Golf Course Survey on Water Conservation 2019

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Introduction

Golf is not only an enjoyable pastime for Florida's residents and visitors, but it also provides substantial positive impacts to Florida's economy. Due to Florida's limited water resources and growing population, collaboration between water managers and water users is required to ensure water remains available to meet all users' needs and the needs of the natural environment well into the future. With approximately 1,120 golf courses occupying 210,300 acres in the state (FGDL 2020), it is important for water managers to understand current and future water needs of the golf course sector. Equally important is water managers should: understand the water use efficiency practices employed on golf courses; promote water use efficiency best management practices; and incentivize, when possible, the implementation of the most efficient irrigation technology.

Toward this end, the St. Johns River and South Florida water management districts partnered with the Florida Golf Course Superintendents Association (FGCSA) in 2019 to conduct a survey (Appendix A) of their members to determine water conservation and irrigation practices. Staff from Southwest Florida Water Management District provided input on survey design, results interpretation and presentation.

The survey sought to:

1) Determine current water conservation and irrigation practices on Florida's golf courses, and
2) Develop a baseline to measure water conservation program success.

Based upon the results, the completed research can be used to:

1) Design messages and educational programs that are likely to result in more efficient water use.
2) Design incentive programs to encourage increased use of technology that results in more efficient water use.
3) Assist in educating the public about the ongoing efficient use of water by the golf course industry.

Methodology

District staff worked with FGCSA representatives to develop a 24-question survey. Working with the FGSCA was thought to be the most efficient means to reach the greatest number of potential respondents regarding golf course practices across Florida. However, it is recognized that FGCSA membership does not include superintendents from every golf course in the state. The survey was deployed utilizing web-based software (SurveyMonkey®). During June 2019, FGCSA emailed a weblink to the survey to 754 FGCSA members in Florida. Eighty-six members (11%) responded to the survey. SurveyMonkey® compiled the results and created graphs for each question. The overall margin of error for the sample is +/-10% at the 95% confidence level. Because the golf course name was not requested, the 86 responses may not represent 86 distinct golf courses.

General Findings

This section provides brief, summarized points of information obtained through the survey feedback. Individual questions and responses to each are presented later in this document. The statistics and information presented below is based on the survey results only and may not be indicative of the practices of all 1,120 golf courses statewide.

Irrigation Water Sources

- A very low percentage (1%) of respondent's courses are using potable water as their sole source of water supply.
- Reclaimed water is the most used water source for the respondent's golf courses (38%).

Rainfall Shutoff Devices

- Most survey respondent's golf courses have rainfall shutoff devices incorporated into their irrigation systems (78%).
- Just over half the respondents (54%) check that the devices are working properly on a monthly basis.
- Only 15% replace them within the recommended period of one to three years (Meeks et al. 2012).

Advanced/Smart Irrigation Controllers

- Just over half (55%) of respondent's golf courses use advanced or "Smart" irrigation controllers.
- A large majority (79%) of controllers currently in use are weather (evapotranspiration)-based (versus soil moisture sensor based).
- Of those respondents who use Smart controllers, 86% reported being satisfied with their performance.
- Almost half (46%) of respondents hope to replace their current controller(s) within the next five years.

Irrigation System Efficiency Maintenance

- Respondents at almost all golf courses (93%) inspect their systems for leaks and/or broken sprinkler heads daily.
- Just over one-third (35%) of respondents have had a water audit of their irrigation systems conducted within the last five years.
- Close to two-thirds (60%) of the full-system audits conducted over the past five years prompted modifications which resulted in water savings.

Real-Time Pump Monitoring Technology

- Just over half of respondents' golf courses (51%) use real-time pump monitoring technology.
- Nearly three-quarters (74%) of those courses that have real-time monitoring technology, have that technology integrated with a central irrigation control system.

Landscape and Irrigation Technology Upgrades

- Many respondents have completed projects aimed at reducing irrigation demands on their courses, but opportunities to implement additional projects remain on roughly half of all courses.
- Projects to reduce irrigation demands have included efforts to reduce overseeding (53%), implement Florida-Friendly Landscaping (FFL 2017) (50%), reduce irrigated acreage (49%), make soil improvements (49%), and use drought-tolerant turf species (43%).

- 59% of respondents indicated they have plans to implement water efficiency upgrade projects on their courses within the coming year. These projects include: the installation of drought-tolerant turf species (33%); soil improvements (28%); installation of real-time pumping technology (21%); installation of advanced/Smart irrigation controllers (20%); retrofitting of landscape irrigation zones with micro-irrigation; and other water use efficiency projects (7%). Some respondents would likely implement more than one project type on a single course.

Hot-Spot (Problem Area) Management

- Almost all respondents (90%) have a program or protocol in place to deal with areas on their courses which, for a variety of reasons, are hard to manage, thus precluding them from applying irrigation or other management methods to the entire zone.

Funding Assistance to Implement Water Use Efficiency/Conservation Measures

- There is strong interest on the part of respondents (84%) to capitalize on funding assistance, if it was made available, to implement water use efficiency improvement projects on their courses. Potential projects of interest include: advanced pumping technology (55%); advanced/smart irrigation controller systems (46%); retrofitting of landscape irrigation zones with micro-irrigation (33%); and other water use efficiency projects (7%). Some respondents would likely implement more than one project type on a single course.

Education of Course Staff, Players, and the General Public Related to Water Conservation and Water Use Efficiency

- Most respondents' golf courses (79%) have at least one staff member certified by the Florida Chapter of the Golf Course Superintendents Association of America (FCGCSAA) in their Golf Course Best Management Practice (GCSAA 2017).
- 13% of respondent's courses represented in the survey have four or more FGCBMP certified staff; 21% of courses have no certified staff.
- Almost two-thirds (63%) of respondents said they promote water conservation to employees and guests.

Audubon Cooperative Sanctuary Certification by Golf Courses in Florida

- Enrollment in the Audubon Cooperative Sanctuary Program (Audubon 2019) by respondents is low (37%). According to Audubon International's website, 102 Florida golf courses are enrolled, which represents less than 10% of all Florida courses.

Open-Ended Questions

The survey included two open-ended questions: "How can water management districts help your golf course educate the public about your water-efficiency efforts?"; and "Are there any additional comments or feedback you would like to share?" Full responses to these questions are shown in Appendix C.

In response to the first question, respondents suggested a variety of approaches the water management districts could employ to help educate the public about the water use efficiency measures they have implemented on their courses. These include providing information on television, newsletters, seminars, brochures, and online. Additionally, specific themes for message content were suggested.

In response to the second question, respondents indicated a strong desire to share their efforts to be efficient water managers and environmental stewards, especially as compared to residential irrigators. In addition, two respondents mentioned that many of the strategies to increase efficiency were not affordable on their operating budgets. Five respondents commented that the golf course industry does a lot to be as efficient as possible and are better water managers than the residential water sector, especially Homeowner Associations.

Recommendations

Based on survey feedback, these areas should be considered for future golf course water use efficiency improvement initiatives:

Rainfall Shutoff Device Use

- Promote and incentivize a movement away from systems fully reliant on rain sensors to more advanced methods like weather-based and soil moisture-based controllers.
- Encourage scheduled testing of systems using rainfall shutoff devices on a monthly basis and their replacement every 12–18 months, in accordance with research on the sustained efficacy of these devices (Meeks et al. 2012).
- Encourage protocols that include testing the sensitivity of the cork inserts, in addition to the wiring connections.

Irrigation System Efficiency Maintenance

- Promote the implementation of full-system irrigation audits on a three- to five-year frequency as recommended by the Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses (FDEP and FGCSA 2012) and the Golf Course Superintendents Association of America and US Golf Association (GCSAA and USGA 2007).

Advanced/Smart Irrigation Controllers

- Promote and incentivize the use of advanced controllers.
- Share information about water management district cost-share funding for advanced controllers.

Real-time Pump Monitoring Technology

- Promote and incentivize the use of real-time pump monitoring technology.

Landscape and Irrigation Technology Upgrades

- Promote and incentivize the following best management practices related to landscape and irrigation water use efficiency:
    - Reduce or eliminate overseeding;
    - Implement Florida-Friendly Landscaping principles;
    - Reduce irrigated acreage;
    - Add or improve soil amendments; and
    - Incorporate the use of drought-tolerant turf species.

Funding Assistance to Implement Conservation Projects

- Improve outreach to inform course managers of funding opportunities to implement water conservation and/or water use efficiency measures as they arise.

