APPENDIX C: TECHNICAL REPORTS

USFWS PRESENTATION ON PERCHED CULVERTS

TECHNICAL MEMO - EXISTING BEST MANAGEMENT PRACTICES

REMAINING ACTION ITEMS

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Assessing Fish Passage for Endangered Topeka Shiner in the Boone River Watershed, Iowa

Julie Jarvey, USFWS Directorate Fellow

La Crosse Fish and Wildlife Conservation Office

Midwest Fisheries Center, Onalaska, WI

Introduction

- Directorate Fellows Program
  - 11-week internship with USFWS

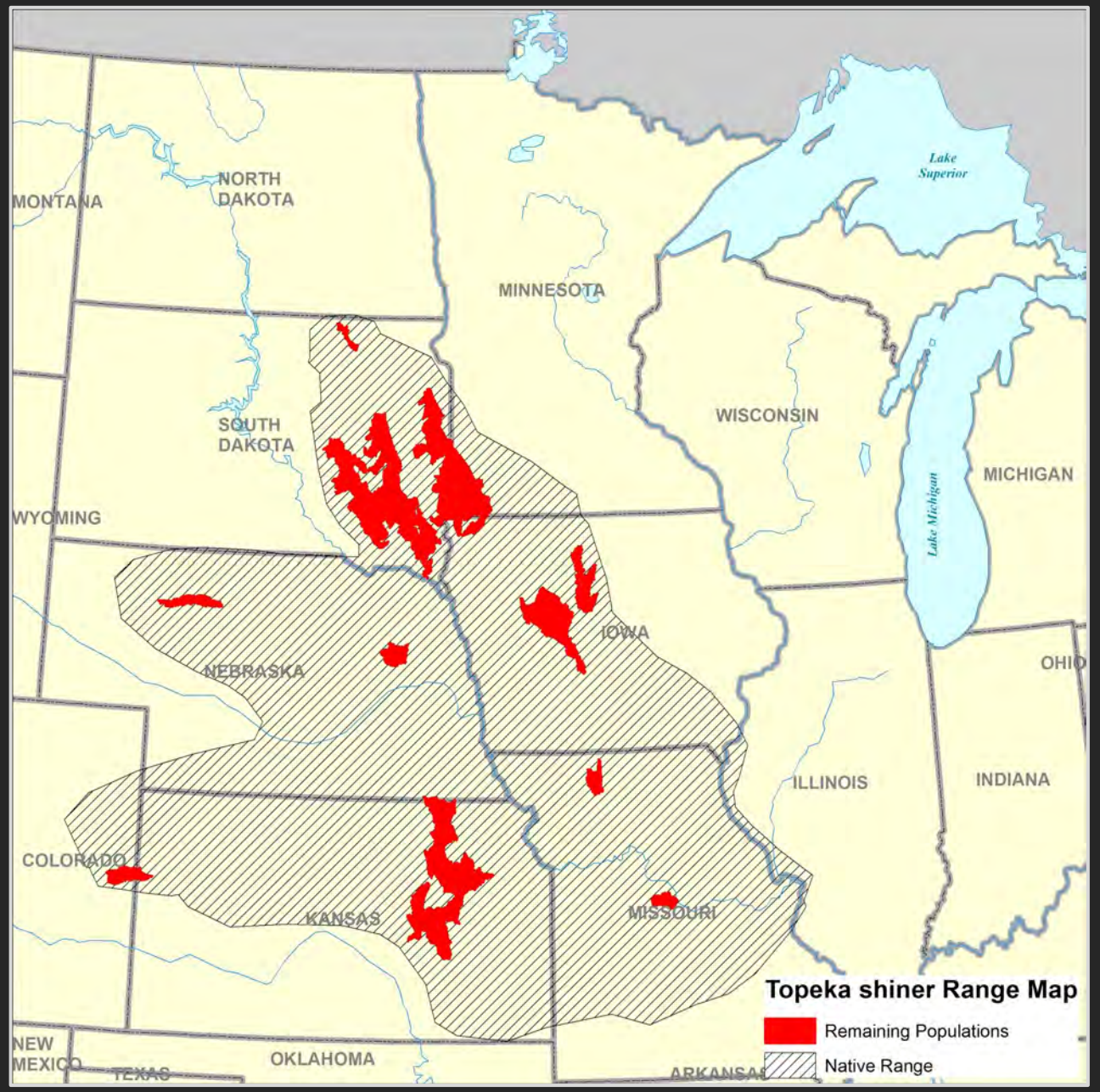
Background

B.S. Wildlife Ecology & Management
Michigan Tech University

M.S. Conservation Ecology
University of Michigan

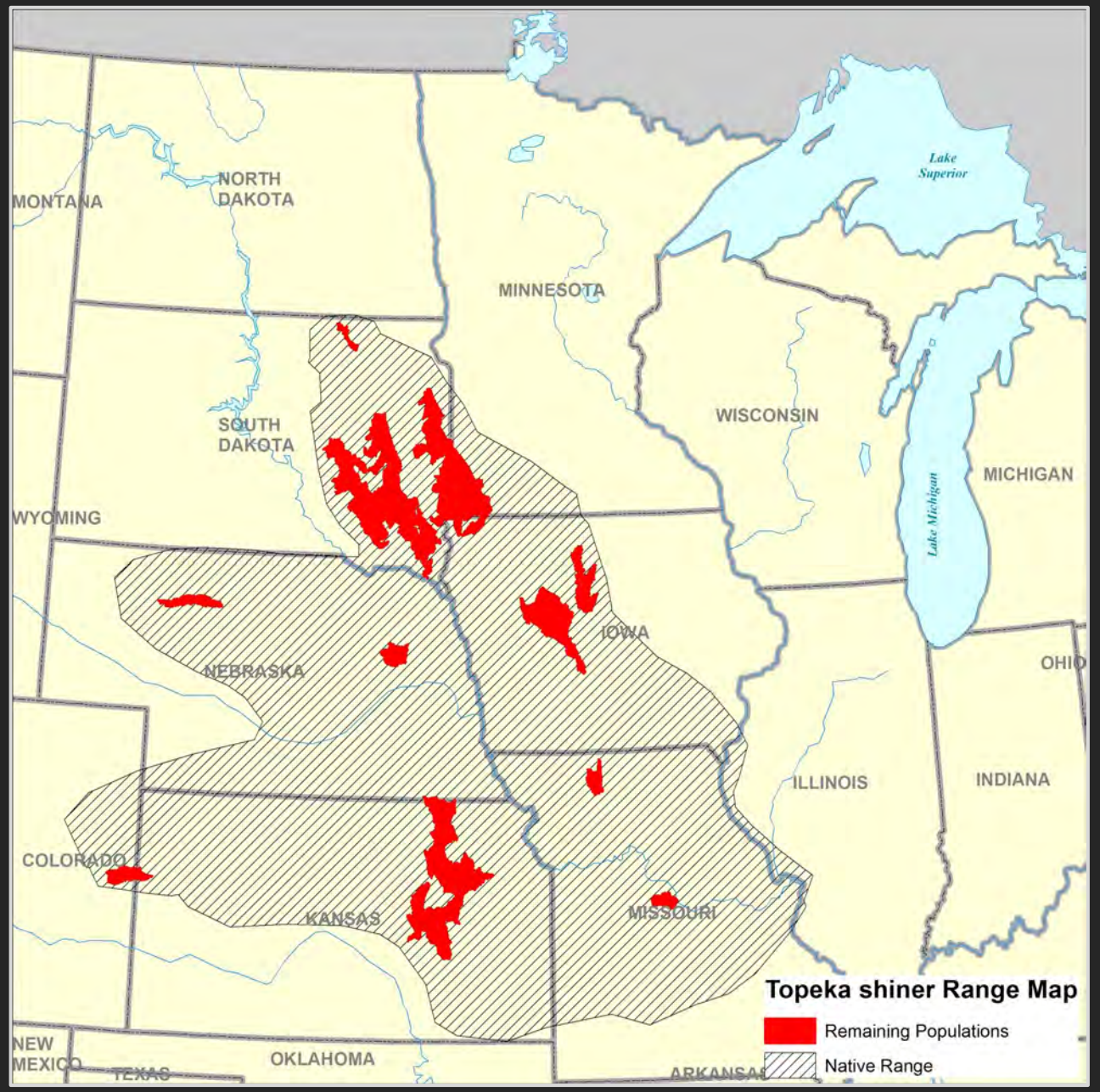
Ph.D. Candidate
Integrative Biology
Ecology, Evolution, & Behavior
Michigan State University

Topeka Shiner



Topeka Shiner

- Federally listed as endangered since 1998
- Threats
  - Habitat loss, degradation, fragmentation

