SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS 2020

MICHIGAN ARMY NATIONAL GUARD
NATURAL RESOURCES CONSERVATION, SMALL INSTALLATION

Program Management

Technical Merit

Orientation to Mission

Transfer-ability

Stakeholder Interaction

Program Impact

The Michigan Army National Guard's (MIARNG) Fort Custer Training Center has long been recognized for its Natural Resources Conservation (NRC) program, one of the most comprehensive and successful examples of the National Guard's stewardship commitment. Encompassing 7500 acres, Fort Custer (FCTC) blends excellence in natural and cultural resource management with innovation in sustainability and environmental quality to enhance and protect the training lands that support small arms, bivouac, and land navigation training as well as specialized convoy reaction and improvised explosive device training. FCTC's biodiversity is virtually unparalleled; the training site supports valuable, globally rare natural communities that require holistic, landscape level management. The Environmental staff for the installation continue to finetune their management techniques to respond not only to present ecological and training needs, but also to prepare for impacts of climate adaptation anticipated in the coming decades. The installation has thus become a national leader in the development and implementation of a climate preparedness plan; at the same time, the training site continues to expand its sustainable energy resources, validate the efficacy of its prescribed fire regime, innovate in forestry practices, and foster a robust network of interagency partners to support region-wide conservation while protecting the MIARNG mission.

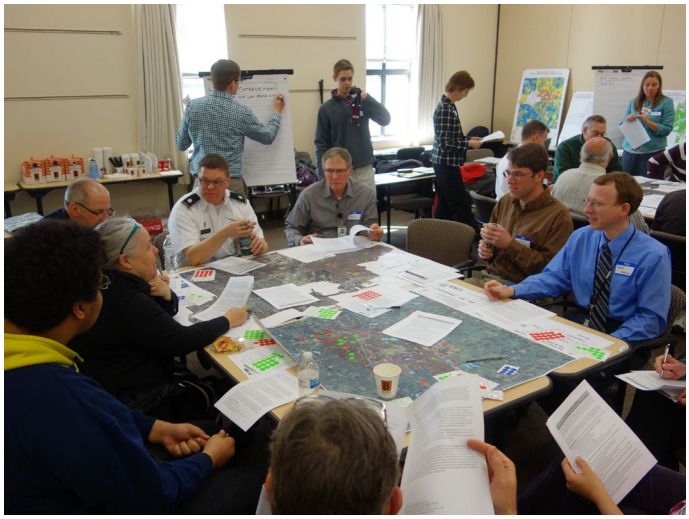
The range of initiatives that have been launched over the past two years at FCTC is unmatched, even by much larger installations. FCTC is the leader in military installations for the number of solar panels and installed and electricity being produced for its own microgrid; the installation is anticipated to be, if required, fully "off-grid" in the near future. From being the Army's representative in the DoD climate change preparedness pilot program, FCTC is now the first installation implementing its own customized climate change plan into its operations and its Integrated Natural Resources Management Plan (INRMP). NRC staff continue to lead cooperative interagency efforts in the state to address future ecological needs and adaptations to current management strategies. The installation's forestry and timber practices are being modernized to emphasize ecological function in conjunction with adoption of the Michigan Forest Inventory System to enhance the value of forestry data; FCTC is the first non-Department of Natural Resources (DNR) agency in the state to adopt this system. These milestone achievements go above and beyond the day-to-day management of the training site and its established programs; the dedication of the Environmental staff have made this success possible.

The NRC program is overseen by the installation Environmental Manager, two NRC specialists, and an ITAM technician, with support from contracted foresters, botanists, and biologists; GIS support from the environmental office is also a key component for NRC activities. All members of this staff are cross-trained so that their expertise is not limited to single program areas. This has been essential to implementing landscape-level management that benefits all habitat and native species collectively. The installation's environmental program also benefits from the full-fledged support of installation command and trainers, who have helped to foster community and local government outreach and partnership. Within the broader installation and MIARNG organization, NRC activities have been integrated into planning and strategy to

streamline coordination among environmental, facilities management, trainers and range control, construction and public works, and MIARNG command.

