A Report To the Joint Standing Committee on Education and Cultural Affairs on Maine Science, Technology, Engineering and Mathematics (STEM) Initiatives, As Requested under Resolve 2009, Chapter 98 (LD 1101) "Resolve, To Understand and Assist Efforts to Promote Science, Technology, Engineering and Math Education"

Submitted by the Maine Department of Education

and the University of Maine System

December 15, 2009

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OVERVIEW:

On June 8, 2009, Governor John E. Baldacci signed into law LD 1101, "Resolve To Understand and Assist Efforts To Promote Science, Technology, Engineering and Math Education," sponsored by Senator Elizabeth Schneider (see Attachment A for full text of legislation). This legislation directed the Maine Department of Education and the University of Maine System to work together at no cost to collect information on science, technology, engineering and mathematics (STEM) initiatives. Data on these initiatives were to be collected by November 1, 2009, with a report including findings and recommendations to be presented by the Maine Department of Education to the Joint Standing Committee on Education and Cultural Affairs no later than December 15, 2009.

CONTEXT:

Since the 1980s the Maine Department of Education has focused support on science, technology, engineering and mathematics learning (what is now commonly known as STEM learning). In this period of twenty plus years the focus and level of support for STEM areas has been variable. From the late 1980s through the mid 1990s, efforts concentrated on the integration of mathematics and science. Statewide initiatives and conferences were often supported using federal Eisenhower Funds. During this period the Maine Department of Education also received two multi-million dollar federal grants. The first of these supported the development of the Curriculum Frameworks for Mathematics and Science and the second grant, the State System Initiative (SSI) Grant, led to the creation of the Maine Mathematics and Science Alliance (a private non-profit organization that supports science and mathematics professional development), and the identification and training of seven Beacon Schools for mathematics and science. The purpose of the seven Beacon Schools was to serve as educational centers for the improvement of mathematics and science instruction and teaching, and as scaling up points for mathematics and science education reform. At the end of the five year SSI grant, Maine did not receive renewal of its funding. As a consequence, the Beacon School effort was discontinued; however the Maine Mathematics and Science Alliance found independent funding sources and continued its professional development work in the State as a 501(c)(3) non-profit.

The Maine Learning Technology Initiative (MLTI), initiated in the late 1990s, focused public attention on the role of technology and resulted in the deployment of laptops to every seventh and eight grade student and their teachers. The goal of this initiative is to provide one-to-one technology, in this case laptops, as instructional resources that will improve teaching and learning across all disciplines, including mathematics and science and technological design/engineering. Currently, teachers in grades seven through 12, as well as all seventh and eighth grade students and many high school students, have been issued laptops under this initiative.

In 2007, Maine applied for two federal grants related to support of STEM efforts in the State. The Department's bid for the National Mathematics and Science Initiative and the National Governor's Association STEM Grant were not successful. However, the discussions behind the grant applications and the release of the Maine Department of Labor Report, "An Analysis of High Demand, High Wage Jobs in Maine", made evident the need to increase public awareness around STEM learning and career opportunities. In an effort to address this need, the Department of Education joined with the Maine Mathematics and Science Alliance and others in

a collaboration to coordinate Maine's first STEM Summit in January 2008 (see Attachment D.6. for list of participants). This collaboration led to the creation of the Maine STEM Collaborative, a group of organizations and governmental agencies working together to support STEM learning in Maine. In January of 2010, this group will host the Second Maine STEM Summit and has secured funding through Maine EPSCoR to provide grants to schools and private organizations to seed STEM collaboration.

NAEP DATA: A National STEM Perspective

Limited improvement in U.S. student scores in mathematics and science on the National Assessment of Educational Progress (NAEP), and unfavorable comparisons to the performance of students from other countries, have been factors leading to a national focus on STEM education. The following summary of data collected through the administration of the NAEP describes Maine's achievement in mathematics and science relative to other states in the country.

Maine NAEP Science Results

The grade 4 NAEP science assessment was given in 2000, 2005, and 2009. The 2009 results are currently unavailable, but will be published by March 2010. In 2000, the average scale score in Maine was 161, compared to a national scale score of 145. In 2005, the average scale score was 160 compared to a national scale score of 149. In 2005, average scale scores were significantly higher at the 10^{th}, 25^{th} and 50^{th} percentiles, but not at the 75^{th} and 90^{th} percentiles. This shows that although Maine's grade 4 students continue to make progress, the progress is greater for lower performing students rather than for the students performing at the 75^{th} to 90^{th} percentiles. In 2005, there were 8 states with a similar percentage at or above *basic* on NAEP. These states were New Hampshire, North Dakota, Virginia, Montana, South Dakota, Vermont, Massachusetts, and Wyoming.

The grade 8 NAEP science assessment was given in 1996, 2000, 2005, and 2009. The 2009 results are currently unavailable, but will be published by March 2010. In 2000, the average scale score in Maine was 160 compared to a national scale score of 147. In 2005, the average scale score in Maine was 158 compared to a national scale score of 148. In 2005, the average score scores at the 10^{th}, 25^{th} and 50^{th} percentiles were higher when compared to the average scale scores in the nation or the Northeast. By 2005, students scoring at the 75^{th} and 90 percentiles in the Northeast and the nation had improved at a greater rate and were similar to Maine student scores. Seven states had higher average scale scores than Maine. In 2005, the average scale score in the Northeast at the 90^{th} percentile was 195, compared to 192 in Maine.

Maine NAEP Mathematics Results

The NEAP mathematics assessments were given at grades 4 and 8 in 1992, 1996, 2000, 2003, 2005, 2007, and 2009. The average score showed a modest but statistically significant improvement each year until 2007. In 2007 there was a gain but it was not enough to be statistically significant. In 2009, the average scale score in Maine was 244 compared to 244 in the Northeast and 239 in the nation. Since 2003, the average scale score of students performing in the 50^{th}, 75^{th} and 90^{th} percentiles in the Northeast tended to be higher than Maine's average scale score. Furthermore, the percentage of students scoring *at or above proficient* on NAEP was not only higher, but the improvement was statistically significant in the following states: Massachusetts, Minnesota, New Hampshire,

and Vermont. Therefore, more students in those states are performing at advanced levels in comparison to Maine.

At grade 8, the average scale scores showed a significant difference each year until 2007, when there was improvement but it was not considered to be statistically significant. In 2009, the average scale score in Maine was 286 compared to 288 in the Northeast and 282 in the nation. Since 2005, the average scale score of students performing in the 50th, 75th and 90th percentiles in the Northeast tended to be higher than Maine's average scale score. Furthermore, the percentage of students scoring *at or above proficient* on NAEP was not only higher, but the improvement was statistically significant in the following states: Colorado, Connecticut, Idaho, Kansas, Maryland, Massachusetts, Minnesota, Montana, New Hampshire, New Jersey, North Dakota, Pennsylvania, South Dakota, Vermont, Washington, and Wisconsin. Therefore, more students in those states are performing at advanced levels in comparison to Maine.

In addition to testing mathematics and science, the NAEP assessment will incorporate a completely electronic assessment of Technological Literacy in 2012. The National Assessment Governing Board proposes to include the following sub-areas in its assessment of Technological Literacy:

- Technology and Society
    - Interactions of Technology and Humans
    - The Effects of Technology on the Natural World
    - The Effects of Technology on the World of Information and Knowledge
    - Ethics, Equity and Responsibility
- Design and Systems
    - The Nature of Technology
    - Engineering Design
    - Systems Thinking
    - Maintenance and Troubleshooting
- Information & Communication Technology (ICT)
    - Construction and Exchange of Ideas and Solutions
    - Information Research
    - Investigation of Problems
    - Acknowledgement of Ideas and Information
    - Selection and Use of Digital Tools

SURVEY STRATEGY:

In fulfillment of LD 1101, the Maine Department of Education, in consultation with the University of Maine System developed a survey on STEM education initiatives in Maine. Allyson Hughes Handley, President, University of Maine at Augusta and Director of the University of Maine System Science & Technology Strategic Initiative was the contact person for the University of Maine System.

The questions included in this survey directly corresponded to the focus areas identified by LD 1101, as well as a few supplemental, clarifying questions (see Attachment B for list of survey questions). The role of the Maine Department of Education and University of Maine System was to create, collect, and summarize the survey data. The survey was implemented on the internet through "SurveyMonkey," and an explanation and survey link was sent out to a broad base of over 450 public and private entities and individuals involved in areas related to STEM education (see Attachment C for list of those receiving survey request and link). The individuals and organizations included in the invitation to participate in this survey were intended to represent a wide range of those involved in work related to STEM education, but by no means represents a comprehensive listing of all such parties in Maine. Final survey results were collected prior to November 1, 2009, as required by LD 1101. Survey results were compiled and analyzed by staff at the Education Development Center (EDC) in Maine under an ongoing contract with the United States Department of Education. The analysis by EDC of the survey results is included in the following pages.

ANALYSIS OF STEM SURVEY DATA PREPARED UPON REQUEST BY REGIONAL EDUCATIONAL LABORATORY NORTHEAST AND ISLANDS (REL-NEI), EDUCATIONAL DEVELOPMENT CENTER, INC. (EDC):

The following analysis of the data collected through "SurveyMonkey" was compiled by staff at the Maine EDC office.

REL-NEI's mission is to help preK-16 educators at the state, district and school levels increase their use of scientifically based evidence to make decisions that lead to improved student achievement and reduced performance gaps among student groups.

The Regional Educational Laboratory Northeast and Islands (REL-NEI) is run by Education Development Center, Inc. (EDC), the American Institutes for Research (AIR), and WestEd's Learning Innovations program. REL-NEI is one of 10 Regional Educational Laboratories funded by the Institute of Education Sciences at the U.S. Department of Education. REL-NEI provides rigorous research that is relevant to national education priorities, responsive to local needs, and usable for policy and practice. Visit www.edc.org/relnei <http://www.edc.org/relnei> .

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EDC SUMMARY OF SURVEY RESULTS:

The Maine STEM survey collected data as part of the response to LD1101. It includes some useful information and also highlights information and gaps that could help guide further data collection in Maine on this topic.

Variety of Respondents with Working Knowledge of Specific Initiatives

The Maine STEM survey collected, from a relatively small but diverse number of respondents, a list of numerous organizations and initiatives working on STEM in Maine. For example, there are 105 individual initiatives and other activities listed for question 5, including 85 distinct replies; these were provided by 28 of the 32 respondents. Of the respondents who included at least one reply, the mean number of initiatives listed is 3.75. Of the respondents who listed a STEM initiative that inspires students in question 7, 90% (18 out of 20) also indicated that they had working knowledge of ***all*** the initiatives they listed in question 7.

Low Survey Response Rate/Potential for Skewed Results

Any decisions based on the survey data should carefully consider the relatively low survey response rate and the composition of the survey respondents, which suggests the possibility of skewed and/or incomplete results. The respondents should not necessarily be considered representative of the sample targeted for the survey or of the population of people involved in STEM initiatives and work in Maine. The majority of the respondents (23 out of 32 total respondents, or 71.9%) are associated, in some way, with education and/or research, which may help explain some patterns in the responses. The highest number of respondents is associated in some way with science, fewer respondents with technology and engineering, and the fewest with mathematics. Some groups, such as members of the University of Maine Cooperative Extension (18.8% of respondents), seem over-represented considering the population. Some potentially important groups are not represented by any survey respondents, including: Principals and Superintendents of public PreK-12 schools, business owners/leaders, leaders of public or private schools of education, leaders from private colleges, and members of many government agencies and departments associated with STEM work and initiatives in Maine.

Respondents' Knowledge of STEM in Maine is Limited

Individual open-ended responses include information on many STEM efforts/programs/initiatives in ME, but individual respondents seem to lack a complete perspective on initiatives, funding streams, "model practices" (as identified in the survey item), and data beyond programs with which they directly work or are closely connected:

- fifty percent of the survey respondents described having working knowledge of a Maine STEM data collection effort in question 3, and only one effort (Maine Educational Assessment) was repeated
- of the 105 STEM organizations/initiatives mentioned by respondents in question 5, 83 (79.0%) are unique or near-unique
- 90% of respondents who wrote at least one relevant initiative that inspires students (question 7) also indicated in question 8 that they had working knowledge of all of their replies in question 7
- three (10.0%) respondents selected "Race to the Top State Grants" as a potential important source of funding

- the highest percent of survey respondents reporting working knowledge of a funding stream listed in the question choices is 18.8%
- 65.6% of survey respondents did not list a single "model practice"
- 59.4% of survey respondents did not list any data they need to advance STEM in Maine

This seemingly focused or narrow knowledge of STEM by the survey respondents may be related to the composition of the survey respondents and not an indicator of STEM knowledge by other members of the targeted sample or the population.

