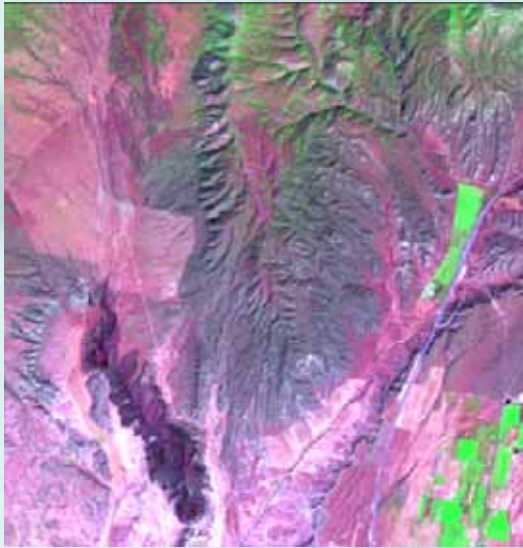
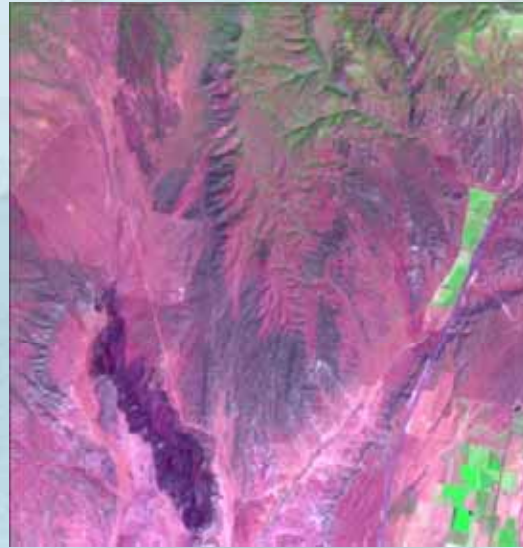




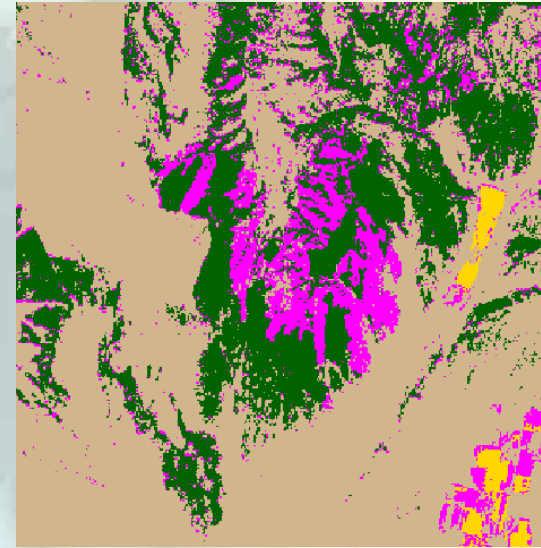
# ***Geographic Analysis and Monitoring Program***



1992



2001



Change

***Jonathan H. Smith***  
***Program Coordinator for***  
***Geographic Analysis and Monitoring***  
***(703) 648-5057***  
***jhsmith@usgs.gov***



# Geographic Analysis and Monitoring Program

## *Program Objective*

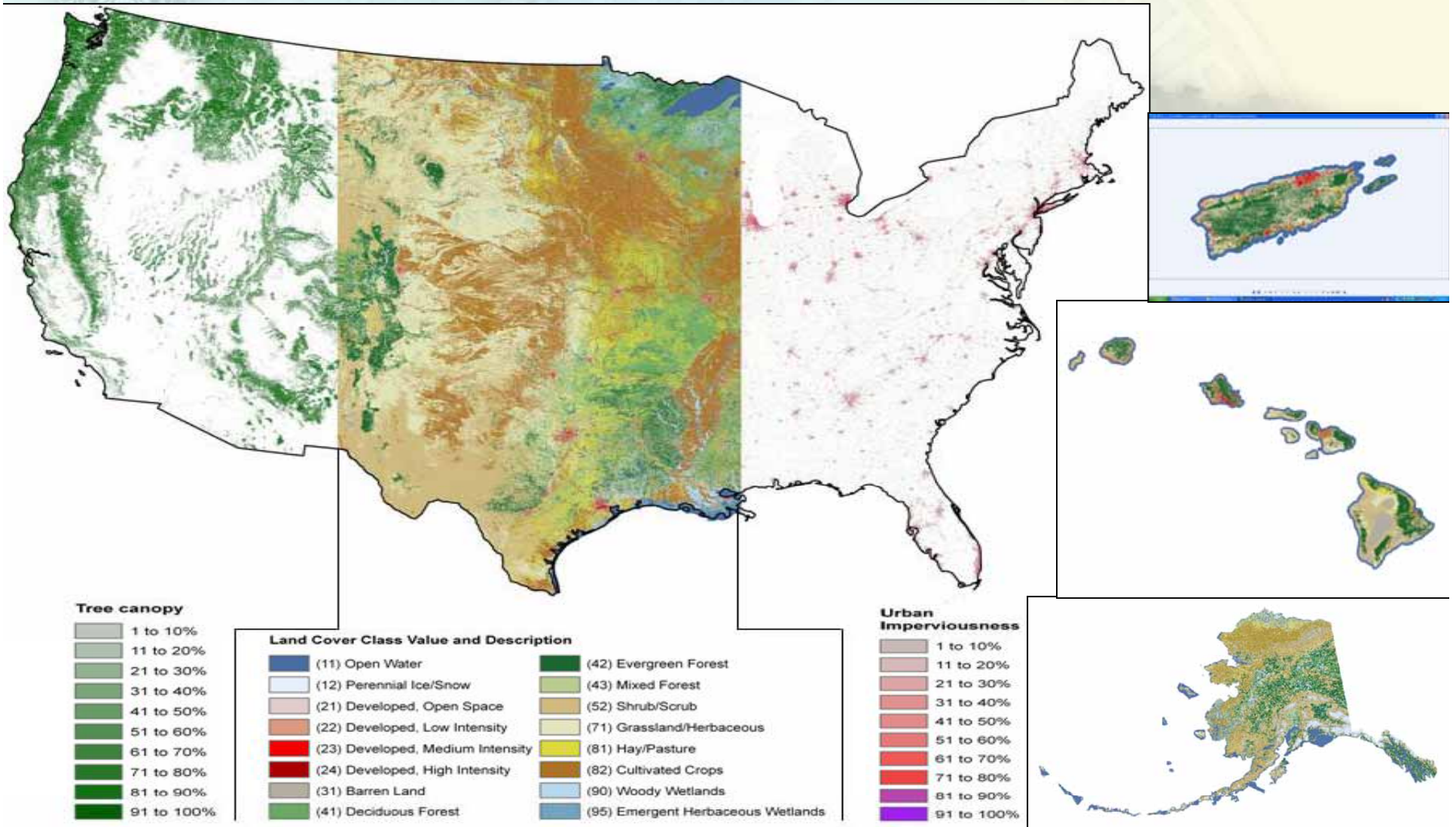
Conduct long-term studies of the land cover and disturbance histories of the United States and selected overseas areas in order to determine the reasons for and the impacts of land-surface change.

Seeks to answer four fundamental questions:

- What kinds of changes are occurring and why?
- What are the impacts of these changes on the environment and society?
- How do these impacts, in turn, further influence the land surface?
- How can GAM research findings best be used for making decisions on resource use and allocation, as well as in reducing risk and vulnerability to natural hazards?



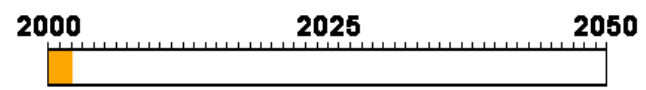
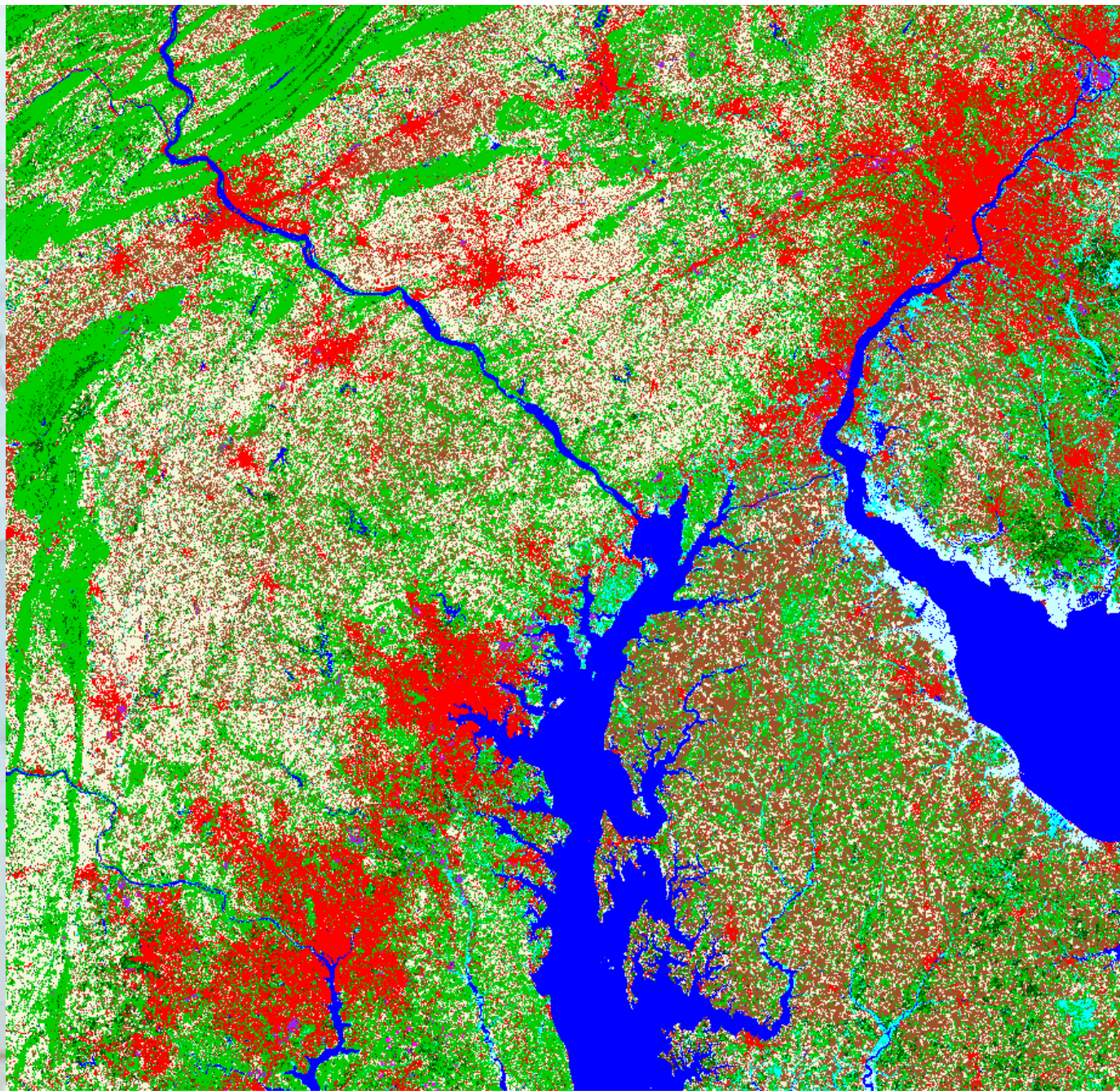
# National Land Cover Database (NLCD)





