Update on Groundwater Monitoring in Delaware

DRBC – Oct 25, 2015

Scott Andres

Delaware Geological Survey

University of Delaware

Alphabet Soup

- GW – groundwater
- SW – surface water
- WL – water level
- WQ – water quality

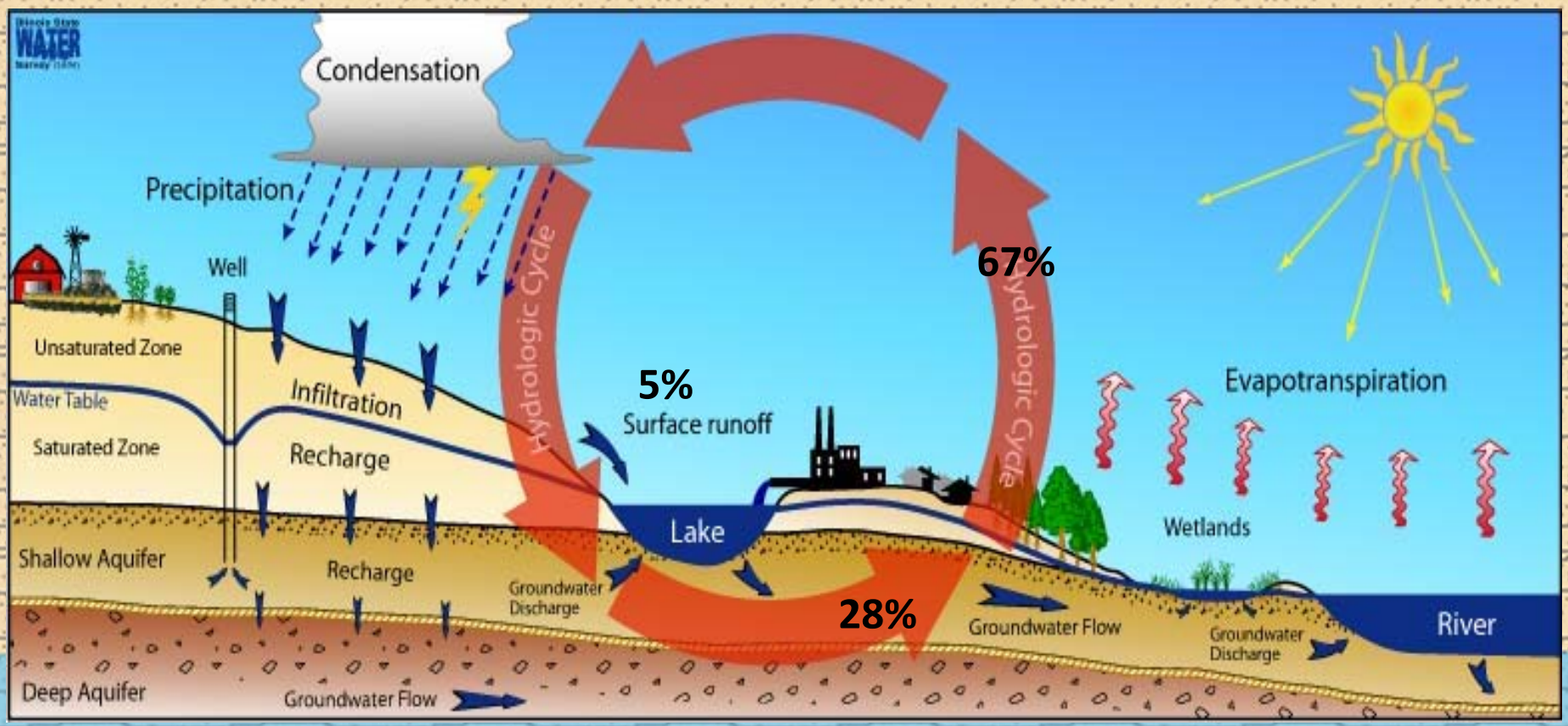
- DGS – Delaware Geological Survey
- USGS – U.S. Geological Survey
- DNREC – Dept. of Natural Resources and Environmental Control
- DDA – Delaware Dept. of Agriculture
- DPH – Division of Public Health

Delaware WQ challenges

- Nutrients – SW and GW
- Saltwater – GW issue
- Toxics – mostly a SW issue with site specific exceptions
- Funding <<<< Needs

GW management challenges

- Potomac aquifer – allocation > resource
- Dover area Piney Point, Cheswold drawdown
- Contaminated sites statewide



