L'Anguille River Riparian Modeling

2010 Non-Point Source Project Review Meeting

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Functions of riparian buffer

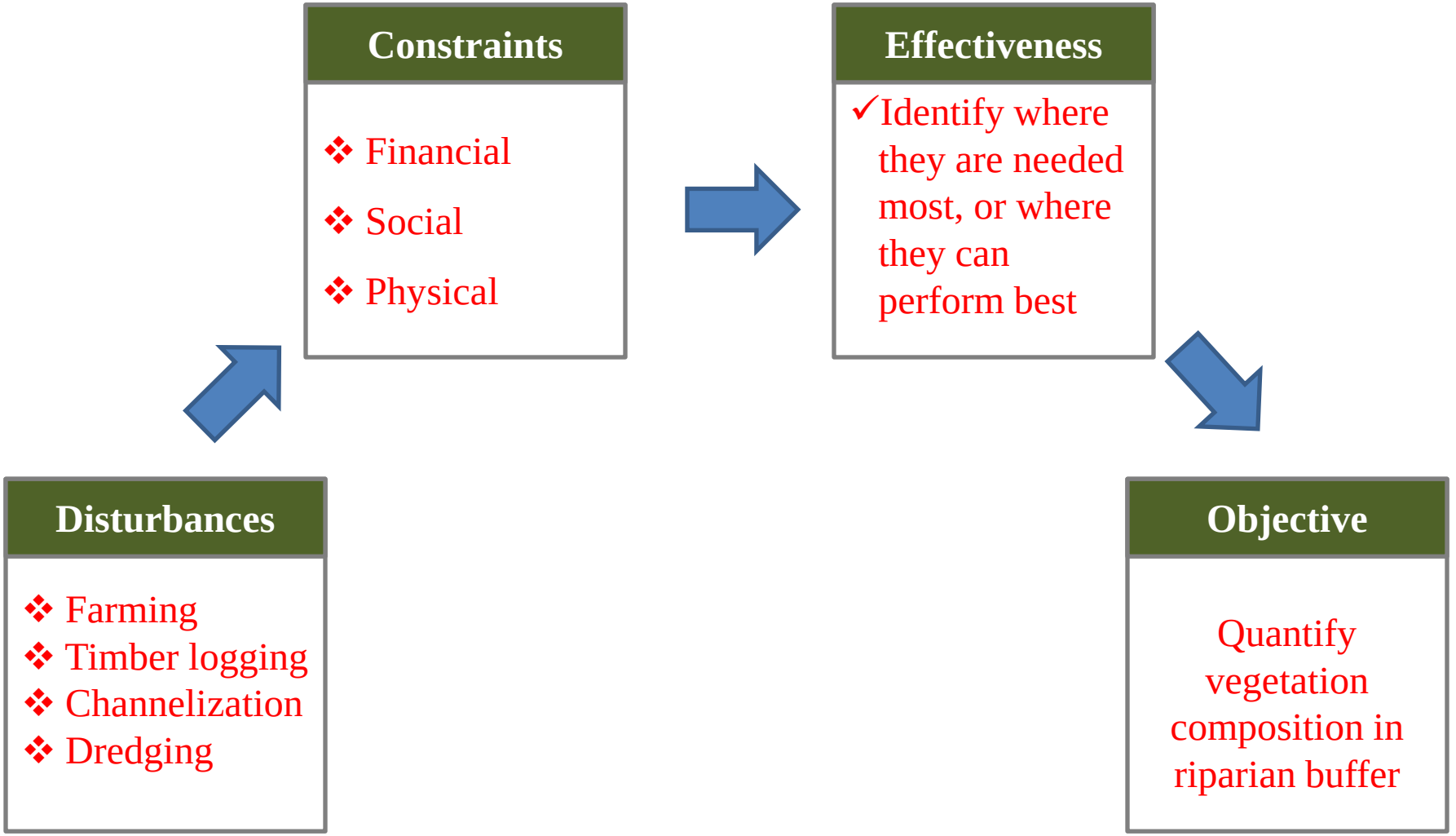
- **Vegetation**- corridor of specific width- adjacent to the banks of water bodies
- **Ecological health**- temperature control, nitrogen filtering, bank stabilization
- **BMP** - One of the best BMP for NPS control[1]
- **Establishment** - NRCS- CRP/CREP/EQIP, and EPA- Cost share through 319(h)

