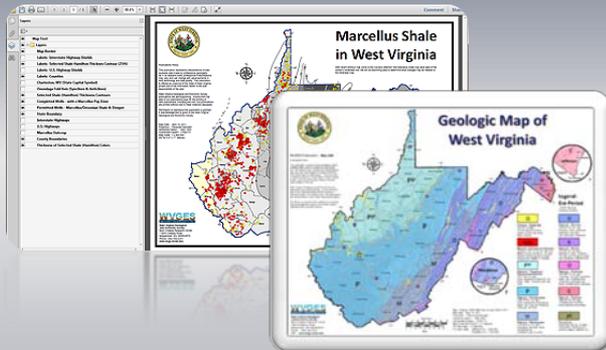


The following was presented at DMT'11  
(May 22-25, 2011).

The contents are provisional and will be  
superseded by a paper in the  
DMT'11 Proceedings.

See also earlier Proceedings (1997-2010)  
<http://ngmdb.usgs.gov/info/dmt/>

# Tricks and Tips of Creating a Layered, *Geo-Enabled* Adobe® PDF Map



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May 22 – 25, 2011





## Some Information

This presentation is based on personal learning experience and its intention is to provide you to get “up and running” in creating a layered, geo-enabled PDF.

## Tools Used:

- ESRI® ArcGIS® Desktop (ArcMap), version 9.3.1
- Adobe® Acrobat® 9 Professional, version 9.4.4



# Example



# Example: Initial View

**Geologic Map of West Virginia**

**Legend: Era/Period**

O	D
M.C.	S
PP	O
P	C
M	pc

**Bedrock Geology of West Virginia**

The majority of bedrock exposed at the surface in West Virginia is sedimentary in origin, deposited during the Paleozoic Era (545 to 230 million years ago), very few igneous or metamorphic rocks are exposed at the surface due to deep burial beneath the thick Paleozoic cover. The geologic history of West Virginia prior to the Paleozoic is poorly understood. The oldest exposed rock in the State, in the tip of the eastern panhandle, is the Precambrian Carolina Greenstone, a metamorphosed lava which erupted 800 million years ago. During the Cambrian and Ordovician periods, the State was covered by a sea that deposited limestone, shale, siltstones, and minor sandstones. These rocks are now exposed at the surface in the eastern panhandle.

During the latest Mississippian and into the Permian, the Appalachian Orogeny produced the Appalachian Mountains we know today. Even as these Mountains were being formed from existing rock layers, erosion began to wear them down providing a new source of sediment for streams flowing to the west.

Motion of the earth's tectonic plates reshape and deform preexisting rock units; subsequent erosion and deposition of the sediments produces new rock layers. The first well-known tectonic event to affect the State, the Ordovician Taconic Orogeny, formed a mountain chain to the north and east of West Virginia that became the source of clastic sediment during the latest Ordovician, Silurian, and early Devonian. Marine carbonates were deposited in south and central West Virginia during this time; the north and west were dominated by non-marine clastics and evaporites, especially during the late Silurian.

The next tectonic event, the Devonian Acadian Orogeny, formed a new set of mountains to the southeast. Erosion of these mountains produced sediment deposited across the State from the late Devonian into the Pennsylvanian. Regression of the Devonian sea led to the deposition of continental red beds over much of the State at the end of the Devonian. The sea returned in the Mississippian and thick limestones of the commercially important Greenbrier Group were deposited.

During the Late Mississippian, the sea regressed from West Virginia leaving a low-lying, swampy Pennsylvanian terrain which produced thousands of feet of mainly non-marine sandstone, shale, and coal, the State's economic mainstay.

Note what is provided for the initial view of this map:

- Layers table at left (with collapsed folders)
- Pages shown
- Size of map/document to screen view





# Example: Expanded Layer Folders

**Layers Panel:**

- Geologic Symbols
  - Closeup Map - Jefferson
    - Map Border
    - Labels
      - Label: County Name (Jefferson)
      - Label: Period (Precambrian)
    - County Boundary
    - Era-Period Colors (with hillshade)
  - Closeup Map - Pendleton
    - Map Border
    - Labels
      - Label: County Name (Pendleton)
      - Label: Era-Period (Mesozoic and Cenozoic)
    - County Boundary
    - Era-Period Colors (with hillshade)
- Main Map
  - Map Border
  - Labels: Interstate Highways Shields
  - Label: State Capital (Charleston)
  - Labels: County Names
  - State Boundary
  - State Capital (star)
  - Interstate Highways
  - County Boundaries
  - Era-Period Colors
  - Era-Period Colors (with hillshade)

**Map Content:**

**Geologic Map of West Virginia**

WVGES Publication: Map 25A  
 Publications Policy:  
 This publication represents interpretations of best available data made by professional geologists. As in all research work, professional interpretations may vary, and can change with advancements in both technology and data quality. This publication is offered as a service of the State of West Virginia; proper use of the information herein is the sole responsibility of the user.

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**Legend:**  
 USGS Geologic Coloring Scheme

<b>Q</b> Cenozoic - Quaternary (0-2 mi. yrs. ago) Alluvial deposits of sand, gravel, silt and clay along major streams.	<b>D</b> Paleozoic - Devonian (355-416 mi. yrs. ago) Redbeds, shale, sandstone, limestone, and chert. Gas, silica sand, limestone.
<b>MzCz</b> Mesozoic and Cenozoic Intrusives Jurassic (145-157 mi. yrs. ago) and Middle Eocene (43-48 mi. yrs. ago). Shallow intrusive igneous dikes ranging from basalt to rhyolite.	<b>S</b> Paleozoic - Silurian (416-444 mi. yrs. ago) Sandstone, shale, limestone, rock salt, and ferruginous beds. Gas, limestone, artificial lime.
<b>PP</b> Paleozoic - Transitional Pennsylvanian/Permian (261+ mi. yrs. ago) Cyclic sequences of sandstone, red beds, shale, limestone and coal. Coal.	<b>O</b> Paleozoic - Ordovician (444-485 mi. yrs. ago) Limestone, dolomite, sandstone, shale, and metabasaltite. Limestone (generically low silica), building stone, clayshale.
<b>IP</b> Paleozoic - Pennsylvanian (299-319 mi. yrs. ago) Cyclic sequences of sandstone, shale, clay, coal, and limestone. Coal, gas, oil, brine.	<b>Є</b> Paleozoic - Cambrian (659-542 mi. yrs. ago) Limestone and dolomite, some sandstone and shale.
<b>M</b> Paleozoic - Mississippian (318-359 mi. yrs. ago) Limestone, red beds, shale, and sandstone.	<b>pC</b> Precambrian (More than 542 mi. yrs. ago) Gneiss. Present only in extreme eastern Jefferson Co.

Map: Original 1968/1969 map revised, March 2011  
 Map Date: May 16, 2011  
 Projection: Transverse Mercator  
 Horizontal Datum: NAD 1983  
 Coordinate System: UTMz17n  
 Map Scale (for full 8.5" x 11" display):  
 For main map: 1:2,000,000  
 For inset maps: Jefferson Co. 1:200,000  
 Pendleton Co. 1:500,000

Users can expand folders, view layers and re-size the document as desired





# Example: No Hillshade

Geologic\_Map\_of\_West\_Virgini-Map25A.pdf - Adobe Reader

File Edit View Window Help

Save file (Ctrl+S)

Geologic Symbols

- Closeup Map - Jefferson
- Map Border
- Labels
  - Label: County Name (Jefferson)
  - Label: Period (Precambrian)
- County Boundary
- Era-Period Colors (with hillshade)
- Closeup Map - Pendleton
- Map Border
- Labels
  - Label: County Name (Pendleton)
  - Label: Era-Period (Mesozoic and Cenozoic)
- County Boundary
- Era-Period Colors (with hillshade)
- Map Text
- Main Map
- Map Border
- Labels: Interstate Highways Shields
- Label: State Capital (Charleston)
- Labels: County Names
- State Boundary
- State Capital (star)
- Interstate Highways
- County Boundaries
- Era-Period Colors
- Era-Period Colors (with hillshade)

## Geologic Map of West Virginia

**WVGES**  
GEOLOGY UNDERLIES IT ALL

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Martinsburg, WV 25858-0079  
Phone: (204) 594-0331  
Web: www.wvgs.wvnet.edu

**Legend: Era-Period**  
USGS Geologic Coloring Scheme

<b>Q</b>	Cenozoic - Quaternary (0-2 mi. yrs. ago) Alluvial deposits of sand, gravel, silt and clay along major streams.	<b>D</b>	Paleozoic - Devonian (369-416 mi. yrs. ago) Sandstone, shale, sandstone, limestone, and chert.
<b>MzCz</b>	Mesozoic and Cenozoic Intrusives (145-157 mi. yrs. ago) and Middle Eocene (12-40 mi. yrs. ago). Shallow intrusive igneous bodies ranging from basalts to mylonites.	<b>S</b>	Paleozoic - Silurian (416-444 mi. yrs. ago) Sandstone, shale, limestone, rock salt, and ferrous beds. Gas, limestone, artificial brine.
<b>IPP</b>	Paleozoic - Transitional Pennsylvanian/Permian (251 mi. yrs. ago) Cyclic sequence of sandstone, red beds, shale, limestone and coal.	<b>O</b>	Paleozoic - Ordovician (444-488 mi. yrs. ago) Limestone, dolomite, sandstone, shale, and metabasaltite. Limestone (particularly low siliceous), chert, chert, chert.
<b>IP</b>	Paleozoic - Pennsylvanian (299-310 mi. yrs. ago) Cyclic sequence of sandstone, shale, clay, coal, and limestone.	<b>Є</b>	Paleozoic - Cambrian (480-542 mi. yrs. ago) Limestone and dolomite, some sandstone and shale.
<b>M</b>	Paleozoic - Mississippian (310-369 mi. yrs. ago) Limestone, red beds, shale, and sandstone.	<b>pC</b>	Precambrian (More than 542 mi. yrs. ago) Greenstone. Present only in extreme eastern Jefferson Co.

