

# Flood Risk Management Outreach Madison, South Dakota

Madison Nonstructural Study  
March 6, 2017



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US Army Corps of Engineers  
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# Agenda

- Introduction
- History and Background
- Risk Assessment Process
- Risk Management
  - Flood Risk Adaptive Measures
- Personal Risk Management Assessment



# Introduction

- ▶ Study was funded through Silver Jackets
- ▶ Objectives
  - Flood Risk Assessment on a structure by structure basis
  - Determine Nonstructural Measures
  - Identify options to complete nonstructural work.



# Introduction

## Study Team

### **City of Madison**

- Chad Comes
- Ryan Hegg
- Dan Whitlock

### **Lake County**

- Doug Huntrods

### **SD OEM**

- Jason Bauder
- Marc Macy
- Jim Poppen
- Allan Miller

### **FEMA**

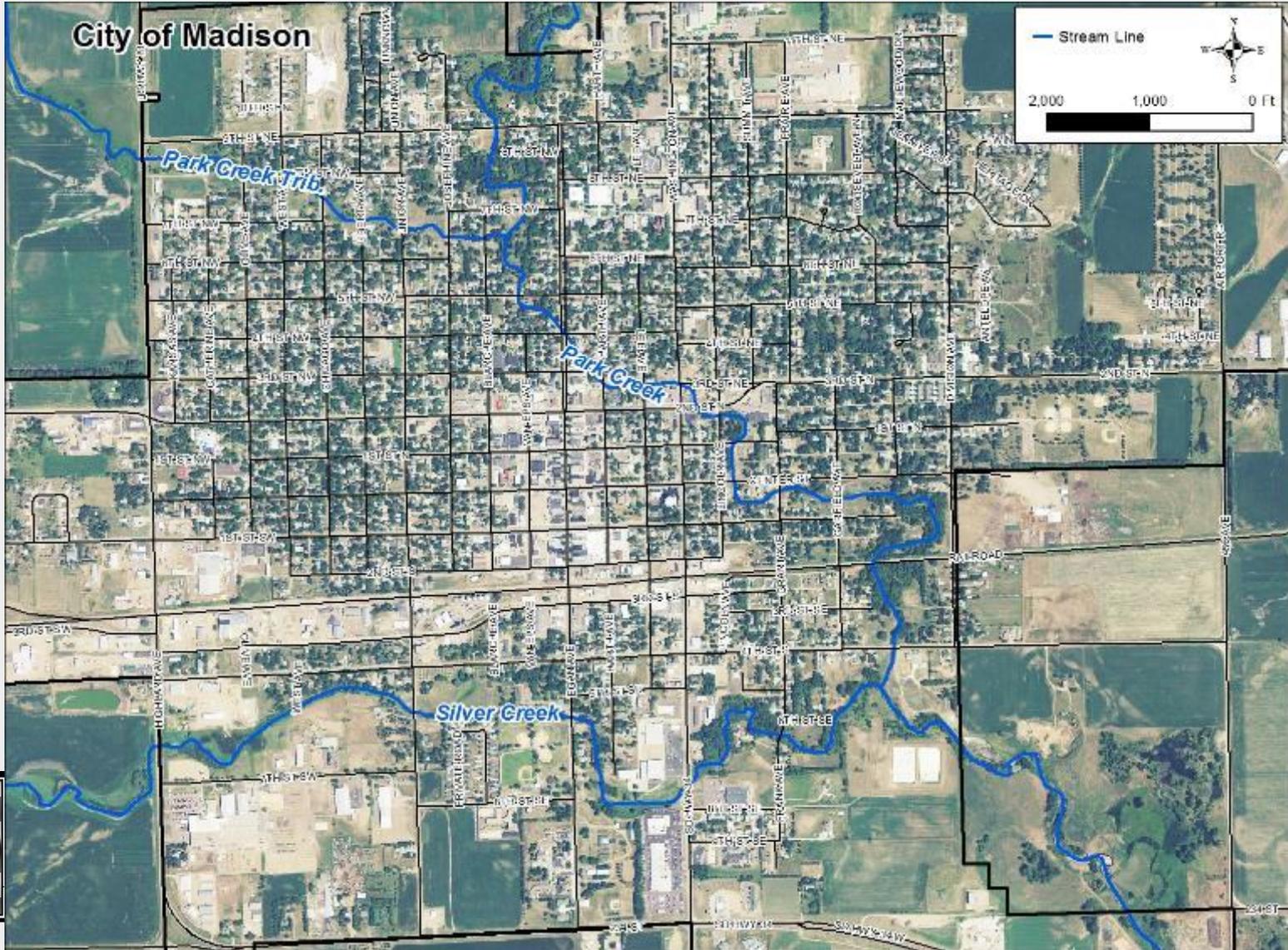
- Thomas Birney
- Jesse Rozelle

### **USACE**

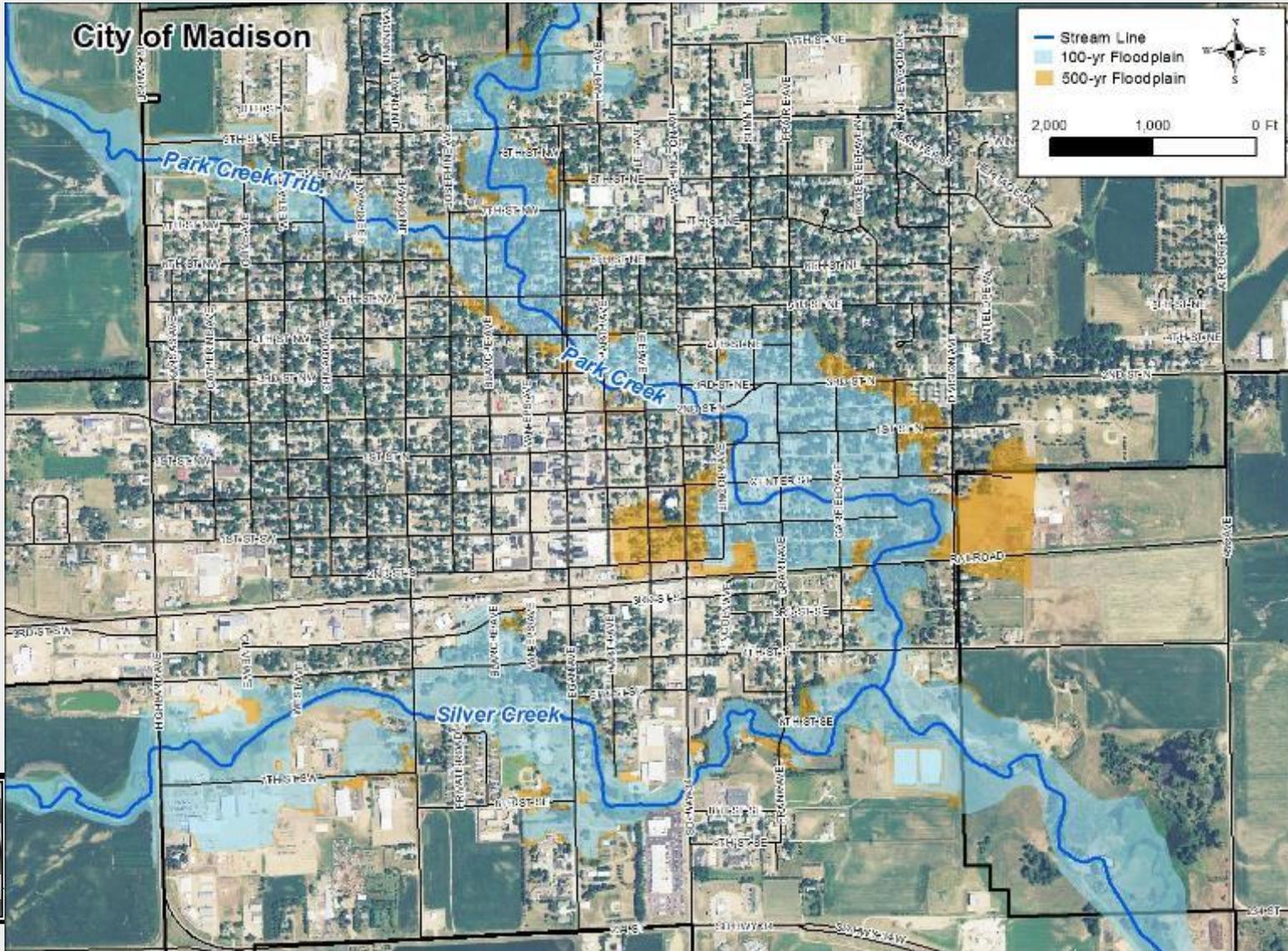
- Lowell Blankers
- Tony Krause
- Rachel Shrader
- Jamie Prochno



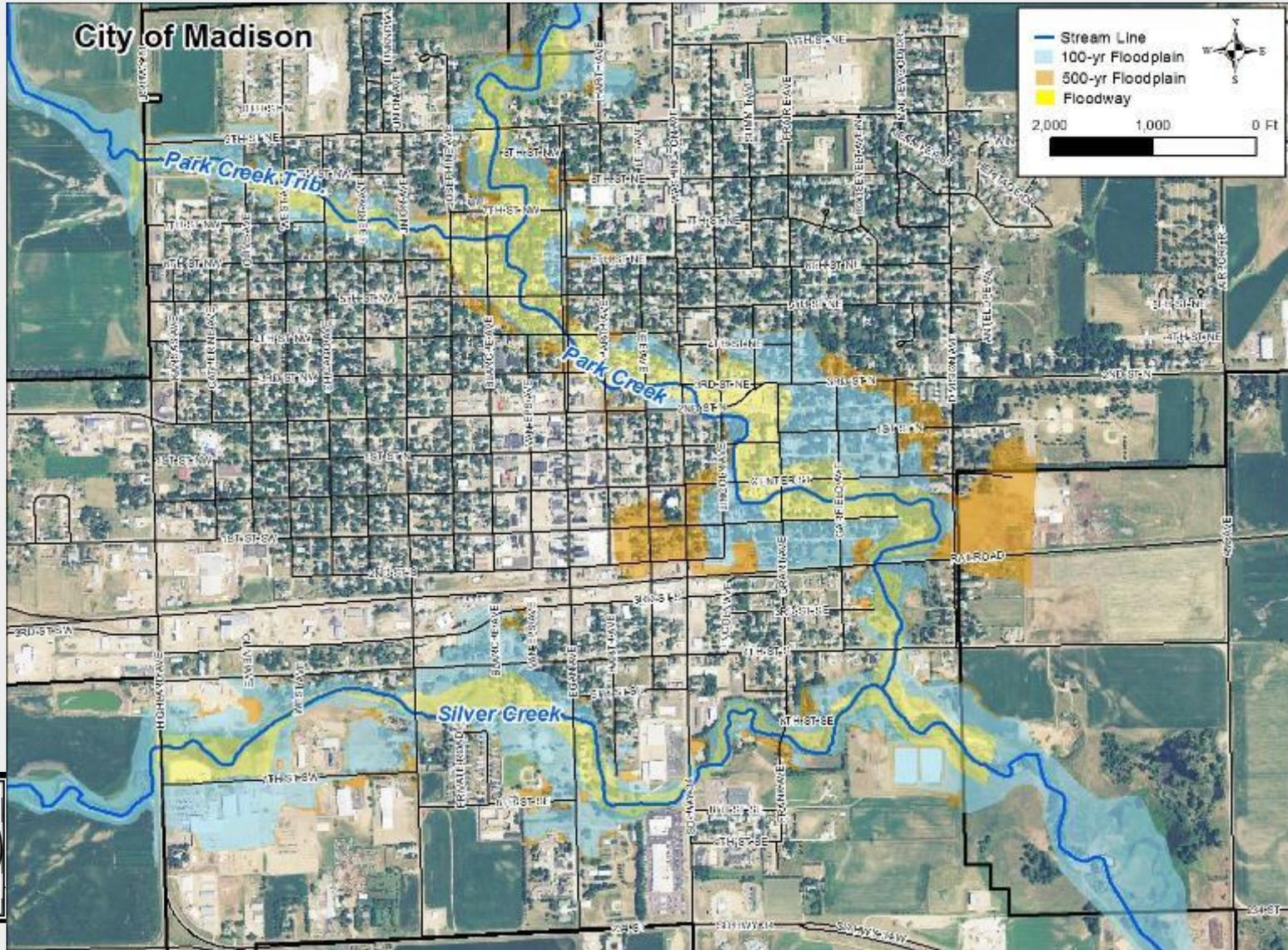
# History and Background



# History and Background



# History and Background



# History and Background

- Park Creek (Memorial Creek)
  - ▶ Stone wall on the stream banks was completed as a WPA project in the 1930's



