

# Invasive Species: Public Awareness and Education

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## **Abstract**

This paper focuses on how and where people learn about invasive species, how much people currently know about invasive species, and what can be done to improve invasive species education within the general public. The data was collected using an online survey with seven questions related to invasive species awareness and sources of knowledge. Five people who worked within the fields of education or invasive species management were interviewed as well to supplement the online survey. People were generally more familiar and could name invasive plants more readily than animals; their knowledge also seemed to be strongly influenced by those species which were likely to be locally encountered. People in all age groups named school, family and friends as their primary sources of information on invasive species. All age groups viewed social media as having potential as a source of knowledge related to invasive species, but interview results suggest that this tool is not currently being well or fully utilized in education or management efforts. To further increase awareness of invasive species within communities, coordinated efforts between schools and management agencies to introduce the topic of invasive species in classrooms should prove particularly beneficial in increasing knowledge of invasive species within the general public. Methods such as integrating social media and localizing education efforts (communicating the issue through emphasis on species which are locally invasive) would also further stimulate the interest of students and the general public with the topic.

## **Introduction**

The purpose of this survey was to determine how the public becomes aware of invasive species, as well as how people in different age groups learn or want to learn about invasive species. Invasive species education is important because what affects the ecosystems that we live in affects our daily lives as well. Non-native plants and animals can disrupt the food industry, agriculture, and natural resources such as waterways. The economic damage caused by such invasions can end up costing the average person extra time, money and resources to control or eradicate the invasive animal or plant (Kay and Hoyle, 2001, Padilla and Williams 2004, Weigle et al. 2005).

Invasive species present threats to the national and world economies, but impacts are also felt and recognized at local scales by educators and managers Gretel Von bargaen, a nationally recognized high school biology teacher stated, “If [our] ecosystem gets out of whack, they will suffer consequences” and many research studies have shown this to be true. Despite this, there seems to be a lack of understanding within the general community of what an invasive species truly is, and the potential for ecological or economic damage when non-native species are introduced to new areas. As stated by Aubrey Tingler, a US Fish and Wildlife Service employee and AmeriCorps volunteer “it seems like most people are aware of the concept of an invasive species but they don’t really know how prevalent they are and how much of a problem they are for our ecosystem.”

This suggests that more efforts to educate citizens are needed, especially for youth who will be the next generation of caretakers for our ecosystems. Furthermore, we know that establishment of new invasive species in areas (or prevention) can be heavily influenced by the decisions and actions of the average citizen, negative effects on not only the economy, but also on natural habitats, which may disrupt outdoor activities or hobbies enjoyed by many (Weigle et al. 2005).

## **Methods**

An online survey was conducted to assess general awareness of invasive species and asked how people are most likely to become aware about invasive species. The questions were also designed to offer information on the best ways of educating people about invasive species: for example, are people more likely to pay attention to a species which is invasive in their locality or one that isn’t local but is very damaging?. There were a total of seven questions. The survey was designed to take about 3 minutes to complete to maintain the interest of the person being surveyed and increase number of respondents. The survey was created online using Survey Monkey, and distributed via email and Facebook posts; the only criteria for respondents were that they lived in Washington State. The complete survey and the response data can be found in Appendices A and B.

Questions 1 and 3 focused on whether people were familiar with invasive plants and or animals by asking them to name an invasive animal and plant. Questions 2 and 4 were multiple select questions aimed at ways (e.g., friends, school, and social media) in which people had come to know about invasive animals and plants in the first place. Questions 5 and 6 asked people to rank options from one to five with one being the most

likely and five being the least likely. Both these questions focused on how and where people were mostly likely to learn about invasive species. Question 7 asked for the respondent to identify themselves into one of three age groups: 10-20, 20-30 and 30+ years old. The survey took most people less than five minutes to complete, and a total of fifty responses were collected.

To complement the survey of the general public, five people who worked in education and or invasive species education and management were interviewed, using four interview questions.

1. *Is it important that individual citizens are aware and educated about invasive species and why?*
2. *Are current levels of education and awareness of invasive species good or is there a lot more progress to be made?*
3. *What efforts does your organization/agency make to reach and educate the public about invasive species, if any?*
4. *Are there any new opportunities like Internet, social media, etc for education and awareness that you see as having a lot of potential or your organization/agency is currently making use of?*

All the interviews were recorded using an audio recorder. The interviews took about six minutes each to complete and were conducted either in person or by phone. The online survey was distributed primarily to people who lived in the local Sammamish and Issaquah areas. The purpose of this control was to reduce the variability in responses given levels of invasive species education in other areas might be different from the Issaquah Sammamish areas.

### Limitations

Because the survey was an open and anonymous survey, it is possible that people from outside of the Issaquah and Sammamish communities (or even outside of Washington State) could have taken it. Even though the survey was sent out directly to people within the community, posts of the survey link were on social media sites such as Facebook and Twitter. Here, anyone could have accessed and taken the survey.

