LANDOWNER KNOWLEDGE AND OPINIONS OF INVASIVE

SPECIES AND THEIR MANAGEMENT SURROUNDING A

SUBURBAN NATURE PRESERVE

By

Christina McLaughlin

A thesis

Submitted to the University at Albany, State University of New York

In Partial fulfillment of

the Requirements for the Degree of

Master of Science

College of Arts and Sciences

Department of Biological Sciences

2015

UMI Number: 1591975

UMI 1591975

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Abstract

Invasive species are a growing human-caused threat to biodiversity around the globe as they are moved both accidentally and intentionally through trade routes. The human component of conservation management is especially critical in invasive species, as human awareness is key to preventing and rapidly responding to new introductions. Yet the social component of management is poorly studied, even as outreach efforts continue to grow in an effort to gain public support. This study attempts to understand public knowledge and opinions toward invasive species and their management through an online survey of neighboring landowners to a suburban nature preserve, the Albany Pine Bush. Neighboring landowners within a quarter mile of the Preserve's boundaries were contacted via postcard and asked to take an online survey. Results indicate that neighboring landowners are a unique stakeholder group, older and better educated than other residents of the capital region around Albany NY, and that while awareness of invasive species is high, knowledge of invasive species is low. This is a change from previous studies, which indicated low awareness of the invasive species problem. Neighboring landowners are generally supportive of active management of invasive species. The majority reported prescribed fire to be mostly acceptable (58.3%), mowing to be mostly acceptable (58.3%), and tree banding or girdling to be mostly acceptable (50.4%). The majority of respondents found passive management such as displays in the Discovery center (95%), education programs (93.6%), and outreach brochures to neighboring landowners (92.1%) as being mostly acceptable or acceptable in all cases. Most respondents (87.8%) were also open to the Preserve working with the local community to control invasive species outside of Preserve boundaries. However the low response rate for this pilot study suggests less interested landowners may be underrepresented. Further study is recommended to

better understand the opinions of this critical stakeholder group in order to gain their

support for future management needs.

Table of Contents

List of Tables

1.0 Introduction

Most nature preserves and national parks are publically funded through government funds and grants, which means taxpayer support is often necessary to obtain increased funding for environmental research and management. Understanding public opinion is critical to gaining public support for conservation programs around the country, yet the social aspects of conservation are understudied. Even as the cost of managing and conserving open spaces continues to grow, public knowledge and support remains unsteady. Invasive species policy in the US is incomplete and what policy does exist focuses on individual invading species rather than on invasive species as a whole (Simberloff et al. 2005). Public support is critical to gaining the political momentum necessary to allocate funding for invasive species management policies. Current public attitudes towards invasive species must be understood in order to create a framework to guide future invasive species management programs, and to identify attitudes that present obstacles to management. This information is critical in order to create effective environmental education programs targeted at changing attitudes. This study seeks to identify correlations between public attitudes towards invasive species management and knowledge levels of invasive species biology and management techniques among a critical stakeholder group: landowners who neighbor a nature preserve.

1.1 Background

Invasive species are one of the greatest threats to biodiversity and conservation. There are an estimated 4500 introduced species in the United States, of which 20% cause serious economic or environmental harm (McNeely 2000). Invasive species cost $120 billion dollars annually in the US alone, with most of that cost spent on management and control techniques, a number which has likely grown in the decade since it was first calculated (Pimental et al 2005). A recent report by the European Environmental Agency estimated the damages of invasive species cost 12 billion Euros ($16.7 billion US) per year in Europe (EEA 2012).

Despite the ecological and economic threat invasive species represent they remain poorly understood by the public, which makes obtaining or increasing public funding for invasive species management difficult. The number of new invasive species detected each year has risen as the global economy allows easy transport between distant parts of the earth, allowing cargo stowaways to travel great distances. Still other species are intentionally introduced for landscaping, agriculture, or as pets. Prevention, early detection, and control of the ever-growing number of invasive species all require public support in order to be effective.

Human values drive wildlife management in assigning positive and negative aspects to species, in determining what we consider harm, in how much we are willing to pay to repair that harm, and in what we are willing to do to control species (Lodge et al. 2009). Public opinion of invasive species is a growing field as the importance of the human dimension of natural resources management is being

recognized. Although invasive species biology has only become well defined as its own field in the last decade or so (Simberloff 2005), introduced exotic species have been a problem since humans first began circumnavigating the globe. Introduced species are an especially large problem on islands, where ecosystems are more fragile, and the impact of the invasive species more severe. The term "invasive species" itself has been used interchangeably with the terms "exotic species" and "introduced species." Each carries its own connotations, and the term continues to require clarification (Colautti and MacIssac 2004; NISC 2006). For this survey, the term, invasive species was defined according to Executive Order 13112 (1999) as "one which both is not-native to a given area and which causes or has the potential to cause ecological, economic, or human-health harm."

Temple (1990) lamented the lack of attention conservation biologists gave to the invasive species problem at the time and attributed much of the hesitation to eradication and control of invasive species to the fear of negative public responses to some eradication methods. The relative aesthetic value of a species also plays an important role in the public opinion (Veitch and Clout, 2001). Many members of the public dislike the outright killing of some species – especially attractive mammalian or avian species or flowering plants – and there is strong dislike for the use of herbicides and pesticides due to negative environmental and human health consequences of these methods (Connelly et al. 2007). These wildlife values are subjective and different among groups of people. When the relative value of an introduced species differs between the local population and conservationists, conflict

occurs (McNeely 2001). These differences in value systems have been found to be the primary source of conflicts over invasive species and their management (Estévez et al. 2014).

The social components of conservation, and in particular, invasive species management, have been poorly studied and remain poorly understood, with ongoing calls for more studies and research to understand how different stakeholder groups view invasive species and the threats they pose (Witmer et al. 2009; Whitehead et. al. 2014; Reiter et al. 1999). Efforts to respond quickly to new introductions have been hampered in several cases by public opposition, and as a result, invasive species become more difficult and more expensive to manage and control once they have become established in an ecosystem. Many factors can influence public opinions, including gender, age, residence (rural vs urban), political leaning, religion, and risk perceptions (Witmer et al. 2009; Estévez 2014). Many of the existing studies of the social aspects of invasive species biology have been done in Australia and Europe. Since invasive species are spread by humans, both accidentally and intentionally, understanding the social component, which has been considered in a limited fashion to date, is critical to slowing their spread (Garcia-Llorente et al. 2008).

The invasive species issue is not just environmental, but economic and ethical as well. It is "dependent…on human concepts used to identify origin, authenticity, and responsibility" (McNeely 2001) which varies between groups. Debates over invasive alien species are frequently an issue of conflicting value systems, and as such the control and management of invasive species is often about "the art and science

of managing people" (Reaser 2001). Invasive species management often requires the cooperation of multiple conservation, public, and corporate organizations working together to address the economic motivations behind invasive species introductions (McNeely 2001). Public confusion over the complexities of the issue. The lack of understanding of the issues confounds efforts to manage invasive species (McNeely 2001). When focusing on the human aspect of invasive species control, understanding public opinions is key to finding ways to change public beliefs towards ones which support the prevention and control of invasive species (Reaser 2001).

The invasive species problem is strongly political, economic, and human, even more than it is biological (Reaser 2001, Tanentzapetal 2009, Sharp et al 2011). When the science is not understood by the public, management of the environment suffers (Tanentzapetal 2009). The primary obstacles to increased public support are a lack of resources and time, apathy towards the problem, and skepticism over the management program (Boudjelas 2009). Understanding public opinion is important to designing education and outreach programs to increase public knowledge of invasive species and to gain public support for management practices. Public participation is "essential for the success of conservation initiatives" and public ignorance, both real and perceived, is "a barrier to their effective participation" in public policy (Fischer and Young 2007).

1.2   Social surveys concerning invasive species

A growing body of work has examined public opinions and attitudes of invasive species management through surveys, however many survey results are

unpublished and performed only as part of statewide invasive species management efforts. Understanding public opinions is critical to minimizing public conflict over invasive species management, and surveys of public opinion provide a baseline and framework for gaining public stakeholder support.

Most people feel that they are not knowledgeable, or have little knowledge or awareness about invasive species or how to prevent biological invasions (Odera and Lamm 2014; Sandra 2012; Connelly et al. 2007). Knowledge and awareness also vary greatly across regions or depending on the invasive species in question (Connelly at al. 2015). Despite feeling uninformed about invasive species, the public has some awareness of the problem and express concern for the presence of invasive species in local habitats, especially in regards to aquatic invasive species (Connelly et al. 2007; Sandra 2012). Support for control and eradication programs has been reported to be highest among men, older people, and people with previous knowledge of the programs in question (Bremner and Park 2007).

Respondents to some surveys have been grouped into two categories: adaptive ecocentrics, those who agreed human management of invasive species was necessary, and absolute ecocentrics, those felt that all animals had a right to live and that management was not necessary (Sharpe et al. 2011). Adaptive ecocentrics were found to be generally older, had more education, and had more outdoor experience, while absolute ecocentrics who were less likely to support management, and were generally younger, less educated, and had less experience outdoors (Sharp et al.

2011). These competing valuation systems demonstrate some of the obstacles that invasive species management proposals must overcome to gain public support.

Willingness-to-pay (WTP) is a metric often used to weigh public support for conservation management by asking the public what amount of money they would be willing to pay, through taxes or other approaches, in order to achieve specific conservation goals. One survey found respondents more willing to pay for eradication of invasive species versus paying for prevention strategies (Garcia-Llorente et al. 2011). WTP for invasive species control was associated with interest in nature as well knowledge and views of individual invasive species (Garcia-Llorente et al. 2011). In one study, the average person was found to be willing to make a one-time payment of $48 to prevent aquatic invasive species (McIntosh et al. 2009).

Local residents in proximity to nature preserves and protected areas are frequently the most vocal about proposed management decisions, and their support or lack thereof can heavily influence the management (REF). Understanding local resident's thoughts and preferences is therefore critical to evaluating proposed management and increasing public support (Ryan 2012), yet this group has been understudied to date.

1.3   Research questions

This survey seeks to evaluate how much neighboring landowners living near (how near?) the APBP know about invasive species and their management, specifically:

- Are neighbors who know more about invasive species more willing to support management efforts in the preserve?

- Are neighbors who know more about the Albany Pine Bush Preserve (APBP) more knowledgeable of invasive species?

- Are neighbors who know more about the APBP more willing to support management efforts in the preserve?

- Are people who participate in more nature-based outdoor activities more knowledgeable about invasive species and their management? Do they have different views of management than those who participate in fewer outdoor activities?

- Are APBP neighbors supportive of management in general? Are they more supportive of specific management techniques over others?

- How do the demographics (age, education, gender) of APBP neighbors compare to Albany County demographics? Do the demographics of APBP neighbors impact their knowledge level and opinions on invasive species management?

2.0 Methods

This survey was designed with help from Lincoln Larsen of the Human Dimensions Research Unit at Cornell University and the tailored design method as described in Dillman et. al. (2009). The survey was designed for neighboring residential landowners to obtain their thoughts and opinions about invasive species and their management in a suburban nature preserve close to their property.

2.1 Survey population

One of the reasons for the APBPs' success is its ability to engage myriad stakeholders. These stakeholders include many groups, but those of primary interest are neighbors – those who own property which borders or is very close to the boundaries of the APBP, visitors to the Preserve who utilize the Discovery Center (main interpretative building and visitors center) and trails, and local residents who do not utilize the Preserve but live in the capital region and pay taxes which help support the Preserve through the local towns and state organizations that are on the Preserve's Commission. The opinions of all stakeholders are important, however survey designs are limited to targeting specific groups. Some groups may be more difficult to access than others. This survey targeted Preserve neighbors, whose opinions and viewpoints are critical to gaining their involvement in and support of conservation efforts at the Preserve and to cultivate positive relationships with neighboring landowners.

To access this set of stakeholders, a survey was mailed to addresses using a tax map obtained from APBP mail merge database maintained on the Preserve's GIS and used to alert nearby residents of prescribed burns.

2.2 Survey database and sampling

The GIS database which the APBP maintains includes real Albany County tax parcels and information about the parcel location and owner for the several thousand tax parcels that surround the Preserve in Albany County, however the data

is several years old. The GIS software ArcGIS was used to identify parcels within 0.3 miles of the APBP boundary were selected to receive the mailed survey using ArcGIS and exported into an Excel database file. This distance (0.3 miles) was used to define 'neighboring' properties because it is the distance used by APBP to send post cards for prescribed fire notifications. Almost 4000 neighboring land parcels were identified within 0.3 miles of Preserve boundaries from the Albany County tax map records. The database includes tax codes for parcels, identifying residential and commercial land parcels. These codes were used to remove all non-residential parcels from the list. Landowners of commercial properties were removed due to difficulty identifying an individual owner of the property. The database of residential land parcels contains 3000 landowners. The database also differentiates landowner address from parcel address for those who do not live on the parcel they own. The landowner address was used as the contact address for the parcel in order to contact landowners in cases where parcels are owned by one individual but lived in by another (e.g., renters). A random sampling of 700 addresses was made from the database by assigning a random number between 0 and 1 to each address, reordering the list in descending order, and selecting the first 700 on the list, and then incomplete addresses were removed for a total of 696 residences contacted. Following a low response rate, a second mailing list of 700 additional addresses was created and contacted, for a total of 1396 residences contacted. The number of addresses contacted initially (700) was selected in the hopes of achieving a 50% response rate to achieve 350 completed surveys to achieve a 95% confidence

interval, based on the population size of 4000 addresses found within 0.3 miles of the

Preserve's boundaries (Dillman et al. 2009).

