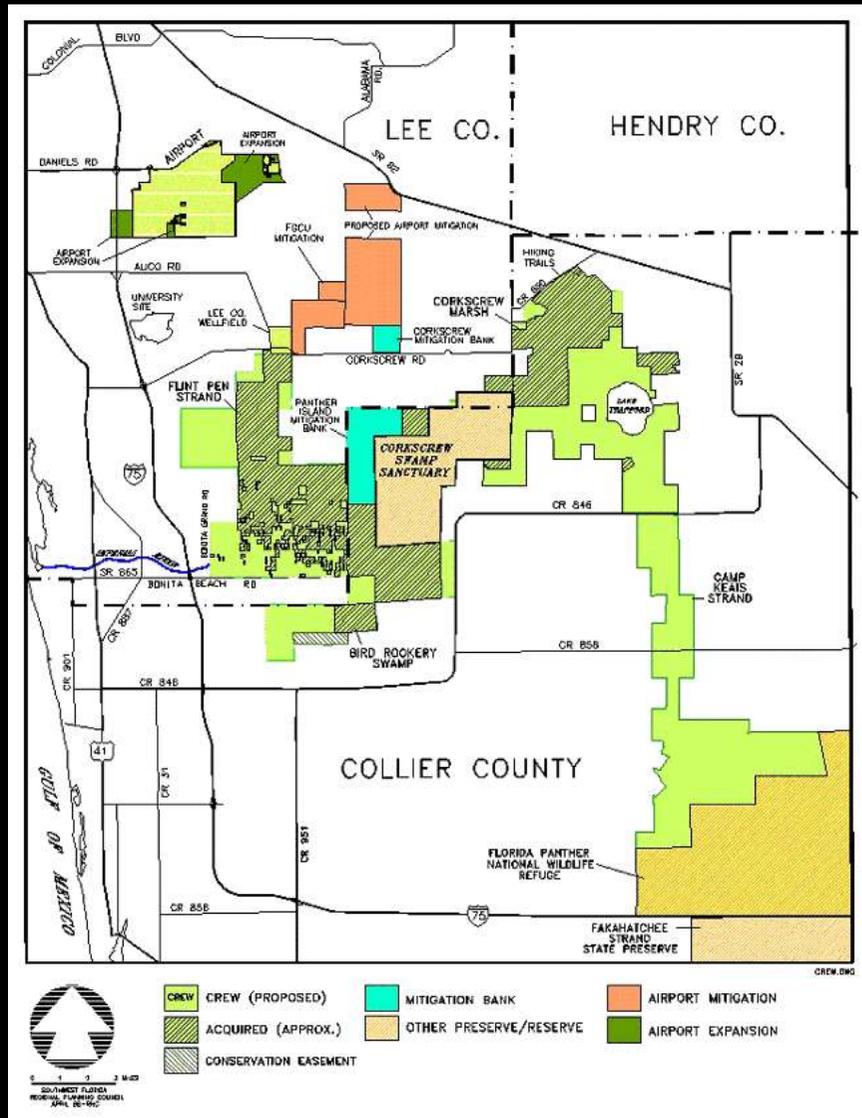


Environmental Impacts to the Corkscrew Regional Ecosystem Watershed from Mining

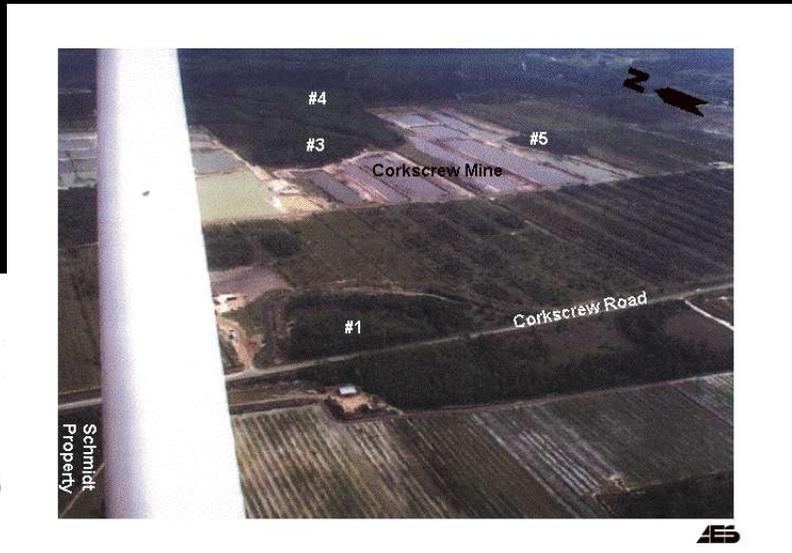
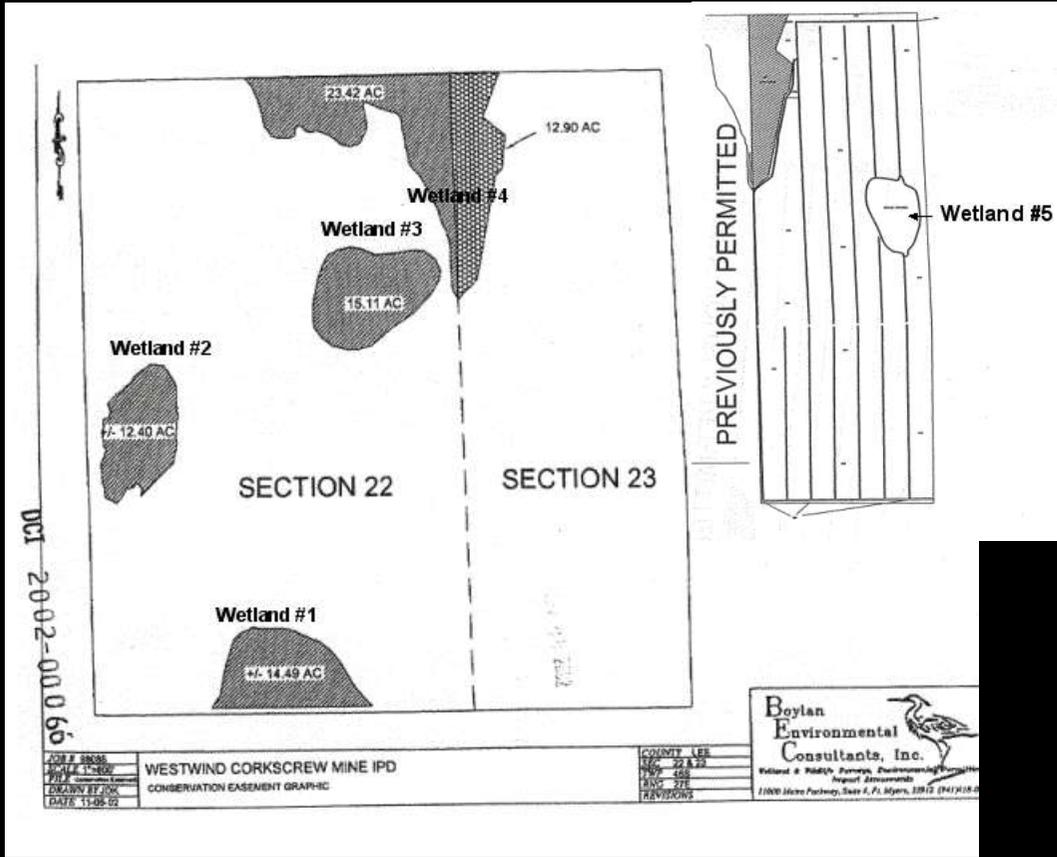
by

Sydney T. Bacchus, Ph. D.
Applied Environmental Services, LLC



(from: CREW Land and Water Trust)

Westwind Mine Wetlands



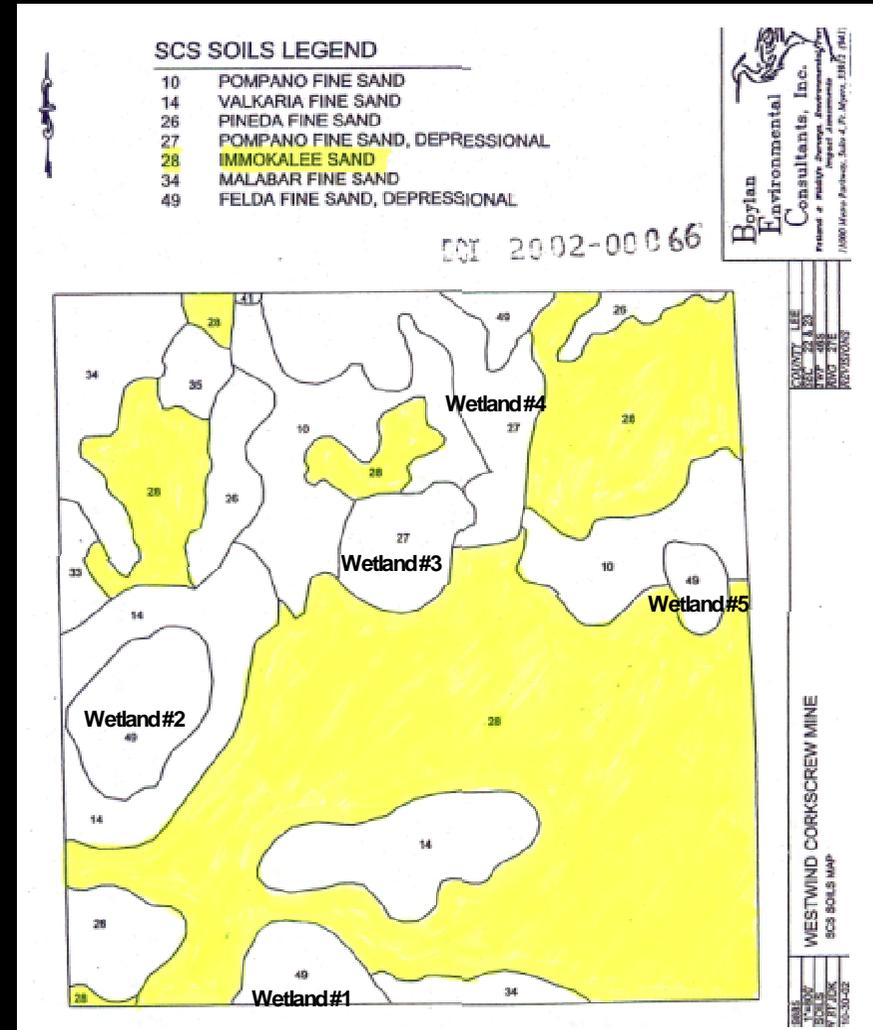
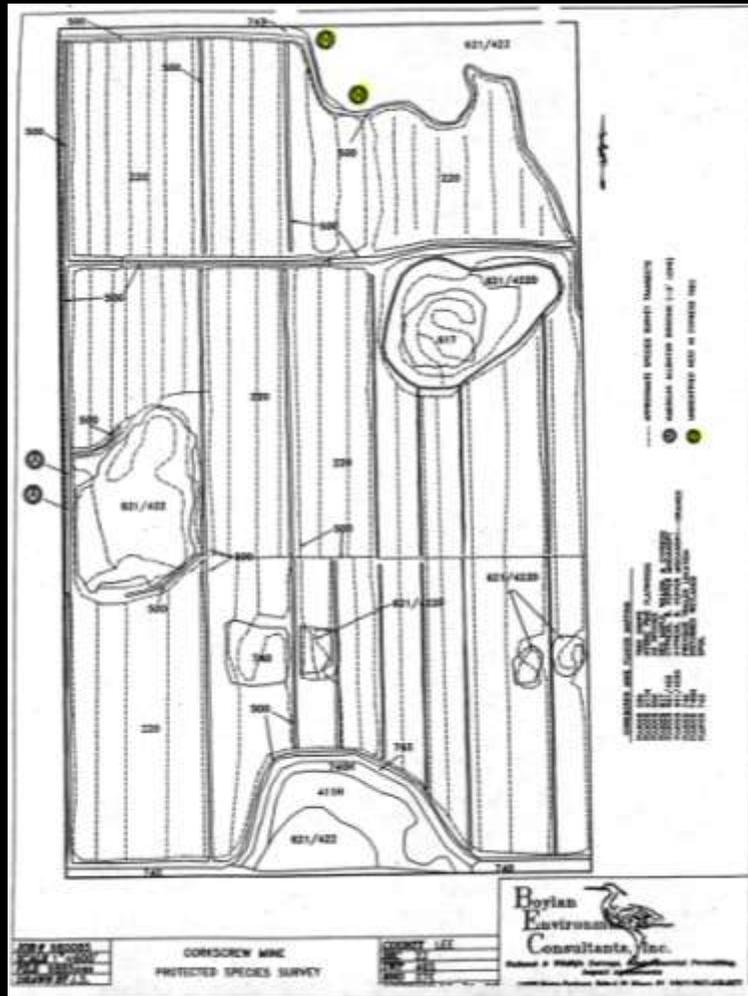
(by: Bacchus 2003)

