Appendices

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Curriculum Connections for 6th Grade Science and Math Cores

Intended Learning Outcomes

Activity	6c	6b	6a	5b	5a	4e	4d	4c	4b	4a	3c	3b	3a	2f	2e	2d	2c	2b	2a	1i	1h	1g	1f	1e	1d	1c	1b	1a
Where's the Water?									X	X							X		X			X			X	X		X
What's in the Water?		X				X		X	X	X					X		X		X	X		X		X	X		X	X
Who lives in the Water?	X								X	X					X				X	X		X		X	X		X	X
Missing Macroinvertebrates		X							X	X					X				X	X				X	X			X
Wetland VS Stream Macros	X	X		X	X				X	X				X	X	X	X		X	X	X			X	X		X	X
Riparian Review		X		X						X									X	X				X	X	X		X
Nitrogen Cycle	X																		X			X			X			X
When Things Heat Up	X				X					X					X				X	X	X	X			X			X
Aquatic Invasion!					X						X											X						
That's Predictable	X	X			X		X	X	X					X							X	X						
Water Management			X		X		X									X	X								X			
Biodiversity Debate					X		X									X	X								X			

State Standards

	Activity	Where's the Water?	What's in the Water?	Who lives in the Water?	Missing Macroinvertebrates	Wetland VS Stream Macros	Riparian Review	Nitrogen Cycle	When Things Heat Up	Aquatic Invasion!	That's Predictable	Water Management	Biodiversity Debate
RP	1	X											
	2												
	3a												
	3b												
	3c						X						
	3d		X						X				
NS		No Correlations											
EE	1				X		X						
	2a												
	2b												
	2c												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
G	1						X						
	2												
	3												
	4												
SP	1												
	2					X	X						
	3					X	X						
	4	X	X			X							
	5a												
	5b		X			X	X						
	5c												
	5d												

Curriculum Connections for 7th Grade Integrated Science and Math Cores

State Standards														
	R	N	B		SP									
Activity	**P**	**S**	E	G	1	2	3	4	5	6	7a	7b	8a	8b
Where's the Water?	No Correlations	No Correlations	No Correlations	No Correlations										
What's in the Water?														
Who lives in the Water?														
Missing Macroinvertebrates														
Wetland VS Stream Macros														
Riparian Review					X									
Nigrogen Cycle														
When Things Heat Up														
Aquatic Invasion!														
That's Predictable														
Water Management														
Biodiversity Debate														

	I	II	III	IV	Standard V												
Activity					V-1a	V-1b	V-1c	V-1d	V-2a	V-2b	V-2c	V-2d	V-2e	V-3a	V-3b	V-3c	V-3d
Where's the Water?	No Correlations	No Correlations	No Correlations	No Correlations			X										
What's in the Water?							X	X			X	X	X				
Who lives in the Water?							X	X	X	X	X	X	X			X	
Missing Macroinvertebrates							X	X	X	X	X	X	X			X	
Wetland VS Stream Macros							X	X	X	X	X	X	X			X	
Riparian Review							X	X		X	X	X	X				
Nigrogen Cycle													X				
When Things Heat Up																	
Aquatic Invasion!																	
That's Predictable																	
Water Management								X									
Biodiversity Debate								X									

Intended Learning Outcomes													
Activity	Where's the Water?	What's in the Water?	Who lives in the Water?	Missing Macroinvertebrates	Wetland VS Stream Macros	Riparian Review	Nitrogen Cycle	When Things Heat Up	Aquatic Invasion	That's Predictable	Water Management	Biodiversity Debate
6f	X											
6e		X						X				
6d										X		
6c	X	X	X	X				X		X	X	X
6b										X		
6a		X								X		X
5d												
5c		X					X			X		
5b								X			X	X
5a	X	X				X	X	X	X	X	X	X
4f								X				
4e	X		X	X	X			X			X	
4d										X	X	X
4c									X	X		
4b									X	X	X	X
4a		X	X	X	X			X		X	X	X
3d												
3c	X	X	X	X	X	X	X	X			X	X
3b						X				X	X	X
3a	X											
2f												
2e						X	X	X			X	X
2d		X								X	X	X
2c											X	X
2b	X	X				X	X	X		X		
2a												
1g			X	X	X	X						
1f										X	X	X
1e										X		
1d	X	X				X						
1c			X	X	X	X		X				
1b			X	X	X	X		X				
1a	X	X	X	X	X	X	X	X				