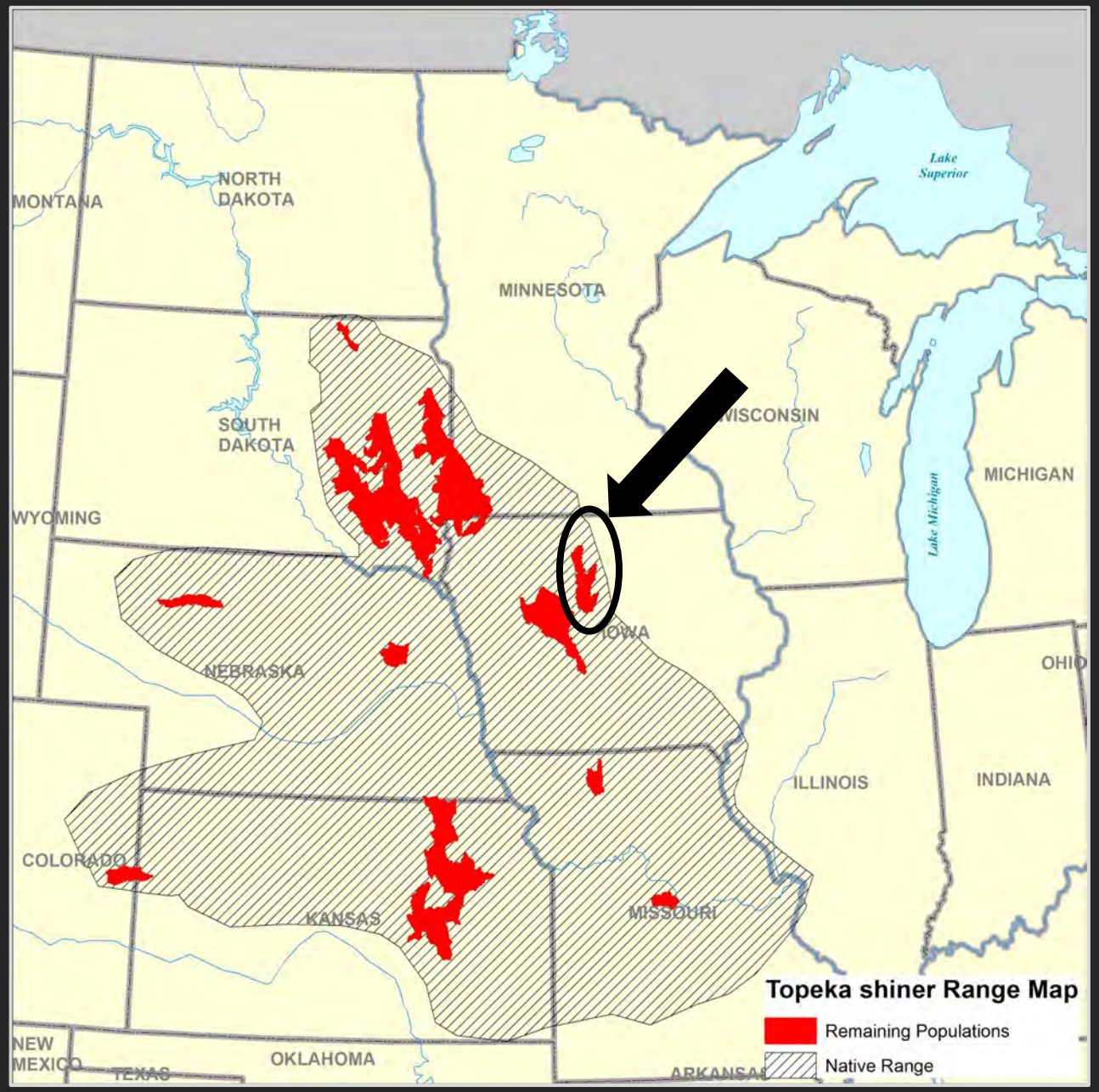


Topeka Shiner

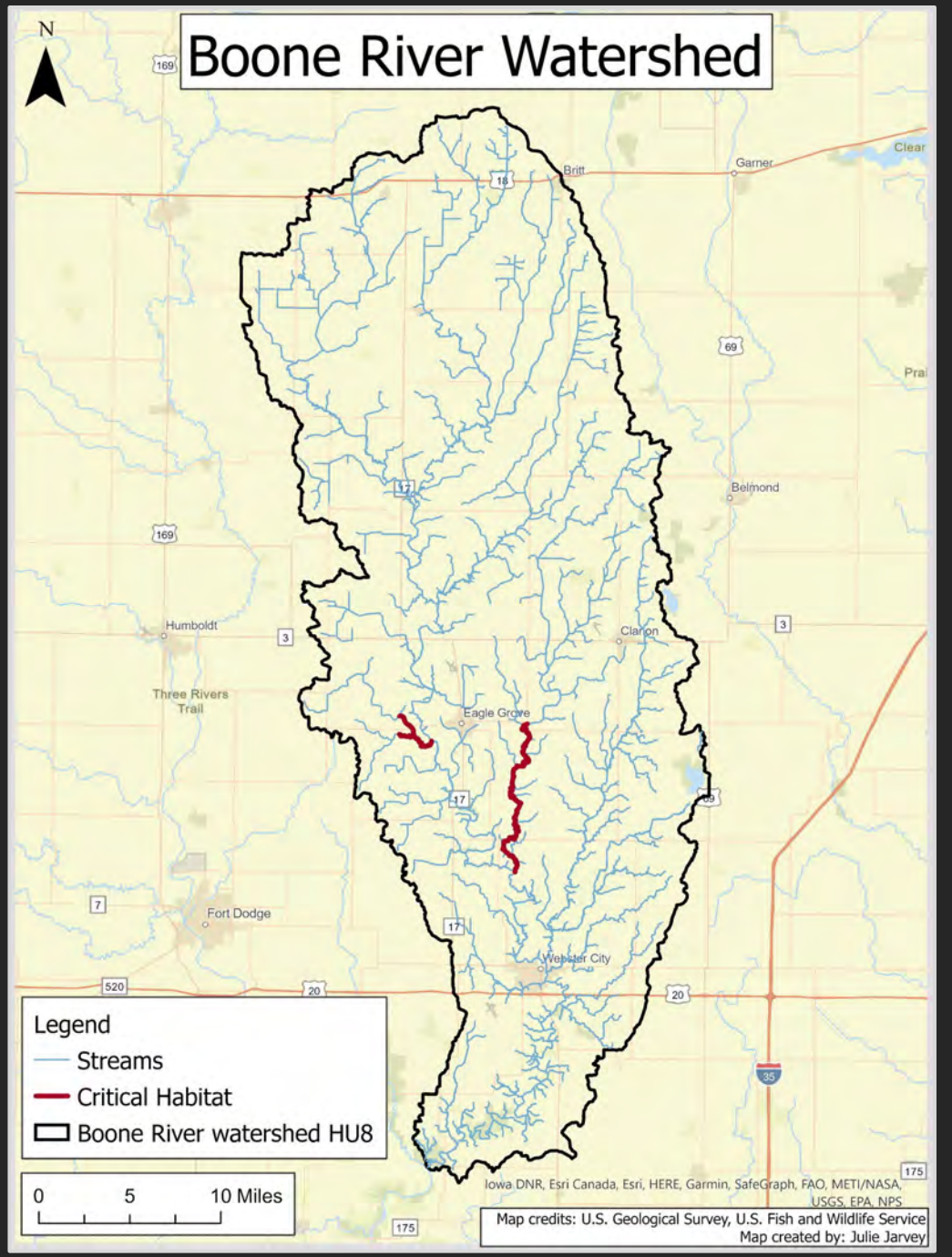
Topeka Recovery Plan (USFWS 2020)

Habitat Protection, Management and Restoration

- Removal of man-made structures such as perched culverts or dams which act as barriers to movement



Boone River Watershed



Topeka Shiner Recovery

- Oxbow restorations
- Alternative farming practices
- Partnerships between federal, state, county, NGOs, academic, public & private organizations and landowners

Source: The Nature Conservancy

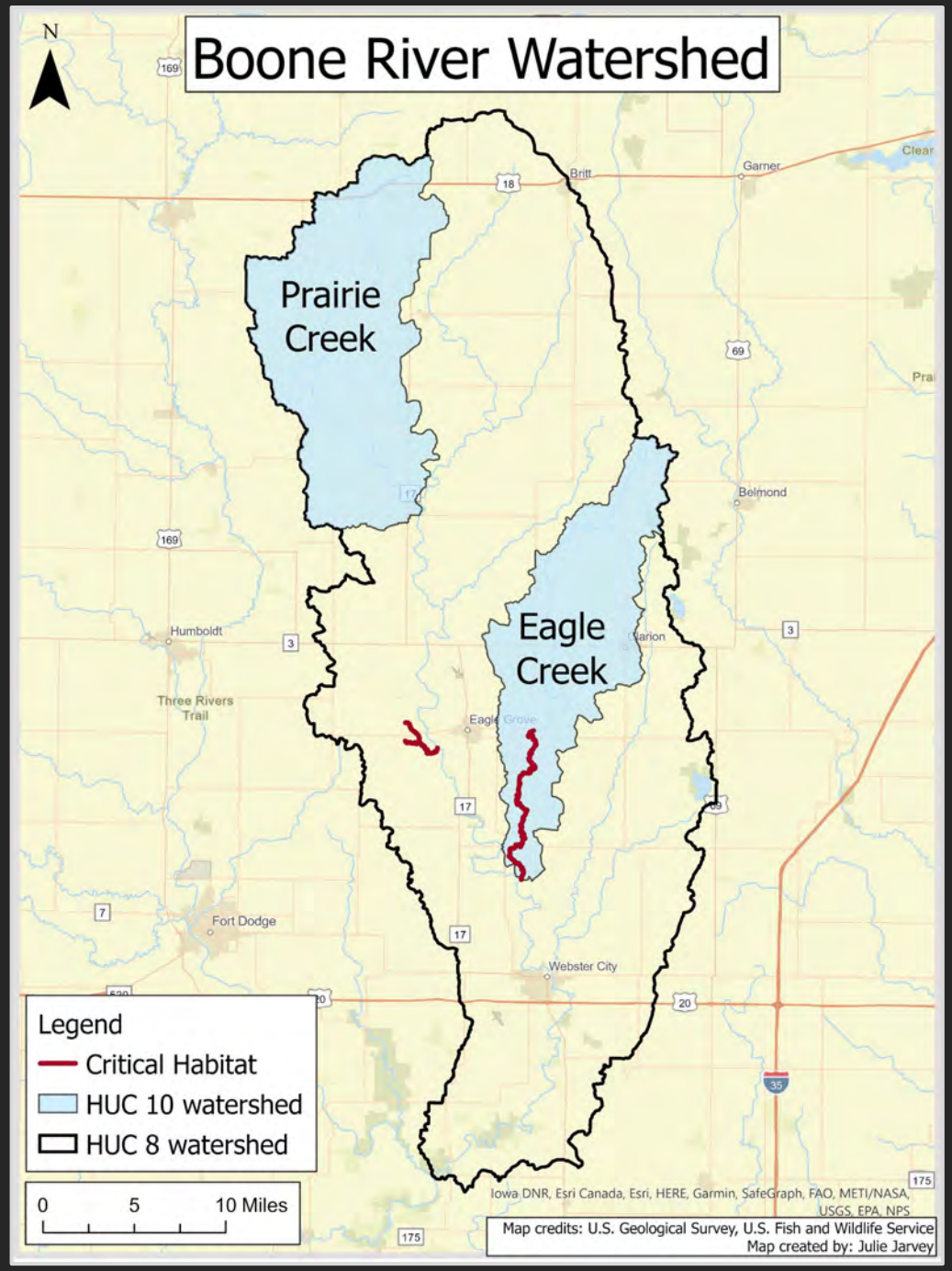
Topeka Shiner Recovery

La Crosse FWCO Habitat Plan (Mauldin & Keuler 2021)

- **Habitat Goal**: Restore longitudinal connectivity and fish passage by removing manmade barriers such as dams, culverts, and other barriers in priority areas
- **Strategy**: Conduct barrier inventories in target subwatersheds in the below Iowa HUC 8 watersheds and prioritize to be addressed by La Crosse FWCO and partners
  - Boone River watershed by 2023-partially completed
  - In 2021, La Crosse FWCO's Directorate Fellows Program student to conduct barrier inventories in subwatersheds, rank and prioritize key barriers to be addressed in priority areas. Results to be used by partners to prioritize and remove key barriers.

