

Local Resolution NHD for West Virginia

**West Virginia GIS Technical Center
Natural Resource Analysis Center
WV State GIS Coordinator's Office**

**November 9, 2005
Charleston, WV**



Welcome

- Agenda
- Goals of meeting
 - Introduction
 - Project benefits
 - Methods
 - Next Steps
 - Discussion
- Introductions



Introduction

- Goals of LR NHD pilot project:
 - User needs analysis – water resources data
 - Develop methods and standards for creation of local resolution NHD (LR NHD) for WV
 - Assemble LR NHD (1:4800 scale) for two pilot watersheds
- Goals for this meeting:
 - Project kick-off meeting
 - Discussion
 - Set the stage for future activities

Introduction to the NHD

- National Hydrography Dataset (NHD) is the national spatial data standard for mapped surface water resource data
- WV NHD development funded by USGS, WVDEP, USFS
- NHD datasets (geodatabase format) available from USGS at:

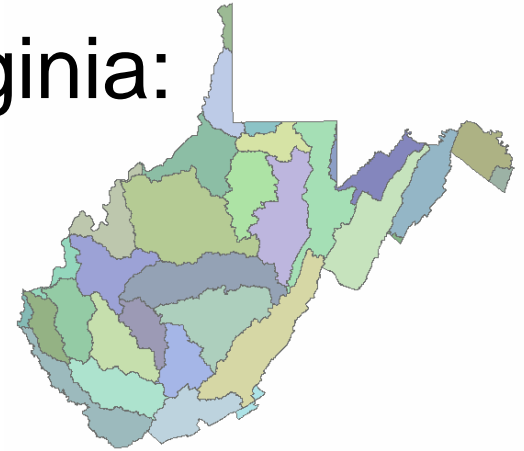
<http://nhd.usgs.gov>



NHD status

- Completed NHD for West Virginia:

- Medium resolution (1:100K)
- High resolution (1:24K)

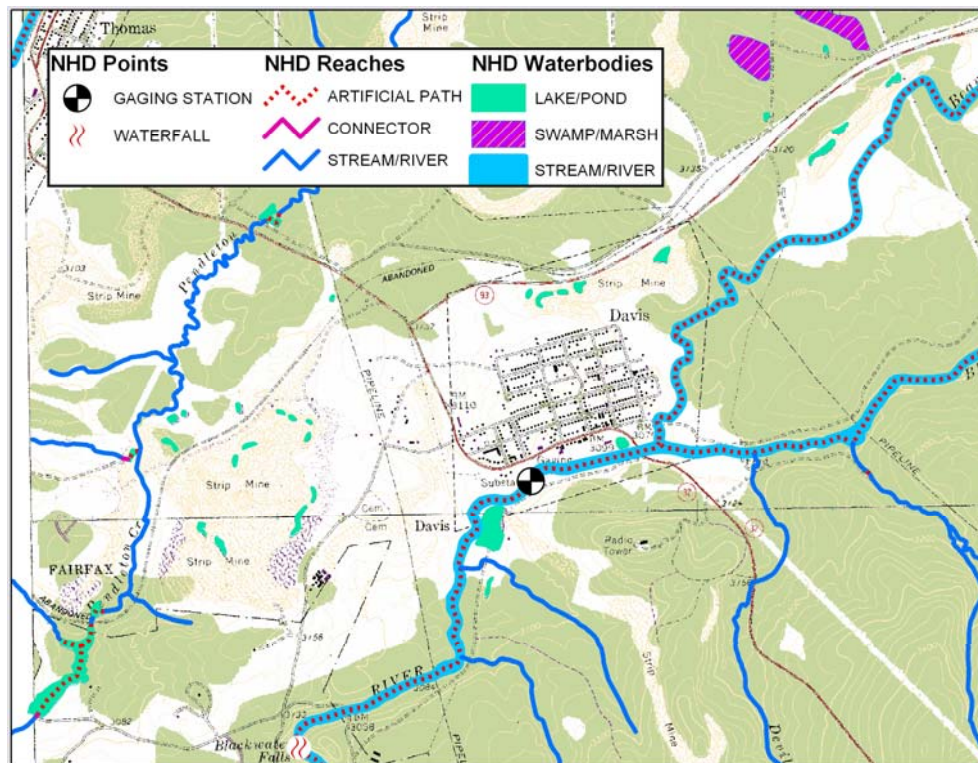


- Advantages of NHD format:

- Included in the National Map
- Consistent format across scales
- Tools for NHD use

NHD formats

- Original format: ArcInfo coverages
- New format: Geodatabase



Sample NHD
data, Davis quad

NHD format

Tables

- Attribute tables for all features
- Unique permanent feature IDs
- Feature type code for all features
- Reach cross-reference table
- Flow table
- Metadata

Area features

- Lakes/ponds
- Swamps/marshes
- Mine ponds
- Wider streams
- Inundation areas
- Sub-basin boundaries
- Locks, other features
- USGS GNIS name if possible

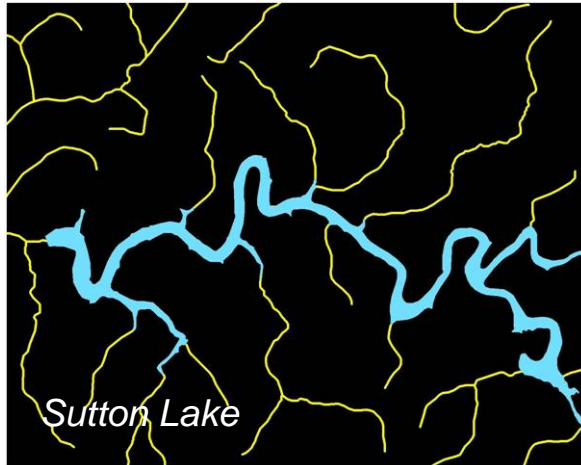
Linear features

- Streams
- Pipelines/canals
- Shorelines
- Artificial paths/centerlines
- Rapids, other features
- Unique reach ID
- USGS GNIS name if possible
- Flow network

