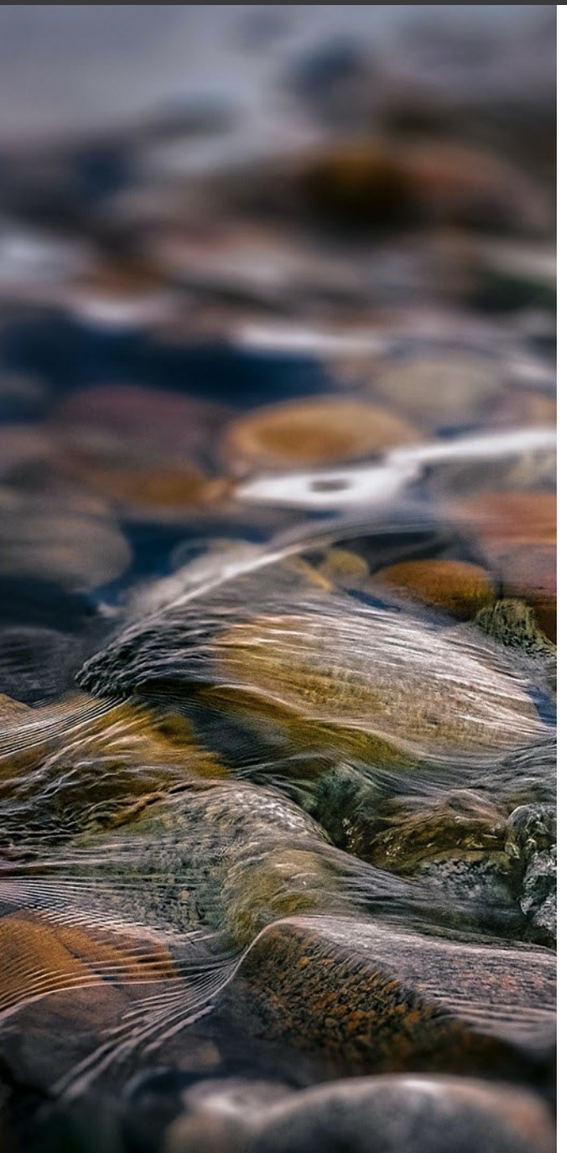
# Scenario Planning: Climate and Natural Systems

## Committee of the Whole

METROPOLITAN COUNCIL

January 17, 2024 Eric Wojchik

# Overview



- Framing Concepts
- Climate Change Findings
- Natural Systems Findings

# Climate Change Challenges Our Established Approaches to Problem-solving

- Strong connections between climate change, natural systems, and environmental justice.
- Interdivisional teams and new organizational frameworks to ensure success and accountability
- New and lasting external collaborations to address intersectionality of climate issues

# Climate Concepts

## Mitigation

Actions to reduce emissions that cause climate change

## Adaptation

Actions to adjust to actual or expected climate impacts

## Resilience

Outcome that allows us to thrive despite climate change

# Minnesota Climate by 2050

## Precipitation

At risk of severe flooding:

- 155,000 residential properties
- 29,000 miles of roads
- 13,000 commercial buildings
- 515 critical infrastructure facilities

## Heat

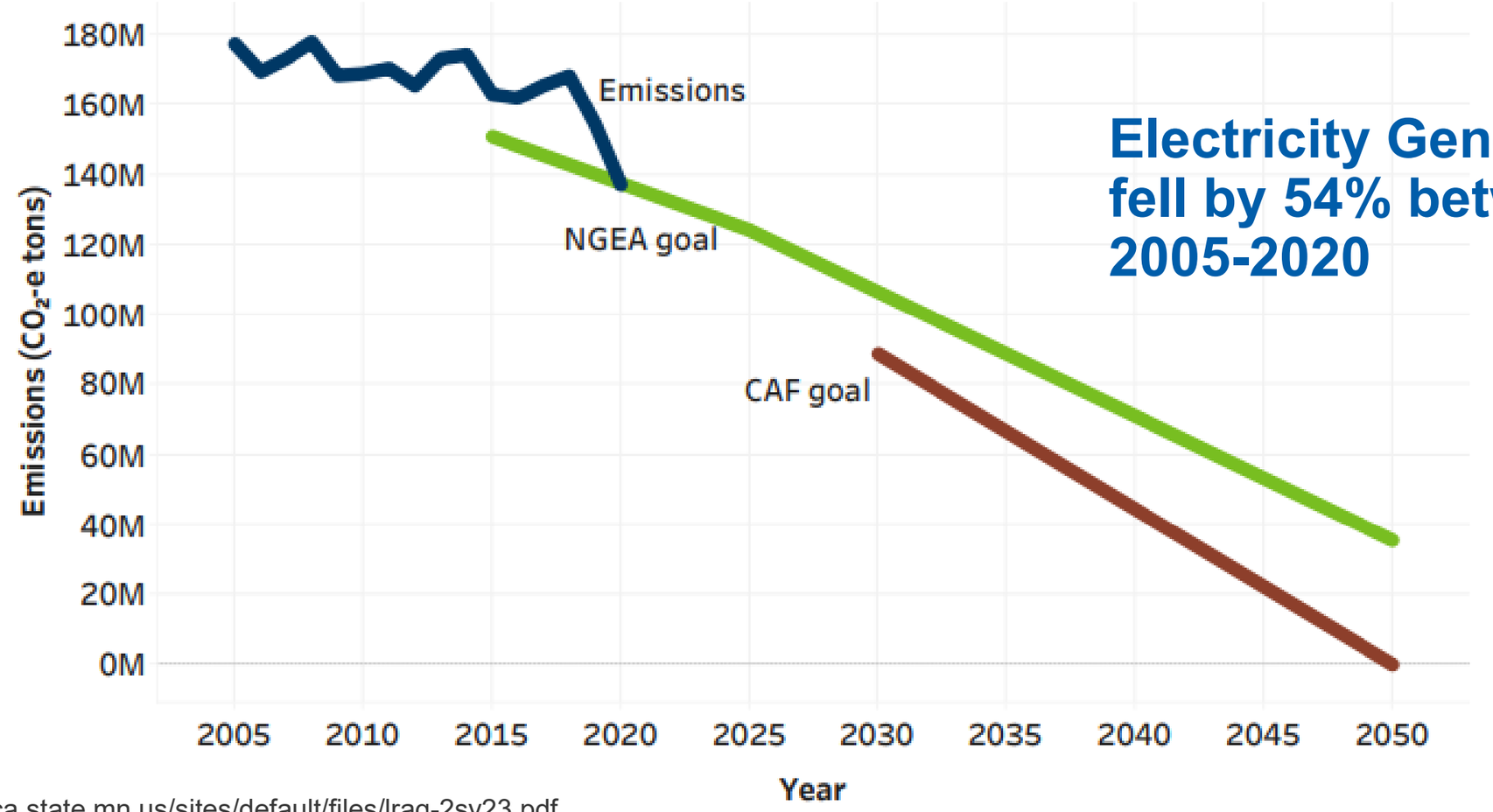
- 7 of 10 warmest years occurred in the last 15 years.
- 40 extra days per year over 90°F by 2050 (average is 14).
- 298 heat-related ER visits in June 2021 (average of 50).

## Extreme Conditions

- 366% increase in insurance premiums since 1998.
- 52 air quality alerts in 2023, including 14 red alerts (average is 1 red alert per decade).
- 11 harmful algal bloom associated medical cases between 2014 to 2022.