Wetland #5 Authorized for Mining

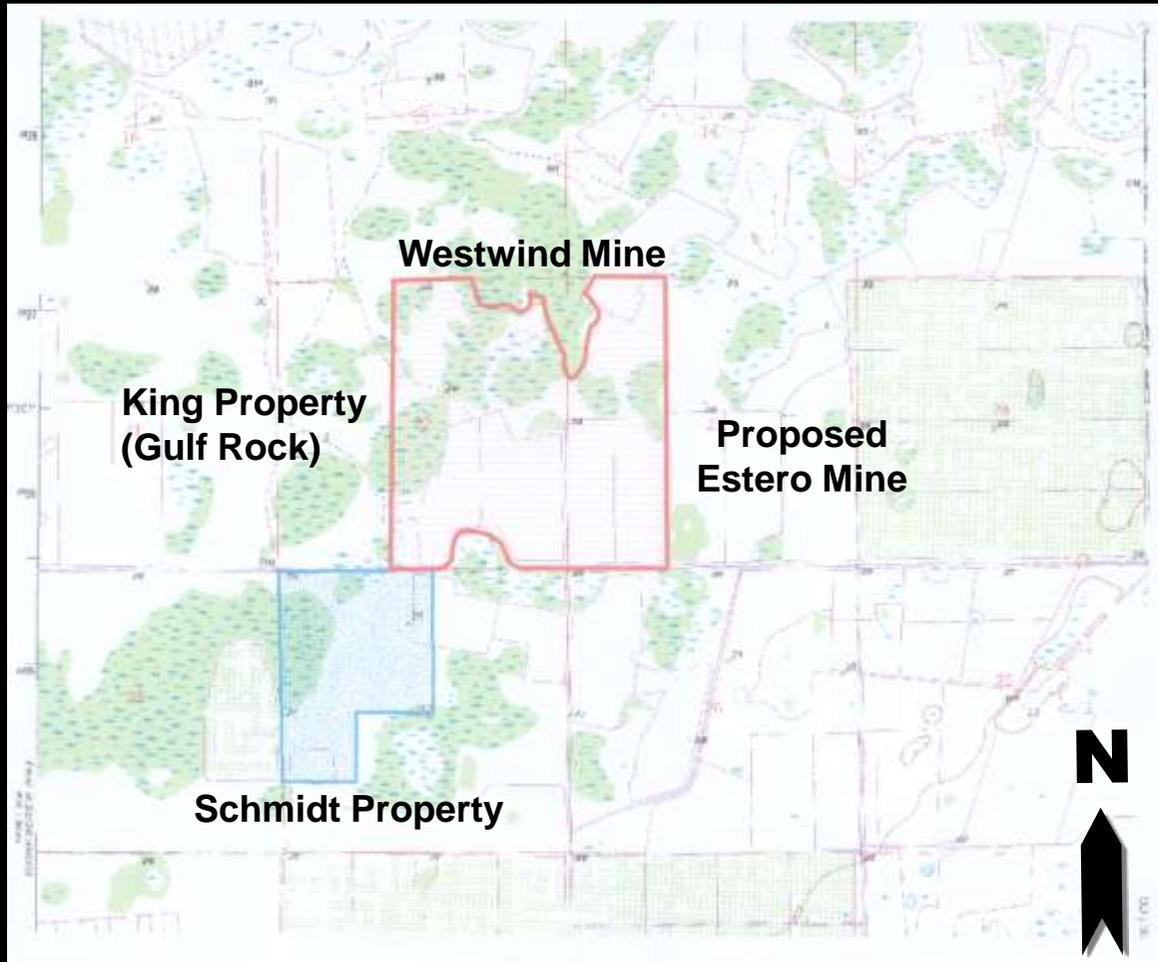


(by: Bacchus 2003)

Delineated Wetlands and Hydric Soils

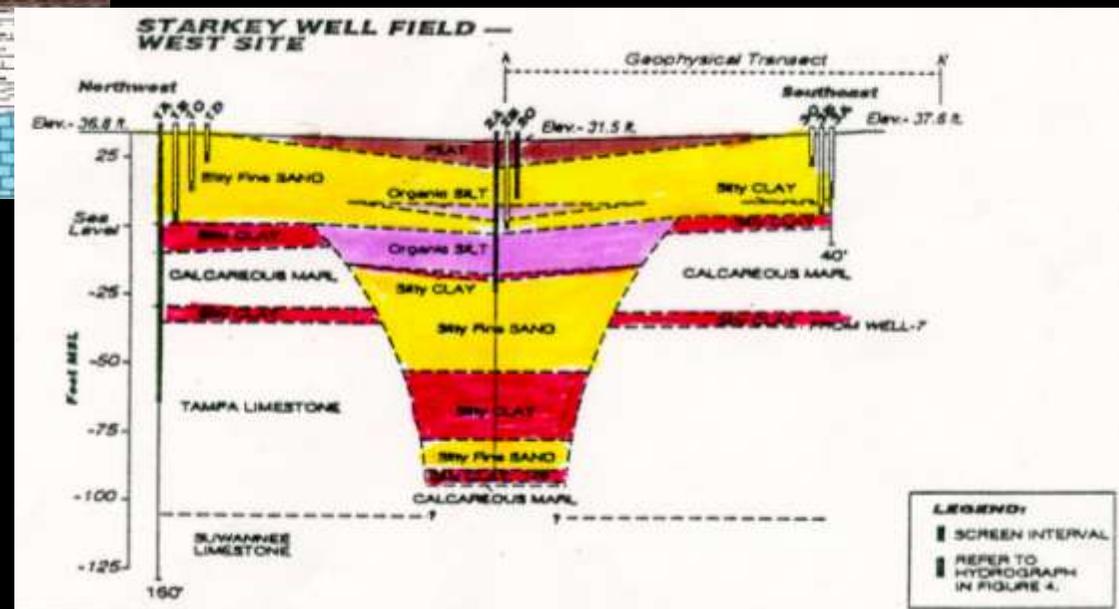
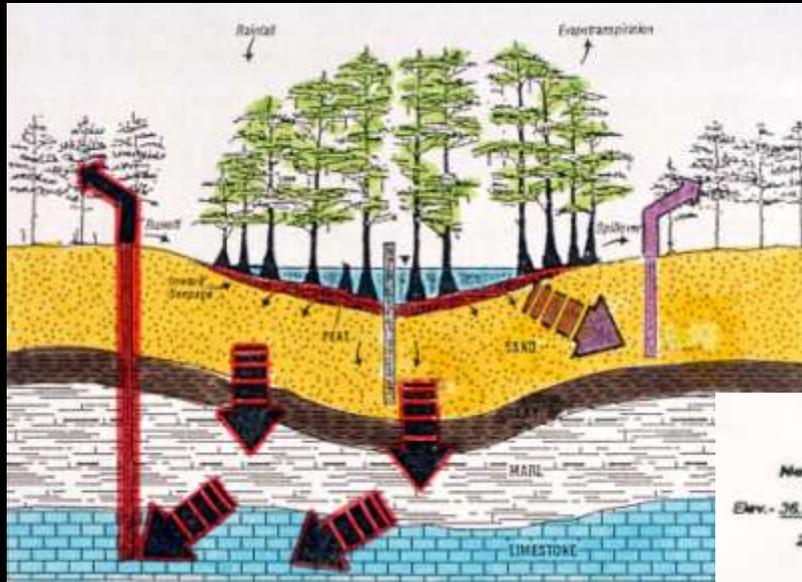


Depressional Slough Wetlands



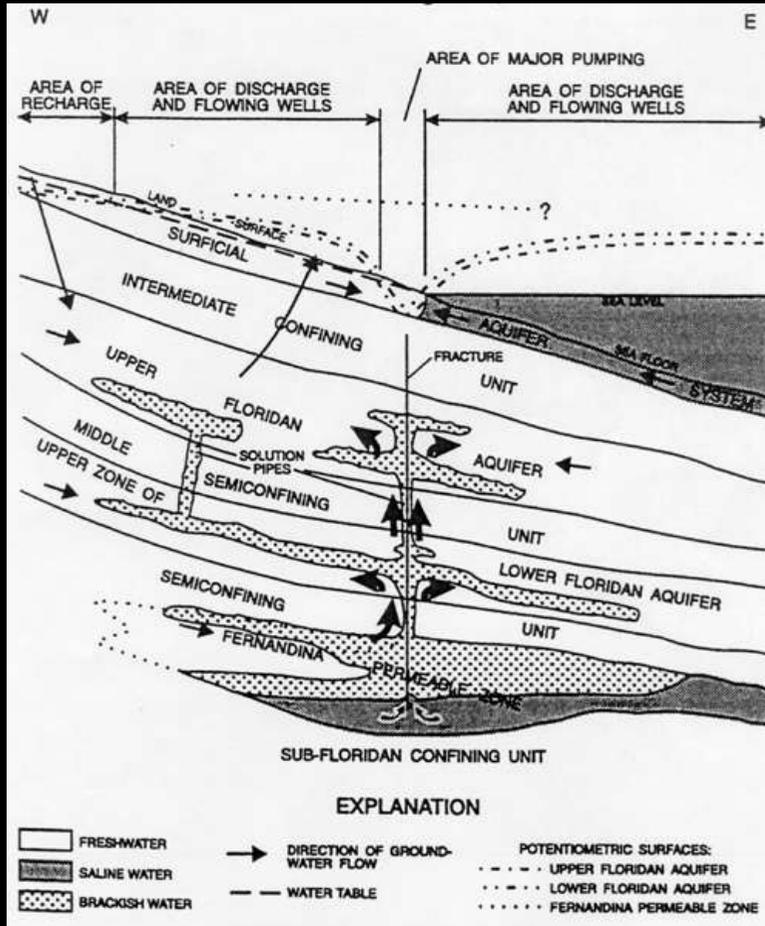
(USGS map Westwind Mine and adjacent property)

