Rivers and Flooding Module

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Unit Overview

Subject Area: Earth Science / Environmental Science
Grade Level: 9-12
Time: 9 days

Next Generation Science Standards

HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

Connection to Civil Engineering

This module looks at the basics of water resource engineering and the decision-making process that is involved in city planning and development. Lesson 7 specifically looks at the various flood control structures that are designed by civil engineers to manage the risks associated with flooding.

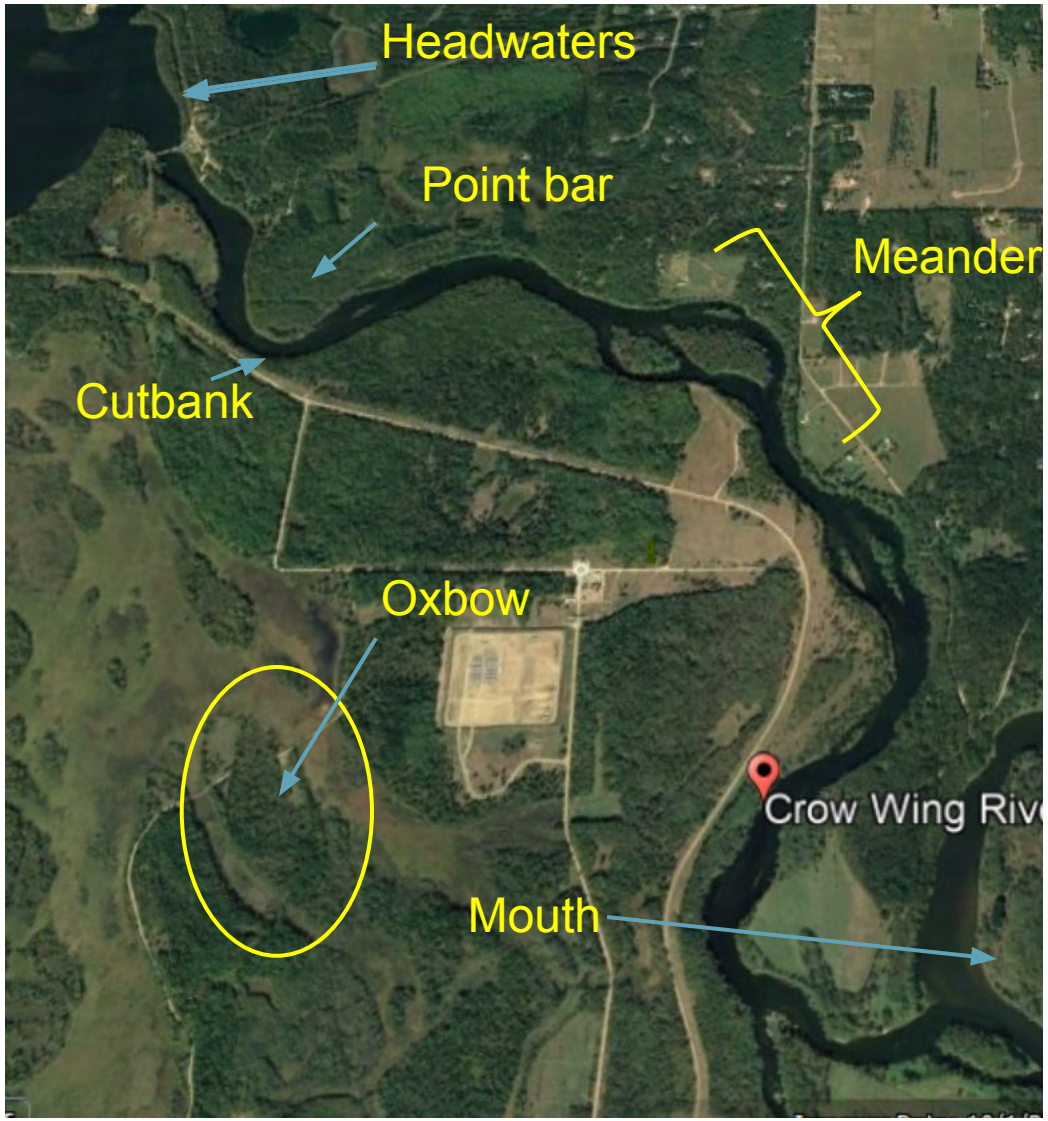
Lesson 1
River Anatomy

Objective: SWBAT identify and describe the parts of a river.

