Haliburton-Muskoka-Kawartha children's water festival

Water Week

In-Class Modules for Teachers

Friends of Ecological and Environmental Learning

"Living, Learning, Growing"

Friends of Ecological and Environmental Learning

"Living, Learning, Growing"

These modules have been adapted from traditional water festival activities to engage students at school in the spirit of the Haliburton-Muskoka-Kawartha Children's Water Festival. It is the hope of the HMKCWF committee, that you and your students have fun, get outside, and make a splash in water education!

Thank you to all of our funders and supporters
who make water and climate change education possible through the

Haliburton-Muskoka-Kawartha children's water festival

Specifically in the production of this document, thank you

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Lesson Plan Index

Friends of Ecological and Environmental Learning

"Living, Learning, Growing"

Beaver Fever / Concentration

This activity is part of the ***Water Protection*** theme.

Beaver Fever / Concentration

This activity is part of the ***Water Protection*** theme.

What's the Purpose of this Activity?

Students will be introduced to the unique adaptations of the North American Beaver (Castor canadensis) to their aquatic environment. Students will investigate the interdependence of these large rodents to their aquatic habitat with the use of metaphors, pictures and discussion.

Estimated Time Requirement

Allow approximately 30 to 45 minutes for this activity.

Key Messages

- Beavers are industrious creatures and are well adapted for their role as an aquatic mammal.
- Beavers are considered furbearers and are the largest North American rodent.
- Beavers play an important role in the dynamics of the forest ecosystem.

Materials

20 Beaver Metaphor Photo Cards – printed in colour if possible

Goal

Children will learn about beavers and their aquatic adaptations.

Delivery of Activity

1. Give a brief introduction to the beaver using some of the background beaver facts (found in Additional Background Information) and lead into its unique environment that it creates.
   - Beavers create their own aquatic environment/habitat by stopping moving water with a dam and creating a pond.
   - This provides them safety/protection

   Beavers are very well adapted for their aquatic habitat

2. Ask students, ***"What is an adaptation?"***
   - An adaptation is a change or adjustment that has occurred over time to a species behaviour, physical appearance or structure to help it become more suited to an environment.

3. Explain that they will be looking at some pictures that seem to have nothing at all to do with beavers, but they do! These are metaphors.
   Ask students, ***"What is a metaphor?"***
   - A metaphor is something (a word or object) that represents or is a "substitution" for another idea or object.
   - It is a comparison.

4. Hold up the Beaver Metaphor Photo Cards from this activity and ask the students, ***"What does this have to do with beavers?"***
   - Also, prompt them to think how this may help beavers in/with their aquatic lifestyle to initiate more discussion
   - Give students a bit of time to come up with ideas for each object/picture/metaphor that you hold up
   - Then go into the explanations using the identified beaver photo.
   - As a group, go over one metaphor & photo together so students better understand the activity before you start.

   You may find that it helps going in the order suggested.

Photos & Explanations

1st Photo **Carpenter's Chisel** (photo page 1)
Explanation *Show* **Beaver Teeth** (photo page 2)
Associated Facts

- Beaver teeth continuously grow.
- Beaver teeth have an orange pigment on the outside which is a harder enamel than the white enamel on the inside.
- Therefore, as beaver chew into the wood of trees, the inside of their teeth wears faster than the outside, forming a chisel like shape.
- A perfect woodworking tool to help them fell trees!

1st Photo **Pelt & Water Drops** (photo page 3)
Explanation *Show* **Beaver** (photo page 4)
Associated Facts

- Beavers produce oils which they groom into their fur.
  - Beavers spend a lot of time grooming themselves to keep the oil dispersed throughout their pelt.
- Oil helps to waterproof things including the beaver's guard hair (which is the longer hairs of their pelt).
- This waterproofing keeps the underfur (the fuzzy fur close to the skin) dry.
- The underfur keeps the beaver nice and warm, like a good pair of long johns!

1st Photo **Swim Fin** (photo page 5)
Explanation *Show* **Beaver's Hind Foot** (photo page 6)
Associated Facts

- The hind webbed feet of beavers help them swim by propelling/pushing them through the water.
- Just like when we swim with swim fins on!

1st Photo **Comb** (photo page 7)
Explanation *Show* **Beaver** photo (photo page 8)
Associated Facts

- Their webbed feet not only help them swim, but their hind foot also has a specialized split toenail on the 2nd toe.
- This split toenail acts like a comb that they use to groom their fur, keeping tangles out and helping to disperse the oil!

1st Photo **Steering Wheel** (photo page 9)
Explanation *Show* **Beaver** photo *and point to tail* (photo page 10)
Associated Facts

- The tail acts like a rudder of a boat when swimming, helping to steer the animal in the direction it wants to go.
- This is especially helpful when it is dragging branches through the water.

1st Photo **Whistle** (photo page 11)
Explanation *Show* **Beaver** photo *and point to tail* (photo page 12)
Associated Facts

- The tail is also used to warn others, like blowing a whistle to draw/get attention.
- The beaver will slap it on the water to warn others of danger.

1st Photo **Cooler** (photo page 13)
Explanation *Show* **Beaver** photo *and point to tail* (photo page 14)
Associated Facts

- The beaver's tail also serves as a fat storage depot in fall and winter.
- Like us storing food in a cooler!

1st Photo **Swim Goggles** (photo page 15)
Explanation *Show* **Beaver** photo *and point to eyes* (photo page 16)
Associated Facts

- Beavers have a transparent (see through) membrane which covers and protects the eyes while they swim underwater.

1st Photo **Sink Plug** (photo page 17)

Explanation *Show* **Beaver** photo *and point to its mouth* (photo page 18)

Associated Facts

- There is a furry patch inside the mouth, at the back, which closes when they are carrying branches or eating under water.
- This prevents them from swallowing water!

Now point at the ears and nose

Associated Facts:

- Beavers also have valves in their ears and nose which close while under water to keep water out!

Photo **"No Trespassing" sign** (photo page 19)

Explanation *Show* **Beaver hind/tail photo** *and point to rump* (photo page 20)

Associated Facts

- Beavers are territorial and deposit a scent from their castor glands to warn other beavers to stay away.
- It is a way to protect their resources such as food, to help them survive.
- The castor gland is found in both males and females near their rump area.

Finish the session by emphasizing that all these adaptations aid the beaver in getting the most out of its habitat and living in an aquatic environment. These adaptations allow the beaver to be very good at living a watery lifestyle!

Beaver Concentration

Once you have gone through all the adaptations and metaphors, put all the pictures upside down in a 4X5 grid across the floor. Students pick one card. They then must select another card and try to match the first one they selected. If they get a match, they get to pick again.

With this game, it is possible that 2 different beaver photos may be used to show the same feature. So, if the student can justify the photo for the match, allow it. It is possible at the end of the game that some of the photos may not match exactly.

Follow Up Activities

Here are some links to a few Beaver related crafts for students to do in class. As they work on the projects, remind them to think about the beaver's special adaptations and include those in the projects if they can. For example, encourage them to colour the front teeth yellow.

Paper Bag Beaver Puppet (K to Grade 1)
https://moosemischief.com/blogs/news/make-a-beaver-sack-puppet

Toilet Tube Roll Beaver Craft (Grade 1 to 4)
https://www.dltk-kids.com/animals/mbeaver.html

Make a wetland mural!

- Students can make a beaver model or the class could create a wetland mural by choosing different wetland animal models

https://www.ducks.ca/resources/educators/paper-animal-models/

Extension: have students identify the adaptations their wetland critter has and come up with fun metaphors for those adaptations

Book Corner

Suggested books:

- Beaver by Gail Gibbons, Holiday House Publishing.
- Beaver Pond, Moose Pond by Jim Arnosky, National Geographic Children's Books

Additional Background Information

- The scientific name for the beaver here in Ontario (North America) is Castor canadensis
- Trees up to 15cm can be cut/chewed down within 50 minutes.
  - But beavers can fell trees up to 40cm in diameter.
- The thickest tree cut by a beaver was recorded to be 1.2m wide (4ft)
- Average number of trees cut by an adult beaver in one year = 216
- Why do beavers cut down trees?
  - To obtain leaves, buds and bark for food
  - To obtain branches for the construction of dams and lodges
- The largest rodent of North America
  - Adult body length = 60-90cm (2-3ft)
  - Adult body length including tail = 1.3m
  - Adult weight = 18-36Kg (40-80lbs)
  - Tail length = 23-33cm (9-13in)
- Heaviest beaver recorded = 50Kg (100lbs)
- The beaver's tail is covered with leathery scales and sparse, coarse hairs.
  - A tail of a large beaver can be up to 30cm long, 18cm wide and 4cm thick.
- The front feet are small in comparison to its hind feet and do not have webbing.
  - The toes have long sharp claws suited to digging.
  - These paws are very dexterous, almost like hands, and with them the beaver can hold and carry sticks, stones and mud.
  - These paws allow the beaver to work objects into their dams and lodges and pack mud around them.
- Beavers live in colonies.
  - Consisting of 4-8 related individuals
  - This colony is normally dominated by a female.
  - The male and female of a colony stay together until one dies, up to 20 years.
- Calls
  - Mumbles
  - Low whines
  - Hiss or nasal blowing when angry
  - Cry when frightened
- Signs
  - Will leave "mud pies" on their trails on which they leave paw prints and the oily deposit of castor oil.
    - This is a physical communication marker that tells others they are around.
- Food - Summer
  - Aquatic vegetation:
    - Water lilies
    - Arrowhead
    - Watercress
    - Duckweed
    - Yellow arum
    - Cattails
    - Sedges
  - Terrestrial (land) vegetation:
    - Grasses
    - Leaves
    - Berries
    - Ferns
- In the summer, a beaver eats an average of 0.7Kg (1.5 pounds) of food a day.

- Food - Winter
  - Beavers cache food for the winter near their lodges
    - A cache that feeds a colony of beavers for a winter consists of about 680Kg (1,500 pounds) - 1134Kg (2,000 pounds) of edible bark, twigs and leaves
  - Bark and twigs of aspen, birch, poplar, mountain maple, willow
  - In the winter, a beaver eats an average of 1Kg (2.2 pounds) of food a day.
- Average lifespan = 4-5 years
  - Up to 16 years in the wild and 23 years in captivity
- Predators:
  - Wolves
  - Bears
  - Lynx
  - Otters
  - Coyotes
  - Wolverines (in northern ON)
- Capacity to hold breath underwater for up to 15 minutes!
- Average swimming speed = 4km/hr (2.4mph)
  - But can swim up to 10km/hr (6mph)
- Age of oldest beaver fossils = 12 million years old
- Estimated population in ON =1.5-2 million
- The beaver is an active animal and is one of the few animals besides humans that are capable of altering its environment to create and maintain a suitable habitat for itself!

We would really like to hear back from you!

Here are some suggestions how:

1. Take a photo of your students with their crafts or the class wetland mural and send back to us.
2. Send along some of your student's wetland critter adaptations and metaphors.
3. Have your students write a short letter or story about, or draw a picture of, what they learned about beavers and send back to us.
4. Fill out the feedback form found at the end of this module.

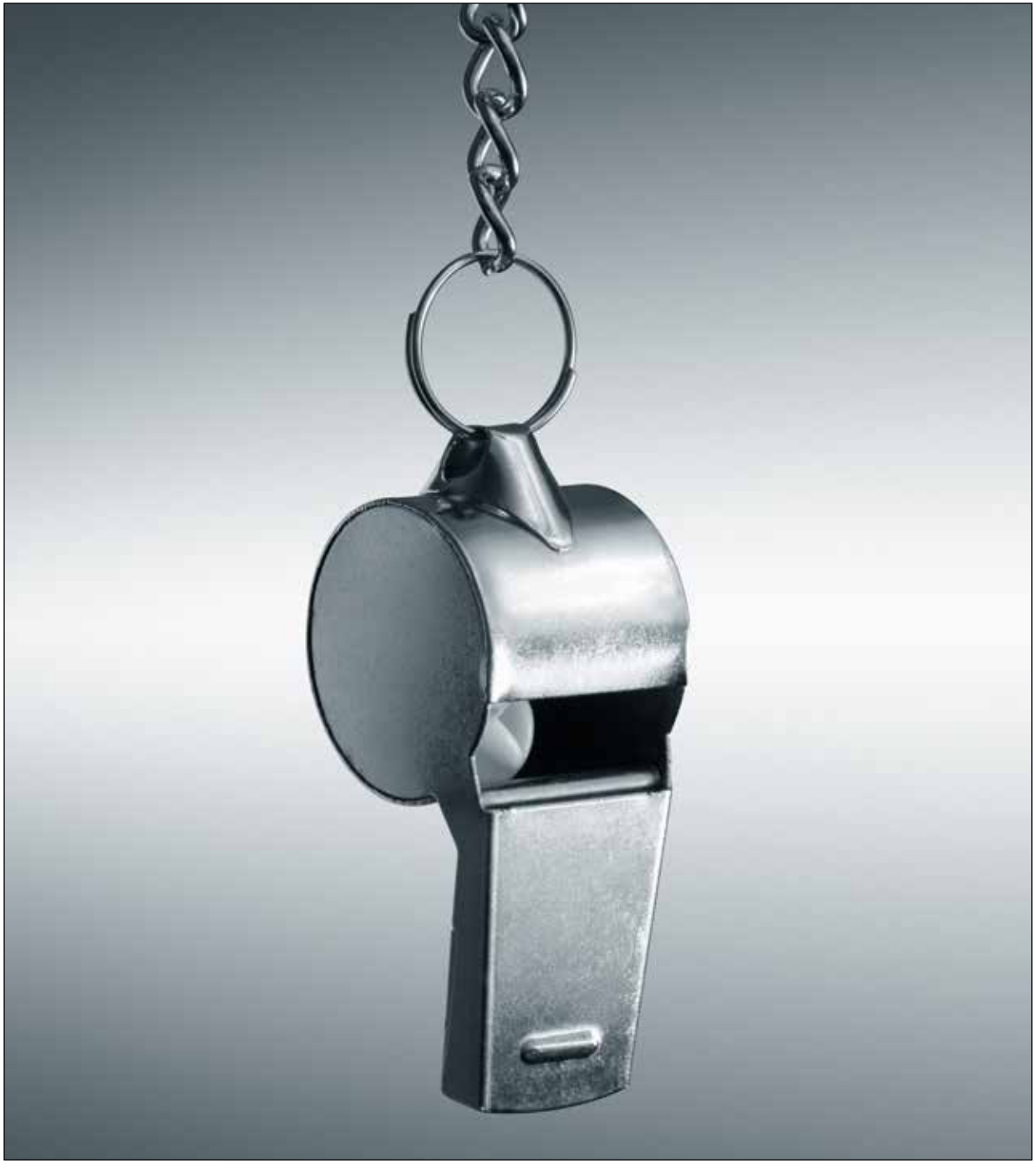
Beaver Metaphor Cards

Print the following pages


Oil


Right Hind Beaver Foot
Innermost toe
Second toe
True nail
Additional horny growth
Janet Pesaturo


E
F
350.8
km
15304
180
200
220
240
260




DANGER
NO
TRESPASSING

Feedback Form

Module Title: Beaver Fever/Concentration Date: _____

School or Organization Running the Activity: _____

Grade: _____ Number of Students _____

	Strongly agree				*Strongly disagree*
1. The content was easy to understand.	1	2	3	4	5
2. The preparation for the module was simple.	1	2	3	4	5
3. The content fit within the curriculum.	1	2	3	4	5
4. The content was age appropriate.	1	2	3	4	5
5. The students were engaged.	1	2	3	4	5
6. The information was presented in a fun and informative way.	1	2	3	4	5
7. The students learned something new.	1	2	3	4	5
8. I will do other HMKCWF modules from this resource.	1	2	3	4	5

9. Given the topic, was this module: ☐ Too short ☐ Right length ☐ Too long

10. In your opinion, was this module: ☐ Introductory ☐ Intermediate ☐ Advanced

11. What did you most appreciate/enjoy/think was best about the module?
Any suggestions for improvement?

_____

_____

_____

_____

_____

_____

Thank you!

Please return this form to the HMKCWF coordinator at info@hmwaterfestival.ca

Blooming Jeopardy

This activity is part of the ***Water Protection*** theme.

Blooming Jeopardy

This activity is part of the ***Water Protection*** theme.

What's the Purpose of this Activity?

Blue Green Algae (bacteria) naturally exists in our waters but occurrences of it seem to be increasing. This fun, team "game show" activity will help students understand more about this water inhabitant, the effect of blooms and what we can do to help decrease them from happening.

Estimated Time Requirement

Allow approximately 45 minutes for this activity.

Key Messages

- Blue Green Algae is a naturally occurring bacteria.
- These bacteria live in water and make food similarly to plants (by photosynthesis).
- Blue Green Algae blooms can cause problems.
- Humans can help decrease Blue Green Algae blooms

Materials

- Unique noise makers (1 per group, 1-2 extras)
- Printed Jeopardy cards and posters attached at the end of these instructions
  - Print the Jeopardy cards double-sided.
  - There will be 20 double-sided pages/ cards and 1 final Jeopardy page/card
  - 2 posters
    - POSTER A – Blue Green Algae Bloom
    - POSTER B- Blue Green Algae in the Great Lakes
- Timer

Goal

This activity forms the main teaching part of the module and will inform students about Blue Green Algae and some other plant processes.

Activity Setup

1. Tape the Jeopardy pieces up on a board or wall in a traditional Jeopardy grid pattern, with the topics along the top and the different values in columns down the board or wall.
2. Organize students into groups. Rearrange desks if required so they can work together as a team.
3. Give each team a unique noise maker

- This activity runs like the game show, Jeopardy.
- Depending on the size of the group, you can divide into 3 or 4 teams.
  - There should be 3-4 students on each team.

1. To begin, show students Poster A and Poster B.

   Q: "Do you know what this is?"

   A: It is a Blue Green Algae bloom. A bloom is just a fancy word for scum. Have you heard of Blue Green Algae before?

   B. These are the Great Lakes and you can see the extent of the Algae bloom on the Great Lakes.
   - Ask students to point to the Algae blooms on the poster. The algae bloom is where the lake appears lighter.

   Q: How much do you know about this Blue Green Algae stuff? … let students answer
   - "Well, we are going to find out! It is time for Blooming Jeopardy!"

2. Divide students up into smaller groups

3. Explain to the students how they are going to play the game!

- Team#1 will choose a topic category":
    - From: "It's a Plants Life!"; "What Is It?"; "This & That!"; "What Can We Do?" or "Why We Need to Know!"
- Then they choose a point category:
    - 100, 200, 300, 400 or 500
- The team chooses one person to say … **We will take "What is It?"for 200 please!**
- All teams give the team noise maker to one of the players, this person is the designated "honker" and holds the noise maker.
    - For each turn, the noise maker is passed along to the next person, so everyone gets a turn to "make some noise" for the team!
- Explain that they only have 5 seconds to make their choice, otherwise they are disqualified from that round and the choice goes to Team#2, then Team#3 … and so one.
- Once the team has decided on their question, pull the card off the board and read the question found on the back.
    - The team must wait for the entire question to be read before answering. You can indicate you have finished the entire question by saying … **"What is your answer?"**
- Once the facilitator has asked "What is your answer?" the team that chose the question, gets first chance to answer. You can set a time limit for the team to provide their answer by.
    - If the team is correct, they get the indicated number of points.
        - Record on a chalkboard, whiteboard or piece of chart paper. Or you can give each team a sheet of paper to keep track of their "won" points on then add them up at the end of the game.
        - If the team is incorrect, the other teams have a "Noise off"
        - The other teams are invited to make their noise after you finish saying **"Noise Off"**
        - The first team to make their noise, is then able to try and answer the question.
    - If the team is correct, they get the indicated number of points.
        - Record on a chalkboard, whiteboard or piece of chart paper. Or you can give each team a sheet of paper to keep track of their "won" points on then add them up at the end of the game.
        - If the team is incorrect, then there is another "Noise off" with the remaining teams.
    - Continue until the correct answer is given.
    - If no teams give the correct answer, then read out the right answer and no points are given.
- In the actual game, participants must answer in the form of a question. We have not set it up this way, but older students may enjoy the additional challenge of playing like they do on the game show.
- Now, onto the next question!
    - If a team gives the correct answer, they choose the next category …
    - If no team gave the correct answer, you allow the next team in line to choose the category
        - For example, if Team#1 started, and no correct answers were given, then Team#2 starts the next round … and so on!
- Play until you have gone through all questions … this will depend on timing and the group.
- When all other questions have been played through, then it is the **Final Jeopardy Round.**
    - You may opt to take a break or breaks along the way and go back to the game another time.
    - Instruct that all teams participate in this round
    - Read the question and the first team to "make noise" gets to answer
    - If they get it right, they get a bonus 1000 points
    - If they do not get it correct, then you read the answer, and no one gets the bonus points.
- Quickly add up teams points and congratulate them all for playing "Blooming Jeopardy"!