Photo : http://www.riparianinstitute.org

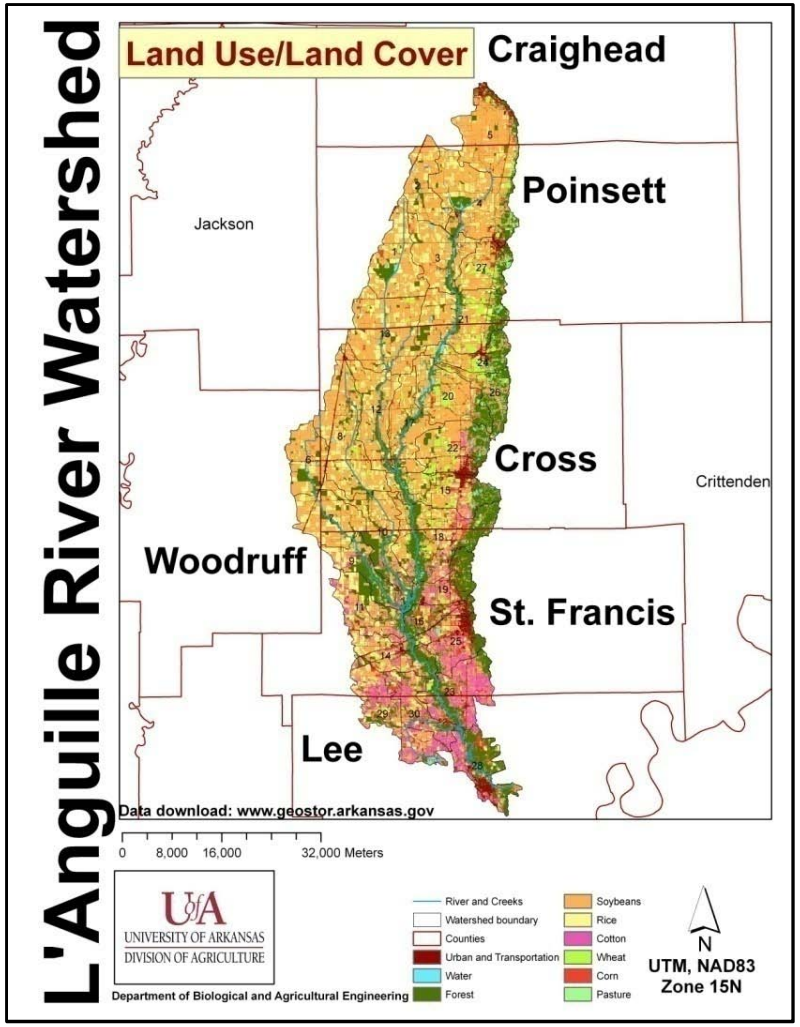
Photo: http://www.epa.gov

[1](Mayer et al., 2005)

Riparian Buffer: Challenges and Opportunities



Study Area: L'Anguille River Watershed (LRWS)



- **Total Area under row crops (70%)**
  - soybean (42.3%),
  - rice (14.9%),
- **Forest (21.2%),**
- **Source of impairment**
  - Drainage of the lowland areas - ditching and channelization
  - Silt loads carried into the streams from row crops

Study stream banks to determine sources for sedimentation (Audubon, 2005)

(Source: Center for Advanced Spatial Technologies (CAST), 2006)

How wide should be the buffer..?

