

**INFO for the  
TEACHER**



**BACKGROUND**

**W**hen you had breakfast this morning, did you think about who grew that food? It was almost certainly a farmer, and that farmer had to think about many things when producing it. What to plant? When to plant it? How to manage the soil? How to harvest it? How to manage pests? How the weather will affect the crop? And where to sell the product? With all these considerations, it is no wonder that farmers are busy people.

Another consideration is how a farm functions as habitat for wildlife. Many animals use farmland as habitat, and most people love to see their populations flourish. Because farmers are so busy, and have many financial pressures, they sometimes need help to support wildlife populations. That is where the Delta Farmland & Wildlife Trust (DF&WT) comes in.

The Delta Farmland & Wildlife Trust helps farmers make decisions that are good for the soil and support wildlife, including Snow Geese, ducks, hawks, herons, small mammals, coyotes and pollinators. Because improving the soil and building habitat for wildlife costs money, DF&WT helps farmers by sharing the cost of these practices. When farmers partner with DF&WT, they are encouraged to create all kinds of habitat for wildlife on their farms. This habitat includes shrubby hedges, grassy field margins, old, grassy fields and cover crop fields in the winter.

**LOCAL AGRICULTURE BACKGROUNDER**

Economically, about twenty five cents of every dollar earned on farmland in British Columbia comes from Metro Vancouver, where crops range from potatoes, peas, broccoli and other vegetables to cranberries and blueberries, and even some grains. There are about 4,200 farm owners in Metro Vancouver, which is not a lot when you consider that the total population is 2.5 million. In fact, that means that less than one percent of people living in the region are farm owners.

In 1973 large parcels of fertile land were protected by the provincial government, and that is one of the major reasons why so much of Metro Vancouver remains farmland instead of being houses, roads and businesses. Twenty two percent of Metro Vancouver land is agricultural, though only half of it is actively used for farming. The other half is either not usable as farmland or the land-owners have decided not to farm it.

Of the agricultural land in Metro Vancouver, the largest chunk is in Langley (37%), followed by Delta (15%), Surrey (14%), Pitt Meadows (10%), Richmond (8%) and Maple Ridge (6%), with other municipalities contributing one percent or less to the total amount of farmland. In Delta, about 40% of the land is agricultural.



**WHAT IS A COVER CROP?**

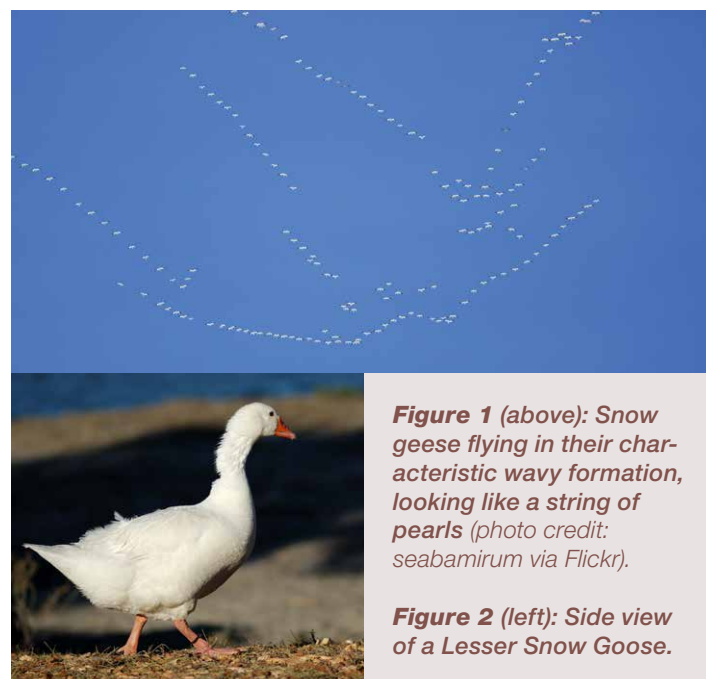
In our climate, most vegetables are grown during the summer. What happens to the field during the winter? If the farmer leaves it bare after harvesting the vegetables, the soil is exposed to the rain and some of it might wash away. Soil is very precious to farmers, and they don't like to lose any of it. As a solution, they can plant a different crop, known as a cover crop, which grows all winter and protects the soil. In our region there are lots of ducks and geese in the winter, and they like to eat cover crops.