2.3   Survey topics

A copy of the survey can be found in Appendix I. Survey questions were

separated into three general categories: Knowledge, Opinions, and Demographics.

The survey question matrix is presented in Table 1. Knowledge questions attempted

to identify landowner knowledge of invasive species and their management,

including the definition of the term invasive species, identification of common New

York State invasive species, the ecological and economic problems invasive species

present, and familiarity with management techniques used to control invasive

species. Knowledge questions also included questions about the APBP's mission and

management techniques currently in use at the Preserve.

Opinion and attitude questions attempted to identify neighboring

landowners' attitudes and thoughts on the threat invasive species pose to the

Preserve and to their own land, their preferences of management techniques used to

control invasive species and their attitudes toward wildlife and land management

techniques.

Demographics include age, gender, race/ethnicity, and highest education

level completed. This survey also considered demographic data including the

landowners' membership in conservation organizations, reason for and frequency of

visits to the APBP, participation in outdoor activities, and the landowners' science or

gardening and landscaping information sources. For future outreach and education

efforts, knowing where neighbors are receiving their science and conservation news,

or where land owners go for information on gardening, landscaping, and land

management is important.

The APBP is a highly managed preserve which utilizes prescribed fires to

manage the fire-dependent ecosystem and to control and remove invasive plant

species. Prescribed burns have a long and controversial history with public opinion.

Since the use of prescribed fires can elicit strong opinions from respondents, and fire

management is not the primary interest of this survey, only one question on the

topic was included in the survey. This minimized a potential source of negative-

thought bias for subsequent questions on the survey instrument. Additionally, the

primary message of prescribed fires presented in APBP outreach and education

materials has been the need to burn in order to reduce the risk of uncontrolled

wildfires and to encourage the growth of native plants including wild blue lupine and

pitch pines as fire-dependent species, not for the control of invasive species (Albany

Pine Bush Preserve Commission 2011b). Public opinions on fire management at the

APBP is a topic which should be thoroughly investigated by a separate survey

instrument.

2.4   Survey timeframe

Landowners were contacted with a post card mailing with information about

the survey and a link to take the survey online. In the event of multiple landowners,

such as married couples, the one with the most recent birthday was requested to

take the survey. Asking the landowner with the most recent birthday to take the

survey randomizes the selection in an effort to avoid biasing responses by gender or

age. The survey was estimated to take 15 minutes to complete. Questions were

written using the tailored design method and with support from Lincoln Larsen, PhD,

of the Cornell Human Dimensions group. Three postcard mailings were sent out on

August 28th, September 8th, and September 22nd 2014 to the first mailing list group.

The second mailing to 700 new addresses selected using the technique described

above was sent out on October 16th, 2014. The survey was closed on November 1st,

2014.

2.5   Survey software

The hyperlink on the post card took respondents to a survey designed on

GoogleDocs Forms, the results of which were automatically saved into a GoogleDocs

Spreadsheet, then exported into Microsoft Excel and IBM's SPSS for statistical

analysis. Screen shots of the online survey are included in Appendix 1. For questions

in which respondents were asked to provide an opinion on several different

statements, the order of the statements was randomized for each respondent using

the "random order" option in GoogleDocs Forms. To increase response rate and

prevent late drop offs, many demographic questions were optional at the end of the

survey.

3.0   Results

Of the 1400 addresses randomly selected from the database, 1395 addresses

were complete and usable. Five surveys were returned to sender as undeliverable.

139 surveys were completed for a response rate of approximately 10%. Three post cards were returned in envelopes from respondents who did not have computers and eleven emails were received, of which one was from a relative of a respondent without a computer, four were from people who had trouble accessing the survey online, and six were landowners voicing complaints and comments about the Pine Bush and its management. People with trouble accessing the survey link were sent direct links via email to the survey and presumably were able to complete the survey. Those without computers were unfortunately unable to take the survey due to the anonymous nature of the study and lack of funds or procedures for mailing paper copies of the survey.

3.1   Demographics

As shown in Table 2, the mean age of respondents was 57.6 with a median age of 60. 50.4% of respondents were male with an average age of 59.9 and 49.6% were female with an average age of 55.5 Most respondents were 60-69 years old. The majority of survey respondents (89.2%) identified as Caucasian, with a few respondents identifying as African-American, Asian-American, or other groups (Table 3). Survey respondents were well educated, with most having a bachelor's degree (37.4%) or master's degree (30.9%), (Table 4).

The majority of respondents (83.5%) have visited the APBP, most of them visiting a few times year (61.2%) (Table 5). The primary reason for most respondents to visit the Preserve was hiking or walking the trails (41%), while 15.8% of respondents last visits were to the Discovery Center for exhibits and programs (Table

6). Of the 23 neighbors who had not visited the Preserve, ten (10) cited being too busy as their reason, while the rest were either not interested (six (6) respondents) or had other reasons for not visiting (Table 6). Neighboring land owners were also frequent visitors to other nature preserves and parks besides the Albany Pine Bush Preserve, with more than two thirds (74.1%, 103 people) reporting having visited other nature preserves or state and national parks in the year besides the APBP in the last year (Table 7). Respondents were asked what outdoor activities they participated in, and were allowed to select as many responses as applied. Popular outdoor activities among respondents included hiking (62.7%), gardening (65.5%), watching wildlife (51.8%) and feeding birds (45.3%) (Table 8).

One fifth (28 people) of respondents reported being members of conservation or wildlife organizations (Table 9). Survey respondents were asked where they went for science news and information and were allowed to select multiple sources, with most reporting they receive their science news from television news channels (63.3%), local newspapers (61.9%), and from large US news outlets online (51.1%) (Table 10). Respondents were also asked where they went for information on landscaping, gardening, and land management, with most responding they went to internet websites (68.3%) and local garden stores (65.5%) (Table 11). Survey respondents were also asked if they had seen, read, or heard anything about invasive species in general within the last six months, with the majority (61.2%) reporting that they had (Table 12).

3.2 Knowledge of invasive species and the Pine Bush

When asked which statement best defined the term, 71.2% of respondents correctly identified invasive species as referring to species that are both not native to the local area and cause damage to local ecosystems (Table 13). Respondents were further asked to rate their own knowledge levels of specific ecological concepts involving invasive species as knowing nothing, very little, a fair amount, or a great deal, as shown in Table 14. Most (44.6%) feel they know a fair amount about why invasive species are considered invasive, but most (43.2%) feel they know very little about the impacts of invasive species on local ecosystems or the effects of invasive species on endangered animals (43.9% very little). When asked about the effects of invasive species on native animals and plants 36.7% of respondents feel they know very little and 38.8% feel they know a fair amount.

Respondents were asked how much they know about the invasive species in and around the APBP and were provided with a text list of the common species names for a variety of highly aggressive invasive species that are currently in the Preserve or are found in Albany County and the Capital Region and may threaten the Preserve in coming years. As shown in Table 15, the majority respondents reported they did not know what the common invasive species were. There were five exceptions: emerald ash borer (EAB), Asian long-horned beetle (ALB), purple loosestrife, water chestnut, and zebra mussels. For EAB, only 29.5% did not know what it was, 17.3% had heard of it but did not know it was invasive, and 53.2% know what EAB is and that it is an invasive species. For ALB, 39.6% did not know what it is,

20.9% had heard of it but did not know it was invasive, and 39.6% had heard of ALB and knew it was invasive. For purple loosestrife, although most did not know what it was (53.2%), a large number (36%) did recognize it was an invasive species. For water chestnut 25.2% did not know what it was, 49.6% had heard of it but did not know it was invasive, and 25.2% had heard of water chestnut and knew it was invasive. For zebra mussels, only 15.8% had not heard of it, 12.2% had heard of it but did not know it was invasive, and the majority 71.9% had heard of zebra mussels and knew they were invasive.

Respondents were asked to rate their knowledge of five general techniques used to manage invasive species, which may or may not be in use currently at the APBP as nothing, very little, a fair amount, or a great deal (Table 16). Most knew nothing or very little about tree banding or girdling (61.8%) or mowing (56.1%), but most knew a fair amount or a great deal about prescribed fire (66.0%), most also know very little (51.1%) or nothing (37.4%) about intensive grazing. Knowledge of pesticide and herbicide use was split between 41.7% knowing very little and 38.8% knowing a fair amount.

As shown in Table 17, most respondents (66.2%) considered themselves to be somewhat familiar with the APBP's mission when asked to self-rank their knowledge. 59.0% of respondents felt they were somewhat familiar and 23.0% felt they were very familiar with the APBP's efforts to restore the inland Pine Barrens ecosystem that it protects when asked to self-rate their familiarity (Table 18). Respondents were also asked which statement best described the mission of the APBP from a list of

three statements, with 59.7% selecting the correct mission statement from the Preserve's website (Table 19).

Respondents were asked whether they were aware of the use of mowing, tree banding and girdling, or chemical herbicides in the APBP to control invasive species, and most (56.1%) were aware mowing was done, but were not aware that tree banding was conducted (53.2%) or that herbicides were used (85.7%) (Table 20). Survey respondents were told that Species of Greatest Conservation Need (SGCN) in New York are defined as those which are considered rare, imperiled, or whose status is unknown within the state, and were asked to estimate how many of these species they thought were found in the APBP. Three respondents entered negative numbers which were converted into missing values for the sake of analysis, as the survey entry space should not have allowed for negative numbers. The mean number of SGCN that respondents thought lived in the Preserve was 20.5 and the median was 7.5, the minimum was 0 and maximum 500 as shown in Table 21. The APBP website identifies 45 SGCN at the Preserve (Albany Pine Bush Preserve Commission 2011a), and most respondents drastically underestimate this.

3.3   Attitudes and opinions on invasive species and their management

Neighboring landowner respondents were asked for their opinions and attitudes on invasive species and the threat they pose to their lands and to the Preserve, as well as their attitudes towards wildlife management practices.

Respondents were provided with a list of common names of invasive plant species and asked to give their opinion of the threat specific invasive species present

to the APBP ecosystems as not sure, no threat, moderate threat, or severe threat (Table 22). The majority (59.7% to 82.7%) were unsure how much of a threat invasive species posed. Most (51.1%) viewed invasive species in general as posing some threat to their property (Table 23). Most respondents (62.6%) also viewed invasive species as having a moderate impact on agriculture, forestry, and recreation in New York State, and one third (34.5%) viewed invasive species as having a severe impact on New York State's economy (Table 24).

Respondents were asked whether they agreed or disagreed with a series of general statements about management at the Albany Pine Bush Preserve using questions modeled on the survey by Sharp et al. 2011 to evaluate respondents' attitudes towards environmental management, the results of which are summarized in Table 25. The majority of neighboring landowners agreed with statements about the need for human intervention to manage the APBP and disagreed with statements about leaving the Pine Bush alone. Most agree or strongly agree with the statements "Protecting the natural ecosystem of the APBP should be a priority" (38.8% agree, 33.1% strongly agreed), "Control of some species is necessary to help conserve the natural ecosystem of the Albany Pine Bush Preserve" (56.1% agree and 33.1% strongly agrees), and "The Albany Pine Bush Preserve's natural areas should be restored" (43.9% agree and 23.0% strongly agreed). Most disagree or disagree strongly with the statements "The Albany Pine Bush Preserve should be left alone for nature to take its course" (30.2% strongly disagree and 42.4% disagree), "Invasive species have as much a right to exist as native species at the Albany Pine Bush

Preserve" (37.4% strongly disagree, 38.8% disagree), and "Management

interventions are not necessary to maintain the ecosystems of the Albany Pine Bush

Preserve" (38.8% strongly disagree and 47.5% disagree).

Neighboring landowners were then presented with a list of possible

management techniques and actions that are available to the management staff at

the APBP and asked whether they would find the techniques or actions acceptable or

unacceptable in all or most cases, the results of which are summarized in Table 26.

The statements and actions presented included three actions representing a lack of

management, four options representing passive management techniques, and ten

active management techniques which included chemical and bio-control of invasive

species (Table 35). The majority of respondents (69.8% to 82.7% unacceptable) found

non-management options such as 'leave invasive species alone' to be unacceptable

in all or most cases. Passive management options such as brochures or education

programs were acceptable in all or most cases to the majority of respondents (87.8%

to 95% acceptable). Active management options were more controversial, though

still generally well accepted. The use of pesticides and herbicides to manage invasive

species was mostly acceptable by the majority of respondents (37.4%) but a large

number (27.3%) also found their usage to be mostly unacceptable. Respondents

found the use of chemicals to control invasive species, a more negative connotation

than managing invasive species, more controversial, with 28.1% finding it mostly

unacceptable, 28.1% unsure, and 28.8% mostly acceptable. Physical management

was generally acceptable to respondents, with 50.4% finding tree banding or girdling

to be mostly acceptable and 58.3% finding mowing to be mostly acceptable.

