Alberta Tomorrow Land Use Field Trip

Objectives:

- *The students will observe a variety of land uses and their effects on the ecosystem in their local area*
- *The students will identify different landscape types in their local area*
- *The students will conduct water quality testing*
- *The students will understand that what happens on the land affects the water*

Duration: actual field trip – 1 day (depends on driving time)

Materials:

- slide show pictures
- hula hoops
- Pencils
- data sheets
- plant identification cards (still under development)
- aquatic invertebrate key
- water sampling test kits
- Water sampling nets
- Maps
- GPS units (optional)

Teacher Background:

Usually, by looking at the land, we can get a pretty good idea of what type of land-uses are taking place. Sometimes we can see the effects on the ecosystem, but sometimes the effects can't be "seen". By looking at the water in an area, we can get a better idea of some of the unseen effects of land-use. The water usually tells us the story of what's going on in the local area.

For this reason, the field trip will have students use their own eyes, and see what's going on, but also take water samples to further examine the effects of land-uses.

This trip is intended to be used in conjunction with the on-line Alberta Tomorrow Simulator (www.albertatomorrow.ca).

Find 4 or 5 locations, close to your community, that will allow students to observe a fairly pristine, untouched landscape (if this is possible) and others that have different land-use taking place around them. If you are having students take sample water, make sure these land-uses are adjacent to a water source. Examples may include agriculture, forestry, oil and gas activity, urban development, recreational activities, golf courses, off highway vehicle use, etc. A bus should be able to easily access all areas.

At each location, you will

1. Identify the landscape type
2. Locate it on a map
3. Complete a brief vegetation survey
4. Sample water and invertebrates
5. Take pictures/video/GPS waypoints
6. Observe changes cause by land-use

Safety/Permission Notes:

Make sure if you are on private land that you have obtained the proper permissions. If you are in a natural area, respect the environment. Do not pick flowering plants or feed the animals, and pack out any garbage and /or sampling waste. Delineate physical boundaries within which the students must stay and encourage them to stay in their groups. If you are in bear country, ensure you have bear spray, and students have been instructed on the proper way to handle bear encounters.

Pre trip activities:

Register your class at www.albertatomorrow.ca. Have your students log-on and create their profile, find their location, watch the videos, and complete the historical and business as usual scenarios for your area. Prior to your field trip, review the videos that show land-uses you will see on your trip.

Field trip:

Talk about landscape diversity. Why is it important? Imagine you are a deer. What would you be looking for in this landscape? Bear? Caribou? Fish?

Land use affects the landscape, both terrestrial (land) and aquatic. Sometime we can see the effect of the land-use, but sometimes we use water quality tests to give us information on what cannot be seen. Humans have also affected the landscape by altering natural processes. For example, by suppressing forest fires we have changed the landscape, resulting in a less diverse forest and issues like mountain pine beetle.

For each for the next stops, have students complete the data sheets.

Post Trip activities:

- In the lab, if doing, complete the Fecal Coliform and B.O.D tests.
- Use the Q value charts and calculate the overall water quality for each site
- Log in and enter your results, pictures and videos in the “Observations” section on the left hand side of the Alberta Tomorrow Simulator.

- Return to www.albertatomorrow.ca and have students complete the future land-use plan for their area.

Extension Activities:

- Simulate a town council debate by having various stakeholders present their land use plans
- Interview individuals involved from one of the industries, conservation associations, or government to get their perspective
- Compare your data to data from other areas in the province

Alberta Tomorrow Land Use Field Trip

Land-Use Field Trip

Date:_____ Names: _____

Group #:_____ _____

Site #:_____ _____

_____

_____

_____

General Information

Location: Latitude:_____ Longitude:_____ GPS waypoint?_____ Location Marked on Map? Y/N

Description of the site location:

_____

_____

Description of current weather conditions:

- Rain
- Overcast
- Partly Cloudy
- Clear/Sunny
- Other:_____

Have a look around you and answer the following questions:

1. What kind of ecosystem do you see? (take pictures/video)

   _____

   _____

2. What makes up this ecosystem?

   _____

   _____

3. What human activity can you see? (take pictures/ video)

   _____

   _____

4. What effects on the ecosystem can you see as a result of that human activity? (take pictures/video)

   _____

   _____

Alberta Tomorrow Land Use Field Trip

Vegetation Sampling:

Directions: Randomly throw your hula hoop on the ground. Where it lands will be your study area. Standing directly above the hula hoop, estimate the % bare ground. Estimate % grasses, shrubs, herbaceous plants

% bare ground: _____ %grasses:_____ %Shrubs:_____ %herbaceous plants:_____

Species present : _____ _____

_____ _____

_____ _____

Water Sampling Site Sketch:

Legend:	**= Algae**	**= Coniferous trees**	**= Riffle**
	= Woody Debris	**= Deciduous trees**	**= Pool**
Raw Data:	**=rocks**	**=Shrubs**	**= Direction =**

Chemical Water Quality Index:

SITE NUMBER: _____ FIELD DATA:				WATER QUALITY (in lab)		CALC.
Test	**Raw Data**	**Conversion of Raw Data**	**Test Result**	**Q value (charts)**	**X weight factor**	**Total Q-Value**
Dissolved O_2 (mg/L -- %sat)	drops		ppm (mgL)		0.17	
Fecal Coliform**			Col/100mL		0.16	
pH					0.11	
B.O.D.**			mg/L		0.11	
Water Temp	^{O}C		0		0.10	
Phosphates	mg/L		mg/L		0.10	
Nitrates	mg/L		mg/L		0.10	
Turbidity	# of 0.5mL additions	See chart on turbidity test kit:	JTU (NTU)		0.10	
TOTALS:					(a)0.93	(b)_____
** Done in lab			**Water Quality Index**		**(b/a)**	
			Overall Water Quality			

Note: If you are not doing some of the water quality tests, subtract the weighting from the total before calculating overall water quality index.

Water Quality Index Ranges:

Index	Rating
90-100	Excellent
70-90	Good
50-70	Medium
25-50	Bad
0-25	Very Bad

Hilsenhoff Biotic Water Quality Index Rating: Macroinvertebrates

(See Macroinvertebrate Taxa Group)

GROUP	Number of Taxa Present (A)	Group Index Value (B)	(A) X (B)
1		3	
2		2	
3		1	
		Cumulative Index Value	
		Stream Quality	

Group 1: pollution-intolerant or indicators of good water quality
Group 2: organisms that can exist in both extremes of water quality
Group 3: pollution –tolerant or indicators of poor water quality

Stream Quality Assessment Scale:
Excellent: Above 22
Good: 17-22
Fair: 11-16
Poor Below 11

Notes on Land Use Issues/Water Quality/ etc.

_____

_____

_____

Other Observations:

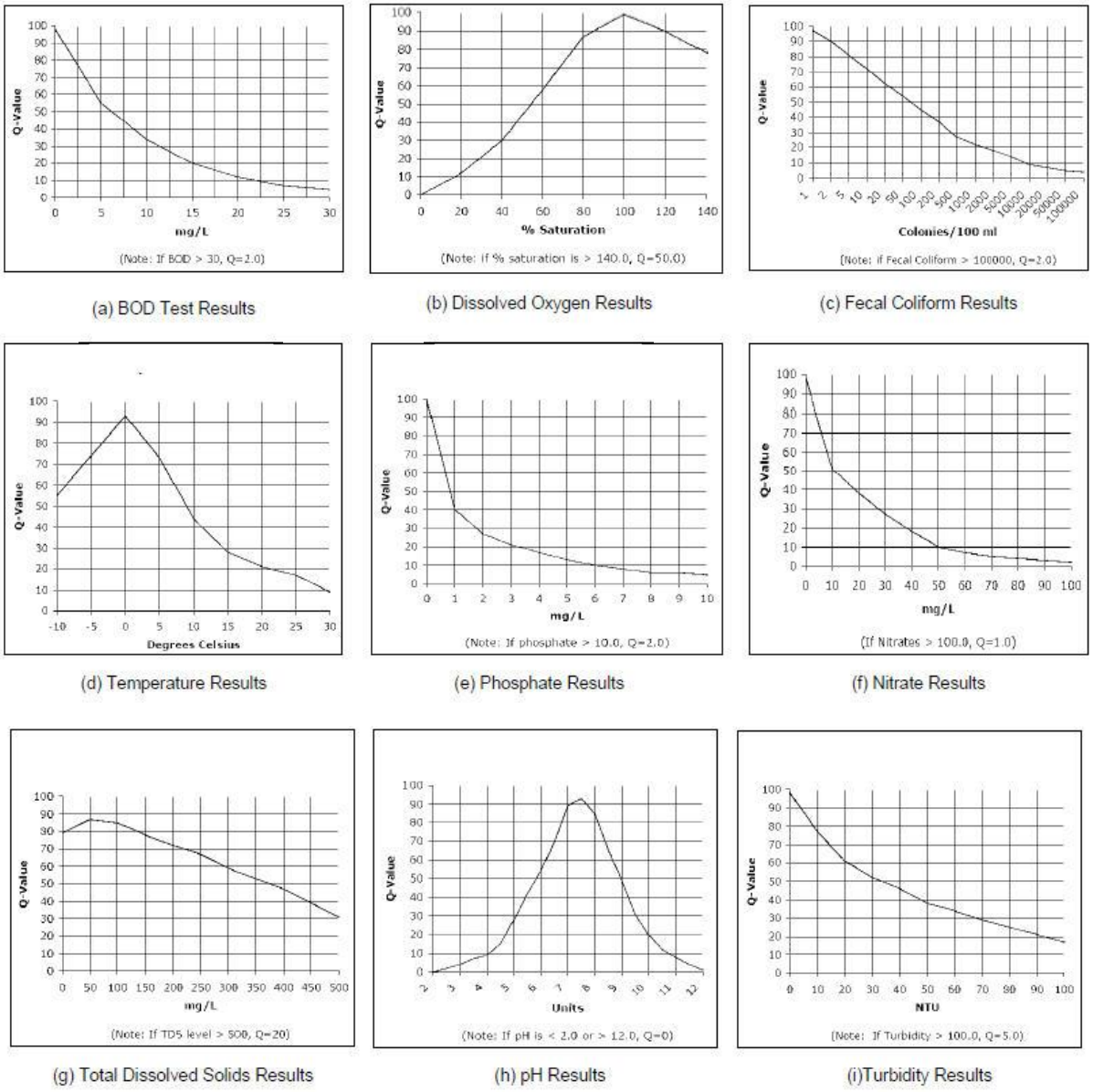
_____

_____

Overall Rating of Site #___= _____ (Biotic Water Quality Index + Chemical Water Quality Index)

