

Preparing Interconnected Civil and Military Infrastructure for Extreme Flooding

Dr. Sarah H. Whitaker & Dr. John Ziker, Department of Anthropology, Boise State University

"Our facilities were built for a set of storms that no longer exist."
– Jim Nash, Water Resources Commissioner, Oakland County (Source: Crain’s Detroit Business)

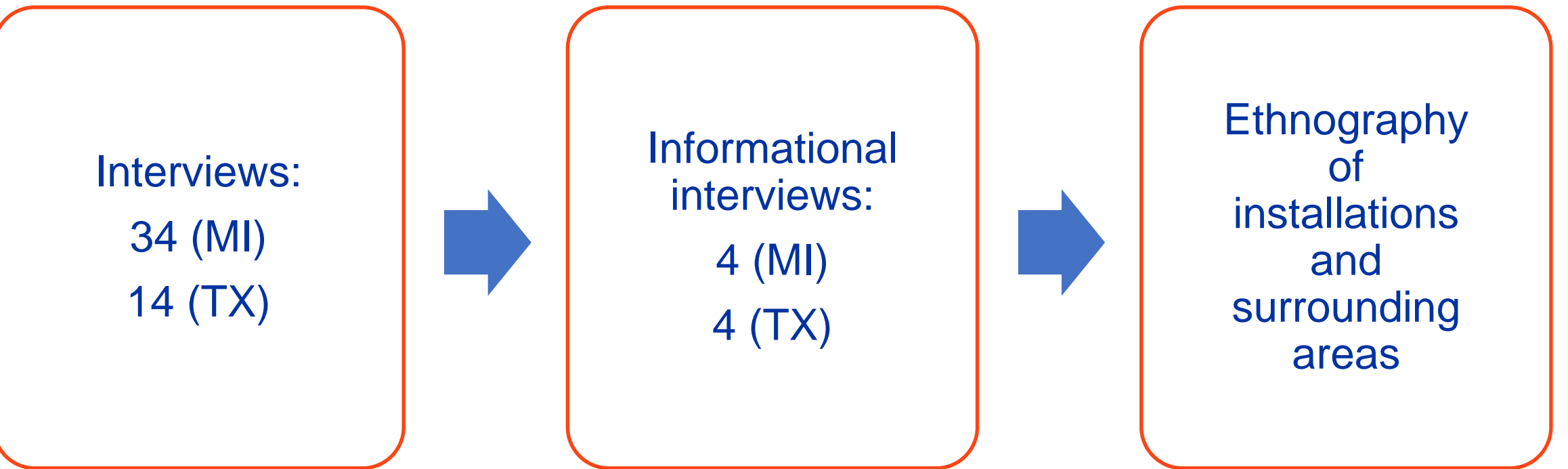
INTRODUCTION

Infrastructure decision-makers in Detroit, MI, and Fort Cavazos, TX, are having to increase the resilience of interconnected civil and military infrastructure to extreme flooding events in order to safeguard human health and safety, minimize impacts to property, and maintain research and mission capacity. Their ability to do so is shaped by the social, ecological, and cultural/institutional context in which they operate. This context affects cross-jurisdictional cooperation and collaboration that is critical for resilience.

OBJECTIVES

1. Understand how the social and ecological context shapes flood risk and decision making.
2. Identify the key trade-offs, facilitators, and barriers facing decision-makers as they seek to address extreme flooding.
3. Understand how social and cultural factors of institutions affect decision-making for natural hazard management within and across jurisdictional boundaries.
4. Generate recommendations for decision makers working across jurisdictional/cultural boundaries.

