

# A HISTORY OF WATERFOWL & WETLAND MANAGEMENT IN NORTH AMERICA

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# My biased view

- From the 1940s when I was very ignorant and naïve to the present
- From the perspectives of the academic educational experience and as a state agency employee
- As a professional working in all 50 states, and 4 other countries from within a university position and with federal, state, and private entities
- As a failed retiree

# My experience was shaped by many exceptional professionals who held diverse views

- Federal: Tom Baskett, Reid Goforth, John P Rogers, Rollin Sparrowe, Lucille and Bill Stickel, Art Hawkins, Alexander Wetmore, George Brakhage, Ken Campbell, Dick Paspahala, Bob Blum, Alex Dzubin, John Taylor, Dirk Derksen,
- State: Frank Bellrose, Glen Sanderson, Ted Shanks, Bill Crawford, Leroy Korschgen, George Arthur, Harry George, Ken Babcock, Dale Humburg, Red Hunt, Dan Connelly, Tom Foti, Phil Covington
- Private Larry Jahn, Clarence Cottom, Ralph Palmer, Frosty Anderson, George Burger, Al Hochbaum
- University: Milton Weller, Kenneth Carlander, Dennis Raveling,

# Mid 1600s to Early 1900s

- ▣ Focus on describing the species on a new continent
  - Wilson, Audubon, and a host of others
- ▣ Detailing the distribution of these species
  - Continues today especially in the face of changing landscape conditions from anthropogenic activities
- ▣ Wildlife in great abundance and was available for purchase in urban markets
  - Market hunting/fishing but also recreational hunting
- ▣ Shift from descriptions to developing a biological understanding
  - Start of period of many classic life history studies

Much food came from natural systems

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Description of species and their distribution

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Protection of species

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Protection of natural systems

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Migratory Bird Treaty Act

Pelican Island NWR

Swampland Acts

Legislation on air and water quality,  
wetlands, and concern for disappearing  
species

Columbus in New World

Pilgrims arrive

United States established

1492

1621

1776

1850

1903

1916

1970

2000

# 300 year period

- Species focused
- Compendiums not widely distributed
- Not many educational opportunities to generate new knowledge
- Systems under siege but extensive areas remain with limited habitat modifications

