New State Plane Coordinate System

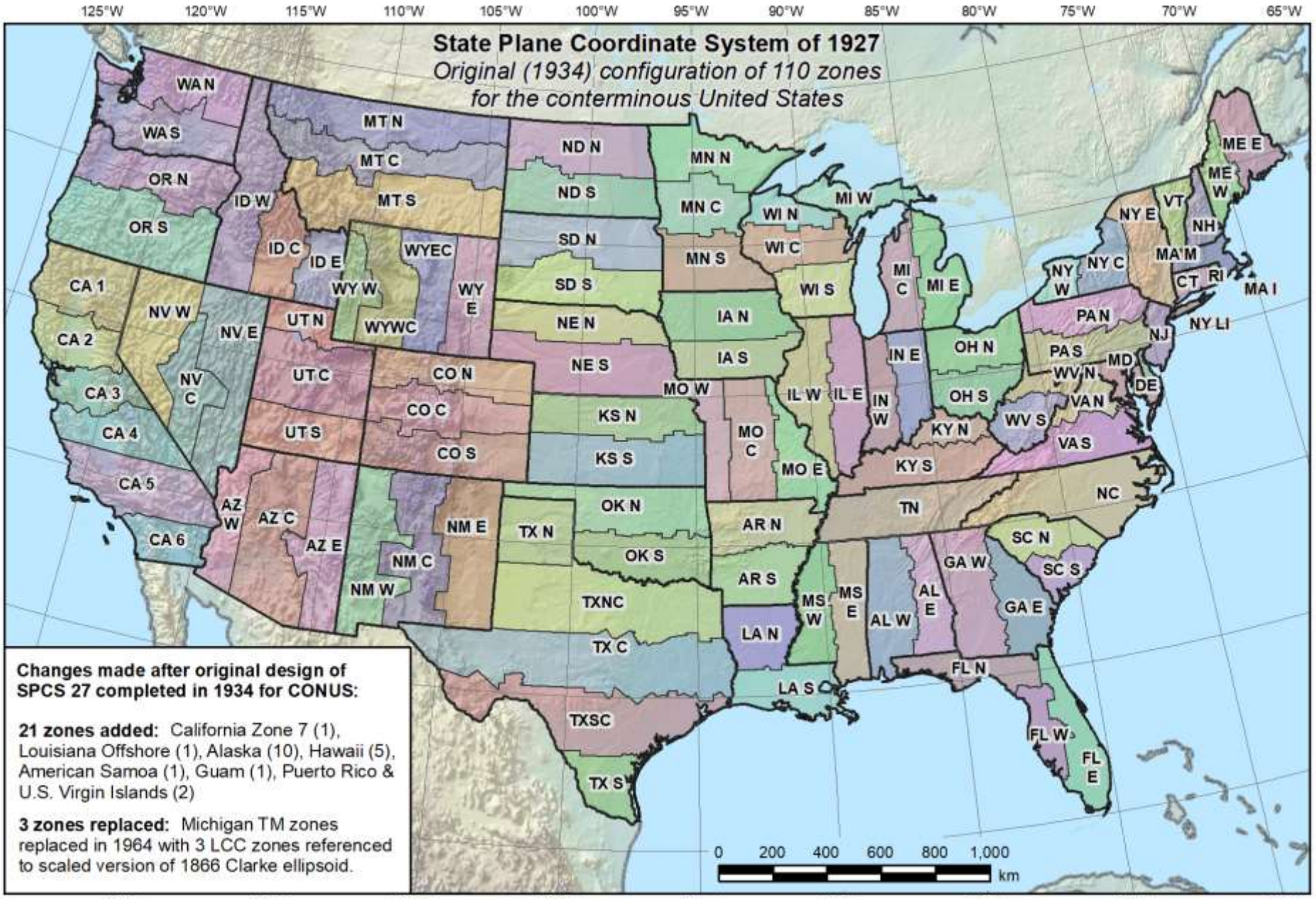
- ***State Plane Coordinate System of 2022 (SPCS2022)***
  - Referenced to new 2022 Terrestrial Reference Frames (TRFs)
  - Based on same reference ellipsoid (GRS 80)
  - Same 3 ***conformal*** projection types
    - Lambert Conformal Conic (LCC)
    - Transverse Mercator (TM)
    - Oblique Mercator (OM)
- NGS in process of specifying SPCS2022 characteristics
  - Draft **policy** and **procedures** for public comment
  - **Federal Register Notice** (FRN) on policy and procedures
  - New **report** on State Plane history, policy, and future (***done!***)

