**Packet of Survey Information for Collaborators**

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3. **Introduction**

The *University of Wisconsin-Madison Golf Course Resource Efficiency Study* attempts to quantify resource (water, energy, fertilizer, and pesticide) use on golf courses primarily in the US and Europe. The associated survey, titled the [University of Wisconsin-Madison Resource Efficiency Survey](https://uwmadison.co1.qualtrics.com/jfe/form/SV_eX9MMWKDYyfndtj), collects information about facility economics, environmental conditions, and data on resource use over a three-year period from 2016 to 2018.

*1a) Your participation*

This document includes helpful information to understand our research. As a collaborator of this research you will have access to the data that is collected from the survey. We also hope that you will join us as a co-author on our peer-reviewed papers reporting the results of this work. We anticipate 2-4 forthcoming papers from this work, depending on the success of our survey efforts this winter (2020-2021).

*1b) Timing*

The survey can be distributed anytime between January and April 2021.

*1c) Abstract of research and rationale*

There are approximately 30,000 golf courses globally (R&A, 2017), which cover an estimated land area of 18,100 square kilometers (7,300 square miles) and take up a land area that is approximately the same size as the US State of New Jersey. Maintaining these courses can require intense input of resources, namely fertilizer, pesticide, water, and energy. Using such resources can be controversial because, unlike agriculture, golf is a leisure activity that is non-essential and is played by predominantly higher socioeconomic status groups[[1]](#footnote-1). Therefore, one might expect that peer-reviewed scientific journals would return a large number of published studies reporting analyses of the efficiency of resource use in the golf industry. However, peer-reviewed publications documenting the environmental implications of golf courses tends to focus on a specific research question appropriate to a specific discipline, such as ecology, water quality, toxicology, soil science, agronomy, or landscape and urban planning. These studies are primarily insular to their disciplines and while many of them state that resource inputs to the course are an important variable of environmental quality (Davis and Lydy 2001; Winter et al. 2002; Winter and Dillion, 2005; King et al. 2010), they do not systematically study resource inputs to golf courses themselves. Therefore, the objectives of this study include: 1) derive a scientifically grounded framework for measuring golf course resource use, 2) develop methods to calculate the performance of resources use (performance is define as the ratio of actual use to expected use), 3) calculate the eco-efficiency or return on investment of resources used (eco-efficiency is defined as the ratio of economic outputs to environment inputs), 4) discover the most important controls on golf course resource use, performance, and eco-efficiency, and 5) develop of future tools and methods to improve resource use, performance, and eco-efficiency of golf courses. A comparative framework for measuring resource use in the golf industry will begin with normalizing resource use by both area and season length. The application of agro-ecosystem models to golf course turfgrass will assist in quantitatively determining the resource use performance on golf courses. We hypothesize that developing an eco-efficiency approach for golf will incentivize the golf industry to reduce its environmental impact while maximizing economic output. Lastly, we hypothesize that the controls on resource use, performance, and eco-efficiency may be caused by unexpected factors, such as golf course playing quality. Conversely, factors that are generally presumed to be important in determining resource use, performance, and eco-efficiency, such as best management practices, may not have their intended effect. Expected outcomes of this work include: 1) the improved ability of a variety of industry stakeholders to quantitatively define resource use, performance, and eco-efficiency under a wide range of environmental, social, and economic conditions, and 2) greater effectiveness of university extension, NGO, and industry association programs whose aim it is to help the golf course managers minimize environmental inputs while maximizing economic outputs of their business (increase eco-efficiency).

1. **Methods**

*2a) Survey structure*

The survey has 3 main parts: 1) facility info, 2) resource use data, 3) BMPs. The resource use section is by far the most valuable to us and is broken down into 6 main subsections (water, energy, fertilizer, pesticide, materials, equipment). Since many of our research outcomes hinge on the resource use data, survey responses that only have part 1 (facility info) and part 3 (BMPs) really don’t help our research goals. This is why the incentives are structured the way that they are. The incentives place a premium on filling in the *Resources* section of the survey.

*2b) Survey length*

It is important to understand that this is a long survey. The survey can take superintendents multiple hours to complete (anywhere from 1-10 hours). The reason for the survey length is that it asks a variety of detailed questions across four main resource use categories. Many of our research outcomes however are predicated on having complete or near complete resource use data for each golf course that has taken the survey.