Curriculum Connections for 8th Grade Integrated Science and Math Cores

Intended Learning Outcomes	Activity	Where's the Water?	What's in the Water?	Who lives in the Water?	Missing Macroinvertebrates	Wetland VS Stream Macros	Riparian Review	Nitrogen Cycle	When Things Heat Up	Aquatic Invasion	That's Predictable	Water Management	Biodiversity Debate
	6f	X											
	6e		X						X				
	6d										X		
	6c	X	X	X	X				X		X	X	X
	6b										X		
	6a		X								X		X
	5d												
	5c				X			X			X		
	5b								X			X	X
	5a	X	X				X	X	X	X	X	X	X
	4f								X				
	4e	X		X	X	X			X			X	
	4d										X	X	X
	4c									X	X		
	4b									X	X	X	X
	4a		X	X	X	X			X		X	X	X
	3d												
	3c	X	X	X	X		X	X	X			X	X
	3b						X				X	X	X
	3a	X											
	2f												
	2e						X	X	X			X	X
	2d		X								X	X	X
	2c											X	X
	2b	X	X				X	X	X		X		
	2a												
	1g		X	X	X	X							
	1f										X	X	X
	1e										X		
	1d	X	X				X						
	1c			X	X	X	X		X				
	1b			X	X	X	X		X				
	1a	X	X	X	X	X	X	X	X				

S P	No Correlations												
G	No Correlations												
F	No Correlations												
EE	8c												
	8b												
	8a												
	7b												
	7a												
	6												
	5		X						X				
	4												
	3												
	2												
	1												
NS	No Correlations												
	Activity	Where's the Water?	What's in the Water?	Who lives in the Water?	Missing Macroinvertebrates	Wetland VS Stream Macros	Riparian Review	Nitrogen Cycle	When Things Heat Up	Aquatic Invasion	That's Predictable	Water Management	Biodiversity Debate

IV	No Correlations												
III	No Correlations												
Standard II	II-3d												X
	II-3c										X		X
	II-3b												X
	II-3a									X	X		X
	II-2d												
	II-2c						X		X				
	II-2b												
	II-2a												
	II-1c												
	II-1b												
	II-1a												
Standard I	I-4e						X						
	I-4d								X				
	I-4c								X				
	I-4b						X						
	I-4a												
	I-3												
	I-2d												
	I-2c		X					X	X				
	I-2b												
	I-2a												
	I-1c												
	I-1b		X					X	X				
	I-1a		X					X	X				
	Activity	Where's the Water?	What's in the Water?	Who lives in the Water?	Missing Macroinvertebrates	Wetland VS Stream Macros	Riparian Review	Nitrogen Cycle	When Things Heat Up	Aquatic Invasion	That's Predictable	Water Management	Biodiversity Debate

Curriculum Connections for High School Earth Systems Science Core and Statistics and Probability

	Activity	Where's the Water?	What's in the Water?	Who lives in the Water?	Missing Macroinvertebrates	Wetland VS Stream Macros	Riparian Review	Nitrogen Cycle	When Things Heat Up	Aquatic Invasion	That's Predictable	Water Management	Biodiversity Debate
ID	1	X	X		X			X					
	2		X	X	X			X					
	3												
	4												
	5												
	6a												
	6b												
	6c												
	7												
	8												
	9												
I C	No Correlations												
P C	No Correlations												
M D	No Correlations												

	Activity	Where's the Water?	What's in the Water?	Who lives in the Water?	Missing Macroinvertebrates	Wetland VS Stream Macros	Riparian Review	Nitrogen Cycle	When Things Heat Up	Aquatic Invasion!	That's Predictable	Water Management	Biodiversity Debate
I		No Correlations											
Standard II	II-1a												
	II-1b												
	II-1c												
	II-2a		X	X					X				
	II-2b				X	X	X						X
	II-2c								X		X		X
	II-2d												
	II-2e		X	X	X	X	X	X	X		X		X
	II-2f						X		X		X		X
	II-3a			X		X	X						
	II-3b												
	II-3c		X		X				X				X
	II-3d									X			
	II-3e									X	X		X
Standard III	III-1a												
	III-1b												
	III-1c												
Standard IV	IV-1a	X											
	IV-1b												
	IV-1c		X	X	X			X	X		X		
	IV-1d		X	X	X		X	X	X		X		
	IV-1e											X	X
	IV-2a												
	IV-2b												
	IV-2c												
	IV-2d												
	IV-2e												
Standard V	V-1a												
	V-1b							X					
	V-1c												
	V-1d												
	V-2a												
	V-2b												
	V-2c												
	V-2d												
VI		No Correlations											

Sampling Safety

The Stream Side Science Curriculum provides the opportunity for students and teachers to collect data in the field, and work in and around water. To ensure the safety of your students, consider the following guidelines before going out to your sampling site.

