



Using GIS Applications to Analyze Conservation Reserve Practice (CRP) Lands

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USDA/FSA/APFO/Service Center Support Section

2012 USDA Imagery Planning Meeting

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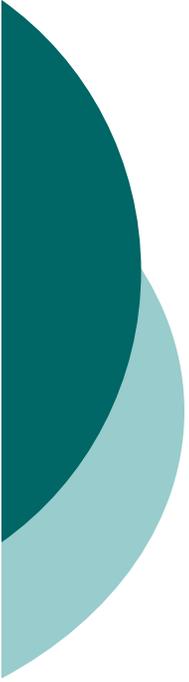


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Outline

- Background
- Process
- Results – Issues
- Future Plans



Background

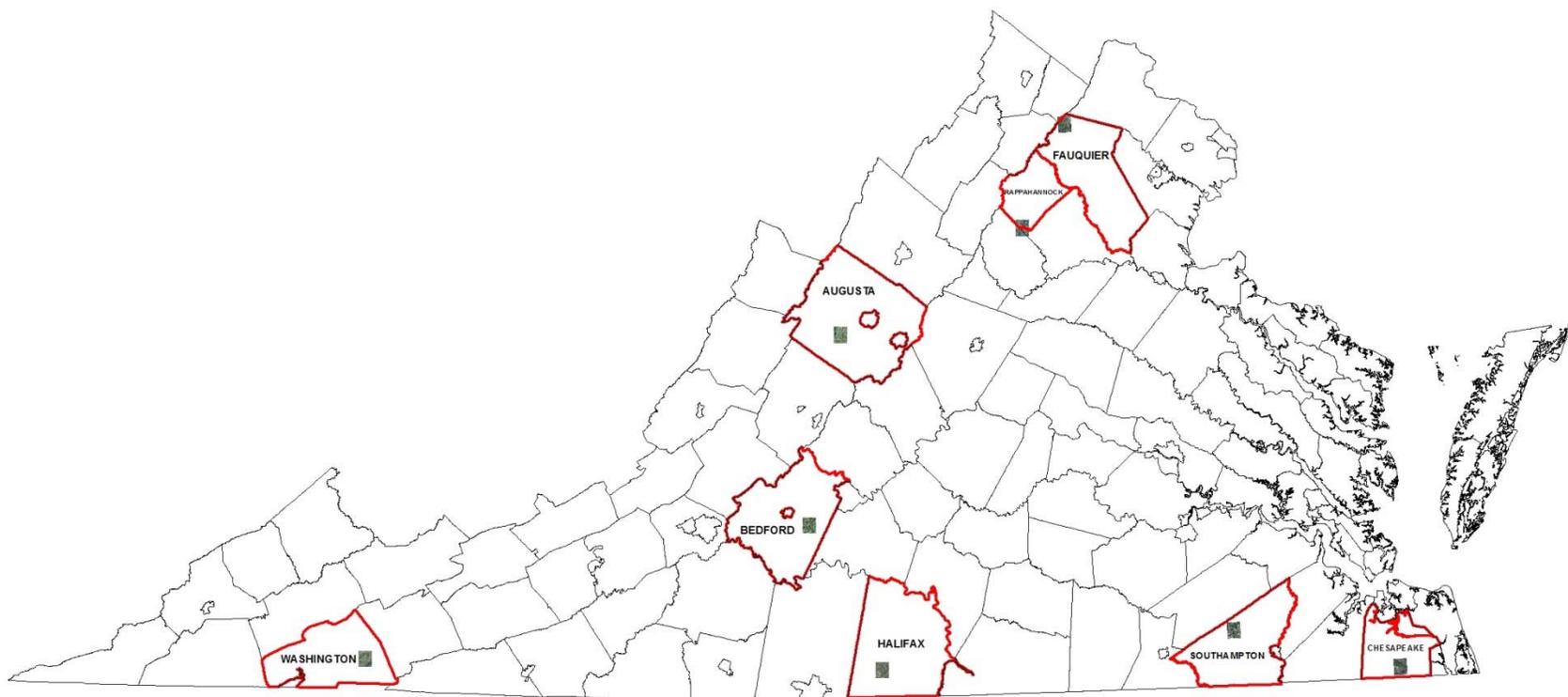
- Initial request in July 2012
 - FSA-Virginia
 - Is there a way to identify potential CRP violations using NAIP and geoprocessing tools?
 - CRP is a voluntary program for landowners where you can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland.
 - Violations include tilling, building new structures, easements, etc.
 - Currently, all 15,000 CRP polygons are manually checked for violations with the most current NAIP as a background
 - Is this the most efficient method?

