



Virginia Coastal Zone  
MANAGEMENT PROGRAM



Eastern Shore Master Gardeners

# Overview of Ground Water on the Eastern Shore

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Accomack-Norhampton Planning  
District Commission  
March 25, 2015





# A-NPDC Overview and Purpose

- Commonwealth created 21 PDCs in 1970 to address regional issues by fostering cooperation amongst localities and cooperation between state & localities
- Accomack-Northampton District:
  - Members: 2 Counties and Town of Chincoteague
  - Also provides services to 18 other towns
- Affiliate Organizations:
  - A-N Regional Housing Authority → provides privately or authority-owned rental housing
  - ESV Housing Alliance → improving housing for homeowners
  - A-NPDC →
    - Community Development
    - Economic Development
    - Transportation Planning
    - Environmental Planning → Ground Water Committee; Climate Adaptation Working Group

# ESVA Ground Water Committee

- Formed in 1990 by Accomack & Northampton to study and plan for ground water protection and management
- 11-member Committee meets monthly
  - 2 County Administrators, 4 County Supervisors, 4 County-appointed members, A-NPDC Executive Director
- Coordinated by A-NPDC with funding from Counties & VA Coastal Zone Management Program
- Contracts consulting hydrogeologist to advise Committee
- Activities:
  - Develop protection and management plans
  - Ground Water Research: USGS, VA Tech, Randolph-Macon
  - Public Workshops & Educational Materials
  - Review/comment on state withdrawal permit applications and federal environmental assessments
  - Coordinate with state/federal governments on ground water-related regulations
  - ESVA Ground Water Model
  - ESVA Ground Water Award Program
  - Household Hazardous Waste Collection

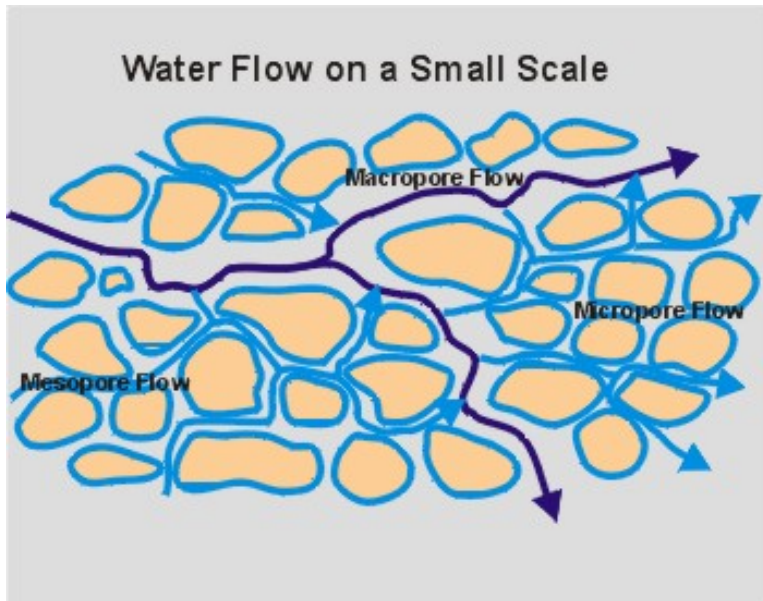
# Presentation Overview

1. Ground Water Conditions
2. DEQ Permit Process
3. Tyson Water Use
4. Overall Ground Water Use

# Ground Water Conditions on the Eastern Shore

# Ground Water is not like an underground river!

- Groundwater flows through porous soils and sediment that includes gravels, sands, silts, and clay.





Soil/Sediment type determines if it can be used as a source of water

## **An Aquifer is a Source for Groundwater and is:**

Any coarse grained material (sand, gravel) that can supply sufficient water for a beneficial use

## **A Confining Unit Impedes Movement of Groundwater and is:**

Any fine grained material (silt, clay) that can significantly restrict vertical movement of groundwater such that the resulting groundwater is under pressure.

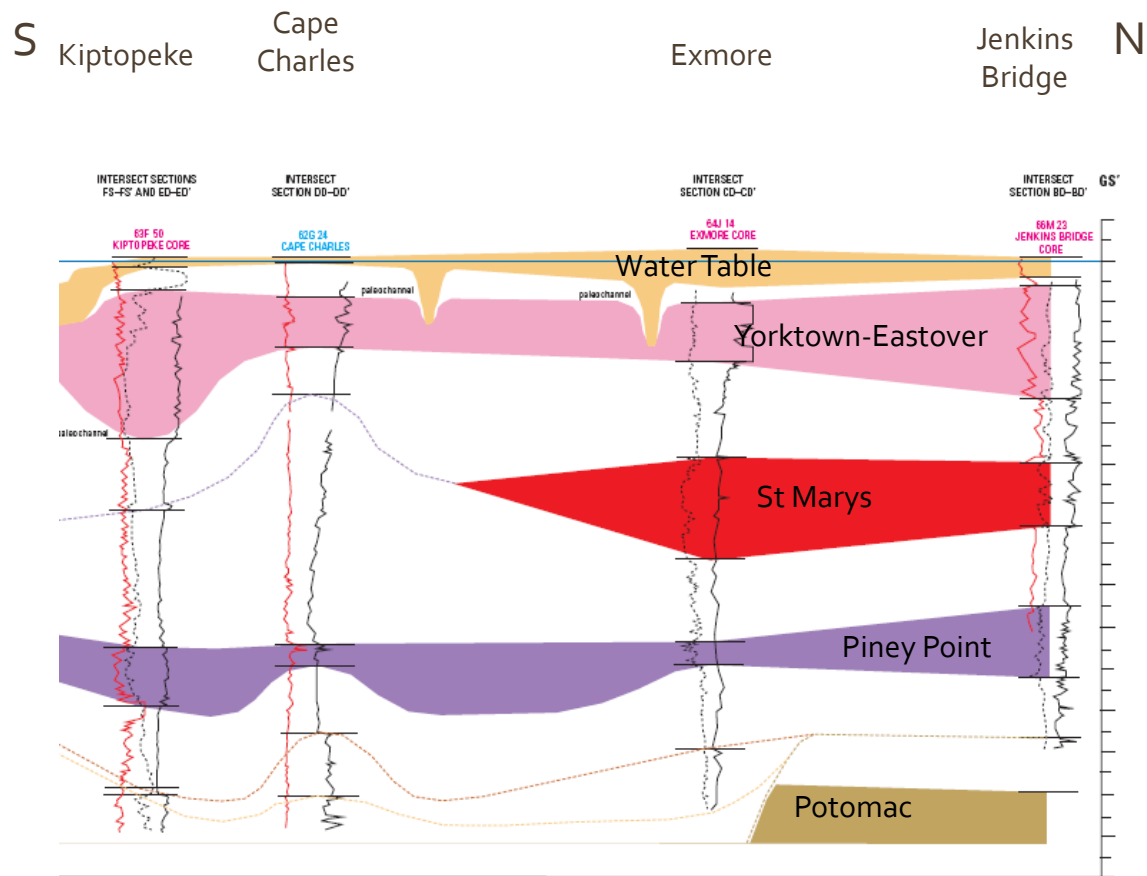
# Aquifers are defined by where they appear relative to a confining layer

- Water Table
  - Water is not “under pressure”
  - Well yield is lower than comparable confined aquifers
  - Replenished (recharged) directly by precipitation
  - More vulnerable to contamination from surface activities
- Confined aquifer
  - Water is under pressure, confined by an overlying layer(s) of silt and clay
  - Replenished from vertical flow through the confining unit (recharge is much lower than a water table aquifer)
  - More vulnerable to saltwater intrusion



