

DFW ADAPTATION PROJECT – OBJECTIVES, STATUS AND FUTURE

Logistics:

- Funding source – Doris Duke money administered by Wildlife Conservation Society
- Timeline – 18 month project begun in April/May 2008. Will conclude in October/November 2009
- Collaborative – Manomet, DFW, TNC

OBJECTIVES

“Big Picture” objective:

- To help climate change impact and adaptation concerns become important elements in future conservation planning and implementation in Massachusetts.

GOALS (1)

To determine how Massachusetts climate has changed in last century and how it will change in the future:

- How much change has already occurred?
- Where in State has change occurred?
- Has rate of change been constant or has it accelerated?
- How much change in next 100 years?
- Where will greatest changes occur?
- Implications for future acquisitions?

GOALS (2)

To evaluate comparative vulnerabilities of fish and wildlife habitats to climate change

- Which habitats are more or less vulnerable?
- How will they change?
- What are implications for species of concern?
- What are roles of non-climate stressors?
- What are our management options?
- Implications for future acquisitions?

GOALS (3)

To support future acquisition prioritization in the face of climate change

- Where should we focus limited resources?
- How do we evaluate future investments?
- How do we focus acquisition to preserve maximum biodiversity (habitat, species)?

PROGRESS SO FAR – VULNERABILITY EVALUATION

Objective to evaluate the comparative vulnerabilities of fish and wildlife habitats

- Expert panel approach

WHY EXPERT PANEL APPROACH?

- We are projecting into the future
- Projections based on best current knowledge about climate change and Massachusetts habitats
 - ecology
 - current extents and change
 - threats
- Need to involve Massachusetts habitat experts
- “Ownership”

HABITATS BEING EVALUATED

Table 4. Habitat types evaluated.			
Forested habitats		Freshwater wetland habitats	
Spruce-fir forest	C	Emergent marsh	C
Northern hardwood forest	C	Shrub swamp	C
Southern/central hardwood forest	C	Spruce-fir boreal swamp	C
Pitch pine-scrub oak forest	C	Atlantic white cedar swamp	C
Freshwater aquatic habitats		Riparian forest	P
Cold water Rivers and Streams	C	Hardwood swamp	C
Large cold water lakes	C	Vernal pools	C
Smaller cold water lakes and ponds	C	Coastal habitats	
Cold water kettle ponds	C	Intertidal mud/sandflats	P
Warm water ponds, lakes and rivers	C	Saltmarsh	P
Connecticut and Merrimack mainstems	C	Dune habitats	P

EMISSIONS SCENARIOS

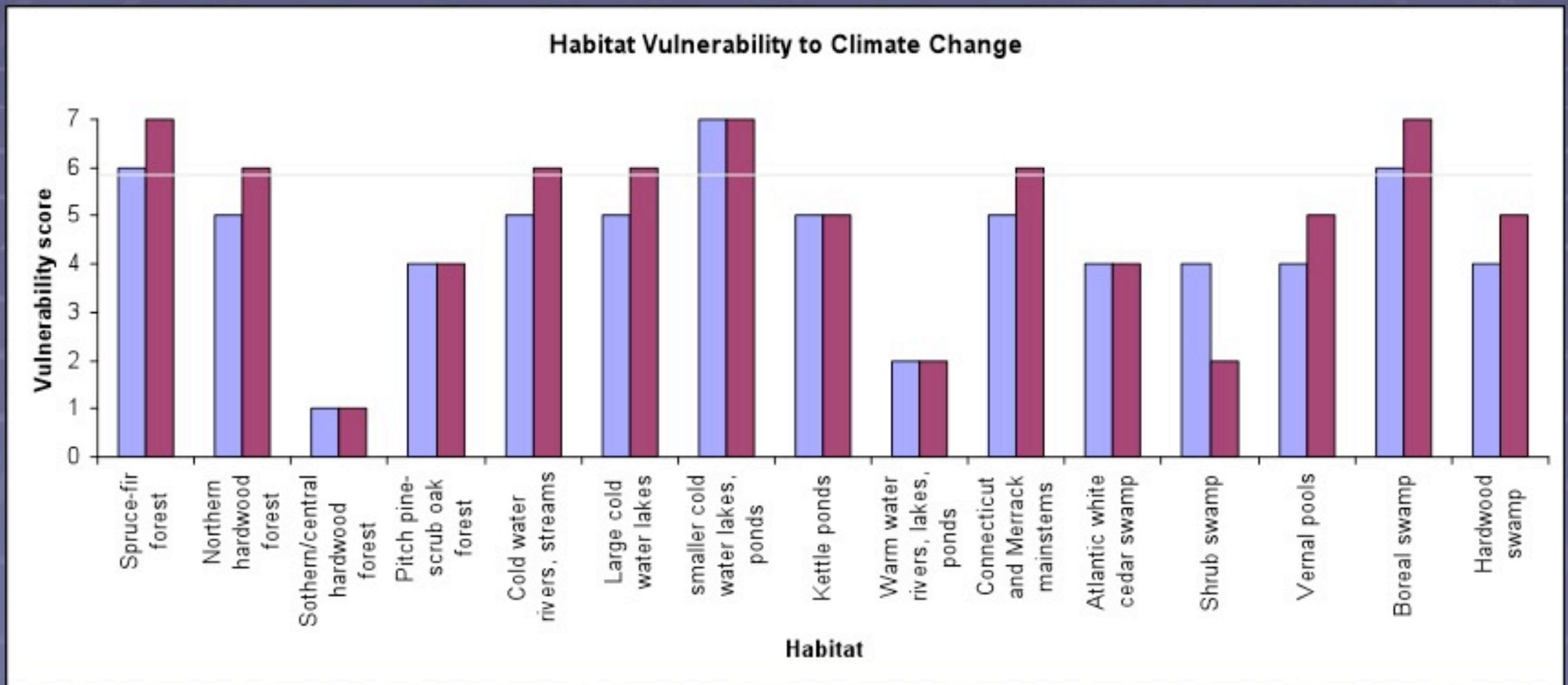
- Doubling of CO₂ (LES)
- Tripling of CO₂ (HES)

