Golf's *Green* Bottom Line:
Uncovering the Hidden Business Value of Environmental Stewardship on Golf Courses

A Research Project of Audubon International

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In the end, environmental progress can best occur in golf with a clear and stable partnership among all those groups and people who call the game of golf their job. This is especially true of the more than 2,400 members of the Audubon Cooperative Sanctuary Program for Golf Courses and Audubon Signature Programs throughout the U.S. and in over two-dozen countries. Without the dedication and action of these environmental stewards, this report would not be possible.

Executive Summary

The subject of golf course management and environmental protection in the United States offers an interesting paradox with respect to environmental management and stewardship. On the one hand, golf course owners and operators are subject to criticism, skepticism, and pressure from the public and local environmental groups for water use, water quality, pesticide and other chemical applications, etc. Yet, at the same time, as a sector comprised predominantly of small, service-providing businesses, golf facilities have not faced nearly the level of public and regulatory scrutiny that other business types (*e.g.*, manufacturing, chemical producers, etc.), specifically larger businesses, have faced over the past forty years.

Larger, heavily-regulated businesses have been forced to change management behavior quickly—shaped by public outrage, expanded laws and regulations, catastrophic environmental events, and even changes in the expectations of investors and insurers—and have recognized the business value of effective environmental management. Golf, on the other hand, is still in relative infancy with respect to managing the natural environmental as a business issue. The purpose of this report is to help play a role in advancing the level of environmental awareness, knowledge, and activity in the golf business sector.

First, the history of the environmental movement and its impacts on business in general, as well as impacts to small businesses specifically, is presented. Those firms that have been affected by early and increasing regulatory and public pressure on the environment have matured to view environmental stewardship as not only a moral obligation but also a source of business value and competitive advantage. Whether it's offering environmentally-friendly new products, operating in a more eco-efficient manner, or interacting differently with customers and stakeholders, these leading businesses have made voluntary environmental action a part of their business model. Voluntary Environmental Programs, like the Audubon Cooperative Sanctuary Program in the golf sector, are also being used to help educate, motivate, and reward these leading firms.

Small businesses of all types, including golf course facilities, have been affected much differently by the environmental movement in the United States. Likewise, smaller firms have a different set of barriers for voluntary environmental action. This is discussed briefly, with the goal of identifying lessons and recommendations for golf course owners, managers, and superintendents.

At the heart of this report is a quest to uncover the business value of environmental stewardship in golf course management. This desire began in 2002, when Audubon International launched an effort to expand the participation rate of golf courses in its voluntary environmental programs (Audubon Cooperative Sanctuary Program for Golf Courses and Audubon Signature Programs).

Yet, with limited staff, budgets, and resources, a flattening of the customer base, and the usual competitive pressures of a small business, golf course owners, managers, and superintendents still viewed environmental actions as an "extra"—something that might be nice to do, but not critical to the short- or long-term success of the business. There was no compelling business case for voluntary environmental action.

As a result, Audubon International initiated a set of research projects designed to reveal the business value of environmental stewardship. Building on the lessons from other business sectors, this research was launched with two main axioms:

1. Yes, there is business value for those golf courses that take voluntary environmental action—in the form of cost savings, new revenue, and image and reputation enhancement.
2. No, most golf course owners, managers, and superintendents do not capture this information, don't know how to, lack the tools to do so, and therefore, are missing opportunities.

The first phase of this research took the form of a four-page survey to all Audubon Cooperative Sanctuary Program (ACSP) for Golf Course members in 2003 and 2004 (the "Business Value Survey"). This survey built on Audubon International's *Managed Lands Survey: 2000-2001* (see Appendix), where preliminary business value information had been captured. This "Business Value Survey" revealed that golf courses were, in fact, experiencing business value from their voluntary environment actions, but most did not know or track this information.

The second phase of this research consisted of interviews with golf course superintendents selected from the Business Value Survey. Echoing responses from the survey, respondents said that they were seeing business value from their voluntary environmental actions in the ACSP for Golf Courses, but that these were not the reasons for joining and taking action. Instead, the majority of golf course superintendents responded that they were taking these actions "because it was the right thing to do." (This information is presented in Section 4 of this report.)

Our most recent work has involved "data mining" our own member files, searching for case studies and examples of voluntary environmental actions and projects—and their business/financial costs and benefits. Nearly three hundred projects—as self-reported by members of the ACSP for Golf Courses—were identified, with the majority of these cases showing business value primarily in the form of cost savings and image and reputation enhancement. (This information is presented in Section 5 and Appendix B of this report.)

The final sections of this report present a set of recommendations and resultant tools for strategic environmental management on golf courses, respectively. As stated previously, voluntary environmental actions by golf course staff can lead to business value. Yet, owners, managers, and superintendents alike often lack the understanding, training, or tools to adequately make this connection. By understanding *Life Cycle Assessments*, *Environmental Auditing*, and *Full Cost Environmental Accounting* concepts and their applications to golf course management, owners, managers, and superintendents will be better equipped to make that next leap to more sustainable (economically and environmentally) golf course management.

In the end, this report is designed to help to further a sea-change in golf—a day when the marriage of business management and environmental management are the norm, not the exception, in golf. It is simply good business to do so. While it is good to consider the moral and ethical arguments for environmental stewardship (*i.e.*, "it's the right thing to do"), the business case for voluntary environmental action can only help to push the golf industry past the tipping point.

Section 1

A Brief History of Business and the Environment

Note: This section has been adapted from previously published work from Kevin A. Fletcher, Ph.D., Executive Director of Audubon International.

Over the past forty years, the environmental movement and the interactions between the three primary stakeholder groups—government, business, and the non-profit community—have changed in significant ways. With the birth of the environmental movement in the 1960s, businesses of all sizes have been asked—and, in most cases, required—to take steps to protect and sustain the natural environment around them. Golf facilities are not different. Understanding the role of "environmentalism" in business decision-making requires an understanding of history.

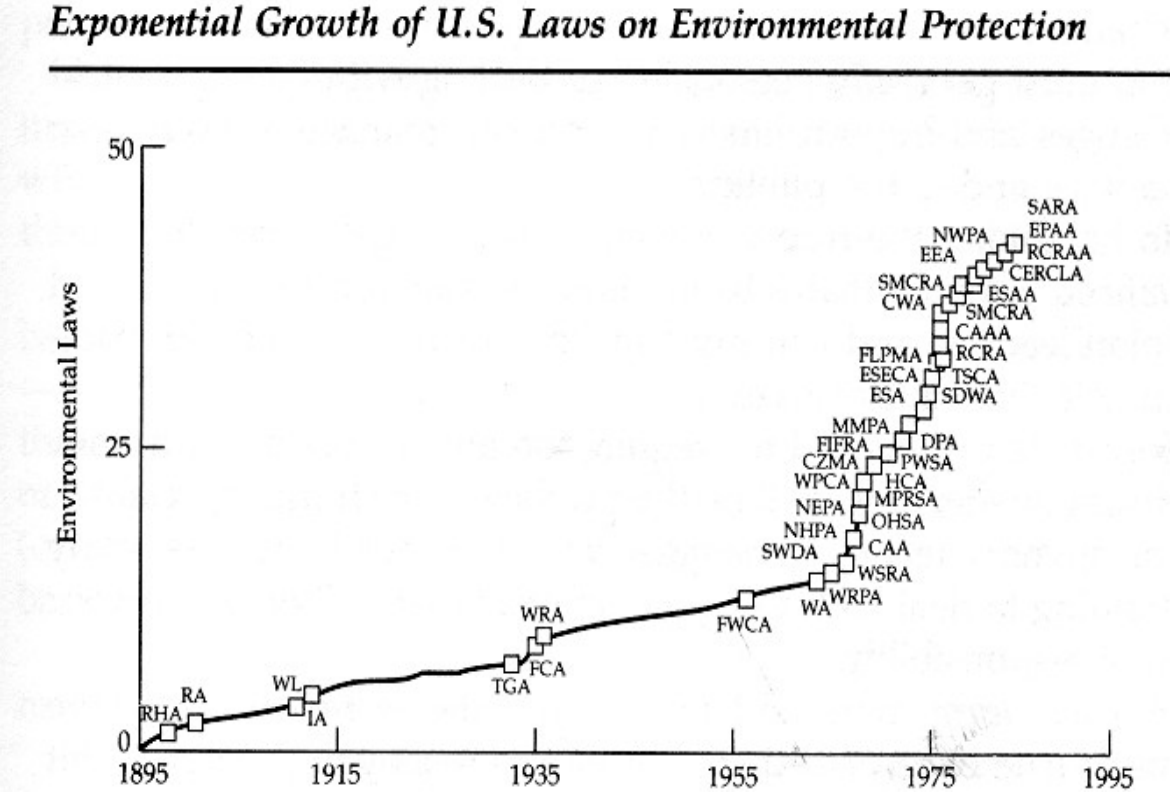
The Rigid History of Environmentalism

American environmental regulatory policy first came as a wave of change crashing on the shores of business during the 1960s. Rachel Carson's book, *Silent Spring*, published in 1962, ignited the public and helped spark the environmental movement. (Gore, 1992) Lake Erie was nearly dead from industrial pollution; the Cuyahoga River in Cleveland caught fire and burned for five days; the nation's proud symbol, the bald eagle, was near extinction from DDT poisoning; and smog in some U.S. cities was often visible and noxious. (Hayes, 1989) As a result, public outcry for Federal leadership in protecting the country's natural environment and public health took a strong hold in Washington, D.C., as well as other state capitals, in the form of legal mandates.

While human activity was seen as responsible for environmental damage before the 1960s, it wasn't until Rachel Carson's *Silent Spring*, that the public and the political process saw American business and industry, and the products of the modern age, as directly responsible for biotic damage. The resultant public outcry—a critical mass of public opinion energizing the first Earth Day, the subsequent creation of the EPA, and the development of Federal regulations in response to public demands—created an additional constraining force on businesses of all types and sizes.

Over the next two and a half decades, the role of the EPA as the country's regulatory agency on the environment expanded. The American environmental movement, public pressure and opinion, and advocacy group influence pushed Congress toward the enactment of laws protecting the environment. The speed and amount of statutory requirements—primarily directed toward the private sector producers, and eventually service-providers—was rapid (see Figure 1).

Figure 1



Source: National Academy of Engineering, as referenced from E. Bruce Harrison's Going Green: How to Communicate Your Companies Environmental Commitment, Business One Irwin, Homewood, IL, 1993.

The bulk of the statutory requirements and regulation developed over that long period were "command-and-control" and "end-of-the-pipe" in nature and focused on the environmental impacts of larger businesses. Congress set statutory guidelines and EPA created specific requirements under the law addressing issues such as Best Available Control Technologies for air and water protection, maximum permissible amounts of pollution, toxicity contents, etc. (Findley, 1992) Primarily media-specific in nature (air, water, and land), the country's environmental policy landscape regarding pollution evolved in an adversarial fashion—with EPA lacking trust in the private sector's commitment and willingness to protect the environment, and firms, in turn, criticizing EPA's less-than-common-sense approaches to environmental regulation.

Environmentalism Shapes Business Behavior

The response of businesses, specifically larger corporations and heavily-regulated industries (*e.g.*, manufacturing and chemical production) to the expansive legal framework throughout the first few decades often was that of denial, legal retaliation, and, over time, grudging acceptance. Most of the money spent on "environmentally-related" business functions throughout the 1970s and 1980s focused on the prescriptive, end-of-the-pipe technology requirement (*i.e.*, capital expenditures on smoke stack scrubbers, wastewater treatment systems, etc.), lobbying efforts

against impending legal requirement, and the legal fees tied to the inevitable court battles in opposition to these new environmental requirements.

Yet, in the wake of the regulatory barrage of the 1970s and 1980s, leading companies began to look for the right waves to surf in order to pass by their competition. The result: The birth of *environmental* strategy. Over time, companies saw business value in voluntary environmental actions—going beyond mere legal compliance. Reinhardt (2000) identifies five dominant environmental business strategies that have evolved during this time: environmental product differentiation, managing competition through environmental strategy, reducing costs, redefining markets, and managing risk and uncertainty.

Just as regulatory pressure shaped environmental strategy, so too did pressure from the press, environmental advocacy groups, and other interest groups. Greening and Gray (1994) looked at the broader management of social and political issues and the response by firms to press coverage and interest group pressure. Their examination verified the resultant strategic response companies have taken to external pressures and environmental issues management. (*Note: The series of Golf and the Environment stakeholder meetings held in the mid-1990s echoes this in the golf industry—at the time of heightened negative press coverage and interest group pressure.)* Firms adopted external scanning mechanisms, departments, and long-range strategies as a result of these "non-market" pressures. From Three-Mile Island to the Exxon *Valdez*, environmental crisis continue to shape environmental strategy in business.

Along with regulator and stakeholder pressure, customer demands have also triggered and shaped businesses' environmental strategies. Market studies in the U.S. have shown that consumers are segmented into different categories based on environmentally-related product purchasing tendencies:

- 10-15% are "True-Blue Greens"—very committed to the environment
- 10% are "Greenback Greens"—also committed to the environment
- 50-55% are "Half-Greens"—express concern, but act erratically as a buyer
- 30% are "Basic Browns"—too poor to focus on environmental issues as a buyer

These segmented customers have served to spur the overall "green consumer movement" throughout the U.S. while adding to the uncertainty of understanding markets and consumer behavior. Representative numbers from similar European surveys indicate an even higher level of commitment to environmental issues as consumers. (Roper-Starch, 2006) This factor is increasingly important to business strategists in the age of global competition.

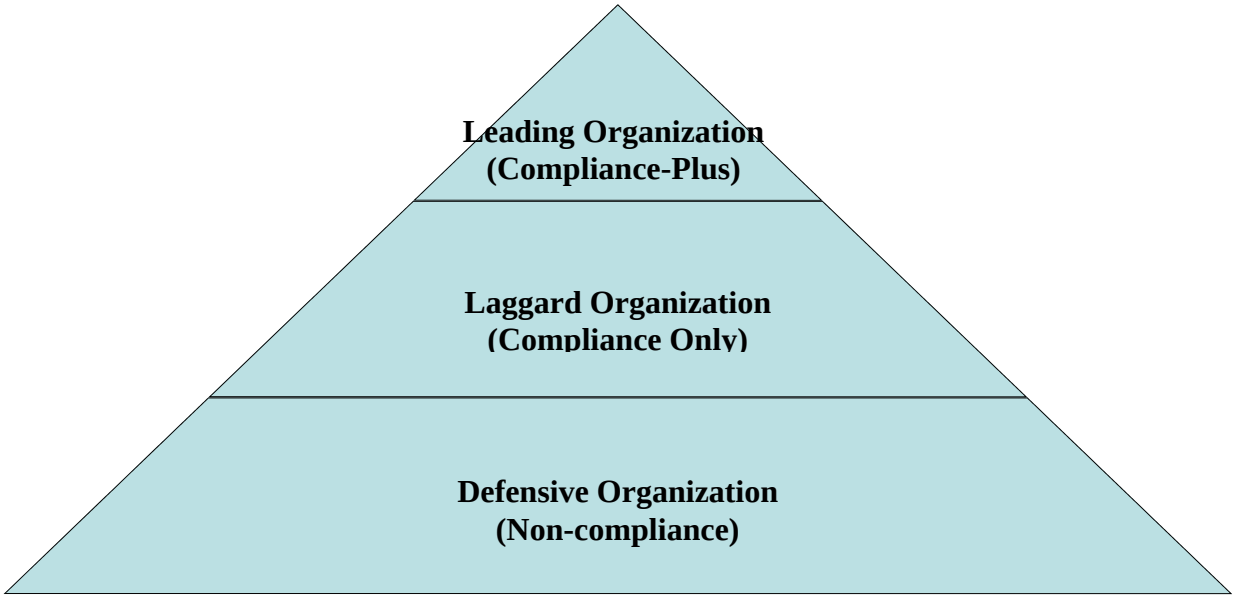
Finally, other factors shaping businesses' response to environmental issues have included the following (Schmidheiny, 1993):

- Banks are faster to lend to companies that prevent pollution.
- Insurance companies are more eager to underwrite clean companies.
- Employees want to work for environmentally responsible companies.
- Clean companies are rewarded by relief from green taxes and charges.