Strategies and Obstacles Focus on Education

The majority of promising strategies listed, as well as the majority of obstacles for expanding STEM in Maine listed, relate to PreK-12 education and the youth, instructors, programs, and funding in the education system. There are far fewer replies for questions about strategies and obstacles on topics such as leadership (including education leadership), government, research, other organizations, collaboratives/networks, and even careers/business. This focus may be related to the composition of the survey respondents and not an indicator of any responses or focus by other members of the targeted sample or the population.

The wording in some survey items may lack specific accepted definitions and leave open the interpretation of the question to individual respondents; for example, use of the term "model practices" in question 15. Authors of any future STEM data collection efforts in Maine should consider whether it is better to use identical item wording or wording designed to be less open to individual interpretation.

Question #1:

Question 1: *Please provide us with some information about yourself:*

Name:
Organization:
Address:
City/Town:
State:
Zip Code:
Email address:
Phone number:

Question #1 Data and Analysis:

Data from question number one was not tabulated for the purposes of this report.

Question #2:

Question 1: *Please identify the organization with whom you are affiliated*

- *K-12*
- *Higher Education*
- *Government Agency*
- *Business (for Profit)*
- *Private Non-Profit*
- *Other (Please specify)*

Question #2 Data and Analysis:

The STEM survey was returned by thirty-two respondents, a relatively small sample size considering the significant population of people working in, supporting, making decisions about, and/or teaching in STEM fields in Maine. The respondents included a diversity of roles and institutions, ranging from K-12 teachers to staff members of the Maine Department of Labor.

The respondents self-identified in six categories in the rates shown in Table 2.1. Respondents could choose more than one category; for example, one respondent from the University of Maine Cooperative Extension selected both "K-12 Education" and "Higher Education, Research."

Table 2.1

Q2. Please identify the organization with whom you're affiliated.

Answer Options	Response Percent (out of 32)	Response Count
a. K-12 Education	28.1%	9
b. Higher Education, Research	28.1%	9
c. Government Agency	12.5%	4
d. Business (For-Profit)	0.0%	0
e. Private Non-Profit	18.8%	6
f. Other (please specify)	21.9%	7

The seven respondents who selected "Other" were all from separate categories:

Table 2.2

"Other" response category	Response Percent (out of 32)	Response Count
public organization	3.1%	1
University of Maine Cooperative Extension	3.1%	1
for-profit business K-12 outreach	3.1%	1
industry association	3.1%	1
renewable energy association	3.1%	1
grant-funded workforce development program	3.1%	1
classroom volunteer	3.1%	1

Note that there are six (18.8% of the sample) respondents from the University of Maine Cooperative Extension. The respondents from the Cooperative Extension answered this question in different ways: one selected "Other;" another selected both "K-12" and "Higher Education, Research," one selected "Private Non-Profit," and four selected "Higher Education, Research."

The four respondents who selected "Government Agency" were from the areas shown in Table 2.3.

Table 2.3

"Government Agency" response category	Response Percent (out of 32)	Response Count
State Board of Education	3.1%	1
Inland Fisheries & Wildlife	3.1%	1
Department of Labor	6.3%	2

The majority of respondents self-identified with education or research. A total of 18 out of 32 (56.3%) respondents selected either (or both) "K-12 Education" (n=9; 28.1%) or "Higher Education, Research" (n=9; 28.1%). Additional respondents who identified their association with education included: a State Board of Education member ("Government Agency"); a classroom volunteer ("Other"); a person coordinating for-profit business K-12 outreach ("Other"); and two

additional Cooperative Extension members ("Other" and "Private Non-Profit"). Clustering these respondents within a more general "Education/Research" category results in a total of 23 out of 32 total respondents (71.9%).

Zero respondents self-identified as "Business (For Profit)," although one "Other" indicated working for a for-profit business doing K-12 outreach.

Question #2 Discussion Points

The 32 STEM survey respondents, although representing a variety of individual and organizational perspectives, likely do not represent many of the perspectives of individuals and organizations targeted for the survey. The respondents should not be considered representative of the sample targeted for the survey or of the population of people involved in STEM initiatives and work in Maine. Any decisions based on the survey data should carefully consider the relatively low survey response rate and the composition of the survey respondents, which suggests the possibility of skewed and/or incomplete results.

The majority of the respondents are associated, in some way, with education and/or research.

A REL-NEI researcher looked at the names and additional identifying information for the respondents and coded them for the individual STEM areas, Science, Technology, Engineering, and Mathematics. Respondents could be coded for more than one area. See the accompanying spreadsheet, sheet name "Complete," columns C,D,E, and F. The assignment of codes for some individuals was subjective and limited by the knowledge of the REL-NEI researcher; codes could have been assigned differently by a person with more knowledge in this area. However, the overall results of this coding may be useful for understanding the broad trends within the group of respondents. The highest number of respondents (25, or 78.1% of the 32 respondents) seemed associated with science, fewer respondents with technology (14) and engineering (14), and the fewest with mathematics (7).

No respondents identified as a Principal or Superintendent in a PreK-12 school administrative unit; no respondents identified as a business owner, manager, or leader. The respondents included one Dean of a school in a public university, but no Deans of colleges/schools of education, Presidents, or other Institution of Higher Education (IHE) leaders were included among the respondents. Additionally, no respondents identified associations with private IHE. Most government departments and agencies do not seem represented, including:

Career Center
Department of Conservation
Department of Economic and Community Development
Department of Education
Department of Environmental Protection
Governor's Office
Department of Health and Human Services
Maine Higher Education Council
Labor market Information Services
Maine Technology Institute
Department of Marine Resources

Other STEM-related organizations, associations, and programs (some of which were listed by respondents on this survey) were also not represented.

Questions #3-#4:

Question 3: *Identify any reports or data collection efforts you are aware of that report on science, technology, engineering and mathematics initiatives in the state.*

Question 4: *Of the reports or data collection efforts you identified for Question 3, of which do you have a working knowledge?*

Questions #3 & #4 Data and Analysis

This survey item was open-ended and responses varied. There was a total of 34 "replies" including reports, data collection efforts, individuals, organizations, and agencies. Only one of the "replies" seems, on initial analysis, to be repeated by two respondents: MEA testing/scores. The 34 individual replies were provided by 20 respondents (62.5% of 32). Twelve survey respondents did not include any relevant information/replies: six left the item blank and six indicated "none" (n=4) or "I am not aware of any" (n=2). The average number of replies per survey respondent (n=32) is approximately 1.1. Of the respondents who included at least one relevant reply (n=20), the mean number of replies is 1.7. The list of individual replies is given in Table 3.1.

Table 3.1

Q3. Identify any reports or data collection efforts you are aware of that report on science, technology, engineering and mathematics initiatives in the state. **Individual Replies, alphabetized** ***[information before colons is added; in a few cases prepositions that start a report title are moved]***
Assessment, Student: MEA scores
Assessment, Student: MEA testing
Assessment, Student: SAT Scores
Assessment, Student: We do twice a year testing of our CTE students to determine their mathematics levels
Astrobiology Pilot Program: The Astrobiology Pilot Program of Maine 2009, funded by Maine Space Grant Consortium, Lockheed Martin, and NASA Ames
DEP 319 grant watershed surveys
DOE: Anita Bernhardt's work
DOL John Dorrer
DOL: Labor Market Information from the Center for Workforce Research and Information
Employment Outlook for STEM in Maine, The
Engineering in K-12 Education: Understanding the Status and Improving the Prospects (2009)
Introduction to Maine's Technology Sectors and Clusters: Status and Strategy, An
Maine Healthy Beaches Special Studies
Maine's K-12 STEM ED Report Card
MDF Employer Initiative
MEPRI/CEPARE: David Silvernail's work

MESEA: Maine Sun (our MESEA quarterly newsletter)
MMSA: Maine Mathematics and Science Alliance projects
MSP: Currently involved with a Mathematics & Science partnership grant. Great Maine Schools is the fiscal agent of our grant
No Child Left Behind
NOAA
NSF ITEST projects
Nutrient Management Plans
Nutrition: None Unless nutrition education is considered science for these purposes
Project WILD Teacher workshop mailing lists
SARP Coastal Resiliency Project Technical Report
Species identification in the area surrounding the Institute has long been a key component in seminars here at Eagle Hill. There have been a number of new specimens that have not been found in this area, and even some evidence of never described species (mainly in Myxomycota, and other fungi)
State Planning Office
STEM Occupational Employment and Wage Surveys
STEM Occupational Projections
TechMaine Organization does for the technology area as far as job outlook and skills needed
UM Coop Ext: I work with our 4-H youth development program in Maine which is through the University of Maine Cooperative Extension. We collect data regarding how many youth enroll in STEM projects through 4-H as this is a national initiative for 4-H
UM Coop Ext: UMaine Coopertive Extension County offices report into an electronic data base specific data regarding our Plan of Work which may include STEM activities
UMaine must but I'm unaware of specifics

Most respondents (n=16, 80.0% of the 20) who wrote a reply also indicated in Question 4 that they had working knowledge of the contents of the report(s), data collection effort(s), organization(s), agency(ies), or individual's work. (This is 50.0% of the 32 total survey respondents.) Three respondents indicated a low level of knowledge of their replies ("Clearly not much"; "Not much. Get their monthly newsletter"; "I have a vague working knowledge"), and another indicated working knowledge of only two of the three content replies.

Questions #3 & #4 Discussion Points

Less than two-thirds of the respondents identified at least one data collection effort related to STEM in Maine. Fifty percent of the respondents described having working knowledge of a data collection effort. The survey data suggests that individual respondents may only have awareness and working knowledge of data collection efforts specific to their own work or field (the list of replies has almost no repeated replies). This may be connected to some responses that include a desire for increased STEM awareness in other survey questions. See also section 4, below.

Questions #5 & #6: Maine STEM Organizations and Initiatives

Question 5: *Identify any organization(s) or initiative(s) currently working to support science, technology, engineering and mathematics in Maine.*

Question 6: *Of the organizations or initiatives you identified for Question 5, with which do you have personal experience?*

Questions #5 & #6 Data and Analysis

This survey item was open-ended and responses varied. There were a total of 105 "replies" including organizations, initiatives, associations, programs, businesses, and agencies. Some of the "replies" were repeated by multiple respondents. The two replies mentioned by the highest number of respondents are the Maine Mathematics and Science Alliance (seven respondents) and 4-H (five respondents). The 105 individual replies were provided by 28 respondents. Five respondents only mentioned one organization/initiative in their reply. Four respondents did not answer the question. The average number of replies per survey respondent (n=32) is approximately 3.3. Of the respondents who included at least one reply (n=28), the mean number of replies is 3.75. The list of individual replies is given in Table 4.1.