# Snow Geese and Agriculture

## WHAT ARE THE WILDLIFE IN THIS REGION?

If you look closely and pay attention, you might find all kinds of wildlife on the farmland of Delta, from scampering coyotes to scuttling shorebirds, from large Bald Eagles to tiny insects, from quiet songbirds to loud waterfowl like ducks, geese, and swans. Some are more commonly found in the summer, but many are more commonly found in the winter, and a lot of the wildlife in the area is feathered. The Fraser River Delta supports large populations of birds, particularly during the winter months. The area is internationally recognized as an Important Bird Area, designated as a Wetland of International Significance, includes a National Wildlife Area and a Migratory Bird Sanctuary, and is a favourite spot for many birders.

There is one population in particular that young and old flock to Delta to see every year: the Lesser Snow Goose. This beautiful white bird is very gregarious, flying in a wavy line resembling a string of pearls (See Figure 1) and overtaking farm fields in dense mats of white. We are lucky that the Snow Geese we see in Delta are unique: they breed on a small island of the coast of Siberia, in Russia, called Wrangel Island. In the fall, new families of geese migrate south and spend part of their winter on the Fraser River Delta.



**Figure 1** (above): Snow geese flying in their characteristic wavy formation, looking like a string of pearls (photo credit: seabamirum via Flickr).

**Figure 2** (left): Side view of a Lesser Snow Goose.

## WHY DO SNOW GEESE LIKE AGRICULTURAL LAND?

Food, food, food: nutritious, easily digestible, abundant food. Snow Geese are also social animals, and one reason they use farmland is because their friends and family do. Geese also flock together on farms for safety; the more snow geese there are on a field, the more likely they are to detect a predator. Every year young geese go exploring, finding new areas to feed and rest. Did you know that Snow Geese only started using agricultural land here in the 1970's? It was thanks to young, 'pioneering' geese.

## HOW DO FARMERS HELP TO SUPPORT SNOW GEESE?

Snow Geese are hungry when they get to Delta, and they will eat all kinds of plants, even rotting potatoes. There used to be lots of areas for them to feed like marshes and grasslands, but with much of that area converted to housing, roads or buildings, the geese are 'squeezed' on to the remaining green areas, which are mostly farmland. Especially when it is stormy and the marsh is flooded, geese need farm fields. On farm fields Snow Geese will eat green hay fields, unharvested vegetables, and cover crops.

Instead of leaving their fields bare over the winter, some farmers choose to plant a cover crop. This crop does not necessarily provide a harvestable commodity, but it protects the soil, enriches the soil with organic matter, prevents nutrients from washing away, and in Delta, feeds hungry geese. In this area the most common cover crop is barley, a cereal grass.

Snow Geese love to eat cover crops. While some farmers are happy to see wildlife populations flourish, many are concerned that their cover crops, which could have protected their soil over the winter, are eaten away bit by bit until almost nothing is left on the field. Luckily in Delta there is an organization that will help farmers with the cost of planting a cover crop (Delta Farmland & Wildlife Trust). For over 25 years the Delta Farmland & Wildlife Trust has helped incentivise cover cropping in an area where it might otherwise not happen, benefitting Lesser Snow Geese in Delta.

# Lesson 1: Snow Goose Game

**Note:** There are two different variations of this lesson for Grades 4 to 7 (pages 3–6) and Grades K to 3 (pages 3–4, 6).

## 1 EXPLAIN ABOUT SNOW GEESE IN DELTA

### INTRODUCTORY DISCUSSION

- Have you ever visited a farm?
- Where can we find farms near Vancouver? Or in BC?
- What grows on a farm?
- Does anything grow on a farm during the winter?
- What is a cover crop?
- Why is it better to grow a cover crop than to leave a field empty?
- What kinds of wildlife use farmland?
- What kinds of birds use farmland?
- Why do birds use farmland?

### OBJECTIVES

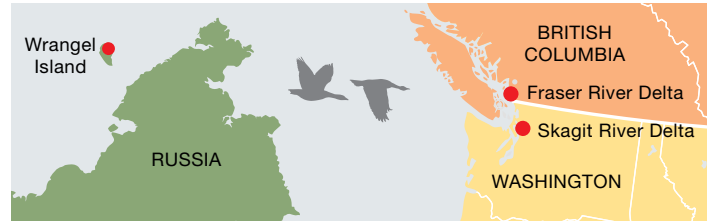
- Explore how cover crops benefit snow geese
- Understand role of a DF&WT cost-share payment in encouraging cover crops
- Discover how the farm landscape contributes to wildlife needs