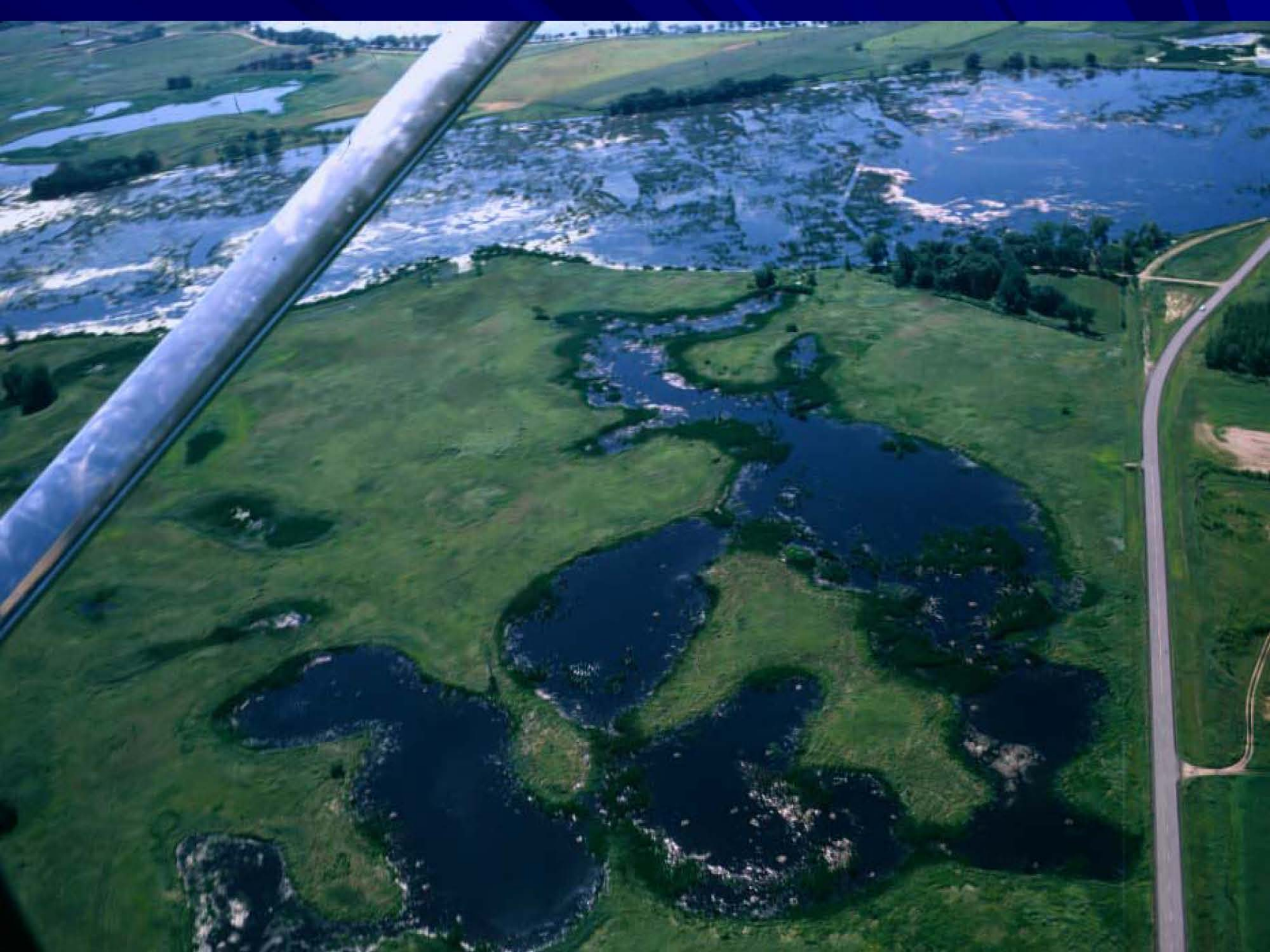
# Mid to Late 1800s

- Attitude of exploitation “Conquer the Wilderness”
- Many US Wetlands in Federal Ownership
- Limited Capital
- Lack of Equipment
- Emphasis on drainage
- Concern for Malaria
- Focus on description and distribution of species

# The period of description and collection

- ▣ Early naturalists spent many years in the field and collected the plants and animals they described, sometimes in sizeable numbers
  - Important repository of type specimens as well as examples from large spatial scale
  - Oologists
- ▣ First scientific periodicals
  - AOU Auk first volume in 1884
- ▣ Interest grew in trying to understand species biology
- ▣ US Government became involved in a more formal way to collect and analyze biological information





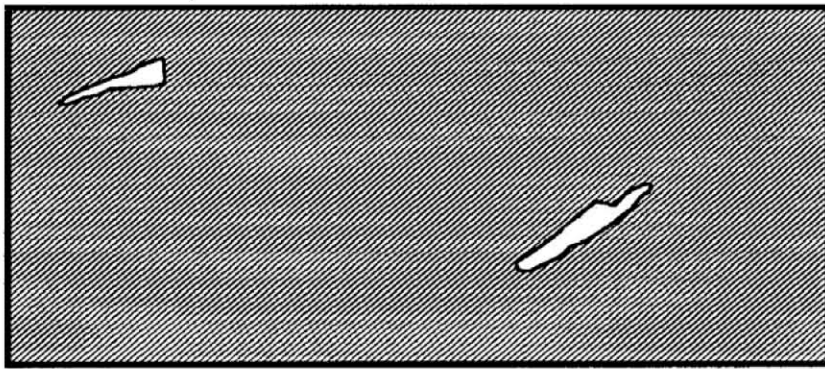
# New era of rapid change begins

- Increasing human population (Immigration)
- US Federal legislation related to floodplains and navigation
- Many decisions are made that are based on opinion and not on fact
- Engineers highly respected for their ability to tackle problems but comparable expertise on natural systems is yet to be developed
- The **ANTHROPOCENE** begins

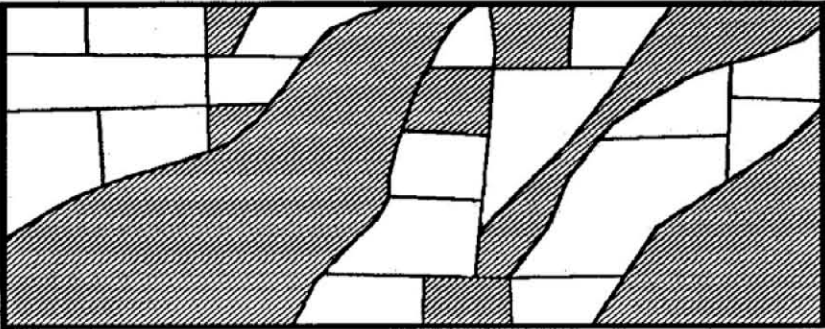
# Late 1800s to Early 1900s

- Extensive drainage projects initiated
  - Most federal lands transferred to states
  - Many drainage districts formed
  - Bonds could be sold to generate capital
  - Increasing improvement in drainage equipment
- Concern for species increasing
  - States set seasons
  - Migratory Bird Treaty Act
- Pelican Island NWR established as first federally protected land IN 1903

