

2022 NORTH DAKOTA HAZARD MITIGATION PROGRESS REPORT

States 1

RESILIENCE IN A CHANGING ENVIRONMENT

TABLE OF CONTENTS

2	Our Changing Environment Requires Resilience, Adaptability
6	Ranchers Weather Adverse Conditions Created by State's Hazards
10	ND Stockmen's Association, Foundation Provide Disaster Relief
12	How 'Colorado Lows' Brought April Storms to North Dakota
14	Success Story Hidden Within Heartbreak for Producers
16	NDDEQ Safeguards North Dakota's Environmental Resources
19	Mitigation Spotlight: Increasing a Community's Resilience
20	Research Points to Successes, Proper Use of Cropland Management Tools
24	Fuels Reduction Project Strengthen Resiliency to Wildfires
27	State Hazard Mitigation Team Examines Impact of Climate Patterns on ND
28	The Place Where Coordination, Disaster Response Coincide
30	2021-2022 Mitigation Action Updates



STATE RESILIENCY OUR CHANGING ENVIRONMENT REQUIRES RESILIENCE, ADAPTABILITY



By Eric Upton, Planning Chief North Dakota Department of Emergency Services North Dakotans are resilient by nature, always persevering and pushing through adversity.

We live in a state where temperatures and precipitation are the most variable day to day, week to week, month to month, year to year, of any place in the country. Temperatures can vacillate 50 or more degrees in one day; blizzards can abruptly end drought during calving season, a critical time in livestock operations; and grasshoppers can invade lush cropland ready for harvest.

North Dakotans are not afraid of hard work. We

find it difficult to give up. We have a reputation as reliable, productive workers. It's not surprising that WalletHub finds North Dakota as the hardest working state in the nation.

FEMA defines community resilience as the ability of a community to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions. Our state's communities exhibit grit and determination when facing challenges created by our state's hazards and threats. We have received 42 federally declared disasters within the past three decades and experienced countless others that never rose to federal thresholds. Each time, we build back better, more resiliently.

Our ever-volatile climate requires us to adapt and to overcome. This issue of our annual report, Resilience in a Changing Environment, discusses climate trends and how agricultural producers weather climate extremes. The annual report also discusses initiatives by our State Hazard Mitigation Team (SHMT) to mitigate impacts of hazards and threats including a new agency, the N.D. Department of Environmental Quality (NDDEQ), dedicated to preserving our state's natural resources through such efforts as the Regional Haze Implementation Plan, air quality protection and spill response; and an initiative by the N.D. Forest Service that is decreasing the impacts of wildland fire.

National Weather Service Warning Meteorologist Greg Gust, a long-time friend of the emergency management comOpposite page, left, North Dakota Department of Transportation snow plow operators worked tirelessly to clear snow from roadways after two blizzards in April blanketed areas across the state with sibstantial snowfall. Right, Joe Lies (left), N.D. Department of Emergency Services regional coordinator presents an Arrowhead Award to Greg Gust, National Weather Service Warning meteorologist. Gust has been a long-time collaborator with N.D. Department of Emergency Services staff.

munity, described why North Dakotans, and farmers and ranchers in particular, are well aware of our changing environment. As he said, "Farmers pay attention to what is going on. They are generally conservative by nature, but they are very responsive to the agricultural market. And those market trends are quite often responding to current weather and longer term climate pressures."

North Dakota is truly a land of extremes. We have record-setting weather with the coldest winter day of 60 below, which occurred on February 15, 1936, in Parshall, ND, and the hottest day, 121 degrees on July 6 in Steele, ND, of that same year. The peak wind speed ever measured in North Dakota was 135 mph at the Sand Creek Remote Automatic Weather Station (RAWS) seven miles northwest of Amidon on September 15, 1997. That's a measured wind speed, not caused by a tornado.

Most recently, the North Dakota Agricultural Weather Network (NDAWN) in Dunn County recorded a rapid temperature rise on September 5, 2022. The morning temperature rose over 30 degrees in the two hours between 9:40 and 11:40 a.m. CDT, from 54.9F to 85.6F, eventually topping out at 96.1F after 3 p.m. CDT with light and variable winds that morning, becoming gusty out of the southwest after mid-morning. Two days later, the NDAWN station in Bowman recorded how the temperature rose over 50 degrees, from a morning low of 50.7F around 8 a.m. CDT, to over 100 degrees by 5 p.m., and topping out at just over 101F between 5 and 6 p.m. CDT with light southeasterly winds turning more southerly in the afternoon. "These more dramatic warming (or cooling) effects usually involve increasing winds from the south (or north) and a subsequent drop in the dew point, which marks the introduction (advection) of a much drier airmass," Mr. Gust said.

North Dakota is the geographic center of North America. As Mr. Gust explained, "It is the farthest removed from the moderating impacts from oceans which typically act to absorb and radiate heat over longer periods of time than dry land. Wet soil heats and cools more slowly than dry soil and air. The more moisture it has, the more energy expended. In early September, when the



air is very dry you get temperatures into the 40s at night and 80s during the day. You will see a 40-degree temperature swing easily whereas in summer with high humidity you only see a 20-degree change such as 75 to 95." The future promises a continuation of intense weather patterns with higher degrees of volatility.

Mr. Gust recently exchanged his analysis with Dr. C. Thomas Shay, ethnobotanist and professor emeritus from the University of Manitoba, author of the book, *Under Prairie Skies: The Plants and Native People of the Northern Plains*. Some key takeaways from his conversation, from which we all can learn, are as follows:

- In our Northern Plains region, our climate variability will most often impact us much more significantly than any perceived climate change. In the short and middle range, that would be seasonal and sub-seasonal, possibly into multi-decadal. That's the natural variability we see from year to year, or even across several years. However, that steadily increasing but subtle rate of change that we see over the long haul is what may become too much.
- Some ethnobotanists believe that our natural landscape, even perhaps our native peoples, have managed to keep pace with such variability through this historical period.
- The challenge appears to be whether the rate of climate change now and in the future will overtake the landscape's ability to adapt, and with that our peoples' abilities to sustain their lives and livelihood.
- Climate change in the multi-decadal and longer period has the potential for hotter temperature, at a faster rate than we have yet to see.
- Precipitation will be highly variable, with more episodes of heavier rains (due to a warmer overall atmosphere), with more and longer periods of drought or flash drought interspersed.

These takeaways are among the many planning considerations



already under evaluation by the SHMT Climate Change Committee. The committee has embarked on an analysis of weather patterns. As part of our revisions, we will build upon the baseline climate assessment to address such areas as human health, ecosystems, environment, economy, transportation, energy production and socio-economic impacts. We have expanded committee membership to include representation from each of these sectors, welcoming to the conversations such partners as N.D. Indian Affairs; our tribal nations; N.D. Department of Environmental Quality; N.D. Department of Health and Human Services; N.D. Geological Survey; N.D. Forest Service; N.D. Department of Agriculture; N.D. Department of Transportation; N.D. Game and Fish Department; North Dakota State University Extension; U.S. Geological Survey; N.D. Parks and Recreation Department; and the American Red Cross.

The data collected by our partners will be shared with local and tribal hazard mitigation planning teams to help them when addressing federal climate change planning requirements. The analysis will also be incorporated into the update of the 2018 Enhanced Mitigation Mission Area Operations Plan, scheduled for revision during 2023.

We are fortunate in North Dakota to have a broad-based SHMT that works collectively to both analyze risk and vulnerability to hazards and threats and then how to mitigate their impacts. We thank our team for their dedication to ensuring a safer, more resilient North Dakota.

The Planning Section of the N.D. Department of Emergency Services compiles the annual mitigation report in collaboration with such partners as Greg Gust. Eric Upton is the Planning Chief for the N.D. Department of Emergency Services. Eric oversees a team of planners, Hope Brighton, Katie Leitch, Brenda Vossler and Kathleen Donahue, who conduct strategic, operational, recovery and mitigation planning.

EYE OF THE STORMS

RANCHERS WEATHER ADVERSE CONDITIONS CREATED BY STATE'S HAZARDS

ithin the span of three years, the Crighton, Winter, and Heller ranch families of McKenzie County endured the worst drought and wildfire season of recent memory, this spring's "livestock-killing" blizzards, and, with the start of harvest, an invasion of grasshoppers.

Persistent drought conditions in 2020-2021 stunted crops and fields, resulting in low yields and a desperate need for hay bales to sustain livestock. Long lines of livestock tractor trailers headed to sales barns as a scarcity of feed forced producers to sell their herds. Dried-out fields became fodder for wildfires that spread rapidly across the terrain, making the 2021 fire season the worst in the state's history. Drought conditions abruptly ended in April 2022 with two spring blizzards, the first of which occurred April 12-14, 2022, breaking 26 daily snowfall records and shutting down the state for three days. Eight days later, another three-day blizzard on April 22-24, 2022, pounded the state with a wintry mix of freezing rain, heavy snow, sleet and downpours as thick ice caused the collapse of 7,000 poles and 500 miles of electrical infrastructure, leaving 10,000 households without power.

The blizzards occurred during a critical time, calving season. Ranchers worked round the clock in blinding snow and rain to You are talking about proud, really strong people brought to their knees."

haul animals to safety, bottle feed newborns, and move generators from building to building to keep both animals and people warm. Extended power outages increased already high operational costs as producers fueled tractors and generators for 24/7 operations. Spring and summer rains gave hope for a better year until grasshoppers invaded cropland this summer in western North Dakota. "You are talking about proud, really strong people brought to their knees," Greg Heller said.

Yet they remain optimistic in the face of adversity. Nikki Winter only has to look at her children, Elice, 10, Ivy, 8, and Wiley, 5, for her motivation. "They keep you going," Mrs. Winter said.

Heller echoed that aim. "The reason I'm doing this is the next



Left, Greg Heller, McKenzie County rancher is pictured with his grandson, Mason Weber. Below, the Winter/ Crighton family at their McKenzie County home. From left to right is Wiley, Ivy, Elice, Nancy Crighton (Nikki Winter's, back, mother) and David Lee Crighton.



generation," Mr. Heller said, nodding toward his grandson, Mason Weber, 14. "I hope there is something left for the grandkids."

According to the 2017 United States Department of Agriculture's (USDA) latest National Ag Census, there are 8,777 cattle operations in the state. "North Dakota cattle ranchers have been thrown more than their share of curveballs the last few years - whether it was the super-saturation of 2019, the COVID pandemic in 2020, the drought in 2021 and then the mega-blizzard storm complex this year. Their strategic planning, hard work ethic, grit, perseverance, faith and commitment to the land, the livestock and their communities keep them going, however, even when the going gets tough," said North Dakota Stockmen's Association (NDSA) President Jeff Schafer, a New Rockford, North Dakota, cow-calf producer and feeder.

HAZARDS AND THREATS

The impacts of hazards and threats on our state's leading industry make it challenging to keep the faith. North Dakota relies on agriculture for its economic viability. If producers experience losses, as they have in recent years, then the consequences reverberate throughout the state's economy. "Many of these people both in North Dakota and Montana have lost so much. Many will never recover," said Karolin Jappe, McKenzie County emergency manager. "The dream of handing off the ranch is over for many. And to think these are the people who put food on our tables."

Greg Heller estimates nine out of 10 people do not realize what it takes to raise crops and livestock, from beginning to end. It takes years of breeding to attain a quality herd. It takes long hours during planting season to nurture crops until harvest season. It takes weathering market highs and lows and paying ever increasing prices for equipment, feed, medicine, and insect control. The adverse impacts of our state's natural hazards have eroded the bottom line for producers with hailstorms or floods destroying crops, early winter storms burying prime farmland under heavy wet snow, and drought conditions leaving little in the ground and creating a high level of stress among producers worried about the continued viability of their operations.

The State of North Dakota's Enhanced Mitigation Mission Area Operations Plan (Enhanced Mitigation MAOP) identifies several hazards with the potential to cause agricultural damages including drought, flood, severe winter weather, severe summer weather, wildfire, infectious diseases and pest infestations. Mr. Heller has noticed an increase in the intensity of storm events, which aligns with analyses in the Enhanced Mitigation MAOP for severe summer and winter weather. The analysis also indicates more frequent floods and droughts, the latter of which translates to an increase in wildfire. Changes in weather patterns may also increase the prevalence of parasites and diseases that affect livestock and crops.

DROUGHT AND WILDFIRES OF 2020-2021

North Dakota experienced an increase in intensity of drought conditions during 2020-2021 as dry conditions reduced fields to stubble and producers looked well past the state's borders to find hay supplies. Farmers and ranchers struggled to maintain operations as they dealt with a 60 percent or greater reduction in hay production and 50 percent or greater decrease in range and pasture production. In 2021, USDA Secretary Tom Vilsack designated 48 North Dakota counties as primary natural disaster areas.

With the cascading impacts of drought came an increase in wildfires. By August 2021, more than 2,000 fires burned 120,000 acres compared to 900 fires and 12,000 total acres in 2020. The state's firefighting force, primarily comprised of volunteers, worked long hours to save fields and farmsteads as fires rapidly spread across fields. "I saw fire travel like water," said Ms. Jappe, a strong advocate for her volunteer fire departments who keeps a reserve of water bottles and snacks in her truck for her fellow firefighters.

Ms. Jappe winced as she discusses the losses experienced by producers in her area. "Some of these folks made tough decisions about selling off what livestock they had as they had no more to feed them. There really was no grass," she said. "When you experience a drought for two years, the rangeland has little or no

North Dakota Brand Inspections

January-December 2020 vs. 2021



nutritional value."

Nikki Winter's father, David Lee Crighton, said the price for livestock plummeted with the increase in cattle hitting the market. Her father-in-law, Keith Winter, added producers bought high and were forced to sell low. As an example, cattle purchased at \$1,800 a head sold for \$475. The NDSA compiled an analysis of North Dakota Brand Inspections between January-December 2020 in comparison to 2021. The results comparing 2020 to 2021 indicated the following increases: 15 percent for brand inspections; 18.8 percent for inspections at livestock markets; 34.7 percent for cow inspections; 10.9 percent for heifer inspections and 21.1 percent increase for calf inspections. Markets in North Dakota, South Dakota and Montana recorded increases from 19.3 percent in Jamestown to 51.3 percent in Rugby. "This isn't necessarily all sales, as ownership in some cases can be transferred via bills of sale, but it is representative of the trend and the significant culling due to the drought," said Julie Schaff Ellingson, NDSA Executive Vice President.

Opposite page, right, a bare patch of cropland leaves evidence of a surge in grasshopper population. Producers swathed hay and barley early this year to get ahead of the insects (pictured left).

The lack of hay supplies threatened operations for producers who had only a few years ago sent truckloads of hay to help drought-stricken producers in other areas of the nation. "A lot of hay went from north to south," Mr. Crighton said. As drought impacted North Dakota in 2020-2021, he said, "The price of everything went up." Producers paid exorbitant prices for fuel, feed supplements, minerals, vitamins and transport of water. Dry conditions required daily monitoring of water sources to ensure an adequate supply. "We had a lot of pastures we couldn't use because there were no sources of water," Mr. Heller said, "We ended up rotating herd in three pastures with stock dams. You still feel the effects of this drought one to two years later.

APRIL 2022 BLIZZARDS

The blizzards became a turning point for drought conditions. "We were in D4 (Exceptional) Drought conditions until then," Keith Winter said. Newborn calves arrived as the blizzards advanced across the state. The Winters, who ranch near Squaw Gap along the Little Missouri River, drove through blinding snow during the April 12-14, 2022, blizzard to find and care for newborn calves and their mothers. Cattle clustered near trees or corners of pastures to avoid the storm, often trampling other cows and newborn calves and knocking down fences. The storm that followed on April 22-April 24 compounded losses as the Winter family hauled animals to safety, bottle-fed newborns, and paid for veterinarian bills, costly feed supplements, minerals and vitamins. Many cows and calves that survived required treatment for pneumonia. Others suffered deformities when freezing rain caused body parts such as tails and ears to freeze and fall off, greatly reducing their marketability at auction.

Mr. Heller suffered devastating losses to his herd. "We knew this storm was coming; we had time to prepare," Mr. Heller said. "I thought we were sitting good but apparently not." During the first blizzard, Mr. Heller and his daughter, Ticinie Weber, spent days in a four-wheel tractor caring for his herd, never shutting the vehicle off, even sleeping in it and constantly refueling at higher-than-average prices. "You listen to the radio, and it is the same song over and over again," he said. "We got frozen tacos and burritos, warming them up on the tractor engine." They ate favorite foods during the first few days and at the end, Mr. Heller said, "What was left looked pretty good." His grandson Mason said, "We had to push snow for three days straight." They fed double the amount of hay each day for two to three weeks after the blizzard.

Losses extend well beyond the number of dead cattle. Breeding takes years of careful planning. As Mr. Heller said, "You are selling a chunk of your life. You work hard to get these quality cows.



It takes generations and now you have to sell them. A lot of cows won't breed after a traumatic event. A loss could mean a setback of eight to ten years to get herds back where you need them."

The losses continue today. "We are still losing calves because of pneumonia," Mr. Heller said. "A lot of people were emotionally hurt. Nobody likes to see animals suffer. But there is no way you can save everyone." In the end, Mr. Heller sold 70 percent of his herd, reducing operations from 300 to 85 head of cattle. With losses still being tallied, the NDSA expects it will take until March 2023 to know the extent when the application period ends for the USDA Farm Service Agency Livestock Indemnity Program; to date, 2100 ranchers have reported losses. "That means that more than 2,100 ranch families had losses that they anticipate will qualify for the federal indemnity program," Mrs. Ellingson said. "We know that not everyone applied for LIP and that the numbers are deep into the thousands from our conversations and our direct experiences."

The blizzards disproportionately impacted rural North Dakotans, many of whom struggled to find fuel for generators and to save livestock endangered by storm conditions. The losses extended to prime farmland inundated by recent rains at a critical time for planting. North Dakota received a Presidential Disaster Declaration on July 14, 2022, for 40 counties impacted by the second blizzard and subsequent flood. Analysis by the NDSU, Center for Social Research, indicates employment is heavily concentrated in agriculture within the affected 40 counties. Statewide total farm employment amounts to 29,603, of which 22,789 farm employment jobs were in the disaster-impacted counties.

SUMMER 2022 GRASSHOPPER INVASION

Producers hoped for a better summer, and at one point, Mother Nature seemed to be favoring the state. Keith Winter described the rains this spring and summer as "almost magical" until the grasshoppers arrived. It's as if the fields came alive when grasshoppers began feeding on crops. The United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) conducted grasshopper counts in mid-June and determined McKenzie County is a hotspot for pesky creatures, Mr. Winter said.

Fields throughout McKenzie County show extensive damage. Now producers are paying for the extra cost of pesticides to retain cropland. "You don't spray once, and they are gone. They keep hatching," Mr. Crighton explained.

Producers are taking their losses to get ahead of the invasion, swathing hay and barley earlier than anticipated. Mr. Winter and others are working with APHIS to see if grasshopper prevention efforts could be instituted. If not, he said, "We could have a



disaster next year." With drier conditions of late summer, producers are only working fields in the mornings and evenings to avoid equipment-caused wildfires.