Theoretical v. Actual Cross-sections

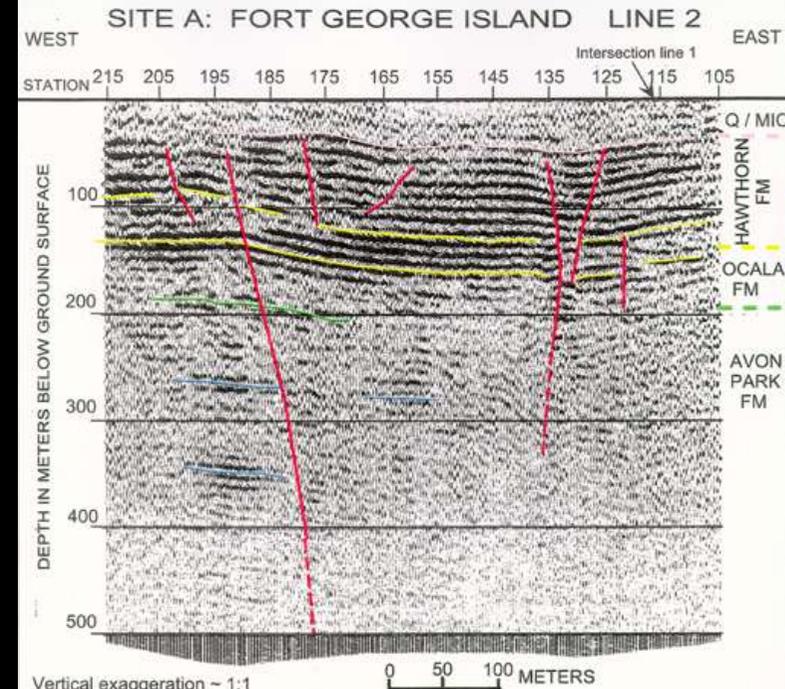
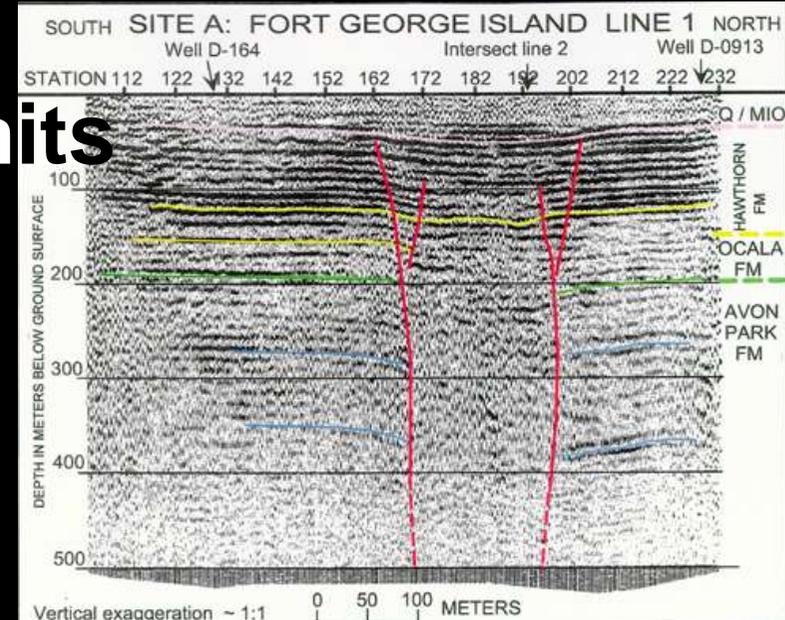


(Watson et al. 1990)

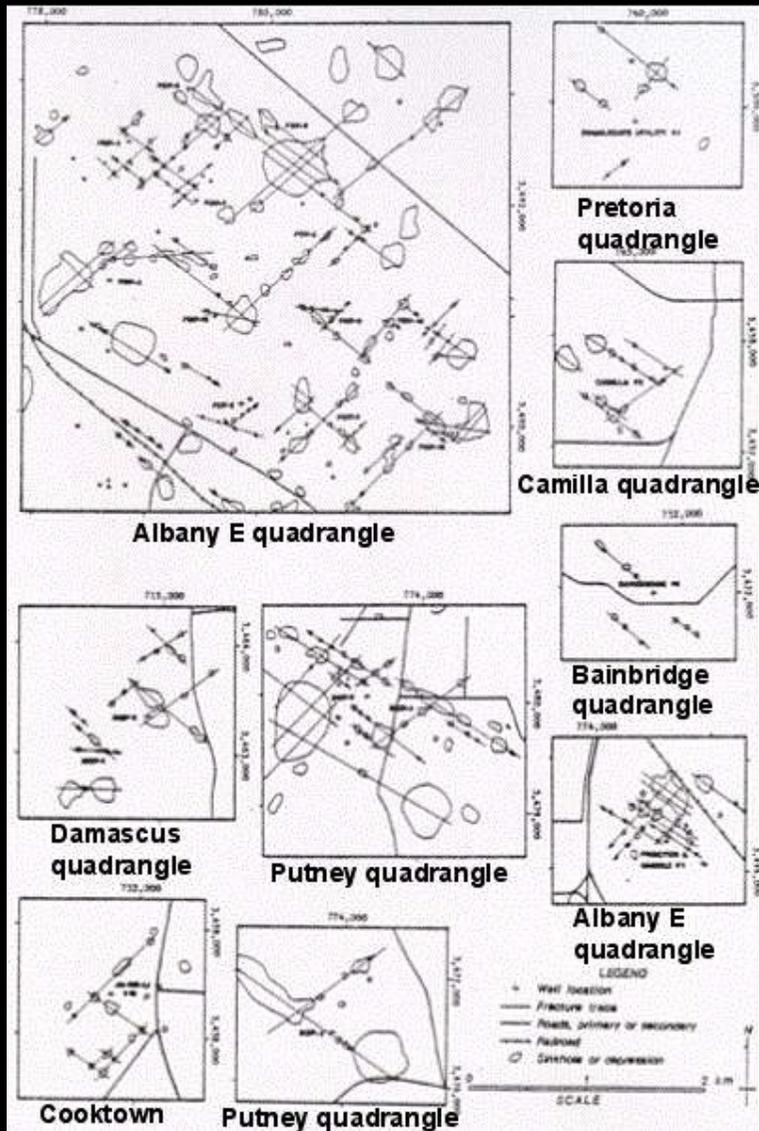
Vertical Flow Through Breached "Confining" Units



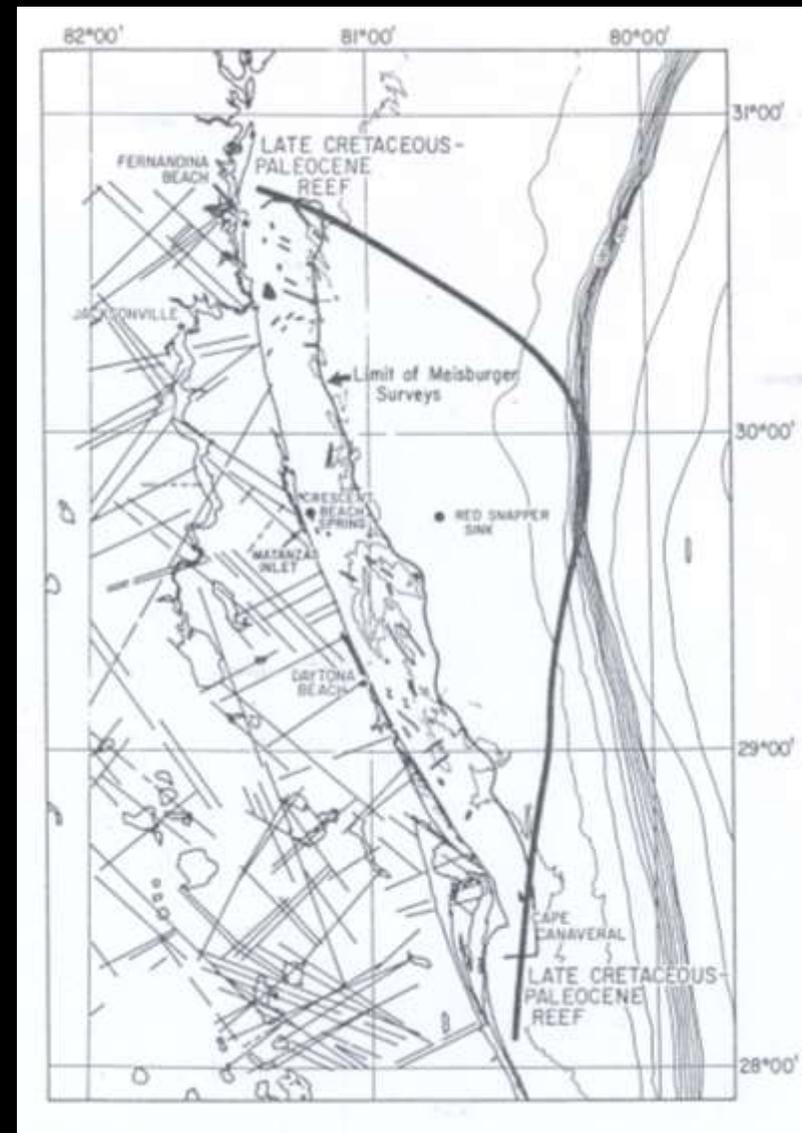
(Odum et al. 1997)



Horizontal Flowpaths

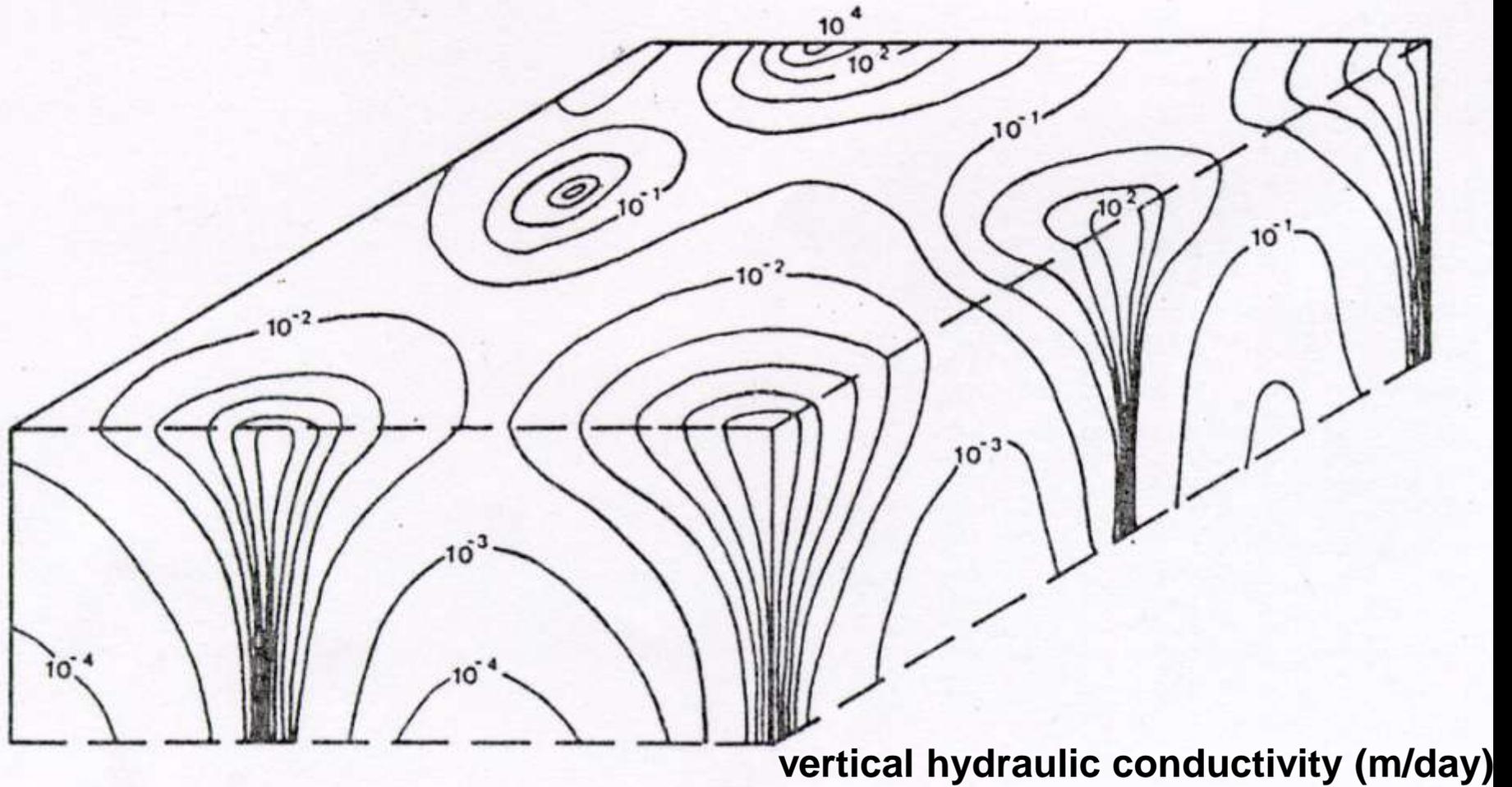


(Brook & Sun 1982)