Each of these external forces, along with an increasing level of environmental awareness and knowledge by business leaders and managers themselves, have changed the way many businesses respond to environmental issues. The rules of the game itself have changed.

Firms in various business sectors have gone through a number of stages as a result of these evolving external and internal pressures and the resultant attempts by businesses to make environmental performance a source of competitive advantage. There have been a number of models in business and environmental research to reflect these stages, but they tend to mirror each other. Simply, they can be represented as shown in Figure 2 below.

Figure 2
Dominant Types of Business Responses to Environmental Pressures



Source: Adapted from the academic literature by Kevin A. Fletcher, 2002

These leading, "compliance-plus" businesses have uncovered the business value of environmental stewardship. Environmental action creates business value in three, distinct ways:

- ***Money-Making*** – bringing in new customers, selling more of your product or service, or the ability to charge more for your product or service.

- ***Cost Reduction*** – minimizing waste and reducing the materials, labor, and overall costs of providing your product or service to customers.

- ***Image & Reputation Enhancement*** – creating a positive feel for your company and products and services, generating positive publicity, and being a trusted business.

As businesses have evolved, changing the definition of environmental leadership and finding business value in their actions, so too have the policies used to affect environmental performance by business. State and Federal government agencies, nonprofit environmental organizations, and even business associations and sectors themselves witnessed leading firms taking voluntary, beyond-compliance actions to protect the environment and launched new tools to trigger similar change with other firms through the use of voluntary environmental programs (VEPs).

The Rise of Voluntary Environmental Program in the U.S.

Voluntary environmental programs (VEPs) have evolved over the past decades to offer individual businesses, and whole industry sectors, ways to go beyond legal compliance. The primary trigger of these VEPs has rested in the area of "Image & Reputation Enhancement" through public recognition by a third party of environmental "good deeds." VEPs are programs, codes, agreements, or commitments that encourage organizations to voluntarily reduce their environmental impacts. Major types of Voluntary Environmental Initiatives include, but are not limited to, those listed in Table 1.

Table 1
Examples of Voluntary Environmental Programs

Types (source)	Example
• Individual Firm	3M – Pollution Prevention Pays
• Trade Association	Chemical Industry – Responsible Care
	Forestry Industry – Sustainable Forest Initiative
• Government	EPA – Energy Star, Green Lights, Project XL
• Non-government organization	CERES Principles, Audubon International Programs
	Forestry Industry – Forest Stewardship Council
• Standards Organization	ISO 14000

Source: Adapted from Patton, 1999.

Since 1990, over 13,000 organizations have participated in a voluntary environmental program—whether sponsored by government, industry, or nonprofits (Mazurek, 2002). According to Darnall et al (2003), roughly 69% of all VEPs in the U.S. are government sponsored, 15% industry-sponsored, and the remaining VEPs are third-party or nonprofit-sponsored. VEPs are often used to define and identify "leading" environmental organizations or efforts, or those organizations interested in being environmental leaders. Most VEPs are designed to provide additional education and assistance in helping business make the leap of faith from compliance and risk-centered strategies to managing the natural environment, to a strategic approach that goes beyond compliance.

Conclusion

There is much that golf can learn from both history and other industries' responses to business environmentalism—namely, the advantages of viewing environmental protection and stewardship as something other than cost- or compliance-based. Yet, most of the lessons and research from the past forty years of business environmentalism have come from larger firms and heavily-regulated industries. Golf course facilities are small, service-oriented businesses. As such, they, like other small businesses, face specific barriers to simply applying large-business environmental management concepts and tools. The next section touches on the research to-date on small-firm environmental management and its relevance for golf course management.

Section 2

Small Businesses and Environment Leadership

Note: This section has been adapted from previously published work from Kevin A. Fletcher, Ph.D., Executive Director of Audubon International.

Golf facilities of all types easily fall under the definition of small-to-medium sized enterprises (SMEs) or small businesses. SMEs have historically been ignored by the regulatory community and public alike with respect to environmental impacts of their business practices. This is especially true for service-based small business, like golf course operations.

Yet, while each small business (SME) may have a negligible impact on the environment, as compared to large, multinational companies, their cumulative impact is great. Consider the following information (Source: US Small Business Administration, 2004):

- America's 23 million small businesses generate 51% of the private gross domestic product and 47% of all US sales activity.
- The number of small businesses in the United States has increased 49% since 1982.
- Small firms account for more than half of all commercial energy use.
- About 85 % of U.S. manufactured goods are produced by the 14,000 member companies of the National Association of Manufacturers. About 10,000 of these companies are small and medium-sized firms.

Yet, many times, small business owners and managers simply see their individual environmental impacts as insignificant. What can one 160-acre golf course do to help improve the state of the natural environment in the community, region, or world? This perception of limited environmental impact is often cited as a reason for SME inaction (Hillary, 2000; Tilley, 1999; Williamson & Lynch-Wood, 2001). What are some of the additional factors that affect SME decisions or ability to go beyond compliance and become an environmental leader? An examination of research on this topic, outside of golf, helps to answer this question.

Barriers for Voluntary Environmental Action in Small Firms

As opposed to larger businesses, smaller firms simply do not have as many resources to address environmental issues beyond the fulfillment of their legal requirements—and even compliance is more difficult for small businesses. Williamson & Lynch-Wood (2001) cited that most SMEs lack an environmental manager or environmental staff—something common in many larger businesses.

The most important resources that any business can leverage are its financial resources. Again, smaller enterprises are at a disadvantage in taking voluntary, leading environmental actions, when costs exist (Petts & Herd, 1999). Williams et al (2000) found that SMEs will tackle simple problems that can be solved at a low cost. While many larger organizations have focused on the cost advantages and savings of enhanced environmental performance, research has shown that the value that many SMEs put on a dollar earned versus a dollar saved (Friedman & Miles, 2002).

Many efforts to engage SMEs in environmental initiatives have failed or had little success as initiatives must be perceived as relevant to operations and have direct tangible benefits with financial rewards. The attraction of receiving external recognition cannot be understated. Without tangible evidence of financial and environmental outcomes expressed through in-depth case studies, initiatives run the risk of appearing to be little more than greenwashing (Friedman & Miles, 2001). This is certainly true for golf facilities where managers lack training or tools to track environmentally-related costs and benefits effectively.

Time, or the lack thereof, is also a barrier for voluntary environmental leadership in SMEs (Scaper, 2002). Williamson & Lynch-Wood (2001) reflected that connection between resources and time, showing that many small business, due to lack of staff and resources, have little time as well. Documentation, specifically tied to voluntary environmental programs like the Audubon Cooperative Sanctuary Program (ACSP) for Golf Courses, can also exist as a barrier for small business. This, of course, is directly tied to this issue of time and resources.

Research has shown that access to environmental information also is a barrier for small businesses (Scaper, 2002). Tilley (1999) also notes the importance of information from a trusted source as a critical element. This level of trust is directly related to the source of the information—whether that source knows enough about that industry and is credible. A level of expertise is certainly required for trust to be created and maintained.

Many of the barriers for voluntary environmental action by small businesses identified in the research from other business sectors are relevant to golf course facilities as well. From 2004 to 2005, a set of phone contacts were conducted by Audubon International as a part of a marketing effort for the ACSP for Golf Courses throughout the Great Lakes region (Illinois, Wisconsin, Ohio, Indiana, and Michigan). This outreach effort to non-member golf course superintendents led with the following question: Are you familiar with the program/have you heard of it? An explanation of the program and clarification for those who know of the program followed as well—with a specific emphasis on the potential costs savings and public relations value of the program. A total of 1,150 calls were made over a year period, with 140 quality communications (*i.e.*, something other than 'no thank you'). Responses were collected in a spreadsheet for analysis.

The following are the category of comments or reasons for non-participation, along with their frequency, presented in order of prevalence (with 160 individual comments identified from these 140 quality communications):

- Lack of Upper Management Support– 35 of 160 (22%); ("My boss won't let me do this.")
- Lack of Time– 34 of 160 (22%); ("I'm too busy managing the course to do this extra thing.")
- Cost or Budget Issues– 32 of 160 (21%); ("I don't have money budgeted for this stuff.")
- Lack of Awareness or Understanding– 24 of 160 (15%); ("Never heard of the program.")
- Lack of Value– 12 of 160 (8%); ("I don't see what I would get out of this program.")

- Other– 12 of 160 (8%); (Some of the comments falling within this category included the following: “I have no issues on the environment, so I have no need for this” and “I’m pretty much an outdoorsman anyway, so why should I join?”)
- Lack of Staff– 5 of 160 (4%); (“I don’t have time and staff to spend on these projects.”)

Elements for Environmental Success in Small Firms

Along with barriers, it is useful to look at elements for success. Petts & Herd’s (1998) work identifies some of these elements. Successful small business environmental leaders in their research each had a champion, positive attitude toward the business benefits of environmental performance, recognition of the need for companies to respond to environmental issues, an open approach, and inclusion of employees in problem solving.

Research has also highlighted the importance of locally-based handholding through any VEP, importance of ownership of the VEP, importance of networking and learning for other SMEs, importance of important or high profile firm participation as leaders, trust and legitimacy of network participants, external recognition (Friedman & Miles, 2002).

Conclusions

While the differences and barriers to “beyond compliance” voluntary environmental action for small versus large businesses are real, the benefits of these actions—cost savings, increased revenue, and image and reputation enhancement—are true for both small and larger firms. The next sections focus on the environmental opportunities, and related business opportunities, for golf facilities.

Section 3

Golf and the Environment

Golf facilities are a unique type of small business. Likewise, golf has a unique role to play in caring for our environment. By their very nature, golf courses provide significant natural areas that benefit people and wildlife in increasingly urbanized communities across North America. Yet, golf's use of chemicals, water, and other resources to maintain pristine golfing conditions is often criticized for threatening the quality of our environment.

Now, more than ever before, golfers and non-golfers alike are taking a second look at the nature of the game. Golf courses offer numerous opportunities to provide not only pleasant places to play, but also to protect drinking water, improve the water quality of our lakes, streams, and rivers, support a variety of plants and wildlife, and protect our environment for future generations.

What Are Golf's Potential Environmental Impacts?

Given their dependence on landscape, golf courses are tied closely to the natural environment, but do present a number of ways to negatively impact the environment, including:

- Ground and surface water pollution caused by the use of pesticides, fertilizers, and other contaminants
- Poor stream water quality due to eroding shorelines and thermal pollution
- Withdrawal of large quantities of water for irrigation
- Degradation or loss of natural areas
- Health hazards from chemical handling and applications
- Negative impacts of chemical use on "non-target" wildlife
- Unsound turf management driven by increasing and unrealistic golfer expectations and demands

New golf developments may raise additional concerns, depending on their location and design:

- Loss and fragmentation of wildlife habitats
- Alteration or damage to wetlands
- Replacement of natural plant communities with intensively managed landscapes and non-native plants
- Increased conflicts with wildlife

What Are Golf's Environmental Opportunities?

Along with potential negative impacts, golf courses can also play a positive role in the community as compared to other types of developments and human uses, by:

- Providing needed wildlife sanctuaries
- Preserving natural areas within urban environments

- Supporting plants and wildlife native to the area
- Protecting water resources
- Filtering stormwater runoff through golf course wetlands and turfgrass
- Rehabilitating degraded landscapes
- Promoting physical and mental well being, reducing stress for more than 25 million U.S. golfers
- Improving air quality and moderating temperatures
- Educating golfers and the general public about the nature of the game and promote environmentally-sound management

What Are the Benefits of Improved Environmental Performance?

In 2000, Audubon International conducted an initial study of ACSP for Golf Course members, looking to assess the environmental and other results of their participation. The full set of results is found in Appendix A, but they can be summarized as follows:

Image and Reputation
Good environmental performance can help differentiate a course from others in a crowded market and add value by improving public relations and marketing opportunities that attract new golfers or club members.

Customer Satisfaction
The nature of a golf course can enrich golfers' experience of the game. Surveys have shown that golfers report that playing quality is maintained or even improved as a result of steps taken to manage a course in harmony with the natural environment.

Financial Performance
An effective golf course environmental management program can result in reduced insurance premiums, as well as reduced costs for energy, water, pesticides, or fertilizers.

Worker Safety and Reduced Liability
Best practices for chemical management reduce exposure and liability risks from storing, handling, and applying chemicals.

Improved Efficiency
Sound environmental management cuts down on waste and promotes efficient operations.

With this initial survey completed and a push to understand the real business value of voluntary environmental actions underway, a second survey, discussed in the next section, was launched in 2003.

Section 4

Audubon International's 2003-2004 Business Value Survey

In order to begin to address the link between environmental performance and business value, Audubon International sent out a four-page survey to members of the Audubon Cooperative Sanctuary Program (ACSP) for Golf Courses. The survey was designed to discover the level of knowledge and involvement in the program by various stakeholders connected with the course. It was also designed to discover whether golf courses at various stages of the program ("inactive member" versus "certified" members) were seeing business value as a result of their participation.

Out of 1,944 surveys sent, 174 golf course members returned surveys, for an 8% response rate. Of those respondents, 41% were Certified Audubon Cooperative Sanctuary members ("certified"), 28% were members with no certifications ("inactive members"), and the remaining 31% were in various states of the certification process ("moderately active").

It is important to note that Certified Audubon Cooperative Sanctuary ("certified") golf courses are those courses that have documented their actions for the entire program. Since the program is broken into six elements, it is possible to earn certification in one area (*e.g.,* Site Assessment & Environmental Planning) or multiple areas before becoming certified as an Audubon Cooperative Sanctuary. Thus, member action was tracked from least active according to our program definitions (*e.g.*, those courses that are members but have not yet earned any certification), to moderately active (*e.g.*, those courses that have document partial action), and finally most active (*e.g.*, certified courses that have worked through the entire program and that have been evaluated by Audubon International staff).

