

Engaging Stream Engineering



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STEM and more

Link to this presentation



bit.ly/2SPdVfR

Agenda

Community connections

Lesson 1: Aquatic perception

Lesson 2: Activity: Collecting data

Lesson 3: Opposites

Lesson 4: Argumentative - science explanation

Lesson 5: Picture lesson

Lesson 6: Drone Lesson

For Future Development

Collaborative Efforts - CHS

Science (Ecology) - Math (current equations) - Vocational (CAD Map plan)

STEM - Project Based Learning plan: stream gauge, cross section

IT - Data management

Science Cafe (drone class lesson)

UWG Dr. Tabit: Fish shocking, more to come: Historical data

Standards...

Major Concepts/ Skills: See page 4 Reflect at the spectrum K-12 :)

SEC1. Students will analyze how biotic and abiotic factors interact to affect the distribution of species and the diversity of life on Earth.

a. Characterize the biotic and abiotic components that define various biomes and aquatic life zones

c. Investigate factors that lead to the species richness of an ecosystem and describe the importance of biodiversity.

d. Relate the role of natural selection to organismal adaptations that are specific to their habitats and describe some examples of coevolution.

Date collected: _____

Time collected: _____



Lesson 1: Aquatic perception

1. Describe the location site of where your water sample was taken:

2. Why do we need to note the time of collection?

3. Describe the color:

4. What might color tell you about the quality of the water?

5. Describe the smell:

6. What might smell tell you about the quality of the water?

7. Describe the temperature:

8. Take the temperature of the sample: _____

Lesson 2: Activity: Collecting data

SR Stream Restoration - Collecting Data

Name: _____

You be assigned to a group and provided a box of supplies. Use the supplies carefully and complete the procedures below for credit. Teamwork will be needed.

Your group will be placed at a station along Buffalo creek to collect and assess the following data:

Step 1: How accurate is your tool?

Use the enclosed "Pipette" to collect a sample of water. Then use the pipette to place the water in the enclosed medicine cup. Redo this 10 times and complete the chart below:

| Trial | Medicine dropper reading (what is the units? _____) | |
|--|--|--|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| Add the 10 measurements → | | |
| Divide this total by 10 to find the AVERAGE → | | |

Macroinvertebrates - Data collection, processing



Lesson 3: Opposites

Outdoor Obstacle Course

Station G
Estacion g

Are the plants in this area
Native
or
Invasive?

Son las plantas de esta zona.
Nativo
o
¿Invasor?

should not be there =
no debería estar allí

Ex: Pez león rojo

Lesson 4: Argumentation

- a science explanation

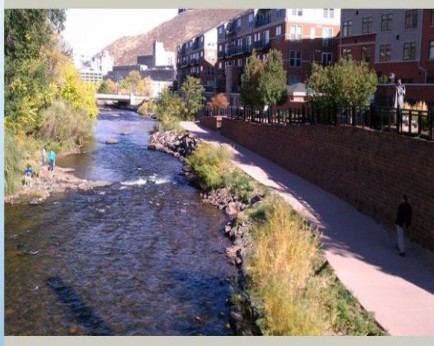
URBAN STREAM



FIELD STREAM



SUBURBAN STREAM



FOREST STREAM



Lesson 5: Picture lesson (after heavy rain)

1.

Is this water

Moving from

Top to bottom

OR

Bottom to top?



4

a. This is usually dry (spot 1)...

Why is the water this color?

b. Describe what is happening (spot 2)



5

a. This is in a flat area, how did the water discolor?

b. Why is the water NOT running away?





Lesson 6: Drone Lesson

Drone video

[Buffalo Creek Drone Flyover: Video](#)

Pause at 10 sec.

1. Which direction is the drone flying (upstream or downstream)

TYPE your response in this box - it will be RED

2. Looking to the foreground, is the river straight or curving?

TYPE your response in this box - it will be RED

3. If you said curving, the best word for this is "meandering". Do you feel like the river will likely become more straight or more meandering? - WHY? Be sure to complete your thought (full sentence(s))

TYPE your response in this box - it will be RED

Unpause for about 5 seconds, watching left. Pause at ~17 seconds

4. What is water doing on the left terrace of the stream (left bank) where does the water come from, where is it going.

TYPE your response in this box - it will be RED

Drone Zone



Richie Rogers - Classroom
Guest presenter

Gaming turned into occupation

Future:

Using a Drone for CAD

Software: pix4D

UWG IT 3D Drone



Velocity of water



Velocity of water at a Riffle SR

Name: _____

Draw an aerial view of a riffle below

Indicate starting point A and stop point B

Measure the distance between the real world A and B, record here: _____

River Left is the "Left" side of the river that you are standing in when looking in a downstream direction. *River Right* will be the opposite! *M* = middle

| Trial | Time (seconds) | Describe starting point (R-M-L) | Comments (example: pooled, leaf or sticks in way) |
|-------|--------------------------|---------------------------------|---|
| | Practice | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| | Added together = | | |
| | Divide by 10 (Average) = | | |

Future Developments

Cladogram

Sunfish, Flier

Scientific Name: *Centrarchus macropterus*



Flier have a compressed body with a rounded profile, and large dorsal and anal fins that are nearly equal in size. They have a dark greenish back with olive green to pale yellow sides that are marked with several rows of brown spots. There is a distinct dark streak running through the eye onto the cheek, and many light spots on the dorsal and anal fins. Small fliers have a prominent black spot surrounded by orange in the rear dorsal fin.

Cladogram - Fish Research

Name: _____

You will be given a fish species that is found in our local waterways to research, note your fish here:

The common name of this fish is: _____

The scientific name / in **binomial** nomenclature is:

This name represents the **Genus species**,

Which word is capitalized? _____ [genus or species]

The 2 part name is in _____ [regular font or italics]

This name is in _____ [english, spanish or latin?]

Characteristics of Life - Exhibited by your fish

1. **CELL**: Is your fish made out of a cell (unicellular) or many cells (multicellular)?

Are the cell(s) of your fish **prokaryote** (**No** nucleus) or **eukaryote** (**Yes**, nucleus)

Is our fish classified as an **autotroph** (makes their own food) or **heterotroph** (has to obtain food)



Basal Tree Identification - Math

How dense is
the forest?

Easy, cheap data
collection



Cross section - quick catch



In 20 minutes:
25 crawfish
2 salamanders
3 brim (different species)



**Other teams took cross section data
for 2 cross sections.**

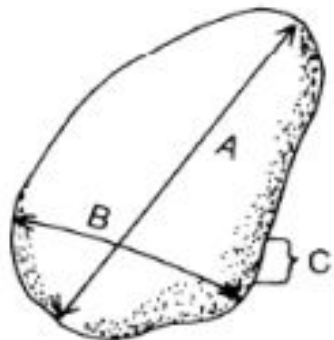
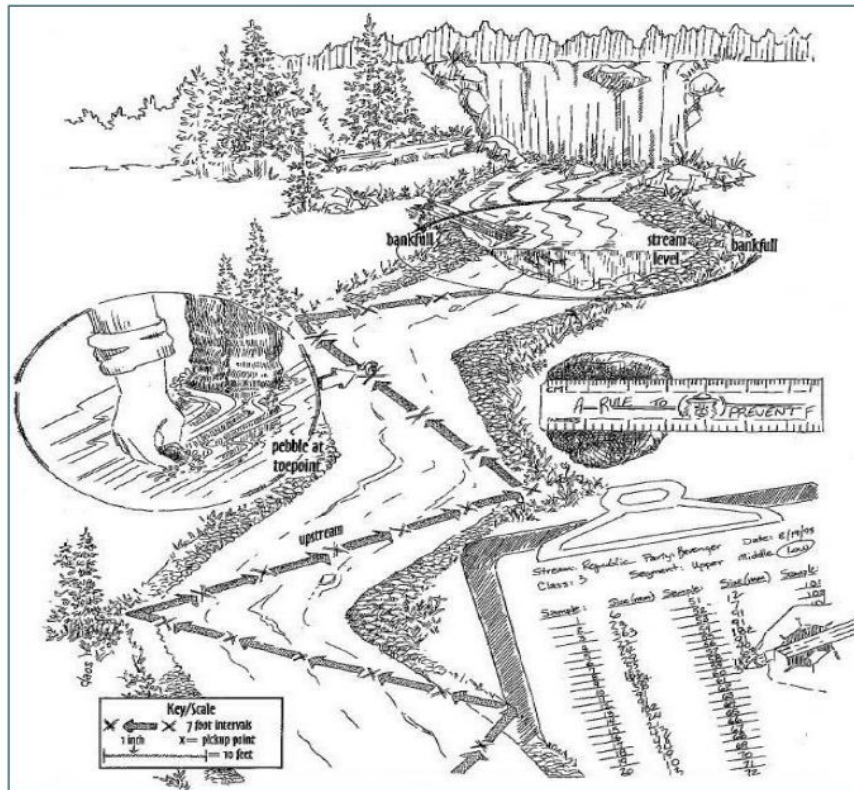
Need a simpler measurement system

