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The National Park Service cares for special places saved by the American people so that all may experience our heritage.

A Few Brief Factoids regarding the NPS:

- *Yellowstone, established in 1872, is the first National Park in the world*
- *National Parks are called America’s best idea*
- *The National Park Service was created in 1916*

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The National Park Service Geologic Resources Evaluation: "Using GIS to get GIS"

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ABSTRACT

The National Park Service (NPS) is currently involved in an encompassing effort to evaluate the geologic resources in 270 NPS park units throughout the country. This involves conducting scoping meetings, assembling geologic bibliographies of all known applicable references, producing geologic maps (bedrock, surficial, abandoned mines, caves, coastal features, etc.), and then assembling all of this information into a usable database. Currently, much of the work revolves around discerning existing geologic map coverage (map type, scale, detail, vintage, usefulness, etc.). To develop this information, the NPS engages in extensive data-mining in cooperation with the USGS, AASG, and academics to evaluate existing index maps of known geologic coverage. The NPS uses "GIS" data to assemble these maps to pinpoint areas of known coverage, as well as to target areas of no known coverage.

DISCLAIMER / CLARIFICATION

- my “title” may be somewhat misleading; should be on “**geology” GIS**; leave if you’d like if it’s not what you were after; I’m not offended

- **I. Background on NPS Geologic Resources Evaluation**
  (one of baseline “inventories by NPS Inventory & Monitoring program)

- **II. Specific GRE methods for determining which geologic maps to evaluate / use**

- **III. Geology…….it’s not just for scenery anymore**
  (using geologic GIS to identify, solve and create new problems)

I.

Background on NPS Geologic Resources Evaluation program

NPS goals of the Geologic Resources Evaluation Program

1. a ***Scoping Meeting*** to discuss geologic map coverage, features and processes, and resource management needs with experts on the park's geology, and to capture those discussions in a scoping summary to give to the park.

2. a ***Bibliography*** of updated references to the park's geology

3. a ***Digital Geologic Map*** at an agreed upon scale and compatible with the NPS Theme Manager and evolving USGS models

4. a ***Report*** to accompany the map that summarizes the park's geologic history, identifies resource management issues, and documents monitoring and research needs.

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Digital Bedrock Geologic Map for Glacier NP

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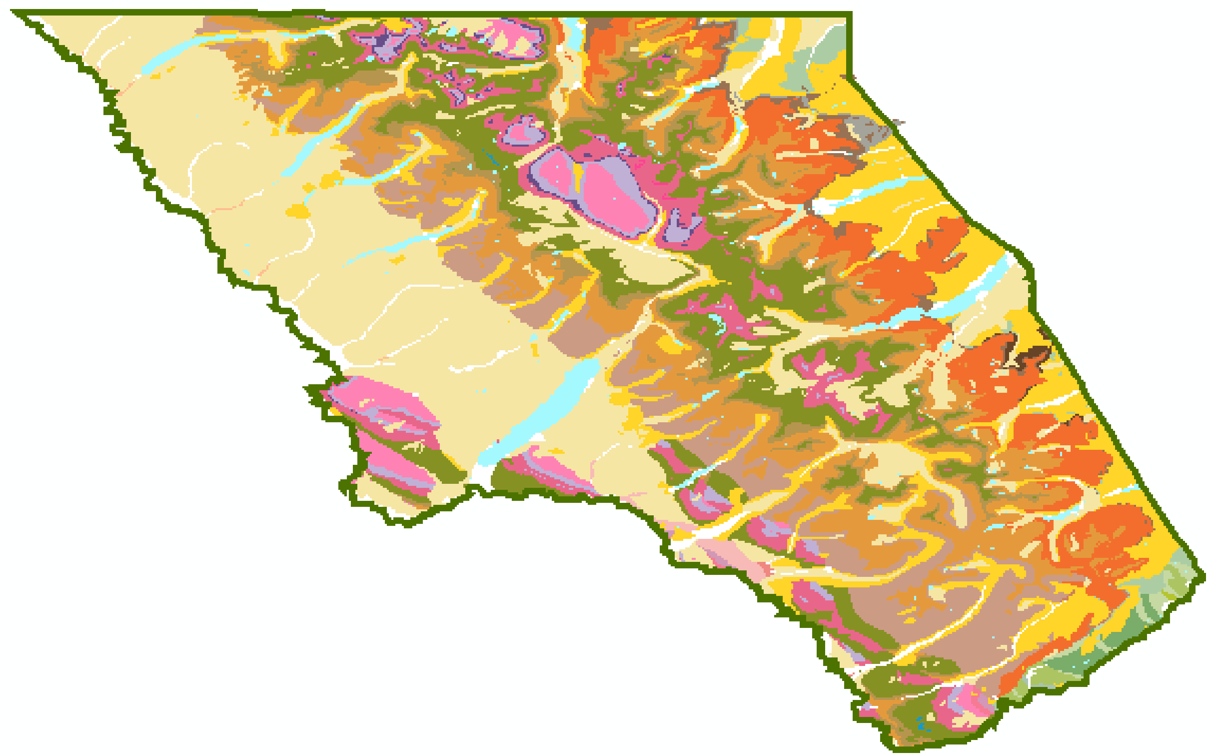
GLACGLG

- Qal - Alluvium
- Qc - Colluvium
- Qls - Landslide deposits
- Qg - Till
- Tku - Kishenehn Formation, undivided
- Tkp - Kishenehn Formation, Conglomerat
- Tkcc - Kishenehn Formation, Lacustrine m
- Km - Marias River Shale
- Ku - Sedimentary rocks, undivided
- Kb - Blackleaf Formation
- Kbk - Blackleaf and Kootenai Formations,
- Kk - Kootenai Formtion
- KJm - Mount Pablo Formation, Morrison F
- Zd - Diorite, diabase, and gabbro sills and
- Ym - McNamara Formation
- Ybo - Bonner Quartzite
- Yms - Mount Shields Formation
- Ysh - Shepard Formation
- Ypb - Purcell Lava
- Ysn - Snowslip Formation
- Ycs - Conophyton stromatolite zone
- Yh - Helena Formation
- Ye - Empire Formation
- Ygl - Grinnell Formation
- Yap - Appekunny Formation
- Yapa - Appekunny and Altyn Formations,
- Yapp - Appekunny and Prichard Formatio
- Yae - Eastern facies
- Ya - Altyn Formation
- Ywt - Waterton Formation



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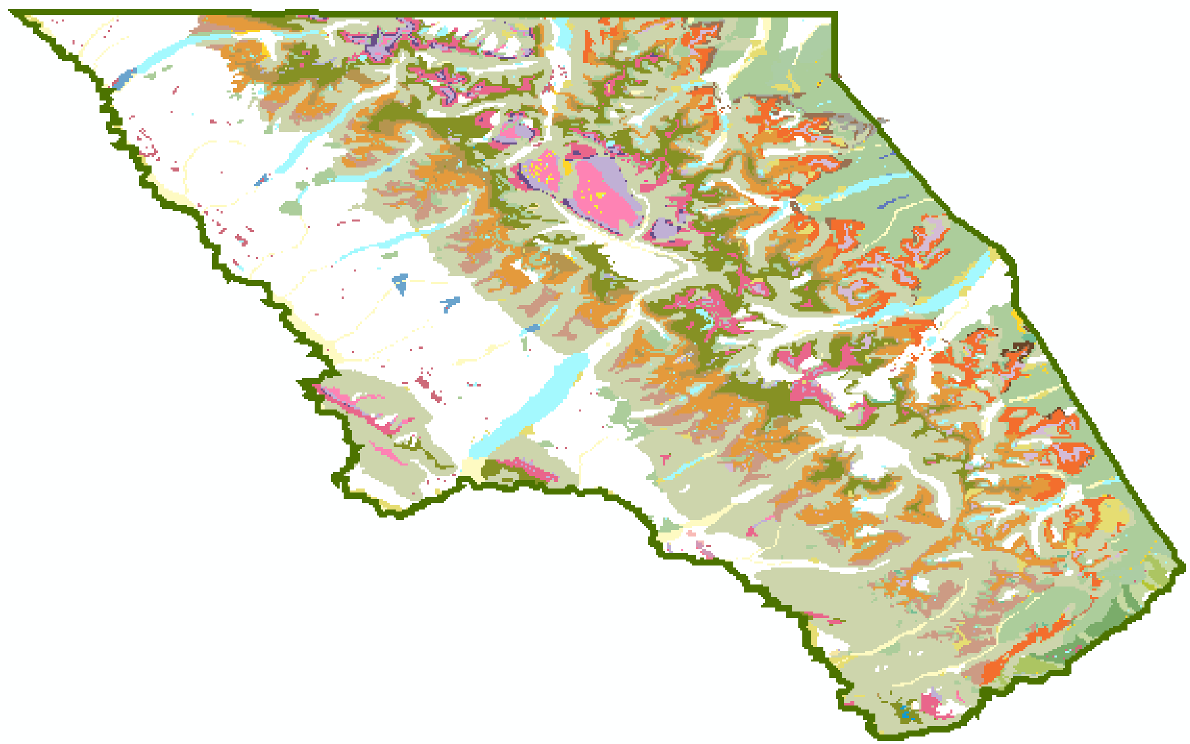
Digital Surficial Geologic Map for Glacier NP

- GLACSUR
  - Qt1 - Till (late Holocene)
  - Qal - Alluvium
  - Qor - Organic deposit
  - Qaf - Alluvial-fan deposit
  - Qac - Alluvial and colluvial deposit
  - Qrg - Rock-glacier deposit
  - Qta - Talus deposit
  - Qls - Landslide deposit
  - Qco - Colluvial deposit
  - Qso - Solifluction and related deposit
  - Qtr - Frost rubble
  - Qt2 - Till (late Pleistocene)
  - Qtg - Terrace deposit
  - Qes - Esker deposit
  - Qt3 - Till (late Pleistocene)
  - Qat - Ablation till
  - QTdi - Diamicton
  - BR - Bedrock
  - WATER
- GLACGLG
  - Qal - Alluvium
  - Qc - Colluvium
  - Qls - Landslide deposits
  - Qg - Till
  - Tku - Kishenehn Formation, undivided
  - Tkp - Kishenehn Formation, Conglomerat
  - Tkcc - Kishenehn Formation, Lacustrine m
  - Km - Marias River Shale
  - Ku - Sedimentary rocks, undivided



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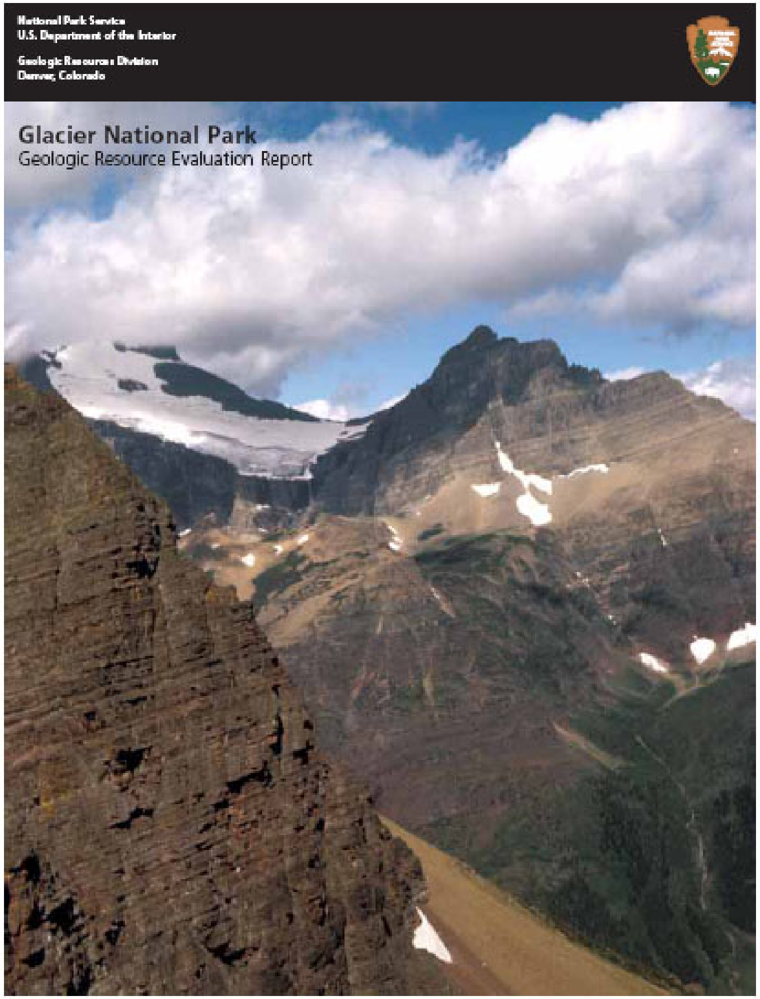
Geologic Report for Glacier NP



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Map Unit Properties Table (“MUPT”)…making the crosswalk between the map and resource management

Formation Properties Table

Age: West	Age: East	Unit Name (Symbol)	Features and Description	Erosion Resistance	Suitability for Development	Hazards	Potential Paleontologic Resources	Potential Cultural Resources	Mineral Specimens	Karst Issues	Mineral Resources	Habitat	Recreation Potential	Global Significance	Limits on restoration
QUATERNARY	QUATERNARY	Glacial and Alluvial Sediments (Qal, Qc, Qls, Qg, Qt, Qor, Qac, Qrg, Qta, Qao, Qtr, Qtt, Qtg, Qes, Qtj, Qat, Qtdl)	Unconsolidated surface deposits 0- 50 m (0- 164 ft) thick; includes alluvium, alluvial fill, colluvium, landslide deposits, terrace gravel, glacial till and outwash deposits; till is jumbled assortment of subrounded to subangular bouldery rubble combined with sand, silt and clay; landslides are large slumps, block slides and earth flows; colluvium is comprised of unsorted, angular gravel-size clasts in a sand- silt- clay rich matrix with small pockets of till, talus, rock-avalanche and debris flow deposits; alluvium consists of sand and gravel deposits as well as channel and overbank deposits of silt and sand	Very low	Unconsolidated material underlies most valleys of the park where buildings already exist and may heave with frost or extreme moisture	Slump and slide potential high	None	Possible camp sites preserved and other Native American artifacts	None	None	Sand, gravel, clay	Valley fill	Good for trails and campgrounds	None documented	None
TERTIARY		Kishenehn Formation (Tkm, Tkp, Tkcc)	Unit is more than 610 m (2000 ft) thick; contains layered gravel, sand, mud, volcanic ash, limestone, and coal; appears pale gray and tan in outcrop, with poor cementation; interlayered sandstone, mudstone and conglomerate; most pebbles are from Belt Supergroup rocks, some up to 2.5 m (8.2 ft) in diameter; oil shale, coal, marlstone, litharenite, lignite and tuff beds are locally present	Low	Altered volcanic clays and poorly cemented rock layers render this unit rather unstable for development, especially for roads and structure foundations	Slump, slide and rockfall potential high if slope is present	Abundant petrified wood (Dawn redwood), fossil gastropods, mammals and palynomorphs, fish, insects and mollusks; leaves of *Mangiferia angustifolia*	Possible camp sites preserved	Zircon in tuff beds	None	Several hundred feet of oil shale and some seeps; coal; sand and gravel	None documented	Good for trails and campgrounds	Thick, Tertiary- aged deposits; type section in North Fork of the Flathead River Valley	None
MP	MIDPROTEROZOIC (MP)	McNamara Formation (Ym)	Exposed locally at GLAC, unit is 61 m (200 ft) thick near Mt. Shields; contains grayish- green siltstone and argillite with fining upward sequences common; some local beds of calcareous siltstone and arenite	Moderate	Locally exposed in park; suitable for all development unless highly fractured	Rockfall potential in steeper terrain	None	None	Mud breccias	None	None documented	None documented	Good for all uses	Precambrian sedimentary rock	Only locally exposed
MP	MIDPROTEROZOIC (MP)	Bonner Quartzite (Ybo)	Exposed locally at GLAC, unit is 244 m (800 ft) thick near Mt. Shields; consists of pinkish- gray to pale red, very fine- to medium- grained feldspathic arenite, some channel deposits and some siltstone and argillite in fining upward sequences; ripple marks are common	High	Locally exposed in park; suitable for all development unless highly fractured	Rockfall potential in steeper terrain	None	Possible tool material	None	None	Attractive flagstone potential	None documented	Good for rock climbing and other uses	Extensive Precambrian sedimentary rock	None
MP	MP	Mt. Shields Formation (Yms)	Unit 777 m (2550 ft) thick in GLAC; maroon to pale purple argillite, siltstone and some greenish- gray siltstone and arenite, some unique cream-colored limestone beds present locally (contain stromatolites), and black argillite at the top of the unit; fining upward sequences are common, as well as wavy and parallel bedding and salt casts.	Moderate	Good for most uses unless thin bedding is present, providing planes of weakness in the rock column. Mostly exposed at higher elevations	Rockfall potential in steeper terrain	Stromatolites in unique limestone layers	None	Salt casts	If severe dissolution is present, karst may be an issue	None documented	Vugs on cliffs may provide bird nest habitat	Good for all uses	Type section at Mt. Shields; Precambrian sedimentary rock with stromatolites in conspicuous limestone layer	None
MP	MP	Shepard Formation (Ysh)	Ranges from 472- 168 m (1550- 550 ft) thick in GLAC; yellowish, greenish- gray dolomite and pyritic siltstone and argillite, with beds of coarse- grained calcarenite, sandstone, limestone and dolomite locally as well as stromatolites and "molar tooth" calcite	Moderate	Good for most uses unless pervasive dissolution is present	Usually exposed on cliffs; rockfall potential high	Stromatolites are common in this unit	None	"Molar tooth" calcite crystals, and pyrite	If severe dissolution is present, karst may be an issue	Pyrite present locally	Vugs on cliffs may provide bird nest habitat	Good for all uses	Type section near Shepard Glacier; Precambrian sedimentary rock with stromatolites	Usually exposed at high elevation
MP	MP	Purcell Lava (Ypl)	Sequence of mafic lava flows forms a marker bed 77- 15 m (253- 50 ft) thick; fine- grained, vesicular bluish- gray to greenish- gray altered basalt; subaqueous pillow structures and vent facies alternate with surface (pahoehoe) flows	Moderate	Exposure limited; if altered volcanic clay is present, may be unstable for construction	Rough surface; locally could pose walking hazard	None	None	Chlorite vesicular filling	None	None documented	None documented	Rough surface for trails; good for all uses	Precambrian lava flows and sedimentary rock; type section locality at Mt. Snowslip	Only locally exposed
MP	MP	Snowslip Formation (Ysn)	Ranges from 357.2 m to 489.5 m (1171- 1606 ft) thick; contains terrigenous green and red argillite, dolomitic argillite and muddy sandstone; some calcareous siltstone and arenite locally; mud breccia occurs in some lower beds; some beds contain calcite and dolomite cements; stromatolite beds common; beds are thin to thick, with prevalent fining upward sequences; contains the Purcell Lava	Moderate	Only in layers where calcite or dolomite cement is present; if dissolved out, rock is friable and weak	Potential rockfall hazards in cirques and cliffs	Stromatolites common in some beds	None	None	Not enough carbonate present					