Results of the 2003-2004 Business Value Survey

In order to begin to understand the organizational structure of golf courses (who reports to whom, etc.), the survey asked respondents—in most cases the golf course superintendent as program "champion"—to address reporting relationships. ACSP for Golf Courses member superintendents directly report to the following: Managers (48%), Directors (20%), Owners (16%) and others (16%). This confirmed the role that Managers and Owners play at golf course facilities in supporting superintendent efforts, or perhaps championing the voluntary environmental action themselves.

However, two-thirds of all respondents did not require any approval in order to join the ACSP for Golf Courses. Of the one-third who did require approval, the approval came from "Director" positions primarily. As such, a majority of superintendents in the program have the authority and autonomy to make the decision to join the program and work towards certification.

Next, a set of questions were posed to assess the level of awareness and support each member had from various stakeholders. According to the responses, golfers, the community, and local government were the least informed about members' participation in the ACSP for Golf Courses. Meanwhile, the supervisor, owner, PGA professional, and green committees (member-based governance structure) were the most aware about this program. Many of the activities required

for program participation and certification might require the approval or participation from superiors or club member leadership (for private clubs).

Likewise, while Outreach & Education is certainly a component of the program requirements, the focus is on operations and maintenance decisions and actions on the course—thus, the external stakeholders (golfers, community, and local government) were least aware of or supportive of the program.

Not surprisingly, the level of "awareness" of participation in the ACSP for Golf Courses, by the full range of internal and external stakeholders, was higher for certified members than the non-certified set of respondents. The same is true for the level of "understanding" of the ACSP and for "how stakeholders feel" about the ACSP. Clearly, members who have worked through the certification process to become Certified Audubon Cooperative Sanctuaries have done a better job informing people about their actions. Most importantly, outside stakeholders who are educated about the program have a positive feeling about the program and the efforts that golf courses are taking through the program to become certified. The business value of creating and maintaining a positive environmental image and reputation through a program like the ACSP for Golf Courses can not be understated for golf course owners, managers, and superintendents.

In order to begin to understand the reasons for participation in the program, members were asked: How important were the following decisions (on a scale of 1-5) to join and participate in the ACSP for Golf Courses? Out of options given to respondents, the most important reasons current members are enrolled and participated in the ACSP, include: "right thing to do" and "improve/protect the environment." Conversely, the least important reasons members gave for enrolling and participating in the ACSP included: "save money" and "attract golfers." This supports the idea that the current membership are made up of those golf course superintendents who care for the environment and feel morally bound to take these actions—matching the 10-15% of the general population who have 'green hearts' according to research (Roper Starch, 2006).

. . .85% of respondents stated that they do not actively track any direct financial costs or benefits of the environmental actions taken as a result of their participation in ACSP for Golf Courses. . . .

This is also reflected in a survey by Petts & Herd (1998) which showed that a large majority of small business owners and managers indeed do care for the protection of the environment, but often lack the means to act on this sentiment. If this is an accurate assessment, there needs to be new ways to inspire the remaining 85% of golf course superintendents to get involved in the ACSP for Golf Courses, or take an equivalent set of voluntary environmental actions. One direct way, as previously discussed, includes identifying and promoting the business value of responsible environmental actions.

In order to discover the business value of environmental action through the ACSP, it has to be measured or tracked. However, 85% of respondents in 2004 stated that they do not actively track any direct financial costs or benefits of the environmental actions taken as a result of their participation in ACSP for Golf Courses. According to this response, golf courses do not currently have a good sense of the environmentally-related costs of operation—or at least the superintendents in this survey simply are not tracking that information. This certainly dovetails with previous research on SMEs and the environment identifying the lack of time, information,

and resources as barriers for action. Even though 85% reported that they were not measuring costs, only an average of 15% of respondents answered "I don't know" to the set of financial cost-benefit questions described below.

A set of "business value as cost savings" questions were asked in order to see whether courses were seeing reductions in the following through the program:

- water costs
- fertilizer costs
- pesticide costs
- overall chemical costs
- the amount of managed turf
- fuel costs and electricity costs
- the amount of watered turf
- staff costs or staff turnover

Roughly twice as many "certified" respondents, versus those respondents with no certification, said they *believed* they had reduced costs as a result of participation in the ACSP for Golf Courses. While not capturing environmental costs, there is a perception, specifically with those courses who have taken all the steps to become a Certified Audubon Cooperative Sanctuary (CACS), that costs are reduced through the program.

. . . golf courses that also tracked environmentally-related costs and benefits stated that they experienced a reduction in operations costs as a result of program participation. . . .

Likewise, 60% of certified members said that in total, they believe that there has been a reduction in their operational costs due to their participation in the ACSP. However, all ten of the Certified Audubon Cooperative Sanctuary golf courses that also tracked environmentally-related costs and benefits stated that they experienced a reduction in operations costs as a result of program participation. Golf courses that are taking voluntary environmental actions through this program and measuring the costs and benefits of those actions verify the environment-business value argument. Yet, with only ten respondents, additional research was needed to strengthen the validity of this conclusion (see Section 5).

Finally, a set of questions were posed to gauge the value that the program had in enhancing the image and reputation of the golf course with the local community, regulators, and golfers. The relationship of the golf course with all three categories of stakeholders was improved more significantly as a result of the program at certified courses than at moderately active or inactive member courses. Bottom line: Taking voluntary environmental actions (*i.e.*, getting certified in the ACSP for Golf Courses) can help improve the environmental image and reputation of golf courses.

As a follow-up to the 2003-2004 Business Value Survey, Audubon International staff began to assemble more detailed information and case examples from program member files. The work is described in the Section 5.

Section 5

Example of *Environmental* Business Value on Golf Courses
(2006 Data Mining Project)

Introduction

Through the "Business Value Survey" (noted in the previous section), it seemed clear that there was a reason to continue to tell the economic story of environmental improvement projects and activities on golf courses. In 2006, Audubon International launched a project to, in part, mine the ACSP for Golf Course member database to better understand whether and how business value was garnered by members' environmental projects completed as a part of their certification and recertification in the program. By definition, these projects have some type or level of environmental benefit to the natural environment in and around the golf course—or, in the case of "Outreach & Education" projects, are helping to communicate and educate others about the environmental actions they are taking through the program.

Cases, projects, and examples for use in this study came from the full membership database of roughly 2,200 members of the ACSP for Golf Courses. Priorities were placed on the certified golf course members (more than 600), with Audubon International staff pulling each member file and capturing project information primarily from the "Case Study Form"—a required self-reporting document as a part of certification and recertification. The goal was not to conduct a complete analysis of all of the more than 600 golf courses in the study population. Rather, the goal was to collect and analyze a critical threshold of anecdotal, self-reported data (10% of all ACSP members and 33% of all certified members) that would be useful in identifying trends.

Data Mining Project: Summary Statistics

A total of 286 "environmental improvement projects" were identified from over 200 ACSP for Golf Course members certified in the program. These "projects" had been completed as part of certification requirements in the program. This data was "mined," summary information was collected, and a set of mini-cases and "project snapshots" were developed (see below and Appendix B).

Of the 286 projects that certified ACSP members conducted, 158 (55%) self-reported that they did see business value or cost savings as a result of their project, with 103 (36%) indicating no business value and another 25 (9%) stating that they simply did not know.

Of those 103 members that indicated they saw no savings or business value in their projects, none had measured or reported either financial benefit information for the project or both cost and benefit. Conversely, of the 158 projects identified as having some form of business value or cost savings, 102 did capture both financial cost and benefit information and reported this information in the case study form provided to them as part of their recertification in the ACSP for Golf Courses. The other 56 did not report either financial costs or benefits related to the project, but did indicate that they believed that the project had led to some level of business value or cost savings.

Examples of "Valuable" Environmental Projects

The types of environmental projects leading to measured business value or cost savings of some type were varied. While a number of projects are shown in Appendix B, a subset is presented below that provides examples of the types of environmental projects identified:

- **Birnamwood Golf Course, Burnsville, MN**
  Natural Areas
  Seven thousand square feet in a non-play area were converted to natural area on this 21 ½ acre, nine-hole, par 3 golf course. Turf was striped so no chemicals were used; oats (as nursery grass), fescue, Indian grass, and purple cone flowers were seeded in and covered with Futura netting to avoid seeds washing away. Cost: $220. Savings: $500 annually (fertilizer, labor, etc.)

- **Broadmoor East/West, Colorado Springs, CO**
  Wildflower Planting
  A 1½ -acre site was identified, cleared, and converted to a wildflower area to provide habitat for wildlife, incorporate use of native plant materials, and provide an environmental demonstration project for golfers. The area has increased wildlife habitat (for the first time, two breeding pairs of wild turkeys were observed); decreased pesticide and water use; decreased labor in maintenance; and educated staff and golfers. Costs: $1,400 ($300 annually). Savings: $600 annually.

- **Del Paso Country Club, Sacramento, CA**
  Introduce Grass Carp to Ponds
  Due to a large amount of aquatic weeds and encroachment of grassy weeds into three ponds and wanting to avoid using herbicides and mechanical removal (not cost effective due to amount of man hours involved), the Club introduced 19 triploid grass carp. Cost: $270. Savings: $150/month (employee labor).

- **Summit Country Club, Owensboro, KY**
  Aerators in Irrigation Lake
  Due to recurring algae and constantly low levels of oxygen—both aesthetically displeasing and costly to maintain (spraying chemicals in lake to eliminate algae and adding more lake dye than normal), diffusers were placed in the irrigation lake. After installing diffusers and graphite vane pump, increased oxygen levels were achieved, providing better over all quality of water (lack of algae and healthier fish). Cost: $2,032. Savings: $10,000 (reduced chemicals, labor, maintenance, wear and tear on boat, decreased repair time for sprinklers due to algae build up, cleaner water also reduced disease problems on greens).

- **Sun City Hilton Head, Bluffton, SC**
  Chemical Loading Area Recovery System
  After initially cleaning equipment on the wash pad area so the trap system contains overflow of rinsate, a chemical overflow and recycling system for spray tank loading and cleaning area was designed and constructed to ensure no chemicals would enter the surrounding ground. Used captured overflow for maintenance/testing nursery turf area. Cost: ~$1,000. Savings: $500-$1,000 (chemicals used in turf nursery).

The Difference Between Believing and Knowing

The focus of the case study form used to collect information on these projects for certification or recertification in the ACSP for Golf Courses is on "cost savings." This is only one side of the "business value triangle." However, simply using Cost Reduction as a measurement, and ignoring both Money-Making and Image and Reputation Enhancement, it's easy to see the return on investment potential for voluntary environmental improvement projects. When these other less-tangible criteria are added (*i.e.*, "it made my members happy") an additional argument to the case for business value can be made. Yet, these elements—Money-Making, Cost Reduction, and Image and Reputation Enhancement—must be measured to be seen and be known.

ACSP staff conducted a more detailed analysis of each of the 103 projects that were self-reported by members as having no business value or costs savings tied to them. The staff identified those projects that were probably experiencing business value or cost savings by comparing them to similar projects identified in the study where business value had been identified and measured. Although somewhat subjective, there were enough examples identified in the research to offer a legitimate, comparative view.

Out of these 103 "no business value" projects, Audubon International staff identified roughly 50 that had a "high likelihood" of seeing business value, another roughly 25 that had "some likelihood" of seeing business value, and another 27 of environmental projects that "probably did not" lead to cost savings or business value. However, this group of 103 projects did include a number of "Outreach and Education" projects (*i.e.*, putting up environmental education signs, doing bird watches on the golf course), and all of these Outreach & Education projects fell into the latter category. Yet, all of the 103 "no business value" projects were viewed as having the potential to help enhance the environmental image or aesthetic quality of the golf course—thereby adding the real, yet hard to measure, value of Image and Reputation enhancement.

Some examples of projects that were self-reported as having no business value or cost savings, but tagged by Audubon International staff as actually having a "high likelihood" for resultant business value are presented below with an exploration of the missed opportunities for capturing, measuring, and communicating business value.

- One project focused on the course-wide removal of invasive Ball Moss from the property's Live Oak population. When prolific, this exotic epiphyte may retard tree growth by blocking sunlight and limiting photosynthesis. Ball Moss infestation may also promote Oak wilt, a fungus that can prove lethal to Live Oak trees. Previously, removal had been conducted on a tree-by-tree basis, but never as a comprehensive project on the entire property. The primary goals of the project included improvement of overall tree health, the avoidance of dangerous chemical use, and a minimization of costs incurred by completing the project "in house" during the winter months.

Initial costs for the Ball Moss removal project were quite small and included only labor expenses and the purchase of a few additional pole saws and pruning equipment, which will continued to be used for future course maintenance projects. The course anticipates financial savings over the long-term by reducing labor costs associated with more widespread Ball Moss invasions in the future. By remedying the problem in one 'fell swoop,' future expenses involving Ball Moss removal and remediation should be alleviated.

- A golf course was required to provide mitigation to over-grazed and unstable riparian areas on the property, as mandated by the county permit granted to build the golf course and community. The river banks had been compromised and serious erosion issues were present throughout the course and adjacent lands.

  The goals of the project included the stabilization of stream banks and the improvement of wildlife and fish habitat by creating riffles and natural 'snags' at strategic locations along the waterway. The project also anticipated reducing existing erosion.

  The project expenses totaled $107,000 and included contracting a construction company and helicopter crew. The environmental benefits of the project were impressive, including increased and improved wildlife/fish habitat; an aesthetically pleasing "natural" look; and reduced erosion during flooding events.

  While the course listed no business value for the project (stating that environmental benefits were the primary goal), the reduction of flood damage to the course may be substantial over the long term. Also, completion of the project allowed continued development and expansion of the golf course and surrounding community, as required by the enabling county permit. By enabling continued development on the property, the club has generated increased revenue. The project has also resulted in abundant positive media exposure and public relations opportunities for the course.

- The prairie restoration project at golf course in Illinois was aimed at converting a half-acre of previously "no mow" area of the golf course into a native prairie. Over the years since naturalization, the area had accumulated a large population of invasive and noxious weeds.

  The goals of the project included using as little herbicide as possible (both *before* and *after* implementation), increasing available food and shelter resources for wildlife, and restoring an *actual* native prairie on the course property.

  The total cost for project completion has been listed at $15,000, and the course anticipated no financial savings or business value to the project. Realistically, the course can expect prolonged cost reductions in chemical application, equipment depreciation, irrigation costs, and overall labor expenses for ongoing maintenance of the restored area.

- Due to a growing algae problem in a lake (which supplies irrigation water for the golf course), the course superintendent adopted and implemented a phosphorous-free fertilizer program. The goals of the project included minimizing or eliminating phosphorous fertilizers on the course property, strengthening the partnership with the lake management company, and pinpointing the cause of elevated nutrient levels in the water supply.

  The costs incurred through this project totaled approximately $4,300 per year, and while the superintendent stated that the environmental and economic benefits are "exponential," no business value was listed. By completing this project, the club reduced the labor and product costs associated with the roughly 810 lbs of phosphorous previously used during each fertilizer application. In addition, the club has reduced its bi-annual water testing costs through the development of a more active working relationship with the Lake Corporation, which now shares testing costs with the course. Over the long-term, these financial savings may be substantial. The implementation of the program has also improved the course's image and reputation.

