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TESTIMONY BEFORE THE JOINT STANDING COMMITTEE ON AGRICULTURE, CONSERVATION AND FORESTRY

Proponent For LD 1661

An Act To Establish a Comprehensive and Interagency Approach To Invasive Species Management

Senator Talbot Ross, Representative Pluecker, and members of the Joint Standing Committee on Agriculture, Conservation and Forestry, I am Gary Fish, a resident of Mount Vernon, Maine and a 10th generation Mainer. I am here speaking as a proponent of LD 1661, An Act To Establish a Comprehensive and Interagency Approach To Invasive Species Management.

As a longstanding unofficial Chair of the Maine Invasive Species Network, I will speak today about a topic I am incredibly passionate about. After countless hours working with public and private entities and listening to their passions and concerns, I urge you to support LD 1661.

I testify today just as a citizen and not in my official capacity. I have been researching and investigating the current status of invasive species prevention and management for over 30 years. Most recently, as a Master of Policy, Planning and Management student at USM, where I earned my Master's degree at the tender age of 63. My capstone project, "Should Maine Develop a More Comprehensive Approach to Invasive Species Management? - A 2022 Survey of Likely Invasive Species Managers in Maine and Policy Recommendations to Strengthen Maine's Resilience to Invasive Species" lead me to this point. After three unsuccessful attempts to request a Senior Planner position through the Governor's budget to finish the investigation, I decided to pursue this proposal.

In Maine, the financial implications for public and private organizations are greater than $6 million in survey, monitoring, management, and enforcement costs. Ecological impacts include habitat degradation through the exclusion of native species and the reduction of biodiversity. Medical consequences of invasive species range from skin rashes, burns, and sight loss to severe disease and death. Environmental impacts include flooding, soil erosion, loss of fisheries, and nuisance algal (cyanobacteria) blooms in lakes or ponds. Skin rashes, clogged waterways, impeded trails, and reduced lobster populations caused by invasive species may discourage the 11.2 million visitors from spending nearly $7.6 billion for overnight visits in Maine. These impacts indicate a need to prioritize invasive species management in Maine.

Continuing to do what is currently done makes the State of Maine vulnerable to the increasing rate of new species invasions. Maine needs sustainable, long-term funding for invasive species

programs to ensure staffing resources are available to address existing and emerging invasive species challenges.

Maine should consider following in the footsteps of states such as Pennsylvania and Massachusetts and thoroughly analyzing the current invasive species programs and approaches to determine if instituting a more comprehensive approach like that used by New York and Michigan should be implemented.

Rapid response and control activities are needed to reduce and eliminate new and existing populations of invasive species in Maine. Establishing a rapid response fund is truly essential since we may no longer expect federal assistance.

Cooperation and partnerships at all levels must exist to effectively prevent and manage invasive species beyond rapid response efforts. State agencies cannot fight the battle alone. Diverse and expansive partnerships with local leaders and organizations, such as businesses, industry, town managers, land trusts, environmental NGOs, Soil & Water Conservation Districts, and lake associations, are essential.

The respondents to my survey clearly stated that more staff and dedicated funding sources are essential. The survey also revealed the large number and variety of organizations working on invasive species management and the need for coordination among those groups and abutting land managers.

You can see the need for a more pragmatic approach to this serious issue. Although we seem to be doing a great job of funding, staffing, and coordinating invasive aquatic plant and fish prevention and management, most other sectors depend on soft funding sources, including federal monies that are sure to dry up soon. The continuous waves of new invasive organisms have been accelerating over the past ten years. We are drowning in assaults from browntail moth, emerald ash borer, beech leaf disease, green crabs, hemlock woolly adelgid, Lone Star tick, West Nile virus, and many more damaging organisms that are knocking at our door; Asian longhorned beetle, oak wilt, box tree moth, southern pine beetle, and blue crabs to name just a few.

We need to find better ways to slow the spread of already established invasive species and prevent these new threats from getting a foothold in Maine. Please join me in support of this bill.

Executive Summary

https://digitalcommons.usm.maine.edu/muskie_capstones/181/

This paper analyzes the status of Maine's public and private invasive species management efforts and attempts to answer the question, "Should Maine develop a more comprehensive approach to invasive species management?".

Background

Invasive species are defined herein, and the history of some key invasive species (IS) in Maine is summarized. Maine needs more refined estimates of the cost of biological invasions in the state, but the national U.S. costs are between $75 and $20 billion.

The impacts of IS are grouped into five overlapping categories: economic, ecological, medical, environmental, and recreational. In Maine, economic impacts to public and private organizations are greater than $6 million, for example, survey, monitoring, management, and enforcement costs. Ecological impacts include habitat degradation through the exclusion of native species and the reduction of biodiversity. Medical consequences range from skin rashes, burns, and sight loss to severe disease and death. Environmental impacts include flooding, soil erosion, loss of fisheries, and nuisance algal (cyanobacteria) blooms in lakes or ponds. Skin rashes, clogged waterways, impeded trails, and reduced lobster populations may discourage the 11.2 million visitors from spending nearly $7.6 billion for overnight visits in Maine. These impacts indicate a need to prioritize IS management for Maine state government and many non-profit organizations.

Example of a State with a More Comprehensive Approach

The paper presents New York as an example of a more comprehensive state approach to IS management. New York has Established an Invasive Species Council, a Bureau of Invasive Species and Ecosystem Health, an Invasive Species Advisory Committee, and added multiple laws and regulations under the Departments of Agriculture and Markets, Environmental Conservation, Soil and Water Conservation and Health.

New York state founded an Invasive Species Research Institute at Cornell University, consolidated all invasive species reporting information on its iMapInvasives mapping and database platform, and contracted with eight private-public grassroots Partnerships for Regional Invasive Species Management (PRISMs) using funds from the state's long-established Environmental Protection Fund.

New York's IS managers stated that this approach had improved invasive species control and targeting of the highest priority species from all taxa groups.

Maine Invasive Species Policy Survey Results and Insights

Approximately 600 public and private IS representatives were sent a survey to help assess the current state of IS management in Maine. One hundred ninety-seven individuals responded, providing a significant but incomplete sample of Maine's current IS management efforts. Respondent affiliations were diverse and represented all areas of the state.

Respondents indicated that public knowledge, funding, and staffing were the top three impediments to effective invasive species management. Invasive terrestrial plants dominated regional species of concern; however, forest insects, invasive aquatic plants, and ticks were also listed. All but three respondents listed invasive species they were either managing now or were concerned about. The most frequently listed species included nine invasive terrestrial plants, three invasive aquatic plants, and three forest insects.

Many suggestions for improvement were offered, but the top four included: increased funding, education and outreach, agency coordination and partnerships, and increased staffing. Few respondents were aware of alternative policy models, but the top suggestion was creating partnerships as New York has done with their Partnerships for Regional Invasive Species Management (PRISMs).

IS management staffing and budgets data collected showed 120 FTE in staffing and $3.2 million in annual expenses in Maine. These numbers only include some of the staff and budget numbers of every state agency currently working on IS. The survey indicated that lake associations employ the most IS management staff and have the highest collective budgets. State agencies, national parks, and land trusts came next in the staffing category, and forestry, unknown, and land trusts followed in the funding category.

Survey respondents offered a few additional suggestions that overlapped with many previous concerns and suggestions. The top three were a partnership/network/regional approach, more education, and increased and improved outreach.

Our survey reveals consistent concerns among IS representatives about funding, staffing, education, outreach, and the need for better organization and prioritization. Invasive species management requires consistent surveillance and monitoring to detect infestations early to allow the potential to eradicate new invasive species before they become well-established in the state. Once new species become established, successful management requires long-term funding, staffing, and commitment to control or slow the invasive species' spread, ensure habitat restoration, and mitigation of harm caused to the economy and human health.

Sustainable IS management programs must address the three key pillars: environmental, social, and economic objectives. Currently, Maine's invasive aquatic plant program is the only IS management program that incorporates all three pillars well. The prevention (courtesy boat inspection program) and early detection (invasive plant patrol program) support the environmental pillar well. The strong coalition of lake associations, state-wide non-profits, and their annual "milfoil summit" provides an excellent foundation for the social pillar. The Maine Interagency Task Force on Invasive Aquatic Plants and Nuisance Species provides a conduit to the legislature to help continuously improve state policy. The economic pillar is well-supported by the Lake and River Protection Fund sticker, which provides close to $2 million annually. This reliable and consistent funding has enabled the eradication of invasive aquatic plants from nine separate Maine lakes and ponds. Although much more needs to be done, that success breeds public confidence and legislative support.

All the other IS taxa groupings lack one or more sustainability pillars. There are no other formal interagency task forces. The Maine Natural Areas Program does have a scientific advisory group that provides another example of how species might be prioritized, but their work needs to be codified in law. Risk evaluations do not naturally happen when multiple competing agencies work within their silos. An office or agency at the Governor's Office level might solve this dilemma.

Most funding for IS management in Maine (outside the invasive aquatic plant area) is short-term, inconsistent, and unreliable. The lack of funding impacts staffing levels which hampers the ability to prevent or slow the spread of IS in Maine. It also affects the ability to enforce the quarantines or bans currently in law. The level of trade, constant flow of visitors, and ease of movement constantly overwhelms the rangers, wardens, and border patrol and blunts the ability to stop the flow of IS into Maine.

Policy Options

- Doing nothing continues the state's vulnerability to the increasing rate of new invasions.
- Seeking new ongoing, dedicated funding sources like the Lake and River Protection Sticker for other IS taxa groups seems essential.
- Adding a Senior Planner position at the DACF or other IS management agency to further analyze current state resources and the viability of a more comprehensive approach in Maine seems prudent.

Conclusion

Maine should consider following in the footsteps of Pennsylvania (https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/GISC/Pages/default.aspx) and Massachusetts (https://malegislature.gov/Bills/192/S563) and thoroughly analyze the current invasive species programs and approaches to determine if instituting a more comprehensive approach like that used by the states of New York, and Michigan should be implemented.

Rapid response and control activities are needed to reduce and eliminate new and existing populations of invasive species in Maine.

Cooperation and partnerships at all levels must exist to prevent and manage invasive species beyond rapid response efforts effectively. State agencies cannot fight the battle alone. Diverse and expansive partnerships with local leaders and organizations like town managers, land trusts, environmental NGOs, Soil & Water Conservation Districts, and lake associations are essential.

The survey respondents clearly stated that more staff and dedicated funding sources are essential. Many supported a comprehensive and collective approach among state, county, municipal, and private entities, such as the Partnerships for Regional Invasive Species Management (PRISM) model.

The survey also revealed the large number and variety of organizations working on invasive species management and the need for coordination between those groups and abutting land managers.

Should Maine Develop a More Comprehensive Approach to Invasive Species Management?

A 2022 Survey of Likely Invasive Species Managers in Maine and Policy Recommendations to Strengthen Maine's Resilience to Invasive Species

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Capstone paper for
Master of Policy, Planning, and Management Program
Muskie School of Public Service
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December 2022
Professor Yuseung Kim, Capstone Advisor

Executive Summary

This paper analyzes the status of Maine's public and private invasive species management efforts and attempts to answer the question, "Should Maine develop a more comprehensive approach to invasive species management?".

Background

Invasive species are defined herein, and the history of some key invasive species (IS) in Maine is summarized. Maine needs more refined estimates of the cost of biological invasions in the state, but the national U.S. costs are between $75 and $20 billion.

The impacts of IS are grouped into five overlapping categories: economic, ecological, medical, environmental, and recreational. In Maine, economic impacts to public and private organizations are greater than $6 million, for example, survey, monitoring, management, and enforcement costs. Ecological impacts include habitat degradation through the exclusion of native species and the reduction of biodiversity. Medical consequences range from skin rashes, burns, and sight loss to severe disease and death. Environmental impacts include flooding, soil erosion, loss of fisheries, and nuisance algal (cyanobacteria) blooms in lakes or ponds. Skin rashes, clogged waterways, impeded trails, and reduced lobster populations may discourage the 11.2 million visitors from spending nearly $7.6 billion for overnight visits in Maine. These impacts indicate a need to prioritize IS management in Maine.

