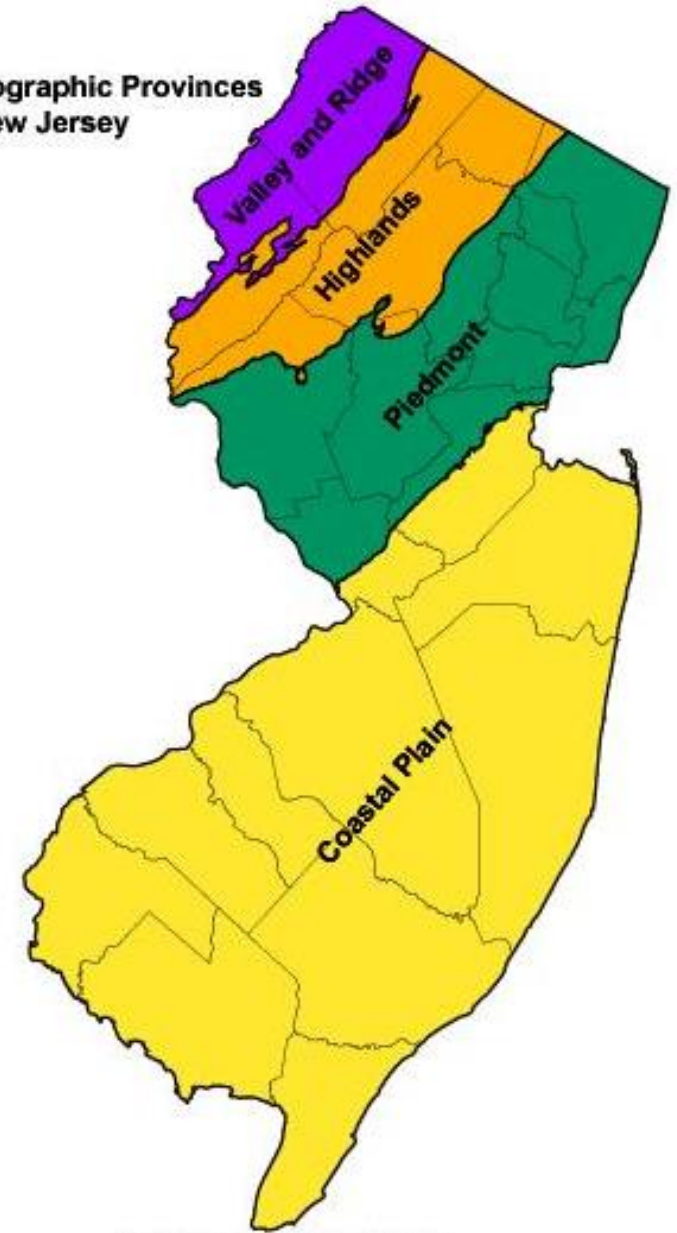


NJDEP's Highlands Septic Density, 2016 proposal

Clean Water Council
May 10, 2016
Jeffrey L. Hoffman



Physiographic Provinces
Of New Jersey



Highlands Act, 2005

Highlands Water Protection and Planning Act

N.J.S.A. 13:20-1 et seq

http://www.nj.gov/dep/highlands/docs/highlands_bill.pdf

NJDEP regulations

Highlands Water Protection and Planning Act

Rules N.J.A.C. 7:38

http://www.nj.gov/dep/rules/rules/njac7_38.pdf

Highlands Act

The Legislature further finds and declares that the New Jersey Highlands is an essential source of drinking water, providing clean and plentiful drinking water for one-half of the State's population, including communities beyond the New Jersey Highlands, from only 13 percent of the State's land area; that the New Jersey Highlands contains other exceptional natural resources such as clean air, contiguous forest lands, wetlands, pristine watersheds, and habitat for fauna and flora, includes many sites of historic significance, and provides abundant recreational opportunities for the citizens of the State.

The Legislature further finds and declares that the New Jersey Highlands provides a desirable quality of life and place where people live and work; that it is important to ensure the economic viability of communities throughout the New Jersey Highlands; and that residential, commercial, and industrial development, redevelopment, and economic growth in certain appropriate areas of the New Jersey Highlands are also in the best interests of all the citizens of the State, providing innumerable social, cultural, and economic benefits and opportunities.

