

Chesapeake Bay Program | Indicator Analysis and Methods Document
Student MWEEs | Updated June 2020

Indicator Title: Availability of Systemwide Student Meaningful Watershed Education Experiences (MWEEs)

Relevant Outcome(s): Student

Relevant Goal(s): Environmental Literacy

Location within Framework (i.e., Influencing Factor, Output or Performance):
Performance

A. Data Set and Source

(1) Describe the data set. What parameters are measured? What parameters are obtained by calculation? For what purpose(s) are the data used?

The Environmental Literacy Indicator Tool (ELIT) is a survey of public school districts that measured:

1. Degree of preparedness to provide Environmental Education
2. Extent to which students participate in MWEEs in each elementary, middle, and high schools

The survey has Paperwork Reduction Act clearance through NOAA as the lead agency for this work (OMB Control Number: 0648-0753). 2015 data represents the baseline data collected. 2017 and 2019 are the second and third years of data collection.

Analysis: Information from the ELIT tool was used to determine the extent to which local education agencies (LEA; also referred to as school districts) are providing Meaningful Watershed Educational Experiences (MWEEs) in each grade band (elementary, middle, high school). The Chesapeake Bay Program (CBP) first screened data to include only LEAs that have 25% or more of their geographic area within the Chesapeake Bay Watershed; this used a GIS analysis based on school district polygons from NCES/American Community Survey School District Data 2013, available at <https://deptofed.maps.arcgis.com/home/item.html?id=93dd62a783d2495e9e0b241a968a8f2f>. The dataset only includes responses from public school districts, and respondents are compared as a percentage of the total public school districts within the Chesapeake Bay watershed. No responses from charter schools were collected by this survey. The CBP then used responses from the surveyed LEAs that are located within the watershed to determine the extent to which each of the school districts provided MWEEs to their students during the previous school year. The number of LEAs in each category (systemwide, some and none) was calculated as a percentage of the total school districts within the watershed, including those that did not respond to the survey.

Survey Response Rate: The response rate to the 2019 survey of LEAs was about 41% of school districts within the watershed portion of DE, DC, MD, PA, VA, and WV. In addition, the analysis carried forward a small number of LEA responses to the 2017 survey, for those districts that did not respond to the 2019 survey request; these districts represented an additional 14% of LEAs within the watershed portion of the states. More information on these numbers is available in the data file at <http://www.chesapeakeprogress.com/engaged-communities/student>. All jurisdictions in the watershed participated in the 2019 survey except New York and Delaware.

For the purposes of the CBP data analysis, only data from LEAs within the watershed were used and are included in the data file. The ELIT survey, however, does include all LEAs in the watershed states regardless of their inclusion in the Chesapeake Bay Watershed. For comparison purposes, the response rate to the 2019 survey of all LEAs was 28% regionwide, including both those within and outside of the watershed; data from an additional 12% of LEAs was carried-forward from 2017 responses that were not updated in 2019. These data are used by state partners to better understand the full scope of their state effort. Additional information on the full survey can be found on the [Environmental Literacy Planning outcome page](#) or through The Chesapeake Bay Program contact.

- (2) List the source(s) of the data set, the custodian of the source data, and the relevant contact at the Chesapeake Bay Program.
- Source: Environmental Literacy Indicator Tool (ELIT) - survey of LEAs in all Chesapeake Bay Watershed jurisdictions except New York
 - Custodian: Katheryn Barnhart, Barnhart.Katheryn@epa.gov, (410) 267-9856
 - Chesapeake Bay Program Contact (name, email address, phone number): Shannon Sprague, shannon.sprague@NOAA.GOV, (410) 267-5664
- (3) Please provide a link to the location of the data set. Are metadata, data-dictionaries and embedded definitions included? N/A

B. Temporal Considerations

- (4) Data collection date(s): May-November 2019
- (5) Planned update frequency (e.g., annual, biannual, etc.):
- Source Data: Biennial
 - Indicator: Biennial
- (6) Date (month and year) next data set is expected to be available for reporting: January 2022

C. Spatial Considerations

- (7) What is the ideal level of spatial aggregation (e.g., watershed-wide, river basin, state, county, hydrologic unit code)? *School district*
- (8) Is there geographic (GIS) data associated with this data set? If so, indicate its format (e.g., point, line polygon). *None at this time.*
- (9) Are there geographic areas that are missing data? If so, list the areas.

