

Spring-Hunting Strategies

And the Diversity of Minnesota's Springs



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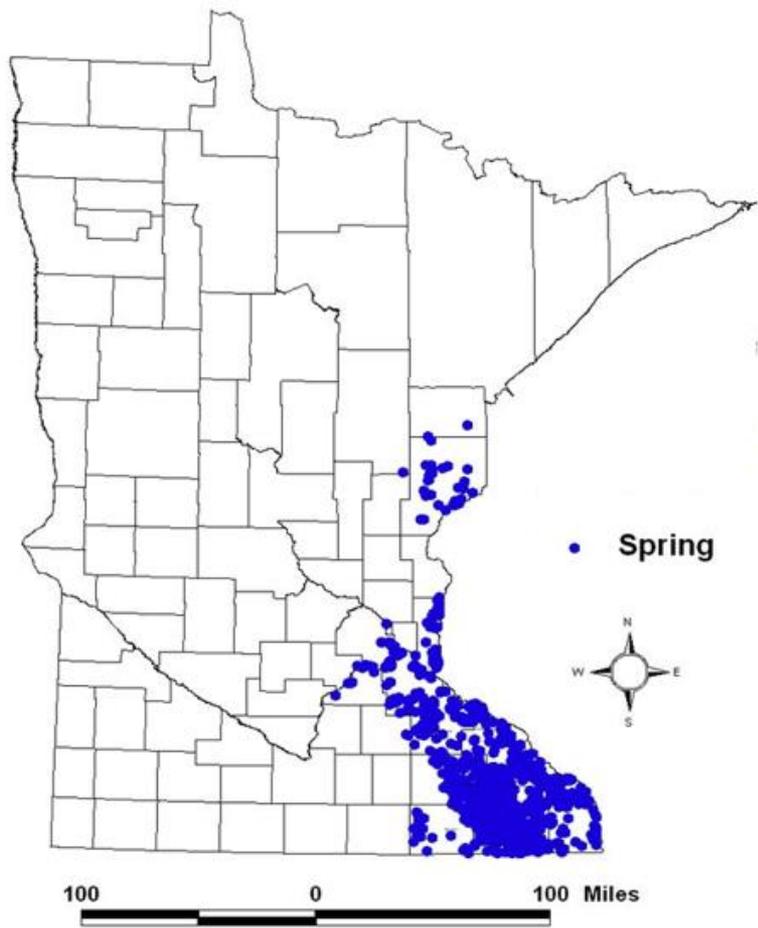
Minnesota Spring Inventory

- Funded by LCCMR
- DRI and SSI protocols
- Level I (Level 3 by MPCA)
- Public vs. private lands
- Citizen science

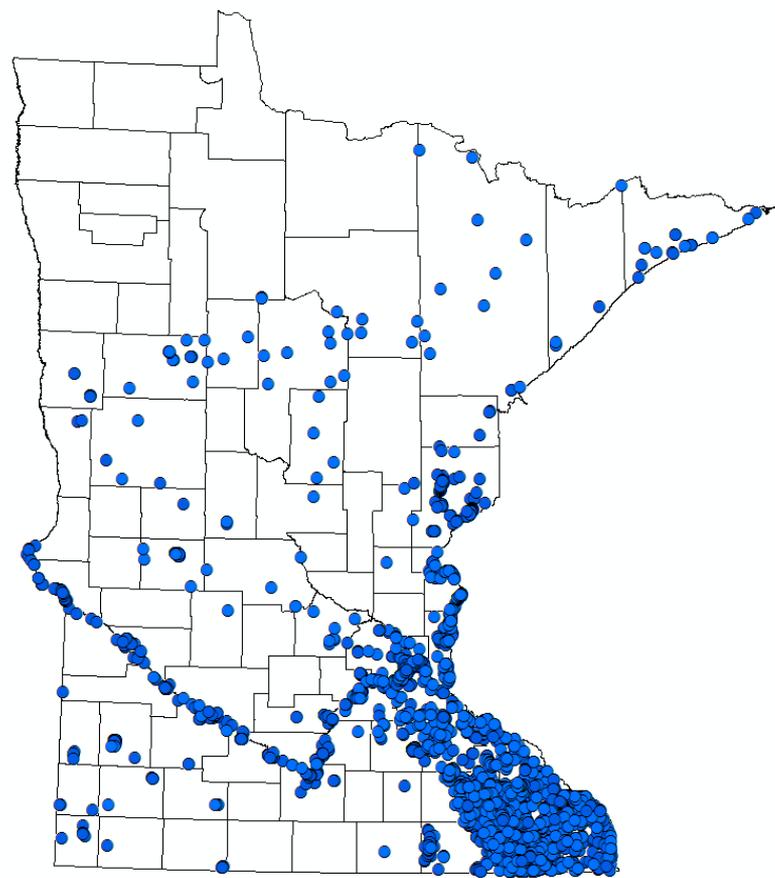


Funding for this project was provided by the
Minnesota Environment and Natural Resources Trust Fund and the Clean Water Fund.





