Agriculture Water Conservation

Role of Farm Ponds in Basin Runoff and Farm Water Security

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http://www.nespal.org/SIRP

Reliability of Farm Water Supply

- Reason for the study

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Assessment of Farm Ponds

- **Rationale:**
  - Recognizing its importance for current and its potential for future water supply for irrigation, we began a study of on-farm ponds.
  - That has proven to be good start on the State Plan's Assessment of surface water supply stored in its numerous small constructed and natural ponds.

- **Objectives:**
  - Determine quantity and their hydrologic significance
  - Determine their use and utility for irrigation supply
  - Influence on stream flow
  - Explore the potential for regional reservoirs

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Reliability of Farm Water Supply

- Situation re farm pond use

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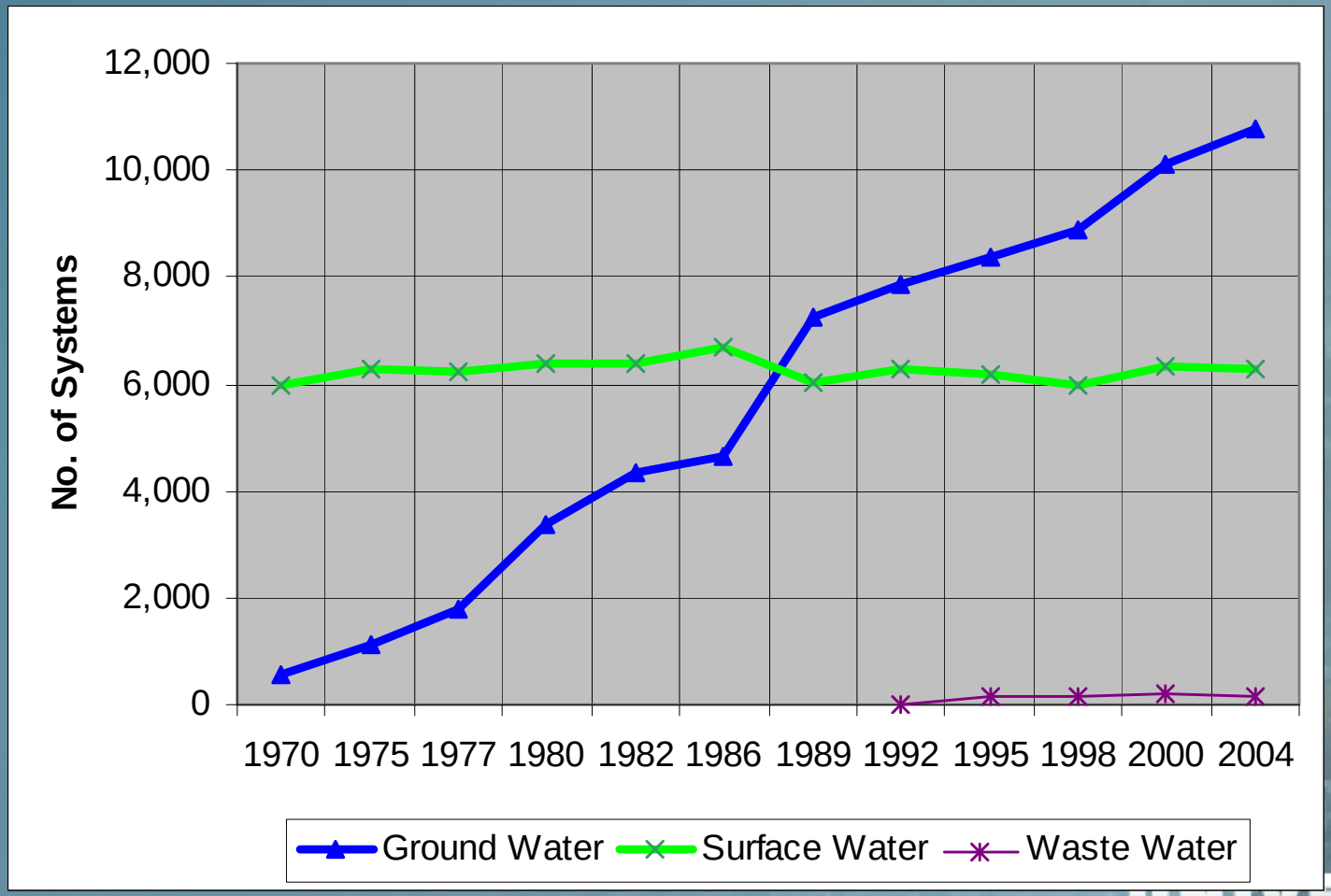
Ga Irrigation Trends – CES Surveys
Water Sources



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Reliability of Farm Water Supply

- Playing into state water objectives

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Water Supply Assessments: Ponds

- **State Water Plan**
  - Passed Georgia General Assembly in 2008
  - Plan developed 2005-2007
  - Foundation in HB237 of 2003
- **Assessment of Water Resources & Demands**
  - First of four strategic steps

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Reliability of Farm Water Supply