There is no data from New York and relatively small amounts of data from Pennsylvania and West Virginia (data from 35% and 50%, respectively, of LEAs within the Chesapeake Bay watershed in each state). Because of this lack of data (NY), or lack of sufficient data (PA and WV), it is difficult to make statewide generalizations about these jurisdictions.

- (10) Please submit any appropriate examples of how this information has been mapped or otherwise portrayed geographically in the past. *N/A*

D. Communicating the Data

- (11) What is the goal, target, threshold or expected outcome for this indicator? How was it established?

The [2014 Chesapeake Bay Watershed Agreement](#) included the Student Outcome under the Environmental Literacy goal. That outcome includes “a target of at least one meaningful watershed education experience in elementary, middle and high school depending on available resources.” As it relates to the ELIT, the Chesapeake Bay Program will strive to increase systemwide MWEEs across the watershed. A specific target has yet to be determined.

- (12) What is the current status in relation to the goal, target, threshold or expected outcome?

The 2019 ELIT shows that 35% of responding LEAs in the watershed have a system-wide MWEE in place at the elementary grade levels, 39% in place at middle school grade levels, and 35% in place within required high school courses.

- (13) Has a new goal, target, threshold or expected outcome been established since the last reporting period? Why? *No.*

- (14) Has the methodology of data collection or analysis changed since the last reporting period? How? Why?

There have been no changes since the last reporting period beyond the inclusion of 2017 data for those school districts that responded in 2017 but not in 2019.

(15) What is the long-term data trend (since the start of data collection)?

For elementary grades, the proportion of districts with system-wide MWEEs seems to have reverted to levels on par with 2015, after a slight increase in 2017. In aggregate, middle school grades seem to show a slight decrease in the proportion of districts with system-wide MWEEs from 2017 and 2015. However, there has seemed to be a slight increase in system-wide MWEEs at the high school grades in 2019, which had been fairly stable from 2015 to 2017.

(16) What change(s) does the most recent data show compared to the last reporting period? To what do you attribute the change? Is this actual cause or educated speculation?

In the aggregate, the prevalence of system-wide MWEEs within LEAs appeared to decrease slightly at the elementary and middle school grades from 2017 levels. However, when we examined the more limited subset of data from districts with both 2017 and 2019 data for evidence of change, we saw that the proportion of system-wide MWEEs actually increased (from 45% to 52% in elementary grades and from 51% to 55% in middle grades). This suggests that the evidence of change at the aggregate level may be at least partially attributable to new districts responding to the 2019 survey, who are not included in prior years' data.

In contrast, the prevalence of system-wide MWEEs at high school grades seemed to increase slightly (from 31% to 35%). Examination of paired 2017 and 2019 data underscored this positive shift, with that smaller set of districts showing an even more dramatic increase from 33% to 48%.

Substantial changes (greater than 5 percentage points) are highlighted in **bold**.

Elementary:

- DE: No new data in 2019
- DC: No change.
- MD: Stable; no category changed more than 1 percentage point.
- PA: Essentially stable; no category changed more than two percentage points.
- VA: Essentially stable, but with a **small decrease in Some MWEEs (6 percentage points)**; and very small increases in System-wide and No MWEEs.
- WV: No data in 2017

Middle:

- DE: No new data in 2019
- DC: No change.
- MD: **Substantial increase in System-wide MWEEs (from 70% to 83%); decrease in Some MWEEs (9 percentage points)** and elimination of No MWEEs.

- PA: **Increase in proportion of Some MWEEs (from 37% to 42%) and decrease in proportion of No MWEEs (from 47% to 39%).** Minimal change in proportion of system-wide MWEEs.
- VA: Essentially stable, no category changed more than three percentage points.
- WV: No data in 2017

High:

- DE: No new data in 2019
- DC: No change.
- MD: **Substantial increase in System-wide MWEEs (from 43% to 63%); corresponding decrease in Some MWEEs (14 percentage points) and No MWEEs (5 percentage points).**
- PA: **Decrease in proportion of System-wide MWEEs (from 33% to 26%) and in proportion of Some MWEEs (from 47% to 41%). Increase in proportion of No MWEEs (from 20% to 32%).**
- VA: **Substantial increase in System-wide MWEEs (from 26% to 37%); corresponding decrease in Some MWEEs (8 percentage points).** Only a three percentage point decrease in No MWEEs.
- WV: No data in 2017

(17) What is the key story told by this indicator?