Project Objectives

- Assess fish passage barriers in tributaries of the Boone River Watershed
- Confirm passage barriers and size using SPIKE application to measure barriers
- Create a ranking system of importance of removal or modification with partners
- Develop procedures to survey more tributaries of the Boone River Watershed



Data Collection

Adapted crossing assessment survey

Survey123

Added Spike laser measurement fields

Created offline maps for field data collection

esri ArcGIS Online

Field Maps

Culvert Assessments

- Conducted baseline crossing inventory & assessments in Prairie Creek and Eagle Creek
- Assessed priority crossings
  - Culverts
  - > 1st order streams

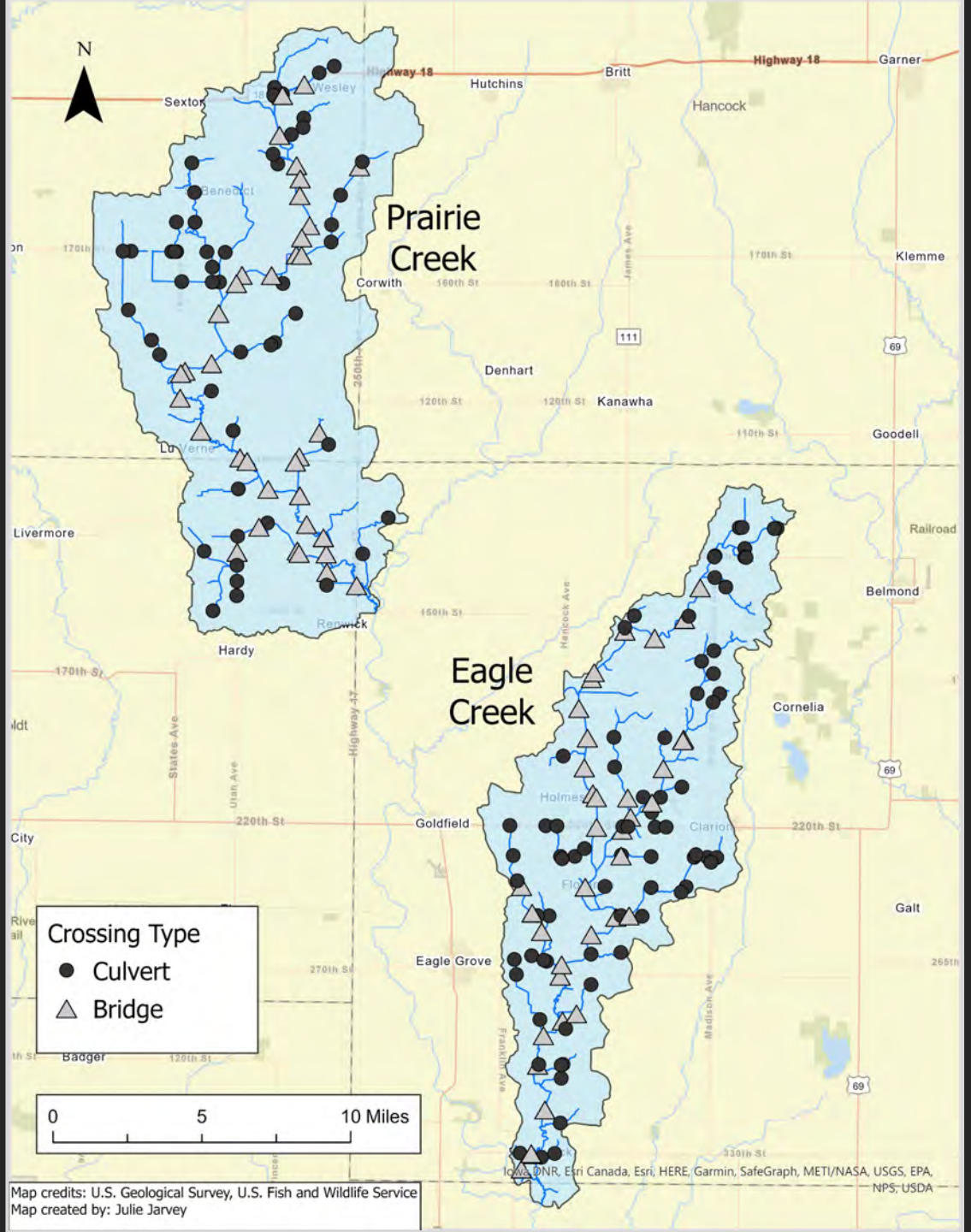
Culvert Assessments

Spike laser

Spike laser

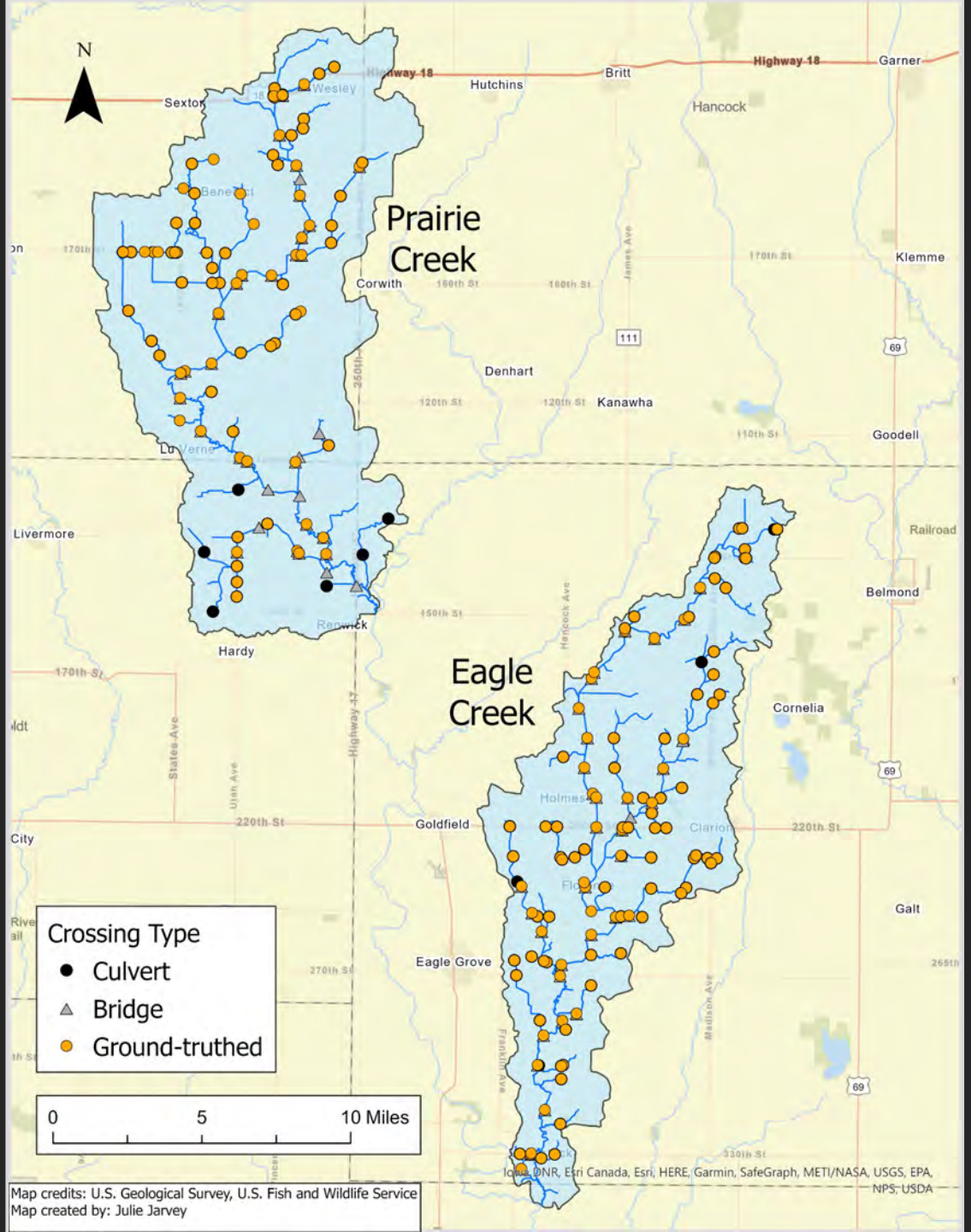
Results

Crossing Assessment



Crossing Assessment

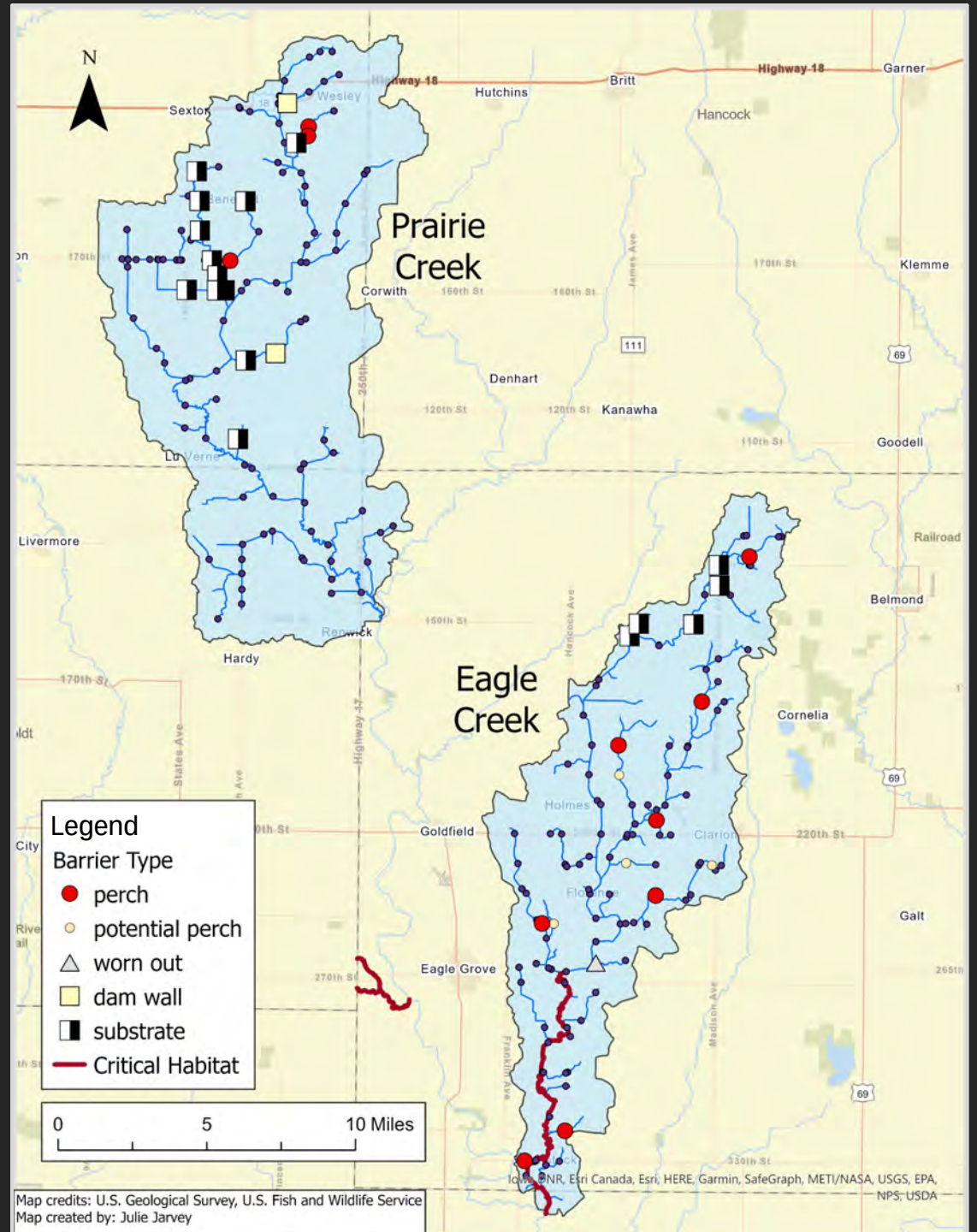
- Ground-truthed
  - 196 crossings
    - 88 - Prairie Creek
    - 108 - Eagle Creek
- Visually assessed
  - 111* crossings
- Assessed
  - 37 crossings



