



Florida Department of Environmental Protection
Aquatic Ecology and Quality Assurance

Hydrologic Modification Characterization DEP SOP FT 3101

March 31, 2016





History

- The hydrologic modification score was collected by DEP biologists in the early 2000s
- Used as a factor in the human disturbance gradient for SCI and BioRecon development in mid-2000s
- Has not been frequently collected since then
- Added to statewide DEP SOPs in 2014
- Hydrologic modification is a key stressor for the macroinvertebrate community, provides information to supplement the landscape development intensity index (LDI)



FT 3101(2) – Gather Information

- Determine watershed extent for site
- Examine aerial photos and maps; as you drive to the site note the following in the surrounding watershed:
 - Draining and ditching
 - Water control structures
 - Percent impervious surfaces
 - Amount and intensity of consumptive use (residential, agricultural, commercial)
 - High water levels, evidence of scouring, level of base flow
 - Topographic alterations within watershed that adversely affect water delivery



Watershed Extent

- Assess the full watershed
- Readily available
 - WBID boundaries may work for small systems
 - USGS HUCs or other for larger
- Visual watershed (follow to high elevation)

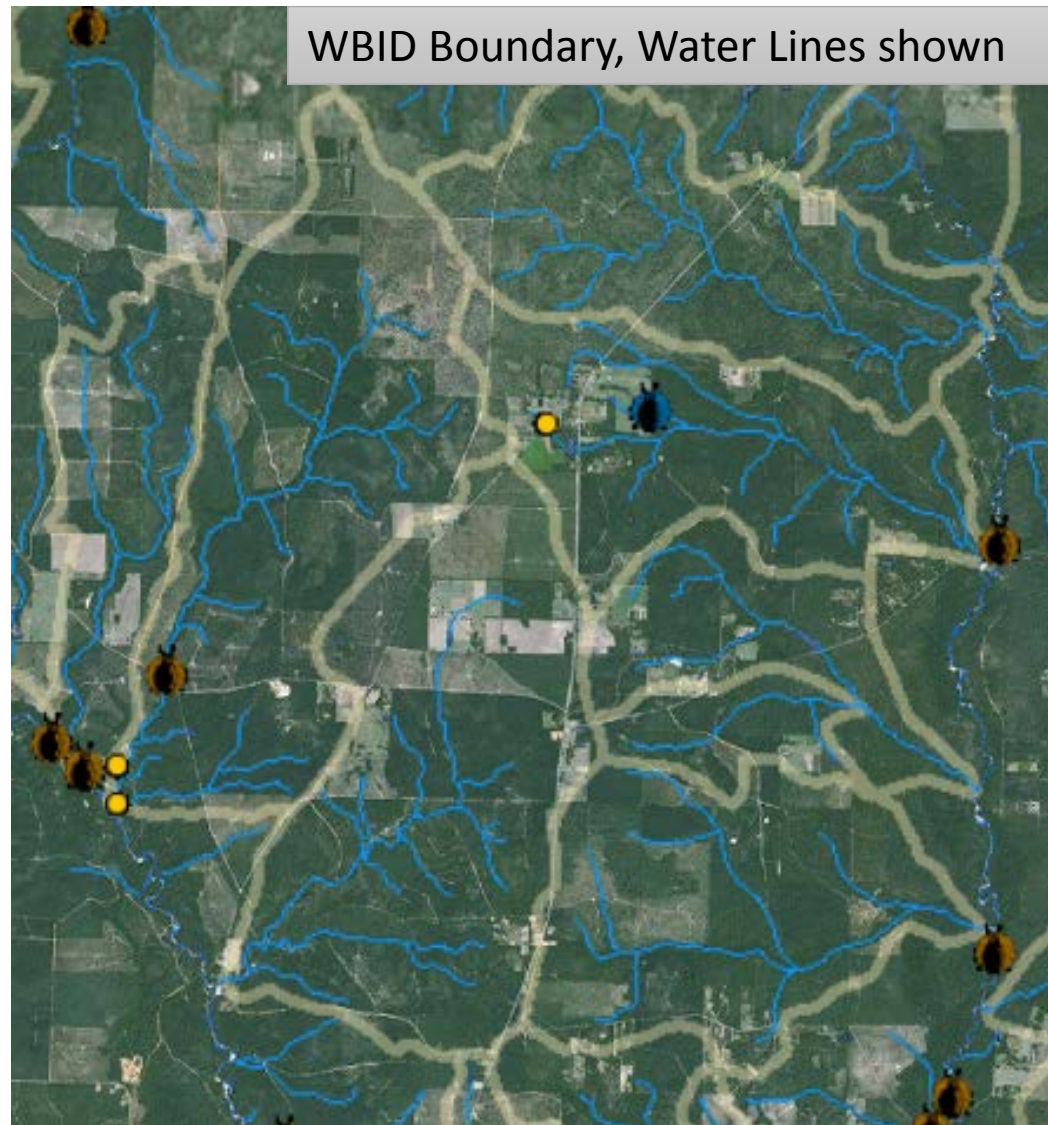


WBID Boundary, Water Lines, and Elevation Contours shown



Watershed Extent

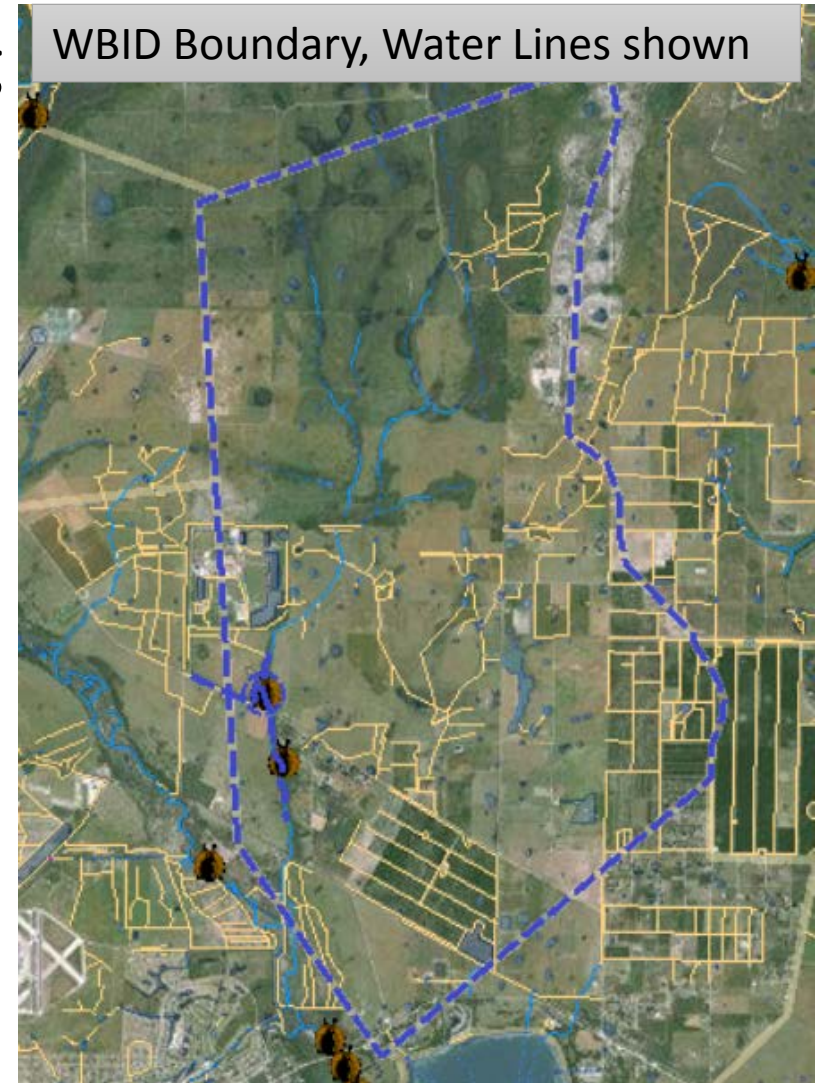
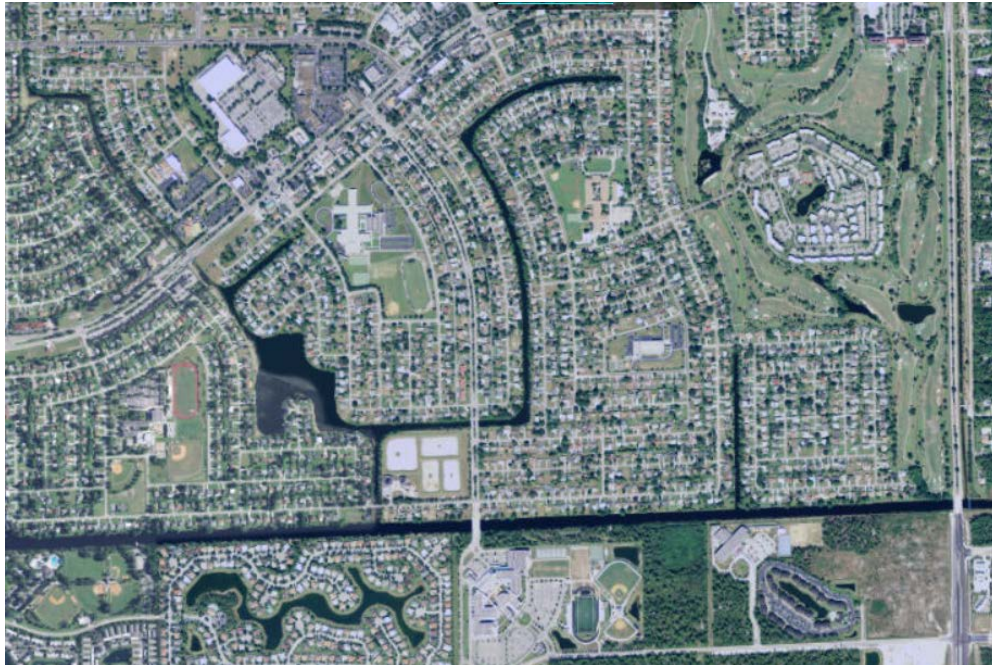
- Areas of the state with clear dendritic networks have clear watershed boundaries
- These WBIDs are watersheds





