The Cornell Lab of Ornithology

# yardmap

## Summative Evaluation
## Prepared for:
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**By:**

**Steve Yalowitz, Ph.D.**
**Patricia A. Montano, M.S., M.A.**

**Audience Viewpoints Consulting**

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Audience Viewpoints Consulting
t: 831-224-3085
13148 Rounding Run Circle, Herndon, VA 20171
www.audienceviewpoints.com


# Executive Summary

## Background

The YardMap network, produced by the Cornell Lab of Ornithology and online at www.yardmap.org, is a citizen science project designed to cultivate a richer understanding of bird habitat and other conservation practices, targeting people concerned with their local environments, while at the same time providing data that over the longer term will help professional ecologists provide the community at large with measures of the scientific the impacts of backyard conservation practices. The YardMap Network merges the lab's existing bird citizen science projects with online social networking and gardening activities, providing new opportunities for a growing audience of middle-aged and older learners to collaborate with professional researchers to investigate the impacts of bird-friendly and carbon-neutral practices in backyards, community gardens, and parks. People are asked to map bird-gardening and carbon-neutral practices in their backyards and parks. If they choose, YardMappers can monitor birds, display their YardMaps, and chat or comment enter the YardMap's groups and integrated social network. The expectation was that both experienced bird-gardeners and novices (non-birders/non-gardeners) would be drawn into the YardMap and that interest, knowledge, and behaviors would spread through the social network.

## Purpose

The purpose of the summative evaluation is to two-fold: 1) provide documentation to NSF about the extent to which the project met its goals and objectives, and 2) give the Lab of Ornithology information about how well the Web application and the ecosystem within which it resides is engaging the intended audiences. The main evaluation questions the study needed to answer related to who is participating in YardMap, how much participation affects participants' knowledge, attitudes and behaviors around birding, gardening, and citizen science.

## Experimental Design

A true experimental design was used, where individuals signing up for the YardMap were randomly assigned to either a Treatment or a Control condition. People in the Control condition were required to not visit the YardMap site until after the research period was over and thus this condition constituted a "waitlist control." There were two Treatment conditions, one where the social networking features were active and another where the social networking features were not present. This was intended to allow the evaluators to explore not only what the outcomes were for participating in YardMap, but also the extent to which having social networking functions available impacted these outcomes. As such, the design was dependent upon having an active social network within the timeframe of the study.

## Methods and Samples

Web surveys (pre- and post-) were the main method used for the summative evaluation. When people signed up for YardMap during the evaluation period, they were invited to participate in the study; 1,703 individuals agreed to participate and filled out the pre-survey. The Control group was instructed not to use YardMap during the evaluation period, while the two Treatment groups were invited to use the site. At the end of the evaluation period, those who had filled out the pre-survey were asked to fill out a post-survey; 576 (34%) of those who filled out the pre-survey also filled out the post-survey. In order to better understand responses to the survey, 17 telephone interviews were conducted from those who filled out a post-survey and gave permission to be contacted. The pre-survey had 56 questions and the post-survey had 62 questions; note that quite a few of the questions had more than one item to answer. In addition to items developed about the use of YardMap and related outcomes, some additional scales were included from the DEVISE (Developing, Validating, Implementing Situated Evaluation Instruments) project, including scales about motivation and self-efficacy for environmental actions. More detail about the methods can be found in the Methods section below.

The Control and Treatment conditions were compared to ensure that the groups were as similar to each other as possible, and any differences in who constituted each group would not differentially affect the findings. As noted below, there were very few differences between the Control and Treatment groups in the demographics and psychographics of the pre-survey; the groups were very similar in nature. Another concern was whether a difference would exist in the kinds of people who would drop out between the pre-survey and the post-survey, which could again affect the results if different people were dropping out in the Control and Treatment conditions. The comparison between who was in the Control and Treatment groups for the post-survey yielded similar results to the pre-survey comparison; there were very few differences between who filled out both the pre- and post-surveys for the Control and Treatment groups.

## Main Findings

This section focuses on the various impacts and indicators that were included related to the project. Many of the findings compare those in the Treatment condition (who used YardMap during the testing period) to the Control condition (those in a waitlist Control group who did not use YardMap during the testing period). In terms of whether YardMap participants increased their knowledge of bird-habitat relationships, YardMap users did report thinking differently about their yard and its relationship to birds after using YardMap. However, there was not a difference in the Treatment and Control conditions in terms of recalling the number of yard practices that help birds. The Treatment group was more likely than the Control group to say that participating in YardMap influenced their thinking about how to make their yard more bird-friendly and about the impact of their practices on birds. There were some specific items, including better understanding the dual nature of earthworms, where the Treatment group had a more positive impact than the Control group. When asked about any specific additional plans for making their yards more bird-friendly, both Control and Treatment groups were less likely on the post-test to say they had plans for doing so. It is important to remember that the study began in April through June, and this may have impacted some of the responses.

It was hypothesized that those participating in YardMap would be better able to identify birds and plants. However, there were no significant differences between Control and Treatment groups for a bird identification test, self-reported learning about birds, or describing their skill level at identifying birds. There were also no significant differences in these same constructs as they related to plant identification (i.e., plant identification test, self-reported learning about plants, and describing ones skill level at gardening. As we did not separate out groups that reported birds for their site and those who named plants, it may be that the amount of time or extent of engagement of the broader sample was not large enough to show differences between Control and Treatment groups.

Another set of items looked at the extent to which participating in YardMap increased a sense of empowerment to help the environment. In the Motivation for Environmental Action Scale, there was not a statistically significant difference in the overall score comparing the Treatment and Control groups. Also, while some individual items showed a significant difference, the difference was counter to the hypothesis: while there were small changes for both groups there was a small negative change for the Treatment group, and a small positive change or no change for the Control groups. In terms of the “Self-Efficacy for Environmental Action Scale”, there were also no statistically significant differences in the overall score between the Control and Treatment groups. In summary, the one statistically significant difference between Control and Treatment groups for an individual item in that scale showed no change for the Treatment group and a small positive change for the Control group. It is possible that this reflects a bias in who took the post-survey between these two groups.

Another set of analyses examined the impact of using YardMap on internet literacy. In this area, challenges using YardMap seemed to have had an impact on this set of indicators. For example,

after participating in YardMap, people were less confident in their ability to look up information and submit data; these users reported encountering some issues using YardMap. This also impacted peoples' confidence in being able to use YardMap in the future, with the Treatment group being slightly less confident than the Control group. Interestingly, when asking about future use of possible sources of information about STEM- and science-related topics, the YardMap participants were generally slightly less likely to use any given source compared to the Control group. Together, these results suggest that the first version of YardMap had usability issues that need to be resolved if the project goes forward.

One group of items looked at the extent to which participating in YardMap would affect future use of social networks for engaging in STEM and science-related issues, but results did not indicate that those who participated in YardMap were more likely to use social networks. One possible factor may be that those who were in the social networking condition for YardMap did not engage in significant use of the social networking functions that were enabled in their version of YardMap. Instead, they obeyed the 90:9:1 rule typical for social networks in which only one percent of participants actively posted comments or liked sites. This may have impacted their consideration of social networking tools as useful for engaging in STEM or science-related issues.

In general, the only important differences between the Treatment and Control conditions, were related to knowledge of bird and habitat relationships. This was a core idea of YardMap and we found that participants in the Treatment group reported that they had greater knowledge of bird-habitat relationships than did the control. This is the only conceptual learning that we detected, but given how complex these relationships are, it may be quite important. There were other outcome categories where differences were hypothesized, but were not supported in the analyses included in the report. Based on the literature, it is not surprising that the social network was not very active in the first year the project was online. Further data collection after the social network grows to a larger size and becomes more active could yield more robust results.

# Conclusions/Discussion

Here we highlight a number of findings that warrant additional discussion to interpret results. Many of the findings highlighted here are those that run counter to the hypotheses driving this research. Findings are discussed in terms of what they may mean for future studies and broader methodological implications for the field.

**Cognitive Gain** – The experimental summative evaluation showed that engaging people through YardMap can increase cognitive gain about birding (see Table 13 and Table 16). and how to create more bird-friendly habitats (see Table 14). Particpants were able to add to their big-picture understanding of bird-related issues, including the relationship between birds and their habitats (see Table 14 and Table 15) as well as thinking differently about their own yard and how it relates to birds (see Table 13,

Table 18, and Table 19). This is an increase in both the greater overall understanding as well as how the issues relate to them. There were also some specific self-reported gains, that show that specific messages can be communicated and understood within YardMap (see

Table 17, Table 20, and

Figure 15). This combination of results is promising since many conservationists think it is necessary for people to understand the large issues facing birds, as well as how the situation is relevant to them and what they can do to help as precursors to taking action. On the contrary, people's willingness to act on behalf of birds in their yards after participating in the study seems to have declined. Alternatiely, it is possible that some of the complexity about acting ecologically conveyed via YardMap overwhelmed some people, leading to increased understanding of this content, but also increased anxiety, which can be related to decreased willingness to act. Finally, it could be that they did a few things, experienced reduced guilt, and thus did not feel motivated to do more. Validated scales are needed to better explore the nexus between learning and action. More research is needed to fully understand how these various factors fit together to explain the series of outcomes observed in this study.

**Identification Skills** – There were not any observed gains in the bird (see

| Overall Score, Bird ID Skills test | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | 0.2 | N |
| Pre * | 6.4 | 5.7 | Y |
| Post | 6.3 | 5.9 | N |

One item asked participants how much they learned about birds, where they had to rate how much they agreed with the statement *"I learned a lot about birds"* since participating in YardMap (the scale was from 1 "Strongly disagree" to 7 "Strongly agree). There was not a statistically significant difference between the Control and Treatment groups on this item (see Table 49).

Table 49) and plant ID scores(see Table 52), indicating that treatment group may not have led people to seek information related to improving these skills. The questions were included to help us understand if participation in the project drove interest in bird and plant ID enough that people concurrently sought-out information to improve these skills on their own. For an agreement item asking if participants learned about birds, the average score was in the "neither agree nor disagree" range (see Table 49). The YardMap Web app does not explicitly teach about bird and plant ID, but those skills would likely be desireable for someone interested in becoming more expert at creating bird habitat and information about birds was available on the Cornell Lab of Ornithology's Website. In the future, explicitly pointing participants to learning resources about plants and birds could allow growth of knowledge in this area within the community. One interesting finding in comparing bird ID to plant ID was that participants did about equally well on the two identification tests, but had more confidence in their birding skills compared to plant-ID skills. Further research to understand how to build off of this finding to help people put their plant-ID skills to use could be useful in supporting many citizen-science Web apps that rely on participants' knowledge of multiple knowledge domains.

**Measuring Changes** – A large number of outcome measures were used to document the impact of particpating in YardMap; this was important since there were quite a few measures that did not show any differences between the Treatment and Control conditions. A number of validated scales (i.e., the DEVISE scales; see http://www.birds.cornell.edu/citscitoolkit/evaluation/instruments ) were employed to examine differences in broader outcome measures like self-efficacy (see Table 23 and Table 24) and motivation (see Table 21,

Table 22,

Table 25, and Table 26). We used the general scales built by DEVISE and also modified those same scales to be more bird-related. There were no differences between Control and Treatment groups for either set of instruments. One possibility is that YardMap may not impact broader outcomes in its current form, which, based on this evaluation, did not yet include the substantial amount of social interaction hoped for in the original proposal. There were some specific changes attributable to participating in YardMap (see specific items in

Table 22, Table 24, and Table 26)., so it may be that the specific messages are getting through, but that influencing peoples' attitudes, motivations and characteristics requires a more robust social network, a larger participant base, and more usability testing to maintain interest in the project. Designing Web architectures for collaborative learning through action is in its infancy, and research shows that more work is needed at the human-computer interactions end of application development if we are to support free choice learning in meaningful online contexts. The Principal Investigators (PI's) plan to touch on this by exploring some of these same questions, but subsetting the data to include only the very active participants.

**Counterintuitive findings** – There were a number of findings that seemed to be counterintuitive from what the PI's hypothesized. These included the handful of survey questions where the control group showed no gain or a modest gain, while the treatment group actually showed a modest decrease. This happened for outcomes related to how difficult particpants found or thought YardMap would be (see Table 27 and Table 28), their intentions to make changes to their yard (see Table 44), and the lack of changes in motivation (see

Table 22 and Table 26) and self-efficacy (see Table 24). These were counterintuitive in that the team expected an increase for the Treatment group, with no change for the Control group. While it cannot be tested with the current dataset, it is possible that the reported challenges in using YardMap may have had a negative effect on some of these outcomes. In other words, people who had difficulty using the application may have transferred this sense of difficulty to the problems on which the project focused. In these cases, we might explain this by saying the tool failed to meet participant expectations, thus those who did not use the tool in the Control group still had the same expectations about their potential experience, or even exaggerated expectations brought-on by waiting six weeks to use the tool. Additionally, those in the treatment group with the social networking features available sometimes had smaller effect sizes than the no social networking group. This could be an indication that adding the complexity of social networking on top of an already complex Web tool could have negative effects on people's experiences. In fact, the population and sample consisted of generally older users (69% were age 45 or older) who may have been less comfortable with social networking. Those in the social networking condition did not engage very deeply or frequently with the social networking functions available and rarely made comments or liked other maps. As the project and social activity continue to grow, this same study could produce different results. To further explore this, the PI's plan to revisit these questions with participants who were active in the project and the social network and control for age to explore the hypothesis that our results are age-dependent.

**Experimental Research** – This study used an experimental approach to evaluation to evaluate a Web app. Although this took a great deal of design and programmer effort and made for a complicated evaluation process, the results are important to push this field of research forward. The intention was to understand if gains seen in the Treatment groups were due to participation in the project, or to some larger, outside influence, like external influences like the media, or other factors that self-selected participants would engage in whether they participated in YardMap or not. The experiment would not get around the problem of self-selection into citizen science projects, in which people often come into projects with substantial knowledge and little room for improvement (small effect size potential). Many studies of informal science programs and experiences rely on correlational research that is not able to determine cause-and-effect. Simply noting that those who participated in an experience had an increased outcome does not mean that the experience caused that outcome. Lack of experimental data in the field means we are at risk for attributing outcomes to informal learning experiences that are simply an artifact. While this study encountered some problems, which we have highlighted in the Limitations section, the field should still strive to engage in experimental studies of the constructs it is measuring. Even as this report sheds light on the additional complexities that come with carrying out research in this manner, it also indicates that the amount of effort people put into a project, which varies predictably in user-generated content projects, is critically important to solid research design. Thinking carefully about measuring the different kinds of effort that participants engage in and controlling for effort, may be a way to make experimental research more efficient and lead to greater insights about learning in the future.

It is the hope of the evaluators and the project team that this summative evaluation adds some interesting and useful infromation to the field, enabling future projects to more effectively engage the general public about important STEM topics. Project staff conclude from this report and from earlier, informal analyses of the data collected in early 2014 that one of the primary issues facing this project is the difficulty of generating and sustaining active participation, including project-specific social interaction. Over the course of the five years this project was in development, the landscape of people engaging socially over the web has changed dramatically. Facebook alone gained one billion users between 2009, when the proposal for this work was submitted, and 2014 when this evaluation was carried out. For some, this may indicate that our potential audience grew more familiar with social networking, making them potentially better participants in our project. Another factor to consider, however, is that peoples' experiences with Facebook have come to set their expectations about what their experiences with any social networking tools on the web should be like. Our 2014 funding from the NSF is focused on the user experience to investigate how to design targeted, social experiences to study how this influence learning interactions. Hopefully, the results of this evaluation will teach us how to leverage the socialness of the web to amplify learning and participation outcomes in open ended citizen science contexts where meaningful activities, inquiry, and learning intersect.

**Unanticipated outcomes**

Today, YardMap is engaged in multiple partnerships to build out various pieces of the application and engage a larger audience. First, it has partnered with The Nature Conservancy (TNC) to launch a co-branded effort rebranded as "Habitat Network." The goals of this project are to develop new tools for urban audiences and expand the audience by reaching out to the one million TNC members, while also launching TNC-funded efforts on the ground. YardMap was included in a USDA grant with TNC and the University of Washington to build out its tools for organic agriculture. At the same time, it is building out tools and learning content for Monarch Butterflies and Honey bees (as well as wild bees) in response to a White House Report that came out in May 2015. It is being used as a tool for Ann Clark's NSF research grant on crows (Binghamton University) and was used to conduct research on urban ecology by one of her Master's students. Partner inquiries are also being fielded from the Wildlife Conservation Society and sought through the California state government, which has passed a law on lawn size reduction for which YardMap could become the tracking instrument.

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# Introduction

## Project Background

The YardMap network, produced by the Cornell Lab of Ornithology and online at www.yardmap.org, is a citizen science project designed to cultivate a richer understanding of bird habitat, for both professional scientists and people concerned with their local environments. The YardMap Network merges the lab's existing bird citizen science projects with online social networking and gardening activities, providing new opportunities for a growing audience of middle-aged and older learners to collaborate with professional researchers to investigate the impacts of bird-friendly and carbon-neutral practices in backyards, community gardens, and parks. YardMap learning resources are designed to produce basic, intermediate, and advanced learning outcomes, while engaging people in learning about habitat-bird relationships and carbon neutral practices. In the process, the YardMap will test the hypothesis that coupling citizen science with social networking creates online learning communities with improved STEM learning outcomes.

The YardMap Network tried to leverage a new concept for recruiting citizen scientists, other birding participants, gardeners, and novices into an ecological social network that spans the continent. People are asked to map bird-gardening and sustainability practices in their backyards and parks. If they choose, YardMappers can monitor birds, display their YardMaps, chat, and/or enter the YardMap's forums and integrated social networks, where novices (non-birders/non-gardeners) will be drawn into the YardMap through social contagion or "the copycat effect." The YardMap site was launched in 2012 and as of this report has over 16,000 YardMaps submitted mapping over 200,000 acres mapped.

## Project Goals

The main goals of YardMap are to create an innovative citizen science tool for use by the general public, and to develop and study a large online learning community to understand how such modalities support peer-to-peer learning through social networking. A more specific set of Impacts and Indicators were produced for the project and are included below.

## Purpose of Evaluation and Evaluation Questions

The purpose of the summative evaluation is to two-fold: 1) provide documentation to NSF about the extent to which the project met its goals and objectives, and 2) give the Lab of Ornithology information about how well the website is engaging the intended audiences. While the summative will need to focus to some extent on the original proposal, the understanding is that the project has likely shifted from the conceptual phase in which it was proposed, so some

changes can be made. Any major changes should be brought to the attention of the program officer.

**The following are the evaluation questions for the summative evaluation:**

1. Who is participating in YardMap, and how does someone who is affect their participation in and experience with YardMap?

2. To what extent does participation in YardMap increase knowledge about bird-habitat relationships and other related concepts?

3. How does participating in YardMap affect peoples' attitudes towards and self-efficacy for citizen science activities? Do they feel like they are better able to contribute to science in general, and more specifically to effective science-based restoration and sustainability?

4. How does participating in YardMap, and specifically the community gardening and online social networking aspects, positively impact STEM-related learning outcomes?

5. To what extent does participating in online social networking aspects positively affect participation and retention rates, and lead to a stronger connection to YardMap and the community? Are these impacts more profound than in community gardening groups?

## Impacts and Indicators

The project included a set of Impacts and Indicators that outlined the goals and objectives for YardMap (see Table 1). This section lists the main impacts, eleven in all, and the corresponding indicators that indicate whether or not the impact was achieved. The National Science Foundation (NSF) requests that each AISL project report the Impacts and Indicators, the summative evaluation is set up in this manner. The indicators are written as hypotheses that can be tested by the data collected in the various phases of the summative evaluation. In order to track the success of these indicators, the Findings section below is set up in order of the Impacts and their corresponding Indicators. The Impacts cover a range of outcomes, including knowledge/understanding, attitudes, skills and behaviors, among others.

**Table 1. Table of Impacts, Indicators and Evaluation Focus for YardMap**

| IMPACT | INDICATOR(S) |
|---|---|
| A. General Public, Adult, and Senior application users will move from basic to advanced knowledge of bird-habitat | A1. YardMap users will have more awareness of impact of yard practices on birds after mapping their yards. |

| | |
|---|---|
| relationships | A2. YardMap users will have Increase in recall (number and breadth) of yard practices that help birds. |
| | A3. More participants will be able to explain concepts of matrix habitat and landscape ecology after using YardMap than before using YardMap. |
| | |
| B. Birder-hobbyists will understand more about the link between their birder community and the gardener community | B1. Increased knowledge of the importance of gardens as habitat for birds. |
| | |
| C. General Public, Adult, and Senior application users will experience an increased sense of empowerment to help the environment | C1. A high proportion of YardMap participants will be engaged long term with the project indicating engagement and the sense that participation empowers them to be stewards of their yards. |
| | C2. Participants will report a decreased sense of hopelessness about their ability to enact changes to the climate. |
| | C3. Participants will report an increased sense of efficacy to positively affect bird populations. |
| | |
| D. Participation in the online learning community in YardMap will increase General Public, Adult, and Senior application users internet literacy | D1. YardMap participants will show a positive correlation between the number of YardMap features/ tools used and their self-reported comfort with engaging on the web. |
| | D2. Participants will show an increasing use of a wider variety of Application tools in YardMap over time. |
| | |
| E. General Public, Adult, and Senior application users greater sense of responsibility for carbon neutrality | E1. Increased positive attitude towards those who take steps to reduce their carbon impact through small changes to their domestic practices. |
| | E2. Positive correlation between the use of YardMap and reported planned changes in domestic practices to reduce carbon impact. |
| | |
| F. General Public, Adult, and Senior application | F1. Social network users will be more willing |

| | |
|---|---|
| users will learn to utilize social networks as tools for engaging in STEM and science-related issues | than non-social network users to consider social networking a tool for resolving scientific questions or problems. |
| | |
| G. General Public, Adult, and Senior application users will invest additional resources into energy conservation and habitat restoration | G1. Self-reported intention and actual behavior related to increased habitat management. |
| | |
| H. General Public, Adult, and Senior application users will be encouraged to try-out invention-based problem solving in their own lives | H1. Positive correlation between use of the YardMap and likelihood of taking an inquiry or invention approach to solving a yard-based problem. |
| | |
| I. General Public, Adult, and Senior application users will increase basic bird & plant ID skills | I1. Increase in number of correct bird identifications increases with participation. |
| | I2. Increase in number of correct plant identifications increases with participation. |
| | |
| J. General Public, Adult, and Senior application users will broaden their contributions to the scientific endeavor | J1. Positive correlation between participation in YardMap and participation in other citizen science projects. |

# Experimental Design

A true experimental design was used, employing random assignment to the Treatment and Control conditions in order to ensure that self-selection or other nested factors did not adversely affect the findings from the study. More detail about the sampling and random assignment is discussed below in the methods section.

The following table shows that there was a pre- and post-test intact group design (see Table 2). This means that each participant provided data twice (indicated by a "O" in the table) during the study period: once at the beginning and a second time at the end. The Control group did not receive the Treatment, while each of the two Treatment groups did (this was indicated by an "X" in the table). The "X" in the table represents their exposure to YardMap, or the Treatment. A waitlist Control group was used, including those who did not participate in YardMap during the study period. Furthermore, the Treatment group was divided into two particular experiences: one group who was exposed to YardMap, with the Social Networking features enabled (SN); another group who were exposed to YardMap, but the social networking features were disabled (NSN). This would allow for the evaluation to identify the potential affordances of the social networking functions in YardMap.

**Table 2. Summative Evaluation Design**

| Program Component | Evaluation Design | Representation (X = Treatment; O = measures/evidence) |
|---|---|---|
| YardMap | Pre-Test Post-Test Intact Group Design | Treatment (SN): O X O<br>Treatment (NSN): O X O<br>Control: O O |

# Limitations of the Study

There were a number of factors that occurred during the study that may have affected the results of the study. It is important to consider these factors and issues when interpreting the results of the study. Where possible, it is noted how these affected data collection, analysis and interpretation of the study. Many of these occurred as the result of using Qualtrics (see www.qualtrics.com), a common tool for collecting online data. Despite multiple people testing out each version of the survey a number of times, there appeared to have been bugs during the data collection process that were not identified until after they had occurred.

Attrition rate / Completion rate – Given the design of the study and the amount of time the the study period occurred, it is not surprising that attrition occurred in all three of the study study groups (see

Figure 1 and

- Figure 2), and since people were randomly assigned before filling out the pre-survey attrition was not perfectly even between these groups. There were also multiple points where participants could drop out of the study: 1) not giving their consent to participate in the study, 2) not filling out the pre-survey, 3) not filling out the post-survey. Of the 4,390 individuals who logged into YardMap during the study period and were invited to participate, 2,359 (54%) were eligible and agreed to participate in the survey. Of these 2,359 individuals 1,712 (73%) completed the pre-survey. After the evaluation period, a total of 606 individuals (26%) filled out the post-survey. The biggest implication is that even though individuals were randomly assigned to their study group (Treatment or Control), there was some self-selection in completing the surveys, which likely affected the results to some degree.
- Non-random assignment (Qualtrics issue) – The Qualtrics survey was designed to randomly assign individuals as they accessed the YardMap login information to invite them to participate in the study. While in the beginning of the study period it was randomly assigning participants to the three groups, during a period of 2 weeks it inexplicably was assigning all participants to the Social Networking group. Given that random assignment was an absolute criterion for the experimental design, those who were not randomly assigned were not included in the analysis. This resulted in a smaller sample size, yet retained the integrity of the experimental research design for the data that were included in the Findings section below.
- Using post-survey instead of pre-survey (Qualtrics issue) – There was also an explicable "bug" within the Qualtrics survey that resulted in a period of two weeks where even though it was programmed to use the pre-survey, it used the post-survey instead. The impact of this was limited by the fact that the pre-post design meant that the large majority of questions were, in fact, the same in the two versions of the survey. One main difference was that demographics were usually collected in the pre-survey, so those participants who incorrectly received the post-survey first were also given the demographics in their true post-survey after participating in the study.

