

Stop Number **1**

10

Aquatics

1 River sinuosity is the ratio of the channel length to the length of the meander belt axis.

The

length of the meander belt axis can be measured down the centre of the flooded river valley.

The photographs for the provided black and white air photo mosaic were taken during August 1993 during low flows on the Assiniboine River. The mosaic shows, at a scale of 1:31,200, the river from a location near Curran Park (indicated with a red arrow labelled A) to a location near the Brandon Sewage lagoons (indicated with a red arrow labelled B).

The photographs for the provided colour air photo mosaic were taken on May 6, 1995 during flood flows on the river. They are at a scale of 1:12,400, cover the same area of the river and identify the same two locations as the black and white mosaic.

string, For the reach of river between the arrowheads at points "A" and "B" and using the

ruler and calculator provided, what is:

- a. The length of river channel in meters?
- b. The length of the meander belt in meters?
- c. The sinuosity of the river?

a. $0.780 \times 31,200 = 24,336$ metres

b. $0.960 \times 12,400 = 11,904$ metres

c. 2.044

Reference: Grade 12 geography, mathematics and field training

2

Forestry

2 What is the closest to the market destination of Manitoba's forest products?

- a. Canada 50%, International 50%
- b. Canada 60%, International 40%
- c. Canada 80%, International 20%

C (Actual 78/22)

Reference: Manitoba's Forests pg 5

2

Non-point source pollution

3 True or false, if the water in a lake is so clear that you can see all the way to the bottom

(4

metres), you know that the water lake is healthy, and the water is clean and unaffected by non-point source pollution.

false, water that is very clear supports little if any life and it may have been seriously impacted by acid rain (non-point source pollution).

Reference: deduction and general reading (trick question)

Trail 1: *Outstanding in the Field*

2

Soil: Agriculture, chemical properties

- 4 On a global scale, which of these would help in the fight against Climate Change?
- Decrease soil salinity
 - Increase soil organic matter
 - Increase soil pH
 - Increase tillage

B

Reference:

2

Wildlife

- 5 Why are Peregrine Falcons impacted so strongly by chemicals such as herbicides and pesticides?

They are predators at the top of the food chain. They eat birds that have already eaten grain or insects containing these chemicals so, they are exposed to much higher levels of pesticide and herbicide than found in the air or water. They accumulate chemical residue levels hundreds of times higher than the levels in their prey species. This causes reproductive failure by interfering with breeding behaviour, eggshell formation, hatching success

Reference:

Wildlife Binder

Trail 1: *Outstanding in the Field*

Stop Number **2**

2 Aquatics

- 1 List four of the seven components of fish habitat that singularly or together provide the basic requisites for fish.

Water quality

Water quantity

Substate

Aquatic plants

Shoreline vegetation

Food

Instream features

Reference: DFO workshop

10 Forestry

- 2
 - a. List three similar impacts of clearcutting and fire to a forest.
 - b. Define Annual Allowable Cut (ACC). What can it be compared to?
 - c. Some trees and woody shrubs around this water hole are deciduous plants. What does that mean?
 - d. Where would you find more biological diversity (circle your answer)? WHY?
 - i. The transitional zone of a wetland and a woodlot, or
 - ii. The centre of a pine plantation.
 - e. Define indicator species

a. area is opened to full sunlight, removes forest floor material, allows for natural seeding

b. The amount of timber that can be harvested from a specified forest area on a sustainable basis. It can be compared to the interest earned on money in a bank account.

c. They shed their leaves in the fall.

d. (i). The transitional zone of a wetland and a woodlot because large numbers of plants, mammals, birds, insects, amphibians, reptiles and fish live in these transitional zone.

e. A species whose progress is monitored by people, as an indication of what is happening to the environment or habitat as a whole.

Reference: Forestry binder, Tomorrow's Forests Today's Challenge pg. 8

2 Non-point source pollution

- 3 Give two reasons why global warming may result in an increase in non-point source pollution.

1. Warmer winter temperatures may result in new disease organisms successfully overwintering (therefore increased pesticide use)

2. Increase in flooding will pick up more pollutants from the soil (eg. Phosphorus from fields during the 1997 flood)

3. Students may think of other answers that are also correct

Reference: April 10 workshop

Trail 1: *Outstanding in the Field*

2 Soils: Fertility

4 How are nutrients cycled within this area?

Leaf decomposition, earthworms

Reference: A renewable resource pp.40-41

2 Wildlife

5 a. What animals have made the dirt piles evident in the field?

b. Do they eat plant or animal matter?

c. Can you tell that the soil in lower areas is more productive from the animal burrows?

d. Why or why not?

a. *Pocket gophers*

b. *plants*

c. *yes*

d. *Soil in the dirt piles is lighter and stonier on the ridge tops*

Reference: Field training

Trail 1: *Outstanding in the Field*

Stop Number 3

2 Aquatics

1 Look at the sample identify four aquatic invertebrates.

Possible answers: water mite, water strider, clam, spiral shelled snail, water boatman, sideswimmer, leech, nematode, mosquito larvae

