SUMMER 2017

SEASONAL HAZARD OUTLOOK

The Ohio Emergency Management Agency

Watch Office

Current as of: June 6
Scheduled Update: June 30

24/7 Awareness | Coordination | Collaboration
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Executive Summary

This outlook forecasts potential threats that could affect Ohio this summer. Information from state and federal partners was used to write this document. Based on this information, the following projections are being made:

1. *Ohio is expected to experience above average summer temperatures.*
2. *Ohio is expected to experience near-average seasonal precipitation.*
3. *Ohio is not projected to experience a major Harmful Algal Bloom this summer.*
4. *ODNR and OFCA do not project major wildfires this summer.*
5. *Multiple planned events are scheduled for this summer, where consequence management needs may overwhelm local response capabilities.*
6. *CDC and ODH do not anticipate any major increases in Zika diagnoses.*

Weather

The Ohio EMA Watch Office developed this analysis to provide an in-depth look at the weather and climate related hazards possible this summer. This report includes forecasts and data from leading Federal agencies charged with producing La Niña and El Niño, temperature, and precipitation outlooks, as well as data on severe weather climatology. Current expectations indicate above normal temperatures and near-average precipitation occurring this summer. El Niño conditions are expected to develop this summer and persist through the fall. Severe weather season will continue to ramp up over the coming months.

TEMPERATURE OUTLOOK

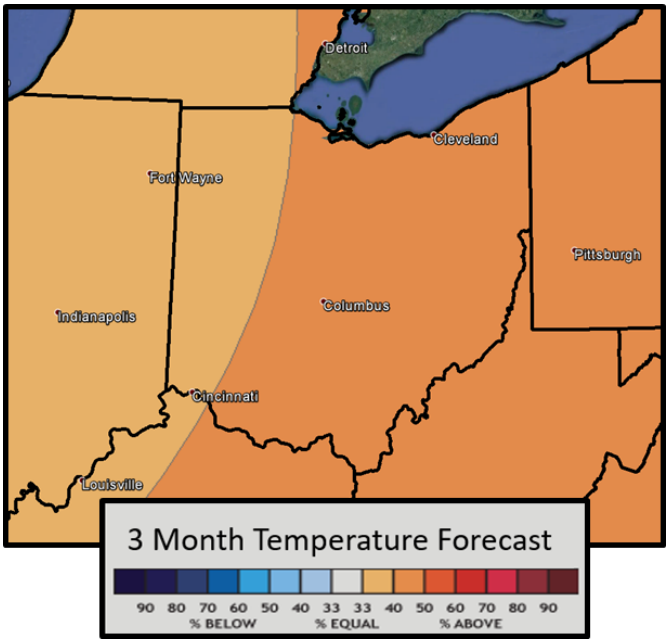


Figure 1: Three Month Temperature Outlook | Source: CPC

The Climate Prediction Center (CPC) is forecasting above average temperatures during the months of May, June, and July in Ohio. The graphic above depicts the CPC's temperature forecast for the three month period. *Table 1* below lists average high temperatures at select Ohio cities over the same time period. These predictions are based on the latest climate computer model simulations, historical trends, and current weather conditions. *Figure 1* displays the monthly temperature forecast for the three month period.

City	Average High Temperature		
	May	*June*	*July*
Columbus	72.5	80.7	84.3
Cleveland	69.5	78.6	82.6
Cincinnati	74.9	83.0	86.6
Akron	69.5	78.2	82.8
Toledo	71.0	80.7	84.5
Athens	72.1	80.0	82.9
Dayton	71.5	80.2	83.8
Portsmouth	75.5	83.3	86.6

Table 1: Average (1981-2010) Monthly High Temperature by City | Source: NCDC

PRECIPITATION OUTLOOK

The CPC indicates that Ohio will have an equal chance for above and below average precipitation over May, June, and July. Average monthly precipitation amounts for select cities in Ohio are listed in *Table 2* in order to depict typical conditions. During the spring, suffiecient rainfall helped keep drought conditions from developing and no drought is expected to develop in the near future.