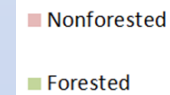
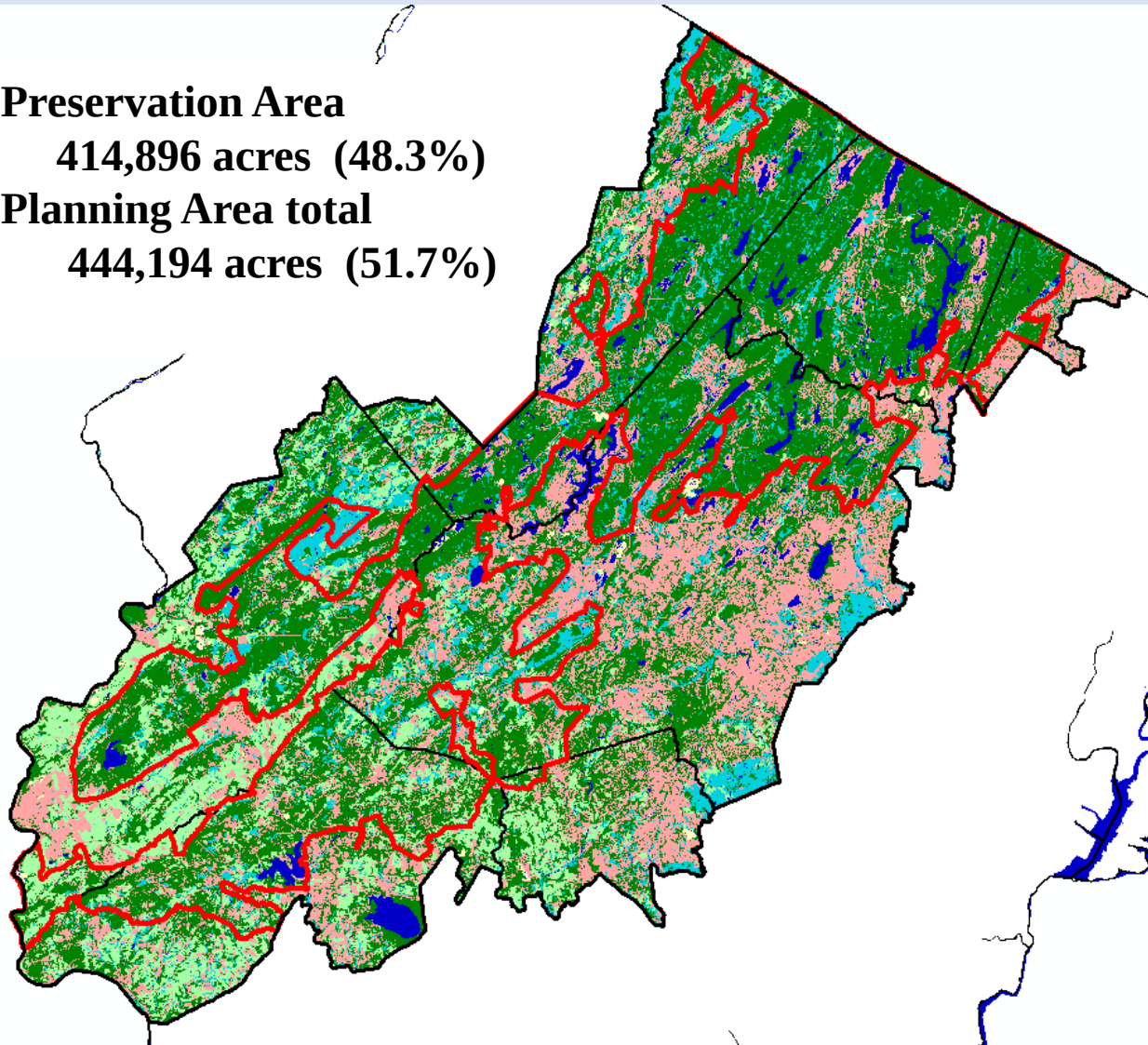
Highlands Regions

Preservation Area

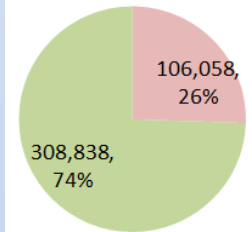
414,896 acres (48.3%)

Planning Area total

444,194 acres (51.7%)

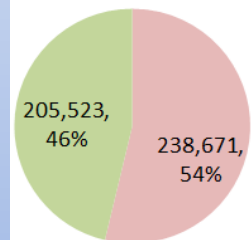


Preservation Area



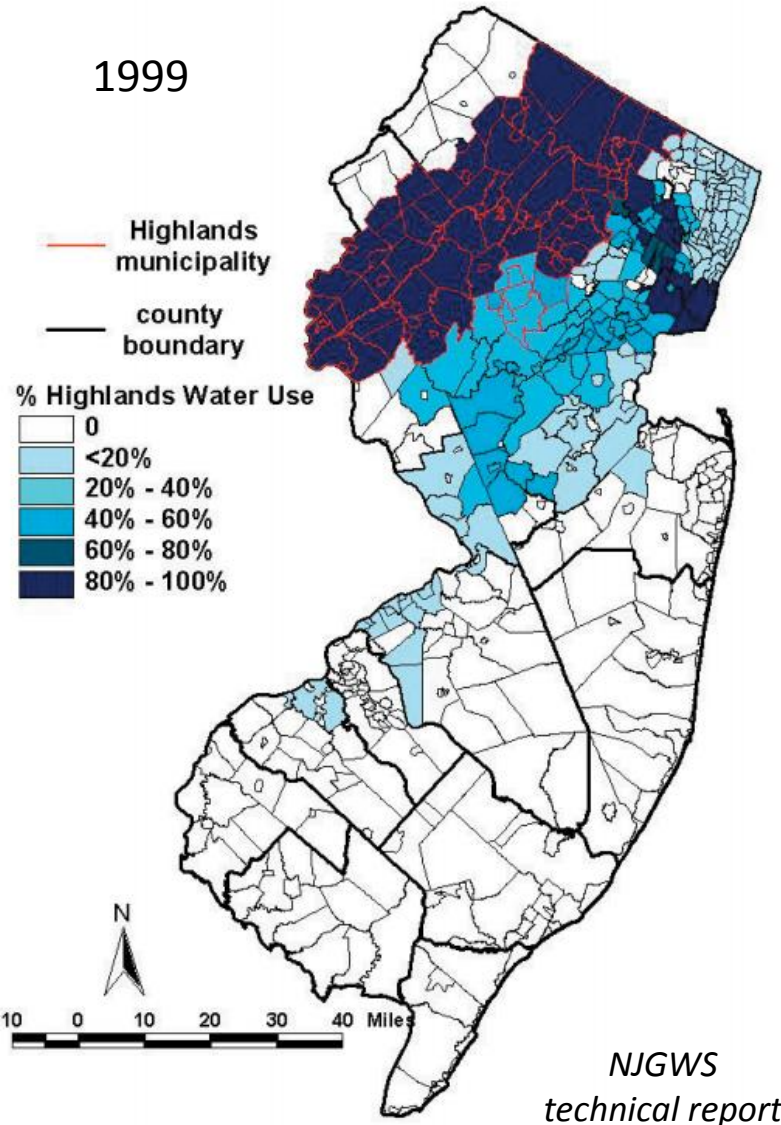
Forested:
woods, wetlands, water
Nonforested:
urban, agricultural, barren

