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Identifying Invasive Species Educational Needs in Florida: Opportunities for Extension

Abstract

Florida's ecology has been adversely affected by invasive species. In Florida, a study was conducted to explore opportunities for Extension educators to contribute to combating the issue of invasive species. Florida residents' responses were captured through the use of an online public opinion survey. The findings revealed a need for invasive species education and respondent interest in learning about invasive species. Potential communication strategies Extension educators should use for invasive species programming also are discussed.

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Introduction

Invasive species, defined as organisms that break natural biogeographical boundaries and influence the ecology at the location of invasion (Colautti & MacIsaac, 2004), have become an issue catching the public's attention (Mooney & Hobbs, 2000). In the United States, more than 6,500 nonnative species have been found causing adverse impacts to native species, ecosystems, and human and wildlife health (U.S. Geological Survey, 2013). Additionally, invasive species can negatively affect the economy by reducing natural resource-based businesses and requiring funding for efforts related to eradication and restoration of habitat (Harmon, Vergot, Momol, Xin, & Miller, 2009; Pimentel, Zuniga, & Morrison, 2005; U.S. Fish and Wildlife Service [USFWS], 2012).

Approximately 1,700 nonnative species have been documented in Florida, including more than 500 fish and wildlife species and 1,180 plant species (Florida Fish and Wildlife Conservation Commission [FWC], 2015b). Humans introduced most of these nonnative species either intentionally or unintentionally (FWC, 2015b). Florida is one of the top areas facing severe invasive species problems due to its climate and geographical location (USFWS, 2012). International travel, ships, wood products, wooden packing materials, ornamental plants, and food and pet trades all represent ways in which invasive species can enter Florida (FWC, 2015a).

To mitigate the impacts caused by invasive species, Extension educators have been developing invasive species-related educational programs, including workshops and webinars, to educate the general public

about the importance of controlling invasive species (Edgerton & Reichenbach, 2015; Nagle, Usborne, Stone, McCullough, & Sadof, 2014). Despite these efforts, low levels of public knowledge and awareness of the impacts of invasive species have been reported (Bremner & Park, 2007; Gillett-Kaufman, Lietze, Bradshaw, & Gioeli, 2014; Yan, Zhenyu, Gregg, & Dianmo, 2001). The severity of invasive species problems has led to public issues in Florida. Therefore, Extension educators need to develop a better understanding of the public's knowledge levels and willingness to learn about invasive species so that educational programs can be more specifically targeted, increasing the chance that the public will engage in invasive species management efforts.

Purpose and Objectives

The purpose of the study reported here was to understand existing levels of public knowledge and perceptions of invasive species and interest in specific educational programs related to invasive species. Extension educators can use the findings to facilitate future public issues education on invasive species in order to alleviate the adverse impact on the environment. The objectives of the study were to identify respondents' knowledge levels relative to invasive species, perceptions of invasive species management, interest in learning about invasive species topics, and preferred learning channels for invasive species information.

Methods

The study involved an online survey research design. The target population was Florida residents. Florida was chosen as the area of interest because the state faces a myriad of issues due to invasive species, including an invasion of Burmese pythons in the Everglades and predation of native tree frogs by Cuban tree frogs (USFWS, 2012). A nonprobability purposive opt-in sampling procedure was used in collaboration with a public opinion survey research company, Qualtrics. Qualtrics invited 546 Florida residents who were 18 or older to participate in the study. There were 515 complete and usable responses received, resulting in a 94% participation rate. Due to the use of nonprobability sampling, limitations caused by potential exclusion, selection, and nonparticipation biases were overcome through the use of poststratification weighting methods to enhance the representativeness of the results (Baker et al., 2013; Kalton & Flores-Cervantes, 2003). Therefore, the data were weighted according to 2010 census statistics related to selected demographic variables, including sex, race, ethnicity, and age. The demographics of the respondents are shown in Table 1.

Table 1.

Weighted Demographic Characteristics of Respondents

| Characteristic | % |
|-----------------------|----------|
| Sex | |
| Male | 48.9 |
| Female | 51.1 |
| Race | |
| African American | 17.0 |
| Asian | 3.0 |

| | |
|--------------------|------|
| Caucasian/White | 77.1 |
| Native American | 0.2 |
| Other | 2.7 |
| Hispanic ethnicity | 22.5 |
| Age ^a | |
| 19 and younger | 1.3 |
| 20–29 | 12.8 |
| 30–39 | 12.2 |
| 40–49 | 14.2 |
| 50–59 | 13.5 |
| 60–69 | 11.1 |
| 70–79 | 7.4 |
| 80 and older | 4.9 |

^aPercentages for the age categories do not sum to 100% because the census data included individuals aged under 18, a group that was not part of the target population.

