

# Adirondack Park Invasive Plant Program

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## The Actual and Potential Economic Impact of Invasive Species on the Adirondack Park: A Preliminary Assessment *Executive Summary*

Prepared by: Yellow Wood Associates, Inc.  
228 North Main Street, St. Albans, Vermont 05478 | <http://www.yellowwood.org>

# Acknowledgements

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The authors hope this report will contribute to a more informed discussion of the economic impacts of invasive species on the Adirondack Park.

*Cover Images (Clockwise from Top Left): Hydrilla, Photo by Robert Vidéki, Bugwood.org; Asian Longhorned Beetle, Photo by Kenneth R. Law, USDA APHIS PPQ, Bugwood.org; Emerald Ash Borer, Photo by Debbie Miller, USDA Forest Service, Bugwood.org; Aquatic Plant Removal, Photo by Adirondack Park Invasive Plant Program; Asian Clam, Photo by U.S. Geological Survey Archive, U.S. Geological Survey, Bugwood.org; Eurasian Watermilfoil, Photo by Alison Fox, University of Florida, Bugwood.org; Spiny Water flea, Photo by Dave Brenner, Michigan Sea Grant College Program; Managing terrestrial plants, Photo by Adirondack Park Invasive Plant Program; Japanese Knotweed, Photo by Paul Rischmiller.*

## Executive Summary

This report, commissioned by the Adirondack Park Invasive Plant Program (APIPP),<sup>1</sup> explores the actual and potential economic impact of invasive species on specific sectors of the economy of the Adirondack Park. Previous research with respect to invasive species has tended to focus on their biology and ecological impacts, strategies to control them, and methods to restore invaded habitat. Consideration of the economic impacts, beyond the direct costs of control, has received relatively little attention though these impacts may be substantial. This assessment focuses on economic impacts. It is a starting point; research on the economic impact of invasive species is a maturing science. Eight high priority species are used to illustrate impacts on the Adirondack Park. The analysis compares current investments related to invasive species prevention and control in the Adirondack Park with the potential economic consequences of species spread.

*The economy of the  
Adirondack Park and region  
is heavily natural-resource  
dependent.*

The purpose of this report is to provide a preliminary foundation for informed discussion about economic risks of invasive species and associated costs and benefits of taking action. It looks at both public and private sector investments and highlights the network of organizations and volunteers committed to protecting the Adirondack Park from invasive species through prevention, early detection and rapid response, education, legislation and enforcement and, where necessary and appropriate, ongoing control and management. This study provides a baseline for future discussion and evaluation. It is based on the best information available. Additional information is welcomed and encouraged to refine the analysis and projections of economic impact.

## Methodology

A combination of primary and secondary data collection methods were used in this research. An advisory committee of experts on invasive species, economics, and policy led by the Director of the Adirondack Park Invasive Plant Program provided guidance throughout the project.

Primary research began with a list of 26 invasive species that pose the greatest threat to the Adirondacks and a list of the economic sectors in the Adirondack Park most likely to be affected by invasive species. Yellow Wood Associates conducted key informant interviews with 32 people at 23 organizations active in nine economic sectors including agriculture and horticulture, conservation, forestry and forest products, human health, local governments, real estate and construction, recreation and tourism, state government, and utilities. Economic activity in the Adirondack Park is heavily dependent on government and tourism (including second homeowners). Smaller sectors include construction, forestry, agriculture, and manufacturing. Interviewees were asked to select the one or two invasive species of greatest concern within their sector and to describe the nature of the impacts of concern to them. The final selection of eight species was informed by the results of key informant interviews and finalized by the advisory committee.

The eight species highlighted in this report include five that are currently present in the Park (Eurasian watermilfoil, Asian clam, spiny water flea, Japanese knotweed, and spotted wing drosophila) and three that are present nearby and of concern (hydrilla, emerald ash borer, and Asian longhorned beetle).<sup>2</sup> The intention was to

<sup>1</sup> For more information on APIPP, go to <http://adkinvasives.com/>.

