

What's up with our lakes?

John A. Downing

Lifetime Seasonal Resident of Wabana COL

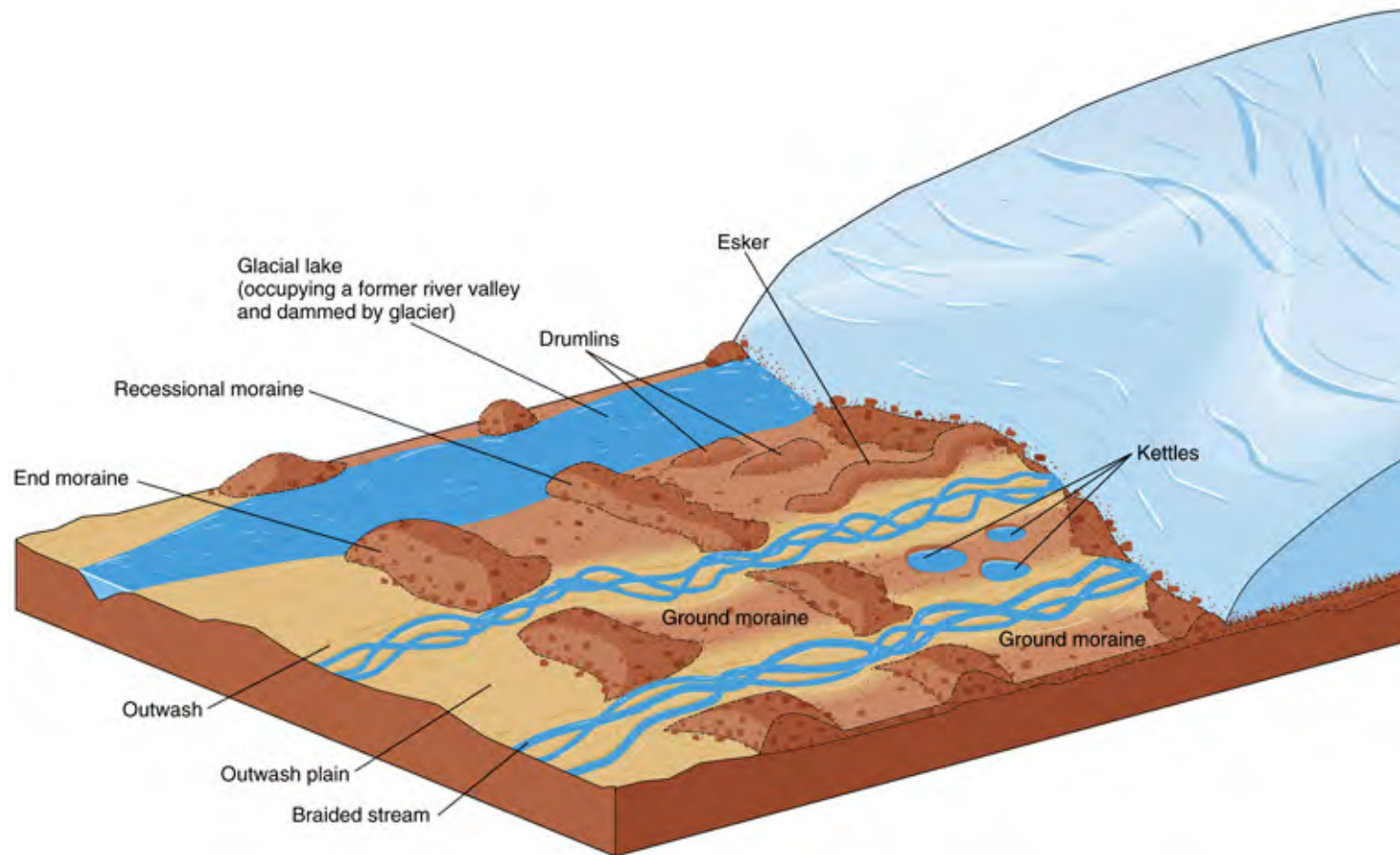
