

1.7a Extension: Why this location? Determining How the Rapids Got Here

Background



Wenk Associates

Channel slope (or gradient) is an important factor in the development habitat characteristics of a river. Areas of steep slope usually support more diverse and abundant populations of aquatic organisms. The elevation of the Grand River drops 551.9 feet, from 1130.7 feet above sea level at the headwaters, to 578.8 feet above sea level at the mouth. The average slope of the Grand River is 2.2 feet/mile with a maximum of 5.48 feet/mile near the former rapids in Grand Rapids. The high quality habitats located near Grand Rapids have been removed by the construction of dams. These dams have eliminated and/or fragmented some of the best pool and riffle habitat on the main stem.

In addition to channel gradient, channel cross-section can be a useful measure of habitat quality. Natural channels typically provide better habitat than those that have been manipulated by channelization or degraded by altered hydrology. Expectations of habitat diversity can be made based on an analysis of channel cross section and stream discharge. Stream channels that do not have natural channel dimensions may have unstable flow patterns or otherwise altered channel shape. Channel cross sections of the Grand River fall within the expected range at average flow. However, channel cross sections are too narrow at high flow and too wide at low flow. Several miles of tributaries in the Grand River watershed do not support minimally acceptable fish and aquatic macroinvertebrate communities as a result of channelization or altered hydrology, due to expansion of drainage areas through field tiling and construction of storm sewers.

Activity

Have students analyze the graphs and the map of the bedrock geology map below. Ask them to answer the following questions:

- Where are the steepest slopes? What type of bedrock is common in these areas?
- Where are the shallowest slopes? What type of bedrock is common in these areas?

If you have rock samples, students can test the hardness of the different bedrock types.

If you have access to a stream table, have students test ways this profile could have formed.