### MATERIALS

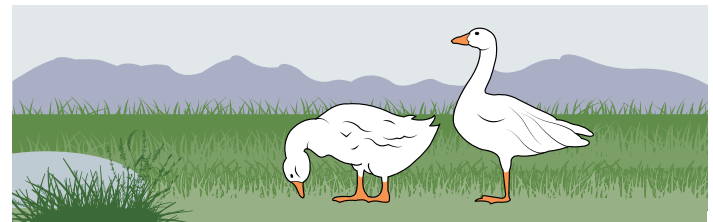
- **Habitat cards** (3 Marsh, 1 Parking Lot, 1 Building, 2 Hay field, 5 Harvested Potato field, 5 Harvested Potato Field with Cover Crop)
- **Photos of Snow Geese**
  - <https://www.reifelbirds sanctuary.com/snow.html>
  - <https://deltafarmland.ca/resources/farmland-wildlife/waterfowl/lesser-snow-geese/>
  - <https://www.ducks.org/conservation/national/photo-essay-wonders-of-the-white-geese> (has lots of nice photos)
  - <https://www.flickr.com/photos/eriagn/8079494352>
- **Videos of Snow Geese**
  - <https://www.youtube.com/watch?v=0D8hENj6QCo> (this is the best video of the bunch)
  - <https://www.youtube.com/watch?v=21-GpU77byk>
  - <https://www.youtube.com/watch?v=W1XKD8rn4-0>
  - need to check audio on these videos to make sure they are appropriate
- **Map of migration route**
  - <http://birdsofwinter.org/snow-geese-of-the-pacific-flyway/>
  - note that size of circles does not represent populations, it represents the geographic area that geese visit

### PREPARATION

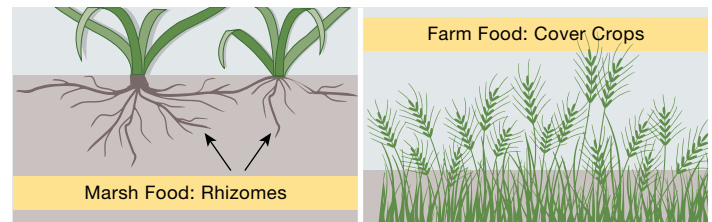
- Make sure the cards are prepared before class.
- Optional: Have students draw/create the cards beforehand



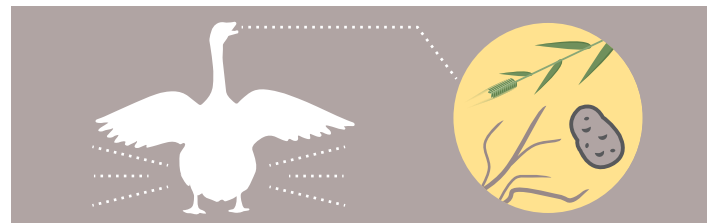
They are a special population that migrates from Wrangel Island, Russia to the Fraser and Skagit River Deltas every year. Their population has varied significantly over the years and is currently about 100,000.



In the late 1970's some of the geese discovered that the farmland in Delta was a great place to feed and rest. Since then they have been using the farmland a lot, and they are even exploring further and further east.



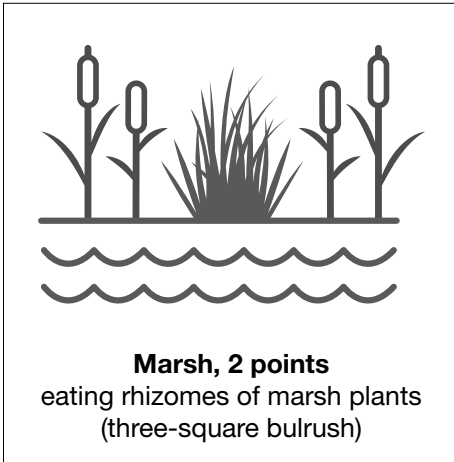
They eat plants. On the marsh they eat rhizomes (underground stems), and on land they eat the green part of cover crops as well as other leftover vegetables on the field. Cover crops are planted during the winter to protect the soil, and they also feed ducks and geese.