Additional Background Information:

Topic Categories:

Topic 1 – It's a Plant's Life!
- General questions on plants.

Topic 2 – What Is Blue Green Algae?
- Introduction to Blue Green Algae.

Topic 3 – This & That!
- Miscellaneous facts related to Blue Green Algae.

Topic 4 – What We Can Do!
- Prevention

Topic 5 – Why We Need to Know!
- Safety concerns.

Question Cards:
- *** indicates the correct answer.

Clean Up Procedures:
- Collect all category cards and arrange in order (100's together, 200's together, etc.)
- Gather all noise makers.

Follow Up Activities
Here are some links to a few water protection related crafts and activities for the students. As they work on the projects, remind them to think about protecting water.

Make Slime (Blue Green Algae).
- This is the standard slime recipe:

https://www.wikihow.com/Make-Slime-with-Borax

- Here is an alternative recipe that does not require Borax:

https://www.wikihow.com/Make-Slime-Without-Borax

- Here is an alternative recipe that does not require glue and some may find easier:

https://www.wikihow.com/Make-Slime-Without-Glue

Water Protection Colouring Pages:
https://coloringhome.com/pollution-coloring-pages
https://betterlesson.com/lesson/resource/3159332/water-pollution-coloring-pages-jpg

Book Corner
Suggested books:
- Nibi Emosaawdang / The Water Walker Paperback – Picture Book, by Joanne Robinson, Sept. 10 2019
- Nibi's Water Song by Sunshine Tenasco (Author), – Aug. 1 2019

We would really like to hear back from you!
Here are some suggestions how:
1. Take a photo of your winning Jeopardy Team.
2. Have your students write a short letter or story about, or draw a picture of, what they learned about water protection and send back to us.
3. Fill out the feedback form found at the end of this module.

Print the following pages double-sided

BLOOMING JEOPARDY! GAME CARDS

It's a Plant's Life

$100

BLOOMING JEOPARDY! GAME CARDS

Q. Plants use the energy of the sun to make their own food. This process is called . . .

1. Photography
2. Symbiosis
3. Photosynthesis ***

A. Photosynthesis! Symbiosis is when two different kinds of organisms or living things have a close relationship.

BLOOMING JEOPARDY! GAME CARDS

It's a Plant's Life

$200

BLOOMING JEOPARDY! GAME CARDS

Q. Photosynthesis can be broken down into 2 smaller words or parts: “photo” meaning light and “synthesis” meaning, putting together. We know it is a process which produces food for the plant, but what is needed for this food to be made?

a) Water
b) Sunlight
c) Carbon Dioxide
d) All of the above ***

A. Sunlight is absorbed by the green chlorophyll in the leaves (that is why leaves are green). Carbon dioxide is absorbed through small pores in leaves and water is absorbed by the roots.

BLOOMING JEOPARDY! GAME CARDS

It's a Plant's Life

$300

BLOOMING JEOPARDY! GAME CARDS

Q. True or False:

To make their food, water plants get the needed carbon dioxide (CO_2) from the water they live in.

a) True***
b) False

A. CO_2 is found in water in very small bubbles. Similar to the bubbles found in soda pop, but even smaller!

BLOOMING JEOPARDY! GAME CARDS

It's a Plant's Life

$400

Q. True or False:

Algae belongs to a group of simple, plant-like organisms that do not have roots or leaves.

a) True***
b) False

A. Algae belongs to a group of simple organisms called protists (Kingdom: Protista). Protists are single celled organisms with a nucleus. Algae does not have roots, leaves, or stems.

BLOOMING JEOPARDY! GAME CARDS

It's a Plant's Life

$500

Q. True or False:

Algae produce more oxygen (as a by-product of photosynthesis) than all plants combined.

a) True***
b) False

A. Algae are the most important photosynthesizing organisms on Earth!

What is Blue Green Algae?

$100

BLOOMING JEOPARDY! GAME CARDS

Q. True or False:

Blue Green Algae is an algae?

a) True
b) False ***

A. Blue Green Algae is a bacteria! Another name for Blue Green Algae is Cyanobacteria.

BLOOMING JEOPARDY! GAME CARDS

What is Blue Green Algae?

$200

BLOOMING JEOPARDY! GAME CARDS

Q. True or False:

Blue Green Algae live in water and make food like plants do, using photosynthesis

a) True ***
b) False

A. Blue Green Algae are bacteria that lives in water and makes food like plants do, using photosynthesis.

BLOOMING JEOPARDY! GAME CARDS

What is Blue Green Algae?

$300

Q. True or False:

Fossils of Blue Green Algae are among the oldest fossils of any life form found on Earth and date back to 3.5 billion years.

a) True***
b) False

A. The oldest known fossils are Blue Green Algae fossils from Archaean rocks of western Australia.

What is Blue Green Algae?

$400

BLOOMING JEOPARDY! GAME CARDS

Q. True or False:

Blue Green Algae are found naturally in all types of water: ponds, rivers, lakes and streams, but is often too small to see.

a) True ***
b) False

A. Blue Green Algae can be so small that they can only be seen through a microscope.

What is Blue Green Algae?

$500

BLOOMING JEOPARDY! GAME CARDS

Q. What colour is Blue Green Algae?

a) Brown
b) Blue/Green
c) Orange
d) Red
e) All of the above***

A. "e" Although the name, Blue Green Algae, makes you think it should only be blue, green or turquoise, Blue Green Algae can also be brown, orange, red and dark purple!

BLOOMING JEOPARDY! GAME CARDS

This and That

$100

Q. True or False:

Algae produce flowers on the surface of the water and this is called algae blooms.

a) True
b) False ***

A. Algae is a type of plant-like living organism but is different from plants. They do not have stems or leaves and their roots are different from plant roots. Algae also do not produce flowers or seeds!

This and That

$200

Q. Normally, Blue Green Algae are not visible in water but populations can grow very quickly causing large masses or scum on and in the water body. This large mass or scum is called . . .

a) A soup
b) A bloom ***
c) A clump

A. Blooms usually occur in late summer and early fall.

This and That

$300

Q. Conditions which promote blooms of Blue Green Algae are:

a) Shallow water
b) Slow moving water
c) Warm water
d) High nutrients such as phosphorous and nitrogen
e) All of the above ***

A. Blue Green Algae blooms can be caused by runoff from agricultural, urban and storm water as well as leaching from septic systems.

BLOOMING JEOPARDY! GAME CARDS

This and That

$400

Q. What is a toxin?

a) A substance created in a lab that is harmful if swallowed
b) A substance made in nature that affects normal functions of other organisms ***
c) A natural substance found only in plants

A. A toxin is a natural substance/chemical produced by a living thing that alters the normal function of another organism.

BLOOMING JEOPARDY! GAME CARDS

This and That

$500

Q. True or False:

Toxin, poison and venom all mean the same thing?

a) True

b) False ***

A. Toxin, poison, and venom are similar but are not the same! Poisons and venoms are toxins. Poisons are ingested (like some amphibian secretions are deadly or taste really bad if eaten) and venoms are injected (like a snake will bite and inject its venom).

BLOOMING JEOPARDY! GAME CARDS

What Can We Do?

$100

Q. True or False:

Phosphate is a leading chemical in Ontario contributing to Blue Green Algae blooms and is found in many of our cleaning products.

a) True ***
b) False

A. Use phosphate free detergents, personal care and household cleaning products.

What Can We Do?

$200

Q. True or False:

Garden and lawn fertilizers are filled with nutrients such as nitrogen and phosphate to help lawns grow. If they run into the water, they also help Blue Green Algae to grow too!

a) True ***
b) False

A. Fertilizers are meant to help plants grow; therefore they will help water plants grow too . . . including Blue Green Algae! Avoid using fertilizers on gardens and lawns close to water bodies.

BLOOMING JEOPARDY! GAME CARDS

What Can We Do?

$300

BLOOMING JEOPARDY! GAME CARDS

Q. If you live on a lake or on a river front, you should . . .

a) Clear all shrubs and trees and plant grass down to the water's edge
b) Replace all shoreline vegetation with sand
c) Maintain a natural shoreline with shrubs and other shoreline plants ***

A. Natural shorelines with shoreline, or riparian, vegetation act as a buffer and slows down runoff and helps absorb nutrients.

What Can We Do?

$400

BLOOMING JEOPARDY! GAME CARDS

Q. Polluted water from a farmer's field can be reduced by . . .

a) Minimizing fertilizer use
b) Planting and maintaining vegetation along waterways
c) Keeping livestock out of waterways
d) All of the above ***

A."d" - Fertilizer and manure contains nutrients and organic material. Nutrients such as organic phosphorus help plants grow, including algae! By reducing the amount of nutrients entering the water can decrease the growth of algae, including Blue Green Algae.

BLOOMING JEOPARDY! GAME CARDS

What Can We Do?

$500

BLOOMING JEOPARDY! GAME CARDS

Q. True or False:

An improperly installed or broken septic system may leak chemicals and nutrients into the water which may cause Blue Green Algae.

a) True ***
b) False

A. Septic systems should be checked regularly to make sure they are functioning properly.

Why We Need to Know!

$100

BLOOMING JEOPARDY! GAME CARDS

Q. True or False:

All Blue Green Algae blooms produce toxins and are dangerous to our health?

a) True

b) False ***

A. Not all Blue Green Algae blooms are toxic, in fact most are harmless. There are many different types of these bacteria and most do not produce toxins. **BUT** a few produce toxins that can be harmful to people and pets! Unfortunately, you can't "see" the toxins and it's not possible to know if it will hurt you. Therefore, it is important to report and stay away from any Blue Green Algae blooms.

BLOOMING JEOPARDY! GAME CARDS

Why We Need to Know!

$200

Q. True or False:

You can see and smell the toxins produced by Blue Green Algae.

a) True
b) False ***

A. No! You cannot see, smell or taste the toxins produced by Blue Green Algae!

Why We Need to Know!

$300

Q. True or False:

Swimming in Blue Green Algae blooms can cause ear, eye and skin reactions?

a) True ***
b) False

A. Some species of Blue Green Algae produce harmful toxins which when eaten, inhaled, or come into contact with your skin can cause harmful reactions. When you swim in affected water you expose your skin, eyes and ears to the Blue Green Algae and this can cause irritations and health issues.

BLOOMING JEOPARDY! GAME CARDS

Why We Need to Know!

$400

Q. True or False:

Any toxins in water with Blue Green Algae are killed if you boil the water long enough.

a) True
b) False ***

A. Boiling water kills microorganisms but not toxins. Never drink water from a source which has Blue Green Algae! Do not cook or clean dishes with the water either. You can't see or smell any toxins which may be harmful to you therefore it is not possible to know if that Blue Green Algae is producing any dangerous toxins. Therefore, be safe and stay away!

BLOOMING JEOPARDY! GAME CARDS

Why We Need to Know!

$500

Q. True or False:

Toxins from Blue Green Algae blooms can cause serious harm to pets and livestock if they drink from water sources with Blue Green Algae blooms.

a) True ***
b) False

A. Just like people, animals can be affected by contaminated water. If animals ingest contaminated water it can cause serious illness and sometimes death.

Print the following page single-sided

BLOOMING JEOPARDY! GAME CARDS

FINAL JEOPARDY QUESTION

$1,000

Q. If you see that your lake has a thick, coloured scum on top, you should...

a) Avoid going or playing in the water.
b) Keep your pets away from the water.
c) Tell an adult.
d) Report to the Ontario Ministry of Natural Resources.
e) All of the above. ***

BLOOMING JEOPARDY! GAME CARDS

Print large or 1 per group if possible

BLOOMING JEOPARDY! POSTERS

POSTER A | Blue Green Algae Bloom

BLOOMING JEOPARDY! POSTER

POSTER B | Blue Green Algae in the Great Lakes

Algae can be seen where the colour is lighter.

From: Ontario Nature, Ontario Nature Blog, https://ontarionature.org/troubled-waters/ access on February 14, 2021

BLOOMING JEOPARDY! POSTER

Feedback Form

Module Title: Blooming Jeopardy Date: _____

School or Organization Running the Activity: _____

Grade: _____ Number of Students _____

	Strongly agree				*Strongly disagree*
1. The content was easy to understand.	1	2	3	4	5
2. The preparation for the module was simple.	1	2	3	4	5
3. The content fit within the curriculum.	1	2	3	4	5
4. The content was age appropriate.	1	2	3	4	5
5. The students were engaged.	1	2	3	4	5
6. The information was presented in a fun and informative way.	1	2	3	4	5
7. The students learned something new.	1	2	3	4	5
8. I will do other HMKCWF modules from this resource.	1	2	3	4	5

9. Given the topic, was this module: ☐ Too short ☐ Right length ☐ Too long

10. In your opinion, was this module: ☐ Introductory ☐ Intermediate ☐ Advanced

11. What did you most appreciate/enjoy/think was best about the module?
Any suggestions for improvement?

_____

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Thank you!

Please return this form to the HMKCWF coordinator at info@hmwaterfestival.ca

Migration Headache

This activity is part of the ***Water Protection*** theme.

Migration Headache

This activity is part of the ***Water Science*** theme.

What's the Purpose of this Activity?

In this activity, students role play as Canadian Geese. The game illustrates the challenges of migration and relying on wetland ecosystems. Students will learn how ecosystems can be damaged and improved through natural and human induced events.

Students use brainstorming skills and improve their knowledge of conserving wetlands for species.

Ensure that students understand the key terms highlighted in the activity by using them in several different contexts throughout the presentation.

Estimated Time Requirement

Allow about 30 minutes for this activity.

Key Messages

- Geese and other birds rely on wetlands as temporary habitat during their migration.
- Loss of a wetland may mean they can't find a place to rest or make into a home.
- There are healthy things we can all do to help create more wetlands spaces.

Materials

- 11 Hula Hoops
- 2 Posters - Poster A: Map of Canadian Goose Migration (Canada to United States) Poster B: The Riparian Edge

Goal

This activity will help students understand what happens when wetlands disappear from a location.

Delivery of Activity

Activity Set Up:

- Identify a playing area and place 6 hula hoops at one end and 5 at the other.
    - Place hula hoops in parallel rows about 15 metres apart.
    - Space hula hoops to avoid crowding.
    - One side of the playing field is Canada (North) with 6 hula hoops and the other side is the United States of America (South) with 5 hula hoops.
- Ask students to give their best goose impersonation (stretch neck, stick out rear end, tilt head back, flap arms like wings, make honking sounds).
    - You can have each student do this individually or have them do it all together and act like a flock!
- Now have students act like geese and do a "practice flight" around the area.
- Ask students what geese do in the winter (they migrate).
- Migration is also known as "flying south".
    - It is when birds head down to southern areas to live in the winter.

Playing the game:

* Numbers can be adjusted based on group size. This example is for 26-30 students.

- Explain to students that they are geese who migrate during the spring and fall.
- They live in wetlands.
    - For this game, each hula hoop represents one wetland and can sustain up to 5 geese living in it.
- Have all students "fly" to their home in Canada (on one side of the playing field) and stand in one of the wetlands.
    - Remind them of the maximum number of geese allowed in each wetland (5 geese/students).
- Now, have them "migrate" to the United States (the other side of the playing area).
    - When they migrate, they will realize that not all geese can fit into the wetlands.
    - Ask the students what happened? … there wasn't enough habitat for all geese.
    - Ask the students what they think happens to geese, or any wildlife, that cannot find habitat … they die.

• Explain to students that if they did not find a home when they migrated, they need to go to the goose graveyard and act out a dramatic death.

    - Let students have fun with their dramatic deaths!
    - Let those students in the Goose Graveyard know that they will be able to rejoin the game soon.

- Tell students that it is now time to migrate back to Canada BUT something has happened!
    - For reason X "(see reasons in Possible Reasons for Wetland Destruction section) one of their wetlands has been destroyed (take one hula hoop away from the other end of the playing area).
- Continue to "destroy" one wetland at a time (with explanation) for each migration until there is only one goose remaining
- Have students brainstorm what they can do to save or regenerate a wetland.
    - When they provide a good idea, add one hula hoop back and ask them to migrate.
    - Let them know that they now have extra space in their wetlands, and they can invite four "dead geese" to return to their home.
    - Continue this pattern until the students have provided many water and wetland conservation ideas and all geese are happily back living on the wetlands.

Possible Reasons for Wetland Destruction:

- A new housing development was built on top of a wetland and the developers had to drain the wetland.
- Bulldozers came and filled in the wetland to make a parking lot.
- There is a large oil spill that damaged a marsh.
- There have been several years with little rain, causing one wetland to dry up.
- A nearby neighbourhood uses a large amount of pesticides on their lawns and gardens. This damages the plant growth in the wetland, resulting in not enough food to support the geese.
- A golf course and hotel are built by a wetland. They change the surrounding vegetation to grass for runways that geese really like to forage on. The guests and golfers don't like this because of all the "poop'. The owners of the facility bring in methods to scare off the geese and they are unable to feed.
- Each one of you left your tap running while you were brushing your teeth and wasted enough water to dry up an entire wetland!
- Climate Change resulted in a massive hurricane which destroyed a wetland.

Possible Things Students Can Do:

** Encourage students to provide suggestions that THEY can do at home (as opposed to more large scale tasks such as "tear down the building on the wetland")

Some solutions you can encourage students to think about:

- Don't pollute.
  - Contaminants can run into wetlands and damage them.
- Encourage your parents to plant Ontario native flowers and shrubs
  - Non-native species are plants or animals which have been introduced from another Country.
  - Native species are plants or animals which have always lived in Canada. This is generally better for the environment, because they are used to the amount of rain and soil and animals in the area.
- Encourage your parents to use less pesticides
- Keep your pets under control. Pets can chase geese or poop in the water making it unsuitable for wildlife.
- If you have wetlands near your property or cottage, do not cut the grass right up to the wetland
  - Leaving a strip of native plants near the wetland edge acts like a filter for the wetland.
  - This is called a Riparian Edge. Show students Poster B: The Riparian Edge.

Follow Up Activities

Here are some links to a few Canadian Geese related crafts for students to do in class.