How to manage a group in the field

- Have an adult supervisor accompany each group, with six students or less per adult.
- Keep a good line of communication between all groups at all times and have a plan in case students become separated. For example, keep groups within shouting distance and establish a central meeting place.
- Make sure each group has access to a first aid kit and knows how to use it.
- Be aware of medical considerations, such as students with allergies to bee stings.
- Know the causes and early warning signs of hypothermia and heat exhaustion.

How to choose a safe site

- Before the field trip, visit the site to make sure there is easy public access and available parking.
- Avoid areas with steep, slippery banks. Be aware of holes, vertical banks and other hazards that can be especially difficult to see when the banks are very heavily vegetated.
- Scout the area for hazards such as broken glass, rusted wire or poisonous plants.
- Flag these areas to avoid if necessary.

When is it unsafe to enter the stream?

- Moving water is deceptively dangerous. Don’t let students enter water over their knees or water that is moving very fast (more than 1 foot per second).
- Cold water can cause hypothermia, even on warm days. Students who intend to enter the water should wear proper clothing (waders or good wading shoes) and should bring a change of clothing.
- Avoid any waters that are obviously polluted or are directly downstream from a pollution discharge pipe.
- Never sample during a lightening storm. Be aware of sudden storms higher in the watershed that could produce flash floods.
- Never let students enter the water if adult supervisors are not present.

Safety guidelines when conducting chemical tests

- Avoid contact between chemicals and eyes, nose, and mouth. NEVER open chemical packets with teeth -- use the scissors provided or tear the packets.
- All the tests are designed to be safe when used correctly, but it is a good idea to avoid touching any chemicals directly.
- After all field activities, wash hands thoroughly. Use lots of water and avoid no-water cleaners.
- The solutions remaining from the tests can be mixed together without any risk. Deposit all liquid waste in a plastic screw-top waste bottle such as a pop bottle. Deposit all solid waste (packets and glass ampoules) in a separate screw top bottle. Liquid waste can be safely flushed down a school drain. Make sure that glass waste is also disposed of safely.

Appendix C

A Note on Units

The Stream Side Science Curriculum uses the metric system throughout the lesson plans and activities. Be sure to stress to your students the importance of using proper units when collecting data. The following conversion chart may be helpful as you work through the activities.

If you know →	Multiply by →	To get
To get ←	Divide by ←	If you know
Length		
inches (in)	2.5	centimeters (cm)
feet (ft)	30.0	centimeters (cm)
yards (yd)	0.9	meters (m)
miles (mi)	1.6	kilometers (km)
Area		
Square inches (in^2)	6.5	square centimeters (cm^2)
square feet (ft^2)	0.093	square meters (m^2)
square yards (yd^2)	0.84	square meters (m^2)
square mile (mi^2)	640.0	acres (acre)
acre (acre)	43,560	square feet (ft^2)
acre (acre)	4,047	square meters (m^2)
acre (acre)	0.405	hectacres (ha)
Mass		
ounces (oz)	28.35	grams (g)
pounds (lb)	0.45	kilograms (kg)
Volume		
teaspoons (tsp)	5.0	milliliters (ml)
tablespoons (tbs)	15.0	milliliters (ml)
fluid ounces (fl oz)	30.0	milliliters (ml)
cups (c)	.24	liters (l)
pints (pt)	.47	liters (l)
quarts (qt)	0.95	liters (l)
gallon (gal)	0.134	cubic feet (ft^3)
gallon (gal)	3.79	liters (l)
cubic feet (ft^3)	0.03	cubic meters (m^3)
cubic feet (ft^3)	28.32	liters (l)
Flow		
cubic feet per second (cfs)	0.03	cubic meters per sec (m^3/s)
cubic feet per second (cfs)	1.98	acre-feet per day (af/day)
cubic feet per second (cfs)	448.8	gallons per minute (gpm)
cubic feet per second (cfs)	646,320	gallons per day (gpd)
Temperature		
degrees Celsius (C°)	(9/5 x °C) + 32	degrees Fahrenheit (°F)
degrees Fahrenheit (°F)	5/9 x (°F – 32)	degrees Celsius (°C)

