



CE 3354 ENGINEERING HYDROLOGY

LECTURE 4: WATERSHED DELINEATION; WATERSHED METRICS



OUTLINE

- Watershed Delineation
- Watershed Metrics

WATERSHED DELINEATION

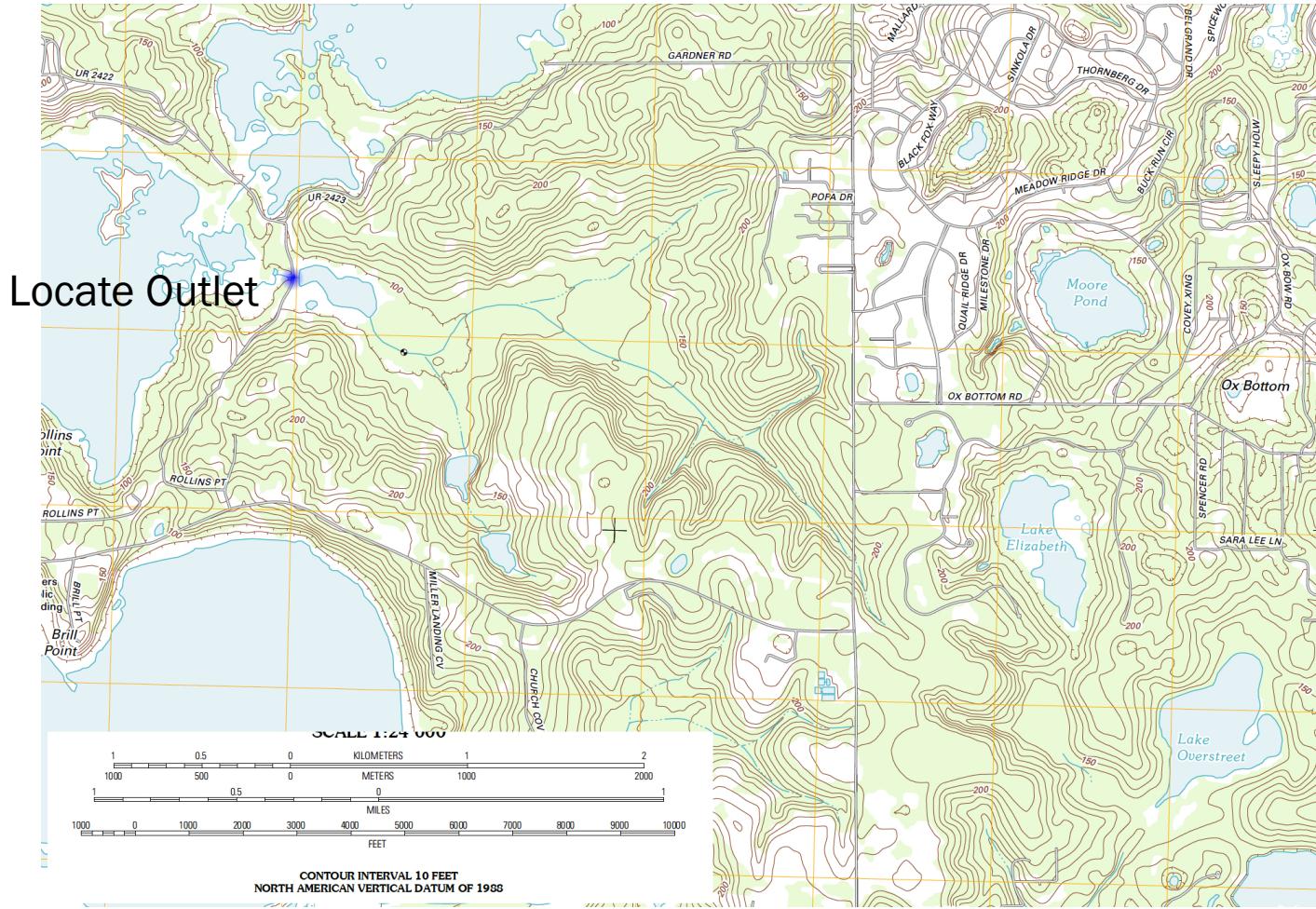
- Identifies the boundaries of our hydrologic unit / area of study.
 - Need to interpret topographic maps (or DEM/DTM) to construct the boundary