Ground-truthing

Crossing Assessment

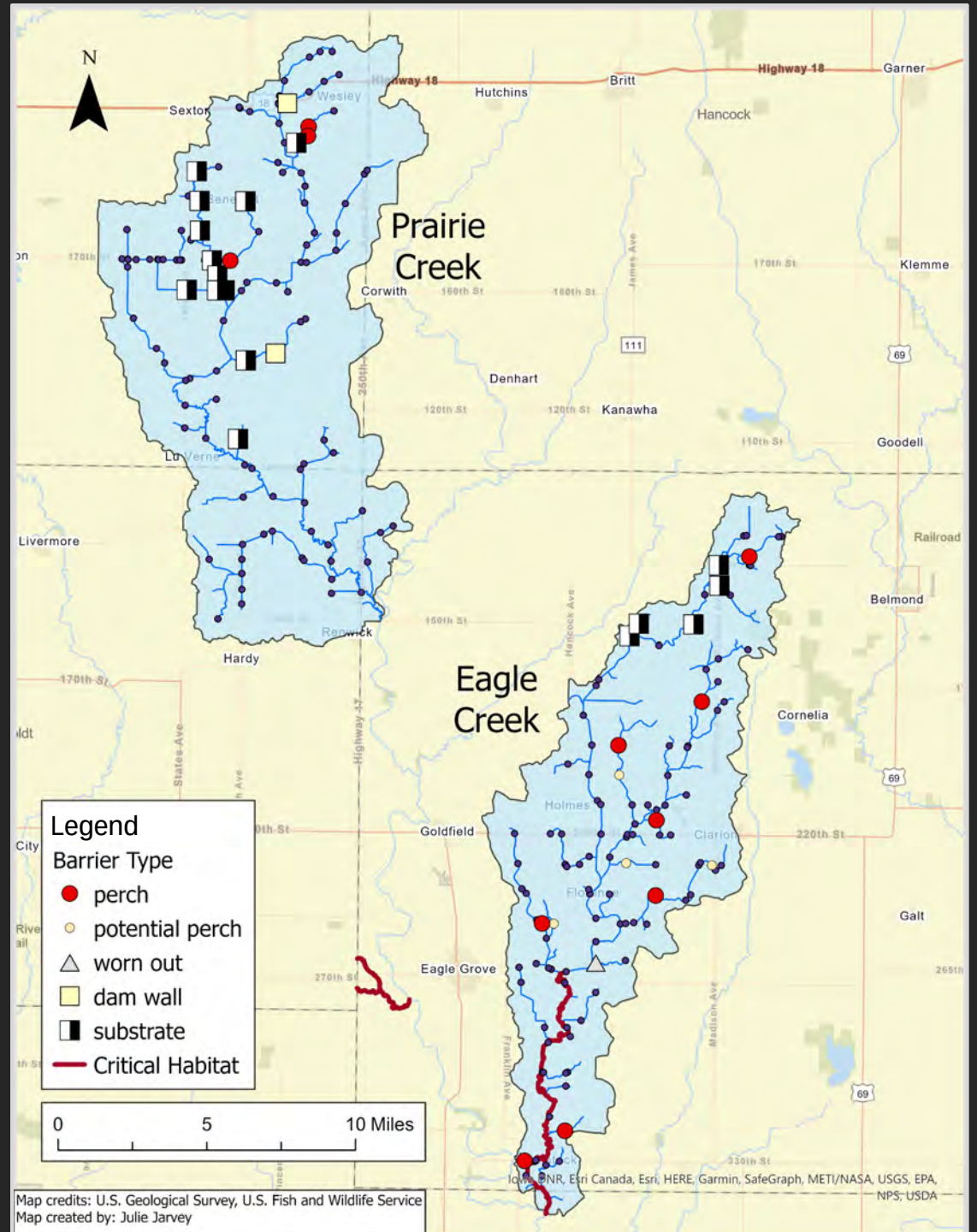
- 11 Perched culverts



Perched culverts

Crossing Assessment

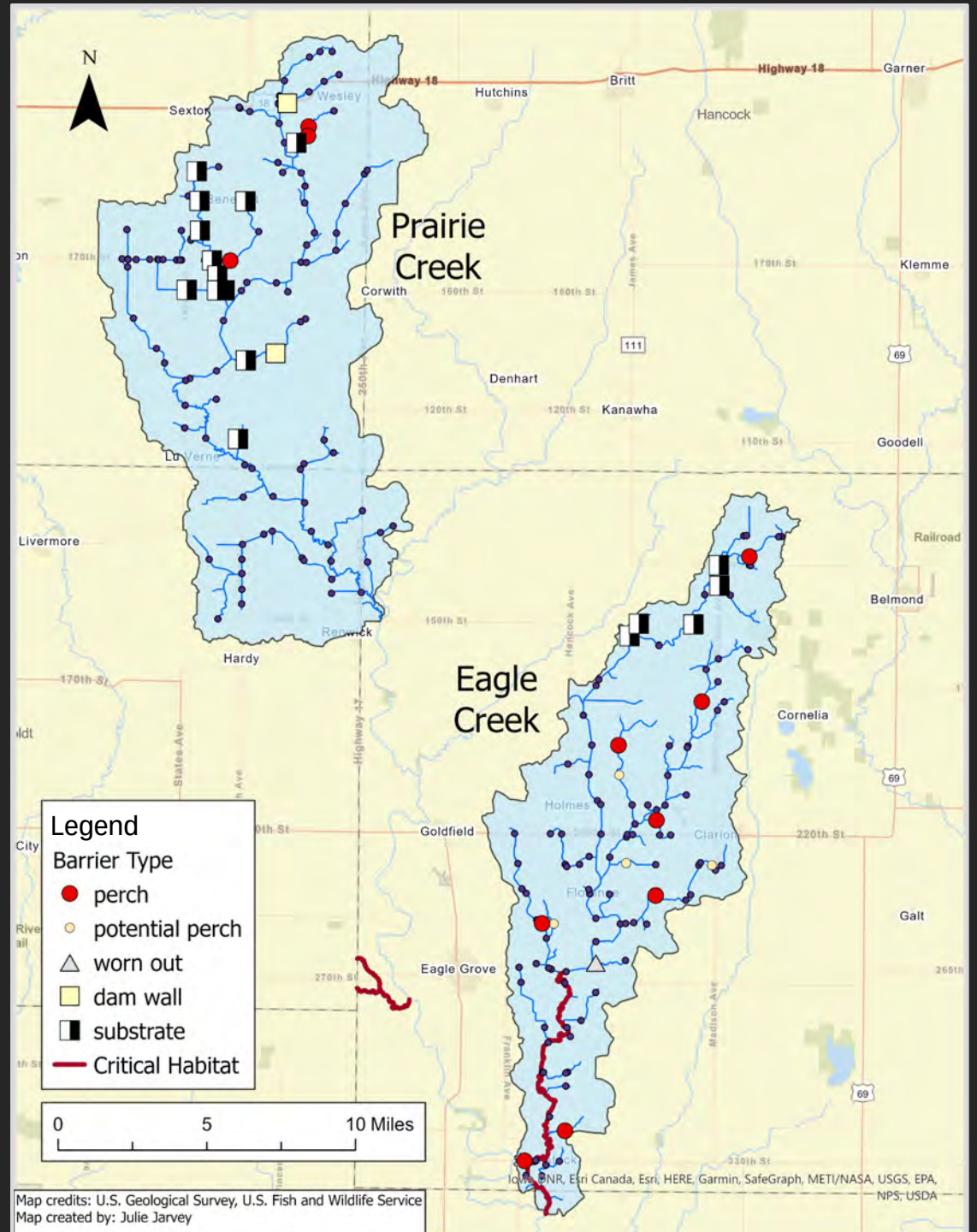
- 11 Perched culverts
- 2 Dam walls



Dam walls

Crossing Assessment

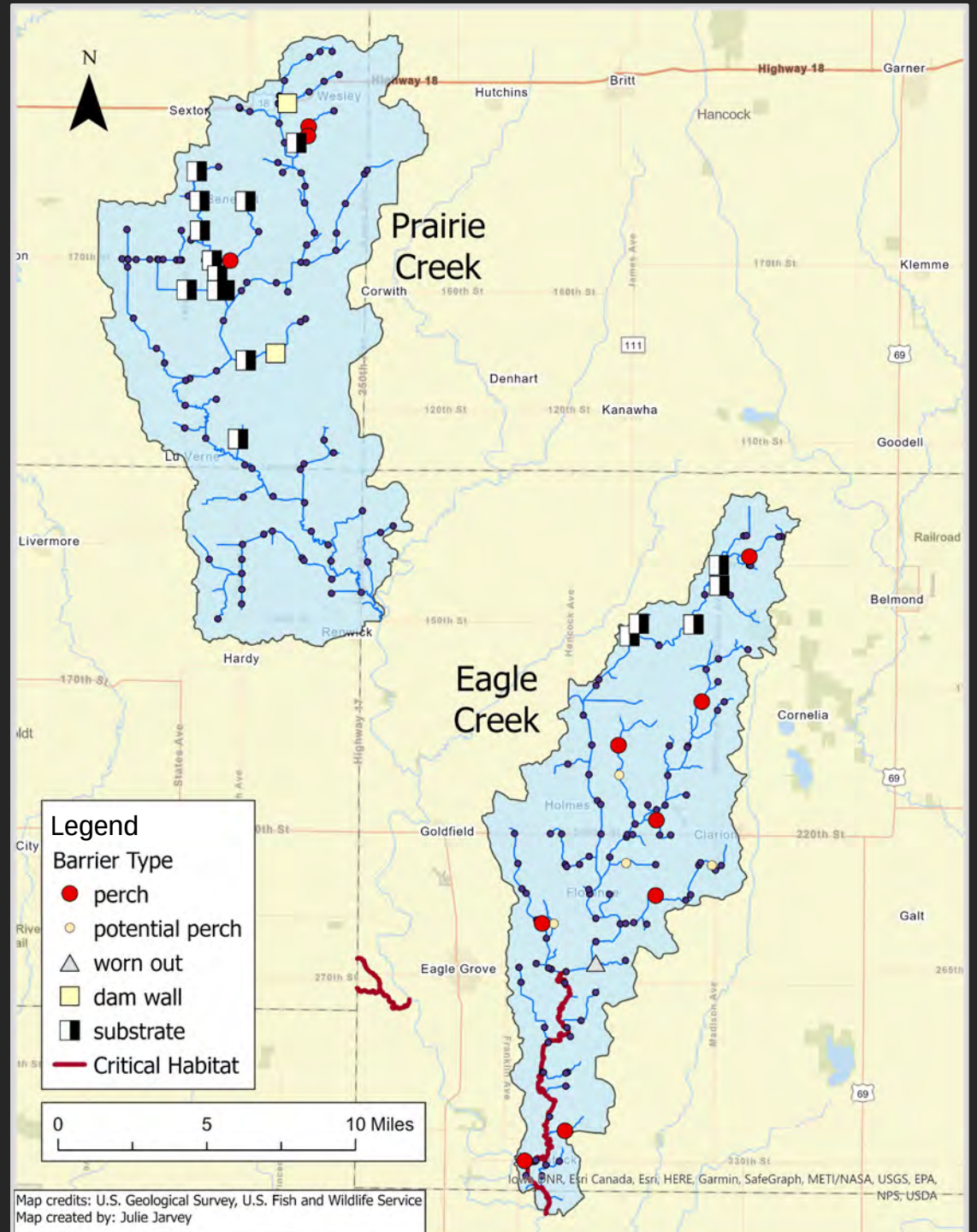
- 11 Perched culverts
- 2 Dam walls
- 1 worn out culvert