# All Groundwater Aquifers on the Eastern Shore

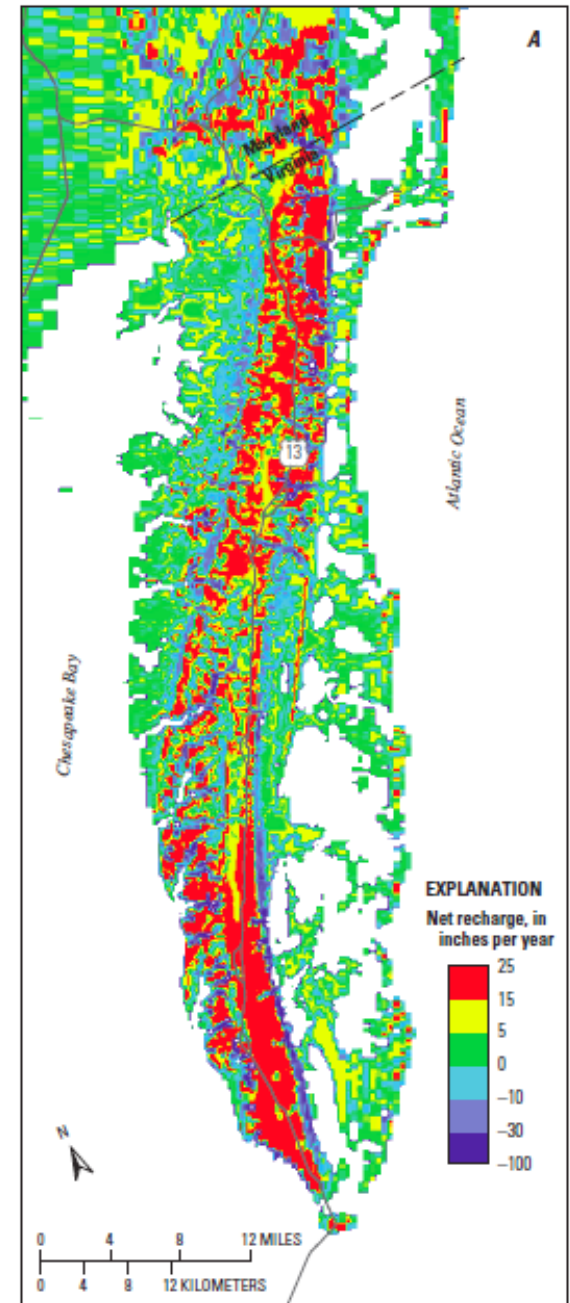
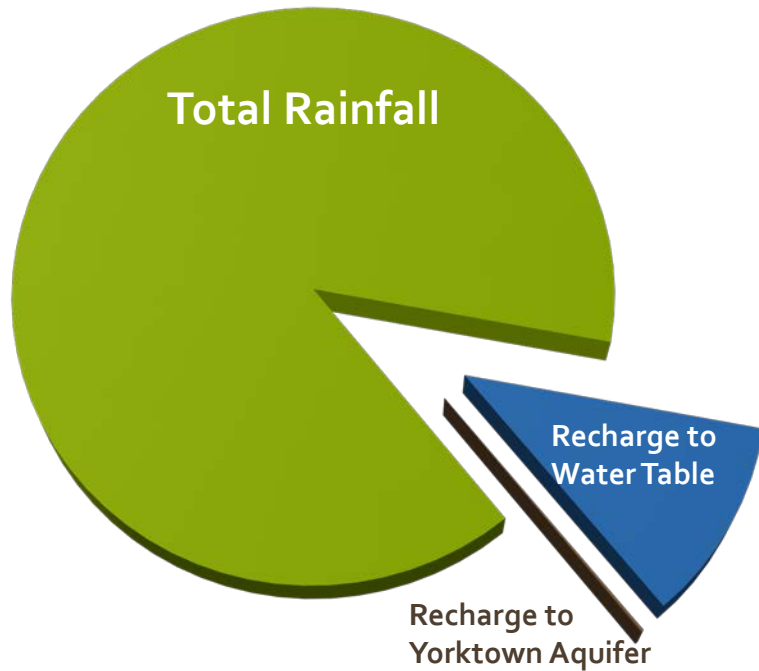
- **Fresh Groundwater is restricted to the Columbia (Water Table) aquifer and significant portions of the Yorktown-Eastover aquifer**
- **Brackish groundwater is found in portions of the Yorktown-Eastover, all of the St. Marys Aquifer, Piney Point, and Potomac aquifers**
- **The Columbia, Yorktown-Eastover, and Piney Point aquifers are found throughout the Eastern Shore**
- **St. Marys and Potomac Aquifers are absent in the southern portion of the Shore**



Source: McFarland and Bruce, 2006

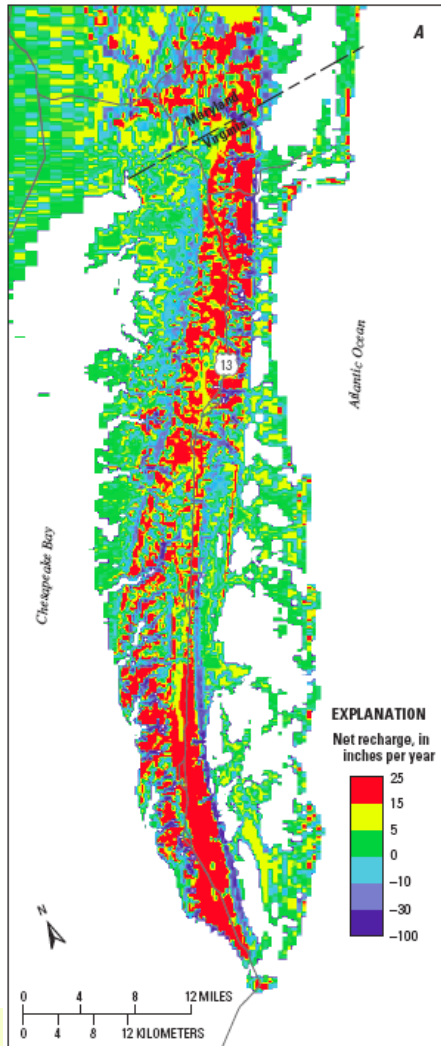
# How Much Water Recharges the Aquifers?

- All fresh water comes from precipitation falling directly on the Shore
- About 88% of the precipitation never infiltrates to the groundwater

