

**Northeastern IPM Center – IPM Partnership Grants – 2012 – Proposal
Project Description**

PD: Kathy Murray

Project Title: Northeast School IPM Working Group: Collaborative Support for Verifiable School IPM Adoption

Project Type: IPM Working Groups

Project Summary. Schools need support and assistance to adopt IPM practices. The Northeast School IPM Working Group (NESIWG), established in 2008, includes broad representation of organizations and agencies serving schools throughout the northeastern states. We propose to collaborate regionally to 1) establish school IPM demonstrations and coalitions to support and promote adoption of IPM practices and policies, 2) identify and capitalize upon opportunities for collaboration with other organizations to support and promote implementation of healthy, effective and sustainable pest management practices for schools, 3) improve access to IPM resources for school and childcare stakeholders, and 4) strengthen the capacity of the NESIWG to accomplish its mission and goals.

We have leveraged additional funds to support establishment of school IPM coalitions in four states. With this proposal we are seeking funding to cover costs of communication and travel to support regional collaboration and resource sharing, complete projects underway, collaborate on national level to tackle new initiatives, and capitalize on our accomplishments to date.

We anticipate this project will minimize pesticide exposure risk in schools, increase compliance with state regulations, and safeguard the health of students and teachers in and around schools throughout the northeast.

Background and Justification. Pests and pesticides can pose a significant risk to people, property and the environment. A number of well-documented studies have demonstrated the strong link between uncontrolled pest populations and risks to human health (Schal and Hamilton 1990, Sporik et al. 1990). Likewise, pesticide use and exposure can also pose risks to both humans (Whitemore et al. 1994, Whyatt et al. 2002, Eskenazi et al. 1999) and the environment (Larson et al. 1997). Some pesticides contain carcinogens, endocrine disruptors, and asthma triggers.

Children are especially sensitive to pesticide exposure risks because they are smaller and their organ systems are still developing and because of their behaviors such as playing on the floor and ground and a tendency to put object in their mouths (National Research Council 1993). The health risks of children's exposure to pesticides in schools are measurable and preventable (Alarcon et al. 2005).

With some of the highest childhood asthma rates in the country, it is critical that northeastern schools use effective and low-risk pest management practices. IPM offers the best means of ensuring that schools are safe, healthy, and productive places to work and learn. Studies have shown that IPM practices significantly reduce exposure risks to pesticides and pests and

improve health (Nalyanya et al. 2009, Landrigan et al. 1999). A study of schools showed that IPM practicing schools had little pesticide residues whereas conventionally treated schools had residues on baseboards and walls (Williams et al 2005). Application of an IPM implementation program in ten school districts spanning seven states averaged a 71% reduction in pesticide applications and a 78% reduction in pest complaints (Gouge et al. 2006). The Center for Disease Control recommends reducing pest infestations and adopting IPM as primary strategies to address asthma (CDC 2010). IPM also improves food and fire safety, improves security and reduces energy costs.

Schools are much in need of support to assist them in adopting IPM practices. In fact, a number of states in our region including Maine, Massachusetts, Pennsylvania, Rhode Island, Connecticut, New Jersey, Maryland and West Virginia, require schools to adopt IPM policies or practices. Connecticut and New York have passed legislation that greatly restricts pesticide use on school grounds. However, with scarce resources allocated to provide tools and training many schools are not in compliance. In a recent survey of New England schools (Clifton, 2009) 42% reported pesticides are used but only 61% have a written pesticide use policy. In Massachusetts, all schools are required to have a written IPM policy but the survey showed that 23% do not. Two-thirds of schools indicated that pests such as wasps, ants, head lice, mice and rats are a problem. Almost 40% of school maintenance and custodial staff, and 30% of teachers and principals said they need IPM education. Especially within the past year, bedbugs have become a significant issue within schools (Oi and Gillett-Kaufman 2010). This new pest issue resulted in inappropriate pesticide applications in Pennsylvania and New York and a two-day school closure in Maine.

School IPM was specifically identified in 3 of the 14 priority needs identified at the 2005 Northeast Community and Urban IPM Conference (http://www.nepmc.org/priority/2005_urban_conf.htm), particularly the need for quantifying costs and benefits of school IPM, which was ranked third. Even states in our region with active school IPM programs (Maine, New York, Pennsylvania) often struggle for resources, and many sectors, particularly private schools, completely lack school IPM programs, resources or awareness. Other states, even those that require schools to adopt IPM, provide little, if any funding to support compliance. The result has been fragmented school IPM programs with limited effectiveness, often short-term activity and little interaction across state lines.

Recent activity at the national level and in each of the four IPM Center regions, presents an excellent opportunity to build, renew, and coordinate school IPM activity nationwide (Gouge et al. 2009). The National School IPM Pest Management Strategic Plan (PMSP) establishes the goal of achieving high-level IPM in all the nation's schools by 2015 and identifies needs and a plan for accomplishing that goal. Workshops, symposia and meetings about school IPM have been featured at a number of recent national conferences and a national school IPM steering committee was established in 2008. In 2008 and again in 2010, the EPA awarded significant grants to the IPM Institute to collaborate with the NESIWG and other regional working groups to support and advance IPM adoption by schools throughout the U.S.

Working Group Accomplishments to Date. The NESIWG was established in 2008. Current membership (Appendix A) represents 11 northeastern states and a diverse array of school IPM interests, organizations and expertise. The WG has identified needs and resources for advancing IPM in the region's schools (Appendix B). We have drafted a 'Strategic Plan' (Appendix C) outlining action steps to promote and sustain school IPM adoption throughout the region. With funds leveraged from a joint effort with the other three regional school IPM working groups, we established pilot school IPM demonstrations in New Hampshire, Rhode Island, and Vermont, a peer-to-peer IPM support 'coalition' of school staff in the greater Pittsburgh, PA area, and a statewide school IPM committee in Connecticut. We also obtained separate funding for a region-wide K-12 IPM curriculum assessment and implementation project. To date, this project has introduced almost 2,000 teachers and more than 20,000 students to IPM learning, has increased accessibility to IPM curricula through the development of an easy-to-use website (www.maine.gov/agriculture/pesticides/school-ipm-curriculum/index.htm) and has worked with educators to develop the K-12 IPM Literacy Plan outlining action steps to promote youth IPM education throughout the region (Appendix D). Working group members we also obtained additional funding to establish a coalition in Vermont and to organize an IPM and green cleaning school workshop in New Hampshire. We have networked with the NE Child Care IPM Working Group to share resources and ideas. The NESIWG serves as a multiplier to share technical information and other resources among different organizations within the region and other regional and national school IPM working groups. Through regular conference calls and a listserv, the working group has been instrumental in disseminating information throughout the Northeast about opportunities for training, new resources, pending legislation, and other critical and timely information.

Objectives and Anticipated Impacts

Objectives

- 1) **Establish and mentor new school IPM coalitions and verifiable IPM demonstrations in four states to reduce environmental asthma risks.**
- 2) **Collaborate to promote and pilot the use of a school turf assessment tool.**
- 3) **Strengthen the capacity of the NESIWG to accomplish its mission and goals.**
- 4) **Develop and pilot tools to help schools institutionalize IPM.**
- 5) **Improve accessibility of school and childcare IPM resources, including K-12 educational curricula.**
- 6) **Update identified priorities for school IPM.**

Anticipated Impacts

Our proposed project directly addresses goals of the IPM Roadmap for human and environmental health impacts, economic impacts and IPM implementation impacts as outlined below. We will utilize components of the logic model under development by the NE IPM Center's Assessment Working Group to help measure our impacts.

Human Health and Environmental Health Impacts. Our project will lead to an increase in the number of schools practicing high level IPM, thereby safeguarding human health and the environment. Schools will be encouraged to utilize pest-prevention and pest monitoring to reduce reliance on pesticides and to select least-risk control methods to minimize risks of human exposure to pests and pesticide. IPM practicing schools are likely to have improved

indoor air quality and playgrounds and athletic fields that are safer for play. In addition, our work to identify and promote utilization of K-12 educational curricula for use in the classroom is expected to increase awareness of pest and pesticide risks and least-risk IPM practices among students representing the next generation of pesticide users.

Economic Impacts. School IPM implementation is sometimes more difficult to quantify. Studies (Lame 2005, Brajkovich et al. 2010) have shown that IPM can save money in the long-term. Therefore we anticipate that our project will benefit schools, and thus taxpayers and communities competing for tax dollars.

IPM Implementation Impacts. Educational materials will be made available to all schools in the northeast via outreach by members and our partners and through the NEIPMC searchable database. By facilitating schools to develop their own local support coalitions we anticipate enhanced collaboration among IPM practitioners, educators, school administrators, athletic directors, custodial and maintenance staff and other school staff. This model of knowledge diffusion has been shown to be an effective means of changing behaviors to adopt improved practices (Gouge et al, 2006). Our effort will facilitate the ultimate goal of effective, self-sustaining school IPM coalitions in all states, where trained and experienced school professionals recruit and mentor peers at other districts.

