

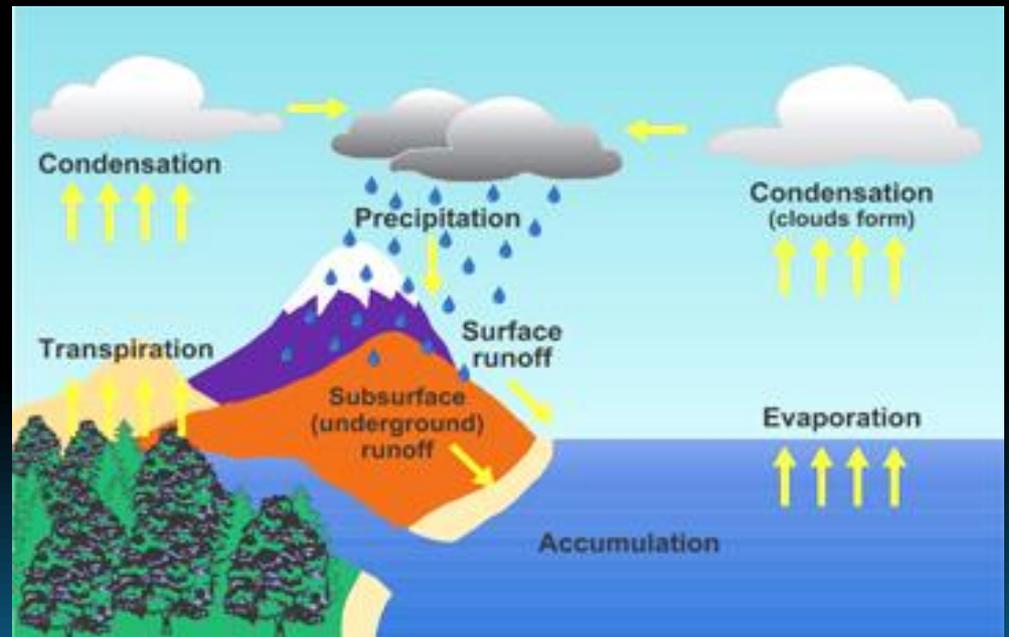
# The Flint River Watershed

Saginaw Bay RC&D

# The Hydrologic Cycle

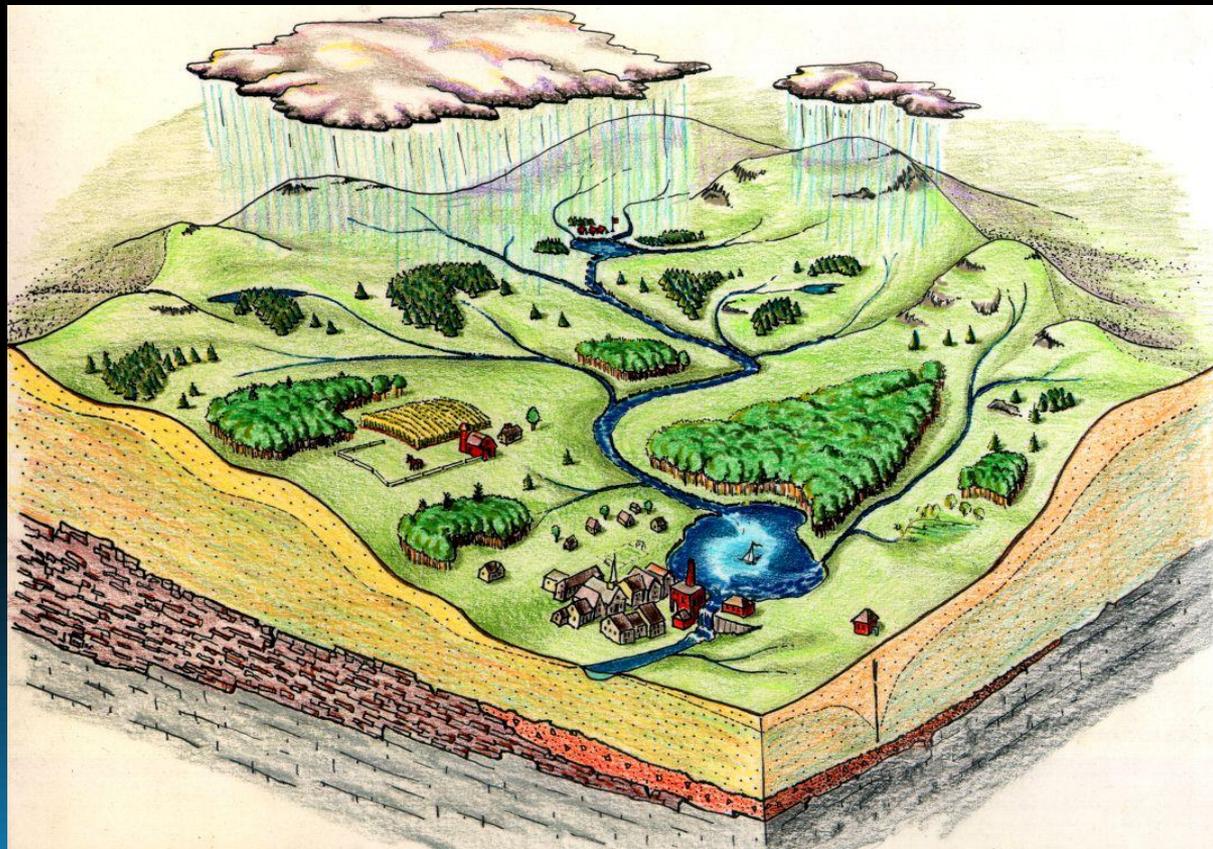
Water evaporates from streams, lakes and oceans, and then, rises into the air and condenses into clouds, and falls back to the ground as rain, hail, sleet or snow.