Draining and Ditching

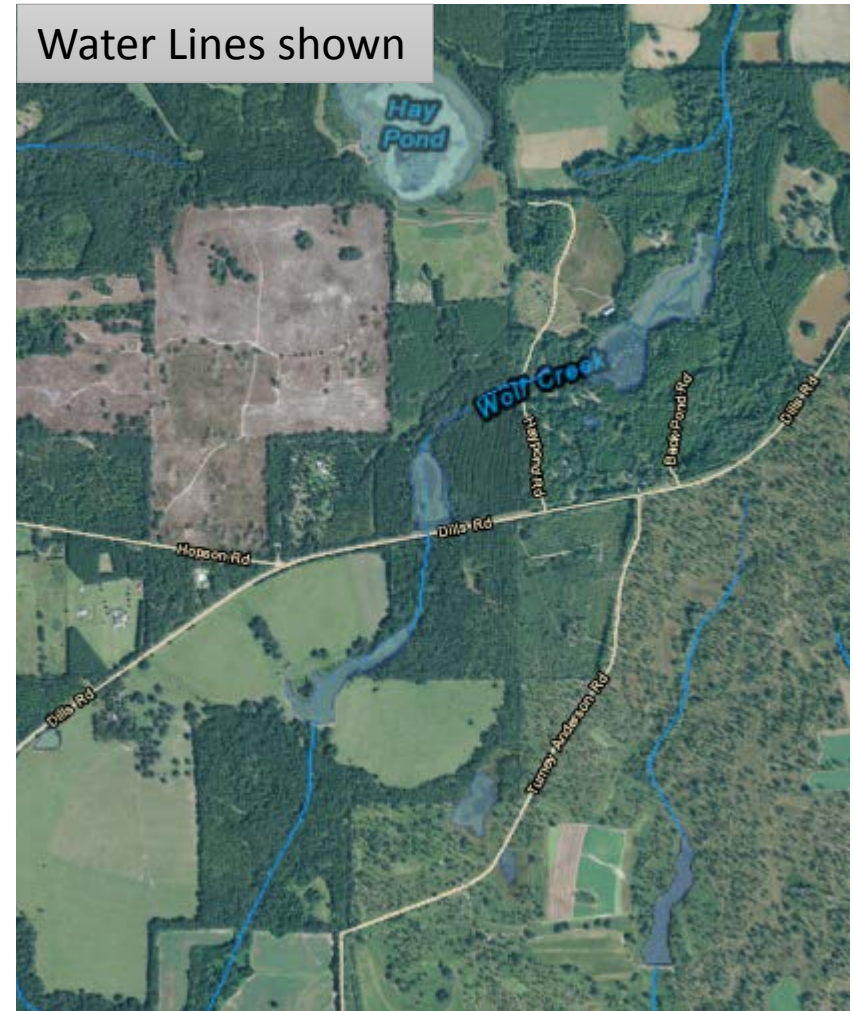
- Estimate the extent of draining and ditching in the watershed
 - Residential
 - Agricultural
 - Silvicultural





