Definitions
Abiotic: nonliving, as compared to biotic which would be living

Aerobic: taking place in an oxygenated environment

Algae bloom: a rapid increase in the numbers of algae caused by ideal conditions for reproduction and growth. The problem caused by the boom depend on the species but can include upsetting feeding patters of algae eaters, poisoning other species through toxins released by the algae, and when the algae die, the related sudden growth of bacteria that decompose them use up oxygen in the water creating anoxic zones in the water, killing other species. Respiration of the algae at night can create the anoxic zones even before they die.

Anabolic reaction: using ATP energy to build complex compounds in the cell. Building glucose from carbon and hydrogen would be an example.

Anoxic: lacking oxygen

Anaerobic: taking place in an oxygen poor environment

Anaerobic cellular respiration: glucose or other nutrients are oxidized (lose hydrogen) through ATP energy and enzymes. The energy is received by NAD^+ which is reduced (gains hydrogen) to become NADH and transfers energy to an inorganic compound such as nitrate or sulfate.
Glucose loses hydrogen to NAD →NADH transfers the hydrogen to sulfate to make→hydrogen sulfate and energy. (Solomon & Berg & Martin & Villee, 1993; Gould & Keeton, with Grant, 1996, p. 164)

Aquifer: an area of impervious rock or soil that traps water underground

ATP: adenosine triphosphate, a nucleotide with up to three phosphate groups attached. The phosphate groups store energy, are easily broken off releasing energy. ATP stores energy for short bursts of reactions in the cell. ATP is made of ribose (a five carbon sugar), a nitrogen base of nucleic acids, and three phosphate groups. If only two phosphate groups are attached the molecule is called ADP, adenosine diphosphate. Phosphate groups can be added or subtracted from the nucleotide base. (Gould & Keeton with Grant, 1996; Solomon & Berg & Martin & Villee, 1993)

Autotroph: make their own food from inorganic (does not contain carbon) raw materials at least one of two ways. Chemosynthetic autotrophs oxidize inorganic substances. Photosynthetic autotrophs use light energy to make their own food from inorganic substances. Compare these two methods to heterotrophs which decompose or metabolize organic (contain carbon) substances for their food.

Bacteria: 2 kingdoms Eubacteria (most common) and Archaebacteria. As prokaryotes they have cells with ribosomes but lack membrane bound organelle. Genetic material is in a DNA molecule, but it is free in the cell. Most have a cell wall around the plasma (outer) membrane. Most are unicellular but some form colonies or filaments with specialized cells in the filament for nitrogen fixing. In some, the plasma membrane folds inward for energy transfer. Most bacteria are heterotrophs, decomposing organic matter. Some are autotrophs (photosynthetic or chemosynthetic) For a discussion of the role of bacteria in wetlands, click here.

Biodiversity: the number of different species in an area, important for survival of a habitat. In a balanced environment there are controls, such as weather, availability of food, predators, diseases, or parasites controlling the numbers in each species so there is a long term balance among them. Researchers found that habitats with the highest rates of diversity (where there were more than one species filling multiple niches) survive the best. People have accidentally or deliberately relocated species, not recognizing that there were no controls in the new area. Introductions, habitat destruction, and over harvesting have led to a global decline in the numbers of species or global biodiversity. Reducing biodiversity we are limits problem solving options, as many solutions to problems have come from nature.

Bioremediation: using biological organisms such as bacteria with special enzymes or species with special characteristics to clean up or speed up processes. Bioremediation may include using plants to absorb toxins from contaminated soil, then disposing of the plants, or using microbes that metabolize inorganic solids such as arsenic and convert it to other forms that may be less toxic or neutral.

Brackish: a mix of saline (salty) and fresh water, often termed the salinity of water

Catabolic reactions: releasing energy by split molecules in the cell to make ATP one of three ways: aerobic respiration, anaerobic respiration, and fermentation. In aerobic respiration nutrients are broken down in steps with oxygen to release carbon dioxide, water, and ATP energy. In anaerobic respiration inorganic substances (nitrate or sulfate) combine with the nutrient to release carbon dioxide, water, the reduced inorganic substances, and ATP energy. In fermentation organic nutrients release carbon dioxide and reduced organic molecules with ATP energy. (Solomon & Berg & Martin & Villee, 1993, Ch 7)

Chloroplast: areas in the cells of green plants that use pigments, called chlorophyll and carotenoids, to convert light energy to chemical energy used by cells. Chloroplasts concentrate chlorophyll in the thylakoid membrane of the chloroplast. In part one of photosynthesis chlorophyll absorbs light energy to make ATP. The energy is used to split water, releasing oxygen. The hydrogen from the water combines with $NADP^+$ to form $NADPH + H^+$. In the second part of photosynthesis the energy of NADPH and ATP made in part one split carbon dioxide with the hydrogen from NADPH being used to make carbohydrates to be used as long term fuel storage for the cell. (Solomon & Berg & Martin & Villee, 1993)

Coastal Plain: the area affected by tides that can extend many miles inland.

