Exploring the Knowledge Commons of Lakes Hubbard County MN

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Overview – discussion of lakes & associated data

Burney introduction - academic who extends

  research to real world situations – Extension Agent

Introduction of the concept of Environmental Commons

  & their associated Knowledge base

Exploring Data > Knowledge > Mgmt Implications

HCCOLA & LA Connections

Defining a Commons

Commons - shared resource 'governed' (both formal & informal rules) by the community of actors (not solely state or private market) who depend on or are affected by that resource. Governed=Co-Managed/Collective Action

Collective Action - **action taken together by a group of people whose goal is to enhance their condition and achieve a common objective.**

Co-Management - **sharing of responsibilities, rights, and duties between the primary stakeholders**, in a decentralized approach to decision-making that involves the local users in the decision-making process as equals with the city-township-county-state government

Tragedy of the Commons - Elinor Ostrom, a political scientist who was awarded the Nobel Prize in economics in 2009, showed how ranchers, fishermen and others had devised clever ways to cooperate, without appealing to government, and to **avoid the tragedy of the commons, which is the overexploitation of shared resources**.

Lakes as Commons

Lakes can be an example of a natural resource commons when they are 'governed' by the lake shore residents (LA) in cooperation with various non-government and government entities through collective action

Examples of Tragedy of Lake Commons

– Over-fishing
– Excessive boating
– Over-developed shoreline
– Rapidly degrading lake water quality

Collective action can avoid the Tragedy

Lake Knowledge to Guide Management

- Abundance of data collected for lakes over time
- Data can be summarized to create information
- Information can be used to create knowledge
- Knowledge should be shared with all actors
- Knowledge can be utilized to benefit the lake

Summary of Data Ideas about Lakes, <u>Part 1</u>

- Aquatic Invasive Species (AIS) status of a lake
    - MNAIS AIS Explorer
    - Track boat launches from infested lakes
- Land Use History
    - Arial photos over time showing changes in watershed land use – primarily natural habitat conversion to ag, housing, etc.
    - Lakeshore land use change directly impacting a lake – VRBO's, Campgrounds, Resorts changing to planned unit development (PUD's), etc.
- Septic System Survey/Upgrades - Hubbard Co,1990's
- Examples for each on following slides

AIS Boat Launch Inspections

- Most public boat launches are periodically staffed with inspectors (Gov't + LA $'s)

- Inspecting boats for AIS – coming in/out & <u>recording previous lake</u> – AIS monitoring!

- Previous lake database tracks possible AIS

- MAISRC – AIS Explorer developed to track <u>AIS risk</u>
  [AIS Explorer | Minnesota Aquatic Invasive Species Research Center (MAISRC) (umn.edu)](#)