Water Control Structures

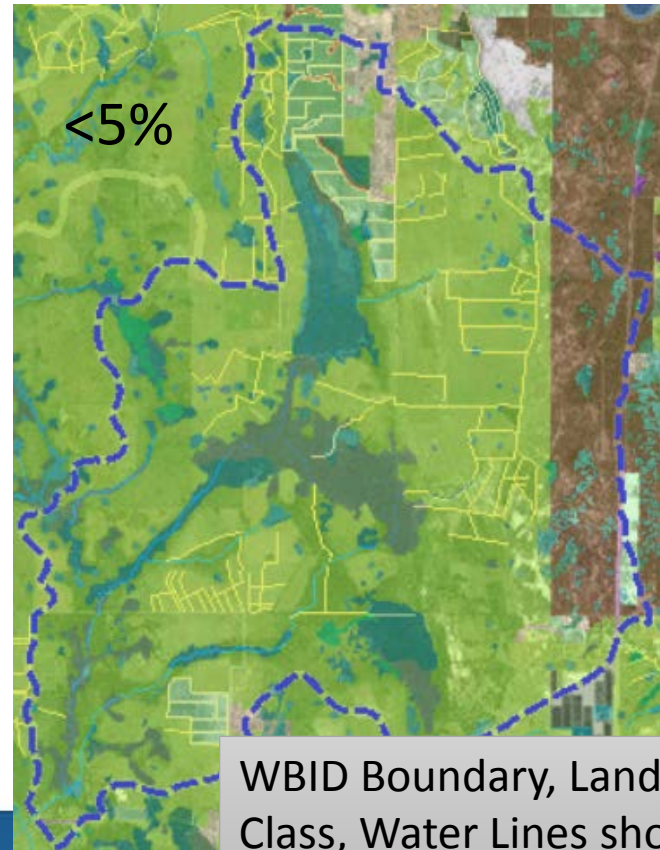
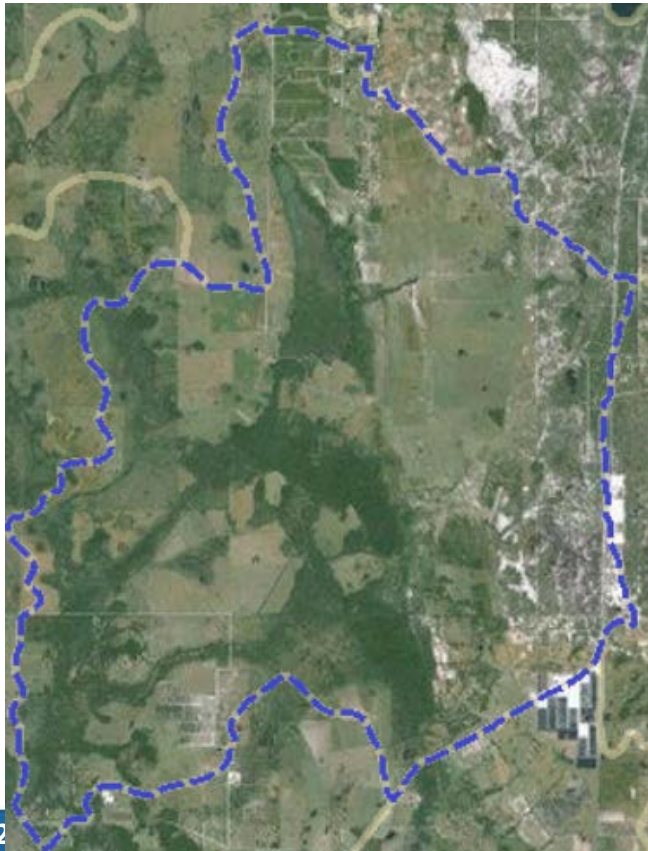
- Impoundments
- Weirs or structures