Approach and Procedures

Objective 1) Establish and mentor new school IPM coalitions and verifiable IPM demonstrations in four states to reduce environmental asthma risks. In 2011, NESIWG entered into a partnership with the IPM Institute of North America and the three other U.S. regional school IPM working groups, to document impacts of IPM implementation on asthma incidence in schools. The ultimate goal is to measurably reduce asthma rates through implementation of IPM practices in schools. This project is funded by an EPA grant awarded to the IPM Institute. In leveraging these funds our capacity for producing measurable impacts is greatly enhanced. To date, we have collaborated to develop outreach materials and guidelines to establish school IPM coalitions and demonstrations. We have also collaborated to develop tools for verifying school IPM implementation and tracking asthma incidence. We have identified collaborators in each of four states and have taken initial steps to establish local coalitions and demonstration sites. In 2012 we will fully establish and mentor these self-sustaining school IPM ‘coalitions’ in New York, Vermont, Massachusetts and Maine. These coalitions will utilize school staff at demonstration site schools where IPM is well established to recruit and mentor peers at other school districts. NESIWG members in each of these states will mentor the coalitions and provide technical assistance for demonstration sites when needed. All identified mentors (Lynn Braband and Jody Gangloff-Kaufmann, NY; Kathy Murray, ME; Carol Westinghouse, VT; Lynn Rose, MA) are very experienced and well-versed in school IPM practices and processes. Additionally, pending funding sought through a separate grant, NESIWG will cooperate with a proposed project to conduct school IPM assessments and demonstrations at additional school districts in VT, NH, and NY. Outcomes of these projects will be well documented and widely shared regionally and nationwide through our stakeholder networks, listservs, publications, presentations at conferences and more. We will also continue to collaborate and communicate with our partners through monthly conference calls with the national school IPM steering committee. Impacts to be

assessed include number of students and staff impacted, numbers of trainings offered and numbers of participants, numbers of and outcomes of coalition meetings, numbers of and impacts of training site inspections conducted in participating schools, numbers of articles published in stakeholder newsletters, and numbers of other outreach events conducted.

Objective 2) Collaborate to promote and pilot the use of a school turf assessment tool. In 2011, we collaborated with NESIWG members to organize a Connecticut school IPM committee. We also supported and promoted well-attended school turf IPM workshops in Connecticut and Pennsylvania. As a result of these efforts, our Connecticut-based NESIWG partners have initiated development of a school turf assessment tool. In 2012, NESIWG will network and collaborate to pilot the tool and promote its utility and availability to school grounds managers and service providers throughout the region.

Objective 3) Strengthen the capacity of the NESIWG to accomplish its mission and goals. Since our inception in 2008, NESIWG has developed an active network of partners and collaborators throughout much of the region. We will continue to identify and build on these successful collaborations to support and promote school and child care IPM. We will continue to actively recruit new members to strengthen and expand our productive stakeholder network. We will continue to establish ties between NESIWG and key collaborators in states presently unrepresented and build on the relationships already established throughout the region. We will continue to identify opportunities for collaboration in each of the 11 northeastern states and the District of Columbia. Examples of potential collaborations include membership on NESIWG, linking to IPM contacts on webpages, publishing articles on IPM in newsletters, displaying materials at conferences and public events, presenting at meetings or conferences, conducting IPM training with collaborators, or collaborating on a school IPM demonstration, assessment or other project. In 2012, we will continue to meet monthly by conference call to share information, update one another on progress, and conduct the business of NESIWG. We will strategize ways to increase engagement with school facilities managers and other school IPM implementers. We will maintain contact and collaborations with other national and regional school IPM Working Groups and networks. We will meet in person at one annual meeting to be held (tentatively in Rockville, MD) in fall 2012. We plan to include an IPM visit with a local school district as part of the meeting.

Objective 4) Develop and pilot tools to help schools institutionalize IPM.

Adoption of new IPM practices and procedures by any organization requires changes in policies and procedures and ultimately changing human behaviors including communication, management practices, record-keeping, purchasing decisions and more. Schools need tools to enable them to permanently incorporate these changes and sustain IPM implementation. We plan to collaborate with several of our NESIWG members to develop and pilot a school IPM implementation workbook and provide technical assistance for its adoption. A separate IPM Issues grant proposal will be submitted to accomplish this. If funded, NESIWG will collaborate to support the project. This collaboration will include: 1) providing a network to identify potential experts, stakeholders, and other partners for technical assistance, 2) outreach to school IPM implementers to provide stakeholder input for development and piloting of the workbook, and 3) reporting and promoting final products to schools throughout the region and the U.S through our networks of partners and stakeholders.

Objective 5) Improve accessibility of school and childcare IPM resources, including K-12 educational curricula. The NE IPM Center's searchable resource database is heavily used (1,000 hits/mo) and contains more than 3,300 science-based IPM publications and information sources. In 2011 we identified numerous additional resources for school and childcare IPM and worked with the NEIPM Center to add them to the searchable database. In 2012 we will identify new resources and will work with the Center to update the database. We will also identify IPM curricula and other teaching resources for K-12 audiences and will work with the NE IPM Center to add these additional resources to the database. Finally, we will work with our network of partners to enlist school and childcare managers and professionals to 'ground truth' the NE IPM Center's webpage to identify opportunities for enhancing its visibility and utility for providing useful IPM resources to these users. As part of that effort we plan to work with Center staff to continue to improve and update the NESIWG's School IPM webpage. Through our established network of listservs, organizations, institutions and agencies we will promote the availability of the Center's web-based resources to school and childcare audiences.

Objective 6) Update identified priorities for school IPM.

We will review and update the priority needs and opportunities identified in 2011 (Appendix B) and evaluate opportunities to support school IPM adoption identified in our Strategic Plan (Appendix C) We will widely promote the availability of the Strategic Plan to partners, stakeholders and advocacy organizations to solicit input on this dynamic document and promote needs and opportunities identified within it to advance adoption of school IPM regionally and nationally.

Implementation Time Table (completion dates)

Objective 1) Establish and mentor new school IPM coalitions and verifiable IPM demonstrations in four states to reduce environmental asthma risks. Establish and mentor coalitions, conduct site assessments and trainings, and provide technical support for demonstration sites (Apr 2012-Mar 2013). Report impact data (Mar 2013).

Objective 2) Collaborate to promote and pilot the use of a school turf assessment tool. Network and collaborate to pilot and share the tool and promote its utility and availability to school grounds managers and service providers (Apr 2012-Mar 2013).

Objective 3) Strengthen the capacity of the NESIWG to accomplish its mission and goals. Conduct regular conference calls, recruit new members and continue to identify opportunities for collaboration in each of the 11 northeastern states and the District of Columbia. (Apr 2012-Mar 2013). Develop strategy to increase engagement with school facilities managers (Oct 2012). Convene annual face-to-face meeting (Oct 2012).

Objective 4) Develop and pilot tools to help schools institutionalize IPM. Collaborate to identify potential experts, stakeholders, and partners for technical assistance (Apr-May 2012). Solicit stakeholder input (Summer 2012), Promote workbook to stakeholders (Mar 2013).

Objective 5) Improve accessibility of school and childcare IPM resources, including K-12 educational curricula. Collect and evaluate resources. Submit resources to NEIPMC staff (Aug 2012). Develop methods to ‘ground truth’ NEIPMC webpages and database with school and daycare IPM users (July 2012). Promote availability of NEIPMC web-based resources to school and childcare audiences (Mar 2013).

Objective 6) Update identified priorities for school IPM. Update priorities (Oct 2012). Promote strategic plan document to stakeholders and partners (Apr 2012-Mar 2013).

Evaluation Plans

The organizations, activities and measures to be used to evaluate project impacts are shown graphically in the Logic Model (Appendix E). Impact measures we will use include the following: number and diversity of participants in demonstration and coalition events, written evaluations by the participants, pre- and post-event surveys of audience awareness and participation, on-site assessments/audits at demonstration schools, rates of adoption of specific IPM-related procedures as the result of demonstration and coalition events, numbers and distribution of schools adopting or improving IPM in coalition states. Additional measures of impact will include: number of pest-related complaints at cooperating schools, frequency and types of pesticide applications, rate of adoption of decision trees and other IPM decision-making formats, number and severity of pesticide exposures at schools in coalition states, number of asthma interventions reported by school health staff.

Evaluation of the separately funded workbook develop project will include structured feedback from participating users and numbers of documented adoption of IPM practices, documented impacts on pest complaints and changes in the number of pesticide applications made at schools using the workbook,.

WG membership will represent 12 NE states and District of Columbia and a diversity of school IPM stakeholders. We will also record the number and diversity of initiatives addressing identified NE school IPM priorities.

We will utilize components of the logic model developed by the NE IPM Center’s Assessment Working Group to help measure our impacts.

Cooperation, Institutional Units, and Key Personnel Involved.

Kathy Murray (Maine Department of Agriculture, Food and Rural Resources) and Lynn Braband (Cornell University) will serve as co-leaders of the Northeast School IPM Working Group. They will coordinate activities, meetings, conference calls, grant proposals, and annual reports.

Institutional units with roles and responsibilities: Maine Department of Agriculture, Food and Rural Resources will serve as the lead institution for this proposal.

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Appendix A. NE School IPM Working Group Members

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Appendix B. NE School IPM Priorities

Appendix B: NE School IPM Working Group Priorities

Ranked by NE School IPM Working Group, 2010. Reviewed and updated, 2011.

School IPM MANAGEMENT (implementation) needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.	
Rank	
1	Identify and piggyback with ongoing environmental health efforts and coordinate with partners in promoting IPM to help schools (including child care facilities, private and public pre K-12 schools) to meet health, high performance and safety, economic, and energy efficiency goals.
2	At school district and/or local school level, establish or use existing diverse local stakeholder committees to advocate for policies and procedures that implement proven IPM strategies and practices.
3	Track adoption of IPM practices in schools and disseminate economic, environmental and/or health impacts of IPM (eg case studies, research data).
3	Assist schools in prioritizing major pest management needs especially with current budgetary constraints.
4	Form a stakeholder coalition to advocate for establishment of IPM laws and policies where none exist.
5	Implement and enforce existing laws and policies at the highest level of economic and regulatory accountability.
6	Recognize schools, organizations and pest management providers that practice verifiable high level IPM.
	comments (submitted by individual members):
	Biggest priority should be to assist in the transfer of existing information to schools, school districts, and states that do not currently use IPM without the seemingly wasteful need for re-invention of existing successful programs. It seems we spend a lot of time coming up with the same IPM programs and call it development and implementation, when all it is is re-issuing of accepted and known successful programs.
	local, regional and national efforts are all necessary

School IPM RESEARCH needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.	
Rank	
1	Identify efficacious least-risk products and tools to manage pests.

