

ENVIROTHON TEST QUESTIONS - 1998

Site 1: Epinette Creek Trail Head

Equipment

3X Field Guide

- STOP 1.** 1. Identify the two prominent tree species in this area. Name two distinguishing characteristics for each.
white spruce, trembling aspen

- STOP 2** 2.a. Fire has caused a major disturbance recently in this area. Describe how it burned and the effect it has caused.
b. Would you expect the forest species to change? Why or why not?
c. Give an adaptation that one of the plant species has to fire.

Fire burned from west to east burning ground cover and killing most trees in its path. Fire was patchy, i.e. some areas were burned while adjacent areas were untouched. In response to the dead trees, several types of insects - e.g. wood borers have infested the area as evidenced by holes in trees. No significant species change. Trembling aspen have ability to sucker from roots. Chemical produced in standing trees that suppresses root suckering is removed by fire.

Fire and dwarf mistletoe damage to the spruce. Recreational damage due to parking lot and trails. No likely changes in the species composition but quantity (frequency) of each species type will change locally. (more aspens, less spruce) Adaptation to fire: spruce - open up cones to release seed; aspen - root suckers; oak - thick fire resisting bark

Bark on the spruce trees is completely burned off on the west facing side, and is only charred on the east side where the burning effect was not as severe.

- STOP 3** 3. What is a snag? give one benefit and one problem associated with snags.
dead standing trees, used by wildlife for cover, feeding, reproduction, preening, lookouts, bridgeways and hibernating. Usually are cut during harvesting to prevent them from toppling onto loggers (safety issue). (page 12) Forestry /Wildlife
4. List three types of animals benefit from fire in this area.
A. Wood-boring insects
B. Cavity nesting birds
C. Sand or open area species (hognosed snakes, tiger beetles, prairie skinks, grassland birds, etc.
D. Ground feeding birds, mammals, seed and fruit eaters (Deer mice)
E. Decomposers
F. Pioneering species
5. Give two in which fire improves area food resources for ground dwelling animals?
A. It brings the terminal but down to where it can be used.
B. It stimulates growth as shade is reduced

- C. Nutrients are available that were tied up in fibre.**
- D. Pioneer plant species invade (seed producers)**

6. Name two groups of animals are adversely impacted by fires in this habitat community.
- A. Animals which feed on seeds and cones from mature trees**
 - B. Tree dwelling animals**
 - C. Animals of closed forest communities**
 - D. Animals which require thermal protection**
7. Would this burn area be used more in winter or summer by large ungulates (why)?
- A. Summer due to abundant herbaceous plant growth.**

STOP 4 8. By what means was the soil formed at this site?

- A. Aeolian
- B. Fluvial
- C. Morainal
- D. Lacustrine

9. What caused the formation of the hills in this area?

Wind

10. List 2 soil characteristics that would limit this site for annual crop production (e.g. wheat, barley).

Infertility, water holding capacity, topography, erosion potential.

Pre-dig two soil Pits. (One on grass knoll, one under tree vegetation, at same elevation)

11. What has deeper A horizon, under grass or under trees. Site A & B. Describe Why?

Under grass, 50% of grass in the roots, they contribute to the Organic matter by roots and dead leaves while under trees mainly contribute to Organic matter buildup by leaf matter.

12. Plant and animal matter broken down beyond recognition is called _____.

- A. Humus.**
- B. Leaf Litter
- C. Mineral matter
- D. Niche

13. Define watershed.

Area bounded by high points of land, includes land use practices, cultural practices, stream,

