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# Outsmart Invasive Species

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# Outsmart Invasive Species



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## **Executive Summary**

This paper asserts that social media may be an effective supplement to traditional media in a volunteer recruitment campaign. I conduct a detailed study to assess the impact of various social media interventions, and offer a detailed analysis of the findings. I conclude with recommendations for organizations interested in using social media to promote a cause. The results of this study support the idea that social media outlets, like Facebook, Twitter, YouTube, and blogs can be used to supplement – but not supplant – traditional forms of marketing in a volunteer recruitment campaign.

## Introduction

**Research Question:** Is Social Media an effective tool for marketing a volunteer project and recruiting volunteers? If so, how can social media be used as a supplement to “traditional” marketing for marketing the project and recruiting citizens in a volunteer conservation campaign?

Social media (Facebook, Twitter, Blogs, YouTube, etc) have changed the ways in which marketing and volunteer recruitment is conducted. Web 2.0 technologies have brought a level of integration to communications campaigns never seen before; consumers of information are encouraged to engage in the campaign and contribute to it. Surprisingly, little research has been done to assess the effectiveness of supplemental social media in educating and recruiting volunteers. Furthermore, despite a widespread perception among outreach and development officers that social media improves the volunteer marketing and recruitment efforts of small business and non-profits, there remains little empirical evidence to support this idea. Until now, most researchers have relied on surveys and polls of nonprofit leaders and outreach officers to assess the success rate of social media campaigns. Only a handful of researchers have attempted to quantify the impact of social media on volunteer recruitment efforts. In summary, the emerging field of social media is not well understood. Through Outsmart Invasive Species (OSI), this capstone project will attempt to measure the effect of various social media interventions on volunteer recruitment. The findings of this project will help to determine best practices for future social media recruitment campaigns.

### **Overview of the larger OSI Project, Community Engagement & Citizen Science**

The OSI project is designed to investigate the use of smartphone apps in identifying key emergent and active invasive species, to both encourage citizen engagement in ecological endeavors and to help keep outbreaks in check. The OSI project will provide scientific data for research and environmental management, and promote environmental awareness among the general public. The mobile app and website work by collecting location data (via GPS on a mobile device, or via user-input), time, date, and verifying photographs of invasive plant species. Volunteers using GPS-enabled mobile phones contribute to the project by making geo-tagged observations to alert relevant agencies to the presence of emergent invasive species. Utilizing this “crowdsourcing” theory allows

scientists to increase the speed and accuracy of their mapping initiatives. In the spirit of citizen science, our primary target audience will be outdoor enthusiast, hikers, birders, and others who are already “in the field”.

By incorporating the concept of “collaborative government” into environmental management, our project looks to add an additional “citizen science layer” to the existing invasive species control efforts being undertaken by Federal (US Fish and Wildlife Service) and State (MA Department of Conservation and Recreation’s Service Forestry) and non-profits such as the Trustees of Reservations ([thetrustees.org](http://thetrustees.org)) in Western Massachusetts. These professional agencies are responsible for weed eradication, while citizens will become the “eyes and ears” on the look out for invasives. Citizens will be used to complement the efforts of trained professionals, since these trained professionals can only cover so much territory (CAISE Inquiry Group 2009)(Silvertown 2009). The goal is to complement efforts being undertaken at Cooperative Invasive Species Management Areas (CISMA) like the Westfield River Invasive Species Partnership (WISP), where resource managers are training teams of volunteers to search for “least wanted” invasive species. Benefits to the public include, introducing a wide spectrum of people to scientific processes, increasing awareness of scientific issues, and improving citizen’s attitudes toward science and ecology.

### **Objectives:**

My primary goal in this paper is to focus on one component of the collaborative governance system: the question of how social media can be best used to supplement traditional media outlets in a campaign to market and recruit citizen participants in scientific work. Through this project, we aim to use social media as an avenue to establish a network of concerned citizen stakeholder groups. These citizens will engage with environmental agencies, providing important input from the wider community. This paper, however, examines *only the initial marketing and recruitment efforts in the OSI project*; future papers may explore the long-term outcomes of social media campaigns.

In this paper, I will begin with a review of the relevant literature on citizen science, volunteerism, mobile devices, and social media. I then explain the study design in detail, including the dependent variables used to measure

recruitment success and the independent variables – social media interventions - that were tested each week. Next, I present the results of each weekly intervention strategy and compare the actual results to the expected results for that intervention. I then explain the significance of the findings, what factors we believe influenced the findings, and explore the take away lessons from this study and the implications for the future of social media recruitment. Finally, I summarize the findings of the study and the conclusions that can be drawn from this work, as well as suggested areas for future study.

## **Literature Review**

### **Citizens Science**

The term “citizen science” describes communities or networks of individual citizens who function as active participants in some domain of science (Goodchild 2009). This includes a wide variety of collaborations between concerned citizens and official agencies (Lee 2006). By leveraging a large pool of volunteer participants, projects utilizing citizen scientists can collect a considerable amount of information, in a short period of time, and are particularly effective in situations where hiring a professional agency would be too costly, too time consuming, or not otherwise feasible. These initiatives may be conducted as focused, time-bound campaigns (“bio-blitzes”, as they are sometimes called), or as long-term projects that continue for several years. The National Park Service, and many other conservation groups, has begun to recognize the benefits of this approach (Delaney 2007). As the use of citizen science expands, and the mainstream of the scientific community recognizes its comparative advantages, researchers are being encouraged to explore an ever-increasing range of topics. In recent years, there has been a considerable increase in the number and scope of citizen science projects being conducted. This is a response to a number of factors, including state and federal budget constraints, an increasing demand for data on local environmental changes, the continued growth of environmental nonprofits, and the general public’s renewed desire to be involved in environmental management (Silvertown 2009).

Citizen science has been proven to be an effective tool for breaking down the physical and mental barrier between the scientific community and citizen participation (C. C. Conrad 2010)(Graham 2010). As web-based platforms

become more commonplace, scientists evaluating new approaches for engaging the public have begun to recognize the value of mobile apps, which are both user-friendly and accessible to the lay public. They also need to consider new research approaches and communication tools (Graham 2010).

Two successful examples of citizen science in North America are the Audubon's Christmas Bird Count (Goodchild 2009) and the Tucson Bird Count (McCaffrey 2005). Both projects enlist amateur ornithologists in an annual census of bird populations. Results from these projects have been cited in several scientific studies, and have helped wildlife managers identify important sites for birds, and develop land-use standards that protect native birds (McCaffrey 2005). The National Audubon Society's Christmas Bird Count, one of the best-established examples of citizen science, has been collecting data about the distribution patterns of North American birds for over 100 years. (Delaney 2007). The Tucson Bird Count enlists skilled and semi-skilled participants to conduct a census of the bird population around the urban center of Tucson Arizona (Goodchild 2009). These two examples demonstrate how members of the public, with only a brief period of training, can contribute important scientific information to an important cause.

The data gathered during a citizen science project can be applied in many ways to solve a wide variety of environmental problems, from theoretical and academic questions, to issues of land use and conservation planning (Dunn 2008). An added benefit, and one more difficult to quantify, is the ability of community-based projects to "reconnect people with nature" (Danielson 2009) and improve the public's understanding of the scientific process (Prestopnik 2011). Additionally, citizen science projects have enormous cost-saving potential, and the value of investing in community based grassroots organizations is self-evident (Danielson 2009).

Encouraging public engagement in science, with the long-term goal of permanent behavior change, requires more than an informational campaign. It demands a reframing of the scientific process in a manner that presents "real-science" as more accessible to the public -- more "fun". Citizen science, through mobile-crowd sourcing, makes it easier for the public to "recognize the connection between their everyday lives, specific values, and various

environmental problems” (Waitt 2010). A review of past environmental projects underscores the importance of integrating stakeholders (volunteers, employees, community members, local residents, business owners, et cetera) into the decision-making process. Bringing stakeholders into the process offers decision makers a broader range of inputs, which can improve the quality of decisions being made. Stakeholder participation demands an organizational culture that values external input and individual empowerment (Reed, 2008). Whenever possible, input from external stakeholders should be solicited early in the project and should continue until its completion (Ibid).