Reference: Aquatics binder and provided

2 Forestry

2 How many of the Forest Regions in Canada occur in Manitoba?

- a. 4
- b. 5
- c. 6

b

Reference: Forest Regions of Canada Map

2 Non-point source pollution

3 a. What is a "Best Management Practice" (BMP)?

b. Give one example of a BMP that would reduce non-point source pollution from each of the following:

- i. agriculture
- ii. your home or urban community

a. Best management practices are practices that achieve the necessary production results while protecting the environment.

b. i) one example is to prevent cattle from entering streams for water

ii) encourage pesticide-free living, wash your car where the water will be filtered by the soil rather than running straight into the drain

Reference: website Atlantic Region Green Lane – Environment Canada

2 Soils: Topography

4 Explain the difference in vegetation between the north and south slopes.

Moisture, sun, temperature

Reference: Observation

Trail 1: *Outstanding in the Field*

10

Wildlife

- 5
- a. Name four species or groups of birds that typically nest along rivers.
 - b. How do amphibians breathe?
 - c. Are amphibians susceptible to changes in pH? Why or why not?
 - d. What are two potential disadvantages for frogs overwintering on land?
 - e. Would you expect to find clams in a river or a lake? Why or why not?

- a. *Ducks, flycatchers, woodpeckers, kingfishers*
- b. *Through their skin*
- c. *True, because of the permeability of their skin*
- d. *Freezing to death and being caught in the open or found by a predator*
- e. *A river, because the flow of water brings more food for them to filter.*

Reference:

Trail 1: *Outstanding in the Field*

Stop Number **4**

0

1 REST

REST

Reference:

Trail 1: *Outstanding in the Field*

Stop Number **5**

2 Aquatics

1 During summer stagnation three temperature layers are defined in a warm lake. What are the two common names for the middle layer in which temperature changes rapidly with depth?

metalimnion or thermocline

Reference: Aquatics binder, pg 12

2 Forestry

- 2 a. What is the main purpose of a Permanent Sample Plot?
- b. What does the term Biotic Potential mean?

a. Determine the growth and yield of trees growing under different conditions, assess trees for insect damage

b. The capacity of a population of animals or plants to increase in numbers under optional environmental conditions.

Reference: Forestry binder glossary

10 Non-point source pollution

- 3 A well is being considered in this area. Three possible sites have been marked out.
 - a. Which is the best location for the well?
 - b. Outline the pros and cons for each well site location
 - c. Describe the ideal well construction to prevent contamination.

To be determined at May 10 visit to site

Reference: April 10 workshop and websites

2 Soils

- 4 Which soil will warm up the fastest?
 - a. Bare wet mineral soil
 - b. Bare dry mineral soil
 - c. Dry mineral soil with standing stubble
 - d. Wet mineral soil with standing stubble

B

Reference: Soil Management, best Management Practices, pg 18.

2 Wildlife

5 Why would deer likely to come to the river rather than a lake or pond in the late fall when there is little snowfall?

Because lakes and ponds would be frozen and thus water would be inaccessible there. Rivers would still be flowing

Reference:

Trail 1: *Outstanding in the Field*

Stop Number **6**

2 Aquatics

- 1 Sediment is a source of non-point source pollution. Sediment directly affects fish populations in several ways. List four of them.

High concentration irritates the gills of fish and can cause death

Destroys the protective mucous covering the eyes and scales of fish, making them more susceptible to infection and disease.

They absorb warmth from the sun and this increases water temperature

Can bury and suffocate fish eggs

Sediment particles can carry toxic agriculture and industrial compounds. If these are released in the habitat they can cause abnormalities or death in the fish.

Suspended sediment decreases the penetration of light into the water. This affects fish feeding and schooling practices and can lead to reduced survival.

Reference: Aquatics binder resource sheet "water - the transporter"

2 Forestry

- 2 Describe the theory of "Natural Disturbance Forest Management".

Managing forest ecosystems through management strategies that mimic or approximate natural disturbance; i.e. fire, wind storms, insects and disease, etc.

Reference: Not in Forestry Binder but information on MBMF web site

10 Non-point source pollution

- 3 a. Identify the major source of Urban Non-Point Source Pollution. (4)
b. Identify the major source of Rural Non-Point Source Pollution. (4)

a. 1) Nutrients (nitrogen and phosphorus) from lawn and garden fertilizers, leaking septic systems, animal wastes, street debris and litter.