Other water equivalents

1 cubic foot (ft^3) = 7.48 gallons (gal) = 62.4 pounds of water (lb/ft^3)
1 cubic foot per second (cfs) flowing for one year = 724 acre-feet (af)
1 gallon (gal) = 0.134 cubic feet = 8.34 pounds of water (lb/gal)
1 acre-foot = one and a half football fields 1 foot deep
1 acre-foot = a typical garden hose (5 gpm) flowing continuously for 45 days
1 acre-foot = approximately 3,475,700 12 oz. cans of soda

Appendix D

Glossary

Acid - Any substance that has a pH level below 7, or that has more free hydrogen ions (H+) than hydroxyl (OH-) ions.

Acidity - A measure of the number of free hydrogen ions (H+) in a solution that can chemically react with other substances.

Acre-foot (AC-FT) - the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adaptation - The modification, over time, of the structure, function, or behavior of an organism, which enables it to be better suited to its environment.

Aerobic - Able to live only in the presence of air or free oxygen; conditions that exist only in the presence of air or free oxygen.

Alkalinity - A measure of the negative ions that are available to react and neutralize free hydrogen ions. Some of most common of these include hydroxyl (OH-), sulfate, phosphate, bicarbonate and carbonate.

Ambient - Pertaining to the current environmental condition.

Anaerobic - Able to live and grow only where there is no air or free oxygen; condition that exist only in the absence of free air of free oxygen.

Aquarium - A man-made aquatic environment.

Aquatic invasive species (AIS) - water-associated non-native plant or animal species that threatens the diversity or abundance of native species due to their uncontrollable population growth, causing ecological instability of infested waters, or economic damage to commercial, agricultural, aquacultural, or recreational activities dependent on such waters. Another term for this word is Aquatic Nuisance Species.

Aquatic zone - The area of the stream channel covered by water.

Aquifer - A geologic formation, or group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Assemblage - The set of related organisms that represent a portion of a biological community (e.g., benthic macroinvertebrates).

Atmosphere - The layer of gases surrounding Earth; composed mainly of nitrogen and oxygen.

Backwaters - Areas of water to the side of a main stream channel usually formed by flooding.

Bacteria - Microscopic unicellular organisms, typically spherical, rod-like, or spiral and threadlike in shape, often, clumped into colonies. Some bacteria cause disease, while others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Bar graph - A graph using parallel bars of varying lengths, as to illustrate comparative data.

Base flow - The portion of the stream flow that is relatively consistent throughout the year.

Basic - Alkaline. Basic water contains high concentrations of hydroxyl ions (OH-).

Beneficial use - The legal, designated uses for a water body including, drinking, recreation, fish and wildlife, etc. Water quality standards are designed to support a water body's beneficial use(s).

Benthic - Pertaining to the bottom (bed) of a water body.

Biochemical oxygen demand (BOD) - A measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by micro-organisms, such as bacteria.

Biodiversity - A measure of the distinct characteristics, qualities, or elements of plant and animal life in a defined area; a measure of biological differences.

Biological integrity - The condition of the aquatic community inhabiting unimpaired water bodies as measured by community structure and function.

Biomass - the amount of living matter (as in a unit area or volume of habitat).

Buffer - To maintain high pH levels. Alkaline soils keep the pH of water from getting too low.

Capillary action - Forces of adhesion and cohesion help water to move through the soil from areas of greater concentration to areas of lesser concentration.

Cause - The producer of an effect.

Channel - The section of the stream that contains the main flow.

Channelization - The straightening of a stream; this often is a result of human activity.

Collectors - Macroinvertebrates that collect bits of food from the water column.

Community - The whole of the plant and animal population inhabiting a given area.

Culvert - Man-made construction that diverts the natural flow of water.

Comparability - The degree to which we can compare data between dates and locations.

Concentration - The amount of a specific substance dissolved in a given amount (volume) of another substance.

Condensation - The process by which a vapor becomes a liquid; the opposite of evaporation.