- Specific Items Skipped (Qualtrics issue) – A number of items[1] on the post-survey that were included in the testing, were left out of the "live" post-survey for no apparent reason. Unfortunately these included a number of open-ended follow-up items asking whether or not peoples' yard and bird practices had changed since participating in YardMap. This does negatively affect the ability of the study to identify potential behavior changes, and intentions for behavior change, as a result of participating in YardMap.
- Some individuals in the Non-social networking group had access to social media pieces after they took the post-survey, and as such some web analytics within the database are contaminated. Limited use of social media tools on YardMap during the study period. Though there was a high number of people enrolled in the study, those that used the social media tools was a very small percent of the social networking sample. So, it is hard to determine the effect of social networking when it was not used very much.

  There has been much written about the advantages of using technology in research and evaluation studies, and there are some advantages of using technology to collect data. The fact is that this experimental study could not have been carried out without using a more powerful software that allowed for random assignment of individuals as they signed up to participate in the study. The automated process of the assignment, which was tested thoroughly before the study began, resulted in some of these issues. The evaluators take responsibility for the study, especially given the care with which the recruitment and instruments were tested. However, the seemingly sudden and random "bugs" within the software provided no indication that the issues were occurring; none of the issues mentioned above occurred when the study started but only after a number of weeks. The evaluators in hindsight could have checked on the data every few weeks to make sure nothing had changed; however, it is difficult to fathom that a system that worked would suddenly change during data collection with no modification from the evaluation team. This is likely why the issues were not identified earlier, especially given how smooth testing and the beginning of data collection occurred. A couple of these issues have occurred in other studies, indicating that the issues lie within Qualtrics. Where appropriate, these limitations are mentioned in the findings sections of the report.

[1] Twenty-four total questions in the post-survey that Qualtrics skipped. Four specific to the Non social networking group (measures of satisfaction with YardMap); 15 specific to the social networking group (including features used in YardMap, satisfaction with YardMap, changes made to their yard); 5 questions specific to the control/waitlist group.

# Methods

Individuals who were creating a login for YardMap during the dates of the testing period in late 2014 were invited to participate in the study. While they were not required to participate in the study in order to sign up for YardMap, they were encouraged to do so and incentivized. Those individuals who looked at YardMap and did not wish to make a map are not included in the population we sampled from. In order to participate in the study fully, individuals had to do the following:

1. Create an account for YardMap
2. Give consent to participate in the study
3. Fill out a pre-survey (see Appendix A)
4. Be assigned to one of the Treatment conditions
5. Participate in the study over a period of 6 weeks, depending on which group they were randomly assigned to:
    a. Control group – this was a waitlist Control condition where participants were told not to use YardMap during the study period. When the study was done, they were told they were free to use YardMap
    b. Treatment groups – they could use YardMap as much or as little as they wanted:
        i. Social Networking (SN) group – full YardMap version
        ii. Non Social Networking (NSN) group – same as the above version of YardMap, but with the social networking features disabled
6. Fill out a post-survey (see Appendix B)
7. [Optional] Those who filled out a post-survey were asked to share their email in order to participate in a follow-up interview (see Appendix C)

As one might imagine, there were multiple places where individuals opted out of the summative evaluation.

Figure 1 below shows the first four steps listed above. Once they gave consent, participants were asked to fill out the survey; when they completed the pre-survey they were assigned to one of the three study conditions. The red lines indicate that those who did not give consent also went to the full YardMap experience (Treatment condition with social networking), but since they did not give their consent they did not receive a post-survey.

In being assigned to the different groups, what participants could and needed to do depended on which group they were in. The waitlist Control group was told that they had been selected as a group to wait to use YardMap, and it was stressed how important this group was. Two different versions of YardMap were created in order to allow for a different experience in the Treatment groups. One version of YardMap was the full version that included social networking functions, for the Social Networking (SN) Treatment group. Another version was created for the No Social Networking (NSN) group, and had the social networking functions disabled.

**Figure 1. Process for Recruitment and Assignment to Conditions**

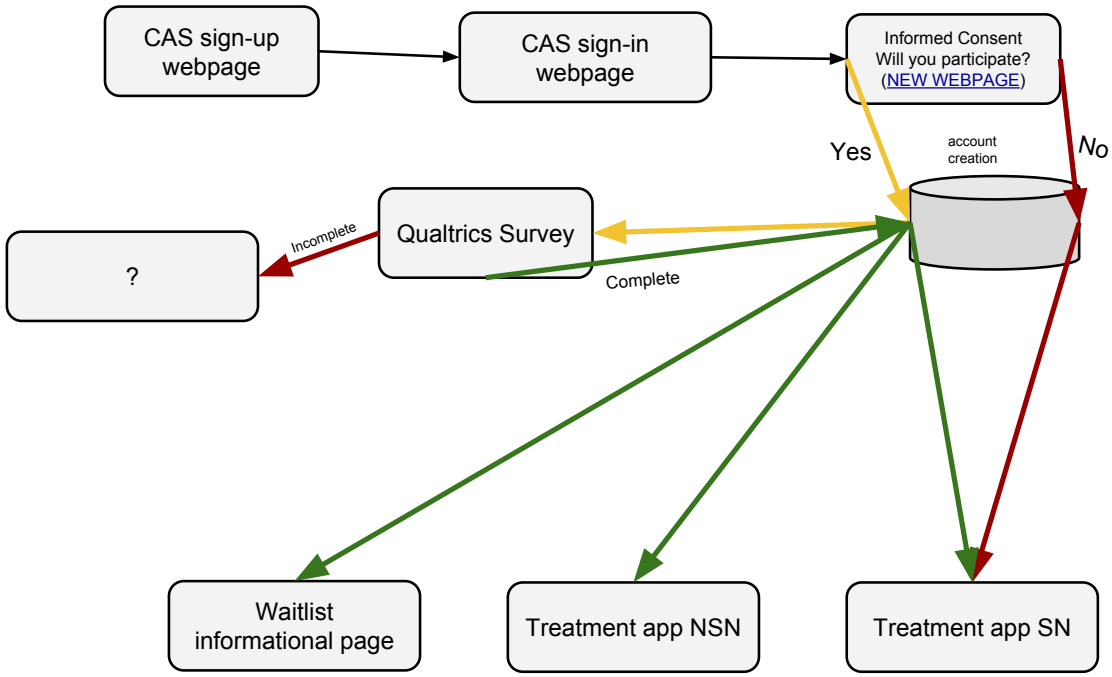
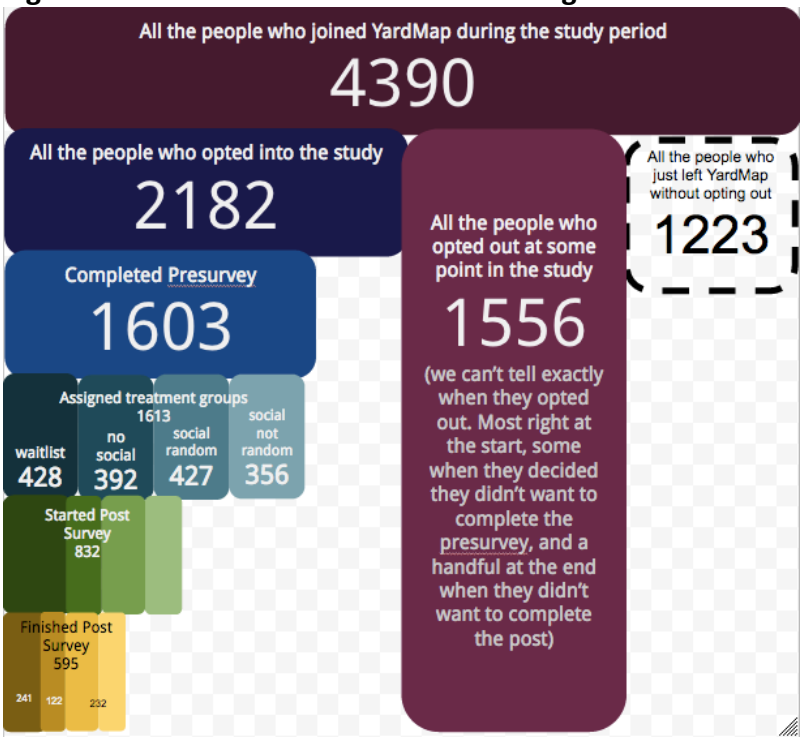


**Figure 2. Process for Recruitment and Assignment to Conditions**




There were a total of 2,182 individuals who signed up for YardMap during the summative evaluation period and gave consent to participate in the study. Of these 2,182 individuals who received the pre-survey, a total of 1,603 (or 73%) finished filling it out (see Table 3). However, as mentioned in the limitations section above there were a number of factors with the Qualtrics data collection software that prevented some of the participants being randomly assigned to the Control condition or one of the Treatment conditions. This resulted in a total of 1,247 of the pre-surveys being randomly assigned and being able to be included in the analysis; since this error did not start occurring until partway through the data collection and was thus undetected, it could not be corrected during the study itself. Even with this situation, there were still a total of 477 individuals who filled out a pre-survey, were randomly assigned to a study condition, and filled out a post-survey. Of this group, 17 of them provided an email address to be contacted a few weeks after completing the post-survey and answered questions during a telephone interview meant to gather more context for the survey findings.

**Table 3. Methods**

| Method | Date | Sample Size |
|---|---|---|
| **Pre- Survey** | 4/5/2014 to 6/20/14 | n=1,603 (1,214 randomly assigned) |
| **Post-Survey** | 5/21/14 to 9/8/14 | n=595 (477 randomly assigned) |
| **Follow up Interview** | 9/2/14 to 9/8/14 | n=17 |

# Instrument Development

Given the number of outcomes included in the summative evaluation, the complexity of the approach, the use of pre- and post-measures, and Control and Treatment groups, an evaluation plan was developed to ensure that the appropriate methods were used and that all of the important variables were included in the study. A very detailed outline was developed in the evaluation plan, and this was the basis for including the various items and instruments outlined below. These included the following outcome categories:

1. Use of YardMap site – in order to understand how people intended (pre) and actually did (post) use the YardMap site. Some of the data were from web metrics from the site, while others included items asking participants about actual use.
2. Knowledge gain – the extent to which participants show a gain in yard- and bird-related content. Includes both self-report and scored items.
3. Attitudes – towards birds, gardening, making yards more bird-friendly, reasons for environmental actions, and impact of environmental actions
4. Intentions – related to making yards more bird-friendly or seeking out additional information
5. Behaviors – in making the yard more bird-friendly
6. Demographic/Psychographic – a number of items were included looking at who someone was (e.g., age, gender, residence, etc.) as well as a person's activities (participation in citizen science, birding, gardening)

The pre- and post-participation instruments for the summative evaluation were developed using a variety of approaches, with the majority of items being repeated from the pre- to the post-survey. These items came from a variety of sources:

- From front-end evaluation, especially those related to comfort and frequency of using technology and the internet. Some of these items were in turn taken or adapted from the Pew internet studies of years past. Many of the items were psychographic or demographic in nature.
- Certain items were developed specifically for this study, including pre- and post- items asking about how easy people expected or found YardMap's various features, as well as questions about what they did on the YardMap site.
- Other sets of items came from were from an NSF-funded project (DRL# 1010744) called DEVISE (Developing, Validating, Implementing Situated Evaluation Instruments), whose purpose was to measure outcomes such as interest, motivation, self-efficacy, and skills; see http://www.birds.cornell.edu/citscitoolkit/evaluation/instruments . See Indicator D3 section below for more detail about the scales. The following were some minor changes that were made in order to use them in this study:
    - Changing some scales to fit YardMap (Motivation for Environmental Action + Self-Efficacy for Environmental Action)
        - Modifying some of the items so they referred to birds more specifically
        - Modifying some of the items to more appropriately reference YardMap use (some didn't make sense the way they were originally phrased)

- Taking out 2 items in the Motivation For Environmental Action that did not make sense in the current context
- Self-Efficacy for Environmental Action
  - Changing it from a "group" item to a more individual item (so it fit how people answered about YardMap)

The follow-up interview was developed as a means of adding context to the pre- and post-survey results, with the team determining which items they wanted more information about; these covered a variety of the outcome categories listed above.

# Sample Characteristics

When looking at both Treatment and Control groups, there was a difference between the two groups in whether they submitted just the pre-survey or both a pre- and post-survey (see Table 4). While more than half of the Control group (56%) filled out both the pre- and post-survey, this was true for only 30% of the Treatment group. Further investigation for the Treatment group showed that this seemed to be related to whether a participant did a YardMap. For the Treatment group those who did a pre-survey only were less likely have done a YardMap (56%) than those who did both the pre- and post-survey (75%) (see Table 5). This suggests that when a participant was randomly assigned to the Treatment group, if they did not complete a YardMap then they were less likely to fill out the post-survey. While it was not mentioned that filling out a YardMap was required for participating in the post-survey, they may have either felt like they did not complete what they were supposed to or were simply less invested since they did not do a YardMap.

**Table 4. Participants Who Submitted a Pre-survey Only versus a Pre-Post Survey**

| | Treatment | Control |
|---|---|---|
| **Pre-Post Surveys** | 30% | 56% |
| **Pre-Survey Only** | 70% | 44% |

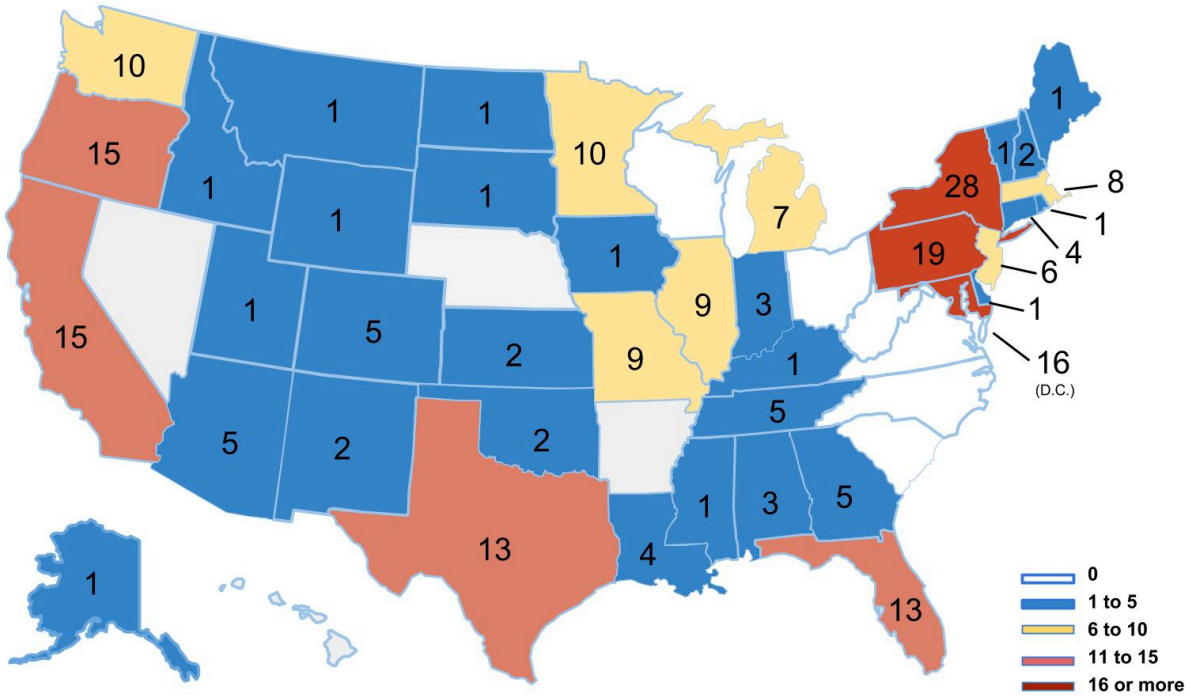
Note: Chi-square analysis showed a significant difference; those assigned to the Treatment group were less likely than the Control group to fill out a post survey.

**Table 5. Treatment Groups Who Submitted a Pre-survey Only versus a Pre-Post Survey and Mapped Their Yard**

| Mapped Yard? | Pre-survey Only | Pre-Post Survey |
|---|---|---|
| **Yes** | 56% | 75% |
| **No** | 44% | 25% |

Note: Chi-square analysis showed a significant difference; participants who submitted a pre-post survey versus only a pre-survey were significantly more likely to have mapped a yard.

**Figure 3. YardMap Participants Across the U.S.**




NOTE: Map shows participants who gave consent, were randomly assigned a study group, and who submitted both pre- and post-surveys. Map shows 39 U.S. states, and a total of 224 participants gave their zip codes in the pre-survey.

The total sample includes all participants who gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. Those in the Treatment (T) and Control (C) groups gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. The participants filled out the pre-survey and after submitting the survey they were randomly assigned to either a Treatment or a Control group.

There was a question as to whether certain types of people would be more likely to drop off during the study period (i.e., between filling out the pre-survey and post-survey). A basic comparison between the demographics in Tables 6 and 7 below, only the level of education item was significantly different between the two; those who completed the post had a slightly higher level of education. Given that the samples were very similar for those who just did the pre-test compared to those who filled out both the pre- and the post-test it is less likely that self-selection among those completing the study adversely affected the results. In looking at differences between the three groups (No Social Networking, Social Networking, Control), there were no demographic differences between the three groups in either the pre-survey or pre- and post-survey groups. Meaning, the random assignment to the three groups resulted in no demographic differences. Additionally, the attrition did not result in a redistribution of the demographics for the post-survey group.

**Table 6. Demographics of Participants Completing Both Pre and Post-surveys**

| Demographic Characteristics | Total Sample | Treatment (T) | | |
|---|---|---|---|---|
| | | No Social Network (NSN) | Social Network (SN) | Control (C) |
| Gender | n=444 | n=118 | n=87 | n=239 |
| Female | 73% | 70% | 83% | 70% |
| Male | 28% | 31% | 17% | 30% |
| Age Category* | n=450 | n=122 | n=89 | n=239 |
| 18 to 24 | 2% | 0% | 3% | 3% |
| 25 to 44 | 30% | 24% | 33% | 31% |
| 45 to 64 | 55% | 60% | 45% | 56% |
| 65 and older | 14% | 16% | 19% | 10% |
| Have Children under 18 | n=301 | n=85 | n=58 | n=158 |
| No | 69% | 69% | 66% | 70% |
| Yes | 31% | 31% | 35% | 30% |
| Family Group | n=263 | n=73 | n=51 | n=139 |
| One Adult, No Children | 22% | 18% | 31% | 21% |
| Two+ Adults, No Children | 46% | 49% | 33% | 49% |
| One Adult, One Child | 2% | 3% | 0% | 3% |
| Two+ Adults, One Child | 13% | 19% | 16% | 9% |
| One Adult, Two+ Children | 2% | 1% | 6% | 1% |
| Two+ Adults, Two+ Children | 14% | 10% | 14% | 17% |
| Highest Level of Education | n=450 | n=121 | n=89 | n=240 |
| Less than High School | 1% | 1% | 1% | 1% |
| High School/GED | 4% | 3% | 6% | 4% |
| Some College | 13% | 15% | 10% | 14% |
| 2-year College Degree | 6% | 8% | 5% | 5% |
| 4-year College Degree | 34% | 28% | 38% | 36% |
| Masters Degree | 30% | 34% | 28% | 28% |
| Doctoral Degree | 7% | 7% | 6% | 7% |
| Professional Degree | 6% | 4% | 7% | 6% |
| Ethnicity | n=447 | n=121 | n=89 | n=237 |
| White, including Hispanic | 94% | 95% | 93% | 93% |
| African-American | 0.4% | 0% | 0% | 1% |
| American Indian or | 0.4% | 0% | 0% | 1% |

| | | | | |
|---|---|---|---|---|
| Native Alaskan | <1% | 1% | 0% | <1% |
| Asian Indian | <1% | 2% | 0% | 0% |
| Japanese | <1% | 0% | 0% | <1% |
| Native Hawaiian | <1% | 0% | 1% | 0% |
| Filipino | <1% | 0% | 0% | <1% |
| Other Pacific Islander | <1% | 0% | 2% | 0% |
| Other | 1% | 2% | 1% | 1% |
| I don't know | 3% | 1% | 2% | 3% |
| Multiracial (more than one ethnicity selected) | | | | |
| Hispanic/Not Hispanic | | | | |
| No, not Hispanic/Latino | n=443 | n=122 | n=87 | n=234 |
| Yes, Mexican, Mexican-American or Chicano | 97% | 96% | 97% | 97% |
| | 1% | 1% | 1% | <1% |
| Yes, Puerto Rican | 1% | 0% | 1% | <1% |
| Yes, other Hispanic | 2% | 3% | 0% | 2% |
| I don't know | 1% | 1% | 1% | <1% |

NOTE: A Chi-square analysis showed a significant difference for age category ($p<.05$), however a comparison of the mean age for the three groups using an ANOVA showed no significant difference ($p=0.178$).

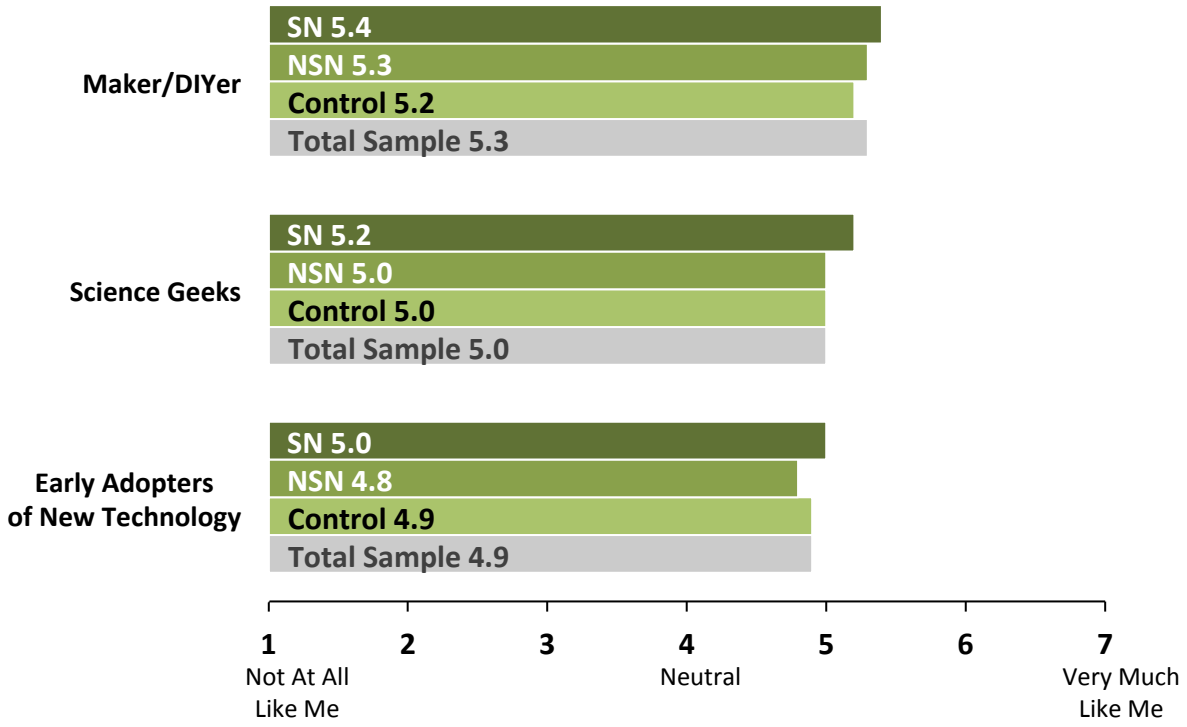
**Table 7. Residential Characteristics of Participants**

| | | Treatment (T) | | |
|---|---|---|---|---|
| Residential Characteristics | Total Sample | No Social Network (NSN) | Social Network (SN) | Control (C) |
| Live in U.S. | n=451 | n=122 | n=89 | n=240 |
| Yes | 95% | 93% | 98% | 95% |
| No | 5% | 7% | 2% | 5% |
| Primary Area of Residence | n=451 | n=122 | n=89 | n=240 |
| Suburban | 57% | 52% | 62% | 58% |
| Urban | 20% | 23% | 18% | 20% |
| Rural | 23% | 25% | 20% | 22% |
| Current Living Situation | n=449 | n=122 | n=89 | n=238 |
| Own Home | 86% | 84% | 84% | 87% |
| Rent | 11% | 12% | 11% | 10% |
| Other | 4% | 5% | 5% | 3% |

Note: For those participants that did not live in the United States (n=23), 17 responded that their country of residency was Canada (n=16) or Great Britain (n=1).

There were no significant differences in the three groups in self-identifying as being a maker, science geek or early adopter (see Figure 4).

