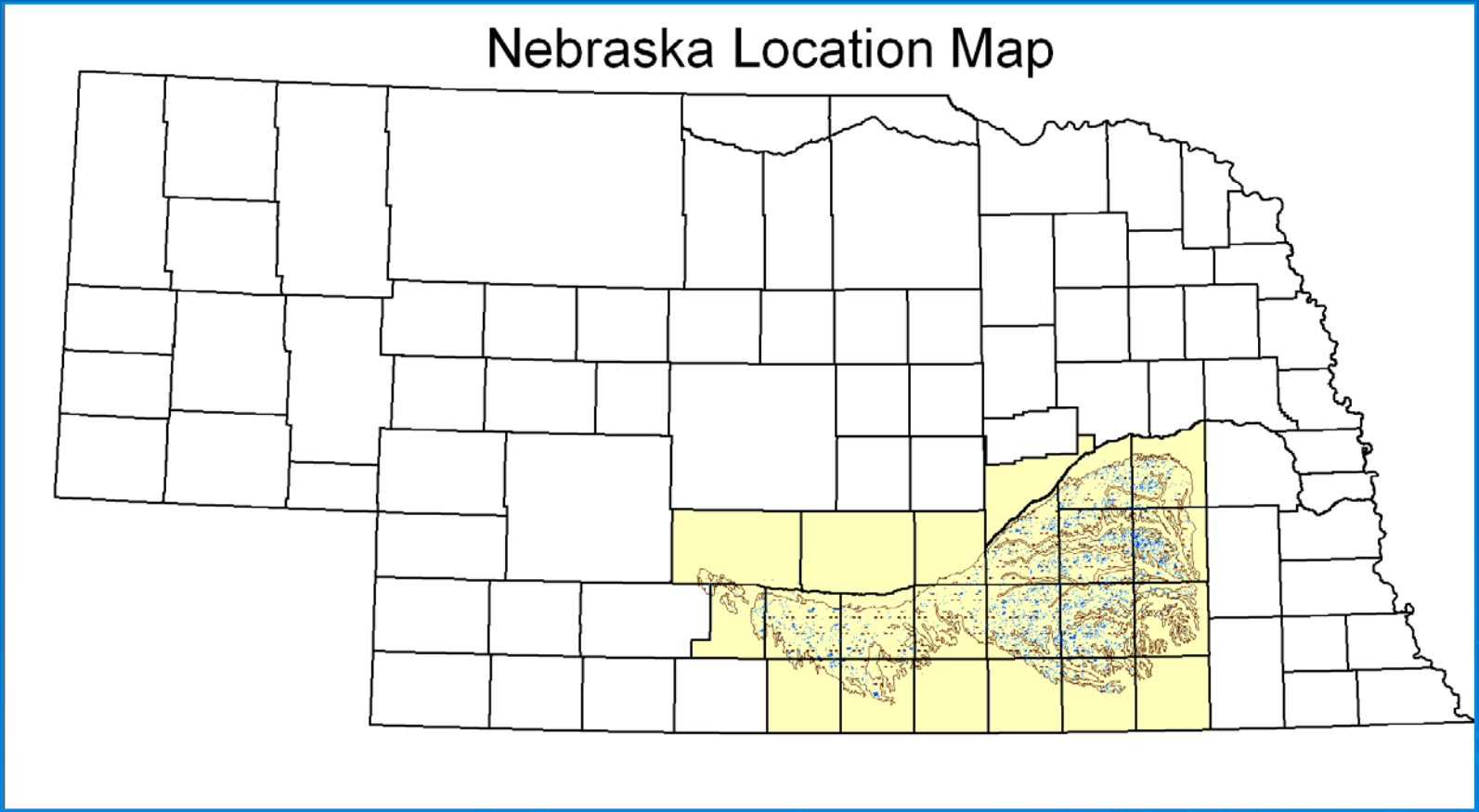
Rainwater Basin Wetland Complex

Rainwater Basin Wetland Complex



Importance

- 90% mid- continent white fronted geese
- 50% mid continent mallards
- 30% mid-continent pintails
- 200,000-300,000 shorebirds/wading birds 30 different species
- 5,000,000 snow geese
- 10-15 million migrants annually
- Migration from March to May
  - competition for nutrient resources and space

Rainwater Basin Joint Venture

- Formed in 1992
- Provide sufficient wetland habitat in the Rainwater Basin Wetland Complex to meet North American Waterfowl Management Plan goals (NAWMP).

