



# Adaptation Planning for Climate Resilience

## Camp Grayling Joint Maneuver Center

A Michigan Army National Guard Pilot Project



A demonstration project to strengthen the communities neighboring three Michigan military installations

June 2016

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## Introduction

Domestic military installations play an essential role in the nation's defense, particularly in training and developing the men and women of our armed forces. But in a world of ever-evolving conditions and challenges, the modern military installation is tasked with much more than training activities. Today, there is an increasing recognition of the interdependence of installations with the communities in which they reside, particularly in the face of modern global challenges such as climate change that are not bound by political or geographical borders.

Several U.S. Federal agencies, including the Department of Defense (DoD), are leading pilot projects with local communities to identify shared climate change vulnerabilities and to develop local strategies to address those shared vulnerabilities. The Assistant Secretary of the Army (Installations, Energy and Environment) asked the National Guard Bureau (NGB) to identify a state to serve as the Army's pilot, recognizing the National Guard's ongoing efforts to increase the resilience of its installations in support of its disaster-response mission. Resilience is a measure of the sustained ability of a community to utilize available resources to respond to, withstand, and/or recover from adverse situations. NGB selected the Michigan Army National Guard (MIARNG) based on its ongoing sustainability and resiliency efforts and its participation in the Michigan Climate Coalition, a statewide partnership of universities, businesses, non-profit organizations and government agencies interested in climate science, adaptation, sustainability and related disciplines.

This report, *Adaptation Planning for Climate Resilience: A Michigan Army National Guard Pilot Project*, assesses current conditions, documents planning efforts, and makes recommendations to improve resilience in the Fort Custer Training Center (FCTC), Camp Grayling Joint Maneuver Training Center (CGJMTC), and Selfridge Air National Guard Base (SANGB) communities. The report details an action plan developed for Camp Grayling Joint Maneuver Training Center aimed at responding to and preventing the adverse impacts of climate change on the installation as well as in the greater community.

## Federal Framework

This project fulfills a number of federal directives to address climate change on Department of Defense installations. In 2013, the President of the United States charged the Department of Defense to prepare for the impacts of climate change, in part by increasing resiliency on military installations. Resiliency, according to this Executive Order, is “the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.”<sup>1</sup> The Department of Defense's 2014 Climate Change Adaptation Roadmap addressed some of the high-level challenges anticipated for the military's domestic activities, noting:

“Our coastal installations are vulnerable to rising sea levels and increased flooding, while droughts, wildfires, and more extreme temperatures could threaten many

<sup>1</sup> Executive Order 13653

of our training activities. Our supply chains could be impacted, and we will need to ensure our critical equipment works under more extreme weather conditions. Weather has always affected military operations, and as the climate changes, the way we execute operations may be altered or constrained.”

The Department of Defense issued DoD Directive 4715.21 – Climate Change Adaptation and Resilience (January 14, 2016) to formalize the roles and responsibilities laid out in DoD’s 2014 Climate Change Adaptation Roadmap. The Directive tasks the DoD Components (including the Army) to assess and manage risks to built and natural infrastructure, basing, and disaster-response mission planning and operations. The Directive also tasks the DoD Components to “collaborate with internal and external stakeholders to address common climate change challenges and opportunities, including regional planning efforts.”

The U.S. Army’s 2015 Energy Security & Sustainability Strategy (ES2 Strategy) calls on Department of Defense installations to integrate resiliency concepts into base operations and land-use planning. “The ES2 Vision describes a strong, mobile, and flexible force that is housed, trained, and maintained on resilient installations that are able to project power, unimpeded by disruptions to domestic utilities or land use constraints.”

The recommendations in this report respond to these federal mandates by increasing the resiliency, self-sufficiency, and preparedness of CGJMTC while protecting the Michigan Army National Guard’s ability to fulfill its mission in the face of a changing climate.

## Regional Climate Trends

As stated by the Intergovernmental Panel on Climate Change (IPCC), significant changes in the Earth’s climate have been observed. The impacts of climate change on agriculture, infrastructure and human health can be felt across the Great Lakes region.

The Great Lakes Integrated Sciences and Assessments Program (GLISA) is a partnership between the University of Michigan and Michigan State University, housed in the Graham Sustainability Institute’s Climate Center at the University of Michigan. As one of 10 regional centers funded by the National Oceanic and Atmospheric Administration (NOAA), GLISA builds capacity to manage risks from climate change and variability in the Great Lakes region.