- A golf course that encompasses seven acres of pond environment on its property historically had contained low oxygen levels, poor water clarity, and excessive algae growth. The result has been water features that are over populated with invasive fish species and that have become unsightly for club members.

  The aquatic habitat improvement program hoped to improve the overall water quality in the ponds, while also reducing or eliminating the population of predatory, non-native fish species including White Sucker and Common Carp. Improved water clarity would also add to the aesthetic value of the course water features, while providing improved habitat for native fish species such as bass or sunfish.

  The golf course partnered with a commercial aquatics management company to remove the exotic fish populations from the ponds via electro-fishing. An aeration system was also installed to introduce additional oxygen to the ponds, and improve water clarity and quality.

  Thus far, annual fisheries costs are listed at approximately $1,500 per year, and additional costs of $10,000 to aerate a 7-acre lake for a ten to fifteen year period. While the club has listed no business value for this project, long-term financial benefits may include reduced costs of algae controls, reduction in chemical costs and labor, and improved member satisfaction with course aesthetics—possibly generating increased revenue from retained or increased memberships.

- A small pond (~ ½ acre) on a golf course's 18th hole had become virtually sterile and had lost most of its aquatic plant and wildlife population over several years. This project was aimed at improving the overall aesthetics of the pond, while also restoring the pond back to a "living environment" by reestablishing a population of native plants and fish species into the water feature.

  The club hired an aquatics plant consultant to assess the existing situation and recommend applicable plant species. These plant species were established on the

shoreline and in the pond, and a subsurface aeration system was installed to replace an inefficient floating aerator previously implemented. The course also stocked the pond with native fish species such as trout, bass, and bluegill.

Over time, this pond has become habitat for fish and other wildlife, while increasing the overall appearance and ecological health of the water feature. Birds, such as ducks and hawks, now utilize the pond; an increase in feeding bats has been noted; and pre-existing weed and algae problems have been virtually eliminated.

The overall cost for the project was listed as $680, and no business value was noted. In truth, the long-term benefits of the project include the elimination of chemical applications to the water feature, relying instead on biological controls. Cost savings associated with maintenance, labor, and chemical product costs may be realized over a multi-year period.

- A golf course decided to replace existing out-of-play turfgrass with native vegetation as a "habitat area" or "naturalized area." The goals of the course included an increase in wildlife habitat on the property and the reduction of mowing and maintenance costs on approximately two acres. The existing turf was eradicated, and native grasses and flowers were drill seeded in the area. Only temporary irrigation needed for grass and flower establishment was provided.

  The completion of the project resulted in the addition of two acres of naturalized habitat area on the course, a reduction in acreage mowed and maintained, and the connection of wildlife corridors across the property.

  While the golf course listed no business value for this project, the initial $1,000 invested in the creation and establishment of the habitat area should be recovered over the long term in significant savings of labor, chemical, irrigation, mowing, and equipment costs.

- Similar to the 2004 habitat area establishment project described above, a golf course also previously increased naturalized areas in 2001. In an effort to increase buffering between several holes on the course, while also increasing the habitat potential of the property, four acres of the course were identified and determined to be suitable for naturalization.

  The implementation of the project was considered "quite simple" by the course superintendent, and incurred an initial cost of $1,000. By converting maintained turf into four acres of habitat area, the course will save significant money as a result of decreased irrigation, labor, chemical application, and the maintenance of course machinery.

  While the course superintendent listed no business value to this project, he did note that the "savings from wear and tear of machinery is significant." In addition, the project has added additional aesthetic value to the property—resulting in a possible increase in revenue generated from additional golfer rounds each year.

Conclusions

The presentation of ACSP for Golf Courses members' voluntary environmental projects, the business value of those projects, examples of projects that are leading to business value (unbeknownst by golf course management), as well as the preceding survey and interview information and presentation of the evolution of environmental management in business, all point to a number of conclusions:

First, golf courses are able to realize business value (*i.e.*, Money-Making, Cost Reduction, Image and Reputation Enhancement) through voluntary environmental actions—like those taken through a voluntary environmental program such as the ACSP for Golf Courses.

Second, very few golf course staff posses the knowledge and awareness to capture the financial costs and benefits of these environmental actions.

Third, those golf courses claiming that all voluntary environmental actions are "extras" and "cost-centers" only, do not possess full awareness of the business value that can be captured from these actions.

Fourth, environmental management tools commonly used in other business sectors (*i.e.*, environmental auditing, full cost environmental accounting, environmental measurement tools, environmental communication tools) are not prevalent within the golf industry—at the owner, manager, or superintendent level.

Finally, there seems to be a terrific opportunity for the golf course management professionals to start looking at managing the natural environment as a core part of their business—not simply an add-on or aesthetic project that adds cost but no real value.

Section 6

Practical Eco-Business Tools for Golf Course Management

The Audubon Cooperative Sanctuary Program for Golf Courses as an Environmental Management System

Audubon International awards certification to recognize golf courses that protect the environment, conserve natural resources, and provide wildlife habitats. Achieving certification demonstrates a course's leadership, commitment, and high standards of environmental management.

A golf course must develop and implement an environmental management plan and document its results to become certified. Environmental management practices in six key areas are included:

- Environmental Planning
- Wildlife and Habitat Management
- Chemical Use Reduction and Safety
- Water Conservation
- Water Quality Management
- Outreach and Education

ACSP members receive a Certification Handbook to guide certification efforts and documentation. The golf course begins by completing a Site Assessment and Environmental Plan, provided in the handbook. This information helps golf course personnel take stock of current environmental management practices and plan improvements.

As discussed in the previous section, golf course facilities are filled with opportunities to both enhance environmental protection and create business value through cost savings, revenue generation, and image enhancement. Yet, our research shows that there is a basic need to bring traditional eco-business tools into golf. As other businesses in other industries have learned the most basic, yet effective model for managing environmental issues is: Plan, Do, Check, Act. This model, which has given rise to the development of more sophisticated Environmental Management Systems worldwide, is the basis for the Audubon Cooperative Sanctuary Program for Golf Courses.

Conduct an Audit. . . Really, It's Not Scary

When most golf professionals—professionals in nearly any business for that matter—hear the word "audit," they cringe. Visions of some Internal Revenue Service staffer, complete with white shirt, black tie, and scowl, enter the mind. Yet, a company self-audit on environmental management and performance can be a critical first step for better, smarter decisions. Perhaps more frightening is a lack of knowledge of areas for costs savings and liability containment.

With the expansion of environmental laws and regulations in the 1970s, many businesses started conducting regulatory environmental audits to avoid fines, penalties, and falling out of compliance. However, a number of firms began to see the value in using these environmental audits as a way to identify cost saving opportunities and other business-related opportunities.

Environmental Management Systems, or EMSs, are increasingly being used by environmentally-leading firms as a means to set and meet performance goals, and improve upon them over time. The Audubon Cooperative Sanctuary Program for Golf Courses is designed to assist in the development of an EMS. The principal components of an EMS are *plan, do, check,* and *act.* Within this framework are a number of key elements or steps related to the development and implementation of an EMS. The U.S. Environmental Protection Agency outlines 17 key elements as follows:

1. **Environmental principles and policy**- Develop a statement of your organization's commitment to the environment. Use this policy as a framework for planning and action.
2. **Legal and other requirements**- Identify and ensure access to relevant laws and regulations, as well as other requirements to which your organization adheres.
3. **Assess significant environmental aspects and impacts**-Identify environmental attributes of your products, activities, and services. Determine those that could have significant impacts on the environment.
4. **Objectives and targets**- Establish environmental goals for your organization, in line with your policy, environmental impacts, the views of interested parties, and other factors.
5. **Develop environmental management programs**- For each environmental issue, formulate an action plan. Plan actions necessary to achieve your objectives and targets.
6. **Structure and responsibility**- Establish roles and responsibilities for environmental management and provide appropriate resources.
7. **Training, awareness and competence**- Ensure that your employees are trained and capable of carrying out their environmental responsibilities.
8. **Communication and outreach**- Establish processes for internal and external communications on environmental management issues.
9. **EMS documentation**- Maintain information on your EMS and related documents. This would include BMPs for each environmental impact issue.
10. **Document control**- Ensure effective management of procedures and other system documents.
11. **Operational control**- Identify, plan and manage your operations and activities in line with your policy, objectives, and targets.
12. **Emergency preparedness and response**- Identify potential emergencies and develop procedures for preventing and responding to them.
13. **Monitoring and measurement**- Monitor key activities and track performance. Conduct periodic assessments of compliance with legal requirements.
14. **Nonconformance and corrective and preventive action**- Identify and correct problems and prevent their recurrence.
15. **Environmental Records**- Maintain and manage records of EMS performance.
16. **EMS audit**- Periodically verify that your EMS is operating as intended.
17. **Management review**- Periodically review your EMS with an eye to continual improvement.

An environmental audit is a periodic, objective, and documented assessment of an organization's operations compared to a set of predetermined criteria. Audit criteria may be compliance requirements, such as regulations, or may be management practices that benefit the environment. In either case, an audit provides information about the operational status of an organization compared to management's environmental performance expectations. For example, if management expects the organization to be in compliance with regulations, an audit will provide information about whether compliance has been achieved or not, and, if not, what specific measures are required to achieve compliance.

It is useful to think of an audit as a periodic operations "tune-up." By conducting the exam (*i.e.*, audit), a business gains a better understanding of where its operations stand compared to specified criteria, such as compliance, management systems, or "greening." The audit will help to identify areas of needed improvement so a business can take action and improve its efficiency. Start by asking basic questions about your operations. The Audubon Cooperative Sanctuary Program for Golf Courses begins with a self-assessment, or environmental audit. The set of criteria used in the program to assess the environmental operations of golf facilities can be found at: http://www.audubonintemational.org/PDFs/Environmental Management Guidelines for Golf-2006.pdf.

An environmental audit is simply a comprehensive way to examine your golf course's own practices and procedures to better identify these environmental risk and opportunity areas. Audubon International developed an online audit, in cooperation with, and funded by the Club Manager's Association of America and the United States Golf Association, which can be accessed and used for free at: http://www.cmaa.org.Audubon/. By answering a set of questions about the site, the facility, and business management approach, environmental costs and opportunities are more easily identified.

Using Environmental Accounting to Capture Full Costs

You can't know what you don't measure. With a better sense of the golf facilities' environmental issues, accounting tools can help to capture the actual or anticipated costs for fixing a problem and return on that investment.

Full-cost environmental accounting is a tool used by businesses of all types and sizes to help more accurately capture the nexus between environmental performance and financial performance. It builds from a comprehensive environmental audit. This application is an extension of Life Cycle Assessments—whereby the environmental costs of any business activity are extended to include impacts from raw materials used, labor, energy, etc.

Environmental accounting can be used to capture four different levels of cost:

- *Conventional Costs* – this includes usual capital and operating costs such as equipment, labor, and materials. Some of these costs may be fixed (set cost to the organization as a function of capital loan payments, etc.) or variable (such as the fluctuation of labor and maintenance).
- *Potentially Hidden Costs* – this includes hidden regulatory costs such as monitoring, paperwork, testing, training, inspections, etc.

- *Contingent Liability Costs* – this includes penalties, fines, and future liabilities.
- *Image and Reputation Costs* – this includes business image, community relations, consumer response, and even avoided costs of marketing and sales due to positive publicity.

By understanding the four types of environmentally-related costs, better decisions can be made on environmental projects and improvements at the golf facility. Capturing conventional costs, such as environmentally-related costs of golf course management, such as materials and labor, is relatively simple—and is the focus of most of this report. However, increasingly, businesses must at least be aware of and consider hidden, contingent liability, and image-related environmental costs of doing business. Too many other businesses in other sectors have been caught napping, only to find out the hard way what these costs can really mean.

For instance, two identical golf facilities located on the same stream have an equipment wash-down area. One uses a simple, low-cost system (hose, drain, and gravity draining to the nearest stream), and the other uses a wastewater capture and treatment (closed loop) system that cost $40,000. One Sunday morning, downstream neighbors noticed fish floating in the stream—hundreds of them. A spill upstream resulted in a dramatic and public fish kill.

Both golf courses, the only businesses directly upstream, are inspected by the state's environmental protection department. In the end, the golf course without the wastewater capture system is found at fault. The golf course is fined $100,000 by the state department of environmental protection and loses a tremendous amount of credibility with the local community.

In this example, both contingent liability costs and image and reputation costs mount quickly for the golf course at the eye of this fish kill storm. These costs, directly related to the environmental performance of the golf course, could have been avoided. Even more, this is an extreme example. There are numerous low-cost ways to treat wastewater from a wash-off area, without investing $40,000 in a closed-loop recycling system, that would have still avoided widespread environmental damage and resultant public concern.

Follow the Money

Every golf course, a small business, has a finite set of resources and dollars to invest in the business each year. Each of those investment decisions is expected to lead to an equal or (hopefully) greater return in the form of rounds of play and dollars spent at the course. Each of these cost areas can be directly and positively impacted by a more accurate assessment of their environmental costs. It's about simple eco-efficiency—meeting your business needs and goals with the least amount of inputs and resources (thus costs) as possible.

Let's look at where most golf courses spend money. As Woodward and Bernstein coined in their Watergate investigations—you have to "follow the money." Golf facilities spend billions of

dollars annually on the materials, equipment, and labor to maintain and manage the fairways, greens, and tees on the golf course.

According a 2003 survey of golf course superintendents, maintenance budgets can range from less than $100,000 per year to millions of dollars (*Alyward*, 2003):

- 14% spend $1 million/year or more on golf course maintenance
- 20% spend $600,000-$999,999/year or more on golf course maintenance
- 22% spend $400,000-$599,999 /year or more on golf course maintenance
- 34% spend $100,000-$399,999/year or more on golf course maintenance
- 8% spend less than $100,000/year or more on golf course maintenance

Roughly 60% of this total budget is usually sunk into labor. Golf course staff can consist of a single superintendent to one primary superintendent with multiple assistants and dozens of maintenance staff. The remaining 40% is spent on operations, equipment, and maintenance costs. *(Alward*, 2003)

The average annual maintenance budgets of golf courses by region and type is shown in the Table 2.

Where does the money go for things like water and chemical inputs necessary to keep turf alive and playable? Mean and estimated total spending by golf courses on various elements of the maintenance budget are shown in the Table 3 (see next page).

It is this investment in maintenance and operations that is at the heart of a successful golf course facility—turf health, quality of play, etc. Yet, in each of these spending areas, there are opportunities to reduce management costs, and in turn, use freed up dollars for environmental improvement projects, additional sales and marketing efforts, etc. A matured and active Integrated Pest Management program has an impact on the amount of chemical inputs to budget for, just as reducing mown and management areas on the course (costs not shown above) can reduce wear and tear on equipment as well as reduce gasoline usage.

Table 2
Annual Budget by
Golf Course Characteristic

Category	**Average Maintenance Budget**
Region	
Northeast	$372,209
Mid-Atlantic	$370,274
Southeast	$518,366
Great Lakes	$337,961
Mid-Continent	$437,198
Western	$688,107
Florida	$999,026
Facility Type	
Daily Fee	$327,773
Semiprivate	$282,734
Private	$635,930
Resort	$576,423
Municipal	$383,819

Source: Luczycki, 2000.

