



# Maine Environmental Literacy Plan

## Introduction

### **Vision of an Environmentally Literate Maine**

The daily life of Mainers exhibits a harmony between the human-constructed and natural environments and Maine people are equally at home in both. An environmentally literate Maine will provide or protect natural green areas, food-growing landscapes, watercourses, woods, and animal habitat in which young people can observe and learn as they play and explore. In an environmentally literate Maine, new industries will utilize energy from sustainable sources and will develop transportation that capitalizes on low carbon-emission options. Emerging businesses and technologies will decrease waste streams and more fully utilize the byproducts of those wastes. This vision is dependent upon the intentional development of a common understanding of environmental literacy as the ability to recognize the components of healthy natural and man-made systems and the actions necessary to maintain, restore, or improve them.

Environmental literacy depends upon learning, much of which can happen naturally, but a significant portion of which must be provided by our schools, not necessarily as a course or program but as an integral aspect of other learning. Science, technology, the arts, literature, mathematics, social studies and engineering all present opportunities to test reasoning and thinking about the environment. All offer routes by which to tie students to their smaller and larger communities. Environmental literacy requires that students understand that the world's systems are interconnected and that individuals have the ability and responsibility to make a difference that improves the environment.

Environmental literacy, environmental education, and issues of sustainability are intimately linked. Developing an environmentally literate citizenry requires effective environmental education. Formal and non-formal environmental educators must teach students fundamental concepts about the ecosystem and how people interact with their surroundings. Further, educators must help students to understand that their actions affect the health of ecosystems as well as the social and economic structures that rely on those ecosystems. Fostering environmental literacy will help students to understand and engage in practices that are sustainable over time.

## **The Case for the Maine Environmental Literacy Plan**

Maine's extraordinary natural environment is the foundation of its prosperity and way of life. Maine's major businesses, including fishing, forestry, the wood products industry, tourism, agriculture, and the multiple elements contributing to the creative economy all depend upon the quality of the State's environment. Maine's economic future hinges on the preservation of its environment and requires an environmentally literate citizenry. An effective environmental literacy plan will:

- increase student achievement of Maine's PreK-12 learning goals through proven, effective environmental education experiences;
- increase student engagement by providing classroom connections to meaningful, real-world applications resulting in higher student retention and graduation rates;
- motivate high school graduates to pursue higher education and careers in science, technology, engineering, and mathematics (STEM) disciplines and green careers;
- promote educators' understanding and application of best practices for environmental education through effective professional development and classroom support;
- increase collaboration among non-formal environmental educators and sustainability educators, and leverage their expertise and resources; and
- benefit Maine's environment and economy by preparing young people to become citizens with the knowledge and skills to make responsible decisions that protect ecosystems and support sustainability.

As economic and environmental challenges arise, so do opportunities. Maine's unique combination of human and natural resources positions Maine to be at the forefront of many new technologies and groundbreaking environmental policies. By helping Maine's young people become environmentally literate, the State is cultivating innovation, prosperity, and an informed citizenry with the knowledge and skills to address future challenges.

### **Background:**

Widely supported and co-sponsored by 123 members of the U.S. House of Representatives and 19 members of the U.S. Senate, the bipartisan bill **No Child Left Inside (NCLI)** is believed likely to be included in the upcoming reauthorization of the Elementary and Secondary Education Act. The NCLI bill currently includes \$500 million, for distribution by state education agencies, to equip teachers with the skills and knowledge to integrate environmental learning into their curricula. Only states with qualifying environmental literacy plans will be eligible for a share of this funding.

The goals of the NCLI legislation are explicit:

1. to prepare students to address major environmental challenges facing the United States; and
2. to strengthen environmental education as an integral part of the elementary and secondary school curriculum.

State environmental literacy plans are required to address five **KEY AREAS**:

1. Standards and courses/subjects (**STANDARDS**)
2. Graduation requirements (**GRADUATION REQUIREMENTS**)
3. Measurement of environmental literacy (**ASSESSMENT**)
4. Professional development to improve teachers' environmental literacy and field-based pedagogical skills (**PROFESSIONAL DEVELOPMENT**)
5. Sustainable implementation and funding (**IMPLEMENTATION AND FUNDING**)

## Elements of the Maine Plan

### Goals

The Maine Environmental Literacy Plan (EL Plan) is connected to and consistent with The Maine Statewide Strategic Plan for Science, Technology, Engineering, and Mathematics (STEM), the recent creation of a STEM Advisory Committee by the National Governor's Association, and the findings of the report from the President's Council of Advisors on Science and Technology. The Maine EL Plan places a high priority on improving teachers' knowledge of content and instructional practice, and on developing partnerships that will increase access to effective STEM teaching practices and open green career pathways to more students.