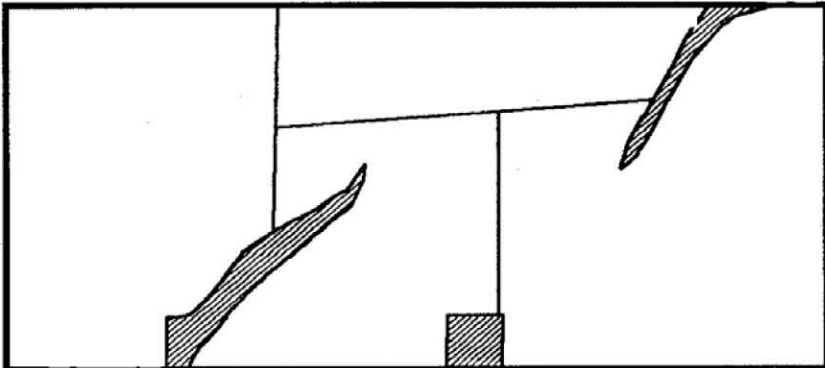




1870 SMALL CLEARINGS ON RIDGES



1940 LARGE CLEARINGS, MANY FENCE ROWS



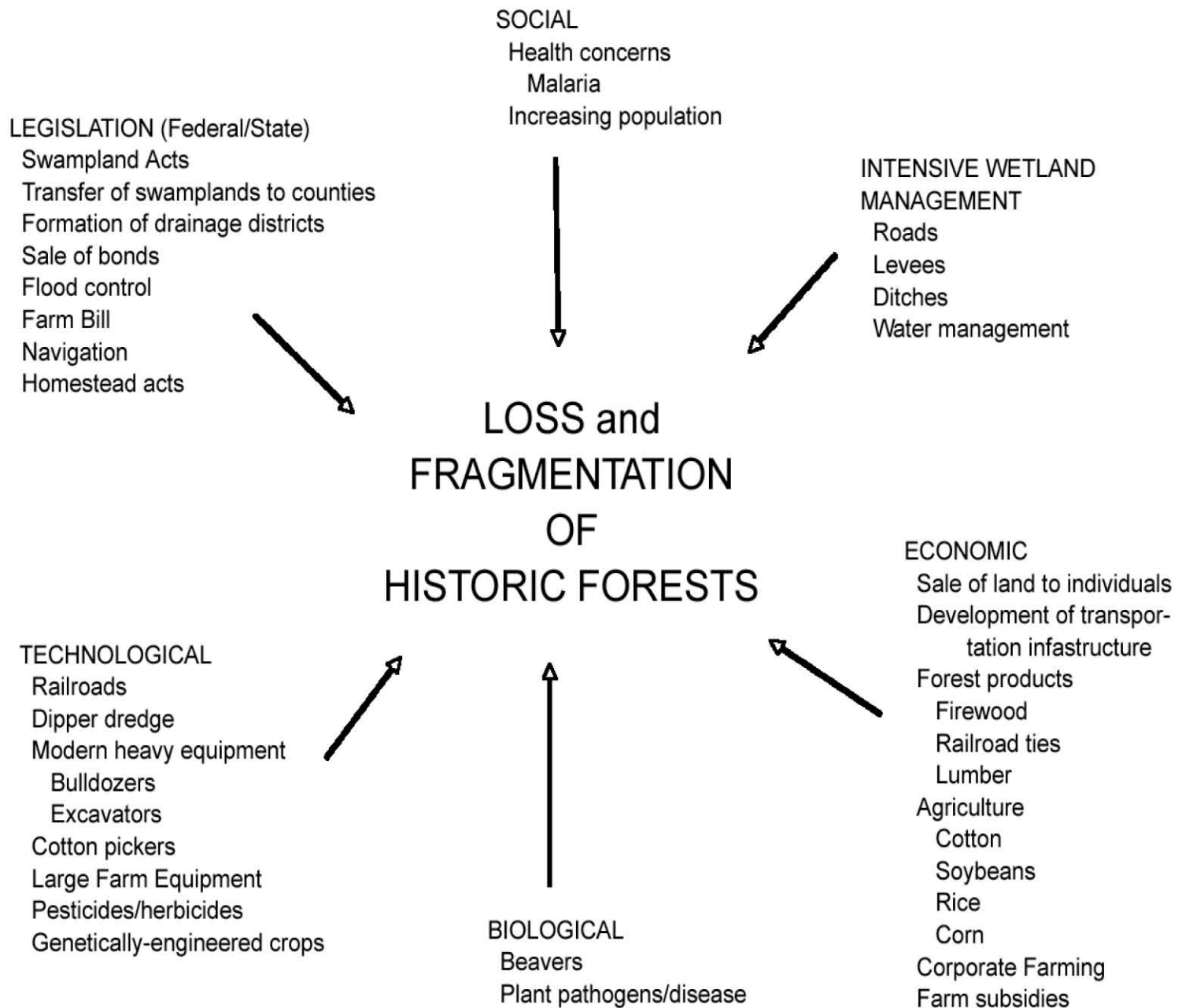
2000 LARGE FIELDS, SMALL REMNANT FOREST PATCHES



Forested habitat



Open fields



# HISTORY OF MANAGEMENT

- FIRST CONCERNS WERE FOR DECLINING POPULATIONS RESULTING IN THE MIGRATORY BIRD TREATY ACT
- DOUGHT OF 1930s RESULTED IN THE PURCHASE OF WETLANDS AND DEVELOPMENT OF INTENSIVE MANAGEMENT FOR WATERFOWL

