SECRETARY OF THE ARMY ENVIRONMENTAL AWARDS 2022

NEBRASKA ARMY NATIONAL GUARD
NATURAL RESOURCES CONSERVATION, TEAM

Every year, endangered whooping cranes and other sensitive bird species migrate from Canada to the Gulf of Mexico and back again, traversing millions of acres where military training may occur. A critical stopover is the Platte River in Nebraska, with the 300-kilometer-wide migration corridor covering most of the central part of the state—areas where the Nebraska Army National Guard (NEARNG) conducts critical aviation exercises. The Crane Protection Team has brought together the NEARNG's Environmental Program Manager with experts from US Geological Survey (USGS) to find solutions that protect the cranes and other migrating species while also deconflicting the readiness and training missions. Protecting cranes protects the mission. Over the past two years, this Team has developed new predictive models with ramifications for every state in the corridor—Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, and Montana—and the full support of US Fish and Wildlife Service. These models enable not only military training, but also any activities on state or federal lands within the migration corridor, establishing trends of habitat use and species presence that can empower project planning and mitigations.

The Crane Protection Team is:
- Larry Vrtiska, EPM, NEARNG
- Brice Krohn, Crane Trust
- Aaron Pearse, USGS

Program Management

Technical Merit

Orientation to Mission

Transfer-ability

Stakeholder Interaction

Program Impact

Over the past two years, the Team has undertaken crane conservation along several key vectors. The most impactful project has been the development of a predictive model based on habitat that takes crane risk factors into account. This study integrates not only the Nebraska corridor, but the entire migration path. As a result of this work, the NEARNG is now able to plan flight paths and aviation exercises to accurately minimize the likelihood of interaction with migrating birds. The Team has also partnered with the Crane Trust to enhance habitat in key sites on around 357 acres of trust-owned lands and address aboveground power lines that pose the greatest threat to migrating birds. Through this relationship, the NEARNG reduces the pressure to create habitat on their own training sites while validating the compatibility of their training activities with species conservation.

The Team has worked closely with USFWS, particularly since their efforts are directly tied to compliance with the Endangered Species Act. The NEARNG Integrated Natural Resources Management Plan (INRMP) includes specific measures for protecting crane habitat, but the Team's efforts truly go beyond the training site, approaching conservation at a statewide and even nationwide level. Every agency with lands in the migration corridor benefits from the Team's predictive model and its delineation of habitat quality and potential human disturbance points. The project has the full support of NEARNG and ARNG leadership, with this effort exceeding the day-to-day operations for natural resources conservation on NEARNG installations.

The Team has made use of Legacy Grant funds to complete the habitat study and predictive model, with USGS also contributing to the study budget. The NEARNG and Crane Trust have collaborated on funding the projects to improve riparian habitat and bury nearly three miles of power lines on the Mormon Island habitat tract.

One juvenile (center) and two adult Whooping Cranes using flooded shallow marsh habitat at Spoonbill Flats Waterfowl Production Area on the morning of 29 March, 2021. This study represents a cooperative effort between the Nebraska Army National Guard and the Crane Trust with support from additional partners and is helping us to better understand how Whooping Cranes use various components of the landscape. Photo Credit D. Baasch, Crane Trust.

Managing for whooping crane has been an ongoing priority for the Team and the NEARNG organization. Aviation activities had been curtailed in the past due to reports of cranes being flushed from habitat by encounters with NEARNG helicopters; resolving both access to lands in between training sites and at lower altitudes was essential. Working with USFWS, the Environmental Program Manager had completed a biological evaluation, studies on crane energy expenditure from flushing incidents, and radio telemetry tracking of individual birds. These efforts were undertaken to identify the impact of the NEARNG on cranes, but while they were helpful, they couldn't really predict contact points or mitigate the risk of training activities. Part of the issue the Team faced was a lack of quality data on crane habitat use and accurate science on the human disturbances that actually influence crane behavior. Out of this need, the Team's strategy emerged.
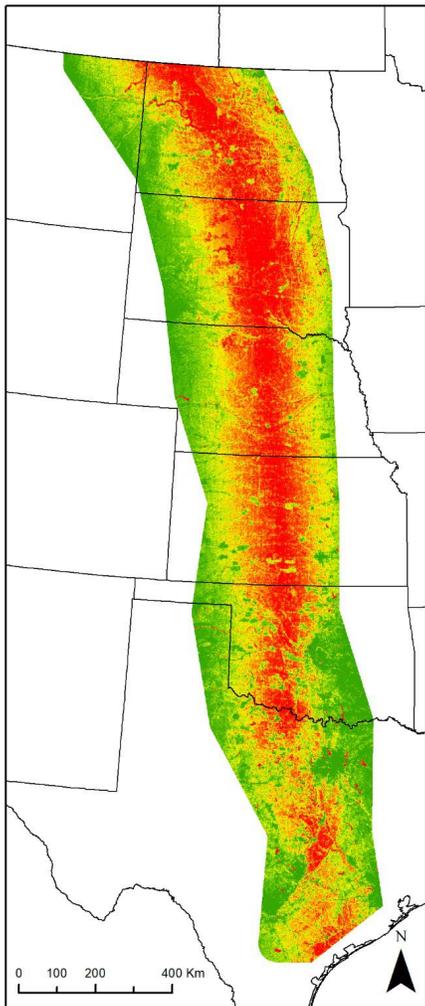
Using the telemetry data available, the Team began to plot actual areas of habitat use with an emphasis on identifying landscape characteristics that might identify locations of future use and estimating the magnitude of the effect of these various characteristics. The initial study also accounted for climate variables like floods and droughts with regard to season. To bring greater clarity, the habitat study also considered other kinds of human disturbance that influence migration patterns and threat to birds. The level of exposure to potential disturbances and the relative magnitude of their effects, individually and collectively, were unknown, and without this information, it was impossible to quantify disturbance risks associated with the NEARNG. The Team introduced a wide range of covariables to the habitat study, including infrastructure, power lines, wetlands, croplands, terrain type, towns, forests, and wind towers; they then took the interactions between several of these covariables into account, for instance, looking at the impact croplands and wetlands that are adjacent.

