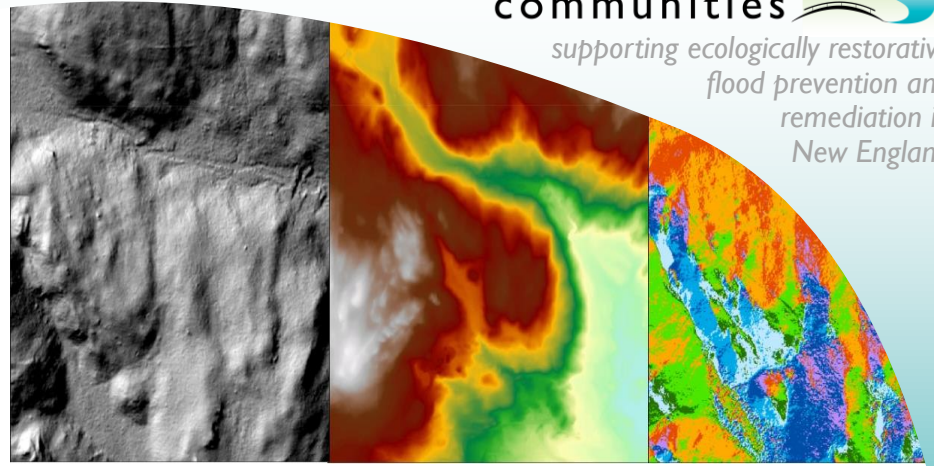


# Measuring Rivers

Collecting accurate information about a river's features and metrics is one of the most important aspects of successful river management.



Metrics can be measured in the **field** or **remotely**, or estimated using **relational equations**.

**Field methods** include **visual inspection** or **physical measurement** of features. Noting rock-staining from floods to define channel edges is a visual inspection. Using a ruler to determine rock size is a physical measurement. Some remote sensing tools can be applied in the field, such as laser-**range-finders** used to map channel cross-sections.

Category	Method	Description	Watershed	Channel Banks	Channel Pattern	Bed Material	Dimensions	Hydraulics	Slope	Vegetation	Accuracy
Field Based	Visual	Human-based assessment		Y						Y	Low
	Physical	In-situ measurement requiring contact with feature.		Y		Y	Y	Y	Y	Y	High
	Ranging	Field-based remote-sensing using radar, laser, or acoustic ranging.		Y		Y	Y		Y	Y	High
Remote Sensing	Aerial Photos	Passive collection of electromagnetic data from an air- or satellite-borne unit.	Y	Y	Y		Y			Y	Med-High
	Elevation Models	Digital terrain models. Various sources.	Y		Y				Y		Low
	LiDAR	Elevation model from airborne laser emission and detection unit. Can detect and filter out vegetation and buildings.	Y	Y	Y		Y		Y	Y	Med-High
Relational Equations	Regional Regression	Empirically-derived equations relating hard-to-measure physical features to more readily available ones.	Y					Y	Y		Low

**Remote-sensing** usually refers to information collected by aircraft or satellites. Digital elevation models (**DEM**) can be generated using radar or LiDAR, or through analysis of photographs. **LiDAR** is similar to radar, and produces high-resolution DEMs that can be processed to remove vegetation and structures. **Aerial photography** is also an important remote-sensing tool.

**Relational equations** approximate the values of certain hard-to-determine river metrics based on features that are more easily measured. This concept is commonly applied through "**regional regression equations**," which estimate a channel's dimensions and hydraulics based on watershed size. Equations are developed for specific regions.