2.7 WILDFIRE

A wildfire is an uncontrolled fire that burns an area of combustible vegetation and typically occurs in rural areas. Each year in Ohio, an average of 1000 wildfires burn 4,000 to 6,000 acres of forest and grassland within ODNR Division of Forestry's Wildfire Protection Area (Map 2.7.a). The protection area includes all 200,000+ acres of Ohio's 21 State Forests, as well as all privately owned lands within the district boundaries. The forest fire protection district corresponds mostly to the state's unglaciated hill country (southern and eastern Ohio), and also encompasses a section of northwest Ohio (Maumee State Forest area). According to the Ohio Department of Natural Resources, Ohio's wildfire seasons occur primarily in the spring (March, April and May) before vegetation has "greened-up", and the fall (October and November) when leaf drop occurs. During these times and especially when weather conditions are warm, windy and with low humidity, cured vegetation is particularly susceptible to burning. Fuel (vegetation, woody debris), weather (wind, temperature, humidity) and topography (hills and valleys) when combined present an unpredictable danger to unwary civilians and firefighters in the path of a wildfire. Open burning is regulated by state laws and local burning ordinances, which may vary from one jurisdiction to another. Outside municipal limits, burning is prohibited from 6 am to 6 pm during the months of March, April, May, October and November. It is during these times of the year and day that wildfires are most likely to occur and are the most difficult to control.

While Ohio government agencies and local fire departments are accustomed to handling seasonal wildfires, occasional extreme events can make conditions dangerous and disruptive. Heavy fuel accumulations oftentimes make wildfire suppression extremely difficult due to more intense blazes. Occasionally, heavy fuel loadings and topography create problems in limiting access to fires, and lead to heavy equipment use for suppression. Prolonged drought may cause an exceptionally long or active wildfire season, as well as contribute to extreme wildfire behavior or burning conditions. Multiple concurrent fires can tax resources and quickly create a lack of manpower and other resources and retard the ability to suppress fires rapidly and safely.

The Wildland Urban Interface (WUI) conditions may create a serious issue of concern in Ohio. The WUI is defined as the situation where homes, residences, and structures are in close proximity to forested lands and grasslands prone to wildfire. This creates a situation where, in the event of a wildfire, personal and property safety are put in jeopardy. Additionally, WUI situations force fire departments to shift focus from fire suppression to structure protection, consequently increasing exposure time and risk. WUI situations are most effectively addressed prior to wildfire occurrence by individual homeowners. Mitigation strategies include reducing flammable vegetation and debris within 30 feet of the structure, choosing less flammable landscape species, using fire resistant building materials, and practicing safe open burning techniques. Currently in Ohio, there a numerous codes in place that regulate buildings and fire safety. The Ohio Fire Code 1301: 7-7 establishes regulations affecting or relating to structures, processes, premises and safeguards regarding:

1. The hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices.
2. Conditions hazardous to life, property or public welfare in the occupancy of structures or premises.
3. Fire hazards in the structure or on the premises from occupancy or operation.

4. Matters related to the construction, extension, repair, alteration or removal of fire protection systems.
5. Conditions affecting the safety of fire fighters and emergency responders during emergency operations.

Because nearly all wildfire occurrences in Ohio are human caused, wildfire prevention through community outreach, education, and local fire department cooperation are critical to decreasing wildfire occurrence and minimizing damage. When local fire departments take the lead on community safety, chances for success are greater because of the leadership and trust that local responders have with community members. The ODNR Division of Forestry supports local fire departments by providing educational materials, brochures, and wildfire prevention handouts for events. The Division of Forestry also supports local Fire Departments by providing wildfire suppression training, grant opportunities, and other capacity-building programs.

Open burning (burning of yard waste or debris) is regulated by state laws and local burning ordinances, which may vary from one jurisdiction to another. ORC addresses kindled fires regulations, and states that outside municipal limits, open burning is prohibited from 6 am to 6 pm during the months of March, April, May, October and November. It is during these times of the year and days that wildfires are most likely to occur and are the most difficult to control. Additionally, the Ohio EPA enforces OAC 3745.19, which regulates materials that may or may not be incinerated through open burning. Prohibited substances include petroleum based materials, food waste, and animal carcasses. To ensure compliance with all regulations, residents should contact their local fire official with jurisdiction for the applicable laws.

RISK ASSESSMENT

LOCATION

Wildfires in Ohio occur most frequently in the southern, southeastern, and eastern parts of the state. This area is predominantly unglaciated, hilly country, and varies in land cover type, including abundant forests and grasslands. The ODNR Division of Forestry is responsible for wildland fire protection on all state and private lands within this area. Additionally, ODNR Division of Forestry has wildfire protection responsibility in a disjoined area in northwest Ohio surrounding Maumee State Forest. Local and volunteer fire departments across these parts of Ohio typically provide initial response wildfire suppression service within their respective jurisdictions. Following response to a wildfire event, local fire departments within the ODNR Division of Forestry wildfire protection area are encouraged to file a wildfire report to ODNR Division of Forestry. Wildfire reports contain information such as date, time, location, size, etc. Filing wildfire reports to ODNR Division of Forestry is not mandatory, but is highly encouraged.

The ODNR Division of Forestry does not collect wildfire occurrence data from outside the ODNR Forestry protection area. Parts of Ohio that are outside of the protection area typically do not experience many wildfire events due to land use and land cover type (agricultural, developed urban/suburban); however certain parts of western Ohio have scattered Conservation Reserve Program (CRP) grasslands, which are a very volatile wildland fire fuel type. Since fire departments outside of the ODNR Forestry wildfire protection area do not file wildfire reports within the ODNR database, ODNR Division of Forestry does not have a dataset for wildfire occurrence in these areas. For the remaining parts of the state outside of the ODNR wildfire protection area, data obtained from the National Fire Incident Reporting System (NFIRS), established by the US Fire Administration, will be used for the purpose of research in this part of the plan. Per their website, NFIRS is a reporting standard that fire departments use to uniformly report on the full