Water Budget

Precipitation ~ 44 inches/year

ET ~ 28 - 32 inches/year

Groundwater ~ 12 – 16 inches/year

Surface runoff ~ 2 – 4 inches/year

Monitoring Budget

Statewide SW monitoring funds estimated at ~ 10 x GW monitoring funds

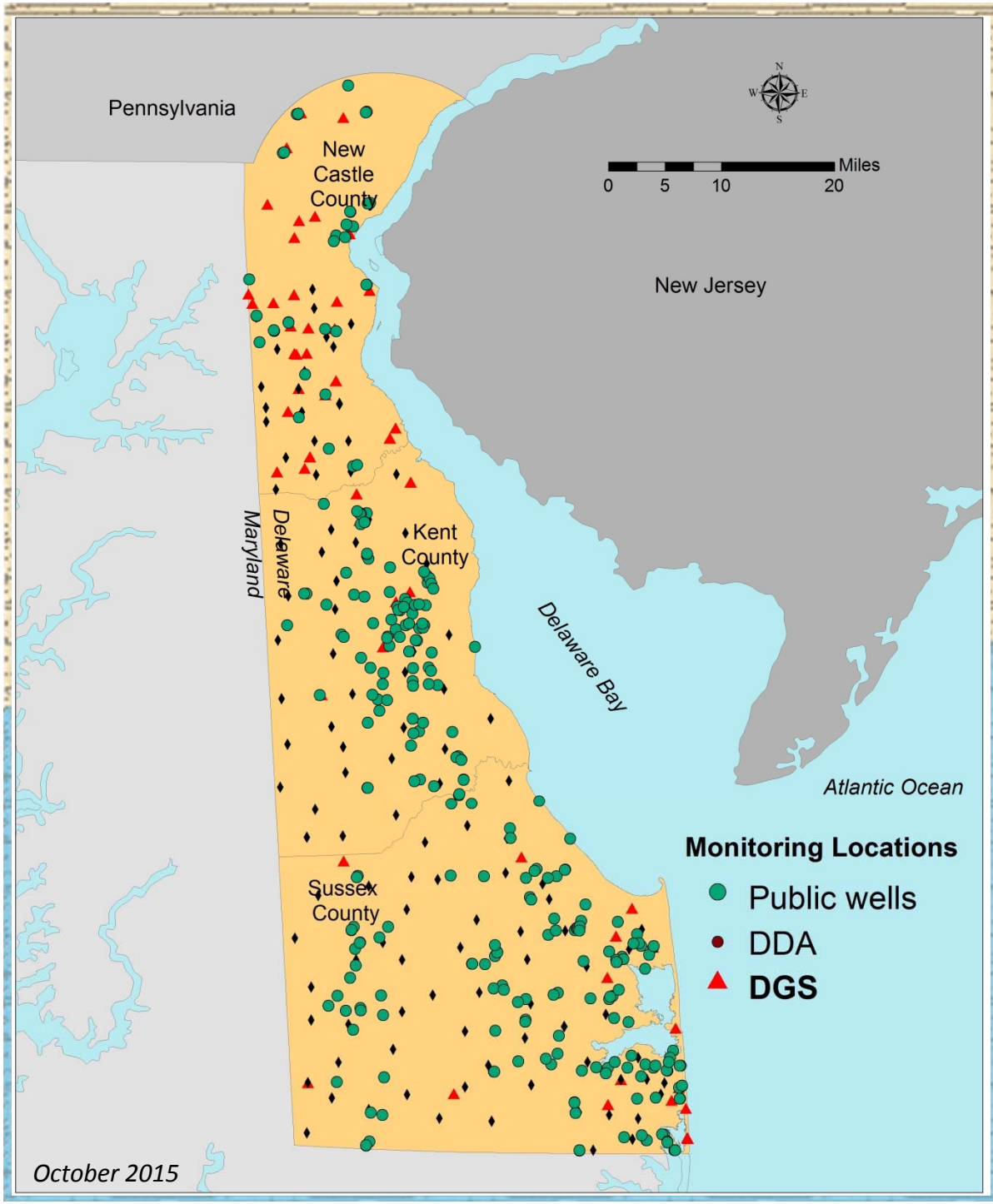
October 2015

GWQ Monitoring

- 2011, 2013 WQ monitoring conferences
- SW $ >>> GW $
- $ for GWQ monitoring fragmented across special projects and programs in multiple agencies and divisions
- Mismatched monitoring objectives so little opportunity to leverage resources

Long-Term Ambient GW Monitoring Programs in Delaware

- DGS/DNREC – WL in 100+ wells in 13 aquifers, since 1970s, intermittent WQ projects
- USGS/DDA – WQ project 70+ wells in WT aquifer just started, other intermittent WL and WQ projects
- DNREC – 305b reporting, site specific GWQ monitoring projects by site owners for specific permitting and contaminant mitigation programs
- DPH – potable water source testing, includes public and private wells



Monitoring infrastructure

- DGS – 13 aquifers, WL, WQ
- DDA – 1 aquifer, WQ
- DNREC/DPH, 13 aquifers, WQ in public wells

Recent Events for DGS Monitoring

- 2012-2014 – Infrastructure improvements through capital-funded project focused on southern New Castle and northern Kent Counties – after 3 year wait
- 2014- present – addition of salinity sensors to selected wells
- 2015 Water Supply Coordinating Council resolution to support project in Kent Co
- Kent-Sussex mapping/water use study

Infrastructure Project - Homework

Draft

U.S. Army Corps
of Engineers
Philadelphia District

Updated Draft Groundwater Model Production Run Report
Upper New Castle County, Delaware

