ILF Service Area 8E
Compensation Planning Framework
Watershed Based Approach to Wetland Compensatory Mitigation

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1. INTRODUCTION

This Compensation Planning Framework (CPF) provides documentation for a watershed-based approach to compensatory wetland mitigation in the eastern portion of the Lower Mississippi Wetland Bank Service Area (BSA 8) in southeastern Minnesota, as part of the Minnesota In-Lieu Fee Program (ILF). The western portion of the Bank Service Area 8 was included in the CPF report with BSAs 9 and 10 (collectively known as the LMMM SA) due to the geographic location, hydrogeomorphology, geology, and land use. The CPF documents baseline conditions and prioritizes compensatory wetland mitigation on a major watershed scale by using statewide data sources, as well as local and regional planning efforts which are readily available to the public.

The CPF is a report which analyzes baseline conditions and develops a prioritization methodology for the siting of replacement sites as a requirement for the ILF Program. As required by both the Federal Mitigation Rule and the Minnesota Wetland Conservation Act (WCA), the CPF must designate areas of high priority for wetland replacement. These are areas of the state where preservation, enhancement, restoration, or creation of wetlands have high public value (Rodacker & Smith, 2018). Initially, the ILF will be focused on credit generation for the Local Government Road Wetland Replacement Program (LGRWRP) which is administered by the Minnesota Board of Water and Soil Resources (BWSR). A list of acronyms and their meanings can be referenced in Appendix A.

2. GEOGRAPHIC SERVICE AREA

ILF Service Area Overview

This CPF focuses on the eastern portion of the Lower Mississippi River Wetland Bank Service Area (BSA 8). For the purpose of this report, and to distinguish it from the whole Bank Service Area, the focus area will be referred to as ILF Service Area 8E (SA 8E). SA 8E covers areas within the Upper Mississippi-Black-Root, Upper Mississippi-Iowa-Skunk-Wapsipinicon, and Upper Mississippi-Maquoketa-Plum subregions which have unique Hydrologic Unit Codes (HUC) of 0704, 0708, and 0706 respectively. SA 8E spans approximately 4.7 million acres and 15 counties in southeastern Minnesota. The boundary of SA 8E ranges from the cities of Lakeville in the north to the Minnesota state border in the south. Minnesota stat border and the Mississippi River are on the eastern border of the SA and to the west is Albert Lea, Mankato, and Faribault (Figure B-1). According to the National Land Cover Database (NLCD), in 2016 land cover in SA 8E was primarily cultivated crops (54% of the SA area). Deciduous forest covers approximately 14% of SA 8E, along with hay/pasture covering 11%, and developed covering 8% (Table 2 1). The land use across the remaining area includes herbaceous land cover, various types of wetlands, forest and open water. SA 8E contains 12 major watersheds (HUC 8) including the Cannon River (Major Watershed number 39; HUC8 ID 07040002), Cedar River (48; 07080201), Mississippi River – La Crescent (42; 07040006), Mississippi River – Lake Pepin (38; 07040001), Mississippi River – Reno (44; 07060001), Mississippi River – Winona (40; 07040003), Root River (43; 07040008), Shell Rock River (49; 07080202), Upper Iowa River (46; 07060002), Upper Wapsipinicon River (47; 07080102), Winnebago River

(50; 07080203), and Zumbro River (41; 07040004). The major watersheds are shown in Figure B-1 and described in the following paragraphs.

Table 2-1. Current Land Cover from the National Land Cover Database	
Landcover (NLCD 2016)	**Percent Area**
Barren Land	0.12%
Cultivated Crops	58%
Deciduous Forest	14%
Developed	8%
Emergent Herbaceous Wetlands	2%
Evergreen Forest	0.16%
Hay/Pasture	11%
Herbaceous	3%
Mixed Forest	1%
Open Water	2%
Shrub/Scrub	0.06%
Woody Wetlands	1%
Land cover data from the National Land Cover Database (NLCD) for SA 8E	

Ecological Classification

The ecological classification system used in this study was developed jointly by the Minnesota Department of Natural Resources (MnDNR) and the United States Forest Service (USFS). This system is used to classify areas with similar ecological characteristics. It is set up in tiers which become successively smaller and more unique. Provinces are the broadest tier and are defined by major climate zones, native vegetation, and biomes. There are four provinces present in Minnesota, but only two of those provinces intersect with SA 8E: Eastern Broadleaf Forest and Prairie Parkland. Within the provinces are sections, which are defined by the origin of glacial deposits, regional elevation, distribution of plants and regional climate. In Minnesota there are 10 sections but only three are present in SA 8E: Paleozoic Plateau, Minnesota & NE Iowa Morainal, and North Central Glaciated Plains. Each section is then broken down further into subsections. Subsections are defined by the glacial deposition processes, surface bedrock formations, local climate, topographic relief, and the distribution of plants (Cleland et al., 1997). There are 26 total subsections in Minnesota, six of the subsections are represented within SA 8E. Maps of the provinces, and subsections can be found in Figure B-2. Each province and subsection are described in more detail below. The acreage of each province, section and subsection within each major watershed can be found in Table 2-2. This will be helpful for decision makers because it allows them to consider ecological patterns and identify areas with similar management opportunities.

EASTERN BROADLEAF FOREST PROVINCE

The Eastern Broadleaf Forest province extends over 99% (approximately 4.5 million acres) of SA 8E. Outside of SA 8E and Minnesota, this province spans most states in the Midwest. It is a transition zone between the semi-arid prairies in southwest United States and the semi-humid mixed conifer-hardwood forests to the north and into Canada. During the last glaciation, glaciers covered the northern section of the Eastern Broadleaf Forest Province in Minnesota. After receding, the glaciers left a thick layer of glacial drift which can be the cause of poor drainage and is highly erodible (MnDNR, n.d.-b). SA 8E also contains a portion of the Eastern Broadleaf Forest that was left unglaciated, and area known as the Pseudo-Driftless Region which refers to the lack of glacial drift and has served as a biological refugia through past ice ages. There are five subsections of the Eastern Broadleaf Forest province within SA 8E.

St. Paul – Baldwin Plains Subsection

This small subsection is characterized by a large moraine of rolling hills and areas of outwash plan that gives parts of this subsection its flat appearance. Pre-settlement vegetation was high in diversity, and tall grass prairies were common in the flat outwash plains. Maple-basswood forests and oak and aspen savannas were found in areas that received repetitive protection from wildfires. Undeveloped drainage is common in the moraine, causing drainage networks to form lakes and wetlands. In the center of the subsection, near the Mississippi River, well developed floodplains with good drainage occur (MnDNR, 2024c). There is only a small fragment of the St. Paul – Baldwin Plains subsection within SA 8E. This subsection is located within the Mississippi River – Lake Pepin watershed and cover only approximately 16,500 acres of SA 8E.

Big Woods Subsection

Lakes and wetlands are a common occurrence within this subsection. Before Euro-American settlement, this area was dominated by red oak, sugar maple, basswood, and American elm. Soils that formed in this area consist of thick deposits of gray limey glacial till left by the Des Moines lobe, which was the last glacier to push through the Midwest. The Minnesota river cuts through the center of this subsection going South to North and meets with the Mississippi that runs along the Northern part of the subsection and meets with the Minnesota river. The retreat of the glaciers left behind depressions that created wetlands and lakes in this region (MnDNR, 2024a). Approximately 294,292 acres of SA 8E make up the Big Woods subsection, in comparison to other subsections it is relatively small.

Oak Savanna Subsection

Pre-settlement, this subsection had pressure from prairie fires but was protected enough to establish fire resistant stands of trees such as bur oak and some aspen. The prairies that surround this subsection on the West and South sides burned the landscape frequently enough to maintain oak openings and did not let Big Woods establish. Maple and Basswood forests occur to restricted areas in portions of the subsection that received greatest fire protection, such as ravines. The soil of this subsection consists of loess plain over bedrock and the glacial drift is usually less than 100 feet thick, but in some areas the bedrock can be exposed near dissected stream valleys and others the glacial till can reach about 200-feet. This subsection has a well-developed drainage network, with below average amounts of lakes and wetlands compared to the rest of Minnesota's regions (MnDNR, 2024b). A large section of the Oak Savanna subsection is within 8E SA (1,692,031 acres), making it one of the largest regions.

Rochester Plateau Subsection

This area can be defined as the transition zone of the land affected by glacial activity and what land remained relatively untouched by the glaciers. To the west side of the subsection, topography consists of gentle rolling till plains with underlying glacial till, and the loess being several feet thick. To the east, the glacial drift is dramatically reduced, with exposed bedrock controlling the topography. For reference, the drift over the bedrock averages from 10 to 100 feet in the east and averages well over 100 feet in the west. Due to the unique topography, there are few lakes as the hydrology is efficiently drained through rivers. Presettlement vegetation include tall grass prairies as well as bur oak savannahs, fire was a major ecological influence (MnDNR, n.d.-e). Approximately 1,359,424 acres of SA 8E are within the Rochester Plateau subsection.

The Blufflands Subsection

This subsection is unique in the fact that it does not have any lakes, and the drainage is well developed, dendritic in nature. The vegetation varies, with maple-basswood forests near the rivers and oak openings with prairies on the broader ridge tops. The drift over bedrock is minimal, 0-50 feet on average. Exposed bedrock is very common in valleys, and the loess thickness ranges from less than a foot in the valleys to 30 feet on the ridgetops. The farther east you go in this subsection, the more common it is to find more bedrock and less loess (MnDNR, n.d.-a). Of the SA 8E, 1,287,288 acres are in the Blufflands subsection.

PRAIRIE PARKLAND PROVINCE

The Prairie Parkland Province covers the western side of Minnesota and extends northwest into Canada, west into North and South Dakota, and south into Iowa, Nebraska, Kansas, Oklahoma, and Missouri. This province has less precipitation and higher temperatures than the other provinces in Minnesota. Prairies and grasslands were the dominate vegetation before European settlement. The thick layer of glacial drift left by the Des Moines lobe as well as the natural development of prairie soils rich in organic matter, provide incredibly fertile soil for agriculture. One of the most distinct characteristics of this province is the Minnesota River, which formed from extreme erosion and downcutting when Glacial Lake Agassiz was dramatically drained. This province is home to prairie pothole wetlands. These wetlands formed in the uneven landscape left by the receding Des Moines Lobe. They are not well connected via surface water, leading to wetlands with variable hydrology and groundwater connections. They are extremely important for both the flora and fauna of the area (MnDNR, n.d.-d). There is one subsection of the Prairie Parkland province within SA 8E.

Minnesota River Prairie Subsection

Taking up the second smallest amount of area in SA 8E is the Minnesota River Prairie Subsection. This subsection covers about 47,000 acres on the southeastern portion of SA 8E. The Minnesota River Prairie subsection generally has gently rolling hills, except for the area around the Minnesota River which has steep bluffs. It is flanked on the western side by the Prairie Coteau. The subsection is covered in a very thick layer of glacial drift which leads to soils that are well to moderately well drained loams. Wetlands in this area are generally prairie pothole wetlands. As far as surface water is concerned, these wetlands would be considered disconnected. The drainage network is poorly developed due to the relatively young age of the landscape. Agriculture is the dominate land use in this subsection (MnDNR, n.d.-c).

Table 2-2. Area (Acres) of Ecological Subsections Broken Down by Each Major Watershed within SA 8E

Province:	**Eastern Broadleaf Forest**					**Prairie Parkland**	
Section:	**Minnesota + NE Iowa Morainal**			**Paleozoic Plateau**		**North Central Glaciated Plains**	
Subsection:	**St. Paul – Baldwin Plains**	**Big Woods**	**Oak Savanna**	**Rochester Plateau**	**The Blufflands**	**Minnesota River Prairie**	**Total**
Cannon River	-	267,241	474,026	130,808	68,469	-	**940,544**
Cedar River	-	-	454,031	-	-	-	**454,031**
Mississippi River – La Crescent	-	-	-	-	60,544	-	**60,544**
Mississippi River – Lake Pepin	16,287	27,285	129,593	62,897	146,719	-	**382,781**
Mississippi River – Reno	-	-	-	10,227	107,221	-	**117,448**
Mississippi River – Winona	-	-	-	136,343	282,858	-	**419,201**
Root River	-	-	108,908	486,486	466,110	-	**1,061,503**
Shell Rock River	-	-	145,353	-	-	12,349	**157,702**
Upper Iowa River	-	-	72,422	65,578	723	-	**138,723**
Upper Wapsipinicon River	-	-	8,264	-	-	-	**8,264**
Winnebago River	-	-	11,432	-	-	34,217	**45,650**
Zumbro River	-	-	287,129	467,086	155,152	-	**909,367**
SA 8E Total	**16,287**	**294,527**	**1,691,157**	**1,359,424**	**1,287,797**	**46,566**	**4,695,757**

Major Watershed Descriptions

The purpose of each watershed description is to provide context for future decisions about mitigation site selection. Data used to fill out the watershed descriptions is plentiful and publicly available. Reports that were used include: Watershed Restoration and Protection Strategy Reports (WRAPS) from the Minnesota Pollution Control Agency (MPCA), Watershed Health Assessment Framework (WHAF) from the MnDNR, county local water management plans, and One Watershed One Plan documents, when available. Mapping resources used were provided from various state agencies through the Minnesota Geospatial Commons. Other resources used in the descriptions are watershed specific and listed when appropriate. For descriptions of the ecological classifications see section 2-B.

CANNON RIVER

The Cannon River watershed (HUC 07040002) is located along the western border of SA 8E. It includes seven counties: Rice, Steele, Goodhue, Dakota, Le Sueuer, Waseca and Freeborn. The population within the watershed, based on the 2010 U.S. census, was 129,671 (MnDNR, 2017a). The primary industry within the watershed is agriculture. Land use does not vary much across the watershed. Most of the land is cultivated for agricultural purposes, with 9% of the watershed listed as forested and 9% mapped as being developed.

The watershed spans four different ecological subsections, including the Oak Savanna, Big Woods, Rochester Plateau, and The Blufflands. A small percentage of the watershed is considered wetland. Emergent wetlands comprise about 2%, woody wetlands make up about 1%, and scrub shrub about 0.5%. Soils in the Cannon River watershed are highly permeable and relatively low in organic matter, with higher areas of silt and sand in the northeastern portion of the watershed (EOR, 2020). The watershed receives an average of 33.9 inches of precipitation every year. Most of the precipitation (14.2 inches) falls during the summer (June through August) (MnDNR, 2019a).

CEDAR RIVER

The Cedar River watershed (HUC 07080201) is located on the southern border of SA 8E. It includes four counties: Mower, Freeborn, Dodge, and Steele, and flows southward to Iowa, with most of the watershed located in Iowa. The population within the watershed, based on the 2010 U.S. census, was 41,747. The primary industry within the watershed is agriculture. Land use does not vary much within the watershed. Most of the land is cultivated for agricultural purposes, with 9% of the watershed being developed (MnDNR, 2017b).

The watershed is located entirely within the Oak Savanna ecological subsection. A very small percentage of the watershed is considered wetland. Emergent wetlands comprise about 0.6%, woody wetlands make up 1%, and there are no mapped scrub shrub communities within the watershed. Soils in the Cedar River watershed are primarily loamy till with moderate permeability (Barr, 2019). The watershed receives an average of 35.5 inches of precipitation each year. Most of the precipitation (14.5 inches) falls during the summer months (June through August) (MnDNR, 2019b).

MISSISSIPPI RIVER – LA CRESCENT

The Mississippi River – La Crescent watershed (HUC 07040006) is located on the eastern border of SA 8E. It includes Winona County and Houston County and extends into Wisconsin where it is labeled as La Crosse-Pine. The population within the watershed, based on the 2010 U.S. Census, was 8,523. Land use within the watershed is dominated by forest at 47%, with pastureland and cropland making up 27%, and developed areas comprising 8% (MnDNR, 2017c).

The watershed is located entirely within The Blufflands ecological subsection. Wetlands collectively make up almost 7% of the watershed. Emergent wetlands and woody wetlands each comprise about 3%, with scrub shrub at a minimal 0.2% (MnDNR, 2015). Soils in the Mississippi River – La Crescent watershed are relatively low in organic matter, with higher percentages of silt. The watershed receives an average of 36.3 inches per year. Most of the precipitation (14.1 inches) falls during the summer (June through August) (MnDNR, 2019c).

MISSISSIPPI RIVER – LAKE PEPIN

The Mississippi River – Lake Pepin watershed (HUC 07040001) is located in the northeastern corner of SA 8E. It includes four counties: Dakota, Goodhue, Wabasha, and Scott, and extends eastward into Wisconsin where the watershed is labeled as Rush-Vermillion. The population within the watershed, based on the 2010 U.S. census, was 194,352. The primary industry within the watershed is agriculture. Land use within the watershed varies, with cultivated crops making up about 41%, forest comprising 15%, and development making up 16% (MnDNR, 2017d).

The watershed spans five different ecological subsections, including The Blufflands, Oak Savanna, Rochester Plateau, Big Woods, and the St. Paul-Baldwin Plains. A small portion of the watershed is considered wetland. Emergent wetlands comprise almost 1%, with woody wetlands making up about 2%, and scrub shrub covers 0.5%. Soils within the Mississippi River – Lake Pepin watershed are relatively low in organic matter, with a higher silt concentration in the southern portion of the watershed. The watershed receives an average of 33.4 inches of precipitation every year. The majority of the precipitation (13.9 inches) falls during the summer months (June through August) (MnDNR, 2019d).

MISSISSIPPI RIVER – RENO

The Mississippi River – Reno watershed (HUC 07060001) is located in the southeastern corner of SA 8E. It is located entirely within Houston County in Minnesota and extends into parts of Wisconsin and Iowa where it is labeled as Coon-Yellow. The population within the watershed, based on the 2010 U.S. census, was 5,372. Land use varies slightly within the watershed. Land use within the watershed is primarily pastureland and cropland comprising about 42%, forested areas comprising about 35%, with minimal development at less than 5% (MnDNR, 2017e).

The watershed crosses two ecological subsections, The Blufflands and the Rochester Plateau. Wetlands comprise a small portion of the Mississippi River – Reno watershed. Emergent wetlands make up 2%, woody wetlands make up almost 5%, and there are no scrub shrub communities located in the watershed. Soils within the Mississippi River – Reno watershed are relatively low in organic matter and higher in silt percentage along the northwestern portion of the watershed. The watershed receives an average of 36.5 inches of precipitation each year. Most of the precipitation (14.3 inches) falls during the summer (June through August) (MnDNR, 2019e).

MISSISSIPPI RIVER – WINONA

The Mississippi River – Winona watershed (HUC 07040003) is located on the eastern border of SA 8E. It includes three counties, Winona, Wabasha, and Olmstead. The watershed extends into Wisconsin where it is labeled as Buffalo-Whitewater. The population within the watershed, based on the 2010 U.S. census, was 57,112. Land use varies across the watershed. Land use is primarily cropland and pastureland at 46%, followed by forested areas at 28%, and development at about 7% (MnDNR, 2017f).

The watershed is within two ecological subsections, The Blufflands and the Rochester Plateau. Wetlands account for a small percentage of the watershed at less than 4%. Woody wetlands comprise 2%, emergent wetlands make up less than 2%, and scrub shrub only comprises 0.1% of the watershed. Soils within the Mississippi River – Winona watershed are high in silt with few areas high in organic matter. The watershed receives an average of 35.6 inches of precipitation per year. The majority of the precipitation (14.3 inches) falls during the summer months (June through August) (MnDNR, 2019f).

ROOT RIVER

The Root River watershed (HUC 07040008) is located near the southern portion of SA 8E. It includes five counties: Fillmore, Houston, Mower, Winona, and Olmstead, and has a minimal expansion into one Iowa county. The population within the watershed, based on the 2010 U.S. census, was 43,093. The primary industry within the watershed is agriculture and does not vary much across the watershed. Land use is dominated by cultivated crops and pastureland totaling 62%, with forested areas making up 22% (MnDNR, 2017g).

The watershed spans across three ecological subsections, including the Rochester Plateau, The Blufflands, and Oak Savanna. Wetlands make up a minimal portion of the watershed, equating to less than 1% of emergent wetlands and woody wetlands, with no scrub shrub communities. Soils within the Root River watershed are comprised of soils with low organic matter and relatively high silt. The watershed receives an average of 36.2 inches each year. Most of the precipitation (14.5 inches) falls during the summer (June through August) (MnDNR, 2019g).

SHELL ROCK RIVER

The Shell Rock River watershed (HUC 07040202) is located on the southern edge of SA 8E. It is located entirely in Freeborn County, and the population based on the 2010 U.S. census was 23,357. The Shell Rock River watershed begins in Minnesota and flows roughly 100 miles southward into Iowa. The primary industry within the watershed is agriculture. Land use is dominated by cultivated crops at 68%, with development the next highest percentage at 11% (MnDNR, 2017h).

The watershed is located in two ecological subsections, the Oak Savanna and the Minnesota River Prairie. A small percentage of the watershed is considered wetland. Emergent wetlands comprise about 3%, woody wetlands comprise over 1%, and there is no scrub shrub community. Soils in the Shell Rock River watershed have varying percentages of organic matter and coarse textures. The watershed receives an average of 35.1 inches of precipitation every year. The majority of the precipitation (14.5 inches) falls during the summer months (June through August) (MnDNR, 2019h).

UPPER IOWA RIVER

The Upper Iowa River watershed (HUC 07060002) is located on the southern border of SA 8E. It is in three Minnesota counties, Fillmore, Mower, and Houston, and extends into three Iowa counties. The population within the watershed, based on the 2010 U.S. census, was 4,929. The primary industry within the watershed is agriculture. Land use across the watershed is dominated by cultivated crops at 65%, with development totaling almost 6% (MnDNR, 2017i).

The watershed spans across three ecological subsections, the Oak Savanna, Rochester Plateau, and a minimal portion located in The Blufflands. Wetlands make up a minimal portion of the watershed, totaling only 0.2%. Soils within the Upper Iowa River watershed are well drained soils formed in loess (Upper Iowa River Watershed Organization, n.d.). The watershed receives an average of 36.6 inches of precipitation per year. Most of the precipitation (14.8 inches) falls during the summer (June through August) (MnDNR, 2019i).

UPPER WAPSIPINICON RIVER

The Upper Wapsipinicon River watershed (HUC 07080102) is located on the southern edge of SA 8E. In Minnesota, it is located entirely within Mower County but extends southward into Iowa, with most of the watershed in Iowa. The population within the watershed, based on the 2010 U.S. census, was 68. The primary industry within the watershed is agriculture. Land use across the watershed is dominated by cultivated crops at 91%, with minimal development at about 5% (MnDNR, 2017j).

The watershed is located entirely within the Oak Savanna ecological subsection. There are no wetland areas within the watershed. Soils within the Upper Wapsipinicon River watershed have varying levels of organic matter and are somewhat poorly drained (Upper Wapsipinicon River Watershed Managment Authority, n.d.). The watershed receives an average of 36.2 inches of precipitation each year. The majority of the precipitation (14.7 inches) falls during the summer months (June through August) (MnDNR, 2019j).

WINNEBAGO RIVER

The Winnebago River watershed (HUC 07080203) is located in the southwestern corner of SA 8E. In Minnesota, it is located primarily in Freeborn County with a small percentage of the watershed located in Faribault County. The watershed extends southward into Iowa with most of the watershed being located in Iowa. The population within the watershed, based on the 2010 U.S. census, was 1,143. The primary industry within the watershed is agriculture. Land use across the watershed is dominated by cultivated crops at 82%, with development just over 5% (MnDNR, 2017k).

The watershed spans across two ecological subsections, the Minnesota River Prairie and the Oak Savanna. A small portion of the watershed is considered wetland. Emergent wetlands comprise 2.5%, woody wetlands comprise almost 1%, and there are no scrub shrub communities. Soils within the Winnebago River watershed are moderately deep and loamy in texture (Shell Rock River Watershed District, 2022). The watershed receives an average of 34.8 inches of precipitation every year. Most of the precipitation (14.4 inches) falls during the summer (June through August) (MnDNR, 2019k).

ZUMBRO RIVER

The Zumbro River watershed (HUC 07040004) is located in the center of SA 8E. It includes six counties: Olmstead, Dodge, Wabasha, Goodhue, Rice, and Steele. The population within the watershed, based on the 2010 U.S. census, was 171,421. The primary industry within the watershed is agriculture. Land use across the watershed is dominated by cultivated crops at 56%, with grassland and pastureland collectively making up 23%, forested areas at almost 10%, and development making up 9% (MnDNR, 2017l).

The watershed spans three ecological subsections, including the Rochester Plateau, Oak Savanna, and The Blufflands. Wetlands comprise a minimal portion of the watershed. Emergent wetlands make up 0.4%, woody wetlands comprise about 1%, and there are no scrub shrub communities within the watershed. Soils within the Zumbro River watershed are relatively low in organic matter, with higher concentrations of silt within the northeastern portion of the watershed. The watershed receives an average of 34.8 inches of precipitation per year. The majority of the precipitation (14.3 inches) falls during the summer months (June through August) (MnDNR, 2019l).

3. BASELINE CONDITIONS

The baseline conditions section analyzes and describes the current conditions of water resources across SA 8E. All of the data analyzed is readily available to the public. Additional information about the land use, vegetation cover, and permitting history is included to add a greater understanding of current conditions and to further inform the prioritization process. Maps for the geographic service area and the baseline conditions are located in Appendix B.

Pre-settlement vegetation

The Historic Vegetation Model (VEGMOD) developed by the Minnesota Department of Transportation (MnDOT) was summarized to gain insight into the distribution of vegetation prior to the significant changes resulting from European settlement (pre-settlement). VEGMOD was developed to represent the vegetation present at the time of the Public Land Survey (1848-1907) across Minnesota. The model is based on statistical analysis of interpreted data which includes surveyor's observations and modern terrain and soils data (MnDOT, 2019). A summary of the vegetative cover grouped by vegetative class is provided in Table 3-1. Unclassified data was excluded from the analysis.

Results from the VEGMOD data (Figure B-3) reflect the ecological classification subsections for each of the major watersheds. The majority of SA 8E was historically prairie or savanna vegetation that transitions to deciduous forest in the southeastern (Blufflands) and northwestern (Big Woods) regions of SA 8E. While small, isolated areas of historic vegetation persist in present day, most of the land within SA 8E has been converted from its natural state to support agriculture and development, especially in areas once dominated by prairie or savanna vegetation. Only 7% of SA 8E was historically wetland.

Table 3-1. Summary of Pre-Settlement Vegetation for SA 8E

Category	Water	Wetland		Forest					Prairie			
Major Watershed	**Surface Water**	**Seasonally Wet**	**Permanently Wet**	**Coniferous Forest**	**Coniferous Woodland**	**Mixed Coniferous-Deciduous Forest**	**Deciduous Forest**	**Deciduous Woodland**	**Prairie**	**Brush-Prairie**	**Coniferous Savanna**	**Deciduous Savanna**
Cannon River	3%	5%	9%	-	-	-	25%	<1%	40%	<1%	-	18%
Cedar River	1%	<1%	4%	-	-	-	1%	-	68%	-	-	26%
Mississippi River – La Crescent	4%	13%	2%	-	-	-	64%	-	1%	-	-	16%
Mississippi River – Lake Pepin	5%	8%	2%	-	-	-	10%	<1%	43%	-	-	33%
Mississippi River – Reno	2%	14%	<1%	-	-	-	44%	-	10%	-	-	30%
Mississippi River – Winona	2%	8%	1%	-	-	-	28%	<1%	24%	-	-	36%
Root River	<1%	4%	<1%	-	-	-	27%	<1%	37%	-	-	32%
Shell Rock River	3%	1%	11%	-	-	-	<1%	-	35%	-	-	50%
Upper Iowa River	<1%	<1%	<1%	-	-	-	9%	-	66%	-	-	24%
Upper Wapsipinicon River	<1%	-	<1%	-	-	-	<1%	-	98%	-	-	1%
Winnebago River	4%	1%	11%	-	-	-	<1%	<1%	69%	-	-	14%
Zumbro River	<1%	3%	<1%	-	-	-	4%	<1%	64%	-	-	28%
SA 8E Total	**2%**	**4%**	**3%**	-	-	-	**17%**	**<1%**	**45%**	**-**	**-**	**28%**
SA 8E Category Total	**2%**	**7%**		**18%**					**73%**			

Wetlands

The current extent of wetlands in SA 8E is based on the 2019 update of the Minnesota National Wetland Inventory (NWI) provided by the MnDNR (Kloiber et al., 2019). SA 8E has approximately 250,000 acres of palustrine wetlands (Figure B-4). Riverine and Lacustrine wetlands were not included in this analysis because they are commonly associated with non-wetland deepwater habitat in the Cowardin classification system.

Approximately 5% of the entire SA 5 is palustrine wetlands, which is lower than the statewide percentage of 20%. The two most prevalent classes or types of wetlands in SA 8E include emergent wetlands (148,127 acres; 58% of the wetlands in SA 8E) and forested wetlands (78,038 acres; 30% of the wetlands in SA 8E). Shrub-scrub wetlands account for about 6% of the wetlands in SA 8E (16,141 acres) and unconsolidated bottom, unconsolidated aquatic, and aquatic bed wetlands account for about 5% (13,842 acres). On the watershed level, the Cannon River watershed has the greatest total area of wetlands with 71,011 acres. The watersheds with the greatest percentage of wetland area are the Mississippi River – Reno watershed with 11% of the watershed area being composed of wetlands, and the Mississippi River – La Crescent watershed with 10% of the watershed area being composed of wetlands. The dominant wetland type in all watersheds within SA 8E is emergent, except for the Mississippi River – Lake Pepin watershed which is dominated by forested wetlands. Table 3-2 includes the exact numbers and a comparison with the whole SA 8E and statewide numbers.

Table 3-2. Acres of Wetland

Major Watershed	Watershed Acres	Palustrine				Total Wetland Acres	% of Watershed is Wetland
		Emergent	Forested	Scrub-Shrub	AB+UB+US*		
Cannon River	940,544	50,801	11,524	4,621	4,065	71,011	8%
Cedar River	454,031	10,239	3,866	720	720	15,545	3%
Mississippi River - La Crescent	60,544	2,937	2,117	519	339	5,913	10%
Mississippi River - Lake Pepin	382,781	9,960	10,418	2,177	2,239	24,794	6%
Mississippi River - Reno	117,448	6,360	5,064	652	687	12,764	11%
Mississippi River - Winona	419,201	12,725	12,006	1,880	1,440	28,052	7%
Root River	1,061,510	22,488	15,385	2,242	1,550	41,665	4%
Shell Rock River	157,702	10,107	1,133	325	820	12,385	8%
Upper Iowa River	138,757	2,922	689	260	190	4,061	3%
Upper Wapsipinicon River	8,264	18	-	1	2	20	0%
Winnebago River	45,650	1,885	206	37	131	2,258	5%
Zumbro River	909,367	17,685	15,628	2,707	1,661	37,680	4%
SA 8E Total	**4,695,799**	**148,127**	**78,038**	**16,141**	**13,842**	**256,147**	**5%**
Statewide	**55,643,000**	**3,497,216**	**4,017,768**	**3,272,709**	**291,837**	**11,079,099**	**20%**

Data from the Minnesota NWI (2019 update)
*Aquatic Bed, Unconsolidated Bottom, and Unconsolidated Shore

Lakes

According to the MnDNR Hydrography data, SA 8E has approximately 43,000 acres of lakes (Figure B-5). Only about 1% of SA 8E is lakes. The Cannon River has the largest acreage of lakes with 25,602 acres. The second highest acreage of lakes is in the Shell Rock River watershed with 5,204 acres, both of which are located on the western side of SA 8E. The area of lakes in all watersheds can be found in Table 3-3. The five largest lakes in SA

8E include Albert Lea Lake (2,669 acres), Lake Geneva (1,884 acres), Cannon Lake (1,593 acres), Lake Byllesby (1,368 acres), and Tetonka Lake (1,358 acres). Albert Lea Lake is located in the Shell Rock River watershed and Lake Geneva is located within the Cedar River watershed. Cannon Lake, Lake Byllesby, and Tetonka Lake are all located in the Cannon River watershed.

Table 3-3. Summary of Lake Area (Acres) for SA 8E

Major Watershed	Watershed Acres	Lake Acres[1]	Lake Area %
Cannon River	940,544	25,602	3%
Cedar River	454,031	2,424	1%
Mississippi River - La Crescent	60,544	139	<1%
Mississippi River - Lake Pepin	382,781	2,324	1%
Mississippi River - Reno	117,448	249	<1%
Mississippi River - Winona	419,201	1,390	<1%
Root River	1,061,510	1,629	<1%
Shell Rock River	157,702	5,204	3%
Upper Iowa River	138,757	132	<1%
Upper Wapsipinicon River	8,264	1	<1%
Winnebago River	45,650	1,446	3%
Zumbro River	909,367	2,604	<1%
SA 8E Total	**4,695,799**	**43,142**	**1%**

[1]Data from MnDNR Hydrography- Lakes and Open Water

Watercourses

The MnDNR Rivers and Streams dataset was used to conduct an inventory of all watercourses within each major watershed. This dataset is part of the National Hydrography Dataset (NHD) provided by the United States Geological Survey (USGS). The length of mapped watercourses, categorized by channel type (ditched or natural) and flow regime (unknown, intermittent or perennial), is provided in Table 3-4. A measure of watercourse density (watercourse length in miles divided by area of watershed in square miles) for each major watershed was calculated to assess variability of the tributary network throughout SA 8E. The majority of watercourses within SA 8E are characterized as natural-intermittent with an average watercourse density of 1.8 miles of watercourse per square mile of watershed (Figure B-6). The Root River watershed has the highest number of watercourse miles (3,666), with the majority in the natural–intermittent category The Cannon River and Cedar River watersheds have the most miles of drainage ditches, at 337 miles and 342 miles, respectively. The Upper Iowa River watershed has the highest watercourse density at 2.5.

Table 3-4. Summary of Watercourses (Miles) for SA 8E						
Major Watershed	**Drainage Ditch**	**Natural-Unknown Flow Regime**	**Natural-Intermittent**	**Natural-Perennial**	**Total**	***Watercourse Density**
Cannon River	337	145	1,277	335	2,095	1.4
Cedar River	342	26	425	199	991	1.4
Mississippi River - La Crescent	2	3	122	67	193	2.0
Mississippi River - Lake Pepin	4	64	706	156	931	1.6
Mississippi River - Reno	0	11	327	59	398	2.2
Mississippi River - Winona	2	41	1,063	283	1,389	2.1
Root River	79	203	2,571	813	3,666	2.2
Shell Rock River	134	18	57	20	229	0.9
Upper Iowa River	34	9	426	67	536	2.5
Upper Wapsipinicon River	10	-	10	3	23	1.8
Winnebago River	70	<1	7	1	79	1.1
Zumbro River	92	102	2,273	553	3,020	2.1
SA 8E Total	**1,106**	**622**	**9,266**	**2,556**	**13,550**	**1.8**
*Watercourse Density is the number of stream miles per square mile of watershed						

Altered Watercourses

An inventory of altered watercourses statewide was completed via a joint project with MPCA and the Minnesota Geospatial Information Office (MnGEO). The inventory analyzed historic aerial photos as well as LiDAR and up to date aerial photography to determine watercourses that have been altered. Watercourses were sectioned into four categories: altered, impounded, natural, and no definable channel. An altered watercourse is a naturally occurring stream or river or an artificially constructed canal or ditch whose habitat has been compromised through hydrologic alteration. Streams whose flow has been dammed are categorized as impounded. Natural watercourses are those that have little to no human influence. The no definable channel category includes flowlines from the NHD that no longer appear on the aerial imagery or LiDAR hillshade (MnGEO, 2013). SA wide, most of the watercourses are categorized as natural, which means they have not been altered (Figure B-7). Of the impounded watercourses, the Mississippi River- Lake Pepin watershed has the most with 46 miles. The Zumbro watershed has the highest amount of altered watercourses with 991 miles. The Cannon River and Cedar River watersheds also have a high number of altered streams due to agriculture and ditching. Exact length of altered watercourses for each watershed can be found in Table 3-5.