NORTH DAKOTA RESILIENT

The Crighton, Winter and Heller families plan to continue weathering adverse conditions to retain their way of life. A freshman at Williston High School, Mason hopes to take advantage of two years of free tuition for Williams County residents attending trade school. He plans to study mechanics, a skill he hopes to transfer to the family cattle operations. As he said, "I've been doing ranching as long as I can remember."

There are inherent qualities about North Dakota producers that transcend the challenges they face, a willingness to help and compassion for others. Mr. Heller has no regrets donating a semiload of hay to other producers in the nation prior to drought conditions creeping into the state, even though southern states were unable to return the favor. As he said, "If someone is in a bad situation, a lot of people will help because they know what it is like. Everybody has been in that situation where they need a little help."

Eric Jensen, NDDES-HLS Strategic Communications Chief, and Kathleen Donahue, NDDES-HLS Deputy Planning Chief, traveled to McKenzie County to meet with the Winter, Crighton and Heller ranch families in July. Nikki Winter's daughters, Elice and Ivy, welcomed visitors with their tasty, specially-made tacos.



ND STOCKMEN'S ASSOCIATION, FOUNDATION PROVIDE DISASTER RELIEF

he North Dakota Stockmen's Association (NDSA) and North Dakota Stockmen's Foundation (NDSF) teamed up to support the state's cattle ranchers who suffered significant impacts in back-to-back storms in April 2022.

First, the record-breaking statewide Blizzard Haley on April 12-14, 2022, dumped more than 40 inches of snow in some areas and coupled it with consistent 50-mile-an-hour winds. Then, Mother Nature delivered a second, serious blow on April 22-24, 2022, pounding livestock operations with a combination of perils, including severe winds, several feet of snow, rain and/ or ice. Livestock industry impacts range from widespread livestock death and illness to damaged buildings and fences. Feed resources were also low, with the storms coming on the heels of significant statewide drought.

To help North Dakota cattlemen and women offset the challenges from these disastrous storms, NDSA and NDSF launched Hope After Haley Disaster Relief Fund. The NDSA and NDSF kickstarted the relief fund with their \$40,000 initial contribution and are inviting others to join them by contributing to the effort.

"Together, we can help North Dakota producers recoup and reclaim hope after a devastating year," said NDSA President Jeff Schafer, a New Rockford, N.D., cow-calf producer and feeder. "Cattle-ranching families give their all to care for their livestock every day, and we want to do all we can to help them through this struggle."

Monetary contributions to the disaster relief fund can be made two ways: 1) Checks can be made to the NDSF with "Hope After Haley" written in the memo and sent to 407 S. Second St., Bismarck, ND 58504; or 2) Credit card gifts can be made online by clicking here. The gifts will be pooled and distributed in their entirety to North Dakota cattle ranchers through an application and nomination process. A selection committee comprised of fellow ranchers will make selections and distribute the funds to those most in need.

The NDSF is a 501(c)3 charitable organization, so gifts can be deducted as charitable contributions for income tax purposes. For more information about the Hope After Haley Disaster Relief Fund or other ways to help, call (701) 223-2522 or visit www. ndstockmen.org.

The NDSA is a 92-year-old beef cattle producers' trade organization that works to unite, protect, promote, educate and serve the state's beef industry. The NDSF is a charitable organization that supports the beef industry with scholarship, leadership, promotion, research and building projects and disaster relief. Together, the organizations have distributed more than a half-million in direct aid to cattle producers recovering from catastrophic floods, blizzards and wildfires since 2009.



SNOWMAGEDDON

How 'Colorado Lows' Brought April Storms to North Dakota

Contributed by Chauncy Schultz, Science and Operations Officer, National Weather Service, Bismarck



Emily Gustafson, transportation engineer with the N.D. Department of Transportation took this photo of her dog and child next to a snow drift south of Mandan, North Dakota.

pringtime in North Dakota sure has a way of reminding us that we're never really that far away from winter's grip, with some of the most memorable blizzards in our history coming in March and April. The fabled March 1966 and April 1997 blizzards both strike immediate memories in the minds of long-time North Dakota residents, and for good reason. These springtime blizzards usually come in the form of what meteorologists call "Colorado Lows," so-named for the location of their birth over the state of Colorado. If conditions are just right, these "Colorado Lows" can strengthen and move northeastward, impacting the Northern Plains with strong winds and heavy precipitation that's often (but not always) in the form of heavy, wet snow, if enough cold air can be pulled into the system.

This spring brought the region a pair of "Colorado Lows" that generated significant winter weather. The first system brought widespread heavy snow totals from 1 to 3 feet and winds gusting to 60 mph to much of western, central, and northeastern North Dakota from April 12-14. The epicenter of the heaviest snowfall — from 24 to 36 — inches extended from the Dickinson and Beulah/Hazen areas northeast to the Minot area. The combination of heavy snow and high winds caused drifts exceeding 8 feet in some areas. The storm also set several one-day county snowfall records.

One-Day County Snowfall Records

County/Location

Dunn/Dunn Center Grand Forks/Larimore Mercer/Hazen Sheridan/McClusky Amount / Date 26.0 inches/April 13 18.9 inches/April 13 18 inches/April 13 12 inches/April 12 Previous Record/Date/Location

Broke 22.3/March 25, 2009 at Halliday Broke 18.0/March 6, 1995 at Grand Forks Tied 18.0/April 7, 1997 at Zap Tied 12.0/Dec. 26, 2016 at McClusky

National Snowfall Analysis during 72h preceding 2022 April 15, 12:00 UTC



Top, left, the National Snowfall Analysis shows the heaviest band of snow extended from Dickinson and the Beulah/Hazen areas northeast to Minot and totaled anywhere from 24 to 26 inches. Bottom, left, a map shows winds at roughly 35,000 feet above ground level on the evening of April 12 and a river of strong jet stream winds close to 100 mph.



If that wasn't enough, another "Colorado Low" impacted the area April 22-24. This system had a dramatic temperature contrast with a wintry mix of rain, freezing rain, sleet and snow in western and central North Dakota and thunderstorms in eastern North Dakota. At one point on Saturday, April 23, there were Blizzard Warnings ongoing in western North Dakota while a Tornado Watch was posted in the eastern part of the state. The cloud pattern of this intense system was captured by satellite imagery, which revealed clouds wrapping around the low pressure system spinning in the Northern Plains.

The surface weather maps with the first storm system revealed a classic pattern for a "Colorado Low" blizzard with a strengthening low pressure system initially over northeastern Colorado on Tuesday, April 12. This rapidly shifted northeast to near Fargo by Wednesday, April 13. Once these lows reach the upper Midwest, they often slow down and linger for multiple days, prolonging impacts.

What causes these strong low pressure systems to form and strengthen? Well, the battleground between warmer temperatures developing over the southern United States in the spring and lingering wintertime cold air at higher latitudes often leads to strong frontal boundaries over the Plains in March and April. This "clash of air masses" often extends to higher levels of the atmosphere, which leads to strong jet stream winds at high altitudes. If a particularly strong jet stream passes over one of these fronts at the surface, it tends to cause rapid "lift" in the atmosphere, essentially causing a large-scale vaccum cleaner effect that generates rising air through the atmosphere. This leaves less air near the ground, which by definition is an area of low pressure.

This scenario is intensified if the air at high altitudes has broad spin to it in the form of large, curved jet stream winds, which can lead to rapidly strengthening areas of low pressure that then move along fronts and are carried northeastward with the strong jet stream winds above the ground. In the the map included here, it shows winds at roughly 35,000 feet above ground level on the evening of April 12. We see a river of strong jet stream winds close to 100 mph. These winds were situated aloft over the developing surface low pressure system in Colorado. We also see a large curve in the jet stream winds over the western United States (forming what meteorologists call a trough). This all came together perfectly to produce one of the most memorable blizzards the region has experienced in many years.

Many things have to come together to cause these intense "Colorado Lows," which is why we don't see them too often. Large contrasts in temperature are common in the spring, but it takes the right combination and strength of jet stream winds crossing frontal zones with enough "lift" in the atmosphere to generate these really strong low pressure systems. However, when these ingredients all come together, they can bring us some of our highest-impact blizzards, just as they did this April.



CARING FOR THE FLOCK

SUCCESS STORY HIDDEN WITHIN HEARTBREAK FOR PRODUCERS

Hope Brighton, NDDES Mitigation Planning Specialist

he North Dakota Board of Animal Health veterinarians have been working tirelessly to mitigate the impacts of Highly Pathogenic Avian Influenza (HPAI). The response has included collaboration on every level from federal, state, local producers, and veterinarian diagnostic labs. Empathetic to the needs of producers, veterinarians Ethan Andress, Sarah Bailey and Beth Carlson guided impacted North Dakota poultry producers

ed States Department of Agriculture

through a maze of federal red tape to the restoration of operations.

With the close surveillance of flight patterns, experts were able to track the outbreak as it traveled within the migratory flocks southbound from Canada into North Dakota. Surveillance, pre-staging, a dedicated workforce, and lots of collaboration can account for the success story of the Spring 2022 Avian Influenza Response.

As birds travel across vast distances in the spring and fall seasons the HPAI can be passed through large flocks of wild birds. The virus can remain active on surfaces outside of the host for a substantial amount of time proving it to be highly transmittable. In 2022, there were 248 detections of HPAI in wild birds with snow geese being the most impacted species. It is common for the virus to travel from wild bird flocks to poultry through fecal droppings, saliva, nasal discharges, and large fans used to cool barns. Large cooling systems cast a tornado of HPAI onto commercial turkey flocks this spring.

For commercial flocks, it is important to keep strict biosecurity measures at poultry operations through quarantining birds that are typically outdoors and watching birds closely for any signs of disease. The transmission rates highlight the importance of an

USDA

Highly Pathogenic Avian Influenza A Guide To Help You Understand the Response Process

Detect

You see unusual signs of illness or sudden deaths in your flock. You can report it to your private veterina or a State or USDA veterinarian. Samples are taken and tested. You find out your flock is positive for HPAL

Ouarantine USDA and State personnel

come to your farm. We

assign you a case manager

vho will be your main point

of contact onsite, answer

your questions, and quide

you through the needed paperwork. We will also

place your operation under quarantine, meaning only

authorized workers are

allowed in and out, and

poultry, poultry products, and equipment go into effect. We contact

neighboring poultry farms and start testing their birds to see if they've been affected, too

ement restrictions for

Appraise We work with you to create a flock inventory. This lists how many birds you have, what species they are, their age, and other key details. USDA will compensate for birds that must be destroyed using calculators.

Depopulate Compensate

Infected flocks are Affected producers and depopulated as quickly growers must certify that as possible-ideally a biosecurity plan was in place prior to an HPAI hin 24 hours of the first HPAI detectiondetection. Split to get rid of the virus. payments can be provided between the owner and contract grower. You receive your first indemnity payment early on in the response process. We also pay you a standard amount for virus elimination activit (cleanup work).

Manage Eliminate Disposal

Virus USDA will help you The next step is to dispose of the dead birds wipe out all traces of safely. Disposal methods the virus at your property. To kill the include composting, virus, thoroughly clean and disinfect burial, incineration rendering, or landfilling The options you'll have the barn, equipment, depend on several things: what type of farm you and all affected areas of your farm. You can have, the specific do this work yourself or hire contractors to conditions there, State and local laws, and what handle it

Test

As soon as you're ready, let your State both approve, case manager know you're finished with you can restock your cleanup. Your site production again must then stay empty for at least 21 days. State officials will release your farm During this time, we'll from quarantine after return to collect and test environmental all required testing and waiting periods samples. We need to are done. confirm that your property is completely virus-free

Restock Once USDA and the

facilities and start

Maintain Biosecurity

After restocking, you'll need to continu maintaining the highest biosecurity standards to keep the virus from coming back. For biosecurity tips, go to www.aphis.usda.gov publications and download the factsheet Prevent Av Influenza at Your Farm.

How Long Does the Process Take?

Ideally, this entire process could be completed in as soon as 60-120 days. However, the timeframe varies depending on many things (for example, flock size, depopulation and disposal methods used, test results, farm's location) We're committed to restoring production as fast as we can while also protecting poultry health.

USDA is an equal opportunity pr

Questions?

you prefer.

Talk with your case manager or the State or Federal officials responding to the disease event in your area.

For general information and contacts, visit www.usda.gov/avian_influenza.html www.aphis.usda.gov/fadprep www.aphis.usda.gov/animalhealth/ defendtheflock

e • APHIS 91-85-005 • Issued March 2017



efficient response from the moment of detection to depopulation and maintenance of biosecurity after restocking. At a state level, the response must be facilitated quickly from the moment of testing to depopulation. However, it is not as easy as it seems.

There have been more than 100 different types of wild birds around the world that have been associated with Avian Influenza. HPAI causes severe disease and a high mortality rate as the virus attacks multiple internal organs. There are several warning signs including but not limited to soft- or thin-shelled eggs, respiratory distress, and stumbling or falling. The disease spreads quickly between the flocks and in most cases attacks the host within 48-hours.

For a synchronous response, there is a close and timely collaboration from agencies on all levels of government. Once there is a suspected positive case the N.D. Animal Board of Health begins working with the U.S. Department of Agriculture's Animal Plant Health Inspection Service (USDA-APHIS) in response. The flock is to be entirely quarantined while the tests are run. During this process, there is an exceptional amount of administrative labor from the associated agencies before depopulation can occur. It is important to streamline this process as quickly as possible to reduce the spread of the virus even further. The North Dakota Department of Agriculture State Veterinarian's staff named the administrative process one of their greatest hurdles and are in the process of developing creative solutions for future incidents. While utilizing USAHERDS, a federal animal health reporting diagnostic system, those working this year's operation identified the need for a system of our own. Closely tracking paperwork will further mitigate biosecurity impacts of all kinds.

This work is exhausting on all levels as staff work long, emotional hours as they follow through with processes on flocks of all origins. Producers prove resilient time and time again as North Dakota conditions throw unimaginable challenges toward them. Although using proven ethical processes to battle HPAI is no easy feat, state and federal partnerships tackled them with grace and the excitement to learn. Pre-staged resources from close surveillance allowed processes to move flawlessly toward continuing commerce as usual.

The State Board of Animal Health continues to prove to the residents of North Dakota that our livelihood, our pets, and our individual health is valued and certainly acted upon using best practices. With close collaboration and communication, the citizens of North Dakota can work together to combat and adapt to the ever-changing environment around us. Using practices such as close surveillance, pre-staging, utilizing partnerships, and continued biosecurity North Dakota's agricultural production and community will continue to thrive.

AIR, LAND AND WATER

NDDEQ SAFEGUARDS NORTH DAKOTA'S ENVIRONMENTAL RESOURCES

n April 17, 2017, Governor Doug Burgum signed legislation separating the Environmental Health Section from the North Dakota Department of Health to create the standalone Department of Environmental Quality. Environmental Quality became an official standalone agency effective July 1, 2019.

Environmental Quality is responsible for safeguarding North Dakota's air, land, and water resources. Their 170 employees work closely with local, state, and federal entities to address public and environmental health concerns and implement protection policies and programs.

Environmental Quality's vision is for a sustainable, high-quality environment for current and future generations. The agency's mission is to conserve and protect the quality of North Dakota's air, land, and water resources following science and the law. In cooperation with the general public, industry, and government at all levels, the department implements protective programs and standards to help maintain and improve environmental quality.

Environmental Quality has primacy for all environmental programs within North Dakota borders, except tribal and reservation lands (where the Environmental Protection Agency (EPA) has jurisdiction). This means the department has:

Responsibility for ensuring that state and many federal environmental laws are implemented, and

Authority to enforce those laws and related regulations.

Spill Response Activities

Environmental Quality reviews spill reports submitted to the state through the SpillND.gov response portal. The department partners with additional state and federal agencies to address those spills. The response may include collecting additional information, assignment to other agencies, field inspection, and on-scene coordination. Staff collect environmental samples of soil and water and work with the responsible party to monitor spill remediation so that North Dakota's ground and surface waters are protected. Since the timely response to a critical incident is crucial, staff are in the field five days a week. A staff person is also on call during weekends and holidays and an emergency line is covered 24 hours a day, seven days a week.

Staff work with various industries to prepare for incident response actions and educate them on proper remediation and spill assessment.

Air Quality Protection

Environmental Quality is responsible for implementing protective programs and standards to help maintain and improve North Dakota's air quality. Scientists, engineers, and technicians manage the implementation of state and federal programs to help ensure compliance with all air quality laws. The department maintains federal delegation for the Clean Air Act (CAA) programs and provides technical assistance on environmental matters and during emergency response efforts. They approve permits to ensure proper operations and compliance and work proactively with industry to address air compliance concerns.

Other responsibilities include:

- Evaluating permit applicationsConducting computer modeling of
- potential impacts on air qualityCompleting compliance inspections
- Operating an ambient air quality
- monitoring network
- Responding to complaints and air quality concerns throughout the state
- Preparing state implementation plans for Federal Rules, including the Regional Haze Rule

Regional Haze State Implementation

All states must have a Regional Haze Implementation Plan (SIP), required for implementing the CAA. Since Environment Quality has primacy, the department is required to develop a plan addressing visibility impairing emissions every ten years. The SIP was submitted to the U.S. Environmental Protection Agency for approval August 10, 2022.

Environmental Quality strives to follow science and the law in making our Regional Haze SIP determinations, and we are grateful for the legislative support that enables us to do so. This same level of collaboration allows North Dakota to meet all of the national ambient air quality standards. Our high level of air quality is accomplished through compliance outreach, technical evaluations, permitting programs, monitoring and enforcement activities.

Managing Oil Field Waste

Despite recent volatility in the oil production and recovery sector, the workload has continued to increase. Oil field service companies and other support businesses, such as tank manufacturers, generate hazardous waste. Even with the slowdown in oil well drilling activity, the service and support companies remain active. The number of facilities that generate 220 pounds or more of hazardous waste annually have increased approximately 10 percent in the past years. New gas stations and truck stops continue to be built or expanded. Both municipal landfills and oil field special waste landfills deal with new types and significantly increased volumes of waste. Ionizing radiation sources and materials are commonly used in oil exploration and production and require proper training and licensing for safe use.

The generation, proper management, and disposal of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) continues to be a priority in North Dakota. TENORM is low-activity radioactive waste generated primarily in oil field exploration and production activities. It includes filter socks, tank bottom sludge and pipe scale. Certain types of fracking material can also be considered TENORM. Responding to illegal dumping has historically taken considerable staff time, as TENORM is a significant public concern.

Environmental Quality oversees rejected waste loads at landfills and the cleanup of illegal dumpsites. However, these incidents have decreased since the department began requiring TENORM waste containers on all oil well sites. The need for safe and effective TENORM disposal locations is essential. Two facilities are currently pursuing TENORM landfill permits. TENORM applications have generated significant public interest. Environmental Quality cooperates with local governments, cities, and counties, sharing information and answering questions about potential TENORM acceptance at landfills. We educate through numerous public hearings and workshops to reach as many interested parties as possible.

Permit reviews ensure landfill design protects public health and the environment while county governments maintain jurisdiction over what land use is appropriate in their communities.

Environmental Quality established a general permitting program in July 2020. This program provides consistent permitting language and streamline the permitting process, reducing review time while preserving protections for public health and the environment. Environmental Quality intends to address general NDDEQ Environmental Scientist Taylor DeVries inspect remediation at a salt water spill site.



permitting for land treatment of petroleum contaminated soils through this process. Developing a comprehensive general permit would ensure a clear and consistent remediation.