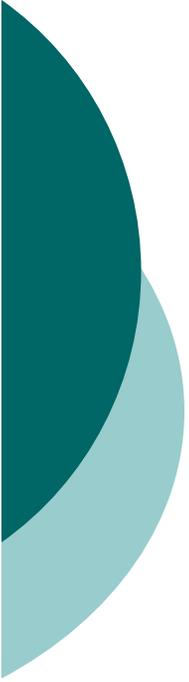


Process

- Requirements to Initiate Process
 - Software with necessary tools
 - ArcGIS 10.0 with ENVI tools
 - ENVI is an image analysis/processing software
 - ENVI toolbox is available in ArcGIS 10.0
 - Input data
 - Latest NAIP imagery
 - 2012 Virginia DOQQs
 - CRP polygons
 - Sample from VA-FSA

- Eight DOQQs were analyzed that corresponded with CRP data

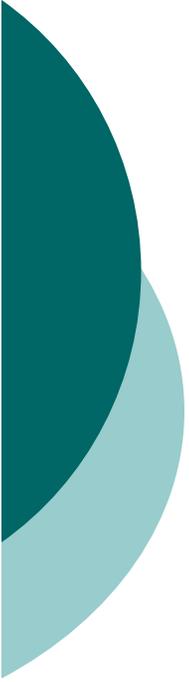




- Data Analysis

- Goals

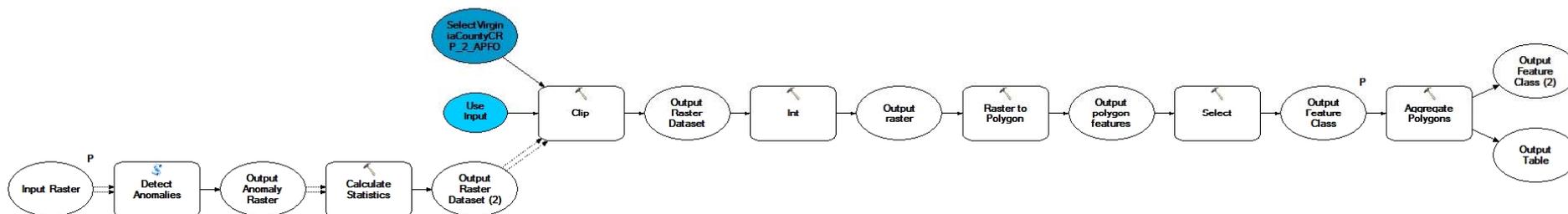
- Create a model in ArcGIS 10 that will detect anomalies between neighboring pixels and pixel clusters
- Execute the model to produce results showing possible CRP violations
- Analyze results to see if in fact there are violations