- Region of interest

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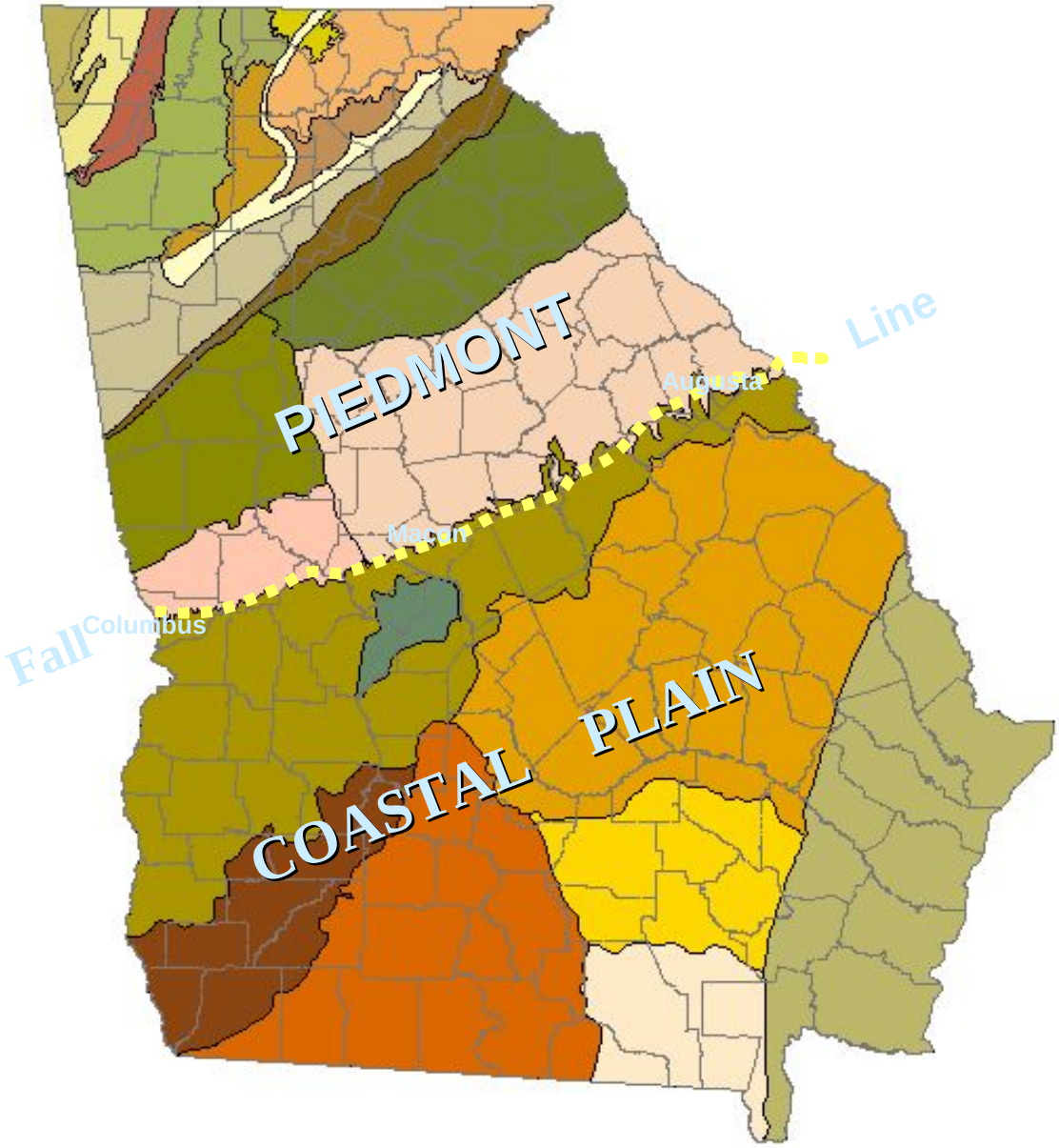
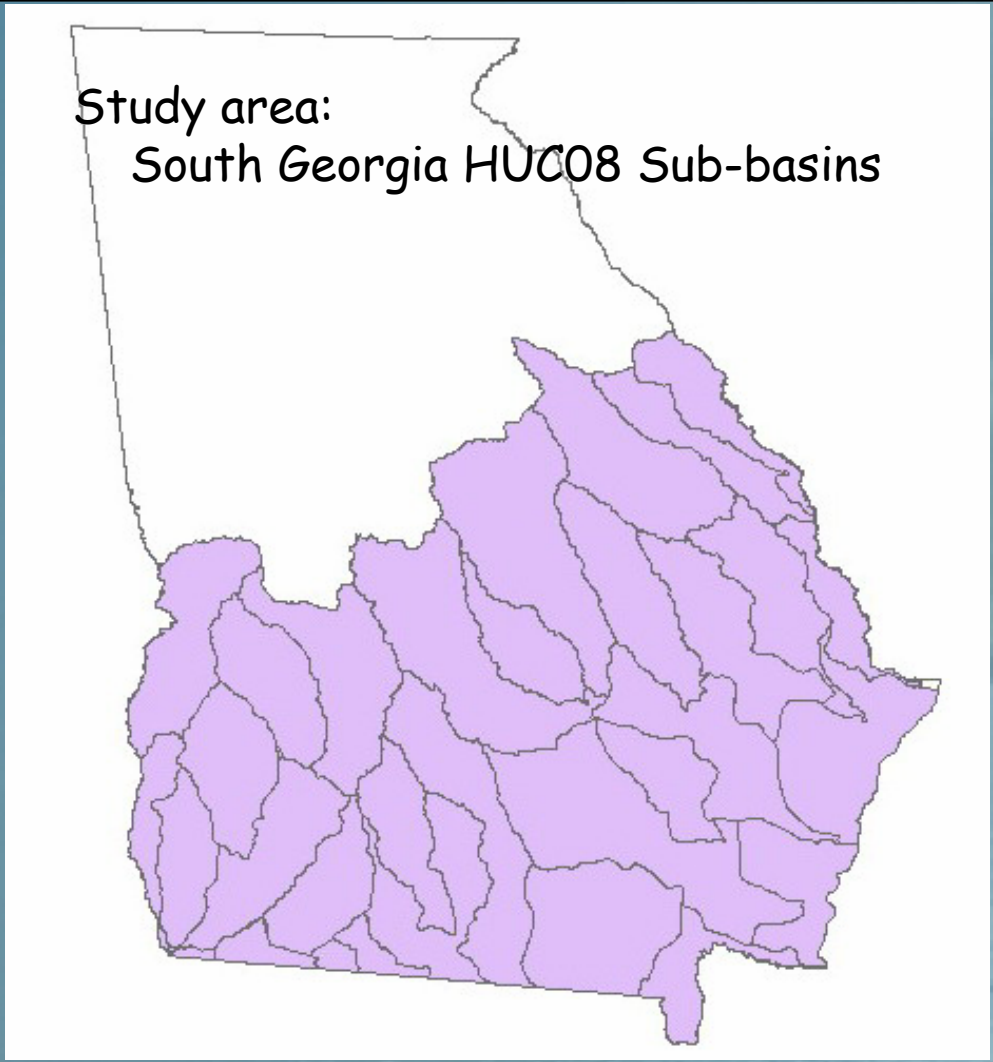