Environmental Quality reinforces its mission for a sustainable, high-quality environment through science, collaboration, and innovation. The department values state, federal, tribal, industry, and community partnerships. They strive to be accessible to customers, transparent in operations, and accountable for decisions.

Jennifer Skjod is a Public Information Officer with the North Dakota Department of Environmental Quality. She established the first Environmental Quality public information program after working at the North Dakota Department of Health and the North Dakota Supreme Court. She is a member of the state Environmental Justice team.



MITIGATION SPOTLIGHT INCREASING A COMMUNITY'S RESILIENCE

s part of the 2018 Pre-Disaster Mitigation Grant Program (PDM), which is a nationally competitive grant program, the City of Mandan was approved to purchase and install emergency generators at two (2) city operated lift stations. These lift stations are located at 40th Avenue SE and Sunset Drive NW, which served a combined 1,569 metered accounts at the time of application.

These generators will help protect Mandan residents from long-term power outages by supplying emergency power to two of their wastewater lift stations. Long-term power outages to lift stations can be devastating to the residents, businesses, and local economy. As an example, wastewater could start backing up into homes and businesses, causing property damage and creating environmental hazards. These generators will provide much needed insurance against power outages and can provide peace of mind.

As of June 21, 2022, this project was closed by NDDES and FEMA. The final cost of the purchase and installation of generators at the two lift stations was \$309,843.25. NDDES is proud of the long-term benefits the generators will provide to the City of Mandan.

Through the Pre-Disaster Mitigation Program, upgrades were made to the lift station on 40th Ave SE in Mandan, ND, top, with new generators, bottom, to protect residents from long-term power outages.





STRENGTH FROM THE SOIL

RESEARCH POINTS TO SUCCESSES, PROPER USE OF CROPLAND MANAGEMENT TOOLS

Hope Brighton, NDDES Mitigation Planning Specialist

s the environment changes, farmers and ranchers closely monitor weather conditions and patterns. Long-term climate conditions are impacting farmers and ranchers now more than ever encouraging them to utilize new forms of crop and livestock management. Many are choosing to utilize crop rotation and livestock integration to reap benefits such as reduced soil erosion, improved soil biodiversity, increase soil nutrient retention, and expanded soil water-holding capacity (Sedivec, Meehan, & Berti, 2020). Researchers across the United States are exploring soil health and production benefits as cropland management methods become more popular.

Dryland regions cover over 40% of total global land area, housing nearly two billion of people with a nearly a quarter allocated to cropland; much of North Dakota can be classified into

this statistic (Liebig, et al., 2022). With predicted increases of aridity in climate, warming, and human population growth there is significant risk as there are continued negative impacts to soils highlighting the importance of integrating cropland management practices. Experts from the U.S. Department of Agriculture -Agriculture Research Service (USDA-ARS) Northern Plains Research Laboratory located in Mandan, N.D., highlight the importance of crop diversification through the benefit of increased biomass that are particularly helpful in reduced tillage cropland. Using manure from livestock will also enhance the biodiversity within the soil allowing for nutrients to breakdown to be used in further nutrient cycles of plants (Liebig, et al., 2022). Keeping a continuous cycle of plant life in the soil helps with carbon sequestration working to reduce the already heightened levels of carbon in the atmosphere. This is only one great example of implementing sustainable mitigation actions.

Understanding sustainable crop and livestock management



practices provides opportunities for increased resilience to natural hazards in North Dakota. Research findings emphasize the importance of proper usage of crop management tools as there are possibilities of negative impacts from malpractice or misunderstanding. Noting the timing and type of cover crop is essential for success. One example is for fall cover crops, is dependent on adequate soil moisture at seeding or a rainfall following seeding (Sedivec, Meehan, & Berti, 2020). Integrating late fall cover crops serves to lock in moisture and provide a barrier to harsh winter winds. There is value is preventing soil erosion as the soil is losing valuable nutrients while also worsening air and water quality.

There are also several points of observation and management to evaluate to ensure that livestock are receiving the proper nutritional needs while also recycling nutrients to enhance soil health. When considering adopting regenerative agriculture practices it is important for farmers and ranchers to consider including the cost and conditions required for a successful cover crop yield. Utilizing minimal tillage practices increases the stability of the aggregate or biomass that remains on the top of the soil. These practices impact the pore spaces in the soil allowing for the infiltrate and retain water to benefit both drought and flooding conditions. There are also fossil fuel benefits for livestock producers as there is less required hauling of resources (Sedivec, Meehan, & Berti, 2020). When considering introducing regenerative agriculture it is important to consider several factors to understand which practices may benefit the production the most.

Liebig (2022, pg. 13) notes, "Future investments fostering the development of well-functioning soils throughout the region will improve economic and social well-being of communities through sustained delivery of ecosystem services and increased adaptive capacity for managing environmental change." Understanding the key elements of cropland and livestock management provides capacity for resiliency building on an operational basis. A Bismarck local, Gabe Brown, has implemented regenerative agricultural practices on his ranch and shares his successes in the next article.

Refer to North Dakota State University (NDSU) Extension and to the USDA-ARS Northern Great Plains Research Laboratory for specific guidelines and recommendations on cropland and livestock management practices.

Climate Resiliency through Regenerative Agriculture

Gabe Brown is an agricultural trailblazer combating climate one move at a time. After growing up within the city Brown started his story in agriculture with a familiar club known as the Future Farmers of America (FFA) and moved on to purchase land from his wife's parents. From learning the conventional production model for agriculture and livestock Brown continually asked, "Why?" This started the journey toward restoring soil health evolving the field of agriculture and eventually operating Brown's Ranch and *Understanding Ag*.



Through formal education and seeking advice from other pioneers of soil health, Brown was able to understand a new way of farming. Working with nature instead of against it using the five principles of soil health overall produces a more profitable yield, foods higher in nutrient density, and ultimately promotes climate resilience. The N.D. National Resources Conservation Service has implemented five principles that the Soil Health Foundation supports. These principles are also featured in Brown's book *Dirt to Soil*:

- 1. Armor the Soil Surface: Allowing plant residue to remain on the soil not only acts as a barrier against weather and weeds but also catalyzes the biology within the soil. Armoring the soil with organic matters naturally cools the temperature of the soil leaving a dramatic impact on plant health.
- Limit Disturbance: Limiting 2. mechanical, chemical, and physical disturbance to allow nature to complete the natural cycles. Brown cites Dirt: The Erosion of Civilization by Dr. David Montgomery noting that tilling immediately destroys soil aggregate, significantly decreases water infiltration rates, and accelerates the breakdown of organic material. Artificial chemicals impact the naturally occurring microorganisms, therefore, disrupting the surrounding ecosystems and human health; simply put fertilizers are making our plants less hardy and therefore more vulnerable to stress.

- 3. Build Diversity: Planting a diverse group of plants to include crops in cool-season grasses, cool-season broadleaves, warm-season grasses, and warm-season broadleaves create a healthy balance of carbon: nitrogen ratios. Having an optimum soil ratio allows for microorganisms such as fungi to decompose plant residue more quickly therefore cycling nutrients for the next crop.
- 4. Keep Living Roots in the Soil: Keeping plants in the soil year-round provides a continuous cycle of converting solar energy into biological energy. Roots aid in both absorption and retention of moisture. This principle is one of the most important that a farmer can implement.
- 5. Integrate Animals: With most grazing animals removed from our natural grasslands keeping animals present in the agricultural landscape offers opportunities for plants to photosynthesize more and pump more carbon into the soil compared to a plant that was not grazed. Having multiple species of grazing animals also increased the profitability of the operation.

Brown has found that using cropland and livestock management benefit the profitability and quality of his products have increased while also adding a natural barrier to serve as a natural form of mitigation. Having plants that are hardy decreases overall loss when there are extreme weather events and increase resiliency in the long-term. In Dirt to Soil Brown discusses the impacts of extreme summer storms on his own ranch in the beginning and the detrimental impacts on his production. As soil health is advanced while regenerative practices come to fruition Brown's Ranch becomes more climate resilient every day.

When interviewing Brown, he highlighted a success story from an Understanding Ag client residing in North Carolina. He shared that the farmer had experienced impacts of Hurricane Florence but had regenerated soil with expedited infiltration rates that was able to be planted within two weeks, while neighboring farmers awaited receding flood waters. Using this example as a best practice for North Dakotan farmers is highly valuable. As the seasons come and go eastern North Dakota faces flooding on a regular basis. Having soils with the ability to infiltrate water quickly and maintain water levels into the long summer months can mitigate both flooding and late season drought.

As we adapt to our changing climate we must work to achieve "common ground for common good." We must work to actively educate ourselves and neighbors on how to mitigate the extreme weather swings furthering positive societal change catalyzing resilience in our communities. Having agricultural advocates in the spaces that are building and implementing policy will positively impact generations to come. To learn more about Gabe Brown check out Understanding Ag and read Gabe Brown's book Dirt to Soil.







GROWING MITIGATION FUELS REDUCTION PROJECT STRENGTHENS RESILIENCY TO WILDFIRES

ildfires are one of North Dakota's sizable hazards and continue to be an ongoing battle threatening life safety, critical infrastructure/property, and the environment. Significant sources of wildfires include inadequate measures for controlled burns, smoking, sparks from farm machinery or trains, and lightning. Wildfires can leave a path of destruction, but they also serve as an agent of rehabilitation for some of our landscapes, offering transformation and renewal. They are an essential component in nature and because of this, wildfire will continue to pose risks.

To mitigate risks resulting from wildfires, the North Dakota Forest Service (NDFS) has been conducting hazardous fuels reduction work. The Deep Creek Fire on September 4, 2004, kickstarted this initiative in North Dakota. With enough ground fuel such as grass, leaves, and debris, the wildfire climbed into the canopy of pine trees in Slope County and resulted in a stand-replacing disturbance causing little to no pine tree regeneration. A fire spreading from treetop to treetop independently of a surface fire is known as a crown fire. According to the National Park Service, crown fires are the most intense type of fire and often the most difficult to contain. They require strong winds, steep slopes, and a heavy fuel load to continue burning. This extreme fire behavior observed during the Deep Creek Fire was caused by a combination of the large accumulations of fuels, weather conditions, topography of the Badlands and characteristics of the pine trees that changed the dominant cover type from ponderosa pine to grass.

Much like our communities in North Dakota, there is resiliency and adaptivity within our forests. Of the species of trees in North Dakota, ponderosa pine trees are well adapted to frequent, low-intensity fires, and they make up roughly 4,000 acres in southwest North Dakota. After a wildfire occurs, a new forest is created from seeds produced by remaining trees, so crown fires that kill all the trees in an area keep the landscape from regenerating naturally. Forests can tolerate fires that stay on the ground, but once it intensifies through mature trees they are likely to be killed. These trees shelter wildlife, provide food, and absorb large amounts of water that would otherwise inundate the land. Historically, ponderosa pine stands faced low to moderate surface fire severity every 3-45 years depending on the region. A historical stand, which is the composition and structure of the ecosystems in a floodplain





Left, a typical unmanaged ponderosa pine stand in southwest North Dakota. Tree crowns are touching, there is continuous fuel from the forest floor to the crowns of the trees, and there are heavy downed fuels. Above, the Deep Creek fire area thirteen years later in 2017. There is no natural ponderosa pine regeneration except in close proximity to the surviving trees.

forest, consists of uneven, aged trees with some being 400 years old, yielding between 12-40 trees per acre. As the land in North Dakota became drier, these ancient forests experienced not only regular but catastrophic fires. Grasslands became dominant as these impacts shifted over the landscape, leaving fewer forest stands remaining. According to the United States Department of Agriculture (USDA) Forest Service, North Dakota has roughly 823,406 acres of forest land, or about two percent of the total land area. An estimated 379 acres of forest land is disturbed annually by fire. In addition, North Dakota has an estimated 796,878 acres of trees, such as windbreaks and conservation plantings, outside of forests. These trees protect our farmsteads, cattle, and fields from wind, and are also vulnerable to wildfire. Grasslands may outweigh forests in the state, but these forests contribute extensively to the biodiversity of this land and contribute to an annual stream of valuable ecosystem services such as erosion protection and carbon sequestration. To ensure the longevity of our environment, the surviving forests should be maintained as North Dakota is naturally wildfire prone.

Beginning in 2005, NDFS started orchestrating their hazardous fuel reduction work near Amidon in Slope County. This work consists of using mechanical thinning treatments done by the NDFS fire crews. Chainsaws are used for felling, bucking, and removing excess tree limbs to reduce ladder fuels or vegetation that serves as a link between the grass and treetops. Skid loaders assist with stacking materials to be burned. Since ponderosa pines are prolific seed-producers, many areas are now seeing ponderosa pine stands of 600-800 per acre where forest remains. Dense areas of ponderosa pines may be hindered without some form of management and will show signs of stress as they mature. Some concerns that are beginning to surface through these forests include porcupine damage and small suppressed trees that are struggling due to over-competition. Removing the young trees and thinning will help ensure mature trees remain healthy. Pine engraver beetles otherwise known as, ips, are present but in low numbers. These beetles attack weak and damaged trees. Dead wood builds up in these stands providing ideal areas for these beetles to thrive. They are also attracted to the piles of materials removed, otherwise known as slash. If the beetle populations get large enough they will begin to attack healthy trees. To mitigate this risk, the slash piles are burned. These beetles are not invasive but can become overpopulated when doing fuel reduction work. Roughly one tree per acre will be infested per year encouraging NDFS to reduce dry fuel buildup. According to



A hazardous fuels mitigation thinning project carried out within a ponderosa pine stand before 2017. The stand is at optimal density for forest health, and downed fuel and ladder fuels are scarce.

the USDA-USFS burn plan, it is required that there must be at least two inches of snowfall accumulation on the ground before burning debris accumulation. NDFS will conduct slash burnings as they deem appropriate. This safety measure is to reduce the risk of additional fire starts since it can become a larger problem if not done correctly. The fire teams are multipurpose crews moving from season to season. Fire season traditionally runs from spring to fall, but crews also work the winter months burning these piles during the "off" season. "Reducing the density of the stand is the best way to keep the trees as healthy and vigorous as possible. This will improve the growth rates of the residual trees, plus it will prevent endemic levels of insect and disease from reaching epidemic levels," states Peter Warmuth, NDFS Fuels Technician. These actions have successfully decreased the number of detrimental fires while fostering the restoration of natural ecosystems.

The land is maintained at all levels (private, state, federal) and these efforts have become collaborative. Lezlee Johnson, NDFS Forestry and Fire Management Team Leader shared, that the working relationships among the whole community partners have grown exceptionally. Private landowners have expressed their satisfaction with completed nearby fuel reduction actions and have requested to expand the scope of projects for assistance. NDFS has had great success with meeting goals and dramatically reducing fuel loads that carry catastrophic wildfire. "The Forest Stewardship Program prepares Forest Stewardship Plans for every private forest landowner whose property we work on. There are comprehensive plans that help forest landowners actively manage their forests, keep their land healthy and productive, and meet their individual goals," Lezlee said. The ponderosa pine stands in southwestern North Dakota are often grazed, a practice that is not compatible with other forest types within the state. Thinning the pine stands improves the forage available for cattle along with reducing the risk of wildfire. A new opportunity recently came along in conjunction with the US Forest Service (USFS). NDFS was invited to join the USFS to coordinate through the Good Neighbor Authority program that led to the expansion of operations to federal land. Actions such as felling, and piling are done according to the prescriptions found in the management plan for each property. Current fuels mitigation projects include work on private land and Little Missouri National Grasslands. NDFS has also been invited to do hazardous fuel reduction work within Theodore Roosevelt National Park to assist with juniper removal. These collaborative and cross-boundary efforts, together, serve to improve ecosystem health and resilience, while reducing the risk of loss to wildfire for all.

Ultimately, these current actions support the most cost-effective way to protect and sustain our remaining forests in North Dakota. Wildfire can impact our daily lives in numerous ways whether it be air or water quality, lack of resources to support firefighting efforts, along with other extensive losses/challenges. Risks will always remain, but through mitigation actions, we can protect our communities with the support of partnerships. Hazardous fuel reduction work is just one of the many valuable projects taken to ensure a safe and resilient North Dakota. Honoring and protecting our environment remains imperative.

Katie Leitch, NDDES-HLS Planning Specialist, collaborated with Ryan Melin, Lezlee Johnson, and Peter Warmuth to fully understand the scope of this project, while also discovering more about the vastness of North Dakotas landscapes and its history.

A LAND OF EXTREMES

STATE HAZARD MITIGATION TEAM EXAMINES IMPACT OF CLIMATE PATTERNS ON ND

orth Dakota can be characterized as a land of extremes when it comes to weather and climate, with potentially extreme heat in the summer to extreme cold in the winter, and severe thunderstorms in the summer to intense blizzards in the winter and early spring. Observed and projected warming of average temperatures across North Dakota are likely to impact the frequency and extent of the weather and climate extremes the state experiences in the future.

The State Hazard Mitigation Team's Climate Change Committee is analyzing weather patterns to determine impacts on North Dakota's Hazards and Threats.

Since the beginning of the 20th century, average temperatures have risen more than 2.6 degrees Fahrenheit across the state. Warming of the average annual temperature is projected to continue, with the magnitude of warming dependent upon the level of future greenhouse gas emissions. While warming temperatures

Dust blows across Interstate 94 May 2021 near Valley City, North Dakota, due to the dry drought conditions across the state.



have been noted during all four seasons of the year, the most significant warming has occurred during the winter months, which can impact weather and climate conditions year-round.

Warming temperatures generally coincides with increasing moisture in the atmosphere for precipitation. Because of this, there has been an observed increase in the number of extreme (2-inch) precipitation events across the state since 1990, and this increase is projected to continue. Despite the lack of an observed trend thus far, the amount of precipitation during the winter months is also projected to increase due to similar reasoning. While not correlated to decreasing snow events and amounts, more rain and freezing rain events will be possible across North Dakota during the winter due to a warmer atmospheric column. When it does snow, heavier, wet snow can be expected with an increased water content.

Despite the projected increase in annual average precipitation, droughts are expected to continue, and are likely to increase in both frequency and extent. This is due to more precipitation falling during the winter months and warmer summertime temperatures leading to increased evapotranspiration and drying of soils. With the increasing evapotranspiration, increases in wildfire extent and frequency are also expected due to the further drying of vegetation which serves as fuel.

Brandon Gale, a meteorologist with the National Weather Service, assisted the NDDES Planning staff during 2021–2022, serving an internship for his emergency management graduate studies. Brandon updated the Enhanced Mitigation Mission Area Operations Plan Baseline Climate Analysis.

BEHIND THE CURTAIN

THE PLACE WHERE COORDINATION, DISASTER RESPONSE COINCIDE

orth Dakota has had its share of disasters with 42 federal declarations since 1993 and many more disasters that do not meet federal thresholds but nonetheless adversely impact our state residents and visitors.

The State Emergency Operations Center (SEOC) supports our local and tribal responders and their communities when a hazard or threat endangers lives and causes damage. The N.D. Department of Emergency Services (NDDES) staff has coordinated state response from the SEOC for a number of wildland fires, hazardous materials spills, potable water shortages, missing persons, Public Alerts, downed/missing aircraft, train derailments, flooding, severe winter storms, tornadoes, power outages, hail, rain and high-wind storms that produced significant property damage and threatened lives.

