

2002 ND\MB Envirothon

Bottineau Trail – Canadian Test

Stop 1:

Aquatics - 10 Points

Equipment: Topographic Map

A. Surface runoff occurs when rainfall rate or snowmelt rate exceeds the receiving landscape's infiltration rate. The provided 1:1230 scale topographic map with a two foot contour interval has two nearby landscape positions identified with red arrowheads labeled A and B.

In what compass direction (such as North, Northwest, etc.) does surface runoff proceed from each of these locations? (5 points)

a) _____

b) _____

B. Determine from the provided topographic map the elevation in feet of (a) your current location and (b) Lake Udall. (5 points)

a) _____

b) _____

Answer: Answer: A. a) – NE, b) – W, B. a) 2271 b) 2250

Reference: A. School geography, B. April 19th Workshop

Biodiversity - 2 Points

*Circle which of these statements is most accurate.

- Biodiversity is represented by few species with large numbers of each.
- Biodiversity is represented by many species with few numbers of each.

Answer: *b*

Reference: Aquatics and Biodiversity binder

Forestry - 2 Points

True or False - Clearcutting is a recognized and acceptable form of silviculture (forest management)?

Answer: T

Reference: Certification and Canada's forests, pg 14

Soils - 2 Points

What is cation exchange capacity?

Why is it important?

Answer: Exchange between positively charged and negatively charged particles in the soil. It is important because cations are held for later release to the plants

Reference: Soils '84, page 7

Wildlife - 2 Points

Equipment provided: Rodent skull (muskrat, beaver, ground squirrel, or vole)

Does this skull belong to an herbivore, omnivore, or carnivore?

How can you tell?

Team # _____

Answers: Herbivore (incisors designed for clipping, molars designed for grinding tough plant material) or carnivore (weak incisors, long, sharp canines for holding live prey, and molars for slicing meat)

Reference: April workshop (wildlife session) and/or station training

Stop 2:

Aquatics – 2 Points

*A. Name two common disease-causing organisms **found in water**.

B. The sediment load of a waterway is determined by multiplying its sediment concentration by what?

Answer: A. bacteria (fecal coliforms), viruses, protozoa: Salmonella, Norwalk virus, Giardia, Cryptosporidium, B. Its discharge or streamflow.

Reference: A. Clean Water Guide (page 19), B. Aquatics binder, pamphlet at the back

Biodiversity – 2 Points

*Name 4 actions that "boating and fishing" Manitobans can take to prevent the accidental introduction of Aquatic Nuisance Species in Manitoba.

Answer: regularly inspect water equipment; drain water from boat/motor, live well, bilge and transfer wells; leave your boat/motor/trailer in the hot sun for 5 days; wash and dry your boat, tackle, down riggers, trailer and other boating equipment; empty your bait bucket on land; learn what organisms look like

Reference :April Workshop, Biodiversity Binder: Field Guide to Aquatic Exotic Plants and Animals.

Forestry - 2 Points

A. How many European tree feeding insect species have successfully invaded North America? Circle

- a) 50
- b) 100
- c) 200
- d) 300

B. How many North American tree feeding insect species have successfully invaded Europe? Circle

- a) 14
- b) 24
- c) 34
- d) 44

Answers: A. d), B. c)

Reference: Alien Forest Pests, pg 4

Soils - 10 Points

A. Using the hand-texturing guide provided, determine the soil texture of samples A & B. (8 pts)

A. _____, B. _____

Which sample would retain more moisture? _____

Which sample would naturally have the lowest fertility for crop production? _____

Which sample would be more prone to wind erosion? _____

Which sample would have the highest cation exchange capacity (CEC)? _____

Which sample would have the lowest total porosity? _____

Which sample would be more likely to be deficient in copper? _____

B. What macronutrient is important for proper root development? (2 pts)

*Answer: A. Loamy sand (A) and Silty clay (B), B, A, A, B, A, A,
B. Phosphorous*

Reference: April Workshop, Soils '84. pp. 6-10, Soil a Renewable Resource, p. 30

Wildlife - 2 Points

Equipment provided: Coyote, fox, wolverine or bear skull

Does this skull belong to a herbivore, omnivore, or carnivore?

How can you tell?

Answers: Carnivore (weak incisors, long, sharp canines for holding live prey, and molars for slicing meat)

Reference: April workshop (wildlife session) and/or station training

Stop 3:

Aquatics - 2 Points

Equipment: Sample

What phylum does this belong to? Circle

- a) Arthropoda
- b) Porifera
- c) Mollusca

Answer: c

Reference: General Biology

Biodiversity - 10 Points

A: Match the characteristic or feature to the appropriate non-native specie.

a. Well developed sensory system allows continual feeding.	_____ Bythotrephes
b. Prolific seed production-up to 2.7 million/plant/year	_____ Rusty crayfish
c. Long stout spines serves as vital protection	_____ Purple loosestrife
d. Forms thick underwater strands of tangled stems and a dense canopy on the surface	_____ Common Carp
e. Prolific, severely reduces lake and stream vegetation	_____ Round Goby
f. Sharp spines on gill covers, dorsal and anal fins make it difficult for larger fish to eat.	_____ Eurasian watermilfoil
g. Increases water turbidity and destroys vegetated habitats	_____ Ruffe

B: The opening of the _____ canal was the beginning of the problem with non native species in the Great Lakes. The first well known accidental introduction was the _____ which devastated _____ fish stocks.

Answers: A: c;e;b;g;a;d;f, B: Welland Canal, sea lamprey, lake trout

References: A: Biodiversity Binder - Minnesota Sea Grant: ruffe and spinytailed bythotrephes; A Field Guide to Aquatic exotic plants and animals; USGS-Non indigenous aquatic species: Common Carp; Environment Canada - Eurasian watermilfoil and Purple loosestrife, B: April 19th workshop: The cumulative effects of climate warming and other human stresses on Canadian freshwaters in the new millennium.

