

# WRAP UP

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Manejo de humedales para técnicos en  
México II

LAGUNA MEXICANOS CHIHUAHUA

Club Raramuri

4-7 March 2014

# OUR EXPERIENCE

- Intentions are good
- Enthusiasm is great
- Efforts are long and hard

**BUT**

The middle is assumed to be the beginning

Old dogma is reshaped

Spatial scale is determined by ownership

Temporal scale is ignored or not appreciated

# A NEW ERA

- THE CHALLENGE OF MANAGING HIGHLY MODIFIED SYSTEMS
  - THE HOLOCENE IS OVER
  - THE ANTHROPOCENE IS 200 YEARS OLD
- THE INCREASING DEMAND AND USE AND MISUSE OF WATER
- THE APPLICATION OF TECHNIQUES WITHOUT UNDERSTANDING TIME AND SPACE



# MOIST-SOIL MANAGEMENT REQUIRES THINKING

- FOR PLANNING
- FOR DESIGNING
- FOR IMPLEMENTATION
- DECISIONS MUST BE MADE WITH LIMITED INFORMATION
- THINKING IS SHAPED BY OBSERVATIONS
- HIGH LEVEL OF EXPERTISE REQUIRES AN INVESTMENT OF 10,000 HOURS

# Management Challenges

- Identifying sources of information
- Accumulating pertinent information
- Setting objectives
- Embracing variability
- Recognizing dynamics
- Sensitivity to temporal and spatial scale

# KNOW YOUR SETTING

- HISTORIC GEOMORPHIC CONDITION
- HISTORIC HYDROLOGIC CONDITION
- RECENT CLIMATIC CONDITIONS

CHANGES TO THE HISTORIC SETTING

WHAT IS FEASIBLE UNDER THESE  
CONDITIONS



# ESSENTIAL TO IDENTIFY LANDSCAPE SETTING

- **GEOMORPHIC SETTING**
  - GEOLOGY
  - FORMATIVE PROCESSES
  - ABIOTIC PROCESSES
- **HYDROLOGIC CONDITIONS**
  - SURFACE
  - SUBSURFACE
- **CLIMATE**