Contaminant - Any substance that when added to water (or another substance) makes it impure and unfit for consumption or use.

Control - A standard for comparing, checking, or verifying the results of an experiment or activity.

Correlation - The mutual relation of two or more things.

Cubic foot per second (ft^3/s)/Cubic meter per second (m^3/s) - Units typically used in measuring streamflow that express rate of discharge. The measurement is equal to the discharge in a stream cross section one foot wide and one foot deep, flowing with an average velocity of one foot per second; 1 cfs = 44.8 gallons per minute (gpm); 1 cms = 1,000 liters per second.

Decomposition - The breakdown or decay of organic matter through the digestive processes of microorganisms, macroinvertebrates, and scavengers.

Density - The compactness or crowdedness of matter (ex. water molecules) in a given area.

Deposition - The process of laying down sediment or accumulating layers of material

carried in suspension.

Designated beneficial uses - State-established desirable uses that waters should support, such as fishing, swimming, and aquatic life. Listed in state water quality standards.

Detection limit - The lowest point at which a particular piece of sampling equipment can accurately assess chemical concentrations.

D-frame net - A fine mesh net that is attached to a pole and used for sampling. It resembles a butterfly net.

Dichotomous key - A tool for identifying objects, such as macroinvertebrates. The key presents a series of yes or no questions to the observer; each question brings the observer closer to the identification.

Discharge - The volume of water (or more broadly, volume of fluid plus suspended sediment) that passes through a cross-section of the channel within a given period of time.

Discharge limits - Any restriction on quantities, rates, and concentrations of chemical, physical, biological or other constituents which are discharged from point sources.

Dissolved Solids - These are dissolved materials that can pass through a standard glass-fiber filter with about one micrometer pore size.

Dissolved oxygen (DO) - Oxygen dissolved in water and available for living organisms to use for respiration.

Distillation - The purification of water. When water evaporates the vapor separates from impurities.

Distilled water - Water that has had most of its impurities removed.

Downstream - In the direction of a stream's current; in relation to water rights, refers to water uses or locations that are affected by upstream uses or locations.

Drainage basin - Part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water. See watershed.

Ecosystem - A community of living organisms and their interrelated physical and chemical environment; also, a land area within a climate.

Effluent - Waste material discharged into the environment.

Emergent plants - Plants rooted underwater, but with their tops extending above the water.

Engulfers - Macroinvertebrate predators that feed by swallowing their prey whole.

Environment - All of the external factors, conditions, and influences that affect an organism or a biological community.

Ephemeral - Occurs intermittently. Ephemeral streams flow only during and shortly after extreme precipitation or snowmelt events.

EPT Value - An index of water quality derived from the percent of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Tricoptera (caddisflies) in a 100-individual sample of macroinvertebrates.

Erosion - The wearing down or washing away of the soil and land surface by the action of water, wind or ice.

Erosive - The power of wind or water to wear away sediment. Highly erosive water can wear away more sediment.

Eutrophic - A condition in which the water in a lake, pond, or reservoir is enriched with plant nutrients such as nitrogen and phosphorous which results in large amounts of plant and algal production. As the plants and algae die and sink to the bottom, an organic sediment is created which removes oxygen from the water as it decays.

Evaporation - The conversion of a liquid (e.g., water) into a vapor (a gaseous state) usually through the application of heat energy; the opposite of condensation.

Evapotranspiration - The loss of water from the soil through both evaporation and transpiration from plants.

Exotic Species - a species that does not naturally occur in an ecosystem, but does not necessarily cause problems for native species.

Exotic Species - a species that does not naturally occur in an ecosystem, but does not necessarily cause problems for native species.

Floating plants - Plants that grow free floating, rather that being attached to the stream bed.

Flood - Any relatively high streamflow overtopping the natural or artificial banks of a stream.

Floodplain - Any normally dry land area that is susceptible to being inundated by water from any natural source; usually lowland adjacent to a stream or lake.

Forbs - Plants with broad leaves and net-like veins; stems are solid and spongy and die back to the ground every year.

Functional feeding groups - Classification of macroinvertebrate groups according to their mode of feeding.

Gas (gaseous) - The state of water in which individual molecules are highly energized and move about freely; also known as vapor.

Glide/run - A section of a stream with a relatively high velocity and with little or no turbulence on the surface of the water.

Gradient - A measure of degree of incline; the steepness of slope.