West	East	Unit Name (Symbol)	Features and Description	Erosion Resistance	Suitability for Development	Hazards	Potential Paleontologic Resources	Potential Cultural Resources
QUATERNARY		Glacial and Alluvial Sediments (Qal, Qc, Qls, Qg, Qt1, Qor, Qac, Qrg, Qta, Qso, Qtr, Qt2, Qtg, Qes, Qt3, Qat, Qtdi)	Unconsolidated surface deposits 0 - 50 m (0- 164 ft) thick; includes alluvium, alluvial fill, colluvium, landslide deposits, terrace gravel, glacial till and outwash deposits; till is jumbled assortment of subrounded to subangular bouldery rubble combined with sand, silt and clay; landslides are large slumps, block slides and earth flows; colluvium is comprised of unsorted, angular gravel- size clasts in a sand- silt- clay rich matrix with small pockets of till, talus, rock-avalanche and debris flow deposits; alluvium consists of sand and gravel deposits as well as channel and overbank deposits of silt and sand	Very low	Unconsolidated material underlies most valleys of the park where buildings already exist and may heave with frost or extreme moisture	Slump and slide potential high	None	Possible camp sites preserved and other Native American artifacts
TERTIARY		Kishenehn Formation (Tku, Tkp, Tkcc)	Unit is more than 610 m (2000 ft) thick; contains layered gravel, sand, mud, volcanic ash, limestone, and coal; appears pale gray and tan in outcrop, with poor cementation; interlayered sandstone, mudstone and conglomerate; most pebbles are from Belt Supergroup rocks, some up to 2.5 m (8.2 ft) in diameter; oil shale, coal, marlstone, litharenite, lignite and tuff beds are locally present	Low	Altered volcanic clays and poorly cemented rock layers render this unit rather unstable for development, especially for roads and structure foundations	Slump, slide and rockfall potential high if slope is present	Abundant petrified wood (Dawn redwood), fossil gastropods, mammals and palynomorphs, fish, insects and mollusks; leaves of *Macginitea augustiloba*	Possible camp sites preserved
MP	MID PROTEROZOIC (MP)	McNamara Formation (Ym)	Exposed locally at GLAC, unit is 61 m (200 ft) thick near Mt. Shields; contains grayish- green siltstone and argillite with fining upward sequences common; some local beds of calcareous siltstone and arenite	Moderate	Locally exposed in park; suitable for all development unless highly fractured	Rockfall potential in steeper terrain	None	None
MP		Bonner Quartzite (Ybo)	Exposed locally at GLAC, unit is 244 m (800 ft) thick near Mt. Shields; consists of pinkish- gray to pale red, very fine- to medium- grained feldspathic arenite, some channel deposit sand some siltstone and argillite in fining upward sequences; ripple marks are common	High	Locally exposed in park; suitable for all development unless highly fractured	Rockfall potential in steeper terrain	None	Possible tool material
MP	MP	Mt. Shields Formation (Yms)	Unit 777 m (2550 ft) thick in GLAC; maroon to pale purple argillite, siltstone and some greenish- gray siltstone and arenite, some unique cream colored limestone beds present locally (contain stromatolites), and black argillite at the top of the unit; fining upward sequences are common, as well as wavy and parallel bedding and salt casts.	Moderate	Good for most uses unless thin bedding is present, providing planes of weakness in the rock column. Mostly exposed at higher elevations	Rockfall potential in steeper terrain	Stromatolites in unique limestone layers	None
		Shepard	Ranges from 472- 168 m (1550- 550 ft) thick in GLAC; yellowish,		Good for most uses	Usually exposed on	Stromatolites are	

West	East	Unit Name (Symbol)	Features and Description	Mineral Resources	Habitat	Recreation Potential	Global Significance	Limits on restoration
QUATERNARY		Glacial and Alluvial Sediments (Qal, Qc, Qls, Qg, Qt1, Qor, Qac, Qrg, Qta, Qso, Qtr, Qt2, Qtg, Qes, Qt3, Qat, Qtdi)	Unconsolidated surface deposits 0 - 50 m (0- 164 ft) thick; includes alluvium, alluvial fill, colluvium, landslide deposits, terrace gravel, glacial till and outwash deposits; till is jumbled assortment of subrounded to subangular bouldery rubble combined with sand, silt and clay; landslides are large slumps, block slides and earth flows; colluvium is comprised of unsorted, angular gravel- size clasts in a sand- silt- clay rich matrix with small pockets of till, talus, rock-avalanche and debris flow deposits; alluvium consists of sand and gravel deposits as well as channel and overbank deposits of silt and sand	Sand, gravel, clay	Valley fill	Good for trails and campgrounds	None documented	None
TERTIARY		Kishenehn Formation (Tku, Tkp, Tkcc)	Unit is more than 610 m (2000 ft) thick; contains layered gravel, sand, mud, volcanic ash, limestone, and coal; appears pale gray and tan in outcrop, with poor cementation; interlayered sandstone, mudstone and conglomerate; most pebbles are from Belt Supergroup rocks, some up to 2.5 m (8.2 ft) in diameter; oil shale, coal, marlstone, litharenite, lignite and tuff beds are locally present	Several hundred feet of oil shale and some seeps; coal; sand and gravel	None documented	Good for trails and campgrounds	Thick, Tertiary- aged deposits; type section in North Fork of the Flathead River Valley	None
MP	MID PROTEROZOIC (MP)	McNamara Formation (Ym)	Exposed locally at GLAC, unit is 61 m (200 ft) thick near Mt. Shields; contains grayish- green siltstone and argillite with fining upward sequences common; some local beds of calcareous siltstone and arenite	None documented	None documented	Good for all uses	Precambrian sedimentary rock	Only locally exposed
MP	MID PROTEROZOIC (MP)	Bonner Quartzite (Ybo)	Exposed locally at GLAC, unit is 244 m (800 ft) thick near Mt. Shields; consists of pinkish- gray to pale red, very fine- to medium- grained feldspathic arenite, some channel deposit sand some siltstone and argillite in fining upward sequences; ripple marks are common	Attractive flagstone potential	None documented	Good for rock climbing and other uses	Extensive Precambrian sedimentary rock	None
MP	MP	Mt. Shields Formation (Yms)	Unit 777 m (2550 ft) thick in GLAC; maroon to pale purple argillite, siltstone and some greenish- gray siltstone and arenite, some unique cream colored limestone beds present locally (contain stromatolites), and black argillite at the top of the unit; fining upward sequences are common, as well as wavy and parallel bedding and salt casts.	None documented	Vugs on cliffs may provide bird nest habitat	Good for all uses	Type section at Mt. Shields; Precambrian sedimentary rock with stromatolites in conspicuous limestone layer	None
		Shepard	Ranges from 472- 168 m (1550- 550 ft) thick in GLAC; yellowish,		Vugs on cliffs		Type section near Shepard Glacier;	Usually

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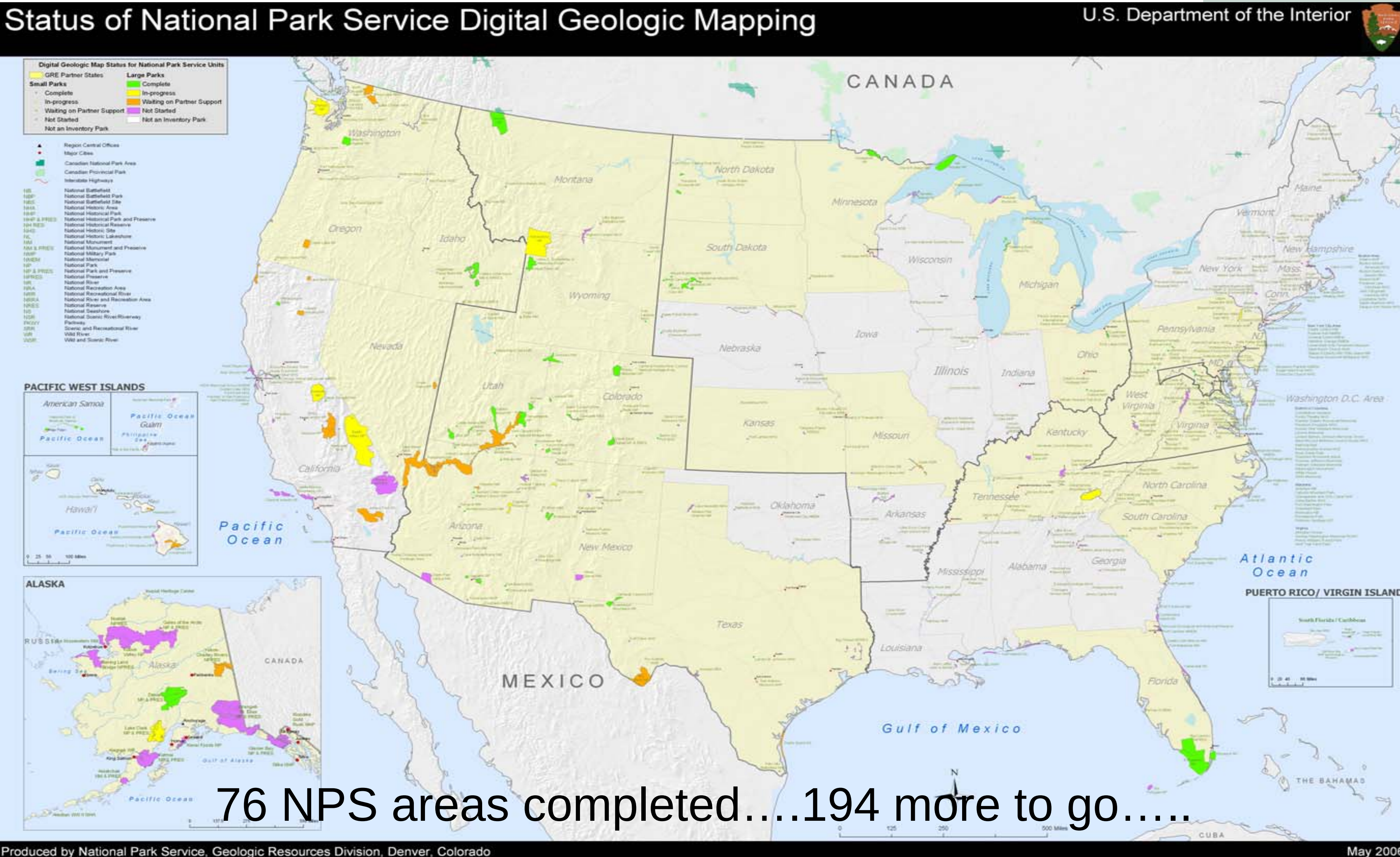

76 NPS areas completed….194 more to go…..

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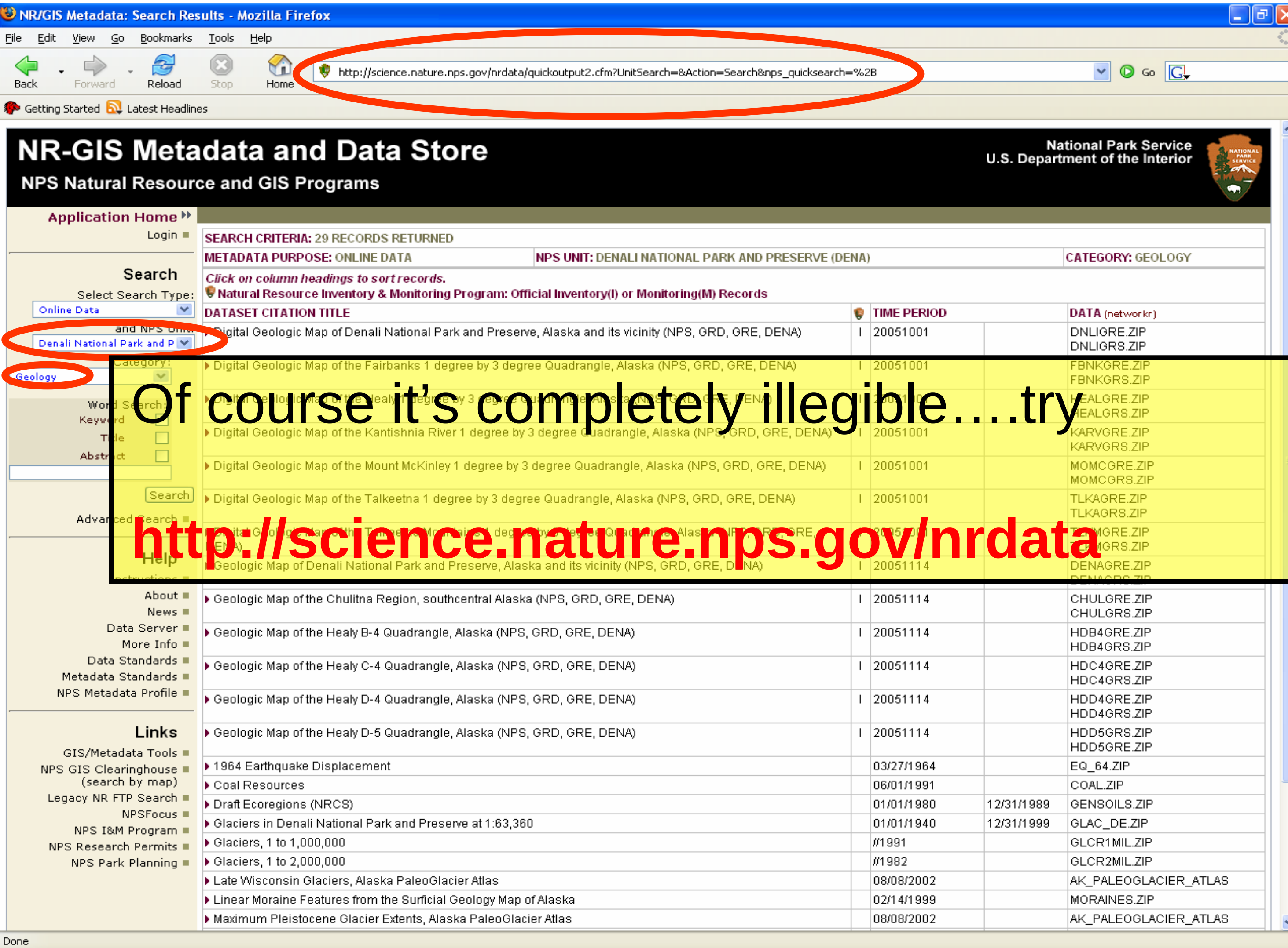
How to get completed NPS digital geologic maps



Of course it’s completely illegible….try

http://science.nature.nps.gov/nrdata

II.