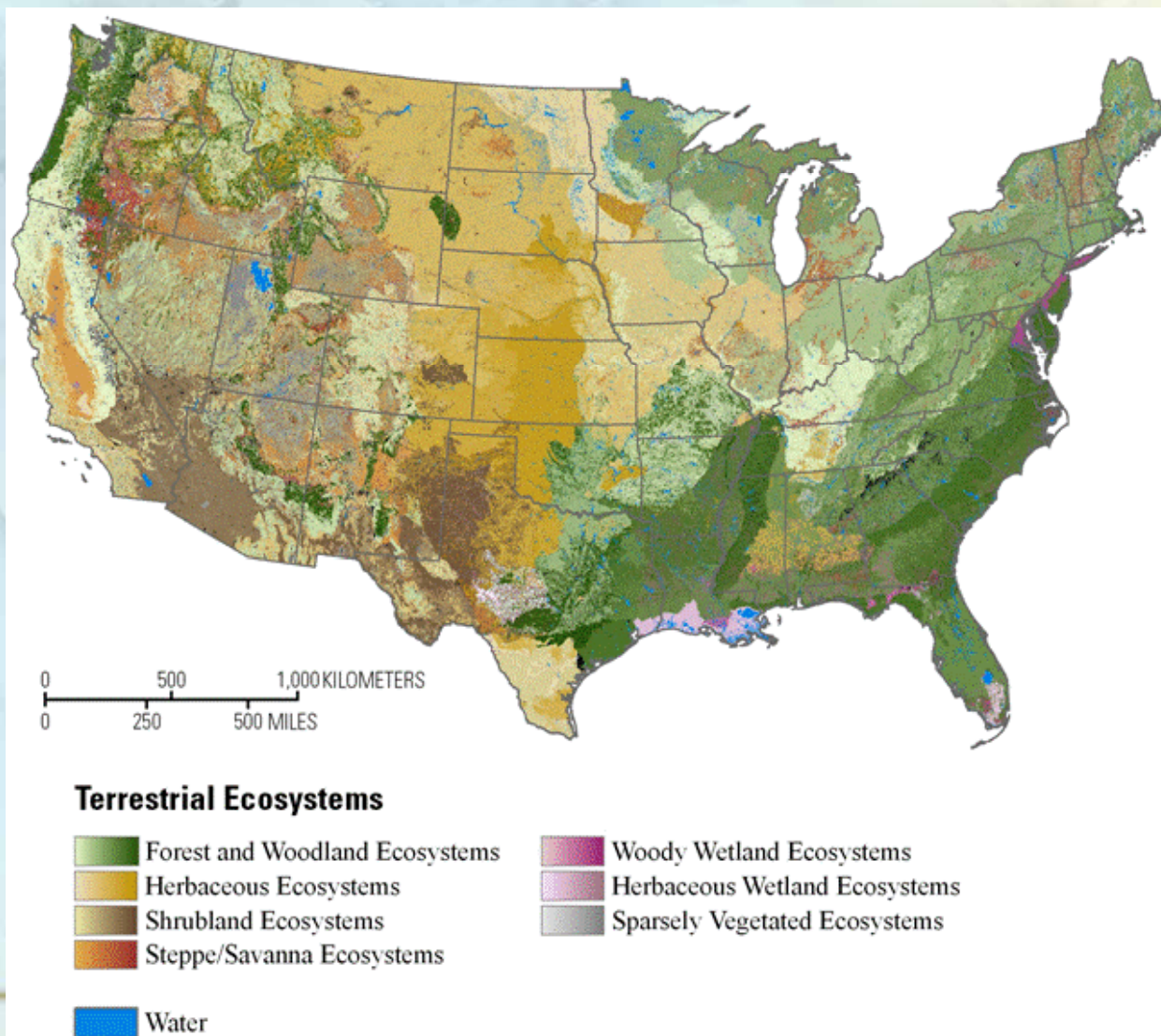
# 2001 to 2050 Projected LULC Change: Washington / Baltimore / Philadelphia

- Open Water
- Developed
- Disturbed (Cut)
- Mining/Quarry
- Deciduous Forest
- Mixed Forest
- Evergreen Forest
- Hay/Pasture
- Cultivated Crops
- Natural Grassland
- Woody Wetland
- Herbaceous Wetland



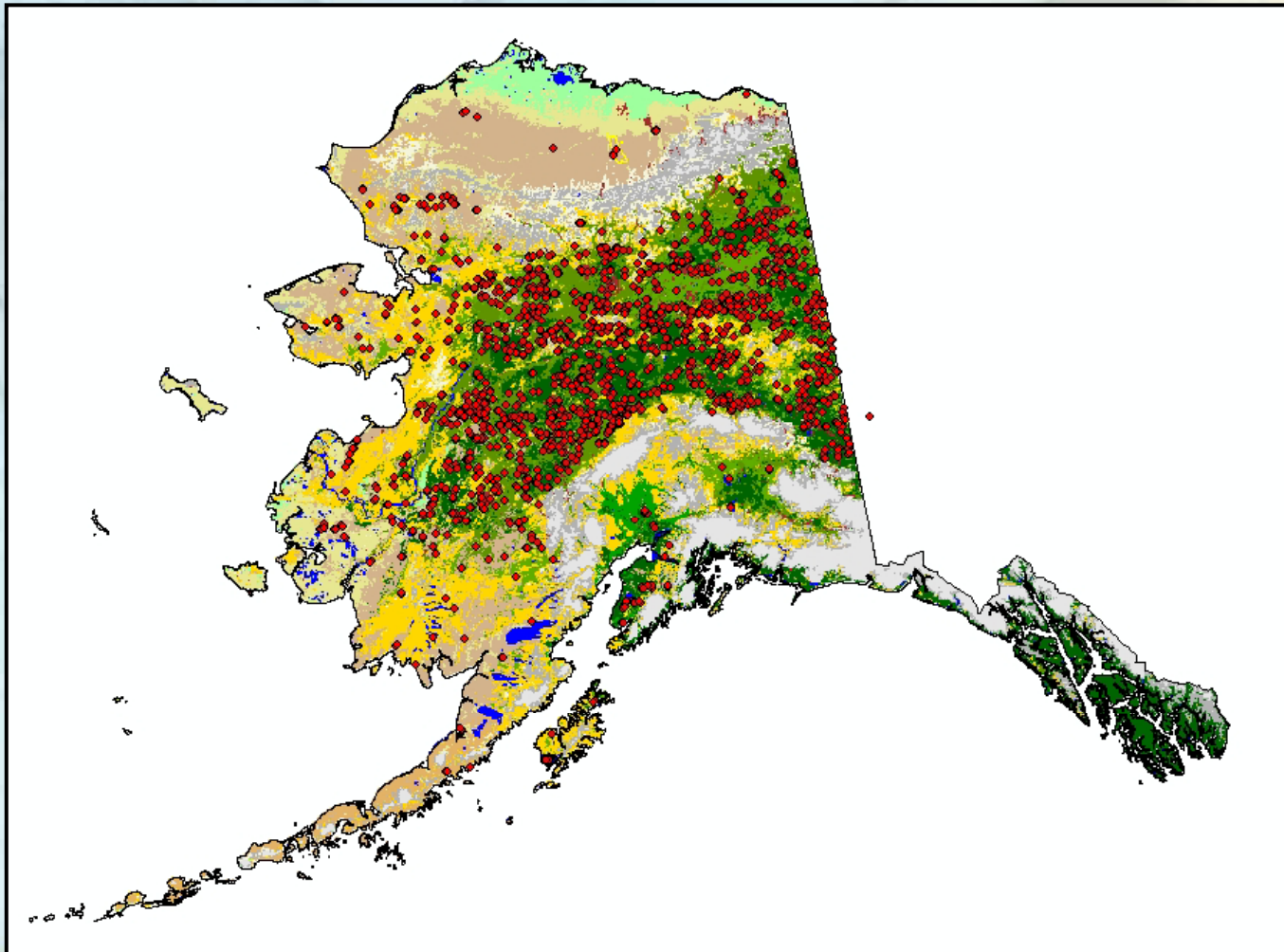


# Terrestrial Ecosystems



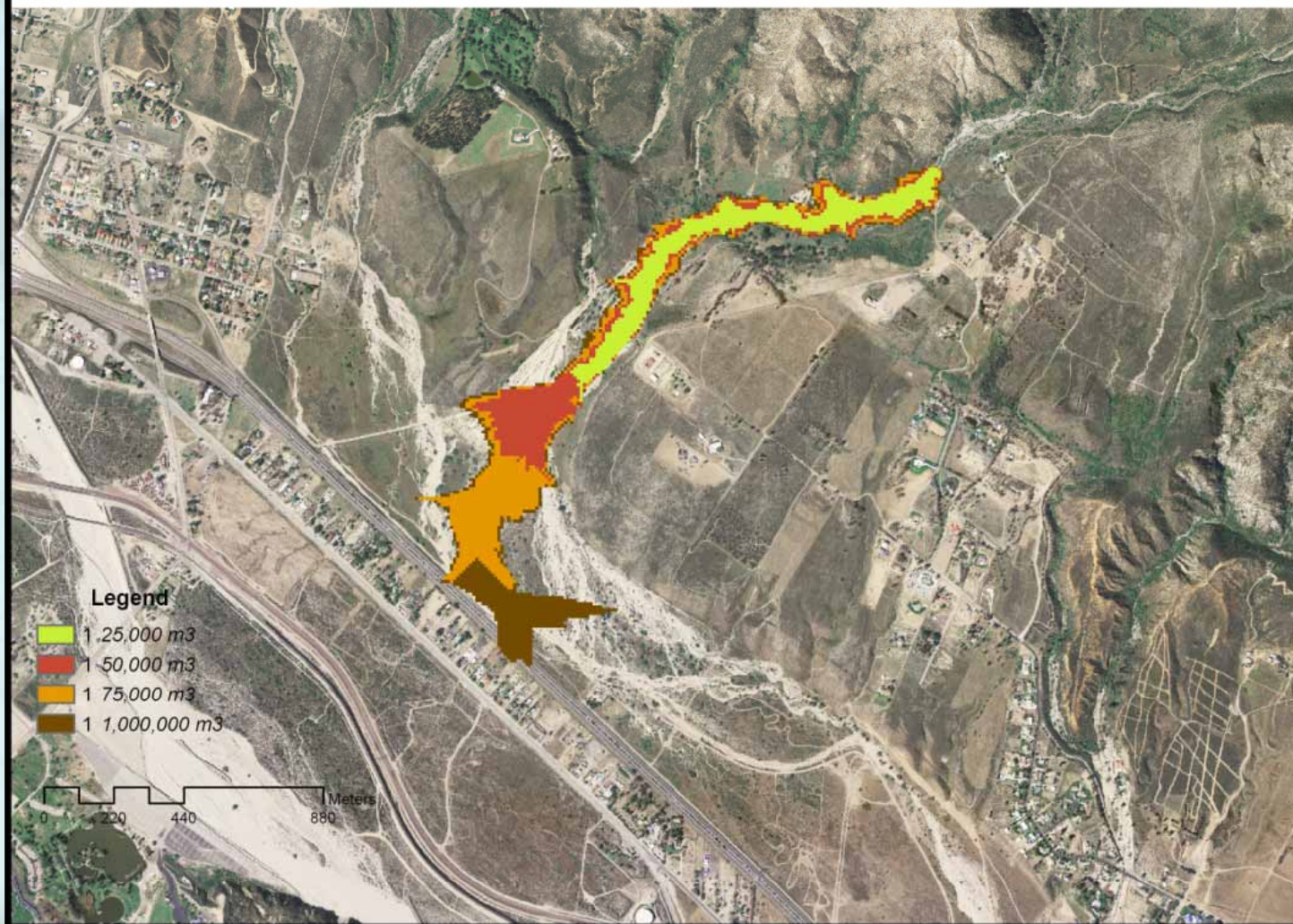


# Fire Science – Alaska Wildfires





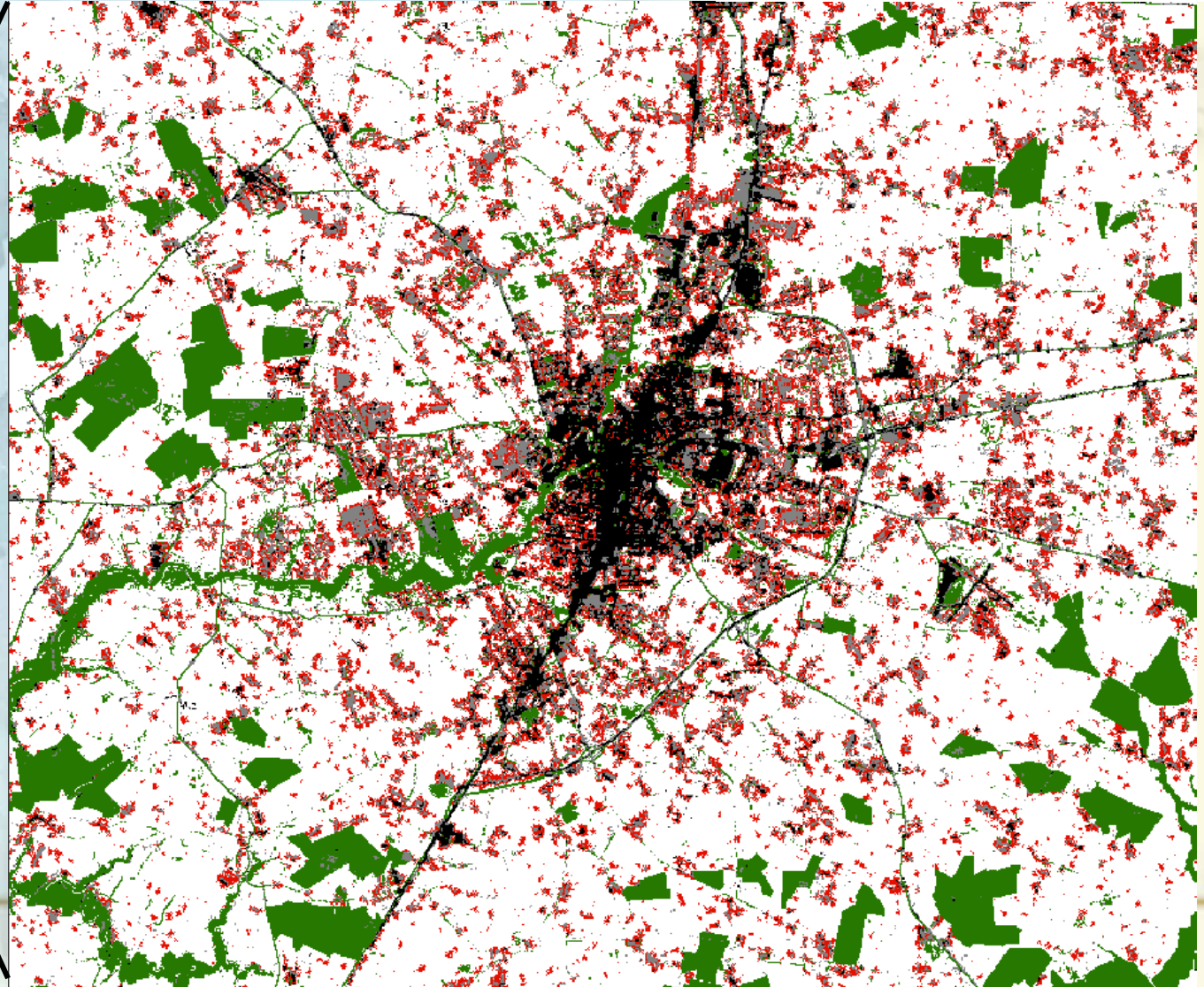
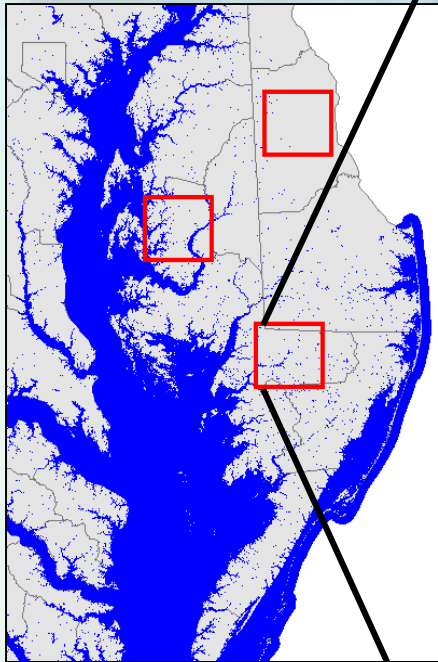
## Cable Canyon Estimated Debris-Flows



