

# ***Fisky Fort Trail [Stops 1-10]***

## **STOP 1**

### **Aquatic Ecology - 2 points**

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A) Within a lake ecosystem, energy is continuously flowing and biomass is being produced or broken down. Scientists have developed several terms to describe these processes, Three of these terms are listed, below. Beside each of these terms, write the letter of the definition, below, which applies to that term.

TERMS	DEFINITIONS
i) Standing crop _____	1) the rate of production per unit time
ii) Biomass _____	2) the weight of organic matter which can be sampled or harvested at any one time from an area
iii) Productivity _____	3) the weight of all living material in a unit area at a given time

B) True or False. Circle the best answer. (0.5 pts)

Biomass can be low, while productivity is high (e.g. when grazing and predation rates are high). Likewise, biomass can be large, while productivity is low (e.g. when grazing and predation rates are low).

True

False

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	A) (1.5 pts in total, 0.5 pts each) i) 2 ii) 3 iii)1 B) True (0.5 pts)
Reference:	Limnology, A Brief Treatise on Eutrophication, Standing Crop, Biomass & Productivity

## ***Fisby Fort Trail [Stops 1-10]***

### **Forestry - 10 points**

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- A) How have Aboriginal people historically passed on Traditional Ecological Knowledge (TEK) from generation to generation? (1 point)
  
- B) On the map provided, there is information indicated about the area. Which items (labeled from a to f) were most likely determined through the collection and interpretation of TEK. (3 points)
  
- C) List three steps taken to transfer TEK to map form. (3 points)
  
- D) Why might an Aboriginal community make a map containing TEK? (2 points)
  
- E) Why are some locations kept secret? (1 point)

TABLE:	1
Stop Attendant:	0,
Equipment:	two maps to be provided
Answer:	<ul style="list-style-type: none"> <li>A) story telling or spiritual practice,</li> <li>B) good moose hunting area, sacred site, and rare medicine,</li> <li>C) interview elders, translate, visit sites with GPS, transfer points to map,</li> <li>D) to demonstrate areas of significance to industry and government planners, to preserve areas of interest, to maintain TEK for future generations,</li> <li>E) some locations are kept secret because people who use resources in those areas are protecting their continued use and access to that resource.</li> </ul>
Reference:	Envirothon workshop handouts and talk, and model forest link - <a href="http://www.modelforest.net/cmfn/en/">http://www.modelforest.net/cmfn/en/</a>

## ***Fisky Fort Trail [Stops 1-10]***

### **Soils and Land Use - 2 points**

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A) What order would this monolith belong to? (1 pt)

B) Under what type of vegetation would this profile develop? (1 pt)

TABLE:	1
Stop Attendant:	1, An Envirothon volunteer
Equipment:	Luvisol Soil monolith, and CSSC (Canadian System of Soil Classification)
Answer:	A) Luvisol (one mark) B. Forested vegetation (one mark)
Reference:	A and B): Canadian System of Soil Classification pg 4

### **Wildlife - 2 points**

Using the Plants of the Western Boreal Forest and Aspen Parkland field guide provided at this stop, identify the plants in these two (2) photos. (2 pts – 1 pt ea)

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Photo 1 - \_\_\_\_\_

Photo 2 - \_\_\_\_\_

TABLE:	0
Stop Attendant:	1, An Envirothon volunteer
Equipment:	Plants of the Western Boreal Forest and Aspen Parkland field guide and two plant photos
Answer:	1 point for each: TBD
Reference:	Common knowledge on using field guides

## ***Fisky Fort Trail [Stops 1-10]***

### **Theme - 2 points**

Define the four (4) terms list below: (2 pts – 0.5 ea)

Permeability:

Unsaturated zone:

Percolation:

Confining bed:

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TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	<p>Permeability - a measure of water's ability to flow through a geologic deposit, dependent on the shape and size of pores in the deposit and their interconnection.</p> <p>Unsaturated zone - subsurface region above the saturated zone where pore spaces contain air and water.</p> <p>Percolation - water infiltrates into the soil slowly seeps downward under the force of gravity.</p> <p>Confining bed - a geological deposit of low permeability that impedes the flow of groundwater.</p>
Reference:	Ontario Envirothon 2009-2010 Current Issue Module: Protection of Groundwater. page 5-6

# ***Fishy Fort Trail [Stops 1-10]***

## **STOP 2**

### **Aquatic Ecology - 10 points**

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Install an unused filter paper in the filtration funnel. Using the small jar supplied, collect a sample of lake water from the pail (supplied), and filter 100 ml of this lake water using the filtration apparatus. Carefully remove the filter paper and examine it. Compare it visually to the sample filter paper on display through which has been filtered 100 ml of water taken from campground water supply system (from nearby faucet). Based on your observations, answer the following questions.

A) Circle the name of the filter that contains the greater amount of residue. (1 pt)

Lake water filter

Campground water filter

B) Circle the number of the listed phrase that most accurately completes the following statement: (1 pt)

The purpose of filtering this water is...