This indicator shows the extent to which public school districts within the watershed are providing MWEEs to their students at least once per grade band as called for in the Student Outcome of the Environmental Literacy Goal.

State departments of education and local education agencies play an important role in establishing expectations and guidelines and providing support for the development and implementation of environmental education programs within their schools. To ensure that every student in the region graduates with the knowledge and skills to act responsibly to protect and restore their local watershed as called for in the Chesapeake Watershed Agreement, environmental education should be embedded into the local curriculum and Meaningful Watershed Educational Experiences should occur at least once during each level of instruction (elementary, middle, and high school). In the development of plans and the delivery of programs, local education agencies can also benefit from partnerships with environmental education organizations, natural resource agencies, universities, businesses, and other organizations that have a wealth of applicable products and services as well as a cadre of scientific and professional experts that can complement the classroom teacher's strengths and heighten the impact of environmental instruction both in the classroom and in the field.

E. Adaptive Management

(18) What factors influence progress toward the goal, target, threshold or expected outcome?

- State Education Agency Leadership: High level support for environmental literacy from state departments of education that is communicated to school districts is critical to establish environmental literacy as an educational priority. These agencies are also important in adopting standards of learning, accountability mechanisms, policies, and practices that are supportive of environmental literacy, and identifying funding streams that can be used to support the development of programs and training of teachers.
- Legislation and Policy: The establishment of formal graduation requirements or incentives, funding programs, and/or teacher certification/re-certification guidelines have been powerful in advancing environmental literacy. These guiding policies can be established by state legislatures, boards of education, or agencies. Stakeholder groups are often instrumental to advancing state legislative and policy initiatives.
- Local Education Agency Implementation of MWEEs: Education in most of the states in the Chesapeake Bay watershed is controlled by local education agencies (600+ in the region), each with their own leadership and management structure that often does not include staffing for environmental literacy. With the exception of state laws and regulations, education priorities are largely determined at the local level and may not mirror state priorities, leaving a critical gap for policy and readiness at the local level. In addition, some policies for field trips, transportation, etc. may not be supportive of the MWEE model. MWEEs are often left out of established accountability mechanisms between state and local education agencies.
- Education Reform/Curriculum Alignment: While national education reform efforts including STEM, Common Core, and Next Generation Science Standards lend themselves to using the environment as an integrating context for learning, the extensive efforts to support and implement the necessary shifts in teaching and learning required by these reforms pose ongoing challenges to systemic approaches to environmental education.
- Funding: A major limiting factor is funding, including for teacher professional development and transportation.
- State agency and partner coordination: MWEE implementation requires the support of many state and local partners who often are the educators conducting teacher professional development and supporting student programming.

- School community (teachers, principals, staff) awareness and readiness: Ultimately the success of MWEEs depends on the ability of educators to understand the essential elements and be comfortable delivering them and the permission and support of principals and the school community.

(19) What are the current gaps in existing management efforts?

- Staffing levels and interagency coordination to drive MWEE implementation at departments of education and natural resource agencies vary across states. Where these resources do not exist, implementation is inconsistent.
- States and many local school districts do not have a funding strategy for student MWEEs. Much of the work is supported by individual grants without a strong plan for sustainability beyond grant period.
- Many teachers do not have the confidence and support they need to implement inquiry-based learning, especially outdoors.
- Given competing priorities (principals and teachers need to be responsive to testing, new standards, 21st century skills, etc.), student MWEEs are often seen as an additional task that is hard to resource, versus a means to achieve requirements in multiple areas.

(20) What are the current overlaps in existing management efforts? None.

(21) According to the management strategy written for the outcome associated with this indicator, how will we (a) assess our performance in making progress toward the goal, target, threshold or expected outcome, and (b) ensure the adaptive management of our work?