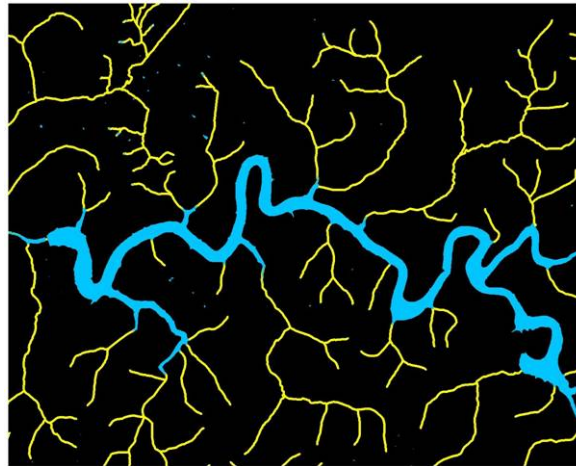
Point features

- Gaging stations
- Wells
- Springs
- Waterfalls

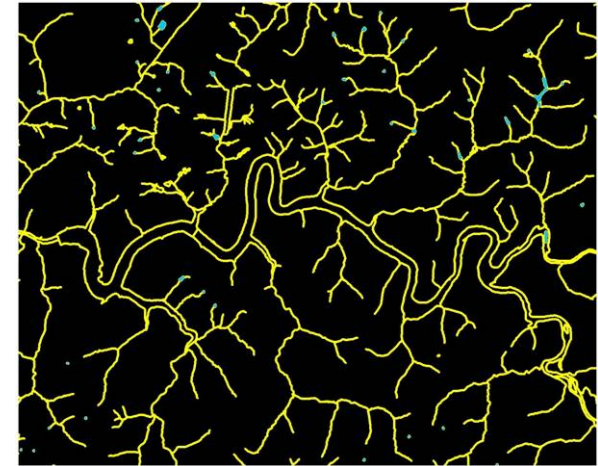
NHD at many scales



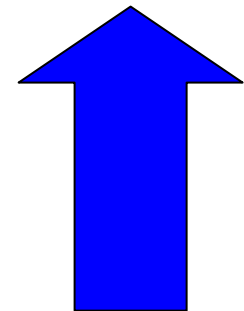
1:100,000 scale NHD
Medium resolution



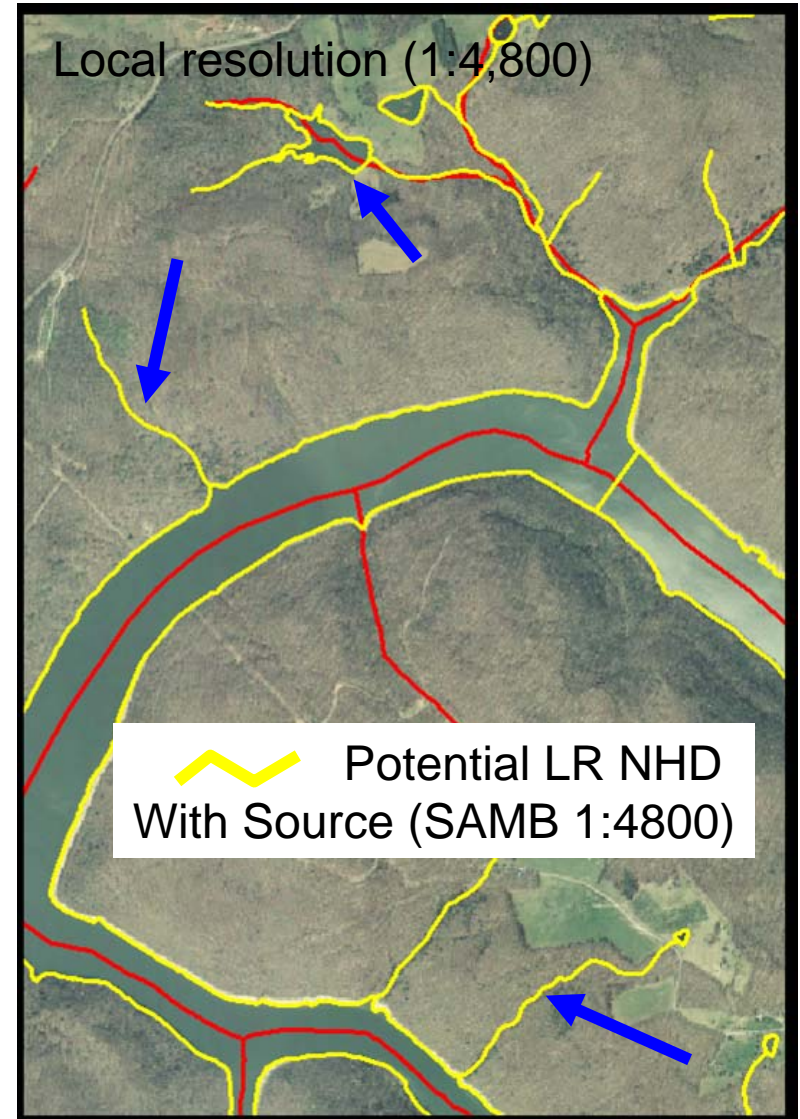
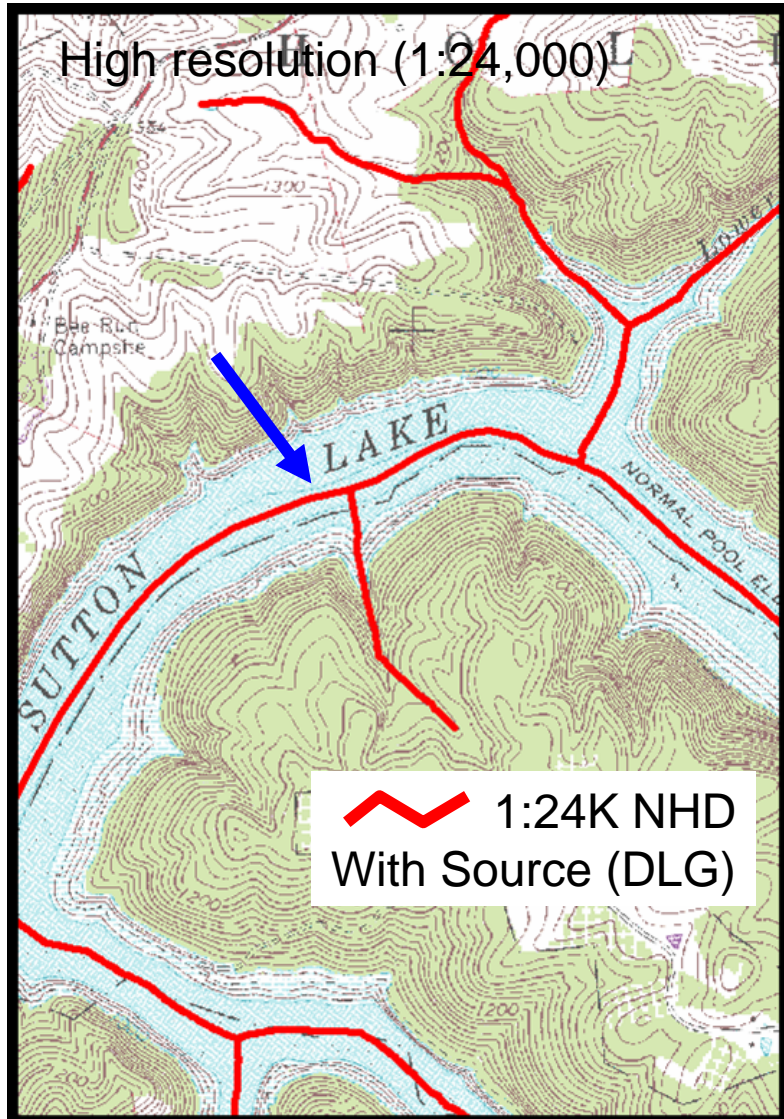
1:24,000 scale NHD
High resolution



