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# Perceptions Of The Audubon Cooperative Sanctuary Program: A Survey Of Superintendents On University - Affiliated Golf Courses In The U.s.

Jacob Joseph Kuban

Illinois State University, jjkuban@ilstu.edu

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PERCEPTIONS OF THE AUDUBON COOPERATIVE SANCTUARY PROGRAM:  
A SURVEY OF SUPERINTENDENTS ON UNIVERSITY-AFFILIATED  
GOLF COURSES IN THE U.S.

Jacob J. Kuban

96 Pages

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The Audubon Cooperative Sanctuary Program (ACSP) for golf courses was established in 1991. Certification through the ACSP is designed to identify and recognize environmental stewardship and sustainable management practices on golf courses. Despite the 20 year history of the ACSP program, only 13% of U.S. golf courses have achieved some level of certification. This study assessed U.S. university-affiliated golf courses on their ACSP certification level and the amount of college or university student involvement with the certification process. It was hypothesized that university golf courses could utilize students to help alleviate obstacles superintendents may have to becoming certified. A cross-sectional, self-administered, online questionnaire was distributed to all U.S. university-affiliated golf course superintendents registered in 2013 with the Golf Course Superintendent's Association of America via an online link to the survey. Among the population of 120 university golf course superintendents, 113 were contacted and asked to participate. The survey response rate was 31.9 %. The participants answered 30 to 40 questions depending on the ACSP certification status of their golf course. Ranking analysis concluded that the time

commitment and labor involved in developing the application for certification were the most identified challenges about beginning the certification process, and that enhanced public perception was the most beneficial outcome of ACSP certification. Open-ended responses confirmed that public relations and sustainable operations were the main reasons superintendents at certified golf courses had become ACSP certified. There was also an identified interest in student assistance at partially certified U.S. university-affiliated golf courses looking to increase their level of certification and at university-affiliated golf courses which had not yet achieved certification.

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GOLF COURSES IN THE U.S.

JACOB J. KUBAN

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2015

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JACOB J. KUBAN

COMMITTEE MEMBERS:

David E. Kopsell, Chair

Aslihan D. Spaulding

Ann Marie VanDerZanden

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J.J.K.

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## CHAPTER I

### THE PROBLEM AND ITS BACKGROUND

#### **Statement of the Problem**

The Audubon Cooperative Sanctuary Program (ACSP) for golf exists for course superintendents to communicate their sustainable turfgrass management practices to golfers, professional colleagues, and the surrounding community. There are six categories of the certification process; 1) *Environmental Planning*; 2) *Wildlife and Habitat Management*; 3) *Chemical Use Reduction and Safety*; 4) *Water Conservation*; 5) *Water Quality Management*; and 6) *Outreach & Education*. Studies have measured the negative effects golf courses can have on the surrounding environment (Limehouse et al., 2009). Leight et al. (2005) found decreased grass shrimp population levels, overall size, and percentage of gravid females over a ten year period on sites in proximity to agricultural and golf course operations in South Carolina, U.S. A study from North Carolina showed that some golf courses have contributed to eutrophication in nearby waters due to off-target nutrient movement (Mallin and Wheeler, 2000). In response to these findings, some golf course superintendents have altered their management programs to promote more environmentally friendly nutrient application practices. Audubon International, Inc. of Troy, NY has kept information on its members of the ACSP for golf courses (not just certified golf courses) and 69% have decreased water

use, providing an average savings of 1.9 million gallons per course per year (“Managed...”, 2001). However, the public can still perceive golf courses as an environmental detriment rather than an environmentally sound place of recreation (Briassoulis, 2010). Enrollment in the Audubon Cooperative Sanctuary Program ensures golfers and the general public that sustainable management practices are being carried out by superintendents which protect the surrounding environment and reduce the input resources required to maintain the quality and function of the golf course. Despite this program being a possible bridge between the public and the golf industry, only 844 (5%) of the approximately 17,000 golf courses in the U.S. are fully certified in the Audubon Cooperative Sanctuary Program (“Certified...”, n.d.). Of the U.S. golf courses involved with Audubon and its programs, the role of students during the certification process has limited documentation.

There has been one project conducted by students at Texas A&M University in 1993. In a United States Golf Association (USGA) Green Section Record, advisor of the Texas A&M University Turf Club, professor of turfgrass management courses and graduate advisor Dr. Richard H. White describes in detail the activities of the Turf Club in regards to assisting Champions Golf Club in Houston, TX (White, 1996). The students of the club wanted to enhance perceptions about golf course management through assisting Champions Golf Club with a Resource Inventory (Site Assessment). This is the initial step of ACSP certification and must be completed prior to any changes in the golf course landscape.

A deficiency that exists is that there has only been one recorded project dealing with the involvement of students with the Audubon Cooperative Sanctuary Program certification process. The Texas A&M case study discusses in detail what one student organization did on one golf course. While this helps significantly in regards to what the students assisted with, this one case study leaves a substantial gap in knowledge that addresses student involvement in the ACSP certification process.

Therefore, the objectives of this survey study were to: i) assess U.S. university-affiliated golf course ACSP certification status, and ii) assess the level of, and interest in, student involvement in the certification process. In this study, a Qualtrics survey software questionnaire was used to measure the relationship between certification status and student involvement. Questions asked were both open-ended and closed-ended. The use of both quantitative and qualitative data allows for a collaborative understanding of this research problem by reinforcing common themes and responses.

The data compiled from this study will benefit the golf industry, academia, and Audubon International as the level of certification on university courses and level of student involvement with certified university courses has yet to be assessed. This information is available to golf courses in close proximity to colleges and universities. These golf courses can benefit from students getting involved in the ACSP certification process by becoming at least partially certified or simply including local colleges and universities in sustainable maintenance programs. It has been stated that 89% of ACSP members improved cultural control methods, 92% are using pesticides with lower toxicity levels, and 80% have decreased the amount of high maintenance turfgrass areas,

with an average increase in wildlife habitat of 22 acres per golf course (Limehouse et al., 2009). Information from this project will be able to advance not only turfgrass programs, but other fields of study such as biology, resource management, construction, and horticulture through independent projects, case studies, thesis research, and course laboratory exercises. Awareness of the Audubon International organization occurs with certification of golf courses and those who visit certified courses can be educated through signage, brochures, and other forms of information delivery, such as course websites. Audubon International's working goal to deliver environmental education and help implement sustainable natural resource management in all the places people live, work and play is addressed through the ACSP.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

#### **History of Turfgrass and Golf Course Industry**

Turfgrasses are perennial plants that provide a permanent, attractive ground cover (Emmons, 2008). Lawn and turfgrass areas were included in gardens thousands of years ago in the Middle East and Asia (Emmons, 2008). Historical references to turfgrasses include the emperor's vast palace gardens during the Han Dynasty in China (100 BC); the Persian garden carpets in the ancient kingdom of Assyria (500 AD); the sports fields used by Akbar, the Great Emperor of Hindustan (1600 AD); and the medieval lawn gardens of Britain in the 13th century (Smiley, 1983). Turf was used in Europe for lawn bowling and cricket fields as early as the 13<sup>th</sup> century and the game of golf became popular in the 1400s in the British Isles (Emmons, 2008).

There has been a tremendous growth in the U.S. turfgrass industry since 1945 (Balogh and Walker, 1992). The U.S. turfgrass industry generated total revenue impacts of \$57.9 billion in 2002 (Haydu et al., 2009). Turfgrass sod, sprigs, or plugs are the third most valuable segment of the horticulture industry in terms of sales, comprising \$877 million of the \$11.7 billion sales of all horticultural crops sold (“2007 Census...”, 2010). As a result of this demand for turfgrass, the intensity of turfgrass management has risen steadily in the U.S. (Balogh and Walker, 1992).

After WWII, the rapid growth of the economy in the U.S., along with the shortened number of hours in the work week, provided people with more income and leisure time. As a result, recreational activities such as golf became increasingly popular (Emmons, 2008). U.S. President Eisenhower thoroughly enjoyed playing golf several times per week if his schedule permitted it and by doing so, popularized the game of golf (“Eisenhower...”, n.d.). There were approximately 4,800 golf facilities in the U.S. in 1946 (Balogh and Walker, 1992). In 2002, golf courses had the greatest economic impact within the turfgrass industry (Haydu et al., 2008). There are approximately 17,000 golf courses in the U.S. and the National Golf Foundation estimates that more than 12% of the U.S. population over the age of 12 plays golf (Emmons, 2008). In 2012, there was an increase of 26 million rounds of golf from 2011 and the 2012 national total rounds played was about 490 million (“Rounds Played...”, 2013).

### **Development of Golf Course Management and Environmental Effect**

A basic knowledge of what a typical golf hole consists of and looks like is essential to grasp some key concepts in managing a golf course. A course is defined as the whole area within which golf play is permitted (“A summary...”, n.d.). Out of bounds is beyond the boundaries of the course or any part of the course so marked by the Committee. When out of bounds is defined by reference to stakes or a fence or as being beyond stakes or a fence, the out of bounds line is determined by the nearest inside points at ground level of the stakes or fence posts (excluding angled supports). When both stakes and lines are used to indicate out of bounds, the stakes identify out of bounds and the lines define out of bounds. When out of bounds is defined by a line on the ground, the line itself is out of bounds. The out of bounds line extends vertically upwards and

downwards (“Rules of Golf”, 2012). A golf hole is defined as an area of the course consisting of a teeing ground, putting green, and the area in between (Appendix A). There are usually 9-18 holes per course, but golf courses can consist of less or more holes. A hole is measured in distance from the teeing area to the green. The tee box (sometimes referred to as a tee) is a designated area that is the starting place for the hole to be played. A green is considered the part of the hole designed for putting and is the most intensively managed area of the course (“A summary...”, n.d.). The ultimate goal of golf is to get the golf ball into the hole located on the green in as few shots, or strokes of a golf club, as possible. Throughout the hole area, obstacles such as sand bunkers, water hazards, trees, or taller mown rough grass are present to create difficulty in playing the hole. A bunker is a hollow comprised of sand or grass or both that exists as an obstacle and, in some cases, a hazard (“A summary...”, n.d.). As the level of skill of a golfer increases, obstacles and hazards can be more easily avoided to improve their score. Obstacles and intended playing turfgrass surfaces both need to be maintained by the course superintendent and staff.

Since the increase in demand for well-maintained turfgrass areas began in the 1950s, the development of improved grass cultivars, turf fertilizers, specialized equipment, and more efficient chemicals to control weeds, diseases, and insects has resulted (Emmons, 2008). Golf course turf (fairways, tees, and rough areas) requires a high level of maintenance to remain healthy and functional when put under the stress of minimum mowing height, heavy traffic, or environmental conditions (Emmons, 2008). In the 1930s, prior to the widespread use of pesticides, cultural methods (maintaining healthy turf, attempting to keep soil weed-free, and hand-weeding) were the most

prominent practices for controlling weeds on a golf course (Monteith, 1930). Chemical advancements occurred after World War II, when an emergence in pesticide use and development began with inexpensive, effective, and popular products such as DDT, BHC, aldrin, dieldrin, edrin, and 2,4-D (Delaplane, 1996). According to a 1982 EPA report, a golf course used an average of nine pounds of herbicides, fungicides, and insecticides per acre per year, which was three times the amount used by the most chemically intensive agribusiness (Limehouse et al., 2009). Now, superintendents utilize integrated pest management (IPM) practices to increase the efficiency and effectiveness of pest control practices. According to a 2012 pesticide usage report by the Golf Course Superintendents Association of America (GCSAA), turf managers most frequently practice weather pattern monitoring, scouting, increases in cultural methods, and recording pest outbreaks to aid in minimalizing chemical usage. Cohen et al. (1997) performed a data analysis on over 16,000 data points from 36 golf courses and found that toxicologically significant impacts were not observed in any of the water quality studies. A nine year study at a golf course in Manhattan, KS concluded that the course had only slightly higher levels of nitrogen (N), phosphorus (P), and sediment than the pre-existing natural vegetation (Starrett et al., 2009).

For years there have been three nutrient elements that have received the greatest attention from turfgrass managers; nitrogen (N), phosphorus (P), and potassium (K) (Emmons, 2008). One of the most common phosphate fertilizers of the 1930s was superphosphate ( $\text{Ca}(\text{H}_2\text{PO}_4)_2$ ), previously and widely known as acid phosphate (“Colloidal...”, 1930). Sulphate of ammonia was considered the preferred choice of fertilizer because it tended to reduce the abundance of weeds by causing vigorous shoot

growth of grass plants, crowding out undesirable weedy plants (“Colloidal...”, 1930). More recently, slow-release nitrogen fertilizers are common due to their increased efficiency, lower burn potential, long-term plant response, and a steadier release pattern which reduces the likelihood of plants absorbing more nitrogen than they need and decreases leaching losses, but are more expensive (Emmons, 2008).

Sodium chlorate, calcium chlorate, sodium chloride, and iron sulphate were chemicals used for weed control in the 1930s, but these chemicals were restricted to fairways and roughs (Monteith, 1930). Today there are dozens of chemical herbicides available to superintendents including pre-plant (chemical soil applied prior to seeding or sodding), pre-emergent (chemical applied to turfgrass to control weeds before they are visible above soil surface) and post-emergent (chemical applied to weeds that have emerged) (“How to Manage Pests”, 2009). Plant growth regulators are chemicals applied most frequently to tees and greens to slow the rate of growth of turfgrass and lessen the amount of mowing required to maintain their playability (“Pesticide...”, 2012).