IDENTIFYING WATERSHED BOUNDARIES

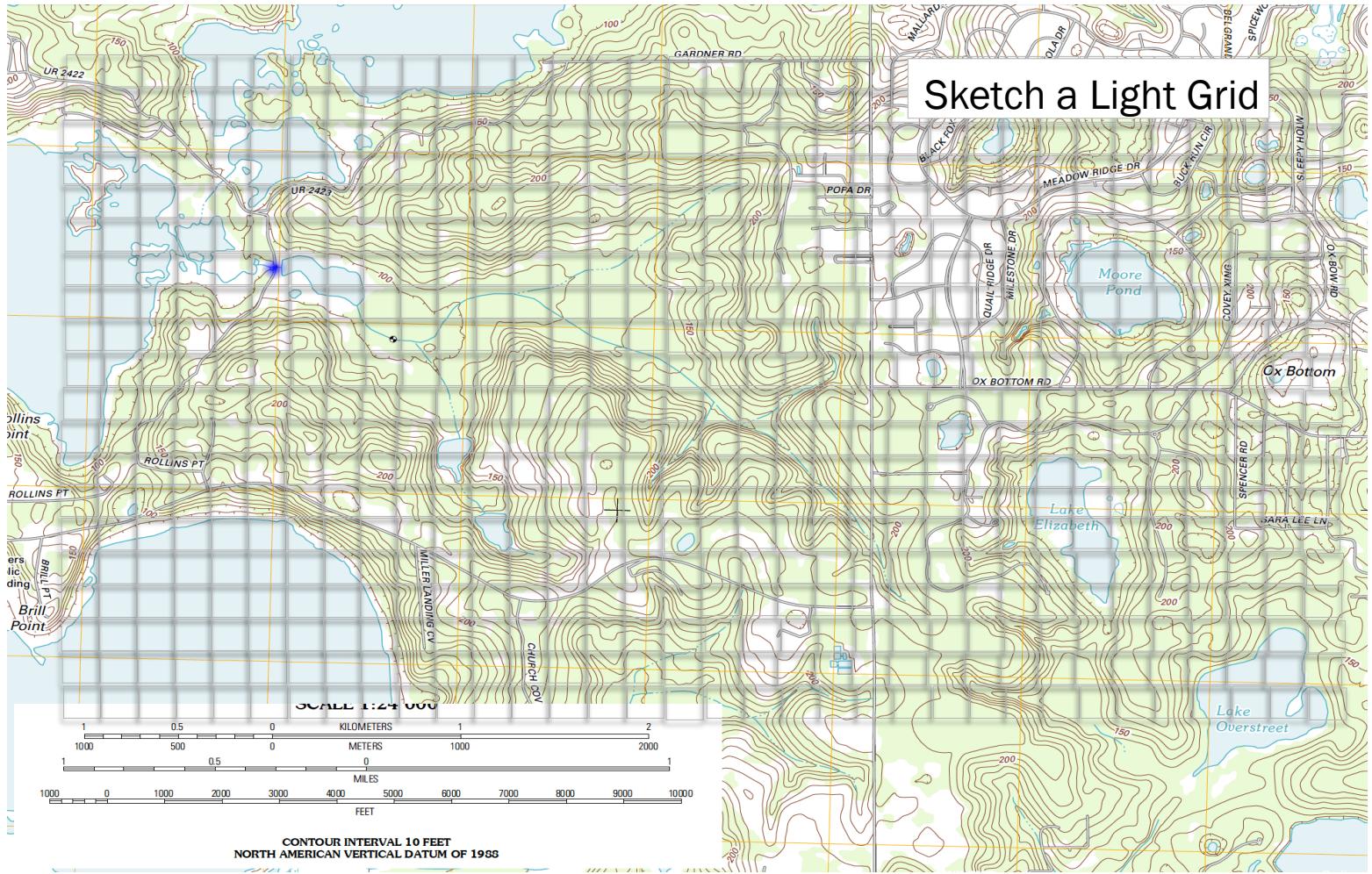
↗ Steps to delineation

- ↗ Superimpose a grid to estimate average elevations
- ↗ Trace/outline outline the main stem of the stream that you want to examine
- ↗ Trace all perennial or influential tributaries
- ↗ Locate the lowest point/outlet of the main stem and work uphill