CGJMTC is located in the forested central northern Lower Peninsula of Michigan. According to GLISA, the area’s average overall temperature increased by about 2.8°F from 1900-2012. The greatest warming, at an average of about 3.5°F, has occurred in the winter months. Average annual precipitation has also increased by about 3.7% during that same time period.

GLISA also projects that warmer temperatures and increasing CO<sub>2</sub> levels will increase forest productivity in the region until other impacts of climate change, such as increased drought and wildfire, present additional stressors to forests.

According to the Michigan Department of Natural Resources (MDNR), atmospheric conditions that promote wildfire spread — such as high wind speeds and drought events

— are projected to become more common during summers. Altered soil moisture due to changes in transpiration from trees, changes in evaporation from soil, and changes in precipitation (e.g., more rain, less snow) are also projected to contribute to more volatile wildfire conditions in the central northern Lower Peninsula.

## Process

To develop this report, the project team conducted a two-day planning exercise at Camp Grayling on May 4 and 5, 2015, to investigate ways that the National Guard and the surrounding communities could work together, leverage resources, and develop a common understanding of shared risks and how they could be addressed. A wide range of stakeholders, including installation leaders, state and local agencies, and the general public, were invited to participate in order to develop a clear understanding of local risks and opportunities associated with climate change. Participants worked to identify priorities and actions to reduce the risks associated with climate change. The project team conducted a series of scenario activities to identify local solutions to a range of potential climate futures. Finally, participants reviewed climate resilience ideas from around Michigan to identify which specific projects and actions could improve local readiness.

A detailed assessment of the Grayling community's vulnerability to the potential impacts of local climate change was also conducted. A summary of the vulnerability assessment is provided in the full project report.

## Camp Grayling at a Glance

Totaling 147,000 acres, Camp Grayling is the largest National Guard installation in the country. The Camp is made up of a variety of land owners and is managed through a series of partnerships between the State of Michigan and the Federal government. As a premier Joint Maneuver Training Center, Camp Grayling is a leader in providing the highest level of modern training. Support resources are scheduled year-round to provide a wide range of training for service members, emergency responders and private-sector customers from around the world. Training sites provide a variety of training scenarios to meet unit readiness requirements. Large artillery, mortar, tank ranges and maneuver courses are among the highlights of Camp Grayling.

From an economic perspective, the installation contributes approximately \$24.7 million in direct inputs annually to the economy, \$15.4 million in wages, \$7.2 million in exercises, and \$2.1 million in transient troop spending. This amounts to a \$49.2 million impact on the local economy.

Camp Grayling has a rich history of taking a proactive approach to ecosystem management and engages in ongoing collaboration with several public and private entities. Camp Grayling collaborates on a watershed management plan, a wetland restoration plan, and a flora and fauna inventory. The installation is also working with the Lake Margrethe Lake Association to address invasive milfoil plants and swimmer's itch parasites.

The installation is committed to increasing its resiliency. Currently, Camp Grayling is about 90% of the way to achieving net-zero waste. A net-zero waste installation is an installation that reduces, reuses, and recovers waste streams, converting them to resource values with zero landfill over the course of a year. In addition to efforts to reduce the volume of waste generated, the installation has a large recycling sorting facility, engages in lead recovery on-site, and is actively pursuing a composting program on base. Additionally, energy- and water-efficiency practices are prioritized for all new construction. Camp Grayling is also evaluating opportunities for renewable energy to increase its energy security posture.

Camp Grayling is one of two arctic training sites in the country. Arctic Eagle, a joint military training exercise, was previously conducted exclusively in Alaska; exercises are now also hosted at Camp Grayling. The Department of Defense is increasingly reliant on Camp Grayling to serve this role, working with Allied Forces from Latvia, Estonia, Lithuania, Canada, Norway and the United Kingdom for arctic training. Warmer winters could affect arctic training at Camp Grayling and increase DoD costs to train forces for future arctic challenges.

## Key Issues

Wildfire is the number one natural hazard in the Grayling area in terms of both public safety and property damage. There are over 100 fires on average per year at Camp Grayling, resulting in 400 man days lost per year. The installation relies upon the MDNR for wildfire response and prevention. To reduce reliance on MDNR resources, Camp Grayling will need more seasonal staff and more full-time staff for wildfire protection to maintain fire breaks on an annual basis. A comprehensive assessment or evaluation of a community's wildfire risk is an important first step in identifying proactive measures for community wildfire protection.

"The single greatest threat to training for the MIARNG at Camp Grayling is wildfire."

