

Calculating Geometric Mean Substrate Size

(first part is similar to Calculating Percent Substrate by Size)

These calculations refer to each of 2 field methods:

- 1) Primary Transects – [Primary Transect with Substrate and Depth](#) – see Data Element 7.00)
- 2) Secondary Transects (on Thalweg Form) - [Secondary Transect with Substrate and Depth](#) – see Data Element 35.00

Each of these 2 methods populates these variables:

[TransectID](#) (e.g. A0, or A5)

[StationLeftRight](#) (e.g. 00, 01...10)

[SubstrateTypeCode](#) – see combined codes table for Substrate Size Class

1. Count the number of lithic observations in the table (ie exclude WD, RC, HP, and OT) from the count). There might be missing data, leaving less than 209. Include This is [NumberOfLithicSubstratesSized](#)
2. Count the number of observations for each lithic size class and divide by [NumberOfLithicSubstratesSized](#). This is [ProportionOfLithos As_____](#):

3. Assign a [Log10MeanClassSize](#) to each lithic SubstrateTypeCode as follows:

SubstrateTypeCode (size in mm)	Log10MeanClassSize	Method to determine Log10MeanClassSize
RS (> 4000 mm)	3.903089987	$\text{Log}_{10}(2 * (\text{LowerLimitDiameter in mm}))$
RR (> 4000 mm)	3.903089987	$\text{Log}_{10}(2 * (\text{LowerLimitDiameter in mm}))$
XB (1000 to 4000 mm)	3.301029996	$[(\text{Log}_{10}(\text{UpperLimitDiameter in mm}) + \text{Log}_{10}(\text{UpperLimitDiameter in mm})) / 2]$
SB (250 to 1000 mm)	2.698970004	$[(\text{Log}_{10}(\text{UpperLimitDiameter in mm}) + \text{Log}_{10}(\text{UpperLimitDiameter in mm})) / 2]$
CB (64 to 250 mm)	2.102059991	$[(\text{Log}_{10}(\text{UpperLimitDiameter in mm}) + \text{Log}_{10}(\text{UpperLimitDiameter in mm})) / 2]$
GC (16 to 64 mm)	1.505149978	$[(\text{Log}_{10}(\text{UpperLimitDiameter in mm}) + \text{Log}_{10}(\text{UpperLimitDiameter in mm})) / 2]$
GF (2 to 16 mm)	0.752574989	$[(\text{Log}_{10}(\text{UpperLimitDiameter in mm}) + \text{Log}_{10}(\text{UpperLimitDiameter in mm})) / 2]$
SA (0.6 to 2 mm)	0.039590623	$[(\text{Log}_{10}(\text{UpperLimitDiameter in mm}) + \text{Log}_{10}(\text{UpperLimitDiameter in mm})) / 2]$
FN (< 2 mm)	-0.823908741	$\text{Log}_{10}(0.25 * (\text{UpperLimitDiameter in mm}))$

4. Multiply ([ProportionOfLithosAs___](#)) x ([Log10MeanClassSize](#)) for each class. Sum this product across all classes. This is [Log10SiteSubstrateDiameterInMillimeters](#).
5. Antilog of ([Log10SiteSubstrateDiameterInMillimeters](#)). This is [SiteGeometricMeanSubstrateDiameter](#)

Variable	Description
NumberOfLithicSubstratesSized	Count of substrates sized, excluding pavement, wood, hardpan, or other.
Log10MeanClassSize	A different constant for each SubstrateTypeCode
Log10SiteSubstrateDiameterInMillimeters (note: this is equivalent to EMAP's LSUB_DMM)	The sum across all lithic substrate sizes of (ProportionofLithosAs___x Log10MeanClassSize)
SiteGeometricMeanSubstrateDiameter (note: this is equivalent to EMAP's D _{gm})	Geometric mean substrate particle size for the site event.
ProportionOfLithosAsBedrockSmooth	Count of observations with SubstrateSizeClass as RS/ NumberOfLithicSubstratesSized
ProportionOfLithosAsBedrockRough	Count of observations with SubstrateSizeClass as RR/ NumberOfLithicSubstratesSized
ProportionOfLithosAsBoulderLarge	Count of observations with SubstrateSizeClass as XB/ NumberOfLithicSubstratesSized
ProportionOfLithosAsBoulderSmall	Count of observations with SubstrateSizeClass as SB/ NumberOfLithicSubstratesSized
ProportionOfLithosAsCobble	Count of observations with SubstrateSizeClass as CB/ NumberOfLithicSubstratesSized
ProportionOfLithosAsGravelCoarse	Count of observations with SubstrateSizeClass as GC/ NumberOfLithicSubstratesSized
ProportionOfLithosAsGravelFine	Count of observations with SubstrateSizeClass as GF/ NumberOfLithicSubstratesSized
ProportionOfLithosAsSand	Count of observations with SubstrateSizeClass as SA/ NumberOfLithicSubstratesSized
ProportionOfLithosAsFines	Count of observations with SubstrateSizeClass as FN/ NumberOfLithicSubstratesSized