Through several studies it has been found that serious environmental problems can occur if pesticides or N leach into the drainage system and are discharged into lakes or streams (Emmons, 2008). One such problem is eutrophication. In 1969, the National Academy of Sciences (NAS) defined eutrophication as natural or artificial addition of nutrients to bodies of water and to the effects of the added nutrients (Rohlich, 1969). The NAS then went on to state that when the effects are undesirable, eutrophication may be considered a form of pollution (Rohlich, 1969). Mallin and Wheeler (2000) determined that nutrient addition to golf courses can cause significant phytoplankton biomass increases and that some golf courses can contribute to eutrophication problems. This

study also found that management practices played a critical role in nutrient concentrations at sample sites and golf courses employing buffer zones, detention ponds, and wetland areas led to lower nutrient output to nearby water sources (Mallin and Wheeler, 2000). Leight et al. (2005) depicted negative environmental effects over a ten year period in tidal creeks on the South Carolina coast. This study concluded that grass shrimp (lower trophic level aquatic organisms with great importance on water quality and larger fish species) population, size, sex ratio, and reproduction were all negatively affected by agriculture and mostly land surrounding golf course operation. The study also reported that conservation methods like best management practices (BMPs) and IPM increased grass shrimp population density (Leight et al., 2005). According to Balogh and Walker (1992) the focus of environmental development should be coordinated with the technical expertise of the golf course industry; regulatory and environmental perspectives of the Environmental Protection Agency (EPA); and the research capabilities of academia, industry, and the private sector. As transport of soluble chemicals in runoff water and leaching of soil solution was identified as a potential threat to water quality, the concept of best management practices (BMPs) evolved (Balogh and Walker, 1992).

One practice contributing to BMP is IPM. A recent survey indicated that 41% of average 18-hole golf facilities had a written IPM plan, and of that 41%, 68% had done it by voluntary action initiated by the golf facility board, committee, or superintendent (Lyman et al., 2012). Integrated Pest Management uses multiple scouting and control tactics to manage pests. Those most often used by 18-hole golf facilities were routine monitoring of weather patterns (97%); cultural practices (96%); scouting (95%); and recording pest outbreaks (86%) (Lyman et al., 2012). Lyman et al. (2012) stated that

46% of respondents to the survey frequently or sometimes used biological controls as an IPM control tool. It was also discovered that 66% of average 18-hole golf facilities had a written pesticide application plan (Lyman et al., 2012).

Another BMP is soil moisture monitoring and more efficient irrigation applications. Soil moisture sensors and tensiometers are utilized to precisely monitor and estimate turfgrass water needs (Emmons, 2008). Tensiometers are instruments used to measure the energy status of soil water (Smajstrla and Harrison, 1998). The tensiometer is placed firmly in soil with the ceramic cup in the plant root zone and the cup is porous so that water can move through it to equilibrate with the soil water (Smajstrla and Harrison, 1998). A partial vacuum is created as water moves from the sealed tensiometer tube and the vacuum causes a reading on the vacuum gauge which is a direct indication of the attractive forces between the water and soil particles (Smajstrla and Harrison, 1998). This reading is a measure of the energy that would need to be exerted by the plant to extract water from the soil (Smajstrla and Harrison, 1998). As the soil dries, water potential decreases (tension increases) and the tensiometer vacuum gauge reading increases. Conversely, an increase in soil water content (from irrigation or rainfall) decreases tension and lowers the vacuum gauge reading. In this way, a tensiometer continuously records fluctuations in soil water potential under field conditions (Smajstrla and Harrison, 1998). Noticing a blue-green or grayish green color of grass, visible footprints or tracks of machinery, and knifing or probing soil within the turfgrass root zone are all older and common practices used to determine when and how much water is needed by turfgrasses (Emmons, 2008).

Onsite weather stations located on golf courses that monitor evapo-transpiration (ET) are connected to irrigation systems and control irrigation scheduling which can save significant amounts on water costs by increasing application efficiency (Emmons, 2008). Fertigation is the application of nutrients through the irrigation system. Advantages of fertigation include more efficient plant use of nutrients, steadier growth rate, and savings on labor costs, but is not yet widely used (Emmons, 2008). A test conducted utilizing moisture sensor-controlled irrigation for reducing nitrogen leaching showed that fertigation with sensor irrigation produced the least nitrogen leaching while maintaining acceptable turfgrass growth and quality (Snyder et al., 1984). In arid regions of the U.S., droughts and population increases have resulted in water shortages and rising concern for valuable drinking water has created an interest in using effluent water reclaimed from sewage treatment systems for irrigation (Emmons, 2008). Effluent water is also referred to as recycled, non-potable, reclaimed, gray water, or waste water. Irrigation of turfgrass with effluent water is practiced on at least 10% of the golf courses in the U.S. (Balogh and Walker, 1992). The older and more common water sources for a golf course irrigation system can be a river, a stream, a lake, a reservoir, a pond, a well, groundwater, or a municipal water line (Emmons, 2008).

### **Audubon Cooperative Sanctuary Program for Golf**

As an outcome of 2003 meetings hosted by the Environmental Institute for Golf (EIFG), the philanthropic organization of the Golf Course Superintendents Association of America (GCSAA), it was learned that the golf industry did not have comprehensive data on the property features, management practices, and inputs associated with golf courses and golf course maintenance. While many individual golf courses had made changes to

make golf course operations more environmentally friendly, there was no systematic process in place to document changes that the golf industry as a whole has made to protect and enhance the environment (Lyman et al., 2012). King and Rice (2005) stated that golf courses have practiced precision agriculture long before the term was coined by the agriculture industry. There are very few ways for golf courses to communicate their sustainable practices to golfers and the public. One way, which has been around since 1991, is the Audubon Cooperative Sanctuary Program (ACSP) for golf courses (Leuzinger, 1994). There are two organizations that teamed up to create the ACSP that promotes environmentally sound stewardship on golf courses while maintaining a fiscally responsible, functional, and aesthetically pleasing experience for golfers: the United States Golf Association (USGA) and Audubon International.

The founding of the USGA on Dec. 22, 1894 marked the formal organization of American golf, establishing a centralized body to write the rules, conduct national championships and establish a national system of handicapping (a means of scoring in which players of unequal skills levels can more fairly compete with one another). The USGA also plays a prominent role as the game's historian, collecting, displaying and preserving artifacts and memorabilia at its Museum and Archives in Far Hills, N.J. (“USGA History”, n.d.). The USGA is also a leader in turfgrass research through its Green Section publication, established in 1921. Published under various titles, the *Green Section Record* magazine, which many consider the authoritative voice on golf course management, debuted in May 1963. In July 2010, the print publication changed to a weekly digital magazine offering the latest information on golf course management, turfgrass culture, environmental issues, research, and economic sustainability (“USGA

History”, n.d.). The USGA's vision for turfgrass and environmental research is to "use science as the foundation to benefit golf in the areas of turfgrass and resource management, sustainable development, and environmental protection." The USGA has funded projects at land grant universities across the country at a cost of \$40 million to improve the playing conditions and enjoyment of the game since 1920 (“USGA Turfgrass and Environmental Research”, n.d.).

Audubon International began under the name of the Audubon Society of New York State over 120 years ago (“Who We Are”, n.d.). It was first established by well-known conservationists Theodore Roosevelt, Frank Chapman, and John Burroughs, but this original Audubon group from New York ceased meeting by the mid-1930s. Then in 1987, the Audubon Society of New York State was reborn as a not-for-profit under a more general organization of environmental education and sustainable resource management. Soon thereafter, programs were designed to help further the organization’s mission to work with others to deliver high-quality environmental education and to facilitate the sustainable management of land, water, wildlife, and other natural resources in all places people live, work, and play. As this mission expanded beyond the state of New York, in 1996 the organization was re-named Audubon International to better reflect the scope of its operations. Audubon International has no formal affiliation with the National Audubon Society or the other 500-plus Audubon organizations worldwide, but it partners with many of these groups to promote common goals. Through education, technical assistance, certification, and recognition, Audubon International facilitates the implementation of environmental management practices that ensure natural resources are sustainably used and conserved. Throughout its history, Audubon International has

enrolled over 3,000 properties (including golf courses, cemeteries, ski areas, housing developments, hotels, and many others) and communities in its rigorous certification programs. The organization has been successful due in large part to its successful relationships with a wide range of interested partners, including small businesses, large corporations, academic institutions, not-for-profits, community associations, local governments, and state and federal agencies (“Who We Are”, n.d.).

The Audubon Cooperative Sanctuary Program for Golf is an award winning education and certification program that helps golf courses protect the environment and preserve the natural heritage of the game of golf. By helping to enhance the valuable natural areas and wildlife habitats that golf courses provide, improve efficiency, and minimize potentially harmful impacts of golf course operations, the program serves as vital resource for golf courses (“Audubon...”, n.d.). Since 1991, membership in the ACSP has steadily grown to include more than 2,300 golf courses in the U.S. and three dozen countries worldwide. Membership is open to private clubs, public and municipal courses, PGA sites, 9-hole facilities, resort courses, and golf residential communities. Audubon International provides a Site Assessment and Environmental Planning Form to give instruction, as well as educational information, to achieve certification in six categorical requirements of the program: 1) *Environmental Planning*; 2) *Wildlife and Habitat Management*; 3) *Chemical Use Reduction and Safety*; 4) *Water Conservation*; 5) *Water Quality Management*; and 6) *Outreach & Education*. Based on the site specific report, a plan is developed that works best for the golf course member, taking into consideration unique settings, goals, staff, budget, and time. By implementing and documenting environmental management practices in the listed categories, a golf course

is eligible for designation as a Certified Audubon Cooperative Sanctuary, thereby improving its stature and reputation. Achieving certification demonstrates an organization's leadership, commitment, and high standards of environmental management and sustainability. Re-certification of the program is required every two years in order to maintain the course's designation as a certified sanctuary ("Audubon...", n.d.). There is an annual membership fee of \$250 for certified golf courses.

### **Advantages and Disadvantages of ACSP Certification**

To some, golf courses are substantial environmental liabilities and are often criticized because they degrade water quality with runoff, use excessive amounts of water, use large amounts of chemical applications for fertilizer and pest control, and destroy natural wildlife and their habitat, while others have claimed environmental benefits for golf courses including reduced noise pollution, open green space, water purification, temperature modification, and increased wildlife habitat (Limehouse et al., 2009). Active participation in the Audubon Cooperative Sanctuary Program helps golf courses highlight their environmental efforts and promotes their sustainable management practices (Mackay and Taylor, 2007). In one case study conducted by Audubon on Carolina National Country Club in Bolivia, NC, it was reported that the course estimated the installation of a 30 acre naturalized area for wildlife cost \$10,000 as a part of their participation in the ACSP. However, the course saves \$15,000 annually from decreased labor, fertilizer, and reduced equipment usage needed to maintain the area (Limehouse et al., 2009).

A study from 2009 assessed U.S. golf course ACSP certification levels and pricing associated with certified courses. In addition to the Cooperative Sanctuary

Program, Audubon International offers the Signature Cooperative Sanctuary Program (SCSP), which provides environmental stewardship assistance to landowners and developers from the planning stages of project design (Limehouse et al., 2009). This study also considered SCSP certified courses. It was found that total golf fees are on average greater for certified courses than for noncertified courses and that golfers pay about 10% to 18% more per round to play on environmentally certified golf courses (Limehouse et al., 2009). Despite all of the positive findings, one surprising discovery is that there was no price premium for SCSP courses (presumably the highest and most stringent level of certification). One explanation may be that allowing environmentalists to play an active role in the planning of a golf course alters the sport characteristics of the course in ways that reduce the players' enjoyment of the golf course (Limehouse et al., 2009). Limehouse et al. (2009) further noted that the Carolina National Country Club reported that one important aspect of the program is communicating their participation to golfers with signage throughout the course and brochures in the pro shop. Limehouse et al. (2009) suggested that courses find it important to communicate environmental stewardship efforts to golfers who may demand playing golf on an environmentally friendly certified course.

An article in the USGA's Green Section Record from 1998 highlights positive aspects of the ACSP program which include protecting the environment for future generations, enhancing wildlife habitats, and educating staff along with golfers, students, and the general public (Ehrbar, 1998). Ehrbar is quoted in the article saying, "My original perceptions were almost unfounded. It was actually fairly easy to incorporate additional IPM ideas since it is an important element of our course management practices

already.” He was the superintendent at Old Marsh Golf Club at the time of the article and he states how simple it was to become certified in three of the six categories at his course. Along with many others in the nation, he was already performing many of the requirements of ACSP and all that was missing was documentation to comply with the ACSP (Ehrbar, 1998).

While there are several benefits to ACSP certification, there are drawbacks to the program. The registration fee for the Signature Cooperative Sanctuary Program is \$9,500 and the Audubon Cooperative Sanctuary Program for Golf annual fee is \$150 (Limehouse et al., 2009). As of 2014, the ACSP annual fee is \$250. Another possible certification deterrent is course design. According to Limehouse et al. (2009), certified courses are generally newer courses, longer in terms of yardage, and more difficult in terms of slope and course rating, which, implies that older courses and smaller courses may be at a disadvantage, or may have difficulty in attaining certification. Other drawbacks include concerns from superintendents on how they will be able to meet the requirements to develop, implement, monitor, and document all of the components necessary for certification (Ehrbar, 1998), as well as golf course member response to implementation of the ASCP program on their course (Pulaski, 1998).