- Students can draw Canadian Geese flying, cut out and create a mobile.
- Goose Handprint Craft
  https://parentingpatch.com/g-goose-handprint-craft/

- Older students may be interested in Canada Goose Origami
  https://www.giladorigami.com/origami-database/Canada%20goose%20Roman%20Diaz

- Make a wetland mural!
  - The class could create a wetland mural by choosing different wetland animal models
    https://www.ducks.ca/resources/educators/paper-animal-models/

Book Corner

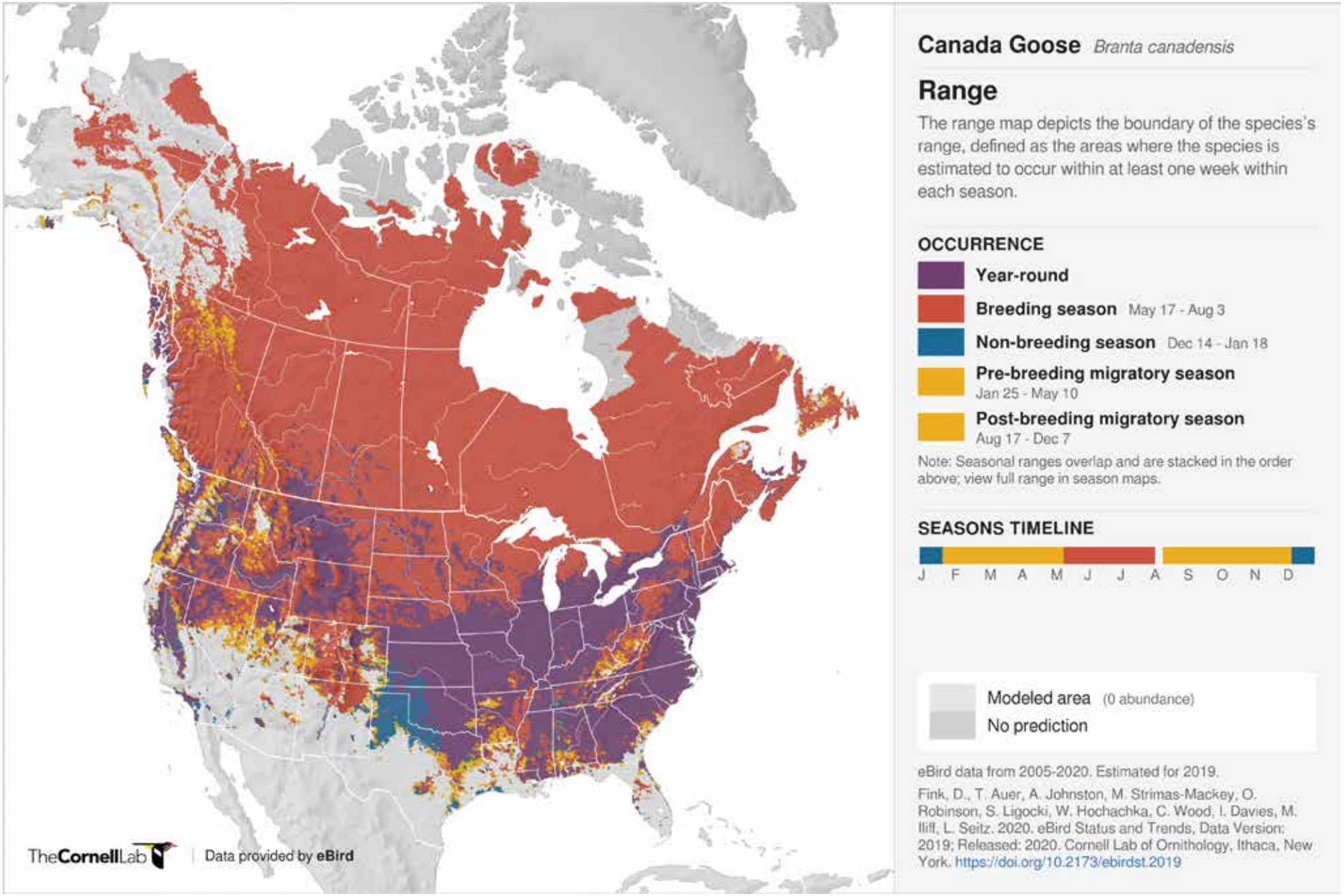
Suggested books:

- Migration by Gail Gibbons, published by Holiday House
- Discovering Nature's Cycles: Migration, by Robin Nelson, published by Lerner Publishing Group

We would really like to hear back from you!

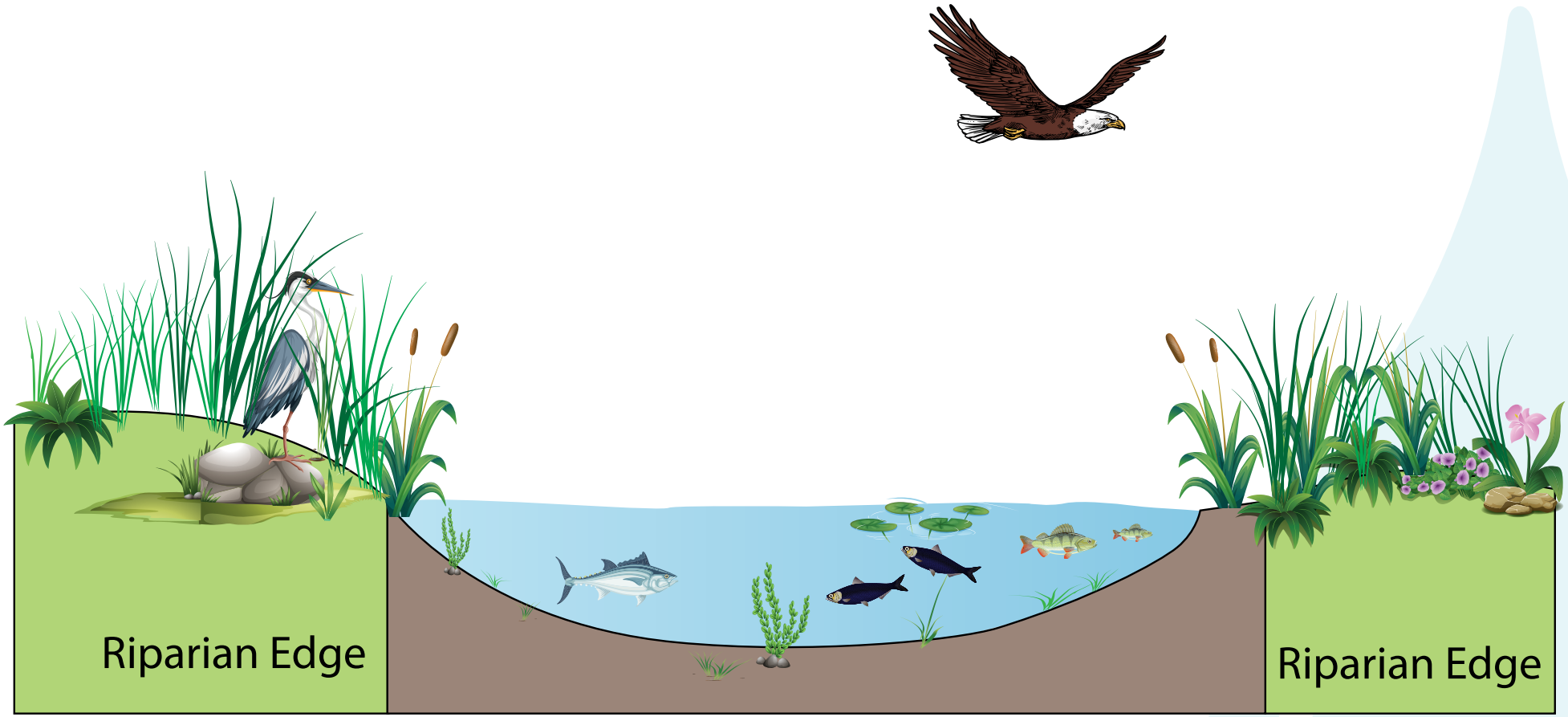
Here are some suggestions how:

1. Take a photo of your students with their crafts or the class wetland mural and send back to us.
2. Have your students write a short letter or story about, or draw a picture of, what they learned about the importance of wetlands and send back to us.
3. Fill out the feedback form found at the end of this module.



Poster A: Map of Canadian Goose Migration

https://ebird.org/science/status-and-trends



Poster B: Riparian Edge

Feedback Form

Module Title: Migration Headache Date: _____

School or Organization Running the Activity: _____

Grade: _____ Number of Students _____

	Strongly agree				*Strongly disagree*
1. The content was easy to understand.	1	2	3	4	5
2. The preparation for the module was simple.	1	2	3	4	5
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_____

_____

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Thank you!

Please return this form to the HMKCWF coordinator at info@hmwaterfestival.ca

Osprey Survivor

This activity is part of the ***Water Protection*** theme.

Osprey Survivor

This activity is part of the ***Water Science*** theme.

What's the Purpose of this Activity?

Students will learn about ospreys and their dependence on healthy lakes and healthy fish. During this fun and engaging activity, students are introduced to the concept of food chains/webs and the effects contaminates have on the living organisms within food chains/webs.

Estimated Time Requirement

Osprey Survivor game – 30 minutes

Key Messages

- Ospreys eat fish and need fish to feed their baby chicks.
- Fish are only healthy if their water source is healthy (clean).
- If water is polluted, fish carry these pollutants in their body, affecting other animals that eat them.
- Food chains and webs show how living things obtain their food and follow the transfer of nutrients and energy within an ecosystem.
- Pollutants and contaminants are taken up by living organisms and are passed along food chains and webs similar to how nutrients move along them. This can cause a buildup of these pollutants and contaminants in individuals over time causing harm and death.

Materials

- Print & cut out 40 coloured fish (found at end of module)
  - Attach to cardboard if possible or use a heavier paper (ex. card stock).
    - *Pink fish - 6 small; 2 large*
    - *Blue fish - 6 small; 2 large*
    - *Yellow fish - 6 small; 2 large*
    - *Red fish - 6 small; 2 large*
    - *Orange fish - 6 small; 2 large*
- Print photo of osprey
- Print mask template (found at https://www.rspb.org.uk/globalassets/downloads/kids--schools/mask---osprey.pdf) or at the end of module)
- Print posters (found at end of module)
  - Osprey Range Map
  - Osprey Worldwide Distribution
  - Bioaccumulation & Biomagnification (optional)
- 1 pylon per pair of children/ospreys
  - Pylon represents a nest
- 1 lake hula hoop per 4 pairs (total of 8 students)
  - 4 students will be "fishing" from the same lake at the same time.
- Numbered baskets/paper bags for each pair (to place collected fish in at the nest)
- Optional: 4-6 sets of osprey wings
  - Students can hold pieces of fabric to represent wings. Or, students can make wings out of garbage bags..
- 2 clothespins per student, 1 for each hand
  - These will act like talons and the students will "hunt fish" by picking up the fish cut outs with their clothespins
- 1 white board with dry erase marker
- 1 cloth brush to clean whiteboard

Goal

In this activity, students pretend to be osprey parents hunting fish to feed their osprey chicks. All fish collected are worth points. Some fish are contaminated by pollutants found in the water of the lake. These pollutants build up in the fish and are toxic, to osprey. Therefore, these fish are worth negative points. To survive, the osprey family must accumulate 6 points.

Engage the students by asking who has seen an osprey and what they know about them.
Familiarize students with the osprey, some of their unique characteristics, where they live, what they feed on and what they look like. (Use osprey photo and other information found in Background Information).

- You may want to read one of the non-fiction books or show one of the videos suggested under the "Book Corner" section.
- This is a fun way to acquaint students with the osprey.

Optional:
Have students make an osprey mask to wear during their role play. (Mask template found at link provided and/or at end of module.)

- Stimulate student's imagination by asking them to imagine themselves as osprey flying over a pond or lake looking for fish to feed their young chicks.
- As osprey parents, you will need to hunt and catch fish to feed your young!

Delivery of Activity

- Choose a large open area outside if possible, or in a gymnasium.
- Set hula hoops up in the middle of the playing area.
    - These are the lakes, the fishing areas.
    - Students will be "fishing" from the lakes to capture their food.
- Distribute the coloured fish between the different lakes (hula hoops).
- Space out pylons a distance from each other and forming a circle around the hoola hoops.
    - These are the nests of the breeding pairs.

This formation will help students understand that hunting for food is competitive because food is a limited resource.

To begin the activity:

- Pair up students:
    - Each pair of students represents a pair of ospreys who need to hunt fish to feed their young.
        - Students can wear their masks if they have made them.
        - Students can wear their wings if they have made any.
        - Students can pretend to have wings, or you can give them something that represents wings.
        - Each student has 2 clothespins, one for each hand, that represent their talons.
    - Give each pair one basket/paper bag to share.
        - This is to collect their fish in!
- Have each pair stand by a pylon, this is their nest.
- Students in the pair will be taking turns being the Hunter and the Guardian of the chicks.
    - Have students decide who will start by being the Hunter and who will be the Guardian of the Nest.
    - Place a numbered basket/bag on the ground at the pair's pylon/nest.
        - Have pairs remember their number!!
        - This is where they will be depositing their "caught"/ collected fish.
- Explain to the students that when you indicate to start the game, the Hunter will run (fly) to a lake and grab any fish that is in the lake (hula hoop) with their clothespins.
    - There can only be 2 Osprey at a lake at a time … so some Osprey may have to "fly around' waiting until a lake becomes free to fish in!
    - Once an osprey can hunt/fish, they can only grab 1 fish at a time!
- The Hunter then runs back to their nest and places the collected fish into the basket/bag.
    - As soon as the fish is in the basket or bag, the pair's roles switch!

- The other student now is the Hunter and they run to the lake to retrieve a fish, while their partner now guards the nest.
- They then run back to their nest, deposit their fish and the roles are switched again!
- Pairs continue to "relay" for 1 minute (or you can determine another set time) … hunting as many fish as they can for their young chicks!

- At the end of 1 minute (or the time you have set), have osprey pairs calculate their points based on the fish that they caught!
  - Write on whiteboard the points associated with each colour of fish (See "Points" section below).
  - Healthy fish are worth positive points.
  - Contaminated fish are worth negative points.
- A total of +6 points (or more) are needed for the family of osprey to survive!

Points:

- On the white board, have the different coloured fish listed with their point value beside them:

  Yellow Fish: +4 points
  - Trees planted along stream helps keep stream and fish healthy.

  Red Fish: +2 points
  - Buffer zone (Riparian strip) along lakefront houses and cottages is improved by planting shrubs and wildflowers.

  Orange Fish: +1 point
  - Septic system is repaired allowing no seepage into lake.

  Blue Fish: -2 points
  - Pesticide is sprayed on the lawn and runs off into the lake after a rain.

  Pink Fish: -3 points
  - Motor oil accidentally is dumped into the lake.

NOTE: If you play more than one round, change the points associated with each colour of fish so the group doesn't know which fish are contaminated and worth negative points!

Background Information

Quick Facts

- Ospreys are raptors, birds of prey.
  - They hunt fish and are sometimes called "Fishing Eagles" or "Fish Hawks".
- What does an Adult Osprey look like?
  - They have: (Show printed photo or one from book)
    - Dark brown back white forehead, cheeks, neck, breast and belly.
    - Dark strip that extends from the base of the beak, across the eye, to the back of its head.
    - Streaks of brown on their head, upper part of the breast, underside of their wings and tail.
- Adult Ospreys weigh around 1.5-2 kg (3-4 pounds) … about the weight of 3 basketballs.
- Adult Ospreys have a wingspan of 1.5-2 meters (5-5.5 feet)
- Ospreys are found across the world, on all continents except Antarctica. They are in South America only as non-breeding migrants. (Show Distribution Map)
- Most Ospreys that live in Canada migrate to Central and South America to over winter. (Show Distribution Map)
  - In the spring, they fly back to Canada to nest.

Ospreys live across Canada near, rivers, lakes, swamps, and bogs. They choose nest sites that are close to shallow water with lots of fish. Ospreys choose places such as cliffs, dead trees and hydro poles to build large nests high off the ground to keep their chicks safe from predators. Their nests are usually made from sticks and lined with soft materials like grasses.

Ospreys, like many other birds of prey, are high on the food chain. They hunt and eat fish. They are dependent on fish for food and therefore, the health of the osprey is directly related to the health of the fish that they are eating. Fish health is directly related to the health of the water they live in. Therefore, the health of an Osprey is affected by the fish that they eat and the water that they fish from.

Pesticides and other chemicals contaminate water. These contaminants are then taken in by fish through the food that they eat as well as being absorbed through their skin. These fish are then eaten by osprey and the toxins are passed along to the osprey.

In April and May, ospreys lay 2-4 eggs and their parents will take turns sitting on the eggs for about 40 days until the eggs hatch. Both the male and female osprey feed their young while they are in the nest and deliver 3-10 fish per day to the nest to make sure their young survive. This means that any contamination will also be passed along to the chicks!

In the 1950's, osprey populations became threatened due to pollutants such as DDT. When this toxin was ingested with the osprey's food, it caused health issues including the thinning of their eggshells. The result, when the female laid her eggs and the pair tried to incubate them by sitting on them, the eggs broke under the weight of the birds. Osprey adults were dying, and younger birds were not hatching which resulted in their population numbers to decrease. When DDT was banned in the 1970s, osprey populations became healthier and rebounded.

Helpful Definitions:

Food Chain

- A food chain shows how energy is passed from one living thing to another through the food that they eat. Food chains begin with plants and end with animals.

Food Web

- A food web is a group of food chains within an ecosystem. Most living things eat more than one type of plant or animal and therefore their food chains overlap and connect.

Toxin

- A poison produced by a living thing.

Poison

- A substance that causes harm when it enters the body or touches the skin.

Venom

- A substance produced by some animals (such as snakes, scorpions, spiders or bees) that is injected into prey mainly by biting or stinging and causes harm.
- A quick way to remember the difference between poison and venom:
  - If you bite it and you are hurt, it's poison.
  - If it bites you and you are hurt, it's venom.

Biomagnification

- Biomagnification (or bioamplification) refers to the increase in the concentration of a substance as you move up the food chain.

Bioaccumulation

- Bioaccumulation is the buildup of a substance, in particular contaminants, over time in a living organism.