Table 4.1

Q5. Identify any initiatives whose specific purpose is to inspire students in science, technology, engineering and mathematics.
Individual Replies, alphabetized *[information before colons is added; in a few cases prepositions that start a report title are moved]*

4-H
4-H
4-H
4-H
4-H: Maine 4-H Program through the University of Maine Cooperative Extension
Acadia Partners
Advanced Engineering Wood Composites Center at UMaine Orono
Ag in the Classroom
ASQ Downeast Chapter
ATMNE
ATOMIM
ATOMIM
ATOMIM- Association of Teachers of Mathematics in Maine
Bigelow Lab for Ocean Sciences
Center for Broadening Participation
Central Maine Mathematics and Science Partnership
Challenger Learning Center of Maine
Chewonki Foundation
Coalitions for Women in Trades and Technology
Cobscook Bay Resource Center
Community volunteers and municipal officials and staff in 23 coastal communities
Consider Engineering Program, The
Cooperative Extension

Curriculum: We offer a multi-course pre-engineering curriculum
DEP
DEP: [Dept of] Environmental Protection
Destination Imagination
DMR
DOC
EAST (Eastern Alliance for Science and Technology)
EDC-Pam Buffington
Envirothon
Envirothon
Envirothon Program
Ferry Beach Environmental Center
FFA
FIRST Robotics
First Robotics: We also have participated for a number of years in First Robotics
Foundation for Blood Research
GS: [Dept of] Geological Survey
Gulf of Maine Council and ESIP Committee
Gulf of Maine Research Institute
Herring Gut Learning Center
Humboldt Field Research Institute has been working to support Natural History Science since the early 1980s
IPC Consulting
Island Institute
Lego League
Live-C is supporting the use of TANDBERG technology
Lockheed Martin
Maine Advanced Technology Center(SMCC) through their efforts to bring composites education curriculum to secondary school teachers
Maine Agriculture in the Classroom
Maine Association of Conservation Districts
Maine Audubon
Maine Audubon
Maine Composites Alliance
Maine Conservation School
Maine EPSCOR
Maine EpSCOR
Maine Girls Collaborative Project
Maine Innovation Economy Advisory Board
Maine Space Grant Consortium
Maine State Arboretum
Maine STEM Collaborative
Manufacturers Association of Maine
Manufacturers Association of Maine--- Maine Industry Partnership Initiative
Mathematics in CTE: We are participating in a pilot program "Math-in-CTE"
MDIFW
MEEA
MESEA
MICDL
MMSA
MMSA

MMSA-- MMSA's-upcoming Govornor's Academy
MMSA: Maine Mathematics and Science Alliance (x 4)
MR: [Dept of] Marine Resources
MSTA
MSTA (Maine Science Teachers' Assoc)
Nat'l Assoc of Women in Construction
NSTA
Oceanswide
Project Learning Tree
Quebec-Labrador Foundation
Sea Coast Mission
SEA: Acadia National Park Schoodic Education Adventure(SEA) Program
SEADS of Truth
Skyheat Associates
SME Maine Chapter
Southern Aroostook Mathematics & Science partnership
STEM
SWCD's statewide - education outreach
Teacher-Ranger-Teacher Program: US National Parks Teacher-Ranger-Teacher Program
UMaine
UMaine Civil and Environmental Engineering
UMaine Climate Change Institute
UMaine School of Marine Sciences
University of Maine
University of Maine College of Engineering
University of Maine System
USM School of Applied Science, Engineering, and Technology
USM- has a new grant for pre-service teachers and mentors, had a first meeting recently
Wells National Estuarine Research Reserve
Women Unlimited

The list of replies above was generated from about 83 distinct replies. All respondents except one (n=27) who wrote at least one reply also indicated in Question 6 that they had at least some personal experience with at least one of the organization(s) or initiative(s) they mentioned question 5. Most respondents indicated personal experience with all the initiatives they mentioned in question 5. One respondent indicated "none."

Questions #5 & #6 Discussion Points

Looking at the combined responses for questions 5 and 6, although there are many distinct initiatives/organizations/programs included in the responses, suggests the individual respondents are mostly aware of and have personal experience with specific initiatives/programs, and do not have a wider knowledge of initiatives/programs with which they are not closely connected. Of the 105 replies listed, 83 (79.0%) are unique. This may be connected to the sample for the survey.

Many of the listed programs, organizations, etc. are funded in whole or in part through state or federal sources.

Questions #7 & #8: STEM Initiatives that Inspire Students

Question 7: *Identify any initiatives whose specific purpose is to inspire students in science, technology, engineering and mathematics.*

Question 8: *With which of the initiatives you identified in Question 7 do you have a working knowledge?*

Questions #7 & #8 Data and Analysis

This survey item was open-ended and responses varied. There were a total of 47 "replies" including organizations, initiatives, programs, and agencies. Some of the "replies" were repeated by multiple respondents. The replies mentioned by multiple respondents are: 4-H (n=3), Agriculture in the Classroom (n=2), and Envirothon (n=2). The 47 individual replies were provided by 20 respondents. Twelve survey respondents did not include any relevant information/replies: eight left the item blank and four indicated "?," "None," and "Not sure," or "I am not aware of any." The average number of replies per survey respondent (n=32) is approximately 1.5. Of the respondents who included at least one relevant reply (n=20), the mean number of replies is 2.4. The list of individual replies is given in Table 5.1.

Table 5.1

Q7. Identify any initiatives whose specific purpose is to inspire students in science, technology, engineering and mathematics.
Individual Replies, alphabetized *[information before colons is added; in a few cases prepositions that start a report title are moved]*

4-H
4-H teaches how to use GPS units to develop maps that can be used to encourage recreational hiking, and tourism
4-H: Maine 4-H Program
ACE After School Program
Ag in the Classroom
Ag in the Classroom, Maine
Aquatic Invaders In Maine (AIM)
ASET Summer Camp (USM)
Astrobiology Pilot Program of Maine
Audubon: all of above [maine audubon]
Bigelow's phytopia
CBRC ciruclation studies
Consider Engineering Program, The
Courses, IHE: We work with the University of Maine in offering students, and faculty the opportunity to study very specific Natural History seminars that are not taught through the UMaine system. Students are eligible to earn undergraduate. graduate credits, or continuing education units (CEUs). We also work with other universities where students have the option to apply for transfer credits
DEP: all of above [DEP]
DMP: all of above [DMR]
DOC: all of above [DOC]

EAST (Eastern Alliance for Science and Technology)
Envirothon Program through MACD
Envirothon: all of above [Envirothon]
FIRST Robotics
Gulf of Maine Research Institute's Vital Signs project
Herring Gut's alt. ed program
Lego League [FIRST?]
Live-C: Both of the above initiatives [Live-C is supporting the use of TANDBERG technology]
Maine Girls Collaborative Project
Maine Healthy Beaches (MHB)
mathcounts- maine society of professional engineers southern maine mathematics league
MDIFW: all of above [mdifw]
MEEA: all of above [meea]
MESEA
MMSA: all of above [mmsa]
MSTA: all of above [msta]
National Science Bowl
NSF ITEST projects such as the Community for Rural Education, Stewardship, and Technology
Project Lead the Way: We are affiliated with Project Lead the Way out of Rochester Institute of Technology. We have sent two teachers for training in the curriculum and hope to be able to continue to send them for training
Project Learning Tree
QLF's circulation studies
SEA program, Acadia
SEADS of Truth
Silver Wake Program
Skyheat Associates
SME Maine Chapter
Southern Aroostook MSP: Both of the above initiatives [Our Southern Aroostook Mathematics & Science partnership]
Space Day activities
UM workshops: University of Maine College of Engineering has held workshops where county youth learn more about engineering and the types of work they do
USNP Teacher-Ranger-Teacher(TRT) Program

Eighteen respondents of the twenty who wrote at least one relevant reply (18/20 = 90%) also indicated in Question 8 that they had working knowledge of all their replies in question 7. One indicated working knowledge of only one of their replies ("QLF's [possibly: Quebec Labrador Foundation] studies"), and another wrote a reply ("AG[riculture] in the Classroom") but did not answer question 8.

Questions #7 & #8 Discussion Points

Similarly to questions 3-4 and 5-6, the responses to questions 7 and 8 indicate, overall, a collective knowledge of many initiatives that inspire students in STEM, but individuals have a limited knowledge of initiatives beyond ones with which they are closely connected.

Many of the responses indicate initiatives that are funded in whole or in part from state or federal sources, such as: fees for agricultural license plates, the public university system, federal grants, and state and federal departments and agencies.

Questions #9: STEM Promotion Benefits

Question 9: *From the following, select those you would identify as benefits resulting from the promotion of science, technology, engineering, and mathematics.*

Question #9 Data and Analysis

This survey item asked respondents to select one or more of six choices (multiple select). Table 6.1 shows the count of respondents selecting each choice, as well as the percentages of choice response counts out of the number of respondents who answered the question (n=31) and out of the total number of survey respondents (n=32).

Table 6.1

Q9. From the following, select those you would identify as benefits resulting from the promotion of science, technology, engineering, and mathematics.

Answer Options	Response Percent (out of 31)	Response Count	Response Percent (out of 32)
a. Job possibilities	90.3%	28	87.5%
b. Job availability	67.7%	21	65.6%
c. Increased wages	74.2%	23	71.9%
d. Connection between STEM areas and economic development	83.9%	26	81.3%
e. Informed citizenry	80.6%	25	78.1%
f. Other (please specify)	32.3%	10	31.3%

The ten respondents who selected "Other" wrote the remarks shown in table 6.2. A REL-NEI researcher looked for possible themes and categories within these ten remarks, and clustered them in the four categories shown in Table 6.2: Economic & Workforce (n=4), Research and Data (n=3), Learning and Teaching (n=3), and Awareness (n=2). A remark could fall into more than one category (i.e., remarks *a* and *e*).

Table 6.2

"Other" response option	Economic & Workforce	Research and Data	Learning and Teaching	Aware-ness
a. Awareness of Higher Education Opportunities			X	X
b. Engaged learners, learners w/broader set of problem solving skills and more critical thinking skills			X	
c. I think our economic prosperity depends on it	X			
d. Inclusion of more women and minorities in the STEM related workforces--leading to a larger and more diverse pool of professionals	X			
e. Increased research, development, and commercialization opportunities	X	X		
f. Increased student awareness				X
g. Increasing knowledge and creativity in all people			X	
h. Knowledge of bio-indicators and their relationship to Maine's environment		X		
i. Lessen brain drain effect	X			
j. Research based info/data assists managers at local and state levels with decision making		X		

Question #9 Discussion Points

Most respondents identified all five of the provided response options as benefits resulting from the promotion of STEM in Maine. Of the 31 respondents who answered at least some part of the question, the selection rate for named choices (not "Other") ranged from 67.7% ("Job availability") to 90% ("Job possibilities"); most respondents considered all the named choices important. Among the "Other" responses, 40% were related to economic/workforce development issues. Many "Other" responses were very general, and others quite specific (e.g., "Knowledge of bio-indicators and their relationship to Maine's environment").

Questions #10-#12: STEM Expansion Strategies and Obstacles, & Strategies for Integrating STEM PreK-12

Question 10: *Please list what you would identify as the three most promising strategies for expanding science, technology, engineering and mathematics in Maine.*

Question 11: *List what you would identify as the three most significant obstacles for expanding [science,] technology, engineering and mathematics in Maine.*

Question 12: *List what you would identify as the three most promising strategies for integrating science, technology, engineering and mathematics into PreK-12 programming.*

Questions #10-#12 Data and Analysis

All three survey items (10-12) were open-ended and responses varied. Three answer fields were given in which to write for each question. The number of respondents who answered at least one part of each question, as well as the total number of "replies" for each question, are given in Table 7.1. In addition, the mean number of replies is shown for both the number of respondents who answered the question (Reply Count ÷ Response Count) and for all survey respondents (Reply Count ÷ 32).

Table 7.1

Question	Response Count	Reply Count	Mean # Replies per Question Respondent (Response Count)	Mean # Replies per Survey Respondent (out of 32)
10: Strategies	29	79	2.7 (29)	2.5
11: Obstacles	30	84	2.8 (30)	2.6
12: Integration PreK-12	26	67	2.6 (26)	2.1

Refer to the following links for a list of replies and additional information for these three questions:

http://www.maine.gov/education/lres/scitech/documents/STEM_survey_results_Q10_REL-NEI.xls
http://www.maine.gov/education/lres/scitech/documents/STEM_survey_results_Q11_REL-NEI.xls
http://www.maine.gov/education/lres/scitech/documents/STEM_survey_results_Q12_REL-NEI.xls

At the above links, the list of individual replies is given in the column A for sheets "Q10 Strategies," "Q11 Obstacles," and "Q12 Integrating PreK12." The replies were analyzed and coded for emerging themes and categories across all three questions (the same categories are used for all three questions, to aid comparisons across questions). Each reply is coded in two ways: by "Area" (blue fill) and by "Sector" (green fill). Consideration of a code for "Area" was independent of consideration of a code for "Sector." Individual replies could be coded in more than one area and/or sector. There is some overlap is these two coding schemes. It may be that one coding scheme is more helpful than the other in answering specific questions. Counts and percentages (out of the total number of replies for that question, e.g., 79 for question 10) are given in rows two and three (red fill).

Table 7.2. (below) shows a list of the emerging categories, with reply counts and percentages out of the total number of replies (NOT the number of question respondents or survey respondents). The data are the same as rows 2 and 3 at above three links [red fill] for each question.