Table 3
Where Money is Spent in Golf Course Management

Category	Mean Spending	Annual Spending by Facilities
Irrigation Water	$30,800	$511.3 million
Fertilizer/Plant Nutrition	$22,900	$380.0 million
Fungicides	$21,000	$348.6 million
Turf Seed	$9,210	$152.9 million
Herbicides	$8,650	$143.6 million
Irrigation Supplies	$7,520	$124.8 million
Insecticides	$7,480	$124.1 million
		$1.7 billion/year total

Source: *Alyward*, 2003

This also does not include the environmental costs of operating the entire golf or club facility. More facilities have some type of clubhouse, restaurant, perhaps amenities like pool and tennis, as well as additional green space and grounds to manage. The same tools and systematic approach to identifying and uncovering hidden environmental business value for a golf course can be applied to these areas.

Conclusion

A number of very easy to use approaches and tools are available to help a golf course management team better assess true environmental impacts and costs in order to prioritize investments in voluntary environmental projects and implement best management practices. As with other business sectors, the use of these 'business tools' to address environmental issues can lead to an "a-ha" moment with the golf course management team. Opportunities are especially ripe in the golf business sector to make use of these tools and approaches.

Section 7

The Business Value of Designing and Building Golf Courses with Nature in Mind

Along with researching the business value of actions taken by ACSP for Golf Course members, over the past five years, Audubon International has also examined the business value of designing and building new golf courses with nature in mind. More than 70 new golf courses have been designed and built in this way through the Audubon Signature Programs and certified for this achievement since 1993. Another 70 are currently enrolled or are going through the program. As such, this group of golf course facilities offers a different dataset to explore and uncover the business value of environmental stewardship.

Becoming a certified Audubon International Signature Sanctuary provides tangible recognition that a property has been developed and is being managed according to Audubon International's *Principles for Sustainable Resource Management* (see Appendix C). Owners and managers of Audubon Signature Sanctuaries gain local, national, and international recognition for leadership in environmental stewardship. In addition, most members find that by achieving certification they have learned and put into practice more cost-effective ways to develop and manage their properties, thus saving money as well as natural resources. For instance:

- ***Cateechee Golf Club, GA:*** By implementing its specific Audubon Signature Program Natural Resource Management Plan, Cateechee saves 20% in electric costs and 35% in overall operating costs compared to traditionally built and managed golf courses. Likewise, Cateechee handles more than 639 million gallons of effluent water annually—allowing the City of Hartwell to abandon its practice of discharging effluent water into a local stream.

- ***PGA Golf Club, FL:*** Saves 25% in overall operating costs because of the state of the art equipment and practices promoted by the Audubon Signature Program, and, as a part of the program, conserve 100 million gallons of Florida's water supply by collecting runoff in 80 acres of ponds created for water storage and wildlife habitat.

- ***Bonita Bay East, FL:*** Through the Audubon Signature Program, Bonita Bay East reduced turfgrass by 82,442 sq. ft. on the Sabal Course and by 4,905 sq. ft. on the Cypress Courses resulting in the estimated savings of $56,000 annually relating to reduced maintenance labor, irrigation, fertilizers, and of other control products. Thirteen hundred carp were released in the course's lakes, saving approximately $10,000 with the decrease in labor and control products needed to maintain the lakes. Bonita Bay saved 1,837,500 gallons of water a year by replacing turf areas with native plants and eliminating thirty sprinkler heads.

In addition, seven sprinklers were disabled on both golf courses saving 428,750 gallons of water a year for a total of 2,266,250 gallons of water saved in a year. By removing 86,400 sq. ft. of turf, Bonita Bay saved an estimated $12,000 annually in maintenance labor, irrigation, fertilizers, and control products.

- ***Sand Ridge Golf Club, OH:*** Approximately 22 acres of fairway that received little to no golf play have been transformed into native plant/open field roughs that are now seasonally mowed. The cost savings of this restoration in terms of labor, equipment, and chemicals eliminated is estimated to be $22,000 per year. Likewise, an additional 25 acres of previously mowed and maintained rough was converted to open field meadow zones. Ground crew labor costs over the past three years were reduced by an estimated 15% or about $5,000 per year, not including the reduction in energy and equipment maintenance costs.

Likewise, anecdotal information and comments collected in phone interviews and print publications also support the business value of "green golf design." A set of these comments are presented below:

"There is no doubt that the [Audubon International Signature] program measurably protects, restores, and enhances natural resources and reduces waste, as well as promotes the more efficient use of one or more natural resources. All this is done while being sensitive to overall environmental community concerns."
- Robert S. Krause, Vice President for Institute Advancement at Kansas State University Manhattan, KS

"Indian River Club was developed under the premise that 'good environmental sense makes good economic sense.' Our members and residents take a great deal of pride in Indian River's participation in the Audubon Signature Program. They consider our status as a Signature Sanctuary as a measure of quality of the club and our community."
- Robert Swift, Former Managing partner of Indian River Club, Vero Beach, FL

"Combining wildlife preservation and development is not only the right thing to do, but it makes good business sense. Long-term operating costs can be significantly reduced while providing valuable environmental benefits to the community. A healthy, well-maintained golf course can be cost efficient by reducing pesticides and conserving water and in the process becomes vital habitat for plants, wildlife, and people. It is a business-environmental partnership that serves everyone."
- Jim L. Awtrey, Former Chief Executive Officer, PGA of America, Palm Beach Gardens, FL

"This achievement and recognition by Audubon International is only the first in working with the environment. This program not only provides golfers with a more eye-pleasing golf course but has a side effect of creating a positive financial impact on the budget."
- David Gourlay, B.Sc., CGCS, General Manger, Colbert Hills

"The Signature Program promotes the merger between the free-enterprise system and productive environmental management. A healthy, well-maintained golf course can be cost efficient by reducing pesticides and conserving water, and in the process becomes vital habitat for plants, wildlife, and people."
- Tim Hiers, CGCS, Golf Course Manager, The Old Collier Club, Naples, FL

As we move into the 21st Century, the principles and concepts of sustainable development need to be more clearly understood by the public and the media. Audubon International's Signature Program does a great job promoting the concept that the environment can and should be able to coexist with a well conceived and economically viable golf development."
- George Kelley, Owner & Golf Course Architect, Stevinson Ranch Golf Club, Stevinson, CA

"Bonita Bay Properties, Inc. is dedicated to an ongoing commitment to environmental stewardship, preservation, and habitat enhancement. Environmental commitment is the foundation of Bonita Bay's approach to managing its properties. The natural partnership with Audubon International exemplifies the productive relationship between conserving the environmental beauty of the property and obtaining the economic benefits of reduced maintenance costs."
- Jim Schilling, Former Golf Course Superintendent, Bonita Bay Golf Club East, Naples, FL

"The concepts incorporated in this program will absolutely pay for the cost of what we're doing over five to ten years…We'll have better managed water and irrigation systems and used fewer chemicals."
– **Bill Fiveash**, East West Partners, Project Manager, Old Greenwood Golf Course, CA

Finally, Audubon International conducted a survey of Audubon Signature Program members on the business value of program participation. The results helped to further support the premise that designing, building, and managing in an environmentally-responsible manner, beyond what is required by law or permit, makes good business sense:

- 90% of respondents reported that they believed annual maintenance and operations costs for their facility were either "lower than" or the "same as" the costs of an equivalent, non-Signature member golf course.

- 43% of respondents felt that these operations and maintenance costs were actually lower due to their participation in the Signature Program.

- 96% view their participation in the Signature Program as "a good business decision," with the remaining 4% indicating that they "Don't Know" at this time.

- 63% of respondents stated that participation in the Signature Program, including upfront monetary and staff investment in the program, has or will save money, as compared to a course designed, constructed, and managed without Audubon International assistance, with 20% of the remaining respondents stating that they "Don't Know" at this time.

- Finally, 90% stated that they believed the Certified Audubon Signature Sanctuary status earned through following the program guidelines has or will have value in marketing and promotional efforts, with the remaining 10% indicating that they "Don't Know."

The trend of green golf course design, whether in conjunction with a voluntary environmental program such as the Audubon International Signature Programs, or through some other means (including use of eco-minded golf course architects), leads to similar conclusions and lessons as existing golf courses participating in the ACSP for Golf Courses. Voluntary environmental actions can lead to real business value—especially if designed and built right from the start.

Section 8

Observations and Recommendations

Given the information collected in this report and subsequent observations, a number of recommendations are offered to help the golf industry in general, and golf course superintendents, managers, and owners specifically, do a better job of uncovering the business value of environmental stewardship. Likewise, recommendations are offered to help continue to move the golf industry along a more environmentally sustainable path.

1. **Deliver more "business and the environment" information and education to golf course superintendents, managers, and owners.** Since 2006, organizations like the Golf Course Superintendents Association of America have launched a concerted effort to do just that. The more recent spike in environmental awareness and interest in the United States in general has made eco-business training more of a reality for other golf professional organizations as well. However, more is needed to allow owners, managers, and golf professionals alike to understand better how to take voluntary environmental actions and then track, measure, and communicate those results—both environmental and economic—to the right audiences.

2. **Develop a set of fact sheets for golf club members and green committee members that emphasize the business value of environmental stewardship.** Often the lead eco-champion at the golf course runs into a barrier in convincing golf course leadership of the value of environmental actions and projects. More information by third-party, credible sources in golf should be made available to these leadership groups—usually comprised of untrained, volunteer members.

3. **Include environmental stewardship and business value information through the United States Golf Association to golfers.** Creating an expectation and demand for voluntary environmental performance on golf courses by golfers can also help to foster quicker uptake throughout the industry.

4. **Create a collective force from all insurance companies involved in golf facility insurance to include rate reductions for golf courses that are working in or certified in voluntary environmental programs that address maintenance facility operations, chemical use, etc.** Research shows that environmentally-leading firms are also better managed in general, giving them a better overall risk profile. A handful of insurance providers are doing this—Fireman's Fund Insurance Company and Signature Risk Insurance (Canada)—but others should take the lead and create broader market expectations for enhanced environmental performance on the golf course.

5. **Golf course superintendents, managers, or owner associations and their chapters should work to create a "Green Golf Purchasing Group" to identify, purchase, and dictate bulk purchase discounts of "eco-friendly" products of all types at golf facilities**—from electricity to paper to cleaning fluids. The industry should use one of many pre-established green product labels to identify products. For more information, visit www.greenerchoices.org.

Appendix A

Managed Lands Survey: 2000-2001

Introduction

By their very nature, golf courses provide significant open spaces and opportunities to provide needed wildlife habitat in increasingly urbanized communities across North America. The average course covers 150 acres, yet just 30% is generally used for greens, tees, fairways, and buildings, leaving 70% as rough, woods, water, and other habitats (United States Golf Association, Green Section, 1995). These non-play areas provide significant opportunities to protect wildlife and native habitats, provide corridors that link to other natural areas, filter pollutants, produce oxygen, and stabilize soils. At the same time, golf courses are called to address environmental concerns related to the potential and actual impacts of water consumption and chemical use on local water sources, wildlife species, and native habitats.

In 2000 and 2001, Audubon International conducted an environmental survey to assess the impact of participation in the Audubon Cooperative Sanctuary Program for Golf Courses on a number of key environmental priority areas. These included: wildlife habitat conservation, water quality, and chemical use and reduction. In addition, the survey included a brief assessment of participant attitudes related to the impact of ACSP participation on golf playing quality, job satisfaction, and golfer satisfaction.

The survey was mailed to all golf course members; 23% responded and data from these 470 golf courses was compiled and analyzed. Results indicate a high level of environmental quality improvement among participants of the program.

Environmental Priority Area: Chemical Use Reduction and Safety

Pesticides and fertilizers can have significant adverse impacts on surface and ground water, people, wildlife, and other organisms. Helping golf courses to reduce the use of pesticides and fertilizers, as well as safely use, store, and handle chemicals, is a key environmental priority of the Audubon Cooperative Sanctuary Program. Results of the Managed Lands Survey indicate that golf courses have been able to achieve these objectives without sacrificing golf course playing quality or member satisfaction.

Since joining the Audubon Cooperative Sanctuary Program…

- 75% of respondents reduced pesticide costs
- 82% reduced pesticide use
- 92% used pesticides with a lower toxicity level
- 89% improved cultural control methods to decrease the need for chemical use

- 64% improved spill containment for pesticide mixing and loading areas (before joining, just 33% reported improved spill containment)
- 85% increased the percentage of slow-release fertilizers used
- 74% increased the use of natural organic fertilizers

Environmental Priority Area: Wildlife and Habitat Management

Golf courses have tremendous opportunities to provide valuable open space for people and wildlife and become part of local green spaces within their communities. Yet many golf course superintendents have never formally studied the natural habitats that often make up more than half of the golf course property. The ACSP provides significant educational information and resources to help golf courses enhance and protect habitat for native wildlife species. Results of the Managed Lands Survey show that the majority of participants are implementing a variety of measures to enhance and protect wildlife habitats.

Since joining the Audubon Cooperative Sanctuary Program…

- 80% decreased managed turfgrass to increase wildlife habitat
- 89% conscientiously chose native plants when landscaping (compared with 49% before joining the program)
- 56% removed exotic invasive plants
- 77% added gardens for birds and butterflies
- 65% now maintain a wildlife inventory, compared with just 16% before joining
- The average number of acres per golf course devoted to providing wildlife habitat increased from 45 acres to 67 acres, an average increase of 22 acres per golf course
- Combined, the golf courses that responded to the survey provided 40,214 acres of wildlife habitat, an increase of nearly 10,000 acres due to program participation

Environmental Priority Area: Water Quality and Water Conservation

Limiting water consumption and preventing water pollution have long been critical environmental issues for the golf course industry. Governmental agencies, environmental organizations, and the general public continue to raise concerns about the impacts of golf course water and chemical use on the water quantity and quality of lakes, streams, and groundwater. The Audubon Cooperative Sanctuary Program aims to help golf courses protect water quality for irrigation, drinking water supplies, and aquatic habitats and wildlife species. Responses to the Managed Lands Survey suggest that golf courses

are taking increasing steps to decrease water use and protect water resources from potential pollutants.

Since joining the Audubon Cooperative Sanctuary Program…

- 60% reduced water costs
- 89% improved their irrigation systems or the ways that water is applied
- 69% decreased water usage
- Golf courses saved an estimated 1.9 million gallons of water per year per course since joining
- 86% increased efforts to monitor water quality
- 55% increased emergent vegetation in golf course ponds
- 45% installed a contained equipment wash-off area (compared with just 23% prior to joining)

Participant Attitudes

In order for environmentally sound management practices to be implemented and accepted, they must not jeopardize the superintendent's or club's ability to maintain quality playing conditions or satisfy golfers. In addition, golf course superintendents must perceive environmentally sound maintenance as a positive aspect of their jobs if they are to make a long-term commitment to maintaining environmental quality. The Audubon Cooperative Sanctuary Program assists golf courses in educating golfers and local community members about the benefits of maintaining an environmentally sensitive golf course. Responses to the Managed Lands Survey show overwhelmingly that program participants have been able to integrate environmentally sound maintenance practices effectively without sacrificing golfing priorities.