# Determining Proportions of Farmland and Forest Loss Salisbury, MD



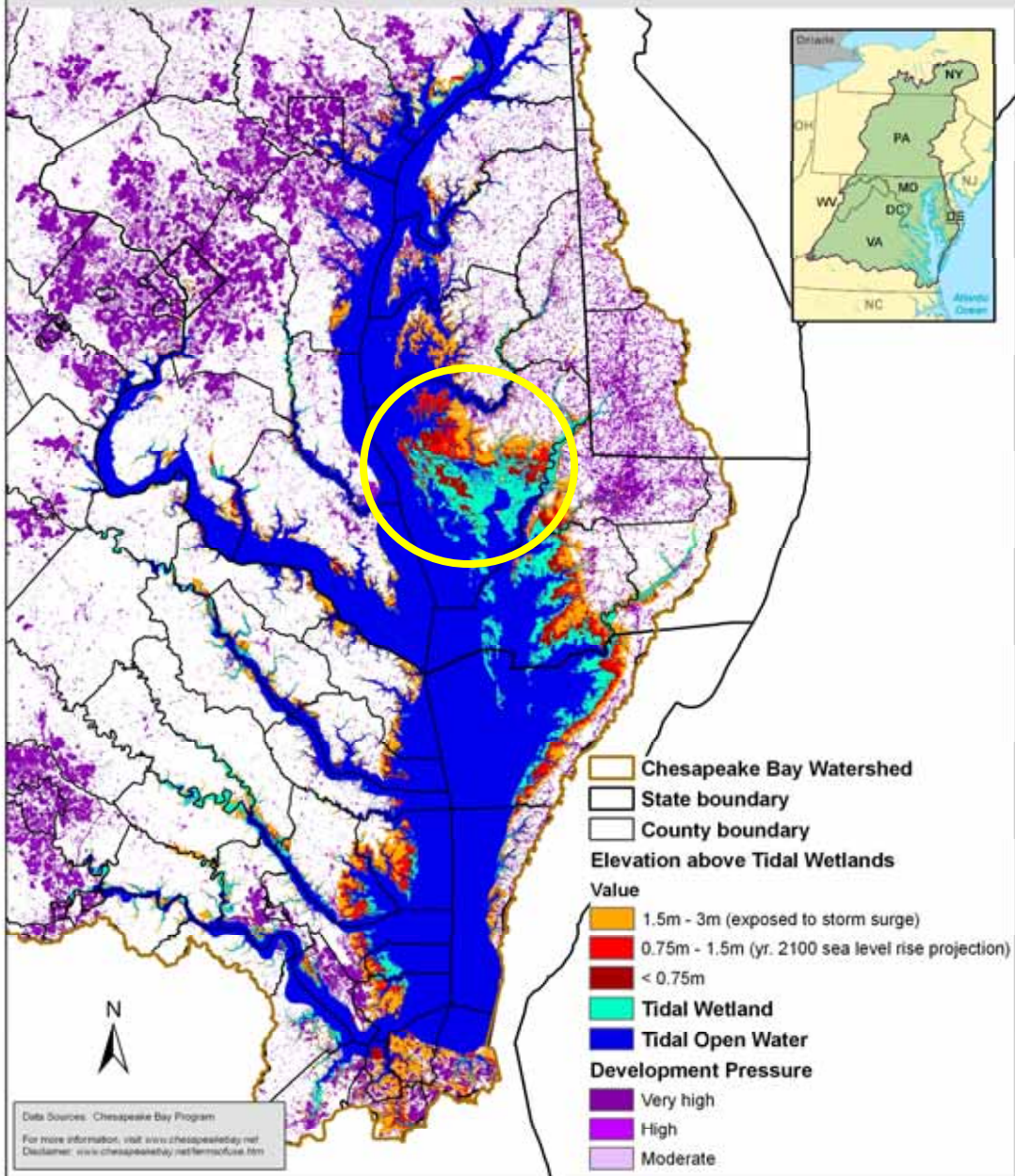
2030 Urban growth







# Future Development Pressure, Sea Level Rise, and Storm Surge in the Chesapeake Bay Watershed



Data Sources: Chesapeake Bay Program  
For more information, visit [www.chesapeakebay.net](http://www.chesapeakebay.net)  
Disclaimer: [www.chesapeakebay.net/learn/faq.cfm](http://www.chesapeakebay.net/learn/faq.cfm)

Created by PRC, 8/13/09

UTM Zone 18N, HAD 83

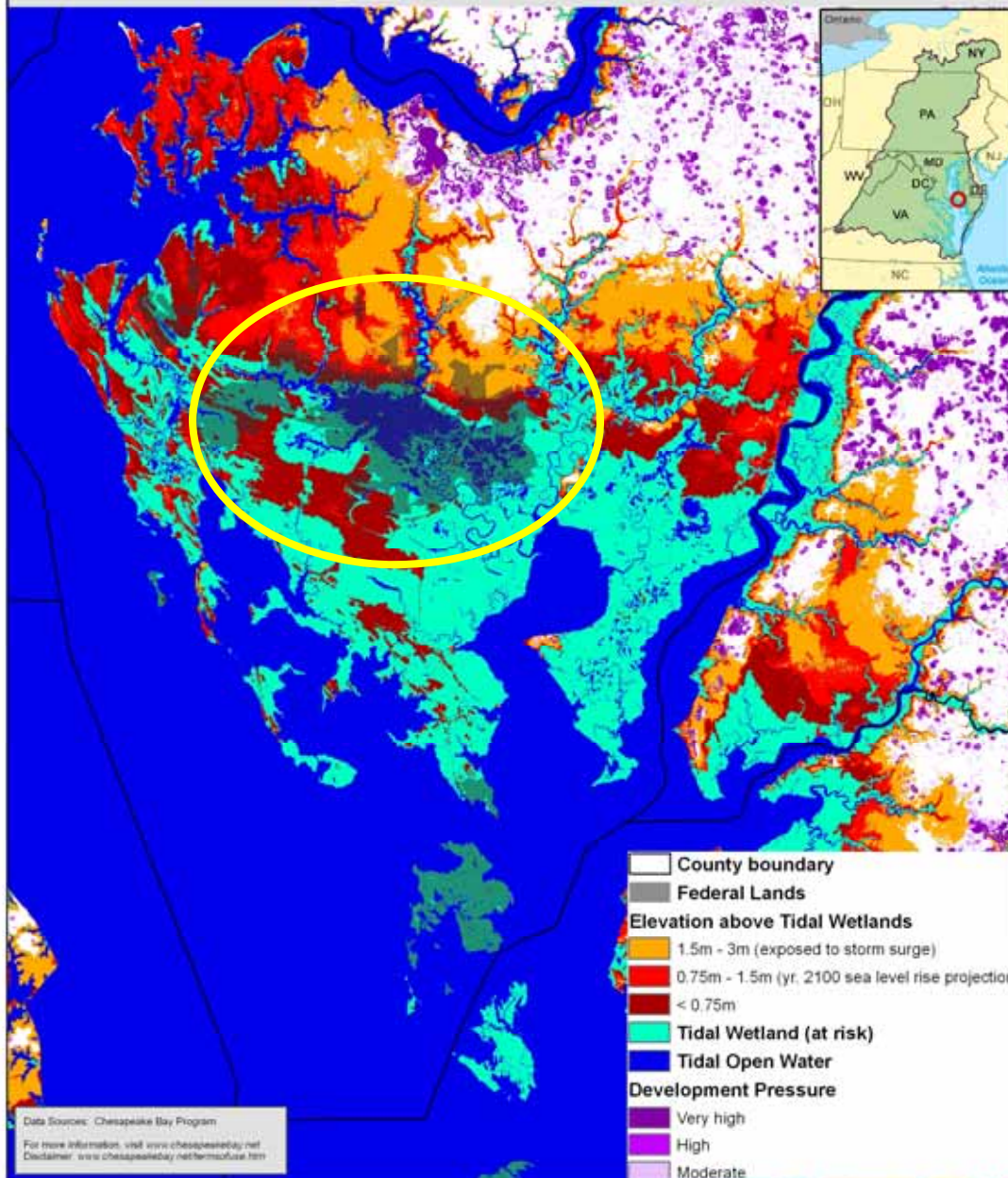




# Future Development Pressure and Sea Level Rise around Blackwater Wildlife Refuge



Chesapeake Bay Program  
A Watershed Partnership



Data Source: Chesapeake Bay Program  
For more information, visit [www.chesapeakebay.net](http://www.chesapeakebay.net)  
Disclaimer: [www.chesapeakebay.net/terms\\_of\\_use.htm](http://www.chesapeakebay.net/terms_of_use.htm)

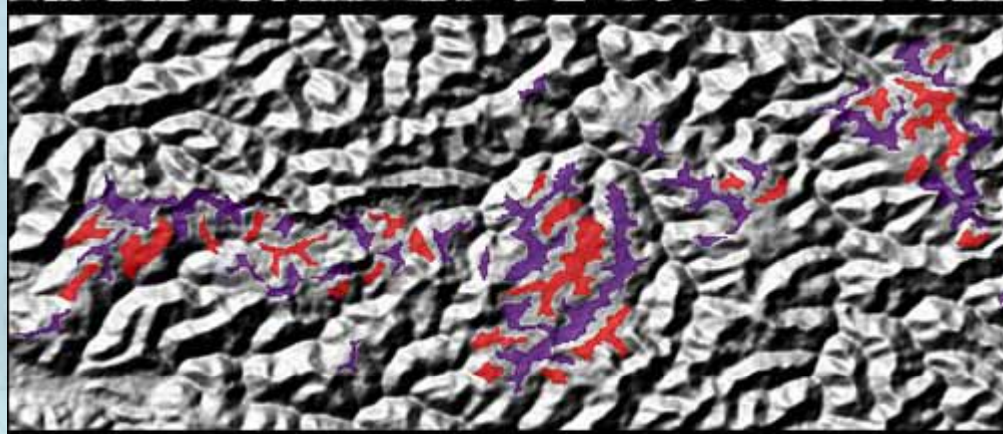
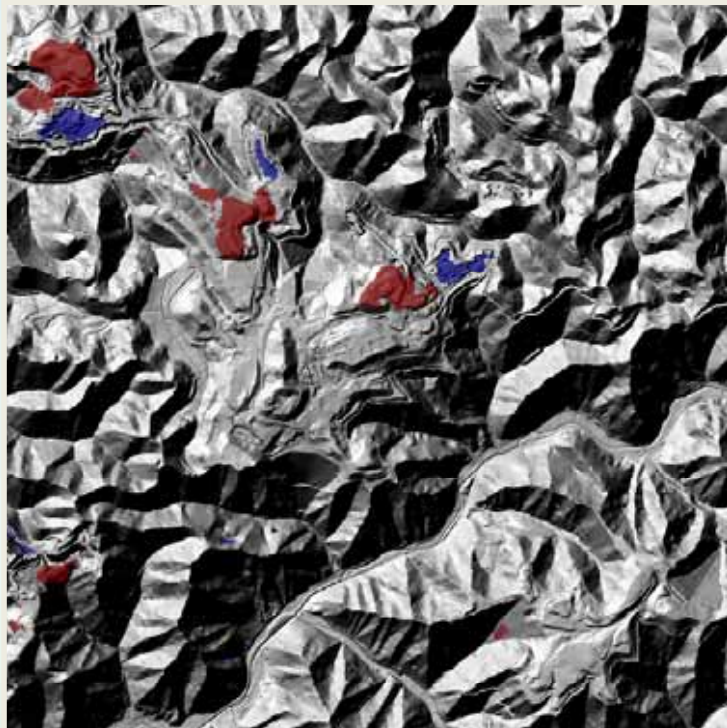
Created by PRC, 8/12/09