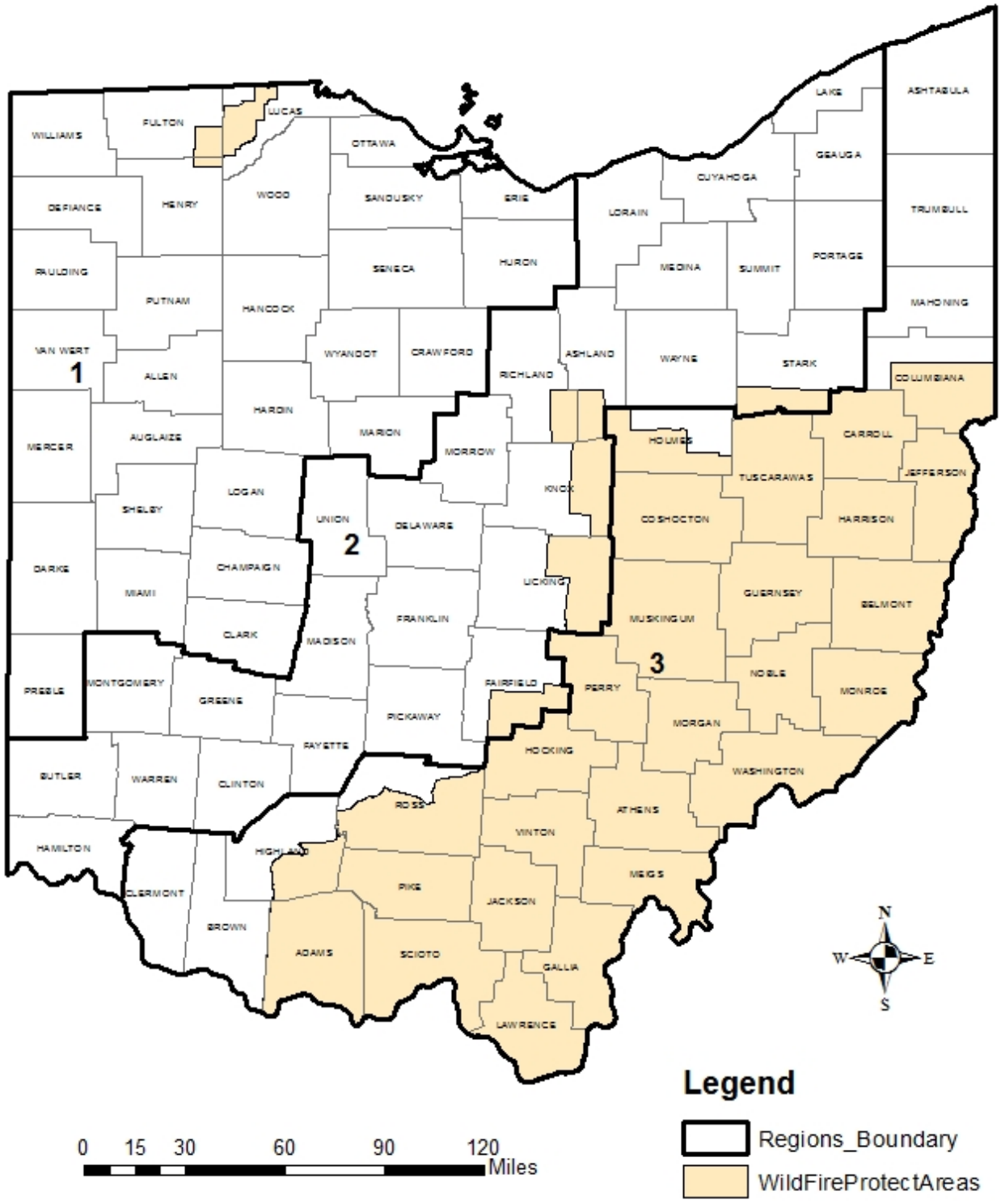
range of their activities. It is the largest national database of fire incident information and claims to comprise of about 75% of all reported fires that occur annually. For Ohio, the data is maintained and compiled by the Ohio Department of Commerce Division of State Fire Marshal and reports the compiled data to the US Fire Administration. For the historical and vulnerability analyses in this plan, counties that are entirely within the ODNR wildfire protection area will use ODNR data. Additionally, any historical data in this plan from 1/1/1997 to 11/20/2007 are fires reported from within the wildfire protection area. Counties that are partially covered or entirely outside of the area will be assessed using data from NFIRS (Map 2.7.a).

Region 1: ODNR Division of Forestry collects wildfire data from fire departments in parts of Lucas, Henry, and Fulton counties in Region 1, as these counties contain parts of Maumee State Forest. ODNR Division of Forestry does not collect wildfire report data in the remainder of Region 1 counties. Land cover type in Region 1 is predominantly agricultural land, and generally unforested; therefore, wildfire occurrence and risk are not as great as Region 3 where the topography provides abundant sources of natural combustible fuel.

Region 2: The majority of Region 2 lies outside of the ODNR Division of Forestry wildfire protection area – six counties straddle the wildfire protection area boundary. Ashland County contains Mohican State Forest, which is located completely within Region 2. Additional portions of Region 2 counties that report wildfires to ODNR Division of Forestry include southeastern Fairfield, western Licking, western Knox, and southern Stark. Region 2 contains Ohio's most developed metropolitan hubs, as well as areas of highest population density. Wildland fuel types (woodland, grasslands) are not as abundant. One notable location for potential large scale and damaging wildfire in Region 2 is the Mentor Marsh in Lake County, east of Cleveland. Mentor Marsh is a 691 acre nature preserve that has converted to nearly a monoculture of 8-12 foot high non-native Phragmites grass. This area is highly flammable, especially in spring with high winds coming off Lake Erie. Mentor Marsh has experienced 10 wildfire events since 1979, four of these being extremely noteworthy: May 1982 – 200 acres, May 1987 – 120 acres, May 1992 – 400 acres, April 2003 – 375 acres. All of these large-scale events were determined to be arson caused. Many homes, businesses, and high valued property are at risk from wildfire events in Mentor Marsh.

Region 3: Counties within Region 3 represent areas of highest wildfire risk and hazard in the State of Ohio. The vast majority of wildfires in Ohio occur in Region 3 due in part to abundant forested lands and grasslands. Population distribution and regional socio-cultural aspects contribute to higher wildfire occurrence, as well. Topography in Region 3 has more variety with numerous ridges and hollows, as opposed to flatter areas in western and central Ohio, which contributes to more complex wildfire behavior. ODNR Division of Forestry has identified 101 communities at risk (CAR) to wildfire in Ohio through GIS analysis, and all 101 CAR lie within Region 3 (Map 2.7.b). ODNR Division of Forestry collects wildfire data from fire departments in all counties of Region 3, with the exception of Brown and Clermont Counties which are completely outside their protection area.

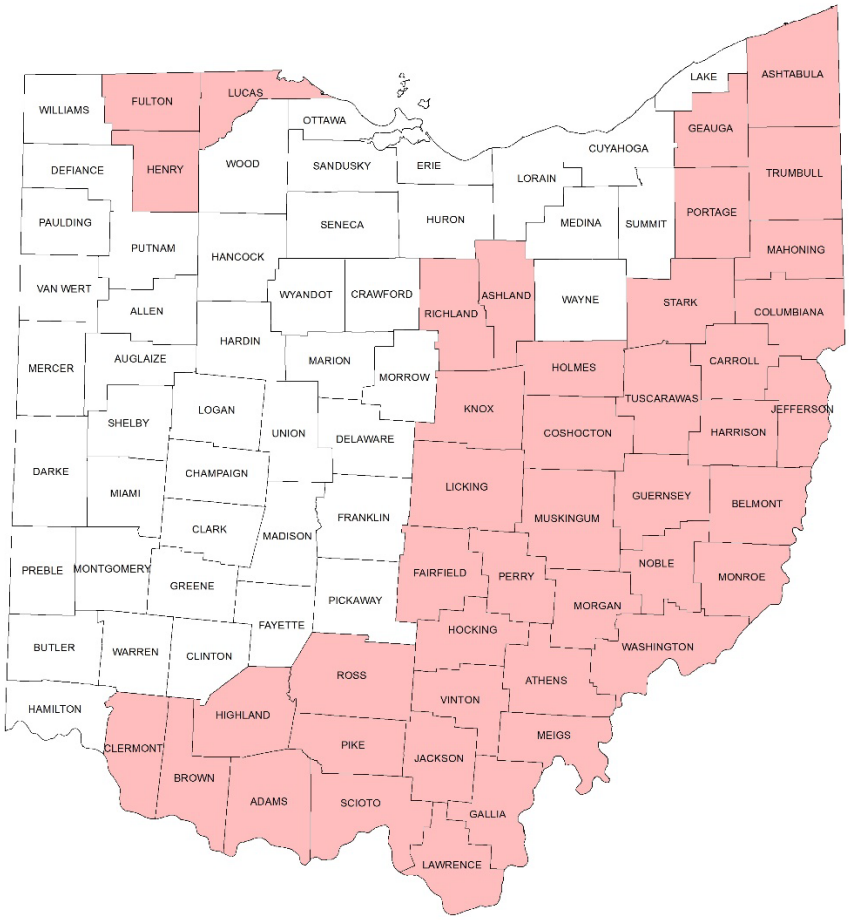
Map 2.7a
State of Ohio Wildfire Hazard Assessment
ODNR Division of Forestry Wildfire Protection Area Boundary



On February 6, 2019, The Ohio Department of Natural Resources Division of Forestry expanded the Wildfire Protection Area. According to Greg Guess, wildfire program coordinator and deputy chief for the ODNR Division of Forestry:

> "The expanded wildfire protection area contains approximately 580 fire departments, a significant increase from approximately 325 fire departments contained in the protection area prior to the expansion…The ODNR Division of Forestry is looking forward to partnering with more rural fire departments to increase wildfire protection efforts in their communities."