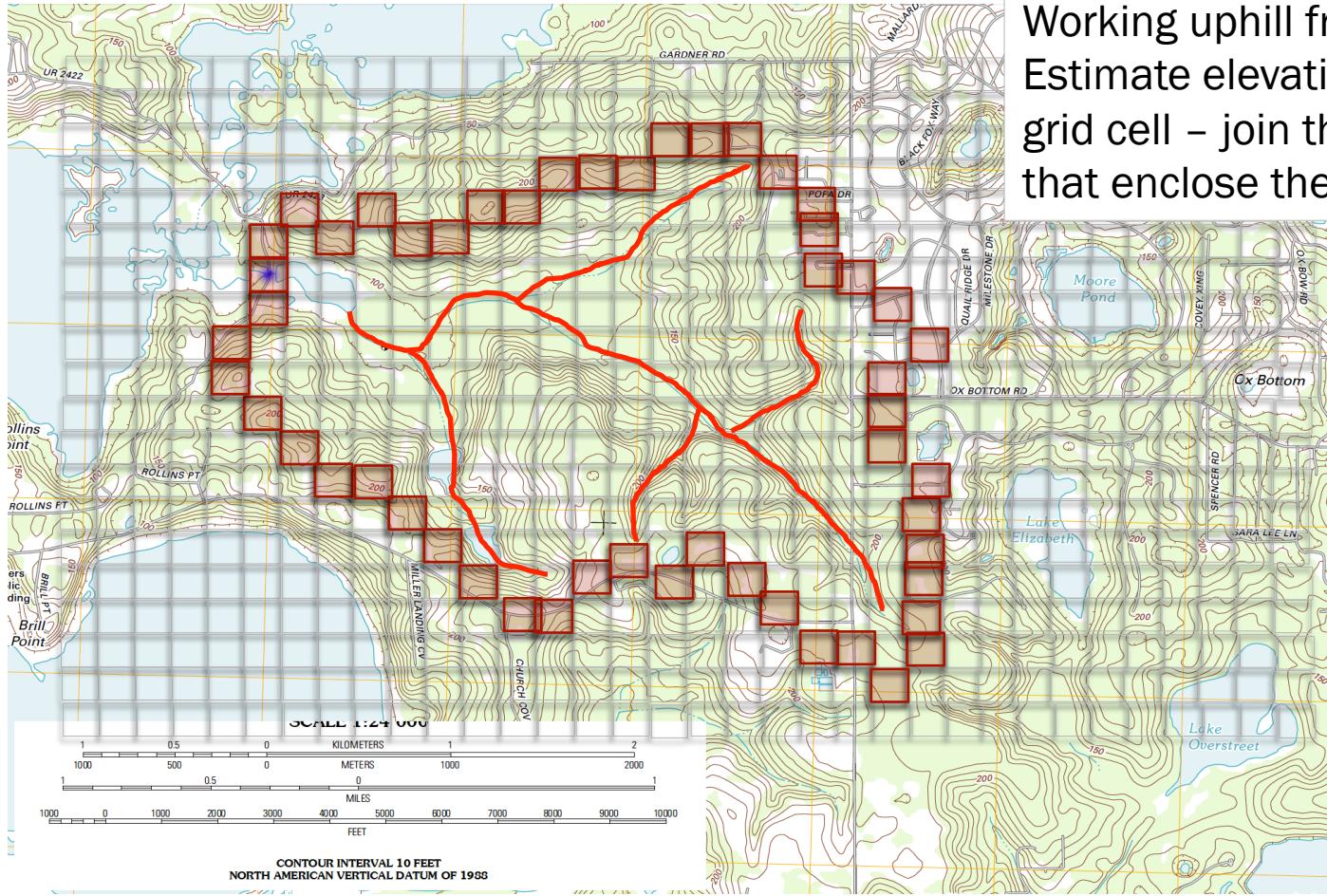
WATERSHED DELINEATION



WATERSHED DELINEATION

