

## Miscellaneous Water Quality Influences

### Algal Blooms

Algae occur naturally all over the world and are part of the food chain. However, under suitable conditions, algae can proliferate to levels that adversely affect natural resources or humans. This is called an algal bloom. These blooms are not a new phenomenon, but the relatively recent boom in human population and land use alteration has made algal blooms more prevalent in recent years. Warm and calm waters with high levels of nutrients and low levels of turbidity and color are prime candidates for a bloom. These blooms can last weeks or months and turn the water bright green. In most cases, blooms are most prevalent during the summer months and die back during the cold winter months.

Algal blooms cause multiple detrimental effects to waterbodies. During daylight hours when algae produce oxygen, supersaturated oxygen levels can occur, whereas night time respiration of algae can cause oxygen supplies to be depleted in the water column, causing organisms relying on oxygen to die. Blooms can also interfere with vegetation in the water by blocking sunlight from the plants, which hinders photosynthesis and alters water temperature.

Another concern with algal blooms is the possibility of toxin production. Certain blue-green algae release toxins when the cells die or are ingested. There are about 20 species or groups of freshwater or freshwater-estuarine blue-green algae that are toxic or potentially toxic occurring in Florida waters. Depending on the type of toxin produced, health effects can range from gastroenteritis, asthma or eye irritation to liver damage, paralysis, or death. For further information please click [here](#).

### Rainfall

Leon County had dryer than normal conditions for the last 13 years, but the last two years have shown a surplus of rainfall (Figure 1). Rainfall for 2013 (Figure 2) measured 66.77 inches (7.54 inches above normal). The wettest month was July with 14.96 inches of rain, augmented by the 7.13 inches received from an anomalous weather pattern July 2<sup>nd</sup>-6<sup>th</sup>, resulting in widespread riverine and flash flooding. The wettest calendar day of the year was February 22<sup>nd</sup>, when 4.75 inches fell. The second wettest day of the year was June 6<sup>th</sup>, when 4.5 inches of rain fell in five hours as Tropical Storm Andrea passed through. May was the driest month of the year with only 0.43 inches of rain was measured. This drought period from late April through early June may have affected the lake and stream sampling and in turn affected conclusions about area lakes and streams.

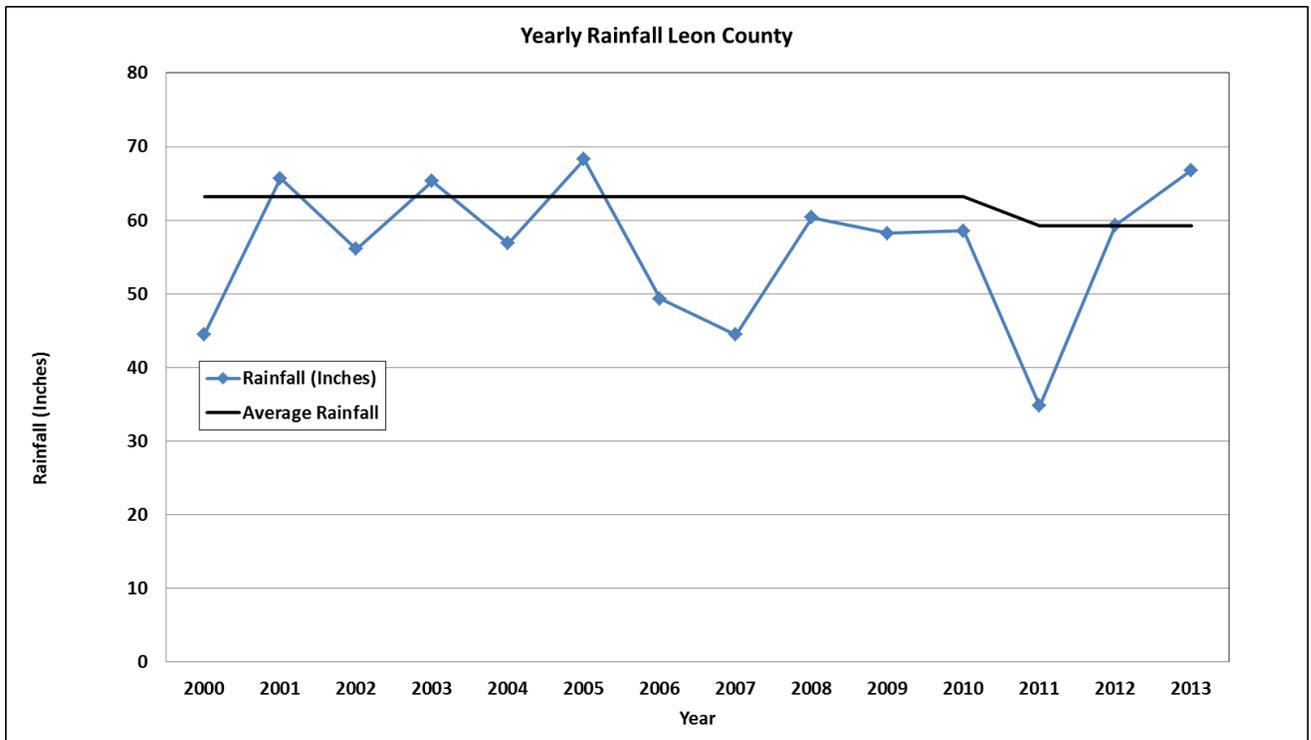


Figure 1. Annual rainfall 2000-2013.