ILLINOIS

HORSESHOE LAKE

MISSOURI

### EXPLANATION

#### HISTORIC CHANNEL POSITIONS

1944  
1880

1820  
1765

#### PRE-HISTORIC CHANNEL-POSITION STAGES

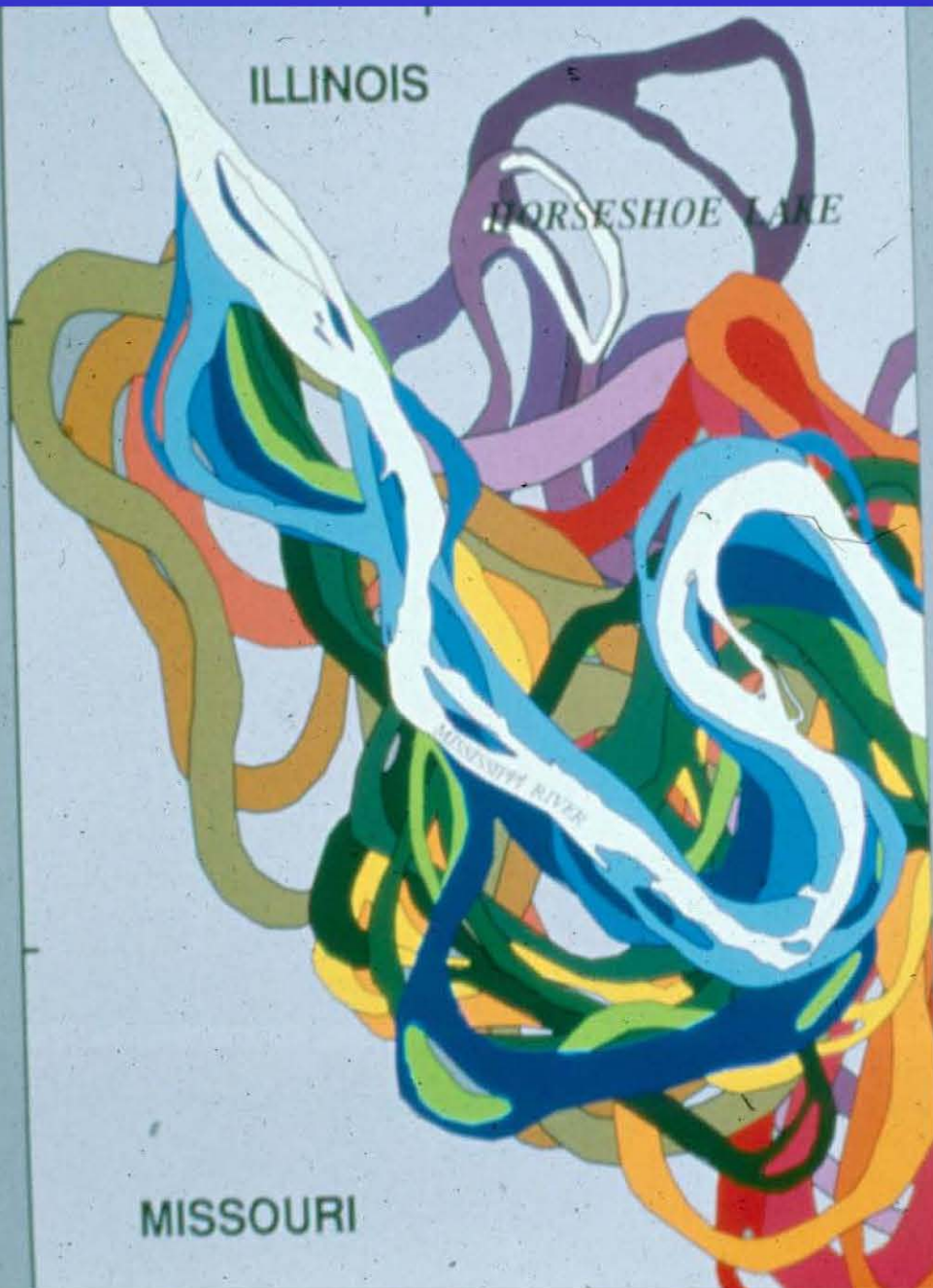
16  
15  
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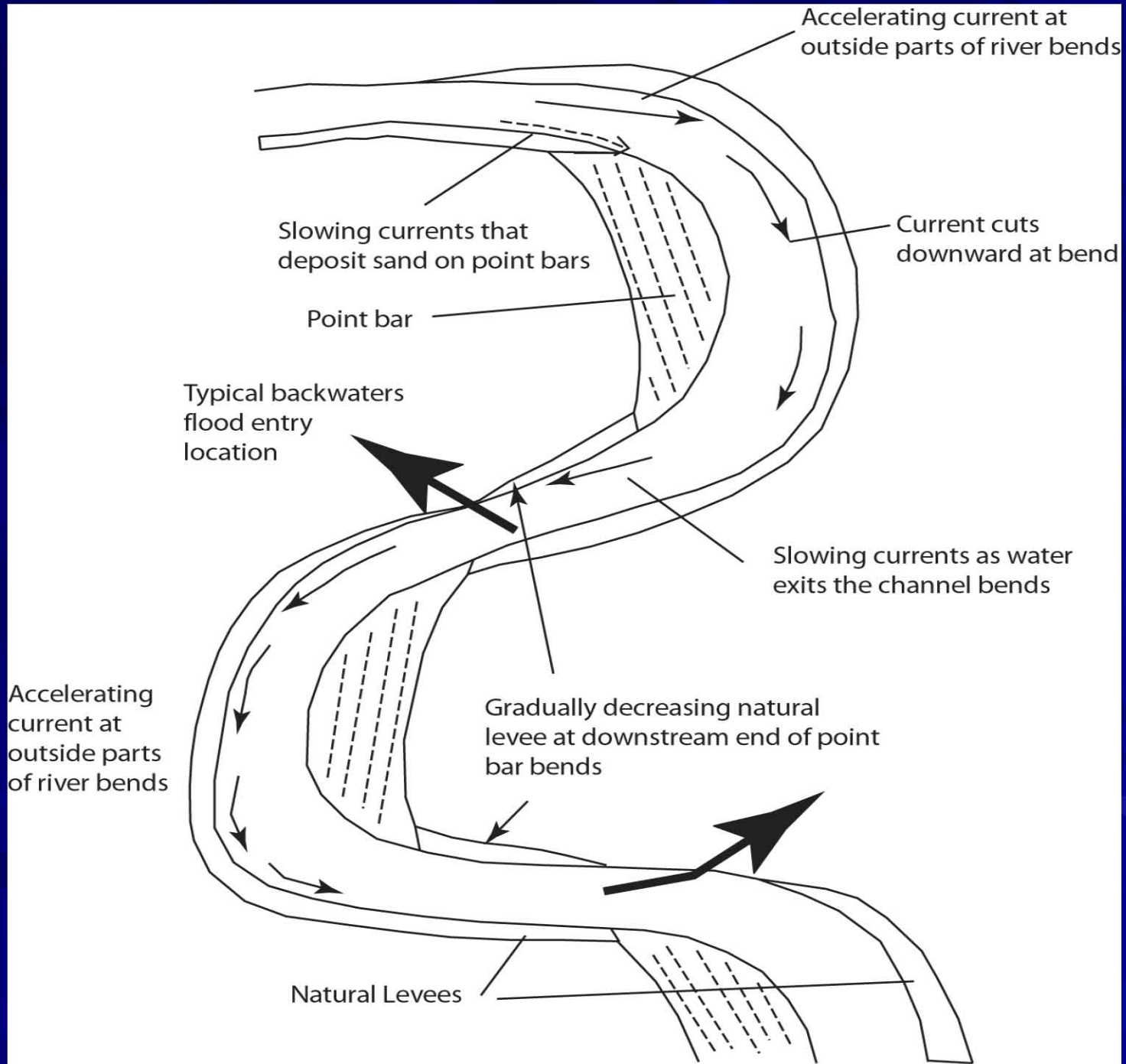
LATE WISCONSIN AND OLDER

