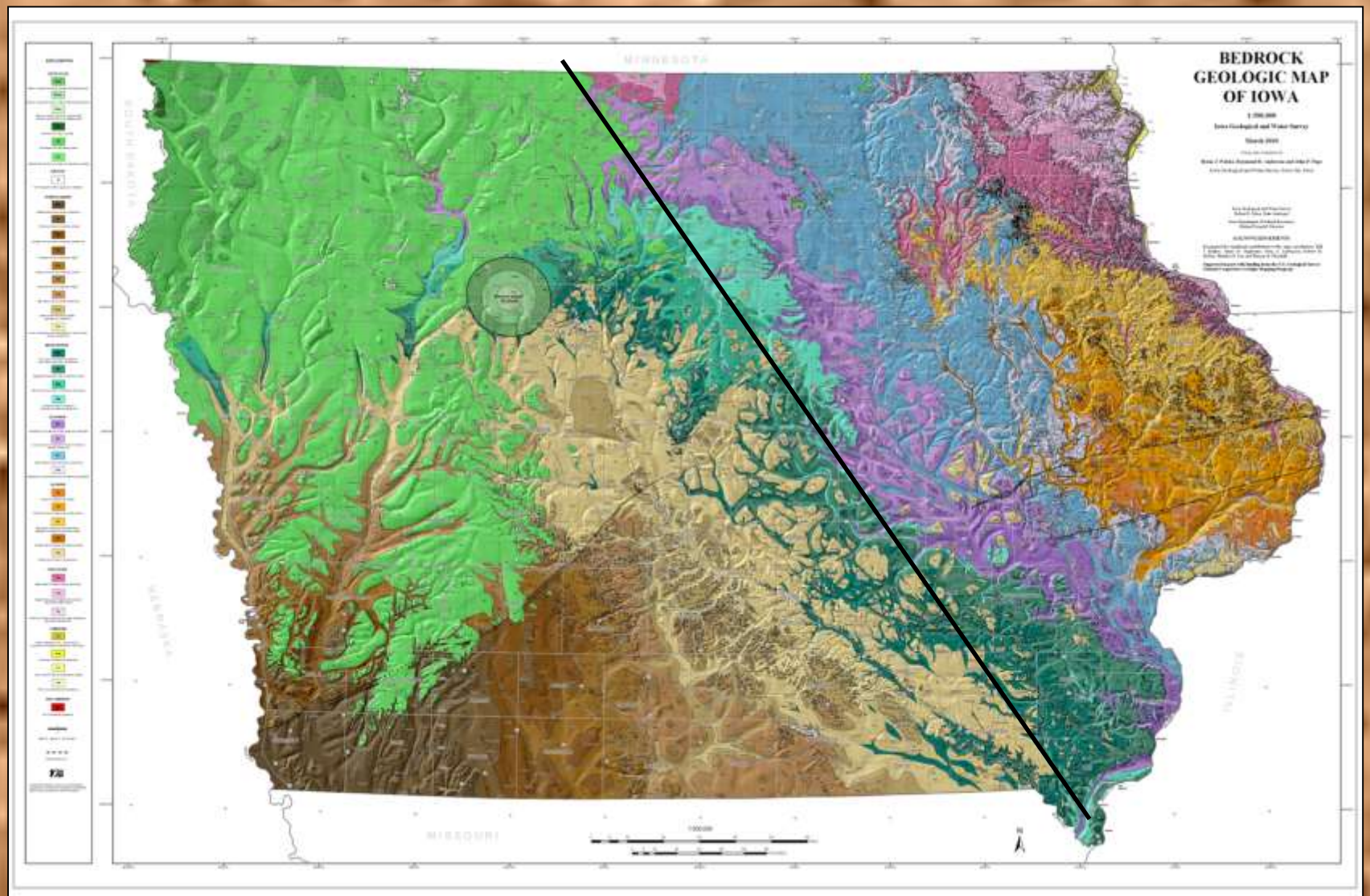
Karst and Groundwater in Northeast Iowa

Bob Libra – State Geologist - IDNR

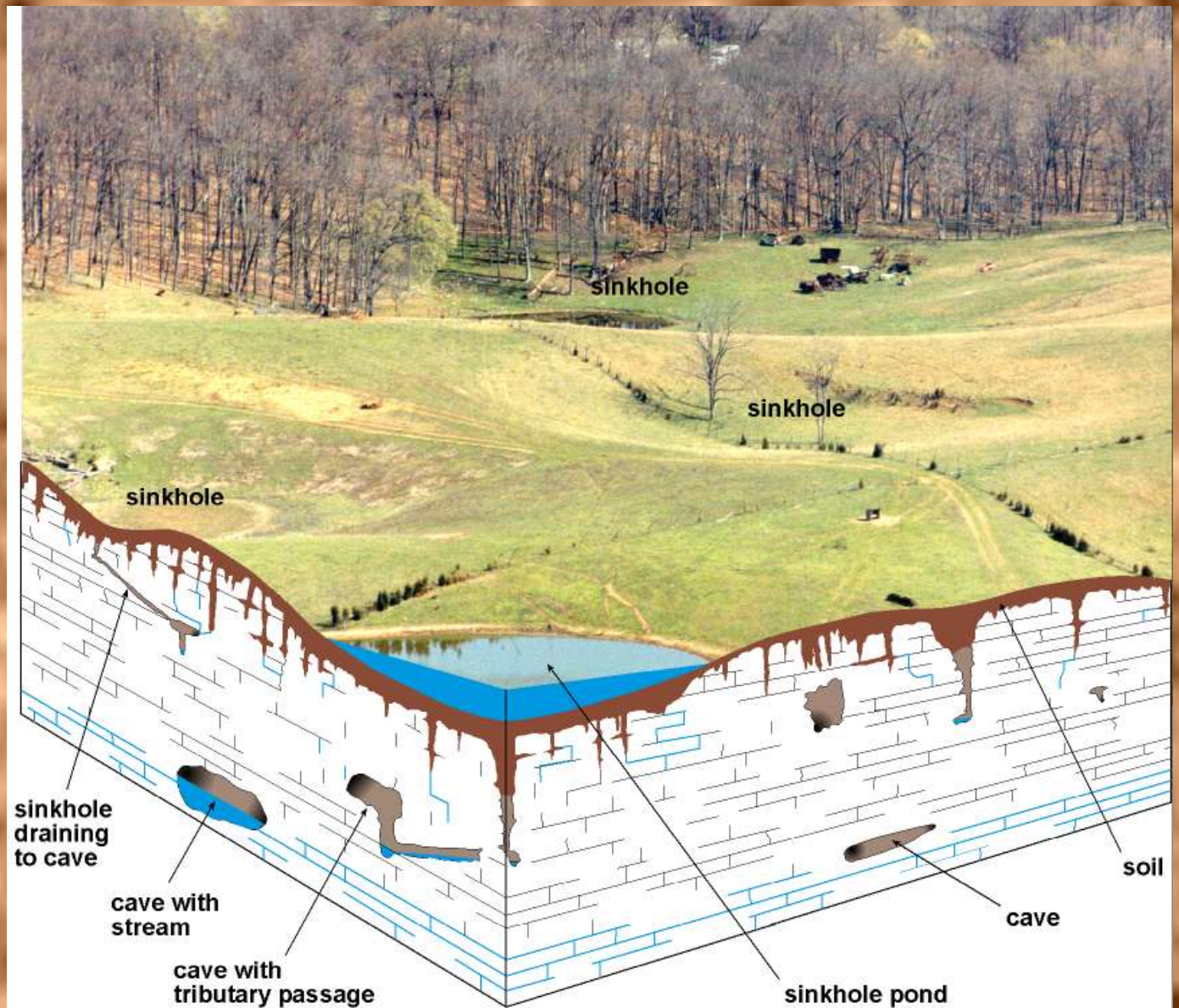
sinkholes developed in
Galena Dolomite
Clayton County