<sup>2</sup> Resources available dictated the parameters of selecting eight species. The top species that were identified through informant interviews determined the species selected for further analysis in this report, which did not include an invasive fish species, such as round goby.

include a mix of aquatic and terrestrial species that have or could have direct economic impacts on the Adirondack economy, as well as a range of species that have already been identified in the Adirondacks and species that have not yet been identified in the Adirondacks but are present in surrounding areas. To better understand activities underway to protect the Park from invasive species, and the extent of existing investment related to invasive species, an online survey was sent out to 274 individuals across economic sectors in the Adirondacks in March of 2014. One-hundred-twenty-four people responded to the survey for a survey response rate of 44%. Activities and expenditures cited are based on best available information provided by respondents completing the survey. These data provide the most comprehensive overview available of investments related to invasive species in the Adirondack Park. Additional primary research was conducted to inform brief case studies of several species (or groups of species), including beech bark disease, Eurasian boar, and aquatic invasive species, in addition to the eight targeted species.

Secondary research involved compiling data from existing studies and data centers related to economic sectors in the Adirondack Park<sup>3</sup> and collecting and analyzing information from existing studies of the economic impacts of invasive species conducted in other areas. Wherever possible, we used studies of economic impacts from nearby regions and regions with some similarities to the Adirondacks.

## Limitations

The estimates of economic impacts are meant to provide insights into the order of magnitude of impacts we might see in the Adirondack Park. The emphasis in this report is on direct economic impacts, e.g. loss of timber value, and not the indirect and induced impacts (often referred to as “multipliers”), such as loss of wages for sawmill workers and loss of retail spending by sawmill workers. Estimates do not include the added costs of prevention and control, cumulative impacts of multiple species, or the costs associated with the loss of ecosystem services.<sup>4</sup> In that sense, they should be considered conservative.

In some cases, we were not able to find studies that offered useful guidance on the time frame and/or likely magnitude of impacts, so we have had to make assumptions, which are transparent. More accurate estimates will be possible as more and better information becomes available.

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<sup>3</sup> The Adirondack Park is delineated by the Blue Line which intersects ten counties and encompasses two counties. The Adirondack region refers to the 12 counties in and around the Park (Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Oneida, St. Lawrence, Saratoga, Warren, and Washington). In many sectors, data is not readily available for the Park as a unit, and data for some or all of the counties that have some land inside the Adirondack Park was used in its place. The definition of “Adirondack” varies from study to study. Significant variations have been footnoted.

<sup>4</sup> One way to think of the value of ecosystem services is to determine what it would cost to replicate them by technological or engineered means such as stormwater-capture infrastructure.

## Invasive Species and the Adirondack Park

The Adirondack Park is one of the largest intact temperate forests in the world and represents one-fifth of New York's land area and contains more than 3,000 lakes and ponds. Compared to other areas of comparable size in the Northeast, the Adirondack Park remains relatively free of invasive species, which are non-native plants, animals, insects, and pathogens that cause harm to ecosystems and the economic activities that depend on them. The economy of the Adirondack Park and region is heavily natural-resource dependent. Second home ownership, tourism and the hospitality industry, forestry and forest products, and agriculture all provide employment and help sustain the many small communities, extensive private forestland holdings, and service providers in the Park. However, as more and more invasive species appear within and near the Park's borders, the economy of the Park becomes increasingly vulnerable.

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## How Invasive Species Create Direct Economic Impact

Each invasive species has its own way of impacting the economy, and multiple species may produce cumulative impacts. Aquatic invasive species, such as Eurasian watermilfoil, have been shown to impact the desirability of property on and near recreational waterbodies. Property values can also be impacted by hydrilla, which has characteristics similar to Eurasian watermilfoil. Any reduction in property value due to invasive species will affect local government revenues as well as the personal wealth of owners of property in the Adirondack Park.