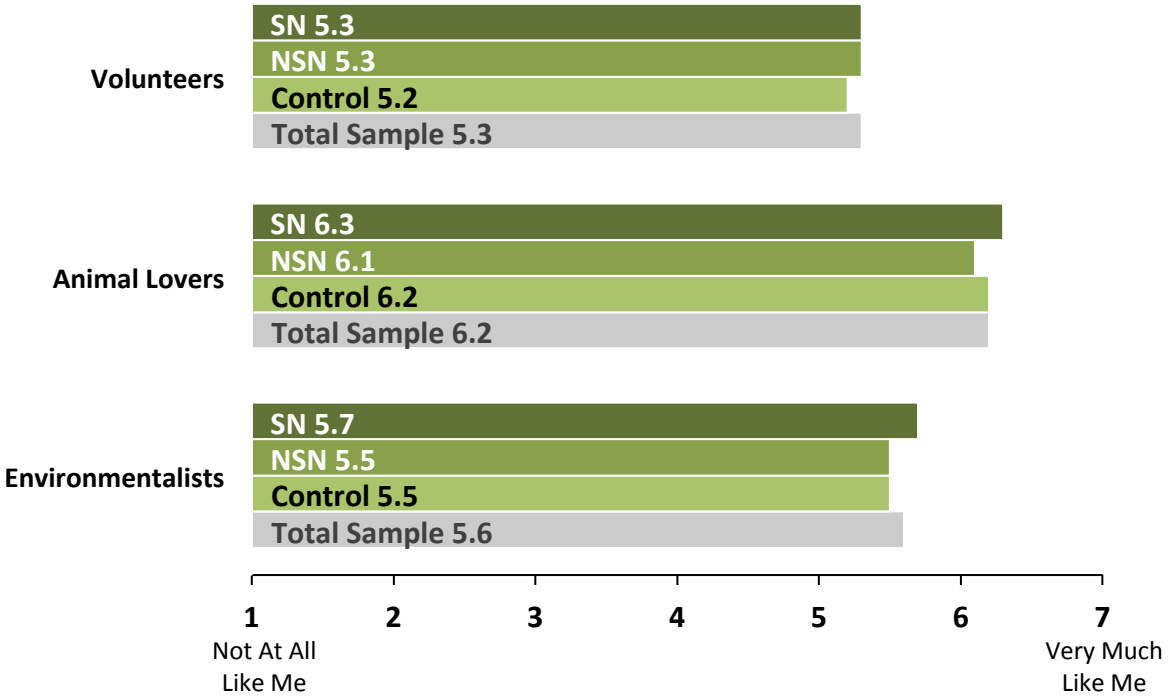
**Figure 4. Psychographic Comparisons for Participants, Pre-Survey (n=449)**




Note: The total sample includes all participants who gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. Those in the Treatment and Control groups gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys.

There were no significant differences in the three groups in whether they self-identified as a volunteer, animal lover or environmentalist (see Figure 5).

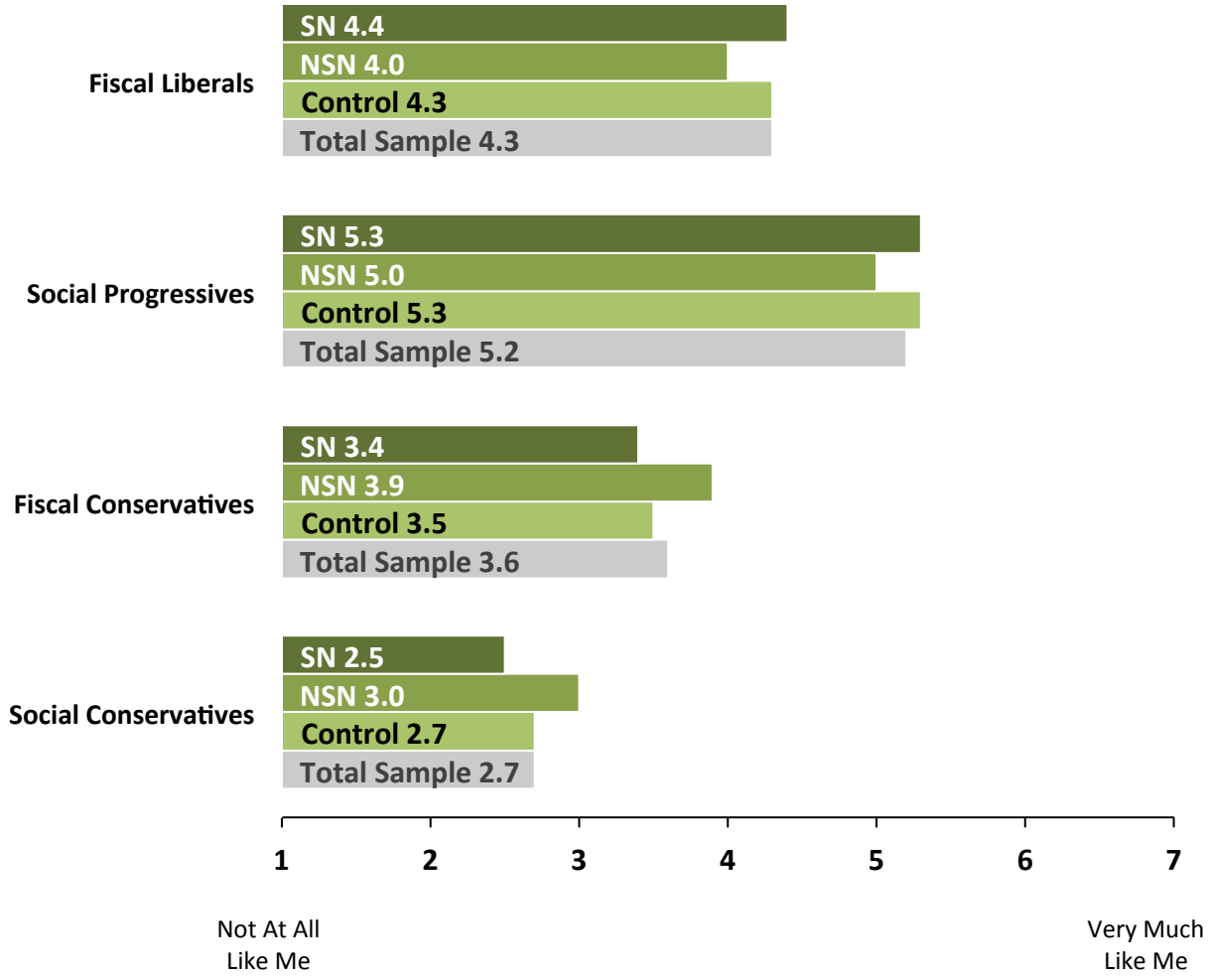
**Figure 5. Psychographic Comparisons for Participants, Pre-Survey (n=449)**




Note: The total sample includes all participants who gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. Those in the Treatment and Control groups gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys.

There were no significant differences in the three groups in self-identifying as being in specific political parties (see Figure 6).

**Figure 6. Psychographic Comparisons for Participants, Pre-Survey (n=447)**

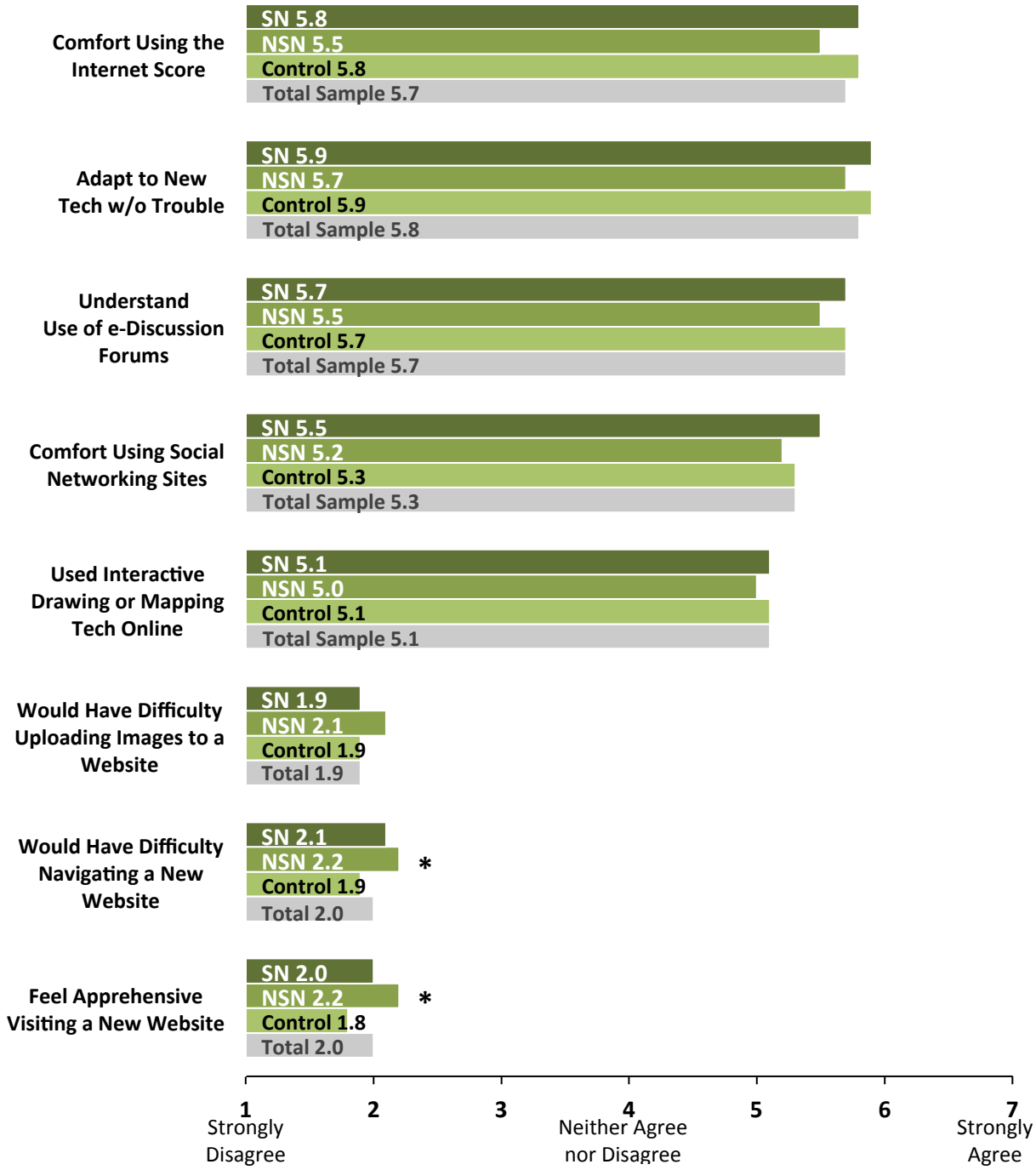



Note: The total sample includes all participants who gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. Those in the Treatment and Control groups gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. An ANOVA showed a significant difference for Fiscal Conservative, though a post hoc analysis was inconclusive.[2]

[2] When an ANOVA compares more than 2 means and a significant difference is found, a next step can be to do a post hoc analysis that compares each mean to the other means to pinpoint where significance lies. When a post hoc analysis was done here, all the p values were above 0.05; though fiscal conservative was shown to have statistical significance between the study groups, where the significance lies (such as NSN being significantly different from control) was inconclusive.

There were two significant differences in the three groups on whether they said they were comfortable with certain aspects of the internet: uploading images to a website, and navigating a new website (see Figure 7). When looking at all of those who filled out a pre-survey, and not just those who filled out both a pre- and a post-survey, there was one difference. This larger group did not show a statistically significant difference for uploading images to a website.

**Figure 7. Comfort Using the Internet for Participants, Pre-Survey (n=495)**



Note: The total sample includes all participants who gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. Those in the Treatment and Control groups gave consent, were randomly assigned a study group, and submitted both pre- and post- surveys. An asterisk (*) shows a significant difference found between the Control and No Social Networking groups (ANOVA, and post hoc analysis) in Figure 8 and Table 8 below.

**Figure 8. Previous Citizen Science Participation for Participants, Pre-Survey (n=495)**

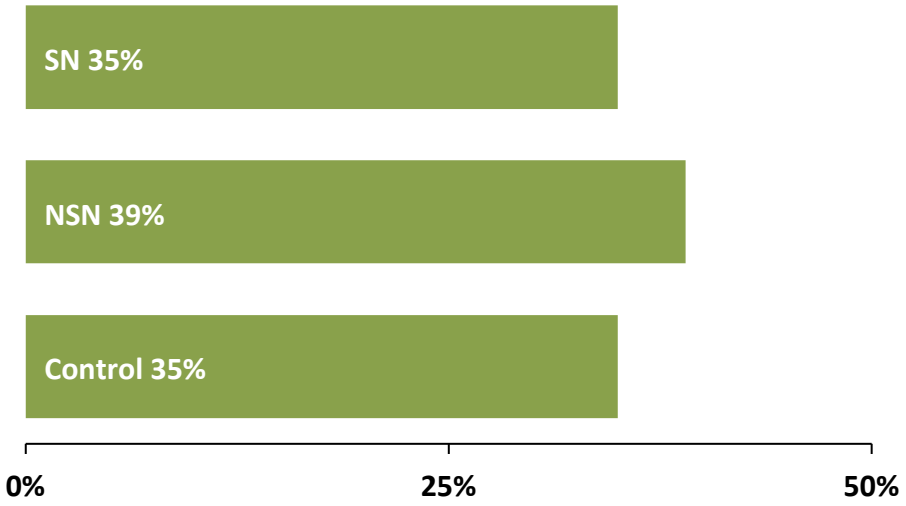



**Table 8. Years Participating In and Number of Citizen Science Projects**

| Citizen Science Characteristics | Total Sample | Treatment (T) | | Control (C) |
|---|---|---|---|---|
| | | No Social Network (NSN) | Social Network (SN) | |
| Number of Years Participating In Citizen Science | n=493<br>2.0 Years | n=121<br>2.8 Years | n=133<br>2.0 Years | n=239<br>1.6 Years |
| Number of Unique Citizen Science Programs Participated In | n=492<br>1 Program | n=121<br>1 Program | n=132<br>1 Program | n=239<br>1 Program |
| Number of Citizen Science Program (including YardMap) Planned to Participate in for 2014 | n=437<br>2.4 Programs | n=107<br>2.5 Programs | n=120<br>2.5 Programs | n=210<br>2.4 Programs |

In terms of citizen science, they were most likely to have heard of FeederWatch, eBird and NestWatch, in that order (see Figure 9). However, they were most likely to have participated in eBird and FeederWatch.

**Figure 9. For Those that Participated in Citizen Science, Other Citizen Science Projects They Heard of and Participated in, Pre-Survey (n=174)**

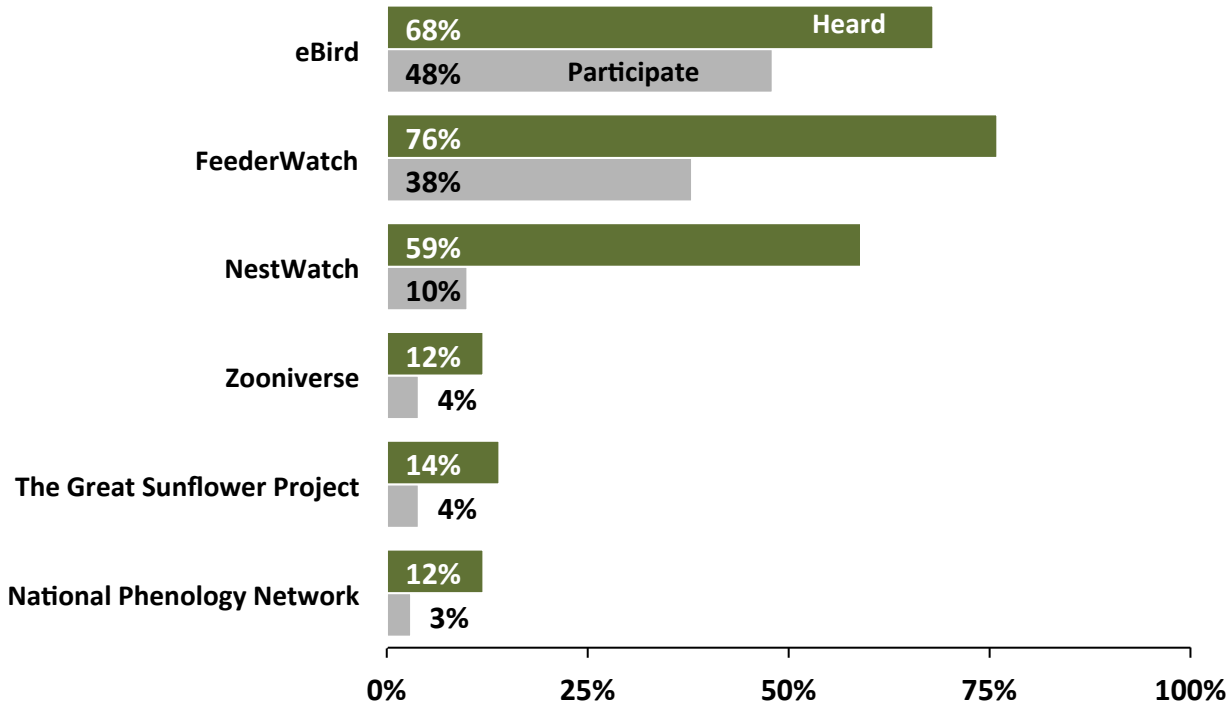
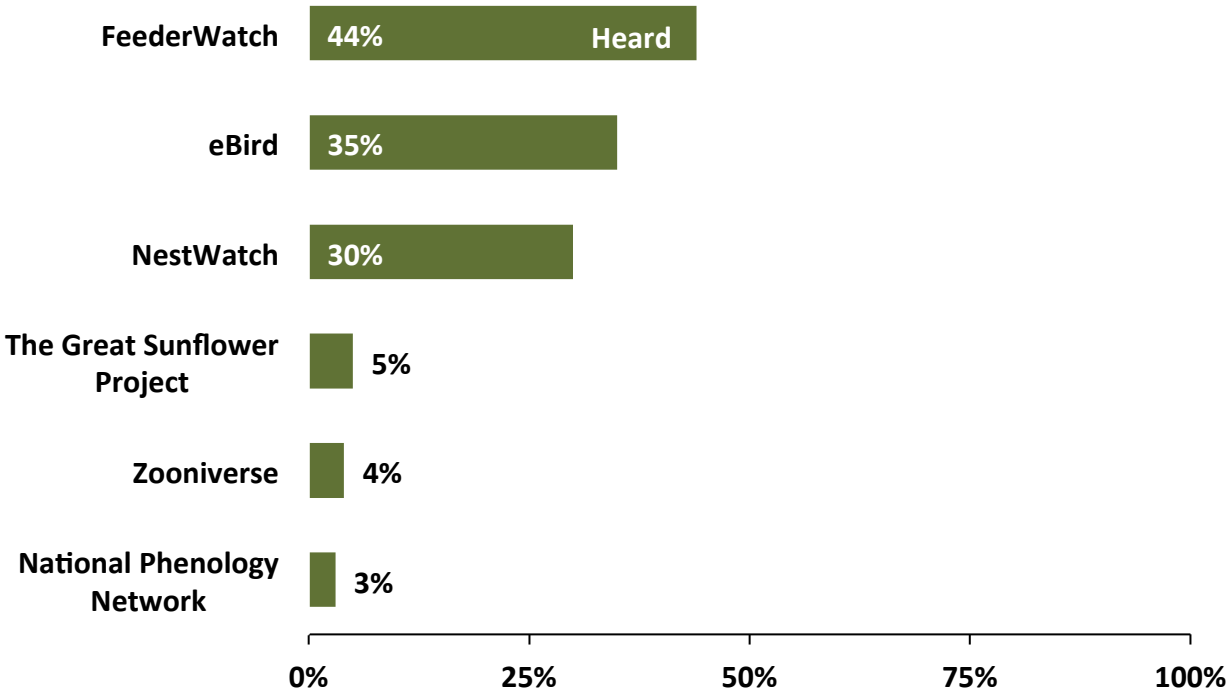


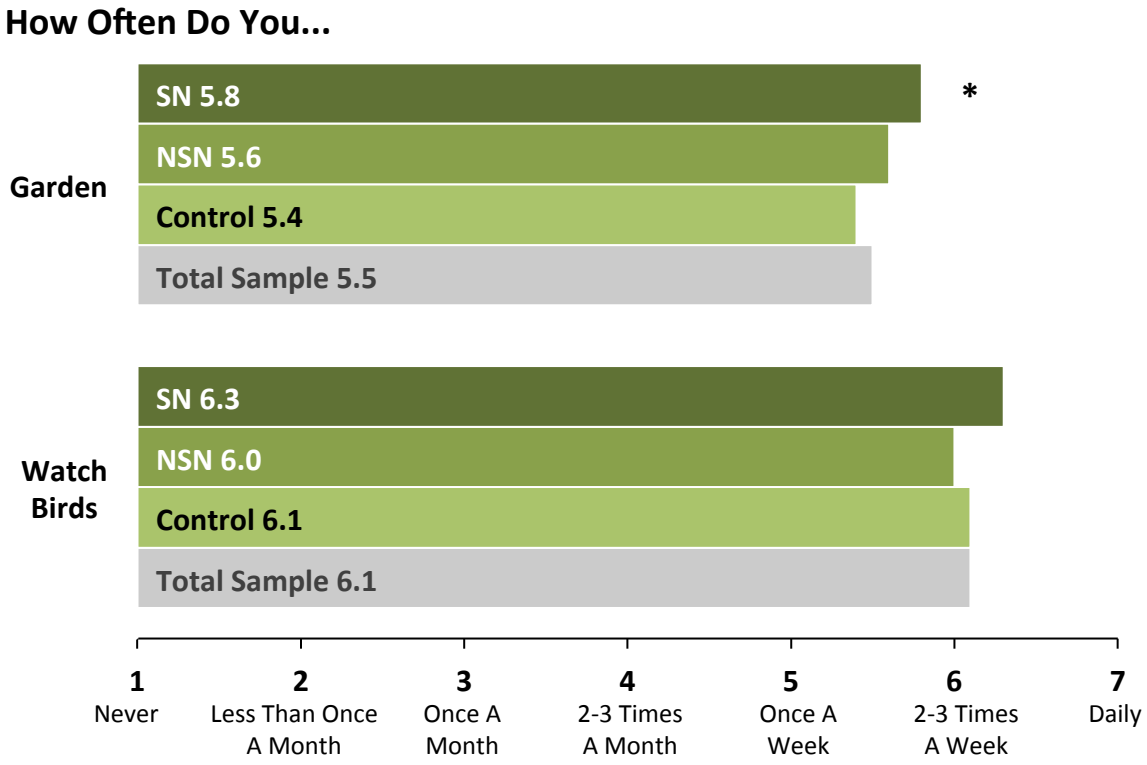
**Figure 10. For Those that Had Not Participated in Citizen Science, Other Citizen Science Projects They Might Have Heard of, Pre-Survey**




NOTE: The eBird, FeederWatch and NestWatch citizen science projects are all related to the Cornell Lab of Ornithology.

It is interesting to note that participants report bird watching as higher than gardening, yet in another section of the report where they self-report skills it is the reverse: participants self-report higher gardening skills compared to bird watching (see Figure 11). When looking at everyone who filled out the pre-survey, and not just those who did the pre- and post-survey, the significant differences were reversed: there was not a statistically significant difference in gardening experience, but there was a statistically significant difference in birding experience.