# Early 1900s to 1940

- Rapid environmental degradation and declining populations stimulates many initiatives to protect species and certain special sites or habitats
- Climatic variation indicates the need to protect habitats on a broader scale
- Government responds to these new conservation challenges



1903 Pelican Island NWR

1916 Migratory Bird Treaty Act

Late 1800s through 1920s Extensive drainage projects

1930s Drought

Rapid expansion of federal refuges

1936 Duck Stamp

Federal Aid (Pittman-Robertson)

Biological Survey from USDA to DOI



1900

1920

1940

Concern for diseases such as botulism and lead poisoning

More scientific periodicals

Wilson Bulletin

Condor

Journal of Field Ornithology

1930s

Interest in food habitats

Wetland Management Dogma established

First North American Wildlife Conference

Transactions published

Wildlife Society formed with JWM

Growing need for talent and information to  
manage the newly acquired lands

Wetland information buried within scientific journals

Some universities with wildlife experts in a wide range  
of departments



1900

1920

1940

# STATUS OF INFORMATION IN 1930s

- LIFE HISTORIES OF WATERFOWL POORLY UNDERSTOOD
- MUCH FOOD HABIT INFORMATION BASED ON CONTENT OF GIZZARDS ACQUIRED FROM HARVESTED BIRDS DURING FALL HUNTING
- POPULATIONS POORLY MONITORED
- WETLAND INFORMATION WAS SUPERFICIAL
- THE TERM WETLAND WAS NOT USED AND WIDELY RECOGNIZED UNTIL THE 1970s

# FACTORS ASSOCIATED WITH EARLY INFORMATION

- FOCUS ON BREEDING
- STUDENT STUDIES LARGELY IN SUMMER
- DIFFICULT TO GET PERMISSION TO COLLECT FEMALES OR YOUNG ESPECIALLY DURING BREEDING
- STUDIES FOCUSED ON CERTAIN SITES SUCH AS DELTA MARSH, BEAR RIVER NWR, RUTHVEN AREA OF NW IOWA

# INITIAL EDUCATIONAL OPPORTUNITIES

- COOPERATIVE WILDLIFE RESEARCH UNITS AND UNIVERSITY FACULTY INITIATED STUDENT PROGRAMS
- DELTA WATERFOWL RESEARCH STATION
- MOST MENTORS WERE HUNTERS AND WERE FIELD OR HABITAT BASED

## World War II disrupts acquisition of lands and expansion of knowledge

### Unit Program established

Educating new talent

Graduate research leading to a rapid expansion of information

Most studies on species

Studies are focused on breeding season and often studies restricted to summer

Stipends not part of the equation

A wealth of talent is available because of GI Bill after the War

### Delta Waterfowl Station established

Hochbaum and Sowls stimulate more research

### Universities establish focus on wildlife

Most early programs in zoology departments

Places like Iowa State have a long line of investigations

1955 First long-term data sets starts with aerial inventories

1940

1955

# US PROFESSIONAL WATERFOWL SPECIALISTS BEFORE 1950s

- LIMITED NUMBER
- ASSOCIATED WITH OLD BIOLOGICAL SURVEY
- STUDIES LARGELY FOCUSED ON FOOD HABITS DURING HUNTING
- CONCERN ABOUT BAITING AND EXCESSIVE HARVEST
  - CLARENCE COTTAM AND FRAN UHLER DID STUDIES ON CHEESAPEAKE BAY AND NEAR HAVANA IL
- EMPHASIS ON FIELD STUDIES TO GAIN GENERAL INFORMATION
  - LOGAN BENNETT - BLUE-WINGED TEAL
  - AL HOCHBAUM - CANVASBACK
  - LYLE SOWLS - PRAIRIE NESTING DUCKS
  - FRANK BELLROSE - WOOD DUCKS
  - JESS LOW - REDHEADS

# DOGMA ESTABLISHED BY MID-20<sup>TH</sup> CENTURY

- LITTLE CONCERN FOR MIGRATION AND WINTERING HABITATS
- FETTERED TO STORE WATER
- FOOD HABITS INFORMATION BIASED TOWARD HUNTING SEASON
- PRODUCTION OF AGRICULTURAL FOODS DOMINATED MANAGEMENT