For environmental scientists to motivate, encourage, and sustain public engagement and stakeholder participation in ecology and other environmental projects, they will need to apply lessons from partners in the social and cognitive sciences. Citizen science is rooted in a belief that participation in science, through informal sources and recreation activities, can establish a mutually beneficial relationship between citizen and scientist: the participant gains (a) a detailed understanding of the scientific process beyond what passive participation could yield, and (b) a degree of scientific literacy that enables him to become an active participant in the larger scientific discussion and decision making process (CAISE Inquiry Group 2009), (Prestopnik 2011).

### **Volunteerism**

Volunteering is often defined as a pro-social activity in which a person’s labor and time are given, to benefit a specific cause, group, or person, without the expectation of monetary compensation (Wilson 2000). This definition does not preclude volunteers from obtaining some benefit, either directly or indirectly, from their work (Ibid).

Citizen scientists, volunteering many thousands of man-hours, have transformed the landscape of the modern conservation movement (Ryan 2001). Volunteers contribute to a wide variety of environmental initiatives, and research investigating the psychology of volunteers is therefore important to conservation biologists and scientists attempting to develop and maintain volunteer programs. Despite the widening influence of citizen science, only a few researchers have studied the motivations of volunteers in the context of environmental projects (Weston. M. & Fendley M. & Jewell 2003).



We know that individuals volunteer in order to satisfy one or more desires (social, personal enhancement, etc). The same volunteer task can satisfy different needs for different individuals, and a volunteer's primary motivations for helping may change over time. Volunteers whose motivations are fulfilled by their participation will derive greater satisfaction than those whose concerns are not met, and the satisfied volunteer is more likely to remain with the project (Clary 1998). Therefore, matching an individual's motivations to the specific volunteering task is an important, and challenging, element of successful and sustainable volunteer projects. To accomplish this, researchers advise volunteer coordinators to focus their recruiting and retention efforts on salient motivational factors, while striving to build personal relationships with their volunteer force (Nov 2011).

Recognizing that volunteers have several motives is important, as it sheds light on the altruism-egoism conflict. This conflict involves two opposing models: first, that helpfulness is motivated by a selfish desire to benefit oneself (ego), and second, the idea that helpfulness is sometimes based on a selfless concern for the other (altruism) (Clary 1998). The multiple motives theory suggests that the Altruism-Ego divide has been over-stated; volunteers give their time for a variety of reasons, not a single motivating factor (Ibid).

### **Mobile Devices**

The rise in mobile phone based sensing platforms marks an important development for citizen science (Paulos 2009). As smart phone technology becomes more widely dispersed, projects utilizing portable sensing technology are becoming increasingly common. Casual and serious citizens scientists are now able to perform complex tasks that had previously been the domain of professional scientists (Willett 2010).

One problem associated with the traditional methods of mapping invasive species, is the cost and time that is required to conduct a detailed environmental survey. Moreover, static maps are quickly rendered obsolete as the population spreads, or as control work succeeds in removing species from the area (Graham 2010). Utilizing a team of citizen scientists to update invasive species maps, however, can circumvent this problem. Leveraging a large pool

of volunteers, who will continually update the data, means that the information is far more likely to present an accurate depiction of the actual invasive population (Graham 2010).

The current limitations that mobile technologies place on data collection remain a major obstacle to the success of mobile-based citizen science projects. While citizen science benefits greatly from improvements in mobile technology, critical issues like network/cellular connectivity, short battery life, and the limited accuracy of GPS systems, have slowed progress (Willett 2010).

### **Traditional Media and Social Media**

Social media has been defined as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content" (A. M. Kaplan 2009). Social media marketing is defined as web-based and mobile technologies that facilitate a two-way, interactive dialogue between organizations and individual users (Ibid). A formal definition of social media requires understanding two related concepts that are often associated with it: (a) Web 2.0 and (b) User Generated Content. Web 2.0 is used to describe a new way in which software developers and end-users utilize the web – that is, a platform where end-users are no longer passive consumers, but become active participants in the creation of web content. In the Web 2.0 model, all parties, in a collaborative fashion, continuously modify content.

While both social and traditional media are capable of reaching a global audience, traditional media utilizes a centralized framework for its production and distribution. Social media, in contrast, is decidedly more decentralized, less hierarchical, and claims multiple points of production/content creation. With traditional media the tools of production are generally controlled by privately owned agencies and/or government agencies. With social media, in contrast, production tools are (generally) freely available to the public at no cost (Tanuri 2010) (Coon 2010).

Under the umbrella of Social Media, three subcategories are most relevant to marketing and recruitment, Blogs, Content Communities, and Social Networking Sites. *Blogs*, a portmanteau of “web” and “log”, represent one of the first forms of social media. “Blogs are the Social Media equivalent of personal web pages and can come in a multitude of different variations, from personal diaries describing the author’s life to summaries of all relevant information in one specific content area” (Blood 2000). Organizations have adopted blogs as a more personal and more immediate channel of communication. Blogs are perceived by customers as more genuine and authentic, when compared to professionally developed websites. *Content communities* facilitate the sharing of media content between multiple users. Content communities are distinguished from other forms of social media in that they do not require the user to create a personal profile page. The popularity of video sharing communities (like YouTube and Vimeo) has made them attractive contact channels for many organizations (Blood 2000). Finally, *social networking sites* like Facebook, and LinkedIn enable individual users to create personal information profiles. These serve both personal and professional purposes and encourage friends and colleagues to have access to those profiles, social networking sites, promote the formation of online communities. These personal profiles can include any type of information, including photos, video, audio files, and blogs (Blood 2000).

A Study by the Pew Research Center's Project for Excellence in Journalism examined the patterns of social media news usage by American consumers of news, they found that compared to traditional/non social media, the issues that became popular in social media platforms were substantially different from those that gained traction in the mainstream press:

*Each social media platform also seems to have its own personality and function. In the year studied, bloggers gravitated toward stories that elicited emotion, concerned individual or group rights or triggered ideological passion... On Twitter, by contrast, technology is a major focus... YouTube has still other characteristics that set it apart. Here, users don't often add comments or additional insights but instead take part by selecting from millions of videos and sharing... Across all three social platforms, though, attention spans are brief. Just as news consumers don't stay long on any website, social media doesn't stay long on any one story. On blogs, 53% of the lead stories in a given week stay on the list no more than three days. On Twitter that is true of 72% of lead stories, and more than half (52%) are on the list for just 24 hours (Pew Research 2010).*

In general, social media tends to focus more on stories that are not covered by the traditional media outlets, and surprisingly, there is little evidence to suggest that the traditional press takes any cues from popular trends in social media - there is little communication between the two. The most distinct feature however is the speed with which social media spreads, and the speed at which it dies out. "The stories that gain traction in social media do so quickly, often within hours of initial reports, and leave quickly as well. Just 5% of the top five stories on Twitter remained among the top stories by the following week. This was true of 13% of the top stories on blogs and 9% on YouTube. In the mainstream press, on the other hand, fully 50% of the top five stories one week remained a top story a week later" (Pew Research 2010).

## **Methods**

The OSI marketing team used a combination of social media platforms and traditional marketing techniques to publicize and recruit volunteers in two watersheds. In the western part of the state, OSI selected the Westfield River watershed, which encompasses the towns west of the Pioneer Valley and east of the Berkshires. In the eastern part of the state, OSI targeted the SuAsCo, which includes central Massachusetts and towns west of Boston. While these watersheds are separated by geography and by organizational boundaries, the demographics of the watersheds were similar enough to compare results. This made the watersheds an ideal environment in which to test the impact of supplemental social media in a volunteer recruitment campaign.