1:4,800 scale streams
Local resolution
(approximated from
SAMB stream data)



Scale comparison



Benefits of developing Local NHD

Local resolution NHD will improve:

1. Cartographic base map
2. Modeling capabilities with NHD
3. Stream mapping accuracy

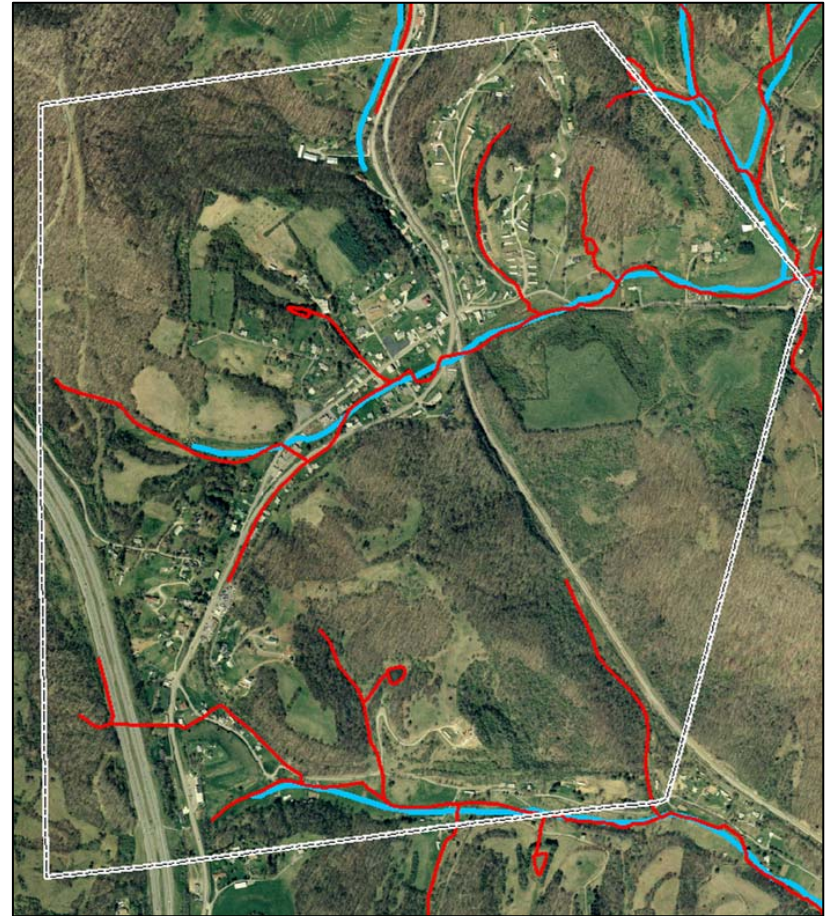
Local resolution NHD will address:

- WV Water Resources Protection Act (SB 163)





Benefits: Cartographic base map

- Local NHD will correspond with WV SAMB imagery and street data
- More appropriate scale for local projects, community mapping than 24K NHD



Flatwoods WV

 24K NHD streams
 SAMB streams

Benefits: Cartographic base map

- 24K NHD does not overlay well with DOQQ or SAMB photos (scale issues)



Indian Creek area,
Big Chimney DOQQ

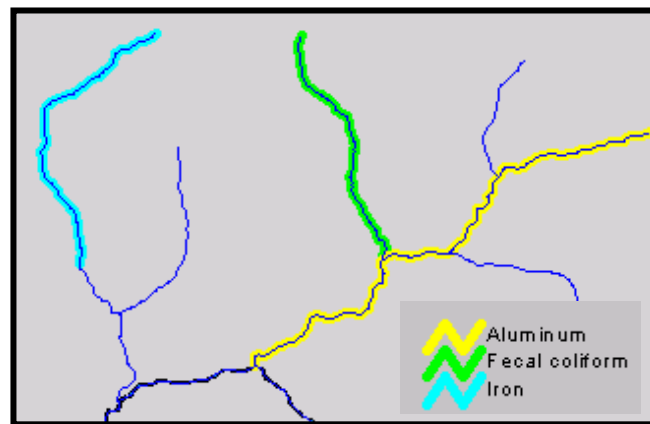
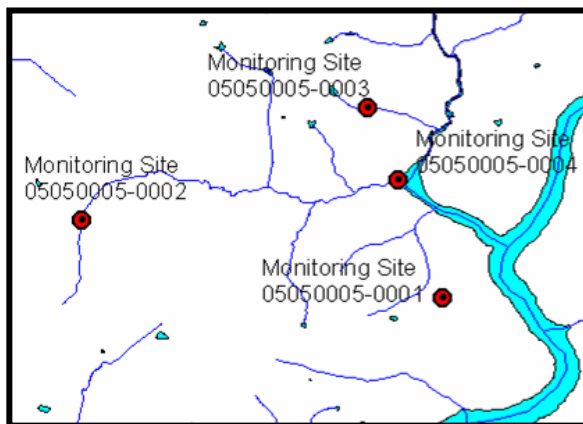
Benefits: Base map (cont'd)