Worn out culvert

Crossing Assessment

- 11 Perched culverts
- 2 Dam walls
- 1 worn out culvert
- 19 partial/potential barriers
  - Substrate
    - Sediment, Rock, Beaver activity
  - Potential perch in low water



Partial and potential barriers

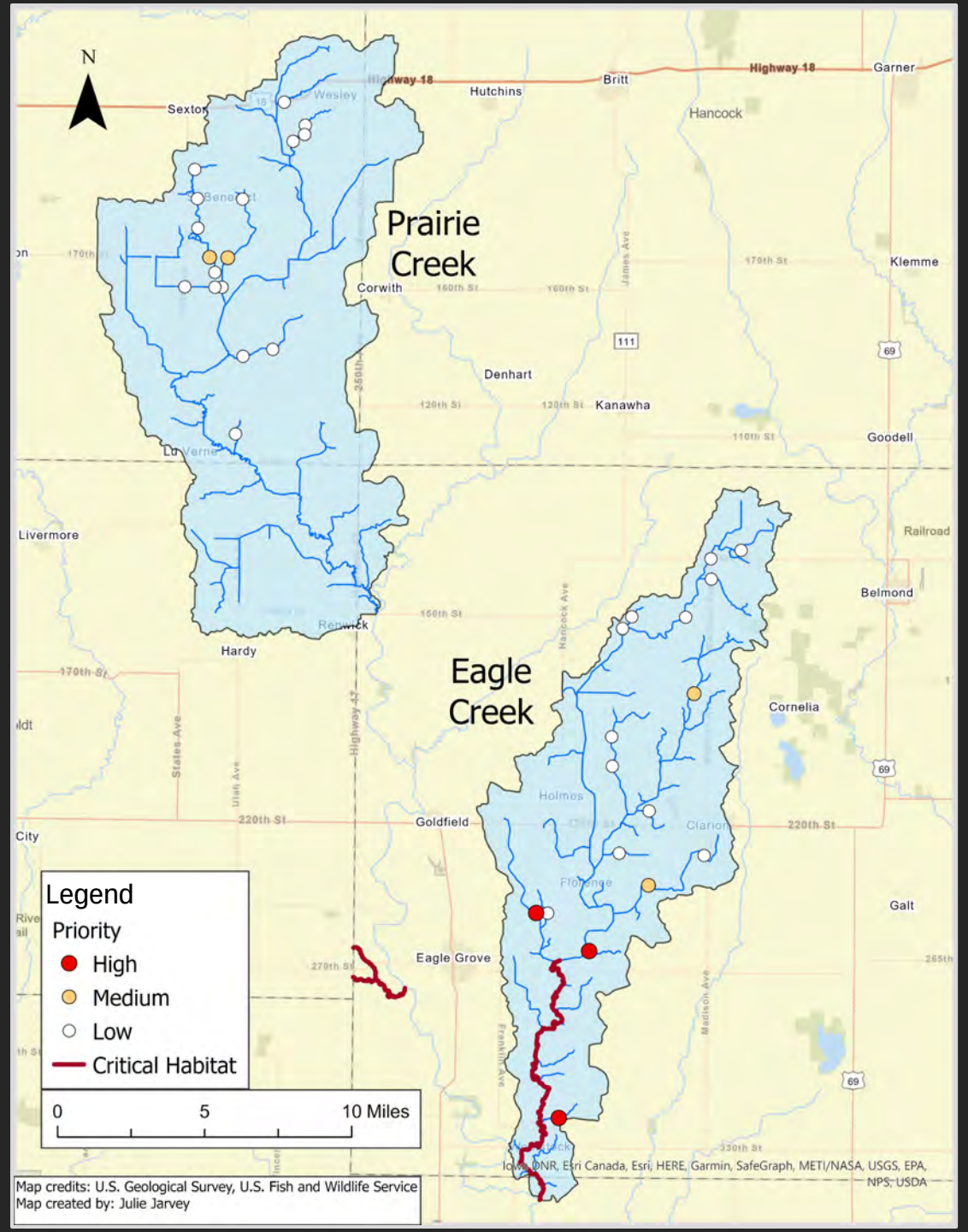
Barrier prioritization

- Degree of barrier
- Stream order
- Proximity to
  - Known Topeka Shiner locations
  - Oxbows & potential oxbows
  - Critical habitat

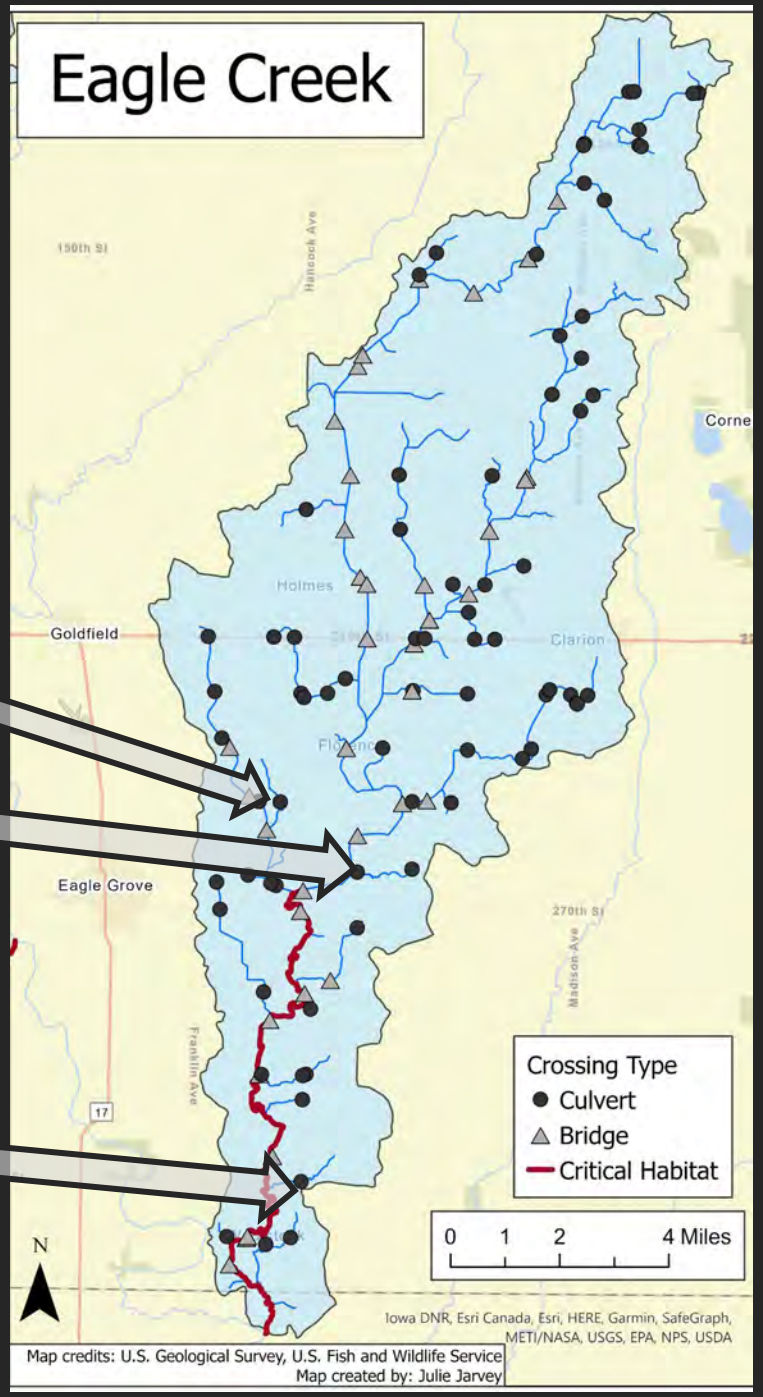

Source: Aleshia Kenney, USFWS, Wikimedia Commons

Barrier prioritization

- Degree of barrier
- Stream order
- Proximity to
  - Known Topeka Shiner locations
  - Oxbows & potential oxbows
  - Critical habitat



