Sub-watershed Analysis

Flooding Risk

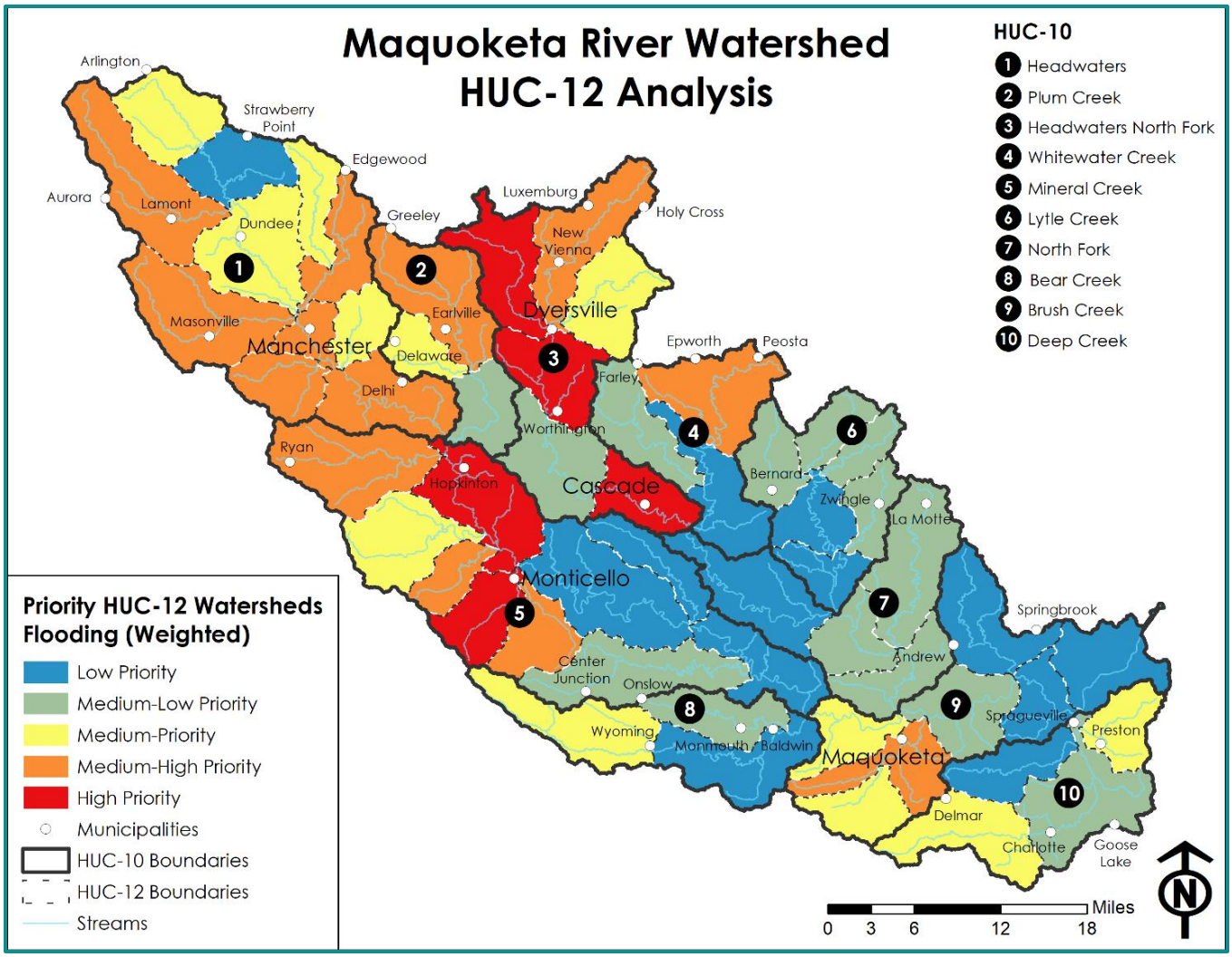

Figure 8: Weighted ranking of HUC-12s for flood mitigation priority. (authors)