ODNR Division of Forestry's Expanded Forest Fire Protection Area

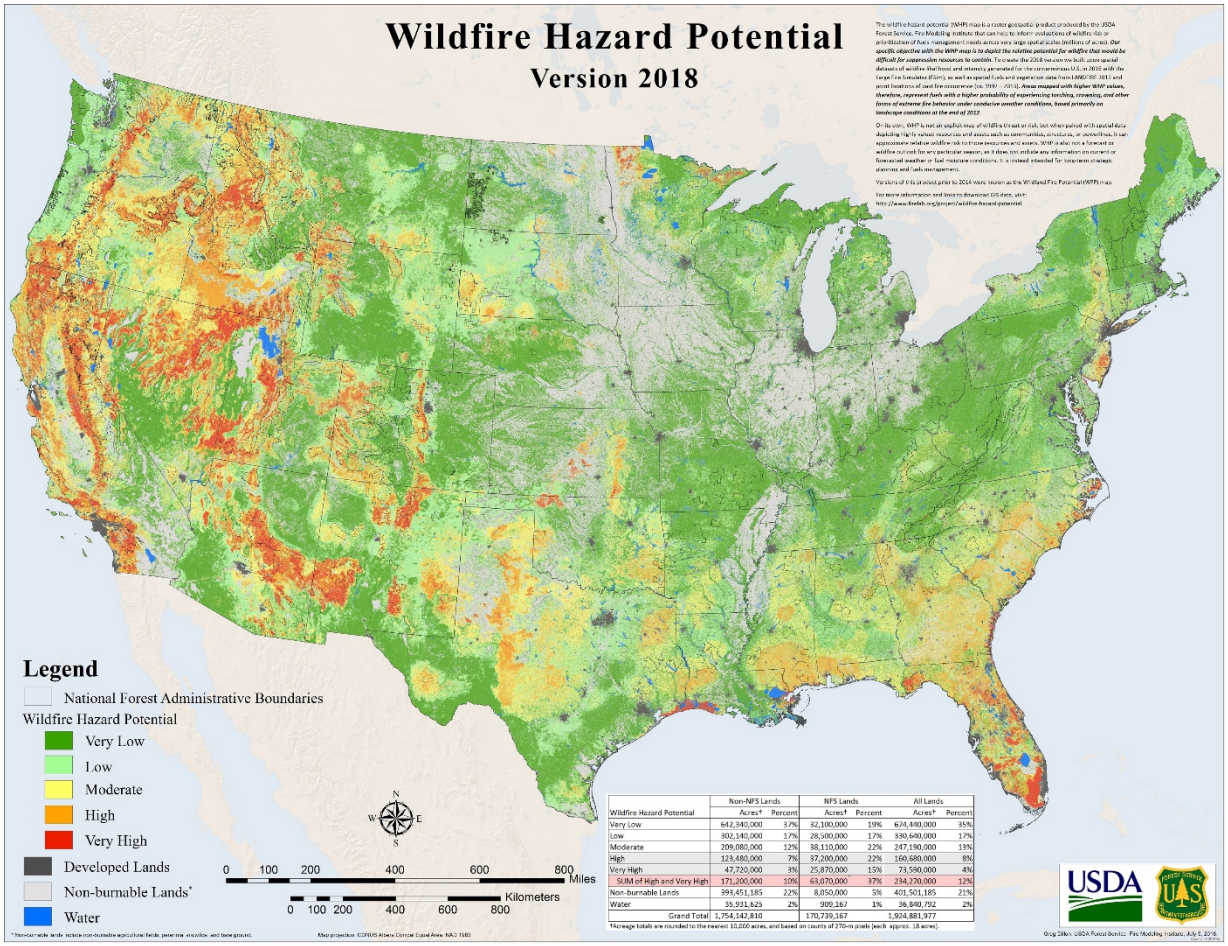


Due to the timing of the 2019 State of Ohio Hazard Mitigation Plan update and the expansion of the ODNR Wildfire Protection area, the newly expanded areas was not assessed based on incidents reported in the ODNR database. The expanded areas will continue to use the NFIRS database for historical assessment until the availability and timeframe of the expanded area's data becomes uniform with the rest of the state for future assessments.

WILDFIRE HAZARD POTENTIAL

Per the US Forest Service, the wildfire hazard potential (WHP) map is a raster geospatial product produced by the USDA Forest Service, Fire Modeling Institute that can help to inform evaluations of wildfire risk or prioritization of fuels management needs across very large landscapes (millions of acres). It was produced for all of the conterminous United States at a 270-meter resolution. Areas mapped with higher WHP values represent fuels with a higher probability of experiencing torching, crowning, and other forms of extreme fire behavior under conducive weather conditions, based primarily on landscape conditions at the end of 2012. On its own, WHP is not an explicit map of wildfire threat or risk, but when paired with spatial data depicting highly valued resources and assets such as communities, structures, or powerlines, it can approximate relative wildfire risk to those resources and assets. WHP is also not a forecast or wildfire outlook for any particular season, as it does not include any information on current or forecasted weather or fuel moisture conditions. It is instead intended for long-term strategic planning and fuels management.