Grass - Plants with hollow stems that are jointed and leaves with parallel veins. The leaves come off the stem opposite to each other.

Gravity - The natural force of attraction exerted by Earth on objects or materials on its surface that tends to draw them down toward its center.

Greenline - A line of vegetation that runs alongside the stream. It is the first line of vegetation you encounter as you move away from the water.

Groundwater - Water found in spaces between soil particles underground (located in the zone of saturation).

Habitat - The environment occupied by individuals of a particular species, population, or community.

Headwaters - The source of a stream.

Hydrograph - A representation of water discharge over time.

Hydrology - The study of Earth's waters, including properties, circulation, principles and distribution.

Hydrophilic - Water-loving.

Impaired waters - Waters that fail to meet applicable water quality standards or to protect designated uses (such as fishing or swimming).

Independent variable - A factor in a relationship that is not affected by the relationship. Time is a common independent variable.

Indicator - A gauge of water pollution: not legal criteria but, rather a sign that there may be a problem. When an indicator level is exceeded, further studies are done.

Instream flow - The minimum amount of water required in a stream to maintain the existing aquatic resources and associated wildlife and riparian habitat.

Instream use - Uses of water within a stream's channel (e.g., fish and other aquatic life, recreation, navigation and hydroelectric power production).

Intermittent - A stream that does not flow year round.

Invasive Species - a non-native (or alien) to the ecosystem under consideration whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Irrigation - The controlled application of water to cropland, hay fields, and/or pasture to supplement that supplied by nature.

Kick-net - A fine mesh net used to collect organisms. Kick-nets vary in size, but generally are about three feet long and are attached to two wooden poles at each end.

Land uses - Activities that take place on the land, such as construction, farming, or tree clearing.

Large woody material - Fallen trees and limbs in a stream.

Larva - The immature, wingless, feeding stage of an insect that undergoes complete metamorphosis.

Line graph - An illustration of data points where individual points are connected by a line. Line graphs show a continuous trend.

Litter - Dead plant material on the ground.

Macroinvertebrate - Organisms that lack a backbone and can be seen with the naked eye.

Mainstem - The primary path for waterflow in a watershed.

Mean - Average. The sum of all the measurement values divided by the number of measurements.

Meandering - The curving pattern of a stream channel.

Metabolism - The physical and chemical processes in an organism that produce energy and result in the production, maintenance, or destruction of materials in the body. Many metabolic processes involve water.

Metal - An elementary substance, such as gold or silver, which is crystalline when solid and yields positively charged ions in aqueous solutions of its salts. Metals can be very toxic in streams at low concentrations.

Metamorphosis - A change in form from one stage to the next in the life history of an organism, as from the caterpillar to the pupa and from the pupa to the adult butterfly.

Milligrams per liter (mg/1) - Used to refer to the concentration of a substance in the water; milligram of a substance dissolved in one liter of water.

Minimum instream flow requirements - Regulations set by management agencies that determine the least amount of water a stream can hold. Requirements protect the aquatic ecosystem and balance competing out-of-stream uses.

Municipal water system - A network of pipes, pumps, and storage and treatment facilities designed to deliver potable water to homes, schools, businesses and other users in the city or town and to remove and treat waste materials.

Narrative criteria - Chemical, physical or biological concentrations in water that are expressed in words. National Pollutant Discharge Elimination System (NPDES) - A national program in which pollution dischargers, such as factories and sewage treatment plants, are given permits to discharge. These permits contain limits on the pollutants they are allowed to discharge.

Native Species - a Biota (plant or animal species) occurring naturally in a specified geo graphic area comprising its ecological range.

Nephelometer (turbidity tube) - A clear tube used to measure the turbidity of a stream or water body.

Nephelometric turbidity unit (NTU) - A unit used to describe turbidity measurements.

Neutral - A substance, such as distilled water, with a pH of 7.

Nitrate - A nitrogen compound (NO3) that functions as a plant nutrient. An overabundance of nitrate is considered a water pollutant.

Nitrite - A combination of nitrogen, ammonia and oxygen (NO2) that functions as a plant nutrient. An overabundance of nitrite is considered a water pollutant.

Nitrogen fixation - Changing nitrogen gas into ammonia. Some plants and algae fix nitrogen.

Nonconsumptive uses - Instream use of water that does not reduce the supply; or, removing water and returning it to the source without reducing the supply.