2	Evaluate building design, construction, renovation, and maintenance criteria (such as 'green buildings', LEED(Leadership in Energy and Environmental Design), LEED for Schools EB (Existing Buildings), CHPS (Coalition of High Performing Schools), EPA(Environmental Protection Agency) Tools for Schools (Indoor Air Quality), HealthySEAT (School Environmental Assessment Tool), sports fields and landscape design criteria, etc) for presence of IPM principles and practices and rates of adoption and provide recommendations for inclusion of IPM principles/tactics in these criteria.
3	Compile data/information on effects of pesticides and pests on children's health and academic performance, and the influence of IPM in addressing health and performance indicators.
4	Evaluate efficacy and risk/benefits of EPA-exempt (25b) products.
5	Research on the impact of pest management on indoor and outdoor school environmental health (eg school's well water, school gardens, use on adjacent properties).
6	Develop analysis tools and conduct in-depth inspections of schools to determine what pest management practices are really being used.
7	Research and evaluate outreach methods to determine most effective methods for school/community audiences.
8	Compile, update, and evaluate state requirements and resources for school IPM.
9	Research effective teaching methods to teach students and teachers about IPM
	Comments (submitted by individual members):
	Right now the biggest need is to identify what "green" school/building/program initiatives are compatible with IPM and in what ways. For instance, is composting outside of facilities compatible with an IPM approach if it attracts more pests to schools which are limited in their response to the pests?
	Research on impact of pest management on environmental health should include 25b products. The outcome of this research should identify least-risk products and tools too.

School IPM REGULATION needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.	
Rank	
1	Identify and promote interagency cooperation among regulatory, environmental, health, insurance, education, and other agencies.
2	Enforce existing IPM laws and policies, at the level of fiduciary and regulatory accountability, and establish these laws and policies where none exist.
2	Incorporate IPM into school wellness legislation.
3	Encourage states to adopt certification programs for indoor and outdoor school IPM providers.
4	Evaluate regulatory approaches to use of EPA exempt (25b) products and determine if these products are accessible for use by schools under existing state and federal regulations.

5	Review Pesticide Safety Education core standards and make recommendations to include IPM principles and practices.
6	Advocate for change at federal level (SEPA: School Environmental Protection Act, NCLB: No Child Left Behind, HHPS Act).
7	Advocate for funds for enforcement of pesticide regulations
8	Quantify costs to regulatory agencies for enforcement of school IPM regulations.
9	Include students and teachers in OSHA-like protections.

School **IPM EDUCATION/OUTREACH** needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.

Rank	
1	Develop and utilize educational methods appropriate for the audience (for example for facilities directors, administrators, teachers, rural, suburban and urban audiences) and conduct outreach to all stakeholder groups (teachers, athletic managers and coaches, staff, students, facilities managers, administration, policy makers, regulators, vendors, building owners, occupants, community members, families).
2	Implement/promote K-12 curriculum-based education. Promote IPM Service Learning for example using school buildings/grounds and community settings. Promote inclusion of IPM in education standards.
3	Outreach to schools and the public about turf management options that are sustainable, organic, and/or use IPM management practices.
4	Conduct pilot demonstrations in schools in the northeast region.
5	Educate policy makers about the needs and benefits of IPM in terms of dollars, health, environment and academic performance. Advocate for funds for IPM education.
6	Coordinate and piggyback education efforts with parallel efforts (ie 'Tools for Schools' type programs).
7	Work with vendors of pest management, custodial services and supplies and other services to provide IPM education, supplies and service.
8	Educate school IPM coordinators/facilities director on how to interpret service tickets/invoices from pest control providers. Develop model IPM service records for use in promoting easily understood and comprehensive service records including non-pesticide solutions.
9	Improve linkages between regulatory agencies and Cooperative Extension.
10	Promote inclusion of IPM lessons into teacher education programs at universities.
	Comments (submitted by individual members):
	addressing the first item in the list should include 1) IPM lessons for teacher education at universities, 2) educating policy makers, 3) sustainable turf practices, 4) K-12 education, and more.

Appendix C. NE School IPM Working Group Strategic Plan

*Northeast School Integrated Pest
Management Strategic Plan*



November 2011

Northeast School Integrated Pest Management Working Group

Acknowledgements

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Executive Summary

Pest management practices in our region’s schools are in need of continued improvement. Nationwide more than 50 published surveys and studies since 1994 have documented situations of illegal pesticide use, unsafe pesticide exposure, and unmanaged pest infestations.

Integrated Pest Management (IPM) has made the improvement of these practices affordable and worthwhile. It has proven to reduce pest complaints and pesticide use in schools and other public places by 71% to 93%. This reduction has been seen without an increase in long-term costs.

Implementing IPM in a public space requires an expert pest manager who understands pests and safe methods for controlling them. Detailed inspections and the monitoring of pest conducive conditions and environments are necessary, as well as the prevention of pests through sanitation, facility maintenance, and education. Pesticides should be resorted to only when non-chemical measures are ineffective and the product chosen should have the least toxicity and potential for exposure.

The Northeast IPM Working Group (NESIWG) is challenging individuals and organizations to find ways to replicate the success of IPM in all schools throughout the region.

The goal of this Strategic Plan is to set out a plan of action to achieve full implementation of IPM in all of our regions schools.

Downscale this fluffy statements about providing guidance and identifying opportunities Specifically, prompt and coordinated action is required to:

- Increase awareness among the school community and key influencers of the problems and availability of ready solutions to reduce pest problems and pesticide exposure;
- Generate a commitment from agencies, organizations and individuals already working in and influencing schools to actively participate;
- Provide financial, material and human resources to implement proven approaches including education, regulation and specific management tactics that prevent and avoid pest problems;
- Improve regulations and compliance with existing laws;
- Address research questions that may lead to less hazardous approaches to managing common and occasional pests in schools;
- Educate staff and students about the benefits of IPM and how they can apply this approach to their homes and workplaces; and
- Increase financial resources available to meet these objectives.

In preparing this plan, we have enlisted participation by stakeholders throughout the region.

Introduction

Pests and pesticides can pose a significant risk to people, property and the environment. A number of well-documented studies have demonstrated the strong link between uncontrolled pest populations and risks to human health (Schal and Hamilton 1990, Rosenstreich et al. 1997, Sporik et al. 1990, Ash & Greenburg 1980, Childs et al. 1994). Likewise, pesticide use and

exposure can also pose risks to both humans (Whitemore et al. 1994, Whyatt et al. 2002, Eskenazi et al. 1999) and the environment (Larson et al. 1997). Some pesticides contain carcinogens, endocrine disruptors, and asthma triggers.

Children are especially sensitive to pesticide exposure risks because they are smaller and their organ systems are still developing and because of their behaviors such as playing on the floor and ground and a tendency to put object in their mouths (National Research Council 1993). The health risks of children's exposure to pesticides in schools are measurable and preventable (Alarcon et al. 2005).

With some of the highest childhood asthma rates in the country, it is critical that northeastern schools use effective and low-risk pest management practices. IPM offers the best means of ensuring that schools are safe, healthy, and productive places to work and learn. Studies have shown that IPM practices significantly reduce exposure risks to pesticides and pests and improve health (Nalyanya et al. 2009, Juneau et al. 2009, Landrigan et al. 1999). A study of schools showed that IPM practicing schools had little pesticide residues whereas conventionally treated schools had residues on baseboards and walls (Williams et al 2005). Application of an IPM implementation program in ten school districts spanning seven states averaged a 71% reduction in pesticide applications and a 78% reduction in pest complaints (Gouge et al. 2006). The Center for Disease Control recommends reducing pest infestations and adopting IPM as primary strategies to address asthma (CDC 2010). IPM also improves food and fire safety, improves security and reduces energy costs.

Schools are much in need of support to assist them in adopting IPM practices. In fact, a number of states in our region including Maine, Massachusetts, Pennsylvania, Rhode Island, Connecticut, New Jersey, Maryland and West Virginia, require schools to adopt IPM policies or practices. Connecticut and New York have passed legislation that greatly restricts pesticide use on school grounds. However, with scarce resources allocated to provide tools and training many schools are not in compliance. In a recent survey of New England schools (Clifton, 2009) 42% reported pesticides are used but only 61% have a written pesticide use policy. In Massachusetts, all schools are required to have a written IPM policy but the survey showed that 23% do not.

Two-thirds of schools indicated that pests such as wasps, ants, head lice, mice and rats are a problem. Almost 40% of school maintenance and custodial staff, and 30% of teachers and principals said they need IPM education. Therefore, our region's schools need a plan of action that is worked on from many levels and by many people. Our IPM working group has established a list of priorities that will bring our schools closer to a fully established IPM system and safety for our region's children.

Improvements are Needed

Numerous studies and surveys over the past 13 years have documented deficiencies in pest management in schools including hazardous pesticide use and uncontrolled pest problems (Appendix G). In non-IPM schools, neurotoxic pesticide residues can contaminate baseboards and floors (Williams *et al.* 2005). These residues were also found on walls at even higher concentrations, likely due to the fact that walls are washed infrequently. German cockroach allergen levels are also higher in non-IPM schools, and as high as 100 times greater than clinically relevant levels (C. Schal, NC State Univ., pers. comm., May 2007). In IPM schools, allergens were below levels of concern.

Regulations addressing pest management in, around and adjacent to schools vary greatly between states (Appendix B, Beyond Pesticides 2007). Requirements in some states include posting and notification of pesticide applications, re-entry periods before staff or students are permitted in treated areas, qualifications for applicators of pesticides in schools, pesticide product selection, adoption of IPM policies or plans, and buffers between neighboring pesticide uses and schools. Federal legislation has been proposed unsuccessfully since 1999 (re-introduced most recently as House Bill 3290 in August, 2007).