City	Average Monthly Precipitation (in.)		
	May	*June*	*July*
Columbus	4.4	4.5	4.3
Cleveland	3.7	3.4	3.5
Cincinnati	5.0	4.1	3.9
Akron	4.3	3.8	4.1
Toledo	3.6	3.6	3.2
Athens	4.4	3.7	4.4
Dayton	4.7	4.2	4.1
Portsmouth	5.0	3.5	4.2

Table 2: Average (1981-2010) Monthly Precipitation by City | Source: NCDC

SEVERE WEATHER

The coming months will bring an uptick in the potential for severe weather. Damaging winds can cause widespread power outages and cascading impacts. Storms producing damaging winds rely on warm surface temperatures to form; so, a rapid escalation in

damaging wind probabilities occurs over the summer months, which can be seen in *Figure 3* below. A maximum in potential exists in July as warm air overtakes the state.

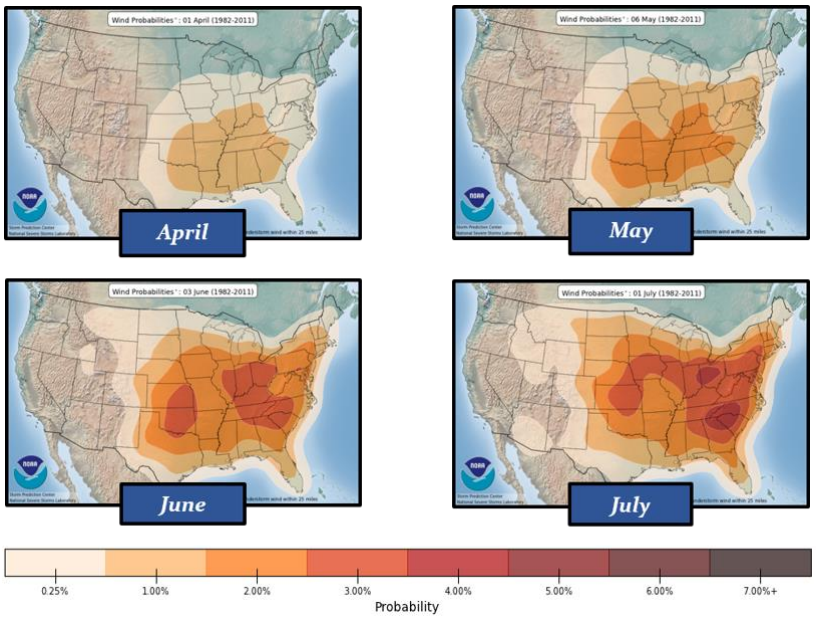


Figure 2 Daily Probability of damaging winds | Source: SPC

Tornadoes can form when warm air, a strong jet stream, and moisture from the Gulf of Mexico intersect in one location. This proximity occurs most frequently in the late spring and early summer months. However, historically, Ohio has had at least a tornado in every calendar month. As shown in *Figure 4* below, the maximum in tornado potential for Ohio occurs in June over western portions of the state.

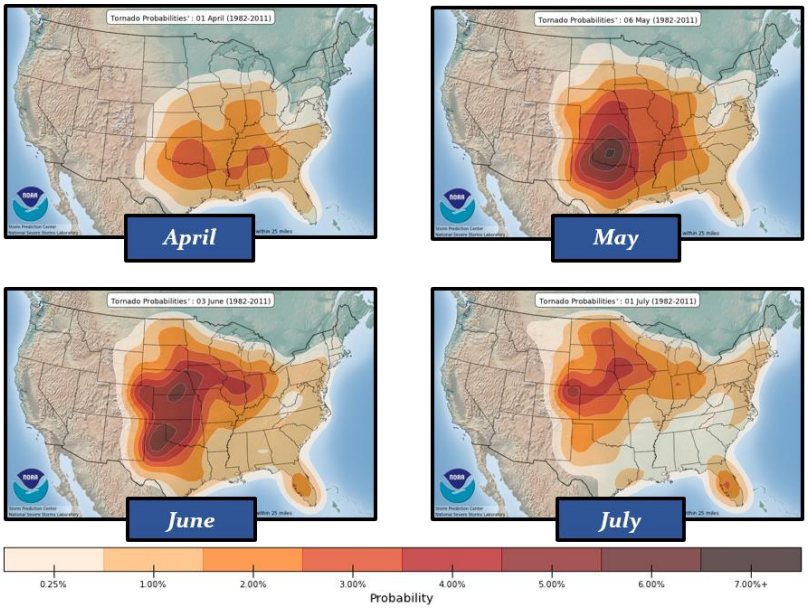


Figure 3 Daily Probability of damaging winds | Source: SPC

Drinking Water and Harmful Algal Bloom

A HAB is any large increased density of algae capable of producing toxins. In freshwater bodies, such as Lake Erie, those algae tend to be cyanobacteria, more commonly known as blue-green algae, that are always present in the water to some extent, but can grow excessively under certain conditions. Many species of blue-green algae float, so when the water is calm, they will form a scum at the surface. However, wind and waves mix them throughout the water column. The HAB is most common in Sandusky Bay, and concentrations are consistently highest in the bay.[1] HABs are caused by a combination of warm water temperatures (above 60° F) and high concentrations of phosphorus in the water. Cool weather conditions produce green algae blooms, while warm weather conditions often produce blue-green algal blooms.