# MN is Not (Quite) Meeting GHG Goals

## New State Goal (Reduce GHG by 50% by 2030, net zero by 2050)




**Electricity Generation fell by 54% between 2005-2020**

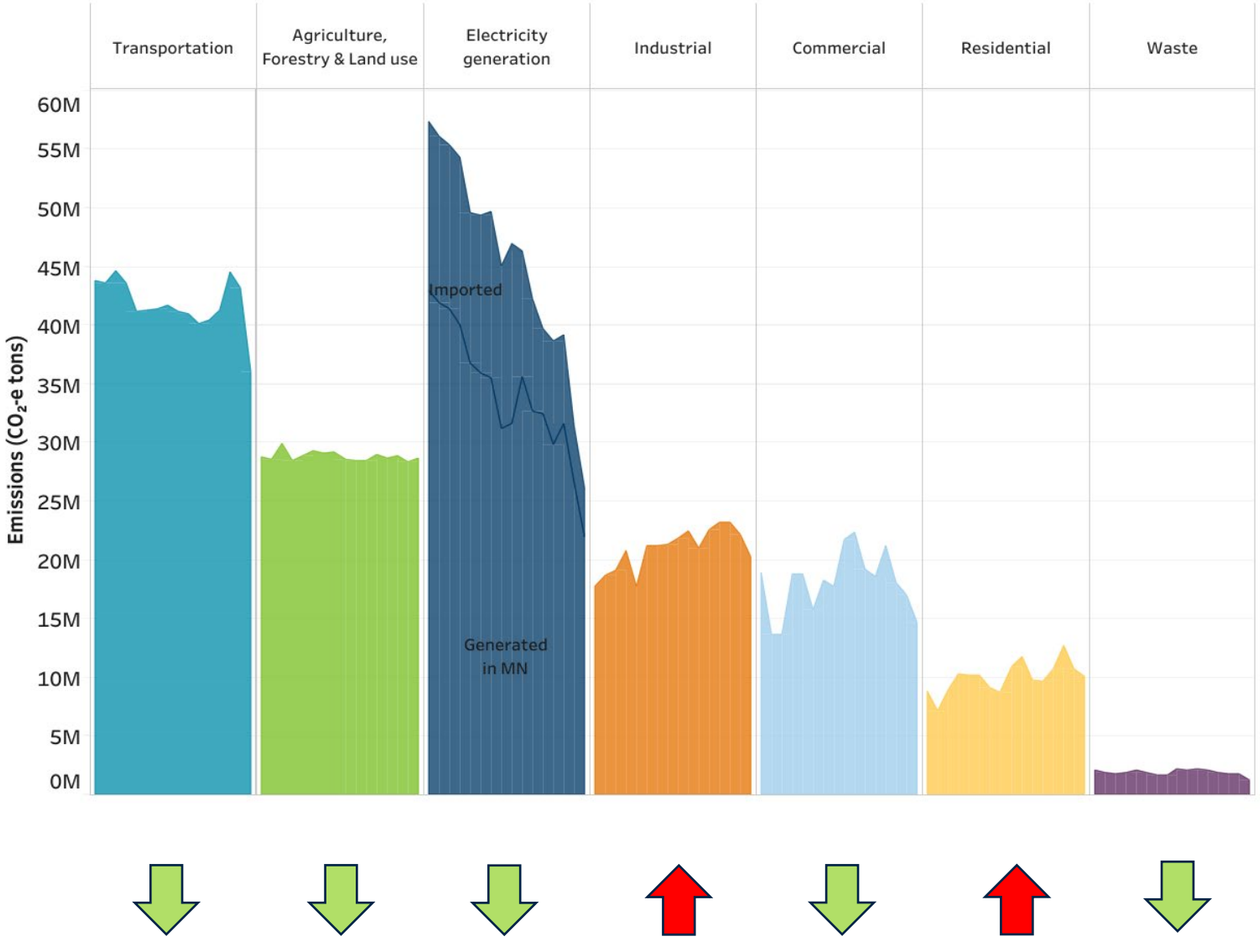
*NGEA: Next Generation Energy Act*

*CAF: Minnesota Climate Action Framework*

Source: https://www.pca.state.mn.us/sites/default/files/lraq-2sy23.pdf

# Emissions Reductions are Needed Across Sectors

## Statewide emissions 2005-2020




**Transportation** sector is leading contributor to greenhouse gases in Minnesota (26% in 2020).

**Agriculture and forestry (working lands)** now second highest contributor of greenhouse gas emissions.

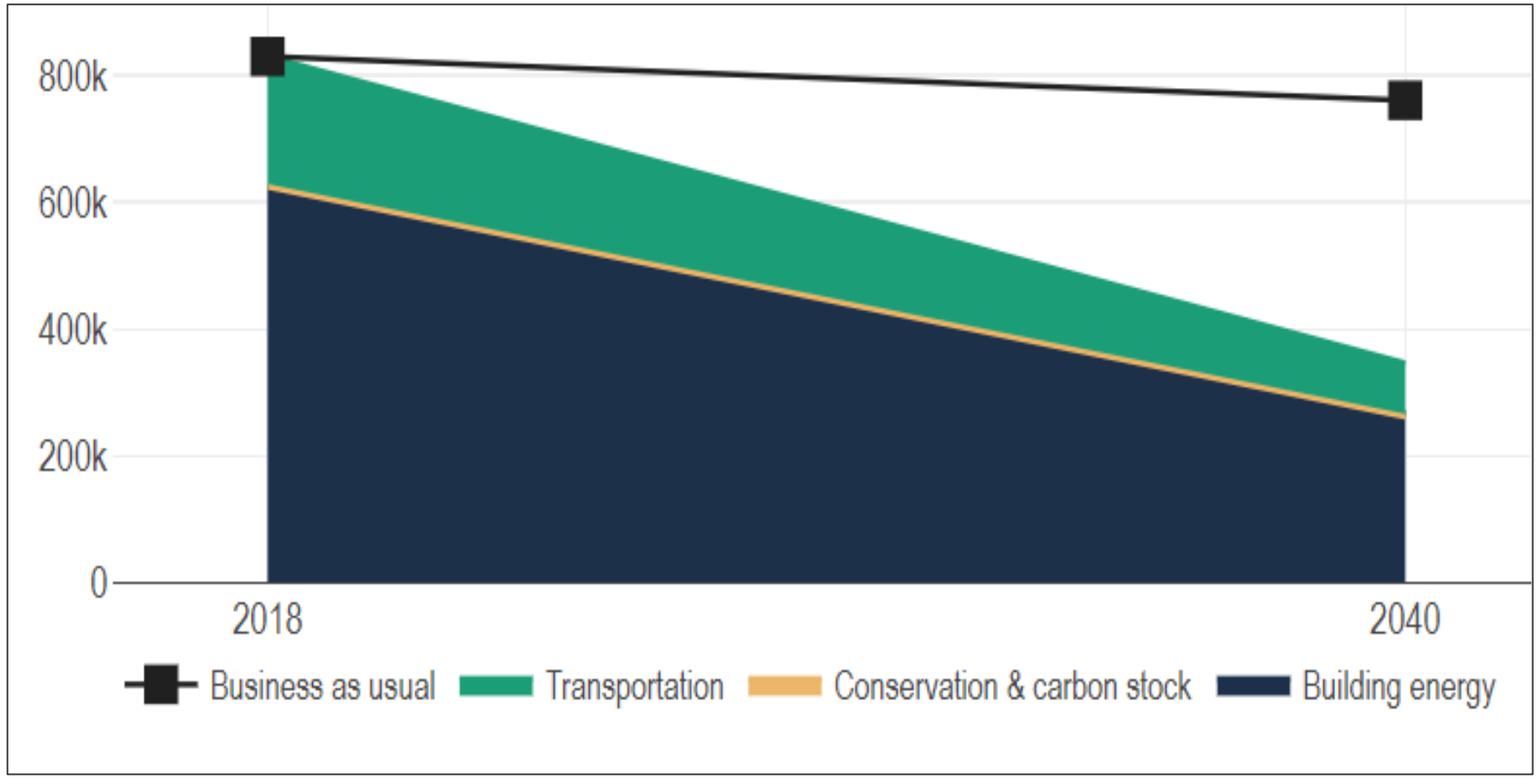
**Electricity generation** has dropped from highest to 3rd highest (-54%) contributor to greenhouse gas emissions due switch to renewables

# There are Many Pathways to Emissions Reductions

## Met Council GHG Strategy Planning Tool – Community-driven Solutions

**Wedge shows impact of strategies**

- Clean energy supply
- Energy efficiency technology
- Sequestering carbon
- Conservation and Sustainable Behavior