UTM Zone 18N, NAD 83

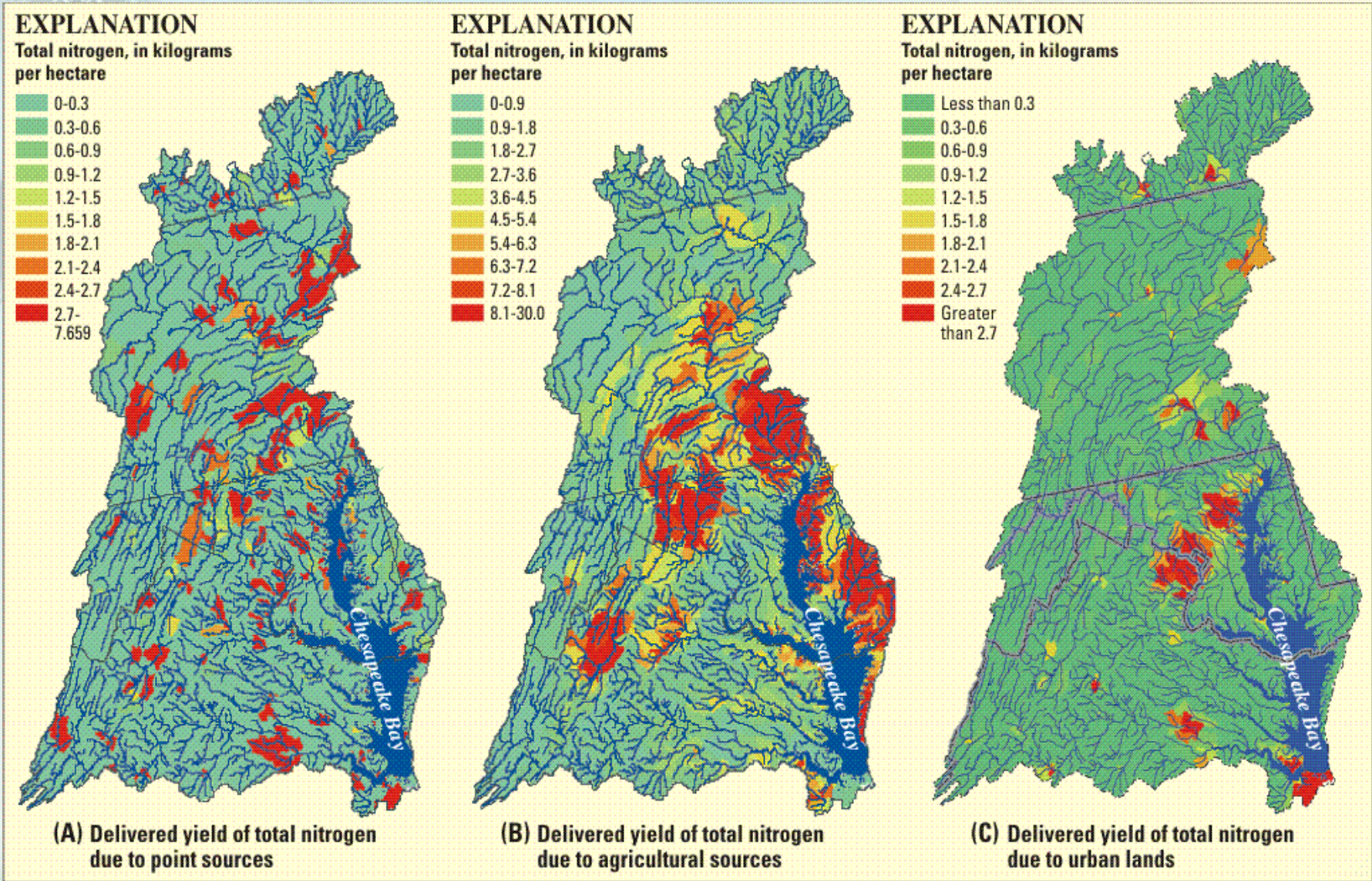




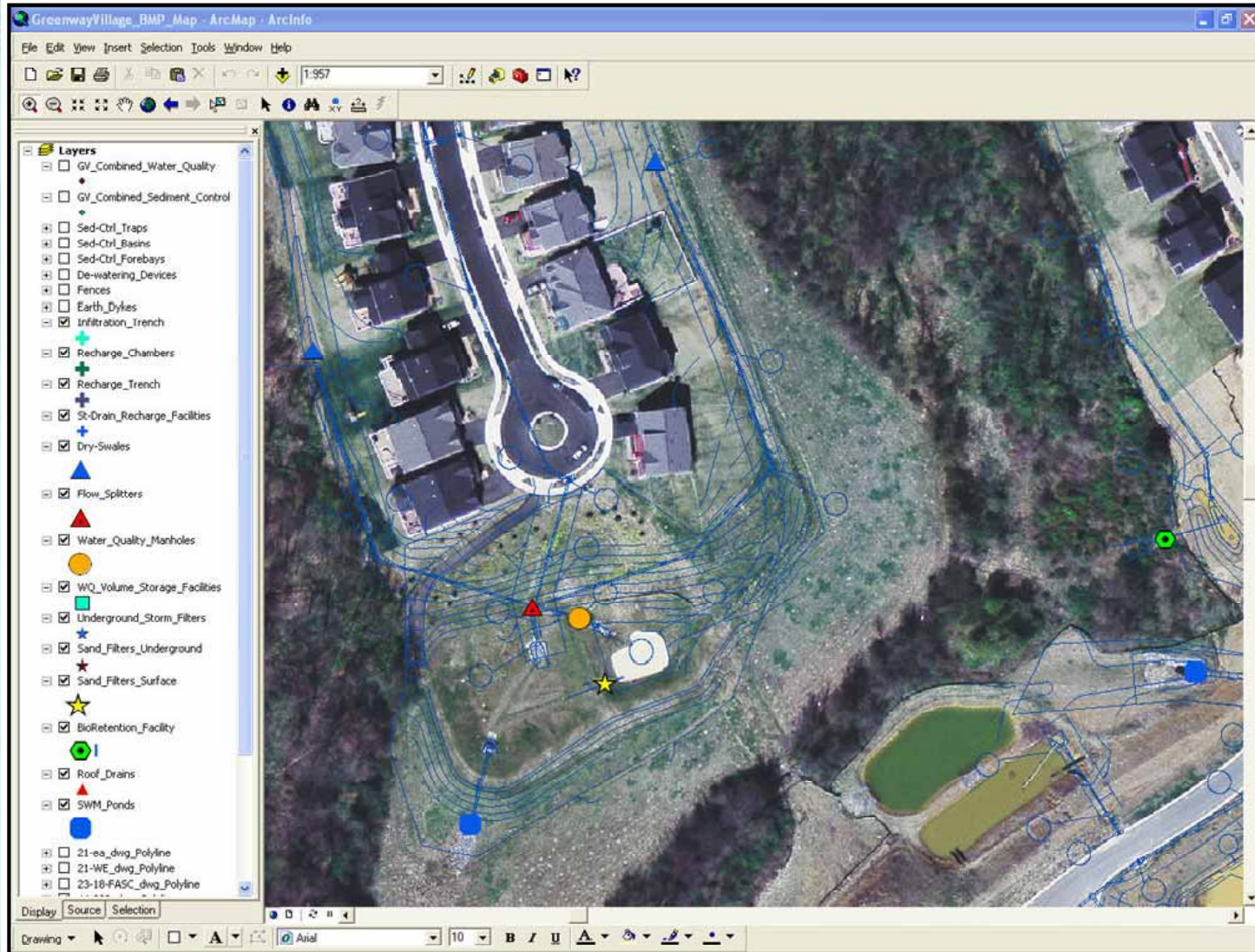
# West Virginia Mountaintop Removal Mining



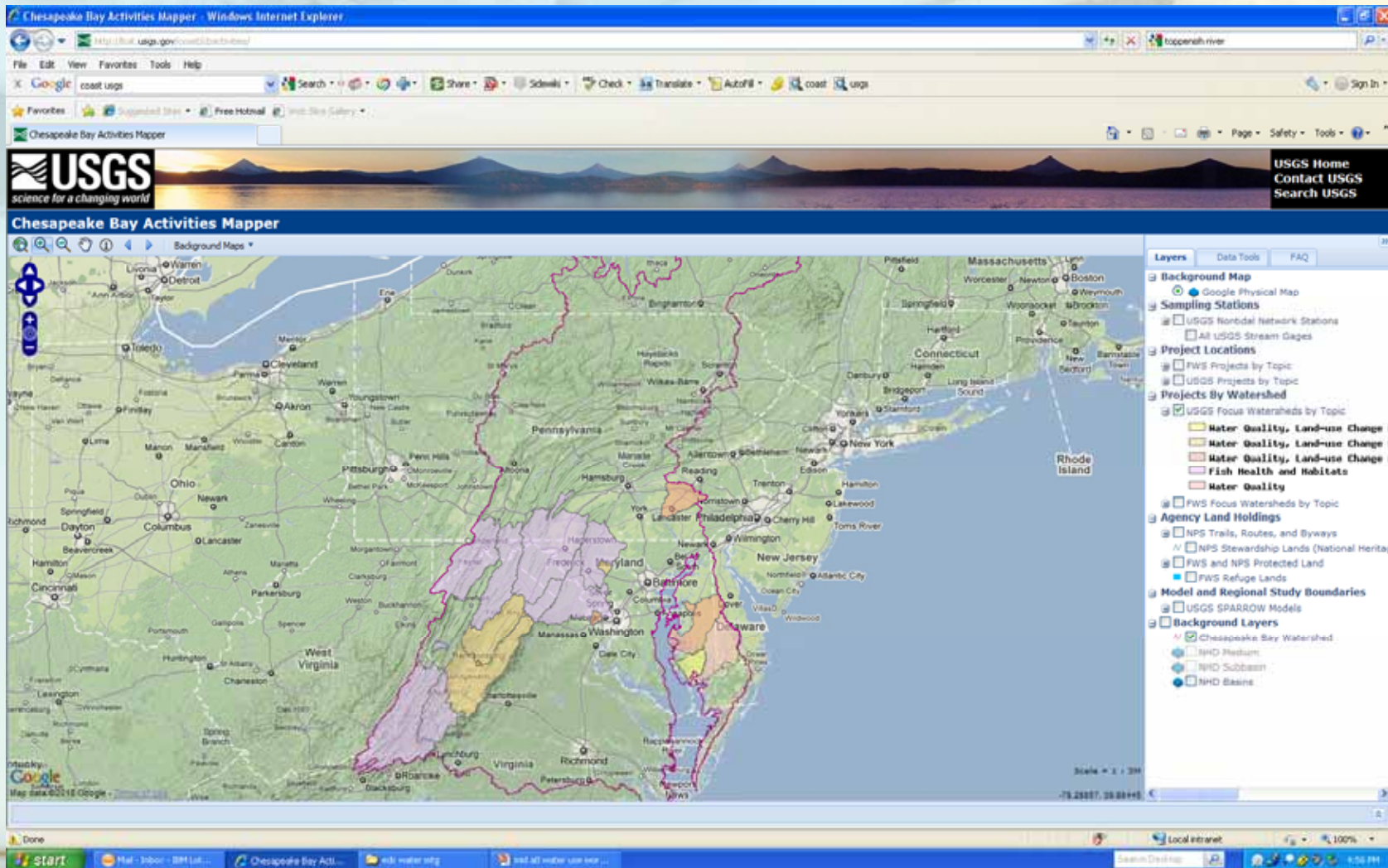
# Identifying Areas for Water Pollution Mitigation



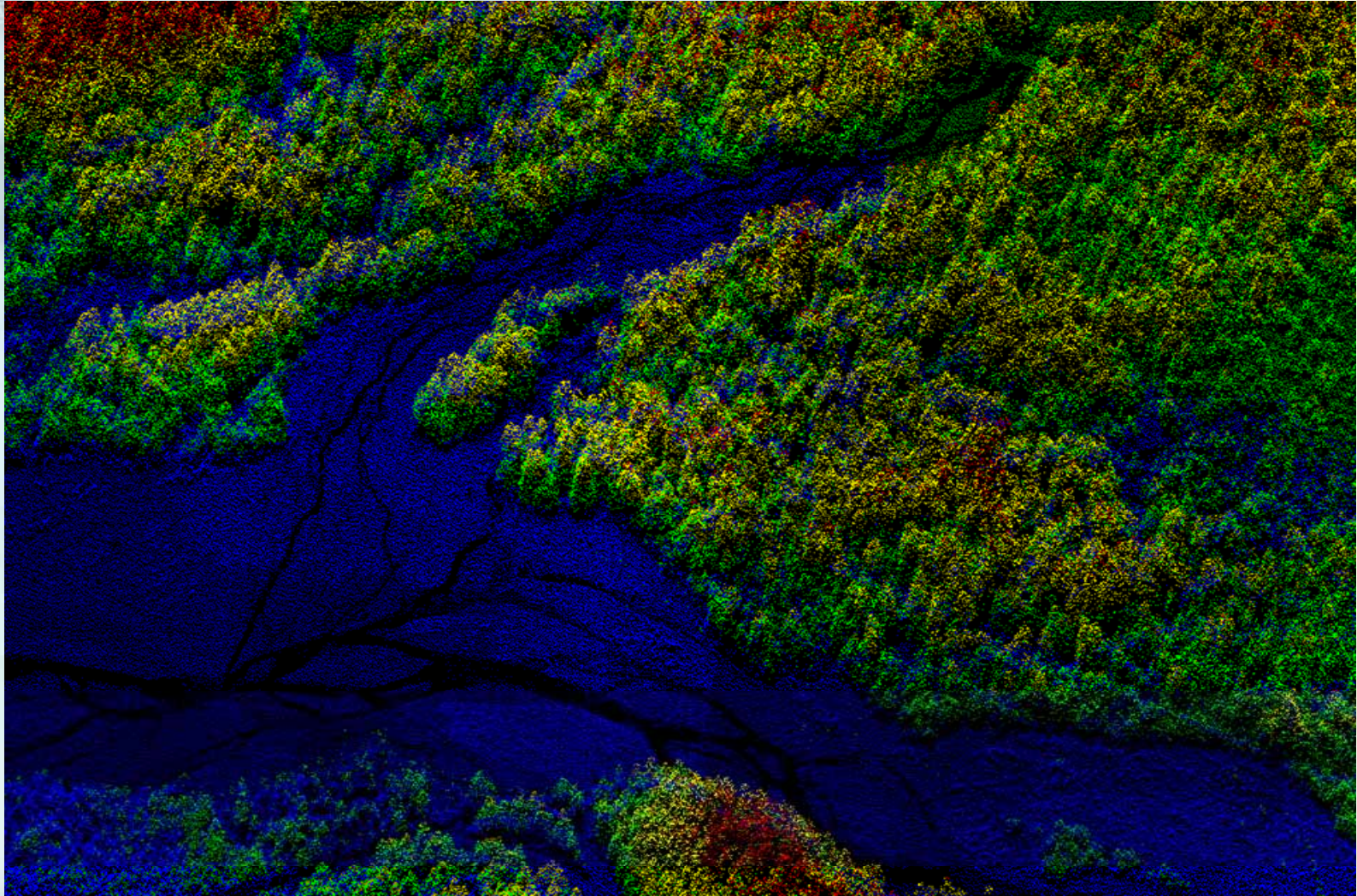
# Water Quality Best Management Practices