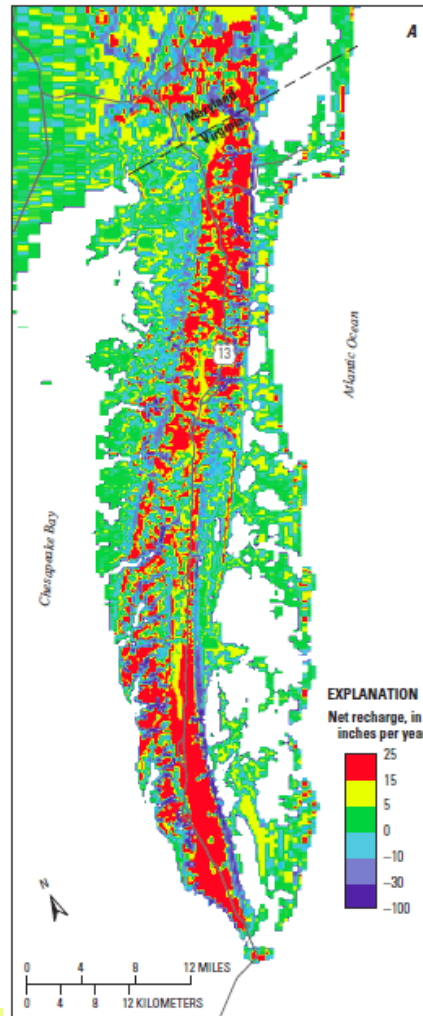


# Recharge amounts vary across the Shore

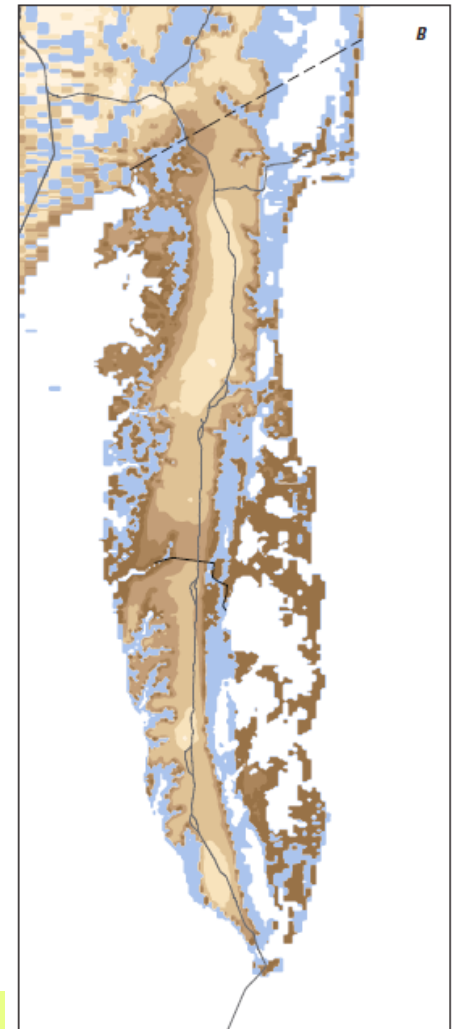
Recharge to Surficial Aq



Estimate Recharge Rates

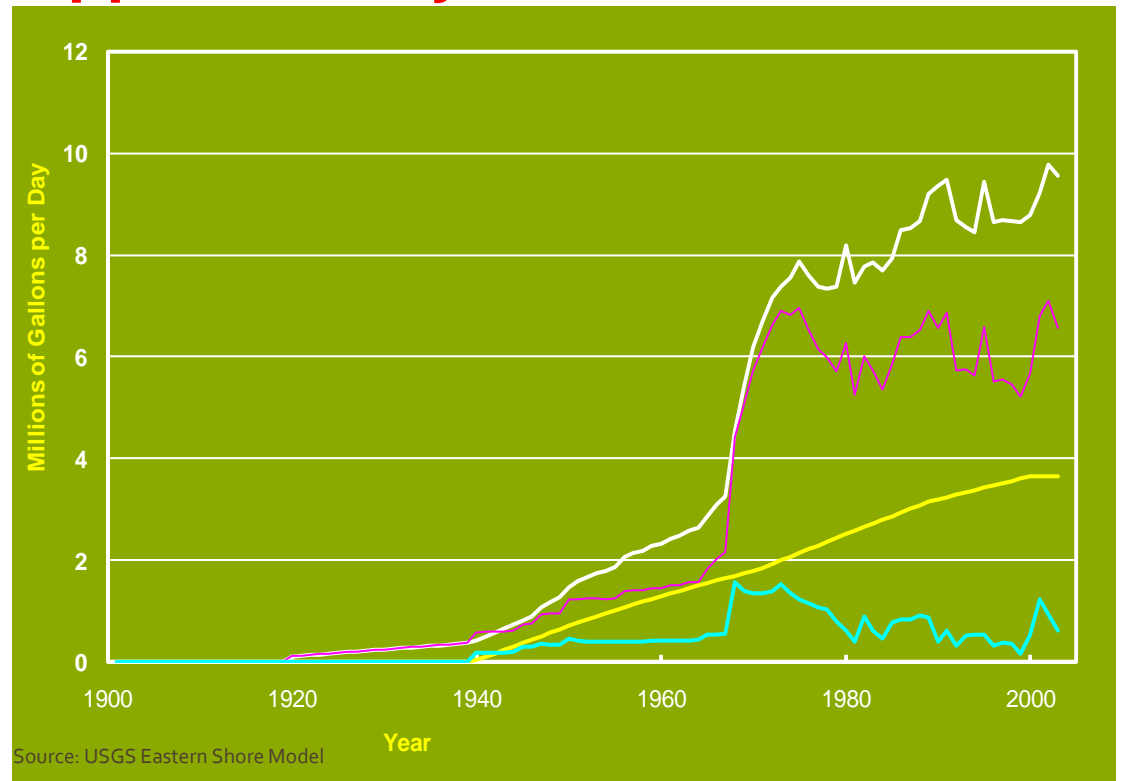


Recharge to Y-E Aq

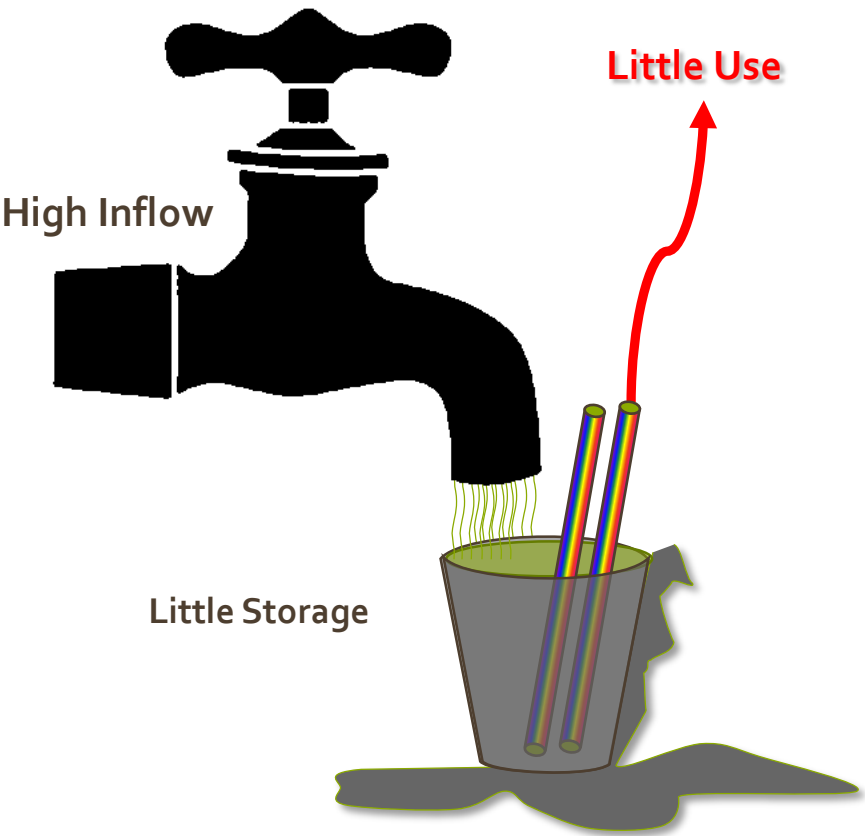


# Recharge rate to the Yorktown has increased over time due to pumping

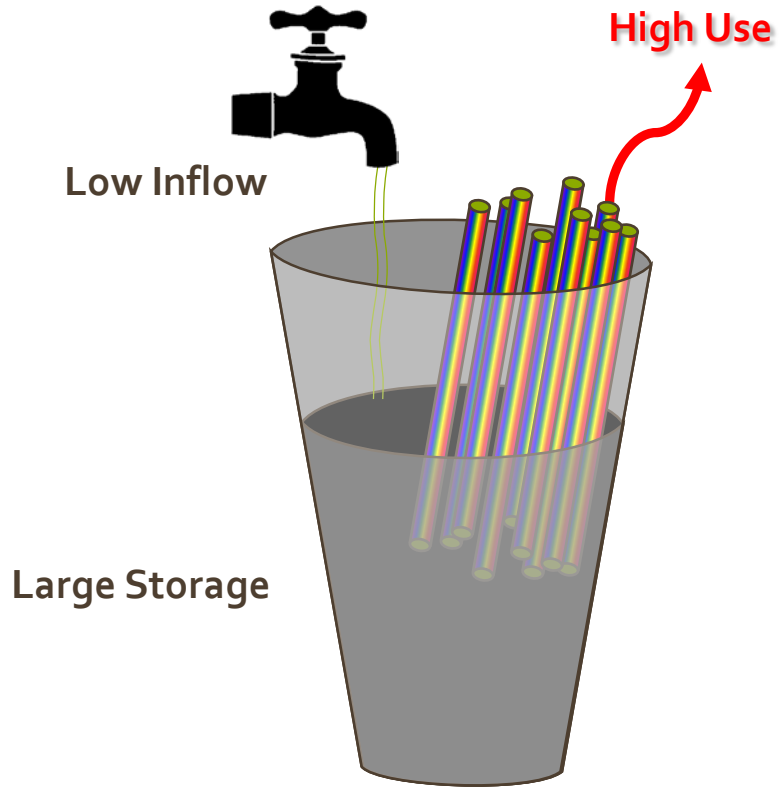
- **Current Yorktown-Eastover Aquifer use exceeds recharge by approximately 1 MGD**
- **Recharge will increase as use increases – but will NOT keep pace with pumping**



