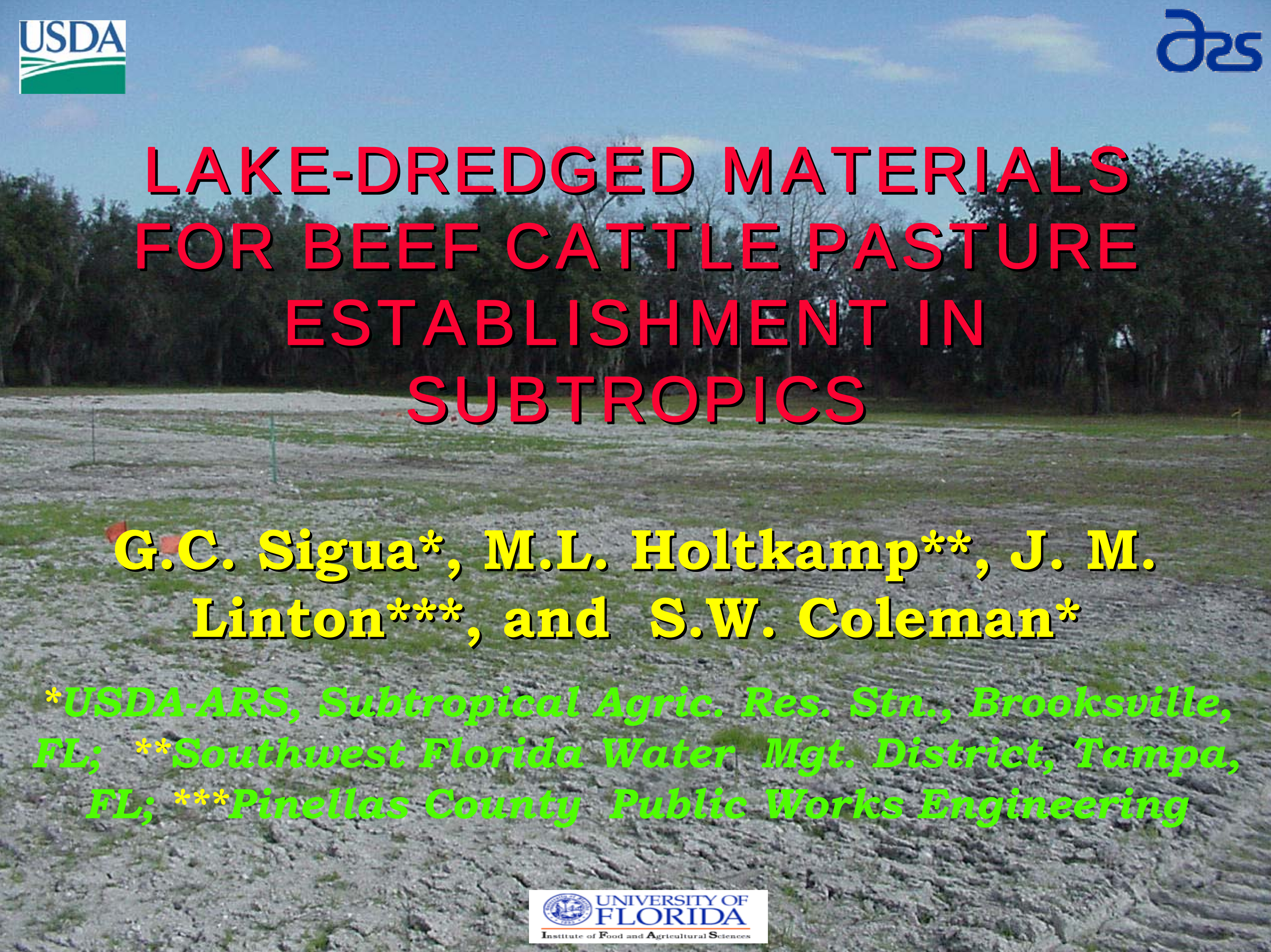

LAKE-DREDGED MATERIALS FOR BEEF CATTLE PASTURE ESTABLISHMENT IN SUBTROPICS

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WHY DREDGING?

TO DREDGE.... OR NOT TO DREDGE?

PROS? AND CONS?

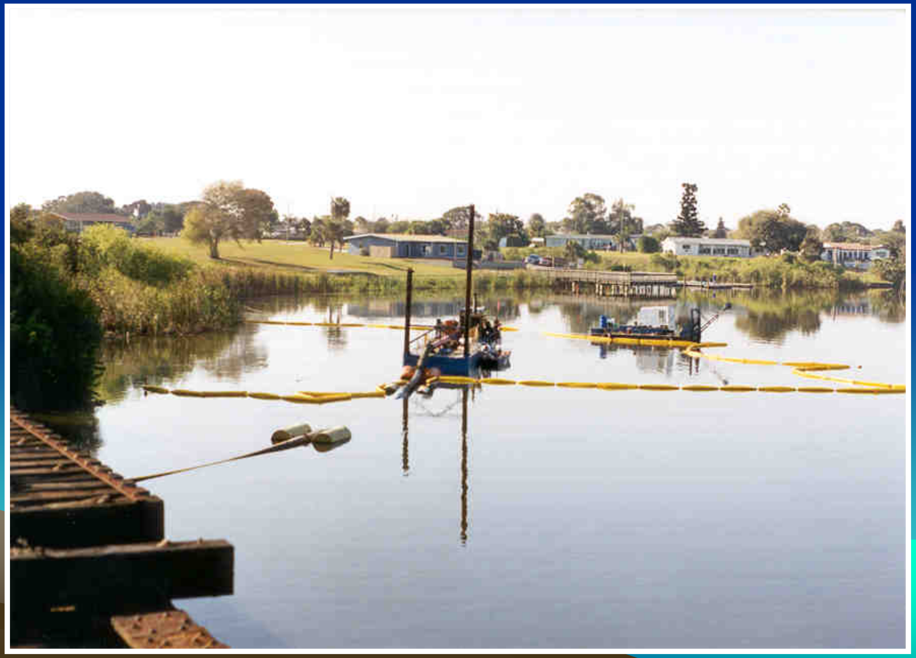
…to dredge… or… not to dredge…

PROS > CONS …… DECISION (YES or NO)