PIEDMONT
COASTAL PLAIN
Fall Line
Augusta
Macon
Columbus

Assessment of Farm Ponds

Quantity and their hydrologic significance



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Reliability of Farm Water Supply

- Approach
  - Explore existing data sets of farm ponds
  - Examine randomly selected ponds for more thorough analysis

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Assessment of Farm Ponds

Quantity and their hydrologic significance

- A.) Existing information
  - USGS NHD+ 2006 Flowlines & Waterbodies

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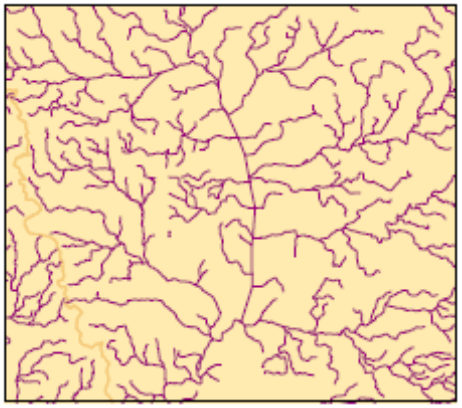
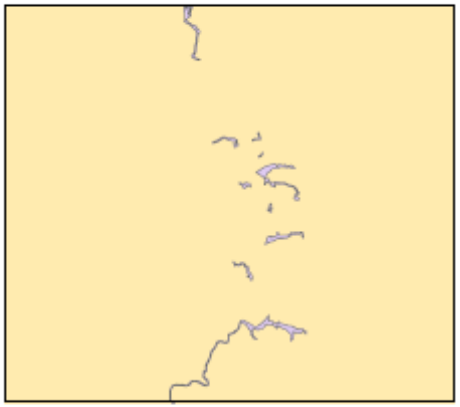
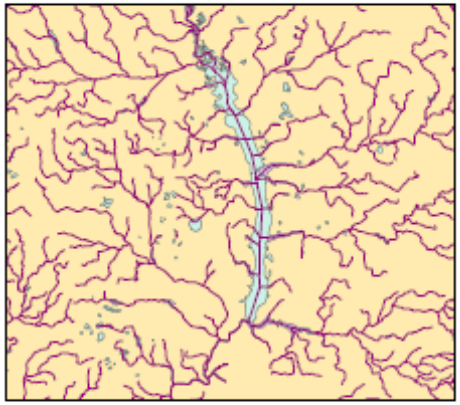


