

Migration Cycles



Section 3 Wetland Activities WETLAND INHABITANTS

Grade: 6 - 9

State Standard: Math A-3, A-4
NGSS: MS-LS1-4.,MS-LS2-4.
MS-LS2-5.,MS-ESS3-4.
HS-LS2-1

Subjects: science, mathematics,
language arts

Skills: addition, subtraction,
multiplication, division,
calculating percentages

Duration: one class session

Group Size: small group

Setting: indoors

Vocabulary: predator, prey,
habitat, wetlands, migration

Objectives:

Students will:

1. Learn about the population dynamics of migrating birds.
2. Learn about problems birds face during migration and nesting.
3. Learn that birds need wetlands as migration stopovers.
4. Use basic math skills to calculate changes in population size.

Method:

Students play a board game that simulates bird migration from the nesting area in Alaska to the wintering area and back again.

Complementary Activities:

Migration Headache

Background

See INSIGHTS, Section 3 Wetland Inhabitants
“Amphibians in Alaska” fact sheet.

Materials:

Migration Game board (xeroxed larger), Migration
Game directions, die, markers, score sheet.
(see p. 161)

Procedure:

Groups of 2 – 5 can follow the directions to play the board game.

MIGRATION GAME DIRECTIONS

1. Each player needs one die, a pencil and paper, and a marker.
2. All players begin the game with a flock of 15 young birds. Each player should record the initial number of birds in their flock on their paper.
3. The player who rolls the highest value gets to have the first turn.
4. A player rolls the die to determine how many squares to advance. The square on which the player lands will then require that the player either add or subtract from their total number of birds in their flock. The player must then



record the number of birds lost or gained, the reason for the population change and the ending number of birds, on the sheet of paper.

5. If a player lands on a Weather Chance or Predator Chance, he or she needs to roll the die again to determine his or her fate. See the Fate Table below.

Fate Table		
Roll of Die	Weather Chance	Predator Chance
1	Storm (-1)	Fox (-1)
2	High Winds (-1)	Gull (-1)
3	Fair Weather (0)	Mink (-1)
4	Low visibility (-1)	Fox didn't see you due to your camouflage (+1)
5	Tailwind (+1)	Humans disturbed your nest (-1)
6	Sleet (-1)	Fought off predator (+1)

6. Players travel twice around the board. At the completion of year 1, each player calculates how many young are produced, and determines the final number of young birds in his or her flock as follows:

STEP 1. Calculate the number of nesting pairs in your flock. Divide the number of birds in your flock by two (one male and one female are needed for each nest). (*Note: if the number in your flock is odd, then use the closest lower even number. For example, if you had 7 birds in the flock, the number of nesting pairs would be $6 \div 2 = 3$.*)

STEP 2. Roll the die to determine the average number of young in each nest (clutch size).

STEP 3. Calculate the number of young produced. Multiply the number of nesting pairs by the average number of young produced per nest.

STEP 4. Calculate the new size of your flock. Add the number of young produced to the total number of birds in your flock.

For example, say at the end of the year there were 8 birds in the flock, so there were 4 nesting pairs. You rolled the die and obtained a value of 3 for an average clutch size. $4 \times 3 = 12$, so there were a total of 12 young produced at the end of the year. $12 + 8 = 20$, so the final size of the flock is 20.

8. The winner of the game is the player who gets the largest flock.

ADVANCED VERSION

A. Early Nesters Have Higher Success: Due to short summers in northern areas, only a short time is available for nesting. Birds that arrive on the nesting grounds and nest early in the season have a higher nesting success than later nesting birds. Nests built later in the summer also mean that young may not have enough time before freeze-up to store up fat required for the long migration south.

To incorporate this factor, limit the time available for northward migration. If it takes more than five turns for the flock to reach the nesting area, nesting success is reduced. Subtract 10% of the young reproduced for every turn over five. For example, if it takes 7 turns to reach the nesting area, subtract 20%. If originally you would have had 12 young produced, subtract 2.4 ($.20 \times 12$), for a final number of young produced of 11.6. (*In this exercise, each bird represents hundreds of birds in reality, thus the relevance of the decimal*).

B. Not all birds nest: Some of the birds in the flock may not be mature or healthy enough to breed. Account for this reduction in potential nesters as follows: toss the die once and multiply the number on the die by 5. This is the percentage of birds in the flock that do not nest. Determine the total number of nesting pairs from your calculation of the number of birds that DO nest.

For example, say you rolled a 6. Then 30% of the birds in your flock do not nest. Or, 70% of the birds DO nest. If there were 8 birds in your flock at the end of the year, then 5.6 ($= .70 \times 8$) birds nest, and you have 2.8 pairs ($= 5.6 \div 2$).



Evaluation

- Students present bar graphs showing the number of birds that died, and number of birds born for each flock.
- Students write a story detailing the year in the life of their flock and the challenges to survival the birds faced.

Curriculum Connections:

(See Appendix for full citations)

Books:

The Atlas of Bird Migration: Tracing the Great Journeys of the World's Birds. (Elphick, 1995).

Winged Migration (Perrin 2003).

Wetlands (Finlayson and Moser 1991).

Video:

Winged Migration (Perrin 2000).



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