

Some questions to guide students in their assessment of wetland health and disturbance.

- Is there any development nearby?
- Have any channels or canals been built for water diversion?
- Is the open water flecked with oil or grease? (Not to be mistaken with algae and duckweed)
- Are there many signs of wildlife and plants? If not, why not?
- Is there any purple loosestrife in the vegetation? If so, authorities should be notified so it can be pulled. (For more information about purple loosestrife, see the file on the supplementary CD entitled, Purple Loosestrife.)
- Is the riparian (vegetation at the edge of the water) lush and healthy or trampled and sparse? A healthy riparian zone increases a wetland's capacity to support wildlife and to keep the water clean.
- Tall grasses, shrubs and trees provide food and nesting areas. A buffer also controls erosion and acts like a natural filter.
- If visiting a bog or fen, you may notice that local streams look brown and foam is visible on the water. This may be perfectly natural; tannins in the bog give water a tea-like appearance and the foam can result from a combination of organic material and water turbulence.

Explain the three important areas that constitute a wetland. They are used to assess wetland health and must be intact for a wetland to be fully functioning:

1. aquatic zone
2. riparian
3. upland

See below, from *What is a Wetland? Teacher Background*

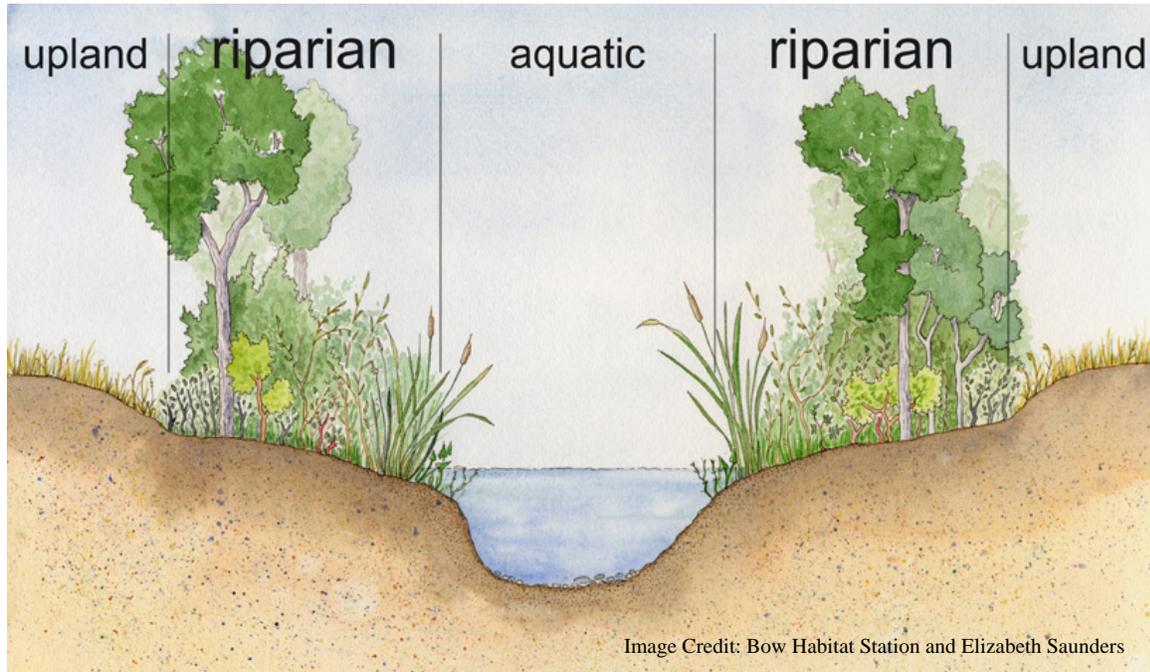
For a wetland to contribute benefits, it must be healthy and well functioning. A healthy wetland ecosystem should incorporate three sections: an **aquatic zone** (water), **riparian area** (vegetative zone bordering the water) and **upland** habitat.

The **aquatic zone** is defined as the area below the high water mark. In this area the water levels change both seasonally and annually. Within this zone, three distinctive types of plants grow – emergent, (out of water) submergent (below water) and floating.

The **riparian area** is the green buffer of moisture-loving plants that surrounds the edges of wetlands, lakes, rivers and streams. This vegetation can tolerate only periodic flooding. The riparian is the transition zone between the aquatic environment and the

drier uplands. The riparian area is characterized by forbs, rushes, grasses, shrubs and deciduous trees (willow, cottonwood).

**Uplands** are the driest areas furthest from the wetland, occupied by trees, shrubs and grasses. The uplands provide vital food and shelter for wetland animals.



Page 9, Wetland Observations, in *SQUISH! A Walk in a Wetland*

To facilitate a simple understanding of a healthy wetland ecosystem, the definition provided in the student booklet is: **One sign of a healthy wetland ecosystem is a variety of plants and animals. Another one is that the water is clean from pollution.**

### **Invertebrates are an Indicator Too!**

After the students have observed the invertebrates, discuss the variety of species. The organisms below are generally tolerant of pollution. If they are the dominant species in the wetland, it usually signifies poor water quality:

- Aquatic worms
- Pouch snails
- Leeches
- Midge larva

## Indicators of healthy Wetland Ecosystems

There are three indicators of wetland health: biological, chemical and physical. Factors within the categories are interrelated and interact with one another. For example, if a wetland is disturbed chemically e.g., by the addition of nutrient-rich water, there may be changes in the nutrient status but may also see changes in the biota—in the algae community and density. Therefore, it is more practical to assess health and quality of a wetland with as many factors and categories.

### *Note to Teacher*

This information is provided as background. The health of a wetland is calculated by more than the three zones (aquatic, riparian and upland). Students should leave with the understanding that the more diversity a wetland has, the healthier it is.

**Table 1: Common biological, chemical and physical indicators of wetland health and quality**

	<b>Indicator</b>	<b>Parameters Measured</b>	<b>Possible responses to disturbance</b>
<b>Biological</b>	Birds Macro-invertebrates Amphibians Zooplankton Algae Vegetation Microbes	Community and/or population structure, diversity, species, richness, health of individuals	<ul style="list-style-type: none"> <li>• Shifts in species composition, community structure</li> <li>• Disturbance-tolerant species dominate</li> </ul>
<b>Chemical</b>	pH Turbidity Dissolved oxygen Phosphorus and Nitrogen concentrations Metals Pesticides Dissolved Organic C Major Ions Cyanotoxins	Acidity, water clarity, nutrient status of water, metals, pesticides, hydrocarbons, salinity, organics	<ul style="list-style-type: none"> <li>• Changes in water pH, eutrophication and algal blooms, anoxic water and/or sediments</li> <li>• Changes to biochemical cycling</li> <li>• Toxic responses by organisms</li> </ul>
<b>Physical</b>	Water depth Temperature Hydrology Sediment Composition Decomposition Structure	Water availability and permanence, water recharge and discharge capabilities, peat accumulation, seasonality of changes in water depth	<ul style="list-style-type: none"> <li>• Changes in water storage or discharge</li> <li>• Changes to ground or surface water connectivity</li> <li>• Increased or decreased decomposition</li> </ul>

*Source: A Review of Indicators of Wetland Health and Function in Alberta's Prairie, Aspen Parkland and Boreal Dry Mixedwood Regions, March 2006.*