SO WHAT?

Interpreting Your Water Quality Data Add'l. Notes ddivional Notes Which may be caused by: Zour dates Which may come from indicates Residues from food substances and Total alkalinity of Wastewater treatment Alkalinity: Increase measures the plant effluent cleaning agents seawater averages water's capacity to 116 mg/l neutralize acids in (mg/l) or Surrounding geology Weathering and erosion of limestone Total alkalinity of (mg/l CaCO3) freshwater is often Burning of fossil fuels Decrease Acid precipitation between 30 and 90 mg/l Surrounding geology Weathering and erosion of granite or igneous rocks Industrial effluent Low pH water consumes alkalinity Warmblooded animal or Leaking or failing septic and sewer Bacteria: Increase EPA criteria for measures Fecal systems human feces -Bacteria in Coliform, recreational waters Sewer overflows, E. coli, or overloaded/malfunctioning waste Enterococci Fresh water: water treatment plant to indicate E. coli levels shall potential fecal not exceed... contamination of Runoff from areas containing pet and • 236 cells or CFU animal waste water in Colony per 100 ml of a Forming Units Direct defecation of animals and single water sample, (CFU) or cells 100 ml of water birds/waterfowl in waterways • 126 cells or CFU per Soil Many coliforms are naturally found in 100 ml as a soil geometric mean from at least 4 water Pulp and paper mill wastes The genus Klebsiella of the Fecal samples coliform group common (harmless) Marine water: Decrease Bacteria-free influent water Springs, tributary, runoff or other clean water source that reduces the total Enterococci levels shall number of coliforms per unit volume not exceed... of water 35 cells or CFU per 100 ml as a geometric mean from at least 5 water samples equally spaced over a 30-day period Biochemical Increase Organic matter Microorganisms consume oxygen Oxygen Demand (BOD): when decomposing animal/pet waste, leaves and woody debris, nutrients measures the Increases the rate of decomposition of amount of oxygen Decrease Aeration in the water organic and inorganic material consumed by aquatic organisms Waste water treatment Chlorine kills decomposers and chemical plant effluent (microorganisms) reactions in (mg/1)Conductivity of Conductivity: Increase Urban runoff Chemical de-icers, salts common waters in measures the Clay soils dissolve into ionic umho/cm water's ability to Surrounding geology conduct an components Deionized water: 0-1 electrical current Distilled water: 0.5-3 Temperature Conductivity is higher in warmer water

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Interpreting Your Water Quality Data/Cont.

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	Paramore services	eraun da Gandietier	New Variety many ecomes morn	Will comey as caused by	Acidinonal slotes (
	micromhos/cm or microsiemens/c m (µS/cm)	Increase	Wastewater treatment plant effluent	lons such as chloride, phosphate, and nitrate	Rivers in the US: 50-1500 Healthy streams: 150-500 Some industrial effluent: 10,000
			Mining operations	Ions such as sulfate, copper, cadmium, or arsenic in mine drainage	
		Decrease	Agricultural runoff	• lons such as nitrate, phosphate, and salts	Seawater: 50,000
			Surrounding geology	Granite and igneous rocks often do not dissolve into ionic components	
	·		Industrial effluent	Olis, aicohois, sugar, and many hazardous organic compounds reduce the number of charged ions per unit volume of water	
			Urban runoff	• Oils	
f	Dissolved oxygen (DO): measures the	Increase	Aeration	Waterfalls, rapids, rocks, and turbines add oxygen to water	Dissolved oxygen levels required for aquatic
	amount of oxygen		Photosynthesis .	Plants give off oxygen	organisms
	dissolved in water in (mg/l)		Temperature	Colder water is able to dissolve more oxygen than warmer water	0 Prolonged 1 exposure
		dec	Respiration, decomposition, and chemical reactions	Plants, animals, and microorganisms consume oxygen during these processes	2 Jiethal 3   4   Stressful 5   to most 6   aquatic organisms 7   8   Usually required
			Turbidity	Blocks sunlight from plants, decreasing photosynthesis and increasing decay and decomposition	
				Causes water temperature to rise by increasing absorption of solar radiation	9 for growth 10 and activity
			Ground water influent	Low in dissolved oxygen because it is not exposed to the atmosphere while underground	Note: DO levels can fluctuate greatly with depth, especially in
			Elevation above sea level	As atmospheric pressure decreases, less oxygen is dissolved in the water	lakes and reservoirs
			Reservoir bottom-water influent	Low in DO due to reservoir stratification	·
L			Nutrients	Fuel overgrowth of algae, which die and decompose	
	Hardness: measures the concentration of		Surrounding geology		Water hardness levels in mg/l of CaCO <sub>3</sub>
	dissolved minerals by		Waste water treatment plant effluent	Residues from food substances and cleaning agents	0-60 = soft water
po in	neasuring polyvalent cations n		Mining operations	Expose rocks containing calcium and magnesium	61-120 = moderately hard 121-180 = hard water 181 and greater = very
	(mg/l of CaCO <sub>3</sub> )		Surrounding geology		hard

"So What" ?