The goals of the Maine EL Plan are to:

1. Develop and disseminate an inventory of environmental literacy programs, providers, and resources and monitor progress in the implementation of environmental literacy in PreK - 12 education. **(KEY AREAS 1 and 3)**
2. Support the development and adoption of the Next Generation of Science standards and social studies standards that reinforce environmental literacy. **(KEY AREA 1)**
3. Monitor graduation rates for students who participate in Career and Technical Education (CTE) programs focused on green occupations and students who participate in environmental education and sustainability education. **(KEY AREA 2)**
4. Correlate student graduation rates and achievement in English language arts, mathematics and science with participation in environmental literacy education. **(KEY AREA 3)**
5. Create and adopt common criteria for effective environmental literacy programming and professional development and implement these practices throughout the State. **(KEY AREA 4)**
6. Partner with key stakeholders to secure funding for sustainable implementation. **(KEY AREA 5)**

## Linking Efforts

Developing an environmentally literate population requires collaboration. This collaboration must represent the variety and complexity of life in modern society and should include educators, business representatives, builders, agricultural specialists, scientists, architects, engineers, transportation coordinators, and government officials, among others.

Accordingly, The Maine EL Plan brings together a wide variety of interest groups.

(Appendix B) Current statewide efforts, including the significant undertakings of the STEM Collaborative, underscore Maine's readiness to address the challenge to develop a STEM literate/environmentally literate populace to ensure a better future for Maine citizens.

Current statewide efforts include:

- 1. STEM Collaborative:** Statewide partnership of education, research, business, government and non-profit sectors to foster increased enrollment in and improvement of science, technology, engineering and mathematics (STEM) education in the State in order to prepare more of today's youth for tomorrow's jobs.
- 2. Brookings Institution Report - *Charting Maine's Future: An Action Plan for Promoting Sustainable Prosperity and Quality Places*, October 2006:** An analysis and plan for Maine's future conducted for GrowSmart Maine. Key recommendations note that Maine's beauty and natural assets are critical to the State's economic success. Emphasis is placed on training Maine workers for new types of jobs and changing Maine's development patterns to retain Maine's "brand" of natural health and beauty and intimate communities.
- 3. Maine's Experimental Program to Stimulate Competitive Research (EPSCoR) - Sustainability Solutions Initiative:** A five-year \$30 million initiative that will create partnerships with many Maine colleges and universities for research and education efforts designed to advance economic and community development while improving the science and practice of sustainable development. The coordinated strategy will develop students' STEM skills and interest, and foster career paths at all levels of PreK-20 education.
- 4. Take it Outside:** Program established in 2007 to recognize the importance of the natural world for the health of Maine's economy and Maine's people. It is a Maine Department of Conservation (DOC) initiative to encourage Maine's children and families to connect with nature.
- 5. Maine Department of Labor (DOL) Green Jobs Initiative:** Recognizing that the evolution to a green economy requires new knowledge, skills, and abilities, the Maine DOL is examining the education expectations for jobs in the State's labor market.

## **Task Force Development**

The first major step in accomplishing the goals of the EL Plan will be for the Maine Department of Education (DOE) to establish two task forces, an Environmental Literacy Principles and Practices Task Force (PPTF) and an Environmental Literacy Professional Development Task Force (PDTF.) These two groups will establish research-based criteria that will form the foundation for statewide coherence in environmental literacy education principles and practices. The specific work of these task forces is defined in greater detail in the action steps that follow.

## **The Maine Environmental Literacy Plan Components**

The five major components of the Maine EL Plan address the five key areas required by NCLI legislation for state environmental literacy plans.

### **KEY AREA 1: STANDARDS**

**Current Context:** Maine has content standards in eight areas that are built from and aligned to rigorous standards documents such as the *Benchmarks for Science Literacy*, *National Science Education Standards* and the *Principles and Standards* from the National Council of Teachers of Mathematics.

