

Lesson Plan #6:

Trumpeter Swan Migration

Objectives

Students will:

- investigate and role-play Trumpeter Swan migration.
- learn that Trumpeter Swans depend on aquatic vegetation for food.
- discover hazards to Trumpeter Swan migration.
- understand how humans impact Trumpeter Swan migration.
- realize how both Fall and Spring migration is necessary for swan survival.

Overview

Students model Trumpeter Swans and demonstrate the hazards they face during migration. Students will role-play migration between Canada and the Greater Yellowstone Ecosystem. In both Fall and Spring, they will stop to rest and feed in wetlands while attempting to avoid hazards such as predators, fences, and power lines.

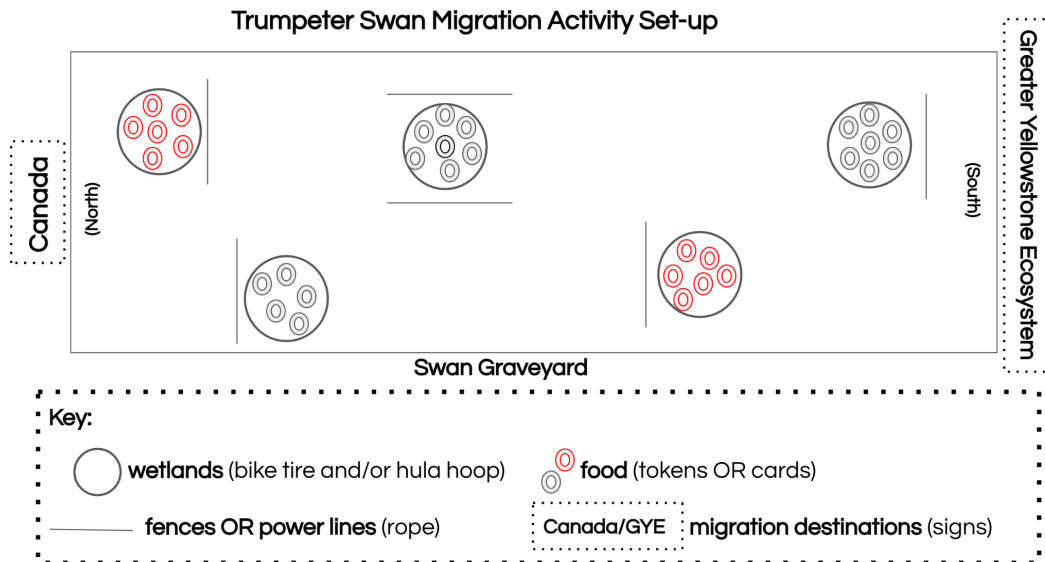
Materials

- outdoor play field or large indoor space
- 4-5 bike tires or hula hoops
- 2-3 bandanas or fabric scraps
- 4-5 sections of rope (2'- 3' long) *can also use yard or meter sticks
- colored tokens or playing cards
- [Field set-up, migration destinations and map](#) (Google Slides)

Activity

setup:

1. Choose a relatively flat, open area without debris or holes. Refer to the diagram below.
2. Identify boundaries for the students.
3. Remind students to be mindful of other students and potential hazards while running in the play area.
4. Instruct assigned predators to only lightly tap other players.
5. Encourage creativity in the placement of hazards and wetlands.



Procedure

1. Using the map on slide 3, inform students that they will be Trumpeter Swans attempting to migrate between Canada and the Greater Yellowstone Ecosystem.
2. Explain that to survive the migration, each student must successfully fly (walking or running while flapping their arms) between locations, avoiding hazards while gathering food.
3. Introduce hazards:
 - **Predators:** Choose 1-2 students to be predators and give them a bandana to wear on their arm, leg, or head. (More predators can be chosen for larger groups.) Predators remain in the play area and try to tag as many migrating swans as possible. Swans in wetland areas are safe and cannot be tagged. Predators must always remain in motion, limiting their ability to guard wetland areas. Once a swan is tagged by a predator, they are considered "eaten" and must stay in the swan graveyard until the next round.
 - **Fences and power lines:** Place rope sections near each wetland to represent fences and power lines. If a swan touches or goes through a fence or power line, they are considered "injured" and must hop on one leg for the remainder of the round. Swans must navigate around these hazards to avoid injury.
4. Explain food gathering:
 - **Fall Migration:** Canada to the Greater Yellowstone Ecosystem
Each swan must stop at two or more wetlands to rest and gather food. Only one card or token can be taken per swan per wetland. Swans can only remain in each wetland for a total of 10 seconds. Swans that do not gather 2 different colored tokens do not survive the migration and remain in the swan graveyard until the next round.
 - **Spring Migration:** Greater Yellowstone Ecosystem to Canada
Each swan must stop at three or more wetlands to rest and gather food. More food is needed in the spring due to lower fat reserves. Only one card or token can be taken per swan per wetland. Birds can only remain in each wetland for a total of 10 seconds. Swans that do not gather 3 tokens (at

least one of each color) do not survive the migration and remain in the swan graveyard until the next round.

