NARSAL Projects

- We have moved… new web address http://narsal.uga.edu
- 2008 land cover is on the way
- Land use integration with the state water plan modeling (water quantity, water quality, ground water)
- Land use projections for the state water plan (what will we look like in 2050 and how will that impact our water)
- Georgia strategic forest lands assessment – farm bill requirement to prioritize all conservation funding activities
- Sustainable bioenergy report – assessing land use and water needs for energy production in the state
- UGA Climate change initiative
- SERPAS SE long-leaf pine mapping project

A Statewide Approach for Identifying Potential Areas for Wetland Mitigation Banking in Georgia: An Ecosystem Functional Approach

Liz Kramer
Stephen M. Carpenedo
University of Georgia
College of Agriculture and Environmental Sciences

General Compensatory Mitigation Requirements

- The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States
- *Key criteria*
  - Likelihood for ecological success and sustainability, location of the compensation site relative to the impact site and the significance within the watershed, and the cost of the compensatory mitigation project.

Watershed approach to compensatory mitigation

- Requires a watershed plan that **should** include
  - Inventories of historic and existing aquatic resources
  - Identification of immediate and long-term aquatic resource needs within watersheds that can be met through mitigation projects
  - The planning effort should identify and prioritize aquatic resource restoration, establishment, and enhancement activities
  - *The watershed approach should not focus exclusively on a specific function, but should provide, where practicable, the suite of functions typically provided by the affected aquatic resource.*

Wetlands mitigation banking model

- Component 1 – An assessment of the biophysical environment
  - An additive multi-layer landscape model that represents the potential of a site for wetland mitigation based on *its ability to increase the desired ecosystem functions within its watershed.*
- Component 2 – An assessment of past, present and future human impacts
  - An additive multi-layer model that prioritizes 12 digit Hydrologic Unit Codes based on their past, present and potential future development and the threats posed to the ecosystem functions provided by wetlands at a watershed scale.

Stakeholders Identified Wetland Function and Values (ecosystem services)

- Water quality and quantity
- Flood control and flow regulation
- Wildlife habitat
- Connectivity
- Ease of restoration
- Biodiversity conservation
- Recreation
- Education
- Scenic value

Component One

- 8 models representing identified wetland functions and values
  1. Hydric Soils
  2. Jurisdictional Designation
  3. Water Quality and Quantity
  4. Connectivity to Existing Conservation Areas
  5. Terrestrial Dispersal Corridors between Wetlands
  6. Hydrologic Connectivity of Wetlands
  7. Natural Upland Habitat Surrounding Wetlands
  8. Maintenance of High Water Quality Streams for biodiversity maintenance

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Jurisdictional Designation

8 Digit HUC
Layer 1.3
Not Restorable
Not Regulated
Potentially Regulated
Regulated

0 25 50 100 150 Miles

1:3,558,632

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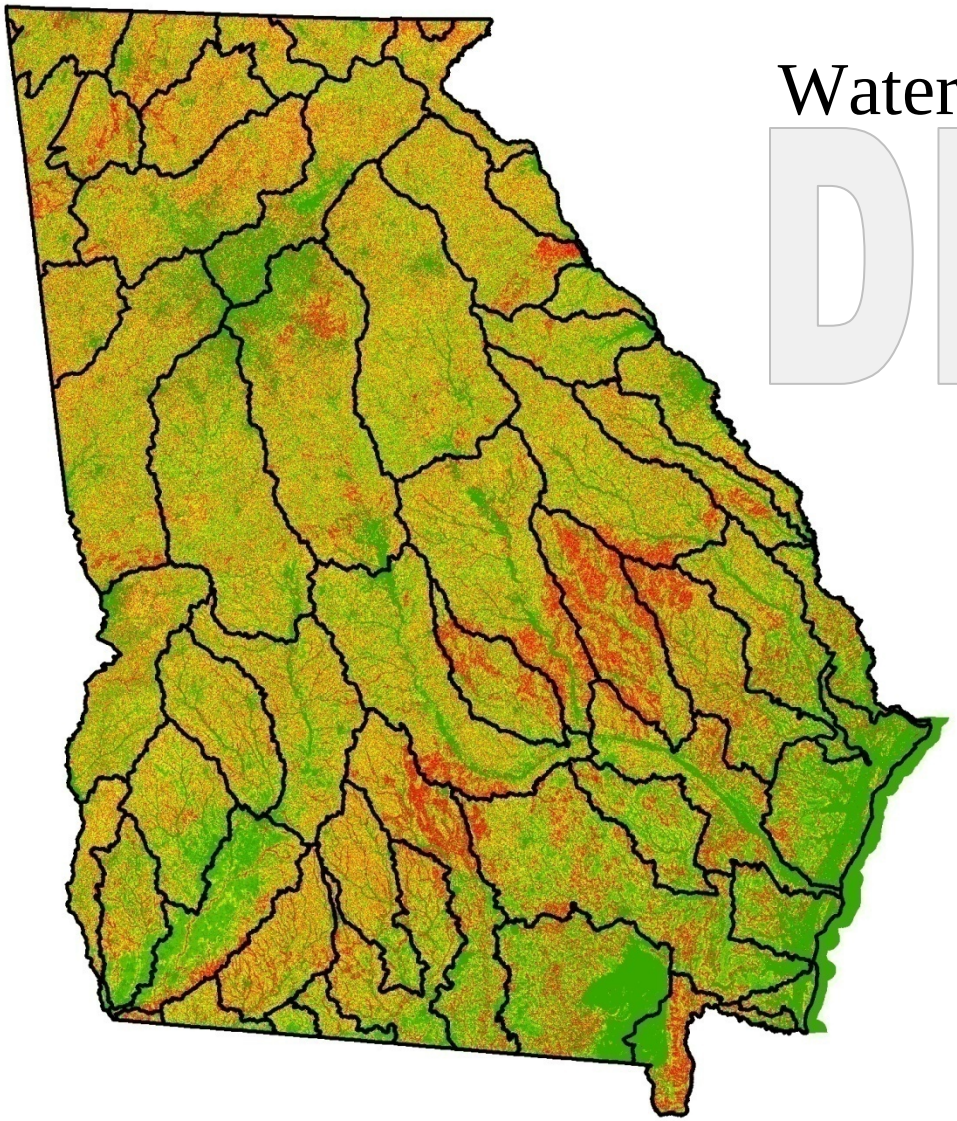
Water Quality and Quantity



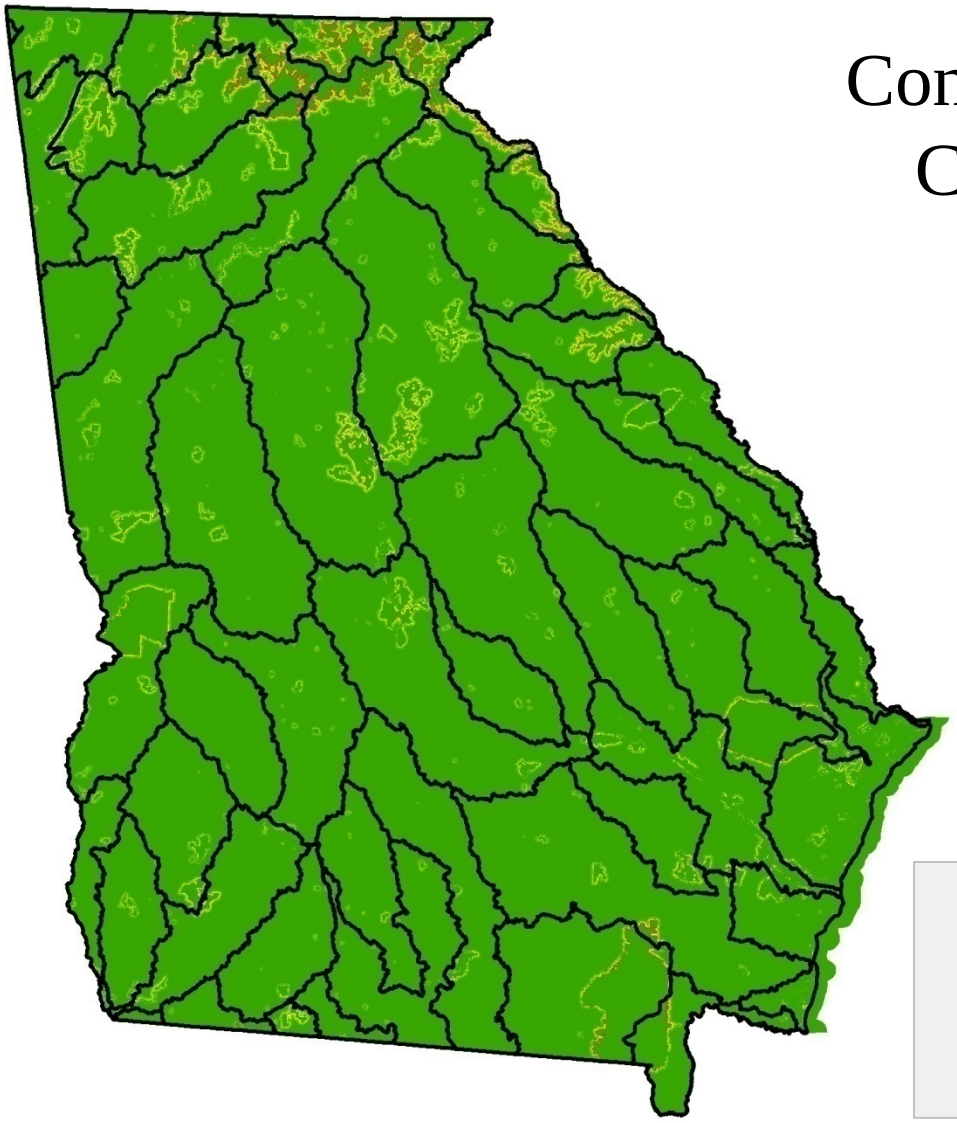
8 Digit HUC
Layer 1.4
1 - Lowest Potential
2
3
4
5
6
7
8
9 - Highest Potential