Follow Up Activities

Make an Osprey Mask

This can be done before the Osprey Survivor activity so students can enjoy wearing their masks as they play the role of an osprey!
https://www.rspb.org.uk/globalassets/downloads/kids--schools/mask---osprey.pdf

Make an Osprey Fact Catcher

or one of these other **fun osprey activities** from Earth Rangers:
https://www.earthrangers.com/eco-activities/eco-activity-18-a-nest-full-of-osprey-fun/

Osprey Colouring Pages

https://www.coloringall.com/coloring-pages/osprey/osprey-hunting-fish/
https://www.birdorable.com/fun/view/osprey-coloring-page/

Book Corner

Suggested books:

- Ospreys by Mary R. Dunn, published by Daniel\D'Auria
- Are You a Fish?: An Osprey Tale by Daniel D'Auria MD, published by Capstone

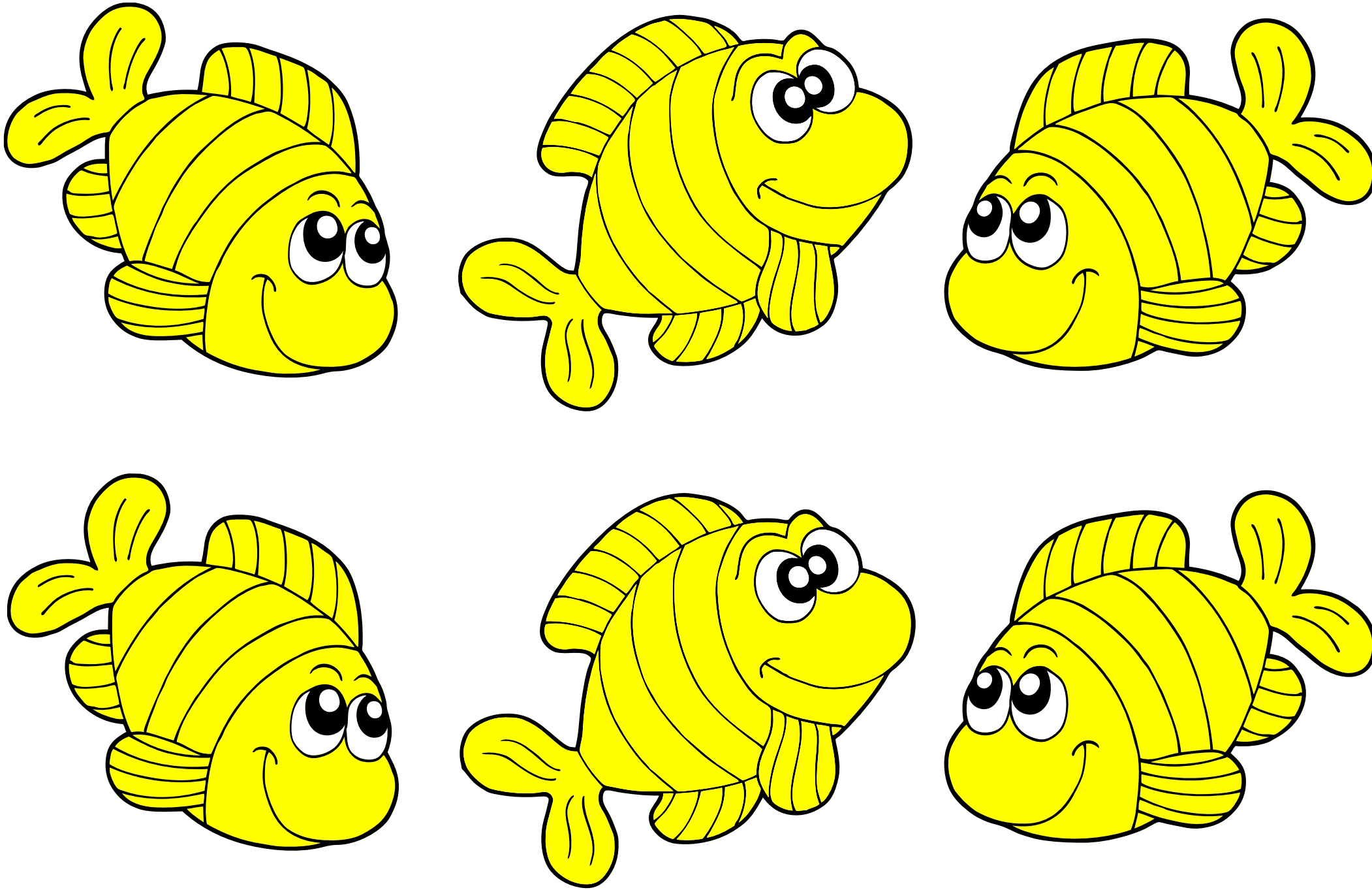
Video Resources

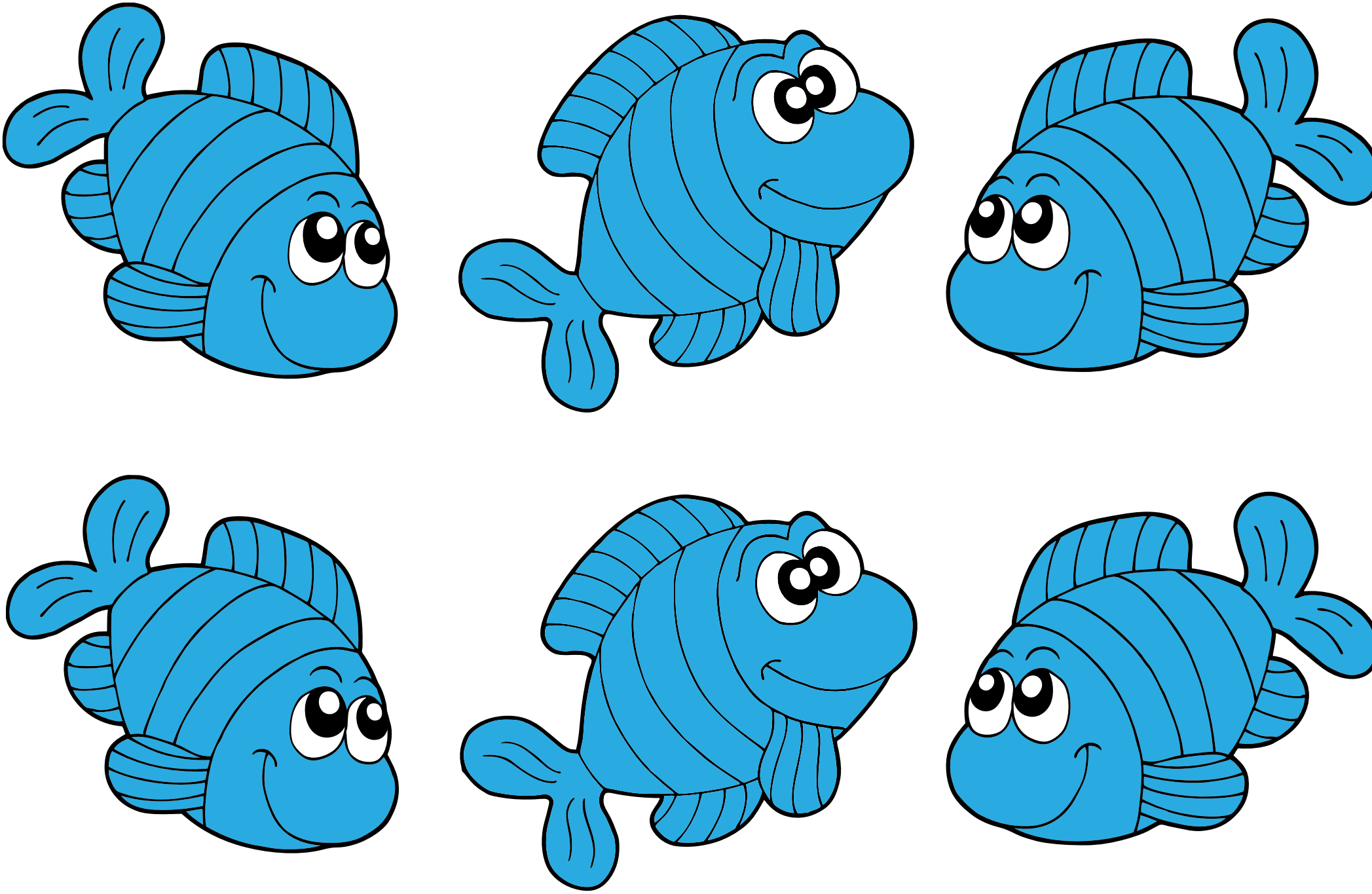
- Osprey facts: they have long legs for a reason/Animal Fact File https://www.youtube.com/watch?v=xsvxVqhOnh8
- Osprey Hunts Fish in Slow Motion/Earth Unplugged : https://www.youtube.com/watch?v=428L7cR4AMU
- Osprey: The Beautiful Flight of the Osprey Bird of Prey Hunting Their Favorite Fish : https://www.youtube.com/watch?v=t26kigYzEoM

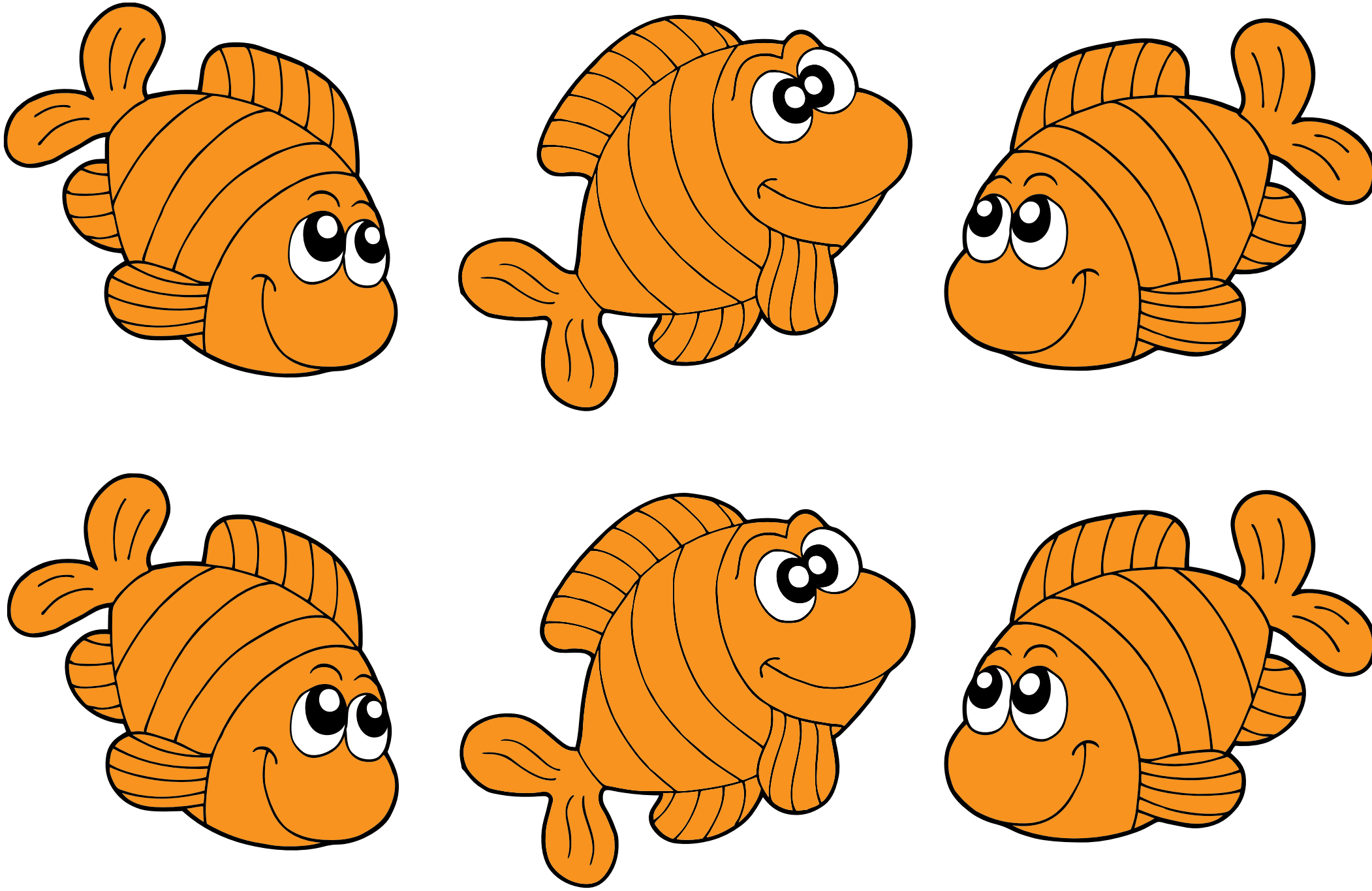
We would really like to hear back from you!

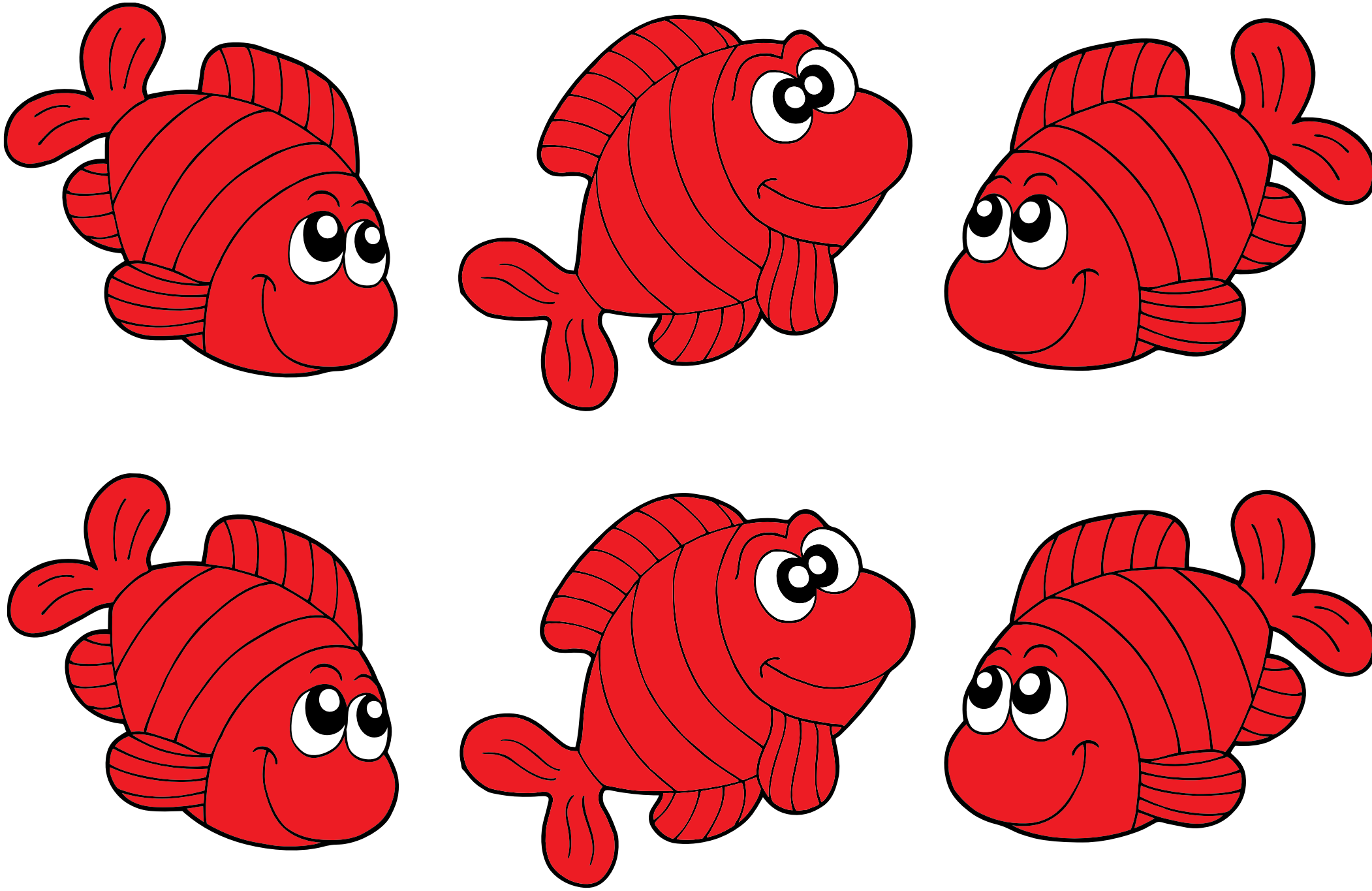
Here are some suggestions how:

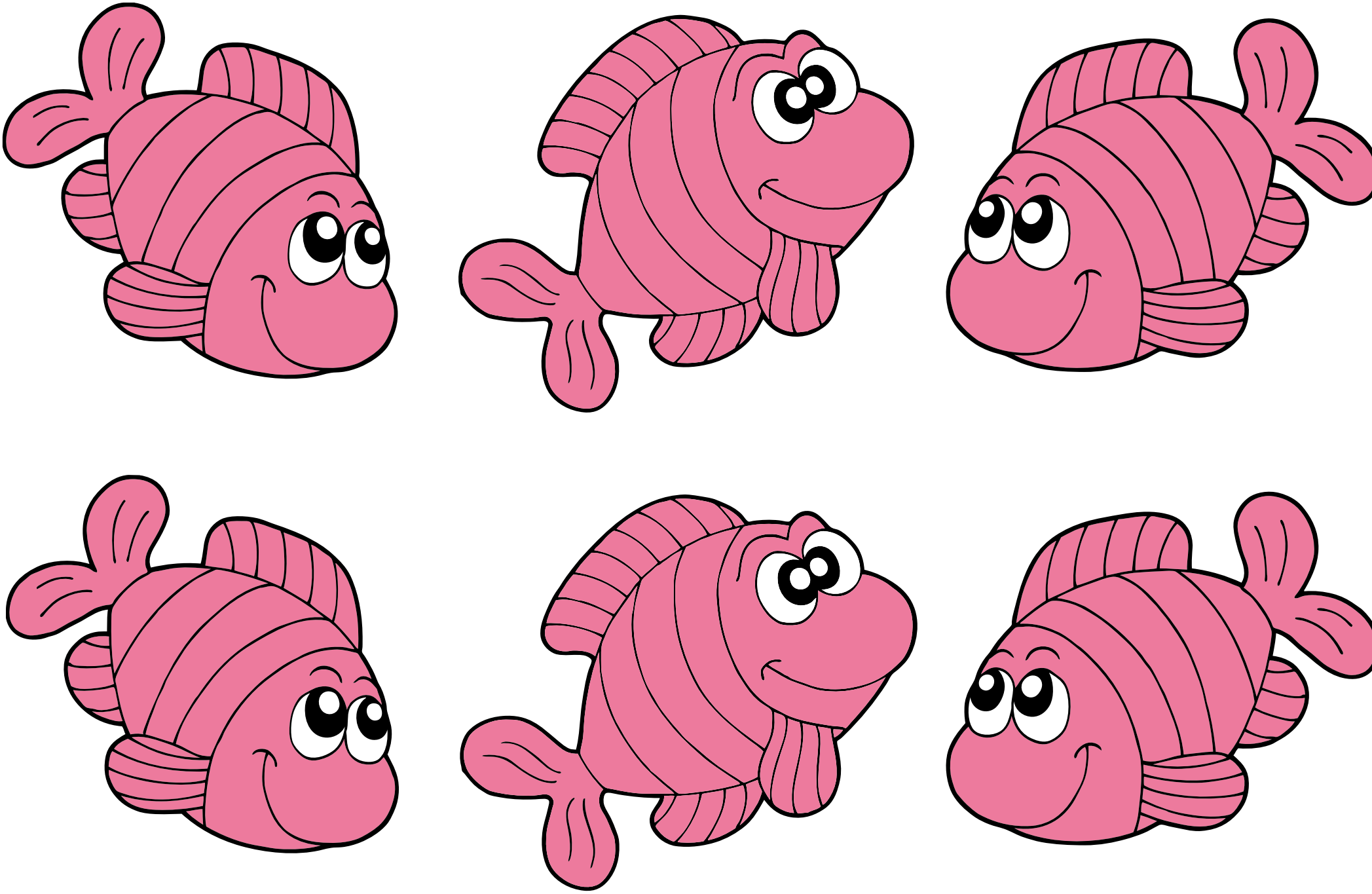
1. Take a photo of your students wearing their masks and wings and send it to us.
2. Send along some of your student's completed colouring pages.
3. Have your students write down, or draw, 2 of their favorite osprey facts and send them back to us!
4. Fill out the feedback form found at the end of this module.