Prepared for
Delaware Department of Natural Resources and Environmental Control

Prepared by
U.S. Army Corps of Engineers
Philadelphia District

February 2007

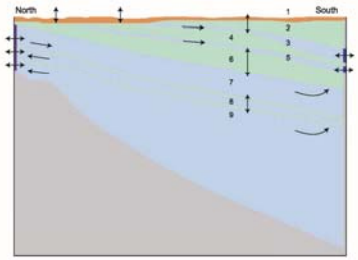
State of Delaware
DELAWARE GEOLOGICAL SURVEY
John H. Talley, State Geologist

REPORT OF INVESTIGATIONS NO. 77

SIMULATION OF GROUNDWATER FLOW IN SOUTHERN NEW CASTLE COUNTY, DELAWARE

By

Changming He and A. Scott Andres



University of Delaware
Newark, Delaware
2011

State of Delaware
DELAWARE GEOLOGICAL SURVEY
John H. Talley, State Geologist

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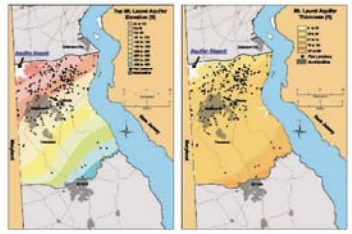
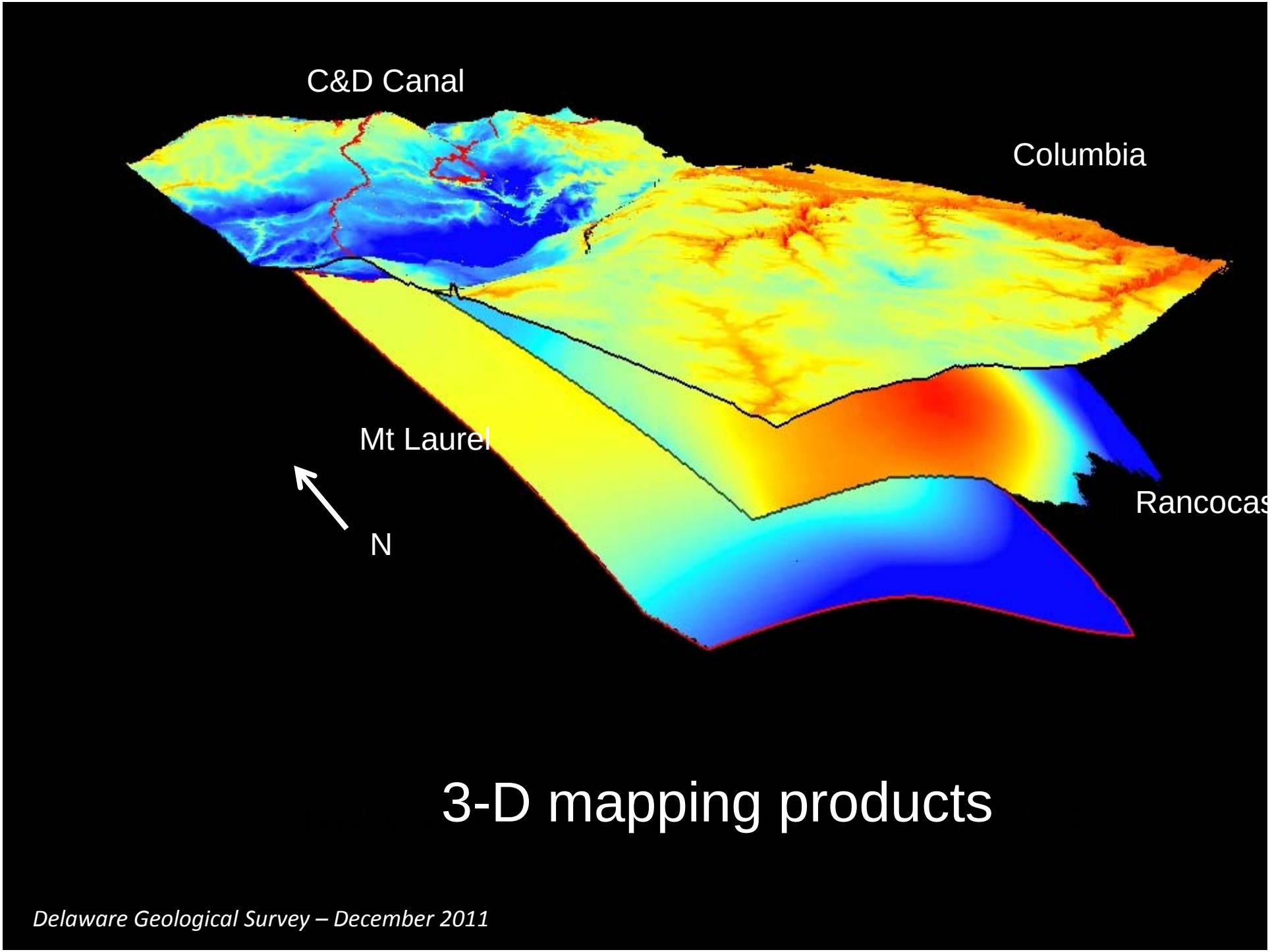
HYDROGEOLOGIC FRAMEWORK OF SOUTHERN NEW CASTLE COUNTY