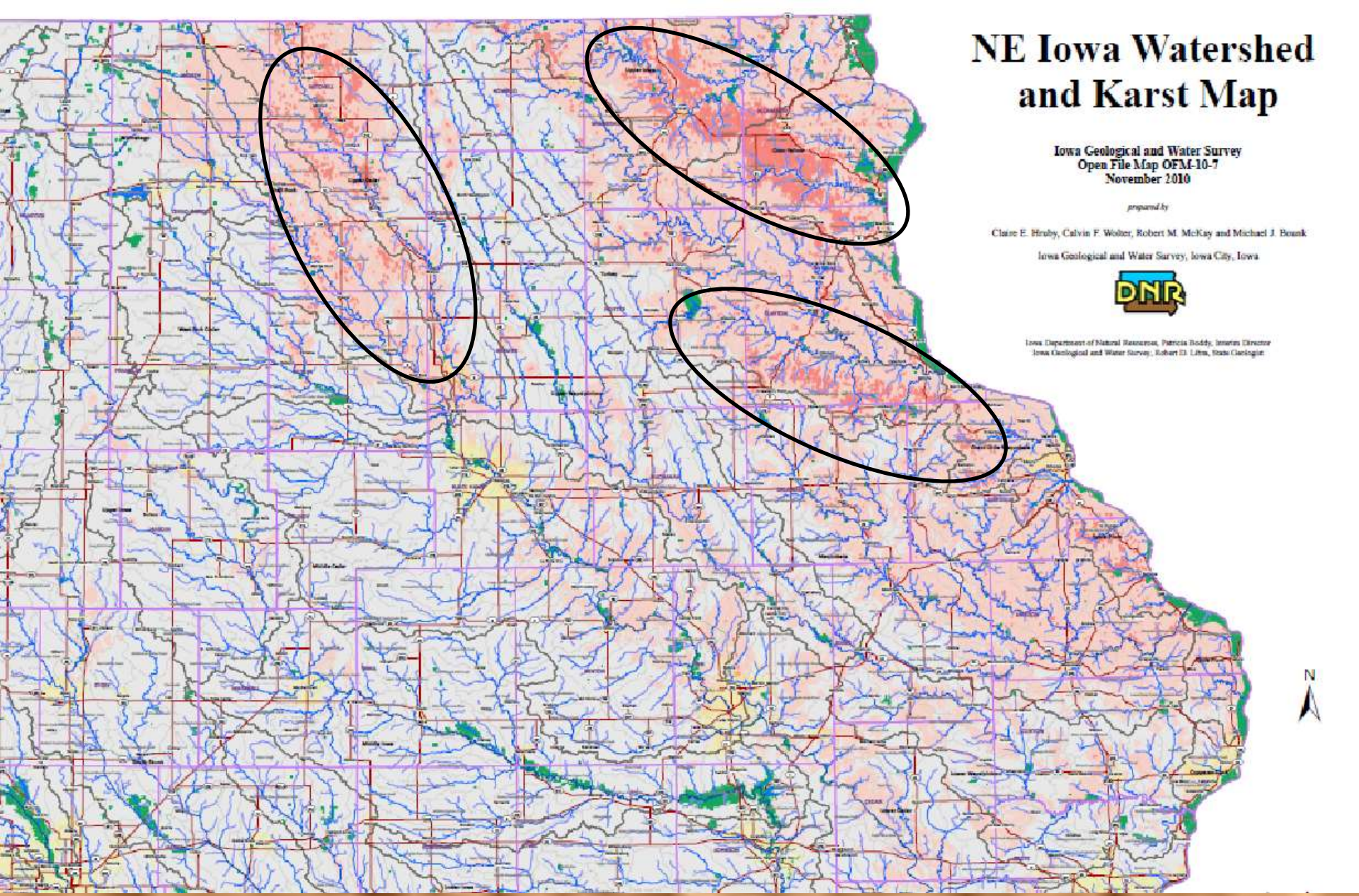
Shallow Limestone



Generalized Stratigraphic Sequence of Aquifers, Aquitards, Bedrock Geologic Map Units & Geologic Formations, Upper Iowa River Basin

Karst Landscape




NE Iowa Watershed and Karst Map
Iowa Geological and Water Survey
Open File Map OFM-10-7
November 2010
prepared by
Claire E. Hruby, Calvin F. Wolter, Robert M. McKay and Michael J. Bounk
Iowa Geological and Water Survey, Iowa City, Iowa
DNR
Iowa Department of Natural Resources, Patricia Boddy, Interim Director
Iowa Geological and Water Survey, Robert D. Libra, State Geologist
N