Flood events are increasingly common in the MRW. A recent 2021 report from the IPCC shows that Iowa is already experiencing increased heavy precipitation due to climate change.[ii] A larger increase in these events is observed in Eastern Iowa, where the MRW is located, compared to Western Iowa.[iii] According to the IFC, Iowa faces more severe effects from flooding than other states. From 1988 to 2016, all nine counties in MRW received between 9 to 17 flood-related presidential disasters declarations.[iv]

To better understand which areas of the Maquoketa River Watershed should be prioritized regarding flooding, the planning team conducted a GIS analysis of existing conditions for multiple variables. These variables, examined individually in Appendix A, include the percentage of land covered by impervious surfaces, acres of public land used for conservation and recreation, parcel value in the FHA, crop value in the FHA, population in the FHA, and the presence of existing BMPs. Figure 8 shows the ranking of each HUC-12 within the MRW for flood risk.

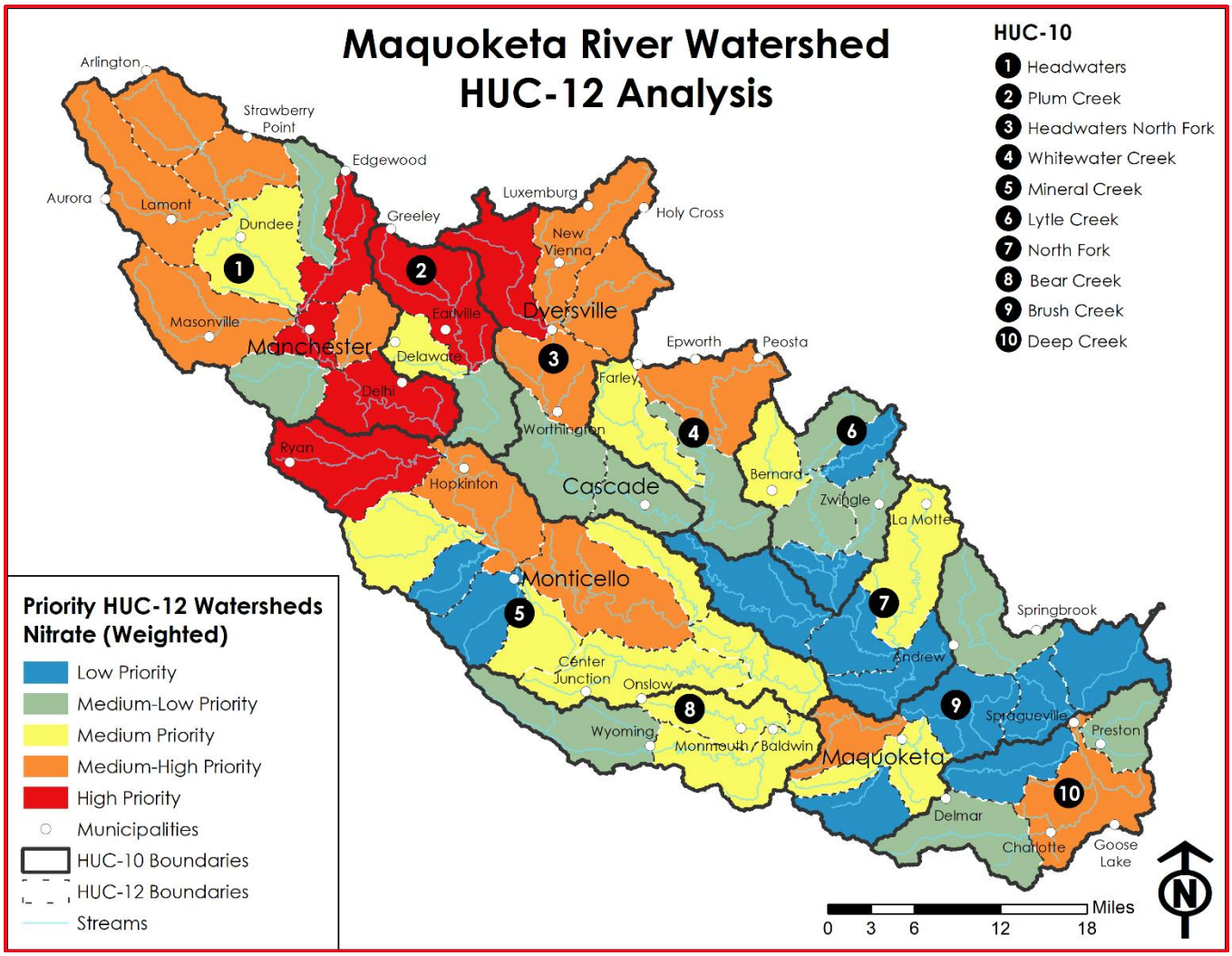

Figure 9: Weighted ranking of HUC-12s for nitrate reduction priority. (authors)