### ***Dependent Variables: Engagement Indicators for the Success of Each Platform***

The dependent variables used in the OSI research study seek to measure and explain patterns of citizen engagement in the marketing and recruitment campaign. Engagement is defined as the level of participation and involvement in the project; we measure engagement across three categories. First, General Success Indicators examine the success of the project overall, these are not specific to either social or non-social media interventions, but rather measure the achievements of the project as a whole. Second, Non-Social Media Indicators measure the

success of non-social media interventions: mailing lists, press releases, etc. <sup>1</sup>Third, Social Media Indicators are used to assess the impact of social media interventions, independent of non-social marketing activity.

#### **A. App Downloads/Data Submission [General Success Indicator]:**

This indicator measures the number of Smartphone users who download the app from the iTunes and Android stores. Each week, the OSI marketing team recorded the number of app downloads in the past seven days. Our hypothesis was that, if social media were an effective marketing and recruitment tool, the number of app downloads would spike following a particular social media intervention, and would generally trend upward over time.

*Expected Results:* The more successful the marketing intervention, the larger the corresponding “bump”. Data submissions, the second part of this metric, measure the number of user submissions received by the ecology field team.

#### **B. Mailing Lists subscribers [Non-Social Media Indicator]**

This indicator measures the number of potential volunteers who have subscribed to the OSI mailing list. The mailing list is one tool that is used to keep those interested in the project informed about important events, and other relevant information.

*Expected Results:* If the social media interventions were successful, we expected this marker to trend upward over time, and we expected to see a spike following interventions that corresponded to the success of the interventions.

#### **C. Facebook “Likes” and “Reach” and Twitter [Social Media Indicator]**

Facebook allowed the OSI team to share videos, photos, and links with followers, and promoted engagement across a variety of media platforms. Facebook provides analytics for page administrators to monitor traffic; this “Facebook Insights” tool allows us to record multiple metrics tracking the success of our Facebook campaign. For the study

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<sup>1</sup> While these were affected by social media interventions, they are sufficiently isolated from the effects of our direct social media campaigns (Facebook, Twitter, blogging) to measure the success of non-social interventions.

weeks, we recorded total “Likes” and weekly “Likes” to measure the number of people following our page. Twitter allowed the OSI team to send out brief, frequent updates concerning the progress of the project. These messages were “pushed” to OSI followers on Twitter who subscribed to receive these results. These messages appeared on followers’ home pages. This provided followers an opportunity to interact with the OSI project on an informal, personal level. This interaction, we believe, created a connection between recruits and the OSI team members.

*Expected Results:* We anticipated the total number of friends and followers to increase overtime, while the weekly statistics would show a “bump” following periods of intense Facebook marketing efforts, with metrics leveling off after the intervention ceased. We also recorded weekly and total “reach” statistics, which assessed the total number of people who saw our Facebook posts (including “friends of friends” who liked our page). Again, we hoped the total statistic would trend upward. Due to the viral nature of Facebook, we expected the post-intervention “bump” to become larger overtime. As more users “liked” our page, our total reach would increase, meaning the size of our social network would increase, thus exposing more people to our page.

#### **D. Website Hits via Google Analytics [General/Social Media Indicator]**

The OSI Blog and website allows the marketing team a space to share longer descriptions of our project, press releases, and information regarding how to sign up. The OSI Blog was updated frequently and linked directly to Facebook, Twitter and YouTube. Google Analytics allowed the marketing team to analyze the traffic that came to the Masswoods website, which reflected how effective the social media intervention was at directing traffic to our homepage. We monitored total (cumulative) and weekly page views, new page views, and returning page views.

*Expected Results:* We expected to see bumps in our weekly new and total views, and that the magnitude of these bumps would increase overtime as the size and reach of our social network increased (meaning we have the potential to reach more users each week). We predicted that the bump in views would be proportional to the success of our marketing intervention, and that, when the weekly interventions ceased, the metrics would fall to a level slightly higher than the pre-intervention level. When viewed over the course of the eight weeks there should, however, be a general upward trend in views (an assumption we had for all metrics).

## **E. YouTube Video Views [Social Media Indicator]**

Our YouTube video served as the final social media marketing intervention, and was launched towards the end of our recruitment campaign. This presented our team with an opportunity to assess its impact and compare it to other marketing interventions used in earlier weeks.

*Expected Results:* We expected the number of YouTube views to rise overtime, with bumps following periods of intense promotional use. A general upward trend in cumulative views, with increasingly larger bumps each week, would indicate a successful social media campaign.

### ***Independent Variables: Social and Traditional Media Interventions***

As discussed above, each week the OSI team employed various marketing interventions to publicize the project and recruit volunteers; these interventions were tracked using metrics that assessed "recruitment success" as a dependent variable over time:

#### *(a) Social Media Interventions*

- Facebook Page (and Twitter Posts<sup>2</sup>)
- Blog
- YouTube Video

#### *(b) Traditional/Non-Social Interventions*

- Email Marketing
- Print Brochures
- Press Releases
- *Extraneous (meetings with external groups, outside news coverage, etc)*

A "mix" of these platforms was used each week in the marketing and recruitment interventions. Each week we performed a different kind of recruitment effort and then monitored the effects. At the completion of each week, the team recorded the outcome for each of the media platforms, and the results were then used to compare the success

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<sup>2</sup> The OSI Facebook and Twitter accounts were linked, allowing us to simultaneously post on both platforms. This is not only helpful, but necessary, because Twitter lacks the analytical features available on Facebook. Without analytical tools, recording the tracking metrics would have been impossible. Henceforth Facebook metrics will serve as a proxy for Twitter metrics.

of various intervention strategies. The first week of the study was used to establish a base line, where we measured the interest in our project prior to launching marketing and recruitment interventions. In the weeks that followed, we employed various intervention tactics, from Facebook to Twitter to YouTube.

We monitored our marketing and recruitment interventions longitudinally, recording when specific interventions occurred and then examining the various metrics of success to see if they spiked. Our hypothesis was that every time we launch an new intervention there should be a spike in visitation to corresponding media platform, which would in turn lead to a smaller bump in the number of people who commit to sign up for the project.

## Results

### Weeks 0: February 19-25

#### *1. Base line week (no intervention)*

*(a) Social Media:* This base line week was used to establish a benchmark of what recruitment and engagement numbers would look like without any social marketing interventions. As anticipated, we experienced only a small response from our target social media population. We can attribute any change in engagement metrics to actions taken by individuals with prior connections of the OSI project (WISP group members and OSI team members), who have been in an ongoing relationship with the project since its inception, or the web developers testing the various social media platforms

*(b) Website Hits:* As predicted, the number of new views on the OSI website remained flat throughout the base line period. Any spikes can be traced to returning viewers, again these are people associated with the project (i.e. website developers, team members, and WISP partners.) The number of new views is a better indicator of marketing and recruitment success, as it provides a better picture of how many web users are being driven to our project website/blog. However, return views remain an important metric, as we obviously wished to maintain a relationship with users throughout the campaign.

*(c) Mailing List:* N/A

*(d) App Downloads/Data Submissions:* N/A



*(e) YouTube Views: N/A*

*(f) Outside Influences that Might Have Caused Interference: WISP Meeting held on Thursday, 2/9/12*

### **Week 1: February 26 – March 3**

#### *1. The OSI marketing team began its Facebook and Twitter engagement campaign*

*(a) SM:* This week, we sent out multiple status updates and tweets. We also began to “friend” other relevant pages on Facebook, and follow relevant twitter accounts. The response we observed was modest, there was a gradual increase in metrics that measure Facebook and twitter engagement (likes and total reach, and followers). These bumps came approximately one day after the interventions, however impacts were seen in as little as a few hours post-intervention. Generally, Facebook elicited the most rapid response times, which was not surprising, given the instantaneous nature of Facebook and social media. (These response time trends continued throughout the project.) As expected, the gradual increases leveled off after the interventions ceased, but post intervention engagement levels remained elevated when compared to pre-intervention levels.

