

# 1000 Atmospheric Carbon Dioxide



# Arctic Sea Ice: Sept 1980 vs Sept 2007



University of Illinois - The Cryosphere Today http://arctic.atmos.uiuc.edu/cryosphere/ NSIDC Sea Ice Animation 1979-2008 http://nsidc.org/sotc/sea\_ice\_animation.html



#### Northeast Winter Temperature Trends 1965-2005



#### Burakowski et al., 2008, JGR

#### Trends in One Inch Precipitation Events 1948-2007



## Winter/Spring (1 Jan - 31 May) Center-of-Volume Dates



All data from unregulated rivers; Hodgkins et al., 2003

# Northeast Climate Impacts Assessment

Collaboration among Union of Concerned Scientists and 50 independent scientists

#### Climate Cha in the U.S. I OUR CHOICES, OUR LEGACY





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#### Confronting Climate Change in the U.S. Northeast









SCIENCE, IMPACTS, AND SOLUTIONS

JULY 2007

#### www.climatechoices.org

## Climate Change in the Casco Bay Watershed: Past, Present, and Future



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#### Portland Mean Annual Temperature: 1891-2006



#### Portland Winter Temperature: 1891-2006



### Portland Annual Precipitation: 1891-2006



# Climate Trends 1965-2006: Portland, Lewiston, Farmington (Bold trends are statistically significant at p<0.01; <u>underlined</u> trends significant at p<0.05)

PORTLAND, ME	Winter	Spring	Summer	Fall	Annual
Precipitation (in/decade)	<u>-0.95</u>	+0.56	+0.13	+0.66	+0.34
Maximum Temp (°F/decade)	<u>+0.71</u>	+0.24	-0.05	+0.32	<u>+0.31</u>
Mean Temp (°F/decade)	+0.93	+0.33	-0.07	+0.26	+0.38
Minimum Temp (°F/decade)	+1.16	+0.43	-0.10	+0.02	+0.39
LEWISTON, ME					
Precipitation (in/decade)	<u>-1.03</u>	+0.26	-0.25	+0.50	-0.87
Maximum Temp (°F/decade)	+0.46	+0.24	+0.17	+0.24	+0.29
Mean Temp (°F/decade)	+0.54	+0.29	<u>+0.34</u>	+0.30	+0.39
Minimum Temp (°F/decade)	+0.65	+0.34	+0.52	<u>+0.35</u>	+0.48
FARMINGTON, ME					
Precipitation (in/decade)	-0.65	+0.74	0.0	+0.72	+0.77
Maximum Temp (°F/decade)	+0.81	<u>+0.60</u>	+0.15	+0.40	+0.51
Mean Temp (°F/decade)	+1.23	+0.74	<u>+0.42</u>	+0.56	+0.76
Minimum Temp (°F/decade)	+1.65	+0.88	+0.70	+0.70	+1.00

#### **Extreme Precipitation Events - Portland**



#### Ice Out Dates – Sebago Lake



#### Portland Covered Days: 1965-2006



#### Portland Snowfall: 1965-2006



#### Relative Sea Level Rise – Portland



#### **Greenhouse Gas Emission Scenarios**



### Projecting Future Climate Change for the Northeast: Downscale Global Projections to Regional Level



### **Rising Annual Temperatures**



## More Hot Days



## Fewer Cold Days



## Increase in Precipitation in Winter & Spring Decrease in Summer



## Snow Cover Days



#### More Extreme Precipitation Events



# More Precipitation During Wettest Day of the Year (higher emissions scenario)



#### Increase in Drought Conditions (20% below average ppt)



### Change in Elevation of 100 Year Floods

Table 8 Preliminary Estimates of Future Stillwater Elevations at the Portland Tide Gauge Under Lower and Higher Emissions Scenarios (feet relative to NAVD <sup>1</sup> )							
Scenario	Lower		Higher				
Year	2050	2100	2050	2100			
FEMA 1998 Stillwater Elevation	8.9	8.9	8.9	8.9			
Subsidence	0.024	0.043	0.024	0.043			
Dynamic	NE	0.52	NE	0.79			
Eustatic	0.66	1.6	1.4	4.6			
Total Stillwater Elevation <sup>2</sup> (ft)	9.5	11.1	10.3	14.3			
1 - NAVD: North American Vertical Datum of 1988 2 – Total Stillwater Elevation may not equal total of components due to rounding							

NE - not estimated

Stillwater: The maximum coastal storm-induced water-surface elevation, primarily a combination of the normal astronomic tide and a storm surge

## 100 Year Storm Flooding in Portland Harbor in 2100 Under High Emissions Scenario (5.4 ft SLR)



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