INTRODUCTION

Analyzing the hazards facing a community is an important and vital step in the mitigation planning process. Before mitigation strategies can be determined, a risk assessment must be made. Part III of the Mole Lake All Hazards Mitigation Plan will focus on the following:

- Identification of all types of natural hazards that can affect Mole Lake
- An analysis of each hazard identified as pertinent to Mole Lake

The hazard analysis will consist of:

- Background information
- History of previous occurrences of hazard events
- An analysis of the Mole Lake's vulnerability to future events
- An estimate of future probability and potential losses from the hazard

HAZARD IDENTIFICATION

The process of identifying those hazards that should be specifically addressed in the Mole Lake All Hazards Mitigation Plan was based on consideration of a number of factors. The process included a review of past hazard events to determine the probability of future occurrences and the threat to human safety and property damage.

Worksheets from the Wisconsin Guide to All-Hazard Mitigation Planning were used by the Planning Taskforce to evaluate and rank a list of possible hazards to help identify which hazards should be included in the Plan based on threat to human safety and possible damage to property.

The resulting priority ranking of hazards accepted by the Mitigation Planning Committee is as follows:

1. Winter Storm / Extreme Cold
2. Thunderstorm /High Wind /Lightning /Hail
3. Tornado
4. Forest Fire / Wild Fire
5. Drought / Extreme Heat
6. Flooding
7. Epidemic / Pandemic

This plan focuses on natural hazards that can be mitigated on a local level and have or could cause disasters. Technological or manmade hazards are things like transportation incidents, civil disturbances, hazardous material incidents, mass casualty events, war, and terrorism. Mole Lake already works closely with the Forest County Sheriff's Department which plans for these types of events, so they are not included in this planning process. Low magnitude earthquakes occur in Wisconsin every few years, but none so far have exceeded a magnitude of 3.9, which would have vibrations similar to the passing of a semi-truck, therefore, earthquakes are not covered in this plan. Mole Lake does not

have coastal hazard issues and conditions for landslide or subsidence problems are not significant in the area.

CLIMATE CHANGE & HAZARD RISK ASSESSMENT

While the assessment of hazard risk is largely based on past weather events and existing development trends, projecting future risks and vulnerabilities is also subject to the influence of possible large-scale, longer-term climatic changes. This section explores how the area's climate is changing and how climate change may impact the probability and severity of natural hazards.

There is ongoing debate over the existence, causes, severity, and impacts of global climatic changes, such as global warming. According to the National Academy of Sciences, the Earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades. There is strong evidence that most of the warming over the last 50 years is attributable to human activities. Increasing global temperatures are expected to raise sea level and impact local climate conditions such as precipitation levels. Changing regional climate could alter forests, crop yields, and water supplies. It could also affect human health, animals, and many types of ecosystems. Most of the United States is expected to warm, although sulfates may limit warming in some areas. Scientists currently are unable to determine which parts of the United States will become wetter or drier, but there is likely to be an overall trend toward increased precipitation and evaporation, more intense rainstorms, and drier soils.

Regardless of the debate over the causes of climate change, there is clear evidence that Wisconsin's climate is indeed changing. The 2003 report entitled Confronting Climate Change in the Great Lakes Region published by the Union of Concerned Scientists and the Ecological Society of America projected that by 2030, summers in Wisconsin may resemble those in Illinois overall, in terms of temperature and rainfall. By 2100, the summer climate will generally resemble that of current-day Arkansas, and the winter will feel much like current-day Iowa.

To further document these climate changes and explore their impacts on our State, the Wisconsin Initiative on Climate Change Impacts (WICCI) was formed as a collaborative effort of the University of Wisconsin and the Wisconsin Department of Natural Resources. The following are some of the key climatic trends being experienced in Wisconsin according to their analysis (www.wicci.wisc.edu):

1. RISING TEMPERATURES - Average temperatures are rising and are projected to continue to rise. The annual average temperature in Forest County has increased between 0.0 and 0.5 degrees between 1950 and 2006. Between 1980 and 2055, annual average temperatures are projected to increase by about 4 degrees in the County. More extreme heat events are also projected. The number of days projected to be 90º F or greater will increase by 12-14 days in Forest County between 1980 and 2055.
2. MORE PRECIPITATION – Forest County is experiencing more annual precipitation, and is expected to get wetter in the future, but there is significant

seasonal and geographic variation to the precipitation. The data shows that the annual average precipitation has increased in the County over the past fifty years overall.

3. HEAVIER PRECIPITATION EVENTS - Heavy precipitation events appear to be increasing in frequency. In the past, the region experienced heavy precipitation events of two or more inches about ten times per decade (once each year). The County is projected to experience 2.5 additional heavy precipitation events per decade by 2055.

HAZARD ANALYSIS

The hazard analysis for each hazard included in this plan is broken down into four components, as follows:

1. Background on Hazard - The next step after identifying a hazard is to define the hazard and give some general background behind it. This can include occurrence of hazard within the area, County or State. This section may also give some indication of the risk to public health and safety and to personal and public property.

2. History of Hazards - Past experiences of disasters is an indication of the potential for future disasters for which Mole Lake would be vulnerable. A review of past occurrences for each identified hazard in Mole Lake was completed. Due to Mole Lake's small size and the breadth of many hazard events, the Town of Nashville and Forest County hazard histories will be examined as representative of hazards affecting Mole Lake by virtue of being located within their boundaries.

Some disasters have had damages that exceeded the capabilities of local communities and state agencies. Federal assistance is then requested, which may be offered through a variety of programs. Assistance may be directed to agricultural producers, individuals and families, businesses, or local governments. There have been seven natural disasters in Forest County for which a Presidential Declaration was requested from 1971 to 2021. They include the following:

- 1975 Army Worm Infestation
- 1976 Drought – Presidential Emergency Declaration
- 1977 High Winds / Hail – Presidential Emergency Declaration
- 2000 Severe Storms/Flooding/Tornado – Presidential Disaster Declaration
- 2010 Severe Storms – State Disaster Fund
- 2019 Severe Storms/Flooding/High Winds/Tornado - Presidential Disaster Declaration
- 2020 Corona Virus Pandemic – Presidential Disaster Declaration

It should be noted that this significantly underestimates the number of hazard events that have occurred in the area. Almost every year significant weather events or disasters cause thousands of dollars in damage where no Federal disaster assistance is requested.

Major indicators of hazard severity are the deaths, injuries, and economic losses resulting from natural hazards and disasters.

The National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC) publish the National Weather Service (NWS) data describing recorded weather events and resulting deaths, injuries, and damages. From January 1, 2012 to December 31, 2021, NCDC reported 70 severe weather events for Forest County.

Since the earlier NCDC data is somewhat incomplete, this report focuses on the 10-year period from 2012 to 2021 for hazard analysis purposes. Other sources of data are used to supplement the NCDC data. These sources include Wisconsin Emergency Management, Wisconsin Department of Natural Resources, Forest County Emergency Management, and local news reports.

3. Vulnerability Assessment For Hazards - For each hazard identified, a summary of the impact that may be caused to the community is given. When possible, existing buildings, infrastructures, and critical facilities located in the hazard areas are identified. Critical facilities are community buildings that are especially important to the health and welfare of the population following hazard events. Examples of such facilities include hospitals, police & fire stations, government administration buildings, and shelters.

4. Future Probability and Potential Dollar Losses for Hazard - The historic data and vulnerability assessment for each hazard is used to project the potential future probability of such a hazard event occurring in the area, and the potential damages in dollars that might be reasonably expected. This section sets a benchmark amount for mitigation of each hazard.

HAZARD ANALYSIS: WINTER STORMS / EXTREME COLD

Background on Winter Storms/Extreme Cold Hazard:
A variety of weather phenomena and conditions can occur during winter storms. For clarification, the following are National Weather Service approved descriptions of winter storm elements:

Heavy snowfall – the accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.

Blizzard – the occurrence of sustained wind speeds in excess of 35 miles per hour accompanied by heavy snowfall or large amounts of blowing or drifting snow.

Ice Storm – an occurrence where rain falls from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.

Freezing drizzle/freezing rain – the effect of drizzle or rain freezing upon impact on objects that have a temperature of 32 degrees Fahrenheit or below.

Sleet – solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces.

Wind chill – an apparent temperature that describes the combined effect of wind and low air temperatures on exposed skin.

