Chesapeake Bay Program | Indicator Analysis and Methods Document
Sustainable Schools | Updated May 2021

Indicator Title: Percentage of sustainable schools out of all schools within watershed boundary

Relevant Outcome(s): Sustainable Schools

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 data set contains public and charter K–12 schools in the Chesapeake Bay watershed that were certified sustainable as of each year covered by this indicator (2015, 2017, and 2019). The set includes schools recognized by the following state and nationwide programs that cover Chesapeake Bay watershed jurisdictions:

- Maryland Green Schools
- National Wildlife Federation (NWF) Eco-Schools
- Pennsylvania Pathways to Green Schools
- U.S. Department of Education Green Ribbon Schools
- Virginia Naturally Schools

This indicator reports the number of individual schools certified as sustainable and the percentage of total public and charter K-12 schools certified as sustainable within the Chesapeake Bay watershed and its individual jurisdictions. Using the list of sustainable schools from the programs listed above, analysts eliminated duplicates (i.e., schools certified by multiple programs), eliminated non-qualifying schools (private, non-K–12, or district-level awardees), and determined the number qualifying schools by jurisdiction. Analysts then used GIS analysis to determine which of these schools were within the Chesapeake Bay watershed (see answer to question 22 of this document for more information on this analytical process).

(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: See listed programs above.
- Custodian: Katheryn Barnhart, Barnhart.Katheryn@epa.gov, (410) 267-9856
- Chesapeake Bay Program Contact (name, email address, phone number): Katheryn Barnhart, Barnhart.Katheryn@epa.gov, (410) 267-9856

(3)   Please provide a link to the location of the data set. Are metadata, data-dictionaries and embedded definitions included?

Data were obtained from the following program sources:

- Maryland Green Schools: https://maeoe.org/green-schools-and-green-centers/green-schools-program/current-green-schools
- National Wildlife Federation (NWF) Eco-Schools: https://www.nwf.org/EcoSchoolsPortal/Manage/SchoolDatabase
- Pennsylvania Pathways to Green Schools: https://www.education.pa.gov/Teachers%20-%20Administrators/GreenSchools/Pages/Awardees.aspx and an updated list provided by Tamara Peffer of the Pennsylvania Department of Education (tpeffer@pa.gov).
- U.S. Green Ribbon Schools: https://www2.ed.gov/programs/green-ribbon-schools/awards.html
- Virginia Naturally Schools: https://dwr.virginia.gov/education/school-recognition/

Each program provides documentation that defines the criteria and process for schools to become recognized.

B. Temporal Considerations

(4)   Data collection date(s):

Source programs collect data continuously as schools apply for certification or recertification. The table below identifies the specific timeframes that were applied for inclusion in this indicator.

Program	Schools included in this analysis
Maryland Green Schools	All schools that had a current certification as of year designated by the indicator (e.g., all schools as of 2019). This certification must be renewed every four years. For the 2019 data point, a few schools recertified in 2015 and 2020, which meant they had a one-year lapse in 2019, but

Program	Schools included in this analysis
	the indicator includes these schools for 2019 because they were recognized as sustainable immediately before 2019 and immediately after, so there is ample reason to believe they were also performing sustainably during 2019.
National Wildlife Federation (NWF) Eco-Schools	All schools that had received a bronze, silver, or green flag recognition as of year designated by the indicator (e.g., all schools as of 2019). This is a one-time recognition.
Pennsylvania Pathways to Green Schools	All schools that had received this recognition as of the year designated by the indicator (e.g., all schools as of 2019). This is a one-time recognition. Note that as of 2019, all state awardees have also gone on to receive U.S. Green Ribbon Schools recognition.
U.S. Department of Education Green Ribbon Schools	All schools that had received this recognition as of the year designated by the indicator (e.g., all schools as of 2019). This is a one-time recognition that started in 2012.
Virginia Naturally Schools	All schools that had a current certification as of year designated by the indicator (e.g., all schools as of the end of the calendar year 2019). This certification must be renewed annually.

(5)   Planned update frequency (e.g., annual, biannual, etc.):

- Source data: Annual
- Indicator: Biennial

(6)   Date (month and year) next data set is expected to be available for reporting:

March 2022

C. Spatial Considerations

(7)   What is the ideal level of spatial aggregation (e.g., watershed-wide, river basin, state, county, hydrologic unit code)?

Watershed-wide and jurisdiction-specific totals (states and DC).

(8)   Is there geographic (GIS) data associated with this data set? If so, indicate its format (e.g., point, line polygon).

Yes, the GIS data are in point format, representing street addresses of each of the sustainable schools. A map of sustainable schools is available at http://www.chesapeakeprogress.com/engaged-communities/sustainable-schools.