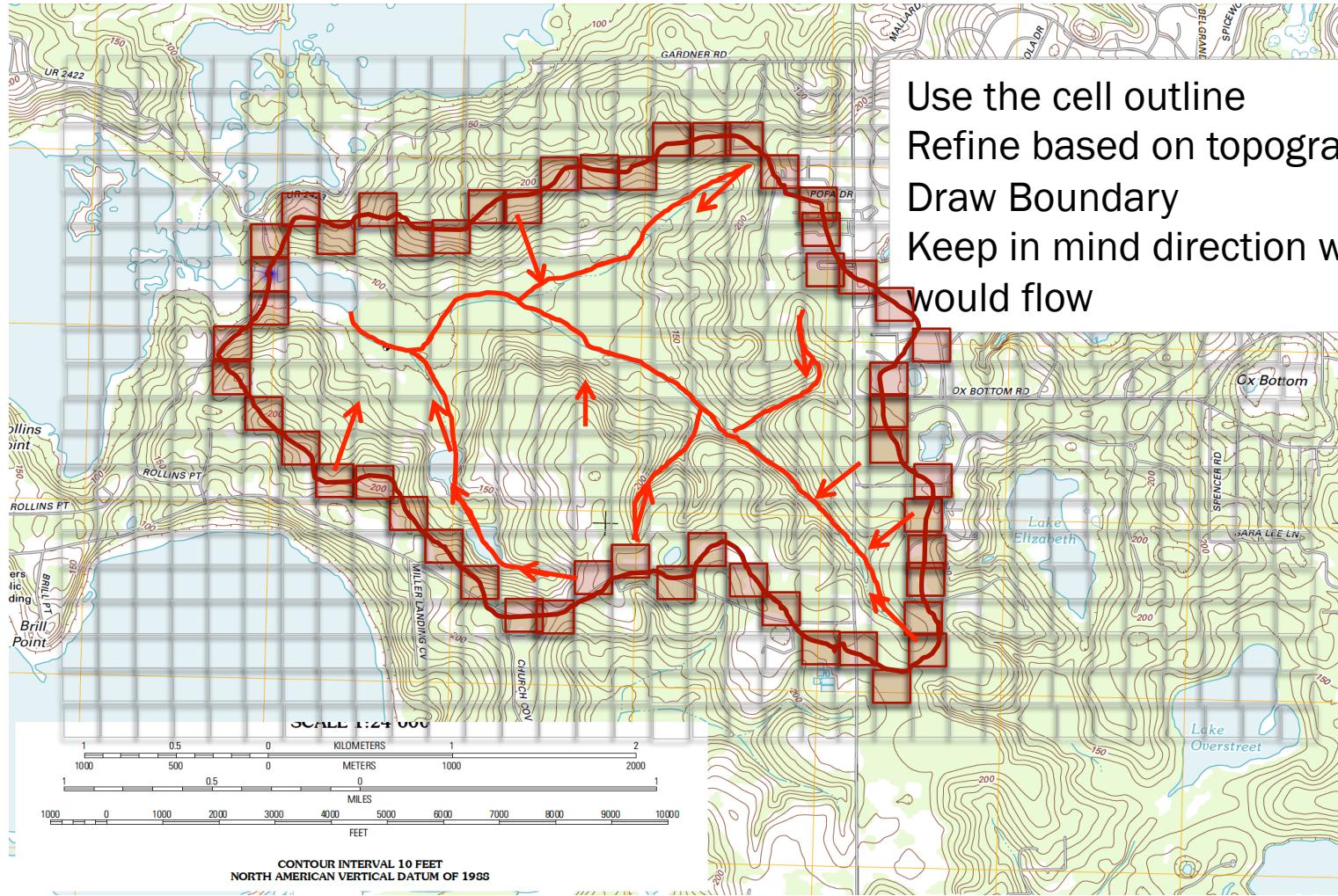


WATERSHED DELINEATION

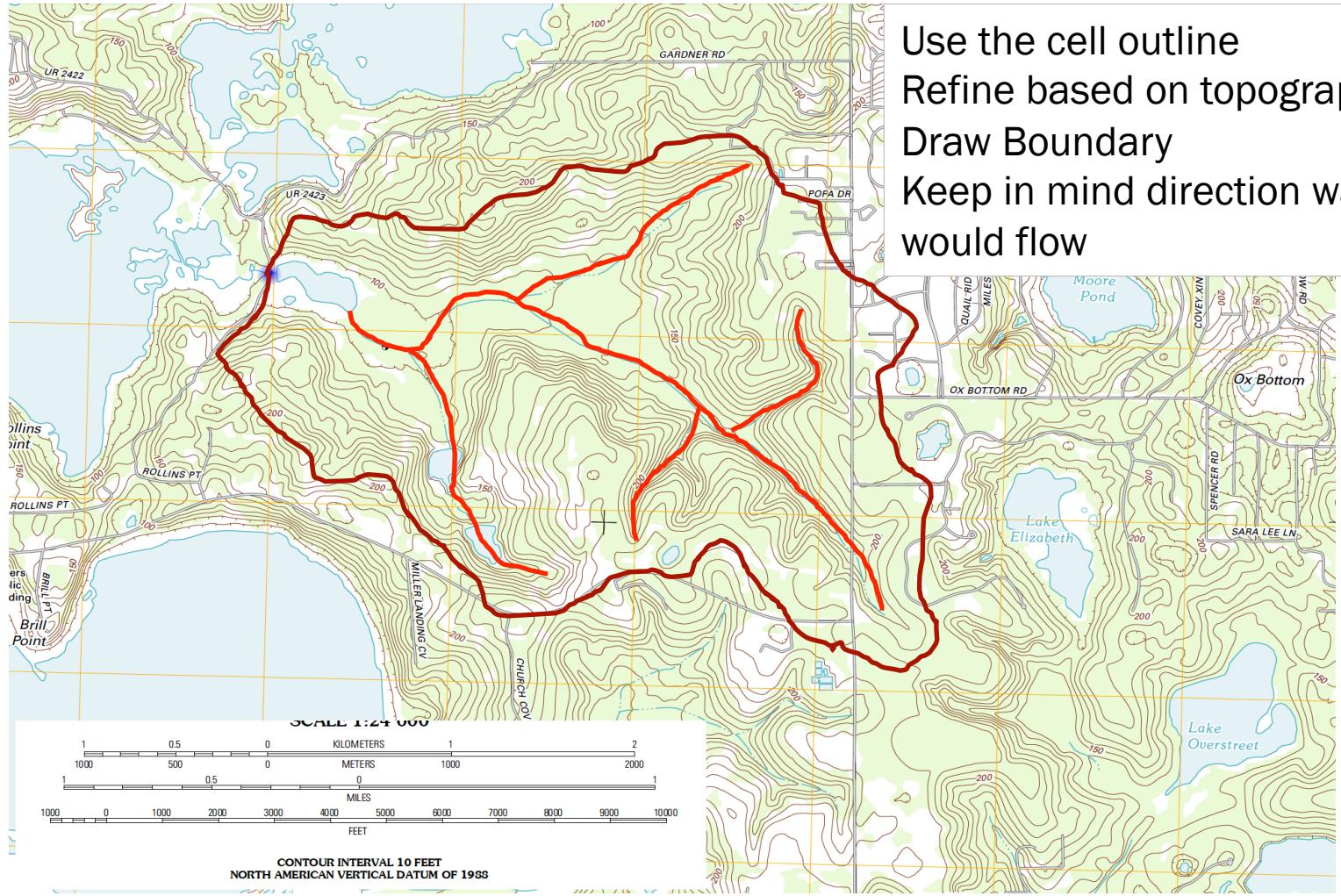


Working uphill from outlet
Estimate elevations in each
grid cell – join the high cells
that enclose the outlet