Winter storms can vary in size and strength and include heavy snowfall, blizzards, ice storms, freezing drizzle/freezing rain, sleet, wind chill, and blowing and drifting snow conditions. Extremely cold temperatures accompanied by strong winds can result in wind chills that cause bodily injury such as frostbite, and even death.

True blizzards are rare in Wisconsin. They are more likely to occur in the northwestern part of the state than in other areas, even though heavy snowfalls are more frequent in the southeast. However, blizzard-like conditions often exist during heavy snowstorms when gusty winds cause the severe blowing and drifting of snow. Heavy snow and ice storms are a part of nearly every winter in Mole Lake.

Dangerously cold conditions can be the result of the combination of cold temperatures and high winds, which creates a perceived sensation known as “wind chill”. Wind chill is the apparent temperature that describes the combined effect of wind and air temperatures on exposed skin. When wind blows across the skin, it removes the insulating layer of warm air adjacent to the skin. When all factors are the same, the faster the wind blows the greater the heat loss, which results in a colder feeling. As winds increase, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature.

The National Weather Service issues wind chill advisories when wind chill readings of -20 to -34 degrees are expected. Wind chill warnings are issued when wind chill values are expected at or below -35 degrees. Extreme cold events are most likely during the months of December, January and February.

History of Winter Storms/Extreme Cold in Mole Lake Area:
The NCDC has reported 33 major winter storm events and 5 cold temperature events for Mole Lake between 2012 and 2021. These storms typically contain some form of heavy snow, blowing snow, ice, freezing rain or drizzle, or glaze.

The most recent heavy snow in Mole Lake took place on December 10, 2021. A surface low tracked northeast from the central Plains through the western Great Lakes region late Friday night (12/10) into Saturday morning (12/11), bringing 8 to 14 inches of snow to northern Wisconsin and portions of central and northeast Wisconsin. Gusty winds of 30 to 40 mph led to blowing and drifting of snow and power outages across portions of northern Wisconsin with over 14,000 customers reported without power. The highest snowfall total across Forest County was 7.9 inches near Mole Lake.

On February 24, 2019, the NCDC reported blizzard conditions as a fierce, late-winter storm produced heavy snow, freezing rain, and high winds across much of central and northern Wisconsin from the 23rd to the 24th as an area of low pressure rapidly deepened across the Great Lakes. At the height of the storm on the 24th, travel was not recommended across parts of central and northern Wisconsin as blizzard conditions made travel nearly impossible. The combination of ice, snow, and strong winds caused power outages and tree damage in many locations. Snow totals reached 15.9 inches near Mole Lake. Parts of central and east-central Wisconsin received up to one-half inch of ice accumulation in addition to the snow. Measured wind gusts in the 50 mph to 60 mph range were recorded at many locations. New daily snowfall records were set for February 24 in many locations. Snow and blowing snow caused whiteout conditions in Forest County for most of the afternoon.

On February 4, 2019, freezing rain fell across northern Wisconsin as a low pressure system moved across the state. One-quarter to four-tenths of an inch of ice accumulated across far north-central Wisconsin during the overnight hours of February 3rd into the early afternoon of the 4th. Roads became hazardous as the ice accumulated and hundreds of vehicles slid off roads. Icing also caused numerous power outages, and at the height of the event more than 5,000 customers were without power.

The most recent extreme cold or wind chill event took place on February 7, 2021, when arctic air was entrenched across northern Wisconsin with morning low temperatures from -15 to -30 degrees. The combination of the bitter cold and light winds created wind chills of -35 to -45 degrees.

A historic event of significance took place in February 1996, when an arctic air mass stalled over Wisconsin bringing extreme cold for an extended period of 5 days. Wind chills reached 70 degrees below zero in some areas. Significant damages and disruption occurred, including cancellation of all outdoor events at the Badger State Games. At least one person died from hypothermia, but this was not in Forest County.

Winter Storms/Extreme Cold Vulnerability Assessment:
Winter storms present a serious threat to the health and safety of affected citizens and can result in significant damage to property. Heavy snow or accumulated ice can cause the structural collapse of buildings, down power lines, cause motor vehicle accidents, or isolate people from assistance and services. Extreme cold includes the risk of frostbite and hypothermia.

The following is a list of things that may be adversely affected by a winter storm. Many of these community assets can be referenced in Part II.

- Infrastructure – operation of emergency services, operation of public facilities and schools
- Utilities – down power and telephone lines
- LP Gas at residences freezing at temperatures below 40 degrees below zero

- Septic system freezing
- Transportation – automobile accidents, roadway plowing, salting/sanding
- Residential – roofs
- Businesses –commerce
- Agricultural – livestock, (forest crop if ice storm)

There are no specific areas in Mole Lake that have an unusually high risk. Winter storms cover a broad area and are a region-wide concern. The extreme cold weather can affect the entire county. The risk to public health includes the chance of getting frostbite and hypothermia, and motor vehicle accidents. Everyone is at risk for becoming injured in extreme cold weather, either because of frail health or because of travel in a motor vehicle.

Future Probability and Potential Dollar Losses – Winter Storms/Extreme Cold:
Based on historical frequency, Mole Lake can expect 3.3 major winter storms per year on average. In other words, the probability is 1.0 or a 100% chance of winter storms in a given year.

Mole Lake can expect an extreme cold temperature event about once every two years, or a 50% chance in a given year, based on historical frequency. Although, because extreme cold temperatures often accompany winter storms, a probability of 100% chance in a given year cannot be ruled out.

Estimating potential future losses from winter storms is difficult. Damages and losses are typically widespread. Auto accidents and additional snow removal expense are typical impacts of winter storms, and such claims are not aggregated or tracked for monetary damage. Winter storms do have the potential to be extremely destructive, particularly in the case of ice storms. Potential future losses per incident might range from $5,000 to $2 million based on experiences from other areas in northern Wisconsin.

HAZARD ANALYSIS: SEVERE THUNDERSTORMS/HIGH WINDS/LIGHTNING/HAIL

Background on Severe Thunderstorm Hazard:
The National Weather Service definition of a *severe thunderstorm* is a thunderstorm event that produces any of the following: downbursts with winds of 58 miles per hour or greater (often with gusts of 74 miles per hour or greater), hail one inch (recently increased from ¾ of an inch) in diameter or greater, or a tornado. Strong winds, hail, and lightning will be addressed in this section, and tornadoes are discussed as a separate hazard.

Lightning results from discharge of energy between positive and negative areas within a thunderstorm separated by rising and falling air. This discharge heats the surrounding air to 50,000 degrees. Hail results as the warm rising air cools, forming ice crystals which are held by the updrafts until accumulating enough weight to fall. The hail size depends on strength of the updrafts keeping it suspended.

Thunderstorm frequency is measured in terms of incidence of thunderstorm days or days on which thunderstorms are observed. Wisconsin averages between 30 and 50 incidence days per year depending on location. A given county may experience ten or more thunderstorm days per year. The southwestern area of the state normally has more thunderstorms than the rest of the state.

Measured wind speeds are typically in the range of an EF0 tornado and may even approach EF1 speeds. Strong winds can be associated with tornado episodes, thunderstorms, or even winter storms. The effects are often widespread, impacting areas hundreds of miles from the actual areas of thunderstorms or snow. Trees, signs, and power poles are the most commonly impacted by high wind events, but significant damage, bodily injury, or death can occur.

History of Severe Thunderstorms in Mole Lake Area:
The NCDC database reported six severe thunderstorm events for the Mole Lake area between 2012 and 2021. These storms typically contain some form of heavy rain, strong winds, lightning, or hail. About 3 significant hail events, typically related to a severe thunderstorm, were listed during this time period. Historical size of the hail in these events ranged from 0.75 to 1.75 inches in diameter. No major lightning incident was noted.

Most recently, on June 8, 2021, thunderstorms developed across the Upper Peninsula of Michigan and tracked south through north-central Wisconsin during the late afternoon and early evening hours, producing isolated wind damage.

The most recent incident including hail reports occurred on August 7, 2019. Severe thunderstorms formed in very unstable air ahead of a passing cold front. The worst of the damage from the storms occurred across east-central and parts of northeast Wisconsin. Thunderstorm winds downed numerous trees and some power lines. Penny size hail was reported in areas around Crandon.