Planning Area



Highlands Potable Water

1999



EXPLANATION

2011

▲ Potable Surface Water Intakes
Downstream of Highlands per Table 3

Highlands

Counties

Municipalities

Percent Highlands Water Use

95% - 100%

75% - 95%

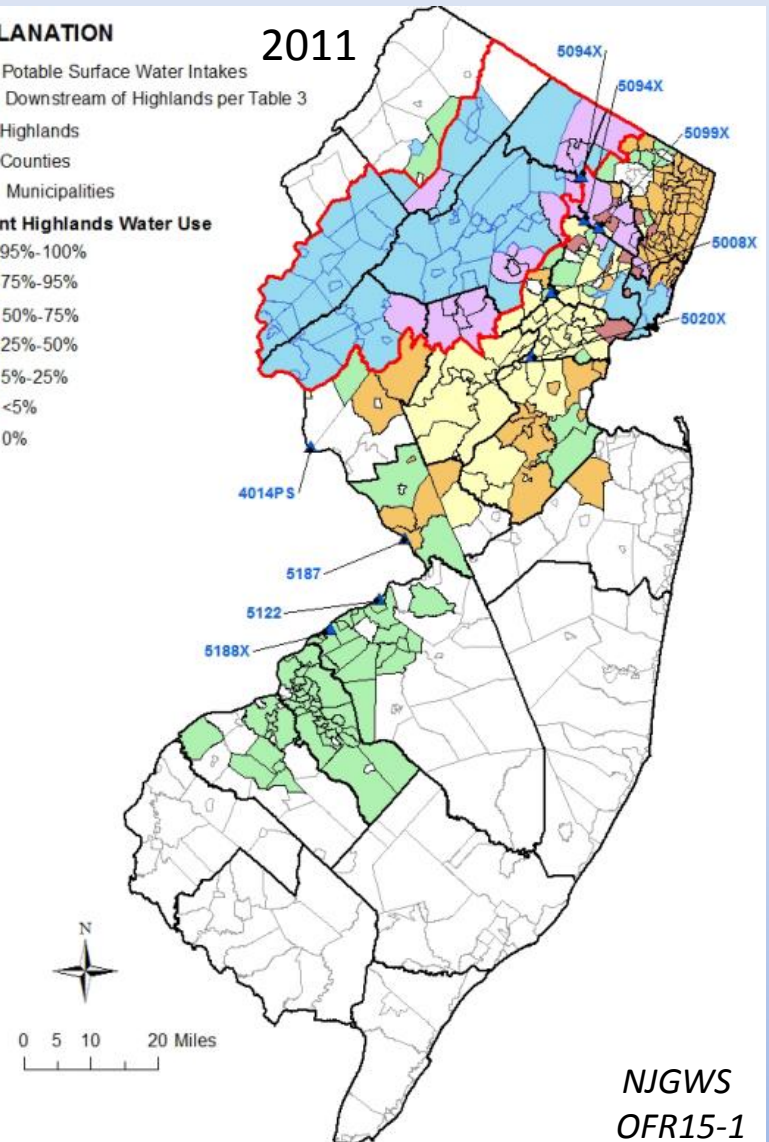
50% - 75%

25% - 50%

5% - 25%

<5%

0%



Septic Density Model

N.J.S.A. 13:20-34e. a septic system density standard established at a level to prevent the degradation of water quality, or to require the restoration of water quality, and to protect ecological uses from individual, secondary, and cumulative impacts, in consideration of deep aquifer recharge available for dilution;

Septic Density Model

- Trela-Douglas
- mass model (NO_3 in = NO_3 out)
- septic system is only sources of NO_3
- lot provides dilution recharge
- used in NJ since late 1970s

Highlands Inputs

- people per home - 4
- nitrate load per person per year
(10 #/year/person)
- recharge rate
 - deep aquifer recharge
 - drought of record - 9.8"/year
 - average recharge is 14.6 "/yr
- NO₃ target based on background (mg/l)
- 3% impervious cover
- Result in acres/home (A_{97%})

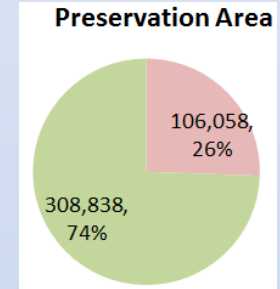
$$A_{97\%} = 4.56 \frac{PN}{RT}$$

Nitrate Estimate, 2006

- Background NO₃?
- USGS NWIS
 - 633 NO₃ values from 388 wells
 - Eliminate high 5% (>3.6 mg/l), 602 left
 - Mean → 0.8 mg/l
- Serfes, 2004
 - Noncarbonate bedrock, northern NJ
 - 45 samples → 0.76 mg/l NO₃
- USGS pristine wells
 - 90% forest, wetlands and water within 500 meters of well
 - 7 wells → 0.21 mg/l