( i ) to make the lake water safe for drinking

( ii ) to separate the dissolved and particulate fractions

( iii ) to determine if the water is pure

C) If we were to analyze the residue on the lake water filter, list five things that you would expect it to contain. (5 pts - 1 pt ea)

(i) \_\_\_\_\_

(ii) \_\_\_\_\_

(iii) \_\_\_\_\_

***Fisby Fort Trail [Stops 1-10]***

(iv) \_\_\_\_\_

(v) \_\_\_\_\_

D) The campground does not have an elaborate water treatment facility, but the water in its supply system is considered safe to drink (potable). Given this information, and your observations of the campground water filter, what is the most probable source of the water used in the campground? (1 pt)

E) In the list, below, circle the two (2) chemicals that would probably be found in highest concentrations in the campground water? (1 pt – 0.5 pts ea)

- |           |         |         |           |
|-----------|---------|---------|-----------|
| arsenic   | calcium | iron    | magnesium |
| manganese | radium  | uranium |           |

F) To what quality of water do these two chemicals contribute? (1 pt)

TABLE:	1
Stop Attendant:	1, John Shearer
Equipment:	Two (2) complete sets of the following items: Table for filtration apparatus, side-arm filtration flask with attached suction tubing and hand-operated vacuum pump, stopper with attached two-piece filtration funnel and clamp, 47 mm diameter GF/C filter papers (1 per team plus extras), container (pail) containing lake water for filtering, display filter through which 100 ml of campground water has been filtered, small jar for collecting lake water to be filtered.
Answer:	a) Lake water filter (1 pt) b) (ii) (1 pt) c) Possible answers include:

## ***Fisby Fort Trail [Stops 1-10]***

	algae or phytoplankton; zooplankton or copepods, cladocerans or daphnia, rotifers, mites; silt or clay particles or soil particles; dead plant material; insects; pollen; etc. (1pt per correct answer for a total of 5 pt) d) groundwater or underground water or well water (1 pt) e) calcium and magnesium (The others could be present in very low concentrations, but would be toxic in higher concentrations) (0.5 pt each for 1 pt total) f) hardness (1 pt)
Reference:	Site Training workshops Aquatic Sampling Techniques Water Quality Groundwater in Manitoba, p. 22-26

### **Forestry - 2 points**

A) Circle the best response. (1 pt)

Which of the following are features of a forest certification standard?

- i) is based on an open process
- ii) includes continual improvement
- iii) produces repeatable and consistent independent audits
- iv) scientifically supported
- v) all of the above

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B) What does PSP stand for? (1 point)

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	1. e) all the above, 2. Permanent Sample Plot
Reference:	Sources – Forestry handouts, Forest Certification Resource Centre

## ***Fisky Fort Trail [Stops 1-10]***

### **Soils and Land Use - 2 points**

A) Rotational grazing is the grazing of livestock in a controlled and grouped movement around a pasture, to allow for regrowth of vegetation. There are some benefits to the soil as well as the vegetation when implemented. Pick the two (2) most likely benefits from the list below. (2 pts – 1 pt ea)

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- Improved soil texture
- Uniform nutrient distribution from manure
- Reduced soil erosion
- Increased moisture holding capacity
- Decreased soil acidity

TABLE:	0
Stop Attendant:	0, forestry person
Equipment:	
Answer:	the two correct answers are: Uniform nutrient distribution from manure and reduced soil erosion; one mark each for a total of two marks
Reference:	Agriculture Outlook 2006-2010

### **Wildlife - 2 points**

Define the term “Carrying Capacity” with respect to wildlife species.

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TABLE:	0
Stop Attendant:	0, An Envirothon volunteer
Equipment:	
Answer:	2 points - The number of animals that an area will support without damage to the habitat or the species is called the carrying capacity.
Reference:	Wildlife binder - Ecology and Wildlife Management, page 13

## ***Fishy Fort Trail [Stops 1-10]***

### **Theme - 2 points**

Climate change is predicted to reduce precipitation and increase temperature during the summer months. List two possible impacts on groundwater as a result of these conditions.  
(2 pts – 1 pt ea)

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TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	1) less precipitation to supply surface for groundwater recharge 2) higher temperatures increase evaporation and reduce surface water supplies for ground water recharge.
Reference:	Ontario Envirothon 2009-2010: Protection of Groundwater page 12

## ***Fisby Fort Trail [Stops 1-10]***

### **STOP 3**

#### **Aquatic Ecology - 2 points**

A) What is an integrated watershed management plan? (0.5 pts)

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B) Using the map provided, list three (3) partners that would be included in discussions related to the development of an integrated watershed plan for Lake Winnipeg. (1.5 pts – 0.5 pts ea)

TABLE:	0
Stop Attendant:	0,
Equipment:	Map of Lake Winnipeg Watershed
Answer:	A) An integrated watershed management plan describes the actions needed, over time, to achieve a sustainable, healthy watershed. B) United States (0.5) Saskatchewan/Alberta (0.5) Conservation Districts/Cities/Government of Manitoba/Non Profit Groups/Federal Government (0.5)
Reference:	A and B): IWMP Brochure

#### **Forestry - 2 points**

Using the Field Guide provided or your own general knowledge, please identify these native tree species, using either the common or scientific name: (2 pts – 1 pt ea)