Map: Original 1968/1969 map revised, March 2011  
Map Date: May 16, 2011  
Projection: Transverse Mercator  
Horizontal Datum: NAD 1983  
Coordinate System: UTM/MTN  
Map Scale (for full 8.5" x 11" display):  
For main map: 1:2,000,000  
For inset maps: Jefferson Co. 1:200,000  
Pendleton Co. 1:500,000

A user may just want to see era and period colors without the hill-shaded terrain





# Example: *Just the Geology*

The screenshot shows the Adobe Reader interface for a PDF file named 'Geologic\_Map\_of\_West\_Virgini-Map25A.pdf'. The 'Layers' panel on the left lists various map elements. Two red arrows point to the 'Interstate Highways Shields' and 'Labels: County Names' layers, indicating they can be toggled off. The main map area displays a geologic map of West Virginia with various geological units labeled with letters: PP (Precambrian), P (Paleozoic), M (Mesozoic and Cenozoic), D (Diplostron), O (Onondaga), and C (Cambrian). Two circular inset maps are also visible: one for Jefferson County showing Precambrian and Cambrian units, and another for Pendleton County showing Diplostron, Mesozoic and Cenozoic units, and Clinchian Intrusives.

One can turn off any or all of the reference layers to see just the geology for the state!



# ArcMap Work

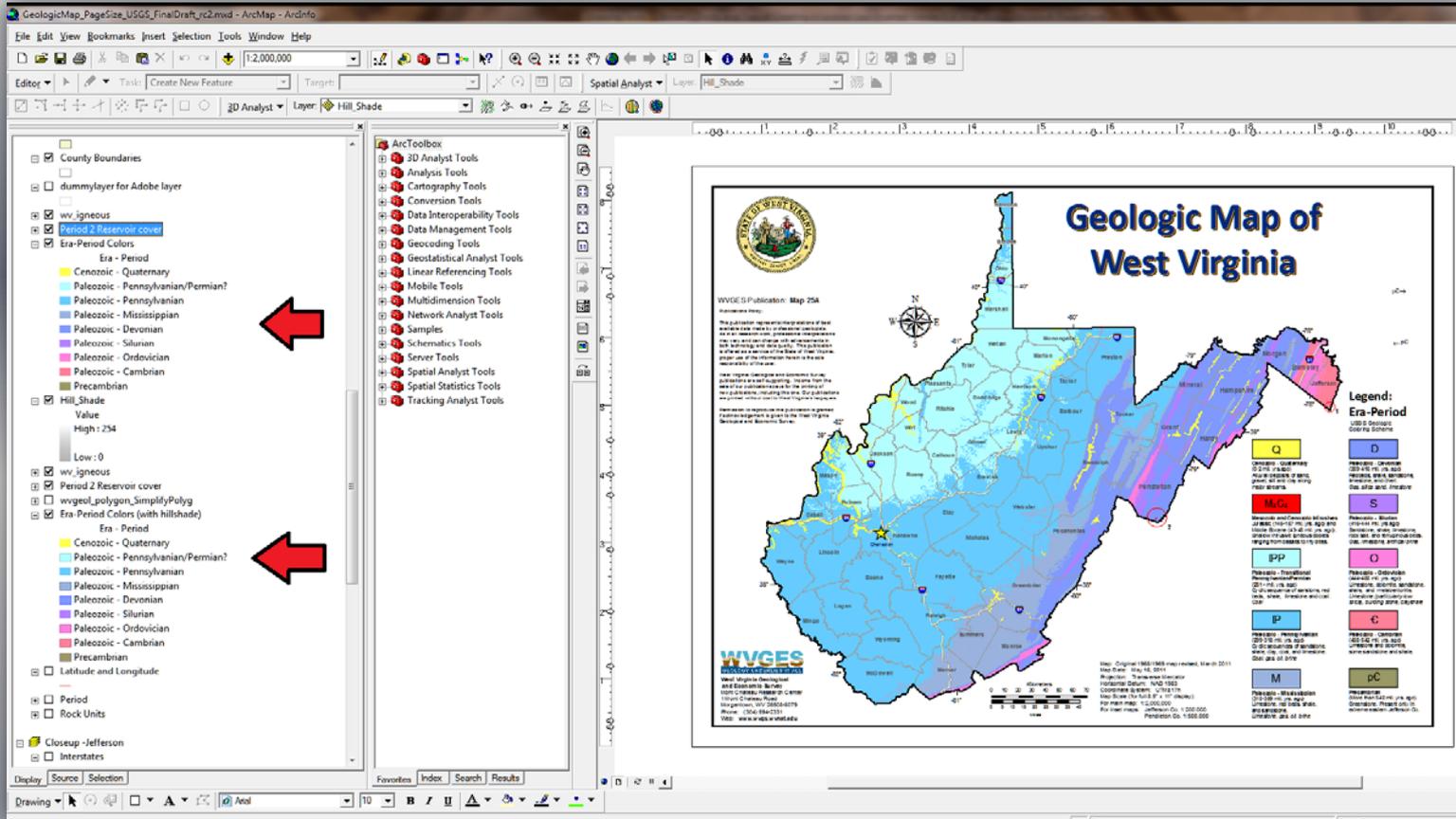


## ArcMap: Things to Consider When Designing a Map for PDF

- Create a map in Layout View as with any formal map. (static map)
- Name Layers and Features that you want a user to see in the PDF map. (dynamic or interactive map)
  - Do this for features even if they *may not be in a legend*
- “Convert Labels to Annotation” (static map)
  - Easier to move around
  - Can group them-- which will help in the translation from ArcMap to PDF
- Watch how you are working with transparent layers, especially polygons.
  - Anything under that layer will be converted into a single image
    - E.g., boundaries, roads, rivers, polygon feature colors under a transparent hill-shaded terrain



