Festival Activity: Salmon Bots

Subject: Science & Technology

Concept: Using coding as a tool to study salmon ecosystems

Key Vocabulary

- Block Coding
- Robot
- Drone or UAV
- Ecosystem
- Ecology/Ecologist
- Esturay
- Migration

Skills

- Coding
- Critical Thinknig
- Creativity
- Collaboration

Materials

- □ Spheros
- □ iPads
- □ Mock river ecosystem

Students will code "salmon" to swim through an ecosystem filled with natural and human caused barriers.

Next Generation Science Standards (NGSS)

Science

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment

Computer Science

1B-AP-10. Create Programs that include sequences, events, loops and conditions.

Objective

Students will: 1) use **block code** to program **robots**, move them in a river stream from point A to point B, and be able to reiterate how coding robots could lead to a profession as an ecologist who studies salmon habitat.

Suggested Procedure

1. Explain salmon migration and barriers they may come across. Tell them they are going to be coding robots because some robots are used to study salmon habitat and because their robots will be used to imitate salmon **migration**.
2. Demonstrate how to use Sphero (aim, speed, heading, seconds) by coding it to roll forward and then back with the roll command.
3. Have the students use the roll commands to make the Sphero move through the mock river toward the **esturary**, pretending that the Spheros are salmon trying to migrate to or from their breeding habitat.
4. Tell them that they have **coded** like an **ecologist** who uses **drones** to study **ecosystems**.

Pre-Work: Introduction to block coding

Subject: Computer

science **Concept:** Coding

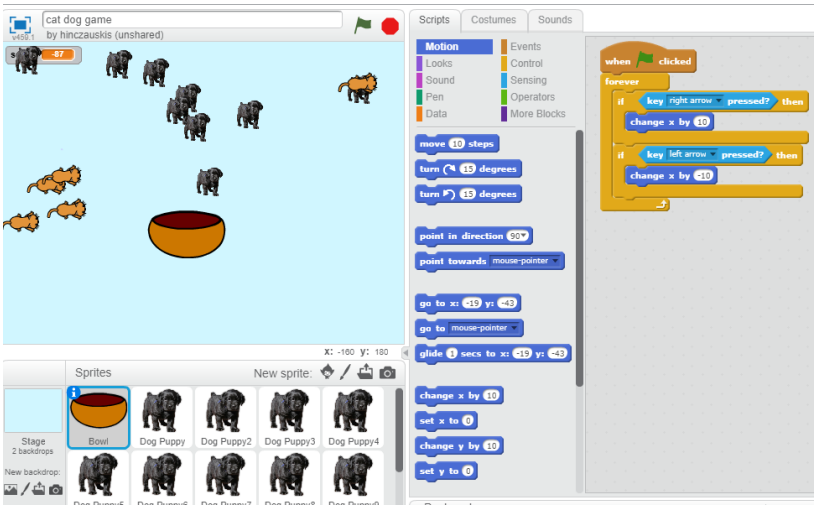
Key Vocabulary
- Block Coding

Skills
- Making models

Materials

□ Computer
□ Internet access

Students will use a **block coding** system called Scratch to prepare to code the salmon bots.



Next Generation Science Standards (NGSS)

Computer Science
1B-AP-10. Create Programs that include sequences, events, loops and conditions.

Objective

Students will learn and practice block coding using scratch

Suggested Procedure

1. On the Scratch home page, click create.
2. Click tips
3. Click on the top option that says “Getting Started with Scratch” and follow the step-by-step instructions to make your own program.
4. See if you can modify your code to create your own personal program. You can even make games.

Pre-Work: Salmon Migration & Human Interaction

Subject: Science

Concept: Survival

Key Vocabulary

- Ecosystem
- Ecology
- Barriers
- Estuary
- Survival rate
- Migration
- Life cycle

Skills

- Differentiating natural and human caused barriers
- Math

Materials

- □ Salmon ecosystem
- □ 100 little salmon
- □ Bag with salmon deaths

Students will play a game to explore salmon survival rate from natural and unnatural causes.

Next Generation Science Standards (NGSS)

Science

5-LS-2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-ESS3-A. Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

Objective

Students will recognize the salmon life cycle, survival rates, and migration barriers.

Suggested Procedure

See following page

Adapted from page 4 of: http://www.naturesweb.ie/Spring%20Newsletter%202006.pdf#search=%22during%20the%20winter%20salmon%20gather%20in%20pairs%22

Salmon are born in a river **ecosystem** and eventually make their way to the ocean (using an **estuary** as an adjustment zone). On their long journey to and from the ocean salmon have a lot of **barriers**. Out of all the salmon that make this journey, about 2 % live to adulthood (http://www.5counties.org/salmoncycle.htm). Some of these barriers are **human caused** and some are **natural**. Can you think of any natural or human caused barriers that salmon may encounter?

Human caused	**Natural**
Dams	Birds
Fishermen	Bears
Oil spills	Bigger fish
Garbage pollution	Marine animals
Logging	Waterfalls
Erosion	Diseases
Run off	
Traffic	

Is there anything we can do do to help protect salmon and their habitat?
Yes, we can help protect and restore steams that have been logged out and eroded, find ways that increase fish survival when faces with dams, decrease pollution and fishing efforts, and educate others about salmon.

Materials
Large salmon ecosystem poster tapped to the wall
100 little salmon to tape on the ecosystem Each salon represents 50 individuals = 5000 total
Box or bag with lists of salmon deaths (human caused and natural) Students have to convert the following salmon deaths. Round to the nearest whole number.
-500 eggs were not fertilized and therefore cannot develop
Take 500 and divide 50 (500 / 50 = 10) Remove 10 salmon
-60 eggs are dead when they were crushed from gravel by tractors eroding the shore Remove 1
-A new apartment complex washed mud and debris into the river suffocating 900 Remove 18
-300 alevins were weak and died Remove 6
-500 fry were eaten by bigger fish in the river Remove 10
-Birds ate 40 Remove 1
-260 salmon died due to pollution Remove 5
-Once in the ocean 1450 were eaten by larger fish Remove 29
-Seals had 100 salmon meals Remove 2
-590 salmon were caught by fishermen Remove 12
-Land mammals ate 80 salmon on their trip back up the river Remove 2
-40 salmon were physically exhausted from fish ladders and died Remove 1
How many salmon are left in the ecosystem? 3 (x 50 = 150) 150 out of 5000 survived. What is the **survival rate** (150 / 5000 x 100 = 3%)

Draw on the board or have a big print out of a river ecosystem all the way to the ocean. Have barriers such as oil spills, fishermen, predators and dams. Each salmon actually represents 50 salmon so kids will have to do a little math to figure out how many salmon they have to remove from the ecosystem every time they pull out a death from the bag

How many salmon were killed by natural causes? 2970
How many salmon died due to human causes? 1850