Example of a State with a More Comprehensive Approach

The paper presents New York as an example of a state taking a more comprehensive approach to IS management. New York has Established an Invasive Species Council[1], a Bureau of Invasive Species and Ecosystem Health[2], an Invasive Species Advisory Committee[3], and a Soil and Water Conservation Committee[4]. To develop this structure, New York has enacted multiple laws and regulations under the Departments of Agriculture and Markets[5], Environmental Conservation[6], and Health[7].

New York state founded an Invasive Species Research Institute at Cornell University[8], consolidated all invasive species reporting information on its *i*MapInvasives[9] mapping and database platform, and contracted with eight private-public grassroots Partnerships for Regional Invasive Species Management (PRISMs)[10] using funds from the state's long-established Environmental Protection Fund[11].

New York's IS managers stated that this approach had improved invasive species control while prioritizing species across all taxa groups.

Maine Invasive Species Policy Survey Results and Insights

Approximately 600 public and private IS representatives were sent a survey to help assess the current state of IS management in Maine. One hundred ninety-seven individuals responded, providing a significant but incomplete sample of Maine's current IS management efforts. Respondent affiliations were diverse and represented all areas of the state.

Respondents indicated that public knowledge, funding, and staffing were the top three impediments to effective invasive species management. Invasive terrestrial plants dominated regional species of concern; however, forest insects, invasive aquatic plants, and ticks were also listed. All but three respondents listed invasive species they were either managing now or were concerned about. The most frequently listed species included nine invasive terrestrial plants, three invasive aquatic plants, and three forest insects.

Many suggestions for improvement were offered, but the top four included: increased funding, education and outreach, agency coordination and partnerships, and increased staffing. Few respondents were aware of alternative policy models, but the most common suggestion was creating partnerships as New York has done with their Partnerships for Regional Invasive Species Management (PRISMs).

Survey respondents shared IS management staffing and budget data illustrating a total of 120 FTE in staffing and $3.2 million in IS-related annual expenses in Maine. These numbers only include some of the staff and budget numbers of every state agency currently working on IS. The survey indicated that lake associations employ the most IS management staff and have the highest collective budgets. State agencies, national parks, and land trusts placed second in the staffing category. Forestry, unknown, and land trusts documented the fewest investments in IS management.

Survey respondents suggested implementing a partnership/network/regional approach, conducting more education, and increasing and improving outreach.

Our survey reveals consistent concerns among IS representatives about funding, staffing, education, outreach, and the need for better organization and prioritization. Invasive species management requires consistent surveillance and monitoring to detect infestations early to allow the potential to eradicate new invasive species before they become well-established in the state. Once new species become established, successful management requires long-term funding, staffing, and commitment to control or slow invasive species' spread, contribute to habitat restoration, and mitigate harm.

Sustainable IS management programs must address three key pillars: environmental, social, and economic objectives. Maine's invasive aquatic plant program is currently the only IS management program that incorporates all three pillars well. The prevention (courtesy boat inspection program) and early detection (invasive plant patrol program) support the environmental pillar well. The strong coalition of lake associations, statewide non-profits, and their annual "milfoil summit" provides an excellent foundation for the social pillar. The Maine Interagency Task Force on Invasive Aquatic Plants and Nuisance Species provides a conduit to the legislature to help continuously improve state policy. The Lake and River Protection Fund sticker supports the economic pillar well, which provides close to $2 million annually. This reliable and consistent funding has enabled the eradication of invasive aquatic plants from nine separate Maine lakes and ponds. Although much more needs to be achieved, successes have bred public confidence and legislative support.

All the other IS taxa groupings lack one or more sustainability pillars. There are no other formal interagency task forces. The Maine Natural Areas Program does have a scientific advisory group that provides another example of how species might be prioritized. Still, their work should be codified in law, i.e., enacting state statutes and rules. Across taxa, risk evaluations do not occur when multiple competing agencies work within their silos. An office or agency at the Governor's Office level dedicated to IS policy might address this critical gap.

Most funding for IS management in Maine (outside the invasive aquatic plant area) is short-term, inconsistent, and unreliable. The lack of funding impacts staffing levels which hampers the ability to prevent or slow the spread of IS in Maine. It also affects the capacity to enforce the quarantines or bans currently in law. The level of trade, constant flow of visitors, and ease of movement overwhelm law enforcement officers (e.g., forest rangers, wardens, and border patrol). It also blunts the ability to intercept the flow of IS into Maine.

Suggestions to Strengthen Maine's Resilience to Invasive Species

Continuing to do what is currently done makes the State of Maine vulnerable to the increasing rate of new IS invasions. Maine must enhance sustainable, long-term funding for IS programs and ensure staffing resources are available to address existing and emerging IS challenges.

- Seek new, sustainable, dedicated funding sources such as the Lake and River Protection Sticker for other IS taxa groups.
- Add a Senior Planner position at the DACF or other IS management agency to analyze current state resources further and ensure collaboration and coordination among Maine's IS programs.
- Add an Invasive Species Advisory Council that reports to the Governor's Office.

- Add an IS management liaison position in each department that manages IS, e.g., DACF, IF&W, DEP, DHHS, MDOT, and DMR.

Conclusion

Maine should consider following in the footsteps of states such as Pennsylvania (https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/GISC/Pages/default.aspx) and Massachusetts (https://malegislature.gov/Bills/192/S563) and thoroughly analyze the current invasive species programs and approaches to determine if instituting a more comprehensive approach like that used by the states of New York, and Michigan should be implemented.

Rapid response and control activities are needed to reduce and eliminate new and existing populations of invasive species in Maine.

Cooperation and partnerships at all levels must exist to effectively prevent and manage invasive species beyond rapid response efforts. State agencies cannot fight the battle alone. Diverse and expansive partnerships with local leaders and organizations, such as businesses, industry, town managers, land trusts, environmental NGOs, Soil & Water Conservation Districts, and lake associations, are essential.

The survey respondents clearly stated that more staff and dedicated funding sources are essential. Many supported a comprehensive and collective approach among state, county, municipal, and private entities, such as the Partnerships for Regional Invasive Species Management (PRISM) model.

The survey also revealed the large number and variety of organizations working on invasive species management and the need for coordination among those groups and abutting land managers.

Background

Invasive species significantly threaten Maine's environment, economy, and communities. Maine defines invasive species as non-native species (including seeds, eggs, spores, or other propagules) whose introduction causes or is likely to cause economic harm, environmental harm, or harm to human health. Invasive species can be pathogens, arthropods, plants, mammals, fish, invertebrates, or other organisms. For centuries, invasive species have affected our forests, agricultural lands, waterways, natural areas, infrastructure, and people. Invasive species do not respect human boundaries. These non-native organisms started arriving with the first European settlers more than 400 years ago. Many of our most naturalized non-native plants, such as dandelion (*Taraxacum officinale*), common plantain (*Plantago major*), or common purslane (*Portulaca oleracea*), were introduced intentionally by early settlers as food plants. Some of these plants have become significant agricultural weeds, and others confound perfect lawn aficionados. Many recent IS introductions have been intentionally planted as ornamentals or stocked in our waters to improve angling opportunities supposedly. These species include knotweed (*Fallopia spp.*), introduced as an ornamental and honeybee forage plant[12], or largemouth bass[13] (Micropterus salmoides), stocked in Maine waters for food and sport. Both organisms were first intentionally introduced in Maine in the 1800s. Some of the most damaging forest invasive species are recent arrivals, such as emerald ash borer (*Agrilus planipennis*) in 2018 or Beech leaf disease (*Litylenchus crenatae*) in 2021. Emerald ash borer moved across the eastern United States in less than 20 years from Michigan to Maine in firewood, nursery stock, and other forest products. The movement of beech leaf disease needs to be better understood, but it moved across the U.S. from Ohio to Maine in only ten years.

Federal, state, and local efforts to exclude, survey, monitor, eradicate or slow the spread of invasive species require significant investments in human and fiscal resources (Figure 1). The most recent estimate for average annual invasive species costs nationally in the United States is between $75 and $20 billion.[14] Internationally, the 2022 Conference of the Parties to the U.N. Biodiversity Conference (COP15) in Montreal has listed five drivers of wildlife extinctions, one of which is invasive species.[15] Invasive species impact species extinction most dramatically on islands or in isolated habitats, such as alpine bogs on Mount Katahdin, coastal plains, or pine barrens.

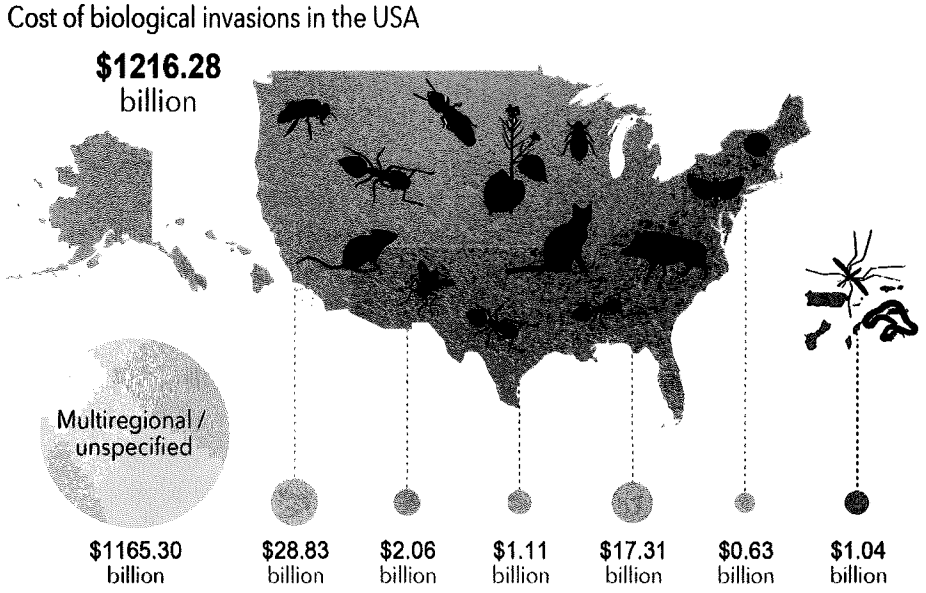


Figure 1. Total Invasive Species Cost 1960 – 2020 Fantle-Lepczyk et. al. 2021[14]

Impacts of Invasive Species

The impact of invasive species can be grouped into five overlapping categories: economic, ecological, medical, environmental, and recreational.

Economic Impact of Invasive Species

Excluding, monitoring, and managing invasive species in Maine costs millions annually. For example, the Maine Department of Agriculture, Conservation, and Forestry spends more than a million dollars annually on invasive species programs focused on invasive terrestrial plants and invasive forest pests and pathogens.[16] The Maine Department of Environmental Protection and the Maine Department of Inland Fisheries and Wildlife spend more than two million dollars on monitoring and managing invasive aquatic plants, fish, and invertebrates.[16] Invasive aquatic plants and insects such as the emerald ash borer and hemlock woolly adelgid (*Adelges tsugae*) impact water quality enough to significantly depress lakeside property values.[17] However, no accurate estimates of Maine's economic losses caused by invasive species exist. Those losses include reduced agricultural production, structural damages, lost worker productivity (e.g., Lyme disease, encephalitis diseases), and many uncalculated ecosystem services costs. Examples of lost ecosystem services that cause economic impacts are the loss of shading and windbreaks provided by ash and hemlock trees devastated by invasive insects[18] and the loss of stored carbon in trees that succumb to invasive organisms.