As one of the first steps in developing a State EL Plan, the DOE compared the Maine *Learning Results* content standards with the *Excellence in Education Guidelines for Learning (K-12)* of the North American Association for Environmental Education and found a strong alignment between the two documents. This comparison, titled the Alignment Study for Environmental Education Guidelines Results, is included as part of Appendix C.

Maine's anticipated adoption of the *Common Core State Standards* in English language arts and mathematics signals the State's support for the adoption of shared state standards and its participation in shared assessments and teaching tools.

### **Short Term Actions**

1. The DOE will establish an Environmental Literacy Principles and Practices Task Force (PPTF), made up of key stakeholders (including but not limited to representatives of green industry, agriculture, forestry, and fisheries, and non-formal environmental educators and sustainability educators, community colleges and other higher education institutions, the STEM Collaborative, and classroom teachers). The Environmental Literacy PPTF will establish research-based principles and practices for meaningful environmental literacy experiences applicable to settings in and out of school, and to formal and informal education. This task force will use the principles and practices it develops to identify exemplary curriculum models and to address issues of accessibility and universal design. The PPTF will also focus on programs that encourage interaction around environmental concerns between students and parents, and engage both with their communities in conversations about career pathways. These exemplary

PreK-12 models will spotlight programs that use environmental literacy or sustainability as an organizer to teach to the Maine *Learning Results*.

2. The members of the Environmental Literacy PPTF and other members of both the non-formal environmental education community and PreK-12 schools will utilize the principles and practices to select and develop effective environmental literacy programming for students.
3. Community and government organizations -- including but not limited to the MEEA, the Maine Department of Transportation (DOT), the Maine Department of Agriculture (AG), the DOE, the DOC, and the Maine Department of Marine Resources (DMR)--will support the development and maintenance of an online, searchable database of environmental literacy programs.

#### Long Term Actions

1. The DOE will participate in national and regional dialogues and work groups to develop, support, and adopt future generations of science and social studies standards that support environmental literacy. Where appropriate, the DOE will solicit input from other groups in the State.

## **KEY AREA 2: GRADUATION REQUIREMENTS**

**Current Context:** State requirements for high school graduation are a topic of focused conversation in Maine. Stakeholder groups are engaged in discussions of these requirements. Decisions on graduation requirements will necessitate alignment to the standards described in Me. Dept. of Ed. Reg. 132, the *Maine Learning Results: Parameters for Essential Instruction* and will honor the authority of local school administrative units to develop curriculum to meet those requirements.

#### Short Term Actions

1. The DOE will work with school administrative units to increase the number of schools that annually incorporate meaningful environmental education or sustainability education into school programming between grades 3-9 so that environmental education becomes a fundamental component of PreK-12 learning and required learning for graduation. As the impact of these environmental literacy programs on student retention and achievement of the *Maine Learning Results* is established, it is anticipated that school administrative units will incorporate environmental literacy initiatives into their local graduation requirements.
2. The MEEA will work with the DOE to convene leaders of place-based learning and service learning programs to identify strategies to increase the number of non-formal and formal education community service projects, and place-based and service learning projects, that incorporate environmental literacy.

### KEY AREA 3: ASSESSMENT

**Current Context:** The DOE collects a variety of student information. This information includes student achievement data for English language arts, mathematics, and science. Maine also collects school-based data including information on school programming and demographics. In Summer 2010, Maine received a \$7.3 million longitudinal data system grant. Part of this system is being developed to correlate Maine environmental education programming with student success in PreK-12 schooling as well as in post secondary schooling and workplace experiences. With appropriate planning, information can be built into the data collection system to assist in the evaluation of programs related to sustainability and environmental literacy.

