CANADIAN WILDLIFE FEDERATION

20 minutes

Fish Fate

Learning Objectives

Students will:

- Recognize positive and negative factors in the environment affecting fish populations.

Method

Students will play a board game introducing them to a broad range of environmental factors that can affect fish populations. They will use math skills to track population fluctuations.

Materials

For each group:

- A die
- Fate cards (enclosed)
- Game board (enclosed)
- Calculator (optional but helpful)

For each student:

- One button or another place marker

Background

This activity highlights a wide range of conditions that can affect fish populations. Depending on the local situation, many factors may be both beneficial and hazardous to a fish population. The main factors that can change our water quality and quantity, are space, food and shelter.

Humans can introduce disturbances that affect the habitat of fishes and other aquatic animals. Loss of natural vegetation due to the development of agriculture or urbanization may result in decreased groundwater (e.g., springs) or surface water (e.g., land runoff from rain) supplies to a stream. Loss of groundwater can also mean the loss of fishes, such as the Brook Trout, which rely on cold groundwater for spawning and rearing young.

Changes in drainage may result in physical changes to a river channel, changes in erosion and sedimentation, and loss of fish species. Increasing land erosion can cause excess nutrients in the water – called eutrophication - that could encourage excessive aquatic plant production. Practices such as intensive cash cropping and urban development may worsen the problem.

Inputs of nutrients from sewage treatment plants, feedlot operations and industry also promote aquatic plant production. When concentrations are high enough, they can have adverse effects. Specific habitats such as spawning areas, juvenile or nursery habitats, and winter habitats are particularly vulnerable. For example, the ideal spawning habitats for Brook Trout are pure spring water upwelling areas with low sediment loads, while those of the Northern Pike are floodplain pools that are flooded for at least one month from mid-April to mid-May.

The habitat requirements of juvenile Brook Trout are shallow, still waters at the margins of streams. In contrast, juvenile Northern Pike requires vegetated areas where they can attach themselves to submerged blades of grass in back bays. The size and depth of pools are important for the winter habitat of juvenile Smallmouth Bass in rivers.

In Advance

Make copies of the game board and fate cards for each student group.

- Game boards and fate cards can be mounted on bristol board and laminated.
- Fate cards are placed face down on the board.

Activity

1. Organize students in groups of two to four to play this game and explain the following rules:

Rules for Fish Fate

a) Each player selects a button or a place marker to represent their fish population and places it at the Start. Each player begins with 50,000 fish. Throughout the game, each player must keep a running record on paper of the size of their fish population using math skills or calculators.

b) Have students determine who goes first. Use only the 1, 2 or 3 on the die. If students roll a 4 or 6, they should halve their move, (i.e., 2 or 3). If they roll a 5, they must pick up a fate card.

c) The first player throws the die and moves the number of spaces on the dice (i.e., 1,2 or 3). If the player lands on “fate”, the player must select a fate card. The fate card will tell the player what to do or how many fish to add or subtract from their population.

d) If a player loses all their fish during the game, they are out of the game

e) The game continues until all players have completed the course

f) The player who reaches the end of the game with the biggest fish population wins.

2. After students have played “Fish Fate” once, discuss the hazards and benefits on the fate cards and game board. Wherever possible, the situations in the game should be translated into local incidents or personal experiences to have more meaning for the students.

Evaluation

- Have students identify three factors which might reduce fish populations and discuss ways to eliminate those factors.

Extensions

- Have students make their own hazard and benefit cards.
- Have students start the game with different population sizes. Students could determine the sizes and randomly draw for them.
- Have students investigate the factors affecting fish populations or a species that is of particular interest to them in their local area. They can use this information to design their own game.

For additional resources visit:

CanadianWildlifeFederation.ca/Education

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FISH FATE CARDS Page 1

Zebra mussels outcompete for plankton in your habitat.
Many young fish starve.

Subtract 2200 fish

Farmers install off-site watering systems and fence the streams on their property to keep cattle from wading into them.

Add 875 fish

A sewage plant's equipment fails. Waste in the water uses up oxygen.

Subtract half of your fish

A builder constructs new homes away from the fish habitat.

Add 1429 fish

Great Blue Herons eat young fish.

Subtract 1000 fish

A factory installs new pollution control equipment.

Add 2750 fish

Concerned "fish helpers" begin programs to protect fish habitats.

Add 2258 fish

Plants grow in streams and help protect the young fish fry.

Take another turn

A parasite infects your fish population.

Subtract 800 fish

Cattle are allowed into a stream and pollute the water.

Subtract 1800 fish

A power plant takes in water from fish habitats to cool machines. Young fish get trapped in the intake pipe.

Subtract 1110 fish

Create a hazard.