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A) \_\_\_\_\_

B) \_\_\_\_\_

TABLE:	1
Stop Attendant:	1, forestry person
Equipment:	native tree species branch samples, Native Trees of Manitoba
Answer:	tbd, at stop are WS, WB, CW, SCOTSP
Reference:	Native Tree Guide

## ***Fisky Fort Trail [Stops 1-10]***

### **Soils and Land Use - 2 points**

Name four micronutrients essential for balanced plant nutrition. (2 pts – 1 pt ea)

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TABLE:	0
Stop Attendant:	0, forestry person
Equipment:	
Answer:	Four of the following: zinc, boron, chloride, copper, iron, manganese, molybdenum, sulfur, magnesium (two points total for the four elements)
Reference:	Soil & Plant Ecology Teacher's Manual pg 32

### **Wildlife - 2 points**

A) Spruce Woods Provincial Park is part of which terrestrial ecozone?

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B) Circle the best answer. (1 pt)

How many square kilometres does this ecozone span?

- i) 5.2 square kilometres
- ii) 5,200 square kilometres
- iii) 520,000 square kilometres
- iv) 5,200,000 square kilometres

TABLE:	0
Stop Attendant:	0, An Envirothon volunteer
Equipment:	
Answer:	(1 point each) A) Prairie B) iii
Reference:	Wildlife binder - Environment Canada – An Introduction to Ecozones, page 52

## ***Fisby Fort Trail [Stops 1-10]***

### **Theme - 10 points**

Pour water into the cylinders as directed by the stop attendant

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A) List the materials from the highest porosity to lowest. (4 pts – 1 pt ea)

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

B) Rank the permeability of the materials from highest to lowest. (4 pts - 1 pt ea)

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

C) Explain the relationship between porosity and permeability (2 pts)

TABLE:	1
Stop Attendant:	1, An Envirothon volunteer
Equipment:	4 Cylinders of materials for water infiltration tests
Answer:	A) clay, silts, sand, gravel B) gravel, sand, silts, clay C) Porosity is the percentage pore space. Higher porosity materials allow greater infiltration than soils with little structure. Permeability - large pore spaces between soil particles, allowing water to quickly percolate to the ground water.
Reference:	Ontario Theme A) 36-37 B)40-41 C) 40-41

# ***Fishy Fort Trail [Stops 1-10]***

## **STOP 4**

### **Aquatic Ecology - 2 points**

Wetlands provide a number of valuable functions, identify four (4) of these functions. (2 pts – 0.5 pts ea).

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TABLE:	1
Stop Attendant:	0,
Equipment:	
Answer:	A water filtration system...removing contaminants, suspended particles and excessive nutrients, improving water quality and renewing water supplies.(water purification and sinks for pollutants) An irreplaceable habitat...nesting, feeding and staging ground for several species of waterfowl and other wildlife such as reptiles and amphibians, and also for many species at risk. A high quality spawning and nursery area for many species of fish. Natural shoreline protection...protecting coastal areas from erosion. A reservoir...helping to control and reduce flooding through water storage and retention. (flood peak modification in watershed and shoreline protection A source of oxygen and water vapour...playing a vital role in the natural atmospheric and climatic cycles. Recreational activities...hiking, bird watching, hunting and fishing. Economic Values - forestry (peatlands softwood and wetlands hardwood); wild rice; hay harvesting; commercial and native harvesting of mink, muskrat and beaver and other wetland dependent game; commercial fisheries non-consumptive recreation (photography, bird-watching and education)
Reference:	Aquatic Ecology: Wetlands Answers

### **Forestry - 2 points**

A) What is the purpose of a preharvest survey? (1 point)

B) What does the term TSP stand for ( 1 point)

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TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	A) identifies values in an attempt to mitigate impacts of forest management activities on sensitive sites, waterways, wetlands, wildlife and their habitat and conserve biodiversity. B) Temporary Sample Plot
Reference:	A) PHSurveys, MC website, B) workshop training

## ***Fishy Fort Trail [Stops 1-10]***

### **Soils and Land Use - 10 points**

Refer to the soil pit found at this stop.

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- A) Using the hand texturing guide provided, what is the soil texture of the A horizon? (1 pt)
- B) Using a ruler, what is the soil depth of the A horizon? (1 pt)
- C) Are there carbonates present within the soil profile, and if so, at what depth? (1 pt)
- D) Using the Munsell colour chart, what is the colour of the parent material ? (1 pt)
- E) Using the Canadian System of Soil Classification, key out the soil to the subgroup level; (Hint: Not a Podzol) (6 pts – 2 pts ea)
  - i) Soil Order: \_\_\_\_\_
  - ii) Great Group: \_\_\_\_\_
  - iii) Subgroup: \_\_\_\_\_

TABLE:	1
Stop Attendant:	1, An Envirothon volunteer
Equipment:	hand texturing guide, ruler, dilute acid for carbonate test, Munsell colour chart, & the Canadian System of Soil Classification & THE SOIL PIT
Answer:	This is a 10 mark question, broken down accordingly; a-d are TBA, for one mark each & e-g are TBA for two marks each
Reference:	The Canadian System of Soil Classification handbook

### **Wildlife - 2 points**

Use the 2009 Manitoba Hunting Guide at this stop to answer the following questions.