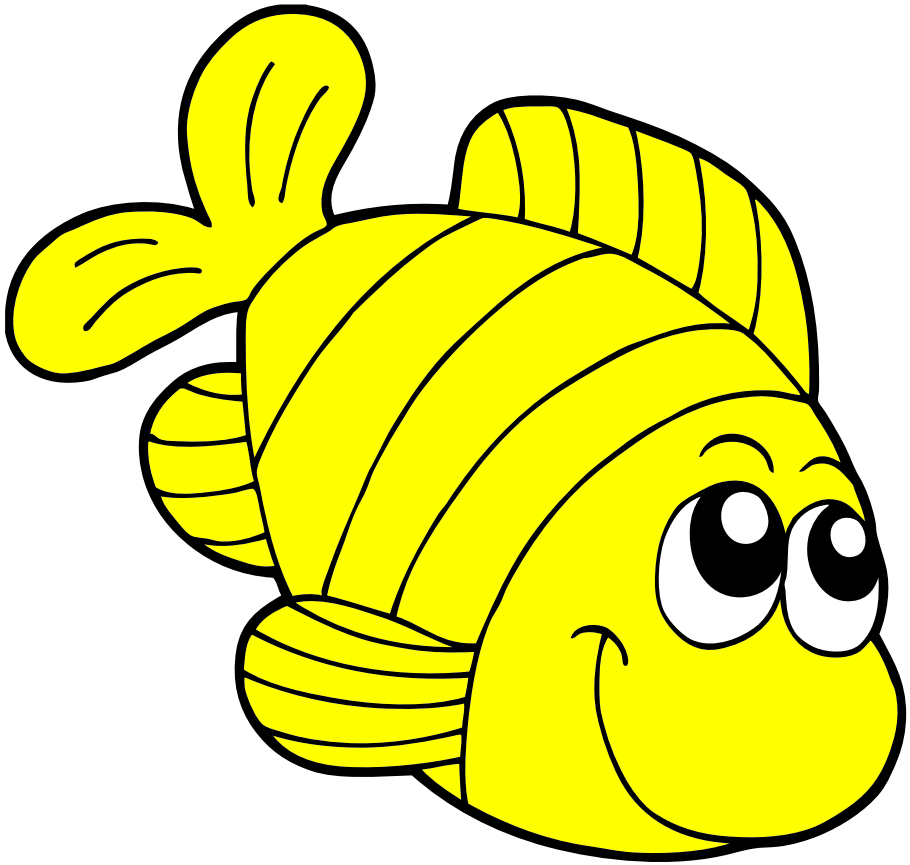


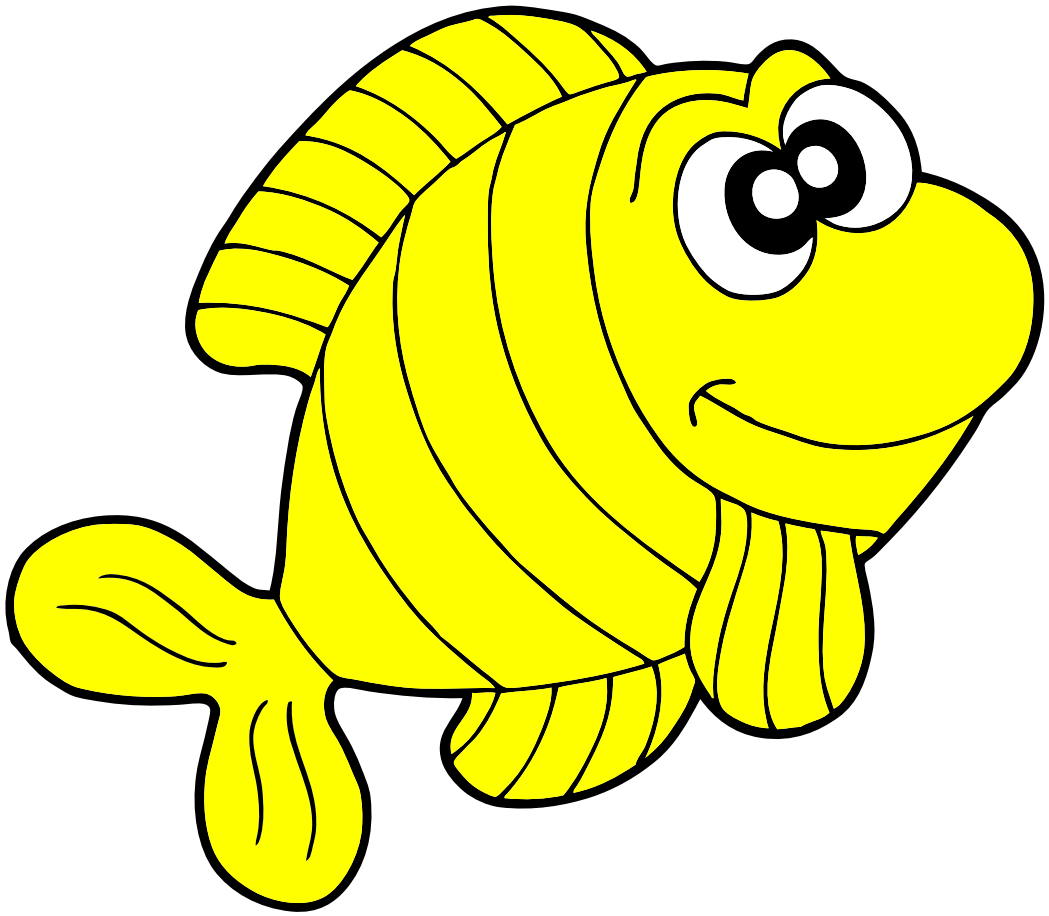


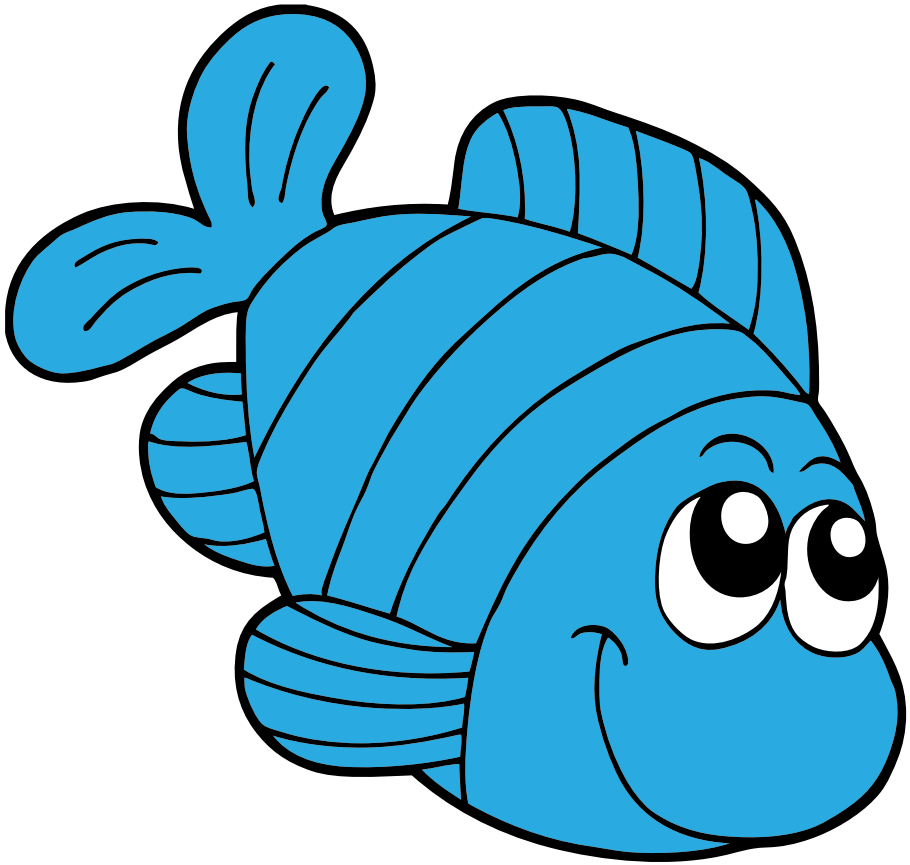


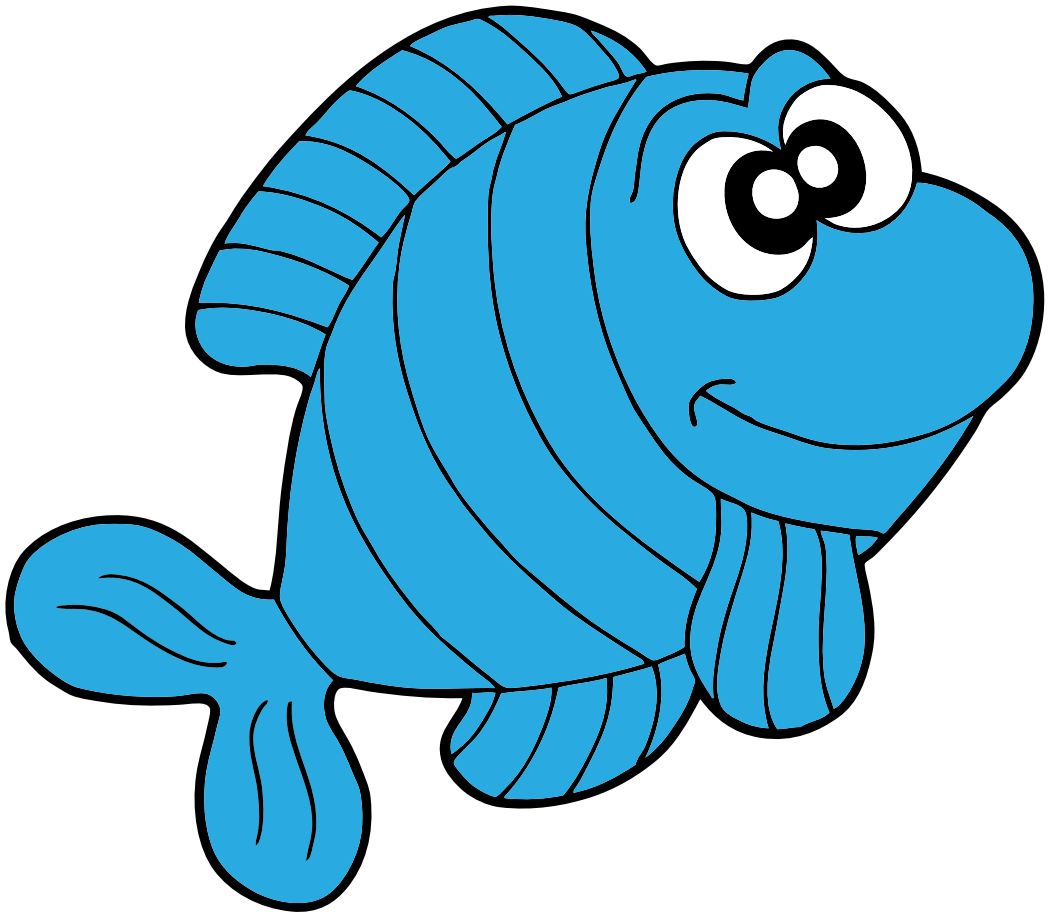


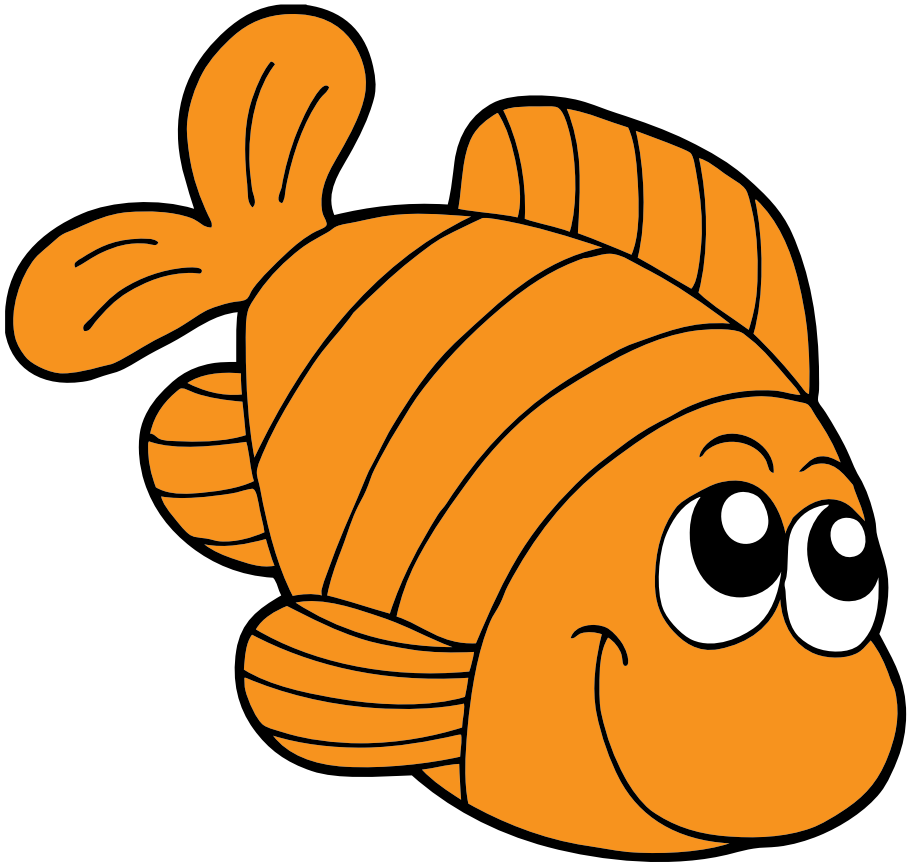


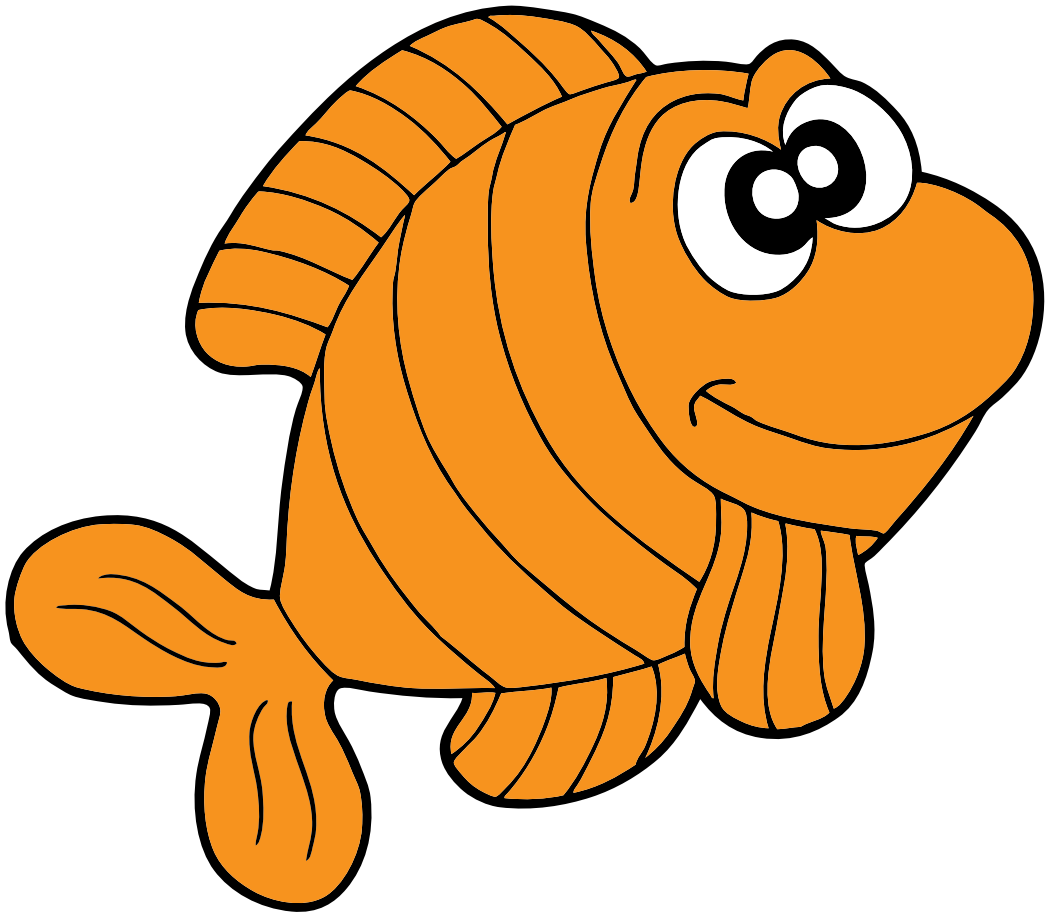


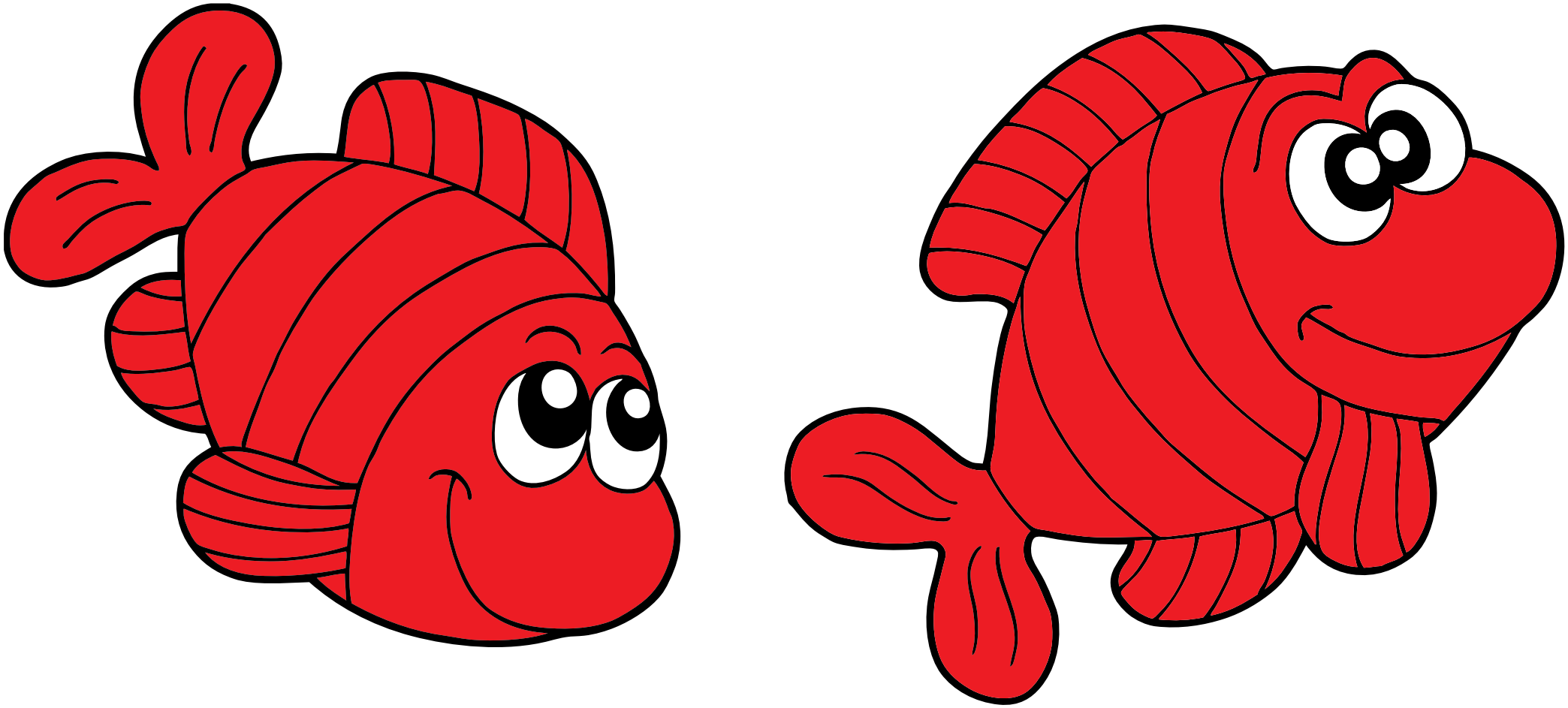


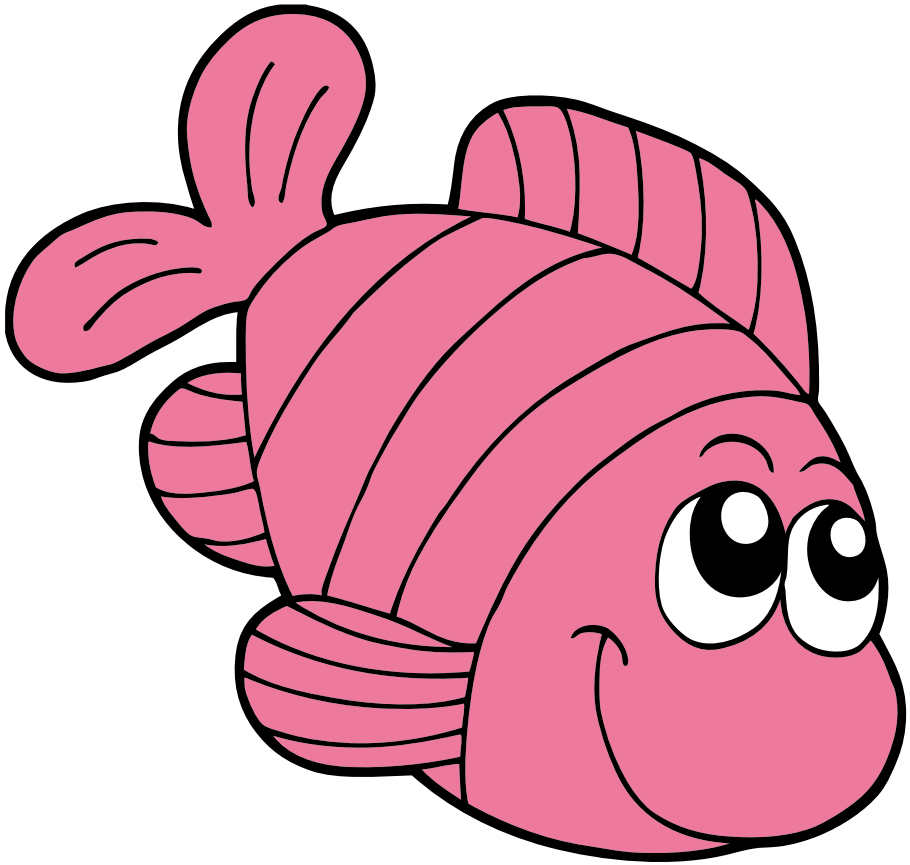


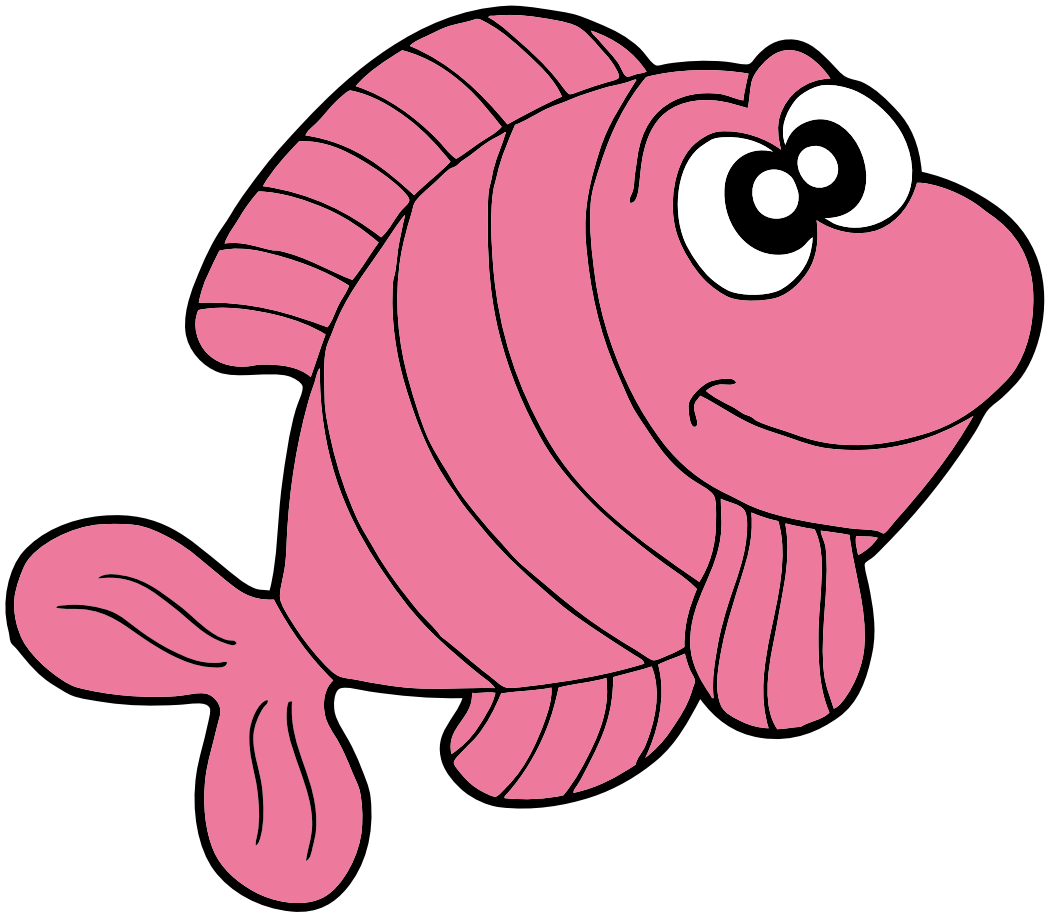




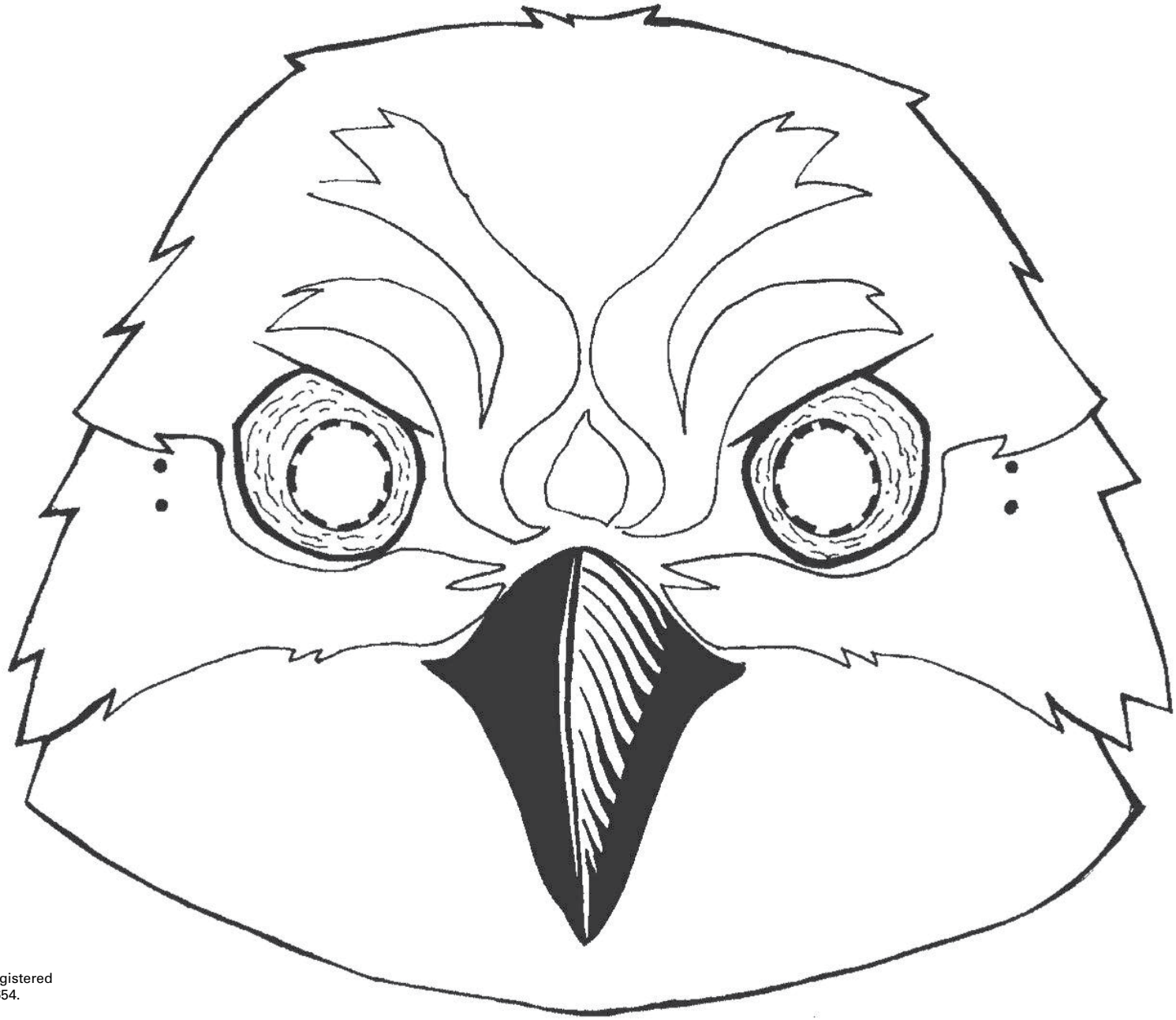




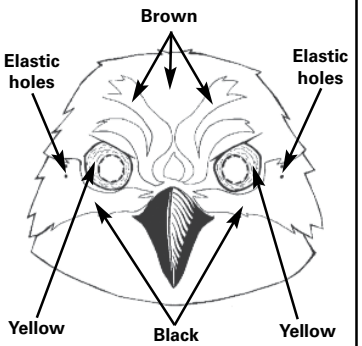




Osprey mask



Colouring guide



RSPB Wildlife Explorers
is the junior membership
of the RSPB

rspb.org.uk/youth

Osprey

Ospreys are exciting birds of prey. They eat fish that they catch with their feet. Their strong feet are great at grabbing the fish and holding on to them.

Ospreys nest in Scotland but they spend the winter in West Africa.

They disappeared from Britain for nearly 40 years because people had killed so many of them. Since 1954, the RSPB has helped and protected ospreys in Scotland. Now a few ospreys are nesting in England and Wales too.

You will need:

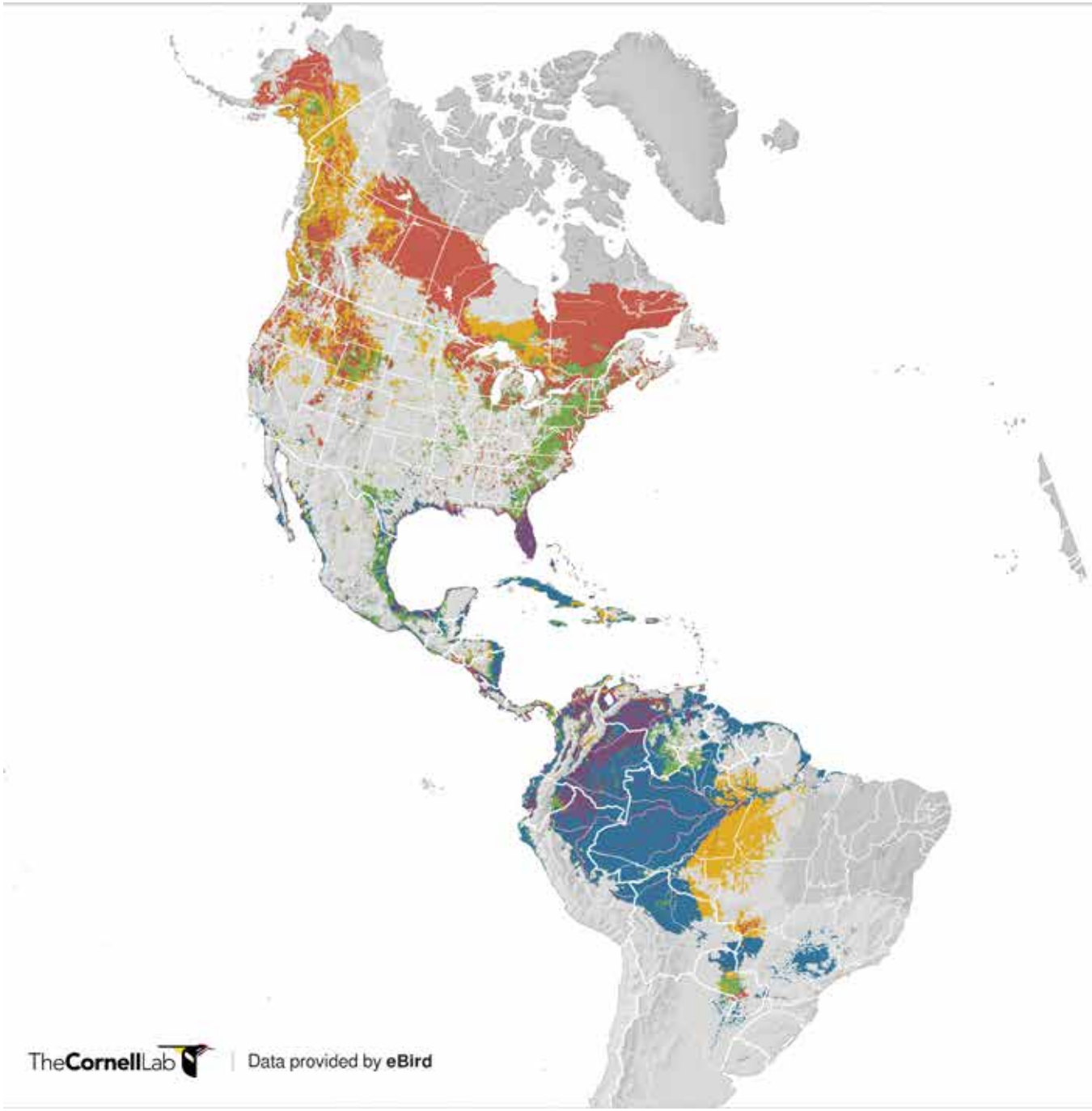
- Brown, black and yellow coloured pencils/pens
- Scissors
- Shirring elastic about 50 cm long
- Sticky tape

What to do:

- Colour in your mask, following the colouring guide.
- Carefully cut out your mask. Follow the thick black line marked with scissors. Be extra careful when cutting out the eyes.
- Ask an adult to help you push out the holes marked, ready to thread the elastic.
- Thread the elastic through the holes from the back of the mask and stick it to the back with the sticky tape. If you want to make it stronger, tie knots in the ends before you stick them down.

Information for activity leader:

Photocopy this template onto card for the best effect.



Osprey *Pandion haliaetus*

Range

The range map depicts the boundary of the species's range, defined as the areas where the species is estimated to occur within at least one week within each season.

OCCURRENCE

- **Year-round**
- **Breeding season** Jun 7 - Jul 13
- **Non-breeding season** Dec 14 - Feb 8
- **Pre-breeding migratory season** Feb 15 - May 31
- **Post-breeding migratory season** Jul 20 - Dec 7

Note: Seasonal ranges overlap and are stacked in the order above; view full range in season maps.

SEASONS TIMELINE

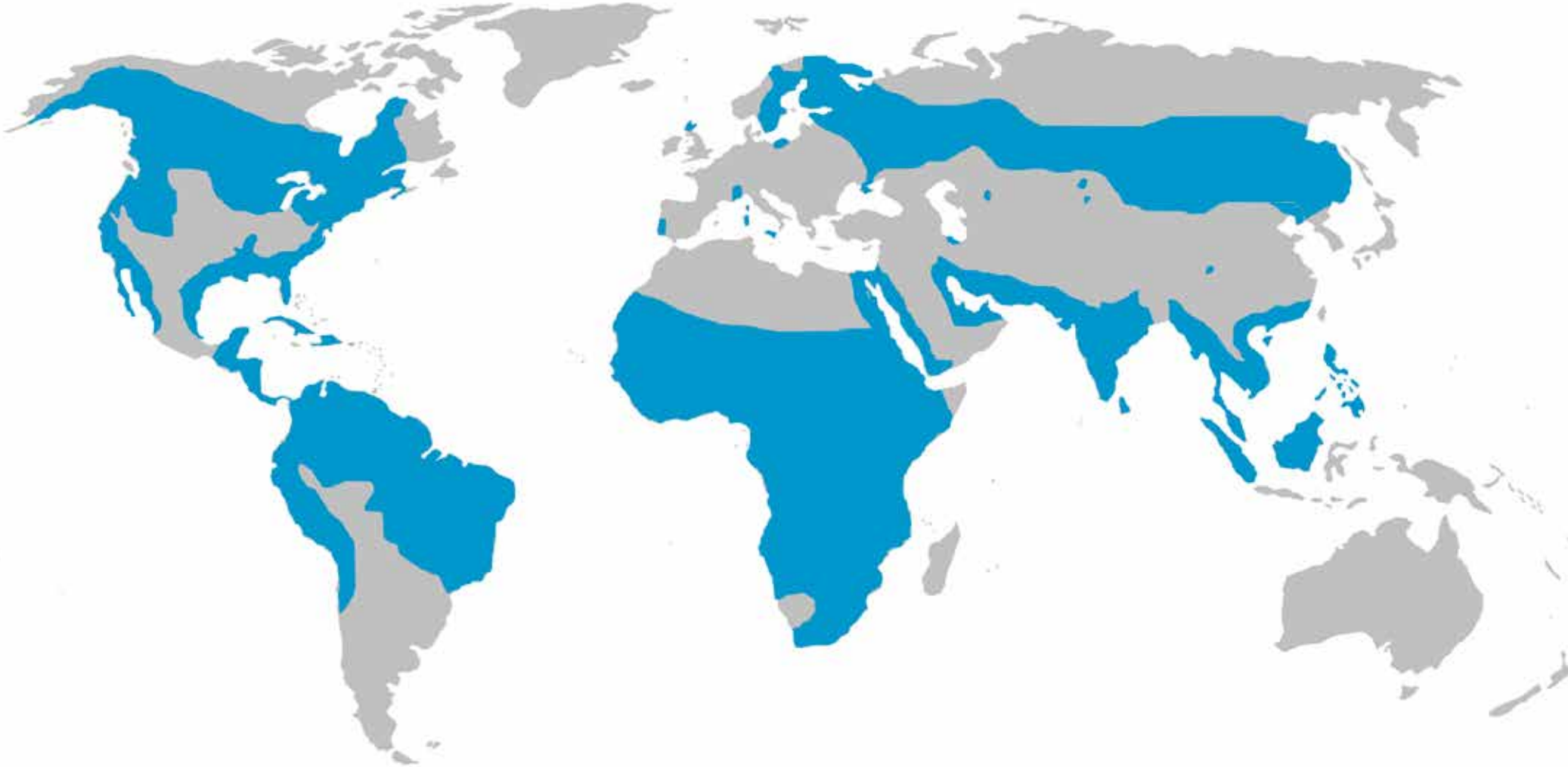
J F M A M J J A S O N D

Modeled area (0 abundance)
No prediction

eBird data from 2005-2020. Estimated for 2019.