Forest County was included in a Presidential Disaster Declaration for storms that occurred between July 18 and 20, 2019. A line of severe thunderstorms moved across much of central, north central, and eastern Wisconsin during the evening hours of July 19, 2019. Widespread tree and power line damage was reported across 18 counties including Forest. WPS reported over 50,000 outages at the height of the storms. The worst damage was associated with a macroburst, a large downburst of straight-line winds that affected a large swath from Pelican Lake in Oneida County, southeast through Langlade and Oconto counties. Southwestern Forest County including Mole Lake was on the periphery of this damage. Hundreds of thousands of trees were snapped or uprooted, resulting in damage to dozens of homes and cottages. The damage path was about 60 miles long and up to 10 miles wide at times. Winds were likely near 100 mph in the hardest hit areas in northeast Langlade County. These storms also resulted in tornados and flooding in other parts of the state.

On July 8, 2013, storms brought thunderstorm winds and hail into the Town of Nashville. The storms produced wind damage from a wet microburst, penny to nickel size hail, and

heavy rainfall. The microburst, with winds estimated at 75 mph, downed about 30 trees. Numerous locations received more than two inches of rain in a three to four hour period.

Another historic event of note occurred on June 23, 2010. Severe storms caused significant damage across a number of counties. Although the damages did not quality for a disaster declaration, the State Disaster Fund was activated. Unstable air combined with a surface front and an upper level disturbance to produce severe thunderstorms across northern Wisconsin. High winds from the storms, some estimated as strong as 90 mph, caused considerable damage to trees and power lines as the storms moved through north-central and northeast Wisconsin. Roads across parts of northern Wisconsin were blocked by downed trees and power lines, including most of the roads in the town of Nashville (and Mole Lake) where numerous homes were damaged. Power was knocked out to more than 15,000 Wisconsin Public Service customers in Forest and multiple other counties for at least part of the night and some well into the next day

The Mole Lake area has been fortunate to not experience any major lightning events between 2012 and 2021. The last major lightning event in Forest County took place in 2000 in the Town of Alvin. Lightning struck a house near the intersection of highway 55 and highway 70.

Severe Thunderstorm Vulnerability Assessment:
The National Weather Service can forecast and track a line of thunderstorms that may be likely to produce severe high winds, hail, and lightning, but where these related hazards form or touch down and how powerful they might be remains unpredictable. The distribution of thunderstorms and related hazard events have been widely scattered throughout the county.

Forest County Hail

Many thunderstorm events (without tornadoes) have caused substantial property and infrastructure damage, and have the potential to cause future damage. In order to assess the vulnerability of the Mole Lake area to thunderstorms and related storm hazards, a review of the past events indicates significant impacts to:

- Infrastructure – hospitals, schools, street signs, police and fire departments
- Utilities – electric lines/poles/transformers, telephone lines, radio communication
- Transportation – debris clean-up
- Residential – mobile homes, garages, trees and limbs, siding, & windows
- Businesses – signs, windows, siding, & billboards
- Agricultural – buildings, crops (including wildrice and forest crop) & livestock
- Vehicles – campers, boats, windshields, body, & paint

Based on review of the historic patterns of thunderstorms associated with high wind, hail, or lightning, there are no specific locations that have unusual risks. The events are spread uniformly across the landscape and are an areawide concern.

Future Probability and Potential Dollar Losses – Severe Thunderstorms:
Based on historical frequency, Mole Lake can expect a severe thunderstorm event every other year, on average. In other words, the probability is 0.6, or a 60% chance of storms in a given year. The probability of a thunderstorm with notable hail is less at 0.3 or 30% chance in a given year. There is not enough data available regarding lightning events to indicate probability.

According to the NCDC data, historic thunderstorm events with associated high wind and reported damages averaged $40,833 in property damage per incident across Forest County. No crop damages were reported. There was insufficient data regarding historic hail and lightning events. Losses in Mole Lake associated with severe thunderstorms could approach $244,998 over the next ten-year period.

HAZARD ANALYSIS: TORNADOS

Background on Tornado Hazard:
A tornado is a relatively short-lived storm composed of an intense rotating column of air, extending from a thunderstorm cloud system. It is nearly always visible as a funnel, although its lower end does not necessarily touch the ground. Average winds in a tornado, although difficult to measure precisely, are between 100 and 200 miles per hour, but some tornados may have winds in excess of 300 miles per hour.

Table 6: Tornado Wind and Damage Scale

Tornado Scale	Wind Speeds	Damage
EF0	65 to 85 MPH	Some damage to chimneys, TV antennas, roof shingles, trees, and windows.
EF1	86 to 110 MPH	Automobiles overturned, carports destroyed, trees uprooted
EF2	111 to 135 MPH	Roofs blown off homes, sheds and outbuildings demolished, mobile homes overturned.
EF3	136 to 165 MPH	Exterior walls and roofs blown off homes. Metal buildings collapsed or are severely damaged. Forests and farmland flattened.
EF4	166 to 200 MPH	Few walls, if any, standing in well-built homes. Large steel and concrete missiles thrown far distances.
EF5	OVER 200 MPH	Homes leveled with all debris removed. Schools, motels, and other larger structures have considerable damage with exterior walls and roofs gone. Top stories demolished

Source: National Weather Service.

A tornado path averages four miles, but may reach up to 300 miles in length. Widths average 300 to 400 yards, but severe tornados have cut swaths a mile or more in width, or have formed groups of two or three funnels traveling together. On average, tornados move between 25 and 45 miles per hour, but speeds over land of up to 70 miles per hour have been recorded. Tornados rarely last more than a couple of minutes in a single location or more than 15 to 20 minutes in a ten-mile area.

Tornados are classified into six intensity categories, EF0-EF5. This scale is an updated or "enhanced" version of the Fujita Tornado Scale (or "F Scale"). The scale estimates wind speeds within tornados based upon the damage done to buildings and structures. It is used by the National Weather Service in investigating tornados and by engineers in correlating building design and construction standards against anticipated damage caused by different wind speeds.

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornados, known as "Tornado Alley". Tornado Alley extends northeast from Oklahoma into Iowa and then across to Michigan and Ohio. Winter, spring, and fall tornados are more likely to occur in southern Wisconsin than in northern counties. Wisconsin has seen a tornado event occur in every month of the year except for February.

History of Tornados in Mole Lake Area:
Forest County experiences fewer tornados than many counties in the State of Wisconsin. And, fortunately, there is only one tornadic event on record in the Mole Lake area at least back to 1950. On July 6, 2012, scattered thunderstorms formed along a cold front moving across Wisconsin. The storms produced wind damage, funnel clouds and hail as large as nickel size. A funnel cloud was spotted south of County Highway Q between the Towns of Lincoln and Nashville. Three other small funnel clouds were spotted near the intersection of State Highway 32/55 and County Highway N, between Argonne and Crandon.

Overall, Forest County has had eight recorded tornados since 1963, with five occurring prior to 1995, see Table 7. The most recent tornado in Forest County occurred on August 9, 2020. An upper-level shortwave produced thunderstorms across north-central Wisconsin during the evening hours. Three tornadoes and wind damage were reported as these thunderstorms tracked through the area. One of these tornados formed at 9:12 PM in a remote forested area in northeast Forest County, east of the town of Alvin. The tornado moved northeast to about 0.3 miles north of Ransdell Lake, then turned east, reaching maximum width before crossing Huff Creek Road. The tornado produced a path of tree damage before entering Florence County at 9:18 PM. Peak winds were estimated at 105 mph.

On September 19, 2012, thunderstorms developed ahead of a cold front and a strong upper level system. Some of the storms produced large hail, damaging winds, and funnel clouds. A funnel cloud was spotted over the Town of Wabeno.

On April 10, 2011, fifteen tornados were seen in the state with ten in northeast Wisconsin, a one-day record. Two tornados were spotted in Forest County that day. Both were spawned by major thunderstorms that developed along and ahead of a cold front as it encountered moist and unstable air across Wisconsin. These storms also produced straight line wind up to 100 miles per hour.

The first tornado developed at 7:30 pm southeast of Argonne and moved over nine miles to the northeast into Florence County. This was an EF2 storm. It downed hundreds of trees, many of which fell on vacation cabins, and blew the roof off a house east of Argonne. This storm did over $200,000 in damage. A second tornado formed just after 8 pm at Armstrong Creek and travelled for about three miles to the north and west. It damaged two houses, one seriously, and did over $50,000 damage.