Forestry - 2 Points

Equipment: Compass

Three methods that could help reduce or balance off CO₂ emissions, which are a major factor in global warming, are:

Answers: tree planting, reducing energy consumption, recycling

Reference: Restoring the Balance, page 1

Compass Use - 2 Points

Using the compass supplied estimate the bearing to the centre of the Peace Tower.

Answer: TBA

Soils - 2 Points

Describe why not all water in the soil (rooting zone) is available for plant growth?

*Answer: Water is held on to the soil particles that the plant roots can not extract.
Permanent Wilting Point.*

Reference: BMP Soil Management, p.16

Wildlife - 4 Points

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?

Answers: A. 6, B. 2, C. Yes, D. Yes, they are cold blooded and need to warm up.

Reference: General Biology

Stop 4:

Aquatics – 2 Points

*Name 2 problems associated with **excessive** aquatic plant growth.

Answer: swimming nuisance, boating difficulties, less appealing drinking water, less dissolved oxygen for fish, dense growth in small streams and drains can impede water flow.

Reference: Clean Water Guide (page 26)

Biodiversity – 2 Points

Introduced species account for what percentage of crop production (by value) in Canada? Circle

- a) 32%
- b) 68%
- c) 50%
- d) over 90%

Answer: d

Source: Biodiversity binder, Food Crops and Biodiversity article

Forestry - 2 Points

A. What is a snag?

B. Name one benefit associated with snags.

C. Name one problem associated with snags.

Answers: A. dead standing tree, B. home for cavity nesting birds, C. dangerous for wood workers

Reference: Wetlands and woodlots

Soils - 2 Points

Where does leafy spurge have its origins?

How was leafy spurge introduced to North America?

Answer: Eastern Europe, Contaminated seed brought in by early settlers

Source: MAF factsheet

Wildlife - 2 Points

What kind of bird made the holes in the marked tree?

What kind of ants made their nest in the tree that the bird was feeding on?

Answers: Pileated Woodpecker, Carpenter Ants

Reference: General Knowledge

Stop 5:

Aquatics – 2 Points

Manitoba has non-native aquatic plants currently invading wetlands. Name two.

Answer: purple loosestrife, flowering rush, Hybrid cattail)

Reference: April 19th workshop

Biodiversity - 2 Points

A: Define “Alien Pest”

B: True or False, Introduced alien species are viewed by many countries as a biological threat to their national economic, environmental and social security.

Answers: A. When the impacts of non-native species or sub-species are beyond acceptable levels, resulting in environmental damage and economic and social losses, B. True

Reference: Alien Forest Pests (CFS) Pg 4, Pg 12

Forestry - 2 Points

Equipment: Field Guide

Using the Field Guide to the Native Trees of Manitoba provided please identified the two marked trees.

A: _____

B: _____

Answers: A. Trembling Aspen, B. Manitoba Maple or Box Elder

Soils - 2 Points

Why is leafy spurge difficult to control?

Answer: Well-developed storage system (roots), able to withstand different control methods, difficulty accessing sites in areas

Source: MAF factsheet

Wildlife - 2 Points

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

Answer: 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

Stop 6:

Aquatics - 2 Points

List two benefits of riffles in streams.

Answer: Diversify the flow, oxygenate the water, important food producing areas, provide habitat for aquatic invertebrates, provide spawning habitat

Reference: Aquatics binder (page 66,70)

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Biodiversity - 2 Points

A. What is biological control?

B. What has allowed organisms to be dispersed at much greater rates than was the case traditionally?

Answers: A. Using natural predators to limit the growth and expansion of introduced species, B. attachment to floating ocean debris such as plastic

Reference: A. April workshop (Cory Lindgren), B. Trash and the Travelling Species, A. Swain, May Newsletter.

Forestry - 10 Points

Equipment: Haga, D-Tape, Tally Sheets, Calculator (with teams)

With the equipment and calculation sheets provided, determine the height and diameter and then using the tables provided to calculate the volume of trees "A" and "B". Record on the tally sheet provided.

Answers. 2 trees = diameters (2 mark each =4), height (2 mark each =4), correct volumes = 2 marks). Once we have measured trees on the 30th answers and acceptable ranges will be determined.

Reference: Workshop Equipment Demonstrations

Soils - 2 Points

Four active processes continually affect the formation of soils. Briefly describe each of the following:

- Additions

- Losses

- Translocations

- Transformations

Answers:

Addition - occur at the surface. Solar energy, precipitation, OM from dead vegetation

Losses - Erosion, water movement, evaporation

Translocations- physical movement of soil, liquids, gases.

Transformations - Chemical changes, physical changes but no movement

Source: Soils '84, pp. 12-13

Wildlife - 2 Points

A. How do amphibians breath?

B. Are amphibians susceptible to changes in pH? Why or why not?

Answers: A. Through their skin, B. Yes, because of the permeability of their skin

Reference: General Knowledge

Stop 7:

Aquatics - 2 Points

List the four methods that are used singularly or in combination to control non-native species.

1. _____
2. _____
3. _____
4. _____

Answer: chemical; mechanical; biological; ecological

Reference: Biodiversity Binder - Fact Sheet: Invasive Species

Biodiversity – 2 Points

What are the two additional major greenhouse gases besides carbon dioxide?

Answer: Methane and nitrous oxide

Reference: Climate Change Primer, p.8

Forestry - 2 Points

Approximately how many trees are planted annually in Canada? Circle

- a) 100 million
- b) 300 million
- c) 600 million
- d) 900 million

Answer: c

Reference: Certification and Canada's forest, pg 4

Soils - 2 Points

Compared to the Grey-Wooded soils, Dark Brown soils: Circle

- a) have a lower surface organic matter content
- b) have a shallower depth to the free lime layer
- c) are less prone to drought
- d) have a lower surface soil pH

Answer: A

Reference: Soil a Renewable Resource, p.22

Wildlife - 2 Points

A: What disease has been isolated in several elk in the Riding Mtn. area in the last few years?