Pre-industrial atmospheric CO₂ was 275ppm. Now at 390ppm – well on way to doubling.

Vulnerability scores

Habitat likely to be eliminated entirely	7	
Majority of habitat likely to be eliminated		6
Extent will be reduced but by <50%	5	
Extent may not change appreciably	4	
Habitat may become established	3	
Habitat may expand moderately (<50%)	2	
Habitat extent may expand greatly	1	
Uncertain	0	

VULNERABILITY RANKINGS



VULNERABILITY RANKINGS – MOST THREATENED

Elimination or near-elimination of some habitats even under lower emissions scenario:

- spruce-fir forest
- boreal swamp

VULNERABILITY AND ACQUISITION

Should we invest in future acquisitions of spruce-fir, etc?

- Not if investment is motivated solely by habitat value.
- However, there are other values (Mt. Greylock spruce fir and viewing area)
- Also, will eventually be northern hardwoods (which is also threatened by cc)

VULNERABILITY RANKINGS – THREATENED

- Northern hardwoods (>50% loss)

VULNERABILITY AND ACQUISITION

Should we invest in future acquisitions of northern hardwoods

- Yes – threatened by cc
- What patches do we acquire so that our investment is protected?

VULNERABILITY AND ACQUISITION

For northern hardwoods we might want to:

- Acquire upper elevation patches (>2,000 feet)
- Acquire patches with plenty of “room to move”
- Acquire patches that are free of other stressors
- Acquire large patches and/or connected patches
- Don't acquire patches in “hotspots”

VULNERABILITY FACTORS

Table 6. Factors influencing the vulnerability to climate change of Massachusetts habitats.

Habitat	Vulnerability scores	Cold-adapted	High elevation	Northern habitat	Southern habitat	Vulnerable To fire	Vulnerable to pest outbreaks
Small coldwater lakes	7/7	Yes	Yes	Yes	No	No	No
Spruce-fir forest	6/7	Yes	Yes	Yes	No	Yes	Yes
Boreal swamp	6/7	Yes	Yes	Yes	No	Yes	Yes
Large coldwater lakes	5/6	Yes	Yes	Yes	No	No	No
Northern hardwood forest	5/6	Yes	Yes	Yes	No	No	Yes
Coldwater rivers	5/6	Yes	Yes	No	No	No	No
River mainstems	5/6	No	No	No	No	No	No
Kettle ponds	5/5	No	No	Yes	No	No	No
Pitch pine scrub-oak	4/4	No	No	No	Yes	No	No
Hardwood swamp	4/5	No	No	No	Yes	No	No
Atlantic white cedar	4/5	No	No	No	Yes	No	No
Vernal pools	4/5	No	No	No	No	No	No
Shrub swamp	4/2	No	No	No	No	No	No
Central/southern hardwoods	1/1	No	No	No	Yes	No	No
Warm water aquatic	2/2	No	No	No	Yes	No	No

Future Acquisitions

- Reactive – we need an approach that will allow us to evaluate change in conservation values of existing holdings or areas that “come on the market”
- Proactive – we also need an approach that will help us identify and target future acquisition priority areas
- We need a “predictive tool” that will complement existing prioritization

Future Acquisitions

Main approach will be to combine on GIS platform:

- current habitat/priority area distributions
- vulnerability results and expected change
- projected patterns of future climate change
- projected responses/changes
- ownership data
- etc.