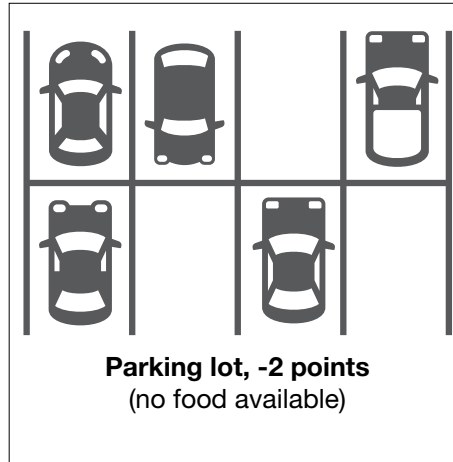
Snow Geese have a big appetite – they need to get fat so that they will have enough energy for their northward migration in the spring

# Lesson 1: Snow Goose Game

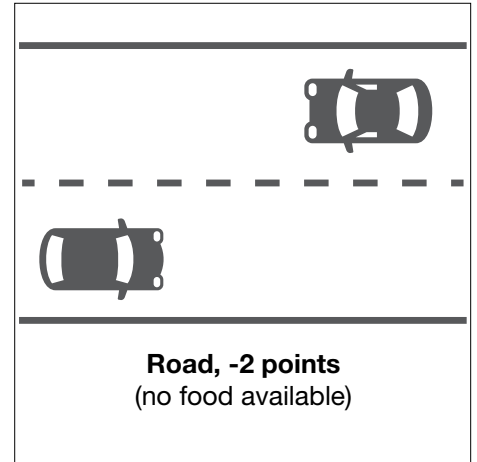
## 2 GO OVER THE HABITAT CARDS



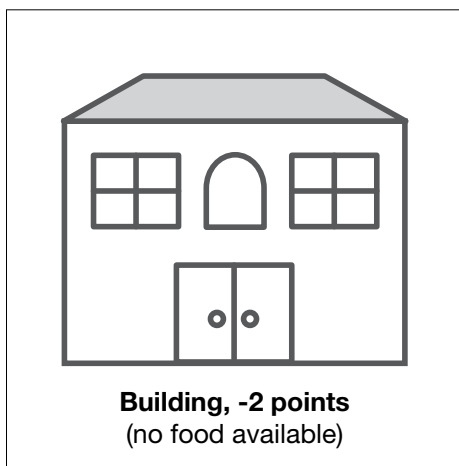
**Marsh, 2 points**  
eating rhizomes of marsh plants  
(three-square bulrush)



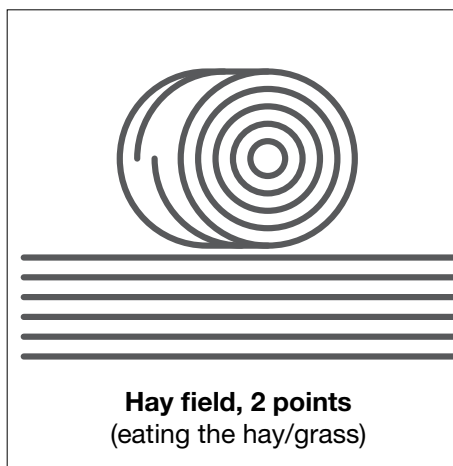
**Parking lot, -2 points**  
(no food available)



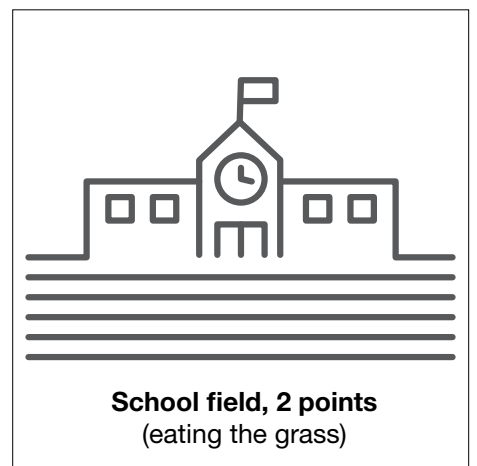
**Road, -2 points**  
(no food available)



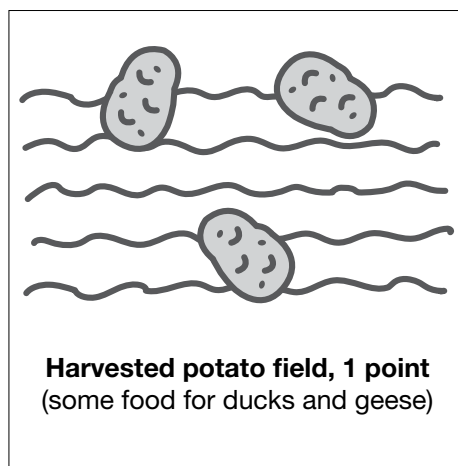
**Building, -2 points**  
(no food available)