B: Why is the apparent presence of this disease of concern to local landowners?

Answers. A. *Bovine tuberculosis*, B. *Possible transmission to their domestic cattle herds and the possibility of a major impact on the marketability of Canadian cattle in the USA if Manitoba loses its TB-free status for cattle.*

Ref.: Press/media

Stop 8:

Aquatics - Points

Equipment: Cabin Illustration

You have just purchased this lakefront cabin property (illustration provided at the stop). Name 4 things you could do to this lot that would enhance lake water quality.

Answers: plant vegetated buffer, replace dock with a floating styled dock, remove stone wall, minimize the amount of fertilizer use by xeriscaping, maintain boat away from the water, promote the growth of aquatic vegetation, store gas and oil away from water.

Reference: The Shore Primer

Biodiversity - 2 Points

65% of agricultural emissions are derived nitrous oxide and 30% derived from methane production. Name the major source for each.

Answer: Nitrous oxide from fertilizers and soil tillage and methane from livestock
Source: Climate Change Primer, p. 22

Forestry - 2 Points

What does the term "Chain-of-custody" mean?

Answers: Refers to the ability to track wood from the time it leaves the forest, through the processing and marketing channels to the final consumer.

Reference: Certification and Canada's forests, pg 5

Soils - 2 Points

A. Clay soils are: Circle

- a) Positive charged
- b) Neutral
- c) Negative charged
- d) Infertile

B. Carbon used for plant growth is obtained from: Circle

- a) Organic Matter
- b) Soil
- c) Soil Water
- d) Air

Answer: A. d, B. c.

Reference: Soils '84, page 11, Soils 84, page 7

Wildlife - 8 Points

Equipment provided: A variety of animal sign from Oak Hammock Marsh (see answer list) and/or collected in the surrounding area. Labels A to H.

Animal sign (tracks, scat, nests, feeding marks, etc.) are clues that reveal the diversity of animals that live in an area. Name the animals that left behind these clues to their presence in the Peace Gardens.

A) _____

B) _____

C) _____

D) _____

E) _____

F) _____

G) _____

H) _____

*Answer: This will be determined on the day of the field test. Any of the following are available and can be used for this question: red fox tracks and scat, deer mouse tracks, jackrabbit tracks and scat, coyote tracks and scat, red squirrel tracks, owl pellet, muskrat tracks and scat, beaver tracks and scat, weasel tracks, domestic dog tracks, snowshoe hare tracks, skunk tracks, woodchuck tracks, mink tracks and scat, Canada goose tracks, white-tailed deer tracks, wolf scat, otter scat, beaver-chewed branches, rabbit-trimmed twigs, deer-ripped branches, duck nest, sparrow nest, swallow nest, beaver skull, muskrat or ground squirrel skull, Canada goose feather, snow goose feather, great horned owl feather, etc. **Beaver and Moose sign used at Peace #1***

Source: April workshop and/or wildlife field test training

2002 ND\MB Envirothon

Lewis & Clark Trail – Canadian Test

Stop 1:

Aquatics - 10 Points

Equipment: Laureen

A. Boat Activity - 3 points

Using the boat go out, anchor at the buoy and do the following:

- a. collect a bottom sample and bring in a portion using equipment provided (1pt)
- b. secchi depth _____m. (1pt)
- c. record the following parameters: Oxygen _____
(1pt) Temperature _____

B. Shoreline Activity - 2 points

*Using the seine, do a sweep along the shoreline. Keep one fish from your sample (trail stop person will indicate which one) and take it with you to Stop 5. Collection materials are at the site. If you are not able to catch any fish take one of the fish provided.

C. Practical Activity - 3 points

- d. On the collection label provided below, fill in the blanks. Include two other parameters that are useful to have on a label and their pertinent information.

Date: _____
Time: _____
Name of collector: _____
Waterbody Name: _____
Identify two other parameters with the correct information:
1. _____:

2. _____:

D. Fill in the Blanks - 2 points

- e. The matter collected in the Ekman dredge is called? _____
- f. This matter consists of: _____ and _____
- g. Name one thing that feeds on this matter? _____

Answers: A. completion of getting a sample. B. TBA. C.TBA D. label information see below. E. Detritus. F.plant and animal. G. bacteria or fungi

*Geographical Reference: TBA
Type of waterbody: lake
Water Temperature: TBA
Depth: TBA
Cover: TBA
Substrate: TBA
Collecting method/gear type: Seine*

Reference: April 19th Workshop

Biodiversity – 2 Points

A. How many species of zebra mussels are in the Great Lakes?

B. What percentage of Canada's freshwater fish species richness is made up of Exotic species? Circle

4%

7%

10%

Answer: a.) two b.)10%

Reference: a.)Biodiversity Binder b.)Wild Species 2000: The General Status of Species in Canada (page 23)

Forestry - 2 Points

What does the term Biotic Potential mean?

Answer: The capacity of a population of animals or plants to increase in numbers under optimum environmental conditions.

Reference: Forestry Binder Glossary, pg 1.

Soils - 2 Points

Each farmer should have a appropriate nutrient management plan. Why?

Answer: To avoid over application, protect the environment, maintain yields.