This integration, along with excellent relationships with USFWS and MDNR, preserves NRC compliance throughout all the installation's operations. The training site is working now to revise and update its fully implemented INRMP to reflect the new forestry techniques, climate preparedness strategies, and recent data from new surveys. The installation also maintains pest management, wildland fire management, and high-quality natural communities management plans. USFWS is a frequent collaborator in wildlife monitoring and other research activities; NRC staff work closely with USFWS and MDNR to mitigate for endangered and sensitive species and habitats on post. As a result, FCTC has been able to coordinate all its training and operations with no adverse impact to wildlife; indeed, FCTC stands out as the place where habitats and wildlife thrive. The Environmental staff's expertise has allowed FCTC to minimize its management costs because so much work is completed in-house. The installation's fire program is conducted in partnership with Kalamazoo Nature Center, which avoids the costs of maintaining a full fire crew on post.

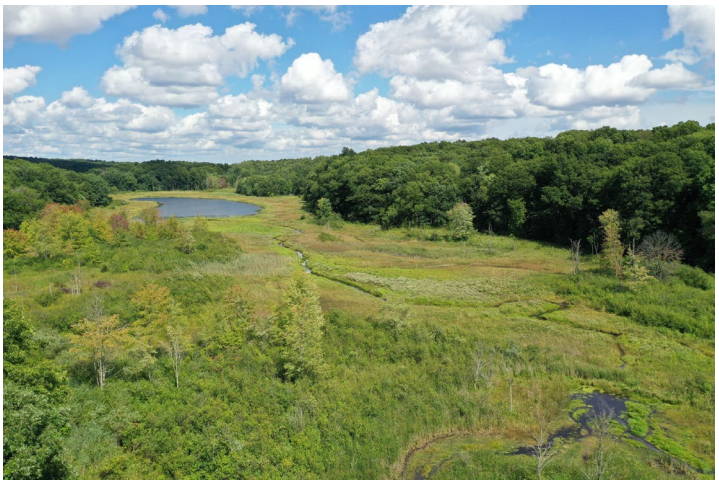
Technical Merit: The installation's day-to-day NRC activities have preserved the quality of FCTC's habitat communities and training access, but several efforts over the past two year reflect the MIARNG's commitment to going above and beyond.



Fort Custer takes part in climate change adaptation planning as part of Army's pilot project. MIARNG was chose to represent Army due to FCTC's proactive coalition building and climate resilience planning that was already in place and could easily be built on. Model climate adaptation plans were written for all three Guard installations in Michigan out of this effort.

Climate Change Preparedness: In 2013, FCTC become the Army representative in the DoD Climate Change Preparedness Pilot; as a result of this program, FCTC now has a customized climate adaptation plan. The installation has begun implementing this plan over the past two years, establishing new or improved protocols for habitat conservation. NRC staff also continue to build on their relationships as part of the Michigan Climate Coalition, which encompasses municipal governments, the Michigan Land Use Institute, state regulatory agencies, US Forest Service, MDNR, MI Department of Community Health, MI Environmental Council. and many other environmental and public institutional partners, to coordinate management goals with other public land stewards. The Coalition meets every other month; recently, its collaboration has been bolstered by participation from University of Michigan (UM) and Michigan State University (MSU) researchers. FCTC's adaptation plan has been enhanced by the inputs of the coalition, and the installation's contributions to the group have helped other members to delineate the interconnected impacts and planning needed to address not only natural communities, but also health, infrastructure, military needs, and community support. FCTC is now also working with the Northern Institute of Applied Climate Science (NIACS) and the Great Lake Integrated Science Assessment (GLISA) to process climate

data and make appropriate changes to management goals. These partners are also helpful in translating this data into materials that are accessible in the broader military and non-military communities, which helps FCTC staff to communicate their goals and needs even more effectively. Based on data projections, FCTC is preparing for potentially significant shifts in flora and fauna more common to Missouri than Michigan in the future, and engaging the community and partners in addressing this transition is essential. Finding ways to accommodate both present habitats and future ones is key to the INRMP update being completed now; ultimately, projects will be attached to goals in that document so that the implementation and effectiveness of the climate adaptation plan can be tracked.