2) Sediment from soil disturbances

3) Bacteria from septic systems

4) Hydrocarbons from gasoline spills, leaking oils and other automobile lubricants

b.1) Animal Waste

2) Soil Erosion

3) Fertilizers and Pesticides

4) Abandon wells

Reference: website Atlantic Region Green Lane – Environment Canada

2 Soils: Formation

- 4 a. How did this rock get to this position on the landscape?
b. What are they called?

a. Morainal deposit, glacier left material

b. Erratic

Reference: Soils 84

Trail 1: *Outstanding in the Field*

2

Wildlife

5 Are the steep areas near the top of the riparian zone good for coyotes and foxes? Why
or
why not?

Yes, dens close to food sources and travel areas

Reference:

Trail 1: *Outstanding in the Field*

Stop Number **7**

2

Aquatics

1 A generalized cross section profile for the Assiniboine River flow at this location is 35 metres wide and 1.2 metres deep.

is

a. Given that the average velocity in this cross section is 0.638 metres per second what

the river's discharge? State the appropriate measurement units with your answer.

Assume that the suspended sediment concentration in the flow at this location is 83 milligrams per litre. Using the discharge established in the previous question:

through

b. What weight of sediment in kilograms does this streamflow carry each second

the cross section?

through

c. What weight of sediment in kilograms does this streamflow carry each second

the cross section?

a. $35 \times 1.2 \times 0.638 = 26.796$ cubic metres per second

b. $26.796 \text{ cu.m/sec} \times 1000 \text{ litres/cu.m} \times 83 \text{ mg/litre} / 1,000,000 \text{ mg/kg} = 2.224 \text{ kg}$

c. $2.224 \text{ kg/sec} \times 60 \text{ sec/minute} \times 60 \text{ minutes / hour} \times 24 \text{ hours / day} = 192, 153.6 \text{ kg/day}$

Reference: Grade 12 mathematics and field training

2

Forestry

2 Discuss one plant species' adaptation to fire.

Trembling aspen have the ability to sucker from roots, however, chemicals produced in standing trees suppress root suckering until a fire removes it. Spruce trees and jack pines open up their cones in fires to release seeds. Oaks have fire-resisting bark.

Reference: Forestry binder, Tomorrow Forests Today's Challenge pg 10

2

Non-point source pollution

3 a. What does TMDL stand for?

b. Define TMDL.

Total maximum daily load, is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards.

Reference: website <http://www.epa.gov/OWOW>

Trail 1: *Outstanding in the Field*

10

Soils: Physical properties

- 4 a. What soil has the greatest water holding capacity?
- sand
 - silt
 - clay
 - Rock
- b. Using the soil profile provided. At what depth does the C horizon start?
- c. You just became an elected official in a small municipality in rural Manitoba. You

are

approached by a small industry that would like to set up in your municipality. To make an informed decision on whether this industry would benefit your community, what

information

would be required?

- d. Using the Hand Texturing Guide. What is the texture of the soil provided?

A. C

B.

C. *Where are suitable sites, soil, water, roads, infrastructure, environmental concerns, economic benefits, history of industry in other locations, negative impacts.*

D.

Reference: Soils 84, pg 4

2

Wildlife

- 5 a. How many legs does an adult dragonfly have?
- b. How many pairs of wings does it have?
- c. Can most dragonflies see in all directions at once?
- d. Are dragonflies slow moving in the morning? WHY or why not?

a. 6

b. 2

c. Yes

d. Yes, they are cold blooded and need to warm up.

Reference:

Trail 2: *Up the side of the Oak Ridge trail*

Stop Number **1**

2 Aquatics

1 What happens when meanders are removed?

When meanders are removed such as in channelization, the length of the channel is shortened, the slope is increased and these result in increased water velocity.

Reference: Field data

2 Forestry

2 Define Annual Allowable Cut (ACC). What can it be compared to?

The amount of timber that can be harvested from a specified forest area on a sustainable basis. It can be compared to the interest earned on money in a bank account.

Reference: Forestry Binder, Tomorrow's Forests Today's Challenge, Teacher Information Kit 85, pg. 14

Trail 2: *Up the side of the Oak Ridge trail*

10

Non-point source pollution

3 a. Circle the all the greenhouse gases that originate from agriculture:

- i. carbon dioxide
- ii. methane
- iii. CFCs
- iv. N₂O

b. How does climate change impact water quality in a rural setting?

c. What are the main contaminants of surface water and groundwater?

variety

d. What property of water gives it the ability to dissolve substances like sugar and a variety of pollutants?

- i. buoyancy
- ii. dielectric constant
- iii. surface tension
- iv. density

e. What is used to disinfect water during the last stage at the sewage treatment plant?