Forest invasive species, such as the Asian longhorned beetle, kill maple (and other) trees that produce timber, sap for maple syrup, and fall colors that attract tourists. Controlling Asian longhorned beetle involves removing infested trees as well as removing unaffected trees nearby that are suitable hosts. Dead trees also create hazards on driveways and roads and in utility corridors and increase the cost of maintenance and safety precautions. Emerald ash borer kills ash trees, which are also important to the wood products industry and poses similar health and safety impacts.

Other invasive species, such as Asian clam, degrade specific recreational experiences, including swimming, and can also clog water pipes used for irrigation, fire protection, manufacturing, and water supply. Several of the species reviewed in this report, including Eurasian watermilfoil, hydrilla, and Japanese knotweed, increase the likelihood of flooding by reducing the capacity of channels to carry floodwater. Japanese knotweed also has the capacity to grow through pavement and increase the costs of infrastructure maintenance. It has even affected the mortgage eligibility of properties.

*The potential direct economic impact from the eight species evaluated in this study is estimated at \$468 to \$893 million.*

The direct economic impacts of some species are quite specific: spotted wing drosophila is an agricultural invasive species that attacks berries and other soft fruits, while the spiny water flea, an aquatic invasive, primarily impacts anglers by disrupting sport fisheries and altering the aquatic food chain.

Although there are not sufficient data to estimate direct economic impacts on other sectors in the Adirondack Park, evidence from elsewhere points to direct impacts on the construction industry through increased costs of site preparation, equipment cleaning, and inspection of materials; the real estate industry through reduced property



values and decreased demand for properties; hydro-electric power generation through clogged water pipes; and, human health through an increased incidence of allergic reactions to aquatic and terrestrial invasive species, such as wild parsnip, and the contribution of invasive species to the spread of disease by, for example, causing water to stagnate and create breeding groups for mosquitos.

## The Potential Direct Economic Impact of Eight Invasive Species

The potential direct economic impact from the eight species evaluated in this study is estimated at \$468–\$893 million.<sup>5</sup> Of this, \$46–\$51 million represents an annual potential loss in direct visitor spending, \$2.3–\$2.5 million in annual potential loss in agriculture and primary forest production value, and \$420–\$840 million loss in property value that will affect the tax base and borrowing ability of property owners on an ongoing basis.

Total direct economic loss from the invasive species evaluated in this report to the recreation and tourism sector in the Adirondack region, including impacts on swimmers, boaters, anglers, and fall tourists, is estimated at \$46–\$51 million a year.

- Sixty-nine percent of those surveyed in the White Mountain Region of New Hampshire, similar in some ways to the Adirondacks, said they would decrease visitation if water clarity and purity deteriorated (invasive species can exacerbate issues related to water quality and water purity). This was the most significant deterrent to visitation and was estimated to result in a decrease of 17.5% in visitor days, total sales, household income, and jobs.<sup>6</sup>
- If a significant reduction in fall colors due to forest pests and pathogens were to affect even 10% of visits to the Adirondacks, the potential economic impact on tourist spending is on the order of \$30 million a year.

Emerald ash borer and Asian longhorned beetle, neither of which was detected within the boundary of the Adirondack Park as of July 2014, are estimated to cost the forest and forest products sector in the Adirondack region \$2.2 million per year or 5% of the total value of annual production through a combination of loss of stumpage value and loss of maple syrup production — even a 5% decrease in the maple syrup harvest would result in a \$650,000 in annual loss. This does not include impacts on the rest of the industry.

***Total direct economic loss from the invasive species evaluated in this report to the recreation and tourism sector in the Adirondack region, including impacts on swimmers, boaters, anglers, and fall tourists, is estimated at \$46 to \$51 million a year.***

***Emerald ash borer and Asian longhorned beetle are estimated to cost the forest and forest products sector in the Adirondack region \$2.2 million per year or 5% of the total value of annual production.***

<sup>5</sup> This estimate does not account for cumulative impact and avoids double-counting.