USDA-NRCS guidelines (Act 391 and 393):

Land Slope (%)	Riparian Forest Buffer, ft	Filter Strip minimum widths, ft			Total combined width, ft
		Cropland	Pastures	Forest	
0-1	35	10	20	25+0.25*25	60+6.25
1-3	35	15	20	50+0.25*25	85+12.5
3-8	35	20	50	50+0.25*25	85+12.5
8-20	35	25	100	70+0.25*25	105+17.5
20-40	35	25	100	90+0.25*25	125+22.5

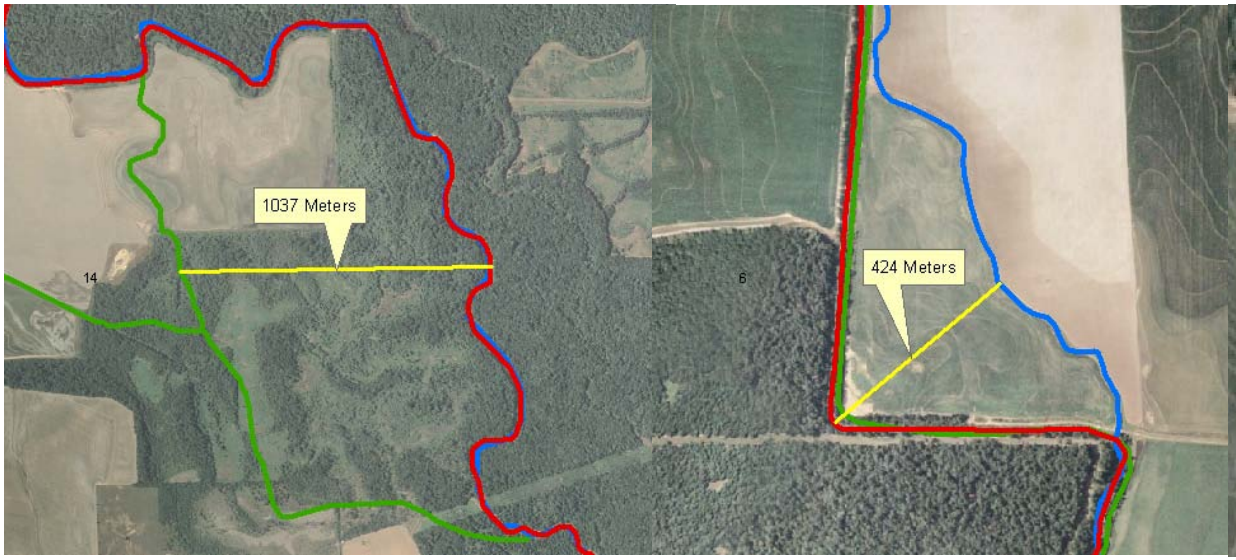
Riparian buffers- largest of the minimum combined width

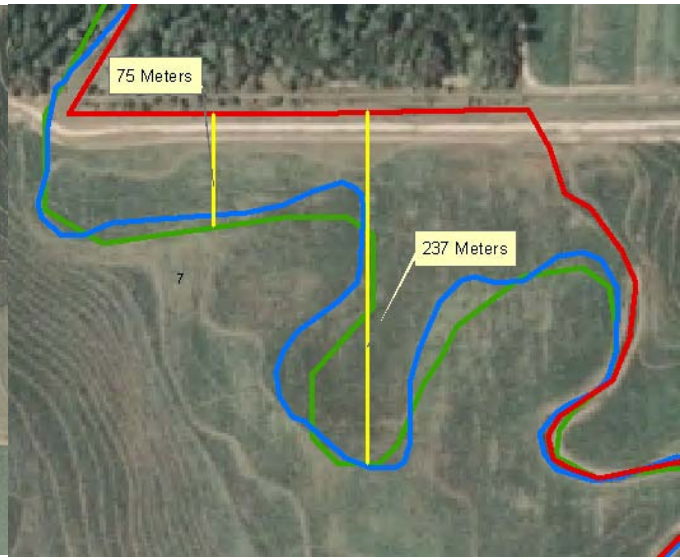
"**vegetation (trees and filter strip practices) lying within 45 m (147.5 ft) from the stream bank**"

Input Data and Initial Effort

- 2006 natural color imagery
- Stream layer- NHD Plus (ADEQ)
- 2006 LULC Image

- Manually edit stream centerlines to ensure that they match location on natural color imagery





ADEQ
NHD Plus
Edited

Riparian Buffer- Data Issues

- Approx. 360 km (225 miles) of streams data was manually created
- Scale used 1:700