Education of Course Staff, Players, and the General Public Related about Water Conservation

- Promote FGCSA Best Management Practices Certification Program (GCSA 2017) certification to course superintendents.
- Investigate funding opportunities to offset training costs for staff.
- Encourage courses to educate golfers on the need for water conservation.
- Encourage course manages and the FGCSA to inform the public of the measures most courses implement to conserve water.
- Consider collaborative partnerships between water management districts and the FGCSA to increase the public's awareness of the water use efficiency and other sustainability measures many golf courses are making.

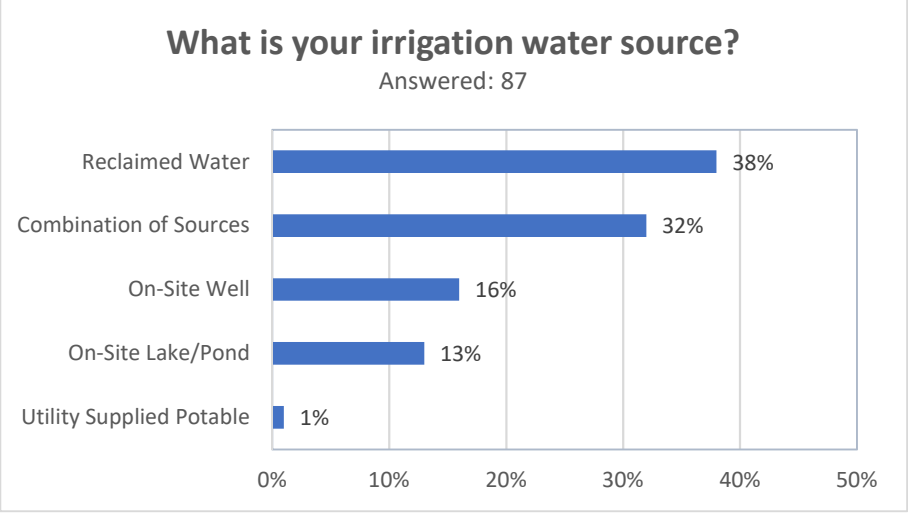
Audubon Cooperative Sanctuary Certification by Golf Courses in Florida

- Consider collaborative promotional activities with Audubon International to increase participation and certification of Florida's golf courses.

Finally, collaboration between water management districts, the Florida Department of Environmental Protection, and FGCSA should be investigated. Such a collaborative effort could bolster water managers' efforts to see greater adoption of water use efficiency and conservation measures on Florida's golf courses.

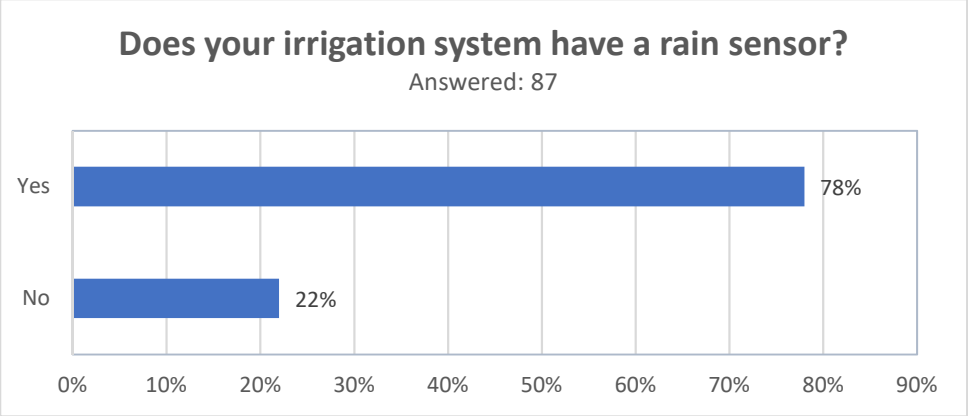
Survey Questions and Responses

Irrigation Water Sources

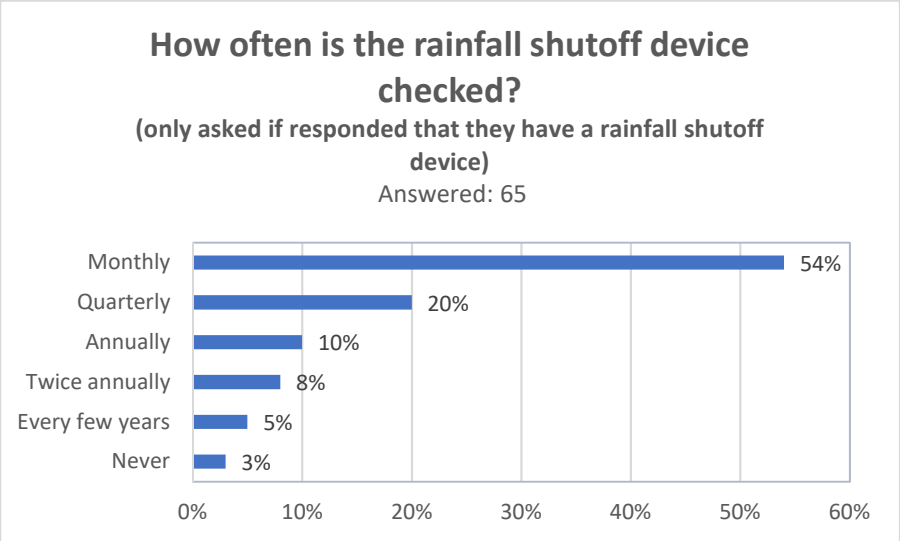


Only 1% of respondents indicated that their course uses utility supplied potable water.

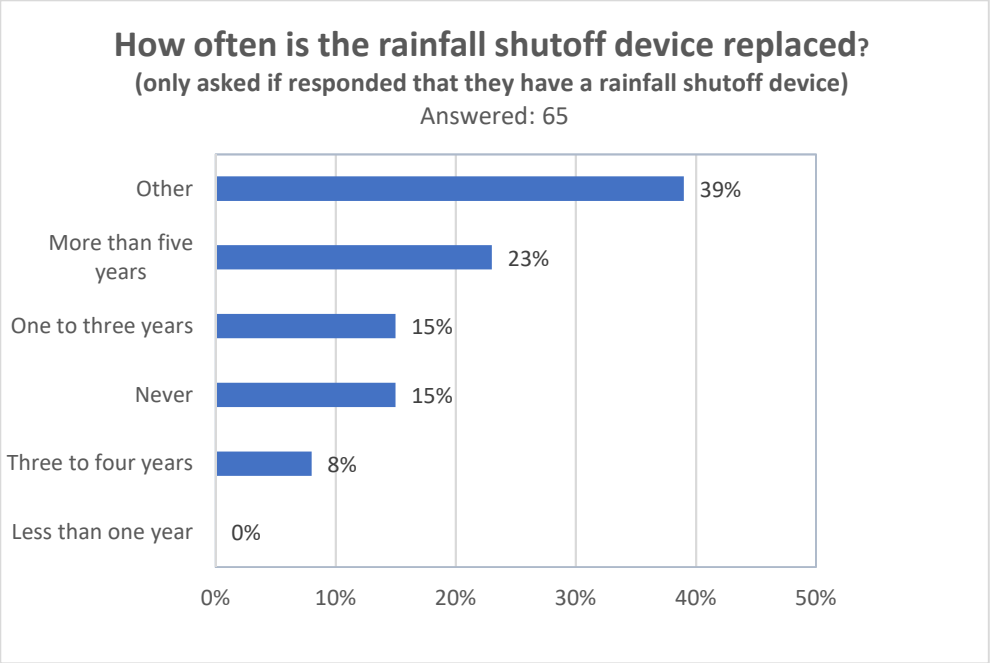
Rainfall Shutoff Device



More than three-quarters (78%) of golf courses use rainfall shutoff devices.