# History and Background

- Flood Events - 15 events over the past 30+ years

Year	Description	Year	Description
1984	Flooding	1998	June 1 <sup>st</sup> Flooding
1985	Heavy Snow with Spring Runoff	2001	Spring Flooding and Storms
1986	May 3 <sup>rd</sup> Heavy Rain	2004	July 20 <sup>th</sup> Flooding
1992	July 2 <sup>nd</sup> Flooding	2007	May 5 <sup>th</sup> Flooding
1993	July 3 <sup>rd</sup> Flooding	2010	March Spring Runoff and Flooding
1994	May 26 <sup>th</sup> Flooding	2011	May 13 <sup>th</sup> , July 3 <sup>rd</sup> , and July 8 <sup>th</sup> Flooding and Storms
1995	Flooding	2012	May 5 <sup>th</sup> Flooding
1997	Flooding Spring		



# 1993 Flood

- Above Normal Precipitation
- 5.6" on July 3, 1993
- 76 were bough and 16 homes received repair assistance.



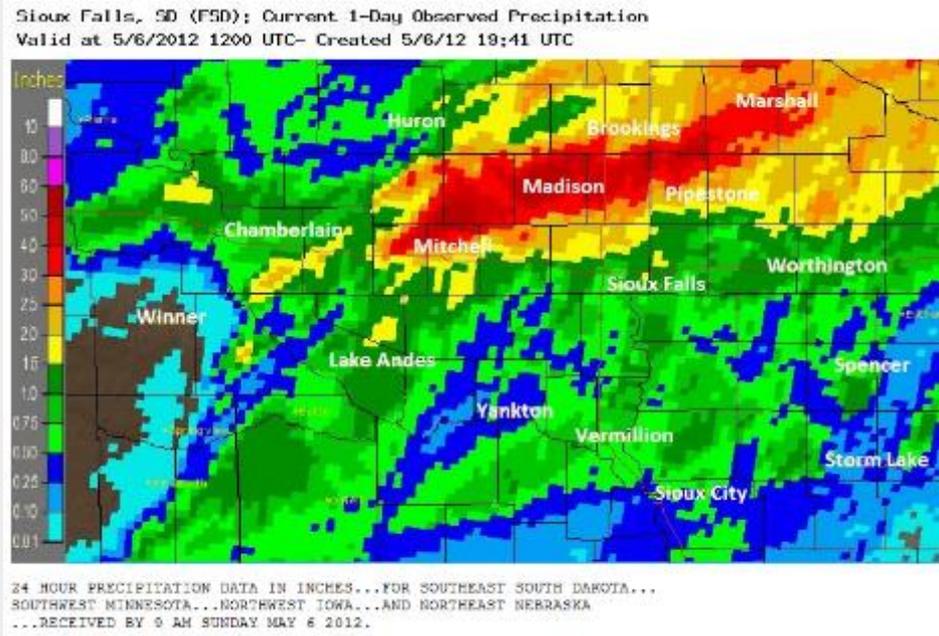
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# Aerial Photo of Silver Creek in 1993



# 2012 Flood

- May 5-6 Heavy Rains
  - ▶ Rainfall totals recorded at 6.2”
  - ▶ Flooding along Park Creek
  - ▶ 1 Fatality



# 2012



Water flowing over SD Hwy 34 west of Madison on May 6, 2012.



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# Risk Assessment Process

What is Risk?

How do we Manage Risk?



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# Definition of Risk

Risk = f(Probability, **Consequences**)

- **Protection of Life** ← Most Important
- **Critical Facilities** ← Largest Emergency Response Issue
- **Personal Sentimental** ← Most Unique to the Individual
- **Financial** ← Most common risk assessment basis

