HARVESTING HIGH FLOW WATER FOR INDUSTRIAL USE TRVWMD

Jonathan W. Pote, professor and department head emeritus
Charles L. Wax, professor and state climatologist emeritus

OUTLINE

- Introduction to our research
- Catfish ponds
- On-farm precipitation capture
- Flood water harvest

CLIMATE AND WATER DESIGN

- Testing new water designs using massive amounts of data
- “If this had been here for the last 50 years, this is how it would have performed”

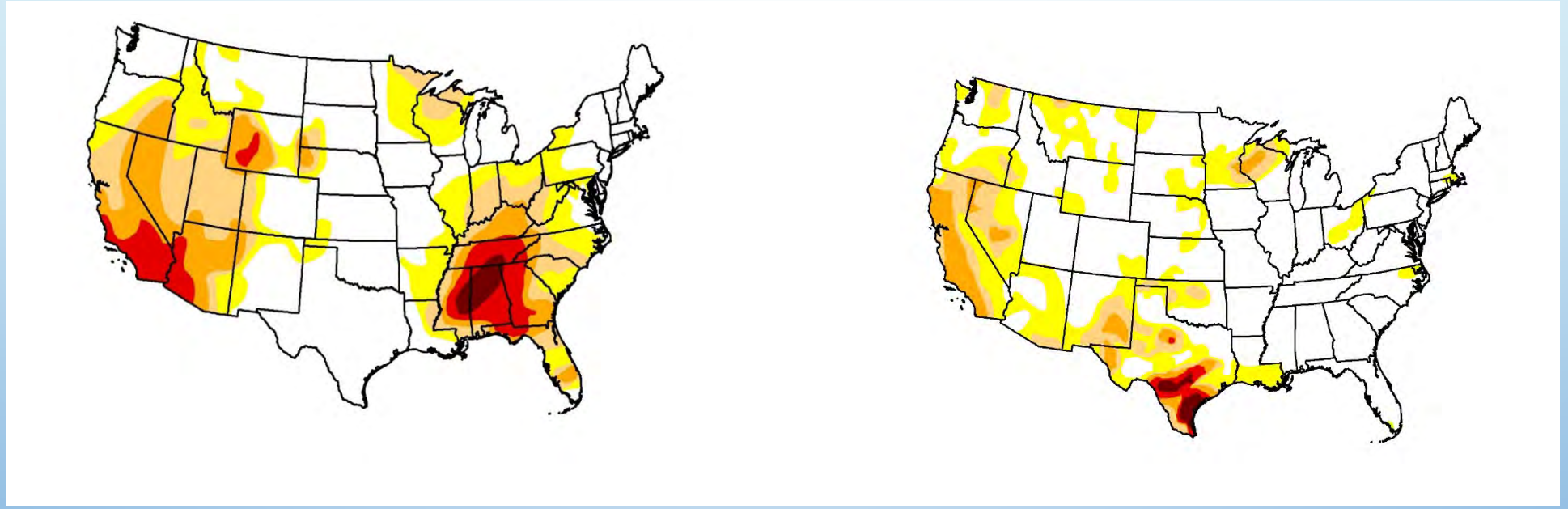
Mississippi—Humid Subtropical Climate:

mild winter
long, hot summer
rainy all year (no distinct wet or dry season)

BUT,

MISSISSIPPI CLIMATE "FEAST OR FAMINE"

June 19, 2007



Jan-May = 10"

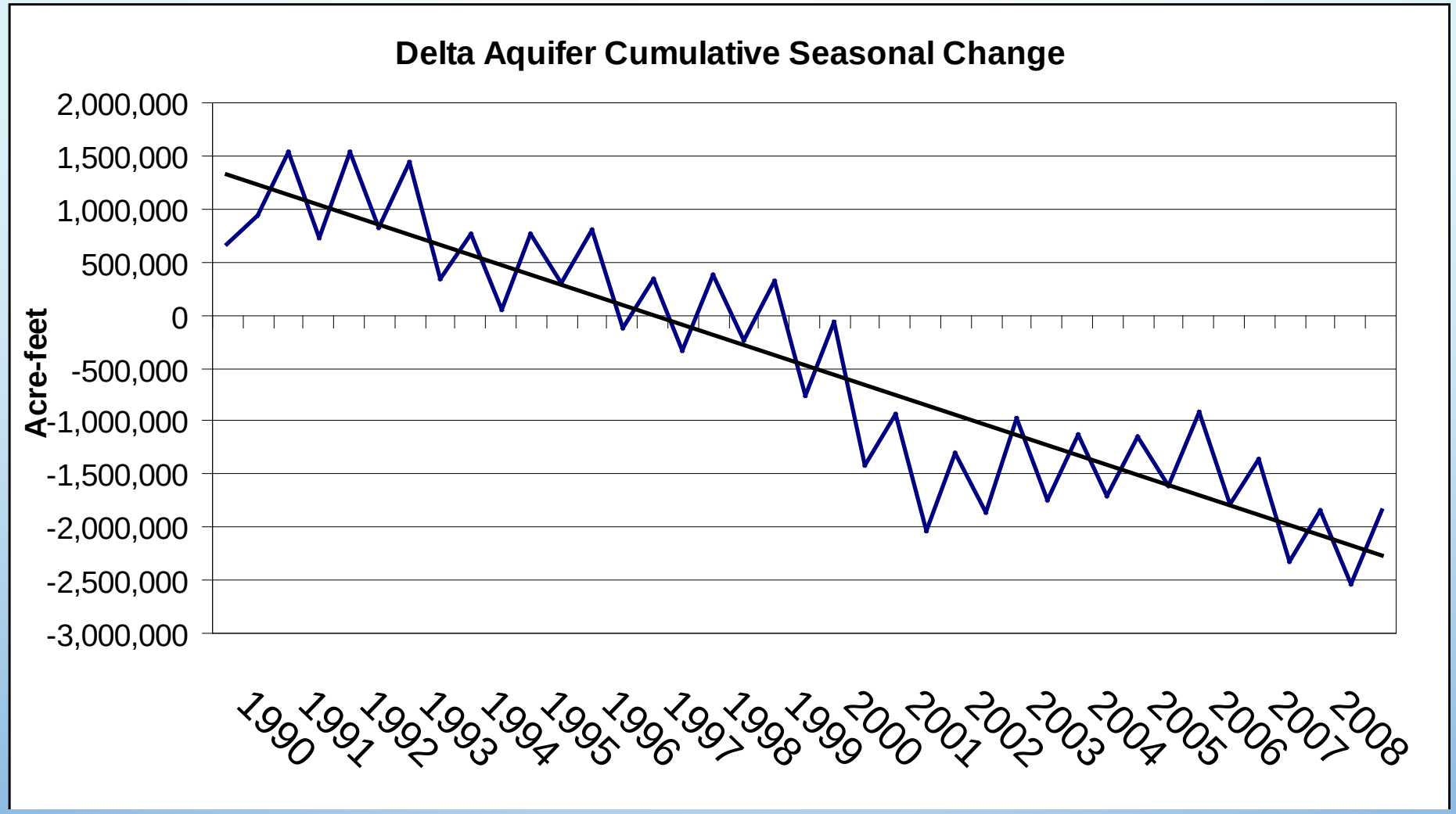
1% chance less than 11"