#### Short Term Actions

1. The DOE will monitor the number of schools that provide all students with environmental literacy experiences every year between grades K and 9.
2. The MEEA will work with community and government organizations (including but not limited to the DOT, AG, DOE, DOC, DMR) to maintain an online, searchable database of environmental literacy programs and resources, which establishes baseline data on the number of schools, teachers, and student contact hours for participants in the programs.
3. The MEEA and the members of the Environmental Literacy PDTF and the Environmental Literacy PPTF will work together to monitor and increase the number of non-formal environmental educators using the criteria established by these two groups.
4. The DOE will use the Maine Educational Data Management System to monitor the number of girls and members of other underrepresented groups (including students whose first language is not English, students with disabilities, and students who come from economically disadvantaged living situations) participating in environmental education programs (including those programs utilizing the criteria established by the Environmental Literacy PPTF.)
5. The DOE will work with the MEEA to compare student graduation rates and achievement data in English language arts, mathematics, and science from schools whose students regularly participate in environmental education programs with data from schools whose teachers and students do not regularly participate in environmental literacy programming.
6. The DOE will review options for increasing the number of questions on the Maine Educational Assessment for Science at grades 5, 8, and 11 that use an environmental literacy context for assessing knowledge of standards D (The Physical Setting) and E (The Living Environment) of the *Maine Learning Results: Parameters for Essential Instruction*.

7. The DOE, in collaboration with the MEEA, will convene environmental literacy educators and sustainability educators who provide professional development to create a common measurement tool for assessing changes in teacher understanding of pedagogical practices in environmental literacy education.
8. The DOE will develop a strategy for monitoring the number of schools using their buildings, grounds, campus practices/operations and transportation to/from school for environmental literacy and sustainability education.
9. The DOE will utilize the State's longitudinal data system to monitor both graduation rates and placements into green jobs for students in CTE programs, and the overall relationship of participation in environmental education and sustainability education with high school graduation and STEM aspirations.

#### Long Term Actions

1. The MEEA and Maine Audubon will work with other providers of environmental literacy and sustainability programming to link and compare data from the Roper report (an annual "National Report on Environmental Attitudes, Knowledge and Behavior" commissioned by the National Environmental Education Foundation and prepared by Roper Search Worldwide) to comparable Maine data.
2. The DOE, Maine Audubon, faculty from community colleges and other higher education institutions, and formal and non-formal environmental educators and sustainability educators will work together to evaluate whether participation in environmental education and sustainability education has an impact on graduation rates, student attitudes and behaviors related to the environment, students' higher order thinking skills, and student aspirations to pursue STEM careers.

#### **KEY AREA 4: PROFESSIONAL DEVELOPMENT**

**Current Context:** Effective educator professional development is key to improving student learning. Recent reports from the President's Council of Advisors on Science and Technology and from the National Research Council (September 2010) call for a national effort to improve STEM education. Both reports emphasize the importance of developing and recognizing effective STEM teaching. The reports identify the need to increase the content knowledge and pedagogical knowledge (the appropriate skills needed to teach the appropriate content) of classroom teachers. Research on in-service professional development practices points to the effectiveness of adult learning that is embedded in daily work and occurs over time. The literature indicates that approximately 80 -100 hours of professional development are necessary to have an impact on teacher practice. Currently, K-8 certification in Maine requires only two semesters of science.

## Short Term Actions

1. The DOE will establish an Environmental Literacy Professional Development Task Force (PDTF) of key stakeholders (including but not limited to representatives of green industry, agriculture, forestry, fisheries, and other business partners, non-formal environmental educators, sustainability educators, community colleges and other institutions of higher education, the STEM Collaborative, and classroom teachers) to establish research-based criteria for best practices of professional development for teachers and for non-formal educators. The task force will use the criteria it develops to identify exemplary national and/or state models for professional development in environmental literacy. The task force will also address accessibility and universal design.
2. The members of the Environmental Literacy PDTF and other members of the non-formal environmental education community (including but not limited to representatives of the fields of art, agriculture, forestry, fisheries, music, finance, alternative transportation, and businesses and agencies) will adopt and utilize the criteria for best practices to design environmental literacy professional development for teachers and non-formal educators. Representatives from the DOE, the DOC, Maine Audubon, and the MEEA will collaborate with the Maine Curriculum Leaders Association, Maine Principals Association, Maine Education Association and Maine School Management Association to share information about the EL Plan and to outline strategies for improving environmental literacy in schools.
3. The DOE will partner with teacher education programs at the campuses of the University of Maine, community colleges, and private Maine colleges to examine coursework requirements for K-8 certification that support environmental literacy.
4. The DOC will work with the DEP, AG, DOE and other partners to create professional development opportunities to assist teachers in using buildings and surrounding outdoor spaces as vehicles for school-based sustainability instruction including green building practices; schoolyard practices that support wildlife habitat and youth exploration; the development of alternative transportation (bike racks, walking, the Walking School Bus); integrated pest management, and practices and projects to enhance understanding of the interdependence of schools and the natural systems in which they operate.
5. The MEEA will work with other New England States to develop an online, searchable database of environmental literacy programs and resources.
6. The MEEA will work with other community and government organizations in the State (including but not limited to the DOT, AG, DOE, DOC, and DMR) to create an updated electronic database of environmental education programs and resources, and a catalogue of the number of schools and teachers participating in the programs and the number of student contact hours.