Interpreting Your Water Quality Data/Cont.

Human and animal wastes  Human and animal wastes  Human and animal wastes  Human and animal wastes  Wastewater treatment plant effluent, runofi from areas containing pet or animal waste  Direct defecation of animals and birds/waterfowl in waterways  Releases long-term store of nitrogen  Decrease  Nutrient-free influent water  Plant use  Plant use  Plants use carbon dioxide, which reacts with water to form carbonic acid  Acid mine drainage  Decrease  Respiration  Plants give off carbon dioxide, which reacts with water to form carbonic acid  Surrounding vegetation  Surrounding vegetation  Phosphate:  Measures the organic or fertilizer  Phosphate:  Measures the organic or fertilizer  Wastewater treatment plant effluent, runoff from areas containing pet or animal waste  Publication of animals and birds/waterfowl in waterways  Phosphate:  Burning of fossil fuels  Phosphate:  Measures the organic or fertilizer  Phosphate:  Measures the organic or fertilizer  Phosphate:  Measures the organic or fertilizer  Acid mine drainage  Phosphate:  Phosphate:  Measures the organic or fertilizer  Phosphates		<b>∽</b>	+ your	he Which main	ater educity Date	
Nitrate: measure the measure the matter in water in digneral forms and submit or the fertilizer matter in water in (mg/l)   Nutrients		Parameters	data 11	dicate Come from	Which may be caused by	1 Add'l.notes
measures the organic or fertilizer matter in water in (mg/l)  Decrease  Decrease  Decrease  Decrease  Decrease  Increase (no units)  Decrease  Decrease  Decrease  Increase (no units)  Decrease  Decrease  Decrease  Respiration  Respiration  Decrease  Respiration  Decrease  Respiration  Decrease  Respiration  Decrease  Respiration  Respiration  Decrease  Respiration			ZZOTOCI Zinglioni	Zalebsnay come arom	Which may signate converse	15. · · · · · · · · · · · · · · · · · · ·
Human and animal wastes   Human and animal wastes   Mastewater treatment plant efficient marker in (mg/l)		measures the	Increase	Nutrients	Runoff from agricultural land, residential lawns, and golf courses	
Burning of fossil fuels  Plant use  Plant use  Plant use  Photosynthesis measures the hydrogen ion concentration or activity on a logarithmic scale (no units)  Pecrease  Photosynthesis measures the hydrogen ion concentration or allogarithmic scale (no units)  Pecrease  Photosynthesis  Respiration  Pecrease  Photosynthesis  Piants use carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Surrounding vegetation  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Surrounding vegetation  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Surrounding vegetation  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Surrounding vegetation  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Surrounding vegetation  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbon dioxide, which reacts with water to form carbonic acid  Piants give of carbonic give of ca		fertilizer matter in water		Human and animal wastes	runoff from areas containing pet or	
Decrease Nurtent/free influent water  Plant use  Photosynthesis  Photosynthesis  Plant use acid of refuser with a very of nurtients per unit volume of water  Plant use acid of carbon dioxide, which reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of acid of reacts with water to form carbonic acid of spanning for the spanning of the spanning for					Direct defecation of animals and birds/waterfowl in waterways	
pH: measures the hydrogen ion concentration or activity on a logarithmic scale (no units)  Decrease  Phosphate: Measures the measures the measures the measures the hydrogen ion no concentration or activity on a logarithmic scale (no units)  Decrease  Respiration  Surrounding vegetation  Phosphate: Measures the measures Nutrients  Decrease  Nutrient-free influent water  Pant use  Nutrient-free influent water  Phosphates  Phosphate:  Weather/seasonal  Nutrients  Respiration  The mineral apatite contains phosphates measures the average measures the average amount of heat in the water in degrees plant use  Respiration  Plant use  Respiration  Phosphates  Phosphat				Burning of fossil fuels	Releases long-term store of nitrogen	