June 16, 2009

Jan-May = 39"

5% chance more than 38"

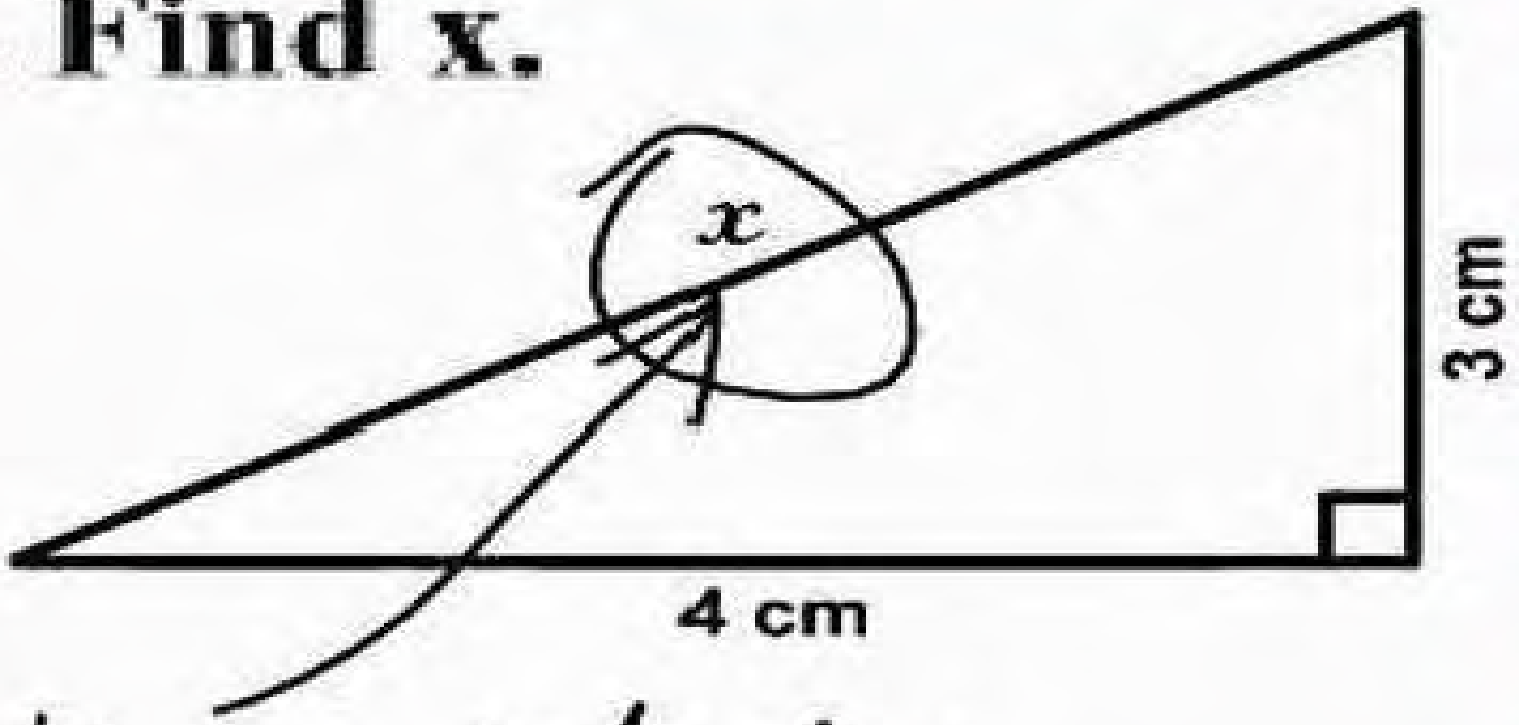
PROBLEM



- **Alluvial aquifer experiencing long-term decline due to the increasing demand for irrigation**

Research--finding solutions!