Fort Custer supports several high-quality prairie fens. These rare ecosystems harbor high levels of biodiversity and numerous rare species. In 2019, monitoring to evaluate the effectiveness of stewardship activities was implemented by Michigan Natural Features Inventory and Michigan Aerospace Corporation. The monitoring platform includes using drones and machine learning to automate the detection of invasive species.

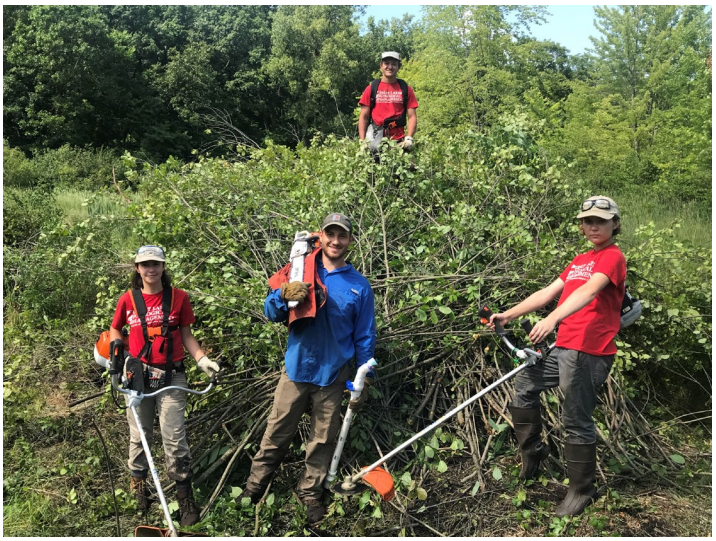
Management adjustments are based on the dynamic downscaling completed for FCTC, which reflect not only the installation but also the regional impacts that relate to Great Lakes' effects. This modeling creates more accurate predictions for the training site that permits better planning for prescribed fire needs, forest system evolution, and wildlife population fluctuations. Approaching the landscape in this way, FCTC is positioned to make smarter investments in the species and communities that are likely to be present in the future, prioritize critical habitats like prairie fens, and prepare for the habitats that will become more relevant. NRC staff continue to actively target the high quality natural communities for enhancement, focusing on invasive species eradication and determining the ideal fire regimes needed within each type.

Habitat management, of course, is the driving force behind wildlife support. The installation is actively managing for cerulean warbler because that bird's core range is shifting from primarily Appalachia to the west and north, encompassing FCTC. Recognizing this, forestry efforts are beginning to favor oak species with roughly 70% canopy cover while protecting the preferred tree species on post from outcompeting invasive or encroaching species. Prescribed fire modeling and treatment and modernized forestry techniques are key strategies for implementing the goals of the climate preparedness plan.

Prescribed Fire Techniques: Like many installations, FCTC has adopted and benefitted from prescribed fire management, but over the past two years, the Environmental program has begun pushing this strategy further. In particular, the installation has partnered with researchers to determine the best fire application regimes to control for invasive species, promote native species growth, and support wildlife. With this effort, FCTC is helping to fill the data-driven gap between fire management use and validated outcomes. Already this research has changed practice on the post: initial research on fire impacts for turtle species revealed that the common fire timing employed by FCTC and the DNR were adversely impacting these species. As a result, FCTC ceased fire applications prior to turtle emergence in the spring and now conducts burns

later in the season when turtles have fully emerged from hibernation. With NRC staff on the Michigan Prescribed Fire Council, FCTC is also ideally positioned to develop further fire application research and learn from others. Staff have begun doing photo documentation before and after fire application; this new initiative will provide the fire modeling programs with substantive data on effect.