Respondents were also supportive of prescribed fires, with 82.8% reporting the use

of fires as mostly acceptable or acceptable in all cases. Respondents were mostly

unsure (49.6%) about biocontrol, the use of a non-native insect to control an invasive

insect. Respondents were also either unsure (29.5%) or mostly accepting (46.8%) of

the use of intensive grazing as a management technique. Most respondents (87.8%)

thought that the Preserve working with the local community to control invasive

species outside of its boundaries would be mostly acceptable or acceptable in all

cases.

Respondents were asked to rate their overall satisfaction with the

environmental management of the APBP on a scale of 1-5 with 1 being completely

unsatisfied and 5 being completely satisfied. Most respondents ranked their level of

satisfaction as a 4 with a mean of 3.6 (Table 27). Survey respondents were also asked

how much of a threat they felt urban development, invasive species, climate change,

or habitat fragmentation posed to the APBP – none, a little, some, or a great deal of

threat (Table 28). The majority reported feeling that urban development posed a

great deal of a threat (56.1%), while 41.7% felt invasive species posed a great deal of

threat, and 50.4% felt invasive species posed some threat.

3.4   Statistical methods and models

In order to answer the proposed research questions, several variables had to

be created from the collected data. Variables were created for the total number of

outdoor activities a person participated in, for support for active management

techniques, and for three knowledge indices for knowledge of invasive species,

knowledge of the APBP, and knowledge of invasive species management, which were

combined into a total knowledge index. To investigate the relationships between

variables to answer the research questions, cross-tabulations and chi-square tests

were performed.

3.4.1 Outdoor activities variable

Question 22 on the survey allowed people to self-report the outdoor activities

they participate in at the APBP or at other outdoor locations. There were 12 options

provided, along with an "other" for additional categories to be added. There were

many additional categories offered in the "other" box, which were combined into

broad categories such as "winter sports" or "hunting and trapping" along with the 12

offered categories. Dummy variables were calculated for each of the 12 categories,

not including none or other (Table 8). A summary variable was created by totaling the

number of outdoor activities each person reported participating in. Participants who

reported outdoor activities, such as running, that fell into the "other" category also

reported multiple other sports, and with very few responses for "other" or none (7

and 8, respectively) these were not included in the outdoor activity index. The

average respondent reported participating in 4 different activities, though most

respondents reported participating in 3 different activities as summarized in Table

29. Due to only one person each reporting 11 and 12 activities, the last group was

collapsed into one category of "greater than 10" activities for use in analysis for chi-

squared and cross-tabulation testing, which is summarized in Table 30.

3.4.2 Knowledge indices

In order to answer questions about whether knowledge levels correlate with opinions on management, 4 knowledge indices were created and are summarized in Table 31. The management knowledge index was created using the responses from question 8 on the survey only, assigning point values to responses on a scale of 1 to 3: no knowledge was 0 points, very little knowledge was 1 point, a fair amount was 2 points, and a great deal of knowledge was 3 points, creating a total point scale of 0-15 points for the index, with an average of 6.6 and is summarized in Table 30. The index was then collapsed into categories of high knowledge (11-15 points), some knowledge (5-10 points) and low knowledge (0-4 points) for use in cross-tabulations and chi-square analysis, which is summarized in Table 32.

Knowledge of the Albany Pine Bush was summarized into an index using the results to questions 9, 11, and 12 on the survey. The ability to correctly identify the mission statement for the Pine Bush from a list of similar statements was not included because it was deemed a poorly designed question that may be a poor gauge of Pine Bush knowledge. Responses of 'not familiar' were worth zero (0) points, somewhat familiar one (1) point, and very familiar worth two (2) points for both questions 9 and 12 (familiarity with the restoration efforts and mission, respectively). For question 11, not knowing that a management technique is used at the Preserve was worth zero (0) points while knowing it is in use was worth one (1) point. The final Pine Bush knowledge index scales from zero to eight (0-8) with an average of 4.19, and is summarized in Table 31. The index was then collapsed into

three categories of high knowledge (6-8 points), some knowledge (3-5 points) and low knowledge (0-2 points) for use in cross-tabulations and chi-square analysis, which is summarized in Table 33.

Knowledge of invasive species was summarized into an index using the results of questions 3, 4, and 5. For question 3, selecting the definition of invasive species, "don't know was worth zero (0) points, either of the partial definitions provided were worth one (1) point, and the correct complete definitions was worth 2 points. For question 4 the response 'nothing' was worth 0 points, 'very little' was worth 1 point, 'a fair amount' was worth 2 points, and 'a great deal' was worth 3 points, while for question 5 not knowing the name, or knowing the name but not knowing it was invasive were both worth 0 points, while knowing the name and knowing it was invasive was worth 2 points. Knowing the name but not knowing it was invasive was worth 0 points because it does not indicate knowledge of an invasive species. For this index, water chestnut was not included, due to the likelihood that people confused it with the cooking ingredient (See Section 4.0 for more discussion). The invasive species knowledge index has a scale of 0-40 points with an average of 13.83, as summarized in Table 31. The index was then collapsed into high knowledge (29-42 points), some knowledge (14-28 points) and low knowledge (0-13 points) as summarized in Table 34.

3.4.3 Support for active management

Management techniques presented in question 16 covered non-management, passive management, and active management techniques to gauge

respondents' attitudes towards management, which are summarized in Table 35. An

index was created for respondents' support of active management in which agreeing

or strongly agreeing with the active management options and disagreeing or strongly

disagreeing with non-management techniques were worth one (1) point, creating an

index which scales from 0-13 with an average of 7.8 and a median and mode of 8

(Table 36). Support for active management was then collapsed into generally

supportive (7-13 points) and generally unsupportive (0-6 points), with 71.9% of the

respondents being generally supportive of active management techniques (Table 37).

3.4.4   Models for answering research questions

*How do the demographics (age, education, gender, and ethnicity) of APBP neighbors
compare to Albany County demographics?*

As discussed in Section 3.1, the average age for all respondents was 57.6 with

a median of 60. Most respondents were in the 60-69 year age group. Females

represent 49.6% of respondents. The majority of survey respondents (89.2%)

identified as Caucasian, with a few respondents identifying as African-American,

Asian-American, or other groups. Most respondents were well educated with 83.4%

have a bachelor's degree or higher.

Neighbors of the Pine Bush live within Albany County, and many within the

city of Albany limits. From the census bureau, Albany County has a population of

306,954 with a 59.3% homeownership rate. In Albany County, 14.9% of residents are

over the age of 65 and 66.0% are between the ages of 18 and 65. Albany County is

78.2% Caucasian, 51.7% female, and 38.8% of those over 25 have a bachelor's degree

(U.S. Census Bureau 2015). The City of Albany has a population of 98,424 with a

39.1% homeownership rate, and is 51.6% female and 57% Caucasian. In the City of

Albany, 11.1% of residents are over the age of 65 and 71% of residents are between

the ages of 18 and 65, and 37.2% of those over age 25 have a bachelor's degree (U.S.

Census Bureau 2015). Despite the small sample size, survey respondents were similar

to residents of Albany County and the City of Albany for gender, although they were

slightly more likely to be Caucasian. Respondents were better educated than most of

Albany County and the City of Albany, with 83.4% having a bachelor's degree or

higher compared to 38.8% and 37.2% of Albany County and the City of Albany

respectively. Respondents also tended to be older with 33.8% of survey respondents

over 65, compared to only 11.1-14.9% of the City of Albany and Albany County,

respectively.

*Are Preserve neighbors supportive of management in general? Are they more
supportive of specific management techniques over others?*

As shown in Tables 25 and 26, neighboring landowners were generally

supportive of environmental management. Respondents agreed that some

intervention and management is necessary to protect and maintain the APBP, and

that it should not just be left alone. Passive management techniques such as

outreach brochures, education programs, and displays at the Discovery Center were

broadly accepted by respondents, while non-management techniques such as doing

nothing and allowing invasive species to compete with natives were generally

considered unacceptable. The most controversial options, in which respondents were

divided between unacceptable and acceptable were the use of pesticides and

herbicides, the lethal control of invasive species, and the use of biocontrol, the introduction of a non-native predator or disease that targets an invasive species. Respondents were generally supportive of physical management including tree banding or girdling, mowing, and the use of prescribed fires.

Do the demographics of APB neighbors (age, education, gender, ethnicity) impact their knowledge level and opinions on invasive species management?

Cross-tabulations and chi-square analysis was used to evaluate categorical demographic data (race/ethnicity, gender, age group, education level) and the total knowledge variable. No significant relationship between race, gender, age group, or education level and knowledge of invasive species (p > 0.05) was found, as summarized in Tables 38 – 39 and 41 - 42.

Due to the low number of non-white respondents, the race variable was recoded into a dummy variable in which one (1) is white and zero (0) is non-white. The cross-tabulation for the race dummy variable and the total knowledge index variable showed no significant relationship between the variables, with 73.3% of non-whites and 43.5% of whites having only some knowledge of invasive species (chi-square = 4.85; df=2, p=0.88) as shown in Table 38.

The cross-tabulation for gender and the total knowledge index (Table 39) showed 42.0% of women and 45.7% of men had some knowledge of invasive species and their management, with no significant difference between genders and knowledge level (chi-square = 0.36, df= 1, p=0.84).

Age was converted into a categorical variable of age group, with groups in ten (10) year increments, as described in Table 40. Most (35.2%) are in the range of 60-69. The relationship between age group and invasive species knowledge was not significant (chi-square = 13.3, df=10; p=0.207). As shown in Table 41, age groups under 50 have little knowledge of invasive species, while 50-59 year olds and those 70 and over have some knowledge of invasive species. The 60-69 year old cohort was evenly split between low and some knowledge of invasive species (44.9% each).

There was also no significant relationship between highest level of education completed and invasive species knowledge (chi-square = 7.438, df = 12, p=0.827). Most of those with an associate's degree (63.6%), a master's (51.2%), or a professional degree (44.4%) have knowledge of invasive species, while most of those with a bachelor's (51.9%) had some knowledge, and those with a doctorate or medical degree were evenly split between low and some knowledge (41.7% each) as shown in Table 42.

Using the support of active management index described in Section 3.4.3, demographic variables for gender, age group, and education level were evaluated in cross-tabulations against support for active management. Due to the lack of non-white respondents, race was not included in this analysis. Demographics did not have a significant relationship with support of active invasive species management techniques (Tables 43-45).

Are people who participate in more nature-based outdoor activities more knowledgeable of invasive species and their management? Do they have different views of management than those who do less outdoor activities?

Using the total outdoor activity variable described in Section 3.4.1, there was no significant relationship between the number of outdoor activities respondents reported participating in and their knowledge of invasive species (chi-squared = 30.045 at 20 degrees of freedom, p=0.069). In general however, the more activities a person participates in, the more likely they are to know more about invasive species, with 75.0% of those reporting one activity having low knowledge of invasive species and 80.0% of those reporting ten (10) or more activities having some knowledge of invasive species, as shown in Table 46.

As shown in Table 47, there was no significant relationship (chi-square = 11.596, 10 degrees of freedom, p=0.288) between the number of outdoor activities a person participates in and support of active management.

Are neighbors who know more about the APBP more knowledgeable of invasive species?

Using the Pine Bush knowledge index and the invasive species knowledge index, neighbors who know more about the APBP are significantly more likely to know more about invasive species (chi-squared = 46.38, df=4, p=0.000). As shown in Table 48, 27.6% of those with high knowledge of the Pine Bush had high knowledge of invasive species and 62.1% of those with high Pine Bush knowledge had some knowledge of invasive species, while 90.5% of those with low Pine Bush knowledge had low invasive species knowledge.

Are neighbors who know more about invasive species more willing to support active management efforts in the preserve? Are neighbors who know more about the APBP more willing to support active management efforts in the preserve?

Neither index for invasive species knowledge or knowledge of the Albany Pine Bush was significantly correlated with support for active management efforts at the Preserve, most likely due to the low number of respondents who had had high or some knowledge of the Preserve. (Tables 49 and 50; p > 0.05). However, there was a general trend that those with more knowledge were more likely to support active management. 67.5% of those with low invasive species knowledge, 75.0% of those with some invasive species knowledge, and 90.0% of those with high invasive species knowledge supported active management. Of those with low knowledge of the APBP, 57.1% supported active management, while 71.9% of those with some Pine Bush knowledge, and 82.8% of those with high Pine Bush knowledge supported active management. There was strong support for active management regardless of knowledge of invasive species or of the APBP.

Other factors influencing support of active management

Participation in a conservation organization was also not significantly correlated with support for active management techniques (chi-square = 1.8, df=1, p=0.179). 82.1% of those who are part of a conservation organization were supportive of active management compared to 64.9% of those who were not members of conservation organizations (Table 51).