Ohio conducts monitoring and notification of bacteria and algal toxins at selected state park beaches and boat ramps, semi-private beaches located along the Ohio Lake Erie border, inland lakes and the Ohio River. The purpose of beach, lake and river monitoring is to test water quality of the state's swimming beach waters and boat access area's to notify the public whenever bacteria or algal toxin levels present a potential health risk to those engaged in water activities.

Routine microcystins monitoring and cyanobacteria screening are required to be conducted by all surface public water systems under Ohio Administrative Code Rule 3745-90-03. The purpose of the *Public Water System Harmful Algal Bloom (HAB) Response Strategy*[2] is to protect the public from cyanotoxins produced by cyanobacteria that may be in sources of drinking water at concentrations that can affect human health. Ohio's Public Water System (PWS) response strategy identifies cyanotoxin levels that will be used to make use advisory decisions. The HAB outlook remains consistent with last year. NOAA will be able to finalize their forecast later this summer.

DRINKING WATER

Having learned lessons from each of Ohio's previous HAB seasons, significant efforts have been made statewide to ensure a similar incident does not take places. Water treatment plants have added additional testing for the algal toxin microcystin that caused Toledo's

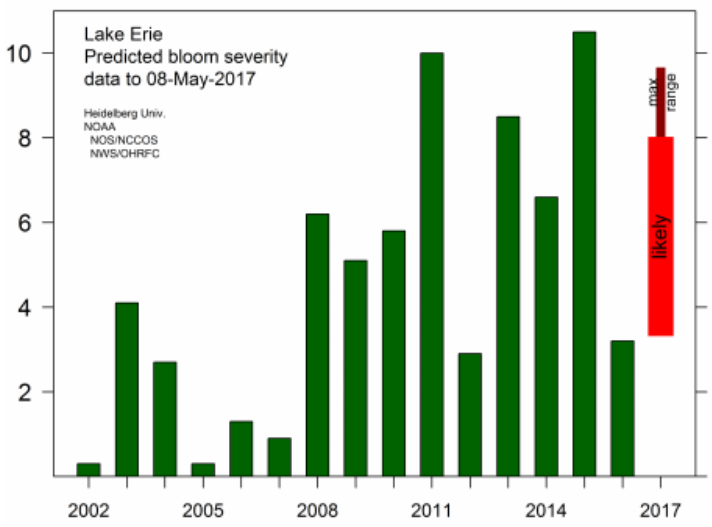
[1] Ohio Department of Health. *Harmful Algal Blooms.* June 2016. http://odh.ohio.gov/odhprograms/eh/HABs/algalblooms.aspx

[2] Ohio EPA. *Public Water System Harmful Algal Bloom Response Strategy*. 2017. http://epa.ohio.gov/Portals/28/documents/habs/2017_PWS_HAB_Response_Strategy_5-15-17-FINAL.pdf

water shutdown, scientists are monitoring HABs as they develop, and backup intakes let larger plants avoid pulling in potentially contaminated water altogether.[3] The public water system throughout Ohio has been encouraged to add onsite testing equipment for Microcystin detection; however, if the public water system cannot afford such equipment, they are able to send samples for testing to Ohio EPA at no charge.