Table 3-5. Summary of Altered Watercourses (Miles) in SA 8E				
Major Watershed	**Altered**	**Impounded**	**Natural**	**No Definable Channel**
Cannon River	914	5	877	299
Cedar River	610	4	215	163
Mississippi River - La Crescent	33	4	142	14
Mississippi River - Lake Pepin	257	46	335	293
Mississippi River - Reno	96	14	274	14
Mississippi River - Winona	277	6	975	128
Root River	385	4	2,275	999
Shell Rock River	180	3	27	19
Upper Iowa River	350	2	100	84
Upper Wapsipinicon River	20	-	<1	2
Winnebago River	77	<1	-	2
Zumbro River	991	15	1,300	714
SA 8E Total	**4,191**	**103**	**6,520**	**2,731**
Data from the MPCA Altered Watercourses Project updated in 2019				

Water Quality

Water quality in SA 8E was assessed using the MPCA's 303(d) impaired waters list. Data for lakes, streams, and wetlands were updated in 2022. Not all the impairments are pertinent to wetland restoration and protection, therefore a subset of the impairments were chosen. The impairments included in this report are dissolved oxygen (DO), fishes bioassessments, aquatic macroinvertebrate bioassessments, nitrate, nutrients and eutrophication biological indicators, turbidity, and total suspended solids (TSS). Lakes and streams that were assessed and located partially or wholly within tribal lands are included in this analysis. Across SA 8E, 120 lakes were assessed, and 54 lakes were found to be impaired (Figure B-8). Of the impaired lakes, none were located partially or wholly on tribal land. In the Cannon River watershed where over 20,000 lake acres were assessed for water quality, 64% were impaired. In the nearby Mississippi River – Lake Pepin watershed where over 30,000 lake acres were assessed for water quality, only 17% were impaired. No lakes were sampled for water quality in some watersheds including the Mississippi River – La Crescent watershed, the Mississippi River – Reno watershed, and the Upper Wapsipinicon River watershed. Of the assessed watersheds, the Mississippi River – Winona and Winnebago watersheds have the highest percentage of lakes impaired; both watersheds had only two lakes assessed, with both impaired. The Mississippi River – Lake Pepin watershed had the highest amount of lake acres impaired (25,714 acres) which is largely due to Lake Pepin being impaired(25,478 acres). The Upper Iowa River and Root River watershed had no impaired lakes, however, both watersheds only contained 1 assessed lake. Table 3-6 includes assessed and impaired lake area and percentage for each watershed.

In addition to evaluating the number of impaired waterbodies, lakes and streams that are nearly impaired or barely impaired (nearly/barely) for one or more impairments were also evaluated. The MPCA identifies nearly/barely waterbodies by analyzing water quality data to determine what waterbodies are close to the impairment thresholds. This information is helpful to establish more context for impaired waterbodies as well as identify waterbodies that aren't included in the impairment analysis but are nearing impairment thresholds. An important consideration when evaluating nearly/barely waterbodies is that these categorizations are based on the waterbody's designated use classification (i.e. aquatic life and aquatic recreation), not specific parameters, so it is possible for a stream to be impaired for one aquatic life parameter (i.e. dissolved oxygen) but also be listed as nearly impaired for aquatic life due to another parameter (TSS, nutrients and eutrophication biological indicators, etc.) nearing the threshold. There are four lakes in SA 8E that are nearly/barely impaired. Two lakes (one nearly and one barely) within the Mississippi River – Lake Pepin watershed, one nearly lake in the Cannon River watershed, and one barely lake in the Mississippi River – Winona watershed. Table 3-7 presented the nearly/barely impaired lakes for SA 8E.

Table 3-6. Assessed and Impaired Lakes

Major Watershed	Assessed		Impaired		% Impaired Based on Lake Count
	Acres	Count	Acres	Count	
Cannon River	21,412	56	19,441	36	64%
Cedar River	1,726	4	1,600	1	25%
Mississippi River - La Crescent	-	-	-	-	-
Mississippi River - Lake Pepin	30,073	30	25,714	5	17%
Mississippi River - Reno	-	-	-	-	-
Mississippi River - Winona	302	2	302	2	100%
Root River	79	1	-	-	0%
Shell Rock River	5,065	14	4,009	6	43%
Upper Iowa River	36	1	-	-	0%
Upper Wapsipinicon River	-	-	-	-	-
Winnebago River	1,973	2	1,973	2	100%
Zumbro River	1,782	10	1,308	2	20%
SA 8E Total	62,448	120	54,347	54	45%
Data includes lakes wholly and partially on tribal lands					

Table 3-7. Nearly/Barely Waterbodies

Major Watershed	Lake ID	Lake Name	Lake Area (acres)	Nearly/Barely
Mississippi River - Lake Pepin	19-0348-00	Winona	7.31	Barely
	19-0349-00	Unnamed (Valley)	35.08	Nearly
Cannon River	66-0045-00	Unnamed (East Lake)	145.96	Barely
Mississippi River - Winona	85-0011-01	Sprague	219.04	Barely

Regarding streams, there were 687 individual stream reaches assessed across SA 8E and 260 of those reaches were found to be impaired (38% impaired; Figure B-9). Two (2) of the impaired stream reaches were partially or wholly on tribal land. The Cannon River and Cedar River watersheds had the highest percentages of stream reaches impaired at 51% and 50%, respectively. The Mississippi River- La Crescent watershed had nine streams assessed and none were impaired (0%).

Nearly/Barely data for streams was also analyzed. There were eight stream reaches throughout SA 8E identified as nearly or barely impaired for one or more of the selected impairments. The Cedar River watershed contains three of those stream reaches. A 14.3-mile reach of Otter Creek is currently impaired for macroinvertebrate bioassessment and barely impaired for one of more additional Aquatic Life parameters (DO, TSS, nutrients, fish bioassessment). A 15-mile reach of the Little Cedar River and a 5.9-mile reach of Woodbury Creek are nearly impaired for one or more Aquatic Life parameters. Within the Root River Watershed, a 13.5-mile reach of Riceford Creek is impaired for macroinvertebrate bioassessment and nearly impaired for one or more additional Aquatic Life parameters. A 5.2-mile reach of Thompson Creek and a 5.5-mile reach of Rush Creek are nearly impaired for one or more Aquatic Life parameters. A 4.4-mile reach of Lime Creek in the Winnebago River watershed is barely impaired for TSS in addition to being impaired for all other Aquatic Life impairments. Finally, a 6.6-mile reach of Crane Creek within the Cannon River watershed is nearly impaired for one or more Aquatic Life parameters. See Table 3-88 for assessed and impaired stream miles and percentages in each watershed.

Table 3-8. Assessed and Impaired Streams

Major Watershed	Assessed		Impaired		% Impaired Based on Stream Count
	Miles	Count*	Miles	Count*	
Cannon River	627	113	396	58	51%
Cedar River	340	80	202	40	50%
Mississippi River - La Crescent	133	9	-	-	0%
Mississippi River - Lake Pepin	347	55	125	16	29%
Mississippi River - Reno	104	15	6	5	33%
Mississippi River - Winona	428	62	168	25	40%
Root River	869	173	433	59	34%
Shell Rock River	203	32	29	9	28%
Upper Iowa River	86	25	30	6	24%
Upper Wapsipinicon River	5	3	1	1	33%
Winnebago River	37	13	18	5	38%
Zumbro River	613	107	300	36	34%
SA 8E Total	**3,791**	**687**	**1,708**	**260**	**38%**

*Count is the number of stream reaches not individual streams
Data includes streams wholly and partially on tribal lands

Land Cover

The 2019 National Land Cover Dataset (NLCD) was used to analyze the current land cover across SA 8E. There are 20 land cover classifications in the NLCD but a simplified list of classes was used for this study. The simplified classifications include *Agriculture, Barren, Developed, Forest, Grassland, Water*, and *Wetlands*. Table 3-99 includes the landcover classification breakdown within each individual watershed.

The majority of land cover in SA 8E is classified as *Agriculture* (69%) with the second highest category being *Forest* at 15% (Figure B-10). Although the wetland area as mapped in the NWI and the NLCD are similar (5% and 3% of SA 8E respectively), the difference is a result of different mapping methods, scales, and accuracy. On the watershed level, *Agriculture* is the highest land cover in every watershed except the Mississippi River – La Crescent watershed where *Forest* is the dominant land cover. Despite 73% of SA 8E historically vegetated in grassland, only 3% of SA 8E remains as grassland due to the conversion of prairies and savannas to cultivated cropland. In contrast, only 3% of forested areas have been lost to land use changes, from 18% historic forest vegetation to the current 15%.

Table 3-9. Land Cover Percentage of Each Watershed in 2019

Major Watershed	Agriculture	Barren	Developed	Forest	Prairie	Water	Wetlands
Cannon River	72%	<1%	8%	10%	2%	3%	5%
Cedar River	87%	<1%	7%	2%	1%	1%	2%
Mississippi River - La Crescent	28%	<1%	8%	48%	1%	6%	9%
Mississippi River - Lake Pepin	54%	<1%	16%	16%	3%	6%	5%
Mississippi River - Reno	43%	<1%	5%	39%	1%	4%	9%
Mississippi River - Winona	51%	<1%	7%	30%	3%	4%	5%
Root River	68%	<1%	5%	23%	3%	<1%	1%
Shell Rock River	75%	<1%	10%	2%	3%	3%	6%
Upper Iowa River	85%	<1%	5%	6%	3%	<1%	1%
Upper Wapsipinicon River	95%	<1%	4%	<1%	<1%	-	<1%
Winnebago River	86%	<1%	5%	1%	1%	3%	4%
Zumbro River	74%	<1%	9%	11%	3%	<1%	2%
SA 8E Total	**69%**	**<1%**	**8%**	**15%**	**3%**	**2%**	**3%**

Data from the National Land Cover Database. Categories simplified based on 2019 NLCD categories

Perennial Cover

In addition to analyzing land cover, perennial cover was evaluated using the 2019 NLCD. Of the seven classes, *Forest*, *Grassland*, and *Wetlands* were categorized as *Perennial*. *Agriculture*, *Barren*, and *Developed* were classified as *Non-Perennial*. *Water* and any uncategorized data were omitted from the analysis. As can be seen in Figure B-11 and **Error! Reference source not found.**10, most of the land cover in SA 8E is *non-perennial* cover (67%). At the watershed scale, the largest acreage of non-*perennial* cover occurs in in the Cannon River (666,706 acres) and Zumbro River (660,867 acres) watersheds. The Upper Wapsipinicon River watershed has the largest percentage of *non-perennial* land cover (99%). Three (3) watersheds have over half of their respective total watershed acres in *perennial* land cover, including Mississippi River – Winona (54%), Mississippi River – Reno (76%), and Mississippi River – La Crescent (84%).

Table 3-10. Acres of Perennial and Non-Perennial Cover in 2019			
Major Watershed	**Non-Perennial**	**Perennial**	**Total**
Cannon River	666,706	247,220	913,926
Cedar River	417,485	34,011	451,496
Mississippi River - La Crescent	9,338	47,743	57,081
Mississippi River - Lake Pepin	229,179	132,168	361,347
Mississippi River - Reno	26,795	85,947	112,742
Mississippi River - Winona	185,816	217,181	402,997
Root River	606,910	452,361	1,059,272
Shell Rock River	128,037	24,156	152,193
Upper Iowa River	111,492	27,113	138,605
Upper Wapsipinicon River	8,194	70	8,264
Winnebago River	40,713	3,452	44,166
Zumbro River	660,867	244,299	905,166
SA 8E Total	**3,091,533**	**1,515,723**	**4,607,256**
Based on the 2019 NLCD.			

Areas of Biodiversity Significance

To assess sensitive plant communities and rare species, the Biodiversity Significance Rank provided by the Minnesota Biological Survey was used. This dataset was developed over 30 years. Initial surveys were conducted starting in the 1990's to inventory and map Minnesota's native plant communities. Sites were selected on a county basis using aerial photos to identify locations where native plant communities would be present. As a result, not all potential areas of biodiversity significance were chosen, and it is likely some boundaries within mapped areas have shifted over time.

Within the survey, ranks were given to each site based on the presence of rare species populations, the size and condition of native plant communities, and the proximity of the site to different land uses (MnDNR, 2022). One of four ranks was assigned to each site: *Outstanding*, *High*, *Moderate*, and *Below*. Sites ranked as *Outstanding* typically have the most numerous occurrences and best examples of the rarest species and contain the most intact rare native plant communities. Sites ranked as *High* have medium occurrences of rare species and are good examples of high quality rare native plant communities. Sites ranked as *Moderate* contain some rare species and have moderately disturbed native plant communities. These sites have very good potential for recovery of native plant communities. Sites ranked as *Below* lack rare species and native plant communities. However, these sites may still be important for local conservation efforts and may benefit native plants and animals. They have high potential for restoration of native habitat (MnDNR, 2022).

Within SA 8E, approximately 485,000 acres (10% of the total area of SA 8E) was surveyed for biodiversity significance (Figure B-12). The Mississippi River – La Crescent watershed has had 42% of the total watershed area ranked for biodiversity, while the Upper Wapsipinicon River watershed has <1% of the total watershed area ranked. The majority of sites SA wide (5%) were ranked as *Moderate*. Within each watershed, the majority of the sites were also ranked as *Moderate*. The watershed with the most acres ranked as *Outstanding* was the Root

River watershed, with 24,359 acres (2% of the watershed area). Shell Rock River and Upper Wapsipinicon River watersheds had no sites ranked as *Outstanding*. Acres and percentages for each watershed and SA wide can be found in Table 3-111.

Table 3-11. Acres of Areas of Biodiversity Significance and Rank

Major Watershed	Below		Moderate		High		Outstanding		Grand Total	
Cannon River	14,123	2%	13,426	1%	16,532	2%	13,911	1%	57,991	6%
Cedar River	2,926	1%	3,030	1%	3,378	1%	269	<1%	9,602	2%
Mississippi River - La Crescent	6,610	11%	10,031	17%	6,564	11%	2,253	4%	25,457	42%
Mississippi River - Lake Pepin	10,368	3%	12,987	3%	11,165	3%	12,198	3%	46,718	12%
Mississippi River - Reno	4,555	4%	27,066	23%	5,235	4%	21	<1%	36,877	31%
Mississippi River - Winona	19,377	5%	37,442	9%	20,258	5%	12,653	3%	89,731	21%
Root River	24,504	2%	89,083	8%	19,525	2%	24,359	2%	157,472	15%
Shell Rock River	2,207	1%	2,587	2%	247	<1%	-	-	5,041	3%
Upper Iowa River	1,538	1%	164	<1%	1,410	1%	1,521	1%	4,633	3%
Upper Wapsipinicon River	14	<1%	-	-	-	-	-	-	14	<1%
Winnebago River	172	<1%	1,800	4%	30	<1%	2	<1%	2,003	4%
Zumbro River	12,393	1%	23,159	3%	9,463	1%	4,806	1%	49,821	5%
SA 8E Total	**98,786**	**2%**	**220,775**	**5%**	**93,806**	**2%**	**71,993**	**2%**	**485,361**	**10%**
Data updated 2021										

Sensitive Groundwater Areas and Groundwater-Surface Water Connections

Stakeholders requested that the baseline conditions include pollution sensitivity of groundwater and groundwater-surface water interactions within SA 8E. As stated before, this SA has unique glacial history and karst geology which impacts wetlands and wetland development. It also impacts groundwater and surface water quality. To sufficiently analyze these, the 2019 Pollution Sensitivity of Near-Surface Materials from the Minnesota Geologic Atlas was used, in addition to spring locations from the MnDNR Minnesota Springs Inventory updated in 2023, and karst features from the MnDNR Karst Features Inventory updated in 2023. The springs and karst data sets, in particular, lend a good understanding of groundwater-surface water interaction because of their nature. These data sets were reviewed to identify sensitive groundwater areas within each watershed to evaluate different levels of sensitivity across the SA.

Pollution Sensitivity of Near-Surface Materials dataset, provided by the MnDNR, is a subset of the County Geologic Atlas, specifically Part B – Groundwater/Hydrogeology. Water chemistry provides information about water movement, infiltration rates, and the relative age of groundwater. Using chemicals like tritium, Carbon-14, Chloride, and Nitrate, among others, researchers can calculate the transmission time (MnDNR, 2021). This dataset estimates that transmission time of water through the top 10-feet from the land surface (three feet of soil and seven feet of surficial geology). Areas of *High* sensitivity can reach this distance in a matter of hours to a week, with *Ultra Low* areas can take more than a year. Additionally, this model maps special conditions such karst topography, which can have very rapid exchange between surface and groundwater, especially in areas with sinkholes and fractured bedrock (Adams, 2016). About 55% of SA 8E is categorized as highly sensitive to groundwater contamination (karst and high) categories. These highly sensitive areas (vulnerable to contamination within less than a week) are generally located in the east-half of the SA, within Root River, Zumbro River, and Mississippi River – Winona, Mississippi River – Lake Pepin, and Cannon River major watersheds (Table 3-12 and Figure B-13).

Surface water and groundwater interactions in this area were analyzed using springs and karst datasets provided by the MnDNR. According to the Minnesota Spring Inventory, a spring is a "focused natural discharge of flowing groundwater." Springs are important because they represent areas where groundwater becomes surface water and are indicators of groundwater quality, pollution, and flow direction. SA 8E contains nearly 2,600 springs that have been recorded by the MnDNR (Table 3-13 and Figure B-14). This represents nearly half of all springs that have been mapped in Minnesota. These springs most frequently occur near ravines and drainageways within the Root River major watershed (MnGEO, n.d.).

Karst features are distinctive landforms and hydrology created from the dissolution of soluble rocks. On the land-surface, karst is most represented by sinkholes and springs. Beneath the ground, karst features can include cave and large bedrock fractures that act as rapid conduit flow. SA 8E contains most of the karst features within Minnesota. The Root River major watershed has by far the greatest number of features within the SA (12,340 features), with the Zumbro and Upper Iowa River watersheds having more than 900 features. There are no karst features mapped within the Shell Rock River, Upper Wapsipinicon River, and Winnebago River major watersheds (Table 3-13 and Figure B-14).

Table 3-12. Summary of Sensitive Groundwater Areas (acres)

Major Watershed	Bedrock at or near surface	Karst	High	Moderate	Low	Very low	Water
Cannon River	1,057	256,250	43,357	24,702	475,722	90,022	49,430
Cedar River	-	75,968	31,619	10,567	318,013	14,031	3,774
Mississippi River - La Crescent	-	27,905	6,523	7,406	17,532	216	934
Mississippi River - Lake Pepin	665	152,938	103,900	34,388	60,098	283	30,440
Mississippi River - Reno	-	78,645	8,324	14,902	14,504	462	571
Mississippi River - Winona	807	285,509	31,332	39,772	50,096	1,318	10,295
Root River	919	804,184	21,429	48,889	172,510	12,775	793
Shell Rock River	-	398	13,078	-	137,669	-	6,536
Upper Iowa River	69	92,407	2,587	100	42,923	528	57
Upper Wapsipinicon River	-	11	127	8	7,909	197	-
Winnebago River	-	-	8,785	-	33,744	-	3,107
Zumbro River	3,706	460,535	53,969	7,336	355,464	24,616	3,737
SA 8E Total	**7,223**	**2,234,750**	**325,030**	**188,069**	**1,686,183**	**144,449**	**109,673**

Data from the MnDNR Minnesota Hydrogeologic Atlas, updated in 2018.

Table 3-13. Summary of GW/SW connections		
Major Watershed	**Number of Springs**	**Number of Karst Features**
Cannon River	297	413
Cedar River	48	52
Mississippi River - La Crescent	71	187
Mississippi River - Lake Pepin	107	144
Mississippi River - Reno	47	100
Mississippi River - Winona	402	895
Root River	1417	12340
Shell Rock River	1	-
Upper Iowa River	88	965
Upper Wapsipinicon River	-	-
Winnebago River	-	-
Zumbro River	406	998
SA 8E Total	**2,587**	**16,094**
Springs data from the MnDNR Springs Inventory updated 2023. Karst feature data from the MnDNR, updated 2023.		

High Quality Habitats

In addition to groundwater and surface water status and interactions, stakeholder also requested that high quality habitats be analyzed as a baseline condition. This further rounds out the baseline conditions by focusing on specific habitats, plans, and species that are unique and important to SA 8E as a whole. The specific data used was the Wildlife Action Network, Trout Streams, and Wildlife Management Areas (Figure B-15).

WILDLIFE ACTION NETWORK

Minnesota's State Wildlife Action Plan – 2015 to 2025 focuses on the long-term health and viability of Minnesota's wildlife, with an emphasis on Species of Greatest Conservation Need (SGCN) and their habitats. About 16% of Minnesota's native species (including both aquatic and terrestrial species) are categorized as SGCN due to significant risks to their long-term health and viability. Data on SGCNs and their habitats was used to map a Wildlife Action Network and area within this network have been ranked from *low* to *high* based on data such as population viability, species richness and areas of biological significance (MnDNR, 2016).

About 17% of SA 8E is mapped as part of the Wildlife Action Network, and much of the network is concentrated along major river systems (including the Mississippi River, Root River, Whitewater River, and Zumbro River). About 6% of SA 8E is in the *Medium-High* to *High* categories, which tend to be associated with public lands along the Mississippi River, Root River, and Whitewater Rivers (Table 3-14).

Table 3-14. Summary of the Wildlife Action Network (acres)					
Major Watershed	**Low**	**Low-Medium**	**Medium**	**Medium-High**	**High**
Cannon River	5,122	69,904	41,542	23,480	5,113
Cedar River	144	1,431	1,385	3,388	3
Mississippi River - La Crescent	1,059	6,203	6,370	8,830	4,948
Mississippi River - Lake Pepin	2,569	20,040	18,820	28,721	21,634
Mississippi River - Reno	547	4,761	5,352	18,207	8,300
Mississippi River - Winona	4,925	32,280	23,555	49,208	26,629
Root River	25,490	103,856	47,659	66,343	15,311
Shell Rock River	553	820	482	9	-
Upper Iowa River	6	20,529	5,646	3,207	1,338
Upper Wapsipinicon River	-	-	-	-	-
Winnebago River	-	1,314	146	887	-
Zumbro River	9,373	35,422	16,615	16,558	3,281
SA 8E Total	**49,787**	**296,561**	**167,571**	**218,837**	**86,558**
Data from the Minnesota State Wildlife Action Plan (2015-2025), updated in 2018.					

TROUT STREAMS

The MnDNR identifies streams and lakes within Minnesota that are important to trout survival and propagation. The designation is legally defined in Minnesota Rules Chapter 6264 (6264.0050 Restrications on Designated Trout Lakes and Streams, n.d.). A trout stream with a legal designation through the state indicates the stream as a trout fishery and allows for regulation of trout fishing seasons and methods. All designations must have a buffer of perennial vegetation or approved alternate practices that protect water quality leading to restoration and improved angler access and fish habitat. SA 8E has some of the best trout fishing in the state because of the cool water, stable flows, and abundant food sources.

In SA 8E, there are approximately 1,966 miles of designated trout streams. Major watersheds with the greatest number of miles of designated trout streams in SA 8E include the Root River watershed (891 miles) and the Mississippi River – Winona (523 miles). The Shell Rock River watershed, Upper Wapsipinicon River, and Winnebago River watershed have no trout stream miles (Table 3-15 and Figure B-15).

Table 3-15. Miles of Trout Streams	
Major Watershed	**Trout Streams (Miles)**
Cannon River	85
Cedar River	2
Mississippi River - La Crescent	56
Mississippi River - Lake Pepin	155
Mississippi River - Reno	118
Mississippi River - Winona	523
Root River	891
Shell Rock River	-
Upper Iowa River	8
Upper Wapsipinicon River	-
Winnebago River	-
Zumbro River	128
SA 8E Total	**1966**
Data from State Designated Trout Streams; updated in 2020.	

WILDLIFE MANAGEMENT AREAS

In addition to trout streams and the wildlife action network, Wildlife Management Area were also analyzed to locate high quality habitats within SA 8E. Wildlife Management Areas (WMAs) are public lands set aside to conserve and manage wildlife habitats, support biodiversity, and provide recreational opportunities. WMAs are managed by the MnDNR and were established under legal framework that addresses conservation and public land use. The distribution across the state encompasses a variety of ecosystems including prairies, wetlands, forests, and river systems.

The landscape of SA 8E has less wetlands due to the landscape geomorphology, and extent of agricultural land use. The targeted ecosystems in SA 8E have approximately 70,446 acres of WMAs which are predominately remnant prairies and wetlands. Major watersheds with the highest percentage of WMA acres in SA 8E include Mississippi River – Winona watershed at 43.8%, Mississippi River – Lake Pepin at 17.1%, and Cannon River watershed at 15.6%. The remaining watersheds in SA 8E have less than 23.5% combined (Table 3-16, and Figure B-15).

Table 3-16. Summary of WMA areas (Acres)	
Major Watershed	**WMA (Acres)**
Cannon River	10,978
Cedar River	2,054
Mississippi River - La Crescent	-
Mississippi River - Lake Pepin	12,036
Mississippi River - Reno	175
Mississippi River - Winona	30,866
Root River	7,697
Shell Rock River	1,544
Upper Iowa River	1,482
Upper Wapsipinicon River	-
Winnebago River	111
Zumbro River	3,503
SA 8E Total	**70,446**
Data from MnDNR Wildlife Management Area Land Cover – Publicly Accessible; updated in 2023.	

Permitting Analysis

Permits issued under the U.S. Army Corps of Engineers (USACE) Regulatory Program were reviewed for the five-year period between January 2017 and December 2021. This review focused on authorized impacts to wetlands (e.g., filling or draining) that resulted in a permanent loss of the resource.

Table 3-177 provides a summary of authorized wetland impacts between 2017 and 2021. It is important to note that this information provides only a subset of wetland impacts over this period. For example, the placement of fill material into a wetland for residential development would be included in this summary. However, the placement of fill material into a wetland for a temporary road, which would be restored to its preexisting condition at a later time, would not be included in this summary. Lastly, the USACE does not regulate impacts to all wetlands. Certain wetlands that are considered isolated are not regulated by the USACE and would not be included in this summary.

Considering these caveats, the Cannon River watershed experienced the greatest amount of wetland impacts over this period. The remaining watersheds have significantly less impacts as impacts are generally correlated with the level of development.

Table 3-17. Acres of Permitted Wetland Impact	
Major Watershed	**Acres of Impact**
Cannon River	29.7
Cedar River	-
Mississippi River – La Crescent	3.3
Mississippi River – Lake Pepin	14.0
Mississippi River – Reno	-
Mississippi River – Winona	1.7
Root River	0.6
Shell Rock River	-
Upper Iowa River	-
Upper Wapsipinicon River	-
Winnebago River	-
Zumbro River	16.7
SA 8E Total	**66.0**
Data from 2017 to 2021 provided by the U.S. Army Corps of Engineers	

4. CUMULATIVE IMPACT ANALYSIS

Wetland Loss

Wetland loss was analyzed for the entire SA 8E. To quantify wetland loss, the historic extent of wetlands was compared to the current extent. The historic extent of wetlands are wetlands that existed prior to European Settlement (from here on referred to as pre-settlement wetlands). To estimate pre-settlement wetlands, a combination of hydric soil data map unit (DMU) ratings and current wetlands extent was used. Hydric soils, as defined by the United States Department of Agriculture (USDA), are soils that have been formed under conditions of saturation, flooding, and ponding, long enough during the growing season to develop anaerobic conditions in the upper part. Soil DMUs mapped with a hydric rating of 66% and above were used in combination with Palustrine class wetlands from the NWI to estimate the areal coverage of pre-settlement wetlands. Soil mapping processes for hydric soils underestimates the actual extent of wetlands, therefore the assumption was made that wetlands that exist today outside the mapped hydric soils also existed pre-settlement. Using this method, there were approximately 1 million acres of wetland in SA 8E prior to European settlement. Compared to the current extent of wetlands (258,000 acres), there has been a 76% loss. The greatest loss has occurred in the Upper Wapsipinicon River watershed with 99% of the wetlands lost. The Mississippi River – Reno watershed has experienced the least amount of wetland loss with only 13%. Table 4-1 summarizes the total wetland loss for SA 8E by watershed and the entire area.

Another approach to quantify the area of pre-settlement wetlands was conducted by Anderson & Craig (1984) by analyzing soil maps provided by the Minnesota Soil Atlas for the entire state. They selected soils that were either peat or wet mineral soils and assumed that these represent areas where pre-settlement wetlands once existed. Wet mineral soils are soils mapped as poorly drained mineral soils. They found that there were 18.4 million acres of pre-settlement wetlands across the state. Within SA 8E they found approximately 680,000 acres of pre-settlement wetlands. Compared to the extent of wetlands at the time of publishing in 1984 (18,000 acres), there was a 97% loss in wetland acreage. See Table 4-2 for detailed numbers for each watershed.

Tables 4-1 and 4-2 show the percent lost in SA 8E from Anderson & Craig (1984) is 97% and the percent lost based on hydric soils and the current NWI is 76%. The most likely reasons for this major difference are mapping methodologies and the level of accuracy of each method.

Table 4-1. Wetland Loss Based on Hydric Soils and NWI				
Major Watershed	**Pre-settlement Acres**	**Current Acres***	**Wetland Loss (acres)**	**Percent Lost**
Cannon River	307,837	71,073	236,764	77%
Cedar River	229,972	15,737	214,235	93%
Mississippi River – La Crescent	7,411	5,959	1,453	20%
Mississippi River – Lake Pepin	41,142	24,818	16,324	40%
Mississippi River – Reno	14,838	12,852	1,986	13%
Mississippi River – Winona	39,586	28,386	11,200	28%
Root River	134,303	42,762	91,541	68%
Shell Rock River	78,485	12,398	66,087	84%
Upper Iowa River	31,684	4,105	27,579	87%
Upper Wapsipinicon River	3,636	20	3,617	99%
Winnebago River	25,543	2,263	23,279	91%
Zumbro River	150,714	38,068	112,646	75%
SA 8E Total	**1,065,151**	**258,440**	**806,711**	**76%**
*Based on the NWI, includes only Palustrine class wetlands				

Table 4-2. Wetland Loss Based on Anderson & Craig (1984)			
Major Watershed	**Pre-settlement Acres**	**Acres as of 1984**	**Percent Lost**
Cannon River	156,210	10,089	94%
Cedar River	198,704	1,723	99%
Mississippi River – La Crescent	-	-	-
Mississippi River – Lake Pepin	20,137	2,345	88%
Mississippi River – Reno	-	-	-
Mississippi River – Winona	1,781	99	94%
Root River	71,275	440	99%
Shell Rock River	69,299	1,024	99%
Upper Iowa River	23,183	112	100%
Upper Wapsipinicon River	3,668	18	100%
Winnebago River	20,122	296	99%
Zumbro River	115,453	1,865	98%
SA 8E Total	**679,833**	**18,010**	**97%**
The county data presented in Anderson & Craig (1984) was processed so that numbers could be summarized by watershed. It was assumed that wetland coverage was equal across the county.			

Banking Analysis

Since passage of the Clean Water Act in 1972 and WCA in 1991, most wetland impacts are regulated by one or both programs and may require mitigation to offset the functions lost as a result of the authorized impacts. Today, credits obtained from wetland mitigation banks are the primary source of mitigation for these impacts.

Project-specific mitigation is also an agency accepted option, provided the site meets regulatory and technical eligibility requirements. To assess how wetland banking credits are being used to offset wetland impacts in SA 8E, an analysis of wetland banking activity and the current credit inventory in the private market and LGRWRP accounts was completed. Banking activity was evaluated by compiling annual credit withdrawals for wetland banks located in SA 8E. The analysis utilized annual reports obtained from the State of Minnesota wetland banking database from 2018 through 2022. Credit inventory in the private market in SA 8E was assessed using information from the BWSR Available Wetland Credit listing which displays credits available for purchase based on feedback from the account holders.

Table 4-3 provides a summary of wetland credits withdrawn in each BSA and SA in Minnesota for the period of 2018 through 2022. The withdrawal numbers include transactions for MnDOT, LGRWRP, and standard accounts. Transactions associated with the agricultural wetland bank are not included in the table. As shown, SA 8E is the seventh most active BSA/SA in Minnesota generating an average annual credit demand of 36 credits during the period of analysis. SA 8E accounts for approximately 6% of the credits withdrawn statewide each year.

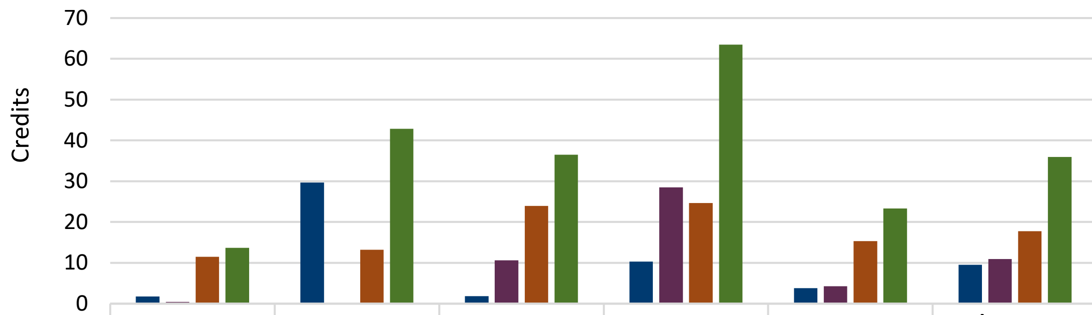
Withdrawal data for SA 8E was further analyzed to determine the individual type contributions (MnDOT, LGRWRP, and standard) for each year. The results of this analysis are summarized in Figure 4-1. Not surprisingly, transactions from standard bank accounts represent most of the credit withdrawal activity in this SA followed by the LGRWRP and then MnDOT. On an average annual basis, they represent 49%, 30%, and 26% respectively of the total number of credits withdrawn during the past five years. There was a jump in credit withdrawals in 2021 due to two larger withdrawals from MnDOT.