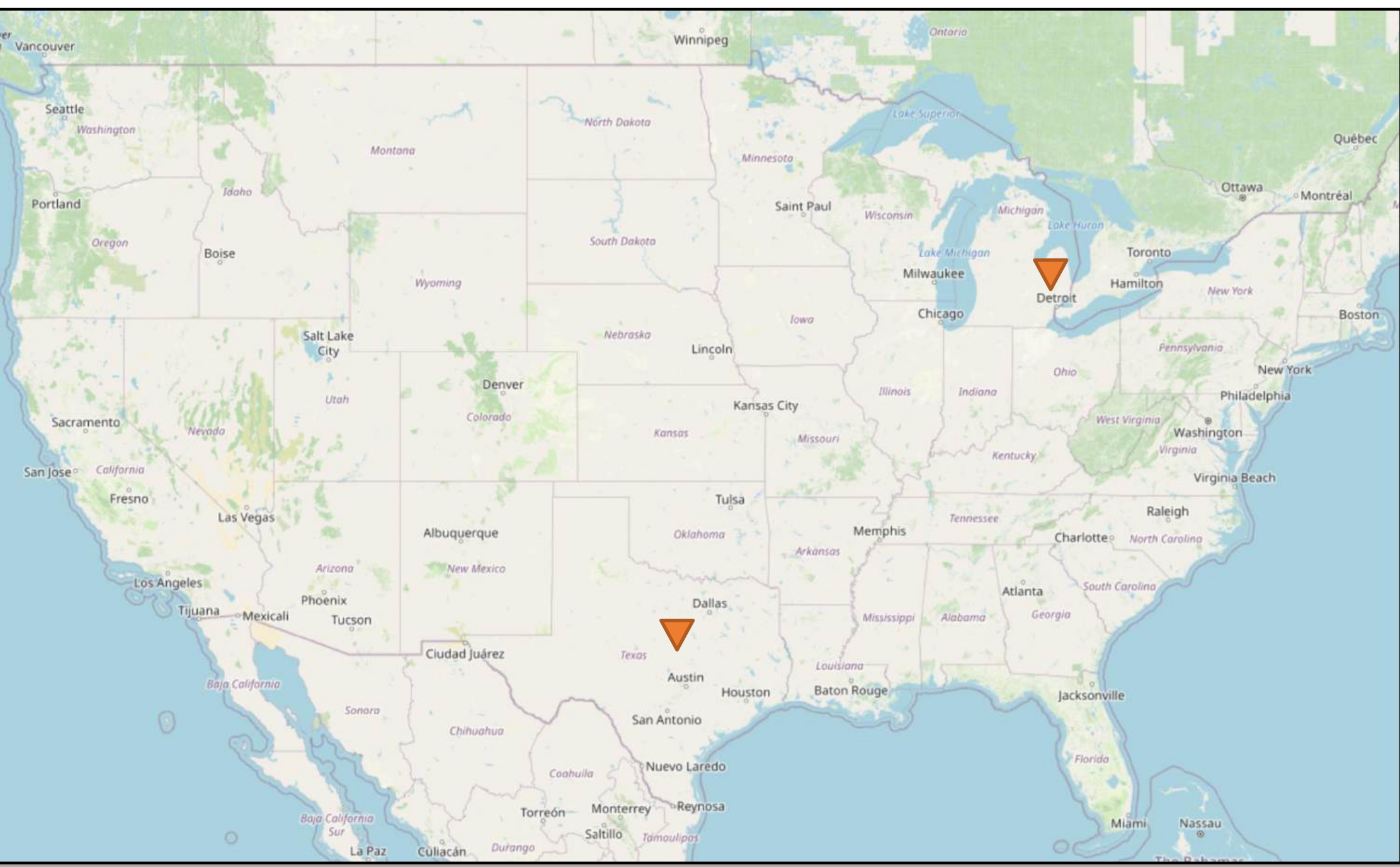
METHODS



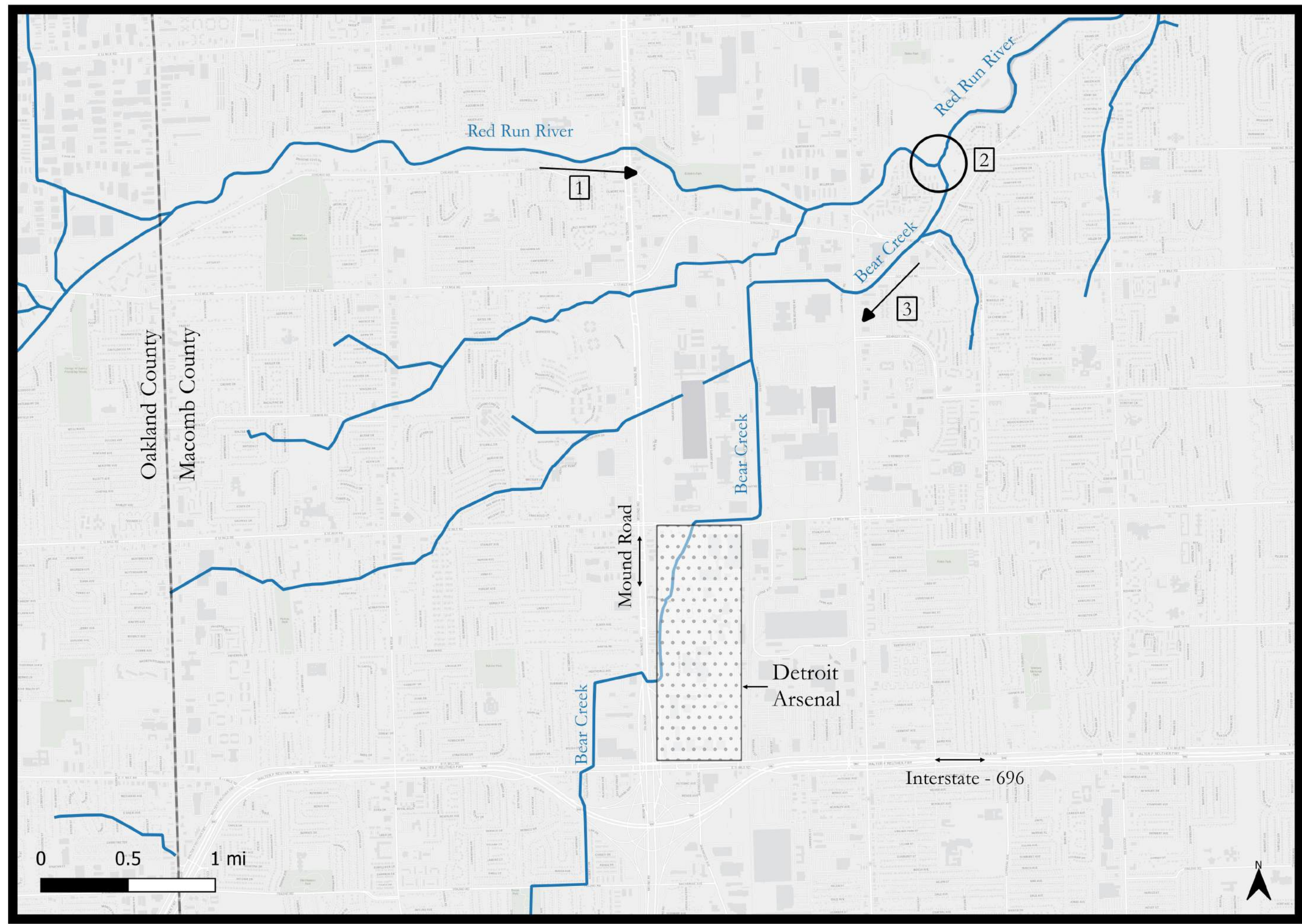
LOCATIONS

Field Site 1: Detroit Arsenal, Detroit Metro Area, and Selfridge Air National Guard Base, Michigan (April 2024 – ongoing)

Field Site 2: Fort Cavazos and Killeen, Texas (December 2024 – ongoing)