HARMFUL ALGAL BLOOM

2016 BLOOM ANALYSIS



The Microcystis cyanobacteria bloom in 2016 was mild compared to the last few years, with a severity index of 3.2, much lower than the 10.5 record observed in 2015. In the western Lake Erie basin, the bloom biomass was more toxic than in 2015, but less than half the toxicity of 2014. In contrast, because of the relatively mild bloom, areas of scum were fewer, less dense, and less toxic in 2016 than in either 2014 or 2015. The 2016 bloom had a "double peak", one in August, followed by a decrease in biomass, then a brief reappearance in late September. This differs from the typical year in which the bloom grows through August to a peak in early September and then gradually decreases through September. Isolated pockets of microcystis also persisted into October. The bloom was milder than the forecast severity of 5.5, but within the range of uncertainty of all the models (3-7). The models primarily use the phosphorus load from the Maumee River. However, the models also included residual internal load of phosphorus in Lake Erie, particularly a residual from the Maumee River's record spring phosphorus load in 2015. This additional phosphorus used in

[3] Dierkes, Christina. *Research Keeps Tap Water Safer From Harmful Algae.* November 2016. http://presspublications.com/18987-research-keeps-tap-water-safer-from-harmful-algae

the models was greater than the apparent residual internal load, leading to model forecasts of greater bloom severity than were observed.[4]

Drought and Wild Fire Forecast

DROUGHT

Drought is a cyclical weather phenomenon, which can have a profound effect on Ohio. It is progressive in nature, and its presence may not be recognized until it has reached a severe level. Effects from drought could potentially impact the agriculture, forestry, fish & wildlife, recreation & tourism, public & private water supplies, water quality sectors throughout Ohio.[5]

The biggest factors leading to drought are temperature and precipitation. Please see the sections above on temperature and precipitation forecast for Ohio. The Climate Prediction Center forecasts that Ohio will not experience drought conditions through July.

[4] National Oceanic and Atmospheric Administration. *Bulletin 30 Experimental Lake Erie HAB.* May 2017. http://nccospublicstor.blob.core.windows.net/hab-data/bulletins/lake-erie/2017/projection_2017-01.pdf?utm_medium=email&utm_source=GovDelivery

[5] Ohio Emergency Management Agency. *State of Ohio Emergency Operations Plan Drought Incident Index.* 2009. http://drought.unl.edu/archive/plans/drought/state/OH_2009.pdf