# ArcMap: Transparent Layer

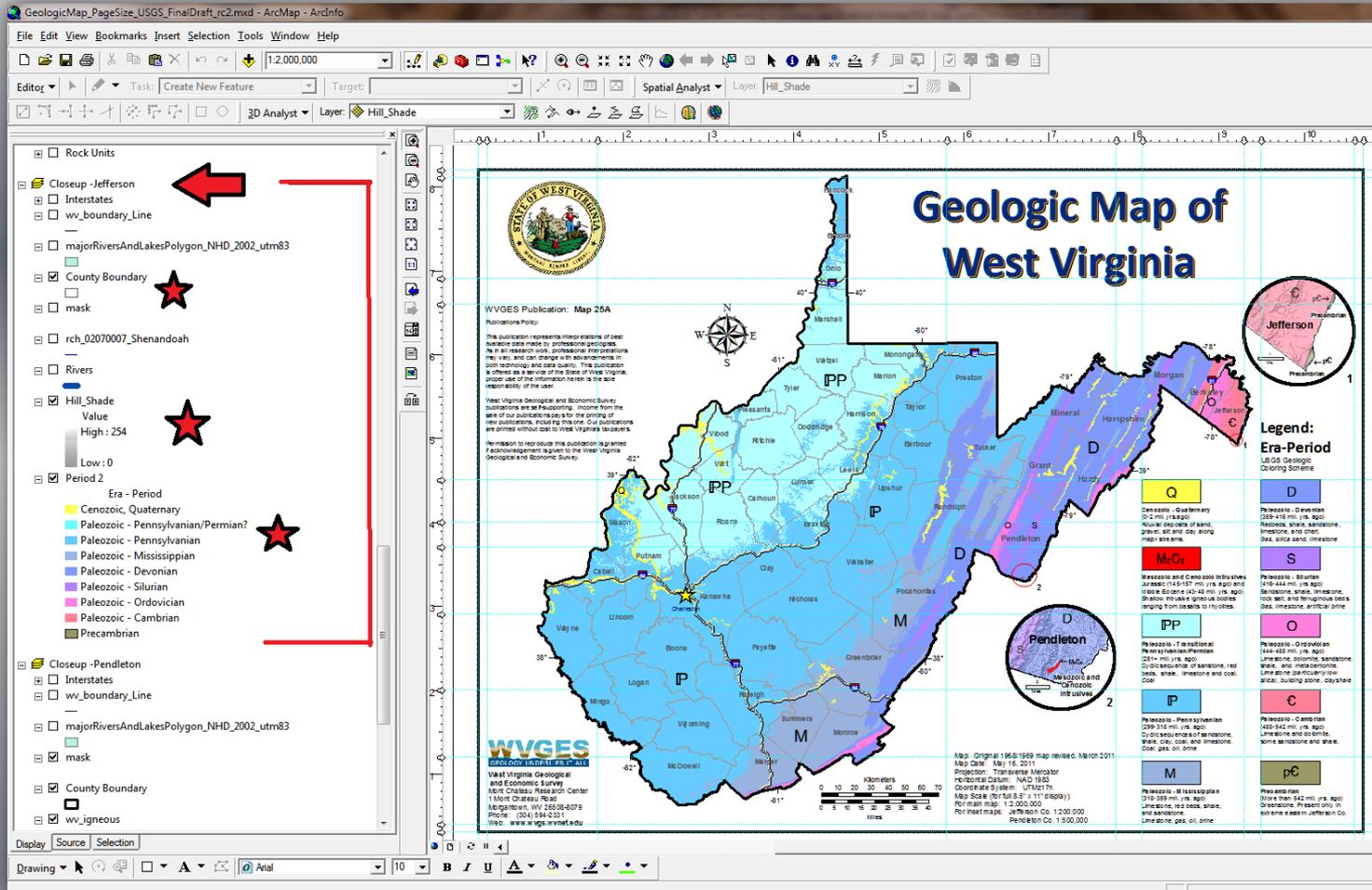


The “Era-Period Colors” (bottom arrow) has a transparent overlay of hill-shaded terrain. Era-Period Colors feature is duplicated and placed above the transparent layer. Anything below the transparent layer will become a PDF “image”. Note the names for these features above: the top one is “Era-Period Colors” and the lower one is “Era-Period Colors (with hillshade)”. These will be the layer names in the PDF.





# ArcMap: Layer Treatment

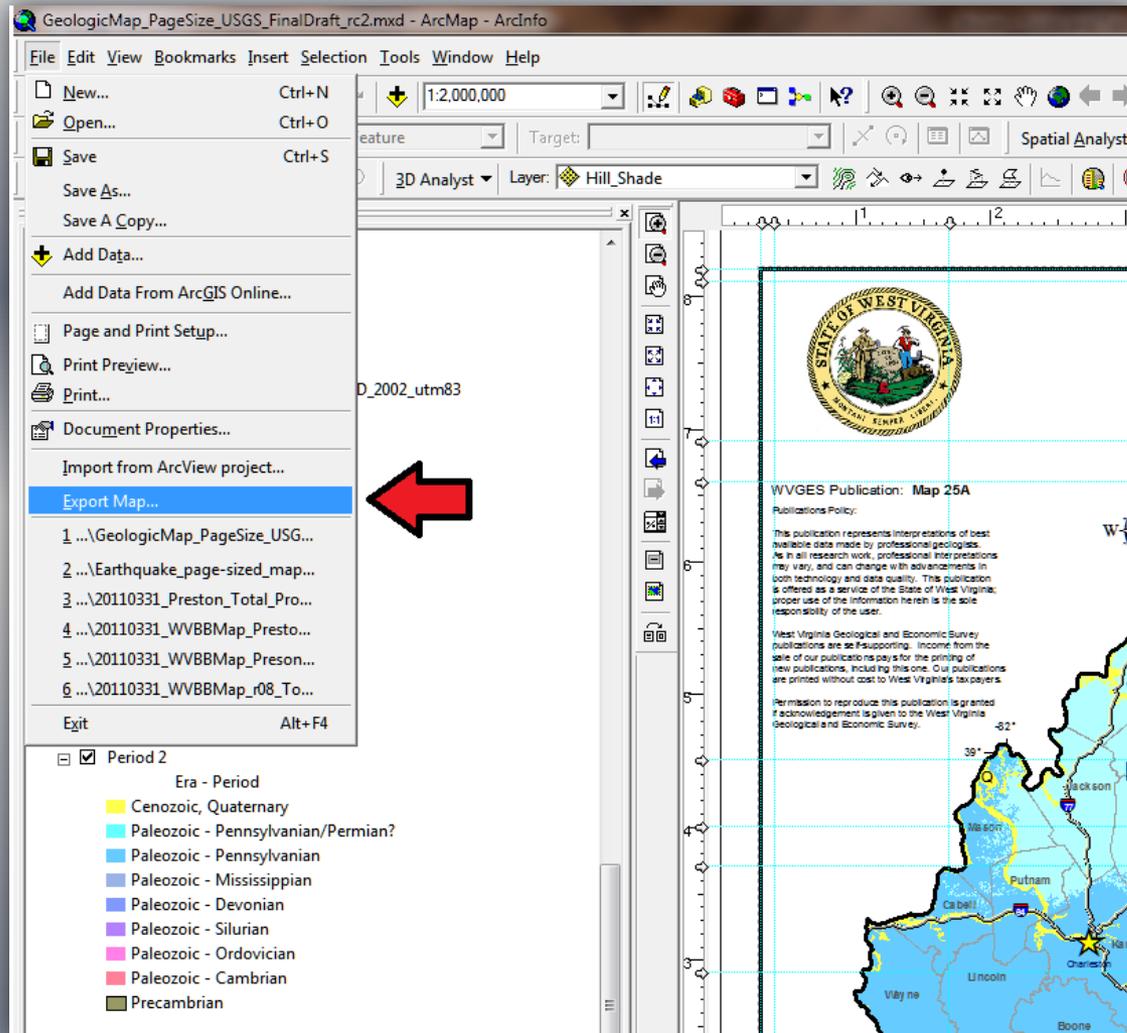


Layers for the Jefferson County Close-up Map: three layers (stars) are used here; however, two will be in the exported PDF Map. The transparent hillshade and “Era-Period Colors” will be listed as “image” on the new PDF.