- Brigadier General Michael A. Stone

Extreme heat, drought and lower water levels would have a negative impact on wildfire response, drive up costs, reduce training time for units, and threaten Camp Grayling as well as surrounding communities. Dry hydrants used to respond to wildfire are hooked up to surface water sources and are negatively impacted by

lower water levels. With more projected heat events, there is an increase in heat casualties, requiring treatment and more personnel. There could also be additional requirements for personal protective equipment (PPE) (such as camel packs) during high heat events.

Invasive species and pathogens are on the rise in area woodlands. Specifically, increased incidence of oak wilt, gypsy moths, and the emerald ash borer could be linked to a changing climate. Pests and pathogens kill trees, resulting in more combustible fuel and increased risk of wildfire.

From the installation's perspective, a primary resiliency goal is energy security. Camp Grayling experiences frequent power outages. Brownouts also occur frequently and damage

appliances. Additional backup generators would be effective in meeting the near-term energy security requirement as the installation moves toward renewables, battery storage and microgrids.

There is a notable degradation in infrastructure on base due to declining maintenance budgets. Rail improvements are planned, but long overdue. Installation and local roads need to be repaired and maintained. Ice and frost heaving, which are projected to increase as climate patterns change, will negatively impact the Grayling Army Airfield runway as well as installation and local roads.

Placing further stress on infrastructure, the installation “throughput,” or number of man days per year, has increased by 82% over its five-year average. Camp Grayling expects to continue to increase its throughput for several years to come. This translates into greater demand for maintenance dollars for infrastructure (that may not be available in future Army budgets) as well as an increased fire protection liability.<sup>2</sup>

High water levels and flooding could negatively impact the total acres of maneuverable land on the installation. There is also potential for an increase in wetland acreage under a high water scenario. These wetlands could be regulated in the future, which could restrict or prohibit certain types of training operations and activities.

## Action Plan

The following goals and actions are a result of a series of in-depth stakeholder interviews, public input from a two-day planning charrette focused on Camp Grayling, a Vulnerability Assessment conducted for the Grayling community, and recommendations made by installation leaders and the project steering committee, the Michigan Climate Coalition (MCC). Not all recommendations and actions are the MIARNG’s responsibility, as several are community-wide recommendations that would be best led by local governments, watershed groups, or other NGOs.

### Natural Resources

**Goal:** *Protect and enhance the region’s natural resources and ecosystems, focusing on areas that may be most affected by climate change.*

- **Action:** Conduct a vulnerability assessment with potential adaptation actions to better manage natural resources in light of climate change predictions.
- **Action:** Partner with local agencies and nonprofits to develop and administer comprehensive education to all surrounding landowners on strategies for reducing the spread of invasive species.
- **Action:** Continue monitoring and evaluating climate change impacts on threatened and endangered species.

**Goal:** *Support community-wide cooperative fire protection efforts, especially in areas where wildfire risk may be exacerbated by climate change.*

- **Action:** Secure funding for an Integrated Wildland Fire Management Plan (IWFMP).

<sup>2</sup> Estimate included in the April 30, 2015 presentation by Colonel Thomas C. Perison – Orientation Briefing

- *Action:* Secure funding to establish and maintain an on-post wildland fire department with a minimum of 16 full-time staff during the fire season, and two full-time staff year-round.
- *Action:* Collaborate with MDNR to secure a seasonal wildfire support crew for the greater Grayling area.
- *Action:* Secure funding for Bambi Buckets and more hangers.
- *Action:* Explore grant opportunities to increase the MDNR's fire management capacity.
- *Action:* Conduct more frequent prescribed burns on MDNR land in areas identified as high fire risk in the Wildfire Risk Assessment.
- *Action:* Seek and obtain funding to increase the number of dry hydrants on MDNR land.
- *Action:* Expand emergency response simulations in partnership with municipal fire departments, the MDNR, Camp Grayling, and other key community partners.
- *Action:* Work with the City of Grayling to secure funding for long-term structural fire protection, including personnel and equipment.

## Infrastructure

**Goal:** *Evaluate the feasibility of a biomass energy plant on the installation to increase the Camp's energy security posture and address projected increased storm-related outages.*

- *Action:* Explore opportunities for a biomass power generation facility at Camp Grayling and conduct a cost-benefit analysis, with special emphasis on the wildfire risk benefits of removing excess biomass.
- *Action:* Investigate the possibility of collaborating with Arauco (a local particleboard manufacturing facility) to utilize excess biomass from its local logging operations as a fuel source for the biomass plant.
- *Action:* Partner with a university to conduct a study of the best way to achieve net-zero energy and waste status.
- *Action:* Complete contract to install two new wind funnels.