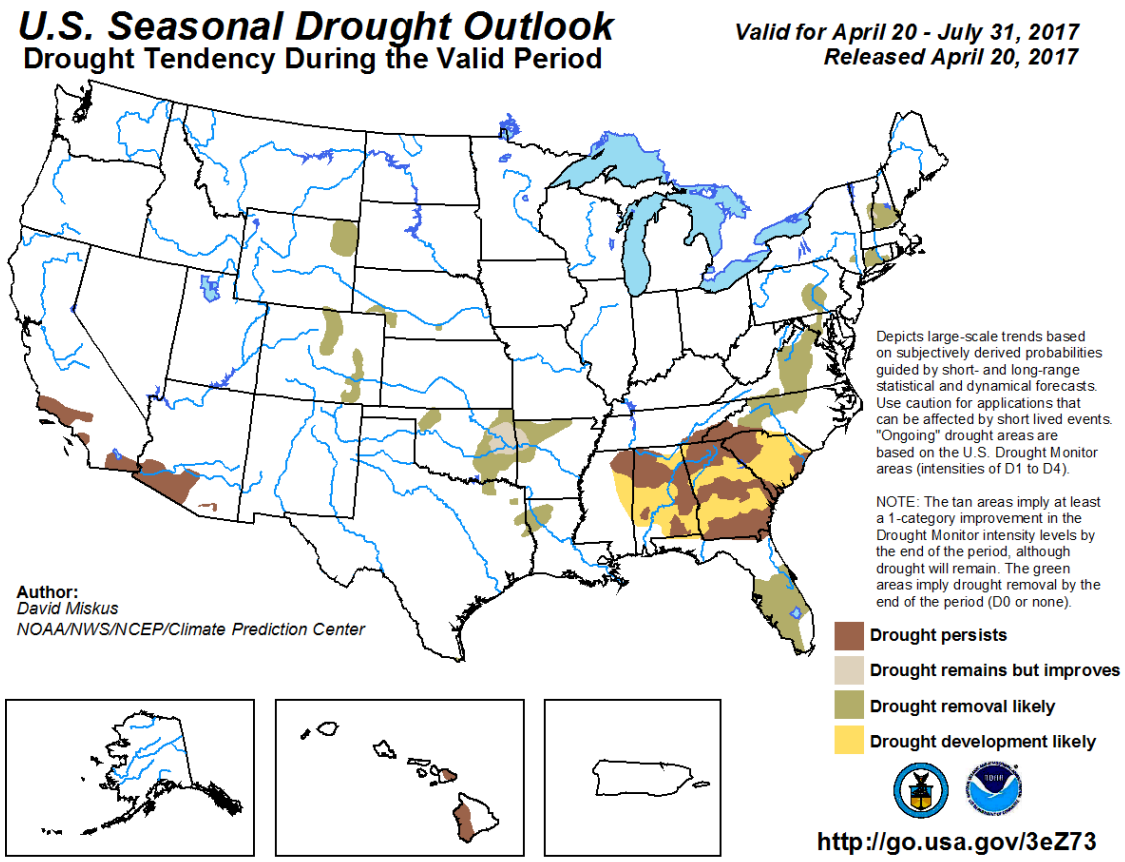


Figure 4 US Seasonal Drought Outlook | Source: CPC

WILD FIRE FORECAST

In a typical year, there are more than 15,000 wildfire and natural fuel fires in Ohio. These fires are primarily caused by careless debris burning, and they can result in damage to landscape, water quality, and improvements such as fences and outbuildings. These preventable fires put people and their homes at significant risk. [6]

Ohio's wildfire seasons occur primarily in the spring (March, April and May) before vegetation has "greened-up" and during the fall (October and November) when leaf drop occurs. During these times, and especially when the weather is warm, windy, and with low humidity, cured vegetation is particularly susceptible to burning. Fuel (vegetation and woody debris), weather (wind, temperature, and humidity) and topography (hills and

[6] Ohio Department of Natural Resources, Division of Forestry. *Wildfire in Ohio.* 2017. http://forestry.ohiodnr.gov/wildfire

valleys) combine to present an extreme danger to unwary civilians and firefighters in the path of a wildfire.[7]

Normal spring shower and thunderstorm activity is expected across the Eastern Area, producing normal fuel conditions and, therefore, normal spring fire activity prior to vegetation green-up. Near-normal fire potential is expected for Ohio through July 2017.

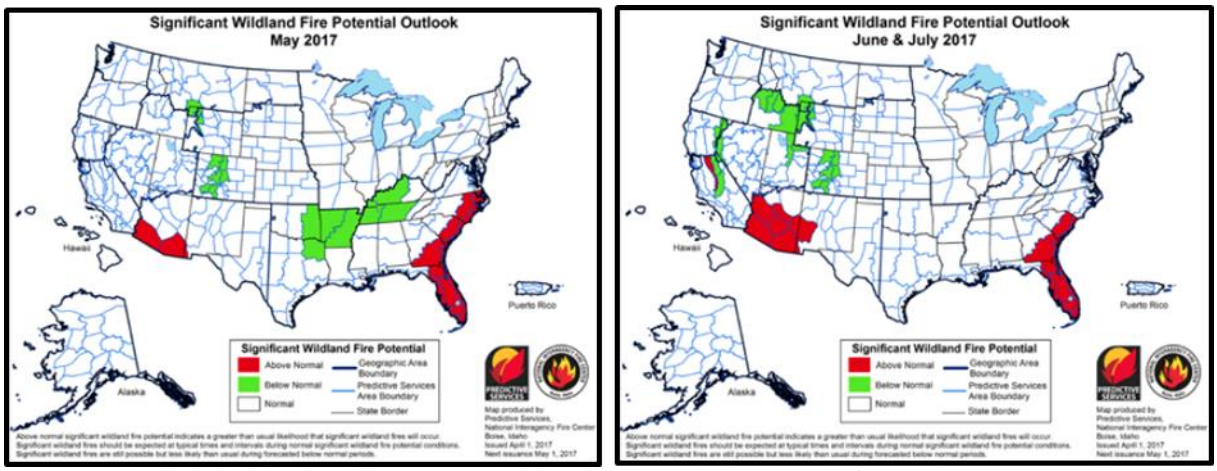


Figure 5 National Significant Wildland Fire Potential Outlook | Source: NIFC

Riverine Flood Outlook

The 2017 National Hydrologic Assessment is the primary source document for the flood outlook portion of this report.[8] This document can be used for general awareness of the most likely flood scenarios and locations, but it is not all inclusive and uses past performance indicators to predict future results. The Department of Homeland Security assesses that high flood waters can impact the following critical infrastructure sectors: Chemical, Dams, Energy, Food and Agriculture, Transportation Systems, and Water and Wastewater Systems.[9]

Based on current conditions, this year's flood risk is normal across the Ohio Valley, with a few areas where moderate flooding is possible. Record warmth diminished the areal extent and volume of the winter snow pack. Additional precipitation should not significantly impact the areas of normal flood risk.