Septic Density Results

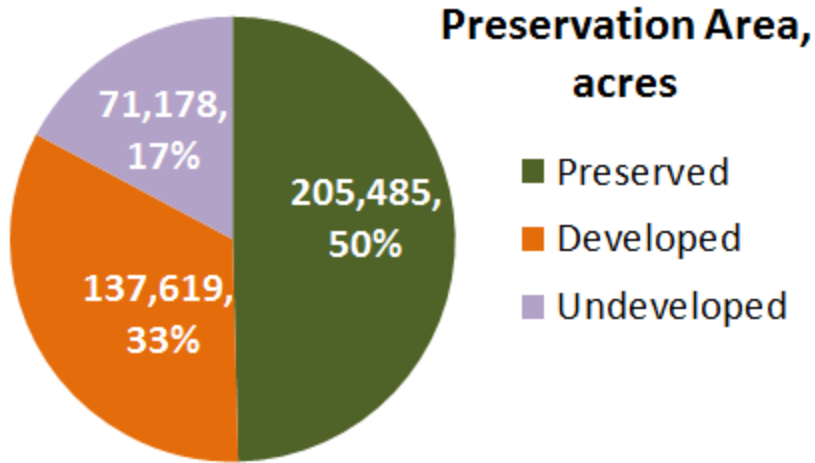
$$A_{97\%} = 4.56 \frac{PN}{RT}$$



DEP Approach, 2006, Preservation Area

Category	# of samples	Median NO ₃ (mg/l)	Density (acres/system)
Nonforested	45	0.76	25
Forested	7	0.21	88

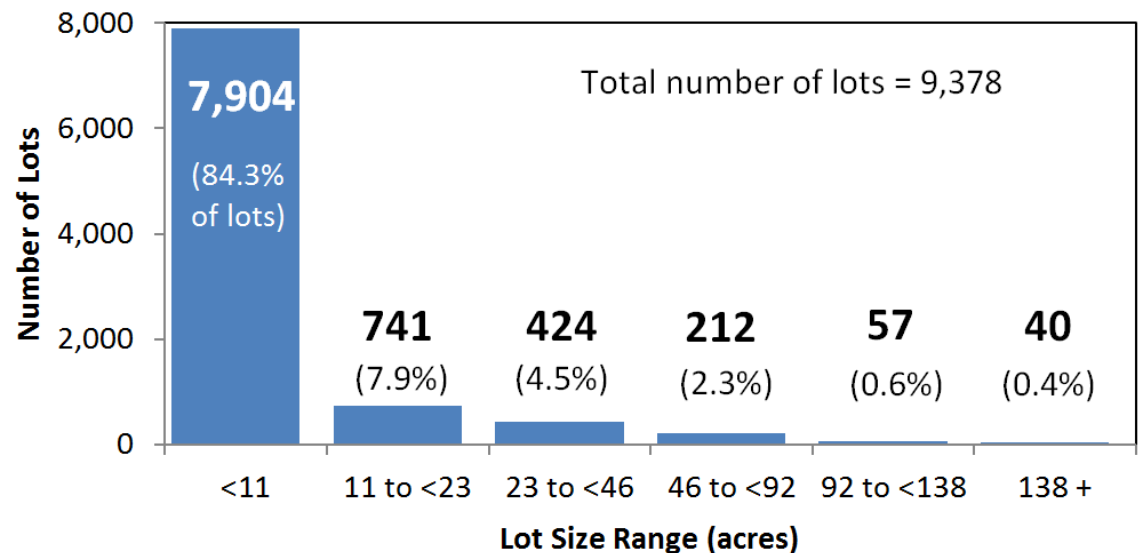
of Additional Septics?