3. Find x.

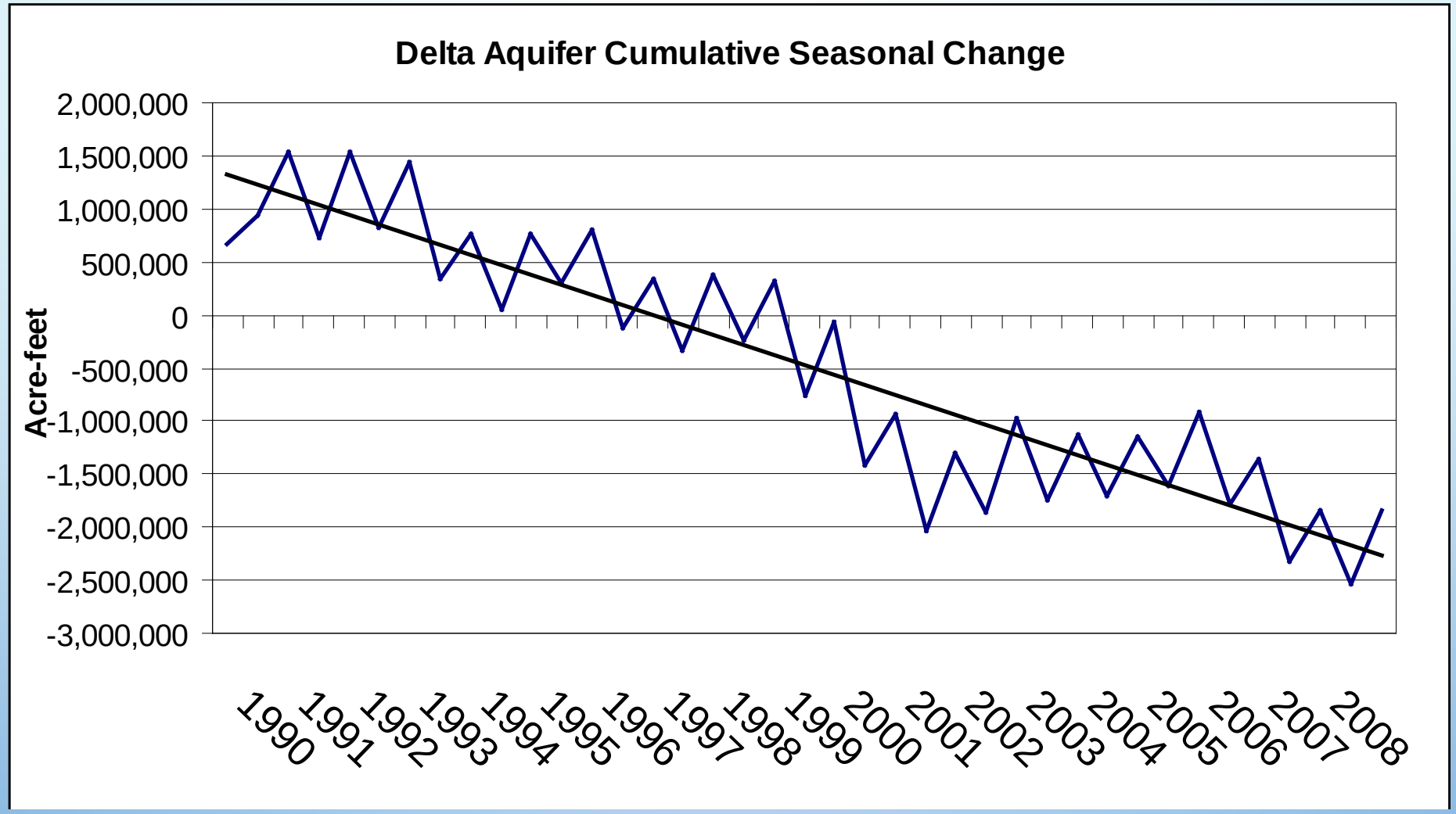


Here it is

Question: can groundwater be conserved in aquaculture in the U. S. Southern region by using a management scheme which *captures* and *stores* precipitation in the ponds?

First research into capturing rainfall to use in place of groundwater, 1988--a management plan to conserve groundwater in aquaculture ponds in the southern U.S.

This again--1988 drought showed vulnerability of aquifer



- **Aquaculture very visible user of groundwater--unlimited use was threatened**

Aquaculture: a water-intensive food production activity

Nearly 110,000 acres of water surface in 1988


2D
Google
100%
Google Data SIO, NOAA, U.S. Navy, NGA, GEBCO Landsat / Copernicus
Camera: 651 m 33°26'49"N 90°53'41"W 36 m


What's this?