NOTE: SPCS2022 policy, procedures, and FRN currently in review
Approved version may differ from what is presented here but should be finalized before April 12 webinar

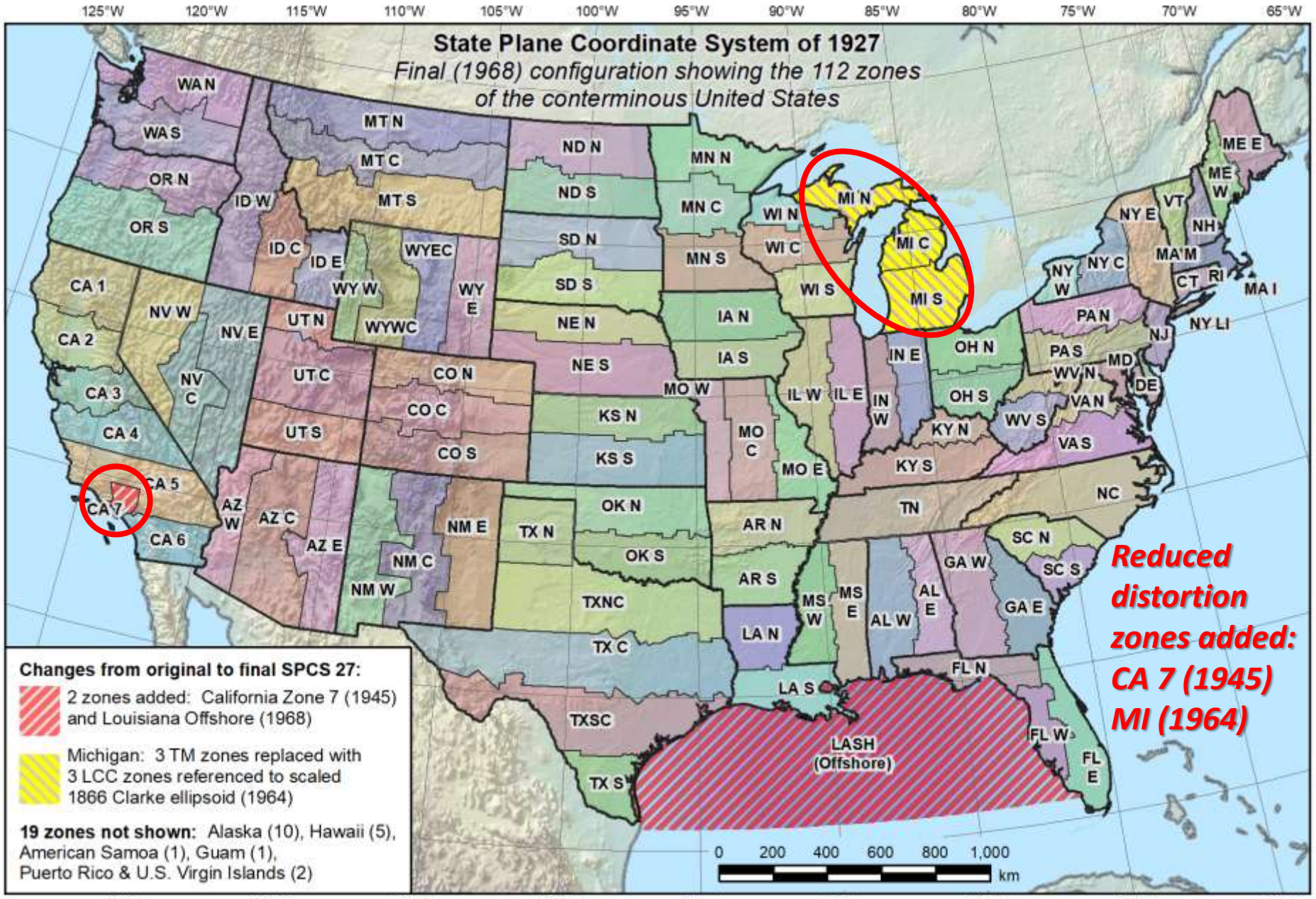
An interesting and varied history

- Initially created for **North Carolina (First in State Plane Coordinates)** at customer request
  - Gave practical access to ***National Spatial Reference System*** (NSRS)
  - SPCS 27 started in 1933, completed in 1934(!)
- Changes from SPCS 27 to SPCS 83:
  - Multi-zone to single-zone for some states (SC, NE, MT)