WATERSHED DELINEATION



WATERSHED DELINEATION



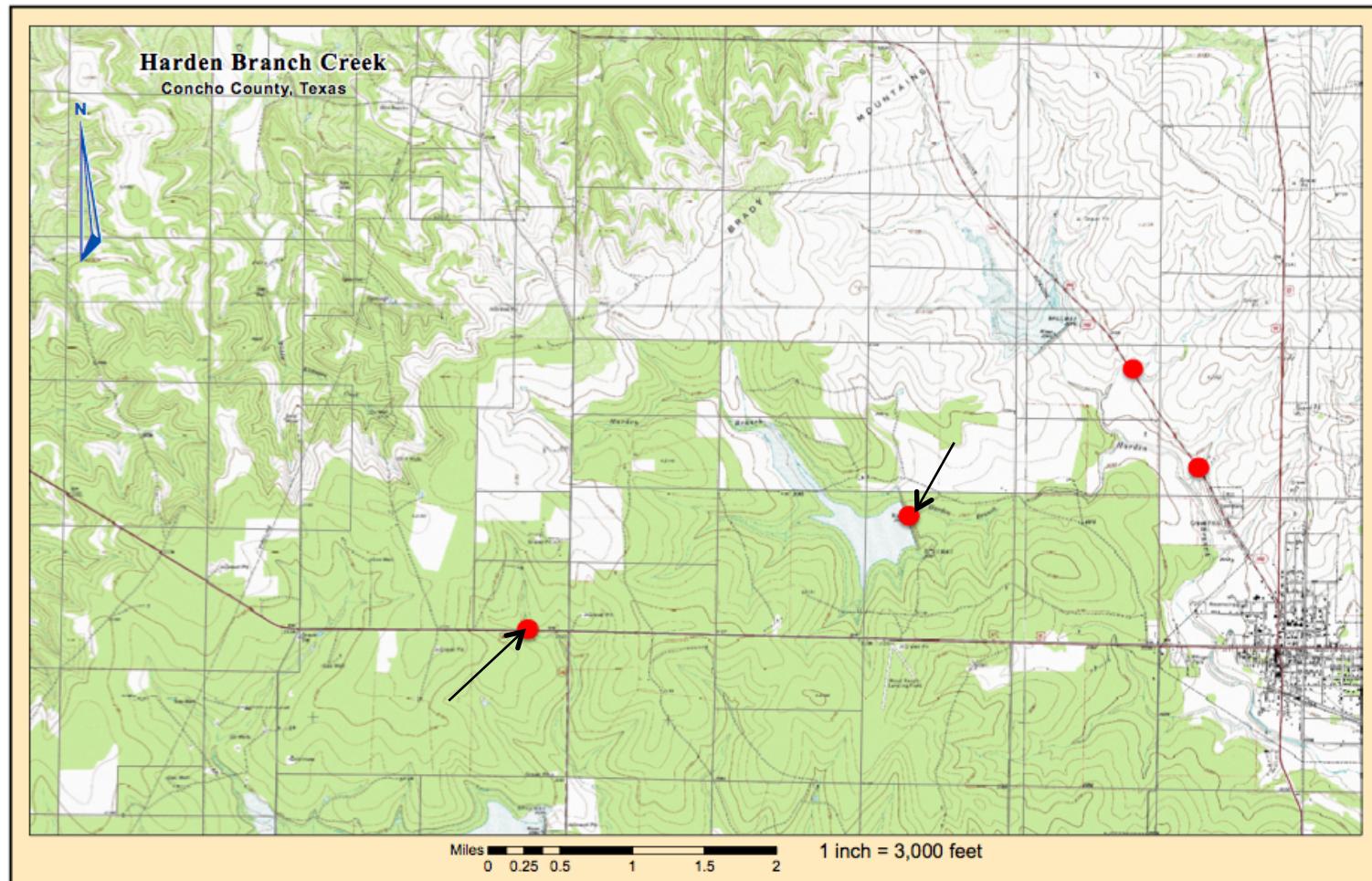
WATERSHED METRICS

- ↗ The fundamental unit in surface water hydrology is the watershed.
- ↗ A watershed is defined as the area on the surface of the earth that drains to a specific location.
- ↗ Watershed properties include:
 - ↗ Area
 - ↗ Main channel length
 - ↗ Slope (requires the specification of path),
 - ↗ Soil moisture/permeability