# STATUS OF MANAGEMENT AT MID-CENTURY

- INTENSIVE MANAGEMENT IN RAPID DEVELOPMENT ESPECIALLY IN MIGRATION AND WINTERING AREAS
- FLYWAYS ESTABLISHED
- START OF POPULATION SURVEYS
- FOCUS ON BREEDING INFORMATION



POOL 1

POOL 3

DUCK CREEK 1955

# FRANK BELLROSE



# 1955 to 1980

- ▣ US Government continues to respond to conservation needs on a larger and larger scale
  - NEPA
  - Clean Water Act
  - Endangered Species Act
  - Wetland legislation (Activities permitted and delineation)
- ▣ Devastating changes to natural systems continues
  - Strong movement to channelize, levee, and dam rivers
  - Agriculture intensifies
- ▣ Many new organizations appear and the expansion of knowledge is more compartmentalized
- ▣ More focus on wetlands as a system and interest in sharing knowledge

# CUTTER BLADE ON DOZER



**Some key work on wetlands and wetland species is published**

Bartonek and Hickey on invertebrates

Errington on marshes and muskrats

Weller on hemi-marsh and other wetland/waterfowl issues

First energetic studies and refinement of food habits

**Migratory Bird Office and FWS Research Centers have considerable resources to focus on wetland species but mostly waterfowl or waterfowl related issues**

Larger and longer term studies

**Studies outside the breeding season are more common**

Energetic approaches open opportunity to collect females and young

Recognition that waterbirds need wetlands year round

**More studies on wetland dependent species are published**

Audubon work on waders

More work on rails, shorebirds, and invertebrates

**Some Universities develop strong programs**

University of Missouri, Iowa State, Utah State, Michigan State, Minnesota, UC Davis

1955

1980

# KEY FINDINGS BETWEEN 1950 AND 1990

- IMPORTANCE OF INVERTEBRATES IN THE DIETS OF BREEDING FEMALE DUCKS
- CROSS-SEASONAL EFFECTS
- ENERGETICS DURING THE ANNUAL CYCLE
- IMPROVED UNDERSTANDING OF POPULATION ECOLOGY
- VAST INCREASE IN UNDERSTANDING OF WETLANDS AND ROLE FOR WATERFOWL AND OTHER WETLAND DEPENDENT SPECIES
- MUCH IMPROVEMENT IN MANAGEMENT STRATEGIES

# STATUS OF MANAGEMENT

- DOGMA OF 1930s CONTINUES
  - FETISH TO STORE WATER
  - FOCUS ON SINGLE SPECIES, LIFE CYCLE EVENT, AND LOCATION
  - MUCH FOCUS ON BREEDING



# STATUS OF MANAGEMENT CONTINUED

- NATIONAL PROGRAMS OF GREAT IMPORTANCE
  - NORTH AMERICAN WATERFOWL PLAN
  - FARM BILL
  - ARM HARVEST STRATEGIES
- FEWER MENTORS FOR STUDENTS
- FOCUS ON EDUCATION OF RESEARCHERS RATHER THAN MANAGERS
- HISTORIC LANDSCAPES HAVE CHANGE FOREVER
- MANAGEMENT IN MODIFIED SYSTEMS NOT WELL UNDERSTOOD

# STATUS OF MANAGEMENT CONTINUED

- POPULATION OBJECTIVES OFTEN USED BUT POORLY STATED
- HABITAT-BASED GOALS AND OBJECTIVES RARELY USED AND POORLY STATED
- MOST INTENSIVELY MANAGED WETLANDS IN DECLINE, POPULATIONS DEPRESSED, AND SOME SPECIES TOO ABUNDANT AND OTHERS DISAPPEARING

# 1980 to 2009

- Wetland courses taught at universities
- New disciplines offer degrees at universities
- New scientific periodicals appear
- Rapid expansion of public lands by federal government and states
- Use of more and more technology
- Expansion of knowledge is staggering

Society of Wetland Scientists  
Wetlands is published in 1982

## Restoration Journals

New degree programs often associated  
with large scale perspective

Loss of University wildlife programs

Use of GIS expands when hardware becomes  
available

Many new refuges and wildlife areas

Refuge organic act

FWS research centers move to USGS

Information on line

Increasing focus on statistics, expert systems,  
adaptive management, and decision support

1980

2009

# STATUS OF WETLAND ECOLOGY/MANAGEMENT AT TURN OF 21<sup>st</sup> CENTURY

- WATERFOWL AND OTHER WATERBIRD EXPERTS MORE QUANTITATIVE, THEORETICAL, AND LESS CONNECTED WITH THE FIELD
- SPECIES EXPERTS OFTEN HAVE POOR UNDERSTANDING OF WETLAND DYNAMICS
- WATERFOWL FALLING OUT OF FAVOR IN THE CONSERVATION COMMUNITY AND FOCUS SHIFTING TO OTHER GROUPS AND SPECIALIZED APPROACHES (FIRST INDICATIONS WERE APPARENT IN LATE 1960s)