  - Change in grid origin and units (US feet to meters)
  - American Samoa has no SPCS 83 zone
- Departures from policy and convention:
  - Guam used non-conformal projection for SPCS 27
  - Michigan used "scaled" ellipsoid for SPCS 27 (after 1963)
  - California added small Los Angeles County zone for SPCS 27
  - Kentucky has "layered" (overlapping) SPCS 83 zones
  - Montana single SPCS 83 zone greatly exceeds 1:10,000 scale error

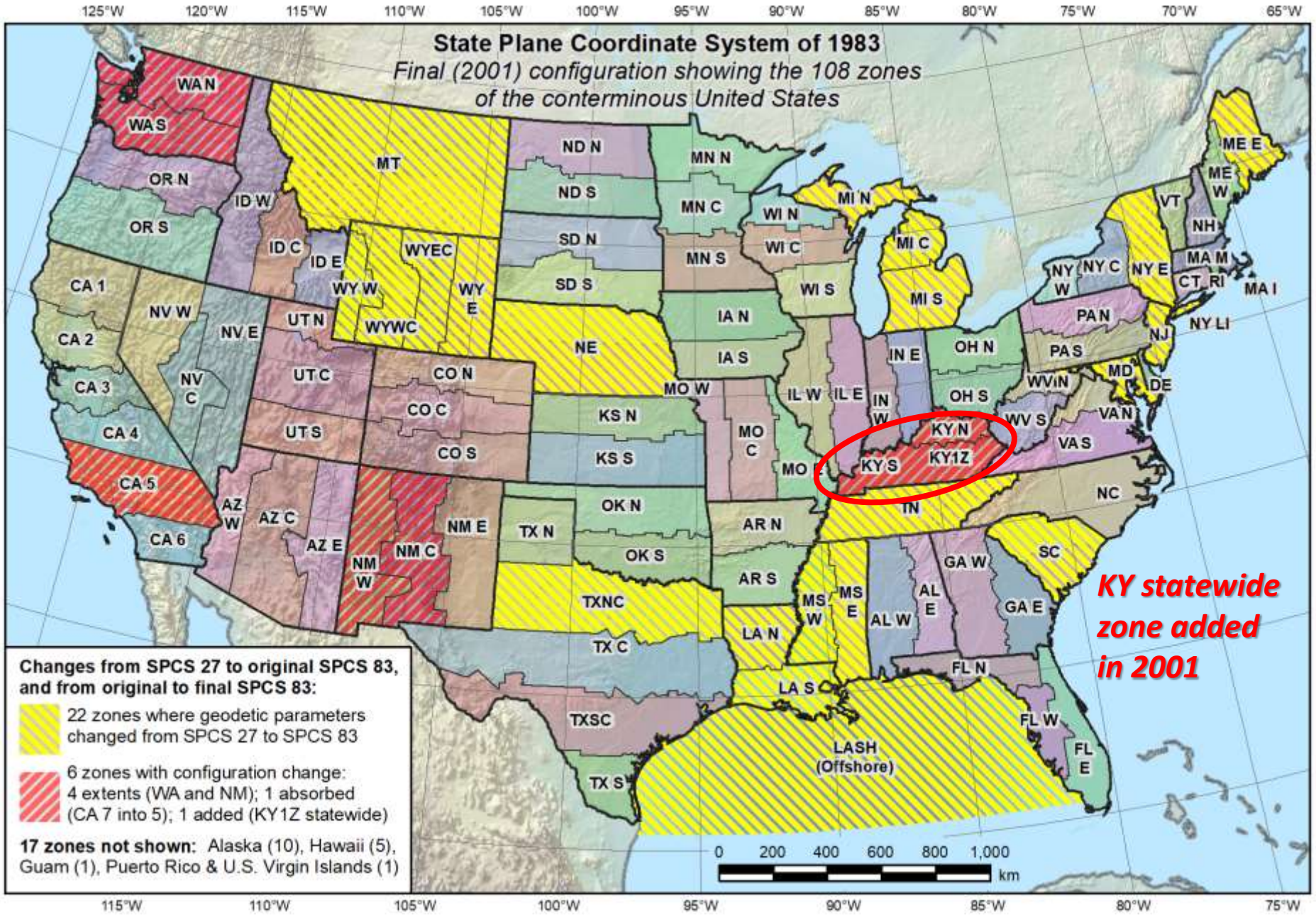
Original SPCS 27, as of 1934 (110 zones total)