MAISRC – AIS Explorer

Hubbard County Risk Map - Zebra Mussels
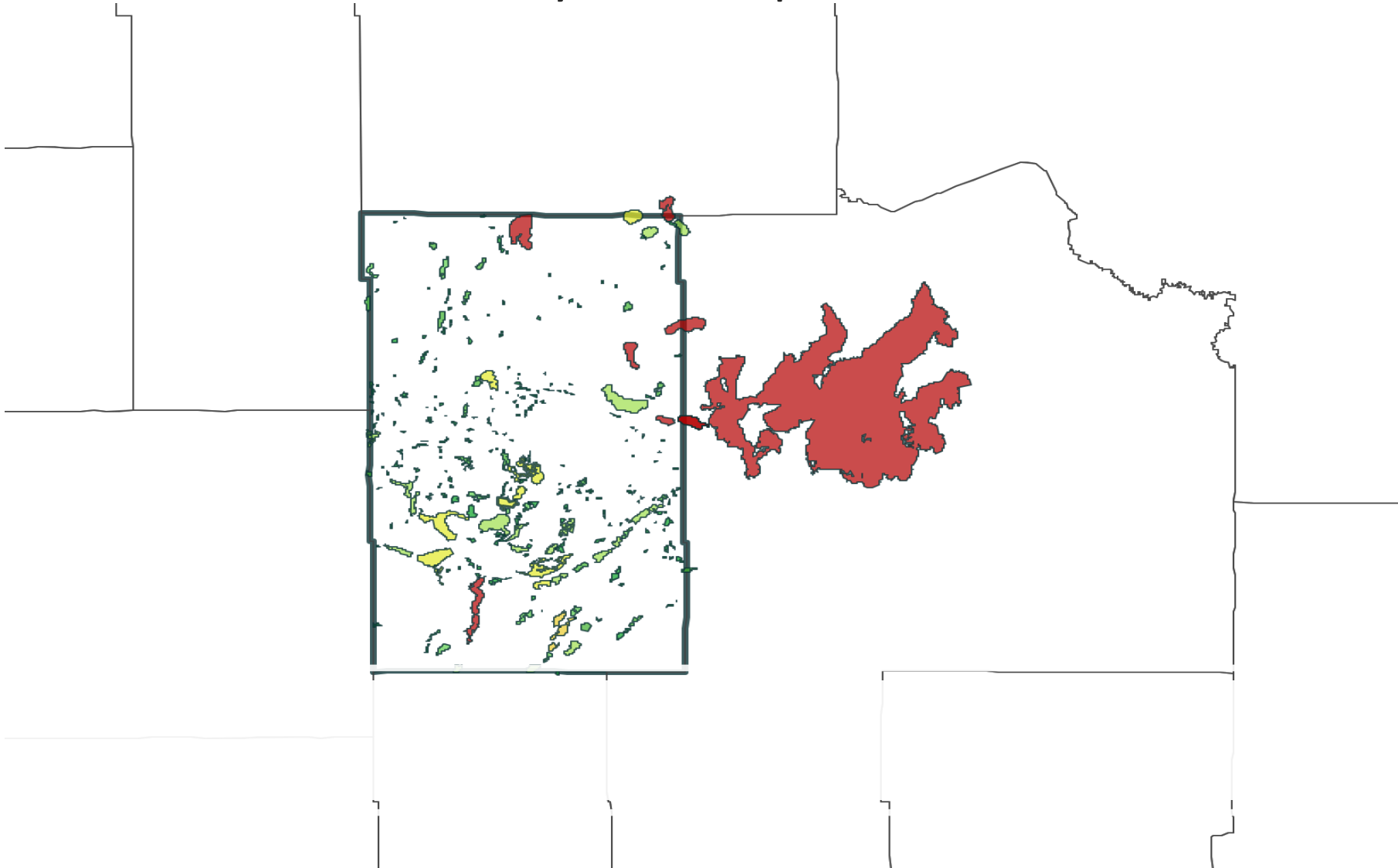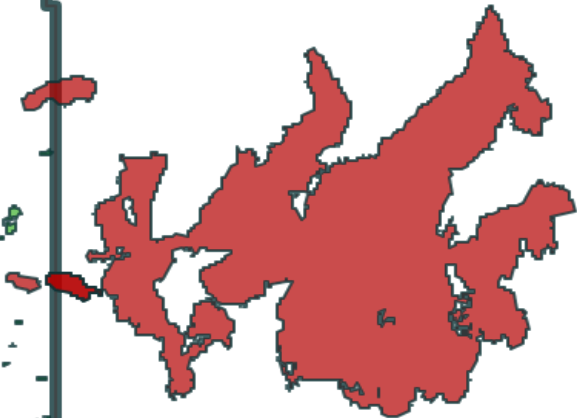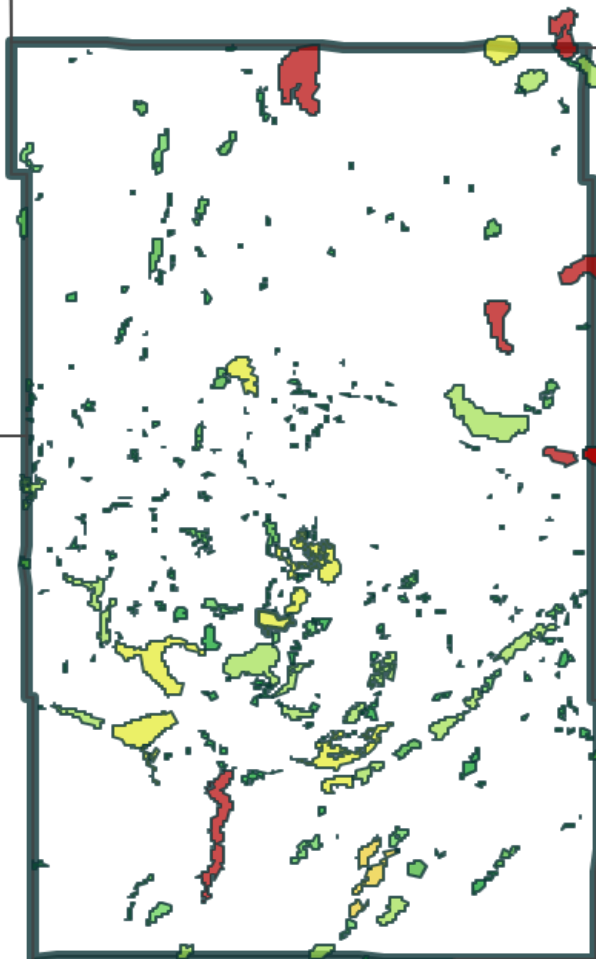
Land Use Change Over Time

