredited college or university AND six years' experience involving data collecting, overseeing site installation and maintenance of environmental field projects and/or telemeter data acquisition systems, an equivalent combination of education and experience, is required. Possession of a valid driver license is required. College-level course work in electronics, computer science or technology and supervisory experience is preferred.

**Wages (in Florida)**

Exempt

| | | |
|---|---|---|
| Minimum –46,862.40 | Midpoint –59,529.60 | Maximum – 72,196.80 |

Non-exempt

| | | |
|---|---|---|
| Minimum –46,862.40 | Midpoint –59,529.60 | Maximum – 72,196.80 |

*(Source: Southwest Florida Water Management District)

## 07 Structure Control Analyst

**Job Description.** Provides skilled technical support to the Structure Operations Section in the monitoring and operation of remotely controlled and manually operated flood and water control structures of various sizes and complexities located throughout the District. Utilizes the District's Supervisory Control and Data Acquisition electronic data collection system (VT SCADA) and its human machine interface (HMI) software to operate automated water control structures remotely. Advises Structure Operations staff on the needed operations for manually operated control structures. Trains and provides technical oversight to the Structure Controls Coordinator. Working with appropriate staff, develops and modifies watershed drainage flow schematics. Provides the general public, consultants, and government agencies with structure operations data and information, as requested. Compiles information for contracted services, prepares technical specifications, and assists in preparing Requests for Bids (RFB) and Request for Proposals (RFP) for contracts pertaining to Structure Operations Section. During an activation of the District's Emergency Operation Center (EOC) the employee is required to perform duties as a member of the Structure Operations Group of the Operations Section of the EOC's Incident Command Structure. Employee may be required to perform duties, which may include the employee's normal work functions or other emergency support functions as determined necessary by the District, as assigned before, during and after major storm events and emergency situations such as

hurricanes or other declared emergencies. Participates in departmental projects and performs other duties as assigned.

**Education and Training.** Associate's degree or certificate from an accredited community college or university with a curriculum which includes computer technology, hydrology, hydraulics, drainage, or general construction D six years' experience involving instrumentation and controls, structure inspection, and/or engineering technology, or an equivalent combination of education and experience, is required. A valid driver license is required. Experience using personal computers and software Experience using HMI and ladder logic software, Direct SOFT32, SCADA system is preferred. College-level course work in computer science and/or electrical engineering/construction technology is preferred.

**Wages (in Florida)**
Minimum –46,862.40 Midpoint –59,529.60 Maximum – 72,196.80
*(Source: Southwest Florida Water Management District)

## 07 Well Driller

**Job Description.** This is field and office work providing support for District well drilling and coring operations, supervision of well construction contracts, and logistical support on aquifer performance tests (APT's). Operates and assists in the operation of drilling and ancillary equipment for the purpose of litho logic coring and the construction of monitor wells. Constructs or supervises the construction of wells in compliance with District rules and regulations. Mixes drilling fluid components and grouting materials following established procedures. Performs necessary calculations involved in cementing well casing. Collects and labels geologic samples, measures water levels, and collects water quality samples. Ensures a safe working environment and appropriate site cleanup. Secures permits and other applicable documents, as required. Orders supplies and maintains an inventory of equipment and materials. Ensures maintenance of heavy equipment. Maintains accurate records of equipment, supplies, and vendor accounts and requisitions. Installs, tests, and removes District pumping equipment. Assists in the operation of large-scale, long-term APT's. Transports drilling and exploratory equipment and assists in loading, unloading, setting up, and/or retrieving of related materials and supplies. Supervises daily operations of a contracted drilling crew on an as-needed basis. Monitors contractor performance in constructing monitor wells, documents work time, and coordinates logistic support as needed. Completes daily logs accurately describing the activities and work completed. Performs labor intensive tasks as necessary and other work as required. Employee may be required to perform duties, which may include the employee's normal work functions or other emergency support functions as determined necessary by the District, as assigned before, during and after major storm events and emergency situations such as hurricanes or other declared emergencies. Participates in departmental projects and performs other duties as required. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** High school diploma or equivalent AND four years experience in the operation of well drilling equipment and well construction, an equivalent combination of education and experience, is required. Possession of a valid driver license is required. Possession of a valid State of Florida Class A Commercial Driver

License (COL) within six months of date of appointment to the position is required. Possession of a Florida Water Well Contractor's License is preferred.

**Wages (in Florida)**
Minimum –34,528.00 Midpoint –43,347.20 Maximum – 52,145.60
*(Source: Southwest Florida Water Management District)

## 07 Well Driller, Senior

**Job Description.** This is field work providing support for District well drilling and coring operations, supervision of well construction contracts, and logistical support on aquifer performance tests (APT's). Reviews well construction plans and initiates all logistic support for materials and site preparation from project planning through completion. Operates and supervises the operation of drilling and ancillary equipment for the purpose of litho logic coring and the construction of monitor wells. Constructs or supervises the construction of wells in compliance with District rules and regulations. Mixes drilling fluid components and grouting materials following established procedures. Performs necessary calculations involved in cementing well casing Collects and labels geologic samples, measures water levels, and collects water quality samples. Ensures a safe working environment and appropriate site cleanup. Secures permits and other applicable documents, as required Orders supplies and maintains an inventory of equipment and materials. Ensures maintenance of heavy equipment. Maintains accurate records of equipment, supplies, and vendor accounts and requisitions. Installs, tests, and removes District pumping equipment. Assists in the operation of large-scale, long-term APT's. Transports drilling and exploratory equipment and assists in loading unloading setting up, and/or retrieving related materials and supplies. Supervises daily operations of a contracted drilling crew. Monitors contractor performance in constructing monitor wells, documents work time, and coordinates logistic support as needed. Completes daily logs accurately describing the activities and work completed Performs labor intensive tasks as necessary and other work as required Employee may be required to perform duties, which may include the employee's normal work functions or other emergency support functions as determined necessary by the District, as assigned before, during and after major storm events and emergency situations such as hurricanes or other declared emergencies. Participates in departmental projects and performs other duties as required.

**Education and Training.** High school diploma or equivalent and six years' experience in coring, well construction and drill rig operation, or an equivalent combination of education and experience, is required. Possession of a valid Florida driver’s license is required. Possession of a valid State of Florida Class A Commercial Driver License (COL) is required within six months of date of appointment to the position is required.

**Wages (in Florida)**
Minimum –42,224.00 Midpoint –53,435.20 Maximum – 64,625.60
*(Source: Southwest Florida Water Management District)

## 07 Aquatic Plant Management Technician

**Job Description.** Performs field work inspecting and maintaining District well and data sites, vegetative management on public waters and District-owned lands, operation and maintenance of water conservation structures, construction and maintenance of roads, rights-of-way, and completes work orders and other required paperwork. Operates, inspects, cleans, and performs routine mechanical maintenance on airboats, trucks, spray equipment, tractors, mowers and other assigned equipment.

**Education and Training.** High school diploma or equivalent AND 1.5 years experience in grounds maintenance, outdoor labor construction trades and basic operation of mechanical equipment, fence repairs and construction INCLUDING one years' experience measuring, mixing, loading and applying pesticides or herbicides, or an equivalent combination of education and experience, is required. Possession of a valid Florida Driver. License is required. Possession of a current Pesticide Applicator License issued by the State of Florida Department of Agriculture is required within six months. Successful completion of the District's in-house training for airboat operator certification, first aid, and chainsaw, ATV, and CPR courses is required for continued employment.

**Wages (in Florida)**

Minimum –26,000.00 Midpoint –32,240.00 Maximum –38,480.00

*(Source: Southwest Florida Water Management District)

## 07 Aquatic Plant Management Technician (Certified)

**Job Description.** Applies herbicides to manage aquatic vegetation on public waters and terrestrial vegetation on other works and lands of the District. Operates, modifies and makes field repairs on airboats as well as airboat and truck mounted pumps and spray tanks. Assists with the calibration of herbicide application equipment. Measures, mixes and safely applies herbicide spray mixtures pursuant to label directions to selectively control targeted aquatic and terrestrial vegetation. Records amounts and types of pesticides or herbicides used, areas treated environmental conditions on required state and federal forms. Completes associated paperwork. Utilizes chainsaw, small hand tools, portable winch and airboat to remove vegetation jams fallen trees with block navigation, access and water flow. When necessary, enters water to remove snags, debris, etc. Conducts indoor pest control treatments utilizing backpack sprayers. Treats water retention and detention ponds to control mosquitoes. Assists with field surveys to determine the need for and location of aquatic plant control operations. Installs warning signs in treated areas to inform the public of any water use or re-entry restrictions. Maintains public contact to address concerns, explain water use restrictions and disseminate information about the program. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** High school diploma or equivalent and one year of outdoor work experience measuring, mixing, loading and applying pesticides or herbicides or comparable education and experience. Possession of a current applicator license issued by the Florida Department of Agriculture and Consumer Services in the Aquatic Pest Control, Right-of-way or Natural Areas Weed Mgmt. category is required. Possession of a valid Florida Driver License is required. Experience in aquatic plant management and operating boats is preferred. Courses in biology, botany or chemistry are preferred. Within twelve months from date of

hire, the employee is required to successfully complete the District's airboat operator certification, first aid and CPR courses.