With this data, validated by telemetry results, the Team was then able to develop predictive maps that showed the probability of a site's use in migration and predictive models that represent the intensity of use by cranes given the present conditions of a given site. The model incorporates the full migration corridor within the United States with satellite-derived information and landform locations to quantify surface water at multiple spatial scales. The Team then segmented the migration corridor into tenths, from highest probability of use to lowest, confirming telemetry data against habitat quality. The model thus delineates those habitat areas that are actually most critical to the migrating birds, revealing that factors like distance from the center of the migration path to wetland basins were most influential, while terrain type or croplands were the least influential to habitat use and habitat like forest discouraged use. Even more critically, the habitat study and predictive model demonstrate that 77% of crane habitat use occurs within just two of the high-quality habitat segments and 93% of habitat use within the top three habitat segments, or 30% of the full migration corridor. The bottom five segments of the corridor contained only 4% of crane use locations. The ramifications of this data are enormous. Delineating the probability of crane presence with this model allows the NEARNG—and any other state or federal agency—to avoid most limitations on activities through the majority of the migration corridor and focus on mitigations that will actually matter in places where migrating cranes are present. For the NEARNG, the model can help to time aviation exercises and route them around potential hotspots without unduly restricting flight paths. The model is also adaptive, allowing changes in climate or habitat type or quality to be incorporated for an updated picture of likely presence over time. NEARNG training sites do not fall within the highest probability habitat zones, but the NEARNG still has a vested interest in promoting more quality habitat throughout the areas where their helicopters fly. In the event that aviation does disturb cranes, a greater abundance of habitat will allow flushed birds to resettle quickly without traveling long distances that would imperil their survival. The Mormon Island habitat tract owned by the Crane Trust presented the Team with a prime opportunity for habitat enhancement, particularly because it is located between the NEARNG's Grand Island AASF and the Greenleaf Training Site. It is in this area that flushing of migrating cranes had been previously reported.

Graphic "map_cat": The Team used whooping crane location data, wetland, and land use information to predict where whooping cranes would be more (red and orange) or less (yellow and green) likely to stop during spring and autumn migrations between wintering areas along the Texas Gulf Coast and breeding areas in the Northwest Territories, Canada.

The Team piloted a partnership with the Crane Trust to accomplish several enhancement actions this year; based on their success, this partnership is being integrated into the natural resources conservation program going forward. The first action directly benefiting cranes and other birds was burying 2.7 miles of powerlines along the Platte River corridor; powerlines are the number one killer of whooping cranes and other birds, including sandhill cranes, piping plovers, and least terns. The Team also conducted disking of sandbars on approximately 300 acres, removing vegetation to allow for sandbar mobility and formation. Sandbars provide roosting habitat for whooping cranes and breeding habitat for terns and plovers with natural protection from predators and human disturbance. The Team then removed approximately 57 acres of undesirable woody plant species encroaching on river roosting habitat, particularly invasive cedar, which benefits cranes as well as grassland nesting birds, migratory waterfowl, and Regal Fritillary and Monarch butterflies. A combination of mechanical removal and prescribed fire were used, with the added benefit of controlling riverbank phragmites growth.

Drone picture showing the tracked-tractor and implement disk in action in the main channel of the Platte River on Crane Trust Mormon Island property. The NEARNG's partnership on this action rehabilitated over 300 acres of sandbars in addition to in-channel disking and encroaching tree removal.

An additional 35 acres of tree removal and 65 acres of in-channel disking will be completed by the end of FY21 along with a feasibility study for construction of crane viewing platforms on the Trust property. On NEARNG training sites adjacent to the Platte River, the Team continues to monitor water quality and backwater habitats, tracking temperatures, turbidity, and dissolved oxygen to ensure that the fish, insects and aquatic invertebrates within the migratory corridor remain robust food sources for the birds that rely upon the river.