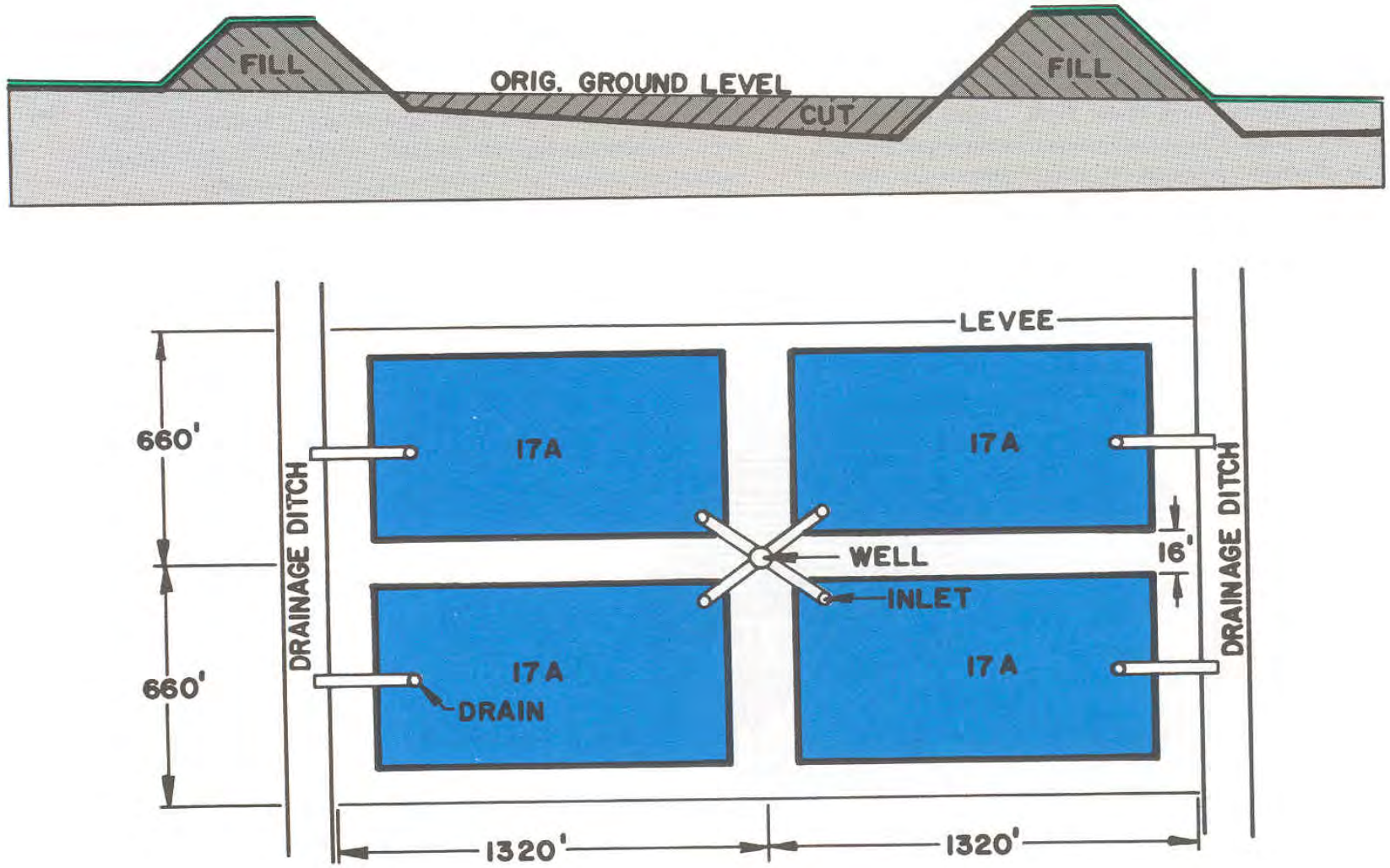


Diagram of a catfish levee pond (upper) and pond layout (lower)