*(b) Website Hits:* The week of the 26<sup>th</sup> brought a modest increase in the number of new viewers accessing the OSI blog. From the 28<sup>th</sup> to the 3<sup>rd</sup>, there were small increases in viewership, however contrary to our initial assumption; these increases were temporary and declined to pre-intervention levels immediately after the interventions ceased.

*(c) Mailing List: N/A*

*(d) App Downloads/Data Submissions: N/A*

*(e) YouTube Views: N/A*

*(f) Outside Interference:* On Sunday, March 2nd, The Gazette ran a story on invasives and MA forests.

### **Week 2: March 4-10**

*1. During this week the OSI team put out it's first press release, which ran on the UMass website and Public Policy department's blog.*

*2. The marketing team continued the social media push on Facebook and Twitter.*

*3. On Friday night, the app was released in the iTunes Store. It was promoted on the OSI Facebook and Twitter page.*

*(a) SM:* At the conclusion of these interventions, we observed a second bump in Facebook and twitter engagement metrics. Again, we expected this bump to level off after the interventions ceased, returning to a post intervention level slightly higher than pre-intervention levels. Because the app was released so late in the week, it was not heavily promoted over the weekend, as anticipated we saw only a modest change in social media metrics.

*(b) Website Hits:* During the week, the website had no views, which was discouraging and not what we had anticipated. Our initial prediction was that earlier interventions would continue to drive at least some traffic to our blog, even during periods of less than normal marketing activity. Over the weekend, after the launch of the app - and the social media attention devoted to that - we finally saw a spike in views. As predicted, this bump was larger than those that preceded it, with peak total viewership nearly 100% higher than the peak from the previous week.

*(c) Mailing List:* 0

*(d) App Downloads/Data Submissions:* Since the app was released late Friday night, we saw only a modest number of downloads over the weekend, statistics for the following (full) week of March 11<sup>th</sup> are more telling.

*(e) YouTube Views:* N/A

*(f) Outside Interference:* The interest generated from a press release posted to the UMass Poli-blog generated less interest than we had expected. We do not have any means to access analytical data from the poli-blog (which we do not own) however it is unlikely that this press release drove any significant web or social media traffic, and our metrics indicated no sign that this made a substantial impact in our numbers. Additionally, there was a meeting of the SuAsCo CISMA on 3/8/12; this meeting drove many new viewers to our blog, a trend we saw throughout the project.

### **Week 3: March 11-17**

*1. This week we employed "targeted email" contacting of various groups we had previously identified as potential partners. Targeted contacting involved reaching out to various groups we have identified and supplying them with "email text" to distribute to their members via their internal listserv.*

*2. The marketing team continued the social media push on Facebook and Twitter.*

*3. Continued promotion of the iPhone app.*

*(a) SM:* This week marked a critical turning point in the social media (Facebook and Twitter) campaign. The gradually increasing level of interest generated over the past weeks, combined with having finally launched the app<sup>3</sup> (which had been delayed due to technical difficulties), helped the social media campaign reach what appeared to be a critical mass. We recorded a drastic bump in Facebook and Twitter engagement metrics (See: Appendix), which we attributed to a continued push with these platforms and the popularity of the app. As expected, this bump leveled off after the interventions ceased, returning to post-intervention levels markedly higher than pre-intervention levels.

*(b) Website Hits:* This week also marked an important milestone for our blog, for the first time since its launch; the weekly number of “new visitors” exceeded the number of returning visitors (See: Appendix). This demonstrates the success of our social media campaign at driving new visitors to the blog.

*(c) Mailing List:* By the conclusion of this week, we expected an increase in the number of users signed up to receive updates on the listserv. Sign-ups proved to be lower than anticipated with a total of one user signed up to receive our email newsletter by the end of this week.

*(d) App Downloads/Data Submissions:*

iTunes Downloads (total): 15

User Data Submissions (total): 25

*(e) YouTube Views:* N/A

*(f) Outside Interference:* WISP Meeting (3/15/12). Don't Move the Firewood tagged OSI's Facebook page in a post on (3/15/12). Neither is believed to have had a significant impact.

#### **Week 4: March 18-24**

*1. Continued social media push*

*2. App Promotion*

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<sup>3</sup> The app had been delayed for approximately three weeks due to technical difficulties. Our original schedule had us launching the app immediately, before even beginning the social media interventions.

*(a) SM:* We expected the bumps seen in social media interest would carry over into this week, as we continued our social media marketing efforts and the promotion of the app. As seen in the graphic (See: Appendix) there was a small “bump” in Facebook and twitter engagement metrics. This can be attributed to interest generated by the release of the app and a social media outreach effort. As expected this leveled off after the interventions ceased, however the post-intervention levels remained significantly elevated.

*(b) Website Hits:* Tuesday March 20<sup>th</sup> saw the highest single day of web -traffic to date, 39 new viewers, and 10 returning viewers, for a total of 49 views. As expected this bump leveled off after the interventions ceased, however the post-intervention levels remained significantly elevated. We believe this spike was due in part to the successes of the previous three weeks, and that this week’s success was built upon the network of fans and users that we had created in the previous weeks.

*(c) Mailing List:* Following these interventions, we saw only a modest increase in the number of users signed up to receive updates on the listserv, we added 1 new sign up, for a total of two subscribers.

*(d) App Downloads/Data Submissions:*

iTunes Downloads (total): 25

User Data Submissions (total): 30

*(e) YouTube Views:* N/A

*(f) Outside Interference:* OSI made contact with a reporter from the Worcester Telegram who would later run a story on the OSI project.

## **Week 5: March 25-31**

*1. Continued social media push*

*2. Continued Targeted Email contacting of various groups we had identified*

*3. Continued App Promotion*

*(a) SM:* While previous week’s social media interventions were spread out evenly (roughly on a Monday/Wednesday/Friday posting schedule) all social media interventions this week took place on Thursday. Social media metrics showed how this pattern affected the amount of interest on our Facebook and Twitter pages.

Unlike previous weeks, there was a negligible increase in the number of visitors to the OSI Facebook page. This suggests that either the effectiveness of Facebook is limited to the first several weeks, or that a more effective pattern of social media updating would be to spread the posts out over a period of several days, evenly distributed throughout the week.

*(b) Website Hits:* Reflecting the same trend seen above, blog hits mirror the pattern seen in SM, and show how this altered promotional pattern affected the amount of web traffic driven to the OSI blog. During the earlier part of the week, (Monday-Wednesday) there was no noticeable bump. Towards the end of the week, however, there was a significant spike in views (See: Appendix). Because there is no corresponding bump in social media metrics, we can conclude that this spike was driven by the Worcester Telegraph feature story that ran this week (See Outside Influences, below).

*(c) Mailing List:* 3

*(d) App Downloads/Data Submissions:*

iTunes Downloads (total): 198

User Data Submissions (total): 33

*(e) YouTube Views:* N/A

*(f) Outside Interference:* During this week, the Worcester Telegraph ran a story about the OSI app and project. We believe this additional attention accounts for a significant percentage of blog visitors and a significant percentage of the week's app downloads. This is because the blog metrics reveal a considerable bump in late to mid-week hits, while there is no corresponding bump in social media (Facebook and Twitter) page views. Additionally, a Westfield Group meeting was conducted at Worcester State College; 100x brochures were distributed at the event (3/25/12).

## **Week 6: April 1-7**

*1. Android App Released (4/4/12, Wednesday)*

*2. Social media push continued*

*(a) SM:* This week marked the first week of the OSI Android App marketing campaign. It should be noted that the spike created by releasing the Android App carried over into Facebook and Twitter, and we observed a bump in

social media metrics, which we believe was driven by visitors downloading the new version of the app. There was a noticeable bump in Facebook and twitter engagement metrics, approximately 24 hours after publicizing the release of the app. (See: Appendix) As expected this bump leveled off after the interventions ceased, however the post-intervention levels remained significantly elevated.