**+9,565
systems**

Highlands
Council
analysis

Undeveloped Lots in Preservation Area



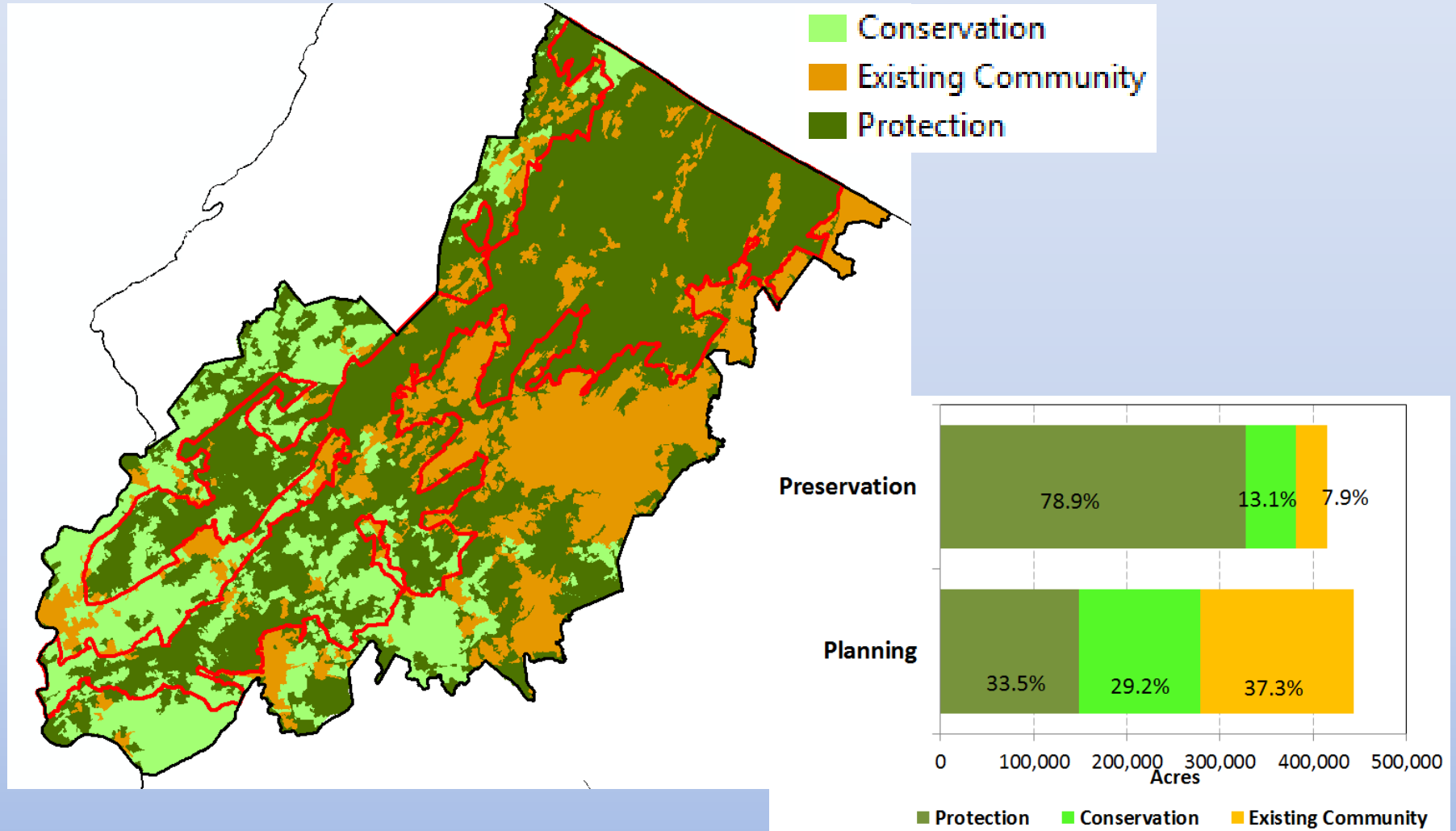
Court Case, 2008

- Farm Bureau challenge, “arbitrary and capricious”
 - used the drought of record (9.8 “/yr) rather than the annual average recharge rate (14.6”/yr)
 - arbitrarily assumed the average number of persons per household in the Highlands Region is four rather than the actual average of 2.7
 - arbitrarily selected low ambient nitrate levels for both forested and non-forested areas
- 2009 ALJ ruling in DEP’s favor, Farm Bureau appealed
- 2010 – stay on appeals
- DEP decision - need better NO₃ estimate

NJDEP Changes

- Switch to land use capability zones compatible with HC's RMP
- Expand nitrate data base
Private Well Testing Act

HC's Land Use Community Zones



Private Well Testing Act



STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER SUPPLY AND GEOSCIENCE

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Water Allocation ▶

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Open Public Records Act (OPRA)

Private Well Testing Act (PWTa)

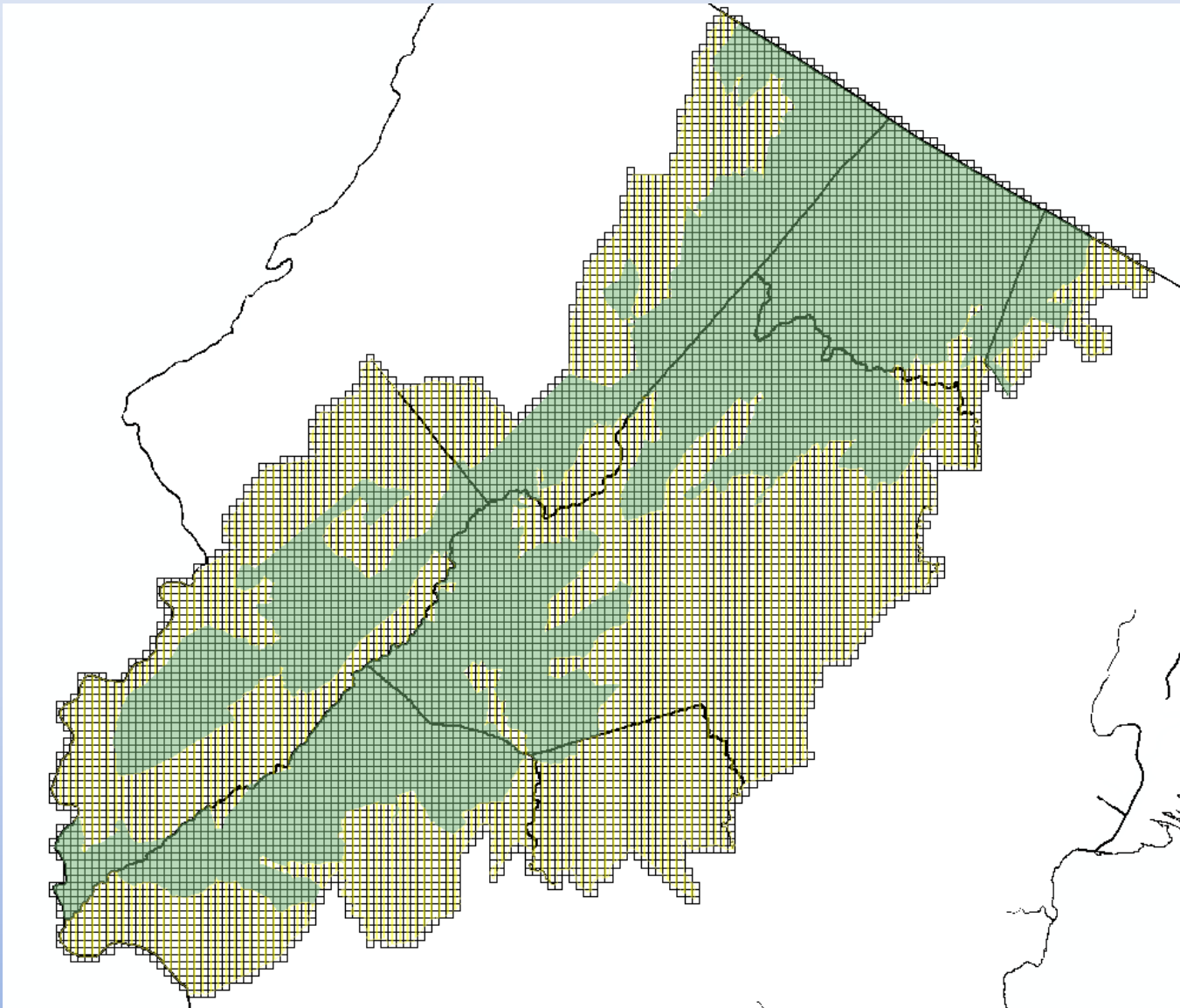
Required when selling or leasing a home or multi-unit dwelling with private well

