

The Confluence Project

WATERSHED SCIENCE CURRICULUM

Developed by the University of Idaho Waters of the West Program and The Lands Council



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The Confluence Project

BACKGROUND

The Confluence Project (TCP) is a research-based model for delivery of high quality watershed science education integrated into existing school curricula and science standards for K-12 students. This model emphasizes experiential, place-based, student-centered learning that incorporates authentic research experiences and develops critical thinking skills for students. Built upon the complex concepts of watershed science and fostered by community partnerships, TCP's model is applicable to a variety of interdisciplinary science themes and is easily replicated in multiple geographic locations, diverse student populations and different school, district and state curricula and standards.

TCP's model goes beyond typical watershed science curriculum because each lesson and field experience builds upon the previous ones while providing unique opportunities for students to conduct their own research projects. Students participate in three field experiences within their communities and develop an integrative picture of their watershed, local water resources and social impacts. Through these field experiences, students learn skills and meet professionals that help prepare them for college and career, particularly in the STEM fields. The year culminates with the Youth Water Summit, a scientific conference where students present their research and propose science-based solutions to environmental issues in their watersheds.

Goals of The Confluence Project:

- (1) Increase secondary student knowledge and critical thinking regarding water, climate change and other local environmental issues and solutions;
- (2) Foster student connection to the environment and exposure to local environmental issues and careers in natural resources and STEM fields;
- (3) Create a replicable model of science and environmental education that can be implemented anywhere.

Development and Contributors:

The Confluence Project was developed in 2013 in an effort to inspire high school students to learn about their watersheds, enjoy science, develop research and critical thinking skills, and get outside. Several individuals and institutions contributed to its development: University of Idaho Waters of the West Program (Audrey Squires, Becky Rittenburg and Ryan Boylan); Lands Council (Kat Hall); and northern Idaho high school teachers (Jamie Esler, Cindy Rust and Rusti Kreider). The program has been supported by a National Science Foundation GK12 grant and a Science Education grant from the Idaho State Department of Education.

The authors encourage wide and free distribution of the curriculum. For more information, please contact squires.audrey@gmail.com or bgmiller@uidaho.edu.

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COURSES and STANDARDS

The Confluence Project curriculum has been implemented in high school science courses but could also be adapted to fit within middle schools or after school and summer programs. We have tested TCP in standards-based and elective courses and have had success in both. While it is easier to implement this program in elective courses, it is possible to do so in standards-based courses. For example, we effectively tailored TCP to tie into biology course curricula. The table below shows the spectrum of implementation of TCP curriculum.

SCHOOL	COURSE	GRADE	CLASS SIZE
Kendrick	Environmental Science	10 th	6 students
Lake City	AP/IB Environmental Science	11 th – 12 th	25 students
Lewiston	Environmental Science/ Ecology	11 th – 12 th	30 students
Paradise Creek	Botany, Biology (Alternative HS)	10 th – 12 th	15 students
Post Falls	Honors Biology	10 th	30 students
Potlatch	Advanced Biology	11 th	25 students
St. Maries	Honors Biology	10 th	20 students
Troy	Fish & Wildlife Sciences	11 th	10 students

Alignment with Standards:

The Confluence Project Curriculum aligns with the Next Generation Science Standards (NGSS), Common Core State Standards (CCSS) and Idaho Content Standards (ICS). Specifically, within NGSS, this curriculum fits with various sections of the Life Sciences, Earth Sciences and Engineering Design. This curriculum targets CCSS Reading and Writing for literacy in Science and Technical Subjects and Speaking and Listening standards. It also aligns well with the ICS Biology standards for grades 9-10. A list of specific standard alignment is included in each lesson.

Timeline for Instruction:

The diagram on the next page shows the recommended timeline for instruction of TCP units and their related lessons. Each content unit aligns with an academic quarter and targets specific watershed science topics that also tie to course curricula and standards. Units include pre-lessons to provide content background and study design; field experiences; and post-lessons for data analysis and reflection. Student research units also occur throughout the year. In the first semester, students complete guided research projects with defined topics that allow them to learn the research process and to delve deeper into related watershed science content. Teachers can help guide students towards research topics that tie into both TCP and course curricular goals. In the second semester, students utilize the skills gained first semester to independently research a topic of interest to them. Student research culminates at a year-end *confluence* of people and ideas where they present their work to peers and professionals.