### **ACSP Certification Demographics and Student Involvement in Program Adoption at University-Affiliated Courses**

In the U.S., there are 1,179 courses certified by Audubon at various levels (6.92% of all courses in the U.S.) (Limehouse et al., 2009). Of the 1,179 certified courses, 484 (2.84% of all courses in the U.S.) are fully certified in all six ACSP categories (Limehouse et al., 2009). Delaware, Colorado, New Jersey, Illinois, Florida, Oregon,

Maryland, and Connecticut all have at least 10% of the courses in their state certified at some level (Limehouse et al., 2009). Limehouse et al. (2009) also found that Delaware and Oregon have the largest percentage of fully certified sanctuaries. There are no Audubon courses in Arkansas, the District of Columbia, New Mexico, or Utah (Limehouse et al., 2009).

More than 100 colleges and universities in the U.S. offer turfgrass courses and programs (Emmons, 2008). In a 1996 USGA Green Section Record (White, 1996) reported on how university students assisted with the certification process. The group of students were primarily undergraduate Agronomy majors in the Turfgrass Management option in the Soil and Crop Sciences Department at Texas A&M University, College Station, TX. The students were members of the Texas A&M Turf Club and sought to accomplish four objectives by completing their service learning project (White, 1996). The first objective was to increase awareness about positive golf course contributions to the environment and the community. The second objective was to encourage habitat enhancement, establish IPM programs, and protect water resources. The third objective was to assist the course superintendent in fulfilling the requirements to become certified in the ACSP. The fourth objective was to enhance the educational background of club members through close interaction with golf course superintendents and application of principles learned in various college courses. The Texas A&M Turf Club students felt they could be most helpful in the ACSP certification process by gathering data and helping Champions Golf Club in Houston, TX complete a Resource Inventory (Site Assessment). Turf Club members gathered and determined pictures, golf play areas, land features, water features, and wildlife information (White, 1996). Based on the site

assessment completed by the students and Champions Golf Club was able to begin the certification process.

### **Surveys and Survey Methodology**

A survey is a way of collecting information that attempts to represent the views of the whole community or group of interest (Conducting Surveys, n.d.). A census survey questions the entire population (Conducting Surveys, n.d.). Survey research provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (Creswell, 2009). There are two research methodologies associated with surveys. There is the quantitative method, which is often associated with closed-ended question formatting. Closed-ended question format is used when researchers want respondents to provide an answer after evaluating possible answer choices (Dillman et al., 2009). Qualitative method is the other type that is associated with open-ended question formatting. The open-ended question format allows respondents to answer freely with no limitations and is particularly useful when the surveyor is seeking information about topics for which little is known (Dillman et al., 2009).

There are four sources of error that must be addressed when creating a questionnaire; sampling error, coverage error, measurement error, and nonresponse error. Sampling error is the result of attempting to survey only some of the units in the survey population, not all units. Coverage error results from the sample list neglecting to include all elements of the population, thus making it impossible to give all elements of the population an equal or known chance of being included into the sample survey. Coverage bias exists when the population with internet access and the entire population

differs on the variable of interest (Tourangeau et al., 2013). Measurement error occurs when the respondent's answer is inaccurate, imprecise, or cannot be used to compare to other respondents' answers. Nonresponse error is when a significant amount of people in a sample survey do not respond to the questionnaire and have different characteristics from those who do respond, when the characteristics are important to the study (Dillman, 2000). Salience is another topic associated with survey research that must be addressed along with the four sources of error. Salience has been defined as the association of importance and/or timeliness with a specific topic (Martin, 1994).

There are several other factors that researchers must take into consideration while composing a questionnaire. One of concern is the survey response rate and nonresponse. Nonresponse creates the potential for bias in estimates, in turn affecting survey design, data collection, estimation, and analysis (National Research Council, 2013). Response rate is not directly linked to bias, is not variable specific, and its use in field operations may distort data collection practices (National Research Council, 2013). Response rates have been steadily declining for at least the past two decades and efforts to raise response rates have used such strategies as monetary incentives or repeated attempts to contact sample members and obtain completed interviews, but these strategies increase the costs of surveys (National Research Council, 2013). Inclusion of token financial incentives, even small ones, can counter nonresponse error and enables the questionnaire to get beyond gatekeepers (anyone who has access to the survey, and blocks it or throws the survey away prior to the selected participant even knowing it was received) and increases response rate (Dillman, 2000). However, for some respondents, cash incentives may be important, but others view topic, sponsorship, or community involvement to be important

incentives (Dillman et al., 2009). Brick and Williams (2013) raised the possibility that the intrinsic rate of increase in nonresponse in U.S. household surveys might be 0.5% per year. There are three forms of nonresponse; unit nonresponse, breakoffs, and item nonresponse. Unit nonresponse is obtaining no answers to any of the survey questions (Tourangeau et al., 2013). Breakoffs are responders who start the survey without finishing it (Tourangeau et al., 2013). Item nonresponse is the failure to obtain answers to selected questions in an otherwise complete survey (Tourangeau et al., 2013).

Yet another factor that affects response in surveys is respondent burden. Two flawed but widely used indicators of respondent burden are the number of questions in the survey and the average time taken by respondents to complete those questions (National Research Council, 2013). Bradburn (1978) suggested that respondent burden includes four elements: interview length, required respondent effort, respondent stress, and the frequency of being interviewed. The simpler and shorter the questionnaire is, the higher the response rate becomes (Dillman, 2000). In general, the longer the survey, the lower the response rate (Dillman, 2000). While open-ended questions aid in understanding certain topics, especially exploratory topics, open-ended questions can be more burdensome to the respondent. However, it has been shown that respondents who do answer open-ended questions, typically respond with higher quality data (European Association of Methodology, 2011). It must be accounted for that people respond to surveys when they conclude that the rewards outweigh the costs (National Research Council, 2013). A mixed research methodology approach utilizes diverse types of data, which best provides an understanding of a research problem (Creswell, 2009). Combining the data from both approaches employs the strengths of both qualitative and

quantitative research and offers the best insight to a problem (Creswell, 2009). Dillman et al. (2009) discuss the tailored design of surveys as involving reduction of the four sources of error, developing a procedure that encourages response, and building positive social exchange. After addressing these common issues and concerns that occur with creation of questionnaires, a mode must be chosen on how to administer the survey and collect data.

There are several modes to administer a survey. These modes include personal interview, phone, mail, E-mail, and online (Salant and Dillman, 1994). All methods have their advantages, and it is up to the researcher to decide which mode suits the research and survey best (Salant and Dillman, 1994). Most online survey studies are considered a self-administered mode. That is, when no one or nothing is leading or stimulating the response of the individual selected for participation. One reason for this occurrence is that fully self-administered modes are less expensive than interviewer-administered modes and they reduce social desirability effects (National Research Council, 2013). To help with response rates of self-administered questionnaire, the survey should be respondent friendly and pre-testing with actual respondents helps the surveyor identify the commonly shared vocabulary of the study population (Dillman, 2000). While there are many methods, Sheehan stated in 2001, that there has been phenomenal growth in the internet in terms of the number of users, the number of sites online, and access availability worldwide. As of 2013, 74.4% of American households reported internet use (File and Ryan, 2014). Extending survey administration to mobile devices has also come to be considered more often due to 62% of Americans claiming to use their mobile device for non-telephony-related activities, including accessing the internet, sending/receiving e-

mail, texting, taking pictures or video, and searching maps or for directions (Horrigan, 2008). E-mail surveys have demonstrated superiority over postal surveys in terms of response speed and cost efficiency (Sheehan and Hoy, 1999). Internet surveys grew immensely in popularity during the mid-1990s into the mid-2000s, with increasing technology and increasing internet access (European Association of Methodology, 2011). Internet surveys are less expensive, allow for graphical presentation, can reduce respondent burden, are less subject to social desirability bias, and allow data to be collected almost in real time (European Association of Methodology, 2011). When utilizing a computerized survey instrument, usability needs to be addressed (Couper, 2000). While there is still coverage and sampling limitations for web based surveys, when the target population is specific, internet questionnaires can be just as appropriate as other survey modes (European Association of Methodology, 2011).

There are some disadvantages to using web surveys for research. For example, the absence of an interviewer means there is less social pressure to finish the survey, which can translate into decreased motivation to continue and increased likelihood of breaking off (European Association of Methodology, 2011). Also, e-mails can often get caught in spam filters or routed to bulk mail folders that are rarely, if ever, checked, and suspicion of e-mail invitations containing links to other websites are both reasons for nonresponse to internet surveys (European Association of Methodology, 2011). A recent study examined nonresponse correlates for self-administered questionnaires using paper and pencil personal interview versus those conducted in a computer assisted personal interview and computer assisted self-interviewing (CASI) formats. The authors found

that CASI was associated with lower response rates compared with other modes and that CASI also affected response dynamics (Kim et al., 2010).

Response rates drop for web surveys and are variable. Implementation procedures have a large influence on response rates (Dillman, 2000). In general, it has been suggested that January-March could be the most conducive to response rates (Dillman, 2000). Dillman (2000) also states that there are several reasons proposed for this time period such as people watching/listening to more media or weather restricting outside the home activity. In an online survey study conducted by Hamilton in 2003, it was concluded that half of all surveys received at least a 26% response rate, but that there was a large degree of variation among the 199 surveys sent out. This being known, there are ways to contest the characteristic low rate of response. Multiple contacts with the sample or population is essential for maximizing response (Dillman, 2000). In addition, personalization of those contacts increases response rates by up to eight percentage points (Heerwegh, 2005). Online survey response rates increase and time spent taking the survey decreases when the surveys are sent between 6:00 and 9:00 am at the beginning of the work day (Hamilton, 2003).

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CHAPTER III  
PERCEPTIONS OF THE AUDUBON COOPERATIVE SANCTUARY PROGRAM: A  
SURVEY OF SUPERINTENDENTS ON UNIVERSITY-AFFILIATED GOLF  
COURSES IN THE U.S.

**Abstract**

This project assessed U.S. university-affiliated golf courses on their certification level in regards to the Audubon Cooperative Sanctuary Program (ACSP) for golf courses and the amount of college or university student involvement with the certification process. Certification through the ACSP is designed to recognize environmental stewardship and sustainable golf course management practices. A cross-sectional, self-administered online questionnaire was administered to U.S. university golf course superintendents via an online link to the survey in an e-mail message. The population of 120 university golf course superintendents was asked to participate. Data was analyzed using Qualtrics, SPSS, SAS, and Microsoft Excel. Questions were both exploratory and inclusive as the project is both qualitative and quantitative. The participants answered 30-40 questions depending on their golf course's certification status with ACSP. The response rate of 31.9% was achieved from the 113 participants that received the questionnaire. The results show that the ACSP is known to superintendents at university golf courses. Of the participants who answered, 75% of them had heard of the ACSP before taking the survey. There is a large amount of interest in the program and in

student assistance with the program. Of those who responded, 73% would be interested or more interested in becoming certified if students were to assist. Relationships exist between the certification status of golf courses, student employment at the golf courses, university classes that visit the golf course, the number of years the superintendent has been in the golf industry, and the presence of a horticulture or turfgrass program at the affiliated college or university. A ranking analysis illustrates that labor and time are the most challenging factors for beginning the certification process. The most beneficial aspect of being certified is enhanced public perception. Student assistance was identified as a viable option for superintendents who want to become certified or want to further their certification status.

### **Introduction**

Studies have measured the negative effects golf courses can have on the surrounding environment (Limehouse et al., 2009). Leight et al. (2005) found decreased grass shrimp population levels, overall size, and percentage of gravid females over a ten year period on sites in proximity to agricultural and golf course operations in South Carolina, U.S. A study from North Carolina, U.S. showed that some golf courses can contribute to eutrophication in nearby waters due to nutrient loading (Mallin and Wheeler, 2000). In response to these findings, some golf course superintendents have altered their management programs to promote a more environmentally friendly approach. The Audubon Cooperative Sanctuary Program (ACSP) exists for golf course superintendents to communicate their sustainable turfgrass management practices to others. There are six categories of the certification process; 1) *Environmental Planning*; 2) *Wildlife and Habitat Management*; 3) *Chemical Use Reduction and Safety*; 4) *Water*

*Conservation*; 5) *Water Quality Management*; and 6) *Outreach & Education*. Audubon International has kept information on its members of the Audubon Cooperative Sanctuary Program for golf courses (not just certified golf courses) and 69% have decreased water use, with an average savings of 1.9 million gallons per course per year (“Managed...”, 2001). However, the public can still perceive golf courses as an environmental detriment rather than an environmentally sound place of recreation (Briassoulis, 2010). ACSP ensures both sustainable management practices by golf course superintendents and the education golf course users and visitors. Despite this program being a possible bridge between the public and the golf industry, only 844 (5%) of the approximately 17,000 golf courses in the U.S. are fully certified in the Audubon Cooperative Sanctuary Program (“Certified...”, n.d.). Of the U.S. golf courses involved with Audubon and its programs, the role of students during the certification process has limited documentation.