(9) Are there geographic areas that are missing data? If so, list the areas.

While no part of the watershed was excluded from this count, not every jurisdiction has its own sustainable school program. Staff will continue to monitor sustainable school programs in the Chesapeake Bay watershed region to include other programs that meet sustainable school criteria as identified by the U.S. Department of Education. See the response to question 19 in this document for more information about variability among 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 goal is to monitor participation in school sustainability programs in public and charter K-12 schools in the Chesapeake Bay watershed. Jurisdictions have committed to actions to increase the number of sustainable schools, so this indicator provides a baseline and will track progress toward this outcome.

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

No specific numerical target or threshold exists, but the Chesapeake Bay Program anticipates an increase from the baseline number of sustainable schools in the watershed as jurisdictions implement actions from the Environmental Literacy Logic & Action Plan and Management Strategy.

(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?

No.

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

Within the Chesapeake Bay watershed, there is an upward trend of recognized sustainable public and charter K-12 schools in Maryland and Virginia across the three biannual data points. The vast majority of sustainable schools within the watershed are within Maryland and Virginia. Maryland's sustainable schools within the watershed increased from 410 (2015) to 503 (2017) to 516 (2019). Virginia's sustainable schools within the watershed increased from 86 (2015) to 99 (2017) to 110 (2019).

(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?

Jurisdictions maintained or added sustainable schools within the watershed. Compared with the last reporting period (e.g., 2017), Maryland and Virginia added sustainable schools within the watershed boundary. The District of Columbia, Pennsylvania, and West Virginia maintained the number of sustainable schools in the watershed. Delaware and New York still have no certified sustainable schools in the watershed. The total number of sustainable schools increased from 610 to 634. The percent of sustainable schools slightly increased from 14% in 2017 to 15.3% in 2019.

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

This indicator tracks progress in efforts by the Chesapeake Bay Program and its state, local, and non-governmental organization partners to increase the number of sustainable schools in the watershed.

E. Adaptive Management

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

Decision Making Authority: Many facets of school sustainability (e.g., environmental performance, health, and wellness, etc.) rest with disparate departments and individuals within a school division or individual school. These different groups are often not coordinated within a jurisdiction.

Underrepresented Stakeholders: Architects, school nurses, building managers, and others who might influence different facets of school sustainability are traditionally underrepresented in discussions about "sustainable" or "green" schools.

Funding: A major limiting factor is funding, including support for sustainable school initiatives, student projects, teacher professional development, and transportation.

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

The ability for schools to participate in school sustainability programs varies by jurisdiction. Some states have robust programs administered by a state non-profit, state agency, or both. In other jurisdictions, no state-specific program exists, or the program is not yet well established.

(20) What are the current overlaps in existing management efforts?

N/A

(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 plan for assessing performance toward this outcome originally was through the Environmental Literacy Indicator Tool (ELIT). However, after the first ELIT data collection in 2015, it became evident that a more efficient and complete technique for assessing performance for this outcome was to go directly to the sustainable school certification program websites or contacts for data. We will continue to use this method to track progress.

For adaptive management, we will continue to meet regularly with state department of education representatives, as well as coordinators of sustainable school programs, to share progress and methods for increasing school sustainability. In 2016, NOAA and the Chesapeake Bay Trust provided funding for projects in five watershed jurisdictions to specifically build capacity to meet the Sustainable School outcome. Those project leaders will convene and share results of their projects with the Environmental Literacy Workgroup.

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.

This indicator draws information from published lists of sustainable schools from the programs mentioned in the response to question 1 of this document. Note that the published lists of sustainable schools also contain schools outside of the

Chesapeake Bay watershed boundary. Analysts performed map searches to determine whether a school is in or out of the watershed; where available, GIS analysts used schools' street addresses and GIS layers to perform a more precise analysis.

The indicator here represents the percent of sustainable schools in the Chesapeake Bay watershed, where the denominator is the total number of public and charter K-12 schools in the Chesapeake Bay watershed portion of each jurisdiction. Charter schools are included because the GIS layers of schools provided by official state websites or state contacts on the Education workgroup include both public and charter schools. The workgroup weighed in on the issue of including charter schools and decided to include them. Although the source data from sustainable school programs include private schools, the Education Workgroup decided to exclude them from this indicator because of the limited availability of GIS layers with a comprehensive inventory of private schools and their geocoded locations (where the latter is needed to determine the denominator of "in-watershed" schools).