### Long Term Actions

1. The DOE will work with higher education and other research organizations to launch an annual, statewide symposium focused on effective professional development practices for in-service and pre-service providers of instruction in environmental literacy.
2. The DOE will partner with the STEM Collaborative and higher education in the development of a Master's of STEM literacy for K-8 teachers.

## **KEY AREA 5: IMPLEMENTATION AND FUNDING**

**Current Context:** Support for any environmental literacy plan requires buy-in and funding. Maine's financial resources can only be described as thinly stretched. Enhanced efforts to support environmental literacy and an increased understanding of sustainability will need to be funded through grants and funding streams outside of the State's general purpose aid to schools. Demand on school unit funds will be high and school administrative units cannot be expected to independently support efforts to promote environmental literacy, no matter how compelling the case, given the many priorities they face. Environmental literacy partners must work together to increase awareness around environmental literacy/sustainability and its place in STEM learning and workplace needs. At present, a \$30 million Experimental Program to Stimulate Competitive Research (EPSCoR) grant is supporting a University of Maine Sustainability Solutions Initiative. Embedded in this and other research grants are educational outreach dollars that may be available to support environmental literacy and STEM learning.

### Short Term Actions

1. Maine Audubon will collaborate with the MEEA, DOE, and DOC to develop a letter of support for the EL Plan and will solicit support for the Plan from members of the EL Plan Advisory Committee, task force groups, and other stakeholder groups (including but not limited to the DOC, DOE, MEEA and its member organizations, representatives of green industry, agriculture, forestry, fisheries, and other business partners, non-formal environmental educators and sustainability educators, community colleges and other higher education institutions, and the STEM Collaborative).
2. The Maine EPSCoR will seek to identify potential partnerships and funding opportunities in its statewide Sustainability Solutions Initiative, as well as in other higher education research programs to support STEM centers in the State, and to support both environmental literacy professional development for PreK-12 educators and programming that encourages student aspirations for higher education in STEM fields and green career pathways.
3. The MEEA will work with other New England states to identify funding for the development and maintenance of an online searchable database of environmental

education programs and resources, and a catalogue of the number of schools, teachers, and student contact hours for participants in the programs.

4. The DOE will work with the PPTF and the PDTF and other partners described in the EL Plan to leverage the existing tools of the Maine Learning Technology Initiative to disseminate information and provide online training to develop the content and pedagogical knowledge needed to achieve environmental literacy.

#### Long Term Actions

1. The DOE and the MEEA will partner with key stakeholder groups such as representatives from green industry, agriculture, forestry, fisheries, and other business partners, environmental educators and sustainability educators, community colleges and other institutions of higher education, and the STEM Collaborative to identify new and sustainable funding for professional development, and resources to provide environmental literacy education for all Maine students prior to high school graduation.
2. The DOE will seek legislative support and funding to leverage the existing professional development infrastructure in superintendents' regions and support the development of eight STEM centers that would, as part of their mission, support environmental literacy.

#### **In Conclusion**

The Maine Environmental Literacy Plan is both ambitious and achievable. The development and implementation of the Maine Environmental Literacy Plan leverages and extends existing partnerships in the State. Through the lens of research-based best practices, the plan seeks to establish widely acceptable criteria to direct improvement in the quality and coherence of PreK-12 teaching and learning with respect to environmental literacy. Essential to this plan is the ability of the Plan's partners to act both independently and collaboratively toward a common set of goals. This Plan provides organizations with that common road map for improving the knowledge and skill set of Maine students and teachers and for sustaining Maine's valued natural settings and resources.