There is one reported project conducted by students at Texas A&M University in 1993. In a United States Golf Association (USGA) Green Section Record, the advisor of the Texas A&M University Turf Club, Dr. Richard H. White, describes in detail the activities of the Turf Club in regards to assisting Champions Golf Club in Houston, TX (White, 1996). The students of the club wanted to enhance perceptions about golf course management through assisting Champions Golf Club with a Resource Inventory (Site Assessment). This is the initial step of ACSP certification and must be completed prior to any changes in the golf course landscape. This example from Texas A&M is the only published information about the documentation of student involvement with the ACSP for golf certification process. There is a substantial gap in knowledge of other such student-golf course partnerships.

The objectives of this survey study were to: i) assess U.S. university-affiliated golf course ACSP certification, and ii) assess the level of, and interest in, student involvement in the certification process. In this study, a Qualtrics survey software questionnaire was used to measure the relationship between certification status and student involvement. Questions asked were both open-ended and closed-ended. The use of both quantitative and qualitative data allows for a collaborative understanding of this research problem by reinforcing common themes and/or responses.

The data compiled from this study will benefit the golf industry, academia, and Audubon International as the level of certification on university courses and level of student involvement with certified university courses has yet to be assessed. This information is available to golf courses in close proximity to colleges and universities. These golf courses can benefit from students getting involved in the ACSP certification process by becoming at least partially certified or simply including local colleges and universities in sustainable maintenance programs. Data shows that 89% of ACSP members improved cultural control methods, 92% are using pesticides with lower toxicity levels, and 80% have decreased the amount of high maintenance turfgrass areas, with an average increase in wildlife habitat of 22 acres per golf course (Limehouse et al., 2009). Information from this project will be able to advance not only turfgrass programs, but other fields of study such as biology, resource management, construction, and horticulture through independent projects, case studies, thesis research, and course laboratory exercises. Awareness of the Audubon International organization occurs with certification of golf courses and those who visit certified courses can be educated through signage, brochures, and other forms of information delivery, such as course websites.

Audubon International's working goal to deliver environmental education and help implement sustainable natural resource management in all the places people live, work and play is addressed through certification.

### **Materials and Methodology**

This study was a collection of both quantitative and qualitative data. A survey was administered that consisted of a mix of closed-ended questions and open-ended questions. This study sought to discover why so few U.S. university golf courses are Audubon Cooperative Sanctuary Program (ACSP) certified and reasoning behind certification levels. Furthermore, the survey assessed the level of student involvement and superintendents' thoughts on student involvement within the certification process.

Since this study collected quantitative and qualitative data at the same time, the study was considered a concurrent triangulation strategy (Creswell, 2009; Figure 1). The survey was cross-sectional (one time period of data collection) and was a self-administered questionnaire sent out via e-mail to the population of U.S. university golf course superintendents.

Prior to the initiation of the study, the survey questions along with the letter of consent were approved by the Institutional Review Board (IRB) at Illinois State University (protocol number 2013-0156).

The population of 120 U.S. university golf course superintendents was obtained with permission from the Professional Golfers' Association (PGA) of America. In 2012, Golf Convergence, a golf research and analysis company confirmed university golf course names and existence of the university courses. Coverage error was addressed by combining the university golf course list with a record of the superintendents' e-mail

addresses fashioned from the Golf Course Superintendents Association of America (GCSAA) membership directory, online public records, and personal phone calls to the universities. Sampling error and randomness were not an issue, as this project concerns a niche of the superintendent population and an entire U.S. university golf course superintendent population (120) were asked to participate in the survey.

While nonresponse can be reduced by incentives, none were given for this project, as discussed at an April 2013 meeting with a subsample of golf course superintendents from the Illinois chapter of GCSAA who agreed that responding should be incentive enough for most of them due to the nature of the project and how they would benefit (personal communications). To reduce respondent burden and increase the response rate, this project's questionnaire was reviewed three times by a university golf course superintendent and tailored for the golf industry. Qualtrics software is designed to assist with reducing visual design effects on the interpretability of the survey questions. Answer categories were alphabetized to avoid any primacy effects. Using skip logic provided by Qualtrics survey software (Provo, UT), participants were able to respond to anywhere from 30-40 questions on 3-5 pages based on their course's current level of ACSP certification. There are three recognized levels of certification in the ACSP; Environmental Planning (beginning the certification process), Environmental Planning Plus (certified in one or more, but not all categories), and Audubon Cooperative Sanctuary (fully certified in all six categories). For the study, the not certified status was divided into not interested and interested levels of certification. Not certified and not interested meant that the superintendent identified their golf course as not certified with the ACSP and they were not interested in the ACSP. Not certified but interested meant

that the superintendent identified their golf course as not certified with the ACSP, but they were interested in the ACSP. If the superintendent identified their course's certification level as not certified and not interested, then the superintendent had the opportunity to answer 30 questions related to ACSP and the golf course they manage. If the course's certification level was at the Environmental Planning Plus level, the superintendent had the opportunity to answer 40 questions. All other levels of certification consisted of between 30 and 40 questions. The open-ended (qualitative) to closed-ended (quantitative) question ratio again varied depending on which level of certification the superintendent's course was. Not certified and not interested course superintendents could answer a maximum of five open-ended questions and 25 closed-ended questions throughout the survey. Environmental Planning Plus course superintendents could answer a maximum of ten open-ended questions and 30 closed-ended questions. Superintendents with courses at all other levels of certification could have responded to as many as five open-ended questions and 30 closed-ended questions. After responding to the specific block of questions about ACSP and student involvement, all respondents were asked to answer questions about location, experience, golf course demographics, and maintenance.

The questionnaire was activated and the first invitation was sent out on November 15, 2013 at 6:34 am Central Standard Time (CST). The last reminder contact occurred on February 3, 2014. Salience, or timeliness of responses, was addressed by making the questionnaire available for several weeks and letting the participants know the date that responses will not be accepted. Reminder e-mails were sent early in the morning due to online survey response rates being higher early in the workday (Hamilton, 2003). These

reminders were distributed on December 3, 2013 at 7:00 am CST, December 10, 2013 at 6:00 am CST, December 17, 2013 at 6:00 am CST, December 18, 2013 at 10:20 am CST, January 6, 2014 at 5:00 am CST, January 14, 2014 at 6:00 am CST, and February 3, 2014 at 6:00 am CST to the superintendents for a total of seven reminder e-mails. Reminder contacts maximize the number of responses. In addition, thank you e-mail messages were sent on December 3, 2013 at 7:00 am CST and again to all of those who had responded after that on February 17, 2014 at 12:08 pm CST.

Nonresponse was addressed by comparing demographic variables of early and late responders. Chi-square tests of independence (Fisher's exact tests) were conducted to test for independence between early and late responders to compare the two groups statistically (Table 1). A Spearman's rank correlation analysis was performed to reveal if any linear relationships occurred between any two variables and to measure the degree of association between any two variables (Hoshmand, 1994). A test was done with original categorical answers first and then another was conducted on condensed bivariate answers. After reducing contingency tables to 2x2 and making the responses bivariate, Chi-square tests of association (Fisher's exact test) were conducted to determine if any relationships existed between certification status and any other independent variables. Chi-square tests of association were also performed using variables that showed a significant correlation, based on correlation coefficients and probability. Lastly, in order to assist with understanding superintendents' perceptions towards ACSP for golf, superintendents were asked three ranking questions (Figure 2). All answers were derived from the researcher's experience in golf course maintenance and personal contact with superintendents. For all three ranking questions, the answer rankings were subjected to a Cox multiple regression

analysis that utilized dummy variables. These tests employed the *phreg* procedure in SAS and the output determined if the answer categories were significantly different and the hazard ratio determined the odds of each answer category occurring against the reference answer in superintendent ranking. Data was analyzed using Qualtrics, SPSS 20.0, SAS 9.3 and Microsoft Excel. All tests of significance were two tailed and a *p* value of  $\leq 0.05$  was considered statistically significant.

### **Results and Discussion**

Of the 120 questionnaires that were sent via e-mail, 113 were received by the superintendent at the specific E-mail address. The seven that failed were most likely due to personalization of spam or junk folder settings (European Association of Methodology, 2011). Of the received 113 questionnaires, 36 (31.9%) were returned by respondents. Of the 36 returned questionnaires, 27 finished the survey (received an automated thank you message at the completion of the questionnaire). Nine respondents broke off and did not finish the survey. Nonresponse bias was addressed by collapsing all multi-valued variables to bivariate in order to minimize the number of cells in contingency tables of the chi-square tests of independence. Lindner et al. (2001) suggest that nonresponse be addressed when less than 85% response rate is achieved. Early responders were defined as the first 50% of respondents and late responders were defined as the last 50% of respondents (Lindner et al., 2001). Late responders were found to be similar to nonrespondents so late respondents can be used to estimate responses of nonrespondents (Miller and Smith, 1983). If no statistical differences are found between early and late responders, then those who responded can be generalized to the larger group (Miller and Smith, 1983). Fisher's Exact Tests were used to adjust when cell expected values were

less than five in the two by two tables. There were no significant differences discovered between any of the evaluation questions and time of response,  $p < 0.05$  (Table 1).

The USGA Green Section Regional Map (Figure 3) was used to locate the region of response, there were eight responses from the North Central region, six responses from the Southeast region, five responses from the Northwest region, three responses from the Mid Continent region, two responses from both the Southwest and Mid-atlantic regions, one response from the Northeast, and zero responses from the Florida region. This made for a total of 27 responses for this question. Twenty-one states were represented and had at least one response. Of those states that responded, Michigan, Illinois, Maryland, and South Carolina had two responses each and North Carolina had three responses. Number of years in the golf industry was reported with 38.4% of respondents having less than 20 years of experience and 61.6% of respondents having 20 years of experience or more. The number of years as superintendent at their current course was reported with 81.5% of respondents at less than 20 years and the remaining 18.5% of respondents at 20 years or more. Of respondents, 78% were members of the Golf Course Superintendents Association of America (GCSAA). Most of those who responded (85%) reported the distance from the college/university to the course they manage to be between zero and four miles. The acreage of university golf courses (average of  $153.5 \pm 65.7$  acres) ranged from 20 to 250 acres. The age of university golf courses (average  $43.2 \pm 24.8$  years) ranged from 1 to 85 years. Thirty-seven percent of respondents reported having 25,000-34,999 rounds played at their course per year (Table 3). Fifty-two percent of the golf courses are open year round, 26% are open six to eight months, and 22% are open nine to eleven months. Table 4 displays the number of holes on the golf course that the

superintendents currently manage. The other category consisted of two responses, one reported to have an 18-hole course with a four hole practice area and the other reported to have a 21-hole golf course. A majority (52%) of golf courses reported having an 18-hole course. Table 5 shows annual maintenance budget for the superintendents' golf course. Eighty-five percent of respondents reported having 10-24 golf course maintenance staff during peak season.

According to the 2013 Compensation and Benefits Report, conducted every other year by the GCSAA, the average age of golf course superintendents is 46 years. Superintendents have spent 15.4 years as a superintendent, on average, and have held their current position for an average of 9.7 years. They also reported managing a crew of 21 people. Over 70% of GCSAA members that responded to the report stated that they were responsible for 18 holes on their golf course. GCSAA also indicated that an 18-hole golf facility averaged between 150-200 acres of total land in 2002 and that urban courses averaged 110-120 acres (Bradbury, 2005). The National Golf Foundation measured the average number of rounds played per 18-hole golf courses to be around 32,000 in 2012. Demographic results of this current research are in alignment with the 2013 Compensation and Benefits Report of the GCSAA.

When asked if they were aware of the Audubon Cooperative Sanctuary Program for golf courses prior to the survey, 75% of respondents reported that they had heard of the program prior to the survey. Table 6 depicts respondents' golf course certification status with ACSP. Seventy-three percent of respondents reported that they would be interested or more interested in becoming ACSP certified if students were to assist in the certification process. This finding indicates that there is an interest from superintendents

at university-affiliated golf courses in students helping with the ACSP certification process. More than half (54%) of the 26 responding superintendents said that the college or university their golf course is affiliated with has a horticulture or turfgrass program. Nearly 60% of superintendents reported having classes visit their golf course as part of course curriculum and each ACSP status was represented. These results indicate that at a majority of university-affiliated golf courses, an academic and industry relationship exists that already involves student interaction. When asked which classes visited, class name and levels were similar across all respondents (Table 7). The classes that were listed covered topics of golf course management, natural sciences, and applied science courses.

Over 85% of university affiliated golf course superintendents employ students at their golf courses. Superintendents were also asked if any research was being conducted on their golf course. Forty-four and a half percent of respondents reported having research currently being conducted on their golf course and all superintendents who had research answered what research is being conducted (Table 8).

The Spearman's correlation analysis produced significant findings (Table 2). Superintendent's ACSP status and interest in student help were strongly correlated,  $r(24) = -0.64, p < 0.001$ . ACSP status and presence of a horticulture or turf program at the affiliated university were also strongly correlated,  $r(24) = -0.57, p < 0.01$ . Years in the golf industry and the number of surveys superintendents respond to per year were strongly correlated,  $r(24) = 0.42, p < 0.05$ . The number of surveys superintendents respond to per year and university class visitation on the golf course were strongly correlated,  $r(23) = 0.55, p < 0.01$ . Presence of a horticulture or turf program at the

affiliated university and presence of current research on the golf course were strongly correlated,  $r(24) = 0.55, p < 0.01$ .