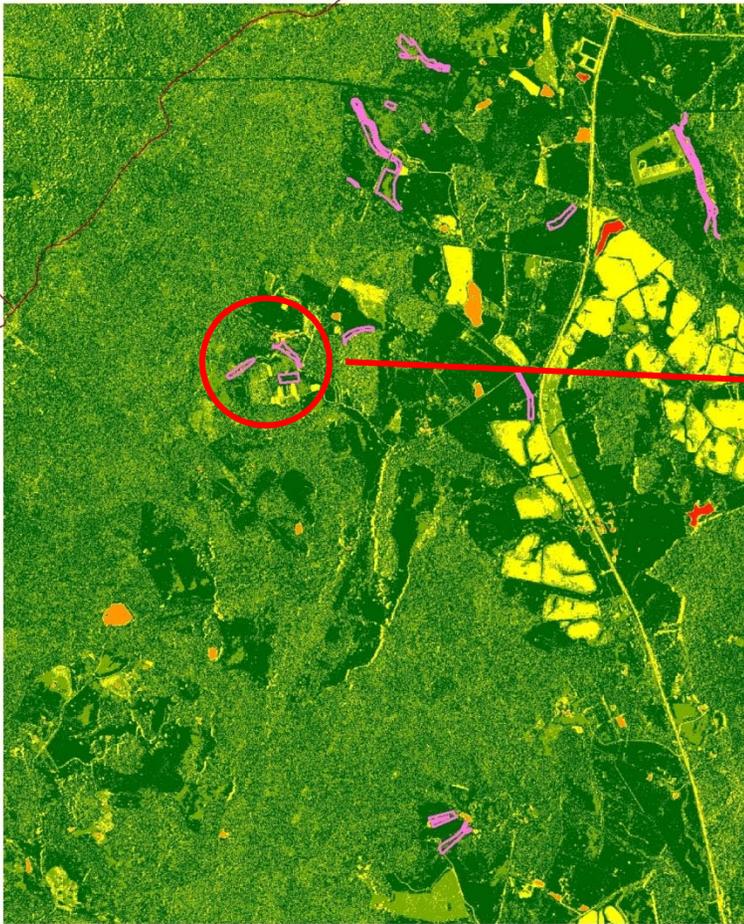


○ Geoprocessing Model

● Steps

- Detect anomalies – ENVI tool
 - Identifies spectral or color differences between a region and its neighboring pixels
- Calculate statistics then classify to 5 default classes
- Clip the raster using CRP polygons
- Convert clipped raster pixels to integer values
- Convert integer value raster to a simplified polygon shapefile
- Select and export polygons with a high anomaly value
- Aggregate the polygons to a manageable size





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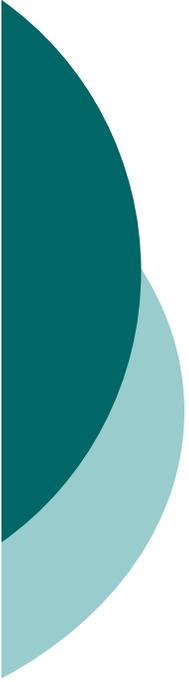
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Results

- Automated inspection
 - Approximately 7-8 minutes per DOQQ to run model then spot check output data (spot checking is ~ 2minutes per)
 - VA 3,031 DOQQs – 200 hours to process...assuming all DOQQs need to be checked
 - 100 hours to manually verify possible CRP violations
 - These estimates based on inputs (amount of CRP polygons, 8 NAIP DOQQs)

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- Automated inspection accuracy
 - For the 8 sample DOQQs, all possible CRP violations were identified
 - However, many more polygons were erroneously identified as possible violations than were actual violations

County	Possible CRP Violation Polygons	Actual Violation Polygons (estimation)	Percentage
Augusta	25	21	84%
Washington	79	21	27%
Southampton	25	4	16%
Fauquier	32	4	13%
Halifax	80	3	4%
Bedford	65	1	2%
Chesapeake	17	0	0%
Rappahannock	5	0	0%



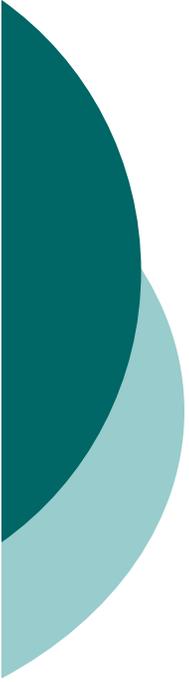
- Human inspection

- From VA FSA: Estimate of 250 person hours to visually check all CRP polygons in Virginia for violations
- Accuracy?
 - Is every polygon checked?
 - Are potential violations ignored?