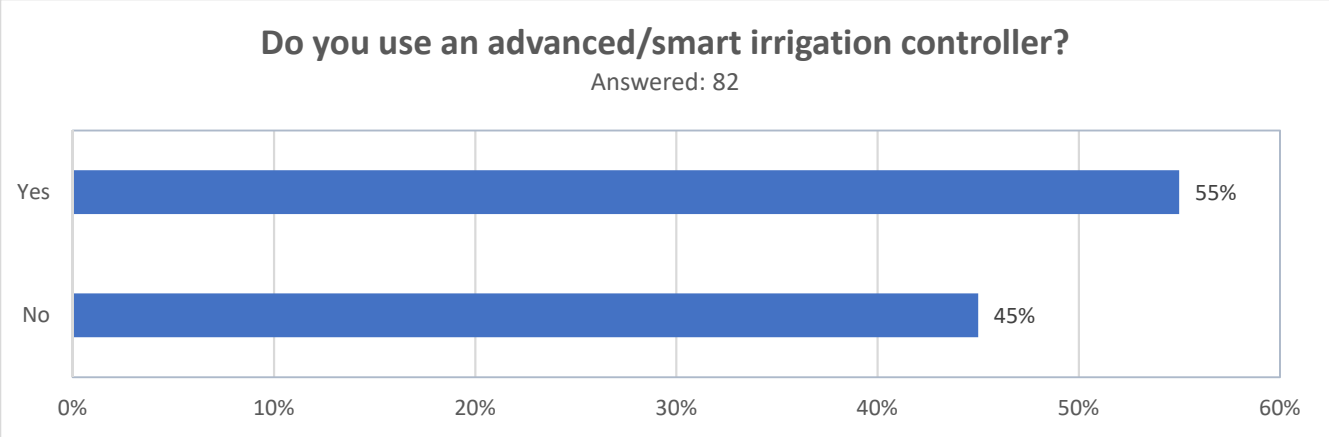


Of the respondents who have irrigation systems using rainfall shutoff devices, just over half check that their device is working properly on a monthly basis and 20% on a quarterly basis. The rest have their devices checked annually (10%), twice annually (8%), or every few years (5%). Only 3% do not check their devices.

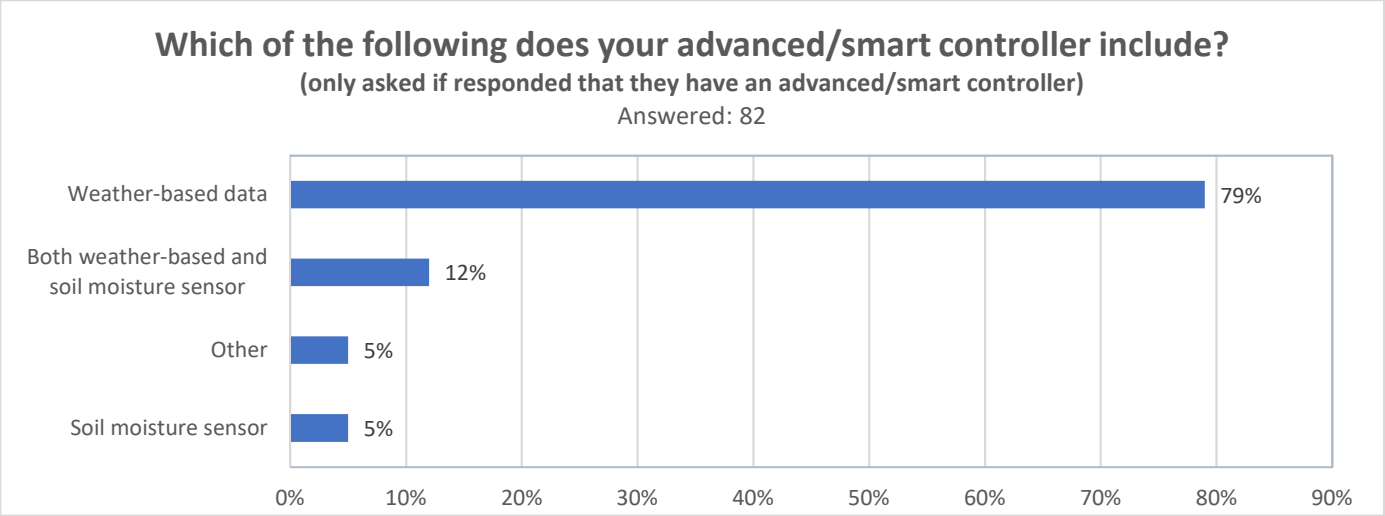


Only 15% of respondents replace their rainfall shutoff device every one-to-two years.

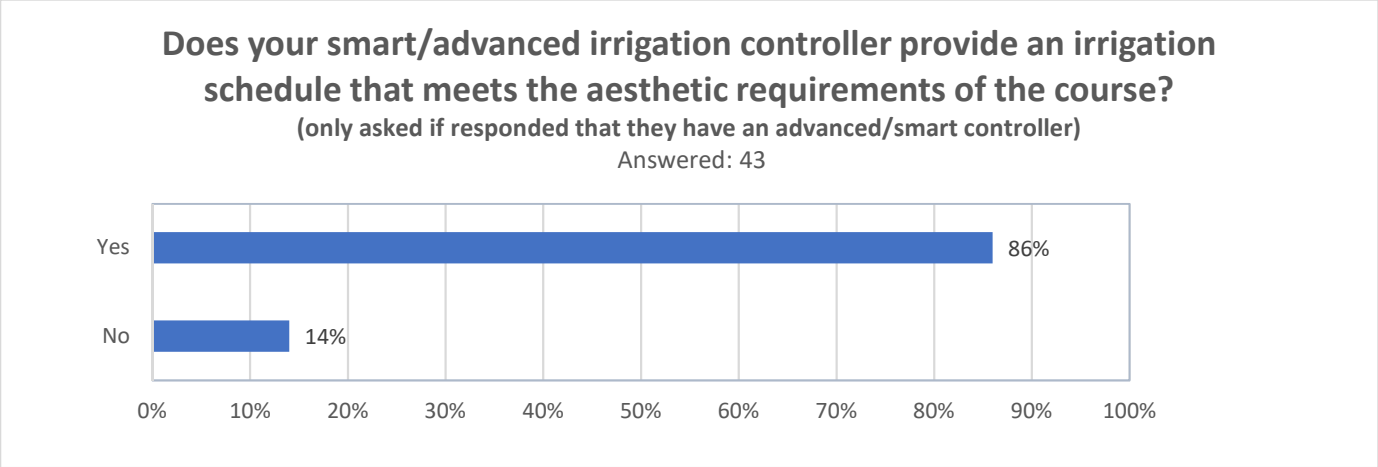
Advanced/Smart Irrigation Controllers



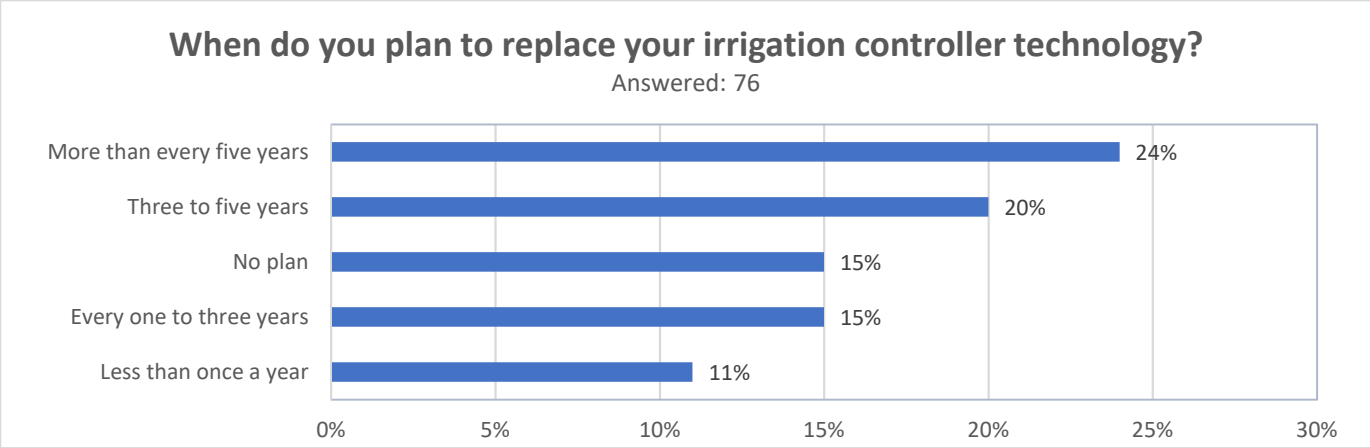
Advanced or Smart irrigation controllers are considered much more accurate than traditional irrigation timers and even timers with functioning rain sensors. Fifty-five percent of respondents reported using smart controllers.



Seventy-nine percent of respondents said their controllers were weather-based and only 5% said their systems use a soil moisture-based controller; 12% indicated their systems have controllers which have both weather and soil moisture sensors.

