Uncovering the Interest of Private Landowners in Learning More About Landscaping with Native Plants

Catherine A. Taylor

University of New Hampshire, Durham

Follow this and additional works at: https://scholars.unh.edu/honors

Part of the Agricultural and Resource Economics Commons

Recommended Citation
https://scholars.unh.edu/honors/687

This Senior Honors Thesis is brought to you for free and open access by the Student Scholarship at University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Honors Theses and Capstones by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact Scholarly.Communication@unh.edu.
Uncovering the Interest of Private Landowners in Learning More About Landscaping with Native Plants

Catherine Taylor
College of Life Sciences and Agriculture
University of New Hampshire
Senior Honors Thesis

Faculty Advisors:
Kelly Giraud, PhD
John Halsted, PhD
Natural Resources Department
Abstract

Increasing populations in New England and the subsequent residential development associated with this growth has had profound impacts on local ecosystems. Residential development often results in habitat loss and fragmentation (Radeloff et al, 2009). Habitat fragmentation, or dividing habitat into smaller, less dense parts, can induce the decline of local populations of native species and interrupt vital ecosystem services. Important services offered by functioning ecosystems include carbon sequestration, flood reduction, and water purification. It has been shown that benefits can be restored to local ecosystems through strategies to restore ecosystem functions (Burghardt et al, 2008). On an individual household scale, landscaping using native plants rather than non-native ornamentals may help restore ecosystem function and habitat for native species (Nassauer, 1997). Native plants benefit the species that have coevolved in this region and reduce the strain of habitat fragmentation (Fusco et al., 2018). Unfortunately, education and awareness of the benefits of landscaping with native plants is currently low (Giraud, 2019). Nonprofits such as Native Plant Trust, Rohdy Native Grow, Native Massachusetts, and The Coastal Maine Botanical Garden currently offer classes to educate landowners on how they can use their land to suit their own needs and benefit local ecosystems. This research aims to be informative for these organizations, helping them understand the characteristics of demand for their classes. During the summer of 2018, a total of 2,033 private landowners across the 6 New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) completed an online survey regarding their land cover, past efforts and future willingness to restore wildlife habitat on their private land. The survey unveiled a diversity of interest in landscaping with native plants.
Introduction

The New England region has been subject to population growth, primarily in urban or suburban areas. Although it was expected that the fervent migration to suburbia may have slowed after the Great Recession, the populations in suburban and smaller metro counties are still growing by 16% since 2000, twice as fast as those in rural counties and 3% higher than those in urban counties (Mitchell, 2020). The New England Region, characterized by the Environmental Protection Agency as Region 1, experienced a population growth of 16.9% between 1982 and 2012, while developed land increased by 53.8% in that time (EPA, 2018). This can be explained in part by demand for suburban or other low-density properties. Lawler et al. (2014) found that projections of land use change based on current future resource needs results in one-fourth of species studied to lose over 10% of their habitat by 2051. Habitat loss is the greatest threat for native species and land management practices that developers or private homeowners choose on this newly developed land also have significant impacts on the ecosystem. Conversion of natural habitat to turf lawn or non-native ornamentals can negatively impact the ability of the overall ecosystem to provide ecosystem services such as water filtration, nitrogen and carbon cycling, and temperature control. Turfgrass, the most common type of lawn cover, could create a positive feedback loop and exacerbate global warming due to nitrogen fertilization and weed invasions may also increase with climate change (BIJOOR et al., 2008). Weeding, mowing, fertilizing, using pesticides, water, and transporting landscape materials are all extensive uses of energy and resources that are required for a “traditional” lawn. Fertilizer use can interfere with nitrogen cycling while pesticides or herbicides used for lawns can leech into nearby waters, degrading the ecosystem. Replacing native habitat with turfgrass and ornamental plants creates cumulative impacts that decrease biodiversity both in the developed region and in
the greater surrounding natural area (Hostetler and Main, 2010). Losses of biodiversity in turn exacerbate losses in ecosystem services provided by the surrounding natural land, ecosystems with low biodiversity sequester less carbon dioxide from the atmosphere and pollinate less effectively (Reich et al., 2001).