Some people skipped questions, especially within the first four questions. Because of this, some data is missing. There were also incidents where people did not complete the ranking questions, leaving some ranks blank or inconclusive.

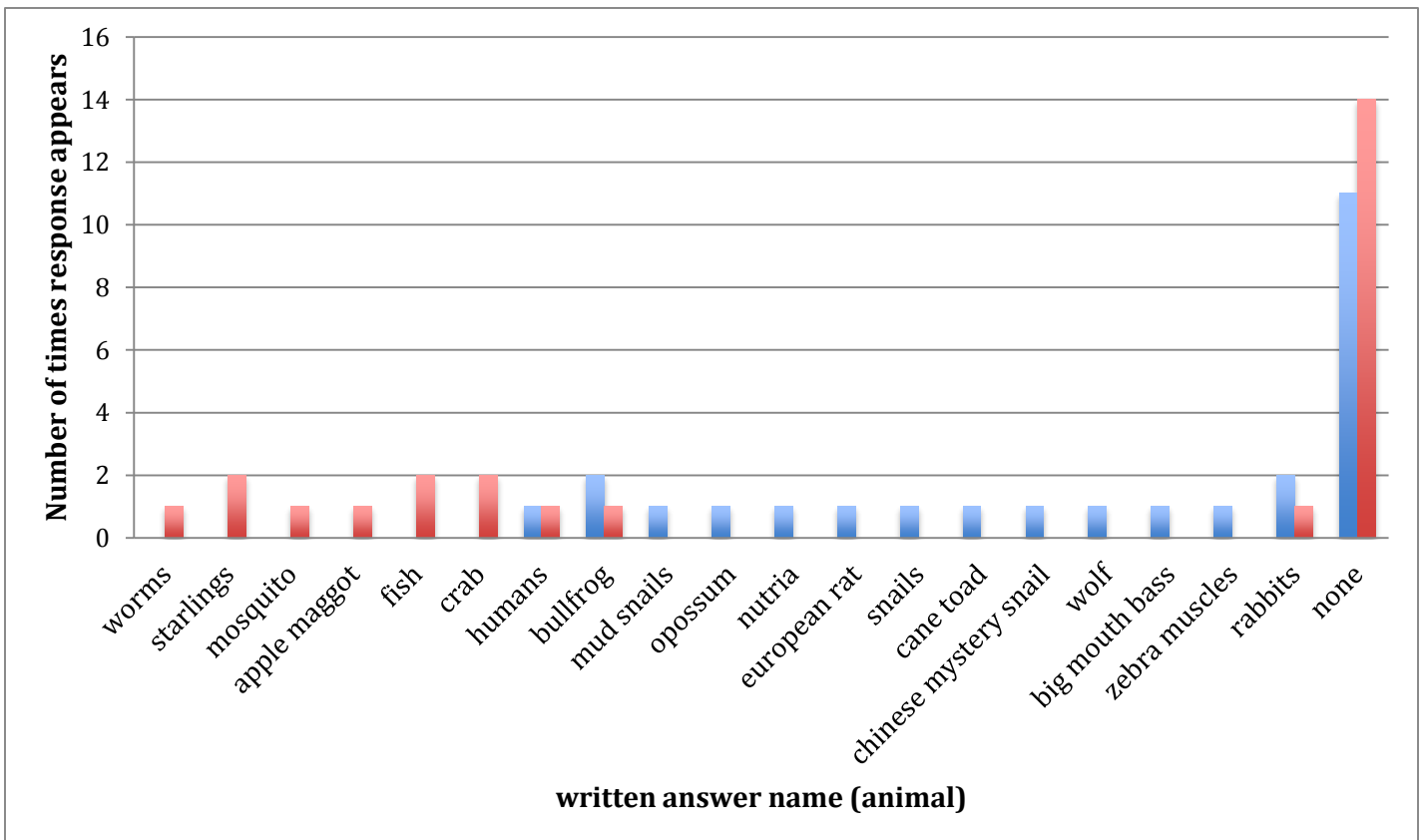
Enough data points for age groups 10 to 20 and 30+ was collected to do a comparison and analysis of the data, however, there were not enough responses for the 20-30 age group to be able to make comparisons with the other two age groups.