*(b) Website Hits:* There was a modest bump in website views following the release of the Android App and its promotion. However we did not see an increase in new viewers, only return views. As expected this bump leveled off after the interventions ceased, returning to a post intervention level slightly higher than pre-intervention levels.

*(c) Mailing List:* 0 New, 2 Total Sign Ups

*(d) App Downloads/Data Submissions:*

iTunes Downloads (total): 293

Android Downloads (total): 7

User Data Submissions (total): 49

*(e) YouTube Views:* N/A<sup>4</sup>

*(f) Outside Interference:* The Trustees of the Reservation included a story about the OSI app in their email newsletter. We believe this additional attention accounts for a modest percentage of blog visitors and a significant percentage of the week's app downloads. Additionally, the Worcester Telegram ran a second story on the OSI project.

## **Week 7: April 8-14**

*1. YouTube Video Published*

*2. Social media push continued*

*(a) SM:* Social media interventions this week were focused on promoting the newly released YouTube video. A review of Facebook metrics indicates that the posting announcing the release of the video quickly became one of the most popular posts (as measured by user interaction, reach, and views). Other popular posts included an external news story about an invasive fish in the Mid-Atlantic States. The spike in viewership corresponds with the release of

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<sup>4</sup> Due to circumstances outside of our control, video production was approximately 6 weeks behind schedule

the video. Unlike previous weeks, *post intervention levels continued to rise* which we believe is due to the viral nature of YouTube videos. Even without consistent promotion on our part, users continued sharing the video with friends, this demonstrates the chief advantage of social media - virality.

*(b) Website Hits:* This week saw a new record in total views and new views. YouTube analytics show that the YouTube video was responsible for nearly all of the increased web traffic. The spike in visits came immediately after the video promotions began. We anticipated a bump in tracking metrics, however this spike was considerably larger than any seen in previous weeks. We expected this bump to level off after the interventions ceased, returning to a post intervention level slightly higher than pre-intervention levels, and while post intervention metrics did slow, the general, weekly upward trend continued a rate not seen before. However, the rapid decline in website hits - immediately following the initial spike - supports the idea that “social media buzz” is ephemeral, audience attention is short-lived, and content must be continually, rapidly updated to maintain interest.

*(c) Mailing List:* 5 New Subscribers, 7 Total Sign Ups

*(d) App Downloads/Data Submissions:*

iTunes Downloads (total): 330

Android Downloads (total): 40

User Data Submissions (total): 63

*(e) YouTube Views:* This week marked the first week of the OSI YouTube marketing campaign (4/11/12 release date). We anticipated a modest number of views on YouTube, and expected this number to rise in the following week. As predicted, the release of the YouTube video drove up all metrics across the board, however we were not expecting the increase to be so rapid or of such great magnitude. Indeed, releasing the YouTube video appeared to be a key intervention in the OSI social media campaign. As with this week’s social media metrics, *post intervention metrics continued to rise*, which we believe is due to the viral nature of YouTube videos (See: Appendix). However, the speed at which viewership declined was equally as dramatic.

*(f) Outside Interference:* The OSI Project was mentioned in the Dept. of Environmental Conservation's Newsletter (4/9/12) and there was a WISP meeting that took place on Thursday the 12<sup>th</sup>. Comparing this with historical trends allow us to conclude that the impacts of these events were minimal.

## **Week 8: April 15-21**

*1. YouTube Video marketed.*

*2. Social media push continued*

*(A) SM:* The ongoing interventions continued to drive our audience to our blog, listserv, twitter account, and Facebook page. As we had anticipated, the magnitude of the “bumps” increased as a function of the size of our existing social network, and the 8<sup>th</sup> week of interventions saw the largest increases.

*(b) Website Hits:* As we had anticipated, the 8<sup>th</sup> week of interventions saw the largest of the weekly bumps. The data show that the YouTube video was effective at driving traffic to the Masswoods blog. Still, the impact of social media proved fleeting; as we had expected, the bump leveled off after the interventions ceased, returning to a level slightly higher than the previous week’s (pre-intervention) level.

*(c) Mailing List:* 2 New, 9 Total

*(d) App Downloads/Data Submissions:*

iTunes Downloads (total): 538

Android Downloads (total): 71

User Data Submissions (total): 80

*(e) YouTube Views:* In the second week of the OSI YouTube marketing campaign. We saw a dramatic increase in weekly views on YouTube, as the video circulated and achieved a certain degree of virality. The YouTube video was most frequently accessed via the Outsmart Facebook page, and was extremely effective at driving traffic to the Masswoods blog.

*(f) Outside Interference:* (1) The latest press released was picked up by RD Magazine. (2) New England Public Radio ran a story about the OSI project. (3) The representatives from the OSI team attended a meeting with the CT River Watershed CISMA Leadership group organized by Cynthia Boettner, and met with a variety of people from New England who are working on invasive species management.



## Analysis

Our initial hypothesis was that, if social media were an effective marketing and recruitment tool, we would observe a spike in engagement metrics following periods of promotion. In analyzing the data, we found that corresponding metrics would spike following a particular social media intervention, and clearly trended upward over time. The more successful the marketing intervention, the larger the corresponding “bump”, this was true across all platforms. Due to the viral nature of Facebook, we expected the post-intervention “bump” to become larger overtime. As more users “liked” our page, our total reach would increase, meaning the size of our social network would increase, thus exposing more people to our page. Indeed, as the OSI social network became larger, our interventions reached an increasingly larger pool of potential recruits; this explains not only the general upward trend, but also the consistently larger bumps each week following interventions. As predicted, the number of YouTube views increased overtime, with bumps following periods of promotion. A general upward trend in cumulative views - with increasingly larger bumps each week - was observed, and indicates a successful social media campaign. In the latter weeks, we noticed that most social media activity could be attributed to hits from returning viewers. This trend confirms the idea that social media is best used to strengthen pre-existing ties, but cannot be used as a substitute for traditional marketing. Social media can be used to re-engage those users who have had prior affiliations with the project, but cannot be relied upon to reach new audiences. For reaching new audiences, a more personal form of marketing is needed.

Because we promoted the project across multiple platforms simultaneously each week, and these promotions linked back to the website, YouTube video and Facebook page, some interpretation and interpolation is required to parse out the effects of any one particular intervention. That said, we observed that success in one channel did not necessarily carry over to other channels. Our initial prediction was that interventions carried out via one channel would continue to drive at least some traffic to other metrics, even during periods with little express marketing activity in one particular channel. Further complicating matter, we noticed that our Facebook and blog metrics would experience a small, seemingly spurious bump. Than a few days later, we would be notified that the OSI project had been discussed in a meeting that we were not previously aware of, and the reason for the spike would

become apparent. In one example, during the last week in March, we saw a spike in website traffic that could not be explained by looking at our media intervention schedule, meaning it was likely driven by an outside variable beyond our control. This speaks to the difficulty of conducting a semi-experimental design in real-world conditions.

One of the most obvious trends, when looking at the patterns of social media engagement, is the transitory impact that these interventions had. It is unsurprising, but important to mention nonetheless, that fresh content released on a weekly, if not daily, basis yielded the best results. Fresh content combined with the "push" of email messaging, press releases, etc made a significant difference in web site visitation and Facebook metrics. After the intensive marketing and maintenance efforts ceased, metrics fell to nearly pre-intervention levels. This was a pattern that we observed throughout the course of the project. Regardless of the size of the post-intervention spike, engagement dropped off rapidly once marketing ceased. This was particularly true of the blog/website visitation. This trend ran somewhat contrary to our initial assumption; we had not expected engagement to fade so rapidly after the interventions ceased.