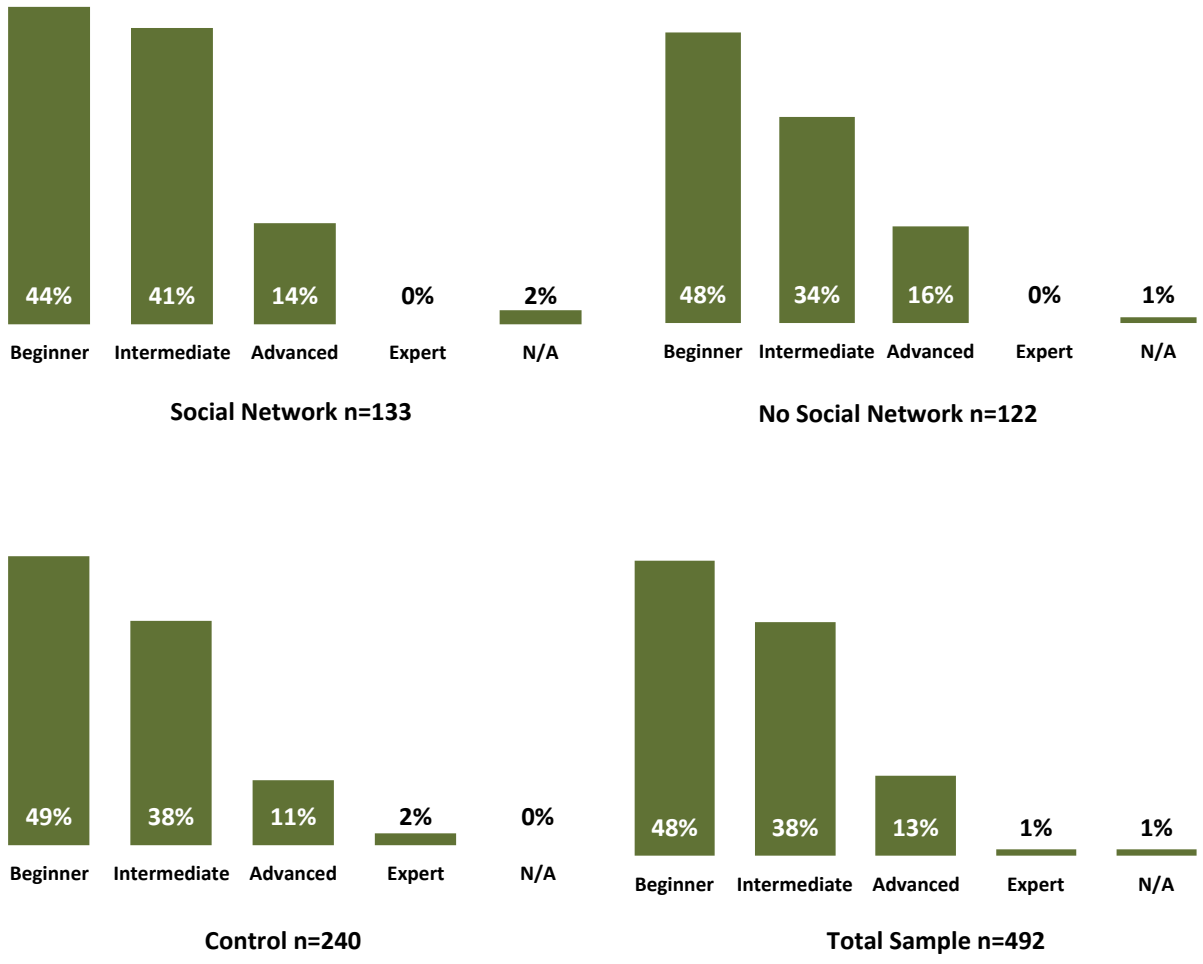
**Figure 11. Frequency of Gardening and Birding Activity for Participants, Pre-Survey**




NOTE: An asterisk shows a statistical difference, using post hoc analysis after an ANOVA, found between the Control and social networking group for frequency of gardening. Any differences between the three groups (two Treatment and one Control conditions) are coincidental, as individuals were randomly assigned to the groups after completing the pre-survey.

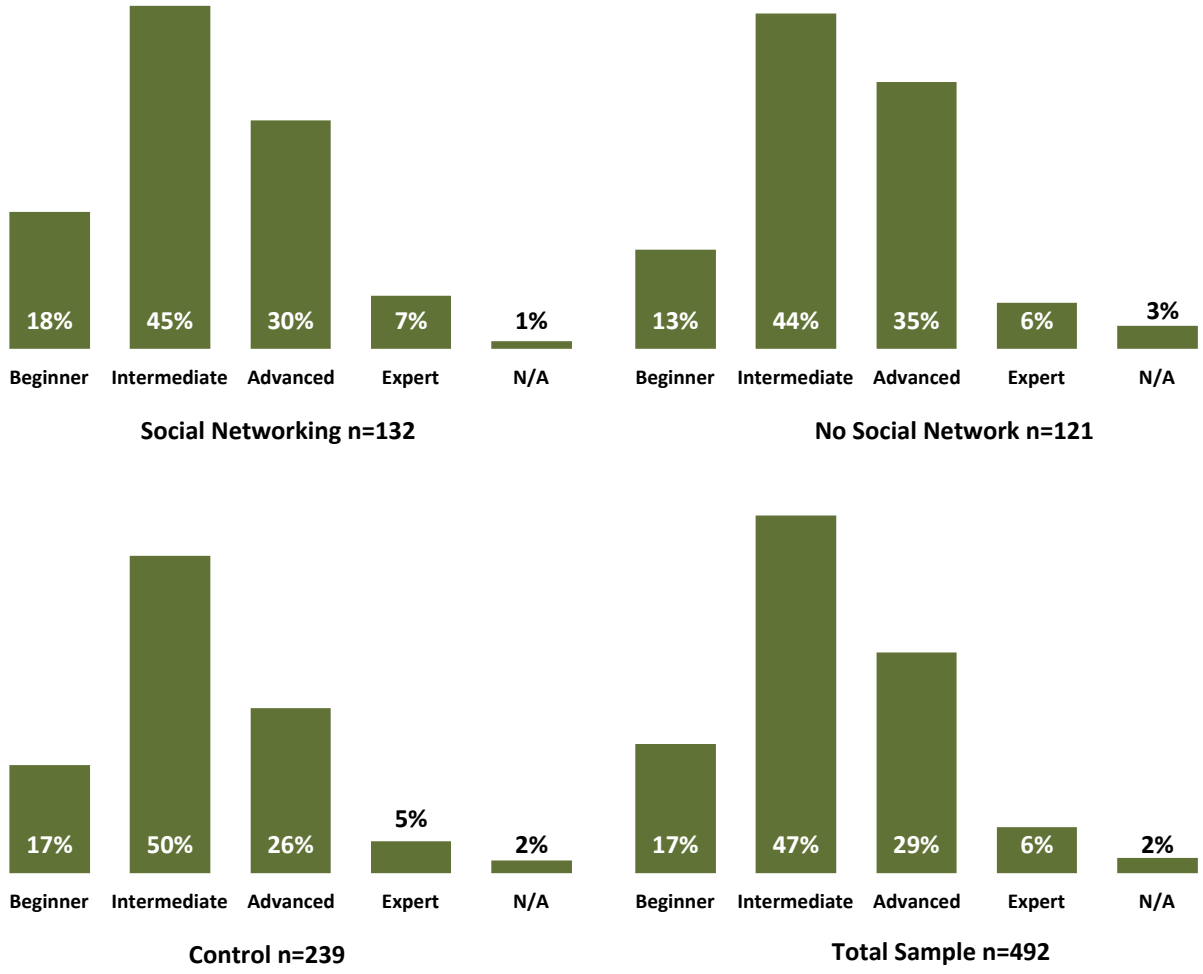
For the whole sample, almost half (48%) thought of themselves as beginner birders, while about another third (38%) thought of themselves as intermediate in their skills, while only 13% reported being advanced and a mere 1% thought of themselves as experts (see Figure 12). When looking at the relationship between this score and visitors' Bird ID Score, there was a significant correction ($r=.459$, $p<.05$). Interestingly, as seen in other Cornell Lab of Ornithology studies, there was a significant difference in this self-reported score and gender. Males were more likely to rate themselves as higher in their bird identification skills compared to females. There was not, however, a gender difference in the Bird ID Score, which measured actual, rather than self-assessed, birding skill.

**Figure 12. Self-Reported Skill Level Identifying Birds By Sight and Sound, Pre-Survey**



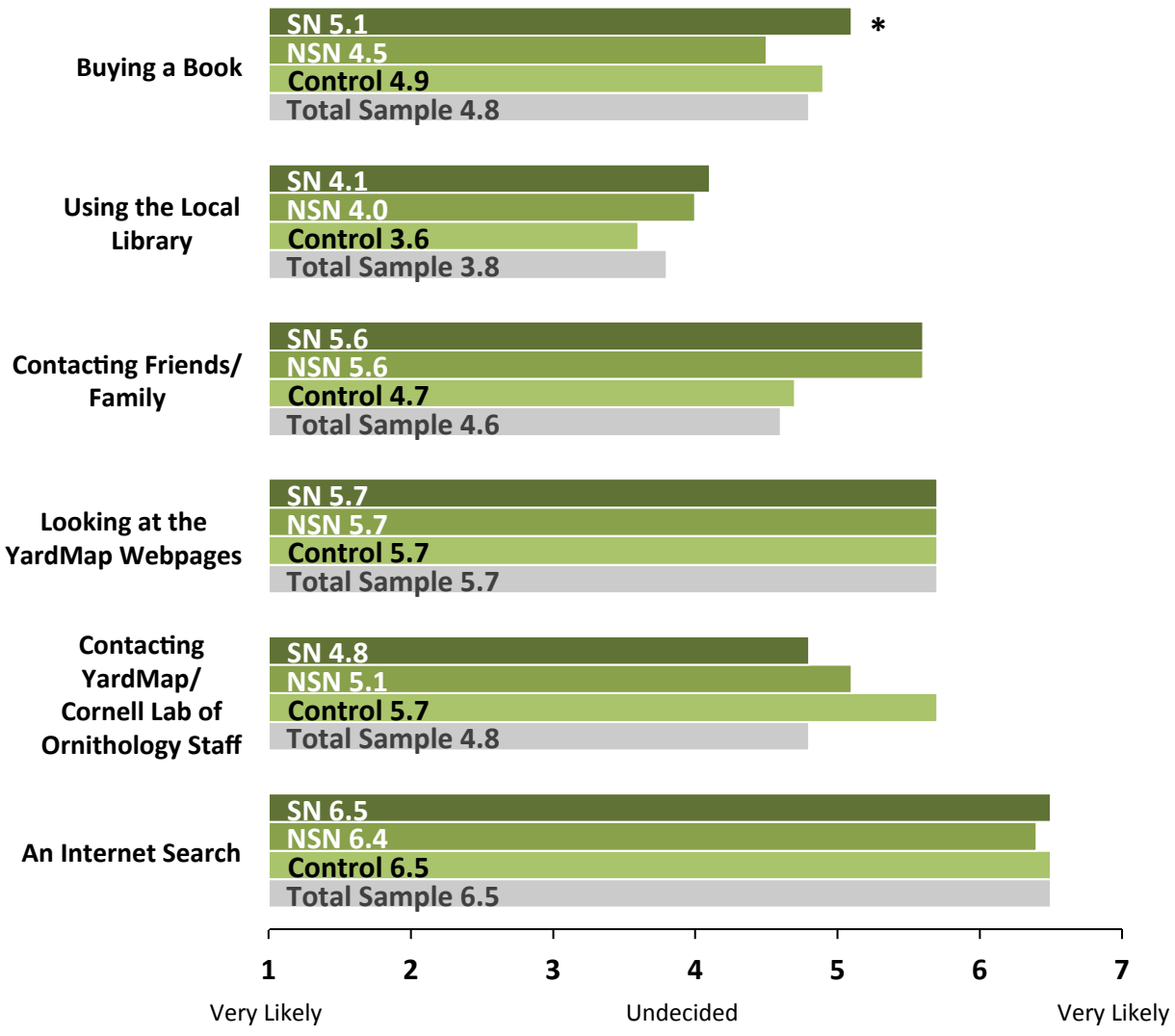
In terms of self-reported skill level at gardening, almost half of all participants (47%) said their skills were in the intermediate range, while 29% said they were advanced, and only 6% considered themselves to be expert gardeners (see Figure 13).

**Figure 13. Self-Reported Skill Level At Gardening, Pre-Survey**



The most common sources people were likely to seek out about gardening as it relates to birds and other animals, the most common sources were doing an internet search, contacting YardMap or Cornell Lab of Ornithology staff, buying a book, or contacting friends or family (see Figure 14). When looking at the same items for everyone who filled out the pre survey, not just those who did the pre- and post-survey, none of the items had a statistically significant difference.

**Figure 14. Likelihood to Seek Information About Gardening for Bird and Other Wildlife, Pre-Survey**




NOTE: An asterisk shows a statistical difference, using post hoc analysis after an ANOVA, found between the Social Networking group and Non Social Networking groups for likelihood to buy a book.

In looking at whether gender, age or level of education made someone more or less likely to create a Yard Map, none of the three were statistically significant differences.

**Table 9. Demographics of Treatment Participants Who Created a Yard Map**
NOTE: Participants are those that created a map on the website, consented, were randomly assigned a study group, and submitted both pre- and post-surveys.

| Demographic Characteristics | Total Sample With and Without Maps | Treatment with Maps (T) | |
|---|---|---|---|
| | | No Social Network (NSN) | Social Network (SN) |
| Gender* | n=444 | n=91 | n=66 |
| Female | 72.5% | 67% | 85% |
| Male | 27.5% | 33% | 15% |
| Age Category | n=450 | n=93 | n=68 |
| 18 to 24 | 2% | 0% | 4% |
| 25 to 44 | 30% | 28% | 37% |
| 45 to 64 | 55% | 56% | 41% |
| 65 and older | 14% | 16% | 18% |
| Have Children under 18 | n=301 | n=67 | n=47 |
| No | 69% | 72% | 60% |
| Yes | 31% | 28% | 40% |
| Family Group | n=263 | n=57 | n=41 |
| One Adult, No Children | 22% | 19% | 32% |
| Two+ Adults, No Children | 46% | 51% | 27% |
| One Adult, One Child | 2% | 4% | 0% |
| Two+ Adults, One Child | 13% | 16% | 17% |
| One Adult, Two+ Children | 2% | 2% | 7% |
| Two+ Adults, Two+ Children | 14% | 9% | 17% |
| Highest Level of Education | n=450 | n=92 | n=68 |
| Less than High School | 1% | 0% | 2% |
| High School/GED | 4% | 2% | 6% |
| Some College | 13% | 13% | 10% |
| 2-year College Degree | 6% | 8% | 4% |
| 4-year College Degree | 34% | 32% | 37% |
| Masters Degree | 30% | 33% | 28% |
| Doctoral Degree | 7% | 9% | 6% |
| Professional Degree (ex.MD) | 6% | 4% | 7% |
| Ethnicity | n=447 | n=92 | n=68 |
| White, including Hispanic | 94% | 96% | 93% |
| African-American | 0.4% | 0% | 0% |
| American Indian or Native | 0.4% | 0% | 0% |

| | | | |
|---|---|---|---|
| Alaskan | | | |
| Asian Indian | 0.4% | 1% | 0% |
| Japanese | 0.4% | 2% | 0% |
| Native Hawaiian | 0.2% | 0% | 0% |
| Filipino | 0.2% | 0% | 2% |
| Other Pacific Islander | 0.2% | 0% | 0% |
| Other | 0.4% | 0% | 2% |
| I don't know | 1% | 1% | 2% |
| Multiracial (more than one ethnicity selected) | 3% | 0% | 3% |
| Hispanic/Not Hispanic | n=443 | n=93 | n=66 |
| No, not Hispanic/Latino | 97% | 97% | 96% |
| Yes, Mexican, Mexican-American or Chicano | 1% | 1% | 2% |
| Yes, Puerto Rican | 1% | 0% | 2% |
| Yes, other Hispanic | 2% | 2% | 0% |
| I don't know | 1% | 0% | 2% |

NOTE: In a Chi-Square analysis, gender showed a significant difference between the two Treatment groups (No Social Network and Social Network).

In looking at whether primary area of residence and current living situation made someone more or less likely to create a Yard Map, neither of them was a statistically significant difference.

**Table 10. Residential Characteristics of Treatment Participants Who Created a Yard Map**

| Residential Characteristics | Total Sample With and Without Maps | Treatment with Maps (T) | |
|---|---|---|---|
| | | No Social Network (NSN) | Social Network (SN) |
| Live in U.S. | n=451 | n=93 | n=68 |
| Yes | 95% | 95% | 97% |
| No | 5% | 5% | 3% |
| Primary Area of Residence | n=451 | n=93 | n=68 |
| Suburban | 57% | 52% | 60% |
| Urban | 20% | 22% | 22% |
| Rural | 23% | 27% | 18% |
| Current Living Situation | n=449 | n=93 | n=68 |
| Own Home | 86% | 86% | 84% |
| Rent | 11% | 11% | 10% |
| Other | 4% | 3% | 6% |

# Findings

As mentioned above, the findings section is organized according to the Impacts and Indicators for the project (see Table 1 above). The set of Impacts and Indicators in this report were derived from the original proposal and, as is typical in NSF projects, modified during the development of the project and its deliverables. The impacts and indicators cover a range of outcomes including knowledge/understanding, attitudes, skills and behaviors, among others. There are cases where an outcome was used to answer more than one indicator, so tables may appear more than once in the report.

As explained and outlined above, there were a number of criteria for including individuals in the comparisons in main findings. Individuals had to provide consent and be randomly assigned to a study group; those who did not meet these criteria were not included in the results included in the Findings section below. Additionally, many of the analyses included a pre- to post-comparison, so if they did not fill out both the pre-survey post-survey, they were not included. Many of the comparison tables include two conditions: Treatment (combined) and Control. This is because there were very few differences between the two Treatment groups (Social Networking and Non Social Networking); differences between these two Treatment groups relevant to the findings are noted in the narrative but not included as a table.

Since we followed a random assignment to the Treatment and Control conditions protocol, one would assume there would not be any statistically significant differences on the pre-survey; however, if it did occur it would indicate that there were some differences that occurred naturally in the random assignment to groups. If the Control and Treatment groups started at the same place in the pre-survey, then a positive result for YardMap on many of the variables would be an increase in the post-survey measure. However, since there is no guarantee that the two groups will start in the same place, simply looking at the post-survey result is not adequate. For the Control and Treatment group comparisons, which make up most of the Findings section, there is also a “change” measure, which subtracts the pre-survey measure from the post-survey measure. This is the third comparison of statistical significance, in addition to the pre-survey measures and the post-survey measures. There were some instances where the “change” measure was a negative result; this happens when a rating is higher for the pre-survey rating compared to the post-survey rating. When possible, an explanation is included in the specific sections.

Statistical significance – In the report there are a lot of comparisons between groups, and the appropriate statistical tests are run to determine whether the differences are significant enough to warrant attention. In other words, is the difference due to the differences between the groups being compared or is it possibly due to other factors. Many of the tables include a column that notes whether the two or more numbers in the row are statistically significant. In

figures, a statistically significant difference is noted with an asterisk (*). Significance levels (i.e., the alpha level) is set at p<.05. Further details, as appropriate, about why there is a significant difference is added as a NOTE below the table.

## What Surprised Participants

Of those who answered the question about what surprised them the most, the largest metacategories were about a specific feature being a problem (30% of responses), a general positive comment (22%), or a general negative comment (20%) (see Table **11**). Fully 9% of respondents had not used YardMap yet.

**Table** 11**. What Surprised Participants Most About YardMap**

| What surprised you most about YardMap, and why? | Number of Responses (n=296) | % of Total Responses |
|---|---|---|
| **Specific Feature Is A Problem** | **88** | **30%** |
| Using it with a specific device | 18 | 6% |
| Tough to change things once you do them | 9 | 3% |
| Sizing/placing/drawing objects | 8 | 3% |
| Image of my house was old, not accurate | 4 | 1% |
| Using it with a specific browser | 3 | 1% |
| Missing a specific feature | 3 | 1% |
| Couldn't import objects/shapes/pictures | 2 | 1% |
| Map was too crowded/messy | 2 | 1% |
| Resolution of pictures | 2 | 1% |
| Saving my YardMap | 1 | <1% |
| **General Positive Comment** | **64** | **22%** |
| Amount of detail/complexity | 24 | 8% |
| Easy to use | 23 | 8% |
| Existence of YardMap | 8 | 3% |
| Fun | 4 | 1% |
| Interesting | 2 | 1% |
| Citizen science | 2 | 1% |
| That I could participate | 1 | <1% |
| **General Negative Comment** | **60** | **20%** |
| Difficult/complicated/harder to use than I thought | 28 | 9% |
| Trouble mapping my yard | 14 | 5% |
| How much time it took | 5 | 2% |
| Amount of detail required | 6 | 2% |
| Couldn't get it to work | 3 | 1% |
| It's very basic | 3 | 1% |
| Not as much information | 1 | <1% |

| | | |
|---|---|---|
| **Haven't Used It Yet** | **27** | **9%** |
| **Content** | **15** | **5%** |
| Amount of information available | 6 | 2% |
| Plant/tree ID information | 5 | 2% |
| Bird ID information | 3 | 1% |
| Lose so much land | 1 | <1% |
| **Features – Positive** | **9** | **3%** |
| You can add/modify things | 4 | 1% |
| Quality of images | 2 | 1% |
| Google Maps/use of photos | 2 | 1% |
| The graphics | 1 | <1% |
| **Other YardMap Users** | **2** | **1%** |
| Others in neighborhood using it | 1 | <1% |
| Not many yards in my area mapped | 1 | <1% |
| **Nothing Surprised Me** | **4** | **1%** |
| **Miscellaneous** | **27** | **9%** |

NOTE: This was an open-ended item in the post-survey only, and only those in the Treatment Group were asked the question. Also, in coding each item was typically coded into a micro category, that belonged to a larger macro category.

## Impact Statement A : Users Will Move From Basic To Advanced Knowledge Of Bird-Habitat Relationships

| INDICATOR(S) | MAIN FINDINGS | |
|---|---|---|
| **A: General Public, Adult, and Senior YardMap application users will move from basic to advanced knowledge of bird-habitat relationships** | 1. YardMap users will have more awareness of the impact of yard practices on birds after mapping their yards. | YardMap users did report thinking differently about their yard and its relationship to birds after using YardMap. |
| | 2. YardMap users will have an increase in recall (number and breadth) of yard practices that help birds. | There was not a statistically significant difference between Treatment and Control conditions for this indicator. |
| | 3. More participants will be able to explain the concepts of matrix habitat and landscape ecology after using YardMap than before. | - For one of the general gardening items, the Treatment group was significantly more likely to know the dual nature of earthworms, and their detriment to North American forests.<br>- A majority of those interviewed a few weeks after the post-survey said that YardMap did help them think of their yard as part of something bigger.<br>- The Treatment group compared to the Control group was more likely to say that participating in YardMap influenced their thinking about how to make their yard more bird-friendly, and the impact of their practices on birds. |

**Indicator A1: YardMap users will have more awareness of the impact of yard practices on birds after mapping their yards.**

There were a number of questions[3] included in the post-survey that specifically addressed Indicator A1, but even though the questions were included in the version that was tested by the evaluators and Cornell they were not included in the post-survey when it was live. Therefore, there are not any questions from the summative evaluation that directly address Indicator A1.

In comparing whether there was a difference in the two Treatment groups (NSN and SN), there was not a significant difference in the extent to which they completed a YardMap (see Table 12). Both groups were about equally likely to complete a YardMap, at around two thirds of participants. The Control group was not able to complete a YardMap since they were not engaging with YardMap at all during the study period.

**Table 12. Treatment Groups Completing a YardMap**

| | | Treatment with Maps (T) | |
|---|---|---|---|
| Started a Map on YardMap | Total Sample (n=243) | No Social Network (NSN) (n=78) | Social Network (SN) (n=85) |
| Have a Map<br>Yes | 67% | 68% | 66% |

NOTE: Participants are those that created a map on the website, consented, randomly assigned a study group, and submitted both pre- and post-surveys.

As can be seen in

[3] Questions 323 through 346 in the Post Survey..

Table 13 and Table 14 below, the small number of visitors interviewed after their YardMap experience did report that YardMap helped them think differently about their yard and its role. There were 12 of 17 individuals interviewed who said they were thinking differently about their yard after participating in YardMap, and the ways they were thinking differently included doing something differently, being more aware of birds, being more aware of trees, realizing something new, and reducing or not using pesticides (see

Table 13). Another question asked specifically if participants were thinking differently about how their yard impacts birds, and 12 of the 16 who responded said they were thinking differently about the relationship between their yard and birds (see Table 14). The large majority of them said they were now seeing their yard as more of a bird- or wildlife-friendly environment.

**Table 13. Thinking Differently About Their Yard After YardMap**

| Think Differently About Your Yard Because of YardMap | Interview: Number of Participants (n=17) |
|---|---|
| Yes | 12 |
| No | 5 |
| **Category if Yes** | **Number of Responses** |
| Did a different action | 6 |
| Became more aware of birds | 5 |
| Became more aware of trees | 3 |
| Realized something new | 2 |
| No or less pesticide use | 2 |
| No or less herbicide use | 1 |
| YardMap community shares my views | 1 |
| Feel doing an action for the environment | 1 |

**Table 14. Thinking Differently About Yard's Role to Help Birds After YardMap**

| Think Differently About the Role Your Yard Might Play to Help Birds or the Environment | Interview: Number of Participants (n=16) |
|---|---|
| Yes | 12 |
| No | 4 |
| **Category** | **Number of Responses** |
| Yes, I see my yard as a bird/wildlife friendly environment | 10 |
| No, I already know what to do | 4 |
| Yes, the changes I make might play a role | 1 |

**Indicator A2: YardMap users will have an increase in recall (number and breadth) of yard practices that help birds.**

In order to determine whether participants were able to identify yard practices that helps birds, they were asked to rank six different yard practices from most important to least important. The six yard practices included were the following:

- Preserving access to dead standing wood
- Decreasing use of pesticides
- Using sustainable energy sources
- Keeping cats indoors
- Providing clean water
- Providing access to a bird feeder with fresh seed

As noted below, there were three that were indicated by Cornell as the top three and a total score was determined by how many of these were in their top three. If they placed Cornell's top three in their top three, they received 3 points. If they included two they received 2 points, and received 1 point for including one of the top three. They received 0 points if they did not include any of Cornell's top three in their own top three. Then, a difference or "change" score was calculated between the pre- and the post-survey to see if there was an increase in the number of correct practices listed in the top three.

As can be seen in Table 15 below, there were not any significant differences between the Treatment and Control conditions, comparing the starting pre-survey score, the post-survey score, or the change score from pre to post. That said, the difference score comparison was approaching significance (p=.053), which may or may not indicate that there is something going on in this comparison between the two groups. Regardless, there was not a positive change in the Treatment group from pre to post, so even if it were significant it would not support the hypothesis.