- More accurate stream mileage for stream mitigation projects, riparian buffers
- Aid in floodplain mapping and emergency planning
- More detailed dataset for resource management and planning, permitting, cumulative impact analysis



Benefits: Improved modeling

- NHD data structure enables modeling of:
 - Stream networks and flow
 - Locations along streams (points)
 - Stream segments



Benefits: Modeling (cont'd)

- Local NHD could serve as basis for model of perennial/intermittent streams in WV
- Perennial/intermittent designation not yet reliably mapped at any scale for WV

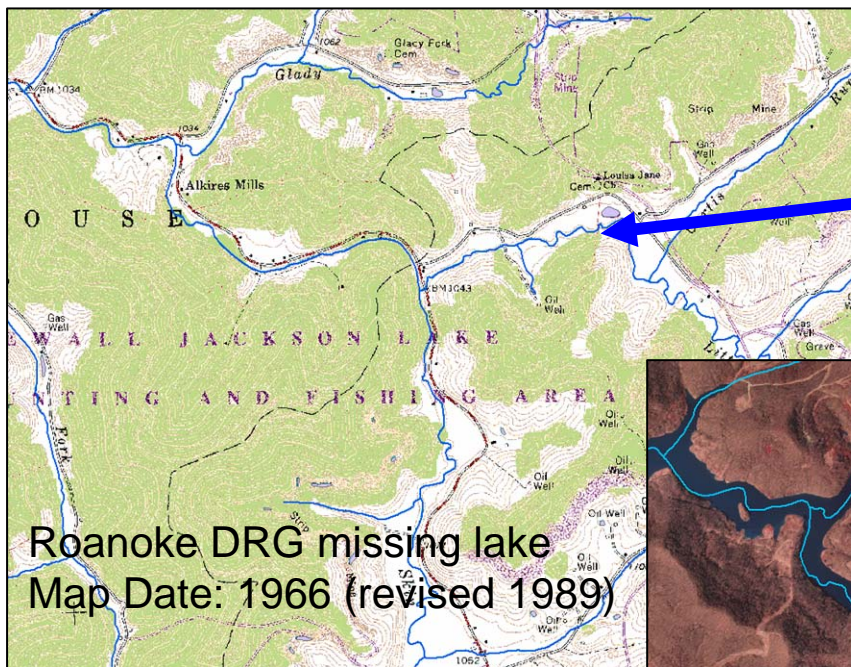


Toms Run, Rupert Quad
USGS Intermittent map symbol

Benefits: Updates to existing data

- 24K NHD errors and omissions can be addressed in local NHD
 - Local NHD linework will be completely new, not based on 24K lines
 - NHD attributes will be transferred from 24K to local only if correct
- Examples of 24K NHD errors/omissions...

24K Errors: Stonewall Jackson Lake



Stonewall Jackson Lake
Built late 1980s



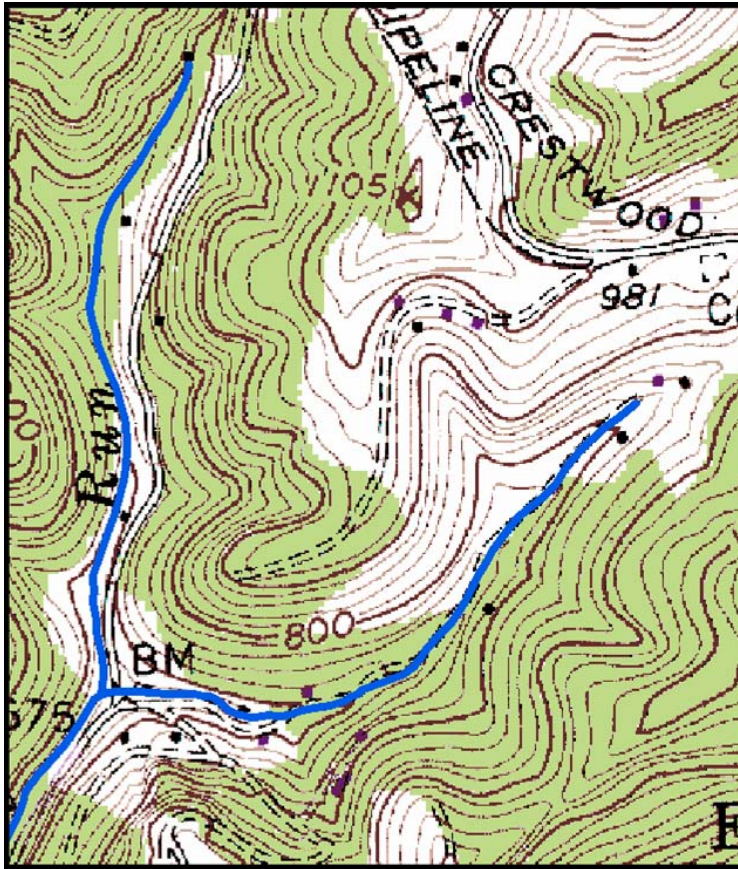
Roanoke DRG missing lake
Map Date: 1966 (revised 1989)

NHD linework comes directly from DLG files. If actual waterbodies are more recent than DLG data, they will not be included in the NHD.