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- A) Determine which game hunting area (GHA) or Zone the Spruce Woods Provincial Park is located. ( 1 pt)
  
- B) What are the season dates for the "First Deer" in the white-tailed deer season using a muzzleloader?

## ***Fishy Fort Trail [Stops 1-10]***

TABLE:	0
Stop Attendant:	0, An Envirothon volunteer
Equipment:	2009 Hunting Guide
Answer:	(1 point each) A) GHA 30 or Zone E B) Oct. 19 to Nov. 8
Reference:	Wildlife binder - Fur Bearers of Canada, page 1

### **Theme - 2 points**

A) Indicate two (2) forms of groundwater contamination that could occur at this site location. (1 pt – 0.5 pts ea)

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_

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B) Indicate two (2) factors that impact the vulnerability of groundwater contamination from agriculture. (1 pt – 0.5 pts ea)

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	Part A 1) fertilizer 2) pesticides Part B permeability, depth to bedrock, depth to groundwater
Reference:	Ontario Theme document page 40

## ***Fishy Fort Trail [Stops 1-10]***

### **STOP 5**

#### **Aquatic Ecology - 2 points**

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A) What are the two (2) methods for measuring the area of a watershed? (1 pt – 0.5 pts ea)

B) Using the acetate provided at this stop, estimate the area of the watershed marked on the topographic map. (1 pt)

TABLE:	1
Stop Attendant:	0,
Equipment:	Topographical Map, Acetate
Answer:	a) Dot Grid, Planimeter b) TBD
Reference:	A and B): Envirothon Resources - Information Sheet: How to read a topographic map and delineate a watershed?

#### **Forestry - 2 points**

A) Circle the best answer. (1 pt)

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Which greenhouse gas is sequestered by trees as they grow?

- i) methane
- ii) carbon dioxide
- iii) carbon monoxide
- iv) nitrous oxide
- v) all of the above

## ***Fisky Fort Trail [Stops 1-10]***

B) Circle the best answer (1 pt)

What is the one best forest practice to increase carbon sequestration?

- i) reforestation
- ii) deforestation
- iii) afforestation
- iv) harvesting
- v) preservation

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	1. ii – carbon dioxide, 2. iii – afforestation
Reference:	Resource: "What Trees Can Do to Reduce Atmospheric CO2" pages 2 & 3

### **Soils and Land Use - 10 points**

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- A) What two (2) things would one look for to distinguish a horizontal change when examining a soil profile? (2 pts – 1 ea)
- B) Determine the soil texture of a soil that has 30% clay, 60% sand, 10% silt and 3% organic matter using the textural triangle. (2 pts)
- C) Explain the presence of stones within the profile found at this stop. (2 pts)
- D) What type of profile would this be considered (2 pts)
- E) Using the Canadian System of Soil Classification, what order would this soil fall into ? (2 pts)

TABLE:	0
Stop Attendant:	1, An Envirothon volunteer
Equipment:	Soil textural triangle, the Canadian System of Soil Classification, and a soil pit
Answer:	a. change in colour & structure / b. Sandy clay loam /c. water deposition of stones due to flooding /d. Cumulic/ e. Regosol (Each worth 2 marks for a total of 10)
Reference:	a. &b April workshop the rest from the Canadian system of soil classification

## ***Fishy Fort Trail [Stops 1-10]***

### **Wildlife - 2 points**

Name two (2) of the three main strategies all animals use to survive cold winters.  
(2 pts – 1 pt ea)

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- 1) \_\_\_\_\_
- 2) \_\_\_\_\_

TABLE:	0
Stop Attendant:	0, An Envirothon volunteer
Equipment:	
Answer:	1 point for any of the following: migration, dormancy and toughing it out
Reference:	Wildlife binder - Animal Adaptations, page 32

### **Theme - 2 points**

List the four (4) Physiographic regions of Manitoba (2 pts – 0.5 pts ea)

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- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	1) Hudson Bay Lowland 2) Precambrian Shield 3) Manitoba Lowland 4) Manitoba
Reference:	Ground water in Manitoba page-3

# ***Fishy Fort Trail [Stops 1-10]***

## **STOP 6**

### **Aquatic Ecology - 10 points**

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Along with biological and chemical measurements, it is important to determine certain physical parameters of a water body. As a fisheries biologist you are here to determine the cross sectional channel area, flow, and discharge of this creek. Please show your work, equations used, and the correct units where appropriate.