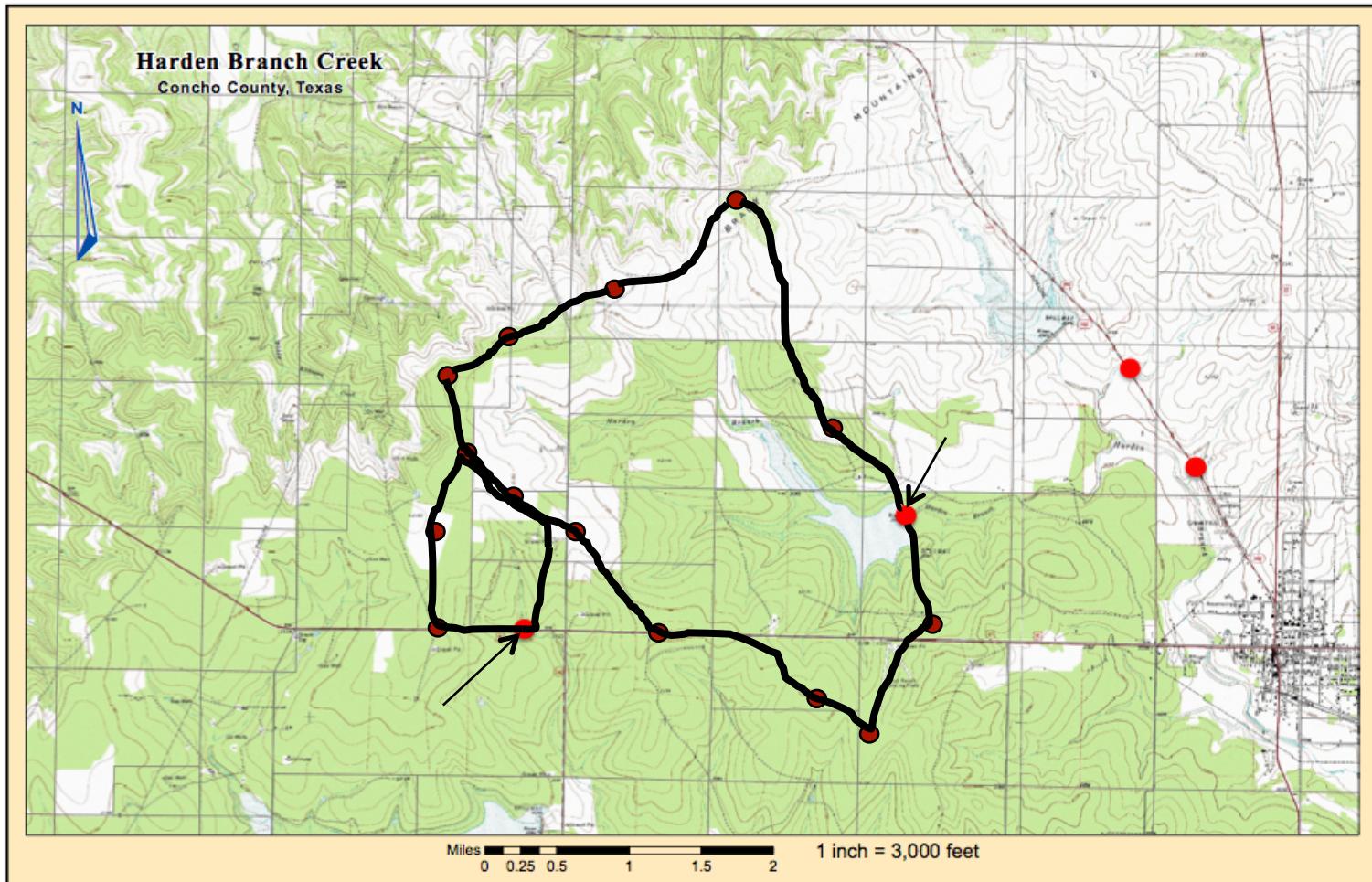
AFTER DELINEATION

- Watershed physical and descriptive characteristics determined after delineation include:
 - Areas
 - Lengths
 - Slopes (along defined paths)
 - Cover type
 - Soil properties