Table 7.2

Area (blue) or Sector (green)	Q10 Strategies n	Q10 Strategies % $\frac{n}{79}*100$	Q11 Obstacles n	Q11 Obstacles % $\frac{n}{84}*100$	Q12 Integration PreK-12 n	Q12 Integration PreK-12 % $\frac{n}{67}*100$
Area 1: Programs, Supports, & Trainings	24	30.4	11	13.1	28	41.8
Area 2: Schools (Academic Standards, Student Preparation, School structure, & Curriculum)	15	19.0	17	20.2	30	44.8
Area 3: Careers, Business, & Economic Development	14	17.7	6	7.1	0	0.0
Area 4: Communication (Awareness/Advocacy/ Outreach/Motivation)	12	15.2	20	23.8	3	4.5
Area 5: Research	2	2.5	1	1.2	1	1.5
Area 6: Funding & Resources	6	7.6	15	17.9	2	3.0
Area 7: Students & Youth	18	22.8	14	16.7	1	1.5
Area 8: Instructors (Teachers/Volunteers/ Afterschool Staff)	14	17.7	16	19.0	14	20.9
Area 9: Leadership	0	0.0	3	3.6	0	0.0
Area 10: Women in STEM	2	2.5	1	1.2	0	0.0
Area 11: Technology	1	1.3	1	1.2	2	3.0
Area 12: Other	7	8.9	15	17.9	6	9.0
Sector 1: Individual Citizens (including Interest/Perceptions/Attitudes, etc.)	3	3.8	13	15.5	3	4.5
Sector 2a: Education - PreK12 *[*NOTE question 12 specifies PreK-12 in the question stem]*	41	51.9	36	42.9	58	86.6
Sector 2b: Education - IHE	22	27.8	7	8.3	3	4.5
Sector 3: Careers/Business and Business Environment	15	19.0	6	7.1	2	3.0
Sector 4: Organizations	7	8.9	0	0.0	5	7.5
Sector 5: Government (excluding Education)	1	1.3	2	2.4	1	1.5
Sector 6: Collaborations/Networks among some of all of Sectors 1-5	9	11.4	2	2.4	2	3.0
Other (including funding, mentoring, women, research) or Unclear	17	21.5	24	28.6	13	19.4

There was overlap in the content of the replies among these three questions. For example, a reply to question 10 was: "*Don't isolate them [STEM]; integration into all subjects; interdisciplinary.*" These responses suggest the need for integration among the STEM areas. This integration is the subject of question 12. See three links listed on page 20 for specific replies.

Questions #10-#12 Discussion Points

The responses indicate the greatest emphasis for strategies and integration in PreK-12 education and the youth population. The highest coding rates across all three questions are for:

Area 1: Programs, Supports, & Trainings
Area 2: Schools (Academic Standards, Student Preparation, School structure, & Curriculum)
Area 7: Students & Youth
Area 8: Instructors (Teachers/Volunteers/ Afterschool Staff)

Sector 2a: Education - PreK12

Listed below are the Areas and Sectors with the highest number of coded replies for strategies (question 10):

	% of replies
Area 1: Programs, Supports, & Trainings	30.4%
Area 7: Students & Youth	22.8 %
Sector 2a: Education – PreK12	51.9%
Sector 2b: Education – IHE	27.8%

The responses related to PreK-12 education, when specific to a grade level or span, focused mainly on upper grades and less on lower grades. Some replies mentioned transition issues or programs, such as dual enrollment programs. Replies also mentioned curriculum integration and interdisciplinary work, teacher preparation and professional development, special STEM curriculums, and additional programming for PreK-12 students (e.g., competitive design challenges and after school programs). Taken together, the strategies, obstacles, and integration areas and sectors related to education include the preponderance of replies (note that question 12 specifically referred to PreK-12 education).

The areas and sectors with the lowest replies included those related to technology, women in STEM, leadership, research, organizations, and government.

Questions #13-#14

Question 13: *From the following, identify the funding streams you know about that could be important potential sources to promote science, technology, engineering, and mathematics.*

Question 14: *With which of the funding streams you identified in Question 13 do you have a working knowledge?*

Questions #13-#14 Data

Question 13 is a multiple-select item with eight choices (including "Other" with an answer field). Question 14 is open response. Thirty of the 32 survey respondents answered question 13, and 25 respondents answered question 14. It is not clear whether the five respondents who selected a funding stream in question 13 but did not answer question 14 have any working knowledge of the streams they selected in question 13.

Table 8.1

Q13. From the following, identify the funding streams you know about that could be important potential sources to promote science, technology, engineering, and mathematics.

Answer Options	Response Percent (out of 30)	Response Count	Response Percent (out of 32)
a. National Science Foundation grants	83.3%	25	78.1%
b. Local town funding	30.0%	9	28.1%
c. General Purpose Aid	23.3%	7	21.9%
d. EPSCoR funds	36.7%	11	34.4%
e. Private business contributions	53.3%	16	50.0%
f. Race to the Top State grants	10.0%	3	9.4%
g. U.S. Dept. of Agriculture Grants	43.3%	13	40.6%
h. Other (please specify)	50.0%	15	46.9%

A REL-NEI researcher looked at the open-response remarks for question 14 and mapped them back to the funding streams selected in question 13. The number and percent of respondents who reported working knowledge (in question 14) of the question 13 answer options is shown in Table 8.2.

Table 8.2

Answer Options	Report Working Knowledge Percent (out of 25)	Report Working Knowledge Count	Report Working Knowledge Percent (out of 32)
a. National Science Foundation grants	24.0%	6	18.8%
b. Local town funding	12.0%	3	9.4%
c. General Purpose Aid	0.0%	0	0.0%
d. EPSCoR funds	8.0%	2	6.3%
e. Private business contributions	24.0%	6	18.8%
f. Race to the Top State grants	0.0%	0	0.0%
g. U.S. Dept. of Agriculture Grants	20.0%	5	15.6%
h. Other (please specify)	40.0%	10	31.3%

Questions #13-#14 Discussion Points

Overall, the respondents may not be aware of many of the funding streams currently available. Data on funding was the most requested reply in question 16. The understanding and potential of the funding streams may not be well understood by respondents; for example, seven out of 32 respondents (21.9%) reported "General Purpose Aid" as an important potential funding stream for STEM, and three out of 32 respondents reported "Race to the Top State grants" as an important potential funding stream. None of the respondents reported working knowledge of "General Purpose Aid" or "Race to the Top State grants." The highest percentage of respondents reporting working knowledge of a funding stream choice listed is "Other" at 31.3% (for all 32 survey respondents). The identified funding stream choices (not "Other") with the highest percentages of respondents reporting working knowledge are NSF grants (18.8%) and "Private Business Contributions" (18.8%).

Question #15: Model Practices

Question 15: *Identify any model practices from other states or regions that should be considered for adoption in Maine.*

Question #15 Data

This survey item was open-ended and responses varied. There was a total of 22 "replies" including individuals, organizations, projects, professions, and strategies. Only one of the "replies" seems, on initial analysis, to be repeated by two or more respondents: Massachusetts STEM initiatives. The 22 individual replies were provided by 11 respondents. Twenty-one (65.6%) survey respondents did not include any relevant information/replies: 18 left the question blank and three indicated "None that I know of," "n/a" or "dont know [sic]." The average number of replies per survey respondent (n=32) is approximately 0.7. Of the respondents who included at least one relevant reply (n=11), the mean number of replies is 2. The list of individual replies is given in Table 9.1.

Table 9.1

Q14. Identify any model practices from other states or regions that should be considered for adoption in Maine.
Individual Replies, alphabetized, by state abbreviation when possible *[information before colons is added; first names placed after last names]*
AZ: Arizona state standards program
CO, WIRED: Colorado's WIRED Region focused on STEM too
Dagget, Bill [Daggett?]
Dual enrollment-getting college credit for advanced work in high school but include CTE applied learning not just AP
Engineering the Future: Science, Technology, and the Design Process, a full-year course designed to introduce students to the world of technology and engineering
Envirothon Program
GLOBE Network Program for students
Curriculum: Promote more integration and interdisciplinary collaboration
Internships: Provide funding for internships as early as legally possible
MA, Boston: urban areas- Boston (youth programming there)
MA: Governor Deval Patrick and the Massachusetts Life Sciences Center were approved $90 million in capital funding. I know, they have a lager population base and more tax $$$, but ME could adjust its spending, but that's up to the law makers, right?!
MA: Massachusetts program
MA: Massachusetts STEM Initiative
MD: Climate Change Adaptation Plan from MD
ME AG: Maine Ag in the Classroom
OH: agriculture programs in ohio
OR: marine programs in oregon
Project Learning Tree
Teachers: Reward innovative teachers with higher pay but especially with higher funding levels.
WA: Climate Change Adaptation Plan from WA
WA: I-BEST Program in Washington State
WI: Wisconsin state standards program

Question #15 Discussion Points

The emphasis in the responses is on projects/programming (dual enrollment, marine programs, internships). One response suggested rewarding "innovative teachers" with increased pay and funding.

Question #16: Data to Advance STEM in ME

Question 16: *List the data that you or your organization needs most to advance science, technology, engineering and mathematics in Maine.*

Question #16 Data

This survey item was open-ended and responses varied. A REL-NEI researcher expanded the contents of the 16 responses to a total of 21 "replies" that included topics such as data, resources, trainings, and people. "Replies" related to funding had the highest rate of occurrence.

The 21 individual replies were provided by 13 respondents (40.6%). Nineteen survey respondents (59.4%) did not include any relevant information/replies: 16 left the question blank and three indicated "NA," "n/a," or "Involved more in public outreach with my company than funding efforts."

The average number of replies per survey respondent (n=32) is approximately 0.7. Of the respondents who included at least one relevant reply (n=13), the mean number of replies is 1.6. The list of individual replies, as expanded and counted by the REL-NEI researcher, is given in Table 10.1. Original responses are included in the accompanying spreadsheet in the sheet named "Q16 List" (column A, yellow fill).

Table 10.1

Q16. List the data that you or your organization needs most to advance science, technology, engineering and mathematics in Maine.

Individual Replies, clustered and alphabetized by cluster *[information before colons is added]*

Academic: academic requirements for graduations
Academic: background data prior to students entering a CTE program
Academic: Student performance data
Climate, tools: Data to tools for local level planning in hydrology, sea level rise, increased extreme weather events
Climate: Climate Change Indicator Data
Jobs: future expected [job] openings by STEM category
Jobs: Labor Market Information
Jobs: STEM jobs currently in Maine
Jobs: What the jobs will be
Needs: Needs and suggested ways to meet those needs plus the resources to implement [also listed separately under Resources]
Pathways: Career Pathways and Ladders
People: contacts who are interested in collaborating with the University of Maine of 4-H
People: qualified professionals and volunteers to teach/spread this information.
Resources, $: Available grants or funding
Resources, $: Dollars dollars dollars
Resources, $: Funding
Resources, $: How to get funding
Resources: Needs and suggested ways to meet those needs plus the resources to implement [also listed separately under Needs]
Scholarship: What scholarships are available for our students
Training: ability to do training for teachers
Training: Short-term and Long-term training opportunities

Question #16 Discussion Points

The focus of requested data is around academic information, jobs, funding opportunities, and possible funding levels. Much of the response information is general, and most is not tied directly to specific educational programs or initiatives (including those mentioned by respondents in prior questions, such as dual enrollment programs, internships, or STEM courses and curricular materials). Two respondents mentioned training in general terms. Pathways and Career paths and ladders were mentioned by one respondent, as was scholarship information for students. The quality and quantity of the responses may be related, in part, to the sample size of the survey return.

DEPARTMENT OF EDUCATION SUMMARY OF SURVEY FINDINGS PRESENTED BY EDC:

The EDC was given the challenging task of analyzing STEM education survey data from a small number of respondents. Despite inherent limitations in this effort, the analysis by the EDC and the raw data from the respondents helps to underscore some important aspects of STEM education in Maine.

Aside from the low response rate and the lack of representation from the business community and from school district administrators, a large variety of individuals and organizations were represented by the respondents. These respondents cited a significant number of STEM reports and data collection efforts in Maine and identified numerous initiatives and organizations related to STEM education. This listing will serve as a resource for future, more comprehensive STEM data collection efforts. It is also clear that there are additional entities already involved in STEM-related partnerships with the Maine Department of Education that are not reflected in the list of individuals, organizations and resources catalogued in this survey. Survey respondents also further validated potential benefits of STEM education including resulting job possibilities, job availability, increased wages, connections to economic development, and an informed citizenry. Such validation underscores the need for further data collection and implementation of efforts related to STEM.

It was sometimes difficult to find clear agreement among survey respondents regarding specific promising strategies and obstacles related to STEM education. However, listed areas of concern and opportunity will contribute to what is known about STEM education; further, the area of professional development for teachers was often cited as a key need.

ADDITIONAL ASSISTANCE REQUESTED FROM EDC:

The Department of Education worked with staff at the Regional Educational Laboratory Northeast & Islands (REL-NEI) at Education Development Center (EDC) who assisted in the analysis of data for this report and collection of additional research inquiries. REL-NEI conducted searches of the research literature to assist in answering the following two inquiries.