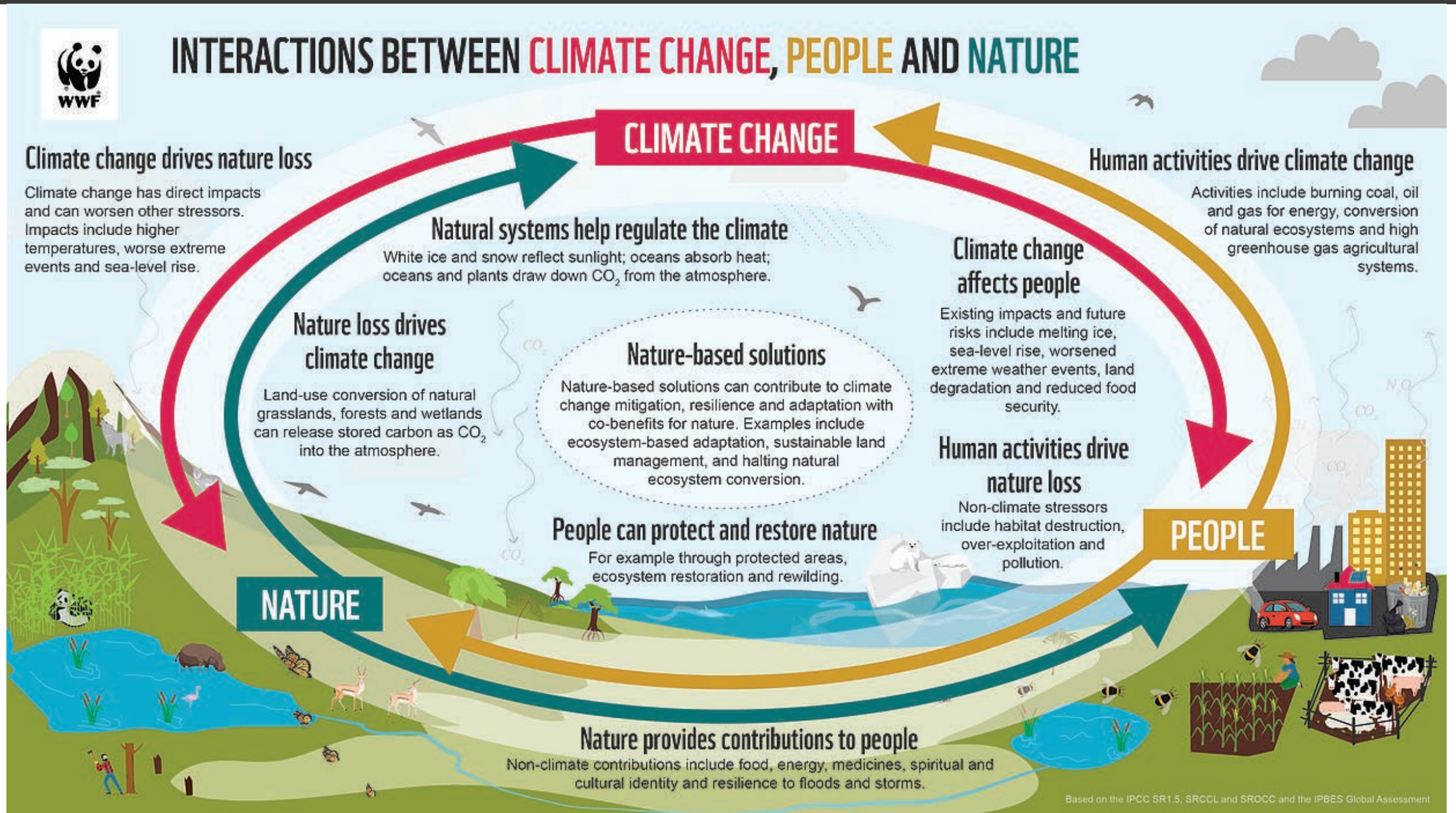

https://metrotransitmn.shinyapps.io/ghg-strategy-tool/

# Natural Systems versus Natural Resources

## A Different Approach

- Focus more on **interconnections** of natural systems and ecosystem services for public health and livability.
- **Move away from extractive language** regarding natural resources which are ‘to be used or preserved.’
- Elevate the need to **restore and regenerate natural systems** within our region, as well as preservation.
- Emphasize the need for natural systems work within **all landscapes**, at all scales, including the urban environment.

# Climate and Natural Systems Connections



# Climate and Natural Systems Topic Areas

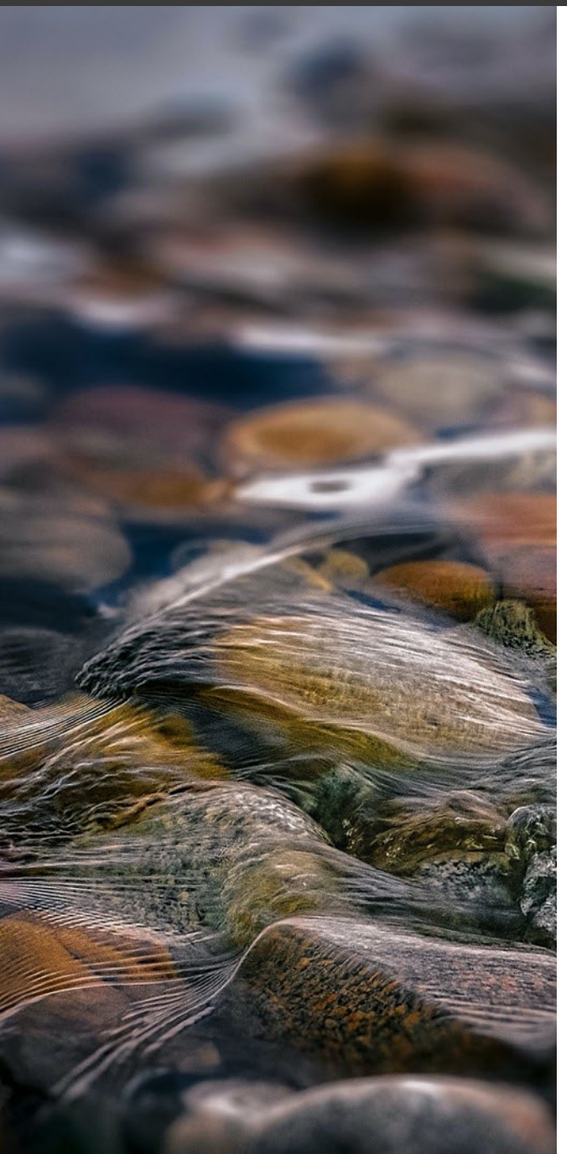
**GHG Emissions**

- Total GHG Emissions
- GHG Emissions from the Transportation Sector
- GHG Emissions from Residential Buildings

**Natural Systems**

- Loss & Fragmentation of Natural Systems
- Water Quality

# Climate and Natural Systems measures: Connection to regional goals



| | Working Regional Goals | | | | |
|---|---|---|---|---|---|
| **Climate and Natural Systems Topic Areas** | **Equitable Inclusive Region** | **Healthy Safe Communities** | **Dynamic Resilient Region** | **Mitigated Adapted Resilient Climate** | **Natural Systems Protected Restored** |
| Total GHG emissions | ✓ | ✓ | ✓ | ✓✓ | ✓ |
| GHG emissions - Transportation | ✓ | ✓ | ✓ | ✓✓ | ✓ |
| GHG emissions – Residential Buildings | ✓ | ✓ | ✓ | ✓✓ | ✓ |
| Natural Systems loss & fragmentation | ✓ | ✓ | | ✓ | ✓✓ |
| Water quality | ✓ | ✓ | | ✓ | ✓✓ |

# Climate Change Scenario Findings

# GHG Emissions

## Total Greenhouse Gas Emissions

Top 3 contributors to GHG emissions –

- Transportation – Light duty trucks (SUVs) contribute the most GHG emissions
- Agriculture and Forestry (working lands)
- Electricity generation – Industrial, commercial and residential

## GHG Emissions from Transportation

Stacking of strategies are needed to reduce transportation GHG in our region –

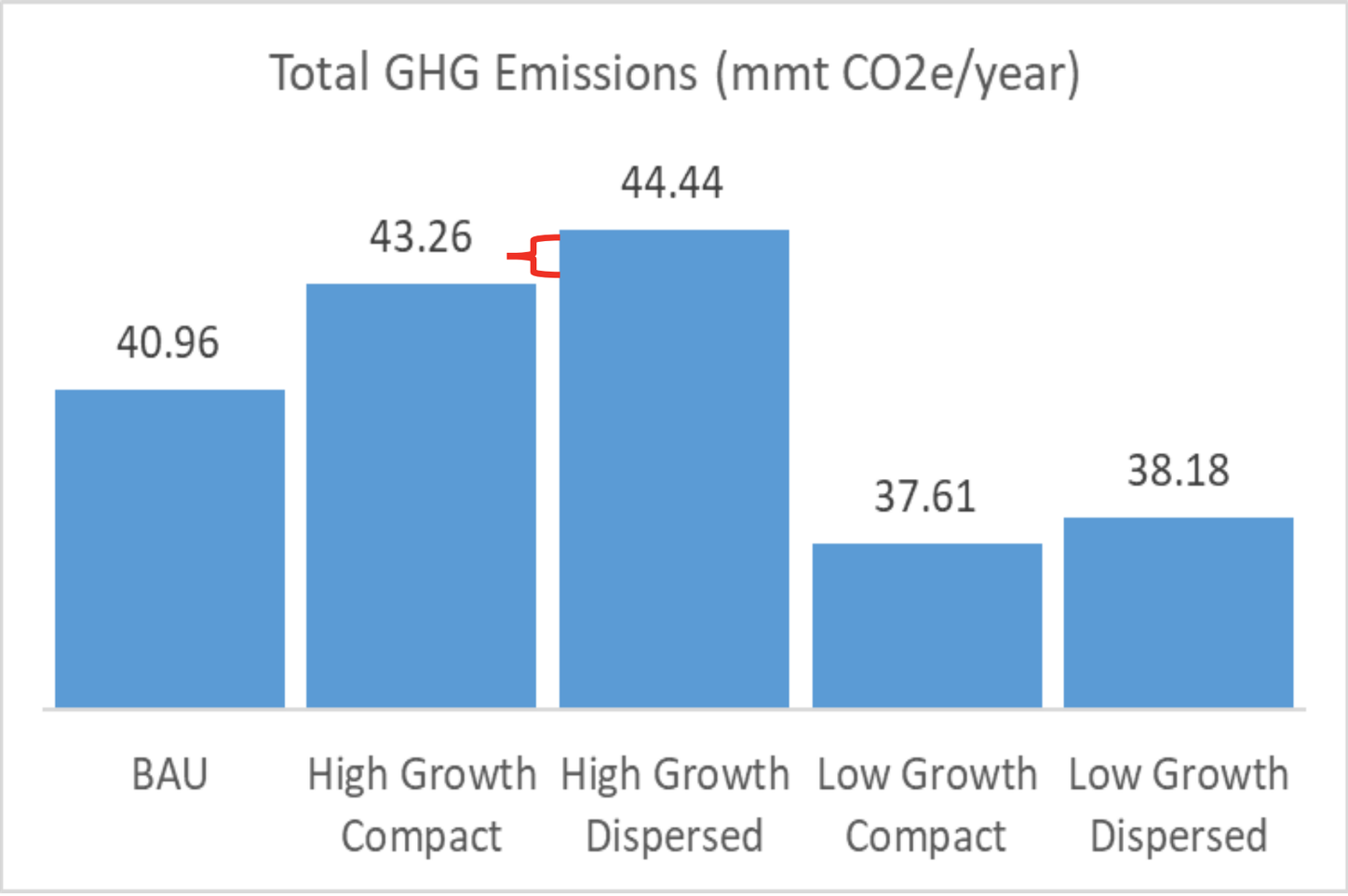
- VMT reduction
- Transit expansion
- Electrification of transportation
- Mode shift

## GHG Emissions from Residential Buildings

Residential building energy use can be reduced through efficiency measures and transition to renewable sources.