HARDEN BRANCH WATERSHED



HARDEN BRANCH WATERSHED



WATERSHED METRICS

- ↗ How to measure area
 - ↗ Numerical Planimetry
 - ↗ Arc GIS
 - ↗ AutoCad (Polygon Area)
 - ↗ Acrobat Pro (Measuring Tools)
 - ↗ Surfer
 - ↗ ENGAUGE
 - ↗ G3DATA+PolyArea.xls
 - ↗ Mechanical Planimetry
 - ↗ Count squares

WATERSHED METRICS

➤ How to measure lengths

- ArcGIS
- AutoCad
- Acrobat Pro
- Surfer
- ENGAUGE
- G3DATA
- By-hand

WATERSHED METRICS

➤ How to find soil properties

➤ Web Soil Survey

➤ Soil Maps



The screenshot shows the homepage of the Web Soil Survey (WSS). At the top, there's a banner featuring the USDA logo, the text "United States Department of Agriculture", and "Natural Resources Conservation Service". Below the banner, a large image displays various soil textures and colors. A prominent green button on the right says "START WSS". To the left, a sidebar has a "Search" section with fields for "Enter Keywords" and "All NRCS Sites", and a "Browse by Subject" section with links like "Soils Home", "National Cooperative Soil Survey (NCSS)", "Archived Soil Surveys", etc. The main content area includes a "Welcome to Web Soil Survey (WSS)" message, a photo of three people working in a field, and a detailed description of the service. On the right, a sidebar titled "I Want To..." lists various options such as "Start Web Soil Survey (WSS)", "Know the requirements for running Web Soil Survey", and "Find what areas of the U.S. have soil data". At the bottom, there's an "Announcements/Events" section with a single item about the release of version 3.1.

websoilsurvey.sc.egov.usda.gov/App/HomePage.h

Home About Soils Help Contact Us

You are here: Web Soil Survey Home

START WSS

I Want To...

- Start Web Soil Survey (WSS)
- Know the requirements for running Web Soil Survey — will Web Soil Survey work in my web browser?
- Know the Web Soil Survey hours of operation
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey
- Know the SSURGO data structure

Welcome to Web Soil Survey (WSS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Announcements/Events

- Web Soil Survey 3.1 has been released! View

WATERSHED METRICS

➤ How to find soil properties

➤ Web Soil Survey

➤ Soil Maps

The screenshot shows the homepage of the Web Soil Survey (WSS). At the top, there's a banner featuring the USDA logo, a ruler, and soil samples. Below the banner, the title "Web Soil Survey" is prominently displayed in yellow. The page includes a search bar, a sidebar with links like "Soils Home", "National Cooperative Soil Survey (NCSS)", and "Archived Soil Surveys", and a large green "START WSS" button. A sidebar on the right lists various "I Want To..." options, such as "Start Web Soil Survey (WSS)" and "Know the requirements for running Web Soil Survey". At the bottom, there's a section about the Welcome to Web Soil Survey (WSS) and announcements.

websoilsurvey.sc.egov.usda.gov/App/HomePage.h

Home | About Soils | Help | Contact Us

You are here: Web Soil Survey Home

Search

Enter Keywords

All NRCS Sites

Browse by Subject

- ▶ Soils Home
- ▶ National Cooperative Soil Survey (NCSS)
- ▶ Archived Soil Surveys
- ▶ Status Maps
- ▶ Official Soil Series Descriptions (OSD)
- ▶ Soil Series Extent Mapping Tool
- ▶ Geospatial Data Gateway

The simple yet powerful way to access and use soil data.

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WATERSHED METRICS

- ↗ How to estimate %-impervious/developed
 - ↗ Google Earth
 - ↗ Find area of interest
 - ↗ Select a viewing height (needs to be same if have to scroll)
 - ↗ Put a grid on the screen (physical grid on see-thru plastic)
 - ↗ Count concrete vs not concrete – relative ratio is a useable estimate of the %-impervious

MINIMAL WATERSHED DESCRIPTION

- ↗ Watershed boundary on a map
 - ↗ Area that drains to the outlet (AREA)
 - ↗ Main Channel Length (MCL)
 - ↗ Slope(s)
 - ↗ Soil Properties (Permeability)
 - ↗ %-Impervious

NEXT TIME

- Discrete Data Preparation