# ArcMap: Export Map

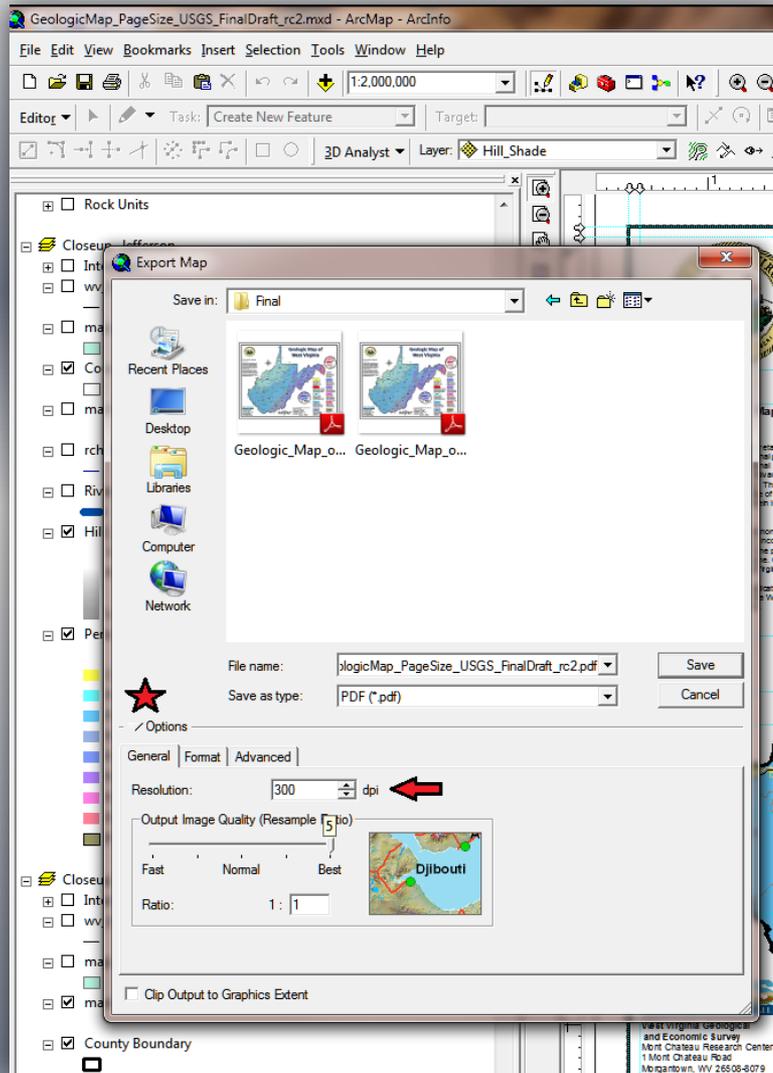


Export Map... function found under File





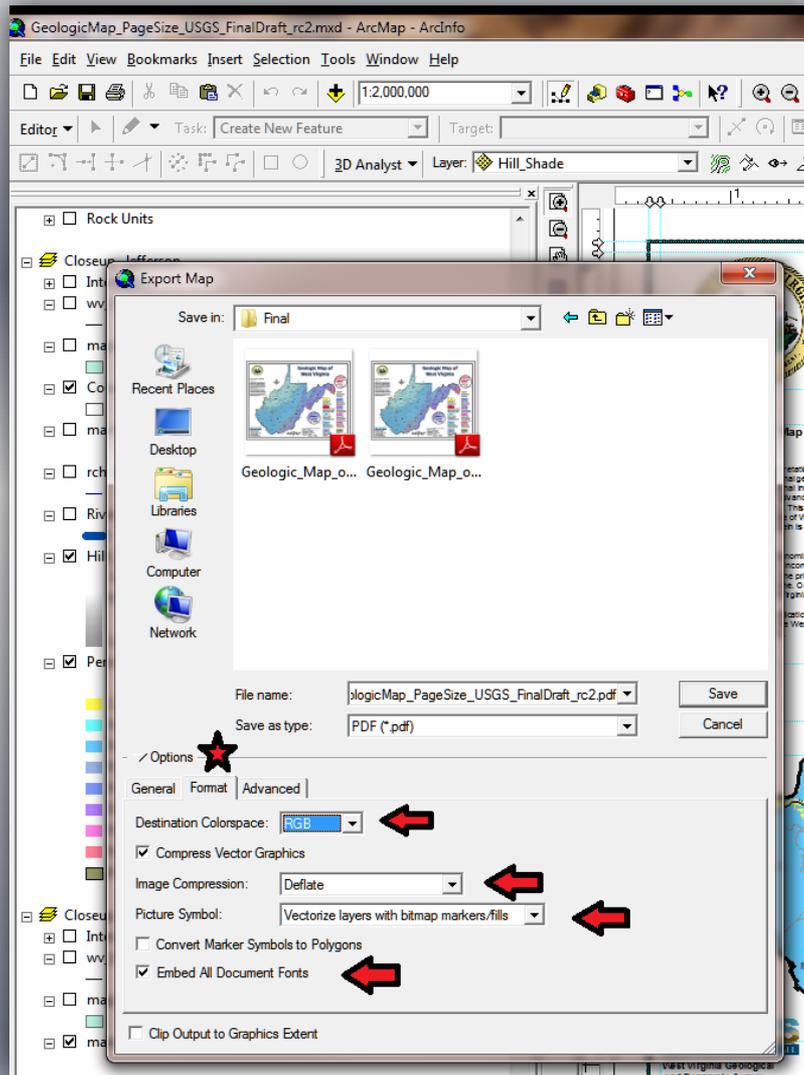
# ArcMap: Export Map, General Options



## General Options:

1. Choose a good resolution based on the map's intended use. 300 dpi will give good quality but it will build a large PDF for users to download! 150 dpi may be good for most uses (small scales).
2. Output Image Quality - Resample Ratio. Adjust for your needs. We've been using a "5" or "Best".

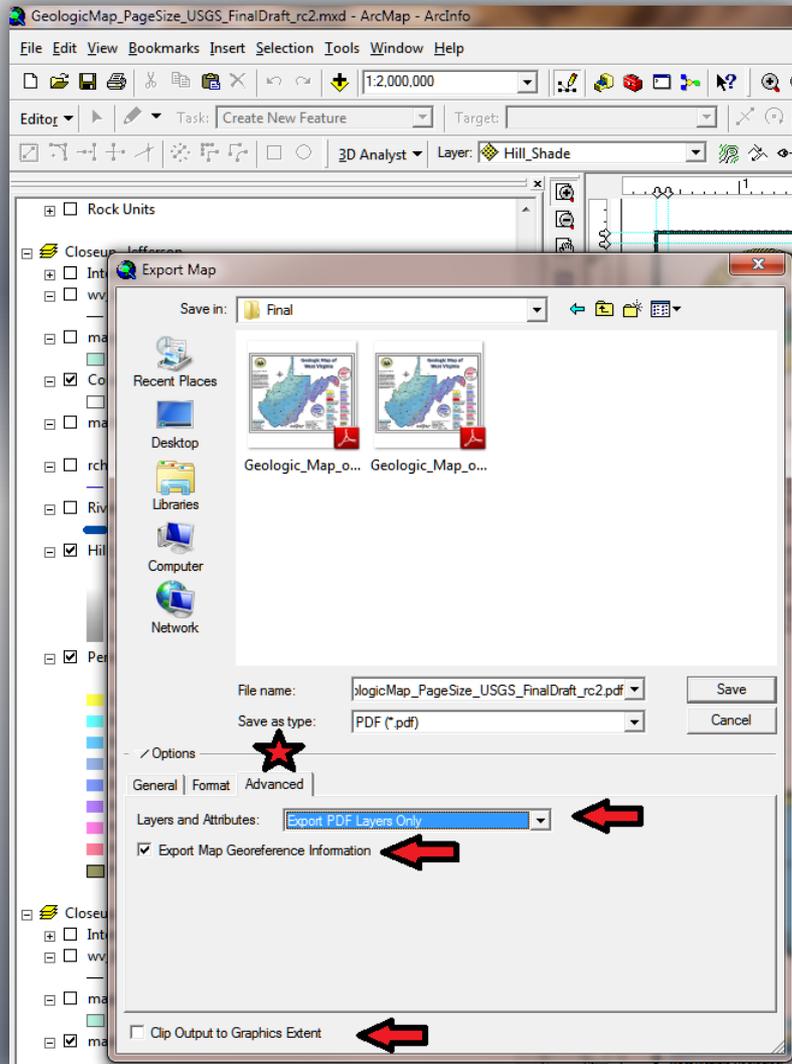
# ArcMap: Export Map, Format Options



## Format Options:

1. Destination Colorspace: RGB or CMYK. RGB is default.
2. Compress Vector Graphics. Checked by default
3. Image Compression: Deflate by default. Other choices: None, RLE, RZW.
4. Picture Symbol choices: Vectorize layers with bitmap markers fills, rasterize layers with bitmap markers/fills, rasterize layers with any picture marker/fill. We've been using the vectorize (groups of these will be a PDF layer).
5. Convert Marker Symbols to Polygons, not selected by default
6. Embed All Document Fonts. (Note, if selected Adobe Acrobat may have some issues with special fonts if done at certain sizes) .

# ArcMap: Export Map, Advanced Options



## Advanced Options:

1. Layer and Attributes: Choices are: None, Export PDF Layers Only, Export PDF Layers and Attributes. For our geologic map, we chose the second option. If you have some attributes that you would like users to see, use the third option; however, Adobe **Acrobat** will enable one to display attributes as well as **Adobe Reader** with the addition of the free **TerraGo®** plugin.
2. Export Map Georeference Information. Check if you want your exported map to be georeferenced.
3. Clip Output to Graphic Extent. Unchecked by default.

After you made your choices, use a good filename and "Save as type" "PDF (\*.pdf)"!

More detailed information on the Export Map options can be found via ArcMap Help, "Exporting a Map".

E.g., for version 9.3.1:

[http://webhelp.esri.com/arcgisDEsktop/9.3/index.cfm?TopicName=Exporting\\_a\\_map](http://webhelp.esri.com/arcgisDEsktop/9.3/index.cfm?TopicName=Exporting_a_map)



# Adobe Acrobat Work



# Adobe Acrobat: New PDF

**Geologic Map of West Virginia**

WVGES Publication: Map 25A  
 Publications Policy:  
 This publication represents interpretations of best available data made by professional geologists. As in all research work, professional interpretations may vary, and can change with advances in both technology and data quality. This publication is offered as a service of the State of West Virginia, proper use of the information herein is the sole responsibility of the user.

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Map Date: May 16, 2011  
 Projection: Transverse Mercator  
 Horizontal Datum: NAD 1983  
 Coordinate System: UTM17N  
 Map Scale (for full 8.5" x 11" display):  
 For main map: 1:2,000,000  
 For inset maps: Jefferson Co. 1:200,000  
 Pendleton Co. 1:500,000