High Priority



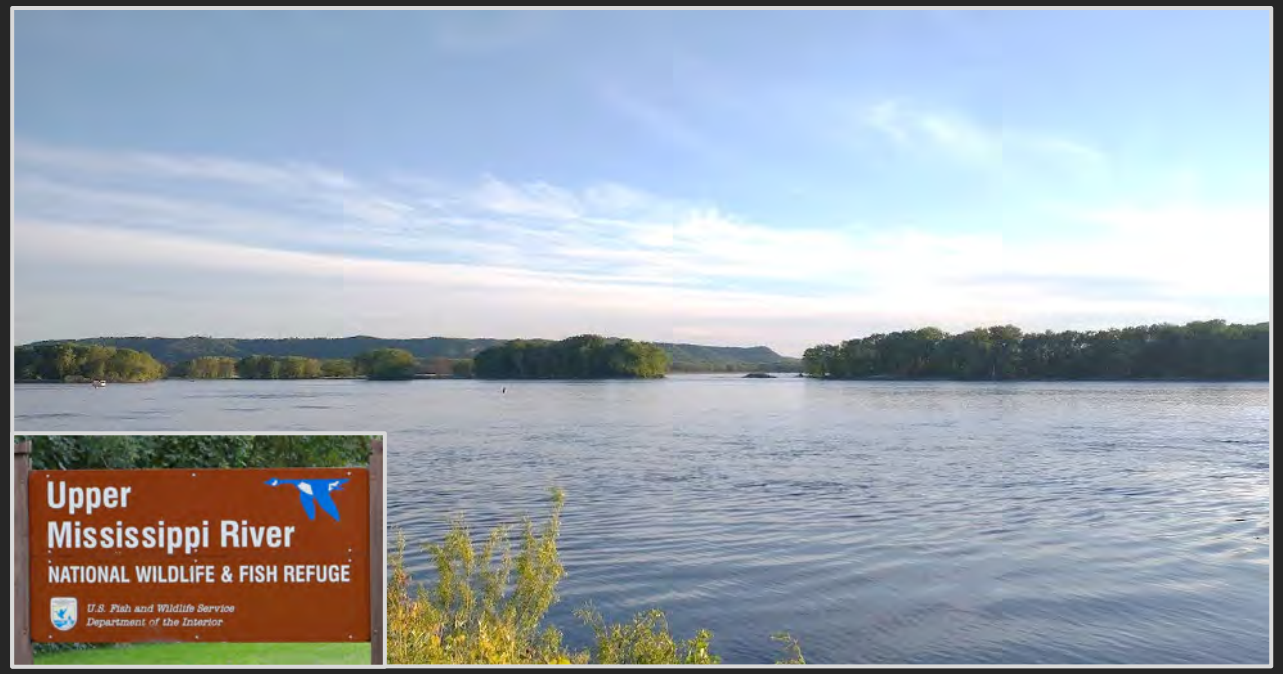
Recommendations

- Remove or modify high priority culverts
- Monitor and assess medium & low priority barriers
  - Varying water levels
  - Sediment buildup
- Assess remaining watersheds
  - Work with landowners to assess crossings

Recommendations

- Revise culvert assessment form
  - Create short survey form for visual assessments and photo records
  - Remove fields that can be added during data processing
- Assess remaining tributaries of the Boone River Watershed
- Conduct more Topeka shiner sampling throughout the watershed
- Develop quantitative method for prioritizing barriers

Other Activities



Thank you!

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Darrick Weissenfluh – USFWS Private Lands

Karen Wilke – The Nature Conservancy

Brandon Iddings – Iowa Soybean Association

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Questions

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Technical Memo – Existing Best Management Practices

Prepared By: Adam Rupe
JEO Project # 190014.00

Purpose

The purpose of this memo is to summarize the existing best management practices (BMPs) within the Boone River Watershed. Located in north-central Iowa, the watershed covers over 581,000 acres, much of which is used for agriculture. This area includes portions of Hamilton, Hancock, Humboldt, Kossuth, Webster, and Wright County. Additional discussion, clarification, and definition about each BMP will be provided in the Boone River Watershed Management Plan. BMPs identified in this memo are focused on those that provide benefits to water quality and/or flood risk reduction. It should be noted that this memo does not identify or address the needs for additional BMP treatment within the watershed. This additional assessment will be documented separately from this memo.

Technical information on many of these BMPS can be found from the following sources:

- **Iowa Nutrient Reduction (NRS)**
  - The NRS has identified multiple BMPs to reduce nutrients.
  - Summary sheet SP435A provides information on reduction rates for select BMPs and can be accessed at: http://www.nutrientstrategy.iastate.edu/
- **Clean Water Iowa**
  - Clean Water Iowa provides information on BMPs applicable to rural (agricultural), urban, and industrial areas.
  - This information is available at: https://www.cleanwateriowa.org/
- **ACPF Toolbox Manual**
  - Available at: https://acpf4watersheds.org/
- **Iowa Stormwater Education Partnership (ISWEP)**
  - ISWEP has developed multiple information sheets for stormwater BMPs. These are available at: https://iowastormwater.org/
- **Iowa Watershed Approach**
  - Multiple BMP informational sheets were developed by Iowa State University Extension. These are available at: https://iowawatershedapproach.org/

- **Small Open Beef Feedlots in Iowa – A Producer Guide**
  - Information on BMPs specific to livestock management can be found in this guide.
  - Available at: https://store.extension.iastate.edu/product/Small-Open-Beef-Feedlots-in-Iowa-a-producer-guide
- **Iowa DNR River Restoration Toolbox**
  - a series of best management practices developed to assist designers in stream stabilization and restoration projects in Iowa with proven techniques with emphasis on incorporating natural materials, such as logs, stone, and live plantings.
  - Available at: https://www.iowadnr.gov/Environmental-Protection/Water-Quality/River-Restoration/River-Restoration-Toolbox
- **Low-Tech Process Based Restoration of Riverscapes Design Manual**
  - This design manual provides restoration practitioners with guidelines for implementing a subset of low-tech tools—namely post-assisted log structures (PALS) and beaver dam analogues (BDAs)—for initiating process-based restoration in streams.
  - Available at: http://lowtechpbr.restoration.usu.edu/manual/

Data Sources and BMP Types

No central listing or full inventory exists for estimating existing BMPs and treated areas. Many government agencies, especially the Natural Resources Conservation Service (NRCS), work with producers to install BMPs, however, that information is typically subject to privacy laws. Additionally, many landowners implement BMPs on their own without government assistance. To estimate existing BMP levels, multiple types of data sources were utilized, as discussed below. Note that each source has varying levels of detail and coverage dates, additionally, the data is limited by the types of BMPs included in each source.

While existing data on structural BMPs is more readily available, estimated existing non-structural BMPs (which includes soil health, livestock, and nutrient management BMPs) are more difficult to identify. Generally, input from local natural resource managers, landowners, or producers is needed to properly estimate adoption levels of non-structural BMPs.

- Iowa BMP Mapping Project
  - https://www.gis.iastate.edu/gisf/projects/conservation-practices
  - Sponsored by Iowa State University
  - Focused on providing a baseline of structural BMPs dating from 2007-2010
  - Utilizes aerial photography

    - BMPs included: Terraces, Water and Sediment Control Basins (WASCOB), Grassed Waterways, Pond Dams, Contour Strip Cropping, and Contour Buffer Strips
- Conservation Technology Information Center (CTIC) - Operational Tillage Information System (OpTIS)
    - https://www.ctic.org/OpTIS
    - Sponsored by the Conservation Technology Information Center
    - Utilizes remote sensing data to map results at regional and watershed scales
    - Includes estimates for tillage practices and cover crop utilization
- The Nature Conservancy
    - Nonprofit charitable organization whose goal is to promote conservation
    - Data provided through personal correspondence with Karen Wilke
    - Data period: 2011-2020
    - Has worked with producers to install BMPs in the Boone River Watershed
    - BMPs Included: cover crops, strip/no-till, nitrogen inhibitor, bioreactor, drainage water management, CREP wetlands, and oxbow restoration
- U.S. Fish and Wildlife Service (USFWS)-Partners for Fish and Wildlife Program
    - Assisting landowners in the restoration and enhancement of wildlife habitat on their land through technical and financial support
    - Data provided through personal correspondence with Darrick Weissenfluh
    - Database contains records back to 2008
    - BMPs included: prairie restoration/enhancements and oxbow restorations
- Water Quality Initiative (WQI) (Administered through IDALS)
    - The Boone River WQI has been active within the watershed for several years in order to increase adoption of BMPs.
    - IDALS CREP program correspondence (https://www.iowacrep.org/)
    - Data provided through personal correspondence with Karen Wilke
    - Data period: 2014-2020
    - BMPs Included: cover crops, strip/no-till, nitrogen inhibitor, bioreactor, drainage water management, CREP wetlands, and oxbow restoration
- County Hazard Mitigation Plan (HMP)
    - Each county in the watershed has an existing HMP: Hamilton, Hancock, Humboldt, Kossuth, and Wright
    - Provides information on previously completed projects that address multiple natural hazards, including flooding
- Existing Watershed Plans

    - There are four existing watershed plans within the Boone River Watershed, several of which contain information on existing BMPs.
    - These plans include: Eagle Creek, Eagle Grove, Prairie Creek, and Lyons Creek.
- Natural Resources Conservation Service (NRCS)
    - 2008 Rapid Assessment of the Boone River Watershed (BRW)
        - https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_006983.pdf
        - Summary counts of 46 conservation practices by unit either completed or planned are included at the watershed scale
        - Includes summaries of Farm Bill acres, funding, and contracts by county
- Iowa Soybean Association
    - Agricultural Conservation Roadmaps
        - Central Iowa / District 5
        - North Central Iowa / District 2
    - Available at: https://www.iasoybeans.com/research/resources
    - These publications, based on Iowa cropping districts, provide estimated levels of BMP adoption and conservation opportunities at the district scale
    - BMPs include: No-till practices, cover crops, ponds, grassed waterways, terraces, WASCOBs, contour buffer strips, strip cropping, CRP, buffers, bioreactors, saturated buffers, and CREP wetlands

List of BMPs Considered

The following list of practices was used to guide the search for existing information. Some BMPs have been grouped into a "practice suite". Additional information on practice suites is provided below. Note: an asterisk (*) indicates that BMP summary sheets are available from the sources previously identified in this memo.

- Soil Health Practices
    - Nutrient Management BMPs (Practice Suite)
    - Cover Crops
    - Reduced Tillage
    - Land Use Change BMPs (Practice Suite)
- In-Field Practices
    - Contour Buffer Strips / Praire STRIPS*
    - Grassed Waterways
    - Drainage Water Management
    - Terraces*

- Below Field (Edge of Field) Practices
    - Riparian Buffers*
    - Saturated Buffers*
    - Bioreactors*
    - Wetlands*
    - Farm Ponds*
    - Water and Sediment Control Basins (WASCOBS)*
- Riparian Management Practices
    - Grade/Stream Stabilization*
    - Floodplain Restoration*
    - Oxbow Restoration*
    - Channel Stabilization*
- Livestock Practices
    - Grazing Lands Management BMPs (Practice Suite)
    - Small Open Feedlot BMPs (Practice Suite)
- Urban Practices
    - Pet Waste Pickup
    - Ordinances, zoning, or regulations pertaining to: stormwater, pet waste, and flood plain management
    - Onsite Wastewater Treatment System (OWTS) Upgrade
    - Urban Stormwater BMPs (Practice Suite)*

Practice Suites

In the context of watershed planning, there are instances where numerous BMPs all have the potential to address a certain pollutant source. For the purpose of this planning effort, some BMP practices have been grouped together into "suites" (which allows for better stakeholder communication, estimating load reductions, costs, etc.). BMPs that are included within each of these practice suites are identified below.