Ecological Impact of Invasive Species

Invasive species can exclude, outcompete, and kill native plants, degrade the habitat of native animals, and reduce the biodiversity of Maine waterways, woodlands, and other natural areas. For example, forest ecology is affected by invasive barberry (*Berberis thumbergia*). Birds spread its berries into forested areas, and the barberry plants readily sprout even in heavily shaded stands. White-tailed deer (*Odocoileus virginianus*) do not browse the barberry and eventually over-browse the native plants, severely affecting the availability of native plants which provide essential foods for birds, mammals, and beneficial insects. Within a few years, barberry covers the forest floor. If the forest is harvested or windthrown, the barberry prevents the natural regeneration of a new forest.

Medical Impact of Invasive Species

Multiple invasive arthropods are vectors for disease or cause human and animal illness in Maine. For example, the rock pool mosquito (*Aedes japonicus*) is a deadly invasive species. It is a vector of West Nile virus (WNV) and eastern equine encephalitis (EEE). Although these diseases are currently rare in humans in Maine[19], as mosquito populations increase, the number of deaths and debilitations will most likely rise. In the last few years, the browntail moth caterpillar (*Euproctis chrysorrhoea*) has wreaked havoc throughout coastal and central Maine. Its tiny poisonous hairs stick into the skin and lungs, causing severe skin rashes and respiratory injury. Since 2012, there have been between 1,000 and 2,000 human Lyme disease (*Borrelia* burgdorferi) cases in Maine.[20] The black-legged tick (*Ixodes scapularis*), which carries Lyme disease, can also vector the deadly Powassan virus, which caused two deaths in Maine in 2022. There is some debate about the native or invasive status of the black-legged tick in Maine, but regardless, the range of this tick has expanded dramatically over the last four decades.[21] Some of its success may be related to the ever-increasing populations of barberry and other thicket-forming invasive plants in southern and central Maine. Under the dense barberry cover, white-footed mice (*Peromyscus leucopus*) and black-legged ticks thrive, creating a natural incubator for Lyme disease (Figure 2). Research in Maine and Connecticut has shown much greater human Lyme disease risk in areas where barberry infestations occur. Invasive plants can also cause harm. Giant hogweed (*Heracleum* mantegazzianum) may cause severe skin burns or sight loss.

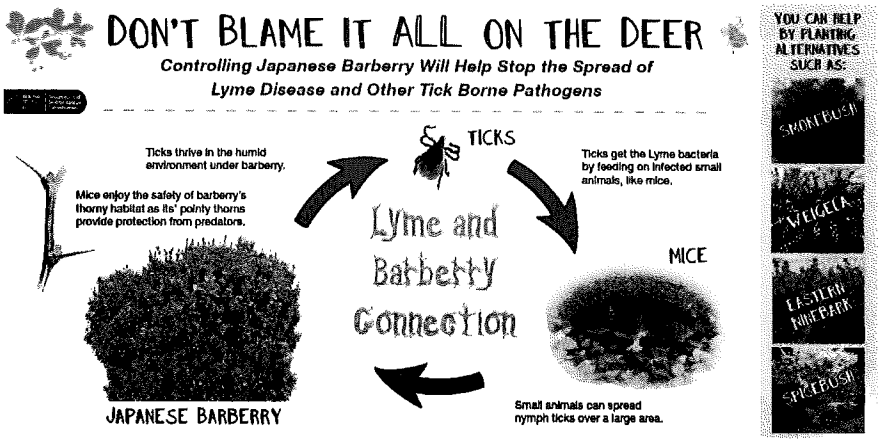


Figure 2 NY State DEC[29]

Environmental Impact of Invasive Species

Invasive species also cause environmental harm. Knotweed colonizes the banks of rivers and streams and narrows the waterways causing increased flooding risk. Green crabs (*Carcinus maenas*) reduce the populations of clams in the mudflats, which are the natural filters for the nutrient pollution that washes into Maines' bays during spring snowmelt and the increasingly heavy rain events caused by climate change. Jumping worms (*Amynthas agrestis*) destroy soil structure, and their castings are highly susceptible to compaction and erosion, causing siltation and phosphorus pollution.

Recreational Impact of Invasive Species

Direct spending on tourism-related trips by overnight visitors to Maine totaled nearly $7.6 billion, and more than 11.2 million visitors spent one or more nights in Maine in 2021.[22] Many of these visitors come to enjoy Maine's scenic coastline, lakes, mountains, and of course, the seafood. However, bittersweet (*Celastrus* orbiculatus), barberry (*Berberis thunbergia*), and multiflora rose (*Rosa multiflora*) can make trails impassible. Milfoils (*Myriophyllum spp.*) and hydrilla (*Hydrilla verticillate*) can restrict water access so that swimmers, anglers, and boaters cannot enjoy the lakes, rivers, and ponds. The fore-mentioned green crabs also compete with lobsters (*Homarus americanus*) for food and shelter. Lobster is one of Maine's most iconic foods. Finally, ticks and the diseases they vector may deter visitors from recreating in Maine's natural areas.

Example of a State with a More Comprehensive Approach

Numerous states in the United States have adopted more comprehensive approaches to invasive species management. One in particular, New York state, has been implementing the 12 recommendations of their Invasive Species Task Force since 2005.[23]

- Establish a permanent leadership structure to coordinate invasive species efforts
- Prepare and implement a comprehensive invasive species management plan
- Allocate appropriate resources for invasive species efforts
- Establish a comprehensive education and outreach effort
- Integrate databases and information clearinghouses
- Convene a regular invasive species conference
- Formalize New York State policy and practices on invasive species
- Establish a center for invasive species research
- Coordinate and streamline regulatory processes
- Encourage nonregulatory approaches to prevention
- Influence Federal actions to support invasive species prevention, eradication, and control
- Recognize and fund demonstration projects

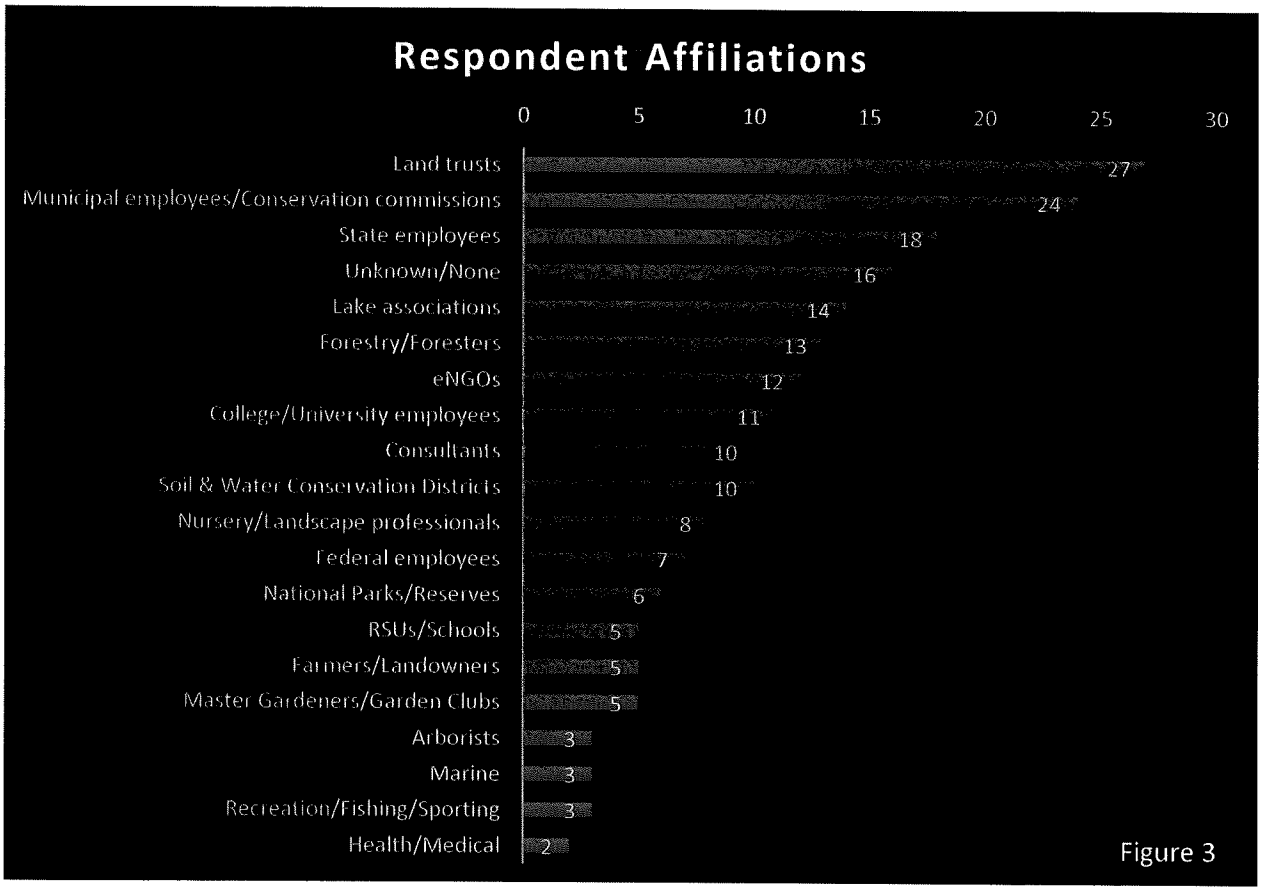
Since the Task Force report was published, New York has responded with multiple policy, planning, and management measures.[24] These include:

- Establishing an Invasive Species Council
- Establishing a Bureau of Invasive Species and Ecosystem Health
- Establishing an Invasive Species Advisory Committee
- Adding multiple laws and regulations under the Departments of Agriculture and Markets, Environmental Conservation, Soil and Water Conservation, and Health
- Founding the New York Invasive Species Research Institute at Cornell University
- Consolidating all invasive species reporting information on the iMapInvasives mapping and database platform
- Contracting with eight private-public grassroots Partnerships for Regional Invasive Species Management (PRISMs) using funds from the state's long-established Environmental Protection Fund