**Goal:** *Maximize climate-informed infrastructure investments to benefit all members of the community.*

- *Action:* Explore opportunities for opening up the underutilized airfield to the larger community to enhance emergency response capabilities.
- *Action:* Pursue increased investment in the railroad to benefit both the military and the community.
- *Action:* Explore the feasibility of fiber-optic communication community-wide.
- *Action:* Expand sewer and water services and distribution systems into Grayling Township.
- *Action:* Explore the use of a microgrid system to make Crawford County more self-sufficient in terms of power.
- *Action:* Explore Federal transportation grant funding for a northbound exit for I-75 at Downriver Road.
- *Action:* Collaborate with MDOT to manage infrastructure impacts due to a changing climate.

**Goal:** *Increase energy efficiency and use of alternative energy across the installation to increase the Camp's resiliency.*

- *Action:* Conduct an assessment of energy efficiency opportunities and implement findings throughout the installation.
- *Action:* Continue to generate additional alternative energy under the \$2 million Environmental Security Technology Certification Program (ESTCP) project, lowering both the installation's reliance on outside power sources and increasing Camp Grayling's energy security posture.

## Economic Development

**Goal:** *Expand outdoor recreation opportunities to keep pace with a changing climate and changing demands from visitors.*

- **Action:** Explore a marketing strategy aimed at attracting new generations to outdoor activities to enhance stewardship of these resources.
- **Action:** Create partnerships between the community and Camp Grayling to protect recreation services that may be affected by climate change.
- **Action:** Explore development of a MIARNG/community multigenerational recreation center in an underutilized building on Camp Grayling.

**Goal:** *Enhance climate-informed economic connections between soldiers on the installation and the larger community.*

- **Action:** Leverage ongoing placemaking initiatives in the City of Grayling to draw troops out into the community to support the local economy.
- **Action:** Actively engage installation officials when developing the county-wide Redevelopment Ready Plan to be sure to leverage collaboration of installation operations.
- **Action:** Explore a public-private partnership to provide transit or shuttles from Camp Grayling to downtown Grayling to better connect both communities and reduce the reliance on fossil fuels.

**Goal:** *Convene a group to identify strategies to increase regional economic resilience.*

- **Action:** Identify which sectors of the local economy will be most impacted by climate change and work to address threats to these industries with respect to climate change.

## Emergency Response and Preparedness

**Goal:** *Enhance the capacity for Defense Support of Civil Authorities (DSCA) at Camp Grayling.*

- **Action:** Prepare appropriate plans to support necessary operations, education, and training.

**Goal:** *Address the needs of sensitive populations in the community who will bear the burden of climate effects.*

- **Action:** Form a working group with local senior citizens and the Area Commission on Aging to better identify and address the needs of an aging community.
- **Action:** Identify vulnerable populations and inventory their needs.

**Goal:** *Prepare for increased severe weather events at Camp Grayling and in the greater community.*

- **Action:** Evaluate any potential change in frequency, duration, and type of severe weather events, to determine potential impacts on response capabilities.
- **Action:** Designate cooling stations in outlying areas, possibly township halls.
- **Action:** Ensure backup generators are available to critical facilities.
- **Action:** Designate Dial-A-Ride and school buses as resources to relocate vulnerable populations.
- **Action:** Have fire departments, law enforcement, emergency medical services (EMS), and MIARNG enter into a mutual aid agreement.
- **Action:** Evaluate the potential to use the over-supply of existing housing at Camp Grayling for emergency housing.

- *Action:* Conduct a scenario exercise to plan for preparedness and local response to extreme weather events.
- *Action:* Validate Continuity of Operations (COOP) or Continuity of Government Plans and synchronize at the local, state, and federal levels to ensure all efforts harmonize.

## Land Use

**Goal:** *Support land use and development that is resilient to climate change and is mutually beneficial to the installation and the greater community.*

- *Action:* Secure funding to conduct a Joint Land Use Study (JLUS) to see where partnerships between the installation and the community could be formed with regard to land use.
- *Action:* Identify appropriate locations for community gardens that could be cooperatively run and managed by both the installation and the larger community.

## Next Steps

MIARNG will continue to engage in ongoing state and local planning efforts both in Michigan and in the greater Grayling area. Camp Grayling leaders plan to continue to monitor the most up-to-date and emerging climate trends and regional projections, and share the info with state and local planning entities.