Impervious Surfaces

- Approximate percent impervious surfaces in watershed
 - Aerial photos
 - Land use maps
- Categories: <5%, 5-10%, 10-20%, 20-30%, >30%

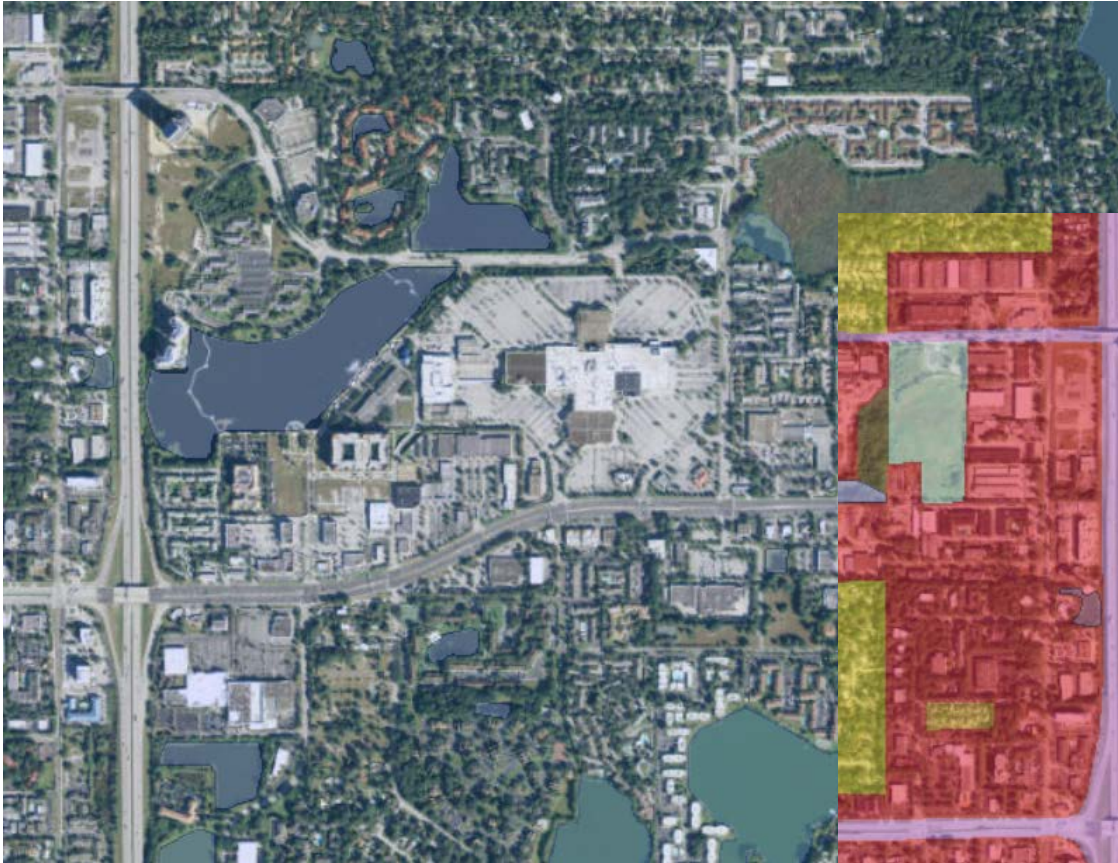


WBID Boundary, Land Use Class, Water Lines shown

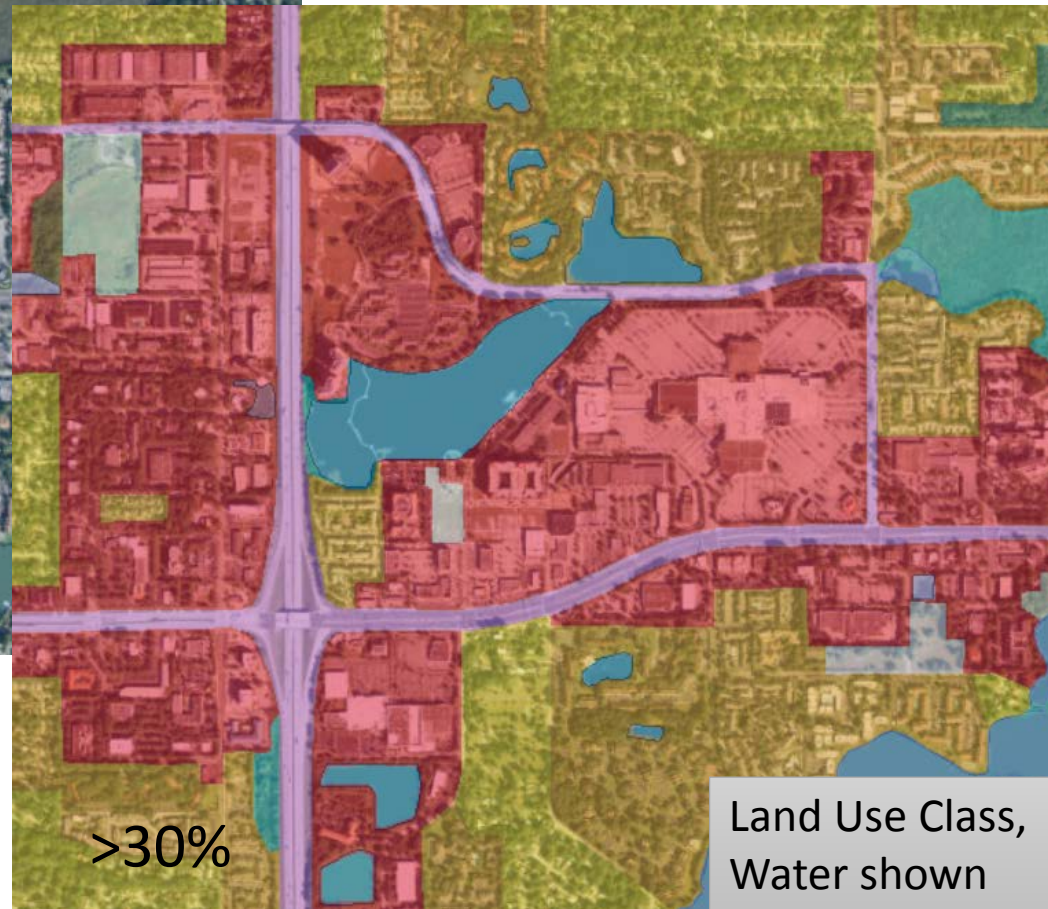