There is no new water:  
it just goes round and  
round through the  
hydrologic cycle.



# Watersheds

A watershed is an area of land that drains to a particular stream, lake or wetland.

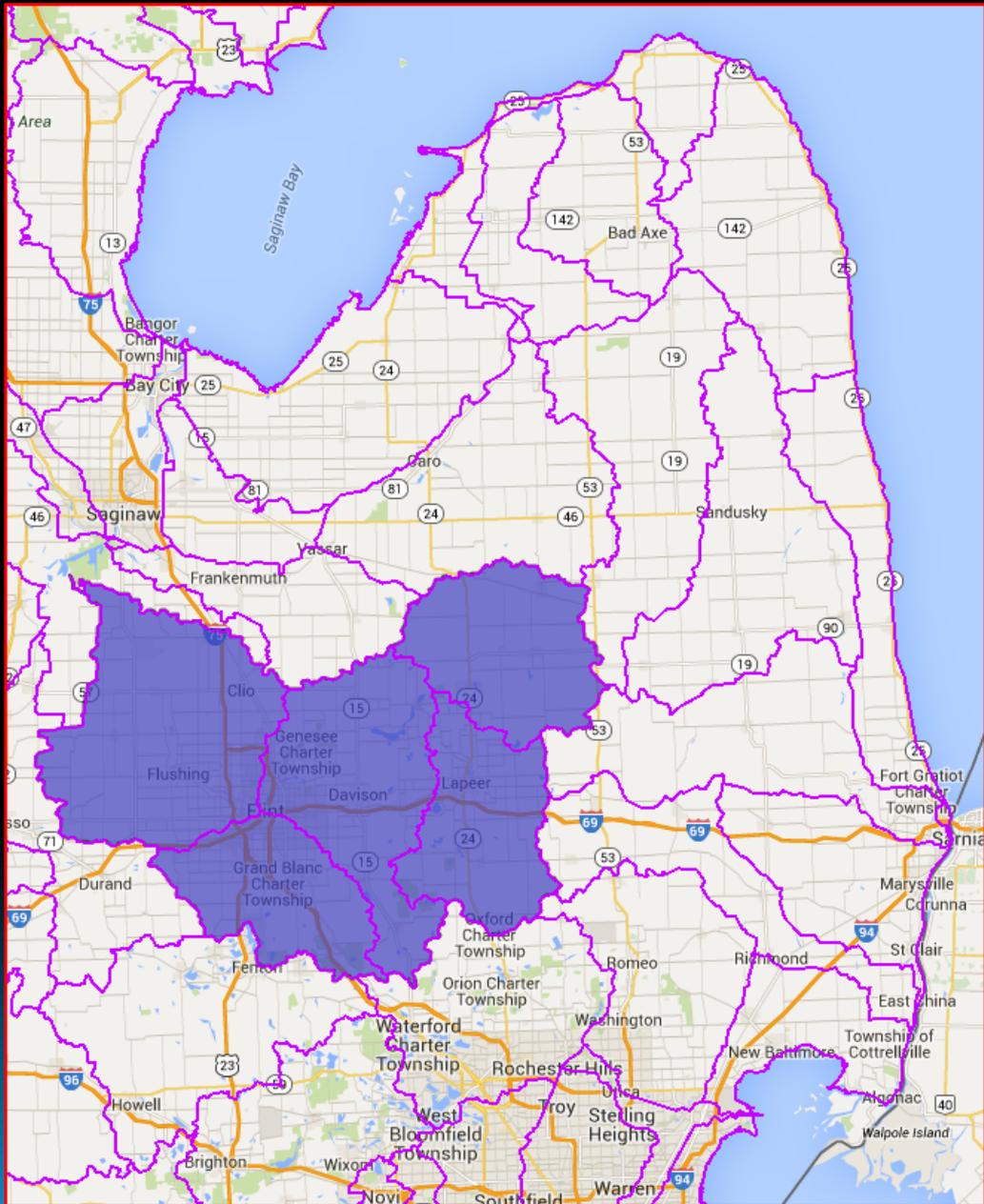


# The Saginaw Bay Watershed

- The Saginaw Bay Watershed, Michigan's largest, is all the land (8,709 square miles) where rain, snowmelt and groundwater drains into Saginaw Bay.
- It covers all or part of 22 counties and drains 15% of Michigan's total land area.
- The Saginaw Bay Watershed covers 9 smaller watersheds, including the Flint River Watershed.
- It has more than 1 million residents and includes Flint, Saginaw, Bay City, Midland, Mount Pleasant and Owosso.
- Over 50% of the land in the watershed is agricultural.

# The Flint River Watershed

- The Flint River Watershed is the 2<sup>nd</sup> largest watershed in the Saginaw Bay Watershed.