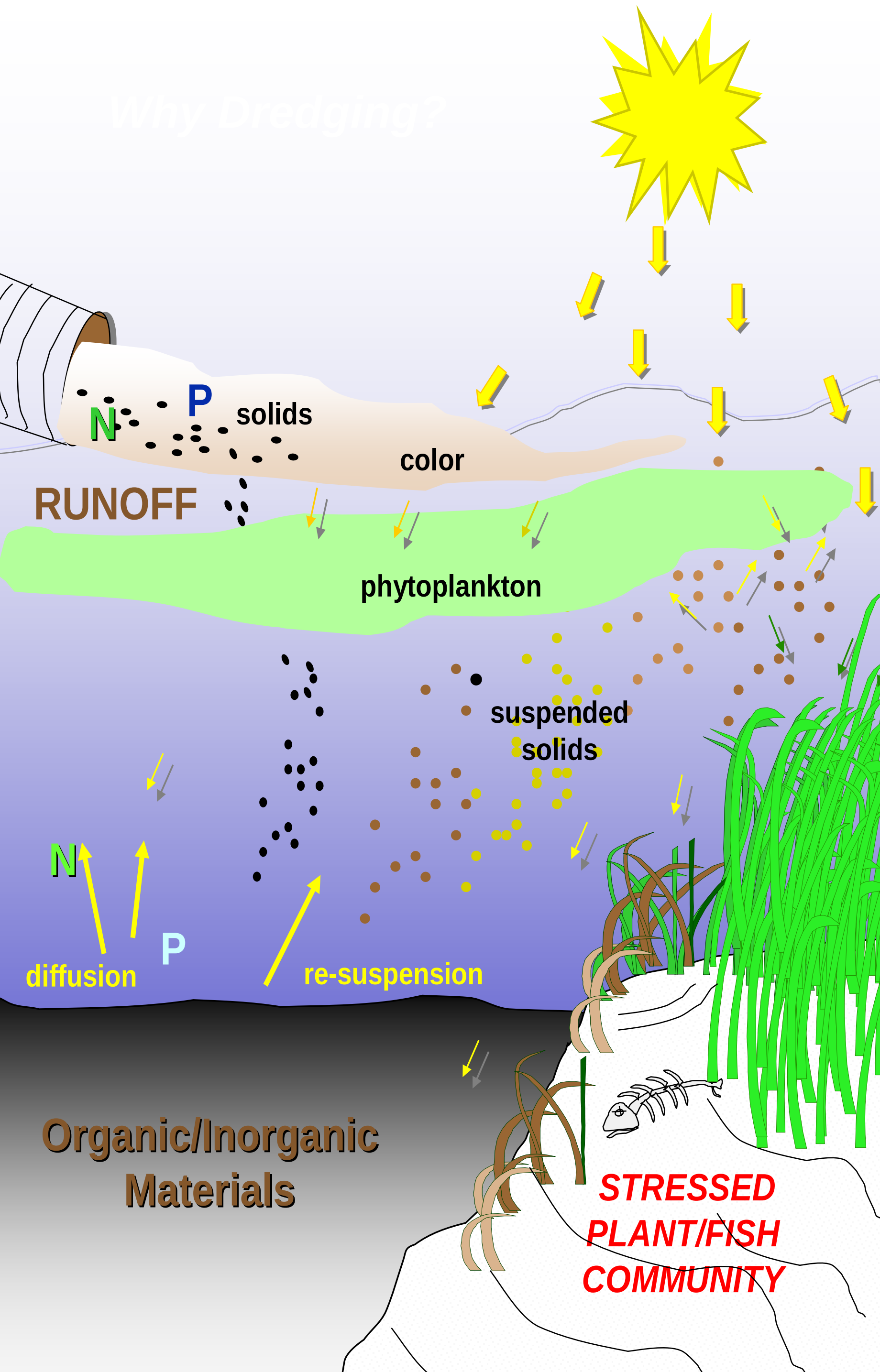
PROS < CONS ……. DECISION (YES or NO)

To Dredge... or Not to Dredge...

The continued need to dredge lakes, rivers, and canals in Florida, both for maintenance and environmental improvement, will produce millions of cubic meters of dredged materials.