The time commitment for superintendents primarily depends on how organized and available their resource use records are. To complete the whole survey it takes most superintendents anywhere from 2-10 hours. As such, we are offering incentives up to $100 (USD) for completing the survey. We offer incentives at three levels depending on survey completion. These levels are detailed in the *Incentives* section below. In addition to incentives, persistent distribution of the survey is crucial to survey success. We recommend sending an initial message with three follow up emails. Further thoughts on survey distribution can be found in the *Survey Strategy* and *Messaging* sections below.

*2c) Incentives and time commitment for survey respondents*

The survey is composed of three main sections:

* Facility Information
* Resource Use
* Best management practices (BMPs)

Gold: Entire survey complete (*Facility Information* + *Resource Use* + *BMPs*)

Silver: *Facility Information* + *Resource Use* (at least 3 of 6 subsections complete) + BMPs

Bronze: *Facility Information* + *Resource Use* (at least 3 of 6 subsections complete)

Gold: $100 Amazon gift card

Silver: $75 Amazon gift card

Bronze: $50 Amazon gift card

Based on the first two years of survey work, below are the time estimates for completing the survey at each level. Time estimates for each superintendent who completes the survey vary greatly. This is mostly because some superintendents have access to all resource use records, and others do not. When superintendents do not have access to energy data, for example, it often takes a considerable effort for them to acquire those records from other employees at the golf course.

Time commitment for survey respondents:

Gold time estimate: 2-10 hours

Silver time estimate: 1-3 hours

Bronze time estimate: less than 1 hour

*2d) Recommended survey strategy*

Our goal is to have between 10-20 golf courses complete the survey to the *Silver* level or higher (see the *Incentive* section above for definition of *Silver* and other levels of completion).

There are many ways in which a survey can be distributed. We encourage you to distribute the survey in the manner that you feel will be most effective for your region. We have made two recommendations below based on what has worked for us in Wisconsin. You are welcome to follow these recommendations or not.

General Recommendation:

We recommend that you identify 30-50 golf courses in your region that you trust and have worked with and send a personal communication (email, phone call, text, etc.) to the head superintendent asking for them to participate. We recommend sending an initial message and 3 follow up messages (spaced out by 2 weeks) to the golf courses that you are attempting to survey in your region. We have also found that Tuesday morning is a good time to send emails.

Before the COVID-19 pandemic, we often visited superintendents personally at their golf courses to speed up the survey process for them (answer questions, assist with resource records etc.). However, it is likely best not to do this at the moment.

We realize that sending the survey to golf courses you are familiar with does not provide a random sample. However, given the length of our survey it is more important for us to get a non-random sample of survey respondents than very few to no respondents at all (which is what has happened to us when we sent out the survey to golf courses randomly).

Alternate Recommendation:

Another way to gather survey data is to send emails directly to members of golf course superintendent associations. This has been reasonably successful for us in Wisconsin, because many of the superintendents know us and trust us. However, when we have sent out the survey to superintendent’s associations outside of Wisconsin the response has been limited. We recommend sending an initial message and 3 follow up messages (spaced out by 2 weeks) to the golf course superintendent association that you are attempting to survey in your region. We have also found that Tuesday morning is a good time to send emails.

To see samples of messages we have sent out in previous years, see the *Messaging* section below.

*2e) Survey link*

This is an anonymous survey link that can be included any form of electronic communication. The survey can be viewed on mobile devices, but we recommend it is viewed on a desktop computer. The survey saves automatically and can be completed in multiple sittings. Once the survey is started, however, it will automatically be submitted after 1 month.

<https://uwmadison.co1.qualtrics.com/jfe/form/SV_eX9MMWKDYyfndtj>

Important note: if you viewed the survey on your computer in 2019, please clear your cookies/cache/web browsing history to ensure that you are viewing the most up to date version of the survey.

*2f) Current number of survey respondents (for your reference)*

For your reference, below are the number of survey respondents by category thus far in the study. The number of responses vary by section. The survey was first distributed in Wisconsin (via personal contacts and the Wisconsin GCSA) and the New York State Park Golf System in Jan-Mar 2019. From Jan-Mar 2020 the survey was distributed to the WGCSA and personal contacts a second time, as well as by the Northern Great Lakes GCSA and the Minnesota GCSA.

* Entire survey complete- 14
* Facility Information- 76
* BMP (Water, Energy, Fertilizer, Pesticide)- 76
* Resource use sections:
  + Water- 42
  + Pesticide- 31
  + Fertilizer-30
  + Energy- 19

*2g) Messaging (Examples of messages we have sent out via email)*

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*Example of email we wrote to Madison Area Golf Courses*

Dear …,

My name is Michael Bekken and I’m a PhD Student in Soil Science at UW-Madison. Dr. Doug Soldat is my advisor. I am writing to ask for your help in a study I am conducting on golf course resource use.