Final SPCS 27, as of 1968 (112 zones in CONUS, 131 zones total)



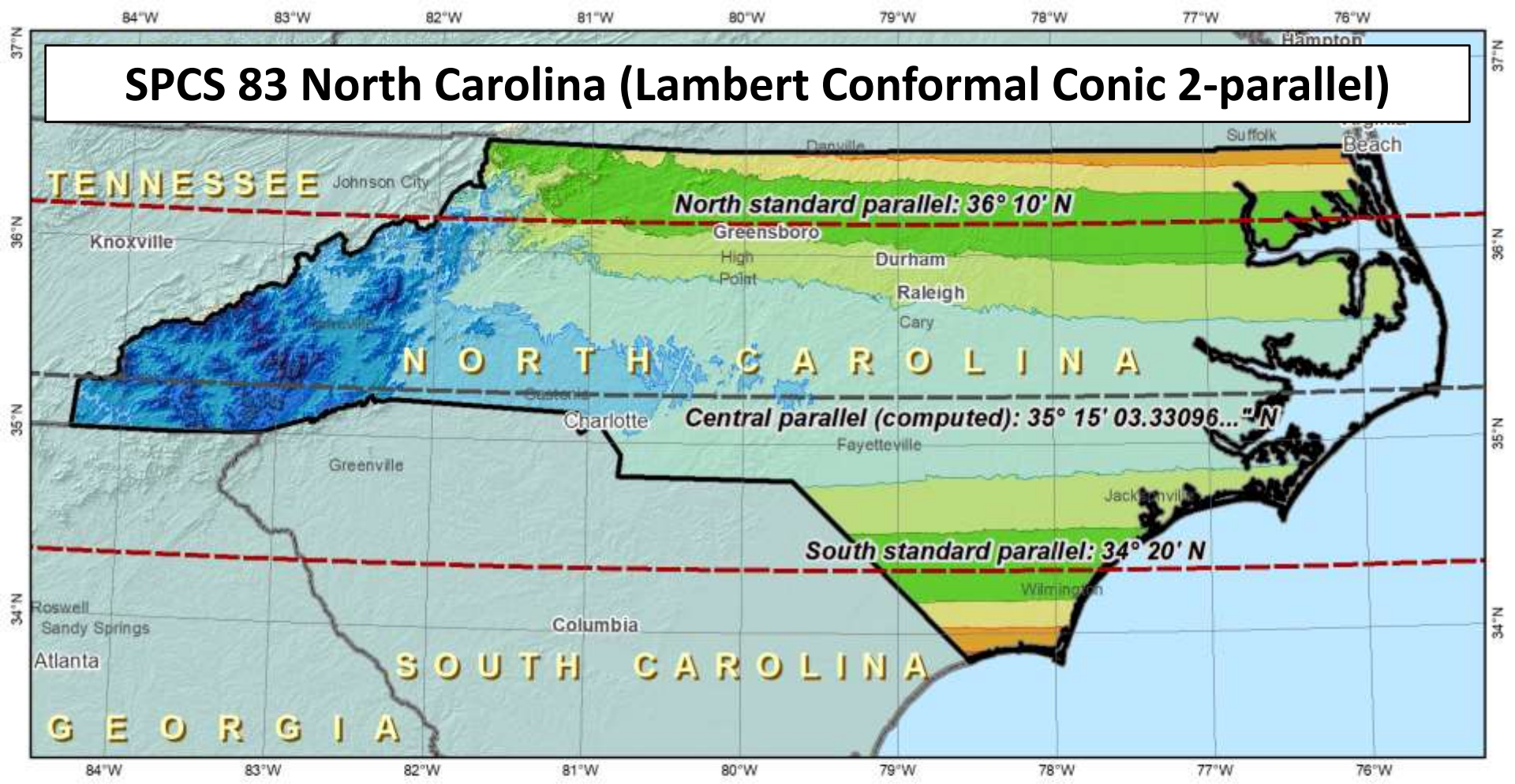
Final SPCS 83, as of 2001 (108 zones in CONUS, 125 zones total)