- Its 1,400 square miles covers 15% of the Saginaw Bay Watershed.
- It includes 18 smaller watersheds located in Genesee, Lapeer, Oakland, Shiawassee, Saginaw and Tuscola Counties.
- 46% of the watershed is agricultural land.

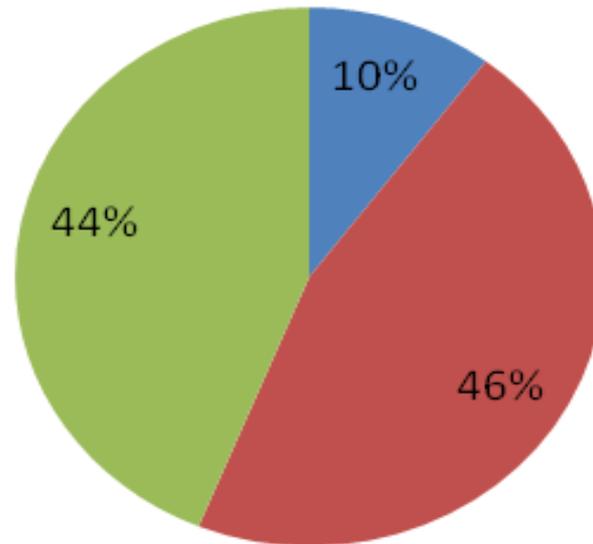


# Major Land Cover Types

Watershed	Area (acres)	Land Cover (acres)		
		Development	Agriculture	Other
Flint (HUC 04080204)	851,414	87,430	390,784	373,200
South Branch Flint River (HUC 0408020401)	136,388	6,157	53,731	76,500
North Branch Flint River (HUC 0408020402)	147,248	2,263	90,466	54,520
Swartz Creek (HUC 0408020403)	125,574	24,099	38,709	62,766
Flint River North Branch (HUC 0408020404)	196,090	23,327	71,791	100,972
Flint River (HUC 0408020405)	246,113	31,583	136,087	78,443
Flint above Hamilton Dam	479,010	31,391	215,824	231,795
Flint above Mott Dam	389,598	14,012	192,634	182,951
Flint above Holloway Dam	334,072	9,838	168,249	155,985

