## Early Rainwater Basin Technical Studies: A Trip Down Memory Lane with Mike and Randy

# History

## **Rainwater Basin Joint Venture**

- Concept Plan 1991
- Private landowners central to success



# The RWB "Landscape" in the 80's

- Economic conditions were conducive to land leveling/center pivot development/excavation of reuse pits
- Issues over ground water pumping for WPAs
- Avian Cholera
- CWA Sec. 404 evolving as to treatment of "jurisdictional" extent
- Relationship of USFWS-Corps
- FSA & Swampbuster provisions
- NGPC inventories documenting historic losses and current condition (\*NWI just getting started)
- Better recognition of RWB as spring staging area
- Cumulative Impacts/"No net loss"
- NAWMP 1986
- ADID

# Section 404 (b)(1) Review Criteria

- The discharge represents the least environmentally damaging practicable alternative
- Compliance with applicable state water quality standards
- Does not jeopardize the existence of Federal listed endangered or threatened species or their habitat
- Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem
- Cause or contribute to significant degradation

## Subpart I—Planning To Shorten Permit Processing Time § 230.80 Advanced identification of disposal areas

- EPA and the permitting authority may identify sites which will be considered as: (1) Possible future disposal sites, or (2) Areas generally unsuitable for disposal site specification;
- Constitutes information to facilitate individual or General permit processing
- An appropriate public notice of the proposed identification
- The permitting authority should maintain a public record of the identified areas and a <u>written statement of the</u> <u>basis for identification</u>
- \*Review the type of activities in the RWB for probability of compliance with the Guidelines (not explicit in the guidance)

# **General Scoping ?'s**

- What are the current economics of wetland conversion and future threats?
- What functions beyond the waterfowl values are being provided by RWB wetlands ?
- What are the characteristic RWB plant communities and what is their affinity to soils ?
- What are the waterfowl actually doing out there ?
- How do we summarize and synthesize this info to provide a rationale for designation and set the stage for future interagency initiatives?

# **Interagency Goals**

- Designate wetlands potentially regulated under Section 404 that may be suitable or unsuitable for fill
- Increase the wetlands data base to support future regulatory policy and wetland management initiatives
- Collect information necessary for making jurisdictional determinations
- Increase public awareness and knowledge of wetland values and functions
- Increase public awareness and knowledge of the Section 404 permit process



SUMMARY REPORT

April, 1987

### What are the current economics of wetland conversion and future threats?

The Profitability of Wetland Drainage in the Rainwater Basin of Nebraska

by Dr. Larry D. Swanson\*

#### Introduction

This report summarizes the results of a study of economic factors in the drainage of wetlands in the Rainwater Basin of Nebraska. Whether this drainage of wetlands has been in the past, is now, or will be actually profitable for those undertaking it is the focus of the study.

#### Wetland Drainage in the Rainwater Basin

The Rainwater Basin of southcentral Nebraska (generally outlined below) extends over some 4,200 square miles spanning seventeen counties in the state. Across this flat tableland region are hundreds of lowlying basins and depressions of varying sizes that tend to flood periodically or seasonally.



Ratewater Seats Wetland Ares

After years of drainage activity, only about 20 percent of the welland acreage once present in the area remains today. Most is in Clay, Fillmore, and York Counties in the eastern portion of the Rainwater Basin and Phelps and Kearney Counties in the west. In recent years, most wetland drainage has been by landowners attempting to make the basins more suited for crop production, usually under either gravity-flow or center-pivot irrigation.

Landowners have ordinarily attempted to drain these wetlands by excavating large dugouts or pits sometimes in combination with drainage ditches. The cost of the earthwork by contractors necessary to drain wetlands has increased substantially over the years. At the same time, market receipts by farmers for major crops produced in the area have increased only modestly. **Cash Flow Model: Looked at costs of land leveling vs. return on investment** 

- General decline in profitability of draining and cropping wetlands within the region
- Drainage of semi-permanently flooded wetlands have been generally unprofitable in the past and will be increasingly so in the future

 Temporarily and seasonally flooded wetland basins are most vulnerable



Dr. Swanson is a private economist and policy analyst in Lintoln, Bebraska. This report is a summary of a study funced by the U.S. Environmental Protection Agency, Region VII Office, Kansas City, Kansas (completed in September, 1986).

## **Project Planning For Environmental Studies**

Paleo-GIS



A FUNCTIONAL ASSESSMENT OF SELECTED WETLANDS WITHIN THE RAINWATER BASIN AREA OF NEBRASKA



### What functions beyond the waterfowl values are being provided by RWB wetlands?

RICHARD A. GERSIB Nebraska Game and Parks Commission Lincoln, Nebraska

RICHARD R. RAINES U.S. Environmental Protection Agency Kansas City, Kansas

MICHAEL C. GILBERT U.S. Army Corps of Engineers, Omaha District Omaha, Nebraska WENDE S. ROSIER U.S. Fish and Wildlife Service

Grand Island, Nebraska

In cooperation with: U.S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi

October 1989

## FHWA/W.E.T. : "Adamus Method"

## An early Wetland RAM

Looks beyond traditional views of waterfowl & wildlife habitat values

### **11 Functions for assessment:**

- Ground Water Recharge
- Ground Water Discharge
- Flood flow Attenuation
- Sediment Stabilization
- Sediment/Toxicant Retention
- Nutrient Removal/Transformation
- Production Export
- Aquatic Diversity/Abundance
- Wildlife Diversity & Abundance for Breeding
- Wildlife Diversity & Abundance for Migration/Wintering
- Recreation/Uniqueness/Heritage



What are the characteristic RWB plant communities and what is their affinity to soils ?