By

Bailey L. Dugan, Mark P. Neimeister, and A. Scott Andres

University of Delaware
Newark, Delaware
2008

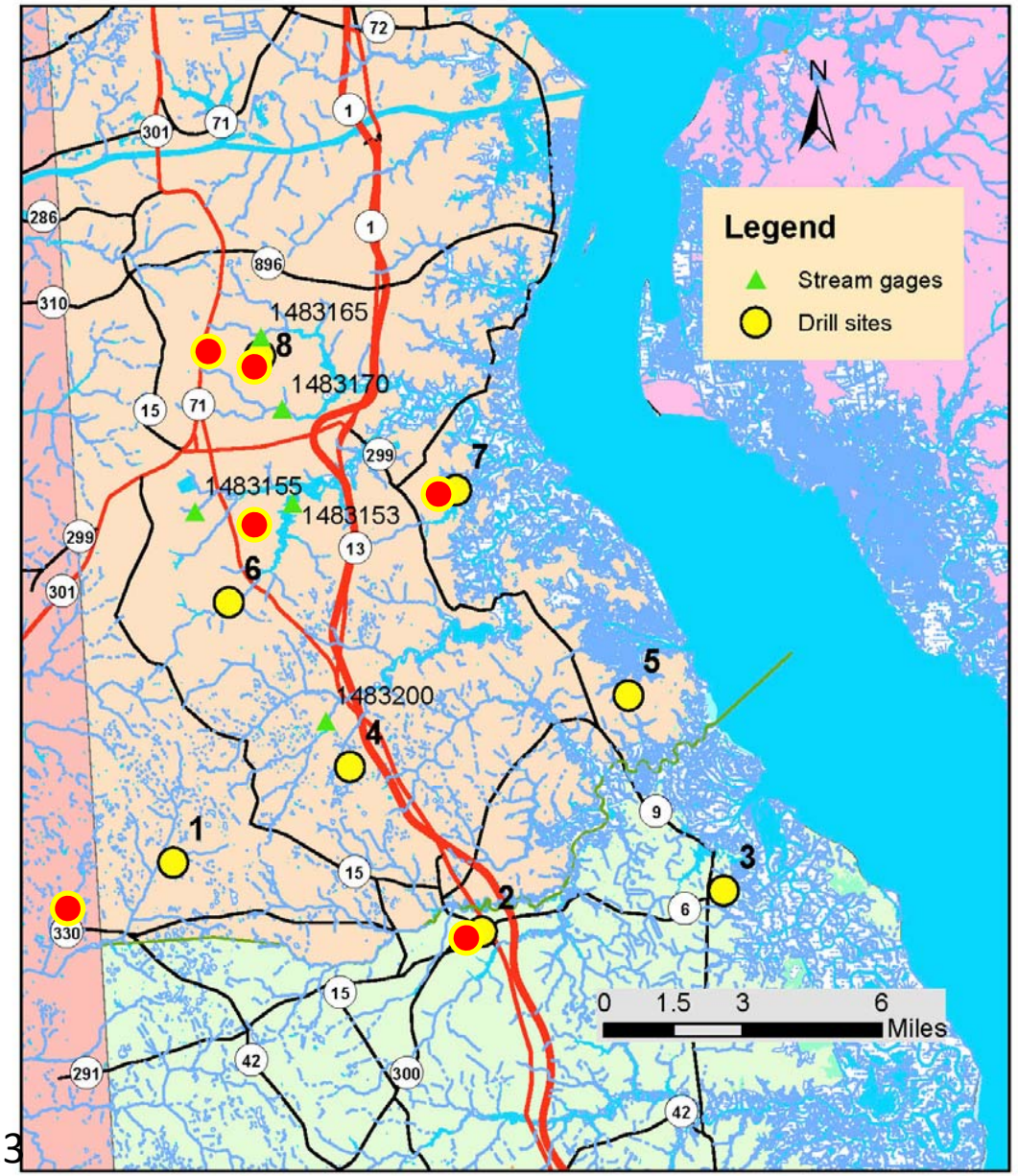


3-D mapping products

Delaware Geological Survey – December 2011