- [An Overview](#)
- [Free online lessons](#) developed by the National Ground Water Association with support from the U.S. Environmental Protection Agency.
- [Frequently Asked Questions](#)
- Statutory and Regulatory Authority
 - [Private Well Testing Act, N.J.S.A. 58:12A-26 et seq.](#)
 - [Private Well Testing Act regulations, N.J.A.C. 7:9E et seq.](#) – Full text of the rules that implement the Act
 - [Regulations Governing the Certification of Laboratories & Environmental Measurements, N.J.A.C. 7:18 et seq.](#)
- [List of New Jersey Certified Laboratories](#)
- [Additional Resources](#): educational, remediation/treatment funding, treatment devices and health effects
- Technical Resources
 - [Required Parameters for Private Well Testing](#)
 - [Global Positioning System \(GPS\) Requirements for Spatial Data Collection](#)
 - [Office of Information Resources Management \(OIRM\), Bureau of Geographic Information Systems \(BGIS\)](#)
 - [US Army Corps of Engineers – Army Geospatial Center](#)
 - [New Jersey Private Well Water Test Reporting Form](#) - A form used exclusively by laboratories reporting well test results to their clients.
- [Directory of New Jersey Health Departments](#)
- PWTa data
 - [Initial Well Test Results for September 2002 - March 2003](#)
 - [Well Test Results For September 2002 - April 2007](#)
 - [Addendum to Well Test Results For September 2002 - April 2007](#)
 - [Well Test Results, September 2002-April 2014](#)
- [Laboratory Reporting of Results](#)
- [Contact us](#)