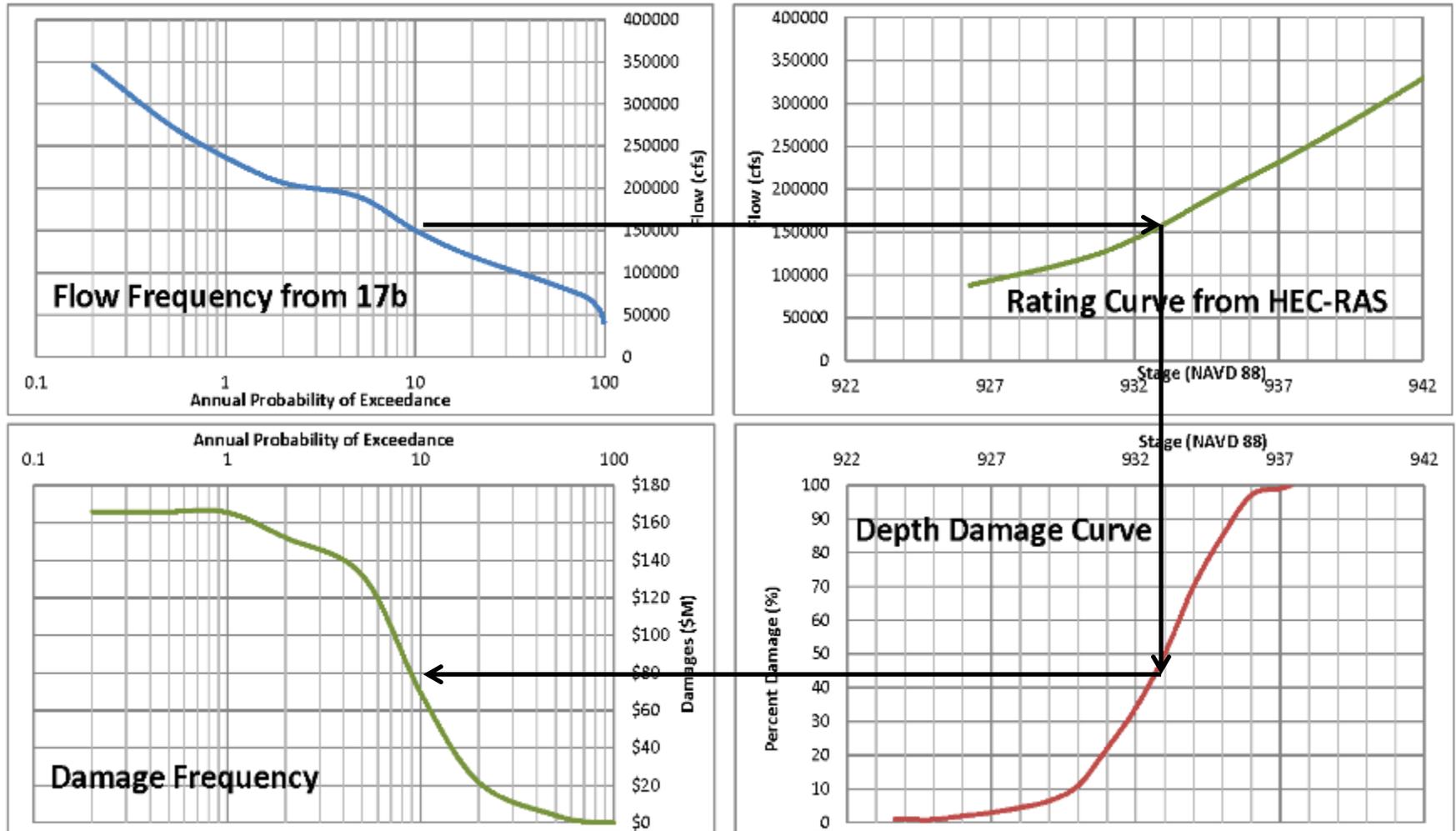


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# Definition of Risk

$$\text{Risk} = f(\text{Probability, Consequences})$$

- Financial



# Definition of Risk

Risk = f(Probability, **Consequences**)

- **Personal/Sentimental Consequences**

- Personal/Sentimental consequences vary significantly from person to person



**Evacuating Beer (Brisbane AU, 1981)**



**Stranded Dog (Seward NE, 1951)**

Important Papers  
Family Photos  
Pets  
Heirlooms  
Medicine  
etc



# Risk Management Process

**Risk management** is a process by which decision makers **reduce, offset, or accept** risk and subsequently make decisions that weigh overall risk against mission benefits

Source: Defense Critical Infrastructure Program

**Risk Treatment Types**

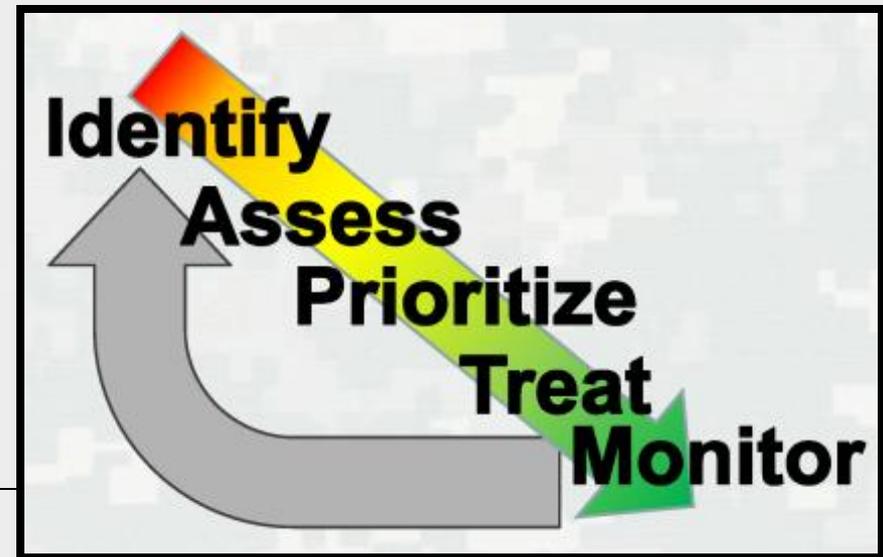


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# Risk Management Process

1. **Identify**, characterize threat
2. **Assess** the vulnerability of critical assets to specific threats
3. **Identify** ways to treat those risks
4. **Prioritize** risk reduction measures based on a strategy
5. **Treat** the Risk
6. **Monitor** and update

(Source: ISO 31000 Risk management – principles and guidelines)



# Risk Treatment

**Risk Reduction** – to reduce the risk  
alter the probability or consequences

**Risk = f(Probability, Consequences)**

## Structural Flood Risk Reduction

- Levees
- Dams
- Channels



## Nonstructural Flood Risk Reduction

- Elevation
- Dry/Wet flood proofing
- Buyout/Acquisition



# 'Flood' Under the NFIP

General and temporary condition of partial or complete inundation of:

*2 or more acres of normally dry land*

or

*2 or more properties.*



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# After a Flood, Local Gov't Should...