Minnesota Sea Grant Program

Duluth & St. Paul

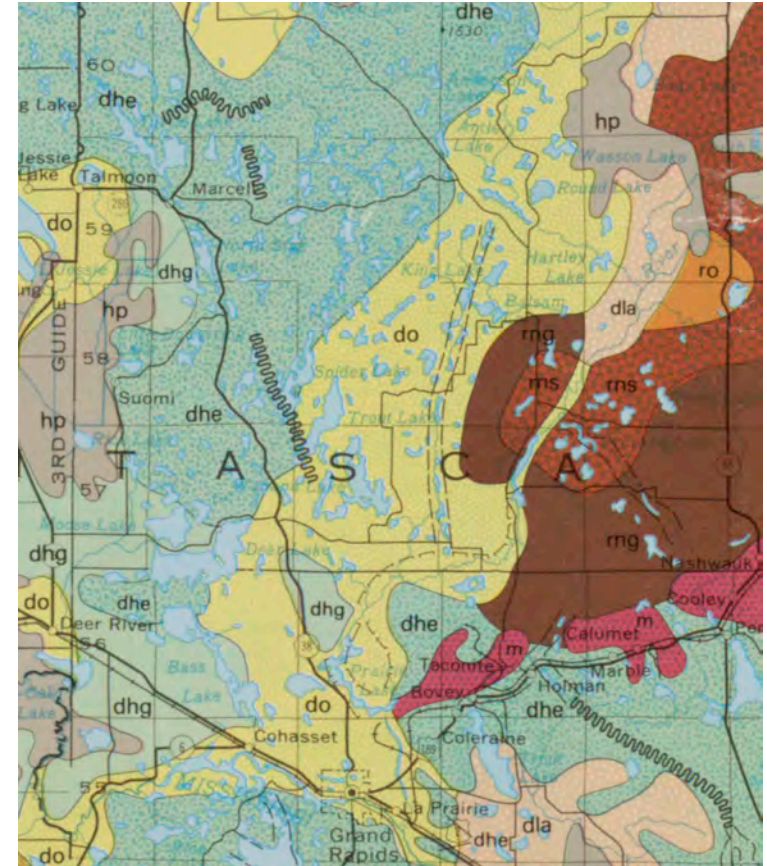
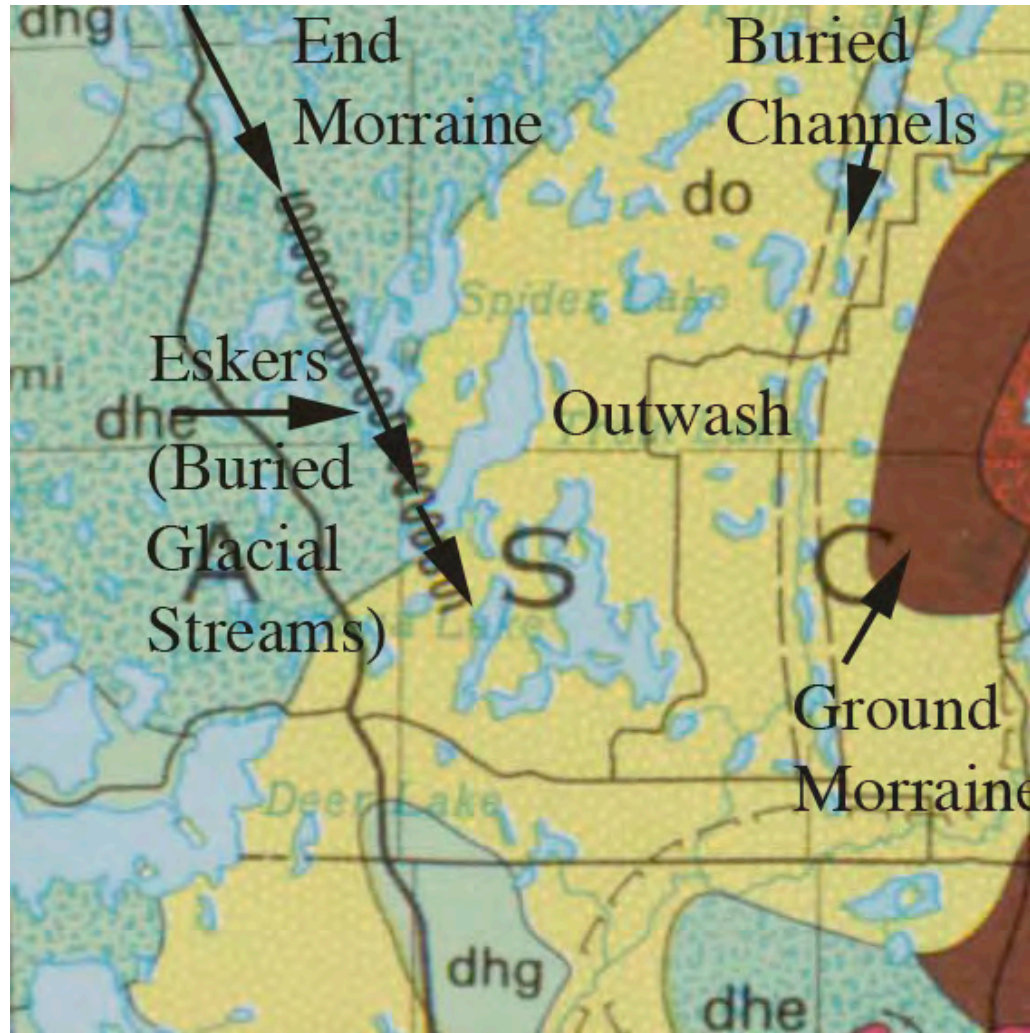
Some topics