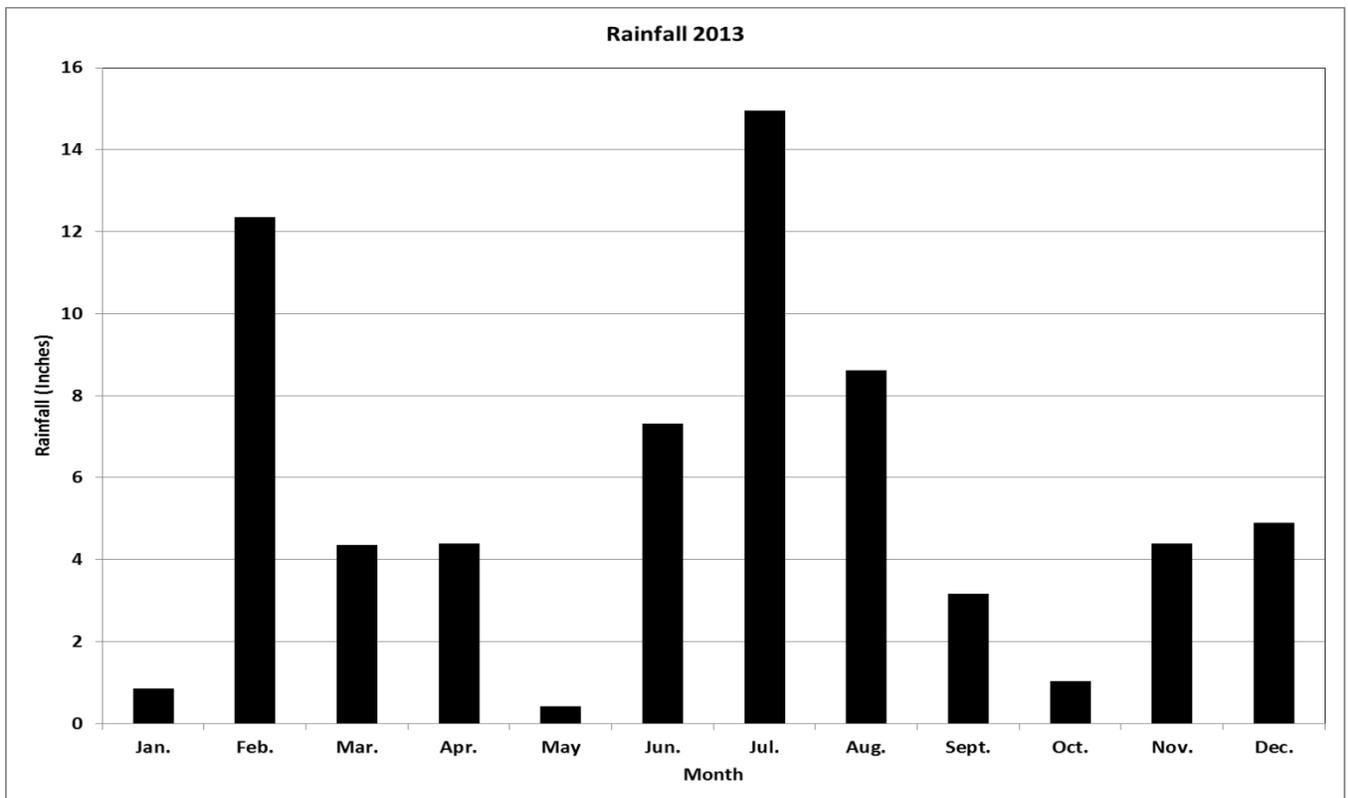


Figure 2. Monthly Rainfall (2013).

During a drought, water levels in lakes and streams can drop significantly, and some can even dry up completely. While low water levels can cause a decline in plants and wildlife, many are adapted to the cycle of drought. For example, periodic dry spells can benefit the health of a lake by allowing sediment in the lake bottom to oxidize.

However, water quality can decline as the concentration of pollutants increases when water evaporates and becomes stagnant. As a counterbalance, pollutants associated with stormwater runoff are not an issue during drought events, so an urban stream's baseflow may be less polluted during a drought than during normal rainfall patterns.

### Land Use

One of the most important factors that affect water quality is watershed land use. Rain falling on undeveloped "natural" land normally soaks into the vegetation and soil, flows through the soil and feeds streams, lakes, and aquifers. When land is developed, and vegetation cleared, soil is compacted or covered by impervious areas. Water, instead of soaking into the ground or vegetation, flows off rooftops, parking lots and roads. As the water flows, whatever lies on the surface is picked up, including fertilizers and pesticides from lawns, oil and gasoline that leak from vehicles, etc. This runoff then flows into stormwater conveyances, stormwater ponds or directly into streams or lakes. Increased impervious area and more efficient transport of stormwater runoff via pipes can cause hydrological, chemical, stream morphological, biological, and nutrient processing changes to streams and lakes.