Default SPCS2022 designs ***(draft)***

- Default needed in absence of stakeholder input
- Same projections and zones for most SPCS 83 zones
- Performance and coverage very similar to SPCS 83
- Characteristics that differ from SPCS 83:
  - Projection scale modified to minimize distortion at ground
  - Lambert Conformal Conic converted to one-parallel type
  - Most geodetic origins with arc-minutes evenly divisible by 3
  - A few zones with different projection & zone extents

SPCS 83 North Carolina (Lambert Conformal Conic 2-parallel)



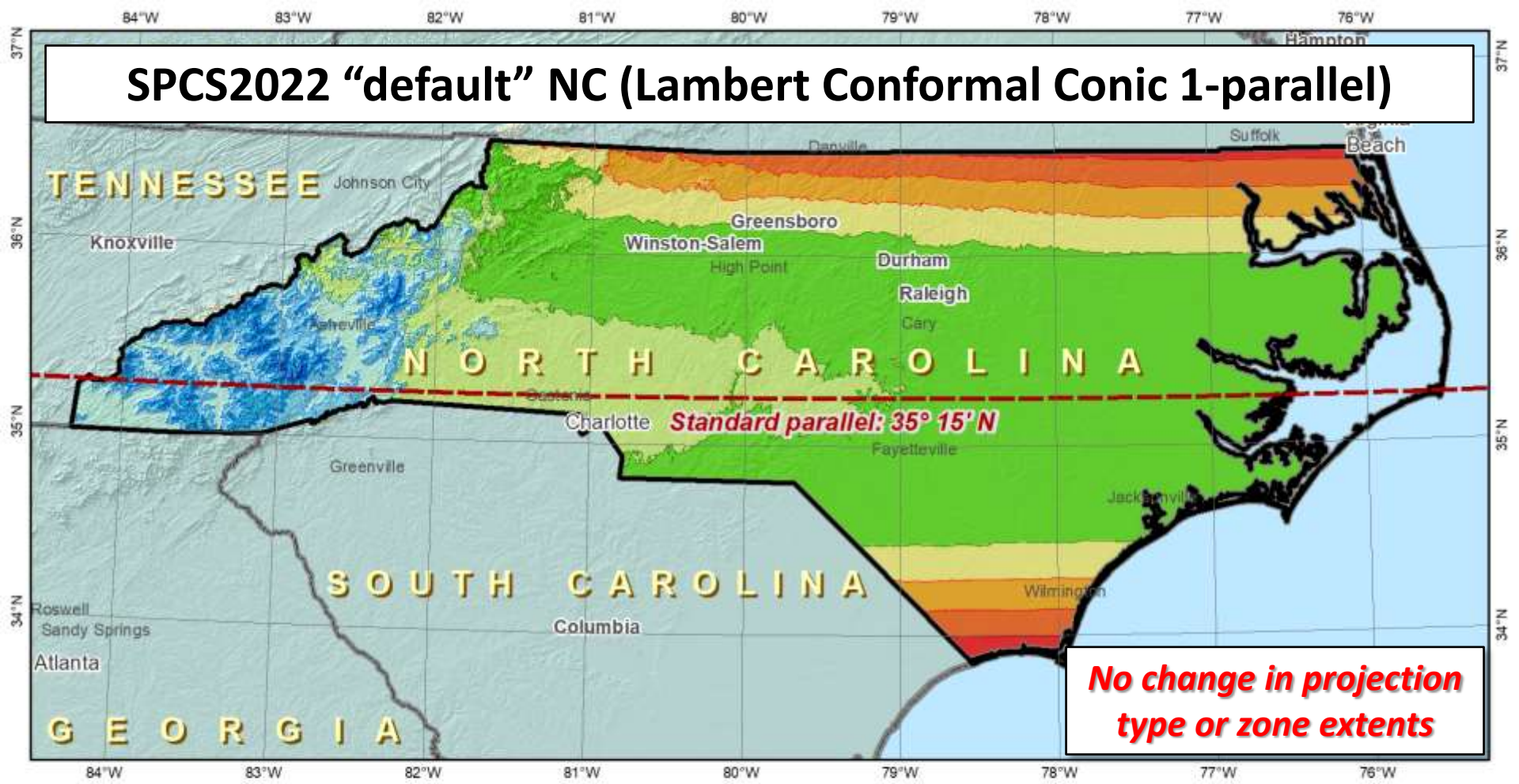
Linear distortion (parts per million)