[7] Ohio Department of Natural Resources, Division of Forestry. *Wildfire in Ohio*. 2017. http://forestry.ohiodnr.gov/wildfire

[8] National Weather Service. *National Hydrologic Assessment*. 2017

[9] United States Department of Homeland Security. *Flooding and Potential Effects to Critical Infrastructure.* 2017. HSIN

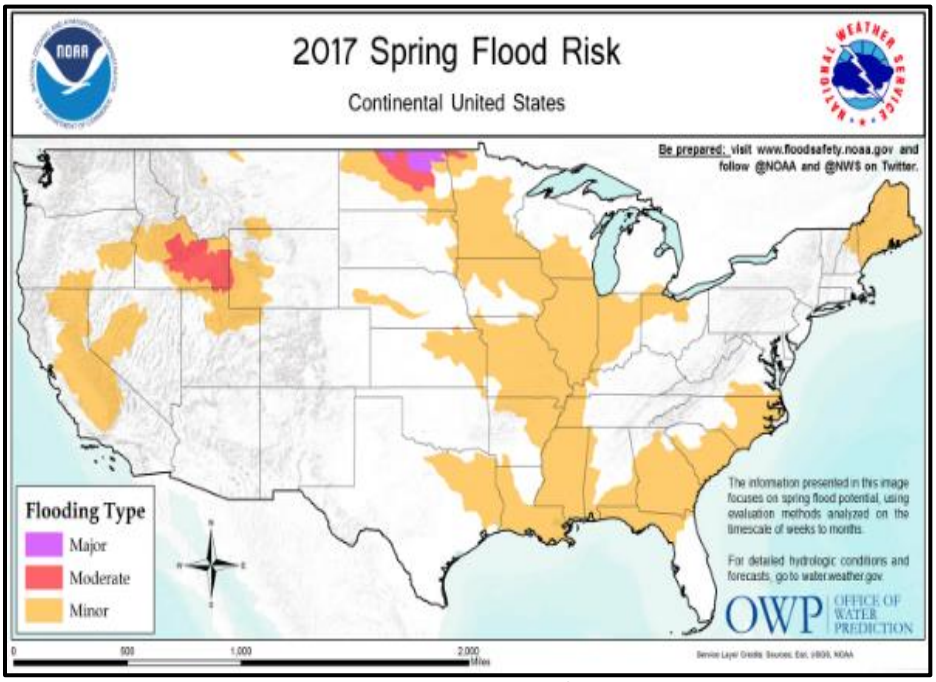


Figure 6 2017 Spring Flood Risk | Source: NWS

Rivers and streams in the Ohio River basin typically experience minor flooding in the spring. There is a threat of minor flooding in these basins throughout spring. Any increase in flood potential will be driven by individual convective rain storms typical in the spring.

Scheduled High Profile Events

A High Profile Event, as monitored by the Ohio EMA Watch Office, can be defined as:

> *An event of interest with the potential to attract over 50,000 attendees that requires specific operational planning by the host city/village/township and may include national television viewing (Example: The Memorial Golf Tournament); any event considered politically or socially charged, warranting a significant law enforcement presence and/or network/social media coverage to protect and inform the general public (example: The Ray Tensing Trial); and, all events found to meet the requirements above and adhere to the tenets of the semiannual National Terrorism Advisory System Bulletin, promoting "increased public vigilance and awareness", for concern from "homegrown violent extremists who could strike the homeland with little to no notice."*[10]

[10] United States Department of Homeland Security. *National Terrorism Advisory System Bulletin. November 2016.* http://dhs.gov/sites/default/files/ntas/alerts/16_1115_NTAS_bulletin.pdf

The focus of the Watch Office is primarily on events where an all-hazard incident poses the potential to overwhelm local response capabilities.