In June of 2010, a funnel cloud was observed near County Highway C in the town of Wabeno. This event took place in conjunction with severe thunderstorms and winds up to 90 mph, which damaged trees and power lines across north central Wisconsin, knocking out power for more than 15,000 Wisconsin Public Service customers.

In June of 2005, two supercell storms moved through the southern part of the county causing significant wind damage and producing a funnel cloud three-miles east of Crandon. Three square miles of trees in the Nicolet National Forest were heavily damaged as winds estimated at 90 mph hit the south part of Birch Lake. The roof was torn from a metal building in Laona. Large hail was also associated with this event.

Table 7: Reported Tornados/Funnel Clouds in Forest County

DATE	TIME	LOCATION	LENGTH (miles)	WIDTH (yards)	DEATHS	INJURIES	EF-SCALE
9/09/2020	9:12 PM	T. Alvin	2.85	250	0	0	EF1
9/19/2012	6:20 PM	T. Wabeno	n/a	n/a	0	0	(FC)
7/06/2012	8:21 PM	T. Lincoln T. Nashville	n/a	n/a	0	0	(FC)
7/6/2012	7:30 PM	T. Argonne	n/a	n/a	0	0	(FC)
4/10/2011	7:30 PM	T. Argonne	9	250	0	0	EF2
4/10/2011	8:03 PM	T. Armstrong Cr.	3	150	0	0	EF1
6/23/2010	5:15 PM	T. Wabeno	n/a	n/a	0	0	(FC)
6/7/2005	6:04 PM	T. Lincoln	n/a	n/a	0	0	(FC)
6/28/1994	5:20 PM	C. Crandon	n/a	n/a	0	0	n/a
5/30/1994	8:50 PM	C. Crandon T. Lincoln T. Laona	12	800	0	3	EF2
9/16/1972	4:05 PM	T. Freedom T. Wabeno	53	200	0	0	EF2
6/30/1968	4:00 AM	T. Caswell	1	200	0	0	EF2
9/19/1963	6:00 PM	T. Laona	1	33	0	0	EF1

Source: National Climatic Data Center. *(FC) = funnel cloud.*

In June of 1994, a waterspout (tornado over water) was observed over Lake Metonga, two miles south of Crandon.

On June 28, 1994, Severe thunderstorms raked west-central and northern Wisconsin with violent damaging winds up to 61 mph, hail up to tennis ball-size, and two tornadoes. One of these tornados, a major EF2, cut a 12-mile path from just southwest of Crandon to just north of Laona in Forest County causing over $1 million damage. It damaged or destroyed 28 homes, including several mobile homes, and leveled 600 acres of timber. Three people were injured in a mobile home that was destroyed by the tornado.

Forest County Tornado Damage, 1994

Forest County also experienced tornados in 1972, 1968, and 1963. In September of 1972, a strong EF2 tornado formed northwest of Wabeno and traveled east cutting a 53-mile long swath. Several barns were flattened in the Wabeno area with extensive trees and powerlines downed. Property damages were estimated at about $250,000. The June 1968 EF2 tornado had a one-mile path with $25,000 in damages. In September of 1963, an EF1 tornado with a one-mile path caused about $25,000 in property damages.

Tornado Vulnerability Assessment:
Though Forest County is primarily rural, with concentrations of population scattered throughout the county. Mole Lake can be regarded as more vulnerable because tornados pose a greater threat to human safety and property damage in more concentrated areas, see Map 11.

Campgrounds and mobile homes are of significant concern in assessing the hazard risks from tornados. In general, it is much easier for a tornado to damage and destroy a mobile home than a site-built home. In addition to mobile homes, campground patrons are vulnerable to tornados because minimal shelter is provided. In Mole Lake, there are only a few mobile homes scattered throughout the residential areas. Most of the Tribal housing is stick-build, however, a significant portion lack full basements. There is one campground within Mole Lake: the Tribal campground associated with the Strawberry Moon Pow Wow grounds.

The following is a list of things that may be affected by a tornado. Much of this list can be referenced in Part II.

- Community facilities – clinics, hospitals, schools
- Public Service – police and fire departments
- Utilities – power lines, & telephone lines
- Transportation – debris clean-up
- Residential – nursing homes, garages, trees and limbs, siding, & windows
- Businesses – signs, windows, siding, & billboards

- Agricultural – buildings, crops (including wildrice and forest crop) & livestock

Based on review of the historic events of tornados, no specific areas in Mole Lake have unusual risks. Tornado events are an area-wide concern.

Future Probability and Potential Dollar Losses – Tornados:
The likelihood of a tornado event affecting Mole Lake in the future is similar to that of Forest County because of the nature of tornado events. Based on historic data, between 2012 and 2021, Forest County experienced one full tornado. This equates to a probability of 0.1 or about a 10 percent chance in a given year. While tornados are not especially common in Forest County, funnel cloud sightings occur more often and serve as reminders of the potential threat of a tornado. Not enough data exists to indicate the probability of tornados of a specific magnitude, however, the tornados on record (since 1950) in Forest County have all been EF1 (3) or EF2 (4).

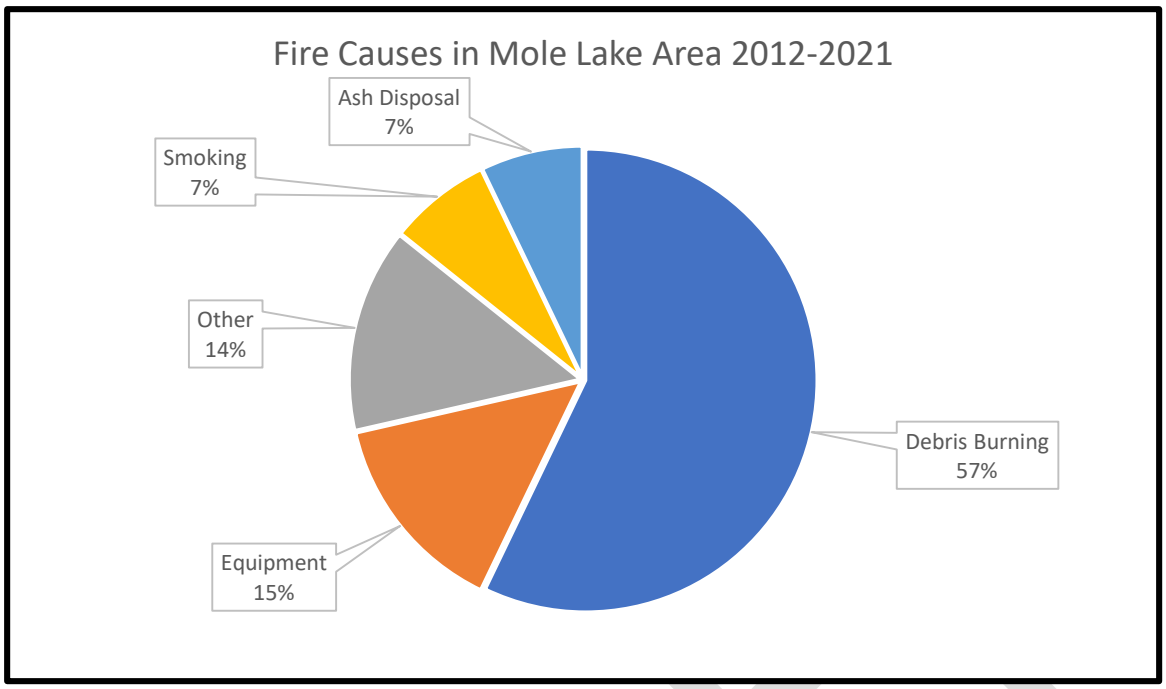
Historic data is again used to estimate potential future dollar losses due to a tornado. Estimated damages resulting from tornados in Forest County range from zero to $1 million. On average, Mole Lake might expect damages exceeding $225,000 per tornado, however, only two of the eight historic tornados resulted in damages exceeding $250,000 while the others were $200,000 or less.

HAZARD ANALYSIS: FOREST FIRES/WILDFIRES

Background on Forest Fires/Wildfires Hazard:
A forest fire is an uncontrolled fire occurring in a forest or in woodlands outside the limits of an incorporated village or city. A wildfire is any instance of uncontrolled burning in brush, marshes, grasslands or field lands. For the purpose of this analysis, both of these kinds of fires are being considered together.