For the 2015 and 2017 editions of this indicator, jurisdiction representatives provided data to derive the denominator (number and locations of public and charter K-12 schools). For the 2019 indicator update, analysts downloaded a "Public Schools" GIS dataset hosted by the California Emergency GIS Group and derived from the U.S. Department of Education, National Center for Education Statistics. Analysts performed analysis in Excel and GIS to refine the list of public schools.

Data were obtained from the following sources:

- Public schools GIS feature dataset:
  https://hub.arcgis.com/datasets/87376bdb0cb3490cbda39935626f6604_0

- Chesapeake Bay watershed boundary (used to clip the results):
  https://data-chesbay.opendata.arcgis.com/datasets/chesapeake-bay-watershed-boundary?geometry=-98.468%2C36.888%2C-56.654%2C42.787

Analysts performed filtering steps and spot-checks to ensure that only public and charter K-12 schools are captured.

(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?

Yes. Data analysts have used the number of sustainable schools in the watershed, along with the number of total schools within a jurisdiction's portion of the

watershed, to determine the percentage of sustainable schools in the Chesapeake Bay watershed per jurisdiction. Mathematical operations are all simple and straightforward—for example, counting the number of schools meeting certain criteria.

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

The indicator uses direct records from the recognized programs to populate the number of sustainable schools, and information from the Public Schools GIS feature dataset to fill in the number of schools within a jurisdiction's portion of the watershed. Because some of the public schools did not report on their grade level, the reported percentage of sustainable schools may be slightly overstated.

This indicator features schools newly recognized or that continue to be recognized by Maryland Green Schools and Virginia Naturally Schools during the data collection year. These programs include ongoing reenrollment or recertification requirements and, as such, are good indicators of whether sustainable schools once recognized are continuing their commitment to sustainability. This indicator also includes schools that received recognition from one-time award programs: Pennsylvania Pathways to Green Schools, NWF Eco Schools (awarded bronze level or higher), and the U.S. Green Ribbon Award from the U.S. Department of Education. In the case of the Green Ribbon program, once a school wins the award, the school cannot reapply for the award. The indicator currently includes all U.S. Green Ribbon schools in perpetuity; however, the workgroup is determining whether this best represents the actual condition of sustainable schools. The workgroup is considering a rule to count Green Ribbon schools for a certain number of years, after which those schools would no longer be counted or included in this indicator. The workgroup's decision will be documented in this Analysis & Methods document when finalized.

(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)?

Data represent a count of sustainable public and charter K–12 schools in the Chesapeake Bay watershed. These data should not be extrapolated in time or space.

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 29-31.**

No.

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

Yes. Data are provided by each certifying program. Measurement and calculations consist of simple, straightforward procedures such as counting the number of schools meeting certain criteria.

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

N/A

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

This document reflects the data collection and analysis procedures. All data compilation and aggregation steps were verified by an independent staff member performing a quality control review.

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

Yes, based on the methods described in this document.

(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?

This data set looks at five different sustainable certification programs that all meet minimum criteria. See the answer to question 9 of this document for more details.

(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?

N/A

(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?

The Sustainable Schools indicator represents public and charter K–12 schools in the Chesapeake Bay watershed. Although the five sustainable school certification programs may include private schools, the GIS data layer used for this analysis does not have available information pertaining to private schools. To maintain consistency, the Education Workgroup decided to exclude private schools from the Sustainable Schools indicator analysis. Future reporting may allow for a more complete accounting of total sustainable schools within the Chesapeake Bay watershed when data are available. In addition, the indicator does not include pre-K schools, post-secondary institutions, and school districts that received an award at a district level.

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.

This indicator captures NWF Eco-Schools that have achieved Bronze, Silver, or Green Flag status. It does not include schools that are participating in the program but have yet to achieve this level of recognition.

Nine school districts within the watershed have received U.S. Green Ribbon awards. This does not mean that all schools in these districts qualify as sustainable schools, but the districts should be recognized for their efforts. The districts are:

- Maryland:
  - Anne Arundel County Public Schools

- o   Calvert County Public Schools
- o   Howard County Public Schools
- o   Montgomery County Public Schools

- Virginia:
  - o   Albemarle Public Schools
  - o   Charlottesville City Schools
  - o   Fairfax County Public Schools
  - o   Henry County Public Schools
  - o   Virginia Beach City Public Schools

Several school districts outside of the watershed were recognized as well, including four districts in Pennsylvania, two in Delaware, and one in West Virginia.

As a note for the next reporting period, the Virginia Naturally Schools program did not accept applications for 2020, due to the COVID-19 pandemic. As of February 2021, the Virginia Naturally Schools program had not yet decided whether to accept applications for 2021. Also, the Pennsylvania Pathways to Green Schools program announced a change for the 2020–2021 application cycle, introducing state-level recognitions in a three-tiered structure.