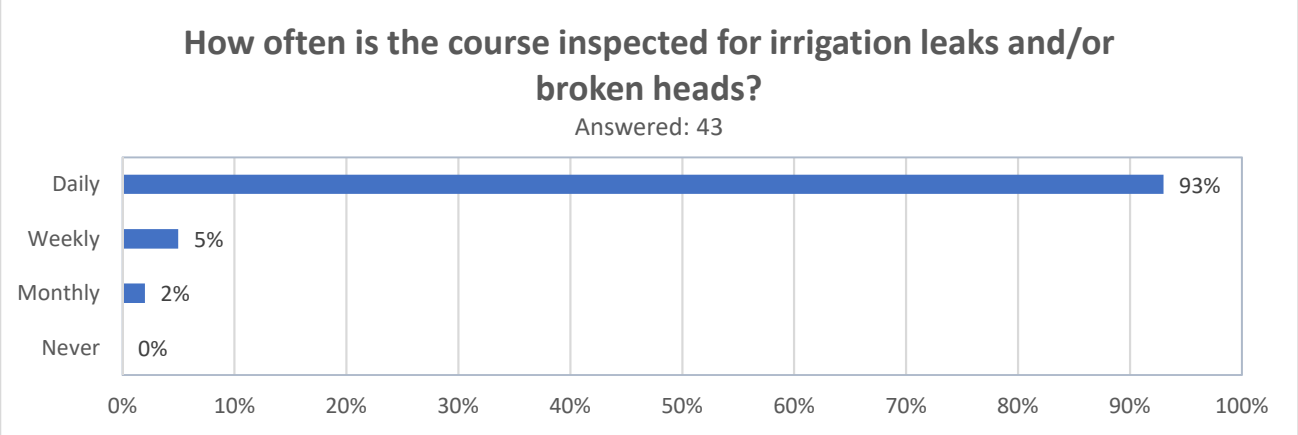


86% of respondents who reported using Smart controllers on their course's irrigation systems said they provide an irrigation schedule that met the aesthetic standards of their courses.

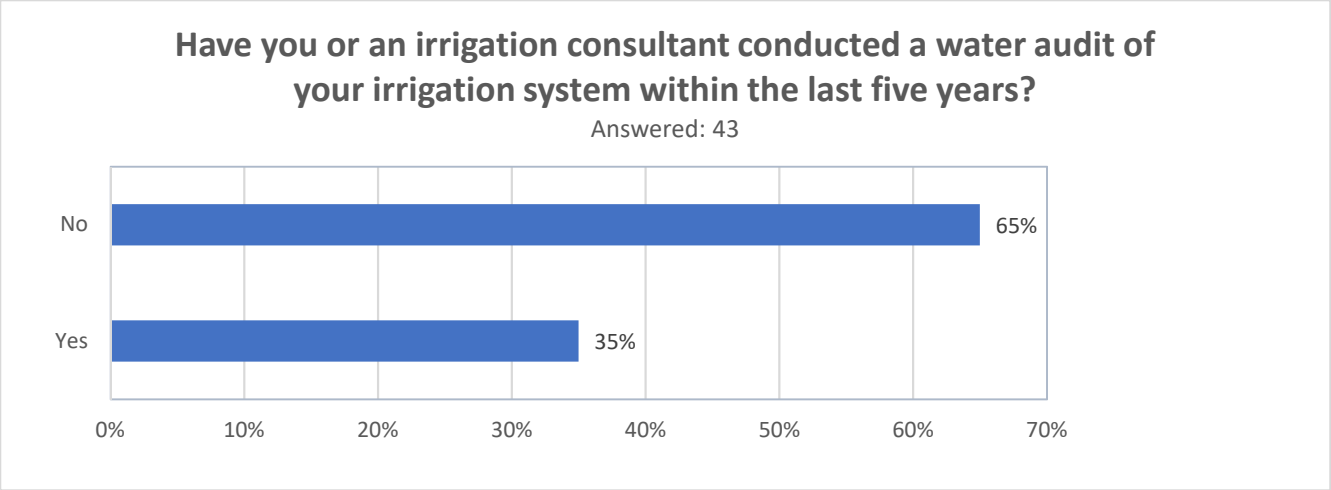


Almost half (46%) of respondents indicated they have plans to replace their current irrigation controllers within five years, with another 24% indicating their replacement plans were more than five years out.

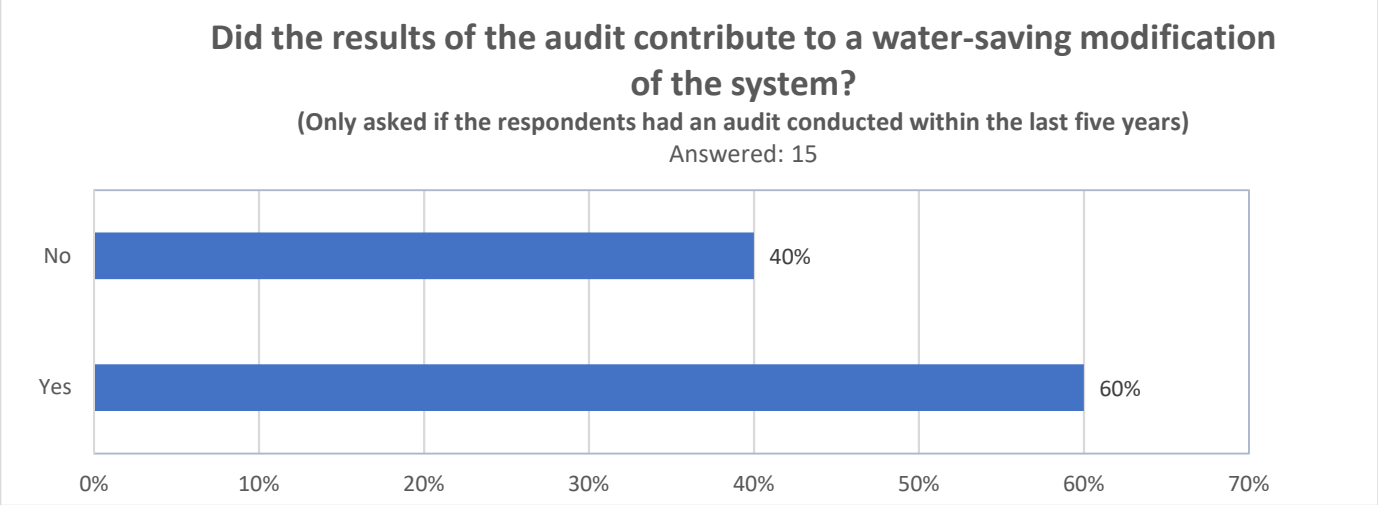
Irrigation System Efficiency Maintenance



A very high percentage of respondents (93%) have staff check their systems for leaks, broken heads and other visible signs of efficiency losses daily.

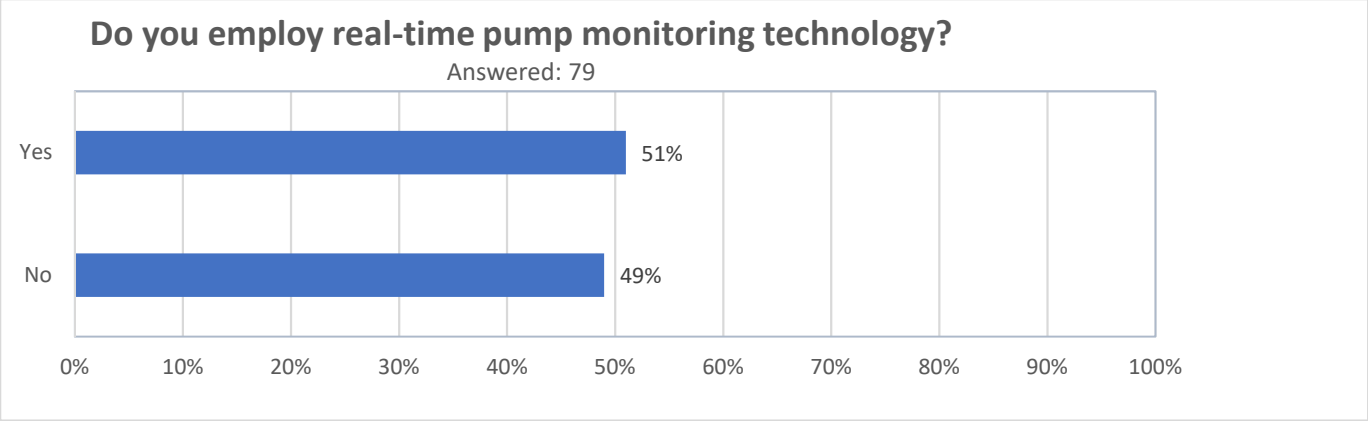


Just over one-third of respondents (35%) reported having a water audit of their irrigation systems conducted within the last five years.

