

**Vocabulary**

**Density Dependent** – the abundance of resources like food and water depend on the number of individuals consuming them. Example: the # of predators depends on the # of prey (food source)

**Density Independent** – When environmental conditions (fire, drought, freeze, tornado, seasonal change) cause the entire population to die at the same rate. The number of individuals in the area has no effect on environmental conditions. Example: Mosquitoes die in the winter because they can’t survive the extreme cold.

**Carrying Capacity** – The maximum amount of individuals (population size)

that an environment can successfully support.

**YELLOW PERCH IN LAKE WINNIPEG**

Located 217 meters above sea level, Lake Winnipeg is a shallow lake composed of two basins: a wide north basin and a narrow south basin. On average, Lake Winnipeg is only 12 meters deep and receives 517 millimeters of precipitation annually. Lake Winnipeg provides a habitat for over 50 different species of fish including yellow perch, chestnut lampreys and rainbow smelt.

Yellow perch prefer water that has little current. They can tolerate moderate turbidity. Also, they prefer a temperature range of 18 to 20 degrees Celsius. If the temperature of the water varies too much above this range, yellow perch will either move to a new location or die.

Yellow perch spawn in May or early June when water temperatures are above 6 degrees Celsius. First, they migrate to tributaries and then several males attend a female while she releases her eggs.

Yellow perch can grow to 302 millimeters in length. Their life span is approximately 9 years. If there is a lack of resources, or too many perch (over-population), yellow perch adapt by stunting. This means that instead of starving, they simply do not grow as large as normal. Thus, they are able to live off less food.

Yellow perch feed in midwater or on the bottom of Lake Winnipeg. They eat a wide variety of invertebrates, and fish such as emerald shiners. The eyes of yellow perch allow them to see almost 360 degrees around them. Thus, they are better able to spot their prey and evade predators.

In Lake Winnipeg, yellow perch are eaten by northern pike and walleye. They are also caught for food by commercial fishers and anglers.

Chestnut lampreys are also found in Lake Winnipeg. Lampreys are parasitic fish that attach to other species of fish (such as yellow perch) to feed on their blood and tissues.

Data Table

Yellow Perch in Lake Winnipeg

|  |  |
| --- | --- |
| Year | Population |
| 1997 | 10,000 |
| 1998 | 13,000 |
| 1999 | 15,000 |
| 2000 | 16,000 |
| 2001 | 16,000 |
| 2002 | 12,000 |
| 2003 | 11,000 |
| 2004 | 13,000 |
| 2005 | 14,000 |

Recently, rainbow smelt have been introduced into Lake Winnipeg. Rainbow smelt are a very invasive and competitive species. They have been thought to cause a decrease in the emerald shiner population.

Lake Winnipeg provides a home for many species of fish. However, a severe drought could disrupt this ecosystem greatly. Lake Winnipeg’s water level would drop, the temperature could change and it could become more turbid. Thus, the carrying capacity of the lake would change.

But, in its current condition, Lake Winnipeg is an excellent habitat for many species of fish.

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**YELLOW PERCH IN LAKE WINNIPEG: QUESTIONS**

1. Explain the difference between **density independent** and **density dependent** limiting factors.

2. Identify as many limiting factors from the reading as possible and classify them as density independent or density dependent in the space below.

**Density DEPENDENT Limiting Factors**

**Density INDEPENDENT Limiting Factors**

**Each of the statements below involves a situation that will affect the growth of a population.**

**Classify each of the statements as DD (density dependent) or DI (density independent).**

1. Rainbow smelt and yellow perch attempt to occupy the same area. The more aggressive smelt survive; the perch do not.
2. A severe flood brings a lot of sediment and silt into Lake Winnipeg. The turbidity of the lake increases greatly.
3. A drought decreases the water level in Lake Winnipeg. The carrying capacity of the lake decreases.
4. Due to the introduction of rainbow smelt, Lake Winnipeg becomes crowded and some fish species do not survive.
5. Since northern pike prey on yellow perch, an increase in the perch population causes an increase in the pike population.
6. Many fish die due to an increase in water temperature.
7. Due to over-fishing, the number of walleye in Lake Winnipeg decreases.
8. Since lake sturgeon migrate long distances to spawn, many do not survive the trip.

**YELLOW PERCH IN LAKE WINNIPEG: GRAPHING**

1. Create a line graph of the yellow perch population using the data table.

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1. The yellow perch carrying capacity is approximately \_\_\_\_\_\_\_\_\_ and was reached in the year/s\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. What do you think the population of yellow perch will be in 2006? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Provide probable reasoning as to why the population dropped and then started going up again.

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