School district policies also vary widely, with the majority of districts having no formal policies specific to pest management practices and no designated IPM coordinator directing program implementation.

In 1999, a survey of Vermont schools indicated 75% of respondents used pesticides monthly and 30% made regular applications whether pests were present or not (Sterling and Browning 1999). Fifty-eight percent of schools using pesticides kept no records of use. Less than 13% of schools posted signs or warned students before or after applications.

Illegal practices have been reported in several surveys, including application of pesticides no longer registered for use in schools (Becker *et al.* 1998, Miller 2002). Onsite evaluations of more than 29 school systems in more than 14 states indicated that nearly half were violating legal requirements or formal district policies related to pest management (Green *et al.* 2007). Three of the 29 districts had outdated, unregistered pesticides in storage, including DDT.

Both school district and general use policies and specifications for sanitation and maintenance, even those included in current standards for “green” buildings (US Green Building Council 2005), fall far short of even basic measures that impact pest management, such as installing door sweeps at the base of exterior doors to prevent pest entry which can reduce pest complaints by up to 65% (F. Oi, Univ. of Florida, pers. comm., June 2007). School district maintenance, operations, custodial and food service staff represent front-line defenses against pest problems and need greater support including education, support tools and recognition for their key roles.

Asthma is epidemic among children in the US and other countries, impacting nearly 6% of school children nationally, with rates as high as 25% in at least one urban center (Centers for Disease Control 2006, Nicholas *et al.* 2005). Asthma can result from and be triggered by exposure to cockroaches, other pests and pesticides (reviewed in Beyond Pesticides 2005). The cost of treating asthma in children under 18 years of age is \$3.2 billion per year (Centers for Disease Control 2006).

More than 12.8 million school days are lost per year due to asthma alone (American Lung Association 2005). Exposure to pests and pesticides can both cause asthma and trigger asthma attacks (reviewed in Beyond Pesticides 2005).

Learning ability and long-term health can also be directly affected by children's exposure to certain pesticides. Of the thousands of pesticide products that may legally be used in schools, some products and uses are especially hazardous and unnecessary. Liquid formulations sprayed on exposed interior and exterior surfaces, and volatile, semi-volatile, granular and dust formulations are more likely to result in exposure. A number of pesticides commonly used in schools (Beyond Pesticides 2003, Green *et al.* 2007) have been identified as neurotoxins or possible or known carcinogens or developmental and reproductive toxins by US EPA and other authorities (US EPA 2000, 2006; California EPA 2006). Yet these products and uses persist when effective, affordable and less hazardous options are available.

Currently, information to fully document the extent and impacts of pest problems and pesticide use in schools is not collected. Records detailing short-term illnesses due to pesticide exposure are limited, and virtually no information exists on occurrences of long-term illnesses resulting from pesticide use and exposures in schools. Barriers to documenting impacts include the multiple potential causes for short and long-term symptoms and illnesses associated with exposure to pests and pesticides. The absence of data does not mean the lack of harm to children and adults in schools or elsewhere in the community. Unknown or poorly understood potential hazards argue for additional levels of protection including exposures to multiple pesticides, at home, at school and in the diet; exposure to chemicals in combination with pesticides such as pharmaceuticals, industrial compounds and personal care products; and the general difficulty in attributing chronic illnesses to any one particular cause (US GAO 1999).

IPM has gained recognition among the school community as a desirable approach, however constraints to adoption remain similar to those developed by the Institutional Constraints Resolution Team at the National IPM Forum fifteen years ago (Sorensen 1992). These include low awareness of the need and benefits among those agencies, organizations and individuals with potential roles in school IPM; insufficient resources to apply

available expertise and existing proven tools; poor enforcement of regulations and insufficient regulations in many states; competing priorities including budget shortfalls, deferred maintenance and security; and lack of national and regional coordination.

Poor understanding of the partnership required between pest managers and the rest of the school community, together with poor quality control over pest management services also impede the full implementation of IPM. In fact, many in the school community believe that adopting an IPM policy and/or entering into a contract for an IPM service is all that is required. Training in pest prevention is largely nonexistent for front line staff including administration, teaching, custodial, food service, maintenance and facility design and construction. Weed management is particularly challenging, with limited awareness and availability of alternatives to chemical-intensive management.

Schools provide an exceptional and underused opportunity to educate students about the benefits of IPM in homes, businesses and other public buildings. To date, only one state, Pennsylvania, requires instruction in IPM as part of the school curriculum. Conversely, schools that continue to use unsafe practices or put up with unmanaged pest problems are teaching the wrong lessons to both staff and students.

Substantial Near-Term Improvements are Achievable

The types of organisms that become pests in schools are well known, well understood and few in number. These potential pests can be readily managed with design, construction and maintenance practices to exclude pests and reduce harborage and access to water; sanitation practices that limit access to food; and mechanical controls including traps. When non-chemical approaches fail to deliver acceptable results, reduced toxicity pesticides including botanicals and other biopesticides, and premanufactured, tamper-resistant bait stations are available that can be placed in areas inaccessible to children to greatly limit potential for exposure.

Sharp reductions in both pesticide use and pest complaints in schools and other public buildings are achievable and affordable. An implementation model documented in two school systems achieved an average 71% reduction in pesticide use and 78% reduction in pest complaints over a two to three-year interval in each district (Gouge *et al.* 2006). Implementing an IPM-based contract for structural pest control services coupled with competent oversight of service providers reduced pesticide use by 93% and pest complaints by 89%, with immediate reductions in insecticide sprays when the contracts were initiated (Greene and Breisch 2002).

The Center for Disease Control recommends reducing pest infestations and adopting IPM in schools as effective primary strategies for addressing asthma. Schools implementing IPM had lower pesticide residues on exposed surfaces, and costs and pest control were comparable to schools receiving regular pesticide applications (Williams et al. 2005).

Surveys indicate some improvement over time, or at the very least, an increased awareness of health and safety issues around pesticide use. For example, the number of school districts reporting insecticide use as the most common response to ant complaints dropped by 50% between 2001 and 2004 (Barnes and Sutherland 2005).

New legislation is driving IPM adoption in many states. As of 2002, 33 states had rules or regulations specifically addressing pesticide use in, around or near schools, up from 30 in 2000 (Owens and Feldman 2002). This assortment of state and local regulations could be standardized with comprehensive Federal legislation or with a “Best Practice” model.

Broader trends with potential to support accelerated change include:

- Green chemistry and specifically the development of reduced-toxicity pesticides, which have been the majority of new registrations in recent years, including biologically based products such as microorganisms and naturally occurring substances;
- Improved tracking of urban and suburban pesticide use patterns and documentation of health and environmental impacts;

- Green cleaning which focuses on increasing the effectiveness and reducing hazards associated with sanitation practices and product selection including antimicrobial pesticides;
- Green building which attempts to reduce negative environmental and personal health impacts of design, construction and maintenance practices and products, and has potential to incorporate IPM principles and practices in greater detail;
- Indoor air quality improvement programs which should incorporate reduction in pest-related airborne contaminants such as cockroach allergens and volatile pesticides; and
- The broader healthy schools movement which in some cases already includes IPM along with other health and safety issues including diesel fume reduction, student nutrition, and green cleaning, green building and indoor air quality.

NESIWG IPM Priorities

The following table lists priority needs identified by the NESIWG in 2010. Priority needs are organized by four categories: Management (implementation), research, regulation, and education. These priorities were developed through a formal process of brainstorming, processing, and voting by membership including review by stakeholders.

NE School IPM Working Group Priorities

Ranked by NE School IPM Working Group members via on-line survey conducted June 2010

School IPM MANAGEMENT (implementation) needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.	
Rank	
1	Identify and piggyback with ongoing environmental health efforts and coordinate with partners in promoting IPM to help schools (including child care facilities, private and public pre K-12 schools) to meet health, high performance and safety, economic, and energy efficiency goals.
2	At school district and/or local school level, establish or use existing diverse local stakeholder committees to advocate for policies and procedures that implement proven IPM strategies and practices.
3	Track adoption of IPM practices in schools and disseminate economic, environmental and/or health impacts of IPM (eg case studies, research data).
3	Assist schools in prioritizing major pest management needs especially with current budgetary constraints.
4	Form a stakeholder coalition to advocate for establishment of IPM laws and policies where none exist.
5	Implement and enforce existing laws and policies at the highest level of economic and regulatory accountability.
6	Recognize schools, organizations and pest management providers that practice verifiable high level IPM.
	comments (submitted by individual members):
	Biggest priority should be to assist in the transfer of existing information to schools, school districts, and states that do not currently use IPM without the seemingly wasteful need for re-invention of existing successful programs. It seems we spend a lot of time coming up with the same IPM programs and call it development and implementation, when all it is is re-issuing of accepted and known successful programs.
	local, regional and national efforts are all necessary

School IPM RESEARCH needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.	
Rank	
1	Identify efficacious least-risk products and tools to manage pests.