Little Cedar Fm. – Coralville Fm.
Conklin Quarry
Coralville

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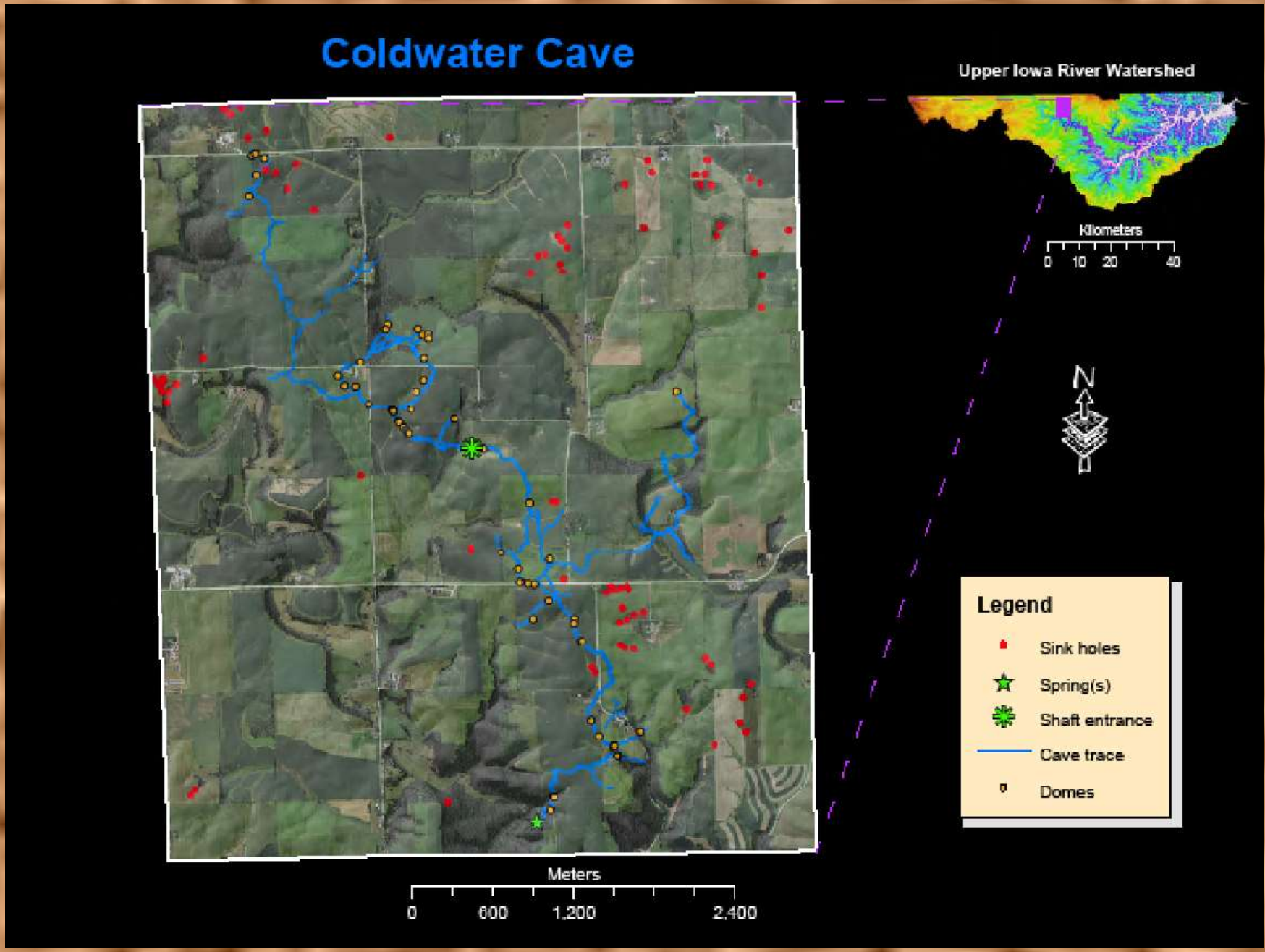
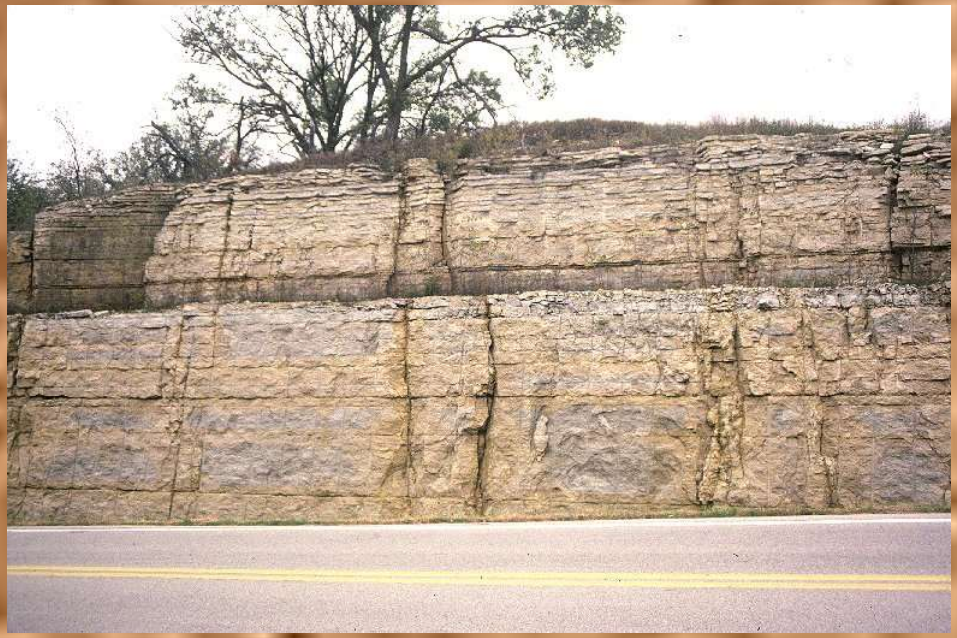

Coldwater Cave
Upper Iowa River Watershed
Kilometers
0 10 20 40
N
Legend
Sink holes
Spring(s)
Shaft entrance
Cave trace
Domes
Meters
0 600 1,200 2,400



- Shallow Rock / Karst conditions vary between these.
- All may have relatively fast groundwater flow velocities.
- Groundwater delivered to streams.

Sinkholes: Open Conduit to Groundwater

Sinkole Mapping includes those from:

- County soil survey maps (70's-90's)
- LiDAR ('07-10)
- Historic Air Photos (back to '30s)

Historic vs Current: Current are conduits. Historic reflect probability of new development,very shallow bedrock.

AFO rules use the term "known" sinkhole.