**Table 15. Score for Ranking Practices that Support Bird Populations**

| Rank Score | Treatment (n=245) | Control (n=231) | Significant Difference (Y/N) |
|---|---|---|---|
| Change | 0.0 | -0.1 | N |
| Pre | 1.5 | 1.6 | N |
| Post | 1.5 | 1.4 | N |

NOTE: Six practices were ranked from most important to the top of the list, to least important to the bottom of the list. If any of the three most important practices were ranked in the top three spots of the list, one point was given. Thus, a participant could receive 0 (none of the most important practices were ranked highly), 1 (1 practice ranked highly), 2 (2 practices ranked highly), or 3 (3 practices ranked highly). Numbers show means, and statistical outcomes for an independent samples t-test.

**Indicator A3: More participants will be able to explain the concepts of matrix habitat and landscape ecology after using YardMap than before.**

NOTE: Some of the findings for Indicator A3 are repeated for Indicator B1.

There were a set of five questions that looked at participant's knowledge about gardening and birds (see Table 16 for the overall score and

Table 17 for individual items). The purpose of including these items was to see if there was a positive gain in the overall score as well as the individual items for the Treatment group. The items were true/false items and participants received one point for each correct item; since the items were to be used for both the pre- and post-surveys the correct answer was not told to the participant. Table 16 represents the total composite score from 0 to 5 (0 for no correct answers and 5 for 5 correct answers) and shows that while the Treatment group had a significantly higher score for the post-survey, they did not show a statistically significant increase in their score compared to the Control group, who started slightly lower than the Treatment group. There was, however, one individual item that showed a statistically significant increase for the Treatment group – for the item about invasive earthworms being good for forests but typically bad for gardens (see

Table 17 for individual items). Treatment groups were significantly likely to get this correct more often than the Control group.

**Table 16. General Knowledge Questions About Gardening and Birds, Overall Score**

| Overall Score, Knowledge Questions About Gardening and Birds | Treatment (n=348) | Control (n=232) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.6 | 0.5 | N |
| Pre Score | 3.1 | 2.9 | N |
| Post Score * | 3.7 | 3.4 | Y |

NOTE: For the overall score, the possible range was from 0 (no correct answers) to 5 (5 correct answers).

**Table 17. General Knowledge Questions About Gardening and Birds, Individual Items**

| An Outdoor Cat Is An Example of An Ecological Trap | Treatment (n=346) | Control (n=231) | Significant Difference (Y/N) |
|---|---|---|---|
| Pre Correct Response | 55% | 52% | N |
| Post Correct Response | 71% | 65% | N |
| **Habitat Loss is the Single Greatest Contributing Factor to the Loss of an Endangered Species** | **Treatment (n=346)** | **Control (n=231)** | **Significant Difference (Y/N)** |
| Pre Correct Response | 95% | 93% | N |
| Post Correct Response | 96% | 94% | N |
| **Birds Migrate Because They Cannot Endure the Cold Temperatures** | **Treatment (n=345)** | **Control (n=230)** | **Significant Difference (Y/N)** |
| Pre Correct Response | 47% | 62% | N |
| Post Correct Response | 61% | 62% | N |
| **Most Birds Will Feed Their Young Seeds From a Bird Feeder if They Are Available** | **Treatment (n=347)** | **Control (n=228)** | **Significant Difference (Y/N)** |
| Pre Correct Response | 43% | 40% | N |
| Post Correct Response | 72% | 68% | N |
| **Invasive Earthworms are Good For Forests, but Typically Bad for Backyard Gardens** | **Treatment (n=346)** | **Control (n=229)** | **Significant Difference (Y/N)** |
| Pre Correct Response | 59% | 52% | N |
| Post Correct Response * | 68% | 57% | Y |

NOTE: For the overall score, the possible range was from 0 (no correct answers) to 5 (5 correct answers).

In interviews with participants a few weeks after the post-survey, more than half, or 11 out of the 17, said that using YardMap helped them think of their yard as part of something bigger (see

Table 18). Reasons they gave for this was realizing that people could have positive impact, the YardMap is concerned with habitats and the environment, Google maps gave them a greater perspective of their yard's place, and realizing that what they do could influence others. Those who said this did not happen for them said that they think their impact is small or they already knew that.

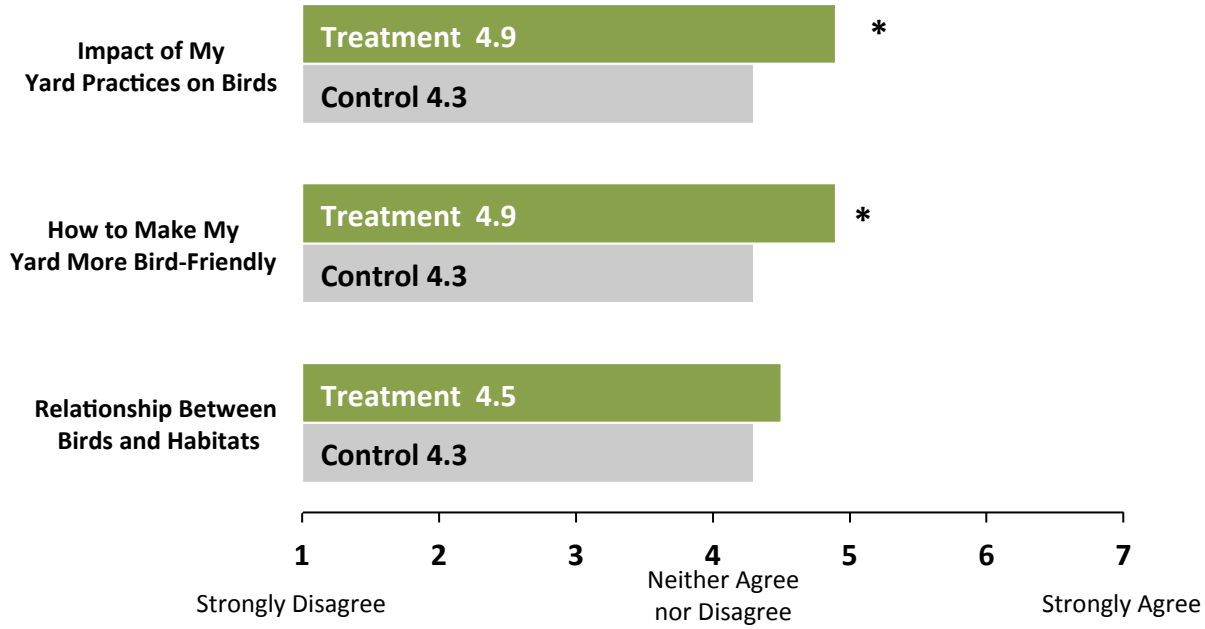
**Table 18. YardMap Helped Me Think of My Yard As Part of Something Greater, Interview**

| Using YardMap Helped Me Think of My Yard As Part of Something Greater or Bigger | Interview: Number of Participants (n=17) |
|---|---|
| Yes | 11 |
| No | 6 |
| | |
| Category | Number of Responses |
| **Yes** | **15** |
| Yes, what I and others do has positive changes | 5 |
| Yes, YardMap is a community concerned with habitats and the environment | 4 |
| Yes, Google maps or a larger perspective, helped me place my yard relative to the surroundings | 3 |
| Yes, what I do might influence others | 2 |
| Yes, Maybe | 1 |
| | |
| **No** | **6** |
| No, my part is small | 2 |
| No, I already thought that way | 2 |
| No, I don't know | 1 |
| No | 1 |

The post-survey asked the extent to which participants had learned about since signing up for YardMap (see

Figure 15). Of the three topics, two of the three showed statistically significant differences between the Treatment and Control conditions, with the Treatment having a higher level of agreement. Treatment groups were more likely to say they learned a lot about how to make their yard more bird-friendly, and also about the impacts of their yard practices on birds.

**Figure 15. Since Signing Up For YardMap I Learned A Lot About Specific Topics**




* = there is a statistically significant difference in this particular comparison

NOTE: The above three questions were only asked in the post-survey. The "How to Make My Yard More Bird-Friendly" and "Impact of My Yard Practices on Birds" items used a scale from 1 (strongly disagree) to 7 (strongly agree). Sample Size for the Treatment group was n=253 and sample size for the Control group was n=238.

## Impact Statement B

| IMPACT | INDICATOR(S) | MAIN FINDINGS |
|---|---|---|
| **B: Birder-hobbyists will understand more about the link between their birder community and the gardener community** | 1. Increased knowledge of the importance of gardens as habitat for birds | The Treatment group compared to the Control group was more likely to say that participating in YardMap influenced their thinking about how to make their yard more bird-friendly, and the impact of their practices on birds. |

### Indicator B1: Increased knowledge of the importance of gardens as habitat for birds

NOTE: Some of the findings for Indicator B1 are repeated for Indicator A3.

There were a set of eight questions that the relationship between gardening and birds (see Table 19 for the overall score and Table 20 for individual items). The purpose of including these items was to see if there was a positive gain in the overall score as well as the individual items for the Treatment group. The items were ratings from 1 (strongly disagree) to 7 (strongly agree). The "change in score" item took the average

Table 19 represents the total composite score from 1 to 7 and shows that while the Treatment group had a significantly higher change score compared to the Control group. While the change was small, it was large enough of a difference from the Control group to be statistically significant. Two individual items yielded statistically significant differences (see Table 20). For the item about *"Scientists have shown that how I garden influences bird populations"* there was a significantly higher post score and change in score for the Treatment group. For the item *"I know what the basic elements of bird habitats are"* the Treatment group had a significantly higher post score than the Control group.

**Table 19. Relationship Between Gardening and Birds, Overall Score**

| Overall Score, Relationship Between Gardening and Birds | Treatment (n=255) | Control (n=239) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | 0.1 | -0.1 | Y |
| Pre Score | 5.5 | 5.5 | N |
| Post Score | 5.6 | 5.4 | N |

NOTE: Change in score from pre to post was significant for the Treatment group.

Of the eight questions that make up the score, the question *"Scientists have shown that how I garden influences bird populations"* showed a statistically significant difference in the post-only response and the pre to post change between Treatment and Control (see Table 20).

**Table 20. Relationship Between Gardening and Birds, Individual Items**

| My yard has a role to play in providing bird habitat. | Treatment (n=248) | Control (n=228) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.0 | -0.1 | N |
| Pre Score | 6.3 | 6.4 | N |
| Post Score | 6.3 | 6.3 | N |
| **How I garden doesn't really impact local bird populations** | **Treatment (n=248)** | **Control (n=230)** | **Significant Difference (Y/N)** |
| Change in Score | 0.1 | -0.1 | N |
| Pre Score | 5.8 | 5.9 | N |
| Post Score | 5.9 | 5.8 | N |
| **Scientists have shown that how I garden influences bird populations** | **Treatment (n=247)** | **Control (n=229)** | **Significant Difference (Y/N)** |
| Change in Score * | 0.3 | 0.0 | Y |
| Pre Score | 5.4 | 5.5 | N |
| Post Score * | 5.8 | 5.5 | Y |
| **Not much is known about how much an individual can contribute to protecting birds through gardening** | **Treatment (n=247)** | **Control (n=230)** | **Significant Difference (Y/N)** |
| Change in Score | 0.2 | 0.0 | N |
| Pre Score | 5.3 | 5.3 | N |
| Post Score | 5.5 | 5.3 | N |
| **The birds I see don't really depend on the plants in people's gardens** | **Treatment (n=247)** | **Control (n=230)** | **Significant Difference (Y/N)** |
| Change in Score | 0.2 | 0.0 | N |
| Pre Score | 5.4 | 5.5 | N |
| Post Score | 5.6 | 5.4 | N |
| **A bird can survive on the habitat I provide in my yard alone** | **Treatment (n=248)** | **Control (n=229)** | **Significant Difference (Y/N)** |
| Change in Score | 0.0 | -0.1 | N |
| Pre Score | 3.9 | 4.1 | N |
| Post Score | 4.0 | 4.1 | N |
| **There is a connection between how people manage their yards** | **Treatment (n=246)** | **Control (n=230)** | **Significant Difference (Y/N)** |

| and the health of local bird populations | | | |
|---|---|---|---|
| Change in Score | 0.0 | -0.2 | N |
| Pre Score | 6.0 | 6.0 | N |
| Post Score | 6.0 | 5.9 | N |
| I Know What the Basic Elements of Bird Habitats Are | Treatment (n=248) | Control (n=230) | Significant Difference (Y/N) |
| Change in Score | 0.3 | 0.2 | N |
| Pre Score | 5.5 | 5.4 | N |
| Post Score * | 5.9 | 5.6 | Y |

## Impact Statement C

| IMPACT | INDICATOR(S) | MAIN FINDINGS |
|---|---|---|
| **C: General Public, Adult, and Senior YardMap application users will experience an increased sense of empowerment to help the environment** | 1. A high proportion of YardMap participants will be engaged long term with the project indicating engagement and the sense that participation empowers them to be stewards of their yards. | - For the Motivation for Environmental Action Scale, two items showed significantly higher change scores from pre- the post-survey; both were related to external motivation. |
| | 2. Participants will report a decreased sense of hopelessness about their ability to enact changes to the climate. | - For the Motivation for Environmental Action Scale, two items showed significantly higher change scores from pre- the post-survey; both were related to external motivation. |
| | 3. Participants will report an increased sense of efficacy to positively affect bird populations | - For the Self-Efficacy for Environmental Action scale, there were not differences for the overall score, but one difference in the individual items |

**Indicator C1: A high proportion of YardMap participants will be engaged long term with the project indicating engagement and sense that participation empowers them to be stewards of their yards.**

**Indicator C2: Participants will report a decreased sense of hopelessness about their ability to enact changes to the climate.**

NOTE: Findings reported below are the same for Indicator C1 and C2.

Some of the scales, including the one in Table X below, were from an NSF-funded project (DRL# 1010744) called DEVISE (Developing, Validating, Implementing Situated Evaluation Instruments), whose purpose was to measure outcomes such as interest, motivation, self-efficacy, and skills; see http://www.birds.cornell.edu/citscitoolkit/evaluation/instruments . This project was also by the Cornell Lab of Ornithology, and the evaluator and team for YardMap discussed the use and modification of some of the instruments for use in YardMap. The scale included an overall composite of all of the items as well as a Internal Motivation and External

Motivation subscales. The items below in Table X were from the Motivation for Environmental Action scale.

The Motivation for Environmental Action scale was filled out in both the pre- and the post-survey by participants. It showed no difference for the overall composite score for the pre-survey, post-survey, or for the change score (see Table 21). In testing whether the groups were evenly distributed between Treatment and Controls for this scale, there were not differences in the Internal Motivation or External Motivation pre- and post-survey scores.

Of the fourteen individual scores in the Motivation for Environmental Action scale, only two showed statistically significant differences in comparing the Treatment and Control conditions: *"For the recognition I get from others"* and *"Because I want people to see me as a good person"* (see

Table 22) While there were no differences in these measures between Treatment and Control conditions for the pre- and post-surveys, there was a statistically significant difference in the change scores. The Control group showed no difference at all in the change scores (0.0), while there was a slight decrease in the measure for Treatment change (-0.1). This showed that for the Treatment group these two recognitions were actually less important after participating in YardMap.

**Table 21. Motivation for Environmental Action (DEVISE Scale), Overall Score**

| Overall Score, Motivation for Environmental Action (DEVISE Scale) | Treatment (n=255) | Control (n=239) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Motivation for Environmental Action | -0.1 | -0.2 | N |
| Pre Score Motivation for Environmental Action | 1.8 | 1.8 | N |
| Post Score Motivation for Environmental Action | 1.7 | 1.6 | N |
| **Internal Motivation Score, Motivation for Environmental Action (DEVISE Scale)** | **Treatment (n=255)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Pre Internal Motivation Score | 4.6 | 4.6 | N |
| Post Internal Motivation Score | 4.6 | 4.5 | N |
| **External Motivation Score, Motivation for Environmental Action (DEVISE Scale)** | **Treatment (n=255)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Pre External Motivation Score | 2.9 | 2.8 | N |
| Post External Motivation Score | 2.9 | 2.9 | N |

NOTE: No significant differences were found when individuals from Treatment groups with maps were compared, or when all three study groups were compared in an ANOVA.

**Table 22. Motivation for Environmental Action (DEVISE Scale), Individual Items with Significant Differences**

| For the Recognition I get From Others | Treatment (n=250) | Control (n=234) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | -0.1 | -0.0 | Y |
| Pre * | 2.2 | 2.0 | Y |
| Post | 2.1 | 2.2 | N |
| **Because I Want People to See Me As a Good Person** | **Treatment (n=253)** | **Control (n=235)** | **Significant Difference (Y/N)** |
| Change in Score * | -0.1 | 0.1 | Y |
| Pre | 2.6 | 2.5 | N |
| Post | 2.5 | 2.6 | N |

## Indicator C3: Participants will report an increased sense of efficacy to positively affect bird populations

A second DEVISE scale (see http://www.birds.cornell.edu/citscitoolkit/evaluation/instruments and section above), the Self-Efficacy for Environmental Action scale, was used to compare Treatment and Control groups. This self-efficacy scale relates to the extent to which people feel like they can take environmental actions. None of the three main comparisons, change score, pre-survey and post-survey, showed a statistically significant difference (see Table 23).

When looking at the eight individual items, there was only one item that showed a statistically significant difference in the Treatment and Control conditions (see Table 24). The change score for the item "I feel confident in my ability to help protect the planet" was significantly higher for the Control group. What needs to be taken into consideration is the fact that the Control group started slightly lower, with both the Treatment and Control groups ending at the same average score. While no significantly different, the pre-scores seem to be driving this change score different; note that all individuals were randomly assigned to the groups.

**Table 23. Self-Efficacy for Environmental Action (DEVISE Scale), Overall Score**

| Overall Score, Self-Efficacy for Environmental Action (DEVISE Scale) | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.0 | 0.0 | N |
| Pre Score Self-Efficacy for Environmental Action | 4.0 | 4.0 | N |
| Post Score Self-Efficacy for Environmental Action | 4.0 | 4.0 | N |

NOTE: No significant differences were found when individuals from Treatment groups with maps were compared, or when all three study groups were compared in an ANOVA.

**Table 24. Self-Efficacy for Environmental Action (DEVISE Scale), Individual Items with Significant Difference**

| I feel confident in my ability to help protect the planet | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | 0.0 | 0.2 | Y |
| Pre Score Self-Efficacy for Environmental Action | 3.7 | 3.4 | N |
| Post Score Self-Efficacy for Environmental Action | 3.6 | 3.6 | N |

NOTE: Rounding error above explains the change in score of the Treatment being higher than -0.1.

A third DEVISE scale (see http://www.birds.cornell.edu/citscitoolkit/evaluation/instruments and section above), the Motivation for Environmental Action scale, was modified to focus more on birds, what is referred to as the Motivation for Environment Action for Birds scale below. The scale includes an overall score as well as an internal motivation score and an external motivation score. Of all of the comparisons, only the change in score for the overall score was a statistically significant difference (see

Table 25). The change score for the Treatment group remained the same, while there was a slight decrease in the change score for the Control group.

In terms of the individual items, three of the twelve items were statistically significant in comparing the Treatment and Control groups (see Table 26). All three differences were in the change score from pre to post. For the item *"Because people I look up to think it's a really good thing to do,"* an external motivation question, the Treatment group decreased compared to the post, while the Control group increased. The next item, *"For the recognition I get from others,"* an external motivation question, saw no change for the Treatment group, while the Control group increased. The third item, *"Because I think it's important to take care of birds"* (this time an internal motivation question), saw no change for the Treatment group and a slight decrease for the Control group.

**Table 25. Motivation for Environmental Action for Bird Populations (DEVISE Scale), Overall Score**

| Overall Score, Motivation for Environmental Action DEVISE Scores | Treatment (n=253) | Control (n=237) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | 0.0 | -0.2 | Y |
| Pre Score Motivation for Environmental Action, Birds | 2.0 | 2.1 | N |
| Post Score Motivation for Environmental Action, Birds | 2.0 | 1.9 | N |
| Pre Internal Motivation Score | 4.5 | 4.5 | N |
| Post Internal Motivation Score | 4.5 | 4.4 | N |
| Pre External Motivation Score | 2.5 | 2.4 | N |
| Post External Motivation Score | 2.5 | 2.5 | N |

NOTE: ANOVA comparing all three study groups found no statistical differences.

**Table 26. Motivation for Environmental Action for Bird Populations (DEVISE Scale), Individual Items with Significant Differences**

| Because people I look up to think it's a really thing to do | Treatment (n=246) | Control (n=230) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | -0.1 | 0.2 | Y |
| Pre | 2.6 | 2.4 | N |
| Post | 2.6 | 2.6 | N |
| **For the recognition I get from others** | **Treatment (n=243)** | **Control (n=232)** | **Significant Difference (Y/N)** |
| Change in Score * | 0.0 | 0.2 | Y |
| Pre | 2.1 | 2.0 | N |
| Post | 2.1 | 2.1 | N |
| **Because I think it's important to take care of birds** | **Treatment (n=245)** | **Control (n=231)** | **Significant Difference (Y/N)** |
| Change in Score * | 0.0 | -0.1 | Y |
| Pre | 4.6 | 4.6 | N |
| Post | 4.5 | 4.4 | N |

NOTE: Only the individual items that yielded statistically significant differences were included in the table above.

## Impact Statement D: Internet Literacy

| IMPACT | INDICATOR(S) | MAIN FINDINGS |
|---|---|---|
| **D: Participation in the online learning community in YardMap will increase General Public, Adult, and Senior application users internet literacy** | 1. YardMap participants will show a positive correlation between their overall use of YardMap and their self-reported comfort with engaging on the web. | - After participating in YardMap, participants were slightly less confident in their ability to look up information and submit data; they did experience some challenges in using YardMap.<br>- The Treatment group found YardMap slightly more difficult to use than anticipated, and were less confident than the Control group in their future ability to engage YardMap<br>- In looking at specific sources of information about gardening and birds, YardMap participants were slightly less likely to say they would seek information from two thirds of the sources listed. |
| | 2. Participants will show an increasing use of a wider variety of Application tools in YardMap over time. | While the testing period did not allow enough time to measure an increase of tool use, almost two-thirds mapped their yard and almost half added unique objects to the map. |

### Indicator D1: YardMap participants will show a positive correlation between the number of YardMap features/tools used and their self-reported comfort with engaging on the web

A series of four pre-post questions (see Table 27) measured how easy participants perceived YardMap would be to use. The first item was modified slightly from pre-survey to post-survey, so that it asked about how easy they anticipated YardMap to be in the pre-survey, and how easy they found YardMap to be in the post-survey. A significant difference was found

comparing the Control (waitlist) to the Treatment (YardMap users) group on the composite score for post responses, and the change from pre to post for the composite score. The Control group saw little change in how they anticipated YardMap in terms of ease of use, while for this first item the Treatment group said they found YardMap to be a little less easy to use in actuality (the post-score) than they anticipated (the pre-score).

An analysis of each of the four individual questions showed a statistically significant difference on the change score from pre-survey to post-survey, the Treatment group agreed less with each statement pre to post (see Table 28). For each of the four measures, there was a larger decrease in the change score for the Treatment groups. As above, this suggests that YardMap participants may have experienced more difficulty using the site than they expected, and their confidence in being able to submit data or look things up decreased to some degree during the test period. One of the items referred to the challenge other people would have using the site, and participants were more likely to say other people would have difficulty using the site after they themselves had participated.

**Table 27. Perceived Ease of Using YardMap, Overall Score**

| Overall Score, Ease of Using YardMap | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | -0.7 | -0.1 | Y |
| Pre Score Ease of Use | 5.4 | 5.4 | N |
| Post Score Ease of Use * | 4.7 | 5.3 | Y |

**Table 28. Perceived Ease of Using YardMap, Individual Items**

| Change Pre to Post for Individual Questions | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| I expect/found to find YardMap easy to use * | -1.0 | -0.4 | Y |
| I expect most people will have some trouble a website * | -0.3 | 0.1 | Y |
| I am confident in my ability to use the YardMap website to submit data * | -0.8 | -0.1 | Y |
| I am confident in my ability to use the YardMap website to look-up information about gardening for birds and other wildlife * | -0.6 | 0.0 | Y |

There were also a series of seven items in the pre-test and post-test looking at the extent to which people were comfortable using the internet in general (see Table 29 below). A composite

score was computed, which was the average for all of the items included in this scale. There was no statistically significant difference in comparing the Control and Treatment groups on the change score, although the Control group had a slightly higher and statistically significant post score than the Treatment group.

The individual items were compared by Control and Treatment groups for the pre-survey only, the post-survey only, as well as the change score from pre-survey to post-survey (see Table 30). One third (7 out of 21) of these comparisons yielded statistically significant differences, including two of the change score comparisons: *"I am comfortable using social networking sites (e.g., Facebook) to share my experiences with others"* and *"I would have difficulty uploading an image to a website."* Interestingly, for both of these measures the Treatment group showed a slight negative change in score. For the first items about social networking sites, the Control group showed a slight increase, while for the second item about uploading an image the Control group showed no change. Additionally, a comparison looking at just the Treatment groups showed the Social Networking condition being more comfortable than the Non Social Networking group in visiting new websites.

**Table 29. Comfort Using the Internet Composite Score, Overall Score**

| Comfort Using the Internet Scale | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | 0.0 | N |
| Pre | 5.7 | 5.8 | N |
| Post * | 5.6 | 5.8 | Y |

NOTE: This is a composite score using the average score for the items in the following table (see Table 30).