Table 1. Pebble count size classes (modified)

| Size categories | Size ranges (mm) |
|--|------------------|
| (BC) Silt/clay <small>Very small (smooth feel)</small> | |
| (BC) Sand <small>(Small grainy feel)</small> | < 2 |
| (BC) Gravel <small>(Pea to tennis ball diameter)</small> | |
| 1. Fine gravel | 2 – 8 |
| 2. Medium gravel | 9 – 16 |
| 3. Coarse gravel | 17 – 64 |
| (BC) Cobble <small>(Tennis ball to basket ball diameter)</small> | |
| 1. Small cobble | 65 – 90 |
| 2. Medium cobble | 91 – 128 |
| 3. Large cobble | 129 – 256 |
| (BC) Boulder <small>(Basketball to car diameter)</small> | |
| 1. Small boulder | 257 – 512 |
| 2. Medium boulder | 513 – 1024 |
| 3. Large boulder | > 1024 |
| (BC) Bedrock <small>Large solid surface</small> | |
| (BC) Woody debris <small>Sticks, leaves etc.</small> | |
| (BC) – Broad category | |

Pebble count

The zigzag pattern



- (A) Long axis
- (B) Intermediate axis
- (C) Short axis

The intermediate axis is the pebble's diameter.

Dr. Christopher Tabit

Department of Biology, College of Science and Mathematics

Professor and Chair of Biology





Tabit Teaching



12-05-18 Fish Shock



From Richie Rogers Drone







Spring 2019

Platform for data, pictures and video (Jared Price)

Have students tell the story (literacy dah)

Accountability of materials by students (check out/in)

Biology based lessons - moving into Milestones

**Bring in new equipment and generate matching lessons
(Grant II) --- labeled out boxes**

Project Based Learning (learn from Austin & Sanders)

Storytelling Tools

We build easy-to-use tools that can help you tell better stories.

We're probably best known for our innovative suite of open-source, adaptable, and lightweight tools for media makers. The most popular, TimelineJS, has been used by more than 250,000 people to tell stories seen hundreds of millions of times, and is available in more than sixty languages. We also develop prototypes of tools for reporting, data management, research, and storytelling

Biology - yup, a Milestone tested course

SB1. Obtain, evaluate, and communicate information to analyze the nature of the relationships between structures and functions in living cells.

d. Plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and **osmosis**) in maintaining homeostasis.

e. Ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., **single-celled alga**).

Instruction should focus on understanding the inputs, outputs, and functions of photosynthesis and respiration

Biology - yup, a Milestone tested course

SB2. Genetics/DNA etc...

c. Ask questions to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture. (thinking: Round-up, biomagnification, GMO)

SB3. Obtain, evaluate, and communicate information to analyze how biological traits are passed on to successive generations.

c. Construct an argument to support a **claim about the relative advantages and disadvantages of sexual and asexual reproduction.**

Different Sunfish species reproduce by visual cues... murky water (oh oh)

The offspring of mixed species are infertile. If that population grows, what happens to biotic index/biodiversity/food chain/web

Redear sunfish *Lepomis microlophus* vs.