ADEQ
NHD Plus
Edited

Algorithm Development

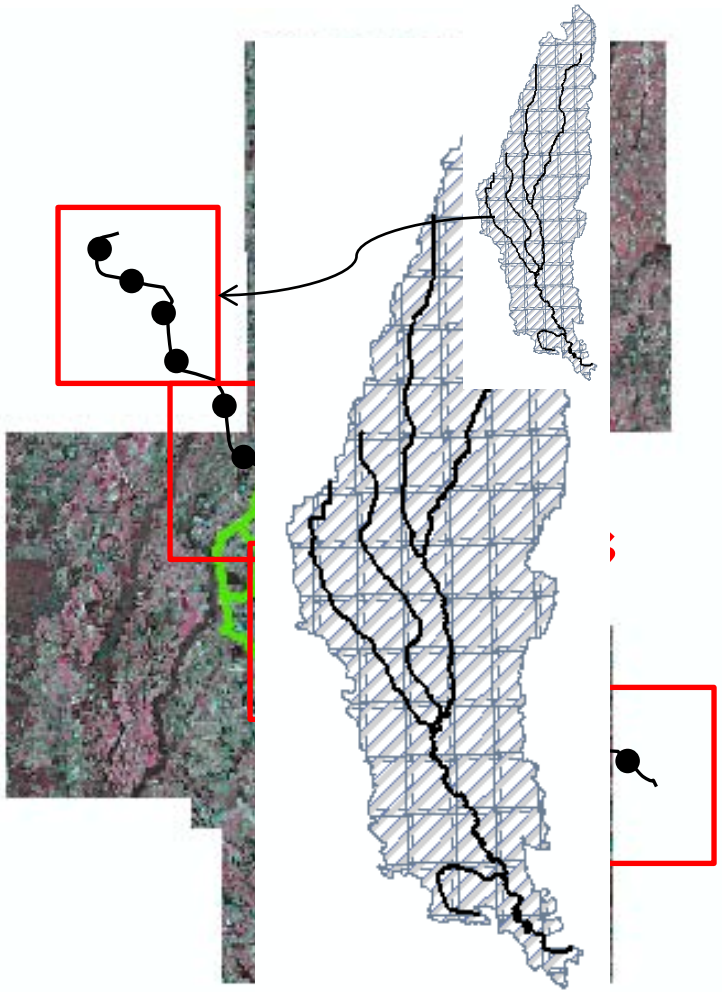
- Use edited stream centerline and natural color imagery obtained in Spring 2006 to delineate stream banks

- Create buffers from ***stream banks***

- Find vegetation composition within the buffers

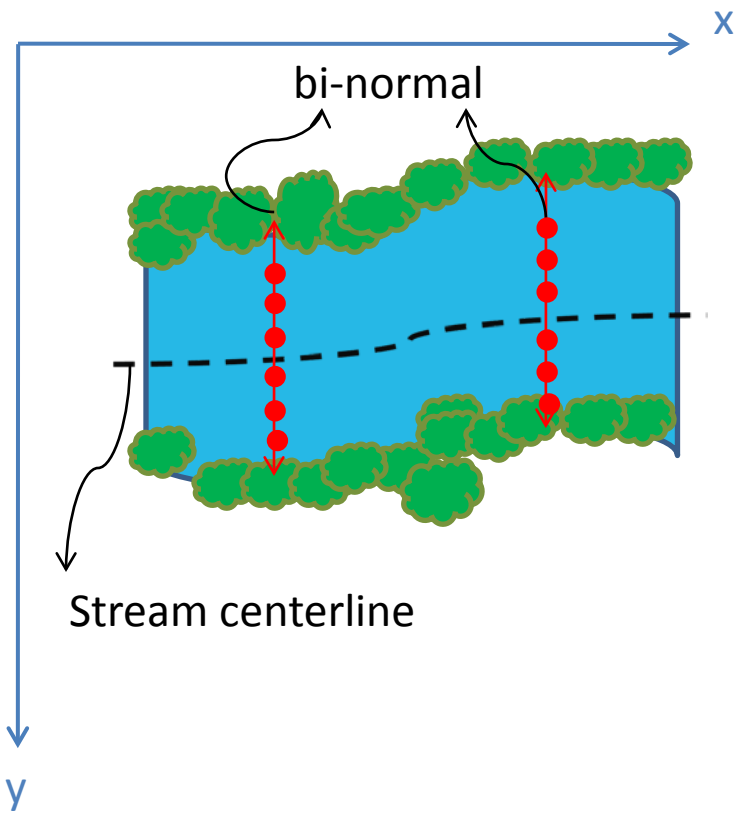
Searching for the right image

- Challenge: Reading entire county 1-m DOQQ and extracting pixel values
- Solution: Used 97 Quarter Quads (QQ) sequentially
- Operation: Extent of each QQ used for searching image under sample points