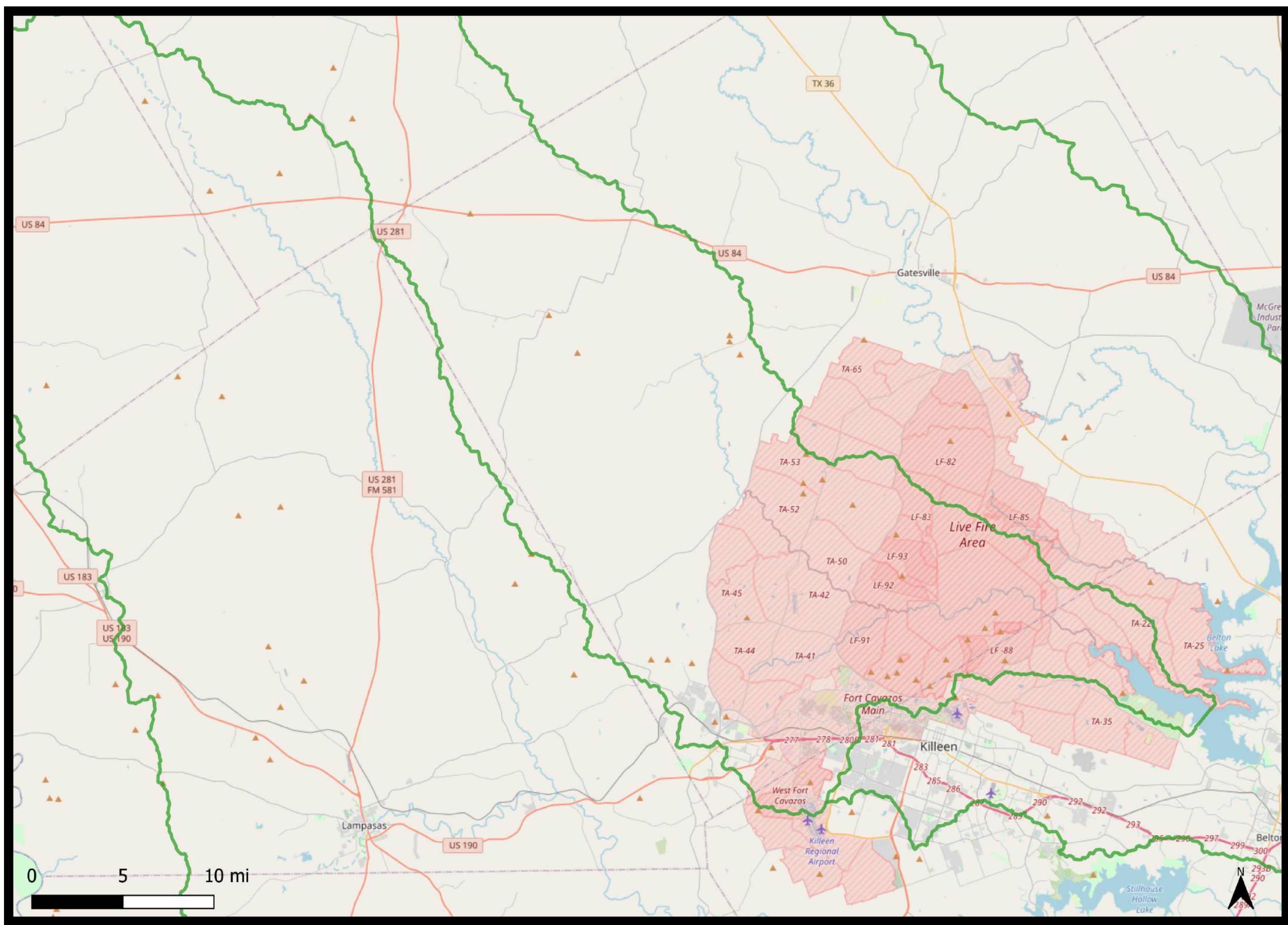


THE SOCIAL AND ECOLOGICAL CONTEXT OF DECISION MAKING



Map 1: Illustrates the flow of stormwater around the Detroit Arsenal. During extreme weather events, flows on the Red Run River block Bear Creek at the confluence (circle) and water backs up into the Detroit Arsenal, Mound Road, and I-696, posing a risk to life, infrastructure, and mission.

Localized downspouts can cause flooding in distant parts of the city due to interlinked infrastructure	Submerged roadways (prone to flooding, limit movement during flooding event)
Little elevation change across the city; many areas were once wetland	Upstream communities unwilling or unable to retain water
Pervasive impervious surfaces and limited green areas to absorb water	Elected government officials dispute proper management of drains
Highly urbanized environment	National, state, and local policies and regulations fluctuate



Map 2: Illustrates the watersheds around Fort Cavazos (green lines) and rivers (blue). The base is at the bottom of the watershed making it vulnerable to flash flooding events both on-site and higher in the watershed. A flash flood wave takes about two hours to cross the installation.

Base is in the heart of Texas' Flash Flood Alley	Because flooding is infrequent, even if it is dangerous and intense when it occurs, it can recede from memory and priority
Heavy rains upstream in the watershed pose flash flood threat as wave moves downstream	Low-water crossings for military vehicles are susceptible to high waters
Dry, rocky, impermeable terrain repels water	Cantonment area is urban; training areas and ranges are rural
Water level can rise quickly in creeks	Flood gauges located low in the watershed

THE ORGANIZATIONAL AND CULTURAL CONTEXT OF DECISION MAKING

Key cultural factors	Key facilitating and constraining factors	Recommendations for decision makers
Short service terms (changing leadership)	Money	Recommendations emerge from systematic analysis of interviews and participant observation with decision makers.
Chain of command	Politics	Understand the social, ecological, and cultural context facing each jurisdiction and how this context affects decision making.
Silos	Policies	Identify and clearly outline the priorities of leaders (at all levels- local, state, and national) and organizations, and share this information with other jurisdictions.
Mission	Competing interests	Civilian organizations working with the military should understand the organizational culture including the chain of command, short leadership rotations, and the importance of mission assurance.
Short memories	Data (access, quality, completeness)	Retain trained and knowledgeable employees with long historical memories and established relationships with other jurisdictions.
Level of service people expect	Collaboration	Share information across jurisdictions.
Willingness to invest in infrastructure and in other communities		Collaborate with universities.



BOISE STATE UNIVERSITY

"It's like trying to fly a 747 while changing the electrical at the same time."