Reference: General knowledge

Wildlife - 2 Points

During the last 50,000 years, mass extinctions of megafauna occurred in many different parts of the world. These events coincided with: Circle

- a) Global catastrophe
- b) Climate change
- c) First arrival of prehistoric humans
- d) Habitat loss
- e) All of the above

Answer: c)

Reference: Biodiversity binder, Alex Salki summary

Stop 2:**Aquatics – 2 Points**

A. Using the formulae provided calculate the Trophic Status Indices for each of: Total Phosphorus, Chlorophyll-a and secchi disc depth for Lake Udall (using your secchi disc measurement from above), assuming that TP=0.05 mg/L, and Chlorophyll-a=9.4µg/L.

$$\text{Secchi depth TSI} = 60 - 14.41 \ln (\text{secchi depth (M)})$$

$$\text{Chlorophyll-a TSI} = 9.81 \ln (\text{Chlorophyll-a (mg/L)}) + 30.6$$

$$\text{Total Phosphorous TSI} = 14.42 \ln (\text{TP } (\mu\text{g/L})) + 4.15$$

B. Given your answers from the calculations above, what is the trophic state of Lake Udall? Circle

- Mesotrophic
- Eutrophic
- mesotrophic to eutrophic
- oligotrophic to mesotrophic

Answers:

1a. TBA (if secchi = 2.2M)

$$\begin{aligned} \text{Secchi depth TSI} &= 60 - 14.41 (\ln \text{ secchi in meters}) \\ &= 60 - 14.41 (\ln 2.2) \\ &= 60 - 14.41 (0.788) \\ &= \mathbf{47.30} \end{aligned}$$

(if Chlorophyll-a = 9.4µg/L)

$$\begin{aligned} \text{Chlorophyll-a TSI} &= 9.81 (\ln \text{ chlorophyll-a in } \mu\text{g/L}) + 30.6 \\ &= 9.81 (\ln 9.4) + 30.6 \\ &= 9.81 (2.240) + 30.6 \\ &= \mathbf{52.58} \end{aligned}$$

(if TP=0.05 mg/L)

$$\begin{aligned} \text{TP TSI} &= 14.42 (\ln \text{ Total Phosphorus in } \mu\text{g/L}) + 4.15 \\ &= 14.42 (\ln 50) + 4.15 \\ &= 14.42 (3.912) + 4.15 \\ &= \mathbf{60.56} \end{aligned}$$

Answer: B: c. Mesotrophic to Eutrophic

Reference: April 19 workshop - Handout on Carlson's Trophic State Index

Biodiversity - 2 Points

A number of non-native species that are now found in the Great Lakes originated from the Ponto-Caspian area. Why would global warming benefit these species?

Answer: These species originated from warm waters and an increase in water temperature in the Great Lakes would amplify their advantage over the cold water species.

Reference: April 19th workshop: The cumulative effects of climate warming and other human stresses on Canadian freshwaters in the new millennium.

Forestry - 10 Points (2 each)

A. List three similar impacts of clearcutting and fire on a forest.

B. Define Annual Allowable Cut (AAC). What can it be compared to?

C. A conifer plantation is sometimes considered a monoculture, why?

D. Where would you find more biological diversity ? Circle

- i. The transitional zone of a wetland and a woodlot, or
- ii. The centre of a pine plantation.

WHY?

E. Define indicator species

Answers:

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. Most conifers in the boreal forest evolved to grow after fire, in full sunlight, in pure or nearly pure species mix, plantations mimic this early growth stage..

D. (i). The traditional 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,
C): Glossary, pg 188

Soils - 2 Points

List four types of soil degradation.

Answer: Wind, water erosion, soil salinity, organic matter loss, urbanization.

Reference: What is soil? Page 4.

Wildlife - 2 Points

A: What disease has been found on numerous elk ranches in Saskatchewan?

B: What disease of humans is this disease related to?

Ans.: A. Chronic wasting disease , B. Creutzfeldt–Jakob (Mad Cow) disease

Reference: Press/media

Stop 3:

Aquatics - 2 Points

In mid-summer three layers are typically formed in a lake. What are these three layers in order of occurrence from top to bottom.

TOP _____

MIDDLE _____

BOTTOM _____

Answer: Epilimnion, metalimnion (thermocline), hypolimnion

Reference: Aquatics Binder (page 12)

Biodiversity - 2 Points

Describe two ways that introduced plants may affect the soil in ways that inhibit the establishment and growth of native plant species?

Answer: Any two of the following: they affect the pH, they change the soil chemistry, they produce toxic compounds/allelopathic chemicals

Reference: Biodiversity binder, Metchosin Museum article

Forestry - 2 Points

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

a. 4

b. 5

c. 6

Answer: b

Reference: Forest Regions of Canada Map

Soils - 2 Points

Silt as defined by particle size analysis has the following dimensions: Circle

- a. Greater than 2 mm
- b. 2 – 0.05 mm
- c. 0.05 – 0.002 mm
- d. Less than 0.002 mm

Answer: C

Reference: Soils 84, page 4

Wildlife - 8 Points

Correctly match each of the following:

- | | |
|-------------------------|---------------------------------------|
| Carolina Parakeet _____ | a. an extinct species of megafauna |
| Great Auk _____ | b. a bird introduced to North America |
| Common Carp _____ | c. endemic to North America |
| European Starling _____ | d. an endangered species |
| Giant Wolf _____ | e. a flightless species of bird |
| Human _____ | f. an efficient predator/hunter |
| Piping Plover _____ | g. an extinct species |
| Passenger Pigeon _____ | h. an invasive fish |

Answer: Carolina Parakeet = c, Great Auk = e, Common Carp = h, European Starling = b, Giant Wolf = a, Human = f, Piping Plover = d, Passenger Pigeon = g

Reference: Biodiversity binder, Salki summary, SARA list, April workshop

Stop 4:

Aquatics - 2 Points

Equipment: Samples

Looking at the samples provided answer the following.

Who built home:

A _____

B _____

C. What habitat has A adapted to? _____

D. What habitat has B adapted to? _____

Answers: A caddisfly, B caddisfly, C fast flowing stream, D slow water areas like a stream pool or littoral area of a lake.

Reference: Aquatics binder (page 51-56)

Biodiversity - 2 Points

Many of the most recent, potentially destructive bark and wood-boring beetles are thought to have entered Canada through what method.

