Analysis of Essential Programs and Services Components:
Isolated Small Schools Adjustment
Report of Findings

Report to the Maine Department of Education

Prepared by

Sarah B. Jessen and Amy F. Johnson

Maine Education Policy Research Institute
University of Southern Maine
December 2019

Analysis of Essential Programs and Services Components:
Isolated Small Schools Adjustment

Sarah Jessen
sarah.jessen@maine.edu

Amy Johnson
amyj@maine.edu

Background

The Essential Programs and Services (EPS) cost model provides an additional allocation to schools that are identified as small and geographically isolated, in recognition that such schools have less opportunity to achieve economies of scale, and possibly have other additional costs inherent to geographic isolation. The form of the adjustment is a reduced student-to-teacher ratio for schools in lower size categories that meet the geographic isolation criteria, along with an additional per-pupil allocation amount for operation and maintenance of physical plant in island schools. The components of the EPS funding formula are subject to periodic review. Prior analyses of the small, isolated, and island school adjustment were conducted in 2005, 2006, and 2010.

Approach to the Component Review

The current component review draws on a number of data sets. In order to calculate which schools were eligible to receive the adjustment based on EPS criteria, this analysis drew on enrollment data from 2017-18, school street addresses from 2017-18, and geographic data outlining district boundaries. Shape files containing geographic data were provided by the Maine Office of Geographic Information Services (MEGIS). These were analyzed using ArcGIS to calculate distances between schools and district boundaries; driving distances between schools were also calculated using a combination of ArcGIS maps and Google map drive times.

To calculate the adjustments, FY17 financial and staffing data were used. These data were disaggregated by school type and size, and evaluated based the adjustments allocated to each school category as follows:

- Analyze student-to-staff ratios for teachers by school size category for high schools, K-8 schools, and non-K-8 elementary schools.
- Analyze per-pupil expenditure for operation and maintenance of plant in island and non-island schools.

- Review the school size criteria and the adequacy of the amounts of the current EPS adjustments compared to the results of the analyses in 1 and 2.
- Analyze geographic data for Maine schools, including distances between schools of compatible grade spans, and review the EPS geographic isolation criteria.
- Identify and describe potential policy alternatives to simplify the adjustment in the cost model.

Findings

There are three different categories of school adjustments, each with distinct qualifying criteria and adjustments: (1) isolated and small K-8 and non K-8 schools, (2) isolated and small secondary schools, and, (3) island schools. The adjustment criteria and allotments for each school type are reviewed separately.[1]

K-8 Isolated Elementary/Middle Schools

Identification

This analysis begins by examining combined elementary/middle schools (spanning grades K-8) that are small and isolated, excluding island schools. According to EPS, the adjustment qualifications for isolated K-8 schools is as follows:

Table 1. Adjustment Qualifications for Isolated K-8 Schools
1. Fewer than 15 students per grade level. 2. Number of school options available fewer than 5. 3. Nearest school is more than 8 miles away.

Since the inception of the EPS formula, the qualification of "15 students per grade level" has been applied as an average enrollment per grade in the school, and the "number of school options" applies to same-grade options that are available within district. Table 2 outlines the K-8 schools that met these definitions in 2017-18.

[1] Small schools that were eliminated by distance or other criteria are listed in Appendix A. These schools serve as a comparison group of small schools that do not receive the adjustment.