# The last decade

- Finally some better approaches to address environmental problems
- Recognition of a greater need for interdisciplinary cooperation and learning
- Processes getting much more attention
- Many publications but an increasing number have significant shortcomings

# Not just wetlands but type of wetlands

- For Missouri it's floodplains
- For South Dakota it's prairie potholes and floodplains
- For Montana it's Montane basins, prairie potholes, and floodplains
- For Texas it's coastal marshes, playas, floodplains
- For Alaska it's coastal estuaries and floodplains
- For Mexico its coastal estuaries, floodplains, and montane basins

# CHALLENGES IN THE NEW MILLENIUM

- MANAGING IN MODIFIED ENVIRONMENTS
- CHANGING HISTORIC DOGMA
- EDUCATING THE NEW GENERATION OF BIOLOGISTS AND MANAGERS
- THINKING ACROSS LARGE AND SMALL SCALES (SPATIAL, TEMPORAL AND TAXONOMIC)
- PROTECTING HABITATS AND POPULATIONS IN A POLITICIZED SETTING
- MAINTAINING RESOURCES FOR ACQUISITION, MANAGEMENT, RESTORATION, AND RESEARCH



# The need for knowledge

- Expands/intensifies
- Is more complex
- Is more expensive to acquire
- **BUT**
- Funding more short term
- More bean counting for accountability
- More funds linked to expected outcomes
- Less patience and more demands on time lines

# The Future

## A biased perspective by an old geezer

- ▣ Overwhelming expansion of information
- ▣ New ways and speed of distribution
- ▣ New ways to acquire information, conduct analyses, and to present information
- ▣ Need to maintain communication face to face
- ▣ Good biology still will require extensive time in the field to learn from repetitive observation
- ▣ One must continue to learn for a life time or you will be obsolete within hours in the years ahead

# STATUS OF MANAGEMENT CONTINUED

- DOGMA OF 1930s CONTINUES
  - FETISH TO STORE WATER
  - FOCUS ON SINGLE SPECIES, LIFE CYCLE EVENTS, AND LOCATION
  - MUCH FOCUS CONTINUES ON BREEDING

# PERSONAL INSIGHTS

- TRENDS OR PROGRAMS THAT ARE LIKELY TO DOMINATE IN THE FUTURE
- MY SENSE OF FACTORS THAT MUST BE CONSIDERED FOR GREATER SUCCESS

# THE GEOMORPHIC SETTING

- NEED TO RECOGNIZE LANDSCAPE SETTING IN HISTORIC CONDITION
- IMPORTANT TO UNDERSTAND THE HYDROLOGIC INPUTS
- NEED TO DETERMINE THE DEGREE OF PERTURBATIONS TO THE HISTORIC CONDITION