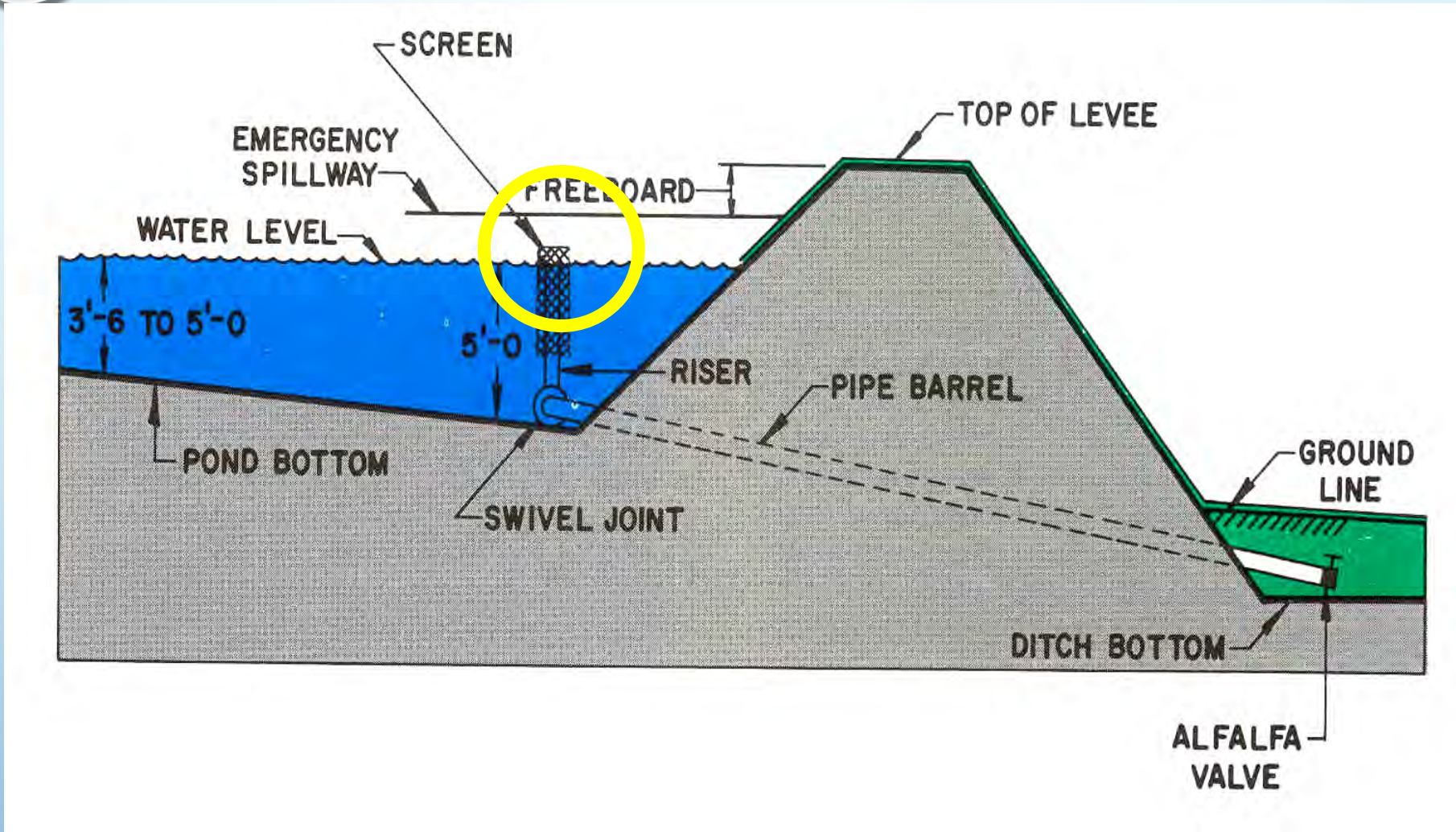
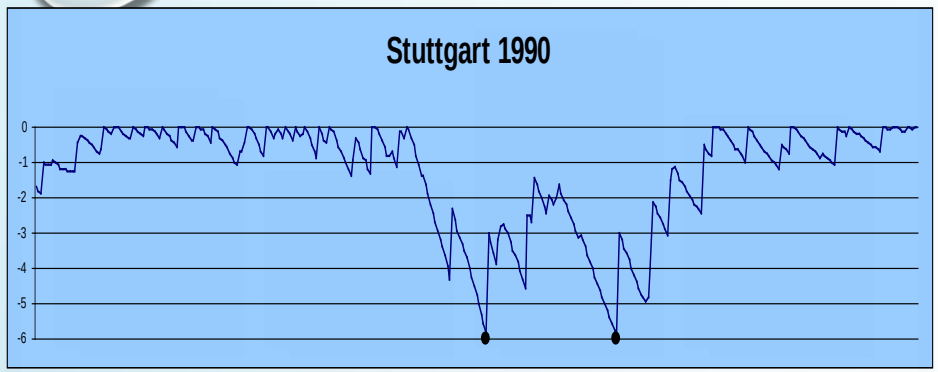
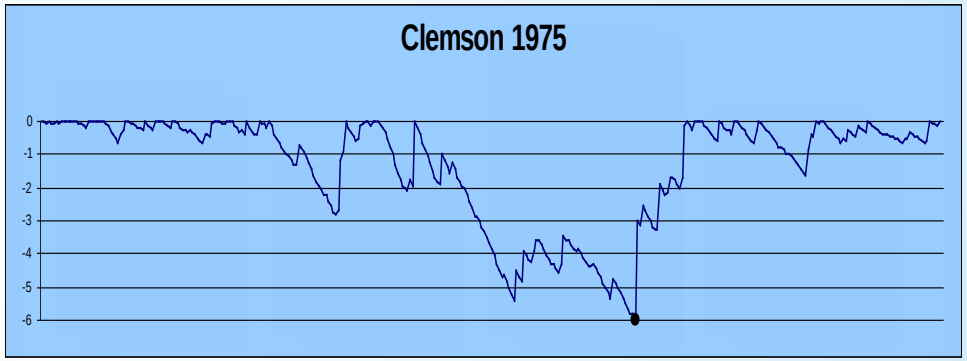


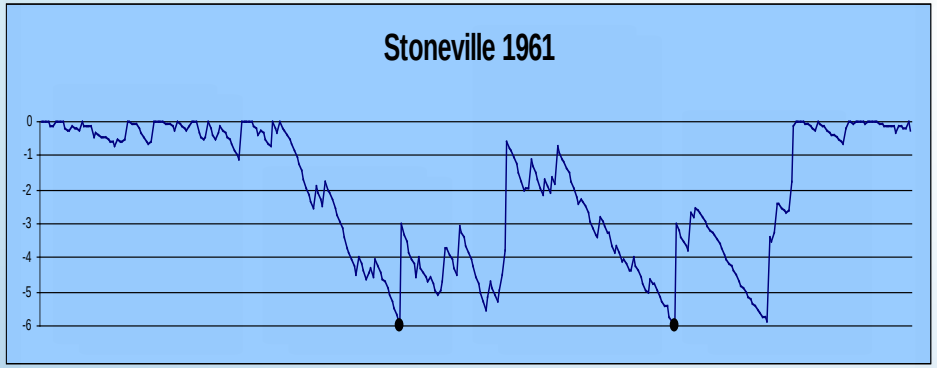
Diagram of catfish pond standpipe and drain

