Making Water Quality Connections

Water Quality	Possible	Possible Associated Causes
Conditions Observed	Associated Problems	, , , , , , , , , , , , , , , , , , , ,
Decrease in Dissolved Oxygen	Temperature increase	Reduction in vegetation shading body of water; increase in sediment or suspended solids; industrial cooling processes
	Organic waste – once part of a living plant or animal (food, leaves, feces, etc.)	Leaking or failing septic systems; waste from farms and animals (pets and feedlots); discharge from food-processing plans, meat packing houses, dairies and other industrial sources; garbage; industrial waste (organic fibers from textile, paper, and plant processing); sewage treatment plants, natural processes; grass, tree and shrub clippings; urban runoff; agricultural runoff
	Chemical runoff – herbicides, pesticides, insecticides	Golf courses; residential lawns; agricultural lands; recreational parks
	Trash	Litter washed into sewer systems
	Lack of algae and rooted aquatic plants	Multiple sources of water pollution (e.g. chemicals, toxins)
	Low water levels	Climatic or weather change
Fecal Coliform Bacteria E. Coli	Organic waste – feces from human beings or other warm-	Leaking or failing septic systems; failing sewer systems
Enterococci	blooded animals	Direct discharge from mammals and birds with access to waterways or waste entering a body of water as runoff
Increase in Temperature (Thermal Pollution)	Organic waste – once part of a living plant or animal (food, leaves, feces, etc.)	Natural processes; grass clippings; tree and shrub clippings; unnatural fish or animal kills
	Reduction in vegetation shading body of water	Shade trees and shrubs removed from stream bank for urban development, irrigation, and industrial and agricultural expansion, exposing the water to direct sunlight
	Industry and power plant discharge	Water returned to source is at higher temperature than at initial intake point
	Runoff from warmed urban surfaces	Impervious land cover such as paved streets, sidewalks and parking lots
		Urbanization leading to increased numbers of buildings, homes and roads on lands which previously were natural areas, and absorbed rain and snowmelt more efficiently
	Suspended solids	Removal of streamside vegetation; overgrazing; poor farming practices and construction causing excessive soil erosion
	Flow of water impeded	Dams, dikes and diversions for agricultural, industrial or municipal practices decrease flow rate of river, absorbing more heat from sunlight
		Dams created from beavers or log jams

Water Quality Conditions Observed	Possible Associated Problems	Possible Associated Causes
Turbidity	Suspended solids (ranging from clay, silt and plankton, to industrial wastes and sewage)	Erosion from agricultural fields; construction sites; residential driveways, roads and lawns; natural and accelerated erosion of stream bank; excessive algae growth
High Total Dissolved Solids/Total Solids	,	Leaves and plant materials
		Wastewater treatment plant
		Run off from urban areas
		Dredging waterways
		Waste discharge (garbage, sewage)
		Excessive population of bottom-feeding fish (such as carp) that stir up bottom sediments
Excessive Phosphates	Human wastes	Leaking or failing septic systems; sewage treatment plants
	Organic waste – once part of a living plant or animal (food, leaves, feces, etc)	Waste containers leaking; lack of waste storage facilities; animals have direct access to waterways
		Pet wastes not collected and disposed of appropriately
		Removal of natural vegetation for farming or construction practices, causing soil erosion
	Run-off from fertilized land	Draining swamps and marshes for farmland or commercial/residential development
	Industrial waste	Drained wetlands no longer functioning as filters of silt and phosphorous
		Agricultural fields, residential lawns, home gardens, golf courses, recreational parks
Excessive Phosphate	Detergents	Poorly treated sewage; broken pipes; farms; gol courses; sewage treatment facilities; industrial discharges
	Natural events	Household and commercial cleaning agents washing into the water and sewage systems
		Forest fires and fallout from volcanic eruptions
рН	Vehicles for transportation	Improper engine maintenance of vehicles (emissions systems)
	Industrial waste	Industrial or mining drainage; sewage treatment plants
	Runoff from fertilized land	Agricultural fields; residential lawns; golf courses; recreational parks

Water Quality	Possible	Possible Associated Causes
Conditions Observed	Associated	
	Problems	
Excessive Nitrate	Runoff from fertilized land	Agricultural fields; residential lawns; golf courses; recreational parks
	Human wastes	Leaking for failing septic systems; sewage treatment facilities
	Animal wastes	Waste containers leaking; lack of waste storage facilities; animals (particularly ducks and geese) that have direct access to waterways
		Pet wastes not collected and disposed of appropriately
	Organic waste – once part of a living plant or animal (food, leaves, feces, etc.)	Natural processes; grass clippings; tree and shrub clippings; unnatural fish or animal kills
pH & Alkalinity	Acid rain (beginning in neighboring regions)	Excessive air pollution from burning fossil fuels for automobiles, boats, planes, etc.
	Natural processes	Surrounding geologic features (soil and rock) High alkalinity may be a result of high levels of limestone
		 Low alkalinity may be a result of high levels of granite
Salinity	Salt and oil runoff	Paved roads cannot absorb substances, such as salts used on roads in winter; irrigation water picks up salts in soil
	Bodies of salt water mixing with fresh water	Water tables decrease in areas where water is being pumped (used) at levels exceeding replenishment capability
	Natural processes	Surrounding geologic features (soil and rock) may have high salt levels
High Conductivity	Discharges into the water	Failing sewage systems
		High Temperature
		Water used for irrigation
		Discharge of heavy metals into the water
Low Conductivity	Natural processes	Surrounding area contains a lot of clay soils
	Discharges into the water	Oil spill
	Natural processes	Low temperature
	Tradital processes	Water runs through area of granite bedrock