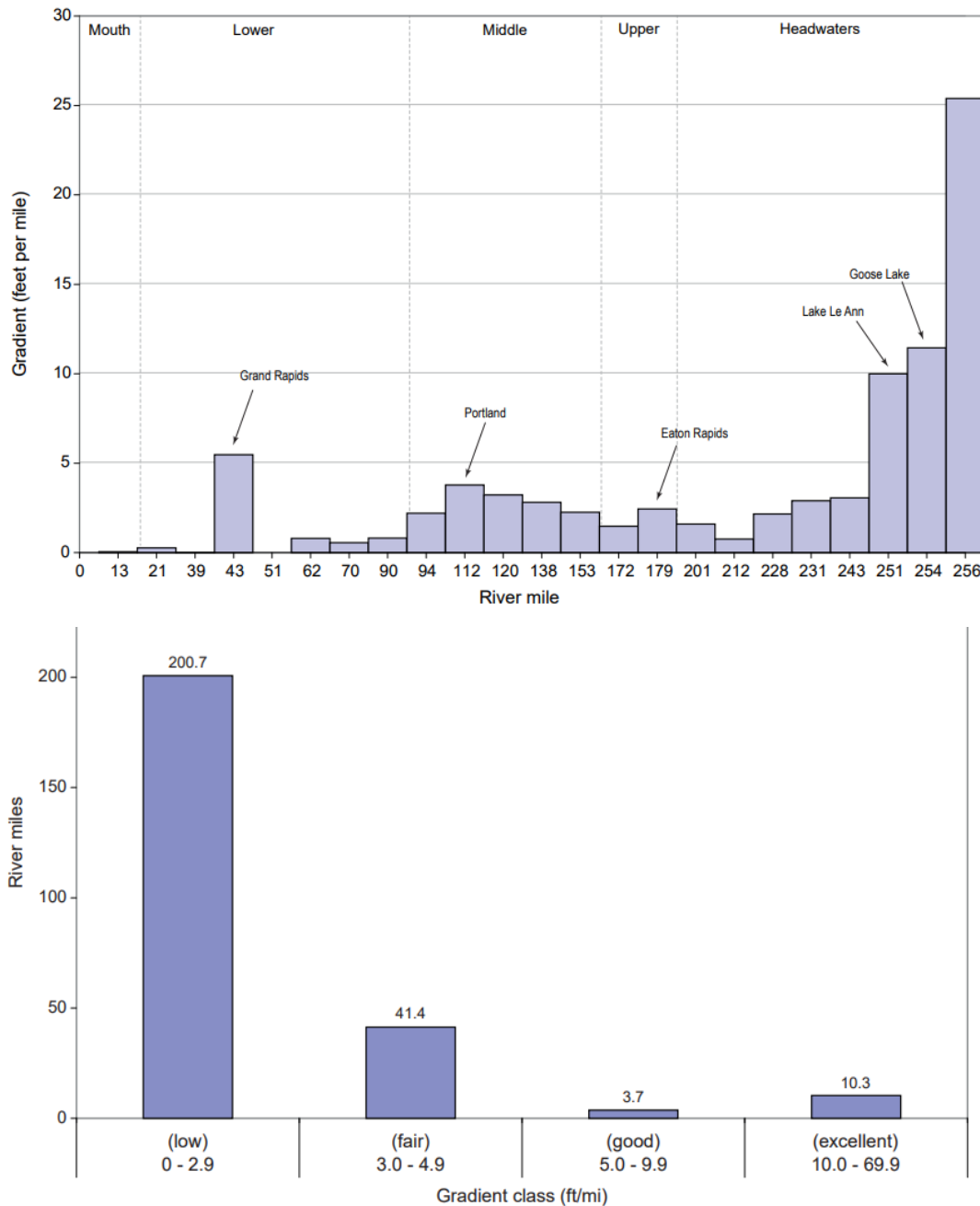


Figure 59.—River miles within each gradient class (expressed as feet per mile) of the Grand River main stem. Source: Michigan Department of Natural Resources, unpublished data.

Background Information and Data from Hanshue, S. K., and A. H. Harrington. 2017. Grand River assessment. Michigan Department of Natural Resources Fisheries Report 20, Lansing.

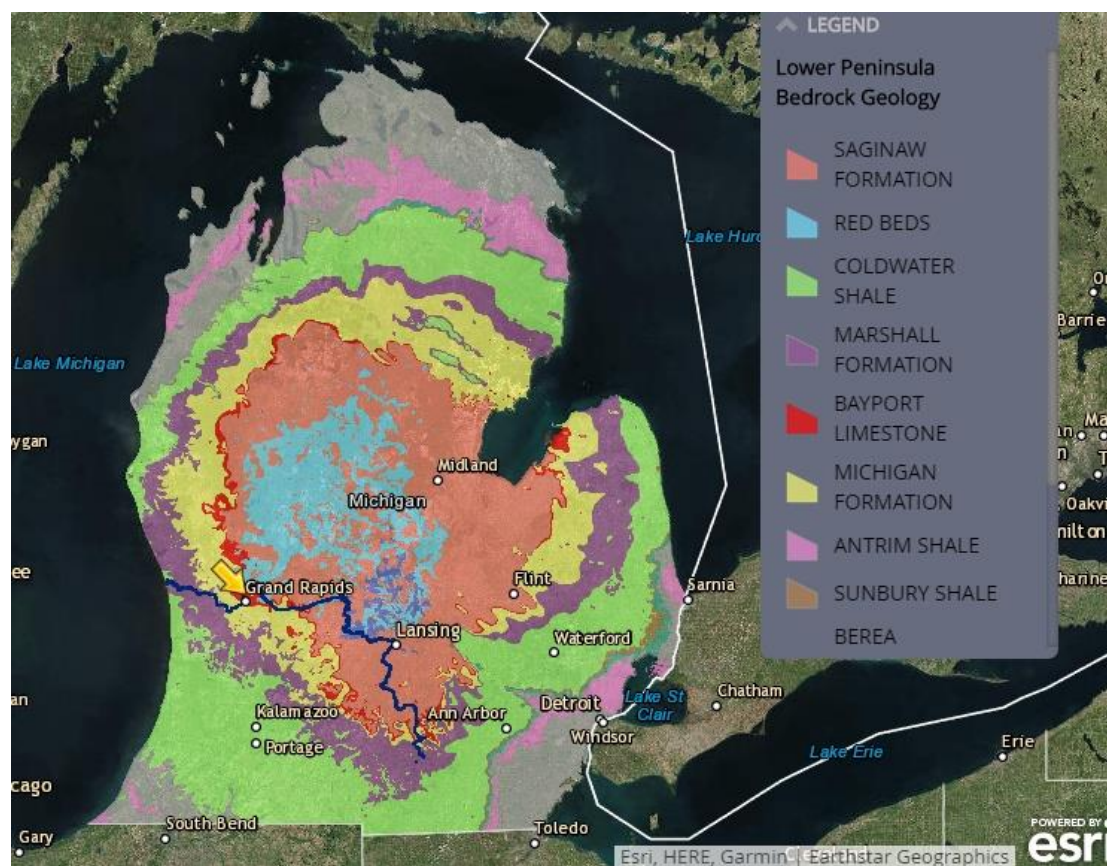


Image courtesy of LGROW (Lower Grand River Organization of Watersheds)