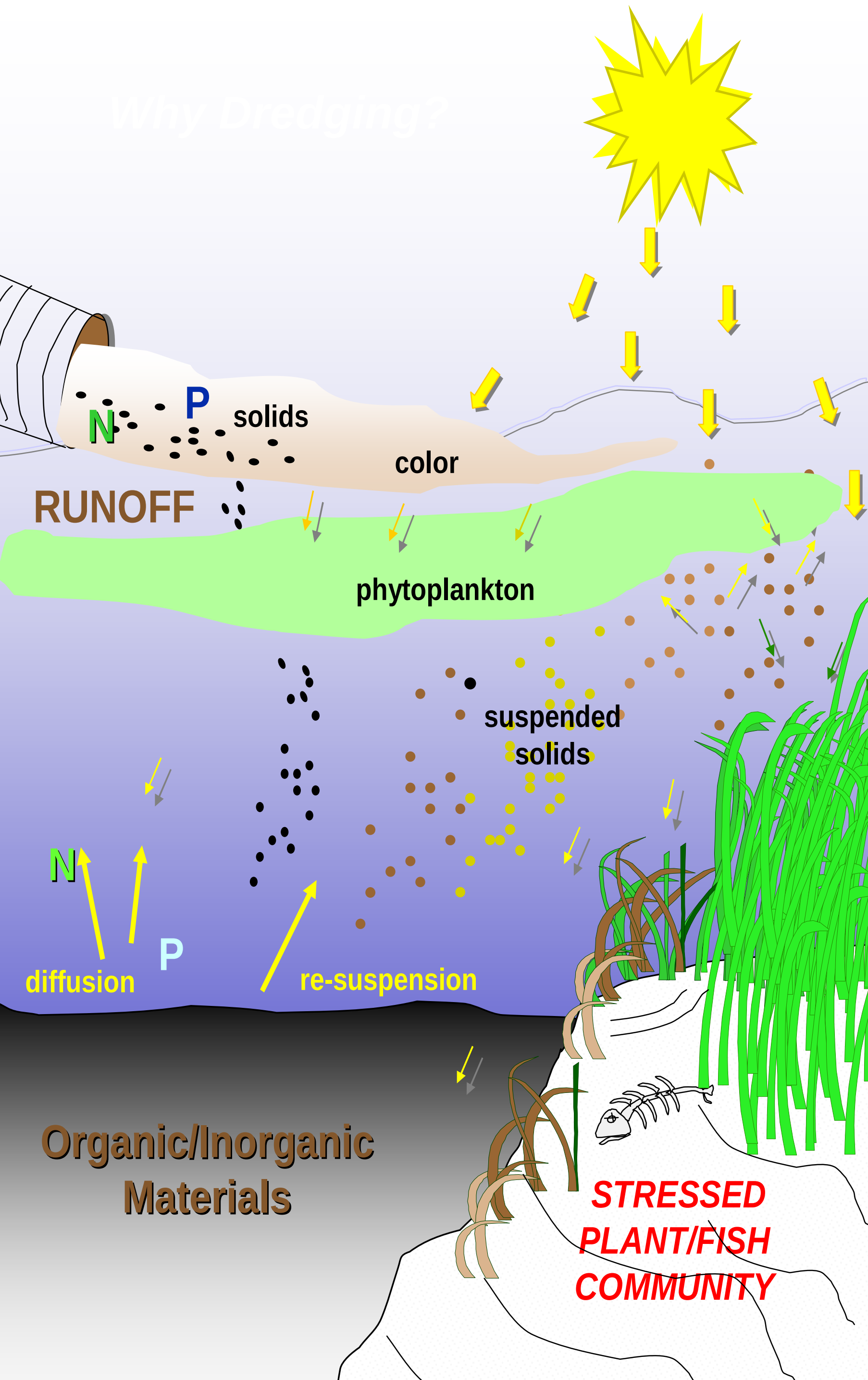



Typical Lake in Florida –
Receiving Runoff from all
locations around the lake



BUILD-UP OF ORGANIC/INORGANIC SEDIMENTS... WHY?

- ***Easily resuspended and thereby increases water turbidity.***
- ***Increased turbidity leads to decreased growth of biological community***
- ***Depletes oxygen due to massive bacterial activity.***



BUILD-UP OF ORGANIC/INORGANIC SEDIMENTS... WHY?

- *Serves as a depository for many nutrients and pollutants such as heavy metals.*
- *In some areas, nutrients stored may be released back into the overlying water to favor eutro-phication.*

“To Dredge… or… Not to Dredge…”

CONS

- ***Dredged materials are often viewed by society and regulators as pollutants.***

- ***Expensive***

- ***Disposal Problem***

"To Dredge… or… Not to Dredge…"

PROS…

… many have used these materials in coastal nourishment, land or wetland creation, construction materials, navigation, and for soil improvement as a soil amendment…

PROS…(Cont'd.)

Dredged materials can be mixed with soil for landfill, road right-of-ways, and other related uses.

PROS… (Cont’d.)

Photograph 14
Bermudagrass-419 Grown in Mixture of Canal Street Cove Sediment and 50% Soil and Canal Street Cove Sediment Only, Both Fertilized

There appears to be beneficial uses of dredged sediments in the horticultural industry, such as a soil composite additive, or nursery soil amendment for landscaping and golf courses turf.

Productive disposal options of lake-dredged materials (DM) may provide substantial and intangible benefits that will enhance the environment, community, and society.

A plan was developed to restore Lake Panasoffkee by removing natural sediments from the lake bottom to improve the fishery and navigation in the lake.

- ***Southwest Florida Water Management District (SWFWMD)***
- ***Florida Fish and Wildlife Conservation Commission***
- ***Florida Department of Environmental Protection***
- ***Lake Panasoffkee Restoration Council in Sumter County, FL***

DREDGING: LAKE PANASOFFKEE

- ***About 7.0 million cubic meters (8.6 million cu. yd.) of predominantly calcium carbonate rich materials will be dredged.***