ORDINATION AND MAPPING OF WETLAND COMMUNITIES IN NEBRASKA'S RAINWATER BASIN REGION



by Michael C. Gilbert Omaha District, U.S. Army Corps of Engineers

in cooperation with:

U.S. Environmental Protection Agency U.S. Fish and Wildlife Service Nebraska Game and Parks Commission

### **Objectives:**

- Provide descriptive info on plant community associations & temporal dynamics
- Evaluate vegetation/soils correspondence from vegetation sampling and mapping data

### **Methods:**

- 47 sites; 272 vegetation samples & 248 species records
- WAO (Hydric Value) and DCA
- Overlay wetland mapping with soil survey data
  - \* Not published: soil chemistry/extensive temporal vegetation data set

SOIL NAME	JUNEVEG						FALLVEG					
	NO. OF STANDS	MEAN	s.D.	c.v	MIN/MAX	95% C.1.	NO. OF STANDS	MEAN	S.D	c.v.	MIN/MAX	95% C.I.
Butler	6	4.82	.57	11.9	4.33/5.83	4.22-5.42	5	5.17	.21	4.1	5.00/5.44	4.91-5.44
Crete	4	4.00	.29	7.4	3.58/4.26	3.53-4.47	1	4.98				
Detroit	2	5.28			4.96/5.60		1	4.12				
Fillmore	26	5.74	.93	16.2	4.06/7.09	5.36-6.11	56	6.95	1.4	20.4	2.27/9.00	6.57-7.33
Hall	5	4.25	.31	7.2	3.92/4.70	3.87-4.63						
Rastings	12	4.50	.70	15.6	3.44/6.07	4.05-4.95	7	4.60	.71	15.4	3.29/5.02	3.95-5.26
Kobbs	2	4.80			4.74/4.85							
Holder	2	4.47	÷		3.91/5.03		2	5.00			5.00/5.00	
Holdrege	5	4.23	.83	19.7	3.29/5.22	3.20-5.27	4	4.52	.92	20.4	3.40/5.47	3.05-5.9
Hord							1	4.22				
Massie	34	7.35	.93	12.7	5.42/8.87	7.03-7.68	15	7.56	1.2	15.5	5.41/8.95	6.91-8.2
Olbut							2	5.83			5.75/5.90	
Scott	38	6.39	.95	14.9	4.47/8.51	6.07-6.70	42	6.90	1.2	17.3	4.02/8.93	6.53-7.20
	n=136						n=136					

Table 5. Descriptive statistics for Hydric Value (HV) data as grouped by soils for the JUNEVEG and FALLVEG survey data sets.

#### Hydric Values Grouped by Soil Series





FIGURE 2. Generalized Rainwater Basin vegetational zones. Species acronyms are stand dominants with groupings based on hydric value intervals for the combined JUNEVEG and FALLVEG data sets.

#### \*Other paleo mapping products



**CLAY 94** 

Edgar NW, Ne. Quad Sec. 29, T6N, R5W



#### SOIL ATTRIBUTES

Bu	=	9.1	acres
Sc	=	48.3	acres
Ма	=	16.0	acres
HdC2	=	86.5	acres

#### WETLAND ATTRIBUTES

PUBF =	32.9 acres
PEMA =	17.6 acres
PEMC =	22.0 acres
PEMF =	12.0 acres

- Custom wetland mapping using Cowardin et. al. (1979) classification
- B & W aerial photography @1:24,000
- Looked at intersection of wetland & soil attributes



# Soil-Vegetation Relationships







WATERFOWL VALUES BY WETLAND TYPE WITHIN RAINWATER BASIN WETLANDS WITH SPECIAL EMPHASIS ON ACTIVITY TIME BUDGET AND CENSUS DATA



# What are waterfowl actually doing out there ?

RICHARD A. GERSIB Nebraska Game and Parks Commission Lincoln, Nebraska

KENNETH F. DINAN U.S. Fish and Wildlife Service Grand Island, Nebraska

#### BETTY ELDER U.S. Fish and Wildlife Service Grand Island, Nebraska

#### THOMAS H. HUPF

U.S. Fish and Wildlife Service Grand Island, Nebraska

## **Objectives:**

- Increase the understanding of habitat needs during spring migration
- Evaluate the relative function of each wetland type for waterfowl
- Document importance of RWB