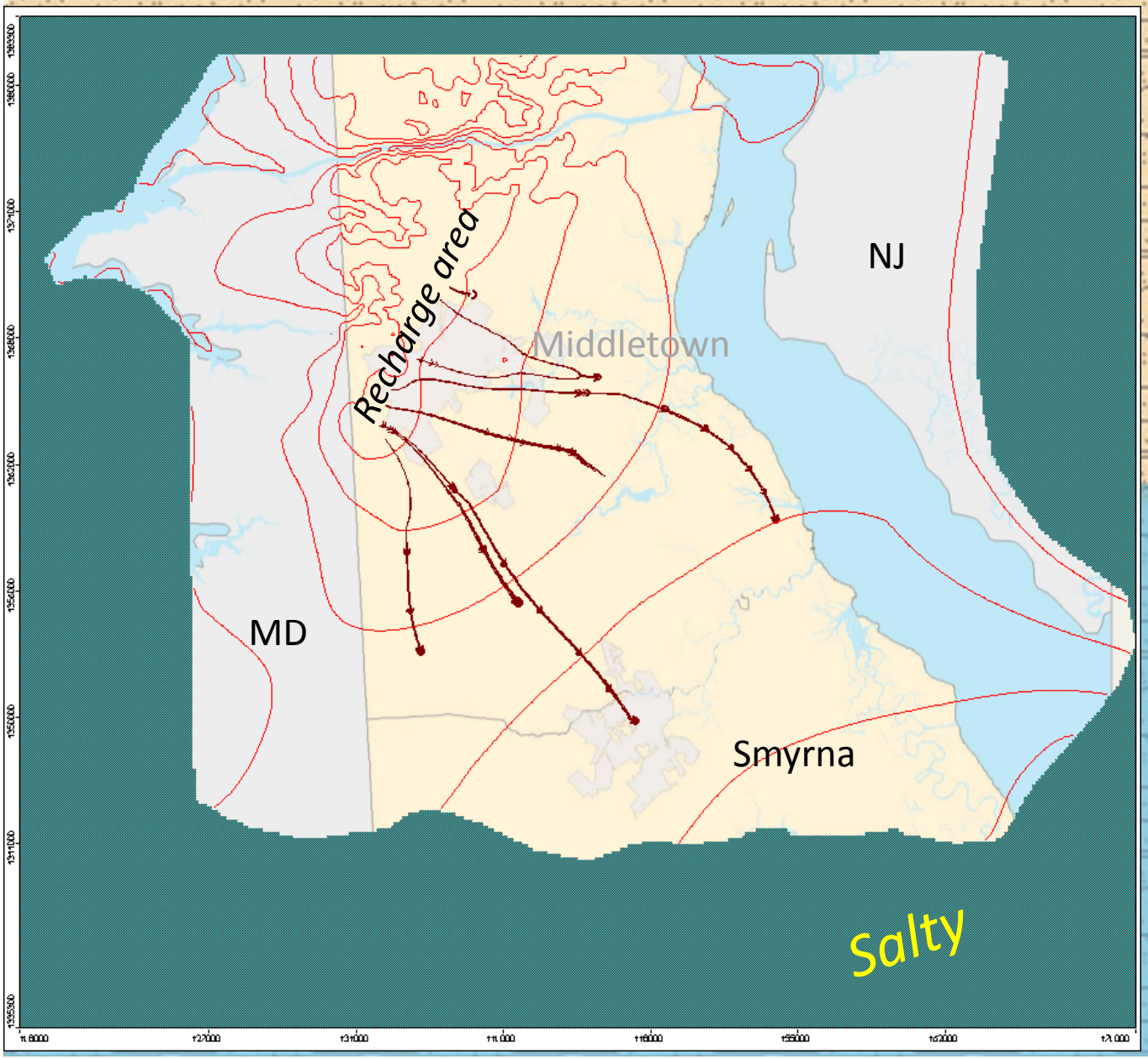
Capital Project Overview

- Monitoring well installs
- Existing monitoring wells added to network
- Stream gages with USGS identifier