4.0   Discussion

This survey of APBP neighboring landowners demonstrates that while responding landowners are generally aware of invasive species as a problem, they are not knowledgeable of the specific invasive species that currently threaten their area, or the reasons that invasive species are a threat, which is consistent with previous research (REF). The respondents data suggests landowners living close (approximately a quarter mile) to Preserve boundaries are a unique group compared to those living in the City of Albany or Albany County, as they are older, more likely to be Caucasian, and have higher levels of education than the general populace of both Albany County and the City of Albany. This suggests that outreach efforts to this stakeholder group of neighboring landowners should be tailored to increase the knowledge levels of neighboring landowners, who are already fairly supportive of active management techniques but may be even more supportive if taught about the specific species that post a threat. Most of this stakeholder groups receives their news and information from local newspapers and television news, indicating that online-based outreach efforts may be less effective when trying to reach this group.

This survey was limited in its reach and found few significant relationships between variables, most likely attributed to the low response rate and low landowner knowledge of invasive species, which are further discussed below.

4.1 Response rate

Response rate was lower than expected for a mailed survey, attributed to several factors. No monetary or other incentive was used to encourage landowners to respond. The phrasing on post cards may have discouraged people from responding; the use of the term 'invasive species' may have stopped people who did not recognize the term and those not interested in the topic or the Preserve from completing the survey. Based on the results that were obtained, the median age of the survey population was older than expected, which may mean that lack of computer access discouraged responses. Additionally the first mailing coincided with the labor day holiday and back to school season, during which residents may have been out of town or otherwise busier than usual, and thus more likely to ignore or lose the post card. Finally, the available literature suggests that the optimum response rates for online and mailed mixed-mode surveys occurs when the final mailing includes a printed copy of the survey for respondents to complete and return, however due to budgetary constraints and the length of the survey instrument, the third mailing was done as a reminder post card only. Additionally, post cards were postmarked by the University at Albany which is not related to the Preserve, which may have confused some respondents and further affected the response rate.

The survey software used (Google Docs Forms) did not have the ability for a respondent to provide only some responses – responses were only saved and reported when the survey was completed and submitted. Respondents who

answered less than the complete survey or who lost interest or had limited time and closed the survey prior to completion did not have their responses recorded. This drop off rate may have contributed to a response rate that was lower than expected. It is recommended that future surveys utilize software which allows for the collection of data from partially completed surveys when the survey length is more than a few questions. Additionally, the use of a cash incentive could increase the response rate among those with lower interest in the Preserve and invasive species.

Ultimately, the low response rate means people who are less interested in the Preserve or outdoor activities may be underrepresented by the results of this survey. Respondents likely represent those with the most interest – the strongest positive and negative opinions on the Preserve. This may also be the reason for the majority of respondents reporting they have visited the Pine Bush, and that they are actively engaged in multiple outdoor activities. Those with low interest in the survey likely did not respond, though their opinions and support are still important to the successful management of the Preserve.

4.2   Knowledge levels

While respondent awareness of invasive species was generally high, specific knowledge of species was low among respondents. From comments by survey respondents, several indicated that they do not recognize invasive species by name, but felt they could identify invasive species by image. Future surveys may consider visual identification of invasive species through images to more thoroughly evaluate respondents' abilities to identify invasive species. Invasive species with a long history

33

in New York such as zebra mussel, or recent arrivals which have received media attention such as EAB, generally had more respondents who recognized the common name of the species and that it was invasive. Water chestnut was an outlier which many respondents recognized but did not know it was invasive, most likely due to confusion over the food 'water chestnut' and lack of any clarification on the common name in the survey.

Through comments on the survey, it became apparent that the APBP has recently sent mailings to some local landowners in certain neighbors which discuss invasive species and their need for control. Despite this mailing, overall knowledge of invasive species remained low, which may indicate that the mailing did not educate neighboring landowners of the invasive species problem. Knowledge of the Pine Bush and its management practices was low, and most respondents drastically underestimated the ecological importance of the Preserve as a home for species of greatest conservation need in New York.

The overall lack of knowledge of invasive species and their management impacted the statistical analysis. With the majority of respondents having only some knowledge, there was no clear relationship between knowledge levels and support of invasive species management. For cross-tabulations, this meant many cells frequently had expected counts of less than five (5) which lowers the likelihood of statistically significant relationships being observed. While a positive correlation between knowledge levels and support for management was expected, the small

sample size and overall low level of knowledge contributed to no statistically significant relationship.

Most respondents were found to have some knowledge of the APBP or invasive species, with few respondents having very low or very high levels of knowledge, which makes it difficult to see clear patterns between knowledge levels and support for management actions. The majority (71.9%) were generally supportive of active management, suggesting that the small sample size might underrepresent those who are less supportive of or uncertain of their stance on active management. The decision to support active management may have additional explanations besides general knowledge, such as trust in the Albany Pine Bush Preserve Commission, a general emotional sense of the need to preserve the area, aesthetic preferences for forested lands, and impacts on land values in the area which may play a larger role in shaping people's support for management than pure knowledge.

This survey found respondents generally aware of the concept of invasive species and the definition of the term, which is consistent with an ongoing statewide survey in New York (Connelly et al. 2015). This is a change from a previous survey of landowners in the lower Hudson Valley (Connelly et al. 2007), which found low awareness. It may indicate that outreach efforts have been successful at raising awareness. However, translating that awareness into knowledge and public action has been less successful (REF).

4.3   Sources for news and potential for outreach

Respondents reported they received most of their gardening and landscaping information from the internet and from local garden stores, while they received their science news from television news channels, local newspapers, and large US news websites. In a previous study, landowners have reported they would look to Cornell Cooperative Extension staff and literature and had interest in periodic mailings with information about invasive species (Connelly et al. 2007). These results are consistent with the ongoing state-wide New York survey, in which many report TV and internet as primary sources of news mentioned above (Connelly et al. 2015). The results demonstrate the importance of local news coverage on invasive species issues, and the need to work with local garden stores as a means of educating landowners.

4.4   Opinions on management

Despite low knowledge levels, landowners were supportive of most management practices. Respondents were not strongly opposed to more controversial practices such as biocontrol and pesticide use, which indicates there is room for outreach efforts to gain public support, or at least understanding, of future management needs in these areas. Many respondents were unaware of the tree banding or girdling, mowing, or chemical control methods are currently in use at the Preserve. The low awareness of mowing is surprising given the visibility of several parts of the Preserve from major roadways and use of large mowing equipment. Respondents were well aware of the use of prescribed fires for management, which

was expected since the landowners are part of the prescribed fire mailing list database at the Preserve.

Overall respondents were supportive of conservation management and found it unacceptable to allow invasive species to exist and compete with native species or to do nothing about invasive species. This highlights the potential for landowner support of management at the Preserve, even if they may not be knowledgeable of the details. For controversial topics such as the use of pesticides and herbicides, lethal removal of invasive species, and biocontrol, there is potential to gain landowner support through open dialogue and education.

4.5   Potential for policy development

The results of this survey could be used to develop outreach and education programs for neighboring landowners to the Preserve. The results seem to indicate that landowners in close proximity (about a quarter mile) to the Preserves boundaries are generally older and well educated and supportive of the Preserve, despite their low knowledge of specific invasive species. Respondents indicated they were supportive of outreach efforts to neighbors, which indicates they would be receptive to the Preserve's efforts. Increasing neighboring landowner knowledge would likely further their support for the Preserve and its management efforts and greatly benefit future management actions.

Additionally, many neighboring landowners report using the Preserve trails, but fewer reported visiting the Discovery Center. This indicates a need for more on-trail education, potentially via interpretive signs and panels, in order to reach trail

users with educational messages about ecology and management. Respondents also reported they looked to local garden stores for information on landscaping, which highlights the importance of local garden stores in preventing the spread of invasive plant species and encouraging the use of native plants.

Overall, the results of this study indicate that neighboring landowners are well educated and supportive of the Preserve, and likely to be interested in being included in the discussion about conservation management going on near their homes. Respondents also indicated they would be open to the Preserve working with them to control invasive species outside of its own boundaries. Since invasive species ignore property lines, and a population of an invasive species on one parcel can continue to infect and spread to neighboring lands, working with neighboring landowners to control invasive species could significantly slow the spread of them within the APBP. Including stakeholders in the discussion and management decisions, rather than dictating future management actions, will further improve the relationship between the Preserve and this stakeholder group.

At the state level, this study supports the initial results of the statewide survey, and indicates that New York continues to lead the way in invasive species management. Increased awareness is a positive step towards successfully slowing the spread of invasive species. With the growing economic importance of outdoor recreation in New York being recognized by policy makers, gaining public support for conservation will continue to be critical to successfully conserving wild lands across the state.

5.0   Conclusion

It is critical to involve the public in conservation decisions in order to minimize conflicts between stakeholder groups and increase the success of conservation projects (Whitehead et al. 2014).

General awareness of invasive species in a broad sense was high, consistent with the most recent survey in New York, but public awareness of invasive species does not necessarily correlate with the actual threat that invasive species represent (Gozlan et al. 2013). Public awareness of invasive species has been correlated to the amount of media attention a species received (Gozlan et al. 2013), which supported in this study by the high knowledge respondents had of EAB and zebra mussels, two species which have been highly-advertised and reported on in the news.

A supportive public not only makes securing funding for management easier, but it can increase the number of volunteers actively engaged in conservation. Respondents who are both aware of the threat of invasive species and who participate in outside activities can create a volunteer "boots on the ground" workforce that can play a critical role in the early detection of new invasive species by keeping their eyes open while hiking, kayaking, or participating in other activities. The use of volunteers is "economically smart" and proven to work in the field and participation by an informed public group equals more eyes and ears for faster detection and identification of an invasion (Boudjelas 2009).

Although awareness of invasive species as an ecological and economic threat has increased, the next step appears to be translating that awareness into support

for prevention and management. As this study has shown, support for management among respondent landowners was high, and additional outreach to raise knowledge levels is likely to have a very positive impact on future management actions at the Preserve. Additionally, while education efforts have been shown to increase invasive species knowledge, increased knowledge does not necessarily correlate with support for management options (Sharp 2010). Further work is needed to understand public opinions and how conservation managers can work to increase public support.

6.0   Tables

Table 1: Survey question matrix

Topic	Question #s
Invasive species knowledge	
Definition	3
Understand invasive species concepts	4
Recognize common invasive species	5
Economic impacts of invasive species	7
Invasive species management knowledge	8
Albany Pine Bush Knowledge	
Restoration efforts	9
Uniqueness of habitat/importance of ecosystem	10
Management done currently	11
APBP Mission	12, 13
Opinions and Attitudes	
Threat invasive species pose to Preserve	14, 17
Attitudes towards management techniques	15, 16
Demographics & Characteristics	
Visit frequency and reason	2, 2A or 2B
Satisfaction with APBP management	18
Demographics (age, gender, education, hobbies)	1, 19-24
Media usage and reach	25-27

Table 2: Age and gender demographics for survey respondents.

	All respondents (n=139)	Men (n=70, 50.4%)	Women (n=69, 49.6%)
Average	57.6	59.9	55.2
Median	60	61.5	57
Minimum	25	27	25
Maximum	114	82	114

Table 3: Race and Ethnicity of survey respondents. Other includes those who did not respond to the question, one Native American and Caucasian response, and other responses not covered by the 3 primary categories.

Race/Ethnicity	Frequency	Percentage
African-American	2	1.4
Asian-American	5	3.6
Caucasian/White (non-Hispanic)	124	89.2
Other	8	5.8

Table 4: Education of survey respondents

Level of education	Frequency	Percentage
High school or GED	9	6.5
Associates Degree	11	7.9
Bachelor's Degree	52	37.4
Master's degree	43	30.9
Professional Degree	9	6.5
Doctorate or Medical Degree	12	8.6
Did not respond	3	2.2

Table 5: Frequency of visits to the APBP among survey respondents. 83.5% (116) of survey respondents had visited the Preserve, and 16.5% (23) had not.

Frequency of visits to the APBP	Frequency	Percent
Few times a year	85	61.2
Monthly	10	7.2
Weekly	8	5.8
More than once a week	13	9.5
Have not visited the Preserve	23	16.5

Table 6: Primary reasons for visitor's most recent visit or failure to visit the Albany Pine Bush Preserve

Reason for visit	Frequency	Percent
Hiking or walking	57	41.0
Biking trails	8	5.75
Dog walking	8	5.75
Other sport (snowshoeing, skiing, running/jogging, horseback riding)	11	7.91
Discovery center program	14	10.07
Discovery center exhibit	8	5.75
Other	10	7.19
Reason for not visiting	**Frequency**	**Percent**
Too busy	10	7.2
Not interested	6	4.3
Other	7	5.0

Table 7: Landowner usage of other nature preserves, including state and national parks, wildlife refuges, and other private or public nature preserves, in the past year, not including the APBP

Visited other nature preserves and parks	Frequency	Percent
Yes	103	74.1
No	33	23.7
Did not respond	3	2.2

Table 8: Participation in outdoor activities reported by respondents at the Albany Pine Bush or other places. Participants were able to report multiple activities they participate in

Outdoor activity	Frequency	Percent of respondents (n=139)
Gardening	91	65.5
Hiking	87	62.6
Wildlife watching	72	51.8
Bird feeding	63	45.3
Nature photography	53	38.1
Boating	42	30.2
Winter sports (skiing, snow shoeing)	40	28.8
Canoeing and kayaking	37	26.6
Camping	30	21.6
Fishing	29	20.9
Gardening	91	65.5
Boating	42	30.2
Backpacking	18	12.9
Hunting and trapping	11	7.9
Winter sports (skiing, snow shoeing)	40	28.8
Nature photography	53	38.1
Canoeing and kayaking	37	26.6
Other outdoor activities	7	5.0
No response or reported "none"	8	5.8

Table 9: Landowner participation in conservation and wildlife organizations

Member of a conservation or wildlife organization	Frequency	Percent
Yes	28	20.1
No	111	79.9

Table 10: Sources of science news among survey respondents. Respondents were able to report more than one news source they use for science news and information. Most "other" news sources were scientific journals or magazines and non-news television channels, such as the Discovery channel.