Forest fires and wildfires can occur at any time whenever the ground is not completely snow covered. The season length and peak months may vary appreciably from year to year. Land use, vegetation, amount of combustible materials present and weather conditions such as wind, low humidity and lack of precipitation are the chief factors for fire season length.

History of Forest Fires/Wildfires in Mole Lake Area:
The Wisconsin DNR maintains a database of wildfire data. Due to limitation of data specificity, fires which took place in the Town of Nashville are counted as being in the Mole Lake area. From 2012 to 2021, the Mole Lake area experienced 14 fires or about 1.4 fires annually. However, there is annual variability ranging from zero fires in to three fires in a given year.



Source: DNR.

The fires range in size from 0.02 to 3.56 acres burned with a total area of 8.77 acres burned over the period. Average wildfire size is 0.63 acres. The principal reason these fires are small is the rapid response of municipal fire departments. This history of small fires is not indicative of the actual risk. For example, there have been some larger fires in the area. In 2002, a single fire burned more than 30 acres.

May is the leading month for wildfire in the Mole Lake area, with 57 percent of the total number of fires between 2012 and 2021 taking place in May. Wildfires can generally occur at any time the ground does not have snow cover. Wildfires have occurred in March, April, May and November in the Mole Lake area.

In 2016, the highest total for acres burned in a year (between 2012 and 2021) was reached at 3.96 acres in three fires. Three is the highest number of individual fires in a year during the period, reached in 2013 and 2016, however, all of the fires were very small.

Forest Fires/Wildfires Vulnerability Assessment:
Mole Lake has approximately 5,292 acres of woodlands, or about 84 percent of the total area of Mole Lake. The potential for property damage from fire increases each year as more of the wooded lands are developed.

Rural buildings may be more vulnerable because of lack of access. Building driveways off main roads are sometimes long and narrow with minimal vertical clearance and no turn around areas large enough for emergency vehicles making it hard to save individual

dwellings. These buildings also may not have adequate forest clearance between the structure and the forest.

The trend toward introducing more human development into fire prone areas has brought about the term wildland human interface or WUI. The WUI identifies areas where structures and human development meet or intermingle with undeveloped wildlands. It is within these areas where wildfire poses the greatest risk to human lives and property.

The WDNR has completed a statewide evaluation of fire risk, referred to as the CAR or Communities at Risk assessment. This assessment uses extensive DNR geo-databases to analyze and map hazardous woodland fuel types and the degree of the intermixing of development with wildlands. The maps identify the level of risk for each community on a scale of very high, high, moderate, or low, and also have a community of concern designation. The Mole Lake Area is classified as a Community of Concern.

Future Probability and Potential Dollar Losses – Forest Fires/Wildfires:
Forest and wildfires are relatively common occurrences in the area. In recent years, Mole Lake has had an average of about 1.4 fires per year. In other words, the probability is 1.0 or a 100 % chance of wildfire each year. However, these fires are typically contained rapidly and remain small, so that each has a minimal impact.

Historic data is used to estimate potential future acres burned due to a wildfire. Estimated losses resulting from wildfires in the Mole Lake area range from zero to 3.56 acres. On average, Mole Lake might expect losses of 0.63 acres per fire; however, only three fires have burned more than one acre of land.

Because of the relatively small impact of typical individual fires in the County, loss data is not tracked. This makes it difficult to develop an estimate of potential future dollar losses. However, with at least one fire per year, Mole Lake should expect some fires to "get out of hand". Annual losses would be maximized if a house was destroyed with each acre (“typical” residential parcel size) burned.

HAZARD ANALYSIS: DROUGHT/EXTREME HEAT

Background on Drought/Extreme Heat Hazard:
A drought is an extended period of unusually dry weather, which may be accompanied by extreme heat (temperatures which are ten or more degrees above the normal high temperature for the period). There are basically two types of drought in Wisconsin: agricultural and hydrologic. Agricultural drought is a dry period of sufficient length and intensity that markedly reduces crop yields. Hydrologic drought is a dry period of sufficient length and intensity to affect lake and stream levels and the height of the groundwater table. These two types of drought may, but do not necessarily, occur at the same time.

Droughts, both agricultural and hydrologic, are relatively common in the state. Small droughts of shortened duration have occurred at an interval of about every ten years since the 1930's.

Extended periods of warm, humid weather can create significant risk for people, particularly the elderly who may lack air conditioning, proper insulation, or ventilation in their homes. Animals are also at risk during extended periods of heat and humidity. The National Weather Service issues a Heat Advisory when the heat index, during a 24-hour period, ranges from 105 to 114 degrees daytime and remains at or above 80 degrees at night. The heat index combines the effects of heat and humidity, better reflecting the risk of hot weather on people and animals. When heat and humidity combine to reduce the amount of evaporation of sweat from the body, outdoor activity becomes dangerous even for those in good shape. The index measures the apparent temperature in the shade. People in the sun would experience an even higher apparent temperature. A heat index of 105 is considered dangerous and prolonged exposure can result in heat stroke, exhaustion and cramps. People should be reminded to use extreme caution when the heat index is between 95 and 105. A heat index of 95 occurs when the temperature is 90 degrees and the relative humidity is fifty percent.

History of Drought/Extreme Heat in Mole Lake Area:
An extended period of drought conditions are shown by NCDC going back to 2005 for Forest County and much of Wisconsin but, eased in 2011. Periods of below normal precipitation led to ongoing moisture deficits despite periodic storm events creating breaks in the dry pattern. In 2009 reports from County Agricultural Agents across northern Wisconsin indicated that crops were drought stressed and would have been in worse shape if temps had not been cooler than normal. The report from Langlade County indicated a 20 to 25 % loss of the corn and soybean crop through July of 2009. During this period, the Governor declared a state of emergency to get assistance to the state's agricultural sectors. The extended dry conditions posed serious challenges for farmers from drought stressed crops to issues providing feed for livestock.

NCDC reports indicate drought periods from September to October 2005, August through October 2007, September 2008 through April 2009, July through October 2009 and from April through August 2010. No drought events were recorded by NCDC since 2010 in Forest County.

The drought of 1976-1977, affected an area stretching from north to south across the state. Stream flow measuring stations recorded recurrence intervals from 10 to 30 years. Numerous private and municipal wells went dry due to the lowered groundwater tables and agricultural losses during this drought were set at $624 million. Forest County was one of 64 counties that were declared federal drought areas and deemed eligible for assistance under the Disaster Relief Act.

Forest County was fortunate to experience no extreme heat waves from 2012 to 2021. The most recent extreme heat wave was in July of 1999 when, for over a week, extreme temperatures and humid weather swept across the state. In some places it was so hot

that concrete roads began to buckle. Heat related illness was widespread and three deaths resulted outside Forest County.

Drought/Extreme Heat Vulnerability Assessment:
Droughts can have a dramatic effect on the limited agriculture and wild rice operations located in Mole Lake. Even small droughts of limited duration can reduce crop growth and yields, adversely affecting farm income. More substantial events can decimate croplands and result in total loss, hurting the local economy.

Irrigation and other groundwater withdrawal can negatively impact the environment by drawing water that naturally goes to aquifers and surface water. Drought can exacerbate the problem when high withdrawal rates and minimal precipitation deplete water bodies and aquifer supplies, thereby decreasing drinking water supplies, drying streams, and hindering aquatic and terrestrial wildlife. During severe droughts, some wells—mainly private wells—will go dry.

Another significant area of impact from drought includes the tourism sector of the economy. As lake levels go down, tourism in Forest County declines, affecting Mole Lake. Recent drought conditions have left lake levels down significantly, and many boat launches cannot be used.

Droughts can trigger other natural and man-made hazards as well. They greatly increase the risk of forest fires and wildfires because of extreme dryness. In addition, the loss of vegetation in the absence of sufficient water can result in flooding, even from average rainfall, following drought conditions.

The following is a list of things that may be adversely affected by a drought. Much of these community assets can be referenced in Part II.

- Infrastructure – municipal water supplies
- Surface water –groundwater reserves, recreation, and wildlife
- Forests- forest production industry
- Agricultural - crops (inc. wildrice), livestock

Essentially, the entire Mole Lake Area is at risk from the impacts of drought on forestry and tourism.