**Table 30. Comfort Using the Internet by Item, Individual Items**

| I am comfortable using social networking sites (e.g., Facebook) to share my experiences with others | Treatment (n=246) | Control (n=228) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | -0.1 | 0.2 | Y |
| Pre | 5.4 | 5.3 | N |
| Post | 5.2 | 5.5 | N |
| **I would have difficulty navigating new (unfamiliar) website (Reverse Coded)** | **Treatment (n=245)** | **Control (n=229)** | **Significant Difference (Y/N)** |
| Change in Score | -0.3 | -0.1 | N |
| Pre * | 5.8 | 6.1 | Y |
| Post * | 5.6 | 6.0 | Y |
| **I would have difficulty uploading an image to a website (Reverse Coded)** | **Treatment (n=245)** | **Control (n=230)** | **Significant Difference (Y/N)** |
| Change in Score * | -0.2 | 0.0 | Y |

| | | | |
|---|---|---|---|
| Pre | 6.0 | 6.1 | N |
| Post * | 5.8 | 6.1 | Y |
| I understand how to use electronic discussion forums | Treatment (n=245) | Control (n=230) | Significant Difference (Y/N) |
| Change in Score | 0.1 | 0.0 | N |
| Pre | 5.6 | 5.7 | N |
| Post | 5.7 | 5.7 | N |
| I am able to adapt to new technologies without much trouble | Treatment (n=246) | Control (n=229) | Significant Difference (Y/N) |
| Change in Score | -0.2 | 0.0 | N |
| Pre | 5.8 | 5.7 | N |
| Post * | 5.6 | 5.8 | Y |
| I feel apprehensive when visiting a new website (Reverse Coded) | Treatment (n=245) | Control (n=230) | Significant Difference (Y/N) |
| Change in Score | -0.1 | -0.1 | N |
| Pre * | 5.9 | 6.2 | Y |
| Post | 5.8 | 6.0 | N |
| I have tried using interactive drawing or mapping technology online (e.g., Google My Maps, Google Earth) | Treatment (n=246) | Control (n=230) | Significant Difference (Y/N) |
| Change in Score | 0.2 | 0.1 | N |
| Pre | 5.1 | 5.1 | N |
| Post | 5.3 | 5.2 | N |

NOTE: Scale was from 1 (Strongly disagree) to 7 (Strongly agree).

A set of six items asked participants to rate how likely they were to use specific sources of information in trying to find out information about gardening, birds and other wildlife (see

Table 31). The individual items were compared by Control and Treatment groups for the pre-survey only, the post-survey only, as well as the change score from pre-survey to post-survey. Of the 18 comparisons, a total of 7 comparisons were statistically significant between the Control and Treatment groups. This included differences in four of the six change scores: internet search, contacting YardMap or the Cornell Lab of Ornithology, looking at YardMap web pages, and using the local library. In each of these cases, there was either no or a small increase for Control groups, while Treatment groups showed a small decrease from pre-survey to post-survey. Additionally, a comparison looking at just the Treatment groups showed the Social Networking condition being less likely than the Non Social Networking group to say they would look at the YardMap pages when looking for information.

**Table 31. Changes in Sources of Information by Item, Individual Items**

| An internet search | Treatment (n=255) | Control (n=237) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | -0.1 | 0.0 | Y |
| Pre | 6.4 | 6.5 | N |
| Post * | 6.3 | 6.6 | Y |
| **Contacting YardMap/Cornell Lab of Ornithology staff** | **Treatment (n=254)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Change in Score * | -0.4 | 0.1 | Y |
| Pre | 4.9 | 4.7 | N |
| Post * | 4.5 | 4.8 | Y |
| **Looking at the YardMap web pages** | **Treatment (n=255)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Change in Score * | -0.4 | 0.2 | Y |
| Pre | 5.7 | 5.7 | N |
| Post * | 5.3 | 5.8 | Y |
| **Contacting a friend or family member** | **Treatment (n=254)** | **Control (n=237)** | **Significant Difference (Y/N)** |
| Change in Score | -0.2 | 0.0 | N |
| Pre | 4.6 | 4.7 | N |
| Post | 4.4 | 4.7 | N |
| **Using the local library** | **Treatment (n=254)** | **Control (n=238)** | **Significant Difference (Y/N)** |
| Change in Score * | -0.2 | 0.1 | Y |
| Pre * | 4.0 | 3.6 | Y |
| Post | 3.8 | 3.7 | N |
| **Buying a book** | **Treatment (n=255)** | **Control (n=238)** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | -0.1 | N |
| Pre | 4.8 | 4.9 | N |
| Post | 4.7 | 4.7 | N |

NOTE: Scale was from 1 (Very unlikely) to 7 (Very likely). Item said *"Please indicate how likely you are to seek information about gardening, for birds and other wildlife by:"*

## Indicator D2: Participants will show an increasing use of a wider variety of Application tools in YardMap over time

There was not a very big difference in how those in the two Treatment groups (Social Networking and No Social networking) behaved while using YardMap, so in the following descriptions the two groups are combined. Additionally, given the relatively lower frequency of the behaviors occurring, it was not possible to track an increase use of YardMap tools over time. While the follow-up interviews included some information, the sample was not large enough to draw conclusions about whether there was an increasing use of a wider variety of YardMap tools over time for users in general. These are data that could be examined by the YardMap team with an increase in YardMap users and more passing of time.

During the study period a total of 728 individuals out of the 1,214 (60%) mapped their yard, though a small number of participants mapped a different kind of site like a farm (n=11), school (n=6), office (n=5), nature preserve (n=4), park (n=4), or community garden (n=1). In terms of specific behaviors within the YardMap site, of those who mapped a site, 183 (25%) added a feeder, 93 (13%) added a composting bin, and 89 (12%) added a nestbox.

While no one shared their map directly with others during the test period, 23 (3%) added screenshot thumbnails to their site. Participants who mapped a yard or site added an average of 8 unique objects to their primary map, and the number of total objects ranged from 1 to 135 objects. A total of 390 participants (54%) simply mapped a space and did not do the next step of adding unique objects to their map. The large majority of people added between 1 to 13 objects to their map, if they added an object. In terms of specific objects, those who outlined and added a habitat averaged 5 unique habitats; on average they named one of these habitats. This number was also seen with naming plant species, as the average participant who mapped a yard identified a plant species in their primary map.

## Impact Statement E

| IMPACT | INDICATOR(S) | MAIN FINDINGS |
|---|---|---|
| **E: General Public, Adult, and Senior application users greater sense of responsibility for carbon neutrality** | 1. Increased positive attitude towards those who take steps to reduce their carbon impact through small changes to their domestic practices | - There were no significant differences in the Control and Treatment groups in their change scores for carbon energy use |
| | 2. Positive correlation between the use of YardMap and reported planned changes in domestic practices to reduce carbon impact. | - There was no significant difference in Control and Treatment groups already using solar panels or the likelihood of them installing them. |

### Indicator E1: Increased positive attitude towards those who take steps to reduce their carbon impact through small changes to their domestic practices

A set of items to answer Impact Statement F were included that look at carbon energy use. This included five specific items and an overall composite score that was an average of these items. The individual items were compared by Control and Treatment groups for the pre-survey only, the post-survey only, as well as the change score from pre-survey to post-survey. There was no difference in the change scores between the Control and Treatment groups for the overall score (see Table 32) or for any of the individual items (see Table 33). There was only one statistically significant difference in the pre-survey comparison, with the Treatment group being slightly more likely to say it was important for them to regulate and reduce their energy consumption. There was only one statistically significant difference in the post-survey comparison, with the Treatment group being slightly more likely to say they were aware of the steps they can take to reduce their energy consumption. However, as noted above, there was no difference between Control and Treatment groups in the change measures.

**Table 32. Carbon Energy Use Composite Score, Overall Score**

| Overall Score, Carbon Energy Use | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | -0.1 | N |
| Pre | 5.5 | 5.3 | N |
| Post | 5.6 | 5.5 | N |

NOTE: This is a composite score using the average score for the items in the following table.

**Table 33. Carbon Energy use by Item, Individual Items**

| I am aware of steps I can take to reduce my carbon emissions | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.0 | -0.1 | N |
| Pre | 5.9 | 5.8 | N |
| Post | 5.9 | 5.7 | N |
| **The steps I can take to reduce carbon emissions will result in insignificant changes (Reverse Coded)** | **Treatment** | **Control** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | -0.1 | N |
| Pre | 3.7 | 3.8 | N |
| Post | 3.7 | 3.7 | N |
| **It is important that I make efforts to reduce my carbon emissions** | **Treatment** | **Control** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | -0.1 | N |
| Pre | 6.0 | 5.9 | N |
| Post | 5.9 | 5.8 | N |
| **It is important for me to regulate and reduce my energy consumption** | **Treatment** | **Control** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | -0.1 | N |
| Pre * | 6.2 | 6.0 | Y |
| Post | 6.1 | 5.9 | N |
| **I am aware of the steps I can take to reduce my energy consumption effectively** | **Treatment** | **Control** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | -0.1 | N |
| Pre | 5.9 | 5.8 | N |
| Post * | 5.9 | 5.7 | Y |

NOTE: Scale was from 1 (Strongly disagree) to 7 (Strongly agree)

**Indicator E2: Positive correlation between the use of YardMap and reported planned changes in domestic practices to reduce carbon impact.**

A number of items asked whether or not participants were planning on performing a behavior that could benefit the environment. For these behaviors, they could also indicated that they were already performing these behaviors (see Table 34). Additionally, for these items participants were asked whether they thought other had already performed this behavior. There was no difference between the Control and Treatment groups in saying they had already 'installed a solar panel. When comparing the likelihood of participants doing this in the future, there was no statistically significant difference between Control and Treatment groups (see Table 35). There was also no difference in the perception of Control and Treatment groups perceiving others as doing this in the future.

**Table 34. Already installed a solar panel**

| Said "Already doing this" for having installed a solar panel | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| The Participant | 6% | 4% | N |
| Other People | 1% | 3% | N |

**Table 35. Likelihood of installing a solar panel, Treatment and Control**

| Likelihood, The Participant | Treatment | Control | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.0 | 0.1 | N |
| Pre | 2.2 | 2.2 | N |
| Post | 2.2 | 2.3 | N |
| **Likelihood, Other people** | **Treatment** | **Control** | **Significant Difference (Y/N)** |
| Change in Score | 0.0 | 0.1 | N |
| Pre * | 2.5 | 2.3 | Y |
| Post | 2.2 | 2.3 | N |

NOTE: The item asked *"Mark how likely YOURSELF and OTHERS are to take the following actions in the next six months?"* The scale went from 1 (Definitely not) to 5 (Definitely will). Only sampled from those that did not already have a solar panels.

## Impact Statement F

| IMPACT | INDICATOR(S) | MAIN FINDINGS |
|---|---|---|
| **F: General Public, Adult, and Senior application users will learn to utilize social networks as tools for engaging in STEM and science-related issues** | 1. Social network users will be more willing than non-social network users to consider social networking a tool for resolving scientific questions or problems | - There were no significant differences in comparing Control and Treatment groups to the strategies to solve a specific problem posed to groups.<br>- In looking at sources for science-related topics, Treatment groups saw three of the six sources as less useful after participating in YardMap. |

### Indicator F1: Social network users will be more willing than non-social network users to consider social networking a tool for resolving scientific questions or problems

NOTE: Some of the findings for Indicator G1 are repeated for Indicator I1.

One item was added in order to see which kinds of solutions the participant thought were the best for solving a yard-related problem, and whether their answers were impacted by participating in YardMap. The item said *"A squirrel keeps raiding your bird feeder and stealing all the seed you put out for birds. How much does each statement below sound like what you would try to do to stop the squirrel?"* It listed three specific solutions and asked participants how likely they would be to employ to address this problem (see

Table 36). Again, participants were asked to rate these items in the pre-survey and post-survey, then the Control and Treatment groups were compared on the pre-survey item only, the post-survey item only, and the change score between the pre-survey and post-survey. As can be seen below, there were no differences in the approaches Control and Treatment participants said they were likely to use in just the pre-survey, just the post-survey, and in the change scores (see

Table 36).

**Table 36. Squirrel Problem Solving by Item, Individual Items**

| Try to find something commercially produced to purchase and solve the problem | Treatment (n=254) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | -0.1 | N |
| Pre | 3.7 | 4.0 | N |
| Post | 3.7 | 3.9 | N |
| **Try to come up with a solution yourself without purchasing anything** | **Treatment (n=254)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Change in Score | 0.1 | 0.2 | N |
| Pre | 5.4 | 5.2 | N |
| Post | 5.5 | 5.4 | N |
| **Search for other people's effective solutions to the same problem and copy those.** | **Treatment (n=253)** | **Control (n=240)** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | 0.0 | N |
| Pre | 5.7 | 5.7 | N |
| Post | 5.6 | 5.7 | N |

NOTE: Scale was from 1 (Strongly disagree) to 7 (Strongly agree)

Another set of six items asked participants to rate usefulness of a specific set of tools in helping find answers about science-related topics (see Table 37). In looking at the change scores for both Control and Treatment groups from the pre-survey to the post-survey, three of the six items yielded statistically significant differences. These included news websites, Wikipedia, and direct conversations with friends and family. Each of these items had either no or a very slight increase for the Control group, and a slight decrease in the perceived usefulness of these sources for the Treatment group.

**Table 37. Usefulness of Sources for Science Content by Item, Individual Items**

| News websites | Treatment (n=253) | Control (n=238) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | -0.3 | 0.1 | Y |
| Pre * | 5.5 | 5.0 | Y |
| Post | 5.1 | 5.0 | N |
| **Peer-to-peer social network interactions** | **Treatment (n=253)** | **Control (n=240)** | **Significant Difference (Y/N)** |
| Change in Score | -0.3 | -0.1 | N |
| Pre | 5.1 | 4.9 | N |
| Post | 4.8 | 4.7 | N |
| **Online forums** | **Treatment (n=255)** | **Control (n=240)** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | -0.1 | N |
| Pre | 5.4 | 5.4 | N |
| Post | 5.3 | 5.4 | N |
| **Books (digital or printed)** | **Treatment (n=255)** | **Control (n=240)** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | 0.0 | N |
| Pre | 6.4 | 6.5 | N |
| Post * | 6.3 | 6.5 | Y |
| **Wikipedia** | **Treatment (n=253)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Change in Score * | -0.3 | 0.0 | Y |
| Pre | 5.6 | 5.7 | N |
| Post * | 5.3 | 5.7 | Y |
| **Direct conversations with friends and family** | **Treatment (n=255)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Change in Score * | -0.2 | 0.1 | Y |
| Pre | 5.7 | 5.6 | N |
| Post | 5.5 | 5.6 | N |

NOTE: Scale was from 1 (Very useless) to 7 (Very useful): *"Rate the following tools according to their usefulness in helping you find reliable answers to questions you might have about science-related topics"*

## Impact Statement G

| | | |
|---|---|---|
| **G: General Public, Adult, and Senior application users will invest additional resources into energy conservation and habitat restoration** | 1. Self-reported intention and actual behavior related to increased habitat management | - In looking at participants' plans to make their yard more bird-friendly, both Control and Treatment groups saw a decrease from the pre-survey to post-survey.<br>- Examining a number of potential behaviors, there were differences between the Treatment and Control groups related to planting bird- or pollinator-friendly plants. |

### Indicator G1: Self-reported intention and actual behavior related to increased habitat management

A set of three items was included to see how bird-friendly someone's yard was and whether they had or have planned recently to take measures to make it more bird-friendly (see

Table 38). In looking at the change scores for both Control and Treatment groups from the pre-survey to the post-survey, three of the six items yielded statistically significant differences. Only one of the three change scores showed a statistically significant difference: while there was a decrease from the pre-survey to the post-survey for both Control and Treatment groups on this item, there was a slightly larger decrease for the Treatment group. In looking just at the pre-survey scores, one was significantly different: the Treatment group had a slightly higher pre-survey score than the Control group for the item about their yard being bird-friendly. Two of the post-survey items yielded statistically significant differences: for the same item about a yard being bird-friendly, the Treatment group was slightly higher than the Control group. However, in the other post-survey item that was significant, the Control group was slightly higher than the Treatment group to say they had plans to make their yard more bird-friendly.

**Table 38. Bird-friendliness of Yard, Individual Items**

| My yard is very bird-friendly | Treatment (n=253) | Control (n=239) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -1.6 | -1.5 | N |
| Pre * | 5.8 | 5.5 | Y |
| Post * | 4.2 | 3.9 | Y |
| **I have plans to very soon make my yard more bird-friendly** | **Treatment (n=250)** | **Control (n=237)** | **Significant Difference (Y/N)** |
| Change in Score * | -1.9 | -1.7 | Y |
| Pre | 5.7 | 5.7 | N |
| Post * | 3.9 | 4.1 | Y |
| **I have recently, or am currently, taking steps to make my yard more bird-friendly** | **Treatment (n=252)** | **Control (n=238)** | **Significant Difference (Y/N)** |
| Change in Score | -1.8 | -1.6 | N |
| Pre | 5.8 | 5.7 | N |
| Post | 4.0 | 4.1 | N |

NOTE: Scale was from 1 (Strongly disagree) to 7 (Strongly agree)

Another set of items asked about the likelihood that a person was to adopt specific behaviors in the next six months, to gauge the extent to which people would engage in conservation-oriented and bird-friendly behaviors. These included beginning to compost, installing a solar panel, planting bird- or pollinator-friendly plants, and giving up the use of pesticides (see Table 39 through Table 46 below). For each behavior, there is one table for whether or not they are already engaging in this particular behavior. The second table includes to likelihood rating for themselves engaging in that behavior over the next six months, as well as the likelihood of other people engaging in that behavior in the same time period. The latter measure was included to provide some sort of comparison to the perceived public norm.

Given that participants were randomly assigned to the two groups, it is not surprising that the percentage of participants who were already engaging in these behaviors was not statistically significant (see Table 39 through Table 46 below). There were some other statistically significant differences found in looking at Control and Treatment groups. First, the Treatment group compared to the Control group on the pre-survey was more likely to say that other people were likely to install a solar panel (see

Table 42). The other two differences were for the item asking about the likelihood of planting bird- or pollinator-friendly plants. The Control group was more likely to say they would install bird- or pollinator-friendly plants in the next six months in the post-survey compared to the Treatment group (see Table 44). Additionally, the change score for that analysis from the pre-survey to post-survey was slightly positive for the Control group, and slightly negative for the Treatment group.

**Table 39. Already composting, Treatment and Control**

| Said "Already doing this" for having installed a solar panel | Treatment (n=253) | Control (n=235) | Significant Difference (Y/N) |
|---|---|---|---|
| The Participant | 60% | 57% | N |
| Other People | 5% | 7% | N |

**Table 40. Likelihood of composting, Treatment and Control**

| Likelihood, The Participant | Treatment (n=101) | Control (n=100) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.0 | 0.1 | N |
| Pre | 2.9 | 2.8 | N |
| Post | 2.8 | 2.9 | N |
| **Likelihood, Other people** | **Treatment (n=101)** | **Control (n=100)** | **Significant Difference (Y/N)** |
| Change in Score | 0.0 | -0.1 | N |
| Pre | 2.7 | 2.8 | N |
| Post | 2.8 | 2.8 | N |

NOTE: The item asked "Mark how likely YOURSELF and OTHERS are to take the following actions in the next six months?" The scale went from 1 (Definitely not) to 5 (Definitely will). Only sampled from those that did not already compost.

**Table 41. Already installed a solar panel, Treatment and Control**

| Said "Already doing this" for having installed a solar panel | Treatment (n=254) | Control (n=235) | Significant Difference (Y/N) |
|---|---|---|---|
| The Participant | 6% | 4% | N |
| Other People | 1% | 3% | N |

NOTE: This information was taken from the post survey.

**Table 42. Likelihood of installing a solar panel, Treatment and Control**

| Likelihood, The Participant | Treatment (n=239) | Control (n=226) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.0 | 0.1 | N |
| Pre | 2.2 | 2.2 | N |
| Post | 2.2 | 2.3 | N |
| **Likelihood, Other people** | **Treatment (n=239)** | **Control (n=226)** | **Significant Difference (Y/N)** |
| Change in Score | 0.0 | 0.1 | N |
| Pre * | 2.5 | 2.3 | Y |
| Post | 2.2 | 2.3 | N |

NOTE: The item asked *"Mark how likely YOURSELF and OTHERS are to take the following actions in the next six months?"* The scale went from 1 (Definitely not) to 5 (Definitely will). Only sampled from those that did not already have solar panels.

**Table 43. Already planted bird-friendly plant, Treatment and Control**

| Said "Already doing this" for having installed a solar panel | Treatment (n=254) | Control (n=234) | Significant Difference (Y/N) |
|---|---|---|---|
| The Participant | 62% | 65% | N |
| Other People | 4% | 6% | |

**Table 44. Likelihood of planting bird-friendly plant, Treatment and Control**

| Likelihood, The Participant | Treatment (n=97) | Control (n=82) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score * | -0.3 | 0.3 | Y |
| Pre | 4.2 | 4.3 | N |
| Post * | 3.9 | 4.5 | Y |
| **Likelihood, Other people** | **Treatment (n=97)** | **Control (n=82)** | **Significant Difference (Y/N)** |
| Change in Score | 0.0 | 0.1 | N |
| Pre | 3.2 | 3.2 | N |
| Post | 3.2 | 3.3 | N |

NOTE: The item asked *"Mark how likely YOURSELF and OTHERS are to take the following actions in the next six months?"* The scale went from 1 (Definitely not) to 5 (Definitely will). Only sampled from those that did not already have a bird-friendly plant.

**Table 45. Already gave up pesticides, Treatment and Control**

| Said "Already doing this" for having installed a solar panel | Treatment (n=252) | Control (n=234) | Significant Difference (Y/N) |
|---|---|---|---|
| The Participant | 73% | 77% | N |
| Other People | 4% | 6% | N |

**Table 46. Likelihood of giving up pesticides, Treatment and Control**

| Likelihood, The Participant | Treatment (n=68) | Control (n=54) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.1 | -0.1 | N |
| Pre | 3.5 | 3.7 | N |
| Post | 3.6 | 3.6 | N |
| **Likelihood, Other people** | **Treatment (n=68)** | **Control (n=54)** | **Significant Difference (Y/N)** |
| Change in Score | 0.1 | 0.1 | N |
| Pre | 2.7 | 2.7 | N |
| Post | 2.7 | 2.7 | N |

NOTE: The item asked *"Mark how likely YOURSELF and OTHERS are to take the following actions in the next six months?"* The scale went from 1 (Definitely not) to 5 (Definitely will).

## Impact Statement H

| | | |
|---|---|---|
| **H: General Public, Adult, and Senior application users will be encouraged to try-out invention-based problem solving in their own lives** | 1. Positive correlation between use of the YardMap and likelihood of taking an inquiry or invention approach to solving a yard-based problem | - There were no significant differences in comparing Control and Treatment groups to the strategies to solve a specific problem posed to groups. |

### Indicator H1: Positive correlation between use of the YardMap and likelihood of taking an inquiry or invention approach to solving a yard-based problem

NOTE: Some of the findings for Indicator H1 are repeated for Indicator F1.

One item was added in order to see which kinds of solutions the participant thought were the best for solving a yard-related problem, and whether their answers were impacted by participating in YardMap. The item said *"A squirrel keeps raiding your bird feeder and stealing all the seed you put out for birds. How much does each statement below sound like what you would try to do to stop the squirrel?"* It listed three specific solutions and asked participants how likely they would be to employ to address this problem (see

Table 36). Again, participants were asked to rate these items in the pre-survey and post-survey, then the Control and Treatment groups were compared on the pre-survey item only, the post-survey item only, and the change score between the pre-survey and post-survey. As can be seen below, there were no differences in the approaches Control and Treatment participants said they were likely to use in just the pre-survey, just the post-survey, and in the change scores (see

Table 36).

**Table 47. Squirrel Problem Solving by Item, Individual Items**

| Try to find something commercially produced to purchase and solve the problem | Treatment (n=254) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | -0.1 | N |
| Pre | 3.7 | 4.0 | N |
| Post | 3.7 | 3.9 | N |
| **Try to come up with a solution yourself without purchasing anything** | **Treatment (n=254)** | **Control (n=239)** | **Significant Difference (Y/N)** |
| Change in Score | 0.1 | 0.2 | N |
| Pre | 5.4 | 5.2 | N |
| Post | 5.5 | 5.4 | N |
| **Search for other people's effective solutions to the same problem and copy those.** | **Treatment (n=253)** | **Control (n=240)** | **Significant Difference (Y/N)** |
| Change in Score | -0.1 | 0.0 | N |
| Pre | 5.7 | 5.7 | N |
| Post | 5.6 | 5.7 | N |

NOTE: Scale was from 1 (Strongly disagree) to 7 (Strongly agree)

## Impact Statement I:

| | | |
|---|---|---|
| **I: General Public, Adult, and Senior application users will increase basic bird & plant ID skills** | 1. Increased number of correct bird identifications increases with participation | - There were no significant differences in the change scores for Control and Treatment groups in the following: a bird identification test, self-reported learning about birds, and describing their skill level at identifying birds. |
| | 2. Increased number of correct plant identifications increases with participation | - There were no significant differences in the change score for Control and Treatment groups in the following: a plant identification test, self-reported learning about plants, and describing their skill level at gardening. |

### Indicator I1: Number of correct bird identifications increases with participation

Participants were given a series of 15 images of birds and asked to answer a question about the bird in the picture (see Appendix A and Appendix B for the images and exact questions). There were typically five responses, with four options to choose and a fifth option that stated "I don't know." They were scored based on the correct answers identified by the YardMap staff person, who also came up with the questions used in this bird identification task.