Non-native Species - biota (plant or animal species) not natural to a specified geographic area, having been introduced either purposely or unintentionally. Only a select group of non-native species are recognized as AIS, since many other create a quality of life desired by man.

Nonpoint source pollution - Refers to pollution sources that are diffuse and do not have a single point of origin. Run-off from agriculture, forestry and construction sites are examples.

Numeric criteria - Chemical, physical or biological concentrations in water that are typically expressed as concentrations, such as milligrams per liter.

Nutrient - An element, such as nitrogen or phosphorus, or compound needed for the reproduction, survival or growth of plants and animals.

Nymph - The young of an insect that undergoes incomplete metamorphosis

Occular tube - A device used to measure canopy cover.

Organic - Of, related to, or derived from living organisms. Organic substances contain carbon.

Parameter - A distinguishing characteristic or feature. For example, nitrate is a water quality parameter.

Parts per million (ppm)/parts per billion (ppb) - Units typically used in measuring the number of “parts” by weight of a substance in water; commonly used in representing pollutant concentrations.

Pathogen - A disease-producing agent, especially a microorganism.

Peak flow - The largest rate of flow during a certain time period.
Piercers - Macroinvertebrate predators that feed by injecting a sharp mouth part into their prey and sucking out body fluids.
Percent saturation - The amount of dissolved oxygen in water compared to the amount of dissolved oxygen the water can hold.
Percolation - Describes the action of water as it moves through spaces in the soil and rock.
Perennial - Occurs year-round. Perennial streams hold water throughout the year.
Permit - Legal authority to carry out a regulated activity.
pH - A numerical measure of the hydrogen ion concentration used to indicate the alkalinity or acidity of a substance. Measured on a scale of 0.0 (acidic) to 14.0 (basic); 7.0 is neutral.
Photosynthesis - The chemical reaction in plants that utilizes light energy from the sun to convert water and carbon dioxide into simple sugars. This reaction is facilitated by chlorophyll.
Pipette - An eye dropper-like instrument that can measure very small amounts of a liquid.
Point source pollution - Refers to pollution resulting from discharges into receiving waters from any discernible, confined and discrete conveyance such as a pipe, ditch, or sewer.
Pool - A deeper portion of a stream where water flows slower than in neighboring, shallower portions.
Precipitation - Water falling, in a liquid or solid state, from the atmosphere to Earth (e.g., rain, snow).
Predator - An animal, such as a macroinvertebrate, that feeds on other animals.
Protocol - A defined procedure.
Reagent - A substance or chemical used to indicate the presence of a chemical or to induce a chemical reaction to determine the chemical characteristics of a solution.
Representative - Accurately depicting the true characteristics of the stream.
Reservoir - A still, lake-like water body that forms upstream from a dam. Reservoirs store water and often provide for recreation.
Riffle - A shallow area in a stream where water flows swiftly over gravel and rock.
Riparian zone - The vegetative area on each bank of a body of water that receives flood waters.
Run/glide - See glide/run.
Runoff - Precipitation that flows overland to surface streams, rivers, and lakes.
Rushes - Similar to sedges but have round (verses triangular) stems and very small or no leaves. Rushes stabilize stream banks and prevent erosion.
Saturated - Inundated; filled to the point of capacity or beyond.
Saturation concentration - The amount of dissolved oxygen a body of water can hold.
Scrapers - Macroinvertebrates that feed by scraping algae and other material from the surface of plants, wood and rock. Also known as grazers.
Season - A period of time during the year classified by length of day and weather conditions.
Sedges - Sedges resemble grasses but have solid, triangular stems with no joints. The leaves have parallel veins and come off the stem in three directions. Sedges are

effective at stabilizing stream banks and preventing erosion.

Sediment - Solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by the quantity and intensity of precipitation. Shredder - A macroinvertebrate that feeds by cutting or tearing on leaves and woody material that falls into the stream.

Shrubs - Plants with woody stems that remain alive all year. The leaves tend to have net-like veins. Shrubs rarely grow larger than 13 ft tall; if they do they may be considered trees.

Siltation - An increased supply of fine sediments to a stream bottom or channel. Siltation can cover up and harm fish spawning areas and macroinvertebrate habitat.

Sinuosity - The degree to which a stream meanders, or curves.