Prescribed burns are conducted in partnerships with Kalamazoo Nature Center, which limits the costs and staffing for FCTC to complete its fire management each year. The Nature Center also provides low cost research on fire effects using the monitoring protocols FCTC staff have implemented. Transects are monitored for vegetation cover, species presence, and other indicators both before and two weeks following fire. The transects are then revisited at the mid-season point every year to document fire recovery and then on a yearly basis. During the burn, fire crews are also capturing the conditions so that FCTC can learn more about how best and when to apply fire. Flame height, spreading rate, wind speed, temperature, and more condition data is collected for each burn. In FY18, FCTC had a breakthrough applying fire on an 800-acre prairie fen area during warmer, drier conditions than usual; by tracking this data, staff were able to demonstrate that these were in fact the ideal conditions for achieving the habitat effects desired. Invasive shrubbery was knocked back by at least 60%, and native species are now thriving in that parcel; orchids in particular recovered exceptionally. The NRC staff are experimenting now with the timing of burns with regard to different bird nesting seasons to encourage greater biodiversity. Annually, FCTC continues to host the Burning Issues consortium with the Michigan Prescribed Fire Council, an event that presents the newest results and practices in fire ecology.



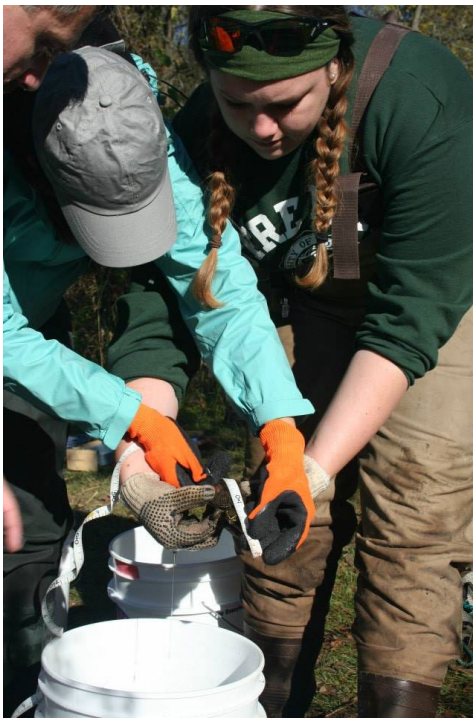
Great Lakes Environmental Management crew is a cooperative endeavor that provides MIARNG with inexpensive and professional assistance managing invasive species. The crew uses mechanical and chemical means to treat species that inhibit training, negatively alter high quality natural communities and prevents prescribed fire from moving through the landscape effectively. The pile in the back ground is glossy buckthorn that has been removed from a prairie fen.

Forestry Improvements: Prescribed fire is a primary management technique for FCTC's forests, encouraging desired species propagation while enhancing soldier accessibility. What is new over the past two years, however, is an evolution of the approach for forestry and timber harvesting, reflecting both new best practices and a shift away from commercial motivations. FCTC has adopted a Restoration Forestry concept to best support high quality natural communities and integrate climate projections. This effort incorporates the new Michigan Forest Inventory System, which creates a comprehensive dataset of forest diversity, density, and characteristics.

Traditional timber harvesting conducted on FCTC would involve skidders and tree dragging, targeting segments of forest for clearing; unfortunately, this approach often creates conditions conducive to invasive plants and erosion. FCTC is in the process of implementing a more selective harvesting protocol, in which selected trees are removed with a mechanized

harvester, a piece of equipment that functions like an excavator with a saw, uprooting and cutting a tree to length in place. The cuts are piled by size and then picked up by a self-loading truck, obviating the need for dragging and skid trails. This machinery can also access forest areas that would not ordinarily be possible with heavy equipment without major ground disturbance. Because the harvester can select a single tree, the NRC staff can also be much more specific about which trees are harvested based on age class and the needs of that particular forest segment. In oak hickory forest, for instance, FCTC has been targeting black locust, cherry and maple for removal to restore the dry mesic forest type desired.