- May 25 – Ray Tensing Re-Trial – Hamilton County Courthouse
- May 29 – June 4 – The Memorial Golf Tournament – Dublin, OH
- Jun 10 – 11 – Buckeye Country Superfest – Ohio Stadium, Columbus, OH
- Jul 3 – Red White and BOOM – Downtown Columbus, OH
- Jul 4 – Lima Star Spangled Spectacular – Lima Faurot Park, Lima OH
- Jul 13 – 16 – Jamboree in the Hills – Belmont County, OH
- Jul 26 – August 7 – Ohio State Fair – Columbus, OH
- Aug 4 – 7 – Dublin Irish Festival – Dublin, OH
- Sep 9 –OSU Football Season Opener – Ohio Stadium, Columbus, OH
- Sep 16 – U.S. Air Force Marathon – WPAFB, Dayton, OH

Public Health

AVIAN FLU

Avian influenza is a contagious viral infection affecting food-producing birds. Avian influenza viruses can be categorized into low pathogenicity (LPAI) and highly pathogenic (HPAI) forms, based on the severity of the illness. HPAI and low pathogenicity H_5 and H_7 avian influenza viruses are considered to be Notifiable Avian Influenza.[11]

On March 7th, 2017 the USDA confirmed Highly Pathogenic Avian Influenza (HPAI) H_7N_9 in a commerical poultry flock in Lincoln, Tennessee along the Mississippi Flyway (or migratory bird paths). The H_7N_9 virus which was identified to be impacting poultry and infecting humans in Asia for the first time in 2013 is genetically distinct from HPAI H_7N_9.[12].Media outlets also reported avian influenza cases in Alabama, [13] Georgia,[14] and

[11] Canadian Food Inspection Agency. *Notable Avian Influenza*. July 2016. http://inspection.gc.ca/animals/terrestrial-animals/diseases/reportable/ai/eng/1323990856863/1323991018946

[12] United States Department of Agriculture. *Avian Influenza*. March 2017. http://usda.gov/topics/animals/one-health/avian-influenza

[13] Kentucky Department of Agriculture. *Low Pathogenic Avian Influenza Detected in Western Kentucky.* March 2017. http://kyagr.com/Kentucky-AGNEWS/press-releases/Low-pathogenic-avian-influenza-detected-in-western-Kentucky.html

[14] Georgia Department of Agriculture. *Confirmed H7, Presumptive Low Pathogenic Avian Influenza in Commercial Flock in Georgia.* March 2017. http://agr.georgia.gov/confirmed-h7-presumptive-low-pathogenic-avian-influenza-in-a-commercial-flock-in-georgia.as

Kentucky[15] during March 2017. These locations share the Mississippi migratory bird flyway with Ohio.

The last USDA-confirmed several cases Highly Pathogenic Avian Influenza (HPAI) *H5* occurred in the Pacific, Central, and Mississippi flyways during winter 2014 to spring 2015. During that time, HPAI *H5* was found in wild birds, a few backyard flocks as well as commercial poultry flocks in these flyways.

ZIKA VIRUS DISEASE

Zika virus spreads to people through the bite of an infected *aedes* species mosquito.[16] The Zika virus disease can also be sexually transmitted. There is no indication it can spread through casual contact. The Centers for Disease Control and Prevention (CDC) maintains an updated list of affected countries and territories, as well as associated travel advisories.[17] Local transmission of Zika has only been documented in the contiguous United States, in southern Texas and Florida.

The yellow fever mosquito, *aedes aegypti*, is the primary transmitter of the Zika virus.[18] This mosquito is found in the tropics and in the southern United States. It is not known to be in Ohio. The Asian tiger mosquito, *aedes albopictus*, is a related mosquito found in Ohio and may potentially transmit Zika virus, although it has not yet been implicated in the transmission of human cases in the United States. As a precaution, health experts urge individuals with suspected cases of Zika virus infection or those returning from a Zika-affected area, to avoid mosquito exposure and use repellants for three weeks after symptom onset or return from Zika-affected area.

Approximately 80 percent of those infected with Zika virus do not have any symptoms.[19] Of those who do experience symptoms, they are usually mild and include fever, rash, joint pain, or conjunctivitis (red eyes). Other symptoms include muscle pain and headache. Severe disease requiring hospitalization is uncommon. Health officials determined an association between Zika virus infections in pregnant women and birth defects.

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[15] Alabama Department of Agriculture. *Update on Premises Under Investigation for Avian Influenza in Alabama.* March 2017. http://agr.georgia.gov/update-on-premises-under-investigation-for-avian-influenza-in-alabama.aspx

[16] Ohio Department of Health. *Zika Virus*. May 2017. http://odh.ohio.gov/zika

[17] Centers for Disease Control and Prevention. *Areas with Risk of Zika*. 2017. http://cdc.gov/zika/geo

[18] Ohio Department of Health. *Zika Virus*. May 2017. http://odh.ohio.gov/zika

[19] Ohio Department of Health. *Zika Virus*. May 2017. http://odh.ohio.gov/zika