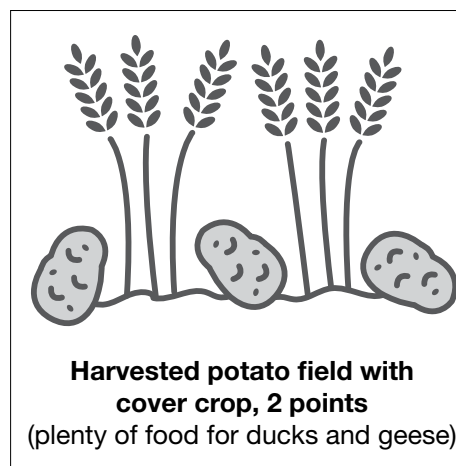
**Hay field, 2 points**  
(eating the hay/grass)



**School field, 2 points**  
(eating the grass)



**Harvested potato field, 1 point**  
(some food for ducks and geese)



**Harvested potato field with cover crop, 2 points**  
(plenty of food for ducks and geese)

# Lesson 1: Snow Goose Game

## GRADES 4 TO 7

### 3 PLAY THE GAME

#### OBJECTIVE OF THE GAME:

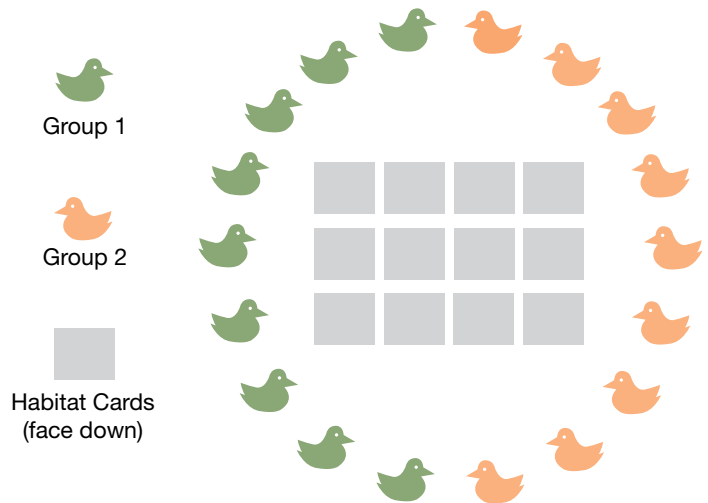
- Each round represents the fate of one goose
- You are trying to determine whether the goose will have enough energy to migrate to Wrangel Island
- The more points you get, the more energy/fat the goose has
- The idea of the game is to get at least 3 points, with 10 turns

#### WHICH CARDS TO USE:

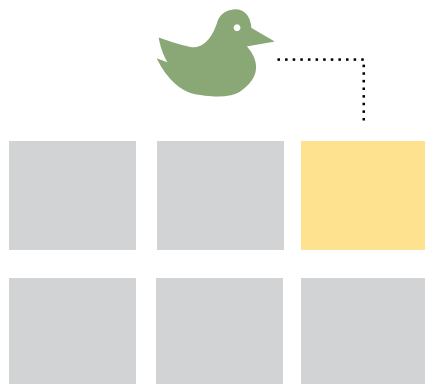
Scenario 1, group 1 and 2	Scenario 2, group 1 and 2
<ul style="list-style-type: none"> <li>• 2 Marsh</li> <li>• 1 Parking Lot</li> <li>• 1 Road</li> <li>• 2 Building</li> <li>• 1 Hay Field</li> <li>• 1 School Field</li> <li>• 4 Harvested Potato</li> </ul>	<ul style="list-style-type: none"> <li>• 2 Marsh</li> <li>• 1 Parking Lot</li> <li>• 1 Road</li> <li>• 2 Building</li> <li>• 1 Hay Field</li> <li>• 1 School Field</li> <li>• 4 Harvested Potato with Cover Crop</li> </ul>

#### SETTING UP:

- Get the students into a circle
- Place the 12 habitat cards from Scenario 1 in the table to the left face down on the floor inside the circle of students
- Divide the class into two groups.