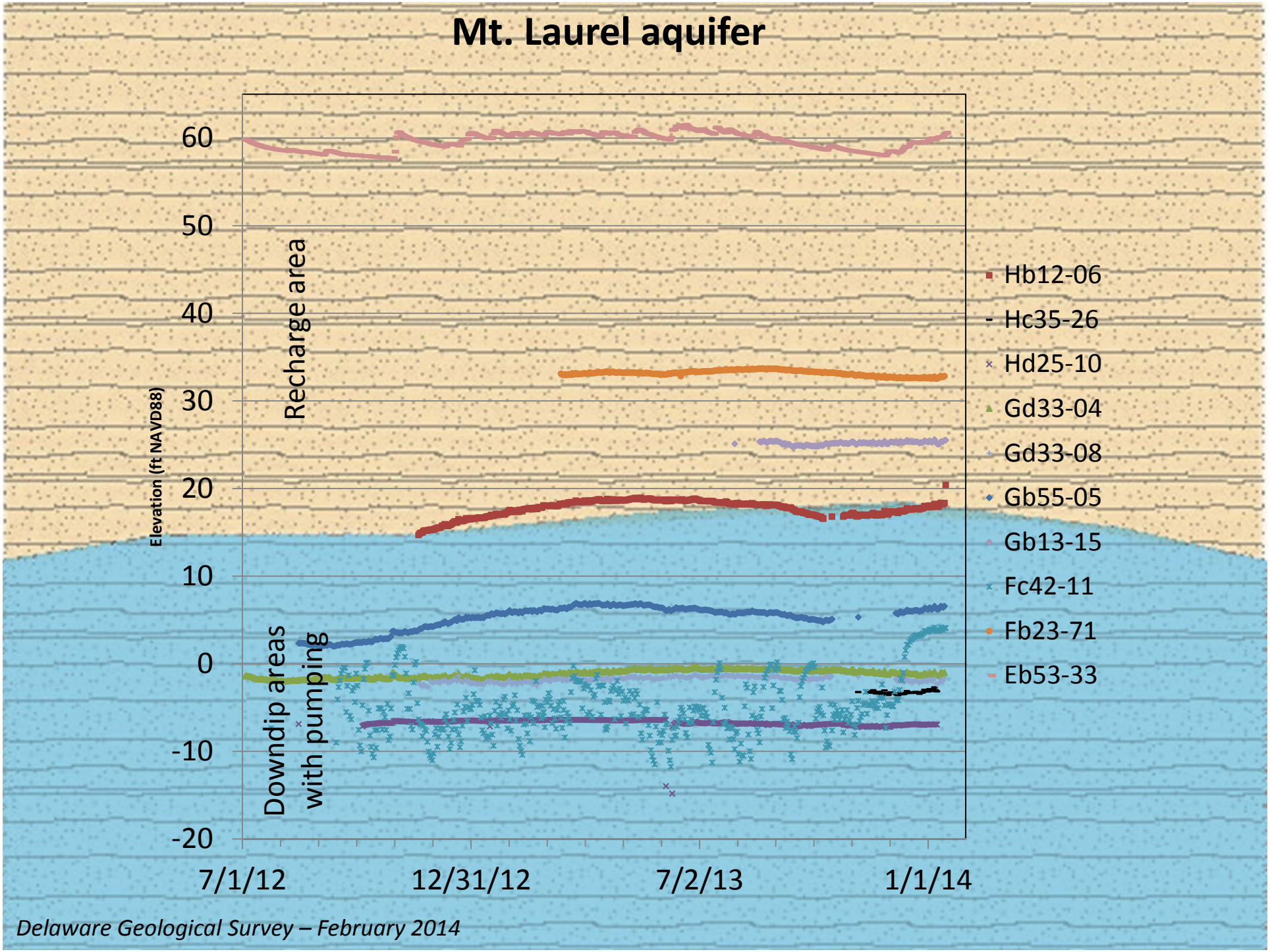
Delaware Geological Survey - October 2013