Fink, D., T. Auer, A. Johnston, M. Strimas-Mackey, O. Robinson, S. Ligocki, W. Hochachka, C. Wood, I. Davies, M. Iliff, L. Seitz. 2020. eBird Status and Trends, Data Version: 2019; Released: 2020. Cornell Lab of Ornithology, Ithaca, New York. https://doi.org/10.2173/ebirdst.2019

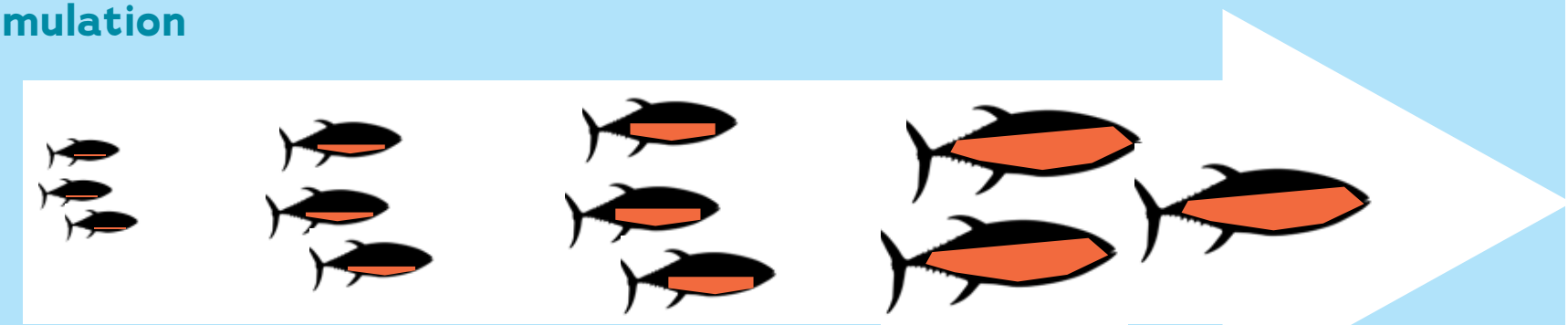
https://ebird.org/science/status-and-trends



Osprey Worldwide Distribution

Source: https://commons.wikimedia.org/wiki/File:Wiki-Pandion_haliaetus.png

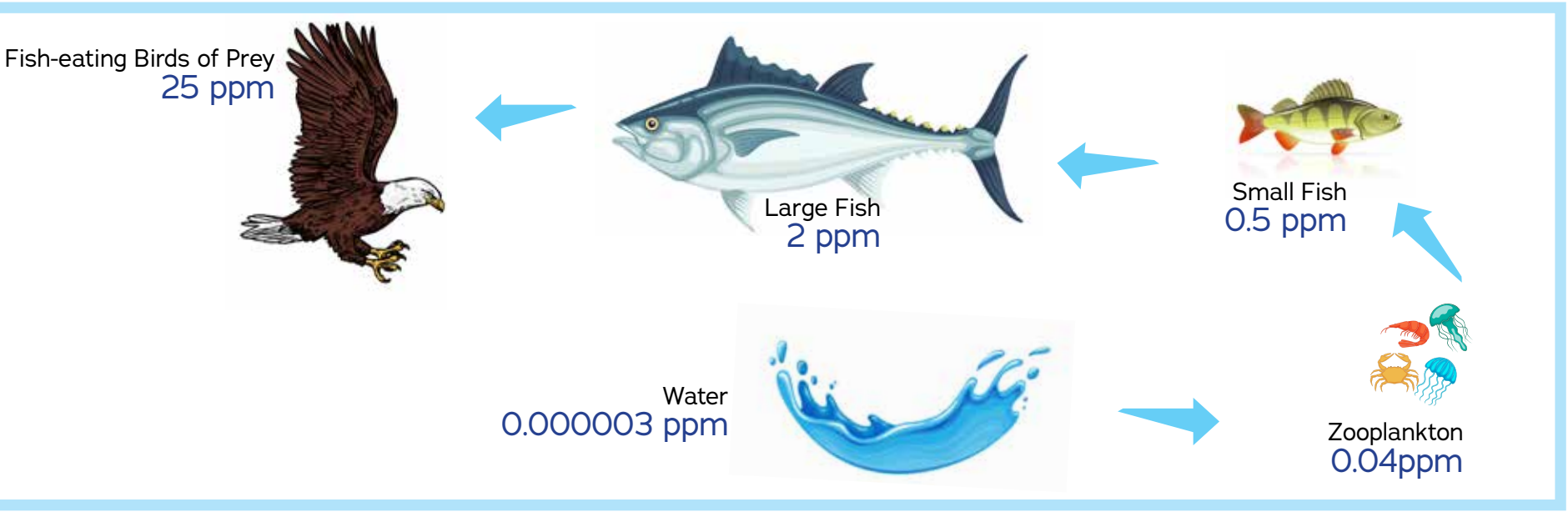
Bioaccumulation



Contamination Levels

Biomagnification

Contamination Levels



Feedback Form

Module Title: Osprey Survivor Date: _____

School or Organization Running the Activity: _____

Grade: _____ Number of Students _____

	Strongly agree				*Strongly disagree*
1. The content was easy to understand.	1	2	3	4	5
2. The preparation for the module was simple.	1	2	3	4	5
3. The content fit within the curriculum.	1	2	3	4	5
4. The content was age appropriate.	1	2	3	4	5
5. The students were engaged.	1	2	3	4	5
6. The information was presented in a fun and informative way.	1	2	3	4	5
7. The students learned something new.	1	2	3	4	5
8. I will do other HMKCWF modules from this resource.	1	2	3	4	5

9. Given the topic, was this module: ☐ Too short ☐ Right length ☐ Too long

10. In your opinion, was this module: ☐ Introductory ☐ Intermediate ☐ Advanced

11. What did you most appreciate/enjoy/think was best about the module?
Any suggestions for improvement?

_____

_____

_____

_____

_____

_____

Thank you!

Please return this form to the HMKCWF coordinator at info@hmwaterfestival.ca

What's Coming

This activity is part of the ***Water Protection*** theme.

What's Coming

This activity is part of the ***Water Science*** theme.

What's the Purpose of this Activity?

This activity is to help students learn the basics of weather prediction based on clouds and wind direction. Participants will learn how to identify basic cloud types and become familiar with weather patterns associated with these different clouds.

Estimated Time Requirement

- Allow approximately 30 minutes for this activity and discussion.
- Crafts and some extensions will require additional time.

Key Messages

- Identify basic cloud types.
- Weather systems are associated with different clouds.
- Wind direction can help predict weather.

Materials

- 1 Cloud Wheel & Spinner print out.
  - Need to cut out and attach to spin board with paper fastener (Brad fastener).
  - If possible, laminate wheel & arrow to reduce resistance.
  - Glue Cloud Wheel to cardboard to make sturdy or use on a clipboard.
  - Note: Colours on edge of cloud types correspond to the elevation shown on the "What's Coming? Weather Chart"
- 1 Wind Direction Wheel
- Cloud Type & Elevation Poster
  - Use to show group where the different clouds are found, to make connection with elevation.
  - Poster has other clouds that aren't on the wheel to let students know that there are other types of clouds.
- Print out Cloud Cards
  - Numbers refer to the types of clouds as listed in Background Information
- What's Coming? Weather Chart
  - Summary of weather predictors and wind direction predictions.
  - Note: Colours in elevation column correspond to the colours found on the edge of the Cloud Wheel.
- 1 Rainmaker (optional and/or a craft)
- 1 Thunder Tube (optional and/or a craft)

Goal

In this activity, students become junior "meteorologists" by spinning a cloud wheel to become more familiar with different cloud types. With the addition of wind effects, students learn about weather, and that interpretations can be made about "What's Coming" based on looking up into our sky!

Delivery of Activity

Take students outside for this activity!

• Have students sit in a circle on the ground and have them look up into the sky.
  - Ask them if they see any clouds?
  - Give them time to share their clouds and describe them.
  - Hold up the Cloud Wheel and ask if they can see any clouds on the Cloud Wheel that look the same?
- Briefly describe each cloud type on the wheel using information from the cloud poster and the background information provided in this document.
  - Go over possible predictors of weather associated with each cloud type using the What's Coming? Weather Chart (See Background Information)

Here is a suggestion on how to engage your class with this activity:

Q: Does anyone know what a meteorologist is?

A: Someone who studies the weather!

- Are you ready to become Junior Meteorologists?... Let's predict some weather!

Spin the Cloud Wheel!

- Have a student come up to you and on a flat hard surface (a clipboard may help), spin the spinner of the Weather Wheel to see what clouds are in our forecast.
- When the arrow stops, read aloud the selected cloud type.
  - Invite a student to stand up and point to the cloud on the weather chart.
- Each section of the wheel represents a cloud and is colour-coded so that you can see where that cloud occurs in our sky (the elevation). (Refer to cloud poster)
- Now ask if anyone can remember what possible weather could be coming related to the cloud on the wheel.
- Spin 3-4 times depending on interest.

Spin the Wind Wheel!

- Have a volunteer spin the wind wheel.
- Discuss how wind direction is a possible predictor of air temperature and potential weather (See Background Information)
  - Use What's Coming? Weather Chart

Optional Extension:

- If you have a thunder tube or rainmaker or have had the students make either of these tubes, you can have fun with the sound during the "Spin the Cloud Wheel".
- Randomly sound the thunder or rain tubes or secretly have one of your students make the sound.
  - Once the sound is heard, have students identify the cloud types most connected to thunderstorms.

Q: What **SHOULD YOU DO** in a thunderstorm?

A:

- Seek shelter in a building or a car.
- If not available, find a tree that is not the highest in the area! Shelter under it.
- If possible, stand on any insulating material (lifejacket, backpack, log)
- Spread out so everyone is not huddling in the same spot.
- **WAIT** 30 minutes after you hear the last clap of thunder before moving on.

Q: What SHOULD YOU NOT DO in a thunderstorm?

A:

- Stand under the tallest tree in the area.
- Stand by anything made of metal.
- Stay in open areas (playing fields, meadows).
- Stand in water.
- Huddle with everyone in you group in one spot.
- Move on before the storm is completely past

(see Background Information about good and bad choices to create a discussion)

Wrap Up

- Turn the cloud wheel around (or have each student turn over their individual weather wheels) so the cloud types are not visible.
- Have photos of clouds on cards (Cloud Cards)
- Hold up a cloud card and ask if anyone can identify the type of cloud it is.
    - What elevation it is found at?
    - What type of weather is often connected to this type of cloud?

Background Information

Cloud names are derived from Latin terms below:

Common suffixes and prefixes

- Cumulus (heaps)
- Stratus (layers)
- Nimbo ("violent rain") - a rain cloud

Distance above surface

- Cirrus (curl of hair) (above 20,000 feet)
- Alto (6,500-20,000 feet)

1. Cirrus:

Cirrus clouds are made of ice crystals and look like long, thin, wispy white streamers high in the sky.

- They are commonly known as "mare's tails" because they are shaped like the tail of a horse.
- Cirrus clouds are often seen during fair weather.
    - But if over time, they build up into larger formations and are followed by cirrostratus clouds then lower altostratus … then rain could be predicted within 24 hours.

2. Cirrocumulus:

Cirrocumulus clouds are small, rounded puffs that usually appear in long rows high in the sky.

- Cirrocumulus are usually white, but sometimes appear gray.
- They are the same size or smaller than the width of your littlest finger when you hold up your hand at arm's length.
- When these clouds cover a lot of the sky, they can look like the scales of a fish, which is why it is called a "mackerel sky."
- Cirrocumulus clouds are common in winter and indicate fair, but cold, weather.

Alto Clouds

3. Altostratus:

Altostratus clouds are mid-level, gray or blue-gray clouds that usually cover the whole sky.

- The Sun or moon may shine through an altostratus cloud, but will appear watery or fuzzy.
- If you see altostratus clouds, a storm with continuous rain or snow might be on its way.
- Occasionally, rain falls from an altostratus cloud.
    - If the rain hits the ground, then the cloud has become a nimbostratus.

4. Altocumulus:

Altocumulus are mid-level clouds, grayish-white with one part darker than the other.

- Altocumulus clouds usually form in groups and are about one kilometer thick.
- Altocumulus clouds are about as wide as your thumb when you hold up your hand at arm's length.
- If you see altocumulus clouds on a warm, humid morning, there might be a thunderstorm by late afternoon.

Stratus Clouds

5. Stratus

Stratus clouds are low and have a uniform gray color .

- These clouds can cover most or all of the sky.
- Stratus clouds can look like a fog that doesn't reach the ground.
- Light mist or drizzle is sometimes falling when stratus clouds are in the sky.
- If stratus clouds are white, usually they result in just cloudy conditions.

Fog is a cloud on the ground. It is composed of billions of tiny water droplets floating in the air. Fog exists if the atmospheric

visibility near the Earth's surface is reduced to 1 kilometer or less.

6. Stratocumulus:

Stratocumulus clouds are low, lumpy, and gray. Sometimes they line up in rows and other times they spread out.

- Only light rain (usually drizzle) falls from stratocumulus clouds.
- To distinguish between a stratocumulus and an altocumulus cloud:
  - Point your hand toward the cloud.
  - If the cloud is about the size of your fist, then it is stratocumulus!
- Most often, stratocumulus do not produce precipitation.
  - When they do, it is generally only light rain or snow.
  - However, these clouds are often seen at either the front or tail end of worse weather. Therefore, they may indicate a coming storm, in the form of thunderheads or gusty winds.
- They are also often seen underneath the cirrostratus and altostratus sheets that often precede a warm front. These higher clouds decrease the sun's heat and therefore convection causes any cumulus clouds to spread out into stratocumulus clouds.

7. Nimbostratus:

Nimbostratus clouds are dark gray, with ragged bases and sit low in the sky.

- Nimbostratus clouds are associated with continuous rain or snow.
- Sometimes they cover the whole sky and you can't see the edges of the cloud.

8. Cumulus:

Cumulus clouds grow vertically.

- They are puffy white or light gray clouds that look like floating cotton balls.
- Cumulus clouds have sharp outlines and a flat base at a height of 1000m.
- They are generally about one kilometer wide which is about the size of your fist or larger when you hold up your hand at arm's length to look at the cloud.
- Cumulus clouds can be associated with fair or stormy weather.
- Cumulus clouds are often called "fair-weather clouds". The base of each cloud is flat and the top of each cloud has rounded towers.
  - Cumulus clouds are not rain clouds but could precede a storm.
- Watch for rain showers when the cloud's tops look like cauliflower heads.
  - These clouds grow upward and they can develop into giant cumulonimbus clouds, which are thunderstorm clouds.

8. Cumulonimbus:

Cumulonimbus clouds also grow vertically and can grow up to 10 km high.

- At this height, high winds will flatten the top of the cloud out into an anvil-like shape.
  - The anvil usually points in the direction the storm is moving.
- Cumulonimbus clouds are thunderstorm clouds and are associated with heavy rain, snow, hail, lightning, and sometimes tornadoes.

Green Clouds

Green Clouds are often associated with severe weather. The green

colour is not completely understood, but it is thought to have something to do with having a high amount of liquid water drops and hail inside the clouds. In the Great Plains region of the U.S., green clouds are associated with storms likely to produce hail and tornadoes.

Wind Direction

Some very general guidelines about weather can be drawn from wind direction in south central Ontario.

South:

- Winds from the south generally travel across portions of the Great Lakes picking up moisture and warmth from southern climates.
- Warm air can hold more moisture.
- Possible predictors- warmer air, humidity, rain or snow

North:

- Generally cooler, drier air

West:

- Prevailing wind (most common) can bring anything but usually weather that is occurring in the western provinces will be here within 48 hours

East:

- Veering wind (coming from the opposite direction of the prevailing wind).
- Often associated with low pressure system.
- Rain or snow- possible stormy weather if wind is brisk.
- Winds from the east, expect a beast!

Lightning & Electricity:

Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground.

- Lightning = electricity.

Electrical insulator is a material in which electric current does not flow freely. What makes a good electrical insulator? … NOT METAL!

- Rubber
- Dry Wood
- Glass

Thunderstorm Safety:

Best to never get caught in a thunderstorm outside- watch the sky! Notice wind changes to give yourself some time to get to a safe spot before the storm is upon you.

DO!

- Seek shelter in a building or a car
- If none available, find a tree that is not the highest in the area to shelter under.
- If possible, stand on any insulating material (lifejacket, backpack, log).
- Spread out so everyone is not huddling in the same spot.
- Wait 30 minutes after the last clap of thunder is heard before moving on.

DO NOT!

- Stand under the tallest tree in the area.
- Stand by anything made of metal.
- Stay in open areas (playing fields, meadows).
- Stand in water.
- Huddle in one spot with everyone in your group.

• Move on before the storm is completely past..

Follow Up Activities

• Have each student make a cloud wheel.
• Have students make a cloud booklet.
    - Give each student 5 pieces of printer paper and instruct them to group the pages together and fold in half, making a booklet..
    - They can decorate the front cover of their cloud booklet and print their name on it.
    - They can then use the pages inside to sketch/draw the different types of clouds from the cloud cards.
    - Write or draw descriptions of each of the clouds.
    - Have a "What's Coming?" section where they can write or draw the type of weather that may be coming when they see those clouds.
• Have students make a thunder tube. (See instructions included at end of module)
• Have students make a rainmaker. (See instructions included at end of module)
• Have students make a cloud mobile.
    - Draw out 3-5 different types of clouds and cut them out.
    - Write the type inside the cloud (optional).
    - Glue cotton balls on the clouds, leaving the names uncovered.
    - Punch a whole in the top with a paper punch and thread with string or yarn.
    - Find a stick and hang the clouds along it at different lengths.
• Check out these other fun cloud activities your students can do:

http://www.weatherwizkids.com/?page_id=64

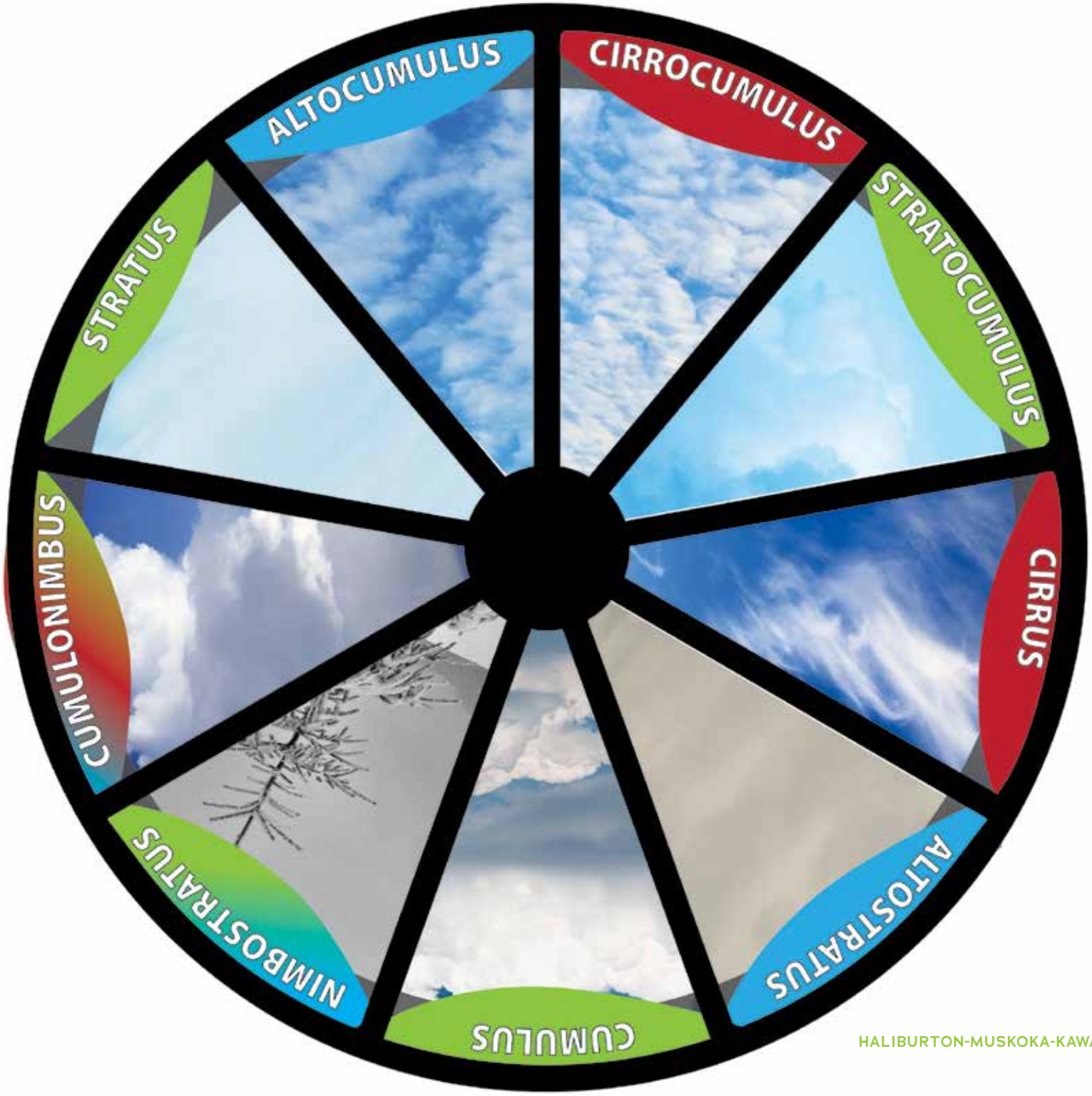
Book Corner

Suggested books:

- Clouds by Anne Rockwell, published by Harper Collins Publishers
- The Cloud by Tomie dePaola, published by Penguin Random House
- Flash, Crash, Rumble and Roll by Franklyn Braley, published by Harper Collins Publishers

We would really like to hear back from you!