Answer: Concealed within dunnage – wooden packaging material such as pallets, crates or drums

Reference: Alien Forest Pests (CFS). Pg 7

Forestry - 2 Points

A. What are the short-term risks of prescribed burns?

B. What are the long-term risks of prescribed burns?

Answers:

- A. Smoke pollution, increased erosion, destruction of vegetation*
- B. Larger, more difficult to control wildfires, declining forests and wildlife*

Reference: Healing fire

Soils - 2 Points

Why is soil erosion an environmental and economic concern?

Answer: Sediments and nutrients can enter waterways. Reduces the productivity of the land.

Source: April Workshop

Wildlife - 2 Points

How can studying owl pellets reveal more about an area's biological diversity

Answer: The presence of the pellet tells you that an owl lives in the area (you may be able to tell the species by the location and size of the pellet) and an

Team # _____

examination of the contents of the pellet can reveal the identity of small mammals that live in the area.

Reference: April workshop (afternoon session on wildlife) and station training (review)

Stop 5:

*Aquatics - 2 Points

Equipment; Ruler

Using the fish you collected from Stop 1 and the equipment at this stop, please answer the following questions.

a. What is the fork length of this fish? _____

b. Is this a spiny rayed or soft rayed fish? _____

Circle the appropriate answer:

c. Soft rayed fish generally have what kind of scales? ctenoid or cycloid

d. Spiny rays are recorded in: roman or arabic numerals?

***Removed question e) to many questions for 2 points!**

Answers:

a. TBA

b. TBA

c. Cycloid

d. roman

Reference: April 19th workshop

Biodiversity – 2 Points

Describe some characteristics of invasive species that favour their success in their new environment.

Answer: Any of the following: few natural controls, generalists, fast reproductive rate, wide dispersal mechanism, tolerant of wide environmental conditions, difficult to eradicate

Reference: Biodiversity binder, Alien Forest Species article

Forestry - 2 Points

True or False – Canada has forest area protected than Sweden, Finland, Germany and Russia combined?

Answer: True

Reference: *Certification and Canada's forest, pg 4*

Soils - 2 Points

A. Approximately what % of the earth is available for agricultural food production? Circle

- a) 2%
- b) 9%
- c) 25%
- d) 45%

B. Soils in Manitoba are approximately _____ year old. Circle

- a) 1,100
- b) 11,000
- c) 110,000
- d) 1,100,000

Answers: B, B

Source: April Workshop, Soils '84.

Wildlife - 2 Points

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

Team # _____

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

Reference: Wildlife Binder

Stop 6:

Aquatics - 2 Points

What are the four characteristics that make the Round Goby effective invaders?

1. _____
2. _____
3. _____
4. _____

Answer: aggressive; well developed sensory system; robust and able to survive degraded water quality; spawn over a long period during summer

Reference: Biodiversity Binder - Minnesota Sea Grant: Round Goby invade North America

Biodiversity – 2 Points

Name the newest insect threat to Canada's broad-leaf trees.

Answer: Asian Long-horned Beetle

Reference: Alien Forest Pests (CFS). Pg 7

Forestry - 2 Points

Describe the theory of "Natural Disturbance Forest Management".

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

disease, etc.

Reference: MBMF web site

Soils - 10 Points

A. What can two things can be done to increase the absorption of carbon dioxide from the atmosphere into forests and soils? (1 pt)

B. What two sectors produce the majority of Manitoba's greenhouse gas emissions? (2 pts)

C. Where would you expect to find a Luvisolic soil? Under what conditions would you expect them to be formed? (2 pts)

D. In the grassland region, typically the surface soils located in lower slope positions tend to: Circle (2 pts)

- a) contain higher levels of organic matter
- b) contain higher levels of calcium
- c) exhibit a lesser depth of soil development

d) exhibit a shallower A horizon

E. Compared to soils formed under forests, soils developed under grassland tend to: Circle (1 pt)

- a. be more fertile
- b. exhibit more sulphur deficiencies
- c. have deeper soil depth
- d. contain lesser amount of calcium and magnesium

F. What information can soil color provide? List two things. (2 pts)

Answers: A. Zero-tillage and agro-forestry, B. Transportation and agriculture, C. higher elevations in the Westman area or forested soils in Northern Manitoba. Formed under forest vegetation and cooler climates, D. a, E. c, F. Drainage, salinity, organic matter, carbonates

References: A. Manitoba and Climate Change, p. 11, B. Manitoba and Climate Change, p. 7, C. Soils '84, p. 18, D. Soil a Renewable Resource, p. 22, E. Soil a Renewable Resource, p.22, F. Soils '84 p.7.

Wildlife - 2 Points

Answer the following statements with a true or false.

Before 1880, white-tailed deer were uncommon in Manitoba. _____

The population of moose in Manitoba has increased since European settlement. _____

Raccoons were rare in Manitoba prior to 1950. _____

Gray squirrels moved to Manitoba in the last 100 years. _____

Answers: True, false, true, true

Reference: Wildlife binder

Stop 7:

Aquatics - 6 Points

Equipment: Aerial Photograph

A stone cairn (approximately 1 metre square and 2 metres tall) is located in the bush near here at the location indicated on the provided aerial photograph by the red arrowhead labeled "A".

Find the cairn and determine how many layers of stone were used to build it?

Answer: 8

Reference: Field Training.

Biodiversity - 2 Points

Why do most grazing animals with the exception of goats and sheep not graze leafy spurge infested pastures?

Answer: *Latex compounds irritates mouth of grazing animals*

Reference: MAF factsheet

Forestry - 2 Points

Biodiversity is measured at what levels?

Answers:
ecosystem, species, genetic

Reference: C&I for Sust. For. Mngt in Canada, National Status 2000, pg 1

Soils - 2 Points

What has the biggest influence on pH of the soil?

- a) texture
- b) parent material
- c) moisture content
- d) structure

Answer: B.