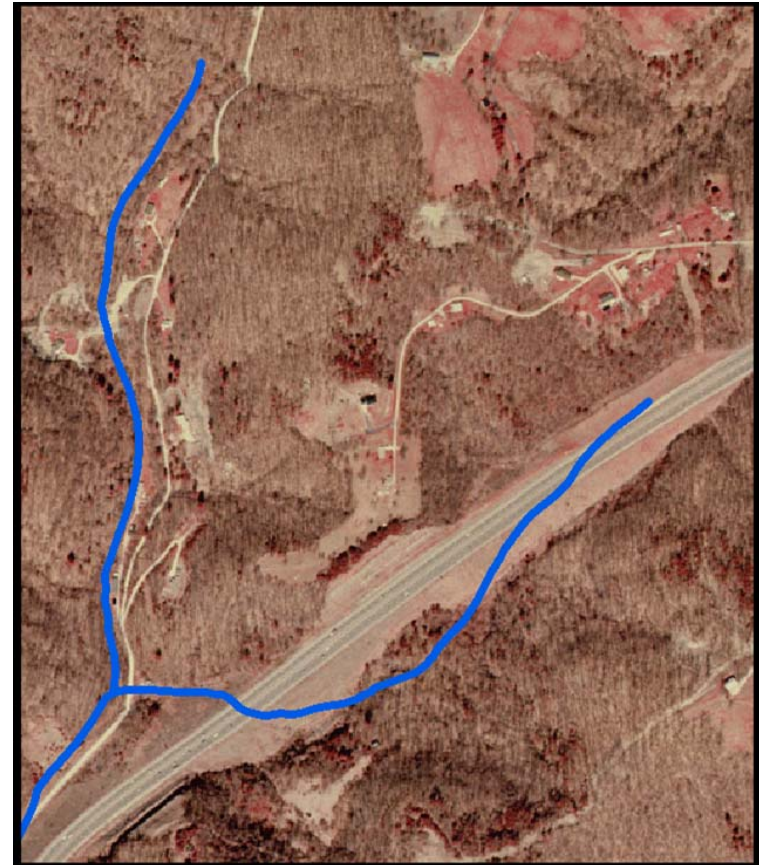


Roanoke DOQQ with lake
Photo Date: 1997

24K Errors: Road construction



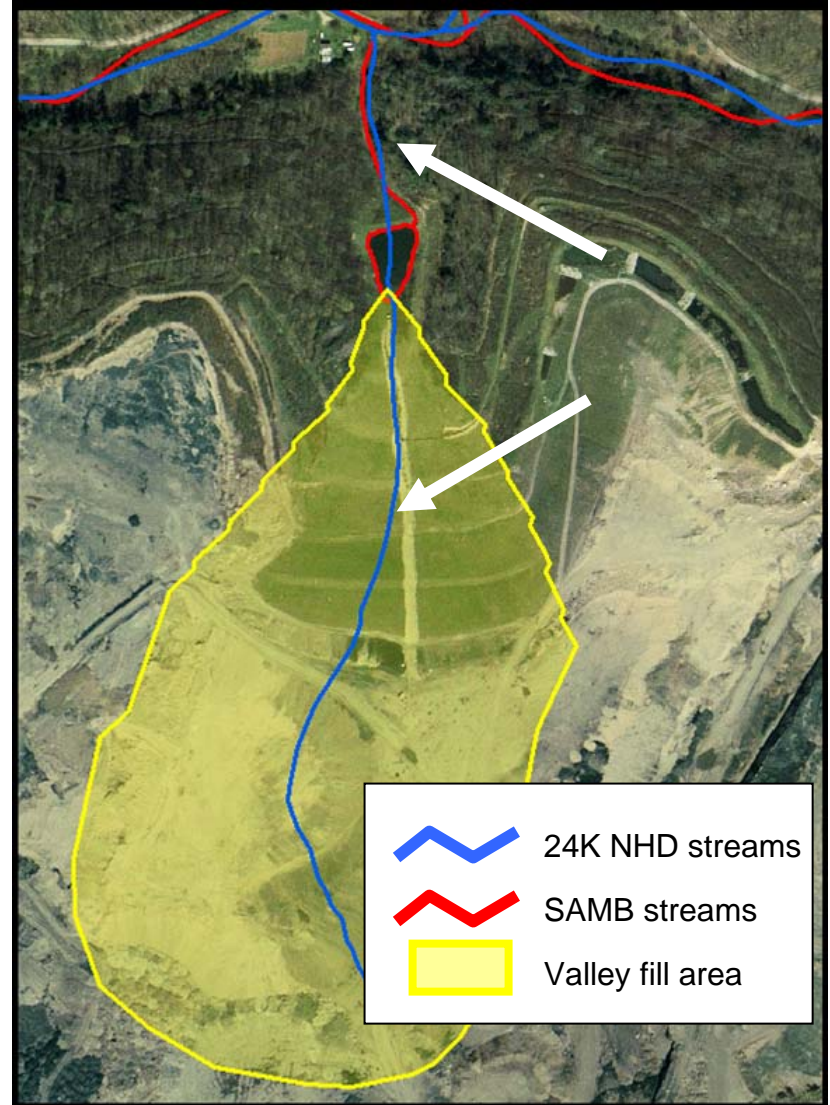
Big Chimney quad
Last revised: 1976



Big Chimney 24K NHD – matches DRG
Does not reflect stream alterations from I-79
construction

24K Errors: Mining

- Valley fills and more recent mining activities cause stream alterations that are not captured in current NHD
- Local NHD would be based on SAMB imagery, thus project will include recent changes
- Provides better information for future assessments



Active mine permit, Lockwood quad

Benefits: Water Resources Protection

- WV Water Resources Protection Act
(Senate Bill 163, 2004)

Section 22-25-3 (emphasis added):

The waters of the state of West Virginia are hereby claimed as valuable public natural resources held by the state for the use and benefit of its citizens. The state shall manage the quantity of its waters effectively for present and future use and enjoyment and for the protection of the environment.

Therefore, it is necessary for the state to determine the nature and extent of its water resources, the quantity of water being withdrawn or otherwise used and the nature of the withdrawals or other uses...

Section 22-25-2:

“Water resources”, “water” or “waters” means any and all water on or beneath the surface of the ground, whether percolating, standing, diffused or flowing, wholly or partially within this state, or bordering this state and within its jurisdiction, and includes, without limiting the generality of the foregoing, natural or artificial lakes, rivers, streams, creeks, branches, brooks, ponds, impounding reservoirs, springs, wells, watercourses and wetlands: *Provided*, That farm ponds, industrial settling basins and ponds and waste treatment facilities are excluded from the waters of the state.