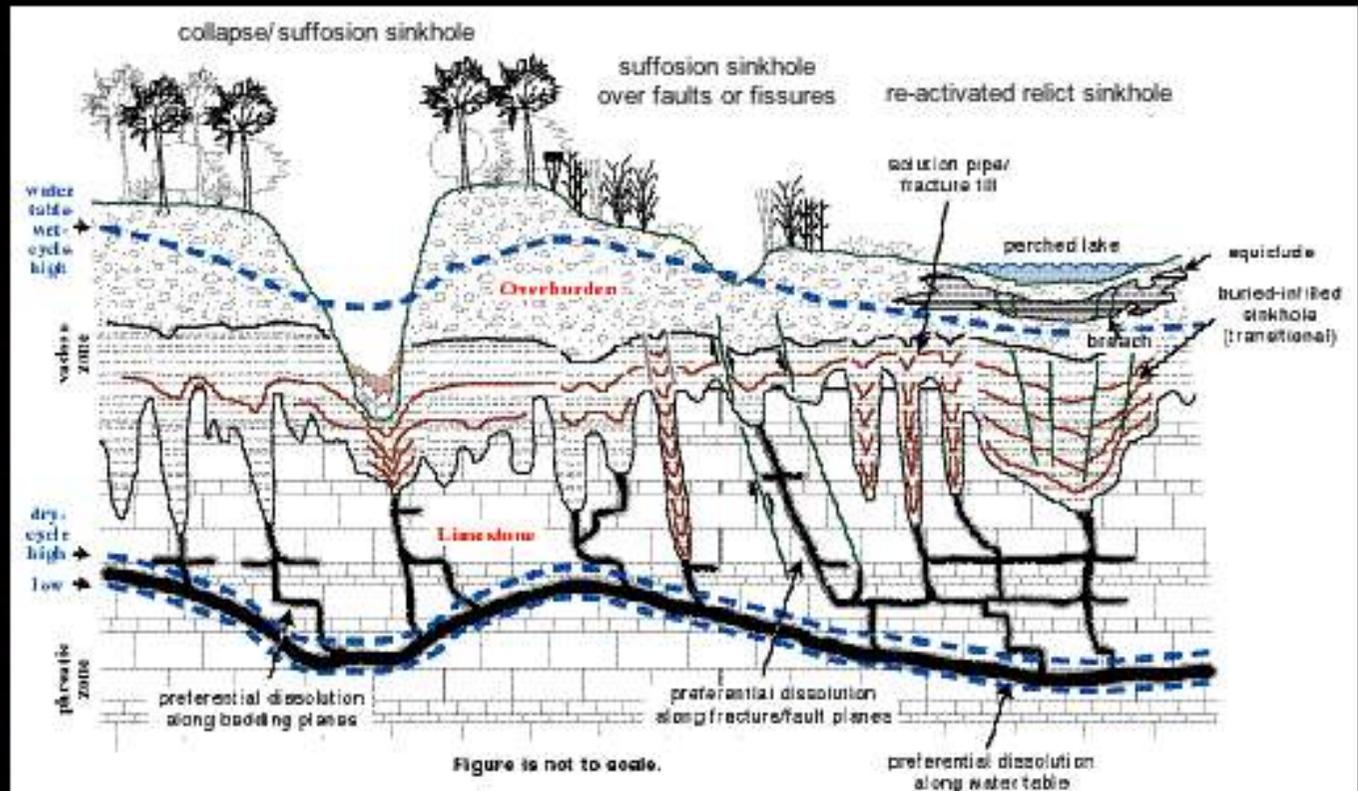
(Popenoe et al. 1984)

Vertical Preferential Flowpaths



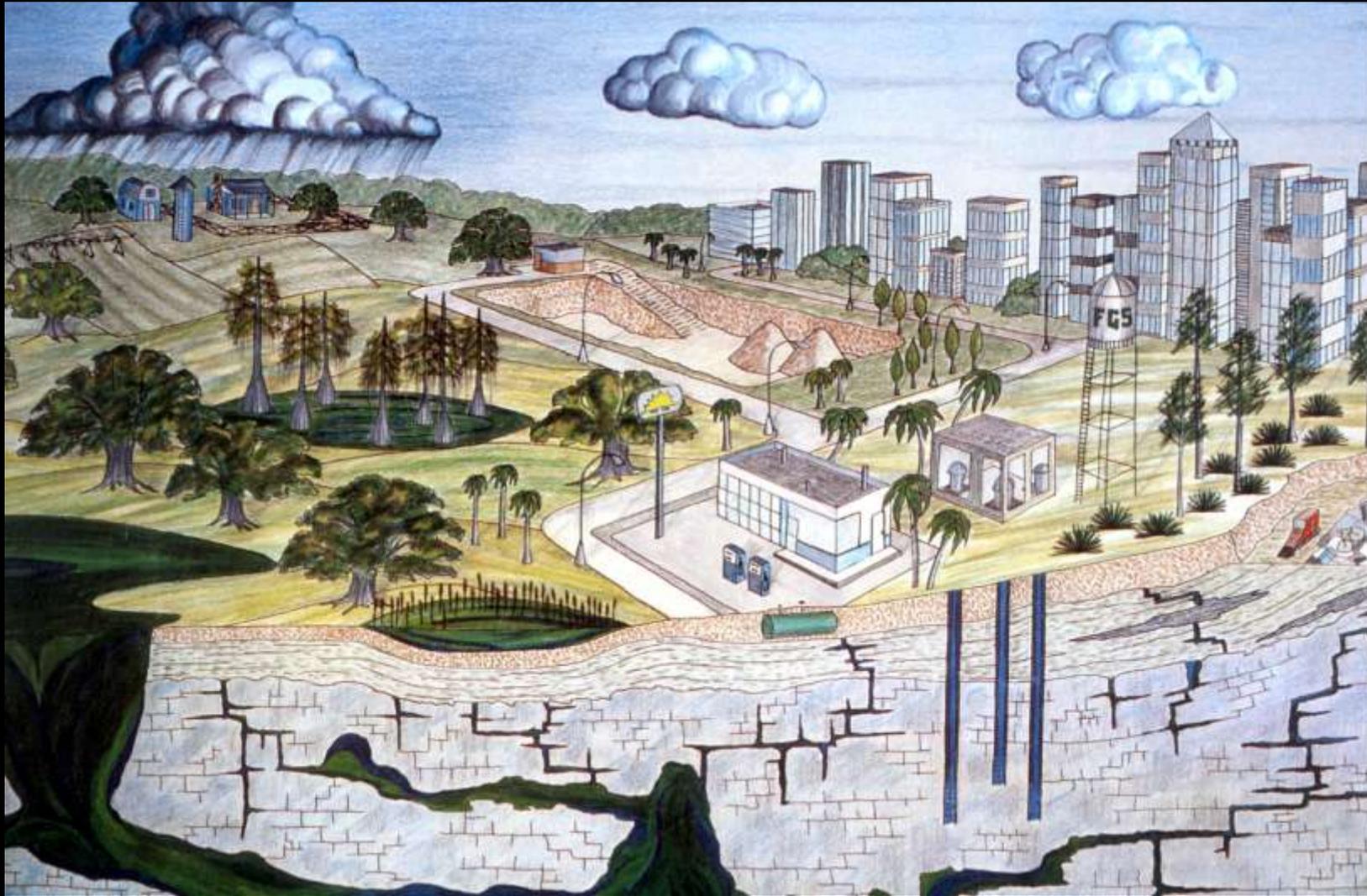
(Williams 1985)

Diagnostic Solution and Collapse Features



(modified from Kindinger et al. 1999)

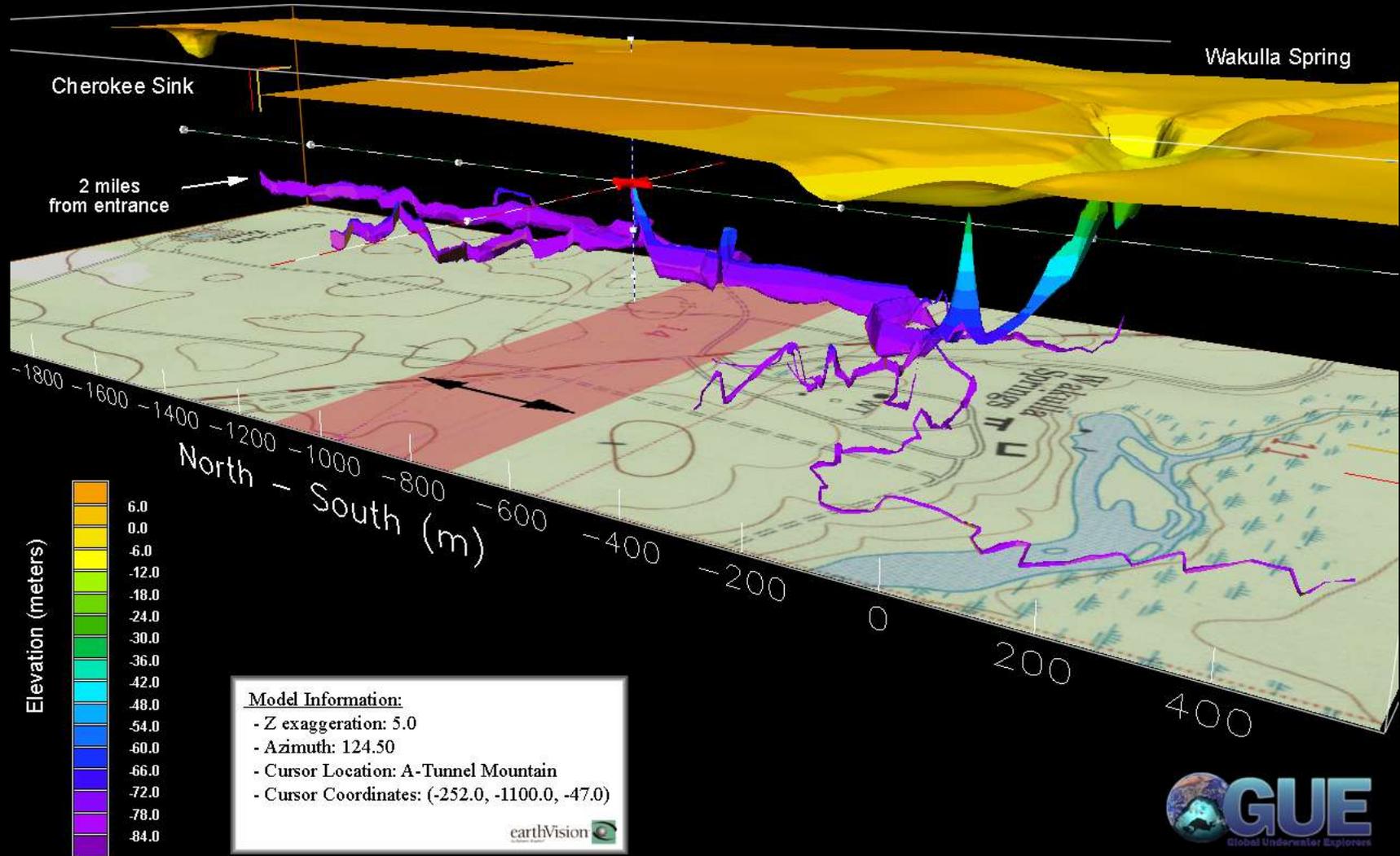
Preferential Vertical and Horizontal Flowpaths



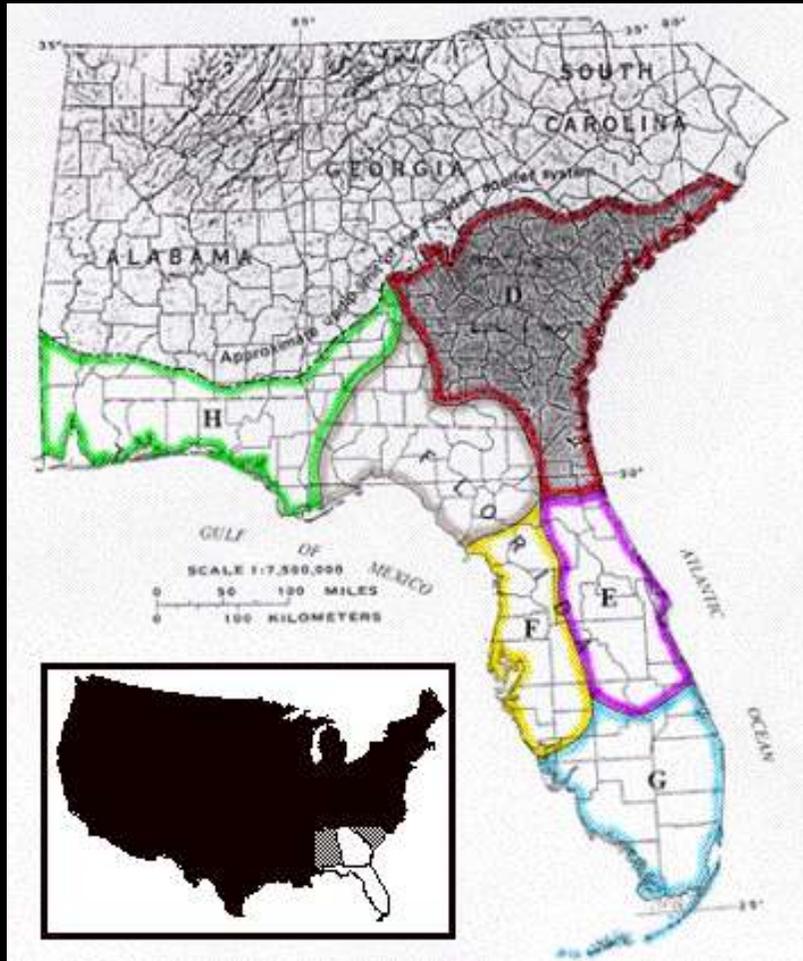
(Maddox et al. 1992)