Nitrate is a naturally occurring compound that can be found in both surface and groundwater. It is an essential plant nutrient, but excessive levels of nitrate can result in significant water quality issues. There are typically no adverse effects on human health when naturally occurring, but health concerns arise when nitrate levels in drinking water exceed 10 mg/L. Above this level, public water supplies must implement costly mitigation measures to meet US EPA criteria. Elevated levels of nitrate are often the result of improper well construction, overuse of fertilizers, human and animal waste, septic systems, and more. Consuming water with elevated levels of nitrate is especially dangerous to the health of infants and pregnant women, as it can cause blue baby syndrome.[v] Due to this, communities need to spend extra money to treat their water supply to get nitrate levels under acceptable standards.

Given that the predominant land use in the MRW is agriculture, a plethora of potential nitrate sources exist, including runoff from fertilized fields and CAFOs. Water quality testing has revealed that nitrate is a consistent water quality issue within the MRW. These nitrate levels also have significant downstream effects, such as the nitrate loads

discharged from the mouth of the Mississippi River, which has been identified as a primary cause of the seasonal oxygen depleted zone in the Gulf of Mexico.[vi]

To better understand which areas of the Maquoketa River Watershed should be prioritized regarding nitrate pollution, the planning team conducted a GIS analysis of existing conditions for multiple variables. These variables, examined individually in Appendix A, include the amount of soil erosion, the number of CAFOs and water treatment facilities, monitored nitrate concentrations, the number of susceptible active wells, and the presence of existing BMPs. Figure 9 shows the ranking of each HUC-12 within the MRW for nitrate pollution.