Source for science news	Frequency	Percent of respondents (n=139)
Library	28	20.1
Local newspapers (print or online)	86	61.9
TV news channels	88	63.3
Radio	43	30.9
US News outlets online	71	51.1
Foreign news outlets online	17	12.2
Other online websites	47	33.8
Social media sites	24	17.3
Other news sources	18	12.9

Table 11: Sources for information for landscaping, gardening, and land management among survey respondents. Respondents were able to report more than one news source. Most "other" news sources were books from personal libraries owned at home.

Landscaping, gardening, and land management news source	Frequency	Percent of respondents (n=139)
Library	23	16.5
Local newspapers (print or online)	48	34.5
Local garden stores	91	65.5
TV home and garden channels	55	39.6
Chain garden stores	59	42.4
Internet websites	95	68.3
Cornell Cooperative extension	38	27.3
Town and village newsletters	15	10.8
Other sources	9	6.5

Table 12: Respondents reporting having seen, heard, or read anything about invasive species in the past 6 months.

Heard, read, or seen anything about invasive species	Frequency	Percent
Yes	85	61.2
No	54	38.8

Table 13: Ability to identify the correct definition of the term "invasive species" among survey respondents

Response	Frequency	Percent
I don't know how to define an "invasive species"	6	4.3
Species that are both not native to the local area and cause damage to local ecosystems	99	71.2
Species that are not native to the local area	21	15.1
Species that cause damage to local ecosystems	13	9.4

Table 14: Self-rated knowledge of ecological concepts surrounding invasive species among survey respondents

Concept	Nothing		Very little		A fair amount		A great deal	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Why invasive species are considered invasive	12	8.6	48	34.5	62	44.6	17	12.2
Impact of invasive species on local ecosystems	12	8.6	60	43.2	53	38.1	14	10.1
Effects of invasive species on native animals and plants	17	12.2	51	36.7	54	38.8	17	12.2
Effect of invasive species on endangered species	17	12.2	61	43.9	51	36.7	10	7.2

Table 15: Familiarity with common invasive species found in and around the Albany Pine Bush Preserve by common name.

Species	I do not know what this		I've heard of this, but did not know it was invasive		I know what this and I know it is an invasive species	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Garlic mustard	85	61.2	38	27.3	16	11.5
Oriental Bittersweet	88	63.3	30	21.6	21	15.1
Multiflora rose	87	62.6	36	25.9	16	11.5
Purple loosestrife	74	53.2	15	10.8	50	36.0
Emerald ash borer (EAB)	41	29.5	24	17.3	74	53.2
Asian Long horned beetle (ALB)	55	39.6	29	20.9	55	39.6
Japanese knotweed	101	72.7	15	10.8	23	16.5
Spotted knapweed	110	79.1	18	12.9	11	7.9
Bush honeysuckle	82	59.0	42	30.2	15	10.8
Common reed (Phragmites)	96	69.1	30	21.6	13	9.4
Sirex woodwasp	109	78.4	18	12.9	12	8.6
Zebra mussels	22	15.8	17	12.2	100	71.9
Water chestnut	35	25.2	69	49.6	35	25.2
Spiny water flea	87	62.6	30	21.6	22	15.8

Table 16: Landowner knowledge of general invasive species management techniques

Technique	Nothing		Very little		A fair amount		A great deal	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Tree banding/girdling	33	23.7	53	38.1	38	27.3	15	10.8
Prescribed Fire	12	8.6	38	27.3	64	46.0	25	18.0
Intensive grazing	52	37.4	71	51.1	8	5.8	8	5.8
Mowing	22	15.8	56	40.3	47	33.8	14	10.1
Pesticide and Herbicide use	13	9.4	58	41.7	54	38.8	14	10.1

Table 17: Self-rated familiarity with the mission of the Albany Pine Bush Preserve among survey respondents

Familiarity	Frequency	Percent
Not familiar	24	17.3
Somewhat familiar	92	66.2
Very familiar	23	16.5

Table 18: Self-rated familiarity with the Albany Pine Bush Preserve's efforts to restore the inland pine barrens ecosystem among survey respondents

Familiarity	Frequency	Percent
Not familiar	25	18.0
Somewhat familiar	82	59.0
Very familiar	32	23.30

Table 19: Ability to correctly identify the statement that best describes the mission of the Albany Pine Bush Preserve among survey respondents

Statement	Frequency	Percent
To preserve the endangered natural communities of the Albany Pine Bush for ecological and recreational benefits, and to provide environmental education to the public	41	29.5
To protect and manage the unique and endangered natural communities of the Albany Pine Bush for ecological, recreational, and educational benefits	83	59.7
To protect the endangered ecosystems of the Albany Pine Bush from urban development for the enjoyment of the public and preservation of nature	15	10.8

Table 20: Landowner knowledge of invasive species management techniques currently in use at the Albany Pine Bush Preserve

Technique in use at APBP	No, I did not know this was done in the Preserve		Yes, I know this is done in the Preserve	
	Frequency	Percent	Frequency	Percent
Mowing plants	61	43.9	78	56.1
Banding/girdling tree	74	53.2	65	46.8
Chemical herbicide	115	85.7	24	17.3

Table 21: Survey respondents estimates of the number of Species of Greatest Conservation Need found within the Albany Pine Bush Preserve. Three responses were not included as negative numbers were entered.

N	136
Mean	20.46
Median	7.50
Mode	10
Std. Deviation	52.221
Variance	2727.065
Maximum	500
Minimum	0

Table 22: Perceived threat invasive plant species post to the Albany Pine Bush Preserve according to survey respondents

Invasive species	Not sure		No threat		Moderate threat		Severe threat	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Garlic mustard	104	74.8	6	4.3	18	12.9	11	7.9
Oriental Bittersweet	107	77.1	5	3.6	18	12.9	9	6.5
Spotted knapweed	115	82.7	3	2.2	16	11.5	5	3.6
Purple loosestrife	83	59.7	4	2.9	29	20.9	23	15.6
Japanese knotweed	109	78.4	3	2.2	18	12.9	9	6.5
Bush Honeysuckle	104	74.8	4	2.9	22	15.8	9	6.5
Common reed (Phragmites)	109	78.4	6	4.3	20	14.4	4	2.9

Table 23: Perceived threat invasive species in general pose to their land according to survey respondents

Response	Frequency	Percent
No threat	12	8.6
Little threat	46	33.1
Some threat	71	51.1
High threat	10	7.2

Table 24. Perceived impacts invasive species pose to agriculture, forestry, and recreation in New York State according to survey respondents

Response	Frequency	Percent
Very little impact	4	2.9
Moderate impact	87	62.6
Severe impact	48	34.5

Table 25: Survey respondents opinions on general statements about the Albany Pine Bush Preserve and its management

	Strongly disagree		Disagree		Unsure		Agree		Strongly agree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Protecting the natural ecosystem of the APBP should be a priority	2	1.4	16	11.5	21	15.1	54	38.8	46	33.1
Control of some species is necessary to help conserve the natural ecosystem of the Albany Pine Bush Preserve	4	2.9	4	2.9	7	5.0	78	56.1	46	33.1
The Albany Pine Bush's natural areas should be restored	5	3.6	8	5.8	33	23.7	64	43.9	32	23.0
The Albany Pine Bush Preserve should be left alone for nature to take its course	42	30.2	59	42.4	23	16.5	11	7.9	4	2.9
Invasive species have as much a right to exist as native species at the Albany Pine Bush Preserve	52	37.4	54	38.8	22	15.8	9	6.5	2	1.4
Management interventions are not necessary to maintain the ecosystems of the Albany Pine Bush Preserve	54	38.8	66	47.5	9	6.5	8	5.8	2	1.4

Table 26: Survey respondents' opinions on specific management techniques available to conservation managers for the management of invasive species at the Albany Pine Bush Preserve

Management option	Unacceptable in ALL cases		Mostly unacceptable		Unsure		Mostly acceptable		Acceptable in ALL cases	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Leave invasive species alone	49	35.3	61	43.9	22	15.8	7	5.0	0	0
Outreach with brochures on invasive species to neighboring land owners	0	0	3	2.2	8	5.8	55	39.6	73	52.5
Use of pesticides and herbicides to manage invasive species	8	5.8	38	27.3	37	26.6	52	37.4	4	2.9
Capture and relocate invasive animals	6	4.3	7	5.0	26	18.7	73	52.5	27	19.4
Allow invasive species to compete with native species	52	37.4	45	32.4	31	22.3	9	6.5	2	1.4
Education programs on invasive species	0	0	1	0.7	8	5.8	50	36.0	80	57.6
Using domestic herbivores (IE sheep) to control invasive plants	2	1.4	8	5.8	41	29.5	65	46.8	23	16.5
Cutting or banding of invasive trees	4	2.9	8	5.8	29	20.9	70	50.4	28	20.1
Do nothing to manage invasive species	67	48.2	48	34.5	18	12.9	6	4.3	0	0

Table 26, continued: Survey respondents' opinions on specific management techniques available to conservation managers for the management of invasive species at the Albany Pine Bush Preserve

Management option	Unacceptable in ALL cases		Mostly unacceptable		Unsure		Mostly acceptable		Acceptable in ALL cases	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Displays and exhibits at the Discovery center on invasive species	0	0	0	0	7	5.0	52	37.4	80	57.6
Sponsor hunts for invasive animals	14	10.1	23	16.5	44	31.7	47	33.8	11	7.9
Use of herbicides and pesticides to control invasive species	12	8.6	39	28.1	39	28.1	40	28.8	9	6.5
Mowing to control invasive plants	1	0.7	6	4.3	17	12.2	81	58.3	34	24.5
Releasing a non-native insect to control an invasive insect	13	9.4	27	19.4	69	49.6	21	15.1	9	6.5
Work with local community to control invasive species outside Preserve boundaries	3	2.2	5	3.6	9	6.5	48	56.1	44	31.7
Lethal control (capture and kill) of invasive animals	19	13.7	19	13.7	44	31.7	44	31.7	13	9.4
Use of prescribed fires for the management of invasive plants	4	2.9	4	2.9	16	11.5	81	58.3	34	24.5

Table 27: Survey respondents' satisfaction with the environmental management of the Albany Pine Bush Preserve. On a scale of 1-5, with 1 being "completely unsatisfied" and 5 being "completely satisfied"

Ranking on scale of 1-5	Frequency	Percent
1	7	5.0
2	4	2.9
3	40	28.8
4	33	47.5
5	22	15.8

Table 28. Perceived threat major management challenges pose to the Albany Pine Bush Preserve according to survey respondents

Management challenge	No threat		A little threat		Some threat		A lot of threat	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Urban development	4	2.9	8	5.8	49	35.3	78	56.1
Invasive species	1	0.7	10	7.2	70	50.4	58	41.7
Climate change	10	7.2	33	23.7	50	36.0	46	33.1
Habitat fragmentation	1	0.7	18	12.9	73	52.5	47	33.8

Table 29: Summary statistics for total number of outdoor activities respondents reported participating in

N	136
Mean	4.12
Median	4.00
Mode	
Std. Deviation	2.754
Variance	
Maximum	12
Minimum	0

Table 30: Summary statistics for the collapse total number of outdoor activities, with those above 10 activities reported grouped into the "greater than 10" category

Number of outdoor activities reported	Frequency	Percent (n=139)
0	9	6.5
1	16	11.5
2	18	12.9
3	26	18.7
4	18	12.9
5	9	6.5
6	13	9.4
7	13	9.4
8	4	2.9
9	8	5.8
10 or more	5	3.6
Total	139	100

Table 31: Summary statistics for four created knowledge indices for Management knowledge, Pine Bush knowledge, invasive species knowledge, and total knowledge level.