Most of these emissions are from natural gas usage for heating.

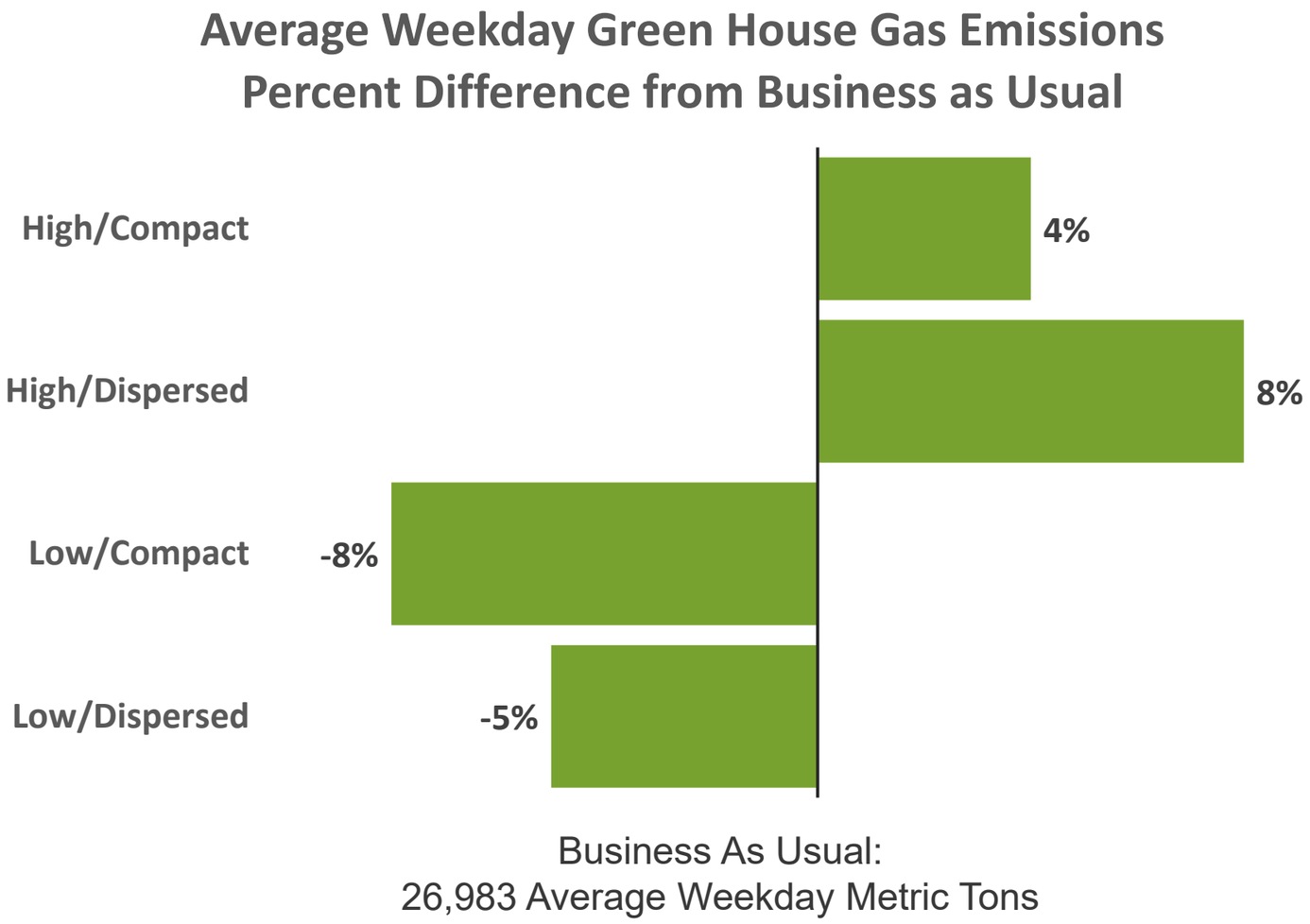
# Total GHG Emissions




**Compact growth produces lower GHG emissions than dispersed growth, no matter how much the region grows.**

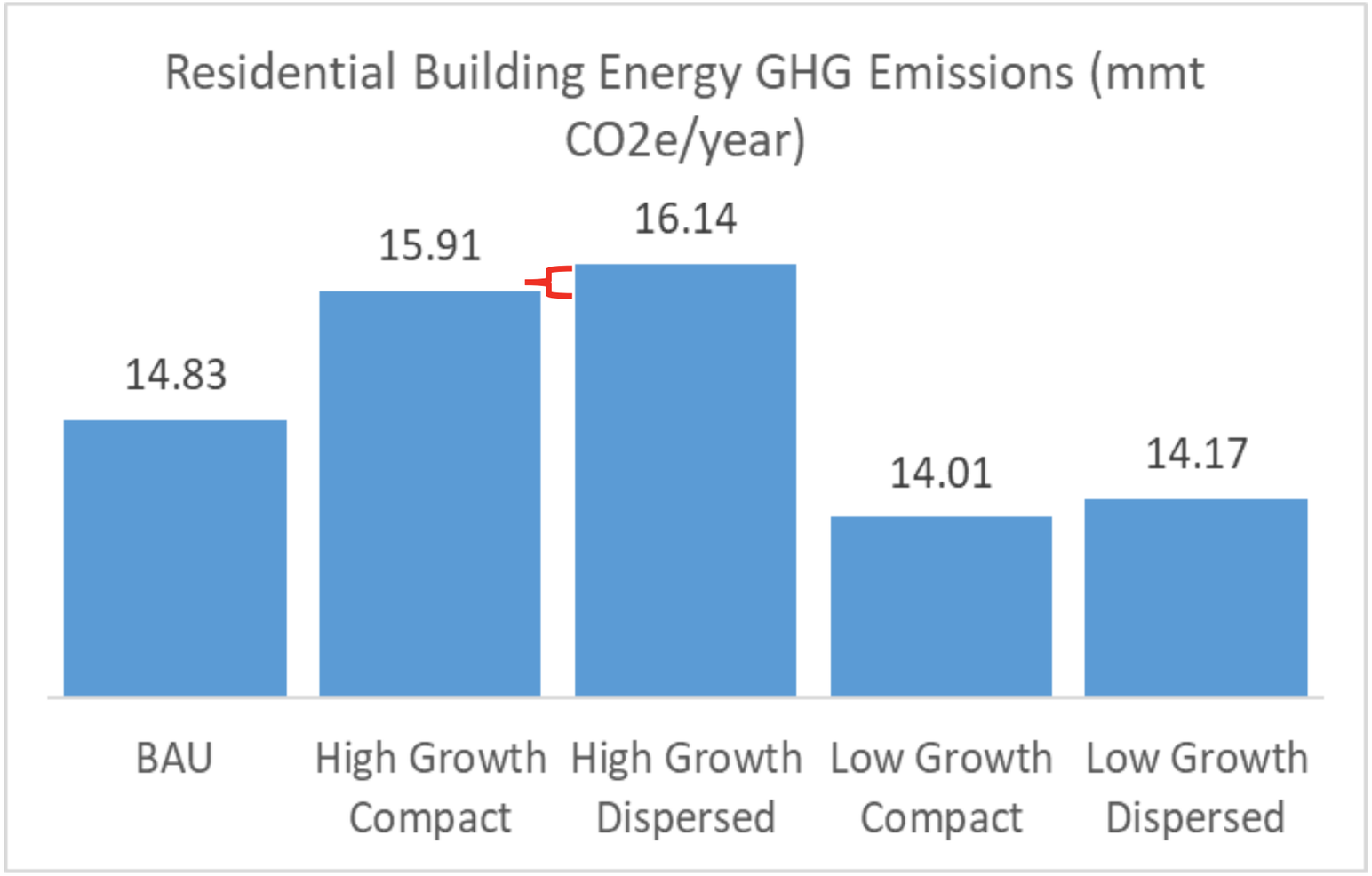
- Emissions equivalent of **149,000 homes**
- or an extra **263,000 cars** on the road per year.