0 25 50 100 150 Miles

1:3,558,632

Draft current as of 8/16/2007

Connectivity to Existing Conservation Areas



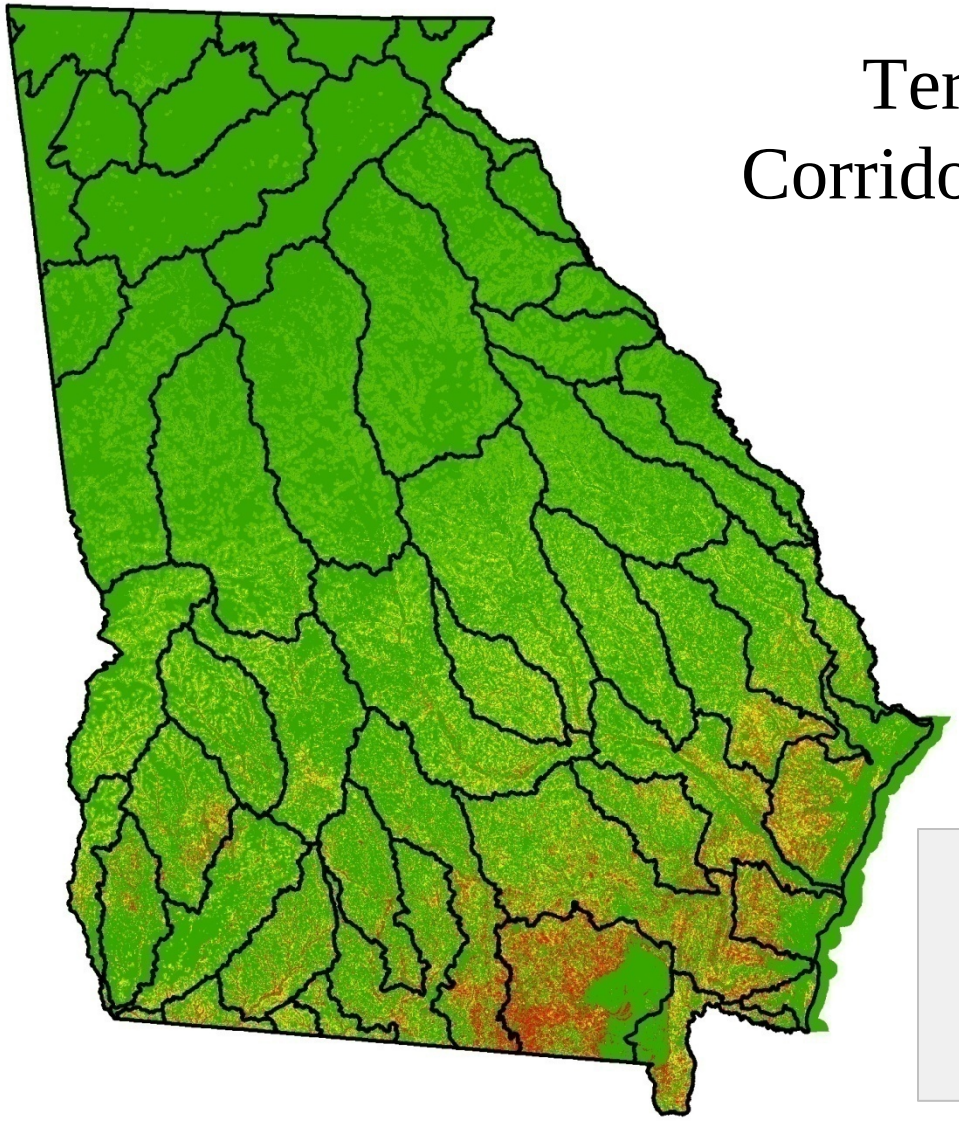
8 Digit HUC
Layer 1.5
1 - Lowest Potential
2
3
4
5
6
7
8
9 - Highest Potential

0 25 50 100 150 Miles

1:3,558,632

Draft current as of 8/16/2007

Terrestrial Dispersal Corridors between Wetlands



8 Digit HUC
Layer 1.7
1 - Lowest Potential
2
3
4
5
6
7
8
9 - Highest Potential

0 25 50 100 150 Miles

1:3,558,632

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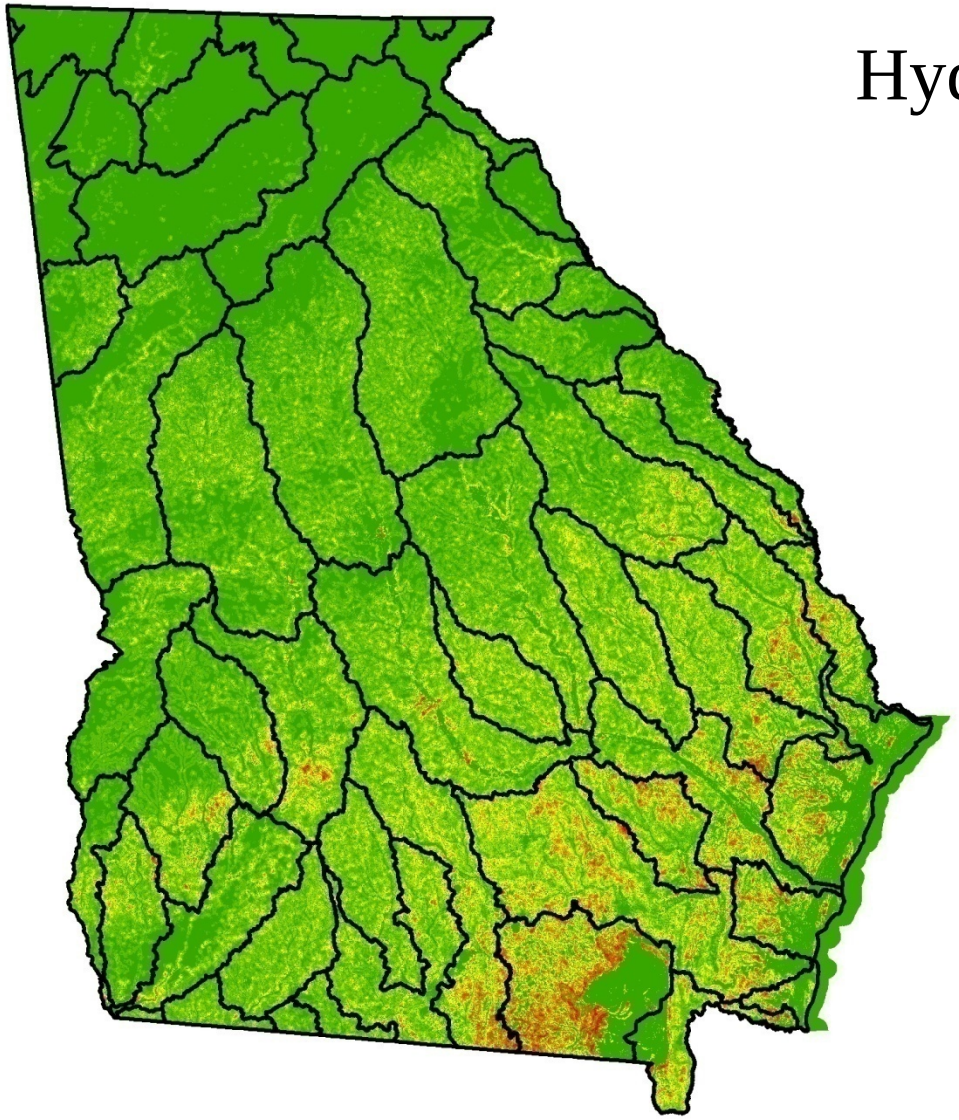
Hydrologic Connectivity of Wetlands



8 Digit HUC
Layer 1.8
1 - Lowest Potential
2
3
4
5
6
7
8
9 - Highest Potential

0 25 50 100 150 Miles

1:3,558,632

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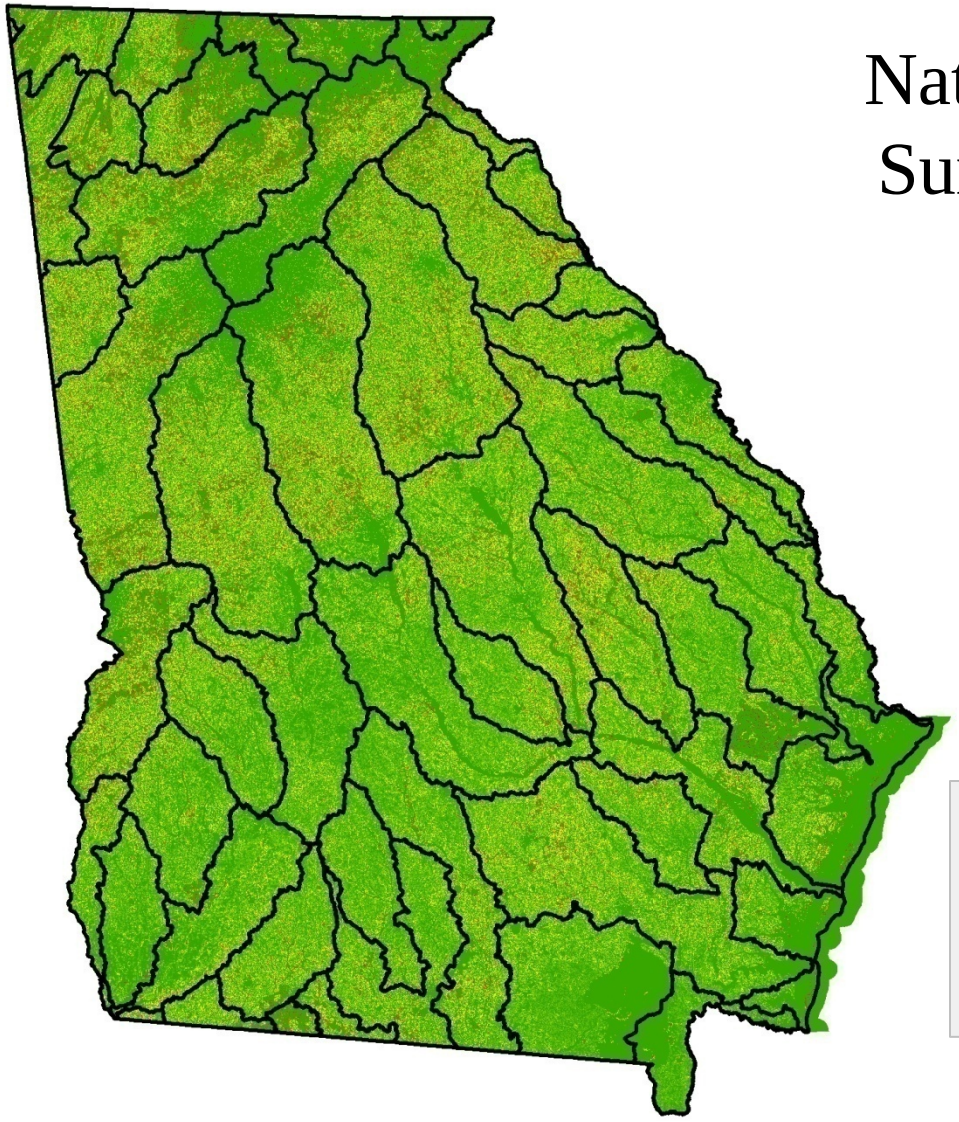
Natural Upland Habitat Surrounding Wetlands