**CIRCLE WHICH SAMPLING STATION YOU TOOK MEASUREMENTS AT:**      1      or      2

- A) To determine the cross sectional area of this creek's channel you need to measure depth at various widths. The number of measurements typically depends on the size of the stream. If there is insufficient water then a "hypothetical" water surface will be provided (blue flagging tape). Take depth measurements where noted (with green flagging tape) on the measuring tape and record in the appropriate places below. (2.5 pts - 0.5 pts ea)

Looking Upstream

Left Bank:	Width = 0 cm	Depth = 0 cm
	Width = _____ cm	Depth = _____ cm
	Width = _____ cm	Depth = _____ cm

Right Bank:    Total Width = \_\_\_\_\_ cm    Depth = 0 cm

- B) Plot the data collected from A on the sheet provided to you at this stop. Remember to label the x and y axis and include a scale. Be sure to put your team number on this sheet and to include it with the rest of your test. (4 points)
- C) Determine the cross sectional area of the channel using the data from A. (Show the equation and include the units). (pts??)
- D) Determine the creek flow (velocity) by using the flow meter provided at the site. Place the instrument in front of the yellow flagging tape OR if not enough flow use the

## ***Fisky Fort Trail [Stops 1-10]***

velocity figure provided by the Stop Attendant. Note your measurement below. Using the velocity measurement you just took, calculate the creek's discharge (Q). (pts??)

Velocity (v): \_\_\_\_\_

Discharge (Q): \_\_\_\_\_

TABLE:	1
Stop Attendant:	1, experienced envirothon volunteer
Equipment:	measuring tape (x2); metre ruler (x2); stakes; blue, green and yellow flagging tape; Flow meter (x2); sheet with graph /student;
Answer:	A) TBD, need to develop two sets of answer keys (for upstream and downstream stations) with a range
Reference:	Provincial Training Prior to the Field Test - Aquatics Training and handouts

### **Forestry - 2 points**

A) Circle the best answer. (1 pt)

While harvesting using a clearcutting system, it is possible to ensure conservation of wildlife habitat, natural beauty and other uses such as recreation.

True

False

<hr style="width: 50%; margin: 0 auto;"/> 2
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B) Circle the best answer. (1 pt)

What percentage of Manitoba's harvested lands receive silvicultural treatment?

i) 25%

ii) 35%

iii) 65%

iv) 75%

## ***Fisky Fort Trail [Stops 1-10]***

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	1. True, 2. iv
Reference:	1. Forestry Resource Guide – Tomorrow’s Forests, Today’s Challenge (Page 8) 2. Forestry Resource Guide – Manitoba’s Forests

### **Soils and Land Use - 2 points**

A) What are the three (3) mineral horizon designations of soil? (1.5 pts – 0.5 pts ea)

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B) What is one of the organic horizon designations? (0.5 pts)

TABLE:	0
Stop Attendant:	0, forestry person??
Equipment:	
Answer:	a. A-surface or topsoil; B-middle or subsoil; C-parent material. /b. organic horizons include O, Of, Om, Oh, LFH.
Reference:	Soil Management Guide pg 13.

### **Wildlife - 2 points**

Using the animal scat key provided, identify the two scat samples found in the jars at this stop. (2 pts – 1 pt ea)

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Sample A: \_\_\_\_\_

Sample B: \_\_\_\_\_

TABLE:	0
Stop Attendant:	1, An Envirothon volunteer
Equipment:	Two types of scat and scat key
Answer:	TBD
Reference:	Common knowledge for using keys

## ***Fisky Fort Trail [Stops 1-10]***

**Theme - 2 points**

Describe the process of soil salinization related to groundwater. (2 points)

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TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	Salinization occurs when conditions of low rainfall, high evaporation, high water table, and the presence of soluble salts in the soil co-occur. In poorly drained soils, where the water table is 3 m or less from the surface of the soil, water is unable to leach down , and instead rises to the surface by capillary action. In hot dry regions, this water leaves the surface of the soil through evaporation. Ground water contains naturally dissolved salts as the water evaporates, the salts are left behind.
Reference:	Ontario Envirothon 2009-2010 Current Issue Module: Protection of Groundwater. page 39

## ***Fishy Fort Trail [Stops 1-10]***

### **STOP 7**

#### **Aquatic Ecology - 2 points**

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The nearby Assiniboine River and its tributaries drains a significant portion of southeastern Saskatchewan and southern Manitoba. However, this region is experiences relatively low precipitation and high summer evaporation rates. Flows in the Assiniboine River are often low and this limited water supply is in demand for various purposes. List four (4) major competing needs/uses of Assiniboine River water. (2 pts – 0.5 pts ea)

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	Possible answers include the following: (Each correct answer is worth 1/2 pt to a maximum of 2 pt) <ul style="list-style-type: none"> <li>- maintenance of habitat for fish and other aquatic organisms</li> <li>- canoeing, swimming and other recreational use</li> <li>- sport fishing</li> <li>- watering livestock</li> <li>- irrigation</li> <li>- municipal water use</li> <li>- industrial water use</li> <li>- waste disposal</li> </ul>
Reference:	Water Use

## ***Fisby Fort Trail [Stops 1-10]***

### **Forestry - 10 points**

Forestry: Tree measurements. (10 Pts – as indicated)

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- A) Using the equipment provided, please measure the marked trees in this “Permanent Sample Plot” which was last measured in 1999 when the Manitoba Envirothon last used this site.. Record the information gathered in the correct places on the tally sheet and perform the calculations required. (9 Pts)

TREE					

Tree 2001 2006 Volume Change

Tree 1999 2010 Volume Change

Diameter Height Volume Diameter Height Volume

cm m m<sup>3</sup> cm m m<sup>3</sup> m<sup>3</sup>

A 35.6 13.4 0.53 42.5 (2) 16.6 0.846 (1) 0.316 (1)