- ***Options are being explored as to the beneficial uses of these sediments.***

DISPOSAL OPTIONS

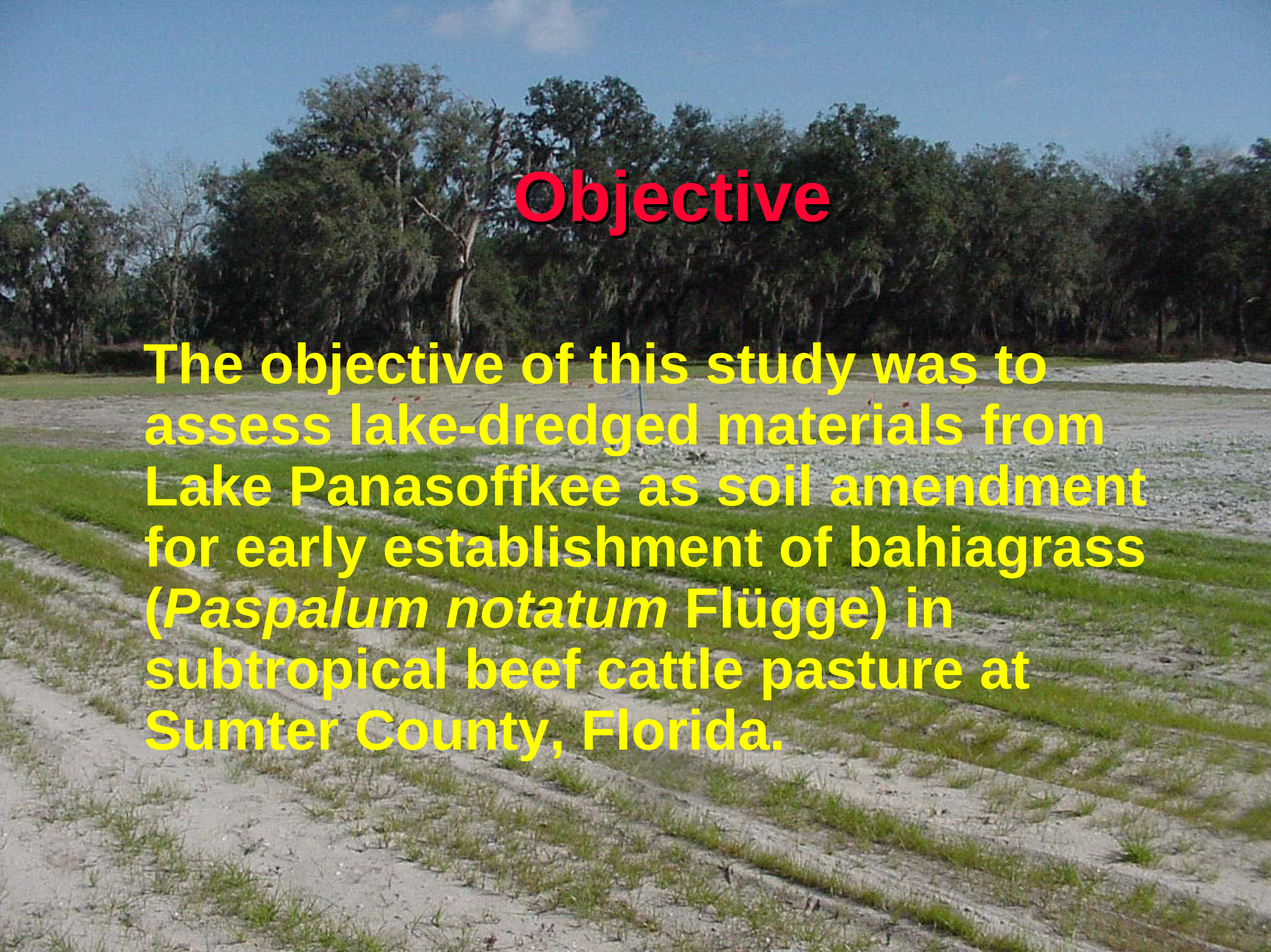
One option would be using the dredged material as a soil amendment for the establishment of Bahiagrass.

- Bahiagrass - general-use pasture grass, tolerate a wide range of soil conditions, and withstands low fertilizer input.

- Ability to produce moderate yields on soils of very low fertility, easier to manage than other improved pasture grasses.

Goal

The goal of this study was to explore the use of the Lake Panasoffkee dredged sediments to improve the physico-chemical properties of existing sandy soils in subtropical beef cattle pastures with calcium carbonate- and organic-enriched dredged materials.