Statistic	Management knowledge index	Pine Bush knowledge index	Invasive species knowledge index	Total knowledge index
N	139	139	139	139
Mean	6.66	4.19	13.83	24.68
Median	7	4	12	22
Mode	8	4	10	17
Std. Deviation	3.49	1.84	9.70	12.73
Variance	12.21	3.37	75.64	162.09
Minimum	0	0	0	1
Maximum	15	8	39	62

Table 32: Summary statistics for Management knowledge index collapsed into high, some, and low knowledge levels

Knowledge level	Frequency	Percent (n=139)
High (11-15 points)	15	10.8
Some (5-10 points)	36	25.9
Low (0-4 points)	88	63.3

Table 33: Summary statistics for Pine Bush knowledge index collapsed into high, some and low knowledge levels

Knowledge level	Frequency	Percent (n=139)
High (6-8 points)	29	20.9
Some (3-5 points)	89	64.0
Low (0-2 points)	21	15.1

Table 34: Summary statistics for invasive species knowledge index collapsed into high, some and low knowledge levels

Knowledge level	Frequency	Percent (n=139)
High (29-42 points)	10	7.2
Some (14-28 points)	52	37.4
Low (0-13 points)	77	55.4

Table 35: Management categories for statements in survey question 16, evaluating respondent support for specific management technique examples.

No management	Passive management	Active management
Leave invasive species alone	Outreach with brochures on invasive species to neighboring land owners	Use of pesticides and herbicides to manage invasive species
Allow invasive species to compete with native species	Education programs on invasive species	Capture and relocate invasive animals
Do nothing to manage invasive species	Displays and exhibits at the Discovery center on invasive species	Using domestic herbivores (IE sheep) to control invasive plants
	Work with local community to control invasive species outside Preserve boundaries	Cutting or banding of invasive species
		Sponsor hunts for invasive animals
		Use of herbicides and pesticides to control invasive species
		Mowing to control invasive plants
		Releasing a non-native insect to control an invasive insect
		Lethal control (capture and kill) of invasive animals
		Use of prescribed fires for the management of invasive plants

Table 36: Summary statistics for the support of active management variable

Statistic	Support of active management variable
N	139
Mean	7.83
Median	8
Mode	8
Std. Deviation	2.72
Variance	7.38
Minimum	0
Maximum	13

Table 37: Summary statistics for Active management variable collapsed into supportive and not-supportive categories

Category	Frequency	Percent
Generally Unsupportive (0-6 points)	39	28.1
Generally Supportive (7-13 points)	100	71.9
Total	139	100

Table 38: Cross-tabulation for race and total knowledge index. 2 degrees of freedom with a chi-squared value of 4.854, p=0.88.

Total knowledge level using Index		Non-white	White	Total
High	Count	1	12	13
	Expected count	1.4	11.6	13
	% within Race	6.7	9.7	9.4
Some	Count	3	58	61
	Expected count	6.6	54.4	61
	% within Race	20.0	46.8	43.9
Low	Count	11	54	65
	Expected count	7	58	65
	% within Race	73.3	43.5	46.8
Total Count		15	124	139
Total expected count		15	124	139
Total % within Race		100	100	100

Table 39: Cross-tabulation for gender and total knowledge index. 2 degrees of freedom with a chi-squared value of 0.356, p=0.837.

Total knowledge level using Index		Female	Male	Total
High	Count	6	7	13
	Expected count	6.5	7.5	13
	% within Gender	8.7	10.0	9.4
Some	Count	29	32	61
	Expected count	30.3	30.7	61
	% within Gender	42.0	45.7	43.9
Low	Count	34	31	65
	Expected count	32.3	32.7	65
	% within Gender	49.3	44.3	46.8
Total Count		69	70	139
Total expected count		69	70	139
Total % within Gender		100	100	100

Table 40: Summary statistics for age group variable

Age group	Frequency	Percent
Under 30	6	4.3
30-39	8	5.8
40-49	24	17.3
50-59	30	21.6
60-69	49	35.3
70 and over	22	15.8

Table 41: Cross-tabulation for age group and total knowledge index. 10 degrees of freedom with a chi-squared value of 13.314, p=0.207.

Total knowledge level using Index		Age group						Total
		Under 30	30-39	40-49	50-59	60-69	Over 70	
High	Count	0	2	0	2	5	4	13
	Expected count	.6	.7	2.2	2.8	4.6	2.1	13
	% within Age group	0.0%	25.0%	0.0%	6.7%	10.2%	18.2%	9.4
Some	Count	2	2	8	17	22	10	61
	Expected count	2.6	3.5	10.5	13.2	21.5	9.7	61
	% within Age group	33.3%	25.0%	33.3%	56.7%	44.9%	45.5%	43.9
Low	Count	4	4	16	11	22	8	65
	Expected count	2.8	3.7	11.2	14.0	22.9	10.3	65
	% within Age group	66.7%	50.0%	66.7%	36.7%	44.9%	36.4%	46.8
Total Count		6	8	24	30	49	22	139
Total expected count		6.0	8.0	24.0	30.0	49.0	22.0	139
Total % within Age group		100	100	100	100	100	100	100

Table 42: Cross-tabulation of highest education level received and knowledge index. 12 degrees of freedom and chi-squared value of 7.438, p=0.827

Total knowledge level using Index		Highest level of education completed							Total
		No response	High school or GED	Associates degree	Bachelors degree	Masters degree	Professional degree	Doctorate or medical degree	
High	Count	0	0	1	4	4	2	2	13
	Expected count	.3	.8	1.0	4.9	4.0	.8	1.1	13
	% within Education level	0.0%	0.0%	9.1%	7.7%	9.3%	22.2%	16.7%	9.4
Some	Count	1	5	3	27	17	3	5	61
	Expected count	1.3	3.9	4.8	22.8	18.9	3.9	5.3	61
	% within Education level	33.3%	55.6%	27.3%	51.9%	39.5%	33.3%	41.7%	43.9
Low	Count	2	4	7	21	22	4	5	65
	Expected count	1.4	4.2	5.1	24.3	20.1	4.2	5.6	65
	% within Education level	66.7%	44.4%	63.6%	40.4%	51.2%	44.4%	41.7%	46.8
Total Count		3	9	11	52	43	9	12	139
Total expected count		3.0	9.0	11.0	52.0	43.0	9.0	12.0	139
Total % within Education level		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100

Table 43: Cross-tabulation of gender and support for active management. 1 degree of freedom and chi-squared value of 0.058, p=0.809

Support for active management		Male	Female	Total
Less Supportive	Count	19	20	39
	Expected count	19.6	19.4	39.0
	% within gender	27.1%	29.0%	28.1%
More supportive	Count	51	49	100
	Expected count	50.4	49.6	100.0
	% within gender	72.9%	71.0%	71.9%
Total Count		70	69	139
Total expected count		70	69	139
Total % within gender		100	100	100

Table 44: Cross-tabulation of age group and support for active management. 5 degrees of freedom and chi-squared value of 6.592, p=0.253

Support for active management		Age group						Total
		Under 30	30-39	40-49	50-59	60-69	Over 70	
Less Supportive	Count	2	1	9	9	16	2	39
	Expected count	1.7	2.2	6.7	8.4	13.7	6.2	39
	% within Age group	33.3	12.5	37.5	30.0	32.7	9.1	28.1
More Supportive	Count	4	7	15	21	33	20	100
	Expected count	4.3	5.8	17.3	21.6	35.3	15.8	100
	% within Age group	66.7%	87.5%	62.5%	70.0%	67.3%	90.9%	71.9
Total Count		6	8	24	30	49	22	139
Total expected count		6	8.0	24.0	30.0	49.0	22.0	139
Total % within Age group		100	100	100	100	100	100	100

Table 45: Cross-tabulation of highest education level received and support for active management. 6 degrees of freedom and chi-squared value of 1.021, p=0.985

Support of active management		No response	High school or GED	Associate's degree	Bachelors degree	Masters degree	Professional degree	Doctorate or medical degree	Total
					Education level				
Less supportive	Count	1	2	2	15	13	3	3	39
	Expected count	0.8	2.5	3.1	14.6	12.1	2.5	3.4	39
	% within Education level	33.3	22.2	18.2	28.8	30.2	33.3	25.0	28.1
More Supportive	Count	2	7	9	37	30	6	9	100
	Expected count	2.2	6.5	7.9	37.4	30.9	6.5	8.6	100
	% within Education level	66.7	77.8	81.8	71.2	69.8	66.7	75.0	71.9
Total Count		3	9	11	52	43	9	12	139
Total expected count		3	9	11	52	43	9	12	139
Total % within Age group		100.0	100	100	100	100.0	100	100	100

Table 46: Cross-tabulation of number of outdoor activities respondents reported participating in and knowledge of invasive species. Chi-squared = 30.045 at 20 degrees of freedom, p=0.069

Invasive species knowledge level using Index		Number of outdoor activities											Total
		0	1	2	3	4	5	6	7	8	9	10 or more	
High	Count	0	2	0	1	2	0	1	1	0	2	1	10
	Expected count	0.6	1.2	1.3	1.9	1.3	0.6	0.9	0.9	0.3	0.6	0.4	10
	% within activity number	0.0	12.5	0.0	3.8	11.1	0.0	7.7	7.7	0.0	25.0	20.0	7.2
Some	Count	2	2	4	10	7	5	6	4	3	5	4	52
	Expected count	3.4	6.0	6.7	9.7	6.7	3.4	4.9	4.9	1.5	3.0	1.9	52
	% within activity number	22.2	12.5	22.2	38.5	38.9	55.6	46.2	30.8	75.0	62.5	80.0	37.4
Low	Count	7	12	14	15	9	4	6	8	1	1	0	77
	Expected count	5	8.9	10.0	14.4	10.0	5.0	7.2	7.2	2.2	4.4	2.8	77
	% within activity number	77.8	75.0	77.5	57.7	50.0	44.4	46.2	61.5	25.0	12.5	0.0	55.4
Total Count		9	16	18	26	18	9	13	13	4	8	5	139
Total expected count		9	16	18	26	18	9	13	13	4	8	5	139
Total % within activity number		100	100	100	100	100	100	100	100	100	100	100	100

Table 47: Cross-tabulation of number of outdoor activities respondents reported participating in and support for active management. Chi-squared = 11.596 at 10 degrees of freedom, p=0.288

Support for active management		Number of outdoor activities											Total
		0	1	2	3	4	5	6	7	8	9	10 or more	
More supportive	Count	5	12	14	17	17	5	8	10	2	5	5	100
	Expected count	6.5	11.5	12.9	18.7	12.9	6.5	9.4	9.4	2.9	5.8	3.6	100
	% within activity number	55.6	75.0	77.8	65.4	94.4	55.6	61.5	76.9	50.0	62.5	100	71.9
Less supportive	Count	4	4	4	9	1	4	5	3	2	3	0	39
	Expected count	2.5	4.5	5.1	7.3	5.1	2.5	3.6	3.6	1.1	2.2	1.4	39
	% within activity number	44.4	25.0	22.2		5.6	44.4	38.5	23.1	50.0	37.5	0.0	100
Total Count		9	16	18	26	18	9	13	13	4	8	5	139
Total expected count		9	16	18	26	18	9	13	13	4	8	5	139
Total % within activity number		100	100	100	100	100	100	100	100	100	100	100	100

Table 48: Cross-tabulation of knowledge of the Albany Pine Bush with knowledge of invasive species. Chi-squared = 46.379; df=4 ; p<0.05.

Invasive species knowledge index		Albany Pine Bush knowledge			Total
		Low	Some	High	
High	Count	0	2	8	10
	Expected count	1.5	6.4	2.1	10
	% within APB Knowledge	0.0	2.2	27.6	7.2
Some	Count	2	32	18	52
	Expected count	7.9	33.3	10.8	52
	% within APB Knowledge	9.5	36.0	62.1	37.4
Low	Count	19	55	3	77
	Expected count	11.6	49.3	16.1	77.0
	% within APB Knowledge	90.5	61.8	10.3	55.4
Total Count		29	21	89	139
Total expected count		29	21	89	139
Total % within APB Knowledge		100	100	100	100

Table 49: Cross-tabulation of invasive species knowledge index and support for active management. Chi-squared = 2.598; df=2 ; p = 0.273

Support for active management		Invasive species knowledge			Total
		Low	Some	High	
More supportive	Count	52	39	9	100
	Expected count	55.4	37.4	7.2	100
	% within invasive species Knowledge	67.5	75.0	90.0	71.9
Less supportive	Count	25	13	1	39
	Expected count	21.6	14.6	2.8	39
	% within invasive species Knowledge	32.5	25.0	10.0	28.1
Total Count		10	77	52	139
Total expected count		10	77	52	139
Total % within invasive species Knowledge		100	100	100	100

Table 50: Cross-tabulation of Albany Pine Bush knowledge index and support for active management. Chi-square = 3.960; df=2; p=0.138

Support for active management		Albany Pine Bush knowledge			Total
		Low	Some	high	
More supportive	Count	12	64	24	100
	Expected count	15.1	64	20.9	100
	% within APB Knowledge	57.1	71.9	82.8	71.9
Less supportive	Count	9	25	5	39
	Expected count	5.9	25	8.1	39
	% within APB Knowledge	42.9	28.1	17.2	28.1
Total Count		29	21	89	139
Total expected count		29	21	89	139
Total % within APB Knowledge		100	100	100	100

Table 51: Cross-tabulation of participating in a conservation organization and support for active management. Chi-squared = 1.807, 1 degree of freedom, p=0.179

Support for active management		Participating in a conservation organization		
		No	Yes	Total
More supportive	Count	77	23	100
	Expected count	79.9	20.1	100
	% within conservation organization participation	69.4	82.1	71.9
Less supportive	Count	34	5	39
	Expected count	31.1	7.9	39
	% within conservation organization participation	30.6	17.9	28.1
Total Count		111	28	139
Total expected count		111	28	139
Total % within conservation organization participation		100	100	100

7.0 References

Albany Pine Bush Preserve Comission. 2011a. Species of Greatest Conservation Need

   Webpage. Accessed 2015 March 9 from:

   http://www.albanypinebush.org/conservation/wildlife-management#greatestneed

Albany Pine Bush Preserve Commission. 2011b. Fire Management. Access 10 May 2015 from:

   http://www.albanypinebush.org/conservation/ecosystem-restoration-and-

   management/fire-management

Boudjelas, S. 2009. Public participation in invasive species management. In: Clout, M. And

   Williams, P. Eds. Invasive species management: A handbook of principles and

   techniques. New York: Oxford. p. 93-107.