Adapted (2023) from Jake Shaughnessy (HC SWCD)
& Eric Buitenwerf (HC Env Services)

Agricultural development had already happened in the prairie land in the early 1900's with some of the conversion of the Pineland Sands happening later in the 1900's. Most fields were unirrigated until the late 1970's to early 1980's when you can start to see irrigation pivots being put up in the Straight River area and east of Long Lake. The majority of the switch to irrigation happened from the mid 80's to about 2000 with some fields converted at a slower rate since. Some resources to view the change include Minnesota Historical Aerial Photos (UM) which has some good imagery from the 1930-78 for the areas. https://apps.lib.umn.edu/mhapo/ and Hubbard County GIS has imagery from 1991-2023. https://hubbardcounty.maps.arcgis.com/apps/webappviewer/index.html?id=405588666bba4397982b98b3fd382f62

As to the question on the impact of agricultural irrigation in our area, there isn't good quantified data of "before" and "after" so it is hard for anyone to make any quantified assessment and thus only speculation is possible.

Land Use Change – Long Lake area
- Note Irrigation Circles -

1978 UM Photo Archives

2023 Hubbard County GIS

Hubbard County Board denies environment review for Pickerel Lake campground - Park Rapids Enterprise 1-6-24

- County commissioners suggested that Pickerel Lake residents consider a surface water use ordinance, like one adopted for Lester and La Salle lakes (2018)

- Decision Hills Campground's waterfront recreation area dock layout on Pickerel Lake is overlaid on a Hubbard County GIS satellite image.

- Contributed/Hubbard County Environmental Services Office

- Septic systems (2) are being negotiated with the County (1-31-24)

Summary of Data Ideas about Lakes, <u>Part 2</u>

- Water quality/clarity over time – LA's monitoring
  - MPCA & RMB Environmental Lab - https://lakes.rmbel.info/
- Fishery status over time – DNR monitors & suggests changes, LA also can suggest changes – administrative decision
  - Changes in catch and fish size limits
  - Fish stocking cycles added/changed
- What might be missing? Ice fishing debris, Loons, Eagles & other wildlife data? Others?
- Examples for each on following slides

Water Quality Characteristics for Big Mantrap Lake
(2023 Data Summary) (From RMB Environmental Labs Monitoring Database Only)

Parameters	Primary Site 201	Site 202	Site 205
Total Phosphorus Mean:	17.2	19.6	21.6
Total Phosphorus Min:	2.5	16	13
Total Phosphorus Max:	44	24	40
Number of Observations:	139	5	10
Chlorophyll-a Mean:	5.4	6.4	6.5
Chlorophyll-a Min:	0.4	3	3
Chlorophyll-a Max:	20	10	14
Number of Observations:	138	5	10
Secchi Depth Mean:	13.5	11.9	9.3
Secchi Depth Min:	6	9	5
Secchi Depth Max:	23	17	14
Number of Observations:	132	5	10
Trophic State Index Mean:	42.9	45.6	46.9

Water Quality Monitoring
- Big Mantrap Lake -

Trends

Years Monitored: 1997 - 2023

Total Phosphorus: No significant trend exists.

Chlorophyll-a: No significant trend exists.

Secchi Depth: No significant trend exists.

Trophic State Index: No significant trend exists.

Ecoregion Comparison

Ecoregion: NLF

Total phosphorus: Within Expected Range

Chlorophyll-a: Within Expected Range

Secchi depth: Within Expected Range

Water Quality Monitoring Summaries for Stony Lake) & Fish Hook Lake

(https://lakes.rmbel.info/OnePageSummary.aspx?LakeID=213) & (https://lakes.rmbel.info/OnePageSummary.aspx?LakeID=86)

Trends – Stony Lake

Years Monitored: 1997 - 2023
Total Phosphorus: Improving with 99.9% confidence.
Chlorophyll-a: Improving with 99% confidence.
Secchi Depth: Improving with 95% confidence.
Trophic State Index: Improving with 99.9% confidence.