**Wages (in Florida)**
Minimum –28,516.80 Midpoint –35,505.60 Maximum – 42,494.40
*(Source: Southwest Florida Water Management District)

## 07 Aquatic Plant Management Crew Leader

**Job Description.** The employee in this field position performs herbicide treatments to manage aquatic vegetation on public waters, District flood control projects and terrestrial vegetation on District-owned right-of-ways, conservation lands and restoration projects managed by the District. Provides field supervision for one or more Aquatic Plant Management Specialists ensuring that crew activities reflect program policies and requirements. The employee calibrates and utilizes herbicide application equipment, measures, and mixes and safely applies herbicide spray mixtures to selectively control targeted vegetation pursuant to label directions. Operates trucks, AWs and airboats, tests dissolved oxygen levels and monitors water quality and climatic conditions to determine if the application of herbicides will cause any adverse impacts to aquatic life, damage public or private property or injure the public. Conducts field surveys to identify and assess the need for and location of required vegetation management operations, to schedule future operations and assess the effectiveness of ongoing activities. Communicates with the public to address complaints, explain water use restrictions, and disseminate information concerning the District's vegetation management programs. Estimates types and amounts of herbicides to be used, records required treatment information, receives and completes work orders. Utilizes chainsaw, small tools, portable winch and airboat to remove vegetation jams and fallen trees which block navigation, access and water flow. Performs other duties as required.

**Education and Training.** High school diploma or equivalent and two years' experience as an Aquatic Plant Management Specialist, an equivalent combination of education and experience, is required. Possession of a valid Florida Driver License is required. Within six months of appointment to the position, possession of a valid Florida Class D Driver license is required. Possession of a current applicator license issued by the State of Florida in the Aquatic category is required. Within six months from date of hire, the employee is required to successfully complete the District's airboat operator certification, first aid and CPR courses. Boating experience and courses in biology, botany or chemistry are preferred.

**Wages (in Florida)**
Minimum –31,345.60 Midpoint –39,187.20 Maximum – 47,028.80
*(Source: Southwest Florida Water Management District)

## 01 FARMS Project Manager (Agricultural Projects)

**Job Description.** This is technical, administrative, and supervisory work involving agricultural projects within the District. The Facilitating Agricultural Resource Management Systems (FARMS) program is an agricultural-best management practices (BMP) cost-share reimbursement program designed to reduce Upper Floridian aquifer withdrawals, improve surface water quality, and restore natural systems through cost-share contracts with agricultural landowners. FARMS Section employees work closely with the agricultural community to develop FARMS projects and with District Resource Regulation Agricultural Team staff on permitting actions

associated with project implementation. The FARMS Program Manager provides oversight of section staff and projects, policy direction, high-level technical and administrative assistance, and promotes the implementation of the FARMS Program through speaking engagements and interaction with the agricultural community. Selects, trains, supervises and evaluates the work of section staff, providing coaching and counseling, and ensuring staff compliance with personnel and administrative procedural requirements. Develops section budgets and tracks project funding, including assistance in obtaining local, state, and federal funding for FARMS. Oversees and evaluates long-term performance of FARMS activities and reports on FARMS Program status to Governing and Basin Boards and other groups. Coordinates scientific research analysis and monitoring work and oversees section activities for the Well Back-Plugging Program. Works closely with the Florida Department of Agriculture and Consumer Services (FDACS) and Natural Resource Conservation Service (NRCS) on FARMS actions. Fosters positive interaction and issue coordination between FARMS staff, District Resource Regulation staff, other agency staff, and District permit holders. Manages staff assigned to detailed research projects that evaluate FARMS Project performance, Institute of Food and Agricultural Science (IFAS) agricultural research projects, the quality of ground and surface water, and ground-water agricultural use. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree from an accredited college or university in physical or natural sciences, engineering, water resources management or water-resources related field AND six years experience relating to water resources, including project management and managerial or supervisory experiences, OR an equivalent combination of education and experiences, is required.

Possession of a valid driver license is required. Experience in agricultural water resource management is preferred. Possession of a Professional Geologist or Professional Engineer license is preferred.

**Wages (in Florida for Project Manager)**
Minimum –52,145.60 Midpoint –67,371.20 Maximum –82,576.00
*(Source: Southwest Florida Water Management District)

## 01 Regulation Director

**Job Description.** This is a professional, senior management position that is responsible for directing, developing and managing water resource permitting and compliance work activities in the Regulation Department Service Office, and to ensure the efficiency, effectiveness and consistency of the District's regulation, permitting and compliance efforts. The employee directs all regulatory and corresponding administrative activities within the service office. The employee coordinates closely with other Regulation Directors, the Strategic Program Office, Performance Management Office, other senior management staff and the Office of General Counsel staff to ensure and maintain consistency in the regulatory and other water resources programs. Develops and maintains good working relationships with local government staff in the service area. Develops and implements the Department's budget and directly supervises the managers and supervisors within the Regulation Department.

**Education and Training.** Bachelor's degree from an accredited college or university in engineering, geology, hydrology, environmental science or a related area AND seven years of experience in water resources related work, or an equivalent combination of education and experience is required. Possession of a valid Florida

Driver License is required. . Supervisory or managerial experience and experience with a governmental agency involving resource regulation programs is preferred.

**Wages (in Florida as Director)**
Minimum –89,710.40 Midpoint –115,731.20 Maximum – 141,752.00
*(Source: Southwest Florida Water Management District)

## 01 Environmental Manager

**Job Description.** Manages and supervises work of professional and technical staff engaged in Environmental Resource Permitting (ERP), Water Use Permitting (WUP), and Proprietary Authorizations for activities on Sovereign Submerged Lands including compliance and enforcement activities. Works closely with Resource Regulation staff, other District staff, permit applicants, and the public to ensure effective and efficient implementation of the ERP, WUP and Sovereign Submerged Lands programs. Maintains excellent technical and communication skills while performing job duties, assuring proper use of permitting, compliance and enforcement processes, procedures, and performance-related standards. Ensures compliance with the District's personnel and other guidelines, and conducts disciplinary activities. Reviews and comments on subordinates draft letters, reports, and permit documents. Conducts efficient and effective pre-application, application, dispute resolution, and compliance and enforcement meetings. Conducts site visits and field inspections. Develops and recommends updates and improvements to internal procedures. Acts as a resource to hydrologists, geologist, engineers, environmental scientists, other technical staff and the public on all environmental aspects of the District's permitting, compliance and enforcement activities. Imparts knowledge and provides technical expertise. Evaluates environmental factors, with emphasis on the ecological value of wetlands and surface waters, including habitats for wetland dependent threatened and endangered species. Establishes and verifies the landward extent of wetlands and other surface waters as requested and needed. Assess environmental impacts and proposed compensation measures in relation to environmental impacts. Maintains and promotes a solution-oriented culture through cooperation, collaboration, assistance and public outreach. Actively participates in Regulation Manager's, ERP Advisory Group and WUP Discussion Group meetings. Investigates and recommends practical and reasonable solutions to permit and compliance- related issues. Coordinates work activities closely with the Strategic Program Office, Legal, and Agricultural Team and Community Affairs staff on permitting, compliance, enforcement, public outreach and related issues. Coordinates with Resource Projects as appropriate within assigned service areas. Prepares presentation materials for Governing Board information and action. Assists in setting Departmental goals and objectives, and closely monitors the Division's goals and performance standards. Actively participates with the Department's Management Team in managing the Department's day-to-day operations. Participates in interviews, employee selection, and conducts objective, constructive performance evaluations of staff. Performs all duties in a customer friendly and solution-oriented manner. Consistently demonstrates quality service with a focus upon continuous process improvement in the conduct of all job duties. Attends staff training related to technical, administrative and managerial responsibilities associated with the position. Coordinates technical and supervisory training opportunities for subordinates to encourage continued professional development. Participates in District emergency management activities and other departmental activities. Provides input and feedback on business processes currently in place, and assists in the development of new business processes for the Water Management Information System (WMIS). Performs

other duties as needed. Participates in District emergency management activities and other departmental activities and performs other duties as needed.

**Education and Training.** Bachelor's degree in biology, biological or natural sciences or related field and six years experience in wetlands ecology is required. Possession of a valid driver license is required. Experience involving public contact regarding regulation or controversial issues is preferred. Supervisory experience is preferred. Master's Degree in a related field is preferred. Professional Wetland Scientist certification is preferred. Additional years of related education will be considered in lieu of required experience on a year for year basis.