- Perform inspections and damage assessments
- Determine if structures are ***Substantially Damaged***; if so, may need alterations during rebuild
- Promote flood insurance



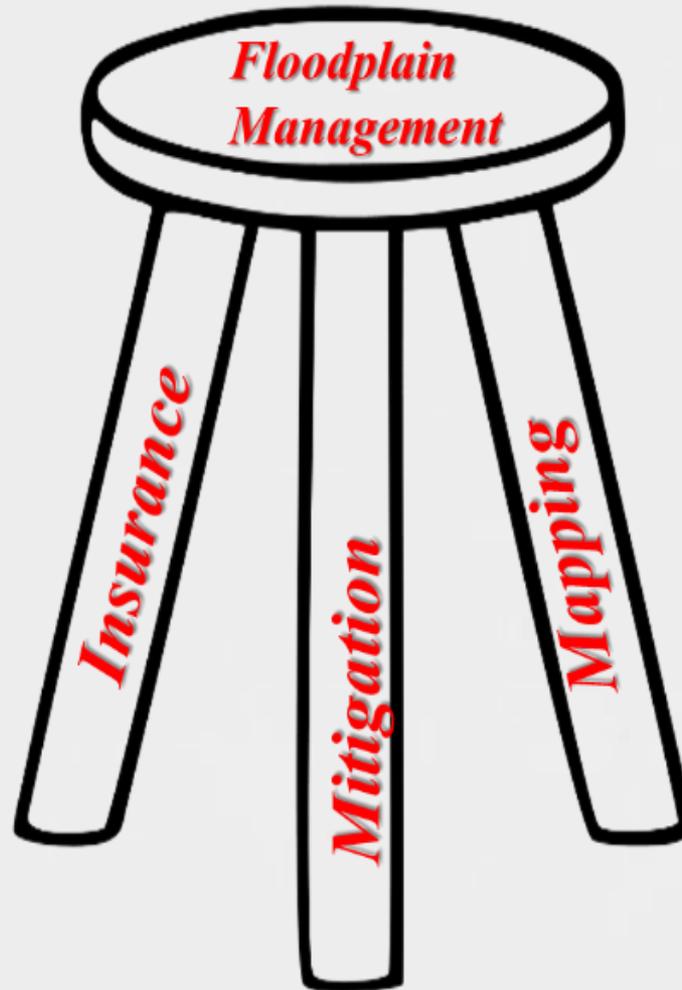
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# NFIP Info for South Dakota

- 3,347 Claims Payouts Since 1978, totaling \$40,250,000
- City of Madison – 73 Payouts totaling \$760,000 (residents get 10% off premiums)
- Lake County – 54 Payouts totaling \$660,000



# NFIP is More Than Insurance



# NFIP Resources

[www.floodsmart.gov](http://www.floodsmart.gov)

***Answers to Questions About the NFIP  
booklet (or online pdf)***

**Marc Macy (SD OEM) – 605.773.3231**

**Tom Birney (FEMA) – 303.235.4802**



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# Flood Risk Adaptive Measures

- Elevation
- Relocation / Buyout / Acquisition (*Floodplain Evacuation*)
- Berms and Floodwalls (*when are these nonstructural?*)
- Dry Flood Proofing
- Wet Flood Proofing

**These techniques may be used to mitigate existing structures or for design and construction of new structures to reduce flood risk**



# Elevation Examples



Piers, Post, Columns & Piles



Extended Foundation Walls



# Elevation Examples



## Utilizing Fill

## Reinforced Slab on Grade



# Relocation / Acquisition / Buyout

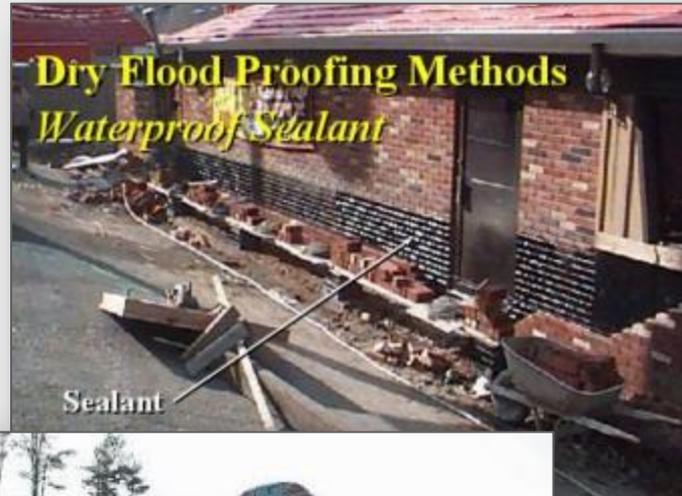


- Eliminates Risk
- New use / opportunities: Open space – Recreation – Environmental Restoration



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# Dry Flood Proofing Examples