Table 4-3. Wetland Credits Withdrawn by BSA/SA 2018-2022[1]

BSA/SA		2018	2019	2020	2021	2022	Total	Average
1		30	15	141	340	119	**645**	129
2		8	18	31	25	10	**91**	18
3		18	38	81	94	88	**319**	64
4		10	24	53	106	17	**210**	42
5		22	52	199	136	127	**536**	107
6		24	38	23	26	4	**115**	23
7		120	121	122	155	142	**660**	132
SA 8E		14	43	37	63	23	**180**	36
LMMM SA	*8W*	*12*	*9*	*8*	*19*	*4*	***52***	*10*
	9	*66*	*57*	*66*	*135*	*88*	***411***	*82*
	10	*0.5*	*7*	*5*	*0.2*	*23*	***36***	*7*
	Total	78.5	73	79	154.2	115	**499**	99
Total		**325**	**421**	**765**	**1099**	**645**	**3255**	**651**

[1] Excludes withdrawals from agricultural wetland bank accounts

Figure 4-1
SA 8E Wetland Credit Withdrawals
by Account Type 2018-2022



	2018	2019	2020	2021	2022	Average Annual
MnDOT	1.7969	29.6967	1.88	10.317	3.78	9.4941
Road Program	0.4006		10.6393	28.4958	4.24	10.9439
Standard	11.4762	13.1876	23.984	24.6853	15.3353	17.7337
Total	13.6737	42.8843	36.5033	63.4981	23.3553	35.9829

CURRENT STATUS

Standard wetland bank ledger information in SA 8E was compiled and reviewed to provide a snapshot of the number of credits currently available. This analysis focused on credits that were deposited into Minnesota wetland banks as of December 2023 and listed for sale on the BWSR Available Wetland Credit listing. This analysis does not include credits from MnDOT or the LGRWRP (the status of credits associated with these state programs is addressed later in this section). The total number of credits listed for public sale in SA 8E is 111.6766 credits spread amongst 16 banks. It is unknown what amount of this credit inventory is under contract and thus not available to future permittees to satisfy mitigation requirements. Regardless, it is reasonable to conclude that SA 8E has a substantial supply of publicly available wetland credits with at least a 6-year supply based on the average annual demand for standard credits calculated in Figure 4-1.

MnDOT and LGRWRP credit balances in this SA are sufficient to meet expected demand for the next 1 to 6 years. MnDOT presently has a balance of 59.2131 credits across four accounts that will meet their program demand for at least the next 6 years based on the five-year annual average calculated for this analysis. The LGRWRP has an approximate one-year supply of credits with a total available balance of 12.7842 credits. The LGRWRP has several active banks that will provide additional credits in the next three to five years, but additional mitigation site development activities are necessary to meet future demand and establish a reserve of wetland credits.

5. WATERSHED TRENDS AND THREATS

Trends in Wetland Quantity and Quality

Minnesota has adopted a policy goal to achieve a no-net-loss in quantity and quality of wetlands across the state. This is achieved through many regulatory and non-regulatory programs, including WCA. Since 2006, the MPCA and MnDNR have completed routine surveys to assess the status and trends in quantity and quality of wetlands across the state of Minnesota.

The MnDNR is responsible for quantifying the status and trends of wetland quantity across Minnesota. Using remote sensing data, three surveys have been completed: a baseline was established in 2006, the first iteration was in 2009, and the second iteration in 2012.

A three-year study was completed from 2006-2008, to establish a baseline in wetland quantity in Minnesota. It was found that there are 10.62 million acres of wetland across the state. The Prairie Parkland Region in southwestern Minnesota and the Paleozoic Plateau in southeastern Minnesota have considerably less wetlands than central and northern portions of the state. Forested wetland was the most widespread type, covering approximately 4.4 million acres. Emergent wetlands were the next most abundant with 3.1 million acres (Kloiber, 2010).

Between the first (2009) and second (2012) iterations there was a net increase of area that changed from upland to wetland. There was some change from wetland to upland which was due to human intervention. A high proportion of the changes in wetland type and area happened on agricultural land (Kloiber & Norris, 2017). It should be noted that the increase in wetland acreage was primarily in unconsolidated bottom type wetlands. It was also found that conversions between wetland types were primarily from emergent wetlands to cultivated or unconsolidated bottom wetlands.

The MPCA is responsible for assessing the status and trends in wetland quality in Minnesota. This is done by completing two surveys, the Depressional Wetland Quality Assessment (DWQA) and the Minnesota Wetland Condition Assessment (MWCA). The DWQA focuses on vegetation, macroinvertebrates, and water quality for depressional wetlands. It has undergone three iterations in 2007, 2012, and 2017. The MWCA, which covers a broader spectrum of wetlands, was first completed in 2011 to determine a baseline for wetland vegetation quality and to begin quantifying potential human impacts associated with degraded conditions (Minnesota Pollution Control Agency, 2015). It was repeated in 2016 to establish trends.

In 2011, the MWCA baseline survey found that Minnesota has relatively high-quality wetlands, but it is regionally specific. There are more wetlands in northern Minnesota than southern Minnesota which causes the data to be weighted towards the condition of the northern region. About 49% of Minnesota wetlands are in exceptional condition. These wetlands are predominately located in the north-central and northeastern portions of the state. As for the western and southern portions of the state, most wetlands are in fair or poor condition. The baseline survey also found that Minnesota's wetlands, as a whole, are exposed to a low level of stressors, but this is also regionally specific. The northern portions of the state experience low pressure from stressors, but the southern and western regions experience high pressure, specifically from non-native invasive plants (Minnesota Pollution

Control Agency, 2015). Wetlands in SA 8E experience high pressure from stressors and are generally lower quality wetlands.

The results from the first iteration of the MWCA in 2016 found that Minnesota's wetland vegetation continues to be high quality. The results are similar to the baseline with the exception of a statistically significant 3% decrease of wetlands in poor condition. Vegetation quality still varied by region with the north having higher quality and less stressors, and the south and west having lower quality and more impact from stressors. In the western and southern portions of the state there was a statistically significant increase in the number of fair condition wetlands and a corresponding decrease in poor condition wetlands (Bourdaghs et al., 2019). Wetland vegetation quality in SA 8E has largely stayed the same since the first baseline assessment in 2011.

SA 8E technically falls within the study region for the DWQA. It should be noted that there were not a significant number of wetlands within the SA that were assessed for the DWQA. In 2017, it was found that 58% of plant communities in depressional wetland basins were in fair condition, 25% in poor condition, and 4% in good condition. The most recent iteration for the DWQA changed the vegetation quality methods and therefore cannot be compared to previous data. Based on the relative stability of aquatic macroinvertebrate community condition of the past surveys, there seems to be no significant change in the quality of depressional wetlands and ponds (Genet et al., 2019).

In addition to these routine studies that establish trends in wetland quantity and quality, BWSR also completed a study assessing wetland quality within depressional wetlands with the intention of refining restoration requirements and strategies on wetland banks ((Strojny, 2020). Using the Floristic Quality Assessment as a measure of wetland condition, wetlands that were restored with differing intensities were compared. The restoration intensities included were intensively restored, passively restored, and naturally occurring wetlands. It was found that fresh wet meadows that were actively managed for vegetation tended to have higher quality vegetation. This trend was not observed in shallow marsh or shallow open water communities. Overall, the quality of the wetlands aligned with the MPCA Statues and Trends reports for southern Minnesota.

In summary, the vegetation quality of wetlands in Minnesota is high. The southern region tends to have lower quality because there is more pressure from stressors. These stressors are both human intervention and non-native invasive species. As far as areal extent, Minnesota has actually seen an increase in wetlands. It is important to note that there have been many conversions from emergent wetlands to deep-water habitats and ponds. SA 8E reflects the regional trends in both wetland quality and extent, with more extensive high-quality wetlands in the north and lesser quality, smaller wetlands in the south.

Description of Threats

Wetlands across Minnesota are under threat from many different stressors. In SA 8E, wetlands are threated specifically by pollution and invasive species. These threats are based on the conditions established in the Baseline Conditions section as well as conversations with stakeholders. It is important to recognize current and future threats, as well as the impact threats have on prioritizing areas for wetland restoration and protection.

THREAT OF POLLUTION

According to the WHAF from the MnDNR, the water quality in SA 8E is one of the lowest in the State. This is primarily due to land use and geology. This southeastern portion of the state has Karst geology which is characterized by highly soluble bedrock, sinkholes, caves, and springs (MnDNR, n.d.-f). Because of the geology, this region is highly susceptible to contamination because contaminated water from the land surface flows directly into groundwater systems. This water has little to no filtering due to bedrock at the surface, the lack of glacial till, and dense networks of fractures which act like large pipe-like conduits within the bedrock (Setterholm, Dale, n.d.). In addition, this area is highly susceptible to erosion and has the steepest slopes near streams (MnDNR, n.d.-g), which exacerbates erosion and water quality issues. Pollution impacts wetland quality and a wetlands ability to filter water. Within SA 8E, wetlands are negatively impacted by pollution, causing a decrease in the macro-invertebrate community, more susceptibility to invasion of invasive species, and a decreased ability to filter water before it reaches deeper groundwater aquifers.

INVASIVE SPECIES

Invasive species are a serious problem for the future of our wetlands and can cause economic and ecological harm. Invasive species like Cattails (*Typha angustifolia*), Reed Canary Grass (*Phalaris arundinacea*), Purple Loosestrife (*Lythrum salicaria*), and Emerald Ash Borer (*Agrilus planipennis*) put native species in Minnesota, and specifically in SA 8E, at risk. Invasive species can crowd out native plants and limit sunlight. They can hinder water flow and reduce wildlife habitat. The impact that invasive species have on wetlands in SA 8E includes changes in hydrology from dense root systems, lowered biological diversity due to outcompeting invasive species, and loss of native canopy cover from invasive pests.

6. STAKEHOLDER INVOLVEMENT

Stakeholders are a crucial part of the CPF development process and were included via virtual meetings. The first meeting took place in March 2023, to introduce the ILF and CPF development process to the stakeholders. A summary of the baseline conditions was presented to gather feedback from stakeholders so metrics could be tailored to SA 8E. Stakeholders invited to participate included: Soil and Water Conservation Districts, Counties, BWSR, MnDNR, MnDOT, MPCA, USACE, Watershed Management Organizations, Watershed Districts, Cities, EPA and Shakopee Mdewakaton Dakota. Those that attended included individuals from Soil and Water Conservation Districts, Counties, Cities, BWSR, and the MnDNR. Discussions during the meeting highlighted the inclusion of public drainage information but found that it was not comprehensive across the SA. At the meeting, stakeholders identified riparian areas adjacent to trout streams and sensitive groundwater areas as baseline conditions to be included in the report. A list of attendees and the material presented is provided in Appendix C-1.

The second stakeholder meeting took place in August 2023. This meeting reviewed the baseline conditions and presented the two conditions, high quality habitat (such as trout streams) and sensitive groundwater surface water areas, which were added based on the first meeting. The cumulative impact analysis as well as the SA 8E trends and threats assessment were also presented. The main focus of the meeting was presenting prioritization criteria for restoration and soliciting feedback from stakeholders. A draft list of the criteria and a preliminary map of prioritized catchments were introduced. The invite list was the same as the first meeting. Those that attended included individuals from Soil and Water Conservation Districts, MnDNR, Cities, MPCA, Watershed organizations and BWSR. The discussion focused on location of wetland credits within the SA and whether credits in the metro area will be required to be retained in the metro area, rather than the SA as a whole. A list of the attendees and the material presented is provided in Appendix C-2.

The third and final stakeholder meeting took place in December 2023. The purpose of the meeting was to present the prioritization process and final results. A brief refresher of the purpose of the report, the baseline conditions, cumulative impact analysis, and SA trends and threats was also given. The invite list was the same as the previous two meetings. It included individuals from Soil and Water Conservation Districts, Counties, BWSR, MnDNR, MnDOT, MPCA, USACE, Watershed Management Organizations, Watershed Districts, Cities, EPA and Shakopee Mdewakaton Dakota. Those that attended included individuals from Counties, Cities, MnDOT, and BWSR. Meeting discussion focused on the presentation of the draft prioritization map and the process used to develop the priority areas. Meeting attendees requested GIS data from this process, which is available upon request as it will not be available on the Geospatial commons. A list of the attendees and the material presented is provided in Appendix C-3.

7. PRIORITIZATION METHODS FOR SELECTING AND IMPLEMENTING MITIGATION ACTIVITIES

The geographic scale used to identify priority areas for wetland mitigation in this plan is the MnDNR Level 8 catchments. The MnDNR has defined Level 8 catchments to be “the smallest delineated and digitized drainage area mapped by the MnDNR Watershed Delineation Project.” The catchment scale was selected for two primary reasons. First, the prioritization process can be conducted at a finer scale which allows for more specific identification of areas where wetland mitigation may benefit watershed health. At the same time, the number of catchments in SA 8E is not excessive and the process can be completed in a reasonable amount of time with meaningful results. Second, the MnDNR has developed large amounts of watershed data at the catchment level that can be easily accessed to support the prioritization process which reduces the time associated with the GIS-based analyses.

SA 8E is made up of 634 catchments distributed across the 12 major watersheds as follows: Cannon River has 162 catchments, Cedar River has 62 catchments, Mississippi River – La Crescent has 7 catchments, Mississippi River – Lakee Pepin has 37 catchments, Mississippi River – Reno has 13 catchments, Mississippi River – Winona has 54 catchments, Root River has 133 catchments, Shell Rock River has 27 catchments, Upper Iowa River has 29 catchments, Upper Wapsipinicon River has 3 catchments, Winnebago River has 7 catchments, and Zumbro River has 100 catchments (Figure 7-1).

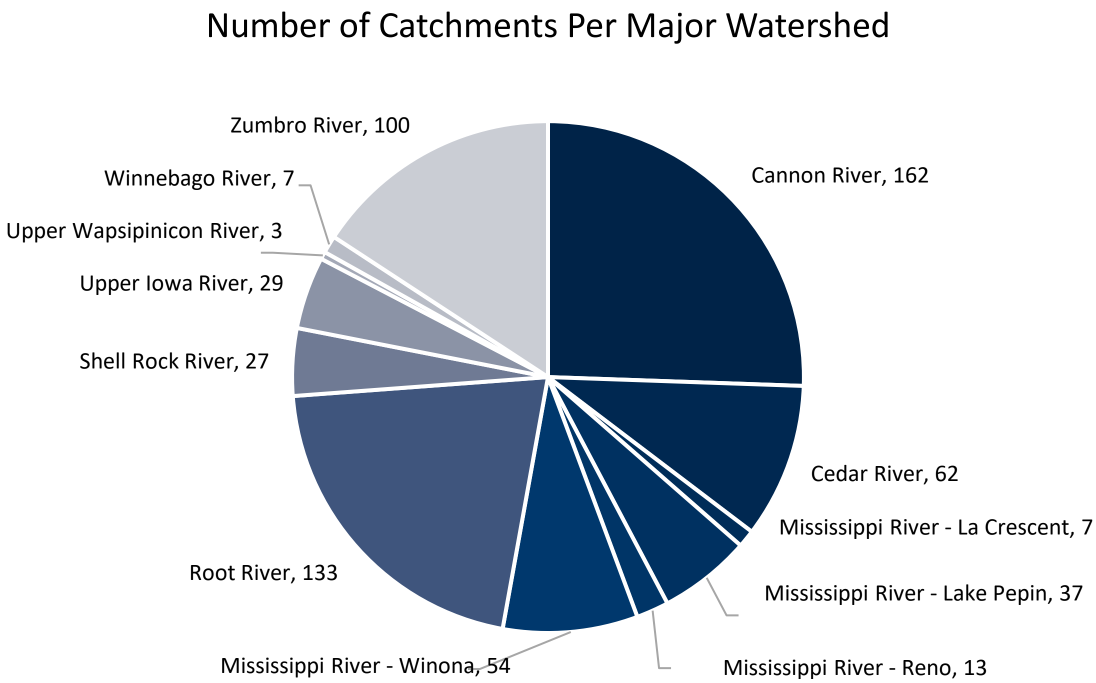


Figure 7-1. Chart showing the number of catchments within each major watershed.

Criteria Selection

Criteria for catchment prioritization were selected by stakeholders attending the second stakeholder meeting. BWSR and ISG staff served as facilitators of the discussion and selection process by suggesting criteria for restoration and then seeking stakeholder input. After the meeting, each criterion was evaluated for availability and suitability of GIS-based data. A list and description of the restoration criteria can be seen in **Error! Reference source not found.**.

RESTORATION CRITERIA

A total of 9 different criteria were selected for restoration prioritization. They include *Altered Streams, Drained Wetlands, Flooding, Ground Water Pollution, Lake and River Impairments, Lake Phosphorus Sensitivity (LPSS), Local Plans, Perennial Cover,* and *Wetland Loss*. The specific criterion and description of data used can be found in **Error! Reference source not found.**.

Table 7-1. Restoration Criteria and Description of Data	
Criterion	**Description**
Altered Streams	This is a ratio of total stream miles classified by the MPCA altered watercourses project as *Impounded* and *Altered* to the total miles of watercourses. Lakes and *No-definable Channel* classification were removed due to the nature of the SA and duplicate mapped features.
Drained Wetlands	The total area of wetlands, relative to catchment area, that have a "d" modifier in the National Wetland Inventory.
Flooding	Catchments with greater acreage within the FEMA 100-year floodplain were prioritized.
Ground Water Pollution	This is based on the near-surface pollution sensitivity dataset from the WHAF. It is a measure of the travel time it takes for water to infiltrate to a depth of 10 feet. Areas of high sensitivity were prioritized.
Impairments	A combination of lake and river impairments as mapped by the MPCA impaired waters project (updated 2020) and the WHAF water quality non-point source score. Areas with both high number of impairments and non-point sources were prioritized.
Lakes of Phosphorus Sensitivity Significance (LPSS)	Lakes of Phosphorus Sensitivity Significance (LPSS) presents a ranked list of priority lakes based on sensitivity to additional phosphorus loading. Catchments with more area of LPSS lakes were prioritized.
Local Plans	These are areas specifically called out in One Watershed One Plan reports and WRAPS reports for wetland restoration. Scores were assigned as follows: 10: specific geographies and wetland restoration actions called out in the plan, 7: wetland restoration is called out as a priority in multiple spots with details given related to BMPs and entities participating but less specifics, 4: wetland restoration generally mentioned as important but there are few specifics, and 1: wetland restoration is not mentioned at all.
Perennial Cover	*Perennial* cover as mapped in the National Land Cover Database, which includes *forest*, *grassland*, and *wetland*. Areas of low amounts of *perennial* cover relative to catchment area were prioritized.
Wetland Loss	Areas that have experienced high amounts of wetland loss, relative to catchment area, since European Settlement. This data was produced for this report. Details can be found in the Cumulative Impact Assessment.

Development of Criterion Maps

GIS transformation of spatially explicit data characterizing each criterion were normalized through a reclassification process to generate maps that captured the potential for a catchment to improve watershed health through wetland restoration. The geoprocessing for each criterion followed a straightforward and repeatable process (Figure 7-2).

First, GIS data representing each criterion was obtained and associated with each catchment in SA 8E. If a catchment value had not been assigned (GIS data obtained from the WHAF typically had predetermined criterion scores for each catchment), a value was calculated for each catchment using raw data. For example, the number of ditched wetlands was determined by dividing the area of NWI wetlands with a “d” modifier by the total area of the catchment and multiplying the result by 100.

The resulting criterion scores were then normalized from 0 to 100 for each major watershed by dividing each catchment criteria value by the highest value in that major watershed. The normalized results were then classified into ten classes using the natural breaks tool in ArcGIS in an ascending order of priority (Reclassify step in Figure 7-2). In other words, low scores are catchments with lower potential for wetland mitigation to improve watershed health and high scores represent areas that would have a higher potential to improve watershed health for restoration.

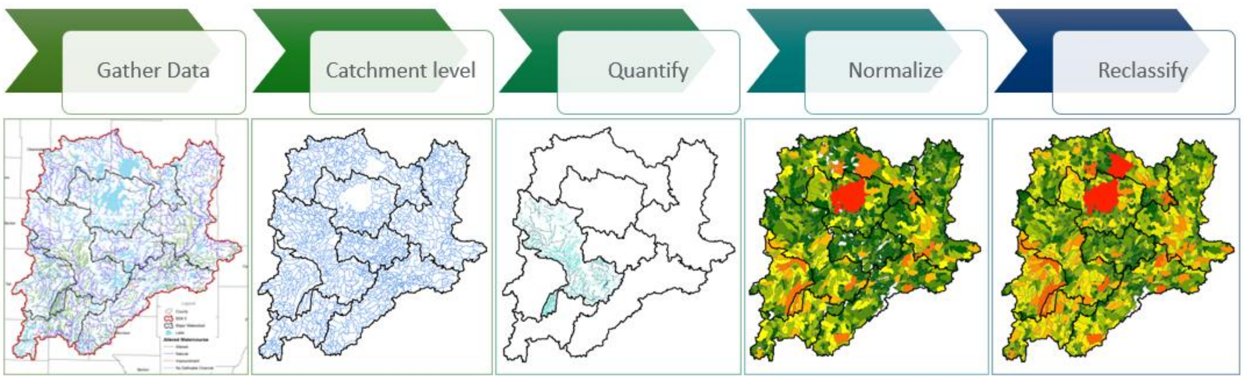


Figure 7-2. Data transformation process.

The process described above and in Figure 7-2 was used for all criteria except local plans. For this criterion specific scores were given to each catchment based on the data. The process and scoring can be found in **Error! Reference source not found.**.

Weighting Derived from Stakeholder Input

Stakeholders were offered the opportunity to weight criteria based on the perceived value within their work area. A simple survey via Survey123 was sent out and the stakeholders had three weeks to respond. Within the survey, stakeholders were asked to rank the criteria from most important to least important. There were 13 responses to the survey. The results of the survey are shown in Table 7-2. The rank of the criteria determined the weight it would receive in the final prioritization.

Weighting was calculated by using the rank sum methodology. Once the rank was assigned by stakeholders the associated weight was multiplied by the criterion score for each catchment. All of the weighted criterion scores were summed together to get the final prioritization score. Catchments with higher scores were prioritized more for restoration. Unweighted results for restoration can be seen in Figure D-1. The weighted results for restoration can be seen in Figure D-2.

Table 7-2. Restoration Ranks Assigned by Stakeholders and Resulting Weights		
Rank	**Criterion**	**Weight**
1	Drained Wetlands	0.2000
2	Local Plans	0.1778
3	Altered Streams	0.1556
4	Impairments	0.1333
5	Wetland Loss	0.1111
6	Ground Water Pollution	0.0889
7	Flooding	0.0667
8	Perennial Cover	0.0444
9	LPSS	0.0222

Designation of Priority Catchments

The analyses completed to this point separated catchments within each major watershed based on their expected potential to benefit watershed health through wetland restoration activities. The next step in the process was to take these results and identify the prioritized catchments for wetland mitigation projects. This required finding a breakpoint in the prioritization outputs that balanced the need for sufficient wetland mitigation opportunities with maximizing benefits to the watershed. For example, designating only a small number of catchments as high priority areas may not result in enough opportunities for projects when a search is initiated through a selection process. Similarly, identifying a large number of catchments as high priority areas may decrease the potential benefits to the watershed because the value of the prioritization process is diluted. To this purpose, catchments that fell within the top third of the prioritization scores were run through an opportunity filter, to be described later, and considered prioritized. It should be noted that the top third was determined by the number of catchments, not the area.

In addition to establishing a breakpoint, the prioritized catchments were run through an opportunity filter to preemptively remove catchments that have little to no opportunity for project establishment. The opportunity filter considered amount of wetland loss in each respective catchment. The breakpoint or threshold for this filter was determined for the entire SA by evaluating the data and applying professional judgement. Using wetland loss, any catchment with zero acres of loss were removed. Any catchments that were prioritized and then removed due to the filter, were replaced with a catchment with the next highest prioritization score. This was done so that the total number of catchments within the top third remained the same for each watershed.

For SA 8E, all catchments with prioritization scores in the top third of the score distribution within each major watershed that also passed the opportunity filter were identified as a high priority area for wetland restoration.

Using this method, a total of 209 catchments (2,365,313 acres of SA 8E) were prioritized. A table showing the number of catchments prioritized for restoration by major watershed can be seen in Table 7-3 and Figure D-3 shows a map of the prioritized catchments.

The major watershed with the largest area prioritized was the Root River watershed with 540,191 acres. The major watershed with the least prioritized area was the Upper Wapsipinicon River watershed, with 5,840 acres. Maps for individual watersheds showing the prioritized catchments can be seen in Figures D-4 through D-15. Table 7-3 lists the acres prioritized for each watershed as well as the percent of the total SA area.

Table 7-3. Number and Area of Catchments Prioritized for Each Watershed

Major Watershed	Number of Catchments	Acres	Percent of SA Area
Cannon River	54	480,456	10%
Cedar River	21	242,387	5%
Mississippi River – La Crescent	2	33,284	1%
Mississippi River – Lake Pepin	12	150,130	3%
Mississippi River – Reno	4	65,540	1%
Mississippi River – Winona	18	222,126	5%
Root River	44	540,191	12%
Shell Rock River	9	82,879	2%
Upper Iowa River	10	97,973	2%
Upper Wapsipinicon River	1	5,840	0.1%
Winnebago River	2	21,701	0.5%
Zumbro River	32	422,806	9%
SA 8E Total	**209**	**2,365,313**	**50%**

8. CONCLUSION

This CPF report established baseline conditions, analyzed wetland trends and threats, gathered stakeholder input, and prioritized catchments for wetland restoration within SA 8E. The prioritized catchments have high public value and identify areas where wetland restoration efforts are expected to provide the greatest benefit to watershed health. The primary use of the CPF is determining the preferred location of future compensatory wetland mitigation sites for the ILF program. In addition, due to the SA specific data and local input used in prioritization, the CPF can be helpful in guiding the location of private (standard) bank establishment. The CPF can also be used for establishing or updating other watershed based planning documents or selecting non-regulatory restoration projects. Data used within this CPF will be periodically updated and can be requested from BWSR.

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Appendix A: Acronyms

Acronym	Full Name
1W1P	One Watershed One Plan
AB	Aquatic Bed wetland type
BMP	Best Management Practice
BSA	Bank Service Area
BWSR	Minnesota Board of Water and Soil Resources
CPF	Compensation Planning Framework
CWMP	Comprehensive Watershed Management Plan
DMU	Data Map Unit
DO	Dissolved Oxygen
DWQA	Depressional Wetland Quality Assessment
EPA	Environmental Pollution Agency
FEMA	Federal Emergency Management Agency
GIS	Global Information Systems
GW	Groundwater
HUC	Hydrologic Unit Code
ID	Identifier
ILF	In-Lieu Fee Program
LGRWRP	Local Government Road Wetland Replacement Program
LMMM SA	Lower Minnesota, Mississippi, and Missouri In-Lieu-Fee Service Area
LiDAR	Light Detection and Ranging- remote sensing method for measuring elevations
LPSS	Lakes of Phosphorus Sensitivity Significance
MBS	Minnesota Biological Survey
MnDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MnGEO	Minnesota Geospatial Information Office
MPCA	Minnesota Pollution Control Agency
MWCA	Minnesota Wetland Condition Assessment
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NWI	National Wetlands Inventory- specifically for Minnesota
SA	In-Lieu-Fee Service Area
SGCN	Species of Greatest Conservation Need
SNA	Scientific Natural Area
SWCD	Soil Water Conservation District
TSS	Total Suspended Solids
USACE	United State Army Corps of Engineers
USDA	Unites States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
VEGMOD	Historic Vegetation Model
WCA	Wetland Conservation Act

WHAF	Watershed Health Assessment Framework
WMA	Wildlife Management Area
WRAPS	Watershed Restoration and Protection Strategy Report