Reference: April Workshop

Wildlife - 2 Points

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

Answer: Foxes, coyotes

Reference: Wildlife Binder

Stop 8:

Aquatics - 2 Points

Place the following plants in their order of occurrence (within the littoral zone) starting from the shoreline: Floating leaved plants; Emergent plants; Submerged or floating plants. Give an example for each of the plant types.

A. _____

Example: _____

B. _____

Example: _____

C. _____

Example: _____

Answer:

A - Emergent plants: cattails, rushes, marsh grasses and marsh plants

B - Floating leaved plants: water lilies, pond weeds

C - Submerged plants: waterweeds, milfoil and hornwort, floating plants: water hyacinth, duckweed

Reference: Aquatics Binder (page 62)

Biodiversity - 10 Points

Equipment: Samples, microscope, keys

A. Using the key, glossary of terms and microscope provided identify this fish. (4 pts)

B. Name 4 species of fish not native to Manitoba. (2 pts)

*C. Which one is not native to Manitoba? Circle

A

B

What is its name? (1pt) _____

D. Give 2 reasons why this non-native species is so threatening to native species. (2 pts)

E. Give 1 economical impact caused by this species. (1 pt)

Answers:

a. *rainbow smelt*

b. *common carp, black crappie, largemouth bass, smallmouth bass, rainbow trout, white bass, cutthroat trout, brown trout, splake and tiger trout, bluegill, white crappie*

c. *B Zebra mussel*

d. *competitive, no predators, aggressive, produces 1 million eggs /year, tolerates a wide range of environmental conditions*

e. *plugs cooling water systems of boat motors, clogs water intakes of private cottages, towns, cities and industries, reduces recreation at beach areas (odour, dead shells)*

Reference: April 19th workshop, biodiversity binder: Zebra mussels in North America

Forestry - 2 Points

Equipment: Compass

Between 1950 and 1995 Canada's west and north have seen a temperature increase of, Circle

a) 0.5 – 1.5 ° C

b) 1.6 – 2.5 ° C

c) 2.6 – 3.5 ° C

d) 3.6 – 5.0 ° C

Answer: b)

Reference: C&I for Sust. For. Mngt in Canada, National Status 2000, pg 30

Compass Use - 2 Points

Using the compass supplied estimate the bearing to the centre of the Peace Tower.

Soils - 2 Points

Why are two reasons that yields are typically lower on the knolls as compared to intermediate and lower slope positions?

Answer: Rainfall runs off knolls limiting crop production and erosional forces move soils downslope

Reference: Soils '84, p. 15

Wildlife - 2 Points

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

Answer: Yes, dens close to food sources and travel areas

Reference: Wildlife Binder

2002 ND\MB Envirothon

Peace Trail – Canadian Test

Stop 1:

Aquatics - 2 Points

Equipment provided: photograph

A. Looking at the photograph provided, what is the green substance called?

B. What 3 main environmental conditions lead to this?

Answers: A. algal bloom B. weather conditions, clarity, adequate nitrogen and phosphorous (nutrients)

Reference: Aquatics binder and Clean Water Guide (page 21)

Biodiversity - 2 Points

Climate warming will interact with a number of stressors already affecting freshwater fishes. Name two of these stressors.

Answer: overexploitation; dams and diversions; habitat destruction; non-native species, pollution

Reference: April 19th workshop: The cumulative effects of climate warming and other human stresses on Canadian freshwaters in the new millennium.

Forestry - 2 Points

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

Answer: erosion, shade, watershed, wildlife corridor, wildlife habitat, and run-off reductions, 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

Soils - 2 Points

A mild solution of hydrochloric acid is used to detect what mineral in the soil?
What information does this provide regarding the movement of water in the soil?

Answer: lime or carbonates, amount of downward water movement (degree of leaching)

Source: Training session prior to Envirothon, April Workshop

Wildlife - 2 Points

What animals do you find evidence of at this stop?

Answer: Beaver (gnawing on aspen), Moose (browse and scat)

Reference: Biodiversity binder, site specific observations

Stop 2:

Aquatics - 2 Points

When the water temperature in Lake Udall increases, what two reactions occur in fish that increase their need for oxygen?

Answer: Their body temperature increases which results in an increase in their metabolic rate.

Reference: Aquatics Binder (pages 7-8)

Biodiversity - 2 Points

How can greenhouse gases be sequestered or emissions reduced within agriculture?

Answer: increasing zero tillage, decreasing summerfallow, improving grazing strategies, or by converting croplands to wetlands and/or wildlife habitats.

Source: Primer, p.22

Forestry - 2 Points

Equipment: Compass

Globally, what percentage of vertebrates that are thought to be in danger of extinction are threatened by invasive species?

- a) 10
- b) 20
- c) 30
- d) 40

Answer b)

Reference: Alien Forest Pests, pg 10

Compass Use - 2 Points

Using the compass supplied estimate the bearing to the centre of the Peace Tower.

Soils - 2 Points

Name four micronutrients essential for balanced plant nutrition.

Answer: Zinc, Boron, Chlorine, Copper, Iron, Manganese, Molybdenum, Sulfur, Magnesium

Source: The Living Soil, A Renewable Resource, p.30

Wildlife - 2 Points

A: When did 95% of the megafauna of North America disappear?

B: Why are wetlands crucial to many migrating songbirds?

Answer: A: 11,000 years ago, Answer B: Songbirds feed on the swarms of insects that hatch out early in the spring.

Reference: Biodiversity binder , Wildlife Binder

Stop 3:

Aquatics - A: 10 Points, B: 2 points

Required equipment: Air photo, topographic map, rulers

A. a) The provided air photo shows this test site area including Lake Udall at a scale of 1:15,840. You are also provided a ruler. A small waterway is evident entering Lake Udall on the east end and one is evident leaving the lake from the west end.