We found that social media, while effective when supplementing intensive traditional media interventions, was not a replacement for traditional media. In the weeks that we relied primarily on social media, with little or no additional use of traditional media channels, we saw disappointing results in metrics across the board. This was true even when the level of social media activity remained high, and the only variable was the reduction in traditional media usage. This leads us to conclude that social media works best as a supplement, not substitute, to traditional media. Our best engagement weeks occurred during periods with a high level of cross channel promotion, such as weeks where we released an app, distributed press releases, and continued with our regularly scheduled social media push.

Simply using social media to push status updates out to subscribers fails to fully utilize social media's entire spectrum of capabilities. Throughout the OSI project, we observed the best results from social media efforts that encouraged engagement and a direct course of action for our followers to take. Rather than passively "liking" a

story, we experienced the best results when we encouraged a clear, specific action to promote engagement. The best examples of this were the iPhone app promotion and the YouTube video promotion, which both contributed to a prominent spike in interest and social media activity.

That said, social media posts do not need to be directly related to the project to generate interest and user engagement. In fact, posts that were only tangentially related to UMass or the OSI project achieved some of the highest views and reach metrics of all social media interventions. We believe that posting information outside of the direct scope of the project helps to build a brand personality that attracts social media followers to the project. A strong brand personality helps users to relate to the project and form a relationship with the campaign beyond what could be expected from a bland educational campaign. This “human” aspect is often lacking in social media campaigns, which may in part be to blame for social media’s poor track record at attracting new users.

YouTube proved to be a tremendously successful marketing tool, and we believe, a powerful tool for creating a brand image. Almost immediately, the video achieved a degree of virality not seen in any other intervention techniques. Not only did the video record an impressive number of views, but also it proved effective at driving viewers to the website, Facebook page and mailing list. In fact, the YouTube video was the only intervention technique that appeared to have made a significant impact on listserv subscribers. The downside to YouTube, as a long-term marketing tool, is the long turn around time for producing a video. One of the lessons learned in the OSI campaign is that fresh content is an absolute necessity. While YouTube viewership was initially high, it quickly faded to nearly pre-intervention levels. The success of the YouTube video was likely affected by its late release, there was already a pre-existing social network of users connected to the OSI project, this helped spread the video rapidly, but contributed little to its long-term success and perhaps hastened its decline in viewership.

The cost-related benefits of social media were a tremendous benefit to the OSI project. The use of social media is (nearly) free, and we clearly benefited from the ability to reach our targeted market for little to no (monetary) cost. The viral quality of social media meant that each user who read a posts had the capability of spreading the

information farther within his or her own social network, thus information reached a large number of people in a short time. Social media proved to be an excellent tool for disseminating information to those individuals who had prior ties to the OSI program. Likewise, social media platforms promoted informal collaboration between the OSI project and the community at large. Engaging the public in ecological research, via mobile crowd sourcing, provided an opportunity to share scientific knowledge with citizens and community members, and created a new avenue to educate citizens about resource management.

Additionally, social media proved to be a good alternative to email marketing or phone conversations in situations where a small, brief exchange was preferable to a more intrusive form of marketing. Here, social media proves useful, engaging with the audience on their own terms, when they are interested, and respecting their desire to not be bothered with direct mail or phone calls. Also, Facebook and Twitter created a convenient platform to initiate dialogue between citizens and project leaders; this offered stakeholders (citizens) a more approachable, less intimidating way of participating in the communication process. In that sense, social media fits with citizen science's primary goal of "breaking down the wall" between scientists and community members (Nov 2011). This created an advantageous, two-way flow of ideas and information that proved beneficial when refining our project.

There were, of course, drawbacks to social media, and to using social networking sites as our primary marketing and recruitment channels. We recognized the limitations of social media, especially the ability of social media to attract new users. Also, it is a bit misleading to say that social media is "free". Updating the social media accounts required time and effort, and it was difficult finding new angles to market the campaign, re-post information, and keep the content fresh. Also, we had to be cautious, and remember to check all social media accounts several times a day to ensure that inappropriate comments were moderated or removed in a timely manner. And of course, publishing blatantly obvious advertising material is not in line with best practices; we had to present information in a form that would be interesting to users, promote engagement, and further the scientific conversation - lest we risk alienating followers.

## Conclusion

This paper seeks to answer the question of how social media can be best used to supplement traditional media in a volunteer recruitment campaign. We experiment with a variety of social media channels in an effort to build a network of concerned citizen stakeholder groups. In this study, we employed various social media interventions and then tracked the success of these interventions to gauge their impact on volunteer engagement. We find that social media can be used as an effective supplement to traditional media for certain forms of volunteer engagement and recruitment, but that social media alone cannot build enduring relationships, nor can it forge new ties with community members.

Organizations interested in social media marketing should be advised to use these new channels as “supplements” to traditional media, not replacements for tried and true methods. While it is generally accepted that social media is useful for marketing and recruitment, this study raises several questions about the actual utility of social media in a volunteer recruitment context. While social media is a powerful tool for reinforcing pre-existing connections, the promise of social media comes with certain caveats. The influence of loose and informal social networks remains difficult to determine - enduring volunteer relationships are founded on shared commitments and trust. Social media, however, encourages connectedness without commitment.

The professional applications of social media are not yet well understood. Despite the popular belief that social media is “the next big thing”, there remains little empirical evidence to support – or refute - such a perception. This does not imply that social media is not worth pursuing; rather it demonstrates that more research is needed to determine the best applications of social media.