Time: 50 minutes

Lesson Plan

- River Anatomy Notes
- Students will use Google Earth to find examples of vocabulary words



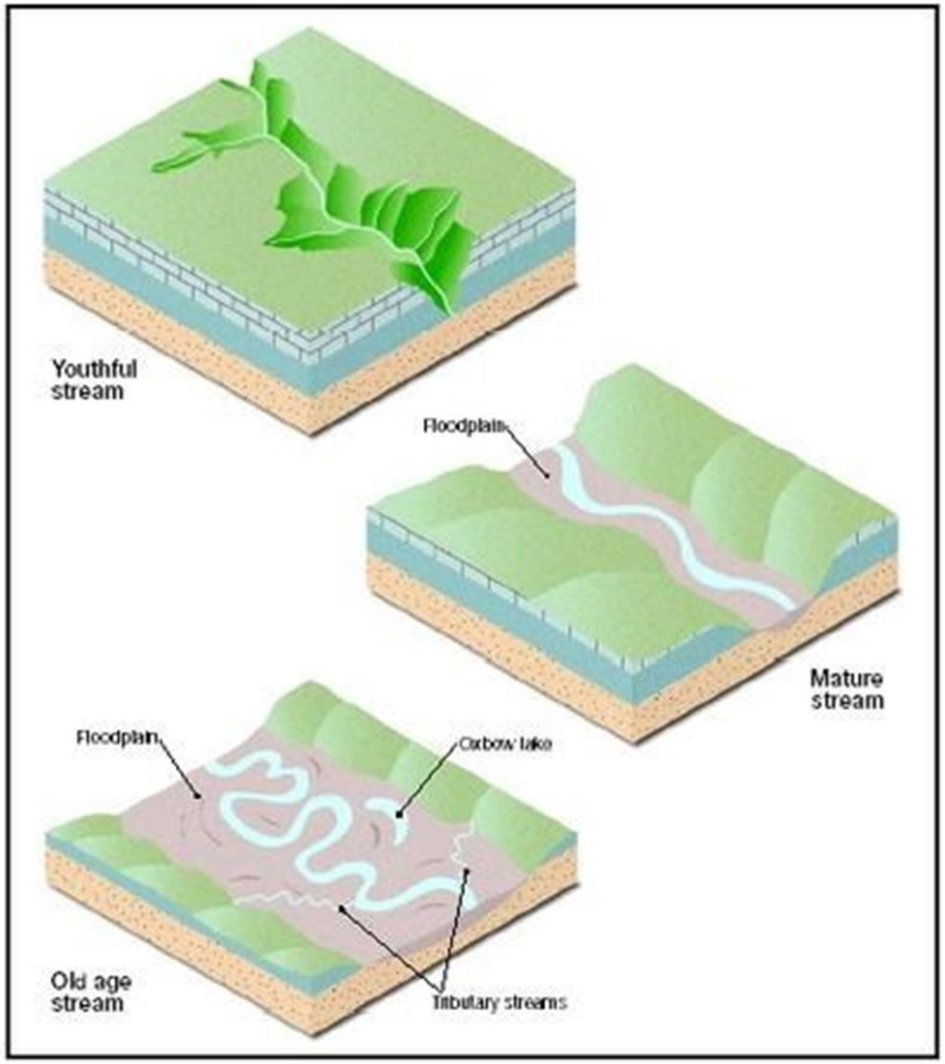
Lesson 2
Age of Rivers

Objective: SWBAT discuss how a river changes over time.

Time: 50 minutes

Lesson Plan

- Lesson 1 Vocabulary Review
- Age of Rivers Notes
- River Drawing Activity – draw all three ages, describe features, label with lesson 1 vocabulary



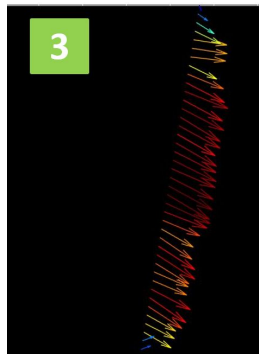
Lesson 3
Determining the Thalweg

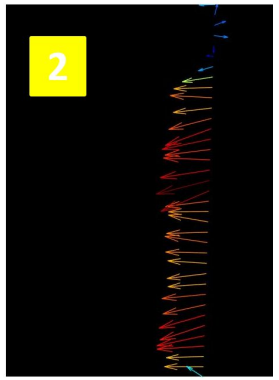
Objective: SWBAT analyze data from a river to determine where erosion, deposition, and the thalweg will occur in a river.