# GHG Emissions – Transportation




**Compact growth produces lower transportation GHG emissions than dispersed growth, no matter how much the region grows.**

# GHG Emissions – Residential Buildings

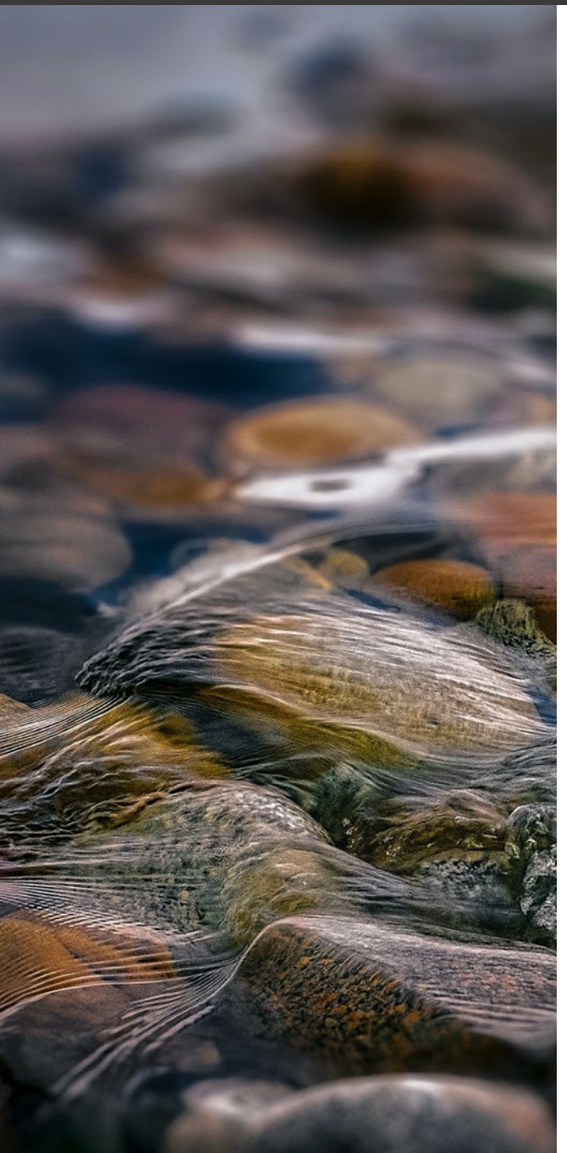



**Compact growth produces lower residential building energy GHG emissions than dispersed growth, no matter how much the region grows.**

- Emissions equivalent of **29,000 homes**
- or an extra **51,000 cars** on the road per year.

Metropolitan Council

# Climate Change Findings



## Compact Growth Produces Less Overall Emissions

- Compact growth generates less GHG emissions than dispersed growth, at each growth level.
- Compact growth produces lower transportation-related GHG emissions than dispersed growth, at each growth level.
- Residential buildings in the compact scenarios produce less GHG emissions than in dispersed scenarios, at each growth level.

# Natural Systems Scenario Findings

# Regionally Significant Ecological Areas (RSEA)

## A Regional Measure of Natural Systems Value

- Landscape scale assessment of the seven-county metropolitan area to identify terrestrial and wetland areas of ecological significance.
- Areas include places where intact native plant communities and/or native animal habitat are still found in the region and continue to provide important ecological functions.

# Natural Systems

## Loss and Fragmentation

- Development patterns show that the highest threat to RSEA loss occurs in Suburban Edge and Suburban Community Designations.
- Greenfield, more dispersed, development tends threaten natural systems expressed through the RSEA measure.
- Current policy measures are insufficient to protect regionally significant ecological areas located outside of conservation designations.

## Water Quality

**Nitrate load**

- Pollutant that enters local lakes and streams
- Contributes to excess algae growth in local waters

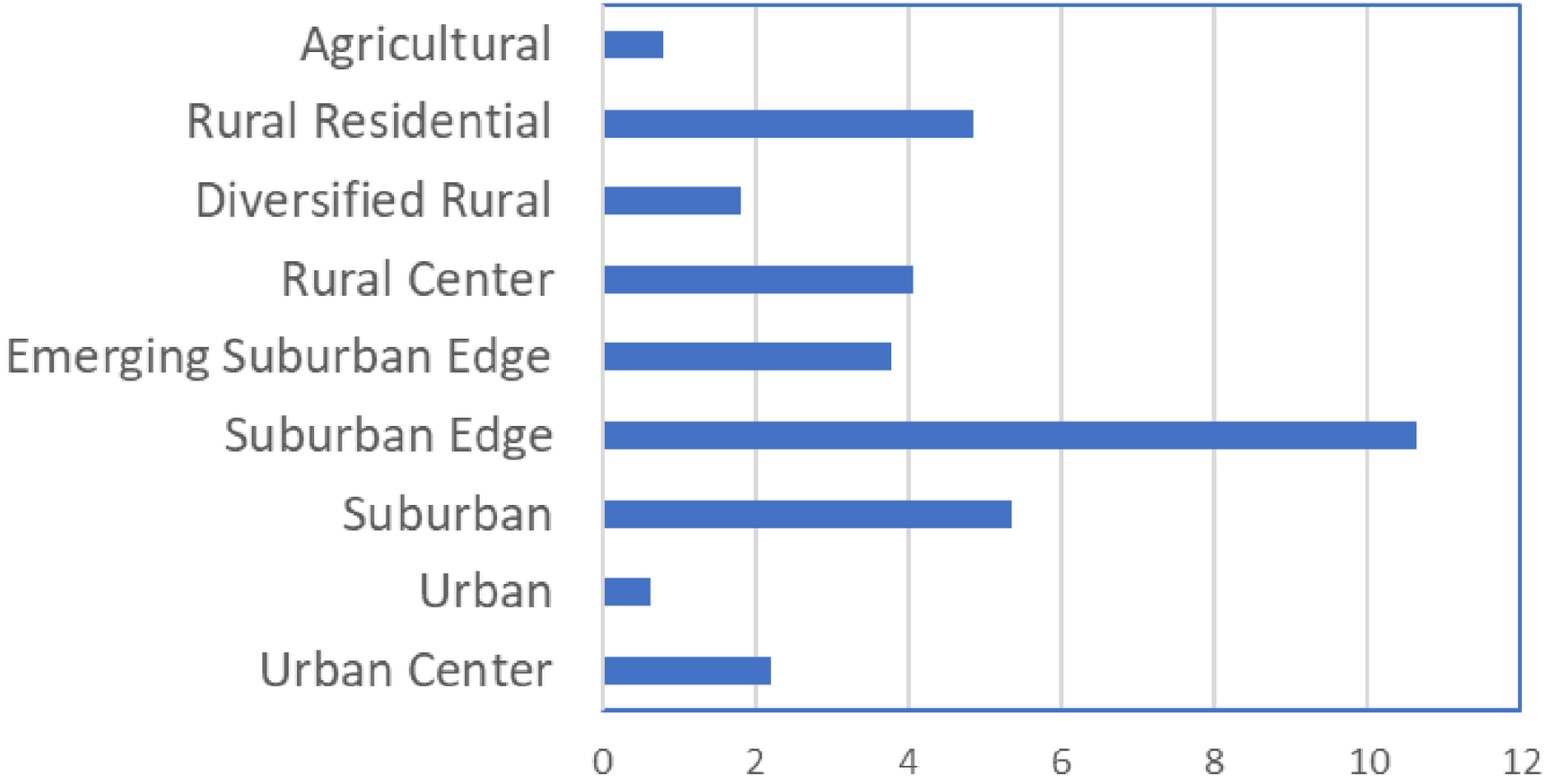
**Chloride load**

- Toxic to aquatic life at high concentrations in local waterbodies.
- Primary source of chloride in the region is road salt.