Q values and conversion charts for Chemical Water Quality Index:

Figure A1: Graphs for each Analyte of NSF WQI



(a) BOD Test Results

(b) Dissolved Oxygen Results

(c) Fecal Coliform Results

(d) Temperature Results

(e) Phosphate Results

(f) Nitrate Results

(g) Total Dissolved Solids Results

(h) pH Results

(i)Turbidity Results

MACROINVERTEBRATE TAXA GROUPS

GROUP 1 These organisms are generally pollution-intolerant. Their dominance generally signifies GOOD WATER QUALITY.


DOBSONFLY LARVA


CADDISFLY LARVA


STONEFLY NYMPH


OTHER SNAILS

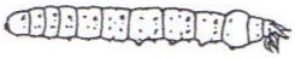

RIFFLE BEETLE ADULT


WATER PENNY
BEETLE LARVAE

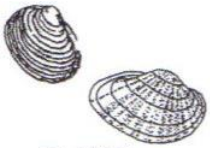

MAYFLY NYMPH

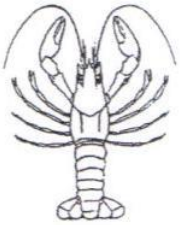
GROUP 2 These organisms can exist in a wide range of water quality conditions.


DRAGONFLY NYMPH


CRANE FLY LARVA


SCUD


CLAMS

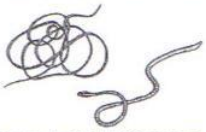

CRAYFISH


DAMSELFLY NYMPH


SOW BUG


BEETLE
LARVA

GROUP 3 These organisms are generally tolerant of pollution. Their dominance usually signifies POOR WATER QUALITY.

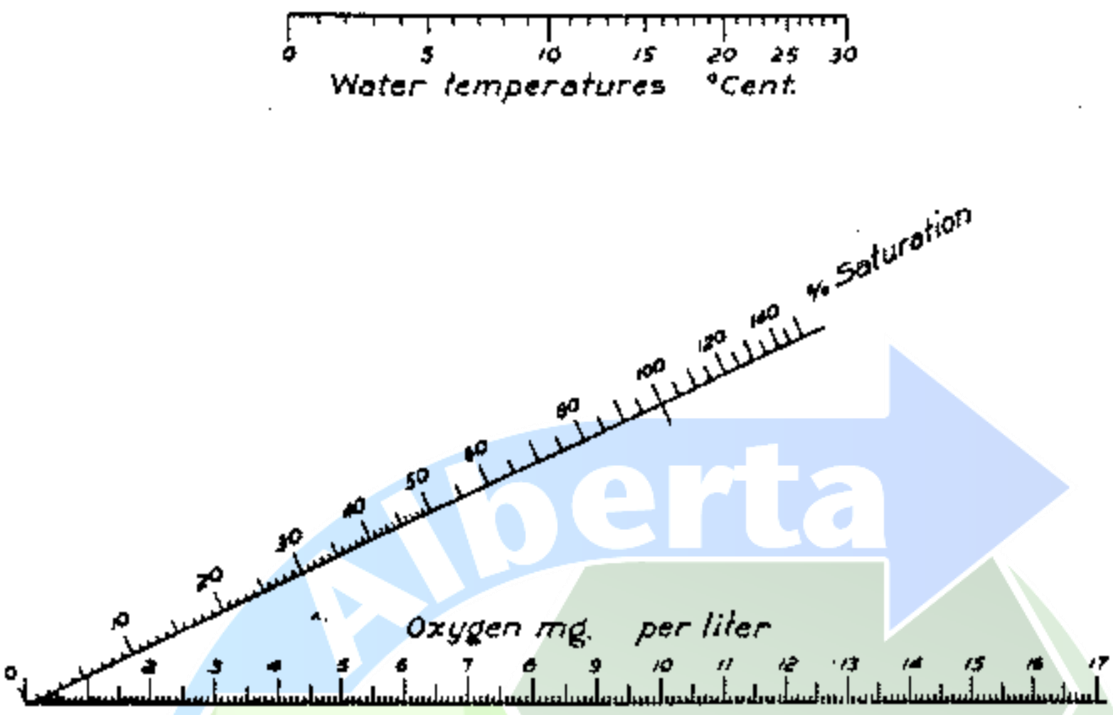

AQUATIC WORMS


MIDGE LARVA


POUCH SNAILS


LEECHES


BLACK FLY LARVA



For calculating % Saturation