Table 2. K-8 Schools Eligible to Receive Adjustments	
School Name (Town)	Average Students per Grade, 2017-18
Adams School (Castine)	6.9
Airline Community School (Aurora)	3.1
Alexander Elementary (Alexander)	4.1
Appleton Village (Appleton)	14.9
Athens Community School (Athens)	10.6
Bay Ridge Elementary (Cutler)	6.3
Beech Hill School (Otis)	9.4
Brooklin School (Brooklin)	5.9
Brooksville Elementary School (Brooksville)	6.2
Cave Hill School (Eastbrook)	9.3
Cherryfield Elementary (Cherryfield)	13.0
Dawn F. Barnes Elementary School (Caswell)*	3.7
East Range II CSD School (Topsfield)*	3.7
Edmunds Consolidated School (Edmunds)*	6.2
Edna Drinkwater School (Northport)	11.3
Ella Lewis School (Steuben)	11.4
Harmony Elementary (Harmony)	5.7
Helen S. Dunn Elementary (Greenbush)	14.4
Indian Island School (Indian Island)	10.6
Indian Township School (Indian Township)	13.9
Jonesboro Elementary School (Jonesboro)	5.7
Jonesport Elementary (Jonesport)	13.1
Kingfield Elementary (Kingfield)	14.9
Lamoine Consolidated School (Lamoine)	14.2
Limestone Community School (Limestone)	11.4
Lubec Consolidated School (Lubec)	8.3
Penobscot Elementary School (Penobscot)	7.2
Phillips Elementary School (Phillips)	13.9
Princeton Elementary School (Princeton)	12.8
Sedgwick Elementary School (Sedgwick)	8.9
Stratton Elementary School (Stratton)*	7.9
Veazie Community School (Veazie)	13.6
Wesley Elementary School (Wesley)	0.9
Whiting Village School (Whiting)	3.2

**Building- level expenditure data not available for FY17.*

Adjustment

The EPS adjustment for isolated K-8 schools has been set historically at 12% of the weighted per pupil amount. According to FY17 expenditure data, the schools listed in Table 2

spent $13,188, on average, per pupil on operating costs.[2] Statewide operating costs for all elementary schools in FY17[3] averaged $11,169 per pupil, meaning that these small, isolated K-8 schools had operating expenditures in FY17 that amounted to 18% more than elementary schools statewide, on average.

Non K-8 Isolated Elementary/Middle Schools

Identification

Small and isolated non K-8 schools—those schools that serve a narrower grade span, such as kindergarten through 5th grade— have slightly different qualifying criteria and adjustments. According to EPS, the adjustment qualifications for isolated non-K-8 schools is as follows:

Table 3. Adjustment Qualifications for Isolated Non-K-8 Schools
1. Fewer than 29 students per grade level. 2. Number of school options available fewer than 5. 3. Nearest school is more than 8 miles away.

The qualifications for isolated non K-8 are similar to the K-8 qualifications, with a higher threshold of average students per grade (i.e. 29 students per grade in non K-8 schools versus 15 students per grade in K-8 schools). Since the inception of the EPS formula, the qualification of "29 students per grade level" has been applied as an average enrollment per grade in the school, and the "number of school options" applies to same-grade options that are available within district. Table 4 outlines the non K-8 schools eligible to receive adjustments based on FY2017 data.

[2] Operating costs exclude major capital outlay, debt services, transportation, and federal expenditures.

[3] Data from other budgetary thingy

Table 4. Non K-8 Schools Eligible to Receive an Small Isolated School Adjustment	
School Name	Average Students Per Grade, 2017-2018
Fewer than 15 students per Grade	
Andover Elementary (Andover)*	4.0
Connor Consolidated School (Connor Twp.)*	4.9
Easton Elementary (Easton)	13.0
Georgetown Central School (Georgetown)	9.4
Kingman Elementary School (Kingman)*	2.3
Southport Central School (Southport)	3.7
15 to 29 Students per Grade	
Dr. Levesque Elementary School (Frenchville)	15.9
Lee/Winn School (Winn)	19.0
Moscow Elementary (Bingham)	17.4
Woodland Elementary (Baileyville)	18.3

**Building level expenditure data not available for FY17.*

Adjustments

For their adjustments, small and isolated non K-8 elementary schools are disaggregated into two size categories based on the average grade enrollment. Those with fewer than 15 students per grade currently receive an additional allocation of 13.4% of the weighted EPS per pupil rate, and those with 15-29 students receive an 8.8% adjustment.