Bremner, A., and K. Park. 2007. Public attitudes to the management of invasive non-native

   species in Scotland. Biological Conservation. 139(3-4): 306-314. Accessed online

   from: http://dx.doi.org/10.1016/j.biocon.2007.07.005

Colautti, R. I. and MacIssac, H. J. 2004. A neutral terminology to define 'invasive' species.

   Diversity Distrib. 10: 135-141

Connelly, N.A., T.L. Brown, andP.J. Smallidge. 2007. Public awareness of invasive plants and

   insects in the Catskills and Lower Hudson Region. Accessed 2015 March 4 from:

   http://www2.dnr.cornell.edu/hdru/pubs/HDRUReport07-7.pdf

Connelly, N.A., T.B. Lauber, and R.C. Stedman. 2015. New York Resident's Awareness of

   Invasive species. Accessed 2015 March 4 from:

   http://www.nyis.info/user_uploads/files/HDRU%20Invasive%20Species%20Screening

   %20Report%20Final.pdf

Dillman, D.A., J.D. Smyth, and L.M. Christian. 2009. Internet, mail, and mixed-mode sureys:

The tailored design method. 3rd ed. New Jersey: Wiley.

Estévez, R.A., C.B. Anderson, J.C. Pizarro, and M.A. Burgman. 2014. Clarifying values, risk

perceptions, and attitudes to resolve or avoid social conflicts in invasive species

management. Conservation Biology. 0: 0, 1-12. DOI: 10.1111/cobi.12359

Exec. Order No. 13112. C. F. R. Vol. 64, No. 25. 1999. Available from:

http://www.invasivespecies.gov/home_documents/EO%2013112.pdf Accessed 2012

October 10.

European Environmental Agency. 2012. The impacts of invasive alien species in Europe.

Available from: http://www.eea.europa.eu/publications/impacts-of-invasive-alien-

species

Fischer, A. and J.C. Young. 2007. Understanding mental constructs of biodiversity:

Implications for biodiversity management and conservation. Biological Conservation.

136: 271-282

Garcia-Llorente, M., Martin-Lupez, B., Gonzalez, J.A., Alcorlo, P., Montes, C., 2008. Social

perceptions of the impacts and benefits of invasive alien species: implications for

management. Biological Conservation 141, 2969–2983.

Garcia-Llorente, M., Martin-Lopez, B., Nunes, P.A.L.D., Gonzalez, J.A., Alcorlo, P., Montes, C.,

2011. Analyzing the social factors that influence willingness to pay for invasive alien

species management under two different strategies: eradication and prevention.

Environmental Management. doi:10.1007/s00267-011-9646-z.

Gozlan, R.E., D. Burnard, D. Andreou, J.R. Britton. 2013. Understanding the threats posed by

non-native species: public vs conservation managers. PloS ONE. 8(1): e53200. DOI:

10.1371/journal.pone.0053200

Lodge, D. M., Lewis, M. A., Shogren, J. F., and Keller, R. P. 2009. Introduction to Biological

Invasions: Biological, Economic, and Social Perspectives. In: Keller, R. P., Lodge, D. M.,

Lewis, M. A., and Shogren, J. F., Eds. Bioeconomics of Invasive Species: Integrating

Ecology, economics, Policy, and Management. New York: Oxford. p. 1-24.

McIntosh, C.R,. J.F. Shogren, and D.C. Finnoff. 2009. Invasive species and delaying the

inevitable: Valuation evidence from a national survey. Ecological Economics. 69. 632-

640. DOI: 10.1016/j.ecolecon.2009.09.014

McNeely, J. A. 2000. The Future of Alien Invasive Species: Changing Social Views. In: Mooney,

H. A., and Hobbs, R. J., Eds. Invasive Species in a Changing World. Washington: Island

Press. p. 171-190.

McNeely, J.A., 2001. An introduction to human dimensions of invasive alien species, in: The

Great Reshuffling: Human Dimensions of Invasive Alien Species. IUCN, Gland,

Switzerland and Cambridge, UK.

National Invasive Species Council (NISC). 2006. Invasive Species Definition Clarification and

Guidance White Paper. Available from:

http://www.invasivespeciesinfo.gov/docs/council/isacdef.pdf Accessed 2012 October

10.

Odera, E., & Lamm, A. 2014. Public Opinions of Endangered Species in Florida. PIE2012/13-

13. Gainesville, FL: University of Florida/IFAS Center for Public Issues Education.

Pimentel, D., Zuniga, R., and Morrison, D. 2005. Update on the environmental and economics

costs associated with alien-invasive species in the United States. Biological

Economics. 52:273-288.

Reiter, D. K., Brunson, M. W., Schmidt, R. H. 1999. Public Attitudes towards Wildlife

Damage Management and Policy. Wildlife Society Bulletin. 27(3): 746-758.

Reaser, J.K., 2001. Invasive alien species prevention and control: the art and science of

    managing people. In: McNeely, J.A. (Ed.), The Great Reshuffling: Human Dimensions

    of Invasive Alien Species. IUCN, Cambridge, UK, pp. 89–104.

Ryan, R.L. 2012. The influence of landscape preference and environmental education on

    public attitudes towards wildlife management in the Northeast pine barrens (USA).

    Landscape and Urban Planning. 107: 55-68

Sanda, C. 2012. Riparian landowner aquatic invasive species awareness: Survey results report

    October 2012. City of Superior, WI Environmental services Division of Public Works.

    Accessed 2014 March 4 from:

    http://www.ci.superior.wi.us/DocumentCenter/View/5133

Sharp, R.L. 2010. The Effects of Two Educational Programs on Neighbors' Knowledge of and

    Attitudes Towards, and Support for Control of, Invasive Species on Cumberland

    Island National Seashore. Unpublished doctoral dissertation. University of Georgia.

Sharp, R. L., Larson, L. R., and Green, G. T. 2011. Factors influencing public preferences for

    invasive alien species management. Biological Conservation. 144: 2097-2104.

Simberloff, D., I. M. Parker, P.N. Windle. 2005. Introduced Species Policy, Management, and

    Future Research Needs. Front Ecol Environ. 3(1): 12-20

Tanentzap, A.J., Bazely, D.R., Williams, P.A., Hoogensen, G., 2009. A human security

    framework for the management of invasive nonindigenous plants. Invasive Plant

    Science and Management 2, 99–109.

Temple, S.A., 1990. Editorial: the nasty necessity: eradicating exotics. Conservation Biology 4,

113–115

U.S. Census Bureau. 2015. "State and County QuickFacts. Data derived from Population
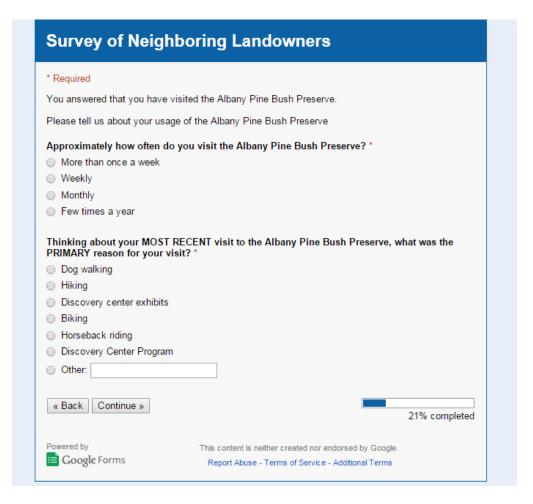
Estimates,

American Community Survey, Census of Population and Housing, State and County

Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic

Census, Survey of Business Owners, Building Permits" Accessed 2015 March 9 from:

http://quickfacts.census.gov/qfd/states/36/36001.html Last updated 2015 February
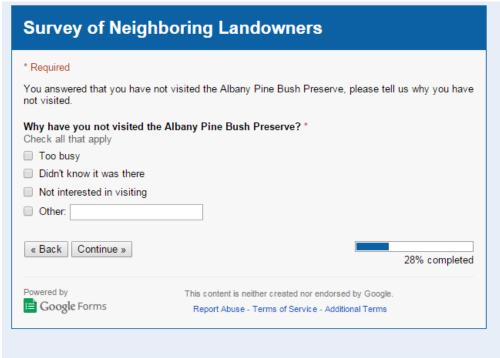
5.

Veitch, C.R. and M.N. Clout. 2001. Human dimensions in the management of invasive species

in New Zealand. In: McNeely, J.A. (Ed.), The Great Reshuffling: Human Dimensions of

Invasive Alien Species. IUCN, Cambridge, UK, pp. 63-71.

Whitehead, A., H. Kujala, C.D. Ives, A. Gordon, P.E. Lentini, B.A. Wintle, E. Nicholson, and C.M.

Raymond. 2014. Integrating biological and social values when prioritizing places for

biodiversity conservation. Conservation Biology. 28: 4, 992-1003. DOI:

10.1111/cobi.12257

Witmer, Gary; Keirn, G. M.; Hawley, N.; Martin, C.; and Reaser, J. K., 2009. Human Dimensions

of Invasive Vertebrate Species Management. Wildlife Damage Management

Conferences -- Proceedings. Paper 141.

Appendix 1: Screen shots of online survey instrument

Survey of Neighboring Landowners

This survey is being performed as part of a master's thesis for the University of Albany. I am working to understand public knowledge and opinions regarding management in the preserve that neighbors your property, and the natural resources that the preserve was designed to protect. I am especially interested in learning more about your perspectives regarding invasive species and their management in the preserve. Your responses will help to identify ways to improve management of the preserve to benefit the natural environment and residents like you who call the area home.

Your participation in this study is voluntary, but I sincerely hope you will take a few minutes to thoughtfully answer my questions. Your identity will be kept confidential and the information you provide is not associated with your name. There are no known risks to taking this survey, and you may exit it at any time by closing your browser window. This survey must be completed in one sitting and should take approximately 15-20 minutes to complete.

If you would like more information or have questions about the survey, please contact the primary investigator at cmclaughlin@albany.edu

* Required

Do you certify that you are over 18 years old and have read and agree to the above statements? *

○ Yes, I am over 18 and have read and agree the statements above

○ No, I do not (exit survey)

Continue »

7% completed

Powered by Google Forms

This content is neither created nor endorsed by Google.
Report Abuse - Terms of Service - Additional Terms

Survey of Neighboring Landowners

* Required

Have you ever visited the Albany Pine Bush Preserve? *

○ Yes
○ No

« Back   Continue »

14% completed

Powered by Google Forms

This content is neither created nor endorsed by Google.
Report Abuse - Terms of Service - Additional Terms

Survey of Neighboring Landowners

You answered that you have visited the Albany Pine Bush Preserve.

Please tell us about your usage of the Albany Pine Bush Preserve

Approximately how often do you visit the Albany Pine Bush Preserve? *

- ○ More than once a week
- ○ Weekly
- ○ Monthly
- ○ Few times a year

Thinking about your MOST RECENT visit to the Albany Pine Bush Preserve, what was the PRIMARY reason for your visit? *

- ○ Dog walking
- ○ Hiking
- ○ Discovery center exhibits
- ○ Biking
- ○ Horseback riding
- ○ Discovery Center Program
- ○ Other: [_____]

[« Back] [Continue »]

■■□□□ 21% completed

Survey of Neighboring Landowners

You answered that you have not visited the Albany Pine Bush Preserve, please tell us why you have not visited.

Why have you not visited the Albany Pine Bush Preserve? *
Check all that apply

- ☐ Too busy
- ☐ Didn't know it was there
- ☐ Not interested in visiting
- ☐ Other: [_____]

[« Back] [Continue »]

■■□□□ 28% completed

Survey of Neighboring Landowners

Knowledge of invasive species and their management

Invasive species create management challenges for Albany Pine Bush Preserve and other nature preserves, state parks, and wild areas.

Please tell us what you know about invasive species and the strategies used to manage them in nature preserves.