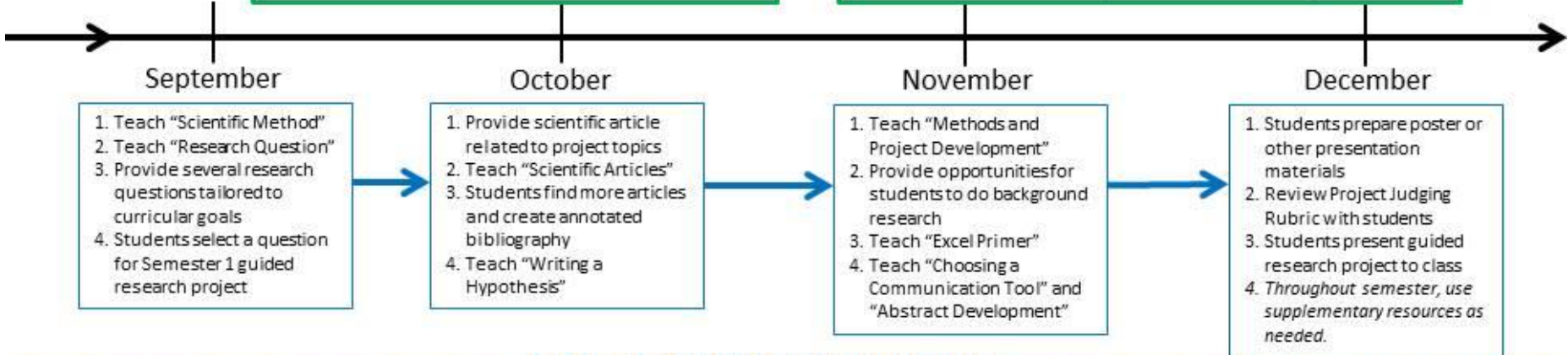
The Confluence Project CURRICULUM TIMELINE

Q1 – WATER QUALITY UNIT

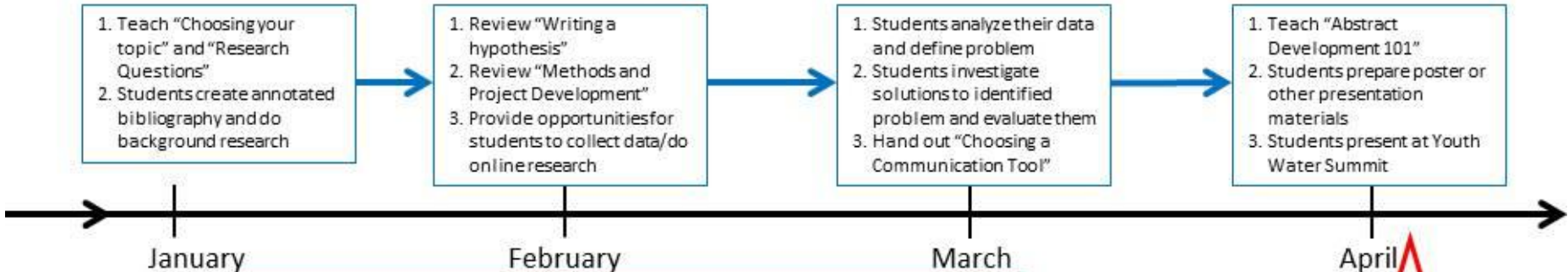
- Water Cycle Model
- Land Use Modeling
- Invasive Species
- Watershed Mapping & Question Development
- Mystery Water
- Macroinvertebrates
- Field Experience
- Riparian Restoration
- Data Analysis

Q2 – AGRICULTURE UNIT

- Which Way Will the Flow Go? - Erosion and Runoff
- Water Law
- Water Budget Experiment
- Genetics, Biochemistry
- Sustainable Agriculture Field Experience
- Reflective Writing
- Bioassay Lab: Soil Testing
- Garden Design



RESEARCH PROJECT TIMELINE



Q3 – SNOW SCIENCE UNIT

- Personal Water Inventory
- Drop in the Bucket/Freshwater Use and Availability
- Snowmelt Observation
- Question Development & Field Preparation
- Snow Science Data Collection
- Reflective Writing
- Analyzing Historic SWE Data