Following is a summary of key events that occurred during 2021, including the pandemic which began in 2020:

Hazardous Materials Incidents

Between January 1, 2021, and December 31, 2021, NDDES received 909 hazardous materials incidents reported through the State's Unified Spill Reporting System (Hazconnect).

June 7-11, 2021 – Severe Summer Storm/Overland Flooding

- Storms produced tornadoes, up to baseball-size hail, damaging winds of up to 93 miles per hour and torrential rainfall that led to overland flooding, which was exacerbated by dried-out, nearly impermeable topsoil.
- Gov. Doug Burgum requested a presidential major disaster declaration for the series of storms that resulted in more than \$2.3. million in damage to roads and other infrastructure. Eight counties were included in the request: Burke, Divide, Emmons, Grant, Kidder, LaMoure, Sioux and Williams.

March 15, 2020 - April 30, 2021 - COVID-19 Response

The State Unified Command team was originally stood up on March 15, 2020, to respond to the COVID-19 pandemic. Through the incident command structure, the N.D. Department of Health (NDDOH), N.D Department of Emergency Services and other state, local and tribal agencies collaborated to develop effective structures, processes and resources for the state's whole-of-government response to the pandemic.

When active COVID-19 cases began to decline and the ND Smart Restart was launched, the Unified Command was scaled



NDDES assisted in facilitating training with the North Dakota Forest Service and providing equipment for members of the North Dakota National Guard in May so the Soldiers could support the state's response to wildfires in 2021.

back in June 2020 and transitioned primarily back over to the NDDOH with NDDES in a support role. Due to an increase in the COVID-19 positivity rate and uncertainty caused by large community events; expanded business activity and the restart of school; along with the possibility of a vaccine launch later that year, the changing environment required a whole-of-government response and holistic incident management. For that reason, the Unified Command was expanded in late August 2020.

NDDES staff spent most of their time engaged in COVID-19 response-related activities to include testing, staffing, school reopening, logistical coordination, incident action and contingency planning, incident management facilitation and participation in daily meetings. On April 30, 2021, the Governor lifted the state emergency at which time the State Unified Command was decommissioned and transitioned back to the NDDOH.

2021 Drought and Wildland Fire Season

Fire season in North Dakota, which typically begins in April, began early in 2021 with the Windy Fire, near Lemmon, South Dakota, on Jan. 14. It burned approximately 7,000 acres on the North Dakota side of the border and 10,000 acres on the South Dakota side. As of Aug. 18, 2021, North Dakota had experienced more than 2,000 fires burning over 120,000 total acres; this is compared to just over 900 fires for a total of about 12,000 total acres in 2020. Historic drought conditions only increased the size and intensity of fires in 2021.

NDDES participated in State Wildland Fire and Drought Unified Command through which staff collaborated with the N.D. Forest Service, N.D. Department of Agriculture and other state, local and tribal agencies to coordinate preparedness and response-related activities.

Some dramatic improvements leveraging technology, however, were generated during NDDES's involvement in response operations. One of those innovations was a GPS-configured wildland fire dashboard that provided leaders, planners and firefighters with better situational awareness. It was the first time data could be compiled through reports from local emergency managers and 9-1-1 calls, as well as historical data from the Integrated Reporting of Wildland-Fire Information (IRWIN) system used by fire departments.

NDDES also initiated a program to augment the state's firefighting capabilities and resources by creating a wildland task force for the state. The task force concept was adopted to allow local fire departments the ability to respond outside their jurisdictions, if needed. Departments that volunteer will coordinate directly with the Forest Service to preposition personnel and equipment for any potential state wildfire suppression missions.

NDDES also partnered with the N.D. Forest Service and N.D. National Guard to train a cadre of Soldiers to augment the Forest Service and bolster their resources.

Large Fire/State Support Activities:

• Windy Fire (January 14) – 7,000 acres on N.D.



side/10,000 acres on S.D. side

- Medora Fire 3,000 acres
- Horse Pasture Fire 5,000 acres
- Roosevelt Creek Fire 4,603 acres
- Mandaree Fire 9,803 acres
- Manning Fire 1,800 acres

Emergency Management Assistance Compact Support

The staff trains, facilitates and evaluates resource requests from other states through the Emergency Management Assistance Compact (EMAC), a state-to-state mutual aid agreement, of which North Dakota is a member. During the year, North Dakota deployed the following resources via EMAC:

- Montana Wildfires Wildland firefighting boots from NDDES cache
- California Wildfires MQ-9 Crew Support from N.D. Air
 - National Guard
- Louisiana Hurricane Response Structural firefighters from Williston, Dickinson and Bismarck Rural Fire Departments

July 1, 2021 -- June 30, 2022, Mitigation Action Updates

The following list encompasses updates on mitigation actions that have occurred since the *State of North Dakota Enhanced Mitigation Plan* received approval on February 14, 2018.

PLEASE NOTE: The status reports in **red** are updates are for July 1, 2021, through June 30, 2022. The ones in **black** are ongoing and continuing or were completed during the last update in 2020. Revisions to Action Statements, Action/Strategy **Descriptions and agencies added to tasks are also in red, based on changes in direction as determined by the State Hazard Mitigation Team.**

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
2019-1	Mitigation Planning	Provide technical and financial assistance to local and tribal jurisdictions developing or updating multi-hazard mitigation plans (MHMPs); and assist communities with other mitigation- related planning initiatives.	All local and tribal jurisdictions are encouraged to develop and adopt mitigation plans that fulfill the requirements of the Disaster Mitigation Act of 2000, enhance community resiliency, and meet the needs of the jurisdictions. This action also calls for the State Hazard Mitigation Team (SHMT) to continue its Community Coffee initiative, collaborating with local and tribal mitigation planning teams to elicit public feedback on hazards, threats, risks, vulnerabilities, and mitigation actions.	 ND Department of Emergency Services (NDDES): Presented on North Dakota's approach to climate change analysis during the FEMA Region 8 Climate Adaptation Seminar. Collaborated on revisions to the state mitigation plan's baseline climate assessment with a National Weather Service meteorologist for his master's degree in emergency management. Conducting a study of the impacts of natural hazards on the state's electrical system. Conducted training on plan review for new NDDES staff; broadened level of mitigation planning expertise. Developed an online mitigation status map for use by partners (NDDES GIS staff): <u>MHMP Status Dashboard.</u> Participated in several local and tribal mitigation planning meetings either virtually or in person to provide technical assistance with plan development Initiated a series of mitigation plan developers meetings focused on best practices and promotion of available resources through the State Hazard Mitigation Team (SHMT) partners. Participated in local and state policy mitigation plan policies webinars.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Participated in the National Climate Assessment Northern Great Plains Engagement Workshop, shared North Dakota's perspective on climate change. Conducted G235 Emergency Planning class – Nov. 15- 18, 2021. Supported a regional G318 Hazard Mitigation Planning Workshop by FEMA Region VIII during March-April 2021 with a Hazard Identification and Risk Assessment presentation. Promoted best practices and technical assistance during 7/1/2020-6/30/2021 during multiple mitigation plan reviews under the Program Administration by State (PAS) Pilot Project. Collaborated with the N.D. Department of Health, Office of Health Equity, on July 15, 2020, to broaden the definition of vulnerable populations. Developed a risk assessment tracker based upon data from local and tribal MHMPs. Conducted a G318 Hazard Mitigation Workshop and tour of mitigation project sites in Fargo in September 2019 in collaboration with Fargo-Cass County Emergency Management, Federal Emergency Management Agency. Held five Community Coffees in 2019 with new Americans, North Dakota State University (NDSU) students, seniors, first responders, and local hazard mitigation teams in collaboration with Emergency Managers from Fargo/Cass, Dickey, Stark and Morton County Emergency Management; Lutheran Social Services; NDSU; and KLJ Engineering. Assisted emergency managers in the completion of local Threat and Hazard Identification and Risk Assessments (THIRAs).

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Conducted 4 regional training sessions on how to complete the THIRA tool. <i>ND Forest Service:</i> Provided cost-share grant opportunities for 41 fire departments totaling \$323,970. Provided wildland fire specific training to 308 North Dakota firefighters. Provided municipal tree inventories and emerald ash borer (EAB) mitigation plans to 100 communities. Provided EAB mitigation plans last year to 18 small communities. Provided cost-share assistance to communities preparing for and diversifying tree species ahead of the arrival of EAB. Trained 205 natural resource professionals in EAB identification and mitigation options Participated in DES statewide mitigation planning through collaborative meetings. Two staff members completed Forest Climate Adaptation Planning training through the Northern Institute of Applied Climate Science. Continue to provide technical and cost-share assistance for rural windbreak renovations improving species diversity and mitigating EAB. Provided cost-share grant opportunities for 45 fire departments totaling \$312,300. Provided cost-share assistance to communities. Provided EAB mitigation plans to 100 communities. Provided cost-share assistance to communities. Provided EAB mitigation plans last year to 18 small communities. Provided cost-share assistance to communities. Provided EAB mitigation plans last year to 18 small communities. Provided cost-share assistance to communities preparing for and diversifying tree species ahead of the arrival of EAB. Trained 205 natural resource professionals in EAB identification and mitigation plans last year to 18 small Provided cost-share assistance to communities preparing for and diversifying tree species ahead of the arrival of EAB. Trained 205 natural resource professionals in EAB identification and mitigation options

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 ND Department of Water Resources: Participated and contributed to the statewide mitigation plan through collaborative meetings ND State Fire Marshal: Support and attend all planning sessions with NDDES. NDSU Extension: Hosted drought planning webinar series for ranchers, which had 140 live and 1,306 video views. Contributed to a regional Collaborative Drought Based Scenario Planning Guide and helped facilitate a workshop on the guide. Participated and contributed to the statewide mitigation plan through collaborative meetings. Extension specialists and agents have been providing educational resources and technical assistance to local and tribal mitigation planning teams to understand hazard and threat impacts on the agricultural industry and communities. ND Department of Agriculture and Animal Health Division: Conducted a day-long workshop given to 20 veterinarians and state response partners at an annual veterinary reserve corps meeting during February 2022, a collaborative initiative between NDDES and NDDA/BOAH. Implemented a OneHealth approach to Highly Pathogenic Avian Influenza (HPAI) response among state, county and local authorities. Participated in a Multi-State Partnership annual meeting Security in Agriculture. Attended a table-top exercise by Southern Agriculture and Animal Disaster Response Alliance Foreign Animal Disease (SAADRA FAD) Safe Exercise (remote/virtual participation).

147

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Expanding or changing ranges of pests and pathogens influenced in part by climate change. Epizootic Hemorrhagic Disease (EHD): deer, elk, bison, cattle, provided outreach/education and diagnostic support to North Dakota Stockmen's Association, veterinarians, other state agencies partners, county Extension and FSA; working through the process to update species eligible for indemnity. Vesicular Stomatitis: highly influenced by climate conditions and regions typically impacted have changed over time; seeing new incursions in new species in new locations and changing seasonality of patterns. Ticks: Asian long, lone star (alpha gal) health department and veterinarians; information sharing with industry via Board representatives. Cyber: Actively engaged in state level disaster recovery planning, firewall testing of information systems and database. Participated in national information sharing events agricultural incursions and vulnerabilities. Veterinary reserve corps training included cyber awareness. Support and promote Secure Food Supply (SFS) plans, created enrollment form and streamlined process for veterinarians to assist producers developing SFS plans National Poultry Improvement Plan biosecurity planning, animal disease traceability standards and building capacity and capabilities for electronic records sharing during outbreaks.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Served as break-out room facilitators of an Animal Search and Rescue (ASAR) emergency shelter planning workshop of a County Emergency Manager (EM), Voluntary Organizations Active in Disaster (VOAD) and animal control from Minnesota and North Dakota in Nov 2020. Support and promote Secure Food Supply plans, National Poultry Improvement Plan biosecurity plans and pilot Swine Health Improvement Plan to effect disease and disaster mitigation at the producer level. Conducted a review of the infectious diseases annex for the Hettinger County Hazard Mitigation Team. Participate in a number of county Mitigation Planning processes to review and support county processes ND Department of Transportation (DOT): Participated and contributed in four quadrant meetings in October 2021 on risk and resiliency for the State Freight and Rail Plan. Feedback was received from County and Tribal Emergency Planners, NDDES, USACE and FEMA. Provided feedback on the Roads Acting as Dams (RAAD) portions of the Spirit Lake MHMP. ND Geological Survey: Reviewed the geologic hazard profile for the Rolette County Hazard Mitigation Team. Provided cattle truck rollover protocol instruction to various law enforcement agencies.
2019-2	Hazard Mitigation Planning Toolbox	Develop a web-based Hazard Mitigation Planning Toolbox.	This action supports State, local, and tribal planning teams by providing links to hazard- and threat-related information and mitigation-related	 NDDES: Finalizing the web-based Hazard Mitigation Planning Toolbox. Resumed efforts to identify and establish a database of resources after the COVID-19 response. Initiated development of the North Dakota Reference Guide: Key Hazard Mitigation Planning Considerations.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			webinars; guidance for developing plans that involve the Whole Community; information on the State's building code program; and development of reference guidance.	 Developed and implemented a process for tracking hazard- and threat-related informational links. Project still under development.
2019-3	Building Codes and Zoning Ordinances	Encourage local jurisdictions to develop and update building codes and zoning ordinances.	Building codes and zoning ordinances promote mitigation principles by outlining requirements and restrictions to keep communities safer. Examples include: • Floodplain ordinances • Defensible space (fire prevention) • Snow load building requirements	 North Dakota Planning Association Educate individuals, legislators, and planning professionals on the importance of planning and contemporary planning best practices, partner with those with a passion toward community-based efforts in planning and related fields, and advocate for the future success of communities through good policy and planmaking. Continuing to educate City and County planners on zoning and encourage all entities to update their Zoning Ordinances and Comprehensive Plans. NDDES: Emphasized importance of building codes and zoning ordinances during a G318 Hazard Mitigation Workshop in Fargo in 2019. NDDES and ND Department of Commerce: Continue to encourage local and tribal planning teams to consider adding mitigation actions directed at reviewing/enhancing building codes and zoning ordinances, as part of technical assistance efforts.
2019-4	Cultural and Historical Preservation	Promote the participation of cultural and historical preservation organizations in the planning process.	This Whole Community action calls for leveraging the expertise of cultural and historical preservation organizations when: 1)	 NDDES & State Historical Society: Conducted EHP Reviews on all preparedness projects. Conducted a meeting with a Federal Emergency Management Agency (FEMA) partner to discuss potential training/integration opportunities. COVID-19 response postponed efforts.
Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
----------------	---	--	--	--
			analyzing risk and vulnerability; and 2) identifying mitigation measures designed to protect cultural and historical resources.	 State Historical Society of ND: Published <u>HISTORIC PRESERVATION IN NORTH</u> <u>DAKOTA. 2022-2027: A STATEWIDE</u> <u>COMPREHENSIVE PLAN.</u> Worked closely with environmental and agricultural groups to protect cultural resources in planning drought mitigation. NDSU Extension: As part of response to events in 2019, 2020, and 2021, Extension staff members have developed educational materials on mitigation measures to preserve historical and cultural resources to response and recovery workers and citizens. ND National Guard (NDNG): Conducts cultural and historical preservation assessments on land used for training or operated by the NDNG.
2019-5	Basin-wide Water Management Development and Management Planning	Conduct comprehensive basin- wide watershed management water management and development planning in the five major basins in North Dakota.	This action ensures comprehensive basin- wide water development planning in the seven eight major basins in North Dakota – the (upper and lower Missouri River Basins; the James River Basin; the Mouse River Basin; the Mouse River Basin; the Red River Basin; Little Missouri; Upper Heart and Upper Cannonball River Basin; and the Devils Lake Basin. – to allow for This process supports a	 ND Department of Water Resources (DWR): The DWR has entered into an agreement with the U.S. Geological Survey (USGS) to evaluate seepage on the Souris River. The Souris River Seepage Study evaluated how drought conditions affected reservoir releases on the Souris River for the purpose of informing future operations. The DWR has entered into an agreement with the USGS to evaluate low flows on the Red River of the North. The objective of this study is to build knowledge of the historical and potential future flow conditions on the Red River, estimate how much changes in land cover and land use have influenced low flows, estimate how much hydroclimatic shifts and long-term persistence have influenced low flows, and evaluate differences between flow minimums and established flow needs.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			moreconsistent and collaborative approach to flood and drought mitigation-plane and projects particularly in large population areas. Looking at the issues that face the basins from a regional and watershed perspective rather than through single jurisdictions typically results in a more favorable and thorough plan of action.	 The DWR has continued its agreement with the USGS to monitor water quality and flow on the Sheyenne River. This monitoring is conducted to better understand the effects of operating the Devils Lake Emergency Outlets on the Sheyenne River. The DWR provides funding and technical assistance for basin-wide water and land management planning. This has included assistance to Joint Water Resource Boards (JWRBs). On a biennial basis, the DWR completes a Water Development Plan. As required by NDCC 61-02-01.3, the DWR shall develop and maintain a comprehensive water development plan that includes a water project inventory. The last Water Development Plan was completed in January 2021. Also see Souris Basin Dams Mitigation Action. <i>US Army Corps of Engineers (USACE) – St. Paul District:</i> St. Paul District, in cooperation with the Red River Basin Commission, the North Dakota Joint Water Resources Commission and the Minnesota Red River Watershed Management Board, completed a Basin-wide Comprehensive Watershed Management Plan for the Red River of the North in 2018. The Plan defines goals and roles for multiple agencies. <i>US Army Corps of Engineers (USACE) – Omaha District:</i> Publish the Missouri River mainstem System 2021-2022 Annual Operating Plan by December 2021. This document outlines both flood risk reduction and water conservation activities for the Missouri River mainstem. Plans are underway to make USACE Emergency Action Plan inundation maps and updated comprehensive dam database publicly available in the National Inventory of Dams by the end of 2021. Will include summaries of best available risk information and inundation scenarios,