Chi-square tests of association (Fisher's exact tests) produced detailed relationships among several responses (Table 9). All variables were condensed to bivariate in order to minimize the number of cells in contingency tables of the chi-square tests. These tests also determined whether observed values for the cells deviate significantly from the corresponding expected values for those cells in the tables (George and Mallery, 2012). These relationships helped to determine variables that affect certification in the ACSP program. The relationship between ACSP status (not certified or certified) and years in the golf industry (0-19 years or 20+ years) was significant,  $X^2(1, N = 25), p < 0.01$ . Superintendents with 20 or more years of experience in the golf industry were more likely to have a certified status (Environmental Planning, Environmental Planning Plus, or Audubon Cooperative Sanctuary). The relationship between ACSP status and presence of a horticulture or turf program at the affiliated university was significant,  $X^2(1, N = 26), p < 0.05$ . Superintendents at golf courses with a horticulture or turf program at the affiliated university were more likely to have a certified status. The relationship between presence of a horticulture or turf program at the affiliated university and presence of current research on the golf course was significant,  $X^2(1, N = 26), p < 0.01$ . Superintendents at golf courses that have a horticulture or turf program were more likely to be conducting research on their golf courses. The relationship between presence of a horticulture or turf program at the affiliated university and number of rounds per year (low =  $\leq 34,999$ , high =  $\geq 35,000$ ) was significant,  $X^2(1, N = 26), p < 0.05$ . Superintendents at golf courses with a

horticulture or turf program at the affiliated university were more likely to have a high number of rounds per year.

The regression rankings analysis explains how superintendents feel about certain areas of ACSP (Table 10). The reference answer used in the tests varied across the different questions and was the answer ranked lowest by superintendents. This is necessary to avoid perfect multicollinearity, that is, when one or more independent variable(s) is an exact linear combination of the others (Hashmand, 1994). The “other” response was left out with only one response ranking it as the number one reason for not being certified and stated, “Never heard of this before.” When compared to “value” as a reference, “cost” was most often ranked as the number one reason for not being certified by superintendents at not certified golf courses. “Cost” was 12.5 times more likely to be ranked number 1 than “value”. The cost of membership to ACSP is \$250 per year. Adoption of certain categories within the program could be costly initially if they are not already established practices. A case study in North Carolina showed a \$10,000 cost for initial input of low maintenance wildlife area on one golf course. The golf course now saves \$15,000 annually due to the installation of this area (Limehouse et al., 2009).

“Time” was most often ranked as the number one reason for not being certified by superintendents at not certified golf courses and was significantly different than “value” (Table 11). “Time” was also 100 times more likely to be ranked as the number one most challenging factor about beginning the certification process. The “other” response was left out with only one respondent ranking it as the number one most challenging factor about beginning the certification process and stated, “documentation.”

It could not be determined what superintendents ranked most beneficial about ACSP certification on not certified golf courses, except for “enhanced public perception” (Table 12). “Enhanced public perception” was the only factor considered different than the reference of “increased wildlife”. “Enhanced public perception” was 2.4 times more likely to be ranked as the most beneficial area of ACSP certification when compared to “increased wildlife”. All other factors were not significantly different than the reference variable.

“Enhanced public perception” was most often ranked as the number one most beneficial factor of ACSP certification, was significantly different than “wildlife”, and was 15 times more likely to be ranked as the number one factor than “wildlife” by superintendents at certified golf courses (Table 13). “Decreased long-term maintenance costs” was ranked as the next most beneficial factor by superintendents, followed by “better water quality”.

A ranking analysis for areas of certification that would be most detrimental to golf courses was conducted, but it could not be determined what superintendents ranked as most detrimental about certification as the factors were not significantly different. It could be difficult for superintendents to pinpoint the most detrimental factor, or ranking of the factors could vary based on course characteristics. The ranking factors were ACSP membership costs, decline in member satisfaction, effect on golf play, high initial costs, increase in maintenance problems, increased time involvement, and “other” with the option to define what “other” means.

Responses to open-ended questions produced information on how superintendents felt about ACSP. “Value”, “budget”, “public relations”, “public perception”,

“sustainable operations”, and “environmental impact” were common phrases emphasized by superintendents while answering some of the open-ended questions (Table 14).

### **Conclusion**

From the results of the survey, it can be concluded that interest exists in the Audubon Cooperative Sanctuary Program at U.S. university-affiliated golf courses. Enhanced public perception was the most beneficial factor of the certification program. Responses revealed that public relations and sustainable operations were the main reasons that superintendents at certified courses became certified. There is also interest in student assistance from superintendents at almost all five levels of ACSP certification. While cost was the biggest reason for not being certified, it was reported by superintendents at ACSP certified courses that time and labor involved are actually the most difficult obstacles to overcome.

Overall, the ACSP certification is accomplishing what superintendents want; enhanced public perception and more sustainable management practices. The problem of low ACSP adoption rates needs to be addressed, and this study reveals how that can be addressed at university-affiliated golf courses in the U.S.

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## CHAPTER IV

### CONCLUSIONS AND RECOMMENDATIONS

The goals of this study were to determine the level of ACSP certification status of university-affiliated golf courses and to identify superintendent's opinions of student involvement in the certification process. It can be concluded that interest exists in the Audubon Cooperative Sanctuary Program at U.S. university-affiliated golf courses. According to golf course superintendents at ACSP certified courses, enhanced public perception was the most beneficial factor of the certification program. Responses to open-ended questions revealed that public relations and sustainable operations were the main reasons that superintendents at certified courses became certified. There is also interest in student assistance from superintendents at university-affiliated courses who were both ACSP certified and interested in expanding their level of certification, and who were not at ACSP certified courses, but were interested in starting the certification process. While there are several superintendents that said cost was the biggest reason for not being certified, it was reported by superintendents at ACSP certified courses that time and labor involved are actually the most difficult obstacles to overcome.

If the survey was conducted again, probing or motivational statements prior to open-ended questions could be used to increase response rate of those questions. Also, providing an incentive for those who respond would probably increase response rate. For

example, respondents would be placed for a drawing to waive their first ACSP membership fee in order to increase response rate. Personalization of contact letters could also increase response rate slightly.

Overall, the ACSP certification is accomplishing enhanced public perception and more sustainable management practices. Perhaps a marketing strategy needs to be developed to let superintendents know that Audubon International staff can work with their course and its characteristics to reduce possible initial installation costs of the ACSP and that long-term maintenance costs decrease with certification. Another possible solution to the time and labor obstacles could be the involvement of students from nearby colleges and universities. Hopefully, this study will increase the amount of science involved with the certification process, and increase the adoption rate of the ACSP.

**Table 1.** Fisher’s exact tests of independence for early and late responders of the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S. with no significant differences

Evaluation question	Response	Early	Late	Fisher’s exact (2-sided) sig. <sup>a</sup>
Heard of ACSP	Yes	38.9%	36.1%	1.000
	No	13.9%	11.1%	
Certification status of golf course	Certified	6.2%	18.8%	0.220
	Not certified	43.8%	31.2%	
USGA regional location	North	33.3%	25.9%	0.440
	South	14.8%	25.9%	
Experience in golf industry	0-19 years	7.7%	30.8%	0.051
	20+ years	38.5%	23.2%	
Member of GCSAA	Yes	29.6%	48.1%	0.077
	No	18.5%	3.7%	
Responses to surveys per year	0-5	30.8%	34.6%	1.000
	6+	15.4%	19.2%	
Rounds on course per year	≤34,999	33.3%	37.0%	1.000
	≥35,000	14.8%	14.8%	
Annual income	≤\$999,999	40.7%	48.1%	0.596
	≥\$1,000,000	7.4%	3.7%	
Academic classes visit golf course	Yes	14.8%	25.9%	0.440
	No	33.3%	25.9%	

<sup>a</sup>  $p < 0.05$  = significant difference.

**Table 2.** Spearman’s rank correlation coefficients (r) between bivariate variables of the ACSP status from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Variable	Certified or not	Years in golf industry	Interest in student involvement	Presence of horticulture or turfgrass program	Conducting research on course
Correlation coefficients (r)					
Certified or not	--	0.56**	-0.41*	-0.45*	-0.40*
Years in golf industry		--	ns	ns	ns
Interest in student involvement			--	ns	ns
Presence of horticulture or turfgrass program				--	0.55**
Conducting research on course					--

\*, \*\* are significant at  $p < 0.05$  and  $p < 0.01$ , respectively.

ns = non-significant.

**Table 3.** Number of rounds of golf played annually at university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Number of rounds played	# of responses	% of respondents
≤ 14,999	4	15%
15,000 – 24,999	5	19%
25,000 – 34,999	10	37%
35,000 – 44,999	3	11%
45,000 – 54,999	3	11%
55,000 – 64,999	1	4%
≥ 65,000	1	4%

**Table 4.** Number of holes at university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Number of holes	# of responses	% of respondents
< 9	1	4%
9 holes	5	19%
18 holes	14	52%
27 holes	1	4%
36 holes	4	15%
Other	2	7%

**Table 5.** Annual maintenance budget at university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Annual maintenance budget	# of responses	% of respondents
< \$250,000	7	26%
\$250,000 - \$499,999	8	30%
\$500,000 - \$999,999	9	33%
\$1,000,000 - \$1,499,999	1	4%
> \$1,500,000	2	7%

**Table 6.** ACSP status at university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

ACSP status	# of responses	% of respondents
Not certified and not interested	11	34%
Not certified but interested	13	41%
Environmental planning (beginning the certification process)	4	13%
Environmental planning plus (certified in one or more, but not all categories)	2	6%
Audubon cooperative sanctuary (certified in all categories)	2	6%

**Table 7.** Responses to which classes visit your golf course (open-ended) from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

ACSP status	Class name or number
Not certified and not interested	Golf class; Winter survival; Movement science; Geology; Biology; Ecology; Environmental sustainability; Physical education; College of vocational technology
Not certified but interested	Hort 377; Soils; Turfgrass undergraduate and graduate; Arborist; Wildlife; Golf class; Turf; PGM; Forage crops; Intro turfgrass and urban forestry; Professional golf management classes
Environmental planning (beginning the certification process)	Turfgrass – 300 level and Intro to Horticulture; Turf; Entomology; Woody plants; Landscape design; Soils
Environmental planning plus (certified in one or more; but not all categories)	Plant pathology; Introduction to turfgrass; Professional golf management introductory; Hort 212; Hort 213; Hort 412; Hort 433; PLPA 406
Audubon cooperative sanctuary (certified in all categories)	Soils; Turf; Ag TM; Agronomy

**Table 8.** Research being conducted on university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

ACSP status	Reported research
Not certified and not interested	Endangered from survival and enhanced habitat found on course; Bt effect on frogs and relationship to mosquito population reductions; Poa controls; Leachate of chemicals and fertilizers from golf course turfgrass
Not certified but interested	Poa annua control; Khaki weed control; Wetting agent evaluation; Weeds; Bugs; Project pollinator; Chemicals for Poa management; Grub worm treatment
Environmental planning (beginning the certification process)	Use of moisture meters and weather station forecasting; Wetting agents; Flowers; Trees; Turf
Environmental planning plus (certified in one or more; but not all categories)	Herbicide and fertility trial for control of annual bluegrass with the use of methiozolin; Poa annua control and spring dead spot control at this time
Audubon cooperative sanctuary (certified in all categories)	Large patch trial; Snow mold; Poa annua; Aerification; Many others

**Table 9.** Chi-square tests of independence: ACSP certification status vs. independent variables from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Variable		ACSP certification status <sup>a</sup>		Sig. <sup>b</sup>
		Not certified	Certified	
Years in golf industry	0-19 years	40.0%	0.0%	0.008
	20+ years	28.0%	32.0%	
Presence of horticulture/turf program and research	Yes	14.8%	22.2%	0.025
	No	55.6%	7.4%	
Interested in student help	Yes	42.3%	30.8%	0.062
	No	26.9%	0.0%	

<sup>a</sup> Percent of respondents.

<sup>b</sup> Significance from test (2-sided).

**Table 10.** Cox multiple regression analysis on reasons for not being certified by superintendents at not ACSP certified university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Factor	Average rank	<i>p</i> value <sup>a</sup>	Odds ratio
Cost	1.91	0.0001*	12.549
Labor involved	2.945	0.0001*	6.649
Application process	3.12	0.0009*	4.968
Time	3.215	0.0011*	4.810
Value <sup>b</sup>	4.165	nd	nd

<sup>a</sup> Significance from Cox multiple regression (2-sided).

<sup>b</sup> Reference variable.

\* Significant difference from value at  $p < 0.05$ .

nd = not-determined.

**Table 11.** Cox multiple regression analysis on what is most challenging about beginning the certification process by superintendents at ACSP certified university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Factor	Average rank	<i>p</i> value <sup>a</sup>	Odds ratio
Time	1.417	0.0001*	100.228
Labor involved	3.083	0.0033*	8.598
Cost	3.417	0.0190*	5.339
Application process	3.000	0.0565	3.920
Value <sup>b</sup>	4.917	nd	nd

<sup>a</sup> Significance from Cox multiple regression (2-sided).