8 Digit HUC
Layer 1.9
1 - Lowest Potential
2
3
4
5
6
7
8
9 - Highest Potential

0 25 50 100 150 Miles

1:3,558,632

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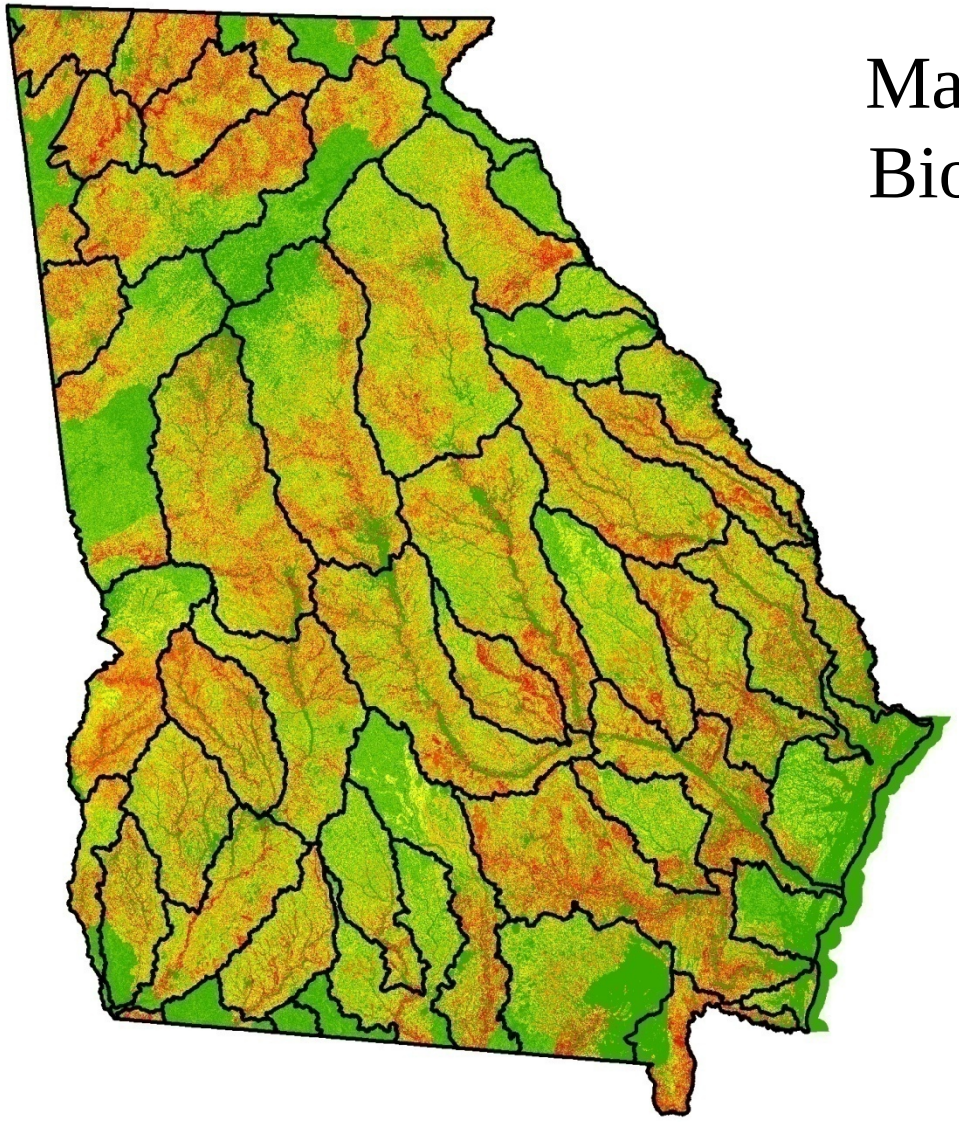
Maintenance of High Biodiversity Streams



8 Digit HUC
Layer 1.10
1 - Lowest Potential
2
3
4
5
6
7
8
9 - Highest Potential

0 25 50 100 150 Miles

1:3,558,632

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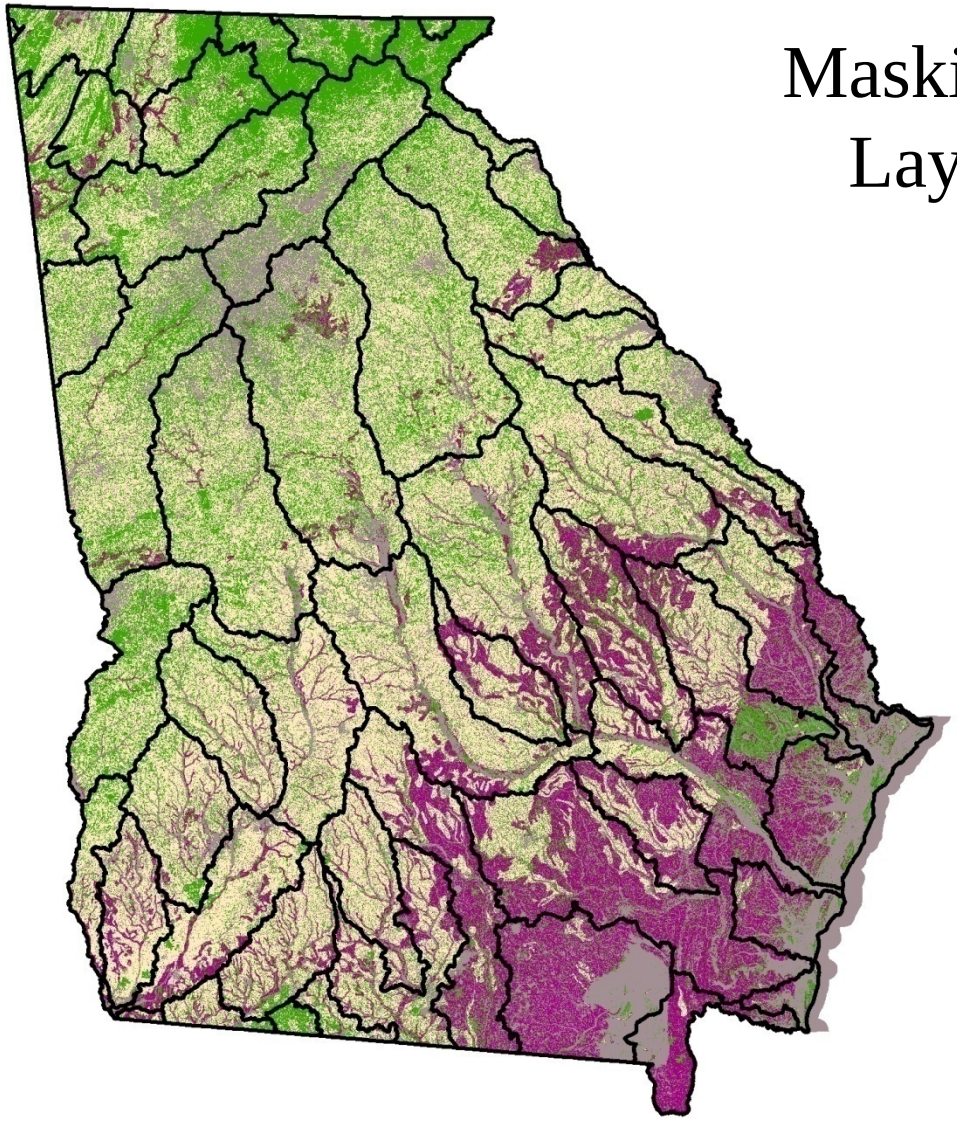
Masking Layer – Exclusion Layer and Hydric Soils



8 Digit HUC

Layer 1.1

- Not Restorable
- Potentially Restorable
- Upland Vegetation
- High Potential For Restoration