Specific GRE methods for determining which geologic maps to evaluate / use

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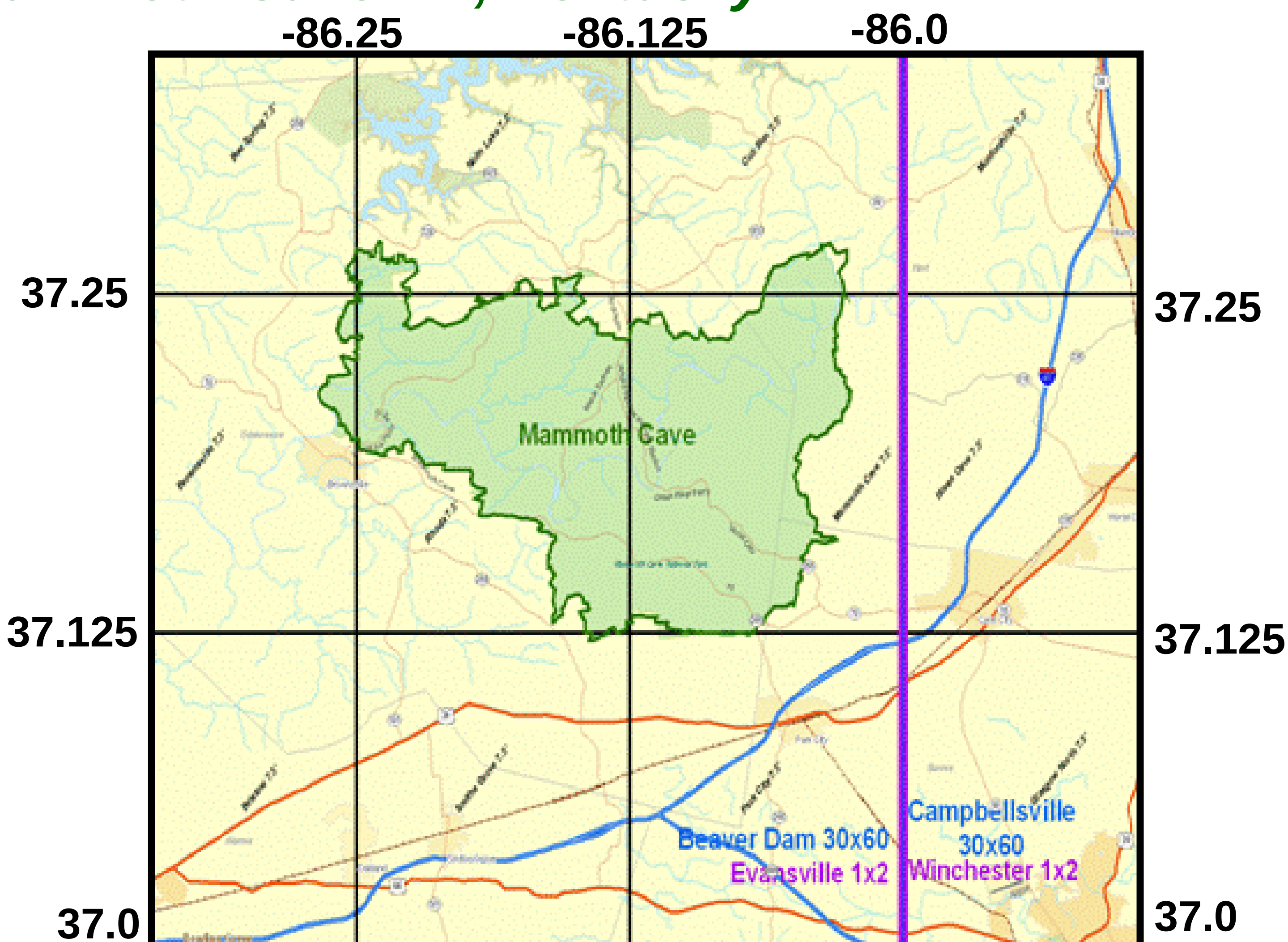
Getting Digital Geologic Maps for NPS areas:

Mammoth Cave NP, Kentucky



Search NPS “Quadrangles of Interest” database to determine maximum extent of interest

Maximum bounding coordinates for USGS database

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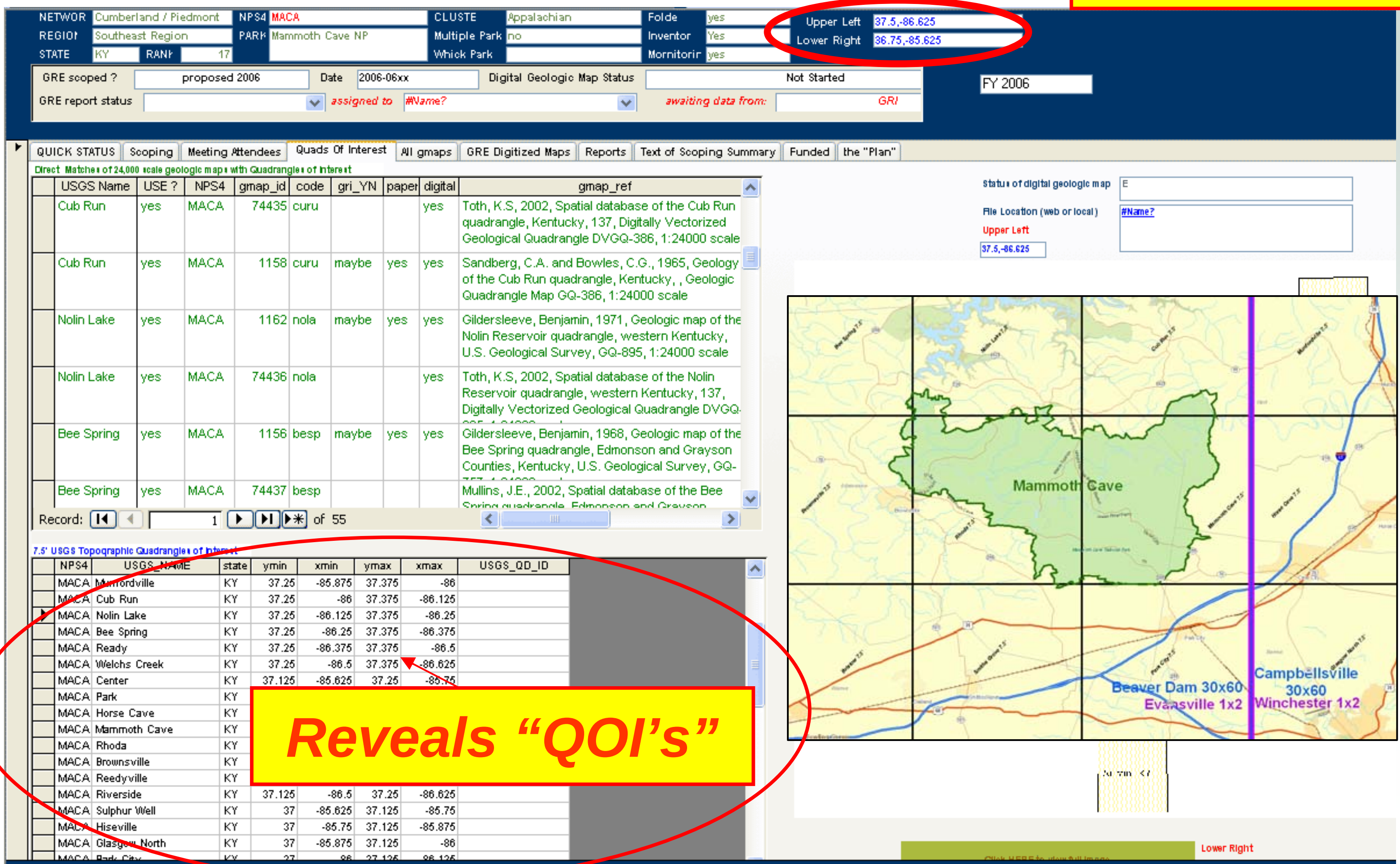

Reveals “QOI’s”

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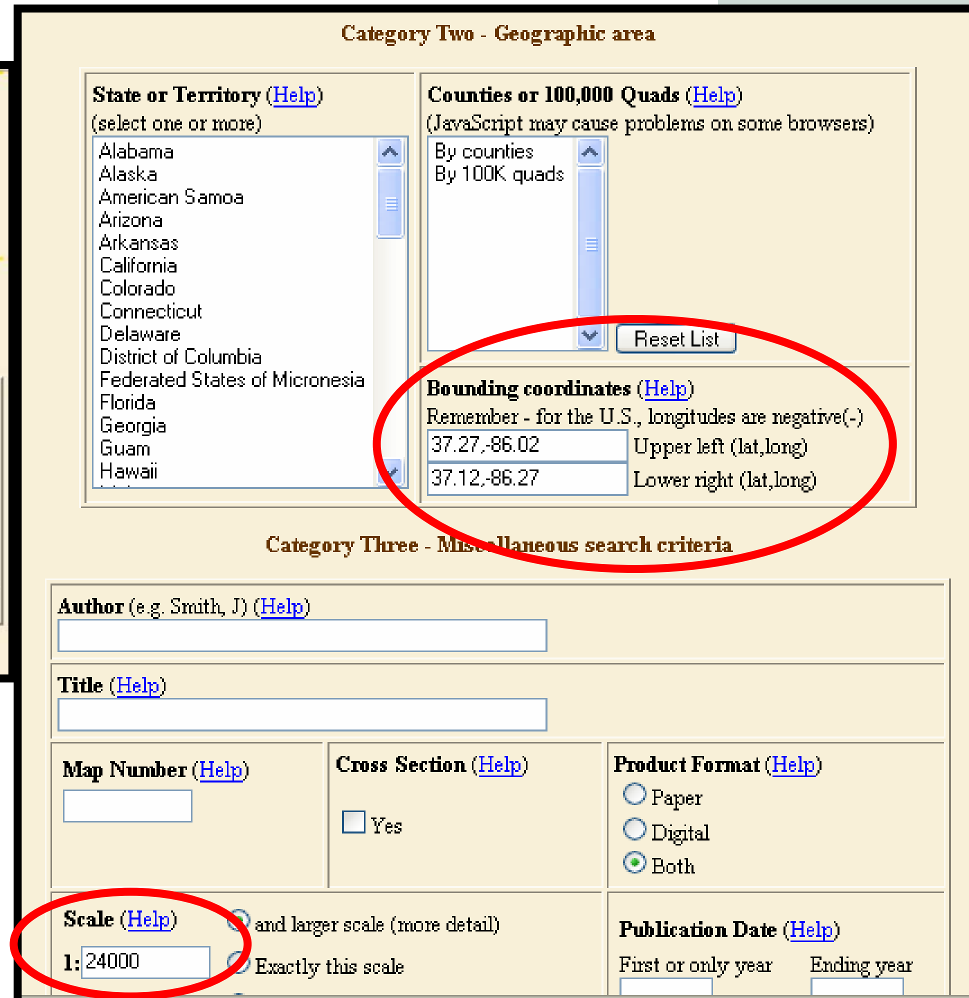
Search USGS on-line geologic maps database for known maps for Mammoth Cave NP, Kentucky

Browse to USGS site



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View the returned results and copy to clipboard

Entries 1 to 9 of 9.
(Any non-scaled publications are at end of list.)

Scale 1:24,000

NGMDB library — Gildersleeve, Benjamin, 1963, Geology of the Bristow quadrangle, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-216, scale 1:24000.

NGMDB library — Gildersleeve, Benjamin, 1965, Geology of the Brownsville quadrangle, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-411, scale 1:24000.

NGMDB library — Gildersleeve, Benjamin, 1968, Geologic map of the Bee Spring quadrangle, Edmonson and Grayson Counties, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-757, scale 1:24000.

NGMDB library — Gildersleeve, Benjamin, 1971, Geologic map of the Nolin Reservoir quadrangle, western Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-895, scale 1:24000.

NGMDB library — Haynes, D.D., 1962, Geology of the Park City quadrangle, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-183, scale 1:24000.

NGMDB library — Haynes, D.D., 1964, Geology of the Mammoth Cave quadrangle, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-351, scale 1:24000.

NGMDB library — Klemic, Harry, 1963, Geology of the Rhoda quadrangle, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-219, scale 1:24000.

NGMDB library — Richards, P.W., 1964, Geology of the Smiths Grove quadrangle, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-357, scale 1:24000.

NGMDB library — Sandberg, C.A. and Bowles, C.G., 1965, Geology of the Cub Run quadrangle, Kentucky: U.S. Geological Survey, Geologic Quadrangle Map GQ-386, scale 1:24000.

Your Search Found 9 entries | New Search | Refine Search

Do you want to generate a downloadable file in bibliographic form of all 9 entries?

U.S. Department of the Interior, U.S. Geological Survey, Reston, VA, USA
URL http://ngmdb.usgs.gov/ngmdb/ngm_catalog.ora.html
Database project personnel.
Generated: 7-Jun-2006

USGS

National Geologic Map Database

Product Description Page

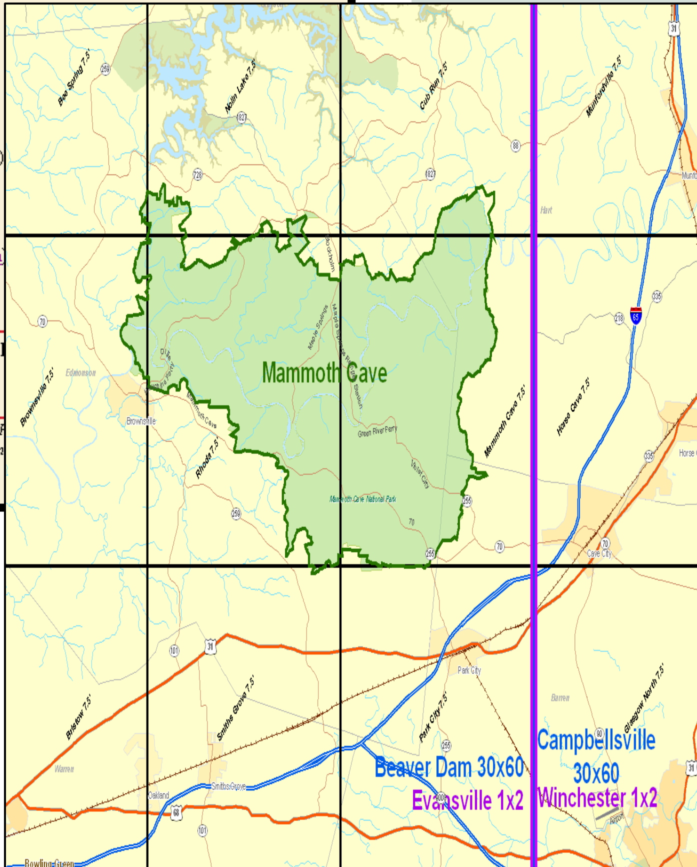
Title: Geology of the Mammoth Cave quadrangle, Kentucky
Author(s): Haynes, D.D.
Publishing Organization: U.S. Geological Survey
Publication Series and Number: Geologic Quadrangle Map GQ-351
Publication Date: 1964
Map Scale: 1:24,000
Cross Section: Yes
Northernmost Latitude: 37°15'0"N (37.2500)
Southernmost Latitude: 37°7'30"N (37.1250)
Easternmost Longitude: 86°0'0"W (-86.0000)
Westernmost Longitude: 86°7'30"W (-86.1250)
ISBN: 0607743859
Publication Format: Paper
View high-resolution images::
Option 1 (requires ExpressView plug-in
Option 2 (no plug-in needed)

You May Find It At A Depository Library.

If any fiel

Back

U.S. Department of the Interior, U.S. Geological Survey, F
URL http://ngmdb.usgs.gov/ngmdb/ngm_catalog.ora.htm
Database project personnel.
Last modified: 5-Jun-2006



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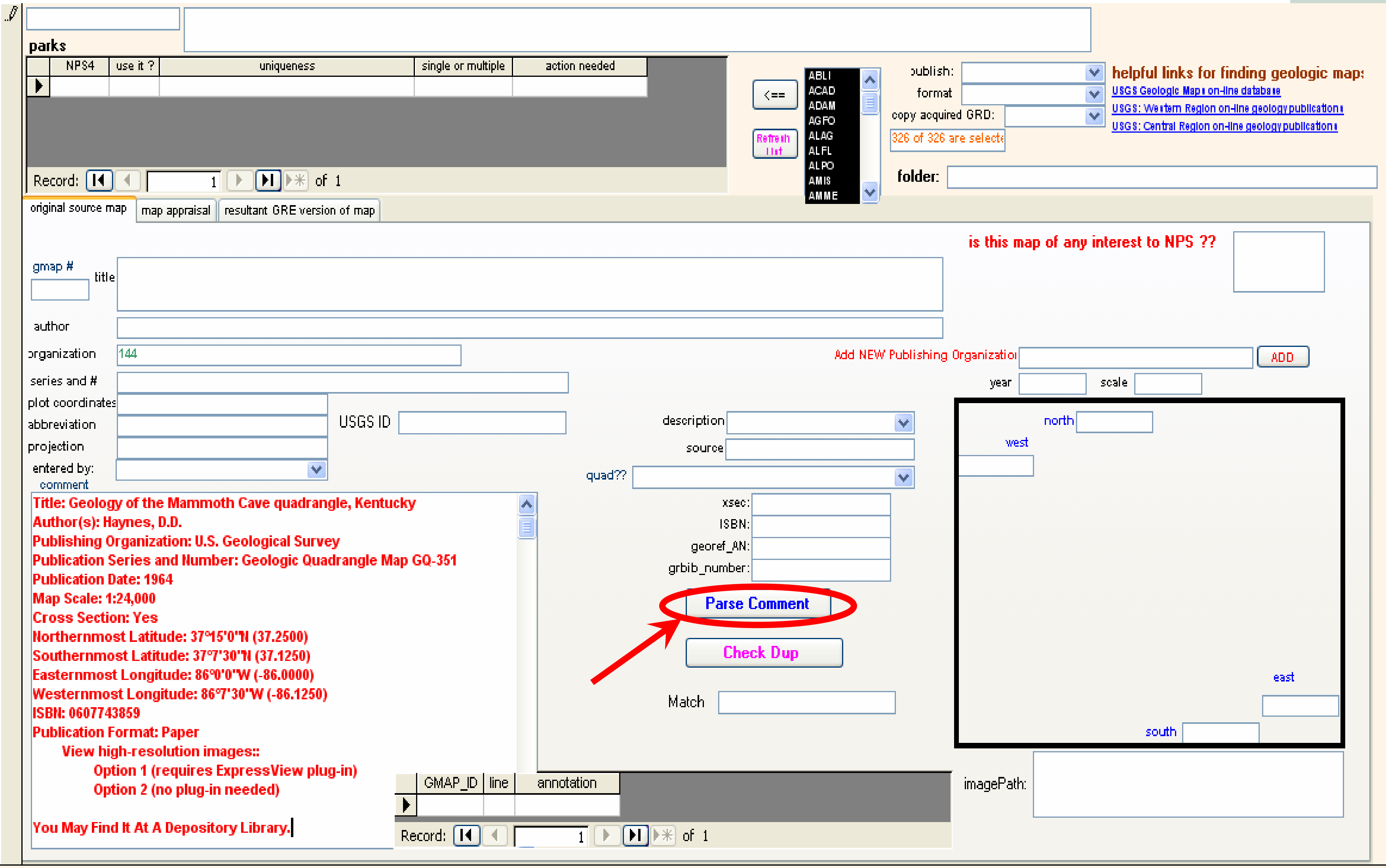
Paste into NPS database and parse



EXPERIENCE

Completed NPS Geologic Map Form

1546

Haynes, Donald D., 1964, Geology of the Mammoth Cave Quadrangle, Kentucky, U.S. Geological Survey, GQ-351, 1:24000 scale

parks

NPS4	use it ?	uniqueness	single or multiple	action needed
APPA				
MACA	yes			conversion