- Describe the breath and depth of local, state, or regional landscape studies conducted to determine a community's STEM resources and capacity.
- What are the characteristics of effective State STEM initiatives and what measures, particularly longitudinal data, have been collected to determine effectiveness?

Initially the searches for both inquiries yielded limited information. This result was surprising to staff at the Department of Education and EDC. The Department initiated a follow up search inquiry and is currently waiting for the results. As a result of the follow up request, EDC provided three documents:

- *Science, Technology, Engineering, and Mathematics Education Program Implementation in Massachusetts*. Education Development Center, Inc., Newton, Massachusetts. Fall 2007. http://cse.edc.org/products/pdfs/MASTEMLandscape.pdf

- *Science, Technology, Engineering, and Mathematics (STEM) Education:*

Background,Federal Policy, and Legislative Action. Congressional Reseach Service Report for Congress. Updated March 21, 2008, Jeffrey J. Kuenzi, Specialist in Education Policy, Domestic Social Policy Division. http://www.fas.org/sgp/crs/misc/RL33434.pdf

- *Federal Science, Technology, Engineering, and Mathematics Programs and Related Trends.* United States Government Accountability Office, 2005. http://www.gao.gov/new.items/d06114.pdf

Information related to STEM landscape studies and longitudinal data efforts in other states will assist in defining Maine Department of Education future work.

In addition to the state and national STEM reports secured through EDC as a follow up to the Maine STEM survey analysis provided in this report, information describing green technology programs in Maine was collected from a recent survey of Career and Technical Education Programs (please see D.5. for this information.)

OTHER STATEWIDE PROJECTS RELATED TO STEM:

The Department of Education also is a part of several STEM related programs and initiatives that do not appear as part of the reported information generated for LD 1101. These programs and initiatives include, but are not limited to, the following:

- **The STEM Collaborative** - The STEM Collaborative is a group of education, business, government, and nonprofit leaders working to improve science, technology, engineering, and mathematics education in Maine. In 2008, the Collaborative launched the first statewide STEM Summit, which brought together over 200 participants to strategize ways of better acquainting teachers and the public with the growing number of STEM-related careers in Maine. According to the Maine Department of Labor, 40% of the industries projected to gain jobs in Maine are STEM-related. The Summit increased public awareness of STEM needs and learning opportunities, and developed a collaborative voice for STEM education. This partnership will host the second STEM Summit on January 29, 2010 in Augusta. STEM in Maine can be found at http://www.mainestem.org/

- **Green Technologies** - The Maine Department of Education-Career Technical Education completed a survey in April-May 2009 concerning green sustainability strategies within the CTE centers, regions and programs. Participants included both the Maine Administrators of Career and Technical Education (MACTE), and Career Technical Educators. This survey brought to light CTE's commitment to green advancements and new occupations. Many of the green approaches, practices and technologies also have STEM indicators (see Attachment D.5).

- **Maine Agriculture in the Classroom** – Taking the approach of integrating information related to agriculture into PK-12 curricula, Maine Agriculture in the Classroom works with teachers, students and a range of partners. Maine Agriculture in the Classroom

provides trainings, informational resources and educational grants to promote an understanding of agriculture for all students (see Attachment D.3).

- **Maine Astrobiology Curriculum** - During the 2008-2009 school year, 10 teachers in 8 schools piloted the reform science curriculum *Astrobiology: An Integrated Science Approach* published by It's About Time, Inc. As part of the pilot, the Department of Education and the University of Maine, Center for Science and Mathematics Education Research, collected data to assist educators and researchers in better understanding curriculum implementation and the effect of education reform materials on student aspirations and achievement. The partners involved in this collaboration included: The Department of Education, the University of Maine, It's About Time, Inc., TERC, Lockheed Martin, The Maine Space Grant Consortium and Maine Senator Elizabeth Schneider. An evaluation of this curriculum reform project is expected to be completed by January 2010 and will be provided as an addition to this report.

- **Real World Design Challenge** – Schools from Maine are participating in the Real World Design Challenge (RWDC) sponsored by the National Governor's Association. Twenty-five states are participating in the 2009-2010 competition. RWDC provides every participating teacher with $1 million worth of professional quality computer-assisted design (CAD) software free of charge. Online professional development is also provided to participating educators. State teams are provided with an on-line environment to collaborate with scientists, mathematicians, and aerospace engineers across the nation, using global engineering software. Winning teams from participating states will compete in a national challenge in Washington D.C. More information can be found at http://www.realworlddesignchallenge.org/

NEXT STEPS:

While the data from LD1101 Survey does not provide a sufficient number or range of respondents to serve as a baseline data for a statewide STEM initiative, the absence of a critically large data pool increases the call for an answer to the question "What is Maine's current state of the State in STEM learning?" A landscape study to provide comprehensive baseline data would support state and local efforts to improve STEM learning in several ways. First, a STEM landscape study would assist Maine in documenting current STEM efforts necessary in completing the federal Race to the Top grant application due in June 2010. Second, data from a comprehensive landscape study would also provide organizations and schools with information that will make them more competitive for national grants (i.e., National Science Foundation and National Institute of Health). Third, a comprehensive documentation of STEM efforts and achievement will provide valuable benchmarks against which organizations and initiatives can mark improvements in STEM learning and provide clear directions regarding statewide STEM goals.

The Maine Department of Education has taken steps to:

- Partner with Maine EPSCoR at the University of Maine and EDC to conduct, analyze and deliver a comprehensive landscape study to document and support STEM learning.

The Department of Education will coordinate the work and generate the final report, Maine EPSCoR at the University of Maine will fund a statewide STEM data collection effort at an approximate cost of $25,000, and EDC will analyze the data. Finalization of agreements in this collaboration is still underway.

- Outline the scope of a landscape study, built on models of existing state and national studies. The framework for this landscape study will include input from EDC, the STEM Collaborative, Career and Technical Education, the Maine Community College System, the University of Maine System, the Maine Department of Labor, and representatives from Maine's business community.

- Engage EDC to catalog all NSF and NIH grant funded efforts in Maine in the last five years. This will provide an overview of externally funded STEM research and innovation projects in Maine.

ATTACHMENT A
FULL TEXT OF LD 1101 – "RESOLVE, TO UNDERSTAND AND ASSIST IN EFFORTS TO PROMOTE SCIENCE, TECHNOLOGY, ENGINEERING AND MATH EDUCATION" – SIGNED ON JUNE 8, 2009 BY MAINE GOVERNOR JOHN E. BALDACCI

Resolve, To Understand and Assist in Efforts To Promote Science, Technology, Engineering and Math Education

Sec. 1 Collect information. Resolved: That the Department of Education and the University of Maine System shall collect science, technology, engineering and math information and data by November 1, 2009 on science, technology, engineering and math initiatives in consultation with the State Board of Education, public and private partnerships, including pilot projects and nonprofit and other organizations and businesses that work on promoting science, technology, engineering and math initiatives through mentoring and other programs and any science, technology, engineering and math initiatives collaborative efforts; and be it further

Sec. 2 Report. Resolved: That with the data and information collected on science, technology, engineering and math initiatives under section 1, the Department of Education shall produce a report with its findings and recommendations for review by the Joint Standing Committee on Education and Cultural Affairs no later than December 15, 2009. The report must focus on the following:

1. Informing the Joint Standing Committee on Education and Cultural Affairs about the initiatives that work to inspire students in the science, technology, engineering and math areas of education;

2. The benefits of promoting science, technology, engineering and math education, including, but not limited to, job possibilities, job availability, wages and how promoting science, technology, engineering and math is tied to economic development of the State;

3. Suggestions for expanding science, technology, engineering and math initiatives throughout the State, including ideas for professional development;

4. Ideas of how to integrate and promote science, technology, engineering and math education in prekindergarten to grade 12 to inspire students to continue education in those subjects when pursuing undergraduate and graduate degrees;

5. Possible funding sources to further promote science, technology, engineering and math education; and

6. Helpful data or information to assist the Joint Standing Committee on Education and Cultural Affairs.

The Joint Standing Committee on Education and Cultural Affairs may submit legislation based on the findings and recommendations of the report submitted by the Department of Education to the Second Regular Session of the 124th Legislature by February 1, 2010.

SPO412, LR 1327, item 1, Signed on 2009-06-08 00:00:00.0 – First Regular Session – 124th Maine Legislature

ATTACHMENT B
ONLINE SURVEY QUESTIONS TO DETERMINE THE STATUS OF INITIATIVES RELATED TO SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS EDUCATION IN THE STATE OF MAINE

Online Survey Questions to collect information on initiatives related to science, technology, engineering and mathematics (STEM):

1. Please provide us with some information about yourself:

   Name:
   Organization:
   Address:
   City:
   Town:
   State:
   Zip / Postal Code:
   Email Address:
   Phone Number:

2. Please identify the organization with whom you are affiliated:

   ___K-12 Education
   ___Higher Education, Research
   ___Government Agency
   ___Business (For Profit)
   ___Private Non-Profit
   ___Other (Please Specify)

3. Identify any reports or data collection efforts you are aware of that report on science, technology, engineering and mathematics initiatives in the state.

4. Of the reports or data collection efforts you identified for Question 3, of which do you have a working knowledge?

5. Identify any organization(s) or initiative(s) currently working to support science, technology, engineering and mathematics in Maine.

6. Of the organizations you identified for Question 5, with which do you have personal experience?

7. Identify any initiatives whose specific purpose is to inspire students in science, technology, engineering and mathematics.

8. With which of the initiatives identified in Question 7 do you have a working knowledge?

9. From the following, select those you would identify as benefits resulting from the promotion of science, technology, engineering and mathematics.

   ___Job possibilities
   ___Job availability

___Increased wages
___Connection between STEM areas and economic development
___Informed citizenry
___Other (please specify)

10. Please list what you would identify as the three most promising strategies for expanding science, technology, engineering and mathematics in Maine.

    1.
    2.
    3.

11. List what you would identify as the three most significant obstacles for expanding science, technology, engineering and mathematics in Maine.

    1.
    2.
    3.

12. List what you would identify as the three most promising strategies for integrating science, technology, engineering and mathematics into PreK-12 programming.

    1.
    2.
    3.

13. From the following, identify the funding streams you know about that could be important potential sources to promote science, technology, engineering and mathematics.

    ___National Science Foundation grants
    ___Local town funding
    ___General Purpose Aid
    ___EPSCoR funds
    ___Private business contributions
    ___Race to the Top State Grants
    ___U.S. Dept of Agriculture Grants
    ___Other (please specify)

14. With which of the funding streams you identified in Question 13 do you have a working knowledge?

15. Identify any model practices from other states or regions that should be considered for adoption in Maine.

16. List the date that you or your organization needs most to advance science, technology, engineering and mathematics in Maine.