Map 2.7.b
USDA Forest Service Wildfire Hazard Potential

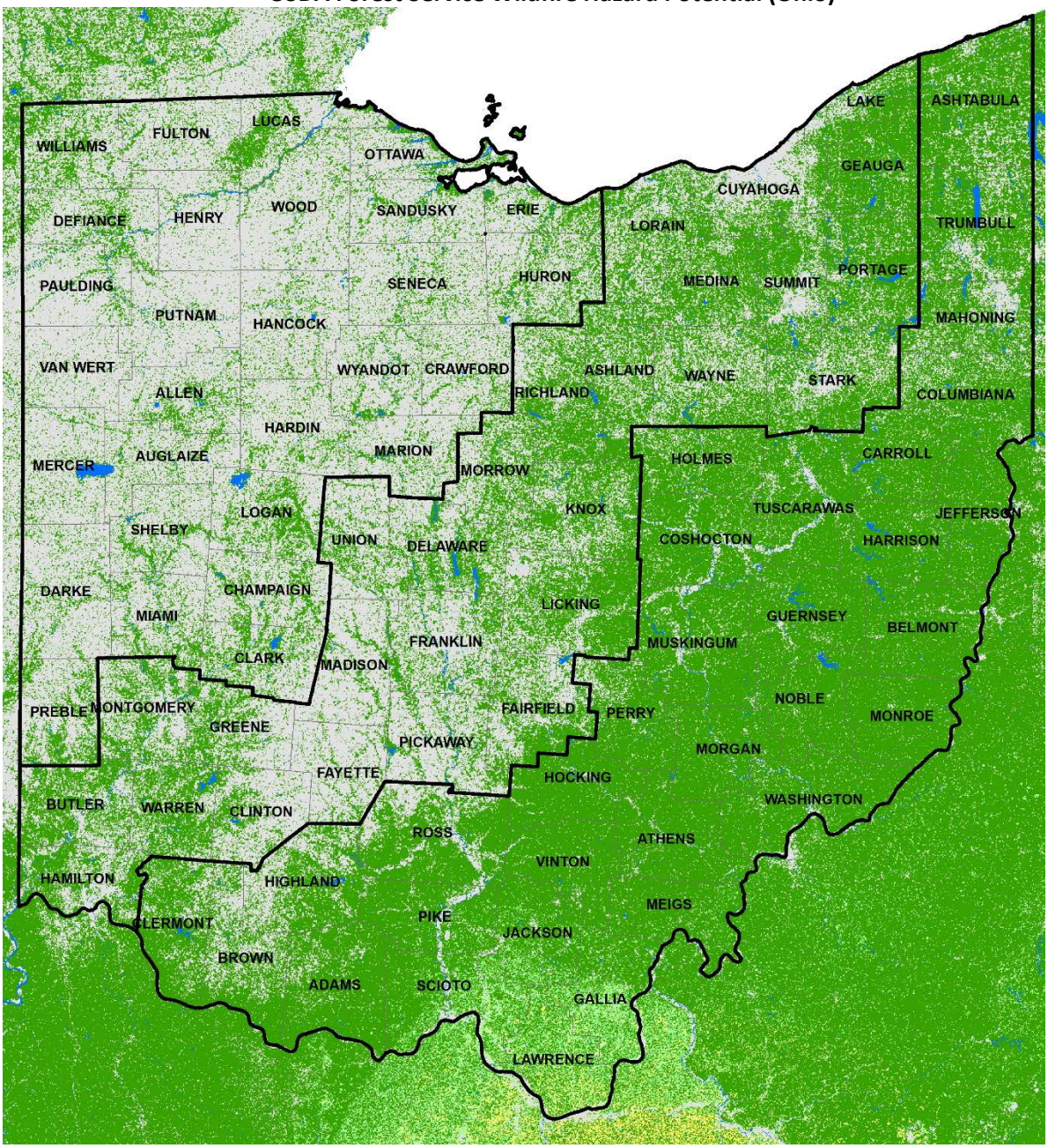


Wildfire Hazard Potential	Non-NFS Lands Acres*	Non-NFS Lands Percent	NFS Lands Acres*	NFS Lands Percent	All Lands Acres*	All Lands Percent
Very Low	642,340,000	37%	32,100,000	19%	674,440,000	35%
Low	302,140,000	17%	28,500,000	17%	330,640,000	17%
Moderate	209,080,000	12%	38,110,000	22%	247,190,000	13%
High	123,480,000	7%	37,200,000	22%	160,680,000	8%
Very High	47,720,000	3%	25,870,000	15%	73,590,000	4%
SUM of High and Very High	171,200,000	10%	63,070,000	37%	234,270,000	12%
Non-burnable Lands	399,451,185	22%	8,050,000	5%	401,501,185	21%
Water	35,931,625	2%	909,167	1%	36,840,792	2%
Grand Total	1,754,142,810		170,739,167		1,924,881,977	

*Acreage totals are rounded to the nearest 10,000 acres, and based on counts of 270-m pixels (each approx. 18 acres).

Source: https://www.firelab.org/project/wildfire-hazard-potential

Map 2.7.c
USDA Forest Service Wildfire Hazard Potential (Ohio)



Based on the WHP 2018 map, Ohio consists of areas of non-burnable to moderate wildfire potential. Most of the wildfire potential and risk exists in the south eastern portion of the state which is also where the ODNR Division of Forestry primarily designates as wildfire protection area. While the vast majority of the state does not have a high potential of wildfire, the potential exists statewide.

LHMP DATA

Scioto County

The Scioto County 2013 Hazard Mitigation Plan states that according to ODNR Division of Forestry Wildfires records, from January 1, 1993 to August 20, 2002, Scioto County experienced wildfires that destroyed 5,482 acres. The most frequent causes of these fires include: debris burning (63%), unknown (13%), and equipment fires (9%). No damages or injuries were reported. April 2010 saw the Largest State Wildfire in Ohio History at Shawnee Forest. Estimated response costs and damage exceeded $175,000.

Jackson County

According to the Jackson County 2017 Hazard Mitigation Plan, Fifty-one percent of Jackson County is forested and another 10% is scrub and brush land. Jackson and Liberty Townships are 74% to 79% forested. These fires generally burn less than five acres but may threaten individual homes and outbuildings. However, they do not pose a significant threat to densely populated areas. Jackson County experiences several wildfires per year, but most are relatively small.

Harrison County

The Harrison County 2015 Hazard Mitigation Plan states that the demographic effect can be high depending on the location of the fire. Many villages within Harrison County border large forested areas and are susceptible to wildland-urban interfaces fires. In addition, the large number of tourist attractions to include parks, national forests, and campgrounds, depending on the time of the year, can increase the demographic effect as temporary population densities increase well within the forest boundaries. The fiscal effects can be large due to the disruption of infrastructure (i.e., roads, rails, and bridges) or loss of commercial and industrial facilities. As the oil and gas industry grows within Harrison County (see section 2.2.11 for more detail), a loss to large processing facilities or transmission lines can result in the loss of billions of barrels of oil and/or millions of cubic feet of natural gas. Wildfire can also effect the timber and forest product industries.

PAST OCCURRENCES

Weather is the primary factor that determines the severity of fall and spring wildfire seasons in Ohio. Drought condition, combined with windy days create red flag, or extreme high fire danger. Consequently, the past fire occurrence record can be closely linked to historical weather data. Weather conditions leading up to and in 1930 resulted in the worst year to date for wildfires in Ohio, as 15,400 acres were recorded as burning over the course of the year.

Extreme drought in 1950 that continued for the next several years provided for very active wildfire seasons as well. March 27, 1950 is considered the worst day in Ohio fire control history – 65 fires burned a total of 5,900 acres. In 1952, continued summer drought spurred a record fall fire season in Ohio and neighboring states. ODNR Division of Parks and Division of Wildlife employees assisted in suppression efforts, and the Ohio National Guard also provided assistance. A total of 680 wildfires burned 22,445 acres in the fall of 1952.

Drought conditions in 1963 required placing on alert the ODNR Division of Forestry's pilots, 2000 fire wardens, 150 ODNR Division of Forestry employees, as well as several thousand volunteer firefighters and

the Ohio National Guard. One or more fires were reported every day from September 17 through November 29, and October showed a record number of fires for that month.

1988 was another severe wildfire year, as drought conditions required that Civilian Conservation Corps crews be mobilized, as well as all other trained Division employees. More recently, 1999 proved to be a busy year for wildfire in Ohio, as an above average 7,836 acres were burned by nearly 1,500 wildfires.

Between 1/1/1997 and 11/20/2007, Ohio has experienced 8,235 wildfires that have burned 42,622 acres within the ODNR Division of Forestry Wildfire Protection Area. Wildfires that have occurred on federal lands in Ohio are not included in these data. It can be safely assumed that less than 100% of all wildfires on state and public land are reported; consequently, actual total occurrence and acres burned are suspected to be higher than data indicate. Data for areas outside of the protection area was not obtained in the 2014 State of Ohio Hazard Mitigation Plan.