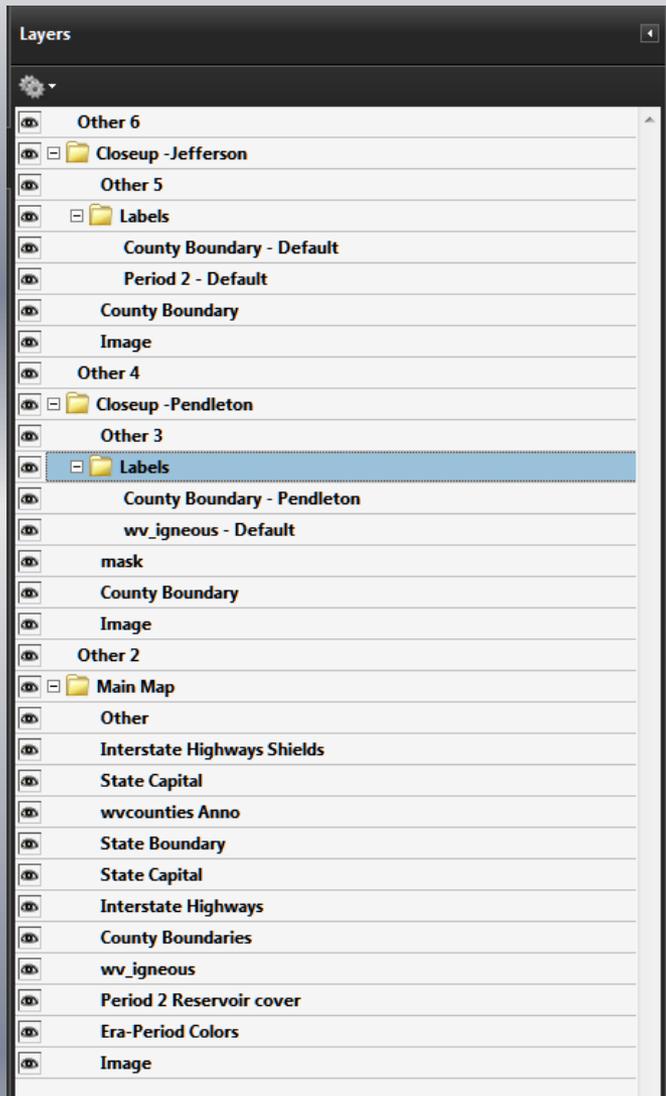
**Legend: Era-Period**  
 USGS Geologic Coloring Scheme

<b>Q</b> Cenozoic - Quaternary (0-2 mi. yrs. ago) Alluvial deposits of sand, gravel, silt and clay along major streams.	<b>D</b> Paleozoic - Devonian (369-416 mi. yrs. ago) Redbeds, shale, sandstone, limestone, and chert. Gas, silica sand, limestone.
<b>M<sub>2</sub>C<sub>2</sub></b> Mesozoic and Cenozoic intrusives (145-157 mi. yrs. ago) and Miocene Eocene (4-24 mi. yrs. ago). Shallow intrusive igneous sodies ranging from basalt to rhyolite.	<b>S</b> Paleozoic - Silurian (419-444 mi. yrs. ago) Sandstone, shale, limestone, rock salt, and ferruginous beds. Gas, limestone, artificial lime.
<b>PP</b> Paleozoic - Transitional Pennsylvanian/Permian (251+ mi. yrs. ago) Cyclic sequence of sandstone, red beds, shale, limestone and coal. Coal	<b>O</b> Paleozoic - Ordovician (444-480 mi. yrs. ago) Limestone, dolomite, sandstone, shale, and metaconglomerate. Limestone (particularly low silica), building stone, clay/shale.
<b>P</b> Paleozoic - Pennsylvanian (259-318 mi. yrs. ago) Cyclic sequence of sandstone, shale, clay, coal, and limestone. Coal, gas, oil, brine.	<b>€</b> Paleozoic - Cambrian (488-542 mi. yrs. ago) Limestone and dolomite. Some sandstone and shale.
<b>M</b> Paleozoic - Mississippian (318-359 mi. yrs. ago) Limestone, red bed, shale, and sandstone.	<b>pC</b> Precambrian (More than 542 mi. yrs. ago) Greenstone. Present only in extreme eastern Jefferson Co.

The newly created PDF via the ArcMap Export Map function. Click on the Layers tab (red arrow) to view and expand the layers.



## Adobe Acrobat: New PDF, Layers List



Once expanded, you'll see some layers that look familiar, others will not:

- **Things marked “Other”**
  - Miscellaneous map text, pictures, images, north arrow, and other stuff found in map *margins* or *collars*.
- **Things marked “<default>”**
  - Although not found here, usually this denotes anything placed above ArcMap's Data Frame graphics layer
- **Things marked “image”**
  - Remember the previous mention about transparency layers and features underneath them? That's what this layer is—a group of the merged layers! For our example map, this would be the transparent hillshade with the “Era-Period Colors”. Note that the duplicate “Era-Period Colors” that we placed above the hillshade transparency is a stand-alone layer, as we intended.
- **Things with “Anno”**
  - Those are annotations or labels that were not converted to graphics in ArcMap. In our example here: “wvcounties Anno” refer to the shapefile name “wvcounties” and “Anno” refers to the county names from labels in ArcMap Properties for that shapefile.
- **Miscellaneous things**
  - mask is a shapefile to ensure the elimination of any feature elements outside of the state that we don't want to show. Sometimes the mask is used with a transparency to semi-hide features, yet still reference them, that are outside of the main feature (e.g., state vs. surrounding states).
  - other shapefiles are features we wanted to keep separate in ArcMap. These will be merged in Adobe Acrobat!



# Adobe Acrobat: Layers Renamed

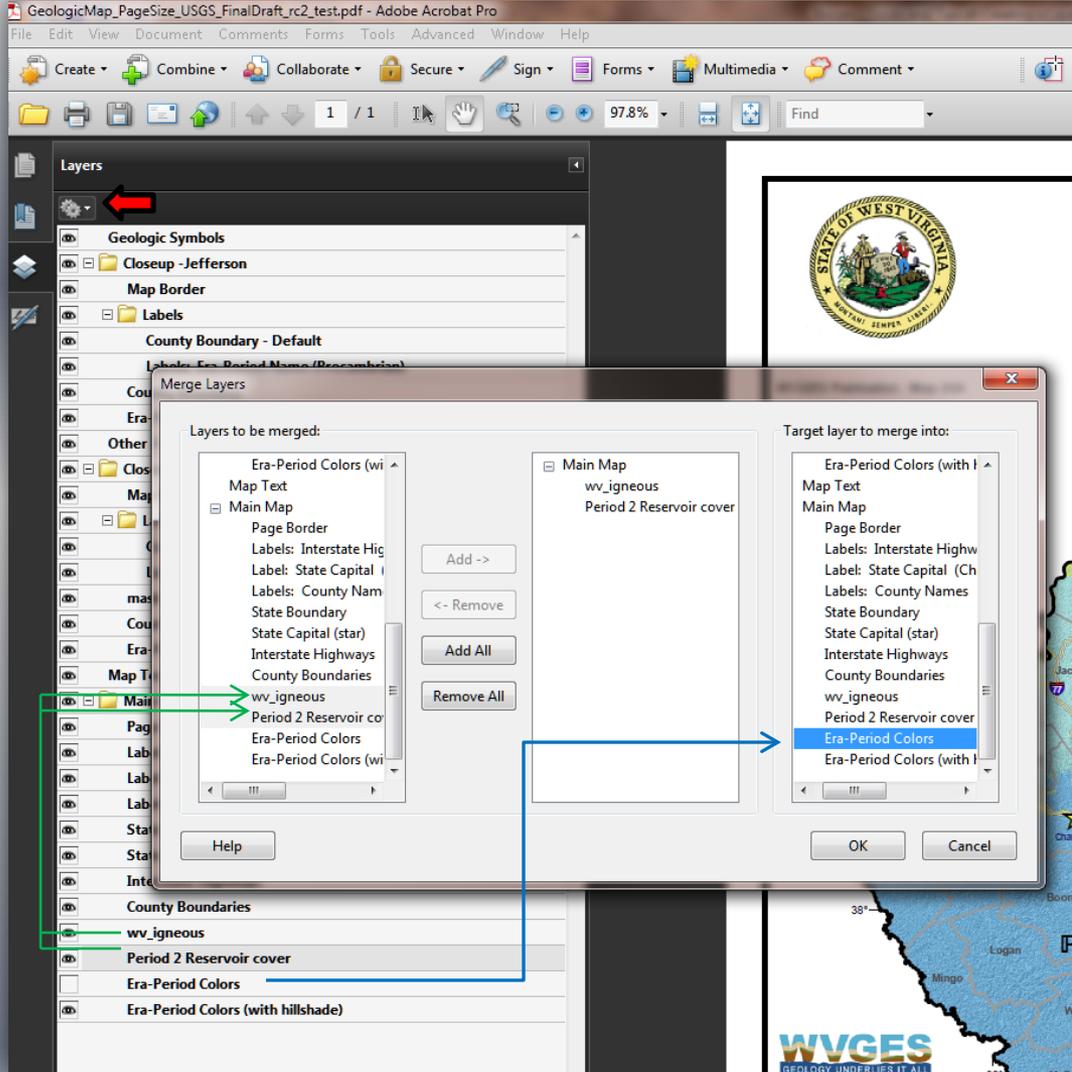
Original Layer Name	Renamed Layer Name
Other 6	Geologic Symbols
Closeup - Jefferson	Closeup - Jefferson
Other 5	Map Border
Labels	Labels
County Boundary - Default	County Boundary - Default
Period 2 - Default	Labels: Era-Period Name (Precambrian)
County Boundary	County Boundary
Image	Era-Period Colors (with hillshade)
Other 4	Other 4
Closeup - Pendleton	Closeup - Pendleton
Other 3	Map Border
Labels	Labels
County Boundary - Pendleton	County Boundary - Pendleton
wv_igneous - Default	Labels: Era-Period Name (Mesozoic and Cenozoic)
mask	mask
County Boundary	County Boundary
Image	Era-Period Colors (with hillshade)
Other 2	Map Text
Main Map	Main Map
Other	Page Border
Interstate Highways Shields	Labels: Interstate Highways Shields
State Capital	Label: State Capital (Charleston)
wvcounties Anno	Labels: County Names
State Boundary	State Boundary
State Capital	State Capital (star)
Interstate Highways	Interstate Highways
County Boundaries	County Boundaries
wv_igneous	wv_igneous
Period 2 Reservoir cover	Period 2 Reservoir cover
Era-Period Colors	Era-Period Colors
Image	Era-Period Colors (with hillshade)

Renaming is done in Adobe Acrobat by double clicking on the layer name and then typing the new name.