<sup>6</sup> Nordstrom, Anne, The Economic Impact of Potential Decline in New Hampshire Water Quality: The Link Between Visitor Perceptions, Usage, and Spending, prepared for The New Hampshire Lakes, Rivers, Streams and Ponds Partnership, May 2007.

The total value of berries grown in Adirondack counties is \$225,000. Based on experiences elsewhere in New York, spotted wing drosophila can eliminate 10–80% of the berry crop in any given year, resulting in direct economic impact of \$22,500 to \$180,000 and presenting many of the small agricultural operations in the region with economic hardship.

***In New York spotted wing drosophila can eliminate 10 to 80% of the berry crop in any given year.***

The largest share of the total estimated direct economic impact is the potential impact on property values. The impact of aquatic invasive species, particularly Eurasian watermilfoil, on property values has been studied and found to range from 1% to 16%.<sup>7</sup> Other studies confirm that a reduction in water clarity (and its diminishment from cultural and non-cultural eutrophication) results in decreasing property values. A study in the Adirondacks found that multiple measures of water quality, including the presence of Eurasian watermilfoil, have significant effects on property values overall, *even for properties that are not directly on the water*. According to this study, the presence of invasive species on the nearest lake decreases property values by \$10,459.<sup>8</sup>

***If we assume a conservative impact of 3% on property values Park-wide, approximately \$420 million in property value could be at risk from increasing numbers and densities of aquatic invasive species, such as Eurasian watermilfoil.***

The total value of residential properties in the Adirondack Park is estimated to be approximately \$14 billion.<sup>9</sup> If we assume a conservative impact of 3% on property values Park-wide, approximately \$420 million in property value could be at risk from increasing numbers and densities of aquatic invasive species, such as Eurasian watermilfoil. A slightly less conservative estimate of 6% impact that is still within the low end of the range suggested by the research increases this impact to \$840 million. While this is a simplistic method of computing impact, it is a reasonable (and likely conservative) indication of the order of magnitude of the impact if an aquatic invasive species, in isolation or in combination with others, were to spread throughout the Park. Currently, second homeowners pay a premium for property within the Park. The presence of aquatic invasive species can be expected to have a dampening effect on their willingness to pay a premium, which will also have a dampening effect on property values.

***“I had a good buyer in the \$2 million range. They looked on Lake George and ended up not purchasing because of fear of invasives.” ~Dan Davies, Co-Owner, Davies, Davies & Associates Real Estate, LLC***

<sup>7</sup> See Zhang, C., Boyle, K.J., “The effect of an aquatic invasive species (Eurasian watermilfoil) on lakefront property values.” Ecol. Econ. (2010) doi:10.1016/j.ecolecon.201002.011 and Horsch, Eric, J and Lewis, David J. “The effects of aquatic invasive species on property values: Evidence from a quasi-random experiment.” University of Wisconsin-Madison Department of Agricultural & Applied Economics; Staff Paper Series. 2008.

<sup>8</sup> Tuttle, Carrie M. and Martin D. Heintzelman, “A Loon on Every Lake: A Hedonic Analysis of Lake Quality in the Adirondacks, May 13, 2013. Supplied by the author.

<sup>9</sup> 47,131 residential parcels owned locally + 31,978 residential parcels owned non-locally = 79,109 (total residential partners) x \$179,163 (average parcel price) = \$14,173,405,767.

## Current Investment Related to Invasive Species in the Adirondacks<sup>10</sup>

Our survey findings show that approximately \$3.56 million was spent by 88 organizations on invasive species in the Adirondacks in 2013. More than half reported that their spending had increased over the past five years and expect their spending to increase over the next five years, signifying an increase in the invasive species threat and subsequent demand for action.