Flow in Mt. Laurel Aquifer

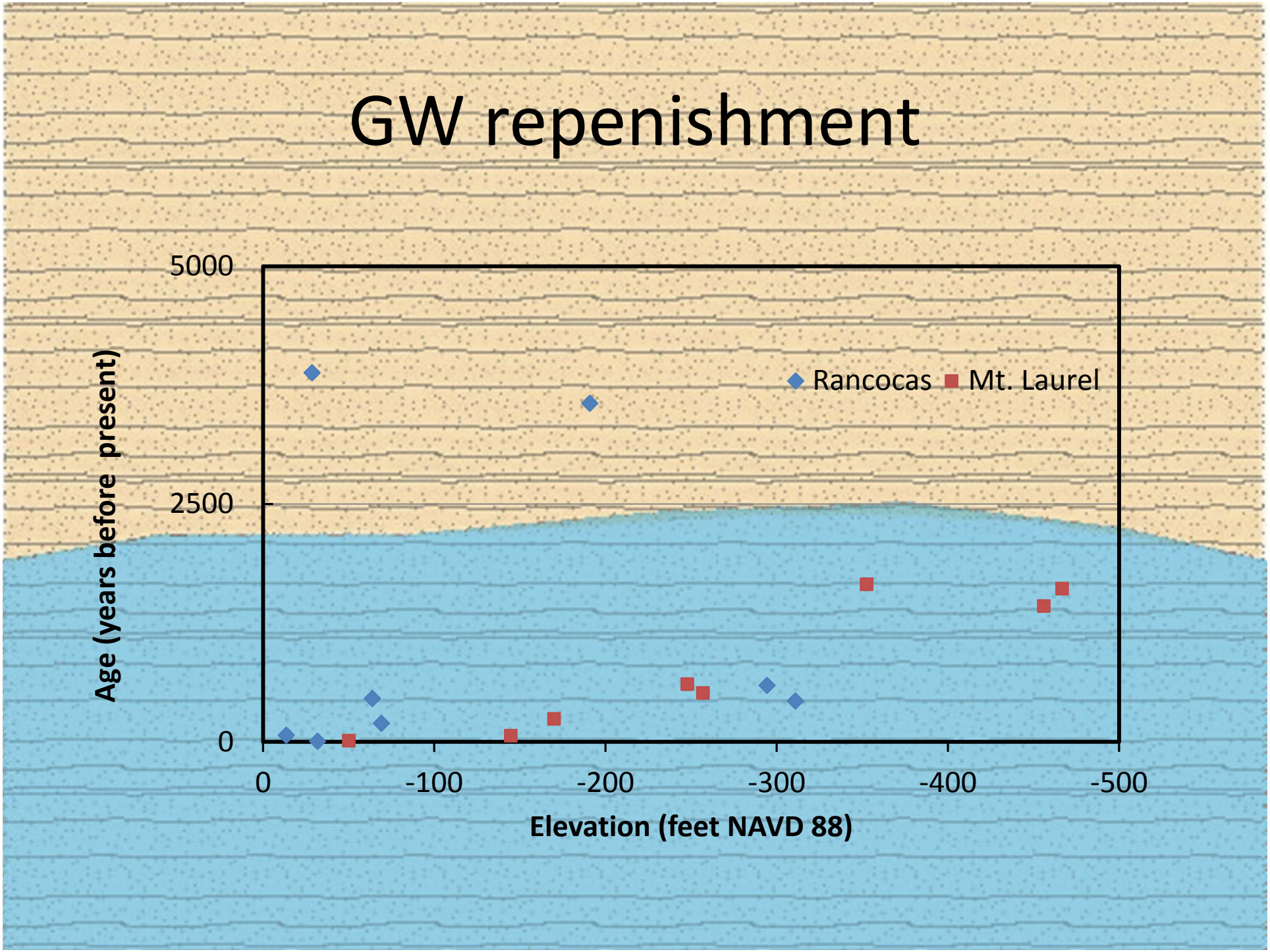


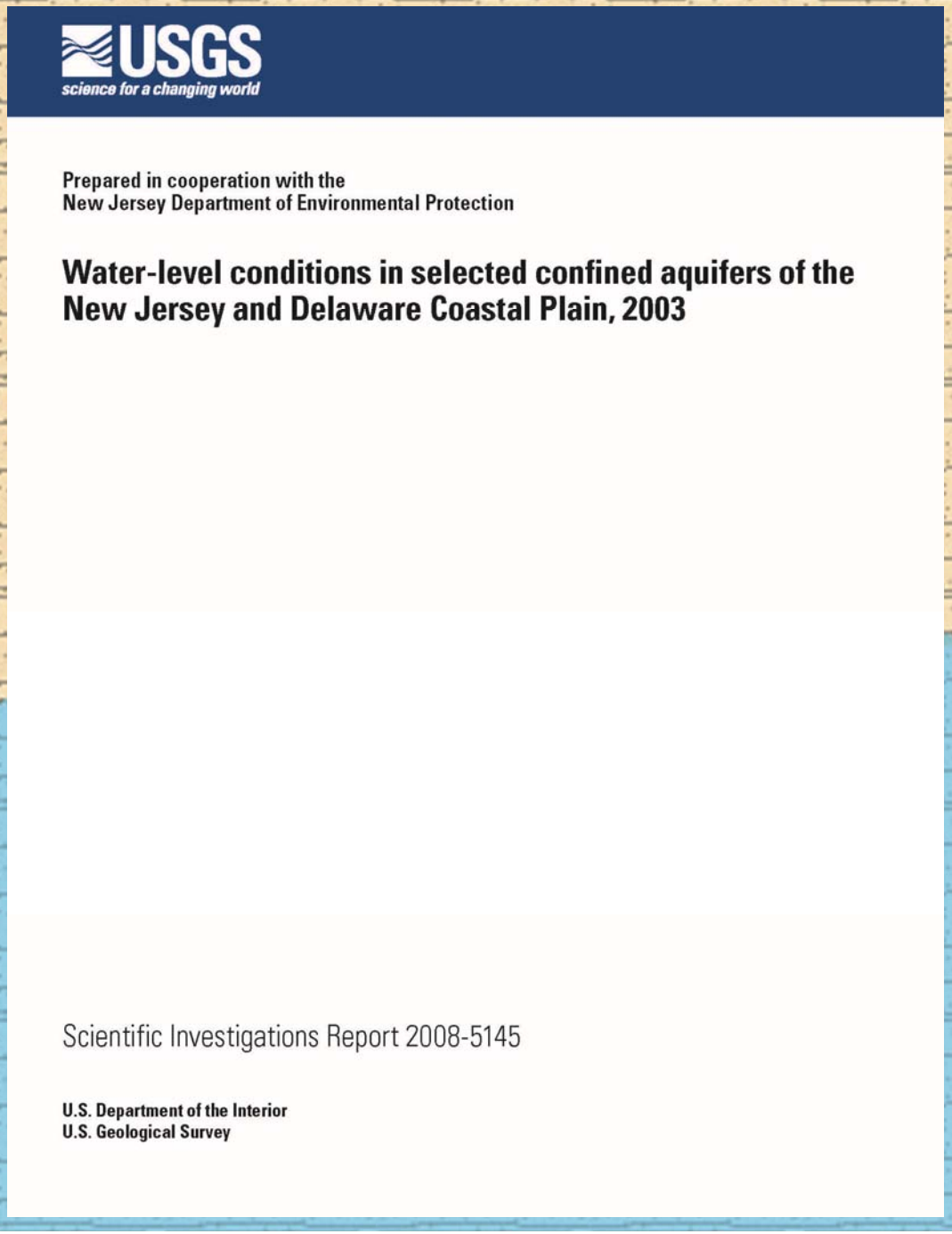
It takes hundreds to thousands of years for flow from recharge area to deep, confined aquifer.