- i. chlorine
- ii. soap
- iii. sunlight
- iv. Bacteria

a. *i. carbon dioxide, ii methane and iv N₂O (from fertilizer)*

b. *Increased precipitation in the spring and warmer temperatures could lead to spring flooding, which leads to higher risk of non-point source pollution. Warmer temperatures and decreased precipitation in the summer could lead to droughts, which lead to higher levels of point source pollution.*

c. *Gasoline, oil, road salts, pesticides, fertilizers, manure, human waste, chemicals. Some of the major sources of these are storage tanks, septic systems, hazardous waste sites, landfills, and the widespread use of road salts and chemicals.*

d. *ii. dielectric constant*

e. *iii. sunlight (ultraviolet rays)*

Reference: April workshop

2

Soils: Organic Matter

4 a. Why are earthworms important in the soil?

b. What can be done to increase their numbers?

a. *Aeration, breakdown organic matter, release nutrients, improve drainage*

b. *Reduce tillage, increase organic matter, reduce pesticides*

Reference: Soil valuable resource

Trail 2: *Up the side of the Oak Ridge trail*

2

Wildlife

- 5 a. What wild native animal scat is most prevalent along the trail between stops one and two?
- b. Why are the shrubs taller and thicker on the north side of the ridge?
- i. The south side has been heavily grazed
 - ii. The south side was cleared in the past
 - iii. The north side is wetter
 - iv. The south side has a thicker canopy inhibiting shrub growth there

a. White tailed deer

b. Iii

Reference:

Trail 2: *Up the side of the Oak Ridge trail*

Stop Number **2**

2

Aquatics

1 Match the insect to the adaptation:

- a. Black fly larvae _____ hangs onto surface with two little hooves
- b. Mosquito larvae _____ specialized fans around the head for filtering out materials
- c. Water boatman _____ flattened streamlined bodies, muscular legs and hooks on feet
- d. Stoneflies _____ long back legs like paddles - flattened, elongate with hairs

B

A

D

C

Reference: DFO workshop and aquatics binder

2

Forestry

2 What is a snag? Name one benefit associated with snags. Name one problem associated with snags.

dead standing tree, benefit - home for cavity nesting birds, problem - dangerous for wood workers

Reference: Wetlands and woodlots

2

Non-point source pollution

3 a. When excess nutrients from fertilizers spread on lawns, golf courses, and farmland enter aquatic systems (lakes and ponds), they can result in the lake becoming:

- i. eutrophic
- ii. photosynthetic
- iii. oligotrophic

b. The north basin of Lake Winnipeg showed evidence of significant non-point source pollution in 19(??). What symptom was observed?

- i. hundreds of dead birds
- ii. thousands of dead fish
- iii. an oily film on the surface of the water
- iv. an algal mat stretching 100 kilometres

A. i) *eutrophic (nutrient-rich)*

B. iv) *an algal mat stretching 100 kilometres*

Reference: April workshop

Trail 2: *Up the side of the Oak Ridge trail*

2 Soils: Fertility

4 How do legume plants fix nitrogen?

Nitrogen gas is converted to plant available nitrogen by certain bacteria contained in the nodules of legumes

Reference: Living soil, science module, p 44

10 Wildlife

5 a. What kind of bird made the holes in the marked tree?

b. What kind of ants made their nest in the old aspen stump along the trail, plant or meat eaters?

c. What kind of animal died over the fence in the Wildlife Management Area?

d. Give two indicators on how you determined the species of animal.

d. Name five different animals that may have or still is feeding on this dead deer.

a. Pileated Woodpecker

b. Plant eaters

c. White tailed deer

d. Hoofs, teeth

e. Blow flies, beetles, millipedes, crows, magpies, ...

Reference:

Trail 2: *Up the side of the Oak Ridge trail*

Stop Number **3**

0

1 REST

REST

Reference:

Trail 2: *Up the side of the Oak Ridge trail*

Stop Number **4**

2 Aquatics
1 The Assiniboine River near Brandon has a drainage area of 85,216 square kilometres and during a 10% annual runoff this area sheds 13 millimeters of water. If you wanted to store this water in a reservoir 10 metres deep and with a flat and level bottom, what area would it have to cover in square kilometres?

11.078 sq km - 85,216 sq km X 0.013 m/10 m = 110.078 sq km

Reference: Field Training

10 Forestry
2 With the equipment and calculation sheets provided, please determine the species and calculate the volume of the numbered trees and measure the height of the marked tree.

4 trees = 2 aspen (2 marks), 2 oak (2 marks), diameters (1 mark each =4), height (1 mark), correct volumes (3 marks). Once I have measured trees on the 23rd I will provide answers and acceptable ranges to markers.

Reference: Manitoba Forests pg 13

2 Non-point source pollution
3 Describe the differences between organic farming and conventional farming and the potential impacts on water quality.

Organic farming does not use manufactured pesticides or fertilizers, conventional farm allows for the use of both. By not using pesticides and fertilizers, organic farming does not introduce these pollutants into the water, but can introduce manure and other natural sources of pollutants

Reference: April 10 workshop

2 Soils: Agriculture
4 Improper fertilization of lawns in urban areas can lead to pollution of surface and groundwater. Discuss how this problem could be minimized.

Applying only what is necessary, minimizing runoff.