Appendix B: Baseline Condition Maps

Figure B-1. Project Location

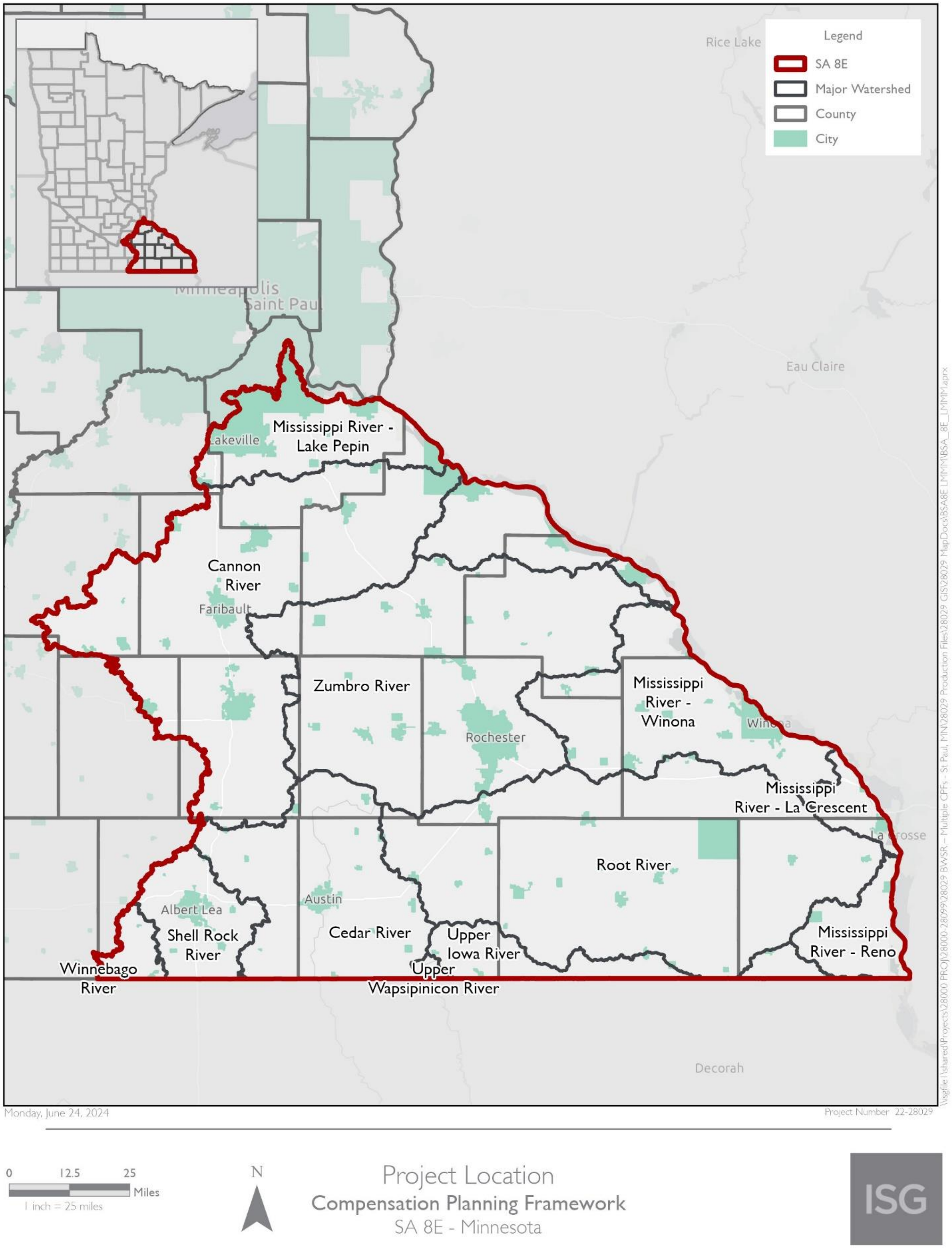


Figure B-2. Ecological Classification

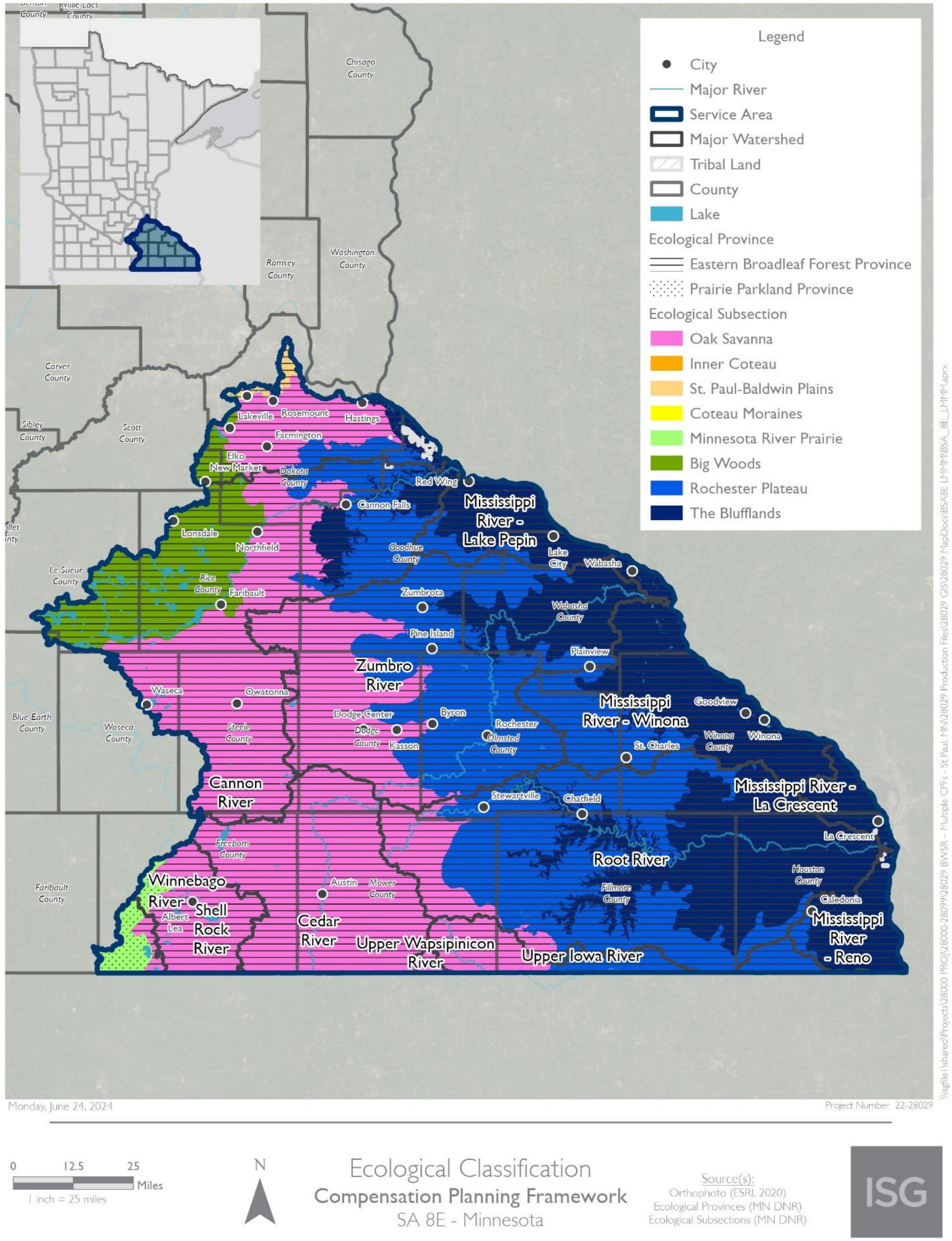


Figure B-3. Pre-settlement Vegetation

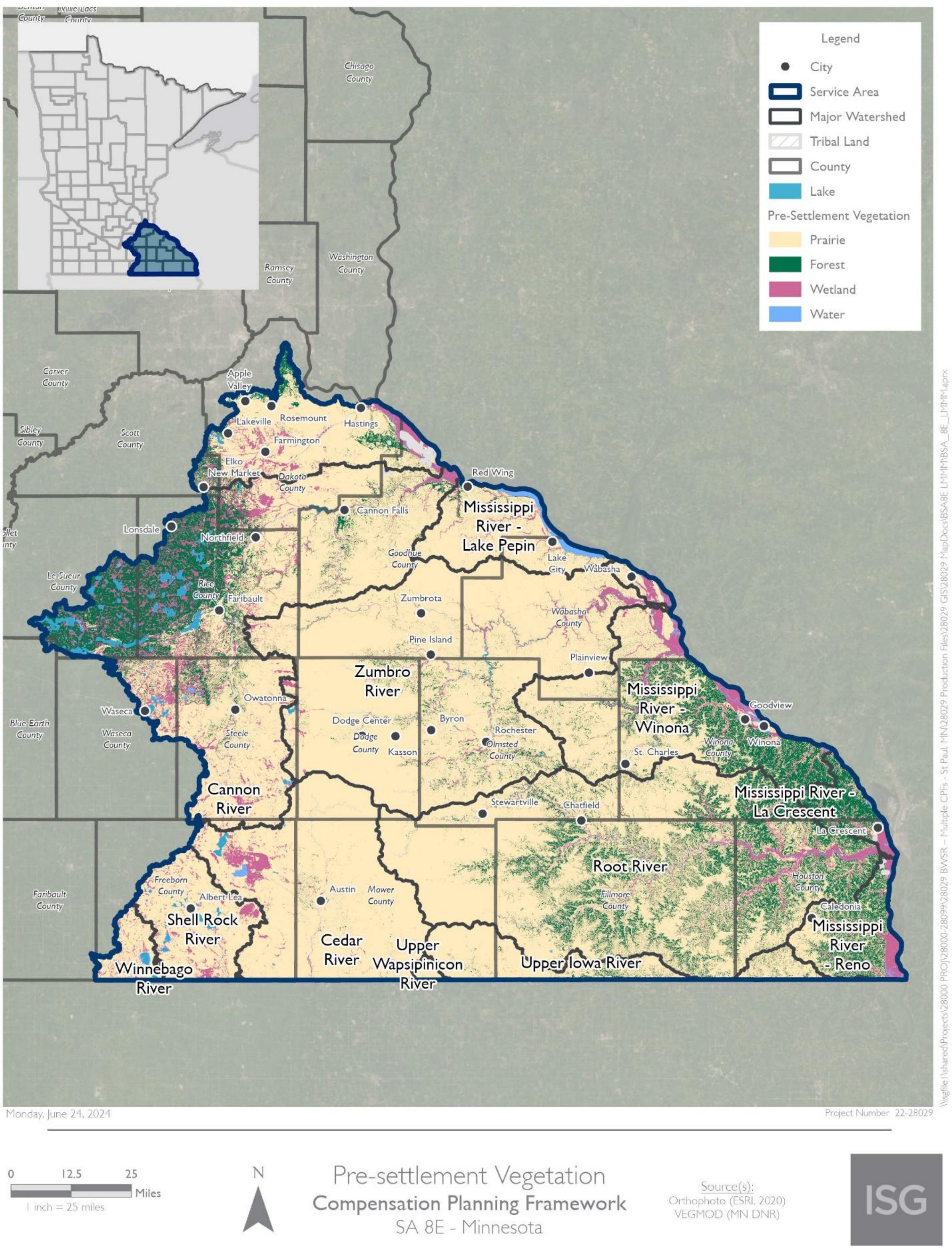


Figure B-4. Wetlands

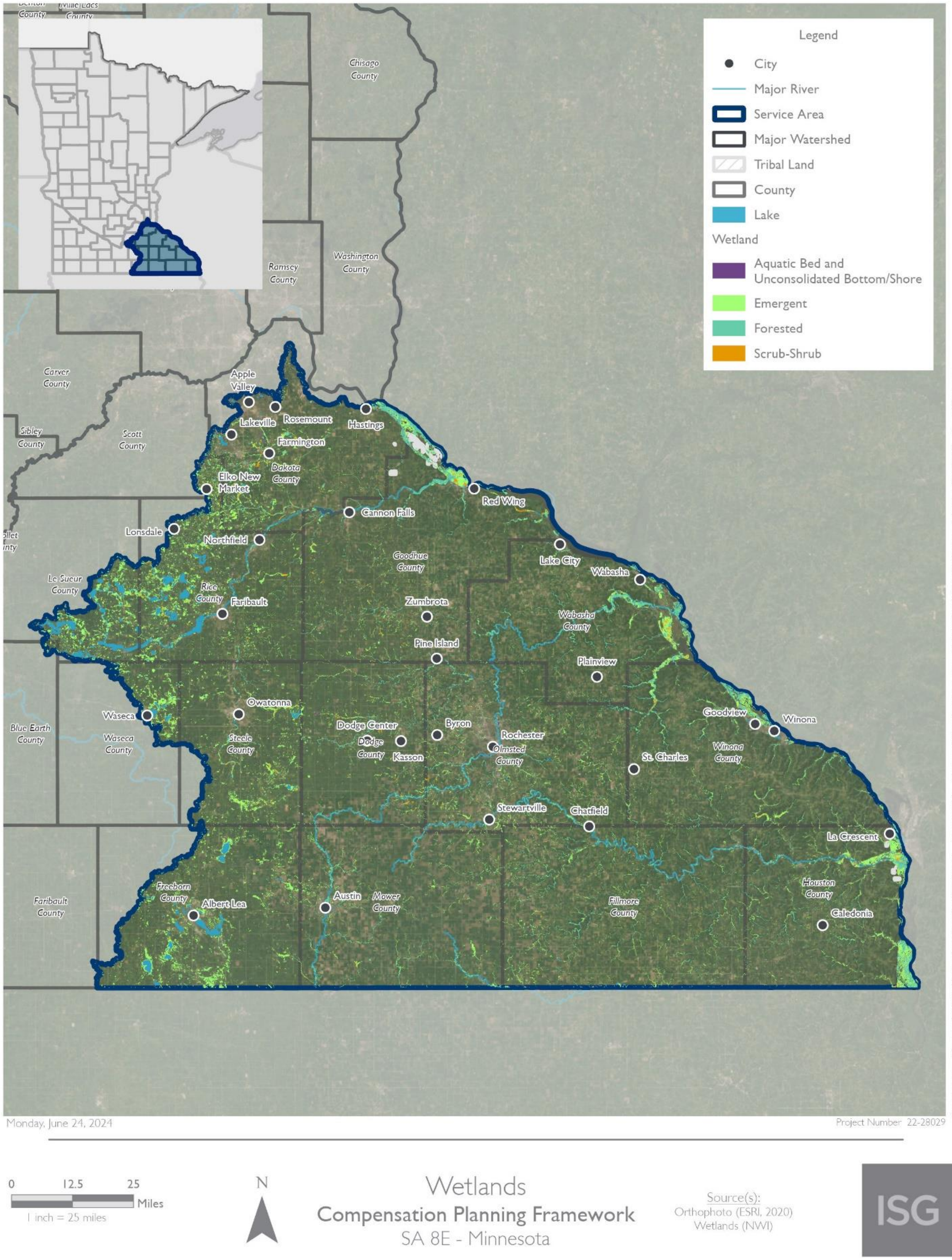


Figure B-5. Lakes

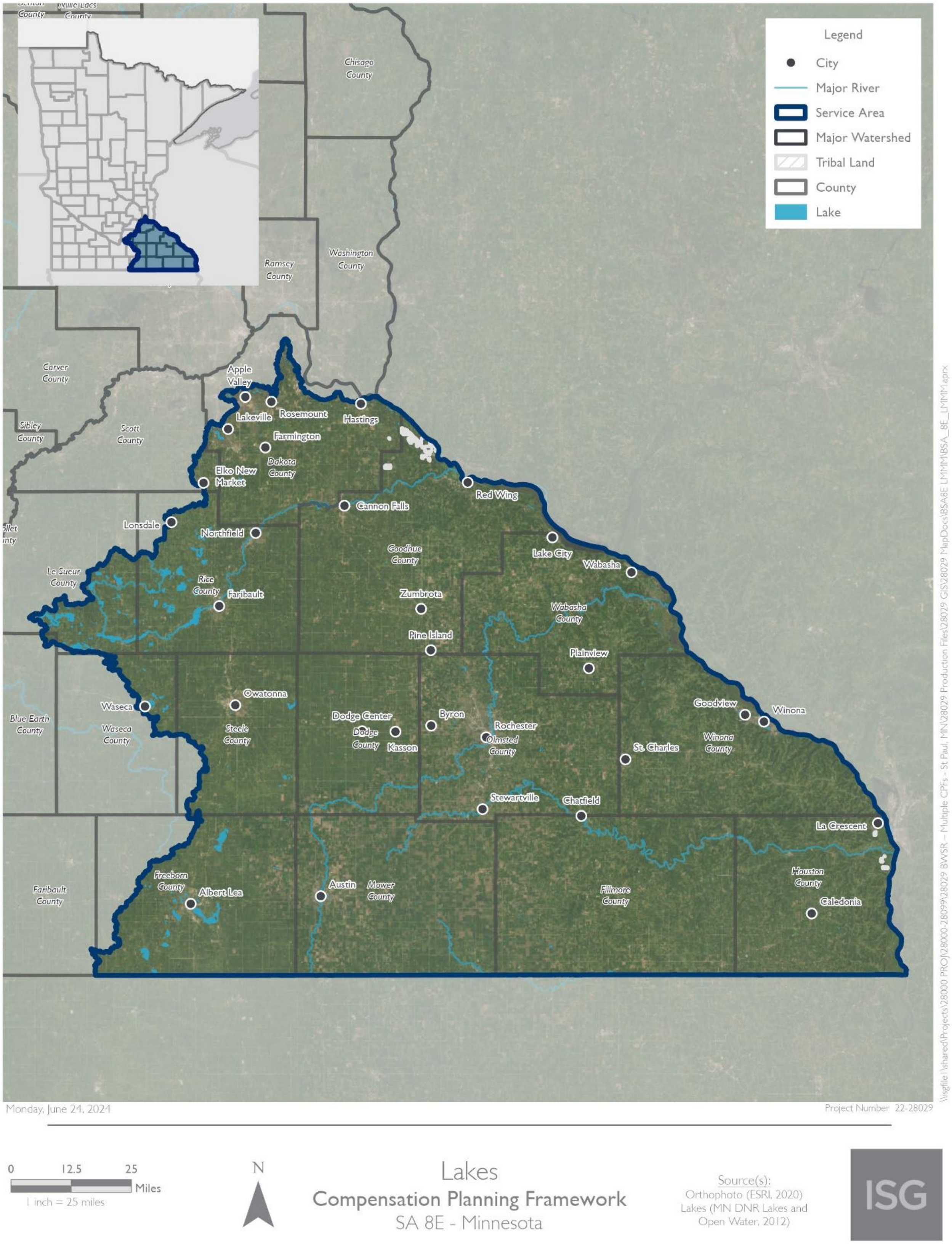


Figure B-6. Watercourses

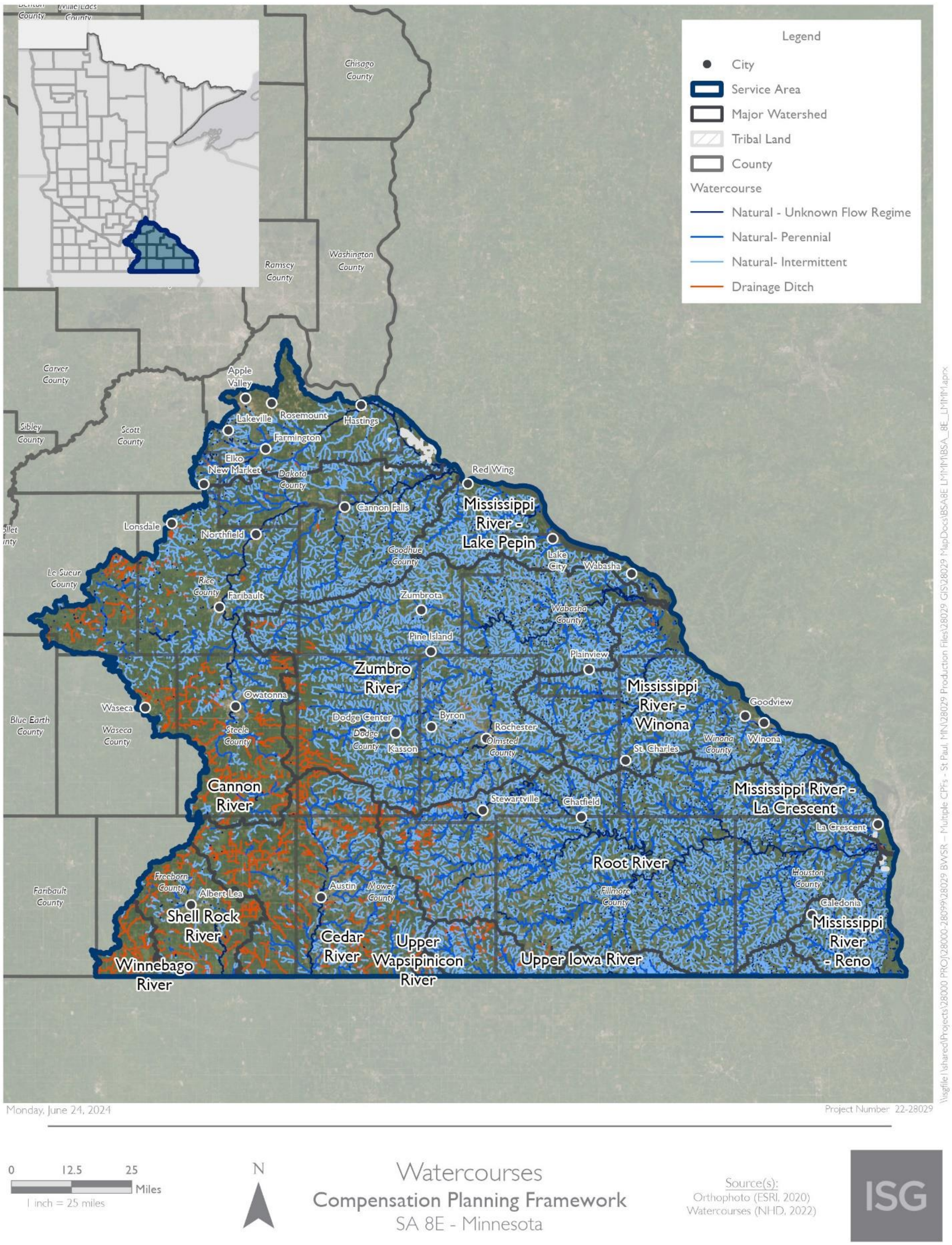


Figure B-7. Altered Watercourses

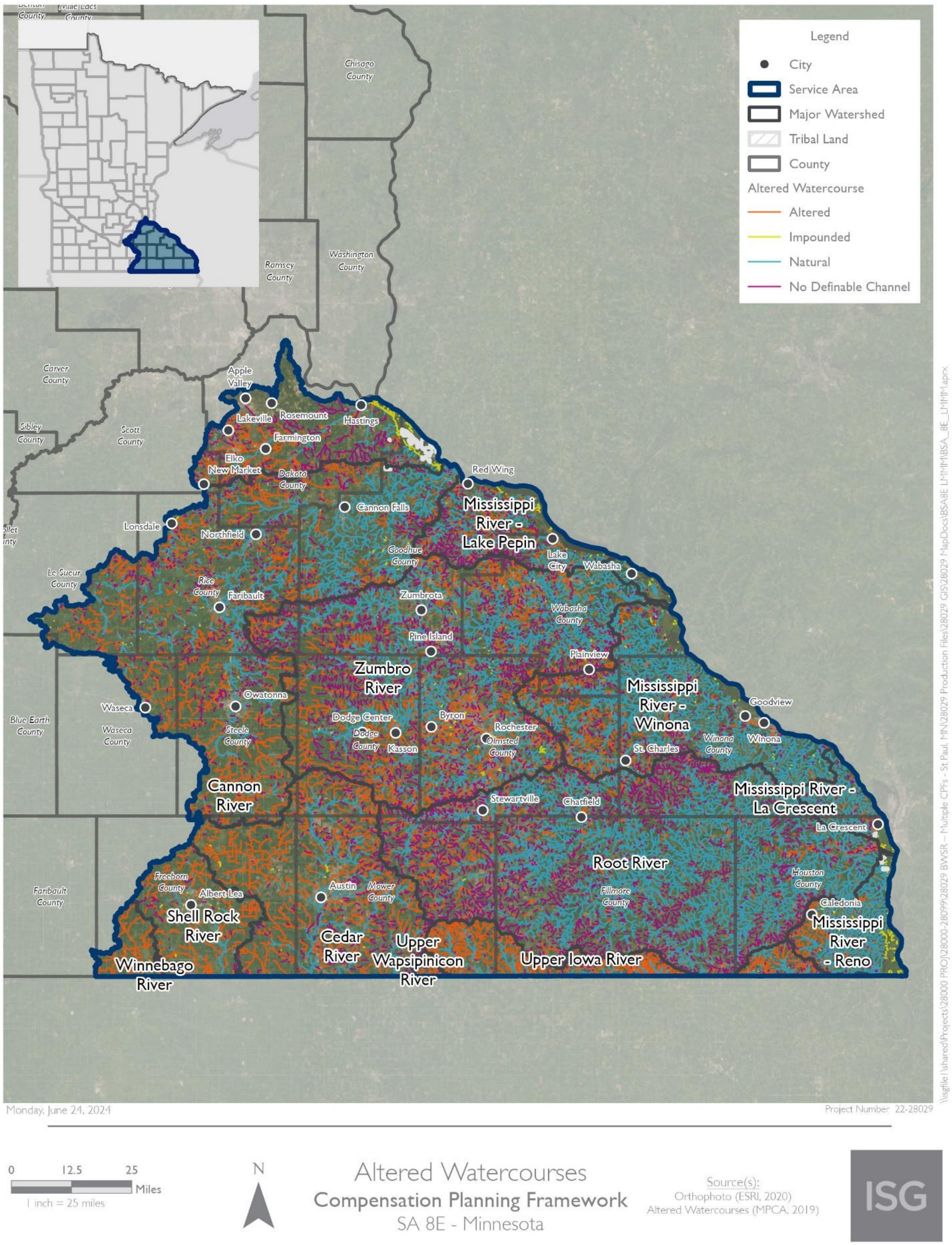


Figure B-8. Water Quality- Lakes

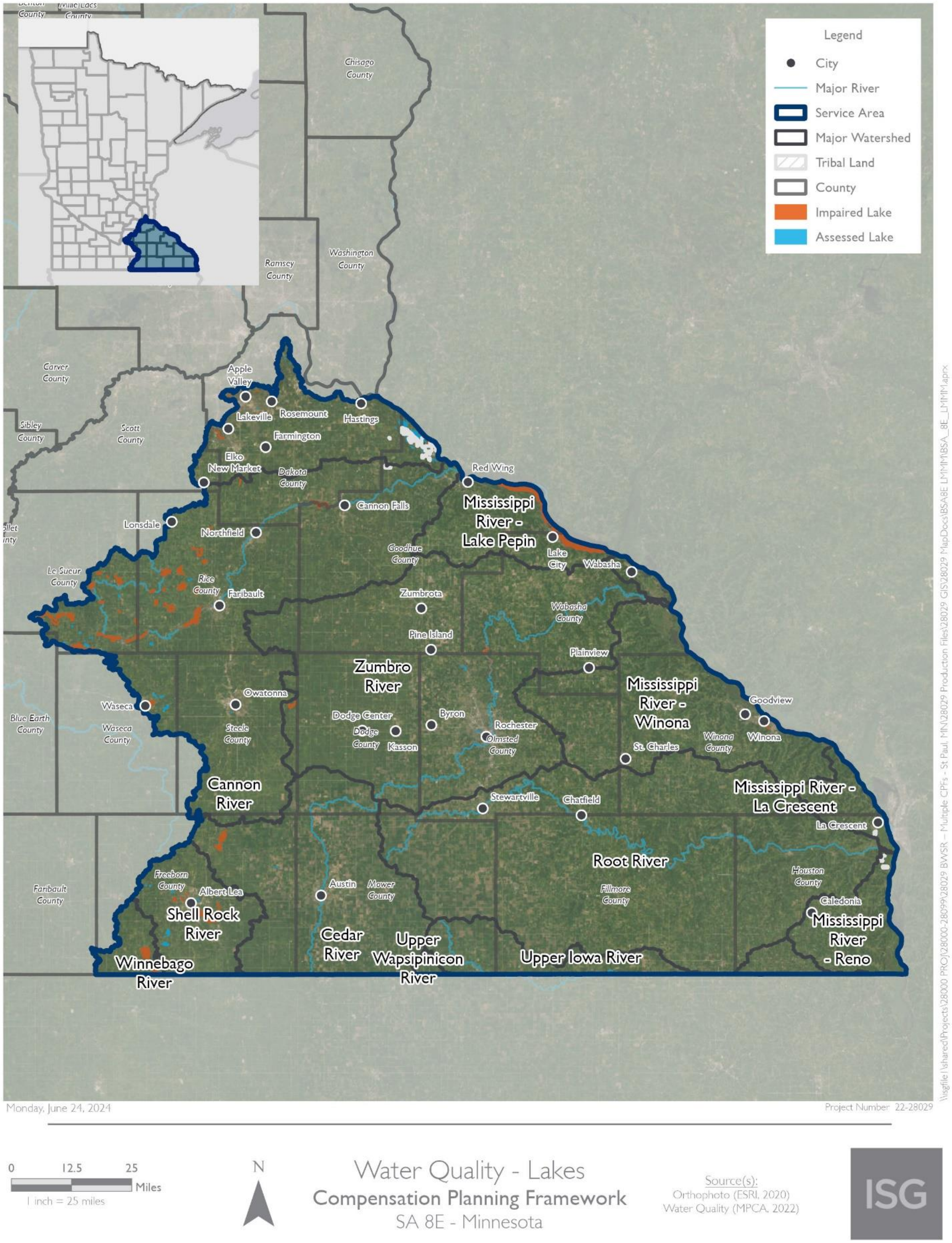


Figure B-9. Water Quality- Streams

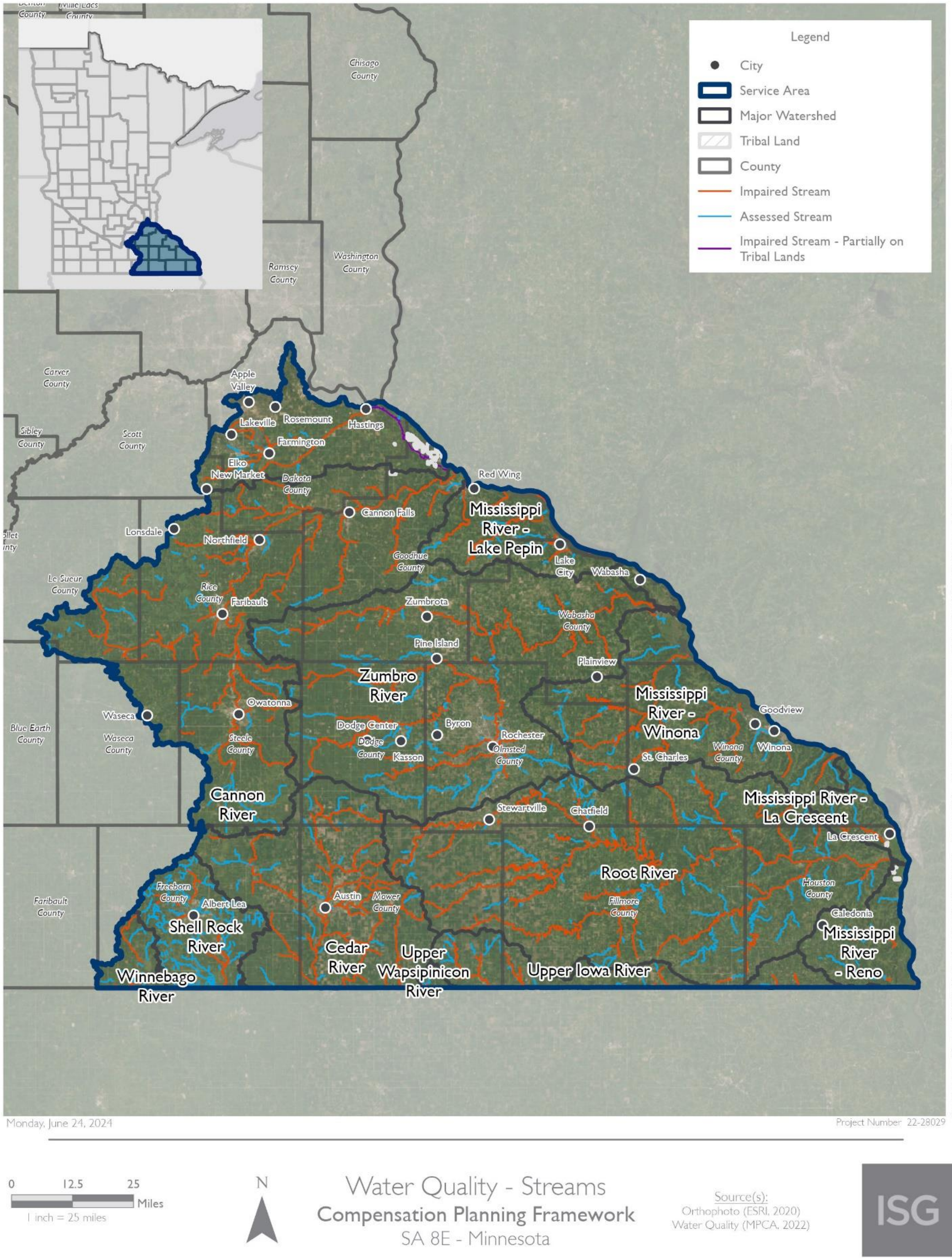


Figure B-10. Land Cover

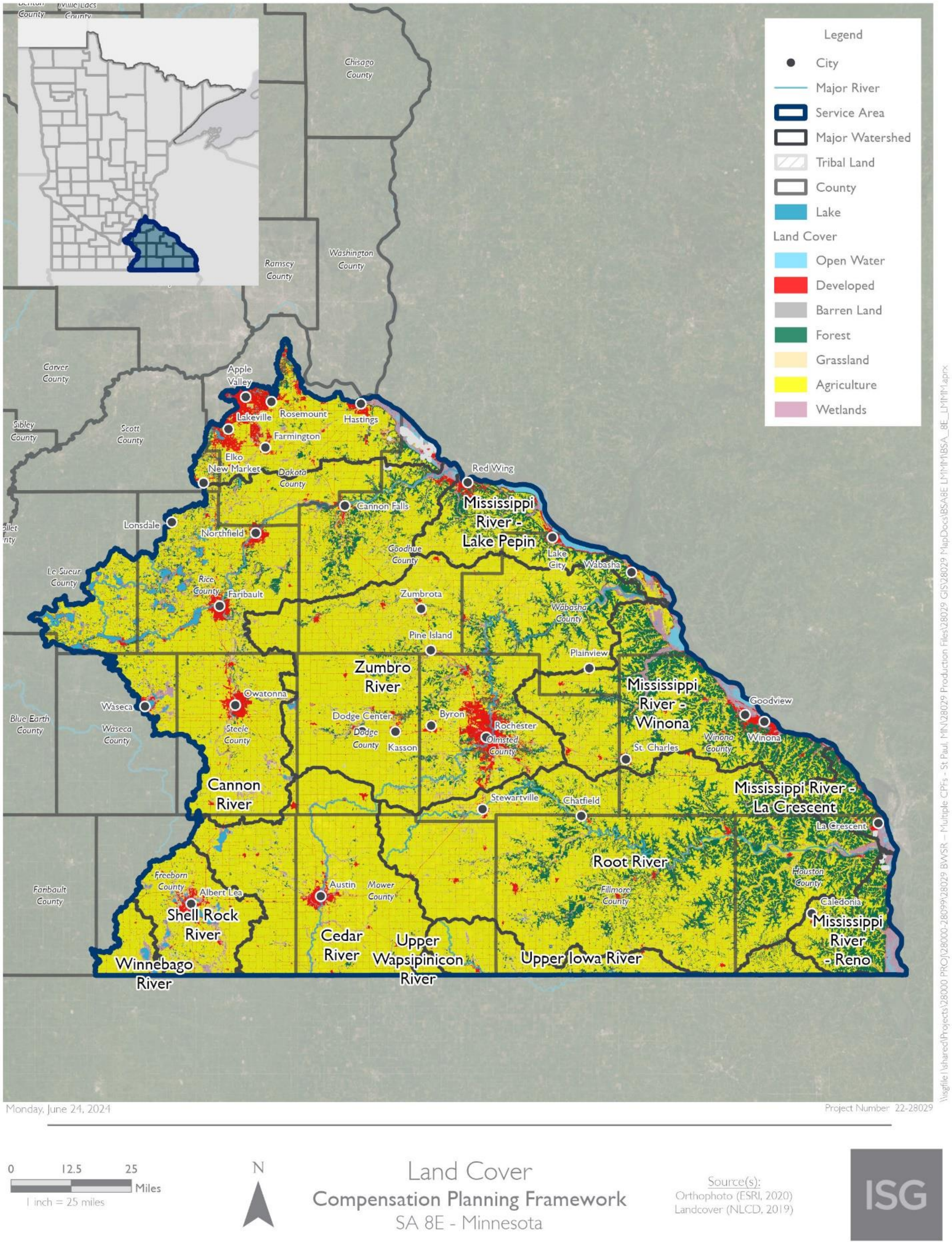


Figure B-11. Perennial Land Cover

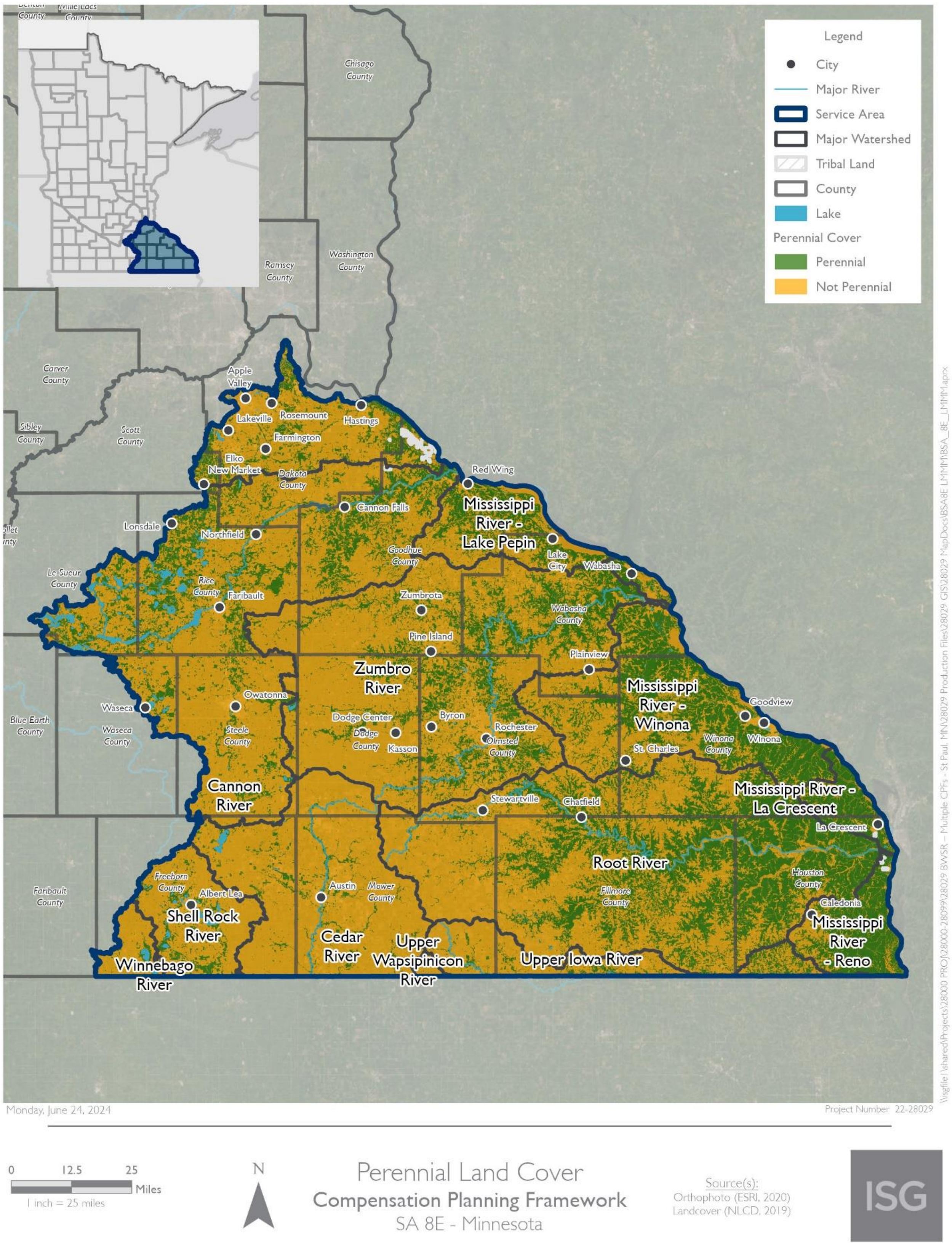


Figure B-12. Areas of Biodiversity Significance

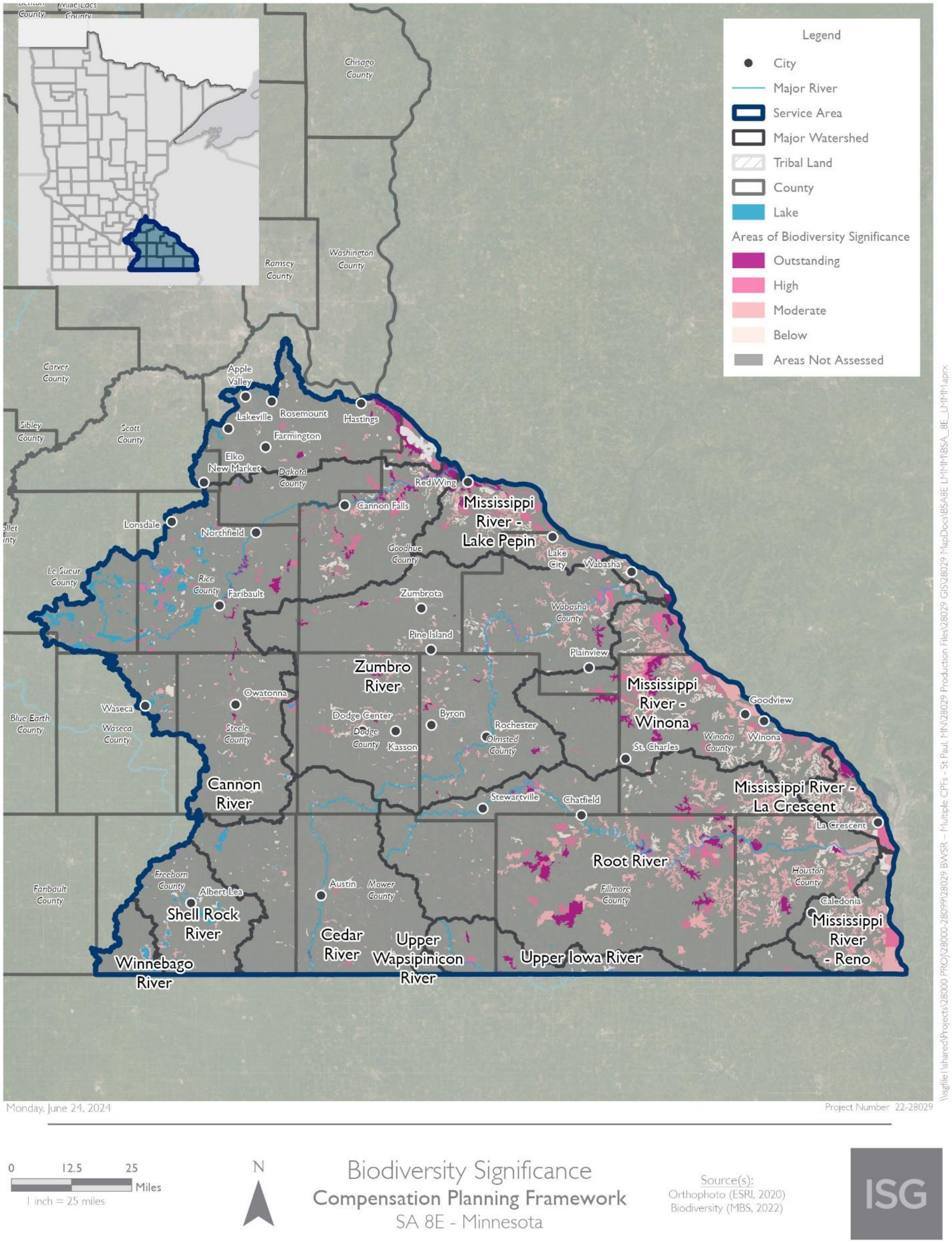


Figure B-13. Groundwater Pollution Sensitivity

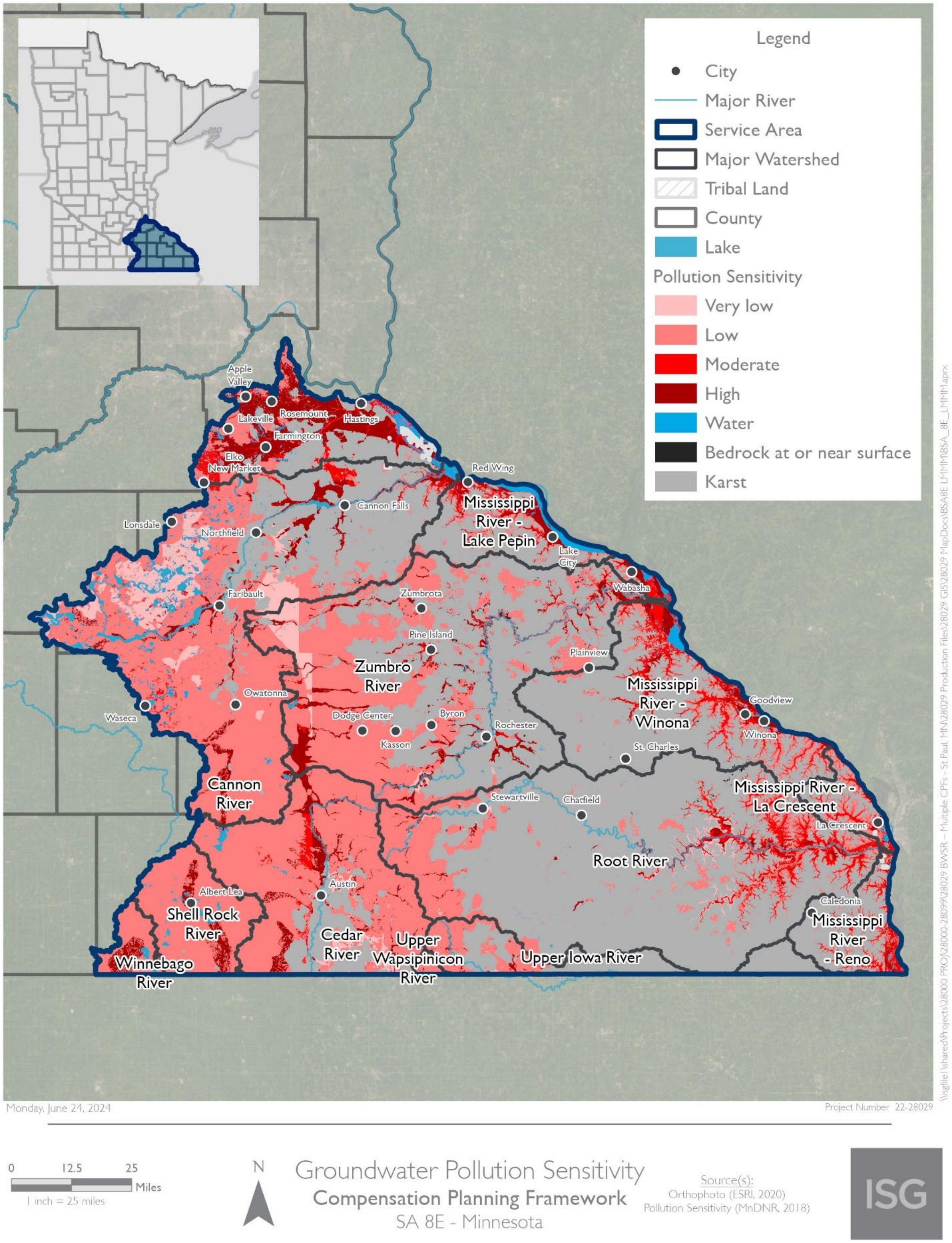


Figure B-14. Groundwater – Surface Water Connections

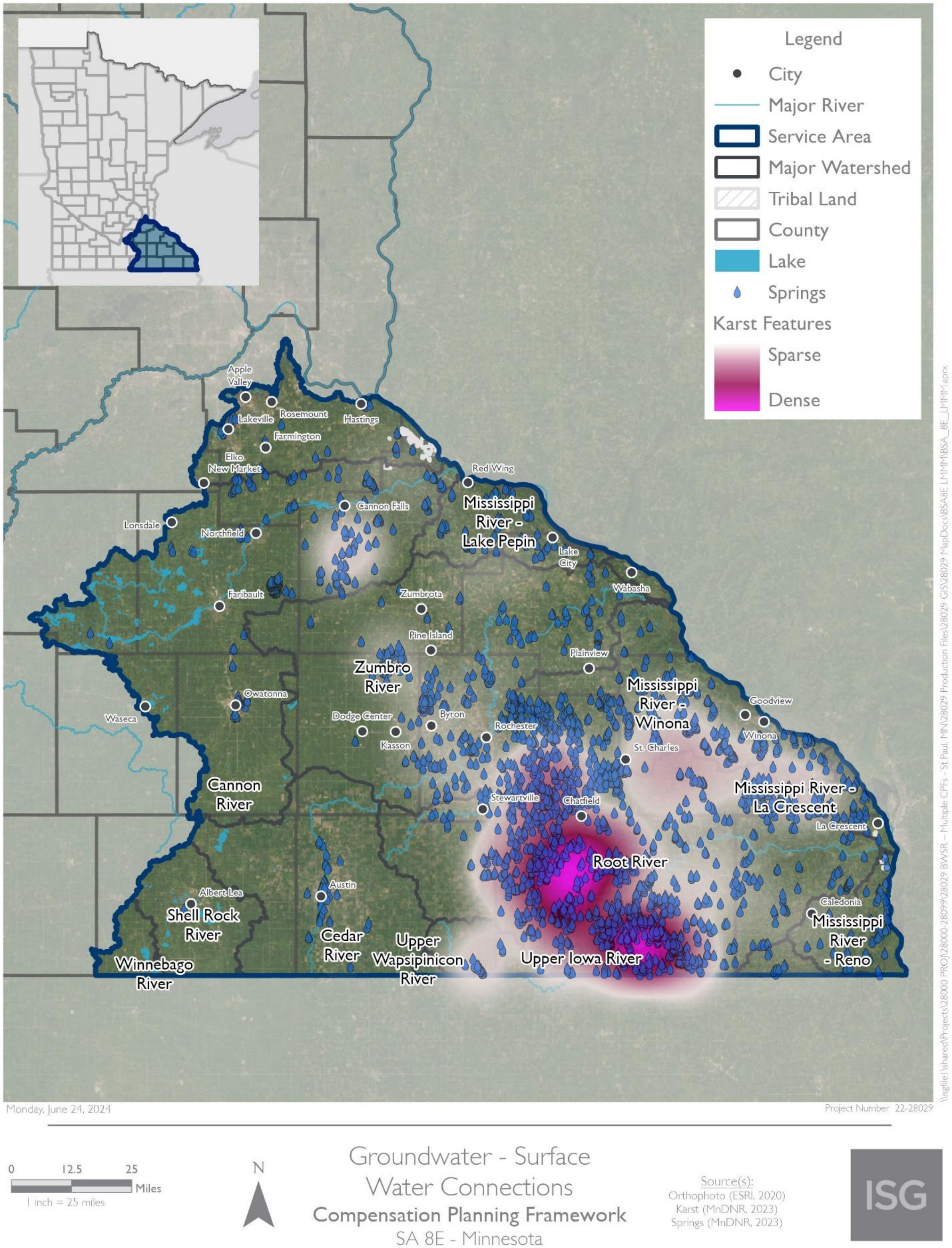
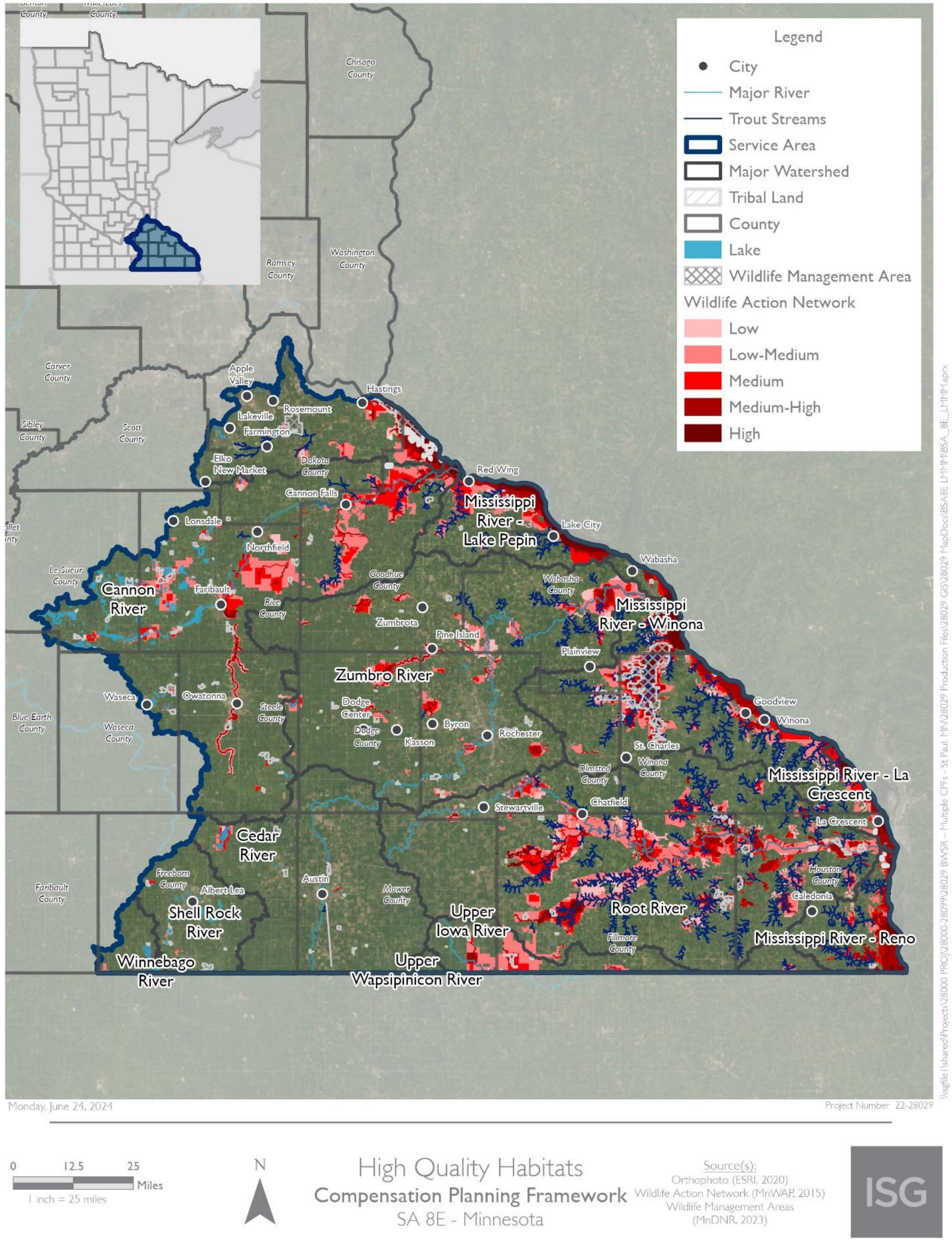


Figure B-15. High Quality Habitats

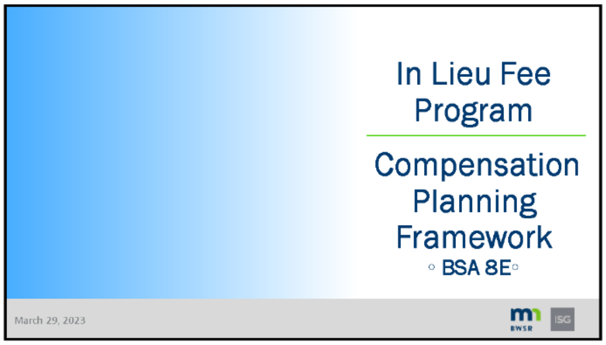


Appendix C: Stakeholder Meeting Attendees and Presentations

C-1. Meeting 1- March 2023 Stakeholder Meeting List of Attendees

First Name	Last Name	Email	Organization
Adam	Beilke	adam.beilke@state.mn.us	BWSR BC
Samantha	Berger	sberger@ci.apple-valley.mn.us	City of Apple Valley
Jed	Chestnut	jed.chesnut@state.mn.us	BWSR
Dave	Copeland	david.copeland@state.mn.us	BWSR BC
Alyssa	Core	alyssa.core@state.mn.us	BWSR
Lauren	Cornelius	Lauren.cornelius@co.dodge.mn.us	Dodge County
Sheila	Harmes	sharmes@co.winona.mn.us	Stockton-Rollingstone-MN City WD
Katie	Heinz	katherine.heinz@state.mn.us	MnDOT
Chad	Hildebrand	childebrand@goodhueswcd.org	Goodhue SWCD
David	Holmen	David.holmen@co.dakota.mn.us	Dakota SWCD
Steven	Jahnke	sjahnke@ci.albertlea.mn.us	City of Albert Lee
Beau	Kennedy	bkennedy@goodhueswcd.org	Belle Creek WD
Skip	Langer	langer.skip@co.olmsted.mn.us	Olmsted SWCD
Nicole	Lehman	nicole.lehman@state.mn.us	DNR Hydrologist
Stacey	Lijewski	stacey.lijewski@hennepin.us	Hennepin County
Aaren	Mathison	aaren.mathison@fillmoreswcd.org	Fillmore SWCD
Jennie	Skancke	jennie.skancke@state.mn.us	IRT (DNR)
Jarrett	Spitzack	Jarett.Spitzack@riceswcd.org	Rice SWCD
Brian	Watson	brian.watson@co.dakota.mn.us	SWCD - Dakota
Lucas	Youngsma	lucas.youngsma@state.mn.us	DNR Hydrologist
Mark	Zabel	mark.zabel@co.dakota.mn.us	Vermillion River Watershed JPO

C-1. Meeting 1- March 2023 Stakeholder Meeting Presentation



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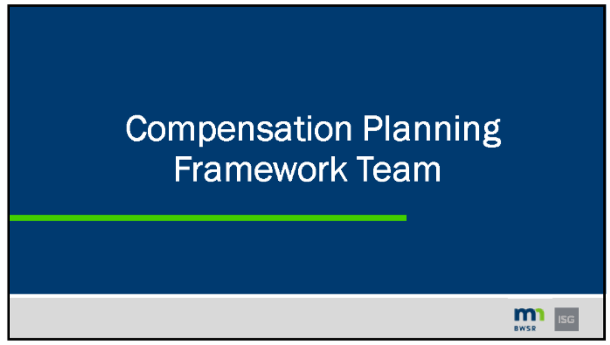

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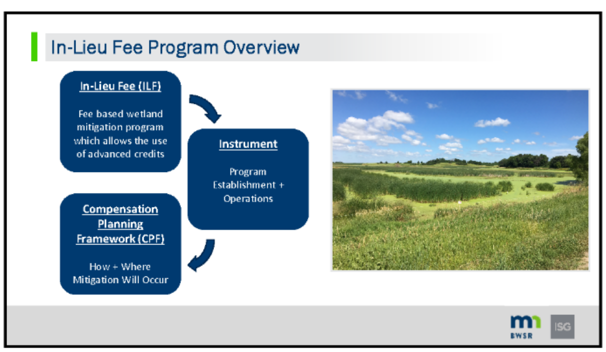

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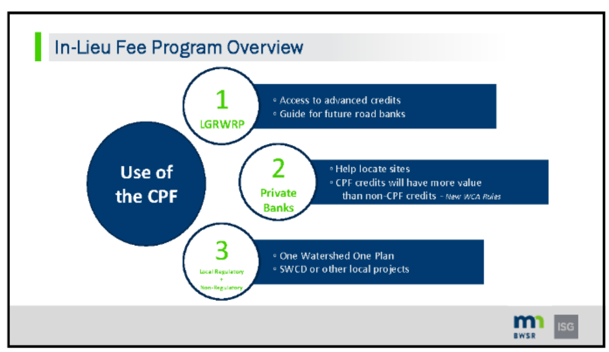

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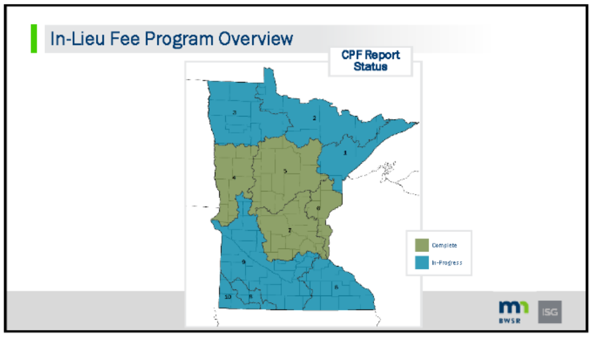
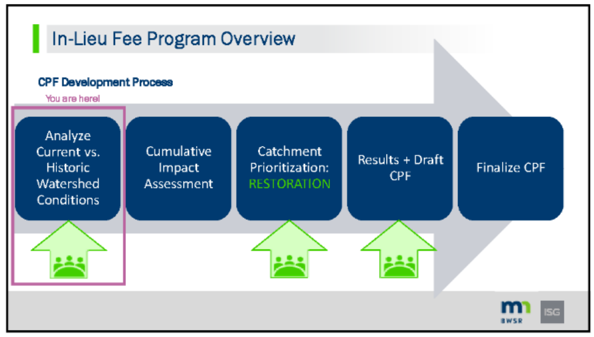

In-Lieu Fee Program Overview
CPF Report Status
Complete
In-Progress
BWSR
ISG

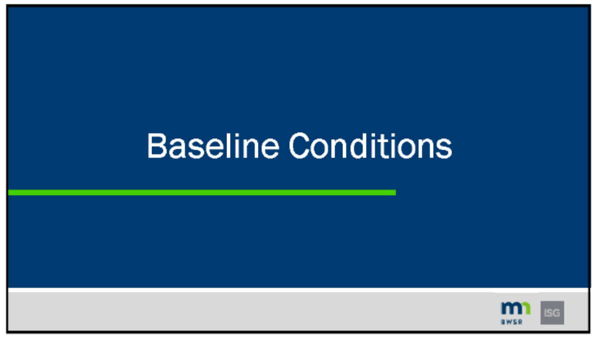