Phosphorous and Soil Loss

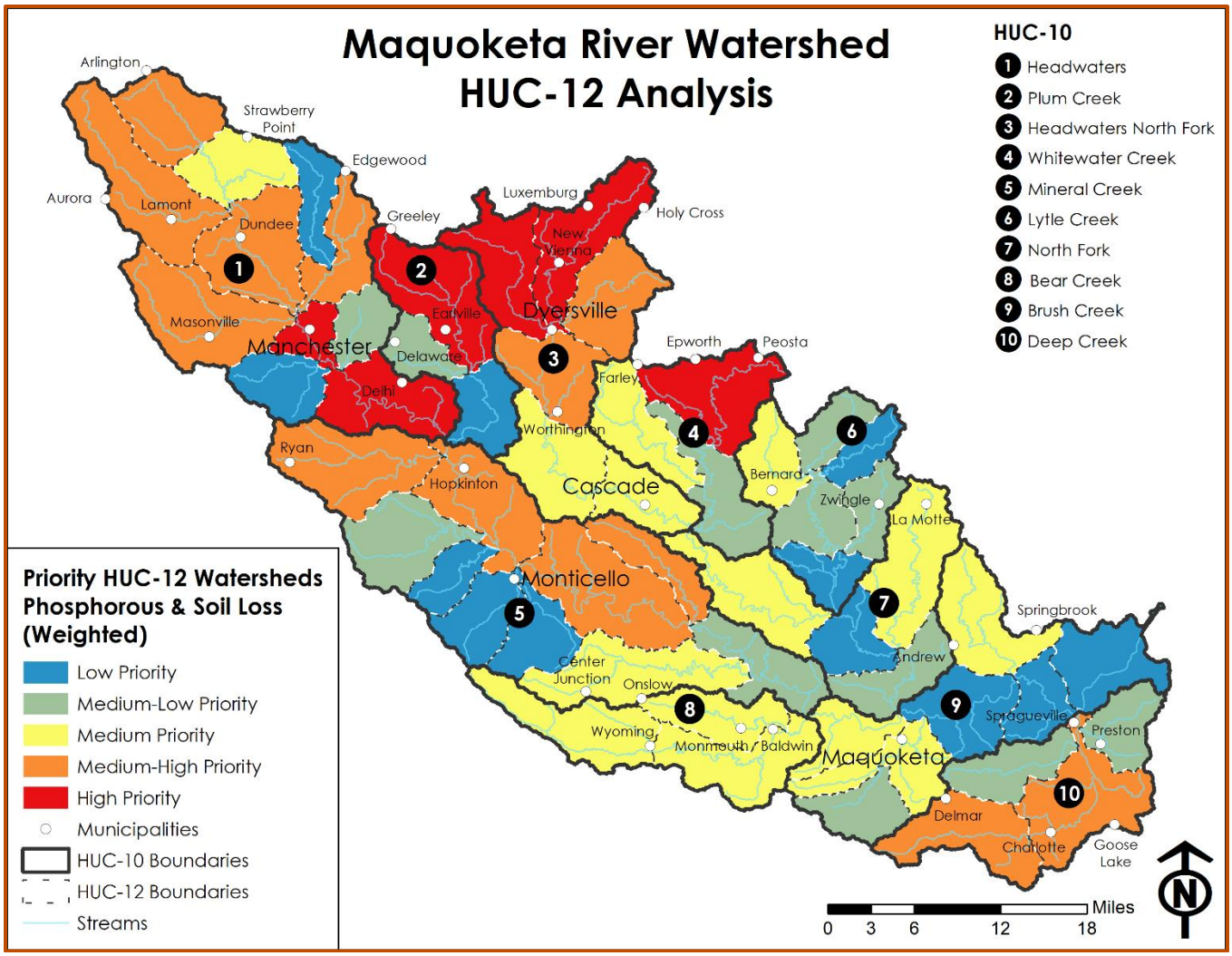

Figure 10: Weighted ranking of HUC-12s for phosphorous and soil loss mitigation priority. (authors)

Phosphorous, like nitrogen, is an essential nutrient for plants, animals, and humans. Under natural conditions, its presence in water is typically scarce. Due to human activities though, phosphorous loading into freshwater systems can occur. When there is too much in the water, phosphorous can cause eutrophication, meaning the environment becomes overly enriched with nutrients, leading to an increase in the amount of plant and algae growth. The consequences of eutrophication include algal blooms, low levels of dissolved oxygen, fish kills, turbidity, and shifts in plant and animal populations in surface waters.[vii]

Due to the tendency of phosphorous to attach to soil particles, it is important that soil loss is viewed in conjunction with phosphorous loading.[viii] Common sources of phosphorous include the chemical fertilizers and animal manure used to grow crops, wastewater treatment facilities, urban runoff, and fossil fuels. The implementation of agricultural practices that mitigate soil loss and limit the overapplication of nutrients are key to reducing the negative impacts associated with phosphorous within the watershed.

To better understand which areas of the MRW should be prioritized regarding phosphorous and soil loss, the planning team conducted a GIS analysis of existing conditions for multiple variables. These variables, examined individually in Appendix A, include the amount of soil erosion, the percentage of land covered by hydrographic group D soils, the number of CAFOs and water treatment facilities, monitored phosphorous concentrations, monitored turbidity levels, and the presence of existing BMPs. Figure 10 shows the ranking of each HUC-12 within the MRW for phosphorous pollution and soil loss risk.