Since joining the Audubon Cooperative Sanctuary Program…

- 99% reported playing quality has improved (50%) or been maintained (49%)
- 99% reported that golfer satisfaction has improved (66%) or been maintained (34%)
- 99% of superintendents reported their job satisfaction has improved (49.3%) or been maintained (49.3%)

Conclusion

Environmentally sound golf course management is essential for maintaining the quality of the environment and continuing the natural heritage of the game of golf. The Audubon Cooperative Sanctuary Program for Golf Courses provides educational resources, a structured framework, and a set of environmental standards that help golf courses respond effectively to the challenges of maintaining an environmentally sound golf course.

Results indicate that participation in a voluntary program like those offered by Audubon International leads to tangible environmental outcomes in a number of key environmental quality areas. Yet, there is work to be done with the golf industry to improve environmental performance, measurement of those results, and capturing the business value of environmental stewardship at golf facilities.

Appendix B

Snapshots of Environmentally and Economically Beneficial Projects in Golf

Aldeen Golf Club
Rockford, IL

Hummingbird/Butterfly Garden
Visible, out-of-play area is turf, surrounded by cart paths, and includes 3 trees in triangular area subject to runoff and minor flooding during heavy rains. Area was selected to introduce, identify, and label native and other plant materials that attract butterflies, birds, insects, and reduce mowing. Cost: $500 - $750. Savings: $100 (more public relations benefit than actual monetary value).

Baker National Golf Course
Medina, MN

Cart Path Renovation
Wood chip cart paths installed after 1989 renovation of the course, followed by installation in 1990 of asphalt cart paths, which have been patched and repaired in numerous deteriorating areas. In 2004 the park district decided to renovate the cart paths and use the standard cart path specifications. Goals were to reduce turf stress and compaction by keeping golf carts on the paths as much as possible, and increase areas for carts to enter and exit on paths to spread the wear on the turf to multiple locations. Cost: $450,000. Savings: $2,000 – 3,000 annually (turf restoration; labor and materials for repairs to old paths).

Birnamwood Golf Course
Burnsville, MN

Natural Areas
Seven thousand sq ft in a non-play area were converted to natural area on this 21 ½ acre nine-hole par 3 golf course. Turf was striped so no chemicals were used; seeded in oats (as nursery grass), fescue, Indian grass, and purple cone flowers covered with Futura netting to avoid seed washing away. Cost: $220. Savings: $500 annually (fertilizer, labor, etc.)

Brickyard Crossing
Indianapolis, IN

Naturalizing Areas
Naturalized approximately 12 acres of property on the course by implementing a hands-off approach to let turf grow unmanaged throughout the growing season and then top growth is cut and harvested in the spring. Project chosen to increase habitat, reduce operating costs, and improve overall aesthetics. Cost: zero. Savings: $14,000 (reduced water consumption, chemical applications, operating costs, etc.)

Broadmoor East/West
Colorado Springs, CO

Wildflower Planting

Identified and cleared 1.5 acre site to convert to wildflower area to provide habitat for wildlife, incorporate use of native plant materials, and demonstrate environmental project to golfers. Area has increased wildlife habitat, decreased pesticide and water use; decreased labor in maintenance, educated staff golfers, and observed for the first time two breeding pairs of wild turkeys. Costs: $1,400 ($300 annually). Savings: $600 annually.

Carmel Country Club
Charlotte, NC

Natural Grass Areas

Create no-mow natural areas for wildlife habitat to decrease man labor hours, reduce chemical use, fuel, and other annual maintenance costs and maintain to be aesthetically pleasing to the golfers. Identified and seeded tall fescue mix and wildflower seed, provide basic fertilizer, mow once a year, and re-seed weak areas annually. Cost: ~$5,000 for initial start-up; $3,000 annual maintenance. Savings: ~$7,500 annually (reduced labor, maintenance, chemicals, fuel, and equipment use).

Self-containment System

Construction new equipment washing and chemical mixing building; changeover to lake and well water; completion of a state-of-the-art fertigation facility. Water from equipment washing facility is cleaned and recycled; dirt, grass, and organic particles washed off equipment are collected and composted. In-house closed-loop chemical mixing prevents accidental spills from reaching storm drains. Conversion from city water to lake and well water facilitates lake recharged by run-off and four wells. Project overall increased self-containment, decreased liability for chemical runoff, and saved costs. Cost: ~$1,000,000 (2 buildings, equipment washing facility, chemical mixing facility, fertigation, well and lake water system). Savings: ~$200,000 (water bill alone).

Chenal Country Club
Little Rock, AR

Natural Area Additions

Increase non-play areas to increase habitat and reduce maintenance and improve aesthetics due to course becoming too easy to play, and to “frame” around holes lost due to loss of trees from new development surrounding the course. Cost: none. Savings: $1,000 (maintenance, labor, water usage).

Colonial Acres
Glenmont, NY

Reduction of Synthetic Pesticides

Reduce synthetic pesticide use to 50% (using only Category III), with 50% organic and biological and maintain a quality golf course through more organic and biological use. Begin season with organic fertilizer, followed by microbial application helped to strengthen soil structure and root density. Used only Category III synthetics to treat disease in June, and increased use of microbes to keep soils and root densities stronger. Cost: no extra cost. Savings: $1,455.

Over a 2-year period, used a consistent ratio of 30:70 percent of synthetic to bio/organic applications without loss of playing surface quality. When project information was posted for golfers, some were so impressed that they requested information and several used the bio products on their own lawns. Technique used was trial and error; results are variable depending on products used, type of soils, or maintenance practices (clay soil reacts better to bios than sand because of microbe activity). Cost: $9,500. Savings: $500 from the first year.

Del Paso Country Club
Sacramento, CA

Introduce Grass Carp to Ponds

Due to large amount of aquatic weeds and encroachment of grassy weeds into three ponds and wanting to avoid using herbicides and mechanical removal (not cost effective due to amount of man hours involved), introduced 19 triploid grass carp. Cost: $270. Savings: $150/month (employee labor).

Eagle Spring Golf Course
St. Louis, MO

Prescribed Burn of Native Areas

Staff maintains 30 acres of no-mow, non-irrigated (prairie-type) areas saving approximately 40,000-60,000 gallons per irrigation day. By burning some of the areas, fuel and man hours are saved. Implementation of the burn was a cooperative effort between golf course staff and county parks department. Burning reduced plant refuse mass that otherwise would be stockpiled for extended period as compost. The burn returned this mass into the ground adding plant nutrients for the next growing season. Growth of desirable plants during the next growing season was much denser creating more refuge for wildlife. Cost: ~$1,300 (man hours; equipment was provided by county parks). Savings: Approximately ~$15,120.

Eagle's Landing Golf Course
Berlin/Ocean City, Maryland

Phragmites Weed Eradication

Eliminate invasive, non-native Phragmites in tidal marsh edge that blocked view not only of golf holes (making them difficult to play), but view of surrounding bays, ocean, and wetlands, which would also open up wetland areas and allow native plants to become established. Height and density prevented from effectively managing the weed by hand weed-eating. Developed program (meeting State of Maryland Toxic Materials Discharge Permit) to apply herbicides when Phragmites actively growing and in bloom stage. Takes two to three years of repeat applications to kill the plants and their vast root reserves. Cost: $1,325 (labor and materials for treating approximately five acres). Savings: $950 (estimated annual cost for hand weedeating). Labor and materials for spray program likely be reduced in years to come due to eliminating weed and need for only spot treating.

Fawn Lake Country Club
Spotsylvania, VA

Wildflower Planting

Replaced 50 acres of unsightly, poorly established native grasses in non-play areas with wildflower plantings to incorporate a low maintenance approach, beautify, and add wildlife habitat. Cost: ~$2,500. Savings: ~$5,000-7,000 (maintenance, labor, etc.)

Fiddler's Elbow Country Club
Bedminster, NJ

Naturalization

Increased naturalized areas from 100 to 150 to make hazardous areas off limits to golfers, stop mowing and spraying, and added habitat for small animals, birds, and insects. Cost: None. Savings: $5,000 (maintenance, labor, chemicals, etc.)

Fowler's Mill Golf Course
Chesterland, OH

Enhancing Wildlife Habitat

Increase 3-5 acres of naturalized areas and buffer zones; add no-mow areas; create brush and rock piles; continue to build and relocate bluebird boxes and monitor; add osprey nesting platform; reduce chemical use. Decreased maintenance hours mowing roughs; decrease equipment maintenance and fuel cost; decrease water usage. Cost: zero (labor already on staff; used lumber on site). Savings: $5,000 – $8,000 (maintenance, fertilizer and chemical costs)

Clubhouse/Golf Course Landscapes

Replaced turf with low maintenance flower beds using native plantings, perennials, wildflowers with assistance from local extension office and nurseries. Cost: $600-$800. Savings: Maintenance, chemical and fertilizer use, water; (plants will be divided in the future to save additional costs).

Goose Control

Goose population approximately 425 (calculated by game warden); as a result, golfer frustration with goose droppings and costly damage to tees and fairways. Adopt border collie from rescue organization to help herd geese and established separate area away from course to attract geese that won't leave. Cost: $300-$500. Savings: None ("satisfied golfers")

Forest Highlands Golf Club
Flagstaff, AZ

Water Conservation

Instituted three level water conservation approach including -- Phase 1: reduce watering 5 to 10%; eliminate watering native grass areas around both courses; reduce lake filling for non-essential lakes. Phase 2: continue with Phase 1, and further reduce irrigation to driving ranges, clubhouse, landscaping and common areas; discontinue filling remaining ponds; further reduce rough irrigation. Phase 3: continue with Phase 1 and 2; discontinue watering driving ranges; restrict watering common areas; eliminate water roughs. Cost: $60,000 (improve water distribution); additional $5,000 (labor costs of additional staff for hand watering). Savings: $3,000 ($8,000 (water), less $5,000 (labor); additional

water savings and electrical costs over time; also realized a more uniform golf course (noted by the membership) from the hand watering.

Gainesville Country Club
Gainesville, FL

Wild Hog Relocation Project
Capture and relocate wild hogs to eliminate destructive digging in tees, greens, and roughs on the course and avoid constant repairs. Developed collection areas and mobile relocation units to get wild hog populations to an acceptable level where damage to the course was manageable. Cost: $550. Savings: $2,000+ (man hours required for repairs, and opportunity to focus on other maintenance. ("There is no dollar amount to put to a satisfied membership.")

High Ridge
Boynton Beach, FL

Wildlife Corridors
Currently have 13.3 acres of core habitat much of which is isolated; increase size and connect when possible; add additional 2.9 acres of native area; and reduce amount of highly maintained turf. Cost: $5,800. Savings: "$750/year forever."

Holly Hills Country Club
Ijamsville, MD

Naturalized Areas
Created naturalized areas to enhance overall wildlife habitat for desirable species by providing coverage, host plants, and other food sources; reduce man hours needed to maintain areas and concentrate on in play areas. Cost: None. Savings: $2,300 annually (labor, maintenance, etc.)

Innsbrook Resort Golf Course
Innsbrook, MO

Landscaping
Create five new butterfly/hummingbird flower beds around difficult to manage/mow tee signs. Initial cost: $1,000. Savings: $100/year (grass/turf maintenance).

Control Panel Upgrade
Twenty year old irrigation pump station with two motors not working effectively/efficiently; pressure and water distribution inconsistent; hired pump technician to install new computerized controller. Cost: $7,000. Savings: $2,400 first year labor alone (decreased water use, less electricity, reduced hand watering by 40%, better coverage).

Itasca Country Club
Itasca, IL

Shop Clean-up
Project was chosen due to Village of Itasca, Community Development. Village forced ICC (through fines and citations) to clean shop area visible from residential homes in town (oversized compost heap, area riddled with garbage, large dirt hill flooded with weeds, standing water along shop area). Increased aesthetics by removing compost,

garbage, and debris from property; re-grade site and eliminate surface water around shop, groundcover to control weeds. Cost: $35,000. Savings: $10,000 annually.

Joe Louis Golf Course
Riverdale, IL

Wash Pads
Not enough money in the budget to invest in filtered, self contained wash pad so used a no-mow area next to the pump house to screen out and provide easy cleanup of grass clippings, and prevent rinse water from traveling into surface water by mowing, lowering, and adding woodchips to the a 3700 sq ft area preventing water from traveling to surface water protecting irrigation pond and Cal Sag canal from runoff. Cost: Labor only (woodchips donated). Savings: cost of new wash pad.

Lords Valley Country Club
Hawley, PA

IPM Modeling
Developed weather database to document seasonal conditions and variations; develop use of weather forecast data for disease and insect modeling; forecast disease, insect, irrigation demands; provide analytical tool to monitor/manage pest occurrence, irrigation, and document. Cost: $150/month for 6 months/season. Savings: ~$2,000 minimum annually (varies due to disease pressures).

Minnehaha Country Club
Sioux Falls, SD

Tree Nursery
Twenty-five pine seedlings were donated to the club but due to low survival rate, seedlings were first planted in a turf nursery and automatically irrigated in order to produce quality specimens for transplant. Cost: $100 to plant (trees donated). Savings: $2,500.

Olde Florida Golf Club
Naples FL

Regrassing
Eradicated existing turfgrass and regrassed with mono improved variety of turf stand, and removed 5 acres of turfgrass and re-vegetate area with native trees creating reduced irrigation, pesticide and fertilizer use, and increase wildlife habitat. Cost: $1.5 million. Savings: $50,000 annually (reduced electricity f/ irrigation; reduced fuel w/ turfgrass removal; reduced pesticide and fertilizer use w/ mono turfgrass stand).

Reduction of Pesticide for Mole Crickets
Goal was to terminate regular bulk pesticide application and reduce pesticide costs for the treatment of mole crickets by phasing out “wall to wall” applications. Populations of mole crickets decreased after major application of Chipco Choice and allowed for subsequent alternative treatments such as spot applications to “hot spots” during peak mole cricket season. Cost: Zero. Savings: $23,644 annually (standard insecticide expenditure ~$32,088; after Chipco Choice applied, average insecticide expenditure is now ~$8,433).

Padre Isles Country Club
Corpus Christi, TX

Buffer Areas Project
Created 50 – 60 acres of native areas and buffer zones around all lakes; also added educational signage. Initial cost: $150 (signs). Savings: $3,000/year (fuel, maintenance, labor, etc.)

Native Habitat Restoration Project
Establish native habitat in approximately 2 acres of out-of-play areas in rough and around lakes. Cost: $100 (signs). Savings: ~$2,000 per year (labor, wear on equipment, saved water).

Quivira Lake and Country Club
Lake Quivira, KS

Eastern Bluebird Adoption Program
Initially installed 15 bluebird nest boxes around the golf course and surrounding property, with additional next boxes added to trail and naturalized areas. Volunteers monitor and record fledgling data, compile data, keep records with results reported to state and national birding organizations. Developed program to raise bluebird fledgling numbers, provide environment considered ideal for bluebirds, and develop heightened volunteer/community awareness and rewards of increased songbird populations. Results demonstrate steady increase in fledglings each year. Cost: $500-$600. Savings: None.