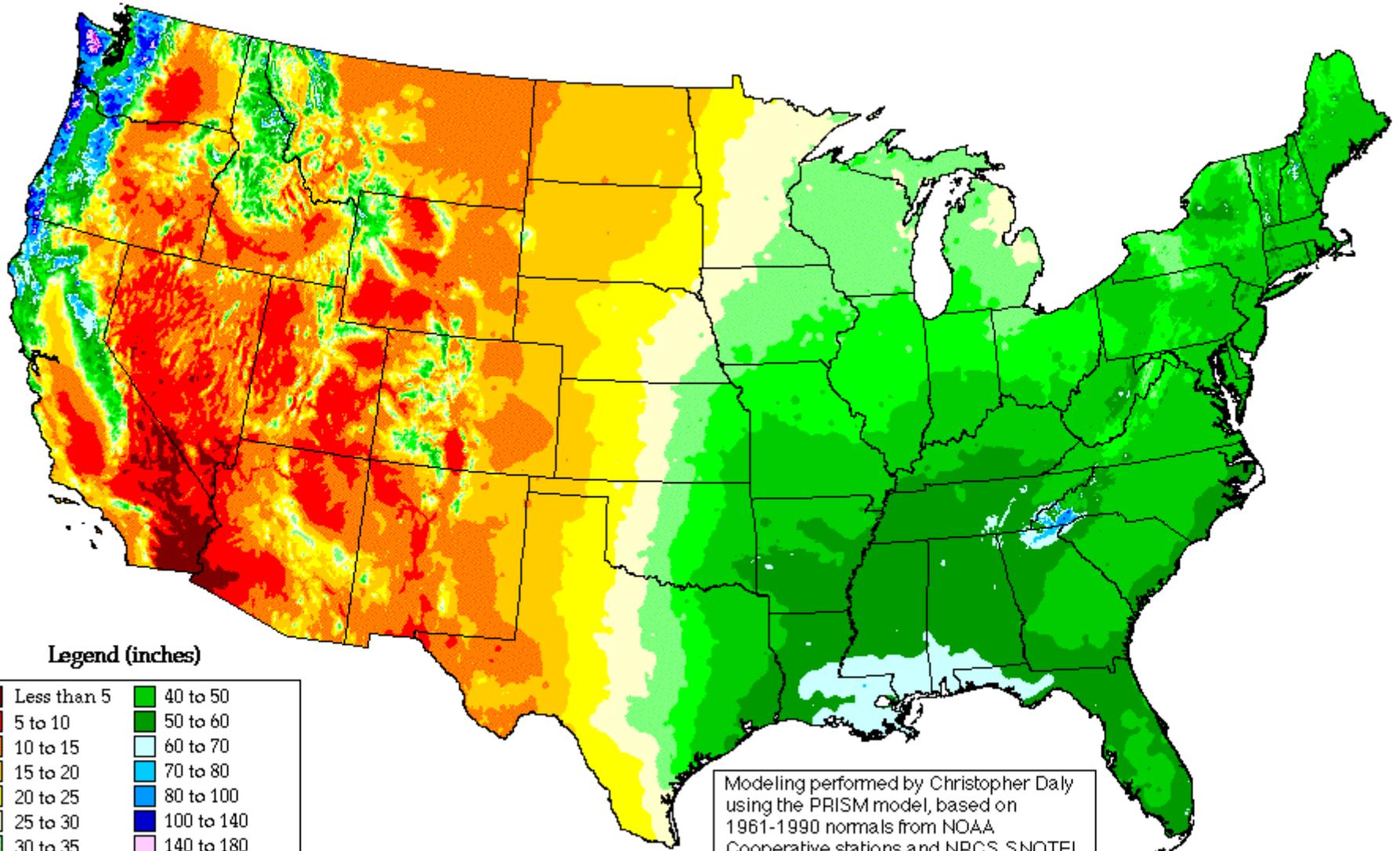
2014



2018

Annual Average Precipitation

United States of America



Legend (inches)

Less than 5	40 to 50
5 to 10	50 to 60
10 to 15	60 to 70
15 to 20	70 to 80
20 to 25	80 to 100
25 to 30	100 to 140
30 to 35	140 to 180
35 to 40	More than 180

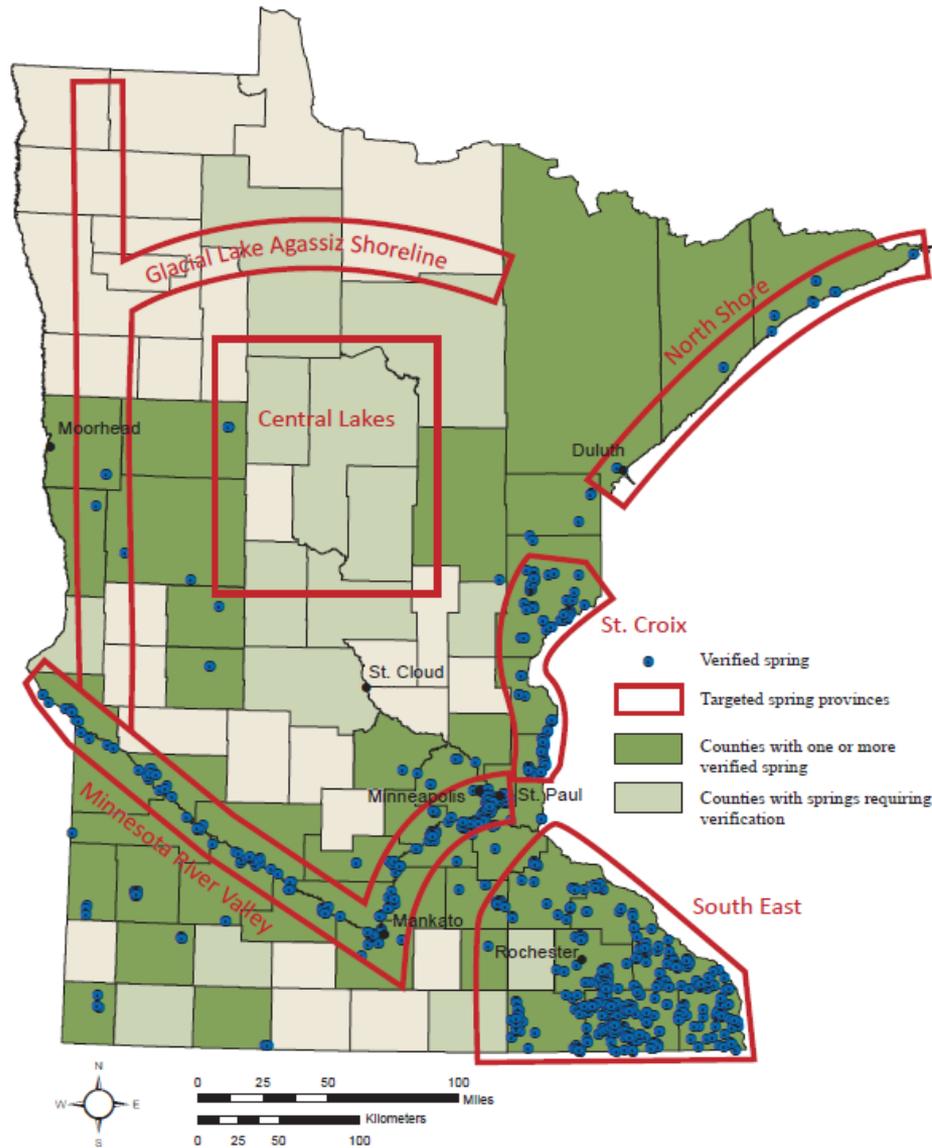
Period: 1961-1990

Modeling performed by Christopher Daly using the PRISM model, based on 1961-1990 normals from NOAA Cooperative stations and NRCS SNOTEL sites. Sponsored by USDA-NRCS Water and Climate Center, Portland, Oregon.

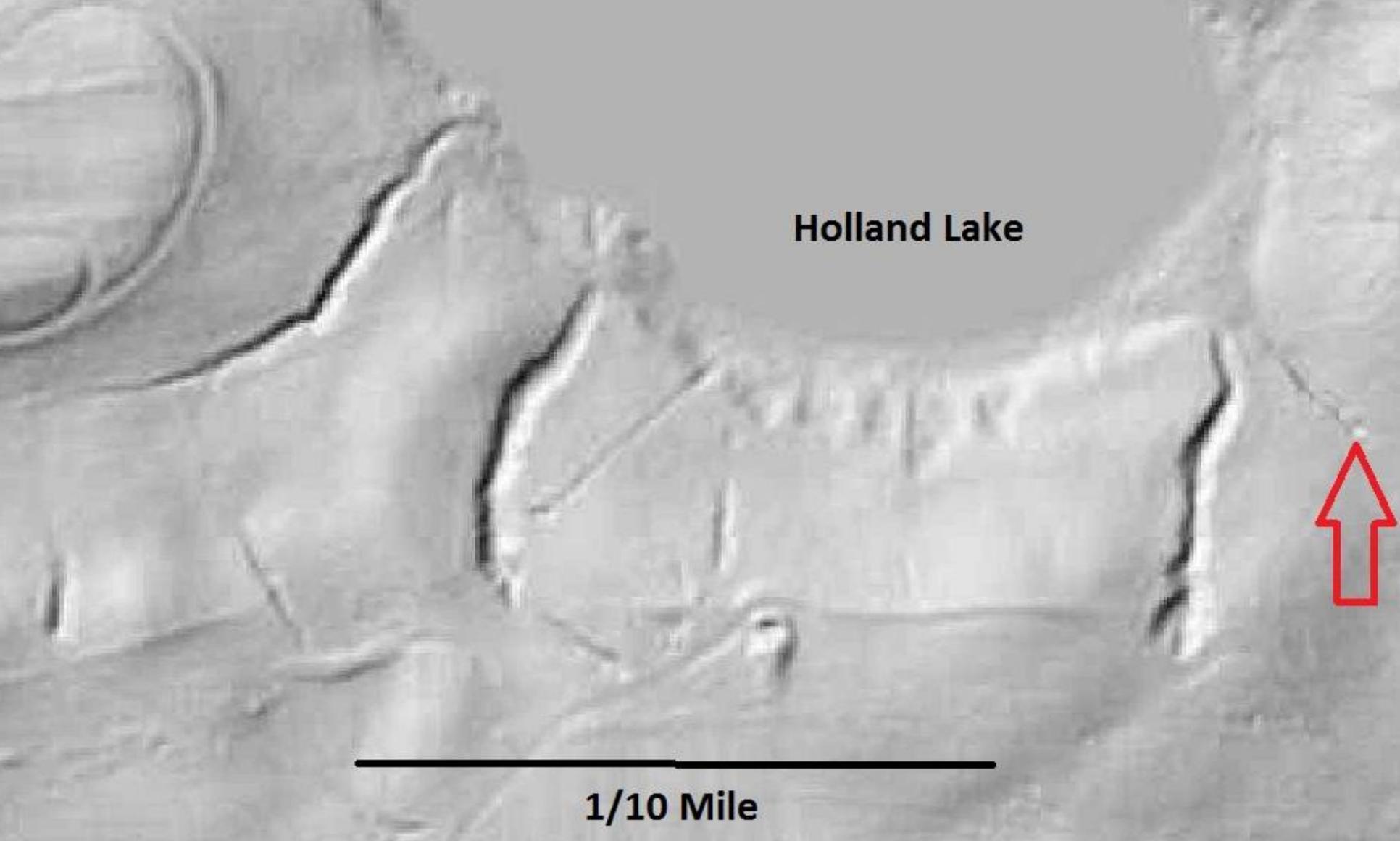
Oregon Climate Service
George Taylor, State Climatologist
(541) 737-5705



Glacial lakes influencing spring distribution.



Spring-Hunting Provinces



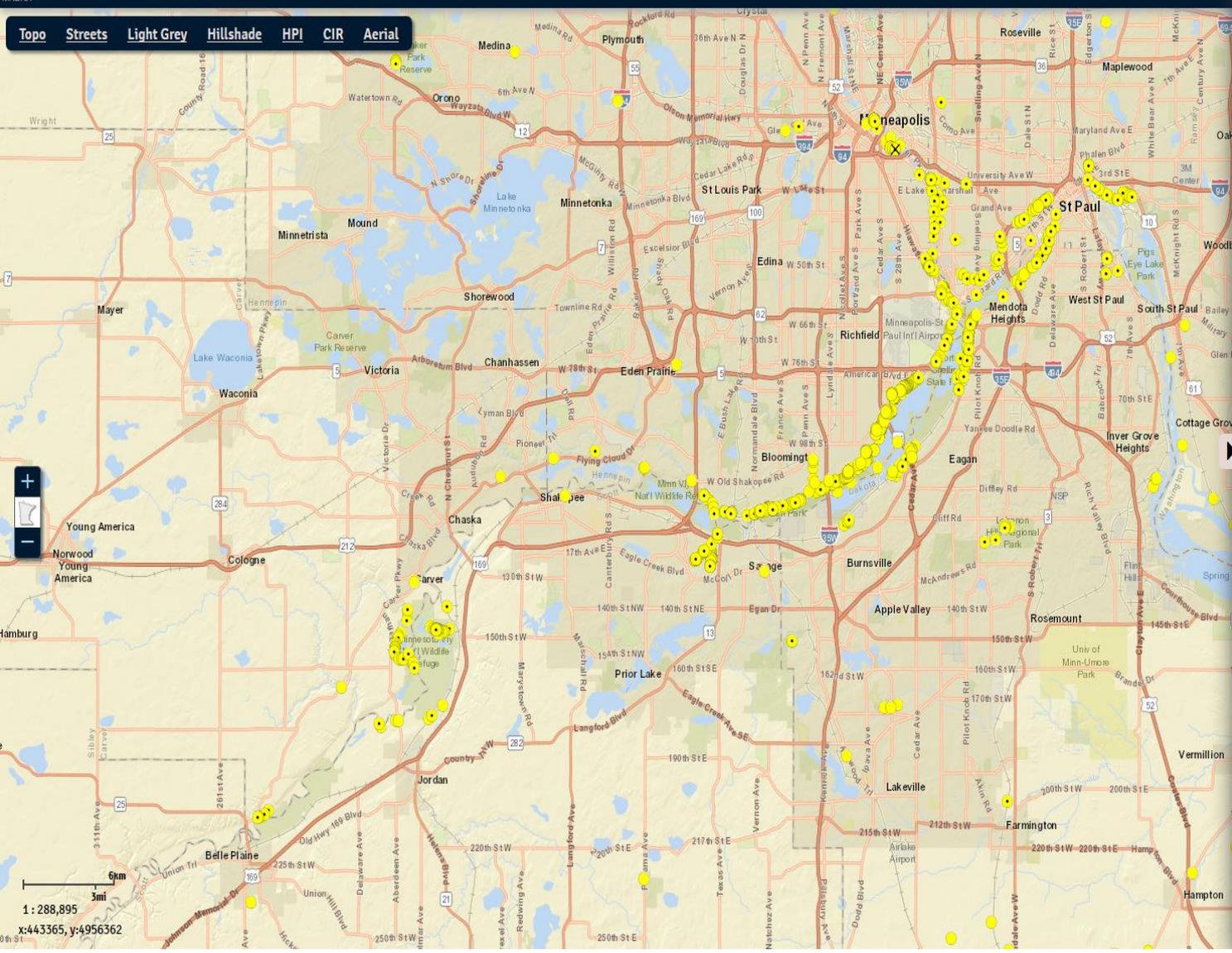
Use of LIDAR in finding even small springs in glaciated landscapes.
Arrow showing 1 GPM "spirilliform."



Tablet with Survey123 and remote upload, at Boiling Springs.
Citizens use simplified cellphone app.

SPRINGS INVENTORY SYSTEM - 6/2/2017

Top Streets Light Grey Hillshade HPI CIR Aerial



Attribute	Value
Relate ID:	27A0000403
UTM:	481526 E 4979428 N
Common Name:	Big St. Mary's
Feature:	A - spring
Feature Subtype:	Spring
Feature	Single
Arrangement:	
Spring Type:	Contact Bedding Plane - visible
Spring Type	
Comment:	
Lithology:	Limestone / Dolomite
Lithology Comment:	
Mineral	Iron
Precipitation:	
Min. Precip.	
Comment:	
Photo:	Yes
Field Observations:	Yes
Chemistry Samples:	No
Field Check Date:	2017/05/25
Field Checked:	Yes
Flowing:	Yes
Flow Measured:	Yes
Flow Volume:	60
Flow Units:	gpm
Flow Method:	estimated
Odor:	Sulfur
Water Odor	
Comment:	
Fish Seen:	Unknown
Amphipods Seen:	Unknown
Plants:	Unknown
Cryptogams:	Bacteria
Biota Comment:	
Temperature(C):	12
Temperature Method:	GEN
Dissolved	
Oxygen(mg/L):	0.67
Diss. Oxygen Method:	GEN
pH:	7.37

Legend
Layers
Search
Create Spring
Help
Logout

Screenshot showing attributes on side panel for spring selected on map.

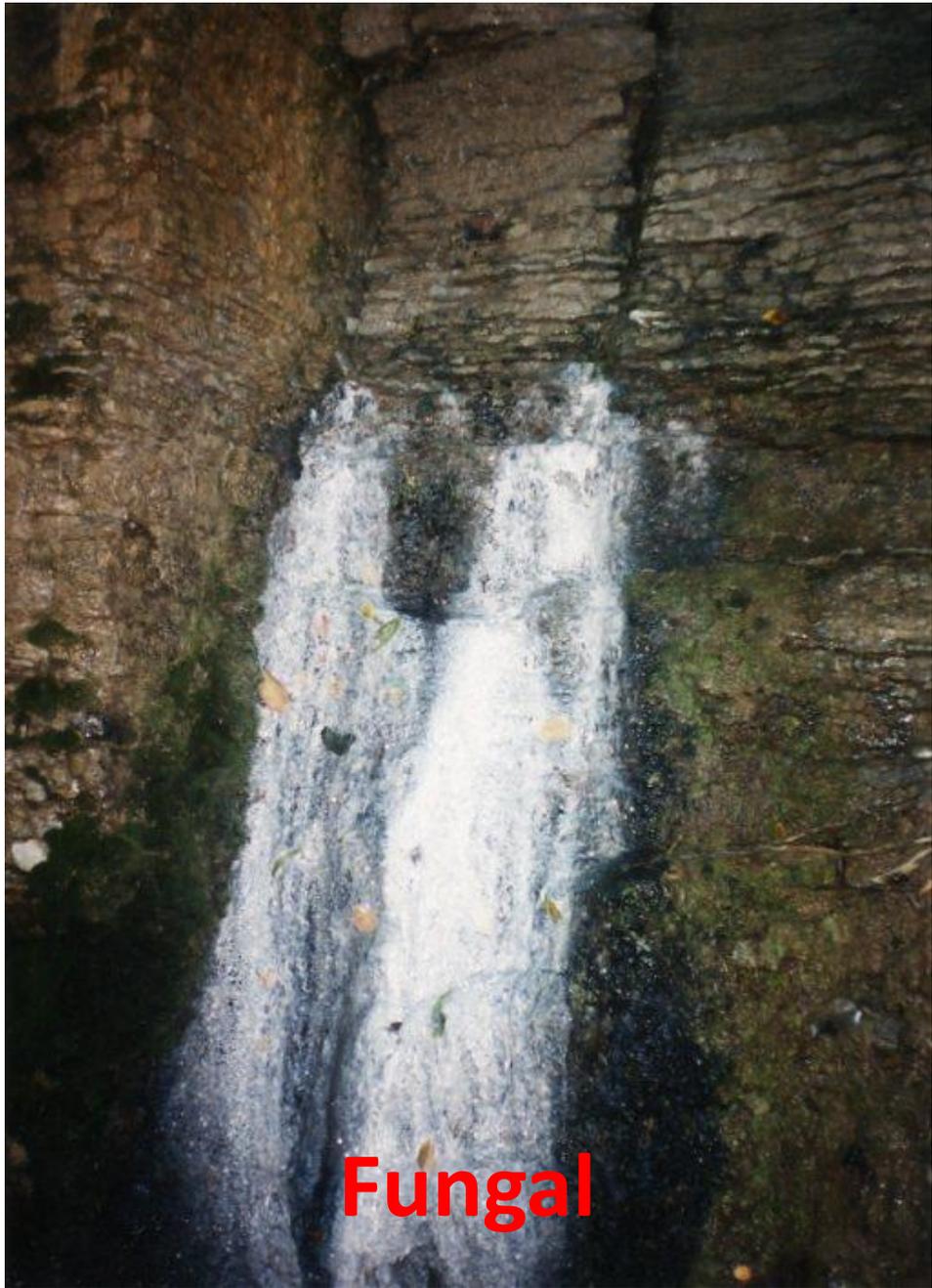


Mapping springs on Native American lands—sensitive issue.

