Total Station

2008 Missouri Envirothon
Aquatics Ecostation

1. Using the key provided, identify the species of fish labeled 1 and 2 with its common or scientific name. (4 points)

   1.

   2.

2. Zebra mussels were recently found in Lake of the Ozarks. Why is their presence in Lake of the Ozarks of concern? List five ways to prevent the further spread of zebra mussels? (6 points)

   Zebra mussels produce millions and millions of offspring that coat the surface of any item upon which they attach themselves. In some locations zebra mussels have reached densities of more than 750,000 per cubic meter. At these high densities they can clog power plants, industrial and public drinking water intakes and boat hull, causing millions of dollars in damage. Zebra mussels directly threaten native mussel populations by suffocating them and preventing them from getting nutrients.

   1. Inspect boats and trailers thoroughly, and remove any trash, mussels or aquatic weeds before leaving any water body. Mussels and other items removed from the boat should be properly disposed of in a trash container.
   2. Drain water from the motor, live-well, bilge and transom wells, and any other water from the boat and equipment before leaving any water body.
   3. Dump leftover bait on land, away from the water.
   4. Rinse boats, trailers and equipment (including live-wells, bilge, and cooling systems) thoroughly with hard spray or HOT (104 degrees) water, like that found at a do-it-yourself carwash.
   5. Dry boats, motors, trailers and equipment thoroughly in the hot sun before using them again.

3. Using the key provided, identify the macroinvertebrate in the vial with its common or scientific name. (2 points)

   Riffle Beetle

4. Lake of the Ozarks is a _____ lake? (1 point)

   A. dimictic
   B. amictic
   C. oligomictic
   D. polymictic

5. Define eutrophication? (1 point)

   Excess nutrients (i.e. nitrogen, phosphorus) in a lake.

6. Define the three stratification layers of lake: epilimnion, thermocline and hypolimnion. (3 points)

   Epilimnion: Warm, low-density, surface waters
   Thermocline: Zone of rapid temperature change; 1 degree C
   Hypolimnio: Cold, high-density waters, deep waters

7. The use of Truman Dam for electric power generation frequently results in very high flow conditions and turbulent water in that part of the Lake of the Ozarks, just below the dam. The *high flow* velocities and turbulent flow can cause physical injury to fish. As water drops from Truman Dam and plunges into Lake of the Ozarks, it brings air from the atmosphere into the water, causing atmospheric gases to become supersaturated in the water. If this condition becomes pronounced, gas bubble disease can cause serious injury or death to fish. Why might fish kills occur under *medium and low flow* conditions, when there is a release of deep water from Truman Dam? (4 points)

8. Describe <u>three</u> ways to limit negative water quality impacts on a lake from motorized boat? (3 points)

1. Avoid spilling gas, oil, paint, varnish, or stripper 2. never pour chemicals over the water during fueling or boat maintenance 3. do not "top-off" fuel tanks 4. fuel the boat on the trailer whenever possible.

9. Using the secchi disk provided, give a secchi reading for the lake today. (2 points)

10. In the Lake of the Ozarks basin, a major nonpoint source problem is the influence of the development surrounding the lake. List 2 specific items that might be part of the problem. (4 points)

Excess fertilizers, herbicides, and insecticides from residential areas
Oil, grease, and toxic chemicals from urban runoff and energy production
Bacteria and nutrients from livestock, pet wastes, and faulty septic systems

11. Hydroelectric dams (like Lake of the Ozarks) often disturb natural instream flow components of streams. Among those are the magnitude, frequency, duration, timing and rate of change of hydrologic conditions. *Define* each of these components, and then *describe how a hydroelectric dam may change each of the flow components from that of a natural stream*. (10 points; 2 points each)

Please use the back of this paper to answer.

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Magnitude *- the amount of rain/flow that a stream receives during a rain event*
The dam operated stream usually controls flow to minimize or alleviate flooding; a natural system would have periodic flood events.

Frequency *– how often a stream rises and falls from precipitation events*
The dam operated stream would have an increase in flow regularly each day while generating power; a natural system would only have increased flows after a rain event so they would occur much less frequently.

Duration *– how long the flow from a precipitation event lasts*
The dam operated stream would control the duration to the amount of time that it is generating power then the flows are quickly ramped down (may rise and fall over a period of minutes or hours); the natural system would have flows that would last as long as the precipitation event and then gradually taper off (usually over a period of days).

Timing *– when precipitation events occur (seasonality)*
The dam operated stream would see increased flows daily as it generated power year round; the natural system would normally see more flows in the spring and fall, less in the summer and winter

Rate of Change *– how quickly a flow event rises or falls*
The dam operated stream would likely be flashier as power generation started and stopped; a natural system would only rise as quickly as the precipitation event increased or continued and would gradually fall over an extended period

1. How does shoreline vegetation help prevent negative affects of stormwater runoff? Provide at least two examples. (2 points)

Shoreline vegetation reduces the velocity of stormwater runoff and provides a buffer against soil erosion, nutrient inputs, etc.

2. In forestry terminology, what is the term used to identify a buffer adjacent to a stream corridor set aside mainly for the purpose of controlling water temperature? (2 points)

A. filter strip
B. ventilation strip
C. shade strip
D. sun strip

3. How does vegetated shallow water (littoral zone) and riparian vegetation benefit fish and wildlife habitat? Provide 4 examples. (4 points)

shade and water temperature stability
shoreline bank stabilization
a source of insects for foraging wildlife
protective cover from overhanging branches and leaves
under water cover from submerged vegetation
protection from wind and wave action
reduction and filtering of stormwater runoff

4. Define palustrine wetlands and provide 2 functions for them. (3 points)

1 *point for definition and 2 points for functions*
Definition: Swampy, non-tidal wetlands where the soils are wet almost all the time. Provide areas for feeding, breeding, and protection for wildlife. (There are more functions, therefore I will have to just see what people say here).