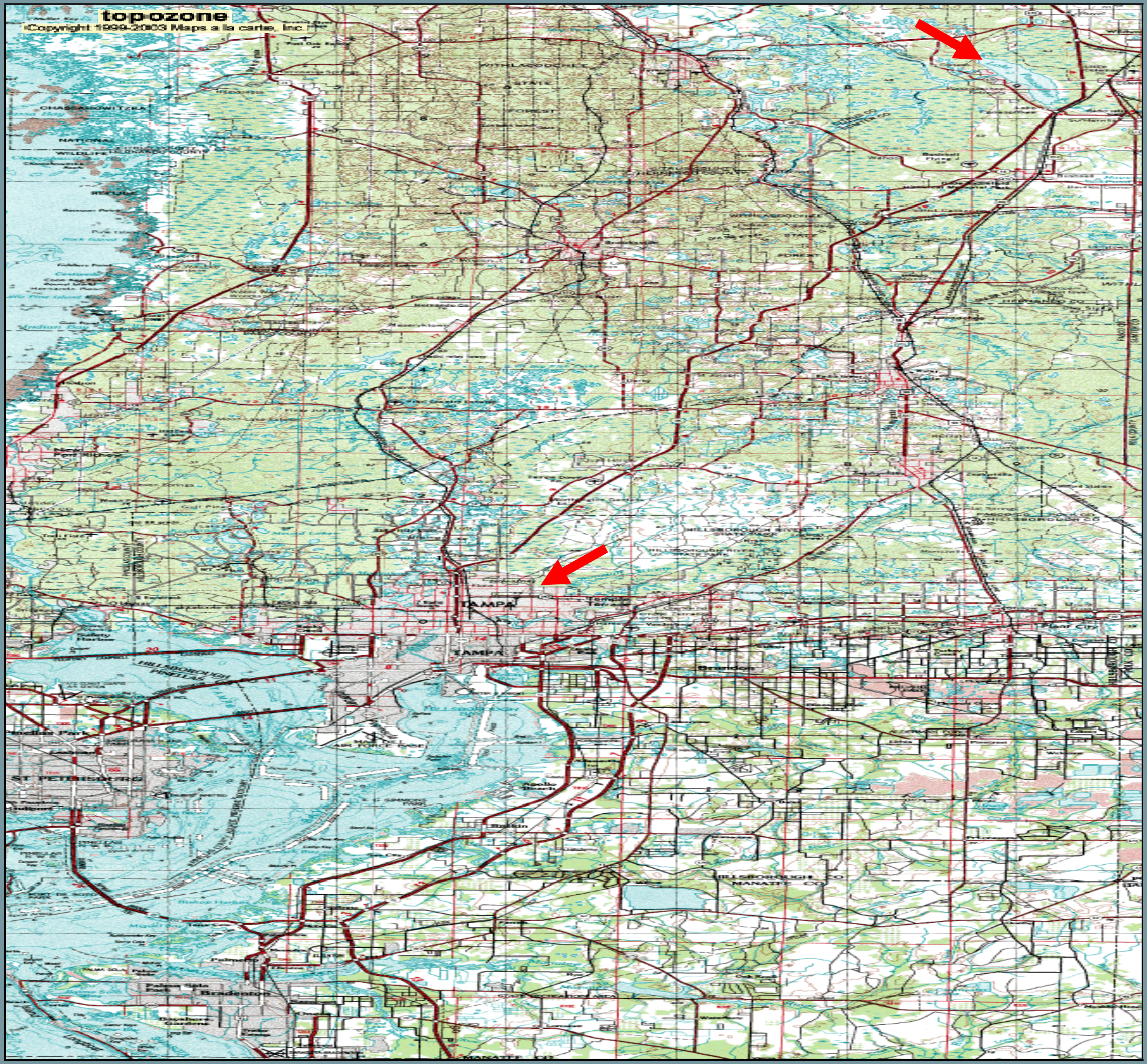


Objective

The objective of this study was to assess lake-dredged materials from Lake Panasoffkee as soil amendment for early establishment of bahiagrass (*Paspalum notatum* Flügge) in subtropical beef cattle pasture at Sumter County, Florida.

Project Site Location

- Coleman Landing (28.798ºN; 82.103oW), Sumter County, Central Florida.
- Soils - formed in sandy marine or eolian deposits and have water table at a depth of 102 to 203 cm for more than 6 months during most years. Hyperthermic, uncoated Typic Quartzipsamments



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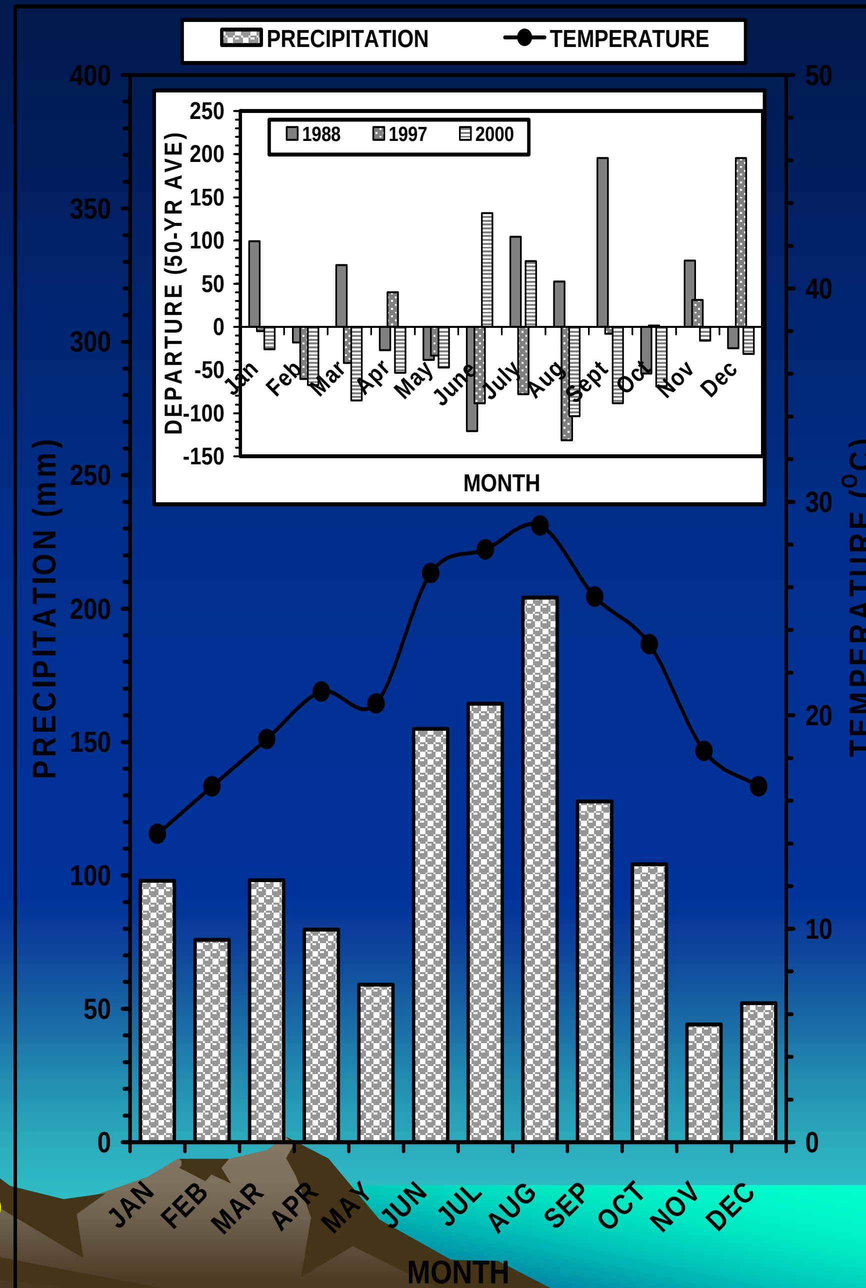
Land Use & Climate

➢*Cattle raising – principal agricultural activity in the county. Beef production – leading income producer. Other crops – watermelons, tomatoes, cucumbers, bell pepper, squash.*