Determine the volume of water in Lake Udall in cubic metres. Estimate the average length and width and assume the average depth is 1.5 metres. Show your computations.

(6 points)

Answer: *Lake Length = .065m x 15,840 = 1029.6m*
 Lake Width = .004m x 15,840 = 63.36m
 1029.6 x 63.36 x 1.5 = 97,853 cubic metres

Reference: April 19th workshop

b) Assume that a fall lake maintenance procedure required the emptying of the lake and that the following spring the incoming waterway flowed for the month of May with an average flow of 0.03 cubic meters per second.

What fraction of the lake would be filled? Show your calculation. (4 points)

Answer: $31 \text{ days} \times 24 \text{ hours/day} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/minute} \times 0.03 \text{ cubic metres/second} = 80,352 \text{ cubic metres}$. Then $80,352 \text{ cubic metres} / 97,853 \text{ cubic metres} = 0.82 = \underline{82/100}$

Source: Field training.

B: a) Identify the plant with the flagging tape on it.

b) What reproductive structure(s) can be found on the stock? Circle

seeds female flower male flower

Answer: a.)Cattail b.) seeds and female flower

Biodiversity - 2 Points

A: The Great Lakes have a number of introduced aquatic nuisance species. How did the majority of them arrive?

B: Name 2 pathways through which aquatic nuisance species could arrive in Manitoba and be accidentally introduced.

Answers: A. ballast water discharge from ocean-going ships B. boats, bilge water, bait buckets

Reference: a.) Threats to the West b.) Biodiversity binder

Forestry - 2 Points

Approximately how much of Canada's forests are harvested annually? Circle

- a) 0.5 million hectares
- b) 1.0 million hectares
- c) 1.5 million hectares
- d) 2.0 million hectares

Answer: b)

Reference: *Certification and Canada's forests, pg 4*

Soils - 2 Points

Equipment: Textural Triangle

Determine the soil texture of a soil that has 30% clay, 60% sand and 10% silt using the attached textural triangle.

Answer: Sandy clay loam

Wildlife - 2 Points

Equipment provided: Know Your Ducks poster, sample wings

Compare this wing to the ducks shown on this poster. Name the species.

Answer: Blue-winged Teal

Source: None. All material provided during the field test

Stop 4:

Aquatics - 2 Points

Circle the correct sequence of phases in the sediment cycle. Circle

- a. erosion, transportation, deposition
- b. deposition, erosion, transportation
- c. transportation, erosion, deposition

Answer: a

Reference: Aquatics Binder Fact Sheet: Water - The Transporter

Biodiversity - 2 Points

How do carp affect native species in wetlands?

Answer: Uproot vegetation, increase turbidity, prey on the eggs of native species

Source: April workshop (Cory Lindgren)

Forestry - 2 Points

Why do forest managers and forest management companies seek forest certification?

Answer: To provide evidence of sustainable forest management that maintains forest health and biodiversity, and meets social and community expectations

Reference: Certification and Canada's forests, pg 1, 5

Soils - 2 Points

What are the dark spots in the sample? Is this an upland or lowland soil?

Answer: Mottles, lowland

Source: April Workshop

Wildlife - 2 Points

What are the principal environmental factors in Manitoba that lead to mortality in white-tailed deer?

Answer: Snow depth and cold temperatures

Source: Wildlife Binder

Stop 5:

Aquatics - 2 Points

Excessive nutrients (phosphorus and nitrogen) in surface water are a problem in Manitoba. Name 4 sources of these nutrients.

Answers: human sewage, natural drainage from bogs and wetlands, grey-water, pet and livestock feces, cleaning products, fertilizers, soil erosion, industrial and municipal effluent, leaching or weathering of rock

Reference: Clean Water Guide (page 21)

Biodiversity - 2 Points

Introduced species have the second greatest impact on biodiversity. What has the greatest impact on biodiversity?

Answer: Habitat loss

Source: Biodiversity binder, Alien Forest Species article

Forestry - 10 Points

A. Development of a forest from a dry, bare rock environment is a form of

_____ (2) _____ (2). Be specific.

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

_____ (.5) _____ (.5)

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

_____ (1)

D. Declination refers to what?

_____ (2)

E. Azimuth refers to what?

_____ (2)

Answers:

- A. *Xeric, Succession,*
- B. *Black spruce and jack pine - 62%*
- C. *bogs,*
- D. *The measure in degrees, of the difference between magnetic north pole and the geographic or true north pole.*
- E. *The direction or bearing of travel, in degrees, using a compass*

Reference: A: Bollman - From Rock to Tree, pg 1, B and C: Manitoba's Forests pg 2, D and E: Quite a bit about Maps and Compasses

Soils - 2 Points

What are four of the six factors involved in soil formation?

Answer: *Grasses have 50% of their biomass as roots underground.*

Reference: Soils '84 p. 3.

Wildlife - 2 Points

Equipment provided for A: rubber tracks from Oak Hammock Marsh, field guide

Equipment provided for B: moose antler from Oak Hammock Marsh

Team # _____

A: These tracks are from one of the few species of megafauna that survive to modern day. Name the species.

B: This antler is from another species of megafauna that survived extinction. Name the animal.

Answer A: Bison (but will accept "buffalo" also as this is how it appears in the handout), Answer B: Moose

Source: Biodiversity binder, Alex Salki summary. April workshop or field test training - A variety of rubber tracks and scat were displayed at the workshop so that students could learn to tell them apart.