The Chesapeake Bay Program will maintain the Environmental Literacy Indicator Tool and collate and report data. The survey will be administered every two years through the state departments of education. In FY 2014 and 2017, funding from National Oceanic and Atmospheric Administration (NOAA)'s Bay Program augmented by NOAA B-WET funding was available to provide technical assistance to states to develop strategies to collect voluntary data from local education agencies to feed into the new Bay Program environmental literacy metrics and to support the work of a professional evaluator to review the data and establish meaningful baselines. In FY 2019, EPA included this work in a new contract awarded to assist with performance metrics for stewardship activities

The Leadership Team of the Education Workgroup, which includes federal representatives from the NOAA and U.S. Environmental Protection Agency (EPA), along with at least two representatives per state (generally from the state departments of education and lead natural resource agencies), convenes monthly to discuss priorities and progress towards meeting the Environmental Literacy Goals and Outcomes. The full

Education Workgroup, which includes broader representation from federal agencies, state agencies, nonprofits, local education agencies, and others, meets twice a year. In addition, the group holds an Environmental Literacy Summit every two years around specific issues or priorities. Moving forward, these Summits will serve as good opportunities to re-assess where the group is in achieving the outcomes of the agreement and adjusting strategies as appropriate.

F. Analysis and Interpretation

Please provide appropriate references and location(s) of documentation if hard to find.

(22) What method is used to transform raw data into the information presented in this indicator? Please cite methods and/or modeling programs.

The ELIT includes a set of questions for each grade band (elementary, middle, and high) intended to help assess whether school districts were providing system-wide MWEEs to all students, offering some MWEEs at a given grade level (at individual schools or classrooms, but not system-wide), or had no evidence of MWEE opportunities for students. Based on their response to the questions within each grade band (elementary, middle, and high school), LEAs were placed into a category if MWEE(s) were offered systemwide to all students (meaning at least once within a grade band) (2), were available to some students, but were not system-wide (1), or showed no evidence of MWEEs being offered to students within that grade band (0).

(23) Is the method used to transform raw data into the information presented in this indicator accepted as scientifically sound? If not, what are its limitations?

The method for grouping LEAs is essentially a descriptive coding that aligns with the indicator – the prevalence of at least one system-wide MWEE (meaning it reaches all students) within a grade band. The codes of “Some MWEEs” and “No MWEEs” are equally descriptive to provide a sense of progress or building-blocks for the target indicator.

Due to low response rates from some jurisdictions, we are limited to talking about the indicator levels only for those LEAs that responded to the survey; we are not able to generalize from the data to make regionwide conclusions. Based on workgroup feedback, the Education Workgroup, in consultation with the Status and Trends workgroup, decided to present the results in relation to all LEAs within the watershed (including the proportion of non-respondents) to show progress towards the outcome, rather than limiting the conversation only to respondents. This was done by calculating the percentage of LEAs in each category (well prepared, somewhat prepared, and not prepared) out of the school districts that fall within the watershed, including those school districts that did not respond to the survey. The proportion of nonreporting LEAs are also included in the chart and data file. The data are also calculated in terms of the number of students served by each LEA, based on enrollment data from the 2013 5-year American Community Survey (link:

<https://deptoed.maps.arcgis.com/home/item.html?id=93dd62a783d2495e9e0b241a968a8f2f>).

There was not a non-response survey done to be able to determine how to extrapolate the data to non-respondents. However, non-response analysis of 2019 respondents indicated that there were several factors related to who responded. LEAs were more likely to respond if they were in the Chesapeake Bay watershed than outside of it. When we look just at LEAs within the watershed, state was a major determinant of who responded to the survey. In Maryland and DC, responses were received from every district in the population (i.e., data are a census, not a sample); as a result, results are an accurate picture of the conditions within those jurisdictions. Virginia's dataset is also very thorough for the state, with 60% of districts reporting updated data in 2019 (and an additional 24% having usable 2017 data). For this jurisdiction, it is reasonably safe to consider data reported in 2019 to be a thorough representation of conditions and generalizations are warranted. Data from West Virginia and Pennsylvania, however, include a relatively limited (50% or lower), self-selected sample of districts in the state; those data do not support generalizations of conditions across those states. See the answer to question 9 of this document for additional data gaps.