B 38.2 9.0 0.41 41.4 15.0 (2) 0.734 (1) 0.324 (1)

Largest Height Increase (0.5) B (6m)

Largest Diameter Increase (0.5) A (6.9cm)

Largest Volume Increase (1) B (0.324m<sup>3</sup>)

(Grey equals information given)

## ***Fisby Fort Trail [Stops 1-10]***

TABLE:	0
Stop Attendant:	1, forestry person
Equipment:	diameter tape, suunto clinometer, volume table
Answer:	A) TBD, should develop a marking range where half points are given for "close" answers, B) dbh - diameter at breast height
Reference:	A and B): Forestry Equipment demonstration at Regional Workshop

### **Soils and Land Use - 2 points**

Using the soil capability for agriculture map provided, what is the agriculture capability rating of the predominant soil found in N1/2 of NW 1/4 12-8-14 W? (2 pts)

2
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TABLE:	1
Stop Attendant:	1, An Envirothon volunteer
Equipment:	Soil Capability for Agriculture map.
Answer:	50% class 2I and 50% class 3WS (two marks for complete answer)
Reference:	Source: Understanding Western Canada's Dominion Land Survey System.

### **Wildlife - 2 points**

A) What kind (?) of animal do you find evidence of at this stop? (1 pt)

2
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B) Why is it important for this animal to gnaw trees? (1 pt)

TABLE:	0
Stop Attendant:	0, An Envirothon volunteer
Equipment:	
Answer:	(1 point each) A) Beaver B) Beaver's teeth constantly grow; helps to keep their teeth worn down; grinds to sharpen them
Reference:	Wildlife binder - Fur Bearers of Canada, page 1

## ***Fisky Fort Trail [Stops 1-10]***

### **Theme - 2 points**

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 2

- A) What does UTM stand for? (0.5 pts)
  
- B) What does GPS stand for? (0.5 points)
  
- C) Your GPS unit gives you the coordinates 14U 0480902 5500711. How many kilometres are you from the equator? (1 point)

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	A) Universal Transverse Mercator (UTM) (0.5 points) B) Global Positioning System (GPS) (0.5 points) C) 5500.711 km (1 point)
Reference:	Training

## ***Fishy Fort Trail [Stops 1-10]***

### **STOP 8**

#### **Aquatic Ecology - 2 points**

At this stop use the Key to Manitoba's Sport Fish and Freshwater Fishes of Manitoba book to identify the four (4) fish to species (common name). (2 pts – 0.5 pts ea)

<hr style="width: 50%; margin: 0 auto;"/> <b>2</b>
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- A) \_\_\_\_\_
- B) \_\_\_\_\_
- C) \_\_\_\_\_
- D) \_\_\_\_\_

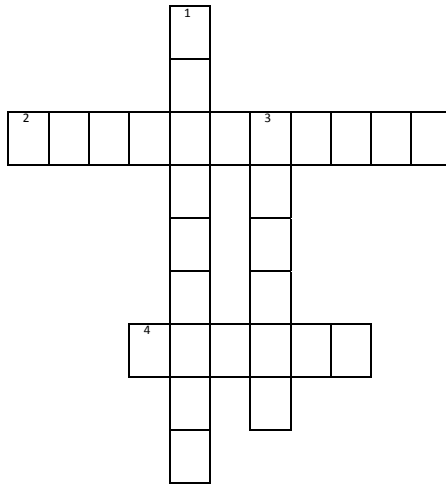
TABLE:	1
Stop Attendant:	1, An Envirothon volunteer
Equipment:	Either four fish (x2) or 2 fish
Answer:	A. Carp; B. Rock Bass; C. White sucker; D. Walleye
Reference:	Aquatic Ecology Resource Manual: Key to Manitoba's Sport Fish; Training and additional keys provided

# ***Fisky Fort Trail [Stops 1-10]***

## **Forestry - 2 points**

Complete the following crosswords using the clues below. (2 pts – 0.5 pts ea)

<hr/> <b>2</b>
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**Across**

- 2. A stand of a single species, generally even-aged
- 4. Northern coniferous forest type

**Down**

- 1. Tree that loses all its leaves in autumn
- 3. Name of main shoot growing from the top of a tree with a single main trunk

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	(across) 2. MONOCULTURE 4. BOREAL (down) 1. DECIDUOUS 3. LEADER (also see word file for answer key)
Reference:	forestry binder - glossary - pages 23-25

## ***Fisky Fort Trail [Stops 1-10]***

### **Soils and Land Use - 2 points**

A) Circle the best answer. (1 pt)

Detailed soil survey maps are much more accurate and reliable for making decisions at what scale level?

- i) 1:1,000,000
- ii) 1:125,000
- iii) 1:50,000
- iv) 1:20,000

B) Of the map scales listed above, which would be the most useful for Land Use Planning by municipalities? (1 pt)

2
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TABLE:	0
Stop Attendant:	0, forestry person
Equipment:	
Answer:	A. iv. or 1:20,000/ B. iv or 1:20,000
Reference:	Soil Management guide pg 24

## ***Fishy Fort Trail [Stops 1-10]***

### **Wildlife - 10 points**

Matching. Match the following Species at Risk (Column A) listed below with the cause of its decline (Column B). Only one species per answer.