Record: 1 of 2

APPA
MACA

Refresh List

publish: published
format: paper
copy acquired GRD: paper
2 of 2 are selected

helpful links for finding geologic map:
USGS Geologic Maps on-line database
USGS: Western Region on-line geology publications
USGS: Central Region on-line geology publications

folder:

original source map | map appraisal | resultant GRE version of map

Once the map coordinates are entered, it automatically compares the values with existing park boundaries and applies the appropriate NPS unit; user then quality assures the choice

??: yes

gmap #: 1546

title: Geology of the Mammoth Cave quadrangle, Kentucky

author: Haynes, D.D.

organization: U.S. Geological Survey

Add NEW Publishing Organization: ADD

series and #: Geologic Quadrangle Map GQ-351

year: 1964 scale: 24000

plot coordinates: yes

abbreviation: Mammoth Cave

USGS ID: 812

description: geologic (generic)

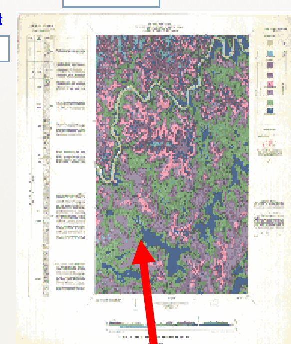
projection: Geographic

source:

entered by: Connors, Tim

quad??: quadrangle (7.5'); 24k lower 48

north: 37.25
west: -86.125
east: -86
south: 37.125



comment

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Cross Section: Yes
Northernmost Latitude: 37°15'0"N (37.2500)
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Easternmost Longitude: 86°0'0"W (-86.0000)
Westernmost Longitude: 86°7'30"W (-86.1250)
ISBN: 0607743859
Publication Format: Paper
View high-resolution images::
Option 1 (requires ExpressView plug-in)
Option 2 (no plug-in needed)

You May Find It At A Depository Library.

xsec: Yes
ISBN: 0607743859
georef_AN:
grbib_number:

Parse Comment

Check Dup

Match: yes

xsec

GMAP_ID	line	annotation
1546		

imagePath: E:\gis-nps_by_gmap_id\1546_mammoth_cave_KY_7.5'\1546_full.gif

If the map has been scanned, the filepath can be inserted to show an image in this location

Derive geologic index maps for the entire US from NPS geologic maps database

1. *Export desired "subset" of 70,000+ records to a "DBF" flat file (one problem though….. MS Excel/DBF limited to 65k records…)*
2. *Review of all 1:24,000 scale (7.5' quad-based)*
3. *Review of all 1:100,000 scale (30' x 60' quad-based)*
4. *Review of all maps with "national" in title as specific park-dedicated maps*
5. *Review of remaining "holes" in coverage of NPS areas*

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From here they can be split into various views by:

- **scale** (24-, 100-, 250-k etc.)
- "**base**": quadrangle or non-quadrangle based; county; state-wide, wilderness, etc.
- **map "type"** (geologic, surficial, mineral, hazard, aeromagnetic, reconnaissance, etc.)
- publishing entity, etc. etc.

Microsoft Access - [qry_gmap_dbf_maker : Select Query]

GMAP_I	plot	gmap_scale	quadrangle	gmap_desc	gmap_title	gmap_auth	
8843	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (general)	Geologic map of part of the Smithland quadrangle, Livingston County, Kentucky	Amos, D.H.	Geolc
12912	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Whitewater quadrangle, southeastern Missouri	Amos, D.H.	Misce
13062	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Chaffee quadrangle, Scott and Cape Girardeau Counties, Missouri	Amos, D.H.	Misce
13130	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Dongola quadrangle, Bollinger and Stoddard Counties, Missouri	Amos, D.H.	Misce
15869	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (general)	Geologic map of the Burna quadrangle, Livingston County, Kentucky	Amos, D.H.	Geolc
61266	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Dongola 7 1/2 minute Quadrangle, Missouri	Amos, D.H.	
61267	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Chaffee 7 1/2 minute Quadrangle, Missouri	Amos, D.H.	
61268	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Whitewater 7 1/2 minute Quadrangle, Missouri	Amos, D.H.	
61291	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Scott City 7 1/2 minute Quadrangle, Missouri	Amos, D.H.	
15868	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (general)	Geologic map of the Dycusburg quadrangle, western Kentucky	Amos, D.H.; Hays, '	Geolc
60586	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Summersville 7 1/2 minute Quadrangle, Missouri	Anderson, K.H.;Wh	
60587	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Summersville NE 7 1/2 minute Quadrangle, Missouri	Anderson, K.H.;Wh	
60590	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of part (15%) of the Alley Spring 7 1/2 minute Quadrangle, Missouri	Anderson, K.H.;Wh	
8121	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Jangle Ridge quadrangle, Nye and Lincoln Counties, Nevada	Barnes, Harley; Ch	Geolc
7951	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Oak Spring quadrangle, Nevada	Barnes, Harley; Ho	Geolc
13895	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Oak Spring quadrangle, Nye County, Nevada	Barnes, Harley; Ho	Open
2263	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geology of the Blacksburg quadrangle, Virginia	Bartholomew, M.J.	Public
27386	yes	15000		geologic (generic)	Geology of the quicksilver deposits of the Pacific slope	Becker, G.F.	Mono
552	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic: photogeologic)	Photogeologic map of the Navajo Mountain-12 quadrangle, Kane and San Juan Counties, Utah	Bennett, H.S.	Misce
5424	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geology of the Williamsburg, Hog Island, and Bacons Castle quadrangles, Virginia - Plate 2: Geologic Map of the Hog	Bick, K.F. and Coch	Repo
67621	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic; PRELIMINARY)	Interim geologic map of the Harrisburg Junction quadrangle, Washington County, Utah	Biek, R.F.	Open
67653	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic; PRELIMINARY)	Interim geologic map of the Hurricane quadrangle, Washington County, Utah	Biek, R.F.	Open
67706	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Hurricane 7.5' quadrangle, Washington County, Utah	Biek, R.F.	Map '
67709	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Harrisburg Junction quadrangle, Washington County, Utah	Biek, R.F.	Map '
66815	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geology of the Paria NW quadrangle, Kane County, Utah	Blakey, R.C.	Maste
15902	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic PRELIMINARY)	Preliminary geologic map of the Castle Rock Ridge quadrangle, Santa Cruz and Santa Clara Counties, California	Brabb, E.E.; Dibblee	Open
60282	yes	62500	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Alley Spring 7 1/2 minute Quadrangle, Missouri	Bridge, Josiah	
60283	yes	62500	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Eminence 7 1/2 minute Quadrangle, Missouri	Bridge, Josiah	
60647	yes	62500	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Alley Spring 7 1/2 minute Quadrangle, Missouri	Bridge, Josiah	
60648	yes	62500	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Eminence 7 1/2 minute Quadrangle, Missouri	Bridge, Josiah	
60651	yes	62500	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Powder Mill Ferry 7 1/2 minute Quadrangle, Missouri	Bridge, Josiah	
60652	yes	62500	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of the Exchange 7 1/2 minute Quadrangle, Missouri	Bridge, Josiah	
48966	yes	24600	basin	reconnaissance	Reconnaissance investigation of water quality, bottom sediment, and biota associated with irrigation drainage in the	Butler, D.L.;Kruege	Wate
8875	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (generic)	Geologic map of the Scrugham Peak quadrangle, Nye County, Nevada	Byers, F.M.; Cummi	Geolc
1938	yes	24000	quadrangle (7.5'); 24k lower 48	hazard: seismic	Official map of Alquist-Priolo Earthquake Fault Hazard Zones, Uhlemeyer Spring Quadrangle	California Division c	Spec
1941	yes	24000	quadrangle (7.5'); 24k lower 48	hazard: earthquake	Revised official map of Alquist-Priolo Earthquake Fault Hazard Zones, NE 1/4 Big Pine Quadrangle	California Division c	Spec
32272	yes	24000	quadrangle (7.5'); 24k lower 48	hazard: seismic	Official map of Alquist-Priolo Earthquake Fault Hazard Zones, Castle Rock Ridge Quadrangle	California Division c	
32276	yes	24000	quadrangle (7.5'); 24k lower 48	hazard: seismic	Official map of Alquist-Priolo Earthquake Fault Hazard Zones, Mustang Peak Quadrangle	California Division c	
32277	yes	24000	quadrangle (7.5'); 24k lower 48	hazard: seismic	Official map of Alquist-Priolo Earthquake Fault Hazard Zones, Crevison Peak Quadrangle	California Division c	
986	yes	36360	basin	geologic	Geology, physical properties, and suraface effects at Discuss Thrower site, Yucca Flat, Nevada Test Site	Carr, W.J.; Miller,C.	OF-7:
61573	yes	62500	quadrangle (7.5'); 24k lower 48	geologic (bedrock specific)	The Bedrock Geology of part (90%) of the Halltown NE 7 1/2 minute Quadrangle, Missouri	Clark, E.L.	
27753	yes	24000	basin	water (ground water)	Ground water for irrigation in the Morgan Hill area, California	Clark, W.O.	Wate
69782	yes	24000	quadrangle (7.5'); 24k lower 48	geologic (general; digital database)	Spatial database of the Mayking quadrangle, Letcher and Knott Counties, Kentucky	Conley, T.J.	Digita

Record: 1 of 314 (Filtered)

Datasheet View

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1:24,000 scale (7.5' quad-based)

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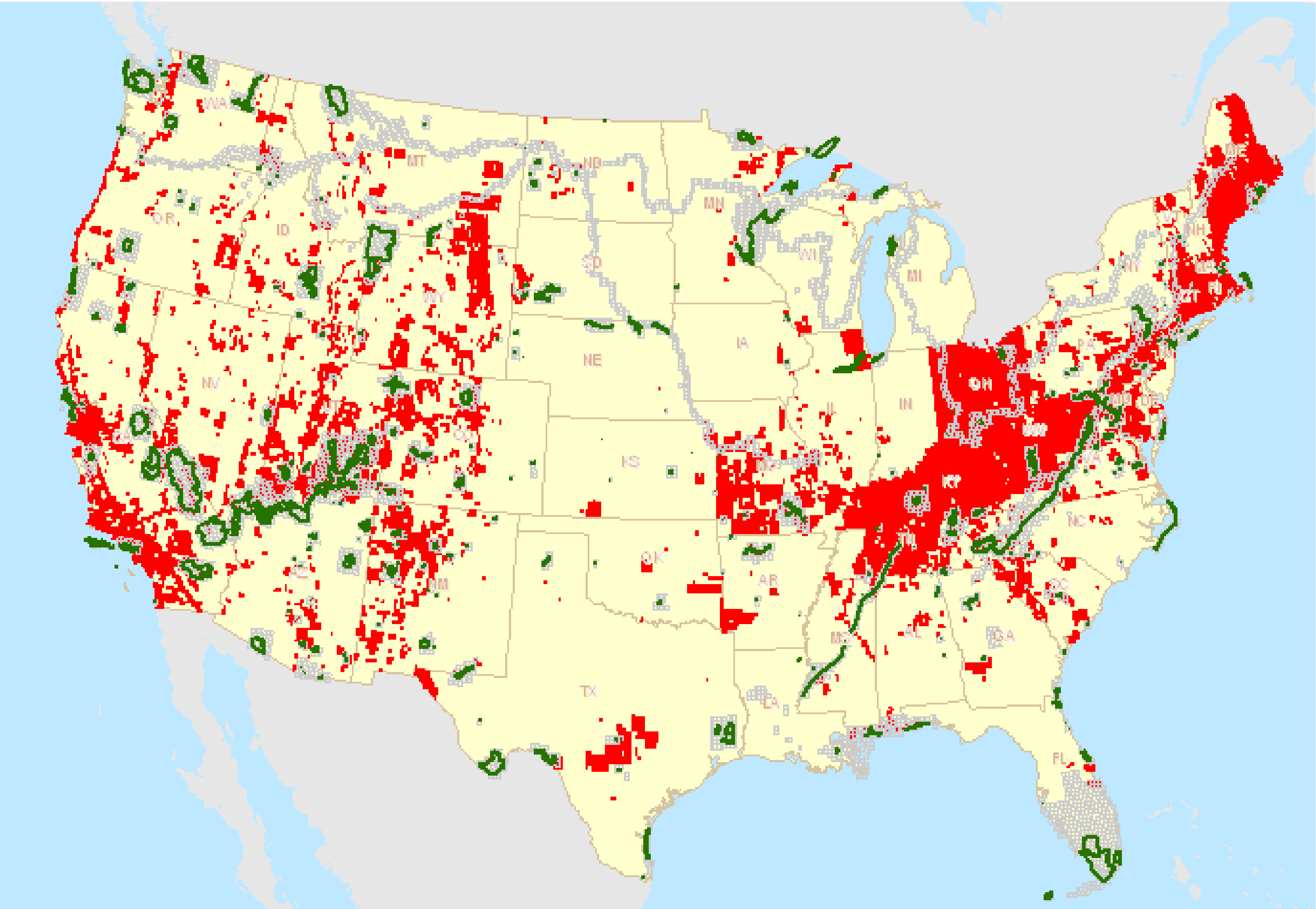

LEGEND

green: NPS areas

Gray: 7.5' quads of interest

Red: 24k gmaps

Blue: 100k gmaps

Yellow: dedicated "national" maps

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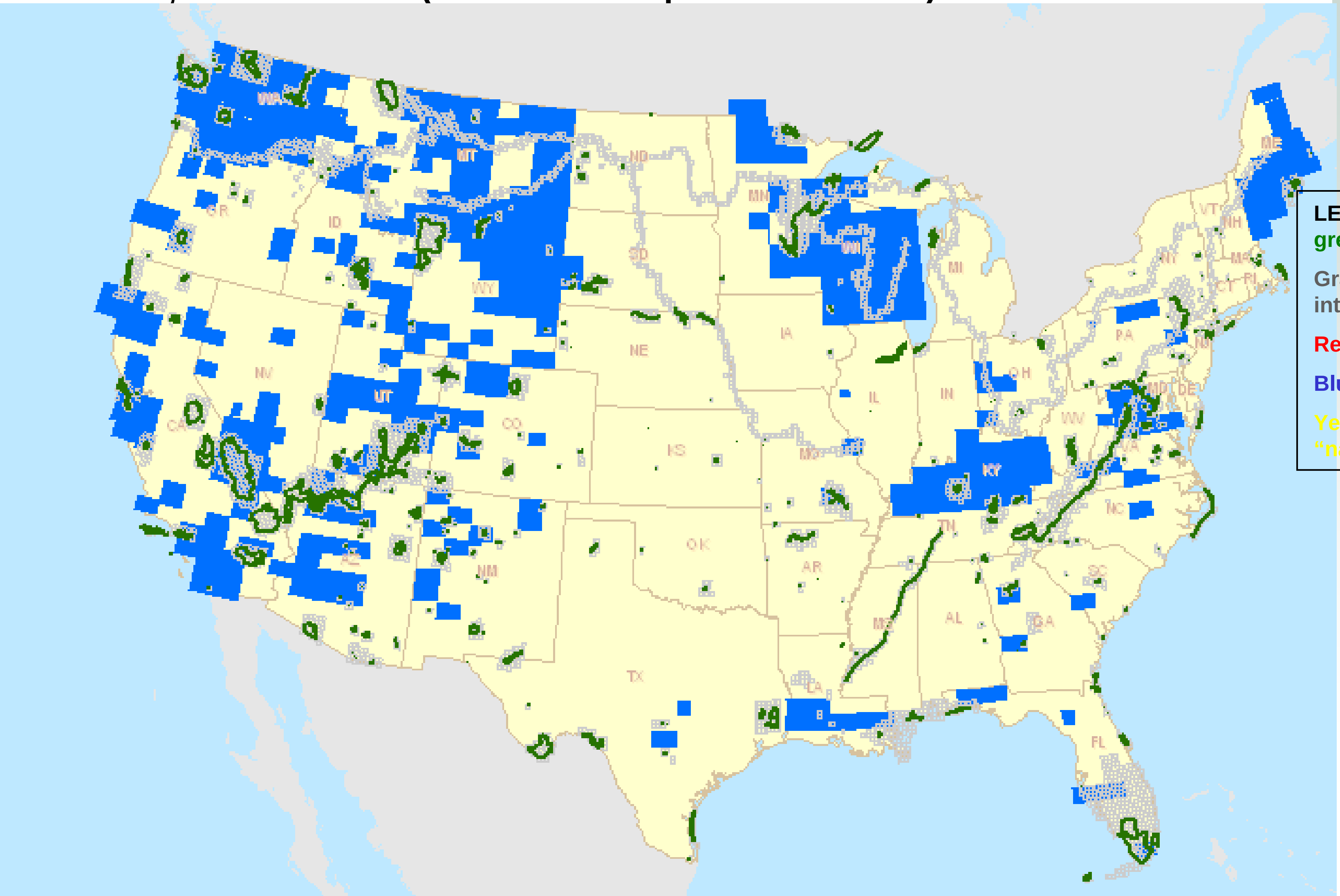
1:100,000 scale (30’ x 60’ quad-based)



LEGEND
green: NPS areas
Gray: 7.5’ quads of interest
Red: 24k gmaps
Blue: 100k gmaps
Yellow: dedicated “national” maps

National Park Service

“national park”