Diminished Recreation

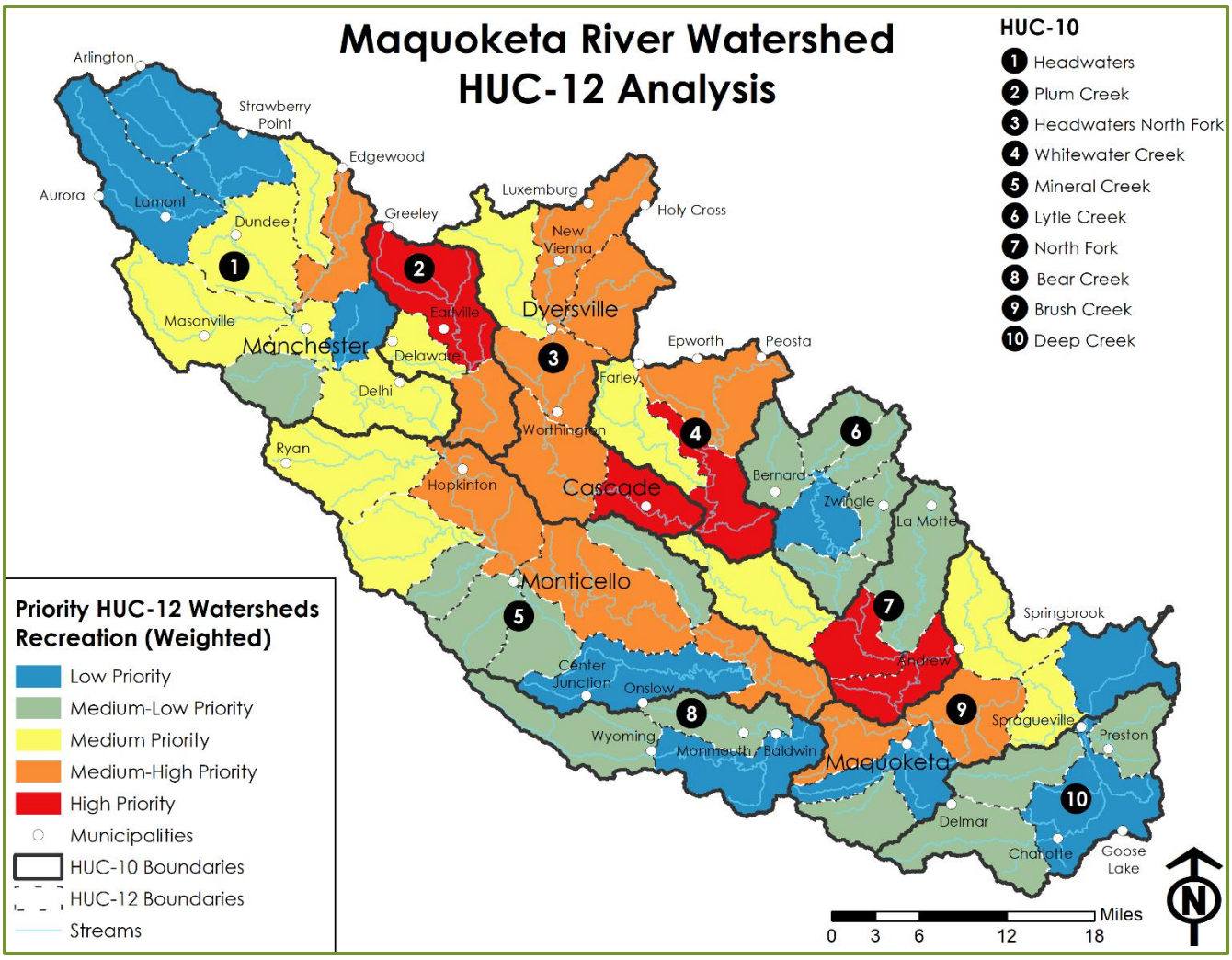

Figure 11: Weighted ranking of HUC-12s for improved recreation priority. (authors)

Recreational opportunities are abundant in the MRW, with people enjoying year-round activities such as boating, fishing, hunting, cross country skiing, and camping. Water quality issues, in the form of nutrient and sediment loading, can result in closure of recreational uses. The level of impairment determines the uses that are allowed in each waterbody in the MRW, so reducing the amount of pollutants will maximize recreational opportunities. It is vital that people who reside within the watershed take the necessary steps to improve water quality and mitigate the impacts of flooding to ensure ample outdoor opportunities remain available to future generations.

To better understand which areas of the MRW should be prioritized regarding diminished recreation, the planning team conducted a GIS analysis of existing conditions for multiple variables. These variables, examined individually in Appendix A, include streams impaired by E. coli, streams impaired by fish kill events, streams impaired by native mussel loss, acres of wetlands, and public land being used for conservation and recreation. Figure 11 shows the ranking of each HUC-12 within the MRW for diminished recreation.