2	Evaluate building design, construction, renovation, and maintenance criteria (such as 'green buildings', LEED(Leadership in Energy and Environmental Design), LEED for Schools EB (Existing Buildings), CHPS (Coalition of High Performing Schools), EPA(Environmental Protection Agency) Tools for Schools (Indoor Air Quality), HealthySEAT (School Environmental Assessment Tool), sports fields and landscape design criteria, etc) for presence of IPM principles and practices and rates of adoption and provide recommendations for inclusion of IPM principles/tactics in these criteria.
3	Compile data/information on effects of pesticides and pests on children's health and academic performance, and the influence of IPM in addressing health and performance indicators.
4	Evaluate efficacy and risk/benefits of EPA-exempt (25b) products.
5	Research on the impact of pest management on indoor and outdoor school environmental health (eg school's well water, school gardens, use on adjacent properties).
6	Develop analysis tools and conduct in-depth inspections of schools to determine what pest management practices are really being used.
7	Research and evaluate outreach methods to determine most effective methods for school/community audiences.
8	Compile, update, and evaluate state requirements and resources for school IPM.
9	Research effective teaching methods to teach students and teachers about IPM
	Comments (submitted by individual members):
	Right now the biggest need is to identify what "green" school/building/program initiatives are compatible with IPM and in what ways. For instance, is composting outside of facilities compatible with an IPM approach if it attracts more pests to schools which are limited in their response to the pests?
	Research on impact of pest management on environmental health should include 25b products. The outcome of this research should identify least-risk products and tools too.

School IPM REGULATION needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.	
Rank	
1	Identify and promote interagency cooperation among regulatory, environmental, health, insurance, education, and other agencies.
2	Enforce existing IPM laws and policies, at the level of fiduciary and regulatory accountability, and establish these laws and policies where none exist.
2	Incorporate IPM into school wellness legislation.
3	Encourage states to adopt certification programs for indoor and outdoor school IPM providers.

4	Evaluate regulatory approaches to use of EPA exempt (25b) products and determine if these products are accessible for use by schools under existing state and federal regulations.
5	Review Pesticide Safety Education core standards and make recommendations to include IPM principles and practices.
6	Advocate for change at federal level (SEPA: School Environmental Protection Act, NCLB: No Child Left Behind, HHPS Act).
7	Advocate for funds for enforcement of pesticide regulations
8	Quantify costs to regulatory agencies for enforcement of school IPM regulations.
9	Include students and teachers in OSHA-like protections.

School IPM EDUCATION/OUTREACH needs that should receive priority for funding and implementation in the Northeast, listed in descending order of importance.	
Rank	
1	Develop and utilize educational methods appropriate for the audience (for example for facilities directors, administrators, teachers, rural, suburban and urban audiences) and conduct outreach to all stakeholder groups (teachers, athletic managers and coaches, staff, students, facilities managers, administration, policy makers, regulators, vendors, building owners, occupants, community members, families).
2	Implement/promote K-12 curriculum-based education. Promote IPM Service Learning for example using school buildings/grounds and community settings. Promote inclusion of IPM in education standards.
3	Outreach to schools and the public about turf management options that are sustainable, organic, and/or use IPM management practices.
4	Conduct pilot demonstrations in schools in the northeast region.
5	Educate policy makers about the needs and benefits of IPM in terms of dollars, health, environment and academic performance. Advocate for funds for IPM education.
6	Coordinate and piggyback education efforts with parallel efforts (ie 'Tools for Schools' type programs).
7	Work with vendors of pest management, custodial services and supplies and other services to provide IPM education, supplies and service.
8	Educate school IPM coordinators/facilities director on how to interpret service tickets/invoices from pest control providers. Develop model IPM service records for use in promoting easily understood and comprehensive service records including non-pesticide solutions.
9	Improve linkages between regulatory agencies and Cooperative Extension.
10	Promote inclusion of IPM lessons into teacher education programs at universities.
Comments (submitted by individual members):	

addressing the first item in the list should include 1) IPM lessons for teacher education at universities, 2) educating policy makers, 3) sustainable turf practices, 4) K-12 education, and more.

Strategic Plan

Objectives

This strategic plan has been written to address our identified regional priorities to fully implement IPM in our region's schools. This plan provides recommended actions that various sectors can take to assist in these efforts.

Sectors Working on IPM

- Northeast School IPM Working Group
 - Diverse group of stakeholders representing state regulators, advocacy groups, research, extension, school administrators, pest management professionals, consultants, and parents
- State and Local Regulatory Agencies
 - State departments of agriculture, environmental protection, local health departments, education, etc.
- Advocacy Groups
 - Non-governmental organizations including PTAs, PTOs, environmental groups, local organizations, parents, the medical community, etc.
- Extension
 - Cooperative States Research Education and Extension Service, county agents, state and regional specialists, national program leaders
- School Administrators and Professional Organizations of School Maintenance

-School superintendents, operations managers, risk managers, etc.

- Consultants

-Consultants from turf management, pest management, food safety, operations, tree care, energy service, environmental health and safety, and green building

- Pest Management Professionals

-Structural pest management service providers and landscape management service providers, including those employed by schools

- Federal Agencies

-USDA, CSREES, US EPA, Center for Disease Control

- Pest Management Product Manufacturers/Distributors

-Pesticide registrants, device manufacturers, distributors/retailers

- Researchers

-At universities or government agencies in the fields of science, technology, and education

- Parents

Recommended Actions for:

Northeast School IPM Working Group

- Evaluate progress of full IPM implementation and locate future needs through monthly meetings/conference calls.

Check in with schools across the region for IPM implementation and maintenance.

Engage with a variety of stakeholders to gauge progress of IPM implementation in northeastern schools.

- Liaison between sectors working on IPM implementation; help coordinate and lead efforts to meet goals.
 - Communicate with various sectors working on IPM implementation and suggest ways that various group can work together to meet goals.
- Identify environmental and health organizations that could be involved with school IPM and enlist partners in these organizations.
 - Work with partners to provide newsletter articles and displays.
 - Present to the boards of these organizations at conferences and meetings.
- Recognize schools, organizations, and pest management providers that practice verifiable high level IPM.
- Implement/promote K-12 curriculum-based IPM education.
 - Share IPM curriculum with local teachers and school districts and offer IPM trainings for teachers. Enlist the help of advocacy groups to promote the importance of IPM education in the K-12 classroom and in educational standards.
- Conduct pilot demonstrations in schools in the northeast region.
- Educate policy makers about the needs and benefits of IPM in terms of dollars, health, environment, and academic performance.
 - Provide conferences and/or presentations for policy makers to educate them on the importance of IPM.
- Coordinate and piggyback education efforts with parallel efforts.
 - Enlist programs such as, Tools for Schools and Ag in the Classroom, to assist in educating people from a variety of sectors on school IPM.
- Promote inclusion of IPM lessons into teacher education programs at universities.
 - Locate teacher education professors in the region and present to them the importance of IPM education to pre-service teachers.

State and Local Regulatory Agencies

- Implement and enforce existing laws and policies at the highest level of economic and regulatory accountability.
- Identify and promote interagency cooperation among regulatory, environmental, health, insurance, education, and other agencies.

- Enforce existing IPM laws and policies, at the level of fiduciary and regulatory accountability, and establish these laws and policies where none exist.
- Review Pesticide Safety Education core standards and make recommendations to include IPM principles and Practices
- Quantify costs to regulatory agencies for enforcement of school IPM regulations.
- Include students and teachers in OSHA-like protections.
- Improve linkages between regulatory agencies and cooperative extension.
- Place educational articles in trade journals such as, the Educational Plant Maintenance Association Journal and the Association of School Business Officials
- Set goals and standards for improving licensing standards
- Develop an annual survey of state regulations regarding school IPM

Advocacy Groups

- At school district and/or local school level, establish or use existing diverse local stakeholder committees to advocate for policies and procedures that implement proven IPM strategies and practices.
- Assist schools in prioritizing major pest management needs especially with current budgetary constraints.
 - Meet with school maintenance professionals to discuss pest management needs and direct them to extension or state agencies to discuss low cost, safe options.
- Form a stakeholder coalition to advocate for establishment of IPM laws and policies where none exist.
- Compile, update, and evaluate state requirements and resources for school IPM.
- Incorporate IPM into school wellness legislation.
 - Form a committee to promote IMP awareness in schools and its effects on student health and wellness.
- Encourage states to adopt certification programs for indoor and outdoor school IPM providers.
- Advocate for change at the federal level.
- Advocate for funds for enforcement of pesticide regulations.

- Evaluate regulatory approaches to use of EPA-exempt (25b) products and determine if these products are accessible for use by schools under existing state and federal regulations.

Extension

- Track adoption of IPM practices in schools and disseminate economic, environmental, and/or health impacts of IPM.
- Research and evaluate outreach methods to determine most effective methods for school/community audiences.
- Develop and utilize educational methods appropriate for the audience and conduct outreach to all stakeholder groups.
- Outreach to schools and the public about turf management options that are sustainable, organic, and/or use IPM management practices.
- Work with vendors of pest management, custodial services and supplies, and other services to provide IPM education, supplies, and services.
- Improve linkages between regulatory agencies and cooperative extension.
- Form statewide school IPM committee with IPM centers, extension directors, specialists, researchers, social scientists, communications staff, and administrators.
- Liaisons with local school boards.
- Train extension educators to carry out school IPM certification.
- Do pesticide inventories in school systems, educate on proper storage and disposal of pesticides.

School Administrators and Professional Organizations of School Management

- Improve relationships between schools and Pesticide professionals
 - Hold meetings to bring school officials and pesticide professionals together to discuss IPM.
- Train key individuals to serve as IPM coordinators for each school district
- Seek out training opportunities and educational materials for local school officials on school IPM

Seek out an extension office to locate educational materials and news about training opportunities.

- Oversee preventative maintenance schedules.

Consultants

- Get information out about IPM services that are available to schools.
- Provide presentations at trade and professional meetings.
- Collaborate with extension and advocacy groups to reach common goals.

Pest Management Professionals

- Educate school IPM coordinators/facilities directors on how to interpret service tickets/invoices from pest control providers.
- Develop model IPM service records for use in promoting easily understood and comprehensive service records including non-pesticide solutions.
- Provide product application data and information.

Federal Agencies

- Identify efficacious least-risk products and tools to manage pests.
- Investigate opportunities to leverage existing programs (Ag in the classroom, Healthy Homes, IPM, etc).