STOP 5 14. Estimate the height and age of this tree

increment borer

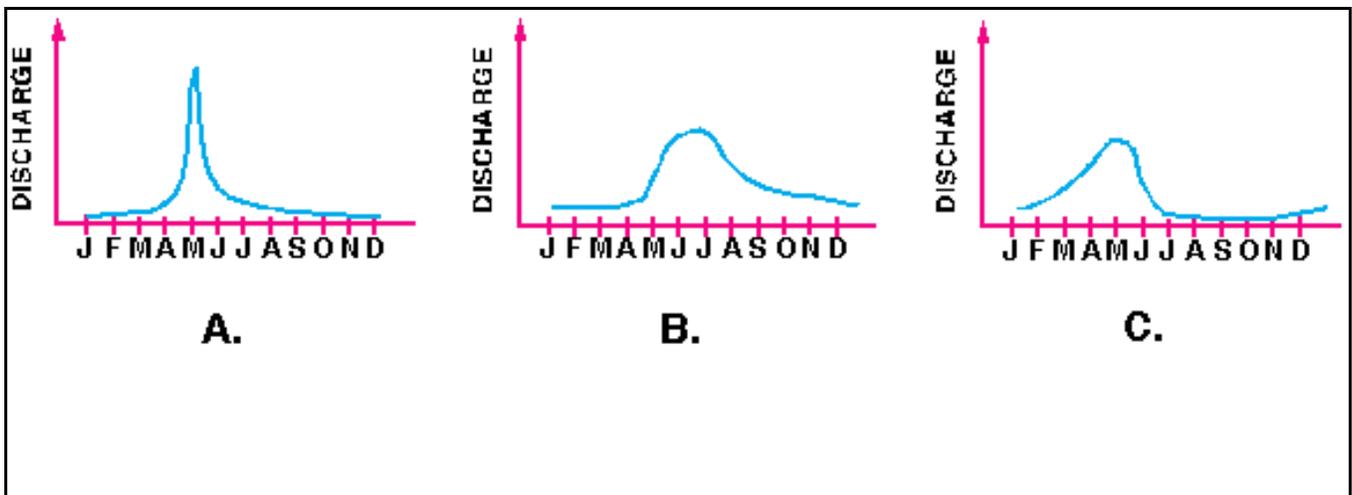
15. Hog-nosed snakes occur in sandy areas of Spruce Woods. Is this species a habitat specialist

or generalist? Why?

specialist as it requires one particular habitat feature (page 8) Forestry/Wildlife section

16. Name three types or levels of diversity that are used to indicate biodiversity. How does habitat fragmentation threaten biodiversity?

Genetic, species and landscape (ecosystem or geographic) Conservation for the sustainable development of forests worldwide: a compendium of concepts and terms Forest Management section. Habitat fragmentation affects genetic diversity by isolating populations and inhibiting genetic flow among these populations.



Site 2: Epinette Creek/Assiniboine River

STOP 1 *Oxbow overlook*

17.A "discharge hydrograph" describes the relationship between stream flow discharge and time at a particular location on a waterway. This relationship is controlled, to a large degree, by land use within the contributing watershed.

Match the following consecutive watershed land development scenarios (1, 2 and 3) to the corresponding "discharge hydrograph" (a, b or c)

scenario #1 A forested watershed in southern Manitoba.

scenario #2 The watershed is cleared of forest, developed for agriculture and many waterway channels are cleared of natural vegetation and straightened.

scenario #3 A large dam is constructed in the upstream portion of the watershed, and the reservoir is operated for the interests of downstream flood control and reservoir recreation.

Hydrographs - move to here

Scenario 1. Hydrograph ____ **B.**

Scenario 2. Hydrograph ____ **A.**

Scenario 3. Hydrograph ____ **C.**

18. This former meander loop of the Assiniboine River was cut off from the main channel by natural erosion processes from 1974 to 1986. Assiniboine River water now flows in this oxbow lake only during periods of high streamflow. Deposition during these events has raised the bottom of the oxbow lake and the vegetation cover has responded to these changes.

The vegetation that covers more than half of the oxbow is indicative of what stage of plant succession? **Carr**

19.a. At this site several springs feed a stream which flows down to the oxbow lake. What is the temperature of the water at the spring's origin in degrees centigrade?

b. What is the likely source of this springs water?

half points for wording that includes "aquifer" or "groundwater".

full points for "Assiniboine Delta Aquifer".

STOP 2 *Farm field*

20. Give three reasons why land in this flood plain is so ideal for agriculture?

- A. Good soil**
- B. Good moisture conditions**
- C. Protected from wind and dry conditions**
- D. Flat; well drained**

21. How do farmers determine the appropriate amount of fertilizer to apply?

Soil Test, Crop requirements

22. List three main types of soil degradation?

Wind Erosion, Water Erosion, Organic matter loss, salinity

23. Soil nitrates, an available form of nitrogen for plants, are prone to leaching? Why

Anion, Soluble in water.

24. Irrigation equipment can be seen in the nearby field. List two reasons why farmers irrigate.

**Increased yield
reduced risk
crop diversification**

25. List two soil characteristics that need to be assessed when planning to irrigate a particular field.

Drainage, texture, topography, salinity,

26. Organic farming means growing crops without using manufactured chemicals or pesticides. List two advantages and two disadvantages of organic farming.

Advantages: Reduced chemicals, improve return, reduced production costs.

Disadvantages: Lower yields, increased tillage and potential erosion. More acres required to feed the world's population.

27. Livestock production is in a rapid expansion phase in Manitoba, e.g.. With increased production comes an increase in manure. When applied properly, manure is a valuable source of nutrients for crop production. Manure management is very important, ensuring that appropriate rates are applied to match crop requirements. If more manure is applied than a crop can use there is a potential for ground water pollution. List three things you would do to ensure that proper manure rates are applied.