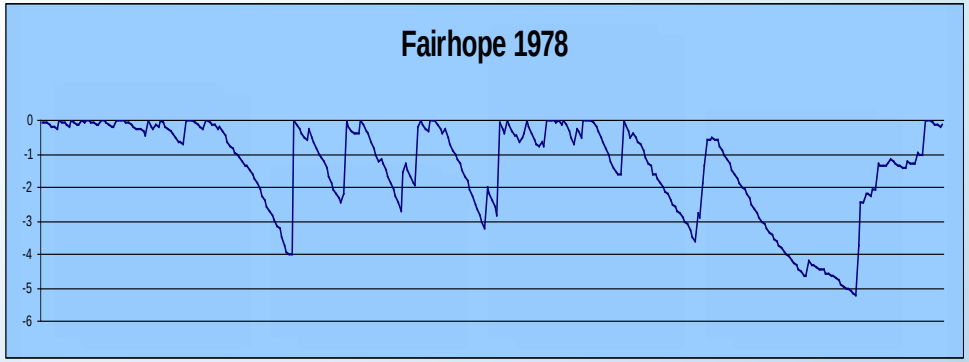
THE 6/3 SYSTEM

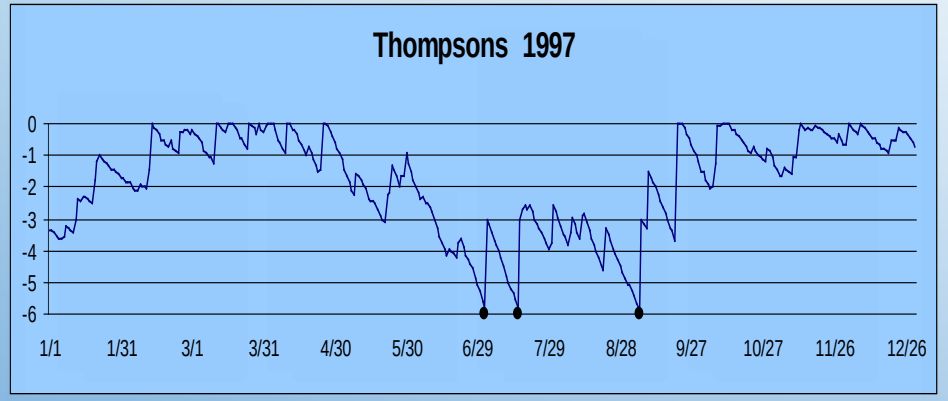
- Should have named it the Pote/Wax system!
- Maximum acceptable drop of water level 6”
- Largest expected rainfall event 3” (90% of time less than this)
- Let evaporate 6”, pump back 3”
- Can catch at least 3” of rain at any time
- Ran 40 years of simulation