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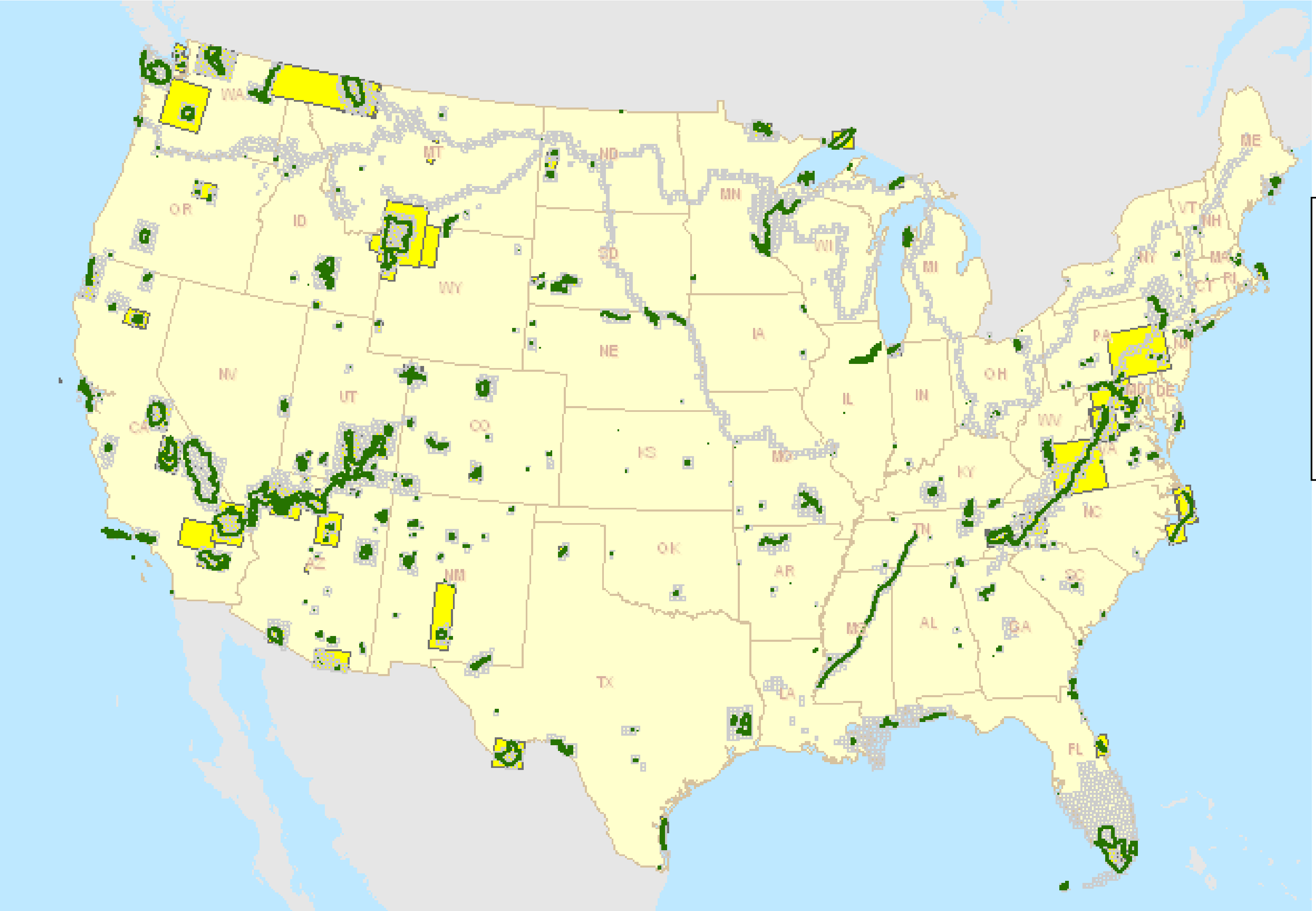

LEGEND

green: NPS areas

Gray: 7.5’ quads of interest

Red: 24k gmaps

Blue: 100k gmaps

Yellow: dedicated “national” maps

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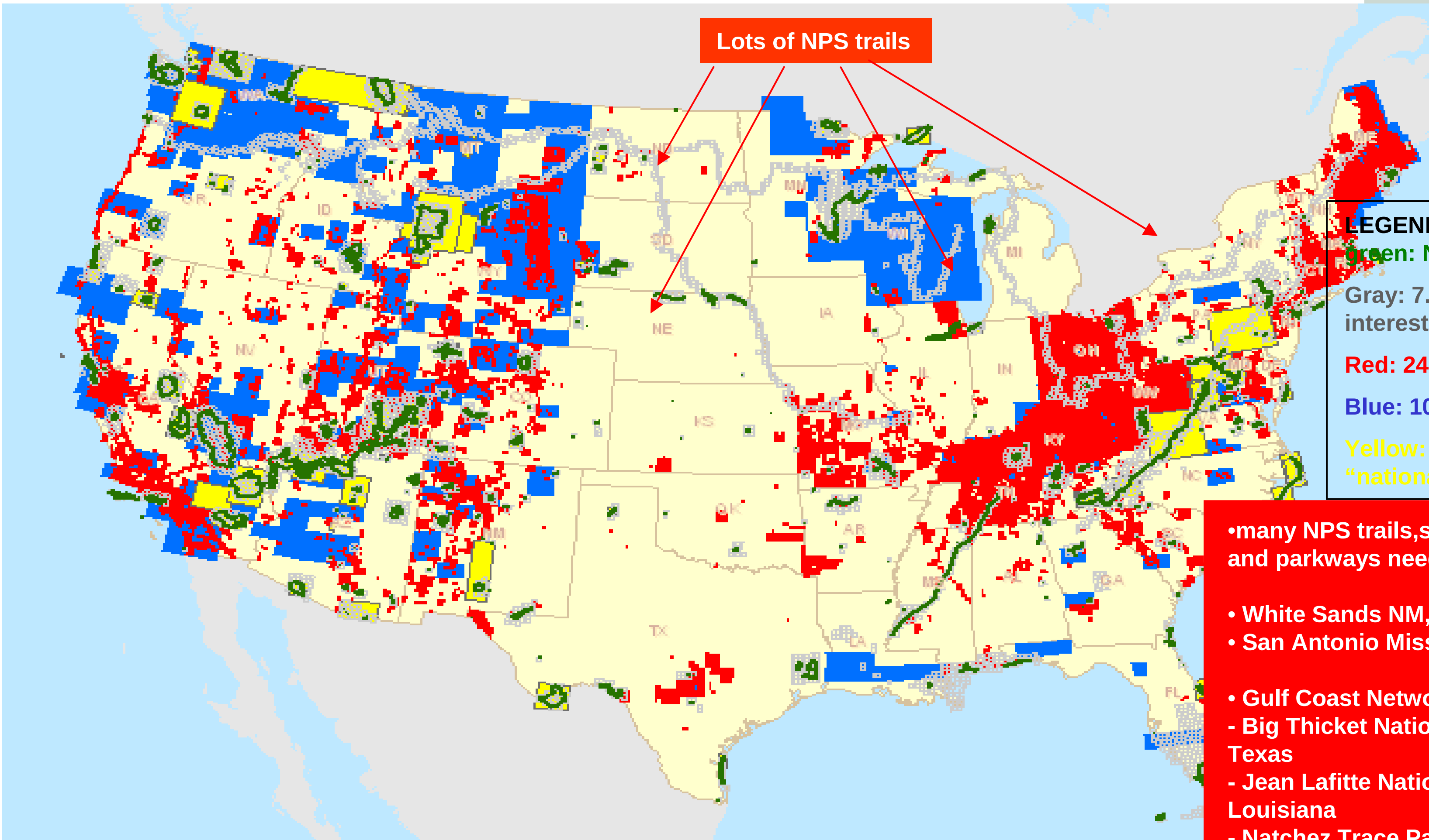
Finding and filling in the holes in the lower 48



LEGEND
green: NPS areas
Gray: 7.5' quads of interest
Red: 24k gmaps
Blue: 100k gmaps
Yellow: dedicated "national" maps

- many NPS trails, scenic rivers, and parkways need "strip maps"

- White Sands NM, New Mexico
- San Antonio Missions, Texas

- Gulf Coast Network parks
  - Big Thicket National Preserve, Texas
  - Jean Lafitte National Preserve Louisiana
  - Natchez Trace Parkway NST
  - Gulf Islands NS

Ways to improve the system

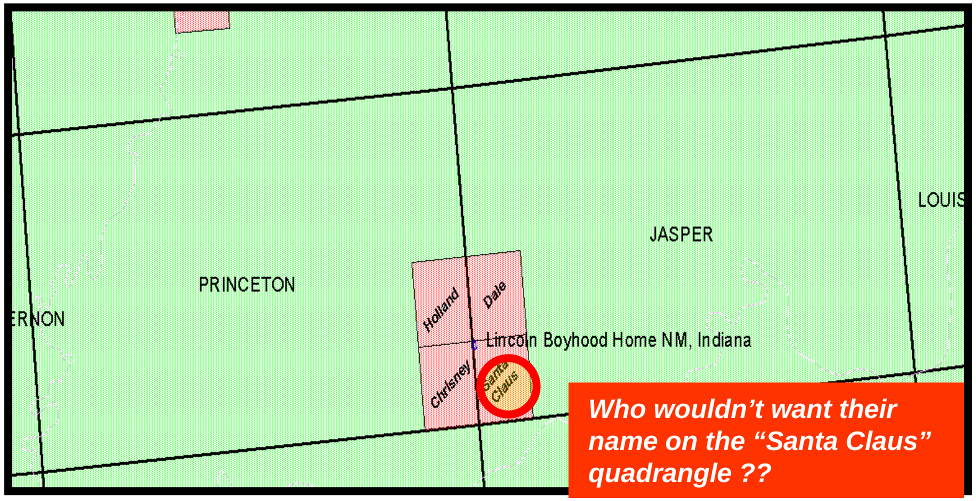
- Reconcile opinions as to the “best” map to use when faced with multiple published maps. (remember the number one rule of geologists: “5 geologists in a room will give 6 differing opinions” !)

- End practice of redundant mapping of same area; instead focus efforts on unmapped and/or inadequately mapped areas [e.g., need scales suitable (>100,000 at least) for managing resources].

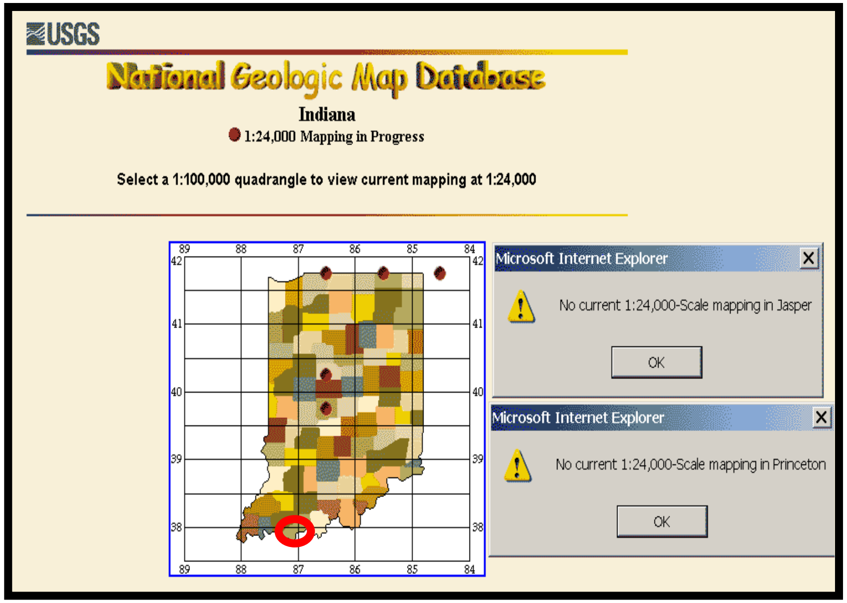
- Create an incentive for mappers to work in *less* glamorous NPS areas…

- **…………….Of course, they are ALL glamorous !**

Lincoln Boyhood Home NM, Indiana has 4 unmapped QOI's



Who wouldn't want their name on the "Santa Claus" quadrangle ??



Not a quad map and not really "geologic" either; it's "water"

III. GEOLOGY……..

It’s not just for scenery anymore!

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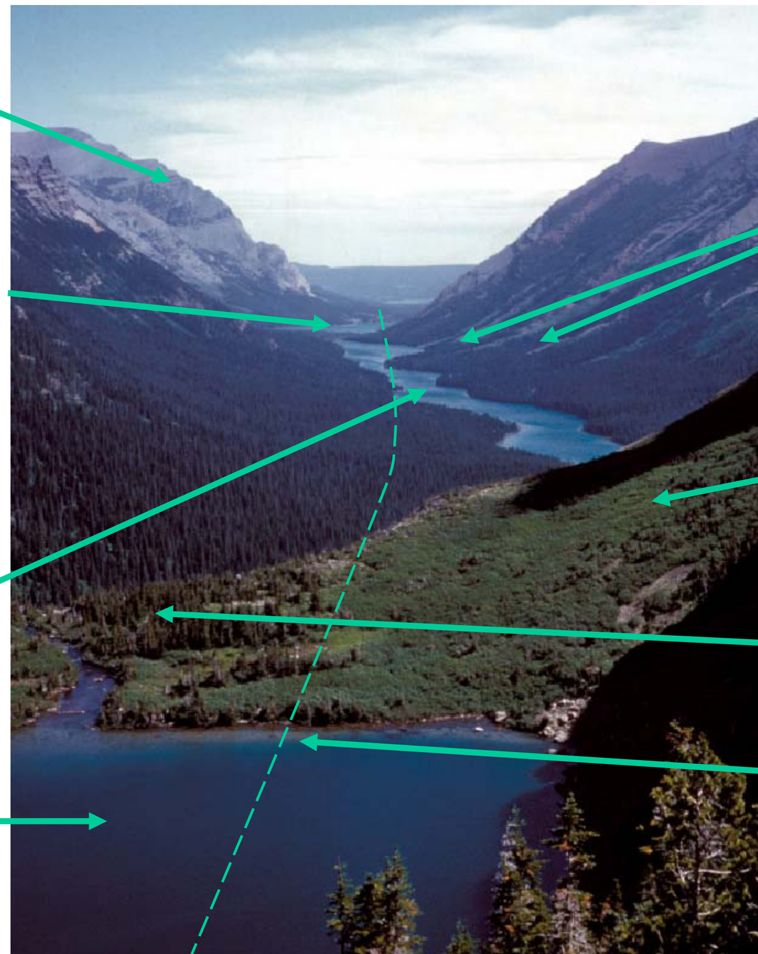
What the “geologist” sees at Glacier NP, Montana

What the “average” person sees at Glacier NP, Montana



Why be average ?

Connecting geology with your audience and other disciplines

We are always looking for more geologic maps and cooperative projects with the USGS, state geologic surveys, academic institutions (CESU's) etc. as well as real world uses of these geologic maps. If you have suggestions, please see me sometime during the meeting.

In the NPS, most resource managers tend not to have geologic backgrounds and it is incumbent on the GRE team to demonstrate the utility of our discipline.

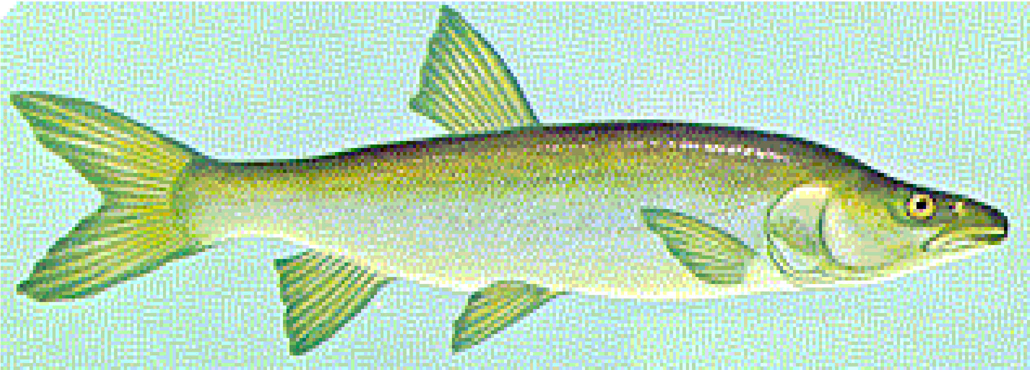
We have come up with a few examples….

Dinosaur NM example

Critical spawning habitat ***may*** be controlled by the underlying **geologic** "structure"

Endangered Colorado Pike Minnow; aka.

Colorado Squawfish (Ptychocheilus lucius).