0 25 50 100 150 Miles

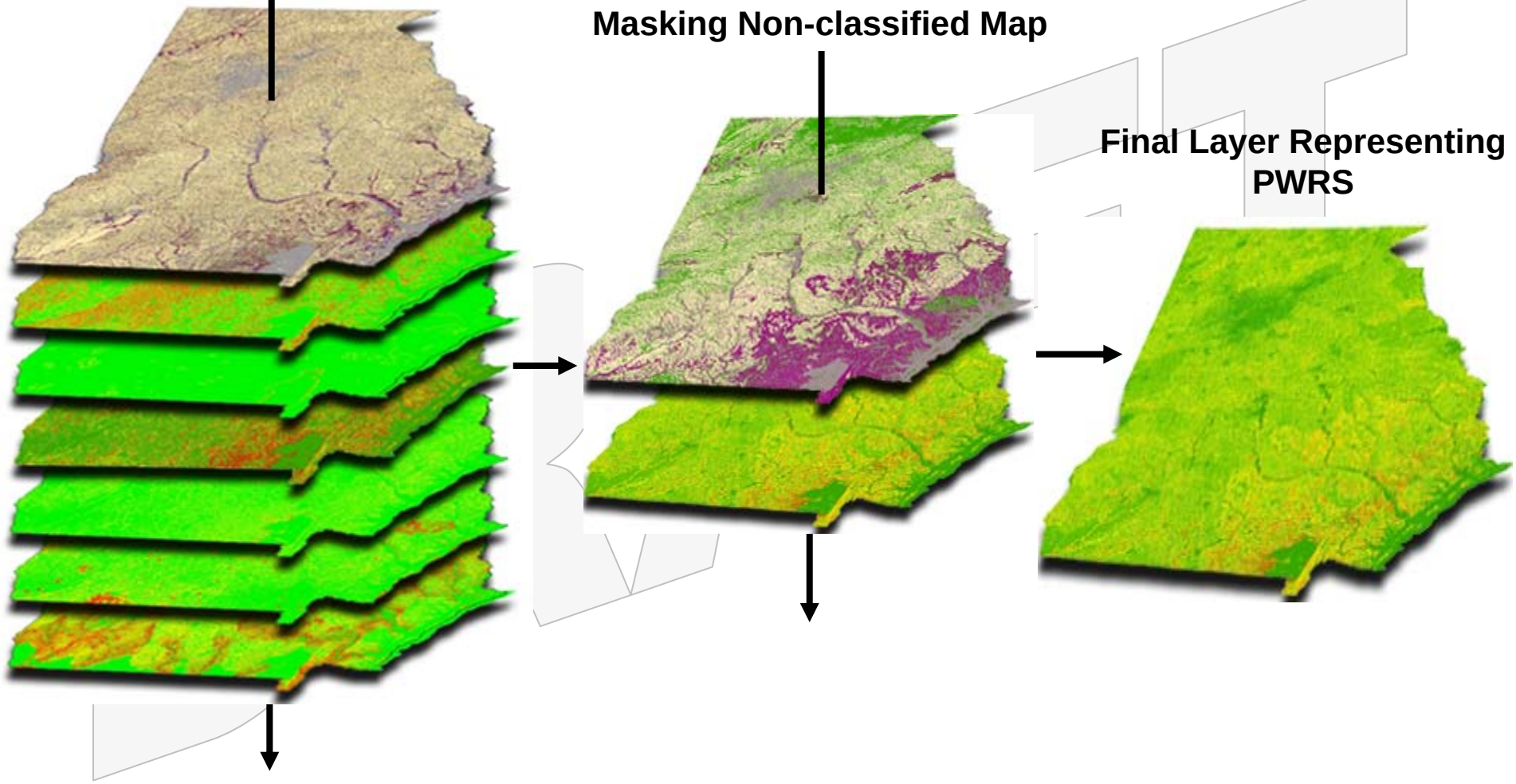
1:3,558,632

Draft current as of 8/16/2007

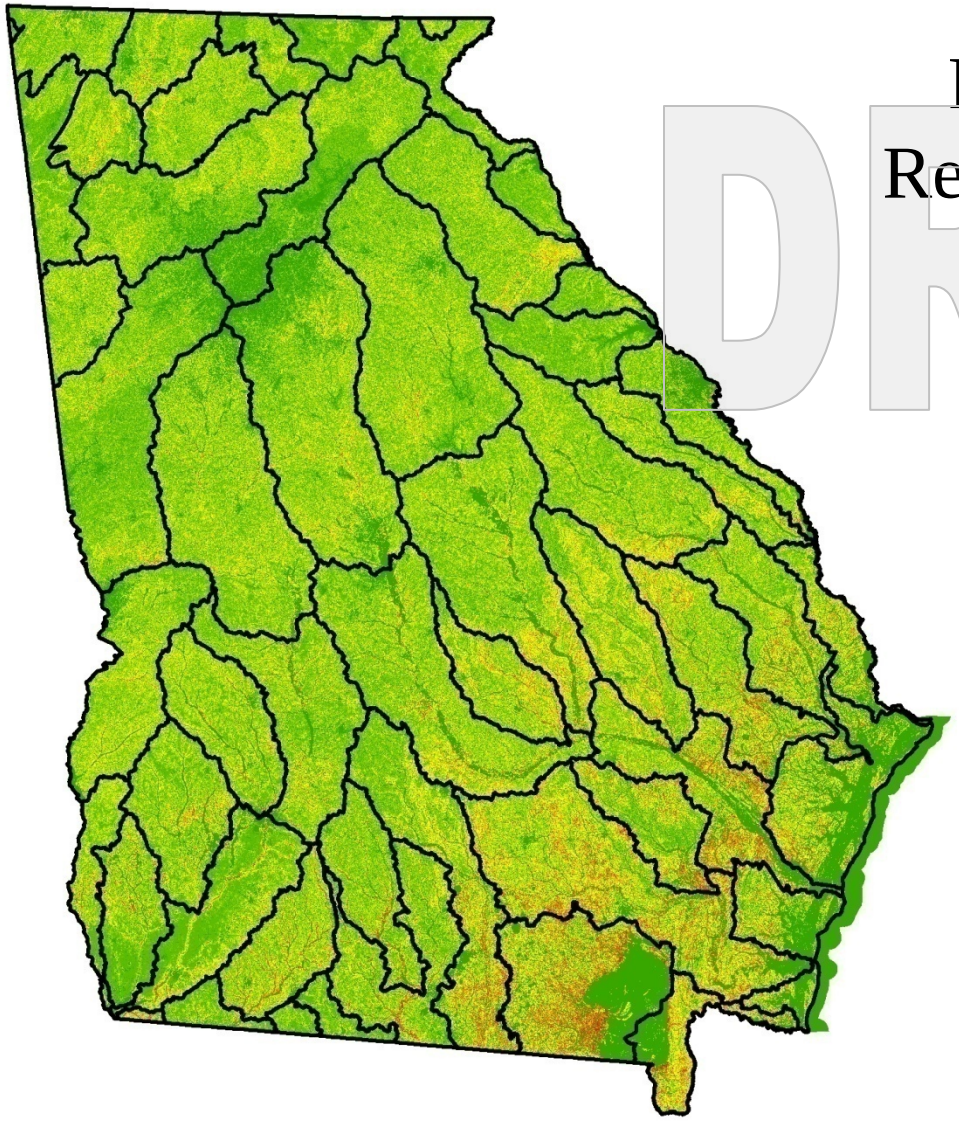
Add Component One Layers Together

Masking Non-classified Map

Final Layer Representing PWRS



Potential Wetland Restoration Site Index



PWRA
8 Digit HUC
1 - Lowest Potential
2
3
4
5
6
7
8
9 - Highest Potential

0 25 50 100 150 Miles

1:3,558,632

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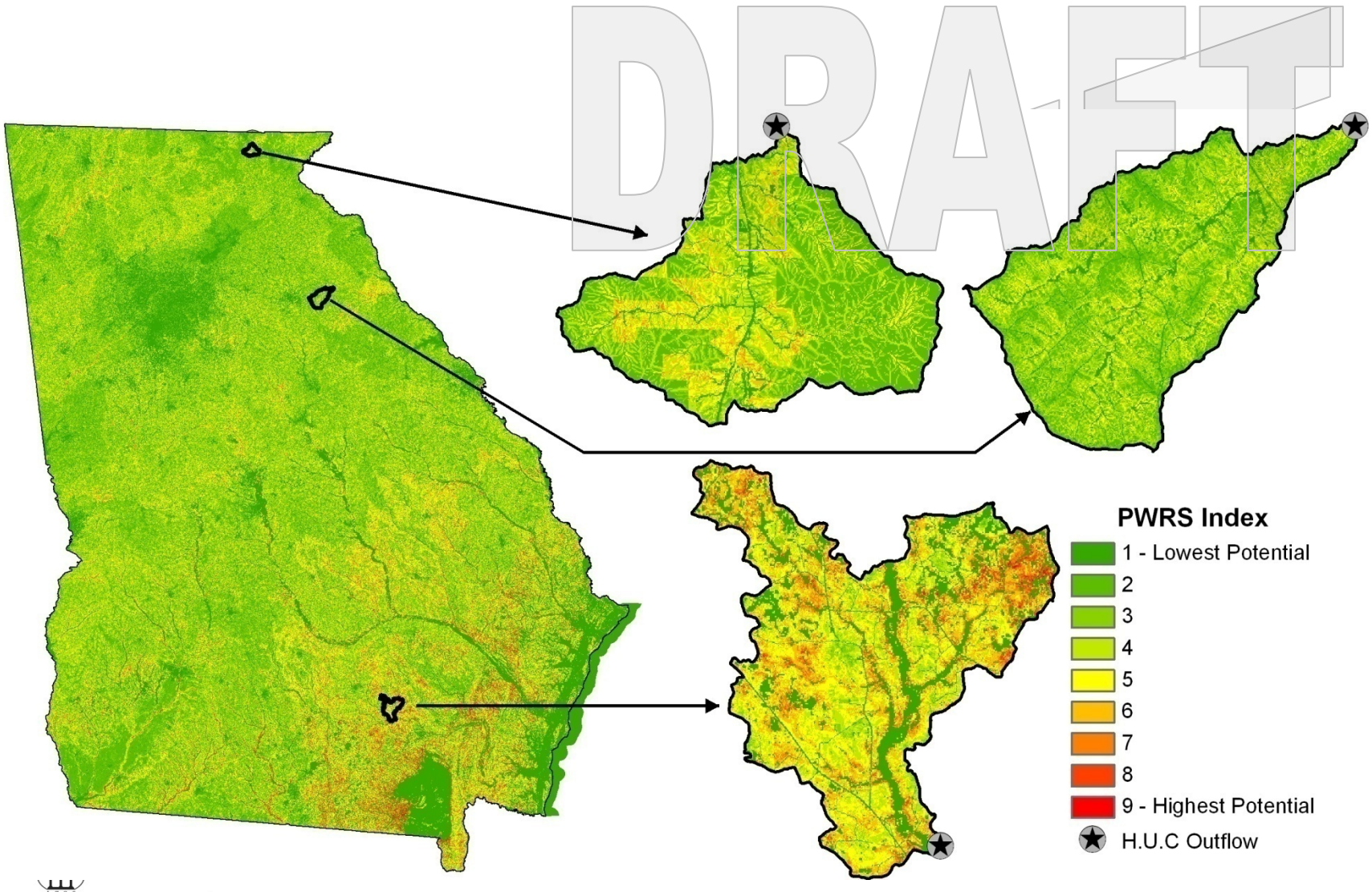
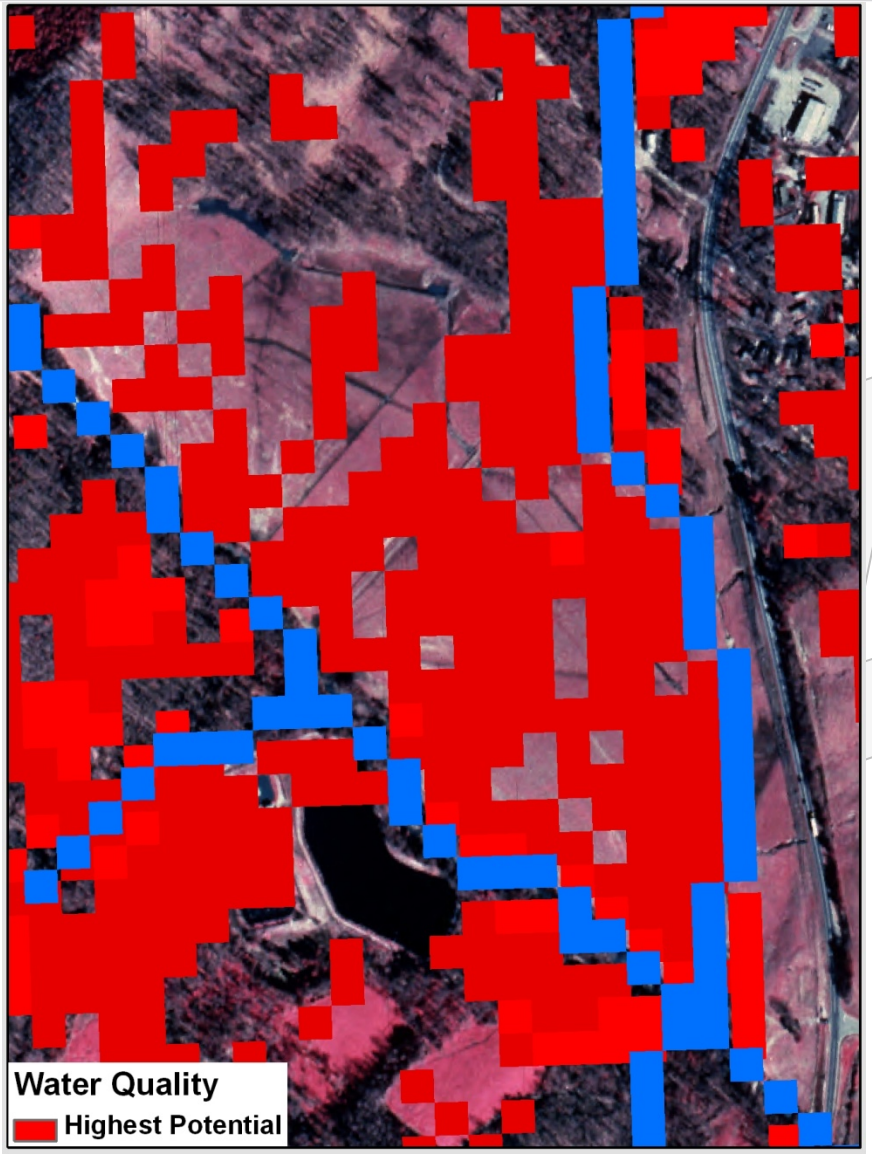
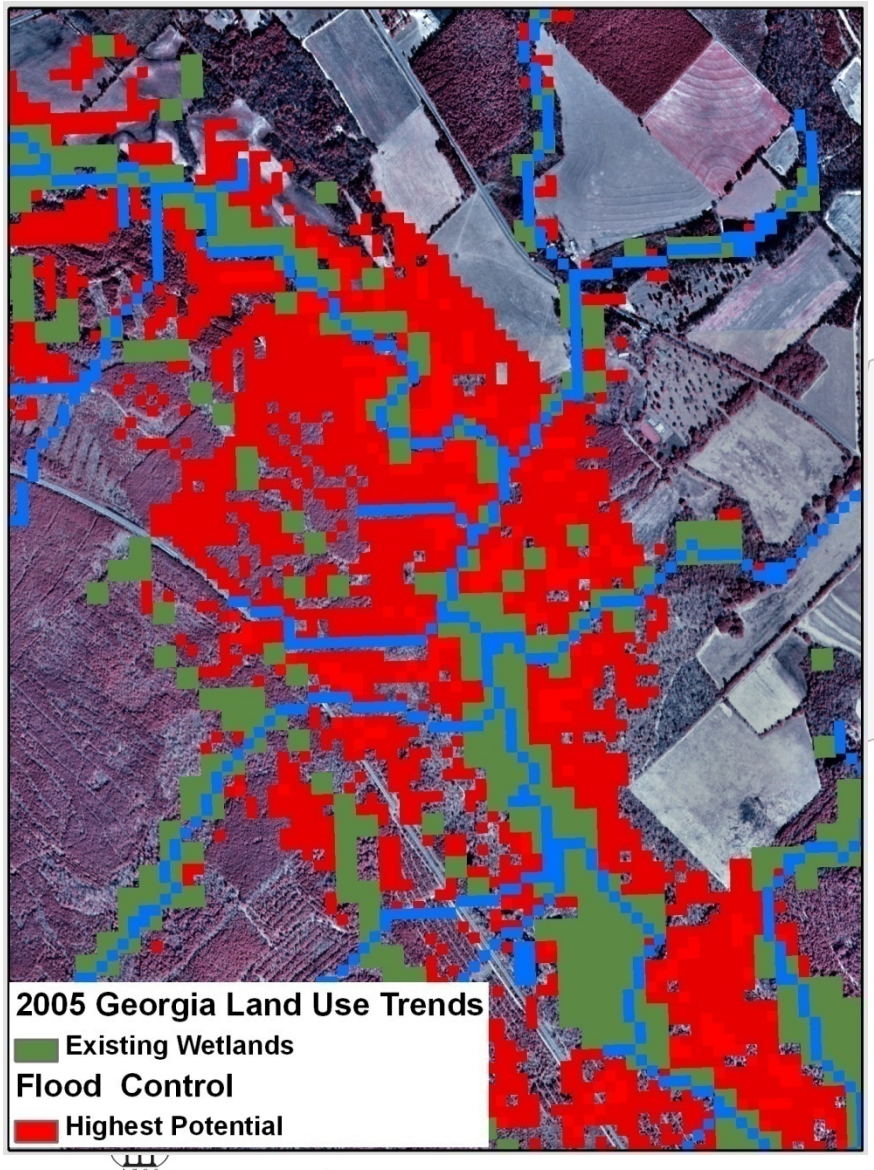
Potential Wetland Restoration Site Index