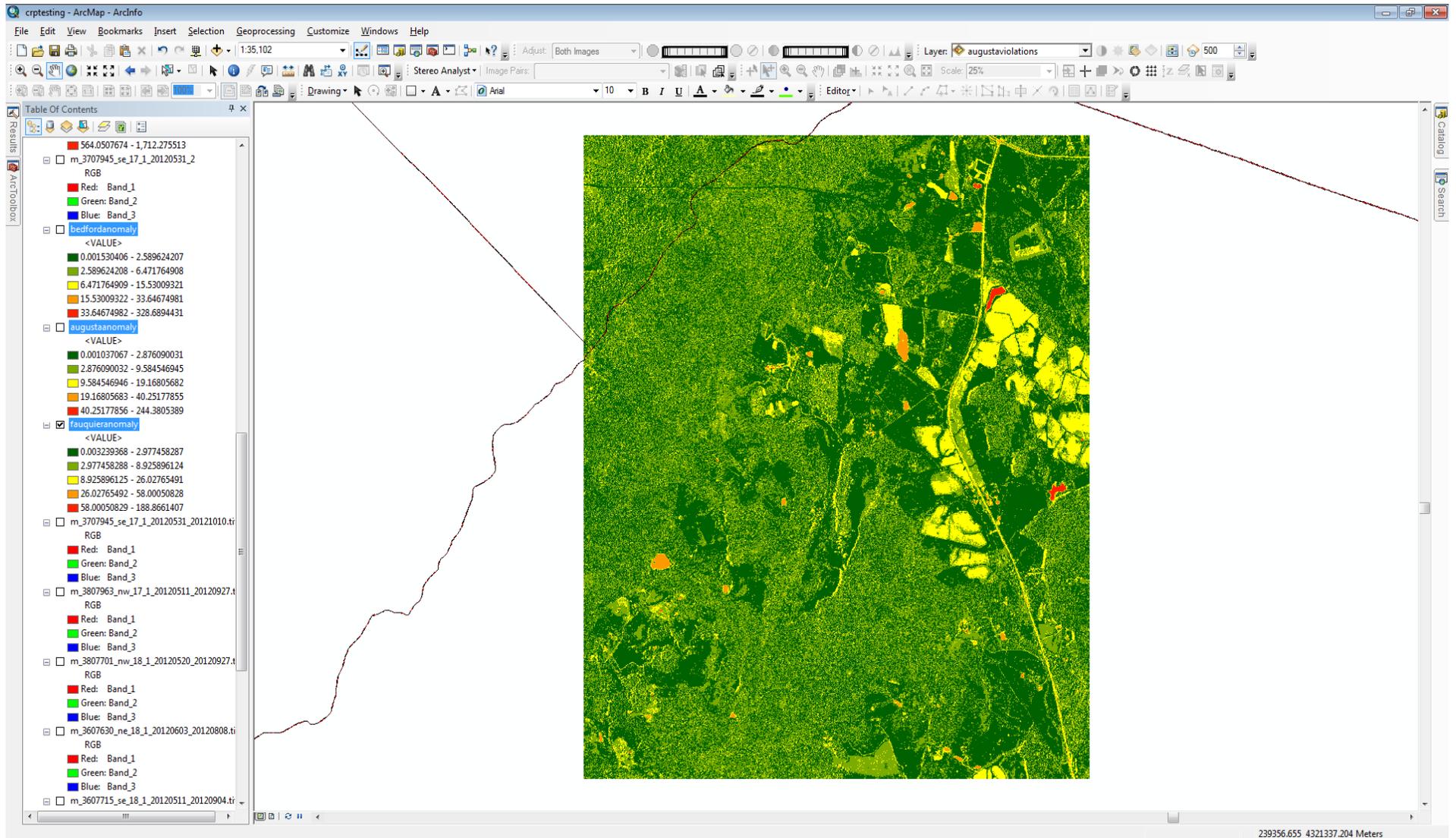
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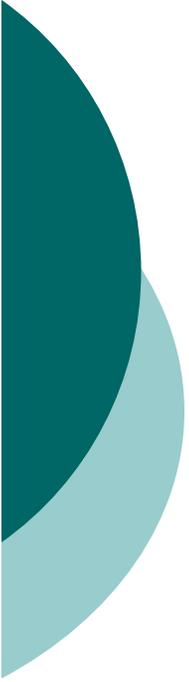
Issues and Limitations

- Input image quality isn't necessarily a factor because the detect anomalies tool checks neighboring pixels...spectral signatures aren't as important
- Aggregate Distance
- CCMs cause model to crash – file size too big
 - Is DOQQ the ideal image size to evaluate?
- Tree shadows create “false” results
- Getting model to function across different software platforms
- Doesn't always detect tilled/plowed land with high accuracy
- Thresholds for anomaly values on different images



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Future Plans

- Continue to refine geoprocessing model
 - Improve automation and edit tools as necessary
- Continue to work with VA STO
 - New processes/tools: Change detection over time, Build vegetation indices, etc.
- Expand this type of analysis to other uses
- Work with other states



Further Information

○ Contacts

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