Rural Observations	Possible Associated Problems	Possible Associated Causes
Agriculture – crop production	Chemical runoff – pesticides, herbicides, insecticides	Poor farming practices causing excessive erosion of sediment and chemicals from fields
	Temperature increase in body of water adjacent to agricultural fields	Shade trees and shrubs removed from stream bank for irrigation or agricultural expansion, exposing the water to direct sunlight
	Natural flow of water impeded	Dams, dikes and diversions for agricultural practices decrease flow rate of river, absorbin more heat from sunlight
		Draining swamps and marshes for farmland
	Reduced ability to contain suspended solids, chemicals and excess water from runoff	Improper containment of farm animal waste
	Organic waste entering water from runoff	Discharge from food-processing plants, meat packing houses and dairies
Animals – feedlots	Organic waste entering water	Direct discharge from farm animals with accesto waterways or waste entering a body of wat as runoff
Homes	from runoff	Leaking or failing septic systems
	Human wastes – gray water leaking into groundwater	Household and commercial cleaning agents washing into the water and sewage systems

Rural to Urban Observations	Possible Associated Problems	Possible Associated Causes
Residential/Commercial/ Industrial	Excess water and chemical runoff	Urbanization leads to increasing numbers of building, homes and roads on lands which previously were natural areas, and absorbed rain and snowmelt more efficiently
	Sediment and suspended	Construction of new buildings and homes, and streets causes excessive erosion
	solids	Paved roads cannot absorb chemicals, soil and suspended particles in runoff
		Draining swamps and marshes for commercial or residential development reduces water catchment ability and filtering of silt and suspended solids
		Dredging waterways
	Temperature increase	Dams, dikes and diversions for drinking water intake decreases flow rate of river, absorbing more heat from sunlight

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Urban Observations	Possible Associated Problems	Possible Associated Causes
Residential Buildings/Construction/Public	Organic waste – once part of a living plant or animal (food, leaves, feces, etc.)	Leaking or failing septic systems; failing sewer systems
Use (Parks and Zoos)		Wastewater treatment plants
		Direct discharge from mammals and birds as waste entering a body of water as runoff
		Pet wastes not collected and disposed of appropriately
		Grass, tree and shrub clippings washed into sewer systems
Residential/Commercial Buildings	Detergents	Household and commercial cleaning agents washing into water and sewage systems
	Trash	Litter washed into sewer systems
	Reduction in vegetation shading body of water	Shade trees and shrubs removed from watershed for urban development, exposing the water to direct sunlight and increasing sedimen and suspended solids entering a body of water from erosion
Agricultural and Recreational Areas/Public Use (Airports	impervious land	Chemical runoff from golf courses, residential driveways and lawns, and recreational parks entering a body of water as runoff
and Train Stations)		Impervious land cover such as paved streets, sidewalks and parking lots causes excessive runoff from warmed urban surfaces
Industrial	Industry and power plant discharge	Industrial cooling process: water returned to source body of water is at higher temperature than at initial intake point
		Industrial or mining drainage
	Organic waste – once part of a living plant or animal (food, leaves, feces, etc.)	Discharge from food-processing plants, meat packing houses, dairies and other industrial sources
		Organic waste from fibers originating from textile and plant processing plants
Ports		Wastewater treatment plants
rota	Petroleum Products	Chemical pollutants from point or nonpoint source pollution

Physical Observations	Possible Associated Problems	Possible Associated Causes
Water Appearance		
Green, Green-Blue, Brown or Red	Indicates the growth of algae	High levels of nutrient pollution, originating from organic wastes, fertilizers, or untreated sewage.
Muddy, Cloudy	Indicates elevated levels of suspended sediments, giving the water a muddy or cloudy appearance	Erosion is the most common source of high levels of suspended solids in water. Land uses that cause soil erosion include mining.
Dark Reds, Purple, Blues, Blacks	May indicate organic dye pollution	Originating from clothing manufacturers or textile mills.
Orange-Red	May indicate the presence of copper	Copper can be both a pollutant and naturally occurring. Unnatural occurrences can result by acid mine drainage or oil-well runoff.
Blue	May indicate the presence of copper, which can cause skin irritations and death of fish	Copper is sometimes used as a pesticide, in which case an acrid (sharp) odor might also be present.
Foam		Excessive foam is usually the result of soap and detergent pollution. Moderate levels of foam can also result from decaying algae, which indicates nutrient pollution.
Rusty	Tannic Water (natural)	Leaves
Multi-Colored (oily sheen)	Indicates the presence of oil or gasoline floating on the surface of the water. Oil and gasoline can cause poisoning, internal burning of the gastrointestinal tract and stomach ulcers.	Oil and gasoline pollution can be caused by oil drilling and mining practices, leaks in fuel lines and underground storage tanks, automotive junk yards, nearby service stations, wastes from ships, or runoff from impervious roads and parking lot surfaces.
No unusual color	Not necessarily an indicator of clean water.	Many pesticides, herbicides, chemicals, and other pollutants are colorless or produce no visible signs of contamination.
Odors		
Sulfur (rotten eggs)	May indicate the presence of organic pollution.	Possible domestic or industrial wastes.
Musty		May indicate the presence of sewage discharge, livestock waste, decaying algae, or decomposition of other organic pollution.
Harsh		May indicate the presence of industrial or pesticide pollution.
Chlorine	May indicate the presence of over-chlorinated effluent	Sewage treatment plant or a chemical industry.
No unusual smell	Not necessarily an indicator of clean water.	Many pesticides and herbicides from agricultural and forestry runoff are colorless and odorless, as are many chemicals discharged by industry.
Dead Salmon Smell?	Spawned out Salmon carcasses	Spawned out Salmon

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