ATTACHMENT C
INDIVIDUALS AND ORGANIZATIONS RECEIVING LINK TO ONLINE SURVEY RELATED TO INITIATIVES IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS EDUCATION IN THE STATE OF MAINE

Recipients of October 2009 Survey on Science, Technology, Engineering and Mathematics Disseminated under LD 1101

Dave Galli, President, Association of Teachers of Mathematics in Maine (ATOMIM)

Anthony Trippi, Green Building Instructor, Bath Regional Career and Technical Center, Bath, Maine

Susan Jonason, Executive Director, Challenger Learning Center-Maine, Bangor Maine

Paul Delva, Senior Vice President, Fairchild Semi Conductor, Portland, Maine

John MacDonald, Air Energy-Composite Instructor, Foster Technology Center, Farmington, Maine

Bill Brown, Corporate Vice President, Instrument Research and Development and Manufacturing, Idexx Laboratories, Inc., Westbrook, Maine

William Wallen, Chief Scientific Officer and Senior Vice President, Idexx Laboratories, Inc., Westbrook, Maine

Jon Geiger, Director, Education Office, The Jackson Laboratory, Bar Harbor, Maine

Timothy Kienstra, Manager, Lockheed Martin, Bath, Maine

Maine Agriculture in the Classroom Association and Council Board Members (see http://www.agclassroom.org/me/about/index.htm and http://www.mainefarmbureau.com/aginclass/maitcc-officers.htm)

Director and State Geologist Robert G. Marvinney, Maine Bureau of Geology and Natural Areas

Director Will Harris, Maine Bureau of Parks and Lands

Directors of Maine Career & Technical Education Secondary Schools (Regions and Centers – see http://www.maine.gov/education/it/directory/index.htm)

President John Fitzsimmonds, Maine Community College System

Commissioner Seth Bradstreet, Maine Department of Agriculture, Food and Rural Resources

Commissioner Patrick K. McGowan, Maine Department of Conservation

Thaxter Trafton, Acting Commissioner, Maine Department of Economic and Community Development

Commissioner David P. Littell, Maine Department of Environmental Protection

John Dorrer, Division, Center for Workforce Research & Information, Maine Department of Labor

Maine Environmental Education Guide Listings (see Attachment D.4. for full listing)

Director and State Forester R. Alec Giffen, Maine Forest Service

Commissioner Roland "Danny" Martin, Maine Inland Fisheries and Wildlife

Stacey Palmer, Industry/Education Liaison, Maine Marine Trades Association, Portland, Maine

Mary Whitten, President, Executive Board, Maine Science Teachers Association

Richard Komp, President, Maine Solar Energy Association, Jonesport, Maine

Terry Shehata, Executive Director, Maine Space Grant Consortium, Augusta, Maine

Maine STEM Collaborative (see http://www.mainestem.org/STEMInitiative.asp)

Gus Goodwin, Maine Technology Education Association, Westbrook, Maine

Lisa Martin, Executive Director, Manufacturers Association of Maine, Westbrook, Maine

Michael McKernan, Director, Education & Conferences, Mount Desert Biological Laboratories, Salisbury Cove, Maine

Anne Gauthier, National Semiconductor Corporation, South Portland, Maine

James Westhoff, Industry Liaison, North Star Alliance, Central/Western Maine Workforce Investment Board, Lewiston, Maine

Brian McDougal, Department Head, Northern Maine Community College, Presque Isle, Maine

Wayne Kilcollins, Wind Technology Instructor, Northern Maine Community College, Presque Isle, Maine

Edward Wright, Project Leader in Presque Isle Maine/Horizon Wind Energy, Presque Isle, Maine

Barrett Parks, Industrial and Farm Mechanics, Presque Isle Regional Technology Center, Maine

Resource Conservation & Development Offices – Maine (see http://www.me.nrcs.usda.gov/programs/rc&d.html)

Secondary Educators listed in Maine Department of Education Agriculture & Natural Resources Directory (see Attachment D.2. for full listing)

Soil & Water Conservation Districts – County Offices (see http://maineswcds.org/locations.htm)

Superintendents of all Maine School Districts (see http://www.maine.gov/education/schoolinfolist.htm)

Ralph Chapman, Photonics Coordinator, United Technologies Center, Bangor, Maine

University of Maine Cooperative Extension County Offices (see http://www.umext.maine.edu/)

University of Maine System – Presidents and Vice Presidents (see http://www.maine.edu/) – contacted by Allyson Hughes Handley, President, University of Maine at Augusta and University of Maine System Science & Technology Strategic Initiative

ATTACHMENT D
LISTING OF SOME ADDITIONAL RESOURCES PERTAINING TO INITIATIVES IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS EDUCATION

ATTACHMENT D.1.
SECONDARY MAINE CAREER & TECHNICAL EDUCATION PROGRAMS RELATED TO SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS

Secondary Maine Career & Technical Education Programs Related to STEM

Agriculture / Horticulture, Caribou Regional Technology Center
AgriScience, Presque Isle Regional Career and Technical Center
Aquaculture I, Coastal Washington County Institute of Technology
Auto Mechanics, Biddeford Regional Center of Technology
Auto Mechanics, Caribou Regional Technology Center
Auto Mechanics, Saint Croix Regional Technical Center
Auto Technology, Maine Applied Technology Region 8
Auto Technology, Portland Arts and Technology High School
Auto Technology I, Capital Area Technical Center
Auto Technology II, Capital Area Technical Center
Automated Manufacturing, Caribou Regional Technology Center
Automotive Diagnostics, Maine Applied Technology Region 4
Automotive Suspensions, Maine Applied Technology Region 4
Automotive Technology, Bath Regional Career and Technical Center
Automotive Technology, Hancock County Technical Center
Automotive Technology, Kenneth Foster Regional Applied Technology Center
Automotive Technology, Lake Region Vocational Center
Automotive Technology, Maine Applied Technology Region 3
Automotive Technology, Maine Applied Technology Region 7
Automotive Technology, Maine Applied Technology Region 9
Automotive Technology, Maine Applied Technology Region 10
Automotive Technology, Maine Applied Technology Region 11
Automotive Technology, Mid-Maine Technical Center
Automotive Technology, Saint John Valley Technology Center
Automotive Technology, Sanford Regional Vocational Center
Automotive Technology, Skowhegan Regional Vocational Center
Automotive Technology, Tri-County Technical Center
Automotive Technology, Westbrook Regional Vocational Center
Automotive Technology / Diesel Technology, Hancock County Technical Center
Automotives, Lewiston Regional Technical Center
Biotechnology, Capital Area Technical Center
Biotechnology, Kenneth Foster Regional Applied Technology Center
Business Computer Education, Lake Region Vocational Center
Business Office Technology, Lake Region Vocational Center
Business Technology, Presque Isle Regional Career and Technical Center
Business Technology, Region 2 School of Applied Technology
Cisco / Computer Repair, Maine Applied Technology Region 9
Cisco & Computer Repairs, Lewiston Regional Technical Center
C.N.A., Maine Applied Technology Region 9
C.N.A. & Health Careers, Lewiston Regional Technical Center
C.N.A. / Medical Science, Maine Applied Technology Region 8
Commercial Video / Communications, Maine Applied Technology Region 4
Composites and Alternative Energy, Kenneth Foster Regional Applied Technology Center
Computer Aided Drafting, Maine Applied Technology Region 11
Computer Aided Drafting, Mid-Maine Technical Center
Computer Electronics, Saint Croix Regional Technical Center
Computer Electronics / Robotics, Maine Applied Technology Region 4

Computer Installation and Repair, Westbrook Regional Vocational Center
Computer Processing, Caribou Regional Technology Center
Computer Repair / Networking, Maine Applied Technology Region 3
Computer Systems Repair, Tri-County Technical Center
Computer Technician Prep / CADD, Saint John Valley Technology Center
Computer Technology, Bath Regional Career and Technical Center
Computer Technology, Capital Area Technical Center
Computer Technology, Hancock County Technical Center
Computer Technology, Kenneth Foster Regional Applied Technology Center
Computer Technology, Mid-Maine Technical Center
Computer Technology, Portland Arts and Technology High School
Computer Technology and Networking Technology, Maine Applied Technology Reg. 7
Computers in Business, Biddeford Regional Center of Technology
Design Technology, Bath Regional Career and Technical Center
Diesel Technology, Hancock County Technical Center
Diesel Technology Small Engines, Maine Applied Technology Region 7
Digital Design, Sanford Regional Vocational Center
Digital Graphic Arts, Skowhegan Regional Vocational Center
Drafting, Biddeford Regional Center of Technology
Drafting, Capital Area Technical Center
Drafting, Kenneth Foster Regional Applied Technology Center
Drafting, Presque Isle Regional Career and Technical Center
Drafting, Westbrook Regional Vocational Center
Drafting and Design, Lake Region Vocational Center
Drafting Technology, Sanford Regional Vocational Center
Electrical / Connectivity, Maine Applied Technology Region 4
Electrical Construction, Skowhegan Regional Vocational Center
Electrical Technology, Bath Regional Career and Technical Center
Electrical Technology, Biddeford Regional Center of Technology
Electrical Technology, Mid-Maine Technical Center
Electrical Trades, Maine Applied Technology Region 7
Electricity, Lewiston Regional Technical Center
Electricity, Westbrook Regional Vocational Center
Electronics, Caribou Regional Technology Center
Emergency Medical Technician, Kenneth Foster Regional Applied Technology Center
EMS / Fire Science Technical / Vocational Programs, Maine Applied Technology Reg. 7
Engineering – CAD, Lewiston Regional Technical Center
Engineering Science and Technology, Maine Applied Technology Region 8
Environmental Horticulture, Maine Applied Technology Region 4
Environmental Science, Sanford Regional Vocational Center
Exploring Applied Technology, Portland Arts and Technology High School
Farm Mechanics, Presque Isle Regional Career and Technical Center
Forest Management & Operations, Region 2 School of Applied Technology
Firefighting / E.M.T., Maine Applied Technology Region 8
Forestry, Maine Applied Technology Region 11
Forestry / Wood Harvesting, Kenneth Foster Regional Applied Technology Center
Graphic Arts, Caribou Regional Technology Center
Graphic Arts, Maine Applied Technology Region 8
Graphic Arts, Maine Applied Technology Region 11

Graphic Arts, Portland Arts and Technology High School
Graphic Communications, Kenneth Foster Regional Applied Technology Center
Graphic Communications, Mid-Maine Technical Center
Graphic Communications, Sanford Regional Vocational Center
Graphic Design, Maine Applied Technology Region 7
Graphic Design and Communications, Tri-County Technical Center
Health Care Careers, Skowhegan Regional Vocational Center
Health Occupations, Biddeford Regional Center of Technology
Health Occupations, Capital Area Technical Center
Health Occupations, Caribou Regional Technology Center
Health Occupations, Hancock County Technical Center
Health Occupations, Lake Region Vocational Center
Health Occupations, Maine Applied Technology Region 3
Health Occupations, Maine Applied Technology Region 4
Health Occupations, Portland Arts and Technology High School
Health Occupations, Saint John Valley Technology Center
Health Occupations, Sanford Regional Vocational Center
Health Occupations, Tri-County Technical Center
Health Science, Lewiston Regional Technical Center
Health Science Careers, Bath Regional Career and Technical Center
Health Science Careers, Maine Applied Technology Region 7
Health Sciences, Region 2 School of Applied Technology
Heating & Sheet Metal, Lewiston Regional Technical Center
Heavy Equipment Operation & Maintenance, Caribou Regional Technology Center
Horticulture, Maine Applied Technology Region 8
Horticulture, Portland Arts and Technology High School
Horticulture / Landscaping / Natural Resources Mgt., Maine Applied Technology Reg. 7
Industrial Technology, Maine Applied Technology Region 11
Information Systems Technology, Skowhegan Regional Vocational Center
Information Technology, Maine Applied Technology Region 4
Information Technology, Sanford Regional Vocational Center
Introduction to Applied Technology, Maine Applied Technology Region 8
Machine Tool, Biddeford Regional Center of Technology
Machine Tool, Maine Applied Technology Region 3
Machine Tool, Van Buren Regional Vocational Center
Machine Tool Technology, Capital Area Technical Center
Machine Tool Technology, Sanford Regional Vocational Center
Manufacturing Technology & Robotics, Portland Arts and Technology High School
Mathematics, Maine Applied Technology Region 7
Mechanical Cluster, Portland Arts and Technology High School
Medical Occupations, Westbrook Regional Vocational Center
Metal Fabrication, Kenneth Foster Regional Applied Technology Center
Metal Fabrication Welding, Maine Applied Technology Region 10
Metals Manufacturing, Tri-County Technical Center
Metal Trades, Maine Applied Technology Region 9
Multi Media I, Capital Area Technical Center
Multi Media II, Capital Area Technical Center
Nursing Assistant, Kenneth Foster Regional Applied Technology Center
Nursing Assistant / CNA, Saint Croix Regional Technical Center

Office Technology, Westbrook Regional Vocational Center
Photonics, Maine Applied Technology Region 4
Plumbing & Heating Technology, Maine Applied Technology Region 4
Pre-Engineering, Sanford Regional Vocational Center
Precision Machine, Maine Applied Technology Region 8
Small Engines, Maine Applied Technology Region 8
Transportation Mechanics, Region 2 School of Applied Technology
TV-Video Production, Hancock County Technical Center
Video Production, Caribou Regional Technology Center
Video Technology, Portland Arts and Technology High School
Web Page Design, Westbrook Regional Vocational Center
Wood Harvesting, Maine Applied Technology Region 9

ATTACHMENT D.2.
SECONDARY EDUCATION PROGRAM LISTINGS FROM
MAINE DEPARTMENT OF EDUCATION
AGRICULTURE AND NATURAL RESOURCES TEACHER DIRECTORY

MAINE SECONDARY AGRICULTURE AND NATURAL RESOURCES PROGRAMS
(From Agriculture & Natural Resources Education Directory at www.maineagnr.org)