**Wages (in Florida as Manager Grades 18-21)**

Grade 18

| | | |
|---|---|---|
| Minimum –52,145.60 | Midpoint –67,371.20 | Maximum – 82,576.00 |

Grade 19

| | | |
|---|---|---|
| Minimum –58,156.80 | Midpoint –76,356.80 | Maximum – 94,536.00 |

Grade 20

| | | |
|---|---|---|
| Minimum –65,000.00 | Midpoint –86,590.40 | Maximum – 108,160.00 |

Grade 21

| | | |
|---|---|---|
| Minimum –72,820.80 | Midpoint –98,238.40 | Maximum – 123,656.00 |

*(Source: Southwest Florida Water Management District)

## 01 Water Quality Monitoring Program Manager

**Job Description.** This is professional-level technical and administrative work managing complex monitoring and research projects with the Water Quality Monitoring Program (WQMP). Develops and manages scientific and technical aspects of surface and groundwater quality related projects. Selects, trains, supervises, and evaluates the work of section staff, providing coaching and counseling, and ensuring staff compliance with technical guidelines and personnel and administrative procedural requirements. Provides oversight of technical data collection, research, and reporting on surface and groundwater quality issues. Provides District staff, other governmental agencies, and the public with scientific information relating to multi-disciplinary knowledge and research. Responds to management or board requests regarding technical aspects of ground and surface water quality topics. Develops section budget and tracks project funding and performance of WQMP projects and activities. Prepares annual performance appraisals for professional section staff and field technician supervisor. Supports data management activities related to the District's Water Management Information System initiatives. Participates in various District projects and performs other duties as required.

**Education and Training.** Bachelor's degree from accredited college or university in engineering, geology, hydrology, chemistry, or related field is required. Seven years' experience in a water-resource related field involving water-resource related experience, including conducting scientific research or analysis and/or project planning, development and management, are required. Possession of a valid driver's license is required. Supervisory or managerial experience is preferred. Additional years of education may be considered in lieu of required years of experience.

**Wages (in Florida as Manager Grades 18-21)**

Grade 18

Minimum –52,145.60 Midpoint –67,371.20 Maximum – 82,576.00

Grade 19

Minimum –58,156.80 Midpoint –76,356.80 Maximum – 94,536.00

Grade 20

Minimum –65,000.00 Midpoint –86,590.40 Maximum – 108,160.00

Grade 21

Minimum –72,820.80 Midpoint –98,238.40 Maximum – 123,656.00

*(Source: Southwest Florida Water Management District)

## Master Electrician

**Job Description.** Performs highly skilled work in the installation, alteration, maintenance and repair of complex electrical systems, equipment and fixtures. This is highly skilled technical and supervisory work at the master level performing various complex electrical installation, alteration, and maintenance and repair tasks in accordance with standard practices of the electrical trade.

An employee in a position assigned to this class of work is responsible for securing permits for electrical installations when the work is being performed by County personnel on County owned/leased buildings and structures. The employee also has responsibility to ensure compliance with governing codes of all installations performed by other County Electricians when such installations require the securing of an electrical permit. The employee connects refrigeration, air conditioning and heating equipment; installs or moves electrical outlets as required by various electrical appliances or equipment items; and installs control and distribution apparatus, such as switches, relays and circuit breaker panels.

**Education and Training.** High school graduate or equivalent and five years experience as an electrician or electrician's helper, two years of which must have been at the journeyman electrician level. Up to three years additional experience may be substituted for up to three years of required education. Some commercial electrical experience is preferred. Orange County certification as a Master Electrician. Must possess and maintain a valid Florida Driver's License by date of hire.

**Wages (in Florida)**

Minimum (Annual) $31,720

Maximum (Annual) $49,026

*(Source: Orange County Government)

## Control Room Operator

**Job Description.** Conducts remote monitoring of central engineering plants and building automated systems, providing early problem detection and remote adjustments to operating parameters for all buildings and systems assigned. Performs a variety of administrative functions in support of building operations, maintenance and casualty control.

An employee in this position is responsible for a variety of duties ensuring safe and efficient operation of assigned building systems. They must have a solid understanding of engineering mechanical, electrical,

hydraulic plant systems, operating parameters and control systems. They must further be able to recognize abnormal conditions based on remote indications and take positive, timely and safe corrective action to restore conditions to normal.

**Education and Training.** Graduation from high school and five years of experience in two or more of the following: electrical, plumbing, HVAC, general building maintenance, or electronic systems; or an equivalent combination of training or experience. Demonstrated computer literacy. Must possess and maintain a valid Florida Driver's License. Based on area of assignment may be required to be certified in the HVAC trade. Some areas of assignment require successful completion of an Environmental Protection Agency (EPA) certification program as Universal technician prior to date-of-hire.

**Wages (in Florida)**
Minimum (Annual) $33,946
Maximum (Annual) $52,541
*(Source: Orange County Government)

## Equipment Operator I

**Job Description.** Performs semi-skilled work operating light to medium sized automotive, construction or maintenance equipment. This is semi-skilled work operating motor vehicles or construction equipment in the performance of assigned duties. An employee in a position assigned to this classification is responsible for safe operation of the vehicle or equipment, Responsibilities include performing routine safety checks and maintenance of the equipment as necessary, and Work is assigned and reviewed by a designated supervisor. Performance is evaluated through observation of work in progress and upon completion for achievement of desired results in a safe, efficient manner.

**Education and Training.** Six months experience in the operation of automotive, construction, or maintenance equipment, or completion of an Orange County department approved training program. Required to possess and maintain the appropriate valid Florida Commercial Driver's License for the type of equipment operated. Must be able to understand and carry out written and oral instructions.

**Wages (in Florida)**
Minimum (Annual) $21,445
Maximum (Annual) $33,155
*(Source: Orange County Government)

## Equipment Operator II

**Job Description.** Performs skilled and semi-skilled work operating medium to heavy sized automotive, construction or maintenance equipment. This is skilled and semi-skilled work operating moderately complex vehicles or construction equipment in the performance of assigned duties. An employee in a position assigned to this classification is responsible for safe operation of the vehicle or equipment. Responsibilities include performing routine safety checks and maintenance of the equipment as necessary. Work is assigned and reviewed by a designated supervisor. Performance is evaluated through observation of work in progress and upon completion for achievement of desired results in a safe, efficient manner.

**Education and Training.** Two years experience in the operation of automotive, construction, or maintenance equipment, or completion of an Orange County department approved training program and one year of experience. Required to possess and maintain the appropriate valid Florida Commercial Driver's License for the type of equipment operated. Must be able to understand and carry out written and oral instructions.

**Wages (in Florida)**
Minimum (Annual) $24,128
Maximum (Annual) $37,336
*(Source: Orange County Government)

## Equipment Operator III

**Job Description.** Performs skilled work operating medium to heavy sized automotive, construction or maintenance equipment. This is skilled work operating complex motor vehicles or equipment in the performance of assigned duties. An employee a position assigned to this classification is responsible for safe operation of the vehicle or equipment. Responsibilities include performing routine safety checks and maintenance of the equipment as necessary. Work is assigned and reviewed by a designated supervisor. Performance is evaluated through observation of work in progress and upon completion for achievement of desired results in a safe, efficient manner.

**Education and Training.** Three years experience in the operation and maintenance of medium to heavy automotive, construction, or maintenance equipment, or completion of an Orange County department approved training program and two years of experience. Required to possess and maintain the appropriate valid Florida Commercial Driver's License for the type of equipment operated. Must be able to understand and carry out written and oral instructions.

**Wages (in Florida)**
Minimum (Annual) $25,875
Maximum (Annual) $39,998
*(Source: Orange County Government)

## Equipment Operator IV

**Job Description.** Performs skilled advance work operating heavy construction and maintenance equipment. This is skilled advanced work operating complex heavy construction and maintenance equipment in the performance of assigned duties. An employee in a position assigned to this classification is responsible for safe operation of the equipment. Responsibilities include performing routine safety checks and maintenance of the equipment as necessary. Work is assigned and reviewed by a designated supervisor. Performance is evaluated through observation of work in progress and upon completion for achievement of desired results in a safe, efficient manner.

**Education and Training.** Four years experience in the operation and maintenance of medium to heavy automotive, construction, or maintenance equipment, or completion of an Orange County department approved training program and three years of experience. Required to possess and maintain the appropriate

valid Florida Commercial Driver's License for the type of equipment operated. Must be able to understand and carry out written and oral instructions.

**Wages (in Florida)**
Minimum (Annual) $29,744
Maximum (Annual) $46,030
*(Source: Orange County Government)

## Industrial Mechanic I

**Job Description.** Performs mechanical repairs and preventive maintenance on pumping systems, blowers, gearboxes and mechanical drive systems, in a major industrial plant environment or the water and wastewater field with multiple critical processes. Installs new pumps and piping as needed to repair and update obsolete equipment. Performs routine maintenance on valves, seals, and motors. Repairs structural problems using various equipment and modifications. Maintains buildings and facilities.

**Education and Training.** High School Diploma or equivalent and five (5) years of mechanical experience in a major industrial complex or a water or wastewater treatment facility, to include experience in disassembly and repair of pumps, using lathes and other milling equipment in a machine shop environment, exposure to welding and fabrication skills to repair damaged equipment, experience in conducting repairs according to technical manuals and drawings and experience in the use of precision measuring equipment; or an equivalent combination of relevant education and experience. Possess and maintain a valid Florida Driver's License with the ability to obtain a Florida Commercial Drivers License Permit. Applicant must submit proof of permit during pre-employment process. Depending on area of assignment must possess appropriate level of COL with required endorsements or possess COL permit and, obtain license and endorsements within six (6) months of hire or promotion. Knowledge of mechanical tools, drilling equipment and presses needed to undertake the various repair tasks. Knowledge of valves and valve repairs Based on area of assignment, must have the ability to conform to confined space entry procedures and use of safety equipment including respirator equipment per Orange County requirements. Ability to follow instructions and work with minimum supervision.