New names are shown on the right. Red lines and arrows connect the old with the new. "Other 4" is a group of annotated items associated with the Pendleton Close-up map that need to be merged with that map. Similar items with the Jefferson Close-up map got automatically merged with other features in the conversion process. This is a "gotcha". Watch how you group annotations and if the groups are above or below other groups!

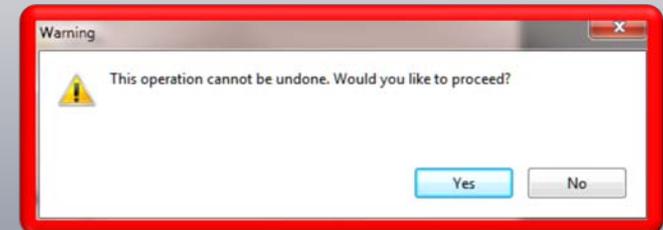
Again, properly name your layers in ArcMap to save time in renaming in Acrobat!

# Adobe Acrobat: Merging



Click on the gears icon (red arrow) to bring up the “Merge Layers” window. Choose layers from “Layers to be merged”, then click the “Add →” button. They will appear in the middle white box. Click on a layer in the “Target layer to merge into” in the right box.

This example has two shapefiles that were used to create the map. “wv\_igneous” is a shapefile of recent scholarship that we wanted to include in the map. “Period 2 Reservoir cover” was an addition to a “hole” in the dataset. For this map, we desired to fill that area. Those two Adobe layers will be merged into “Era-Period Colors”.



**Important!** Adobe Acrobat (version 9) does not give you the option to “un-merge”. Once done, it’s done! If you merge something in error, you will need to go back to ArcMap and export the map to PDF again.



# Adobe Acrobat: Layers Merged

Layers

- Geologic Symbols
- Closeup -Jefferson
- Map Border
- Labels
  - County Boundary - Default
  - Labels: Era-Period Name (Precambrian)
  - County Boundary
  - Era-Period Colors (with hillshade)
- Other 4
- Closeup -Pendleton
- Map Border
- Labels
  - County Boundary - Pendleton
  - Labels: Era-Period Name (Mesozoic and Cenozoic)
- mask
- County Boundary
- Era-Period Colors (with hillshade)
- Map Text
- Main Map
- Page Border
- Labels: Interstate Highways Shields
- Label: State Capital (Charleston)
- Labels: County Names
- State Boundary
- State Capital (star)
- Interstate Highways
- County Boundaries
- wv\_igneous
- Period 2 Reservoir cover
- Era-Period Colors
- Era-Period Colors (with hillshade)

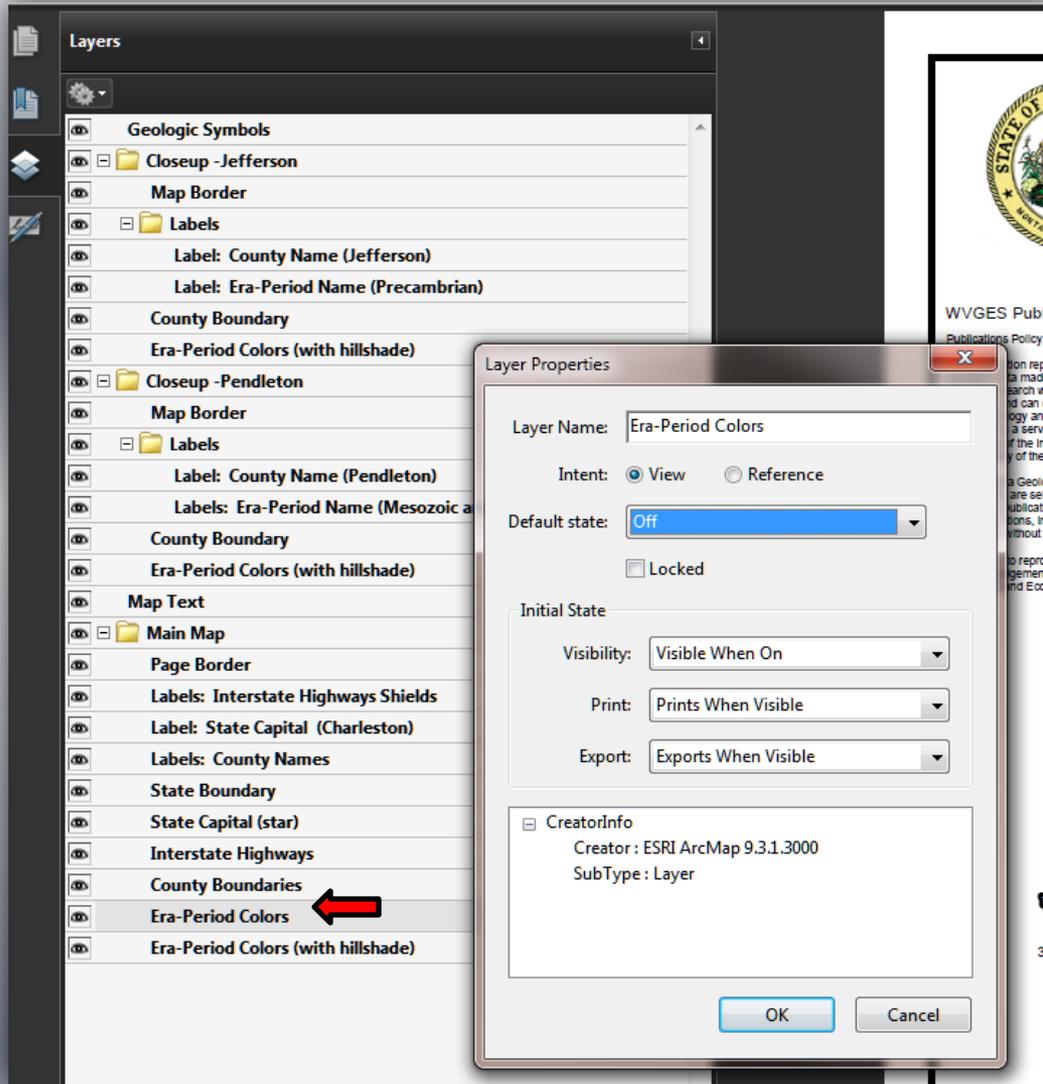
Layers

- Geologic Symbols
- Closeup -Jefferson
- Map Border
- Labels
  - Label: County Name (Jefferson)
  - Label: Era-Period Name (Precambrian)
- County Boundary
- Era-Period Colors (with hillshade)
- Closeup -Pendleton
- Map Border
- Labels
  - Label: County Name (Pendleton)
  - Labels: Era-Period Name (Mesozoic and Cenozoic)
- County Boundary
- Era-Period Colors (with hillshade)
- Map Text
- Main Map
- Page Border
- Labels: Interstate Highways Shields
- Label: State Capital (Charleston)
- Labels: County Names
- State Boundary
- State Capital (star)
- Interstate Highways
- County Boundaries
- Era-Period Colors
- Era-Period Colors (with hillshade)

Layers on the left were merged into other layers on the right (via red arrows). Some other layers were renamed—refined or remnant from previous renaming session.



## Adobe Acrobat: Layer Views



The screenshot shows the Adobe Acrobat interface with a PDF map. The Layers panel on the left lists various map layers. The 'Era-Period Colors' layer is highlighted with a red arrow. The Layer Properties dialog box is open, showing the following settings:

- Layer Name: Era-Period Colors
- Intent:  View  Reference
- Default state: Off
- Locked
- Initial State:
  - Visibility: Visible When On
  - Print: Prints When Visible
  - Export: Exports When Visible
- CreatorInfo:
  - Creator: ESRI ArcMap 9.3.1.3000
  - SubType: Layer

You may wish to have a layer available but not visible or “turned on” for a user’s initial view.

Right click on that layer (shown with red arrow) to bring up the “Layer Properties” window. Change the Default state to “off” and click “OK”. Also, click on the eye icon to the left of the layer name to turn off the feature. Save the PDF.