Finding Stream Banks

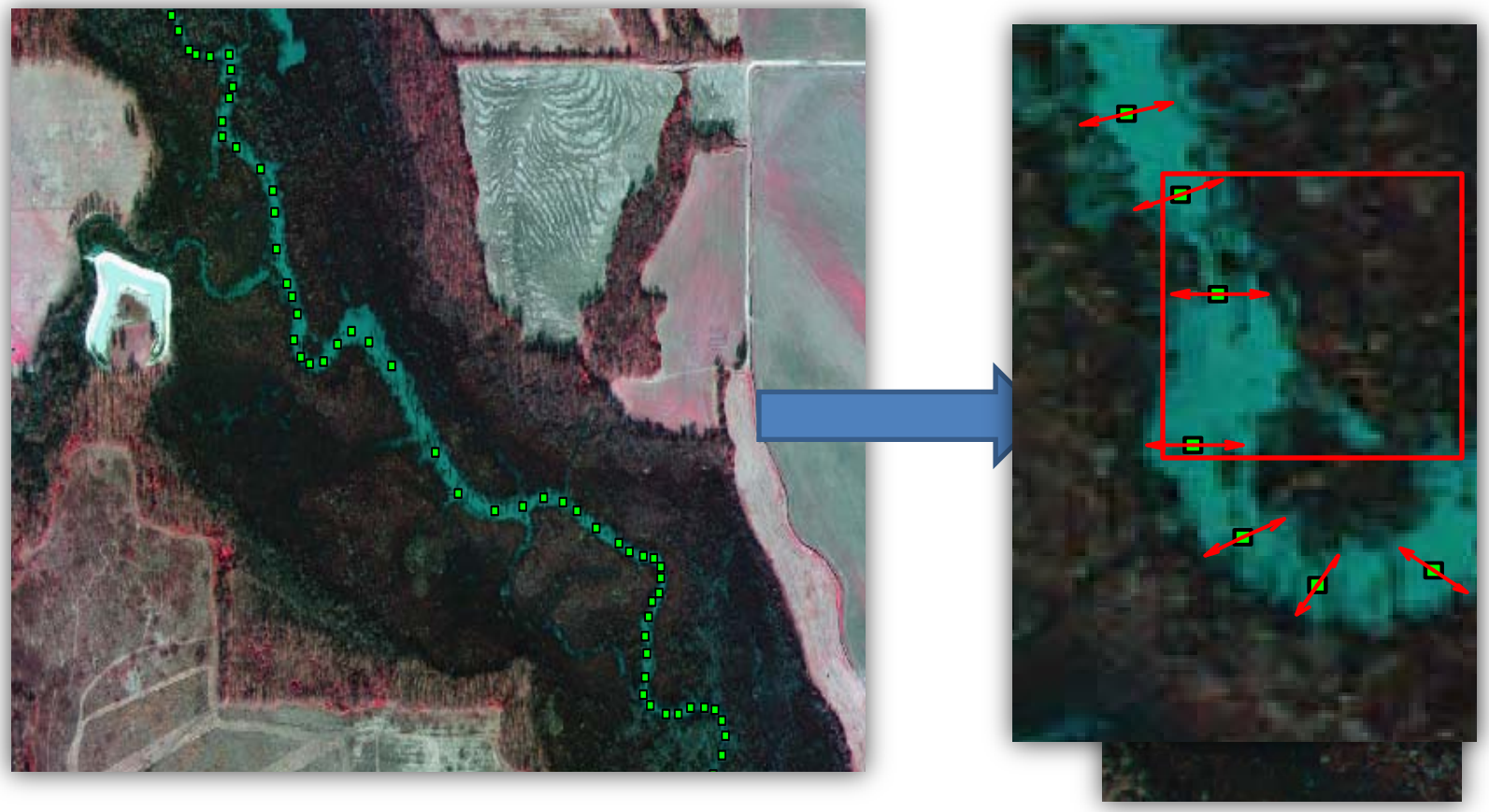
- Identify perpendiculars to the stream
- Extract pixel values along perpendiculars
- Identify stream banks using edge detection concept