< -400	to -200	to +150
to -400	to -150	to +200
to -350	to -100	to +250
to -300	±50	to +300
to -250	to +100	> +300

0 50 100 150 200 250 km

	SPCS 83 NC
Central parallel	35°15'06.33..."N
Cen parallel scale	0.9998 7259...
	Height (m) / Distortion (ppm)
Min	-41 / -413
Max	1939 / +176
Mean	197 / -93

SPCS2022 “default” NC (Lambert Conformal Conic 1-parallel)



No change in projection type or zone extents

Linear distortion (parts per million)

< -400	to -200	to +150
to -400	to -150	to +200
to -350	to -100	to +250
to -300	±50	to +300
to -250	to +100	> +300

0 50 100 150 200 250 km

		SPCS 83 NC	SPCS2022
Central parallel		35°15’06.33…”N	35°15’N
Cen parallel scale		0.9998 7259…	0.99996
	Height (m)	Distortion (ppm)	
Min	-41	-413	-325
Max	1939	+176	+263
Mean	197	-93	-5

New Datums are Coming in 2022

Our preparations to date include:

- Created a 2022 Datum Working Group to develop implementation recommendations ✓
- Working with SC Geodetic Survey, SC, NC, and VA Department's of Transportation to develop common implementation plans ✓
- Working with the National Geodetic Survey to complete GRAV-D in North Carolina
  - Collecting terrestrial gravity data ✓
  - Collection of airborne gravity data completed ✓
- Partnering with UNCC to purchase an absolute gravity meters ✓
- Obtaining ellipsoidal heights on NAVD88 bench marks ✓
- Collecting statewide LiDAR elevation data (USGS QL1 and QL2) ✓
- Created 2022 Datum web page ✓
- Education outreach ✓
- National Geodetic Survey GPS on Bench Marks project ✓

In progress = ✓
Completed = ✓

National Geodetic Survey

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GPS on BM Links

- Home
- Recover
- Observe
- Report
- 2018 Web Map
- Prioritized Marks
- Training Resources
- GPS on BM FAQ
- GPS on BM One Pager

Related Links

- GEOID18
- NGS Data Explorer
- DSWorld
- OPUS Upload
- Mark Recovery Form
- Photo Submission

For geocachers:

- Hunt for marks!
- Bench Mark Hunting

GPS on Bench Marks

Help improve the National Spatial Reference System (NSRS) by participating in the GPS on Bench Marks (GPS on BM) campaign. Your efforts will support the following objectives:

- Improve the next hybrid geoid model, GEOID18
- Improve the 2022 Transformation Tool , which will enable conversions to the new vertical datum in 2022 and be integrated into the NGS Coordinate Conversion and Transformation Tool (NCAT); and
- Help the local surveying community.

Recover, Observe, Report

Regardless of your objective, GPS on BM will always include three important steps: recover, observe, and report.

Recover: Look up the description of an existing bench mark and visit the bench mark of your choice.