10
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Column A - Species at Risk

Column B - Cause of decline

- |  |  |
|--|--|
| <p>___ A. Piping Plover</p> <p>___ B. Peregrine falcon</p> <p>___ C. Burrowing owl</p> <p>___ D. Western Silvery Aster</p> <p>___ E. Small white lady's-slipper</p> <p>___ F. Western prairie fringed-orchid</p> <p>___ G. Western spiderwort</p> <p>___ H. Great Plains toad</p> <p>___ I. Baird's sparrow</p> <p>___ J. Ferruginous hawk</p> | <ol style="list-style-type: none"> <li>1. Illegal collection of plants and hybridization with a closely related species</li> <li>2. Loss of habitat due to agricultural and urban expansion, and decreased prey abundance due to pest control</li> <li>3. Human use of beaches</li> <li>4. Drainage of temporary pools for breeding</li> <li>5. Susceptible to pesticides (DDT)</li> <li>6. Loss and degradation of native prairie habitat due to human settlement, agricultural expansion and resource extraction</li> <li>7. Loss of native prairie habitat, particularly wet meadows from draining</li> <li>8. Loss of native prairie grasslands, decreased prey abundance from insecticide use and nest parasitism</li> <li>9. Gravel extraction, encroachment of woody species and invasion of non-native plants</li> <li>10. Changes to land management practices (burning and grazing)</li> </ol> |
|--|--|

TABLE:	0
Stop Attendant:	0, An Envirothon volunteer ??
Equipment:	
Answer:	1 point each - A-3, B-5, C-2, D-9, E-1, F-7, G-10, H-4, I-8, J-6
Reference:	Wildlife binder - Species at Risk fact Sheets (PDF)

## ***Fisby Fort Trail [Stops 1-10]***

**Theme - 2 points**

List four (4) possible point sources of contamination to groundwater. (2 pts – 0.5 ea)

2
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- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	1) septic tanks 2) fluid storage tanks 3) landfills 4) industrial lagoons
Reference:	Ground water and Surface Water: U.S. Geological Survey Circular 1139 page-66

# ***Fishy Fort Trail [Stops 1-10]***

## **STOP 9**

### **Aquatic Ecology - 2 points**

Examine the photos on display at this stop. They illustrate a variety of different species belonging to a large group of mainly microscopic animals living in lakes and ponds, and feeding on phytoplankton or each other.

<hr/> <b>2</b>
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- A) To what important lake group do these all belong? (1 pt)
  
- B) In which part of the lake would they normally be living? (0.5 pts)
  
- C) What do many of the members of this group do on a diurnal (definition??) schedule? (0.5 pts)

TABLE:	1
Stop Attendant:	0,
Equipment:	Sets of laminated photos of several zooplankters (daphnid, copepod, chaoborid, rotifer) for each table
Answer:	a) Zooplankton or invertebrates (1 pt)                      Plankton (1/2 pt) ??? b) Open water or offshore region or limnetic zone (1/2 pt) c) Many migrate vertically within the water column (1/2 pt)
Reference:	Freshwater Productivity Limnology, Plankton, Zooplankton of Fresh Water, Vertical Migration

## ***Fisky Fort Trail [Stops 1-10]***

### **Forestry - 2 points**

What are two (2) potential local positive effects on forest growth which could result from climate change? (2 pts – 1 pt ea)

2
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TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	Longer growing season, increased growth due to increased CO2, changes to precipitation patterns, increased efficiency of water use in plants
Reference:	Source: CC I &A

## ***Fisby Fort Trail [Stops 1-10]***

### **Soils and Land Use - 10 points**

The Assiniboine Delta Aquifer is the largest area of irrigated potato production in Manitoba, with the McCains processing plant at Carberry supplying most of the french fries for McDonald's across Canada. The combination of quality groundwater and well drained, stone-free soil is the reason for this centralized production.

<hr style="width: 50%; margin: 0 auto;"/> <p style="font-size: 24px; margin: 0;">10</p>
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A) Matching. Match the definition to its term. (4 pts – 1 pt ea)

DEFINITION	TERM
<p>a. ____ The maximum amount of water held in a soil, measured a few days after it has been thoroughly soaked and allowed to drain freely.</p>	<p>1. Field Capacity</p>
<p>b. ____ The amount of water held in the soil that plants can use, based largely on soil texture.</p>	<p>2. Permanent wilting point</p>
<p>c. ____ The amount of water remaining in the soil after drying at room temperature for several hours.</p>	<p>3. Air dry</p>
<p>d. ____ Soil moisture content which is calculated based only on the weight of water and the weight of soil.</p>	<p>4. Available water holding capacity</p>
	<p>5. Saturation</p>
	<p>6. Gravimetric soil moisture content</p>
	<p>7. Volumetric soil moisture content</p>

B) The Stockton Fine Sand at field capacity has a 14% moisture content by weight. At the permanent wilting point it has a 4% moisture content by weight.