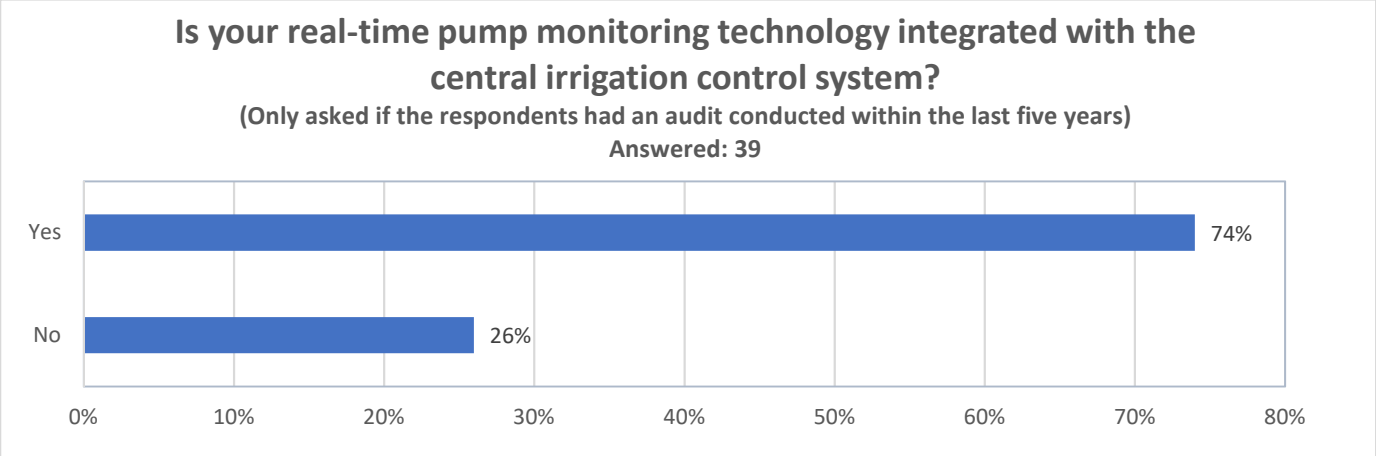


Close to two-thirds (60%) of the survey respondents, who said they had irrigation system audits conducted with the past five years, indicated the audits resulted in system modifications which yielded water savings.

Real-Time Pump Monitoring Technology

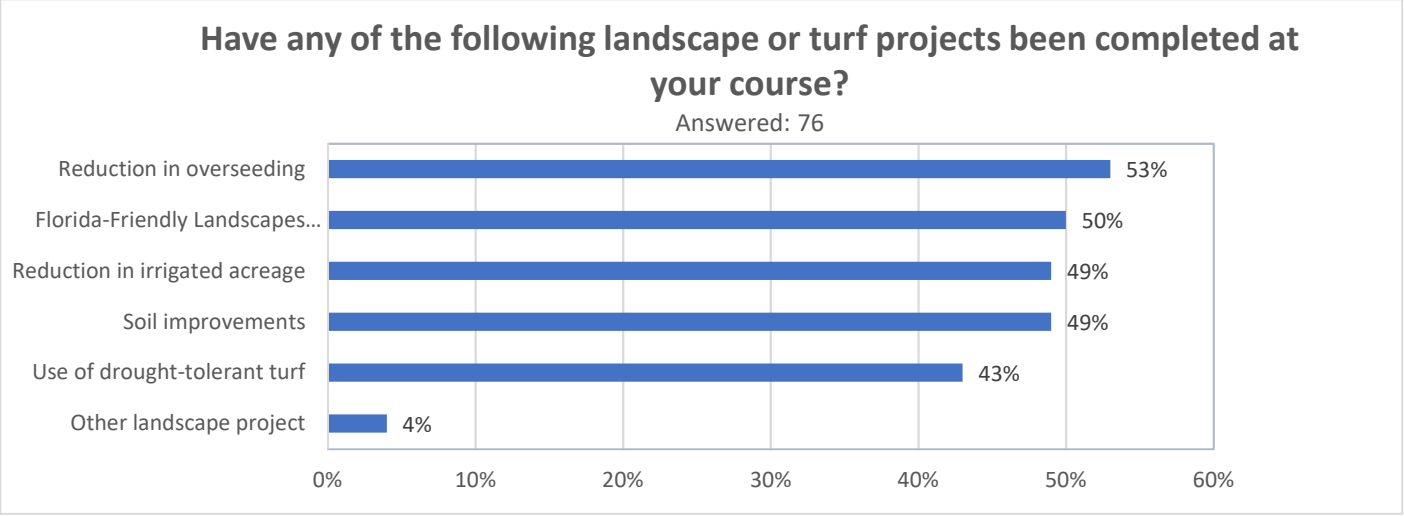


Just over half of respondents (51%) employ real-time pumping technology (which involves wireless remote monitoring and control systems that enable golf courses to remotely monitor the operations of their irrigation systems and make better decisions regarding water, chemical, and electrical usage).

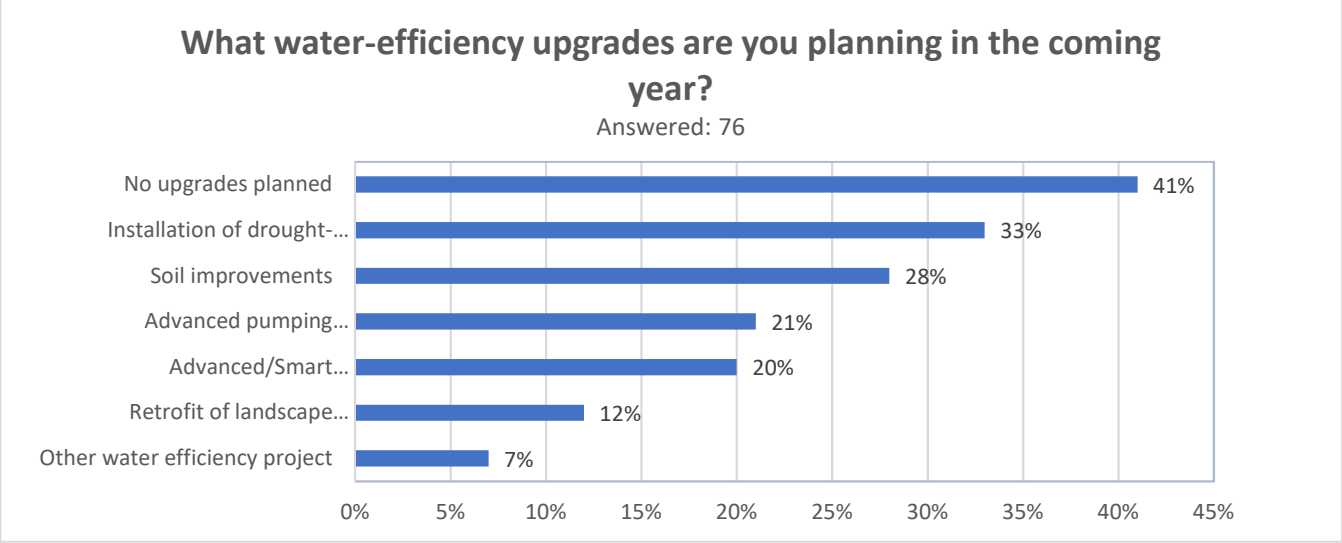


Of the respondents who indicated they employ a real-time monitoring system, 74% indicated their pump monitoring system is integrated with their central irrigation control system.