# Chesapeake Online Adaptive Support Toolkit - COAST

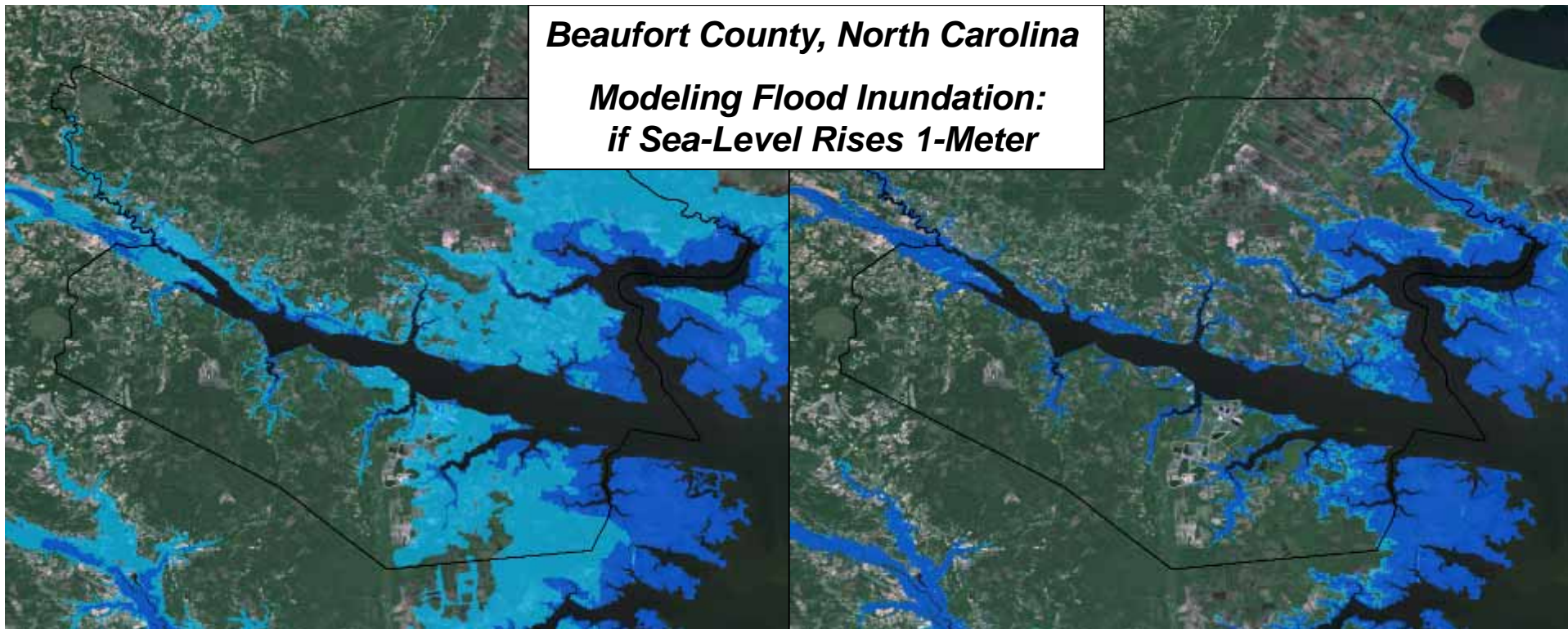


# LiDAR – Light Detecting and Ranging



**Beaufort County, North Carolina**

**Modeling Flood Inundation:  
if Sea-Level Rises 1-Meter**



**Calculated using 30-m DEM**

**Calculated using 3-m lidar data**

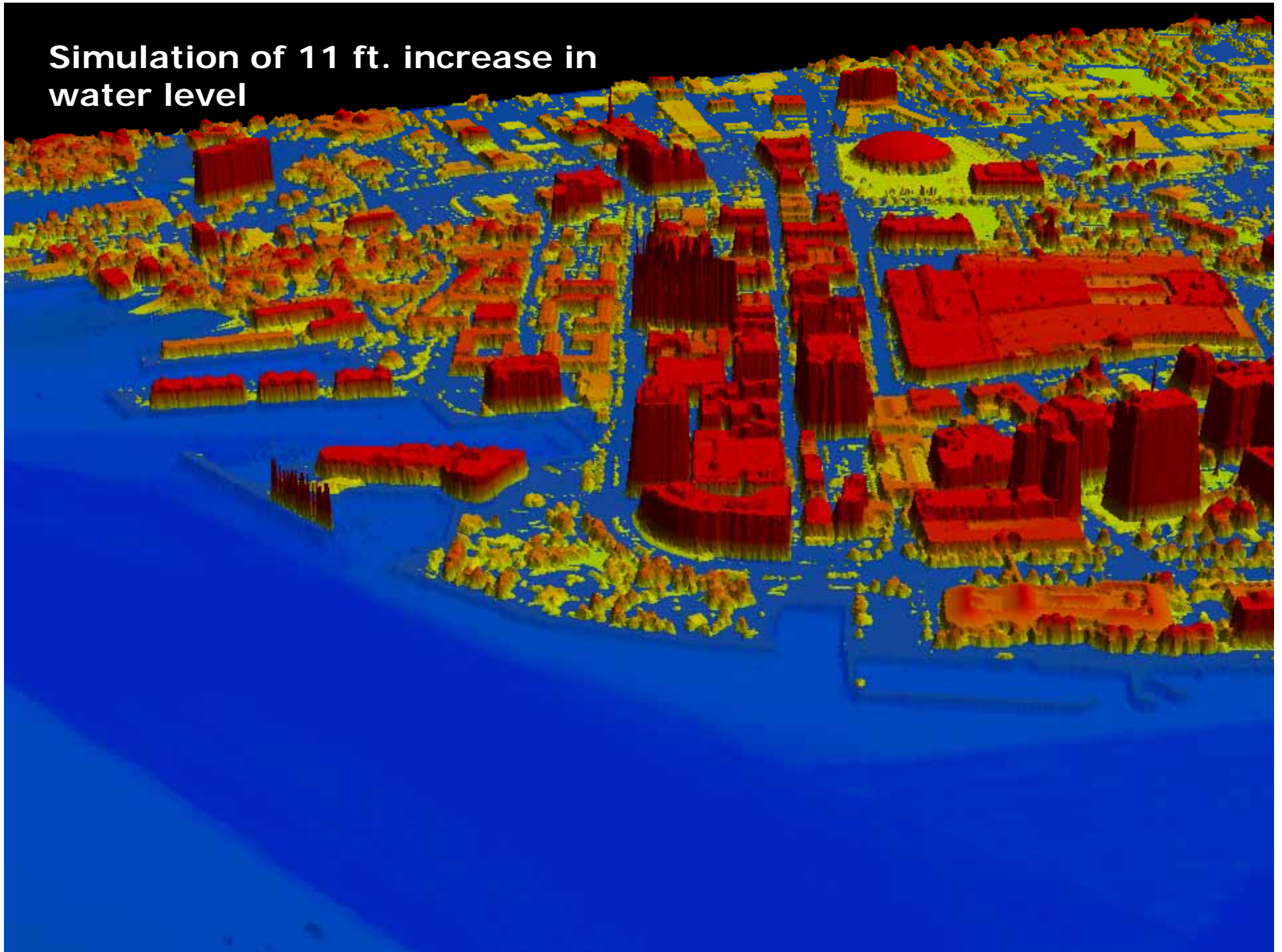
***Darker blue tint:*** Inundated land if sea level rose  $\leq 1$ -meter