For the 2019 State of Ohio Hazard Mitigation Plan, the assessed area was expanded from just the ODNR Division of Forestry Wildfire Protection Area to the entire state. In order to obtain historical data for each county, two different datasets were looked at: the ODNR Division of Forestry database, and NFIRS. Counties that are entirely within the ODNR wildfire protection area will use ODNR data. Counties that are partially covered or entirely outside of the area will be assessed using data from NFIRS. Between 1/1/1997 and 11/20/2007, there were 7,963 wildfire events statewide that burned approximately 60,620 acres. 6,609, or 83%, of the 7,963 reported events were classified as 9.99 acres and under. 493 events were from 10 to 99.99 acres, and 19 events were reported as 100 acres or more. Events that reported less than one acre burned were not assessed.

Region 1 had the second highest number of reported events and acres burned. 2,369 events were reported in this timeframe that burned 19,205 acres. Region 2 had the lowest numbers of the three regions at 1,814 events and 9,946 acres burned. Region 3 had the highest number of reported events at 3,780 as well as the highest number of acres burned at 31,469.

Table 2.7.a

Past Occurences of Wildfire Events (1/1/07 to 12/31/2017)										
Region 1										
County	Total Fire Events	Total Acres Burned	Average Acres/Event	Est. Events per Year	1 to 9.99 Acres		10 to 99.99 Acres		100+ Acres	
					# of Events	% of Total	# of Events	% of Total	# of Events	% of Total
Allen	84	477	5.68	8	74	88.10%	9	10.71%	1	1.19%
Auglaize	52	588	11.31	5	38	73.08%	13	25.00%	1	1.92%
Champaign	57	405	7.11	5	43	75.44%	14	24.56%	0	0.00%
Clark	72	524	7.28	7	57	79.17%	14	19.44%	1	1.39%
Crawford	34	219	6.44	3	25	73.53%	9	26.47%	0	0.00%
Darke	148	868	5.86	13	121	81.76%	26	17.57%	1	0.68%
Defiance	92	800	8.70	8	69	75.00%	22	23.91%	1	1.09%
Erie	49	375	7.65	4	37	75.51%	12	24.49%	0	0.00%
Fulton	111	763	6.87	10	90	81.08%	21	18.92%	0	0.00%
Hancock	74	439	5.93	7	59	79.73%	15	20.27%	0	0.00%
Hardin	115	789	6.86	10	93	80.87%	22	19.13%	0	0.00%
Henry	124	1136	9.16	11	88	70.97%	35	28.23%	1	0.81%
Huron	78	707	9.06	7	59	75.64%	18	23.08%	1	1.28%
Logan	117	683	5.84	11	103	88.03%	13	11.11%	1	0.85%
Lucas	73	426	5.84	7	62	84.93%	10	13.70%	1	1.37%
Marion	59	473	8.02	5	46	77.97%	13	22.03%	0	0.00%
Mercer	110	665	6.05	10	86	78.18%	24	21.82%	0	0.00%
Miami	69	407	5.90	6	56	81.16%	13	18.84%	0	0.00%
Ottawa	53	402	7.58	5	40	75.47%	13	24.53%	0	0.00%
Paulding	49	569	11.61	4	32	65.31%	16	32.65%	1	2.04%
Preble	69	839	12.16	6	54	78.26%	12	17.39%	3	4.35%
Putnam	120	1793	14.94	11	97	80.83%	22	18.33%	1	0.83%
Sandusky	63	624	9.90	6	41	65.08%	22	34.92%	0	0.00%
Seneca	68	629	9.25	6	52	76.47%	15	22.06%	1	1.47%
Shelby	94	770	8.19	9	75	79.79%	18	19.15%	1	1.06%
Van Wert	84	800	9.52	8	66	78.57%	16	19.05%	2	2.38%
Williams	100	620	6.20	9	81	81.00%	19	19.00%	0	0.00%
Wood	117	1152	9.85	11	87	74.36%	29	24.79%	1	0.85%
Wyandot	34	263	7.74	3	26	76.47%	8	23.53%	0	0.00%
TOTAL	2,369	19205	8.11	215	1857	78.39%	493	20.81%	19	0.80%

Table 2.7.a (Continued)

Past Occurences of Wildfire Events (1/1/07 to 12/31/2017)										
Region 2										
County	Total Fire Events	Total Acres Burned	Average Acres/Event	Est. Events per Year	1 to 9.99 Acres		10 to 99.99 Acres		100+ Acres	
					# of Events	% of Total	# of Events	% of Total	# of Events	% of Total
Ashland	50	346	6.92	5	44	88.00%	5	10.00%	1	2.00%
Butler	70	295	4.21	6	64	91.43%	6	8.57%	0	0.00%
Clinton	134	897	6.69	12	113	84.33%	20	14.93%	1	0.75%
Cuyahoga	27	102	3.78	2	25	92.59%	2	7.41%	0	0.00%
Delaware	55	227	4.13	5	50	90.91%	5	9.09%	0	0.00%
Fairfield	103	423	4.11	9	93	90.29%	10	9.71%	0	0.00%
Fayette	44	343	7.80	4	36	81.82%	8	18.18%	0	0.00%
Franklin	46	183	3.98	4	41	89.13%	5	10.87%	0	0.00%
Geauga	32	102	3.19	3	30	93.75%	2	6.25%	0	0.00%
Greene	60	221	3.68	5	55	91.67%	5	8.33%	0	0.00%
Hamilton	87	118	1.36	8	87	100.00%	0	0.00%	0	0.00%
Knox	78	370	4.74	7	68	87.18%	10	12.82%	0	0.00%
Lake	17	43	2.53	2	16	94.12%	1	5.88%	0	0.00%
Licking	139	961	6.91	13	117	84.17%	20	14.39%	2	1.44%
Lorain	37	217	5.86	3	36	97.30%	0	0.00%	1	2.70%
Madison	54	554	10.26	5	40	74.07%	13	24.07%	1	1.85%
Medina	39	381	9.77	4	35	89.74%	3	7.69%	1	2.56%
Montgomery	51	199	3.90	5	48	94.12%	3	5.88%	0	0.00%
Morrow	55	258	4.69	5	50	90.91%	5	9.09%	0	0.00%
Pickaway	57	881	15.46	5	38	66.67%	17	29.82%	2	3.51%
Portage	113	389	3.44	10	105	92.92%	8	7.08%	0	0.00%
Richland	97	211	2.18	9	79	81.44%	18	18.56%	0	0.00%
Stark	116	618	5.33	11	99	85.34%	17	14.66%	0	0.00%
Summit	30	218	7.27	3	24	80.00%	6	20.00%	0	0.00%
Union	81	565	6.98	7	62	76.54%	19	23.46%	0	0.00%
Warren	53	590	11.13	5	48	90.57%	3	5.66%	2	3.77%
Wayne	89	234	2.63	8	85	95.51%	4	4.49%	0	0.00%
TOTAL	1,814	9946	5.48	165	1588	87.54%	215	11.85%	11	0.61%

Because Region 3 primarily lies within the ODNR Division of Forestry Wildfire Protection area, the ODNR data was used to for historical and vulnerability analysis for most counties listed in Table 2.7.b. Counties noted with an asterisk (*) will use NFIRS data as they are either partly or completely outside of the protection area.