- Geology – why our COL exists
- Oxygen demand - What we're seeing and what it means
- Algae blooms-
- Invasive species
- Human issues

Glaciers formed our landscape



Why our chain of lakes exists



Tall, gravel esker at the SW of Trout Lake



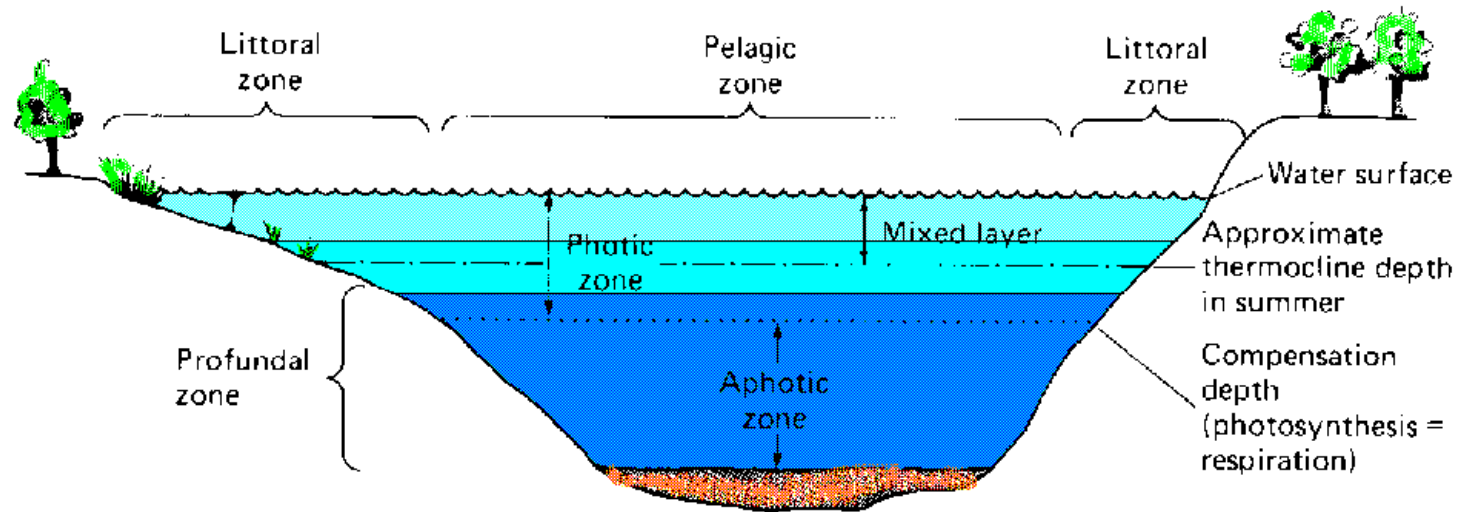
View of the esker on Bluewater



Flow to the COL from the esker groundwater system

- Via Trout Lake channels:
 - 1/4 m/second (4m wide x 0.5 m deep)
 - 1 m³/sec
 - 100,000 gallons/hour
- Via Bluewater channel
 - 0.15 m³/sec (3 m wide x 0.5 m deep)
 - 15,000 gallons/hour
- Close to this year-round – not much influenced by rainfall and runoff
- What's in the groundwater matters

Basic limnology: summer stratification



Deepwater oxygen – why it matters

- Trout and ciscos need 4 mg/L to live and reproduce
 - Also need to be below 52 degrees F (11 degrees C)
 - And they reproduce in fall
- Other fish can't live below 2 mg/L
- Oxygen in spring is around 12 mg/L

What uses dissolved oxygen?

- Starts high in spring because lake mixes top to bottom and takes in oxygen from the air
- Normally, oxygen is taken out of the water by decomposition of stuff growing in the lake
 - Algae, fueled by nutrient is the usual thing that decomposes
 - Chemical processes can add to it
 - Eutrophication from human nutrients makes it increase very fast
- Oxygen depletion in the deep water of the COL is 5-10 times faster than we expect for a clear water lake

9 sites since mid-May



Oxygen conditions now

- Many places in the COL, no fish can survive below 30-40 feet
- Deep water in south Trout lower in oxygen than north Trout
- Fish in a sandwich between warm water and low oxygen – and it's getting worse (need >4 mg/L oxygen and <52 degrees F)
- Deep water in north Bluewater lower in oxygen than in south Bluewater
- Interlochen (aka "Little Trout") has no oxygen below about 35 feet – never mixes
- We're trying to figure out the source of phenomenon for these and other "Cisco Lakes" so it can be fixed
- Seems as if groundwater is involved