**Wages (in Florida)**
Minimum (Annual) $27,726
Maximum (Annual) $42,890
*(Source: Orange County Government)

## Industrial Mechanic II

**Job Description.** Performs mechanical repairs and preventive maintenance on pumping systems, blowers, gearboxes and mechanical drive systems, in a major industrial plant environment or the water and wastewater field with multiple critical processes. Installs new pumps and piping as needed to repair and update obsolete equipment. Rebuilds pumps replacing bearings, shafts, seals and bushings. Replaces machine parts and retrofit equipment with modifications to reduce failures and increase pump efficiency. Works with hydraulic, pneumatic and electrical control systems. Supervises other technicians in the repair and maintenance of processing equipment.

**Education and Training.** High School Diploma or equivalent and seven (7) years of experience; mechanical experience in a major industrial complex or a water or wastewater treatment facility, to include experience in disassembly and repair of pumps, using lathes and other milling equipment in a machine shop environment, welding skills and experience in dynamic balancing, experience in conducting repairs according to technical manuals and drawings and extensive experience in the use of precision measuring equipment; or an equivalent combination of relevant education and experience. Possess and maintain a valid Florida Driver's License with the ability to obtain a Florida Commercial Drivers License Permit. Applicant must submit proof of permit during pre—employment process. Depending on area of assignment must possess appropriate level of COL with required endorsements or possess COL permit and, obtain license and endorsements within six (6) months of hire or promotion. Knowledge of mechanical tools, drilling equipment and presses needed to undertake the various repair tasks. Extensive knowledge of valves and valve repairs, Based on area of assignment, must have the ability to conform to confined space entry procedures and use of safety equipment including respirator equipment per Orange County requirements.

**Wages (in Florida)**
Minimum (Annual) $31,720
Maximum (Annual) $49,026
*(Source: Orange County Government)

## Industrial Electrician I

**Job Description.** Performs electrical repairs and preventive maintenance on control systems in a major industrial plant environment or the water and wastewater field with multiple critical processes. Installs, trouble shoots and repairs controls and instrumentation as needed to upgrade and update obsolete equipment including incoming electrical services. Test motors, generators, lighting and power distribution systems. Troubleshoots and repairs motor controls.

**Education and Training.** High School Diploma or equivalent and five years of electrical experience in industrial motor controls, including PLC programming knowledge and experience maintaining electronics instruments in accordance with technical specifications, experience with test meters for measuring current, voltage and resistance, and have worked from wiring schematics and prints to accomplish repairs; or an equivalent combination of relevant education or experience. Must possess a Journeyman Electrical License. Must be familiar with and utilize the NEC standards. Must be able to determine problems commonly associated with motors, generators, and service. Based on area of assignment, must have the ability to conform to confined space entry procedures and use of safety equipment including respirator equipment per Orange County requirements.

**Wages (in Florida)**
Minimum (Annual) $31,720
Maximum (Annual) $49,026
*(Source: Orange County Government)

## Industrial Electrician II

**Job Description.** Performs electrical repairs and preventive maintenance on control systems in a major industrial plant environment, major building complex, or the water and wastewater field with multiple critical processes. Installs, trouble shoots and repairs new and existing controls and instrumentation as needed to upgrade and update obsolete equipment including incoming electrical services. Tests motors, generators, and lighting and power distribution systems. Troubleshoots and repairs variable frequency drives and other motor controls. Supervises other technicians in the repair and maintenance of processing equipment and/or building support systems.

**Education and Training.** High School Diploma or equivalent and ten years of electrical experience in industrial motor controls. Extensive PLC programming knowledge and experience maintaining electronics instruments in accordance with technical specifications, experience with test meters for measuring current, voltage and resistance and have worked from wiring schematics and prints to accomplish repairs; or an equivalent combination of relevant education or experience. Must possess a Master's Electrical License or equivalent industrial electrical certification. Must be familiar with and utilize the NEC standards. Must be able to determine problems commonly associated with motors, generators, and service. Based on area of assignment, must have the ability to conform to confined space entry procedures and use of safety equipment including respirator equipment per Orange County requirements.

**Wages (in Florida)**
Minimum (Annual) $36,338
Maximum (Annual) $56,181
*(Source: Orange County Government)

## Plant Specialist I

**Job Description.** Performs operation and maintenance of a treatment facility. Participates in the analysis and troubleshooting of the operational problems using available data and follows the proper course of action to meet plant operating objectives. Work requires independent judgment and is performed under the general supervision of a designated supervisor. Work is reviewed through observations, conferences, reports and results achieved. Work is physically demanding in hazardous conditions requiring close contact with different chemicals while wearing the appropriate safety equipment. Plants operate 24 hours 7 days a week and may require Operators to work overtime and rotational shifts. May be assigned as team leader. May be required to provide training.

**Education and Training.** High School Diploma or equivalent and, two (2) years of water or wastewater plant experience. Depending on area of assignment, must possess appropriate level of COL with required endorsements or possess CDL permit and, obtain license and endorsements within six (6) months of hire or promotion. Depending on area of assignment, must possess State mandated "C" Water or Wastewater certification. Depending on area of assignment, must be able to comply with the requirements of the Utilities' Health and Safety Manual. Must demonstrate proficiency in one (1) of the areas listed: Treatment process control in advance water or wastewater systems. SCADA/DCS system operations of electronic equipment.

Proficiency and use of computer software used in operation Mechanical maintenance of the treatment facilities. Biosolids processing and management.

**Wages (in Florida)**
Minimum (Annual) $31,720
Maximum (Annual) $49,026
*(Source: Orange County Government)

## SCADA Administrator

**Job Description.** This is technical work responsible for the operation, performance, and maintenance of the Supervisory Control and Data Acquisition (SCADA) telemetry system through process improvement methodologies, and successful use of contractual maintenance services that monitor and control both remote and local industrial Water Facilities.

**Education and Training.** Bachelor's Degree from an accredited college or university with a major in Management Information Systems, Computer Science, Engineering or related field. Three (3) years of experience in telemetry systems installing software, data analysis, maintaining and troubleshooting hardware. An equivalent combination of education and experience, which provides the required skills, knowledge and abilities, may be substituted for the required education and experience. This position requires that the incumbent be available on an on-call basis to ensure that all systems are efficiently operating.

**Wages (in Florida)**
Minimum (Annual) $48,360
Maximum (Annual) $74,027
*(Source: Orange County Government)

## Senior Utilities Maintenance Coordinator

**Job Description.** Coordinates maintenance activities by multiple crews, schedules work activities to maintain facilities in efficient operating condition, reviews work performed by a variety of trades, coordinates activities of vendors and subcontractors, and responds to emergency situations to correct operating problems in a timely fashion. Work performed involves highly complex technical work. Prepares budget recommendations, is responsible for meeting budget objectives and approves minor budget expenditures. Work requires a great deal of independent judgment under the general supervision of a designated supervisor.

**Education and Training.** Graduation from high school or equivalent and five years of experience to be specified by the department; or an equivalent combination of education, training or experience. Must possess and maintain a valid Florida Driver's License. May be required to possess and maintain a valid Commercial Driver's License based on area of assignment. Based on area of assignment, may be required to possess and maintain the appropriate certification or license.

**Wages (in Florida)**
Minimum (Annual) $43,202
Maximum (Annual) $67,122
*(Source: Orange County Government)

## Utilities Supervisor

**Job Description.** Supervises all activities performed by the work unit, plans and controls activities and resources to meet operational and budgetary objectives. This is highly responsible work requiring interaction with vendors, engineers and local regulatory officials as well as individual customer homeowners groups. Work requires considerable independent judgment with minimal supervision.

**Education and Training.** Graduation from an accredited college or university with an Associate's degree and five years of experience to be specified by the department; or an equivalent combination of education, training or experience. Based on area of assignment, may be required to possess and maintain the appropriate certification or license.

**Wages (in Florida)**
Minimum (Annual) $48,360
Maximum (Annual) $74,027
*(Source: Orange County Government)

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[i] Workforce Florida, Inc. Creating the Strategy for Today's Needs and Tomorrow's Talent, Workforce Florida's Five-year Strategic Plan.2009

[ii] Harris, et al. Needs Assessment for Florida's Workforce in the Water Services Industry. Patel Center. 2010.

[iii] TREEO. Needs Assessment. May 2011. Not completed.

[iv] Ritchie, Ed. "The Workforce Gap." water2go Journal of the Employ Florida Banner Center for Water Resources. Spring 2011.