Regatta Bay Golf & Country Club
Destin, FL

Butterfly Garden
Routed cart path on uplands over wetlands, cleared to put in drainage, and left 1 acre of land free of sod. Filled in with low maintenance native plantings that will not need mowing, water, or fertilizing and created excellent outdoor "classroom." Cost: $2,700; $500 annually (maintenance). Savings: $6,200 in sod; $1,200 labor, products).

Cleanup Existing and Expand Native Grass Plantings
Replant and expand low maintenance native grass plantings, some of which were overrun with weeds and unwanted plant material, for a total of 2 acres of non-irrigated, naturalized area resulting in less turf, less maintenance, and protected area for birds and small wildlife. Cost: $1,500 (plant material and labor). Savings: $2,500 (labor, products, water).

Robert Trent Jones Golf Club
Gainesville, VA

Native Wildflower Meadow
Naturalized areas currently exist of tall grasses, wildflowers and native plants to be replaced with a wildflower meadow with indigenous plants to attract a variety of wildlife and a low maintenance area. Cost: $20,000 (native plant expert & bed design). Savings: $1,000 annually.

Transplant Wildflowers to Established Beds
Wildflower meadow created in 2000 needed to be moved. New locations for all rescued wildflowers were created to go well with current color scheme and proper growing environment. Native wildflower transplants went with pre-existing plant materials and transplanting was a success. No fertilizer or pesticides to keep wildflower looking great. Cost: $2,000 (120 man hours). Savings: $2000 (pruning, weeding, watering, reduced pesticide use).

Round Hill Club
Greenwich, CT

Bluebird Boxes
Due to only isolated bluebird sightings, added approximately 40 next boxes over four years; maintain boxes, monitor, and maintain detailed records of monitoring activity. Reduced amount of cut worm; only greens are treated and only once or twice a year. Before project, 5 or 6 applications were needed per year. Cost: $45/box (~$1,800). Savings: ~$1,500 annually (labor and chemical reduction)

Saddle Rock Golf Club
Aurora, CO

Russian Olive Removal in Waterways
Removal of increasing numbers of invasive Russian Olive trees from waterways on golf course. Trees are cut down, removed, and stumps treated with Rodeo herbicide. Scouting is required throughout the year, followed by removal activities. Removal before maturity will keep the waterway free of invasive species and benefit areas of the waterways down stream from the course. Cost: $2,000. Savings: $5,000 (future removal and herbicide costs).

Sandy Hollow Golf Course
Rockford, IL

Wildflower Plantings
Chose two non-play areas suitable for planting wildflower mixture developed for this region; gardens located in out-of-bounds playing areas that are highly visible to golfers, neighbors, and passing public; added educational signage. Cost: $500. Savings: $1,000 (less mowing, water, maintenance, labor).

Tree Nursery
Reestablishment of tree nursery with 30 trees to plant and reposition at a later date for greater species diversity on site. Cost: $950 (trees, soil amendment). Savings: $5,800.

Silver Creek Valley Country Club
San Jose, CA

Naturalization
Increased 2 acres of non-mowed naturalized area to 20 acres; upgraded irrigation system to single head control in those areas and anticipate reduced water by 15% over time. Increased wildlife sightings (wild turkey, bobcat, birds, rabbits, etc.). Cost: Zero (irrigation was part of master plan renovation). Savings: $15,000 to $20,000 (water).

Skippack Golf Course
Skippach, PA

Wildflower Additions
2,700 sq ft additional wildflowers planted throughout naturalized areas helping to heighten golfer awareness of fragile naturalized areas, overall beauty, and increase attraction to wildlife. Cost: $500. Savings: $300-500 annually.

Summit Country Club
Owensboro, KY

Aerators in Irrigation Lake
Placed diffusers in irrigation lake due to recurring algae and constantly low levels of oxygen—both aesthetically displeasing and costly to maintain (spraying chemicals in lake to eliminate algae and adding more lake dye than normal). After installing diffusers and graphite vane pump, achieved increased oxygen levels; better over all quality of water (lack of algae and healthier fish). Cost: $2,032. Savings: $10,000 (reduced chemicals, labor, maintenance, wear and tear on boat, decreased repair time for sprinklers due to algae build up, cleaner water also reduced disease problems on greens).

Sun City Hilton Head
Bluffton, SC

Chemical Loading Area Recovery System
After initially cleaning equipment on wash pad area so trap system contains overflow of rinsate, designed and constructed a chemical overflow and recycling system for spray tank loading and cleaning area to ensure no chemicals enter the surrounding ground and use captured overflow for maintenance/testing nursery turf area. Cost: ~$1,000. Savings: $500-$1,000 (chemicals used in turf nursery).

The Aspen Golf Club
Aspen, CO

Low-maintenance Garden
Re-landscape non-descript, unattractive, but high profile tee area (tee sign, ball washer, and bench under overgrown blue spruces, weeds, and other debris) where golfers tend to eat lunch while they wait. Goal was to develop a more attractive, low-maintenance area by trimming trees, relocating signage, eliminate existing weeds, planting ground cover (ground cover and rocks relocated from another project on the course), and distributing wood chips, as well as taking advantage of use as an educational site. Cost: minimal (primarily labor). Savings: herbicide, fuel, equipment use and maintenance.

The Farm Golf Club
Rocky Face, GA

Creek Bank Stabilization Project
Eliminate sand/silt/soil from washing into creek that is an integral part of #5 hole, making area easier to maintain, increase playability for golfers, increase water quality, and elimination of silt in watershed. Following storms, velocity of water causes bank to erode, resulting in silt in watershed and damage to putting green surface. Hired Course Crafter to regrade, renovate, stabilize, and sod with acceptable turf, making areas easier

to maintain and providing better playing surface. Cost: $50-$75 per L.F. depending on equipment access. Savings: $500 per year on resodding and labor ("cannot put a cost on increased quality and elimination of silt in watershed").

Irrigation Lake Culvert Replacement
Rusted, leaking culvert caused irrigation lake to be low during drought periods, destabilize lake banks, and excessive draw from water source (Mill Creek) which in turn caused excessive wear on transfer pumps and water source to stay low even when replenished by rainfall. Replacing pipe allows reasonable level of water to be maintained at main site of water source, and, during wet periods, the culvert valve can be opened to drain lake back into Mill Creek. Cost: $8,181. Savings: $400 annually plus pump maintenance

The Greenbrier
White Sulphur Springs, WV

Construction of Turf Care Center North
Construct a 6,450 sq ft Turf Care Center to replace the 60-year old maintenance facility (3,000 sq ft of storage, 40 % of storage outdoors, and no wash water containment). New center included: chemical and fertilizer storage with heat, sprinkler system, ventilation, (chemical storage has sump with recirculation pump for mix and load); grass and oil separator wash pad; double wall above ground fuel tank; 3-bay, covered bulk storage bins. New Turf Care center has increased wildlife habitat by 5-6 acres; eliminated possible ground water/creek contamination; reduced runoff into Howards Creek; reduced containment of oil/gas leaks with inside storage of equipment; sewage removal goes from septic system to city sewage removal. Cost: $1,000,000. Savings: $100,000 (less wear on equipment, better utility (electric/water) utilization, less distraction to golfers, less risk).

The Legacy
Springfield, TN

Creating Additional Native Areas
Naturalized more than 30 acres along the borders of the property reducing the amount of turf requiring daily maintenance consequently reducing the maintenance budget for management of those areas by approximately 15 man hours/week. Also contributed to improved aesthetics and increased wildlife including hawks and quail in those areas. Cost: $5,000. Savings: ~$10,000.

The River Club
Suwanee, GA

Deer Management
Installed deer netting around all azaleas and annual beds due to deer eating foliage off the landscape material or damaging plants with antlers, and visually inspect 2 times/month. Initial Cost: grow-in, $500 (labor). Savings: $4,000.

The Timbers at Troy Golf Club
Elkridge, Maryland

Reforestation & Reintroduce Baltimore Checkerspot Butterfly
Project began in 2000 and completed in 2005. Reforest 13 acres of lost timberland with 100-200 tress obtained from Parks & Rec and reintroduce Baltimore Checkerspot

butterfly in 5,000 sq ft plot. Checkerspot is state insect and has not been seen in Howard County since 1997. Cost: $500 plant material; $200 caterpillars ($100 checkerspot Grant); $25,000 reforestation ($25,000 grant). Savings: None

Tournament Players Club at Jasna Plana
Princeton, NJ

Water Quality Testing Program
Local township required quarterly testing for pesticides and fertilizers (none conducted prior to construction and opening in 1998) and course wanted to document success or failure of pesticide program and make any necessary adjustments as a result of testing. With assistance from NJDEP (identify pesticides to test, testing methods, sample locations, etc.), results were extremely useful and golfers supportive due to living in the area and concern about water quality allowing validation of stewardship efforts and pesticide program. Cost: $22,000/ year. Savings: None.

Naturalization
Increase non-maintained buffer areas surrounding pond, lake, stream water lines and added ornamental grass; increased naturalized areas where possible totaling approximately 4-5 acres; increased habitat acreage by 5-6 acres; and took 4 acres out of intensive management. Cost: $3,500. Savings: $2,000.

Tournament Players Club at Prestancia (Stadium Course)
Sarasota, FL

Pump Station Replacement
Due to old system not providing proper amount of water, questionable water pressure, and failures in pipe and fittings allowing thousands of gallons of water to be wasted, replaced old pump station with new Flowtronics pump station with variable frequency drive and replace control package with new Toro OSMAC controller package. Cost: $250,000. Savings: 5-10% on electricity; $2,000 – 3,000 on repairs, $15,000 on labor, maintenance.

Tournament Players Club at River Highlands
Cromwell, CT

Expanding Native Areas
Due to development of surrounding property, expanded native areas to increase food sources and shelter for wildlife; also to reduce use of pesticides, fertilizers and water. Cost: $2,000 (labor and supplies). Savings: $10,000 (reduced labor/maintenance).

Mulching with Compost
Due to pour soil and numerous applications of fertilizers (4/season) during growing season, replaced all bark mulch planting beds with yard waste/compost for cover to add more organic matter to soil, reduce cost of mulching products, and reduced fertilizing to 1/season. Cost: none. Savings: $2,500 annually (mulch); $325 annually (fertilizer)

Tournament Players Club at Southwind
Memphis, TN

Audubon Garden
High profile area (formerly planted with Bermuda grass) was selected; planted with native species of trees, flowers, and grasses; and identification placards placed to identify plantings to highlight club's involvement in Audubon Cooperative Sanctuary Program and to attract birds. Cost: $300 (plants, labor, installation coupler). Savings: chemical use, labor, maintenance.

Native Grasses
Incorporation of fine fescue blend (sheep fescue, hard fescue, creeping red fescue, and chewing fescue) of grass to create more native areas (16 acres), reduce amount of maintained turf, improved aesthetics of the course, and provide environment for more wildlife habitation. Also installed birdhouses and butterfly houses to encourage habitation and areas to be marked "environmentally sensitive." Cost: $10,000. Savings: $2,000-$3,000 annually (labor, maintenance)

Tournament Players Club of Tampa Bay
Lutz, FL

Naturalization
Relatively small areas tying a large cypress forest to a clean water source used by birds, otters, and alligators, previously maintained as part of the golf course, were identified and naturalized to allow animals access to water sources without human disturbance and consequently decreased labor and maintenance of those areas. Signage posted to keep golfers our and maintained as no-mow areas. Cost: under $100. Savings: $500+ annually.

Tournament Players Club of the Twin Cities
Blaine, MN

Geese Control
Club has over 40 acres of open water and vast open green areas throughout the property. Prevalent geese population so numerous they posed a threat to quality of turf, water, and golfers. First attempted chemicals (no lasting control) and cap guns (immediate scare response only) so purchased a trained boarder collier dog to chase geese from property causing goose population to diminish to a tolerable level and chemicals and cap guns no longer necessary. Cost: $2,000. Savings: $17,000 (cost of chemicals).

Wade Hampton Golf Club
Cashiers, NC

Naturalized Area
Maintained 3/4 acre of natural wetlands (poor appearance, murky waters, pungent odor, consistently wet due to relatively flat area, with one stream that bisects the area); identified for improved overall appearance, native plantings, and return to healthy wetland area with decrease maintenance. Area was cleaned, higher grasses introduced to keep carts from driving through the area, positioned rocks in stream to aid in water flow to help drainage, reclaimed additional wetland/native area, and aquatic life has returned in the area as a result. Cost: $1,800. Savings: $4,000 (labor and maintenance).

Walt Disney World-Lake Buena Vista Club
Lake Buena Vista, FL

Butterfly Garden
Created butterfly garden at currently non-irrigated location that receives good sunlight and drainage adjacent to half-way house, visible to guests, and acts as screening for a service road. Created new bed 3,500 sq ft, installed automatic valve and 12 spray heads, killed existing vegetation, and introduced plants to attract butterflies, covered with 6" pine straw to preserve moisture and reduce weeds. Cost: $1,200 (labor and irrigation). Savings: $600 annually (decreased labor and maintenance).

Wayzata Country Club
Wayzata, MN 55391

Native Landscape and Bird Sanctuary
Approximately 3 acres of land formerly either thick with buckthorn or filled with cultivated plants with little value for wildlife were re-landscaped with native plants including a variety of grasses, shrubs, perennials, and trees. Areas were previously fertilized, mowed, irrigated, and cultivated. Plantings now provide buffer zone for pond and wildlife support and require minimal management. Various wildlife observed in these areas. Weed control needs to continue. Cost: $100,000 (pond renovation/plantings, not including pond excavation; other native plants were within yearly landscape budget). Savings: ~$1,000/year (areas will not need irrigation, additional fertilizer, or intensive labor).

Willow Run Golf Course
Pewaukee, WI

Natural Areas
Grow in approximately 20 acres of natural area and buffers throughout the course due to unused space and stream bank erosion creating increased wildlife areas and more species in those areas; also reducing maintenance and labor. Cost: Zero. Savings: $5,000 annually (reduced maintenance, labor, water, etc.)

Naturalization
Enhance and naturalize about 5 acres, increasing buffers from 3-5 to 10-15 feet in play areas, increasing existing natural areas, and adding new areas. Natural zones now considered part of the hazard by golfers. Native aquatic plants expanded; increased wildlife activity (blue herons); added buffer zones created less golfer disturbance. Cost: $0 for expansion of natural areas; $750 for part circle irrigation heads. Savings: Mowing times cut by 10 hrs/wk; savings on fuel, equipment, and labor.

Winding River Golf Course
Indianapolis, IN

Prairie/Naturalized Wildlife Areas
Project began in 1999 and continues to be expanded; replacing wide open areas of golf course maintained as shortly mown rough with fescue blend that grow 6-8" high, reducing chemical inputs and labor, increasing wildlife populations and biodiversity, providing corridors for animals, and beautifying golf course. Currently over 20 acres are naturalized. (Golfers pleased with outcome: requires really poor shot to end up in prairie

areas and comment that areas frame holes & increase aesthetic appeal). Cost: $8,000. Savings: $2,000 annually (chemical savings alone)

Garden Conversion
Project began in 2001 converting all perennials (mix of native plantings and non-native shrubs and perennials) to locally grown native plantings creating healthier and low maintenance gardens requiring less irrigation/water, and use of fewer annual plantings. Cost: $4,000. Savings: approximately $1,000 annually (labor and reduced annual plantings).