Shallow rock = Infiltration to GW
Sinkholes = Captured Runoff,
Risk for collapse, spills.

Potential Contaminants from Manure:

- Nitrate
- Ammonia and Phosphorus
- Organic Matter – BOD
- Pharmaceuticals, Antibiotics
- Pathogens – Bacteria, Viruses

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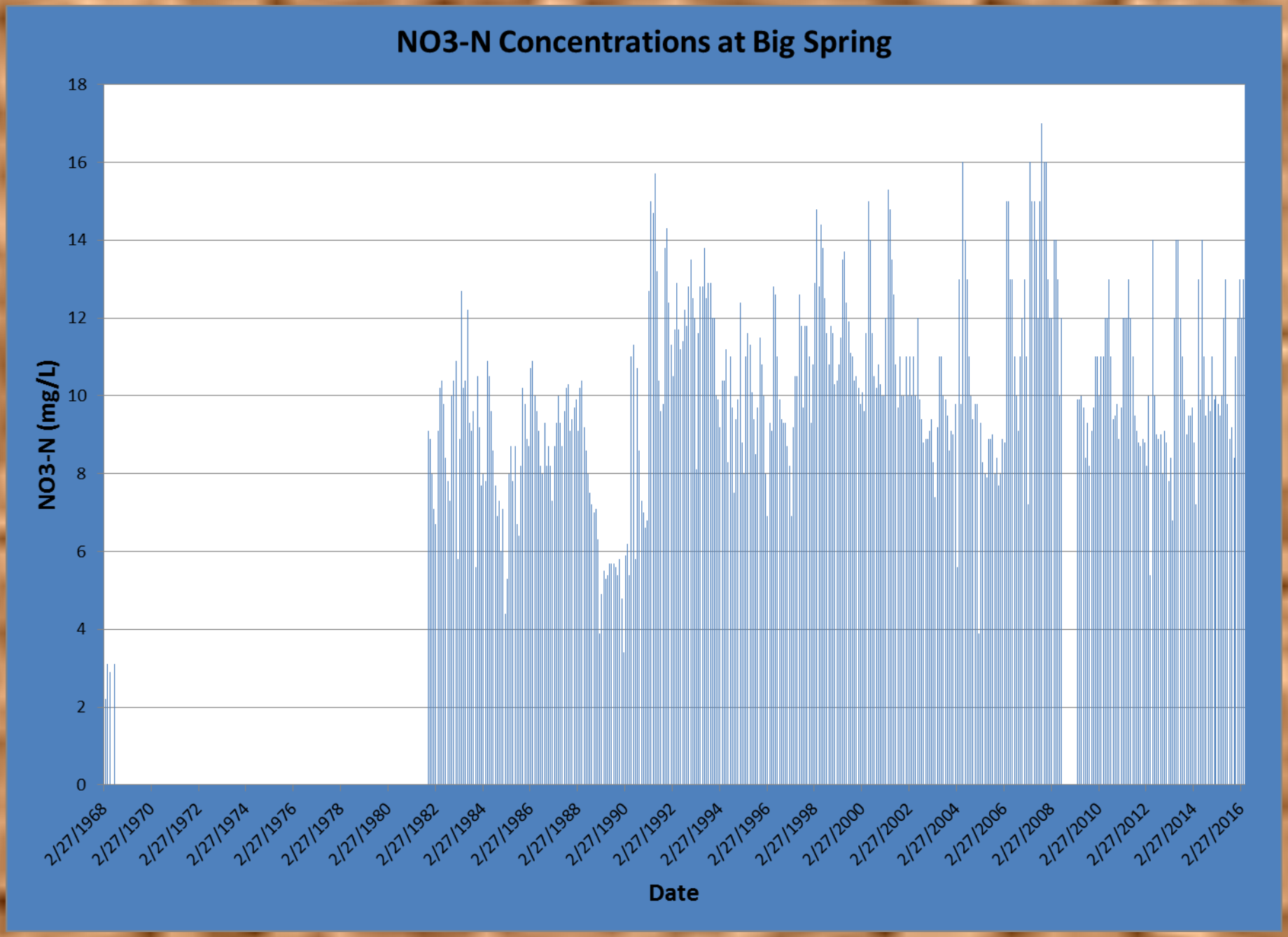
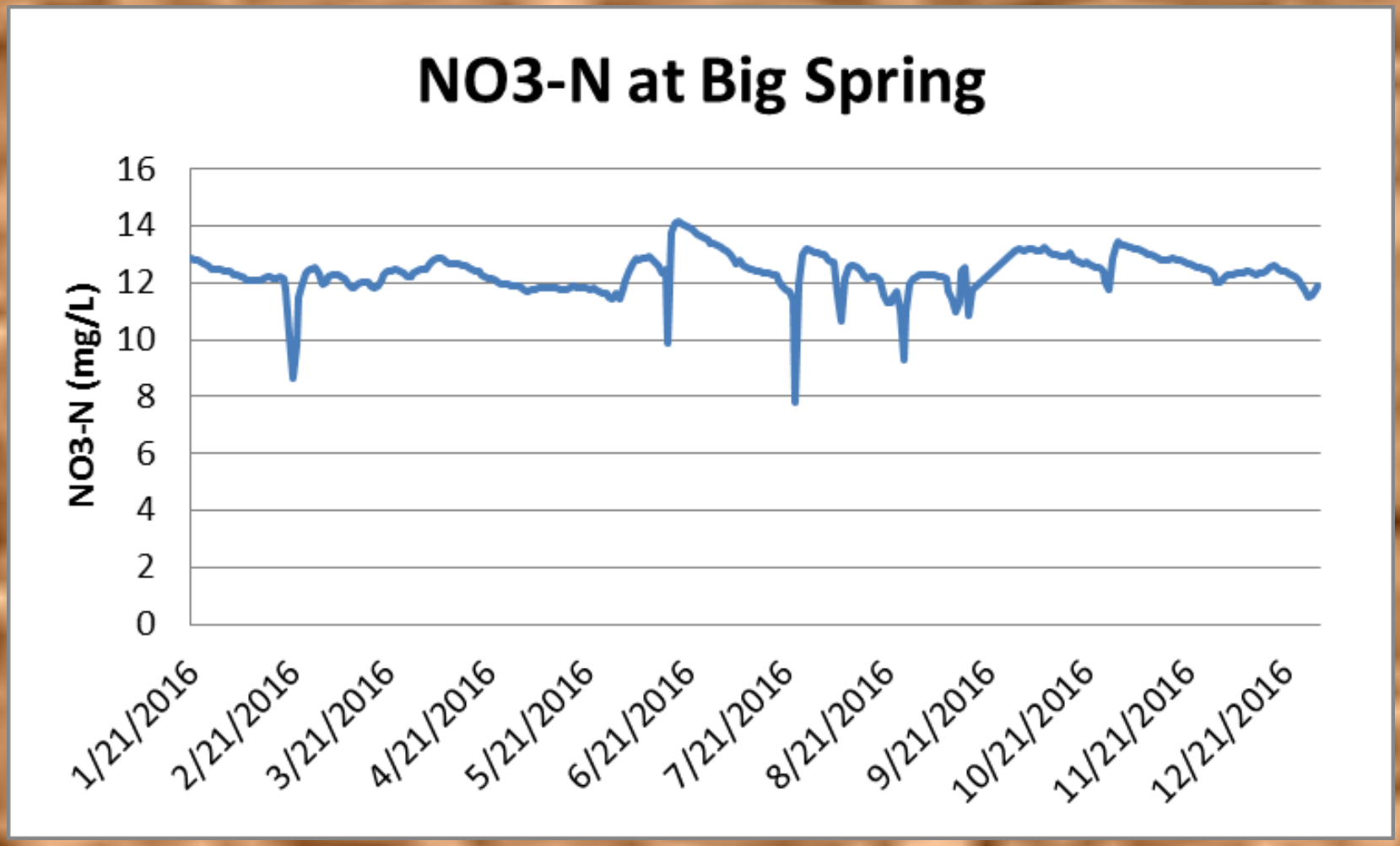
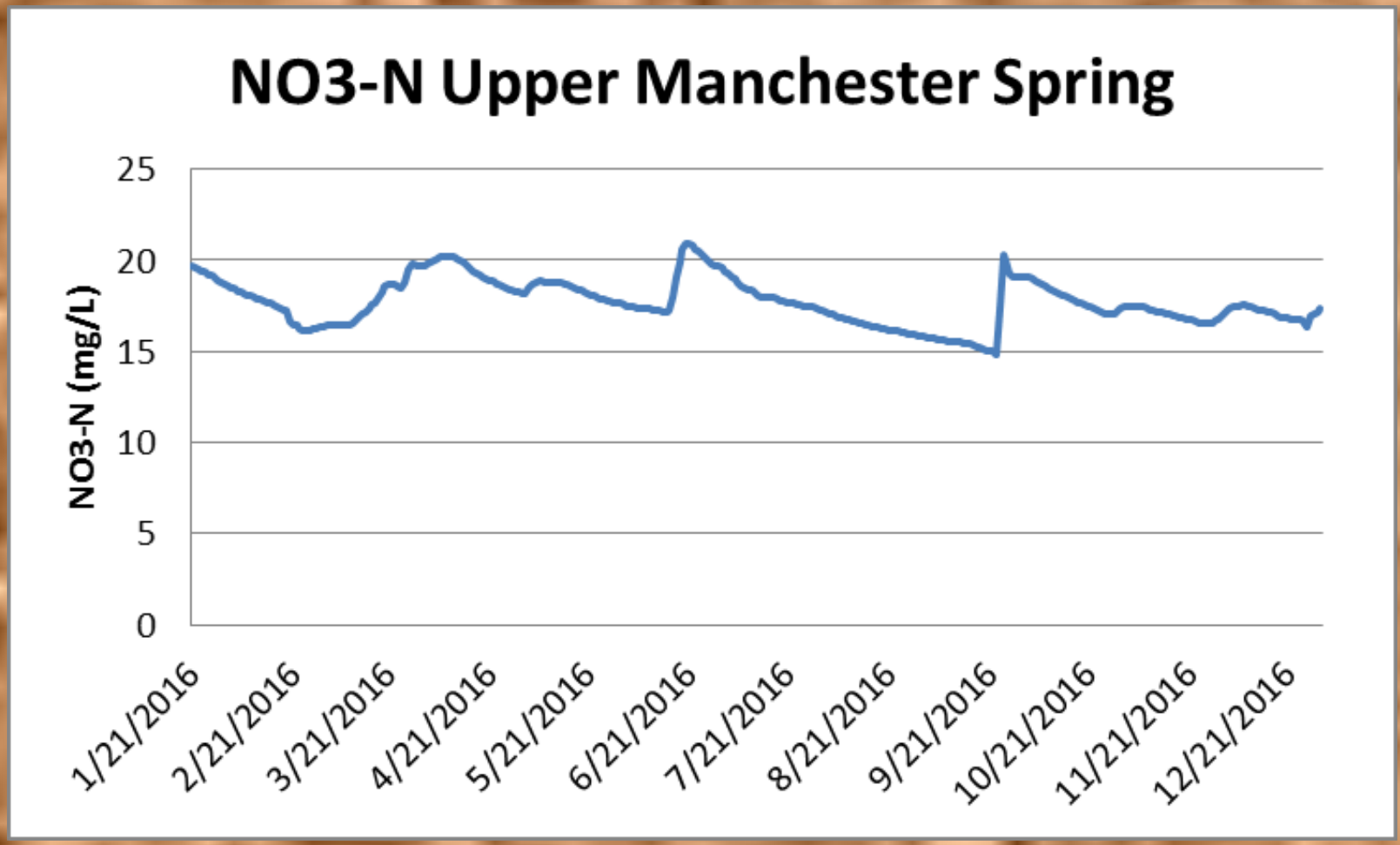
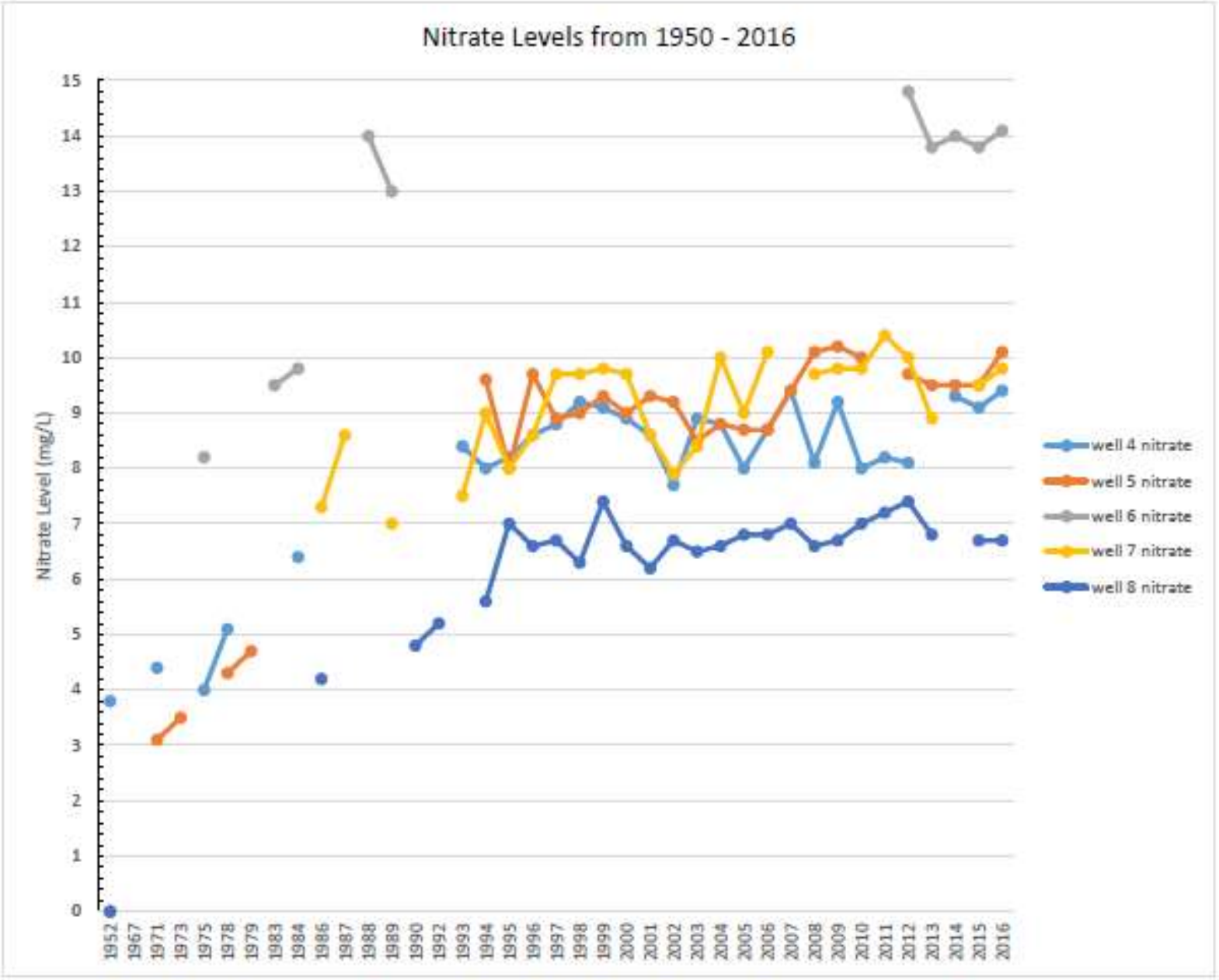
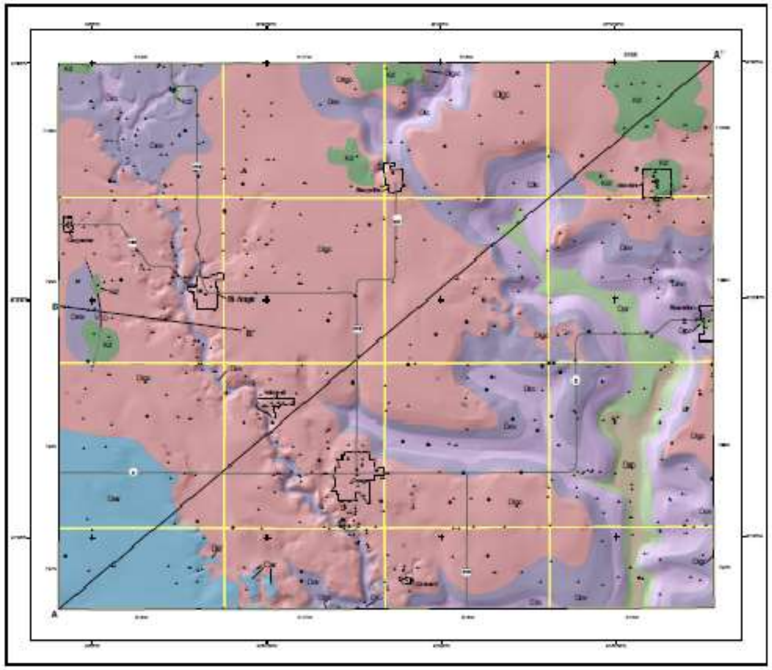