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				including water depth and arrival times and life loss and property impact estimates.
2019-6	Local Master/ Comprehensive Planning	Encourage local zoning and planning boards and commissions to develop and maintain master and/or comprehensive plans.	Analyses of local and tribal mitigation plans indicate local master and comprehensive plans are outdated in many communities. This action supports development of these plans as vehicles to regulate development in hazard-prone areas. Hazard mitigation becomes much more cost effective when handled before structures and infrastructure are placed in hazard-prone areas.	 Supported an initiative by the ND Department of Commerce to promote comprehensive planning during the October 2020 Main Street Summit. North Dakota Planning Association Educate individuals, legislators, and planning professionals on the importance of planning and contemporary planning best practices, partner with those with a passion toward community-based efforts in planning and related fields, and advocate for the future success of communities through good policy and plan- making. Continuing to educate City and County planners on zoning and encourage all entities to update their Zoning Ordinances and Comprehensive Plans. ND State Fire Marshal Updated the fire code to the 2018 Edition to remain current and match the building, residential and other State codes. Notified local fire authorities of the State fire code and gave access to updates. Participated in the Building, Residential and other State code adoption processes run by the Dept. of Commerce. Meet with local fire chiefs and Emergency Managers to discuss local issues. Approximately 40 fire departments visited in 40 different counties. Meet with local fire chiefs and Emergency Managers.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Emails sent to County Emergency Managers (EMs) requesting invitation to meetings Attended three County EM meetings attended Approximately 50 local fire chief visits conducted. ND Department of Water Resources: Working on flood risk reduction investigations for the City of Zap (Mercer County), Spiritwood Lake (Stutsman County), and Rice Lake (Emmons County). The DWR provides funding and technical assistance for basin-wide water and land management planning. This has included assistance to Joint Water Resources completes a Water Development Plan. As required by NDCC 61-02-01.3, the Department of Water Resources shall develop and maintain a comprehensive water development plan that includes a water project inventory. The last Water Development Plan was completed in January 2019. Completed flood risk reduction investigation for the City of Strasburg (Emmons County)
2019-7	Integration of Mitigation and Comprehensive Planning	Promote integration of mitigation and comprehensive plans.	Integration of both mitigation and comprehensive planning will link mitigation strategies with a community's vision, goals, objectives, policies and strategies for future growth and development.	 ND Housing Finance Agency (NDHFA): Supported an initiative by the ND Department of Commerce to promote affordable housing programs during the October 2020 Main Street Summit. Active participant in the Rural Housing Taskforce which consisted of local and state government entities, the private sector and nonprofits to identify and remove barriers to enhancing housing in rural North Dakota. Administered the National Disaster Resilience Program's Resilient Homebuyer Program in partnership with the Minot Disaster Recovery Program. Since 2018, \$4.5 million in federal funds were distributed to 76 households that were impacted by the 2011 flood.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Participated in the Expanding Access to Homeownership in North Dakota webinar hosted by FDIC and HUD. Participated at the Turtle Mountain Housing Authority's Housing Summit in Belcourt, ND. Conducted internal crisis management exercises with staff. NDHFA published the North Dakota 2020 Current State of Housing. The study focused on the affordability of single and multifamily housing, the impacts of COVID-19, and housing challenges faced by vulnerable populations in 2020.www.ndhfa.org/wp- content/uploads/2020/11/CurrentStateofHousing NDDES: Conducted G235 Emergency Planning class – Nov. 15- 18, 2021. NDDES, FEMA, and the City of Fargo conducted a meeting on implementation of FEMA Integrated Preparedness Program. Unfortunately, COVID response has delayed further collaboration and implementation. NDDES and FEMA supported the 2019 Main Street ND Summit attended by more than 1,400 community leaders, students and stakeholders. NDDES organized a panel on community resilience and using a "whole-of-community" approach when recovering from disasters with speakers from Paradise, CA; Dubuque, IA; FEMA Region VIII; and NDDES. Speakers included: Melissa Schuster, Paradise Town Council member, California; Deron Muehring, Dubuque civil engineer, lowa; Logan Sand, FEMA community planner; and Justin Messner, NDDES disaster recovery chief.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 NDDES, Grand Forks Emergency Management and FEMA in which panelists emphasized the importance of hazard mitigation planning as an investment in communities and the importance to integrate mitigation with other planning initiatives such as comprehensive and land use plans. SHMT partners who supported the 2019 summit included North Dakota's: State Library, Forest Service, Department of Health, Job Service, North Dakota State University Extension, NDHI, Game and Fish Department, Housing Finance Agency, Workforce Safety and Insurance, Department of Transportation, Department of Human Services, Public Finance Authority, Information Technology Department, Department of Parks and Recreation, Department of Water Resources, Department of Agriculture, Office of Management and Budget, and NDDES. ND Department of Agriculture, Board of Animal Health Interagency review of animal health disease response annex planned and after-action items identified in multiagency hotwash to be incorporated as well as references to documents and processes of external/partner agencies that are integral to effective response (carcass management, truck rollover, etc.) ND Department of Health Emergency Preparedness and Response (NDDoH/EPR) cooperative inventory effort (personal protective equipment, vaccine distribution planning, Foot and Mouth Disease) and integration of plans. Worked with NDDoH on sample submission (courier) and resource allocation (field deployments). Conducted strategic national veterinary stockpile resource management planning with NDDoH.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
2019-8	Firewise and Community Wildfire Protection Plan (CWPP)	Promote the Firewise and CWPP program.	ND Forest Service (NDFS) provides financial and technical assistance regarding CWPPs. These plans specifically address mitigation for wildland fires and may be required for jurisdictions to receive wildfire mitigation funding. This action calls for integrating data from the CWPPs into mitigation plans and leveraging mitigation plan data to inform the CWPPs.	 ND Forest Service and ND State Fire Marshal (NDSFM): Continued to collaborate on promotion of Firewise and Community Wildfire Protection Plans (CWPPs). Promote State software contract for free fire reporting. Approximately 282 fire departments are reporting fires through the contract. Promote State software contract for free fire reporting. Approximately 282 fire departments are reporting fires through the contract. Promote State software contract for free fire reporting fires through the contract. ND National Guard Provides support to the NDFS and state utilizing Red Card certified ground and aviation crews.
2019-9	Debris Management Plans	Support the development of local and tribal debris management plans.	Debris management plans help mitigate potential public health impacts following a disaster. This action requires facilitating education, planning, and developing tools to properly address debris management.	 No Update During this Reporting Period ND Department of Environmental Quality (NDDEQ): The NDDEQ Solid Waste Program conducted annual operator training in January and February 2020 and January and February 2021 (two sessions each year) for landfill operators which included information on debris management from disasters. The NDDEQ Solid Waste Program conducted annual operator training in January and February 2019 and January and February 2020 for landfill operators which included information on debris management from disasters. The Solid Waste Program also held online workshops on July 23, 2020, and July 28, 2020, related to debris management from disasters for inert landfills. NDDES developed a template for debris management for local and tribal communities to adapt to their needs.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
2019-10	Disaster Recovery Planning Toolbox	Develop a web-based Disaster Recovery Planning Toolbox that promotes community resiliency.	This action promotes a Whole Community approach to pre- and post-disaster planning by providing planning and programmatic resources. The web page will provide information on land use strategies; hardening of critical infrastructure; protecting environmental and cultural resources; sustainability; and revitalization of the economy; and social and natural environment systems.	 NDSU Extension: Aided in development of the 2021 Drought and Fire Resource Guide. Provided an overview of guide to local Extension agents to use in providing support to those in their communities. NDDES: Initiated revisions to the Disaster Recovery Mission Area Operations Plan and Operations Guide to update processes, partners, resources, and tasks. Developed Drought Recovery resource databases in 2021 for elected officials and for the public, posted on NDResponse: 2021 Drought and Fire Resource Guide. Continued efforts to identify and establish a database of resources. Developed and implemented a process for recovery informational links. Project still under development.
2019-11	Dam Emergency Action Plans (EAP)	Review EAPs to ensure these plans address actions to reduce the potential consequences of dam failure.	Dam owners are required to develop, update, and periodically test EAPs for all high and medium hazard dams under NDCC 61-03-25. This action reduces both the risk of dam failure and potential consequences if a failure were to occur.	 ND Department of Water Resources: Efforts to track and maintain copies of existing EAPs and ensure compliance with NDCC 61-03-25 are ongoing. U.S. Bureau of Reclamation: Conducted 2022 yearly EAP (Emergency Action Plan) orientation exercises for Dickinson Dam on March 18, 2022; Heart Butte Dam on March 29, 2022; and Jamestown Dam on March 16, 2022. Conducted 2021 yearly EAP (Emergency Action Plan) orientation exercises for Dickinson Dam on March 24, 2021; Heart Butte Dam on March 10, 2021, and Jamestown Dam on March 5, 2021. Conducted the 2022 yearly Dam inspections: Dickinson Dam on August 31, 2022; and Jamestown Dam on September 12, 2022.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Conducted EAP (Emergency Action Plan) orientation exercises on these dates: Dickinson Dam, March 24, 2021; Heart Butte Dam, March 10, 2021; and Jamestown Dam, March 5, 2021. Conducted the yearly EAP orientation exercises for Dickinson Dam (February 26, 2020); Jamestown Dam (March 11, 2020) and Heart Butte Dam (March 3, 2020). US Army Corps of Engineers – Omaha District: Modification for Pipestem – redesign and construct new spillway - in design, construction anticipated to begin in 2022. Dam Safety Modification Study (DSMS) for Garrison – ongoing. DSMS for Snake Creek – initiating fall 2021 Issue Evaluation Study (IES) for Oahe – ongoing (dam itself is in SD but reservoir extends into ND). No EAPs were updated during this time period; however, plans are underway to make USACE Emergency Action Plan inundation maps and updated comprehensive dam database publicly available in the National Inventory of Dams by end of 2021. Will include summaries of best available risk information and inundation scenarios, including water depth and arrival times and life loss and property impact estimates. US Army Corps of Engineers – St. Paul District: Dam Safety manager updates the EAPs for dams in the St. Paul District inventory (Baldhill and Homme), These two dams are in the queue for EAP updates and orientation exercises. Specific to the Devils Lake construction; most of the project documentation has been completed. The As-Built Drawings, Updated Design Documentation Reports, Operations & Maintenance Manuals, and EAP have been provided to the City of Devils Lake. The Levee System

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Evaluation Report, documenting certification of the project, was submitted to FEMA in May 2020. Only a few minor items of documentation remain such as finalizing the instrumentation report. While preparing the final documents it was discovered that the 17th Street ponding area hydraulic analysis had not been updated to the same storm event as the other ponding areas. Doing so would result in a larger floodplain footprint that would potentially impact residential homes. Rather than increase the footprint of the ponding area, the decision was made to excavate the existing pond and install a small pump station. The excavation is nearing completion with the pump station scheduled to be completed in late fall/early winter 2021-22. Also, USACE considers Devils Lake a hybrid levee system, designed as a dam in many ways. But it is in the National Levee System Inventory, not the dam inventory. It does not have a dam number. This is added for clarification. ND Game and Fish Department: No EAPs were reviewed during this time period. Natural Resources Conservation Service: Dam assessments were completed for three high hazard dams: Mott, English Coulee, and Upper Turtle River Dam 5 (to be completed 12/20). These included development of updated dam breach hydraulic modeling; which will inform future EAP updates.
2019-12	Dam Rehabilitation <i>New Action</i> <i>Added in 2020</i>	Rehabilitate aging dams that do not meet current dam safety criteria.	Reconstruction or decommissioning of dams that have dam safety deficiencies. This	 Natural Resources Conservation Service: Rehabilitation planning for Matecjek, Fordville, Bylin, Senator Young, Olson, Bourbanis, and Larimore dams is ongoing.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			action calls for reducing the risk of dam failure and potential consequences if a failure were to occur.	 Department of Water Resources Continue to provide cost-share for the repair, rehabilitation, or removal of dams with safety deficiencies. Maintains an inventory of known low-head dams in the state and provides cost-share to mitigate associated dangers.
2019-13	Geographic Information Systems (GIS) Data Improvement/ Data Creation	Identify and enact GIS Improvements or Data Creation.	This action promotes collaboration with the North Dakota Geographic Information Systems Technical Committee (GISTC) and the SHMT to share data in support of the development of State, local, and tribal mitigation plans. This includes interagency sharing of GIS data for inundation mapping, and geologic mapping data. Additionally, the action calls for resolving identified gaps in GIS data, if feasible. It requires an evaluation of the feasibility and sustainability for the appropriate steward agency to undertake prior to the next plan update cycle.	 ND Information Technology: Continue to make State Agency GIS data available for viewing, downloading, and web streaming via the <u>State's GIS Hub</u>, the <u>Hub Data Portal</u> (newly upgraded to Esri's Open Data sharing solution) and enterprise database solutions (upgraded to SQL). Developed a statewide parcel program, comprised of contiguous rural property boundaries and taxation information. With funding provided by the ND legislature and collaboration with local county and tribal governments. Aggregation of locally maintained property information is now available to aid in planning and mitigation efforts. ND Department of Water Resources: Continues to improve statewide elevation datasets via large highly accurate lidar collections across the state of North Dakota. Ultimately useful in BLE for flooding inundation. Through collaboration with FEMA, DWR has created a publicly accessible ND Risk Assessment Map Service. ND Department of Emergency Services: Is nearing completion of statewide NG 9-1-1 GIS dataset buildout and implementation. (Includes; Site Structure Address Points, Road Centerlines. Emergency Response Zones). 45 of the 53 county jurisdiction are complete and loaded for 911 service providers. During COVID identified and facilitated numerous dataset maintenance and creation via collaboration with other

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 state agencies. Including, Local Public Health Units, Hospitals and Educational Institutions. ND State Fire Marshal: Share fire department coverage updates with NDDES/ND State Radio/ND Information Technology to increase accuracy of response GIS maps. Built software capable of sharing coverage updates. Need to get NDDES login to extract data updates.
				 ND Department of Health: Due to COVID-19 along with local public health and the statewide response teams continuous work in the response; no additional training has been scheduled. ND Department of Environmental Quality, ND Department of Health (NDDOH), NDDES: These GISTC member agencies cooperated to update trauma centers, hospital, nursing homes, skilled nursing homes and other facilities regulated by NDDOH for COVID response and tracking. Benefits included continued interagency coordination and sharing of geospatial data allows for rapid response. Gap identified included maintenance of NDDOH geospatial data. ND Forest Service Created high-resolution tree cover map for 53 counties, through USDA Forest Service Great Plains Initiative II. Interactive map will be available on USDA FS site. Created map of highly erodible cropped soils as potential strategic locations for windbreaks to mitigate climate effects. ND Department of Agriculture: NDDA has continued to develop its GIS platforms across the Commissioner's program areas to help ensure that information is available for department and community

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 use. This platform was integral to surveillance and response of HPAI. The USAHERDS database is being used to manage state response to HPAI and captures brucellosis, tuberculosis, CVI movement data, test charts. No-trust environment and state-designed firewalls defended against attempted incursion. In 2020, Animal Health division procured USAHERDS that includes premises mapping and incident mapping capabilities. The agency's expanding data set coupled with GIS can inform planning and response priorities. NDDA has continued to develop its GIS platforms across the Commissioner's program areas to help ensure that information is available for department and community use. This includes increased data on local food map, staff added attributes for vendors that allow visitors to the map to see layers displaying producers that sell certain types of foods at a local or regional level. ND Department of Transportation: In accordance with 23 CFR 667, NDDOT created GIS point and line layers to help evaluate resiliency of state and federal aid county roads damaged and permanently repaired due to multiple Emergency Relief events. ND National Guard Available to provide GIS and mapping capability in support of an NDDES request.
2019-14	Geologic Mapping	Promote geologic mapping efforts.	Surface geologic mapping activities continue to focus in North Dakota's urban areas with current mapping projects being conducted in the greater Bismarck-Mandan and	 ND Geological Survey: Completed 60 1:24,000 Comparative Landslide Area Maps for the Pembina Gorge and Red River Valley Corridor. Numerous active landslide areas have been identified with this initial mapping work. Conducted a virtual presentation to county Emergency Managers (EMs) on the NDGS Landslide Mapping Program and highlighted the availability of new county

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			Fargo areas. Geologic hazards (landslide areas) mapping continues to focus in the most landslide prone areas in western North Dakota where mapping has not been completed. Updating of older mapping work is also being conducted with the inclusion of recently available Light Detection and Ranging (LiDAR) elevation data and contemporary aerial imagery products. The Survey has initiated Comparative Landslide Mapping in eastern North Dakota which identifies areas of continued landslide movement through the differencing and comparison of repeat LiDAR surveys.	 wide landslide map and data products and upcoming comparative mapping projects. Continuing to update older landslide maps with LiDAR data in the landslide prone portions of western North Dakota. To date, the NDGS has mapped over 45,000 landslide areas. Completed landslide mapping in all 1,464 1:24,000 quadrangles across North Dakota. So far, the Survey has mapped over 34,000 landslides: https://www.dmr.nd.gov/ndgs/landslides/ We believe we are the first state to accomplish this task at the detailed mapping scale of 1:24,000. Older landslide maps continue to be updated with LiDAR elevation data sets adding significantly to the amount of landslides mapped statewide. Completed all 1,464 1:24,000 scale LiDAR elevation quadrangles and all 61 1:100,00 scale LiDAR sheets providing full coverage of easily accessible detailed elevation maps and data sets across the entire state. Raster files and pdfs are available at: https://www.dmr.nd.gov/ndgs/lidar/ Completed 508 1:24,000 scale landslide maps in landslide prone areas in western North Dakota and along major hydrologic corridors in the rest of the state including the Sheyenne and Red River Valleys with current coverage of 75 % (1,100 of 1,467 quads) of the state. So far, the Survey has mapped 30,186 landslides: https://www.dmr.nd.gov/ndgs/landslides/ Completed 1,164 1:24,000 scale LiDAR elevation quadrangles providing full coverage of easily accessible detailed elevation maps and data sets across the entire state. So far, the Survey has mapped 30,186 landslides: https://www.dmr.nd.gov/ndgs/landslides/ Completed 1,164 1:24,000 scale LiDAR elevation quadrangles providing full coverage of easily accessible detailed elevation maps and data sets across the entire state. Raster files and

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
2019-15	Losses Avoided	Conduct a comprehensive losses avoided study.	This action calls for developing a Losses Avoided Committee to determine criteria and conduct a statewide loss avoidance study as funding allows. The study would encompass project level information from the different mitigation partner agencies in order to catalog and analyze projects, determine potential damages and benefits, and provide a narrative for each identified project to determine its general effectiveness in mitigating damages.	 ND Department of Water Resources The DWR has an economist on staff evaluating benefits and costs of flood hazard reduction projects which apply for funding through the agency's cost-share program. ND Department of Transportation: In accordance with 23 CFR 667, NDDOT created GIS point and line layers to help evaluate resiliency and losses avoided of state and federal aid county roads damaged and permanently repaired due to multiple Emergency Relief events. NDDES: Plans are under development to identify SHMT partners with interest to support a Losses Avoided Committee. Natural Resource Conservation Service: Economic analysis work to quantify flood damage reduction benefits completed for Matecjek, Fordville, Bylin, Senator Young, Olson, Bourbanis, and Larimore dams as a part of the planning process to bring them into compliance with current dam safety criteria. US Army Corps of Engineers – Omaha District: Accreditation occurred for the Williston Levee. Plans are underway to make USACE Emergency Action Plan inundation maps and updated comprehensive dam database publicly available in the National Inventory of Dams by end of 2021. Will include summaries of best available risk information and inundation scenarios, including water depth and arrival times and life loss and property impact estimates. US Army Corps of Engineers – St. Paul District: Every January the Corps of Engineers prepares a Damages Prevented spreadsheet that lists all of the projects we designed. It includes cumulative damages prevented spreadsheet that lists all of the projects we designed. It includes cumulative damages prevented spreadsheet that lists admages