Has this changed?

- Rates of oxygen “demand” 5-10x the amount seen in other clear-wter lakes
- Surveys I did 15 years ago showed some low oxygen but not as much
- Role of climate and new nutrients?
- My ancestors caught trout in Wabana
- I used to find dead ciscoes on the shore
- The “cisco lake problem” is one of the big mysteries DNR is trying to solve

(Spring oxygen)-(natural demand)-(demand due to new nutrients)-(chemical demand)=(August oxygen)

Algae blooms –why?



This year's spring bloom

- Our spring bloom was a bluegreen algae species
- Wabana warmed from ice to swimmable in 3 weeks before Memorial Day
- When lakes mix in spring, nutrients from the deep water are available to algae
- I'm seeing more algae in the water now than I've seen in the past
- We've seen a lot of globs of filamentous algae we haven't seen in the past
- Climate and increased nutrients the likely cause of increased algae

Why should we care about this

- Some species can be toxic to people, pets, and aquatic life
- They can stink and add odor and flavor
- They are a sign of declining water quality

Invasive species



How do they get here

- Mostly by accidental transport by boats via landings
- 3 official boat landings on the chain of lakes
- Watercraft inspections are helpful
- Boats arrive out of inspection hours and at unofficial landings, too
- Nearby lakes have a variety of species
 - Zebra and quagga mussels
 - Didymo
 - Spiny water flea
 - Starry stonewort
- “Cures” not in near-future so “prevention” is key

Lot's of ways to increase safety from AIS



Boat-in Campsites



CAMPERS

Your cooperation will help keep these campsites operating. You can help our program and reduce our costs by observing the following:

- Being considerate of other campers.
- Keeping firearms unloaded and cased at the campsites.
- Carrying out all trash and leaving the campsite clean.
- Not consuming intoxicating liquor.
- Camping a maximum of 14 days.
- Limiting your party to 8 people.
- Reporting vandalism to the nearest official.