Provides spatial model of climate change “risk” to habitats

FUTURE ACQUISITIONS - CLIMATE WIZARD

- Web-based tool developed by The Nature Conservancy
- Provides practitioners with ability to:
 - backcast, empirical data from monitoring stations
 - project climate, three downscaled General Circulation Models, three emissions scenarios

The Historic Massachusetts Climate

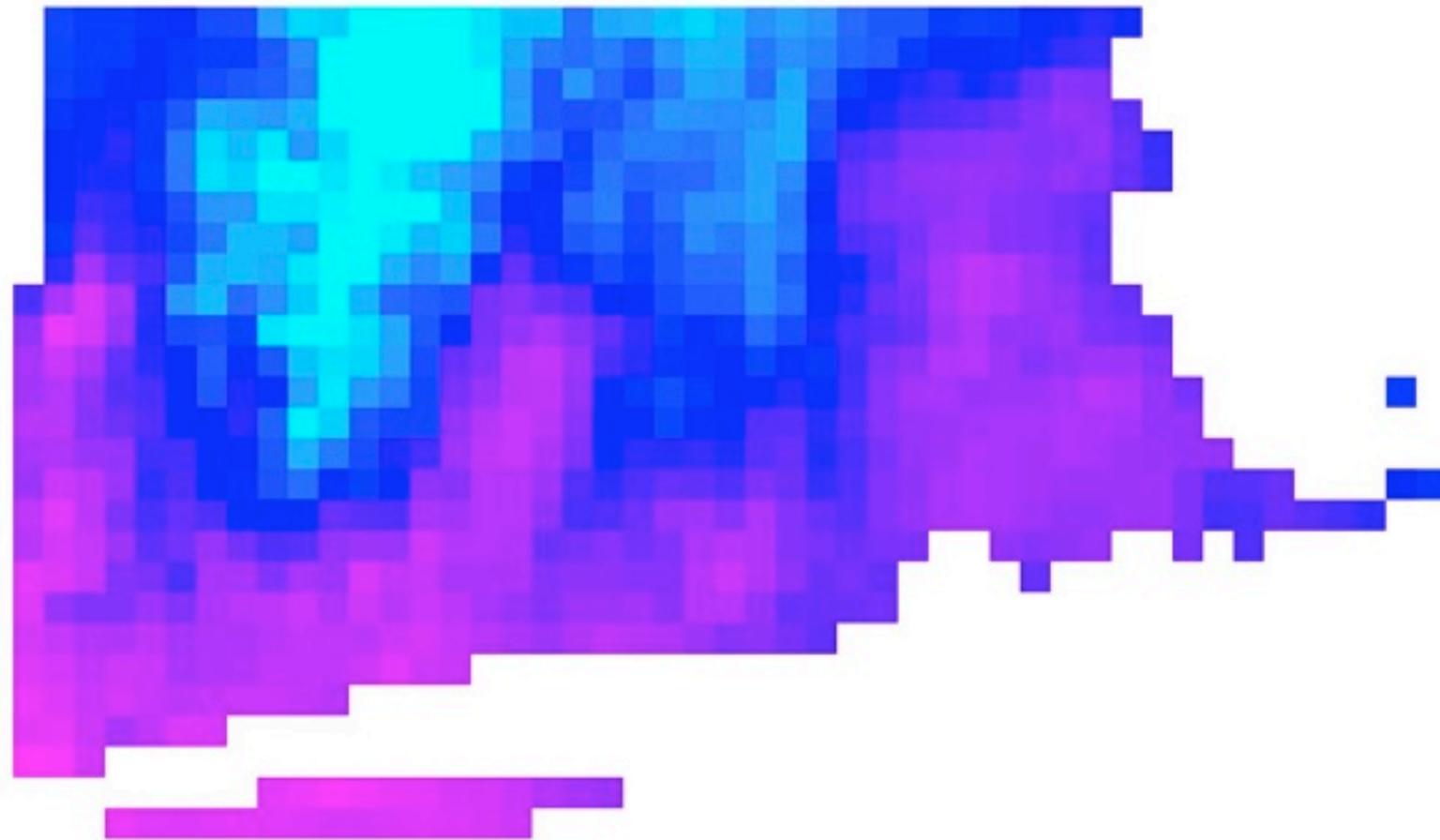
What are the spatial and temporal patterns in temperature and precipitation (~1900-2006)?

- Decadal (since 1900)
- 100yr trend
- 50yr trend
- Acceleration?

Climate Projections

What are the likely spatial and temporal patterns in temperature and precipitation (~2010-2100)?

- 3 General Circulation Models, coupled
- Low, medium, high emissions scenarios



Legend

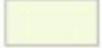
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Value





NHESP Priority Habitats for Rare Species

 PRIHAB_POLY