Hydrology of the Florida Panther National Wildlife Refuge

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Project Staff

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Funding

- Critical Ecosystems Studies Initiative (NPS)
- Priority Ecosystems Science (USGS)
Project Assistance

• Chris Reich and Don Hickey, USGS – Drilling and well construction
• B. J. Reynolds, USGS - GPS Survey
• Rick Solis and Liz Hittle - Surface Water measurements
• Dr. Mark Grasmueck – UM/RSMAS – GPR work
• USGS staff – Transducer installation and monitoring
Summary

• Objectives of project
• Project Location
• Monitoring Stations
• Data Collection and Analysis
Objectives

• Inventory existing hydrologic data
• Design and install a hydrologic monitoring network
• Collect other hydrologic data as needed
• Evaluate historic and current data
Questions to be Answered

• How are water levels in the refuge affected by adjacent canals?
• What affect does geology have on water levels?
Location of Florida Panther National Wildlife Refuge
Predevelopment Conditions

- Water flowed from NE in the Okaloacoochee Slough and the east in the East Hinson Marsh towards Fakahatchee Strand to the south
Current Conditions

• 3 canals affect hydrology
  – SR29
    • Control structure at north end of refuge
    • Control structures south of I75
  – I75
    • Begins west of SR29
    • Flows to west
    • All flow in canal is discharge from ground water in refuge or surface water runoff
  – Merritt
    • Lucky Lake control structure about 0.75 miles south of I75
SR29 bridge with berm between canal and refuge
Current Conditions
Current Conditions

- Urban area (Golden Gate Estates North) located west of refuge
- Agriculture on north side of refuge
- New urban development on north side of refuge
Ground Water Monitoring Network

- Limited access to refuge restricts well placement
- Pairs of wells installed at 9 locations
- North-south transect to determine gradient to canal
- Shallow well completed above confining layer
Ground Water Monitoring Network

- Instrumentation – submersible pressure transducer
- Hourly water level readings
- Installed summer of 2006 – only some wells
- Additional transducers installed in 2007
- Transducers moved between sites as needed
- Surveyed to NAVD88 datum
Drilling Monitor Well
Sand Pack Around Screen
Cement Seal Outside of Casing
Monitor wells with protective sleeve to protect from fire and animals
Monitor well and reference mark
Well Instrumentation
GPS Survey
Monitoring Network

New monitor wells installed in FPNWR

Existing Big Cypress Monitoring Stations
September 2006 Water Level Data

Interior

Land Surface at Buffer

Water above land surface most of the period

Merritt Canal at Lucky Lake (HW)
Surface Water Measurements
Boundary Flows

• Inflow
  – SR29 bridges and culverts

• Outflow
  – I75 bridges and culverts
Canal Measuring Sites

- Merritt Canal
- Picayune Strand State Forest
- Fakahatchee Strand State Preserve
- Florida Panther National Wildlife Refuge
- SR29 Canal
- Big Cypress National Preserve
SR29 Bridge ADCP Measurement
SR29 culvert under road
I75 culverts
Doppler measurement
ADCP measurements

Culvert in I75 Canal
Merritt Canal Bridge and Plug
Merritt Canal Plug
south side of highway
Merritt Canal Flowing to the south over earthen dam (plug)

Note small waterfall flowing into canal

Earthen Plug in canal
Discharge overland flow
Discharge results
October 2006

• Inflow
  – SR29 bridge 26 cfs

• Outflow
  – I75 borrow canal 36 cfs
  – Merritt Canal at I75 67 cfs
Water Levels 2006

Interior

Land Surface at Buffer

Buffer Deep

Merritt Canal at Lucky Lake (HW)
Ground Penetrating Radar (GPR) Survey

Survey Crew:
Mark Grasmueck
David Viggiano

Survey dates:
Examination of the entire dataset yielded 9 different radar facies types:
Patchy = Mix of chaotic and transparent

dry palmetto brush

edge of clearing

Pond

toward the end of profile evidence of swampy area. Change in vegetation.

- Example where both vegetation and GPR show the sudden change of geologic and hydrologic properties in the subsurface over a distance of less than 50 m.
- The GPR pond signatures was common
- Often the vegetation on the surface has already changed while the subsurface reveals there were wetter conditions in the past.
swampy area

GPR profile

DSC01347.JPG: View to NW
Rock pinnacle and soil-filled pits in the epikarst
Conclusions

• Berm next to SR29 Canal helps to prevent drainage
• SR29 Canal generally not high enough to supply water to refuge
• Operations of Lucky Lake Structure on Merritt Canal has major effect on water levels in refuge
• Modifications to plug in Merritt Canal could help maintain higher water levels in refuge
Conclusions

• There appears to be no geologic confinement allowing for ponding of surface water in the refuge
• Epikarst features provide connection through low permeability rocks
• What will be the impact of the Picayune Strand restoration on the refuge?
Questions???