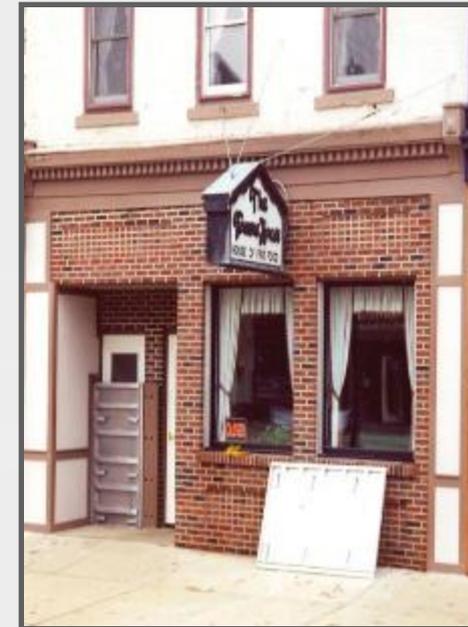


# Wet Flood Proofing Examples



Wet Flood Proofing  
Elevate Utilities

Elevate  
Utilities

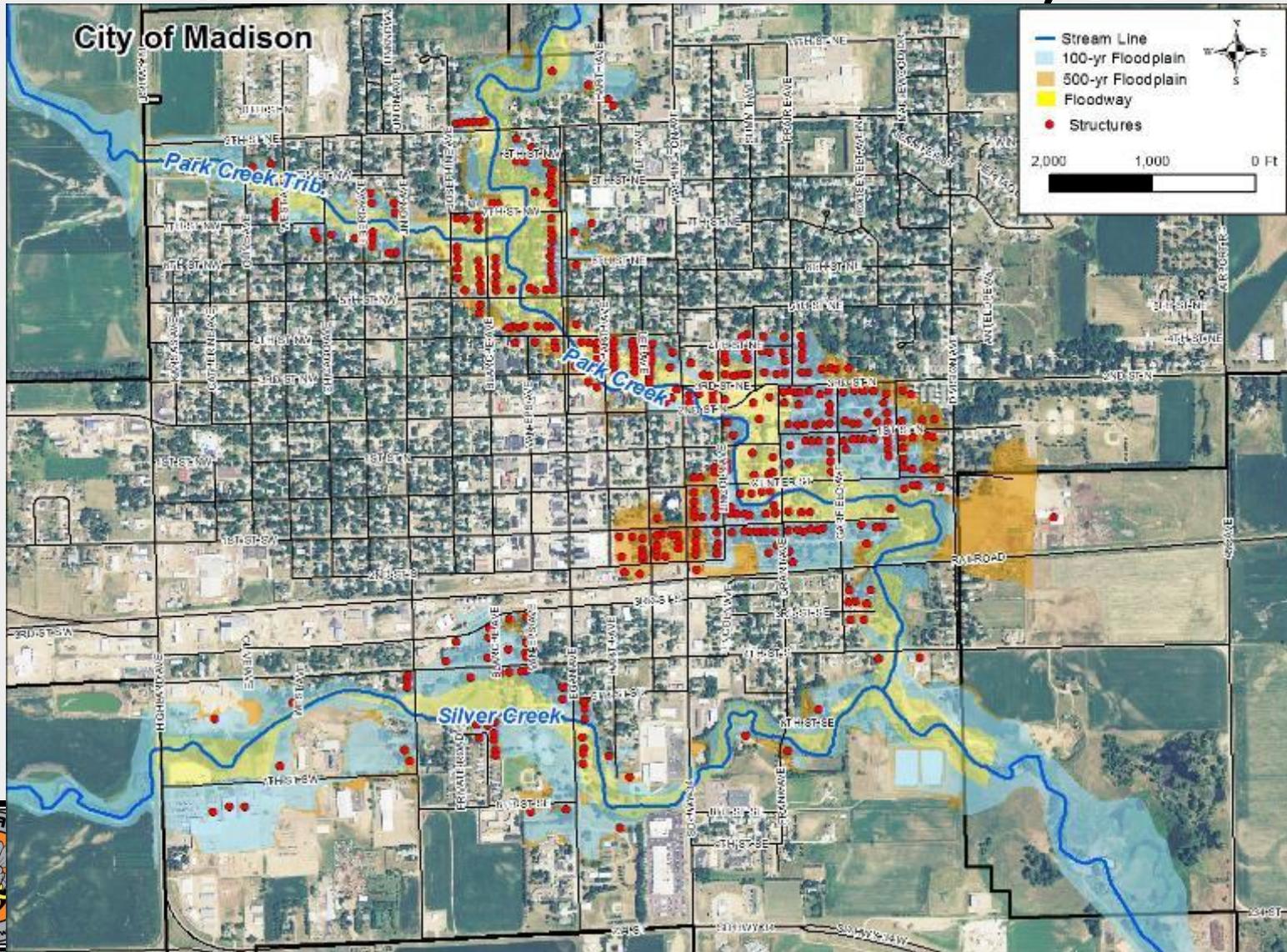


Historical Structure Retrofit – Darlington, WI

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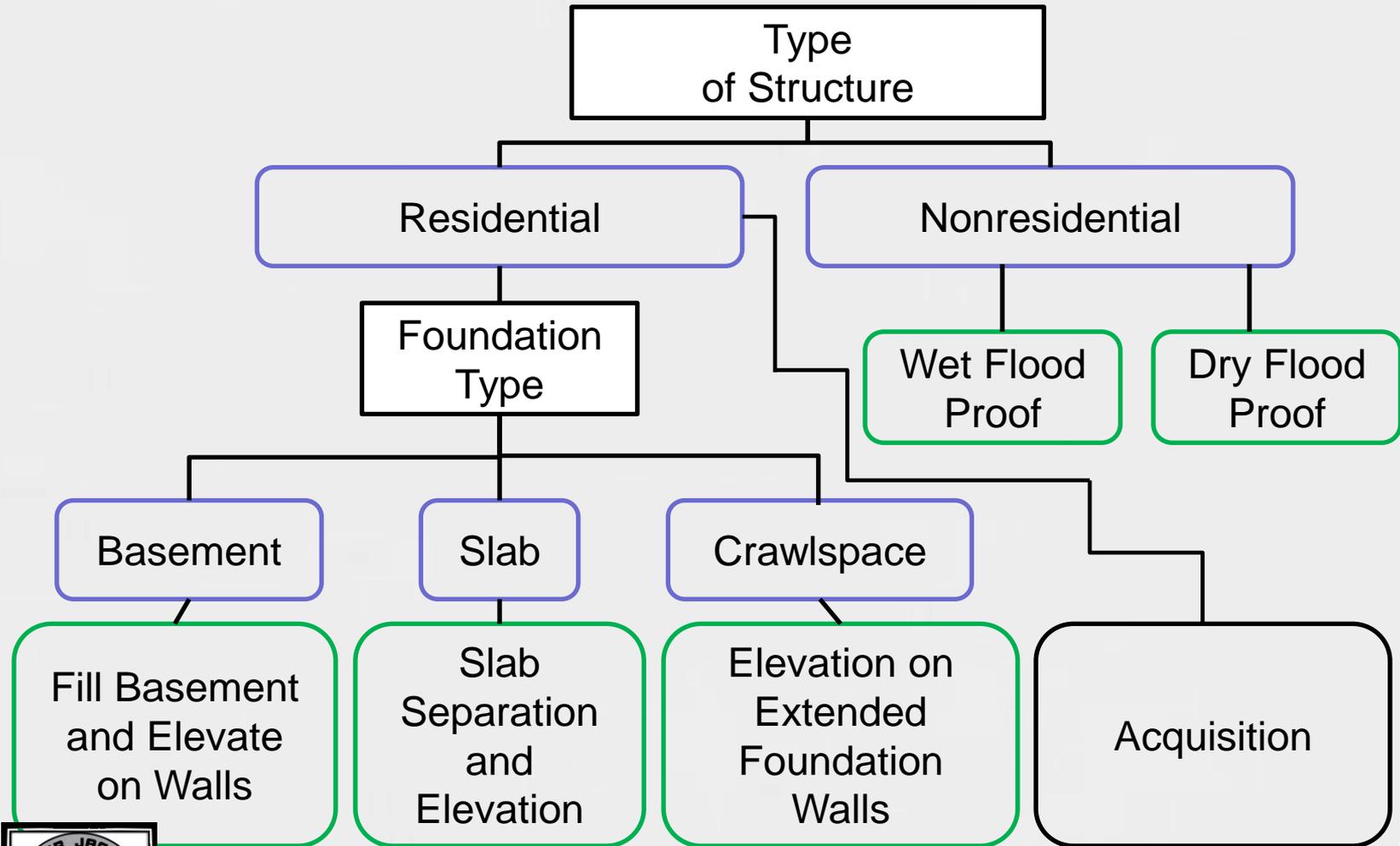
# Structures in the Analysis