# Flint Watershed Land Cover

■ Development ■ Agriculture ■ Other



# Water Pollution

- Water pollution enters streams and lakes from the watershed that drains into them.
- Water pollution is the presence of a substance or heat energy in water in an amount that diminishes or impairs its value and potential for use as a resource for benefiting and supporting humans, plants, and wildlife.
- Humans cause water pollution by engaging in harmful land use and waste and wastewater disposal practices.
- To protect streams and lakes, people need to be careful about what they do in the watershed to prevent pollution.

# Pollution Sources

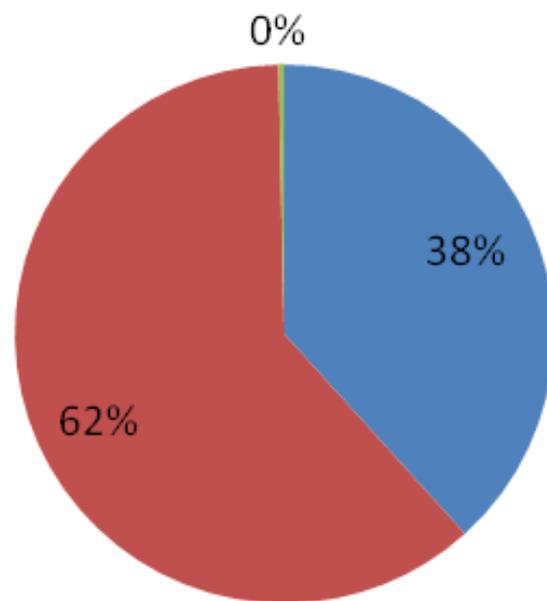
- Known, potential and presumed water pollution sources in the Flint River Watershed include pollution from non-point sources (i.e., soil erosion, contaminated groundwater discharges, and sanitary sewer exfiltration) and point sources (i.e., municipal storm water discharges and illegal direct and indirect discharges).
- Storm water runoff from both developed and agricultural areas is presumed to be a significant source of non-point source sediment, plant nutrient and pesticide pollution.
- Urban stormwater is known to be laden with various pollutants such as sediment (dirt), plant nutrients, organic matter, litter, feces and pathogens, road salt, oil and grease, and toxic metals and pesticides.

Estimated non-point source pollutant loadings to the watershed calculated with the Purdue University Long-Term Hydrologic Impact Analysis (L-THIA) GIS tool are as follows:

Watershed	Pollutant Loadings (lb/yr)					
	Sediment	Phosphorus	Nitrogen	Lead	Copper	Zinc
<b>Flint (HUC 04080204)</b>	18,590,647	306,626	958,769	1,871	3,234	15,694
<b>South Branch Flint River (HUC 0408020401)</b>	1,697,082	28,909	96,862	187	366	1,286
<b>North Branch Flint River (HUC 0408020402)</b>	3,080,871	54,298	181,159	157	321	1,053
<b>Swartz Creek (HUC 0408020403)</b>	2,970,040	45,350	135,231	458	738	4,027
<b>Flint River North Branch (HUC 0408020404)</b>	3,329,715	52,782	164,796	460	777	3,816
<b>Flint River HUC 0408020405)</b>	8,384,345	140,803	435,194	679	1,187	5,890
<b>Flint above Hamilton Dam</b>	6,059,644	101,878	344,152	529	970	3,941
<b>Flint above Mott Dam</b>	4,859,569	84,820	287,557	319	641	2,099
<b>Flint above Holloway Dam</b>	4,087,880	71,558	242,832	250	510	1,633