## Results

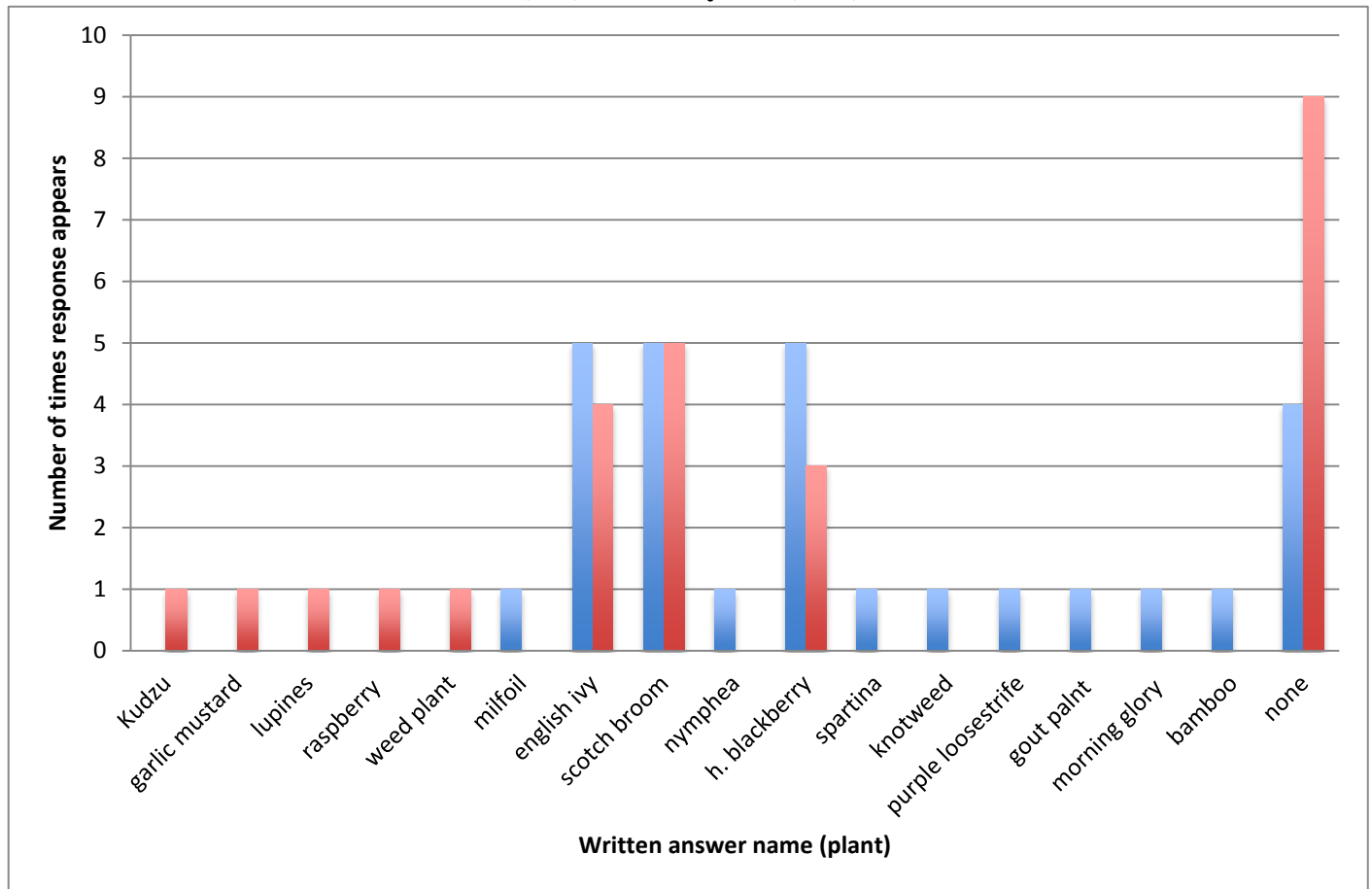
The first and third questions asked “Can you name an invasive animal species in Washington State that you have heard about?” and “Can you name an invasive plant species in Washington State that you have heard about?” Figure 1 shows responses for animals and figure 2 shows responses for plants. There was more variety in answers given by the 30+ age group than the 10-20 age group. The 10-20 age group also answered “none” more often than the 30+ age group. Both age groups seemed to be familiar with different invasive species as there was a noticeable difference in the invasive species named between the two age groups. There were exceptions to this where respondents from both age groups named the same invasive species such as bullfrogs and scotch broom. Respondents in both age groups were more familiar with invasive plants than animals.

One thing that is striking is the large number of answers that are not specific enough to indicate a particular invasive species. In the 10-20 age group, worms, mosquitoes, fish, crab, weed plant and ivy are all vague as there are non-invasive and invasive species of animals from all of these classes. In the 30+ age group opossum, snails, blackberry, ivy, and bamboo are vague. It was assumed that the responders were thinking of the invasive species when writing their answers. In addition the 30+ age group named a wolf and gout plant as invasive species. Neither of these species is invasive. It is also interesting that some people named notorious species that are invasive in Australia (rabbits, cane toads) and the Midwest (zebra mussels) versus those that are invasive locally. This occurred more in the question about invasive animals than plants.

