OHF Benefits to Ecosystem Services

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DEPARTMENT OF NATURAL RESOURCES

Habitat for whom?

- Historically, we've framed conservation around wildlife
  - Conservation → habitat → pheasants → hunters
- But, conservation has many benefits!
  - Science continues to support these benefits
  - Articulating these diverse benefits makes conservation more relevant to more people
  - Untapped resource of conservation advocates

www.startribune.com

Habitat benefits, for all Minnesotans

Habitat conservation supports grasslands and wetlands that play a role in:

- Removing carbon from the air and store it in the soil
- Making travel safer
- Reducing runoff – reducing the economic and emotional costs of flooding
- Recharging groundwater – protecting wells for cities and homeowners
- Filtering sediment from the water – keeping our lakes and rivers healthier
- Filtering nitrates from the water – keeping drinking water safe for infants and others

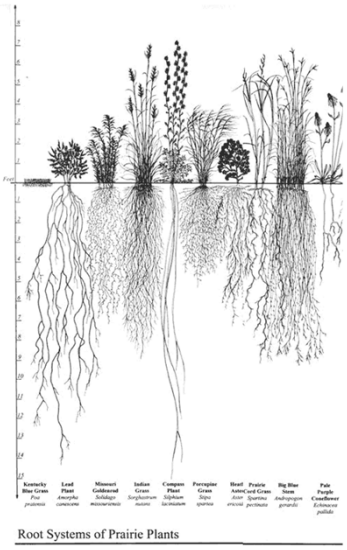
Farm Bills conservation programs

Conservation programs have long been focused on landscape issues:

- 1936 – Soil Conservation and Domestic Allotment Act (ACP)
  - "wastage of soil and moisture resources…soil erosion, is a menace to the national welfare…prevention of soil erosion…preserve natural resources…control floods…"
- 1956 – Agricultural Act (Soil Bank)
  - "soil erosion, depletion of soil fertility and too rapid release of water from lands where it falls…"
- 1985 – Food Security Act (CRP)
  - "conserving and improving soil and water resources"

Benefit: prairies remove carbon from the air and store it in the soil

- 90% of the prairie is underground, in the roots
  - Roots, fungi, bacteria, inverts all add carbon to the soil
- "Restoration of tallgrass prairie vegetation…has the potential to sequester relatively large amounts of soil organic carbon over a sustained period of time." (Matamala et al. 2008)



https://www.fws.gov/news/blog/index.cfm/2011/6/27/Iowa-The-Power-of-Prairies

Benefit: grasslands make winter driving safer

Two images from same point, one minute apart, truck facing two directions:

Benefit: grasses capture water, minimize run-off

- Prairie plants captures 12,770 gallons/acre on the leaves
- Water doesn't even get to soil

Runoff in western Minnesota

~7 inch rain in Blue Earth County
6/18/2014

Water in creek bounced ~8 ft

Benefit: prairie soils are porous sponges

- Dying roots, burrowing insects, worms
- Leave channels in soil
- Weaver and Noll (1935)
  - Runoff from prairie – "nil"
  - Runoff from bare ground – 50%
- Water soaks down instead of running off

Public land wetland one mile to east of last slide, one hour later – clear water soaking into soil

Benefit: prairie wetlands hold even more water

Northeast South Dakota (Hubbard and Linder 1986)

- Studied small wetlands (2/3 acre, 1.4 feet deep)
- Extrapolated to Altamont Moraine
- Small wetlands hold 15,800 acre-feet

Glacial Ridge NWR, Polk County

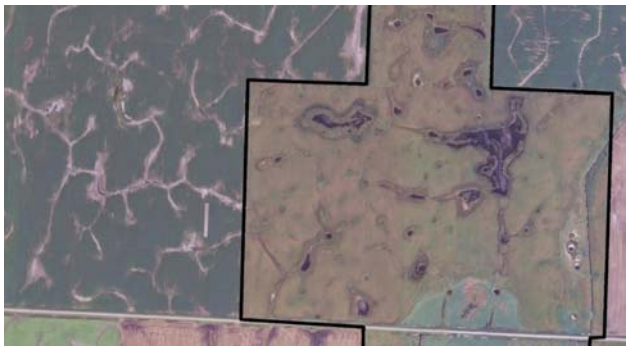
- Restorations reduced flood peak by 40-55% (Gerla 2007)

https://www.fws.gov/refuge/Glacial_Ridge/what_we_do/resource_management.html

Benefit: public lands habitat holds water

Before and after wetland restoration

- Buchl WPA, NW Becker County



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Benefit: grasslands and wetlands clean water

Sediment (Weaver 1968)