http://www.nj.gov/dep/watersupply/pw_pwta.html

Model Grid

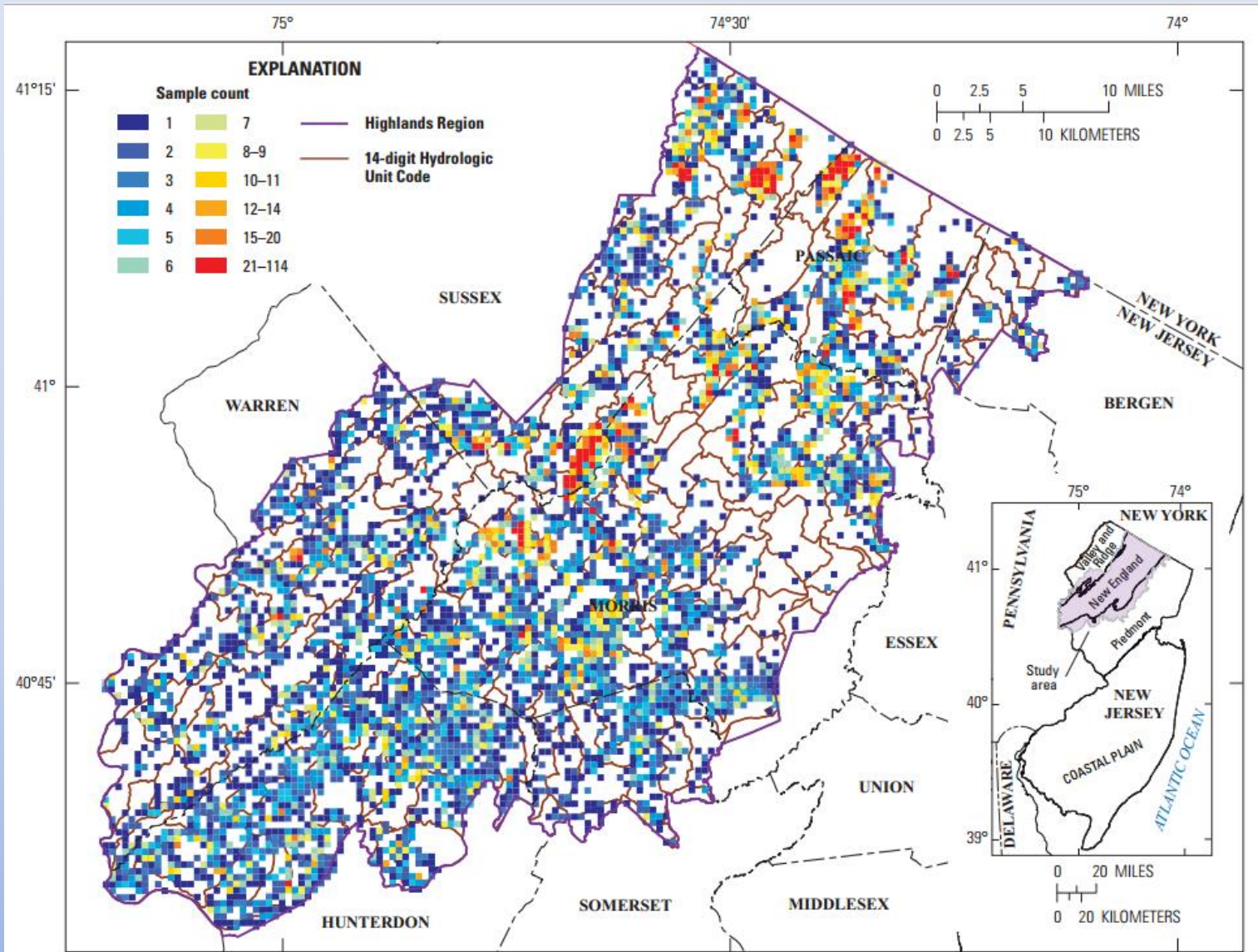


Need to
maintain
confidentiality

9,745 cells

2,000' x
2,000'

Combined PWTA & NWIS Data



9,745 cells
4,516 w/ NO₃
5,229 w/o

USGS SIR
2015-5075

Observed PWTA NO₃

Summary of Private Well Testing Act Data						
Parameter	<u>Planning Area Zones</u>			<u>Preservation Area Zones</u>		
	Conserva- tion	Existing Comm.	Protec- tion	Conserva- tion	Existing Comm.	Protec- tion
<u>Summary of Observed Nitrate Values</u>						
Minimum (mg/l)	0.038	0.1	0.059	0.13	0.033	0.035
median (mg/l)	3.00	3.43	2.17	2.30	3.36	2.00
maximum (mg/l)	26	106	19.8	26.2	153	23.6
number	1,562	3,294	2,273	781	2,206	4,699
Number of Samples with no Observed Nitrate						
number	339	687	747	188	653	1,833