**Figure 1: Ability to name an invasive animal by people in age groups of 10-20 (red) and 30+ (blue) years**



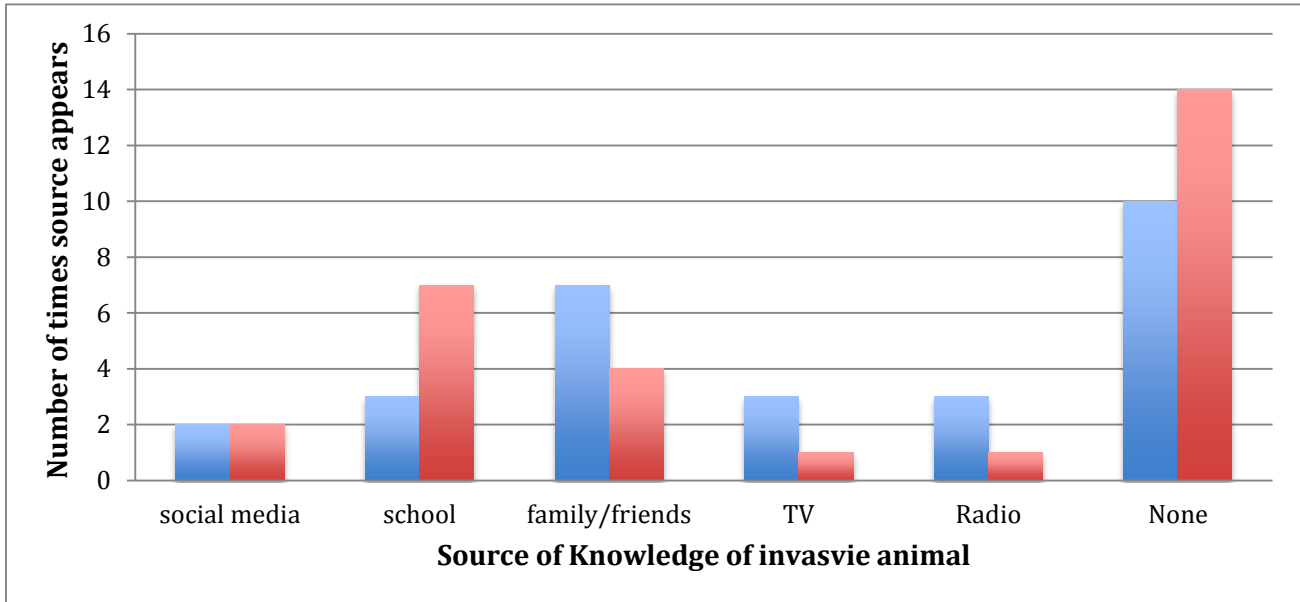
**Figure 2: Ability to name a specific invasive plant species by people in age groups of 10-20 (red) and 30+ years (blue).**



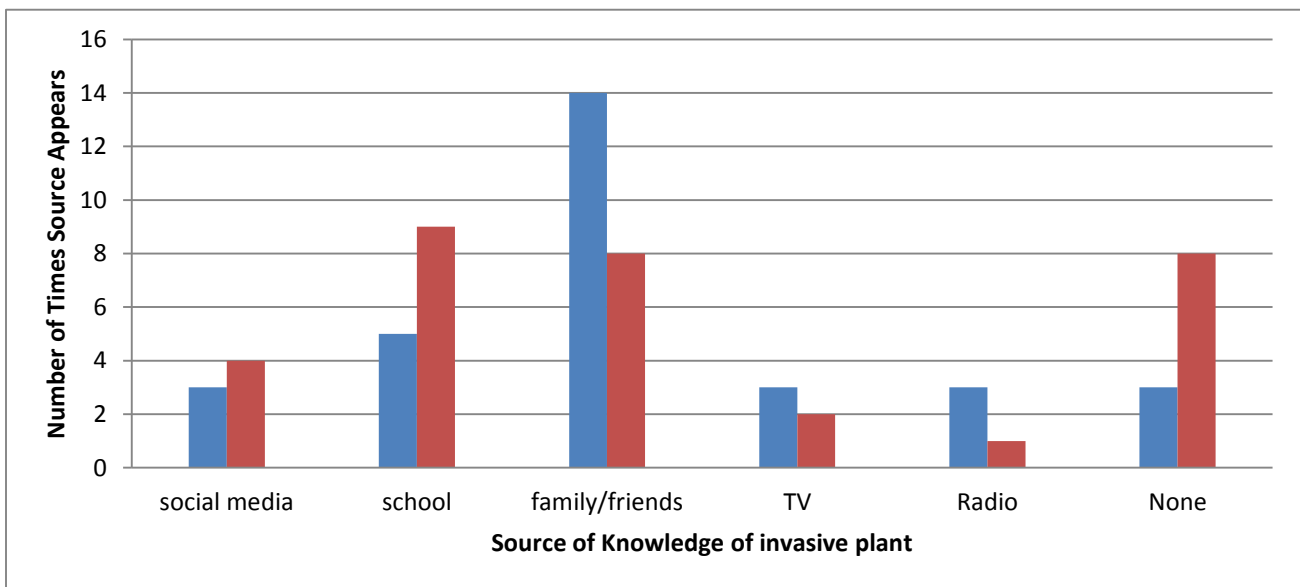
Question 2, “How did you hear about the invasive animal species?” and question 4, “How did you hear about the invasive plant species?” showed similar trends between age groups. The 10-20 age group answered “none” and “school” more often than the 30+ age group. The 30+ age group answered “TV,” “family/friends,” and “radio” more often than the 10-20 age group. The difference in response from both groups regarding “social media” was very small, if any. Both the options “school” and “family/friends” received a high number of responses from both groups, while options “TV,” “radio,” and “social media” were not chosen very frequently.