Table 5. FY17 Per Pupil Operating Costs of Small, Isolated Non K-8 Schools, by Average Grade Enrollment Category		
	Average Grade Enrollment	
	Less than 15	15-29
Number of schools with isolatable expenditures	3	4
FY17 Average Operating Costs per Pupil	$14,994	$8,445
Comparison to statewide elementary per pupil spending	+34%	-24%

For non K-8 schools that had fewer than 15 students in each grade, on average, the operating expenses were 34% higher than statewide operating costs of $11,169 per pupil for elementary schools in FY17. Conversely, for non K-8 schools that fell within the 15-29 average grade range, the average operating costs were 24% *less than* the average for elementary schools in the state. These findings are consistent with trends seen in the 2010 component review, in which isolated elementary schools with fewer than 15 students per grade spent 22% more than the state average, and those with 15 to 29 students spent only 2% more than the state average for elementary schools. However, these data were based on incomplete records, with no building-level expenditure data available for three of the schools in the smallest size category.

Student-Teacher Ratios for K-8 and Non K-8 Small and Isolated Schools

This report also provided an opportunity to examine student-to-teacher ratios at isolated elementary and middle schools in the state. As a comparison, Table 6 looks at elementary and middle schools with similar average grade-level enrollments.

Table 6. Average Student-Teacher Ratios for Elementary & Middle Schools		
	Average Grade Enrollment	
	Fewer than 15	*15-29*
Small Elementary Schools (Not Isolated)	11.2 : 1	13.7 : 1
Small Middle Schools (Not Isolated)	9.8 : 1	12.9 : 1
Small and Isolated K-8 and Non K-8 Schools	9.6 : 1	12.1 : 1

These data show that schools that are defined as small and isolated have slightly lower student-to-teacher ratios compared with non-isolated elementary and middle schools in similar size categories.

Isolated Secondary Schools

Identification

Secondary schools have different criteria and adjustments than elementary and middle schools. According to EPS, the criteria for identifying isolated, small secondary schools is as follows:

Table 7. Adjustment Qualifications for Isolated Secondary Schools
1. Fewer than 200 students per school. 2. Distance from furthest point in the district to nearest high school is at least 18.5 miles 3. Distance between the high school and nearest high school is more than 10 miles.

The qualifications outlined in Table 7 delineate that all small, isolated secondary schools should have a smaller total enrollment than 200 students, and also be positioned far from other secondary options. Given these definitions, Table 8 identifies secondary schools that should continue to receive this adjustment in the EPS model.

Table 8. Secondary Schools Eligible to Receive Adjustment based on FY17 Data		
School Name	Town	Total Enrollment
Deer Isle-Stonington High School	Deer Isle	113
East Grand School	Danforth	144
Forest Hills Consolidated School	Jackman	149
Jonesport-Beals High School	Jonesport	78
Katahdin Middle/ High School	Stacyville	148
Machias Memorial High School	Machias	112
Penobscot Valley High School	Howland	156
Shead High School	Eastport	92
Telstar High School	Bethel	199
Upper Kennebec Valley Middle/ Sr. HS	Bingham	59
Van Buren District Secondary School	Van Buren	77
Wisdom Middle High School	Saint Agatha	104
Woodland Jr.-Sr. High School	Baileyville	174

Adjustments

Small and isolated secondary schools are broken into two size categories to receive adjustments to their student-to-teacher ratios. Isolated secondary schools with fewer than 100 students have a lower student-teacher ratio (11:1) than those secondary schools with 100-199 students (13.1), as shown in Table 9.

Table 9. Student-Teacher Ratios for Isolated and Small Secondary Schools, by Total School Enrollment			
Student Enrollment	< 100	100-199	> 200*
Small and Isolated High Schools	10.2:1	12.0:1	N/A
High Schools (Not Isolated)	10.7:1	12.6:1	14.3:1
Adjustment Currently Applied in EPS	*11:1*	*13.1:1*	--

** By definition, there are no small, isolated secondary schools with more than 200 students.*

Table 9 shows that the student-teacher ratio at isolated, small secondary schools is lower, on average, than the adjustments provided in the EPS formula at the time of writing. For those secondary schools with fewer than 100 students, the student-teacher ratio for schools is 10.2:1. For secondary schools with enrollments between 100-199, the student-teacher ratio is 12:1. This suggests that small and isolated schools have continued to face enrollment declines since the adjustments were initially calculated and implemented in 2005.