The issue of invasive species should also be of concern to landscapers as the origin of most invasive plants that have been introduced to the United States has been for use in gardening or landscaping (Reichard & White, 2001). Invasive species are defined as both non-native to the ecosystem in which they are located as well as a high potential to do harm (United States Department of Agriculture, 1999). Invasive species typically do harm to ecosystems when they can outcompete native species due to special advantages they have gained from evolving in a different environment. Energy webs interrupted by invasive species can break down and species may even go extinct from over predation or lack of resources and have been recently estimated at an economic cost of $35 billion per year (Pimentel et al. 1999). Meanwhile, properties that employ native species have been found to support more biodiversity, species richness, and biomass and have been found in some cases to positively influence the species carrying capacity in suburbia (Burghardt et al, 2008). It is hypothesized that, although the impact of a single property-owners decisions may seem small, a landscape of yards landscaped with environmental benefits can contribute to nearby ecological health aggregately (Nassauer, 1997).

Several nonprofit organizations such as Native Plant Trust, Rohdy Native Grow, Native Massachusetts, and The Coastal Maine Botanical Garden aim to change the behaviors of individuals to contribute to a more diverse and functional ecosystem at a larger scale. Due to the nature of private lands in the United States, it may be beneficial to work towards changing behaviors and attitudes when landscaping rather than proposing restrictive regulations that are
politically unpopular on property owners. Changing the values of homeowners to desire environmentally beneficial and native landscapes will create a longer lasting effect than providing incentives and may also allow a local market for such services to grow, providing business to native-focused nurseries or garden centers through consumer choice. The interest of private landowners in landscaping with native plants has been studied before, as researchers determine the impact of demographic variables or attitudes on the desirability of several modeled lawns. However, more research is needed to further examine the diverse motivations that landowners hold for landscaping with native plants to inform interest groups that aim to increase the behavior. Helfand et al. found that people are willing to pay more for well-designed yards that feature native plants than for traditional laws and that this extra payment would more than cover the increased initial costs of planting with native plants (2006). Similarly, Yue et al. (2010) found that people were willing to pay a $0.35 premium for plants labeled as noninvasive and native and a $1.01-$1.66 discount for plants labeled as invasive. Peterson et al. found that participants in their study preferred a mix of 50% native plants from various garden designs (2012). Additionally, Peterson et al. used regression to determine that ethnicity and perception of neighbor’s preferences were the best predictors of landscaping preferences. Like Peterson et al., this study will use regression techniques to determine the factors that more strongly predict native plant landscaping preferences, but will expand upon this work by including factors that represent possible motivations for landscaping with native plants with the goal of identifying what landowners perceive as most important when considering to landscape with native plants. This study aims to give direction to groups that disseminate information about landscaping with native plants. Rodriguez et al. (2016) found that landscaping preferences can be changed from opposition for native plant coverage designs to support after an informational treatment
describing the potential benefits of native plants to bird species. If interest groups can effectively reach private landowners, they may be able to change their landscaping preferences and create new conservation values.

Methods

Survey Design

The survey used for this analysis is from the work of Kelly Giraud, PhD and collected data in 2019. To design this survey, Dr. Giraud conducted a series of 4 focus groups that consisted of 8 to 16 landowners and were held in Lunenburg MA, Glastonbury, CT, Barrington, NH, and South Berwick, ME. Input from was solicited from representatives of the respective state Fish and Game Departments, non-profit groups, and landscape companies. From this valuable input, an online survey was developed and pretested on 100 respondents through a convenience sample. The final survey included 51 questions that asked about the land coverage of the respondent’s property, landscaping preferences, and attitudes toward native plants. After giving some brief information on the definition of native plants, the survey asked respondents if they would be interested in taking landscaping workshops if they were offered locally as well as and where the ideal locations and modes of delivery would be for said classes. Finally, a set of socioeconomic questions were asked of the respondents.