# Water Table / Yorktown Dilemma



**WATER TABLE AQUIFER**

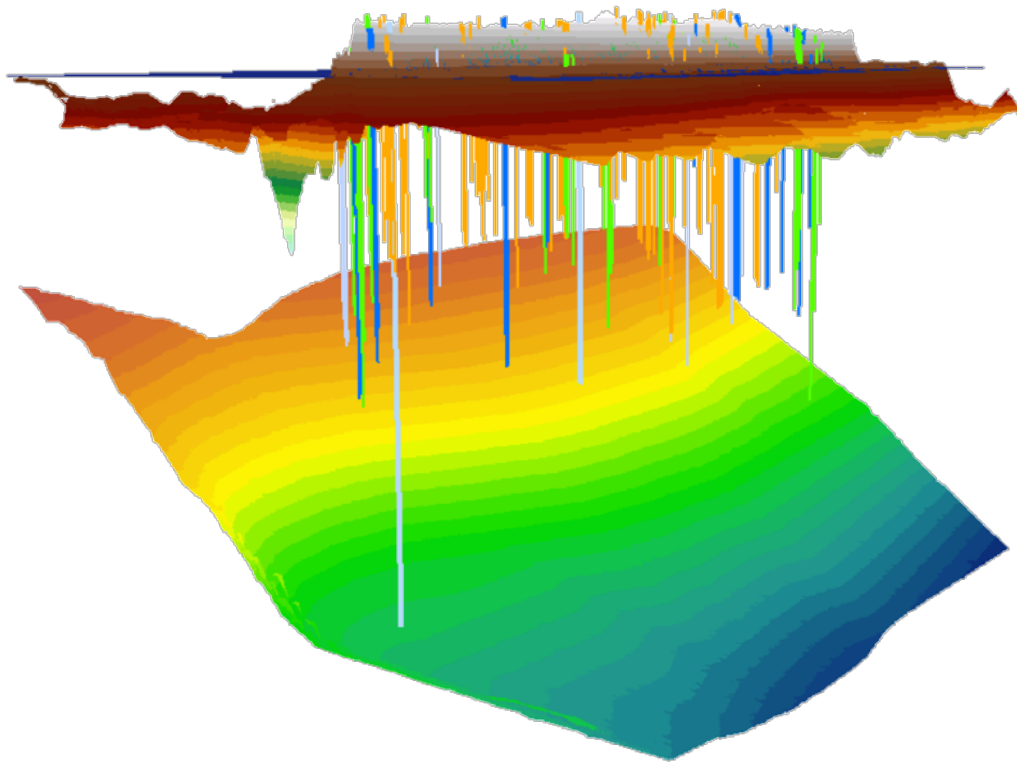


**DEEP AQUIFER**





# Groundwater Use on the Eastern Shore

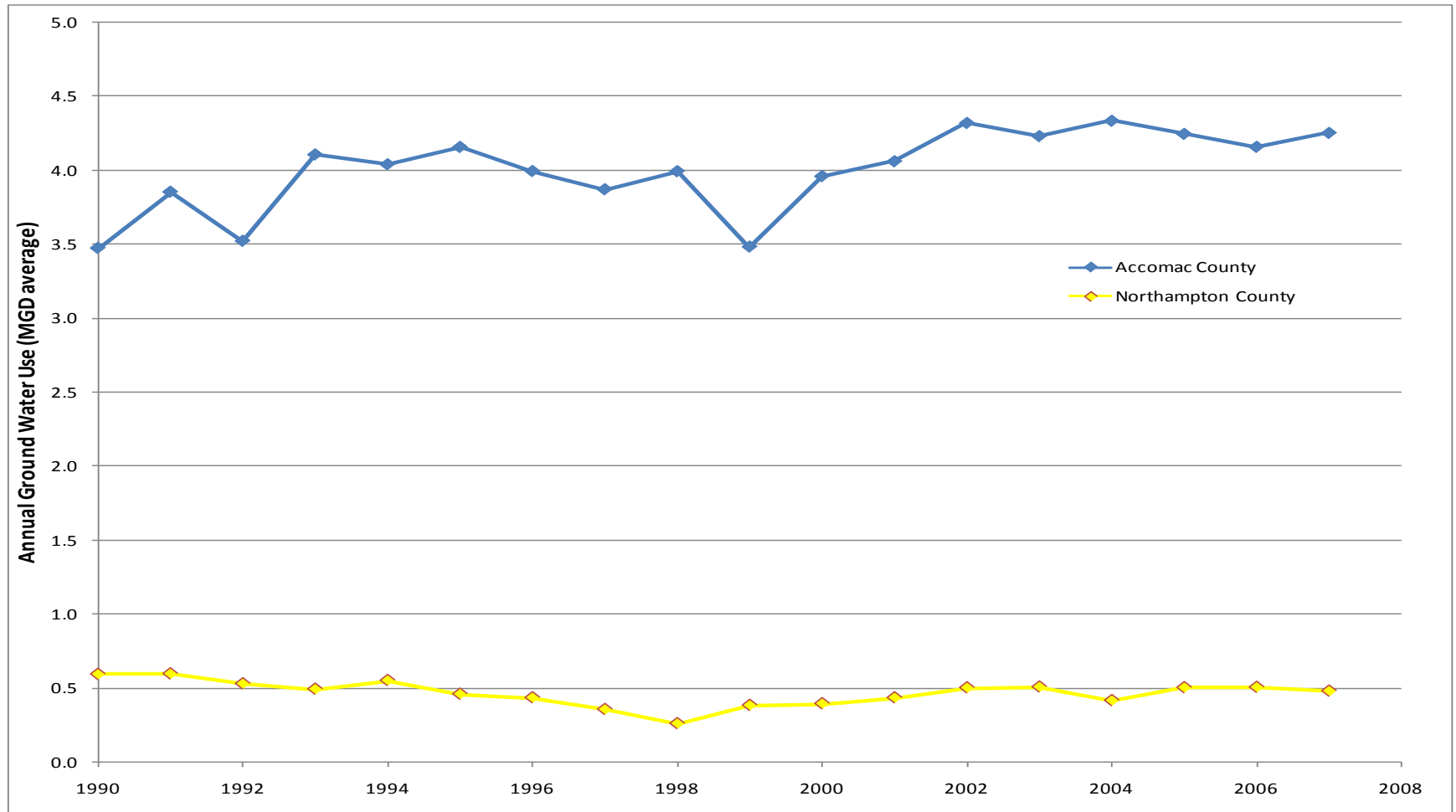




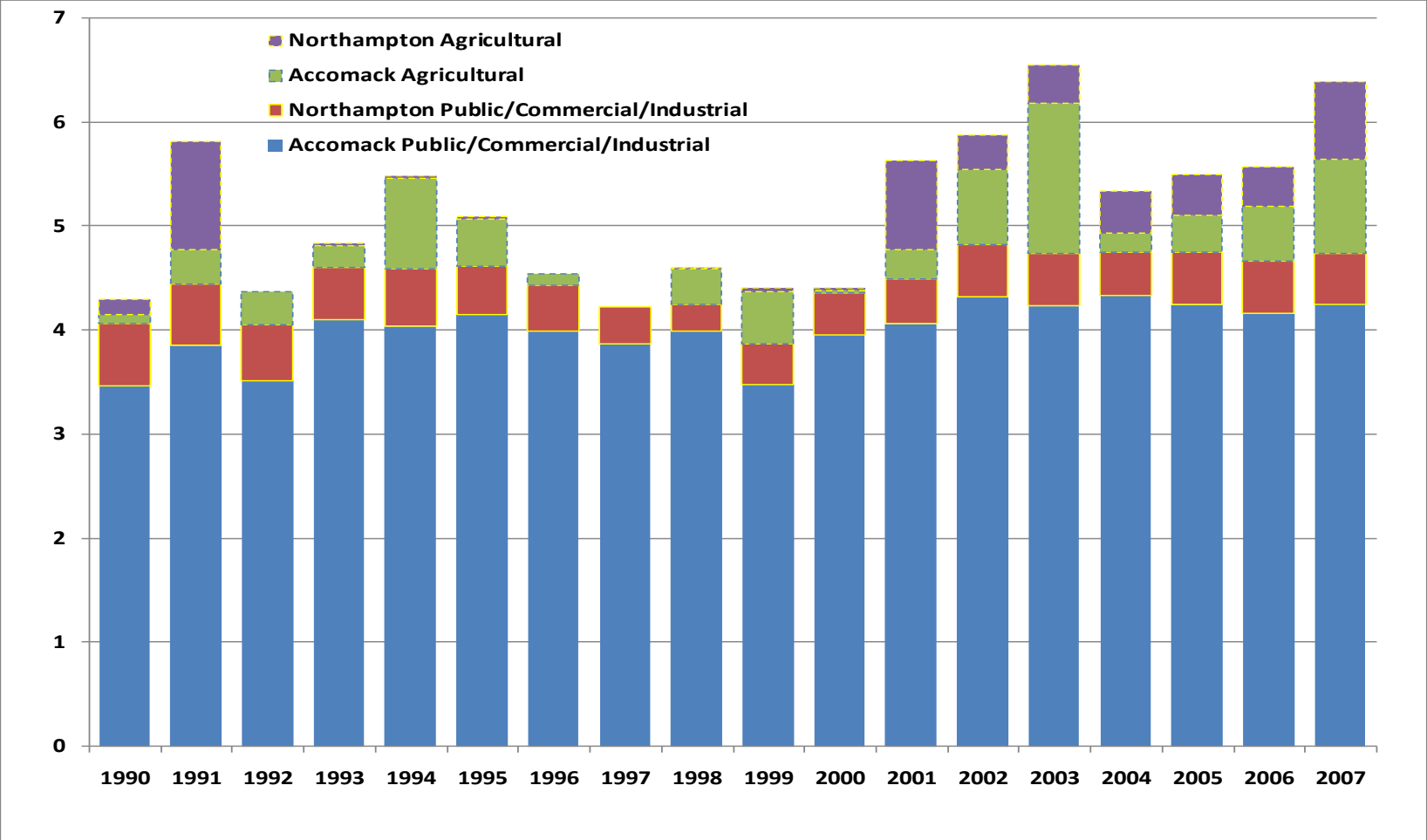
# Ground Water Use and Ground Water Level Measurements

- Ground Water Use for permitted wells (wells pumping greater than 300,000 gallons-per-month) are submitted to VDEQ
- Ground Water Levels are routinely measured in Observation Wells by the USGS

