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Data Assessment of Species and Habitat Migration due to Climate Change[1]

Research Need

USACE is tasked with the monitoring and conservation of numerous threatened, endangered, and at-risk species (TER-S) over more than 12 million acres. A large number of TER-S spread across a large geographic area makes conservation efforts difficult particularly when complicated by habitat shifts driven by climate change (CC).

Section 3 of Executive Order 13653 requires federal agencies, including USACE, to consider climate change impacts and focuses on increasing resilience in the face of CC. Temperature and precipitation changes can impact vegetation phenology and may disrupt ecosystems sufficiently that changes the habitat of TER-S result; such changes may also influence the dispersal of invasive species.

With the wide breadth of potential impacts from CC, earlier efforts have focused on developing tools for specific circumstances and/or impacts. However, as influencing factors change independently, a more comprehensive methodology is needed to predict the anticipated impacts of CC across a variety of situations and locations. What is needed is a tool that enables managers to prioritize conservation actions to get the most return on investment. Given that a large number of species/geographic areas are impacted by climate change, a framework is needed to enable site comparisons and allow for prioritization of restoration efforts.

Project Objectives & Plan

This effort will develop a working model that can serve as a tool to predict range shifts of threatened, endangered, at-risk species (TER-S), and invasive species as environmental conditions are altered by climate change. This tool will assist USACE with future needs for restoration project planning and preparation that incorporate management for TER-S and invasive species already present within the North Atlantic Division (NAD). This tool also will serve as an early detection warning for invasive species that are likely to invade sites and

thus allow for proactive management to reduce impacts to the environment and to TER-S.

Tools developed from the proposed work will directly support the USACE Climate Change Adaptation Plan and assist with the framework from the Council on Climate Preparedness and Resilience. While the initial development will utilize NAD as an example of its utility, this approach will be easily transported to other locations throughout USACE.

The primary deliverables will be a series of Tech Notes that demonstrate and detail the capabilities of the predictive model for TER-S and invasive species migration associated with CC. A web-based GIS visualization tool will also be developed to display regions of vulnerability for given species. Additional major deliverables will include the conceptual and actual predictive model for TER-S migration associated with CC in the NAD. Results will also be disseminated to the scientific community via one peer-review journal titled "Modeling approach for predicting range shifts for threatened and endangered species and invasive species within the Northeast in the face of climate change."

Payoff
The predictive model for TER-S in NAD will assist USACE in both Planning and Operations business lines (restoration efforts and mission requirements for project operations) by predicting range shifts of TER-S and invasive species that occur within the NAD. This model can be extended to incorporate other Areas of Responsibility (e.g. USACE Divisions, training areas) to assist in a proactive approach and early awareness to changes in habitat, shifts in plant communities associated with both TER-S and invasive species, and species composition. In addition, the model could aid the USACE in establishing better interagency cooperation to support climate change adaptation including involvement with groups such as the Climate Change and Water Working Group (CCAWWG) and the Climate Data and Tools Working Group.

Products
Technical Notes (TNs)
Davis, A.V., Fuentes, A.A., Jung, J.F., Theel, H.J., Britzke, E.R. and Fischer, R.A. (2019). Tools for predicting wildlife species distribution response to ecological shifts (ERDC/TN EMRRP-EI-05), Technical Note. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Jung, J., Guilfoyle, M., Davis, A., Britzke, E. and Fischer, R.A. (In review). Threatened and Endangered Species for Consideration into Climate Change Models in the Northeast, Technical Note. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

[1]**Project Alias – Work Unit Documentation Title:** *Data Assessment of Species and Habitat Migration due to Climate Change*