<sup>b</sup> Reference variable.

\* Significant difference from value at  $p < 0.05$ .

nd = not-determined.

**Table 12.** Cox multiple regression analysis on areas of ACSP certification most beneficial to university-affiliated golf courses by superintendents at not ACSP certified university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Factor	Average rank	<i>p</i> value <sup>a</sup>	Odds ratio
Enhanced public perception	2.945	0.0168*	2.447
Decreased long-term maintenance costs	3.135	0.4646	1.334
Reduced chemical application	3.370	0.1037	1.834
Better water quality	3.510	0.1316	1.754
Reduced water usage	3.675	0.6427	1.201
Increased wildlife <sup>b</sup>	4.355	nd	nd

<sup>a</sup> Significance from Cox multiple regression (2-sided).

<sup>b</sup> Reference variable.

\* Significant difference from increased wildlife at  $p < 0.05$ .

nd = not-determined.

**Table 13.** Cox multiple regression analysis on areas of ACSP certification most beneficial to university-affiliated golf courses by superintendents at ACSP certified university-affiliated golf courses from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Factor	Average rank	<i>p</i> value <sup>a</sup>	Odds ratio
Enhanced public perception	2.167	0.0002*	15.089
Decreased long-term maintenance costs	2.417	0.0007*	11.351
Better water quality	3.250	0.0100*	6.090
Reduced chemical application	3.833	0.0265*	4.759
Reduced water usage	4.000	0.0440*	4.209
Increased wildlife <sup>b</sup>	5.333	nd	nd

<sup>a</sup> Significance from Cox multiple regression (2-sided).

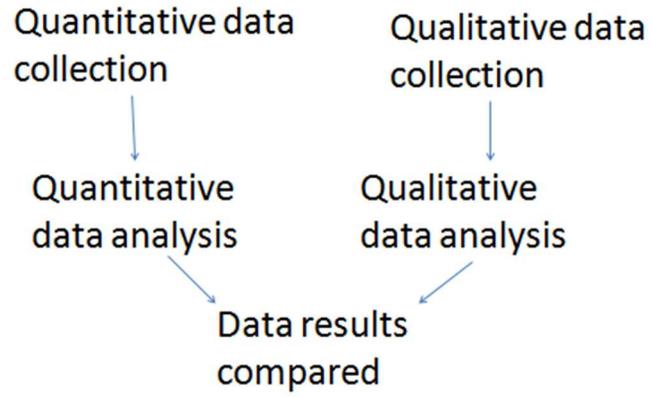
<sup>b</sup> Reference variable.

\* Significant difference from increased wildlife at  $p < 0.05$ .

nd = not-determined.

**Table 14.** Responses to open-ended questions about ACSP from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

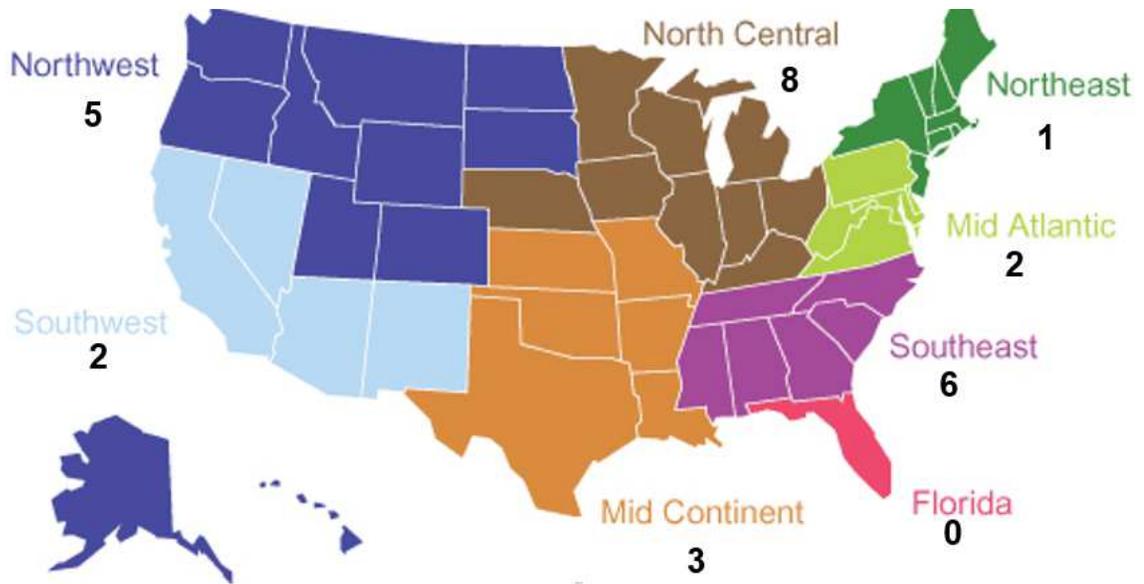
ACSP status	Question	Responses
Not certified and not interested	Are there any other reasons for not being certified?	Duplication of GCSAA program; Work with extension services; Danger to aircraft; Don't need others to tell us what we already know; Conflicts with university environmentalists
	Why are you not interested in becoming ACSP certified?	Not sure what it takes; No value; Airport location; No advantage; It is a joke; Budget
Not certified; but interested	What is/are your reason(s) for your interest in ACSP for golf courses?	<b>Public relations</b> ; Environment; Always looking for sustainable practices; Survey; Curious; <b>Public relations</b> ; Learn more about it; It has merit - shows the value of the course as a wildlife area
	Are there any other reasons for not being certified?	We work with Wildlife and County Extension service in Las Cruces; Never heard of it
	Do you plan on becoming certified in the ACSP?	(1/12) 8% said yes; (11/12) 92% said maybe; (0/12) said no
Environmental Planning	Are you interested in becoming fully or partially certified with ACSP?	3/4 (75%) plan on becoming fully certified
	Why is full certification not possible for your course?	Limitations in the overall landscape and playability; Not enough commitment from higher ups
	What year did you begin the certification process?	2012; 2005; 2012; 1995
Environmental Planning Plus	Do you plan on achieving full certification; why or why not?	I plan to achieve full certification for the previously mentioned public relations value. There are very minor changes that are required to our programs. Almost everything needed for certification is there except the documentation; Only if I can get a better equipment wash pad. I believe our current situation would prevent full certification
	What year did you begin the certification process?	2010; 1998
	What is/are your reason(s) for being partially certified?	Finding time to complete the documentation; Grad student who was heading the effort graduated and moved on and I have not followed up
	If you were to go through the certification process again; what would you do differently?	I would delegate the categories and documentation to more of my staff; Go ahead and get everything complete and not let it drag on
Partially and fully certified (Environmental Planning; Environmental Planning Plus; and Audubon Cooperative Sanctuaries)	What is/are your reason(s) for becoming certified with ACSP for golf courses?	To help <b>public perception</b> of golf course management practices along with working toward a more sustainable operation; I am familiar with the program and know that I am a steward of the land. As time becomes available/ I will provide all the documentation to become fully certified. I think this will be a great <b>public relation</b> tool for the university; Previous superintendent was already pursuing when I arrived; To lower the <b>environmental impact</b> the golf course has property; Show our community that our golf course has a positive <b>impact to the environment</b> . we care about the environment and wanted others to know about it; Management company with high expectations for environment seems like a "good" thing to be a part of/ a good label
	Who is/was most involved with the completion of the certification process for all three certification statuses	2 of 8 answered college or university students while the remaining 6 replied that they themselves (superintendent) was most involved



**Figure 1.** Concurrent Triangulation Strategy derived from Creswell, 2009 utilized for the flow of quantitative and qualitative research completed for the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

Question	Answers provided
Please rank your reason(s) for not being certified by clicking on each item, holding & dragging into the appropriate ranking (1 = most prominent reason, 2 = next reason, and so on). (not ACSP certified)	Application process Cost Labor involved Time Value Other
Please rank what is most challenging about beginning the certification process by clicking on each item, holding & dragging into the appropriate ranking (1 = most challenging, 2 = next most challenging, and so on). (ACSP certified)	Application process Cost Labor involved Time Value Other
In order of importance, please rank which areas of ACSP certification would be most BENEFICIAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most beneficial, 2 = next most beneficial, and so on).	Better water quality Decreased long-term maintenance costs Enhanced public perception Increased wildlife Reduced chemical application Reduced water usage Other
In order of importance, please rank which areas of ACSP certification would be most DETRIMENTAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most detrimental, 2 = next most detrimental, and so on).	ACSP membership costs Decline in golf course member satisfaction Effect on golf play High initial costs Increase in maintenance problems Increased time involvement Other

**Figure 2.** Ranking questions from the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

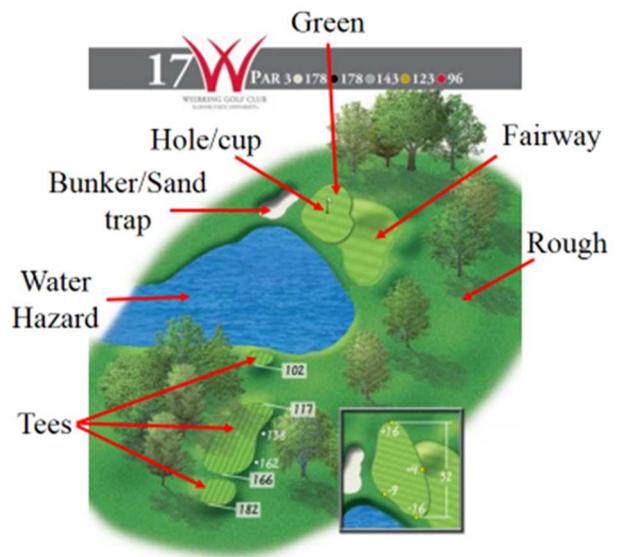


**Figure 3.** USGA green section regional map with corresponding number of responses from each region to the 2014 Illinois State University survey of superintendents on university-affiliated golf courses in the U.S.

APPENDIX A

EXAMPLES OF A GOLF COURSE LAYOUT AND HOLE AT THE ILLINOIS STATE UNIVERSITY GOLF COURSE AT WEIBRING GOLF CLUB FROM

[HTTP://WWW.ISUGOLF.COM/SCORECARD/](http://www.isugolf.com/scorecard/)



APPENDIX B

SURVEY CONTACT LETTERS (LETTER OF CONSENT, REMINDERS, AND  
THANK YOU MESSAGES) SENT TO UNIVERISTY-AFFILIATED GOLF  
COURSE SUPERINTENDENTS FOR THE 2014 ILLINOIS STATE  
UNIVERSITY SURVEY OF SUPERINTENDENTS ON  
UNIVERSITY-AFFILIATED GOLF COURSES  
IN THE U.S.

Dear Fellow Greens Keepers,

As a graduate student at Illinois State University in the Department of Agriculture, I am conducting a survey regarding Audubon Cooperative Sanctuary Program (ACSP) for golf on U.S. university golf courses. Certification through the ACSP is designed to recognize environmental stewardship and sustainability. There are six categories of the program:

1. Environmental planning
2. Wildlife and habitat management
3. Chemical use reduction and safety
4. Water conservation
5. Water quality management
6. Outreach and education

Of particular interest to my committee and me is the level of certification and amount of student involvement during the certification process on your course. We hope to gain insight on the interaction between students and golf courses within the ACSP certification process and create a model that incorporates students from local colleges and universities into the certification procedure.

We invite you to participate in this confidential on-line questionnaire that will take approximately 10 minutes to complete. Participation in this study is voluntary and confidential. All E-mail addresses were obtained with consent from the GCSAA directory or were retrieved via public records. During the survey, you may skip questions you are not comfortable answering and/or stop responding at any time. The risk is no greater than everyday life as the questions are not personal. Information and data will be kept

confidential in a locked office and will be reported in aggregate response for no traceability. We will use the data and information to assist me with my graduate research project, and after publishing my findings, the data and information will be destroyed.

By clicking on the hyperlink to the survey below, you agree to (1) voluntarily participate in the survey, (2) confirm that you are at least 18 years of age and (3) that you are currently employed as a golf course superintendent.

If you have any questions or comments, please contact me at [jjkuban@ilstu.edu](mailto:jjkuban@ilstu.edu) or contact Associate Professor of Horticulture Dr. David Kopsell at [dkopsel@ilstu.edu](mailto:dkopsel@ilstu.edu)

Thank you for your time and response!

Jacob Kuban, Department of Agriculture Graduate Assistant

\*If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Research Ethics & Compliance Office at Illinois State University at (309) 438-2529

Follow this link to the Survey:

[\\${1://SurveyLink?d=Take the Survey}](#)

Or copy and paste the URL below into your internet browser:

[\\${1://SurveyURL}](#)

Follow the link to opt out of future e-mails:

[\\${1://OptOutLink?d=Click here to unsubscribe}](#)

Fellow Greens keeper,

Two weeks ago a Qualtrics online questionnaire seeking your perceptions about the Audubon Cooperative Sanctuary Program (ACSP) and amount of student involvement during the certification process was sent to you via E-mail. This E-mail message serves as a friendly reminder to invite you to participate in this confidential on-line questionnaire that will take only 10 minutes to complete.