The trend of people knowing more about invasive plant species than animal species can be seen in figures 3 and 4. People answered “none” more frequently for the source of an invasive animal than with an invasive plant. In figure 4, the 30+ age group chose “family/friends” more often the “none” and the 10-20 age group chose “school” more often than none. In figure 3, “none” is the most common choice for both age groups.

**Figure 3: Age groups of 10-20 and 30+ years source of knowledge for a specific invasive animal species compared to each other**

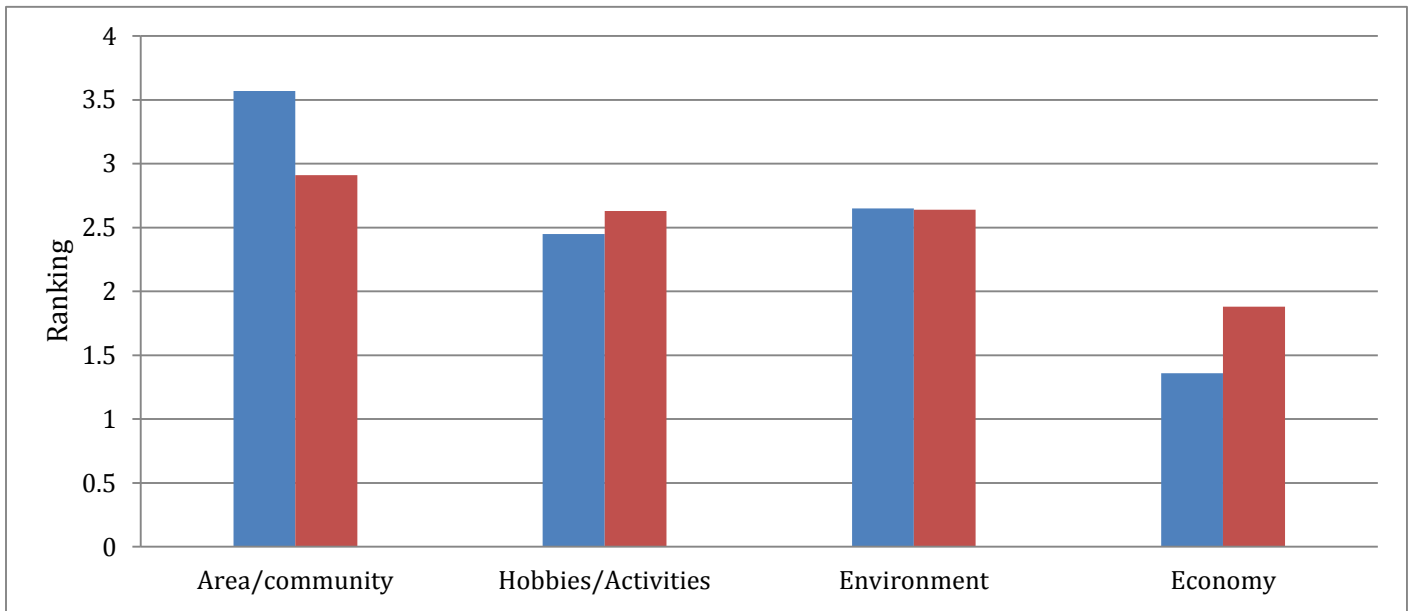


**Figure 4: Age groups of 10-20 and 30+ years source of knowledge for a specific invasive plant species compared to each other**



The fifth question asked people to rank options that would make them most likely to read or look up an article on an invasive species (four being the most likely and one being the least likely). Both age groups were most likely to be interested in stories about invasive species in their communities, followed by if the invasive species impacted their activities or resulted in environmental damage, seen in figure 5. Invasive species effects on the economy were considered the least interesting to respondents. The option concerning economic consequences showed the largest difference in responses between age groups, with the 10-20 age group more likely to choose “if it was damaging to the economy” than the 30+ age group. There was also a slight difference in responses for “if it was about a species in my local community/area” with the 30+ age group more likely to read an article on an invasive species than the 10-20 age group.