[v] Manpower, Inc. 2010. http://www.manpowergroup.com/investors/releasedetail.cfm?releaseid=471751

[vi] WaterWorld. 2011. http://www.waterworld.com/index/display/article-display/244815/articles/waterworld/volume-21/issue-12/feature/funding-regulations-water-resources-top-issues-facing-municipal-water-industry.html

[vii] USDOL. Indistry Competency Model. CareerOneStop. http://www.careeronestop.org/competencymodel/

[viii] Statewide Indicators, Enterprise Florida. http://www.eflorida.com/Knowledge.aspx?id=672

[ix] Census. http://factfinder.census.gov/servlet/NPTable?_bm=y&-geo_id=04000US12&-qr_name=ACS_2009_5YR_G00_NP01&-ds_name=&-redoLog=false

[x] State Competitiveness. Florida Tax Watch. http://www.floridataxwatch.org/resources/pdf/03092011StateCompetitivenessIndicesRankings.pdf

[xi] Florida Department of Education. http://www.fldoe.org/workforce/pdf/0910QuickFacts.pdf

[xii] FRED. Florida Research and Economic Database.

[xiii] Help Wanted OnLine, Statewide Summary. AWI.
http://www.labormarketinfo.com/library/hwol/statewide.pdf

[xiv]State Competitiveness. Florida Tax Watch.
http://www.floridataxwatch.org/resources/pdf/03092011StateCompetitivenessIndicesRankings.pdf

[xv] State Competitiveness. Florida Tax Watch.
http://www.floridataxwatch.org/resources/pdf/03092011StateCompetitivenessIndicesRankings.pdf

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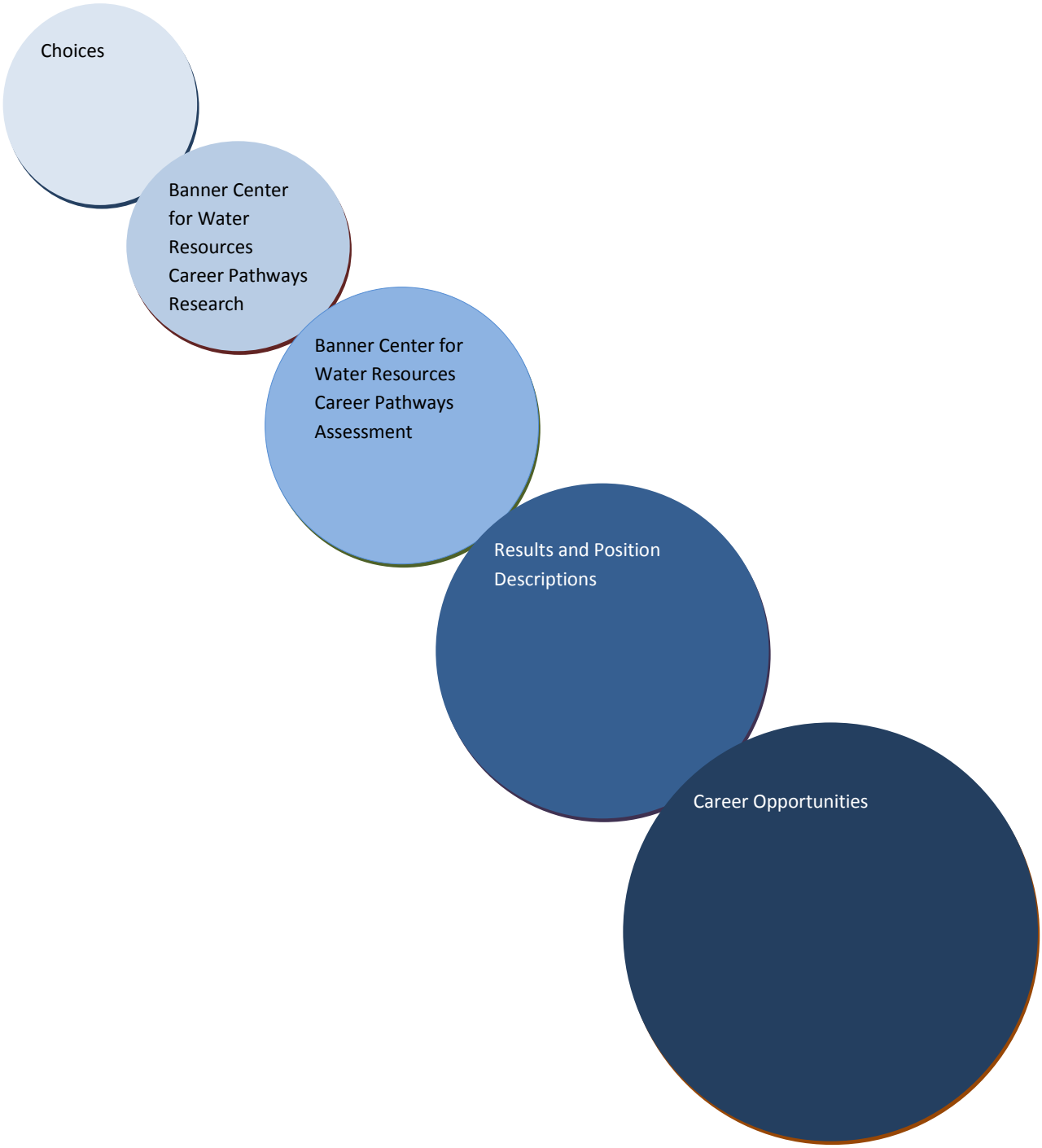
Choices
Banner Center for Water Resources Career Pathways Research
Banner Center for Water Resources Career Pathways Assessment
Results and Position Descriptions
Career Opportunities

**Florida Gateway College**
**Presidential Initiatives – 2013-2014**

1. To continue supporting FGC as a student centered campus by implementing a "service learning" philosophy throughout the College and embedded in selected classes and programs, beginning spring semester 2014.

2. To establish an honors program to challenge and support high achieving students in developing their abilities to be outstanding students and citizens through academic excellence and leadership, beginning spring semester 2014.

3. To expand the baccalaureate degree program by offering a Bachelor of Science degree in Environmental Science: Water Resources during the academic year of 2014-2015.

4. To expand the College wide learning lab into the newly established student center to offer expanded support opportunities to more students with work in progress at present time.

5. To continue to explore great opportunities to support the implementation of a fire tower and a training track for emergency vehicles in the "to protect and serve" program, the grant is submitted and we are waiting for the results.

6. To continue to collaborate with committees involved in the development of the North Florida INTERMODAL Park (inland port) project and to serve as a partner in providing necessary services and training for this project and its participants this is an important ongoing process with staff serving on a variety of committees supporting the project.

7. To continue the FGC Entertainment series to add to the quality of life for our students and communities and to draw attention to FGC as a "can do" college. We start the year with a near "sold out" series schedule that usually improves throughout the year.

8. Working with Frankel Media Group, we will begin the process of "rebranding" and marketing the College. We will have college management groups and full college employee groups involved with the process throughout the year.

# Appendix E

Library Resources

Existing Resources

To be Acquired Resources

# FGC Existing Library Resources for Water Resources Management

Material Type: Book

**Water resources atlas of Florida**

Edward A Fernald; Elizabeth Purdum; James R. Anderson Jr.; Peter A Krafft; Florida State University. Institute of Science and Public Affairs. ; Tallahassee, Fla. : Institute of Science and Public Affairs, Florida State University ; c1998

**Available:**Florida Gateway College/Lake City Reference (REF GB705.F5 W3 1998 ) **+more locations**

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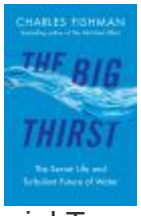


Material Type: Book

**The big thirst : the secret life and turbulent future of water**

Charles Fishman 1961- ; New York : Free Press ; 2011

**Available:**Florida Gateway College/Lake City Circulation (HD1691 .F55 2011 ) **+more locations**

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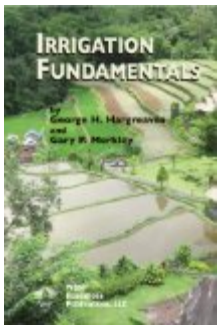


Material Type: Book

**Irrigation fundamentals : an applied technology text for teaching irrigation at the intermediate level**

George H. Hargreaves ; Gary P Merkley ; Highlands Ranch, Colo. : Water Resources Publication, LLC ; c1998

**Available:**Florida Gateway College/Lake City Circulation (S613 .H376 1998 )

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Material Type: Book

**Water**

Jacqueline Langwith ; Detroit, MI : Greenhaven Press/Gale Cengage Learning ; c2010

**Available:**Florida Gateway College/Lake City Reference (REF OP Wa ) **+more locations**

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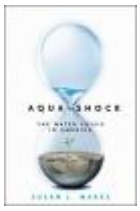


Material Type:

**Aqua shock : the water crisis in America**

Susan J. Marks ; New York : Bloomberg Press ; 2009

**Available:**Florida Gateway College/Lake City Circulation (HD1694.A5 M37 2009 ) **+more locations**

Book


**When the rivers run dry : water, the defining crisis of the twenty-first century**

Fred Pearce ; Boston : Beacon Press ; c2006

**Available:**Florida Gateway College/Lake City Circulation (TC405 .P43 2006 ) **+more locations**

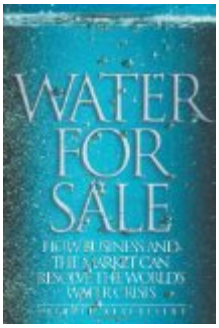
Material Type: Book


**Blue covenant : the global water crisis and the coming battle for the right to water**

Maude Barlow ; New York : New New Press : Distributed by Perseus Distribution ; 2009, c2007