As can be seen in Table 48 there was not a statistically significant difference in the change score in comparing the Control and Treatment groups. Of note is that even though the groups were randomly assigned, the Treatment condition had a significantly higher score than the Control group on the pre-survey.

**Table 48. Bird ID Skills Test, Overall Score**

| Overall Score, Bird ID Skills test | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | 0.2 | N |
| Pre * | 6.4 | 5.7 | Y |
| Post | 6.3 | 5.9 | N |

One item asked participants how much they learned about birds, where they had to rate how much they agreed with the statement *"I learned a lot about birds"* since participating in YardMap (the scale was from 1 "Strongly disagree" to 7 "Strongly agree). There was not a statistically significant difference between the Control and Treatment groups on this item (see Table 49).

**Table 49. Learning about Birds**

| I learned a lot about birds | Treatment (n=254) | Control (n=236) | Significant Difference (Y/N) |
|---|---|---|---|
| Agreement score (1 to 7) | 4.3 | 4.3 | N |

One of the pre-survey and post-survey items asked participants how often they watch birds, to see if there was any change in this variable. In comparing the Control and Treatment groups, there were no statistically significant differences in the pre-survey, the post-survey or the change score comparisons (see Table 50). Not surprisingly, participants were avid bird watchers, with 65% of the Treatment group and 62% of the Control group saying they watch birds daily.

**Table 50. How Often Participants Watch Birds**

| How often do you watch birds? | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.1 | 0.1 | N |
| Pre | 6.2 | 6.1 | N |
| Post | 6.2 | 6.2 | N |

NOTE: Scale included 7 options: 1 (Never), 2 (Less than once a month), 3 (Once a month), 4 (2-3 times a month), 5 (Once a week), 6 (2-3 times a week), and 7 (Daily).

A third item related to this indicator asked participants to describe their skill level at identifying birds, both by sight and by sound. As can be seen in Table 51, there were no differences between Control and Treatment groups for the pre-survey, the post-survey or the change score.

**Table 51. Skill Level at Bird Watching**

| How would you describe your skill level at watching birds? | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | 0.0 | 0.0 | N |
| Pre | 1.7 | 1.7 | N |
| Post | 1.7 | 1.7 | N |

NOTE: Scale included 4 options: 1 (Beginner), 2 (Intermediate), 3 (Advanced), and 4 (Expert).

### Indicator I2: Number of correct bird identifications increases with participation

Participants were given a series of 6 images of plants and asked to drag the picture of the plant into the appropriate species label (e.g., drag the elm tree left picture into the box labeled *"Elm Tree species."* See Appendix A and Appendix B for the images and exact questions. There were typically five responses, with four options to choose and a fifth option that stated "I don't know." They were scored based on the correct answers identified by the YardMap staff person, who also came up with the questions used in this plant identification task.

As can be seen in Table 52, there was not a statistically significant difference in the change score in comparing the Control and Treatment groups. Of note is that even though the groups were randomly assigned, the Treatment condition had a significantly higher score than the Control group on the pre-survey, as well as in the post-survey.

**Table 52. Plant ID Skills Test, Overall Score**

| Overall Score, Plant ID Skills test # Correct | Treatment (n=250) | Control (n=237) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | 0.1 | N |
| Pre | 3.8 | 3.7 | N |
| Post | 3.7 | 3.8 | N |

One item asked participants how much they learned about plants, where they had to rate how much they agreed with the statement *"I learned a lot about birds"* since participating in YardMap (the scale was from 1 "Strongly disagree" to 7 "Strongly agree). There was not a statistically significant difference between the Control and Treatment groups on this item (see Table 53).

**Table 53. Learning about Plants**

| I learned a lot about plants | Treatment (n=254) | Control (n=238) | Significant Difference (Y/N) |
|---|---|---|---|
| Agreement score (1 to 7) | 4.3 | 4.2 | N |

An additional item for plant identification asked which feature was most important in identifying plants (see

Table 54 and Table 55). There were no significant differences between Control and Treatment groups in the pre-test or the post-test choices. As indicated by the numbers, the leaf shape option was the correct one.

**Table 54. Important Features in Identifying Trees (Pre-test)**

| When identifying a tree species what is the most important part of the plant to making an identification? | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Bark | 6% | 4% | N |
| Seeds | 1% | 3% | |
| Flowers | 3% | 3% | |
| Leaf shape | 81% | 80% | |
| Location of the tree | 3% | 2% | |
| I don't generally try to identify trees | 8% | 10% | |

**Table 55. Important Features in Identifying Trees (Post-test)**

| When identifying a tree species what is the most important part of the plant to making an identification? | Treatment (n=246) | Control (n=230) | Significant Difference (Y/N) |
|---|---|---|---|
| Bark | 10% | 4% | N |
| Seeds | 0% | 1% | |
| Flowers | 4% | 3% | |
| Leaf shape | 74% | 84% | |
| Location of the tree | 3% | 2% | |
| I don't generally try to identify trees | 9% | 6% | |

One of the pre-survey and post-survey items asked participants how often they garden, to see if there was any change in this variable. In comparing the Control and Treatment groups, there were no statistically significant differences in the post-survey or the change score comparisons (see Table 56). However, even though participants were randomly assigned to groups there was a statistically significant difference in the pre-survey: the Treatment group said they gardened more often than the Control group.

**Table 56. How Often Participants Watch Birds**

| How often do you garden? | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | 0.1 | N |
| Pre * | 5.7 | 5.4 | Y |
| Post | 5.6 | 5.5 | N |

Note: Scale included 7 options: 1 (Never), 2 (Less than once a month), 3 (Once a month), 4 (2-3 times a month), 5 (Once a week), 6 (2-3 times a week), and 7 (Daily).

Another item related to this indicator asked participants to describe their skill level at gardening. As can be seen in Table 57, there were no differences between Control and Treatment groups for the pre-survey, the post-survey or the change score.

**Table 57. Skill Level at Gardening**

| How often do you garden? | Treatment (n=255) | Control (n=240) | Significant Difference (Y/N) |
|---|---|---|---|
| Change in Score | -0.1 | 0.0 | N |
| Pre | 2.3 | 2.2 | N |
| Post | 2.3 | 2.2 | N |

NOTE: Scale included 4 options: 1 (Beginner), 2 (Intermediate), 3 (Advanced), and 4 (Expert).

## Impact Statement J

| | | |
|---|---|---|
| **J: General Public, Adult, and Senior application users will broaden their contributions to the scientific endeavor** | Positive correlation between participation in YardMap and participation in other citizen science projects | - |

### Indicator J1: General Public, Adult, and Senior application users will broaden their contributions to the scientific endeavor.

NOTE: General information about participation in citizen science programs is provided above in Sample Characteristics section.

When asked whether or not they had participated in any new citizen science projects since joining YardMap (see Table 58), the Treatment group was more likely to say yes (14%) than the Control group (8%). While this was not a statistically significant difference, it was a very strong trend. In terms of future behavior, there was not a significant difference in the estimated number of citizen science programs between the treatment and control groups (see Table 59).

**Table 58. Participation in New Citizen Science Projects since joining YardMap?**

| Have you joined or participated in any new citizen science projects since you registered for YardMap? | Treatment (n=246) | Control (n=229) |
|---|---|---|
| Yes | 14% | 8% |
| No | 36% | 92% |

NOTE: While not a statistically significant difference, it was very close (p=.056)

**Table 59. Participation in New Citizen Science Projects since joining YardMap?**

| How many total citizen science projects (including YardMap) will you participate in in 2014? | Treatment (n=274) | Control (n=247) |
|---|---|---|
| Average | 2.2 | 2.3 |

NOTE: This was not a statistically significant difference.

# Appendix A : Pre-Survey Instrument

Thank you very much for taking time to answer the questions below. Your important feedback and thoughtful responses will help us as we think about, develop and refine the YardMap site, improving the experience for you and everyone else who uses it. Answering the questions will take about 15 minutes. If need be, you can leave and return to this survey page, but you won't be able to access YardMap or be entered into the drawings until you complete the survey.

(NEXT PAGE IS A MANDATORY INFORMED CONSENT DOCUMENT REQUIRED BY CORNELL UNIVERSITY)

Study Consent & Confidentiality Statement

Introduction

We are studying how to best design software to support citizen science communities. To accomplish our research, we need to monitor how people use the YardMap interfaces and interact with the tools and resources that we provide. This includes recording when a user logs in, what pages the user requests, what actions the user commits, what the user draws, what social networks the user displays their progress on, among others. We derive statistics on this, but do not view or tie these statistics to your actual identity. Additionally, we ask you to participate in our informational surveys.

Participant Requirements

You must be 18 years or older to use YardMap.org.

Risks

There are no risks to participating in this study.

Benefits

Although we cannot guarantee that you will benefit personally from participation, YardMap is created as an educational project and seeks to produce specific learning outcomes. Other benefits, such as those attained by spending more time outdoors, may be secondary effects. In addition, the knowledge received may be of value to humanity.

Compensation & Costs

There will be no cost to you if you participate in this project and any associated studies that arise from it. You may win a prize for participating, but this is not guaranteed.

Confidentiality

By participating in studies associated with YardMap, you understand and agree that Cornell may be required to disclose your consent form, data and other personally identifiable

information as required by law, regulation, subpoena or court order. Otherwise, your confidentiality will be maintained in the following manner: YardMap.org does not release e-mail addresses or names to any third parties. We may share your demographic data (without your name or e-mail address attached) in research results. Furthermore, we may refer to the actions of individual users (without your name or e-mail address attached) in research results. Aside from the above, information is held as confidential as is practical within our database. We represent users anonymously as numeric identifiers so that researchers do not know the real identity of the users in the data they are studying. By participating, you understand and agree that data and information gathered during this study may be used by Cornell and published and/or disclosed by Cornell to others outside of Cornell.

Rights

Your participation is voluntary. You are free to stop your participation at any point. Refusal to participate or withdrawal of your consent or discontinued participation in the study will not result in any penalty or loss of benefits or rights to which you might otherwise be entitled. The Principal Investigator may at his/her discretion remove you from the study for any of a number of reasons. In such an event, you will not suffer any penalty or loss of benefits or rights, which you might otherwise be entitled.

Right to Ask Questions & Contact Information

If you have any questions about this study, you should feel free to ask them now or anytime throughout the study by contacting Professor Janis Dickinson at Cornell. She can be contacted directly at jld84@cornell.edu, or by mail at: Cornell Lab of Ornithology, Ithaca, NY 14850. If you have questions later, desire additional information, or wish to withdraw your participation please contact the Principle Investigator by mail or e-mail. If you have questions pertaining to your rights as a research participant; or to report objections to this study, you should contact the Office of Research Integrity and Assurance at Cornell University. Matthew Aldridge, CIP Sr. IRB Administrator t: 607-255-6182 East Hill Office Building 395 Pine Tree Road, Suite 320 Cornell University Ithaca, NY 14850 f. 607-255-0758 e. irbhp@cornell.edu

Cornell University Institutional Review Board (IRB) approved the use of human participants for this study. CU IRB #: 1005001414 Approval Date: 3/21/2014

This Study is funded by the National Science Foundation, which is supporting the costs of this research. Neither Cornell University, nor Dr. Dickinson will receive any financial benefit based on the results of the Study.

❍ I consent to participate

1. Please indicate how much you DISAGREE or AGREE with each of the following statements

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I expect to find YardMap easy to use | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I expect most people will have some trouble using a website like YardMap | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am confident in my ability to use the YardMap website to submit data | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am confident in my ability to use the YardMap website to look-up information about gardening for birds and other wildlife | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

2. Please indicate how much you DISAGREE or AGREE with each of the following statements. Please respond as you really feel, rather than how you think "most people" feel. Think about some of the things you do to protect nature or help solve environmental problems. Why do you do these things?

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Because I think it's a good idea to do something for the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because other people will be disappointed in me if I don't | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to people I care about if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I would feel guilty if I didn't do anything for the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I enjoy doing it | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to me if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the pleasure I experience while doing it | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because people I look up to think it's a really good thing to do | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's a good idea to protect nature | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because it's fun to do it | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the recognition I get from others | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's important to take care of the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to the natural world if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I want people to see me as a good person | ❍ | ❍ | ❍ | ❍ | ❍ |

3. Please indicate how much you DISAGREE or AGREE with each of the following statements about your influence on the environment. Please respond as you really feel, rather than how you think “most people” feel.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I feel confident in my ability to help protect the planet | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am capable of making a positive impact on the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am able to help take care of nature | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe I can contribute to solutions to environmental problems by my actions | ❍ | ❍ | ❍ | ❍ | ❍ |
| Compared to other people, I think I can make a positive impact on the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| I don't think I can make any difference in solving environmental problems | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that I personally, working with others, can help solve environmental issues | ❍ | ❍ | ❍ | ❍ | ❍ |
| It's hard for me to imagine myself helping to protect the planet | ❍ | ❍ | ❍ | ❍ | ❍ |

4. Please indicate how much you DISAGREE or AGREE with each of the following statements

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I am aware of steps I can take to reduce my carbon emissions | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The steps I can take to reduce my carbon emissions will result in insignificant carbon reduction | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| It is important that I make efforts to reduce my carbon emissions | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| It is important for me to regulate and reduce my energy consumption | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am aware of the steps I can take to reduce my energy consumption effectively | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

While the questions below are similar to ones you have already answered, they focus specifically on actions that help or protect birds.

5. Please indicate how much you DISAGREE or AGREE with each of the following statements. Please respond as you really feel, rather than how you think "most people" feel. Think about some of the things you do to protect birds or help solve environmental problems. Why do you do these things?

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Because I think it's a good idea to do something for birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because other people will be disappointed in me if I don't | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I would feel guilty if I didn't do anything for birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I enjoy doing activities that protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the pleasure I experience while doing it | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because people I look up to think it's a really good thing to do | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's a good idea to protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because it's fun to do it | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the recognition I get from others | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's important to take care of birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to the birds if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I want people to see me as a good person | ❍ | ❍ | ❍ | ❍ | ❍ |

6. Please indicate how much you DISAGREE or AGREE with each of the following statements about your influence on birds and the environment. Please respond as you really feel, rather than how you think "most people" feel.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I feel confident in my ability to help protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am capable of making a positive impact on bird populations | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am able to help take care of birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| My actions contribute to solutions to environmental problems that affect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Compared to other people, I think I can make a positive impact on birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I don't think I can make any difference in solving the problems birds face in my community | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that I personally, working with others, can help solve environmental issues affecting birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| It's hard for me to imagine myself helping to protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |

7. Please indicate how much you DISAGREE or AGREE with each of the following statements about your influence on birds and the environment. Please respond as you really feel, rather than how you think "most people" feel.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I feel confident that many people working together can help protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Many people working together are capable of making a positive impact on bird populations | ❍ | ❍ | ❍ | ❍ | ❍ |
| People, working together, are able to help take care of birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe many people working together can contribute to solutions to environmental problems that affect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Compared to other people who don't take action, I think people who take actions to landscape for birds make a positive impact on birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Even if many of us participate, I don't think I can make any difference in solving the problems birds face in my community | ❍ | ❍ | ❍ | ❍ | ❍ |
| It's hard for me to imagine enough people helping to protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I think most people who garden aren't interested in helping birds | ❍ | ❍ | ❍ | ❍ | ❍ |

8. Please indicate how much you DISAGREE or AGREE with each of these statements about your yard.

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| My yard is very bird-friendly | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I have plans to very soon make my yard more bird-friendly | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I have recently, or am currently, taking steps to make my yard more bird-friendly | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

9. Rank the following according to their importance for supporting bird populations. Drag the MOST IMPORTANT practice to the top of the list, and the LEAST IMPORTANT practice to the bottom, ordering the remaining practices according to their importance.

_____ Preserving access to dead standing wood
_____ Providing clean water
_____ Decreasing use of pesticides
_____ Providing access to a bird feeder with fresh seed
_____ Keeping cats indoors
_____ Using sustainable energy sources

10. Please indicate how much you DISAGREE or AGREE with each of the following statements about gardening and birds.

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| My yard has a role to play in providing bird habitat | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How I garden doesn't really impact local bird populations | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Scientists have shown that how I garden influences bird populations | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Not much is known about how much an individual can contribute to protecting birds through gardening | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The birds I see don't really depend on the plants in people's gardens | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| A bird can survive on the habitat I provide in my yard alone | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| There is a connection between how people manage their yards and the health of local bird populations | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I know what the basic elements of bird habitat are | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

11. MARK how likely YOURSELF and OTHERS are to take the following actions in the next six months?

| | You | | | | | |
|---|---|---|---|---|---|---|
| | Definitely Not | Probably Not | May or May Not | Probably Will | Definitely Will | Already doing this |
| Start composting | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Install a solar panel | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Plant a bird- or pollinator-friendly plant | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Give-up the use of pesticides in your yard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | Other people | | | | | |
|---|---|---|---|---|---|---|
| | Definitely Not | Probably Not | May or May Not | Probably Will | Definitely Will | Already doing this |
| Start composting | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Install a solar panel | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Plant a bird- or pollinator-friendly plant | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Give-up the use of pesticides in your yard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

12. Please choose either TRUE, FALSE or I DON'T KNOW for each of the following statements.

| | True | False | I don't know |
|---|---|---|---|
| A outdoor cat is an example of an ecological trap | ❍ | ❍ | ❍ |
| Habitat loss is the single greatest contributing factor to the loss of an endangered species | ❍ | ❍ | ❍ |
| Birds migrate because they cannot endure the cold temperatures | ❍ | ❍ | ❍ |
| Most birds will feed their young seeds from a bird feeder if they are available | ❍ | ❍ | ❍ |
| Invasive earthworms are good for forests, but typically bad for backyard gardens | ❍ | ❍ | ❍ |

The following questions will help us understand peoples' knowledge about plants and how much explanation we should give about plants on the site.

13. When identifying a tree species what is the most important part of the plant to making an identification?

- ❍ The bark
- ❍ The seeds
- ❍ The flowers
- ❍ The leaf shape
- ❍ The location of the tree
- ❍ I don't generally try to identify trees

14. Please indicate how much you DISAGREE or AGREE with each of the following statements: I am confident about my ability to . . .

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|
| distinguish a mature tree from other kinds of plant life (like a shrub or an herb) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| distinguish a deciduous plant from an evergreen plant | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| distinguish a conifer tree from a broad-leafed tree | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify all of the trees in my backyard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify some of the trees in my backyard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify most local species of trees | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify the first plants to come up in my garden at the beginning of the growing season | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

15. Match the images of leaves to the correct type of tree by dragging the image to the correct box (NOTE: Large images of single leaves were displayed)

| Elm Tree species | Oak Tree species | Maple Tree species | Pine Tree species | Cherry Tree species | Sycamore Tree species |
|---|---|---|---|---|---|
| _____ | _____ | _____ | _____ | _____ | _____ |

16. Please indicate how much you DISAGREE or AGREE with each of the following statements

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|
| If I posted a picture of a tree to Facebook my friends would be able to help me identify it | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I expect YardMap to offer tools to help me identify plants | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I know of a website where I could go to get help identifying a tree I had a picture of | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

The following questions will help us understand peoples' knowledge about birds and how much explanation we should give about birds on the site. (NOTE: Large images of each bird were displayed)

17. The common name of this species is:

- ❍ Gray Flycatcher
- ❍ American Dipper
- ❍ Dark-eyed Junco
- ❍ None of the above
- ❍ I don't know

18. The identification of this bird is most often confused with:
- ❍ Red-headed Woodpecker
- ❍ Hairy Woodpecker
- ❍ Pileated Woodpecker
- ❍ Red-bellied Woodpecker
- ❍ I don't know

19. The common name of this species is:
- ❍ White-throated Sparrow
- ❍ Chipping Sparrow
- ❍ Song Sparrow
- ❍ None of the above
- ❍ I don't know

20. The common name of this species reflects:
- ❍ What it eats
- ❍ The shape of its nest
- ❍ Its preferred breeding habitat
- ❍ None of the above
- ❍ I don't know

21. Which of the following phrases is typically used to describe the song of this species?
- ❍ "Sweet sweet, you're so sweet"
- ❍ "Drink your tea"
- ❍ "Teacher, teacher, teacher"
- ❍ "When I see you I will seize you and I'll squeeze you till you squirt" (said by bird to a caterpillar)
- ❍ I don't know

22. The common name of the female bird pictured is:
- ❍ Rose-breasted Grosbeak
- ❍ Northern Cardinal
- ❍ Evening Grosbeak
- ❍ None of the above
- ❍ I don't know

23. How many different species are pictured in this image?
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ I don't know

24. This bird is a member of which group of birds?
- ❍ Hawks
- ❍ Kites
- ❍ Falcons
- ❍ None of the above
- ❍ I don't know

25. Which of the following statement(s) about this species is true?
- ❑ This bird lays its eggs in nests of other species
- ❑ This bird is not native to North America
- ❑ This bird is a federally listed threatened bird
- ❑ None of the above
- ❑ I don't know

26. The common name of this species is:
- ❍ American Golden-plover
- ❍ Semipalmated Plover
- ❍ Black-bellied Plover
- ❍ None of the above
- ❍ I don't know

27. The common name of this species is:
- ❍ Mourning Dove
- ❍ Rock Dove
- ❍ White-winged Dove
- ❍ None of the above
- ❍ I don't know

28. The bird pictured here belongs to which group of birds?
- ❍ Swifts
- ❍ Sparrows
- ❍ Swallows
- ❍ None of the above
- ❍ I don't know

29. Which of the following statement(s) is true about this species?
- ❑ This bird prefers to breed in wetland and swampy areas
- ❑ This bird prefers to feed while in flight
- ❑ This bird is not native to North America
- ❑ All of the above
- ❑ I don't know

30. Which of the following statement(s) is NOT true of this species?

- ❑ They often flick their tails
- ❑ They nest on the ground in open grasslands
- ❑ They feed mostly on insects
- ❑ They have extremely varied songs
- ❑ I don't know

These questions will help us understand to what extent people participate in citizen science projects.

31. Have you ever participated in a citizen science project where as a member of the general public you collected data and contributed to a scientific effort – not your own?

- ❍ Yes
- ❍ No

If Yes Is Selected

If you have ever participated in a citizen science project where as a member of the general public you collected data and contributed to a scientific effort – not your own?

32. How many years have you been participating in citizen science programs?

- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7
- ❍ 8
- ❍ 9
- ❍ 10
- ❍ 11
- ❍ 12
- ❍ 13
- ❍ 14
- ❍ 15
- ❍ 16
- ❍ 17
- ❍ 18
- ❍ 19
- ❍ 20
- ❍ 21
- ❍ 22
- ❍ 23
- ❍ 24
- ❍ 25+

If Yes Is Selected, Have you ever participated in a citizen science project where as a member of the general public you collected data and contributed to a scientific effort – not your own?

33. How many total unique citizen science programs have you participated in?

- ❍ 0
- ❍ 1
- ❍ 2-4
- ❍ 5 or more

34. How many total citizen science projects (including YardMap) will you participate in in 2014?

- ❍ 0
- ❍ 1
- ❍ 2-4
- ❍ 5 or more

If Yes Is Selected, Have you ever participated in a citizen science project where as a member of the general public you collected data and contributed to a scientific effort – not your own?