Appendix C

Audubon International's

PRINCIPLES for SUSTAINABLE RESOURCE MANAGEMENT

Audubon International's Vision and Mission

Our Vision...

We envision our communities becoming more sustainable through good stewardship of the natural environment where people live, work, and recreate.

Our Mission...

We provide people with the education and assistance they need to practice responsible management of land, water, wildlife, and natural resources.

Our Beliefs...

- Healthy functioning of our planet's ecosystems – the air, water, land, and broad (but rapidly shrinking) diversity of life on Earth – is key to human well-being and its preservation critical.

- There are places on Earth where human activity should be limited, including pristine areas that should be preserved and protected.

- Maintaining healthy functioning ecosystems begins at the local level with people, policies, and practices that protect watersheds, promote biodiversity, and sustain natural resources.

- People must not only take steps to minimize negative impacts to the environment in human-dominated areas of the world, but also strive to enhance healthy functioning ecosystems in these places.

- Finding a sustainable balance among environmental, economic, and social systems is key to sustaining the quality of life for all of Earth's inhabitants. Ultimately, our human communities can and must be balanced within the limits of the natural world.

- By becoming good students of the environment, people and organizations can help to protect and sustain the land, water, wildlife, and natural resources around them.

- Scientific information, in conjunction with broad public participation, should guide the planning, design, development, and management of human communities for the betterment of all life on Earth.

- While laws, rules, and regulatory conditions are important tools for protecting and enhancing our natural environment, voluntary efforts are effective and essential means to protect and enhance the natural environment, as well.

- Effective collaboration and partnerships among governments, nonprofit organizations, businesses, and the public can lead to better environmental decision-making and improve the quality of our human and natural communities.

Realizing Our Environmental Vision

Audubon International looks forward to a world where people from all walks of life demonstrate commitment to responsible stewardship of our environment. We look forward to global and local landscapes that sustain biological diversity, as well as the intricate ecosystem relationships essential to sustain this diversity. Central to this environmental vision are thriving human communities rooted in ecological integrity, economic security, and social and cultural integration.

To realize this environmental vision, people in all walks of life must be educated and motivated to participate positively and actively in environmental decisions that confront our society. They must seek out and choose sustainable actions, individually and collectively. This document sets forth the principles and types of activities that Audubon International considers critical to help us move forward toward these goals.

Building a Foundation for Sustainability

Biological diversity – defined broadly as the spectacular diversity of life on Earth – is key to the ultimate health and survival of humans and our environment. Preserving that diversity demands protecting and conserving natural resources, on which all life depends. *Sustainable resource management*, which includes *sustainable development*, entails using natural resources in ways beneficial to human beings, while maintaining their availability to support biological diversity and continuing human use in the future. Sustainability can be the hallmark of the coming years – *if* we choose to embrace it over current patterns of consumption and development that pay little heed to the requirements of future generations of life in all forms.

Audubon International's view of sustainable resource management, then, rests on these fundamental concepts:

- Sustainable resource management requires short-term and long-term decision-making that aims to protect or enhance watersheds, plants, wildlife, human life, and our economic and social systems for the benefit of future generations.
- Sustainable resource management strives to ensure that the effects of our actions now maintain or even enhance, rather than diminish, the quality of life in our environment for future generations.

- Sustainable resource management fosters natural resource conservation and continued proper functioning of healthy ecosystems.
- Sustainable resource management promotes production, consumption, and waste management practices that allow us to keep resources available for use indefinitely.

These concepts should be articulated and embraced by landowners and developers at the inception of any land use development and adopted by everyone associated with the project. In the case of development of a community, they should be passed along to all who will live, work, and play there after it is built.

Principles for Sustainable Resource Management

In its efforts to promote more sustainable patterns of land use and sustainable resource management, Audubon International recognizes a set of principles embodying the basic tenets we hold crucial for people to move forward toward a more sustainable future. Moving toward sustainability must depend on many small steps, collaborative and individual efforts, and political and social will.

Audubon International's principles form a philosophical foundation by which a community, as well as organizations, families, and individuals within it, may work toward a sustainable future. To that end, Audubon International urges that local and global communities:

- Consider the geographic and ecological contexts in which our actions take place, and at the same time strive to manage resources within the natural limitations and opportunities defined by ecosystems and geographic boundaries.
- Encourage human activities, practices, and land uses that support ecosystems that maintain and enhance biodiversity.
- Encourage resource management practices that have the greatest positive impact on plant and wildlife species, water, and the ecosystems that sustain life.
- Encourage human activities and practices that conserve water and protect or enhance water quality on a local and global basis.
- Strive to use resources that are most easily renewed.
- Strive to eliminate or reduce the use of resources that are difficult or impossible to renew.
- Encourage activities that result in identifying new resources and technologies and enhance our current resource base in ways that will maximize positive impacts on the overall quality of life and the environment.

These principles are intended to serve, preferably, a community as a whole as it evolves, providing an educational and philosophical foundation, as well as a living guide, for all those who work, live, or recreate in the community. Consequently, in the case of a new community these principles should be displayed throughout the community as a joint commitment between those who build it and those who live in it.

Turning Principles into Actions

Audubon International seeks to encourage and assist community leaders and property owners and managers to turn these principles into good environmental stewardship and sustainable resource management practices. In each of the following categories, we give examples of resource management activities that illustrate how the principles for sustainable resource management can be applied to current and future resource management decisions.

A. Assess the Natural and Man-made Resources of the Site and Its Surroundings. Before making resource management decisions, it is crucial to understand the characteristics of the site involved, in its regional context. A comprehensive site survey includes:

1. Identifying the geographic and topographic features and demographics of the area.
2. Identifying the area's physical attributes, such as geology, mineral resources, hydrology, soil types, wind patterns, and sunshine patterns, to provide a basis, in conjunction with other site assessment data, for environmentally sound choices.
3. Identifying the area's unique ecological and biological resources, to protect and conserve them.
4. Identifying greenspaces, wildlife habitat areas and corridors, and water resources and quality of water resources.
5. Identifying sites of archeological, natural, historical, or cultural significance in the area, to protect and conserve them.
6. Identifying land uses in the vicinity, to provide a basis for assessing compatibility of proposed changes and uses.
7. Specifying the proposed areas of change and establishing parameters for future changes beyond those areas.

B. Preserve Wildlife Habitat and Interconnections. Sustaining biological diversity necessarily entails protecting and enhancing habitat for wildlife species and corridors for movement between areas of habitat. Managing resources in a habitat-sensitive way includes:

1. Protecting ecologically sensitive areas from all degrading impacts.
2. Not disturbing local wildlife populations by degrading food or water sources, shelter from predators or weather, or breeding habitat.
3. Not posing threats to species directly or indirectly through increased air or water pollution.
4. Avoiding or minimizing increases of ambient noise levels in the area during and following changes in land use.
5. Providing for migratory species' access to habitual routes, food and water sources, and breeding grounds.
6. Preserving greenspaces and corridors of significant wildlife habitat and water quality value.
7. Maintaining corridors that connect habitat areas and allow for wildlife movement through and across property boundaries and between habitat areas.

C. Emphasize Natural Landscaping. Sustainable resource management should emphasize landscaping with a variety of materials and resources native to an area, and maintaining them in a natural condition. Natural landscaping includes:

1. Except for social purpose areas such as agricultural lands, recreational use areas, and work areas, preserving or enhancing species of vegetation native to the natural region and, to the extent practical, removing species of vegetation not native to that region.
2. Maximizing the size and number of natural or naturalized patches within the area and maximizing the use of natural or naturalized corridors to tie those patches together.
3. Preserving and adding species to establish a wide variety of plants native to the region.
4. Preserving or enhancing a variety of different types of habitat, such as forest, wetland, streamsides, pond margins, and meadows and grasslands.
5. Preserving or enhancing a variety of vertical layers of plants, such as canopy and understory trees, shrubs, and ground cover.
6. Retaining dead standing trees, fallen trees, logs, and vegetative litter, such as fallen branches, twigs, and leaves.
7. Not using pesticides, herbicides, fertilizers, or irrigation in natural or naturalized areas, patches, or corridors.

D. Conserve and Protect Water. Supplies of clean, pure water are vital to survival of humans and wildlife. Yet water is one of our most misused, mismanaged, and misunderstood resources. We make deserts bloom year round and have expanded populations in area that are running out of water. Good water conservation and water quality protection techniques include:

1. Using a rainwater collection or gray water system for watering grounds, flushing toilets, *etc.*, and otherwise recapturing and reusing water resources.
2. Minimizing water usage by monitoring it and by installing low-flow devices.
3. Evaluating sustainable yields for the lowest flow periods of water supply and designing to accommodate those periods.
4. Maximizing use of native and naturalized plants and turf that are biologically appropriate for the natural region, to avoid or minimize use of irrigation, fertilizers, and pesticides.
5. Properly designing and maintaining irrigation systems to use only the minimum water needed, only where needed.
6. Controlling erosion and runoff.
7. Avoiding or minimizing the use of fertilizers and pesticides, avoiding their use entirely near water bodies, and storing, handling, and disposing of them in ways that will not result in contamination to water bodies.
8. Using organic fertilizers, where fertilization is necessary.
9. Avoiding direct drainage to water from areas where fertilizers or pesticides are used, and maintaining vegetative buffer strips along the margins of water bodies to filter fertilizers, pesticides, other contaminants, and sediments.

E. Minimize Waste Disposal. The initial goal of waste management must be to use resources efficiently and generate as little waste as possible. To the extent that waste *is* generated, more sustainable waste management measures include:

1. Recycling or reusing solid or liquid wastes, including hazardous wastes, whenever possible.

2. Continually monitoring and assessing how much solid and liquid wastes are being generated, with a view to further reduction of generation.
3. Composting all organic wastes.
4. Disposing of non-recyclable wastes in an environmentally sensitive manner.
5. Periodically reviewing waste reduction strategies and recycling methods used.
6. Exploring low capital, low maintenance alternatives for wastewater treatment systems.

F. Maximize Energy Efficiency and Use of Renewable Energy Sources. A sustainable energy future demands that, in the first instance, we use energy resources as efficiently as possible to minimize our consumption of them. Sustainability further requires that we emphasize the use of energy sources that are renewable in less than geologic time spans. Sustainable energy strategies include:

1. Minimizing energy consumption through conservation and use of energy efficient technologies in all sectors of the economy, including industry, agriculture, service provision, commercial buildings and residences, and transportation.
2. Emphasizing use of:
    a. Photovoltaic solar power.
    b. Wind power.
    c. Geothermal power.
    d. Wave and tide generated power
    e. Hydro-electric power, particularly small-scale or low-head, run-of-the-river power at existing dams.
    f. Cleaner burning non-fossil, plant-derived fuels, such as ethanol.

G. Increase Transportation Efficiency. Moving toward a more sustainable future requires that we: expand availability and use of mass public transportation and low-impact non-powered personal transportation; deploy more energy efficient, renewable, and cleaner burning transportation systems and vehicles; better integrate living, work, and recreational areas to reduce sprawl; and rely more on regionally available agricultural products. Measures to promote more sustainable resource management in transportation include:

1. Expanding the availability of public transportation in developed areas.
2. Making energy-efficient public transportation available in development of new urban and suburban areas.
3. Using available public transportation.
4. Encouraging low-impact transportation by providing sidewalks, walking trails, and bicycle paths.
5. Using available sidewalks, walking trails, and bicycle paths instead of powered vehicles.
6. Reducing cross-country transportation of goods by diversifying local sources.
7. Developing infrastructure changes that support the use of more energy-efficient and cleaner burning fuel technologies in vehicles (such as electric battery charging stations, compressed natural gas refueling stations).
8. Deploying more energy-efficient and cleaner burning fuel technologies (such as electric, hybrid electric, and compressed natural gas) in public transportation systems, government and private fleets of trucks and automobiles, and individual private vehicles.

H. Build Green. Sustainability demands that we focus on environmentally sound, resource efficient building techniques and technology—whether residential, commercial, or industrial—from design to site orientation, sizing, systems, materials, furnishings, appliances, and landscaping. Sustainability in building design includes:

1. Incorporating energy efficient design approaches for:
   a. Heating/cooling.
   b. Ventilation.
   c. Building materials.
   d. Appliances.
   e. Lighting.
   f. Cooking.
   g. Water use.
   h. Space.
2. Efficient waste handling and recycling programs.
3. Applying landscaping practices that minimize maintenance, such as employing native or naturalized plants.
4. Using building materials that will not become hazardous waste or impossible to dispose of in an environmentally safe manner at the ends of their useful lives.

I. Preserve and Enhance Regional Agriculture. Sustainable resource management in agriculture depends not only on good environmental stewardship practices in farming operations, but also on protecting prime agricultural areas to maximize regional food self-sufficiency. Sustainable resource management in agriculture includes:

1. Protecting prime agricultural production areas.
2. Promoting regional food self-sufficiency to the extent possible.
3. Improving the efficiency of low-input farming methods.
4. Improving irrigation and drainage systems to minimize water use and protect water quality.
5. Integrating livestock management with food crop and vegetative management to improve soil fertility.
6. Encouraging the use of integrated pest management (IPM) practices at all farms and agriculture facilities.
7. Promoting the use of greenhouse farming.
8. Promoting the use of aquaculture.

J. Design New Communities and New Developments for Sustainability. Good community design, whether for entirely new communities or new developments within existing ones, must pull all of the above threads of sustainability together and integrate them into a unified, sustainable whole. Sustainable resource management in community design includes:

1. Protecting the area's sustainable resources.
2. Encouraging low impact transportation, like walking, bicycling, *etc*.
3. Working with the contours of the land to avoid excessive mechanical land and soil movement, such as blasting and filling.
4. Clustering structures, to facilitate maximizing open space.

5. To the greatest extent possible, clustering residences and commercial facilities necessary to support them, such as groceries and shops, within distances where they are reasonably accessible to each other by low impact transportation, like walking or bicycling.
6. Providing access to greenspace for educational and recreational experiences.
7. Providing recycling and composting centers; and encouraging provision of exchange [and reuse stations, for items such as used clothing, appliances, and house wares.
8. Providing infrastructure, such as charging or refueling stations, for forms of transportation that rely on alternative sources of energy.
9. Providing a multi-purpose community / environmental education center.
10. Minimizing the use of impermeable surfaces for drives and parking lots.
11. Continually looking for and taking advantage of opportunities to "re-claim" previously degraded environments.

Audubon International

Audubon International is a not-for-profit environmental education organization concentrating on environmental stewardship, biodiversity conservation, and sustainable development and resource management. Audubon International is the name the Audubon Society of New York State, Inc., has taken for doing business as its programs, including the Audubon Cooperative Sanctuary System, expanded beyond New York throughout the United States and into many other countries. Audubon International is one of a number of fully independent Audubon societies and is not affiliated with any other local, state, or national Audubon society.

Audubon International
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