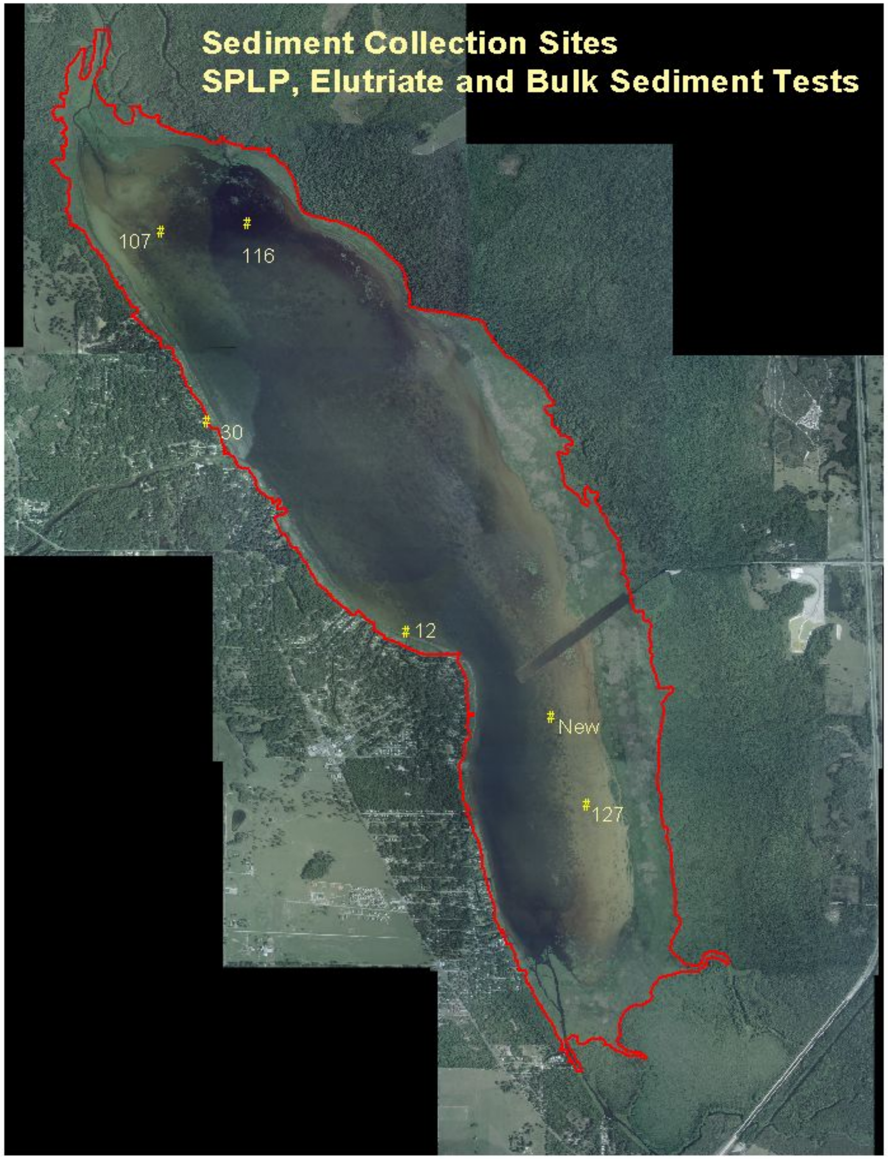
➢*Climate: long, warm, and relatively humid summers and mild, dry winters. Average total annual ppt was about 1,191 mm with approx. half (56 %) this amount occurring during the mid-June through mid-Sept. period.*



DREDGING AND DREDGED MATERIALS

Hydraulic suction dredging typically involves excavating the deeper, largely uninhabited sediments and depositing them on top of the ecologically productive surface substrates. One such dredging project of the CL boat ramp and adjacent Lake Panasoffkee was completed in July 2000.

Sediment Sampling Sites



Flowers Chemical Lab. Inc. – performed the physical amd chemical analyses of dredged sediments from Lake Panasoffkee

Parameter	Unit	Natural Soil	Lake-Dredged Soil Materials
pH		5.9 ± 0.01	7.8 ± 0.2
Soil Organic Matter	%	4.5 ± 2.2	
Potassium	mg kg^{-1}	33.9 ± 11.6	4.3 ± 1.8
Total Phosphorus	mg kg^{-1}	20.6 ± 38.9	1.6 ± 1.2
Total Nitrogen	mg kg^{-1}	2.9 ± 1.5	6.9 ± 0.3
Magnesium	mg kg^{-1}	66.2 ± 29.2	
Copper	mg kg^{-1}	0.2 ± 0.4	
Iron	mg kg^{-1}	4.9 ± 10.0	
Aluminum	mg kg^{-1}	83.4 ± 70.1	
Sodium	mg kg^{-1}	25.1 ± 18.7	
Ca (as $CaCO_3$)	%		82.8
Mg (as $MgCO_3$)	%		0.9

Parameter	Unit	Mean	Threshold Effect Levels	Probable Effect Levels
Iron	mg kg^{-1}	710.0 ± 1.3		
Silicon	mg kg^{-1}	490.0 ± 1.2		
Copper	mg kg^{-1}	8.7 ± 1.2	18.7	108
Zinc	mg kg^{-1}	7.0 ± 0.6	124	271
Cadmium	mg kg^{-1}	2.5 ± 0.1	0.7	4.2
Lead	mg kg^{-1}	5.2 ± 1.3	30.2	112
Nickel	mg kg^{-1}	14.6 ± 6.4	15.9	42.8
Chromium	mg kg^{-1}	40.5 ± 2.1	52.3	160
Arsenic	mg kg^{-1}	4.4 ± 0.1	7.2	41.6
Mercury	mg kg^{-1}	0.01 ± 0.02	0.1	0.7
Selenium	mg kg^{-1}	0.02 ± 0.02		
Molybdenum	mg kg^{-1}	1.3 ± 0.2		

Threshold Effect Level **represents the concentrations of sediment-associated contaminants that are not considered to represent significant hazards to aquatic organism.**

Probable Effect Level **defines the lower limit of the range of contaminant concentrations that are usually or always associated with adverse biological effects.**

MacDonald (**1994**)