Observe: Record field notes, take digital photos, and collect GPS observations or coordinates for the bench mark you visit.

Report: Use online tools to send the information to NGS.

Download Prioritized Marks

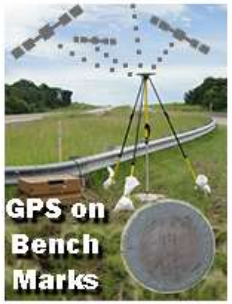
A listing of prioritized marks has been generated and is downloadable in various formats (.xls; .kmz; and .shp).

Time Constraints

You can submit data at anytime, but keep in mind:

- Data to support GEOID18 must be submitted by August 2018.
- Additional coordination efforts often occur annually in conjunction with National Surveyors Week (e.g., the third week of March).

Recover
Observe
Report



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Quick Links

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- Survey Mark Datasheets
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- State Plane Coordinates
- Antenna Calibration
- UFCORS
- GEOID
- GPS on Bench Marks
- Geodetic Advisors
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- 2017 Geospatial Summit
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Coming in 2022: **New Datums!**

NOAA's National Geodetic Survey (NGS) provides the framework for all positioning activities in the Nation. The foundational elements of latitude, longitude, elevation, shoreline information impact a wide range of important activities.

Learn more about:

- Data and tools we provide
- Activities in your area
- Applications of geodesy

GNSS & GPS Data

Get coordinate information and the tools you need to work independently.

Learn More

Remote Sensing

Download data and critical information into nautical charts.

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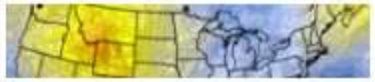
Land Surveying

View guidelines and get tools to support land surveyors.

Learn More



Geodesy

NGS works closely with the global researchers advancing geodetic science.

Learn More

Looking for Bench Marks?

Notices

Beta Release: NADCON 5

Beta Release: CORS & OPUS Share Maps

Previous Notices

In the News

06/22/2017 - NGS Recognized at Boulder, CO, Public Art Dedication

06/15/2017 - 'Foundations of Global Navigation Satellite Systems' Online Lesson

06/08/2017 - New Tool for Easy, Consistent Coordinate Transformations

http://www.ngs.noaa.gov/

To Learn More

Visit the New Datums web page

geodesy.noaa.gov/datums/newdatums/index.shtml

NGS Resources

- YouTube Videos
  https://www.ngs.noaa.gov/corbin/class_description/NGS_Video_Library.shtml
- Training/On Line Learning Tools
- Presentation Library
- Sign up to get:
  - Announcements
  - Training Information (Often Recorded)
  - Monthly Webinars (Recorded)

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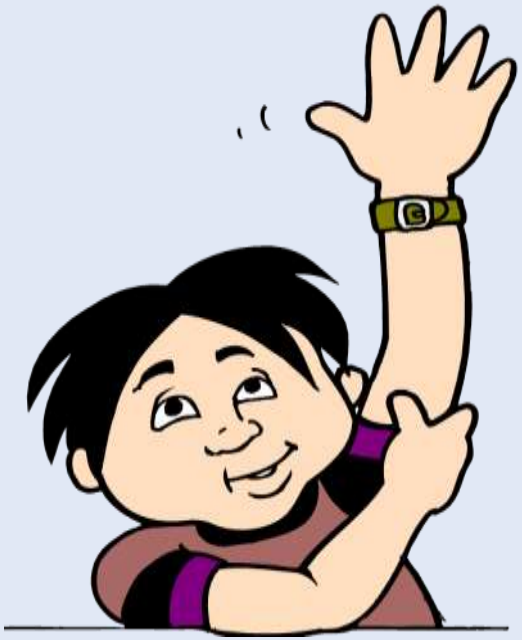
Document Type	File Type	Name	Document Type	NCGS Program Area
2022 Reference Frame		SMAC_January_2018	2022 Reference Frame	Datums

About NCGS

The purpose of the Geodetic Survey section is to establish precisely located monuments on the North Carolina Grid System and Bench Marks referenced to a vertical datum (NGVD 1929 and NAVD 1988).

Sign In

Questions?



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