Crenobiology



Bacterial Flocs

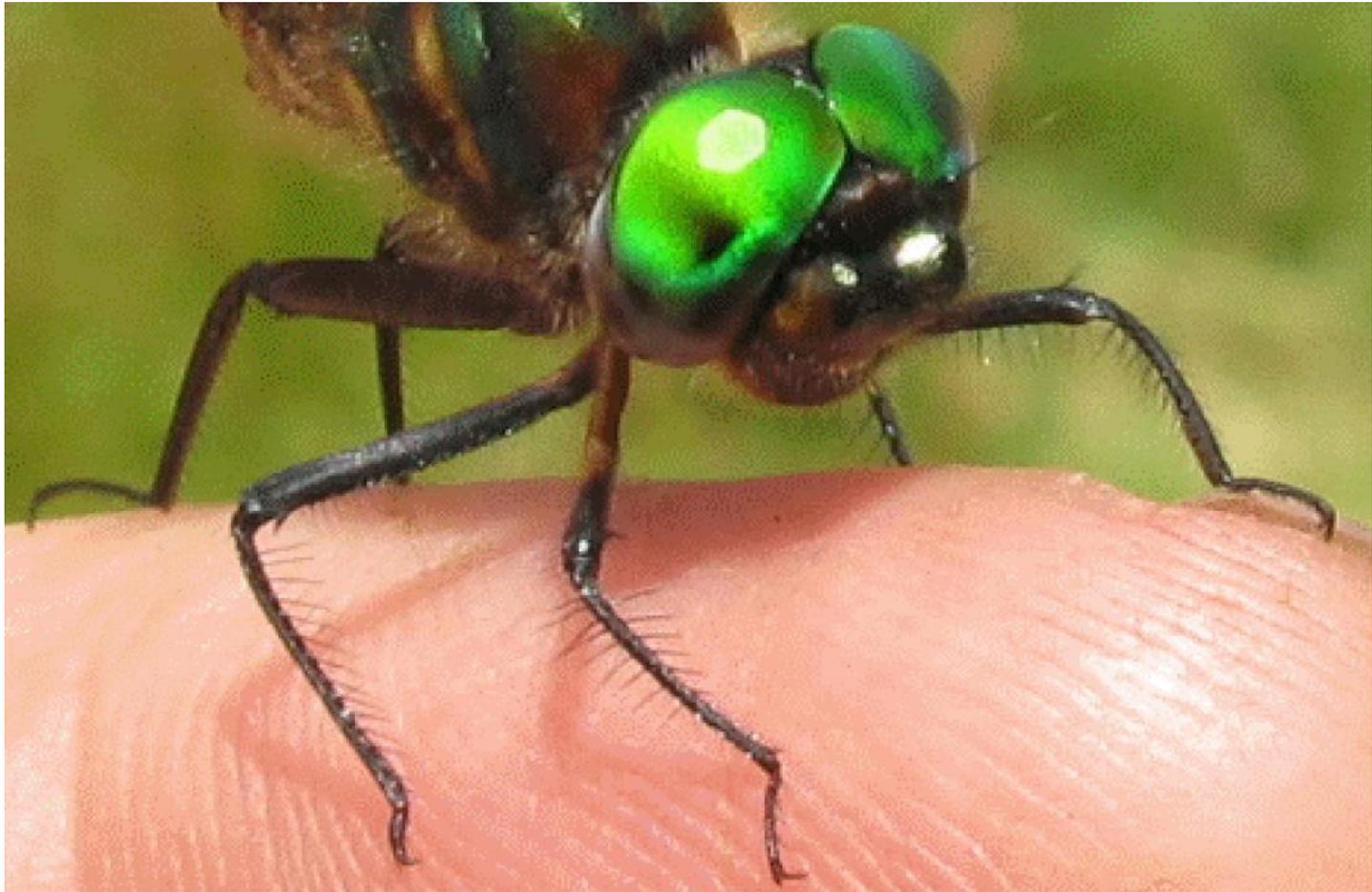


Fungal





Enough data points to test Glazier's hypothesis in Minnesota?
Amphipod vs. insect springs.



Values



Springs as coldwater resources—climate change issues.



overwintering thermal oasis

Springs providing open water habitat for wildlife.



Swan Spring



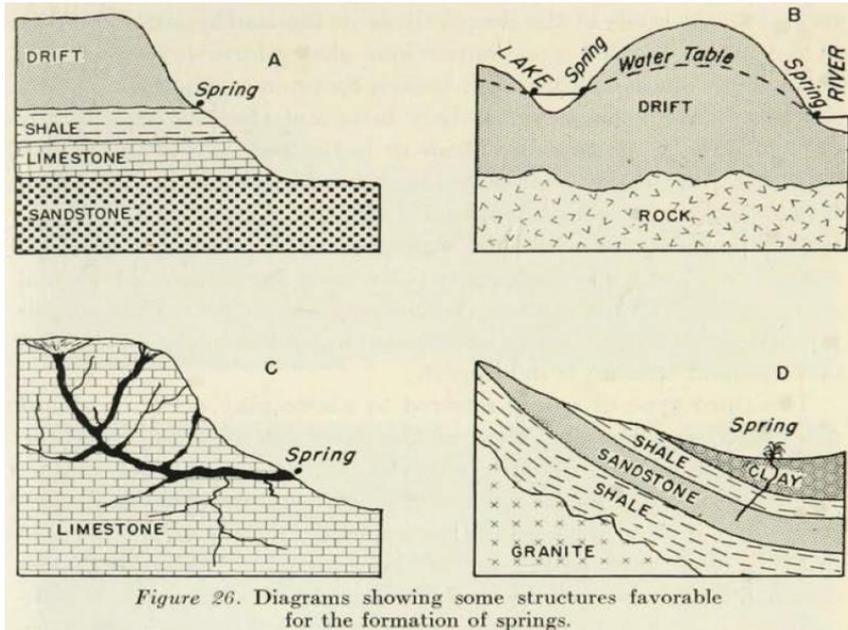


Calcareous Fens

Spring Classifications (Point of Discharge)

Schwartz & Thiel (1954)

MSI (2014)



- Contact, bedding plane
- Fault, fracture, joint
- Cave
- Fen
- Fluvial
- Littoral
- Depression, water table
- Pipe
- Historical
- Other



Some humid analogs
of desert springs?

Hajduk Spring,
a contact spring
with waterfall.
Cf. hanging gardens.



Crystal Spring SNA,
a postglacial valley
of spring-sapping origin.
Cf. Colorado Plateau.



Mound spring with stromatolitic structure. Cf. ojos.



Gas generating springs, some of which have become tourist attractions!





Littoral Spring



Outwash sand over glacial lake varves determine the spring-line.



Glacial Lake Lind spring-line
on Government Ridge.