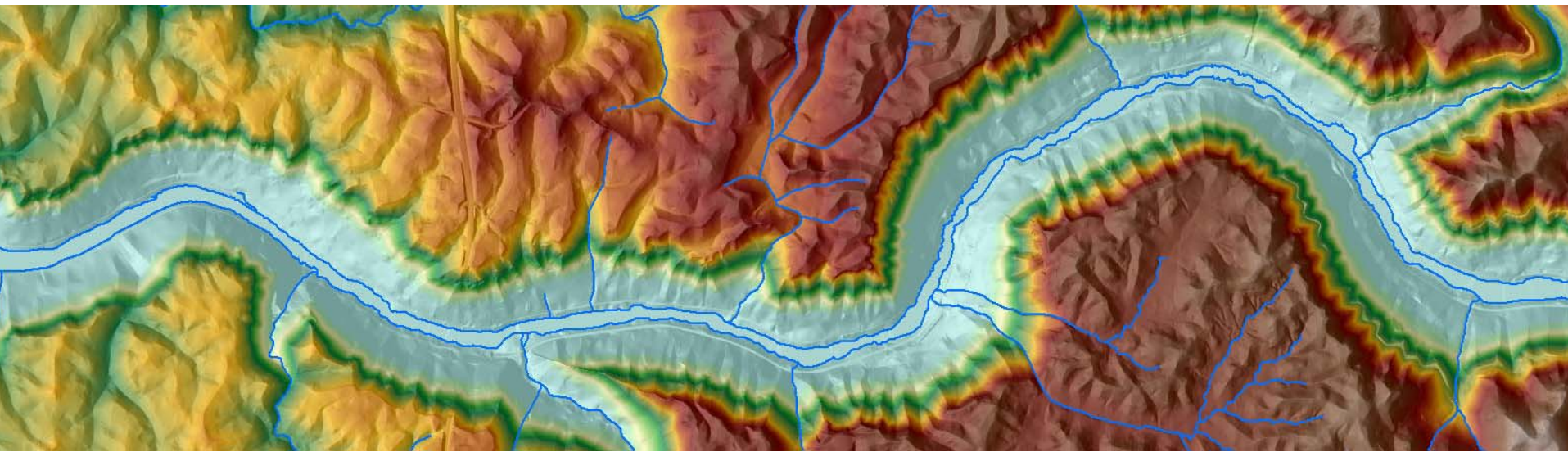
Benefits: Water Resources Protection

SB 163:

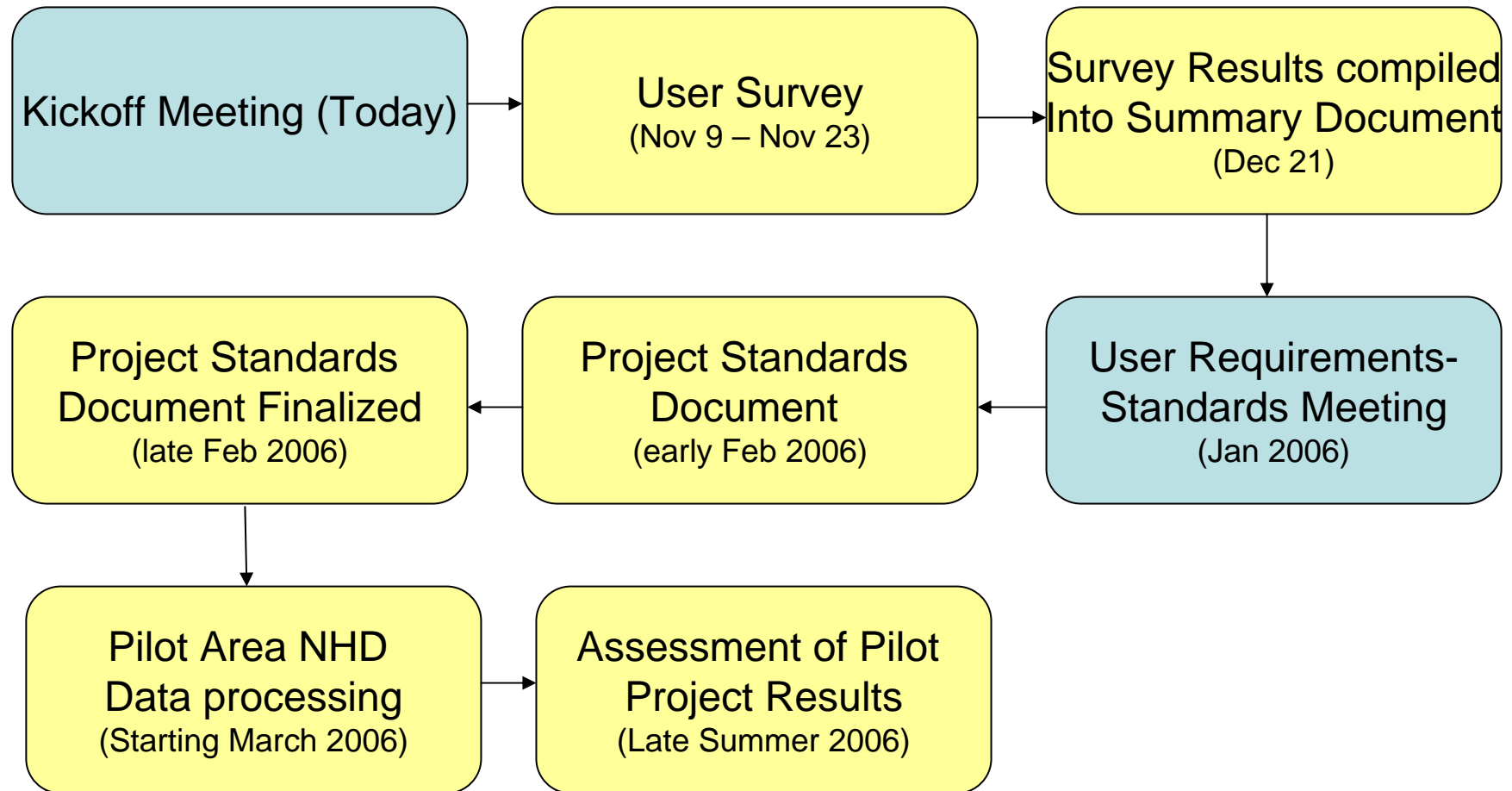
- Result of concern over water withdrawals
- Requires DEP secretary (and other agencies) to report by December 2006:
 - Location and quantity of surface and groundwater resources of WV
 - Extent of water withdrawals
- NHD data may be used to help meet this reporting requirement

Other local stream mapping efforts

- Vermont – Mike Brouillette
 - North Carolina
 - Tennessee
- } Joe Sewash



Local NHD Process for WV



Anticipated Technical Issues

- Data Standards
- Repairs to 24K NHD
- Additions to 4.8K data
- Culverts



Methodology

- Surveys – two purposes
 - 1) Establishing standards and definitions
 - 2) NHD user requirements and expectations
- Compilation of known 24K errors
 - Users!
 - Omissions, reach errors

Methodology 2

- Within pilot watersheds:
 - Repair known 24K errors
 - Review 1:4800 scale data and edit, repair and update where necessary