**Available:**Florida Gateway College/Lake City Circulation (HD1691 .B366 2009 ) **+more locations**

Material Type: Book




**Water for sale : how business and the market can resolve the world's water crisis**

Fredrik Segerfeldt ; Washington, D.C. : Cato Institute ; Lanham, MD : Distributed to the trade by National Book Network ; c2005

**Available:**Florida Gateway College/Lake City Circulation (HD1702 .S4413 2005 ) **+more locations**

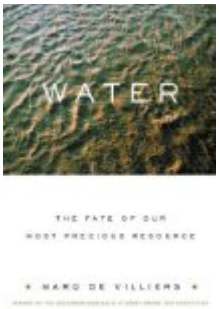
Material Type: Book

**The big water fight; : trials and triumphs in citizen action on problems of supply, pollution, floods, and planning across the U.S.A.**

League of Women Voters (U.S.). Education Fund. ; Brattleboro, Vt., : S. Greene Press ; 1966

**Available:**Florida Gateway College/Lake City Circulation (HD1694.A5 L4 ) **+more locations**

Material Type: Book




Material Type: Book

**Water : the fate of our most precious resource**

Marq De Villiers ; Boston, MA : Houghton Mifflin ; 2001, c2000

**Available:**Florida Gateway College/Lake City Circulation (TD345 .D473 2001 ) **+more locations**

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Material Type: Book

**Evaluation of the quantity and quality of the water resources of Volusia County, Florida,**

Darwin D. Knochenmus ; Michael E Beard; Geological Survey (U.S.); Florida. Bureau of Geology; Volusia County, Fla. Board of County Commissioners. ; Tallahassee, Bureau of Geology ; 1971

**Available:**Florida Gateway College/Lake City Circulation (QE99 .A32 no. 57 )

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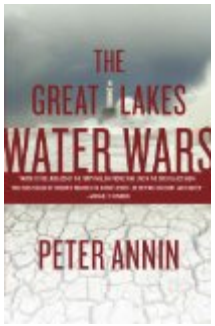


Material Type: Book

**The Great Lakes water wars**

Peter Annin ; Washington : Island Press ; 2009

**Available:**Florida Gateway College/Lake City Circulation (HD1695.G69 A56 2009 )

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Material Type: Book

**Water supply and sewerage.**

E. W. Steel (Ernest William), 1893- ; New York, McGraw-Hill ; 1960

**Available:**Florida Gateway College/Lake City Circulation (TD145 .S8 1960 ) **+more locations**

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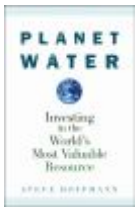
Material Type:

**Blue revolution : unmaking America's water crisis**

Cynthia Barnett 1966- ; Boston, Mass. : Beacon Press ; c2011

**Available:**Florida Gateway College/Lake City Circulation (TD223 .B37 2011 ) **+more locations**

Book

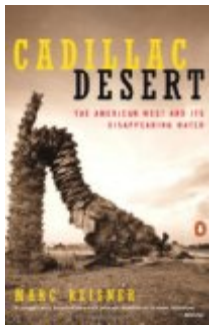



Material Type: Book

**Planet water : investing in the world's most valuable resource**

Stephen J. Hoffmann 1955- ; Hoboken, N.J. : Wiley ; c2009

**Available:**Florida Gateway College/Lake City Circulation (HD1691 .H64 2009 ) **+more locations**




Material Type: Book

**Cadillac desert : the American West and its disappearing water**

Marc Reisner ; New York, N.Y., U.S.A. : Penguin Books ; 1993

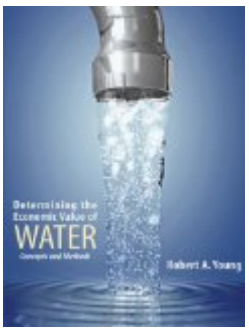
**Available:**Florida Gateway College/Lake City Circulation (HD1739.A17 R45 1993 ) **+more locations**

Material Type: Book

**Appraisal of the water resources of eastern Palm Beach County, Florida**

Larry F. Land ; Harry G Rodis (Harry George), 1927-; James J Schneider; Geological Survey (U.S.) ; Tallahassee : State of Florida, Dept. of Natural Resources, Division of Interior Resources, Bureau of Geology ; 1973

**Available:**Florida Gateway College/Lake City Circulation (QE99 .A32 no. 67 )




Material Type: Book

**Determining the economic value of water : concepts and methods**

Robert A. Young (Robert Alton), 1931- ; Washington, DC : Resources for the Future ; c2005

**Available:**Florida Gateway College/Lake City Circulation (HD1691 .Y675 2005 ) **+more locations**

Material Type:

**Vegetation and watershed management; an appraisal of vegetation management in relation to water supply, flood control, and soil erosion.**

Edward A. Colman 1910- ; Conservation Foundation. ; New York, Ronald

Book

Press Co. ; 1953

**Available:**Florida Gateway College/Lake City Circulation (TD353 .C6 )

Material Type: Book

## Out of the earth : civilization and the life of the soil

Daniel Hillel ; New York : Free Press ; Toronto : Collier Macmillan Canada ; New York : Maxwell Macmillan International ; c1991

**Available:**Florida Gateway College/Lake City Circulation (S591 .H62 1991 ) **+more locations**


Material Type: Book

## Dry spring : the coming water crisis of North America

Chris Wood 1953- ; Vancouver : Raincoast Books ; Berkeley, Calif. : Distributed in the U.S. Publishers Group West ; c2008

**Available:**Florida Gateway College/Lake City Circulation (TD222 .W65 2008 ) **+more locations**

Material Type: Book

## Environmental geology and hydrology, Tallahassee area, Florida.

Florida. Bureau of Geology ; Tallahassee ; 1972

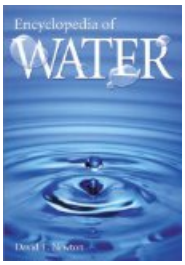
**Available:**Florida Gateway College/Lake City Reference (REF G1318.T2 F5 1972 ) **+more locations**

Material Type: Book

## Springs of Florida

Geological Survey (U.S.). ; Jack C Rosenau; George E. Ferguson 1906-; Florida. Bureau of Geology; Florida. Bureau of Water Resources Management. ; Tallahassee : Bureau of Geology, Division of Resource Management, Florida Dept. of Natural Resources ; 1977 [i.e. 1978

**Available:**Florida Gateway College/Lake City Circulation (GB1198.3.F6 U54 1977 ) **+more locations**




Material Type: Book

### Encyclopedia of water

David E. Newton ; Westport, Conn. : Greenwood Press ; 2003

**Available:**Florida Gateway College/Lake City Reference (REF GB655 .N48 2003 ) **+more locations**

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Material Type: Book

### Water basics for decision makers : local officials' guide to water and wastewater systems

Frederick Bloetscher ; Denver, CO : American Water Works Association : Published in conjunction with the Florida Section of the American Water Works Association ; c2009

**Available:**Florida Gateway College/Lake City Circulation (TD481 .B58 2009 ) **+more locations**

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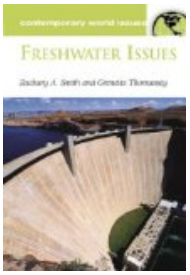


Material Type: Book

### Freshwater issues : a reference handbook

Zachary A. Smith (Zachary Alden), 1953- ; Grenetta Thomassey ; Santa Barbara, Calif. : ABC-CLIO ; c2002

**Available:**Florida Gateway College/Lake City Circulation (TD345 .S65 2002 ) **+more locations**

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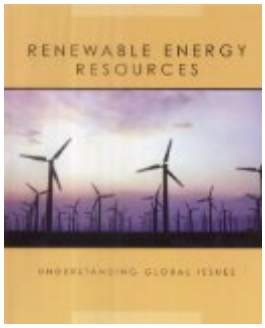


Material Type: Book

### Renewable energy resources

Trevor Smith ; Mankato, MN : Weigl Publishers ; c2004

**Available:**Florida Gateway College/Lake City Circulation (TJ808.2 .S65 2004 )

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Material Type: Book

### Florida coastal environmental resources : a guide to economic valuation and impact analysis

David Letson ed.; J Milon ed.; Florida Sea Grant College. ; Gainesville, Fla. : Florida Sea Grant College Program, University of Florida ; c2002

**Available:**Florida Gateway College/Lake City Circulation (HC79.E5 F57 2002 ) **+more locations**

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**FGC Library Resources to be Acquired– BAS Water Resources Management**

**Journal Access**

1. Access subscription to the USGS ( United States Geological Survey y) Libraries Program
2. Transactions of the ASABE (American Society of Agriculture and Biological Engineers)
3. ASABE Technical Library access
4. Water and Wastes Digest
5. Access subscription to six ASCE (American Society of Civil Engineers) Journals: Environment and Water Resources
    - Environmental Engineering
    - Hazardous, Toxic, and Radioactive Waste
    - Hydraulic Engineering
    - Hydrologic Engineering
    - Irrigation and Drainage Engineering
    - Water Resources Planning and Management
6. Access subscription to Journal-American Water Works Association
7. Florida Water Resources Journal- monthly subscription
8. Florida Watershed Journal