***Lighter blue tint:***

**Area of uncertain inundation if sea level rose  $\leq 1$ -meter**

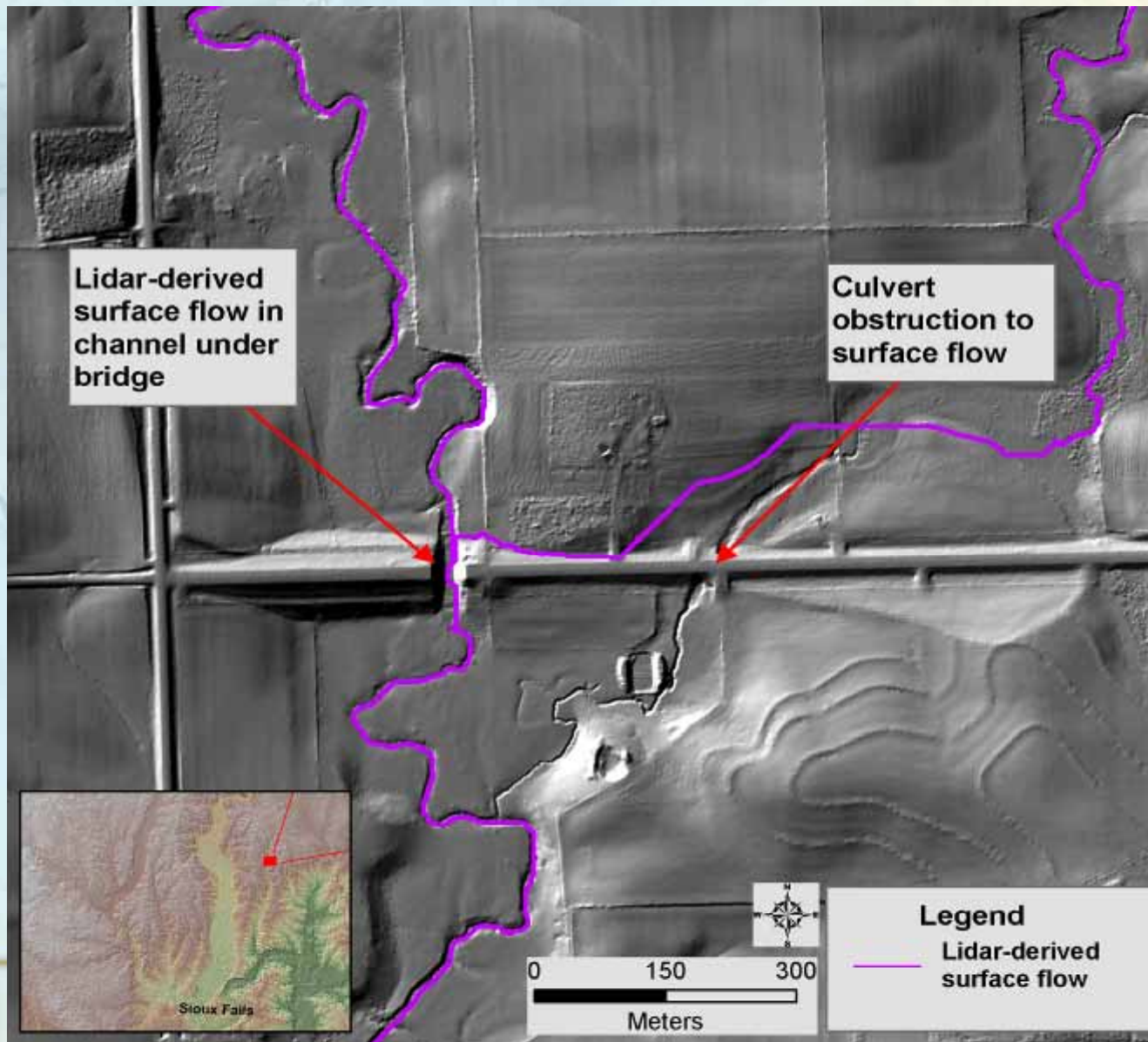


**Simulation of 11 ft. increase in  
water level**



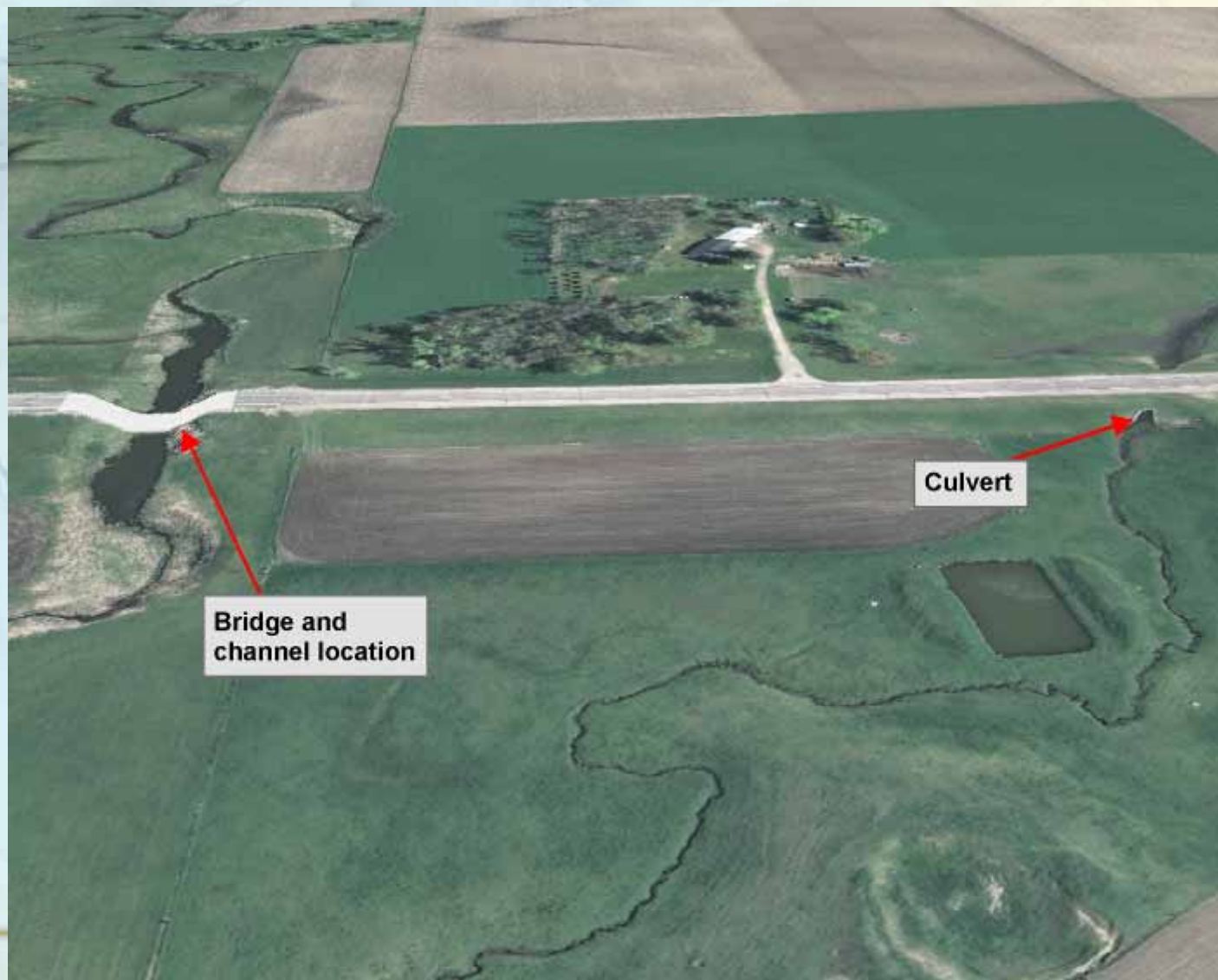


# Detailed lidar-derived elevation data

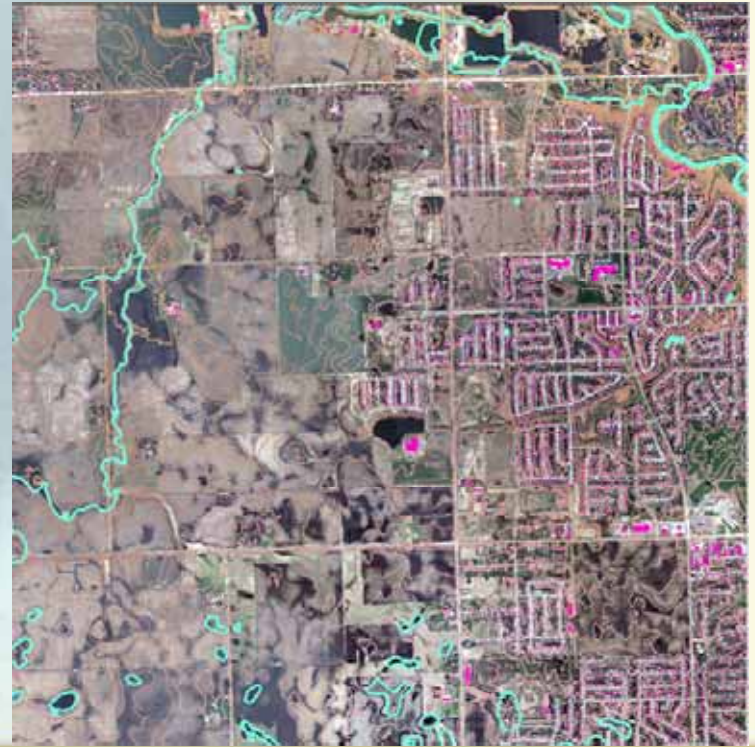




## Obstructions to lidar-derived surface flow



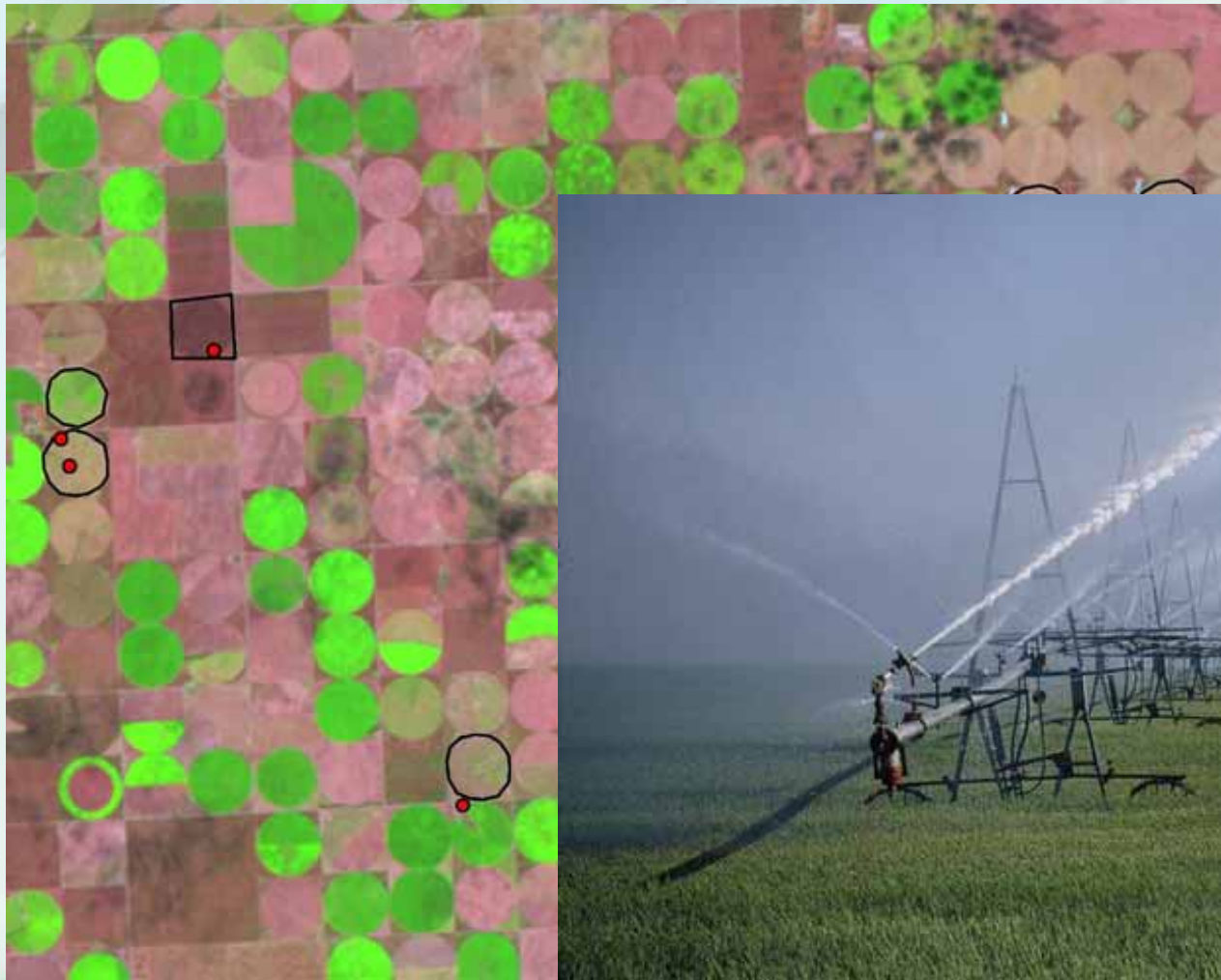
# Waterbodies extracted from lidar





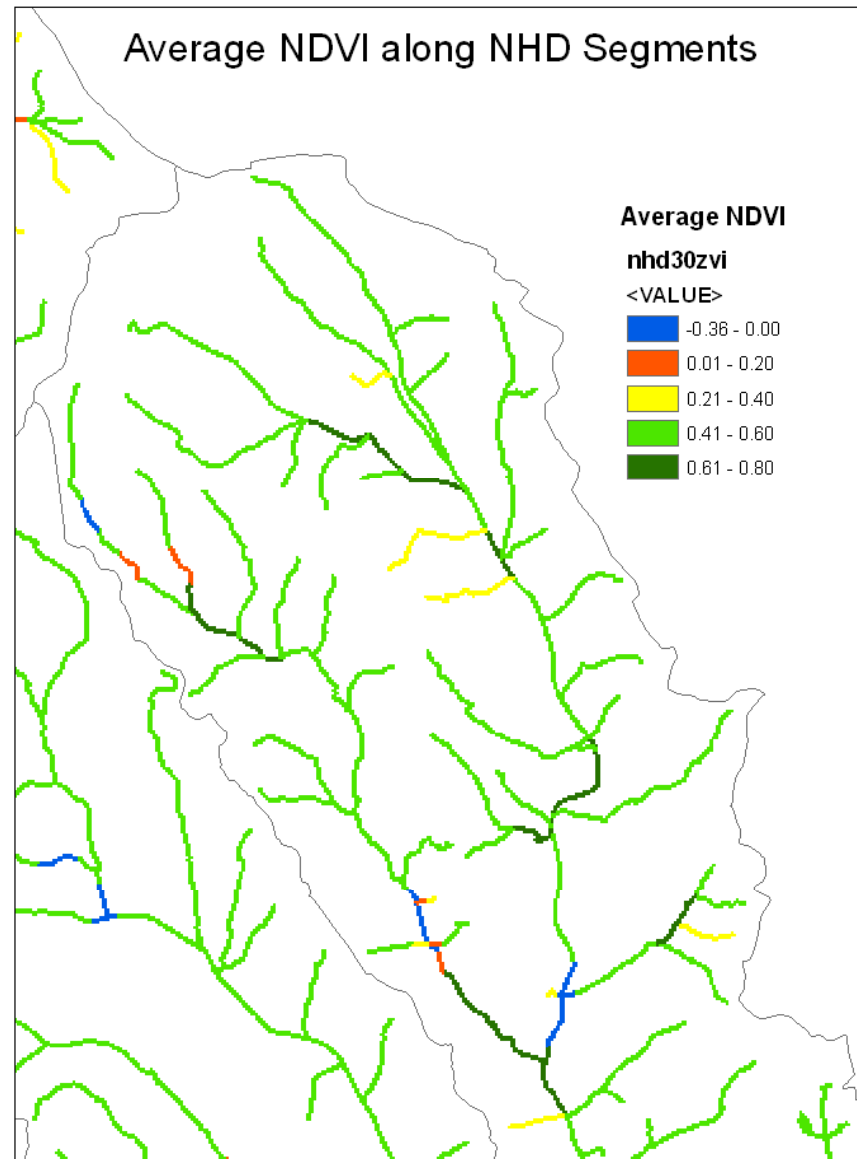
# Irrigation Monitoring System

The National Water Availability and Use Assessment Initiative

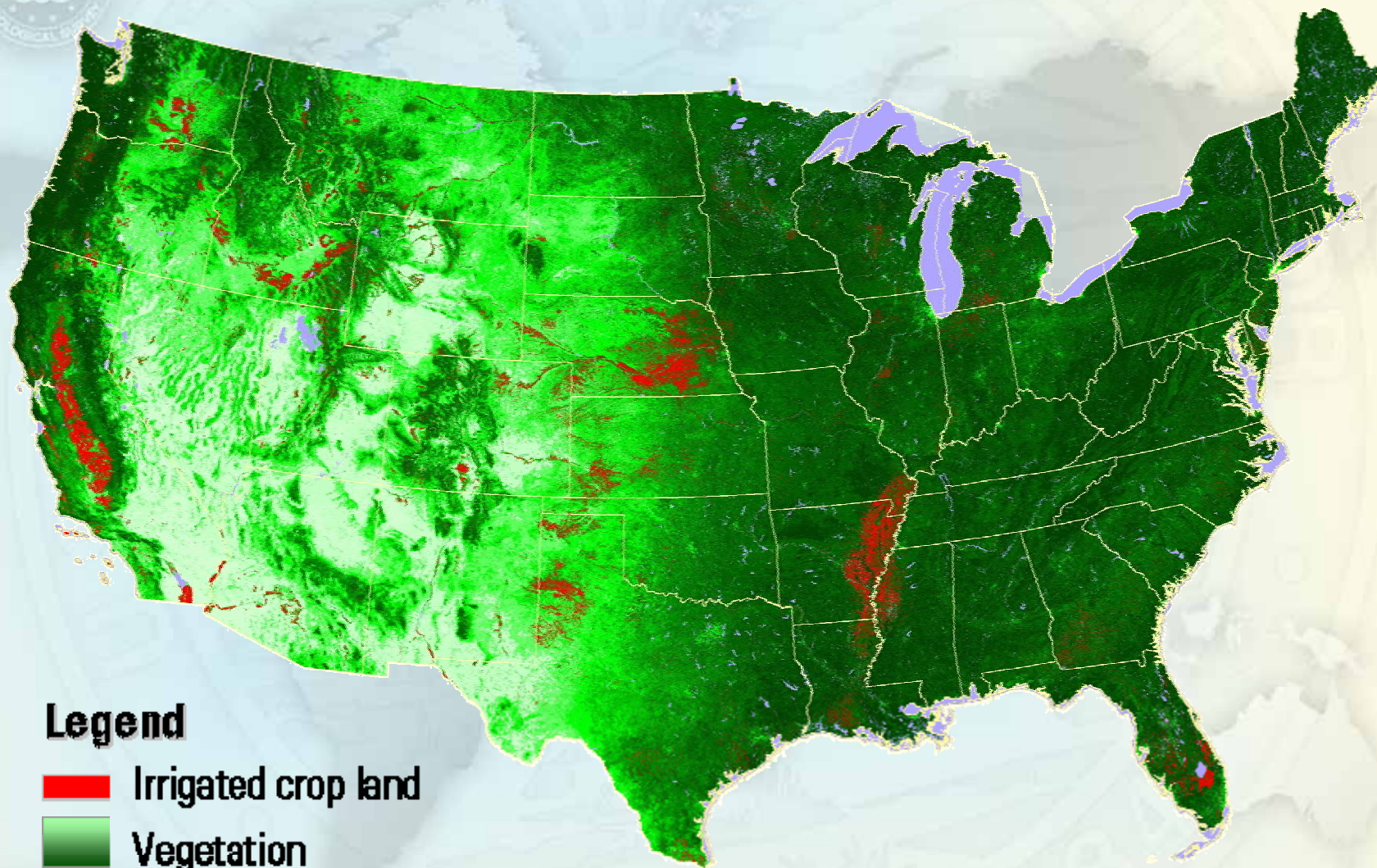




# Upper Flint River Water Availability Study



# 2002 MODIS Irrigated Agriculture (MIRAD)





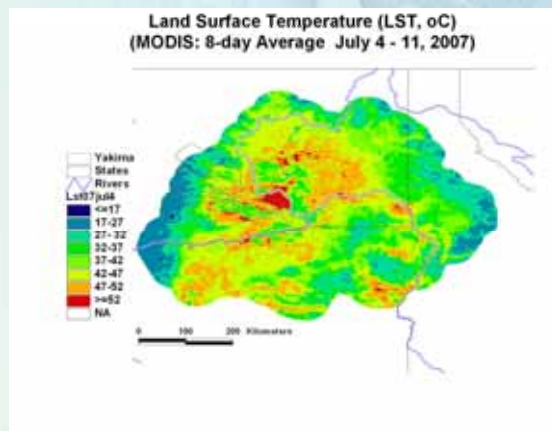
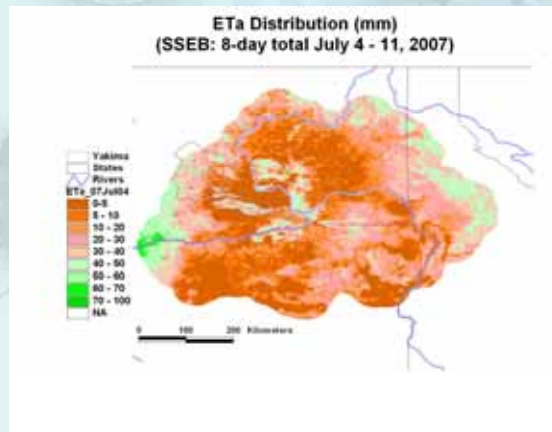
# Vegetation EvapoTranspiration (VegET) Modeling

- Background