Landscape and Irrigation Technology Upgrades

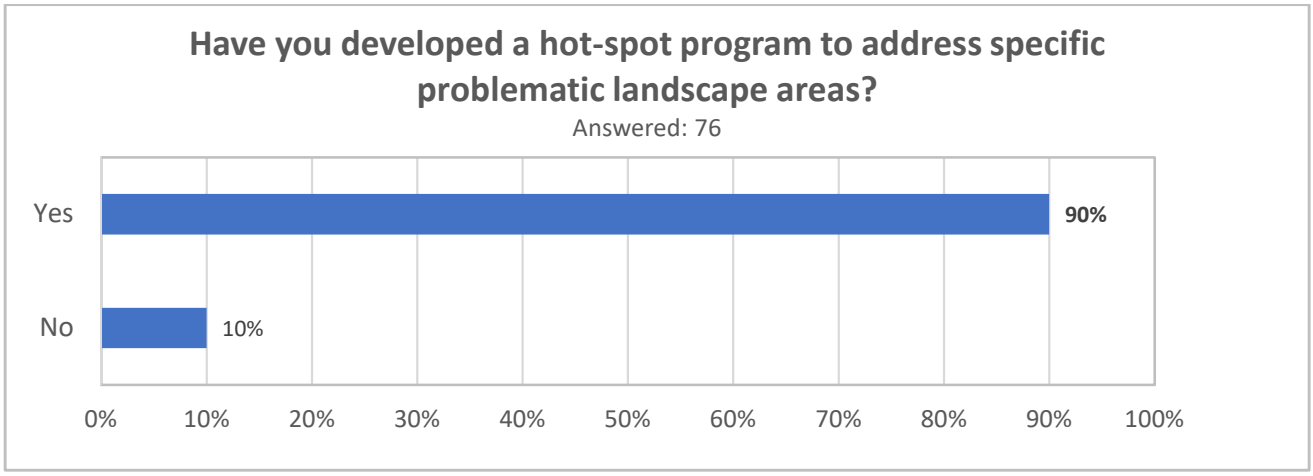


Respondents have completed a variety of projects designed to reduce water demands on their courses. These include projects to reduce overseeding (53%), implement Florida-Friendly Landscaping (50%), reduce irrigated acreage (49%), make soil improvements (49%), and the use drought-tolerant turf species (43%).



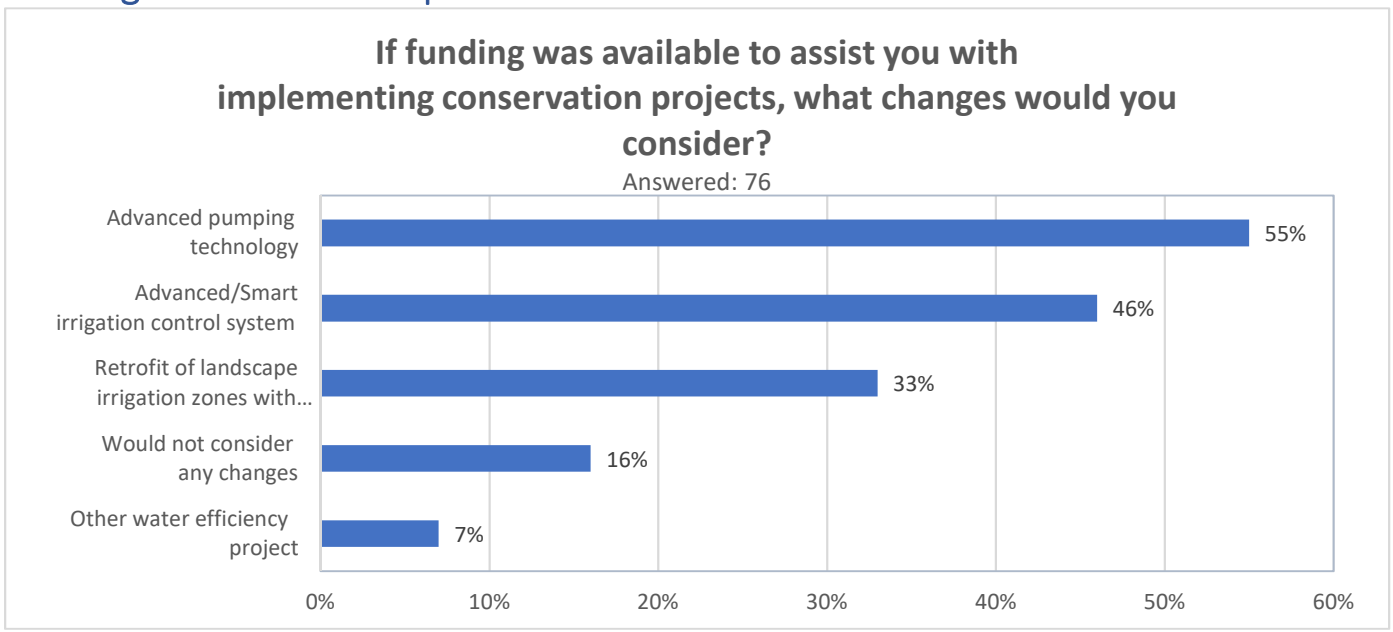
Almost two-thirds of respondents (59%) indicated they have plans to implement water efficiency upgrades on their courses in the coming year. These projects include: the installation of drought-tolerant turf species (33%); soil improvements (28%); installation of real-time pumping technology (21%); installation of advanced/Smart irrigation controllers (20%); retrofitting of landscape irrigation zones with micro irrigation; and other water use efficiency projects (7%). Some respondents would likely implement more than one project type.

Hot-Spot Program/Protocols



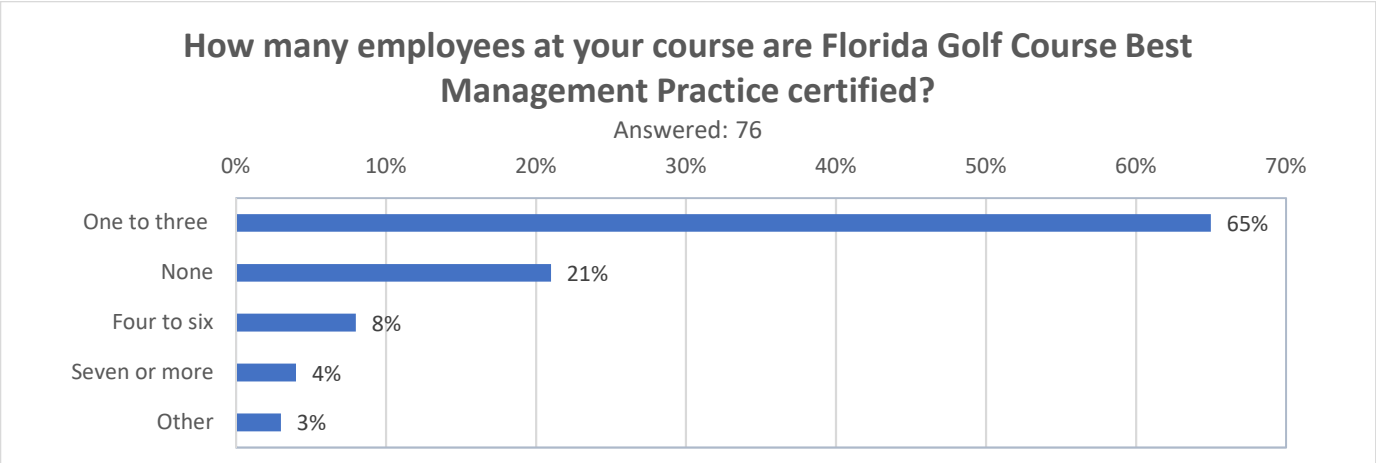
Ninety percent of respondents have a protocol in place to deal with problematic areas of their courses that are difficult to irrigation or manage for any of a variety of possible reasons.

Funding Assistance to Implement Water Conservation Measures

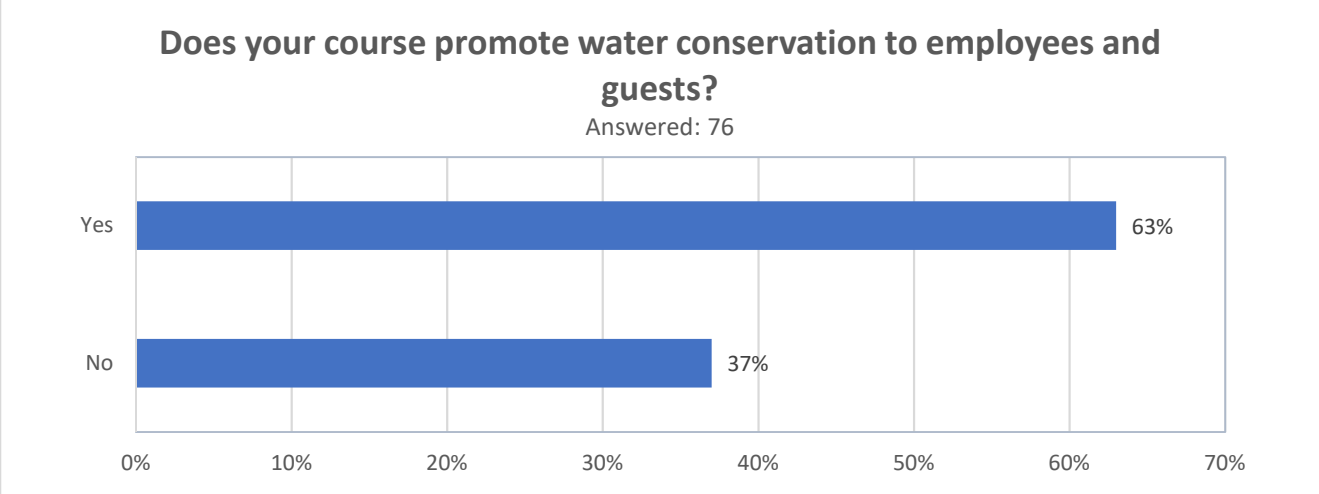


Respondents indicate interest to improve water use efficiency on their courses (84%) in several areas. These include investments in advanced pumping technology (55%), advanced/smart irrigation controller systems (46%) and retrofitting of landscape irrigation zones with micro-irrigation (33%).