- i) What is the percent available water it can hold? (2 pts)
- ii) A Red River Clay at field capacity holds 68% moisture by weight. If the available moisture percent is 50%, what is the permanent wilting point? (2 pts)

## ***Fisky Fort Trail [Stops 1-10]***

- iii) What are two (2) reasons why Stockton sands may be preferred to Red River Clays for irrigated potato production? (2 pts – 1 pt ea)

TABLE:	0
Stop Attendant:	0, forestry person??
Equipment:	
Answer:	Part A//a. (#1) or field capacity /b. (#4) or available water holding capacity / c. (#3) or air dry / d. (#6) or gravimetric moisture content {each answer worth one mark} ///Part B. a. 10% /b. 18%/ c.any two of the following would do; sandy loams warm up faster; sandy loams have better drainage; sandy loams do not stick to potatoes as much, making it easier to harvest;Better structure for tillage; easier to control soil moisutre content than on the clays; fewer plant diseases; better soil aeration; and each of the two answers is worth one mark each.....ignore the rest as the form had me stumped.....[each is worth one mark]
Reference:	Soil Management guide pg 42.

### **Wildlife - 2 points**

Using the field guide provided, identify the bird species in the pictures at the stop.  
(2 pts – 0.5 pts ea)

2
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- A) \_\_\_\_\_
- B) \_\_\_\_\_
- C) \_\_\_\_\_
- D) \_\_\_\_\_

TABLE:	0
Stop Attendant:	1, An Envirothon volunteer
Equipment:	Bird field guide and pictures
Answer:	(.5 points for each answer ) TBD
Reference:	Common knowledge for using field guides

## ***Fisky Fort Trail [Stops 1-10]***

### **Theme - 2 points**

Indicate the top two (2) uses of groundwater and the approximate percentage of each compared to total use. (2 pts – 0.5 pts ea)

<hr style="width: 50%; margin: 0 auto;"/> 2
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1) \_\_\_\_\_, \_\_\_\_\_ %

2) \_\_\_\_\_, \_\_\_\_\_ %

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	Agriculture - 44%, Industry - 22%
Reference:	MB Eco-network, Groundwater in MB, page 1

## ***Fishy Fort Trail [Stops 1-10]***

### **STOP 10**

#### **Aquatic Ecology - 2 points**

Most climate change predictions anticipate major changes across the Canadian prairies. List four (4) possible impacts on Lake Kitche Manitou and other similar prairie lakes, if these predictions are accurate. (2 pts – 0.5 pts ea)

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2

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	<p>Possible answers include the following: (Each correct answer is worth 1/2 pt to a maximum of 2 pts)</p> <ul style="list-style-type: none"> <li>- warmer water temperatures</li> <li>- lower water levels</li> <li>- more algal blooms</li> <li>- higher concentrations of dissolved chemicals</li> <li>- changes in food web composition</li> <li>- changes in hydrological regimes</li> <li>- longer ice-free seasons</li> <li>- more frequent floods and droughts</li> </ul>
Reference:	Climate Change and Aquatic Ecosystems

## ***Fishy Fort Trail [Stops 1-10]***

### **Forestry - 10 points**

- A) What does NTFP stand for? (1 pt)
- B) List four 4 examples of NTFP's (2 pts – 0.5 pts ea)
- C) Does NTFP need to have forest certification? (1 pt)
- D) Further NTFP questions. (6 pts)

<hr/> 10
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TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	A. Non-Timber Forest Products, B. Answer: Edible berries Wild mushrooms Medicinal plants Maple products Christmas trees Syrup Jams, jellies,ciders Furniture Wood crafts Teas, C. Answer: no, consumers of NTFP don't demand certification D.
Reference:	Source: Forestry handouts/ training

### **Soils and Land Use - 2 points**

- A) On a fertilizer bag, there are at least three numbers given, showing the nutrient content (example 15-30-17). Give the correct nutrients in the correct order for the three number sequence. (1 pt)
  
- B) What is the correct term for the piling and turning of manure to make it into a product which is easier to handle as a soil amendment? (1 pt)

<hr/> 2
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TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	a. (N-P-K) for one mark/ b. Composting (one mark).
Reference:	Soil Management Guide.

## ***Fisky Fort Trail [Stops 1-10]***

### **Wildlife - 2 points**

- A) Each level of consumption in the food chain is called \_\_\_\_\_.
- B) Organisms that cannot produce their own food are called \_\_\_\_\_.
- C) Organisms that produce their own food are called \_\_\_\_\_.
- D) Circle the best answer. (0.5 pts)

2
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The diet of a elk is an example of a:

- i) herbivore
- ii) carnivore
- iii) omnivore

TABLE:	0
Stop Attendant:	0,
Equipment:	
Answer:	(.5 points for each answer ) A) Trophic level B) Heterotrophs C) Autotrophs D) i - herbivore
Reference:	Wildlife binder - Food Chains, page 26

### **Theme - 2 points**

Use the GPS unit to determine the UTM coordinates of the flagged post at this site.

2
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TABLE:	1
Stop Attendant:	1, Allen Tyrchniewicz or Steven Hills
Equipment:	Garmin GPS Units (2) Flagged Stake
Answer:	TBD
Reference:	Training