There was also a relationship between district enrollment and response rate; LEAs that responded to the 2019 ELIT tended to have significantly larger student enrollment. The average enrollment of responding LEAs was almost 4 times higher than the average enrollment of non-responding LEAs. This may indicate that district size and capacity is a factor in responding; however, district size is also related to state, as some states (e.g., Maryland) have large county-level school districts, while other states (e.g., Pennsylvania) have smaller municipality-level school districts.

(24) How well does the indicator represent the environmental condition being assessed?

The indicator represents LEAs that chose to respond to these specific ELIT questions. Therefore, this indicator does not represent all LEAs in the watershed or within the watershed jurisdictions. The indicator does not include charter and private schools.

(25) Are there established reference points, thresholds, ranges or values for this indicator that unambiguously reflect the desired state of the environment? No.

(26) How far can the data be extrapolated? Have appropriate statistical methods been used to generalize or portray data beyond the time or spatial locations where measurements were made (e.g., statistical survey inference, no generalization is possible)?

See the answer to question 23 of this document, as well as the response rates for individual jurisdictions, located in the data file housed at <http://www.chesapeakeprogress.com/engaged-communities/student>. See the answer to question 22 of this document for more information.

G. Quality

Please provide appropriate references and location(s) of documentation if hard to find.

(27) Were the data collected and processed according to a U.S. Environmental Protection Agency-approved Quality Assurance Project Plan? If so, please provide a link to the QAPP and indicate when the plan was last reviewed and approved. **If not, please complete questions 28-31. No.**

(28) *If applicable:* Are the sampling, analytical and data processing procedures accepted as scientifically and technically valid? **Yes.**

(29) *If applicable:* What documentation describes the sampling and analytical procedures used?

A report of the 2019 survey procedures and results is available at:
https://www.chesapeakebay.net/who/group/education_workgroup.

(30) *If applicable:* To what extent are procedures for quality assurance and quality control of the data documented and accessible?

A report of the 2019 survey procedures and results is available at:
https://www.chesapeakebay.net/who/group/education_workgroup

Support for completion of the ELIT survey is provided by state education representatives from the Education Workgroup for districts within their jurisdiction, and staff from the CBP is available to answer questions. In addition, districts are provided access to their previously completed ELIT surveys (from 2015) to aid new staff in answering the questions by considering how their district responding to the items (including open-ended explanations) in previous years. This was intended to reduce burden on districts and to provide some year-to-year reliability.

(31) Are descriptions of the study design clear, complete and sufficient to enable the study to be reproduced? **Yes.**

(32) Were the sampling, analytical and data processing procedures performed consistently throughout the data record? **Yes.**

(33) If data sets from two or more sources have been merged, are the sampling designs, methods and results comparable? If not, what are the limitations?

Yes. The 2019 reported data include a small subset of data that were gathered in the 2017 survey period. The exact same survey tool was used, and data from 2017 was only carried forward if a district did NOT respond to the 2019 survey. This is based on an awareness of the value of a more comprehensive dataset, the difficulty of obtaining responses from districts regularly, as well as an assumption that preparedness at a

district level may have stayed reasonably stable for two years. Data would not be carried forward further than two years. When year-to-year comparisons were made, the more constrained dataset of only paired 2017-2019 responses were considered to interpret results.

(34) Are levels of uncertainty available for the indicator and/or the underlying data set? If so, do the uncertainty and variability impact the conclusions drawn from the data or the utility of the indicator?

See the answer to questions 9 and 25 of this document for information about data gaps.

(35) For chemical data reporting: How are data below the MDL reported (i.e., reported as 0, censored, or as < MDL)? If parameter substitutions are made (e.g., using orthophosphate instead of total phosphorus), how are data normalized? How does this impact the indicator? N/A

(36) Are there noteworthy limitations or gaps in the data record?

See the answer to questions 9 and 23 of this document.

H. Additional Information (*Optional*)

(37) Please provide any further information you believe is necessary to aid in communication and prevent any potential misrepresentation of this indicator.

N/A