**Problems generally associated with urban streams (modified from Walsh et al, 2005). Responses are those that have been observed to increase (↑) or decrease (↓) with increased urbanization.**

<b>Feature</b>	<b>Response</b>
Hydrology	↑ Frequency of overland flow
	↑ Frequency of erosive flow
	↑ Magnitude of high flow
	↓ Lag time to peak flow
	↑ Rise and flow of storm hydrograph
Water Chemistry	↑ Nutrients
	↑ Toxicants
	↑ Temperature
Channel Morphology	↑ Channel Width
	↑ Pool depth
	↑ Scour
	↑ Channel complexity
Organic Matter	↓ Water Retention
Fishes	↓ Sensitive Fishes
Invertebrates	↑ Tolerant Invertebrates
	↓ Sensitive Invertebrates
Algae	↑ Eutrophic diatoms
	↓ Oligotrophic diatoms
Ecosystem Processes	↓ Nutrient uptake

In determining possible sources and causes of water quality and biological issues, land use tables were created in the fall of 2006 from utilizing the Tallahassee-Leon County (TLC) Planning Department's Existing Landuse 2003 data set, Florida Fish and Wildlife Commission's Habitat and Landuse 2003 data set, and Leon County Property Appraiser's Parcel data set. Land use tables were reviewed and updated in 2011 using updated information from the Leon County Property Appraiser's files, permits and the aforementioned land use records. Northwest Florida Water Management District's 2009-2010 landuse records were used to verify the above. These tables are included in each waterbody summary page with the exception of waterbody basins/watersheds that extended outside Leon County information. Unfortunately, Leon County's GIS coverage does not extend beyond Leon County, so accurate land use is not readily available for areas outside the county. This limitation affects the Ochlockonee River, St. Marks River and Lakes Talquin, Iamonia and Miccosukee. Because of this limitation, land use tables are not provided for these waterbodies.

### Fish Consumption Advisories

Mercury is a toxic metal that can cause learning and memory problems to children. Mercury can be naturally found in the environment or may occur due to pollution from electric power plants, mining and other industrial sources. Most Florida fish have low to medium levels of mercury. Another industrial toxin found in fish are polychlorinated biphenols (PCBs), which have been known to cause cancer and can negatively affect the immune system, reproductive system, nervous system, and endocrine system of animals including humans. To lower the risk of harm from mercury (or other contaminants) found in fish caught in Florida, the Florida Department of Health (FDOH) developed a set of guidelines based on tests of various freshwater waterbodies to allow people to determine the amount of fish to eat or avoid. The guidelines for Leon County waterbodies are shown in the following table. For more information regarding fish advisories please visit the [Florida Department of Health website](#).

<b>Water Body</b>	<b>Species</b>	<b>Women of childbearing age, young children (# of meals)</b>	<b>All Other Individuals (# of meals)</b>
Lake Iamonia	Bluegill, Redear sunfish, Black crappie	One per week	Two per week
	Brown bullhead catfish	Two per week	Two per week
	Largemouth bass	One per month	One per week
Lake Jackson	Largemouth bass	One per month	One per week
	Bluegill, Redear sunfish	Two per week	Two per week
Lake Miccosukee	Bluegill	Two per week	Two per week
	Largemouth bass	One per month	One per week
Lake Munson (PCBs)	Largemouth bass 19 inches or more	One per month	One per month
Lake Munson	Brown bullhead catfish, Bluegill, Redear sunfish	Two per week	Two per week
	Largemouth Bass	One per week	Two per week
	Black crappie	One per month	One per week
Lake Talquin	Bluegill, Black crappie, Brown bullhead catfish, Redbreast sunfish, Redear sunfish, Spotted bullhead catfish	Two per week	Two per week
	Largemouth bass	One per month	One per month
Lake Tom John	Largemouth bass	One per month	One per week
Moore Lake	Largemouth bass	One per month	One per month
Ochlockonee River and tributaries	Bluegill, Redbreast sunfish	One per month	One per week
	Channel catfish, Spotted sunfish, Warmouth	One per month	One per week
	Flathead catfish, Redear sunfish	One per month	One per month
	Largemouth bass	<b>DO NOT EAT</b>	One per month
Ochlockonee River north of US 90 bridge	Bluegill, Redbreast sunfish, Redear sunfish, Spotted sunfish, Warmouth	One per month	One per week
	Black crappie	One per month	One per month
	Flathead catfish, Largemouth bass	<b>DO NOT EAT</b>	One per month
Piney Z Lake	Redear sunfish, Warmouth	Two per week	Two per week
	Bluegill, Brown Bullhead	One per week	Two per week

## Reference

Walsh, C. J., Roy, A. H., Feminella, J. W., Cottingham, P. D., Groffman, P. M., Morgan II, R. P. 2005. The urban stream syndrome: current knowledge and the search for a cure. *Journal of the North American Benthological Society* 24(3): 706-723