**Books with media**

Water Resources Systems Analysis through Case Studies
Edited by David W. Watkins, Jr., Ph.D.
2013 / Soft Cover / Digital

Agricultural Salinity Assessment and Management
Edited by Wesley W. Wallender, Ph.D., P.E.; Kenneth K. Tanji, Sc.D.
2012 / Hard Cover / Digital

Estuarine and Coastal Modeling (2011)
Edited by Malcolm L. Spaulding, Ph.D. P.E.
2012 / Soft Cover

Guideline for Development of Effective Water Sharing Agreements
Water Regulatory Standards Committee of the Standards Development Council of the Environmental and Water Resources Institute
2012 / Soft Cover / Digital

Membrane Technology and Environmental Applications
Edited by Tian C. Zhang; Rao Y. Surampalli; Saravanamuthu Vigneswaran; R. D. Tyagi; Say Leong Ong; C. M. Kao 2012 / Soft Cover / Digital

Sea Level Rise and Coastal Infrastructure
Edited by Bilal M. Ayyub, Ph.D., P.E., and Michael S. Kearney, Ph.D.
2012 / Soft Cover / Digital

Water Treatment Plant Design
Stephen J. Randtke, Ph.D., P.E.; Michael B. Horsley, P.E.
2012 / Hard Cover

Groundwater Quantity and Quality Management
Edited by Mustafa M. Aral and Stewart W. Taylor
2011 / Soft Cover / Digital

Guidelines for the Physical Security of Water Utilities (56-10) and of Wastewater/Stormwater Utilities (57-10)
2011 / Soft Cover / Digital

Design of Municipal Wastewater Treatment Plants, Fifth Edition
2010 / Hard Cover

TMDLs in the Urban Environment
Edited by Stuart M. Stein, P.E.
2010 / Soft Cover / Digital

Sustainable Sludge Management
Edited by R. D. Tyagi; Rao Y. Surampalli; Song Yan; Tian C. Zhang; C. M. Kao; B. N. Lohani
2009 / Soft Cover / Digital

The Role of Technology in Water Resources Planning and Management
Edited by Elizabeth M. Perez, P.E.; Warren Viessman Jr., P.E.
2009 / Soft Cover / Digital

Remediation Technologies for Soils and Groundwater
Edited by Alok Bhandari; Rao Y. Surampalli; Pascale Champagne; Say Kee Ong; R. D. Tyagi; Irene M. C. Lo
2007 / Soft Cover / Digital

Operating Reservoirs in Changing Conditions
Edited by Darell Zimbelman, P.E.; Werner C. Loehlein, P.E.
2006

Crossing the Next Meridian: Land, Water, and the Future of the West (Paperback)
by Charles F. Wilkinson

# FLORIDA COLLEGE SYSTEM
# ENROLLMENT, PERFORMANCE AND BUDGET PLAN
## (NEW BACCALAUREATE PROPOSALS ONLY)

**COLLEGE NAME:** *FLORIDA GATEWAY COLLEGE* **CONTACT NAME: Dr. Brian Dopson**

**DEGREE NAME:** B.A.S. Water Resources Management **PHONE NUMBER: 386-754-4209**

| | PROJECTED | PROJECTED | PROJECTED | PROJECTED |
|---|---|---|---|---|
| **I. PLANNED STUDENT ENROLLMENT** | **2013-14** | **2014-15** | **2015-16** | **2016-17** |
| A. Student Headcount | 0 | 15 | 30 | 45 |
| | | | | |
| B. Upper Division Student Credit Hours Generated **(Resident)** | 0 | 90 | 480 | 720 |
| Upper Division Student Credit Hours Generated **(Nonresident)** | 0 | 0 | 0 | 0 |
| Upper Division Total Student Credit Hours Generated **(Resident and Nonresident)** | **0** | **90** | **480** | **720** |
| | | | | |
| C. Upper Division Student FTE (30 Credit Hours) - **(Resident)** | 0.0 | 3.0 | 16.0 | 24.0 |
| Upper Division Student FTE (30 Credit Hours) - **(Nonresident)** | 0.0 | 0.0 | 0.0 | 0.0 |
| Upper Division Student FTE (30 Credit Hours) - **(Resident and Nonresident)** | **0.0** | **3.0** | **16.0** | **24.0** |
| | | | | |
| **II. PLANNED PERFORMANCE** | **2013-14** | **2014-15** | **2015-16** | **2016-17** |
| A. Number of Degrees Awarded | 0 | 0 | 0 | 7 |
| B. Number of Placements | 0 | 0 | 0 | 7 |
| C. Projected Annual Starting Salary | $0 | $0 | $0 | $37,500 |
| | | | | |
| **III. PROJECTED PROGRAM EXPENDITURES** | **2013-14** | **2014-15** | **2015-16** | **2016-17** |
| **INSTRUCTIONAL** | | | | |
| 1. Faculty Full-Time FTE | 0.0 | 0.5 | 1.0 | 1.0 |
| 2. Faculty Part-Time FTE | 0.0 | 0.2 | 0.5 | 0.5 |
| | | | | |
| 1. Faculty Full-Time Salaries/Benefits | 0 | 45,000 | 92,500 | 95,000 |
| 2. Faculty Part-Time Salaries/Benefits | 0 | 4,200 | 8,400 | 8,400 |
| 3. Faculty Support: Lab Assistants, etc | 0 | 0 | 0 | 0 |
| | | | | |
| **OPERATING EXPENSES** | | | | |
| 1. Academic Administration | 35,000 | 40,000 | 41,200 | 42,500 |
| 2. Materials/Supplies | 1,000 | 1,000 | 1,000 | 1,000 |
| 3. Travel | 2,500 | 3,000 | 3,000 | 3,000 |
| 4. Communication/Technology | 0 | 0 | 0 | 0 |
| 5. Library Support | 0 | 0 | 0 | 0 |
| 6. Student Services Support | 0 | 0 | 0 | 0 |
| 7. Professional Services | 10,000 | 5,000 | 0 | 0 |
| 8. Accreditation | 300 | 0 | 0 | 0 |
| 9. Support Services | 17,500 | 18,000 | 18,500 | 19,000 |
| | | | | |
| **CAPITAL OUTLAY** | | | | |
| 1. Library Resources | 10,000 | 3,000 | 1,500 | 1,500 |
| 2. Information Technology Equipment | 1,500 | 3,000 | 1,500 | 1,500 |
| 3. Other Equipment | 0 | 0 | 0 | 0 |
| 4. Facilities/Renovation | 0 | 0 | 0 | 0 |
| **TOTAL PROJECTED PROGRAM EXPENDITURES** | **$77,800** | **$122,200** | **$167,600** | **$171,900** |
| | | | | |
| **IV. NATURE OF EXPENDITURES** | | | | |
| 1. Recurring | 55,000 | 110,200 | 163,600 | 167,900 |
| 2. Nonrecurring | 22,800 | 12,000 | 4,000 | 4,000 |
| **TOTAL** | **$77,800** | **$122,200** | **$167,600** | **$171,900** |
| | | | | |
| **V. SOURCES OF FUNDS** | | | | |
| **A. REVENUE** | | | | |
| 1. Special State Nonrecurring | 0 | 0 | 0 | 0 |
| 2. Upper Level - Resident Student Tuition Only | 0 | 8,261 | 46,679 | 66,088 |
| Upper Level - Nonresident Student Fees Only | 0 | 0 | 0 | 0 |
| Upper Level - Other Student Fees | 0 | 2,569 | 13,699 | 20,549 |
| 3. Contributions or Matching Grants | 0 | 0 | 0 | 0 |
| 4. Other Grants or Revenues | 77,500 | 25,000 | 0 | 0 |
| 5. Florida College System Program Funds (formerly Community College Program Fund) | 0 | 18,000 | 96,000 | 144,000 |
| 6. Unrestricted Fund Balance | 300 | 68,370 | 11,000 | 0 |
| 7. Interest Earnings | 0 | 0 | 0 | 0 |
| 8. Auxiliary Services | 0 | 0 | 0 | 0 |
| 9. Federal Funds - Other | 0 | 0 | 0 | 0 |
| | | | | |
| **B. CARRY FORWARD** | 0 | 0 | 0 | -222 |
| **TOTAL FUNDS AVAILABLE** | **$77,800** | **$122,200** | **$167,378** | **$230,415** |
| **TOTAL UNEXPENDED FUNDS (CARRY FORWARD)** | **$0** | **$0** | **-$222** | **$58,515** |

**NOTE: THIS FORM IS EFFECTIVE UNTIL JUNE 30, 2014 (FOR FISCAL YEAR JULY 1, 2013 TO JUNE 30, 2014)**

**DO NOT DELETE** **#DIV/0!** **91.79** **97.25** **91.79**

**2013-14 TUITION RATE ESTABLISHED IN THE GENERAL APPROPRIATION ACT**

UF 11098

USF
UNIVERSITY OF
SOUTH FLORIDA

April 2, 2013



Mr. Frank T. Brogan, Chancellor
State University System of Florida
325 West Gaines Street
Suite 1614
Tallahassee, Florida 32399

Dear Chancellor Brogan,

The University of South Florida has no concerns regarding the proposal from Florida Gateway College to offer a Bachelor of Applied Science in Water Resources Management. At this time we do not see any conflict with USF programs and do not plan to offer an alternative proposal for this program.