Researchers

- Evaluate building design, construction, renovation, and maintenance criteria for presence of IPM principles, practices, and rates of adoption.
- Provide recommendations for inclusion of IPM principles/tactics in these criteria.
- Compile data/information on effects of pesticides and pest on children's health and academic performance, and the influence of IPM in addressing health and performance indicators.
- Evaluate efficacy and risk/benefits of EPA-exempt (25b) products.

- Research the impact of pest management on indoor and outdoor school environmental health.
- Develop analysis tools and conduct in-depth inspections of schools to determine what pest management practices are really used for.
- Research effective teaching methods to teach students and teachers about IPM.

Parents

- At local school level establish committees to advocate for policies and procedures that ensure IPM implementation.
- Recruit other parents to participate in advocacy and become educated about pest and pesticide hazards and IPM.

Locate educational materials for the community from the local extension office or state agencies.

Table 4.1 from National Pest management strategic plan. Indicators of high-level IPM fully implemented in schools nationwide. A number of these indicators will be measured annually via the school IPM report card (Appendix C) to be completed by state lead contacts and reported to Sherry Glick, US EPA national school IPM coordinator, and the national working group. Others will be measured during evaluations to be conducted at mid-term (2012) and final (2015) evaluations.

1. All school systems have a board-approved IPM policy.
2. All school systems have a written IPM plan.
3. All schools have an IPM coordinator, i.e., a trained individual responsible for day-to-day interpretation of the IPM policy for a school or school system.
4. IPM is the way pests are managed for both structural and landscape pests including:
 - a. Pest managers working in schools can accurately assess pest problems and respond appropriately.
 - b. All schools have an inspection and monitoring program in place to detect pest problems and pest-conducive conditions early.
 - c. Pest management actions are based on monitoring and thresholds.
 - d. All schools can evaluate and oversee any structural pest and landscape management service providers for IPM performance.
 - e. Prevention is the primary strategy, pest management is proactive.
 - f. Pest proofing is a primary consideration in all new construction and renovations, and pest managers provide input on these plans and review construction in progress.
5. IPM training is a component of ongoing training for school staff in all schools.
 - a. All staff and students are aware of what IPM is and what the benefits are.
 - b. Everyone working on school health and safety issues including indoor air quality and green cleaning incorporates IPM in their work.
 - c. All coaches are educated on IPM practices for athletic fields and facilities.
6. All Departments of Education incorporate pest proofing into facility design specifications.
7. US Green Building Council fully incorporates IPM into program for new buildings and existing buildings.
8. All states include a full set of school-specific IPM elements in training and licensing process for applicators.
9. Training curriculum is offered on an annual basis nationally for change agents (any person that acts as a resource and catalyst for change by marketing the advantages of IPM to decision makers in the school community).
10. Sustainable funding is secured for ongoing demonstrations and coalitions in all states, and for an individual in each state lead agency to focus on school IPM.
11. All school systems use science-based criteria for identifying and selecting least hazardous pesticides when pesticides are needed.
12. All school IPM programs and plans are evaluated annually.
13. Pest problems and pesticide applications in schools are rare events due to successful implementation of IPM!

**Appendix D. NE IPM Working Group Literacy Plan for K-12
IPM Education**



Integrated Pest Management Literacy Plan

For K-12 Education



October 2011

Northeastern School Integrated Pest Management Working Group

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Executive Summary

This Literacy Plan was developed by the Northeastern School Integrated Pest Management Working Group (NESIWG) in collaboration with educators from throughout region. The purpose of this plan is to identify needs and opportunities for improving awareness of the environmental and human health impacts of pests and pest management practices, including pesticides, and to increase problem-solving skills among future generations of earth's stewards. This plan is intended as a road map for use by K-12 educators, pest management specialists and others to identify pathways for collaboration and partnership, strengthen the availability and utility of educational resources, and ultimately, promote increased human and environmental health and a stable food and fiber supply. We recommend establishment of IPM literacy task forces to lead efforts at regional, state and local levels to:

- 1) identify and evaluate existing K-12 IPM educational resources,
- 2) lead the development of new resources for K-12 IPM education and make resources widely available to educators,
- 3) strengthen local, state, and regional networking and partnership opportunities to support K-12 IPM education,
- 4) incorporate IPM learning goals into K-12 education standards in each state,
- 5) encourage and support inclusion of IPM education in teacher training programs, and
- 6) cover mandatory requirements within the curricula.



Introduction

What is Integrated Pest Management and Why is it Needed?

Undoubtedly, the first question for most people is 'What is Integrated Pest Management?' Integrated Pest Management (IPM) is an approach to managing properties, such as farms, homes, schools, gardens, to protect ourselves and our resources from pests while minimizing risks. IPM emphasizes the use of biological, physical and cultural methods to keep pests out and uses pesticides usually as a last resort. This approach has been used very successfully, for over 30 years, first by farmers and more recently by pest managers in every setting, to protect people, our food and fiber supply, and the environment from the potentially harmful impacts of pests and pesticides. Yet, most people have never even heard of IPM!

Before the widespread availability of chemical pesticides, people used cultural practices and common sense to manage pests around the home and on the farm. In recent years, however, homeowners increasingly turn to widely and readily available chemical pesticides. Advertisers promote pesticides as a 'silver bullet' for everything from ticks, mosquitoes, and weeds to ants and bathroom mold. According to the US Environmental Protection Agency, 100 million pounds of pesticide active ingredients were applied in homes and gardens in the United States in 2001. Of that, homeowners used 13 percent of the total amount of herbicides used in the U.S., 16 percent of total insecticides and miticides, and 16 percent of total fungicides (1). This increased reliance on pesticides is not without risk. The instructions for product use are often printed in very small type and the precautionary language can be difficult to interpret. The potential for misuse is high. In fact, statistics show alarming rates of pesticide poisonings in the U.S. 2005, over 93,000 people reported unintentional exposure to pesticides --excluding disinfectants. Twenty percent of these required treatment in health care facilities and more than 20,000 cases showed clear signs of poisoning (2). Education to reduce reliance on pesticides is needed.

With IPM the goal is to protect the resource (people, our communities and our food and fiber crops) while minimizing harmful impacts. This requires taking a holistic view to know when and what kind of pest management intervention is needed to tip the balance of nature in our favor. Effective use of IPM requires that we learn a bit about why nature sometimes becomes a pest. For instance, when is a plant considered a weed? Why do carpenter ants play an important role in maintaining forests, but are feared pests in our homes? Armed with a basic understanding of pest biology and ecology we can keep pests from causing us harm without disrupting the natural environment. When we learn the conditions leading to pest problems, we can often eliminate pests simply by changing those conditions.

The need for improving competence in the scientific fields in the U.S. has been well recognized (3). Science, technology, engineering, and math (STEM) initiatives at the national, state and local levels have been undertaken to increase literacy and spur interest in careers in science, technology, engineering and math (4). At the same time, environmental literacy has been identified as a critical need to reconnect people with nature (5, 6). IPM provides an all of these needs by providing relevant and practical application of biology, ecology and math using real world examples. IPM methods are biological (such as encouraging populations of good bugs to eat the pest insects), physical (e.g. using a heater to kill bed bugs), cultural (e.g. altering planting times to avoid pests), regulatory (e.g. laws prohibiting transport of pests), genetic (e.g. breeding disease-resistant plants), or chemical (e.g. use of pesticides and repellents). Therefore, elements of physical science, health, language arts, and even public policy, are naturally woven into IPM learning.

Is it just farmers and foresters that need to learn about IPM? No! We all make pest management decisions every day in our actions and our purchases of products and services. Questions such as ‘Do I need to hire an exterminator or is that just a harmless bug in the house?’ and ‘What kind of repellent is best for mosquitoes and ticks?’ and ‘What’s the best way to keep our lake-front lawn green?’ can only be answered with a basic understanding of the ecological and biological processes involved. To protect people and our food and fiber supply from pests while safeguarding the planet against environmental harm the next generation needs to be IPM literate.

What is IPM Literacy?

IPM literacy means:

- Understanding what the term ‘pest’ means. Understanding that no living organism is inherently a pest, rather, the concept of ‘pest’ is human-defined. Understanding that people call a living organism a ‘pest’ when and where its population density threatens our health and comfort or food and fiber supply.
- Understanding the ecological roles of ‘pests’ in the natural world; for example, how pests interact with other organisms and the environment.
- A basic understanding of the biological, ecological and physical processes that cause pest ‘problems’.
- Knowledge that people can utilize cultural, physical, mechanical, biological and regulatory means along with selective least-risk use of chemicals when needed, to keep pests below harmful levels.

Why Teach Integrated Pest Management to K-12 Students?

- IPM education includes basic science learning that connects K-12 students to the real world.
- Children and adults are confronted with pests regularly and must make informed decisions to protect themselves from pathogens, biting insects, poisonous plants, and sometimes even vertebrates such as rodents.
- Traditional, pesticide-based pest control approaches threaten human health and cause environmental disruption. The next generation of earth's citizens must be informed about sustainable, least-risk pest management practices to protect our food and fiber supply, safeguard the environment and promote human health.
- IPM provides relevant examples demonstrating impacts of human activity on the environment.
- IPM provides practical knowledge that students and teachers can use in school gardens, greenhouses, agricultural/horticultural programs ,vocational/technical education programs, and in their own homes.

How Should IPM be Included in K-12 Curricula?

- We recommend that basic IPM concepts be introduced as part of science, math, language arts and social studies in elementary grades, with more advanced concepts and applications being integrated with the same disciplines in high school. In addition, IPM education fits very well with agricultural and environmental education. IPM is an essential learning objective in school garden projects, school greenhouses, and farm-to-school nutrition initiatives.