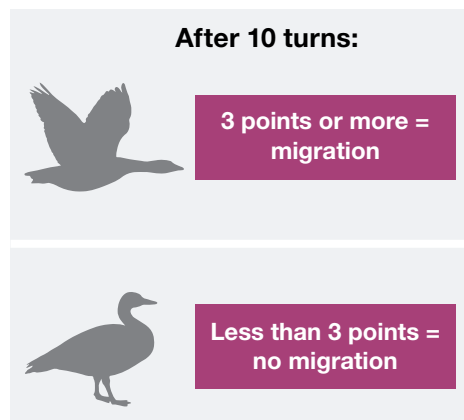


#### PLAYING THE GAME:



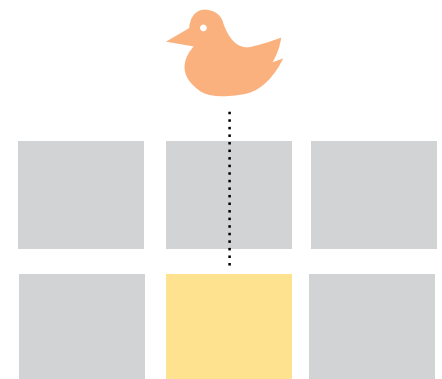
#### STEP 1

- One student from Group 1 picks the first card to turn over.<sup>1</sup>



#### STEP 2

- Continue go around the circle and ask students from Group 1 to turn over cards, for a total of 10 turns.
- Elicit from students why certain habitats are worth more points than others (i.e. when there is more food, there are more points)
- If after 10 turns the goose has 3 points, it will be able to migrate North to Wrangel Island.



#### STEP 3

- Once Group 1 is finished, repeat steps 1 and 2 with Group 2.
- The group with the most points is able to migrate quicker and is the winner of that round.

#### STEP 4

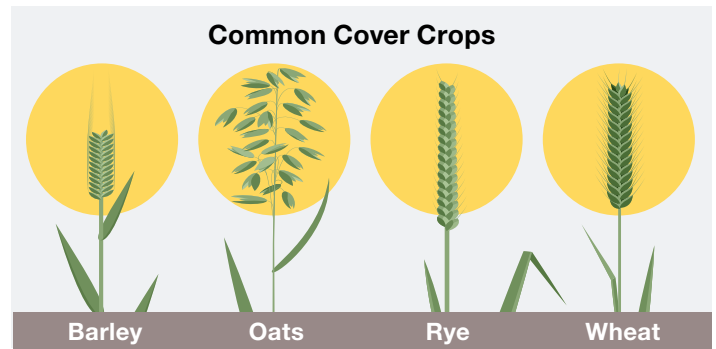
- Place the cards from Scenario 2 (see table above) face down in the middle of the circle. Play one more round, starting with Step 1.

<sup>1</sup> Choose who goes first in a group by asking a skill testing question and pick who answers it correctly. Sample skill testing question: What percent of land in Metro Vancouver is agricultural? (Answer: 22 percent)

# Lesson 1: Snow Goose Game

## FOLLOW UP QUESTIONS – GRADES 4 TO 7

- Cover crops help geese. How do we encourage them to be planted?
  - This is an opportunity for the teacher/instructor to discuss the partial payments that the Delta Farmland & Wildlife Trust gives farmers, sharing in the cost of cover cropping
- If you were a farmer, would you plant a cover crop? Why/why not?
- What is your main concern as a Snow Goose?



## GRADES K TO 3

### 1 EXPLAIN ABOUT SNOW GEESSE IN DELTA

See page 3.

### 2 GO OVER THE FOOD STOPS

Explain to the students that they are hungry geese, and they want to eat as much as possible so that they can migrate north

Go over the “Food Stops,” (the Habitat Cards, see page 4) explaining that geese need to eat a lot before migration, so that they have energy to fly.

### 3 PLAY THE GAME

#### SETTING UP:

- Get all of the students to sit in a circle
- Place all 16 of the “Food Stop” cards face down in the middle of the circle