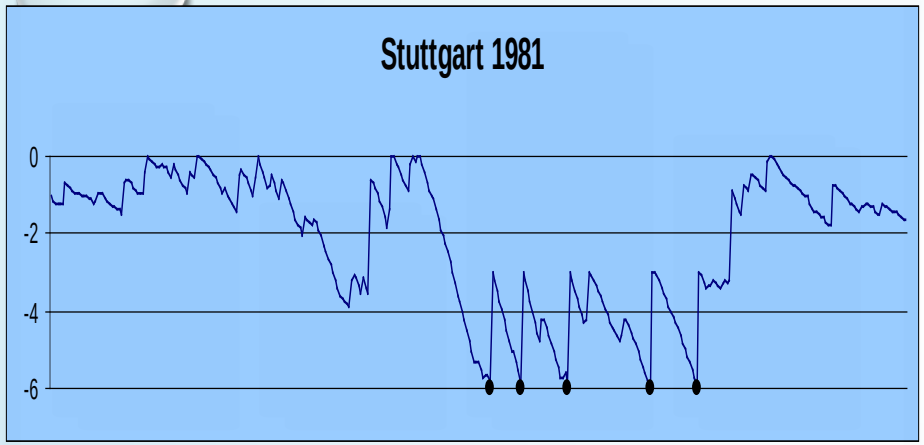


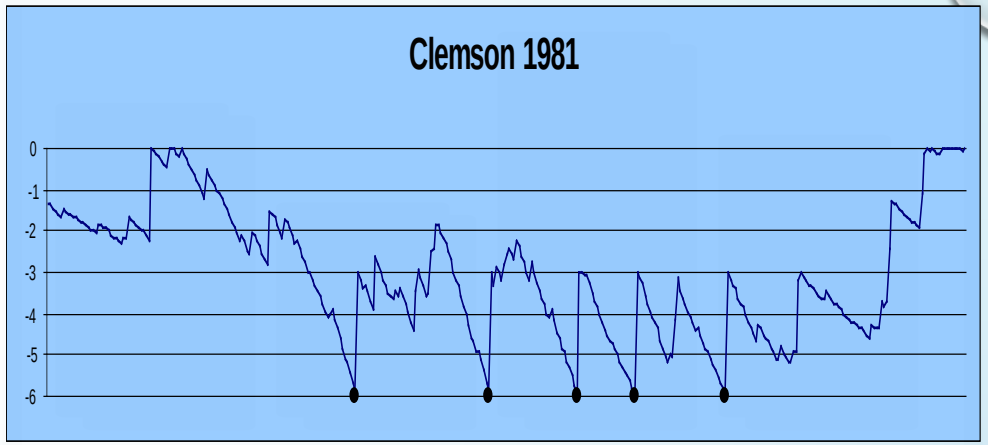


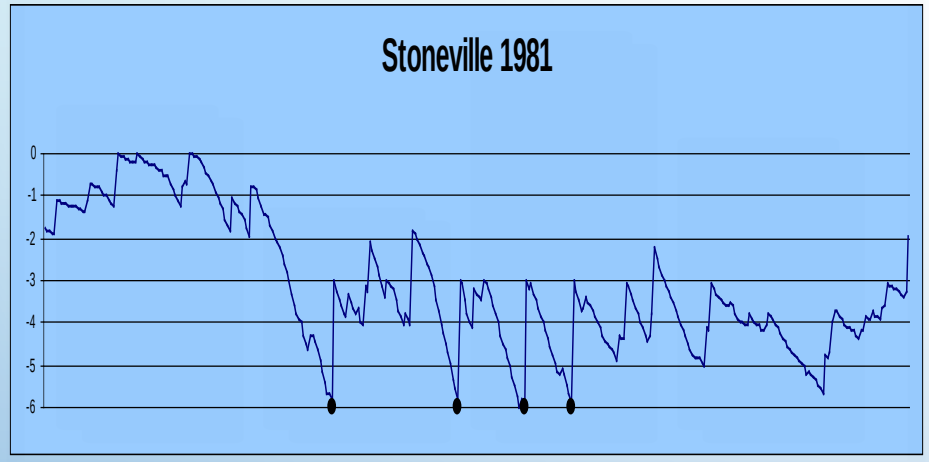


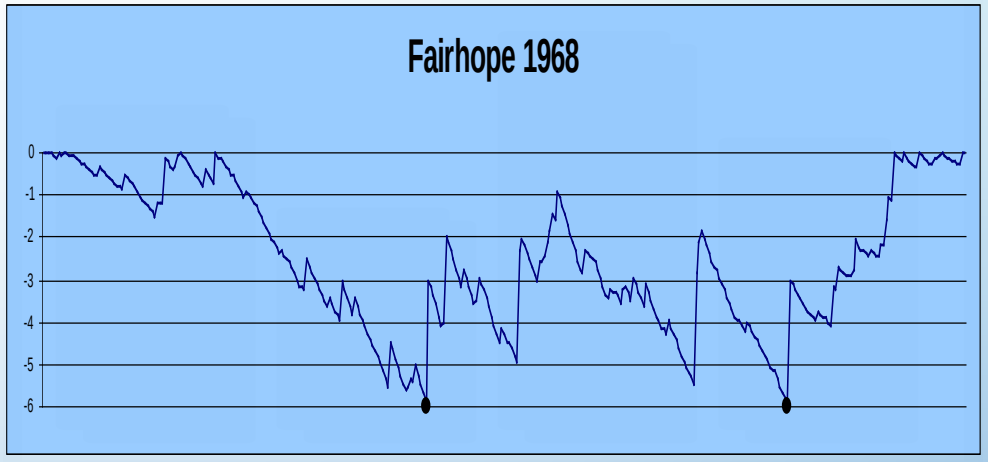


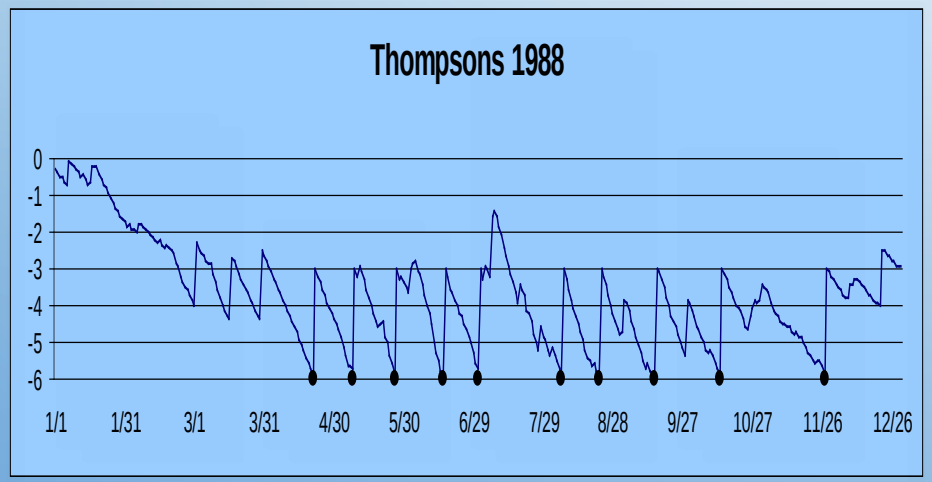
How the management scheme worked in the wettest year











How it worked in the driest year

Forty-Year Averages of Annual Groundwater Use (inches), Two Management Methods, with Conservation Potential Indicated

	"make-up"	"Pote/Wax"	Amount Conserved
Fairhope	34.0	4.0	30.0 (88%)
Clemson	33.9	6.7	27.2 (80%)
Stoneville	40.1	14.5	25.6 (64%)
Stuttgart	39.7	13.5	26.2 (66%)
Thompsons	43.9	15.4	28.5 (65%)
Region Average	38.3	10.8	27.5 (72%)

So capturing and storing precipitation works!!