pH: measures the hydrogen ion concentration or activity on a logarithmic scale (no units)  Decrease  Respiration  Surrounding vegetation  Burning fossil fuels  Burning fossil fuels  Burning fossil fuels  Phosphate: Measures the organic or fertilizer matter in water  Decrease  Nutrients  Phosphate: Measures the organic or fertilizer matter  Decrease  Nutrients  Dec			Decrease		water source that reduces the level	
measures the hydrogen ion concentration or activity on a logarithmic scale (no units)  Decrease Respiration  Surrounding vegetation  Surrounding vegetation  Phosphate: Measures the organic or fertilizer matter in water  Phosphate: Measures the organic or fertilizer matter in water  Decrease  Nutrients  Decrease  Nutrients  Decrease  Respiration  Surrounding vegetation  Surrounding vegetation  Phosphate: Measures the organic or fertilizer matter in water  Decrease  Nutrients  Decrease  Nutrients  Removal of vegetation  Removal of vegetation  Phosphates are used by aquatic organisms for growth  Increase  Removal of vegetation  Removal of vegetation  Phosphates are used by aquatic organisms for growth  Removal of vegetation  Phosphates are used by aquatic organisms for growth  Removal of vegetation  Phosphates are used by aquatic organisms for growth  Removal of vegetation  Removal of vegetation  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature vari			·	Plant use	Nitrates are used by aquatic organisms for growth	
Concentration of activity on a logarithmic scale (no units)   Decrease (no units)		measures the	Increase	Photosynthesis	reacts with water to form carbonic	1 Stornach acid
Plants give off carbon dioxide, which reacts with water to form carbonic acid   Surrounding vegetation   Surrounding vegetation   Sphagnum moss and pine needles are slightly acidic (bogs, marshes, and pine forests)   Sea water slightly acidic (bogs, marshes, and pine forests)   11 2 Bleach acid   Decaying vegetation produces organic acids   Decaying vegetation produces organic acids   Emissions react with the atmosphere to form acid precipitation   Emissions react with the atmosphere to form acid precipitation   The IPPA suggest that greater than 0.1 mg/l of total phosphates with water or animal waste   Waste water treatment plant effluent, runoff from areas containing pet or animal waste   Direct defectation of animals and birds/waterfowl in waterways   Nutrients   Plant use   Springs, tributary, nunoff or other clean water source that reduces the level of nutrients per unit volume of water   Phosphates are used by aquatic organisms for growth   Water temperature varies with air temperature   Stream-bank vegetation provides shade and reduces runoff (furbidity)   Many plants, bass, crapple, bluegill, carp, impoundments   Impou	1			Mining operations		3 Soft drinks
Surrounding vegetation  Sphagnum moss and pine needles are slightly acidic (bogs, marshes, and pine forests)  Decaying vegetation produces organic acids  Burning fossil fuels  Burning fossil fuels  Phosphate: Measures the organic or fertilizer matter in water  Nutrients  Decrease  Nutrient-free influent water  Decrease  Nutrient-free influent water  Pemperature: measures the average amount of heat in the water in degrees Fabrenheit (F) or about 10 mg (cathy, larve, many fish diseases at temperatures around in the water in degrees Fabrenheit (F) or a fine water in the water in degrees fabrenheit (F) or a fine water in the water in t		logarithmic scale	Decrease	Respiration	reacts with water to form carbonic	range 5 Natural rain 6 neutral