## Areas for Future Study

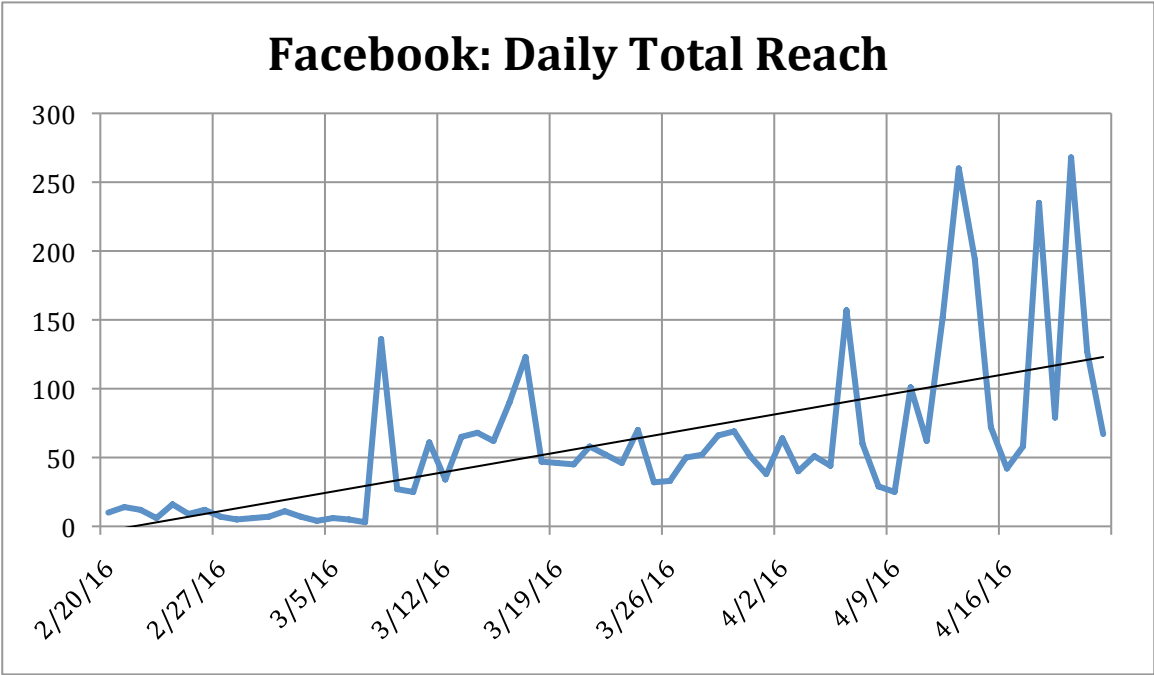
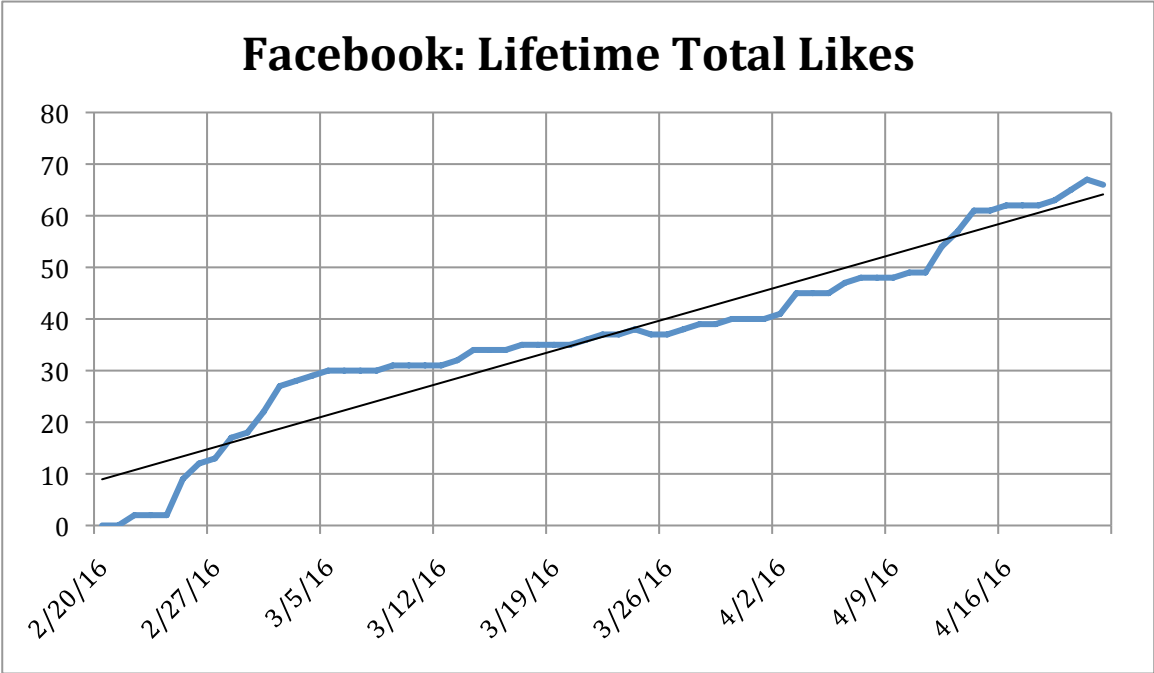
Social networking remains a new phenomenon for recruitment and engagement officers, and more work is needed to better understand this growing phenomenon. We know that citizen science projects can greatly improve their chances of recruiting (and then retaining volunteers) if they offer some salient reward to participants in return for

their time and effort. This “reward” may be as simple as a compliment or positive feedback from the project facilitators, or as complex as turning the data collection into an interactive “game”, with rankings and a live scorecard (Graham 2010). This “game approach” promotes friendly competition among volunteers. “Games may be an especially powerful way to keep participants interested in otherwise "dry" activities” (Ibid). In the era of Web 2.0, citizen scientist projects have been exploring ways to turn the collection process into a highly interactive game, with engaging social activities for participants. However, this “game” aspect of the campaign must be carefully directed at the correct demographic. Competition is not an appropriate motivator for all volunteers participating in a campaign. Such external incentives can be counterproductive, since they have the potential to “crowd-out” intrinsic motivations (Frey 2001). This crowding out phenomenon could present an obstacle to the recruitment and retention of some participants; it is therefore important to conduct more research in to the matter before pursuing it.

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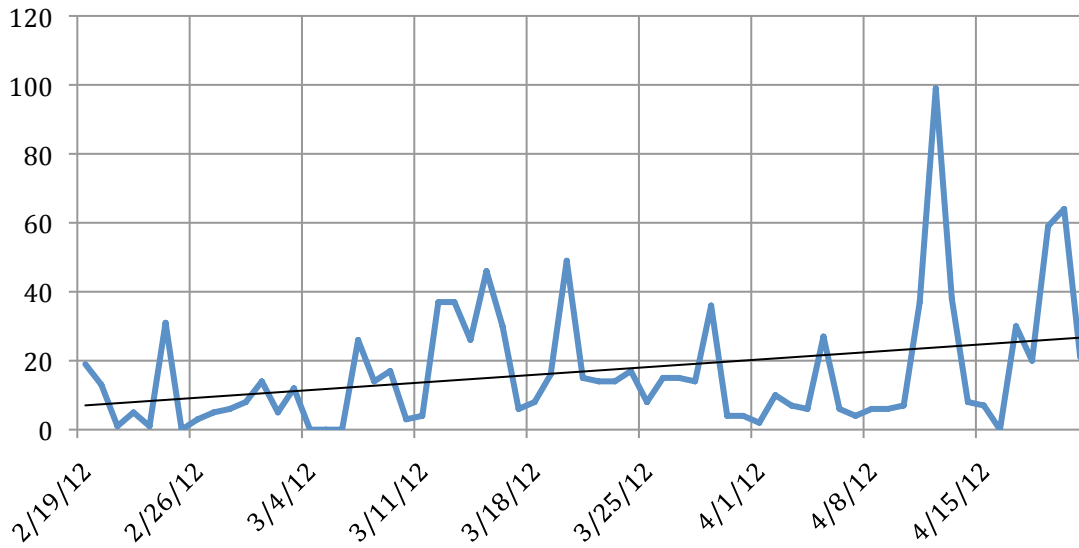
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Appendix