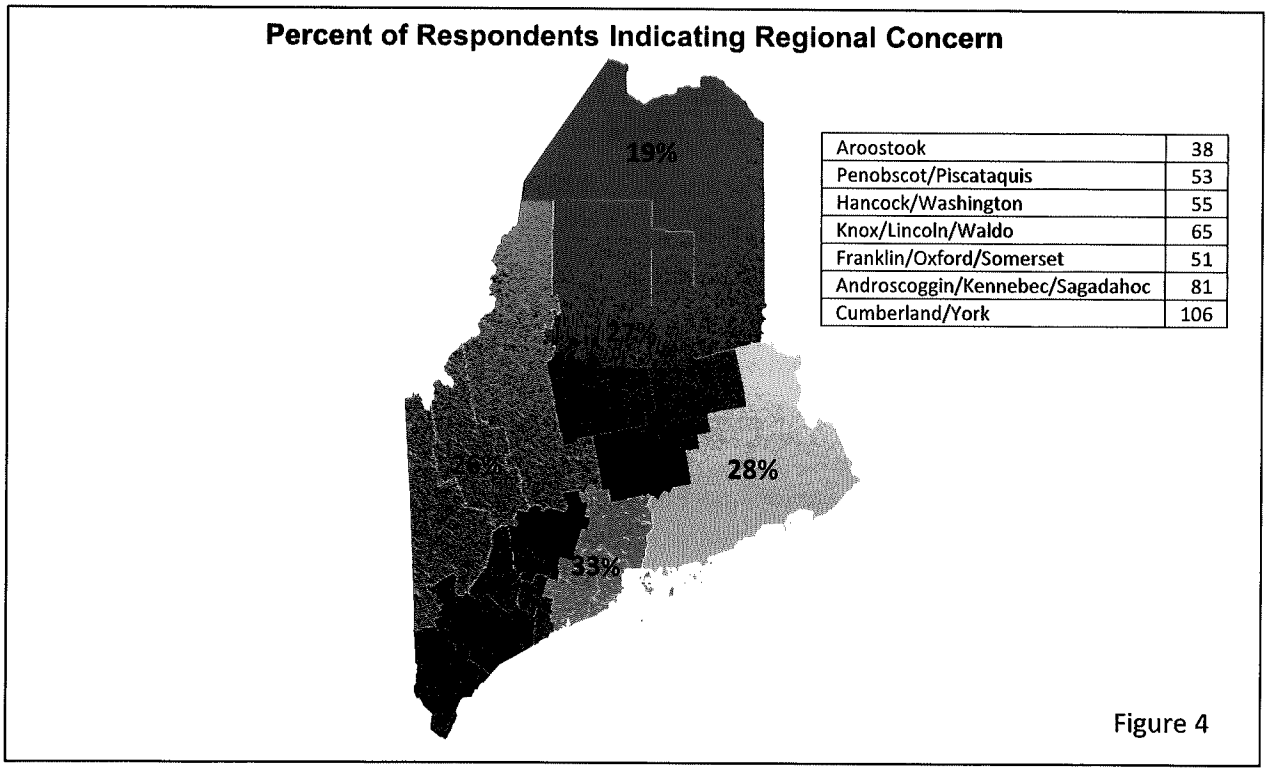
Personal correspondence with the Director of the Division of Plant Industry in the New York Department of Agriculture and Markets, the Director of the Division of Invasive Species and Ecosystem Health in the New York Department of Environmental Conservation, and the Director of the New York Invasive Species Research Institute indicates that New York state's more comprehensive approach has improved results on the ground as well as funding management efforts that target the highest priority species from all taxa.

Maine Invasive Species Policy Survey

Currently, the state of invasive species management in Maine is siloed, with little interagency or organizational coordination or prioritization. We created a survey to assess the current situation and sent it to approximately 600 recipients (Appendix 1). Recipients included representatives from state, federal, non-profit, and private organizations that are known actors in the invasive species community in Maine. We also posted the survey on the Maine Invasive Species Network listserv.[28] A total of 197 respondents provided a significant but incomplete sample of the current management efforts in Maine. Respondents represented all potential affiliations involved in invasive species management (Figure 3). These respondents indicated they were concerned about all regions in Maine (Figure 4). The most significant concern was predictably for the most developed areas, with more than half expressing concern about Cumberland and York Counties (53%) and 18% expressing minor concern for Aroostook County (Figure 4). Additionally, respondents listed management of or concerns about species in all the major taxa groups in terrestrial, freshwater, and marine environments.



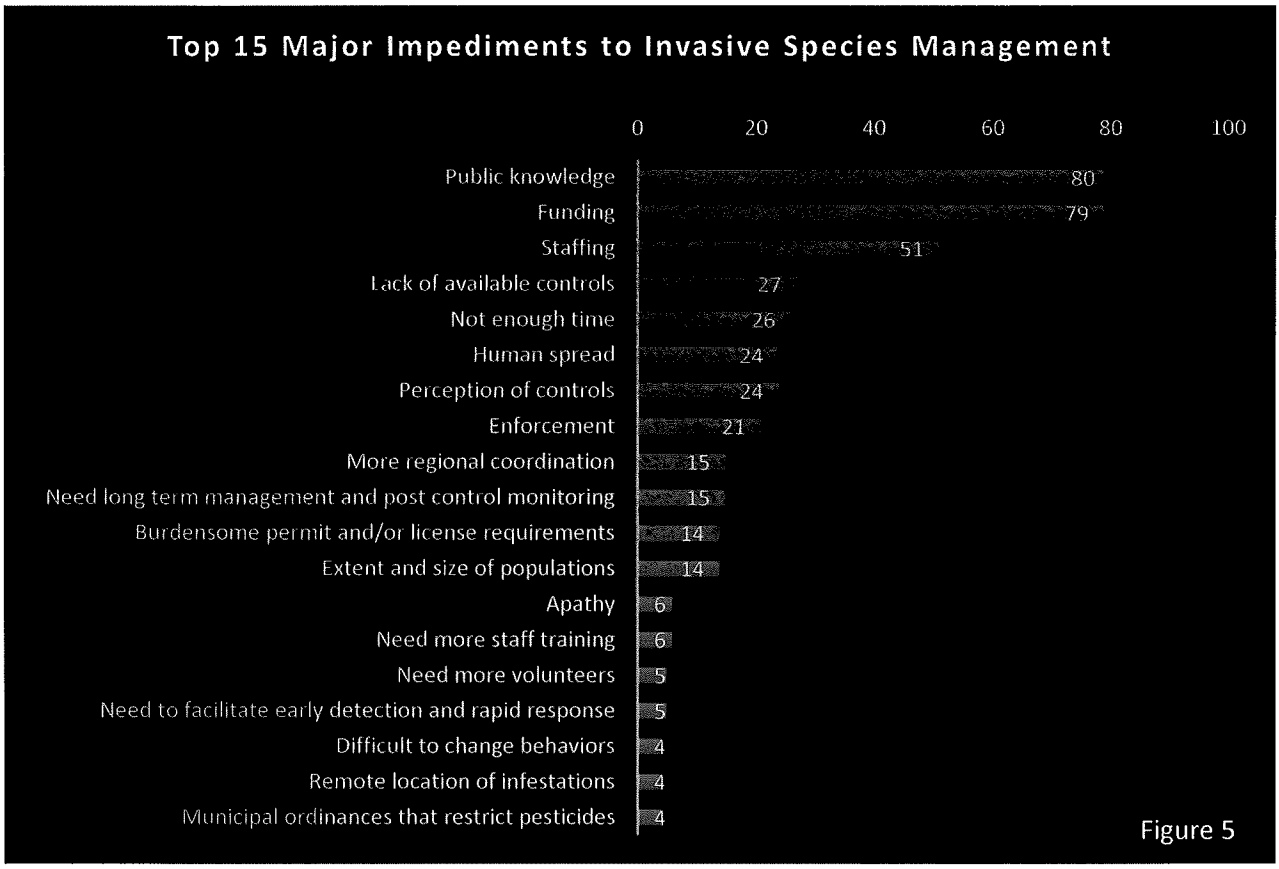
Respondent affiliations self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)



Percent of respondents indicating regional concern self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)

Respondents indicated that the most significant impediments to effective invasive species management are a lack of public knowledge, the need for more funding and staffing, and a lack of available controls (Figure 5). The second tier of impediments included human spread, negative perceptions about pesticides

and biological controls, lack of enforcement, and insufficient time to complete the work (Figure 5). The third tier of challenges expressed included a need for regional coordination, long-term management and follow-up, burdensome license and permit requirements, and large populations of invasive species (Figure 5).

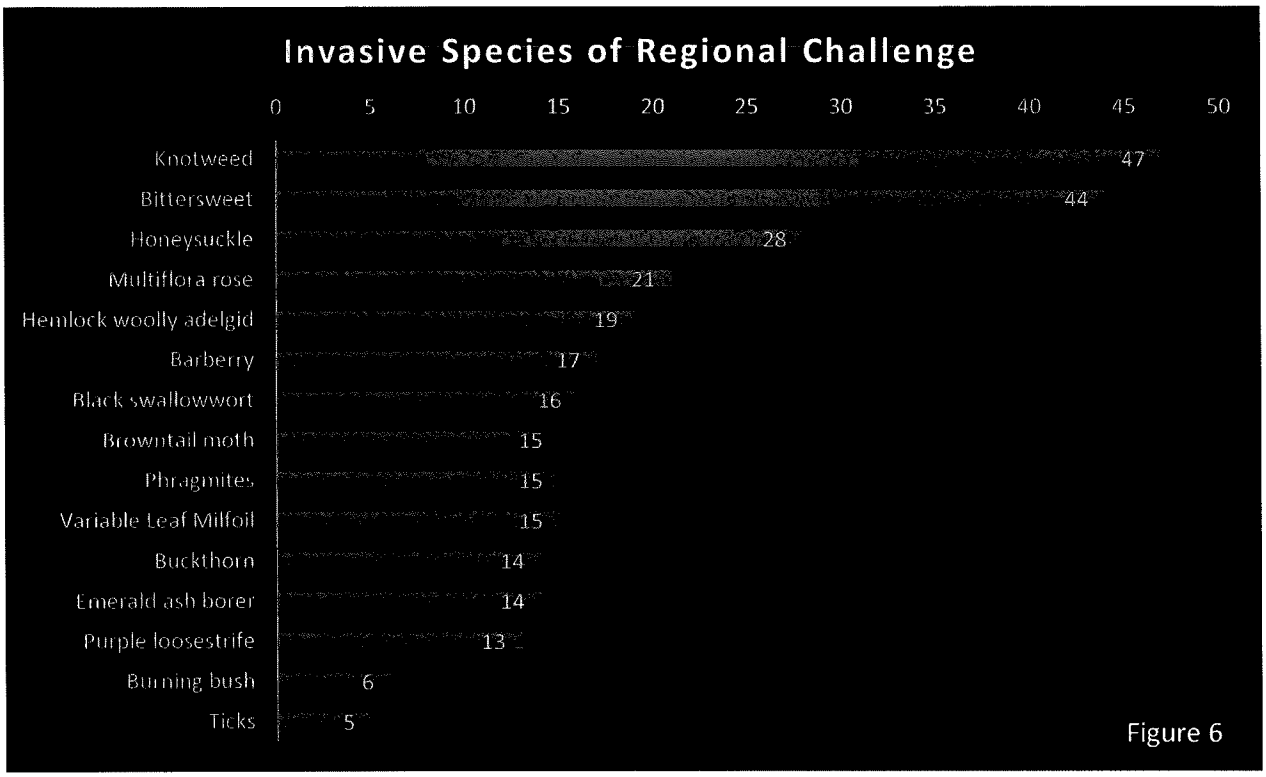


15 major impediments to IS management self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)

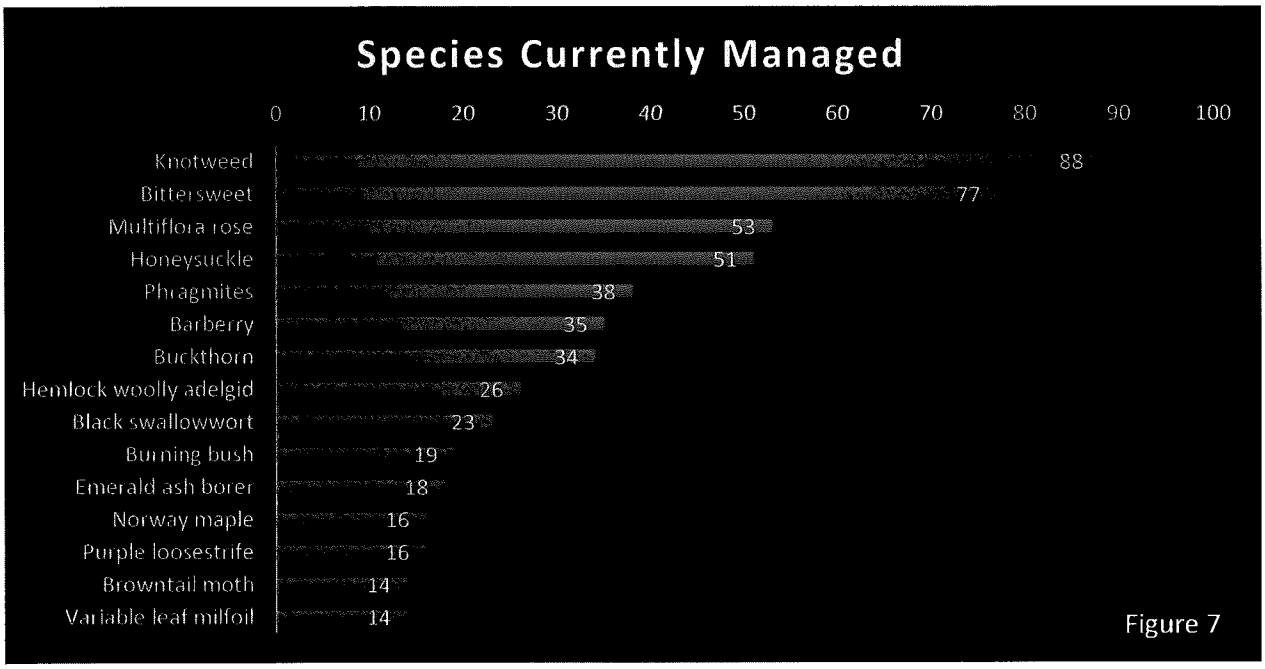
Respondents listed 61 species as a specific challenge in their respective Maine regions (Figure 6). They also listed ticks, people, fish, tree species, terrestrial plants, and deer as additional concerns (Figure 6). Other challenges included climate change, human movement, plant sales, municipal ordinances, large populations, abutters, remote locations, and the inability to perform early detection and rapid response (Figure 6). This expansive list demonstrates the depth and breadth of regional concerns. It may be surprising to many that more than 60 individual invasive species pose a management challenge in Maine. Concurrently, the top 15 challenging species include plants, insects, ticks, and mammals; finfish, worms, tunicates, and shellfish fill out the rest of the list.