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# Decision Tree for FRAM Selection



Madison Nonstructural Assessment



Nonstructural Recommendations

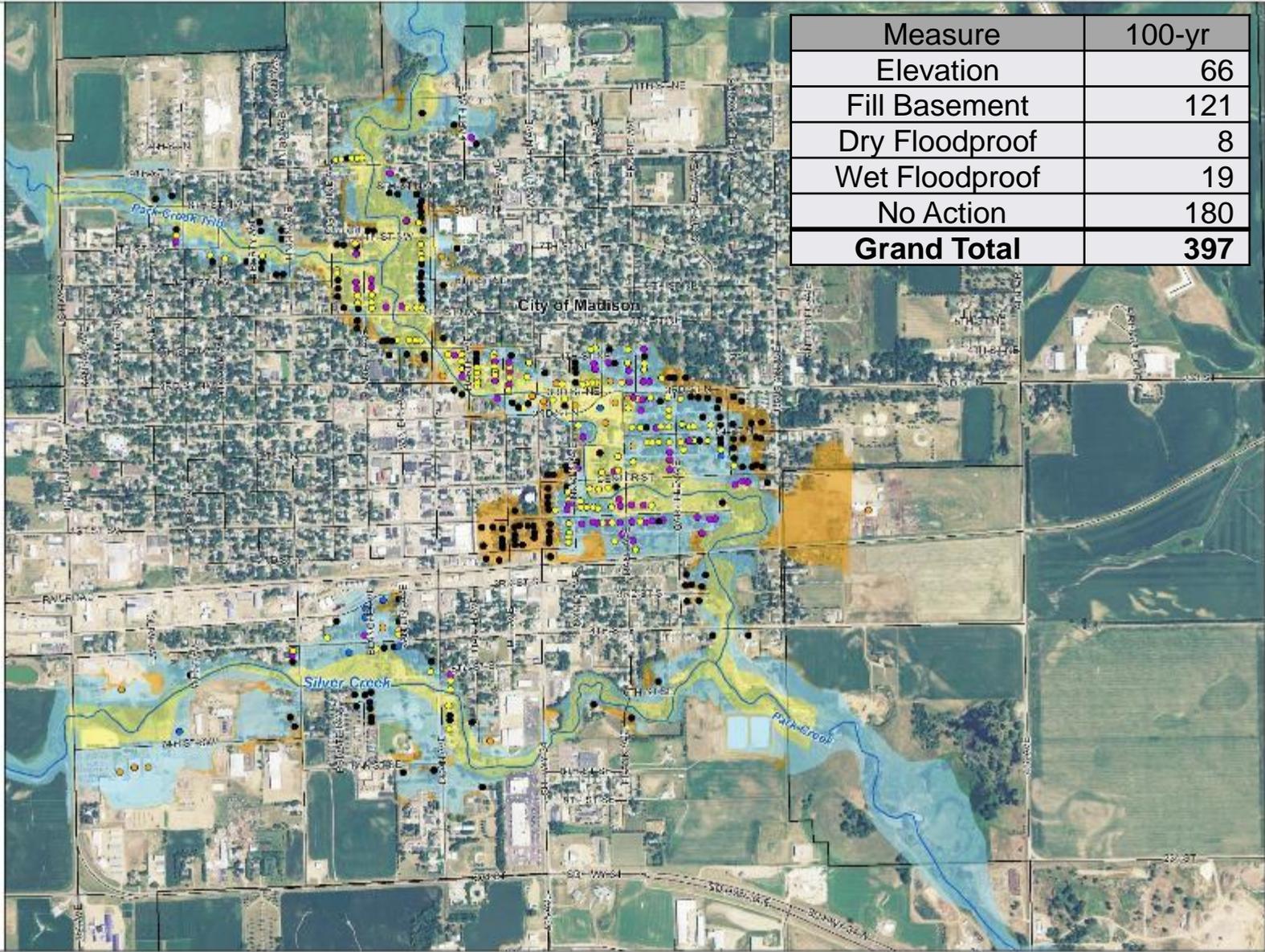
February 2017

Legend

- Streams
- Nonstructural Method**
- Elevation
- Fill Basement
- Dry Floodproof
- Wet Floodproof
- None
- Effective FEMA Mapping**
- 500yr
- 100yr
- 100yr Floodway



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Measure	100-yr
Elevation	66
Fill Basement	121
Dry Floodproof	8
Wet Floodproof	19
No Action	180
<b>Grand Total</b>	<b>397</b>



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# Madison Nonstructural Assessment