7


In-Lieu Fee Program Overview
CPF Development Process
You are here!
Analyze Current vs. Historic Watershed Conditions
Cumulative Impact Assessment
Catchment Prioritization: RESTORATION
Results + Draft CPF
Finalize CPF
BWSR
ISG

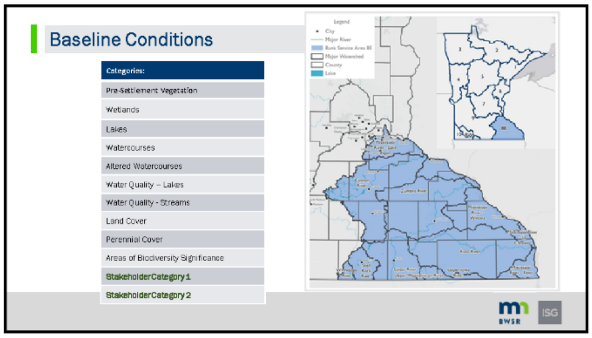
8


In-Lieu Fee Program Overview
Key CPF Development Component
Stakeholder Input
Nothing replaces local knowledge
Input on appropriate data sources
State + Local
Leads us through local plans
Identifies the most important watershed goals
BWSR
ISG

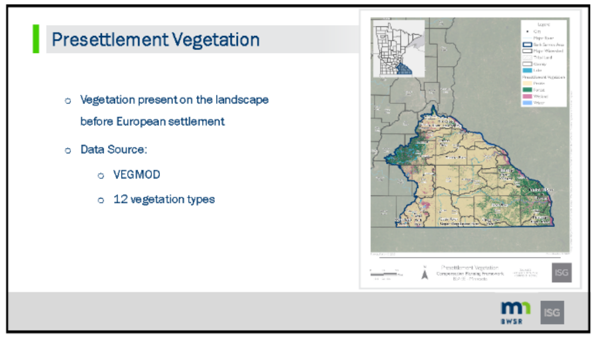
9


Baseline Conditions
BWSR
ISG

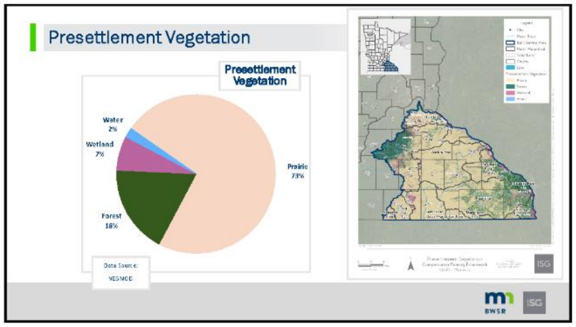
10


Baseline Conditions
Categories:
Pre-Settlement Vegetation
Wetlands
Lakes
Watercourses
Altered Watercourses
Water Quality – Lakes
Water Quality - Streams
Land Cover
Perennial Cover
Areas of Biodiversity Significance
StakeholderCategory 1
StakeholderCategory 2
BWSR
ISG

11


Presettlement Vegetation
Vegetation present on the landscape before European settlement
Data Source:
VEGMOD
12 vegetation types
BWSR
ISG

12



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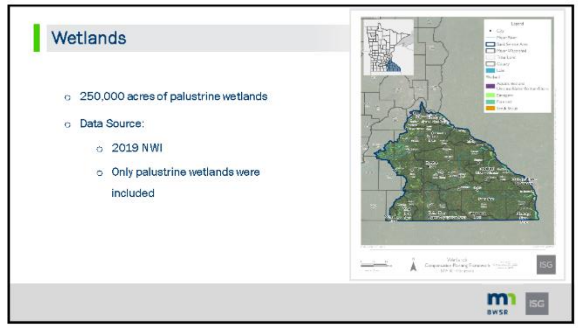

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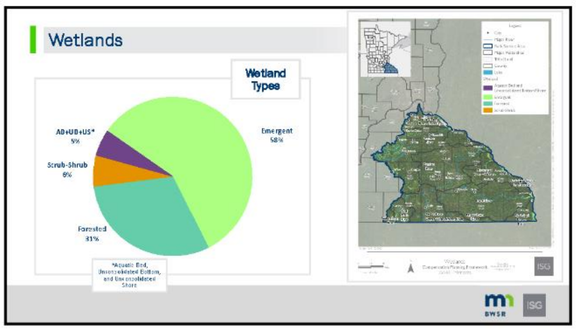

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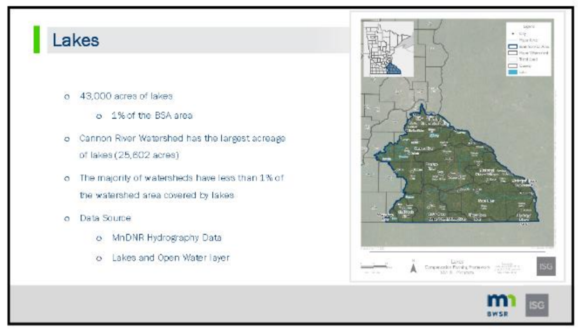

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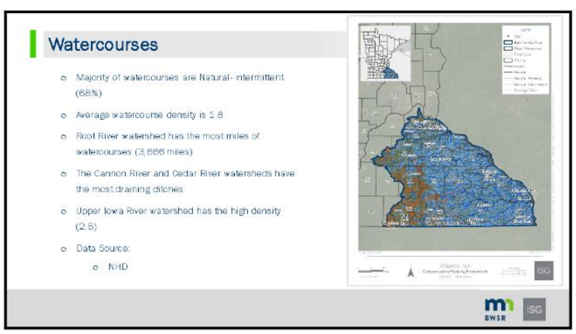

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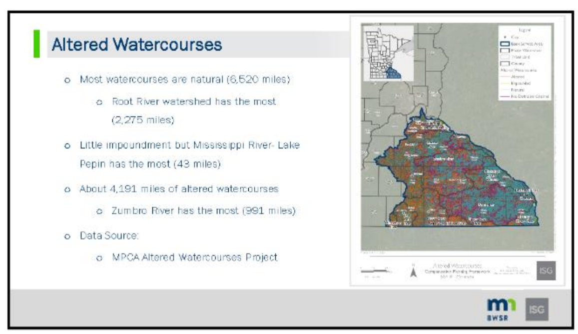

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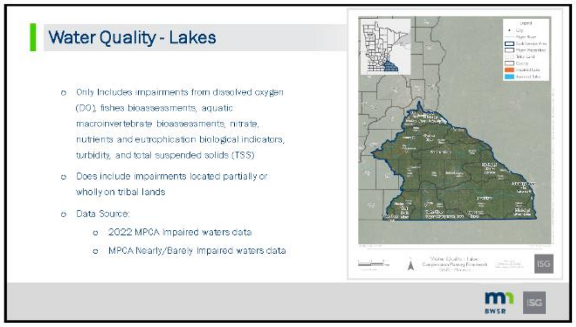

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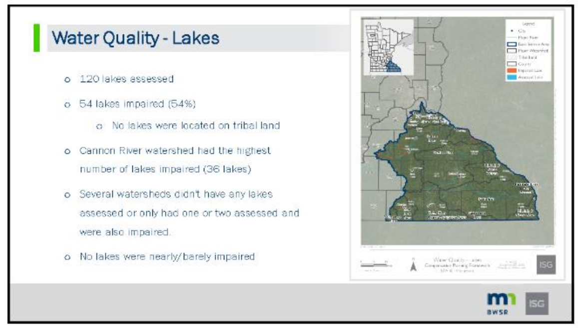

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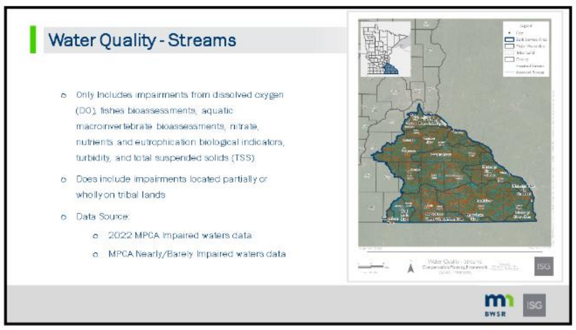

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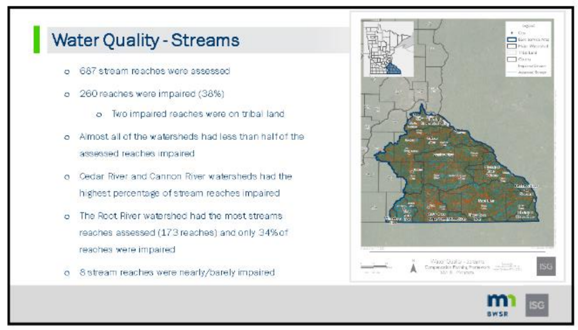

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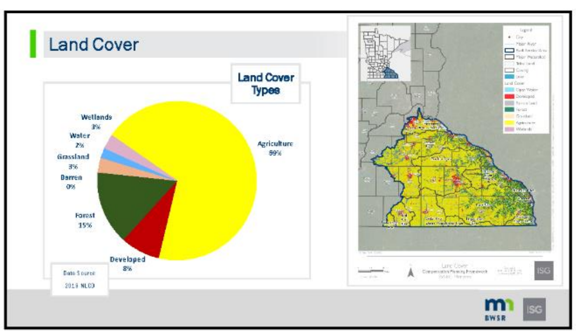

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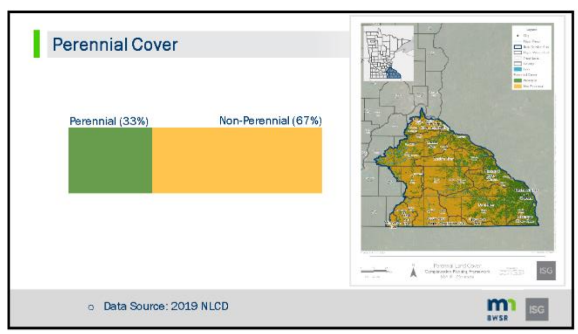

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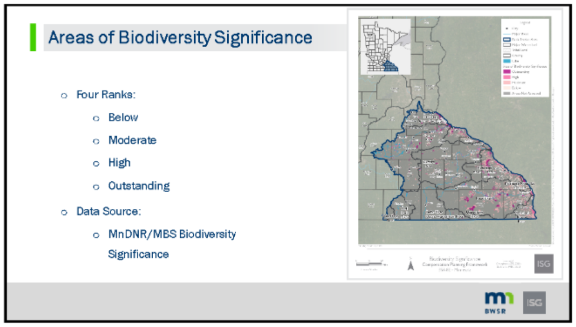

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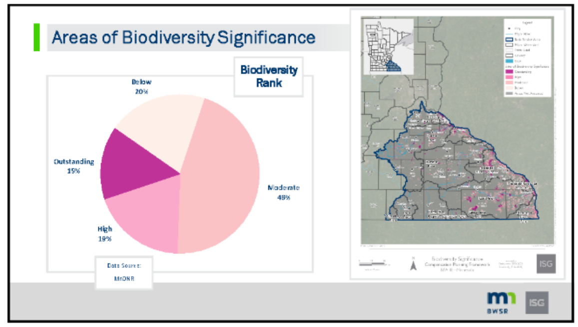

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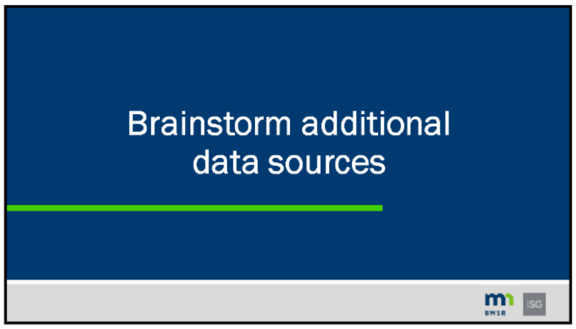

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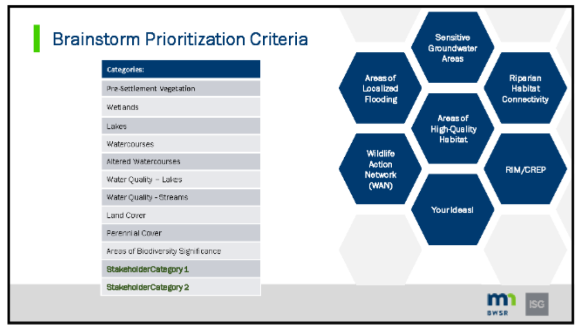

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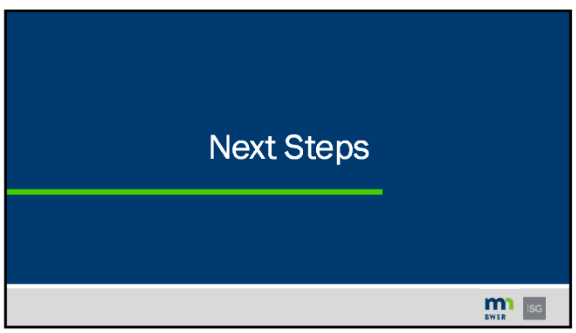

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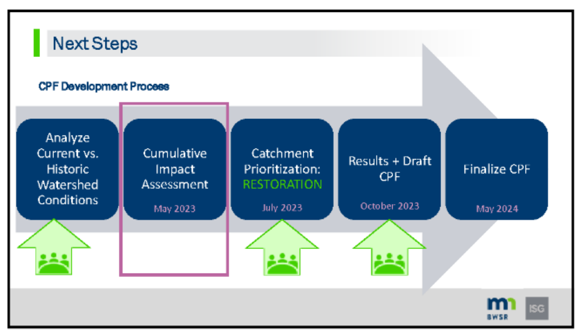

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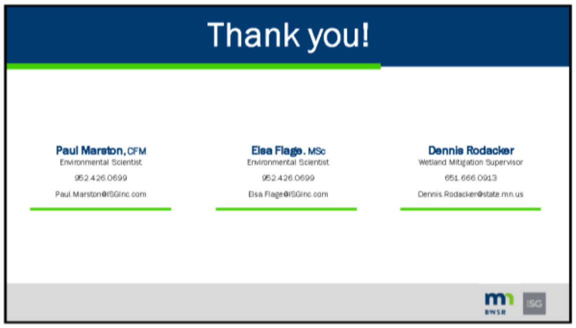
Thank you!
Paul Marston, CFM
Environmental Scientist
952.426.0699
Paul.Marston@ISGinc.com
Elsa Flage, MSc
Environmental Scientist
952.426.0699
Elsa.Flage@ISGinc.com
Dennis Rodacker
Wetland Mitigation Supervisor
651.666.0913
Dennis.Rodacker@state.mn.us
BWSR
ISG

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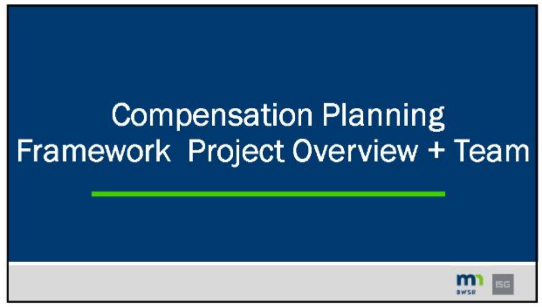
C-2. Meeting 2- August 2023 Stakeholder Meeting List of Attendees