Burning fossil fuels  Emissions react with the atmosphere to form acid precipitation  The EPA suggest that form a produces organic acids  Waste water treatment plant effluent, runoff from areas containing pet or animal waste  Human and animal wastes  Nutrients  Decrease  Nutrients  Decrease  Nutrient-free influent water  Plant use  Phosphates are used by aquatic organisms for growth  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature varies with air temperature varies with air temperature varies with air temperature for the water in degrees fahrenheit (%F) or the water that is exposed to the water sound the state of the water that is exposed to the water sound the state of the water that is exposed to the water and the water of the water that is exposed to the water and the water of the water that is exposed to the water sound the state of the water that is exposed to the water of the water that is exposed to the water of the water that is exposed to the water of the water that is exposed to the water of the water that is exposed to the water of the water that is exposed to the water that the water that is exposed to the water that the water that is exposed to the water that the water that the water that is exposed to the water that the temperature water that the water that the temperature water that the water that the temperature water that the water that the wa		·		Surrounding vegetation	slightly acidic (bogs, marshes, and	optimal Sea water 9 10 11
Phosphate: Measures the organic or fertilizer matter in water  Nutrients  Decrease  Nutrient-free influent water  Phosphate: Nutrients  Decrease  Nutrient-free influent water  Phosphates  Nutrients  Decrease  Nutrient-free influent water  Phosphates  Nutrient-free influent water  Phosphates  Phosphates  Rumoff from areas containing pet or animals and birds/waterfowl in waterways  Runoff from agricultural land, residential lawns, and golf courses  Nutrients plant growth to surpass natural eutrophication rates  Plant use  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature varies with air temperature  Removal of vegetation  Removal of vegetation  Removal of vegetation  Plant use  Removal of vegetation  Plant in the water in degrees Fabrenheit (FF) or sharehold (FF) o						13
Measures the organic or fertilizer matter in water  Human and animal wastes  Human and animal wastes  Pure defectation of animals and birds/waterfowl in waterways  Nutrients  Plant use  Decrease  Nutrient-free influent water  Plant use  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature  Removal of vegetation  Removal of vegetation  Removal of vegetation  Parchaphates are used by support and reduces the level of nutrients per unit volume of water  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature  Properature:  Removal of vegetation  Removal of vegetation  Removal of vegetation  Plant use  Removal of vegetation  Plant use  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature  Stream-bank vegetation provides shade and reduces runoff (turbidity)  Impoundments  Impoundments  Impoundments  Impoundments increase the surface area of the water that is exposed to				Burning fossil fuels		
Human and animal wastes		Measures the	Increase	Surrounding geology	The mineral apatite contains phosphates	The EPA suggest that greater than 0.1 mg/l of
Nutrients   Decrease   Nutrient-free influent water		matter		Human and animal wastes	runoff from areas containing pet or	total phosphates stimulates plant growth to surpass natural
Decrease  Nutrient-free influent water  Plant use  Phosphates are used by aquatic organisms for growth  Increase  Weather/seasonal  Removal of vegetation  Temperature: measures the average amount of heat in the water in degrees Fahrenheit (*F) or the street of the water that is exposed to  Nutrient-free influent water  Springs, tributary, nunoff or other clean water source that reduces the level of nutrients per unit volume of water  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature  Stream-bank vegetation provides shade and reduces runoff (turbidity)  Impoundments  Impoundments increase the surface area of the water that is exposed to						