My committee and I are especially grateful for your help because it is only by asking people like you to share your thoughts and experiences that we can begin to understand ACSP adoption and student involvement with the certification process on college and university golf courses. You are part of a special population group of college and/or university golf course superintendents.

Remember that by clicking on the hyperlink to the survey, you agree to (1) voluntarily participate in the survey, (2) confirm that you are at least 18 years of age and (3) that you are currently employed as a golf course superintendent.

If you have any questions or comments, please contact me at [jjkuban@ilstu.edu](mailto:jjkuban@ilstu.edu) or contact Associate Professor of Horticulture Dr. David Kopsell at [dkopsel@ilstu.edu](mailto:dkopsel@ilstu.edu)

Thank you again for your time and response!

Jacob Kuban, Illinois State University Department of Agriculture Graduate Assistant

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Fellow Greens keeper,

Three weeks ago you were sent an E-mail with a survey link to a Qualtrics online questionnaire seeking your perceptions about the Audubon Cooperative Sanctuary Program (ACSP) and amount of student involvement during the certification process. This E-mail serves as a friendly reminder to invite you to participate in this confidential on-line questionnaire that will take only 10 minutes to complete.

My committee and I are especially grateful for your help because it is only by asking people like you to share your thoughts and experiences that we can begin to understand ACSP adoption and student involvement with the certification process on college and university golf courses. We greatly value your response. You are part of a special population group of college and/or university golf course superintendents.

Remember that by clicking on the hyperlink to the survey, you agree to (1) voluntarily participate in the survey, (2) confirm that you are at least 18 years of age and (3) that you are currently employed as a golf course superintendent.

If you have any questions or comments, please contact me at [jjkuban@ilstu.edu](mailto:jjkuban@ilstu.edu) or contact Associate Professor of Horticulture Dr. David Kopsell at [dkopsel@ilstu.edu](mailto:dkopsel@ilstu.edu)

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During the survey, you may skip questions you are not comfortable answering and/or stop responding at any time. The risk is no greater than everyday life as the questions are not personal. Information and data will be kept confidential in a locked office and will be reported in aggregate response for no traceability. We will use the data and information to assist me with my graduate research project, and after publishing my findings, the data and information will be destroyed.

Fellow Greens keeper,

One month ago you were sent an E-mail with a survey link to a Qualtrics online questionnaire seeking your perceptions about the Audubon Cooperative Sanctuary Program (ACSP) and amount of student involvement during the certification process. This E-mail serves as a friendly reminder to invite you to participate in this confidential on-line questionnaire that will take only 10 minutes to complete.

My committee and I are especially grateful for your help because it is only by asking people like you to share your thoughts and experiences that we can begin to understand ACSP adoption and student involvement with the certification process on college and university golf courses. We greatly value your response. You are part of a special population group of college and/or university golf course superintendents.

Remember that by clicking on the hyperlink to the survey, you agree to (1) voluntarily participate in the survey, (2) confirm that you are at least 18 years of age and (3) that you are currently employed as a golf course superintendent.

If you have any questions or comments, please contact me at [jjkuban@ilstu.edu](mailto:jjkuban@ilstu.edu) or contact Associate Professor of Horticulture Dr. David Kopsell at [dkopsel@ilstu.edu](mailto:dkopsel@ilstu.edu)

Thank you again for your time and response!

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\*If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Research Ethics & Compliance Office at Illinois State University at (309) 438-2529

Participation in this study is voluntary and confidential. All E-mail addresses were obtained with consent from the GCSAA directory or were retrieved via public records.

During the survey, you may skip questions you are not comfortable answering and/or stop responding at any time. The risk is no greater than everyday life as the questions are not personal. Information and data will be kept confidential in a locked office and will be reported in aggregate response for no traceability. We will use the data and information to assist me with my graduate research project, and after publishing my findings, the data and information will be destroyed.

Fellow Greens keeper,

Thank you so much for your response to my survey on the Audubon Cooperative Sanctuary Program! My committee and I are especially grateful for your help and please accept our sincere thanks.

Jacob Kuban, Illinois State University Department of Agriculture Graduate Assistant

APPENDIX C  
SURVEY QUESTIONNAIRE SENT TO UNIVERSITY-AFFILIATED GOLF  
COURSE SUPERINTENDENTS FOR THE 2014 ILLINOIS STATE  
UNIVERSITY SURVEY OF SUPERINTENDENTS ON  
UNIVERSITY-AFFILIATED GOLF COURSES  
IN THE U.S.

ACSP Certification and Student Involvement

Q130 Have you heard of the Audubon Cooperative Sanctuary Program (ACSP) for golf courses prior to this survey?

- Yes (1)
- No (2)

If Yes Is Selected, Then Skip To What is your golf course certificatio...

Q113 Please click on the document below if you would like to learn more about ACSP for golf. Acsp fact sheet

Q14 What is your golf course certification status in regards to ACSP? (This target question will direct you to a series of questions related to the status selected)

- Not certified and not interested (1)
- Not certified but interested (2)
- Environmental Planning (beginning the certification process) (3)
- Environmental Planning Plus (certified in one or more, but not all categories) (4)
- Audubon Cooperative Sanctuary (fully certified in all categories) (

Answer If What is your golf course certification status in regards ... Not certified and not interested Is Selected

Q17 Please rank your reason(s) for not being certified by clicking on each item, holding & dragging into the appropriate ranking (1 = most prominent reason, 2 = next reason, and so on).

- \_\_\_\_\_ Application Process (1)
- \_\_\_\_\_ Cost (2)
- \_\_\_\_\_ Labor involved (3)
- \_\_\_\_\_ Time (4)
- \_\_\_\_\_ Value (5)
- \_\_\_\_\_ Other (6)

Q88 Are there any other reasons for not being certified?

Q18 Why are you not interested in becoming certified in the Audubon Cooperative Sanctuary Program for golf courses?

Q26 Would you be interested in becoming ACSP certified if students were to assist in the certification process?

- Yes (1)
- No (2)

Q103 Does your golf course have an affiliation with a college or university?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Does your golf course currently emplo...

Q107 What is the name of the college or university your golf course is affiliated with?

Q20 Does the college or university your golf course is affiliated with have a Horticulture or Turf grass program?

- Yes (1)
- No (2)
- Unknown (3)

Q19 How many college or university classes visit your golf course as part of learning curriculum?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 or more (5)

If 0 Is Selected, Then Skip To Does your golf course currently emplo...

Q21 Which classes visit your golf course?

Q22 Does your golf course currently employ college or university students?

- Yes (1)
- No (2)

Q22 Is research being conducted by faculty and/or students at the course you manage?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Some advantages to becoming ACSP cert...

Q23 What research is being done?

Q24 In order of importance, please rank which areas of ACSP certification would be most BENEFICIAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most beneficial, 2 = next most beneficial, and so on).

- \_\_\_\_\_ Better water quality (1)
- \_\_\_\_\_ Decreased long-term maintenance costs (2)
- \_\_\_\_\_ Enhanced public perception (3)
- \_\_\_\_\_ Increased wildlife (4)
- \_\_\_\_\_ Reduced chemical application (5)
- \_\_\_\_\_ Reduced water usage (6)
- \_\_\_\_\_ Other (7)

Q25 In order of importance, please rank which areas of ACSP certification would be most DETRIMENTAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most detrimental, 2 = next most detrimental, and so on).

- \_\_\_\_\_ ACSP membership costs (1)
- \_\_\_\_\_ Decline in golf course member satisfaction (2)
- \_\_\_\_\_ Effect on golf play (3)
- \_\_\_\_\_ High initial costs (4)
- \_\_\_\_\_ Increase in maintenance problems (5)
- \_\_\_\_\_ Increased time involvement (6)
- \_\_\_\_\_ Other (7)

Answer If What is your golf course certification status in regards ... Not certified but interested Is Selected

Q89 Please rank your reason(s) for not being certified by clicking on each item, holding & dragging into the appropriate ranking (1 = most prominent reason, 2 = next reason, and so on).

- \_\_\_\_\_ Application Process (1)
- \_\_\_\_\_ Cost (2)
- \_\_\_\_\_ Labor involved (3)
- \_\_\_\_\_ Time (4)
- \_\_\_\_\_ Value (5)
- \_\_\_\_\_ Other (6)

Q90 Are there any other reasons for not being certified?

Q29 Do you plan on becoming certified in the Audubon Cooperative Sanctuary Program for golf courses?

- Yes (1)
- Maybe (2)
- No (3)

Q27 What is/are your reason(s) for your interest in ACSP for golf courses?

Q111 Would you be more interested in becoming ACSP certified if students were to assist in the certification process?

- Yes (1)
- No (2)

Q104 Does your golf course have an affiliation with a college or university?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Does your golf course currently emplo...

Q110 What is the name of the college or university your golf course is affiliated with?

Q30 Does the college or university your golf course is affiliated with have a Horticulture or Turf grass program?

- Yes (1)
- No (2)
- Unknown (3)

Q31 How many classes visit your golf course as part of learning curriculum?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 or more (5)

If 0 Is Selected, Then Skip To Does your golf course currently emplo...

Q32 Which classes visit your golf course?

Q33 Does your golf course currently employ college or university students?

- Yes (1)
- No (2)

Q34 Is research being conducted by faculty and/or students at the course you manage?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To In order of importance, which areas o...

Q35 What research is being done?

Q112 In order of importance, please rank which areas of ACSP certification would be most BENEFICIAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most beneficial, 2 = next most beneficial, and so on).

- \_\_\_\_\_ Better water quality (1)
- \_\_\_\_\_ Decreased long-term maintenance costs (2)
- \_\_\_\_\_ Enhanced public perception (3)
- \_\_\_\_\_ Increased wildlife (4)
- \_\_\_\_\_ Reduced chemical application (5)
- \_\_\_\_\_ Reduced water usage (6)
- \_\_\_\_\_ Other (7)

Q113 In order of importance, please rank which areas of ACSP certification would be most DETRIMENTAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most detrimental, 2 = next most detrimental, and so on).

- \_\_\_\_\_ ACSP membership costs (1)
- \_\_\_\_\_ Decline in golf course member satisfaction (2)
- \_\_\_\_\_ Effect on golf play (3)
- \_\_\_\_\_ High initial costs (4)
- \_\_\_\_\_ Increase in maintenance problems (5)
- \_\_\_\_\_ Increased time involvement (6)
- \_\_\_\_\_ Other (7)

Answer If What is your golf course certification status in regards ... Environmental Planning (beginning the certification process) Is Selected

Q39 Are you interested in becoming fully or partially certified with Audubon Cooperative Sanctuary Program for Golf Courses?

- Fully certified (1)
- Partially certified (2)

Q119 Is full certification possible for your course?

- Yes (1)
- No (2)

If Yes Is Selected, Then Skip To What year did you begin the certifica...

Q120 Why is full certification not possible for your course?

Q102 What year did you begin the certification process? (numeric answer only please)

Q118 Who is/was MOST involved with the completion of the certification process?

- College or University students (1)
- Outside organization(s). Please specify. (2) \_\_\_\_\_
- Staff (Maintenance employees) (3)
- Yourself (Superintendent) (4)
- Others. Please specify. (5) \_\_\_\_\_

Q98 Please rank what is most challenging about beginning the certification process by clicking on each item, holding & dragging into the appropriate ranking (1 = most challenging, 2 = next most challenging, and so on).

- \_\_\_\_\_ Application Process (1)
- \_\_\_\_\_ Cost (2)
- \_\_\_\_\_ Labor involved (3)
- \_\_\_\_\_ Time (4)
- \_\_\_\_\_ Value (5)
- \_\_\_\_\_ Other (6)

Q40 What is/are your reason(s) for beginning the certification process?

Q115 Would you be more interested in becoming ACSP certified if students were to assist in the certification process?

- Yes (1)
- No (2)

Q51 Who is MOST involved with the maintenance and upkeep of certification at your course?

- College or University Students (through employment or curriculum) (1)
- Outside Organization(s). Please specify. (2) \_\_\_\_\_
- Staff (maintenance employees) (3)
- Yourself (Superintendent) (4)
- Others. Please specify. (5) \_\_\_\_\_

Q50 Which categories of ACSP do you plan on becoming certified in? Please check all that apply.

- Chemical Use Reduction and Safety (1)
- Environmental Planning (2)
- Outreach and Education (3)
- Water Conservation (4)
- Water Quality Management (5)
- Wildlife and Habitat Management (6)

Q105 Does your golf course have an affiliation with a college or university?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Does your golf course currently emplo...

Q114 What is the name of the college or university your golf course is affiliated with?

Q41 Does the college or university your golf course is affiliated with have a Horticulture or Turf grass program?

- Yes (1)
- No (2)
- Unknown (3)

Q42 How many classes visit your golf course as part of learning curriculum?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 or more (5)

If 0 Is Selected, Then Skip To Does your golf course currently emplo...

Q43 Which classes visit your golf course?

Q44 Does your golf course currently employ college or university students?

- Yes (1)
- No (2)

Q45 Is research being conducted by faculty and/or students at the course you maintain?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To In order of importance, please rank w...

Q46 What research is being done?

Q116 In order of importance, please rank which areas of ACSP certification would be most BENEFICIAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most beneficial, 2 = next most beneficial, and so on).