  - VegET is a new modeling approach that integrates phenology and commonly used water balance modeling algorithms to estimate actual vegetation ET (water use) in primarily non-irrigated crop and grassland environments for agro-hydrological applications.
- Objective
  - Produce daily ETa and soil moisture to monitor crop and grassland performance for early assessment of yield and biomass production.

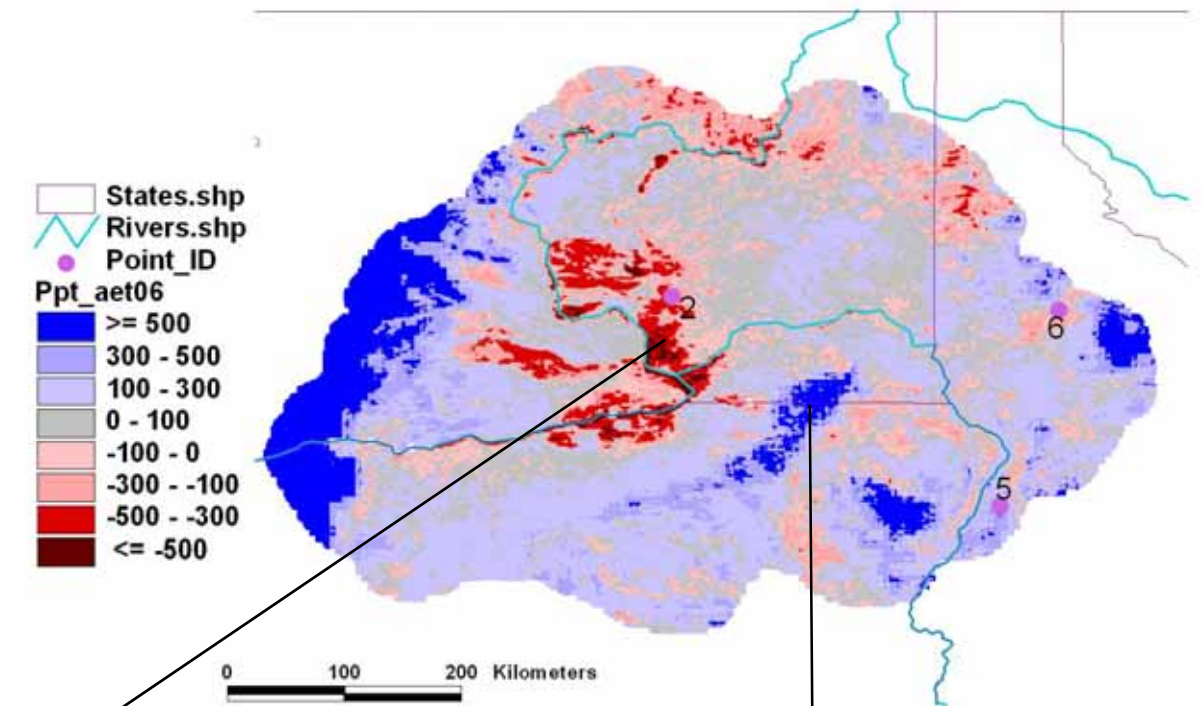




# Columbia Plateau Study



**2006 Annual Water Balance (PPT - ETa) (mm)**  
Columbia Plateau: NOAA/NEXRAD Precip minus SSEB ETa)

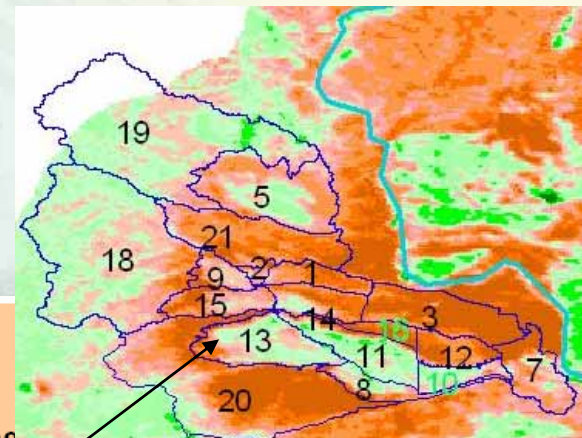


Withdrawal

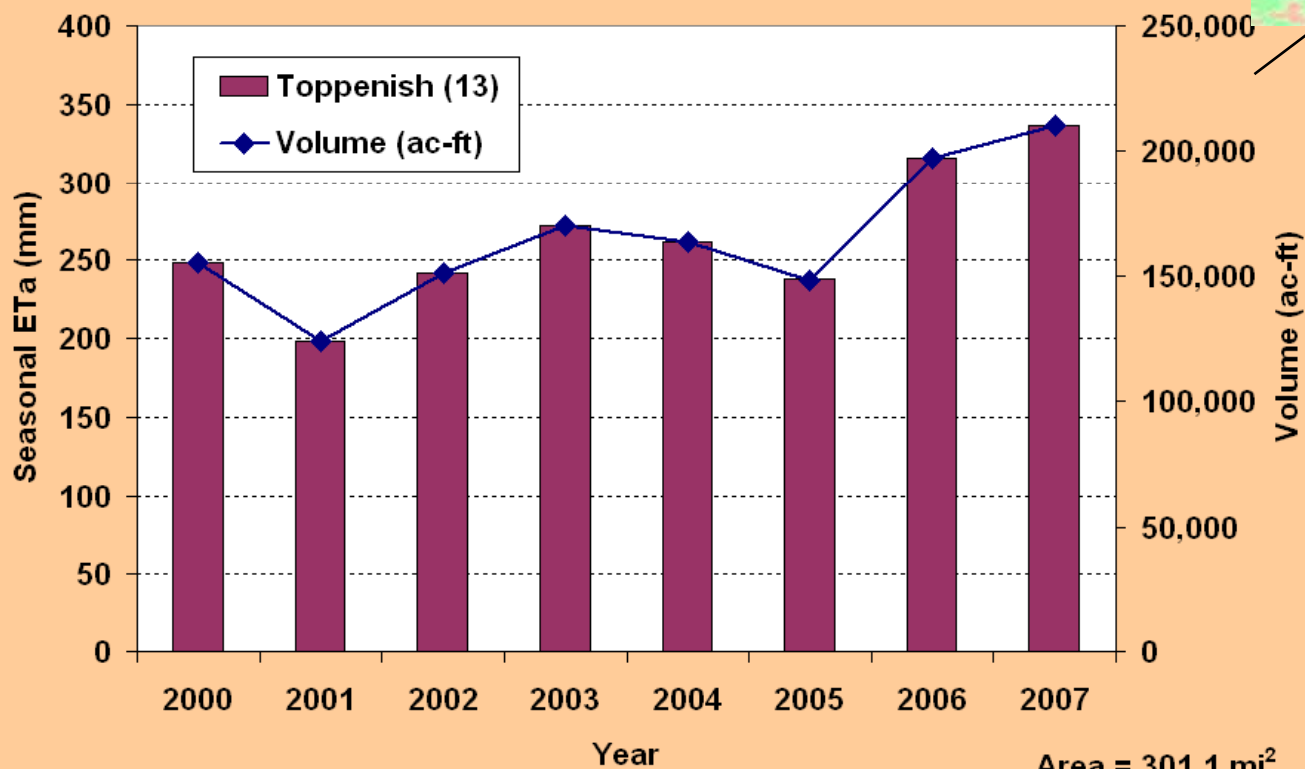
Recharge



# Basin Analyses



Seasonal ETa and Volume of Water-Use  
SSEB: May-Sep, Toppenish (ID 13)

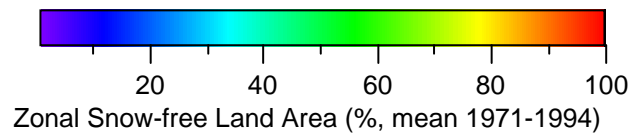
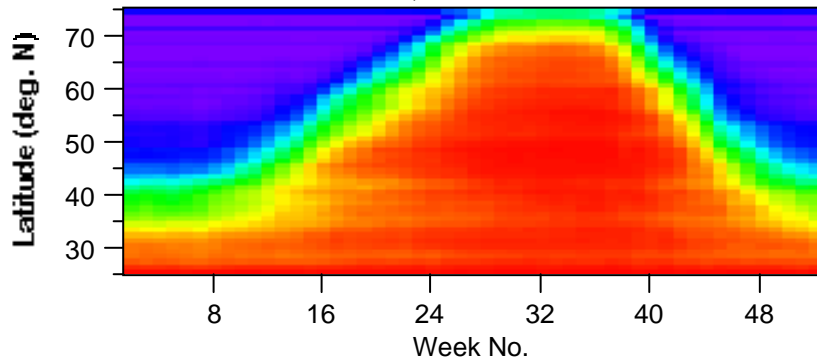