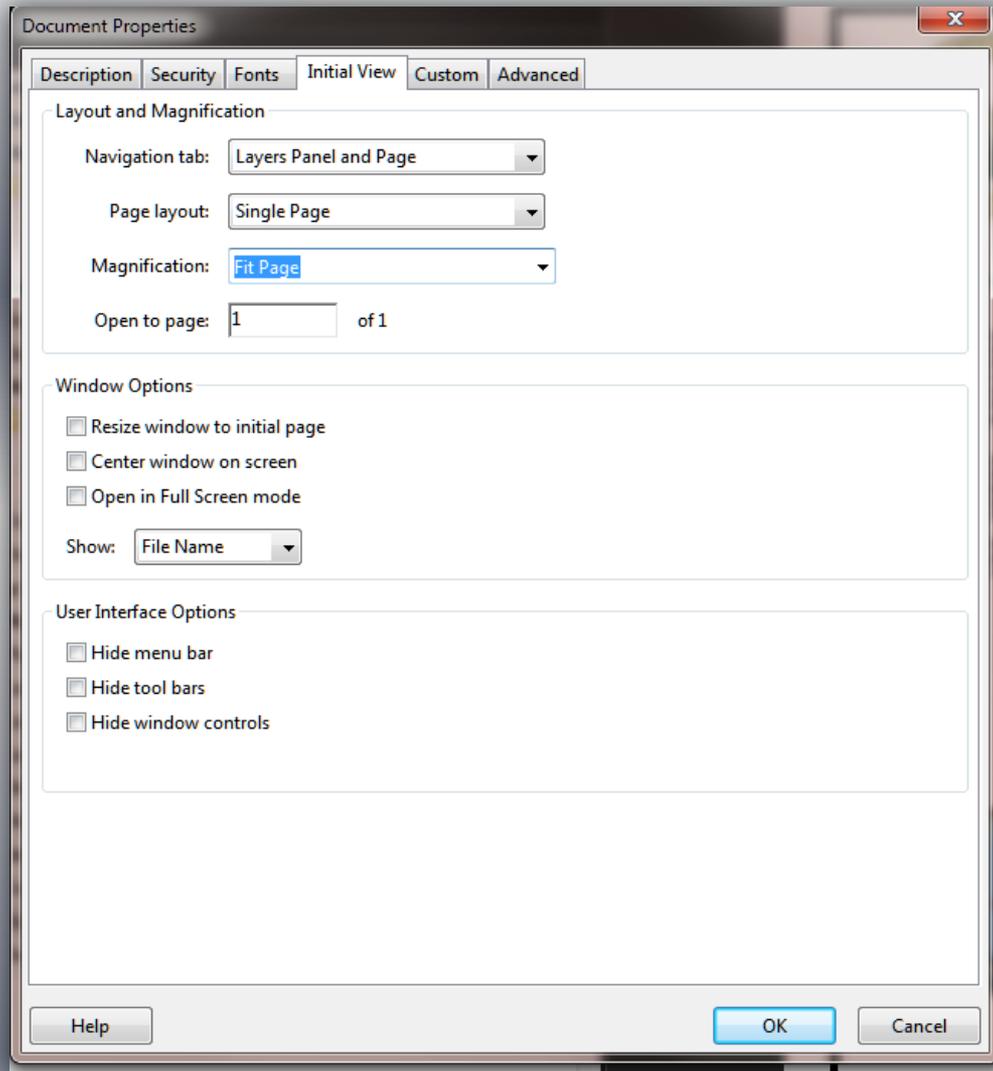
For our example here, the “Era-Period Colors (with hillshade)” will be the default view when one opens the PDF. If the user wants to see era-periods without hillshade (just the colors), s/he would click the square to show the “eye”, turning on that layer.

With Adobe Acrobat Professional, one cannot have an automatic toggle, that is, to click one layer and simultaneously turn off another. Place an “off” toggle layer in ArcMap above the default “on” toggle layer. The previously “off” layer turned on will merely cover the lower layer.



# Adobe Acrobat Work *Post Processing*

## Adobe Acrobat: PDF Properties – Setting the PDF Initial View



In Adobe Acrobat, choose **File** → **Properties** to open the Document Properties window. Go to the “Initial View” tab.

Here, you can choose how you want a person to see the map when initially viewed. Since we are working with a layered PDF, it’s advisable to choose “Layers Panel and Page” under Layout and Magnification for the Navigation tab. For the other settings here: “Single Page” for Page layout and “Fit Page” for Magnification are good settings.

*You may want to use a “Two up” option in Page layout if you want a user to also see other pages that might be attached to a map. (E.g., WVGES’ West Virginia Geologic Map).*

Click OK if finished with Properties; otherwise, click on the Description tab, our next step!



## Adobe Acrobat: PDF Properties – Setting the “Metadata”

The screenshot shows the Adobe Acrobat Document Properties dialog box. The 'Description' tab is selected, and a red arrow points to it. The dialog box contains the following information:

Document Properties

Description

File: GeologicMap\_PageSize\_USGS\_FinalDraft\_rc2\_test.pdf

Title: Geologic Map of West Virginia

Author: West Virginia Geological and Economic Survey (WVGES), John M. Bocan-cartographic compiler

Subject: Geologic eras and periods (simplified) of West Virginia, based on the 1968 Geologic Map

Keywords: geology, geologic map, geologic eras, geologic periods

Created: 5/21/2011 6:25:01 PM

Modified: 5/21/2011 7:22:48 PM

Application: ESRI ArcMap 9.3.1.3000

Additional Metadata...

Advanced

PDF Producer:

PDF Version: 1.6 (Acrobat 7.x)

Location: G:\WORK\Geologic\_Map\Final\Final\

File Size: 8.37 MB (8,781,805 Bytes)

Page Size: 11.00 x 8.50 in

Number of Pages: 1

Tagged PDF: No

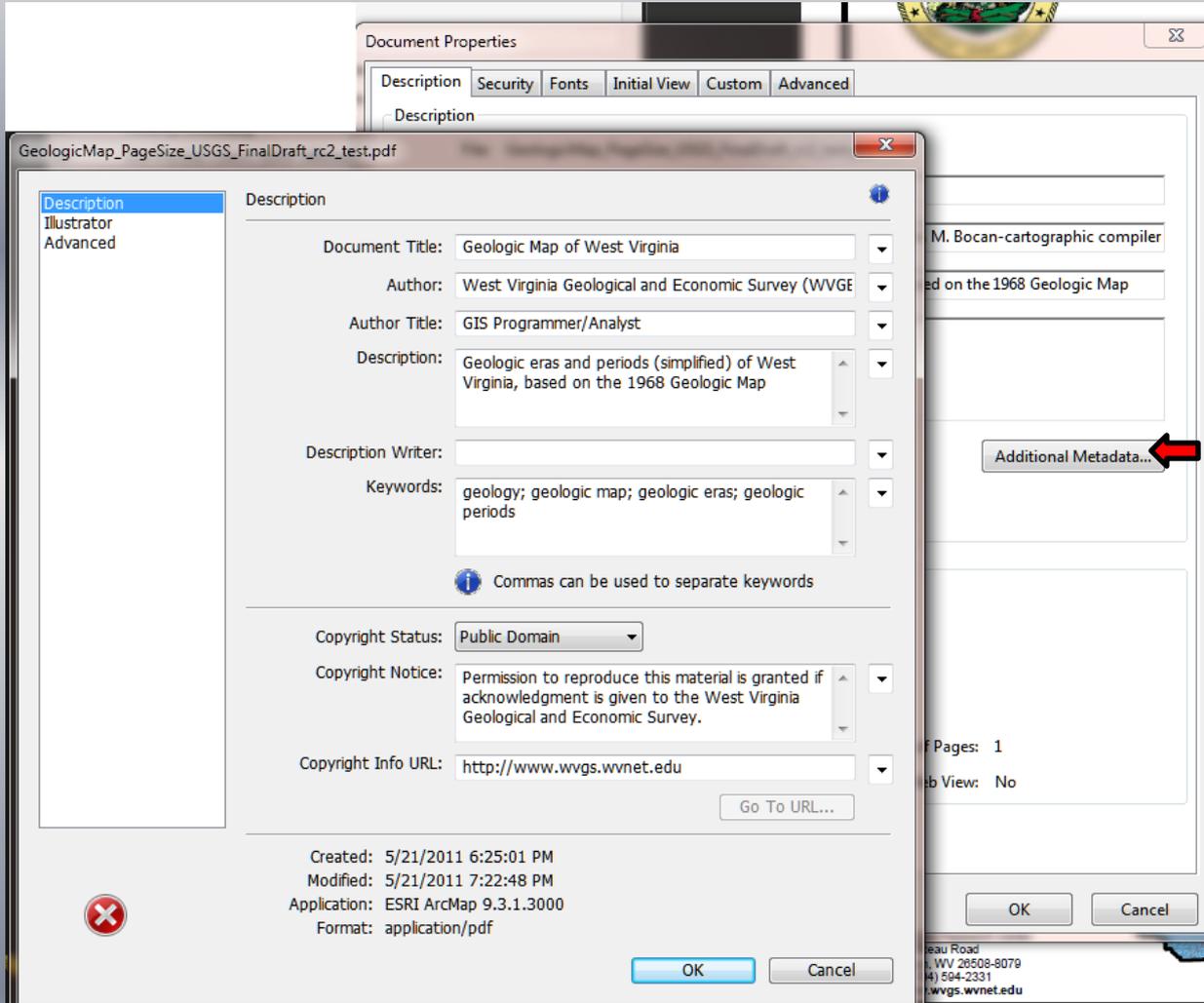
Fast Web View: No

Buttons: Help, OK, Cancel

In Adobe Acrobat, choose *File* → *Properties* to open the Document Properties window. Go to the “Description” tab.