First Name	Last Name	Email	Organization
Mac	Cafferty	mcafferty@lakevillemn.gov	City of Lakeville
Jed	Chestnut	jed.chesnut@state.mn.us	BWSR
Dave	Copeland	david.copeland@state.mn.us	BWSR BC
Lauren	Cornelius	Lauren.cornelius@co.dodge.mn.us	Dodge County
Nicole	DeWeese	deweese.nichole@epa.gov	EPA
Kristen	Dieterman	Kristen.Dieterman@state.mn.us	MPCA
Amanda	Gentry	amanda.gentry@winonaswcd.com	Winona County SWCD
Sheila	Harmes	sharmes@co.winona.mn.us	Stockton-Rollingstone-MN City WD
Chad	Hildebrand	childebrand@goodhueswcd.org	Goodhue SWCD
David	Holmen	David.holmen@co.dakota.mn.us	Dakota SWCD
Steven	Jahnke	sjahnke@ci.albertlea.mn.us	City of Albert Lea
Skip	Langer	langer.skip@co.olmsted.mn.us	Olmsted SWCD
Steve	Lawler	steve@mowerdistrict.org	Mower SWCD
Nicole	Lehman	nicole.lehman@state.mn.us	DNR Hydrologist
Ann	Messerschmidt	amesserschmidt@lakevillemn.gov	City of Lakeville
Rebecca	Novak	rebecca.novak@state.mn.us	MnDOT
John	Ryther	jryther@ci.albertlea.mn.us	City of Albert Lea
Jarrett	Spitzack	Jarett.Spitzack@riceswcd.org	Rice SWCD
Travis	Thiel	travis.thiel@co.dakota.mn.us	Dakota County

C-2. Meeting 2- August 2023 Stakeholder Meeting Presentation

1



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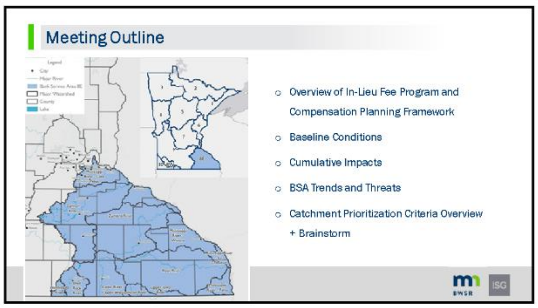

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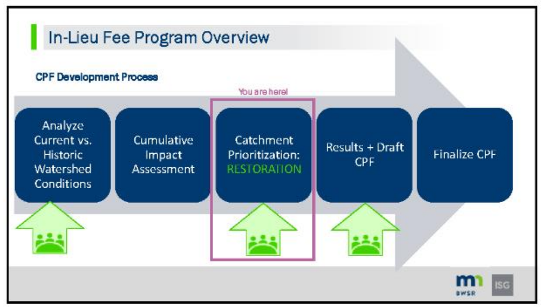

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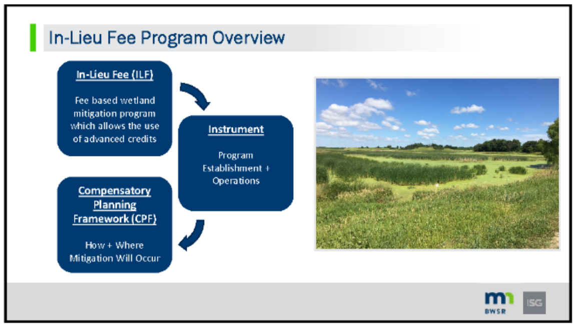
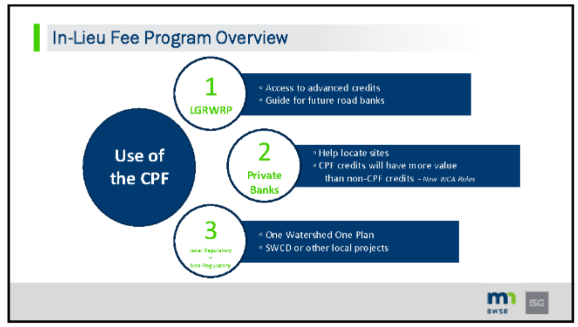
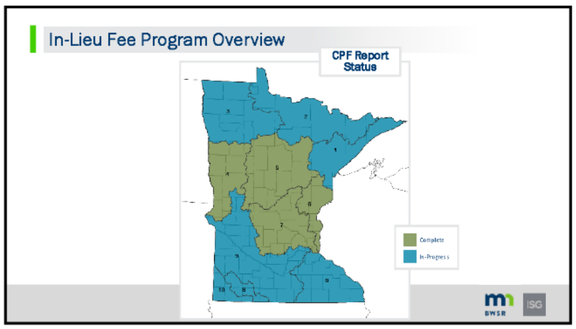

In-Lieu Fee Program Overview
In-Lieu Fee (ILF)
Fee based wetland mitigation program which allows the use of advanced credits
Instrument
Program Establishment + Operations
Compensatory Planning Framework (CPF)
How + Where Mitigation Will Occur

7


In-Lieu Fee Program Overview
Use of the CPF
1
LGRWRP
Access to advanced credits
Guide for future road banks
2
Private Banks
Help locate sites
CPF credits will have more value than non-CPF credits - New WCA Rules
3
Local Regulatory
-
Non-Regulatory
One Watershed One Plan
SWCD or other local projects

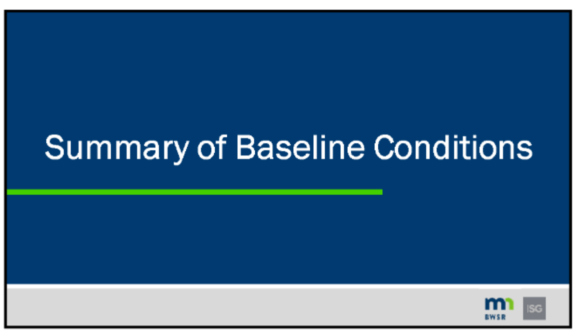
8


In-Lieu Fee Program Overview
CPF Report Status

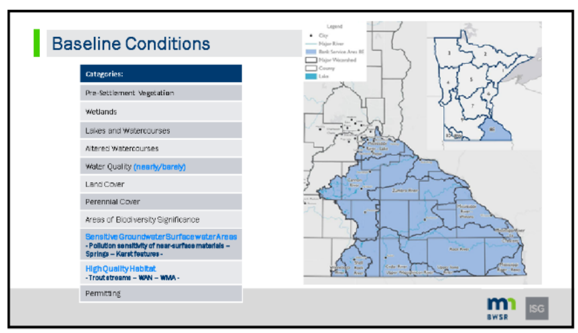
9


In-Lieu Fee Program Overview
Key CPF Development Component
Stakeholder Input
Nothing replaces local knowledge
Input on appropriate data sources
State + Local
Leads us through local plans
Identifies the most important watershed goals

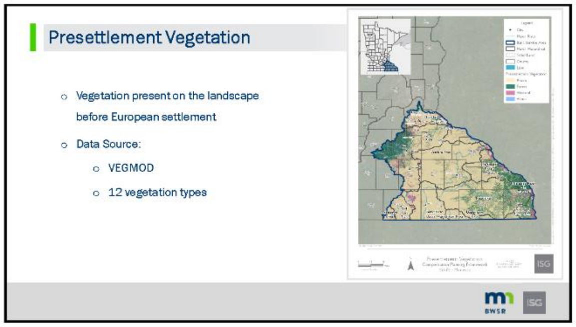
10


Summary of Baseline Conditions

11


Baseline Conditions
Categories:
Pre-Settlement Vegetation
Wetlands
Lakes and Watercourses
Altered Watercourses
Water Quality (nearly/barely)
Land Cover
Perennial Cover
Areas of Biodiversity Significance
Sensitive Groundwater Surface water Areas
- Pollution sensitivity of near-surface materials – Springs – Karst features -
High Quality Habitat
- Trout streams – WAN – WMA -
Permitting

12



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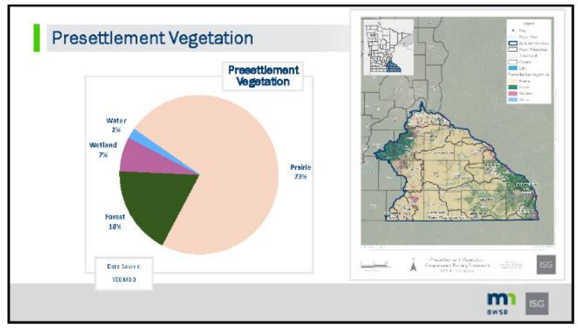

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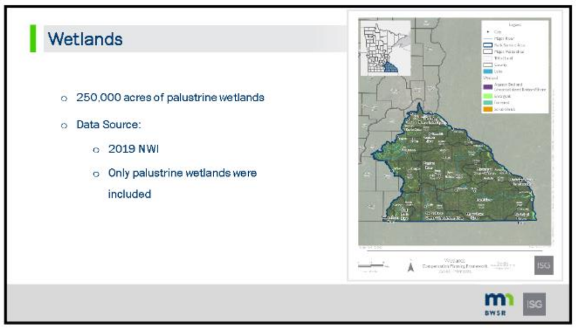

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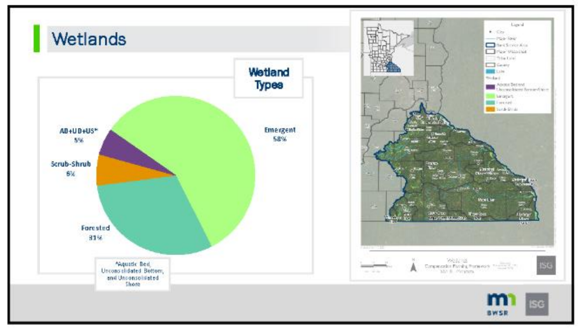

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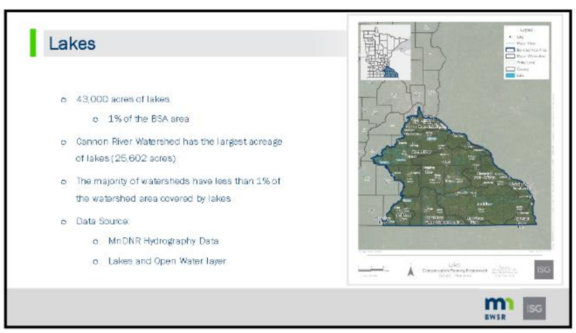

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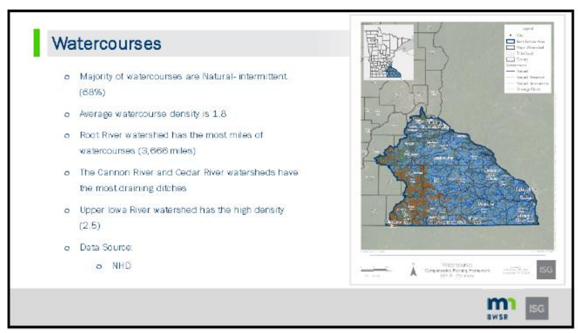

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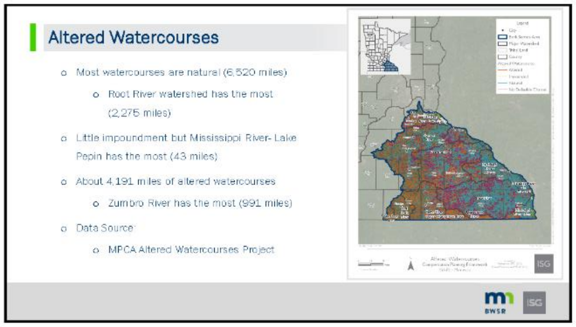

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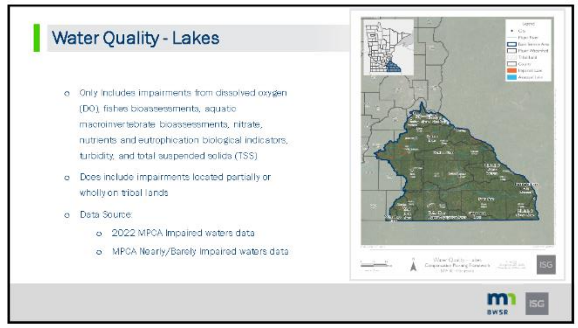

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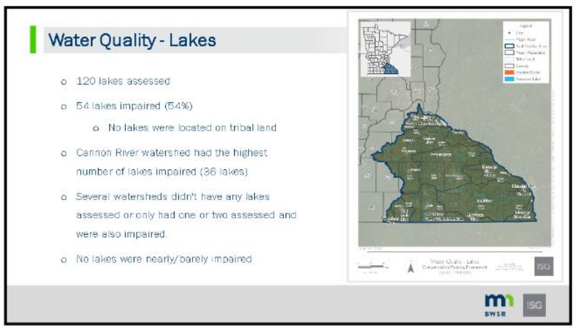

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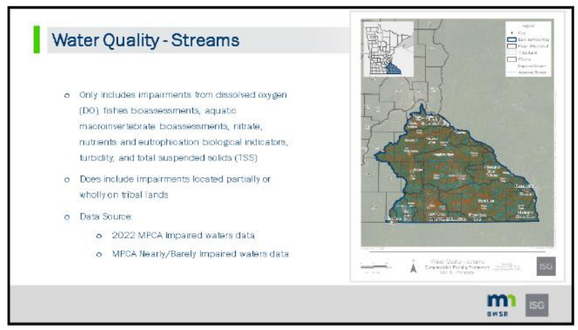

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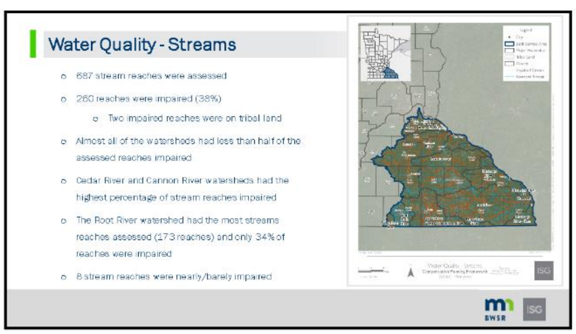

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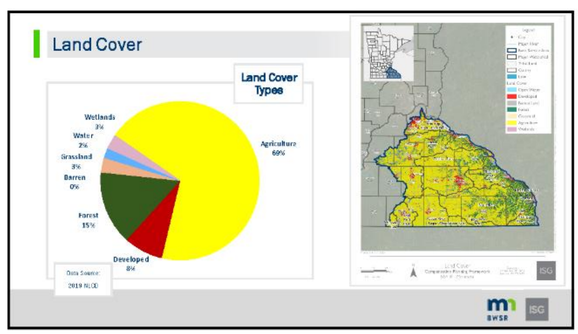

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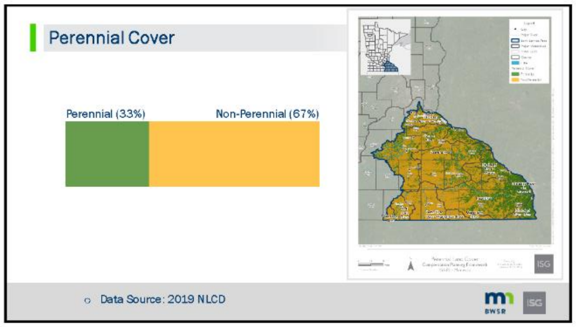

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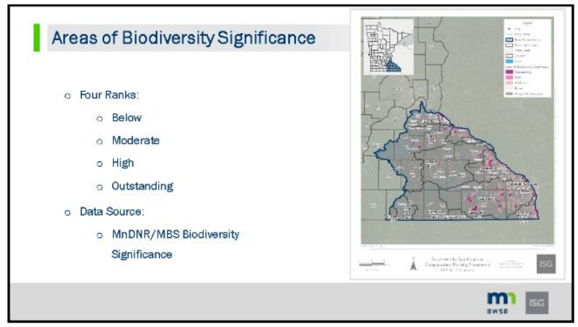

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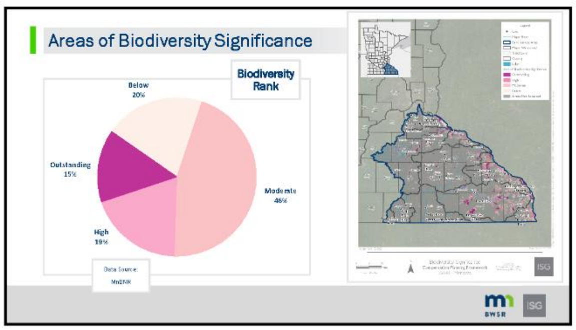

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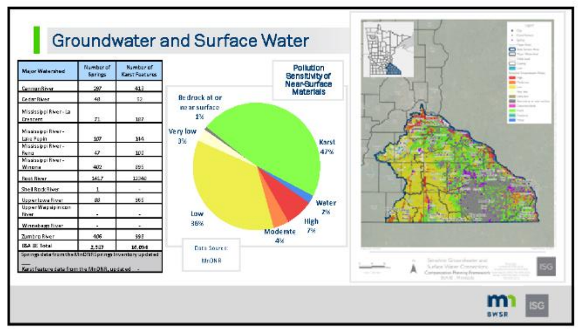
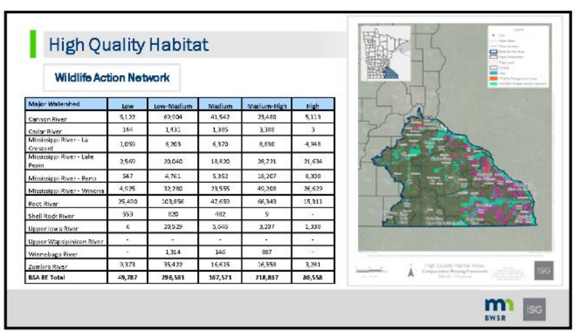


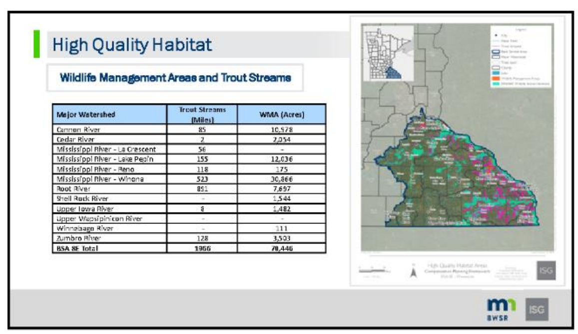
Major Watershed	Number of Springs	Number of Karst Features
Cannon River	297	413
Cedar River	48	12
Mississippi River - La Crescent	71	187
Mississippi River - Lake Pepin	107	144
Mississippi River - Reno	47	103
Mississippi River - Winona	402	895
Root River	1417	13340
Shell Rock River	1	-
Upper Iowa River	88	565
Upper Wapsipinicon River	-	-
Winnebago River	-	-
Zumbro River	406	598
BSA 8E Total	2,937	16,094
Springs data from the MnDNR Springs Inventory updated ___ Karst Feature data from the MnDNR, updated ___		

28



Major Watershed	Low	Low-Medium	Medium	Medium-High	High
Cannon River	5,122	69,904	41,542	23,480	5,113
Cedar River	144	1,431	1,385	3,388	3
Mississippi River - La Crescent	1,059	6,203	6,370	8,830	4,948
Mississippi River - Lake Pepin	2,560	20,040	18,820	28,721	21,634
Mississippi River - Reno	547	4,761	5,352	18,207	8,300
Mississippi River - Winona	4,925	32,280	23,555	49,208	26,629
Root River	25,400	103,856	47,650	66,343	15,311
Shell Rock River	553	820	482	9	-
Upper Iowa River	6	20,529	5,646	3,207	1,338
Upper Wapsipinicon River	-	-	-	-	-
Winnebago River	-	1,314	146	887	-
Zumbro River	9,373	35,422	16,615	16,558	3,281
BSA 8E Total	49,787	296,581	167,571	218,887	86,558

29



Major Watershed	Trout Streams (Miles)	WMA (Acres)
Cannon River	85	10,978
Cedar River	2	2,054
Mississippi River - La Crescent	56	-
Mississippi River - Lake Pepin	155	12,036
Mississippi River - Reno	118	175
Mississippi River - Winona	523	30,866
Root River	891	7,697
Shell Rock River	-	1,544
Upper Iowa River	8	1,482
Upper Wapsipinicon River	-	-
Winnebago River	-	111
Zumbro River	128	3,503
BSA 8E Total	1966	70,446

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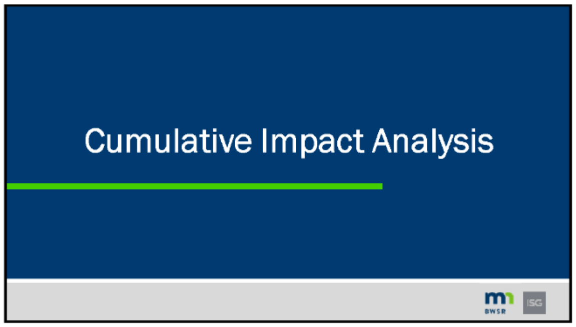

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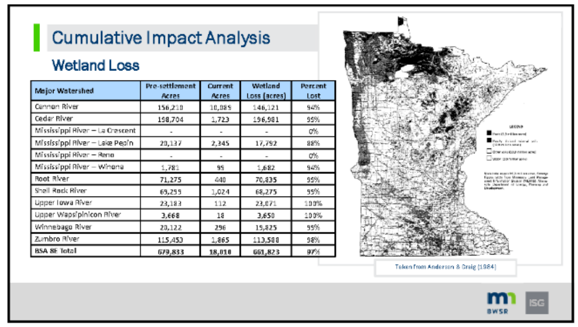

Major Watershed	Pre-settlement Acres	Current Acres	Wetland Loss (acres)	Percent Lost
Cannon River	156,210	10,089	146,121	94%
Cedar River	198,704	1,723	196,981	99%
Mississippi River – La Crescent	-	-	-	0%
Mississippi River – Lake Pepin	20,137	2,345	17,792	88%
Mississippi River – Reno	-	-	-	0%
Mississippi River – Winona	1,781	99	1,682	94%
Root River	71,275	440	70,835	99%
Shell Rock River	69,299	1,024	68,275	99%
Upper Iowa River	23,183	112	23,071	100%
Upper Wapsipinicon River	3,668	18	3,650	100%
Winnebago River	20,122	296	19,825	99%
Zumbro River	115,453	1,865	113,588	98%
BSA 8E Total	679,833	18,010	661,823	97%

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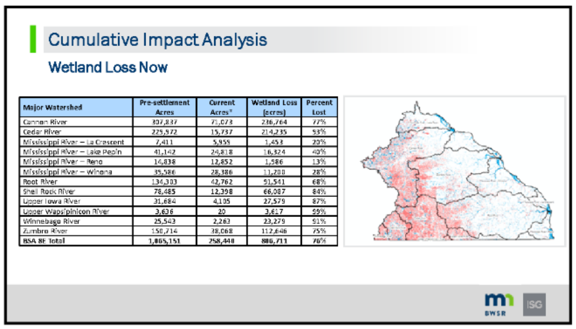

Major Watershed	Pre-settlement Acres	Current Acres*	Wetland Loss (acres)	Percent Lost
Cannon River	307,837	71,073	236,764	77%
Cedar River	229,972	15,737	214,235	93%
Mississippi River – La Crescent	7,411	5,959	1,453	20%
Mississippi River – Lake Pepin	41,142	24,818	16,324	40%
Mississippi River – Reno	14,838	12,852	1,986	13%
Mississippi River – Winona	39,586	28,386	11,200	28%
Root River	134,303	42,762	91,541	68%
Shell Rock River	78,485	12,398	66,087	84%
Upper Iowa River	31,684	4,105	27,579	87%
Upper Wapsipinicon River	3,636	20	3,617	99%
Winnebago River	25,543	2,263	23,279	91%
Zumbro River	150,714	38,068	112,646	75%
BSA 8E Total	1,065,151	258,440	806,711	76%

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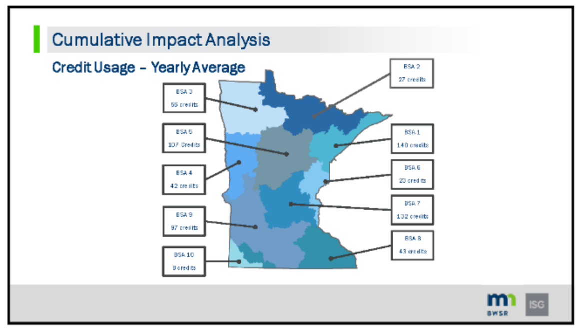

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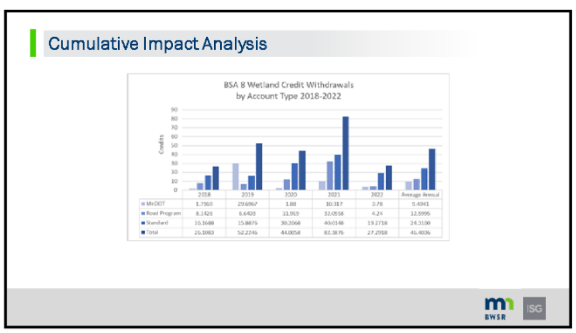

	2018	2019	2020	2021	2022	Average Annual
MnDOT	1.7969	29.6967	1.88	10.317	3.78	9.4941
Road Program	8.1426	6.6408	11.919	32.0558	4.24	12.5995
Standard	16.1688	15.8875	30.2068	40.0148	19.2718	24.3100
Total	26.1083	52.2246	44.0058	82.3876	27.2918	46.4036

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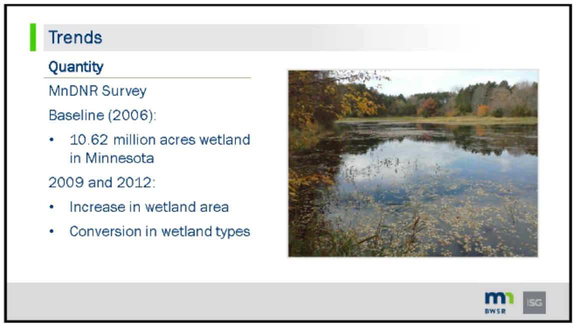

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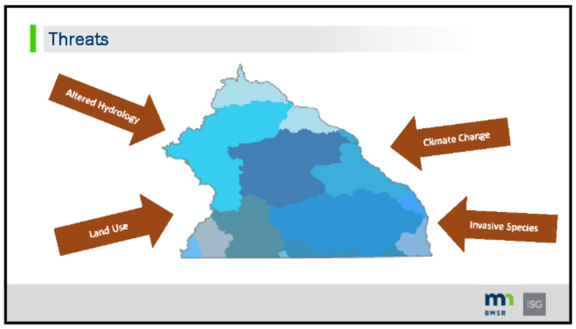

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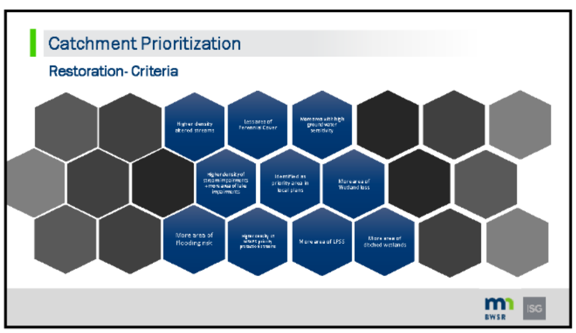

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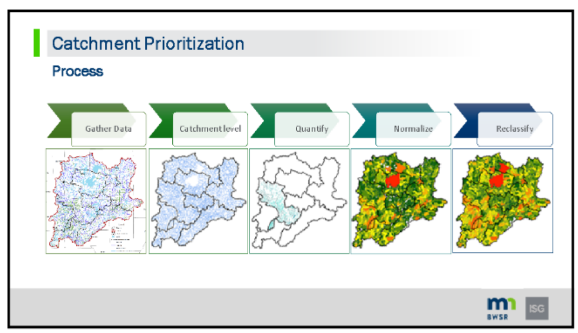

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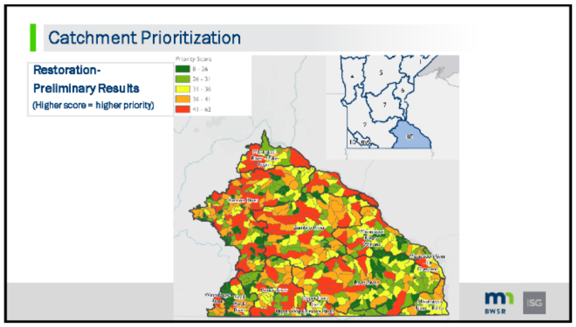

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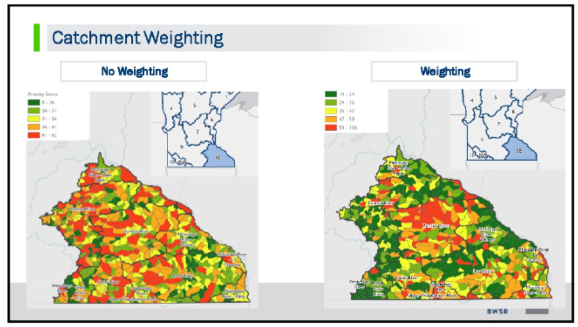

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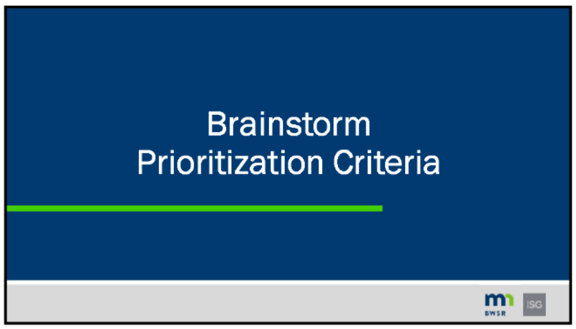

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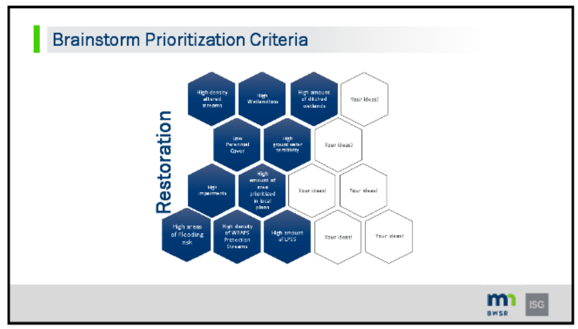

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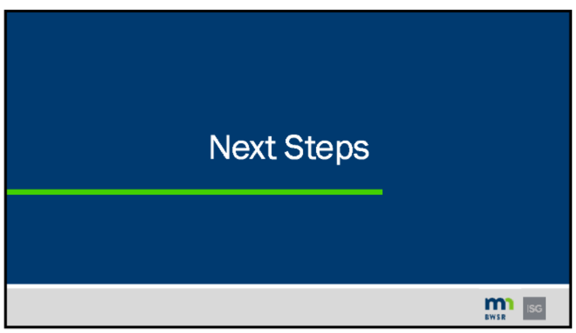

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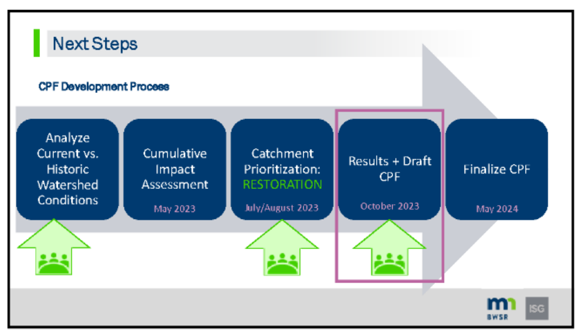

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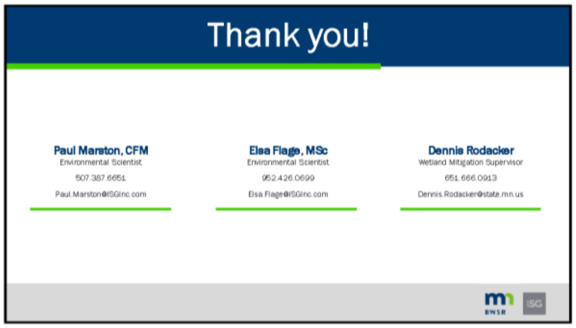
Thank you!
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651.666.0913
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BWSR
ISG

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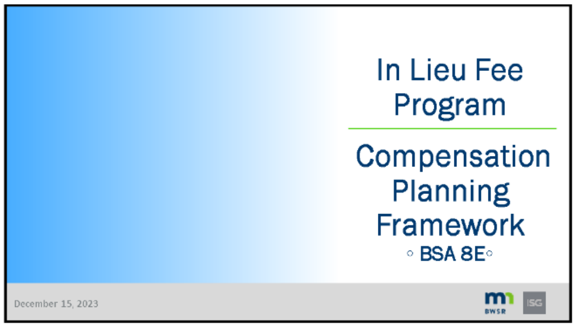
C-3. Meeting 3- December 2023 Stakeholder Meeting List of Attendees

First Name	Last Name	Email	Organization
Samantha	Berger	sberger@ci.apple-valley.mn.us	City of Apple Valley
Jed	Chestnut	jed.chesnut@state.mn.us	BWSR
Dave	Copeland	david.copeland@state.mn.us	BWSR BC
Lauren	Cornelius	Lauren.cornelius@co.dodge.mn.us	Dodge County
Kristen	Dieterman	Kristen.Dieterman@state.mn.us	MPCA
Kenny	Famakinwa	kenny.famakinwa@co.nicollet.mn.us	Nicollet County
Ashley	Gallagher	ashley.gallagher@co.dakota.mn.us	North Cannon River WMO
Chad	Hildebrand	childebrand@goodhueswcd.org	Goodhue SWCD
David	Holmen	David.holmen@co.dakota.mn.us	Dakota SWCD
Beau	Kennedy	bkennedy@goodhueswcd.org	Belle Creek WD
Skip	Langer	langer.skip@co.olmsted.mn.us	Olmsted SWCD
Stacey	Lijewski	stacey.lijewski@hennepin.us	Hennepin County
John	Ryther	jryther@ci.albertlea.mn.us	City of Albert Lea
Michael	Schultz	mschultz@co.le-sueur.mn.us	SWCD - Le Sueur
Jarrett	Spitzack	Jarett.Spitzack@riceswcd.org	Rice SWCD
Henry	Stelten	henry.stelten@piic.org	Prairie Island Indian Community
Brian	Watson	brian.watson@co.dakota.mn.us	SWCD - Dakota
Rachel	Wehner	rachel.wehner@co.freeborn.mn.us	Freeborn County

C-3. Meeting 3- December 2023 Stakeholder Meeting Presentation



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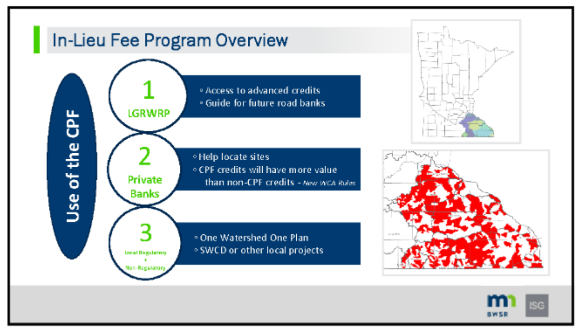