Table 2.7.b

Past Occurences of Wildfire Events (1/1/07 to 12/31/2017)										
Region 3										
County	Total Fire Events	Total Acres Burned	Average Acres/Event	Est. Events per Year	1 to 9.99 Acres		10 to 99.99 Acres		100+ Acres	
					# of Events	% of Total	# of Events	% of Total	# of Events	% of Total
Adams	125	890	7.12	11	100	80.00%	25	20.00%	0	0.00%
Ashtabula*	137	843	6.15	12	123	89.78%	12	8.76%	2	1.46%
Athens	84	426	5.07	8	78	92.86%	5	5.95%	1	1.19%
Belmont	66	514	7.79	6	55	83.33%	11	16.67%	0	0.00%
Brown*	82	572	6.98	7	62	75.61%	19	23.17%	1	1.22%
Carroll	111	1456	13.12	10	85	76.58%	23	20.72%	3	2.70%
Clermont*	81	373	4.60	7	71	87.65%	10	12.35%	0	0.00%
Columbiana*	80	258	3.23	7	76	95.00%	4	5.00%	0	0.00%
Coshocton	91	1004	11.03	8	70	76.92%	19	20.88%	2	2.20%
Gallia	190	1911	10.06	17	146	76.84%	40	21.05%	4	2.11%
Guernsey	102	638	6.25	9	92	90.20%	7	6.86%	3	2.94%
Harrison	50	459	9.18	5	38	76.00%	10	20.00%	2	4.00%
Highland*	182	1137	6.25	17	155	85.16%	26	14.29%	1	0.55%
Hocking	99	980	9.90	9	85	85.86%	12	12.12%	2	2.02%
Holmes*	53	178	3.36	5	48	90.57%	5	9.43%	0	0.00%
Jackson	161	949	5.89	15	147	91.30%	11	6.83%	3	1.86%
Jefferson	70	556	7.94	6	56	80.00%	13	18.57%	1	1.43%
Lawrence	456	4430	9.71	41	339	74.34%	112	24.56%	5	1.10%
Mahoning*	56	162	2.89	5	53	94.64%	3	5.36%	0	0.00%
Meigs	132	427	3.23	12	121	91.67%	11	8.33%	0	0.00%
Monroe	62	468	7.55	6	57	91.94%	4	6.45%	1	1.61%
Morgan	51	298	5.84	5	46	90.20%	5	9.80%	0	0.00%
Muskingum	145	787	5.43	13	127	87.59%	17	11.72%	1	0.69%
Noble	57	481	8.44	5	45	78.95%	11	19.30%	1	1.75%
Perry	113	710	6.28	10	103	91.15%	9	7.96%	1	0.88%
Pike	227	1309	5.77	21	193	85.02%	33	14.54%	1	0.44%
Ross*	108	855	7.92	10	86	79.63%	21	19.44%	1	0.93%
Scioto	225	6300	28.00	20	173	76.89%	44	19.56%	8	3.56%
Trumbull*	146	616	4.22	13	133	91.10%	13	8.90%	0	0.00%
Tuscarawas	87	392	4.51	8	72	82.76%	15	17.24%	0	0.00%
Vinton	94	674	7.17	9	80	85.11%	13	13.83%	1	1.06%
Washington	57	416	7.30	5	49	85.96%	7	12.28%	1	1.75%
TOTAL	3,780	31469	8.33	2861	3164	83.70%	570	15.08%	46	1.22%

PROABILITY OF FUTURE EVENTS

Based on historical events, there is a 100% probability that a wildfire will occur within any county in any given year. To further see this estimation by county, see the "Est. Events per Year" column in Table 2.7.a/b. For the historical probability of these events, see the "% of Total" columns. However, the severity of these events will depend on many factors. According to research and the historical record, wildfires have occurred every spring and fall in the hardwood forests and grasslands of southern, southeastern, and eastern Ohio for hundreds of years, and will continue to do so. The number of occurrences, size of wildfires, and severity of burn fluctuate annually in response to a variety of factors including:

- Weather – daily, monthly, seasonal, annual, and long-term trends in:
    - Precipitation
    - Relative Humidity
    - Temperature
    - Wind
- Fuels – condition of 1, 10, 100, 1000 hour fuels in terms of:
    - Moisture content
    - Arrangement
    - Accumulation level
    - Availability
    - See Map 2.7.b for The Wildfire Hazard Potential in Ohio, developed by the USDA Forest Service. It is a represention of fuels with a higher probability of experiencing extreme fire behavior under conducive weather conditions, based primarily on landscape.
- Ignitions – presence or absence of wildfire starts:
    - Human caused
        - Debris burning – compliance with ORC 1503.18, and safe debris burning techniques
        - Incendiary – arsonists at large
        - Wildfire prevention and awareness efforts
- Suppression Response – Capability and timeliness of initial attack:
    - Quickness of response to the incident
    - Local / Volunteer fire department capability
    - Availability of state and local resources
        - Number of concurrent wildfires

VULNERABILITY ANALYSIS & LOSS ESTIMATION

METHDOLOGY

In order to accurately and quantitatively determine statewide wildfire risk, ODNR Division of Forestry combined several available datasets, using GIS tools and extensions, to complete a wildfire hazard assessment. Datasets integrated in the wildfire assessment include historic wildfire occurrence and acres burned data (compiled from wildfire reports submitted to ODNR Division of Forestry from Ohio fire departments), USGS Landfire 13 Anderson Fire Behavior Fuel Models land cover dataset, and Wildland Urban Interface / Intermix (WUI) data derived from the University of Wisconsin SILVIS lab. These three datasets were chosen to represent a risk (wildfire occurrence and acres burned), hazard (land cover/fuel type), and value (population/homes through WUI). The township level was chosen to assign wildfire risk

because rural fire departments in Ohio are typically organized at the township level. Evaluating wildfire hazard at the township level paints a better picture of the existing wildfire hazard at a level of organization that can affect change through operational function. It is also useful in scoring grant applications and assistance requests from the local fire departments that are responsible for particular high-risk jurisdictions.

Each of these respective datasets was converted to a raster format, and categorical values were reclassified accordingly. A weighted calculation was then performed using the ArcGIS raster calculator function, whereby a total wildfire hazard value was computed from the reclassified values as such:

(("acres_burned" + "fire_occurrence") / 2) + ("fuel_type" * 0.5) + ("wui_value" * 0.5)

The calculation resulted in a new raster. The calculated wildfire hazard value was broken into four categories and labeled low (0 to 1.185), moderate (1.186 to 2.37), high (2.38 to 3.16), and very high (3.17 and above). Areas that are blank are urban and incorporated areas that were not evaluated. Factors pertinent to overall wildfire hazard level not incorporated into the calculation include fire department capability, water availability, defensible space and accessibility of structures, and error associated with FDs who do not submit wildfire reports. The ODNR Division of Forestry wildfire hazard assessment was most recently updated in October 2012.

