

# Engineering With Nature

## Project Fact Sheet



### **Quantifying Engineering With Nature® (EWN®) Benefits Associated with Large-Scale Levee Setback Projects**

#### **Background**

Levee setbacks can provide significant ecological as well as flood risk management and socioeconomic benefits; however, specific ecological benefits associated with levee setbacks have not been meaningfully quantified and communicated. As infrastructure suffers decades of repeated flood damages and repairs, continuing to repair in-place becomes more challenging and less effective due to foundation damage, updated levee design standards, and the possibility of more frequent or extreme flood events associated with climate change. This research provides an opportunity to inform future levee setback projects of features needed to deliver maximized multiple benefits.

#### **Objectives**

The overall goal of this research is to produce levee setback design guidance, linking specific project features to engineering, ecological, economic, and social benefits, which will facilitate implementation of future levee setback. This project will develop a list of science and performance-based design priorities and challenges and will maximize leveraging natural processes especially on setback projects with real estate and dimensional constraints. New design criteria guidance would enable levee setback projects to be easier to plan and construct, thereby realizing the multiple benefits levee setback projects may provide across the country.

#### **Approach**

A summary of existing data will be developed to help focus subsequent research years for this project. At least one workshop will be conducted with multi-agency partners in the first year to help ensure relevant datasets are made available to the Project Delivery Team (PDT). In project years 2, 3, and 4, focused field data collection, modeling, and analysis efforts will be conducted in partnership with multiple federal, state, NGO, and University collaborators. Information derived from this study will be used to develop levee setback design guidance. Levee setback metrics and success criteria based on data summary and gap analysis will also be developed. Setback metric development is expected to involve both field data collection and processing of previously collected data. This project will take advantage of existing partnerships across multiple local, state, federal, and NGO agencies. The products developed will also provide effective guidance on how to achieve this level of multiagency collaboration on future projects.



*Planted wet meadow at levee setback borrow pit, levee system L-575 along the Missouri River in Fremont County, IA (2013) Photo Credit: Dave Crane, USACE*

#### **Outcomes**

This research will develop improved levee setback engineering guidance, standards, and priorities for all future levee setback projects, large and small. Research outcomes are expected to target levee setback projects with real estate constraints – common among levee setbacks – empowering future teams in prioritizing features which could optimize ecological benefits within the project limits where ecological benefits cannot be maximized commensurate with flood risk reduction. Present and future benefits associated with levee setback projects include reducing upstream flood risk; reconstruction of a levee with current design standards on more stable foundation; reduction in levee sponsor operation and maintenance costs, as well as reduction in federal emergency levee rehabilitation construction costs (i.e., repetitive losses). Other benefits include enhanced wildlife habitat created by the setback for both aquatic and riparian species (including the resultant borrow pits re-designed as depressional wetlands) and increased economic and social benefits from recreational activities through increased utilization by commercially and recreationally important species.

#### **Points of Contact:**

Dave Crane (CENWO-PMA-C), [david.j.crane@usace.army.mil](mailto:david.j.crane@usace.army.mil), 402-971-9041  
Michelle Bourne (ERDC EPR), [michelle.bourne@usace.army.mil](mailto:michelle.bourne@usace.army.mil), 601-634-3836