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 and cumulative including the current year. The information is provided to Headquarters. The Annual Flood Damages Prevented Report to Congress (Appendix G) is available for the fiscal year around April/May each year. Previous reports are also available for the past 10 years. <i>Contact St. Paul District staff who with Mr. Chandra Pathak to get copies via email.</i> His team is currently working on the website where these reports would be available in future years. However, the website is not completed and not yet available.
2019-16	North Dakota Silver Jackets	Provide flood risk mitigation measures throughout North Dakota with hydrologic studies and related flood risk reduction projects.	The North Dakota Silver Jackets program fosters a Federal and State interagency approach to reduce the threat, vulnerability, and consequence of flooding. It is led by the North DWR) with membership including the St. Paul Corps, Omaha Corps, USGS, United States USFWS, NRCS, NWS, FEMA Region VIII, NDDES, and NDGS. The program promotes flood risk reduction and awareness through identification, development and implementation of selected projects and measures with a goal of	 ND Department of Water Resources See the Silver Jackets article in this annual report for the 2020-2021 Updates. North Dakota Hazard Mitigation Progress Report 2021. Collaborated with ND Silver Jacket partners to continue ongoing initiatives through to completion. Reviewed potential opportunities and submitted funding requests through various partners. Supported agency efforts to maintain and enhance flood risk mitigation projects. ND Statewide Probable Maximum Precipitation (PMP) Analysis has been completed. The DWR approved funding for this study in Fall of 2018 and the study was initiated with support from the ND Silver Jackets in Spring 2019. The study was completed by Applied Weather Associates in May 2021. ND QL2 LiDAR Acquisition is continuing. In previous reports, DWR acquired LiDAR for the entire state and it is available to all federal, state and public entities through the Department of Water Resources website. This project is ongoing with current funding being provided from

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			reducing the threat and impact of flooding in North Dakota.	 FEMA Region VIII and the Natural Resources Conservation Service (NRCS). Our current focus is updating the current LiDAR in the Red River Basin from Quality Level III to Quality Level II, a significant enhancement. ND Risk Assessment Map (NDRAM) Enhancement is ongoing. The Department of Water Resources and ND Silver Jackets are working with the Omaha Corps of Engineers and FEMA Region VIII to include the Corps Building Structure Database along with their Damage Curve Data to the DWR's current NDRAM platform. This project was submitted in Spring of 2020 and if approved will assist federal and state agencies in identifying both the flood risk and associated damages to selected areas. Missouri River Basin Non-Stationarity Study is ongoing. The DWR and ND Silver Jackets are partnering with the United States Geological Survey (USGS) and the Omaha Corps of Engineers to determine the impact of changing precipitation and hydrology on the Missouri River Basin. This is a multi-year effort with our participation beginning in Spring 2020. Discharge-Frequency Curve Updates on the Mouse River at the Sherwood, ND and Westhope, ND Gages is ongoing. The ND Silver Jackets requested this project from the St. Paul Corps in Spring of 2020 and is currently pending approval. If approved, this project will update the discharge-frequency curves at Sherwood and Westhope and allow for better flood forecasting throughout the Mouse River Basin.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Mouse River Basin Flood Inundation Mapping is ongoing. This ND Silver Jacket project has been ongoing since 2016. Phase 1 through 3 includes the Mouse River Basin and we just started Phase IV (Oct. 2019) to include a portion of the Des Lacs River. Upon completion (Spring 2021) this will be provided to the Souris River Joint Board and published on the National Weather Service's (NWS) Advanced Hydrologic Prediction Service (AHPS) web portal. This will allow all users to identify their location in the vicinity of the Mouse River Basin and determine their risks of flooding based upon current conditions. Red River Basin (RRB) Gage Datum Change from '29 to '88 is ongoing. The ND Silver Jackets requested this project from the St. Paul Corps in the Spring of 2020 and is currently pending approval. The goal is to survey all the existing RRB gages and convert them from NVD '29 to '88. Upon completion all the USGS RRB gages will then report flow elevations in both '29 and '88 to prevent confusion within the Basin. Currently all new FEMA flood plain maps are being published in NVD '88, so this project would allow for similar data to be made available when property owners look at their FEMA map compared to the USGS gage sites. Souris River Basin (SRB) Soil Temperature and Moisture Gage Study is ongoing. The ND Silver Jackets requested the St. Paul Corps conduct this study in the Spring of 2020 and is currently pending approval. The study would analyze the best locations throughout the SRB to place temperature and soil moisture

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 gages to better determine the flood risk and reduce the risk of flooding. Medora Flood Risk Reduction Study: (ongoing) Red River (RR) Bathymetry Project: (ongoing) ND Flood History Project: (pending approval) US Army Corps of Engineers – Omaha District: Conducted a Baseline Engineering (BLE) study.
2019-17	Souris Basin Dams	Analyze operating agreements for the Souris River Dam.	As part of flood mitigation efforts, the International Joint Commission is reviewing operating agreement for the Souris River Dams. This three- year study, due in 2020, involves agencies and the public from North Dakota, Saskatchewan, and Manitoba. The IJC appointed a Study Board to oversee the study.	 ND Department of Water Resources: Collaborated with partners to complete data analysis, develop recommendations to present to the International Joint Commission and conducted public hearings. Provided work-in-kind for various technical and administrative tasks. Assisted with facilitation of workshops with advisory groups. Participated on the Resource and Agency Advisory Groups, including being co-chair. N.D. Departments of Emergency Services, Health, Transportation, Agriculture, Game and Fish, U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers and the U.S. Geological Survey: Completed work on the Souris River Study in 2022. Provided data analysis to the Resource Agency Advisory Group. Participated in workshops and meetings; sharing data and recommendations.
2019-18	Drought Contingency Plans	Encourage rural and regional water suppliers to develop drought contingency plans.	This action prepares water suppliers and farmers for potential drought conditions by developing priorities for water use during drought.	 ND Department of Agriculture: Serve as a lead agency for the Drought Multi-Agency Coordination System; provide assistance to producers and local and tribal mitigation planning teams. National Weather Service: On a weekly basis, collaborated with the ND State Climatologist (NDSCO) on suggested updates to the U.S.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Drought Monitor. On a bi-monthly basis collaborated the same with the Canadian Drought Monitor. Based on the US Drought Monitor, by the middle of May 2022, no part of North Dakota remained in D2 drought. As a result, the last Drought Briefing from the National Weather Service was issued on May 31, 2022. Supported the Command and General Staff Calls for Drought and Fire, and also support the Wildfire Readiness Level calls. Also issue Drought Information Statements: (https://www.drought.gov/drought-information-statements) and Drought Briefings (https://www.weather.gov/media/bis/BIS drought briefing .pdf) ND Department of Water Resources: Administer and manage the Drought Disaster Livestock Water Supply Assistance Program (Program). The Program provides financial relief to livestock producers experiencing water supply problems caused by drought. See more in the "Drought Mitigation" Action Title. US Army Corps of Engineers – St. Paul District: Publish the Missouri River mainstem System 2021-2022 Annual Operating Plan by December 2021. This document outlines both flood risk reduction and water conservation activities for the Missouri River mainstem. NDSU Extension: Developed guidelines for collecting and submitting water samples for laboratory analysis. Extension specialists and agents have been providing educational resources and technical assistance related to water quality. Develop educational program focused on livestock water quality that provided screening of livestock water sources impacted by drought.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 ND Department of Environmental Quality: Promote and provide training to assist drinking water systems of all sizes perform Vulnerability Assessments and develop Emergency Response Plans. North Dakota Stockmen's Association: Developed and disseminated informational resources about drought contingency planning and resources to livestock producers and decision-makers.
2019-19	Hazardous Materials Flow Study – <i>Project</i> <i>Completed</i>	Assist local and tribal jurisdictions with hazardous materials planning.	NDDES has commissioned a hazardous materials flow study that, once complete, will provide insights into volume and nature of hazardous materials movement into, out of, and within North Dakota. Data from the study will also help local leaders with land and traffic planning, zoning, and mitigation plans.	 NDDES: A website has been created by NDIT to host the flow study data for ease of access to relevant stakeholders. Completed statewide Flow Study. With Hazardous Materials Emergency Preparedness (HMEP) dollars NDDES conducted a Flow Study across the state. Individual counties have access to data about what hazardous materials are traveling through or being stored in their counties; identify geographic areas (roads, train routes, pipelines) which are at risk of experiencing an accident/spill; identification of populations, public and private facilities which may be impacted by accidents/spills. The counties can take this information on help mitigate impacts by identify mitigation actions to prevent spills from occurring in those areas (e.g. reduced speeds)
2019-20	Tornado Safe Rooms and Shelters	Support the establishment of tornado safe rooms and shelters.	NDDES has been working with local and tribal communities to promote the use of safe rooms and shelters. These rooms and shelters protect the public from injury or death caused by	 NDDES: Tornado Shelter applications for Homme Dam Recreation area, Stump Lake recreation area, and Silver Lake Recreation area have been submitted to FEMA. Tornado Shelter projects have been awarded to the City of Elgin, Steele County, LaMoure County, and Cavalier County.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			tornadoes and other high wind events.	 Applications for Tornado Shelter projects have been submitted to FEMA to be located in Elgin, Steele County, LaMoure County, and Cavalier County. Promoted storm shelters as a focal project type for the Pre-Disaster Mitigation grant cycle. Shelters were awarded in McKenzie County and in the City of Beulah.
2019-21	Flood Mitigation Measures	Support the implementation of flood mitigation measures at the local and tribal level.	This action places priority on flood mitigation projects for Special Flood Hazard Areas. This action encompasses projects that prevent damage to structures, such as critical facilities and homes, bank stabilization, bank armoring, acquisitions, floodwalls, and relocation of critical facilities (such as lift stations). There are flood mitigation projects outside of the Special Flood Hazard areas that protect homes, businesses, government buildings, and roads in rural areas of the state.	 ND Department of Water Resources: The State of North Dakota directs the majority of state funding for flood damage reduction projects through the DWR budget, and cost-share program. The 2021 Legislative assembly provided \$48 million for various types of flood damage reduction projects, \$435 million for the Fargo-Moorhead Area Diversion Project, and \$74.5 million for the Mouse River Enhanced Flood Protection Project. The DVR budget bill following the 2019 Legislative Assembly included \$197 million in authority for state cost-share toward flood damage reduction projects. DWR has an economist on staff evaluating benefits and costs of flood mitigation projects which apply for funding through the DWR Coat-Share Program. NDDES: Flood Mitigation projects have been awarded to the City of Fargo for the protection of its Wastewater Treatment Plant and the Raw Water Pump Station Natural Resource Conservation Service: Emergency response to mitigate damage to Bourbanis Dam during May 2021 flood event is in progress. Final engineering design in progress with Cass for a 2.2-mile levee to protect the community of Amenia.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Planning in progress with the Park River JWRD for a 2,590 ac-ft off channel retention project to protect rural homes, roads, and the community of Crystal. Planning in progress with the Pembina WRD for a channel stabilization project on the Tongue River, to halt massive erosion that is impacting Renwick Dam (provides flood protection to the City of Cavalier). Planning in progress with Cass Joint WRD for a 2,863 ac-ft off channel retention project that will protect rural roads and homes in the Upper Maple River watershed. Planning in progress with Sargent WRD for a 2,561 ac-ft off channel retention project that will protect rural roads and homes in the Shortfoot Creek watershed. Planning in progress with Richland WRD for an off channel retention project to protect rural roads and homes in the Antelope Creek watershed. Planning the Missouri River mainstem System 2021-2022 Annual Operating Plan by December 2021. This document outlines both flood risk reduction and water conservation activities for the Missouri River mainstem.
2019-22	Floodproofing Critical Facilities	Promote flood proofing activities to protect critical facilities, utility infrastructure, government buildings, and residential structures.	Floodproofing measures include anchoring buildings and tanks, reinforcement of walls with water resistant materials, installing watertight doors and windows, sealing basements and walls to prevent seepage, installing permanent pumps, installing backflow prevention	 No Update During this Reporting Period NDDES: Flood Mitigation projects have been awarded to the City of Fargo for the protection of its Wastewater Treatment Plant and the Raw Water Pump Station. Mitigation staff has promoted the concept during meetings with potential Hazard Mitigation Assistance applicants. ND Department of Water Resources DWR evaluates the efficiency of infrastructure floodproofing to ensure public expenditures return sufficient benefits to the state's taxpayers for the

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			valves on utilities, elevating utility systems and other equipment, and taking measures to protect water and sewer systems from floodwaters Note – not all floodproofing measures are eligible for the DWR cost-share assistance.	 investment to be considered through the cost-share program. ND Department of Environmental Quality: Promote and provide training to assist drinking water systems of all sizes perform Vulnerability Assessments and develop Emergency Response Plans.
2019-23	Power Redundancy at Critical Facilities	Encourage redundancies within power systems.	This action ensures continued emphasis on back-up generators or alternative solutions of emergency power until the service is restored for critical facilities, special needs facilities, utility infrastructure, and emergency shelters. Alternative solutions may include solar panels.	 NDDES: Conducted MGT-345 Disaster Management for Electric Power Systems Mar. 29-30, 2022. Conducted Operation Staple Puller tabletop exercise – scenario, a cyber attack on the electric power grid June 27, 2022. Projects have been awarded to install emergency back- up generators at the Stanley Lift Station and Kulm Water Tower. Back-up generators have been awarded to 25 Fire Halls/Law Enforcement Centers throughout the state of North Dakota. Central Valley Health in Jamestown and the City of Jamestown Main Lift station both installed emergency back-up generators. City of Mandan was awarded a project to install back-up generators at two of their lift stations. ND Association of Rural Electric Cooperatives (NDAREC): Further adoption of smart meters more accurately predict & identify outages, thereby reducing outage response times and durations.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Additional smart devices such as substation circuit breakers and line reclosers offer improved visibility of the electrical system via SCADA, enabling more automation and system diagnostics. Advanced modeling tools help identify overloaded equipment before failures occur. NDAREC members install backup generators in critical areas as well has have generators available for outages. Electric cooperatives continue to add solar panels to the system. Under power ground lines are routinely added to the system. Under power ground lines are routinely added to the system. Promote and provide training to assist drinking water systems of all sizes perform Vulnerability Assessments and develop Emergency Response Plans. State and Local Intelligence Center: Continue outreach with Critical Facilities/ Sectors concerning threats, hazards and risks, and promote information/ intelligence sharing. US Department of Homeland Security: CISA (Cybersecurity and Infrastructure Security Agency) is now the operational component under the US Department of Homeland Security for all cybersecurity and infrastructure security preparedness, prevention, mitigation and recovery.
2019-24	Electric Infrastructure Protection	Promote electrical infrastructure mitigation measures.	I his activity would primarily occur through the burial of electrical power lines but also include other electrical mitigation activities,	 NDDES: Initiated a study of how natural hazards have the potential to adversely impact the state's electrical grid. Conducted MGT-345 Disaster Management for Electric Power Systems Mar. 29-30, 2022.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			including redundancies of the power grid.	 Conducted Operation Staple Puller tabletop exercise – scenario, a cyber attack on the electric power grid June 27, 2022. Providing conference Chair and sponsorship for CyberCon, a cyber and infrastructure protection conference <i>ND Association of Rural Electric Cooperatives:</i> Distribution-voltage automatic transfer switches for critical loads allow for substation sources to automatically transfer without operator interaction in the event of a single substation outage. Investments in new or substation expansions allow for additional capacity to serve new loads while also backfeeding other substations in the event of a system contingency. NDAREC members continue to add under power ground lines, retire overhead power lines and replace with underground powerlines especially in high risk areas. Redundancy is built into the system and is expanded upon when feasible. <i>State and Local Intelligence Center:</i> Continue outreach with Critical Facilities/ Sectors concerning threats, hazards and risks, and promote information/ intelligence sharing.
			Local and tribal	NDDES:
2019-25	Outdoor Warning Systems	Support installation and update of outdoor warning systems.	mitigation plans identify outdoor warning systems as a priority mitigation action for the state's communities. Federal, state, local, tribal, and territorial alerting authorities can use Integrated Public Alert	 Applications for early warning sirens for the City of Berlin and the City of St. Thomas and the City of Glen Ullin have been submitted to FEMA. Projects have been awarded to install early warning sirens in the City of St. Johns and the Peace Garden, three early warning sirens for the City of Bismarck and the City of Minnewaukan, and the City of Glen Ullin. Projects have been awarded to install early warning sirens in the City of St. Johns and the Peace Gardens.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			and Warning System (IPAWS) and integrate local systems that use Common Alerting Protocol standards with the IPAWS infrastructure. IPAWS provides public safety officials with an effective way to alert and warn the public about serious emergencies using the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), the National Oceanic and Atmospheric Administration (NOAA) Weather Radio, and other public alerting systems from a single interface.	 Applications for three early warning sirens for the City of Bismarck and the City of Minnewaukan have been submitted to FEMA. City of Mott was awarded a project to install an additional early warning siren by the County Fairgrounds and update the current siren. The Preparedness Section awarded 33 projects totaling \$579,332 through the State Homeland Security Program Grants for long range hailing and warning devices; and systems, public notification and warning. Recipients included: Argusville Fire Department District; Park River Fire Department; Minot Public Works Department: counties of Grant, Logan, McLean and Rolette; and Cities of Fredonia, and Gackle in Logan County; Cities of Christine, Hankinson, Lidgerwood, Mantador and Wahpeton in Richland County; City of Hope in Steele County; and Cities of Fessenden, Hurdsfield and Sykeston in Wells County. Stutsman County Law Enforcement Center provides monthly testing of the outdoor warning sirens for LaMoure County and others to ensure their operation. LaMoure County does also support various communication methods and have an IPAWS vendor.
2019-26	Emergency Notification Systems	Procure and implement all-hazards emergency notification systems.	NDDES supports federal, state, local, and tribal agencies with the update and installation of emergency notification systems to include next generation interaction 911, phones, smart TVs, and smart message boards.	 NDDES and the North Dakota Association of Counties: Collaborating on development of the next generation 911 project. Project Complete (March 2022). Use 911 Grant funds form NHTSA to fund three projects: Next Generation 911 Geographic Information Systems, Internet Protocol (IP) Aggregation for Originating Service Providers, and a Recorder/Logger . City, County, Tribal Emergency Management: LaMoure County does support various communication methods including IPAWS, telephone emergency alert

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				system, telephone text mass message to first responders, and social media.
2019-27	Dam Status Review	Periodically review dam status, conditions, designs, permitting of new dams; encourage owners to maintain and repair dams.	This would improve North Dakota's State Dam Safety Program to reduce the risk of dam failure and reduce the potential consequences if a failure were to occur.	 ND Department of Water Resources: Refer to the Dam Safety Article in 2021 annual report. A statewide study to update Probable Maximum Precipitation (PMP) values used in dam design was completed and interim guidance for use of the study results was published. DWR has a prioritized inventory of known low-head dams in the state and provides cost-share funding to mitigate specific hazard effects or remove the structures. Periodic dam inspections and review of construction permit applications are ongoing; development of updated dam design guidelines is underway; and a statewide study to update Probable Maximum Precipitation (PMP) values used in dam design has been completed. US Bureau of Reclamation: Held ASI (Annual Site Inspections) on: Dickinson Dam, May 12, 2021; Heart Butte Dam, May 19th, 2021; and Jamestown Dam, August 4, 2021 Reclamation conducted the annual site inspection (ASI) for Dickinson Dam (July 15, 2020); Jamestown Dam (August 11, 2020) and Heart Butte Dam (July 16, 2020) US Army Corps of Engineers – Omaha District: All USACE dams in North Dakota were inspected during the past year in accordance with the dam safety program requirements. Annual Inspection for Garrison Dam and Snake Creek Embankments the week of 16 September 2021 and the Annual Inspections for the Williston Levee and Pipestem Dam were performed the week of 20 September 2021. A Periodic Inspection of Bowman- Haley Dam was completed the week of 10 May 2021. Risk reduction studies are ongoing at Snake Creek,