A full list of rules is available at public water accesses, Minnesota DNR offices or the U.S. Forest Service.

**United States Forest Service
Minnesota Department of Natural Resources**

Concern about sanitary conditions



BLUEWATER/WABANA LAKES AREA



- | TRAILS | FACILITIES |
|-------------------------------------|---------------------------------|
| Tacanite State Trail | Parking |
| Non-Motorized Trail (Hiking/Skiing) | Boat Ramp Access |
| State Forest Road | Carry-in Access |
| Unmaintained Roads | Beach |
| | Boat-in Campsites |
| | Wayside Rest (Water facilities) |

- OWNERSHIP**
- State Forest Land
 - County Land
 - Federal Land
 - Private Land



LOOKING FOR MORE INFORMATION?
 The DNR has mapped the entire state in 51 sections showing inland, lake and county lands with their recreational facilities. Public Recreation Information Maps (PRIM) are available for purchase from the DNR gift shop. DNR regional offices, Minnesota state parks and major sporting and map stores. Check out our website at <http://www.dnr.state.mn.us/mapshop.htm>

YOU ARE HERE →

Respect Private Property

Concerns about boat-in campsites

- Untreated waste
 - Nutrients (50 people for a day produce sewage of 1 person for 2 months)
 - 50% of phosphorus output is as urine
 - Disease-causing microbes (bacteria, viruses, other pathogens)
- Big parties and drunken boating
- Fire hazards
- Litter
- “common property” resource problem- when it belongs to everyone, who looks after it?



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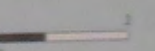
Beard Blom Lake

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LAKES AREA

FACILITIES

- Parking
- Boat Ramp Access
- Carry-in Access
- Beach
- Boat-in Campsites
- Wayside Rest (noted below)