Area = 301.1 mi<sup>2</sup>

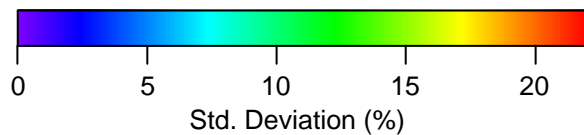
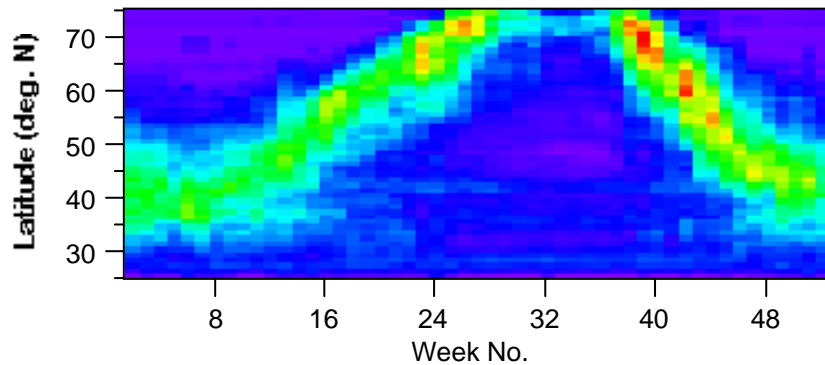


# Seasonal Variation in Zonal % Snow-Free Land Area

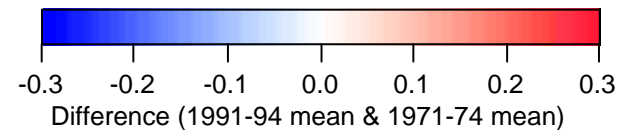
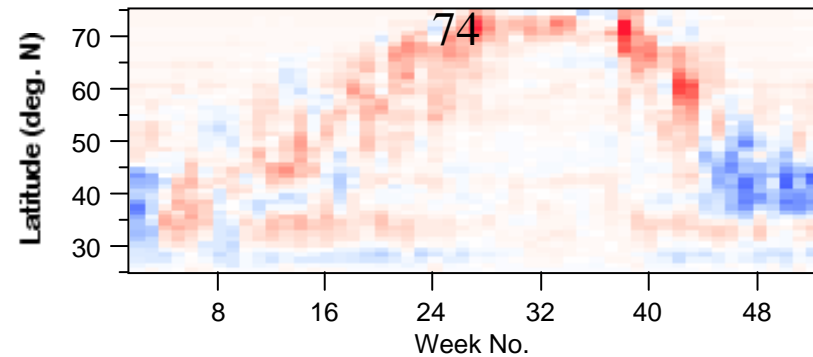
Mean, 1971-1994



SD, 1971-1994

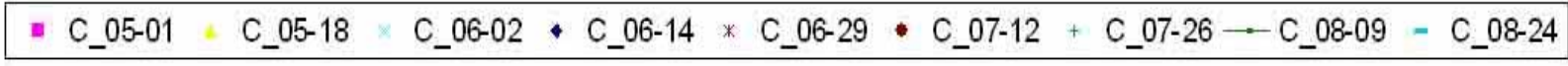
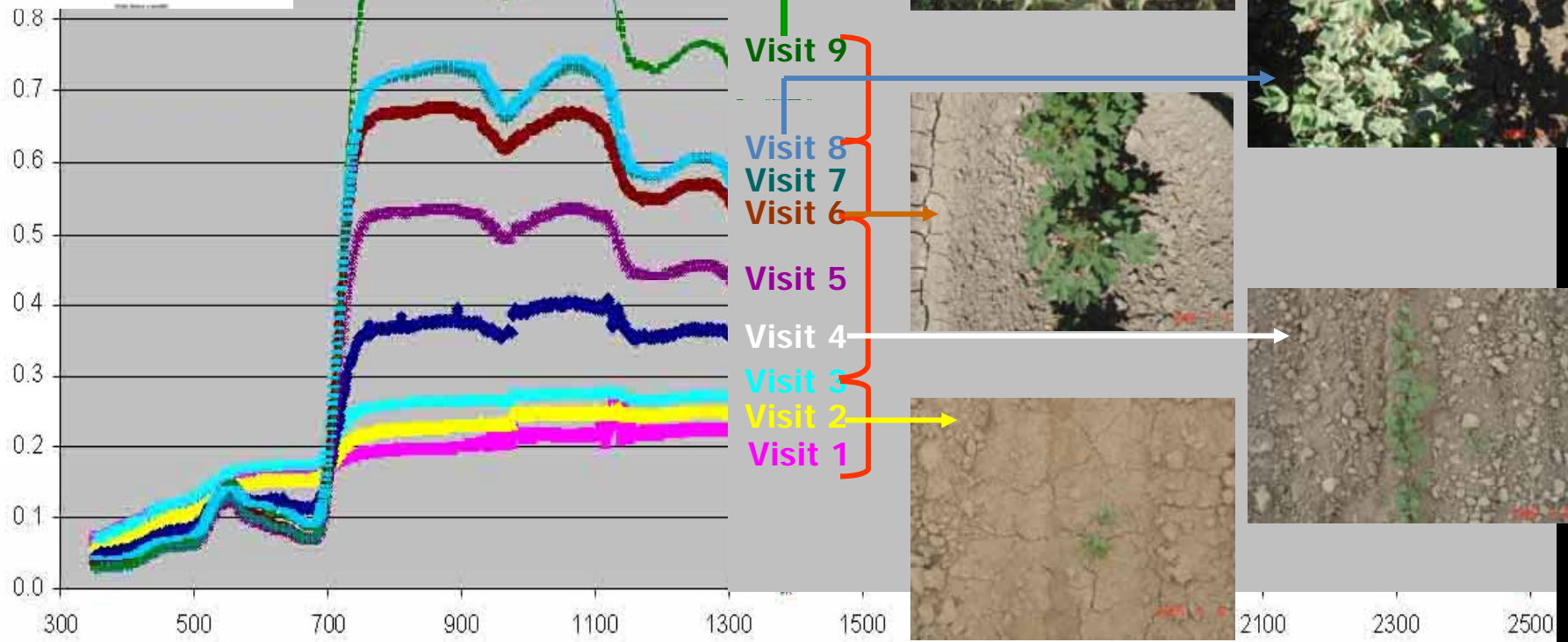
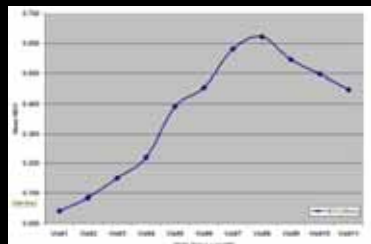


Difference of Means for 1991-94 & 1971-



# Water Productivity (WP; crop per unit of water; kg/m<sup>3</sup>)

## Cotton crop @ different growth Stages

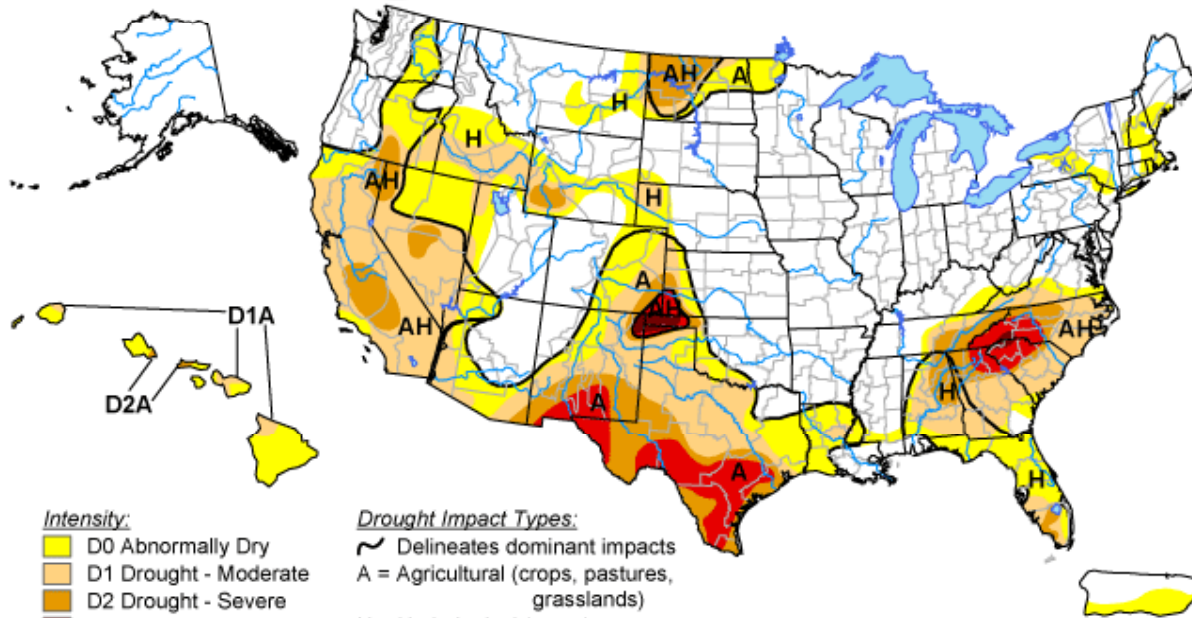




# National Drought Monitoring

## U.S. Drought Monitor

June 17, 2008  
Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

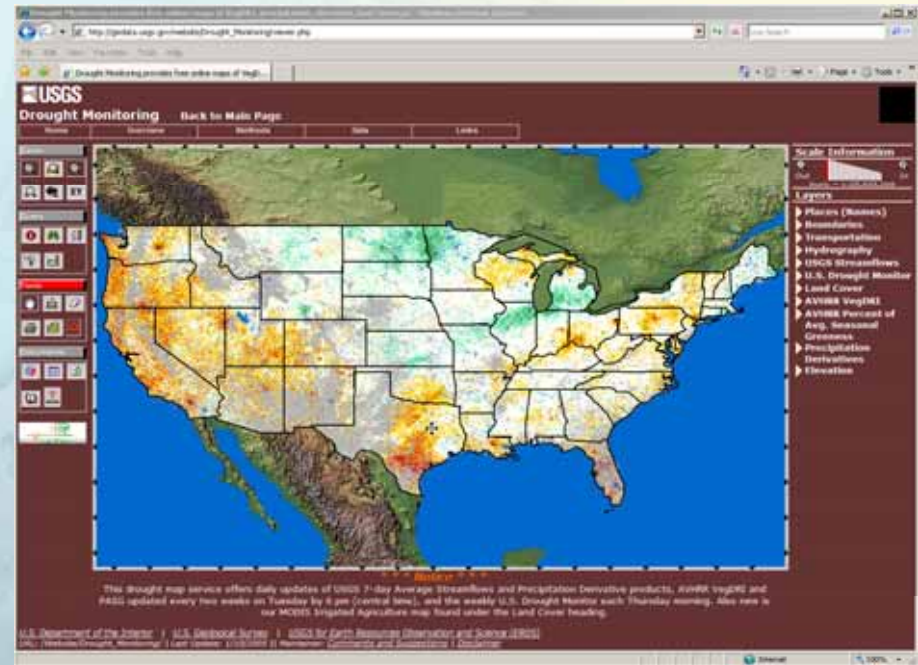
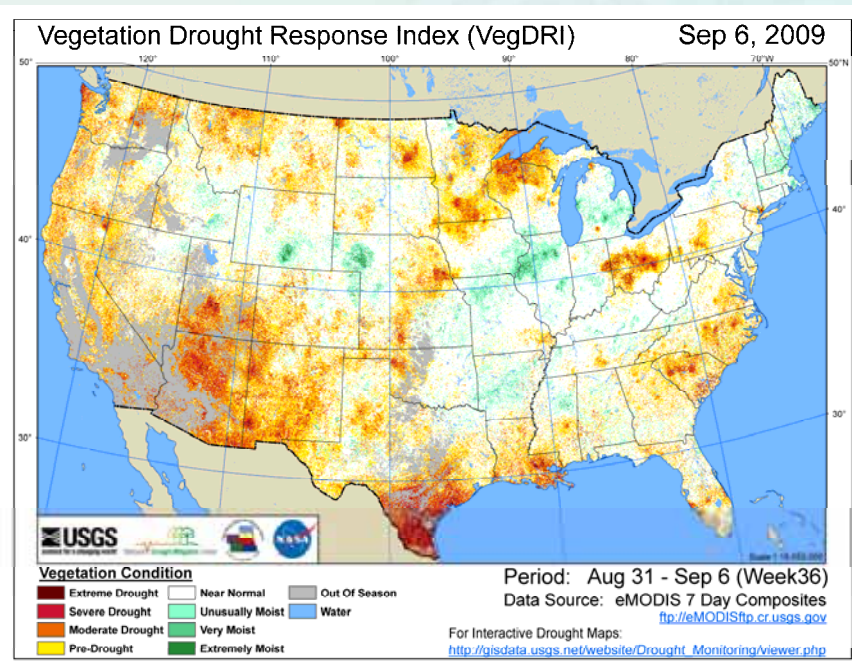
<http://drought.unl.edu/dm>



Released Thursday, June 19, 2008

Author: Rich Tinker, CPC/NOAA

Improve near-real time national geospatial information about drought-impacted vegetation in the US and support drought related decisions and risk management



VegDRI is a new 'hybrid' drought indicator and monitoring tool that integrates:

- satellite-based observations of vegetation conditions (phenology)
- climate-based drought index data
- biophysical characteristics of the environment to produce maps of drought-related vegetation