The species respondents listed as currently under management or most concerned with (Figure 7) are predictably similar to the regional concern listing (Figure 6). The only difference is that ticks are on the regional concern list, and Norway maple (*Acer platanoides*) is on the currently managed list.

Terrestrial invasive plants seem to be the most significant management concern among the respondents (Figure 7); however, current funding levels do not reflect this as a priority. Currently, the state level of funding and staffing for terrestrial invasive plant management is significantly less than aquatic invasive plant management, a difference of approximately 1.5 million dollars.[16] This disproportionate funding may indicate a policy weakness that policymakers should address. The lesser investments in marine and freshwater organisms and terrestrial mammals may not accurately depict the overall concern for these taxa.

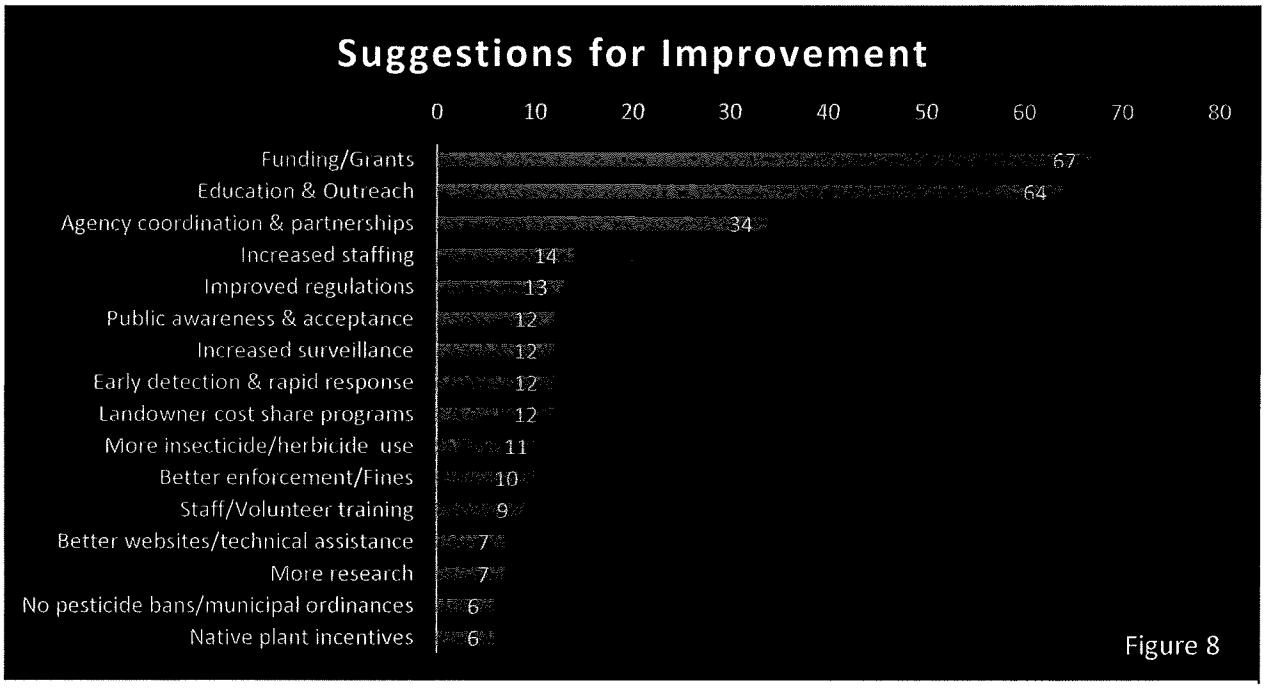


Invasive species of regional challenge self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)



Invasive species currently managed self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)

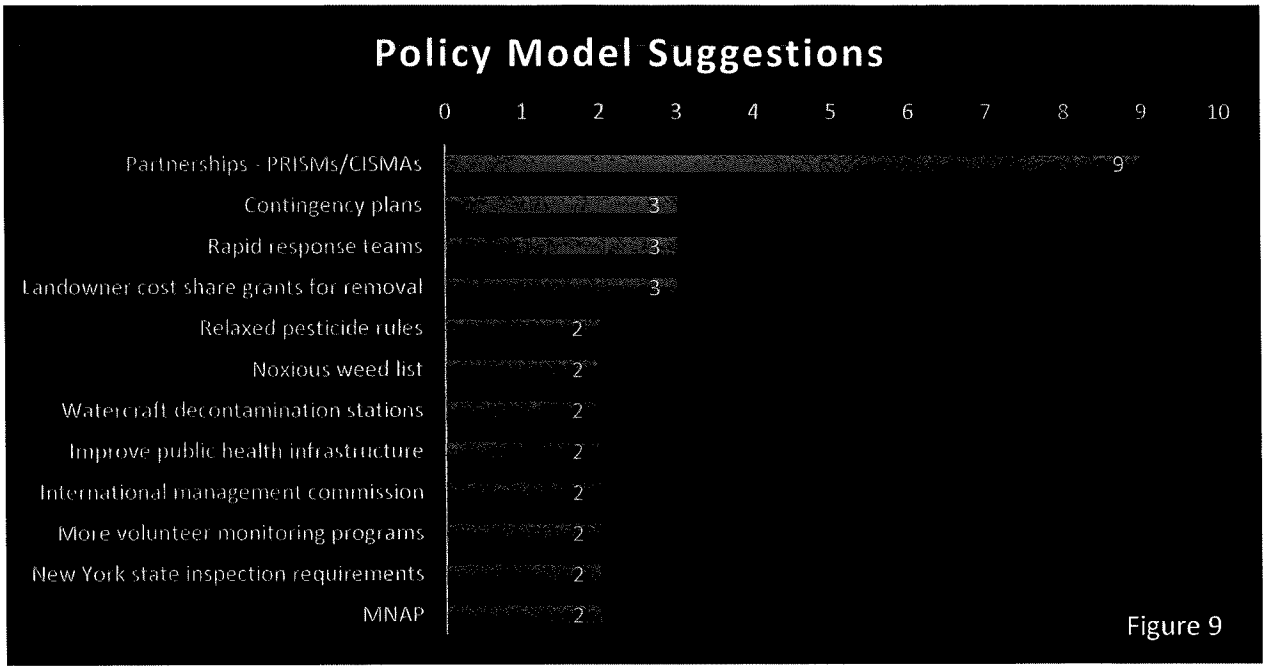
Respondents made 46 suggestions for improving invasive species management for all taxa in Maine (Figure 8). The top three are increased funding and grants, more and improved education and outreach, encouraging agency cooperation, and the development of partnerships (Figure 8). The next tier includes increased staffing, improved public awareness and acceptance, increased surveillance, improved early detection and rapid response, improved regulations, more pesticide use, and better enforcement or fines (Figure 8). Lastly, they listed landowner cost-share programs, staff or volunteer training, better websites and technical assistance, more research, no pesticide bans or municipal ordinances, and native plant incentives (Figure 8). Predictably the suggestions for improvement are solutions to the impediments cataloged above.



Suggestions for improving IS management self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)

Respondents suggested 30 different policy models that Maine might want to emulate to help improve invasive species management (Figure 9), including 12 suggestions recommended by more than one respondent (Figure 9). These models included: partnerships for invasive species management (PRISM), contingency plans, rapid response teams, landowner cost-share grants for removal, relaxed pesticide rules for invasive species management, noxious weed lists, watercraft decontamination stations, improving public health infrastructure, an international management commission, more volunteer programs, and New York state inspection requirements. (Figure 9).

Several states have instituted the partnerships model with some success. New York[25], Michigan[26]. and Florida[27] all have regional partnerships funded through a central invasive species advisory council or similar mechanism. The partnership approach has significantly benefited Maine's invasive aquatic plant management program. Funds from the Preserve Maine Waters stickers ($15.00 for residents and $35.00 for boats registered outside of Maine) are distributed to multiple lake associations and other groups to support training and recruiting volunteer lake monitors, courtesy boat inspectors, and implementing invasive plant management. In this way, a small team of state staff leverages the efforts of a large and geographically diverse network of volunteers and seasonal staff.



Policy model suggestions self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)

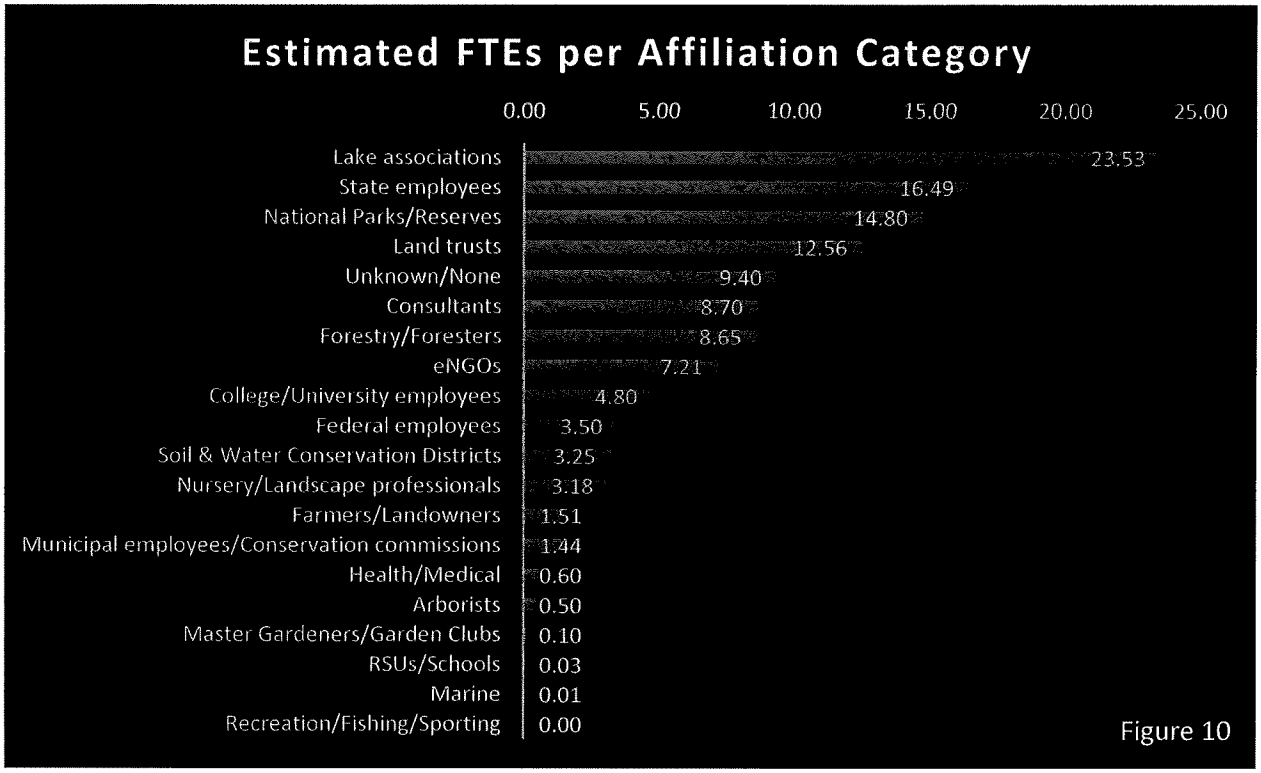
More than half of the respondents reported that they have staff or volunteers that work on managing invasive species. The total number of FTEs (Full-time equivalent personnel – 1 FTE = 2000 hours) was 120.24, with an overall average of 0.61 FTE among all respondents. The total of all respondent budgets was more than $3 million, and the overall average for respondent budgets was about $19,000. Unfortunately, there is little coordination among these groups with staff and volunteers, and the money spent may not be focused on managing the species of most significant concern.