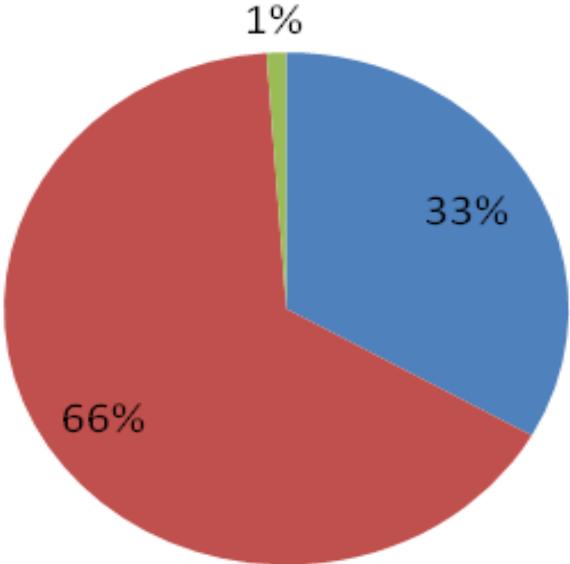
# Flint Watershed Sediment Sources

■ Development ■ Agriculture ■ Other



# Flint Watershed Phosphorus Sources

■ Development ■ Agriculture ■ Other



# Beneficial Uses

- Specific beneficial uses for the Flint River and its tributaries designated for protection under the Michigan Natural Resources and Environmental Protection Act (NREPA) are as follows:
  - public, agricultural, and industrial water supply
  - cold and warm water fishery
  - other aquatic life habitat
  - fish consumption,
  - partial and total body contact recreation
  - navigation

# Watershed Management

The Flint River Watershed is primarily managed to protect beneficial uses by various governmental agencies, under Federal, State and local laws, as follows:

	Agency	Role
Federal	Environmental Protection Agency	Regulates lakes and streams, public drinking water, wastewater and waste disposal, environmental cleanups, etc.
	Department of Agriculture	Assists farmers with conservation planning for developing rural green infrastructure
	US Fish and Wildlife Service	Owens and manages green infrastructure
State	Department of Environmental Quality	Regulates lakes and streams, public drinking water, wastewater and waste disposal, environmental cleanups, etc.
	Department of Natural Resources	Regulates and manages hunting and fishing; owns and manages green infrastructure
	Soil and Water Conservation Districts	Assist farmers with conservation planning for developing rural green infrastructure
County	Drain Commissions	Regulate and control wastewater and waste disposal, regulate soil erosion and sedimentation, regulate and control surface water drainage and associated green infrastructure
	Health Departments	Regulate on-site wastewater disposal
	Park Departments	Own and manage green infrastructure
Local	Cities, Villages and Townships	Regulate and control wastewater and waste disposal, regulate land use, own and manage green infrastructure, etc.

# Pollution Regulations

- Potential non-point source pollution from contaminated groundwater leaking from underground storage tanks and other soil contamination sites are regulated by the Michigan Department of Environmental Quality (MDEQ) under the NREPA Parts 213 and 201, respectively, which require soil and water remediation if contamination impacts or threatens surface waters.
- Point source wastewater discharges to surface waters are regulated by the MDEQ under NREPA Part 31 by issuing National Pollutant Discharge Elimination System (NPDES) permits, which set pollutant discharge limits and/or require best management practices for ensuring that MDEQ water quality standards are met in receiving streams to protect their designated uses.
- Flint Urbanized Area municipal separate storm sewer systems are regulated under NPDES permits that require various measures for reducing stormwater pollution and prohibiting non-stormwater discharges, such as: public education/involvement; regulating sewer use and new development/redevelopment; and good municipal housekeeping practices.

# Agricultural Best Practices

- The USDA Natural Resources Conservation Service (NRCS) implements the NRCS Environmental Quality Incentives Program (EQIP) for preventing and reducing non-point source agricultural pollution in the watershed.
  
- EQIP conservation practices available for program funding include:
  - Nutrient management
  - Cover crops
  - Reduced tillage (either mulch or no till)
  - Drainage water management (where applicable)
  - Grade stabilization structures
  - Animal trails and walkways
  - Prescribed grazing
  - Pipelines
  - Watering facilities
  - Animal access control
  - Pasture and hayland planting
  - Heavy use area protection
  - Waste storage and transfer facilities
  - Roofs and covers
  - Flow diversions
  - Roof runoff management
  - Agrichemical handling facilities