Impervious Surfaces

- Aerial photos
- Land use maps



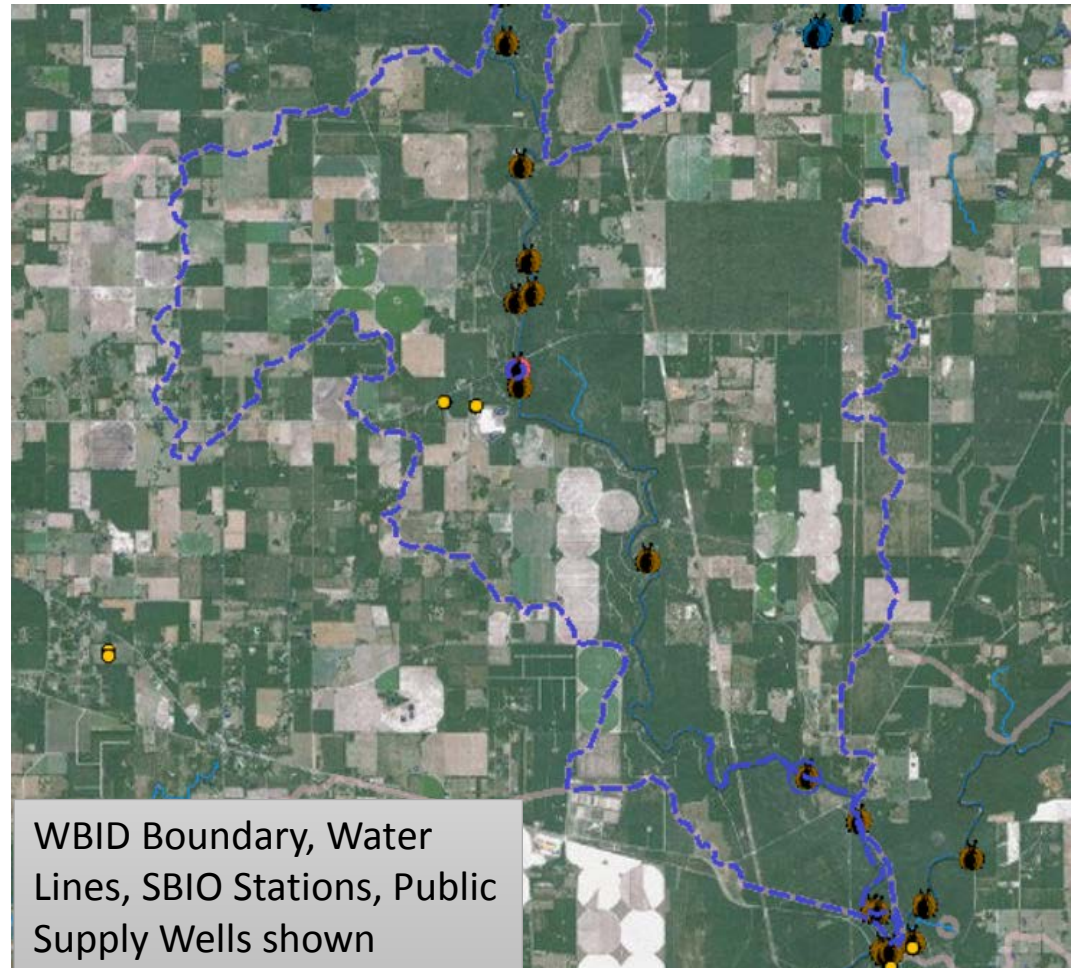
- Categories: <5%, 5-10%, 10-20%, 20-30%, >30%





Consumptive Use

- Estimate human water withdrawals in the watershed
- GIS layer for Public Supply Wells, but not agricultural.
- Look for other evidence of agricultural use (e.g., center pivots)



WBID Boundary, Water Lines, SBIO Stations, Public Supply Wells shown



Topographic Alterations

- Look for evidence of earth-moving changes within the watershed
- Artificial separation of watershed inputs from stream
- Can reduce base flow to stream