Plant use  Plant use  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature  Temperature:  measures the average amount of heat in the water in degrees Fahrenheit (F) or the water in degrees Fahrenheit (F) or the water that is exposed to  Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature  Stream-bank vegetation provides shade and reduces runoff (turbidity)  Impoundments  Impoundments increase the surface area of the water that is exposed to  Many plants, bass, crappie, bluegill, carp, sucker, caddisfly, larvae, many fish diseases at temperatures around				Nutrients	Runoff from agricultural land, residential lawns, and golf courses	
Phosphates are used by aquatic organisms for growth  Water temperature varies with air temperature  Temperature: measures the average amount of heat in the water in degrees Fahrenheit (FF) or Fahrenheit			Decrease		water source that reduces the level of	
Increase Weather/seasonal  Water temperature varies with air temperature  Temperature:  measures the average amount of heat in the water in degrees Fahrenheit [°F] or Impoundments  Impoundments  Water temperature varies with air temperature  Stream-bank vegetation provides shade and reduces runoff (turbidity)  Impoundments increase the surface area of the water that is exposed to  Water temperature varies with air temperature  Impoundments increase the surface area of the water that is exposed to				Plant use	Phosphates are used by aquatic	
measures the average amount of heat in the water in degrees Fahrenheit (Ff) or Impoundments and reduces runoff (turbidity) crappie, bluegill, carp, sucker, caddisfly, larvae, many fish diseases at temperatures around			Increase	Weather/seasonal	Water temperature varies with air	
the water in degrees   Impoundments   Impoundments increase the surface area   many fish diseases at   temperatures around	m an th Fa	measures the average amount of heat in the water in degrees Fahrenheit (°F) or		Removal of vegetation	Stream-bank vegetation provides shade and reduces runoff (turbidity)	crappie, bluegill, carp,
				Impoundments ,	mapo di mici canc di comine e men	many fish diseases at temperatures around

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Interpreting Your Water Quality Data/Cont.

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Temperature: cont		Thermal poliution  Urban runoff	Solar radiation     Warm-water discharge from power plants and other cooling waters     Water is heated by asphalt and	Some plant life, trout, walleye, northern pike, stonefly nymph, caddis fly larvae, water beetles, water stiders, some fish diseases 14°C (57°F)
·	Decrease	Cold water inflow	Groundwater, tributary, springs, and reservoir bottom water can be colder than the receiving water	Few plants, trout, caddisfly larvae, stonefly nymph, mayfly nymph, few fish diseases  ?C {?F}
		Depth	Seasonal stratification, especially in lakes	
Total dissolved solids (TDS): measures ions and particles that will pass through a filter with pores of about 2-4 microns (0.002-0.004 cm) in size in (mg/l)	Increase	Seasonal/weather  Erosion  Waste water treatment plant effluent  Surrounding geology	<ul> <li>Runoff from rain an snowmelt carries dissolved constituents</li> <li>Agricultural, road-building, construction, and logging all increase erosion rates.</li> <li>Many dissolved constituents are not removed</li> </ul>	According to the World Health Organization, TDS of natural water sources varies greatly from less than 30 mg/l to as much as 6,000 mg/l
		Organic matter Urban runoff	<ul> <li>Limestone or sedimentary rocks dissolve easily, releasing ions</li> <li>Decaying plants and animals</li> <li>Chemical de-icers, salts, fertilizers (nutrients), and chemicals</li> </ul>	
	Decrease	Surrounding Geology	Granite and igneous rocks often do not dissolve easily	
Turbidity: measures either the clarity of	Increase	Erosion	Agriculture, road-building, construction, and logging all increase erosion rates	Typical groundwater has a turbidity of less than 1 NTU