1993 POST-FLOOD BANKLINE  
AND LEVEE-BREAK FEATURES

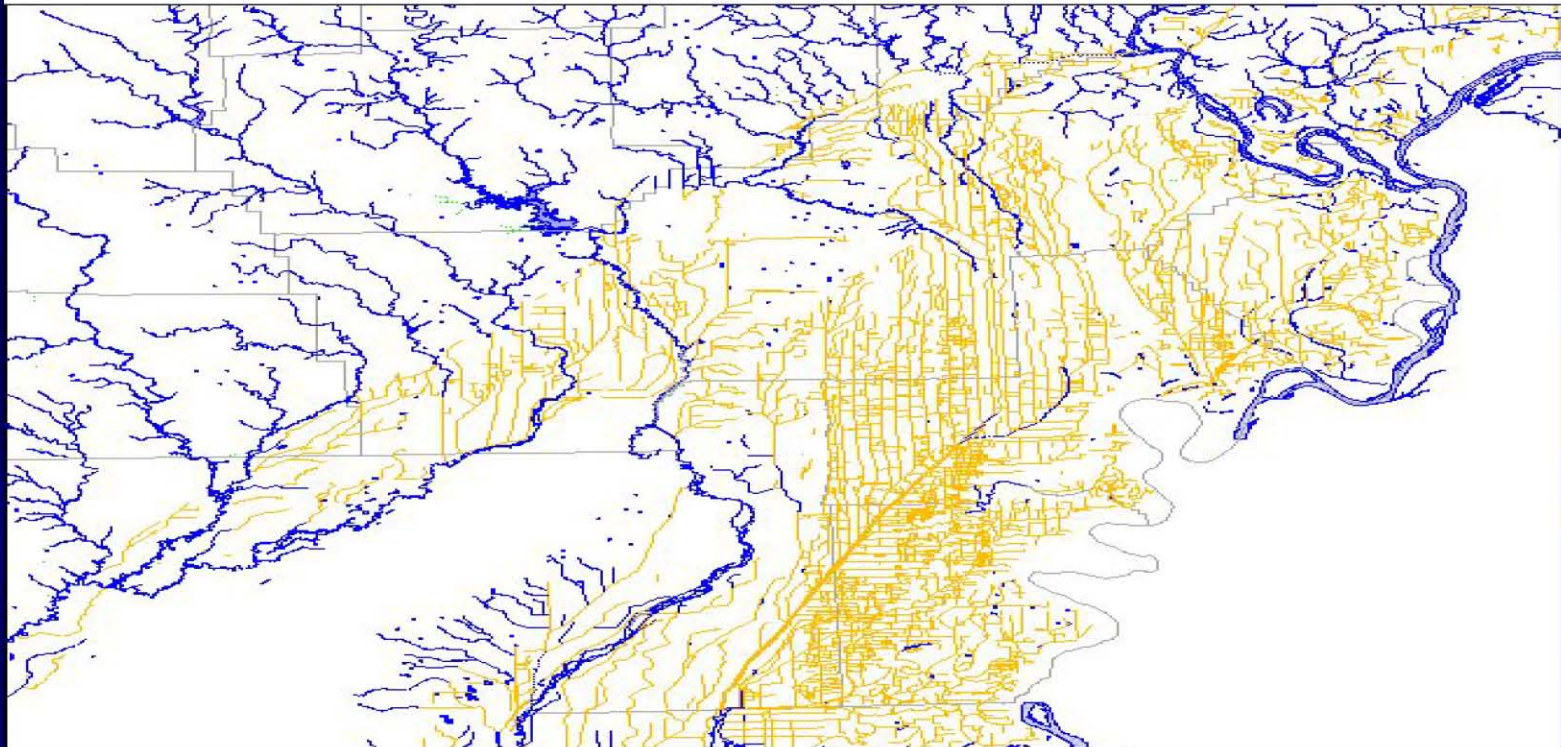
0 2 4 6 KILOMETERS  
0 2 4 MILES







# Southeast Missouri Drainage Ditches



## Legend

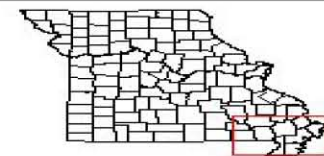
### Perennial Streams

- Stream / River (perennial)
- Stream / River
- Canal / Ditch
- Artificial Path
- Connector
- County boundaries