According to Wisconsin Emergency Management, excessive heat has become the most deadly hazard in Wisconsin in recent times. Extreme heat can happen anywhere within Mole Lake affecting everyone, however the elderly and young are the ones with the highest risk of getting heat related injuries, which can lead to death. Ways to prevent injuries include wearing light-colored clothing, drinking plenty of water, slowing down, and not staying in the sun for too long.

Future Probability and Potential Dollar Losses – Drought/Extreme Heat:
Based on the historic data presented here (frequency of past events), Mole Lake can expect a drought every ten years on average, which is a probability of 0.10 or a 10 percent chance in a given year. Significant severe drought is somewhat less common, affecting Wisconsin once about every 15 years.

Drought is another hazard lacking good loss figures at the county level. However, a look at aggregate data for the last two major droughts can give some idea of potential impact. The last two major droughts in Wisconsin resulted in losses of $9.6 million (1976-77) to $18 million (1987-88) per county on average.

Normally, counties in northern Wisconsin are known for their cold winters, however, extreme heat waves will affect Mole Lake in the future. Mole Lake can expect a heat wave about once every 20 years or a 5 percent chance in a given year based on historic data.

HAZARD ANALYSIS: FLOODING / DAM FAILURE

Background on Flood Hazard:
A variety of classifications are used to describe flood events including flash, riverine, urban/small stream, lake, stormwater, dam failure, and coastal. Mole Lake has the potential for all these types of flooding, except coastal. The following descriptions of the types of flooding are compiled from various FEMA and other notable hazard planning sources:

Coastal – Different from other types of flooding which relate to movement of water through a watershed, coastal flooding is due to the effect of severe storm systems on tides resulting in a storm surge. Primarily known as an ocean-based event, the Great Lakes coastal areas can also be affected.

Dam Failure – More of a technology related hazard than a natural hazard, various factors can result in the failure of the structural components of a dam, thus causing flooding of areas downstream of the dam, often similar in effect to flash flooding.

Flash – Involves a rapid rise in water level moving at high velocity with large amounts of debris, which can lead to damage including tearing out of trees, undermining buildings and bridges, and scouring new channels. Dam failure, ice jams, and obstruction of the waterway can also lead to flash flooding. Urban or built-up areas are increasingly subject to flash flooding due to removal of vegetation, covering of ground with impermeable surfaces, and construction of drainage systems.

Riverine – Also known as overbank flooding, this is the most common type of flooding event. The amount of flooding is a function of the size and topography of the watershed, the regional climate, soil type and land use characteristics. In steep valleys, flooding is

usually rapid and deep, but of short duration, while flooding in flat areas is typically slow, relatively shallow, and may last for long periods.

Lake – Prolonged wet weather patterns can induce water-level rises that threaten lakeshore areas.

The cause of flooding in rivers is typically prolonged periods of rainfall from weather systems covering large areas. These systems may saturate the ground and overload the streams and reservoirs in the smaller sub-basins that drain into larger rivers. Annual spring floods are typically due to the melting of snowpack.

Stormwater – Water from a storm event which exceeds the capacity of local drainage systems, either man-made or natural, can result in flooding. Inadequate storm sewers and drainage systems are often the primary factor resulting in this type of flooding.

Urban and Small Stream – Heavy rainfall can lead to flooding in smaller rivers and streams. Streams through urban or built-up areas are more susceptible due to increased surface runoff and constricted stream channels.

Flooding problems in Mole Lake tend to occur in the spring, when melting snow adds to normal runoff, and in summer or early fall, after intense rainfalls. Flooding occurs in the spring due to snowmelt and frozen soil. This build up continues until the river or stream overflows its banks, for as long as a week or two and then slowly recedes inch by inch. The timing and location of this type of flooding is fairly predictable and allows ample time for evacuation of people and protection of property.

Flooding is a potentially significant hazard in Mole Lake, particularly because of the extensive water features found throughout the area. As described in Part II, there are seven lakes and three creeks in the Mole Lake area within two watersheds. Surface waters are found on Map 3.

Floodplains are described in Part II and shown on Map 4. These floodplains are narrow along tributaries and lakes but extensive throughout the area. The North Central Wisconsin Regional Planning Commission obtained the digital Flood Insurance Rate Maps (DFIRMs) from FEMA to map the floodplains for planning purposes.

There is one dam in Mole Lake (see Map 4). Swamp Creek Dam, on Swamp Creek below Rice Lake, is a small dam. The Wisconsin DNR regulates all dams on waterways to some degree, however the small dams are not stringently regulated for safety purposes.

A dam can fail for a number of reasons such as excessive rainfall or melting snow. It can also be the result of poor construction or maintenance, flood damage, weakening caused by burrowing animals or vegetation, surface erosion, vandalism, or a combination of these factors. Dam failures can happen with little warning, resulting in the loss of life and significant property damage in an extensive area downstream of the dam.

The WDNR assigns hazard ratings to large dams within the state. When assigning hazard ratings, two factors are considered: existing land use and land use controls (zoning) downstream of the dam. Dams are classified into three categories that identify the potential hazard to life and property downstream should the dam fail. A high hazard indicates that a failure would most probably result in the loss of life. A significant hazard indicates a failure that could result in extensive property damage. A low hazard exists where failure would result in only minimal property damage and loss of life is unlikely. Swamp Creek dam has a low hazard rating and does not pose a significant hazard if it fails.

History of Flooding in Mole Lake Area:

Flooding was a principal cause of damage in only one of seven Presidential Disaster Declaration requests in Forest County from 1971 to 2021. This event occurred in 2000, when a nearly stationary front across Wisconsin combined with upper air and abundant moisture to produce a prolonged period of thunderstorms. Flooding from heavy rain caused the majority of problems, including flooded roads and basements. Rainfall totals ranged from 2 to 4 inches in a 24 hour period. Small streams and creeks overflowed their banks and rural areas suffered some crop damage. Mole Lake also received significant hail during this storm event.

Hwy Flood Damage, Forest Co.

The most recent flood event in the Mole Lake Area occurred in March of 2019. Spring snow melt coupled with heavy rains caused flooding outside the Sokaogon C-Store. Emergency pumping was set up to control the expanding water flow near the front door and water filling in the area facing the north exit to State Highway 55.

In April 2002, significant rainfall and snow melt resulted in flooding of roads and low-lying areas throughout Forest County, as well as in Oneida and Florence Counties.

In April of 1996, heavy runoff from spring snow melt and rains resulted in widespread minor flooding across north central and far northeast Wisconsin. Numerous roads and culverts were washed out across numerous counties including Forest.

There are no records of significant dam failure within Mole Lake or Forest County. Some of the dams have developed holes or other damage but have not caused flooding problems.

Flood Vulnerability Assessment:

Flood events in the county have caused substantial property and infrastructure damage in the past and have the potential to cause future damage, since a significant number of structures still exist in the floodplain. Looking at past events, the following have been significantly impacted by flooding:

- Infrastructure – flooded public facilities, and schools
- Utilities - down electric lines/poles/transformers, telephone lines, and radio communication
- Roadways – washouts, inundated roadways, debris clean-up
- Residential structures – flooded basements, damaged septic systems
- Businesses – loss of commerce
- Agriculture - inundated cropland (including forest), may effect wildrice

To assess the vulnerability of Mole Lake to flooding hazards, basic inventory data in Part II must be analyzed. For this purpose, consideration should be given to structures (specifically critical facilities), infrastructure, and cropland within the flood plain.

One of the first reports to reference in assessing vulnerability to structures during flooding is the State of Wisconsin Repetitive Loss Report. This Report provides the status of repetitive loss structures by community. FEMA, through the Federal Insurance Administration, classifies a repetitive loss structure "when more than one flood insurance claim of at least $1,000 is made within a ten-year period." The information is used as a floodplain management tool and to supplement information provided by communities for flood mitigation grants administrated WEM. According to the report, there are no repetitive loss structures in the Mole Lake area.

Since no structures are listed in the Repetitive Loss Report, structures within floodplains were analyzed. The floodplain boundaries within the Mole Lake area are shown on Map 4. Structures are identified as "vulnerable to flooding" according to proximity to floodplains. However, there were no structures inside reservation boundaries were identified within the floodplain.