*Table 1. **Full-time equivalent personnel (FTE) and budget for invasive species management reported by respondents in the Maine Invasive Species Policy Survey (N = 197 respondents).***

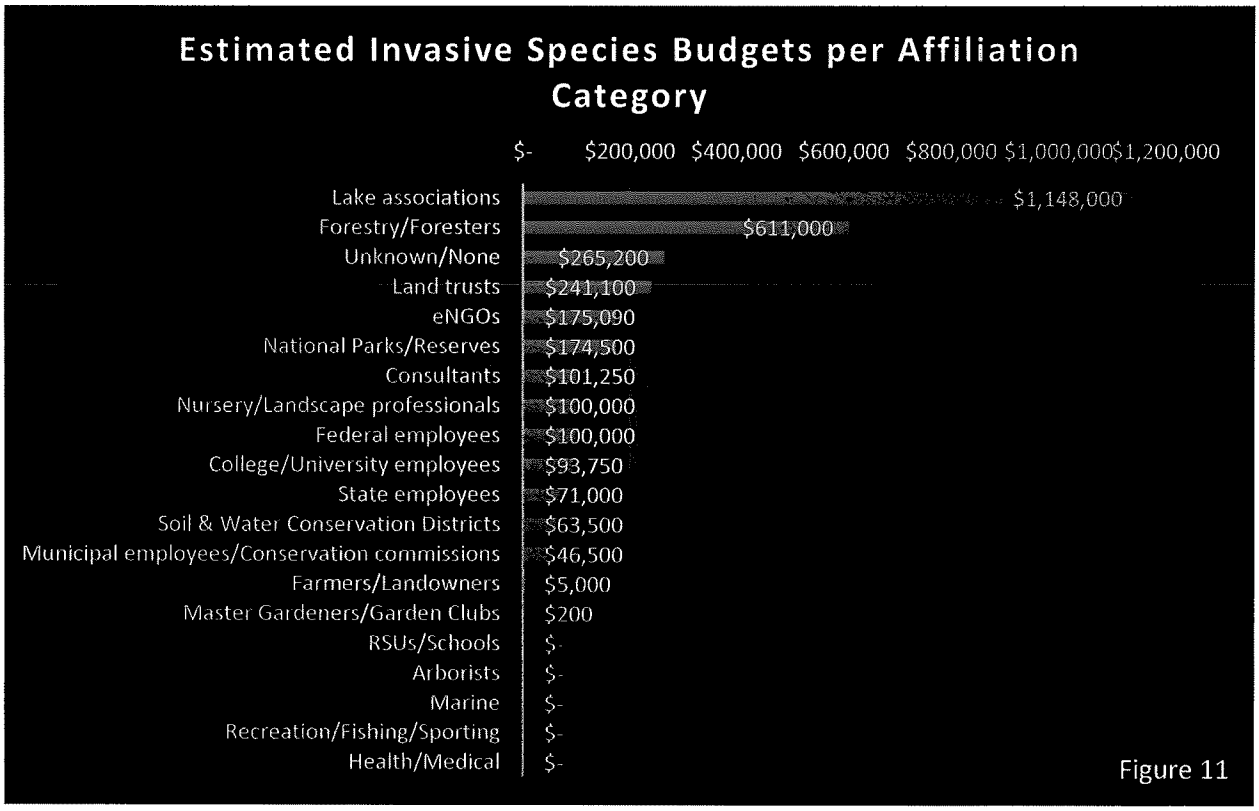
	FTE Personnel	**Hours (1FTE = 2,000 hours)**	**Budget**
Total	120.24	240,480	$ 3,196,090.00
Average	0.61	1,220	$ 16,223.00

Analyzing FTEs and budgets by affiliation category (Figures 10 & 11) demonstrates the haphazardness of the funding and staffing across different taxa groups and management sectors. It also illustrates that lake associations are the best-funded and staffed sector. The lake association budget total is almost double the next category (forestry/foresters), and their FTEs are 50% higher than the next category (state employees) (Figures 10 & 11). The funding estimates for state invasive species management programs are incomplete and likely similar to or greater than the lake association budgets. The FTE estimates may also be low for overall state efforts.

Forestry/Foresters, National Parks/Reserves, Land trusts, Environmental non-profit organizations (eNGOs), consultants, and Colleges/Universities also have significant staff and budget resources. These resources span the entire state; thus, partnerships or regional coordination might improve the efficacy of the collective efforts.



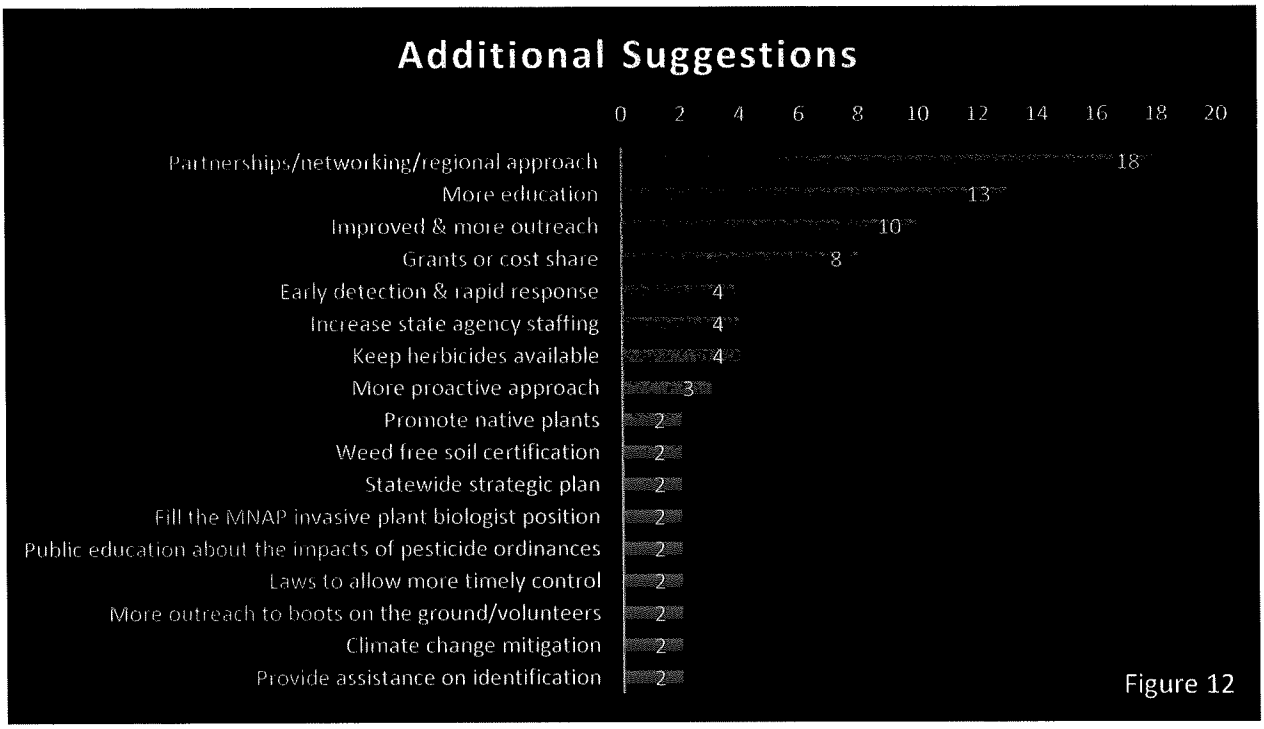
Estimated FTEs per affiliation category self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)



Estimated IS budgets per affiliation category self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)

Most respondents added at least one additional suggestion (Figure 12). The respondents repeated seventeen suggestions at least once (Figure 12). The top four were repeated more than eight times, including partnerships/networking/regional approaches, improved and increased outreach, more education, and grants or cost-share programs (Figure 12). The next tier included increased state agency staffing, early detection, and rapid response, ensuring herbicides are available, and a more proactive

approach (Figure 12). There were nine suggestions with two answers: promote native plants, weed-free soil certification, statewide strategic plan, filling the invasive plant biologist position at the Maine Natural Areas Program, public education about the impacts of municipal pesticide ordinances, laws to allow for more timely control of invasive species, more outreach to boots on the ground and volunteers, climate change mitigation, and providing invasive species identification assistance (Figure 12). Because partnerships/networking/regional approach was the top additional suggestion, it indicates support for that approach.



Additional suggestions self-reported to the Maine Invasive Species Policy Survey (N = 197 respondents)

Survey Conclusions

The Maine Invasive Species Policy Survey is consistent with the findings of a 2011 article in the Journal of Environmental Management by Diane Larson et al. (2011).[30] In that article, written more than ten years ago; the authors wrote, "Our ability to effectively manage invasions is limited by the efficacy of available management tools and economic and political constraints. Resource managers with limited funds and labor must often react to immediate threats, with few resources remaining for developing and implementing comprehensive long-term management plans. Funding for current invasive species management is clearly insufficient, but given that invasion rates are expected to accelerate, it is increasingly important that we ask the question: is effective invasive species management sustainable?"[30]

Our survey reveals consistent concerns about funding, staffing, education, outreach, and the need for better organization and prioritization. Invasive species management requires constant surveillance and monitoring to detect infestations early to allow for the potential to eradicate new invasives before they become well-established in the state. Once new species become established, successful management requires long-term funding, staffing, and commitment to control or slow the spread of invasive species and support habitat restoration efforts.

Case Study: Successful Management of Maine's Invasive Aquatic Plants

As highlighted in the paper by Larson et al. (2011),[30] sustainable invasive species management programs must address three key pillars: environmental, social, and economic objectives. The exclusion of any pillar causes management efforts to suffer and become unsustainable.[30] One success story is the management efforts for Maine's invasive aquatic plants. These efforts address all three pillars (Figure 13),

have developed the most robust network of partnerships, and have demonstrated the most consistent results in eradication and reduced spread. Maine is one of few eastern states with a low percentage of waters with known invasive species infestation. The map below (Figure 14) demonstrates how few lakes in Maine are infested with Eurasian water milfoil (*Myriophyllum* spicatum) compared to the surrounding states. This lack of infestation is not just a coincidence.