Ecoregion Comparison

Ecoregion: NLF
Total phosphorus: Better Than Expected Range
Chlorophyll-a: Within Expected Range
Secchi depth: Within Expected Range

Trends – Fish Hook Lake

Years Monitored: 1999 - 2023
Total Phosphorus: Declining with 90% confidence.
Chlorophyll-a: No significant trend exists.
Secchi Depth: Improving with 80% confidence.
Trophic State Index: Declining with 80% confidence.

Ecoregion Comparison

Ecoregion: NLF
Total phosphorus: Within Expected Range
Chlorophyll-a: Within Expected Range
Secchi depth: Within Expected Range

MN Lake Finder

- Big Mantrap Lake -

Lake Data - Size and depth

- **Area**: 1617.69 acres
  Littoral Area: 849.45 acres
  Shore length: 26.3 miles
  Mean depth: 17 feet
  Maximum depth: 68 feet

- **Fish species**: black bullhead, black crappie, bluegill, brown bullhead, hybrid sunfish, largemouth bass, muskellunge, northern pike, pumpkinseed, rock bass, smallmouth bass, sunfish, tiger muskellunge, tullibee (cisco), walleye, yellow bullhead, yellow perch, shorthead redhorse, white sucker, banded killifish, blackchin shiner, blacknose shiner, bluntnose minnow, brook stickleback, central mudminnow, golden shiner, Iowa darter, Johnny darter, spottail shiner

Lake Reports Available

- Fisheries Lake Survey
- Water Access Sites
- Fish Stocking
- Ice In/Out
- Fish Consumption
- Water Levels
- Lake Health
- Aquatic Plant Survey

From MN Lake Finder – Fishing Regs, Etc.
- Big Mantrap Lake -

- **Fishing regulations**:
  [General](#) »
  [Inland waters](#) »
- **Special Fishing Regulations**: This lake has special fishing regulations that differ from statewide or border water regulations for those species identified below and take precedence. Regulations listed below are currently in place. Visit the [fishing regulations page](#) for links to upcoming regulations for specific lakes.
- **Black and White Crappie**: Daily limit five
- **Northern Pike**: All from 24-36" must be immediately released. Possession limit three, only one over 36"
- **Invasive species**: Eurasian watermilfoil

New (2023) MN Ice Fishing Regulation
- Regarding Trash, Waste, etc. –

https://www.revisor.mn.gov/statutes/cite/97C.363

Related to garbage & other waste (all forms) left on the ice. Impetus was increased dumping of sewage from permanent fish houses, however it affects all ice anglers, regardless of the type of shelter. Specifically, people using an ice shelter, vehicle or other conveyance may not deposit "garbage, rubbish, cigarette filters, debris from fireworks, offal, the body of a dead animal, litter, sewage or any other waste outside the shelter, motor vehicle or conveyance, unless the material is placed in a container that is secured to shelter, motor vehicle or conveyance, and not placed directly on the ice or in state waters."

New law appears to be the result of collective action. No data reported to indicate the problem size – eyesore, environmental, etc.

LAs should monitor & report problems!

Knowledge applications

- AIS – Increased launch site monitoring ($'s), Lake wide monitoring
- Fish – DNR lake data to fishing regs (localized for particular lake)
  - DNR driven vs LA request (ex. <u>Garfield Lake</u> panfish limit reduction)
  - Size limits, creel limits, seasonality
- Watershed knowledge informing water quality conditions/trends
  - LA water quality monitoring data over time (see MNDEM)
  - Agriculture expansion (land use change) and intensification (irrigation) – see county GIS for maps over time
  - Septic systems upgraded by County (1990's)
  - % watershed protected status (ex. Kabekona Lake is now at 75%!)
  - Others?
- Anything else come to mind?

Discussion - Transforming Data > Knowledge

- Questions & Discussion
- How does knowledge become available to stakeholders – residents, gov't, visitors, etc.?
  - News Stories
  - DNR, etc. announcements
  - County government updates
  - LA newsletters, meetings
  - Word of mouth
  - Other?

The Role(s) of LAs in Application

- Engage with all actors – members, non-members, visitors, local & state gov't

- Share all knowledge – websites, meetings, public launch site, etc.

- Share ideas of how the knowledge may be used to benefit the lake (the commons)

- Specifically engage with all actors on any proposed decisions & actions