Island Schools

Island schools receive a variety of adjustments, depending on the type of school and the enrollment size. Island secondary schools receive the same adjustment as small and isolated secondary schools All island schools that currently serve a secondary school age population have fewer than 100 students. The average student-teacher ratios for these schools are as follows:

Table 10. Student-Teacher Ratios for Island Secondary Schools	
	School Enrollment
	<100
Island Secondary Schools	7.0
Adjustment Applied in EPS	11:1

According to the ratios in Table 10, island schools with high school grades have, on average, seven students per teacher, which is well below the 11:1 adjustment currently provided.

Island elementary/middle schools receive a 13% or 26% adjustment to allocated EPS funding for operations and maintenance costs. The actual proportion varies depending on the size of the school. Island schools with fewer than 20 students receive 13%, while those schools with 21-75 students receive 26% additional allocation. Table 11 outlines the overall operations and maintenance expenditures in FY17 for island and non-island schools.

Table 11. Per-pupil expenditures (FY17) for Operation and Maintenance of Plant in Island and Non-island schools				
	Island v. Not Island		Island Schools, By Enrollment	
	Non-Island Schools	All Island Schools	Fewer than 20	21-75
Average Per Pupil OMP	$1,841	$4,534	$5,338	$3,568
% of Average ($1,841)	100%	246%	290%	194%

According to Table 11, island schools had an average operation and maintenance cost in FY17 that was 146% higher than non-island schools in Maine. This is substantially higher than the adjustment provided in EPS.

Although student-teacher ratio is not outlined among the adjustments for elementary and middle schools on islands in Maine, this review includes an evaluation of those ratios as well. Table 12 shows the student-teacher ratios for elementary/ middle island schools.

Table 12. Student-Teacher Ratios for Island Elementary & Middle Schools, by Average Grade Enrollment				
School Type	Title I Status	Average Grade Enrollment		
		Less than 15	15-29	More than 29
Elementary & Middle Schools	Student-Teacher Ratio	6.8	N/A	N/A

According this analysis, island K-8 and non-K-8 schools have an average student-teacher ratio of 6.8:1, which is lower than all other school types reviewed for this analysis.

Finally, EPS outlines that island schools receive an additional 'transportation allocation' which is "equal to approved transportation expenditures." In the FY17 expenditure data, only two island schools have transportation expenses that are identifiable by the school cost center. No further analysis was conducted.

Discussion & Policy Implications

In general, these results indicate that the spending gap between small, isolated schools and other schools has continued to grow since the development of this funding adjustment in 2005. Small and isolated schools of all grade levels have even lower student-to-teacher ratios than in the early 2000s, and per-pupil spending on operations in the smallest elementary schools (i.e. those with fewer than 15 students per grade) was 18% to 34% higher than average. Per pupil spending on island school facilities also far outpaces the spending in average schools, by more than double. These patterns triangulated across multiple measures, and point to a need for increased adjustments for small and isolated schools.

However, these analyses were challenged by the unavailable expenditure data for some small isolated schools, and inconsistent trends from prior reports. For example, the per pupil spending in the handful of small and isolated non-K8 schools with between 15 and 29 students per grade level were unexpectedly lower than average, by 24%. Also, the per-pupil spending on operations and maintenance of plant in small island schools (20 students or fewer) was historically lower than the per-pupil spending in larger island schools (21 to 75 students), but that trend has since reversed. This suggests caution in making substantial changes in these adjustments. Because these analyses are based on small numbers of schools, the data can fluctuate from year to year. These trends should be re-examined in the next review to see

whether the spending patterns have persistently remains changed since the model was developed.