Reference: General Knowledge

2 Wildlife
5 What are some of the plant adaptations for living on a river bottom?

*Anchorage systems
Oxygen deprivation
Flood tolerance
Flooded seedbeds
Silt accumulations*

Reference:

Trail 2: *Up the side of the Oak Ridge trail*

Stop Number **5**

2 Aquatics

- 1 Assume that due to future climate change, the drainage area from the previous question (85,216 sq km) will shed 9% less water. What area would the storage reservoir then have to cover?

$$110.078 \times 0.91 = 100.171 \text{ sq km}$$

Reference: Field Training

2 Forestry

- 2 a. What is the sustainable forest management goal set by the Canadian Council of Forest Ministers?

b. What is the main purpose of a Permanent Sample Plot?

a. *"...to maintain and enhance the long-term health of forest ecosystems, while providing ecological, economic, social and cultural opportunities for the benefit of both present and future generations."*

b. *Determine the growth and yield of trees growing under different conditions, assess trees for insect damage*

Reference: Towards Sustainable Forest Management Certification, pg. 2

2 Non-point source pollution

- 3 How would excess nutrients make their way to a lake?

surface runoff. Soil naturally filters water as it flows through

Reference: April Workshop

2 Soils: Physical Properties

- 4 Which is coarser - loamy sand or sandy loam?

Loamy sand

Reference: Soils'84, p. 9

2 Wildlife

- 5 a. What kind of plant grows in this area that may cause an allergic reaction (rash and itching)?
b. How do you identify it?
c. What colour are the winter berries?
d. Are the berries edible?
e. Is this plant a perennial or annual?

a. *Poison ivy (Rhus radicans)*

b. *Three oily leaves on each stem*

c. *White*

d. *No*

e. *Perennial*

Reference:

Trail 2: *Up the side of the Oak Ridge trail*

Stop Number **6**

2 Aquatics

1 The Assiniboine River is home to some twelve species of clams (unionids). In 1991, Manitoba Fisheries Branch started receiving lots of inquiries regarding the availability of

one

particular species, the three ridge or *Amblema plicata*, for the cultured pearl harvest.

Before Fisheries Branch could determine if this species could sustain harvesting a better

data

base on their population density and distribution was needed. Samples were collected from

a

number of reaches along the Assiniboine River. Substrate was recorded and height, length and weight measurements were taken. A sub sample of clams were aged. To determine

their

ages they were thin sectioned and the dark bands (annuli) counted. This is similar in fish where each dark band represents the slow growing season of winter while the light wider areas in between are the faster summer growth.

- a. Why would Fisheries Branch be responsible for Manitoba clams?
- b. Using the microscope, determine the age of this three ridge clam.

a. *Under the Federal Fisheries Act, freshwater clams are considered a "fish".*

b. ?

Reference: Aquatics binder pg 76

2 Forestry

2 What natural factors prevented trees from encroaching on this mixed-grass prairie site

in

the past.

fire, excess moisture (flooding)

Reference: Manitoba Forest Publication pg. 6

2 Non-point source pollution

3 a. How does too much phosphorus affect water quality?

b. List two sources of phosphorus

a. *Phosphorus is frequently the factor that limits primary production in lakes. Increases in phosphorus can lead to the growth of blue-green algae.*

b. *fertilizer, detergent, natural elements*

Reference: websites and previous test (1999 Envirothon)

Trail 2: *Up the side of the Oak Ridge trail*

10

Soils: Agriculture, Chemical Properties

- 4 a. What are two challenges of current crop production practices?
- b. Why are sulphates held loosely by the soil compared to potassium?
- c. Treed areas are not cleared on the property for what two reasons?
- d. Looking into the distance, what are two possible sources of agricultural pollutants and what specific best management practices could be used to address them.

- a. *Reliance on fossil fuels, reliance on pesticides, consumer demands for cheap food*
- b. *Anions repelled as opposed to cations*
- c. *Topography, water*
- d. *Various, BMP will depend on pollutant*

Reference: April workshop, soils '84 pp10-11, Observations

2

Wildlife

- 5 Why are wetlands crucial to many migrating songbirds?

Songbirds feed on the swarms of insects that hatch out early in the spring.

Reference:

Trail 2: *Up the side of the Oak Ridge trail*

Stop Number **7**

10

Aquatics

1 The Envirothon Field Test Site is located on the south side of the Brandon Hills.

Spring Creek begins just south of the Brandon Hills and conveys its water east and north into the Little Souris River, which empties in turn into the Assiniboine River.

You are provided a 1:50,000 scale topographic map of the upper Spring Creek area with your location marked on it, an 8.5" X 11" transparent sheet, which will be registered over the map by the stop guide and a black marker. In addition, a road and bridge over Spring Creek is indicated with a red letter "A" on the map.

On the transparency, mark your team number and outline the approximately nine square mile drainage area that contributes to Spring Creek upstream of the road and bridge labelled "A". Turn the transparency in to the Stop Guide, along with your test, at the completion of this trail.