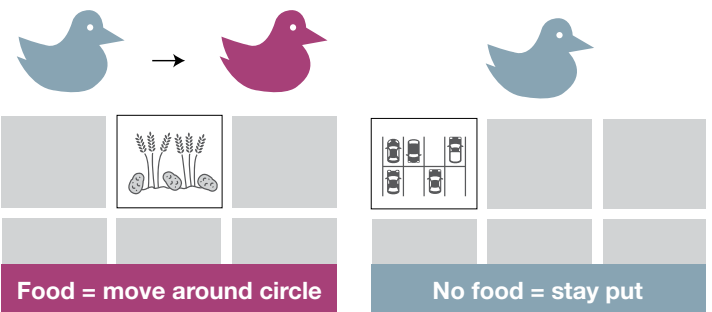
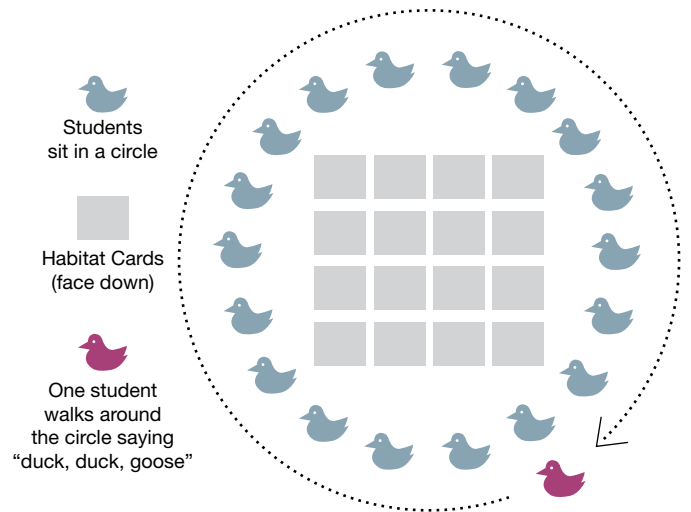
#### STEP 1

- Play a modified version of “Duck duck goose”, but note that there is no running around the circle in this game.
- The first child picks a “goose” by going around the circle saying “duck, duck, duck, (etc) goose!”
- That goose (instead of running around the circle) will flip over one habitat card.

#### STEP 2

- With each food stop pause to discuss whether there is anything to eat on at that food stop. If it has more than 0 points, there is something to eat
- If there is something to eat, they can choose the next “goose” by walking around the circle saying “duck, duck, duck (etc) goose!”
- If there isn’t anything to eat they have to stay put because they don’t have energy to fly, and the person who chose them gets to go again.

### Playing the “Duck, Duck, Goose” Game



#### FOLLOW UP QUESTIONS:

- How did the food stop change whether you could ‘fly’ or not?
- Do you think food stops have the same effect on real geese?
- What would be your favorite food stop, as a goose?
- What was better for geese, a harvested potato or a harvested potato with a cover crop?

# Lesson 2: Field Detective

## OBJECTIVES

- Learn about how biologists measure impacts of wildlife
- Learn about what 'clues' there are on the farmland

## MATERIALS

- Photos from farmland:
  - Exclusion tent (small structure that blocks geese from feeding underneath it)
  - Field that has been mostly grazed
  - Waterfowl poop on a field
  - Piece of plant with bite mark(s)
  - Intact cover crop field
  - Waterfowl on a field (SNGO)
  - Footprints on a field

Photos can be found in the separate Field Detective Photos document on the [spec.bc.ca](http://spec.bc.ca) website.

## ACTIVITY, GRADES K TO 7

### STEP 1

- Have students divide into groups of 2 or 3

### STEP 2

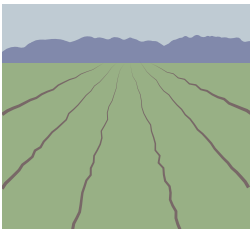
- Show a farmland photo to the class and ask groups whether the field had Snow Geese feeding on it or not
- After showing the photo, students have 1-2 minutes to discuss whether there was any feeding on a given photo
- Choose a few groups to report back with their conclusion and how they reached it.

### STEP 3

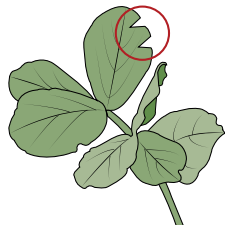
- Reveal the answer and the reason (see answer key on page 8 and follow up questions below) and repeat Steps 1 and 2 for the other photos.

## FOLLOW-UP QUESTIONS

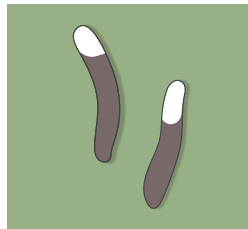
- What are some of the things to look for when determining whether a field has had Snow Geese on it?



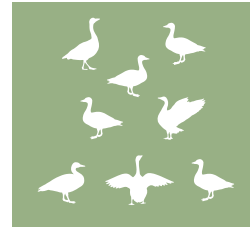
Is the whole field green?



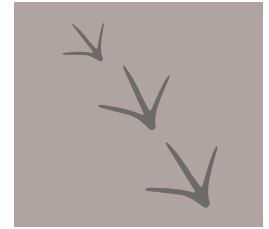
Are there bite marks on plants?