Field Site Preparation

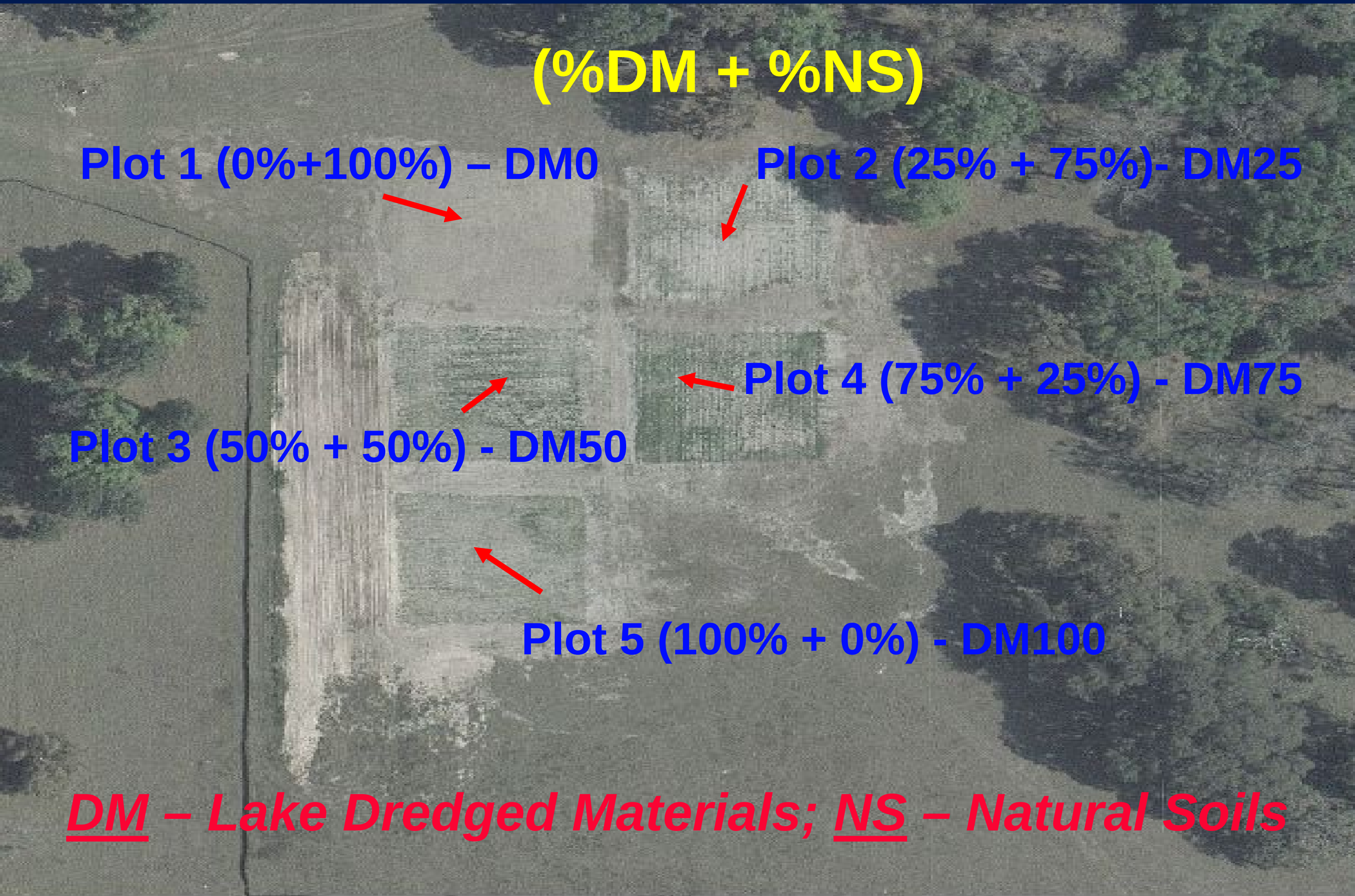
. . . consisted of 5 larger test plots (30.5 x 30.5 m) adjacent to the spoil disposal site . . .

Field Site Preparation (Cont'd.)

- ***Each plot was excavated to a depth of about 28 cm, existing natural soil and organic materials were completely removed.***

- ***Existing vegetation from each plot was totally removed prior to back filling with different ratios of lake dredged materials (DM) and natural soils (NS).***

Plot/Treatment Combinations



Field Site Preparation (Cont'd.)

- ***Natural soils that were excavated were backfilled to each plot along with DM that were hauled from the adjacent settling pond.***

- ***The total amount of DM and NS that was placed back on each test plot was in accordance with the different ratios of DM and NS.***

Field Site Preparation (Cont'd.)

- ***After mixing the NS and DM, each of the test plots was disked to a uniform depth of 28 cm. Plots were disked in an alternate direction until DM and NS were uniformly mixed.***

- Plots were seeded on January 28, 2002.

BIOMASS

- Aboveground biomass of BG was measured at 16, 34, and 78 weeks after seeding, using a double-ring method (Williams and Hammond, 1999).

- Freshly cut aboveground growth was oven-dried (60ºC for 24 hr, USDA-ARS Lab. in Brooksville, FL.


RESULTS
RESULTS
RESULTS


FORAGE YIELD
16, 34, and 78 WEEKS
(Jan 2002 – June 2003)