In addition to structural damage from flooding, there could be significant damage to public roadways, particularly to roadway surfaces, culverts, and bridges. Flooding could inundate or close roadways from a period of a few days up to as much as several months. Such interruptions in the Mole Lake transportation network would cause travel delays through detours or even cut off access to certain areas.

The primary impact from damages to roadways is to businesses including tribal enterprises. The monetary impact is unknown but past floods in some parts of the County have restricted public access and even closed businesses. Tourism is an important industry in Mole Lake and several facilities, such as the casino and hotel could be significantly affected by widespread flooding.

The Sokaogon Chippewa also have forest resources which can be at risk from flooding. Forestlands can become too wet for logging operations and many water-logged tree plantations suffer high mortality rates. Studies show that flooding conditions can have detrimental effects on wildrice crops as well.

The areas considered to have a higher risk for impact from flooding include structures adjacent to floodplains as shown in Map 12.

Future Probability and Potential Dollar Losses – Flood:
Mole Lake has been fortunate to have experienced only one notable flooding event between 2012 and 2021. Based on historic data presented here (frequency of past events), Mole Lake can expect a flood event about every ten years on average. This equates to a probability of 0.10 or about a 10 percent chance in a given year. The percentage chance of a dam failure is estimated to be less than one percent.

Historic data on the dollar losses due to flood in Forest County is spotty. Recorded losses range from zero to $154,000. Mole Lake should anticipate at least $154,000 in property and crop losses, on average, for each significant flood occurrence. Over the next ten-year period, flood losses in Mole Lake will likely exceed $154,000.

HAZARD ANALYSIS: EPIDEMIC / PANDEMIC

Background On Epidemic / Pandemic Hazard:
Communicable diseases, sometimes called infectious diseases, are illnesses caused by organisms such as bacteria, viruses, fungi and parasites. Sometimes the illness is not due to the organism itself, but rather a toxin that the organism produces after it has been introduced into a human host. Communicable diseases may be transmitted (spread) either by: one infected person to another, from an animal to a human, or from some inanimate object (doorknobs, table tops, etc.) to an individual. Some communicable diseases can be spread in more than one way.

Pandemic Influenza is a global disease outbreak. An outbreak occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. The disease spreads easily from person to person, causes serious illness or death, and can sweep across the county and around the world in a very short time frame.

History of Epidemic / Pandemic in Forest County:
COVID-19 is a disease caused by a new virus strain that began spreading in people in December 2019. On March 11, 2020 the COVID-19 outbreak was characterized as a pandemic by the World Health Organization. Then on April 4, 2020 a Presidential Disaster Declaration was signed for the pandemic in the United States. Since then, the pandemic has been dynamic and constantly changing with cases surging in waves coinciding with new variants of the virus. As of October 2022, the pandemic was in a bit of a lull, but new daily cases were still significant with expectations of increasing again. So far, the U.S. Center for Disease Control has reported that there have been approximately 96,704,026 cases of COVID-19 in the United States alone with a death toll now exceeding 1 million at 1,060,833.

Influenza Pandemics are naturally occurring events. Global outbreaks have occurred four times in the last century, in 1918, 1957, 1968 and 2009. The greatest loss occurred in 1918 when the Spanish Flu (H1N1) killed an estimated 20-40 million people worldwide between 1918 and 1919. The mortality rate in the United States was 550,000. The Asian Flu (H2N2) occurred from 1957 to 1958 with a mortality rate of 70,000 in the United States. The Hong Kong Flu (H3N2) occurred from 1968 to 1969 with a mortality rate of 34,000 in the United States.

2009 saw the rise of a new variant of the H1N1 virus, popularly referred to as the Swine Flu. Lab confirmed deaths from Swine Flu total about 14,000 worldwide with 3,400 deaths in the United States. However, most experts now agree that the actual death toll attributable to the 2009 Swine Flu is 10 to 15 times the confirmed number. Spread of H1N1 flu occurs in the same way that seasonal flu spreads. Flu viruses are spread mainly from person to person through close range coughing or sneezing by people with influenza. As a result of preparation and mitigation strategies such as vaccinations and public education, the threat of a full blown H1N1 pandemic in the U.S. has receded. The possibility for a pandemic, though, still exists.

A previous pandemic flu threat that still looms is the avian flu. Birds can contract avian flu and pass it along to humans. Some strains of the avian flu are more virulent than others. Public health experts continue to be alert to the risk of a possible re-emergence of an epidemic of avian among people primarily in Asia in 2003. People who had been very close contact with infected birds (for example, people who lived with chickens in their houses) contracted a virulent form of avian flu and there was a high death rate from this disease. Thus far, the avian flu virus has not mutated and has not demonstrated easy transmission from person to person. However, were the virus to mutate in a highly virulent form and become easily transmissible from person to person, there would be significant potential for a pandemic that could disrupt all aspects of society and severely affect the economy.

The Forest County Health Department tracks communicable disease through a channel of communications at the local, state and regional levels between public health, private physicians, hospitals, and labs. This communication channel allows for prompt investigation of possible outbreaks and unusual situations, and to implement control measures to minimize further transmission of disease to others.

In Forest County, there have been 3,166 totals cases of COVID-19 resulting in 52 deaths so far as of 10/16/22. For Wisconsin, cases are up to 1.88 million with 15,352 deaths. By comparison, there were 13,511 confirmed or probable cases of the 2009 H1N1 from April 2009 to March 2010 with 1,320 hospitalized and 55 deaths across Wisconsin.

The next epidemic / pandemic situation may not be a "flu" but could be a developing "super bug" such as antibiotic resistant MRSA or some as yet unknown bacteria or virus.

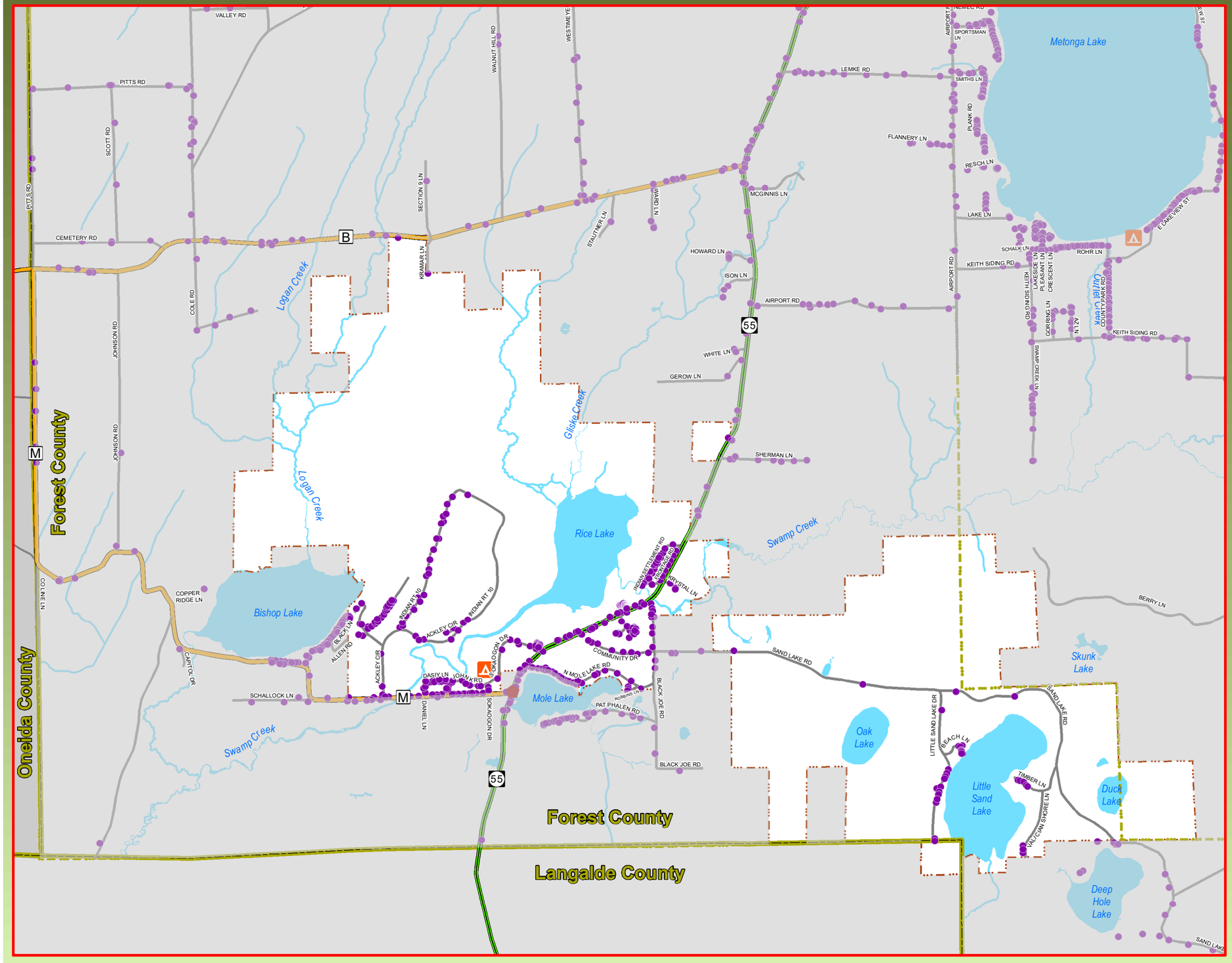
Epidemic / Pandemic Vulnerability Assessment:
Most communicable diseases are dealt with through traditional health department activities. The complexity and magnitude of a Pandemic Influenza outbreak would tax the normal capabilities of the medical service community and the Emergency Management Department would assist in all activities surrounding an event of this severity.