### NHD Water Bodies

- Lake / Pond (perennial)
- Lake / Pond (intermittent)
- Reservoir (unspecified)
- Reservoir (aquaculture)

- Reservoir (sewage treatment)
- Reservoir (tailings pond)
- Reservoir (unspecified disposal)
- Stream / River (perennial)



0 8 16 Miles



Center for Agricultural,  
Resource and  
Environmental Systems  
University of Missouri

Prepared at the CARES Map Room: <http://maps.cares.missouri.edu/maproom>.  
Please see the website for data sources. Jun 17, 2001

# ABIOTIC FACTORS

- FOCUS ON ABIOTIC FACTORS IN THE CURRENT SETTING
- HOW DO THESE ABIOTIC FACTORS INFLUENCE FOOD PRODUCTION
- HOW DO THESE ABIOTIC FACTORS INFLUENCE THE USE OF FOOD RESOURCES

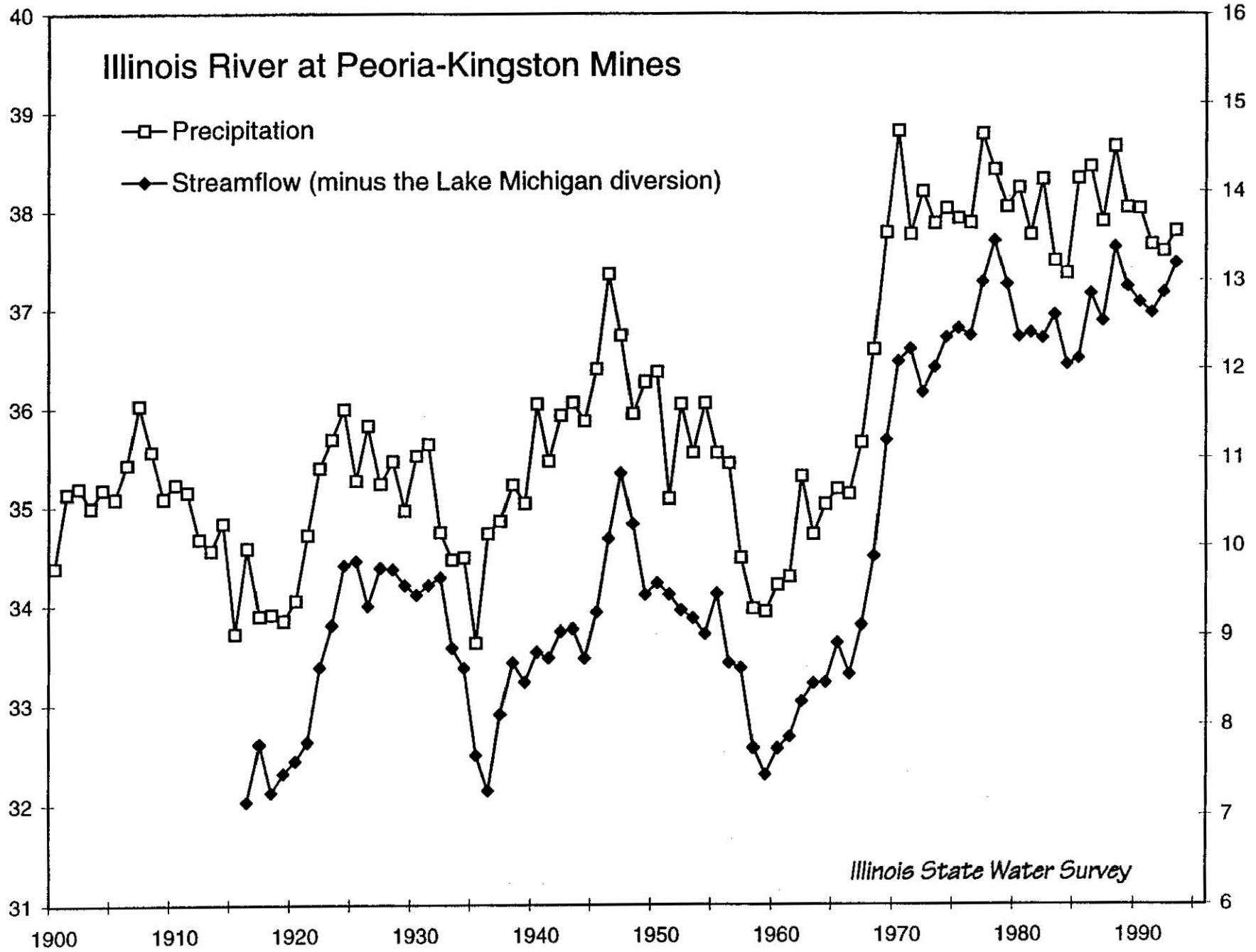


# Illinois River at Peoria-Kingston Mines

- Precipitation
- ◆— Streamflow (minus the Lake Michigan diversion)