NHD Flowline

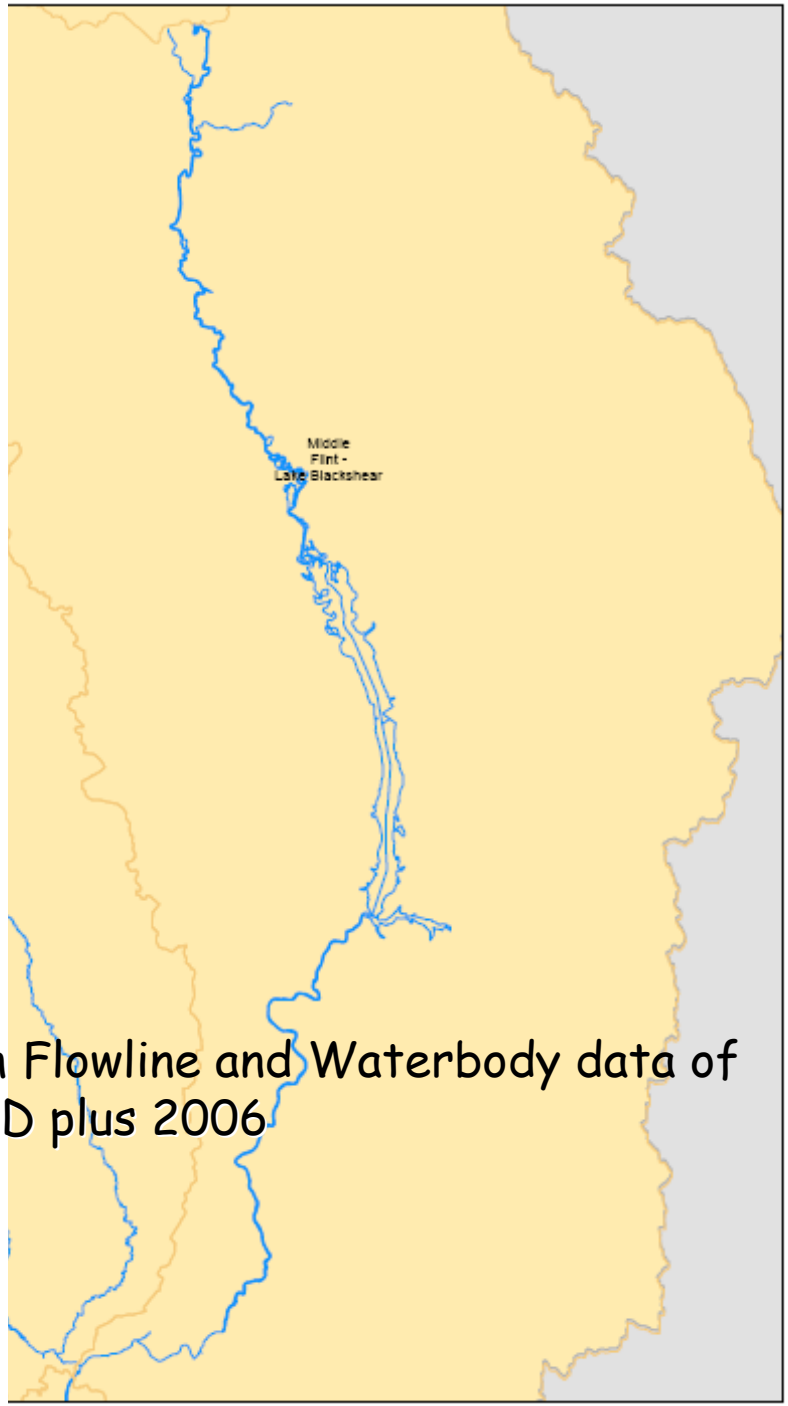
NHD Waterbody



NHD Area



Flowline, Area and Waterbody



Used both Flowline and Waterbody data of USGS NHD plus 2006

Reliability of Farm Water Supply

- Learned from NHD Data

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Assessment of Farm Ponds

Quantity and their hydrologic significance

- A.) Existing information
  - USGS NHD+ 2006 Waterbodies So. Ga. HUC08's
    - Ponds/Lakes – Manmade – 7,900 (0.001 to 26 km2)
    - Median – 0.033 km2; mean – 0.073 km2 (18 ac)
    - Total area ponds & lakes – 576 km2 (142,300 ac)

    - Swamps/Marshes – 3676 (0.001 to 1477 km2)
    - Median – 0.38 km2; mean – 2.2 km2 (544 ac)
    - Total area swamps/marshes – 8223 km2 (2,032,000 ac)

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Assessment of Farm Ponds

Quantity and their hydrologic significance

- A.) Existing information
  - USGS & Ga 2003 Waterbodies So. Ga. HUC08's

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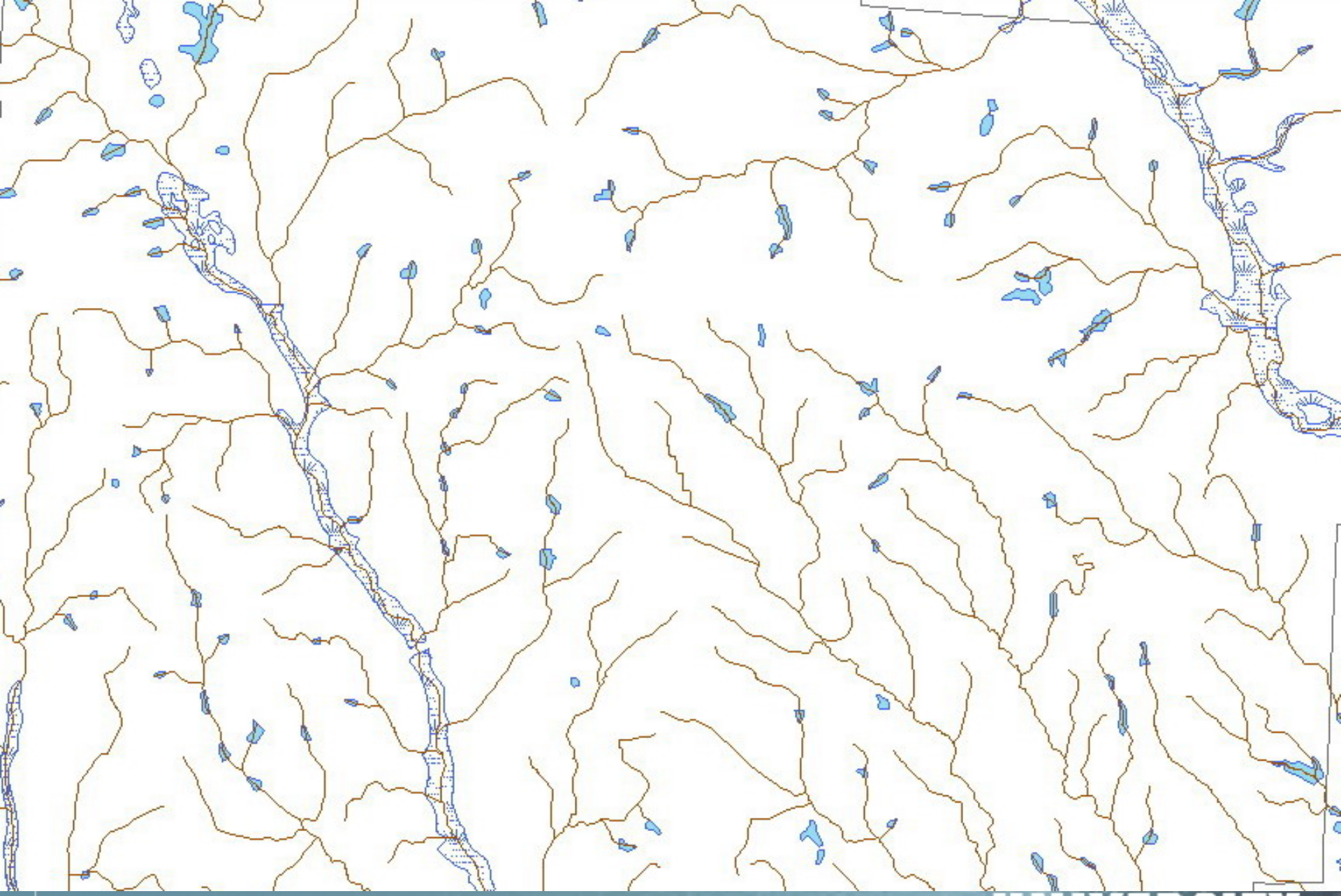