Duration: time during which something happens

DNA: deoxyribonucleic acid, the basic unit of heredity. The sequence of nucleotides in DNA is the code in genes that control the characteristics and activity of cells. There are four kinds of nucleotides in DNA that differ in their nitrogen base. The nucleotides in DNA are bonded so the sugar of one is attached to the phosphate group of another. This creates a chain with the nitrogen bases as side groups of the chain. The chains exist in pairs with the nitrogen bases and hydrogen bonds linking them. The sequences in which the four nucleotides occur are essentially constant in DNA molecules of the same species, but differ slightly from species to species.

Emergent vegetation: plants that are rooted in mud beneath water, but grow tall enough to stick out above water or have leaves that float on the water under normal conditions. Examples would be cattail and waterlilies.

Enzymes: proteins that speed up reactions in the cell.

Filter Feeders: animals that eat microscopic plants and animals suspended in the water. Some of this is detritus, decayed plants or animals washed in from the land. Some filter feeders, like oysters, clean the water taking out nutrients, and then bind the rest in clumps which settle to the bottom of the body of water, improving water clarity. Clearer water allows sunlight to penetrate encouraging the growth of underwater plants which provide oxygen in photosynthesis, and habitat. In the past, oysters were plentiful enough in the Chesapeake Bay to filter the entire bay in about 4 days. Their demise from over harvesting and disease means the remaining oysters now take over a year to filter the same amount of water so clarity has gone down.

Frequency: number of times something happens in a given amount of time

Gleyed soil has insoluble iron oxides reduced to ferrous iron giving the soil a grey or bluish tint. The wet conditions are often seasonal so the soil is often rich in organic matter and mottled. (www.macaulay.ac.uk) Gley soil is a slippery clay soil that forms under wetlands. The clay traps water above it and anaerobic bacteria activity produces a black or dark color in the soil.

Ground Water: water that has penetrated the soil surface. It may evaporate out in dry weather, be taken up by plants, or may be flowing trapped below ground in between water impervious (link) layers of rocks in aquifers or underground streams.

Habitat: a place that is self contained with adequate food, shelter, and water for a species to survive without leaving to obtain shelter, food or water.

Hydrology: pertaining to the water cycle, a cycle of wet and dry periods generally

Hydric: having an abundance of water. Soil typical of wetlands is "soil formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part." Federal Register, July 13, 1994 (http://en.wikipedia.org/wiki/Hydric_soil)

Impervious: resisting passage, used in the context of this class, it means soil or man made barriers that do not permit water to penetrate. Impervious surfaces such as parking lots and roofs speed run off causing erosion. Impervious rock layers in the Earth trap water that can be tapped for wells, or slow its flow so it replenishes rivers and streams.

Indicator species: a species that responds rapidly or over time to small changes in the environment, and can be used to indicate environmental changes. Sea grasses are used as an indicator of clean water because they require sunlight to penetrate water. When suspended sediment or algae block the sunlight, the grasses die quickly. Frogs are another indicator of clean water. From the egg through maturity they are in contact with water, and they are more sensitive to some pollutants than other species. They will die or become ill and deformed at relatively low levels of water pollution, so are a good indicator of water quality. The canary is a classic indicator species. In the days before air testing equipment, odorless and colorless poison gas built up in coal mines. Miners would bring a canary into the mine with them. Because the canary was more sensitive to these gasses than the miners, miners knew that as long as the canary was singing, the air was safe.

Inundate: to cover completely, fill all capacity, flood

Ion: an atom or group of atoms that have a charge from losing or gaining an electron. Cation is a positive charged ion. Anion is a negative charged ion.

Latitude: distance above or below the equator, measured in degrees, minutes and seconds

Low Marsh/High Marsh: elevation above sea level is lower in a low marsh than a high marsh. This means if water is coming downstream or tidal, a low marsh area will be flooded to a greater depth than a high marsh area. In wetlands, differences in elevation of an inch can mean an extra four hours of flooding a day. This will have significant impact on plants in the wetland.