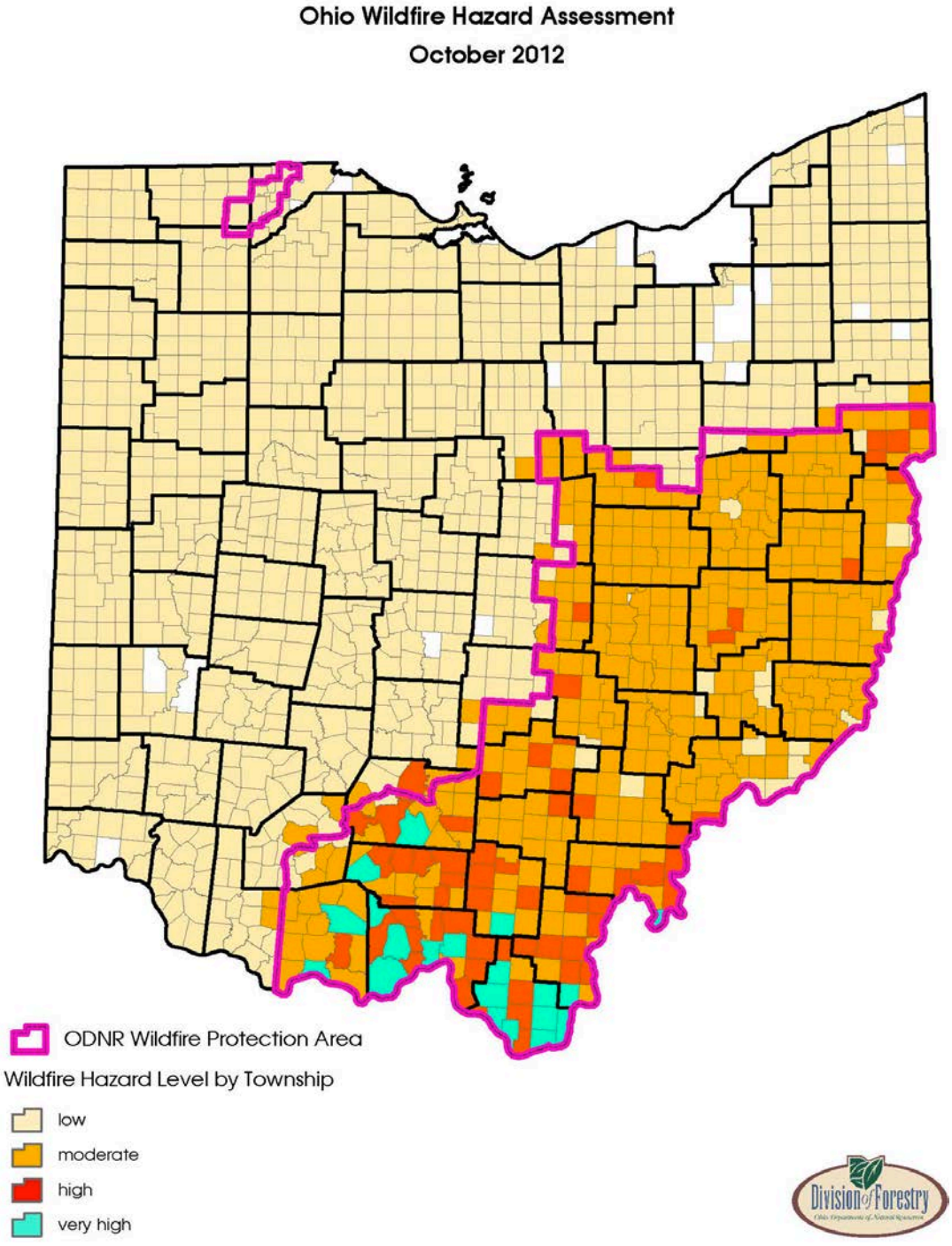
RESULTS

The product of this project, the Ohio wildfire hazard assessment map, accurately indicates wildfire hazard level for all townships in Ohio (see map 2.7.d). Communities at risk to wildfire in Ohio are those townships that were attributed with a calculated wildfire hazard value equal to High or Very High.

Region 1 and Region 2 are assessed as having generally low wildfire hazard, with several pockets of moderate risk of wildfire. Region 3 is assessed as having generally moderate risk of wildfire, with a sizeable section of southern Ohio having high or very high wildfire risk (Gallia, Lawrence, Scioto, Adams, Pike, and southern Ross Counties). Southeastern and eastern Ohio were assessed as having an additional 29 communities rated as having high wildfire hazard. Particular high-risk groups in southeastern and eastern Ohio occur in southern Athens and Meigs Counties, as well as in Belmont and southern Jefferson Counties.

High valued personal property, including homes, machinery, agricultural crops, and tree plantations in areas of high or very high wildfire hazard are more vulnerable to damage by wildfire. Fire engines belonging to local fire departments are occasionally damaged while suppressing wildfires. A great amount of personal property has been saved by fire departments through effective and safe wildfire suppression

Map 2.7.d



HISTORICAL ANALYSIS

Estimating monetary losses to wildfire is difficult as the vast majority of wildfires in Ohio occur on open land or fields and monetary losses are not often recorded. This lack of data may result in inconsistencies if an analysis was done based on reported monetary loss. However, from an exposure assumption, the greater the number of people and property in an area— and the greater variables for wildfire severity

(weather, fuel, ignition, suppression response) of that area, the greater the potential of loss. Nevertheless, for the purpose of this plan, a broader (but more consistent) unit needs to be used to determine potential losses. The data that is more consistently available are the number of acres burned per event. For this estimate, the total number of acres burned from January 1st, 2007 to December 31st, 2017 for each county was divided by the respective number of events recorded. This results in the average number of acres burned per event. The results of this method can be seen in the "Acres/Event" column in Tables 2.7.a/b.

STATE-OWNED AND STATE-LEASED CRITICAL FACILITIES VULNERABILITY ANALYSIS & LOSS ESTIMATION

Using the wildfire hazard level classifications shown in Map 2.7.d, state-owned and state-leased facilities were analyzed in a GIS environment. Because of the limited attributes associated with the facility data, the assumptions used in this assessment had to be broad. Therefore, the figures projected are based on an exposure assessment. The entire property value is considered exposed based on the wildfire hazard level of the township it resides.

With the exception of Union Township in Ross County, the high and very high risk areas only fall within Region 3, which is the most undeveloped and heavily forested Region in the state. In terms of facilities in areas classified as "Very high" in ODNR's Wildfire Hazard Assessment, Scioto County had the most assets with 70 facilities valued at $20,764,332 followed by Lawrence County with 31 facilities valued at $10,611,231. In terms of facilities in areas classified as "High", Ross County had the most assets with 106 facilities valued at $236,423,088 followed by Scioto County with 40 facilities valued at $164,486,741. Overall statewide, there were 6,788 critical facilities assessed amongst the 4 classification levels. The results for the statewide overview are listed in Table 2.7.c. The county-specific results are listed in Table 2.7.d.