Methodology 3

- Repairing errors will rely on several data sources, including:
 - 24K NHD
 - SAMB Photography
 - Artificially generated streams utilizing new, high resolution DEMs (acreage tolerance at appropriate scale, TBD)
 - Ancillary sources (TBD)

Methodology 4

- Attribute 1:4800 data with DLG codes to prep for NHD process
 - May involve splitting and specific attribution
 - Polygon creation
- USGS tools for NHD creation, 3 steps:
 - Pre-conflation
 - Conflation
 - QA/QC



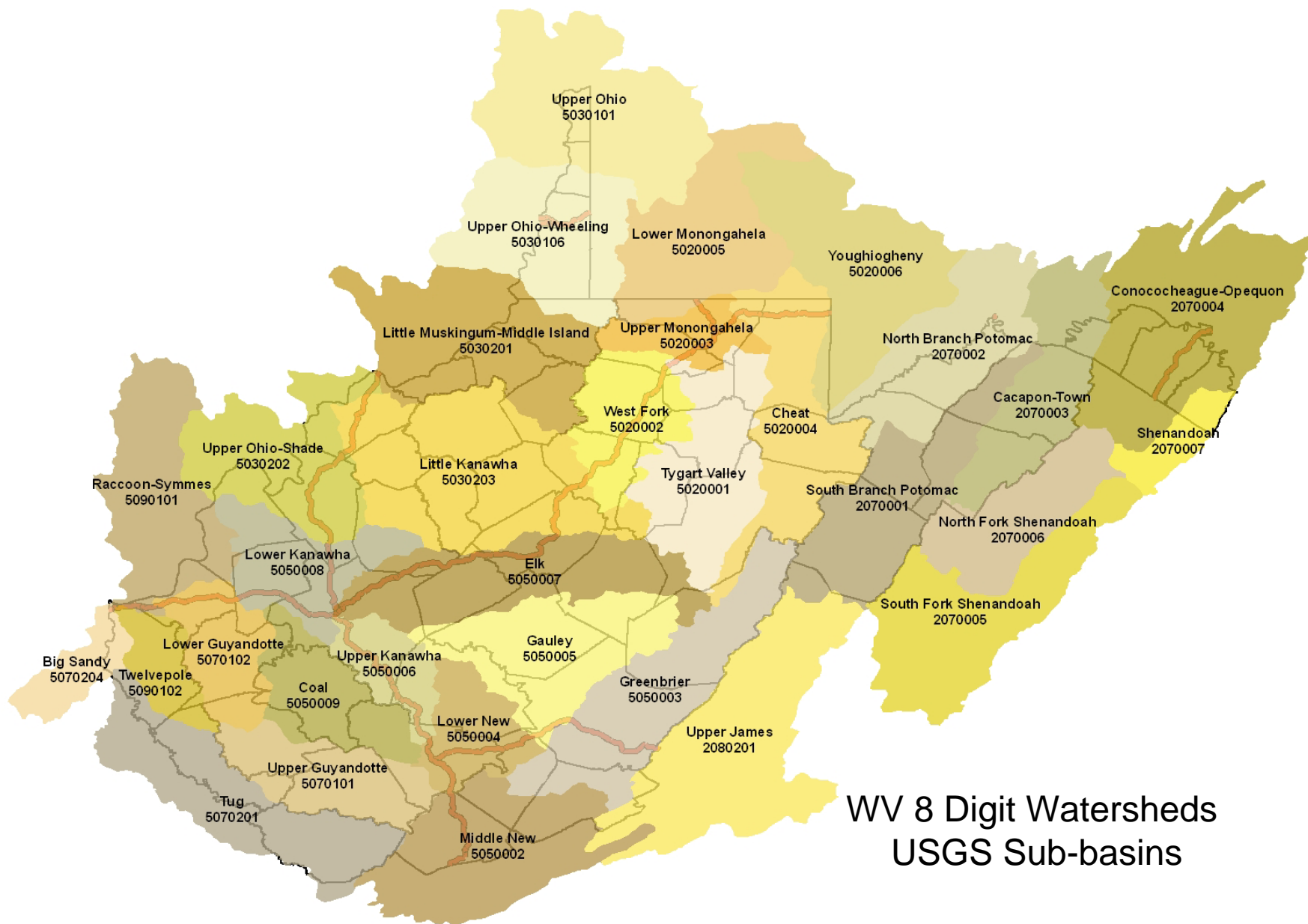
Next Steps

- Surveys! Your participation is vital!
- Selection of pilot watersheds
 - Two pilot watersheds, selected with the following criteria:

Pilot Watershed Criteria

- 8 digit watershed, not very large
- No karst features
- 24K NHD should require only minor repairs
- Ancillary data available, or easily field checkable
- Area of current research or regulation
- Entirely within West Virginia





WV 8 Digit Watersheds
USGS Sub-basins

Methodology Development

- The purpose of pilot projects:
 1. Determine feasibility of statewide completion
 2. Establishment of data preparation methodology
 3. To demonstrate improved applications with transfer from 24K to 4.8K
 4. Explore methods of generalizing to coarser scales for cartographic purposes
- Pilot projects will also give us a better idea of timelines and funding needs

Stakeholder Input

- Assembly of standards and definitions
- Assembly of known 24K errors
- NHD Utilization and Improvement study

Please help!