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Garrison, and Pipestem Dams. Construction to modify the Pipestem spillway are anticipated to begin in 2023. Williston Levee is currently being accredited by FEMA under the National Flood Insurance Program. Plans are underway to make USACE Emergency Action Plan inundation maps and updated comprehensive dam database publicly available in the National Inventory of Dams by end of 2021. Will include summaries of best available risk information and inundation scenarios, including water depth and arrival times and life loss and property impact estimates. US Army Corps of Engineers – St. Paul District: The Corps conducted the 5-year periodic inspection at Homme on 12 August 2020, and Baldhill on 15 August 2018. ND Game and Fish Department: No progress to report during this time period. NRCS completed inspections on16 dams in 2021 and 24 dams in 2020 currently under Operations & Management (O&M) agreements and invited owners or their representatives to join our staff in the field so that needed maintenance and repairs could be discussed on site. Followed up with letters documenting recommendations.
2019-28	Protect Communication Sites	Retrofit communication sites to mitigate risk of threats and hazards.	Mitigation of potential losses of critical communications requires retrofitting sites with protective security measures, which include installing guy wires and ensuring system redundancies through	 No Update During this Reporting Period State and Local Intelligence Center: Continue outreach with Critical Facilities/ Sectors concerning threats, hazards, and risks and promote information/ intelligence sharing. ND Department of Transportation: NDDOT deinstalled fencing around new sites and have an on-board monitoring system that does

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			satellites, portable towers, and new technology devices.	 notifications/alarms if the premises are entered without authorization or if the site goes down. NDDOT installed fencing around our new sites and have an on-board monitoring system that does notifications/alarms if the premises are entered without authorization or if the site goes down.
2019-29	Secure Electronic Systems	Procure and install secure electronic systems.	This action focuses on protecting data by employing next generation firewalls and implementing industry best practices. This action promotes adoption of processes that promote secure electronic systems.	 State and Local Intelligence Center: Continue outreach with Critical Facilities/ Sectors concerning threats, hazards and risks. and promote information/ intelligence sharing. Cybersecurity and Infrastructure Agency: CISA (Cybersecurity and Infrastructure Security Agency) is now the operational component under the U.S. Department of Homeland Security for all cybersecurity and infrastructure security preparedness, prevention, mitigation and recovery.
2019-30	Transportation Engineering and Systems	Improve transportation infrastructure to reduce transportation accidents and prevent mass casualty and hazardous material release incidents.	This action will be completed through engineering, including the design of subsequent roads, railways, and barriers. Managed transportation through the implementation of hazardous truck routes and bypasses may prevent hazardous material releases, particularly in populated areas. Regulations related to railway speeds could reduce the probability of accidents in urban areas and provide	 ND Department of Transportation: Was awarded a \$550,000 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) planning grant for the design of a Traffic Management Center (TMC) to utilize Smart Corridor Technology. Received \$22 million from the 2020 Better Utilizing Investments to Leverage Development (BUILD) grant to upgrade 12 sites. The competitive grant, awarded through the U.S. Department of Transportation, is designed to repair, rebuild and revitalize transportation systems across America. State and Local Intelligence Center: Continue outreach with Critical Facilities/ Sectors concerning threats, hazards, and risks and promote information/ intelligence sharing. ND Aeronautics Commission: The North Dakota Aeronautics Commission supports aviation activities in the state through communication with

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			consistency across the state. Additional considerations could be given to those communities experiencing growth or development in industries requiring heavy use of the transportation systems. This outreach/ education would also include adversarial (e.g. Homegrown Violent Extremist (HVE), Terrorism, Hacktivists) threats (purposed or imminent).	 state, local, and Federal Aviation Association (FAA) officials, congressional offices, and national aviation groups. The commission is responsible for administering North Dakota's laws in regard to the registration of aircraft, aircraft dealers, aerial applicators, and the collection of aircraft excise tax. The Aeronautics Commission provides grant funding for airport infrastructure projects and manages aviation education initiatives and programs throughout the state. The office also provides airport planning services, helps to maintain the state's Automated Weather Observation Systems (AWOS), and provides airport inspections for the general aviation airports. The Aeronautics Commission also works to maintain and update publicized planning documents to help maintain and grow North Dakota's aviation transportation system. Statewide airport capital improvement plans, aviation economic impact studies, airport directories, state aviation system plans, and pavement condition index studies are a few examples of these documents. Specifically in FY 2021, the state and local entities were successful in leveraging approximately \$53 million from the Federal Airport Improvement Program for airport projects within North Dakota. The ND Aeronautics Commission also allocated and administered approximately \$10 million of state grant allocations. Additionally, the agency also completed work on a statewide pavement condition study that provided an updated inventory and cost benefit analysis of approximately 60 million square feet of pavement at ND's public-use airports. Also in FY 2021, the North Dakota Aeronautics Commission licensed 41 aircraft dealers and 95 aerial applicators. Additionally, 1.823 state aircraft registrations

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				were processed for airworthy aircraft within the state of North Dakota.
2019-31	Snow Fences	Support the development of natural and artificial snow fences at the local and tribal levels.	Several local and tribal mitigation plans identify snow fences as a strategy. Enactment of this action will require emphasis on obtaining sources of funding for Snow Fences since state funding sources are no longer available.	 No Update During this Reporting Period NDDES: Continue to provide guidance to local and tribal mitigation planning teams to identify areas where snow fences are needed. ND Forest Service: Incentives for living Snow Fences are available through the Environmental Quality Incentives Program (EQIP) administered by UDSA NRCS and through the ND Statewide Conservation Tree Planting Initiative. Technical assistance is available from NDFS or local Soil Conservation Districts.
2019-32	Drought Mitigation	Identify and implement drought mitigation strategies.	This action requires implementation of programs and projects that mitigate water supply shortages for domestic, rural, municipal, industrial, and agricultural uses; and assist vulnerable populations with heat induced health risks; promotes crop insurance and drought-resistant farming practices.	 NDSU State Climate Office: Provide in-depth analysis of current drought conditions and outlooks during ND Ag Disaster Response bi-weekly calls and for the State Drought Multi-Agency Coordination System. Shared analysis for the Governor's disaster declarations of drought and other weather conditions to provide incident-specific data and to discuss long-term impacts of North Dakota's recent drought and other disasters. ND Department of Agriculture: The Commissioner developed with ND Information Technology a software to allow submission of requests related to drought impacts on feed transportation. This system built in dynamics will allow future data collection if additional Emergency Programs are authorized. ND Department of Water Resources: The DWR manages the Drought Disaster Livestock Water Supply Assistance Program as outlined in NDAC Chapter 89-11. This Program was last activated in April 2021 and

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 remained open until September 1, 2022. This Program provides 50% cost-share, with up to \$4,500 per project to help livestock producers install long term sustainable water supplies for their cattle in times of severe drought. Eligible projects include new water wells, rural water system connections, pipeline extensions, pasture taps and associated works, labor, and materials and equipment rentals for work completed by the producer to develop new water supply projects. The Program must be activated by the State Water Commission (SWC), which determines beginning and end dates. Funds can only disburse for water supply projects in counties that the Governor has declared to be a drought disaster area for purposes of the program. The DWR has entered into an agreement with the USGS to evaluate seepage on the Souris River. The Souris River Seepage Study evaluated how drought conditions affect reservoir releases on the Souris River for the purpose of informing future operations. ND Department of Environmental Quality: Promote and provide training to assist drinking water systems of all sizes perform Vulnerability Assessments and develop Emergency Response Plans. ND Department of Transportation, ND Department of Commerce, NDDES, NDSU State Climate Office, ND Department of Agriculture, National Weather Service: SHMT partners collaborated on assessments of drought conditions during 2019-2021 and potential mitigation strategies.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Provide technical support to farmers and ranchers impacted by drought to aid in identifying drought related hazards and develop mitigation strategies. Lead the bi-weekly ND Agriculture Disaster Response meetings to evaluate disaster impacts on the agricultural community, including drought and drought mitigation measures. US Army Corps of Engineers – Omaha District: Publish the Missouri River mainstem System 2021-2022 Annual Operating Plan by December 2021. This document outlines both flood risk reduction and water conservation activities for the Missouri River mainstem. North Dakota Stockmen's Association: Developed and disseminated informational resources about drought contingency planning and resources to livestock producers and decision-makers. Tallied and analyzed livestock sale and travel information through brand inspection documents to assess culling and relocation and provided information to decision-makers and livestock producers.
2019-33	Hazardous Fuels Reduction	Identify potential areas or communities that may be adversely effected by excessive fuel loading and create partnerships to mitigate hazardous fuels.	The action will support Firewise concepts and Community Wildfire Protection Plan by creating a more resilient landscape with communities that are protected from catastrophic wildfires.	 ND Forest Service: The ND Forest Service continues to collaborate with state, federal and local partners on a hazardous fuels reduction strategy for areas of concern within North Dakota. Continue to target 100 acres of hazardous fuels in the ponderosa pine stand in western North Dakota yearly. The ponderosa pine hazard fuel mitigation site is within a 1000-acre area representing the northeastern most extent of ponderosa pine in North America and one of two native pine areas in North Dakota. The mitigation site includes both private and federal lands. The project provides risk mitigation by removing hazardous fuel thus providing a

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				higher degree of protection to communities and homes that may be at risk.
2019-34	Hazardous Materials Storage and Disposal	Promote and enforce safe handling, storage, and disposal of hazardous materials.		 ND Department of Agriculture: The Commissioner continued to support unused Hazardous Materials collection using Project Safe Send, this project provided a transportation vendor in several ND cities for drop of unused chemicals to prevent spillage or other impacts. ND Department of Environmental Quality: The department updated fact sheets and web site information to provide information on safe handling, storage and disposal of hazardous material. The department updated rules and retargeted inspection to increase staff presence in the field. State and Local Intelligence Center: Continue outreach with Critical Facilities/ Sectors concerning threats, hazards, and risks and promote information/ intelligence sharing. ND State Fire Marshal: Continue to work with other State Agencies to identify and inspect sites storing hazardous materials in excess of maximum allowable quantities and ensure compliance with state adopted codes such as the North Dakota State Fire Code. No progress, just added State Fire Marshal to this action as ensuring fire code compliance is a critical point of HAZMAT storage safety. ND National Guard Provide training and ensure safe handling, storage and disposal of hazardous materials at all sites operated by the NDNG. NDSU Extension

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Provide educational resources on Spill Prevention Control and Countermeasures for petroleum storage.
2019-35	Insurance Moonshots	Encourage homeowners to purchase insurance.	This action supports FEMA's goal of doubling the number of properties covered by flood insurance by 2022. Education will be key to ensuring citizens understand their level of threat, types of insurance are available. This action requires educating several different industries in order to convey the message. The State National Flood Insurance Program (NFIP) Coordinator will work with the State Insurance Commission on setting up workshops. The State NFIP Coordinator will continue to hold training with specific target markets (e.g., Emergency Managers, Realtors, Floodplain Administrators, Public) annually as funding becomes available.	 No Update During this Reporting Period ND Department of Water Resources: Promote the NFIP, Community Rating System (CRS) and RiskMAP programs and provide guidance to communities who participate in the NFIP and the CRS to ensure their achievement in the flood loss objectives under the NFIP. City, County, Tribal Emergency Management: LaMoure County held a public meeting prior to Spring Flooding to encourage knowledge of the NDRAM product to show flood prone areas and also encourage flood insurance. The DWR, NWS, and USACE also attended.
Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
----------------	-------------------------------------	---	--	--
2019-36	NFIP, RiskMap and CRS Program	Promote the NFIP, CRS, and RiskMAP program and provide guidance to communities who participate in the NFIP and CRS Program to ensure their achievement in the flood loss objectives under the NFIP.	This action provides guidance to communities who participate in the NFIP to ensure their achievement in the flood loss objectives under the NFIP. This is accomplished by providing technical assistance, evaluating community performance, implementing NFIP floodplain management activities, and strengthening community floodplain management expertise. Communities that go beyond the minimum federal standards are eligible to join the CRS. Through this program, communities are becoming more flood resilient and property owners are rewarded with discounts on their NFIP flood insurance premium. RiskMAP provides high quality flood maps and information, tools to better assess the risk from flooding, and	 No Update During this Reporting Period ND Department of Water Resources: See the NDRAM article in the 2021 annual report. Promote the NFIP, CRS, and RiskMAP programs and provide guidance to communities who participate in the NFIP and the CRS to ensure their achievement in the flood loss objectives under the NFIP. NDDES: Utilizing the RiskMap program to support our benefit cost analyses for NDDES Hazard Mitigation projects. NDDES and Department of Water Resources: Promoted use of RiskMap as a tool for local and tribal planning teams during the first plan developers meeting in March 2021.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			planning and outreach support to communities to help them take action to reduce, or mitigate, flood risk.	
2019-37	StormReady Program	Promote use of NOAA's National Weather Service's StormReady Program.	The StormReady program will help mitigate the impacts of storms by giving communities the communication and safety skills needed to save lives and property, before and during the event. StormReady helps community leaders and emergency managers strengthen local safety programs.	 National Weather Service: The NWS continues to promote the Weather Ready Nation Ambassador initiative. Website: https://www.weather.gov/wrn/ambassadors The NWS continues to promote StormReady. Website: https://www.weather.gov/stormready/nd-sr. Currently 30 counties, 29 communities, 1 tribal nation and four universities are recognized as StormReady. NDDES: City, County, Tribal Emergency Management: LaMoure County encourages StormReady as NWS has attended and taught at the county agricultural safety days for elementary students and weather warn classes for the public.
2019-38	Cyber Security Threats Education	Educate and support the Whole Community on ways to mitigate cyber threats affecting personal, private, and state security and other sensitive information.	An attack can impact business revenue, services offered by state, local, or tribal governments and other organizations, and the functionality of infrastructure and other physical systems. North Dakota has placed a higher priority on building prevention systems and countermeasures to mitigate the impacts of	 ND Information Technology and State and Local Intelligence Center 43 Public Speaking Presentations Created and participated in CyberMadness, a High School competition to show skills in detecting and responding to cyber threats Created JCSOC, a Joint Cyber Security Operations Center with multiple States to share information The NDDES Preparedness Section issued several awards for IT personnel to attend Cyber Security training. Cyber Public Awareness Campaigns: includes public speaking, conferences and events 25 Public Speaking Presentations Committee Members of BSC CyberCon and o ND Cybersecurity Conference

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			this hazard, but the prevalence and varied approaches of cyberattacks means that this remains a threat.	 VCSU Youth Tech Day Members of K-20W SANS GirlsGoCyberStart Air Force CyberPatriot Cybershield Members of the Cyber Intelligence Network, Election- ISAC, MS-ISAC and many others. Joint Security Operations Command Misinformation/Disinformation Campaigns NDResponse website Cybersecurity and Fraud Information National Cyber Security Awareness Month Career Fair and Career Days State and Local Intelligence Center: NDDES Preparedness Section provided funding to NDIT to staff a Cyber Analyst within the SLIC. Staff is conference Chair at CyberCon promoting infrastructure and cyber security. Continue outreach with Critical Facilities/ Sectors concerning threats, hazards, and risks and promote information/ intelligence sharing. NDDES: Conducted MGT-345 Disaster Management for Electric Power Systems Mar. 29-30, 2022 Conducted Operation Staple Puller tabletop exercise – scenario was a cyber-attack on the electric power grid June 27, 2022. NDDES provided funding to support Cyber Madness. This is State high school tournament for high school students be educated and compete by solving cyber challenges. Providing conference Chair and sponsorship for CyberCon, a cyber and infrastructure protection conference

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 North Dakota National Guard (NDNG): Providing board member and student sponsorship for the Bismarck State College CyberCon conference. Providing qualified Servicemembers through the CISA Assessment Evaluation and Standardization program able to perform cyber risk assessments for governmental agencies. Participation in multiple Cyber exercises with military and industry partners that provide training and increased the states posture for Cyber incident response. Continuous training provided to all NDNG servicemembers in general Cyber awareness and specific Cyber hygiene topics. Provided speakers at multiple community Cyber events.
2019-39	Public Education and Outreach	Develop and implement an all- hazard and all-threat public education and outreach program.	This program would include: • Engaging media and social media during hazardous awareness months, prior to spring flooding, and other seasonal weather hazards. • Providing education about the potential consequences of geomagnetic and solar storms in addition to radio blackouts. • Encouraging personal mitigation measures for property and community. • Promoting educational activities designed to	 North Dakota Stockmen's Association: Developed and disseminated informational resources about drought, extreme heat, blizzards, animal health and farm stress to decision-makers and livestock producers. Conducted media interviews to expand reach of information. NDDES, ND Department of Health, ND Department of Human Services: Conducted numerous press briefings, townhall meetings and other outreach to provide up-to-date and accurate information on vaccine safety and effectiveness, mask efficacy, safe therapies and other COVID-19 mitigation strategies. Led collaborative efforts to develop an Immigrant and Immigrant Communities Outreach and Support Strategy, designed to act as a guiding document for COVID-19 response and recovery efforts targeting the immigrant community. National Weather Service:

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			protect the public, including weather spotter training, adversarial threat training and Community Emergency Response Team (CERT). • Providing the public information to make informed decisions about how to prevent infections or infestations or avoid spreading diseases.	 NWS Grand Forks and Bismarck offices held in person SKYWARN training sessions in the spring of 2022. NWS continues to provide education and outreach both in person and via social media - Facebook and Twitter along with our webpages: weather.gov/fgf and weather.gov/bis. The NWS has returned to doing in person outreach with schools and civic organizations. We have also coordinated outreach with the NDDES Strategic Communications Chief. This includes providing weather /water education and outreach material on the ND Response Website and social media channels. NWS Grand Forks and Bismarck offices held virtual SKYWARN training sessions in the spring of 2021. NWS continued to hold SKYWARN spotter classes, though COVID-19 did have an impact on those in 2020. NWS continued to provide education and outreach via social media - Facebook and Twitter along with our webpages: weather.gov/bis and weather.gov/fgf. State and Local Intelligence Center: Continue outreach with Critical Facilities/ Sectors concerning threats, hazards, and risks and promote information/ intelligence sharing.
				 The department of Environmental Quality: The department updated fact sheets and web site information to provide information on various hazard, but especially those related to flooding.
				 Extensive outreach and educational efforts underway due to the COVID19 response. Multiple news releases on various non-COVID health risks, including rabies, foodborne illness, west Nile virus, vaccinations, vector borne diseases.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Multiple health alerts sent to health care providers and other stakeholders regarding significant public health issues such as COVID-19, vaping injuries, congenital syphilis, hepatitis A, pertussis and other health threats. <i>ND State Fire Marshal:</i> Continue to coordinate with other agencies and participate in fire safety public education projects: Fire safety week in October each year Arson awareness week Spring each year Smoke alarm installation campaigns Childcare fire safety <i>Sinoke alarm installation campaigns</i> Childcare fire safety <i>City, County, Tribal Emergency Management:</i> LaMoure County encourages preparedness through county website postings, public meetings and press releases in local papers. <i>American Red Cross (ARC):</i> Continue to conduct the Sound the Alarm (STA) annually at a determined location. The ARC works with the local mayor, emergency managers, fire departments and other partners. COVID-19 disrupted plans in 2020; however, ARC encouraged clients to request individual alarms, at no cost, on its website: https://www.redcross.org/sound-the-alarm.html Provides Pillowcase Project, another preparedness program, to schools with 2-5 graders or any youth program. The ARC educates youth about the potential for disasters and what items they should take with while escaping/getting out, placing those items in their pillowcases. The ARC provides workbooks/scenarios, making them aware of the various dangers. <i>ND Forest Service</i> Continued to coordinate and conduct seasonally appropriate wildfire prevention outreach and education