This is the pasture site that restoration would have an effect on the water quality of streams.

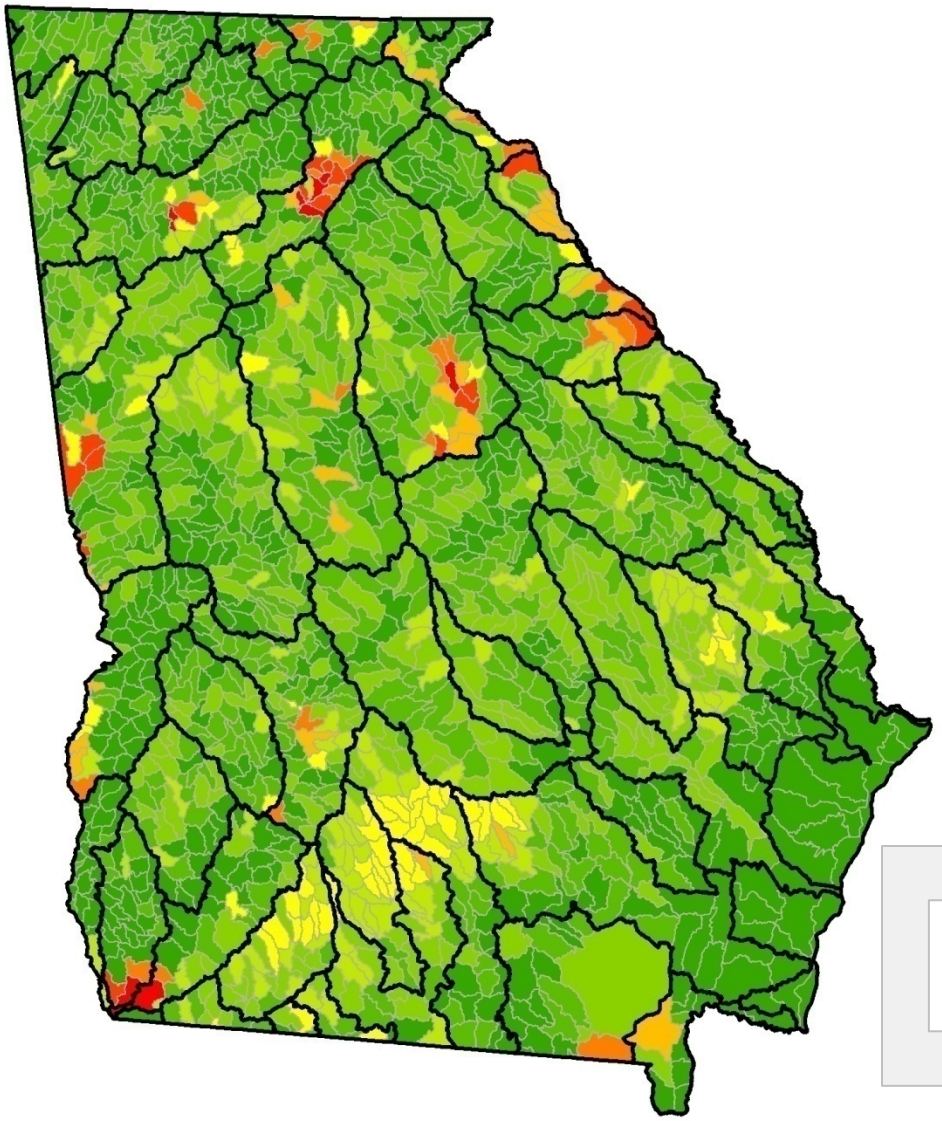


Potential Wetland Restoration Site Index

Component 2

- 8 Threats Modeled
  1. Stream Fragmentation Due to Impoundments 1974 - 2005
  2. Percent of Stream Miles in 12 digit HUC Listed as Impaired
  3. Change in Wetland Area from 1974 – 2005
  4. Percent of Impervious Surface in the Watershed 2005
  5. Probability of at Least 50% Increase in Development 2005 – 2025
  6. Change in Mean Wetland Size from 1974 – 2005
  7. Change in Proximity of Wetlands 1974 – 2005
  8. Percent Change in Number of Stream Miles with a Continuous Streamside Forest Cover 1974 - 2005

Layer 2.1 – Stream Fragmentation



8 Digit HUC
12 Digit HUC
Layer 2.1
1 - Lowest Threat
2
3
4
5
6
7
8
9 - Highest Threat

0 25 50 100 150 Miles

1:3,558,632

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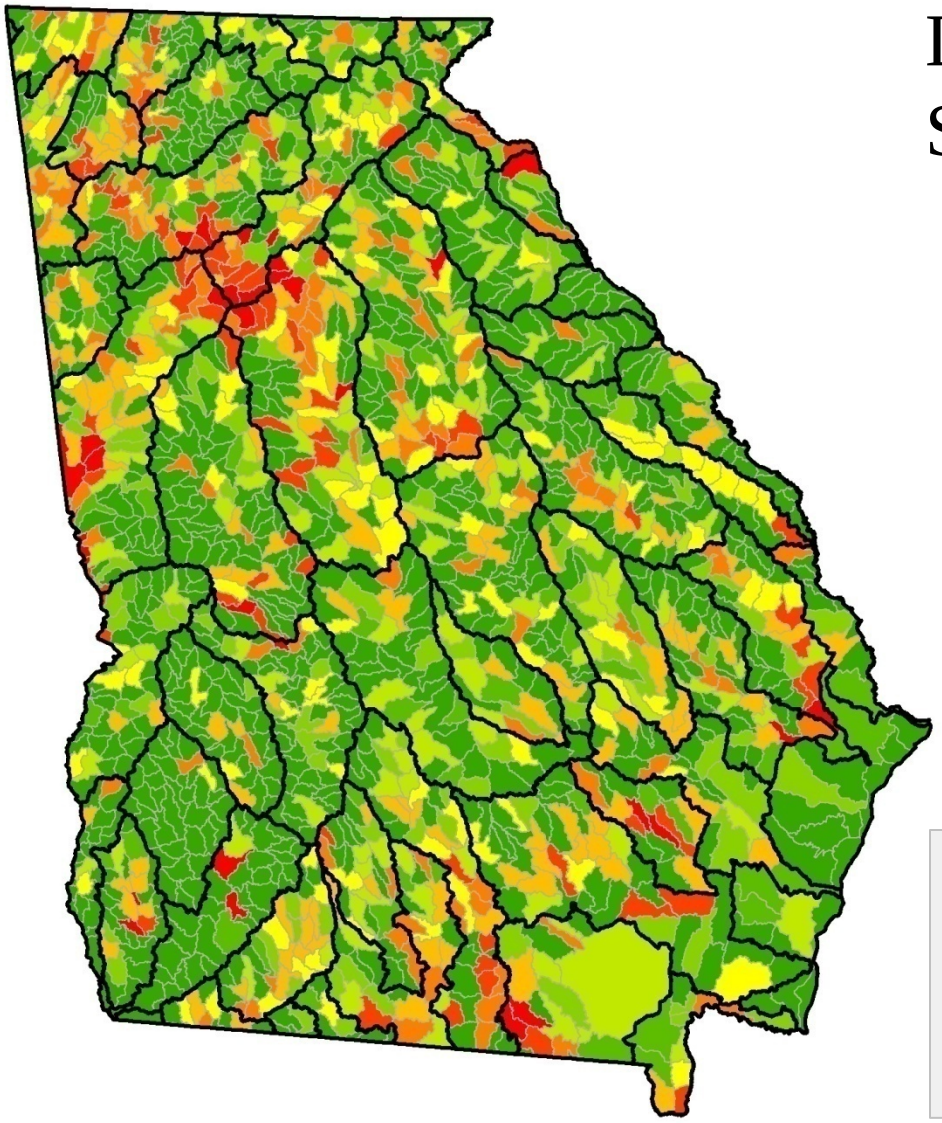
Layer 2.2 – Percent of Stream Miles Impaired