Helpful hints: The referenced road is visible due south of this stop. The bridge on this road is located just east of the visible white and green house. The required drainage area includes this test stop site. To help you envision the topography a mirror stereoscope and a 1:50,000 scale air photo stereo pair of the area, with location "A" marked are also provided.

Reference: Grade 12 geography and field training

2

Forestry

- 2 a. What are short-term risks of prescribed burns?
b. What are the long-term risks of prescribed burns?

- a. Smoke pollutin, increased erosion, destruction of vegetation*
b. Uncontrollable wildfires, declining forests

Reference: Healing fire

2

Non-point source pollution

- 3 a. At what temperature does water have the greatest density?
i. 0
ii. +4
iii. -4
iv. 10
b. Why is this important to underwater life?

A. *b). +4*

B. This means that water sinks to the pond bottom while it freezes at the top. Many invertebrates and other organisms would not survive if all water bodies froze from the bottom up.

Reference: Galloway presentation (April workshop)

Trail 2: *Up the side of the Oak Ridge trail*

2 Soils: Fertility

4 Why can high levels of nitrate nitrogen be of concern?

Contaminating water supplies, releasing greenhouse gases

Reference: Environmental Sustainability, SOE Bulletin 2000-1

2 Wildlife

5 What animals would likely travel on the ice in the winter on a river?

Foxes, coyotes

Reference:

Trail 3: *Through the Marsh we go!*

Stop Number **1**

2 Aquatics

1 Through anaerobic respiration bacteria can form "rotten egg" gases. Name two such gases.

Methane, hydrogen sulfide

Reference: Aquatics Binder, pg 18

10 Forestry

2 a. Development of a forest from a dry, bare rock environment is a form of _____ . Be specific.

b. What tree species constitute the bulk of the provincial softwood annual allowable cut?

c. Declination refers to what?

d. Rationalize "clear cutting" as a silviculture management tool.

e. What type of wetland provides trees for the softwood industry?

f. What softwood tree(s) grow in this type of wetland?

g. Does this tree grow around this site?

a. *Xeric, Succession*

b. *Black spruce and jack pine - 62%*

c. *The measure in degrees, of the difference between magnetic north pole and the geographic or true north pole.*

d. *Can be applied to even-aged, sun tolerant tree species such as jack pine. In the case of jack pine, cones left on the harvest site are exposed to the sun's heat, which opens the cones releasing the seed. The seed falls on exposed mineral soil, a suitable medium for germination and a new forest is born*

e. *bogs*

f. *Black spruce*

g. *No*

Reference: Bollman - From Rock to Tree, pg 1

2 Non-point source pollution

3 Give two reasons why global warming may result in an increase in non-point source pollution.

1) warmer winter temperatures may result in new disease organisms successfully overwintering (therefore increased pesticide use), 2) increase in flooding will pick up more pollutants from the soil (e.g. Phosphorus from fields during the 1997 flood). Students may think of other answers that are also correct (flooding will also increase erosion, turbidity, etc.)

Reference: April Workshop

Trail 3: *Through the Marsh we go!*

2 Soils: Agriculture

4 Name two problems associated with irrigated production?

Salinity, nutrient management, wind erosion

Reference: Land Use and Society, p. 36

2 Wildlife

5 a. Are there often bands of similar vegetation around wetlands?

b. What environmental factor is likely the most important one in the establishment of vegetation around native wetlands?

a. Yes

b. Moisture

Reference:

Trail 3: *Through the Marsh we go!*

Stop Number **2**

2 Aquatics

1 List four reasons why riparian areas are important to aquatic ecosystems.

Filters sediment, excess nutrients and toxic substances

Roots stabilize banks

Canopy lowers water temperature

leaves and falling insects provide food source

slows flows

helps to recharge the ground water

Reference:

2 Forestry

2 Explain the difference between "deforestation" and "clear cutting".

Clear cuts are reforested.

Deforestation implies land is converted from forest to other non-forest use(s).

Reference: Tomorrow's Forests Today's Challenge, Teacher Information Kit 85, pg. 5 and 6

2 Non-point source pollution

3 Describe the two drainage systems for waste and run-off in Winnipeg and the advantage

of system used in newer areas.

The old system was a combined pipe for both waste-water and run-off, the new system uses separate pipes. The advantage is the new system allows for the waste water to go directly to the treatment facilities without the extra water from the run-off.

Reference: April 10 workshop

2 Soils: Physical Properties

4 What are the four components of soil?

Minerals, air, water and organic matter

Reference: What is Soil

Trail 3: *Through the Marsh we go!*

10

Wildlife

- 5 a. What is making this sound?
b. What is making this sound?
c. What is making this sound?
d. Answer the following statements with a true or false
i. Before 1880, white-tailed deer were uncommon in Manitoba. _____
ii. The population of moose in Manitoba has increased since European settlement.

iii. Raccoons were rare in Manitoba prior to 1950. _____
iv. Gray squirrels moved to Manitoba in the last 100 years. _____
e. Name three reason why wetlands are important?

a.