USGS NHD+ 2006 Waterbodies

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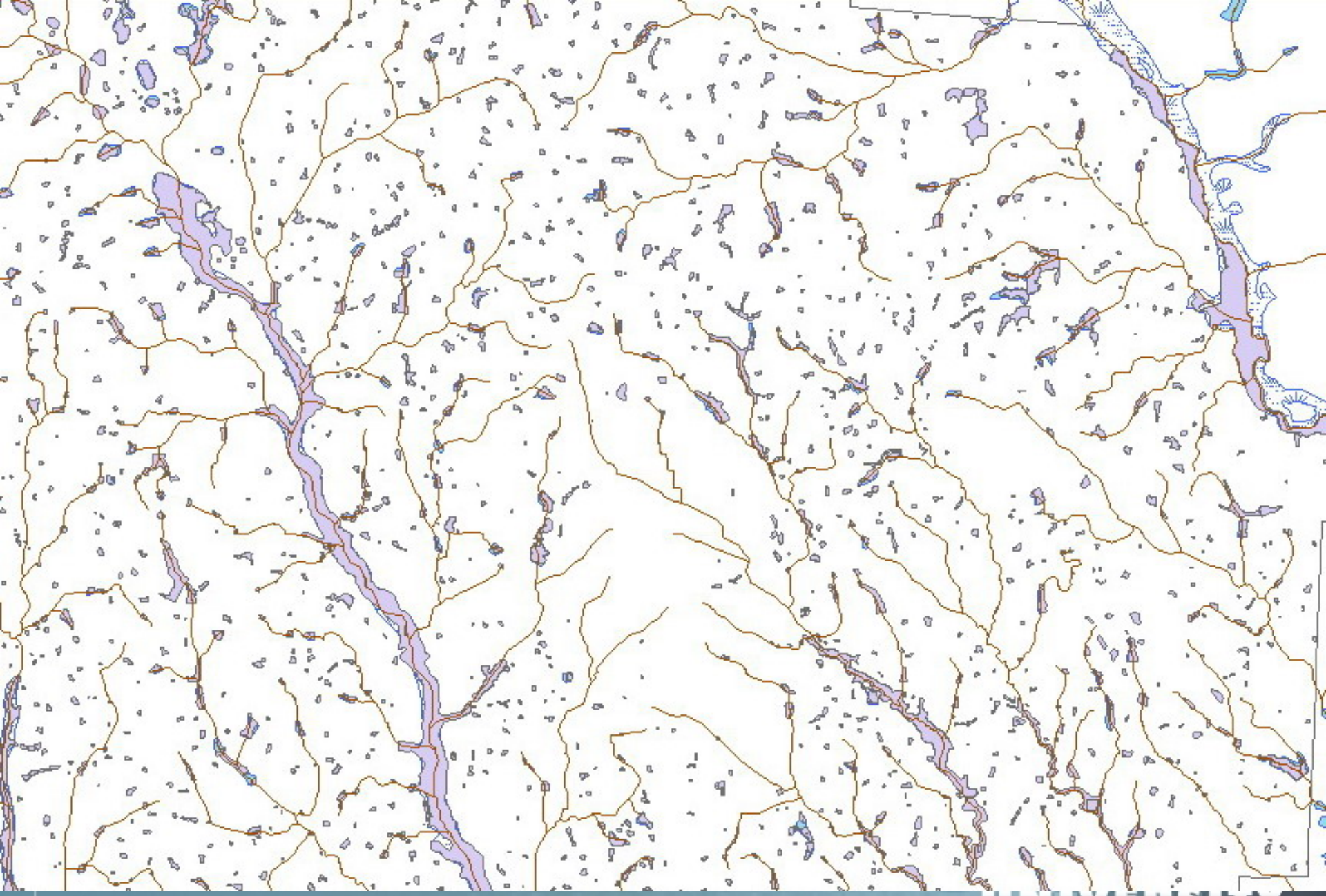

USGS & Ga 2003 Waterbodies

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Reliability of Farm Water Supply

- Learned from NHD – GA pond Data

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Assessment of Farm Ponds

Quantity and their hydrologic significance

- A.) Existing information
  - USGS & Ga 2003 Waterbodies So. Ga. HUC08's
    - Ponds/Lakes – Manmade – 80,760 (0.001 to 8615 ac)
    - Median – 1.2 ac; mean - 3.4 ac
    - Total area ponds & lakes – 276,000 ac

    - Swamps/Marshes – 89,059 (0.001 to 112,645 ac)
    - Median – 3.97 ac; mean - 30.4 ac
    - Total area swamps/marshes – 2,708,000 ac

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Reliability of Farm Water Supply

- Transects
  - Currently completed 49 transects intersecting 104 ponds (02/01/08)
  - Views comparing ponds

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SCREVEN 100_1

NHD_PONDS
Selected_REDRAWN_POND
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