# LANDSCAPE SETTING

## ■ GEOMORPHIC SETTING

- GEOLOGY
- FORMATIVE PROCESSES
- ABIOTIC PROCESSES

## ■ HYDROLOGIC CONDITIONS

- SURFACE
- SUB-SURFACE

# The Deficiencies of the Hemimarsh Marsh Concept

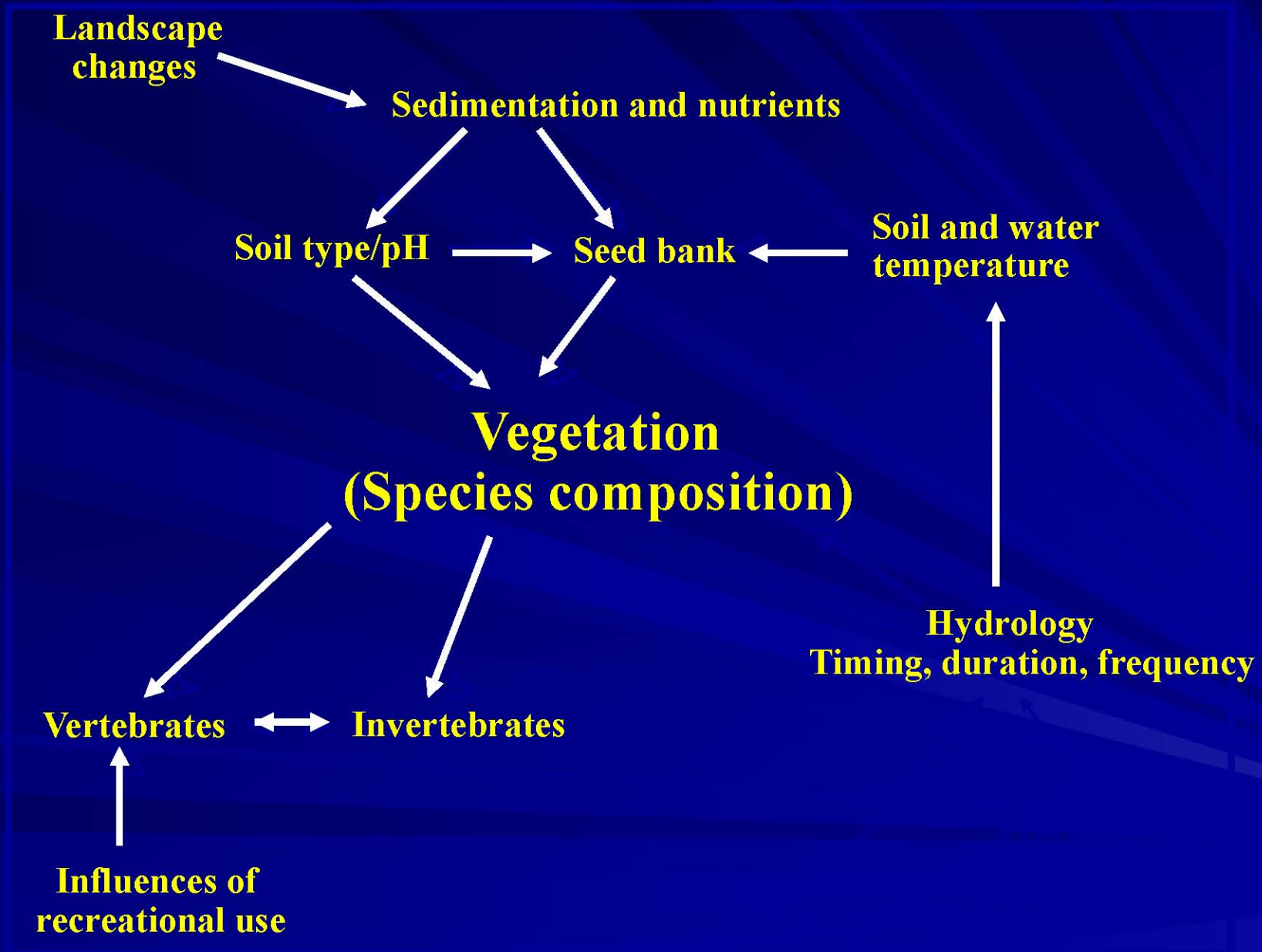
- **Location of Primary Studies**
  - ET less than precipitation
  - Area of tile drainage or modified hydrologic regimes
- **Focus of Primary Studies**
  - Based on structure not on processes
  - Limited connection with invertebrates
- **Temporal Scale of Primary Studies**
  - Short Term Investigations
  - Poor recognition of time in long-term wetland cycle
- **The Disconnect between the Publication Process in Science vs a Management Based Perspective**
  - Cost of Publication
  - Poor acceptance of the importance of identifying time and space

# HEMI-MARSH MISDIRECTION

- NOT BASED ON ABUNDANCE OF FOODS WHETHER INVERTEBRATE OR OTHERWISE
- WORK AT RUSH LAKE WAS IMMEDIATELY AFTER A DRAWDOWN
- A PERENNIAL STREAM FLOWS THROUGH RUSH LAKE
- WATER CONTROL STRUCTURE CONTROLS WATER LEVEL
- IN AN AREA OF TILE DRAINAGE



# Model of what we know (relationships and linkages)



# A Comfort Level with Dynamic Variability in Wetland Systems

## ■ Habitat

- Hydrologic variability
  - On Site and Off Site
- Plant response to hydrologic variability
  - Hydrologic
  - Climatic

## ■ Populations

- Demand or Desire to Maintain High Populations
- Poor Appreciation for the Variability Among Years