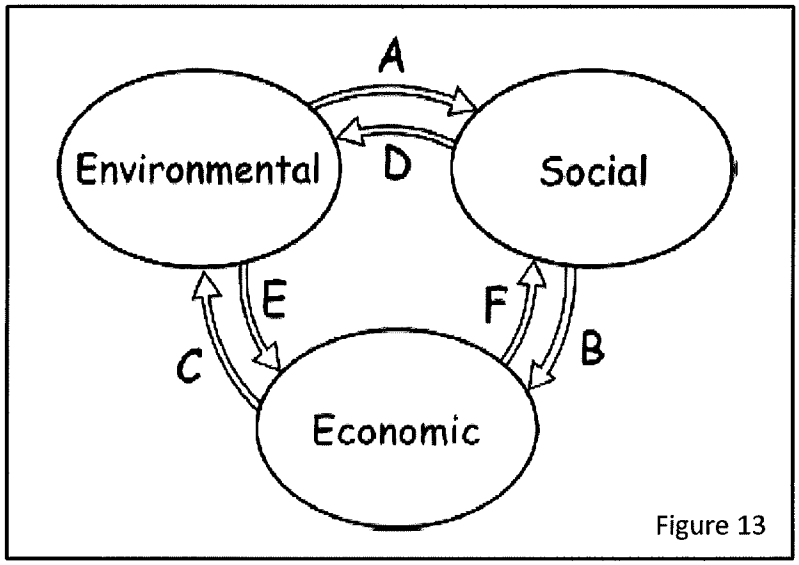


Figure 13

The three pillars of sustainable invasive species management[30]

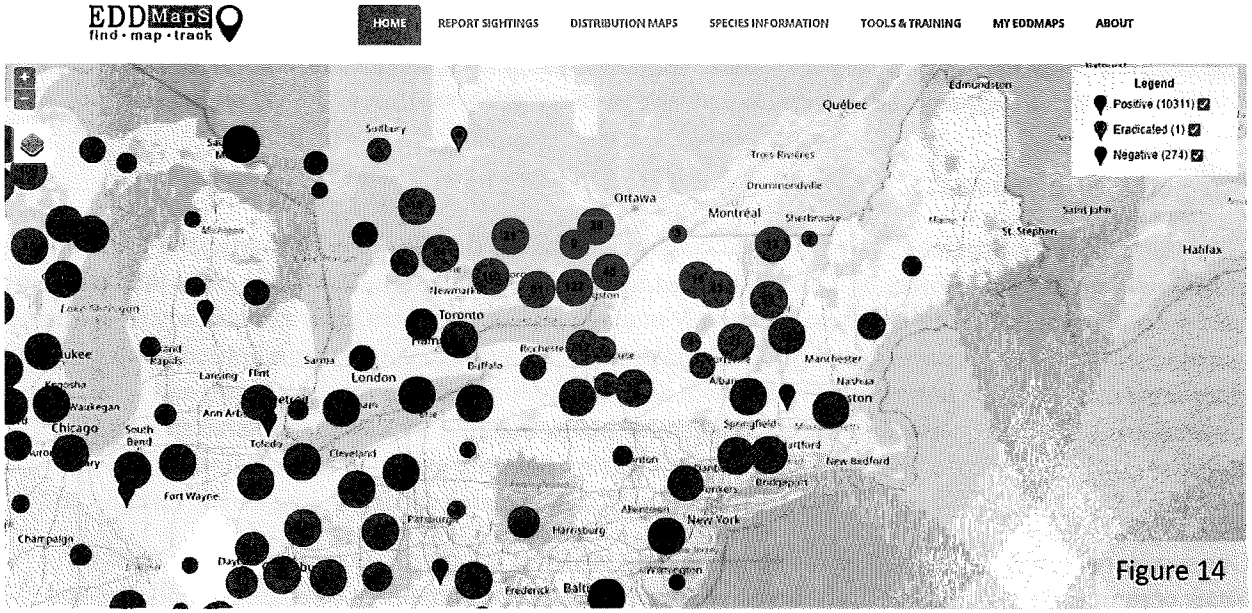


Figure 14

Positive reported sightings of Eurasian water milfoil – December 2022

There has been a strong volunteer lake monitoring program (VLMP) in Maine since 1971.[31] The VLMP program was established by the Legislature and initially housed at the University of Maine. Subsequently, it moved to the Maine Department of Environmental Protection (DEP) until 1996. Because of state budget shortfalls, VLMP became a freestanding non-profit organization. In 2003 the VLMP Center for Invasive Aquatic Plants was established to support Maine's Invasive Aquatic Species Action Plan. This approach has endured and remained successful because it continually addresses the three pillars of a sustainable framework.

Environmental Pillar: Monitoring

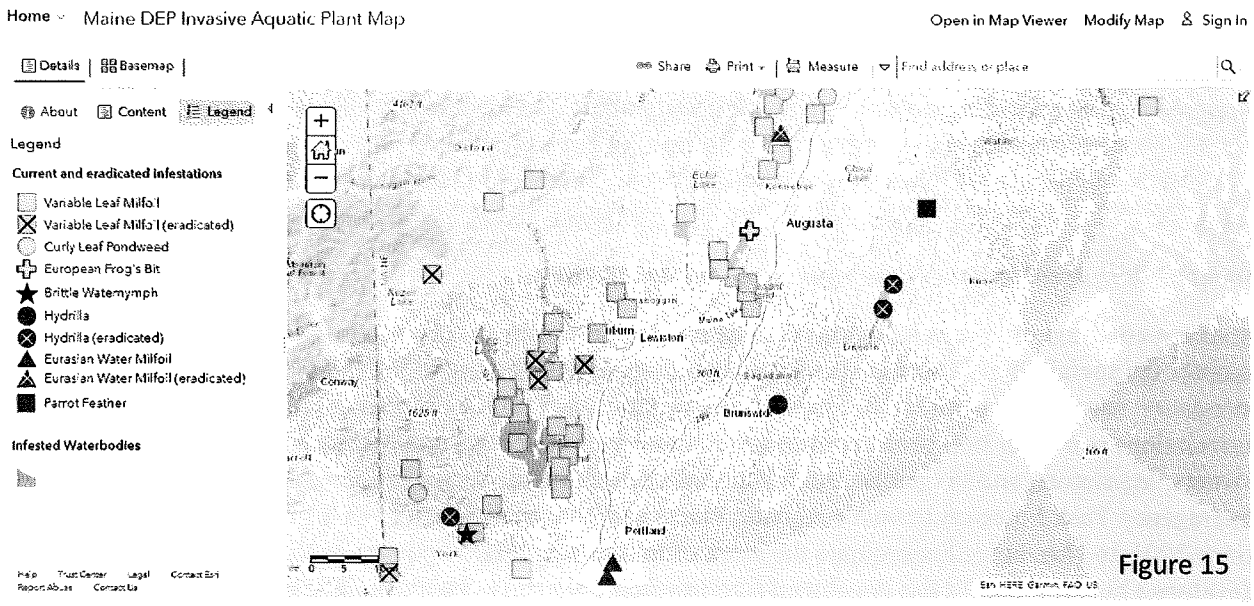
The environmental pillar is supported by a robust monitoring presence with well-trained volunteers on most of Maine's lakes who survey susceptible waters annually and report findings to the Maine DEP. Many also train and stand-up courtesy boat inspectors at boat ramps to prevent infested boats and equipment from spreading invasive plants or invertebrates into un-infested waters and to stop invasive plant fragments or other viable organisms from leaving already-infested lakes. Finally, in the event of a new discovery, Maine DEP has a rapid response fund available to quickly eradicate any new invasive plant.

Social Pillar: Associations, Non-profits, and Annual Meetings

A strong coalition of lake associations and statewide non-profits that help support those associations support the social pillar. There is also a longstanding annual meeting to provide updates on lake and pond infestation statuses, new research, funding opportunities, and policy objectives. The many lake associations and other non-profit entities offer continuous education and outreach to waterfront property owners, legislators, and the public. An additional strength in this sector is a long-established Maine Interagency Task Force on Invasive Aquatic Plants and Nuisance Species.[32] This task force has existed since 2001 and has helped coordinate the work of multiple agencies and non-profits to address priorities developed by the group. It has developed a comprehensive state invasive aquatic plants and nuisance species management plan. Finally, the Task Force must build and maintain regional contacts and cooperation. The group reports annually to the Departments of Inland Fisheries and Wildlife (IF&W), the Department of Marine Resources (DMR), and the Legislature. This feedback loop helps to maintain the policy recommendation and implementation process moving.

Economic Pillar: Consistent and Reliable Funding

The invasive aquatic plant and nuisance species programs have been well-defended in legislative hearings by demonstrating how infestations impact Maine's tourism industry, lakefront property values[17], and the overall reputation of Maine as a clean and refreshing place to work, live and recreate. This strong advocacy has resulted in a consistent and reliable funding source. The initially coined milfoil sticker has endured the test of time. Anyone registering a powered watercraft in Maine or launching a powered watercraft on Maine inland waters must pay for a Lake and River Protection Fund sticker ($45.00 non-resident and $15.00 resident fee). This sticker must be affixed to their watercraft. The fee currently generates 1.85 million dollars annually, of which 80% is disbursed to Maine DEP, and 20% is disbursed to Maine IF&W.[16] Each agency provides funding to local and regional organizations with staffing and volunteers to address local aquatic invasive species concerns. The agencies also have internal programs to provide herbicide applications for invasive plant control or piscicide (fish-specific pesticides) applications to reclaim ponds infested with invasive fish species. Finally, reliable and consistent funding has provided enough money to illustrate positive results to the public. To date, Maine DEP has eradicated nine invasive aquatic plant infestations from Maine lakes during the last 20 years (Figure 15).[33]



Maine DEP invasive aquatic plant status map – December 2022[33]

A Need for the Three Pillars: Other Taxa Lacking Organization

Unfortunately, groups managing other invasive taxa in Maine have yet to be able to take a similar approach to invasive species management. There is no interagency task force or similar policy group to help develop management plans or to determine which species may be environmental, social, or economic priorities. Funding needs to be more consistent and reliable. There also is a lack of regional coordination and few, if any, regional partnerships.

The lack of a central task force or a similar stakeholder group leaves disparate agencies in competition for limited funding and staffing. A structure is needed to help these agencies develop priority listings of species. Currently, invasive forest insects such as browntail moth, hemlock woolly adelgid, and emerald ash borer are receiving adequate attention, with multiple staff assigned to help slow the spread of these high-impact species. In contrast, little or no attention is provided to species such as stiltgrass (*Microstegium* vimineum) or green crabs.

The Maine Natural Areas Program has an informal Terrestrial Invasive Plant Scientific Advisory Committee, which has developed an Advisory List of Invasive Plants that the Department of Agriculture, Conservations and Forestry Commissioner endorsed. This committee is a positive example of an approach the Legislature could codify in law.

There is a need for a more comprehensive assessment of where the state should be expending its resources and which species could create the most significant impacts environmentally, socially, or economically. Risk evaluations that prioritize and compare invasive species across taxa do not generally happen when multiple competing agencies work within their silos. An office, agency, or committee attached to the Governor's Office level might address this gap.

Funding for most invasive species management programs in Maine occurs through competitive grants or cooperative agreements from the United States Department of Agriculture (USDA), the United States Department of the Interior (DOI), the United States Department of Commerce (DOC), or the Environmental Protection Agency (EPA). Funding of a limited number of state agency personnel that work on invasive species management occurs through the state general fund or other special revenues. Yet, most of the personnel that provides active control on the ground are seasonal positions funded by soft money.

As the survey indicates, most non-profit organizations fund invasive species management with grants from state agencies, private and non-profit companies, and individual contributions from their membership or the general public.

The funding could be more long-term, consistent, and reliable in both cases. Effective and efficient invasive species management requires reliable and long-term financing. Many survey respondents mentioned their frustration with this issue and provided examples of management efforts that failed because of the lack of sustained effort.