B.

C.

D. True, false, true, true

e. Any three of: they provide wildlife habitat, control flooding and erosion, protect surface and ground water quality, form links between uplands, lakes and streams

Reference: Wildlife binder

Trail 3: *Through the Marsh we go!*

Stop Number **3**

2

Aquatics

1 Look at the edge of the marsh.

- a. The shallow water area of the marsh is called the _____ zone.
- b. The leaves on the bottom constitute _____.
- c. The bacteria that decompose this material are _____.
- d. The plant that is floating close to the shore and does not have a root structure is called _____.

a. *Littoral zone*

b. *Detritus (non-living organic matter)*

c. *Saprophytic bacteria*

d. *Duckweed*

Reference: Aquatics binder

2

Forestry

2 Approximately, what percent of the province of Manitoba is classified as productive forest land?

~ 25%

Reference: Manitoba Forest Publication, pg 2, piechart

2

Non-point source pollution

3 a. If you found high levels of the following in your well water during testing, which would be of most concern to you?

- i. coliform bacteria
- ii. *E. coli* bacteria
- iii. fecal coliform bacteria
- iv. invertebrates

b. What human disease can be contracted if people drink water that is contaminated by non-point source pollution?

- i. foot and mouth disease
- ii. *Giardia* (beaver fever)
- iii. encephalitis
- iv. Malaria

A. ii. *E. coli*

B. ii. *Giardia* (beaver fever)

Reference: April workshop

Trail 3: *Through the Marsh we go!*

10

Soils: Agriculture

4 a. Soil pits are located at sites A and B. What location has a thicker A horizon. Why?

b. A mild amount of sulfuric acid can be used to determine the presence of carbonates in the soil. Carbonates are naturally formed from chemical reactions in the soil. They are highly soluble. Apply the acid at 10 cm, 50 cm and 100 cm samples from sites A and B. What information does this provide between the two sites?

c. List two practices farmer can use to reduce Wind Erosion

a.

B. Drainage, carbonates leached down

c. Residue management, shelterbelts, forages, reduced tillage

Reference: April workshop, soils '84

2

Wildlife

5 a. How do insects survive winter above the snow?

b. Is the scat on the rock from a carnivore or herbivore? How can you tell?

c. Name the animal this scat belongs to.

a. They produce their own antifreeze

b. Carnivore, has hair in it

c. By size and probability of that species being there, mink

Reference:

Trail 3: *Through the Marsh we go!*

Stop Number **4**

0

1 REST

REST

Reference:

Trail 3: *Through the Marsh we go!*

Stop Number **5**

2 Aquatics

- 1 List four common development activities in a watershed that can result in increased nutrients and contaminants in surface water

Site preparation, shoreline alterations, stormwater management, groundwater extraction, dredging and filling, land clearing and soil cultivation.

Reference: Aquatics Binder, pg 83

2 Forestry

- 2 List two reasons why you would avoid harvesting operations near wetlands.

erosion, shade, watershed, wildlife corridor, wildlife habitat, and run-off reduction, increased temperature, increased nutrients and contaminants, increased sedimentation and turbidity, loss of habitat, changes in water flow

Reference: Deduction and Aquatics binder pages 79-86

2 Non-point source pollution

- 3 Describe the process by which a pollutant reaches a body of water

Non-point source pollution occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into ground water. NPS pollution also includes adverse changes to the vegetation, shape, and flow of streams and other aquatic systems.

NPS pollution is widespread because it can occur any time activities disturb the land or water.

Agriculture, forestry, grazing, septic systems, recreational boating, urban runoff, construction, physical changes to stream channels, and habitat degradation are potential sources of NPS pollution.

Reference: website www.epa.gov/OWOW/NPS/facts/point1.htm

2 Soils: Agriculture

- 4
 - a. Using the two maps, Land Classification for Agriculture and Land Classification for Wildlife. Find the location x-x-x W1.
 - b. What is the classification for Agriculture?
 - c. What is the classification for Wildlife?
 - d. What is this land most suited for? Why?

a.

B.

C.

D.

Reference: Soils 84

2 Wildlife

- 5 How do trees that grow in the river bottom or riparian areas grow so large so fast?

Ample moisture and nutrients

Reference:

Trail 3: *Through the Marsh we go!*

Stop Number **6**

10

Aquatics

- 1 With the zodiac go out as far as the tethered rope permits and record the following measurements.
 - a. pH
 - b. oxygen
 - c. transparency
 - d. temperature
 - e. What affect does temperature have on oxygen?
 - f. When would oxygen be considered a limiting factor?
 - g. What range of pH supports a well balanced fish population?
 - h. Water with a pH of 6 is 10 times more acidic than water with a pH of 7. How much more acidic is water with a pH of 5?
 - i. Twice as acidic
 - ii. Half as acidic
 - iii. 100
 - iv. 1000
 - i. Circle the factor(s) that could cause a low secchi disk reading?
 - i. turbidity
 - ii. Natural colouration from soil
 - iii. pesticides
 - iv. Algal growth in the water column
 - j. A low secchi disk reading indicates that the water is polluted.
TRUE
FALSE
 - k. What do your measurements tell you about the ability this body of water has to support a diverse community of organisms?