NO3-N Concentrations at Big Spring
NO3-N (mg/L)
0
2
4
6
8
10
12
14
16
18
2/27/1968
2/27/1970
2/27/1972
2/27/1974
2/27/1976
2/27/1978
2/27/1980
2/27/1982
2/27/1984
2/27/1986
2/27/1988
2/27/1990
2/27/1992
2/27/1994
2/27/1996
2/27/1998
2/27/2000
2/27/2002
2/27/2004
2/27/2006
2/27/2008
2/27/2010
2/27/2012
2/27/2014
2/27/2016
Date


NO3-N at Big Spring
NO3-N (mg/L)
16
14
12
10
8
6
4
2
0
1/21/2016
2/21/2016
3/21/2016
4/21/2016
5/21/2016
6/21/2016
7/21/2016
8/21/2016
9/21/2016
10/21/2016
11/21/2016
12/21/2016


NO3-N Upper Manchester Spring
NO3-N (mg/L)
25
20
15
10
5
0
1/21/2016
2/21/2016
3/21/2016
4/21/2016
5/21/2016
6/21/2016
7/21/2016
8/21/2016
9/21/2016
10/21/2016
11/21/2016
12/21/2016

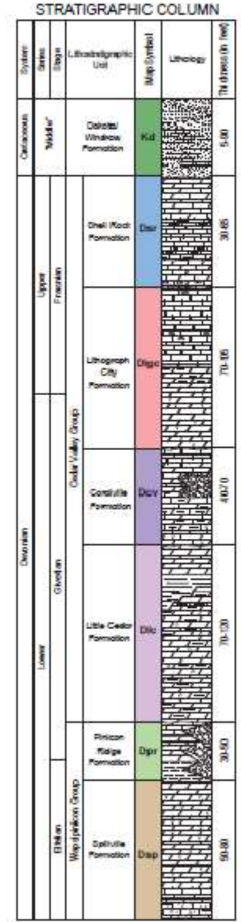

Nitrate Levels from 1950 - 2016
Nitrate Level (mg/L)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
1952
1967
1971
1973
1975
1978
1979
1983
1984
1986
1987
1988
1989
1990
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
well 4 nitrate
well 5 nitrate
well 6 nitrate
well 7 nitrate
well 8 nitrate