See http://www.cpluhna.nau.edu/Biota/fishes.htm for more specifics

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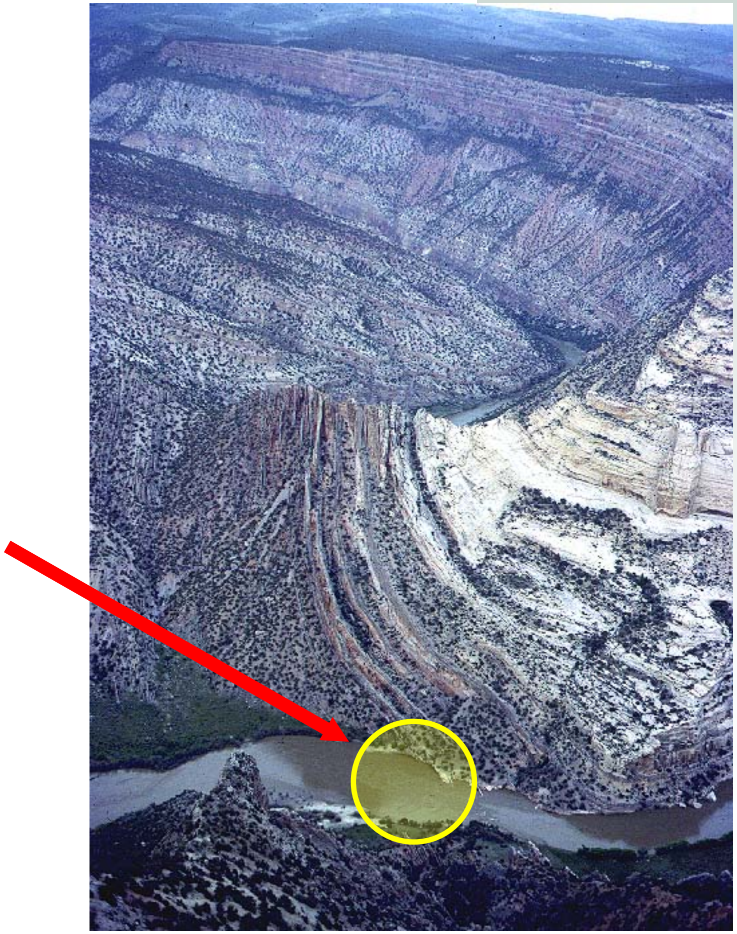
Dinosaur NM example

Where rivers (Green and Yampa) cross upturned geologic strata (*via folding and faulting*), riffles are formed providing pike minnow spawning grounds….enter the digital geologic map…



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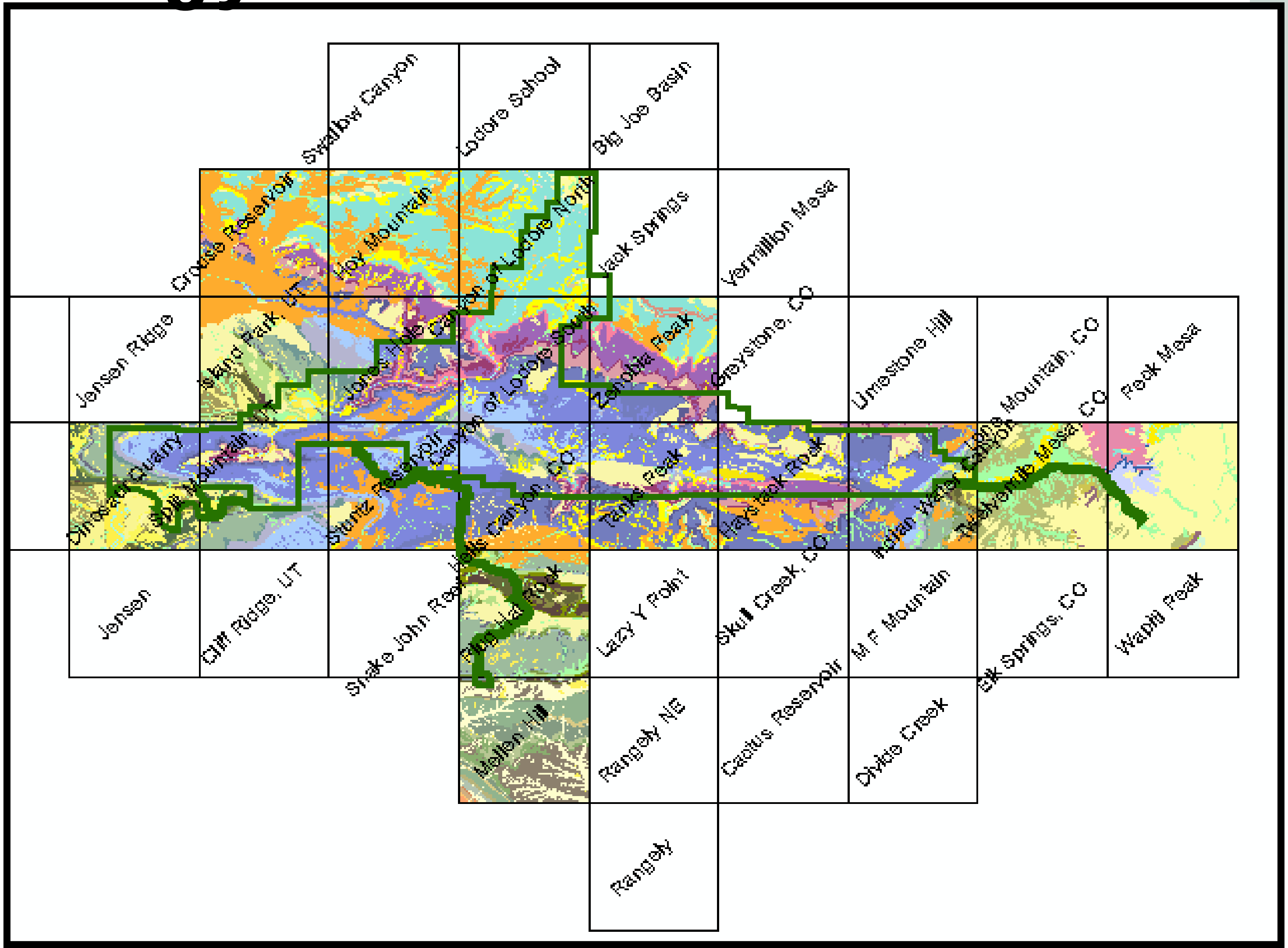
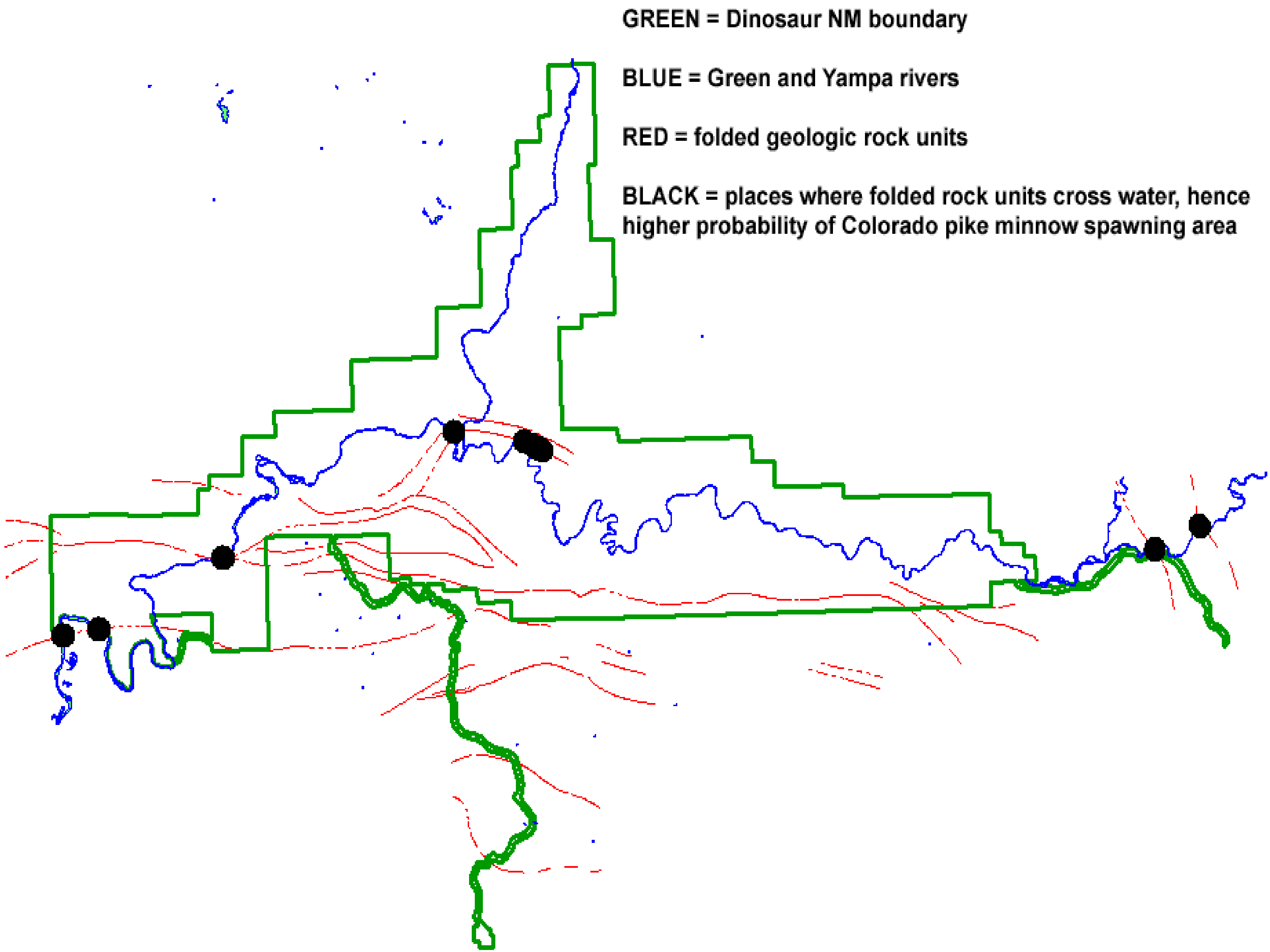
Geology of Dinosaur NM




GREEN = Dinosaur NM boundary
BLUE = Green and Yampa rivers
RED = folded geologic rock units
BLACK = places where folded rock units cross water, hence higher probability of Colorado pike minnow spawning area

Capitol Reef NP example

Distribution of endangered Winkler's Cactus

In Capitol Reef, it grows only on the Morrison Formation and its detritus

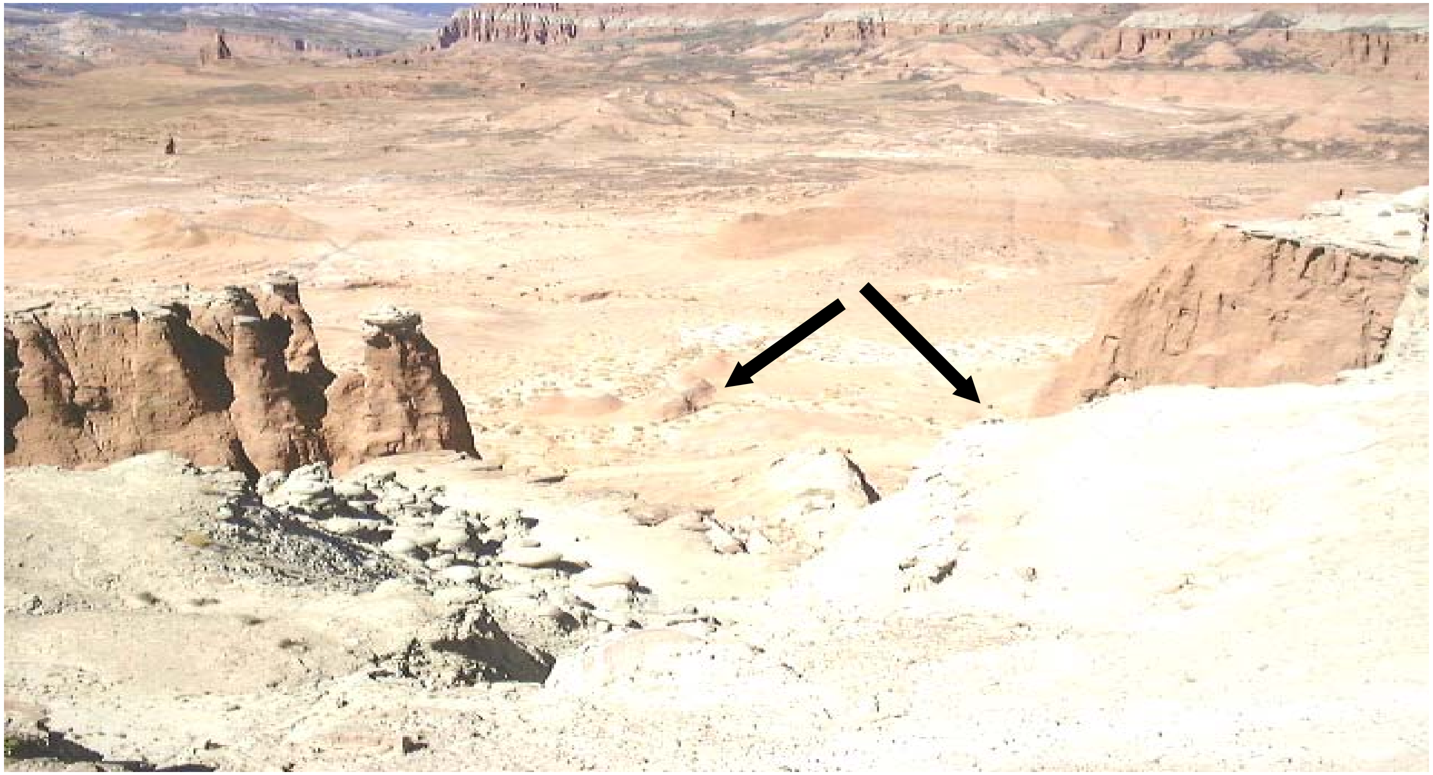
north, on the Curtis; and

south, on the Dakota

source: Tom Clark, Chief of Natural Resources, Capitol Reef NP

Capitol Reef NP example

Cactus distribution constrained to Morrison Formation
Geologic materials (bedrock, surficial, soil derived from)



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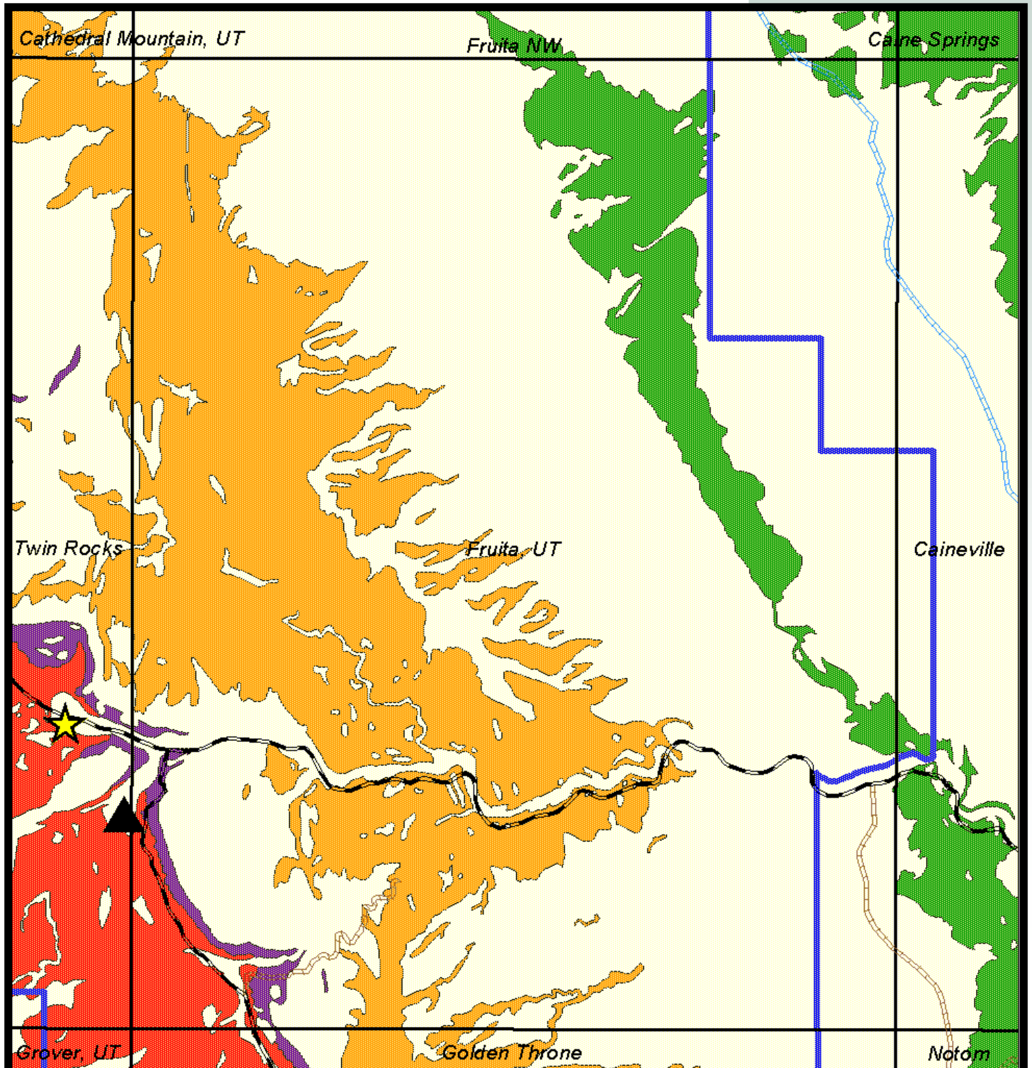
Other Capitol Reef NP examples: Fruita area

- **Moenkopi: Barneby reed mustard**
- **Chinle: Jones cyclidia**
- **Navajo: Becks spring parsley, Maguires daisy, rabbit valley gilia, Harrison's milkvetch**
- **Morrison: Winkler's cactus**



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Colorado NM example

Valley-fill deposits ("Qvf") can be used to determine a region's fire history

Colorado National Monument Geologic Database

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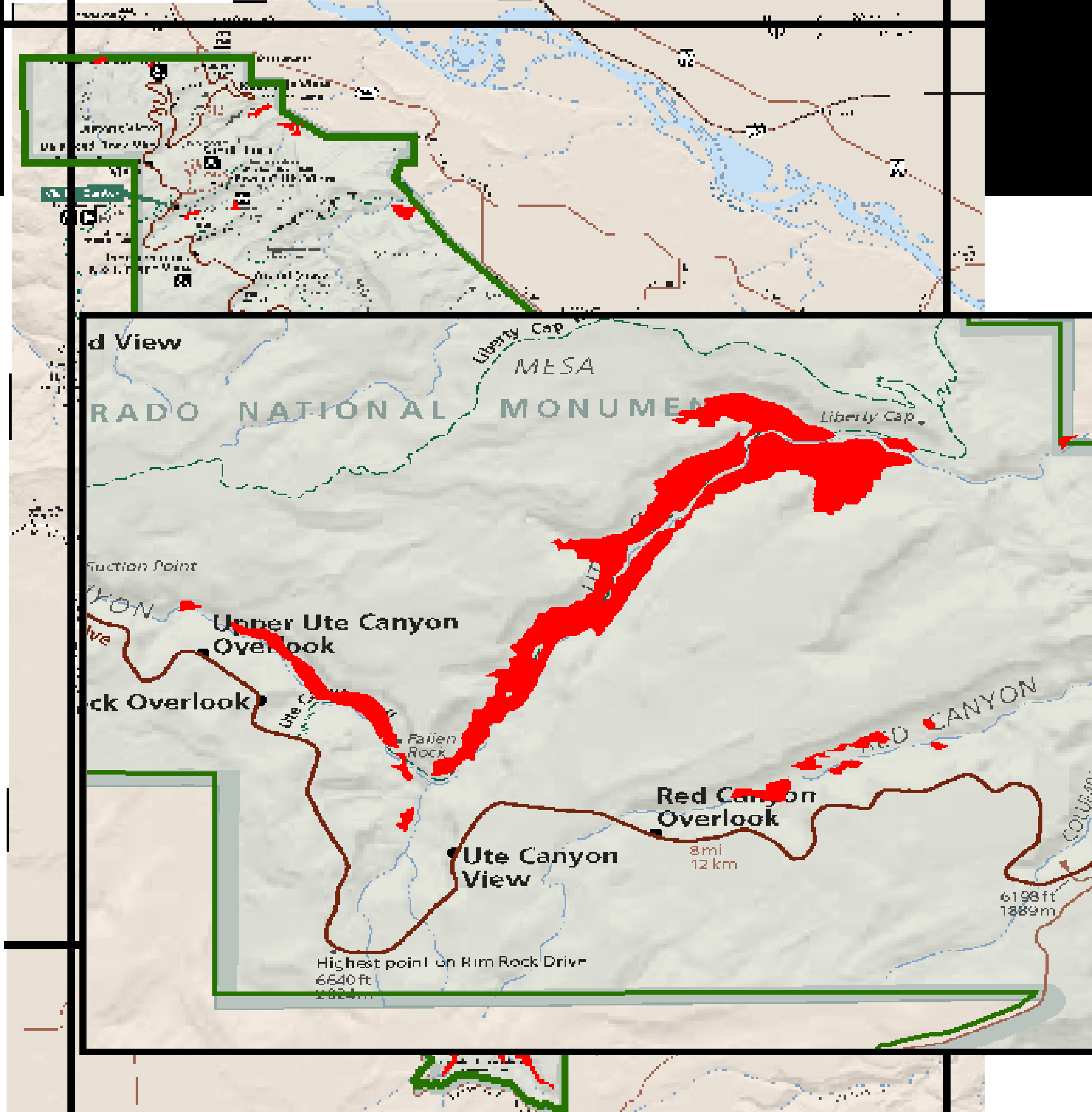
Qvf - Valley-fill deposits (Holocene and late Pleistocene)