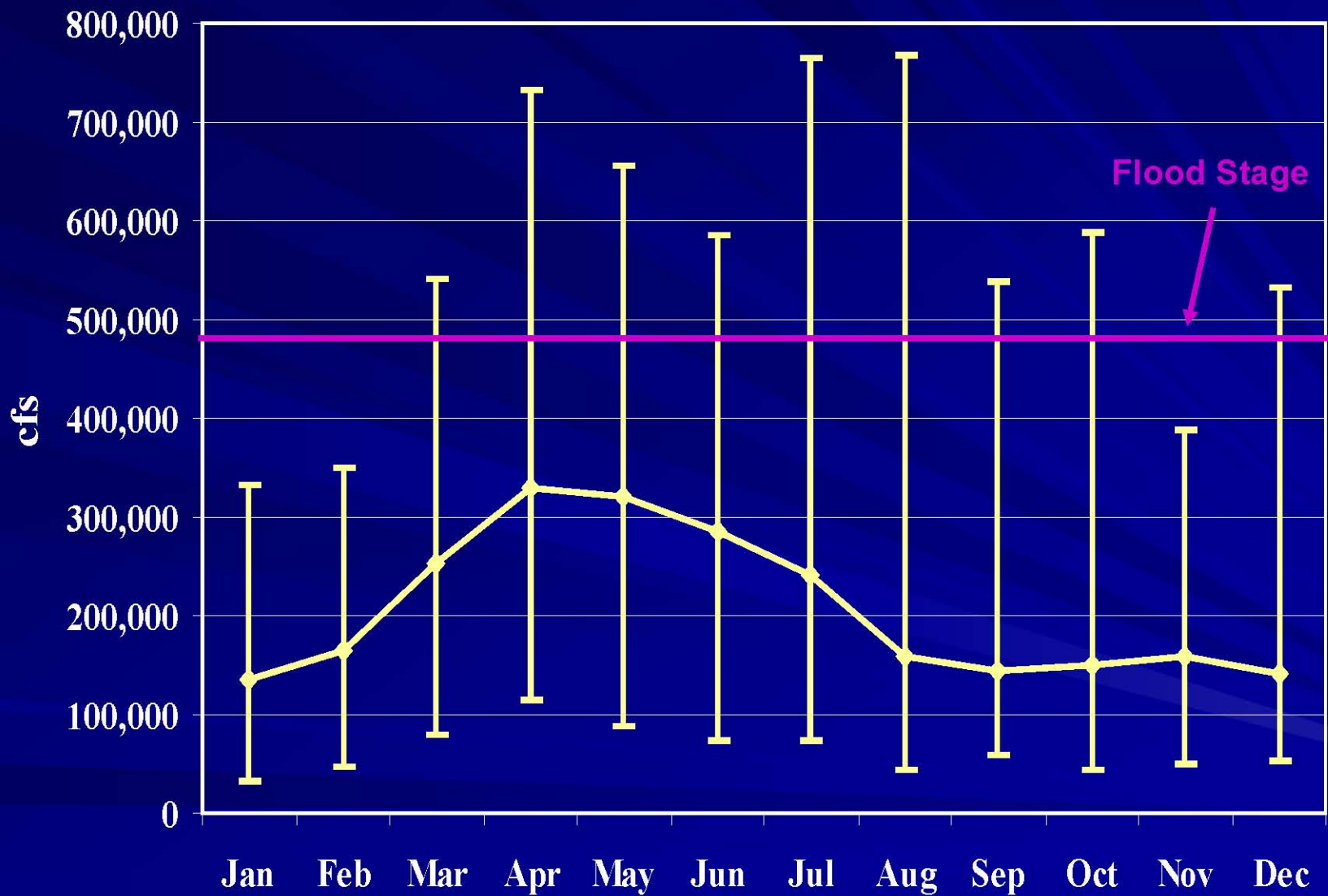
10-Year Average Precipitation (inches)

10-Year Average Streamflow (inches)



Illinois State Water Survey

# Mean monthly discharge of the Mississippi River from 1933-2000



# ECOLOGICAL PERTURBATIONS

- COMPROMISED SHEET FLOW
- CHANGED FLOW PATTERNS
- CONCENTRATED FLOW AT HIGH VELOCITY
- IMPEDED WATER MOVEMENTS
- REDUCED BASE FLOW
- MODIFIED GROUND WATER DISCHARGE
- PLANT AND ANIMAL COMMUNITY CHANGES