Based on your knowledge, which of the statements below best defines the term "invasive species"? *

○ I don't know how to define an "invasive species"

○ Species that are not native to the local area

○ Species that cause damage to local ecosystems

○ Species that are both not native to the local area and cause damage to local ecosystems

How much do you know about the following specific invasive species concepts? *

	Nothing	Very little	A fair amount	A great deal
Impact of invasive species on local ecosystems	○	○	○	○
Effects of invasive species on native animals and plants	○	○	○	○
Effect of invasive species on endangered species	○	○	○	○
Why invasive species are considered invasive	○	○	○	○

« Back   Continue »

35% completed

Powered by   This content is neither created nor endorsed by Google.

83

* Required

Knowledge of invasive species and their management

Invasive species create management challenges for Albany Pine Bush Preserve and other nature preserves, state parks, and wild areas.

Please tell us what you know about invasive species and the strategies used to manage them in nature preserves.

Please indicate how much you know about the following invasive species that occur in and around the Albany Pine Bush Preserve *

	I do not know what this is	I have heard of this, but I did not know it is an invasive species	I know what this is AND I know it is an invasive species
Spiny water flea	○	●	○
Zebra mussels	○	●	○
Japanese knotweed	○	○	○
Bush honeysuckle	○	○	○
Spotted knapweed	○	○	○
Sirex woodwasp	○	○	○
Multiflora rose	○	○	○
Emerald Ash Borer (EAB)	○	○	○
Purple Loosestrife	○	○	○
Garlic mustard	○	○	○
Water chestnut	○	○	○
Common reed (Phragmites)	○	○	○
Asian Long horned Beetle (ALB)	○	○	○
Oriental Bittersweet	○	○	○

« Back   Continue »

42% completed

84

Survey of Neighboring Landowners

Knowledge of invasive species and their management
Invasive species create management challenges for Albany Pine Bush Preserve and other nature preserves, state parks, and wild areas.

Please tell us what you know about invasive species and the strategies used to manage them in nature preserves.

How much of a threat do you think invasive species pose to your property (land)? *
- ○ No threat
- ○ Little threat
- ○ Some threat
- ○ High threat

How much of an economic impact do you think invasive species have on agriculture, forestry, and recreation in New York state? *
- ○ Very little impact
- ○ Moderate impact
- ○ Severe impact

How much do you know about the following management techniques used to control invasive species? *

	Nothing	Very little	A fair amount	A great deal
Mowing	○	○	○	○
Prescribed Fire	○	○	○	○
Herbicide or pesticide use	○	○	○	○
Tree banding/girdling	○	○	○	○
Intensive Grazing	○	○	○	○

« Back   Continue »

50% completed

85

Survey of Neighboring Landowners

Knowledge of the Albany Pine Bush Preserve
Please tell us what you know about the Preserve that you live near, the Albany Pine Bush Preserve

How familiar are you with the Albany Pine Bush Preserve's efforts to restore the inland pine barrens ecosystem that it protects? *

- ○ Not familiar
- ○ Somewhat familiar
- ○ Very familiar

In New York, a Species of Greatest Conservation need is one that is considered rare, imperiled, or whose status is unknown within the state. Approximately how many New York Species of Greatest Conservation Need do you think are found in the Albany Pine Bush? *
Enter a single number, not a range

[   ]

How familiar are you with the mission of the Albany Pine Bush Preserve? *

- ○ Not familiar
- ○ Somewhat familiar
- ○ Very familiar

Are you aware that the following management techniques are currently used in the Albany Pine Bush Preserve to control invasive species? *

	No, I did not know this was done in the Preserve	Yes, I know this is done in the Preserve
Prescribed fire	○	○
Mowing plants	○	○
Chemical herbicides	○	○
Banding/girdling trees	○	○

Which of the statements below best describes the mission of the Albany Pine Bush Preserve? *

- ○ To protect and manage the unique and endangered natural communities of the Albany Pine Bush for ecological, recreational, and educational benefits.
- ○ To protect the endangered ecosystems of the Albany Pine Bush from urban development for the enjoyment of the public and preservation of nature.
- ○ To preserve the endangered natural communities of the Albany Pine Bush for ecological and recreational benefits, and to provide environmental education to the public.

[« Back] [Continue »]

57% completed

Survey of Neighboring Landowners

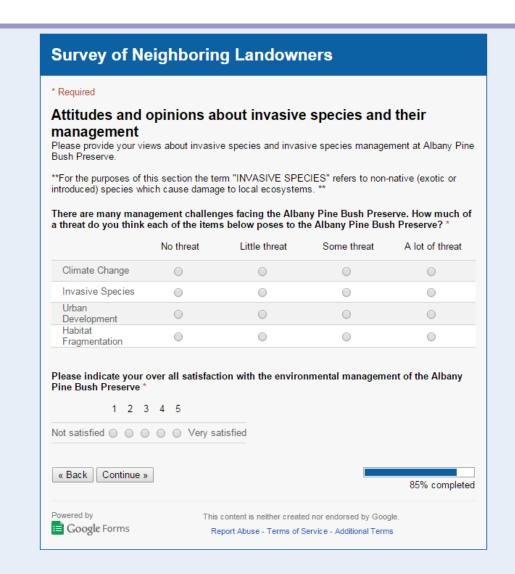## Opinions and attitudes about invasive species and their management

Please provide your views about invasive species and invasive species management at Albany Pine Bush Preserve.

**For the purposes of this section the term "INVASIVE SPECIES" refers to non-native (exotic or introduced) species which cause damage to local ecosystems. **

Please give your opinion of the species below and the threat they present to the Albany Pine Bush Preserve ecosystem *

	No threat	Moderate threat	Severe threat	Not sure
Asian long horned beetle	○	○	○	○
Garlic mustard	○	○	○	○
Spotted knapweed	○	○	○	○
Sirex woodwasp	○	○	○	○
Common reed (phragmites)	○	○	○	○
Japanese knotweed	○	○	○	○
Bush honeysuckle	○	○	○	○
Multiflora rose	○	○	○	○
Purple Loosestrife	○	○	○	○
Oriental Bittersweet	○	○	○	○

« Back   Continue »

64% completed

Survey of Neighboring Landowners

Attitudes and opinions about invasive species and their management

Please provide your views about invasive species and invasive species management at Albany Pine Bush Preserve.

**For the purposes of this section the term "INVASIVE SPECIES" refers to non-native (exotic or introduced) species which cause damage to local ecosystems. **

Do you agree or disagree with the following statements about the Albany Pine Bush Preserve and its management. *

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
The Albany Pine Bush's natural areas should be restored.	○	○	○	○	○
Control of some species is necessary to help conserve the natural ecosystem of the Albany Pine Bush Preserve	○	○	○	○	○
Invasive species have as much a right to exist as native species at the Albany Pine Bush Preserve	○	○	○	○	○
Protecting the natural ecosystem of the Albany Pine Bush Preserve should be a priority	○	○	○	○	○
Management interventions are not necessary to maintain the ecosystems of the Albany Pine Bush Preserve	○	○	○	○	○
The Albany Pine Bush Preserve should be left alone for nature to take its course	○	○	○	○	○

« Back | Continue »

71% completed

88

Survey of Neighboring Landowners

Attitudes and opinions about invasive species and their management

Please provide your views about invasive species and invasive species management at Albany Pine Bush Preserve.

**For the purposes of this section the term "INVASIVE SPECIES" refers to non-native (exotic or introduced) species which cause damage to local ecosystems. **

There are many techniques available to conservation managers for the management of invasive species. Of the following, do you or would you consider these actions unacceptable or acceptable in regards to invasive species at the Albany Pine Bush Preserve? *

	Unacceptable in ALL cases	Mostly Unacceptable	Unsure	Mostly Acceptable	Acceptable in ALL cases
Education programs on invasive species	○	○	○	○	○
Mowing to control invasive plants	○	○	○	○	○
Use of prescribed fires for the management of invasive plants	○	○	○	○	○
Leave invasive species alone	○	○	○	○	○
Allow invasive species to compete with native species	○	○	○	○	○
Work with local community to control invasive species outside Preserve boundaries	○	○	○	○	○
Outreach with brochures on invasive species to neighboring land owners	○	○	○	○	○
Sponsor hunts for invasive animals	○	○	○	○	○

boundaries					
Outreach with brochures on invasive species to neighboring land owners	○	○	○	○	○
Sponsor hunts for invasive animals	○	○	○	○	○
Lethal control (capture and kill) of invasive animals	○	○	○	○	○
Use of herbicides and pesticides to control invasive species	○	○	○	○	○
Cutting or banding of invasive trees	○	○	○	○	○
Capture and relocate invasive animals	○	○	○	○	○
Using domestic herbivores (IE sheep) to control invasive plants	○	○	○	○	○
Releasing a non-native insect to control an invasive insect	○	○	○	○	○
Displays and exhibits at the Discovery center on invasive species	○	○	○	○	○
Use of pesticides and herbicides to manage invasive species	○	○	○	○	○
Do nothing to manage invasive species	○	○	○	○	○

« Back   Continue »

78% completed

Survey of Neighboring Landowners

Attitudes and opinions about invasive species and their management

Please provide your views about invasive species and invasive species management at Albany Pine Bush Preserve.

**For the purposes of this section the term "INVASIVE SPECIES" refers to non-native (exotic or introduced) species which cause damage to local ecosystems. **

There are many management challenges facing the Albany Pine Bush Preserve. How much of a threat do you think each of the items below poses to the Albany Pine Bush Preserve? *

	No threat	Little threat	Some threat	A lot of threat
Climate Change	○	○	○	○
Invasive Species	○	○	○	○
Urban Development	○	○	○	○
Habitat Fragmentation	○	○	○	○

Please indicate your over all satisfaction with the environmental management of the Albany Pine Bush Preserve *

	1	2	3	4	5	
Not satisfied	○	○	○	○	○	Very satisfied

[« Back] [Continue »]

85% completed

Survey of Neighboring Landowners

Demographic information

The following questions are important to help us understand more about neighboring landowners around the Albany Pine Bush Preserve. Please check the responses that apply. All responses are voluntary and are kept completely confidential.

Please note that only questions with asterisks are required questions. Many questions in this section are optional and you may complete the survey without answering any you are not comfortable with.

Which of the following have you taken part in in the past 12 months?
Please check all you have taken part in anywhere, not just at the Albany Pine Bush Preserve

☐ nature photography

☐ gardening

☐ snow shoeing or skiing

☐ Hiking

☐ Bird feeding

☐ hunting or trapping

☐ boating

☐ Camping

☐ wildlife watching

☐ Fishing

☐ canoeing or kayaking

☐ backpacking

☐ Other:

Do you belong to any wildlife or conservation organizations?

○ Yes

○ No

Have you visited any public or private nature preserves, state or national parks, or wildlife refuges in the past 12 months, not including the Albany Pine Bush Preserve?

○ Yes

○ No

92

Have you seen, read, or heard anything about invasive species in the past 6 months?

○ Yes

○ No

If you have seen, read, or heard anything about invasive species in the past 6 months, please provide details or comments on where and what you saw in the space below

☐ *(text box)*

Where do you go for science news and information?
Check all that apply

☐ TV news channels

☐ Social media (Facebook, Twitter)

☐ Other online sites (Reddit, blogs, etc.)

☐ Radio

☐ Large foreign internet news outlets (BBC, The Guardian, Al Jazeera)

☐ Library

☐ Local newspapers (print or online)

☐ Large US internet news outlets (IE CNN, NBC, NY Times, etc)

☐ Other: _____

Where do you go for information on landscaping, gardening, or land management?
Check all that apply

☐ TV Garden and home channels

☐ Local garden and home stores

☐ Local newspapers (print or online)

☐ Large chain garden and home stores

☐ Town or Village newsletter

☐ Internet sites

☐ Cornell Cooperative Extension

☐ Library

Where do you go for information on landscaping, gardening, or land management?
Check all that apply

☐ TV Garden and home channels

☐ Local garden and home stores

☐ Local newspapers (print or online)

☐ Large chain garden and home stores

☐ Town or Village newsletter

☐ Internet sites

☐ Cornell Cooperative Extension

☐ Library

☐ Other: [_____]

[« Back] [Continue »]

92% completed

Survey of Neighboring Landowners

Demographic information

The following questions are important to help us understand more about neighboring landowners around the Albany Pine Bush Preserve. Please check the responses that apply. All responses are voluntary and are kept completely confidential.

Please note that only questions with asterisks are required questions. Many questions in this section are optional and you may complete the survey without answering any you are not comfortable with.

Please enter the year your were born. *
Remember, you must be over 18 to take this survey.

[   ]

I identify as a... *

○ Male

○ Female

Which group do you identify with?
Select all that apply

☐ Caucasian/White (non Hispanic)

☐ Asian-American

☐ Hispanic

☐ Native American (American Indian)

☐ African-American

☐ Other: [   ]

What is the highest level of education you have completed?

[▼]

[« Back] [Submit]
Never submit passwords through Google Forms.

[████████████████████]
100%: You made it.

Powered by
≡ Google Forms

This content is neither created nor endorsed by Google.
Report Abuse - Terms of Service - Additional Terms