Soil test to determine what nutrients are in the soil

Manure analysis to determine nutrient content

Nutrient requirement of crop

Ensure that there is enough land base to spread

28.a. What is a soil profile?

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

b. What is soil structure?

The way soil particles cling together to form soil aggregates.

29.63. Using the hand texturing guide provided determine the texture of samples A and B.

A. _____

B. _____

STOP 3 *Épinette Creek at culvert: Quadrat (west side of Epinette Creek)*

30. Identify four species of trees, include three distinguishing characteristics for each. (a) which are hardwoods?, which are conifers? Field Guide, string & stakes for quadrat

Green ash, balsam poplar, American elm, bur oak, trembling aspen, Manitoba maple (must identify 5); Conifers: white spruce only

Species of tree	Hardwood/Conifer	Three Characteristics

31. Which Manitoba vegetation type is represented? Name two shrubs and two herb species found here that support your choice. V-type pages

V1 Balsam Poplar Hardwood and Mixedwood - west side of creek north of road; V3 Miscellaneous Hardwoods - elsewhere.

Arrowwood, hazel, choke cherry, red osier dogwood, hawthorn, honeysuckle, nannyberry, saskatoon berry, wild rose, wild raspberry, alder, willow

32. Give the most probable reason that there are so few understory woody shrub species in the woodland near the forks?

Siltation from flooding constantly changes growing habitat; newly formed area in the delta of the creek through soil deposition, thus there has been a limited time for greater varieties of woody plants to grow. Poison ivy is the most common woody shrub at the forks.

33. Given that streamflow discharge equals average streamflow velocity times streamflow cross-section area and given the following equipment; stopwatch, tape measure, survey rod and three wooden floats.

Using the culvert as a control section of the stream, what is the present streamflow discharge for Epinette Creek in cubic metres per second?

Answer will be determined Thursday May 28, 1998.

34.a. The remnants of an abandoned beaver dam are evident in the Epinette Creek channel approximately 50 meters upstream from the culvert crossing. How does this enhance the surrounding area? How does this degrade the surrounding area?

Enhancements include; the creation of a pool and riffle environment for a range of terrestrial and aquatic flora and fauna.

Degradations include the breach in the east end of the dam which is directing low flow against the channel bank resulting in slope failure and increased erosion.

Fish may not be able to pass up or down stream if the dam is completed.

b. You measured the stream cross-section just upstream of the beaver dam and got the following result:

DIAGRAM - joel

- Where is the stream velocity the greatest?
- Where would you expect to find the finest or smallest substrate material?
- Where is the erosion zone?

35. List three adaptations you might expect to see in resident fish in Epinette Creek and the Assiniboine River.

eye size/position, presence of barbels, body shape, fin shape/location.

36. Would introducing an invader species (e.g. carp, rainbow smelt, zebra mussels) result in a net increase or decrease in biodiversity? **decrease**

37. Sketch the hydrologic cycle.

38. List five reasons why riparian habitats are valuable for wildlife?

Breeding Cover

travel corridor

Feeding diversity (lateral)

Rearing

Soil moisture

Aquatic component Fertility

39. How do plants stabilize the stream banks?

Roots, surface material and shade.

Assiniboine River

40. Using a thermometer, measure the temperature of Epinette Creek. Given the water temperature of the Assiniboine River (taken at the marked location), compare the water temperatures in the Assiniboine River and in Epinette Creek.

Give three reasons that explain the difference;

- 1.
- 2.
- 3.

(These values will be determined Friday, May 29, 1998.)

The Assiniboine River water is anticipated to be a couple of degrees warmer than Epinette Creek. Reasons include;

- 1. Ground water contributes a significant portion of Epinette Creek streamflow (as told during training) which tends to reduce summer streamflow temperatures.**
- 2. Epinette Creek has fast water which increases evaporation and thereby streamflow temperature.**
- 3. Epinette Creek has riparian tree cover which provides shade that tends to reduce streamflow temperature.**

41. List three indications of previous Assiniboine River high water levels that are evident from this site.

- 1. Clumps of grass and debris caught in the willow along the river bank.**
- 2. Ice damage on large trees at forest edge.**
- 3. Erosion line evident on downstream river bank.**
- 4. Lack of vegetation due to siltation.**

42. Manitoba requires secondary sewage treatment which is the settling of solids. How does this level of treatment compare with tertiary treatment required by the EPA in the United States?

Tertiary treatment removes phosphates

43. If a sewage treatment plant were established and discharged into Epinette Creek, what two macronutrients would likely be present in the greatest quantity?

nitrogen, phosphorus

44. The replacement line (solid line) in the graph below, shows the number of adult walleye required to produce a sufficient number of fry that would eventually replace the original adults. For example, 100 adults produce 1,000 fry (dotted line). 90% or 900 fry die before becoming adults resulting in 100 new adults.