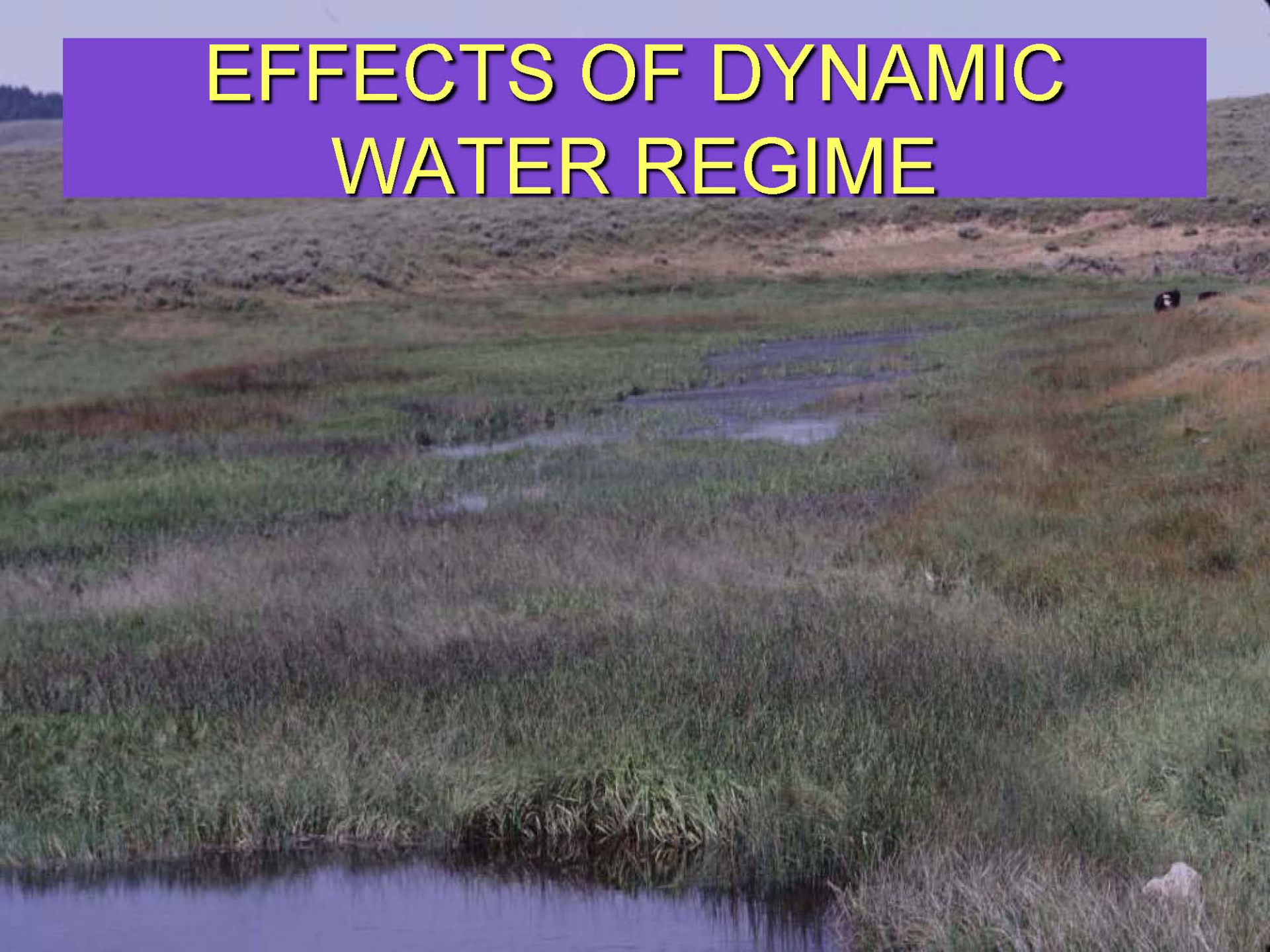
# Cottonwood Lake Study Area – Wetland P7



# EFFECTS OF STABLE WATER



# EFFECTS OF DYNAMIC WATER REGIME



# TAXONOMIC SCALE FOR OBJECTIVES

- CONTINENTAL - WATERFOWL
- FLYWAY – DABBING AND DIVING DUCKS, GEESE
- STATE – MIGRANT DABBING DUCKS, MIGRANT GEESE, AND BREEDING WOOD DUCKS
- REGIONAL – MIGRANT MALLARDS AND PINTAILS, RESIDENT CANADA GEESE, MIGRANT WHITE GEESE, AND POST BREEDING WOOD DUCKS
- LOCAL – BREEDING WOOD DUCKS, WINTERING MALLARDS, RESIDENT CANADA GEESE

# CHANGES LIKELY IN THE FUTURE

- USDA PLAYS A MORE IMPORTANT ROLE IN LAND CONSERVATION
- USDA DEVELOPS A MANAGEMENT COMPONENT TO PROGRAMS
- CONTINUAL DEGRADATION OF HABITATS AND HYDROLOGIC CONDITIONS IN AGRICULTURAL AREAS
- MORE RESTRICTIVE HARVEST REGULATIONS
- EXOTIC SPECIES WILL BE MORE COMMON AND CAUSE MAJOR MANAGEMENT CHALLENGES

# REQUIREMENTS FOR SUCCESS

- A BETTER EDUCATED PUBLIC
- A GREATER EMPHASIS ON THE EDUCATION OF BIOLOGISTS AND MANAGERS WITH THE TOOLS TO BE SUCCESSFUL IN MODIFIED LANDSCAPES
- BETTER COOPERATION WITHIN AND AMONG AGENCIES ACROSS SPATIAL BOUNDARIES
- DEVELOPMENT OF BIG SCALE PERSPECTIVES AMONG AGENCIES, ACROSS FLYWAYS AND ACROSS THE CONTINENT