5. Explain rounds:

Each round consists of a fall and spring migration. Swans in the graveyard rejoin the game at the start of each new round.

Round 1: Predator hazards only. Most swans should survive this round.

Round 2: Introduce fence and power line hazards. Fewer swans should survive this round.

Round 3: Remove fence and power line hazards and increase wetlands in conjunction with each correct answer to the following questions:

- How can humans decrease swan migration hazards?
- How can humans aid swans in their migrations?

Background Information

Trumpeter Swan (*Cygnus buccinator*)

Facts:

- Male: cob; Female: pen; Young: cygnet
- Bill is heavy and somewhat wedge-shaped in proportion to their large angular head.
- They have a distinct red border or stripe, like lipstick, on the edge of their lower mandible.
- Trumpeter Swans are known for their resonant, deep, loud, sonorous trumpet-like calls.

Size:

- Trumpeter Swans are the largest native waterfowl in North America.
- They have a wingspan of 7-8 feet and are about 4 feet tall.
- They weigh 21-30 pounds. (Female: 21-23 lbs/Male: 26-30 lbs)

Lifespan:

- Trumpeter Swans can live approximately 20 years in the wild.

Diet/Feeding:

- Their diet consists of aquatic vegetation, including Water Milfoil, Arrowhead, Bur-Reed, bulrush, and sedges.
- The swans' favorite food is Segó Pondweed.
- Swans can eat up to 20 lbs. of wet vegetation daily.
- Trumpeter Swans will strain aquatic plants and water with their serrated bills.
- They will uproot plants in water up to 4 feet deep.

Breeding Biology:

- Trumpeter Swans mate for life and may live for 20 years or more.
- They arrive at breeding grounds before ice melts in early spring.
- Their ideal habitat are large, shallow wetlands 1-3 feet deep, with a diverse mix of emergent vegetation and open water.
- Swans' courtship behavior includes bobbing heads and quivering their wings as they face each other.
- The Trumpeter Swan's nest diameter can be 6 ft or more and is usually surrounded by water.

- Eggs are laid in late April or early May, one egg every other day until the clutch of 5-9 is complete.
- The incubation period is about 33 days.
- Cygnet hatch in late May or early June.

Swan development:

- Cygnet are initially completely gray and gradually change white throughout their first winter and spring.
- They weigh about 7oz. at birth but within 75 days, they can weigh over 15 lbs.
- During their first summer, cygnets have pink bills with black tips.
- Their bills turn black during their first winter.
- For the first 10-20 days, cygnets rely solely on insects kicked up by adults foraging for food and they start feeding on aquatic vegetation at 4-6 weeks old.
- Cygnet are fully feathered by 9-10 weeks.
- They are able to fly when about 15 weeks old or about 100 days
- Cygnet remain with their parents throughout the first winter and migrate back with them to breeding grounds.

Overwintering factors:

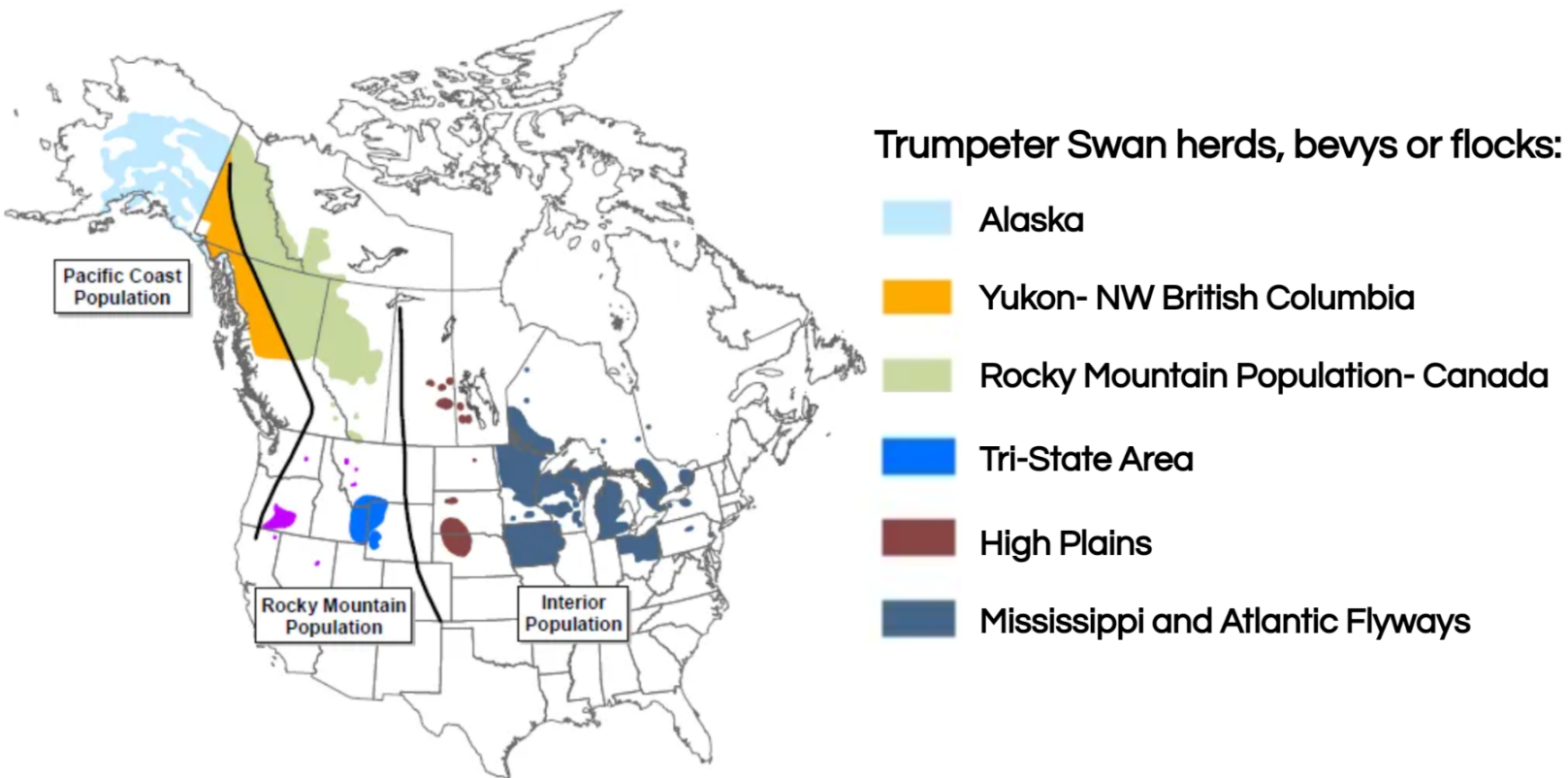
- Trumpeter Swans need open water to survive the winter so they can find food.
- Their feathers are extremely insulating.
- They have a countercurrent heat exchange system in their feet that keeps cold blood from entering the core of their bodies.
- They tuck their feet and bills into their feathers when temperatures drop to reduce body heat loss.
- If the pond or lake they have chosen to overwinter on freezes, Trumpeter Swans will wait until it thaws/opens back up rather than wasting energy to fly somewhere else.
- They store fat as a reserve while waiting for the thaw.
- During winter, adult Trumpeter Swans watch while their young eat so cygnets can get all the food they need without burning fat.
- A Trumpeter Swan family will eat approximately 50-70 lbs. of food daily.
- Their main predators are foxes and coyotes.

Limiting factors:

- Trumpeter Swans need open water to survive the winter so they can find food.
- There is limited wintering habitat/limited wetland areas in the Greater Yellowstone Ecosystem (GYE).
- Canadian birds leave in spring to find nesting sites in Montana.
- GYE permanent birds have to wait until the snow melts to build a nest; sometimes, if there is a late spring, they may not nest that year.

Current populations:

- There are approximately **5,000** permanent Trumpeter Swan residents in the GYE.
- There are about 100 Trumpeter Swans outside of the GYE during summer.
- The rest of the local population of swans are primarily Alaskan and Canadian swans overwintering in the GYE, Montana, and Idaho.



Reflection/Evaluation

As a reflection and evaluation activity, students can answer the following questions. They can also be evaluated on how well they participated and followed directions.

- **How does this activity model Trumpeter Swan migration?** *Students (Trumpeter Swans), taggers (predators), ropes/yardsticks (fences and power lines), bike tires/hula hoops (open water), tokens/cards (food), graveyard (dead swans)*
- **When do Trumpeter Swans migrate?** *Each fall to wintering grounds and each spring to breeding grounds*
- **Why do Trumpeter Swans migrate?** *Trumpeter Swans depend on aquatic vegetation, which is only accessible in unfrozen waters.*
- **What are the hazards to Trumpeter Swan migration?** *Power lines, fences, illegal hunting, predators like foxes and coyotes, wetland draining, and lack of habitat*
- **How can humans decrease swan migration hazards?** *Place flagging on power lines, move power lines underground, and remove fencing around wetland areas*
- **How can humans help swans during migration?** *Preserve, improve, and increase wetland habitats along swan migration routes*