To balance these two findings, we recommend the following moderate changes to provide more resources to small and isolated schools.

Qualifying School Category	Current Adjustment	Calculated FY2017 Pattern	Suggested Adjustment
K-8 Schools	12.0% of weighted per pupil amount	18% of average spending	18% of weighted per pupil amount
Non-K-8 schools, <15 students per grade	13.4% of weighted per pupil amount	+34% of average spending	18% of weighted per pupil amount
Non-K-8 schools, 15 to 29 students per grade	8.8% of weighted per pupil amount	-24% of average spending	No change
High Schools, 1 to 99 students	Teacher ratio of 11:1	Teacher ratio of 10.2:1	Teacher ratio of 10:1
High Schools, 100 to 199 students	Teacher ratio of 13:1	Teacher ratio of 12.0:1	Teacher ratio of 12:1
Island schools, 1 to 20 students	Applicable adjustments above, plus additional 13% of OMP allocation, plus actual transportation	Additional 190% of average per-pupil spending	Applicable adjustments above, plus additional 50% of OMP allocation and actual transportation
Island schools, 20 to 75 students	Applicable adjustments above, plus additional 26% of OMP allocation, plus actual transportation	Additional 94% of average per-pupil spending	Applicable adjustments above, plus additional 50% of OMP allocation and actual transportation

Lastly, we recommend further study in the next component review (to be conducted in 2021) to investigate the following options for simplifying the small school adjustment:

- Investigate the impact of varying the number or distance of nearby "options" for elementary and middle schools to qualify as isolated. For example, both the K-8 and non-K-8 schools state that they should have fewer than "five school options available." This has been interpreted as the number of options in district. Analysis showed that the 'options' component does not eliminate any schools that are not also covered by the criterion for distance from similar schools. The threshold could warrant a change to focus only on the building's distance to any nearby school of similar grade span (elementary and/or middle level) to reduce policy barriers to school (or district) reorganizations that may optimize travel distance and educational opportunities for students.

- Similarly, secondary schools are evaluated based on two distance criteria—the distance between the farthest district boundary to the next nearest secondary school, as well as from the district's secondary school to the next nearest secondary school. It may simplify matters to use only the distance to the next nearest secondary school, which would also reduce disincentives to district collaboration. However, the impact on eligible schools would first need to be examined.
- The patterns seen in the smallest K-8 and non-K-8 schools (fewer than 15 students per grade) appear to be similar. It may be preferable to have the same adjustment treatment for both categories, based on enrollment per grade and distance, rather then treating the schools as different categories.
- The adjustments for non-K-8 schools with between 15 and 29 students per grade should be re-examined. Recent analyses suggest that these schools may not spend more per pupil or have smaller student to teacher ratios than average schools, regardless of geographic isolation. However, this also would need to be more fully understood, as removing the modest small-size adjustment would also remove that incentive to continue to operate efficiently.
- It may simplify annual calculation of the small school adjustment amounts if the supplemental amount were computed as a flat per-pupil amount (which could be inflated annually) rather than as a lower staff ratio and/or increased OMP allocation. However, this may require changes to the statutory language in Title 20-A, §15683.

References

Allen, D. and Sloan, J. (April 2005). Adequacy-Based Funding for Small, Isolated Schools: An Approach for Maine. A report of the Maine Education Policy Research Institute (MEPRI), Presented at NEERO Conference in Northampton, MA.

Silvernail, D. (2006). Preliminary Analysis of the Cost and Characteristics of Maine's Higher Performing Public Schools. A report of the Maine Education Policy Research Institute (MEPRI). Gorham, ME: University of Southern Maine (http://mepri.maine.edu/posts/)

Silvernail, D. and Allen, D. (2010). The 2009-10 Review of the Small School Adjustment to the Essential Programs and Services School Funding Model. A report of the Maine Education Policy Research Institute (MEPRI). Gorham, ME: University of Southern Maine (http://mepri.maine.edu/posts/)