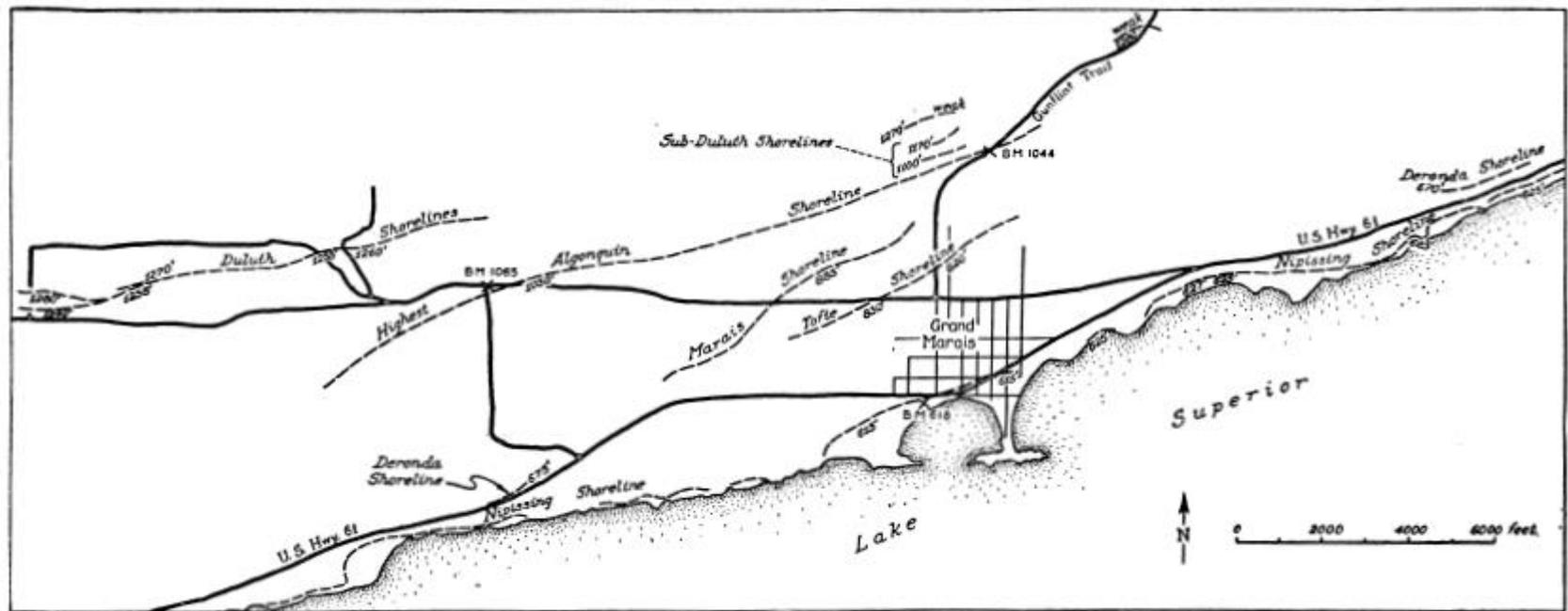


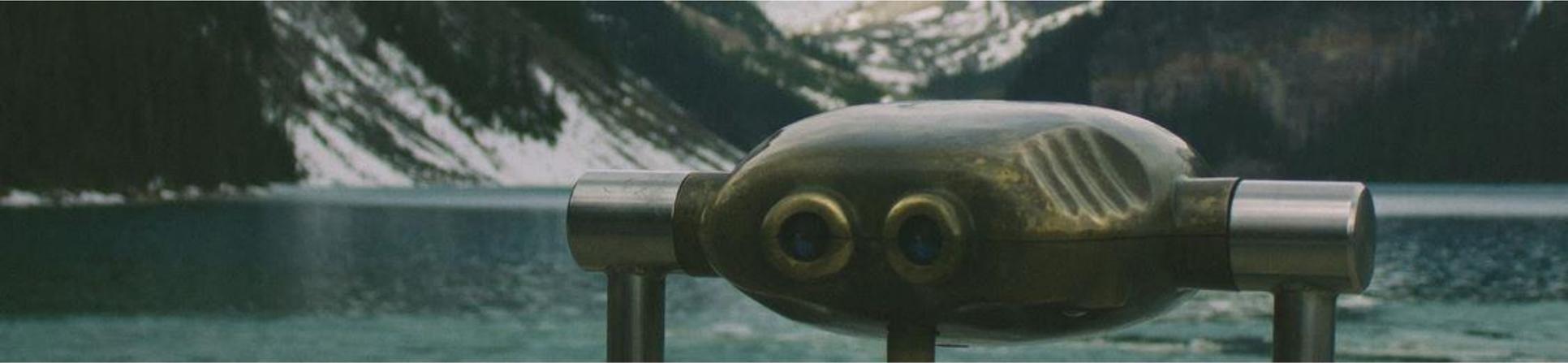
Fig. 5. Shoreline features in Grand Marais area.

Glacial Lake Algonquin Beach Lines



Grand Marais

Springs Channel on YouTube



Greg Brick

136 subscribers

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Unusual Peat Spring in Minnesota

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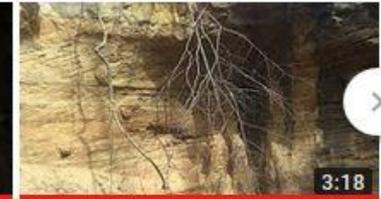
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Frontenac State Park, Minnesota, caves

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New Ulm's Big Spring

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Questions?

Minnesota
Spring-Hunter's
Anthology

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