The Team's undertakings over the past two years are in direct service not only to the NEARNG's mission, but also to all the central states within the migratory corridor. Their projects are creating positive advancement in the baseline condition of whooping cranes and other species, enhancing the NEARNG's standing with USFWS and serving successful Section 7 consultation.

The NEARNG is acquainted with the kinds of impacts endangered species can have on operations; several years ago, possible flushings of cranes led to the flight ceiling for helicopters being limited to 1500 feet, which conflicted with the exercises soldiers needed to complete. The broad scope of the full migration corridor, moreover, meant that mitigations were being required even where the likelihood of species contact was exceedingly low. By developing the predictive model, the Team is allowing the NEARNG to assess relative risk for whooping crane encounters with a degree of accuracy never before possible. With this information, the NEARNG can make improved decisions for flying specific routes within spring and fall migration seasons, and perhaps among years with differing precipitation patterns. This information will reduce mission conflicts with a federally listed species, and promote the NEARNG's flight mission capabilities.

Based on the model's predictions, it appears that the NEARNG will actually have to make very few adjustments to flight paths and will be free to operate at lower altitudes. USFWS has concurred that the agency will accept proposed NEARNG operations provided that the model is used as the planning guide, and the regional director is eager to employ this habitat-based model not only for whooping cranes throughout the migration corridor, but also as an approach to risk assessments for threatened and endangered species more generally.

Preserving the ability of the NEARNG to conduct aviation training exercises is a core driver for research and habitat enhancement for crane species. Here, the crew of a Nebraska Army National Guard UH-60 Blackhawk helicopter refill a 780-gallon water bucket from a pond in Banner County in western Nebraska while fighting the Hackberry Wildfire Aug. 7, 2021.

The Team's work on the level of habitat rather than species individuals is one aspect that other state Guards and military entities can adopt, particularly as these organization and installations employ landscape-level management strategies. A more nuanced consideration of how species use habitat with regard to other development or disturbances and to climate/seasonal factors allows for an evolving understanding of species and habitat needs. Indeed, that is yet another strength of the Team's model: resurvey efforts of habitat and bird sightings can be incorporated to illustrate changes in habitat use, from climate change to structural development to variations in surface water. Being able to pinpoint the changes that impact the birds insulates the NEARNG, as impacts not related to training won't be assumed to be related. From the perspective of programmatic continuity, the adaptive capacity of the model allows the Team to track changes and trends and adjust conservation efforts—or training plans—accordingly.

By taking the full migration path into account, the Team can assist numerous military installations throughout the entire central United States. Whooping crane often arrive at stopover sites in the late afternoon or evening and depart early the following morning, therefore, and it is possible that several installations have whooping crane stopping for a brief period but go undetected. Regardless of the short duration or frequencies of these stopovers, mission training flights can be restricted for the entire migration period even when no whooping cranes are present. This model will allow all these states to assess and mitigate those risks and potentially justify their operational plans to the USFWS.

Other state Guards and military entities could also benefit from the Team's model of interagency partnership to develop habitat outside of NEARNG training sites. The installations currently have little or no habitat of high quality for cranes, and there is not an operational advantage in attracting cranes or other migratory species onto NEARNG training sites. Inter-installation operations, however, are served by having an abundance of quality habitat, particularly in those two habitat segments that support 77% of crane use. When there is more habitat, there is less impact if a NEARNG helicopter does encounter or even flush a roosting

crane, as the bird will be able to easily resettle close by rather than flying too soon further along the migration corridor.

The partnership between the NEARNG and USGS is the basis for the Team, but outreach with US Army Corps of Engineers (USACE) in evaluating flight paths and the Crane Trust to enhance habitat have been integral to the Team's success. The USACE Partners in Flight program and the Team have begun to share information from the model to jointly identify habitat hot spots that may intersect with military activities. This cooperation reflects the recognition that the Team's project has impact far beyond aviation in Nebraska alone—any training or construction project within the corridor can effectively be deconflicted using the model at the assessment stage.

The partnership with the Crane Trust is the first time that the NEARNG has conducted natural resources projects on non-NEARNG property, but the Team has shown conclusively how beneficial this kind of innovative agreement can be, with USFWS concurrence on this approach. Enhancements completed at Crane Trust properties are credited as conservation measures in the Section 7 consultation process. The Trust is a key stakeholder in validating the compatibility of NEARNG operations with species conservation, and the Team has developed the credibility and trust core to this kind of collaboration. The Team and the NEARNG have sponsored a Crane Trust employee to complete two four-month surveys over the past two years, focused on habitat use and diurnal patterns, which in turn has helped to document the negligible response cranes seem to have to the presence of helicopters.

Currently, the Team and the Trust are planning ways to expand on the habitat projects. A feasibility study will be completed this year for construction of viewing platforms. The platforms would include educational displays about the military support of conservation and the NEARNG's role in improving crane habitat. They are also exploring the possibility for launching training exercises on Crane Trust property that would allow helicopters to practice using Forward Looking Infrared (FLIR) equipment by conducting deer and bison surveys, a perfect blending of conservation and training needs. The Team's relationship with the Crane Trust is opening doors for even more ambitious efforts toward shared conservation goals throughout the state.