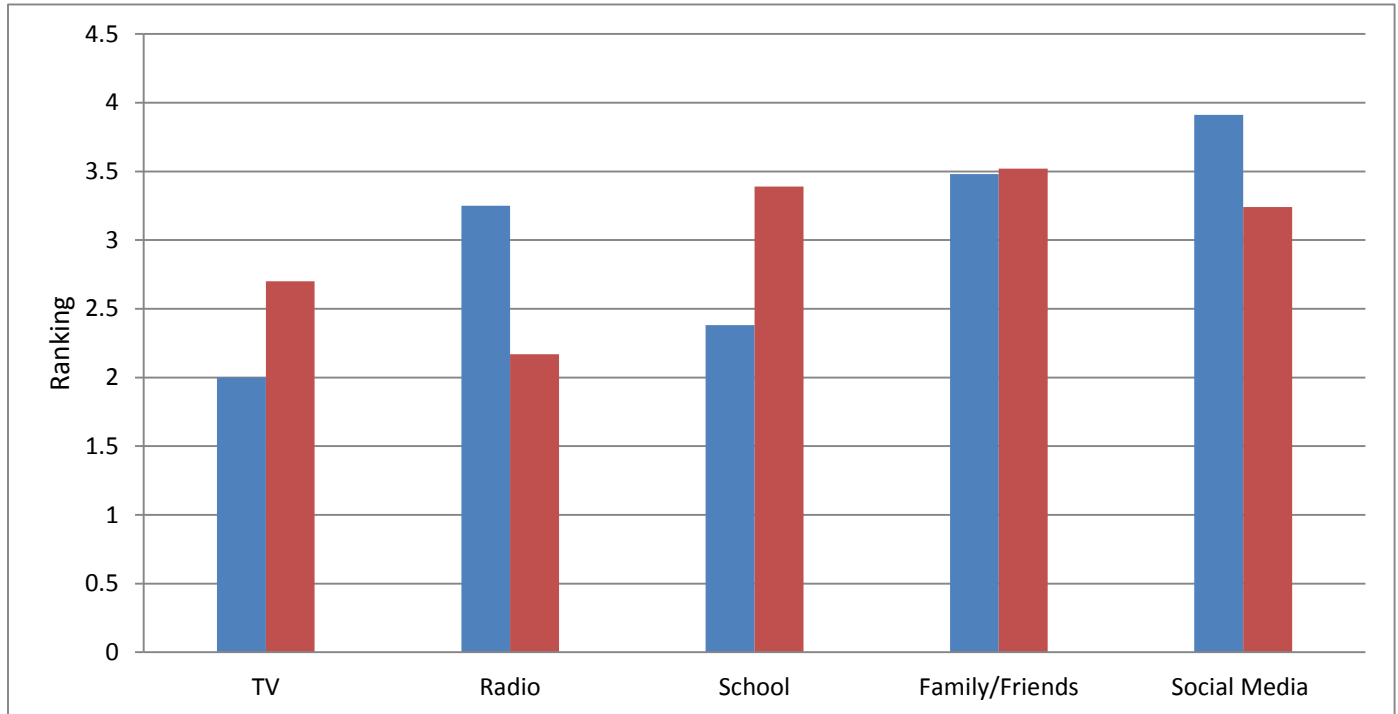
**Figure 5: Rankings of what would motivate someone to be interested in learning about an invasive species by age groups 10-20 (red) and 30+ (blue).**





Question six asked people to rank options from 1 to 5 (five being the most likely and one being the least likely) on where respondents were most likely to learn about an invasive species. There were substantial differences in where people think they are most likely to learn about invasive species, except for the “family/friends” option. The 30+ age group ranked “social media” and “radio” as more likely than the 10-20 age group. The 10-20 age group ranked “TV” and “school” as more likely than the 30+ age group.

**Figure 6: Ranking of most likely sources of information for invasive species by age groups 10-20 (red) and 30+ (blue).**



### Interview Results

The first interview question asked respondents whether awareness and education of the public on invasive species was important and why. All respondents agreed that awareness and education was important, but differed in their reasons why. A similar trend was seen with question two, when the respondents were asked if more progress was necessary regarding invasive species education and awareness. All respondents answered yes, but to varying degrees of “definitely” to “probably.” Most respondents made a statement of why progress needed to be made. The respondents focused on the scope of current education levels, showing that there was limited outreach for invasive species education. In order to expand invasive species outreach, education must be expanded as well to reach a wider audience.

The third question asked what their organization/agency was doing to promote invasive species education. Three of the respondents were schoolteachers who answered that there was not much effort being done by school or school related organizations to promote invasive species awareness. The other two respondents – both from resource

management agencies - gave examples of their outreach projects, which included outreach in schools.

The last question asked about new ways to reach people, including through social media. The response to this varied, but none of the respondents found social media to be more than an additional tool to use for outreach. Other ideas that people brought up to reach out to the public included more in-school presentations, public education events (such as setting up a booth about invasive species during the Seattle boat show) and posting signage in public areas warning people of the consequences for introducing invasive species accidentally.