- \_\_\_\_\_ Better water quality (1)
- \_\_\_\_\_ Decreased long-term maintenance costs (2)
- \_\_\_\_\_ Enhanced public perception (3)
- \_\_\_\_\_ Increased wildlife (4)
- \_\_\_\_\_ Reduced chemical application (5)
- \_\_\_\_\_ Reduced water usage (6)
- \_\_\_\_\_ Other (7)

Q117 In order of importance, please rank which areas of ACSP certification would be most DETRIMENTAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most detrimental, 2 = next most detrimental, and so on).

- \_\_\_\_\_ ACSP membership costs (1)
- \_\_\_\_\_ Decline in golf course member satisfaction (2)
- \_\_\_\_\_ Effect on golf play (3)
- \_\_\_\_\_ High initial costs (4)
- \_\_\_\_\_ Increase in maintenance problems (5)
- \_\_\_\_\_ Increased time involvement (6)
- \_\_\_\_\_ Other (7)

Answer If What is your golf course certification status in regards ... Environmental Planning Plus (certified in one or more, but not all categories) Is Selected

Q52 What made you decide to become certified with Audubon Cooperative Sanctuary Program for Golf Courses?

Q104 Is full certification possible for your course?

- Yes (1)
- No (2)

If Yes Is Selected, Then Skip To Do you plan on achieving full certifi...

Q105 Why is full certification not possible for your course?

Q106 Do you plan on achieving full certification? Why or Why not?

Q103 What year did you begin the certification process? (numeric answer only please)

Q54 Who is/was MOST involved with the completion of the certification process?

- College or University students (1)
- Outside organization(s). Please specify. (2) \_\_\_\_\_
- Staff (Maintenance employees) (3)
- Yourself (Superintendent) (4)
- Others. Please specify. (5) \_\_\_\_\_

Q101 Please rank what is most challenging about beginning the certification process by clicking on each item, holding & dragging into the appropriate ranking (1 = most challenging, 2 = next most challenging, and so on).

- \_\_\_\_\_ Application Process (1)
- \_\_\_\_\_ Cost (2)
- \_\_\_\_\_ Labor involved (3)
- \_\_\_\_\_ Time (4)
- \_\_\_\_\_ Value (5)
- \_\_\_\_\_ Other (6)

Q53 What is/are your reason(s) for being partially certified?

Q121 Would you be more interested in becoming ACSP certified if students were to assist in the certification process?

- Yes (1)
- No (2)

Q132 Who is MOST involved with the maintenance and upkeep of certification at your course?

- College or University Students (through employment or curriculum) (1)
- Outside Organization(s). Please specify. (2) \_\_\_\_\_
- Staff (maintenance employees) (3)
- Yourself (Superintendent) (4)
- Others. Please specify. (5) \_\_\_\_\_

Q56 Which categories of ACSP is your golf course certified in? Please check all that apply.

- Chemical Use Reduction and Safety (1)
- Environmental Planning (2)
- Outreach and Education (3)
- Water Conservation (4)
- Water Quality Management (5)
- Wildlife and Habitat Management (6)

Q58 If you were to go through the process again, what would you do differently the second time you went through the certification process?

Q106 Does your golf course have an affiliation with a college or university?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Does your golf course currently emplo...

Q122 What is the name of the college or university your golf course is affiliated with?

Q59 Does the college or university your golf course is affiliated with have a Horticulture or Turf grass program?

- Yes (1)
- No (2)
- Unknown (3)

Q60 How many classes visit your golf course as part of learning curriculum?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 or more (5)

If 0 Is Selected, Then Skip To Does your golf course currently emplo...

Q61 Which classes visit your golf course?

Q62 Does your golf course currently employ college or university students?

- Yes (1)
- No (2)

Q67 Did college or university students play a role in the ACSP certification procedure?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Is research being conducted by facult...

Q68 What did the students help with?

Q63 Is research being conducted by faculty and/or students at the course you maintain?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To In order of importance, please rank w...

Q64 What research is being done?

Q123 In order of importance, please rank which areas of ACSP certification would be most BENEFICIAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most beneficial, 2 = next most beneficial, and so on).

- \_\_\_\_\_ Better water quality (1)
- \_\_\_\_\_ Decreased long-term maintenance costs (2)
- \_\_\_\_\_ Enhanced public perception (3)
- \_\_\_\_\_ Increased wildlife (4)
- \_\_\_\_\_ Reduced chemical application (5)
- \_\_\_\_\_ Reduced water usage (6)
- \_\_\_\_\_ Other (7)

Q124 In order of importance, please rank which areas of ACSP certification would be most DETRIMENTAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most detrimental, 2 = next most detrimental, and so on).

- \_\_\_\_\_ ACSP membership costs (1)
- \_\_\_\_\_ Decline in golf course member satisfaction (2)
- \_\_\_\_\_ Effect on golf play (3)
- \_\_\_\_\_ High initial costs (4)
- \_\_\_\_\_ Increase in maintenance problems (5)
- \_\_\_\_\_ Increased time involvement (6)
- \_\_\_\_\_ Other (7)

Answer If What is your golf course certification status in regards ... Audubon Cooperative Sanctuary (fully certified in all categories) Is Selected

Q75 What made you decide to become certified with Audubon Cooperative Sanctuary Program for Golf Courses?

Q125 What year did you begin the certification process? (numeric answer only please)

Q133 Who is/was MOST involved with the completion of the certification process?

- College or University students (1)
- Outside organization(s). Please specify. (2) \_\_\_\_\_
- Staff (Maintenance employees) (3)
- Yourself (Superintendent) (4)
- Others. Please specify. (5) \_\_\_\_\_

Q111 Please rank what is most challenging about beginning the certification process by clicking on each item, holding & dragging into the appropriate ranking (1 = most challenging, 2 = next most challenging, and so on).

- \_\_\_\_\_ Application Process (1)
- \_\_\_\_\_ Cost (2)
- \_\_\_\_\_ Labor involved (3)
- \_\_\_\_\_ Time (4)
- \_\_\_\_\_ Value (5)
- \_\_\_\_\_ Other (6)

Q76 What is/are your reason(s) for becoming fully certified?

Q128 Would you be more interested in becoming ACSP certified if students were to assist in the certification process?

- Yes (1)
- No (2)

Q134 Who is MOST involved with the maintenance and upkeep of certification at your course?

- College or University Students (through employment or curriculum) (1)
- Outside Organization(s). Please specify. (2) \_\_\_\_\_
- Staff (maintenance employees) (3)
- Yourself (Superintendent) (4)
- Others. Please specify. (5) \_\_\_\_\_

Q78 What year did you become fully certified in all six categories of ACSP? (numeric answer only please)

Q79 How many years did it take to become fully certified?

- less than 1 year (1)
- 1-2 years (2)
- 3-4 years (3)
- 5-6 years (4)
- more than 6 years (5)

Q80 If you were to go through the process again, what would you do differently the second time you went through the certification process?

Q107 Does your golf course have an affiliation with a college or university?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Does your golf course currently emplo...

Q129 What is the name of the college or university your golf course is affiliated with?

Q81 Does the college or university your golf course is affiliated with have a Horticulture or Turf grass program?

- Yes (1)
- No (2)
- Unknown (3)

Q82 How many classes visit your golf course as part of learning curriculum?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 or more (5)

If 0 Is Selected, Then Skip To Does your golf course currently emplo...

Q83 Which classes visit your golf course?

Q84 Does your golf course currently employ college or university students?

- Yes (1)
- No (2)

Q85 Did college or university students play a role in the ACSP certification procedure?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To Is research being conducted by facult...

Q86 What did the students help with?

Q87 Is research being conducted by faculty and/or students at the course you maintain?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To In order of importance, please rank w...

Q88 What research is being done?

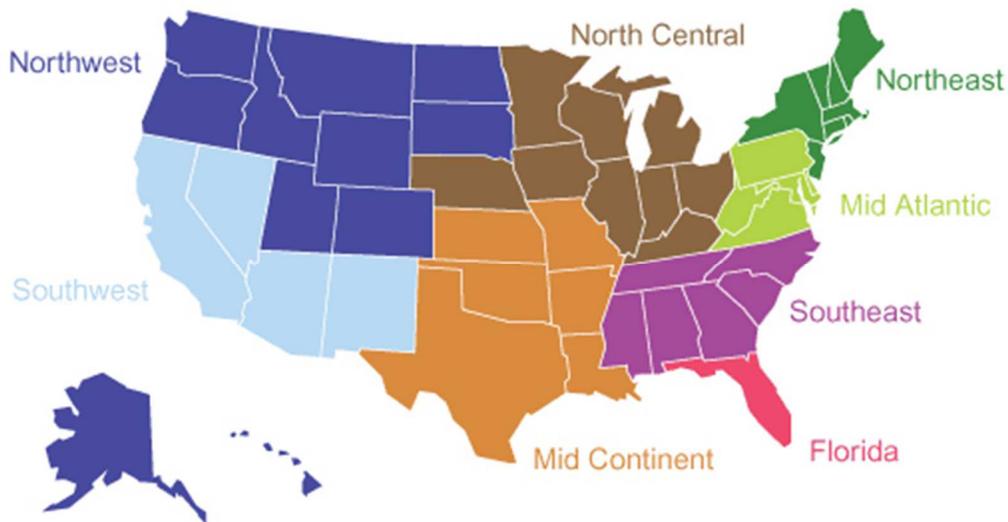
Q126 In order of importance, please rank which areas of ACSP certification would be most BENEFICIAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most beneficial, 2 = next most beneficial, and so on).

- \_\_\_\_\_ Better water quality (1)
- \_\_\_\_\_ Decreased long-term maintenance costs (2)
- \_\_\_\_\_ Enhanced public perception (3)
- \_\_\_\_\_ Increased wildlife (4)
- \_\_\_\_\_ Reduced chemical application (5)
- \_\_\_\_\_ Reduced water usage (6)
- \_\_\_\_\_ Other (7)

Q127 In order of importance, please rank which areas of ACSP certification would be most DETRIMENTAL to your golf course by clicking on each item, holding & dragging into the appropriate ranking (1 = most detrimental, 2 = next most detrimental, and so on).

- \_\_\_\_\_ ACSP membership costs (1)
- \_\_\_\_\_ Decline in golf course member satisfaction (2)
- \_\_\_\_\_ Effect on golf play (3)
- \_\_\_\_\_ High initial costs (4)
- \_\_\_\_\_ Increase in maintenance problems (5)
- \_\_\_\_\_ Increased time involvement (6)
- \_\_\_\_\_ Other (7)

Q1 USGA Green Section Regional Map



Q87 Please select the location of your golf course that corresponds to the USGA Green Section Regional Map.

- Florida (1)
- Mid-Atlantic (2)
- Mid-Continent (3)
- North-Central (4)
- Northeast (5)
- Northwest (6)
- Southeast (7)
- Southwest (8)

Q25 Please select the state your golf course is located.

Drop down menu

Q4 How many years have you been working in the golf industry?

- 0-4 (1)
- 5-9 (2)
- 10-14 (3)
- 15-19 (4)
- 20-24 (5)
- 25-29 (6)
- 30-34 (7)
- 35 or more (8)

Q5 How many years have you been superintendent at your current course?

- 0-4 (1)
- 5-9 (2)
- 10-14 (3)
- 15-19 (4)
- 20-24 (5)
- 25-29 (6)
- 30-34 (7)
- 35 or more (8)

Q91 Are you a Golf Course Superintendents Association of America (GCSAA) member?

- Yes (1)
- No (2)

Q135 How many surveys do you respond to per year?

- 0-2 (1)
- 3-5 (2)
- 6-8 (3)
- 9-11 (4)
- 12 or more (5)

Q102 What is the distance (in miles) from the college/university to the course you manage?

- 0-4 (1)
- 5-9 (2)
- 10-14 (3)
- 15-19 (4)
- 20 or more (5)

Q7 What is the age (in years) of the course you currently manage?

\_\_\_\_\_ Age in years (1)

Q9 How many acres is the golf course you manage?

\_\_\_\_\_ Acres (1)

Q102 How many rounds are played per year at the course you currently manage?

- less than or equal to 14,999 (1)
- 15,000 - 24,999 (2)
- 25,000 - 34,999 (3)
- 35,000 - 44,999 (4)
- 45,000 - 54,999 (5)
- 55,000 - 64,999 (6)
- greater than or equal to 65,000 (7)

Q101 How many months of the year is the course you manage open for golf?

- 0-2 (1)
- 3-5 (2)
- 6-8 (3)
- 9-11 (4)
- Open all year (5)

Q8 How many holes are on the golf course you manage?

- less than 9 (1)
- 9 holes (2)
- 18 holes (3)
- 27 holes (4)
- 36 holes (5)
- Other (6) \_\_\_\_\_

Q10 Excluding capital improvement expenditures, which of the following best describes the annual maintenance budget for your golf course? (This includes payroll/salaries, operating equipment leases, water, fertilizer/chemicals, etc.)

- Less than \$250,000 (1)
- \$250,000 - \$499,999 (2)
- \$500,000 - \$999,999 (3)
- \$1,000,000 - \$1,499,999 (4)
- \$1,500,000 or higher (5)

Q12 Total number of golf course maintenance staff during peak season.

- 0 (1)
- 10-24 (2)
- 25-49 (3)
- 50-99 (4)
- 100 or more (5)