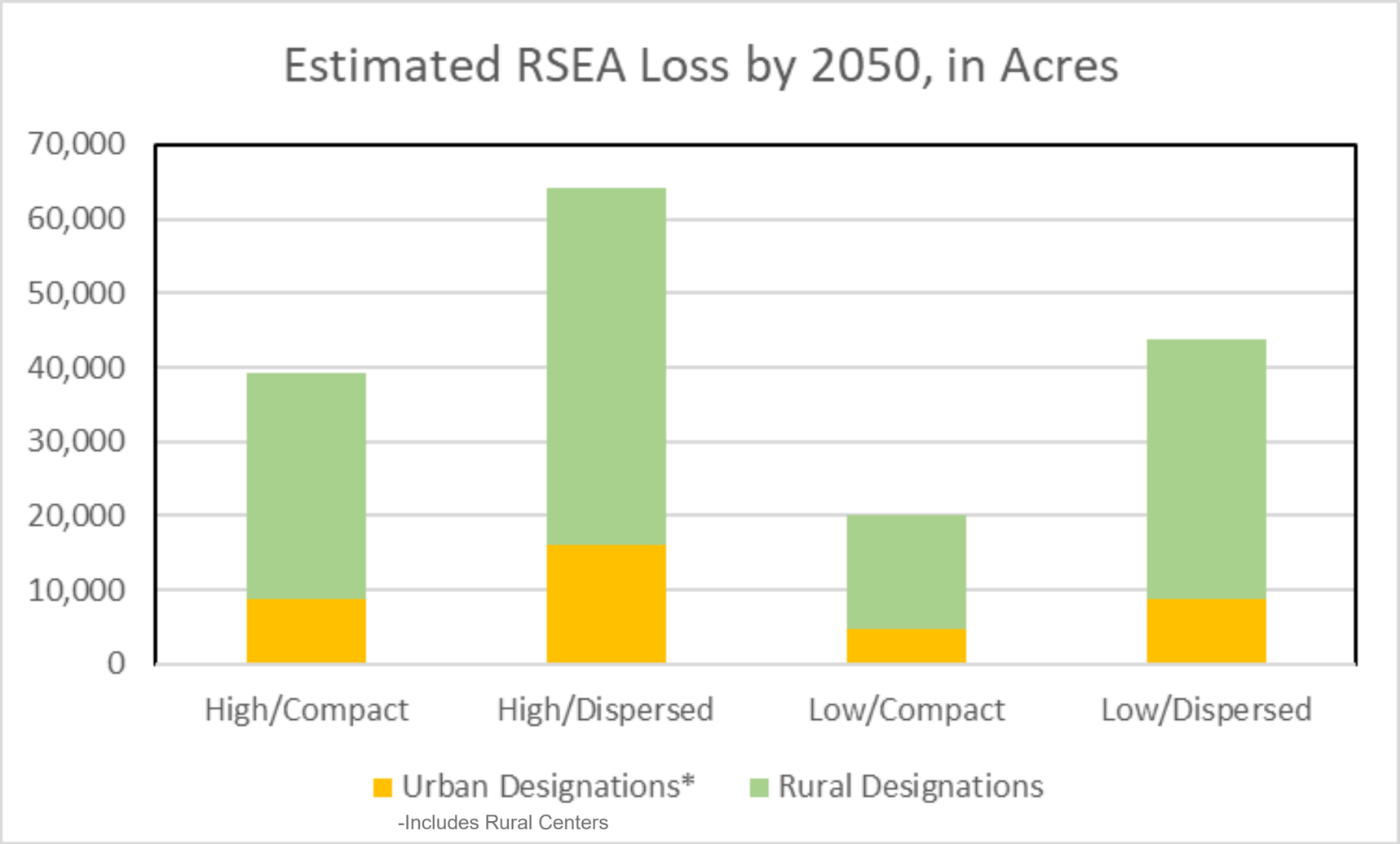
# Natural Systems Loss

## Percent Loss of RSEA between 2005 and 2020

Within each Community Designation

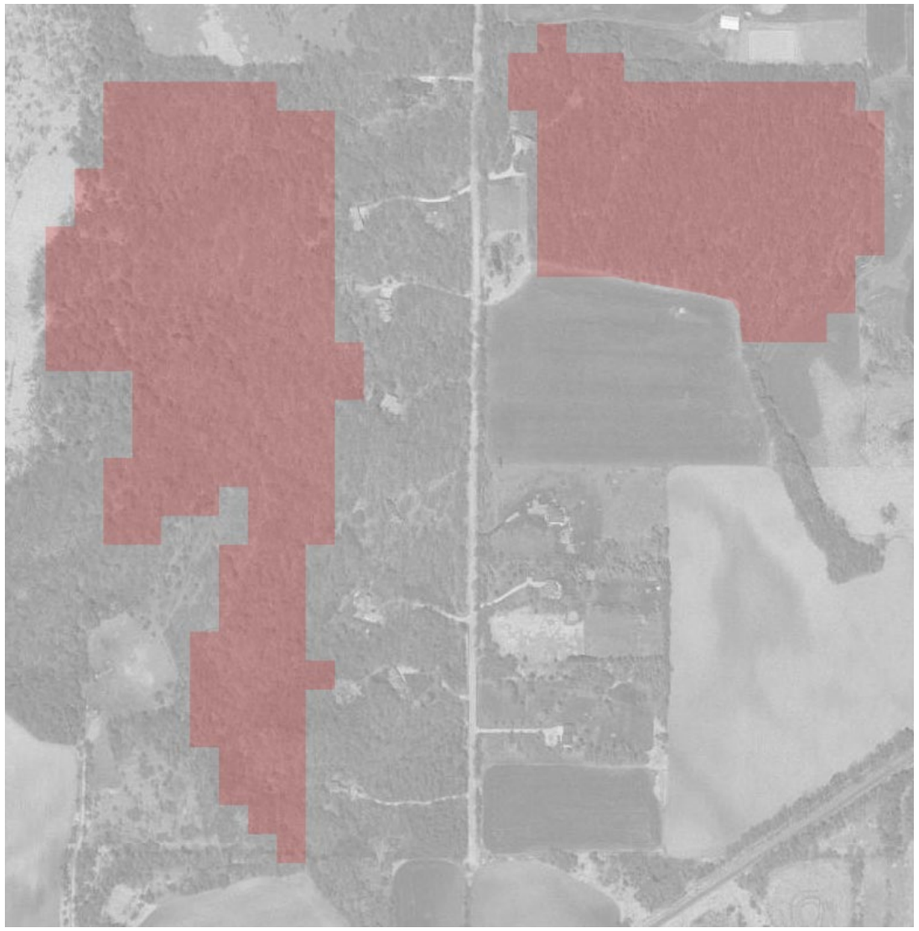


# 2050 RSEA loss by scenario

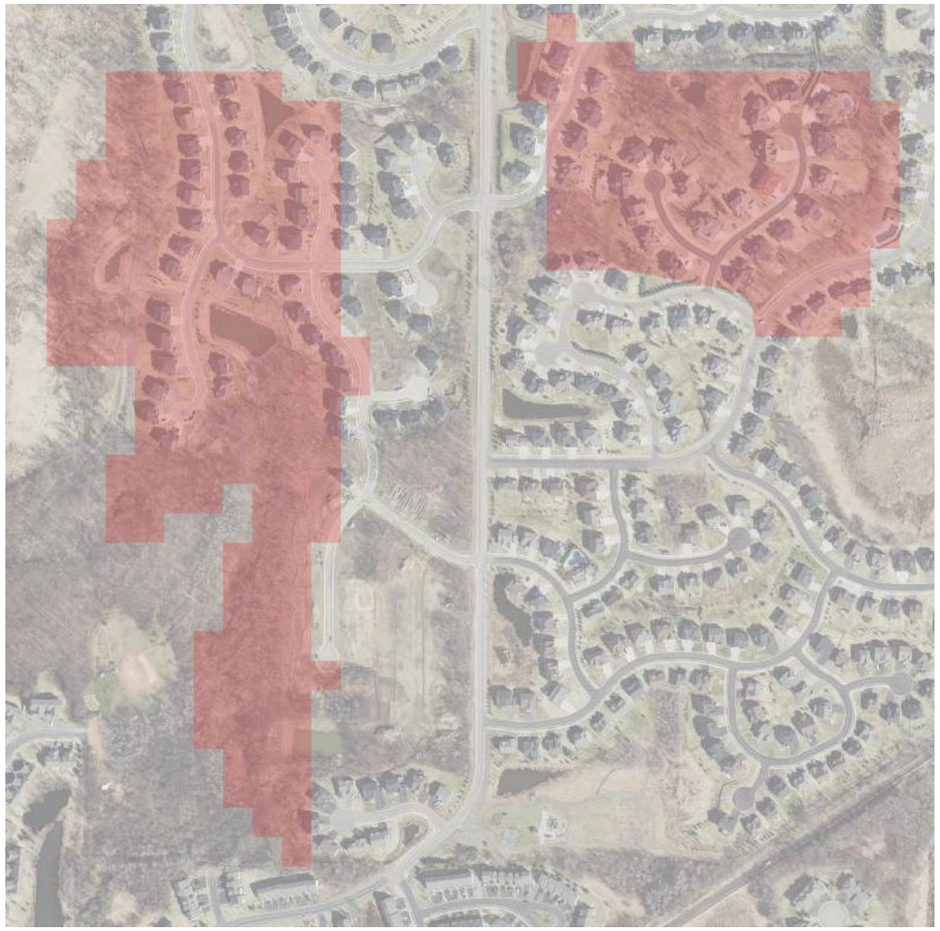


# Natural Systems Fragmentation

## 2000 Imagery with RSEA

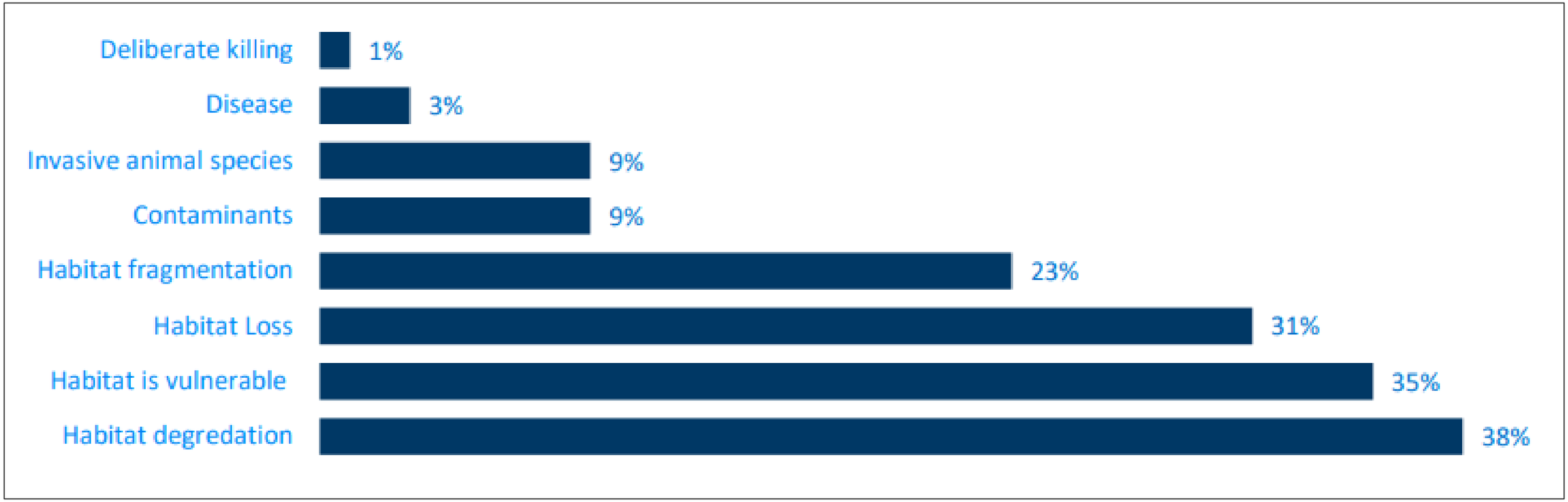