Is there any poop on the field?



Are there ducks or geese on a field?



Are there footprints on the field?

- What makes it easier and harder to tell if there have been snow geese on a field?
  - Easier: direct evidence (presence, footprints, droppings)
  - Harder: indirect evidence (lack of plants)
- Why do you think Snow Goose choose certain fields over others?
  - Many possible reasons!! Examples include more food, some water on field, other snow geese present, close to their water resting habitat...
- **Grade 7** – If you were a farmer, would you plant a cover crop if you knew it was going to be completely grazed by hungry waterfowl and as a result would provide minimal benefit to your soil? If there was a program to support you with the costs of planting a cover crop would that change your decision?
  - Costs associated with planting a cover crop vary from \$50-100/acre. DF&WT offers a \$50-55/acre cost-share payment to offset a portion of the total cost. This cost-share payment provides enough of a financial incentive to encourage farmers to plant a cover crop despite the high level of waterfowl grazing that occurs.
  - Farmers are aware of the additional benefits that cover crops provide including reducing soil erosion, reducing soil compaction and improving soil fertility. It is for this reason that farmers also spend their own time and money to plant cover crops for the winter season.
  - Without any financial support however, the costs can be too high. This can discourage a farmer from planting a winter cover crop, which reduces the quantity of food for hungry waterfowl and leaves the soil at risk of degradation.

# Lesson 2: Field Detective

## ANSWER KEY FOR WINTER COVER CROP PHOTOS

### Question: Were there ducks or geese on this field?

- 1. No.** This is a lush cover crop field, and an example of a field that has no waterfowl damage. Notice how green it is, how the whole field is the same colour, and if you look closely, the barley leaves end in a point, showing that they were not bitten off by a duck or goose.
- 2. Yes.** What is this?? You guessed it, it's a waterfowl turd. Ducks and geese poop every 10-20 minutes, and finding their poop on a field indicates that they were there.
- 3. Yes.** There are two clues on this field, the poop is the same as the previous clue... what else do you see? The pattern on the soil is caused by slippery footprints of waterfowls' webbed feet.
- 4. Yes.** The structure in the photo is called an "Exclusion Tent," because it excludes (keeps out) ducks and geese. Is the grass more lush in the tent? If so this indicates that ducks/geese ate the grass everywhere else.
- 5. Yes.** At the edge of the field, the grass is lush and green, but in the middle of the field the grass is shorter and is a more drab, brownish colour. This shows that there were ducks and geese feeding in the middle part of the field.
- 6. No.** Notice that the blades of grass go all the way to a point. If they had been nibbled on by a duck or goose, they would have a bite-mark out of them, and the end would be wide and jagged.
- 7. Yes.** Notice that at the end of the grass, there is a bite-mark taken out and the end is not pointy. This means that a hungry duck or goose had a mouthful.
- 8. Yes.** This white feather came from a Snow Goose, and finding it means that Snow Geese were on this farm field.
- 9. No.** The grass and clover in this photo look like no ducks or geese took a bite out of them, so there were no hungry ducks or geese on this field.
- 10. Yes.** This is a tough one, but think back to the lush cover crop you saw in the first photo. Compared to that, the grass on this field is shorter, and some clumps of grass have been eaten more than others.
- 11. Yes.** Based on what you've learned already, what does the shape of this grass tell you?
- 12. Yes.** What are all those animals on the field? Ducks! Finding them on a field shows that it was used by ducks or geese.
- 13. Yes.** There are two clues in this photo. One is the Exclusion Tent, which shows that the ducks and geese have been eating grass. The second is the ducks on the field.
- 14. Yes.** There is a sea of white on the field in this photo. Those are Snow Geese.
- 15. Yes.** In the foreground, there are bits of plants that have been trampled, and bite marks out of the grass. In the background there are white shapes that are probably Snow Geese.
- 16. Yes.** What is this called? That's right, and Exclusion Tent. This one shows that ducks and geese have been busy on the field.
- 17. No.** This farmer is driving his tractor on a lush, green field that shows no signs of visits from ducks or geese.
- 18. Yes.** This is the view of a farm field with Snow Geese on it from an airplane. Cool, right?

### OTHER IDEAS

- Label the parts of a goose, draw freehand, or from diagram?
- Letter scrambles of key words
- Field trip to Reifel Bird Sanctuary in Delta to see Snow Geese