The survey was deployed through Qualtrics, who also provided the panel respondents (Qualtrics, 2018). 2,033 complete surveys were gathered, with a response rate of approximately 21%. When eliminating the potential respondents who opted out because they did not own property, the response rate increases to approximately 32%. Including partial responses brings the response rate up to 36%.
The use of purchased samples has gained much study in recent years. Purchasing a sample from a company like Qualtrics offers some clear advantages. The relatively low cost allows for a larger sample. Specific demographics can be targeted with precision. The survey platform can screen out “speeders” (who move through the survey too quickly). The survey platform was able to screen out those logged in from outside the geographic area of interest and those that did not own their property. This has allowed this survey data to be representative specifically of property owners in the New England region. There are also drawbacks to using an opt-in panel from a survey company. Respondents are paid for their participation, and they may participate in many surveys leading to survey fatigue, these factors may alter how participants respond and may not be fully representative of their true preferences if they have little stake in the results of the survey. While an opt-in panel may have certain drawbacks, all modes of sample collection are wrought with issues. Mail surveys tend to favor older, more educated men. Telephone surveys are easily ignored and miss a large portion of the population who no longer have landlines. Door to door surveys are time consuming and cost prohibitive in a large geographic area. As with any mode of data collection, the advantages and drawbacks should be clearly understood.

Probit and Logit Regression Analyses

In order to determine which factors influence whether there exists a stated interest in planting native plants, a probit and logit regression model was used. Both the probit and logit models are binomial regression models that use a variation of the cumulative normal function rather than the standard linear model used in Ordinary Least Squares regression. Typically, both models are estimated to find which gives the best fit to the sample data. The difference between the two is that the logit model assumes a standard logistic distribution of errors while the probit
model assumes a normal distribution of errors. The likelihood that the binary dependent variable matches what was observed in the sample is maximized in these equations. The probit model is based on the following equation (Studenmund, 1992):

$$P_r\left(Y_i = \frac{1}{x_i}, \beta\right) = 1 - \Phi(-x_i\beta) = \Phi(x_i\beta)$$

The dependent variable YesPlantNative is a binary (Yes/No) variable derived from the survey question “If the cost was the same as common cultivated plants, would you purchase Native Plants for your property?”. For this variable, a value of 1 denotes a willingness to plant with native plants while a value of 0 denotes that the respondent was unwilling to plant with native plants. Those that chose “Definitely Yes” or “Probably Yes” were considered to describe a willingness to plant with native plants and coded as 1, while all other responses were coded as 0 (“Might or Might Not”, “Probably Not”, and “Definitely Not”). This delineation was used to focus on the group that will be most likely to change their behavior and plant with native plants rather than attempting to change the behavior of those more unwilling. This model can be used to see how each influencing factor changes the probability of a positive dependent variable result. These non-linear models compare each coefficient to the probabilities found within the sample to create a model that best represents what has been observed. In this case, these models can estimate the impact of independent variables on the probability that someone is willing to plant native plants. It can be helpful to determine the factors that have a positive correlation with an interest in planting native plants so that class content can be guided toward the interests of those who would choose to landscape with native plants. This estimation will reflect what is important to private landowners when growing native plants on their property.
The equation below was used to estimate the probability that someone would be willing to plant native plants.

\[ YesPlantNative = \beta_1 \text{Acres} + \beta_2 \text{age18to24} + \beta_3 \text{age35to44} + \beta_4 \text{age55to64} + \beta_5 \text{Income7} + \beta_6 \text{Income9} + \beta_7 \text{Resale} + \beta_8 \text{Environment} + \beta_9 \text{Wildlife} + \beta_{10} \text{History} + \beta_{11} \text{Healthier} + \beta_{12} \text{SupportLocal} + \beta_{13} \text{LongRun} + U \]

YesPlantNative is the probability that someone is willing to plant native plants. Each \( \beta \) coefficient is derived from the sample using the probit or logit model equations. Acres is the number of acres of one’s property. Age18to24, age 35to44 and age 55to64 were included in the final model as statistically significant. Only two categories of Income were included as previously significant, the variables Income7 and Income9, representing the income categories $60,000-69,999 and $80,000-89,999. The following variables are connected to stated reasons for planting native plants and listed in the tables below, Definition of Variables.