35. Please indicate if you have HEARD OF or PARTICIPATED IN the following citizen science projects

| | Heard of this project? | | Participated in this project? | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| FeederWatch | ❍ | ❍ | ❍ | ❍ |
| NestWatch | ❍ | ❍ | ❍ | ❍ |
| National Phenology Network | ❍ | ❍ | ❍ | ❍ |
| The Great Sunflower Project | ❍ | ❍ | ❍ | ❍ |
| Zooniverse | ❍ | ❍ | ❍ | ❍ |
| eBird | ❍ | ❍ | ❍ | ❍ |

If No Is Selected, Have you ever participated in a citizen science project where as a member of the general public you collected data and contributed to a scientific effort – not your own? No Is Selected

36. Please indicate if you have HEARD OF the following citizen science projects

| | Yes | No |
|---|---|---|
| FeederWatch | ❍ | ❍ |
| NestWatch | ❍ | ❍ |
| National Phenology Network | ❍ | ❍ |
| The Great Sunflower Project | ❍ | ❍ |
| Zooniverse | ❍ | ❍ |
| eBird | ❍ | ❍ |

37. How often do you:

| | Never | Less than Once a Month | Once a Month | 2-3 Times a Month | Once a Week | 2-3 Times a Week | Daily |
|---|---|---|---|---|---|---|---|
| Watch birds? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Garden? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

38. How would you describe your skill level at:

| | Beginner | Intermediate | Advanced | Expert | Not applicable |
|---|---|---|---|---|---|
| Identifying birds, both by sight and sound? | ❍ | ❍ | ❍ | ❍ | ❍ |
| Gardening? | ❍ | ❍ | ❍ | ❍ | ❍ |

39. A squirrel keeps raiding your bird-feeder and stealing all the seed you put out for birds. How much does each statement below sounds like what you would do to try and stop the squirrel?

| | Not at all like me | Not like me | Not much like me | Neutral | Somewhat like me | Like me | Very much like me |
|---|---|---|---|---|---|---|---|
| Try to find something commercially produced to purchase and solve the problem | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Try to come-up with a solution yourself, without purchasing anything | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Search for other people's effective solutions to the same problem and copy those | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

40. Please indicate how likely are you to seek information about gardening for birds and other wildlife by:

| | Very Unlikely | Unlikely | Somewhat Unlikely | Undecided | Somewhat Likely | Likely | Very Likely |
|---|---|---|---|---|---|---|---|
| An internet search | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Contacting YardMap/ Cornell Lab of Ornithology staff | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Looking at the YardMap web pages | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Contacting a friend or family member | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Using the local library | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Buying a book | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

41. Please indicate how much you DISAGREE or AGREE with the following statements:

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I am comfortable using social networking sites (e.g., facebook) to share my experiences with others | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I would have difficulty navigating a new (unfamiliar) website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I would have difficulty uploading an image to a website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I understand how to use electronic discussion forums | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am able to adapt to new technologies without much trouble | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I feel apprehensive when visiting a new website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I have tried using interactive drawing or mapping technology online (e.g. - Google My Maps, Google Earth) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

42. Rate the following tools according to their usefulness in helping you find reliable answers to questions you might have about science-related topics: (choose NOT APPLICABLE if you've never used that source)

| | Very Useless | Useless | Somewhat Useless | Neutral | Somewhat Useful | Useful | Very Useful | Not Applicable |
|---|---|---|---|---|---|---|---|---|
| News websites | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Peer-to-peer social network interactions (e.g. - asking friends via online social networking tools like Facebook) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Online forums | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Books (digital or printed) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Wikipedia | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Direct conversations with friends and family (e.g. - in person, on the phone, over email) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

43. Are there any additional tools you use to seek information about science-related topics? What are they?

Tool 1 _____
Tool 2 _____
Tool 3 _____

The following questions help us understand who is using YardMap and how well we are reaching different audiences.

44. What year were you born? (Selections from 1920 to 2000)

45. What is your gender?

❍ Male
❍ Female

46. Do you currently live in the United States?

❍ Yes (1)
❍ No (2)

47. Please enter your 5 digit zip code (Yes Is Selected for Q57)
48. In which country do you reside? (No Is Selected for Q57, list of all countries)

49. What is the highest level of education you have completed?

- ❍ Less than High School
- ❍ High School / GED
- ❍ Some College
- ❍ 2-year College Degree
- ❍ 4-year College Degree
- ❍ Masters Degree
- ❍ Doctoral Degree
- ❍ Professional Degree (JD, MD)

50. Would you consider where you live to be primarily:

- ❍ Urban (in a city
- ❍ Suburban (around a city)
- ❍ Rural (not near a city)

51. Please indicate how much the people in each of the following groups RESEMBLES YOU. Please respond as you really feel, rather than how you think "most people" feel. Think about how much you feel like you belong to each of the following groups

| | Not at all like me | Not like me | Not much like me | Neutral | Somewhat like me | Like me | Very much like me |
|---|---|---|---|---|---|---|---|
| Early adopters of new technology | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Environmentalists | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Animal lovers | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Volunteers | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Science geeks | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Maker/ DIYer | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Social Conservatives | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Fiscal Conservatives | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Social Progressives | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Fiscal Liberals | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

52. Please describe your current living situation (this helps us understand your ability to make decisions about your yard):

- ❍ I am renting
- ❍ I own my home
- ❍ Other _____

53. How many of each age group are currently living in your home?

| | Children (under the age of 18) | Adults |
|---|---|---|
| | select one | select one |
| 0 | ❍ | ❍ |
| 1 | ❍ | ❍ |
| 2 | ❍ | ❍ |
| 3 | ❍ | ❍ |
| 4 | ❍ | ❍ |
| 5 | ❍ | ❍ |
| 6 or more | ❍ | ❍ |

54. Are you of Hispanic, Latino or Spanish origin?

- ❍ No, not of Hispanic, Latino or Spanish origin.
- ❍ Yes, Mexican, Mexican-American or Chicano
- ❍ Yes, Puerto Rican
- ❍ Yes, another Hispanic, Latino or Spanish origin: _____
- ❍ I don't know

55. Which of the following best describe your ethnicity? Please select as many as apply

- ❑ White, including Hispanic
- ❑ African-American or Black
- ❑ American Indian or Native Alaskan
- ❑ Asian Indian
- ❑ Japanese
- ❑ Native Hawaiian
- ❑ Chinese
- ❑ Korean
- ❑ Guamanian or Chamorro
- ❑ Filipino
- ❑ Vietnamese
- ❑ Samoan
- ❑ Other Asian: _____
- ❑ Other Pacific Islander: (_____
- ❑ Other ethnicity: _____
- ❑ I don't know

56. Anything else you wanted to share with us related to the questions above or YardMap?

# Appendix B : Post-Survey Instrument

This is a follow-up to the survey you took 6 weeks ago. When complete you will be done with your participation in this research. Some of the questions are similar to the questions on the first survey, but it is important to answer each of the items. Your thoughtful responses will help us as we think about, develop and refine the YardMap site, improving the experience for you and everyone else who uses it. Answering the questions will take about 20 minutes, and your feedback is extremely important to the success of YardMap. Once you complete the survey you will be entered into the drawings for prizes.

Thanks for all your time, we really appreciate it.

1. Please indicate how much you DISAGREE or AGREE with each of the following statements

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I found/expect to find YardMap easy to use | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I expect most people will have some trouble using a website like YardMap | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am confident in my ability to use the YardMap website to submit data | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am confident in my ability to use the YardMap website to look-up information about gardening for birds and other wildlife | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

2. Please indicate how much you DISAGREE or AGREE with each of the following statements, as they relate to you since first signing up for YardMap

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I learned a lot about birds | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I learned a lot about plants | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I learned a lot about the relationship between birds and habitats | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I learned about how to make my yard more bird-friendly | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I learned about the impact of my yard practices on bird | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

3. Please indicate how much you DISAGREE or AGREE with each of the following statements. Please respond as you really feel, rather than how you think "most people" feel. Think about some of the things you do to protect nature or help solve environmental problems. Why do you do these things?

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Because I think it's a good idea to do something for the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because other people will be disappointed in me if I don't | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to people I care about if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I would feel guilty if I didn't do anything for the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I enjoy doing it | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to me if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the pleasure I experience while doing it | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because people I look up to think it's a really good thing to do | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's a good idea to protect nature | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because it's fun to do it | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the recognition I get from others | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's important to take care of the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to the natural world if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I want people to see me as a good person | ❍ | ❍ | ❍ | ❍ | ❍ |

4. Please indicate how much you DISAGREE or AGREE with each of the following statements about your influence on the environment. Please respond as you really feel, rather than how you think “most people” feel.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I feel confident in my ability to help protect the planet | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am capable of making a positive impact on the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am able to help take care of nature | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe I can contribute to solutions to environmental problems by my actions | ❍ | ❍ | ❍ | ❍ | ❍ |
| Compared to other people, I think I can make a positive impact on the environment | ❍ | ❍ | ❍ | ❍ | ❍ |
| I don't think I can make any difference in solving environmental problems | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that I personally, working with others, can help solve environmental issues | ❍ | ❍ | ❍ | ❍ | ❍ |
| It's hard for me to imagine myself helping to protect the planet | ❍ | ❍ | ❍ | ❍ | ❍ |

5. Please indicate how much you DISAGREE or AGREE with each of the following statements

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I am aware of steps I can take to reduce my carbon emissions | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The steps I can take to reduce my carbon emissions will result in insignificant carbon reduction | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| It is important that I make efforts to reduce my carbon emissions | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| It is important for me to regulate and reduce my energy consumption | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am aware of the steps I can take to reduce my energy consumption effectively | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

While the questions below are similar to ones you have already answered, they focus specifically on actions that help or protect birds.

6. Please indicate how much you DISAGREE or AGREE with each of the following statements. Please respond as you really feel, rather than how you think "most people" feel. Think about some of the things you do to protect birds or help solve environmental problems. Why do you do these things?

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Because I think it's a good idea to do something for birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because other people will be disappointed in me if I don't | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I would feel guilty if I didn't do anything for birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I enjoy doing activities that protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the pleasure I experience while doing it | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because people I look up to think it's a really good thing to do | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's a good idea to protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because it's fun to do it | ❍ | ❍ | ❍ | ❍ | ❍ |
| For the recognition I get from others | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I think it's important to take care of birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I'm concerned about what could happen to the birds if I don't do anything | ❍ | ❍ | ❍ | ❍ | ❍ |
| Because I want people to see me as a good person | ❍ | ❍ | ❍ | ❍ | ❍ |

7. Please indicate how much you DISAGREE or AGREE with each of the following statements about your influence on birds and the environment. Please respond as you really feel, rather than how you think "most people" feel.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I feel confident in my ability to help protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am capable of making a positive impact on bird populations | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am able to help take care of birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| My actions contribute to solutions to environmental problems that affect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Compared to other people, I think I can make a positive impact on birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I don't think I can make any difference in solving the problems birds face in my community | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that I personally, working with others, can help solve environmental issues affecting birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| It's hard for me to imagine myself helping to protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |

8. Please indicate how much you DISAGREE or AGREE with each of the following statements about your influence on birds and the environment. Please respond as you really feel, rather than how you think "most people" feel.

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I feel confident that many people working together can help protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Many people working together are capable of making a positive impact on bird populations | ❍ | ❍ | ❍ | ❍ | ❍ |
| People, working together, are able to help take care of birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe many people working together can contribute to solutions to environmental problems that affect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Compared to other people who don't take action, I think people who take actions to landscape for birds make a positive impact on birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| Even if many of us participate, I don't think I can make any difference in solving the problems birds face in my community | ❍ | ❍ | ❍ | ❍ | ❍ |
| It's hard for me to imagine enough people helping to protect birds | ❍ | ❍ | ❍ | ❍ | ❍ |
| I think most people who garden aren't interested in helping birds | ❍ | ❍ | ❍ | ❍ | ❍ |

9. Please indicate how much you DISAGREE or AGREE with each of these statements about your yard.

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| My yard is very bird-friendly | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I have plans to very soon make my yard more bird-friendly | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I have recently, or am currently, taking steps to make my yard more bird-friendly | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

10. Rank the following according to their importance for supporting bird populations. Drag the MOST IMPORTANT practice to the top of the list, and the LEAST IMPORTANT practice to the bottom, ordering the remaining practices according to their importance.

_____ Preserving access to dead standing wood
_____ Providing clean water
_____ Decreasing use of pesticides
_____ Providing access to a bird feeder with fresh seed
_____ Keeping cats indoors
_____ Using sustainable energy sources

11. Please indicate how much you DISAGREE or AGREE with each of the following statements about gardening and birds.

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| My yard has a role to play in providing bird habitat | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How I garden doesn't really impact local bird populations | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Scientists have shown that how I garden influences bird populations | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Not much is known about how much an individual can contribute to protecting birds through gardening | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The birds I see don't really depend on the plants in people's gardens | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| A bird can survive on the habitat I provide in my yard alone | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| There is a connection between how people manage their yards and the health of local bird populations | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I know what the basic elements of bird habitat are | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

12. MARK how likely YOURSELF and OTHERS are to take the following actions in the next six months?

| | You | | | | | |
|---|---|---|---|---|---|---|
| | Definitely Not | Probably Not | May or May Not | Probably Will | Definitely Will | Already doing this |
| Start composting | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Install a solar panel | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Plant a bird- or pollinator-friendly plant | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Give-up the use of pesticides in your yard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | Other people | | | | | |
|---|---|---|---|---|---|---|
| | Definitely Not | Probably Not | May or May Not | Probably Will | Definitely Will | Already doing this |
| Start composting | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Install a solar panel | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Plant a bird- or pollinator-friendly plant | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Give-up the use of pesticides in your yard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

13. Please choose either TRUE, FALSE or I DON'T KNOW for each of the following statements.

| | True | False | I don't know |
|---|---|---|---|
| A outdoor cat is an example of an ecological trap | ❍ | ❍ | ❍ |
| Habitat loss is the single greatest contributing factor to the loss of an endangered species | ❍ | ❍ | ❍ |
| Birds migrate because they cannot endure the cold temperatures | ❍ | ❍ | ❍ |
| Most birds will feed their young seeds from a bird feeder if they are available | ❍ | ❍ | ❍ |
| Invasive earthworms are good for forests, but typically bad for backyard gardens | ❍ | ❍ | ❍ |

The following questions will help us understand peoples' knowledge about plants and how much explanation we should give about plants on the site.

14. When identifying a tree species what is the most important part of the plant to making an identification?

- ❍ The bark
- ❍ The seeds
- ❍ The flowers
- ❍ The leaf shape
- ❍ The location of the tree
- ❍ I don't generally try to identify trees

15. Please indicate how much you DISAGREE or AGREE with each of the following statements: I am confident about my ability to . . .

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|
| distinguish a mature tree from other kinds of plant life (like a shrub or an herb) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| distinguish a deciduous plant from an evergreen plant | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| distinguish a conifer tree from a broad-leafed tree | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify all of the trees in my backyard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify some of the trees in my backyard | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify most local species of trees | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| identify the first plants to come up in my garden at the beginning of the growing season | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

16. Match the images of leaves to the correct type of tree by dragging the image to the correct box (NOTE: Large images of single leaves were displayed)

| Elm Tree species | Oak Tree species | Maple Tree species | Pine Tree species | Cherry Tree species | Sycamore Tree species |
|---|---|---|---|---|---|
| _____ | _____ | _____ | _____ | _____ | _____ |

17. Please indicate how much you DISAGREE or AGREE with each of the following statements

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|
| If I posted a picture of a tree to Facebook my friends would be able to help me identify it | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I expect YardMap to offer tools to help me identify plants | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I know of a website where I could go to get help identifying a tree I had a picture of | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

The following questions will help us understand peoples' knowledge about birds and how much explanation we should give about birds on the site.

18. The common name of this species is:

- ❍ Gray Flycatcher
- ❍ American Dipper
- ❍ Dark-eyed Junco
- ❍ None of the above
- ❍ I don't know

19. The identification of this bird is most often confused with:
- ❍ Red-headed Woodpecker
- ❍ Hairy Woodpecker
- ❍ Pileated Woodpecker
- ❍ Red-bellied Woodpecker
- ❍ I don't know

20. The common name of this species is:
- ❍ White-throated Sparrow
- ❍ Chipping Sparrow
- ❍ Song Sparrow
- ❍ None of the above
- ❍ I don't know

21. The common name of this species reflects:
- ❍ What it eats
- ❍ The shape of its nest
- ❍ Its preferred breeding habitat
- ❍ None of the above
- ❍ I don't know

22. Which of the following phrases is typically used to describe the song of this species?
- ❍ "Sweet sweet, you're so sweet"
- ❍ "Drink your tea"
- ❍ "Teacher, teacher, teacher"
- ❍ "When I see you I will seize you and I'll squeeze you till you squirt" (said by bird to a caterpillar)
- ❍ I don't know

23. The common name of the female bird pictured is:
- ❍ Rose-breasted Grosbeak
- ❍ Northern Cardinal
- ❍ Evening Grosbeak
- ❍ None of the above
- ❍ I don't know

24. How many different species are pictured in this image?
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ I don't know

25. This bird is a member of which group of birds?
- ❍ Hawks
- ❍ Kites
- ❍ Falcons
- ❍ None of the above
- ❍ I don't know

26. Which of the following statement(s) about this species is true?
- ❑ This bird lays its eggs in nests of other species
- ❑ This bird is not native to North America
- ❑ This bird is a federally listed threatened bird
- ❑ None of the above
- ❑ I don't know

27. The common name of this species is:
- ❍ American Golden-plover
- ❍ Semipalmated Plover
- ❍ Black-bellied Plover
- ❍ None of the above
- ❍ I don't know

28. The common name of this species is:
- ❍ Mourning Dove
- ❍ Rock Dove
- ❍ White-winged Dove
- ❍ None of the above
- ❍ I don't know

29. The bird pictured here belongs to which group of birds?
- ❍ Swifts
- ❍ Sparrows
- ❍ Swallows
- ❍ None of the above
- ❍ I don't know

30. Which of the following statement(s) is true about this species?
- ❑ This bird prefers to breed in wetland and swampy areas
- ❑ This bird prefers to feed while in flight
- ❑ This bird is not native to North America
- ❑ All of the above
- ❑ I don't know

31. Which of the following statement(s) is NOT true of this species?

- ❑ They often flick their tails
- ❑ They nest on the ground in open grasslands
- ❑ They feed mostly on insects
- ❑ They have extremely varied songs
- ❑ I don't know

These questions will help us understand to what extent people participate in citizen science projects.

32. How many total citizen science projects (including YardMap) will you participate in 2014?

- ❍ 0
- ❍ 1
- ❍ 2-4
- ❍ 5 or more

33. Have you joined or participated in any new citizen science projects since you registered for YardMap?

- ❍ Yes
- ❍ No

34. If you have joined or participated in a new citizen science project, which one(s)? (Open-ended response)

35. How often do you:

| | Never | Less than Once a Month | Once a Month | 2-3 Times a Month | Once a Week | 2-3 Times a Week | Daily |
|---|---|---|---|---|---|---|---|
| Watch birds? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Garden? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

36. How would you describe your skill level at:

| | Beginner | Intermediate | Advanced | Expert | Not applicable |
|---|---|---|---|---|---|
| Identifying birds, both by sight and sound? | ❍ | ❍ | ❍ | ❍ | ❍ |
| Gardening? | ❍ | ❍ | ❍ | ❍ | ❍ |

37. A squirrel keeps raiding your bird-feeder and stealing all the seed you put out for birds. How much does each statement below sounds like what you would do to try and stop the squirrel?

| | Not at all like me | Not like me | Not much like me | Neutral | Somewhat like me | Like me | Very much like me |
|---|---|---|---|---|---|---|---|
| Try to find something commercially produced to purchase and solve the problem | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Try to come-up with a solution yourself, without purchasing anything | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Search for other people's effective solutions to the same problem and copy those | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

38. Please indicate how likely are you to seek information about gardening for birds and other wildlife by:

| | Very Unlikely | Unlikely | Somewhat Unlikely | Undecided | Somewhat Likely | Likely | Very Likely |
|---|---|---|---|---|---|---|---|
| An internet search | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Contacting YardMap/ Cornell Lab of Ornithology staff | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Looking at the YardMap web pages | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Contacting a friend or family member | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Using the local library | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Buying a book | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

39. Please indicate how much you DISAGREE or AGREE with the following statements:

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I am comfortable using social networking sites (e.g., facebook) to share my experiences with others | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I would have difficulty navigating a new (unfamiliar) website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I would have difficulty uploading an image to a website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I understand how to use electronic discussion forums | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am able to adapt to new technologies without much trouble | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I feel apprehensive when visiting a new website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I have tried using interactive drawing or mapping technology online (e.g. - Google My Maps, Google Earth) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

40. Rate the following tools according to their usefulness in helping you find reliable answers to questions you might have about science-related topics: (choose NOT APPLICABLE if you've never used that source)

| | Very Useless | Useless | Somewhat Useless | Neutral | Somewhat Useful | Useful | Very Useful | Not Applicable |
|---|---|---|---|---|---|---|---|---|
| News websites | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Peer-to-peer social network interactions (e.g. - asking friends via online social networking tools like Facebook) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Online forums | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Books (digital or printed) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Wikipedia | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Direct conversations with friends and family (egg - in person, on the phone, over email) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

41. Are there any additional tools you use to seek information about science-related topics? What are they?

Tool 1 _____
Tool 2 _____
Tool 3 _____

**(BOTH Treatment Groups)** These questions will help us understand how you have used YardMap since you registered for the site.

42. What surprised you most about YardMap, and why? (Open-ended response)

43. Have you started to map your yard? (By "map your yard" we mean outlining your yard on the map then starting to outline specific areas, add features and adding information about it.)

❍ Yes
❍ No

44. Is there any particular reason why you haven't started to map your yard? (Open-ended response)

45. What space or spaces did you map? (e.g. a yard, a public space, a school, etc.) (Open-ended response)
47. Did you fill in your yard with any habitat polygons (see picture above)?

❍ Yes
❍ No

46. Is there any particular reason you didn't include any habitat polygons? (Open-ended response)

47. Did you add any objects like trees or bird feeders to your map (see map image above for an example)?

❍ Yes
❍ No

48. Is there any particular reason you didn't add any objects to your map? (Open-ended response)

49. Did you fill in any characteristics about your habitats and objects using the characteristics tab shown in the image above?

❍ Yes
❍ No

50. Is there any particular reason you didn't fill in any specific information or characteristics? (Open-ended response)

**(Non Social Networking Group)**
51. How satisfied were you with the following

| | Very Dissatisfied | Dissatisfied | Somewhat Dissatisfied | Neutral | Somewhat Satisfied | Satisfied | Very Satisfied |
|---|---|---|---|---|---|---|---|
| The YardMap website overall | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Your ability to share your sustainable gardening actions with Cornell | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Your ability to share your yard with Cornell using the YardMap website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The educational content available through the YardMap website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

**(Social Networking Group)** These questions will help us understand how you may have communicated with other users in YardMap.

52. Thinking about interacting with other people in YardMap, how much do you agree with the following statements?

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| It was important to be able to see what other people had done. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| It was helpful to be able to ask the community questions about what I was doing. (3) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I changed how I used YardMap based on what other people did or said. (5) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

53. Have you done anything differently in your actual yard as a result of looking at someone else's map?

❍ Yes

❍ No

54. What changes have you made in your own yard as a result of looking at someone else's YardMap? (Open-ended response)

55. Which of the following features did you use in YardMap?

| | Used | Did not use | Was not aware you could do this |
|---|---|---|---|
| Posting questions about my yard in the Community section of YardMap | ❍ | ❍ | ❍ |
| Reading other peoples' notes in the Community section of YardMap | ❍ | ❍ | ❍ |
| Commenting on other peoples' posts | ❍ | ❍ | ❍ |
| "Liking" someone else's post | ❍ | ❍ | ❍ |

56. Of the four features listed in the previous question, which was the most important to you and why? (Open-ended response)

57. How satisfied were you with the following,

| | Very Dissatisfied | Dissatisfied | Somewhat Dissatisfied | Neutral | Somewhat Satisfied | Satisfied | Very Satisfied |
|---|---|---|---|---|---|---|---|
| The YardMap website overall | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Your ability to share your sustainable gardening actions with Cornell | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Your ability to share your yard with Cornell using the YardMap website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The educational content available through the YardMap website | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The social tools built into yardmap (looking at other people's maps, talking to other users, reading other users comments about their maps) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

**Waitlist Group**

58. Have you logged into, used or looked at the YardMap site since you first registered?

❍ Yes

❍ No

59. Please indicate how much you DISAGREE or AGREE with each of the following statements

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| I expect to find YardMap easy to use | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I expect most people will have some trouble using a website like YardMap | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am confident in my ability to use the YardMap website to submit data | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am confident in my ability to use the YardMap website to look-up information about gardening for birds and other wildlife | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

60. To have a more thorough understanding of peoples' experiences with YardMap, we are interested in talking to a small number of people in more depth. Would you be interested in receiving an invitation for a short telephone conversation a month or so from now so that we can continue to improve YardMap?

❍ Yes

❍ No

61. Please enter your first name and email address we can use to contact you for a follow-up conversation: Please know that if you enter your email address below, it will only be used for the purpose expressly stated, and not shared, distributed or used for any other purpose besides to follow-up for a phone call.

Name: _____

Email: _____

62. As a thank you for completing the survey, you will be entered into a drawing, which includes an iPad mini and (10) $100 amazon.com gift certificates. Please indicate if you would like to be entered into the drawing:

❍ Do NOT enter me into the drawing

❍ Yes, enter me into the drawing

# Appendix C : Interview Instrument

1. First Name (data collector inputs information based on post-survey)
2. Last Name (data collector inputs information based on post-survey)
3. Gender (data collector inputs information based on pre-survey)
4. US Region (data collector inputs information based on pre-survey)
5. Did participant use social networking available on YardMap? (data collector inputs information based on web analytics and interview responses)

6. What was your favorite thing about YardMap?
7. Were there any ways that using YardMap and its different features resulted in you thinking differently about your own yard?
8. [Follow up to question "thinking differently"] Did you look at anyone else's map, and if so, did this influence how you thought about your own yard?
9. [Those that didn't use social networking] There were some options for looking at other YardMap users' posts, commenting or asking questions. Did you use any of these options?
   9a. Was there any particular reason why you didn't use these?
10. [Used social networking group only] YardMap has some options where you could ask or answer questions, or post something within YardMap. How did you like using them?
11. [Used social networking group only] Did being able to read comments or talk to other people about their owns yards change how you think about or take care of your own yard?
    11a. If yes, please explain.
12. Did you find yourself thinking differently about the role your yard might play to help birds or the environment?
    12a. [If yes] Tell me more about that.
13. Some people have mentioned that YardMap helped them think of their yard as a part of something greater or bigger. Was that something you thought about at all while you were using YardMap?
14. Have you done anything differently in your yard as a result of participating in YardMap?
    14a. [If yes, made changes] Of all the changes you could have made, why did you choose to do this one?
    14b. [If yes, made changes] And how did you realize this is something you wanted to do?
15. Was there anything you want to do to your yard, but haven't yet?
    15a. What is it?