NAD: a receptor or shuttle for electron energy in the cell. When hydrogen atoms are removed (oxidized) from a compound, some of the energy comes with it to the hydrogen receptor (reduced), NAD. NAD^+ is an enzyme (special protein) that readily accepts hydrogen atoms, storing their energy as NADH. This energy can contribute to cellular metabolism or be used to produce ATP, another way of storing energy. (Solomon & Berg

& Martin & Villee, 1993)

Niche: the job in a habitat that a species performs. In wetland environments, green plants are producers converting the sun's energy to chemical energy for their own use and other species that eat the plants. Plants also filter water of nutrients and sediment, and provide a home for other species, including herbivores that eat the plants. Herbivores like snails may be eaten by predators such as small herons, which are then eaten by other predators like fox. Decomposers, like bacteria, metabolize the organic matter releasing elements to the system and are also food for fresh water mussels and clams. Other decomposer bacteria metabolize inorganic solids making the minerals available to plants. The mussels and clams are then eaten by birds which are decomposed when they die to become nutrients for plants. The shells of the snails, mussels and clams may also provide shelter for tiny fish or other species.

Niche	**Species that fills it**
producers	green plants
decomposers	bacteria, fungi
consumers	snails, birds, fox, mussels, clams

In any habitat there will be at minimum: primary producers, consumers that eat the primary producers, and decomposers. Different habitats will have different niches depending on the physical characteristics of the habitat.

Nucleotide: a molecular unit of a five carbon sugar, a phosphate group, and a nitrogenous base. Nucleotides form nucleic acids that serve many functions in cellular activity including transmitting heredity information and controlling cellular functions. DNA and RNA are two nucleic acids responsible for heredity and cellular activity.

pH: hydrogen ion concentration measured on a standard scale of 7 being neutral, above 7 being base or alkaline (low hydrogen concentration or accepts hydrogen atoms) and below 7 being acid (high concentration and yielding hydrogen and an anion (Solomon & Berg & Martin & Villee, 1993, p.1)

Precipitation: natural water that falls to Earth from clouds: snow, sleet, hail, rain

Protein: a compound made of amino acids. Each amino acid is made of carbon, hydrogen, oxygen, and nitrogen. Most proteins also include sulfur. Amino acids bond with other elements or groups of elements to form polypeptide chains. Protein may have more than one polypeptide chain held together by weak bonds.

Respiration: cellular respiration under aerobic conditions oxidizes glucose to produce carbon dioxide and energy for cellular functions. In the pre-photosynthesis atmosphere anaerobic cellular respiration was most common as there was little oxygen, and sulfur, nitrogen and inorganic carbon were broken down in respiration. As photosynthesis increased the oxygen available, aerobic respiration became common. In aerobic respiration sugar, oxygen and water are oxidized to make carbon dioxide and water and energy. Hydrogen electrons are transferred from carbon to oxygen.

$C_6H_{12}O_6+6O_2+6H_2O \rightarrow 6CO_2+12\ H_2O$ + energy

Organism respiration is respiration on an organism scale using gills, skin, or lungs where the blood vessels are close to the surface to expel carbon dioxide produced by the cells and bring in oxygen for aerobic cellular respiration.

Ribose: a five carbon sugar

Ribosome: made of ribosomal RNA and ribosomal protein.

RNA: ribonucleic acid): a sequence of nucleotides with a ribose sugar. There are several types of RNA, each with a role to play in protein synthesis. Some act as messengers from DNA to the sites of protein synthesis in the cell.

Riparian: pertaining to rivers, wetlands along a river's banks or in an overflow bend of a river.

Saturate: to fill to the point no more will fit. In saturated soils most, if not all, of the air pockets in the soil are filled with water creating anaerobic conditions.

Silt: fine particles of soil deposited as sediment (suspended soil particles) settle out of water

Species: a relatively arbitrary distinction that an organism that is sufficiently different from others to have its own name. Most species have differences within the group but they are not so pronounced that it is not possible to see the relatedness of them. DNA is increasingly needed to determine species distinctions over outward appearances.

Sequester: to lock away, in the case of organic material under built up soil so the carbon can not escape to the atmosphere as carbon dioxide.

Surface Water: water that falls on the land surface as precipitation or collects there (streams, ponds, estuaries, oceans)

Water table: upper limit of water in saturated soil. Water goes into the ground as far as an impervious layer of rock, then begins flowing downhill along that rock layer to the nearest body of water such as a stream or lake. After a heavy rain or snow melt, the top surface of this ground water may be above the ground level in depressions and other areas.