Creek perch *Lepomis megalotis*

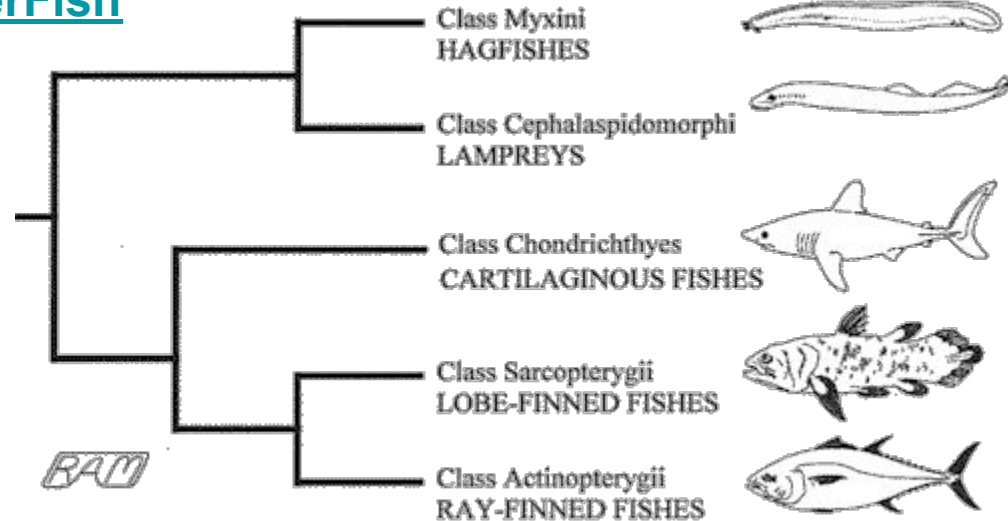
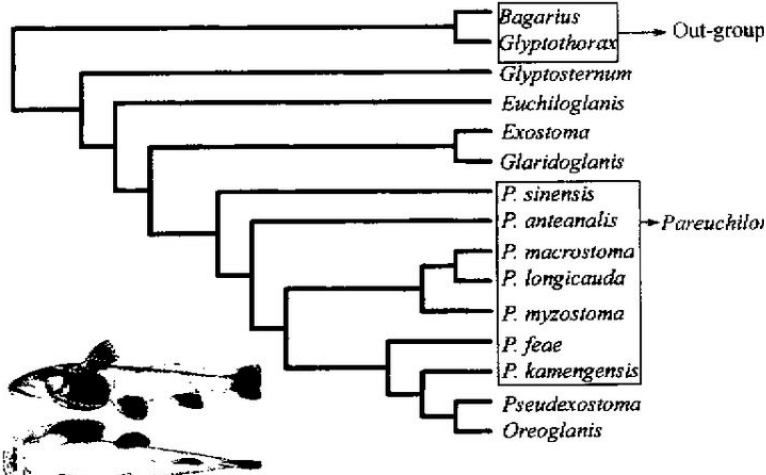
Have students find the evidence for the population gathered in the fish shock.

Biology - yup, a Milestone tested course

SB4. Classification/organization

b. Analyze and interpret data to develop models (i.e., cladograms and phylogenetic trees) based on patterns of common ancestry and the theory of evolution to determine relationships among major groups of organisms.

<https://georgiawildlife.com/FreshwaterFish>

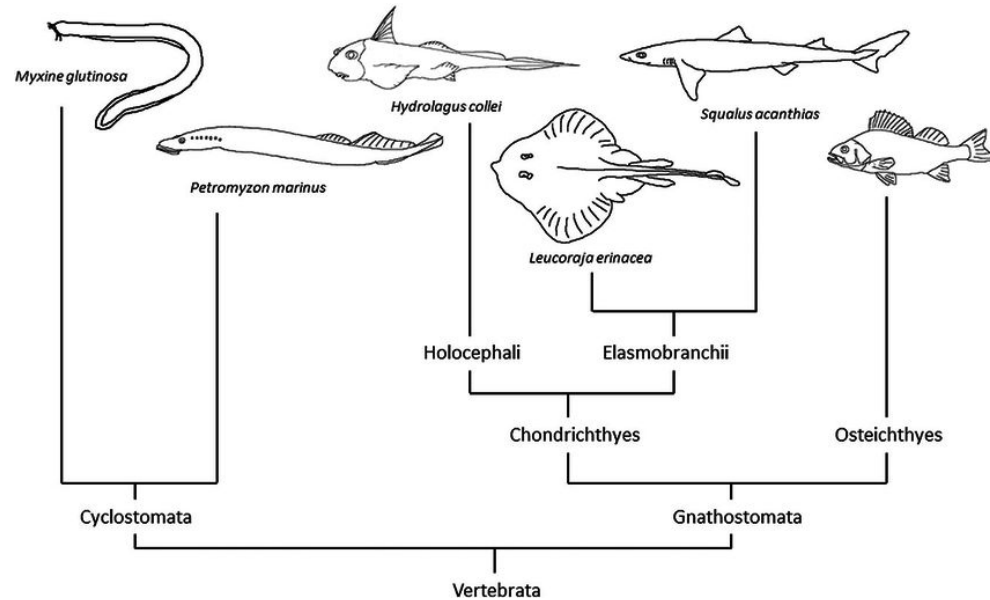


Lesson #1 [See this!](#)

Project Based Learning

Make a cladogram of what we find at our creek

See Mrs. Wasdins
In-class Lesson



Thank you!

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