Subtract 500 fish

Lake is stocked.

Add 2000 fish

Create a benefit.

Add 500 fish

FISH FATE CARDS Page 2

A landowner cuts down trees along a shoreline, and the sediment washes into a stream.

Subtract 750 fish

Heavy rains cause shorelines to flood and creates a new habitat, so many more eggs and fry survive.

Add 2500 fish

Sport fishing is restricted this year because of low numbers of fish.

Take another turn

Waste from a factory pollutes the water and causes many algae to grow. The algae die and use up oxygen in the water.

Subtract 900 fish

A predator fish is stocked in the same lake as your fish population.

Subtract 1000 fish

An invasive fish species is eliminated from the area.

Add 750 fish

New houses were built on a landfill marsh. Fish spawning areas have been destroyed.

Subtract 1000 fish

A farmer plants cedar trees along the river running through this property and shades the stream.

Add 1577 fish

The insect population has doubled in size. Many young fish survive.

Keep this card to cancel your next loss of fish

Create a benefit.

Add 500 fish

Pesticides kill aquatic insects.

Lose one turn while your fish move to new feeding areas

An oil tanker has had a severe spill.

You are left with only 800 fish

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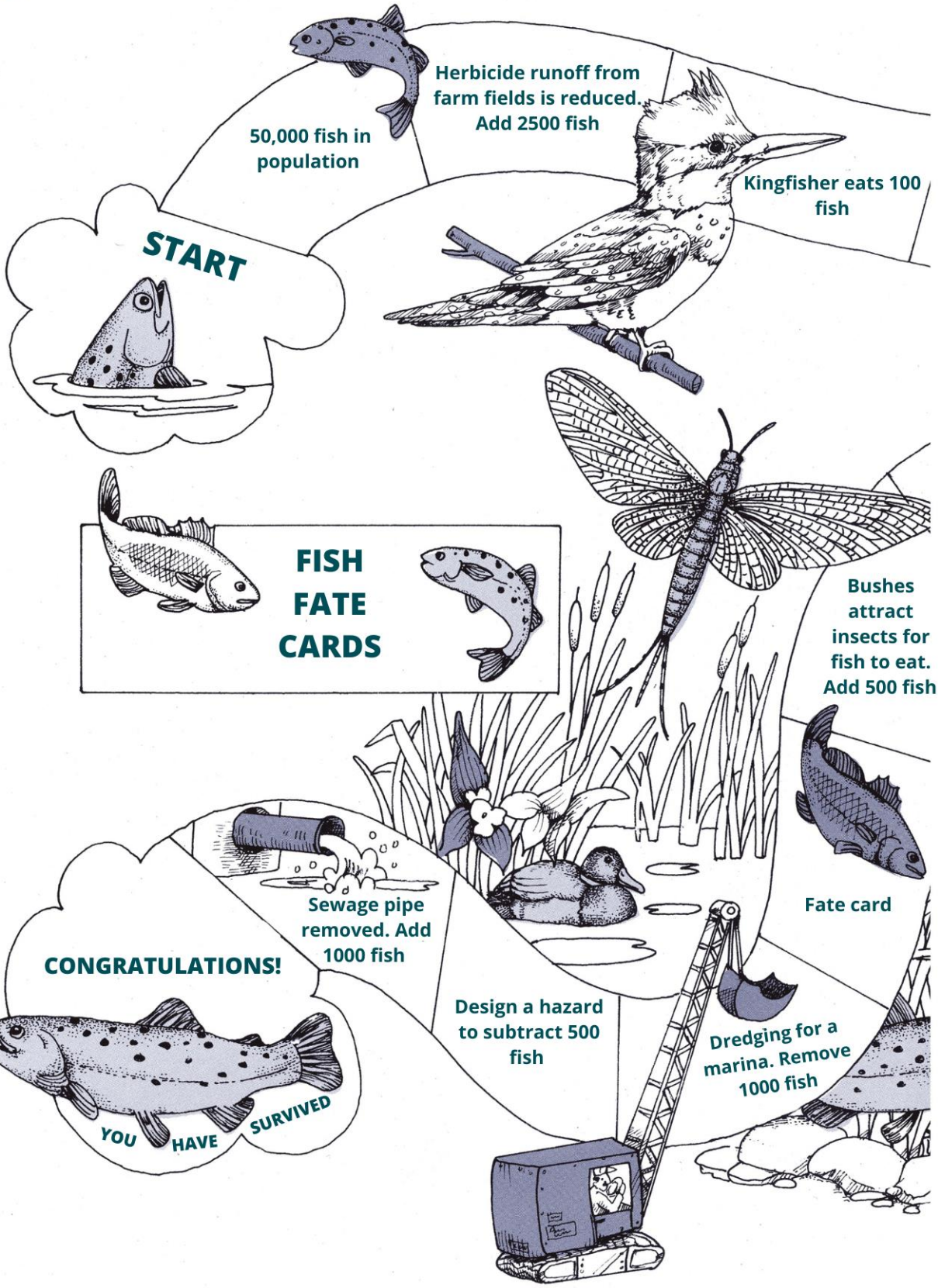
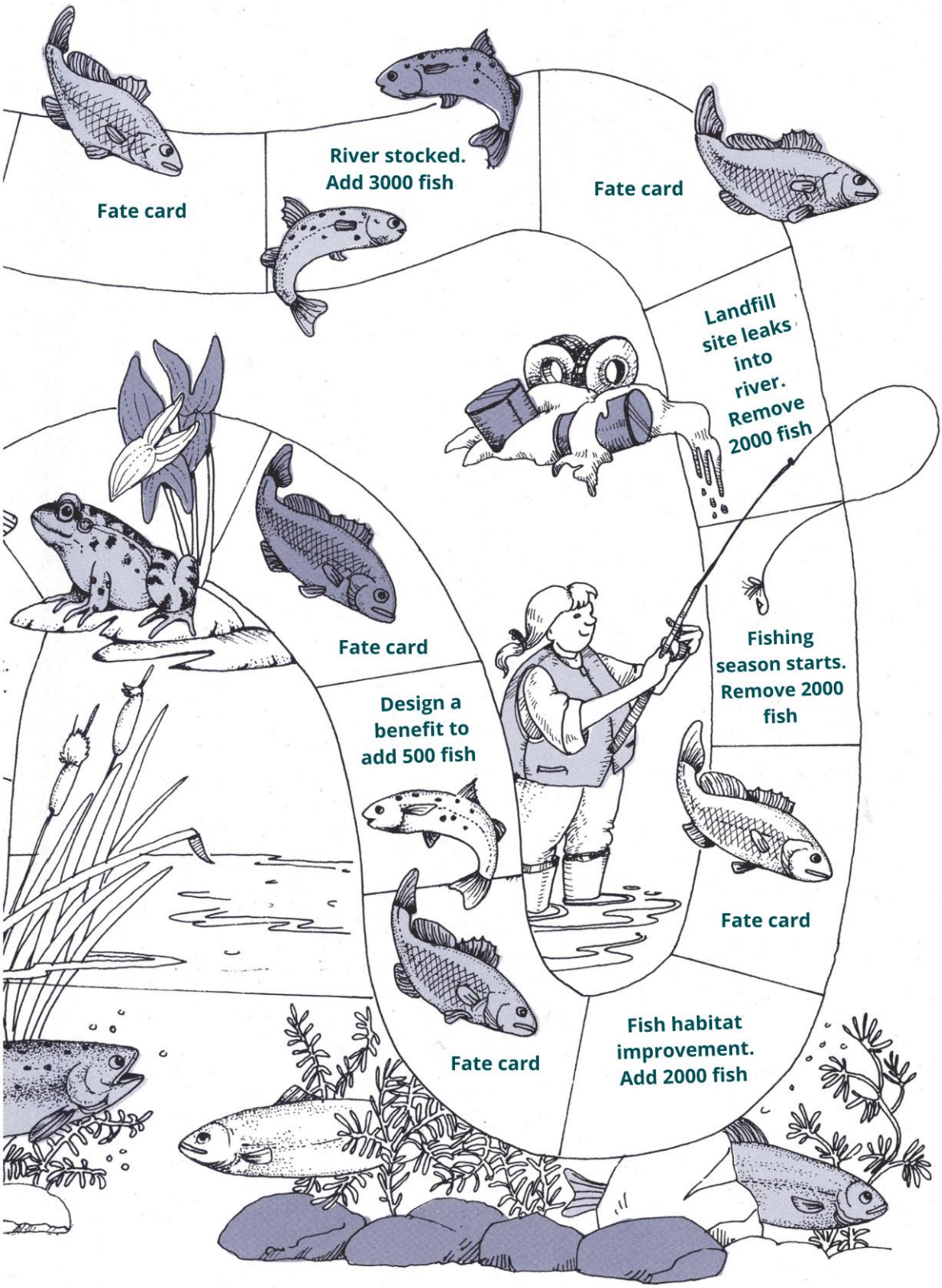
Fish Fate




Fate card
River stocked. Add 3000 fish
Fate card
Landfill site leaks into river. Remove 2000 fish
Fate card
Fishing season starts. Remove 2000 fish
Design a benefit to add 500 fish
Fate card
Fate card
Fish habitat improvement. Add 2000 fish