Model: Wakulla Cave

Woodville Karst Plain, Florida



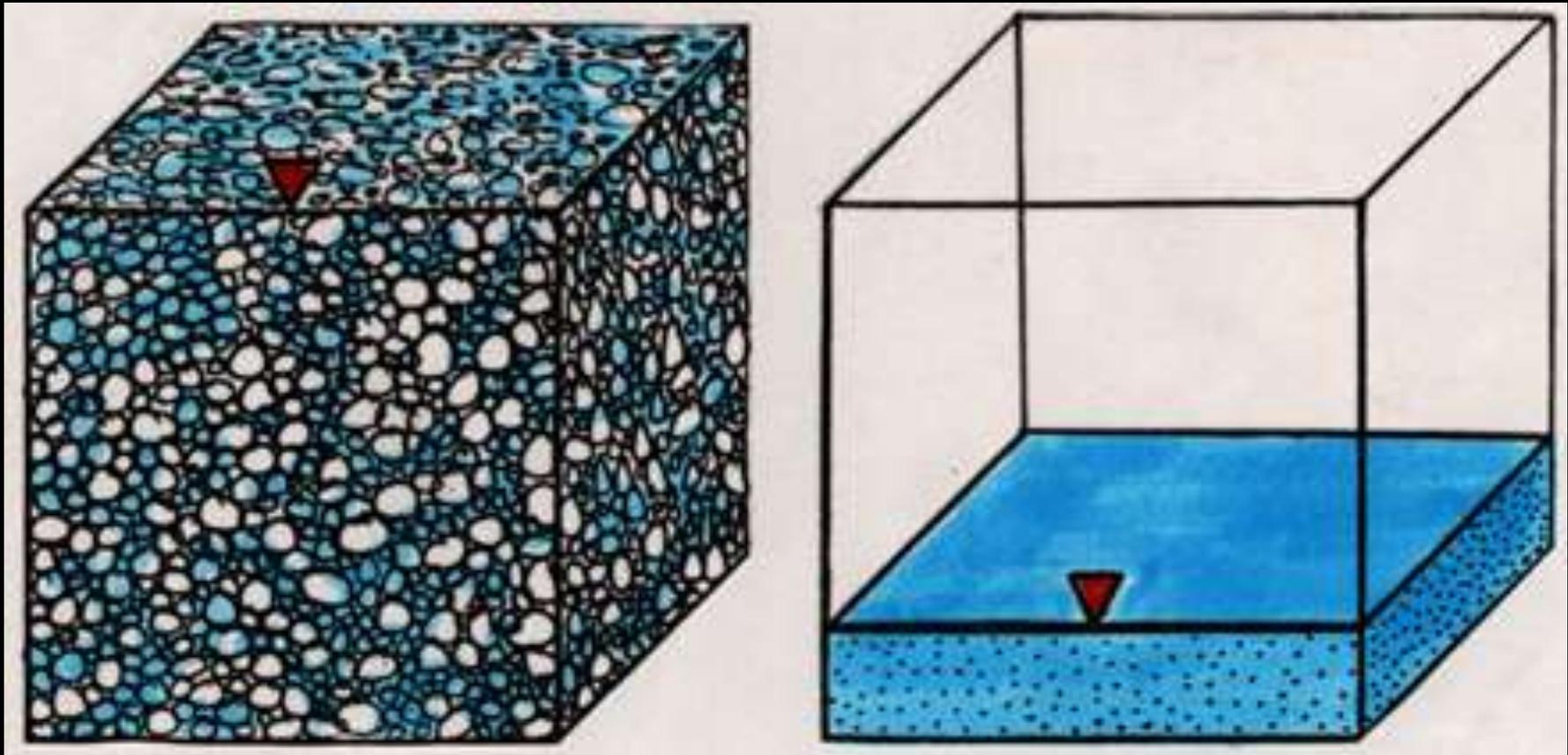
Karst Features Characteristic of all Floridan Aquifer System Subregions



- D** SC, Georgia, NE Florida
- H** NW Florida, Alabama
- !** Florida panhandle
- F** W-central Florida
- E** E-central Florida
- G** S Florida

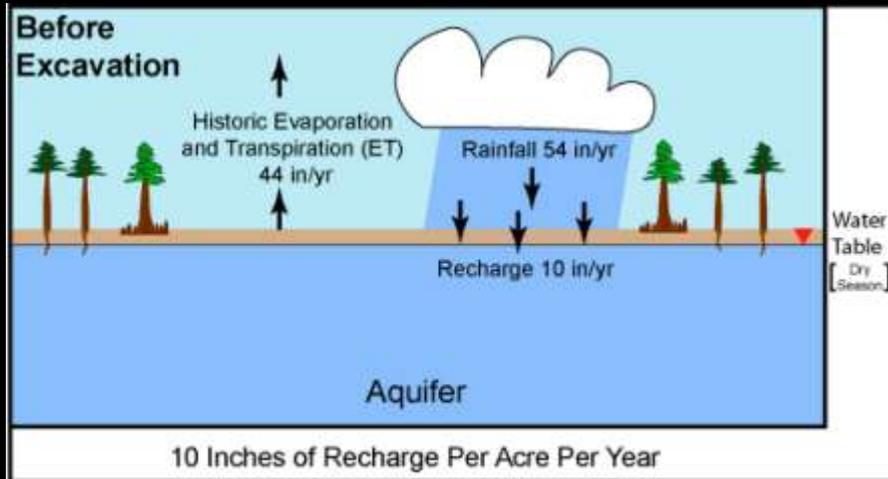
(Krause & Randolph 1989)

Water Displacement and Non-Mechanical Dewatering by Excavations



(Bacchus 1991, 1995, 2006)

Non-Mechanical Dewatering by Excavations



Historic Rainfall = 54"/yr
 Historic ET = 44"/yr
 Pre-pit RECHARGE = 10"/yr

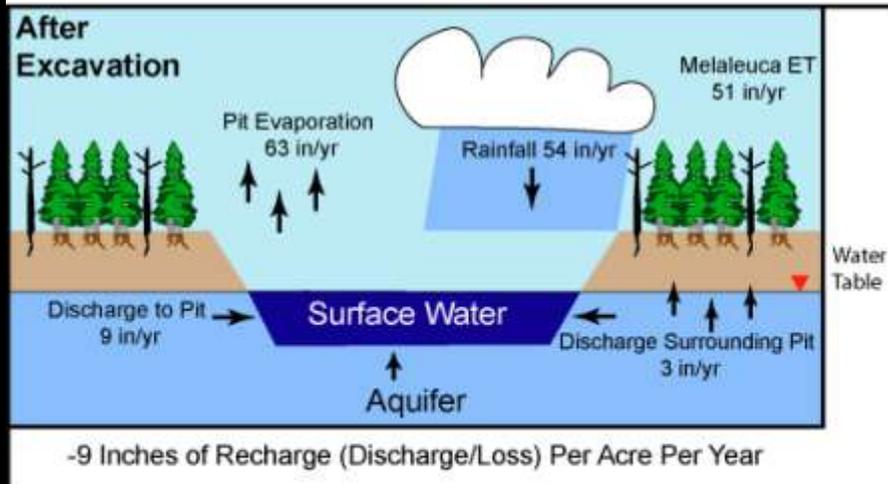
Post-pit Evaporation = 63"/yr
 Post-pit Transpiration = 51"/yr

Post-pit DISCHARGE = -9"/yr
 to pit

Post-pit DISCHARGE = -3"/yr
 surrounding pit

Post-pit NET LOSS OF WATER =
 19"/yr for each acre of pits

308 ac pit = 158,906,880 gallons/yr



Melaleuca Invasion and Spread Triggered by Hydroperiod Alterations



(by: Bacchus 2001)

Northern Wetland King Property (Gulf Rock)



(by: Bacchus 2003)

Southern Wetland King Property (Gulf Rock)



(by: Bacchus 2003)

Northern Wetlands Schmidt Property



(by: Bacchus 2003)

Uplands Schmidt Property



(by: Bacchus 2003)



Uplands Schmidt Property



(by: Bacchus 2007)

“Conservation” Wetland #1 Westwind Mine Property



(by: Bacchus 2003)

“Conservation” Wetland #1 Westwind Mine Property



(by: Bacchus 2007)

“Conservation” Wetlands #2 and #3 and Northern King Wetland

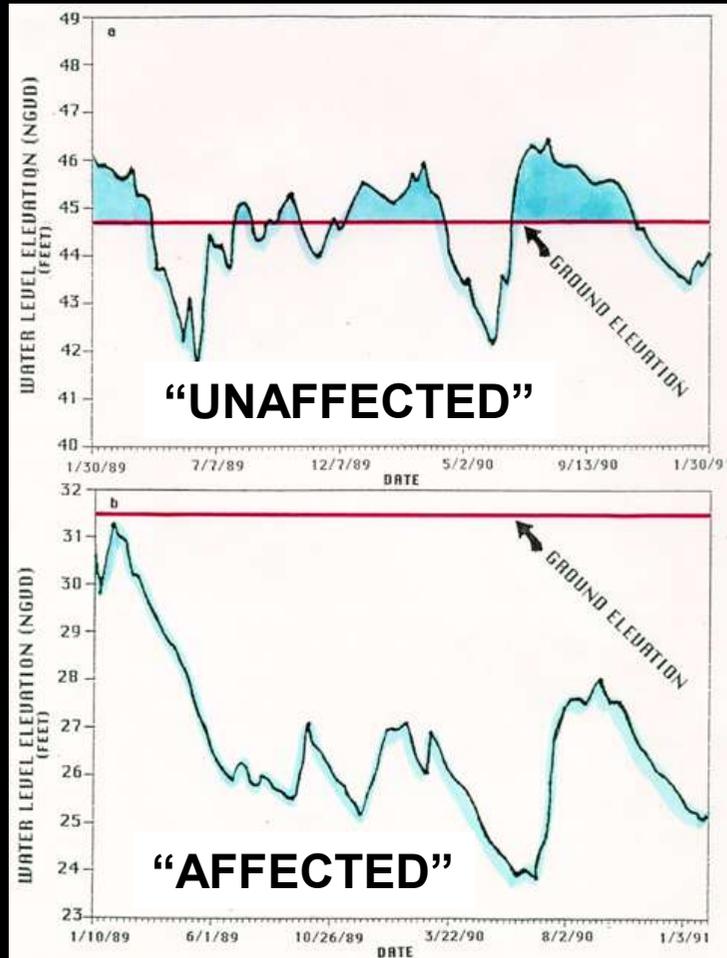
Subsidence



(by: Bacchus 2003)

Ignored Impacts of Subsidence

Starkey Wilderness Park and Wellfield



(Rochow 1994)

Hill Property West of Westwind Mine

Subsidence



(by: Bacchus 2007)