What is the relationship between the number of spawning adult walleye and the number of fry produced at the three points along the dashed line?

A. # adults producing the maximum # of juveniles

B. # adults equals the number of juveniles

C. # of juveniles is less than the number of adults

45. Give three reasons why bats, gulls, swallows, nighthawks and whip-poor-wills might be found along the river?

A. Easy travel route; open, protected from wind

B. Emerging insects

C. Humid, consistent temperature

D. Nest sites (the swallows are in the bank)

46. Give three species of aquatic mammals which might use this habitat.

A. Raccoon

B. Muskrat

C. Beaver

D. Mink

E. Water shrew

47. Give four reasons why is it important to maintain riparian zones in native cover?

- A. Nutrient filter.
- B. Water quality
- C. Erosion control
- D. Habitat diversity
- E. Cover and shade for fish and aquatic animals.
- F. Humidity and temperature control.

48. What are two conditions that river bottom plant species must adapt to in order to survive?

High water table, flooding, silt accumulation, ice gouging, dense cover on the forest floor, seed germination problems related to wet conditions and silt accumulation.

Site 3: Marshs Lake

STOP 1 49. Identify 5 of the more prominent trees. Name three distinguishing characteristics of any two. (a) which are hardwoods? (b) which are conifers? (c) which are not native to this area? Field Guide

Basswood, oak, cottonwood, peachleaf willow, aspen, Manitoba maple, white spruce (in field), green ash (in field), hybrid poplar (in field). (a) All but spruce. (b) spruce. (c) hybrid polar.

Species of tree	Hardwood/Conifer	Three Characteristics

50. Which Manitoba vegetation type describes this woodland? Identify 3 woody shrubs which are diagnostic understorey species for this vegetation type

field guide or FEC
shrub id pages V-type pages

V3. Miscellaneous Hardwoods

51. Of the vegetation type you chose, name two tree component(s) are missing?
white birch, balsam poplar, black ash (choose any one)

52. What are the four layers that make up the vertical structure of a forest stand? Name two characteristics of a forest that determine the number of layers in a stand.
Forest floor, herb and shrub layer, tree understory, canopy. Forest age and type.

STOP 2 53. Key out a fathead minnow and long nosed dace.
(boardwalk)

- Which fish would you expect to find in Marshs Lake?
- List 3 characteristics that are adaptations to a lake environment.

Body form, mouth position/form, fin shape/location.

54. Graph the relationship you would expect to see between oxygen and depth during summer in a eutrophic lake and a river.

DRAFT - Joel

55.a. Why does too much phosphorus negatively affect freshwater ecosystems?

b. List three sources of phosphorous.
fertilizer, detergent, natural elements

c. Why is there phosphorous in dishwasher detergent?
spot-free finish.

56. In a winter with lots of snow you travel to Spirit Sands to cross-country ski. It is late March and you stop to look at Marshs Lake. You notice the ice is melted away from the shoreline and there are lots of dead fish in the water, accompanied by a distinctive rotten

egg smell. Explain what has happened?

Winter kill. Plants have decomposed on the bottom, using oxygen in the process. The poor sunlight penetration - caused by deep snow - has reduced photosynthesis (and the creation of oxygen), thereby creating an oxygen deficient situation for the fish.

57. Name four features which make a marsh area productive?

- i. Aquatic and terrestrial features.**
- ii. Rich organic soils, shallow water with organic bottom.**
- iii. Emergence of food from aquatic and terrestrial environments.**
- iv. Concentration of organic material, nutrients, organic breakdown, niches.**

58. What is the water source for this lake and marshland?

groundwater, artesian wells, surface run-off, stream deposition

59. How long ago was Marshs lake an active part of the Assiniboine River?

- a. 20 years
- b. 200 years
- c. 2,000 years

Explain your answer

Stop 3 Soil pit

60.a. What is the thickness of the A horizon?

b. At what depth does the C horizon begin?

_____cm

c. What is the colour at 50 cms?

Grey

c. What does this colour indicate.

Soil is reduced, soil constantly wet, lack of oxygen,

61. A mild amount of Hydrochloric acid can be used to detect carbonates in the soil. Carbonates are formed from natural chemical reactions in the soil and are soluble. When the acid comes into contact with carbonates a reaction occurs. At this site apply the acid to the soil at 10, 30 and 60 cms.

What information does this test provide?

Drainage, if carbonates are found at the surface then the soil is poorly drained

If no reaction, or increases as move down the drainage is improved.

62. What is the ultimate energy source in aquatic ecosystems?

the sun

63. Place the organisms from the list on the right into the appropriate box in the food chain pyramid on the left.

A. Mayflies

B. Fathead minnows

C. Northern pike

D. Diatoms