The study discussed herein was part of a larger project with focuses on endangered species and invasive species. To address the objectives of the study, seven survey questions specifically targeting invasive species were drawn from the larger project. The instrument was researcher-developed. Detailed information about the questions used in the study is provided in Table 2. The definition of the term *invasive species* and examples of invasive species were provided prior to respondents' answering the questions. The examples included citrus canker, Burmese python, water hyacinth, kudzu, and lionfish. Respondents were asked to indicate their (a) levels of knowledge about invasive species in general and in two specific topical areas by selecting from response choices on 5-point Likert-type scales, (b) perceptions related to prioritization efforts and management practices for invasive species by selecting all that applied from six listed factors, (c) perceptions of how invasive species should be controlled by answering a single-choice question involving three statements, (d) perceptions of importance of controlling invasive species relative to four statements by selecting from response choices on 5-point Likert-type scales, (e) interest in learning about invasive species by selecting all that applied from three listed topics, and (f) preferred channels for learning about invasive species by selecting all that applied from 12 listed options. Before data were collected, the instrument was reviewed by a panel of experts and pilot tested by 50 respondents who were representative of the target population. The study was approved by the University of Florida Institutional Review Board.

Table 2.
 Survey Question Descriptions
Statements for scale
items/items from which

Survey question

to choose

Scale response choices

How knowledgeable do you feel you are about invasive species in general?

- a. Not knowledgeable
- b. Slightly knowledgeable
- c. Somewhat knowledgeable
- d. Highly knowledgeable
- e. Extremely knowledgeable

Please indicate your level of knowledge related to the following invasive species topics.

- A. Types of invasive species living in Florida
- B. Which of the following factors should be considered by government agencies when prioritizing efforts to control invasive species? Please check all that apply.

- a. Not knowledgeable
- b. Slightly knowledgeable
- c. Somewhat knowledgeable
- d. Highly knowledgeable
- e. Extremely knowledgeable

Which of the following factors should be considered by government agencies when prioritizing efforts to control invasive species? Please check all that apply.

- A. Harm to native species
- B. Harm to agriculture
- C. Harm to humans
- D. Harm to property
- E. Physical appearance of the species
- F. Cost involved in controlling invasive species

Please indicate which statement comes closest to your personal views, even if none are

- A. We should leave invasive species alone.
- B. We should use

quite right.

management strategies to control invasive species only in areas that are most affected.

C. We should do all we can to completely eradicate invasive species.

How important are the following management priorities to you?

A. Maintaining the native population of species in Florida

a. Not at all important

b. Slightly important

B. Controlling the current population of invasive species in Florida

c. Fairly important

d. Highly important

C. Restoring natural areas harmed by invasive species in Florida

e. Extremely important

D. Preventing invasive species from entering Florida in the future

Would you like to learn more about any of the following invasive species topics? Please select all that apply.

A. Types of invasive species

B. Process by which a species becomes invasive

C. Strategies for managing invasive species

If you had the following types of learning opportunities to learn more about invasive species, which would you most likely take advantage of? Please select all that apply.

A. Read printed fact sheets, bulletins, or brochures.

B. Visit a website.

C. Attend a short course or workshop.

D. Look at a demonstration or display.

- E. Read a newspaper article or series.
- F. Watch TV coverage.
- G. Take part in a one-time volunteer activity.
- H. Get trained for a regular volunteer position.
- I. Attend a fair or festival.
- J. Watch a video.
- K. Attend a seminar or conference.
- L. Other.

Descriptive statistics were analyzed using SPSS 22. Constructs were developed for level of knowledge about invasive species and the perception of importance of controlling invasive species by taking the average of the responses to the series of questions. Both respondents' levels of knowledge about invasive species ($\alpha = .88$) and perceptions of importance of controlling invasive species ($\alpha = .90$) were found to be reliable constructs.