5. Which of these tree species would be well suited to plant in a riparian zone? (1 points)

A. sycamore
B. black oak
C. red pine
D. white oak

6. The ___**otoliths**_____ (s) found in the inner ears of fish can be used to determine its age, similarly to counting the rings on a cross section of a tree. (3 points)

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Score

1. What cartilaginous fish is found in Lake of the Ozarks? (2 point)

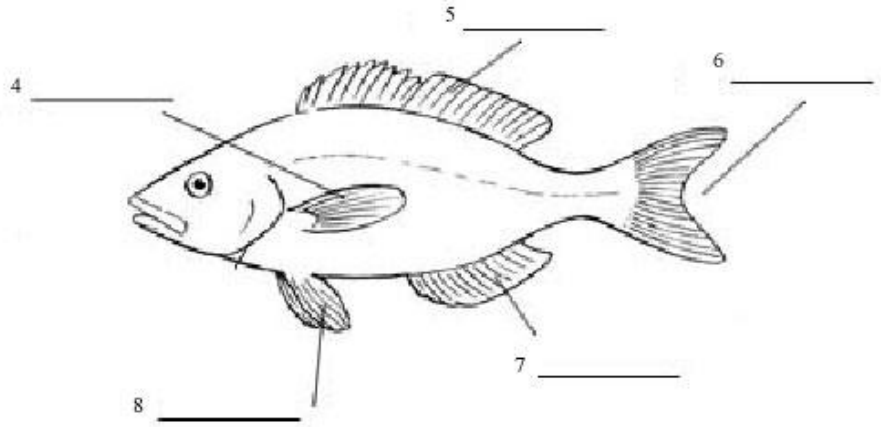
American paddlefish or spoonbill

2. Fish have different tolerances to water temperature. Name a fish that requires cold water (40 – 60 degrees F), one that requires cool water (60 – 70 degrees F), and one that requires warm water (70 – 90 degrees F.) (3 points)

Cold water – Rainbow Trout, Brown Trout, Cool water – Smallmouth bass, muskellunge, Northern Pike, Walleye, Warm water – Largemouth bass, channel catfish, bluegill, crappie, White bass (Fisheries Management (Conservation Education Series) pg. 41

3. Correctly label the fish fins on the diagram numbered 4-8? (5 points)

1 *point for each correct answer*
4-8 pectoral, dorsal, caudal, anal, pelvic



4. Name two ways that trees can be used as fish habitat in ponds. (2 points)

Woody vegetation like trees offer something else that few other plants can however; large woody debris. Woody debris in streams creates slow spots in fast-moving water where fish can rest. It creates pools where fish can grow and escape predation. Woody debris becomes both home and food for insects that make up a fish's diet. It also provides fish the physical cover needed to avoid predators.

5. Correctly identify the species of mussels found in Lake of Ozarks labeled one and two. (2 points)

1. *Three Ridge*

2. *Zebra Mussel*

6. What species of fish may help control snail populations in ponds? (1 point)

Redear sunfish

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1. Define a watershed. (2 points)

An area of land from which surface water drains into a common outlet, such as a river, lake, or wetland.

2. In the Lake of the Ozarks basin, a major nonpoint source problem is the influence of development surrounding the lake. List 2 specific items that might be part of the problem. (4 points)

Excess fertilizers, herbicides, and insecticides from residential areas
Oil, grease, and toxic chemicals from urban runoff and energy production
Bacteria and nutrients from livestock, pet wastes, and faulty septic systems

3. What is the name of the volcanic clay that swells when wet and is often used to seal a leaky pond? (1 point)

bentonite

4. Many of the campsites at Lake of the Ozarks State Park are heavily used. How does increased foot traffic affect soils and how does this impact the lake? (4 points)

Compacts soil, decreases infiltration rate. Increases stormwater runoff, which increases soil erosion.

5. Soils influence water quality by: (2 points)

A. Absorbing and neutralizing potentially harmful chemicals
B. Adding minerals to water
C. Adding organic matter to water
D. Absorbing and slowing runoff
E. All of the above

6. How do watershed boundaries affect the movement of groundwater? (2 points)

Groundwater can move across watershed boundaries in many different ways including sink holes, losing streams, and getting into deep aquifers where it can travel hundreds of miles.

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1. If Bighead carp (Aristichthys nobilis) was introduced in the lake, how would this impact the fishery within a top-down trophic interaction. (15 points)

Bighead carp are planktivorous and attain a large size. They compete with native fish populations such as the paddlefish for food resources. Their introduction to Lake of the Ozarks could be devastating to native mussel and fish populations.

Bighead carps main source of food is zooplankton. If they were introduced in lake they would compete with other planktivorous fish for food resource. In turn, they would decrease the population of native planktivorous fish in the lake because they would out-compete populations of the smaller native fish. This would impact the top carnivores (i.e. walleye, catfish) in the lake by limiting their food resources. Without smaller fish for piscivores to feed on their numbers would eventually decline. Additionally, they would decrease the abundance of zooplankton in the lake, which feed on algae. This would increase the abundance of algae in the lake.

Points:
1 point: Correctly identifying Bighead carp diet.
2 points: Identifying how this would impact top carnivores.
2 points: Identifying how this would impact smaller fish.
2 points: Identifying how this would impact zooplankton.
2 points. Identifying how this would impact algae.
2 points: Correct trophic order
4 points: Specific species examples

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