1992 - Joint Venture Implementation Plan

- **Objective 1- Protect, restore, and create an additional 25,000 wetland acres, plus 25,000 acres of adjacent upland habitat**
- **Strategy 1-** Protect 10,000 acres of existing wetlands plus associated uplands.
- **Strategy 2-** Restore and protect 12,000 acres of degraded or destroyed wetlands, plus associated upland.
- **Strategy 3-** Create and protect 3,000 acres of new wetlands, plus associated upland.

1992 - Joint Venture Implementation Plan

- Objective 2 - Provide reliable water sources for a minimum of 1/3 of all protected wetland acres to assure sufficient quantity, quality, and distribution to meet migratory waterfowl and water bird needs

2008 - Paradigm Shift

- Joint Venture is currently updating its Implementation Plan
- Conscious shift from acres to a more biological metric (energetics)
  - Primary role of Rainwater Basin migration habitat is to provide essential food resources to feed waterfowl and improve body condition during spring migration

Proposed New Strategies

- Original Implementation Plan suggested a minimum of 1/3 of waterfowl habitat be provided by publicly-owned wetlands.

- Current proposal is to provide 1/3 of necessary energetic resources on public wetlands.

Problem Statement

- How to optimally manage publicly-owned wetland habitats with limited resources to meet bio-energetic needs of waterfowl during spring migration.
  - Lack of comprehensive management goals
    - site to regional scale
    - state/federal jurisdiction
  - Lack of explicit & standardized performance measures.
  - Impediments (cross-organizational) to implement management in the field.

Objectives

- **<u>"Ends" Objectives:</u>**
- **Provide 1/3 of energy (2.8 billion kilocalories) on public lands for spring migrating waterfowl.**
  - *8.4 Billion kilocalories required across entire Rainwater Basin Wetland Complex.*
- Provide waterfowl hunting opportunities on public land.
- Provide sufficient habitat for migrating shorebirds.
- In the western Rainwater Basins, provide roosting habitat for migrating Whooping Cranes.

Objectives

- **<u>"Means" Objectives</u>**
- **Provide & maintain 14,750 flooded acres of waterfowl foraging habitat on public lands**
- **Maintain foraging habitat units at 75% of early successional vegetation**
- Maintain 2,200 acres of roosting habitat
- Maintain a spatial distribution/configuration of habitats necessary to mitigate disease, snow goose/duck interactions, and spread out foraging areas
- Restore _ acres of non-functioning wetland habitat
- Acquire and restore _ acres of non-functioning high priority wetland habitat

Alternatives / “Actions”

