

Hydrology badge information and scoring rubric

Content, skills, and behavioral attributes of the badge:

- Content: velocity-area method for calculating discharge, interpretation of a dynamic system, channel geometry, cross-sectional and longitudinal variations in channels, sediment mobility
- Skills: spreadsheet construction and calculations in Excel, use of a flowmeter, use of surveying equipment, hydrologic field sketches, sediment sampling
- Behavior: time management, teamwork, decision-making, site selection

Overarching badge goals:

1. Students will measure stream velocity and utilize field data to calculate stream discharge.
2. Students will use field data and theoretical hydrologic principles to make predictions about sediment mobility in a stream.
3. Student can collect and analyze field data to correctly determine stream channel geometry and stream discharge with light supervision.

Field exercises that may be completed in the pursuit of the badge:

- SNARL discharge and surveying
- Mono North discharge, surveying, and synthesis questions

Rubric

Field sketches

Exceeds the standard	Meets the standard	Does not meet the standard
Sketch is neat and legible. AND Sketch includes all components of a hydro field sketch. AND Author uses field sketch observations to make interpretations. AND Field observations and interpretations are explicitly delineated.	Sketch is neat and legible. AND Sketch includes all components of a hydro field sketch.	Issues with neatness and legibility. AND/OR Sketch missing one or more components of a hydro field sketch. AND/OR Sketch confuses field observations with interpretations.

Elements of field sketch

- title
- location
- north arrow and/or orientation information
- scale
- Legend
- locations of cross-sections and transit marked, if applicable
- riffles

- pools
- channel edges
- cutbanks
- point bars
- flow direction
- location of study sites
- indication of channel bed grain size
- terraces
- evidence of past floods
- structures (bridges, culverts, etc.)
- vegetation (sizes, types)

Stream discharge measurement and analysis

Exceeds the standard	Meets the standard	Does not meet the standard
All velocity measurements taken at correct depths. AND Correct number of measurements made to within 5 data points. AND Significant figures used to indicate precision. AND/OR Error analysis is included. AND Data presentation is clear and includes sample calculations. AND Data table corresponds to Excel calculations. AND Accurate grain size analysis included. AND Written interpretation with references to data included.	All velocity measurements taken at correct depths. AND Correct number of measurements made to within 5 data points. AND Significant figures used to indicate precision. AND Data presentation is clear and includes sample calculations. AND Data table corresponds to Excel calculations.	Errors in velocity measurement depths. AND/OR More than 5 too many or 5 too few measurements made. AND/OR Precision is not indicated. AND/OR Data presentation is unclear. AND/OR Sample calculations are not included. AND/OR Lack of correspondence between data table and Excel calculations.

Surveying

Exceeds the standard	Meets the standard	Does not meet the standard
<p>Cross-sections include necessary elements. AND Longitudinal profile includes necessary elements. AND Cross-sectional data are accurate. OR More than 95% of cross-sectional data are accurate and reflect the student's field observations. AND Longitudinal profile is accurate. OR More than 95% of longitudinal data are accurate and reflect the student's field observations as recorded. AND Analysis included with interpretation supported by field observations/measurements.</p>	<p>Cross-sections include necessary elements. AND Longitudinal profile includes necessary elements. AND Cross-sectional data are accurate. OR More than 75% of cross-sectional data are accurate and reflect the student's field observations. AND Longitudinal profile is accurate. OR More than 75% of longitudinal data are accurate and reflect the student's field observations as recorded.</p>	<p>One or more elements missing from cross-section. AND/OR One or more elements missing from longitudinal profile. AND/OR Cross-sectional data are inaccurate. OR Cross-sectional data do not reflect the student's field observations. AND Longitudinal profile is inaccurate. OR Longitudinal profile data do not reflect the student's field observations as recorded.</p>

Elements of hydro cross-sections and longitudinal profiles

- Title
- Location
- Scale
- Legend
- North arrow and/or orientation information
- Left edge of water
- Right edge of water
- Terraces
- Obstructions
- Bars, if applicable