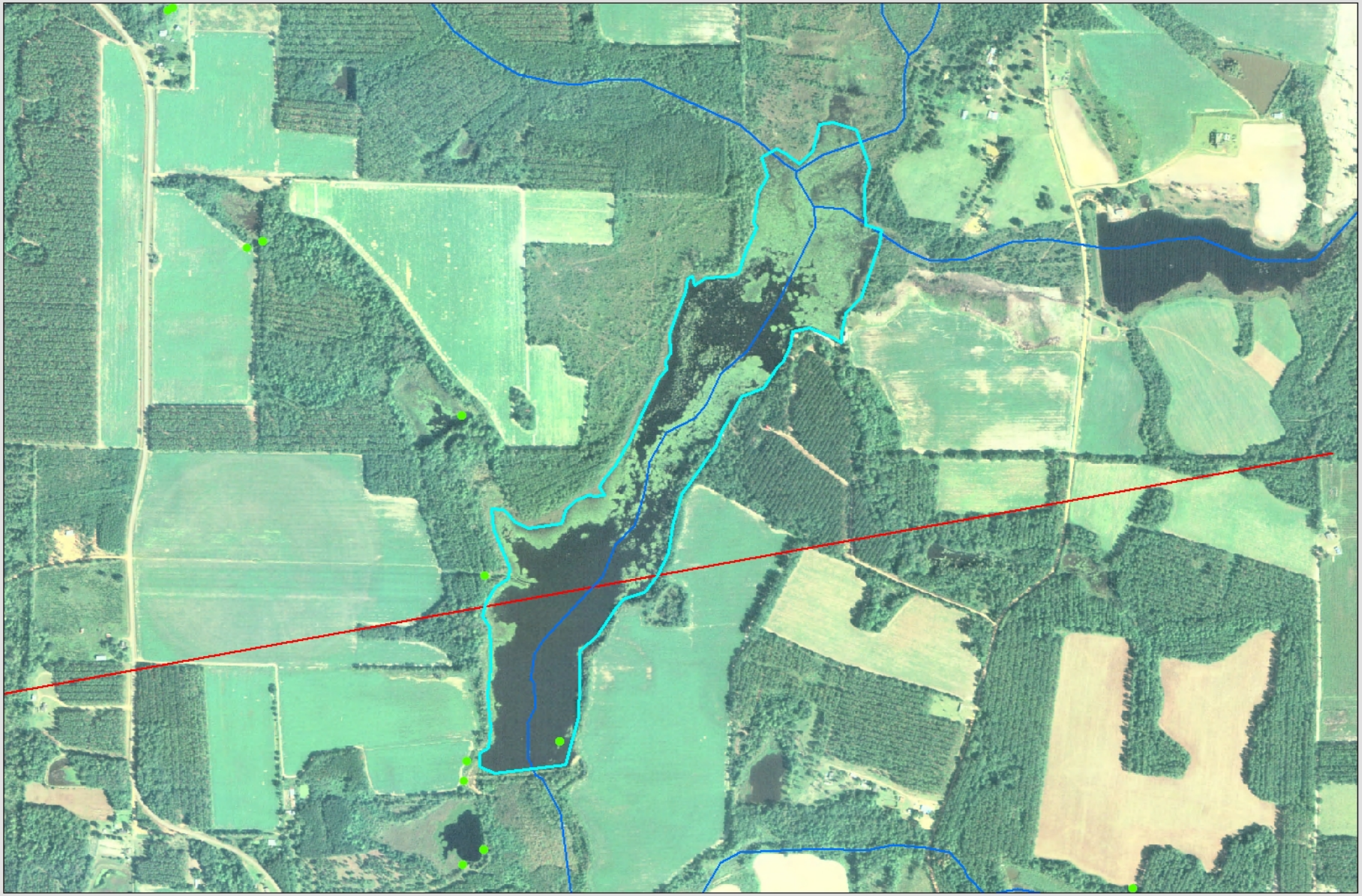
1:9,000

SCREVEN 96_1

NHD_PONDS
Selected_REDRAWN_POND
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

COFFEE 76_1



NHD_PONDS
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REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

JOHNSON 71_2

NHD_PONDS
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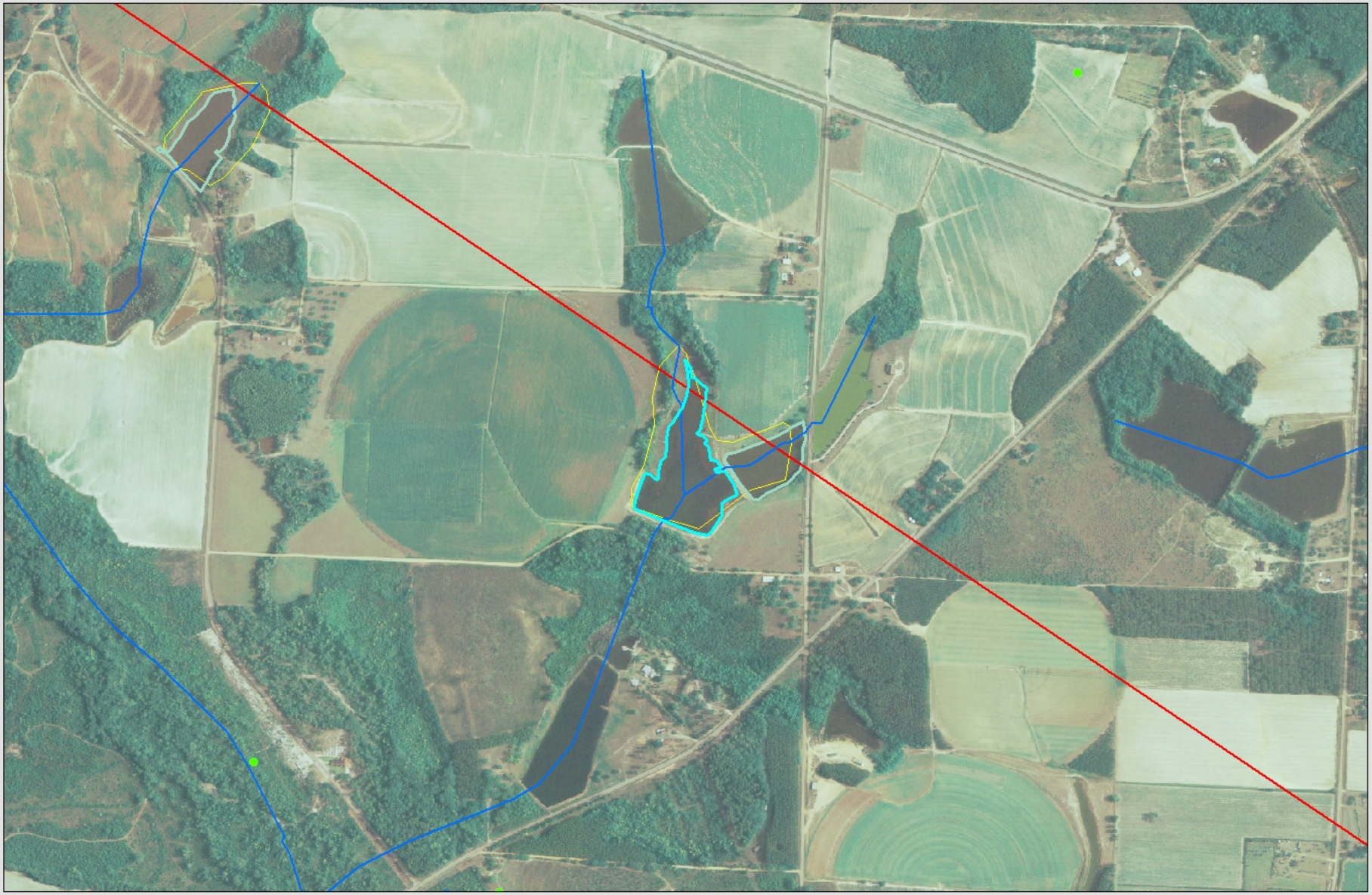
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