Bedrock Geologic Map of Mitchell County, Iowa

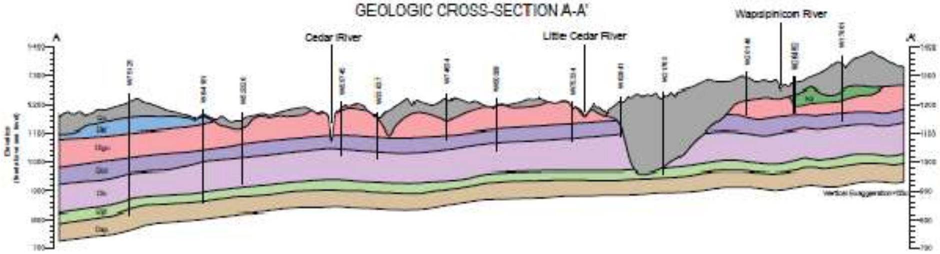


LEGEND

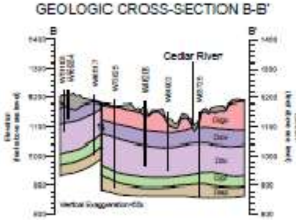
STRATIGRAPHIC COLUMN



GEOLOGIC CROSS-SECTION A-A'



GEOLOGIC CROSS-SECTION B-B'