Soil - The top layer of Earth's surface, containing unconsolidated rock and mineral particles mixed with organic material.

Solids - Water, a liquid, can contain quite a bit of solid material, both in dissolved and suspended forms. Solids captured on the filter are, by definition, suspended solids. Solids which settle out of a water sample on standing for a period of an hour are defined as settleable.

Soluble - Able to be dissolved in water.

Solute - A substance dissolved in another substance (the solvent) to create a solution.

Solvent - A material such as water that dissolves another substance (the solute) to form a solution.

Spreadsheet - A work sheet that is arranged in the manner of a mathematical matrix and contains a multicolumn analysis of related entries for easy reference on a single sheet.

Stream - A channel of water that flows as a function of gravity and elevation across the Earth's surface.

Streamflow - The discharge that occurs in a natural channel. Although the term discharge can be applied to the flow of a canal, the word streamflow uniquely describes the discharge in surface stream course. The term streamflow is more general than runoff as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Submergent plants - Plants that live and grow fully submerged under the water.

Substrate - Refers to a surface. This includes the material comprising the streambed or the surfaces which plants or animals may attach or live upon.

Surface runoff - Water that flows over the surface of the land or through the upper layer of soil.

Surface water - Water above the surface of the land, including lakes, rivers, streams, ponds, floodwater, and runoff.

Suspended solids - Particles carried in water without being dissolved.

Taxon (plural taxa) - A level of classification within a scientific system that categorizes

living organisms based on their physical characteristics.

Taxonomic key - A quick reference guide used to identify organisms. They are available in varying degrees of complexity and detail.

Temperature - The measurement of the average kinetic energy of moving molecules within a substance. Tolerance - The ability to withstand a particular condition - (e.g., pollution tolerant indicates the ability to live in polluted waters).

Topography - The shape of the land's surface.

Toxic - Poisonous or damaging.

Turbidity - Murkiness or cloudiness of water, indicating the presence of some suspended sediments, dissolved solids, natural or man-made chemicals, algae, etc.

Turbidity tube (nephelometer) - A clear tube for measuring the turbidity of a stream or water body.

Uplands zone - The area of the watershed that does not receive regular flooding by a stream. The uplands zone borders the riparian zone.

Upstream - Toward the source or upper part of a stream; against the current. In relation to water rights, refers to water uses or locations that affect water quality or quantity of downstream water uses or locations.

Utah State Standard - The legally designated allowable concentration of an impurity in a water body. Concentrations over this state standard are considered as pollution.

Velocity - The speed of water flow.

Volume - The amount of water in a stream.

Wastewater - Water that contains unwanted materials from homes, businesses, and industries; a mixture of water and dissolved or suspended substances.

Wastewater treatment - Any of the mechanical or chemical processes used to modify the quality of wastewater in order to make it more compatible or acceptable to humans and the environment.

Water (H2O) - An odorless, tasteless, colorless liquid made up of a combination of hydrogen and oxygen. Water forms streams, lakes, and seas, and is a major constituent of all living matter. The word water and important concepts related to water appear on almost every page of this text.

Water allocation - In a hydrologic system in which there are multiple uses or demands for water, the process of measuring a specific amount of water devoted to a given purpose.

Water cycle - The paths water takes through its various states-vapor, liquid, and solid-as it moves throughout Earth's systems (oceans, atmosphere, groundwater, streams, etc.). Also known as the hydrologic cycle.

Water quality - The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.

Water quality criteria - Maximum concentrations of pollutants that are acceptable, if those waters are to meet water quality standards. Listed in state water quality standards.

Water quality rating index - An index of water quality derived from a 100-individual sample of macroinvertebrates. The more pollution-intolerant individuals found in the sample, the better the water quality.

Water quality standard - Recommended or enforceable maximum contaminant levels of chemicals or materials (e.g., nutrients). In relation to water rights, refers to water uses or locations that affect water quality or quantity of downstream water uses or locations.

Water right - A legal right to use a specified amount of water for beneficial purposes.

Watershed - The land area from which surface runoff drains into a stream channel, lake, reservoir or other body of water; also called a drainage basin.

Water table - The top of an unconfined aquifer; indicates the level below which soil and rock are saturated with water.

Wetlands - Lands where water saturation is the dominant factor determining the nature of soil development and the types of plant and animal communities. Other common names for wetlands are sloughs, ponds and marshes.