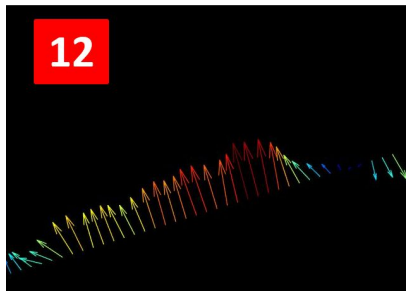
Time: 50 min

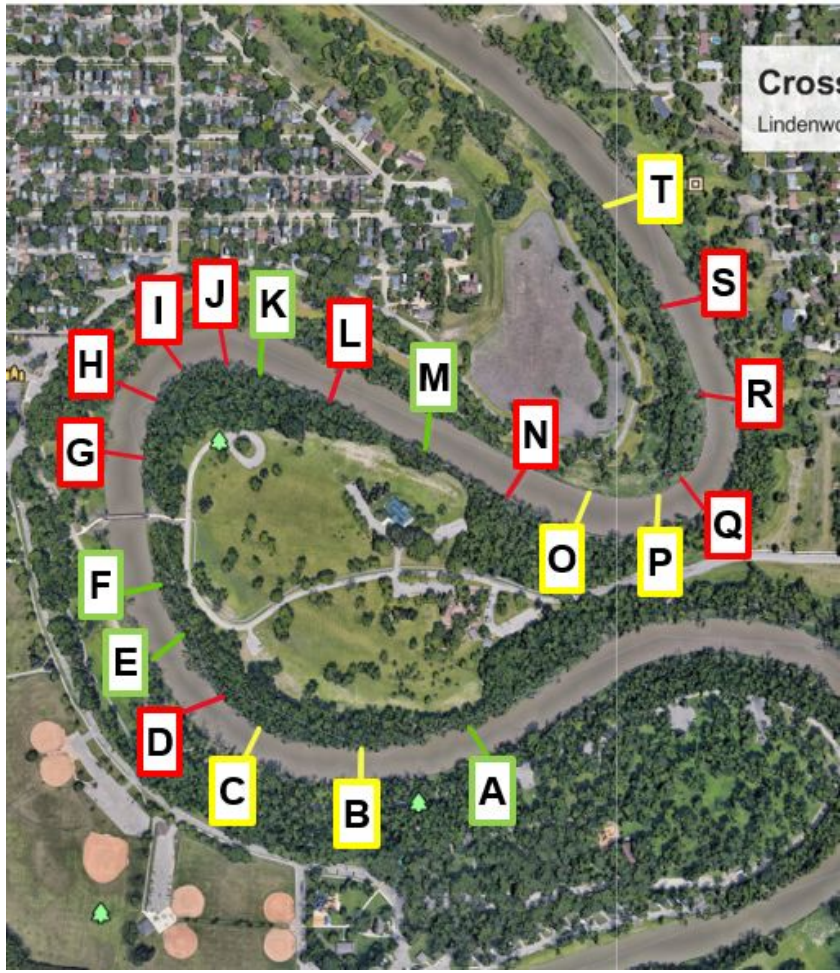
Lesson Plan

- Quiz – River Anatomy and Age of Rivers
- Students will use stream velocity data collected by NDSU to match cross sections to the place on the river.
- Colors represent level of difficulty









Stream Table Labs Planning

- Lessons 4 and 5 are stream table labs.
- If stream tables are not available, lessons 4 and 5 will be skipped.
- If stream tables are available, follow the schedule below to maximize student engagement with stream tables.

	Groups 1 and 2	Groups 3 and 4
Day 4	Lesson 4: Young Stream and Stream Cutoff Lab	Lesson 6: Flooding Causes
Day 5	Lesson 6: Flooding Causes	Lesson 4: Young Stream and Stream Cutoff Lab
Day 6	Lesson 5: The Great Flood Lab	Lesson 7: Flood Risk Management
Day 7	Lesson 7: Flood Risk Management	Lesson 5: The Great Flood Lab

Lesson 4
Young Streams and Stream Cutoffs

Objective: SWBAT demonstrate how erosion and deposition occur in different ages of rivers.

Time: 50 min

Lesson Plan

- Students set up a straight “young” stream and observe river flow and where erosion is happening
- Students set up a stream that will cut off at a meander and create an oxbow lake
- Students will make a video describing their rivers using river anatomy vocabulary

Lesson 5
The Great Flood

Objective: SWBAT identify components that lead to flooding and natural erosion control methods.

Time: 50 min

Lesson Plan

- Students will create a meandering stream and implement “natural” erosion control methods
- Students will make a video discussing the methods they implemented and how well they worked in flood conditions

Lesson 6
Flooding Causes

Objective: SWBAT interpret information from primary source documents to define the causes that lead to flooding.

Time: 50 min

Lesson Plan

- Spinner activity looking at flood causes
- Students will read about the 1997 or 2009 flood to determine flooding factors
- Students will record a short newscast of the events and reasons that led to the flood they researched

Lesson 7
Flood Risk Management

Objective: SWBAT describe flood risk management strategies and their benefits and drawbacks.

Time: 50 min

Lesson Plan

- Watch video on flood control and fill in table on the benefits and drawbacks
- Watch video on levee issues
- Discuss a hypothetical scenario on the Red River and determine the best flood risk management plan

Lesson 8
River Management Scenario

Objective: SWBAT generate a flood management plan that explains how a river interacts with the land surrounding it.

Time: 100 min

Lesson Plan

- Summative Project
- Students will be given a scenario where they will act as city engineers looking at a city issue of developing land near the Red River
- As city engineers they will have to decide if this development will occur and how to best mitigate flood risk
- Create a presentation discussing their conclusions

Questions?

Acknowledgements

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