Sincerely,

Ralph C. Wilcox, Ph.D.
Provost and Executive Vice President

cc: Steve RiCharde, Associate Vice President for Institutional Effectiveness and Assessment
John Wiencek, Dean, College of Engineering

Office of the Provost and Executive Vice President for Academic Affairs
University of South Florida · 4202 East Fowler Avenue, CGS 401· Tampa, Florida 33620-6100
(813) 974-2154 · FAX (813) 974-5093 · http://www.acad.usf.edu

# FLORIDA DEPARTMENT OF EDUCATION



March 26, 2013

**MEMORANDUM**

**TO:** Mr. Frank T. Brogan, Chancellor
State University System

Dr. Ed Moore, President
Independent Colleges and Universities of Florida

Mr. Samuel Ferguson, Executive Director
Commission for Independent Education

**FROM:** Ms. Abbey Cunningham, Coordinator of Baccalaureates and Common Prerequisites

**SUBJECT:** Letter of Intent from Florida Gateway College

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The purpose of this correspondence is to inform you the Division of Florida College received a Letter of Intent (LOI) from Florida Gateway College on March 20, 2013.

The LOI is attached. The degree proposal being developed by Florida Gateway College is:

- Bachelor of Applied Science in Water Resources Management

Section 1007.33, Florida Statutes, requires the Division of Florida Colleges to forward the notice of intent to the Chancellor of the State University System, the President of the Independent Colleges and Universities of Florida, and the Executive Director of the Commission for Independent Education. Please disseminate the information herein to the institutions within your respective systems as appropriate.

FLORIDA GATEWAY COLLEGE

*From the Office of the President*

March 12, 2013

Randall W. Hanna, Chancellor
Division of Florida Colleges
325 West Gaines Street, Room 1544
Tallahassee, Florida 32399-0400

Dear Chancellor Hanna:

In order to address the critical need for professionally trained managers in an industry vital to the economy, public health and quality of life of our entire state, Florida Gateway College (FGC) proposes to expand its current online water resource training programs to include a Bachelor of Applied Science (BAS) Degree in Water Resources Management. Authorized by the Board of Trustees on February 12, 2013, we submit this Letter of Intent as the first step in the Baccalaureate Proposal Approval Process. Below you will find the program description, career paths or employment opportunities for graduates, workforce demand data, key learning objectives, regional higher education planning, and institutional capacity and funding for this program. The estimated timeframe for implementation/upper division enrollment is Fall term, 2014.

*Program Description:*

The goal of this proposed program is to prepare mid- to upper-level managers for Florida's water resources industry, a high demand industry critical to the state's economy, public health, and quality of life. Currently the College offers Continuing Workforce Education (CWE), College Credit Certificate (CCC), and Associate of Science (AS) Degree in Environmental Science Technology programs which primarily target the water/wastewater operations sector of the water industry. The proposed BAS program will not only focus on water/wastewater operations, but will also include additional specialty tracks based on industry demand such as Agri-Science Water Operations, Water Quality Lab Operations, and Water Management Operations. The existing CWE, CCC and AS degree programs currently offered by the college will provide a pipeline of students for the new BAS program. The program will also provide opportunities for experienced workers in the industry to advance to higher levels of technical operations and/or management. Course work shall include a combination of advanced technical training as well as management courses suitable for both public and private sector positions. .



149 SE College Place
Lake City, FL 32025-2007

www.fgc.edu
(386) 752-1822

*Key Learning Objectives of Program:*

Graduates will demonstrate foundational understanding of:

1. Water/wastewater operational systems including treatment, collection, and distribution in the private and public sector
2. Automated process control systems in water/wastewater operations
3. Advanced and emerging technologies in water/wastewater operations
4. Federal, state, regional, and local water management laws and regulations
5. Management of employees, system assets, and budgets
6. Governmental budgets, taxation, rate-setting and other sources of funding for infrastructure and operations
7. Water resource management in public and private water/wastewater systems

*Regional Higher Educational Planning:*

On January 8, 2013, Mr. Tim Atkinson, Director of FGC Water Resources Training Programs, and Mr. David Still, consultant to FGC, met with the UF Dean of the College of Agricultural and Life Sciences (CALS), Associate Dean of the Institute of Food and Agricultural Sciences (IFAS), Chair of Agricultural and Biological Engineering, and Head of the Department of Environmental Engineering. On January 16, Mr. Atkinson and Mr. Still met with St. Leo University's Assistant Vice President of Continuing Education and the Director of the Lake City Education Center. Mr. Atkinson and Mr. Still presented the College vision for a Bachelor of Applied Science in Water Resource Management and the aim of the College not only to avoid duplication of effort but to foster collaboration and support where possible. Extensive discussions ensued covering workforce demand, curriculum, and potential areas of collaboration and sharing of resources. There were no areas of duplication noted by either University. The representatives of St. Leo and the UF Dean of CALS, Associate Dean of IFAS, and Chair of Agricultural and Biological Engineering encouraged further exploration of areas of collaboration and resource sharing.

*Institutional Capacity and Funding:*

Start-up costs will be funded through unrestricted fund balance identified for this purpose. Operational costs for the first two years will be supported by unrestricted fund balance in addition to student tuition and fees. The College projects that the program will be self-supporting through the use of student tuition and fees by the end of the third year of operation (2016-2017). Because the proposed program is totally online, the college expects to generate sufficient operational revenue via tuition and fees from students all over the state supplemented by tuition from non-resident students. In addition, the College is in the process of negotiating with a commercial water quality lab to locate on campus in a revenue-sharing venture to support water resources training. Department of Labor and other grant sources are also being pursued.

301 South Bronough Street • Suite 300 • P.O. Box 1757 • Tallahassee, FL 32302-1757 • (850) 222-9684 • Fax (850) 222-3806 • www.floridaleagueofcities.com

January 24, 2013

Dr. Charles Hall, President
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

The Florida League of Cities (FLC), Florida's unified voice for municipal government supports Florida Gateway College efforts in creating a Bachelor's Degree in Water Resources. The objective of the degree is to prepare entry-level and experienced workers in advanced water/wastewater operations technology supplemented by course work in management and administration.

The FLC represents over 400 cities, towns, and villages in the state of Florida. We are acutely aware of the critical lack of qualified workers to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic security of our state and its municipalities. Further, our member cities face increasing need for well-trained personnel in mid- to upper-level management positions, not only in water utility operations, but in all areas of municipal management.

Many of our member municipalities operating water and wastewater systems will benefit from your program by providing a trained, skilled workforce to provide needed services to our local communities. This type of training will prepare graduates for a variety of successful career paths in water resources and management. The training will provide them with the skills and knowledge to be prepared as new technology evolves and to deal with increasingly complex water quality regulations and management issues confronting Florida's cities regardless of size.

In conclusion, The Florida League of Cities, fully supports your efforts to develop a robust water resources/management program preparing leaders in advanced water and wastewater technology with a thorough knowledge of issues facing our local governments with water, wastewater and water resource issues.

Florida Gateway College
JAN 29 2013
President's Office

Sincerely,

Michael Sittig
Executive Director

UF UNIVERSITY of FLORIDA

IFAS
*College of Agricultural and Life Sciences*

**Office of the Dean**

2002 McCarty Hall
PO Box 110270
Gainesville, FL 32611-0270
352-392-1963
352-392-8988 Fax
www.cals.ufl.edu

January 31, 2013

Dr. Charles Hall
Florida Gateway College
149 SE College Place
Lake City, FL 32025

Dear Dr. Hall:

As you are aware, I received a presentation from Mr. Tim Atkinson and Mr. David Still regarding Florida Gateway College's intent to develop a Bachelor's Degree of Applied Science in Water Resources Management. The objective of the degree is to prepare incumbent and entry level workers for mid- to upper-level technical and managerial positions in Florida's water resources industry.

The University of Florida is aware of the critical lack of qualified workers to provide the drinking water, wastewater, and water distribution operations essential to public health, quality of life, and economic security of our state and its municipalities. Further, we know that with a retirement rate of about 50% expected within the next decade this problem is not only acute, but also chronic, and will only get worse.

Many of the state's municipalities operating water and wastewater systems will benefit from your program by providing a trained, skilled workforce to provide needed services to local communities and other service providers. This type of training will prepare graduates for many potential successful career paths in water resources. The training will provide them with the ability and foresight to be prepared as new technology improves and potentially lowers the cost of many of the current expensive processes.

It is my hope that our institutions can work together in this endeavor. We believe there may be some courses taught by faculty at Florida Gateway College that could be taken by students at the University of Florida. We also believe that there may be courses taught at the University of Florida that could be taken by student at Florida Gateway College. In addition, many of your graduates could pursue admission to UF for advanced degrees in similar water resources areas.

In conclusion, we fully support your efforts to develop a robust water resources program training individuals who can enter the workforce with a thorough knowledge of issues in the area of water, wastewater and water resource.

Sincerely,

Teri C. Balser
Dean