SCHOOL ADDRESS	COORDINATOR	PROGRAM
Ashland High School (SAD #32)	Janet Perry	Science Curriculum, Integrated
46 Hayward St., P.O. Box 369	JPerry@sad32.org	with Agriculture
Ashland, ME 04732		
Tel: 435-3481		
Fax: 435-6417		
Brewer High School	Daryl King	Sciences &
79 Parkway South	dking@breweredu.org	Food Services
Brewer, ME 04412		(inc. garden)
Tel: 989-4140		
Fax: 989-8659		
Bucksport High School	Denise Smith	Environmental Science
102 Broadway	denise.smith@bucksportschools.com	Marine Biology
Bucksport, ME 04416	Terry Jergenson	Biology
Tel: 469-6652	terry.jergenson@bucksportschools.com	Anatomy
Fax: 469-6654		(inc. greenhouse)
Camden High School	Margo Murphy	Botany
25 Keelson Drive	margo_murphy@fivetowns.net	(inc. greenhouse)
Rockport, ME 04856		
Tel: 236-7800	Nick Ithomitis	
Fax: 236-7813	nick_ithomitis@fivetowns.net	
Capital Area Technical Center	Rene Albison	Earth / Life Science
40 Pierce Drive, Suite 1	ralbison@augustaschools.org	Nature Center
Augusta, ME 04330		Field Exploration
Tel: 626-2475		(inc. greenhouse)
Fax: 626-2498		
Caribou Regional Applied	Thomas Hale	Agri-Science
Technology Center 308 Sweden Street, Suite 1	thale@mail.caribouschools.org	(Ag. Mechanics & Engineering;
Caribou, ME 04736 Tel: 493-4263 (FFA Hotline)		Physics & Chemistry in Ag.;
Fax: 493-4242		Natural Resources;
		Turf Landscape; Honor Ag.)
		(inc. greenhouse)
Carrabec High School	Sue Hallowell	Agri-Science
160 North Main Street	shellewell@msad74.org	(inc. greenhouse)
P.O. Box 220		
North Anson, ME 04958	Ken Coville	Food Services
Tel: 635-2296	kcoville@msad74.org	Agriculture
Fax: 635-2276		

SCHOOL ADDRESS	COORDINATOR	PROGRAM
Central Aroostook High School	Jennifer Morin	Ag-Science
P.O. Box 310	jmorin@sad42.k12.me.us	(Natural Resources;
Mars Hill, Me 04758		Ag . Mechanics; Agri-Business
Tel: 425-2811		& Sale; Animal Science;
Fax: 429-8460		Horticulture; FFA Studies;
		Introduction to Agriculture)
Charleston Correctional Center	Steve Conner	Wood Harvesting
1202 Dover Road	steve.conner@maine.gov	
Charleston, ME 04422		
Tel: 285-0872		
Fax: 285-0815		
Coastal Washington County	David Finlay	Aquaculture
Institute of Technology	finlay_david@yahoo.com	
School Union 102	Tim Reynolds	
109 Court Street	treynolds@msln.net	
Machias, ME 04654	Brian Leavitt	Entrepreneurship
Tel: 255-3812	bleavitt@mmhsbulldogs.org	(inc. greenhouse)
Fax: 255-3093		
Deer-Isle Stonington High School	Tom Duym	Natural Resources
251 North Deer Isle Road	tduym@dishs.org	Partners in Monitoring
Deer Isle, ME 04627		(Water Quality)
Tel: 348-2303		Marine Technology
Fax: 348-2304		
Easton High School P.O. 66	Bryan Wright	Environment & Natural Res.
Easton, ME 04740	bryan.wright@eastonschooldistrict.org	Science and Biology
Tel: 488-7702		
Fax: 488-7707		
Fort Fairfield Middle/High School	Linda Jones	Environmental Studies
28 High School Drive, Suite A	ljones@msad20.org	Botany / Horticulture
Fort Fairfield, ME 04742		Freshman Science
Tel: 472-3271		Veterinary Science
Fax: 472-3281		(inc. greenhouse)
Hodgdon High School	Malcolm Nesbitt	Natural Resources
174 Hodgdon Mills Road Hodgdon, Me 04730	malcolmnesbitt@msln.net	(Environmental Science
		Earth Science and
Tel: 532-2413		Advanced Biology)
Fax: 532-2679		
Jonesport-Beals High School	Lynn Alley	Natural Resources
180 Snare Creek Lane	lyalley@yahoo.com	Partners in Monitoring

SCHOOL ADDRESS	COORDINATOR	PROGRAM
Jonesport, ME 04649		(Water Quality)
Tel: 497-5454		
Fax: 497-3004		
Katahdin High School	Jim Willard	Natural Resources
800 Station Road	jwillard@khs.msad25.k12.me.us	(Ecology, Biology)
Stacyville, ME 04777		
Tel: 365-4218		
Fax: 365-6011		
Kenneth Foster Regional	Dean Merrill	Wood Harvesting
Applied Technology Center	dmerrill@msad9.org	
173 Seamon Road		
Farmington, ME 04938		
Tel: 778-3562		
Fax: 778-3562		
Lee Academy	Vanessa Michaud	Biology
26 Winn Road	vanessa.michaud@leeacademy.org	Anatomy & Physiology
Lee, ME 04455-4214	Susan Sieczkiewicz Linscott	Biology
Tel: 738-2252	linscotts@leeacademy.org	
Fax: 738-3257	Rena Poole	Physics, Chemistry
	rpoole@leeacademy.org	(inc. greenhouse)
Lisbon High School	Olivia Griset	Ecology
2 Sugg Drive	ogriset@lisbonschoolsme.org	Biology
Lisbon Falls, ME 04252		Oceanograpy
Tel: 353-3030	Jill Denniston	Marine Biology
Fax: 353-7908	jdenniston@union30.org	(inc. greenhouse)
Lubec Consolidated School	David Finlay	Aquaculture
44 South Street	finlay_david@yahoo.com	(inc. greenhouse)
Lubec, ME 04652		
Tel: 733-5591		
Fax: 733-2004		
Madison High School	Jessica Ward	Science
486 Main Street	jessicaward@msln.net	Lab Biology
Madison, ME 04950		Anatomy
Tel: 696-3395		(inc. greenhouse)
Fax: 696-5644		
Maine Applied Technology	David Smith	Horticulture
Region 10	smith@mrv10.org	Landscape Design
68 Church Road		(inc. greenhouse)
Brunswick, ME 04011		
Tel: 729-6622		
Fax: 721-0907		
Marshwood High School	Christopher Stauffer	Biology

SCHOOL ADDRESS	COORDINATOR	PROGRAM
260 Route 236	cstauffer@msad35.net	Marine Biology
South Berwick, ME 03908		Honors Biology
Tel: 384-4500		(inc. greenhouse)
Fax: 384-4508		
Medomak Valley High School 320 Manktown Road	Neil Lash	Horticulture / Landscaping
Waldoboro, ME 04572	neil_lash@sad40.k12.me.us	Greenhouse Management
Tel: 832-5389 Fax: 832-2280		Heirloom Seed Saving Project
		Water Quality Monitoring
		(inc. greenhouse)
Messalonskee High School	Marge Stehle	Science
131 Messalonskee High Drive	mstehle@rsu18.org	(inc. greenhouse)
Oakland, ME 04963		
Tel: 465-7381	Gwen Bacon	Life Sciences
Fax: 465-9683	gbacon@msad47.org	
Mid-Coast School of Technology	John Pincince	Horticulture & Natural Resource
Maine Applied Tech. Region 8	(734-6723 - Islesboro)	Management
One Main Street	ashgrove@peoplepc.com	(inc. greenhouse)
Rockland, ME 04841	jpincince@msln.net	
Tel: 594-2161/Fax 594-7506		
Mount Desert Island High School	Bruce Munger	Marine Technology
P.O. Box 180	bmunger@u98.k12.me.us	
Mount Desert, ME 04660		
Tel: 288-5011		
Fax: 288-4703		
Mount View High School	Peter Wagner	Biology, Science
577 Mount View Road	pwagner@msad3.org	
Thorndike, ME 04986	Travis Collins	Alternative Education
Tel: 568-3255	tcollins@msad3.org	Greenhouse
Fax: 568-7550		(inc. greenhouse)
Nokomis Regional High School 266 Williams Road	Ed Buzanoski	Agriculture & Natural Resources
Newport, ME 04953	ebuzanoski@rsu19.org	
Tel: 368-4354		
Fax: 368-3276		
Northern Penobscot Tech. Ctr.Maine Applied Tech. Reg. 3 35 West Broadway	Frank Burnell	Natural Resources Technology
Lincoln, ME 04457	sburnell@fairpoint.net	(Forestry)
Tel: 794-3004		

SCHOOL ADDRESS	COORDINATOR	PROGRAM
Fax: 794-8049		
Oxford Hills Technical School Maine Applied Tech. Region 11	Al Schaeffer	Forestry and Wood Harvesting
P.O. Box 313	aschaeffer@sad17.k12.me.us	
Norway, ME 04268		
Tel: 743-7756 x 2207		
Fax: 743-0667		
Portland Arts & Technology	Robert Francis	Horticulture
High School	francb@portlandschools.org	(inc. greenhouse)
196 Allen Avenue	Barry Roberts	
Portland, ME 04103	roberb@portlandschools.org	
Tel: 874-8165		
Fax: 874-8170		
Presque Isle Regional	Aaron Buzza	Ag-Science and
Technology Center	aaron.buzza@sad1.org	Natural Resources
79 Blake Street, Suite One	Shelly Gross	(inc. greenhouse)
P.O. Box 1118	shelly.gross@sad1.org	
Presque Isle, ME 04769	Vicki McCurry	
Tel: 764-8113	vicki.mccurry@sad1.org	
Fax: 7648107		
Sanford Regional Vocational Ctr.	Aaron Stam	Environmental Science
52 Sanford High School Blvd.	astam@sanford.org	(inc. greenhouse)
Sanford, ME 04073		
Tel: 324-2942		
Fax: 324-2957		
School of Applied Technology Maine Applied Tech. Reg.9	Marc Dupuis	Forestry / Wood Harvesting
377 River Road Mexico, ME 04257	mdupuis@region9school.org	
	Ben Welch	
Tel: 364-3764	benwelch@region9school.org	
Fax: 364-2074		
Skowhegan Regional	William Houston, Jr.	Outdoor Resources
Vocational Center	whouston@msad54.org	
61 Academy Circle		
Skowhegan, ME 04976		
Tel: 474-2151		
Fax: 858-4879		
Southern Aroostook	Melanie Greaves	Environmental Sciences
Community School	mgreaves@nscom.org	
922 Dyer Brook Road		
Dyer Brook, ME 04747	David Libby	Forest Management &

SCHOOL ADDRESS	COORDINATOR	PROGRAM
Tel: 757-8206	dlibby@satc.houlton.k12.me.us	Operations
Fax: 757-7313		(inc. greenhouse)
Southern Aroostook	David Libby	Forest Management
Vocational Education (SAVE)	(757-8877)	and Operation
Maine Applied Technology	dlibby@satc.houlton.k12.me.us	
Region 2		
Box 307 5 Bird Street		
Houlton, ME 04730		
Tel: 532-9541		
Fax: 532-6975		
United Technology Center	Jeff Beswick	Environmental
Maine Applied Technology	jbeswick.utc@gmail.com	Horticulture
Region 4		(inc. greenhouse)
200 Hogan Road		
Bangor, ME 04401		
Tel: 942-5296		
Fax: 942-0076		
Waldo County Technical Center	Patrice Janssen	Horticulture
Region 7 1022 Waldo Road Waldo, ME 04915	pjanssen@waldo-tech-ctr.k12.me.us	Natural Resources Management
Tel: 342-5231		(inc. greenhouse)
Fax: 342-4070		
Washburn High School (SAD 45)	Daryl Molton	Ecology / Botany
1359 Main Street	dmoulton@msad45.net	
Washburn, ME 04786		
Tel: 455-4501		
Fax: 455-4509		
Washington Academy	Don Sprangers	Ecology / Biology
66 Cutler Road, P.O. Box 190	sdsprangers@gmail.com	Marine Vocational
East Machias, ME 04630	Tim Reynolds	(inc. greenhouse)
Tel: 255-8301	treynolds@msln.net	
Fax: 255-8303	Clint Tuttle	
	c.tuttle@washingtonacademy.org	
Windham High School	Dale Wilson	Life Sciences
406 Gray Road	dwilson@windham.k12.me.us	(inc. greenhouse)
Windham, ME 04062		
Tel: 892-1810		
Fax: 892-1813		

ATTACHMENT D.3.
MAINE AGRICULTURE IN THE CLASSROOM PROGRAMS
(INFORMATION FROM WEBSITE http://www.agclassroom.org/me/programs/index.htm)

MAINE AGRICULTURE IN THE CLASSROOM (MAITC) PROGRAMS

(from web page – see http://www.agclassroom.org/me/programs/index.htm)

Agriculture Specialty Plate

Introducing Maine's first ever agriculture specialty license plate!
$10 from the sale of each set of these colorful plates will be transferred to a special fund for agricultural education programs in Maine administered by the Maine Agriculture in the Classroom Council.