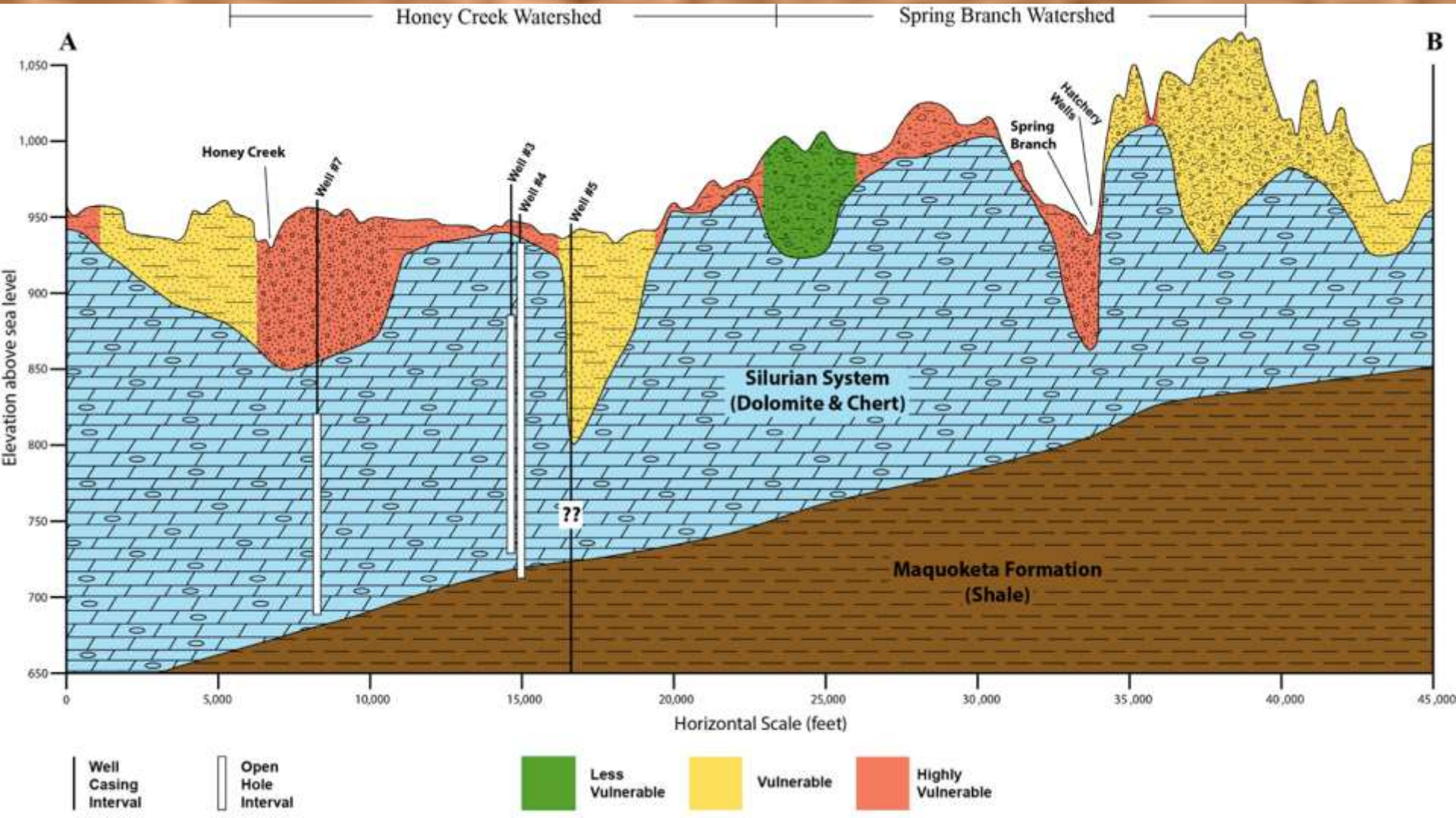


Location Map

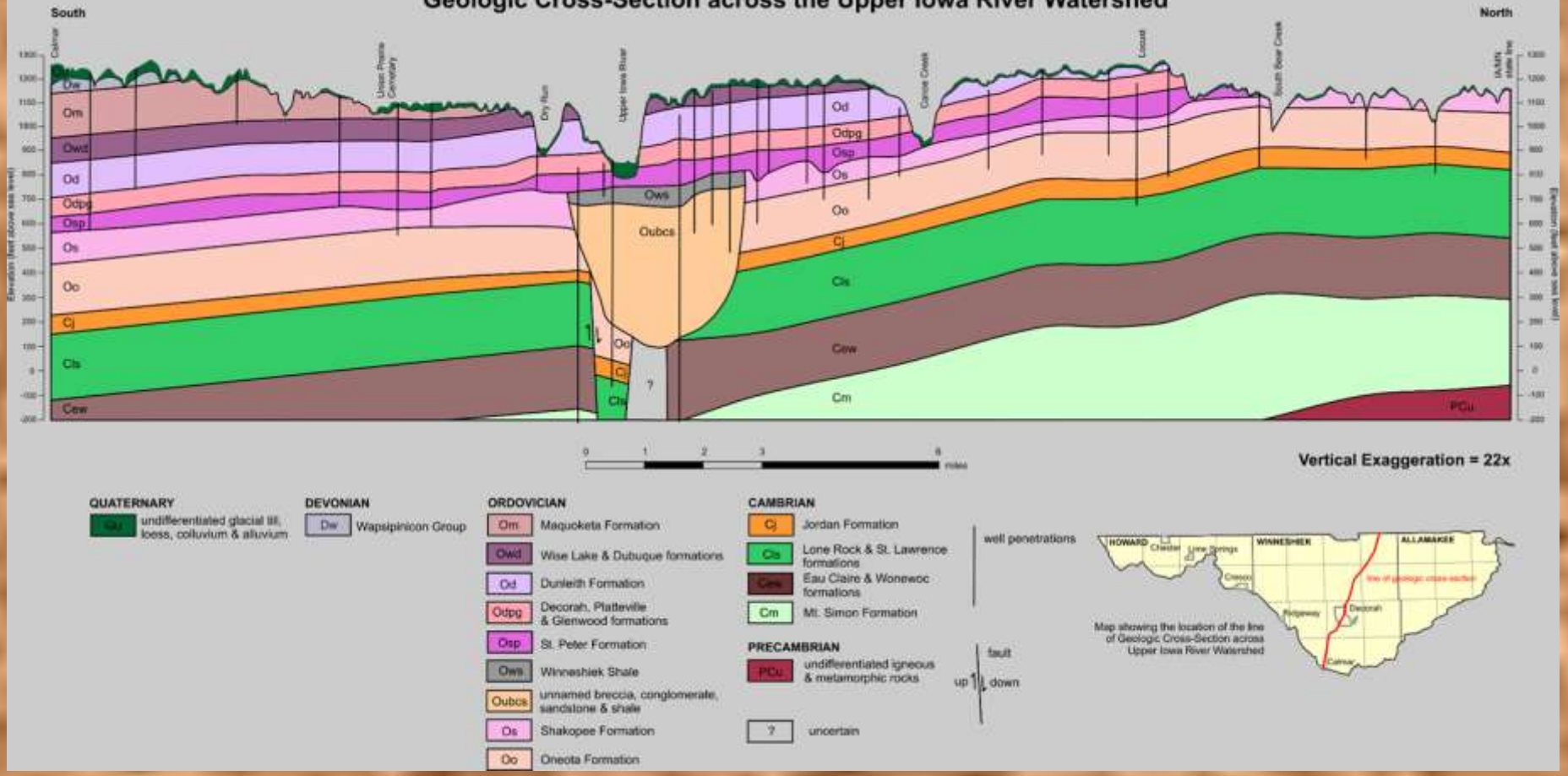
BEDROCK GEOLOGIC MAP OF MITCHELL COUNTY, IOWA

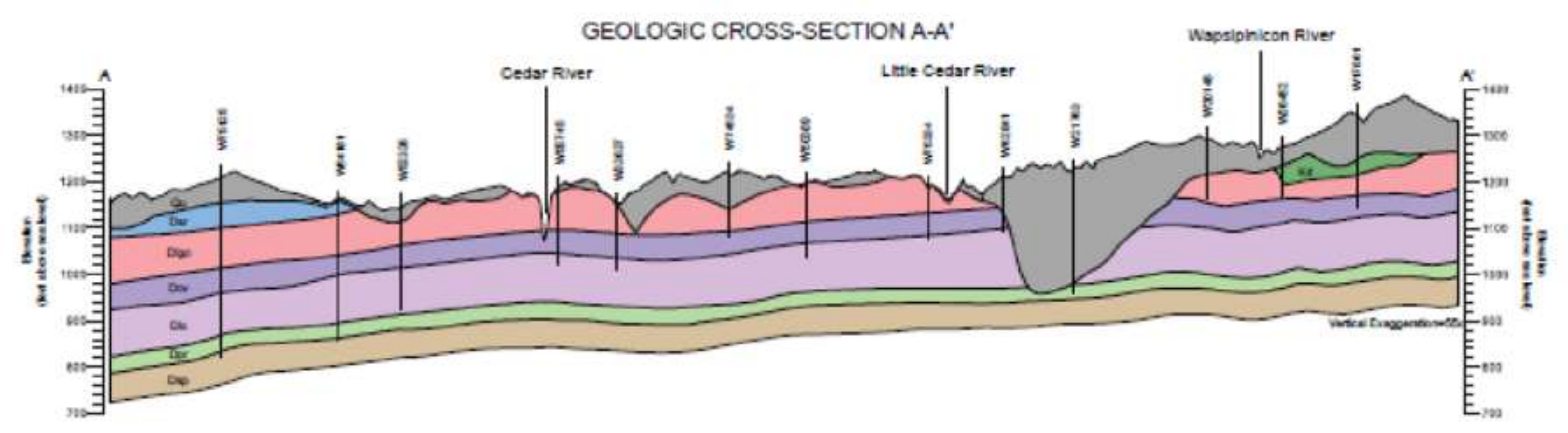
Iowa Geological Survey
Open File Map OFM-14-1
June 2014

Introduction to the Bedrock Geologic Map of Mitchell County, Iowa


Honey Creek Watershed
Spring Branch Watershed
A
B
1,050
1,000
950
900
850
800
750
700
650
Elevation above sea level
Honey Creek
Well #7
Well #3
Well #4
Well #5
Spring Branch
Hatchery Wells
Silurian System
(Dolomite & Chert)
??
Maquoketa Formation
(Shale)
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
Horizontal Scale (feet)
Well Casing Interval
Open Hole Interval
Less Vulnerable
Vulnerable
Highly Vulnerable

Geologic Cross-Section across the Upper Iowa River Watershed




GEOLOGIC CROSS-SECTION A-A'
Cedar River
Little Cedar River
Wapsipinicon River
A
A'
Vertical Exaggeration=55x

Thanks – Questions??