<table>
<thead>
<tr>
<th>Definition Of Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>YesPlantNative</td>
</tr>
<tr>
<td>Acres</td>
</tr>
<tr>
<td>age18to24</td>
</tr>
<tr>
<td>age35to44</td>
</tr>
<tr>
<td>age55to64</td>
</tr>
<tr>
<td>Income 7</td>
</tr>
<tr>
<td>Income 9</td>
</tr>
<tr>
<td>Resale</td>
</tr>
</tbody>
</table>
Demographics found to be significant from previous regression tests were used such as how many acres the respondent’s property is, several age ranges, and two ranges of income. Factors such as gender, education level, and other categories of age or income were found to be insignificant from previous models. It is prudent to remove these variables from the final model so that it has more predictive power, several insignificant independent variables can skew the final effects if left in the model. The other influencing variables are derived from the survey question “If you would consider growing Native Plants on your property, why?”, where the respondent can check if they agree with a list of possible reasons. The full list of reasons why the respondent could choose to grow native plants were as follows: “To increase my property’s resale value”, “For the environment”, “To benefit local wildlife”, “To preserve history”, “To be an example for others”, “For my property’s public image”, “To reduce the need to water my plants”, “To reduce the need for fertilizer”, “To have a healthier property”, “To support local growers”, “To support the local economy”, “They may cost me less in the long run”, and “To promote diversity”. In prior iterations of the model, not all reasons for planting native plants
were found to have a significant effect on the probability that a respondent is willing to plant native plants in the first place. The insignificant variables were removed for the final models. The responses were recorded on a Likert Scale from 1-7, with 1 representing “Strongly Agree” that the reason is important to the respondent when planting native plants to 7 representing “Strongly Disagree”. For this model, 1-3 was considered that the respondent agreed that the reason was important for them while 4-7 including “Neither agree nor disagree” were considered to denote a lack of importance for the respondent. Using these guidelines, this group of variables stating reasons for planting with native plants were translated into binary variables with 1 representing that the reason is considered important and 0 where the reason is not considered important. The differentiation between 1-3 and 4-7 were considered less important for this preliminary study, what is most relevant is whether each factor is considered important or not.

Results

Surveyed Preferences

Four questions were evaluated by their response count to unveil private landowner preferences for hypothetical classes about various environmentally beneficial landscaping practices. To isolate the group most likely to take advantage of these classes, the sample was further narrowed to include only those who had responded that they were willing to landscape with native plants if the cost was the same. This left 1,556 responses, approximately 77.1% of the sample. The remainder of the sample consisted of 22.9% of respondents who chose that they might or might not and 3.9% who chose they would probably not or definitely not purchase native plants for their property.
Respondents were asked “What is important to you when thinking about landscaping this property?” with the option to choose multiple answers. “Plants that are easy to keep alive” had 623 respondents select that it was extremely important, the most out of every choice. “Minimize maintenance time” and “Minimize maintenance cost” followed with 513 and 501 respondents selecting that they are extremely important. “Plantings the support birds, butterflies, and pollinators” and “A design that frames the home/building well” had the most respondents select that these factors were not at all important or slightly important.
Regarding hypothetical classes about environmentally friendly landscaping or gardening practices, respondent were asked “Which of the following would be the best places to hold a class or workshop on landscaping for wildlife?”. The local library was the most popular location at 874 responses. Local gardening center or greenhouse and online followed, with 629 and 585 responses, respectively. The least popular locations were State Fish and Wildlife Office and Cooperative Extension Office at 159 and 147 responses, respectively.
For class topic, respondents were asked “If there were a free, one day workshop on the following topics, which of the following would you attend?” with the option to select multiple choices. The three most popular possible class topics were “Gardening with Native Plants”, “Landscaping for Song Birds”, and “Non-Toxic Pest Control” at 759, 642, and 628 responses, respectively. “How Native Plants Benefit the Ecosystem”, “Historic Garden Plants of the Area”, and “Restoring Wildlife Habitat on My Land” were least popular with 423, 399, and 251 responses, respectively.
Additionally, respondents were asked “If would consider growing Native Plants on your property, why?” and the link of these motivations to willingness to plant with native plants was further investigated in the following probit regression. “For the environment”, “To benefit local wildlife”, and “To have a healthier property” had the highest response count where respondents strongly agree that these are reasons they would plant with native plants at 452, 373, and 369 responses, respectively. “For increase my property’s resale value”, “To be an example for others”, and “For my property’s public image” had the highest response count for strongly disagree, at 40, 51, and 67 responses, respectively.
If you would consider growing Native Plants on your property, why?