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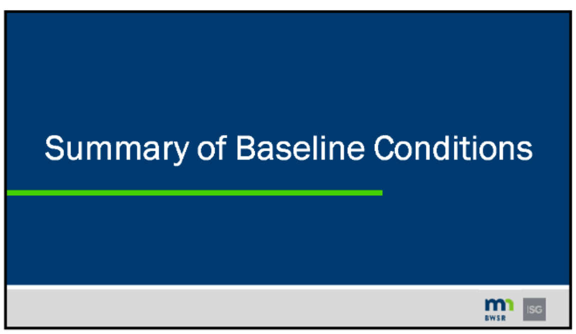

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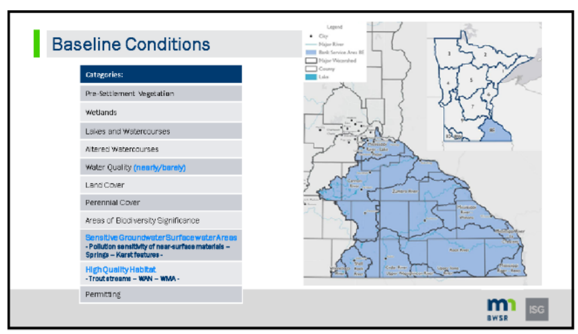


6

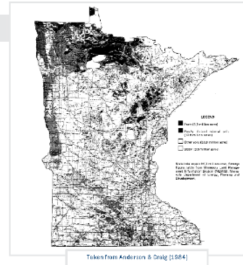
Cumulative Impact Analysis

7

Cumulative Impact Analysis

Wetland Loss

Methodology	Presettlement Wetlands (Acres)	Current Wetlands (Acres)	% Loss
Anderson and Craig (1984)	680,000	18,000	97%
Soils + NWI Analysis	1 Million	258,000	76%



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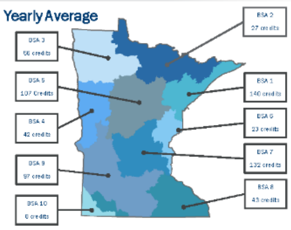
Cumulative Impact Analysis

Credit Usage – Yearly Average



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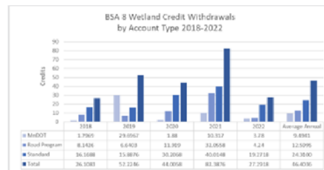
Cumulative Impact Analysis



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BSA
Trends and Threats

11

Trends

Quantity

MnDNR Survey

Baseline (2006):

- 10.62 million acres wetland in Minnesota

2009 and 2012:

- Increase in wetland area
- Conversion in wetland types

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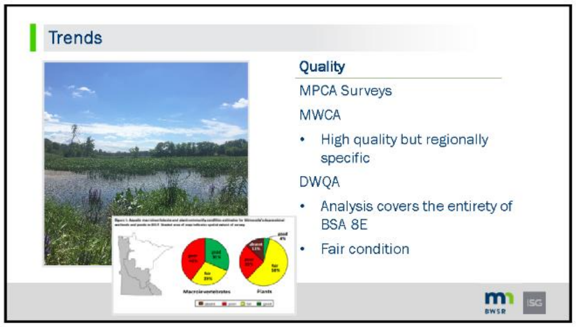

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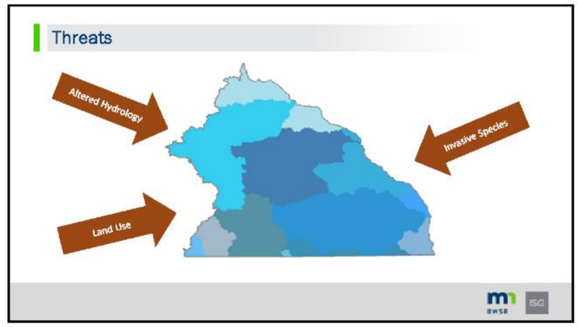

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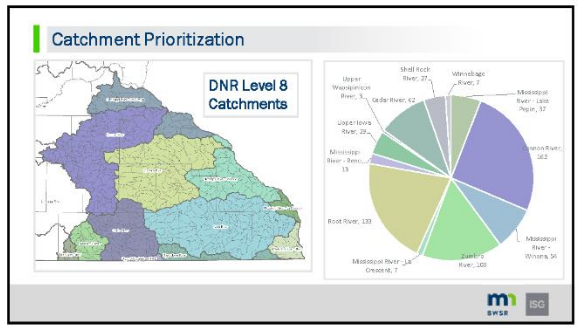

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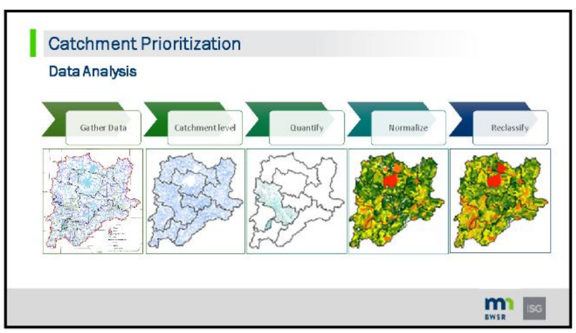

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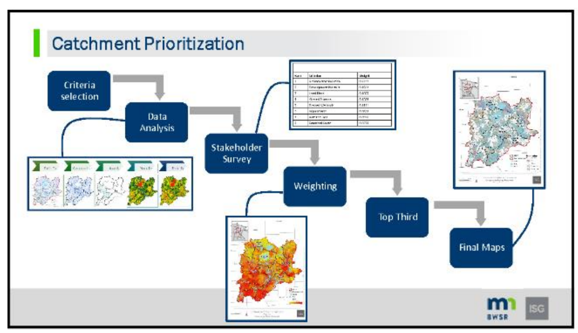

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Catchment Prioritization

Restoration- Criteria

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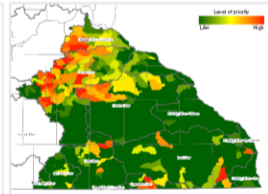
Catchment Prioritization

Restoration

Drained Wetlands

- Areas of large amounts of drained wetlands
- Wetlands with "d" modifier in the NWI



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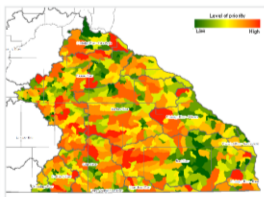
Catchment Prioritization

Restoration

Altered Streams

- Areas of high amounts of Impounded and Altered watercourses
- Lakes and No-definable Channel classification were removed
- Altered Watercourses data from the MPCA



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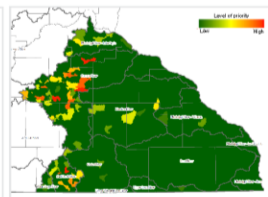
Catchment Prioritization

Restoration

Lakes of Phosphorous Sensitivity

- Lakes with higher sensitivity to phosphorous loading
- LPSS data from the MPCA



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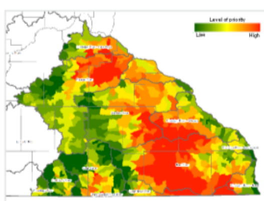
Catchment Prioritization

Restoration

Ground Water Pollution

- Areas of high sensitivity to ground water pollution
- Near-surface pollution sensitivity dataset from WHAF



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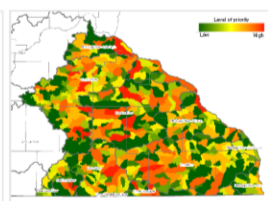
Catchment Prioritization

Restoration

Impairments

- Areas of high impairment
  - both lakes and river
- Combination of lake and stream impairments from MPCA and Water Quality- Non-Point Source score from WHAF



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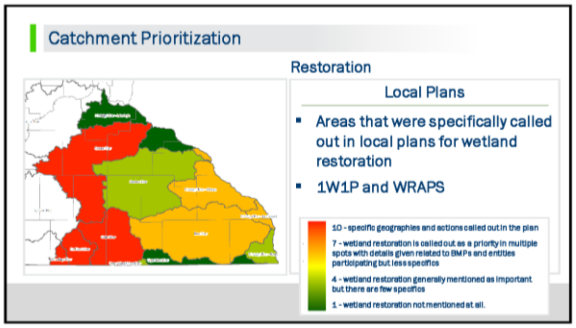

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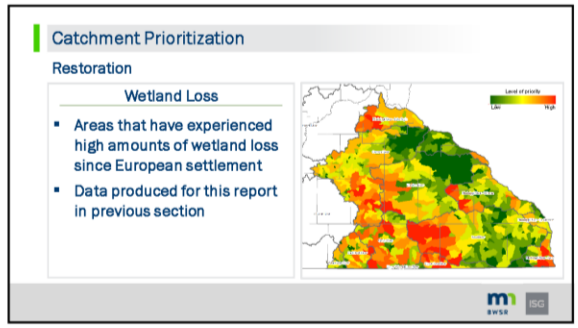

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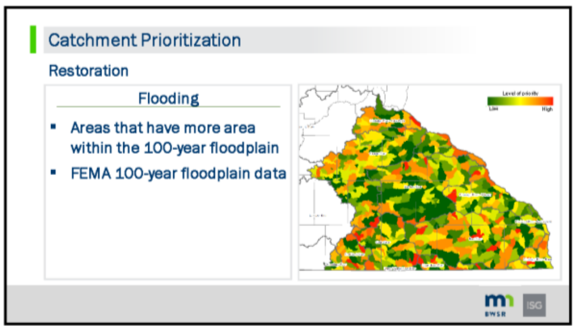

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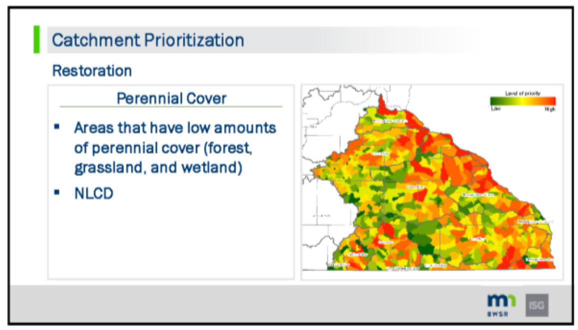

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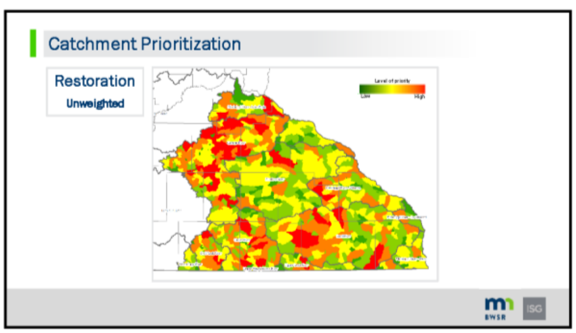

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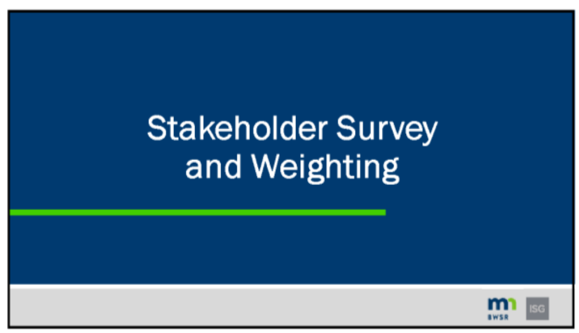

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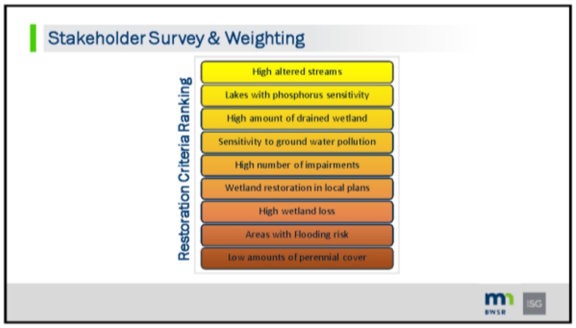

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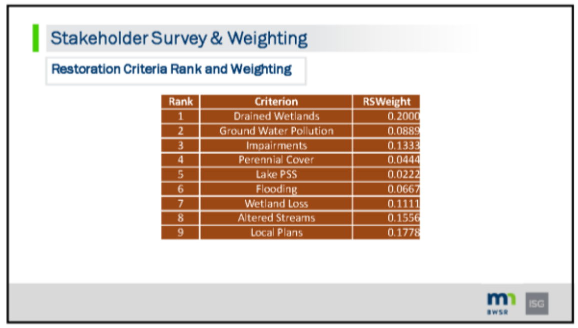
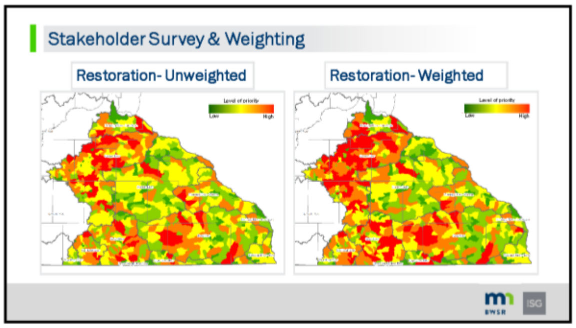


Rank	Criterion	RSWeight
1	Drained Wetlands	0.2000
2	Ground Water Pollution	0.0889
3	Impairments	0.1333
4	Perennial Cover	0.0444
5	Lake PSS	0.0222
6	Flooding	0.0667
7	Wetland Loss	0.1111
8	Altered Streams	0.1556
9	Local Plans	0.1778

32



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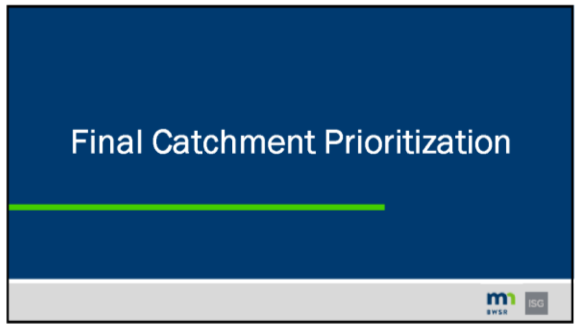

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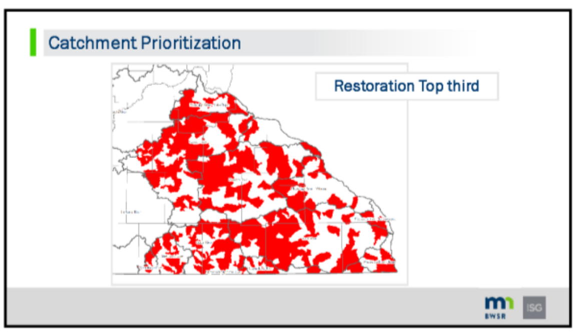

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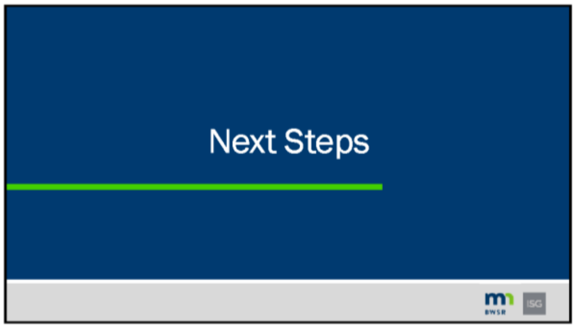
Next Steps

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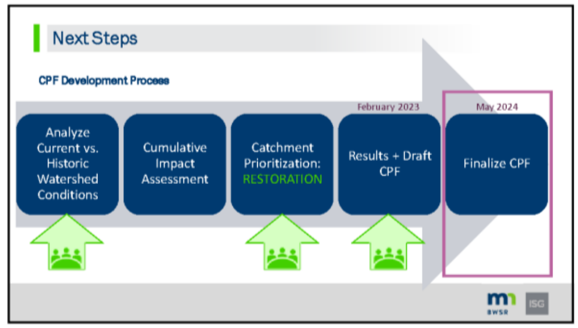
Next Steps
CPF Development Process
February 2023
May 2024
Analyze Current vs. Historic Watershed Conditions
Cumulative Impact Assessment
Catchment Prioritization: RESTORATION
Results + Draft CPF
Finalize CPF

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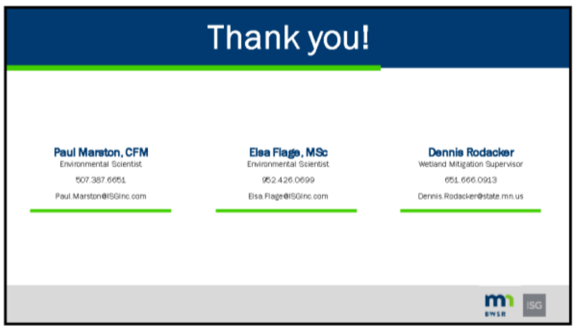
Thank you!
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Appendix D: Catchment Prioritization Maps

Figure D-1. Unweighted Restoration Catchment Prioritization

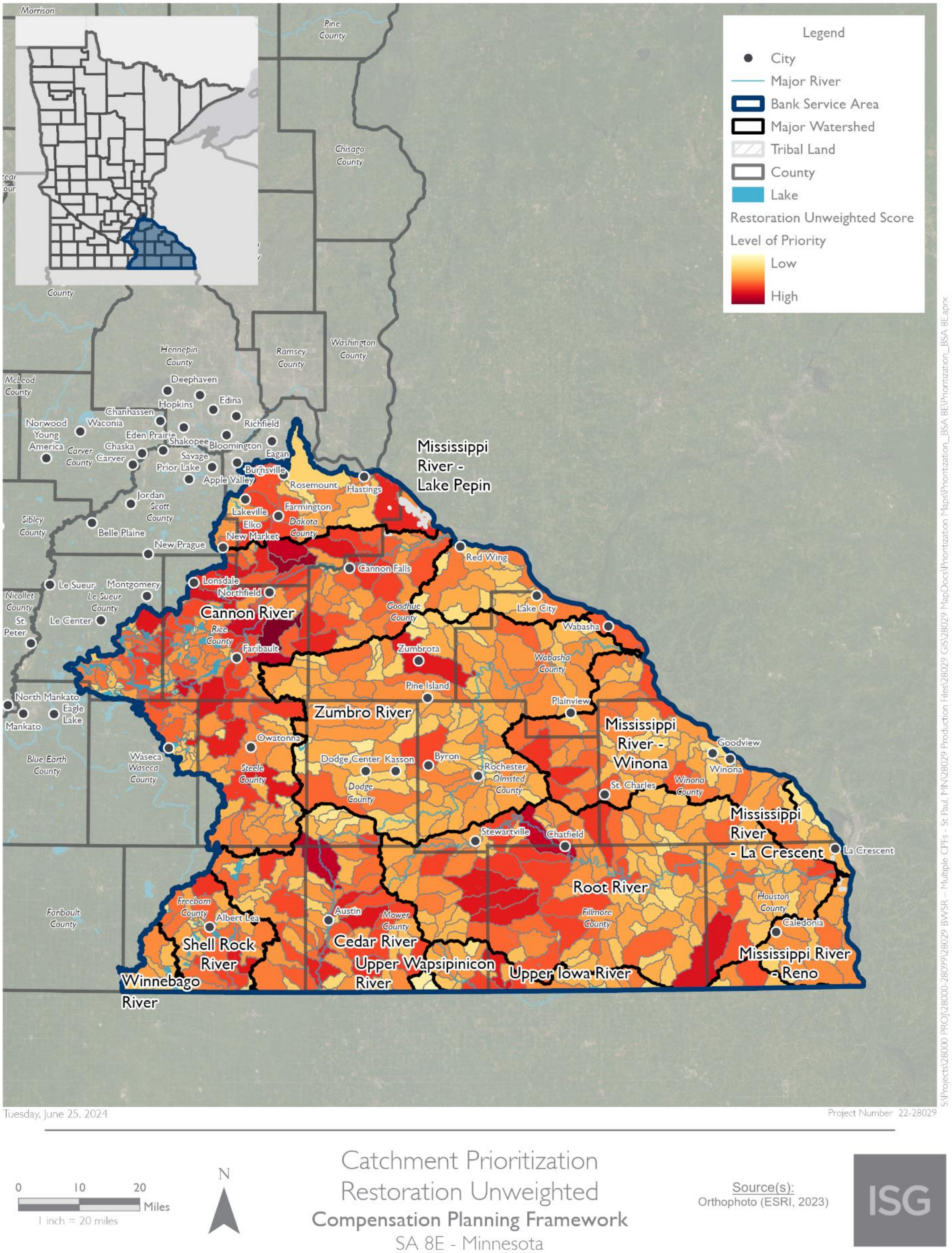


Figure D-2. Weighted Restoration Catchment Prioritization

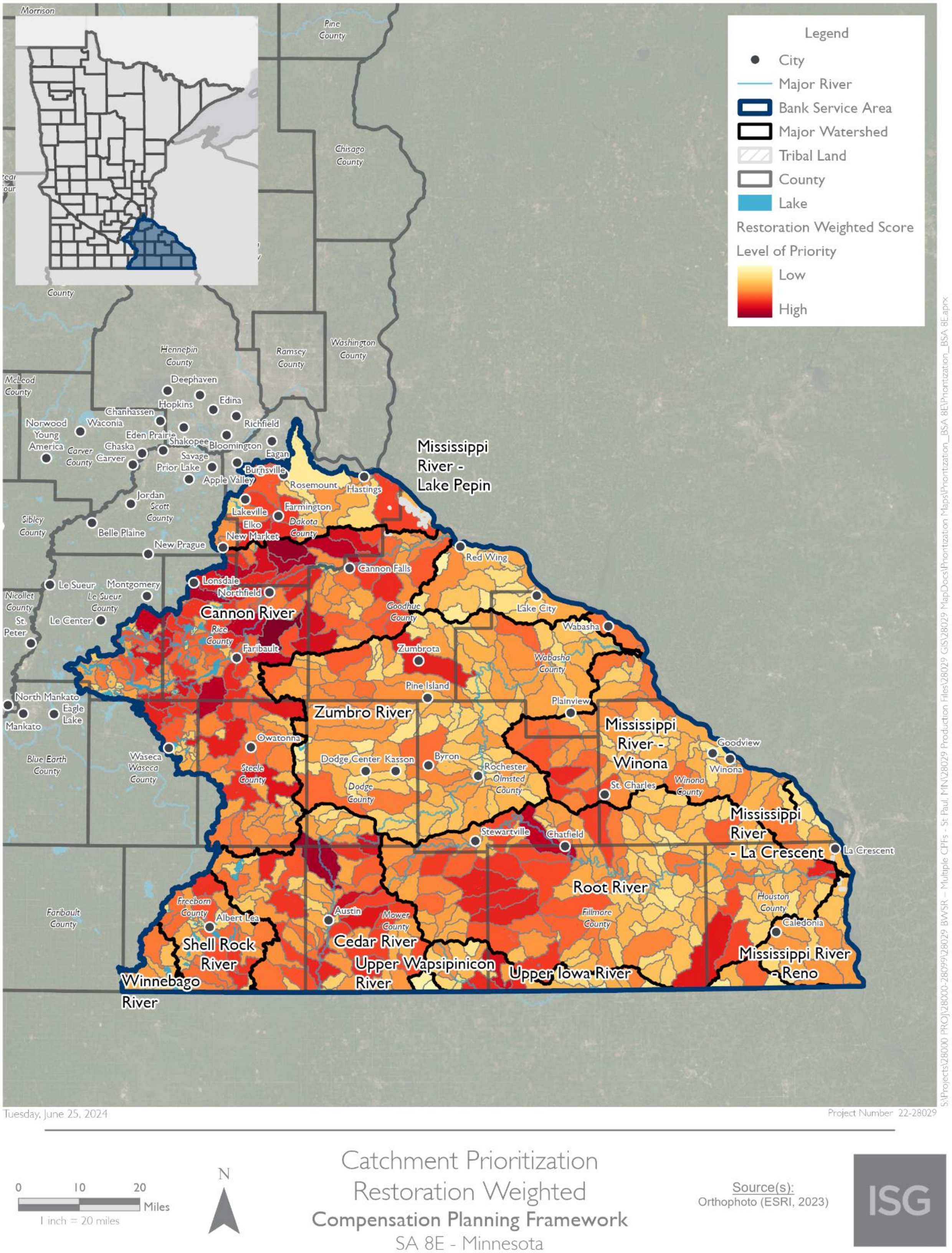


Figure D-3. Final Restoration Catchment Prioritization

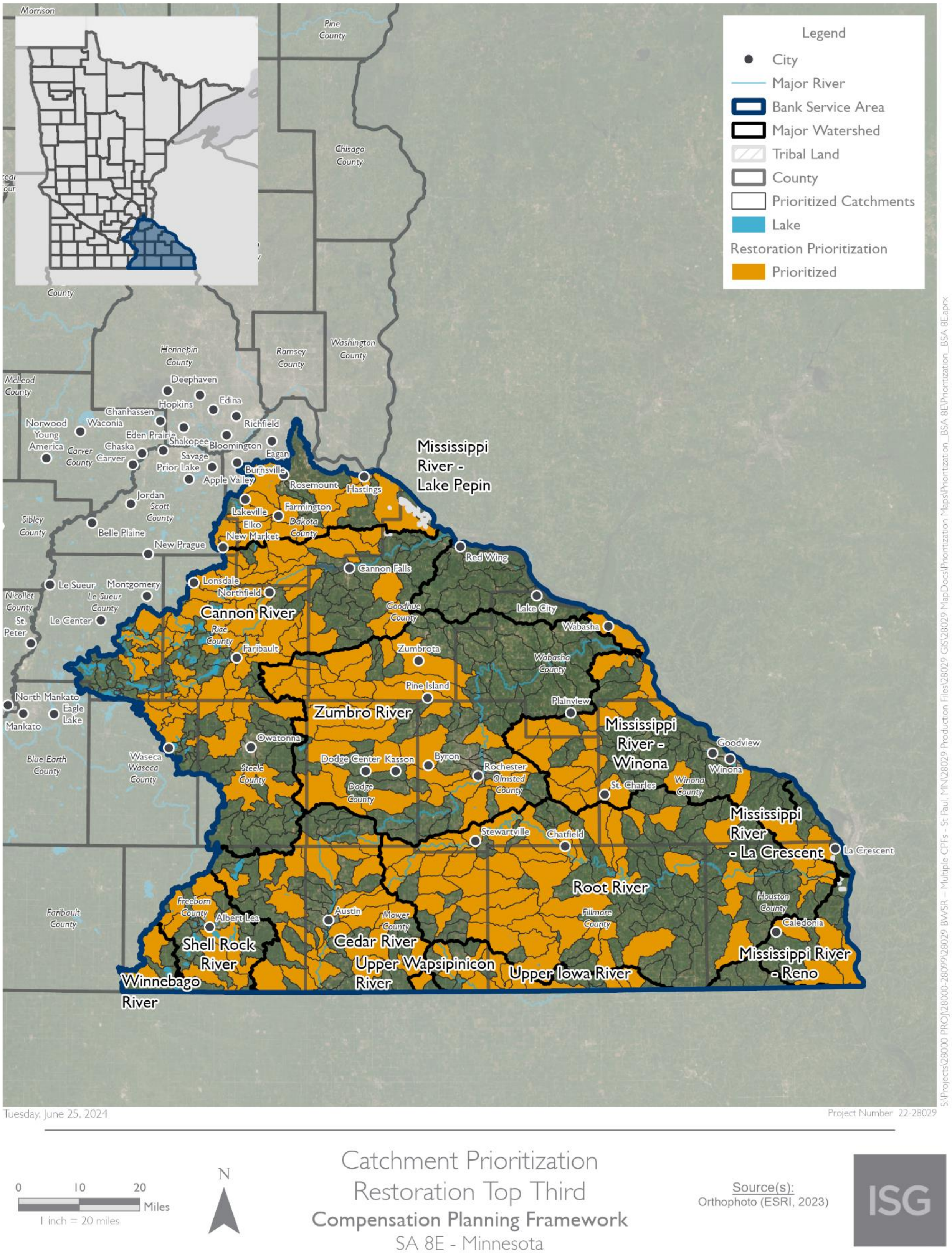


Figure D-4. Final Restoration Catchment Prioritization – Cannon River Watershed

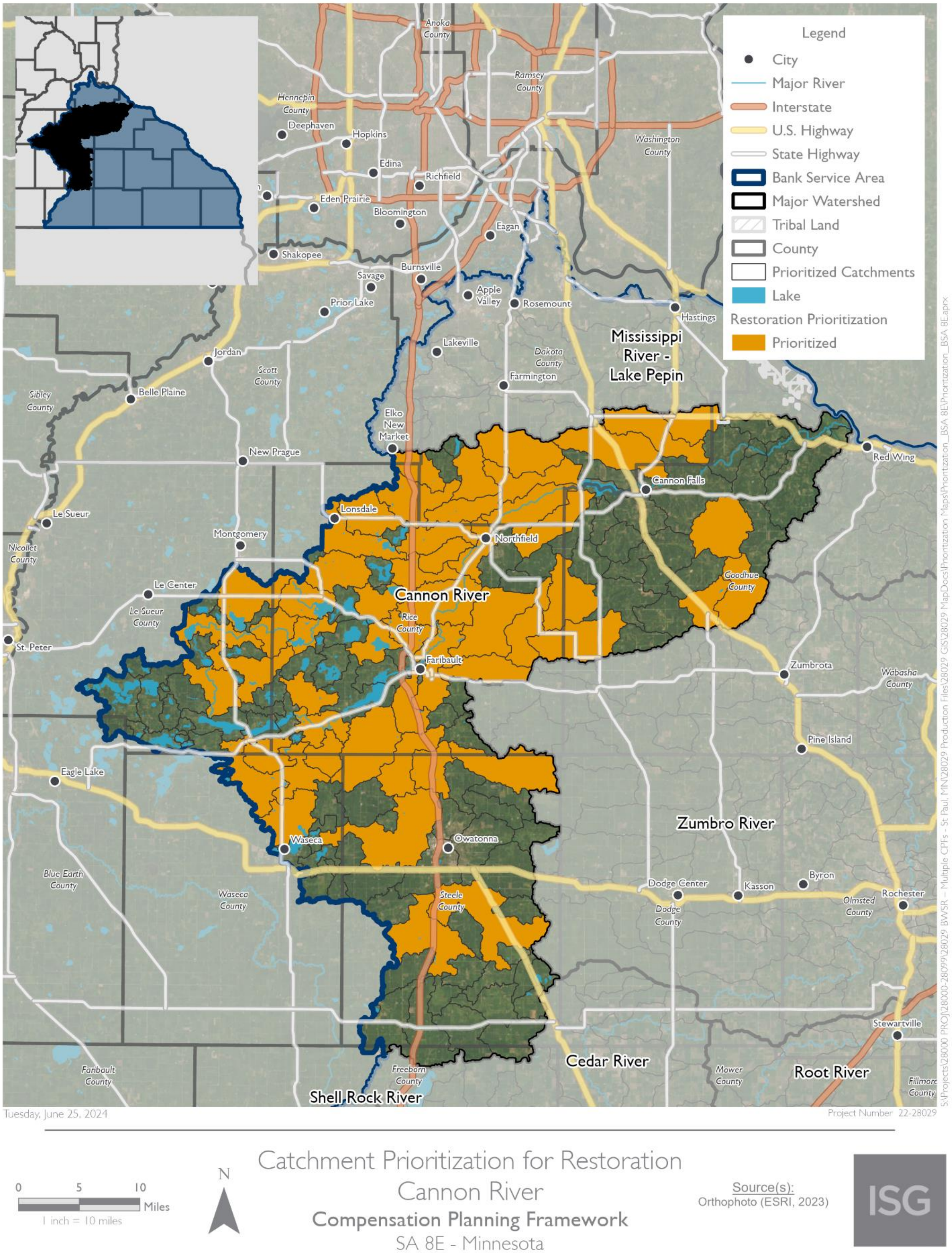


Figure D-4. Final Restoration Catchment Prioritization – Cedar River Watershed

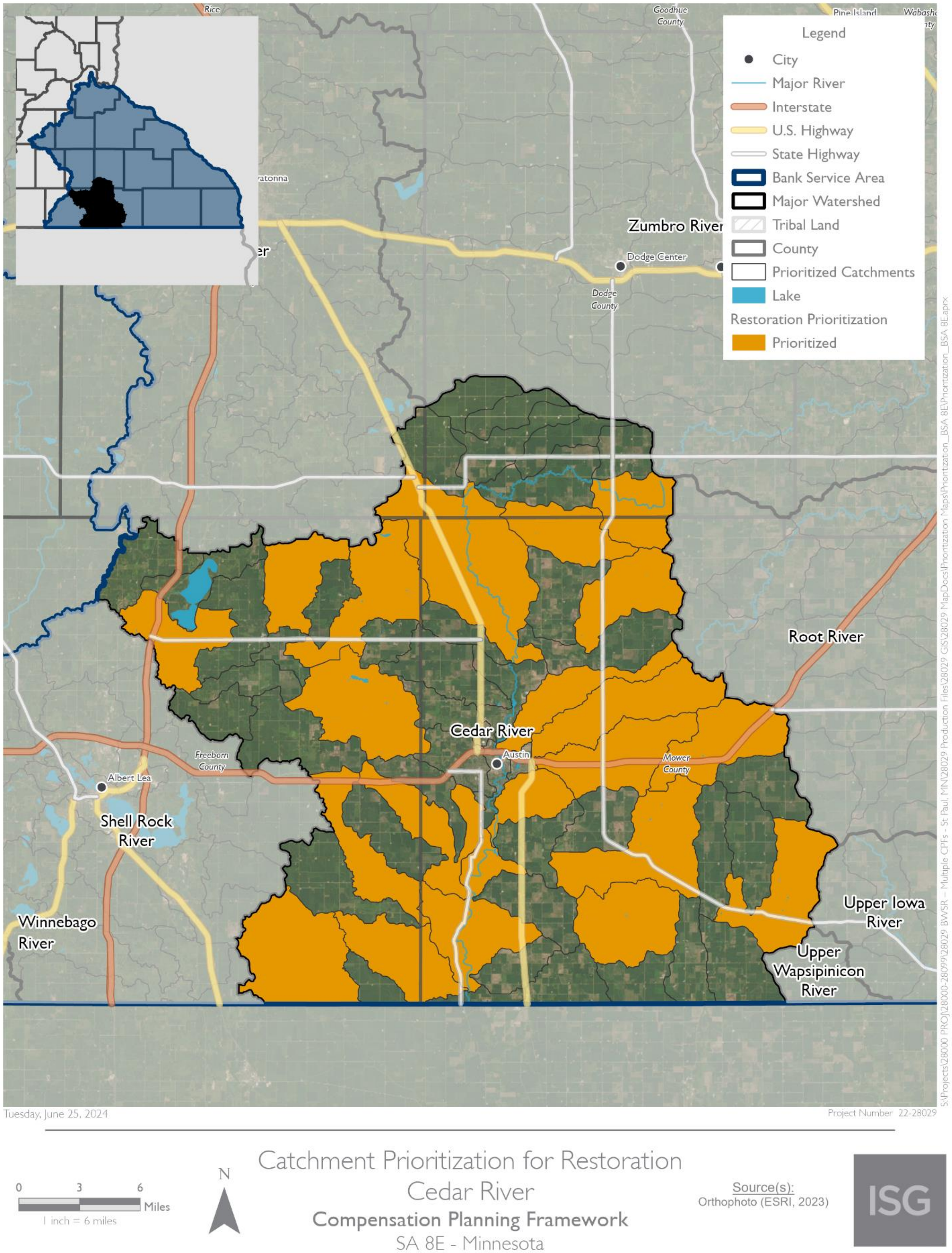
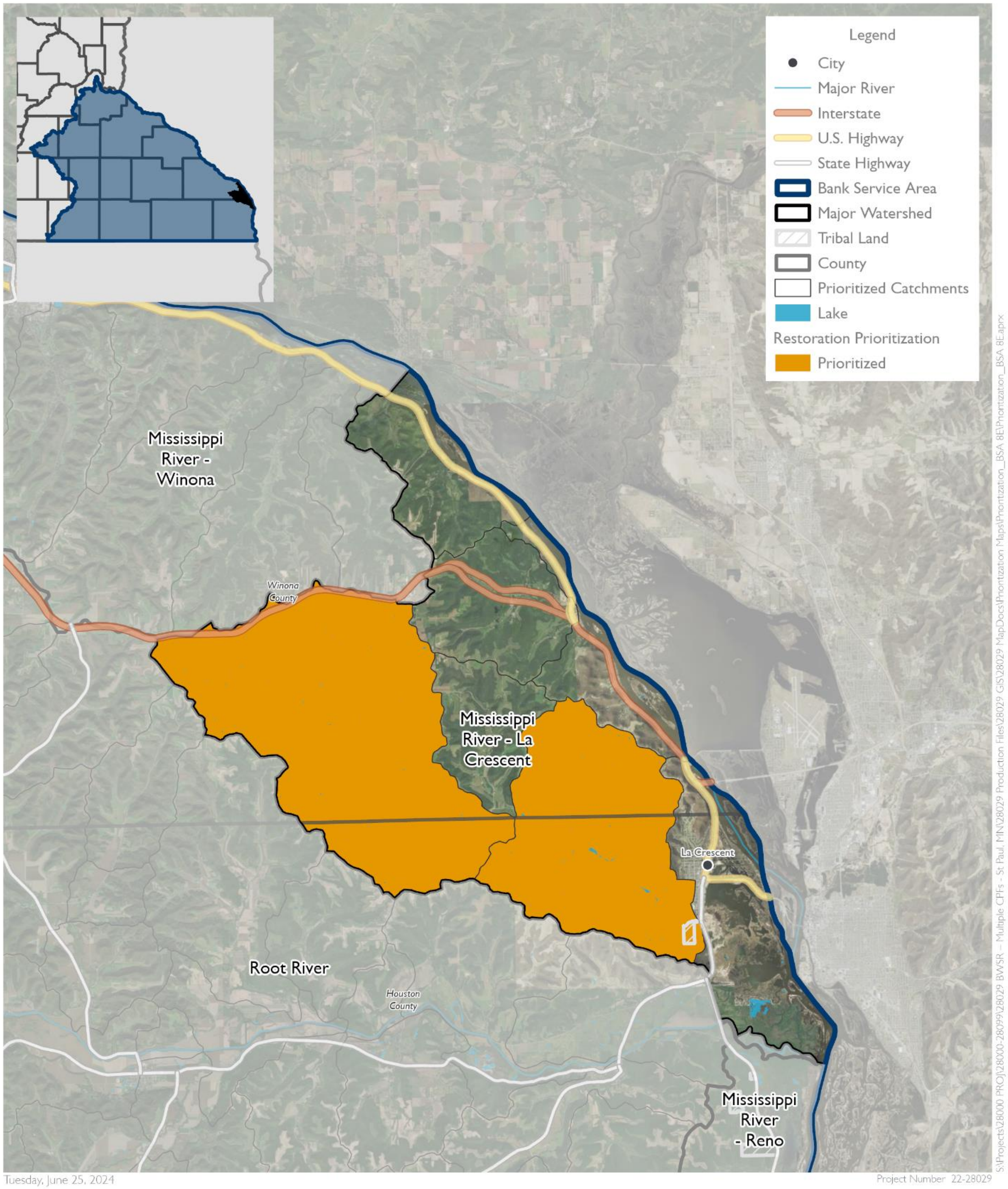