IRWIN 64_5



NHD_PONDS
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REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

MARION 37_1

NHD_PONDS
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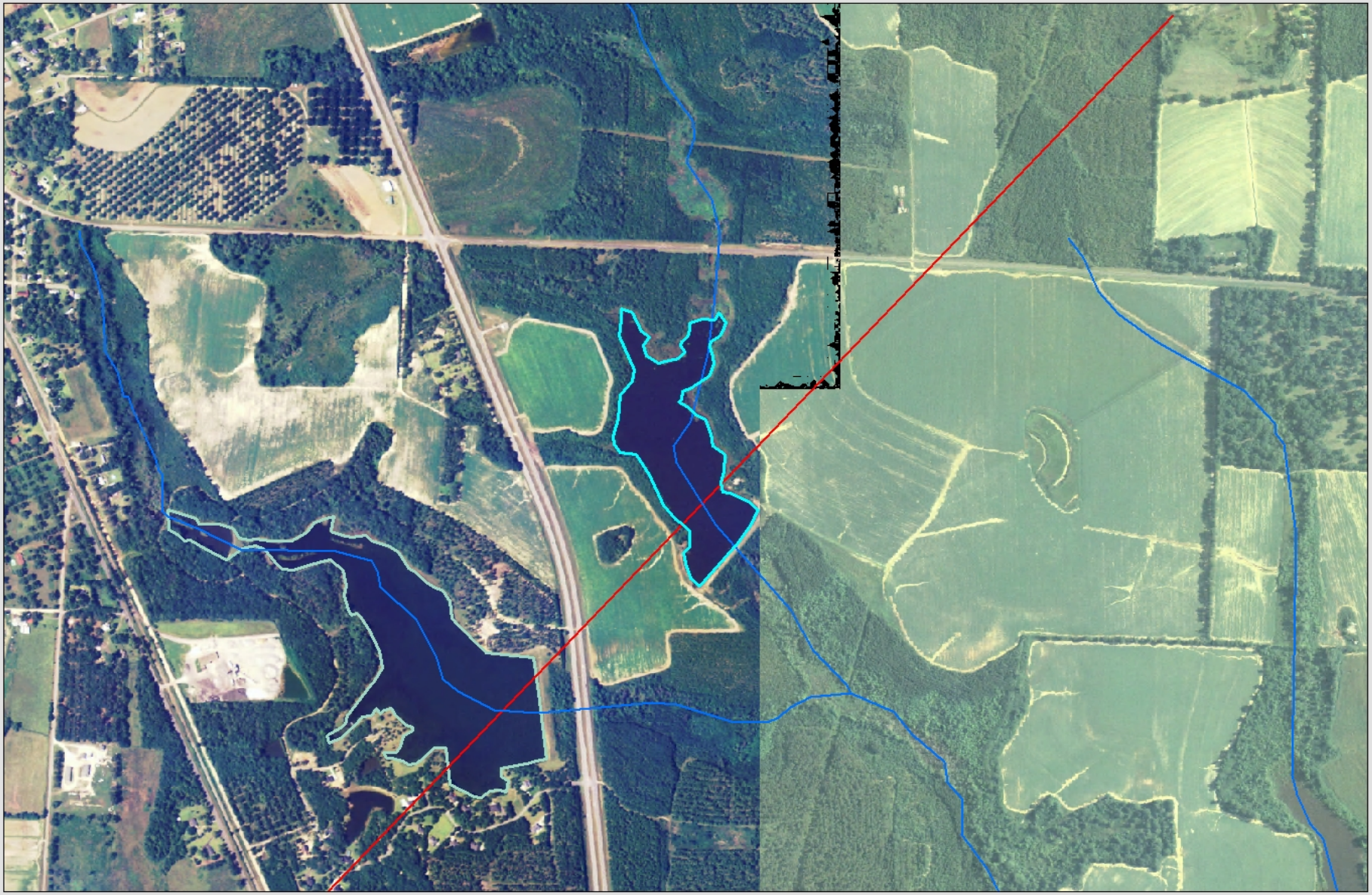
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