Education of Course Staff, Players, and the General Public Related to Water Conservation and Water Use Efficiency on Golf Courses

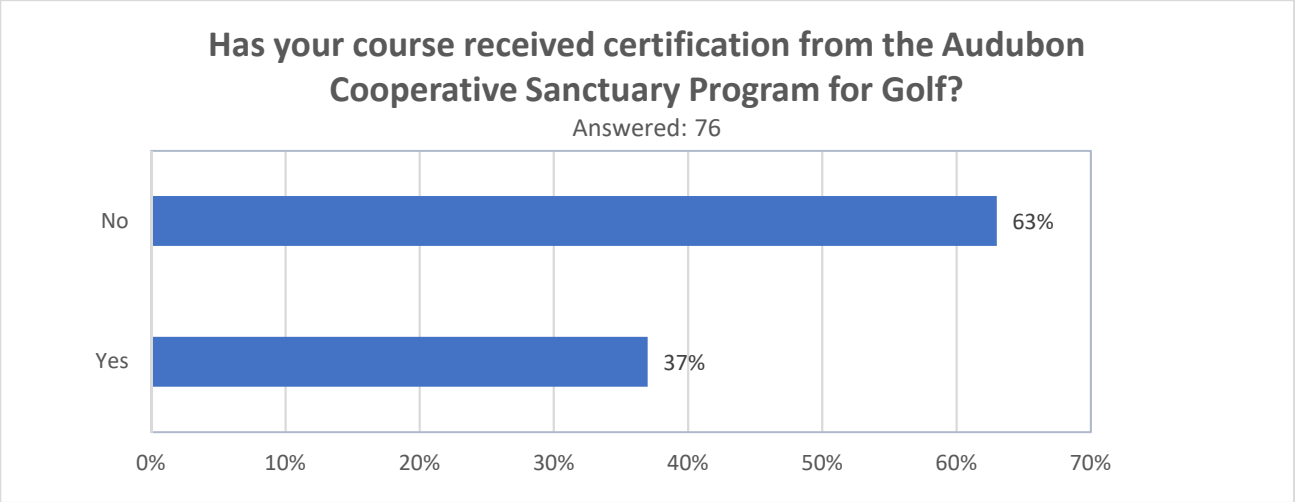


Seventy-nine percent of respondents said at least one of their staff were certified. However, only 13% of respondents have four or more FGCBMP certified staff; 21% of courses have no certified staff.



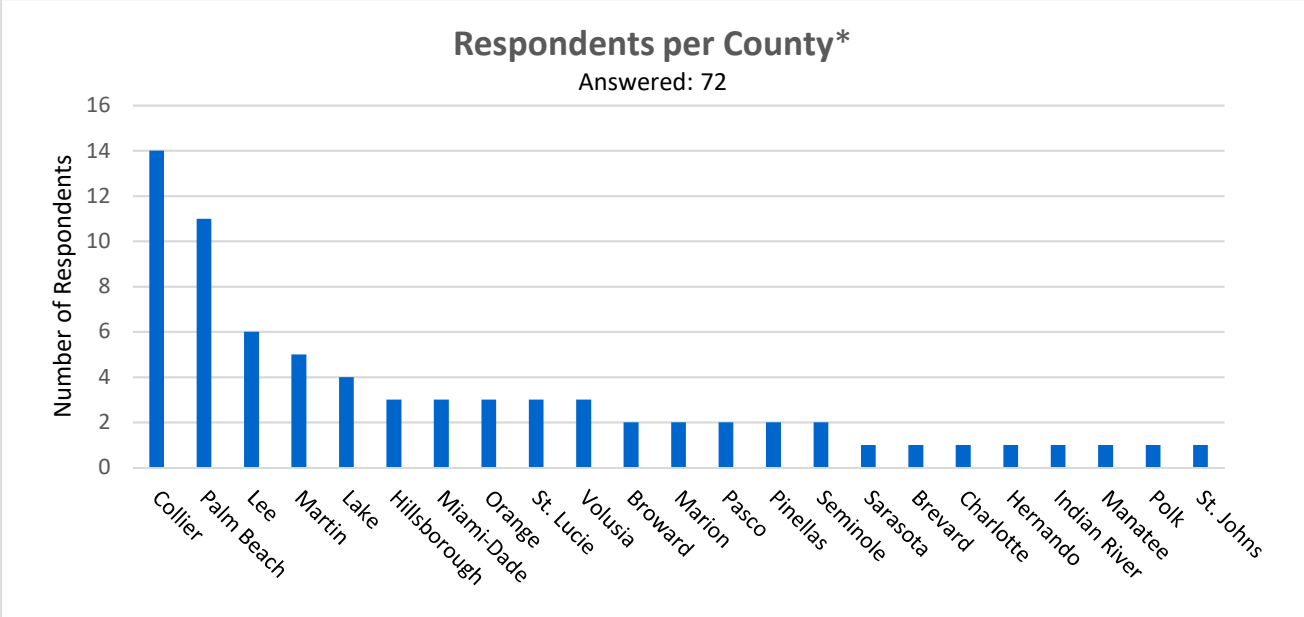
Almost two-thirds (63%) of respondents said they promote water conservation to employees and guests.

Audubon Cooperative Sanctuary Certification by Golf Courses in Florida



Thirty-seven percent of respondents answered that their course has received certification from the Audubon's Cooperative Sanctuary Program for Golf. The Audubon Cooperative Sanctuary Program for Golf Courses is an environmental certification program that recognizes golf courses that implement environmental management standards in six areas: Environmental Planning; Wildlife and Habitat Management; Chemical Use Reduction and Safety; Water Conservation; Water Quality Management; and Outreach and Education.

In what county is your course located?



* Zero respondents if county is not shown.

Fifteen respondents did not respond to this question. Sarasota County was initially omitted, but was added to the drop-down menu upon being notified.

Conclusion

This survey succeeded in providing the water management districts and FGCSA with information on the breadth and depth of conservation and irrigation practices currently being implemented on golf courses in Florida. It affirmed that the districts should continue providing funding for water efficiency improvement projects, including those covering changes to landscaping, irrigation systems, pump technology and advanced controllers.

Over the past two decades, water management districts have encouraged large water users (such as golf courses) to increase use of non-potable sources such as reclaimed and surface water for irrigation. The survey shows that potable water use is only 1% of the total volume of irrigation water use. Clearly, technology in pump monitoring, rainfall shutoff devices, and Smart irrigation controllers are increasingly being adopted as viable solutions while traditional BMPs are still being implemented. The recent development of a BMP certification program for golf course professionals, as well as the Audubon Cooperative Sanctuary Program for Golf, should serve to further implementation of water-conserving devices and strategies. Therefore, water management districts have an interest in promoting these programs and encouraging superintendents and their courses to engage in them.

The industry is clearly proud of its achievements with reference to water conservation and environmentally sustainable practices and is eager to work with water management districts to publicize this fact. Finally, survey respondents requested assistance from the water management districts in getting the word out about their efforts to be good water managers and to dispel the common belief that golf courses waste water. The survey information can be used as a baseline which future water conservation implementation can be measured against.