# **APPENDICES**

## Appendix A

### Glossary

**AG: Maine Department of Agriculture**

**CTE: Career and Technical Education**

**DMR: Maine Department of Marine Resources**

**DOC: Maine Department of Conservation**

**DOE: Maine Department of Education**

**DOL: Maine Department of Labor**

**EL Plan:** A state-designed plan intended to make a state eligible for funding under the anticipated requirements of the NCLI Act. (See below)

**Environmental Literacy:** The ability to recognize the components of healthy natural and man-made systems and the actions necessary to maintain, restore, or improve them.

**EPSCoR: Experimental Program to Stimulate Competitive Research:** A program directed at states that have historically received lesser amounts of research and development (R&D) funding. Through this program, states develop partnerships among their higher education institutions, industry, government, and others to effect lasting improvements in their R&D infrastructure, capacity, and national competitiveness.

**Green Career:** Employment within the green economy.

**Green Economy:** The Occupational Information Network of the U.S. Department of Labor defines the green economy as "...economic activity related to reducing the use of fossil fuels, decreasing pollution and green house gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy."

**MEEA:** The Maine Environmental Education Association.

**NCLI: No Child Left Inside Act:** Pending federal legislation that emphasizes environmental literacy education and is expected to become part of the Elementary and Secondary Education Act.

**Non-Formal Education:** Education conducted by institutions and organizations other than state-accredited schools.

**Place-Based Education:** Teaching by immersing students in local heritage, cultures, landscapes, opportunities and experiences and using these as a foundation for the study of language arts, mathematics, social studies, science and other subjects across the curriculum. Place-based education emphasizes learning through participation in service projects for the local school and/or community.

**PPTF:** Principles and Practices Task Force

**PDTF:** Professional Development Task Force

**Service Learning:** A method of teaching, learning and reflecting that combines academic classroom curriculum with meaningful service in the community

**STEM:** Science, technology, engineering and mathematics.

**Sustainability:** The satisfaction of basic economic, social, and security needs, now and in the future, without undermining the natural resource base and environmental quality on which life depends.



## Appendix B

### Maine Environmental Literacy Plan Advisory Committee

Jim Banks	Maine State Board of Education
Anita Bernhardt*	Maine Department of Education
Sandy Buck	Horizon Foundation
Mike Cline	Tin Mountain Conservation Center
Sarah Cushman	Cushman Transportation Consulting
Laurette Darling	Maine Science Teachers Association
Kevin Doran*	Maine Department of Conservation (Forest Service)
Lynn Farrin	Maine Math and Science Alliance
Willie Grenier	Maine Agriculture in the Classroom
John Harker	Maine Department of Agriculture
John Keimel	Maine Public Broadcasting Network
Shawn Lagasse	Maine Department of Education
Jessica Leahy	University of Maine
David Littell	Maine Department of Environmental Protection
Roger Merchant	University of Maine Cooperative Extension
Sarah Morrisseau	Gulf of Maine Research Institute
Vicki Nemeth	Maine Experimental Program to Stimulate Competitive Research
Lynn Seeley	Ferguson Foundation
Emily Sherman	Scarborough High School
Pat Sirois	Maine Sustainable Forestry Initiative
Sheila Sullivan	Portland Trails
Elizabeth Vaselli	University of Maine
Linda Woodard*	Maine Environmental Education Association
Kara Wooldrik*	Maine Audubon

\* Member of the Steering Committee for the Maine Environmental Literacy Plan

## **Appendix C**

### **Links to Additional Resources**

No Child Left Inside (NCLI) Legislation

<http://thomas.loc.gov/cgi-bin/query/D?c111:2:./temp/~c111sbCl3e::>  
<http://thomas.loc.gov/cgi-bin/query/D?c111:4:./temp/~c111i6oZS3::>

Alignment Study for Environmental Education Guidelines and Maine *Learning Results*

<http://www.maine.gov/education/lres/scitech/links.html>

Statewide Strategic Plan for Science, Technology, Engineering and Math

<http://www.maine.gov/education/documents/STEMPlanFINAL.pdf>

Brookings Institution Report

<http://www.brookings.edu/reports/2006/10cities.aspx>

Research Bibliography

[http://maineaudubon.org/explore/ELP\\_bibliography.shtml](http://maineaudubon.org/explore/ELP_bibliography.shtml)