- 27 inches of rain over 15 months
- Prairie – no measurable erosion
- Bare ground – 5.08 tons of soil lost

Jordan Boat Ramp, Minnesota River, July 2019

Nitrates/phosphates create algal blooms

- Algal blooms in local lakes
- Dead zones in Gulf of Mexico and Lake Winnipeg
- Impacts
  - Commercial and recreational fisheries
  - Lake homeowners

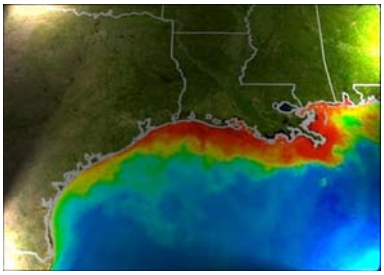
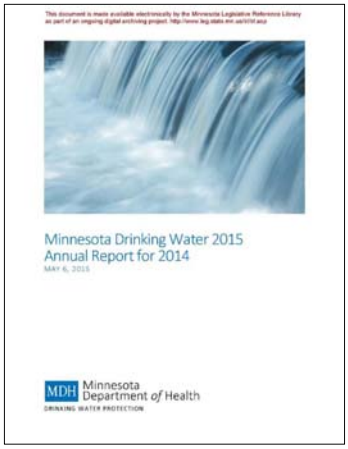


Photo Credit: NASA / NOAA

https://www.cbc.ca/news/canada/manitoba/lake-winnipeg-algae-july-2019-1.5228183

Nitrates' human health impacts

Pheasant habitat = healthy drinking water



COMMUNITY AND NONCOMMUNITY WELLS:
AN INTEGRATED APPROACH

Battle Lake, a community in northern Minnesota, discovered a high nitrate issue through water sampling in noncommunity wells. The impact on the community and surrounding area concerned officials, especially as they discovered additional problems through further sampling.

The sampling indicated that groundwater in the vicinity contained significant levels of nitrate. The flow of this groundwater was toward Battle Lake, prompting concerns that it could affect city wells. MDH developed a nitrate monitoring plan for the community. The plan's two components were water quality monitoring and groundwater flow monitoring. The tasks included evaluating nitrate trends, determining if the water quality was a result of human impacts on the environment, and estimating the rate of change in the community and surrounding areas.

Nitrate sampling data have been collected for many years, providing a potentially powerful set of information. The historical data were evaluated within the context of current information to give a clear picture of the nitrate impact in the water. An integrated and coordinated approach was implemented, including the community and noncommunity water sources as well as the broader source water protection area.

Benefit: waterfowl habitat reduces nitrates

- Christiana WPA (acquired and restored with OHF dollars) – one-time grab sample
  - Nitrate level of water entering the WPA and leaving WPA
  - 98.4% reduction – for a waterfowl habitat project
  - OHF is already making surface water cleaner and safer

Practices and geography matter

- Contributions of wetlands to nitrate removal at the watershed scale (Hansen et al. 2018 – Nature Geoscience)
  - Research conducted in Minnesota
  - "Wetland spatial patterning…plays a key role in determining nitrate removal potential"
- Focused, strategic conservation - not just what we do, but where on the landscape
  - Grass *there* creates pheasant habitat
  - Grass *here* creates habitat and makes driving safer/reduces erosion/cleans surface waters/recharges groundwater/holds floodwater/etc.
- Duck and Pheasant Plans, Prairie Plan, State Wildlife Action Plan
  - All have focused geographies

Recent headlines

- Even in region with abundant water, residents turn to bottles and try to conserve (Baier, March 20, 2014 – MPR)
- Town's contaminated water highlights a larger problem for Minnesota (Kennedy, April 25, 2015 – Star Tribune)
- Nitrates cited as a 'growing threat' to Minnesota's drinking water (Kennedy, May 7, 2015 – Star Tribune)
- Nitrates in drinking water a costly problem for small, rural cities (Marohn, Oct 2, 2018 – MPR)
- Grassland conversion may increase water pollution in SE Minnesota (Meersman, July 18, 2014 – Star Tribune)

"Grassland conversion may increase water pollution"

- "Recent trends in grassland loss…are likely to increase the future number of contaminated wells by 45 percent leading to millions of dollars in lost income and remediation for private households." – B. Keeler, quoted by Meersman
- "Link between land-use change, water quality, and impacts on human well-being…evidence that land-use change in a region experiencing rapid and extensive grassland loss is likely to significantly increase the number of contaminated private drinking water wells." – Keeler and Polasky 2014, Environmental Research Letters

Restore, protect, and enhance Minnesota's wetlands, prairies, forests, and habitat for fish, game, and wildlife

Is that phrase the

end of the story,

or the beginning?

Photo: C. Henderson