In implementing a climate preparedness framework, FCTC has also been able to identify segments of forest that will be less likely to flourish in the future. As the training site develops more prairie oak/savannah habitat, wildlife will rely on those natural communities. With this in mind, NRC and forestry staff identified a 110-acre parcel of commercial timber that could be clearcut and subsequently restored as prairie habitat. Essentially, restoration can now be conducted with an eye to the future rather than the past.



eDNA research done by Notre Dame at FCTC will provide a biological assessment tool that can address the issues of aquatic biota assessments being restricted due to UXO (traditional methods involve electroshocking and cannot be done in lakes with possible UXO). Here researchers are collecting data using traditional netting methods to compare to the water samples that will be analyzed in their labs to determine what species occupy the water and assess the accuracy of the eDNA methodology.

The new forest inventory system is a novel approach that will enable better monitoring when the dataset is complete; a full delineation of forest stands is now in progress that will include not only trees, but also ground layers. Fire history data will be linked into this system as well, allowing FCTC staff to statistically analyze efficacy. This inventory can also be used to protect particularly valuable trees, like the historic sugar maples and black walnut found along FCTC's segment of the Territorial Road, a historic landscape feature. These trees are around 160 years old and were once valuable for the survival of Michigan Territory settlers. The marking and inventorying of these trees helps to ensure they are protected during prescribed fires and other forest thinning practices.

Wildlife Monitoring: FCTC continues to focus on sensitive species in its high quality natural communities. A biological evaluation is currently in process to reintroduce the Michell satyr butterfly on the training site's ranges; the butterfly would pose no restrictions to training, but its recovery as a species could be benefitted by FCTC's pristine prairies. Currently, the installation is preparing to launch a new monitoring project for state-listed threatened prairie voles, using traditional live trapping methods in addition to testing remote motion-sensor cameras. This hybrid program will be used to evaluate the efficacy of remote cameras as a primary monitoring method. It is possible that this method will not only indicate species presence, but also generate more robust data on population density and habitat use. New techniques will also be applied in upcoming herpetofauna surveys next spring, employing acoustical monitoring similar to that used with bats. If that survey is successful, acoustical monitoring will be expanded for other species. In addition to the acoustical monitoring, soil and water samples will be collected and

tested for DNA of at risk species. Other planning level surveys are currently in process, for bees and Monarch butterflies, bats, and vegetation. A MOTUS tower has been installed on post that captures the presence of any radio-tagged birds flying within its range; Kalamazoo Nature Center (KNC) manages the data from the tower and has found a surprisingly varied number of species as it maps avian productivity and survivorship. FCTC and KNC in turn share this data with the Institute of Bird Population Research. Any insects recovered from birds are also sent to labs at MSU to contribute to research on disease vectors.

Water Monitoring: FCTC maintains a surface water monitoring program to track any particulates or contaminants that enter or leave the training site. General parameters of monitoring also include temperature, pH, dissolved oxygen, turbidity, and conductivity to generate a complete picture of water quality on a quarterly basis across 32 test sites. This data is shared with state regulatory agencies to confirm the quality of management and the compatibility of training with resource conservation.

Indeed, the NRC program for FCTC is an exemplar of how excellent training lands and pristine habitats are essentially one and the same. The prescribed fire that preserves habitat quality simultaneously serves the needs of units and their trainers. The NRC program works closely with Range Control to plot prescribed fire where it will serve both training and ecological needs, as well as to manage fuel loads and train personnel on suppression when incidental fires occur. The NRC program is particularly integral to maintaining access for land navigation, one of the primary training aspects provided on FCTC. Fire and invasive species management are essential to preserving that accessibility.