Results

Levels of Knowledge About Invasive Species

Respondents indicated their perceived levels of knowledge about invasive species (Table 3). For the most part, respondents reported that they are not very knowledgeable when it comes to invasive species. Almost 63% of the respondents reported that they are not at all or are only slightly knowledgeable about invasive species in general, and 66.0% reported being not at all or only slightly knowledgeable about how they can prevent invasive species from entering Florida.

Table 3.
Levels of Knowledge About Invasive Species

| Topic | Level of knowledge (%) | | | | |
|-----------------------------|------------------------|------|------|-----|-----|
| | NK | SK | FK | HK | EK |
| Invasive species in general | 21.2 | 41.4 | 30.9 | 4.5 | 2.1 |
| Types of invasive | 25.2 | 38.4 | 27.8 | 6.4 | 2.1 |

| | | | | | |
|----------------------------------------------------------|------|------|------|-----|-----|
| species living in Florida | | | | | |
| How I can prevent invasive species from entering Florida | 39.8 | 26.2 | 21.7 | 8.5 | 3.7 |

Note. Scale: NK = *not at all knowledgeable*, SK = *slightly knowledgeable*, FK = *fairly knowledgeable*, HK = *highly knowledgeable*, EK = *extremely knowledgeable*.

Perceptions of Invasive Species Management

Respondents were asked to indicate which reasons should be considered by government agencies when prioritizing efforts to control invasive species (Table 4). Harm to native species was the factor that received the highest number of responses ($n = 450, 87.4\%$), followed by harm to humans ($n = 426, 82.7\%$) and harm to agriculture ($n = 403, 78.3\%$).

Table 4.

Reasons for Invasive Species Management

| Reason | f | % |
|-----------------------------------------------|----------|----------|
| Harm to native species | 450 | 87.4 |
| Harm to humans | 426 | 82.7 |
| Harm to agriculture | 403 | 78.3 |
| Harm to property | 334 | 64.9 |
| Cost involved in controlling invasive species | 231 | 44.9 |
| Physical appearance of the species | 44 | 8.5 |

Respondents also were asked to convey their personal views related to invasive species management by indicating which of three statements most closely aligned with their personal beliefs (Table 5). Views were divided on this topic, with almost half of the respondents reporting that they believed invasive species should be controlled only in areas that are most affected and the other half believing that invasive species should be completely eradicated by any means. A very small proportion (3.3%) felt that invasive species should be left alone.

Table 5.

Personal Views Related to Invasive Species Management

| Statement | f | % |
|-------------------------------------|----------|----------|
| We should use management strategies | 255 | 49.5 |

to control invasive species only in areas that are most affected.

We should do all we can to completely eradicate invasive species. 243 47.2

We should leave invasive species alone. 17 3.3

Respondents also were asked to indicate the levels of importance they associated with invasive species management priorities (Table 6). Almost 80% of the respondents indicated that preventing invasive species from entering Florida in the future is highly or extremely important ($n = 405, 78.6\%$), and about 72% of the respondents indicated that controlling the current population of invasive species in Florida is highly or extremely important ($n = 372, 72.2\%$).

Table 6.

Perceptions of Importance of Controlling Invasive Species

| Management priority | Level of importance (%) | | | | |
|-------------------------------------------------------------------|-------------------------|-----|------|------|------|
| | NI | SI | FI | HI | EI |
| Preventing invasive species from entering Florida in the future | 1.6 | 4.7 | 13.2 | 26.6 | 52.0 |
| Controlling the current population of invasive species in Florida | 1.4 | 4.5 | 21.2 | 33.2 | 39.0 |
| Restoring natural areas harmed by invasive species in Florida | 1.6 | 5.4 | 21.4 | 32.8 | 37.5 |
| Maintaining the native population of species in Florida | 1.4 | 5.4 | 20.0 | 30.2 | 37.7 |

Note. Scale: NI = not at all important, SI = slightly important, FI = fairly important, HI = highly important, EI = extremely important. Percentages of "unsure" responses are not included.

Interest in Learning About Invasive Species

Respondents' areas of interest relative to learning about invasive species are reflected by the data in Table

7. Respondents were most interested in learning about types of invasive species ($n = 327$, 63.5%), followed by strategies for managing invasive species ($n = 263$, 51.1%), and they were least interested in the process by which a species becomes invasive ($n = 200$, 38.8%).

Table 7.