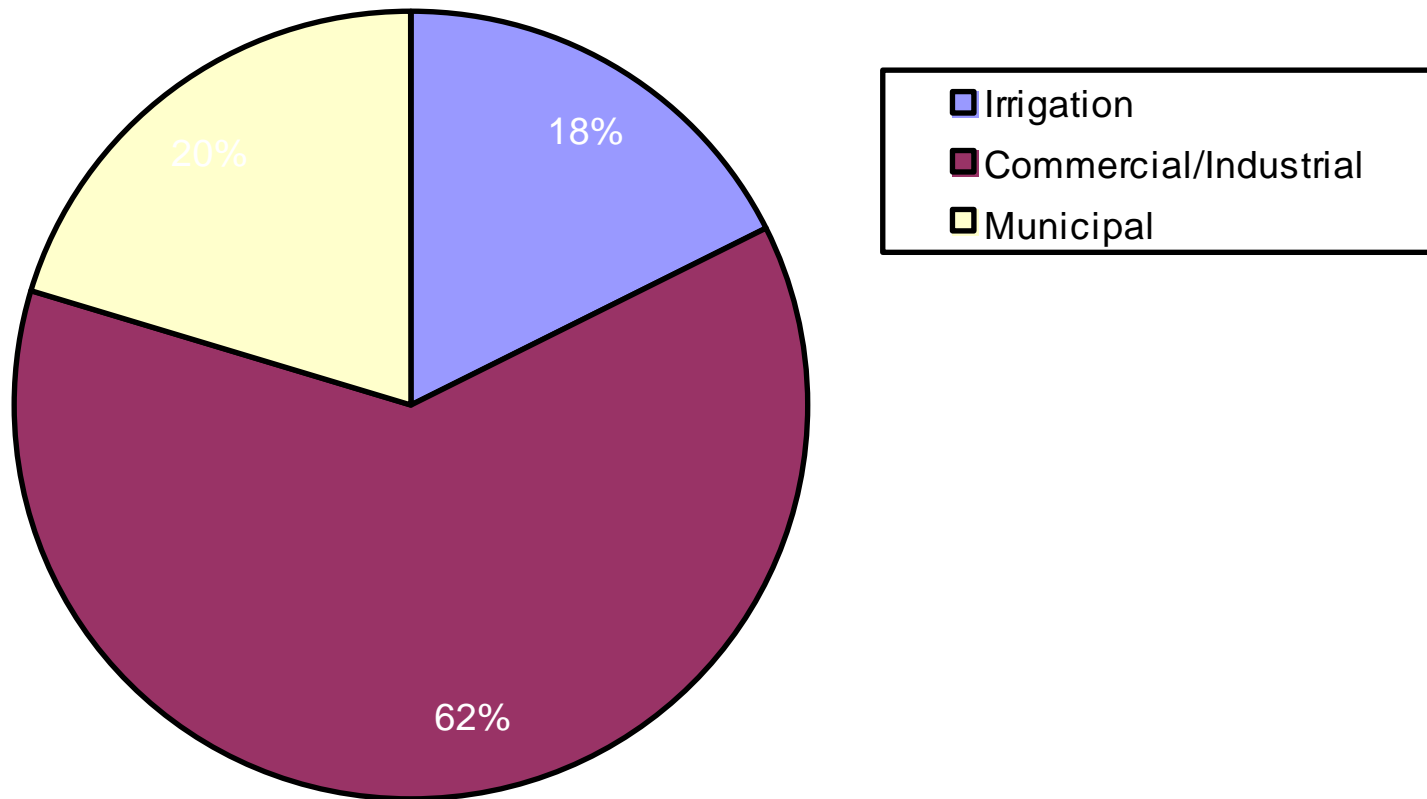
# Non-Agricultural Ground Water Use Trends