Lazy D Property South of Hill Property Uplands



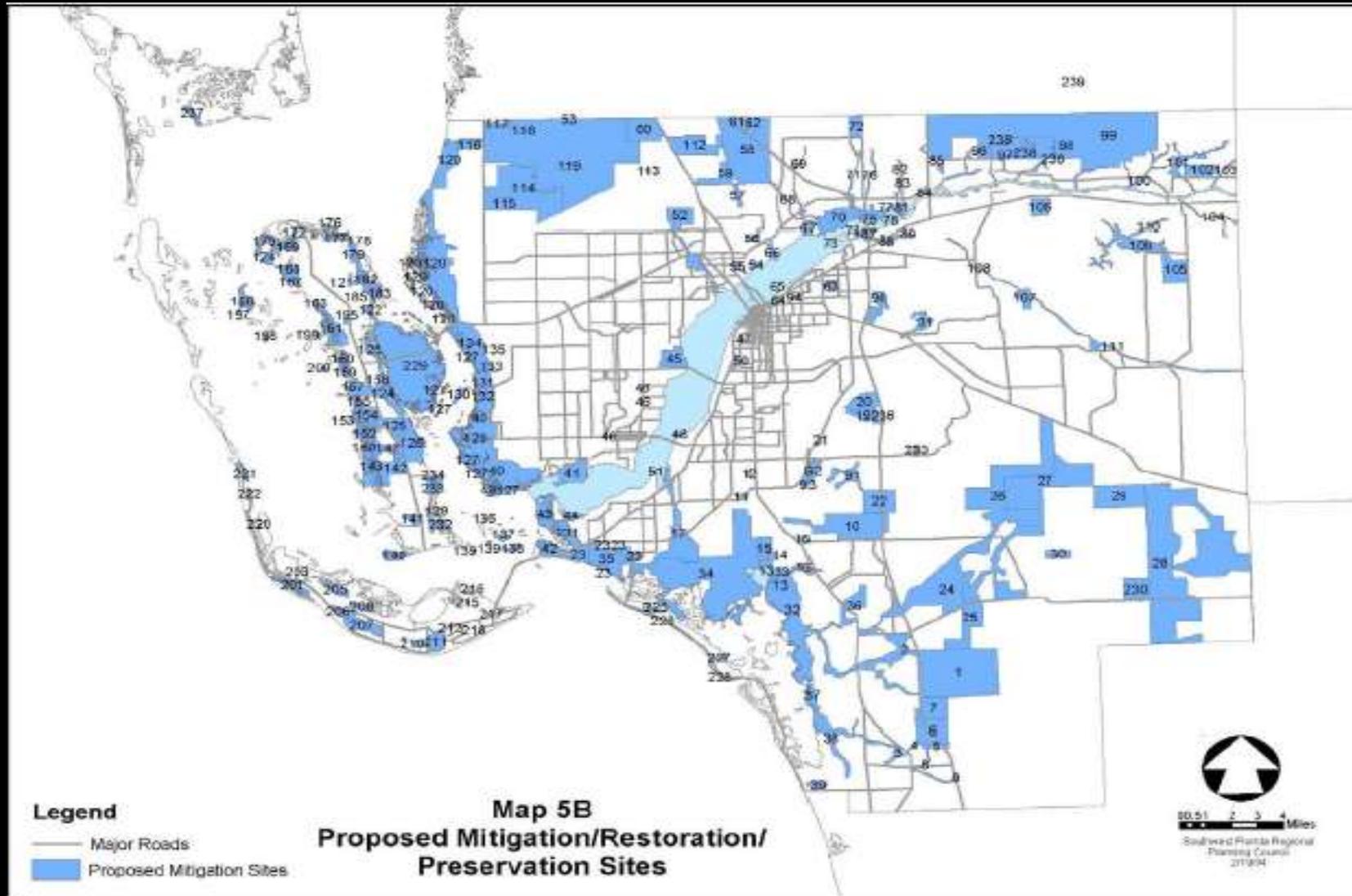
(by: Bacchus 2007)

**7/13/07 Ruling on Dade Mines:
Benzene Contamination from Blasting
in Mines > 0.5 Mile from Wellfield**

and

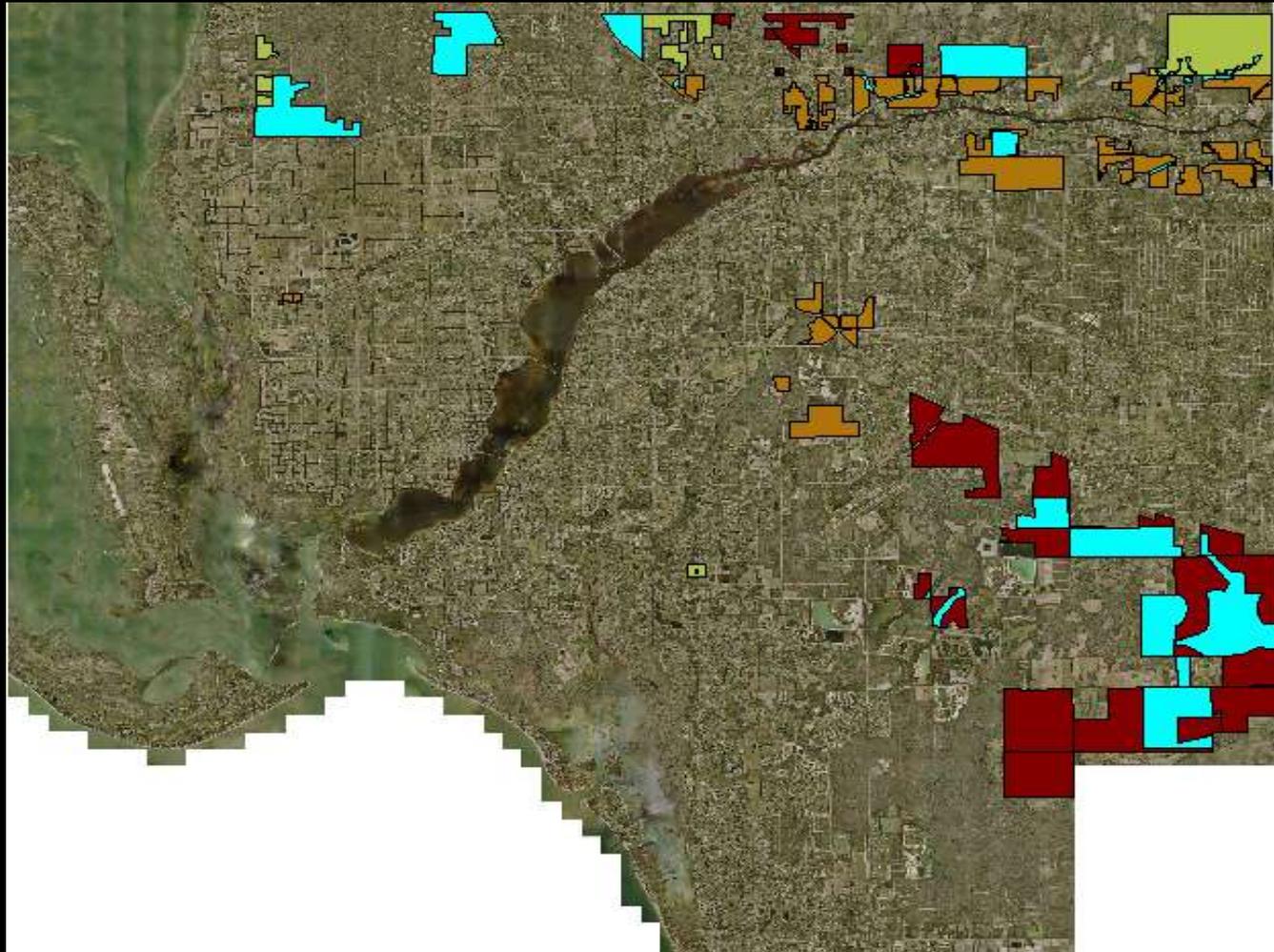
Flying Pigs

Lee Mitigation Map



(from: Rawl 6/05)

Potential Future Mining Activity Mitigation Map Areas in Blue



(from: Rawl 6/05)

Lee County Groundwater Resource and Mining Study

(Rawl & Voorhees, 2005)

“This [DRGR] designation and the applicable land have remained unchanged since 1990....” (p. 4)

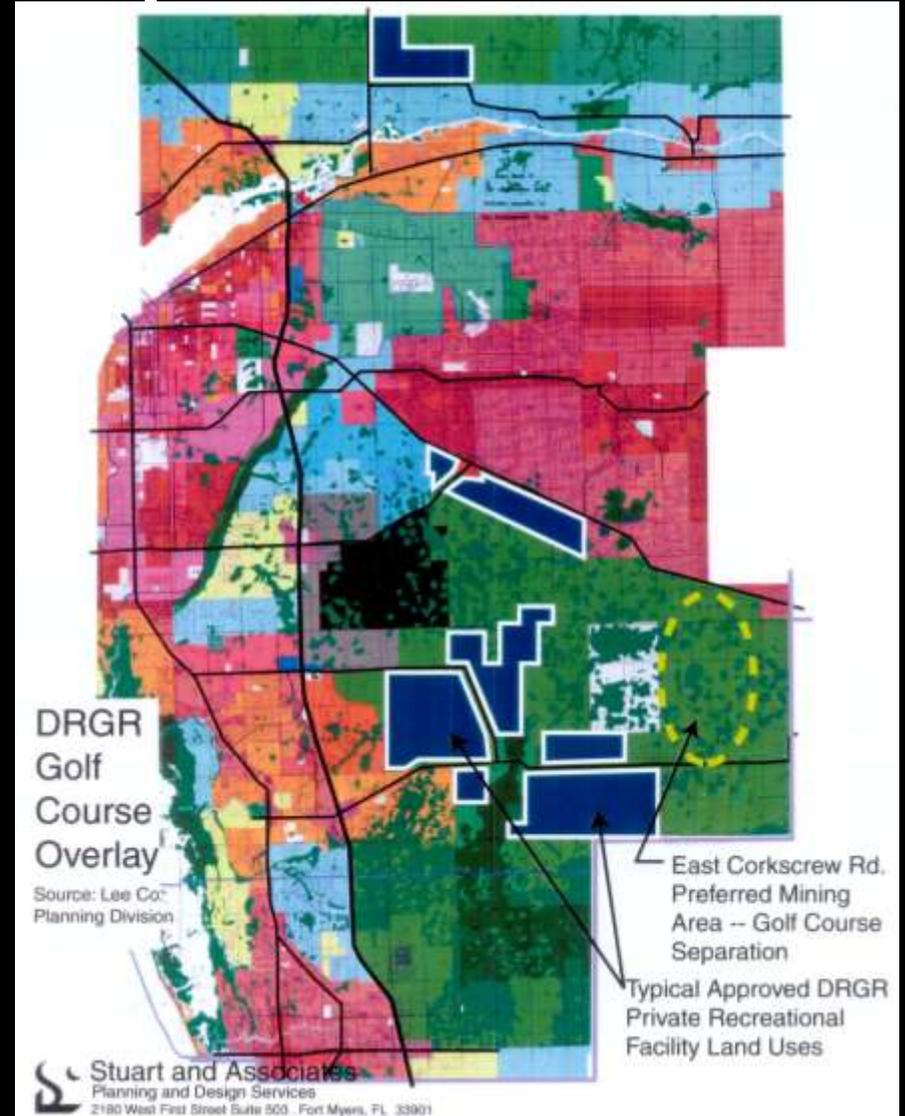
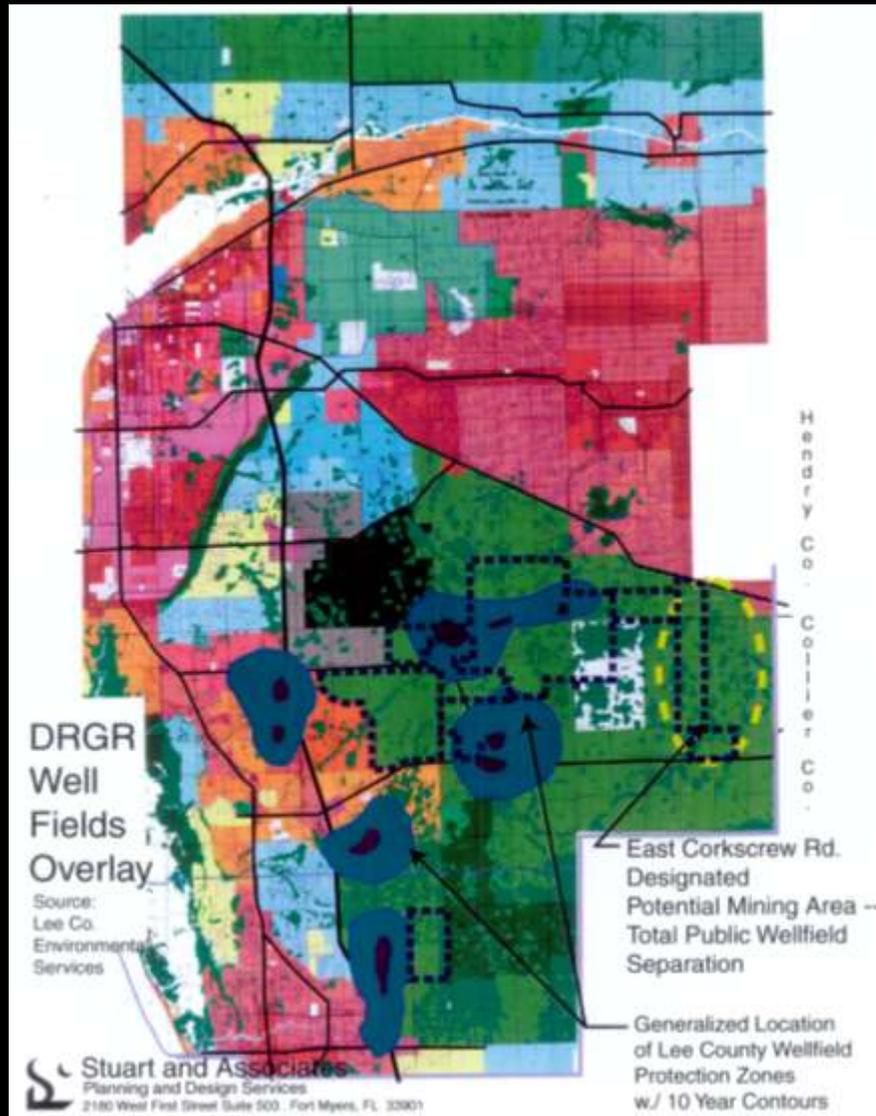
Policy 1.4.5 (DRGR)