Interest in Learning About Invasive Species

| Topic | <i>f</i> | % |
|---------------------------------------------|-----------------|----------|
| Types of invasive species | 327 | 63.5 |
| Strategies for managing invasive species | 263 | 51.1 |
| Process by which a species becomes invasive | 200 | 38.8 |

Preferred Channels for Learning About Invasive Species

Last, respondents were asked to indicate their preferred channels for learning about invasive species (Table 8). The top three preferred learning channels were television ($n = 389$, 75.5%), websites ($n = 388$, 75.3%), and videos ($n = 381$, 74.0%).

Table 8.

Preferred Channels for Learning About Invasive Species

| Learning channel | <i>f</i> | % |
|---------------------------------------------------|-----------------|----------|
| Watch TV coverage | 389 | 75.5 |
| Visit a website | 388 | 75.3 |
| Watch a video | 381 | 74.0 |
| Read printed fact sheets, bulletins, or brochures | 369 | 71.7 |
| Read a newspaper article or series | 364 | 70.7 |
| Look at a demonstration or display | 347 | 67.4 |
| Attend a fair or festival | 324 | 62.9 |
| Attend a seminar or conference | 320 | 62.1 |
| Take part in a one-time volunteer activity | 315 | 61.2 |
| Attend a short course or workshop | 313 | 60.8 |
| Get trained for a regular volunteer position | 304 | 59.0 |

Conclusions, Implications, and Recommendations

The findings of the study reveal that most respondents had low knowledge levels of invasive species, supporting the findings of Bremner and Park (2007) and Yan et al. (2001) and implying the need for invasive species education in Florida. About 80% of respondents or more indicated that invasive species should be controlled to reduce harm to native species, humans, and agriculture. This finding implies that respondents valued native species, humans, and agriculture more than other listed reasons.

Almost all respondents felt that invasive species should be managed rather than left alone in the environment. This finding implies that the respondents perceive invasive species management as a necessity. Interestingly, although approximately 80% of the respondents indicated that they perceived the management priority of preventing invasive species from entering Florida in the future as highly or extremely important, most respondents indicated that they are not at all or are only slightly knowledgeable about invasive species prevention strategies. This finding implies the existence of a knowledge gap about invasive species prevention strategies. When asked about their interest in learning about invasive species relative to the three topics listed in the survey, almost two thirds of respondents indicated interest in types of invasive species, about half were interested in strategies for invasive species management, and fewer still had interest in invasive species' invasion processes. This finding implies that respondents were interested in learning about invasive species but were more interested in learning basic information than in learning deeper, more complex information.

Additionally, respondents' learning channel preferences revealed that they would prefer to use mass and online media for learning about invasive species. A comparison of this finding with findings of Gillett-Kaufman et al. (2014) reveals that the Internet was identified in both studies as one of the most preferred learning channels for information about invasive species management. This finding also implies that respondents would prefer to learn about invasive species by viewing and reading information themselves rather than by engaging in interactive approaches, such as attending events and participating in activities.

The study reported here was implemented as a needs assessment to explore a need in Florida and further facilitate program development. The findings confirmed the need for educational programs about invasive species. In addition, the respondents' perceptions of and interests in learning about invasive species shed some light on what should be covered in educational programming developed to fill the knowledge gap, including values that should be emphasized in the programming to strengthen its impact. It is recommended that Extension educators attract their audience's attention by discussing invasive species' harmful effects on native species, humans, and agriculture while educating them about invasive species identification, prevention, and management strategies. Although more complex information about invasive species (e.g., the invasion processes of invasive species) should be known by the audience in order to enhance the effectiveness of reducing invasive species problems, Extension programming, in general, should address topics that will garner higher interest from the general public. More complex information associated with invasive species can be included in future advanced programs targeting audiences with specific needs and interests, such as lionfish eradication programming for audiences in coastal Florida. In addition, it is important to note that respondents preferred mass and online media. Extension educators should make additional efforts to create written and video-based instructional materials to distribute via the suggested channels, focusing on television and website delivery methods.

As a state abundant in natural resources but facing severe invasive species problems, Florida is seeking solutions to alleviate existing issues. Public issues education is one of the approaches Extension agents can

use to enhance public awareness of issues related to invasive species. Efforts can be made by Extension educators to increase public knowledge and provide credible information about proper management strategies.

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