## 2020 Imagery with RSEA (~70 acre loss)

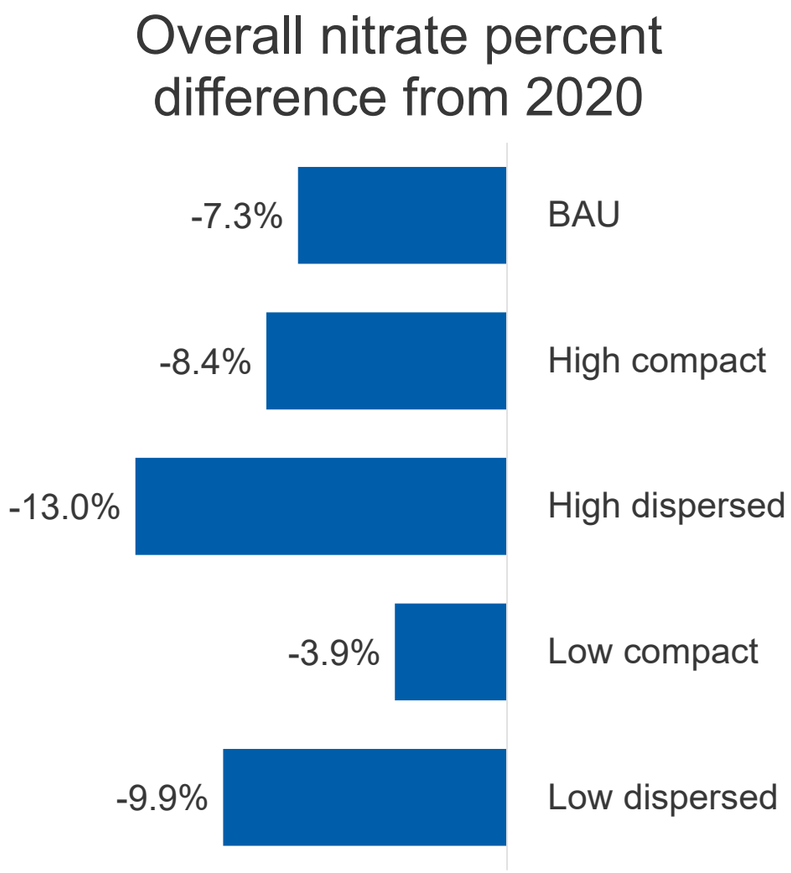


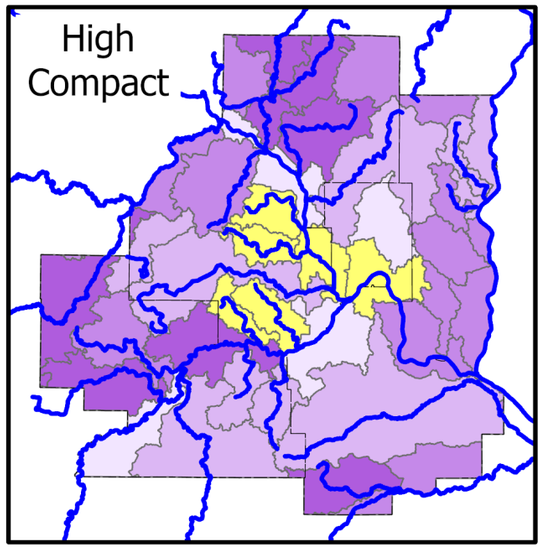
# Species Loss Tied to Threats to Habitat

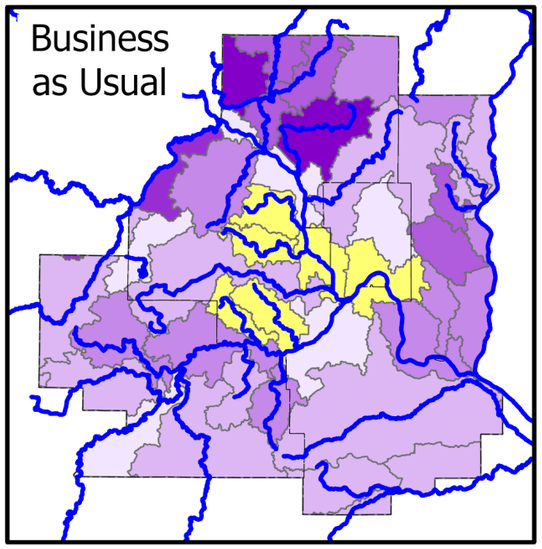
## Percentage of Minnesota's species in greatest conservation need affected by various stressors