- Nutrient Management BMPs (Practice Suite)
    - Modified timing, rates, or placement of application of nutrients
    - Education for manure application
    - Nitrogen inhibitors
    - Changing nutrient sources
    - Soil and plan tissue sampling
    - Practicing the 4Rs of Nutrient Stewardship

    - Living mulches
- Land Use Change BMPs (Practice Suite)
    - Land use change through conversion of corn-soybean systems to perennial vegetation or extended rotations
        - Perennial crops (energy or biomass crops)
        - Diversified or extended crop rotations
            - Includes at least 2 yrs alfalfa in a 4- or 5-year rotation
        - Land retirement (Prairie or CRP)
        - Conversation to pasture
- Grazing Lands Management BMPs (Practice Suite)
    - Exclusion or cross fencing
    - Alternative water sources
    - Grazing management plans
    - Stream crossings
- Small Open Feedlot BMPs (Practice Suite)
    - Animal waste/manure storage systems
    - Clean water diversion systems
    - Vegetative treatment systems
    - Terraces
    - Manure containment structures and management
    - Open lot runoff management
    - Heavy use area protection
    - Feed management practices
    - Education for manure application
- Urban Stormwater BMPs (Practice Suite)
    - Detention Basins and Ponds*
    - Bioswales*
    - Rain Gardens
    - Bioretention Cells
    - Constructed Wetlands*
    - Green Roofs and Living Walls*
    - Permeable Pavers*
    - River Restoration
    - Tree Boxes and Trenches*

Existing Agricultural BMP Counts

Structural BMPs

A summary of existing levels of BMPs within the watershed was compiled, based on a review from multiple sources, as previously identified in this memo. Due to the varying differences in data (age, coverage period, spatial coverage area, programs included, method of collection, etc.) the most representative data sources were selected for reporting in this memo. Data from the 2008 NRCS Rapid Watershed Assessment is not included in this memo, as existing BMP practice information is included only at the program level (EQIP, CRP, WRP, WHIP) and on a county-by-county level basis, and not for specific BMPs of interest or at the watershed scale.

Note: During reviews of the TM, Karen Wilke, ISA, commented that the Iowa Soybean Association (ISA) is in the process of assembling a statewide edge-of-field practice map. When that information is shared, this TM will be updated to include it.

A summary count of known structural BMPs is included in Table 1. Existing locations of BMPs from the Iowa BMP Mapping Project and TNC Oxbow Restoration sites (where GIS data was available) are shown in Figure 1.

Table 1: Summary of Existing Structural BMPs

BMP	Count	Source
Contour Buffer Strips*	6 structures	Iowa BMP Mapping Project
Grassed Waterways*	1,127,291 feet	Iowa BMP Mapping Project
Ponds*	55 structures	Iowa BMP Mapping Project
Terraces*	104,070 feet	Iowa BMP Mapping Project
WASCOBs*	393 structures	Iowa BMP Mapping Project
Nutrient Reduction Wetland / CREP Wetland	5 sites	Existing watershed plans and TNC database
Bioreactors	8 structures	Existing watershed plans
Prairie STRIPs	1 site	Existing watershed plans
Drainage Water Management	1 site	TNC database
Oxbow Restoration*	32 sites	TNC database
Saturated Buffer	1 site	Personal correspondence with Karen Wilke, TNC

**Indicates these BMPs are shown in maps attached to memo*

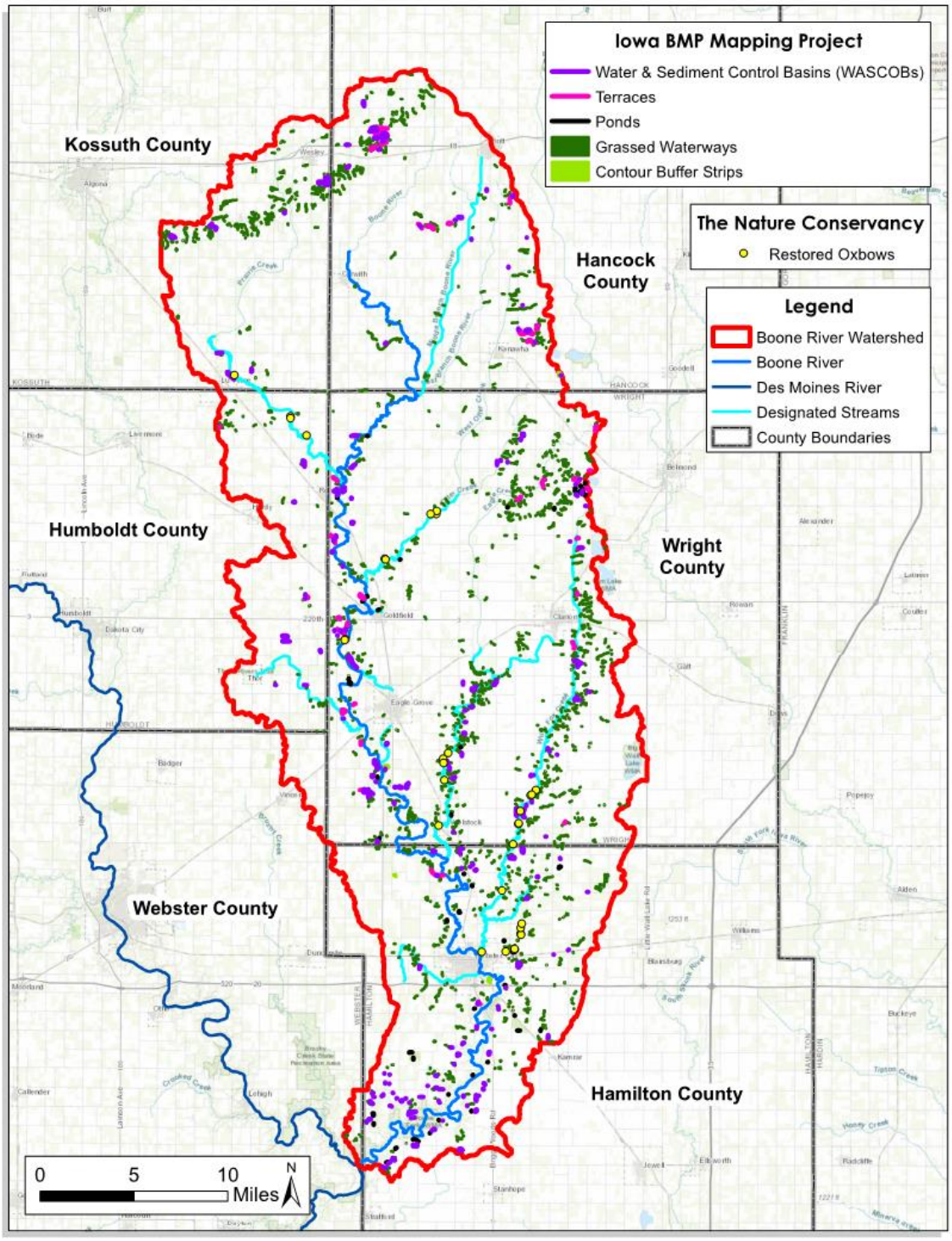


Figure 1: Map of Structural BMPs in the Boone River Watershed

Non-Structural BMPs

While structural BMPs are relatively permanent BMPs, non-structural BMPs are not. Adoption or implementation levels can vary year-by-year based on landowner or producer management practices. Data was available from TNC and WQI from 2011 through 2020, based on the practices that were enrolled through their programs. This data is presented in Table 2.

Nutrient management practice levels were only identified in the existing watershed plans for one year (2017) and were accounted for on 4,270 acres.

Additionally, TNC reported 324 acres of spring side-dress nitrogen fertilizer in 2015.

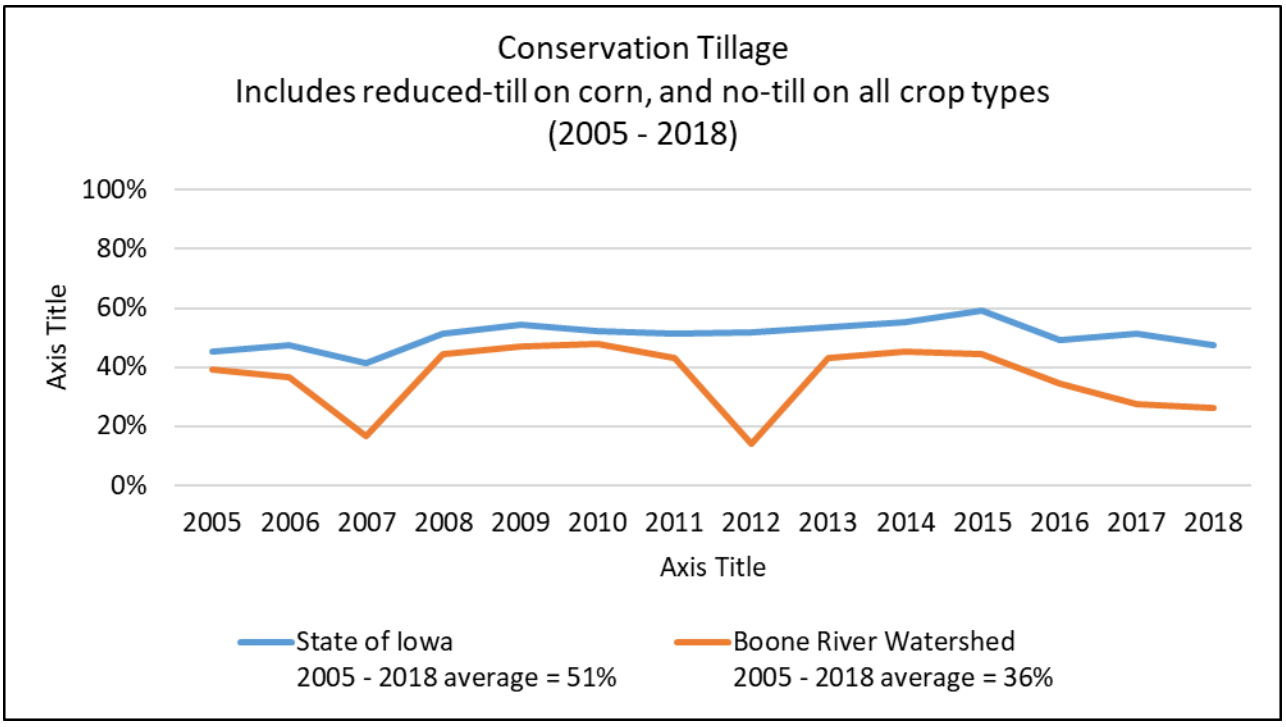
Table 2: Summary (by year) of Non-Structural BMPs Funded by TNC and WQI

Year	Cover Crops (acres)	Strip / No-Till (acres)	Nitrogen Inhibitor (acres)
2011	0	0	0
2012	217	0	0
2013	375	500	0
2014	3,599	1,080	97
2015	2,568	2,199	149
2016	3,833	745	353
2017	4,636	3,801	0
2018	5,014	4,281	0
2019	2,157	0	0
2020	9,297	2,479	0

Source: Compiled data provided by The Nature Conservancy (TNC) and Water Quality Initiative (WQI)

TNC and WQI data is only representative of the BMPs adopted through these cost-share programs; therefore, to gain a better understanding of adoption levels of non-structural BMPs across the entire watershed, OpTIS data, provided by CTIC, was also reviewed (Figure 2 and Figure 3). This data represents an aggregated count across the entire watershed from 2005 through 2019 and shows practices being utilized, whether they are adopted through a cost-share program or a producer has implemented them on their own. OpTIS data includes estimates of tillage practices and use of cover crops.