Table 2.7.c

State-owned and State-leased Critical Facility Wildfire Hazard Level Exposure								
State-wide								
Total # of Critical Facilities	ODNR Forestry Wildfire Hazard Level							
	Low		Moderate		High		Very High	
	# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF
6,788	4,360	$4,804,067,874	1,794	$743,306,445	465	$466,487,445	169	$37,391,207

Table 2.7.d

State-owned and State-leased Critical Facility Wildfire Hazard Level Exposure									
Region 1									
County	Total # of Critical Facilities	ODNR Forestry Wildfire Hazard Level							
		Low		Moderate		High		Very High	
		# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF
Allen	138	138	$123,081,953	0	$0	0	$0	0	$0
Auglaize	91	91	$20,888,999	0	$0	0	$0	0	$0
Champaign	58	58	$7,504,757	0	$0	0	$0	0	$0
Clark	81	81	$26,284,967	0	$0	0	$0	0	$0
Crawford	14	14	$10,388,299	0	$0	0	$0	0	$0
Darke	32	32	$8,687,352	0	$0	0	$0	0	$0
Defiance	20	20	$7,784,383	0	$0	0	$0	0	$0
Erie	93	93	$175,392,052	0	$0	0	$0	0	$0
Fulton	50	50	$4,930,612	0	$0	0	$0	0	$0
Hancock	53	53	$20,704,014	0	$0	0	$0	0	$0
Hardin	19	19	$4,343,406	0	$0	0	$0	0	$0
Henry	40	40	$5,810,222	0	$0	0	$0	0	$0
Huron	27	27	$10,829,844	0	$0	0	$0	0	$0
Logan	84	84	$12,154,380	0	$0	0	$0	0	$0
Lucas	116	116	$333,521,206	0	$0	0	$0	0	$0
Marion	116	116	$142,272,619	0	$0	0	$0	0	$0
Mercer	29	29	$8,037,491	0	$0	0	$0	0	$0
Miami	44	44	$13,864,357	0	$0	0	$0	0	$0
Ottawa	190	190	$99,375,613	0	$0	0	$0	0	$0
Paulding	4	4	$1,426,138	0	$0	0	$0	0	$0
Preble	113	113	$26,454,883	0	$0	0	$0	0	$0
Putnam	19	19	$5,634,425	0	$0	0	$0	0	$0
Sandusky	23	23	$6,999,502	0	$0	0	$0	0	$0
Seneca	59	59	$35,886,799	0	$0	0	$0	0	$0
Shelby	60	60	$29,660,305	0	$0	0	$0	0	$0
Van Wert	23	23	$8,258,684	0	$0	0	$0	0	$0
Williams	21	21	$8,502,979	0	$0	0	$0	0	$0
Wood	59	59	$70,021,518	0	$0	0	$0	0	$0
Wyandot	45	45	$13,019,332	0	$0	0	$0	0	$0
TOTAL	1,721	1,721	$1,241,721,091	0	$0	0	$0	0	$0

Table 2.7.d (Continued)

State-owned and State-leased Critical Facility Wildfire Hazard Level Exposure									
Region 2									
County	Total # of Critical Facilities	ODNR Forestry Wildfire Hazard Level							
		Low		Moderate		High		Very High	
		# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF
Ashland	146	32	$19,300,471	114	$45,368,964	0	$0	0	$0
Butler	37	37	$19,264,969	0	$0	0	$0	0	$0
Clinton	71	71	$16,633,214	0	$0	0	$0	0	$0
Cuyahoga	1	1	$10,279	0	$0	0	$0	0	$0
Delaware	109	109	$68,818,336	0	$0	0	$0	0	$0
Fairfield	92	27	$9,692,388	65	$77,983,487	0	$0	0	$0
Fayette	45	45	$7,508,833	0	$0	0	$0	0	$0
Franklin	317	317	$1,511,425,668	0	$0	0	$0	0	$0
Geauga	75	75	$19,778,026	0	$0	0	$0	0	$0
Greene	46	46	$24,773,257	0	$0	0	$0	0	$0
Hamilton	25	25	$23,774,728	0	$0	0	$0	0	$0
Knox	37	36	$39,860,400	1	$742,572	0	$0	0	$0
Lake	23	23	$7,129,471	0	$0	0	$0	0	$0
Licking	98	57	$138,739,051	40	$40,509,655	1	$27,500	0	$0
Lorain	116	116	$111,907,809	0	$0	0	$0	0	$0
Madison	137	137	$325,701,163	0	$0	0	$0	0	$0
Medina	36	36	$19,934,012	0	$0	0	$0	0	$0
Montgomery	40	40	$49,596,601	0	$0	0	$0	0	$0
Morrow	37	37	$7,438,291	0	$0	0	$0	0	$0
Pickaway	211	211	$233,138,844	0	$0	0	$0	0	$0
Portage	102	102	$22,963,033	0	$0	0	$0	0	$0
Richland	124	80	$110,097,403	44	$12,671,717	0	$0	0	$0
Stark	51	50	$106,330,251	1	$685,702	0	$0	0	$0
Summit	77	77	$128,011,211	0	$0	0	$0	0	$0
Union	60	60	$89,278,962	0	$0	0	$0	0	$0
Warren	182	182	$159,065,607	0	$0	0	$0	0	$0
Wayne	17	17	$8,689,815	0	$0	0	$0	0	$0
TOTAL	2,312	2,046	$3,278,862,093	265	$177,962,097	1	$27,500	0	$0

Table 2.7.d (Continued)

State-owned and State-leased Critical Facility Wildfire Hazard Level Exposure									
Region 3									
County	Total # of Critical Facilities	ODNR Forestry Wildfire Hazard Level							
		Low		Moderate		High		Very High	
		# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF	# of CF	Value of CF
Adams	86	0	$0	50	$6,010,266	0	$0	36	$1,702,071
Ashtabula	198	198	$36,092,722	0	$0	0	$0	0	$0
Athens	76	5	$12,116,110	68	$38,460,045	3	$171,250	0	$0
Belmont	91	1	$22,108	90	$57,247,319	0	$0	0	$0
Brown	33	33	$39,124,798	0	$0	0	$0	0	$0
Carroll	20	0	$0	20	$4,821,847	0	$0	0	$0
Clermont	93	93	$27,079,516	0	$0	0	$0	0	$0
Columbiana	63	3	$1,150,998	45	$17,050,308	15	$1,497,943	0	$0
Coshocton	30	0	$0	30	$13,976,528	0	$0	0	$0
Gallia	85	0	$0	58	$28,282,329	27	$9,234,127	0	$0
Guernsey	181	0	$0	174	$86,597,167	7	$1,842,423	0	$0
Harrison	46	0	$0	46	$11,102,993	0	$0	0	$0
Highland	62	17	$3,271,961	43	$12,051,563	1	$6,600	1	$12,500
Hocking	168	1	$950,041	132	$14,854,928	35	$5,120,754	0	$0
Holmes	29	2	$837,134	14	$1,421,316	13	$8,221,793	0	$0
Jackson	46	0	$0	22	$13,801,180	10	$3,971,460	14	$1,664,476
Jefferson	59	10	$4,729,060	43	$5,675,815	6	$924,352	0	$0
Lawrence	32	0	$0	0	$0	1	$1,458,701	31	$10,611,231
Mahoning	77	77	$73,513,718	0	$0	0	$0	0	$0
Meigs	47	0	$0	10	$2,793,291	37	$7,297,553	0	$0
Monroe	31	5	$5,197,450	26	$6,290,191	0	$0	0	$0
Morgan	100	0	$0	96	$20,866,300	4	$22,875	0	$0
Muskingum	111	0	$0	111	$19,251,307	0	$0	0	$0
Noble	41	0	$0	41	$50,894,080	0	$0	0	$0
Perry	20	0	$0	20	$4,019,441	0	$0	0	$0
Pike	82	1	$61,687	13	$4,818,853	51	$5,844,928	17	$2,636,597
Ross	270	1	$78,375	163	$41,454,569	106	$236,423,088	0	$0
Scioto	127	0	$0	17	$8,147,074	40	$164,486,741	70	$20,764,332
Trumbull	116	116	$59,339,913	0	$0	0	$0	0	$0
Tuscarawas	106	0	$0	106	$65,210,242	0	$0	0	$0
Vinton	145	0	$0	46	$8,337,672	99	$19,255,113	0	$0
Washington	84	30	$19,919,099	45	$21,907,724	9	$680,244	0	$0
TOTAL	2,755	593	$283,484,690	1,529	$565,344,348	464	$466,459,945	169	$37,391,207