Figure D-6. Final Restoration Catchment Prioritization – Mississippi River – La Crescent Watershed



Catchment Prioritization for Restoration
Mississippi River - La Crescent
Compensation Planning Framework
SA 8E - Minnesota

0 1.5 3 Miles
1 inch = 3 miles

N

Source(s):
Orthophoto (ESRI, 2023)

ISG

Figure D-7. Final Restoration Catchment Prioritization – Mississippi River – Lake Pepin Watershed

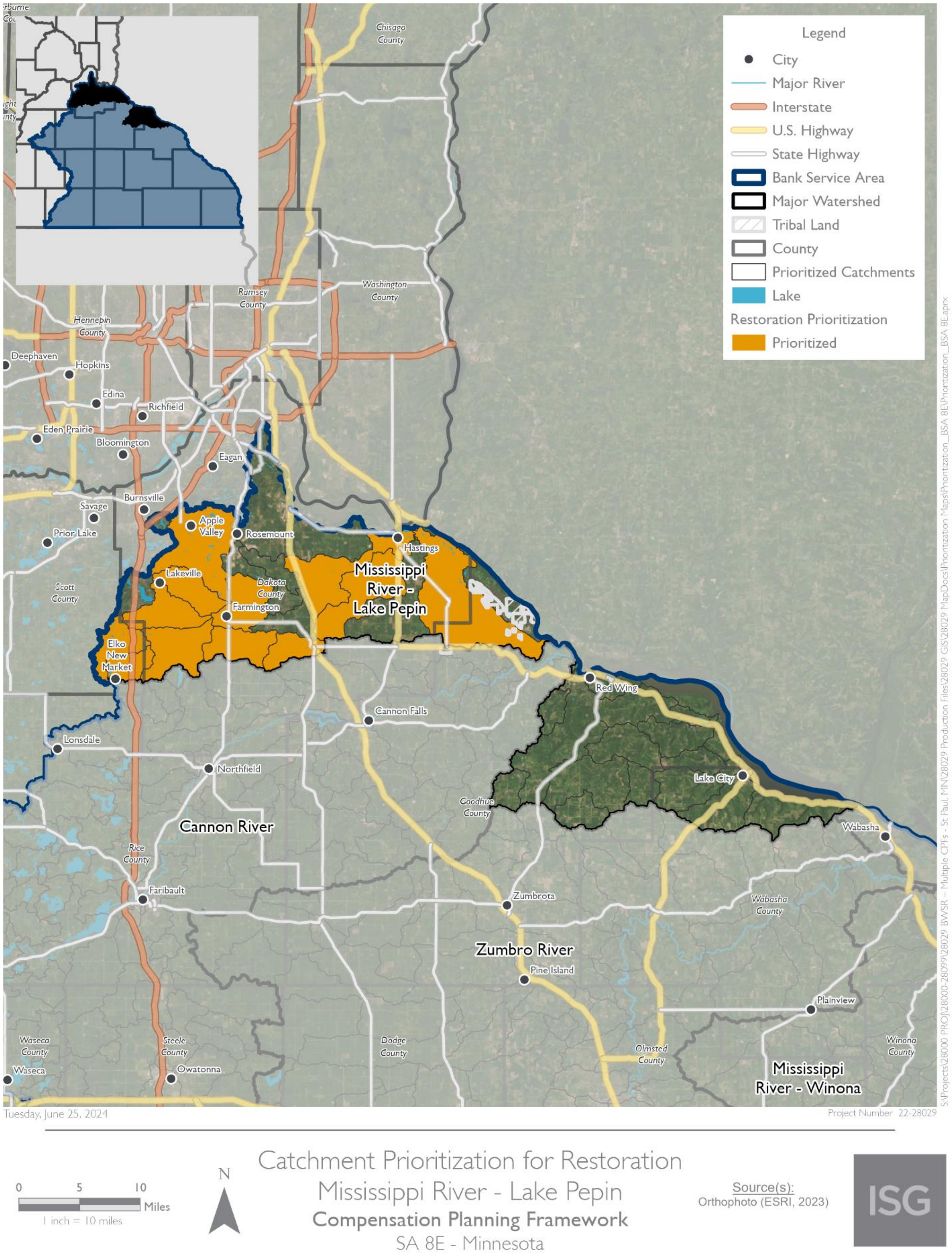


Figure D-8. Final Restoration Catchment Prioritization – Mississippi River – Reno Watershed

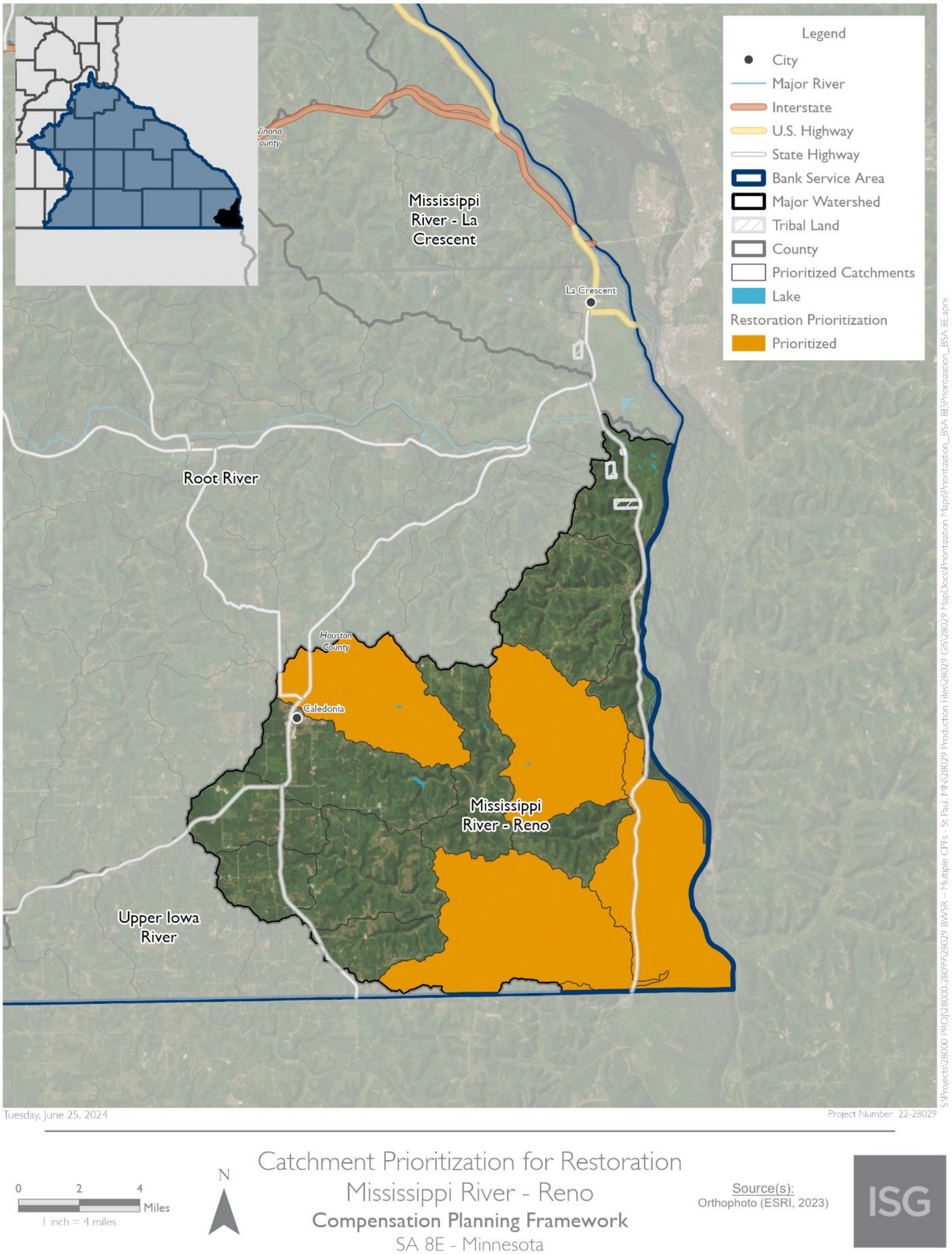


Figure D-9. Final Restoration Catchment Prioritization – Mississippi River – Winona Watershed

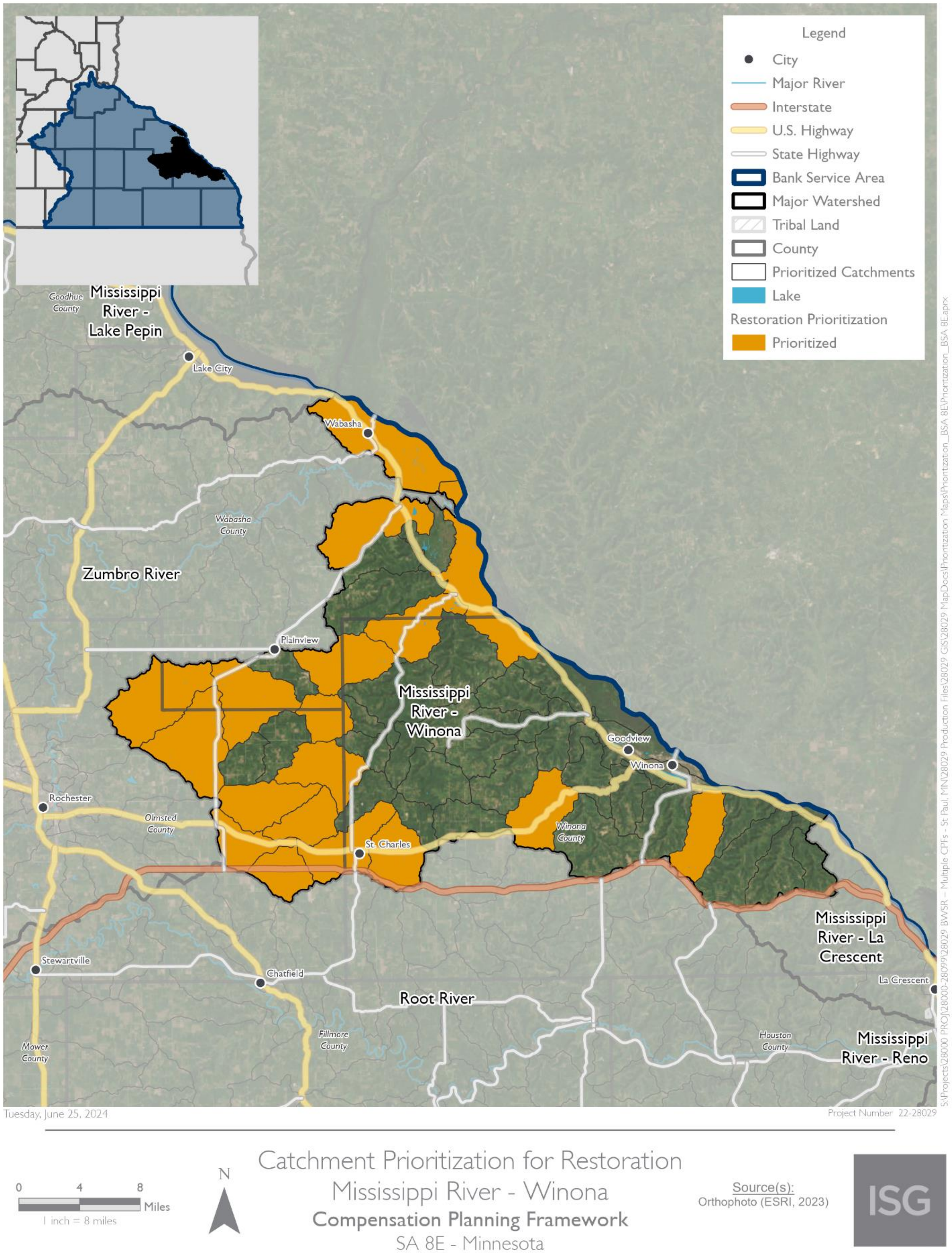


Figure D-10. Final Restoration Catchment Prioritization – Root River Watershed

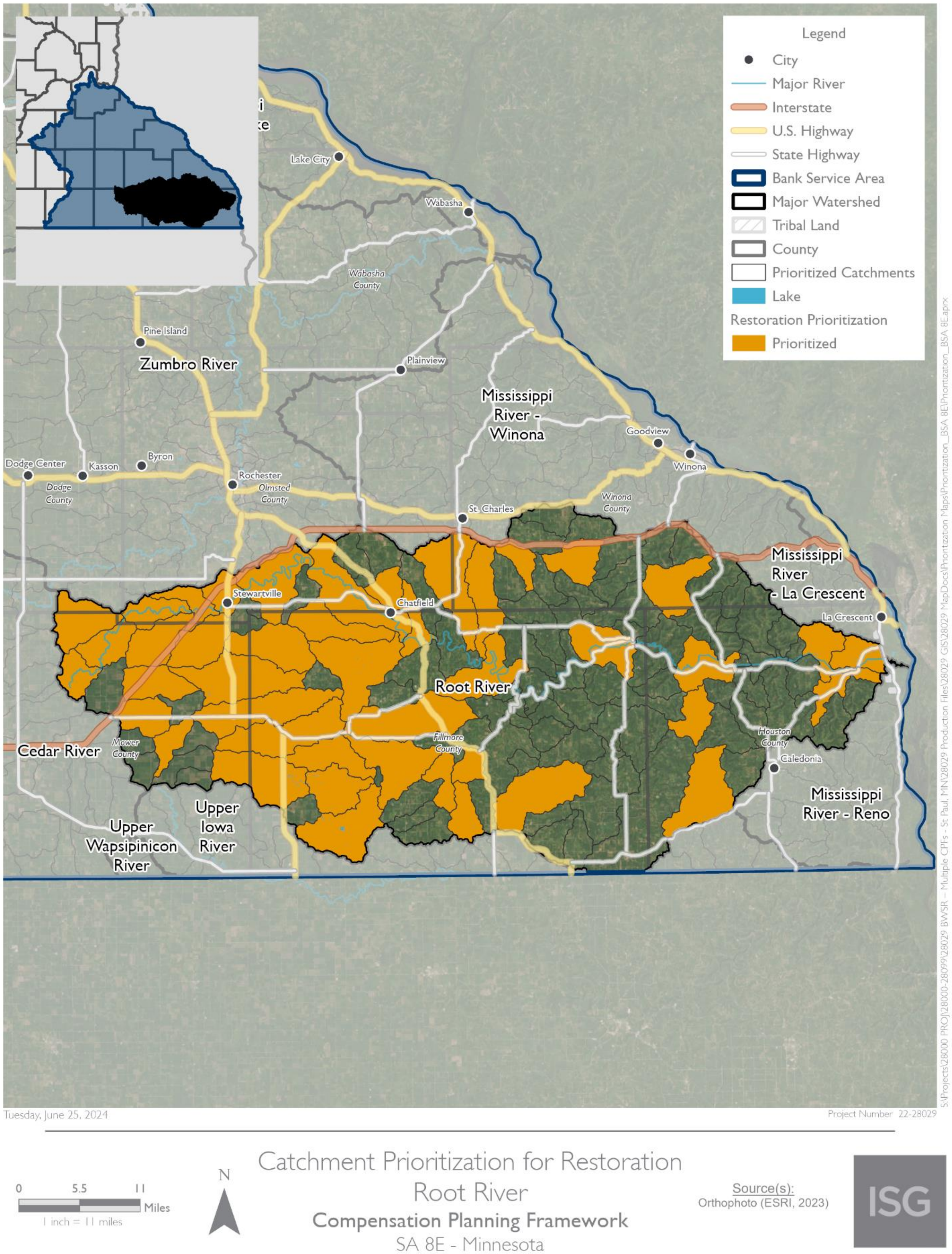


Figure D-11. Final Restoration Catchment Prioritization – Shell Rock River Watershed

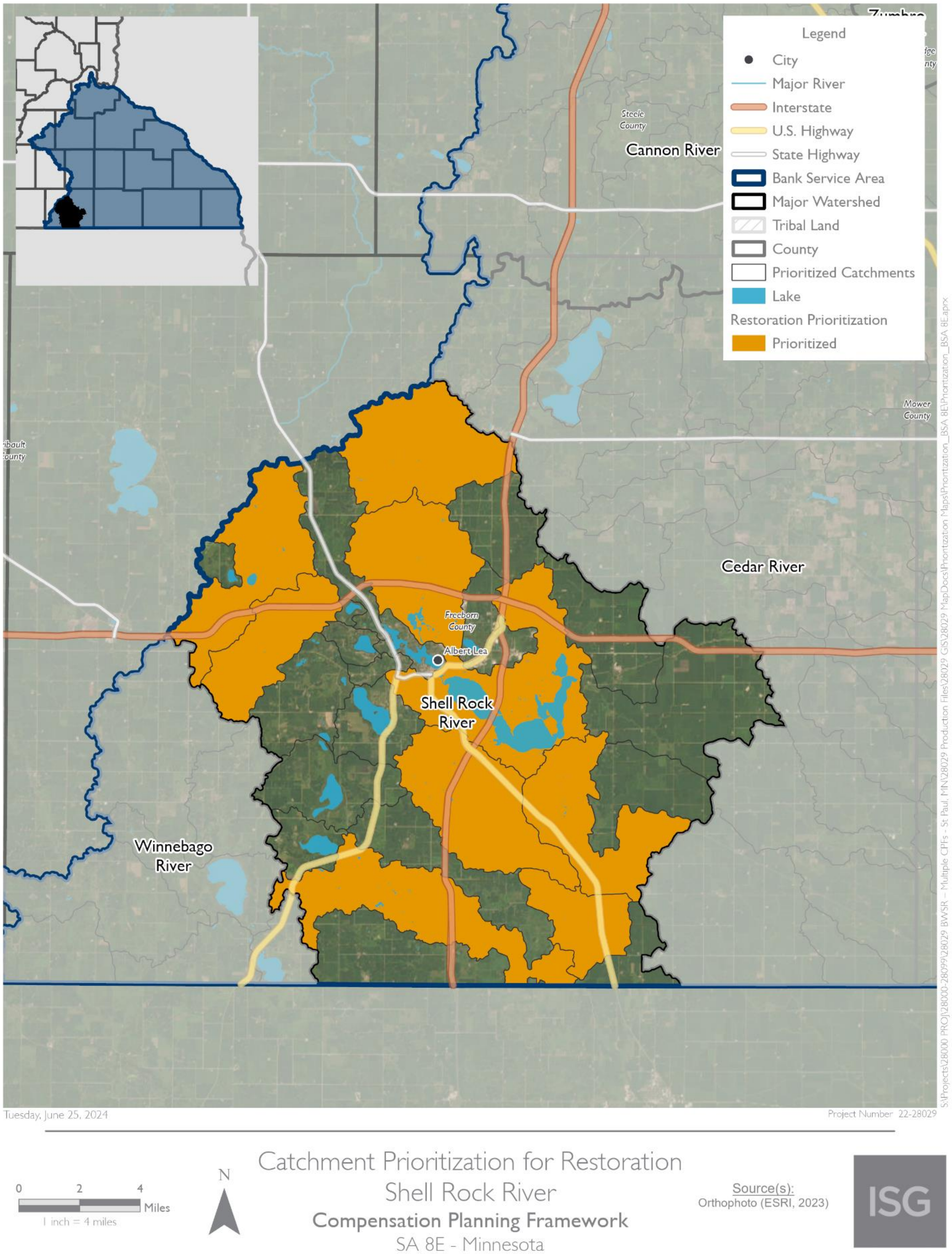


Figure D-12. Final Restoration Catchment Prioritization – Upper Iowa River Watershed

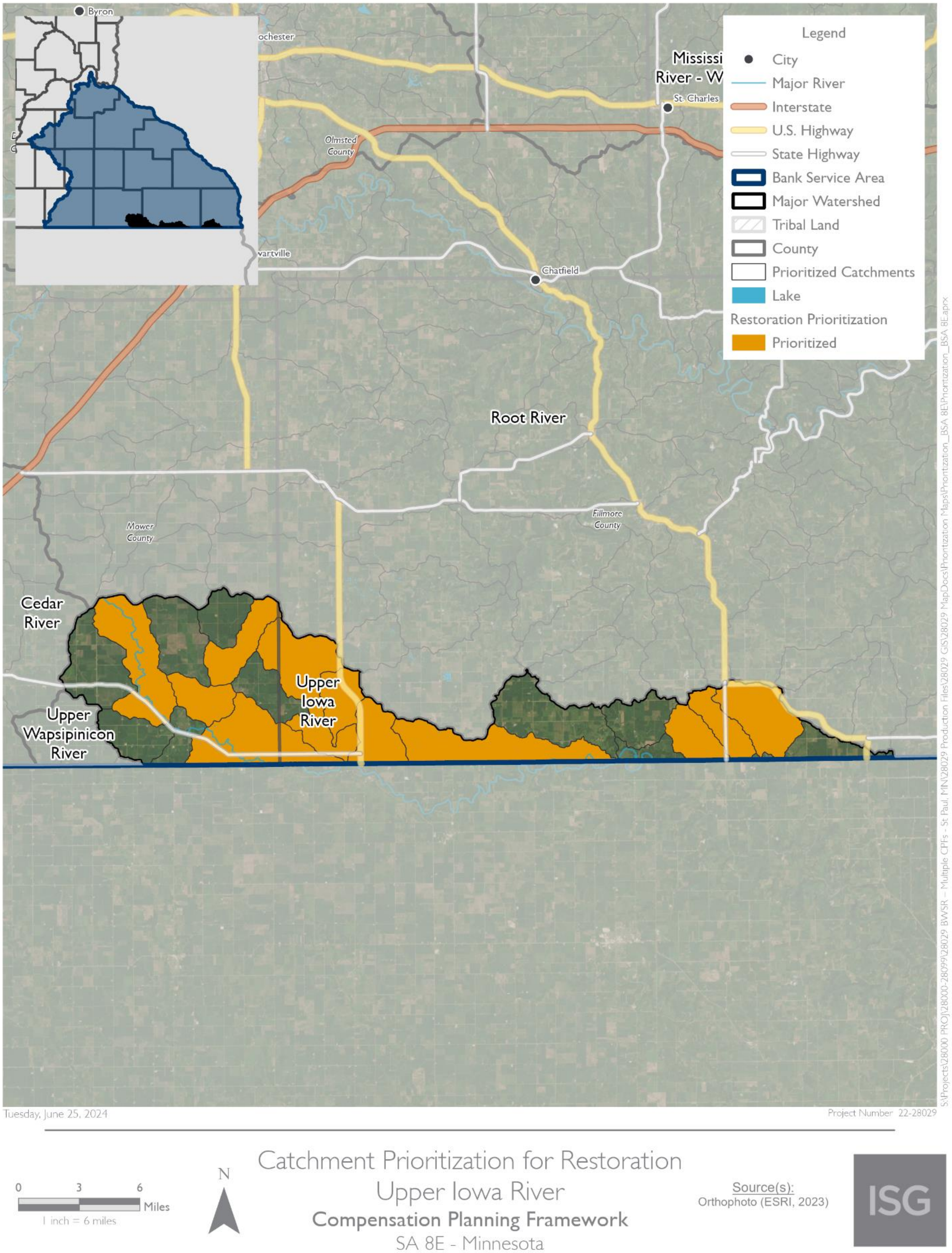


Figure D-13. Final Restoration Catchment Prioritization – Upper Wapsipinicon River Watershed

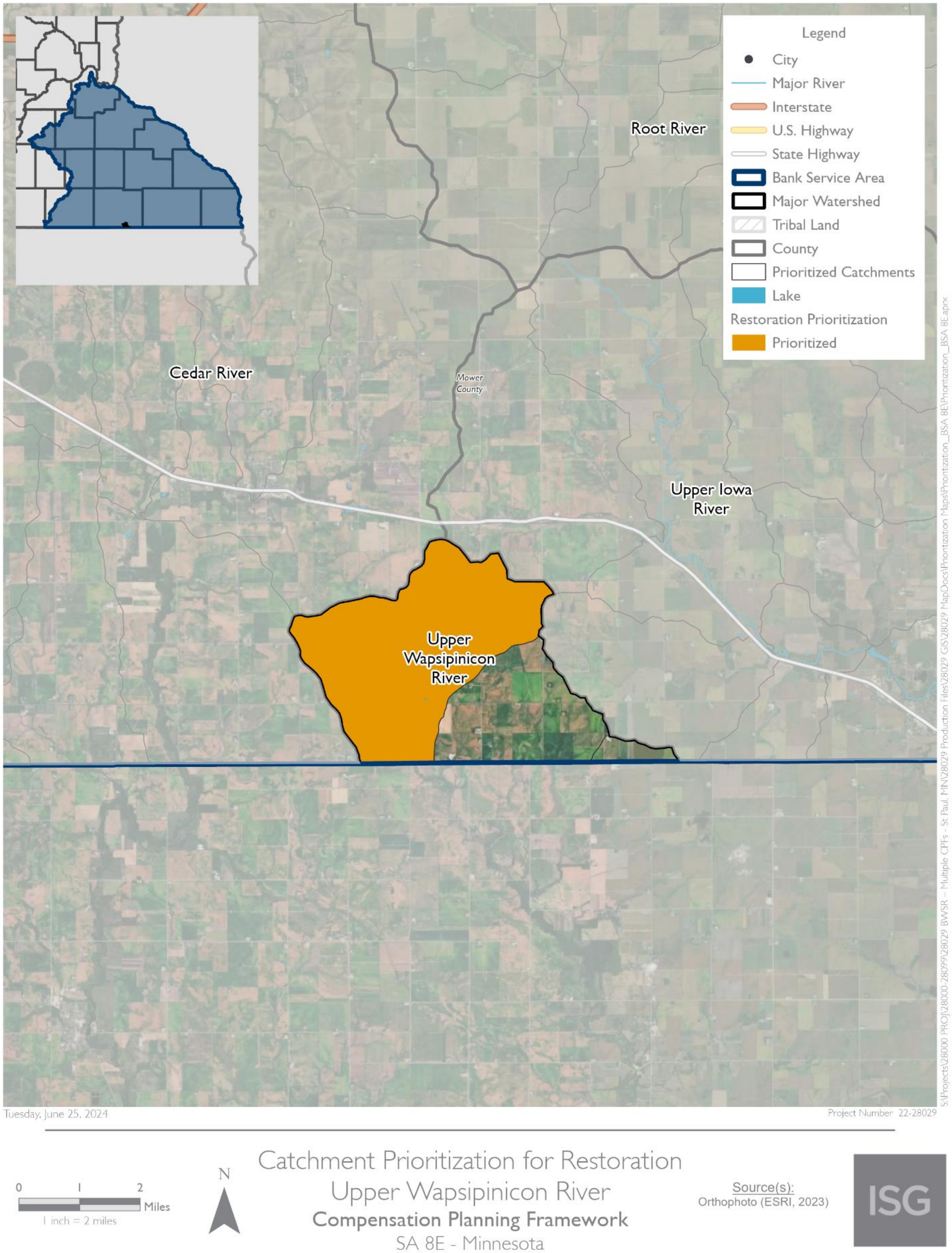


Figure D-14. Final Restoration Catchment Prioritization – Winnebago River Watershed

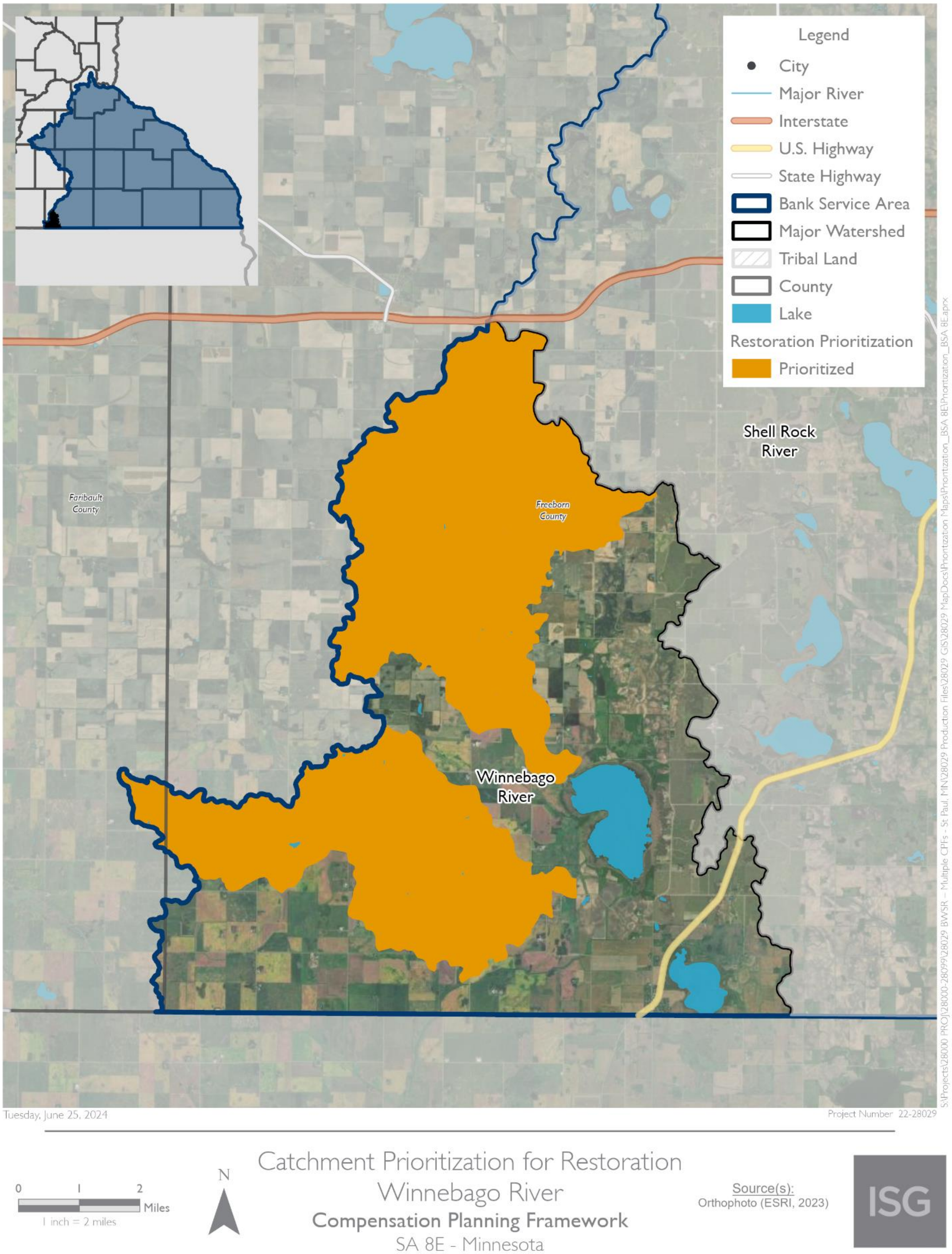


Figure D-15. Final Restoration Catchment Prioritization – Zumbro River Watershed