Benefit to Cost Ratios

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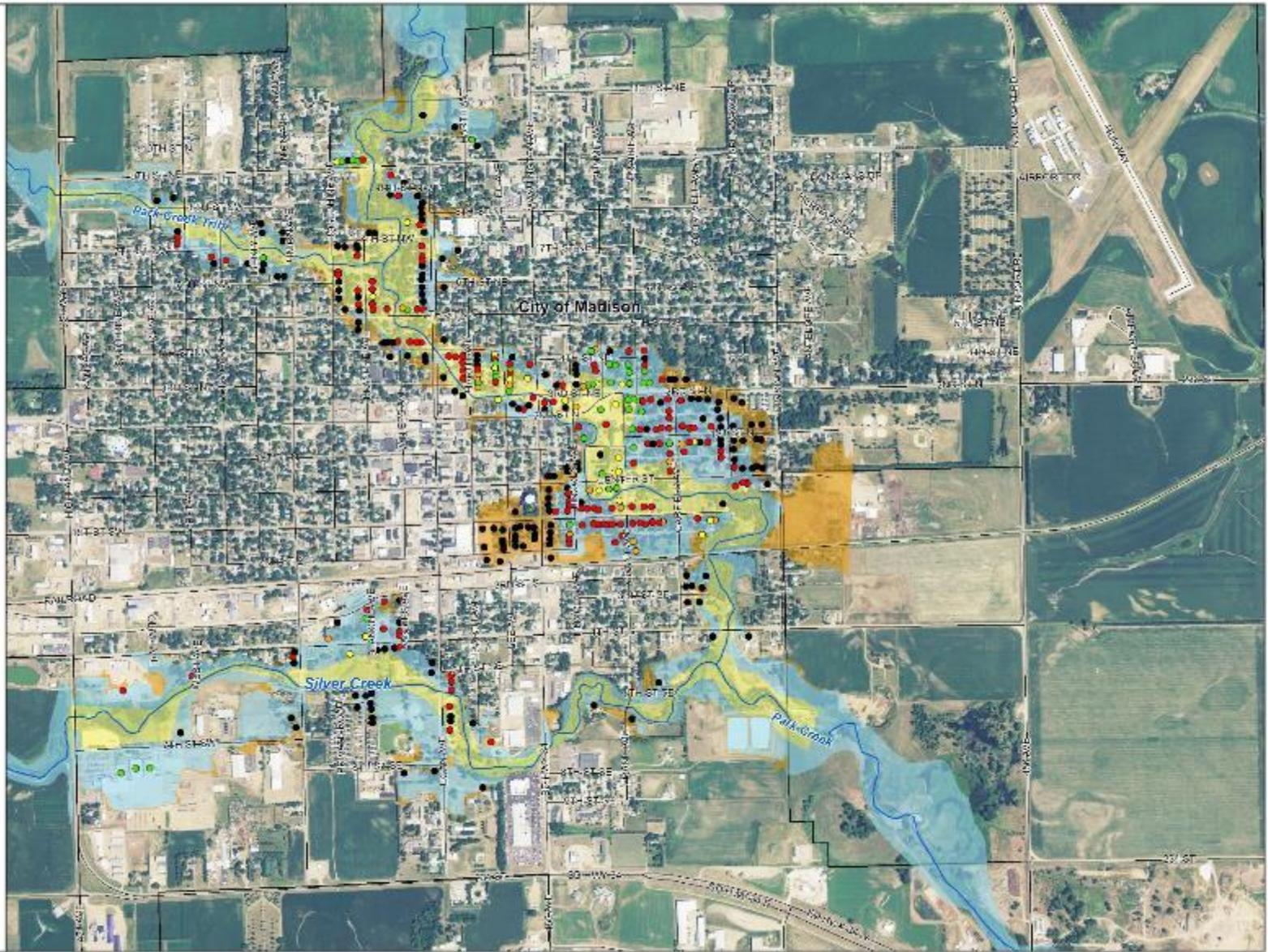
### Legend

- Streams
- Benefit to Cost Ratio**
  - N/A
  - 0.01 - 0.49
  - 0.50 to 0.74
  - 0.75 to 0.99
  - 1+
- Effective FEMA Mapping**
  - 900yr
  - 100yr
  - 100yr Floodway

100 200 300 400 Feet



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# Study Summary

- There are numerous structures in the community at notable flood risk. (217 structures that show damages for the 100-yr flood)
- There are 96 structures in the 100-yr Floodway.
- Nonstructural measures were both technically feasible and cost effective



# Previous Section 22 Study

- Updated the Hydrology and Hydraulics
- There were areas where the Water Surface Elevations change.
- If the Nonstructural Analysis was run again with these elevations the results would be slightly different.



# Community Solutions

- Take advantage of SD OEM programs
- Create community financial program to help with initial costs
  - ▶ Partners: County, Regional Economic Development
- Work with USACE
  - ▶ Section 22 Study
  - ▶ Section 206
    - Would look at all alternatives for flood risk reduction.



# SD OEM Programs

- Hazard Mitigation Grant Program (HMGP)
  - ▶ Post disaster allocation of funds
  - ▶ Voluntarily participation
  - ▶ 75(federal)/25(local) cost share
    - Acquisition/Relocation
    - Acquisition/Demolition
    - Elevation
    - Drainage improvement
  - ▶ Applications from Local Government due October 13, 2017



# SD OEM Programs

- Pre-Disaster Mitigation Grant (PDM)
  - ▶ Annual allotment from FEMA
  - ▶ Voluntarily participation
  - ▶ 75(federal)/25(local) cost share
    - Acquisition/Relocation
    - Acquisition/Demolition
    - Elevation
    - Drainage improvement
  - ▶ Applications period to be announced



# USACE Programs

- Section 22 Study

Sponsor Letter of Request



Scope and cost estimating  
• Planning Assistance to States Agreement (PAS)



Technical study completed



# USACE Programs Section 205

Sponsor Letter of Request



## Initial Assessment

- Federal Interest Determination (FID)
- Scope and cost estimating
- Feasibility Cost Share Agreement (FCSA)



## Cost-Shared Feasibility Study

- Identification of existing conditions and alternatives
- Public scoping
- Environmental compliance
- Alternative Formulation Briefing (AFB)
- Final product is a completed feasibility report with recommended alternative
- Major Subordinate Command (MSC) approval
- PPA Execution



## Design and Implementation

- Plans and specs
- Construction
- Operation and maintenance manual provided to sponsor



# Personal Flood Risk Assessment

## ■ Worksheet

- ▶ Information about your home
- ▶ Risk Identification
  - Am I at risk?
- ▶ Risk Assessment
  - What is the magnitude of the risk?
  - What is the cost of the risk?
- ▶ How can I treat the risk
  - What are the costs for these treatment options



# Questions?



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