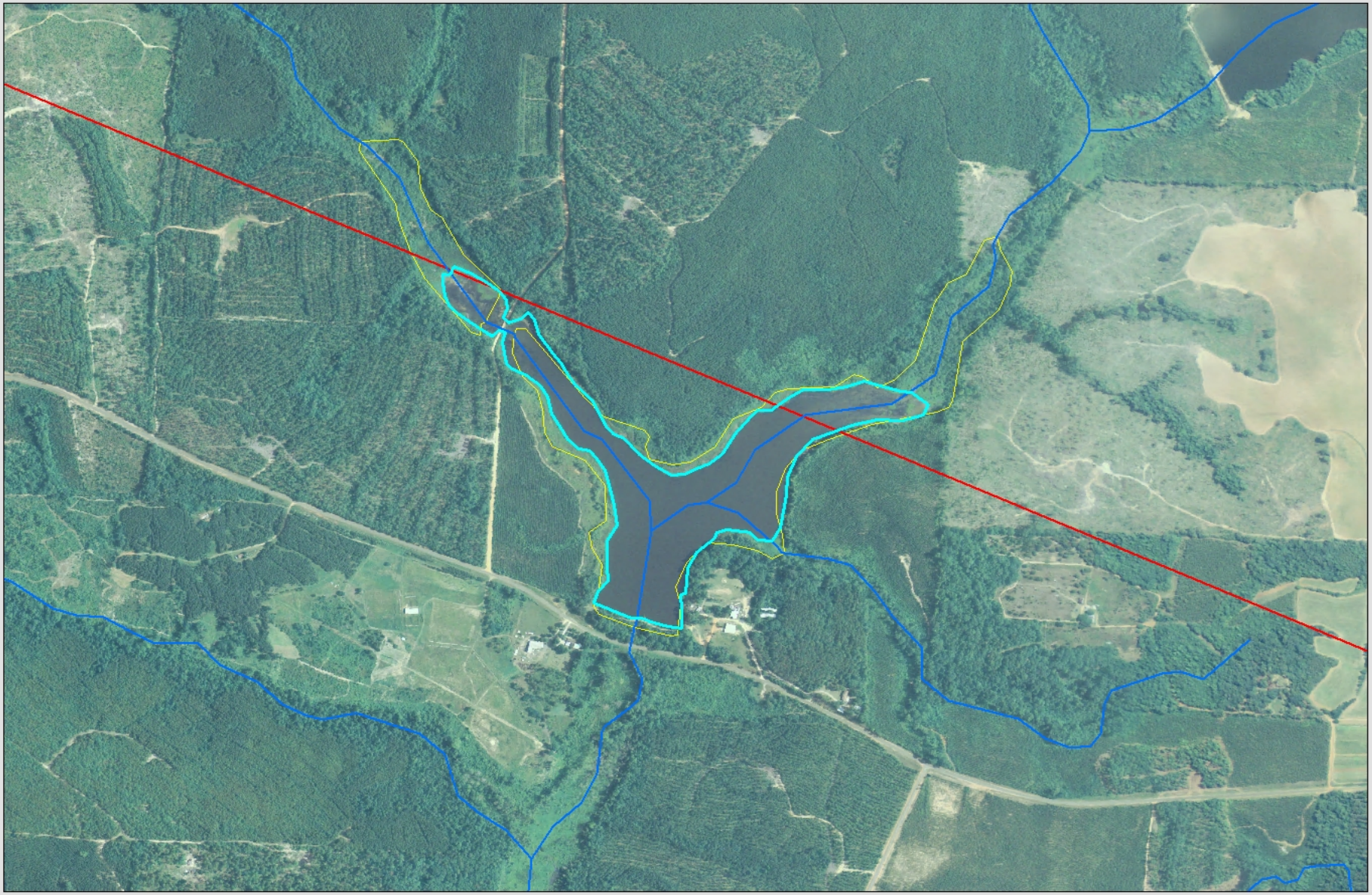
THOMAS 36_6



NHD_PONDS
Selected_REDRAWN_POND
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

SUMTER 28_1



NHD_PONDS
Selected_REDRAWN_POND
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

WORTH 3_3

NHD_PONDS
Selected_REDRAWN_POND
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

IRWIN 64_2

NHD_PONDS
Selected_REDRAWN_POND
REDRAWN_PONDS
NHD_FLOWLINE
TRANSECT_LINES
G PERMIT
S PERMIT

1:9,000

Reliability of Farm Water Supply

- Transects
  - Currently completed 49 transects intersecting 104 ponds (02/01/08)
  - Data results:
  - 65% of visible ponds not mapped in NHD
    - 1.5 fold increase not 10-fold as suggested in NHD-GA data
  - Average visible area mapped was 21 ac vs 27 acres for same ponds
  - Average size of all visible ponds was 13 ac

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Reliability of Farm Water Supply

- Transects
  - Character of location re stream order

  - 38% on upland or unmapped ephemeral streams
  - 0% on mapped ephemeral
  - 50% on 1st order streams
  - 3% of 2nd order streams
  - 10% on 3rd or higher order

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Reliability of Farm Water Supply

- Transects
  - Pond Clusters: distance to upstream and downstream ponds
    - 42% had nearby upstream pond
    - 30% had nearby downstream pond

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Reliability of Farm Water Supply

- Transects
  - Character of use: proximity to farms, permitted sources
  - 61% immediately adjacent to farmland
  - 14 of 104 ponds already had permitted surface water withdrawals (23 permits)
  - 1 was adjacent to golf course; 7 had docks for boating or fishing

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Reliability of Farm Water Supply

- Quantity of stored water
  - Assume ratio of mapped to unmapped NHD and relative sizes, there are
    - 11,850 man-made ponds in South Georgia having average area of 9 ac
    - At average depth of only 5 ft these store 530,000 ac-ft
  - Relative to irrigation in Georgia
    - With a typical to high annual consumption of 1 ac-ft/ac, this would supply 1/3 to ½ of all irrigated acreage in Georgia without in-season resupply

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Reliability of Farm Water Supply

- Capability of average sized ponds for center pivots
  - An average sized center pivot in Georgia is 100 ac
  - To supply 1 acre-ft/year, a pond would have to provide 100 acre-ft.
  - Without in-season refill this is a 10 acre pond with and average depth of 10 ft
  - This is more than twice the capacity of average ponds measured thus far
  - Considerable cleanout and expansion needed for more dependable pivot supplies

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Reliability of Farm Water Supply

- **Conclusions**
  - Existing and refined GIS data show that man-made ponds are numerous and widespread.
  - Many are too small or too remote from farm fields to serve as reliable irrigation supplies.
  - Expansion and cleanout efforts on existing ponds could substantially increase water security for irrigated farmers and lower dependence on groundwater

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Reliability of Farm Water Supply

- **Recommendations**
  - Multi-agency and farmer assessment of pond data and pond design to address ways to improve existing pond sites for irrigation water supplies.
  - Assessment of pond location and pond use on flows downstream in the region's watersheds.
  - Assessment of farm ponds on species and habitats in South Georgia

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