# EFFECTS OF STABLE WATER





# EFFECTS OF DYNAMIC WATER REGIME



# CHANGES IN ECOLOGICAL FUNCTIONS

## ■ CHANGED PLANT COMMUNITIES

- COMPOSITION
- DISTRIBUTION
- DYNAMICS

## ■ CHANGED WILDLIFE COMMUNITIES

- OFTEN SMALLER POPULATIONS OF DESIRED SPECIES
- OFTEN LARGER POPULATIONS OF UNDESIRABLE SPECIES
- CHANGES IN DISTRIBUTION



# HYDROGEOMORPHIC SETTING

- I HAD A WONDERFUL EDUCATION BUT THE BASIS FOR THAT EDUCATION WAS ON RESULTS FROM PRAIRIES AND GREAT LAKE SAND DUNES
- MY MENTORS WERE RECOGNIZED AS AMONG THE BEST
- MY CHALLENGE WAS TO APPLY THIS INFORMATION IN A BOTTOMLAND FOREST SETTING

# WE ARE IN THIS TOGETHER

- IT TOOK NEARLY 3 DECADES TO GAIN THE EXPERIENCE TO RECOGNIZE WIDESPREAD MANAGEMENT FAILURES
- I REPRESENT PART OF THE PROBLEM
- THE PUBLIC IS ASKING THE IMPOSSIBLE OF LAND MANAGERS IN DISTRUPTED SYSTEMS



# EDUCATION AND EXPERIENCE

- I HAD A WONDERFUL ACADEMIC EDUCATION
- BUT MY REAL EDUCATION ONLY BEGAN AFTER I CAME TO MISSOURI AND INTERACTED WITH LAND MANAGERS ACROSS A LARGE SCALE (SOMETHING NOT POSSIBLE IN MANY SETTINGS)
- MANAGERS TAUGHT ME ABOUT THE ART FORM OF LAND MANAGEMENT IN A WAY IN WHICH WE LEARNED TOGETHER



# HOW TO MEET THE CHALLENGE

- MAKE DECISIONS WITH LIMITED KNOWLEDGE
- MILLIONS OF DOLLARS AND POWERFUL RESEARCHERS ARE NOT NECESSARILY VALUABLE OR HELPFUL
- DEVELOP EXPERIENCE AND SHARE IT

# HOW DO WE CHANGE??

- START AT THE BEGINNING AND NOT IN THE MIDDLE
- GATHER AND SYNTHESIZE INFORMATION FIRST
- BE SKEPTICAL
- BE PATIENT
- TEST FOR RESULTS BEFORE GOING REFUGE/AREA WIDE

# Wetland Cycle

- Varying lengths from wet to dry
  - 6-7 years in Southern hardwoods
  - 12-15 years in Prairie Potholes
  - 25-30 years in Montane Systems
- Germination requires bare mineral soil
  - Annuals germinate as surface water disappears
  - Some perennials when shallowly flooded or saturated
- Abundance of annuals results in good interspersion of perennials
- Annuals decrease in second year



# WHAT ARE LIFE CYCLE EVENTS AND WHEN DO THEY OCCUR?

- PLANTS
- INVERTEBRATES
- VERTEBRATES

# LINK LIFE CYCLE EVENTS WITH SYSTEM FUNCTION AND PROCESSES

- HABITAT TYPE
- TIMING OF EVENT
- DURATION OF EVENT
- BIOENERGETIC AND NUTRIENT  
NEEDS

# DECISION-MAKING AT DIFFERENCE SCALES

- AT WHAT LEVEL OF INTENSITY WILL THIS TECHNIQUE BE USED
- A DECISION AT THE ADMINISTRATIVE LEVEL THAT DETERMINES WHETHER ACTIONS WILL BE TAKEN AND WHAT PERSONNEL AND EQUIPMENT WILL BE USED OR MADE AVAILABLE



# DECISION-MAKING AT DIFFERENCE SCALES

## AT FIELD LEVEL

- WHAT SPECIFIC ACTIONS WILL BE TAKEN TO EXPOSE BARE MINERAL SOIL?
  - KEEP FLOODED
  - HIGH BIRD USE
  - MECHANICAL
  - FIRE

# DECISION-MAKING AT DIFFERENCE SCALES

## AT FIELD LEVEL

- WHAT SPECIFIC ACTIONS WILL BE TAKEN TO STIMULATE GERMINATION?
  - DRAWDOWN
- WHAT SPECIFIC ACTIONS WILL BE TAKEN TO ASSURE FOOD PRODUCTION?
  - REFLOOD
  - MOW
  - HERBICIDE