Overall Ranking

Following detailed sub-watershed analysis of 17 metrics to measure flood risk, nitrate pollution, phosphorous and soil loss, and diminished recreation, the planning team looked at all issues together. Using weights assigned by a survey of the MR Technical Committee, the 56 MRW HUC-12s were ranked in order of importance of addressing water concerns. Weighted analysis revealed that flooding was the most important issue to address, followed by nitrates, phosphorous and soil loss, and finally recreational opportunities. Figure 12 below shows the priority level of HUC-12s across the watershed for all issues combined.

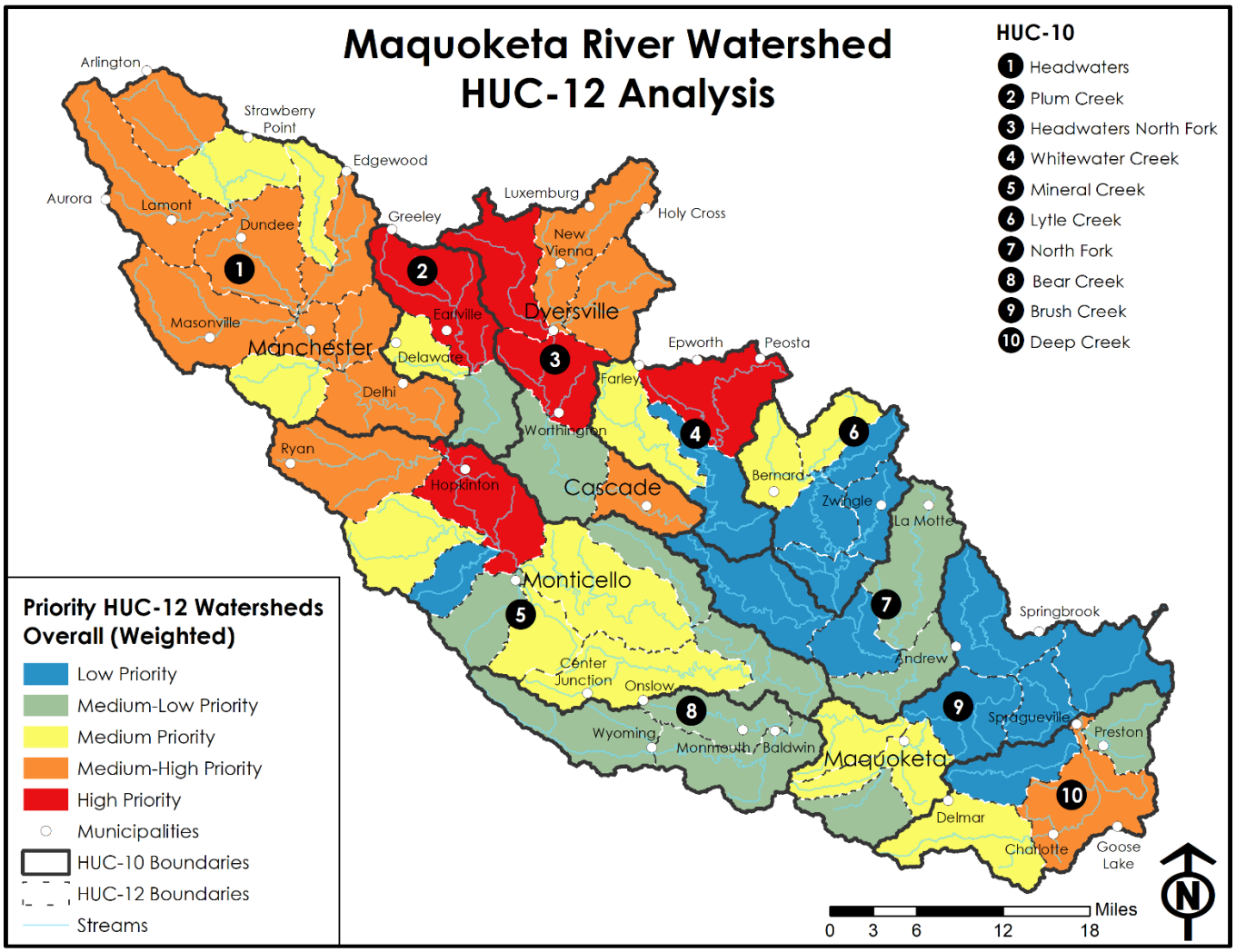

Figure 12: Map showing the combined priority level of HUC-12s within the MRW. (authors)