The approximately \$3.56 million does not include the value of more than 12,000 volunteer hours valued at \$708,000.<sup>11</sup> Taken together, *this \$4.27 million is less than one percent of the lowest estimated potential direct economic costs of eight invasive species.*

Of the \$3.56 million, non-profit expenditures were \$931,313 (26% of overall annual investment); state government, \$896,400<sup>12</sup> (25%); associations,<sup>13</sup> \$568,393 (16%); academic institutions, \$559,850 (16%); local governments, \$426,076 (12%); other types of organizations, \$137,275 (4%); and, for profit businesses, \$43,650 (1%).<sup>14</sup>

Under Governor Cuomo, the State of New York has invested in strengthening the tourist economy in the Adirondack Park. Tourists to the Adirondack Park and region generated an estimated nearly \$153 million in state and local taxes in 2012.<sup>15</sup> The natural resource base in the Adirondacks and the amenities (lodging, attractions, etc.) that have been built around it are the foundation for these revenues. If invasive species undermine the viability of the tourist economy, tax revenues will go down (not only from tourism, but in all impacted economic sectors).

***\$3.56 million was spent on invasive species in the Adirondacks in 2013, which does not include the value of more than 12,000 volunteer hours valued at \$708,000. Taken together, this \$4.27 million is less than one percent of the lowest estimated potential direct economic costs of eight invasive species.***

There are five relatively standard categories of activity on the invasive species spectrum of strategies: 1) Prevention, 2) Early Detection and Monitoring, 3) Rapid Response, Control and Management, 4) Education, Outreach and Training, and 5) Enforcement and Legislation. Organizations across the Adirondack region are investing in activities in all of these categories (Figure 1). The survey found the largest proportion of investment was in prevention (with 31% of the total spending) followed by rapid response, control and management (28%). Education and outreach and early detection and monitoring each captured about a sixth of the spending (17% and 14% respectively), followed by enforcement and legislation (6%) and other types of spending (5%). Examples of other types of spending include disease sampling, working with New York State Department of Environmental

<sup>10</sup> All data in this section comes from the *Survey to Capture Spending on Invasive Species in the Adirondacks*, administered to 274 individuals in March 2014. The survey had a response rate of 44% or 124 usable responses.

<sup>11</sup> Based on the value of one hour of volunteer time of \$28.73, established by New York State. "Economic Impact: 36 Adirondack Nonprofits." 2013. <https://www.generousact.org/leading/economic-impact-study> Accessed 06/09/14.

<sup>12</sup> State funding includes annual support of the Adirondack Park Invasive Plant Program, a regional invasive species partnership program housed at the Adirondack Chapter of The Nature Conservancy.

<sup>13</sup> This group of respondents is composed of 30 lake associations, one forest products association and one agricultural association.

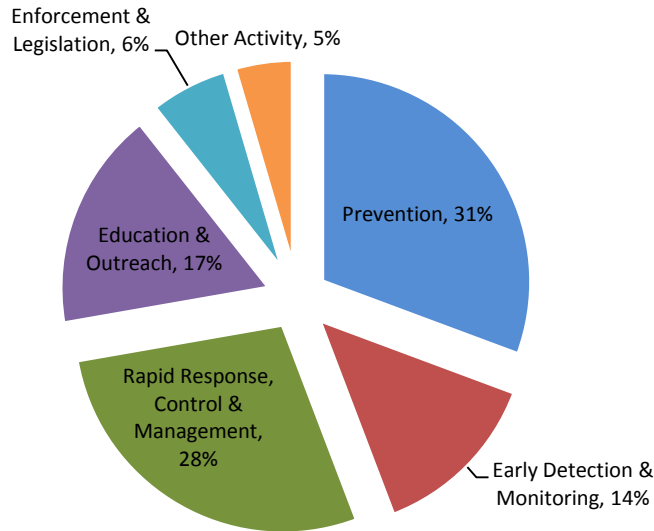
<sup>14</sup> These figures include all reported investments in the Adirondacks by a total of 88 organizations. Each survey was linked to an email address to allow for tracking of each survey response. Additionally survey respondents were required to provide the name of the organization and/or department for which they were responding, allowing us to identify and remove any duplicative responses and avoid double counting.