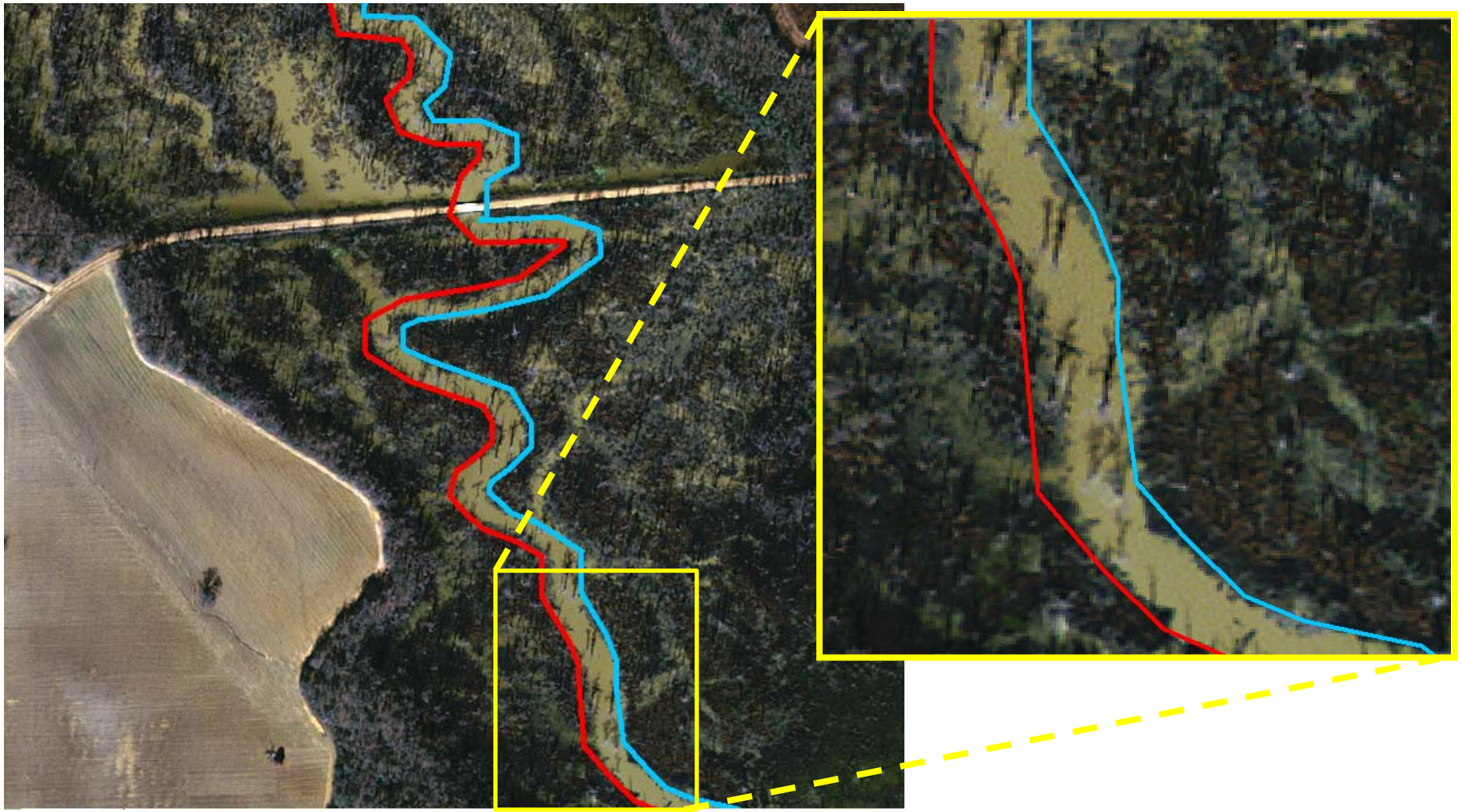
Results –Perpendiculars

sampled stream centerline

identified perpendiculars

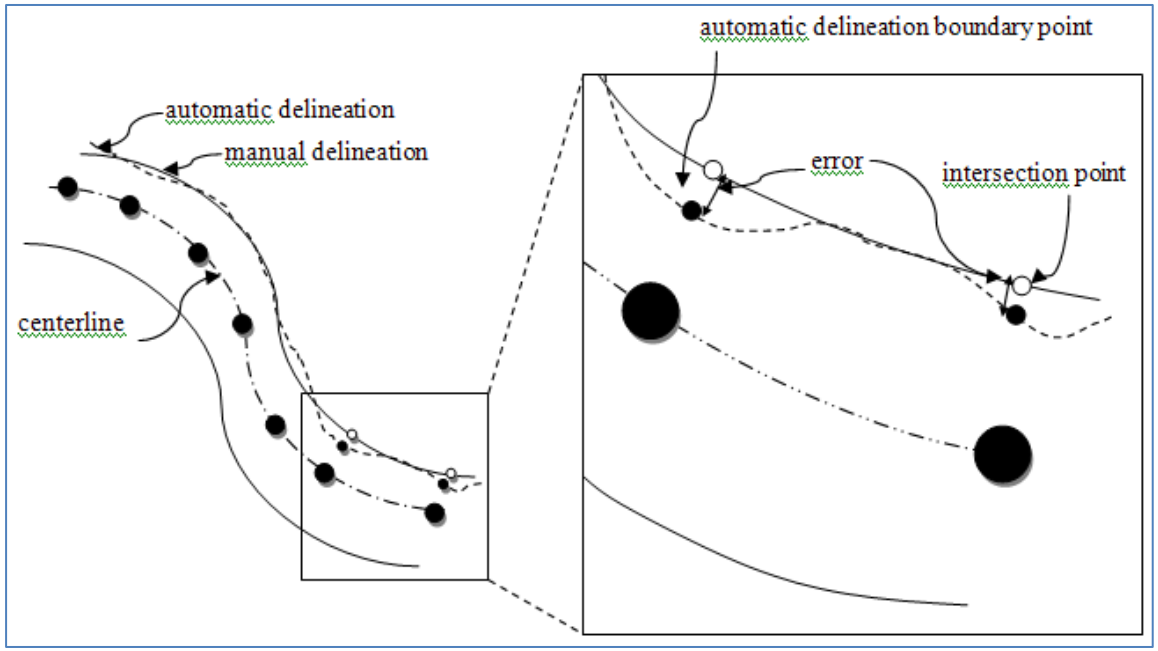


Results -Stream Boundary Delineation



Error Analysis

How much error can we expect from this method?



Compare with manually delineated streams in GIS

✓Mean error of 2.55 m (RMSE 3.41 m)

Results – Vegetation Composition

Stream Bank Stream Centerline

	First Creek		Second Creek		Bushy Creek		Larkin Creek		L'Anguille River	
	SB	SC	SB	SC	SB	SC	SB	SC	SB	SC
Urban (%)	1.1	1.2	1.9	1.8	1.9	2.9	1.2	1.8	1.4	6.6
Water (%)	0.7	0.8	1.7	2.0	8.8	9.1	0.3	2.0	6.6	34.3
Crops (%)	52.2	47.1	32.3	31.6	46.5	40.3	32.8	31.6	8.2	24.9
Forest (%)	45.1	49.7	63.3	64.1	41.5	46.2	63.1	64.1	83.0	32.3
Grass (%)	0.7	1.2	0.6	0.5	1.1	1.5	2.4	0.5	0.6	1.9

✓ **Lower water pixels inventoried**

✓ **Higher accuracy of riparian inventory**

Summary

- ✓ Algorithm developed to delineate stream banks: mean error 2.55 m (RMSE 3.41 m)
- ✓ Riparian inventory shows >32% cropland acreage adjacent to tributaries
- ✓ Lower water pixels inventoried resulted in higher accuracy of riparian inventory

Acknowledgements

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