Education Grants Program

The Maine Agriculture in the Classroom Council had $25,000 to offer in 2009 in support of Maine agricultural education in grades Kindergarten through 12 as a direct result of the Maine Agriculture Specialty License Plate.

Summer Teacher's Institute

This annual, multi-day "hands-on" program allows educators to experience Maine agriculture through field trips to area farms and agricultural facilities. Participants receive educator recertification credits (42 credits were granted at the 2009 conference) and are trained in and presented with various agricultural curricula (such as the Project Food, Land & People), and are able to network with agricultural experts.

Read "ME" Agriculture

Read "ME" Agriculture is a very successful new program we began in 2008 that reached over 3,500 students across the State, and will return during Ag Week (March 16-20) 2009. Volunteers will read and give books about agriculture to Kindergarten – 4th Grade classrooms across the State. Then they will tell the students about their farms or connections to agriculture and leave behind lessons and information for the teachers to use.

MAITC Teacher of the Year

Each year, the MAITC Association recognizes an outstanding Maine elementary or secondary school teacher who uses agricultural education materials and/or activities in the classroom to such an extent as to merit our special award.

MAITC Newsletter

We create and distribute a newsletter three times a year to over 1,500 interested educators, farmers, and agricultural organizations. Contact us at maitca@maine.gov to add your name to our mailing list.

ATTACHMENT D.4.
COVER AND CONTACT INFORMATION FOR MAINE ENVIRONMENTAL EDUCATION GUIDE OF THE MAINE ENVIRONMENTAL EDUCATION ASSOCIATION

Maine Environmental Education Guide

A listing of environmental education organizations, resources and topics for Maine Educators to incorporate environmental education into their curricula.

compiled by
The Maine Environmental Education Association
www.meeassociation.org

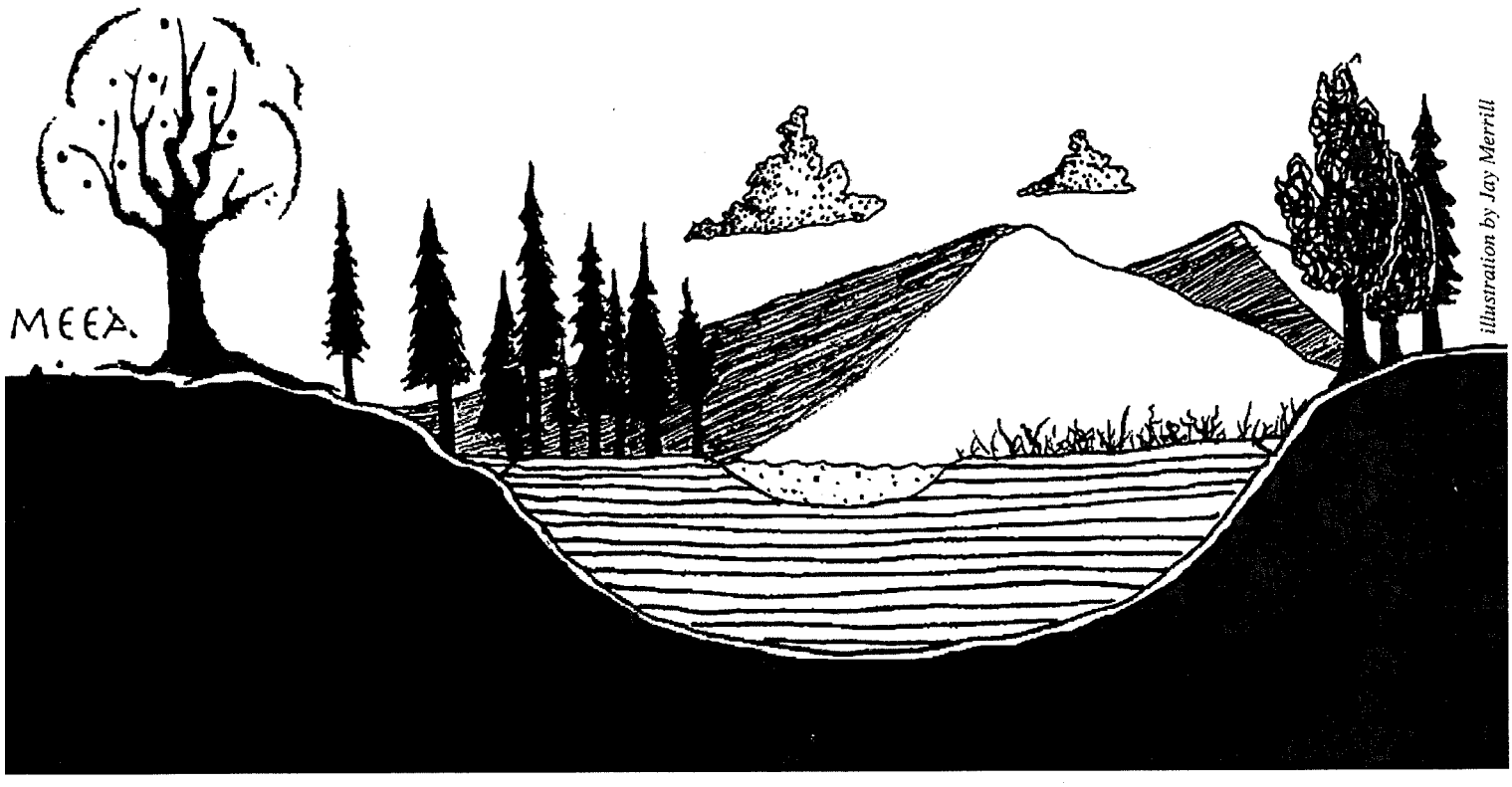

illustration by Jay Merrill

ATTACHMENT D.5.
RESULTS OF APRIL – MAY 2009 CAREER & TECHNICAL EDUCATION GREEN SUSTAINABILITY SURVEY

April-May 2009 CTE Green Survey Results

The Maine Department of Education-Career Technical Education completed a survey in April-May 2009 concerning green conservation strategies within the CTE centers, regions and programs. The participants ranged from both the Maine Administrators of Career and Technical Education (MACTE), and Career Technical Educators. The goal of the survey brought to light CTE's commitment to green conservation advancements and new occupations. Many of the unearthed green conservation approaches, practices and technologies also have STEM indicators.

The survey asked participants to provide an example of a Green Technology, Approach, Practice or a Greener Approach. The following definitions were provided to survey takers:

Green Technology
--Solar, wind, hydro, tidal, wave, geothermal, biofuels, biomass, fuel cell, etc...
Green Approach
--Super insulated walls, closed-mold, LEED rating, water efficiency, indoor environmental quality, etc...
Green Practice
--Use of sustainable renewable resources, recycled materials, recycled used oil, etc...
Greener Approach
--Bio-friendly chemicals, natural cleaning approach, recycling, etc...

Here are just a few results from the survey:

Activities	Type
Home Building to MSHA Green Standards	Green Approach
Passive solar building elements	Green Approach
Composites Program	Green Approach
Green materials, super insulated walls, LEED, Solar, Wind	Green Approach
Heat Pumping for home heating	Green Approach
Energy recovery, exhaust hood heat exchangers.	Green Approach
Wind turbines, tidal power experiments	Green Approach
Solar Hot Water	Green Approach
Radiant energy control with reflective window shade systems	Green Approach
Use of sustainably harvested wood products in building	Green Practice
Carbon foot print calculations	Green Practice
Green Energy Alternative energy study and practice	Green Technology
Biofuels project to produce ethanol from waste	Green Technology
Solar panels to provide power for laptops	Green Technology
Grid tie photovoltaic roof panels	Green Technology
Wind Blades design	Green Technology
Built battery powered Electrathon Race car	Green Technology
Solar panels to power electric car.	Green Technology
Solar Panels-Alternative Energy	Green Technology
Have photovoltaic and evacuated tube panels on hand to construct demonstration model	Green Technology
Solar Voltaic electrolysis to hydrogen gas	Green Technology
Photovoltaic System Demonstration	Green Technology

Battery research for electric cars	Greener Approach
Utilize soil test results	Greener Approach
UV water sterilization demonstration	Greener Approach

ATTACHMENT D.6.
PARTICIPANT LIST FROM JANUARY 2008 MAINE STEM CONFERENCE

PARTICIPANTS AT JANUARY 2008 MAINE STEM SUMMIT, AUGUSTA

Number from each participating organization in parenthesis ( )

Advantage Recruiting (1)
Auburn School Department (3)
Bangor High School (1)
Belfast Area High School (1)
Biddeford Reg. Ctr. of Technology (1)
Biomed Works, Brunswick High Sch (1)
Bonny Eagle High School (3)
Boothbay Region High School (1)
Brunswick Junior High (1)
Camden Hills Regional High Sch (1)
Cathance River Education Alliance (2)
Challenger Learning Center (4)
Cianbro & ASCE (1)
Coastal Studies for Girls (1)
Colby College (1)
Conners Emerson School (1)
Correct Building Products (1)
Custom Composite Technologies, Inc (1)
D.R. Gaul Middle School (2)
DECD (2)
Durham Elementary School (3)
Earthwatch Institute (1)
Eastern Alliance in Science, Technology, Engineering and Mathematics (1)
Education Development Center (1)
Educator of Technology (1)
Edward Little High School (1)
Ellsworth High School (1)
Erskine Academy (3)
ESPCoR research project NSF funding (1)
Falmouth High School (1)
FIRST Robotics; Lanco Assembly Systems (1)
Former Governor; Bernstein, Shur, Sawyer and Nelson, P.A. (1)
Foster Technology Center (2)
Foundation for Blood Research (2)
George Stevens Academy (1)
Gulf of Maine Research Institute (3)
Hancock County Technical Center (1)
Herring Gut Learning Center (1)
House of Representatives (1)
Institute for Broadening Participation (5)
Island Institute (1)
Islesboro Central School (1)\
Jackson Laboratory (2)
JohnSilver Associates (1)
Lewiston Middle School (2)
Lewiston Regional Technical Center (1)
Lewiston School Department (2)
Lockheed Martin (3)
Lubec Consolidated School (1)
Maine Aquaculture Association (1)
Maine Aquaculture Innovation Center (1)
Maine Department of Education (9)
Maine Department of Labor (3)
Maine Education Policy Research Institute (1)
Maine Engineering Promotion Council (1)
Maine Learning Technology Initiative (1)
Maine Mathematics and Science Alliance (5)
Maine Medical Center Research Institute (2)
Maine Patent Program (1)
Maine Pulp and Paper Foundation (1)
Maine Robotics (1)
Maine School Administrative District 48 (1)
Maine Science Collaborative AND Midcoast Regional Professional Development Center (1)
Maine Senate (1)
Maine State Board of Education (2)
Maine Technology Institute (1)
MaineFIRST (1)
Manufacturers Association of Maine (1)
Maranacook Community High School (3)
Massachusetts Institute of Technology (1)
Mid-Coast School of Technology (1)
Millinocket / Union 113 Schools (1)
Mount Desert Island Biological Laboratory (1)
MSAD 06 (1)
MSAD 30 (1)
MSAD 40 (2)
MSAD 41 (1)
MSAD 47 (5)
MSAD 48 (1)
MSAD 52 (1)
MSAD 54 (2)
MSAD 55 (2)

MSAD 57 (1)
MSAD 58 (1)
Mt. Blue High School (1)
National Semiconductor (3)
Nokomis Warrior Broadcasting (5)
Orono Middle School (1)
Oxford Hills Technical School (1)
Platform Shoes Forum (1)
Poland Regional High School (1)
Portland Public Schools (2)
Project Learning Tree (1)
Sacopee Valley High School (2)
Scarborough High School (4)
School of Applied Science, Engineering,
And Technology, USM (1)
South Portland High School (2)
Southern Maine Community College (1)
Stantec (1)
Stem (3)
Tech Maine (1)
The Maine School of Science
& Mathematics (1)
The Science Source (1)
UMS (1)
Union 47 (1)
Union 52 (1)
Unity College (1)
University of Maine (14)
University of Southern Maine (4)
Wakanaki Center/University of Maine (1)
Washington Academy (4)
Waterville High School (1)
Windham High School (2)
Winslow High School (1)
Women's Resource Center, UMaine (1)
Xwave (2)
York School Department (4)
Zero G Corp (1)