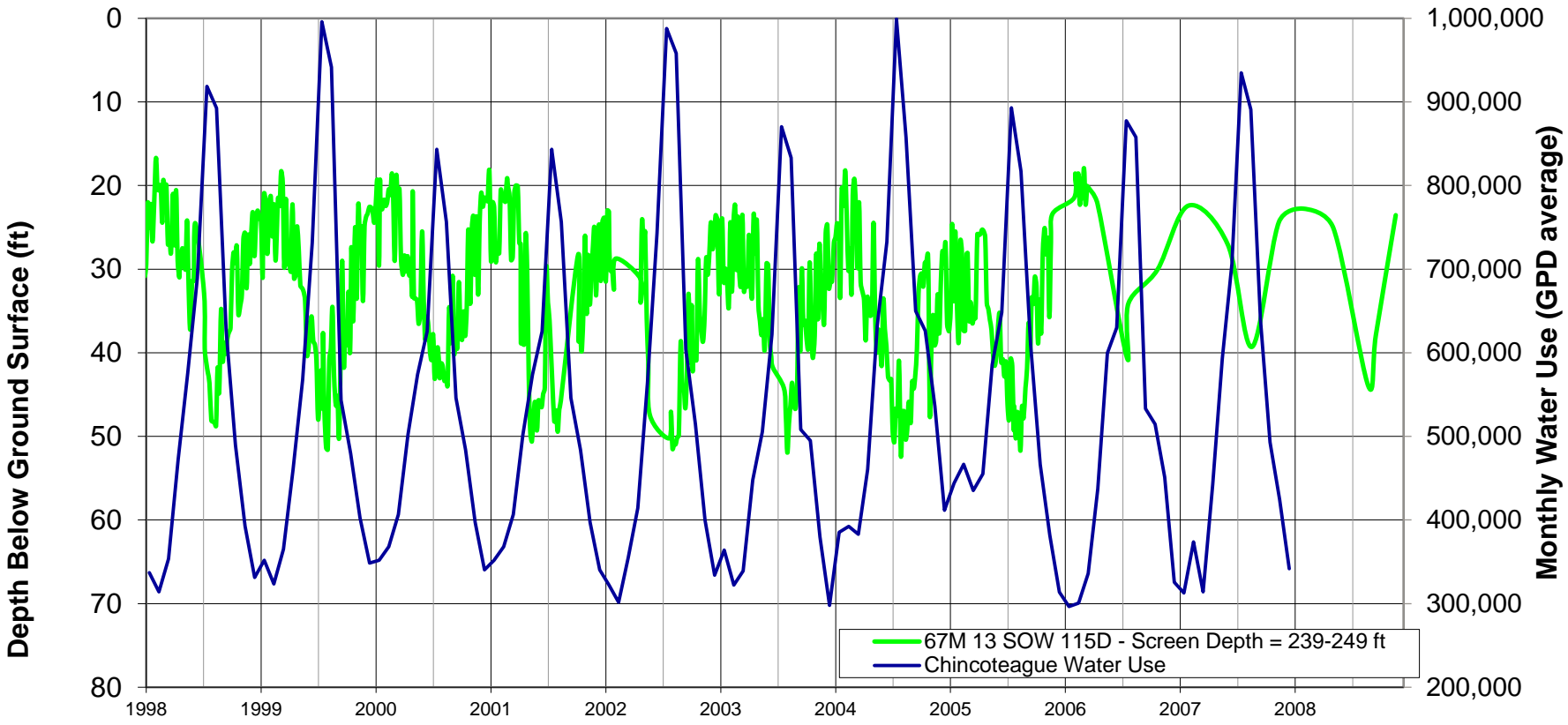
# All Permitted Ground Water Use



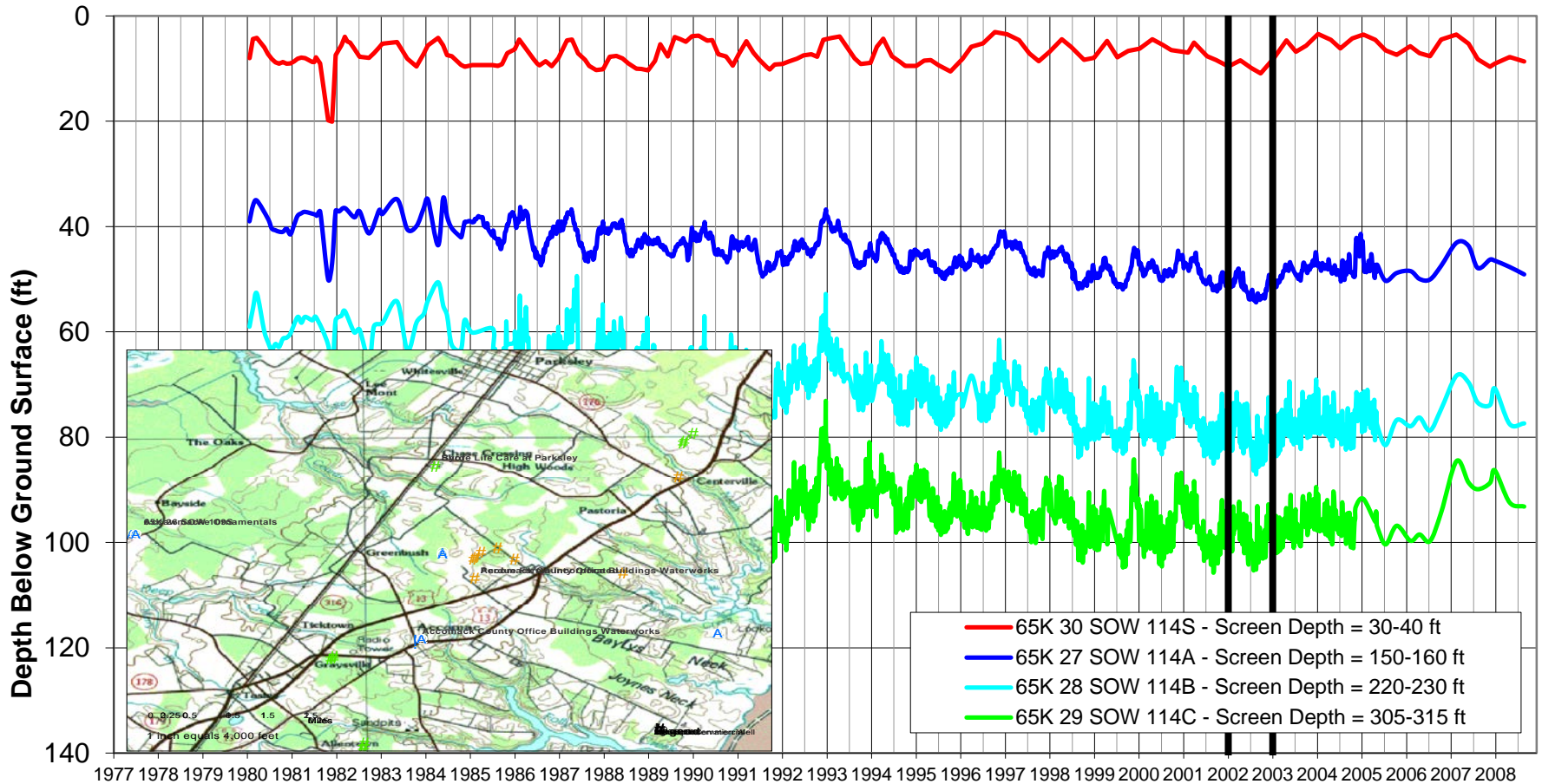
# Types of Groundwater Use



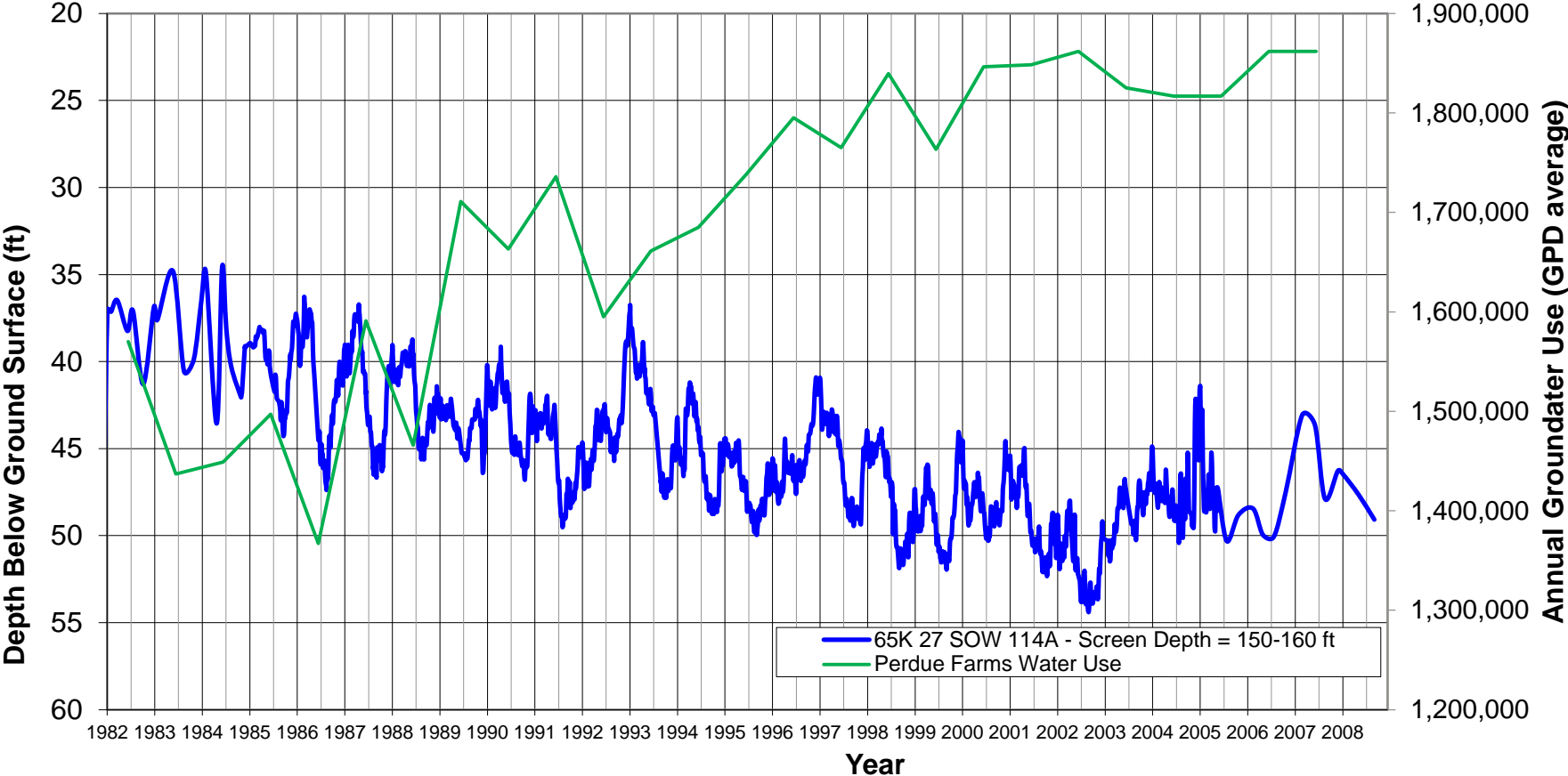
# Water Level Change and Monthly Use



# Ground Water Levels Near Perdue Farms



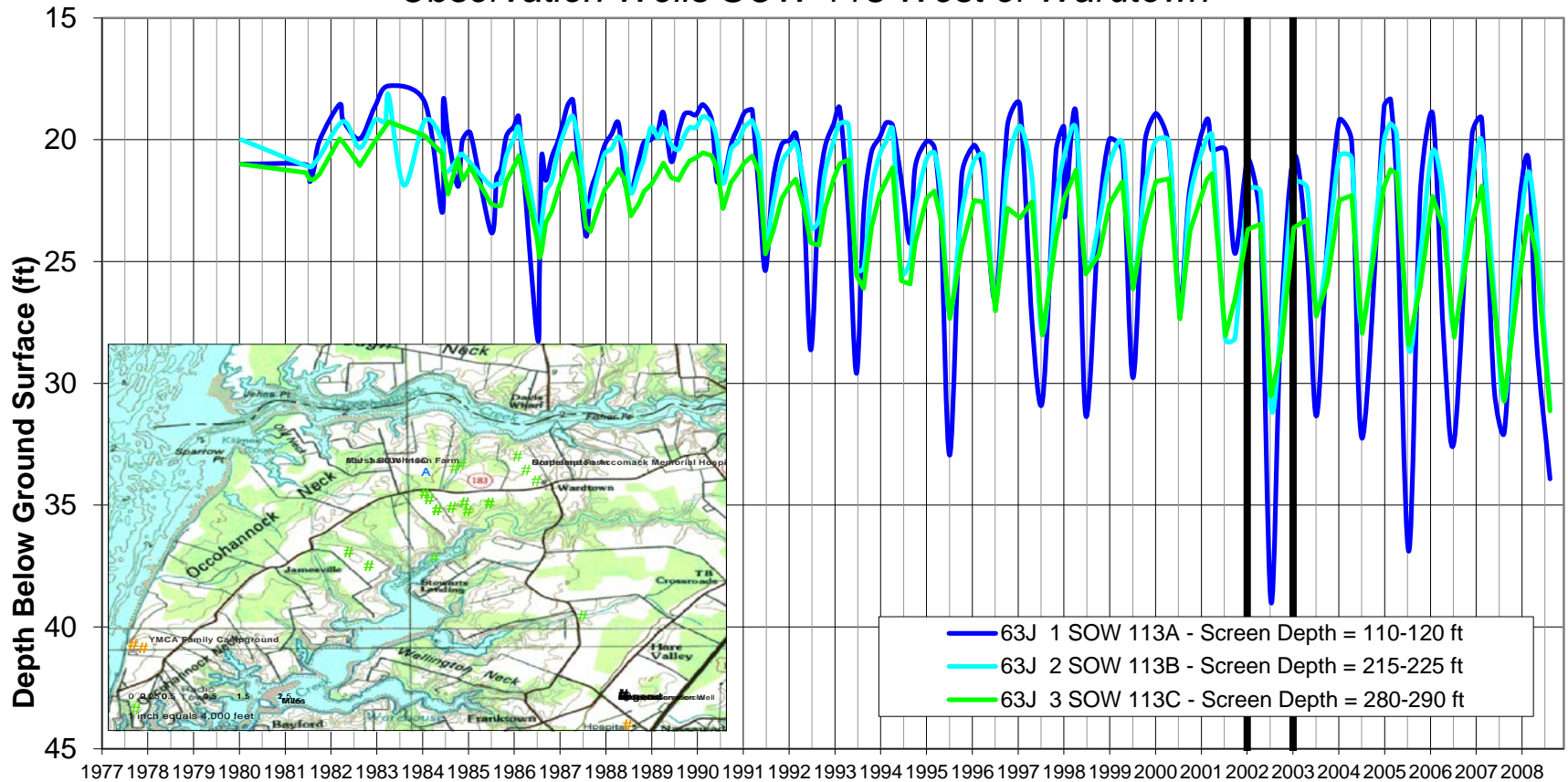
# Water Level Change and Annual Use Near Perdue Farms