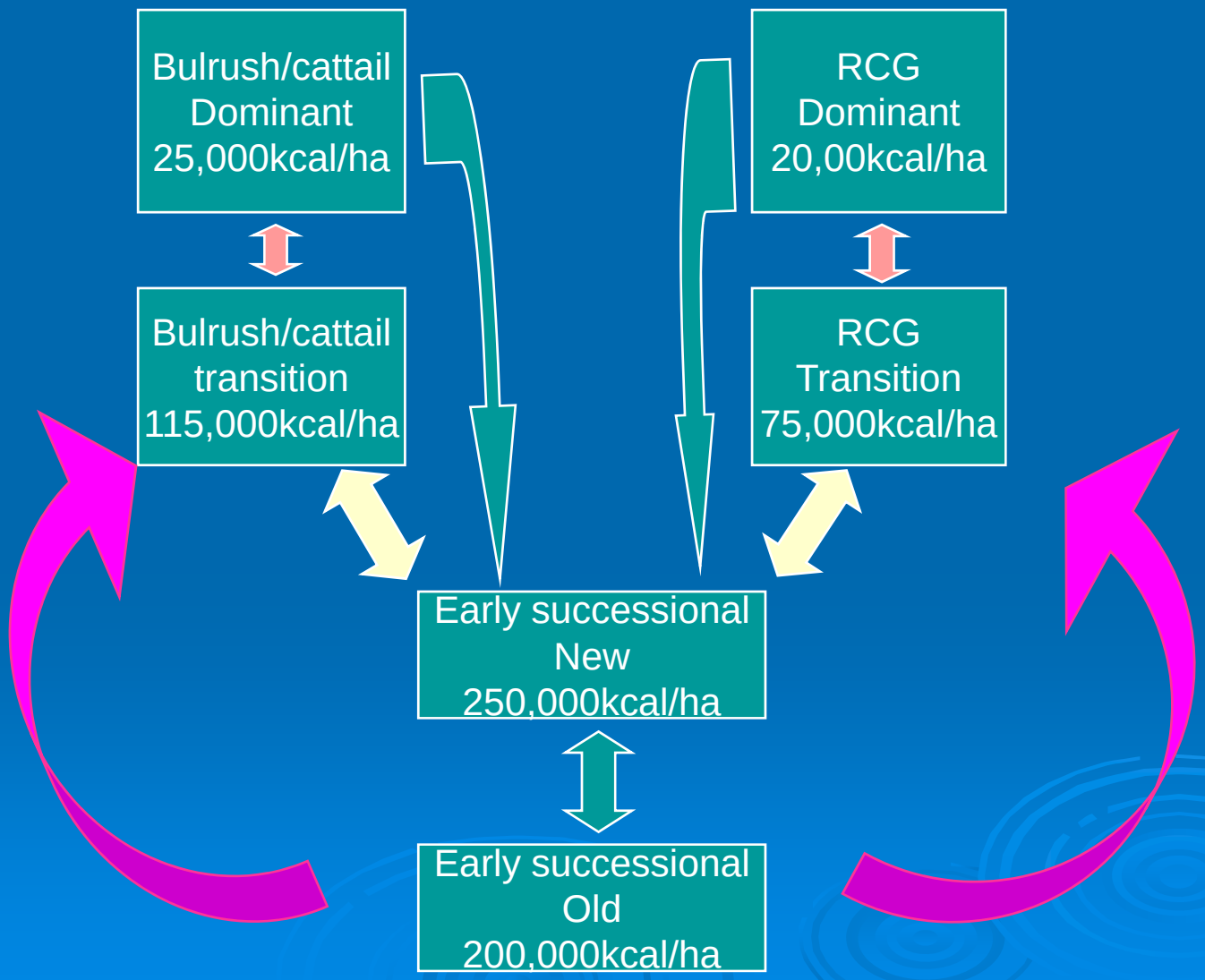
Means Objective

- To achieve the 14,750 acres of early successional vegetation on public lands our goal was to grow early successional vegetation on state and federal wetland properties.
- Management actions which could be used to grow early succession vegetation were framed in a single wetland scenario.

Defining a Framework

State Variables	Definition	Utility
Wetland Vegetative Condition	Percent vegetation composition	Kilo-Calories per Acre
Reed Canarygrass (Dominant)	>75%	20
Bulrush-cattail (Dominant)	>75%	30
Reed Canarygrass (Transitional)	25 – 75%	75
Bulrush-cattail (Transitional)	25 – 75%	115
Early Successional (New)	>75% Annuals	250
Early Successional (Old)	>75% Perennials	200

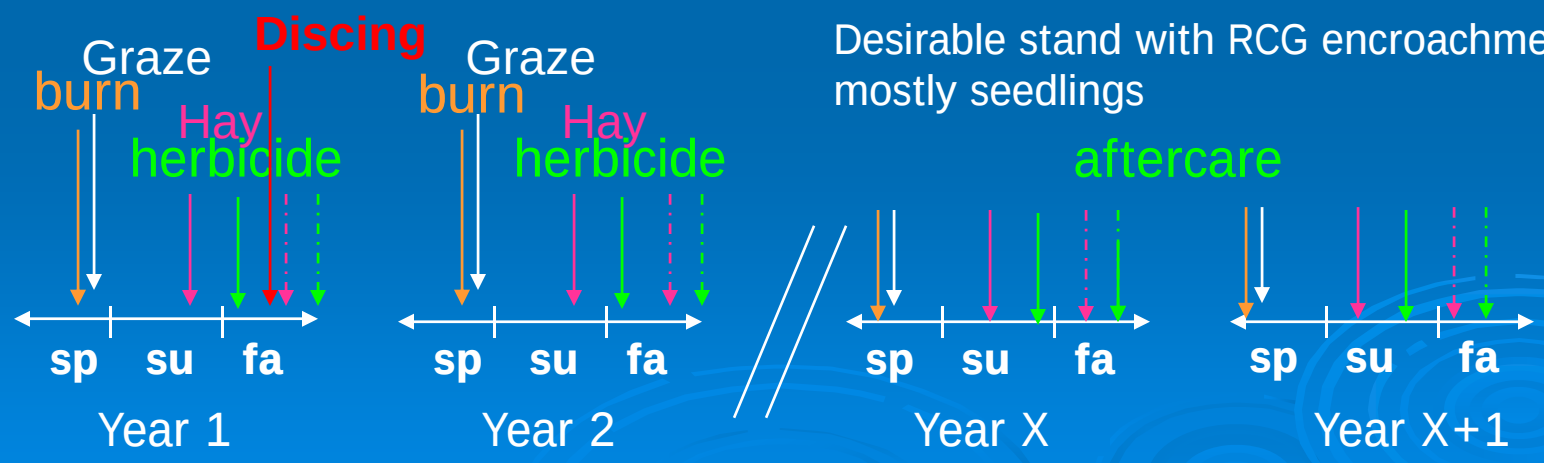
State Dynamics - RWB Vegetation Transition Model



Necessary shift in management practices to reduce Reed Canarygrass

current paradigm: 1 growing season

proposed paradigm: multiple growing seasons



$

$$$$

Consequences

Tradeoffs

Reed Canary (D)										
Action	RG (D)	BC (D)	RG (T)	BC (T)	ES (N)	ES (O)			E(Kcal)		Cost/acre
Grazing (H)	0.8	0	0.2	0	0	0	1		31		+ 90
Grazing (L)	1	0	0	0	0	0	1		20		+ 30
Discing	0	0	0.5	0	0.5	0	1		162.5		-20
Tilling	0	0	0.4	0	0.6	0	1		180		-40
Mowing	1	0	0	0	0	0	1		20		-15
Fire (SP)	1	0	0	0	0	0	1		20		-25
Fire (FA)	1	0	0	0	0	0	1		20		-25
Haying	1	0	0	0	0	0	1		20		+15
Herbicide (G)	0.2	0	0.8	0	0	0	1		64		-25
Herbicide (F)	0.95	0	0.05	0	0	0	1		22.75		-30
Water level mgmt.	1	0	0	0	0	0	1		20		-14
Rest	1	0	0	0	0				20		0
scraping	0	0	0.1	0	0.9	0	1		232.5		-1250
Fire (SP) / Grazing (H) / Herb (G)	0.1	0	0.8	0	0.1	0	1		87		40
Fire (SP) / Grazing (H)	0.9	0	0.05	0	0.05	0	1		34.25		65
Fire (SP) / Haying / Herb (G)	0.1	0	0.8	0	0.1	0	1		87		-15
Grazing (H) / Herb (G) / Discing	0	0	0.2	0	0.8	0	1		215		45
Grazing (H) / Herb (G)	0.2	0	0.7	0	0.1	0	1		81.5		65
Grazing (H) / Herb (G) / Tilling	0	0	0.1	0	0.9	0	1		232.5		25
Grazing (L) / Herb (G) / Discing	0	0	0.2	0	0.8	0	1		215		-15
Grazing (L) / Herb (G)	0.3	0	0.65	0	0.05	0	1		67.25		5
Grazing (L) / Herb (G) / Tilling	0	0	0.1	0	0.9	0	1		232.5		-35
Discing / Tilling	0	0	0.2	0	0.8	0	1		215		-60
Discing / Water	0	0	0.1	0	0.85	0.05	1		230		-34
Grazing (H) / Herb (G) Water	0	0	0.35	0	0.6	0.05	1		186.25		51

Decide & Take Action

- Evaluate Kcal response vs Cost of actions
- Determine which Alternatives are possible at specific sites or across the entire Rainwater Basin landscape
  - Weather / Environmental
  - Political
  - Legal
  - Staff
  - Money
  - Time
- We now have a comprehensive (across agencies) decision matrix to make the right decision at the right time.
  - We can prioritize actions to achieve desired results while recognizing potential constraints

Hold On Now…

- We successfully addressed management at the site level but ignored a critical element in the problem statement necessary to achieve the goal – Water.

- Early successional wetland vegetation produces great duck food, but without water the food would not be available.

But is it Flooded?

- Currently we do not own a sufficient number of wetlands to ensure 14,750 acres of ES vegetation would be flooded and available under the normal range of climatic conditions.
- Additional actions are needed to meet the “End Objective”
  - Acquisition of additional wetland acres
  - Improve offsite hydrology
  - Groundwater wells
- Revisit the Ends and Means Objectives to make sure they were still relevant.

Objectives

- **<u>"Ends" Objectives:</u>**
- **Provide 1/3 of energy (2.8 billion kilocalories) on public lands for spring migrating waterfowl.**
  - *8.4 Billion kilocalories required across entire Rainwater Basin Wetland Complex.*
- Provide waterfowl hunting opportunities on public land.
- Provide sufficient habitat for migrating shorebirds.
- In the western Rainwater Basins, provide roosting habitat for migrating Whooping Cranes.

PrOACT [3]

Objectives

- **<u>"Means" Objectives</u>**
- **Provide & maintain 11,800 flooded acres of waterfowl foraging habitat on public lands**
- **Maintain foraging habitat units at 75% of early successional vegetation**
- Maintain 2,200 acres of roosting habitat
- Maintain a spatial distribution/configuration of habitats necessary to mitigate disease, snow goose/duck interactions, and spread out foraging areas
- Restore _ acres of non-functioning wetland habitat
- Acquire and restore _ acres of non-functioning high priority wetland habitat

Provide 1/3 of energy (2.8 billion kilocalories) on public lands for spring migrating waterfowl.

Fundamental Objectives

Hunting Opportunity

WHCR Habitat

Shorebird Habitat

Means Objectives

Flooded foraging habitat Acres

Roosting Acres

Foraging units at 75% of early successional vegetation

Juxtaposition

Attributes (measures)

Acres (flooded forage)

Plant comp.

Spatial models for all spp.

Acres (flooded roosting)

Public Lands Capacity

Vegetative Conditions	Acre	Kilocalories (Thousand)	Potential Habitat	Average Habitat**
Reed canary grass (D)	2,791	20	55,820	10,048
Bulrush-cattail (D)	1,900	30	57,000	10,260
Reed canary grass (T)	800	75	60,000	10,800
Bulrush-cattail (T)	400	115	46,000	8,280
Early successional (New)	7,500	250	1,875,000	337,500
Early successional (Old)	2,300	200	460,000	82,800
Sum	15,691		2,553,820	459,688
Deficit			-8.8%	-83.6%

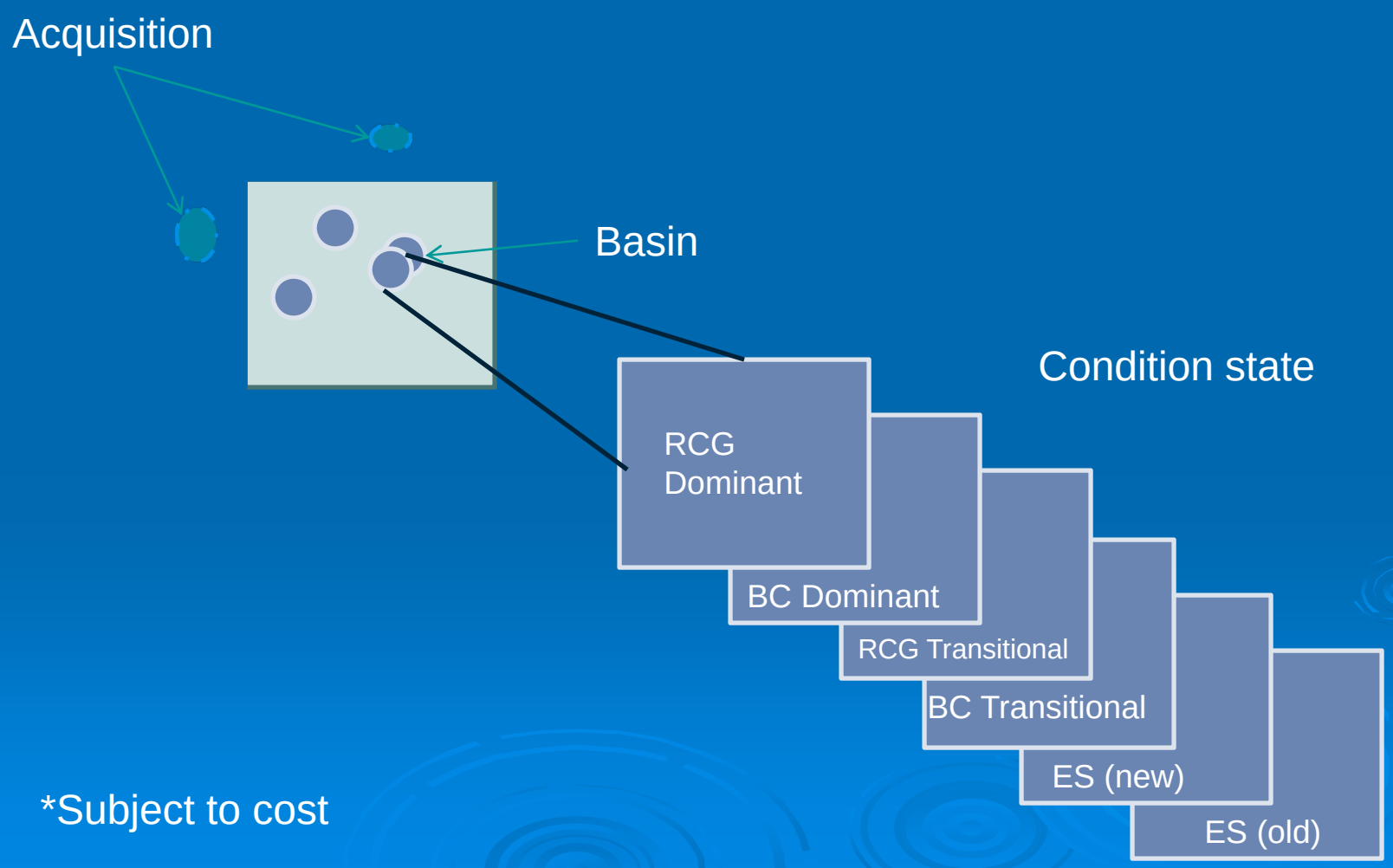
Public Lands Capacity Preferred Management Strategy and 100% Flooded

Vegetative Conditions	Acres	Kilocalories (1,000's)	Potential Habitat (kcals 1,000's)	Habitat Average Flooded (kcals 1,000's)
Reed canary grass (D)	738	20	14,750	2,655
Bulrush-cattail (D)	738	30	22,125	3,983
Reed canary grass (T)	738	75	55,313	9,956
Bulrush-cattail (T)	738	115	84,813	15,266
Early successional (New)	5,900	250	1,475,000	265,500
Early successional (Old)	5,900	200	1,180,000	212,400
Sum	14,750		2,832,000	509,760
Deficit			1.1%	-81.8%
Public Wetland Acres	15,691			

Current Public Lands Capacity Under Variable Climatic Conditions

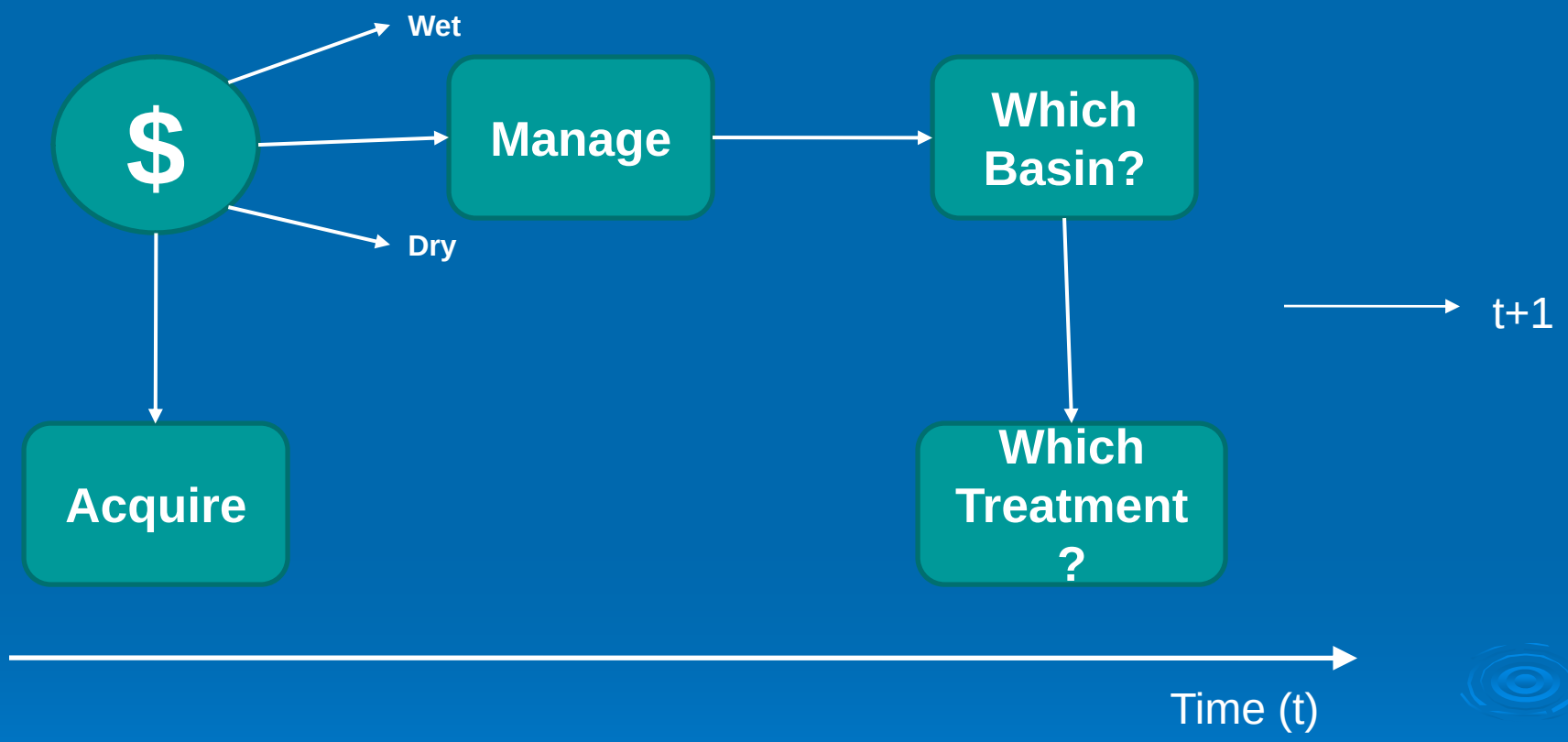
Vegetative Conditions	Acres	Kilocalories (1,000's)	Energetic Resources 100% flooded (kcals 1,000's)	Energetic Resources Average Conditions (kcals 1,000's)*	Energetic Resources Drought Conditions (kcals 1,000's)**	Energetic Resources Above Average Conditions (kcals 1,000's)**
Reed canary grass (D)	2,791	20	55,820	10,048	4,466	16,188
Bulrush-cattail (D)	1,900	30	57,000	10,260	4,560	16,530
Reed canary grass (T)	800	75	60,000	10,800	4,800	17,400
Bulrush-cattail (T)	400	115	46,000	8,280	3,680	13,340
Eearly successional (New)	7,500	250	1,875,000	337,500	150,000	543,750
Early successional (Old)	2,300	200	460,000	82,800	36,800	133,400
Sum	15,691		2,553,820	459,688	204,306	740,608
Deficit			-8.8%	-83.6%	-92.7%	-73.5%

Scaling Up Optimal Decisions



*Subject to cost

Fund Allocations



Develop a well-defined model to access which path to take through this process are most beneficial given the objectives

Discussion

- At individual site scale
  - Decision Tool
    - Linked set of steps for decision making
    - Expected Response of Treatments (Actions)
    - Expected Kcal output
    - Cost analysis

Discussion

- Current acreage at optimal conditions fall short of Kcal goal
  - Need more land
  - Need more wells and turn them on each year
  - Need to restore enough offsite hydrology and probably acquire more land

Discussion

- Uncertainties
  - Transition Probabilities
  - Kcal values
  - Monitoring
  - Political
  - Agency Coordination

What Next?

- Evaluate Monitoring Protocol
  - Annual vs. Every Three Years
- Individual Agency Meetings
  - Get buy-in from agencies to adopt proposed goal for public lands
- Reports to RWBJV Tech Committee
  - Recommend to JV structure to proposed approach
- All Agency Public Land Manager meeting
- Inform Joint Venture Implementation Plan Update
- Standardize site specific management plans
- Re-convene Public Land Managers Working Group
  - Divide up the energetic goal among public properties so public land as a whole meets its Kilo-Calorie Goal
- Analyze past management actions with past monitoring data to inform transition probabilities
  - Revise Best Management Practices Document

Questionable

Questions?