# DECISION-MAKING AT DIFFERENCE SCALES

## AT FIELD LEVEL

- WHAT SPECIFIC ACTIONS WILL BE TAKEN TO MAKE FOOD AVAILABLE?
  - REFLOOD
  - MOW-TILL
- WHAT SPECIFIC ACTIONS ARE APPROPRIATE IN AN ECOLOGICALLY BASED PROGRAM?
  - ALLOW PROCESSES TO FUNCTION



HABITAT FIRST

# *HANALEI NATIONAL WILDLIFE REFUGE*









# INTENSIVELY MANAGED WETLANDS





# INTENSIVELY MANAGED WETLANDS



## HISTORY OF USE

NO COOTS

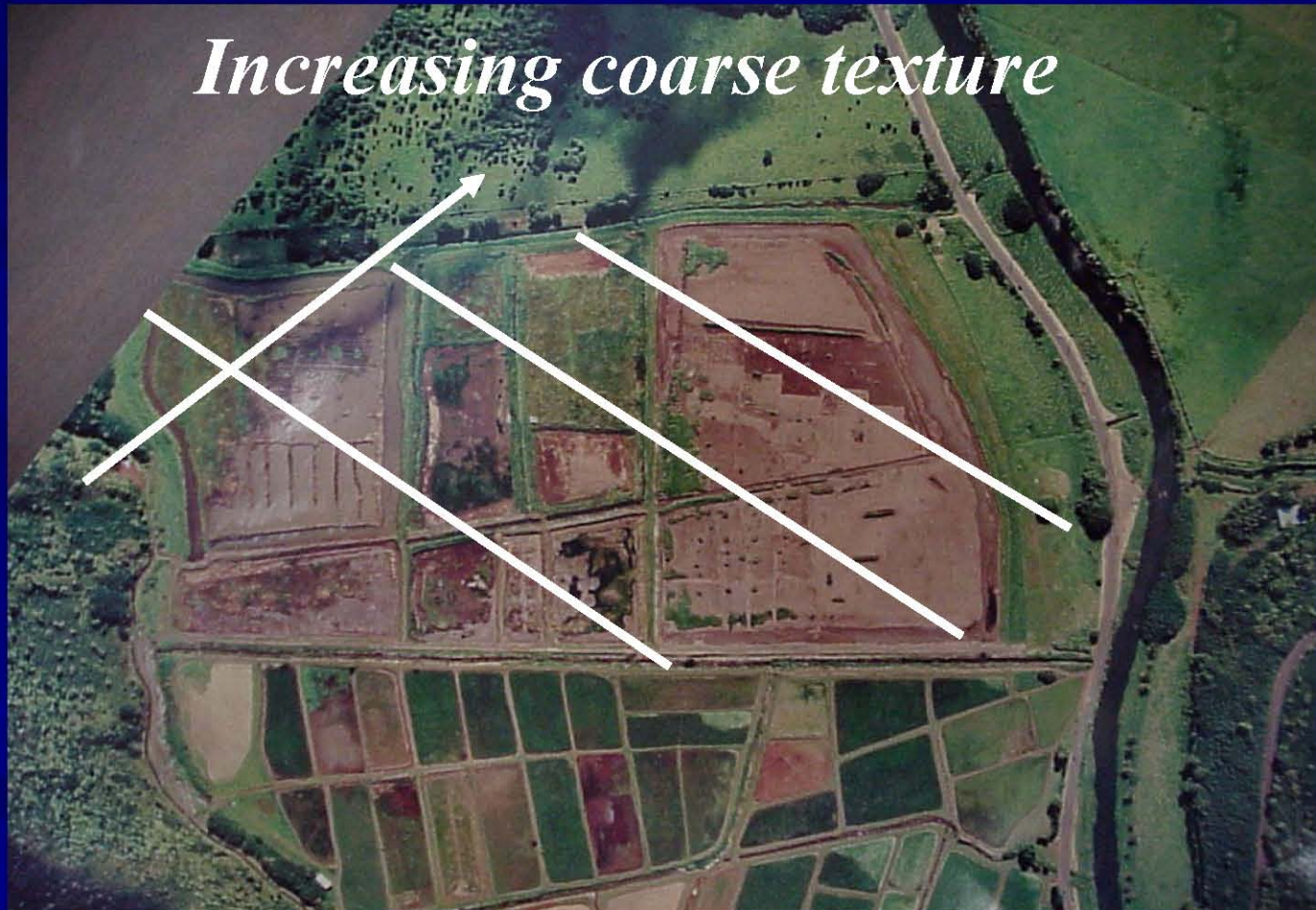
NO STILTS

15-25 KOLOA

2-3 MOORHENS

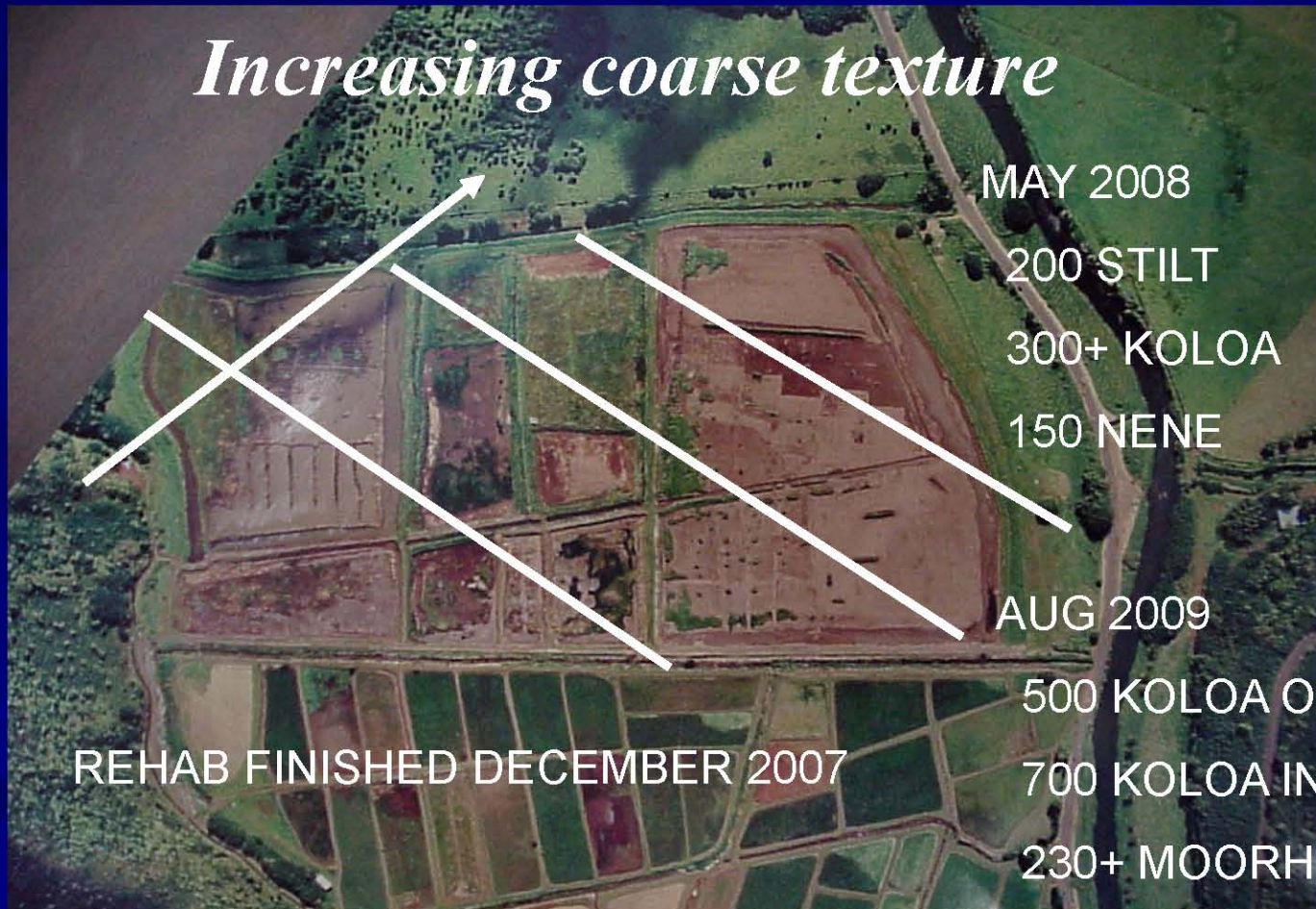


# INTENSIVELY MANAGED WETLANDS





# INTENSIVELY MANAGED WETLANDS



# MANAGEMENT IS AN ART FORM

- CONDITIONS CHANGE DAILY AND ONLY ON-SITE INSPECTIONS CAN DETECT THE RESULTS OF THESE SUBTLE CHANGES
- EXPERIENCE RESULTING FROM GOOD OBSERVATIONS THAT ARE EMBEDDED IN ONES BRAIN IS FAR SUPERIOR TO ANY COMPUTER OR ANY SOFTWARE



# IT TAKES MORE THAN BIOLOGY

- GOOD LEADERSHIP
- UNDERSTAND SOCIAL AND ECONOMIC ISSUES
- A COOPERATIVE STAFF
  - MUTUAL RESPECT
  - INPUTS FROM ALL PLAYERS



# TAKE HOME LESSONS

- BE A GOOD OBSERVER
- WORK BEYOND 8 TO 5
- BE PATIENT
- LEARN FROM THE PROS
- NEVER STOP LEARNING
- LISTEN TO EVERYONE
- DON'T FEAR DECISION MAKING

# FINAL WORD

- ALWAYS PLANT CORN AT THE GATE