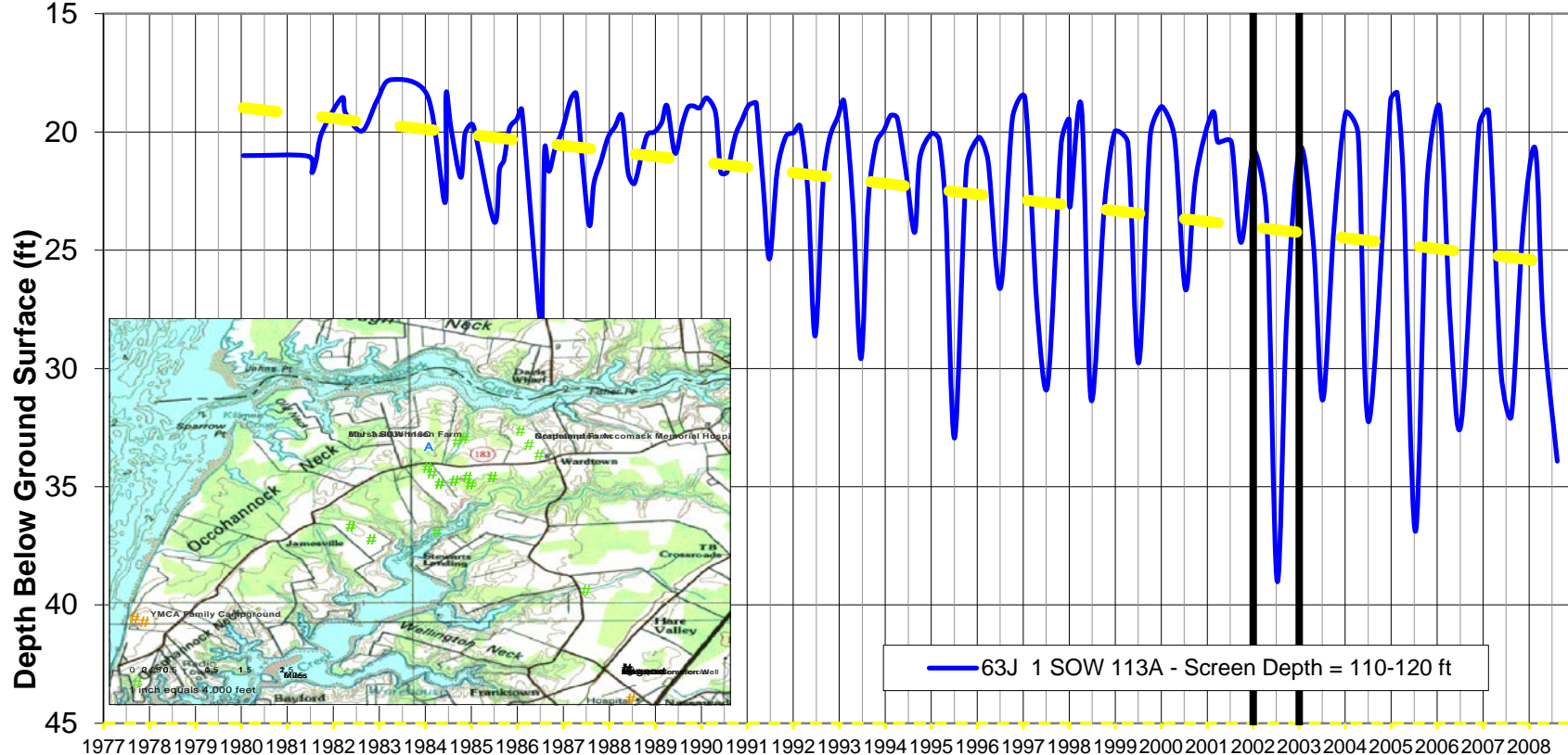
# Effect of Irrigation Use

Observation Wells SOW 113 West of Wardtown



# Long Term Decline from Irrigation Use

Observation Wells SOW 113 West of Wardtown





# Potential Threats To Water Table Water Quality

## Sources:

### Agriculture / Livestock

- Nutrients (Fertilizers)
- Pesticides / Herbicides
- On-site waste disposal

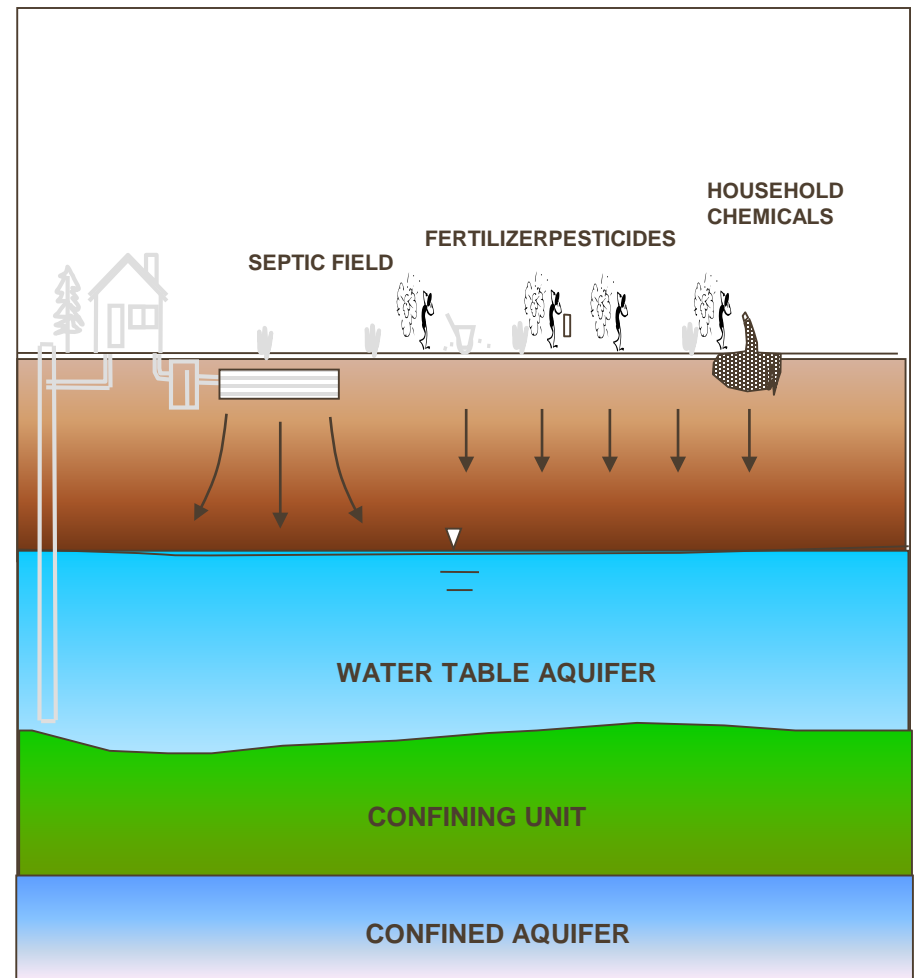
### Waste Units

- *Septic Systems / Drain Fields*
- Public Sewers
- Underground Storage Tanks (USTs)