“Land uses...must be compatible with maintaining surface and groundwater levels at their historic levels” (p. 8)

“Impact of DRGR Land Use on Water Level” determined by “Averaged Water Levels” for “Kriged Surfaces” (6/05 presentation)

DCA “also requested a cumulative analysis of the mining activities in the [DRGR] area.” (p. 8)

Cumulative Impacts

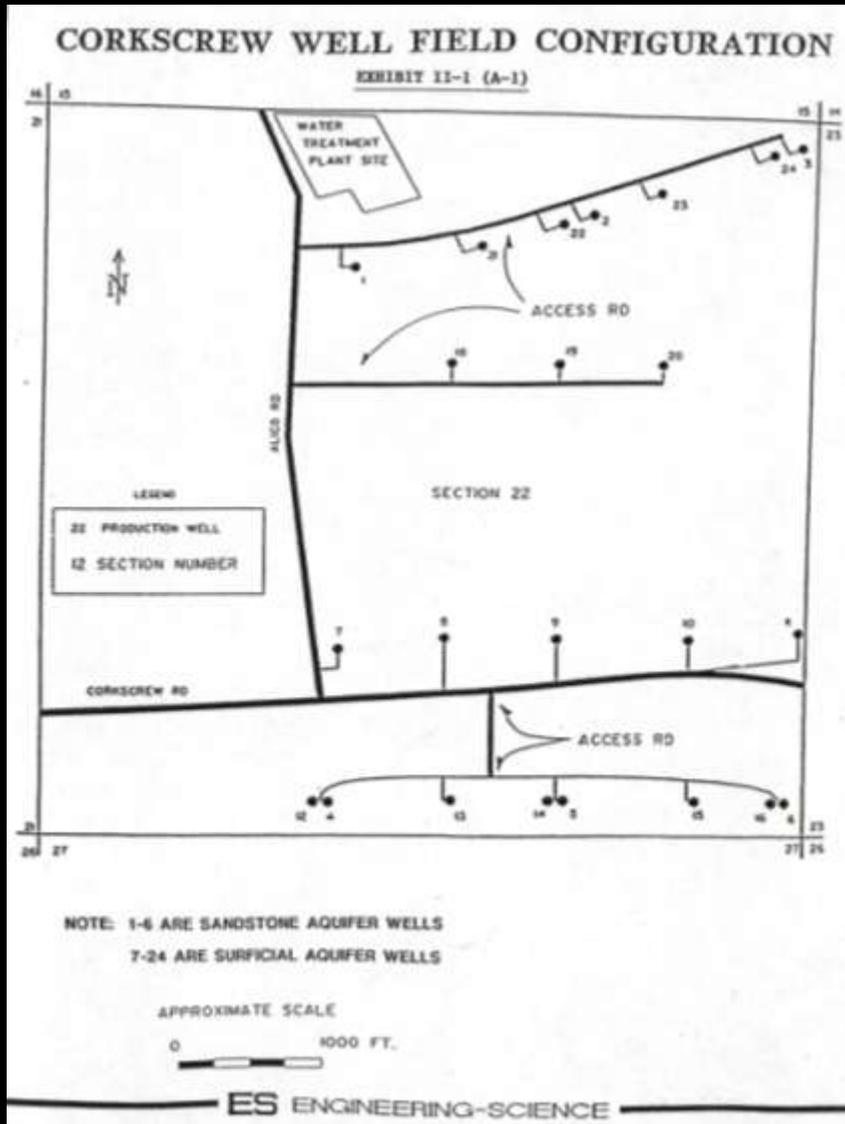


(from: Stuart and Associates)

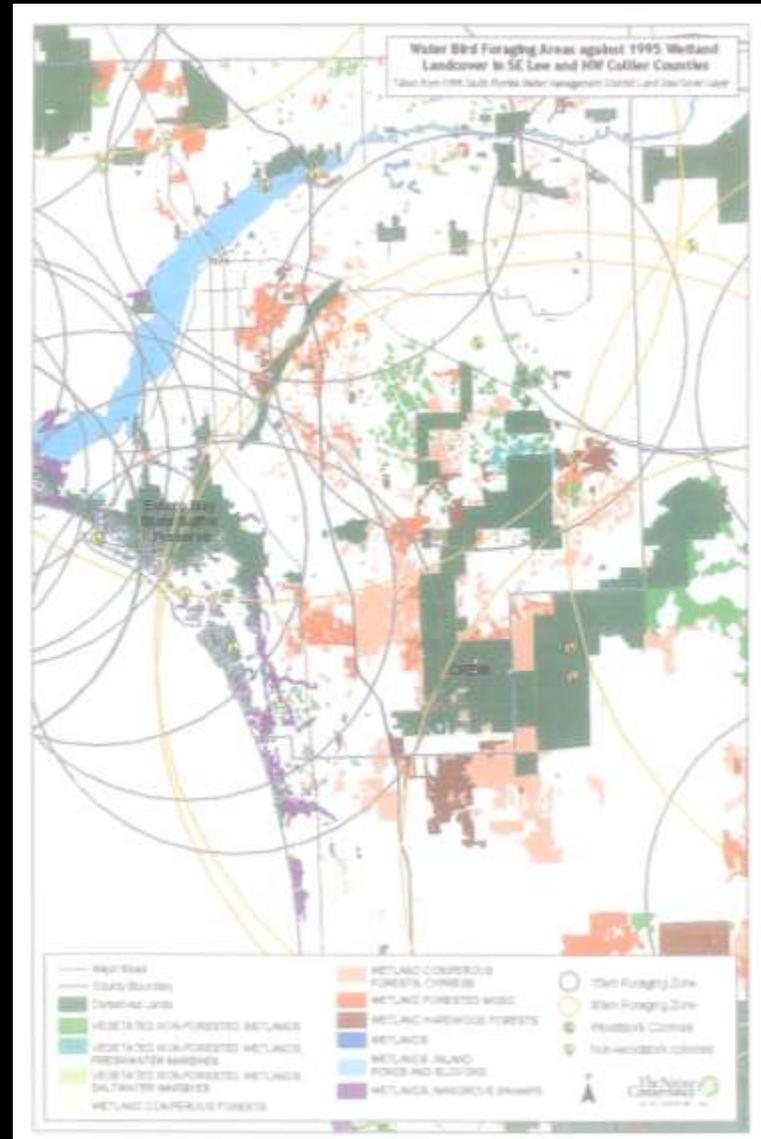
Panther Habitat Destruction at DRGR Corkscrew Wildlife Crossing



(by: Bacchus 2003)

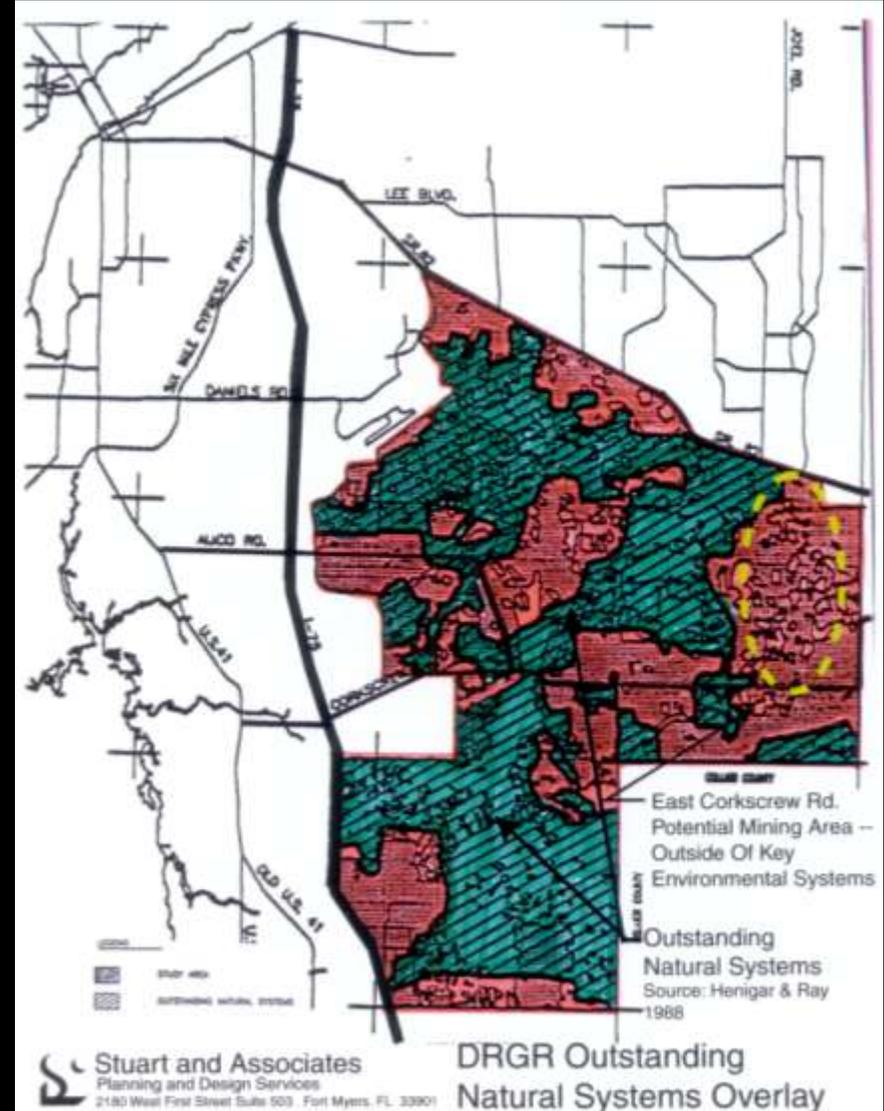
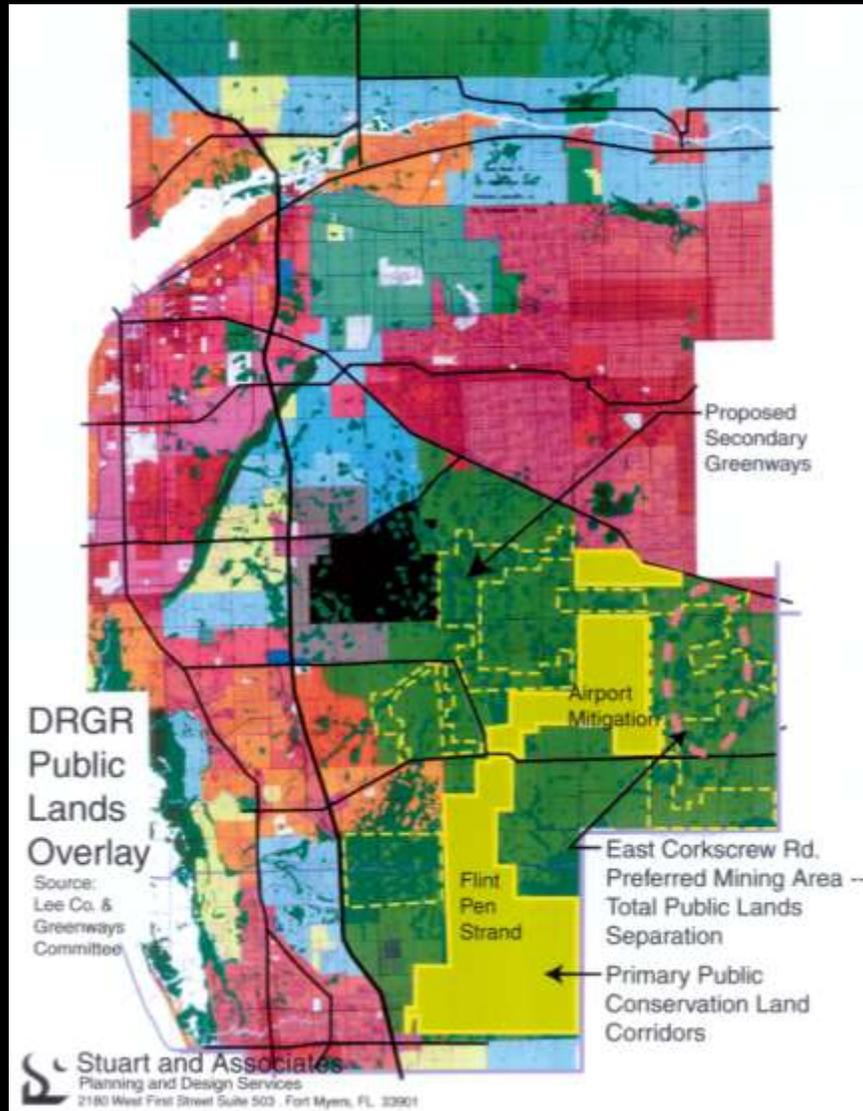