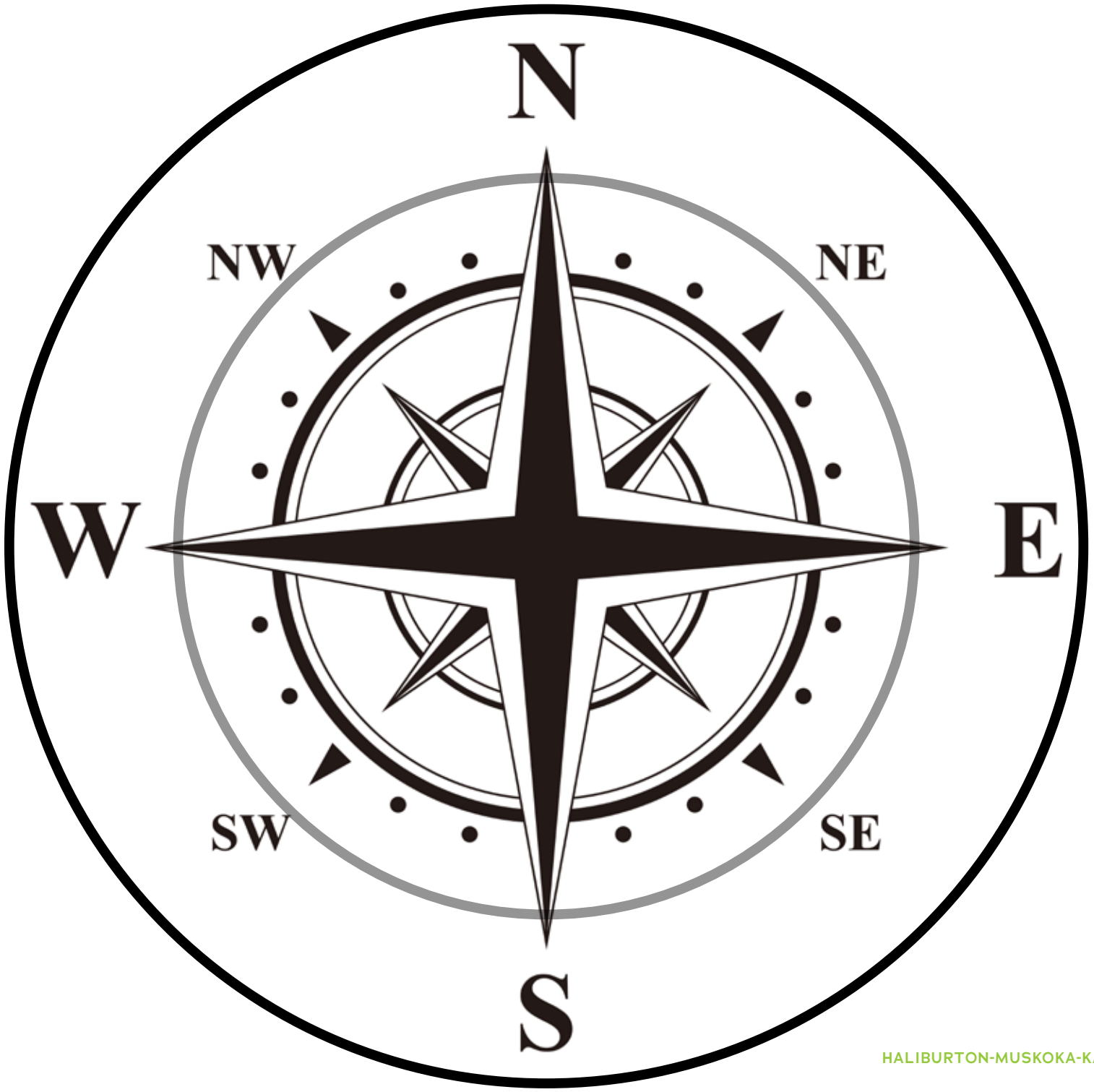
1. Take a photo of your students completed cloud creations: cloud booklets, cloud mobile, thunder or rainmaker and send to us.
2. Take a photo of some of the engaging fun experiments your students do from the Weather Wiz Kids website and send to us.
3. Have your students write down their favorite fun cloud fact on a cloud and send them back to us!
4. Fill out the feedback form found at the end of this module



Cloud Wheel

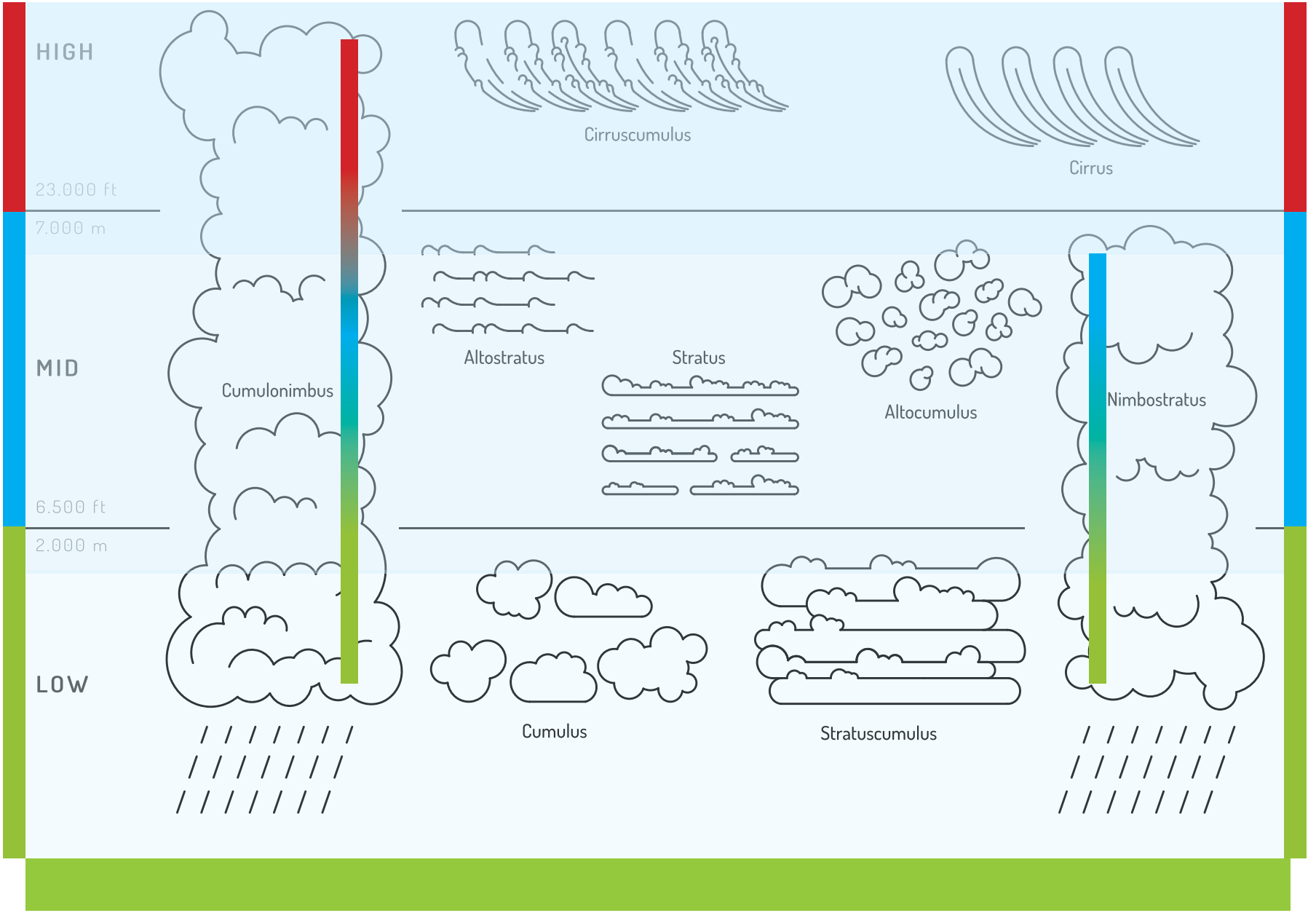
Instructions:

1. Print on cardstock.
2. Cut out cloud wheel and arrow.
3. Laminate if possible (this will reduce resistance during spin)
4. Place metal brad into arrow, indicated by "x", and into middle of wind direction wheel.



Wind Direction Wheel

1. Print on cardstock.
2. Cut out direction wheel and arrow.
3. Laminate if possible (this will reduce resistance during spin).
4. Place metal brad into arrow, indicated by “x”, and into middle of wind direction wheel.



Cloud Type & Elevation

What's Coming?

Clouds

Cloud Type	Elevation	Common weather association
CIRRUS	**HIGH**	Fair weather! Unless, followed by alto stratus ▶ rain within 24 hours.
CIRROCUMULUS	**HIGH**	If covering most of the sky in winter ▶ fair but cold conditions.
ALTOSTRATUS	**MID**	Rain or snow likely.
ALTOCUMULUS	**MID**	On warm, humid days ▶ likely a thunderstorm in the afternoon.
STRATUS	**LOW**	If white ▶ cloudy day. If darker ▶ light rain or snow.
STRATOCUMULUS	**LOW**	If dark bottomed ▶ likely light rain or snow; otherwise just cloudy conditions. These clouds sometimes occur at the front or tail-end of thunderstorms.
CUMULONIMBUS	**LOW** TO **HIGH**	Associated with cold fronts ▶ thunderstorms, snow, hail. Anvil shape at top of cloud points in the direction of travel of storm.
CUMULUS	**LOW** TO **MID**	Fair weather if spaced out. If top looks like the head of cauliflower ▶ rain.
NIMBOSTRATUS	**LOW**	Rain or snow.

Wind

Wind Direction	General Rules
NORTH	Cooler, drier condtions
SOUTH	Warmer, humidity higher ▶ could be a mild or humid day or precipitation
EAST	Wind travelling counter clockwise ▶ opposite of prevailing wind usually means storms ▶ rain or snow
WEST	Prevailing wind ▶ not a strong predictor of any specific weather pattern other than whatever is happening in Western Canada eventually moves here to Ontario.

Make your own Rainstick!

In many cultures, summoning rain often included the use of musical instruments. One well-known example is a rainstick, an instrument that mimics the sound of rain. They are traditionally made from dead cactus tubes with cactus spines hammered to the inside and filled with tiny pebbles.

The origin of the rainstick is not fully known, but many people think that it probably came from a group of indigenous people known as the Diaguita from the deserts of northern Chile.

Here you get to build a slightly less traditional rainstick of your own! This one is made from a cardboard tube and aluminum foil.

What you need:

- A long cardboard tube (paper towel or wrapping paper tube). About a two inch diameter is best.
- Aluminum foil
- Small dried lentils, unpopped popcorn, dry rice, or tiny pasta.
- Tape
- Scissors
- Crayons or markers

What you do:

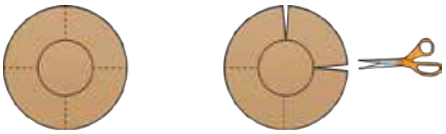
1. Trace around the end of your tube onto a piece of brown paper (or construction paper).

2. Draw a circle that is two times bigger than your first circle (around that first circle) and then draw four or so spokes between the two circles.

For more information and to find this activity online go to NASA's Climate Kids website: http://climatekids.nasa.gov/rainstick.
Find more fun activities at http://climatekids.nasa.gov/make

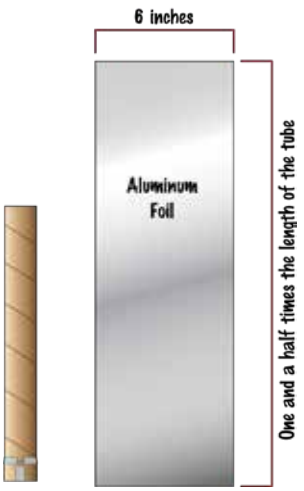
www.nasa.gov

3. Cut along the spokes.

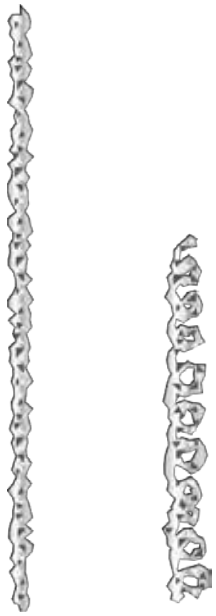


4. Tape the spokes onto one end of your tube.

5. Cut a few pieces of aluminum foil that are about one and half times the length of your tube and about 6 inches wide.



6. Crunch the aluminum foil pieces into long, thin, snake-like shapes. Then twist each one into a spring shape.



7. Put the aluminum foil springs into your tube.

8. Pour some dry beans, dry rice, or unpopped popcorn into your tube. The tube should only be about 1/10 full. You can experiment to see how different amounts and different types of seeds and beans change the sound.
9. Make another cap from brown paper (the same as the first three steps) and cap your tube.

10. Optional: Decorate the tube by covering it with brown paper or construction paper, and then making designs with crayons or markers (or cut-out paper or stickers).

For more information and to find this activity online go to NASA's Climate Kids website: http://climatekids.nasa.gov/rainstick.
Find more fun activities at http://climatekids.nasa.gov/make

www.nasa.gov

Making a Thunder Tube!

A thunder tube is a percussion instrument which mimics the sounds of a thunderstorm. The thunder tube makes its sound by vibrations created from a metal coil attached to a tube which is wiggled by gently moving the tube from side to side. These vibrations echo inside the tube producing a sound very similar to thunder.

Materials Needed:

- An empty potato chip can (like Pringles) with the plastic lid recycled.
    - You can also use PVC piping around 30cm (12") in length.
    - If using PVC piping, you will also need packing tape for the end!
- A thin metal coil, approximately 45-50 cm (1 ½ feet) long
- Hot glue and a hot glue gun
- Tape
- Scissors
- Decorations for the thunder tube (markers, crayons, paint, stickers, etc.)

Instructions:

1. Use the scissors to poke a small hole in the bottom of the potato chip can.
    - If using PVC piping, stretch about 10 pieces of packing tape over one end of the tube.
    - Make sure this is taught!
    - Now, poke a small hole in the middle of the taped end.

2. Now carefully twist one end of the metal coil through the hole.

3. The hot glue gun will need to be used (with an adult) to glue the metal coil in place so it does not move around in the hole.

4. After the glue dries . . . try it out! Gently wiggle the tube from side to side and hear the sound of thunder!

5. Cover the potato chip can with paper and secure with tape.

6. Now it can be decorated however you like!
    - Can use markers, crayons, paint, stickers and any other supplies to make it unique!

What's Coming?

CLOUD CARDS

Print the following pages double-sided

1

Cirrus Clouds

- Made up of ice crystals.
- Look like long, thin, wispy white streamers high in the sky.
- Commonly known as “Mare’s tails” because they are shaped like a horse’s tail.
- Often seen during fair weather.
- If over time, they build up into larger formations and are followed by cirrostratus then lower altostratus clouds . . . rain may come within 24 hours.

1

2

Cirrocumulus Clouds

- Small, rounded puffs that usually appear in long rows high in the sky.
- Usually white but sometimes appear gray.
- Same size or smaller than the width of your littlest finger when you hold up your hand at arm's length.
- When these clouds cover a lot of the sky, they can look like fish scales, which is why it is called a "mackerel sky".
- These clouds are common in winter and indicate fair, but cold weather!

2

3

Altostratus Clouds

- Mid-level, gray or blue-gray clouds that usually cover the whole sky.
- The sun or moon may shine through an altostratus cloud, but will appear watery or fuzzy.
- If you see these types of clouds, a storm with continuous rain or snow might be on its way!
- Sometimes rain falls from altostratus clouds, but if the rain hits the ground, then the cloud has become a nimbostratus cloud.

3

4

Altocumulus Clouds

- Mid-level clouds, grayish white with one part darker than the other.
- These clouds usually form in groups and are about 1 km thick.
- They are about as wide as your thumb when you hold up your hand at arm's length.
- If you see altocumulus clouds on a warm, humid morning, there might be a thunderstorm by late afternoon!

4

5

Stratus Clouds

- Low lying clouds that have a uniform gray colour.
- These clouds can cover most or all of the sky.
- Status clouds can look like a fog that doesn't reach the ground.
- Light mist or drizzle sometimes falls when these clouds are in the sky.
- If stratus clouds are white, usually that means just cloudy conditions.

5

6

Stratocumulus Clouds

- Low, lumpy, and gray clouds.
- Sometimes they line up in rows and other times they can spread out.
- Most often, stratocumulus clouds do not produce precipitation. When they do, it is generally only light rain or drizzle or snow.
- These clouds are often seen either at the front or tail end of worse weather. Therefore, they may indicate storms to come, in the form of thunderheads or gusty winds.
- To distinguish between a stratocumulus and an altocumulus cloud:
  - Point your hand toward the cloud.
  - If the cloud is about the size of your fist, then it is a stratocumulus!

6

7

Nimbostratus Clouds

- Dark gray clouds with ragged bases that sit low in the sky.
- Nimbostratus clouds are associated with continuous rain or snow.
- Sometimes they cover the whole sky, and you can't see the edges of the cloud.

7

8

Cumulus Clouds

- Are puffy white or light gray clouds that look like floating cotton balls.
- These clouds have sharp outlines and a flat base at a height of 1000m.
    - These clouds grow upward.
- They are generally about 1 km wide … about the size of your fist or larger when you hold up your hand at arm's length and look at the cloud.
- Cumulus clouds are often called "fair-weather" clouds, although they can be associated with fair or stormy weather.
    - They are not rain clouds but can come before a storm.
- Watch for rain showers when the cloud's tops look like cauliflower heads!

8

9

Cumulonimbus Clouds

- These clouds also grow upward and can grow up to 10km high!
- At this height, high winds will flatten the top of the cloud into an anvil-like shape.
- The anvil usually points in the direction the storm is moving.
- Cumulonimbus clouds are thunderstorm clouds and are associated with heavy rain, snow, hail, lightning and sometimes tornadoes!

9

Feedback Form

Module Title: What's Coming? Date: _____

School or Organization Running the Activity: _____

Grade: _____ Number of Students _____

	Strongly agree				*Strongly disagree*
1. The content was easy to understand.	1	2	3	4	5
2. The preparation for the module was simple.	1	2	3	4	5
3. The content fit within the curriculum.	1	2	3	4	5
4. The content was age appropriate.	1	2	3	4	5
5. The students were engaged.	1	2	3	4	5
6. The information was presented in a fun and informative way.	1	2	3	4	5
7. The students learned something new.	1	2	3	4	5
8. I will do other HMKCWF modules from this resource.	1	2	3	4	5

9. Given the topic, was this module: ☐ Too short ☐ Right length ☐ Too long

10. In your opinion, was this module: ☐ Introductory ☐ Intermediate ☐ Advanced

11. What did you most appreciate/enjoy/think was best about the module?
Any suggestions for improvement?

_____

_____

_____

_____

_____

_____

Thank you!

Please return this form to the HMKCWF coordinator at info@hmwaterfestival.ca

Haliburton-Muskoka-Kawartha

children's water festival

Friends of Ecological and Environmental Learning

"Living, Learning, Growing"