<sup>15</sup> Tourism Economics, *The Economic Impact of Tourism in New York, Adirondacks Focus*, 2012 Calendar Year.



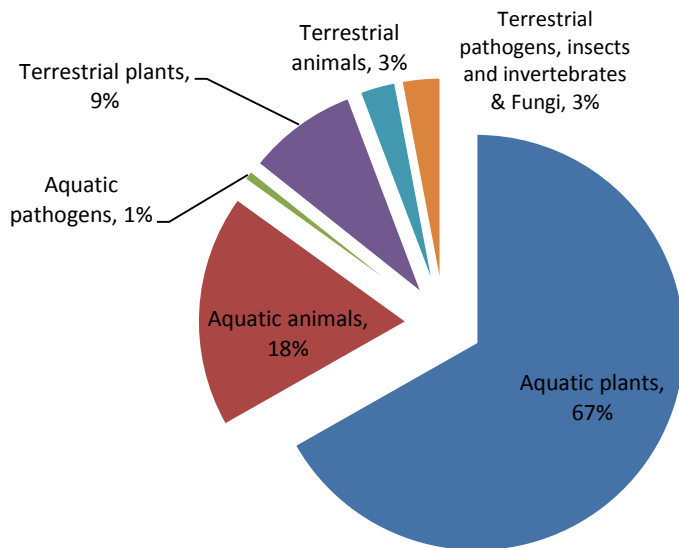
Conservation, treatments, coordination, special reports, harvesting, equipment maintenance, salaries, training, and volunteers.<sup>16</sup>

**Figure 1: Proportion of Survey Respondent Spending by Category of Activity, 2013**



Eighty-five percent of all reported investments on invasive species were directed at aquatic invasive species with 15% targeted at terrestrial invasive species (Figure 2). Aquatic plants (e.g. Eurasian watermilfoil) are currently receiving over half of the total investment in invasive species in the Adirondacks.

**Figure 2: Proportion of Survey Respondent Spending by Category of Species, 2013**



<sup>16</sup> Though we provided guidance to survey respondents on the types of activities included in each category, it can be difficult to delineate hard lines when interpreting which activities are aligned with each strategy and differentiating expenditures between these types of activities.

## Lessons Learned about Spending on Prevention and Control of Invasive Species

Our research revealed several important lessons learned in the Adirondacks and elsewhere about spending in relation to invasive species.

1. Prevention is less costly than control. Control costs escalate rapidly once invasive species are present. Experience in the Adirondacks to-date illustrates this.
2. While prevention is less costly than control, for species that are already present in the Adirondack Park, control of small, relatively isolated populations is less costly than control of widely dispersed populations.
3. Very few invasive species can be eradicated once established. Control often involves actions that are implemented in perpetuity and should include ongoing monitoring to ensure success.
4. The most cost effective approach to prevention is to focus on the pathways that transport invasive species from one location to another.

***Invasive species cannot be effectively addressed by one-time activities or one-time investments.***

Invasive species pose a significant threat to the Adirondack Park economy, and it warrants putting systems into place to address both invasive species present in the Park and those that have not yet arrived. Although there have been successes, such as the Town of Inlet's work to control Japanese knotweed, control of Eurasian watermilfoil in Upper Saranac Lake, and the Raquette Lake Preservation Foundation's well-organized aquatic invasive species prevention efforts, the cost has been high and the limited resources of volunteers, local governments, state governments, and non-profit organizations are all stretched thin.