Valley-fill deposit (Holocene and late Pleistocene)—Chiefly stream-terrace alluvium and probably sandy debris-flow deposits, but also locally includes stony colluvium on valley sides as well as minor deposits of eolian sand and sheetwash. The only exposure of the map unit exists in the southwestern part of the map area within the Colorado National Monument. In the adjacent Colorado National Monument 7.5' quadrangle, valley-fill deposits can be subdivided into a thicker bedded (>30 cm), slightly calcareous upper part and a thinner bedded (<30 cm), calcareous lower part (Scott and others, 2001). Both parts are largely composed of sand and silt that contain small, discontinuous lenses of gravel. Both parts locally contain several buried, weakly developed paleosols and common small (<2 mm) charcoal fragments. Some of these paleosols are darker than the rest of the map unit Qvf from the accumulation of organic matter, and contain abundant charcoal, presumably from burnt woody vegetation. Charcoal not associated with paleosols is concentrated at bedding breaks in the sediments, but charcoal also occurs within beds. Charcoal 14C laboratory values range from 1,280±50 to 9,190±50 years BP (before present, referenced at 1950) (Scott and others, 1999), and calibrated ages (Stuiver and others, 1998) range from 1,180 to 10,360 years BP. The discovery in No Thoroughfare Canyon of a mastodon tooth, which was probably eroded from the undated lowest part of the map unit, is consistent with a late Pleistocene age for the oldest part of the unit. The upper part of unit Qvf has beds that are typically 0.1–2 m thick, is generally reddish brown (5YR 5/4) to yellowish red (5YR 5/8), and contains minor charcoal fragments. The lower part typically has beds 5–50 cm thick, is yellow (2.5Y 7/6) to reddish yellow (7.5YR 6/6), and locally light olive brown (2.5Y 5/4), has iron oxide staining, and contains more charcoal fragments and fewer gravel lenses than the upper part. The lower part is weakly indurated, due in part to secondary calcium carbonate in a stage II Bk horizon. The gravel lenses in the lower part can be traced only a few meters at most, are about 2–5 cm thick, and consist chiefly of small granules and pebbles. Unit Qvf may be as much as 18 m thick in the map area. *MF-2363*



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Opportunities for Integrating Geology with Land Management using GIS

Combining the park's geology with other parameters can provide management with useful information for decision making

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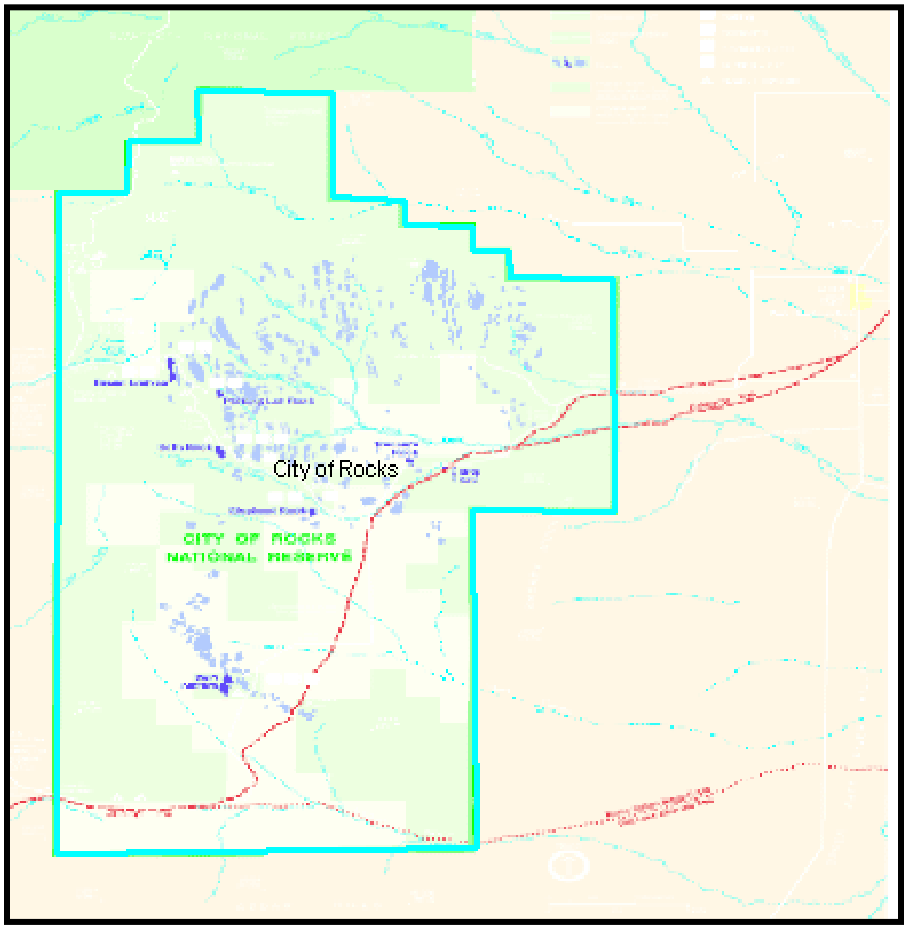
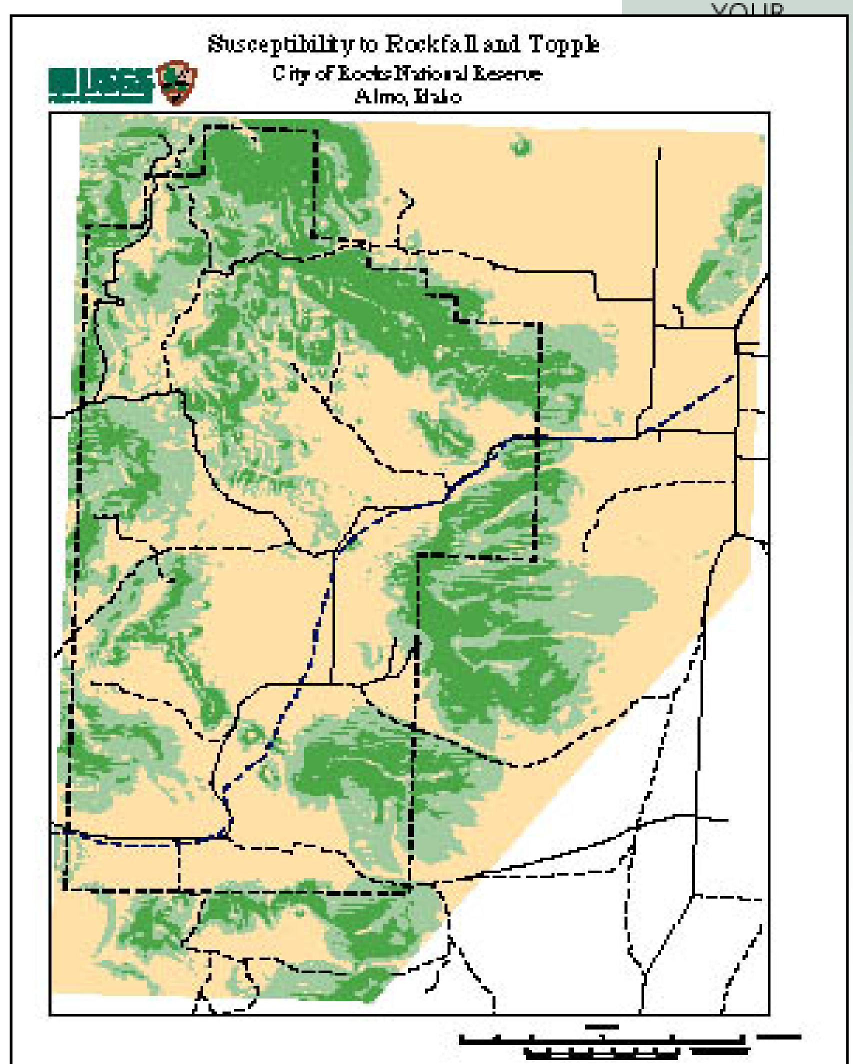
City of Rocks NR example





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Zion NP Bad Example: “Rock”ville, Utah ~2001

Full extent of “Qmsy” in and around Zion NP

Zion National Park Geologic Map Units

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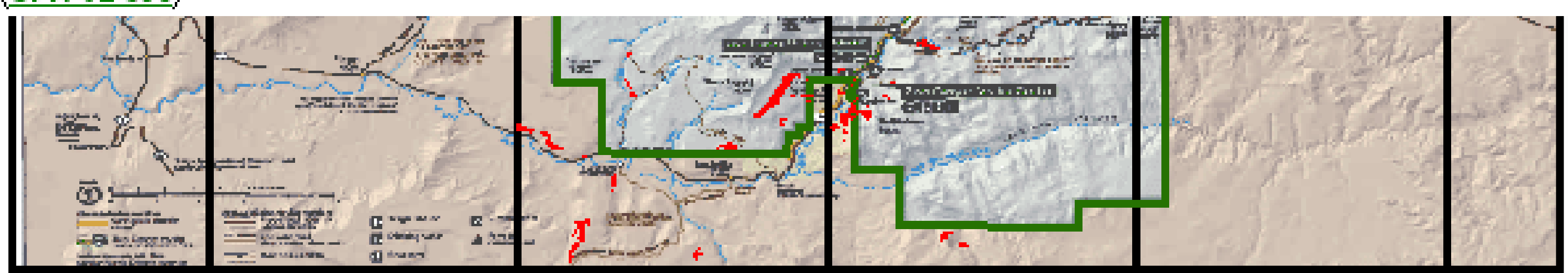
Qmsy Younger undifferentiated mass-movement slide and slump deposits

Qmsy Younger undifferentiated mass-movement slide and slump deposits (Holocene to upper Pleistocene) -- Masses of rock and unconsolidated material that have undergone translational and/or rotational downslope movement; bedrock strata within the blocks are commonly tilted and shattered; individual blocks may be as much as several hundred feet long; slip surfaces commonly develop in the clays of the Petrified Forest Member of the Chinle Formation and in silt and clay units in the Kayenta Formation; similar in character and occurrence to Qmsh, but landslide features such as scarps and slide blocks are morphologically less distinct as the result of weathering and erosion; locally includes deposits with historical movement; probably formed mostly during wet climatic regimes in the Pleistocene, but continue to move near springs and other wet areas, and where undercut or oversteepened by stream erosion or human activity; vary greatly in thickness, but most are probably less than 50 feet (15 m) thick.

(*OFR-02-393*)
(*OFR-02-394*)
(*OFR-02-395*)



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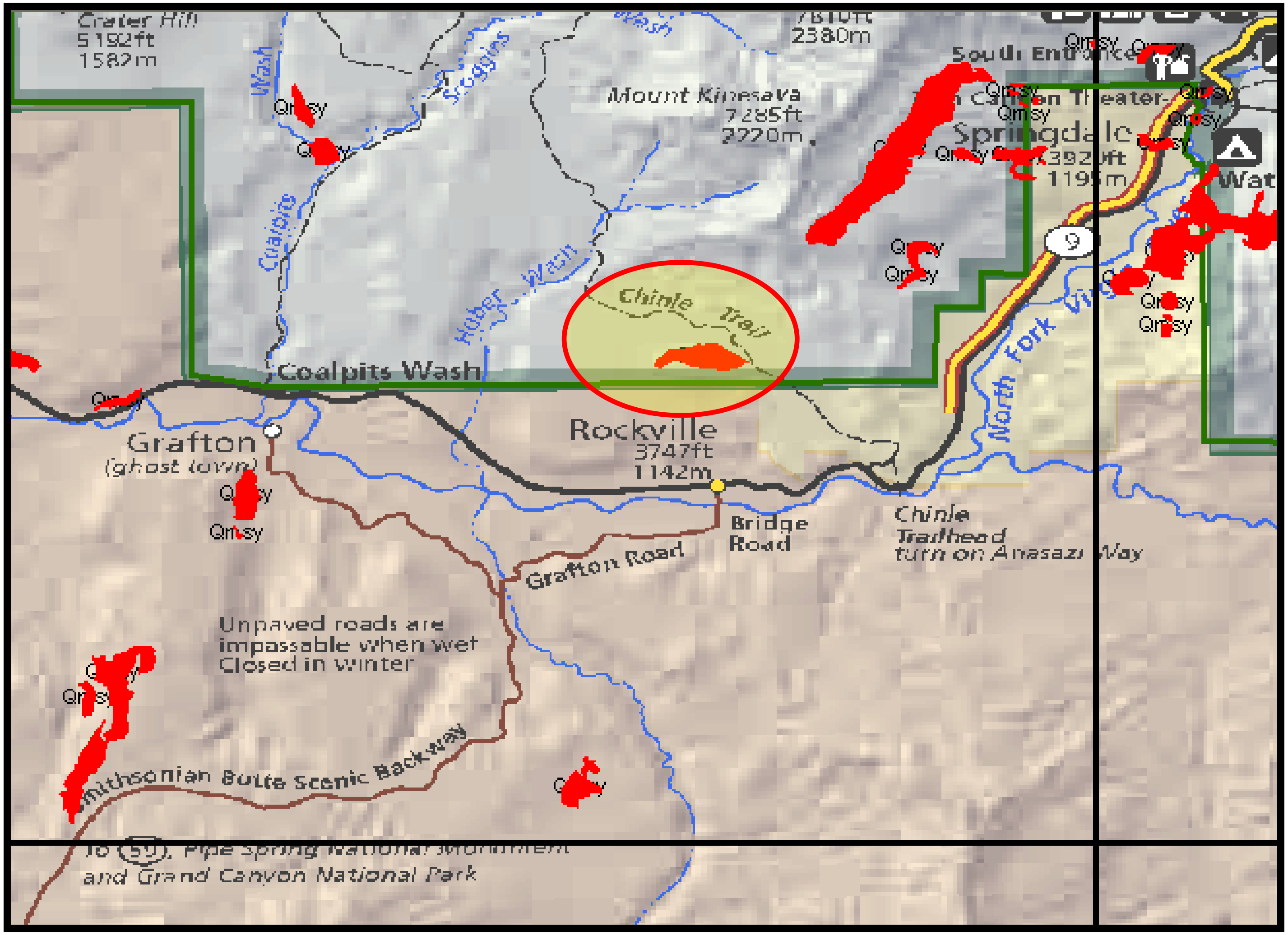
Uh oh…"source" in Zion NP near "Chinle trail"



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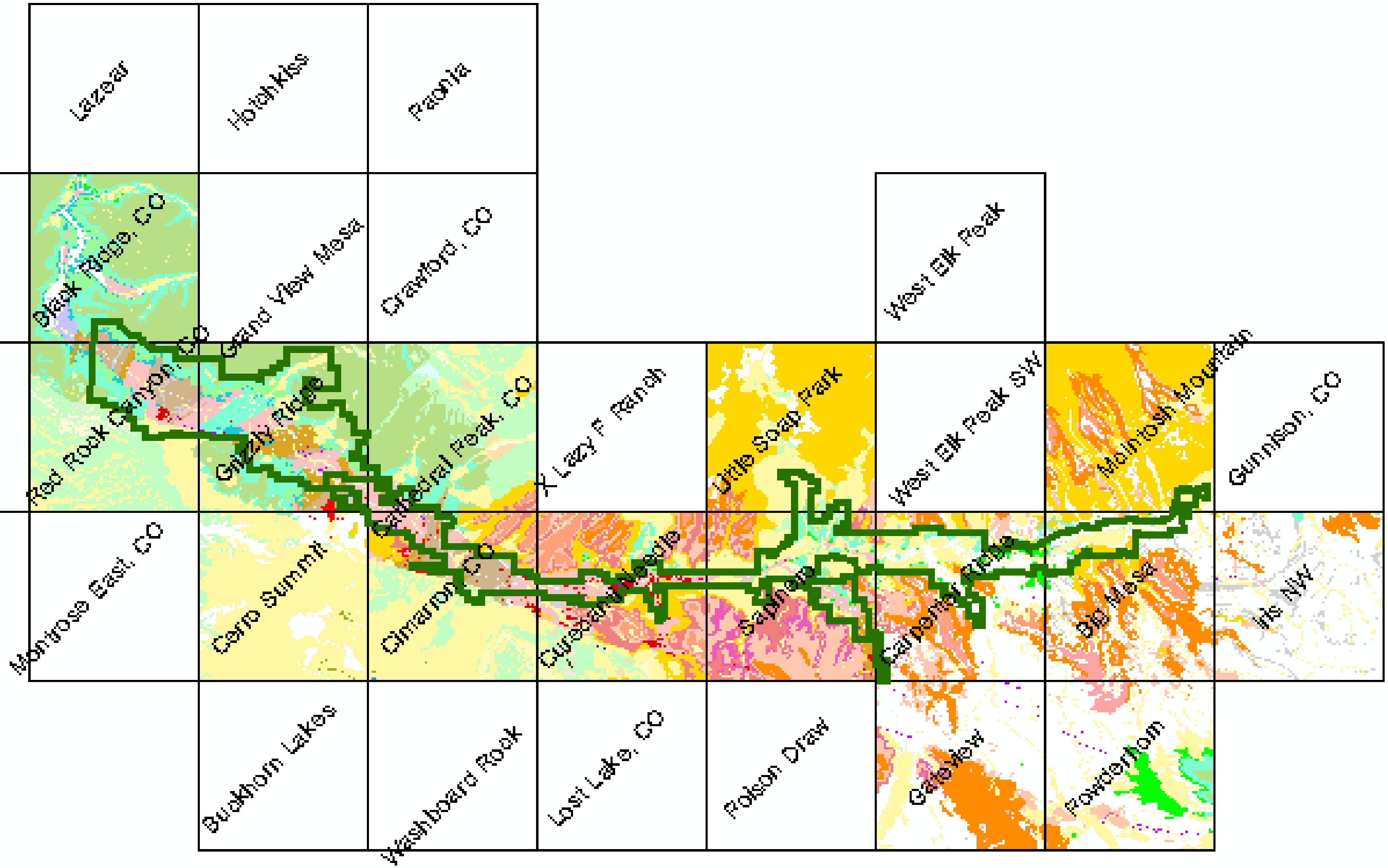
Paleontologic Resources: Curecanti NRA Expansion (??)