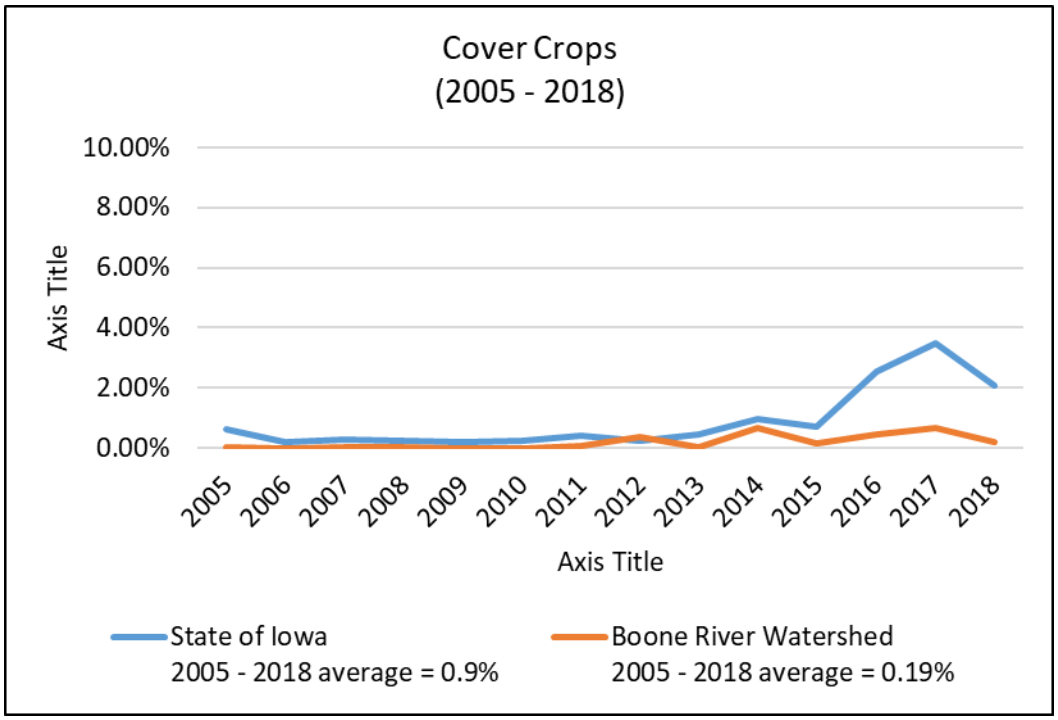
Conservation tillage is a broadly defined practice that includes strip-till, ridge-till, and mulch till systems. Vertical tillage is sometimes included as well. These techniques maintain plant residues on at least 30% of the soil surface after tillage activities. No-till is also considered a form of conservation tillage, however, strip-till, ridge-till, and mulch-till, and vertical tillage all involve some level of tillage and are not considered true no-till. In Figure 2 rates of both conservation tillage and no-till are summed together over time for both the Boone River Watershed – levels across Iowa are also shown for context. Over the period of 2005-2018 an average of 36% (178,901 acres) of the watershed used some form of conservation tillage, while the rest of Iowa average 51%.



Source: Conservation Technology Information Center (CTIC) Operation Tillage Information System (OpTIS)

Figure 2: Adoption Rates of Conservation Tillage

The adoption of cover crops across Iowa and the watershed has shown increasing rates of adoption in recent years. This is supported by the TNC and WQI enrollment numbers and from the OpTIS data. Figure 3 shows cover crop adoption rates over time for the Boone River Watershed, and levels for all of Iowa are also shown for context. Over the period of 2005-2018 an average of 0.19% (928 acres) of the watershed used cover crops, while the rest of Iowa averaged 0.91%. However, over the period of 2010 - 2018 (when TNC and WQI began providing focused cost-share within the watershed) the adoption rate in the watershed was much higher, at 2.6% or an average of 12,795 acres. While this adoption rate marks a significant increase, the total area treated by this BMP is still very small.



Source: Conservation Technology Information Center (CTIC) Operation Tillage Information System (OpTIS)

Figure 3: Adoption Rates of Cover Crops

Existing Urban BMP Counts

Identifying and summarizing existing urban BMPs was limited to input from watershed partners. Currently, only one City (Goldfield) is a member of the Boone River Watershed Management Authority. The following urban BMPs were identified:

- Webster City
    - Webster City completed a stormwater project in 2018 by turning open space into a wetland to treat stormwater runoff from multiple outfalls before entering into the Boone River. This project received funding through WQI.
- Eagle Grove
    - Eagle Grove is currently working on water quality improvements funded through the Clean Water SRF Clean Water Loan Program
    - The project is located in the downtown area, along West Broadway Street
    - Project elements include:
        - Permeable pavers
        - Vegetative Plantings
        - Soil Quality Restoration

Future Data Needs for BMP Estimates

This memo provides a summary using readily available data and information reported by partners. It is highly likely that additional BMPs are existing within the watershed. The following is a list of key BMPs that very limited or no information was found to be available for. Collecting this data in future efforts is recommended. This data could be collected from a variety of methods, including but not limited to: in-field/visual assessments, review of aerial photography, producer/community surveys, and obtaining access to existing BMP cost-share program records from NRCS, IDALS, or others.

- Soil Health Practices
  - Nutrient Management BMPs (Practice Suite)
  - Land Use Change (Perennial crops, extended rotations, diversified crops, CRP, and Prairie STRIPS)
- In-Field Practices
  - Drainage Water Management
- Below Field (Edge of Field) Practices
  - Riparian Buffers
  - Saturated Buffers
  - Bioreactors
- Riparian Management Practices
  - Grade/Stream Stabilization
  - Floodplain Restoration
  - Channel Stabilization
- Livestock Practices
  - Grazing Lands Management BMPs (Practice Suite)
  - Small Open Feedlot BMPs (Practice Suite)
- Urban Practices
  - Ordinances, zoning, or regulations pertaining to: stormwater, pet waste pick up, and flood plain management
  - Onsite Wastewater Treatment System (OWTS) Upgrade
  - Urban Stormwater BMPs (Practice Suite)
- Riparian Management Practices
  - Grade Stabilization*
  - Floodplain Restoration*
  - Channel Stabilization*

REMAINING ACTION ITEMS

Background

The following is a summary of remaining action items identified throughout the planning process. These activities were identified through evaluation of watershed data and input from WMA members and stakeholders. Additional consideration was given to ensure that action items were identified for each of the draft goals. Only the action items that were of highest priority and thought to be realistically achievable within five years were included in the action plan. these can be found in the Action Plan within Chapter 7.

The following is the list of all remaining action items that were identified during this process, but not selected for the Action Plan.

Potential 'Projects and Studies' Action Items Not Included in Action Plan

- Complete a flood damage loss avoidance study by 2025, which will identify a baseline level of flood resiliency and quantify the losses or damages avoided due to the implementation of flood mitigation measures.
- Complete a flood risk assessment for each community to identify flood risks and potential solutions that address flood risk and each community's ability to recover economically and socially.
- Develop a Boone River Water Trail Plan by 2025.
- Survey communities to understand the extent that ordinances, zoning, and community planning address urban stormwater, floodplains, pet waste, and other pollutant sources.
- Identify ageing septic systems or unsewered communities throughout the watershed.
- Develop stormwater management plans for two communities by 2023.
- Implement urban stormwater BMP projects within two communities by 2025.
- Develop a load duration curve for *E. coli* bacteria loadings to better identify pollutant sources and loads.

Potential 'Education' Action Items Not Included in Action Plan

- Educate producers on BMPs that can reduce nitrogen loading, cost-share opportunities, and on how those practices affect farming profitability.
- Work with Iowa Stormwater Education Partnership (ISWEP), IDALS urban conservationists, and other partners to educate community leaders on stormwater management practices and the Iowa Storm Water Management Manual.
- Provide regular communications and updates to the general public on the WMA's Vision, goals, projects, events, and accomplishments.
- Enlist local Co-Op's and crop advisors to provide education and resources to producers regarding water quality and benefits of BMP adoption.
- Develop a database of projects or demonstration sites that can be utilized in outreach materials and events.

- Publish examples of producers and the BMPs they are utilizing on an on-going basis, such as newsletters, social media, or other outlets.
- Work with multiple partners to hold two BMP workshops per year in the watershed.
- Develop education materials that explain the benefits, effectiveness, farming profitably, and cost-share opportunities for BMPs.
- Develop educational materials that address common questions and concerns of landowners and producers, which are specific to the Boone River Watershed.
- Develop or make available online webinars, YouTube videos, and guidance materials to absentee landowners regarding watershed issues and how to encourage BMP adoption by renters.
- Provide landowners information on multiple BMP funding options and help them navigate the administrative hurdles of programs in order to increase BMP sign-up/adoption rates.
- Work with DNR staff and local educators to provide at least one citizen science event per year within the watershed.
- Publish regular (minimum 6 per year) press releases and materials to local newspapers or other existing organizations within the watershed.
- Work with DNR, CCBs, cities, Natural Heritage Foundation to increase river access points and/or make improvements to existing river access points to enhance usability.
- Developed uniform messaging about the WMA and the plan for use by all partners.
- provide education to engineers and other practitioners that are helping to implement projects and practices? River Restoration Toolbox… other standards?
- Provide all farm owners and operators a copy of the "Whole Farm Conservation Best Practices Manual" from ISU Extension

Potential 'Partnership and Policy' Action Items Not Included in Action Plan

- Advertise the Boone WMA Vision Statement and goals, so that potential members understand who the WMA is and its intentions.
- Develop and maintain a website and social media presence where the public can access the watershed plan, education materials, monitoring data, and news/updates.
- Work with County Emergency Managers and Iowa Homeland Security and Emergency Management (HSEMD) officials to integrate the Boone River Watershed Plan with local county hazard mitigation plans by amending a list of watershed projects to each county HMP, by 2024.
- For each quarterly meeting, arrange for 1-2 guest speakers from major funding or technical programs to present and educate.
- Attend and participate in state and regional conferences, meetings, organizations, and other events focused on watershed management.
- Attend NRCS Local Working Group meetings to guide priorities on NRCS programs and funding locally.

Potential 'Monitoring & Plan Evaluation' Action Items Not Included in Action Plan

- Create a database to track flood resiliency indicators, such as: public assistance claims, flood insurance enrollment and claims, properties in the regulatory floodplain, properties removed from the floodplain, and projects completed.

- Work with ISU Extension to complete a baseline survey of existing knowledge, understanding, and attitudes of target audiences in 2022.
- Develop and maintain an inventory of the quantity and quality of wildlife habitat and associated projects or practices.
- Gauge BMP retention levels with randomized yearly follow-ups with operators who implement practices.
- Host an annual review meeting to provide an opportunity to update the public and partners on activities and evaluate progress; summarize and present the results of annual evaluation metrics/worksheets.

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