Source: April workshop or wildlife training at the field test (or both)

Stop 6:

Aquatics - 2 Points

A: At what temperature on the centigrade scale is water most dense? Circle

- a. 100
- b. 4
- c. 0
- d. -32

B. Which of the following describes water's ability to climb against the pull of gravity? Circle

- a. transpiration
- b. capillarity
- c. percolation
- d. precipitation

Answer A. b, B. b
Reference: Aquatics binder

Biodiversity - 10 Points

A: On what types of soils would you most likely find leafy spurge? 2 points

B: Why is the control of leafy spurge necessary? 2 points

C: What are two means to control leafy spurge? 2 points

D: List one advantage and one disadvantage of each control method listed in C.
4 points

Answers

A: Typically sandy/pasture/rangelands, Source: MAF factsheet

*B: noxious weed, decreases value of pastureland, decreases livestock production, prolific seed production/spreading of leafy spurge patches
Source: MAF factsheet*

*C: Chemical, cultural, grazing, or biological
Source: MAF factsheet*

D: Advantages of chemical control: can be used with other means, effective in controlling small patches

Disadvantages of chemical control: no single product controls leafy spurge, re-growth possible in subsequent years, typically requires repeat application, not always cost effective due to higher application rates required for control

Advantages of cultural control: chemical-free control means, used in conjunction with chemical means, out compete with certain forage species

Disadvantages of cultural control: Cultural means typically have limited success, intensive tillage required every 3 weeks, erosion can be a concern.

Advantages of grazing control: involves no chemicals, suitable in areas where other means impractical, no harmful effects, spurge more vulnerable to other control means, sheep and goats can be grazed with other livestock

Disadvantages of grazing control: does not kill spurge, decreases seed production, seeds can be transferred with animals if not contained

Advantages of biological control: introduce predators of spurge, single release which decreases costs, use in conjunction with other means

Disadvantages of biological control: winter survival may be an issue, part of a longer term strategy, insecticides may kill biological control agents.

Source: MAF fact sheet

Forestry - 2 Points

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

Answer: 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:

Soils - 2 Points

Dry and finely granulated soil is not susceptible to wind erosion. True or false?

Why?

Answer: False. No structure/vegetation to provide stability.
Source: What is Soil?

Wildlife - 2 Points

Why might frogs lay their eggs in a temporary pond rather than in a lake or backwater of the river? Give two reasons.

Answer: Warmer water so the eggs will hatch more quickly, warmer water so the tadpoles will grow faster, fewer predators

Reference:

Stop 7:

Aquatics - 2 Points

Humans intentionally introduce new species for a variety of reasons. Name 2.

Answers: provide recreational hunting and fishing opportunities; as predators to control species; plants because of food value or vigorous growth habits assisted in controlling soil erosion and windbreaks; people wanted physical reminder of home they left; re-introduction of species that were historically present and became extinct.

Reference: Biodiversity Binder - Biodiversity: Protecting our Disappearing Natural World

Biodiversity - 2 Points

Give Two (2) examples of alien species and their resultant impact on North American tree species.

Answer:

*European Elm Bark Beetle, carrier of DED, widespread loss of American Elm.
White Pine Blister Rust, reducing of White Pine planting and renewal or historic forests*

Gypsy Moth, mortality of large number of native deciduous (and in some coniferous tree species.

Plus others – see documents

Reference: Alien Forest Pests (CFS). Pg 4-6, Forest Week Biodiversity Poster

Forestry - 2 Points

List two components of a Model Forest.

Answer 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 web site

Soils - 10 Points

Use map provided.

A: Using the map provided, what is the Soil Capability for Agriculture rating (Canada Land Inventory) for 2-14-6E1? (2 pts)

B: What is the Land Capability for Wildlife – Waterfowl (Canada Land Inventory) for 2-14-6E1? (2 pts)

C. Why are correction lines required? (2 pts)

D. How many sections does a township contain? (1 pt)

E. How many acres are there in a section? (1 pt)

F: What would be the most appropriate land management practices for this site (2-14-6E1). (2 pts)

Answer:

A: 3S, B: 5T/M, C: Meridians/range lines converge to meet at the poles. This makes the northern border of any township slightly shorter than the southern border. Surveyors created a jog to the west so as to keep parcels of land of similar size, D: 36, E: 640, F: Crop production, however, limitations are more severe than Class 2 soils. They affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. Under good management they are fair to moderately high in productivity for a fair range of crops.

References: Map reading and interpretation, April Workshop, and Understanding Western Canada's Land Survey System, pgs 3-4 and 7.

Wildlife - 4 Points

Equipment provided: Fur samples

A: This fur is from a nocturnal mammal. Name the species.

B: This fur belongs to a member of the weasel family. Name the species.

C: These furs belong to two aquatic rodents. Name them.

Answers: Raccoon, Skunk, Beaver and Muskrat

Source: General knowledge and size/appearance of the furs, Workshop training

Stop 8:

Biodiversity - 2 Points

Answer True or False to the following:

A: Wetlands were numerous in the southern prairies during the mid-Holocene

B: At higher temperatures semi-volatile organic contaminants can be re-emitted to the atmosphere.

C: Evaporation can increase as much as 30% with an average increase in air temperature from 14 to 16%.

D: An increase in dissolved organic carbon (DOC) causes waters in small lakes to become clearer .

Answers: F, T, T, F

Reference: April 19th workshop: The cumulative effects of climate warming and other human stresses on Canadian freshwaters in the new millennium.

Forestry - 2 Points

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

Answer: 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

Soils - 2 Points

A: What is soil structure?

B: Why is it important?

Answer: A: How soil particles form or cling together to form aggregates.

B: Structure has a significant effect on porosity, root growth, aeration, compaction

Source: Soils '84, page 6

Wildlife - 8 Points

Equipment provided: Language Master, sound cards for station training, sound cards for test, and spare batteries. Answer Sheet

The sounds that you hear in an area can be clues to the biological diversity. Match the calls to the following species

- Canada goose
- Boreal Chorus Frog
- Red-winged Blackbird
- Mallard duck
- Killdeer
- White-throated sparrow
- Wood Frog
- Barred Owl

Answer: Each "calling card" will have a letter. An answer sheet will be provided.

Source: April workshop (wildlife) and station training refresher