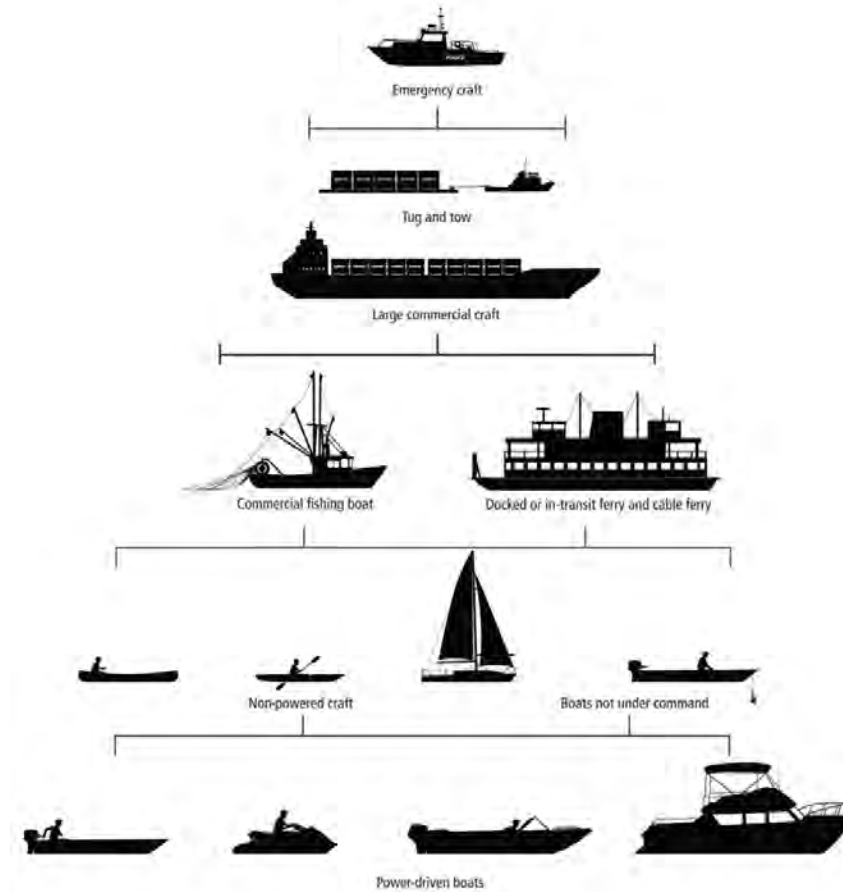


Respect Private Property

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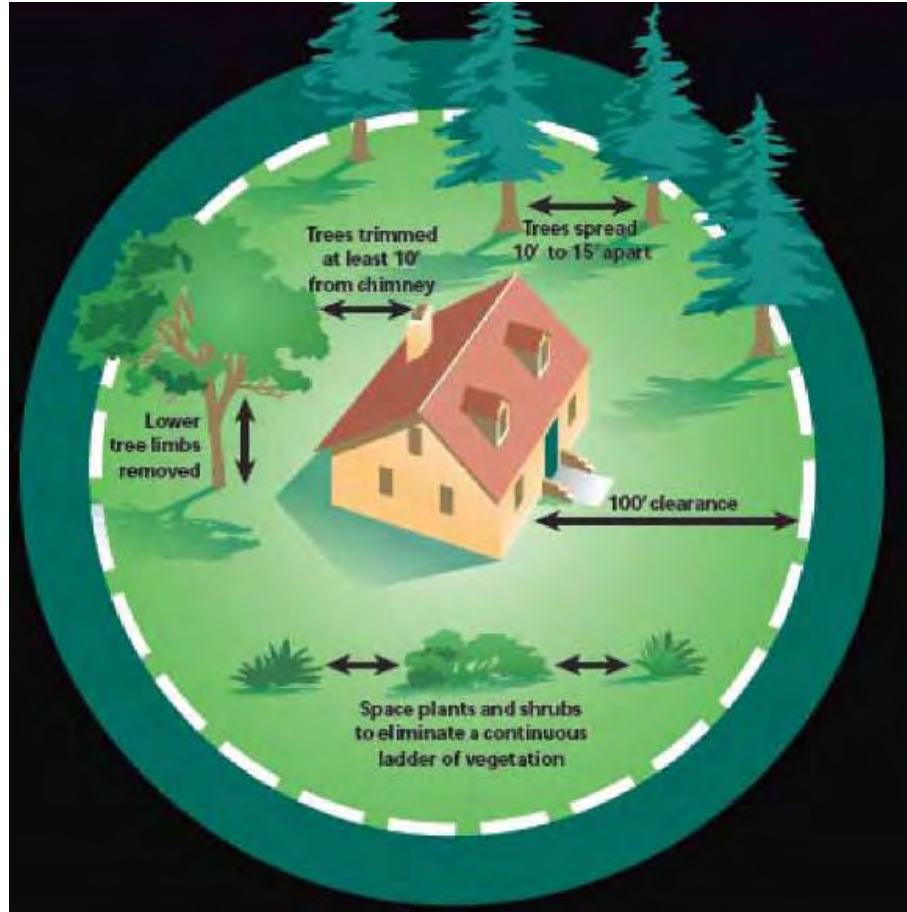
Navigation is getting complicated



Safety of people and the resource is important

- Right-of-way rules seem unknown to boaters
 - Motorized yield to unmotorized
 - Upstream traffic yields to downstream
 - More collisions in channels and destructive navigation
- Is this a role for WCOLA?

Wildfire protection & water quality



- Clearing 100' diameter circle is 7854 sq feet
- 1/5 acre per house
- Clear to the shore and nearly the entire width of a 250' lot
- Perhaps safe for houses but not for the water

What is the role for WCOLA in....

- Insuring good water quality and healthy fisheries
- Protecting the groundwater resource that sustains our “chain”
- Algae bloom monitoring and protection
- Aquatic invasive species
- Safe use of campsites
- Safe navigation