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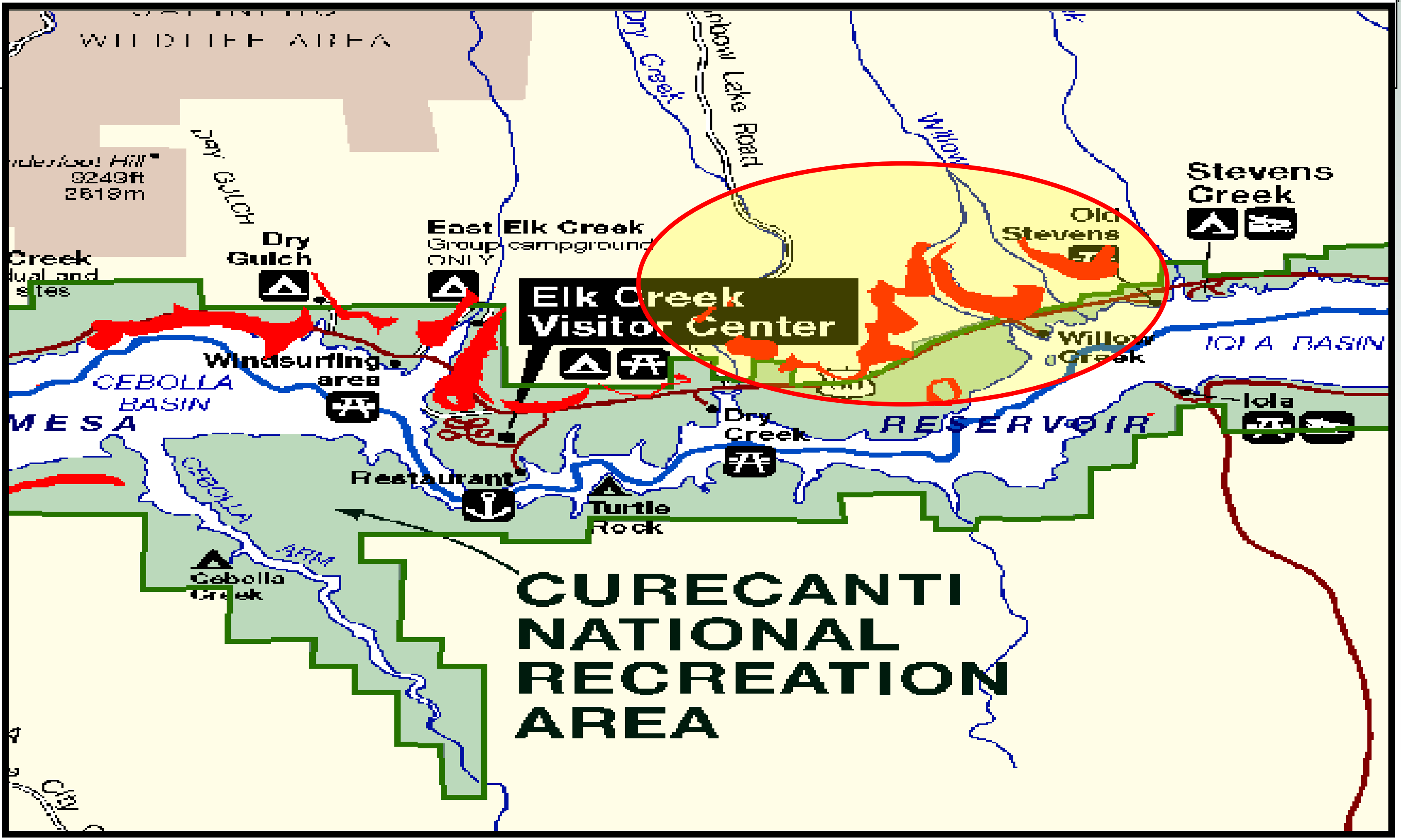
Jurassic Morrison formation occurrence



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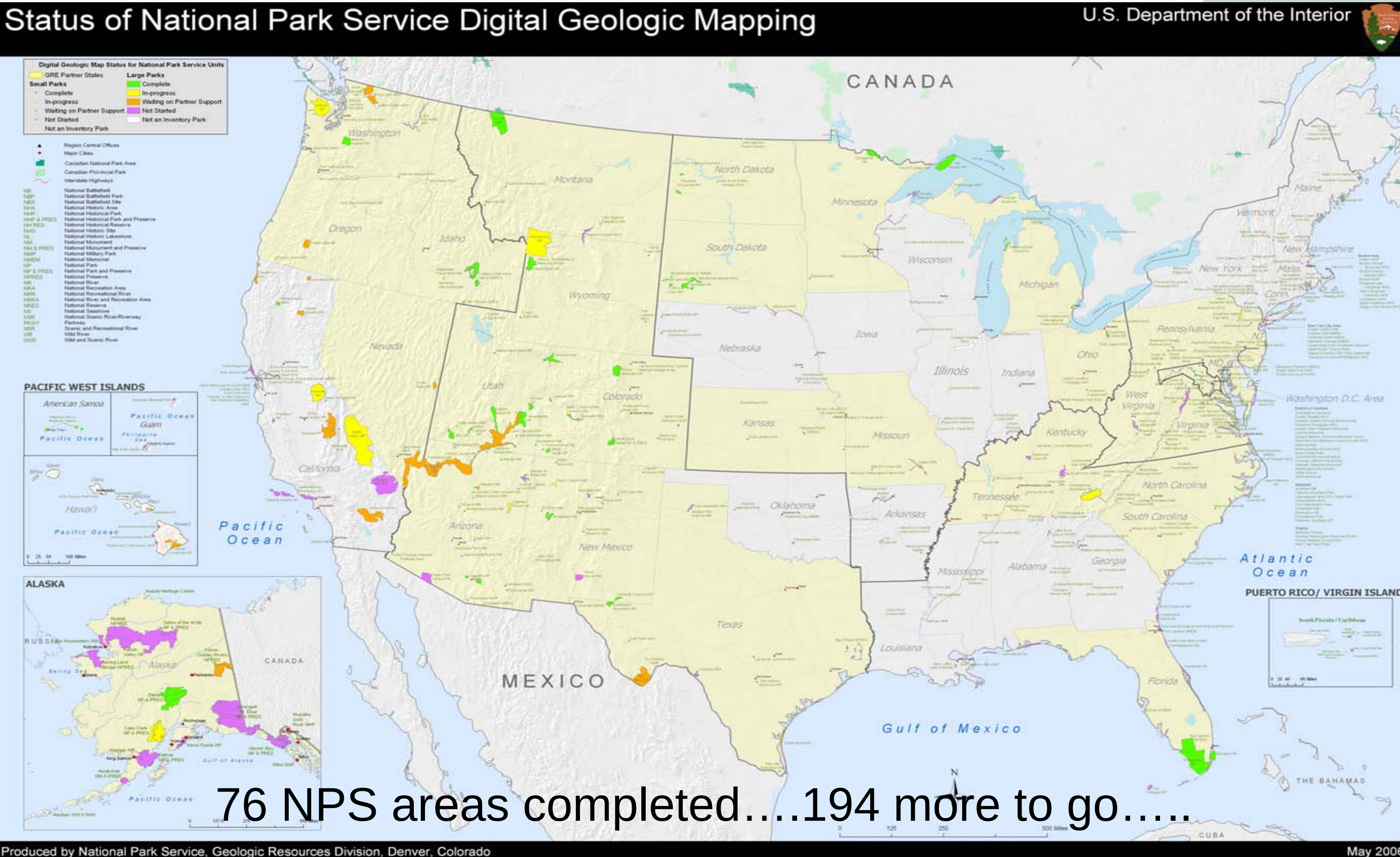

76 NPS areas completed….194 more to go…..

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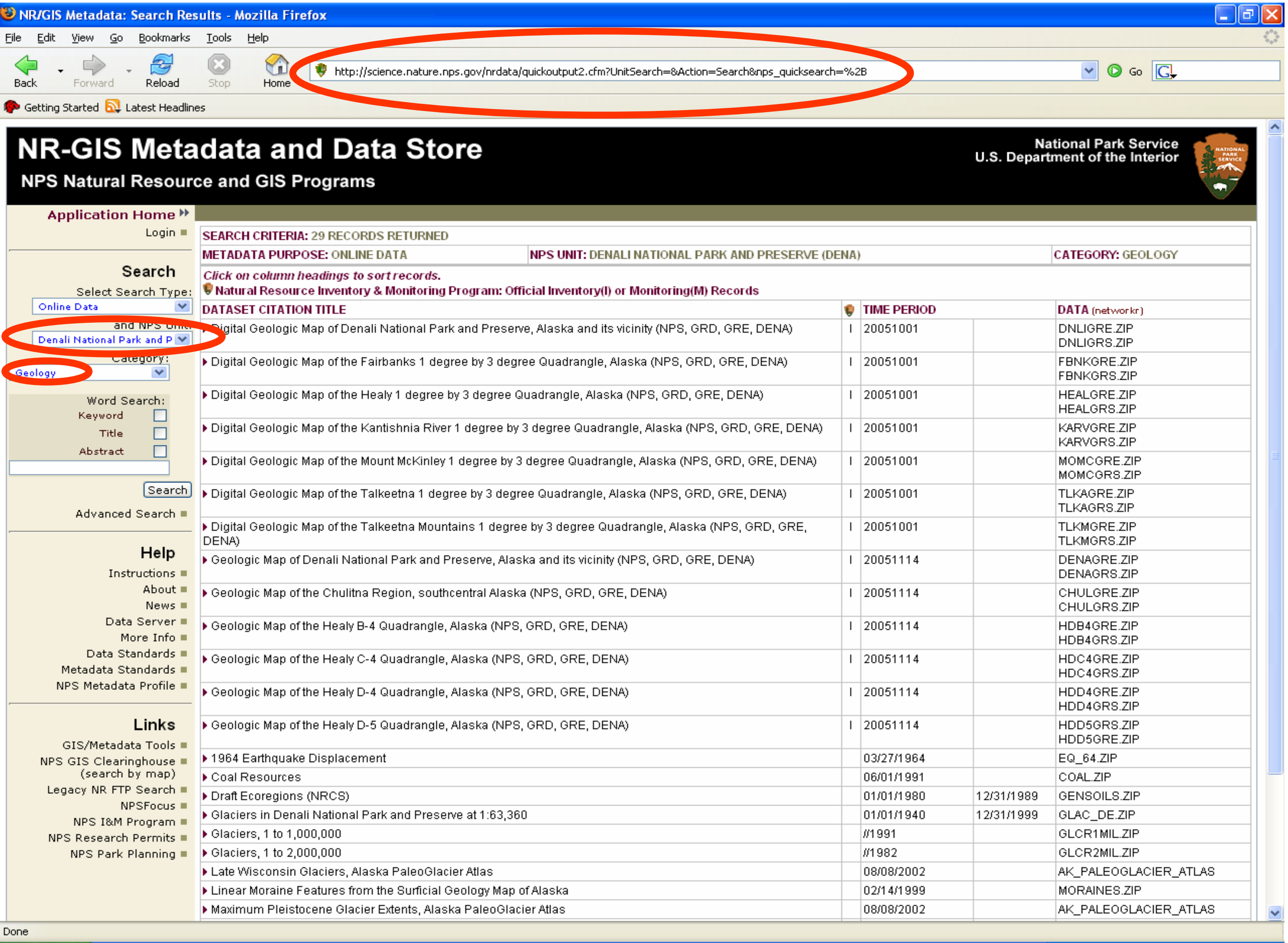
How to get completed NPS digital geologic maps



NR/GIS Metadata: Search Results - Mozilla Firefox

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NPS Natural Resource and GIS Programs

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U.S. Department of the Interior

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Keyword
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More Info
Data Standards
Metadata Standards
NPS Metadata Profile

Links
GIS/Metadata Tools
NPS GIS Clearinghouse (search by map)
Legacy NR FTP Search
NPSFocus
NPS I&M Program
NPS Research Permits
NPS Park Planning

SEARCH CRITERIA: 29 RECORDS RETURNED

METADATA PURPOSE: ONLINE DATA | NPS UNIT: DENALI NATIONAL PARK AND PRESERVE (DENA) | CATEGORY: GEOLOGY

Click on column headings to sort records.

Natural Resource Inventory & Monitoring Program: Official Inventory(I) or Monitoring(M) Records

DATASET CITATION TITLE		TIME PERIOD		DATA (networkr)
Digital Geologic Map of Denali National Park and Preserve, Alaska and its vicinity (NPS, GRD, GRE, DENA)	I	20051001		DNLIGRE.ZIP DNLIGRS.ZIP
Digital Geologic Map of the Fairbanks 1 degree by 3 degree Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051001		FBNKGRE.ZIP FBNKGRS.ZIP
Digital Geologic Map of the Healy 1 degree by 3 degree Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051001		HEALGRE.ZIP HEALGRS.ZIP
Digital Geologic Map of the Kantishnia River 1 degree by 3 degree Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051001		KARVGRE.ZIP KARVGRS.ZIP
Digital Geologic Map of the Mount McKinley 1 degree by 3 degree Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051001		MOMCGRE.ZIP MOMCGRS.ZIP
Digital Geologic Map of the Talkeetna 1 degree by 3 degree Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051001		TLKAGRE.ZIP TLKAGRS.ZIP
Digital Geologic Map of the Talkeetna Mountains 1 degree by 3 degree Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051001		TLKMGRE.ZIP TLKMGRS.ZIP
Geologic Map of Denali National Park and Preserve, Alaska and its vicinity (NPS, GRD, GRE, DENA)	I	20051114		DENAGRE.ZIP DENAGRS.ZIP
Geologic Map of the Chulitna Region, southcentral Alaska (NPS, GRD, GRE, DENA)	I	20051114		CHULGRE.ZIP CHULGRS.ZIP
Geologic Map of the Healy B-4 Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051114		HDB4GRE.ZIP HDB4GRS.ZIP
Geologic Map of the Healy C-4 Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051114		HDC4GRE.ZIP HDC4GRS.ZIP
Geologic Map of the Healy D-4 Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051114		HDD4GRE.ZIP HDD4GRS.ZIP
Geologic Map of the Healy D-5 Quadrangle, Alaska (NPS, GRD, GRE, DENA)	I	20051114		HDD5GRS.ZIP HDD5GRE.ZIP
1964 Earthquake Displacement		03/27/1964		EQ_64.ZIP
Coal Resources		06/01/1991		COAL.ZIP
Draft Ecoregions (NRCS)		01/01/1980	12/31/1989	GENSOILS.ZIP
Glaciers in Denali National Park and Preserve at 1:63,360		01/01/1940	12/31/1999	GLAC_DE.ZIP
Glaciers, 1 to 1,000,000		//1991		GLCR1MIL.ZIP
Glaciers, 1 to 2,000,000		//1982		GLCR2MIL.ZIP
Late Wisconsin Glaciers, Alaska PaleoGlacier Atlas		08/08/2002		AK_PALEOGLACIER_ATLAS
Linear Moraine Features from the Surficial Geology Map of Alaska		02/14/1999		MORAINES.ZIP
Maximum Pleistocene Glacier Extents, Alaska PaleoGlacier Atlas		08/08/2002		AK_PALEOGLACIER_ATLAS

Done

Other ESRI UC 2006 NPS geology related "stuff"

TALKS:

Wednesday: 130-245; ***"The National Park Service Geology-GIS Geodatabase Data Model"***: Heather Stanton, Colorado State University-NPS

POSTERS:

- ***"The Geologic Resources Evaluation: Getting Started, Digital Map Creation, Types of Maps, Conclusions"***: Melanie Ransmeier and Georgia Hybels

- ***"The National Park Service – Creating Digital Geologic-GIS Data"***: Stephanie O'Meara, Heather I. Stanton, James R. Chappell, Ronald D. Karpilo, Gregory S. Mack, Georgia A. Hybels, Trista L. Thornberry-Ehrlich