- a. TBA
- b. TBA
- c. TBA
- d. TBA
- e. Cold water contains more oxygen, warm water contains less
- f. When the oxygen level is too low certain species cannot survive
- g. 6.7-8.6
- h. 100
- i. a, b and d
- j. false
- k. Low ability to support a diverse community of organisms. There would be a few dominant species.

Reference: Aquatics Binders pgs 23, 25, 29, April workshop and field training

Trail 3: *Through the Marsh we go!*

2 Forestry

2 What are the effects of livestock grazing on forest communities and how does it affect their function?

Reduced biodiversity in plant species within the forest community, particularly the herb and shrub species. In hardwood dominated forests such as aspen a gradual thinning of trees is evidenced over time as trees are damaged by livestock and eventually die off. Suckering or propagation is also reduced as livestock will browse on new shoots or trample them.

Soil compaction may also be increased.

Forest functions such as providing quality habitat may be negatively affected along with the ability for snow/water retention, filtering and aquifer recharge.

Reference:

2 Non-point source pollution

3 What shape are many fish and invertebrates that live in moving water?

a). long and sticklike

b). round

c). Torpedo

c) aquatic organisms are often torpedo-shaped

Reference: Galloway presentation (April workshop)

2 Soils

4 List two types of soil degradation.

Wind, water erosion, salinity, organic matter loss, urbanization

Reference: What is soil

2 Wildlife

5 Why might frogs lay their eggs in a temporary pond rather than in a lake or backwater

of

the river? Give two reasons.

Warmer water so the eggs will hatch more quickly

Warmer water so the tadpoles will grow faster

Fewer predators

Reference:

Trail 3: *Through the Marsh we go!*

Stop Number **7**

2

Aquatics

1 The black and white air photo mosaic referred to in question #1 shows the entirety of the City of Brandon south of the Assiniboine River and the mile road grid (2" squares) is clearly evident.

is Given that a square mile is 2.59 square kilometres, assume that 40% of Brandon's area

lawn and that all lawns south of the Assiniboine River are fertilized at the recommended application rate for established lawns on the provided fertilizer bag.

How many kilograms of fertilizer would be used during a growing season?

$6 \text{ square miles} \times 2.59 \text{ sq km} / \text{sq mi} \times 1,000,000 \text{ sq m} / \text{sq km} \times 0.4 \text{ area in lawns} \times 2 \text{ kg} / 100 \text{ sq m} \times 5 \text{ applications} = 621,600 \text{ kg}$

Reference:

2

Forestry

2 List two components of a Model Forest.

Should include two of the following:

- 1. a diverse partnership of stakeholders and rights holders*
- 2. a large-scale working model of sustainable forest management*
- 3. site for developing and applying new knowledge and technologies*
- 4. a focus for promoting ecologically sound forest management practices*
- 5. a consensus-driven partnership working with shared decision-making to achieve social, environmental, and economic sustainability in forest management*
- 6. a creator of on-the-ground solutions addressing local needs and global concerns*
- 7. a place where communities and traditional knowledge play a role in forest management*
- 8. a link in a network to facilitate an exchange of ideas and approaches to sustainable forest management*

Reference:

Forestry binder, Canada's Model Forest Program

Trail 3: *Through the Marsh we go!*

10

Non-point source pollution

- 3 Use the maps provided.
- You are standing in the watershed of which river?
 - This river forms a part of the watershed of what freshwater lake?
 - What large body of saltwater does this lake ultimately drain into?
 - What province is home to the westernmost headwaters of the Lake Winnipeg watershed.
 - Define non-point source pollution
 - Define point source pollution
 - What is the main difference between them?

a) Assiniboine River (half marks for Red River)

b) Lake Winnipeg

c) Hudson Bay

d) Alberta

e. Non-point source pollution cannot be traced back to an exact point and usually occurs over a wide area.

F. Point source pollution can be traced back to its point of origin, usually from a specific discharge point, such as a pipe from industry.

G The polluter can be determined in point source pollution, while it is often difficult to pin point the polluter of non-point source pollution.

Reference: map reading skills and the April workshop (two speakers showed the Lake Winnipeg watershed)

2

Soils: Physical Properties

- 4 What is a soil profile?

A vertical section of soil which layers or horizons can be distinguished.

Reference: Soils 84

2

Wildlife

- 5
- What type of large tree is growing here?
 - What animal might have made the holes you see in the bark?
 - What two reasons might the animal have had for making the numerous holes in the

tree

trunk?

a. Cottonwood

b. A sapsucker

c. Sap and insects trapped in it

Reference: