U.S. Fish and Wildlife Service

USFWS Mission:

Working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

Jeff Drahota
USFWS Biologist
Rainwater Basin Wetland
Management District

U.S. Fish and Wildlife Service

Enforce federal wildlife laws,
Protect endangered species,
Manage migratory birds,
Restore nationally significant fisheries,
Conserve and restore wildlife habitat such as wetlands,
Help **foreign governments** with their international conservation efforts, and distribute hundreds of **millions of dollars**, through our Wildlife Sport Fish and Restoration program, in excise taxes on fishing and hunting equipment to State fish and wildlife agencies.

How?

Duck Stamp
Ecological Services
Endangered Species
Fire Management
Fish and Aquatic Conservation
International Affairs
Invasive Species
Landscape Conservation Cooperatives
Law Enforcement
Migratory Birds
National Wildlife Refuges
Partners for Fish and Wildlife
Permits
Science
Strategic Habitat Conservation

National Wildlife Refuge System

Mission:

…to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

National Wildlife Refuge System

Guiding Principles:

Land stewards

Habitat Restoration and Management

Wildlife dependent recreational use

Respect neighbors

Science-based with a high emphasis on scientific integrity

Wetland Management Districts

- 1934 Migratory Bird Conservation Act (Duck Stamp), money used to purchase or lease wetlands
- 1958 Small Wetland Act, expanded to purchase Waterfowl Production Areas (WPA)

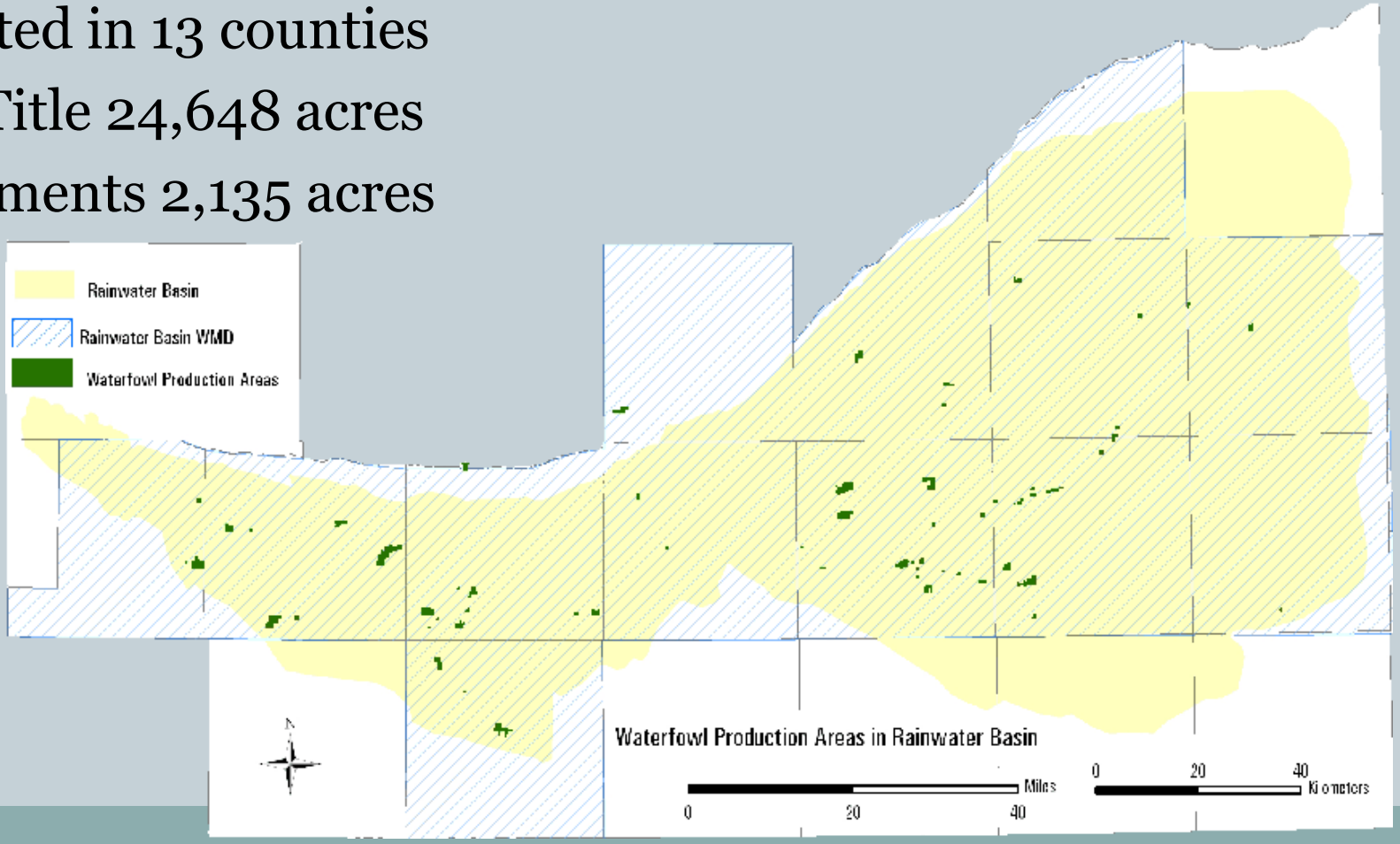
1962 the Service created an administrative organization called a Wetland Management District.

WMDs Primary Purpose

Provide optimal migration habitat for waterfowl, shorebirds, and other species that depend on a grassland-wetland ecosystem.

Rainwater Basin Wetland Management District

- 61 Waterfowl Production Areas
- Located in 13 counties
- Fee Title 24,648 acres
- Easements 2,135 acres



Rainwater Basin WMD Vision

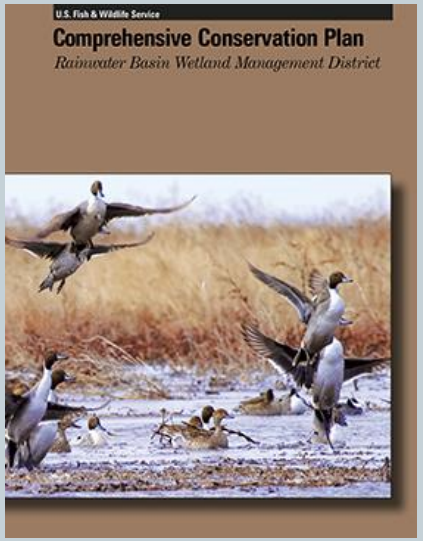
*The Rainwater Basin provides **critical habitat** for millions of migratory birds. The basin's name reflects both the basis of its wetland hydrology and natural precipitation cycles. A network of **functioning** wetland and prairie plant ecosystems provides a **native grassland mosaic** that gives the local community a sense of pride and connection to the Great Plains flora and fauna. The lands managed by the wetland management district serve as an example of land stewardship **mimicking natural processes**, and they provide an array of wildlife-dependent educational and recreational opportunities. It is only through **partnerships** with individuals, agencies, and organizations that this vision can be achieved and maintained.*

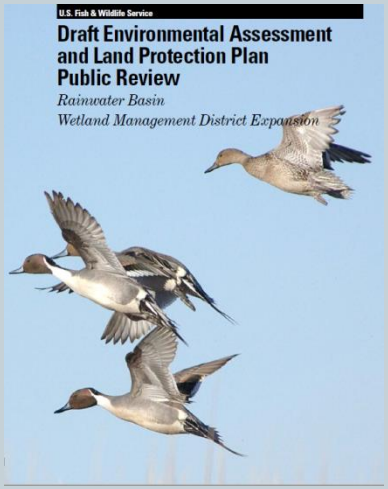
Photos by J Drahota and M Vesey

Planning

Comprehensive Conservation Plan (CCP 2007) and Environmental Assessment

Goals, objectives, and strategies (why we do what we do)





Land Protection Plan (LPP 2011)

Allows for the perpetual protection of additional acres, expands by 14,177 A

Habitat Management Plan (HMP 2019)

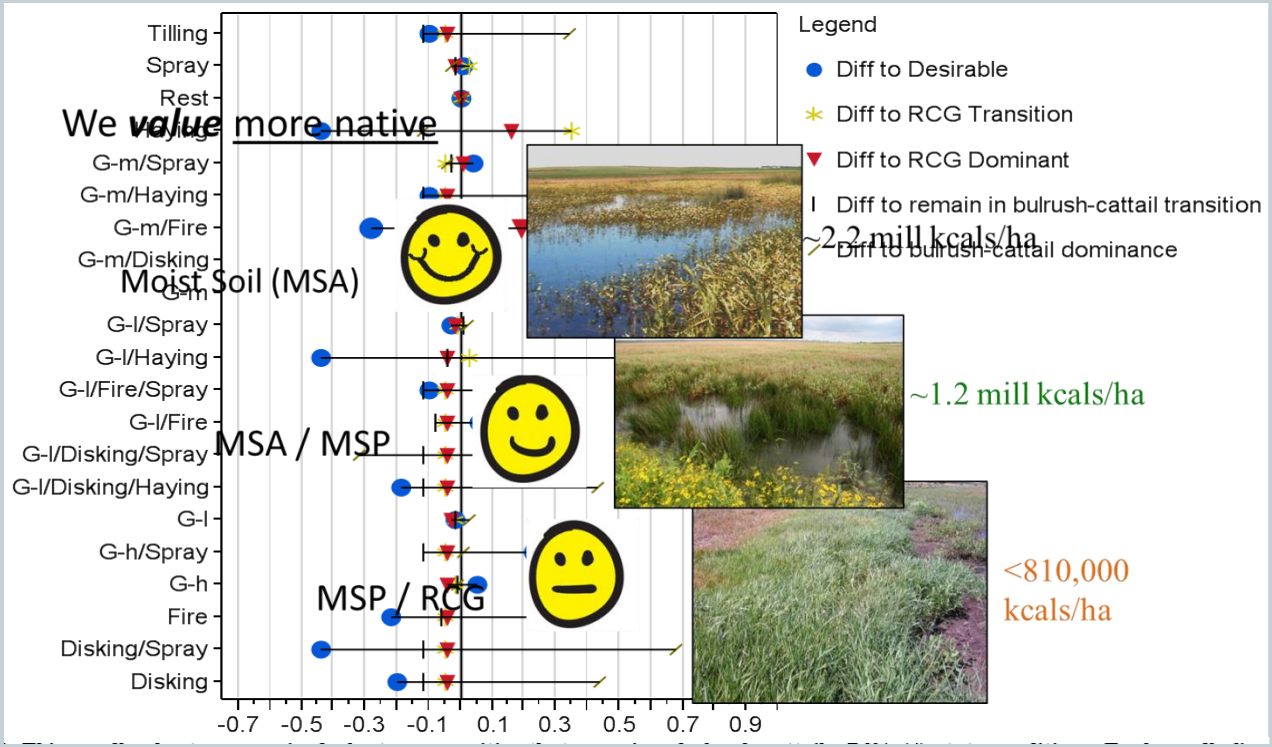
where, what, and when

Habitat Management Plan

- An operational document identifying priority restoration and infrastructure improvements
- 5 year time frame
- Priority projects determined based on:
  - CCP wetland and upland priority goals and objectives
  - restoration priority models
  - current funded projects or already initiated projects

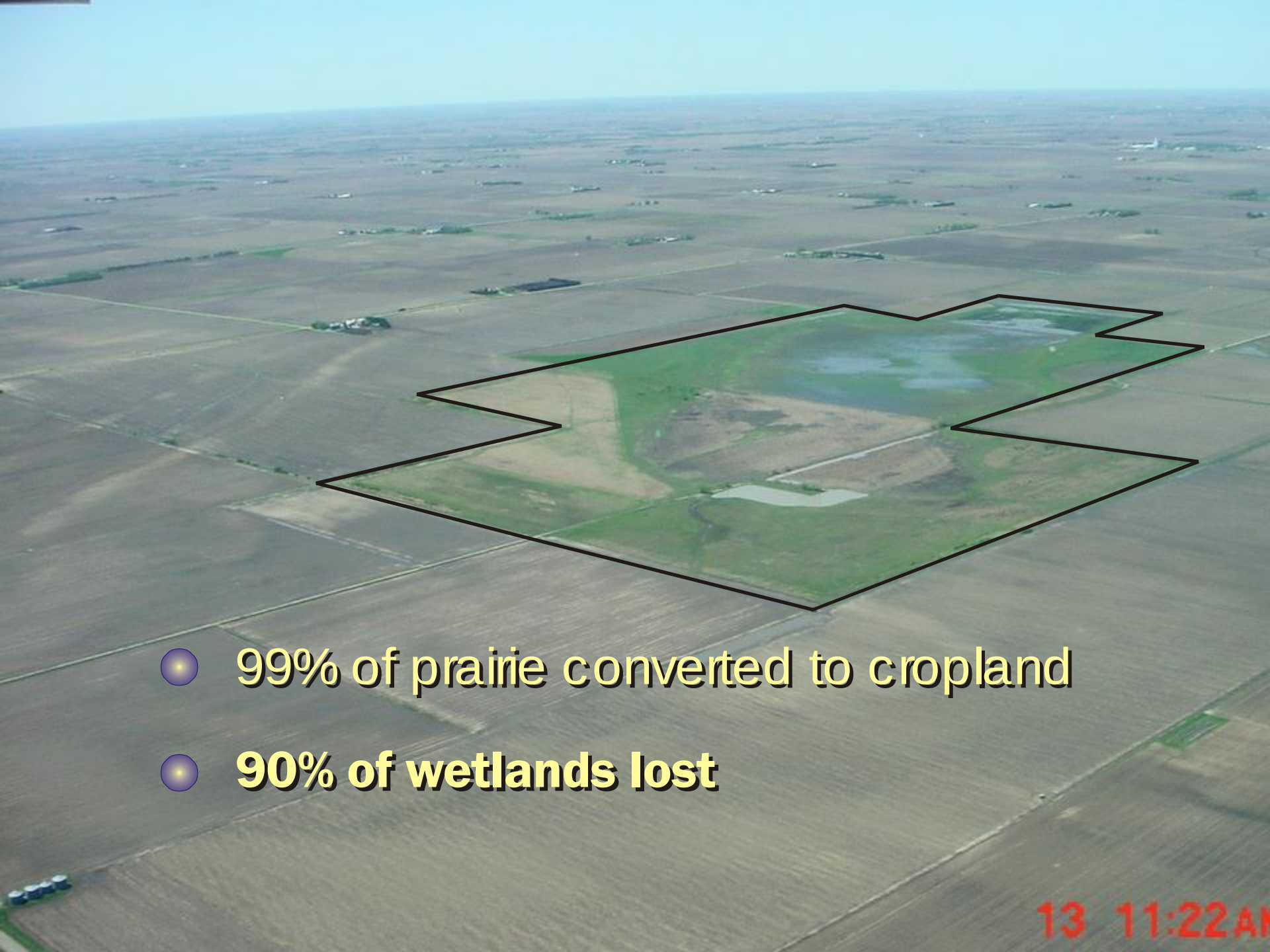
Annual Management Plans

- Plan and implement specific management treatments for each WPA annually



Pumping List Max Duck Habitat Cost	Cost to Execute
Hultine N Basin	$ 1,705
McMurtrey West	$ 917
McMurtrey East	$ 750
Harvard Main NE	$ 660
Massie NE	$ 424
Massie W	$ 1,428
Massie SW MS	$ 816
Krause E	$ 820
Mallard Haven Wies	$ 1,680
Mallard Haven Main	$ 1,596
Mallard Haven SE	$ 534
Gleason South	$ 2,093
Lindau	$ 3,131
Youngson	$ 1,287
Prairie Dog Middle	$ -
Spoonbill Flats	$ 2,150
Atlanta SE	$ -
Jones	$ 2,463
Funk Mallard MS	$ 525
Funk Pintail	$ 1,080
Funk Teal	$ 972
21	$ 25,032

Drahota and Reichart 2015



- 99% of prairie converted to cropland
- **90% of wetlands lost**

Natural Processes

Highly manipulated landscapes both increase and reduce natural processes:

- Frequency
- Intensity
- Duration

- **Affects:**
  Ecosystem Resilience
  - ✓ wetland function
  - ✓ decrease available habitat for migratory species
  - ✓ increase active management

Erosion

Deposition

and

Deflation

Before

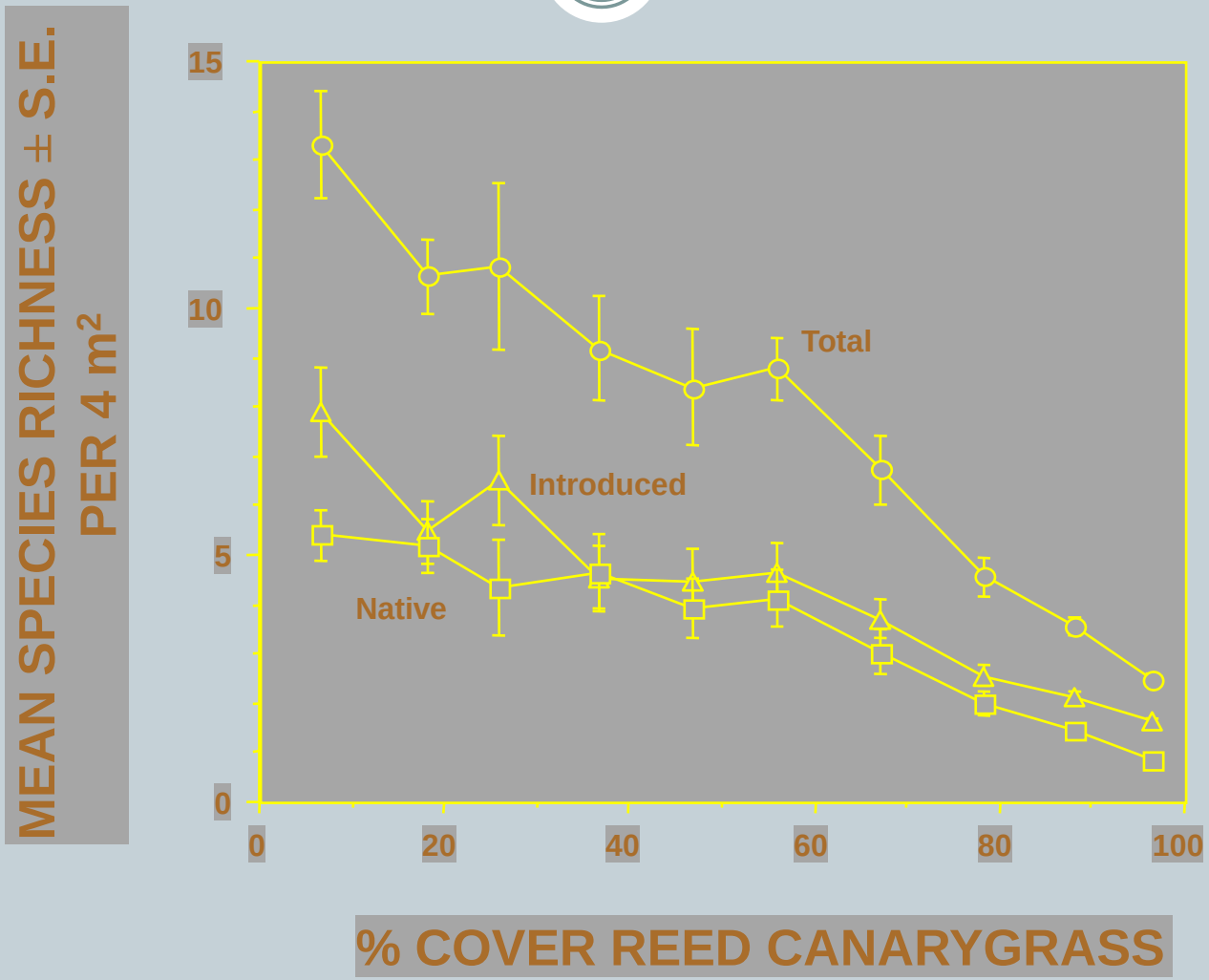
After

Expose substrate to wind removes recently deposited soils

25 days after

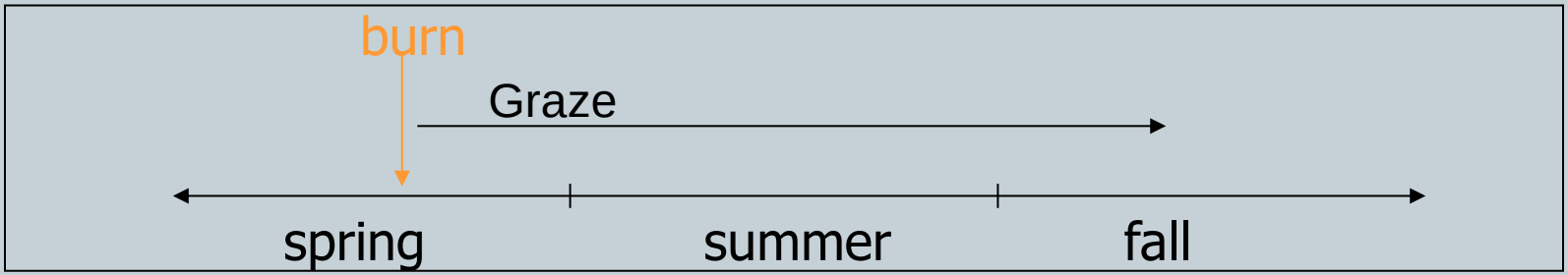
Grazing

What happens when you have no disturbance?

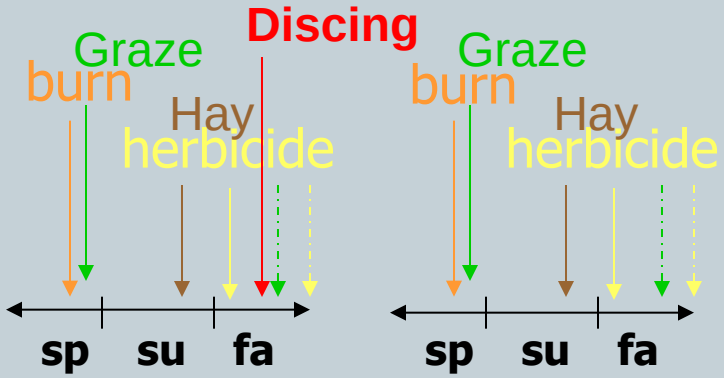


Necessary shift in management practices to reduce undesirable plants

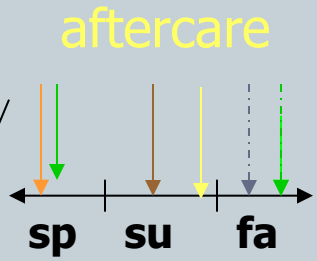
Previous paradigm: 1 growing season

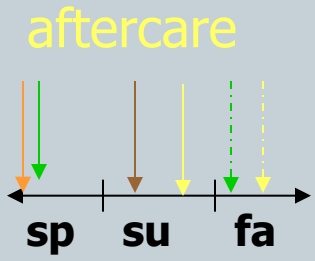


Adaptive Management: multiple growing seasons



Desirable stand with RCG encroachment, mostly seedlings





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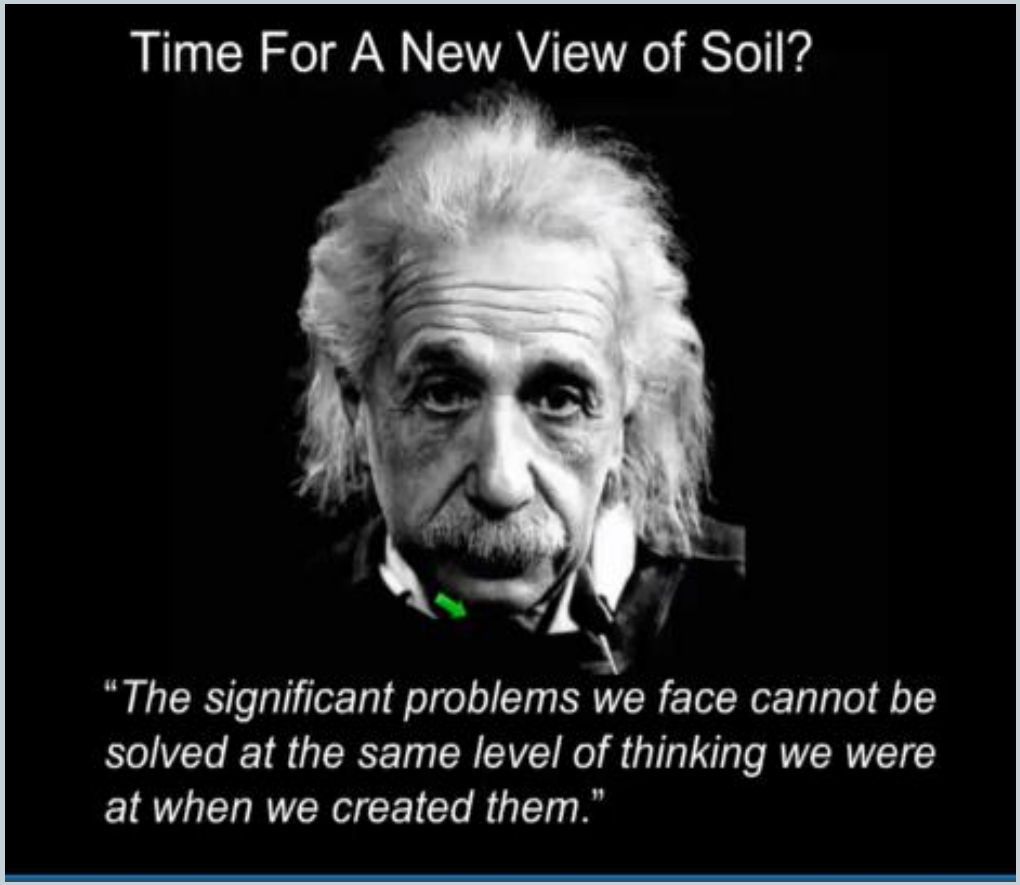
(modified from Reinhardt and Galatowitsch 2004)

Sustainability

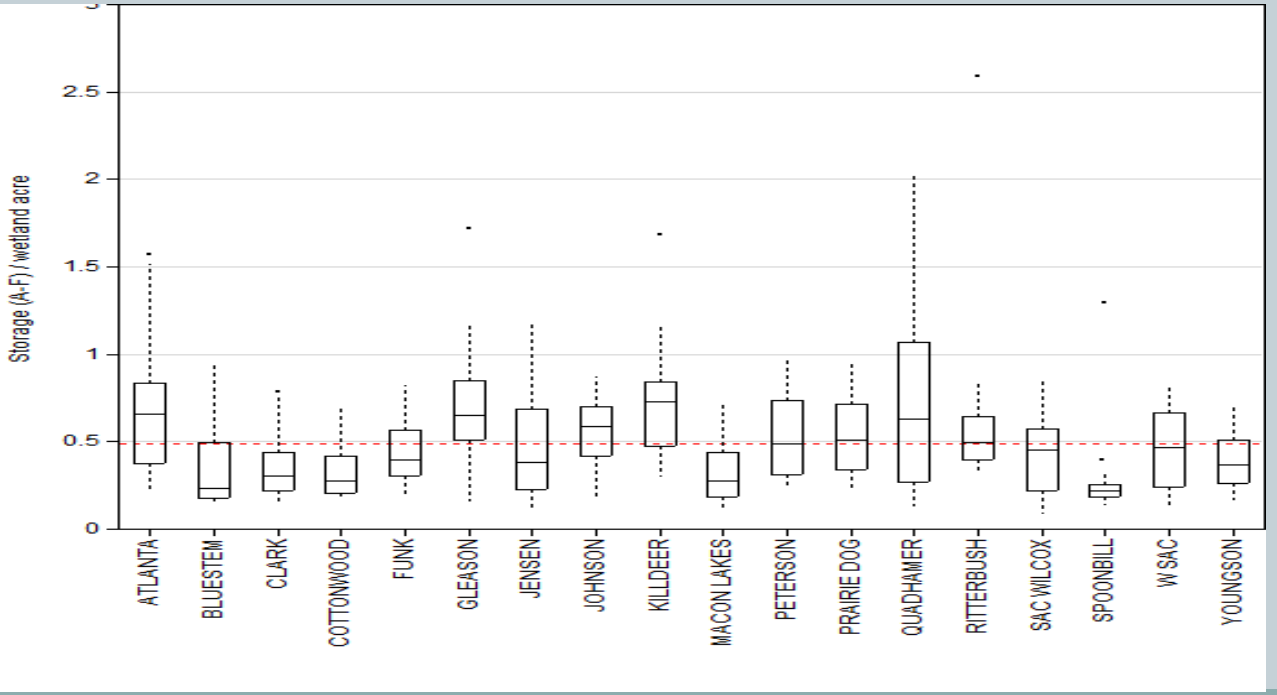
- Resilient community hypothesis:
  - Plant species that can establish and survive under environmental conditions found at any given site will eventually be found growing there and/or be found in the seedbank (efficient community hypothesis, Galatowitsch and van der Valk 1996)

Symptom or the Problem



Organic Matter

- OM holds increases water holding capacity
  - Soil water holding capacity to 6” based on mean OM indicates a mean 0.49 A-F/A can be stored before the wetland will “show” surface water



Organic Matter - RCG

RCG belowground biomass is 3x greater in YR 2 than YR 1. This shows the difference in just 3 months after germination

Five Ways Soil Organic Matter Resists Soil Compaction

1. Surface residue resists compaction. Acts like a sponge to absorb weight and water.
2. Organic residues are less dense (0.3-0.6 g/cm^3) than soil particles (1.4-1.6 g/cm^3).
3. Roots create voids and and spaces for air and water.
4. Roots act like a biological valve to control oxygen in the soil.
5. Roots supply exudates to glue soil particles together to form macroaggregates and supply food for microbes.

Reinhardt and Galatowitsch 2004

Soil Formation

- Takes a long time, or does it?

Figure 4 An example of soil building using organic matter deposited in a garden. This depicts new soil formed to 4” deep in six years.

Soil Compaction

- Less organic matter increases compaction
- Organic residues act like sponges, absorbing water and nutrients, while cushioning soil particles
- Organic particles keep clay particles from chemical binding

Hoormon et al. 2009

Sustainability

Plant roots are like a biological valve (air and water movement), increases capillary flow

RWB Wetland Soil Health

- ✓ Decrease water infiltration
- ✓ Decrease available water holding capacity
- ✓ Decrease nutrient availability
- ✓ Detoxify soil
- ✓ Increase ponding frequency
- ✓ Increase ponding duration.

Fertilization can affect root growth and the production of plant exudates, which influences microbial life in the rhizosphere.

Figure 1 Differences in root development in soils that are rich in nutrients (right) or lack nutrients (middle).

If you want to make small changes, change how you do things, if you want to make big changes, change how you see things

HMP Projects (aka Table 2)

<u>Key to a successful HMP</u>

- Identify the **ecological and human benefits** to each restoration
- Concisely describe the **efficiency gained** by completing the project
- Identify the **key metrics** that can be used to monitor success or failure.

HMP

Examples:

- **ecological and human benefits**

  Remove fill from two wetlands on the eastern portion of the WPA to increase ponded habitat for the benefit of federal trust species and sustainable, native plant communities.

- **Efficiency gained**

  Increase spring ponding frequency and ponded area, increase energy available, increase recreational opportunities. Reduce undesirable species and management frequency.

- **Key metrics**

  Habitat shifts (upland veg. community and species to desirable wetland plant communities), ponding frequency and area, ponding duration, management frequency, water quality and groundwater recharge.

RWB WMD HMP Activities (Table 2)

4 activities identified

1. Restore wetland function (wetland scale)



2. Restore upland and wetland habitat (WPA scale)
3. Enhance wetland habitat (specific treatments may not address the entire need)

4. Infrastructure improvement

HMP Projects, sub-activities, timeline, and operational considerations (aka Table 3)

Examples:

- **Activity and timeframe (what will be done)**

Activity/sub-activity (in sequential order)	Year	Month
Cottonwood topo survey and soil survey	2018	Nov-Dec

- **RWB WMD obligation**

Rainwater Basin Wetland Management District			
Staff		Other (Equipment; Material; Contract)	
Personnel (hours)	Cost ($)	Item (hours)	Cost ($)
RE (8), Biotech (16)	$1,160	Tractor (8)	$ 3,200

- **Partner Contributions/Grants**
- **Total Estimated Project Cost**

Partner Contributions/Grants		Total
NRCS/ DU	$9,000	**$10,800**

HMP Projects, sub-activities, timeline, and operational considerations (aka Table 3)

Example: Funk Mallard Temp Restoration

			Rainwater Basin Wetland Management District								
			Staff		Other (Equipment; Material; Contract)		Refuge Sharing		Partner Contributions/Grants		Total
Activity/sub-activity (in sequential order)	**Year**	**Month**	**Personnel (hours)**	**Cost ($)**	**Item (hours)**	**Cost ($)**	**Type (hours)**	**Cost ($)**	**Name**	**Cost ($)**	**Cost ($)**
Funk Mallard Temp survey	2018	Sept	RE (4)	$180					DU	$7,500	$ 7,680
Develop restoration plan	2018	Dec	RE (32)	$1,440							$ 1,440
Grant submission	2018	June	RE (32)	$1,440							$ 1,440
NEPA, SHPO, etc.	2019	Feb	Bio (8)	$360					ES, CR	$360	$ 720
Bids	2019	Feb	RE (8)	$360						$0	$ 360
Complete restoration	2019	Sept	RE (56)	$2,520						$95,000	$ 97,520
Farm remaining lowlands to create a favorable seed bed	2019	April-Oct	Mgr (32), RE (8)	$1,800					Cooperators	$0	$ 1,800
Reseed lowlands with diverse native plant mix appropriate for the soil type and hydrology	2022	June	RE (8), Biotech (40)	$1,440						$0	$ 1,440
Annual Monitoring			Bio (40)	$1,800						$0	$ 1,800

RWB HMP Projects List 2019-2024

Restore Wetland Function

- Ritterbush
- Cottonwood
- Johnson East
- Smith
- Linder
- Atlanta
- Funk Whitefront
- Funk Mallard Temp
- Sinninger PEMA

Enhance Wetland Habitat

- Morphy dike removal
- Well replacement

Restore WPA

- Killdeer
- Real
- Spoonbill

Infrastructure Improvement

- Freeman Lakes access, parking, and boat ramp

Questions

Figure 6 September 2011, pre restoration

Figure 1 Organic accumulation down to 7" was found in all core samples collected at Theesen.

Theesen WPA on 12 April 2016, note the area has been hayed the prior growing season.

Figure 7 The 2017 was a fairly dry growing season. This photo was taken in August 2017, post restoration (80% complete on east footprint).

Figure 6 Theesen WPA on 16 June 2017, three and a half months after removing sediment. A total of 13.13" of rain had fallen after dirt work was complete up to this photo date. One large runoff event occurred on 14 May with 5.25" of rainfall, yet only 2.15" of rain fell between 14 May and 16 June, and only one of these events was more than 1" (1.09" on 28 May) indicating a low probability that ponding occurred because of runoff.