8 Digit HUC
12 Digit HUC
Layer 2.2
1 - Lowest Threat
2
3
4
5
6
7
8
9 - Highest Threat

0 25 50 100 150 Miles

1:3,558,632

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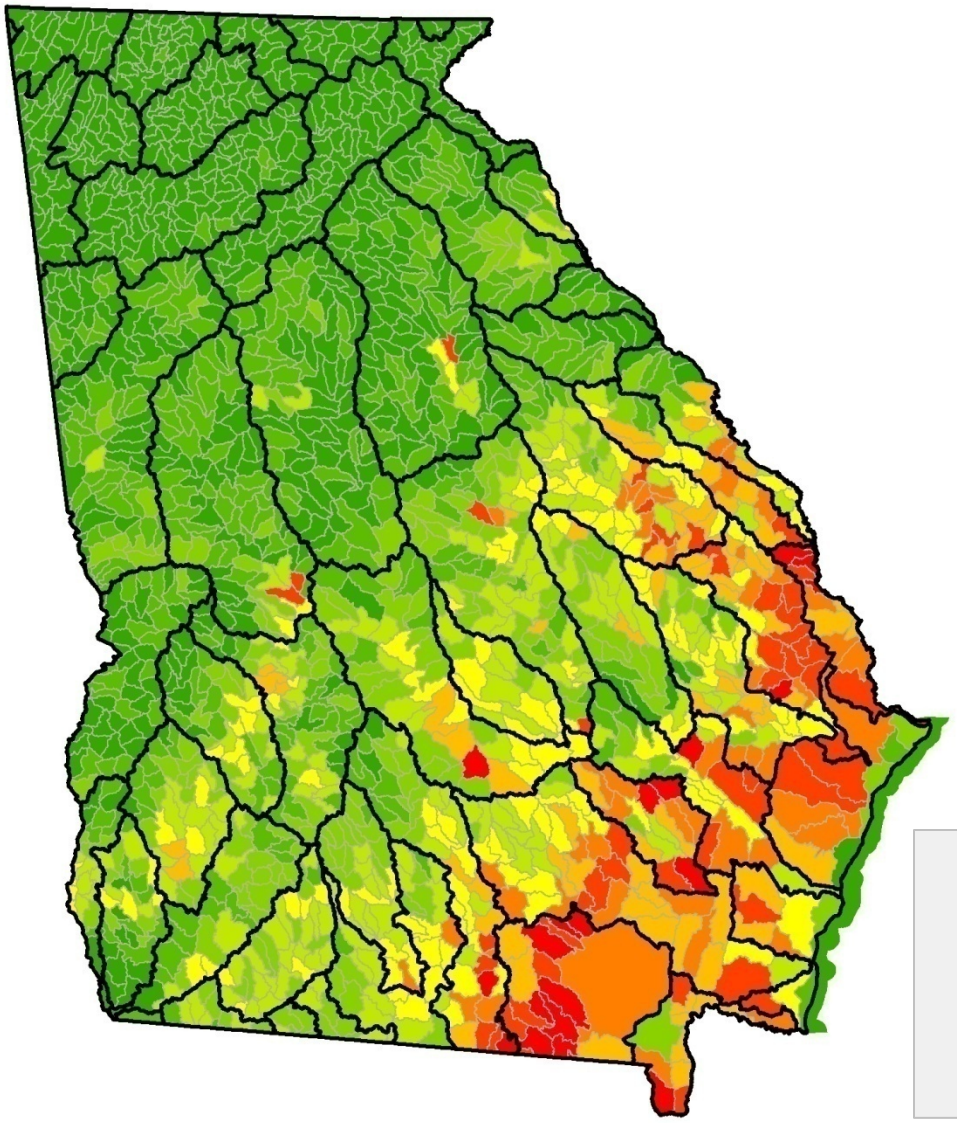
Layer 2.3 – Wetland Activity Index



8 Digit HUC
12 Digit HUC
Layer 2.3
1 - Lowest Threat
2
3
4
5
6
7
8
9 - Highest Threat

0 25 50 100 150 Miles

1:3,558,632

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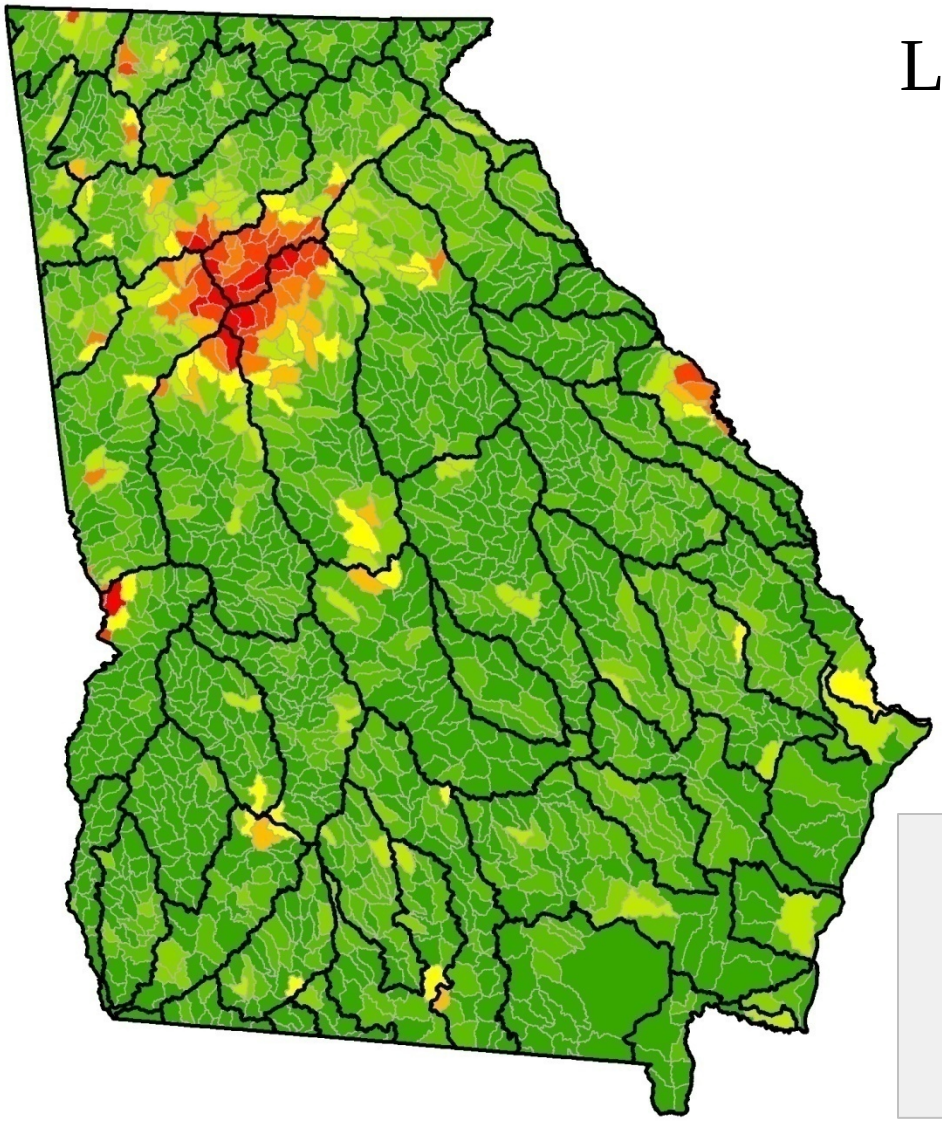
Layer 2.4 – Impervious Surface Cover