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 campaigns using a variety of media. Most resources available via the ND Response website. Continued to conduct seasonally appropriate wildfire prevention outreach and education campaigns using a variety of media. Department of Water Resources: The DWR manages a Water Education Program. The North Dakota Water Education Program enhances public knowledge and awareness about water resources. Programming efforts include water science, conservation, and best management practices, and demonstrate how water interacts with humans and the natural environment. Many of the programs are presented using online, indoor, and outdoor educational experiences and the dissemination of classroom ready teaching aids. NDSU Extension Develop educational resources and curriculum, and disseminate information through webinars, meetings, articles and interviews related to drought, flooding, building agricultural resilience, enhancing community resilience, and stress and mental health. Provide technical support to farmers and ranchers impacted by hazards and develop mitigation strategies.
2019-40	Dam Owner Education	Work with federal, state, local and tribal agencies to secure additional financial support to improve dams and educate dam owners.	Ensure dams are properly maintained and necessary repairs are made. This outreach/ education would also include adversarial (e.g. HVE or Terrorism) threats (purposed or imminent). This would also improve North Dakota's State Dam	 No Update During this Reporting Period ND Department of Water Resources: Refer to the Dam Safety Article in the 2021 annual report. Presented on dam safety topics to dam owners at a local water convention. Send notices to owners of low head dams to educate them about the existence of those dams, and to offer free signs to warn the public about the dangers associated with low head dams. U.S. Bureau of Reclamation:

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			Safety Program to reduce the risk of dam failure and reduce the potential consequences if a failure were to occur.	 Reclamation utilizes a comprehensive facility review schedule at the North Dakota Dams. The reviews are done on an eight-year cycle. Yearly annual site (ASI), every fourth year of the cycle, a more intensive, periodic review (PR) is conducted and the eighth year of the cycle, a wide ranging, comprehensive review (CR) is conducted. Recommendations from those reviews are tracked to ensure that they are addressed. State and Local Intelligence Center: Continue outreach with Critical Facilities/ Sectors concerning threats, hazards, and risks and promote information/ intelligence sharing. US Army Corps of Engineers - Omaha District Plans are underway to make USACE Emergency Action Plan inundation maps and updated comprehensive dam database publicly available in the National Inventory of Dams by end of 2021. Will include summaries of best available risk information and inundation scenarios, including water depth and arrival times and life loss and properly impact estimates. USACE will provide briefings to the State of North Dakota Dam Safety and local emergency response agencies on the release of this mapping. Press releases will be used to inform the public. US Army Corps of Engineers – St. Paul District The National Inventory of Dams (<u>https://nid.sec.usace.army.mil/</u>) is being updated to include a risk summary for USACE dams. Baldhill was due to be posted at the time of printing. ND Game and Fish Department: No progress to report during this time period.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
2019-41	Medical Surge	Increase the capacity to provide acute and long-term care for people with infectious diseases.	This action increases the capacity within communities to provide acute and long-term care for people with infectious diseases, including comfort care. Medical surge is labor and cost intensive as well as resource and space intensive. Shortages of qualified healthcare workers and medical supplies or equipment will be a challenge.	 No Update During this Reporting Period ND Department of Health: Established systems to assist with and provide COVID-19 vaccinations in areas where additional resources are needed/ Establish system to provide support for COVID-19 diagnostic testing and screening. Established two medical surge facilities in response to COVID-19 Established HAI work team to assist LTC with infection prevention and case management in response to COVID-19 Provided a system to assist with staffing shortages resulting from staff being furloughed related to COVID-19 Providing PPE to providers from the state medical cache for the COVID-19 response.
2019-42	Community Health and Safety Resiliency	Increase safety and health of workers, first responders and new Americans.	The action emphasizes efforts to promote safety and health measures designed to protect workers, first responders and new Americans. These initiatives include, but are not limited to, safety training, risk management training, public health screening, and assistance for new Americans.	 ND Department of Health: Established and systems for the allocation of monkeypox vaccine and vaccinations. Modifications to the immunization information system to accommodate inventory tracking and reporting for both COVID-19 and monkeypox vaccines. Coordinate with local public health and communities to deliver monkeypox vaccinations to high risk groups. Established systems for the safe delivery of COVID-19 vaccines Established systems for the rapid placement of monoclonal antibodies/antivirals or other therapeutics where they are needed or requested. Coordinate wrap-around services for individuals in isolation or quarantine. Health screenings have increased for response employees and partners for the COVID response. Staff

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 working in the field who anticipate close contact with high risk individuals are required to be swabbed/tested weekly. During orientation, new staff are directed in proper Personal Protective Equipment (PPE) donning and doffing and are fit tested for N95 respirators. Established testing sites in locations to increase accessibility to COVID-19 testing Implement, coordinate and promote testing availability for emerging pathogens (monkeypox). <i>ND Workforce Safety and Insurance:</i> Continue to offer organizations such as political subdivisions, civic groups, churches, etc., with volunteers to establish a volunteer policy to provide coverage for volunteers. WSI also promotes the health, safety, and well-being of employees by providing the following professional safety services: Promoting safety Developing safety courses, plans, and programs Responding to safety consultations Conducting courtesy walk-through inspections Providing general safety consultations Conducting accident and hazard investigations Providing internal risk management services and Training and education
2019-43	Vaccination	Promote vaccinating	Promote vaccinations to	ND Department of Health:

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
		population to induce active immunity to a disease and develop herd immunity or slow disease progression.	diseases and stopping outbreaks in both humans and animals. It is the best tool for preventing disease in people and animals. Vaccines are not available for all diseases. Vaccines may be in short supply. It may take six months or longer to produce influenza and foot-and-mouth disease (FMD) vaccines specific for an outbreak. Vaccination programs are labor and resource intensive. Record keeping for the purposes of tracking can be labor intensive.	 Preparations and coordination to receive allocations of monkeypox vaccine from the SNS. Enrolled providers and educated providers to administer monkeypox vaccine. Refocusing efforts to getting childhood vaccination rates up to date by working with community partners. Role out of COVID-19 vaccinations, tracking of breakthrough cases, implementation of third COVID vaccine doses, planning for COVID booster doses. Extensive work with the Legislature to preserve vaccination laws and defeat bills that would ban vaccination requirements. Established storage, handling and distribution systems for the safe storage and handling of COVID-19 vaccine, including ultra-cold storage capacity. Provided human resources for the COVID-19 vaccine campaign. In progress due to COVID-19. Achieved 90% vaccination coverage for HPV vaccination in adolescents. Nearing 95% rate for school age children on required school vaccinations. Ensured post-exposure prophylaxis and vaccination of people who may have been exposed to rabies MD Department of Agriculture, Division of Animal Health: Animal Health conducted two planning workshops, with practicing veterinarians, NDSU Extension and the Veterinary Diagnostic Laboratory representatives to explore capabilities, capacities, and resource gaps in the event of a national or state-wide Foreign Animal Disease (FAD) vaccination campaign. The plan that was created at this workshop was then tested during a multi-state, multi-agency tabletop exercise in May 2020.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
2019-44	Disease and syndromic surveillance	Enact the system collection of the occurrence of disease or disease syndrome.	Surveillance enables the more rapid detection of outbreaks and capable of providing consistent data for comparison over time or by population. Disease reporting is not always timely and may occur after an outbreak has started. It requires cooperation from several areas of the health care industry. There may also be delays due to disagreements over or lack of funds available funds for indemnity payments.	 ND Department of Health: Data modernization efforts is underway in several areas including electronic case reporting, Reportable Conditions Knowledge Management System (RCKMS), death investigations and linkages of the immunization information system to the electronic disease surveillance system. Upgrade completed to the disease reporting system (Maven). Discontinued the use of Dynamics 365 for COVID case investigation and contact tracing. Continuous upgrades to Dynamics 365 application for COVID data relating to both community testing and case investigations. The COVID-19 response has shown significant improvement in data collection and analysis. These processes will undergo evaluation for future outbreaks. Implemented new syndrome definitions to better understand the scope of COVID-19 case distribution in the state. NDSU Extension Developed educational resources and curriculum, and disseminated information to individuals with poultry during the Highly Pathogenic Avian Influenza outbreak in spring 2022. Extension agents aided the ND Department of Agriculture in completing surveillance within the control zones in their counties during the Highly Pathogenic Avian Influenza outbreak in spring 2022. MD Department of Agriculture: Animal Health conducted two planning workshops, with practicing veterinarians, NDSU Extension and the Veterinary Diagnostic Laboratory representatives to explore capabilities, capacities, and resource gaps in the

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 event of a national or state-wide Foreign Animal Disease (FAD) vaccination campaign. The plan that was created at this workshop was then tested during a multi-state, multi-agency tabletop exercise in May 2020. Assisted veterinarians with lab costs associated with testing for unusual disease investigations. Influenza Sars-Co-V-2 RHDV2 (WS, NDG&F) Rabies EHD/BT Anthrax USAHERDS software included tests and accessions module to better map and monitor spatial disease events over time. Provide health inspections of all attendees at the North Dakota State Fair along with educational efforts to exclude, identify or prevent spread of infectious diseases of animals, animal owners and spectators. Promoted water and feed testing to prevent and mitigate drought-associated diseases. Assisted veterinarians with lab costs associated with testing for unusual disease investigations.
2019-45	Chemoprophylaxi s	Give people or animals who may have been exposed to a disease-causing agent an antibiotic, antifungal or antiviral medication to prevent illness.	Chemoprophylaxis can be effective in preventing and controlling disease and outbreaks in both human and animal populations.	 No Update During this Reporting Period ND Department of Health: Updated anthrax resources in Spring 2020. Guidance issued to providers for prophylaxis for close contacts to COVID cases using monoclonal antibodies. In response to three meningococcal cases, provided recommendations and follow up to assure close contacts received chemoprophylaxis. ND Department of Agriculture: Coordinate for diseases such as Anthrax for resource information and appropriate use of this process to vaccinate

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
2019-46	Disease and Infestation Prevention and Control Technical Assistance	Providing technical information to health care professionals, agronomists, vector control boards or others.	The action requires education on regarding the regulation pertaining to importation, diagnosis, treatment and management of people, animals or plants relating to the prevention and control of diseases or infestations, including infection prevention. This action focuses on providing the latest science on diagnosis and management of diseases and infestations. It can be difficult to reach all providers with information. Information and best-practice recommendations may be conflicting or not available when responding to novel or emerging threats.	 ND Department of Health: Increasing genomic surveillance for enteric pathogens, SARS-CoV-2. Provided guidance to health care providers on assessing risk for monkeypox, appropriate specimen collection and disease reporting. Issued notification to providers on the emergence of monkeypox. State public health laboratory hardening monkeypox testing capability. Disease Investigators trained to conduct monkeypox investigations, contact tracing and to coordinate post-exposure prophylaxis, as indicated. Division of Immunization is preparing for monkeypox vaccine allocations into the state from the Strategic National Stockpile (SNS.) Continued mitigation efforts for COVID-19. Scaled up mitigation for a third wave in the fall of 2021. Lab is conducting whole genome sequencing on COVID positive specimens to identify variants Breakthrough cases and reinfections are being tracked. Technical assistance provided to schools, child care, higher educations, employers/businesses and health care on implementation of COVID preventive measures and response to cases. Enacted quarantine orders for international travelers in response to COVID-19. (Subsequently lifted in September 2020) ND Department of Agriculture: The Animal Health Division is expanding partnerships and providing technical support to ND Stockmen's Association (NDSA), ND Veterinary Medical Association (NDVMA) and industry associations including Farmed Cervid and Captive Elk for CWD prevention and control, and cattle

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 associations on Animal Disease Traceability (AD)T efforts and Bovine tuberculosis (TB) eradication. Coordinate Import/Export certification and Health Certificates along with Animal Health Control Programs, leafy spurge flea beetle collection for control of Leafy Spurge, and outreach on potential invasive pests like Emerald Ash Borer. The Animal Health Division is expanding partnerships and providing technical support to NDSA, NDVMA, and industry associations including Farmed Cervid and Captive Elk for CWD prevention and control, and cattle associations on ADT efforts and TB eradication. Coordinate Import/Export certification and Health Certificates along with Animal Health Control Programs, leafy spurge flea beetle collection for control of Leafy Spurge, and outreach on potential invasive pests like Emerald Ash Borer. MDSU Extension: Develop educational resources and curriculum, and disseminate information about Highly Pathogenic Avian Influenza and poultry biosecurity during the Highly Pathogenic Avian Influenza outbreak in spring 2022. Provide professional development to specialist to better equip NDSU Extension to support preparedness and response effort for disaster involving animal mortalities. Provided expertise and public education on the identification, diagnosis, remediation and prevention of anthrax in animals, and prevent exposure and transmission to people.
2019-47	Isolation and Quarantine	Separate people, animals or produce who are ill or are contaminated or that	Isolation and quarantine are effective for selected situations only and used more extensively in	 ND Department of Health: Disease investigators trained on isolation and quarantine recommendations for monkeypox.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
		may have been exposed from the general population.	animal health and sometimes in plant health. The action requires human resources to ensure compliance and to provide humane living conditions, and such, is labor and resource intensive. It may require providing a specific location for isolation or quarantine. May require considerable work determining if animals or people have been infected or exposed.	 Worked with local public health as needed to isolate infectious disease cases as warranted. Scaled up efforts for case work, including isolation and quarantine in response to the delta variant and the anticipated fall increase in cases. Implemented policy and procedures for isolation and quarantine or people diagnosed with or exposed to COVID-19. Hired and trained a team of case investigators and contact tracers to assist with operationalizing isolation and quarantine activities. ND Department of Agriculture: Enacted Highly Pathogenic Avian Influenza (HPAI) preparations with state stakeholder groups ahead to significantly improved response by clarifying people: roles and responsibilities, agency leads/contacts; training on equipment, pre-staging of assets across state and across agency and process: pre-identified communication channels, agency documentation needs, notifications. Leveraged USDA's early warning system (WS wildlife surveillance) worked to give us a head-start on planning Quarantine animals or plants upon investigation as appropriate until disease risks are mitigated. ND Department of Environmental Quality: Department of Environmental Quality:
2019-48	Social Distancing	Provide community or population-based strategies to reduce events that lead to crowding during an infectious disease outbreak.	Examples include canceling public events, canceling classes, encouraging sick people to stay at home and discouraging non- essential travel. This is less labor intensive than	 No Update During this Reporting Period ND Department of Health: Numerous news releases and press conferences regarding social distancing, including some state level policies requiring distance education, closing of non- essential businesses and prohibiting larger gathers. ND Department of Agriculture: Removed from mitigation action.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			other mitigation strategies. These measures may result in economic impacts such as canceling concerts or sporting events or closing retail centers. Closing daycares and schools can create workforce problems as parents are forced to stay at home with children. From an animal health perspective, this might include closing auction markets, agricultural fairs, and competitions. Closing markets creates possible humane concerns during stop movements. Generally, not enforceable unless there is a legal order issued.	 ND Department of Human Services: Enacted the following measures: Waiting rooms: Chairs placed at 6 ft. distance Hand sanitizer station deployed Screening process implemented at all Human Service Centers, State Hospital and Life Skills and Transition Center Joint office space: Installed plexiglass health barriers at staff desks. Mandated PPE use for all staff and clients when in the facility. Developed PPE use guide Implemented C-OVID19 home visit guidelines Completed numerous 'Teams' trainings with staff on screening, PPE use and Preventative Measures C-19 Transport Guidelines
2019-49	Depopulation of ill or exposed animals or plants	Used to control animal and plant diseases, this is the process of removing ill and/or exposed animals or plants through euthanasia or other methods.	Depopulation is effective in eliminating ill animals or plants, or those that pose a risk for transmitting disease. However, it can be labor and resource intensive, and it often has an economic impact on the producer. Social outcry	 ND Department of Health: Worked with the Department of Agriculture on numbers Brucella canis situations in the state. ND Department of Agriculture: Conducted mortality management symposium. Worked with NDSU Extension and the NDDEQ on disposal planning pre HPAI. Participated in USDA/state cooperative process depopulation exercises. Supported a county/NDDES foam drill.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
			or poor public acceptance is another concern. Depopulation may also lead to decreased protein availability in the food supply.	 Established memorandum of understanding (MOU)/Memorandum of Agreement regarding staging of resources with NDDOT and NDDES. Updated and reviewed MOUs with Federal Agencies with regards to depopulation and indemnity. NDSU Extension: Provided expertise and public education on the disposal of animal carcasses contaminated with anthrax spores and highly pathogenic avian influenza.
2019-50	Control plant disease and infestation	Spray or apply insecticides/ fungicides/ pesticides/ herbicides/ larvicides.	This action is used to control plant diseases and infestations. In some cases of animal and human disease spread by ticks, mosquitoes, or other vectors. It is effective if applied appropriately. Larvicides used to control mosquitoes tend to be more specific in their targets. This can be labor intensive, is not effective in eliminating the problem completely, and not always target specific.	 ND Department of Health: Tick surveillance looking for various species of ticks associated with disease transmission Testing ticks for human pathogens Mosquito surveillance for west Nile virus and other arboviruses. ND Department of Agriculture: Removed from mitigation action. ND Game and Fish Department: Surveys were taken on numerous lakes and Aquatic Nuisance Species were observed in 4 waterbodies. The public was notified, and rules were posted in various places. ND Department of Environmental Quality: Department reviews requests for aerial applications over populated areas. Review includes checking that the aerial applicator plans to use appropriate product and equipment for work being done as well as the steps they plan to take to notify the public of the activity. NDSU Extension Develop and disseminate education materials on crop diseases and management of crop diseases.

Action ID #	Action Title	Action (Statement)	Action/Strategy Description	Status Updates: 7/1/2021 – 6/30/2022
				 Conduct integrated pest management surveys to monitor pest populations. Develop and disseminate information on treatment thresholds and treatment options. Develop and disseminate educational materials on noxious and invasive plant identification, characteristics and management.
2019-51	Genetic Modification – Action Withdrawn by the ND Department of Agriculture and NDDES for further revision during the next update cycle	Used mostly in helping to control plant diseases and pests. This involves the development of hybrid plants that are resistant to common diseases.	Genetic modification is very effective in preventing known diseases. Social acceptance of genetically modified organisms (GMOs) is conflicted along with poor public perception, time, resource, and labor intensive. New technology may cost producers more to implement. One disease may be replaced by another to which the plant is still susceptible.	 ND Department of Agriculture: Recommended discontinuation of this mitigation action along with NDDES Planning Staff.

N.D. Department of Emergency Services Fraine Barracks P.O. Box 5511 Bismarck, ND 58506

> des.nd.gov facebook.com/NDDES twitter.com/NDDES