Forty-Year Averages of Annual Overflow (inches), Two Management Methods, with Reduction Potential Indicated

	"make-up"	"Pote/Wax"	Amount Reduced
Fairhope	56.5	26.5	30.0 (53%)
Clemson	45.8	18.7	27.1 (59%)
Stoneville	42.7	17.1	25.6 (60%)
Stuttgart	38.8	12.6	26.2 (68%)
Thompsons	36.8	8.3	28.5 (77%)
Region Average	44.1	16.6	27.5 (62%)

This saves "wasted" or "lost" precipitation for use in place of groundwater

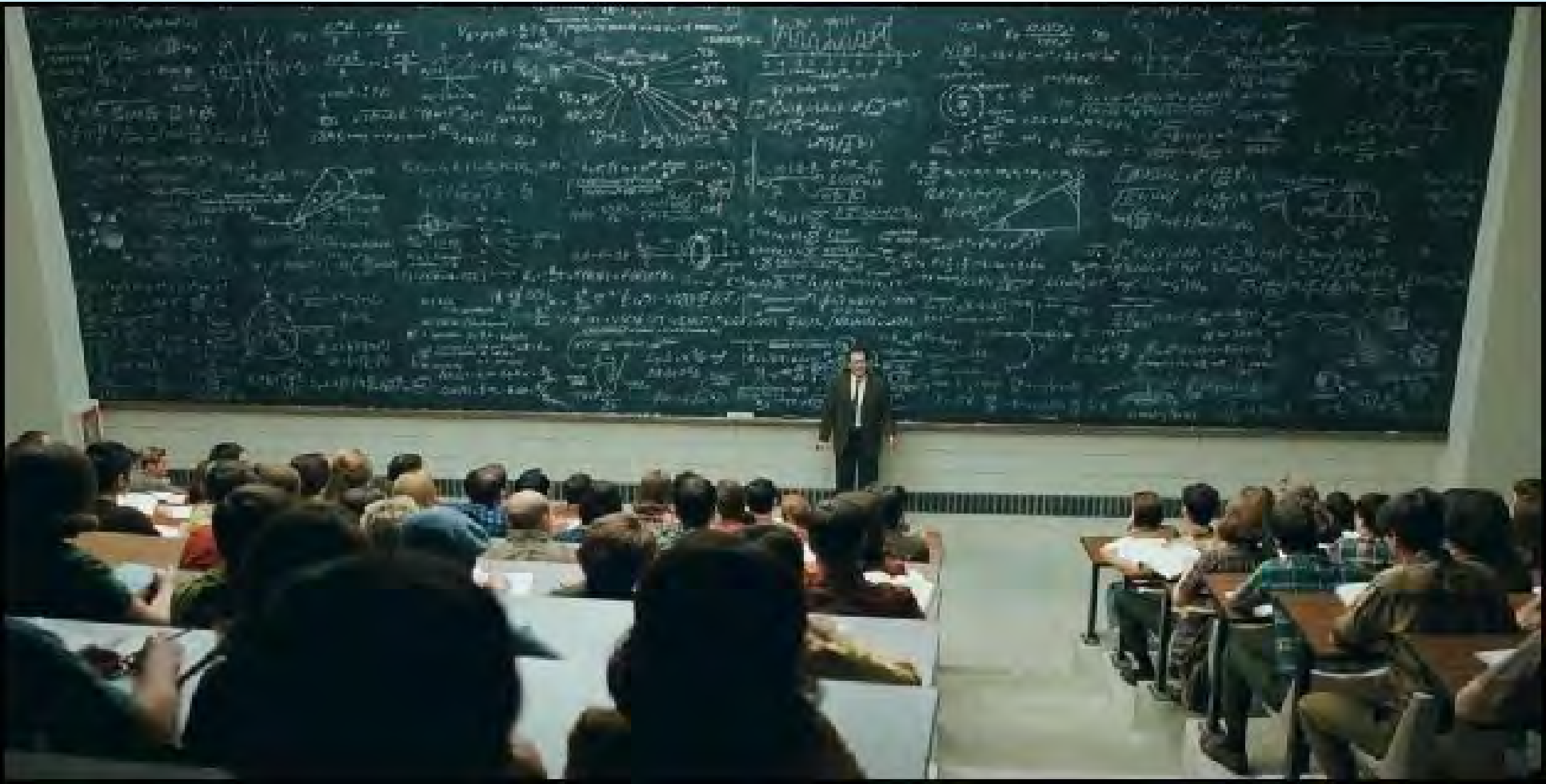
RECAP--CATFISH 6/3 SYSTEM

- **Formally adopted by the Catfish Farmers of Mississippi**
- **Formally adopted by the Catfish Farmers of America**
- **Official USDA recommended best mamagement practice**
- **Funded USDA program**

capturing and storing precipitation to conserve groundwater is a simple yet effective strategy!!

One of “those” moments…

There are worse things than overusing PowerPoint!!



NEW RESEARCH TOPIC—FARM FIELD PRECIPITATION CAPTURE

- **Can excess precipitation be captured and held in fields for use when it gets dry? (Using excess precipitation in place of groundwater, like in the catfish ponds)**

CROPLAND WATER HARVEST

- **Most farms have a drainage ditch that takes *excess* precipitation or irrigation away from the field**
- **Change that into a pond (in real life a deeper canal) to *capture the excess* water**
- **Use captured water to irrigate when needed**

Variability of Mississippi rainfall