8 Digit HUC
12 Digit HUC
Layer 2.4
1 - Lowest Threat
2
3
4
5
6
7
8
9 - Highest Threat

0 25 50 100 150 Miles

1:3,558,632

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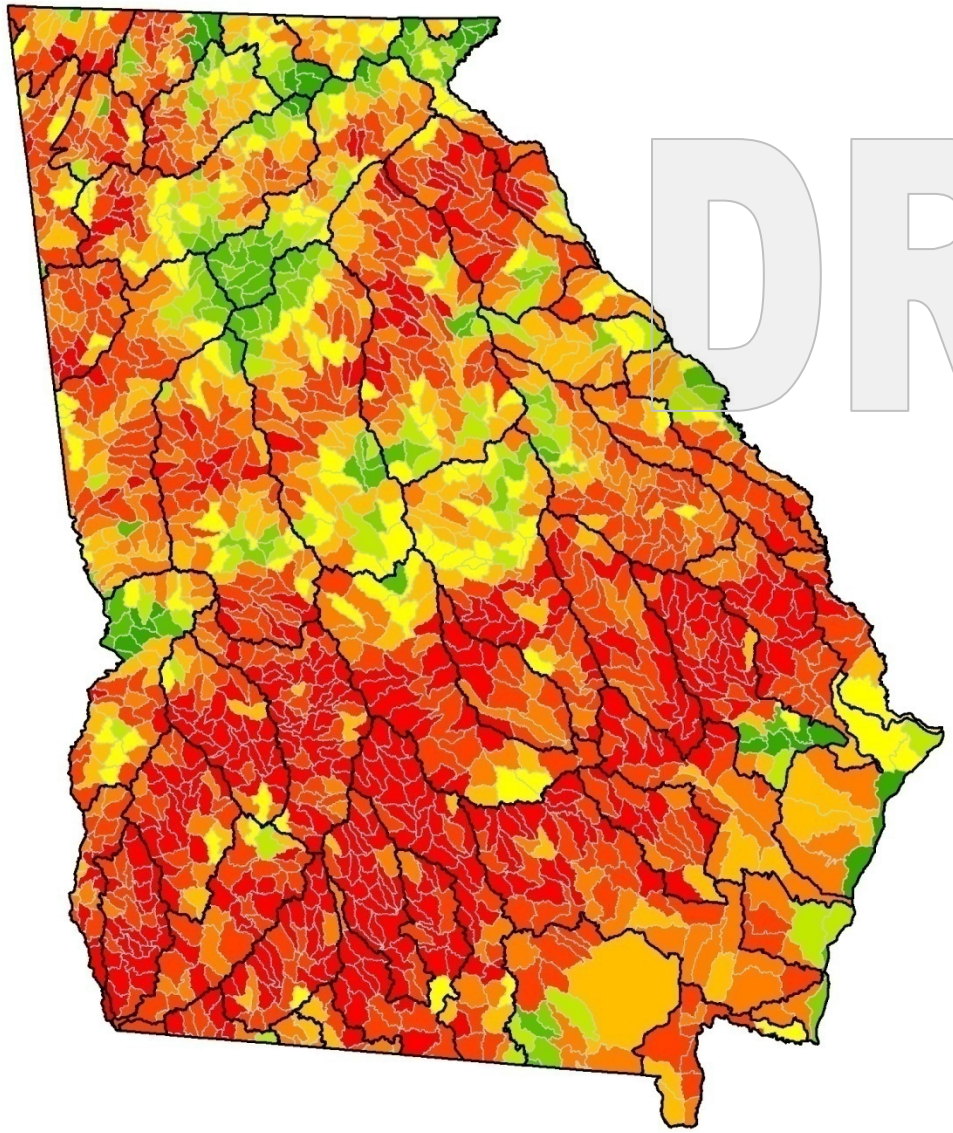
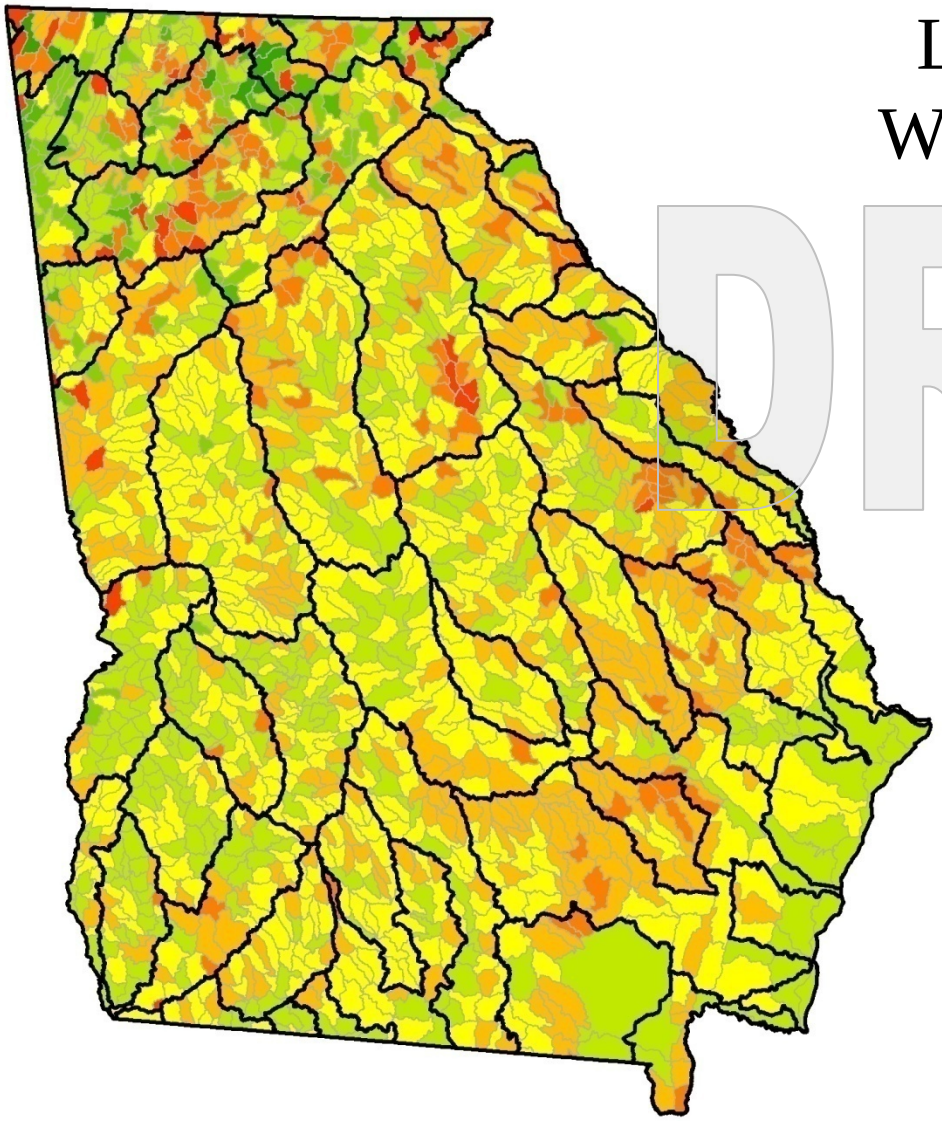
Layer 2.5 – 50% Probability of Development - 2025



8 Digit HUC
12 Digit HUC
Layer 2.5
1 - Lowest Threat
2
3
4
5
6
7
8
9 - Highest Threat

Layer 2.6 – Change in Wetland Size 1974-2005



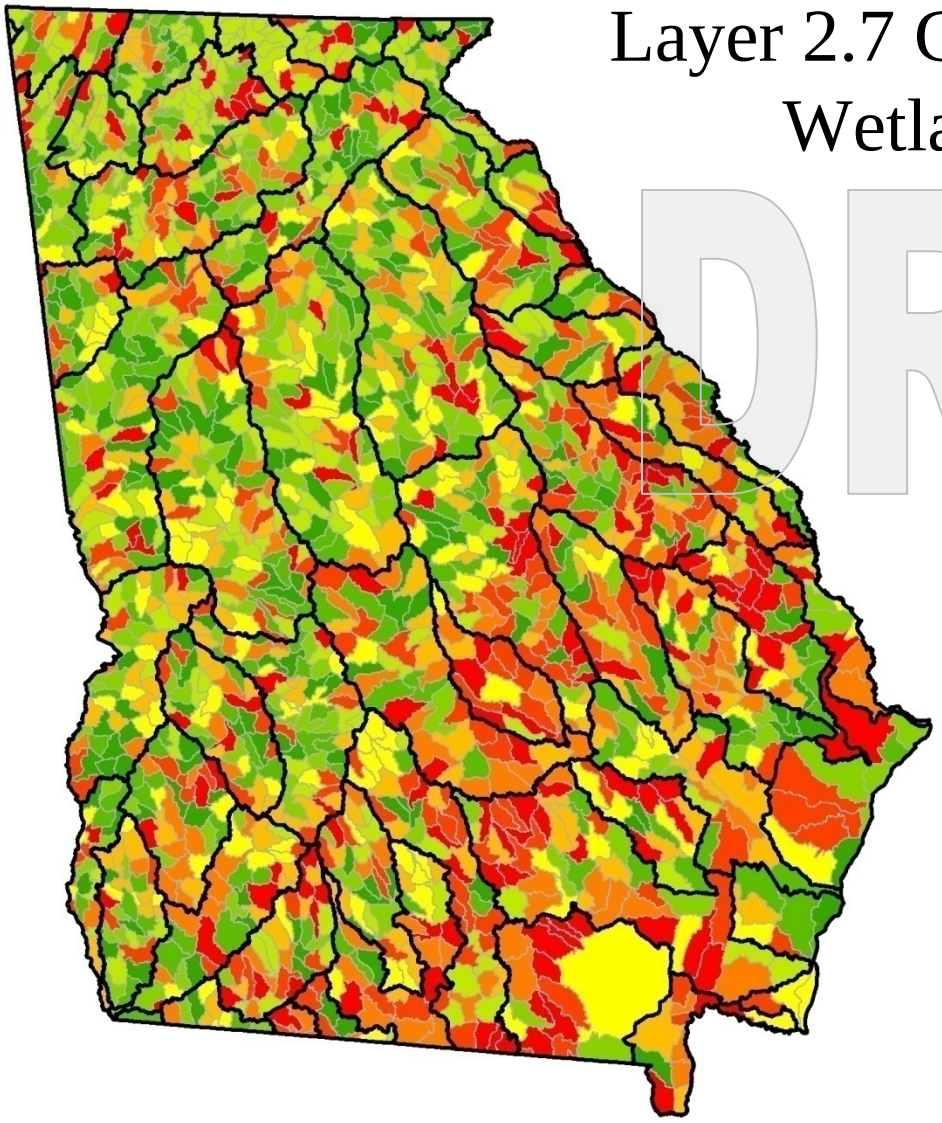
8 Digit HUC
12 Digit HUC
Layer 2.6
1 - Lowest Threat
2
3
4
5
6
7
8
9 - Highest Threat

0 25 50 100 150 Miles

1:3,558,632

Draft current as of 8/16/2007

Layer 2.7 Change in Proximity of Wetlands 1974 - 2005



8 Digit HUC
12 Digit HUC
Layer 2.7
1 - Lowest Threat
2
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8
9 - Highest Threat