A graduated approach to integrated pest management education should follow a logical progression from awareness about pests and IPM in lower grades to knowledge that can be applied to real pest management situations in higher grades. A framework for introducing IPM concepts integrated with environmental science and ecology, borrowed from Pennsylvania's academic standards is shown in Appendix A.

Connecting Integrated Pest Management to Environmental and Agricultural Literacy:

- Environmental and agricultural literacy is crucial for the next generation to succeed in creating a sustainable society.
- IPM is part of environmental and agricultural literacy. IPM lessons provide excellent learning opportunities about human interaction with the environment, and illustrate the importance of responsible stewardship.

- This document identifies opportunities for collaboration with environmental and agricultural literacy initiatives and established programs to share resources, build on successes, and meet a unified common goal of improving environmental, agricultural and IPM literacy among the next generation of earth's stewards.

Examples of Scientific Concepts and Topics that can be Included in IPM Education:

- Animal and plant reproduction
- Biological diversity
- Carbon cycle and water cycle
- Chemistry, biochemistry and physics
- Classification of living organisms
- Community ecology
- Ecological food webs and nutrient cycling
- Invasive species
- Life cycles of plants and animals
- Microbiology and cellular biology
- Photosynthesis
- Pollution prevention
- Population ecology
- Predator/prey relationships
- Sustainability

Strategic Plan

Objectives

- Increase understanding about IPM among students and educators in the Northeast.
- Promote and support collaboration among environmental, agricultural, science and IPM education programs to support common goals and avoid duplication of efforts.
- Identify needs and opportunities to promote the availability of existing IPM education resources to educators and education specialists.

Establishment of a Northeast Regional IPM Literacy Task Force

We recommend that an IPM literacy task force be developed with key representatives from each Northeast state to develop, promote, and support IPM education in K-12 schools throughout the region.

Potential members include representatives of state education, conservation and agriculture departments, Agriculture in the Classroom coordinators, 4-H and FFA leaders, environmental education organizations, classroom teachers, school district curriculum coordinators, Cooperative Extension educators, and others involved in K-12 agricultural, environmental and science education. The task force should provide leadership to:

- 1) identify and evaluate existing K-12 IPM educational resources,
- 2) lead the development of new resources for K-12 IPM education and make resources widely available to educators,
- 3) strengthen local, state, and regional networking and partnership opportunities to support K-12 IPM education,
- 4) incorporate IPM learning goals into K-12 education standards in each state, and
- 5) encourage and support inclusion of IPM education in teacher training programs.
- 6) promote IPM curricula as a means of addressing mandatory curriculum requirements

Recommended Engagements of the Regional Task Force

- **Recruit regional, state and local partners/stakeholders to identify and promote opportunities for improving IPM literacy at the K-12 level.**

Partners/stakeholders can be identified through cooperative extension offices, state agriculture departments, environmental education organizations and centers, science education networks, Agriculture in the Classroom programs, Summer Agriculture Institute, and local school districts. These partners/stakeholders are essential for the development of new initiatives and in identifying opportunities for partnership with on-going educational programs. The ultimate goal is to empower all K-12 students to make informed decisions to protect themselves and our planet's resources from pests while minimizing risks of pesticide exposure. These partners/stakeholders can be instrumental in establishing a regional or national coalition to promote and support K-12 IPM literacy similar to that which has been established for environmental education (4).

- **Recruit topic experts and educators to provide teacher training and classroom resources**

Topic experts and educators can be identified through state agriculture departments or cooperative extension offices. These individuals need the knowledge to teach strategies for IPM education in the classroom and to give educators resources for this purpose. The task force should locate and contact these individuals so they can be asked to present about IPM education at workshops, schools, higher education institutions, and in other educational communities.

- **Evaluate, compile and distribute curricula, resources and materials for IPM education**

The task force should appoint members to search for IPM resources and materials that will inform and direct educators on next steps. This compilation should be user-friendly and comprehensive and can be distributed to local school systems, higher education institutions, and environmental education facilities. *A list of potential resources can be found at the end of this plan.*

- **Build and maintain a web-based compilation of IPM resources and materials for educators to access directly**

This web-based collection should include curricula, individual lesson plans, information about IPM, strategies for IPM integration in the classroom, and contact information for experts in the field. It can also include related environmental and agricultural resources. The location of this web resource should be sent to schools and environmental education programs so that it is easily accessible for teachers.

- **Connect IPM partners with educators to engage children in non-traditional learning environments**

These partners should include environmental and/or agricultural educators that offer learning environments outside of the classroom where they can expose students to the environment around them and ways that they can care for it in a responsible and educated way. The task force should identify these educators and put them in touch with local school administrators and individual classroom teachers to set up learning opportunities.

- **Explore opportunities for including IPM concepts in national, regional and state academic standards**

Task force members should contact curriculum coordinators/developers in their local schools and state departments to determine the process of curriculum development and opportunities for including IPM. The task force should also work on a proposal and presentation that details the importance of IPM education and reasons why it should be included in academic standards.

- **Explore opportunities for piggy-backing IPM education with environmental and agricultural education**

Contact should be made with environmental education facilities to determine ways to include IPM lessons in already established environmental/agricultural education curriculums.

Recommended Actions for Educators

Department of Education:

- Research, develop, and promote national and state academic standards that require students to learn about the environment and IPM

Each state department of education and the US Department of Education should review the current academic standards and find ways to incorporate ideas on IPM and environmental protection so students better understand how to responsibly care for the environment and its people.

Institutions of Higher Education:

- Insert IPM education into pre-service teacher education

Institutions of higher education in the northeast should take action by including instruction to pre-service teachers about the importance of IPM education and the ease in which IPM can be included in science, mathematics, and environmental units in the K-12 classroom. This instruction could be included in science methods classes for upcoming elementary school teachers or in a variety of classes for upcoming high school science teachers.

- Promote the importance of environmental education in the K-12 classroom through conferences for educators and in undergraduate and graduate education courses

Higher Education institutions should implement conferences to bring educators together from various communities to discuss environmental education and to present the importance of educating students on IPM in the classroom. This large educational discussion will promote awareness about IPM and begin to educate teachers on its meaning and importance.

K-12 School Districts:

- Identify IPM educators in each state/district that will act as guest speakers for surrounding schools

These educators can be located through the local cooperative extension offices or the state agricultural department. They should be invited to speak to local educators about inserting IPM into their curriculum. They can also be invited into schools to present to students on IPM and other agricultural/environmental issues.

- Identify IPM educators to offer workshops on IPM education for teacher accreditation

School districts should contact cooperative extension offices in their area to find candidates to teach workshops on IPM education to their district teachers. By offering accredited workshops teachers have incentive to learn the content of IPM and strategies for incorporating it into the classroom.

- Investigate the current curriculum plan to see where IPM could be integrated or added
The district can ask the curriculum coordinator or a group of interested teachers to look at the school curriculum and determine places, especially in the math and science curriculum, where IPM instruction can be added.
- Connect teachers with facilities management to develop service learning opportunities for students that promote environmental learning
Schools should partner teachers up with facilities management staff to develop school service learning projects around environmental topics. Service learning projects could include surveying land, pulling weeds, putting out safe pest traps, and much more. These types of activities provide hands-on student learning and provide a great arena for IPM education.
- Educate school health and wellness advocates on IPM and its effects on schools and communities, as well as searching for funding IPM education through healthy school initiatives
By involving school health and wellness advocates IPM education can be promoted in various school departments. This department can also access many grant funds through healthy school initiatives by showing how IPM can lower asthma rates and lessen environmental toxins.

Environmental Education Organizations:

- Insert IPM education into pre-established environmental education programs and workshop offerings
Many independent environmental education organizations offer programs and classes for students and teachers that could easily be integrated with IPM education. These organizations should work to include IPM in their programs and curricula.

Teacher Organizations:

- Promote IPM through organizations like the National Science Teachers Association, the National Education Association, and other local teacher organizations
The promotion of IPM through these organizations will spread the word about IPM education and will get educators interested in learning more about it

Individual Educators:

- Integrate IPM lessons into established science or mathematics units
Science and math units offer a great base for IPM instruction. There are many aspects of integrated pest management that can be introduced with science units about the environment or math lessons about area, or volume. Teachers can find creative ways to

integrate IPM instruction into their established curriculum to promote greater learning without taking too much instructional time.

- Research curricula and lesson plans that teach about IPM

Classroom teachers can take IPM learning and instruction into their own hands by researching a few of the included resources and adjusting established lesson plans to fit in their classroom.

Potential Partners and Collaborators:

Northeast Region

- Northeastern IPM Center
- Environmental Nonprofits, such as Audubon, Gulf of Maine Research Institute, New England Environmental Education Association,
- University of Connecticut Cooperative Extension
- Pennsylvania State University Integrated Pest Management Program
- Maine Department of Agriculture, Food and Rural Resources
- University of Maryland Cooperative Extension
- West Virginia Cooperative Extension

State and Local-level:

- State Departments of Agriculture, Education, Environmental Protection
- State Environmental, Agricultural and Science Teacher Associations
- Agriculture in the Classroom Programs
- University Cooperative Extension programs including IPM Programs, Master Gardeners and 4-H,
- State and local *No Child Left Behind* initiatives
- Local or state-wide STEM (science, technology, engineering, math) education collaborative
- Land trust organizations
- Local and state-wide natural history education centers such as museums
- Local and state-wide environmental education centers (Chewonki, etc).



Expected Outcomes

NESIWG expects that by putting this literacy plan into action the end result will be that students in the northeast region will be provided with IPM education starting in elementary school and continuing through secondary school. It is expected that outcomes will be seen in the content of academic standards, student professional development and in the assessment of student learning and teacher outcomes. Students who have been provided with IPM education will be literate in Integrated Pest Management and will provide future generations with the knowledge they have acquired; thus creating more least-risk pest management practices that guard the environment and protect human health.