### **Methods:**

- Aerial/Ground Census (Average of 70 sites/year)
- Activity Time Budget(n=31)
  \* Behavioral Categories :
  - Loafing, locomotion, feeding, courtship , alert
- Observations over 6 week period

February 1989



k	Temporary	<u>Seasonal</u>	Semipermanent	<u>Probability</u>
Pintails				
N = 994 Feeding Locomotion Loafing/Comfort Courtship Alert	40.1 17.2 35.2 3.9 <u>3.5</u>	39.1 21.5 34.2 3.4 1.7	23.8 28.0 43.5 3.3 1.4	.000* .000* .004* .719 .003*
Green-winged tea N = 599	al			
Feeding	55.8	62.1	25.3	.000*
Locomotion	22.4	23.5	38.4	.000*
Courtship	2.6	2.0	3.4	.316
Alert	1.0		.4	.010*
All Dabbling Duo N = 3614	cks			
Feeding	42.1	46.4	24.8	.000*
Locomotion	15.8	17.8	27.3	.000*
Loafing/Comfort	38.2	33.3	44.9	.000^
Alert	1.8	1.5	<u>.9</u>	.011*
All Waterfowl				
Feeding	39.3	38.8	18.1	.000*
Locomotion	15.1	19.6	28.5	.000*
Loafing/Comfort	41.8	41.5	50.5	.000*
Courtship	1.9	1.6	1.5	.493
Alert	2.0	.9	1.3	.000*

Table 4. (Cont.) Proportion of day spent in each activity in wetland with differing water regimes.

\* P < .05 was considered to be significant. Underlining indicates areas where significant differences occur.  $\overline{N}$  Number of birds included in data set.

## Proportion of Day Spent in Each Activity (All Dabblers)





Figure 6. Proportion time waterfowl species feeding by wetland type.

### **Expansive Discussion of :**

- The RWB Value as Spring Staging Habitat
- Literature Review of Waterfowl Values by Water Regimes
- Ecological Factors and Human Activities Affecting Wetland Values and Waterfowl
- Special Concerns





# A Dabbler's View



#### REGULATORY PLANNING FOR NEBRASKA'S RAINWATER BASIN WETLANDS — ADVANCED IDENTIFICATION OF DISPOSAL AREAS —



U. S. Evironmental Protection Agency Region VII Kansas City, Kansas

U. S. Fish and Wildlife Service Grand Island, Nebraska Denver, Colorado U. S. Army Engineer District, Omaha Corps of Engineers Omaha, Nebraska

Nebraska Game and Parks Commission Lincoln, Nebraska **Rationale for designations based on Technical Studies** 

**Recoded NWI for public record** (Class I – IV)

Reviewed probable regulated activities in RWB with their respective "permitability"

**Provided recommendations for future wetland protection & information needs** 

October 1990







- 1. Regulatory
  - Determine feasibility of advanced 404(c) veto action
  - Develop general permits for minor discharges and enhancement/restoration projects
    - Review nationwide permits in light of study findings for possible modification or revocation
    - · Develop permit processing MOA w/standardized review criteria
    - · Develop joint agency enforcement plan
    - Develop monitoring plan for permit compliance
- 2. Wetland Management
- $\rightarrow$ 
  - Additional wetland acquisition by federal, state and private organizations
    Support of Rainwater Basin Joint Venture under the North American Waterfowl
  - Management Plan
  - Establish acknowledgement program for individuals and others demonstrating leadership in wetlands protection
    - Establish private lands extension program for technical assistance to landowners
- 3. Public Outreach
  - Develop additional wetlands functions and values information to enhance public awareness
  - · Develop 404 information outreach programs to local agencies and organizations
  - Develop joint communication strategies with agricultural agencies and organizations to better serve the affected landowner
- 4. Information Needs
- $\rightarrow$

Develop and implement a mapping and information data base to centralize permit data and individual wetland data necessary to support the identified regulatory actions and wetland management initiatives

 Develop and implement a hydrology model for wetland restoration and impact analysis

 Initiate an archive of historical aerial photography and schedule monitoring for wetland trend analysis

THEME	Then	Now
Technology/Data Availability	Paleo-GIS	Decision Support Systems, Scenario Planning, Restorable Wetland Index
Hydrology	WHAM	Modeling, Watershed Restoration
Vegetation	What is out there?	Management Orientation : Moist Soil Management & Invasive Species
Waterfowl	Census & Time Budget	Local and Landscape Variables, Energetics, Avian Community Structure
Wetland Functions	FHWA/W.E.T.	HGM Playa Models/NeWRAM
Economics	Conversion Costs of Land Leveling	Working Landscapes and Ecosystem Services
Public Involvement	Poor: Nobody wants to be regulated!	Seminars, newsletters , landowner involvement/tech assistance
Partnerships	Limited to Agencies	Extensive Public & Private , Academic Community
Adaptive Management	What's that?	SHC/CEAP
Science and the Application	General Characterization	Sediment Studies & Vegetation Response, Pollinators, Avian Guilds