On-site Observations

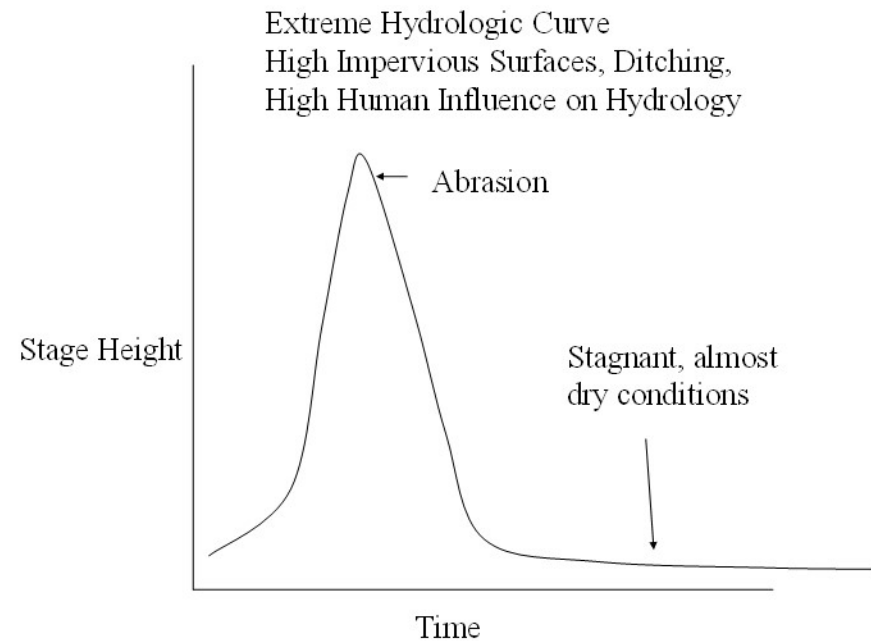
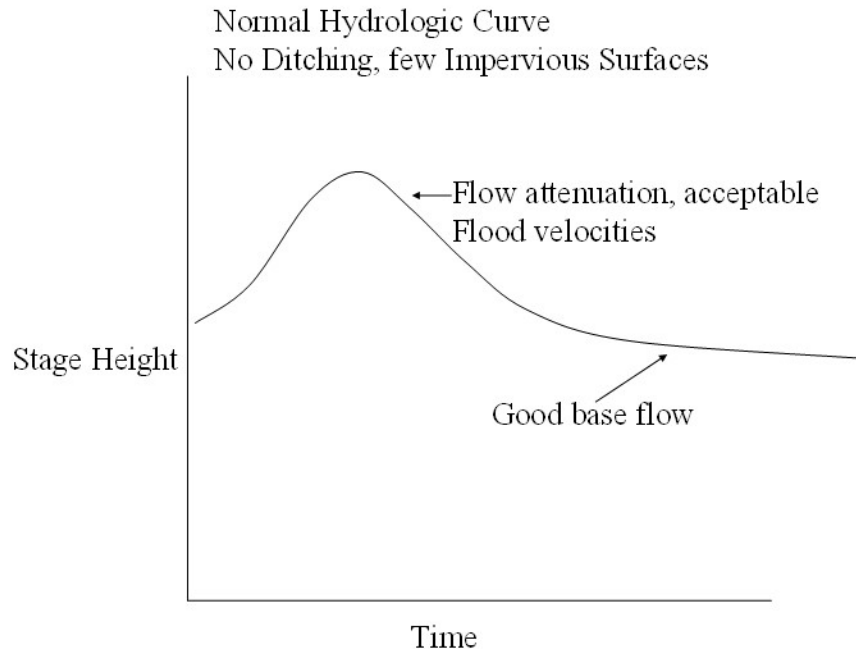
- Scouring can indicate a flashy hydrograph





Hydrologic Curves

- Stream hydrograph can indicate presence or absence of stable base flow and flashy responses to storm events
- Natural range in hydrographs, but human alteration creates extreme curve





FT 3101(3) – Assign Score

- Best (1-2 points): Flow regime as naturally occurs (slow and fairly continual release of water after rains), few impervious surfaces in watershed (<5%), high connectivity with ground water and surface features delivering water (e.g., sand hills, wetlands; no ditches, berms, other impediments)



FT 3101(3) – Assign Score cont'd

- Slight Disturbance (3-4 points): Flow regime minimally changed; hydrograph resembles normal hydrologic curve; some water withdrawals; some wetland drainage, some ditching, some impoundments; some impervious surfaces in watershed (5-<10%)



FT 3101(3) – Assign Score cont'd

- Moderately altered (5-6 points): Flow regime moderately altered; hydrograph moderately flashy (scouring after rain events with subsequent reductions in flow); groundwater pumping evident; much wetland drainage, topographic alterations reduce natural water input; more impervious surfaces throughout watershed (10-<20%), dams/control structures change normal water delivery schedule



FT 3101(3) – Assign Score cont'd

- Poor (7-8 points): Flow regime highly altered; hydrograph very flashy (scouring after rain events with subsequent reductions in flow, leading to stagnant or dry conditions, related to large amounts of impervious surfaces and/or ditching throughout watershed); water withdrawals & impoundments/control structures severely alter flows, large amounts of impervious surfaces (20- <30%)



FT 3101(3) – Assign Score cont'd

- Very Poor (9-10 points): Flow regime entirely human controlled; hydrograph very flashy (scouring after rain events with subsequent reductions in flow, leading to stagnant or dry conditions, related to impervious surfaces and ditching throughout watershed); water withdrawals and impoundments fundamentally alter the nature of the ecosystem; impervious surfaces $\geq 30\%$