(Engineering Science)



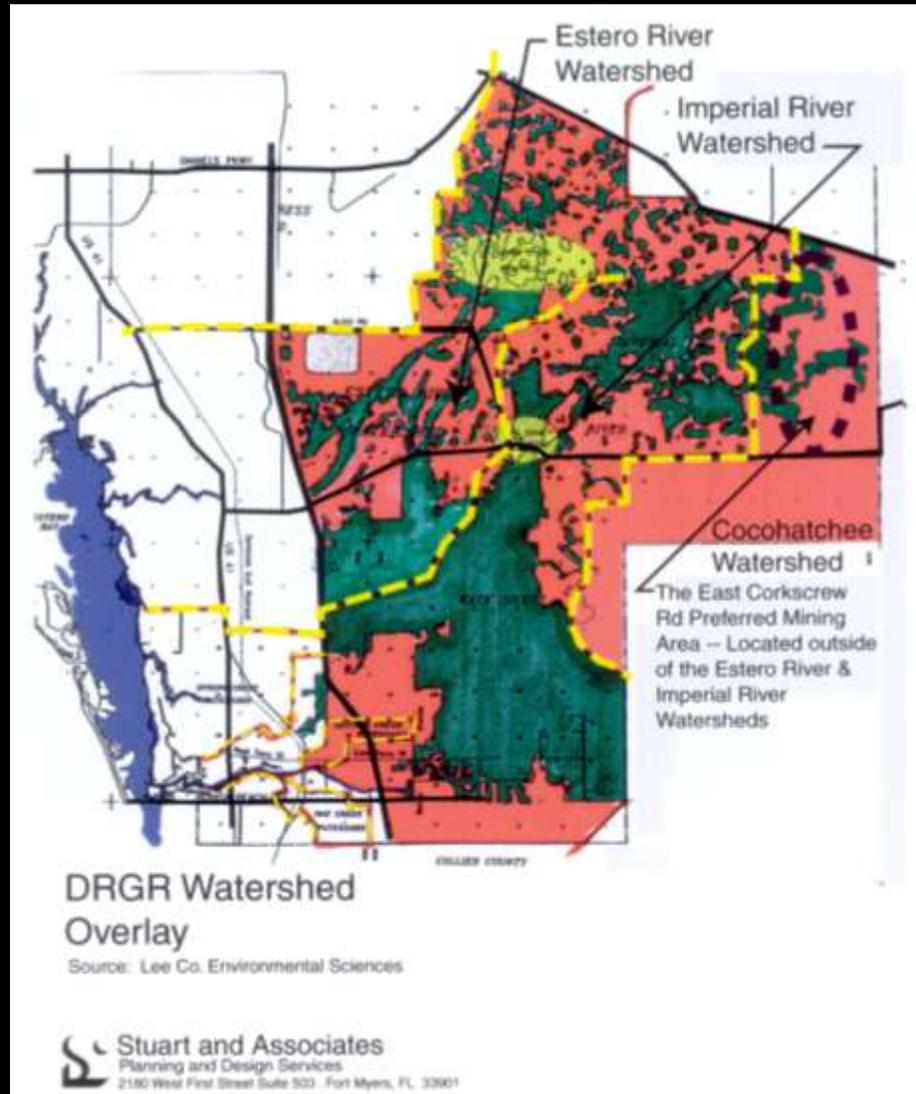
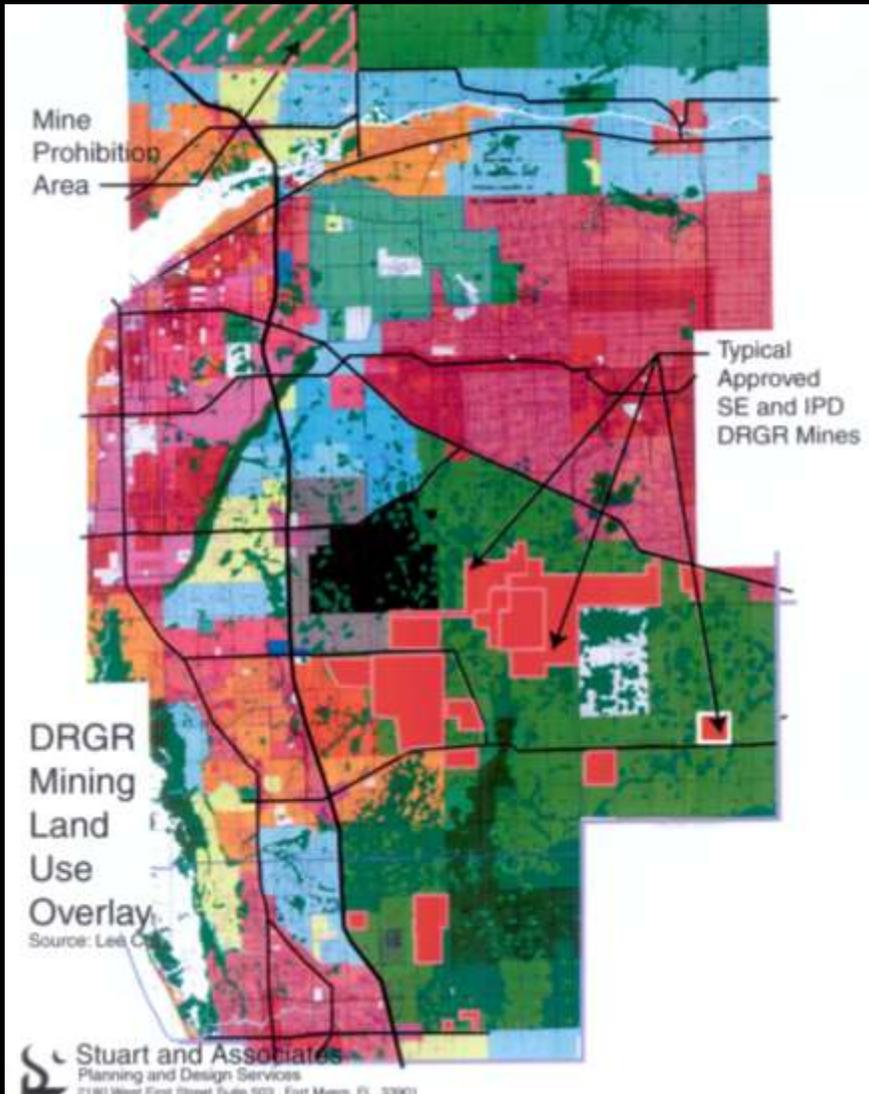
(The Nature Conservancy)

Destruction of Critical Habitat



(from: Stuart and Associates)

Mining Encroachment-Breached Watersheds

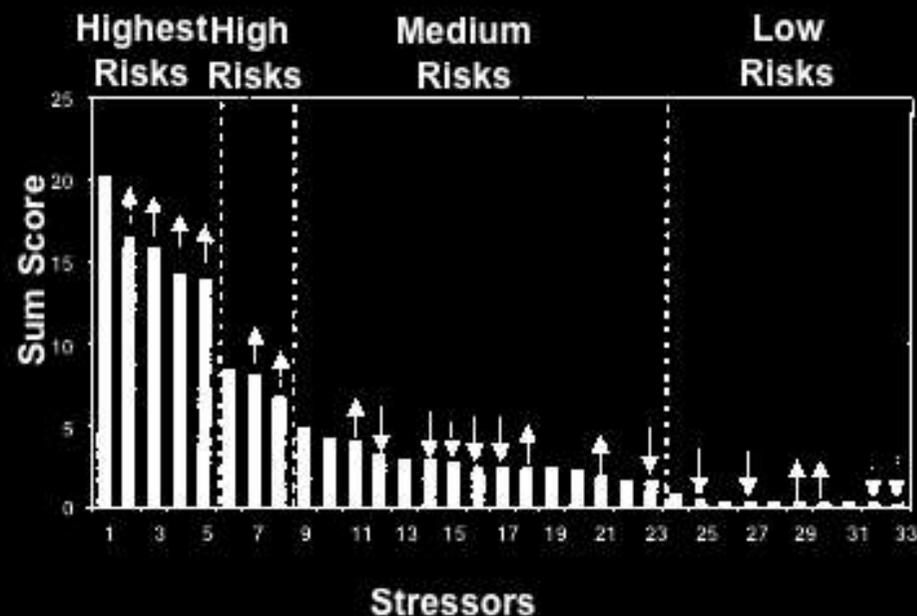


(from: Stuart and Associates)

**Review and Summary of Studies
Containing Information Relating to
DR/GR Lands
Southeastern Lee County, Florida
(McLane Environmental 5/07)**

“This project team also found that there were a few major components of the overall character of the DR/GR lands that were not described in sufficient depth in the documents reviewed as part of this project ... ecological impacts associated with mining activities...” (p. ES-9)

Rank of Environmental Stressors



1 hydrologic alteration
 2 harvesting-coastal
 3 habitat conversion
 4 climate change
 5 alien species
 6 turbidity/sedimentation
 7 habitat fragmentation
 8 pesticides

9 disease/pest outbreaks
 10 nutrients
 11 physical habitat disruption
 12 acid deposition (lakes)
 13 altered salinity regime
 14 altered fire regime
 15 persistent toxic organics
 16 DO/BOD
 17 other heavy metals
 18 harvesting-freshwater
 19 tropospheric ozone (agric.)
 20 toxic inorganics (As, Se, B)
 21 UV-B
 22 tropospheric ozone
 23 acid mine drainage

24 oil spills
 25 acid deposition (forests)
 26 Hg
 27 SO2
 28 radionuclides
 29 noise
 30 light
 31 contaminated ground water
 32 thermal pollution
 33 NOx

(from USEPA SAB 1999)

Cost of Services



Mines



Golf Course
Communities



Golf Courses



Ranchettes



Preserves

Impact on Present and Future Resources

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