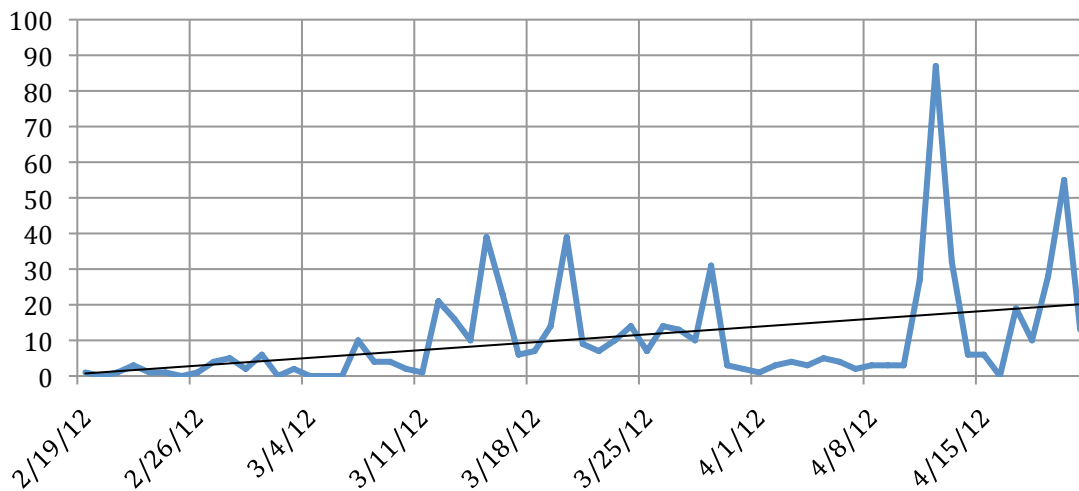




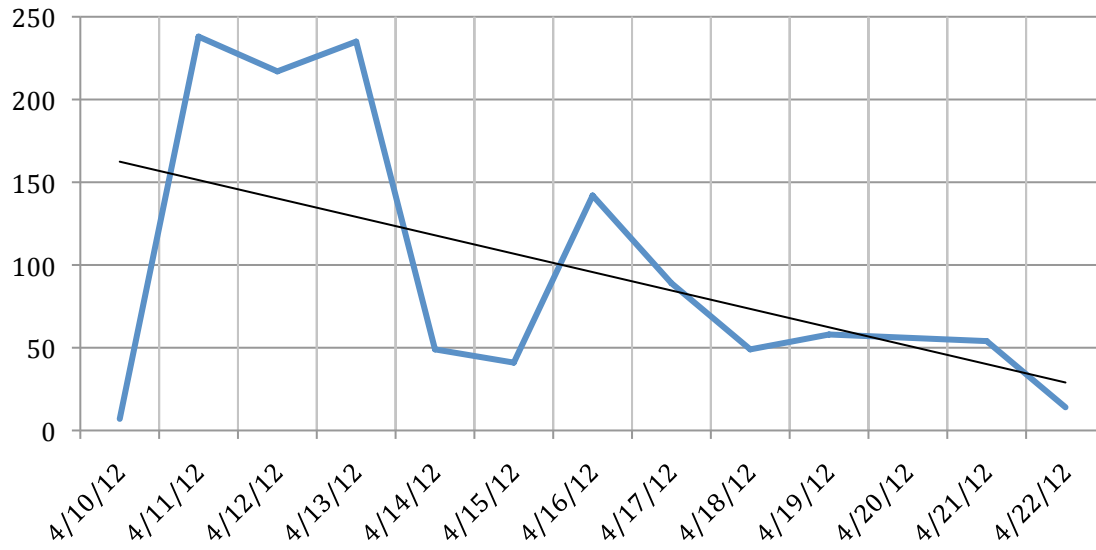
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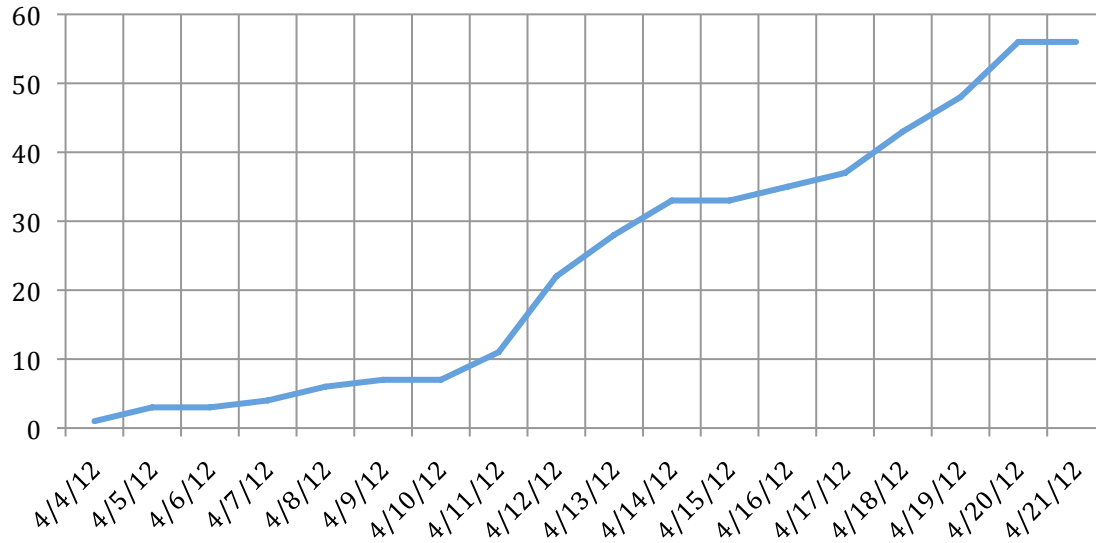
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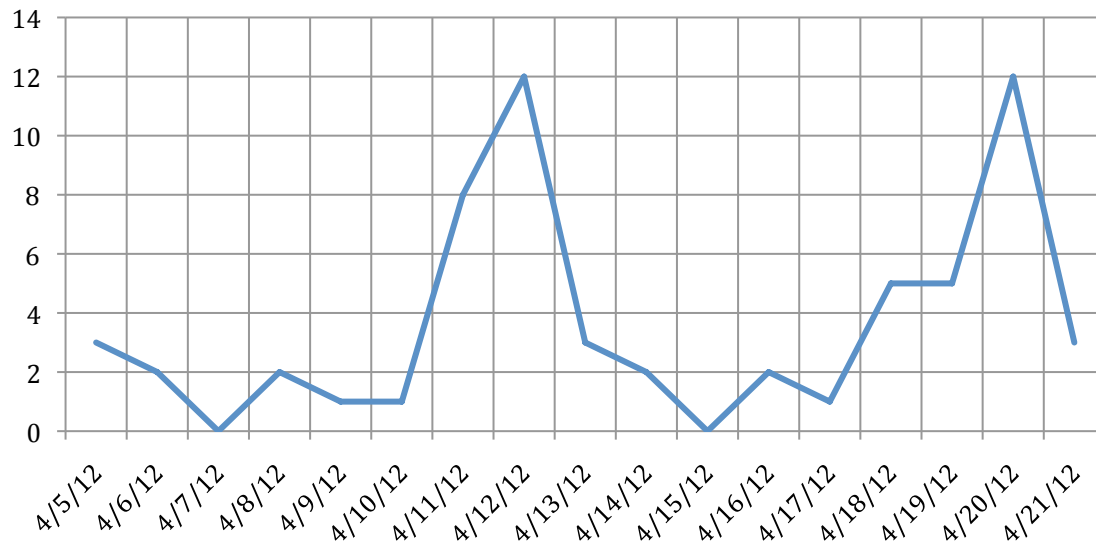
## YouTube: Daily Video Views



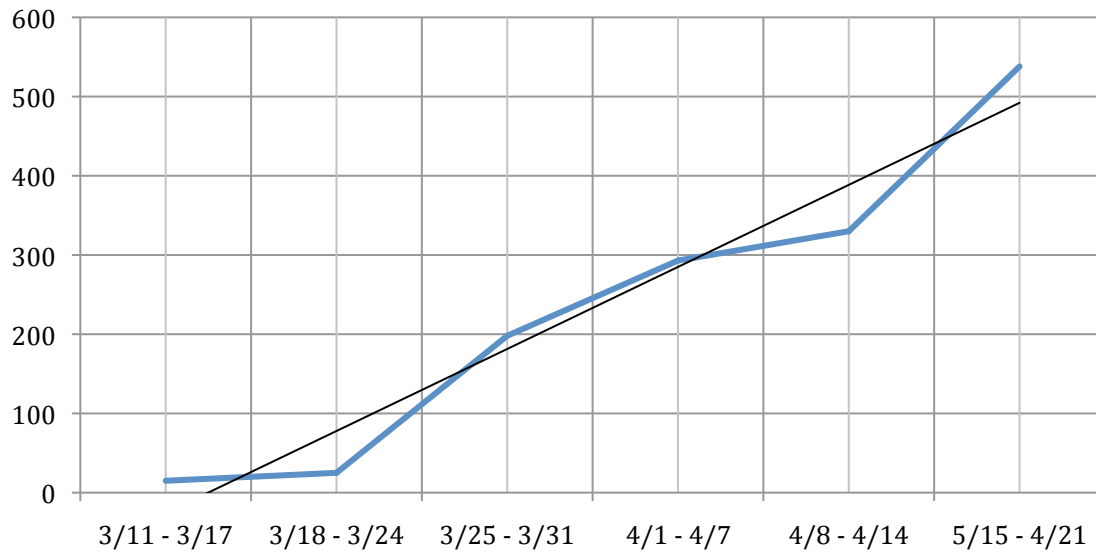
## Total Android Downloads



## Daily Android Downloads



## Total iTunes App Downloads



## Total User Data Submissions