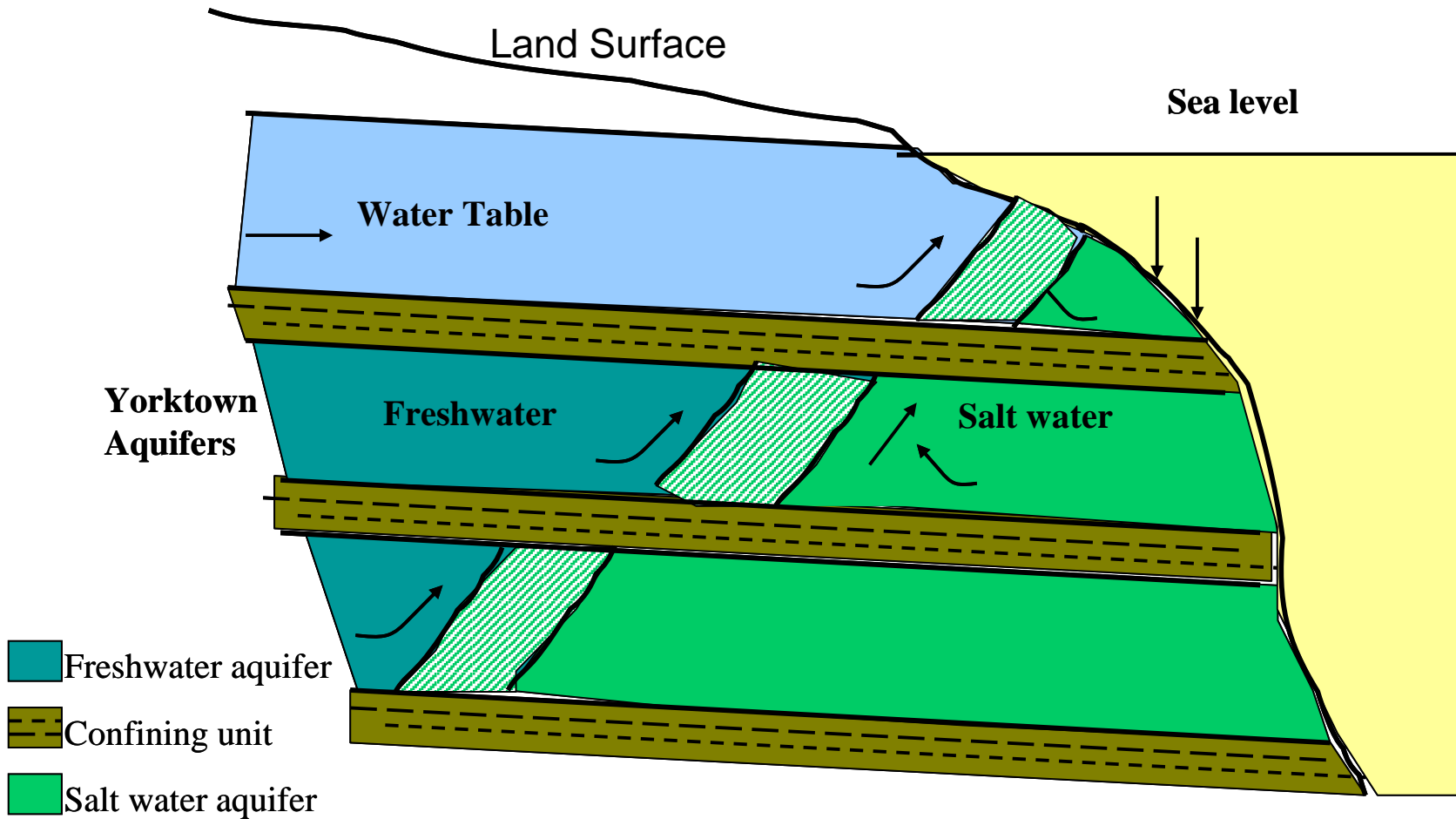
### Residential

- *Nutrients / Pesticides - Herbicides*
- *Petroleum and solvents*

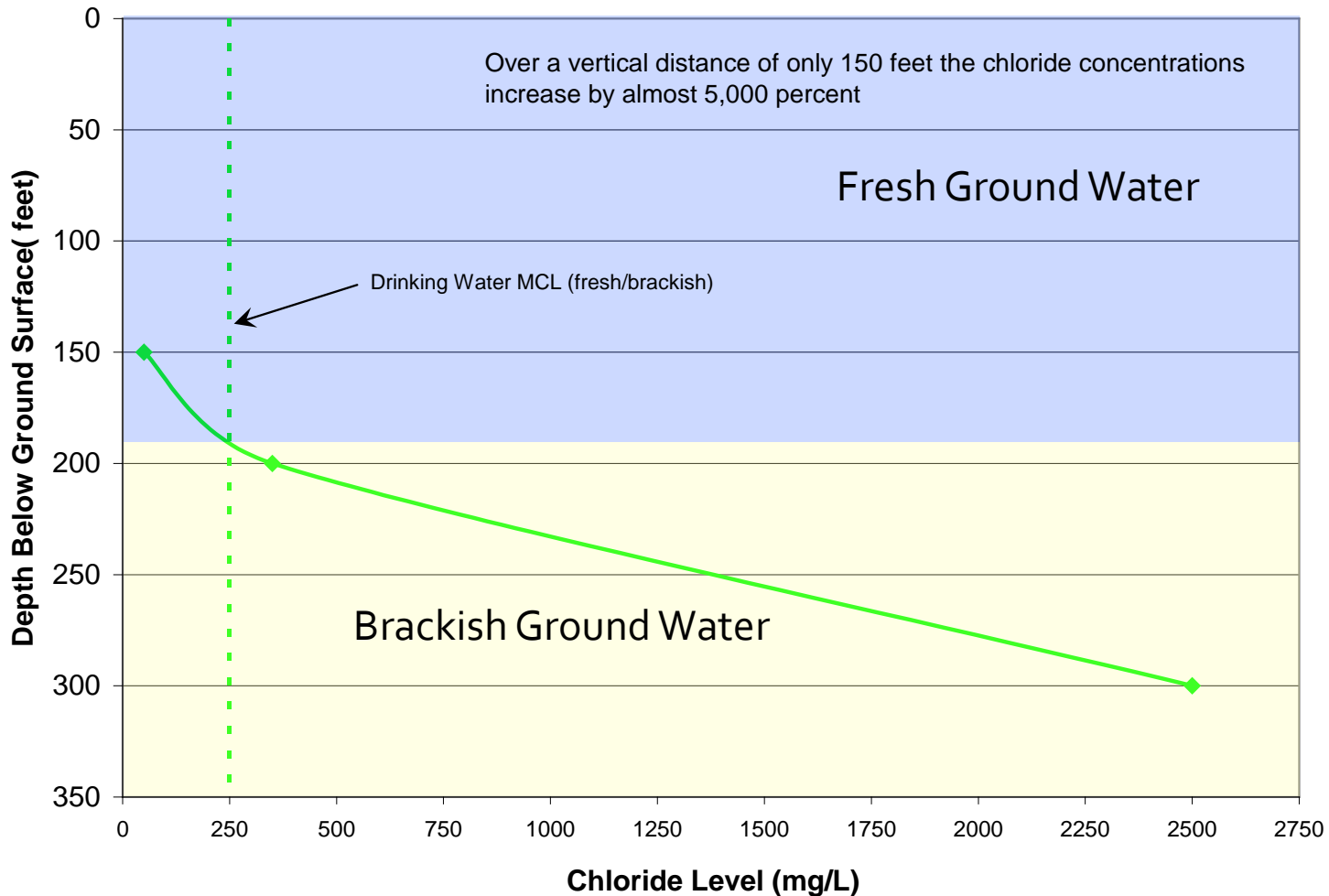
Function of amount  
(loading) and area of  
application



# Potential Threats to Yorktown-Eastover Aquifer Water Quality

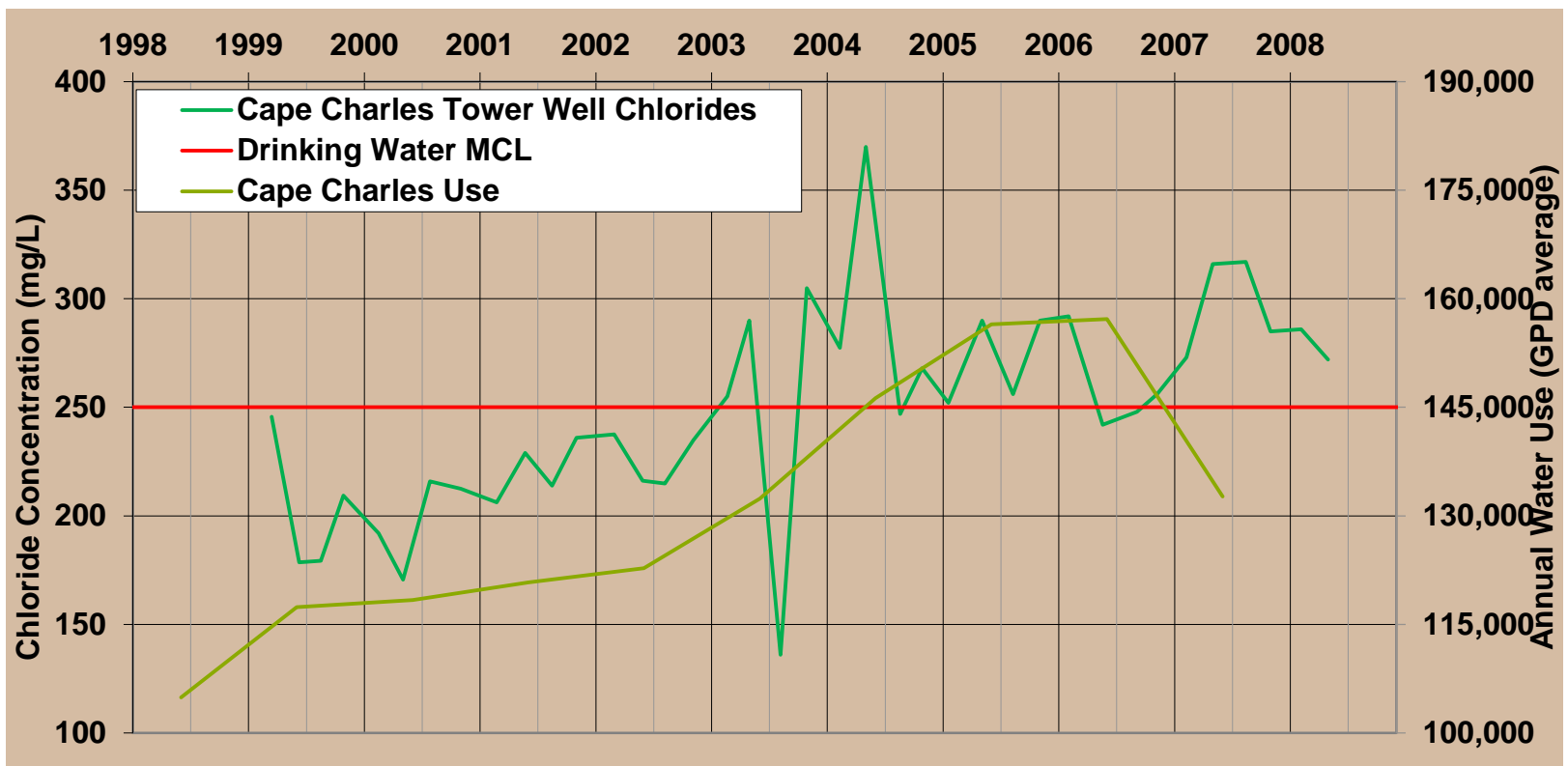


# Chloride Increase With Depth Upshur Neck Seaside Example



# Why the Eastern Shore of Virginia?

Most likely cause for a loss of fresh ground water is salt water intrusion due to over pumping





# Thank You!



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