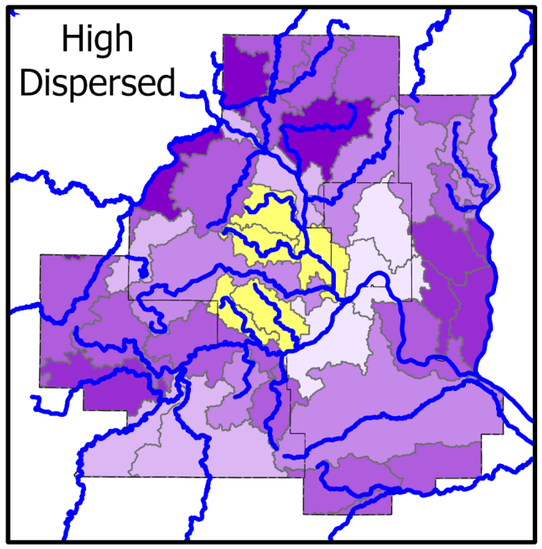


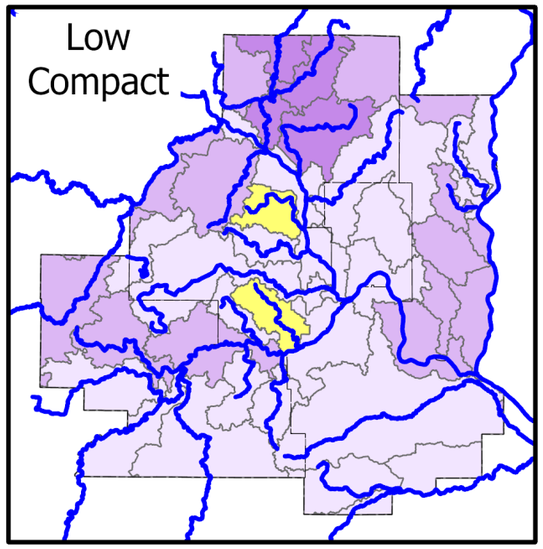
# Water Quality - Nitrate runoff

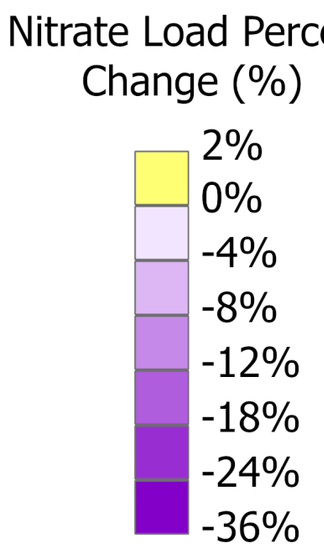


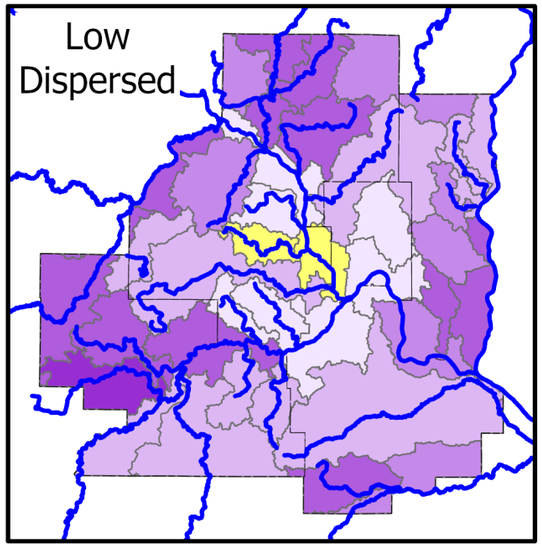



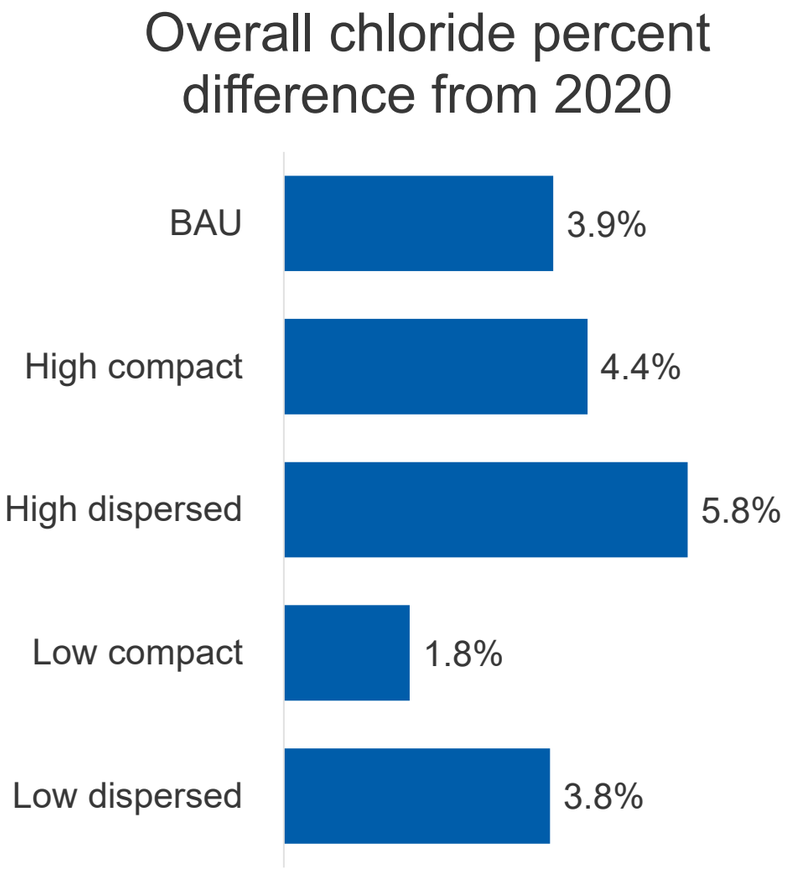



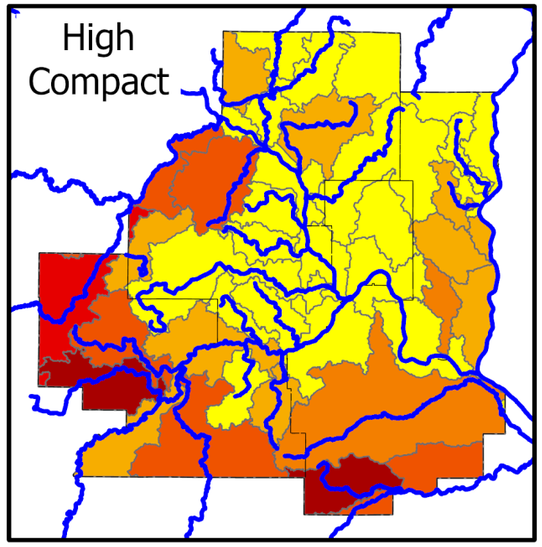



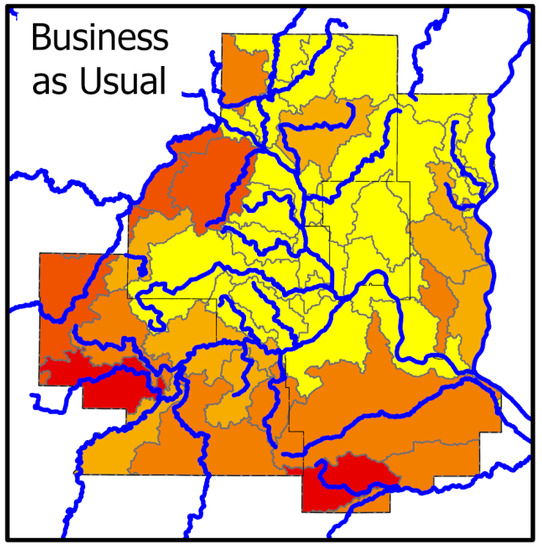



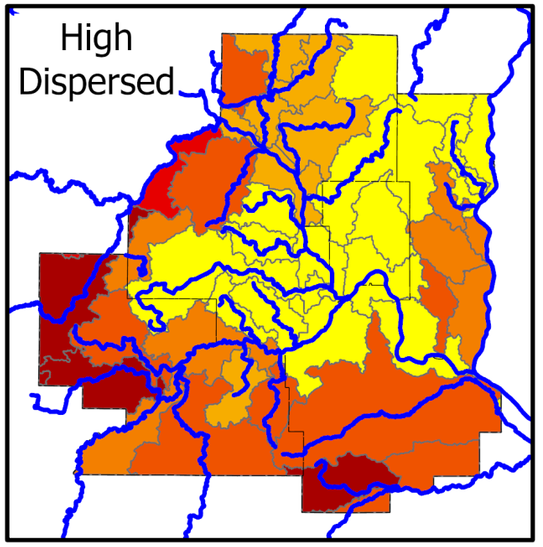



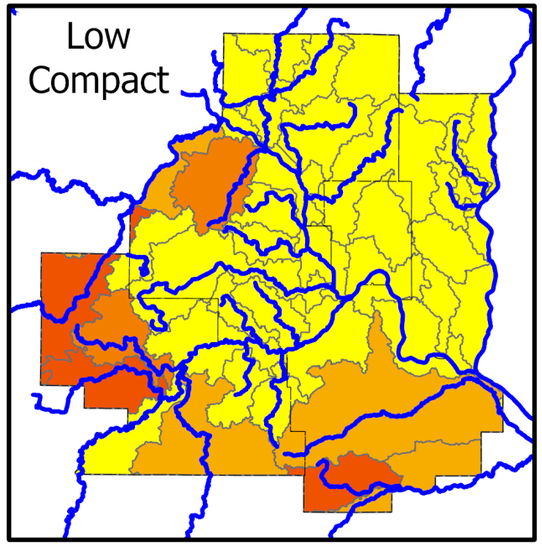
# Water Quality - Chloride runoff

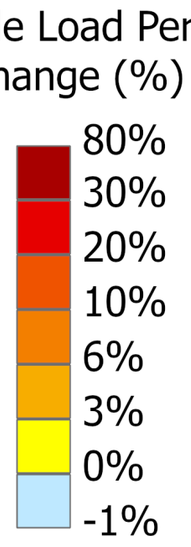


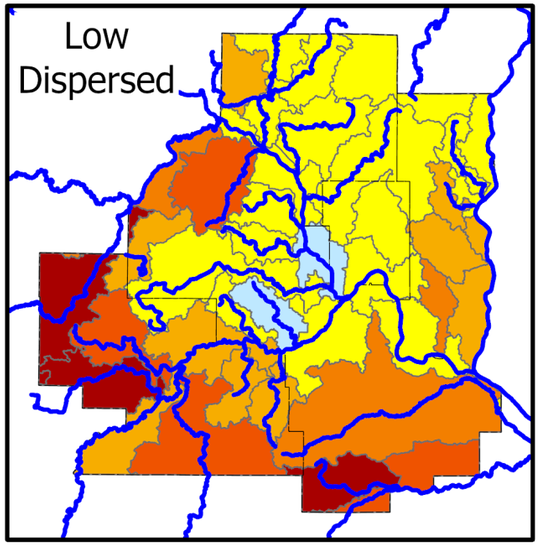



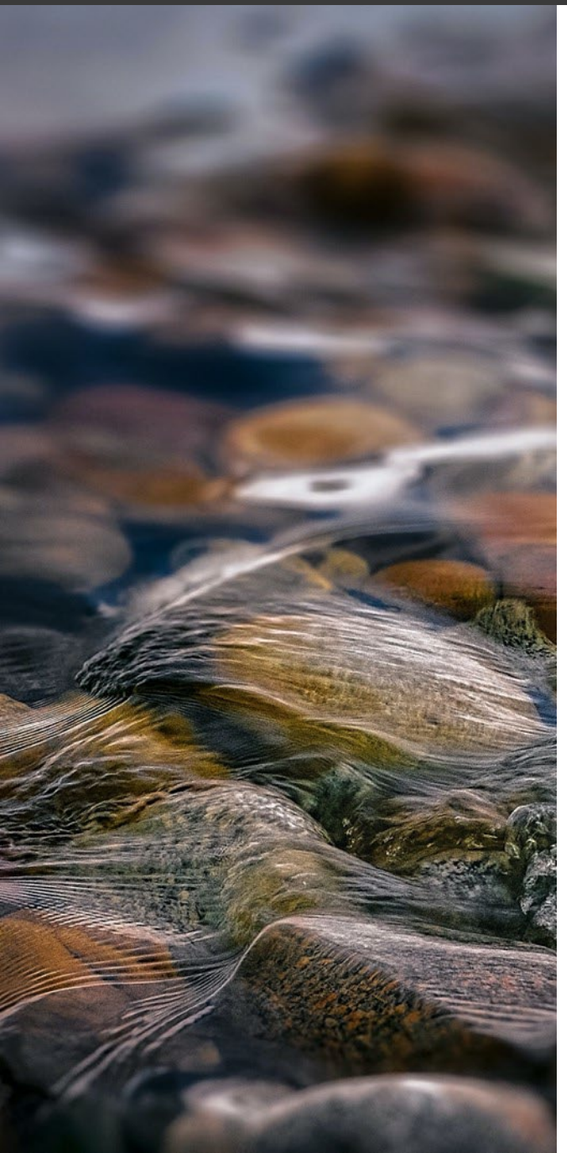



# Natural Systems Findings



## Compact growth reduces natural systems loss and fragmentation.

- Dispersed development patterns pose higher threat of natural systems loss, fragmentation, and species loss than compact patterns.

## Growth has mixed impacts on water quality.

- Dispersed development reduces nitrate runoff, which comes from agricultural lands.
- Compact development reduces chloride runoff, which comes from de-icing roads and sidewalks.

# Connections to Land Use

# Connections to Land Use

**Overall, compact growth provides better outcomes for climate and natural systems compared to dispersed:**

- Lower GHG Emissions
- Less Habitat Fragmentation & Loss
- Less Chloride Pollution
- More Nitrate Pollution

# Discussion

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