Academic Standards

- Key IPM topics will be outlined for suggested use in K-12 curriculum on a grade by grade basis
Examples can include Pennsylvania Ecology and Environmental Educational Standards for K-12 students and alignments of University of Connecticut's IPM Curricula with state and regional standards (see [Appendix A](#)).
- IPM curriculum available in the public domain will be aligned with current federal and regional science and environmental standards, so that these resources are more user-friendly for teachers to adopt

By aligning IPM curricula to academic standards, teachers can easily see where IPM education can fit into their schedules, thus making it easier to integrate IPM education into their classroom.

Professional Development:

- By offering IPM education in the elementary and secondary schools there is a basis for interest in IPM-related professional fields
Trade skills for these fields should then be integrated into technical schools and certificate programs to promote student pursuit of jobs in landscaping, horticulture, arboriculture, agricultural, research etc.

Assessment

- Through the actions outlined in this plan there will be quantifiable student and teacher learning
The impacts of integrated pest management education in K-12 schools will be monitored to evaluate the program's success as IPM awareness and knowledge diffuse throughout the northeast. To evaluate the success of the program we will monitor the number of

trained education specialists and teachers who participate in IPM education workshops. State departments of education can also help track the number of schools providing IPM education to K-12 students. The full means for assessment of the program are outlined in the Logic Model in [Appendix B](#).

Conclusion

This literacy plan was developed by NESIWG to provide background information on IPM, stress the importance of IPM education, and to set up an action plan to include IPM education in our schools. Literacy in Integrated Pest Management means understanding the role of ‘pests’ in the natural world and how our actions against these ‘pests’ directly affects human health and the environment around us. These concepts need to be taught to K-12 students so that they can make informed decisions about how to handle ‘pests’ in their surroundings and the ways in which these actions will affect their health and the environment. IPM education will promote concepts of biology and ecology and can be fit into already established curriculum plans. IPM literacy can be achieved through taking action to promote the education of IPM in elementary and secondary schools.

The goals of this literacy plan are to establish a Northeast Regional IPM Literacy Task Force to take action for IPM education. The task force will be engaged in the identification and evaluation of IPM resources, the development of new resources, the networking of IPM partnerships, the promotion of IPM in academic standards, and the inclusion of IPM in teacher training programs. This task force will also encourage state education agencies, institutions of higher education, K-12 school districts, environmental education organizations, teacher organizations, and individual educators to take appropriate action to include IPM education into the everyday lives of students and educators.

The outcomes of this action plan are that IPM will begin to be incorporated into the everyday lives of students and teachers. IPM will be commonplace in academic standards and in school curricula and students will be encouraged to pursue professional fields related to IPM. Assessments will be conducted to provide quantifiable student and teacher learning and insight into the effects of teaching IPM literacy. Literacy in integrated pest management, coupled with environmental and agricultural literacy are key components of educating today’s generation on what it means to be sustainable. By raising awareness, we hope to change attitudes and behaviors of tomorrow’s decision makers. Integrated pest management is a part of the broader sustainability movement, and these concepts will help form a society that can continue to prosper with respects to the finite resources our planet offers.

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Appendix A

Standards

* Borrowed and adapted from Pennsylvania Environment and Ecology Academic Standards

Elementary School:

Kindergarten / Grade 1	Grade 2/ Grade 3	Grade 4 / Grade 5
Identify living and non living things	Life Cycles, food chains. Basic insect identification	Ecosystem dynamics and illustrate that all organisms depend on living and nonliving features in their environment for survival
Differentiate animals from plants etc.	Differentiate between organisms that humans may classify as pests and/ or beneficial and why they are situation dependent	Introduce integrated pest management and describe common IPM techniques used at the school
Discuss pros and cons of pesticide use	Common household IPM practices to deal with pests (i.e. weeding, cleaning spills etc)	Discuss agricultural systems and how IPM is use to grow crops common to your region

Middle School and High School:

Grade 6/7	Grade 8/9	Grade 10/11	Grade 12
Discuss how human actions can effect an ecosystem and how it can be detrimental to an environment	Explain how pest control can effect humans and the environment	Research and analyze the long-term effects of pest management practices on the environment	Research and design an effective IPM plan for a non-agricultural or agricultural situation, and describe mechanical, biological or chemical methods used
Discuss historical events that have influenced pest management (such as DDT use) and go over short and long term effect	Identify risks associated with pest management practices on terrestrial and aquatic ecosystems	Analyze the risks and benefits to the environment and society associated with alternative practices used in integrated pest management	Research and analyze pest management practices globally

Appendix B

Logic Model

Participants: Northeastern School IPM working group, state and regional governments, private and non-profit organizations tied to IPM

Goal: Integrated Pest Management education in K-12 schools to promote IPM literacy in the northeastern region

Target audience: K-12 schools

Inputs	Outputs	Outcomes		
<ul style="list-style-type: none"> Land grant universities & extension State and federal regulatory agencies Advocacy groups & other NGO's (including related environmental & agricultural organizations) Pest management industry School teachers Teacher organizations Leveraged funds 	<p style="text-align: center;">Audience</p> <ul style="list-style-type: none"> Teachers & Education Specialists Departments of education Environmental & agricultural education/ advocacy groups State & federal regulatory agencies <p style="text-align: center;">Activities</p> <ul style="list-style-type: none"> Collaboration among input groups to pool resources and diffuse IPM awareness (especially environmental and agricultural organizations) Provide IPM education for K-12 teachers Compile database of resources for IPM education Make available IPM resources user-friendly (align to academic standards) Encourage IPM education to be included in regional academic standards 	<p style="text-align: center;">Short Term</p> <ul style="list-style-type: none"> Diffusion of IPM awareness in K-12 teachers Increased number of K-12 students that are exposed to IPM education Collaboration between environmental and agricultural groups that cross promote sustainable practices <p style="text-align: center;">Possible Measurements</p> <ul style="list-style-type: none"> Number of teacher's that participate in IPM education workshops Monitor the number of schools that offer IPM education (work w/ Departments of Education) Work with environmental and agricultural advocacy groups to estimate number of children exposed to IPM through non-classroom settings 	<p style="text-align: center;">Intermediate</p> <ul style="list-style-type: none"> Attitude changes in students and teachers in sustainability Increased IPM knowledge & skills among high school graduates <p style="text-align: center;">Possible Measurements</p> <ul style="list-style-type: none"> School environments that engage in IPM activities; ie, school gardens, reduced pesticide use etc. Number of high school students that graduate who have participated in IPM education or have gained trade skills related to IPM 	<p style="text-align: center;">Long Term</p> <ul style="list-style-type: none"> Improved integrated pest management literacy in citizens in the northeast region to make decisions concerning personal and community- wide activities to promote sustainability <p style="text-align: center;">Possible Measurements</p> <ul style="list-style-type: none"> Increased sustainability within Northeastern communities by engaging in IPM practices <ul style="list-style-type: none"> reduced use of pesticides transition to less toxic pesticides increased cultural, physical & biological controls Transition to landscapes and crops that are native to area that require less maintenance

Participants: Northeastern School IPM working group, state and regional governments, private and non-profit organizations tied to IPM

Goal: Integrated Pest Management education in K-12 schools to promote IPM literacy in the northeastern region

Target audience: K-12 schools

Inputs	Outputs	Outcomes		
<ul style="list-style-type: none"> Land grant universities & extension State and federal regulatory agencies Advocacy groups & other NGO's (including related environmental & agricultural organizations) Pest management industry School teachers Teacher organizations Leveraged funds 	<p style="text-align: center;">Audience</p> <ul style="list-style-type: none"> Teachers & Education Specialists Departments of education Environmental & agricultural education/ advocacy groups State & federal regulatory agencies <p style="text-align: center;">Activities</p> <ul style="list-style-type: none"> Collaboration among input groups to pool resources and diffuse IPM awareness (especially environmental and agricultural organizations) Provide IPM education for K-12 teachers Compile database of resources for IPM education Make available IPM resources user-friendly (align to academic standards) Encourage IPM education to be included in regional academic standards 	<p style="text-align: center;">Short Term</p> <ul style="list-style-type: none"> Diffusion of IPM awareness in K-12 teachers Increased number of K-12 students that are exposed to IPM education Collaboration between environmental and agricultural groups that cross promote sustainable practices <p style="text-align: center;">Possible Measurements</p> <ul style="list-style-type: none"> Number of teacher's that participate in IPM education workshops Monitor the number of schools that offer IPM education (work w/ Departments of Education) Work with environmental and agricultural advocacy groups to estimate number of children exposed to IPM through non-classroom settings 	<p style="text-align: center;">Intermediate</p> <ul style="list-style-type: none"> Attitude changes in students and teachers in sustainability Increased IPM knowledge & skills among high school graduates <p style="text-align: center;">Possible Measurements</p> <ul style="list-style-type: none"> School environments that engage in IPM activities; ie, school gardens, reduced pesticide use etc. Number of high school students that graduate who have participated in IPM education or have gained trade skills related to IPM 	<p style="text-align: center;">Long Term</p> <ul style="list-style-type: none"> Improved integrated pest management literacy in citizens in the northeast region to make decisions concerning personal and community- wide activities to promote sustainability <p style="text-align: center;">Possible Measurements</p> <ul style="list-style-type: none"> Increased sustainability within Northeastern communities by engaging in IPM practices <ul style="list-style-type: none"> reduced use of pesticides transition to less toxic pesticides increased cultural, physical & biological controls Transition to landscapes and crops that are native to area that require less maintenance

Appendix E. Logic Model

Appendix E: Logic Model

Focus Area: School IPM Implementation in the Northeast

Impact Area: Schools

Roadmap Goal: Improve Human and Environmental Health Impacts in Schools through IPM Implementation