0 25 50 100 150 Miles

1:3,558,632

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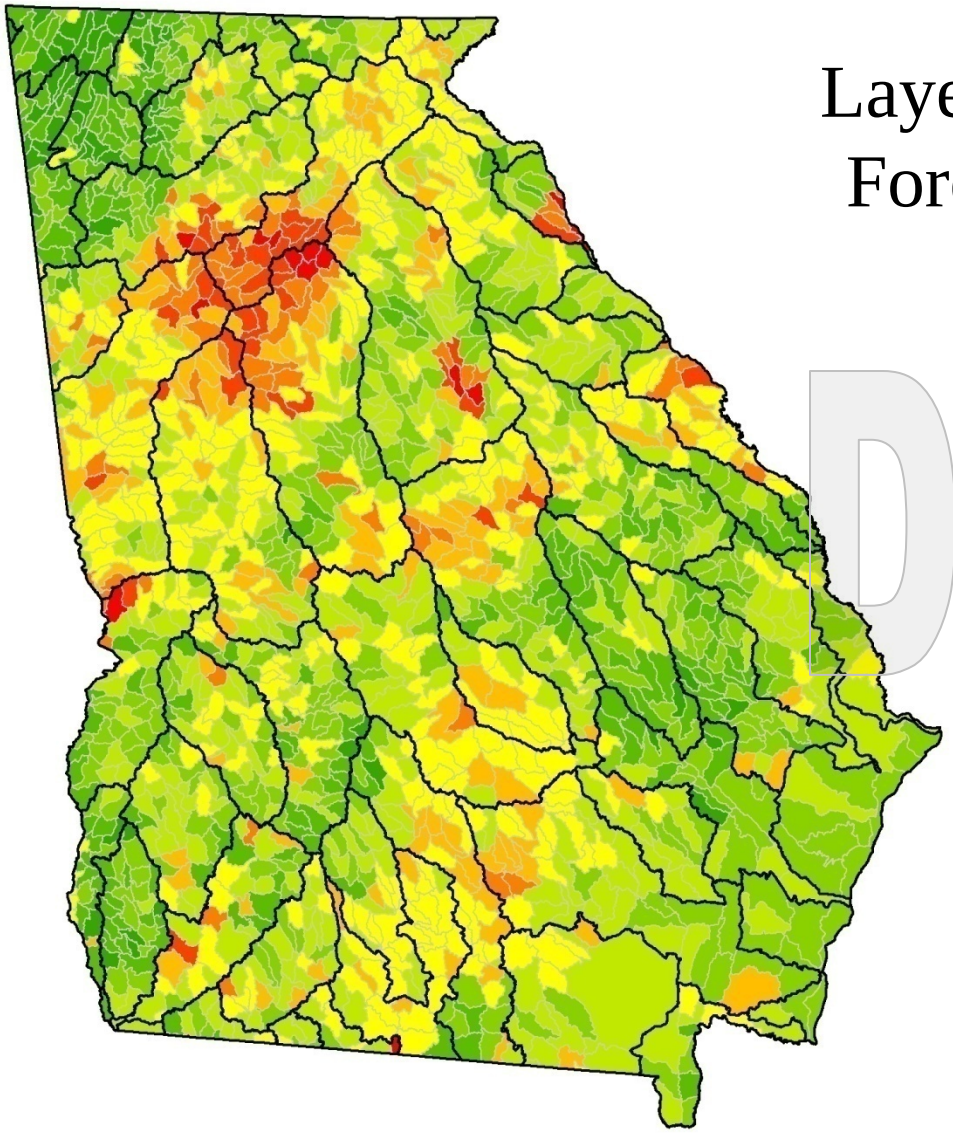
Layer 2.8 – Streamside Forest Fragmentation 1974 - 2005



8 Digit HUC
12 Digit HUC
Layer 2.8
1 - Lowest Threat
2
3
4
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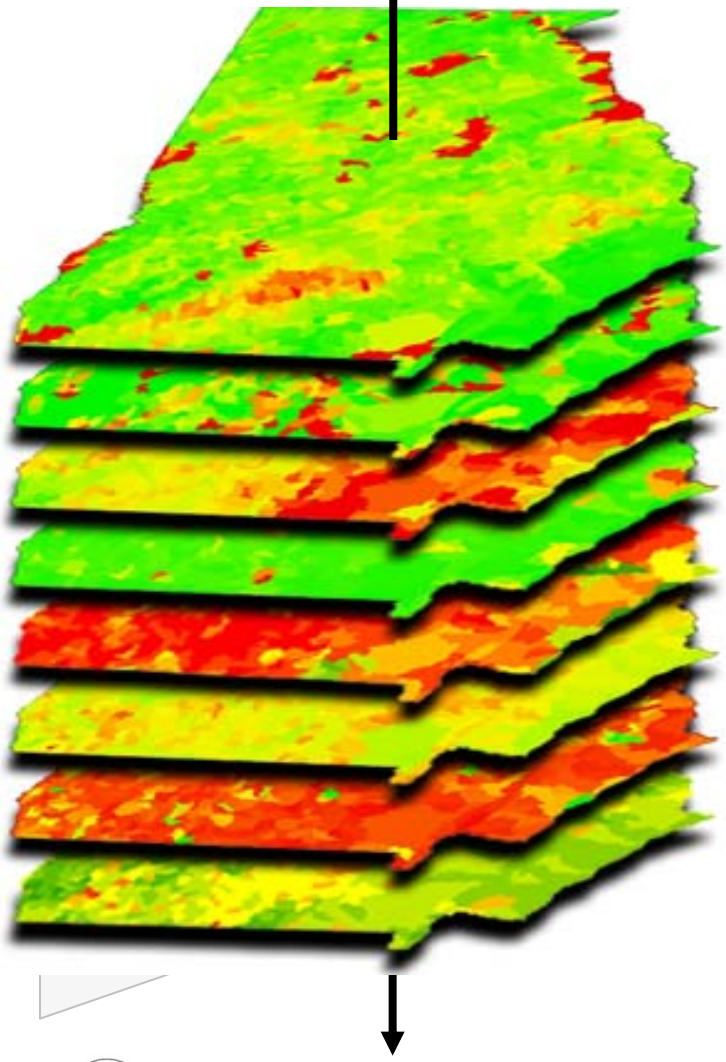
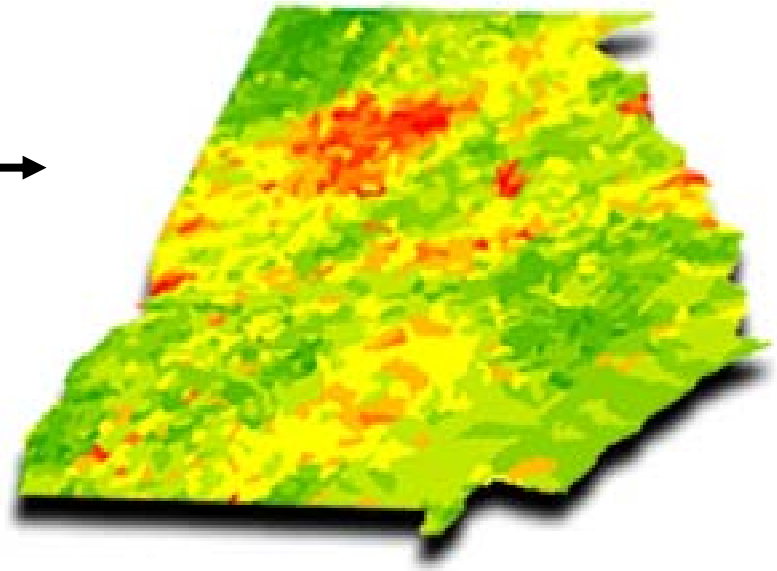
7
8
9 - Highest Threat

Add Layers Together



Final Layer Representing Threat Prioritization Index



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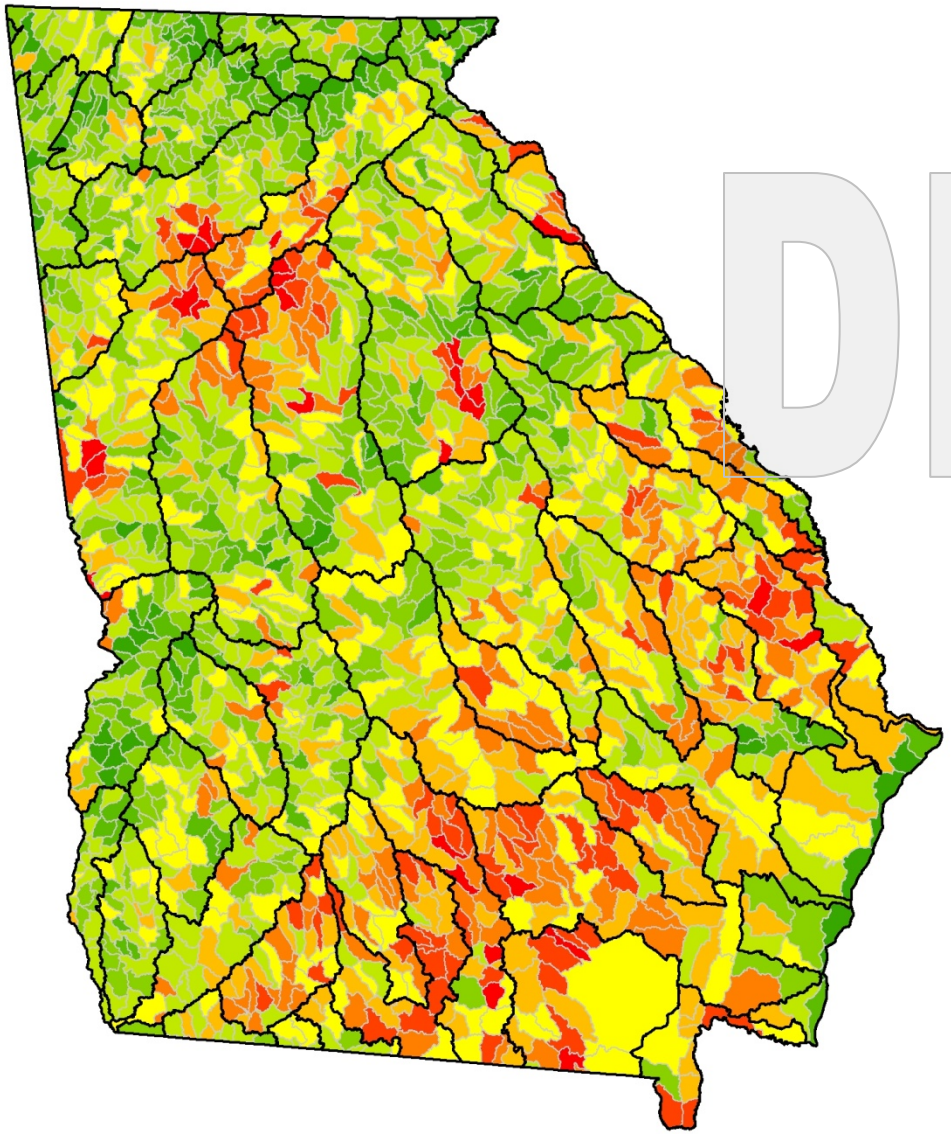
Threat Prioritization Index



Conclusions

- Model address function over structure – critical to maintain "no net loss" of ecosystem function rather than an acreage approach
- Model provides the watershed planning information required for the new rules
- Model can be used to identify service area boundaries
- Model can be used to identify watershed monitoring sites for the development and assessment of performance standards
- Threats assessment can be used to develop cumulative impact assessments
- Using the model will require a change in the current approach to site selection
- Finally, model should never replace boots on the ground for final selection.

Next Steps

- EPA grant for phase 2
  - Complete database of wetland mitigation sites
  - Create a tool that will allow user to query the datasets in a controlled environment
  - Training workshops to use the data and the tools
  - New models
    - Potential Wetland Mitigation Sites for coastal marshes and tidally influenced wetlands
    - Landscape Scale conditional assessment of existing wetland for prioritizing restoration potential
- Future project
  - Linking results to hydrological and Economic models
    - Goal to prioritize wetland mitigation and restoration for enhancing flows and stormwater management
  - Open for discussion