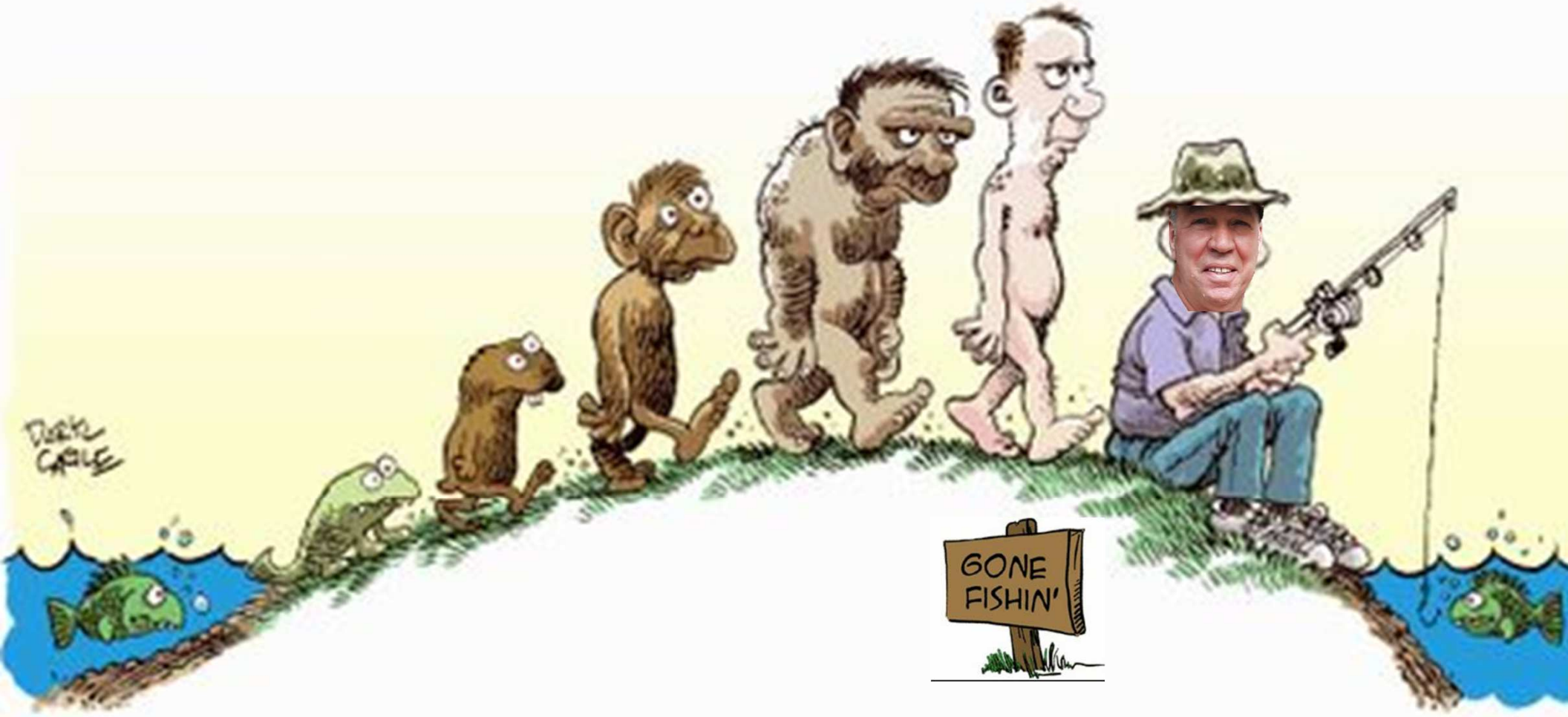
Evolution of the County Groundwater Atlas (CGA)

….or, ~30 Years in 15 minutes



MINNESOTA WATER SUSTAINABILITY FRAMEWORK

2011

MINNESOTA WATER SUSTAINABILITY FRAMEWORK

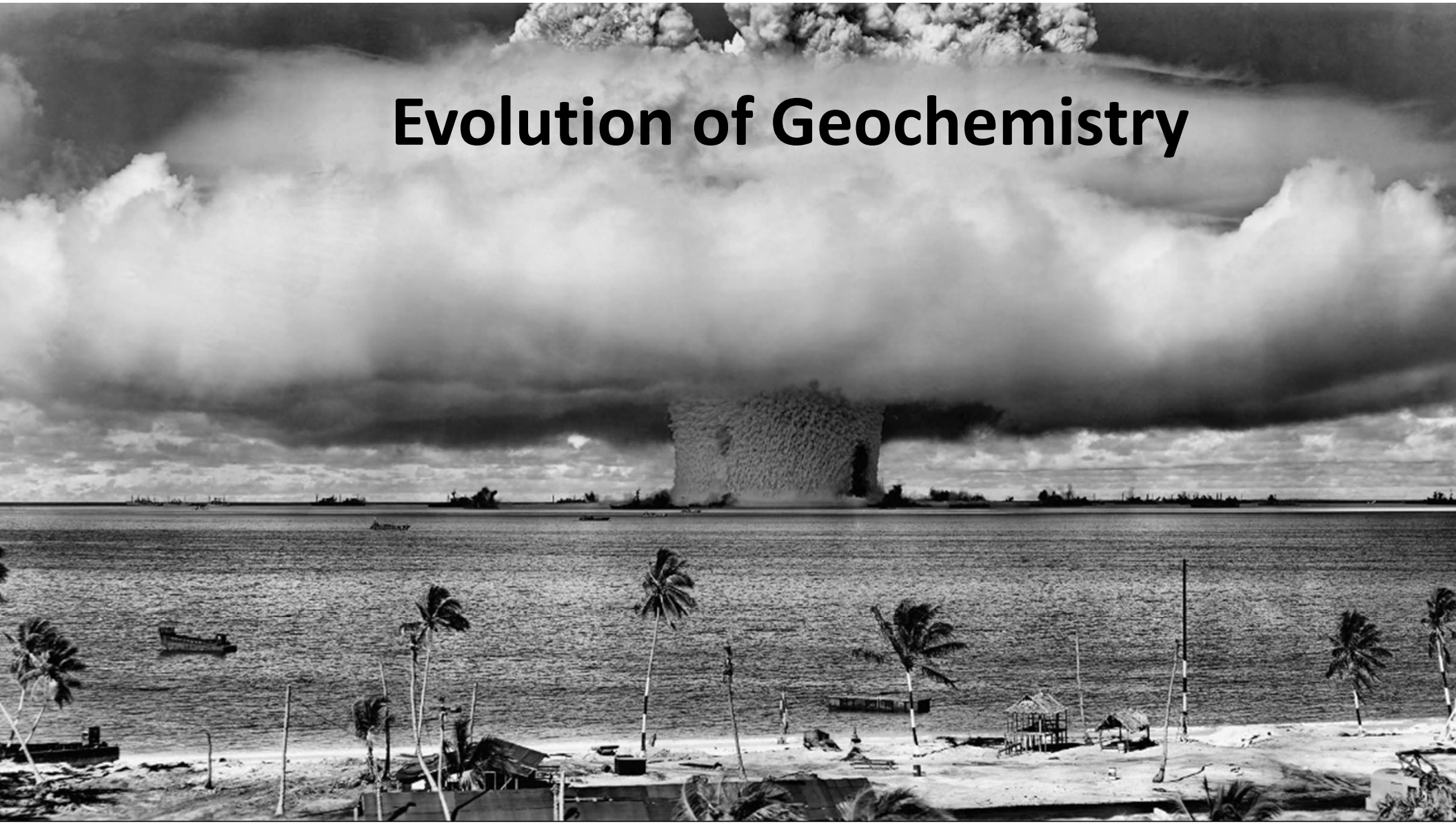
RECOMMENDATION A.1.a: Determine the state's water balance. ***Develop a long-term robust program that includes the necessary mapping and monitoring to manage water sustainably and proactively.***

ACTION PLAN

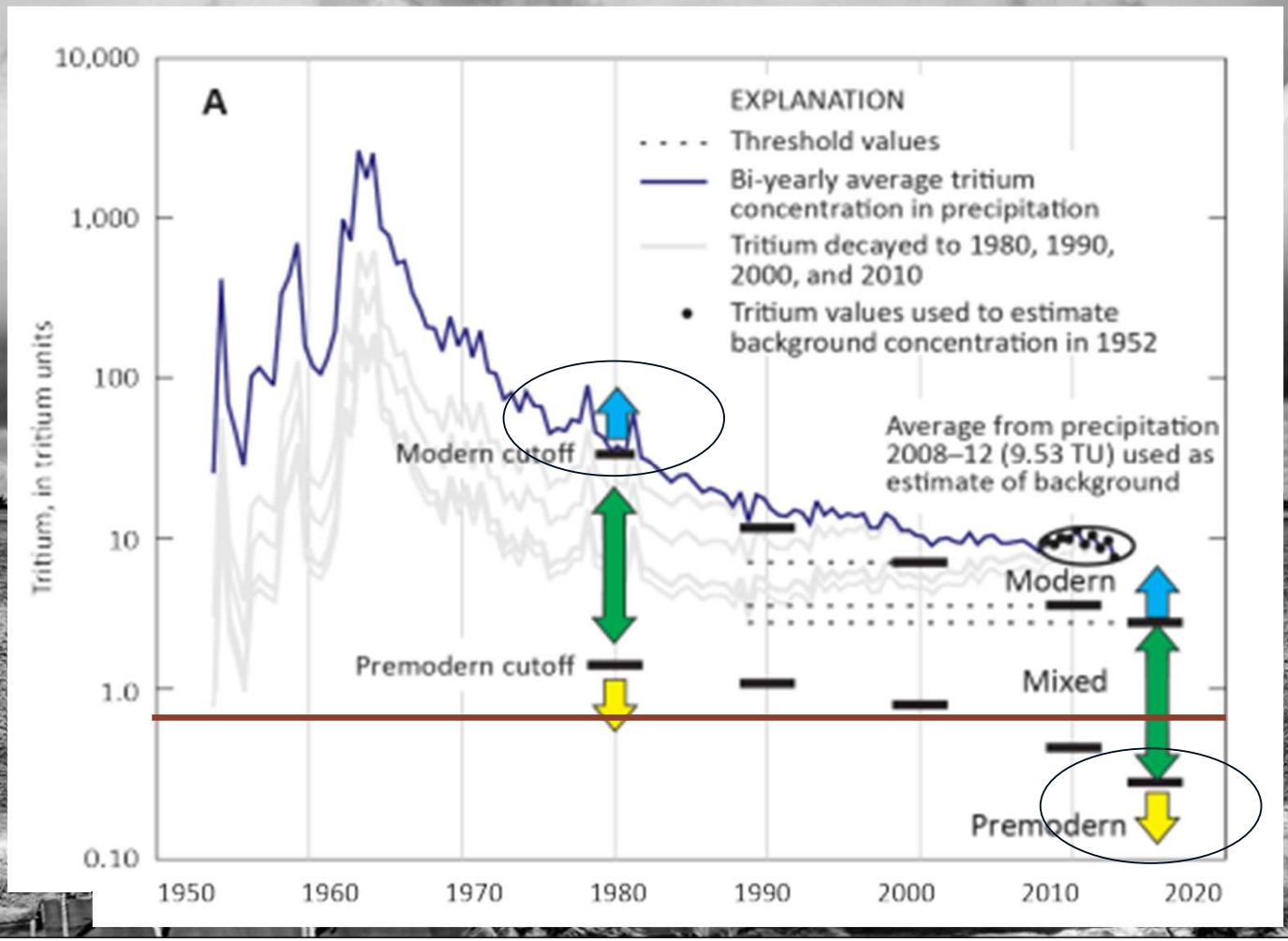
i. The ***completion of the county geological atlases by the Minnesota Geological Survey (MGS) and DNR should be accelerated.*** These atlases provide maps of geology, hydrology, and pollution sensitivity of groundwater, and are one of the essential elements for implementation of this strategy.

ii. ***Aquifer characterization mapping by the DNR should be accelerated at the same rate as the geologic atlases.*** The aquifer characterization studies and springshed mapping are essential for understanding how water moves through the state's aquifers (flow paths) and determining aquifer properties and interactions between groundwater and surface water.

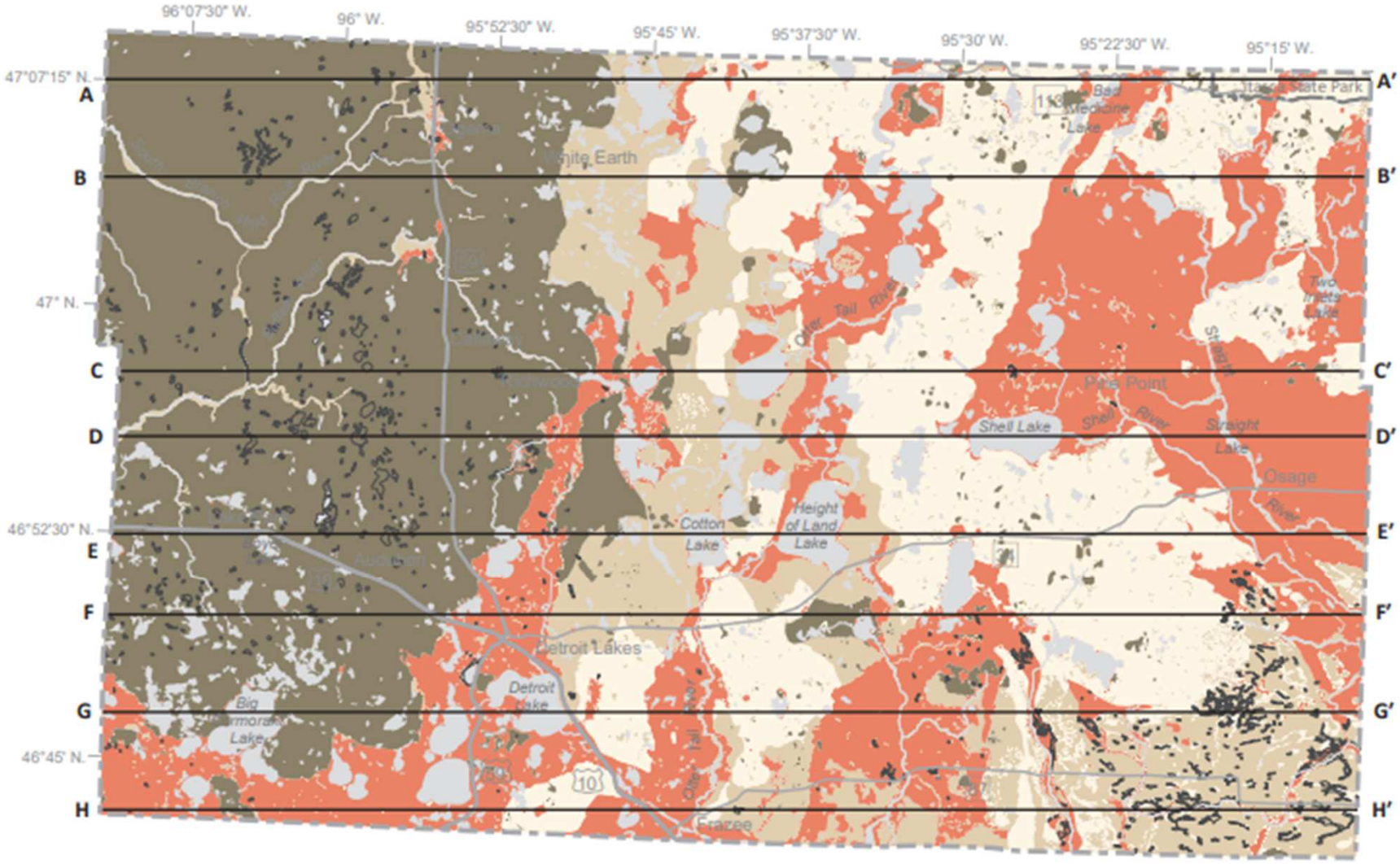
Evolution of Geochemistry



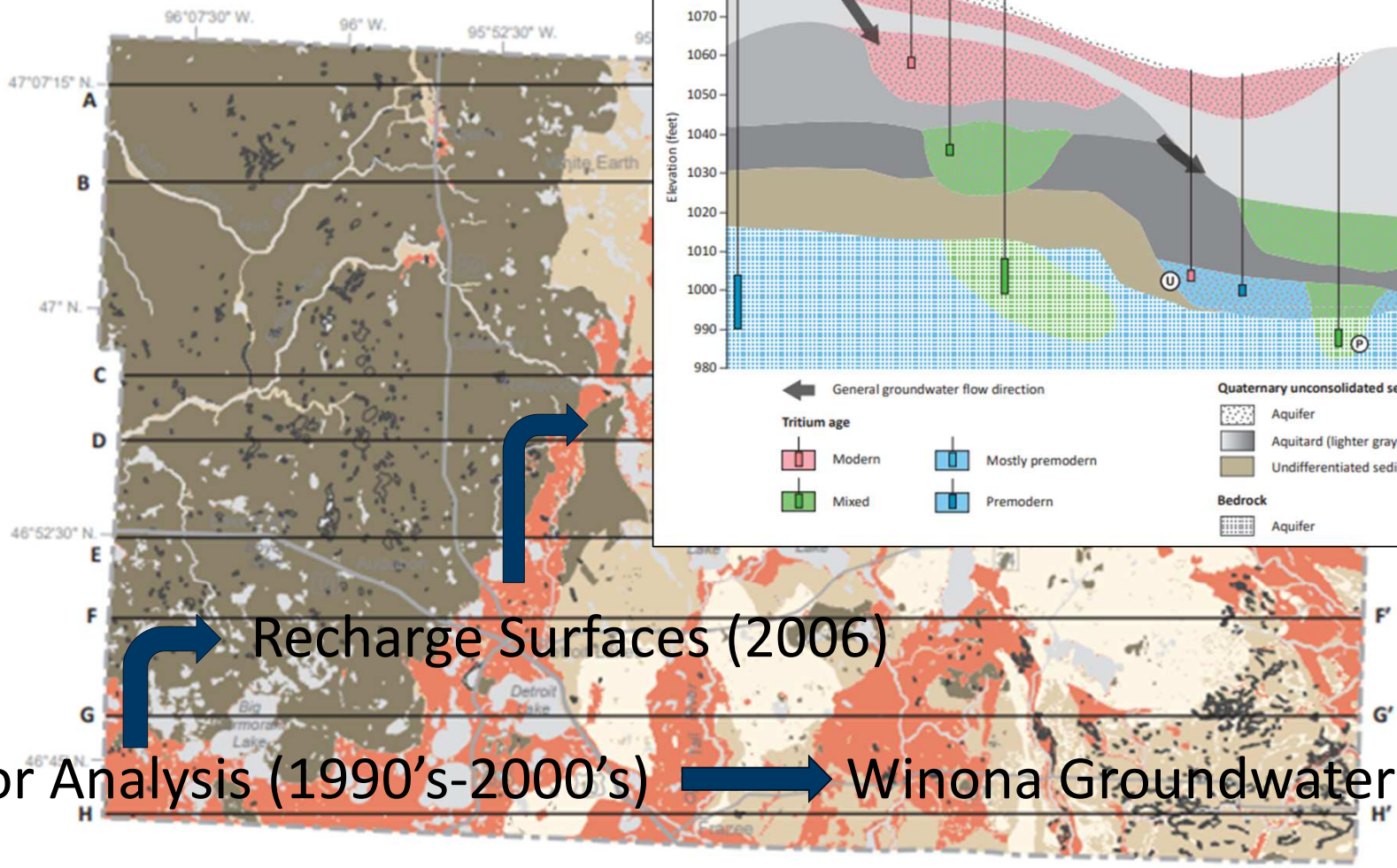
Evolution of Geochemistry



Pollution Sensitivity Modelling



Pollution Sensitivity Modelling

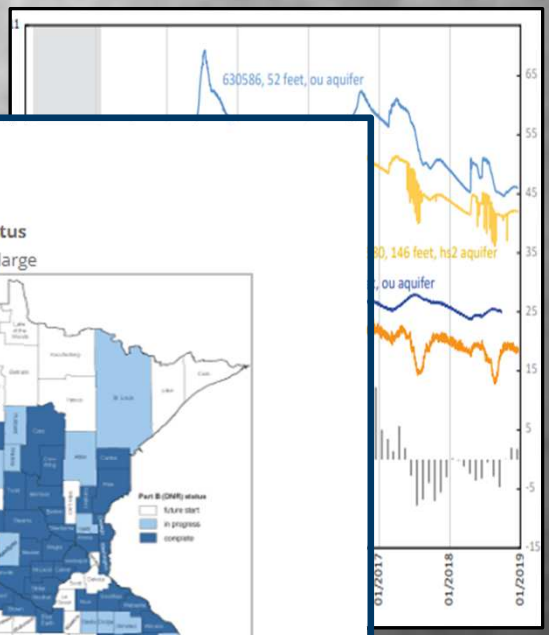


Recharge Surfaces (2006)

Factor Analysis (1990's-2000's) → Winona Groundwater Atlas (2021)

Production

Production – Misc.



Groundwater Atlas

Main page
Data, resources, studies
Contacts

Map type

County (CGA)
Springs & karst
State (MHA)
Groundwater provinces
Region (RHA)

County Geologic Atlas (CGA)

A complete county atlas provides information about the geology and groundwater resources of a county. Most atlases are produced in two parts.

Part A - Geology

The Minnesota Geological Survey produces the Part A atlas, which includes the geology, sand distribution, bedrock topography, and depth to bedrock. The Geologic Atlas User's Guide has a general overview of Minnesota geology and suggestions on how to use a county atlas (27 pages). For the Part A status map see the County Geologic Atlas website.

Part B - Groundwater/Hydrogeology

After Part A is completed, the DNR produces the Part B atlas, which includes maps and reports identifying the direction of groundwater flow, aquifer properties, groundwater chemistry, and pollution sensitivity of aquifers. In older atlases the groundwater information is included in Part A. See the Groundwater Atlas User Guide (PDF) for an overview of reading Part B (8 pages).

Regional Hydrogeologic Assessment (RHA)

RHAs are larger areas (typically 4-9 counties) covered in less detail than a county atlas and do not include bedrock. These older assessments will be superseded by the county atlases as they are completed. See the RHA page.

Part B Status

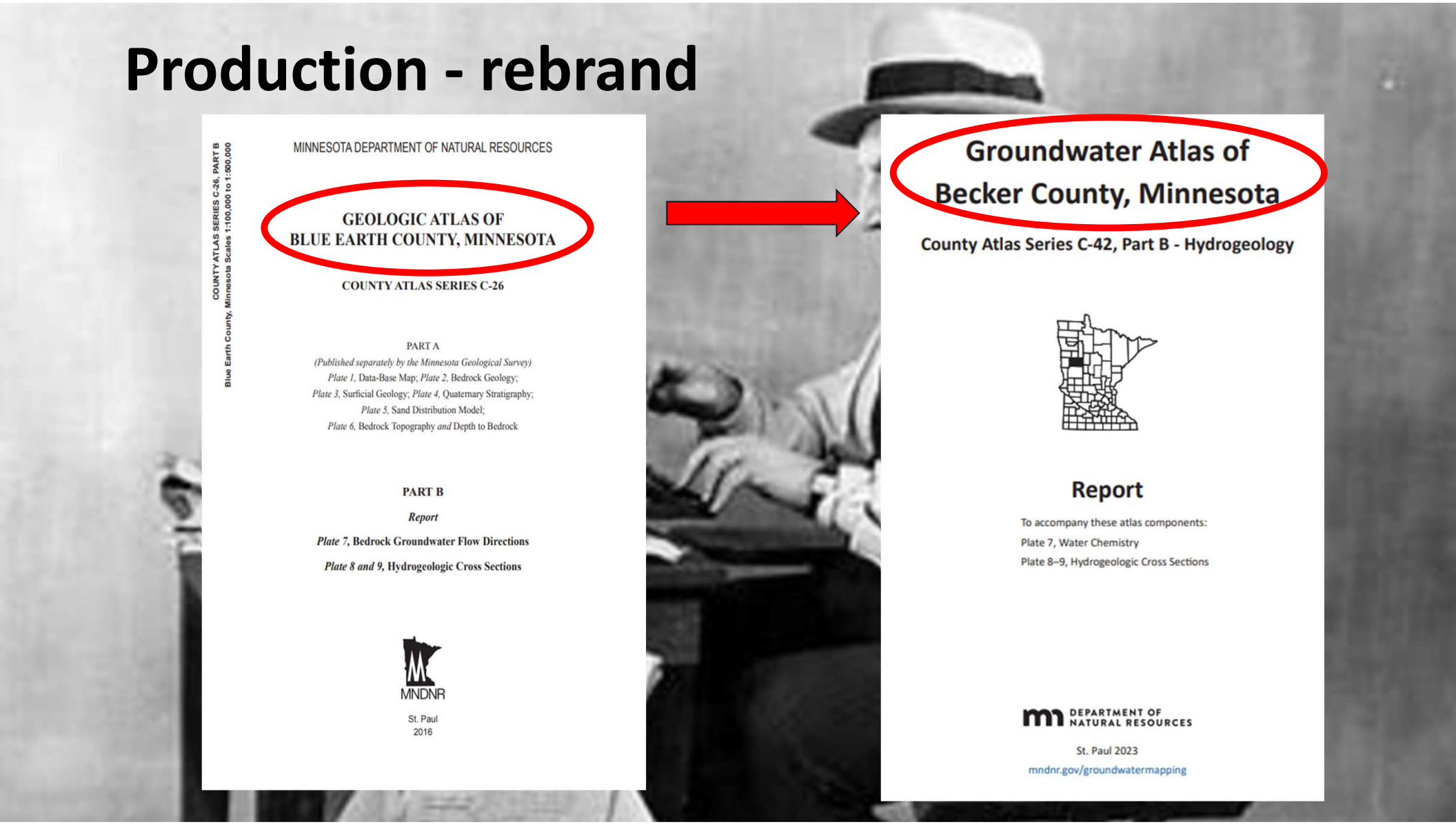
Click to enlarge

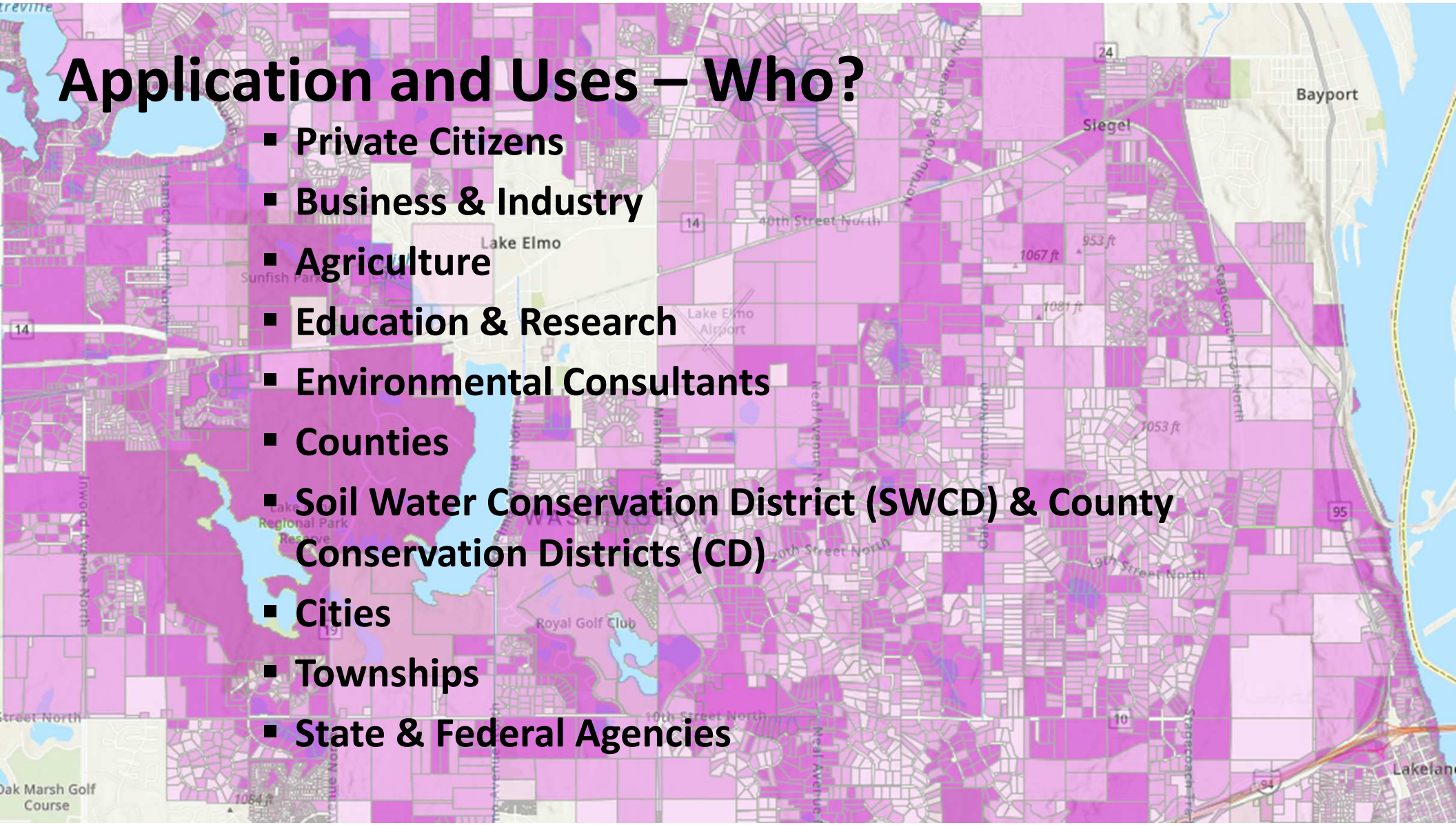
Atlas status by county

Counties are added to the list as they are begun. Paper copies can be obtained from MGS Map Sales.

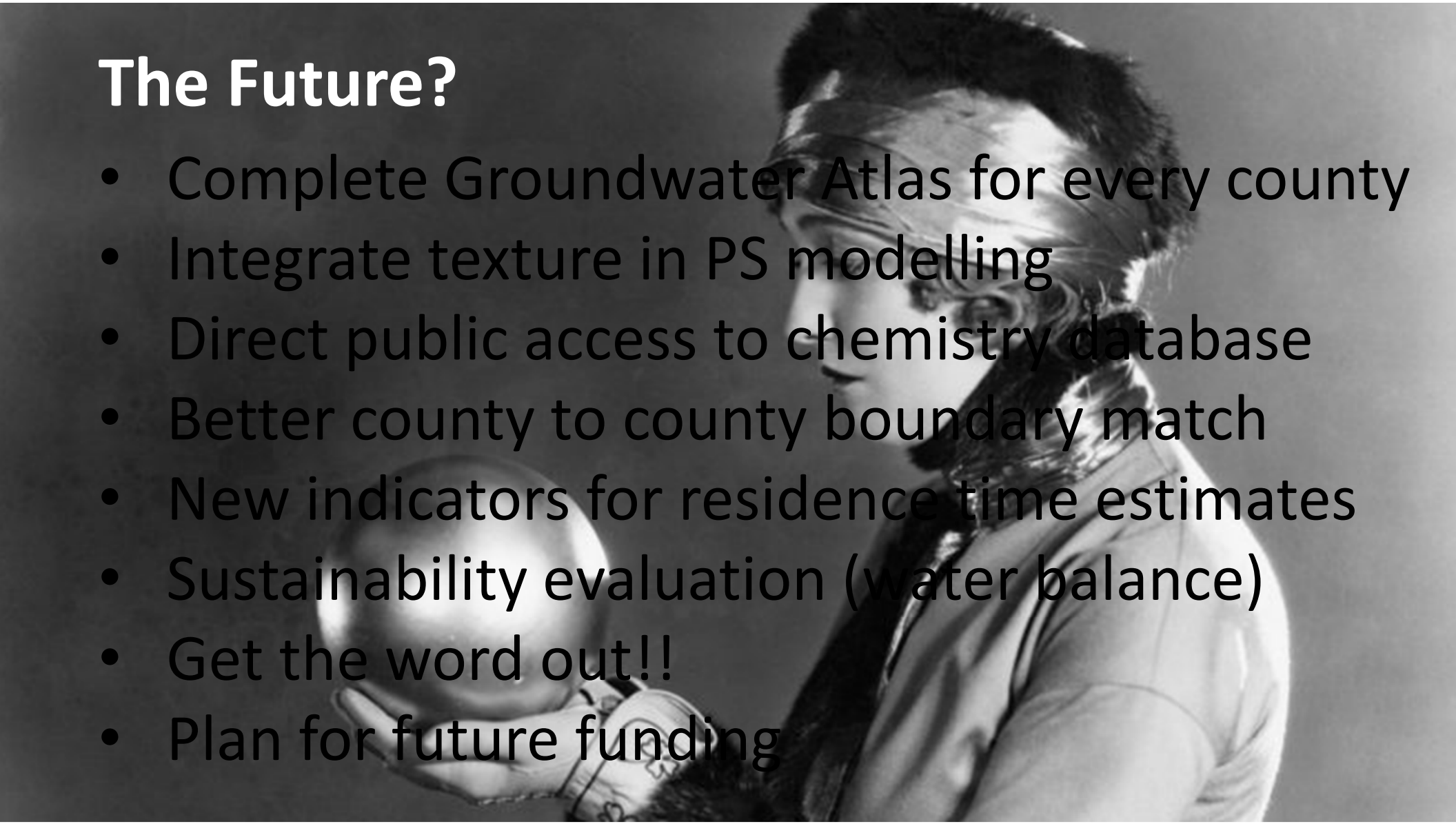
A - B - C - D - E - F - G - H - I - J - K - L - M - N - O - P - Q - R - S - T - U - V - W - X - Y - Z

Production - rebrand




Application and Uses – Who?
Private Citizens
Business & Industry
Agriculture
Education & Research
Environmental Consultants
Counties
Soil Water Conservation District (SWCD) & County Conservation Districts (CD)
Cities
Townships
State & Federal Agencies
Bayport
Siegel
Lake Elmo
Lake Elmo Airport
Royal Golf Club
Oak Marsh Golf Course
40th Street North
20th Street North
19th Street North
10th Street North
Inwood Avenue North
Neal Avenue North
Manning Avenue North
Northbrook Boulevard North
Stagecoach Trail North
1067 ft
953 ft
1081 ft
1053 ft
1084 ft

The Future



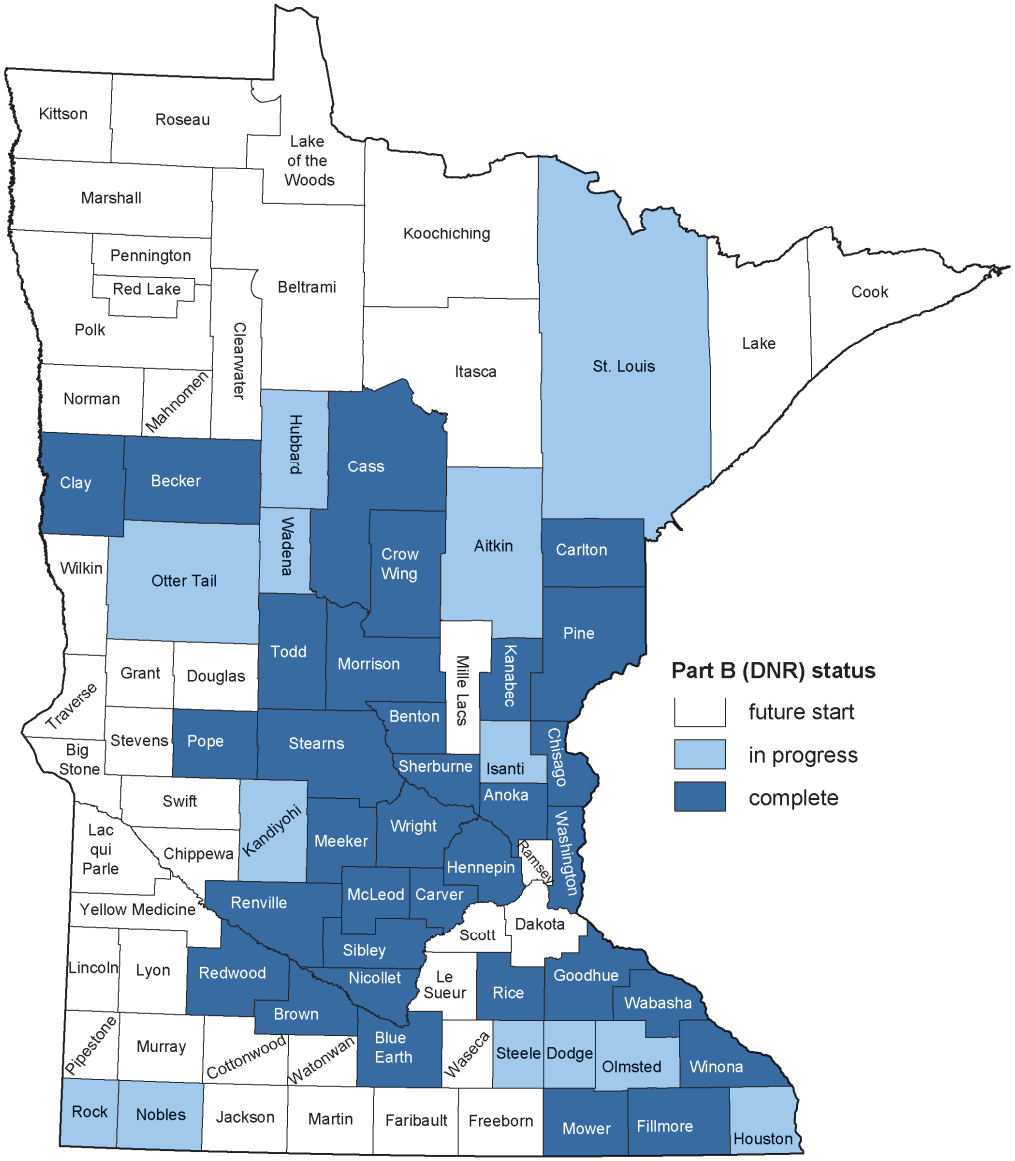
The Future?

- Complete Groundwater Atlas for every county
- Integrate texture in PS modelling
- Direct public access to chemistry database
- Better county to county boundary match
- New indicators for residence time estimates
- Sustainability evaluation (water balance)
- Get the word out!!
- Plan for future funding

Acknowledgements

- Vanessa Baratta
- Jim Berg
- Nick Budde
- Jan Falteisek
- Dale Setterholm
- Others

Status


Kittson
Roseau
Lake of the Woods
Marshall
Koochiching
Pennington
Red Lake
Beltrami
Polk
Clearwater
Itasca
St. Louis
Lake
Cook
Norman
Mahnomen
Hubbard
Cass
Clay
Becker
Wadena
Crow Wing
Aitkin
Carlton
Wilkin
Otter Tail
Pine
Todd
Morrison
Mille Lacs
Kanabec
Grant
Douglas
Traverse
Benton
Stevens
Pope
Stearns
Chisago
Big Stone
Sherburne
Isanti
Swift
Anoka
Kandiyohi
Meeker
Wright
Washington
Lac qui Parle
Chippewa
Ramsey
Hennepin
Yellow Medicine
Renville
McLeod
Carver
Scott
Dakota
Sibley
Lincoln
Lyon
Redwood
Nicollet
Le Sueur
Rice
Goodhue
Wabasha
Brown
Pipestone
Murray
Cottonwood
Watonwan
Blue Earth
Waseca
Steele
Dodge
Olmsted
Winona
Rock
Nobles
Jackson
Martin
Faribault
Freeborn
Mower
Fillmore
Houston
Part B (DNR) status
future start
in progress
complete