- To increase my property’s resale value
- For the environment
- To benefit local wildlife
- To preserve history
- To be an example for others
- For my property’s public image
- To reduce the need to water my plants
- To reduce the need for fertilizer
- To have a healthier property
- To support local growers
- To support the local economy
- They may cost me less in the long run
- To promote diversity
- Other:

Legend:
- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree
Probit Regression

The probit model estimated output is depicted in Figure 2. The model itself is likely to be statistically significant, given the Prob > chi2 estimate is below our alpha level of 0.10. This result implies that our model is likely more effective than a model with none of the chosen predictive variables. At first glance, the motivational factors that have the strongest positive effect on predicting a willingness to plant native are a desire to protect the environment, estimated coefficient of 0.60, the desire to support local businesses, estimated coefficient of 0.48, and a desire to benefit local wildlife, estimated coefficient of 0.36. The model estimates that the presence of each variable increases the probability that someone is willing to plant native plants by a z-score of β, each coefficient estimate, respectively with all else constant. All of the coefficient estimates with the exception of the “inc7” variable are statistically different from zero with p-values below the chosen alpha level.

*Figure 2: Stata Probit Regression Output*
The pseudo R2 calculated for the probit model, 0.233, is the same as the logit model. However, the estimates for the coefficients in the logit model are generally higher, or have a higher estimated effect, than in the probit model. This result suggests that there is no significant difference between using probit or logit estimation techniques for this model. However,
Continuing with the probit model, the marginal effect of each variable on the probability that someone is willing to plant with native plants was calculated. The results are shown in Figure 4. To calculate the coefficient estimate for each variable, all other factors were held constant at their means to isolate the effect of the variable of interest. Most notable for this research question is the effects of each variable describing possible motivations for landscaping with native plants. Someone who chose resale as an important motivator were estimated to be 12.7 percentage point (found from positive event probability subtracted by negative event probability) less likely to be willing to plant with native plants. Those who are motivated by a desire to protect the environment 20.7 percentage points more likely to say they would landscape with native plants, those who are motivated to benefit local wildlife 11.9 percentage points more likely, those who are motivated by history preservation 7.7 percentage points more likely, those who desire a healthier property 11.7 percentage points more likely, those who look to support...
local growers 15.8 percentage points more likely, and those who are motivated by the shorter cost in the long run 9.7 percentage points more likely to be willing to landscape with native plants with all other variables than that of interest held constant at their means, based on the data collected, and vice versa.

Discussion

This survey found that interest in classes offered to inform landowners about how to implement a variety of environmentally friendly landscaping or gardening techniques is varied as is the possible motivations for switching landscaping behaviors. Uncovering what homeowners prioritize when landscaping their properties can be useful in strategizing how to best reach them. Planting with native plants instead of imported decorative plants typically used in landscaping can meet many of these needs. Not only do they minimize maintenance and stay alive longer due to their coevolution with the local climate, but they can attract native birds and butterflies that many desire in their gardens. From this survey, it appears that minimizing maintenance time and cost as well as plants that are easy to keep alive are most important to private landowners when landscaping their property. If classes were to advertise these benefits of landscaping with native plants, they may have higher attendance in classes and increase overall education of the topic effectively. Native plants often require less maintenance and cost than non-native as they are adapted to their environment without human intervention. Costs of using excessive fertilizer and replanting each season can be avoiding by planting with native plants, however this is not currently common knowledge among landscaping professionals or homeowners, calling attention for the need for effective dissemination of educational materials.

This survey found that a majority of respondents willing to plant native plants preferred a hypothetical class held at a local library the most, with a local gardening center or online
following behind. However, it may be interesting to research how the pandemic and the prevalence of video conference software and work from home policies may have shifted preferences more in favor of online classes. As for class topic, “Gardening with Native Plants” was the most popular. “Landscaping for Song Birds” and “Non-toxic Pest Control” were also among the most popular topics. Least popular were “Restoring Wildlife Habitat on My Land” and “Historic Garden Plants of the Area”. Organizations that wish to distribute educational information about environmentally friendly landscaping practices, in the form of classes or other media, could focus their efforts on these topics in order to increase attendance and interest in landscaping with native plants.