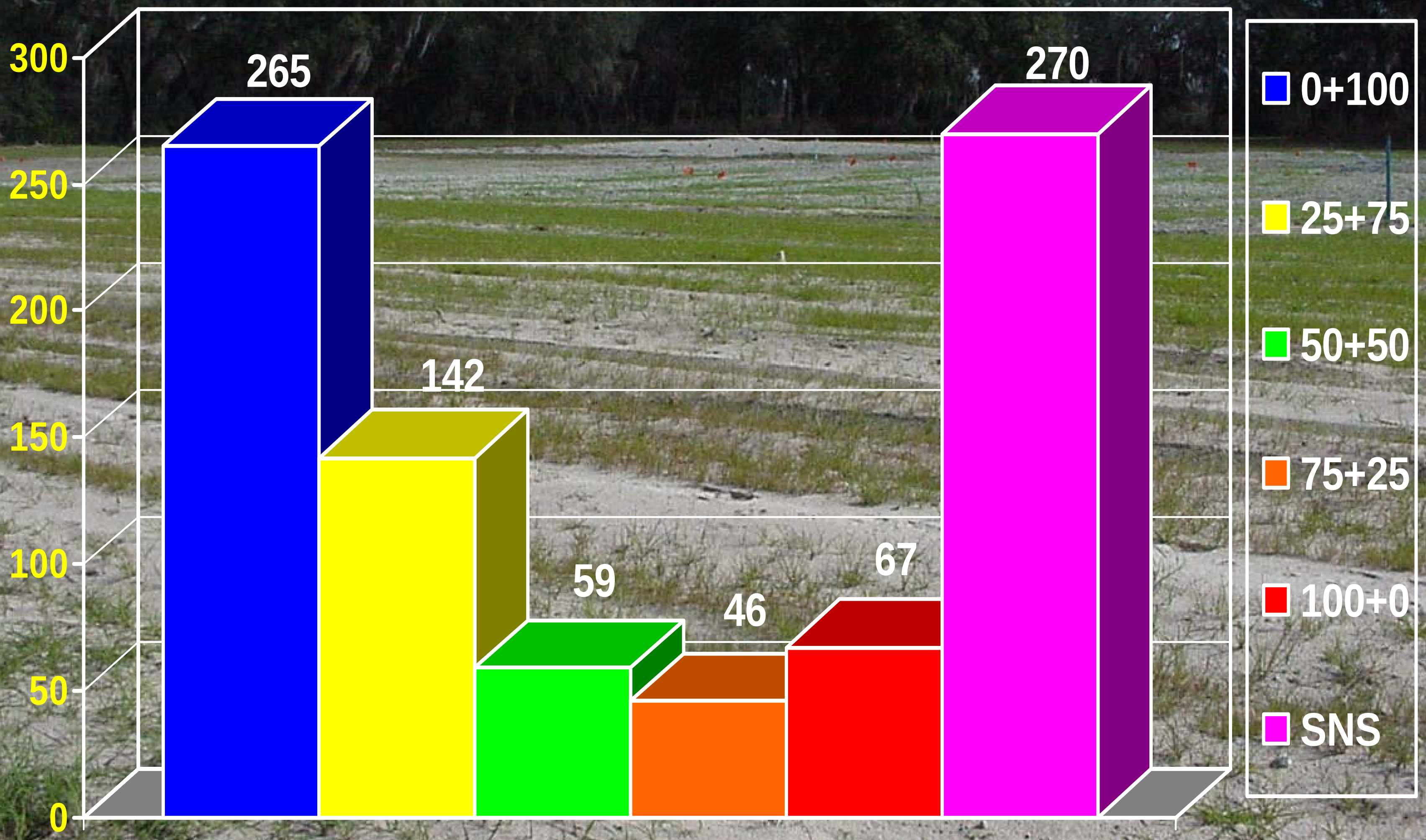
Treatment (%DM + %NS)	16 weeks (kg/ha)	34 weeks (kg/ha)	78 weeks (kg/ha)
0 + 100	89±65d*	1513±166c	1262±116d
25 + 75	378±185c	2409±423b	2780±678c
50 + 50	673±233a	2466±320b	3076±322bc
75 + 25	654±106ab	2764±320b	4109±220c
100 + 0	470±93bc	3349±174a	3804±112ab

*Means on each column followed by same letter(s) are not significantly different from each other at $p \leq 0.05$.


SOIL PHYSICAL
AND CHEMICAL
PROPERTIES
JANUARY 16, 2003
(52 weeks)

DREDGED MATERIALS AND SOIL COMPACTION (psi)

Sept. 23, 2003



Treatment (%DM+NS)	pH	K	Na
0 + 100	5.98±0.1c*	3.6±0.6ab	20.2±1.2a
25 + 75	8.39±0.3ab	0.9±0.3b	23.5±6.2a
50 + 50	8.35±0.1ab	2.8±1.4b	21.3±0.9a
75 + 25	8.17±0.1b	1.8±1.0b	22.5±3.2a
100 + 0	8.54±0.1a	2.5±0.7a	22.1±2.4a

*Means on each column followed by same letter(s) are not significantly different from each other at $p \leq 0.05$.

Treatment (%DM+NS)	Ca	Mg	Zn
0 + 100	105±5.1b*	4.4±2.6b	0.690±0.13a
25 + 75	1963±26a	11.9±0.7a	0.010±0.01b
50 + 50	2040±29a	13.6±1.1a	0.006±0.01b
75 + 25	2009±87a	14.6±1.7a	0.007±0.12b
100 + 0	2030±9a	14.7±0.6a	0.005±0.00b

*Means on each column followed by same letter(s) are not significantly different from each other at $p \leq 0.05$.

Treatment (%DM+NS)	Mn	Cu	Fe
0 + 100	2.86±0.39a*	0.456±0.6a	15.6±0.05a
25 + 75	0.35±0.05b	0.001±0.1b	0.03±0.05b
50 + 50	0.31±0.01b	0.002±0.0b	0.006±0.0b
75 + 25	0.25±0.01b	0.002±0.0b	0.007±0.0b
100 + 0	0.34±0.04b	0.003±0.0b	0.005±0.0b

*Means on each column followed by same letter(s) are not significantly different from each other at $p \leq 0.05$.

Treatment (%DM+NS)	Al	Si
0 + 100	187.23±13.3a*	20.5±2.1b
25 + 75	0.19±0.25b	30.8±8.8a
50 + 50	0.03±0.02b	37.1±1.1a
75 + 25	0.01±0.01b	37.9±2.2a
100 + 0	0.04±0.07b	36.4±1.1a

*Means on each column followed by same letter(s) are not significantly different from each other at $p \leq 0.05$.

SUMMARY

- *Results demonstrated favorable/ beneficial effects of added DM on BG establishment ;*

- *Initial improvement on the physical and chemical conditions of subtropical sandy pastures;*

SUMMARY (Cont'd.)

- *DM dredged from Lake Panasoffkee contained neither materials that would not classify them as a human risk nor would require expensive waste handling and disposal; and*

SUMMARY (Cont'd.)

- ***DM should be regarded as a beneficial resource, as a part of the ecological system.***

Looking Ahead….

To continue the study…, to explore and assess the long term efficacy of DM on productivity and quality of BG beyond its early establishment stage in subtropical beef pastures.

ACKNOWLEDGEMENT

- **Southwest Florida Water Management District – Financial Support**
- ***Lesley Touchton*** **and** ***Joel Deangelis*** **(SWFWMD) – Field Assistance and Field Site Maintenance**
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thank you!!!!
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RESEARCH STATION
BROOKSVILLE, FL