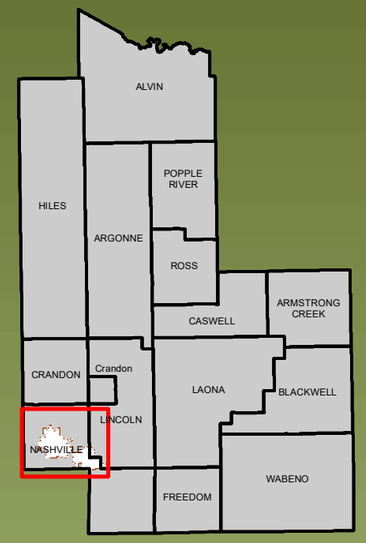
The possibility of a communicable disease epidemic or pandemic outbreak is equal across the County, but the ability to predict where and when an event will occur is very difficult.

Future Probability and Potential Dollar Losses – Epidemic / Pandemic:
Post COVID-19, the future probability of a communicable disease / pandemic outbreak is difficult to determine. The probability would appear low, but the threat exists, and the impact of a widespread event is very severe as displayed by the effects of COVID-19. Significant economic disruption can occur due to loss of employee work time and costs of treating or preventing spread of the pathogen.

A probability of an outbreak might be calculated across a hundred year period. Based on the four major events identified here, the likelihood of an event occurring in any given year would be 4%.

Mole Lake — Forest County, Wisconsin — DRAFT — Tornado Vulnerability Map 11





Legend

- County Boundaries
- Minor Civil Divisions
- US Highway
- State Highways
- County Highways
- Local Roads
- Water
- Tribal Land
- Address Points
- Population Concentration
- Campground

N W E S

0 0.5 1 1.5 Miles

Source: WI DNR, NCWRPC, FOREST CO.

This map is neither a legally recorded map nor a survey of the actual boundary of any property depicted. This drawing is a compilation of records, information and data used for reference purposes only. NCWRPC is not responsible for any inaccuracies herein contained.

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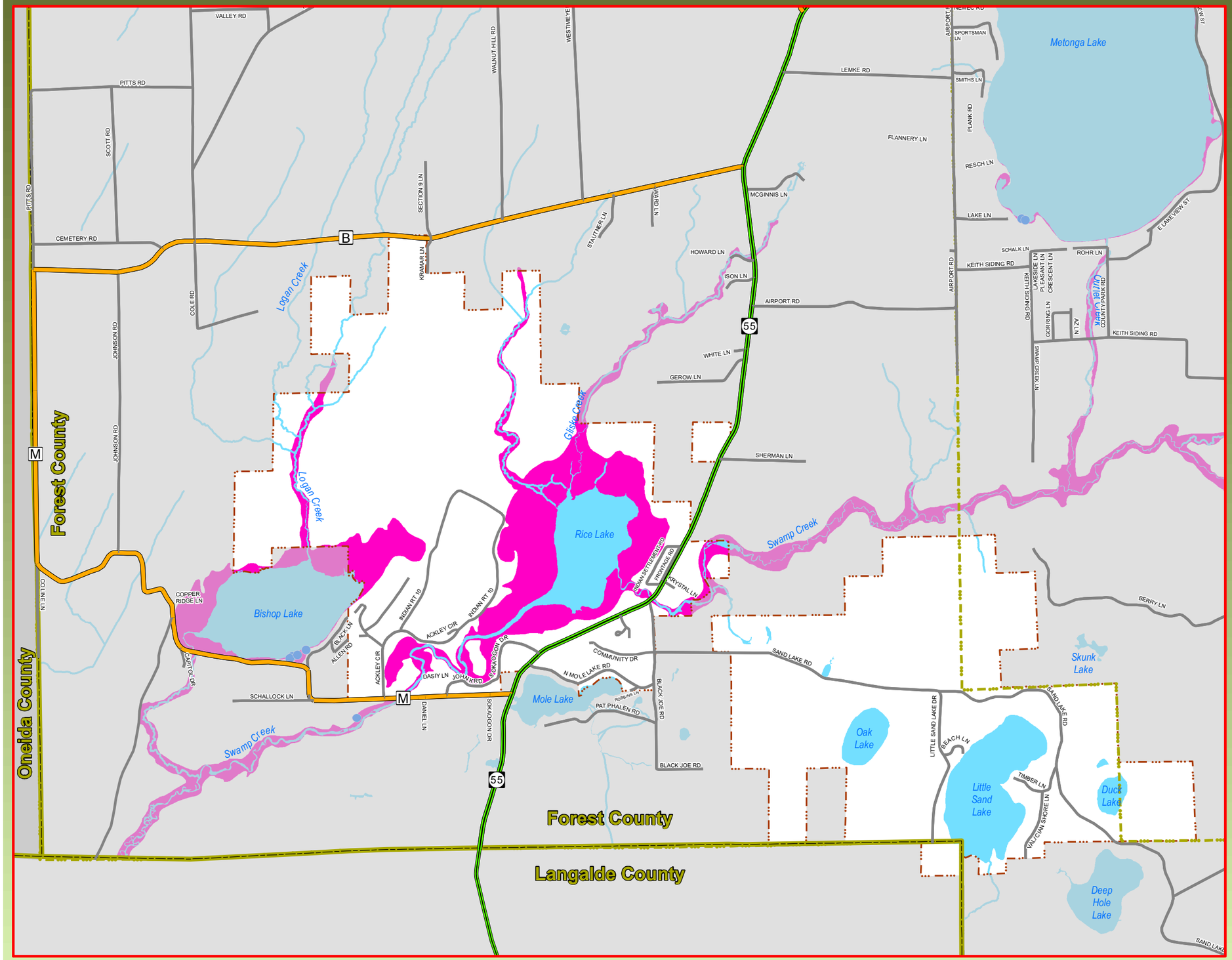
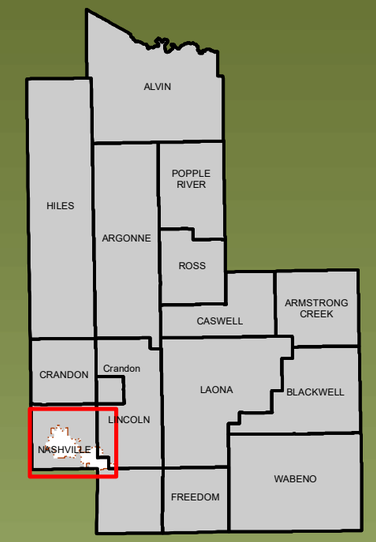
Mole Lake — Forest County, Wisconsin — DRAFT — Flood Vulnerability — Map 12





Legend

- County Boundaries
- Minor Civil Divisions
- Tribal Land
- US Highway
- State Highways
- County Highways
- Local Roads
- Water
- Structures in DFirm
- DFirm Floodplains

N W E S

0 0.5 1 1.5 Miles

Source: WI DNR, NCWRPC, FOREST CO., DFIRM

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