Appendix A

1. **What is your irrigation water source?**
    a. Utility Supplied Potable Water
    b. On-Site Lake/Pond
    c. On-Site Well
    d. Combination of Sources
    e. Reclaimed Water
2. **Does your irrigation system have a rain sensor?**
    a. No
    b. Yes
3. **How often is the rainfall shutoff device checked?**
    a. Never
    b. Every few years
    c. Twice annually
    d. Annually
    e. Quarterly
    f. Monthly
4. **How often is the rainfall shutoff device replaced?**
    a. Less than once a year
    b. Every one to two years
    c. Three to four years
    d. More than every five years
    e. Never
    f. Other (please specify)
5. **Do you use an advanced/smart irrigation controller?**
    a. No
    b. Yes
6. **Which of the following does your advanced/smart controller include?**
    a. Soil Moisture sensor
    b. Weather-based data
    c. Both
    d. Other
7. **Does your smart/advanced irrigation controller provide an irrigation schedule that meets the aesthetic requirements of the course?**
    a. Yes
    b. No
8. **How often is the course inspected for irrigation leaks and/or broken heads?**
    a. Never
    b. Monthly
    c. Weekly
    d. Daily
    e. Other
9. **Have you or an irrigation consultant conducted a water audit of your irrigation system within the last five years?**
    a. Yes
    b. No
10. **Did the results of the audit contribute to a water-saving modification of the system?**

a. Yes
b. No

11. **Do you employ real-time pump monitoring technology?**
    a. No
    b. Yes
12. **Is your real-time pump monitoring technology integrated with the central irrigation control system?**
    a. Yes
    b. No
13. **Have any of the following landscape or turf projects been completed at your course?** Respondents were able to select more than one possible answer.
    a. "Florida-Friendly Landscapes in rought and non-play areas"
    b. Soil improvements
    c. Use of drought-tolerant turf
    d. Reduction in irrigated acreage
    e. Reduction in overseeding
    f. Other landscape project
14. **Have you developed a hot-spot program (program to separately handle difficult to irrigate or challenging areas) to address specific problematic landscape areas?**
    a. Yes
    b. No
15. **When do you plan to replace your irrigation controller technology?**
    a. Less than one year
    b. One to three years
    c. Three to five years
    d. More than five years
    e. No plan
16. **What water-efficiency upgrades are you planning in the coming year? Please select all that apply.**
    a. Advanced/Smart irrigation controller system
    b. Advanced pumping technology
    c. Retrofit of landscape irrigation zones with microirrigation
    d. Soil improvements
    e. Installation of drought-tolerant plants or turf
    f. No upgrades planned
    g. Other water-efficiency project (please specify)
17. **If funding (state or local government) was available to assist you with implementing conservation projects, what changes would you consider? Please select all that apply.**
    a. Advanced/smart irrigation controller system
    b. Advanced pumping technology
    c. Retrofit of landscape irrigation zones with microirrigation
    d. Would not consider any changes
    e. Other water-efficiency project (please specify)
18. **How many employees at your course are Florida Golf Course Best Management Practice certified?**
    a. None
    b. One to three employees
    c. Four to six employees

d. Seven or more
e. Other (please specify)

19. **Does your course provide water conservation education to players and guests?**
    a. Yes
    b. No
20. **Does your course promote water conservation to employees and guests?**
    a. No
    b. Yes
21. **How can water management districts help your golf course educate the public about your water-efficiency efforts?**
    (Open-ended question)
22. **Has your course received certification from the Audubon Cooperative Sanctuary Program for Golf ?**
    a. Yes
    b. No
23. **In what county is your golf course located?**
24. **Are there any additional comments or feedback you would like to share?**
    (Open-ended question)

Appendix B

Open-Ended Question: How can water management districts help your golf course educate the public about your water-efficiency efforts?

As per the open-ended nature of the question, the responses are provided in full below.

1. Create commercials to air on Local TV stations about the benefits of golf courses to the surrounding environments.
2. Promoting new irrigation systems.
3. The public in most cases have no idea of how often or when to water. They assume their schedule days are when the sprinklers come on rain or shine without fail. The easiest way to kill grass is too overwater it.
4. Make more people aware that golf courses tend to make great strides in water conservation and management
5. Give me some ideas on how others are doing that. I haven't thought about it much because we already use reclaimed water.
6. By informing the public that golf courses and the course managers that manage them are stewards of the environment.
7. n/a
8. You or another third-party promoting the positive benefits of water use, conservation, etc on a golf course. As you were aware turfgrass is a phenomenal water filter and the golf course recharges the aquifer by capturing and cleansing rainfall. Turfgrass is a terrific filter of nutrients and does not cause detrimental effects to water bodies. We need those not associated with the golf course to promote the positive benefits of golf courses
9. Newsletters, updated info, hold seminars

10. Show them we have the technology to turn water off in an instant. Ask home owners to do the same after a rain event. It's disheartening to ride the course the next morning and see residential irrigation flying...happens too frequently.
11. News letters
12. Let people know that Golf Courses are not the biggest consumers of water. Every time I tell people what i do they instantly assume that i use a lot of water. I see more waste driving in neighborhoods after a heavy rain.
13. Through educational outreach programs.
14. Help them to understand that more heads, and single head control, will actually reduce the amount of water needed.
15. Continued attempts to let the public know that our irrigation computers are programmed to give the least watering but with acceptable turf. Each sprinkler throughout the course is individualized for that location. Hand watering is used for hot spots. Irrigation is turned off when there is rain over 0.15".
16. Keep South Florida Water Management under control with a Strong Governor!
17. Produce golf-oriented brochures for the public to be educated.
18. Tell them that dry and brown is all right
19. Through the media mention that golf courses manage their water use daily and adjust use based on environmental conditions daily. Also mention that golf course course managers manage the irrigation in a manner to keep turfgrass healthy but not too moist because that leads to poor playing conditions.
20. Educate public that it is in the best interest of golf courses to carefully manage water usage. Over watering can lead to reduced turf health, poor play-ability and increased costs. These are all things that turf managers are trying to avoid.
21. Remove automatic irrigation from hoa/poa
22. Seminar
23. Make sure the public knows we have been water efficient for decades. It's nothing new, and that we take water no one wants (reclaimed) and use it.
24. On-site promotion training
25. The need for home owners to pay attention to rainfall amounts so they can turn off irrigation systems
26. Publications
27. Speak more on how we take useless reclaimed water and clean it through filtration to eventually turn it back into aquifer
28. Posters and/or signage
29. Provide press releases on how golf courses use reclaimed water, and other water saving measures.
30. Monitor residents and require adherence to BMP's
31. Simply by promoting the fact that we use reclaimed water
32. PSA
33. Printed publication and online content
34. Have a meeting to discuss improved techniques so we can help educate the public
35. Educate the public on the effects of reclaimed water and how it can affect the playing surface of golf courses.

Open-Ended Question: Are there any additional comments or feedback you would like to share?

Two respondents mentioned that they have low budget courses so many of the strategies to increase efficiency were not affordable. Five respondents commented that the golf course industry does a lot to be as efficient as possible and are better water managers that the residential water sector, especially HOA's. Question 21 had some similar responses to those in Q24, indicating a desire among the industry to get the word out that they are efficient water managers and environmental stewards, especially as compared to residential irrigators.

As per the open-ended nature of Question 24, the responses are provided in full below (Q24, 19).

1. We installed a new irrigation system to our golf course 3 years ago and installed the HDEP pipe, it's a has a lot less joints and the longevity is supposed to be many years.
2. We are a low budget facility. It would be nice to have all the latest gadgets, we rely on a well-used soil probe and fingers.
3. Not that I can think of.
4. n/a
5. Show the math and facts on what golf courses use compared to residential in South Florida from June through end of September. Show it as irrigated acres with use rates.
6. We are planning to set up some type rain shut off switch
7. Water used for golf courses is filtered by the turf and any runoff is returned to the lakes or ponds for reuse.
8. Sarasota County is location. Not available in your drop-down menu
9. Course has been on a lower budget than it should be. Weather station has been down for 8 years and money is not available at this time to update along with other resources.
10. Thank you
11. None
12. The biggest inefficiency we see is the use of irrigation water by HOA/POAs as strictly programmed with no shut off. we hand-held use moisture meters for all green irrigation and wilt as our trigger for tee and fairway irrigation.
13. As turf managers, water is the backbone of our operation. We spend more time making sure our system is right, than on anything else we do. Without it, we may as well close the doors. If something is broken, we fix it right away. We don't waste water and are probably the most efficient users of it in the state.
14. Diligence is the key, we have standalone controllers that have to be torn on or off manually so we must watch the weather very carefully
15. Our irrigation system is past its effective life span we plan on having a complete new system in 2021.
16. Golf Courses are the best conservationists I know, particularly in having managed residential irrigation for the past 10 years.
17. No
18. No
19. Reclaimed water needs to be treated better at the facility and monitored more closely.

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