With any good map production, we need to provide documentation or “metadata”. “Description” is the area for PDF metadata. Fill in information as appropriate for your agency or organization.

# Adobe Acrobat: PDF Properties – Setting MORE “Metadata”



Click on the **Additional Metadata...** button

Just when you thought it was safe...

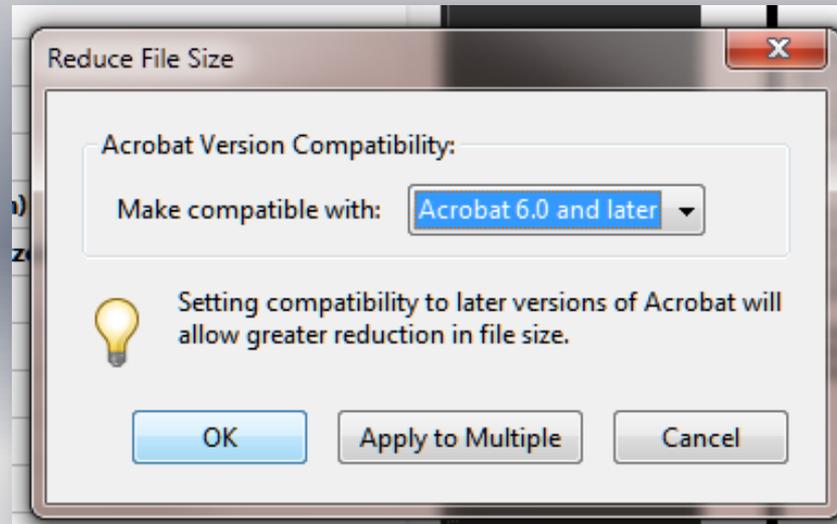
This area provides additional areas, such as author’s title. More importantly, you should let the user know what s/he can do with your map. Most governmental agencies provide maps as “public domain”. You can put in further information about copying, such as for WVGES:

*Permission to reproduce this material is granted if acknowledgment is given to the West Virginia Geological and Economic Survey.*

If you have a source page for copyright or publication information, you can enter that in the “Copyright Info URL” or just provide your agency’s or organization’s web URL.

Click OK to complete.

## Adobe Acrobat: Optional Optimize



Click on *Document* → *Reduce File Size...*

This step is optional; however, do try it. If you don't lose any map quality, your users will be thankful for downloading what could be a 1.0 MB file compared to 8.5 MB!

*Alternatively: Advanced* → *PDF Optimizer...*

After clicking OK, save to a different filename.



# Adobe Acrobat: Final Result

**Geologic Map of West Virginia**

**Legend:**

Era-Period	Color	Description
Q	Yellow	Quaternary - Alluvium, recent deposits, etc.
D	Blue	Devonian - Devonian rocks, including the Greenbrier Group.
M.C.G.	Red	Mississippian - Carboniferous rocks, including the Monongahela Group.
S	Purple	Silurian - Silurian rocks, including the Onondaga and Seneca.
PP	Pink	Precambrian - Precambrian rocks, including the Catoctin Greenstone.
O	Orange	Ordovician - Ordovician rocks, including the Onondaga and Seneca.
P	Light Blue	Pennsylvanian - Pennsylvanian rocks, including the Allegheny and West Virginia.
C	Light Green	Carboniferous - Carboniferous rocks, including the Allegheny and West Virginia.
M	Light Blue	Mississippian - Mississippian rocks, including the Allegheny and West Virginia.
P.C.	Light Green	Precambrian - Precambrian rocks, including the Catoctin Greenstone.

**Bedrock Geology of West Virginia**

The majority of bedrock exposed at the surface in West Virginia is sedimentary in origin, deposited during the Paleozoic Era (545 to 230 million years ago), very few igneous or metamorphic rocks are exposed at the surface due to deep burial beneath the thick Paleozoic cover. The geologic history of West Virginia prior to the Paleozoic is poorly understood. The oldest exposed rock in the State, in the tip of the eastern panhandle, is the Precambrian Catoctin Greenstone, a metamorphosed lava which erupted 800 million years ago. During the Cambrian and Ordovician periods, the State was covered by a sea that deposited limestone, shales, siltstones, and minor sandstones. These rocks are now exposed at the surface in the eastern panhandle.

Motion of the earth's tectonic plates perhaps and deform preexisting rock units; subsequent erosion and deposition of the sediments produces new rock layers. The first well-known tectonic event to affect the State, the Ordovician Taconic Orogeny, formed a mountain chain to the north and east of West Virginia that became the source of clastic sediment during the latest Ordovician, Silurian, and early Devonian. Marine carbonates were deposited in south and central West Virginia during this time; the north and west were dominated by non-marine clastics and evaporites, especially during the late Silurian.

The next tectonic event, the Devonian Acadian Orogeny, formed a new set of mountains to the northeast. Erosion of these mountains produced sediment deposited across the State from the late Devonian into the Pennsylvanian. Regression of the Devonian sea led to the deposition of continental red beds over much of the State at the end of the Devonian. The sea returned in the Mississippian and thick limestones of the commercially important Greenbrier Group were deposited.

During the Late Mississippian, the sea regressed from West Virginia leaving a low-lying, swampy Pennsylvanian terrain which produced thousands of feet of mainly non-marine sandstone, shale, and coal, the State's economic mainstay.

The final PDF result. The PDF opens with the Layers Panel showing on the left, on the right--the two pages with "two-up facing" so that the user will know there are two pages included. The user can expand the folders in the Layers Panel to reveal other layers.



## Adobe Acrobat: Other Considerations

Other PDF options may be important to your agency/organization:

- Document Properties: Security Settings
- Add a page from *Document* → *Insert Pages* → *From File...*
- If your map has multiple pages, consider:
  - adding bookmarks
  - adding internal links
  - having an initial view of “two-up” (facing, continuous, etc)
- Governmental agencies need to be mindful of 503 A.D.A.

Accessibility standards, *use the Adobe Acrobat Professional Accessibility tool* when and where possible.

- Visit Adobe’s Help pages: <http://www.adobe.com/support/acrobat/>



## Resources:

Web Page, ESRI Knowledge Base – Technical  Articles:

*Layers in a PDF exported from ArcGIS Desktop do not match the layers of the map.*

<http://support.esri.com/en/knowledgebase/techarticles/detail/30882>

PDF: *PDF Features and ArcMap*

University of Georgia, GIS & GPS Resources for Landscape Management and Urban Forestry

<http://www.uga.edu/gpshort/instructions/gis/PDF%20Features%20and%20ArcMap.pdf>

PDF: *How to create PDF maps, pdf layer maps and pdf maps with attributes using ArcGIS*, 29 pages

Lynne W. Fielding, GISP

<http://www.neurisa.org/resources/Documents/NEURISA-Low-Cost-PDF-Maps.pdf>

## Software to Consider:

TerraGo Toolbar™ (free, registration required for this Adobe Reader plugin)

<http://www.terragotech.com/products/terrago-toolbar>

TerraGo Publisher® for ArcGIS (for purchase)

<http://www.terragotech.com/products/terrago-publisher-arcgis>

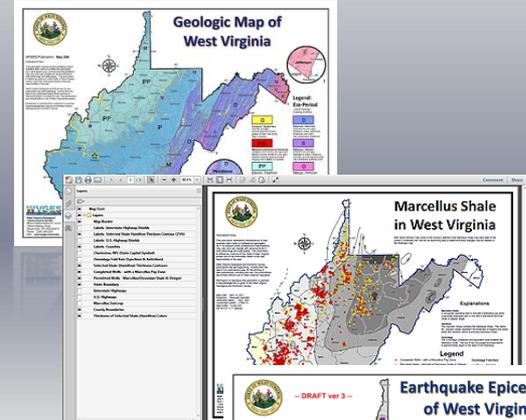
*All resources as of May 20, 2011*

## WVGES layered, geo-enabled PDFs:

### Geologic Map of West Virginia (page-sized)

<http://www.wvgs.wvnet.edu/www/maps/geomap.htm>

High and low resolution maps



### Marcellus Shale in West Virginia

<http://www.wvgs.wvnet.edu/www/datastat/devshales.htm>

### Earthquake Epicenters of West Virginia: 1824 through 2010 (draft)

[http://www.wvgs.wvnet.edu/www/seismicity/Earthquake\\_page-sized\\_map\\_3\\_annotated\\_opt.pdf](http://www.wvgs.wvnet.edu/www/seismicity/Earthquake_page-sized_map_3_annotated_opt.pdf)

### West Virginia Broadband Mapping Program, downloadable state and 11 regional maps:

<http://www.wvgs.wvnet.edu/bb/Maps.html>

72 maps





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