The probit regression model estimated the effect of each stated motivation for planting with native plants on their willingness to do so. Most demographic factors were initially found to be statistically insignificant in preliminary regression analyses, contrary to past research that has found significant effects for race. The only demographic variables that were found to be statistically significant in their effect on willingness to plant native plants was the age category 18 to 24 and two categories of income, the income ranges $60,000-69,999 and $80,000-89,999, all with positive effects. The motivational factors that have the strongest positive effect on predicting a willingness to plant native are a desire to protect the environment, estimated coefficient of 0.60, the desire to support local businesses, estimated coefficient of 0.48, and a desire to benefit local wildlife, estimated coefficient of 0.36. Those who are motivated by a desire to protect the environment 20.7 percentage points more likely to say they would landscape with native plants, those who look to support local growers 15.8 percentage points more likely, and those who are motivated to benefit local wildlife 11.9 percentage points more likely. Interestingly, someone who chose resale as an important motivator were estimated to be 12.7 percentage points less
likely to be willing to plant with native plants, this was the only negative effect. This may be due to a difference in values between those concerned with their house resale value may not wish to invest time and money into their landscaping or improve the community around them if they are looking to sell their house in the near future. These results show what factors are most important to private landowners when choosing to plant with native plants and their relative effects can inform organizations the underlying values that may motivate a change in behavior. Classes with these motivations in mind can be designed to focus on these topics and distribute educational materials that emphasize the benefits of native plants connected to how it supports the environment, local wildlife, and local growers. It may also be effective for these organizations to partner with local growers or distributors of plants, such as garden centers or nurseries, to promote planting for environmental benefits.

Limitations

This data sample provided 2,017 observations applicable to the probit model estimated. This large sample size should lend some credibility of the sample to accurately represent the true values for New England private landowners. However, there are limitations to using paid survey-takers. These survey-takers may not have a vested interest in the results of the survey and respond untruthfully to finish the survey for their incentives. While refining my response to my research question, I believe that using logit as my primary model of choice rather than probit may lead to an easier interpretation and is more in line with the model that is more commonly used in the literature. I am unsure as to why logit shows a slightly larger effect for each explanatory variable on the probability of the dependent variable event. If there was more time, more research into the different interpretations of each model is warranted to find flaws in the execution of these modeling techniques.
An error received when estimating the preliminary probit modes was that the Residential variable was omitted due to collinearity. This would imply that this variable describes the same effect as another. The binary for this variable was meant to be either a resident property or a commercial property. Upon further introspection into the data, this variable cannot be included in the regression because there were no respondents that completed this survey with a commercial property as their primary property for landscaping. In this case, it would be logical that the residential variable is not only describing no effect, but would also lower the statistical significance of the entire model if left in the equation of interest.

It may have also been more effective to use the ordered probit technique rather than converting each variable of interest into a binary dummy variable. The dummy variables were created because of the simplicity of results considering someone either found the motivation important or not important, the distinctions between the categories of “Strongly Agree” and “Somewhat Agree” may be inconsequential for example. A benefit to using ordered probit instead would be the ease of interpreting the probability of each Likert scale category, which would also be more similar to current literature using logit and probit.

The results of this analysis suggest that special interest groups looking to structure native plant landscaping content around what most motivates landowners to landscape with native plants may find it effective to focus on how it protects the environment, supports local growers, and benefits local wildlife. The presence of these variables increased the probability that someone would be willing to plant native plants with all else held constant. This may show a relationship between considering these values important and a willingness to landscape with native plants. Most demographic variables were not found to have a significant effect on the probability that someone is willing to landscape with native plants, contrary to previous
literature. Race was not a variable recorded in this sample, future studies may wish to include this variable to replicate the results of previous literature on preferences for native landscaping. Future work with this data includes using Willingness to Pay techniques to quantify the amount private landowners are willing to pay to landscape with native plants given their responses to the survey. A question uncovering an element of a willingness to pay in time, in the form of hours spent landscaping, is also included and can be evaluated in a similar way. A combination of these analyses together will grant a more full picture of current preferences and values related to landscaping with native plants and the possibilities for changing this behavior by increasing demand through effective education.
References


*Definitions | National Invasive Species Information Center* [Press release].

https://www.invasivespeciesinfo.gov/executive-order-13112-section-1-definitions#:%7E:text=%28f%29%22Invasive%20species%22%20means%20an%20alien%20species%20whose,historically%20occurred%20or%20currently%20occurs%20in%20that%20ecosystem.