Both Maine DEP and Maine IF&W have rapid response plans in place for invasive aquatic plants[34] and other aquatic nuisance species.[35] The aforementioned formal planning has yet to be implemented at the state level for terrestrial or marine invasive species. Maine DEP also annually sets aside some of its dedicated funding for rapid response situations. In 2010 The Gulf of Maine Council on the Marine Environment published the Marine Invasive Species - State of the Gulf of Maine Report.[36] Yet, there remains a need for more information on invasive terrestrial plants, forest insects and diseases, earthworms, ticks, mosquitoes, mammals, and birds. Also, funds need to be budgeted and appropriated for rapid response to new infestations of invasive species of these terrestrial organisms by other state agencies.

The survey also revealed a significant deficit in knowledge regarding the identification and impacts of invasive species and the need for additional and more effective outreach to multiple audiences. Many disparate education and outreach efforts exist at the state, local and non-profit levels. Still, there needs to be more coordination amongst state agencies and regional organizations to help reach the essential audiences efficiently and effectively. Some national campaigns funded through USDA, DOI, and DOC, such as Don't Move Firewood[37], Clean-Drain-Dry[38], and Play-Clean-Go,[39] are promoted in Maine; however, to make this type of promotional outreach as impactful as needed requires additional and better-trained staffing.

The effective enforcement of laws and rules is part of the social pillar of sustainable invasive species management. The survey revealed concerns about the effectiveness and the need for more enforcement of the current rules and laws. A need for improved regulations and better enforcement appeared at the top of the suggestions for improvements (Figure 8) and in the major impediments list (Figure 5). Most enforcement of invasive species law is the responsibility of the state Forest Rangers and Game Wardens. Both groups need help coping with their collective duties, which include providing fire protection and protecting wildlife from illegal harvest. Preventing the international importation of new invasive species is the jurisdiction of the federal Department of Homeland Security - Customs and Border Patrol. Their agricultural compliance personnel are well trained but equally overwhelmed by the number of imports entering our ports and border crossings. Regarding importation from other states, no agency personnel routinely inspect vehicles or shipments crossing the New Hampshire border.

Signs warn of the illegality of bringing firewood to Maine from outside the state or introducing invasive aquatic plants, but signs alone are only a modest deterrent. The Department of Agriculture, Conservation and Forestry has promulgated rules that quarantine specific invasive forest insects and diseases or ban the sale of invasive terrestrial plants and has inspection and compliance agreement processes to implement these rules. [40] Still, those mechanisms only work well when businesses are highly cooperative.

Options to Strengthen Maine's Resilience to Invasive Species

Do Nothing

One must always consider doing nothing as a possible option and doing nothing more leaves Maine vulnerable to the increasing rate of new IS invasions. According to the survey respondents, this option is implausible since the number of new species affecting Maine's environment continues to rise. The ability to stem the tide of tree species loss, fisheries impacts, or soil and water degradation should be more robust.

Seek More Reliable and Additional Funding for Underfunded Programs

Currently, only the freshwater invasive aquatic species programs are reliably and well-funded by the Lake and River Protection Stickers. Boaters must display these stickers on all motorized watercraft used on Maine's inland waters. The many invasive species management efforts carried out by the Departments of Agriculture, Conservation and Forestry, Health and Human Services, and Marine Resources could seek similar funding mechanisms through the legislative process. This funding could also provide additional staff to pursue federal or private foundation support to improve their current invasive species programs.

Do a Deeper Analysis that Allows for a More Comprehensive Approach Similar to New York State

During the next legislative session, we recommend support for a Senior Planner position to be included in the Department of Agriculture, Conservation, and Forestry budget. The position would be a two-year project position attached to the Plant Health programs. The Senior Planner would be assigned the task of researching effective strategies for invasive species management, analyzing other states, federal or non-profit approaches, and the efficacy of those approaches. It would work with the DACF Director of Policy & Community Engagement to develop a departmental bill to introduce into the second session of the 131st Maine Legislature that addresses the policy weaknesses uncovered by the survey conducted for this paper and any additional research findings.

Recommended research areas:

- How to build partnerships and capacity
- How other states fund multi-taxa IS management programs
- Gathering more data on how Maine can fund multi-taxa IS management programs
- Need for a centralized framework for sharing invasive species information
- How to set priorities for invasive species management and advanced preparedness
- Improving ways to engage and inform the public
- Improve invasive species prevention and early detection
- Improve rapid response to invasive species
- Improving the ability to restore ecosystem integrity and resilience
- How to evaluate success

Questions to consider as a basis for the development of a legislative document:

- Should Maine establish an Invasive Species Advisory Council (ISAC) to help develop IS management policy, set priorities, and make funding decisions?
- Should a Statewide Coordinator and additional staff be provided to the council as funding allows?
- Should Maine establish a Comprehensive Invasive Species Management Office (CISMO)?
- Should the CISMO be attached to the Governor's Office or a Departmental agency?
- Should Maine encourage the development of regional invasive species management partnerships (RISMPs) or areas managed by public/private partnerships, including municipalities, NGOs, Soil and Water Conservation Districts, and other organizations?
- Should Maine conduct a statewide invasive species assessment to provide a complete picture of existing IS management plans, identify gaps where legislation is needed, suggest priority issues, identify areas of overlap or redundancy, enable financial supporters of invasive species projects to

allocate funding to the highest priority areas for managing invasive species and fill gaps in staffing, and define roles and responsibilities for IS management entities.

- Should Maine establish an Invasive Species Trust Fund to support:
    - the ISAC;
    - the Statewide Coordinator and staff salaries, office equipment, space, and other expenses;
    - development of a Statewide Strategic Invasive Species Plan;
    - research and pilot projects; and
    - grants to RISMPs or other organizations?

Conclusion

Maine should consider following in the footsteps of Pennsylvania[41] and Massachusetts[42] and thoroughly analyze the current invasive species programs and approaches and determine if instituting a more comprehensive system like that used by the states of New York and Michigan can be implemented effectively in a smaller state like Maine. Most survey respondents agreed there should be a comprehensive approach to addressing invasive species with dedicated resources and continued research. The survey also indicated that there is no uniform approach to address invasives, and the state's efforts to control terrestrial invasives are slow and reactionary. Therefore, rapid response and control activities are needed to reduce and eliminate new and existing populations of invasive species in Maine.

Cooperation and partnerships at all levels must exist to prevent and manage invasive species beyond rapid response efforts. State agencies cannot successfully manage invasive species alone. Diverse and expansive partnerships with local leaders are needed.

The survey respondents clearly stated that more staff and dedicated funding sources are essential. Many supported a comprehensive and collective approach among state, county, municipal, and private entities, such as the Partnerships for Regional Invasive Species Management (PRISM) model. This public-private partnership model is currently being used in New York state and has a proven track record for helping prevent and minimize the harm caused by invasive species. The PRISM model provides early detection and rapid response, stakeholder education, volunteer recruitment and training, and prevention programs. The survey also revealed the large number and variety of organizations working on invasive species management and the need for coordination between those groups and abutting land managers.

In the next decade, Maine can act to be more effective and efficient at preventing and managing invasive species. I hope this capstone project becomes a spark that helps ignite the fire.

Many thanks to all the reviewers that helped improve this paper.

Patty Cormier, Lisa DeBruyckere, Molly Docherty, Judith East, Lisa St. Hillaire, Colin Holme, Kathy Hoppe, Rebecca Jacobs, Allison Kanoti, Yuseung Kim, Elizabeth Listowich, Nancy McBrady, John McPhedran, Nancy Olmstead, and Hillary Peterson.

References:

1. https://nyis.info/new-york-state-invasive-species-council/
2. https://www.dec.ny.gov/animals/265.html
3. https://www.dec.ny.gov/animals/6989.html#:~:text=The%20Invasive%20Species%20Advisory%20Committee,to%20the%20Invasive%20Species%20Council.
4. https://agriculture.ny.gov/soil-and-water/soil-water-conservation-committee
5. https://agriculture.ny.gov/
6. https://www.dec.ny.gov/index.html
7. https://www.health.ny.gov/
8. http://www.nyisri.org/
9. https://www.imapinvasives.org/
10. https://nyis.info/prisms/
11. https://www.dec.ny.gov/about/92815.html
12. https://www.in.gov/dnr/files/Japanese_Knotweed.pdf
13. https://www.maine.gov/ifw/fish-wildlife/fisheries/species-information/largemouth-bass.html
14. https://www.sciencedirect.com/science/article/pii/S0048969721063968
15. https://www.unep.org/news-and-stories/story/5-key-drivers-nature-crisis
16. Personal conversations with program leaders
17. https://www.maine.gov/dep/water/invasives/costs.html
18. https://ehjournal.biomedcentral.com/articles/10.1186/s12940-016-0103-6/
19. https://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/arboviral-surveillance-arch.shtml
20. https://legislature.maine.gov/doc/8753
21. https://www.cabidigitallibrary.org/doi/book/10.1079/9781789249637.0000
22. https://motpartners.com/wp-content/uploads/2022/04/2021MaineTourismHighlights.pdf
23. https://www.dec.ny.gov/docs/wildlife_pdf/istfreport1105.pdf
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30. https://www.sciencedirect.com/science/article/pii/S0301479710002732
31. https://lakestewardsofmaine.org/wp-content/uploads/2013/11/The-VLMP-Story-2013.pdf
32. https://legislature.maine.gov/legis/statutes/38/title38sec1871.html
33. https://maine.maps.arcgis.com/home/webmap/viewer.html?webmap=126b9dbc59f44f969f74739bc9bc4ade
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37. https://www.dontmovefirewood.org/
38. https://www.fws.gov/story/clean-drain-dry
39. https://playcleango.org/
40. https://www.maine.gov/dacf/php/horticulture/importingplants.shtml#quarantines
41. https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/GISC/Pages/Managing-Invasive-Species.aspx
42. https://malegislature.gov/Bills/192/S563

Invasive Species Policy Survey

The purpose of this survey is to help improve Maine's management of invasive species and to help develop a more effective invasive species policy. (Invasive species is defined as a non-native species (including seeds, eggs, spores, or other propagules) whose introduction causes or is likely to cause economic harm, environmental harm, or harm to human health. It could be a pathogen, arthropod, plant, mammal, fish, invertebrate, or other organism.) Thank you for your help.

Required

1.Name

2.Affiliation

3.What region or regions are you most concerned with regarding invasive species? (Check all that apply)

- [ ] Aroostook County
- [ ] Washington and Hancock Counties
- [ ] Penobscot and Piscataquis Counties
- [ ] Waldo, Knox, Lincoln Counties
- [ ] Androscoggin, Kennebec and Sagadahoc Counties
- [ ] Somerset, Franklin and Oxford Counties
- [ ] Cumberland and York Counties

4.Email address (Optional)

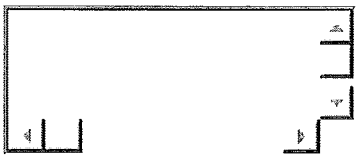
5.What are the major impediments to managing invasive species in Maine? (see definition above)

6.Are there specific invasive species challenges in your part of Maine that may be different or more challenging? If so, please list the species and their location.

7.Please suggest approaches to improving invasive species management (for all taxa) in Maine.

8.Are there other state policy models that you think Maine should emulate? (Please provide examples and links)

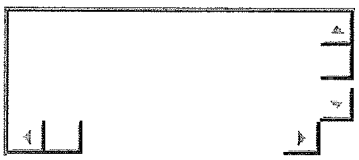
9.What invasive species are you currently trying to manage or are most concerned about?



10.On average, how many FTEs do you have working on invasive species in your organization?
(1 FTE=Approximately 2000 hours)

11.On average, what is your invasive species program budget (please include the total cost of salaries and fringe (combined together), outreach, survey, monitoring, control or other efforts).

12.Please add any other ideas or comments you think might be helpful.



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