Participation is simple. I will come visit your course for 1 to 2 hours and together we will fill in an online survey. The survey contains a section on general information about your facility, management practices you employ to use resources (water, energy, fertilizer, and pesticide) efficiently, and resource use at your course. The survey is completely confidential, and any reports derived from the survey will be entirely anonymized.

The goals of our study are to determine: 1) how to best quantify and contextualize resource use on golf courses, 2) variables that impact resource use the most, 3) which management practices may be most effective in helping superintendents use resources as efficiently as possible, and 4) resource use return on investment in the golf industry.

Please let me know if you are willing to participate in this research project. Our project depends on your participation and we would greatly appreciate your involvement. I will follow up by phone unless I hear from you sooner.

Thanks so much for your consideration.

Best regards,

Michael Bekken and Dr. Doug Soldat

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*Example of emails that Doug and I sent to the WGCSA- Wisconsin Golf Course Superintendents Association (Wisconsin specific information has been removed)…*

***Initial Email***

Dear …,

It is no secret that the general public often has a negative perception of golf course resource use, and we would like to help change that. Our lab is currently conducting a research project to highlight the positive environmental and economic outcomes that come from golf course resource use. To achieve these aims we are asking golf course superintendents to participate in a resource use study. Your participation in this survey is absolutely vital to the success of this project and achieving positive outcomes for the golf industry.

Please participate in this research today by following the link below!

Survey Link: [UW-Madison Resource Efficiency Survey](https://uwmadison.co1.qualtrics.com/jfe/form/SV_eX9MMWKDYyfndtj)

The survey is composed of three main sections: 1) general facility information, 2) resource use at your golf course 3) best management practices you employ to use resources (water, energy, fertilizer, and pesticide) efficiently, and. To complete the resource use portion (third section) of the survey you will need to consult your records. We anticipate that the survey will take approximately 1-2 hours to complete, but you can complete the survey in parts.

I am especially excited about this study and its potential outcomes for golf course superintendents and our industry.

Thank you so much for your time and willingness to participate.

Yours sincerely,

(name)

***Reminder 1***

Dear …,

Two weeks ago, I invited you to participate in the **UW-Madison Resource Efficiency Study**. Results from this study will be used to help show the many benefits of course resource use and the efficiency with which resources are used. This study addresses many important issues facing our industry today, however our study will only be as powerful as the information that we are able to collect. Every response is extremely valuable to our project and the positive outcomes that this study could have for our industry.

If you have already taken the survey, thank you so much! If you have started the survey, awesome, you can return to the survey (your progress saves automatically) and finish it up. If you have not started yet, please start by clicking the link below.

Survey Link: [UW-Madison Resource Efficiency Survey](https://uwmadison.co1.qualtrics.com/jfe/form/SV_eX9MMWKDYyfndtj)

Thank you for your consideration.

Best regards,

(name)

***Reminder 2***

Dear …,

Recently I emailed asking for your help with the **UW-Madison Resource Efficiency Study**. Results from the study will be used to help us change perceptions of golf course resource use. Our research team is passionate about showing the environmental and economic benefits of resource use in the golf industry and we need your help!

I am writing today to encourage you to **click the link below and respond to our survey as soon as you can**. I know that you may not be interested in participating for any number of reasons—the survey is time consuming, you are very busy, you may not believe the survey results are actually used – but **I really do need your help**. Every single response is tremendously helpful to us!

Survey Link: [UW-Madison Resource Efficiency Survey](https://uwmadison.co1.qualtrics.com/jfe/form/SV_eX9MMWKDYyfndtj)

Best regards,

(name)

***Reminder 3***

Dear …,

My name is Michael Bekken and I’m working on a PhD in Doug Soldat’s lab on a UW-Madison golf course resource efficiency study. This email is the final reminder to please participate in our survey.

The survey will go a long way to show the successful efforts toward resource efficiency by golf course superintendents to date. It will also help us chart a sustainable path forward given our changing world.

On a more practical note, this survey is of critical importance to my graduate studies. By participating in the survey, you are not only helping golf’s future, but also helping me gather the information that I need to graduate on time (seriously!). Plus, my family is from Montana, so good participation from my home state means a great deal.

Thanks so much for your help!

Best regards,

Michael Bekken

1. According to the National Golf Foundation, in 2018 the mean income of a US golfer was $99,202. Median

   household income in the US in 2018, according to the US Census Bureau was $61,372. [↑](#footnote-ref-1)