Aquifer use limited to SE by salt and poor yield


Mt. Laurel aquifer
Elevation (ft NAVD88)
60
50
40
30
20
10
0
-10
-20
Recharge area
Downdip areas with pumping
7/1/12
12/31/12
7/2/13
1/1/14
Hb12-06
Hc35-26
Hd25-10
Gd33-04
Gd33-08
Gb55-05
Gb13-15
Fc42-11
Fb23-71
Eb53-33
Delaware Geological Survey – February 2014

GW repenishment

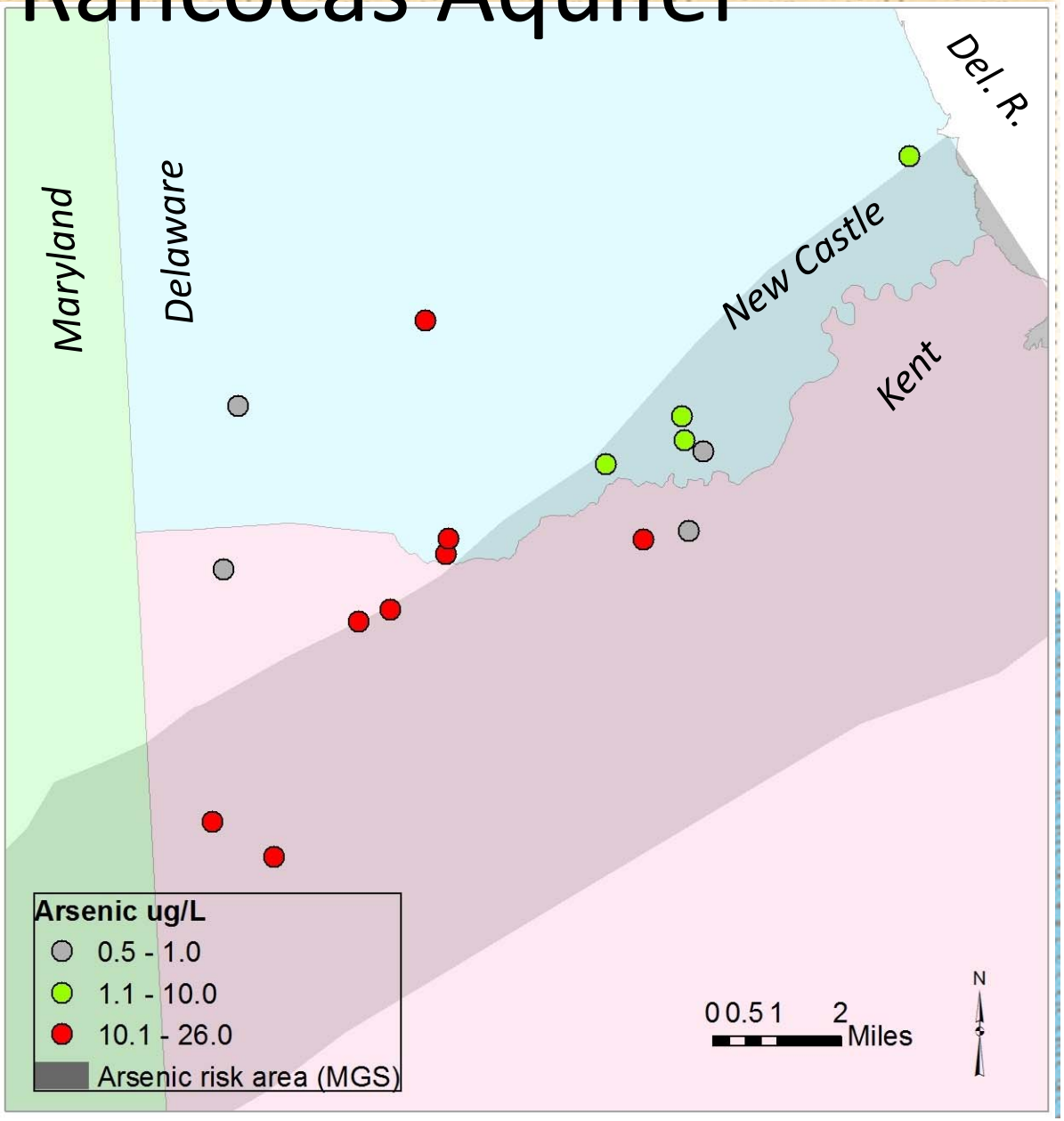




- Previous work underestimated water pressures
- New monitoring data support DGS model predictions
- Follow up 2008 and 2013 USGS projects

Arsenic in Rancocas Aquifer

- Work prompted by Maryland study
- Naturally occurring
- Follow up by USGS-Dover



Future for DE GW Monitoring (DGS)

- Proposal to join National Groundwater Monitoring Network
- Looking for stable funding to initiate and sustain regular GWQ monitoring
- Capital appropriation proposal has been submitted for three budget cycles