## Considerations Going Forward

The Adirondack Park is a unique and valuable asset for the State of New York. To the extent that it can remain a landscape relatively free of invasive species, it will become an even more valuable asset over time. There is likely to be considerable interest in lessons learned in the Adirondack Park and region since the spread of invasive species is likely to continue with increased impacts in rural areas.

Invasive species cannot be effectively addressed by one-time activities or one-time investments. A long-term approach to prevention and targeted control that includes monitoring and habitat restoration is essential to ensure success. The costs to control invasive species in the Adirondacks are escalating. Local governments and lake associations are particularly concerned about not having the resources needed to address additional threats.

***The most cost effective approach to prevention is to focus on the pathways that transport invasive species from one location to another.***

***"We have been fighting milfoil for 20 to 25 years and we are spending hundreds of thousands to manage it. We can't afford to get 5 or 10 or 15 more [invasive species]." ~Fred Monroe, Supervisor, Town of Chester; Executive Director, Adirondack Park Local Government Review Board***

***"We are seeing donor fatigue, as this limited donor base is being asked to address a problem that will be ongoing and far exceeds the amounts that can be raised from the small, highly seasonal population." ~Respondent to 2014 Survey to Capture Spending on Invasive Species in the Adirondacks***

At the same time, property owners in the Park recognize the threat of invasive species and are concerned that the spending levels are too low.

The current focus of spending is overwhelmingly on invasive aquatic plants, but forest invasive species, aquatic animals, and pathogens including those not covered in this report also pose significant threats to the economy of the region. The costs of control exceed the costs of prevention, so it makes economic sense to focus resources on prevention wherever possible, while, at the same time, maintaining adequate resources for targeted control of existing species where success is likely.

Prevention, early detection, and rapid response require advance planning for both private and public lands, since invasive species make no distinction and the Adirondack landscape has such mixed ownership. Planning for prevention on public lands is particularly important with respect to forest invasive species, since so much of the public land in the Park is forested and since invasive species management on public land is complex.

Current patterns of investment suggest a need for greater attention to prevention of forest invasive species overall. Once an appropriate prevention infrastructure is in place, it must be sustained to be effective. A one year hiatus in activity could result in re-infestation and nullify the value of prior investments.

The most cost effective approach to addressing invasive species is prevention, and the most cost effective approach to prevention is to address the pathways that transport invasive species from one location to another. Based on our review of existing conditions and best practices research, there appear to be four key areas to consider prioritizing investments to avoid or minimize economic impacts: 1) pathway management, 2) public education, 3) rapid response and strategic control, and 4) regulation and enforcement. Focusing on these areas will limit further degradation and spread of invasive species already present in the Park while also reducing the likelihood of future introductions. Control and management of the majority (if not all) of invasive species requires years of work, including habitat restoration, and ongoing monitoring to be effective.

***The magnitude of potential economic impacts of invasive species on the Adirondack Park and region is extensive, and the benefits to the State of a healthy natural resource-based economy are considerable.***

The magnitude of potential economic impacts of invasive species on the Adirondack Park and region is extensive, and the benefits to New York of a healthy natural resource-based economy (tax revenues, reduced transfer payments,<sup>17</sup> stronger communities, etc.) are considerable. There are recurring costs associated with prevention and control of invasive species. Experience elsewhere tells us that prevention is less expensive than control and the failure to prevent and/or control invasive species will result in economic harm. Our analysis evaluated only eight of more than 70 invasive species in the Adirondack region: more than 100 others are in surrounding areas.

Invasive species negatively impact a variety of sectors; and all sectors — public and private — have a vested interest in preventing and controlling the spread of invasive species. The economic consequences of an uncontrolled onslaught of invasive species in the Adirondack Park and region would not only undermine the current economy of the Park and region, but, once forests are damaged and waters are fouled, there will be fewer opportunities for long-term economic development.

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<sup>17</sup> Transfer payments refer to subsidies to support individuals who are not able to find employment due to a weak economy.