### **Conclusion and Recommendations**

Although there is substantial research about the ecological and economic consequences of species invasions, the importance of education in promoting or preventing introduction and spread is only minimally understood. The three schoolteachers who were interviewed all stated that their schools and school programs were not doing much, if anything, to promote invasive species education – the teachers themselves were motivated to introduce and include the topic in their curriculum. Results from the online survey indicate that the general public has a very partial understanding of invasive species in their own communities, probably due to a lack of education. In schools seems to be a good way to reach and educate people on invasive species, as many people obtained their knowledge from school. Even though family and friends seemed to provide people with more information on invasive species, those people must have gotten their knowledge from somewhere, including school.

School seems to be one of the main sources for learning about invasive species. This may be due to the fact that school can make use of a variety of different mediums such as TV, radio, social media and friends. Today some school classes and teachers have made an effort to include invasive species education within a curriculum. This shows that even though schools have not made any coordinated efforts to make invasive species education part of the general curriculum, there is potential for schools to become impactful venues, especially if school associations and management agencies are willing and able to work together.

There are differences in what the 30+ and 10-20 age groups know. The 30+ may have gained experience more from interacting with the world and the environment around them. The 30+ group listed invasive species that are more commonly known through experience, such as English ivy and blackberry, while the 10-20 age group were more likely to list “famous” invasive plants and animals (e.g., Kudzu). By integrating an outdoor class activity to teach students about invasive species, students may be able to gain a broader set of knowledge on the different invasive species and how to control them.

The similarity between both age groups is their stance on social media. Both age groups indicated that social media was the lowest current source of knowledge for invasive species. However, both age groups thought they would be most likely to learn about an invasive species from social media. This suggests that social media is a potentially powerful way to advertise and educate the public on invasive species. Internet and social media can be a great way to engage the interest across age groups. This

method is also a great way to create a source of information that can be easily accessed and easily updated.

People said that they would be most likely to look an article about invasive species if it impacted their community, followed by if the invasive species impacted their hobbies or activities. This suggests that education and outreach may be most effective when it is localized; targeting participants in activities which may be threatened by invasive species may also be a particularly useful way to educate and inform the public. However, outreach efforts (e.g., curriculum, media coverage) should not focus solely on local species as people are often traveling outside their communities to other regions. They may inadvertently help the spread of invasive if they are unaware of which species are invasive.

The importance of schools as vectors for invasive species should also not be ignored. Teachers, who use live animals in class rooms for student engagement, may not know the invasive qualities of that species and release it into the local ecosystem where it will become a problem. In order to avoid this, schoolteachers should also be educated on invasive species and how to properly handle live animals in a classroom. Live animals are a very good way to engage students but could lead up to another invasion if not handled properly (Larson, 2008).

## References

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Appendix A

Table 1: Survey data from age group 10-20 years old

Survey number	Invasive animals named	How surveyor learned of animal	Invasive plants named	How surveyor learned of plant	Learning motivation rankings				Learning medium rankings				
					Area	Hobbies	Environment	Economy	TV	Radio	School	Family	Social media
1	bullfrog	social media	garlic mustard	social media	2	1	4	3	2	1	4	3	5
2	trout	school	Scottish Broom	family/friends	3	2	4	1	2	3	5	4	1
3	apple maggots?	school	None	None	2	4	1	3	4	1	5	3	2
4	Bunnies?	None	Scotch Broom	Family/Friends	3	4	1	2	5	1	4	2	3
5	None	None	None	None	4	3	2	1	1	4	2	3	5
6	None	None	Kudzu	Social media/TV	4	3	2	1	4	2	3	1	5
8	Green Crab	School	Ivy	Family/friends	4	3	2	1	3	5	1	4	2
17	None	None	ivy	family/friends	3	1	2	4	2	5	3	4	1
18	None	None	Broom plant	school	1	2	3	4	5	4	2	3	1
19	none	none	ivy	school/family/friends	3	4	2	1	1	2	4	3	5
20	Mosquito	TV/radio/school/family/friends/social media	Scotch Broom	TV/radio/school/family.friends/social media		3	2	1	2			4	3
21	starlings	Family/friends	ivy	social media/family friends	4	1	3	2	3	1	2	5	4
22	None	None	SB/Himilayan blackberry	school	2	4	3	1	4	1	5	2	3
23	worms	school	blackberry	school	3	4	2	1	4	1	5	2	3
24	starlings	Family/friends	lupines	school	3	2	1	4	5	4	3	2	1
32	None	None	None	None	2	1	4	3	2	3	5	4	1
33	Crab/a fish	School	Raspberry bushes and weed from japan	school	2	1	4	3	2	1	5	4	3
34	None	school	None	School			3	4		2		5	4
36	Humans	Family/friends	A weed plant	family/friends	2	3	4	1	3	1	2	5	4
40	None	none	himilayan blackberry	school	4	3	2	1		3	1	2	5
41	None	None	None	None	4	2	3	1	1	2	3	5	4
43	None	None	None	None	2	4	3	1	2	1	4	5	3
44	None	None	None	None	4	2	3	1	2	1	4	5	3
45	None	None	None	None	2	3	4	1	1	2	3	4	5
46	None	None	None	None	4	3	2	1	2	1	3	4	5