The Environmental office has also been the driver on the establishment of a microgrid and solar power project that serves the MIARNG's goals of energy resilience and sustainability. FCTC was the demonstration site for a microgrid control framework that manages energy generation, demand, and storage assets for power export through a dispatchable generation hub serving interconnected military facilities. Access to immediate and uninterrupted electricity is critical to missions of both facilities. Successful implementation of the microgrid establishes a whole new level of regional energy security and resiliency available on demand to the military and the utility company. The system integrates legacy generators with 603kW of solar energy with optimized storage.

The installation's focus on the future climate realities is also key to mission support. The NRC staff are looking ahead to anticipate the potential challenges to training and readiness on the horizon. This foresight ensures that the MIARNG will be proactive, not reactive, to both training impacts and mission shift in support of the state.

FCTC's climate preparedness plan implementation is also one of the most transferable initiatives that would benefit installations nationwide. Now that the installation is executing its plan, it is in a position to be an example for other training sites to follow. The Environmental staff have been incredibly active within the NRC community to share their lessons learned and expertise. In addition to being active in the Michigan Climate Coalition, NRC staff serve on the Join Fire Science Program for the Department of the Interior, the Advisory Board for Tall Grass Prairie and Oak Savannah Consortiums for the Great Lakes region, the Michigan Prescribed Fire Council, and several other state working groups and consortiums. With this support, the MIARNG and FCTC are clearly leading the way in integrating climate preparedness into the

INRMP process. The FCTC staff are also coordinating closely with regional stakeholders to determine the best approach for maintaining robust habitat, seed banks, and sensitive species through processes of local conservation and reintroduction in other locations. Working with the Northern Institute for Climate Planning, FCTC's Environmental program is also contributing to the DoD's development of guidance for other states to follow in meeting these future challenges.

Internally, the NRC program's data is captured within databases and GIS systems to ensure that an ongoing record of activities is in place to inform future actions. As new survey and modeling techniques are integrated into management, this information enriches the many years' worth of data already collected.

FCTC's many partnerships also bolster the program's continuity, building in layers of expertise and accountability to sustain mutually beneficial programs among agencies. Among the efforts undertaken over the past two years, FCTC's partners and collaborators include:

MI Parks Service	MI DNR	MI DEQ	USFWS
Notre Dame University	Michigan Climate Coalition	The Nature Conservancy	Lake States Fire Science Consortium
Kalamazoo Nature Center	Michigan State University	Kalamazoo River Watershed Council	MI Dept of Community Health
National Wild Turkey Federation	US Forest Service	MI Environmental Council	MI Farmers Union
National Military Fish and Wildlife Association	Michigan Prescribed Fire Council	MI Dept of Transportation	National Wildlife Federation
MI Conservation Districts (Envirothon)	Superior Watershed Partnership and Land Trust	MI Dept of Agriculture and Rural Development	University of Michigan
Northern Institute of Applied Climate Science	Great Lake Integrated Science Assessment	Michigan Natural Features Inventory	

FCTC has also been an incredible resource for the public, supporting environmental projects for the Youth Challenge Academy, National Public Lands Day, Boy Scouts and Eagle Scouts, and Earth Day events. Hunting program have also been a feature of outreach for many years, including special hunting opportunities. The Freedom Hunt, dedicated to disabled soldiers and veterans, is now in its 13th year, conducted with assistance from the MI DNR; in 2018, 50 hunters participated. Deer hunts are also held each year for soldiers and the general public; youth turkey hunts are also held on post, along with hunter safety courses. The NRC program carefully monitors deer populations at FCTC, using enclosures and feed plots, to ensure a balance between population density and hunting permits issued. The post also participates as a sponsor and host for the regional Michigan Envirothon program, a statewide environmental education program and event for high school students; every four years, the installation hosts the statewide Envirothon competition. Through this constellation of outreach, education, and partnership, FCTC has been able to entrench its own commitments to stewardship and expand that ethic in the wider community.