Secchi Disk, or the amount of light reflected by suspended particles using a Turbidimeter in either a Secchi Depth (meters) or a Turbidimeter reading in Nephelometric Turbidity Units (NTU)	Decrease	Nutrients Weather/seasonal Urban runoff  Forest fires/flooding Waste water treatment plant effluent  Erosion prevention measures	<ul> <li>Increased algal growth</li> <li>Runoff from snowmelt or rainfall</li> <li>Salts, fertilizers (nutrients), chemicals, sediment</li> <li>Increases stream-bank erosion since pavement prevents slowseepage of water into the ground</li> <li>Temporarily increases erosion and therefore turbidity</li> <li>Nutrients increase algal growth</li> <li>Carries dissolved and suspended solids</li> <li>Stream-bank vegetation; Best Management Practices for agriculture, road-building, construction and logging</li> </ul>	
	Total dissolved solids (TDS): measures ions and particles that will pass through a filter with pores of about 2-4 microns (0.002-0.004 cm) in size in (mg/l) in size in (mg/l) in size in (mg/l) a Secchi Disk, or the amount of light reflected by suspended particles using a Turbidimeter in either a Secchi Depth (meters) or a Turbidimeter reading in Nephelometric Turbidity Units	Total dissolved solids (TDS): measures ions and particles that will pass through a filter with pores of about 2-4 microns (0.002-0.004 cm) in size in (mg/l)  Decrease  Turbidity: measures either the clarity of water using a Secchi Disk, or the amount of light reflected by suspended particles using a Turbidimeter in either a Secchi Depth (meters) or a Turbidimeter reading in Nephelometric Turbidity Units (NTU)	Temperature: cont.  Thermal pollution Urban runoff  Decrease Cold water inflow  Depth  Total dissolved solids (TDS): measures ions and particles that will pass through a fiter with pores of about 2-4 microns (0.002-0.004 cm) in size in (mg/l)  Turbidity: measures either the clarity of water using a Secchi Disk, or secchi Disk, or the amount of light reflected by suspended particles using a Turbidimeter reading in Nephelometric Turbidity Units (NTU)  Decrease Erosion  Waste water treatment plant effluent Surrounding Geology  Organic matter Urban runoff  Weather/seasonal Urban runoff  Weather/seasonal Urban runoff  Forest fires/flooding Waste water treatment plant effluent  Decrease  Erosion	Temperature: cont.  Thermal pollution Urban runoff  Decrease Cold water inflow Decrease Cold water inflow Depth Decrease Cold water inflow Depth Decrease Cold water inflow Depth Seasonal stratification, especially in lakes Increase glabout 2-4 microns (0.002-0.004 cm) in size in (mg/1) In size in (mg/1)  Turbidity: measures of about 2-4 microns (0.002-0.004 cm) in size in (mg/1)  Turbidity: measures size that with pores of about 2-4 microns (0.002-0.004 cm) in size in (mg/1)  Turbidity: measures size that with pores of about 2-4 microns (0.002-0.004 cm) in size in (mg/1)  Turbidity: measures either the clarity of water using a Secchi Dight reflected by suspended particles using a Turbidimeter in either a Secchi Depth (meters) or a Turbidimeter in either a Secchi Depth (meters) or a Turbidimeter reading in Nephelometric Turbidity Units (NTU)  Decrease Decrease Erosion prevention measures  Decrease Erosion prevention measures dispagment Practices for agriculture, road-building, construction, and logging all increase erosion rates  Surrounding Geology  - Agriculture, road-building, construction, and logging all increase erosion rates  - Agriculture, road-building, construction, and logging all increase erosion rates  - Agriculture, road-building, construction, and logging all increase erosion rates  - Agriculture, road-building, construction, and logging all increase erosion rates  - Agriculture, road-building, construction, and logging all increase erosion rates  - Increases algal growth  - Runoff from snowmelt or rainfall  - Salts, fertilizers (nutrients), chemicals, sediment  - Increases algal growth  - Increases algal growth  - Increases algal growth  - Increases algal growth  - Runoff from snowmelt on rainfall  - Salts, fertilizers (nutrients), chemicals, sediment  - Increases algal growth  - Runoff from snowmelt on rainfall  - Runoff from rain an snowmelt car