Table 2: Data from age range of 20 to 30 years old

Survey number	Invasive animals named	How surveyor learned of animal	Invasive plants named	How surveyor learned of plant	Learning motivation rankings				Learning medium rankings				
					Area	Hobbies	Environment	Economy	TV	Radio	School	Family	Social media
16	None	None	None	None	3	4	2	1	3	2	1	5	4
42	Green Crab	school	zostera japonica	school	3	4	2	1	1	2	5	4	3

Table 3: Data from age range of 30+ years old

Survey number	Invasive animals named	How surveyor learned of animal	Invasive plants named	How surveyor learned of plant	Learning motivation rankings				Learning medium rankings				
					A r e a	H o b i e s	E n v i r o n m e n t	E c o n o m y	T V	R a d i o	S c h o l	F a m i l y	S o c i a l m e d i a
7	Humans	Family/friends	milfoil	family/friends	4	3	1	2	2	3	1	4	5
9	Mud snails/bullfrogs /zebra muscles	family/friends	English ivy/scotch broom	family/friends	4	2	3	1	1	2	3	4	5
10	None	None	None	None	4	3	2	1	1	5	4	2	3
11	bullfrog	social media	Scotch Broom	family/friends	4	1	3	2	2	5	1	4	3
12	None	None	None	-----	2	3	4	1	3	5	1	2	4
13	None	None	Scotch Broom	family/friends	4	3	2	1	1	2	3	4	5
14	big mouth bass	school/family/friends	Scotch Broom	school/family/friends	3	4	2	1	3	2	1	4	5
15	opossum	social media	English ivy	social media	3	2	4	1	2	3	1	4	5
25	None	None	None	None	3	4	2	1	2	1	4	3	5
26	None	None	None	None	4	3	2	1	3	4	5	2	1
27	None	None	ivy/scotch broom/morning glory	TV/radio/school/social media	4	3	2	1	5	3	1	2	4
28	European Rat	Family/friends	Nymphaea	school/family/friends			1		1				2
29	None	None	Ivy/Himalayan blackberry	Family/friends	3	2	4	1	1	3	2	4	5
30	Nutria	Radio/family/friends	Blackberries	TV/radio/family/friends	4	1	3	2					5
31	None	None	Blackberries	School	4	2	3	1	1	2	4	3	5
35	Snails	TV	Blackberry	TV/radio		1	2	3	1	2	5	3	4
37	rabbits	Family/friends	Blackberries/bamboo	Family/friends	4		3	2	2	3	1	5	4
38	cane toad	TV/radio/school/family/friends	ivy	Family/friends/social media	4	3	2	1	2	3	1	4	5
39	None	None	Spartina grass	Family/friends	4		3	2	2	5	1	3	4
47	Chinese mystery snail	School	Knotweed	School	4	2	3	1	1	3	5	4	2
48	None	Radio	Purple loosestrife	Radio/family/friends	2	4	3	1	1	5	2	3	4
49	None	None	Yes	Family/friends	4	2	3	1	2	4	1	5	3
50	wolf	TV	Gout Plant	Family/friends	3	1	4	2	5		3	4	2

## Appendix B

1. Can you name an invasive animal species in Washington State that you have heard about? (If you do not know any species, put NONE in the text box)
2. How did you hear about the invasive animal species?
  - a. TV
  - b. Radio
  - c. School
  - d. Family/Friends
  - e. Social Media (Facebook, Twitter, blogs, YouTube, ect.)
3. Can you name an invasive plant species in Washington State that you have heard about? (If you do not know any species, put NONE in the text box)
4. How did you hear about the invasive plant species?
  - a. TV
  - b. Radio
  - c. School
  - d. Family/Friends
  - e. Social Media (Facebook, Twitter, blogs, YouTube, ect.)
5. What would make you most likely to check out an article or post about invasive species? Rank the following choices (4 being the most likely and 1 being the least likely).
  - a. If it was about a species in my local area/community
  - b. If it was something that might affect one of my hobbies or activities
  - c. If it was damaging to the environment
  - d. If it was damaging to the economy
6. Rank the following in how likely you would be to learn or hear about invasive species (5 as most likely and 1 as least likely)
  - a. TV
  - b. Radio
  - c. School
  - d. Family/Friends
  - e. Social Media (Facebook, Twitter, blogs, YouTube, ect.)
7. What is your age group?
  - a. 10-20
  - b. 20-30
  - c. 30+