Stakeholder Input 2

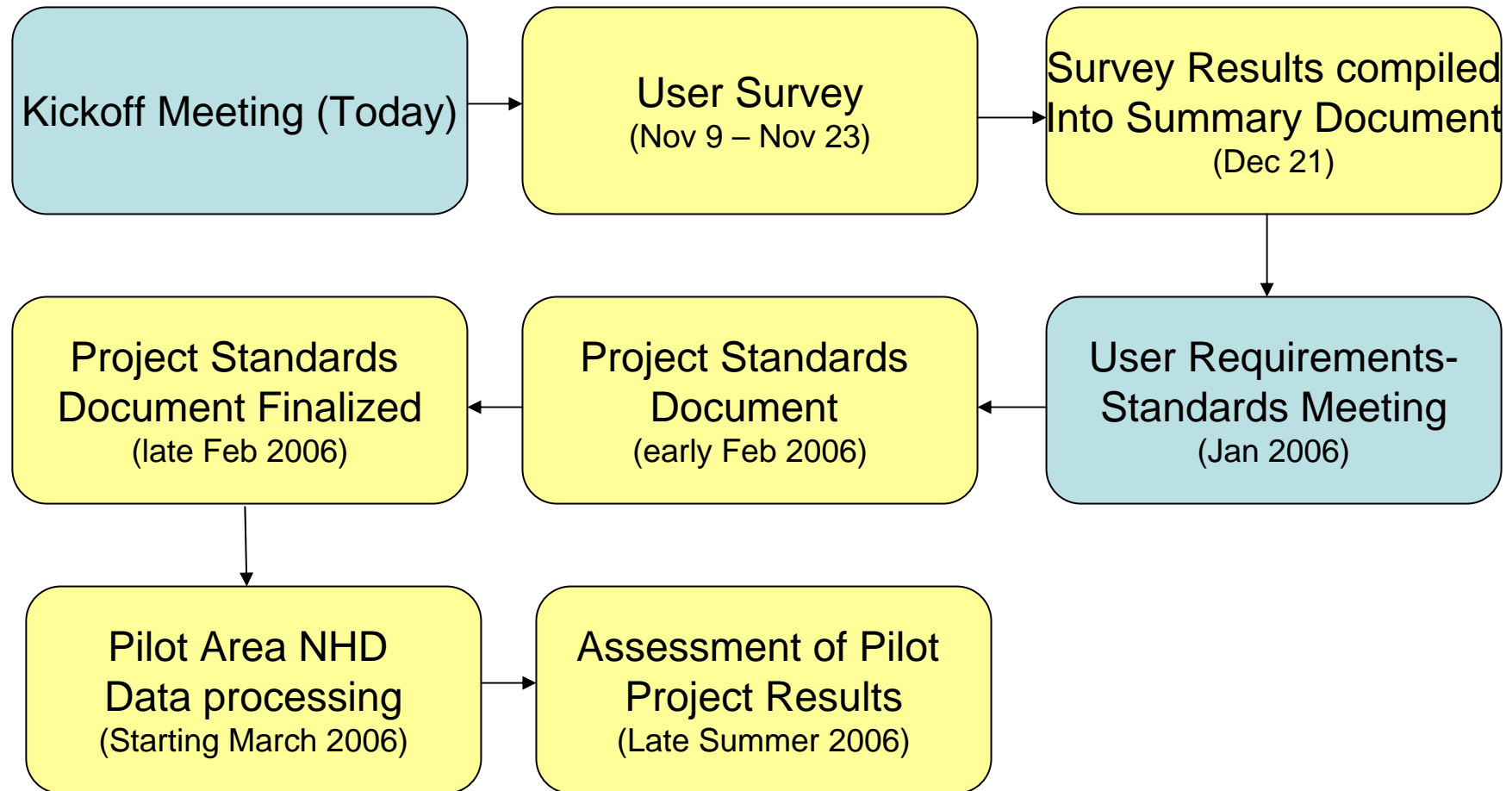
- Document detailing present uses, future needs and expectations in digital stream GIS data in West Virginia
 - Expected to be complete by late December 2005

Timelines

- Generally speaking...
- Pilot projects begin by Spring of 2006
- Complete by Aug/Sept 2006
- Full production started by Fall of 2006



Local NHD Process for WV



Personnel Requirements

- One trained supervisor
- One part time technical consultant
- Three trained technicians
- Working full time, exclusively on NHD, project will take approximately 3 years



Anticipated Funding

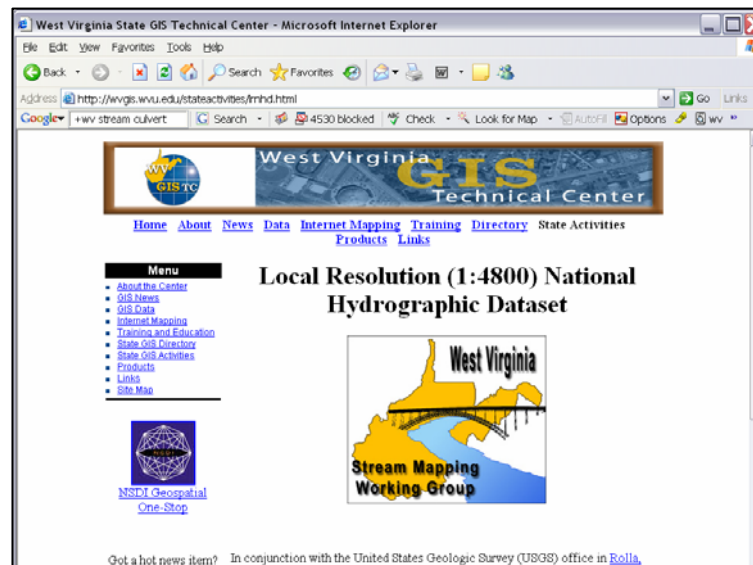
- Pilot project is funded through USGS and the Office of the State GIS Coordinator
- Future funding to be determined
 - 24K NHD in WV: \$900,000
 - Local NHD in NC: \$15 million
- Pilot projects will help determine future funding needs

Website

Project Website:

<http://wvgis.wvu.edu/stateactivities/LRNHD.html>

- Will contain news, documents, presentations and sample data



Summary

- Local Resolution NHD pilot project is planned, two demonstration watersheds
 - SAMB aerial photos and stream datasets will form basis of 1:4800 stream maps for WV
 - LR NHD will provide many benefits, and will overcome some shortcomings of 24K NHD
- Your input (via survey, future meetings) will help determine:
 - Stream mapping needs
 - Project standards and methods



Thank you!

A scenic photograph of a river flowing through a forest. The river is surrounded by large, smooth rocks and is bordered by dense trees with green and yellow foliage. The sky is blue with scattered white clouds. A semi-transparent rectangular box is centered over the image, containing the word "QUESTIONS?".

QUESTIONS?

Discussion

- How does Senate Bill 163 affect you? Does spatial data fit into the mandates and needs of that bill?
- Do you, the users, think that going to local resolution NHD will improve your ability to do your job?
- Are there any other stakeholders that should be involved with this project and the West Virginia Stream Mapping Working Group?



Discussion

- Are parties/agencies interested in committing funding and/or personnel to the project?
- How should we plan for (and pay for) maintenance and updates of the NHD (24K now, 1:4800 possibly in the future) within WV?
- Suggestions for pilot watersheds?