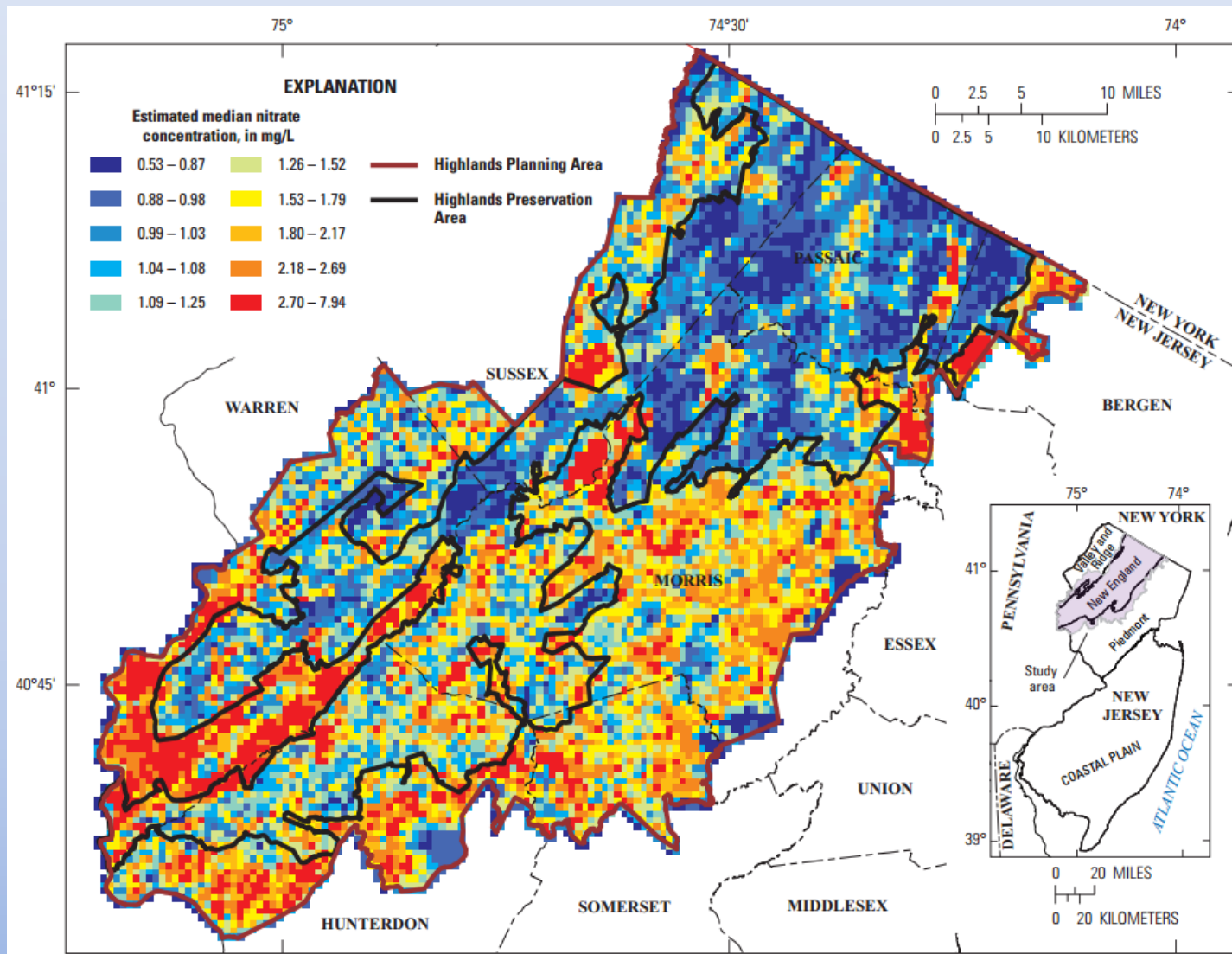
USGS Modeling - 1

- What land use parameters are significant?
- Examined 320 different parameters in a 500-meter radius around each NWIS point
- 5 land use characteristics are significant:
 - % urban land
 - % ag land
 - septic system density
 - total length of streams
 - # of known contaminated sites

USGS Modeling - 2

- 2,000' x 2,000' grid cells
- NJDEP provided 19,371 NO₃ values
- USGS model based on 19,670 NO₃ values
- Logistic regression model of median value in each cell
- Apply to all cells, generate a median NO₃
- Centroid of each cell assigned to a Highlands Area and a LUCZ
- Take median of all cell medians

Estimated Median NO_3



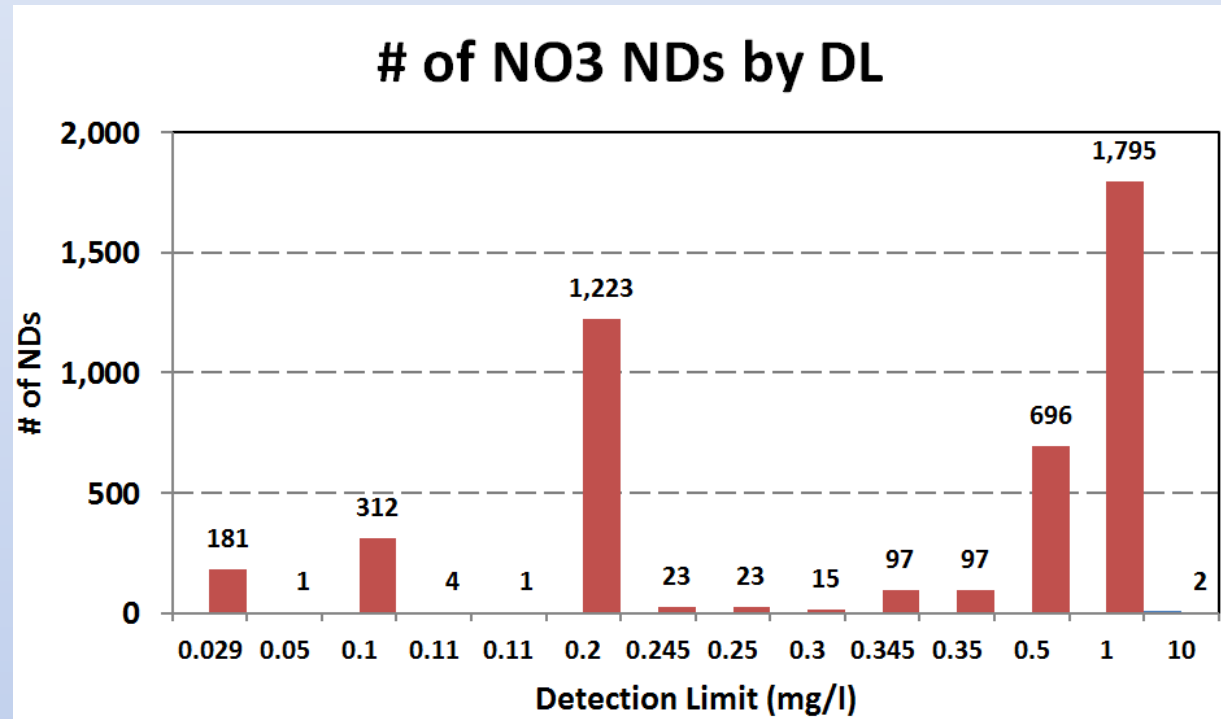
K-M approach
for NDs

USGS SIR
2015–5075

Nondetects – How to Handle?

Concern that not addressing NDs may artificially raise estimate of median NO_3 .

- 0.0 mg/l
- 50% of detection limit
- 100% of detection limit
- Kaplan-Meier analysis of left-censored data



NonDetect Methods & Results

USGS ran model 4 times, substituting all NDs with a different value each time.

Preservation Area				
Table 1. Estimated median nitrate (mg/l)				
Zone	Method for Handling Non-Detects			
	Zero	0.5DL	K-M	DL
Existing Community	1.77	1.78	1.79	1.79
Conservation	1.60	1.61	1.64	1.64
Protection	0.80	0.83	1.05	1.06

Assume 0.0 mg/l for all NDs

- Most conservative
- Housing densities, acres/system
 - 11 – existing community LUCZ
 - 12 – conservation LUCZ
 - 23 – protection LUCZ
- 10,710 units
- + 1,145 (12%)

Status

- Published in register May 5, 2016
- <http://www.state.nj.us/dep/rules/proposals/20160502a.pdf>
- Public hearing June 1, 2016

Objections So Far

- PWTA data skewed towards development
- Should measure, not model, NO_3
- Rollback in protection

Questions?