Estimation of Future Coastal Flood Risk Due to Climate Change

A methodology for determining the future extent of flooding in planning for adaptation

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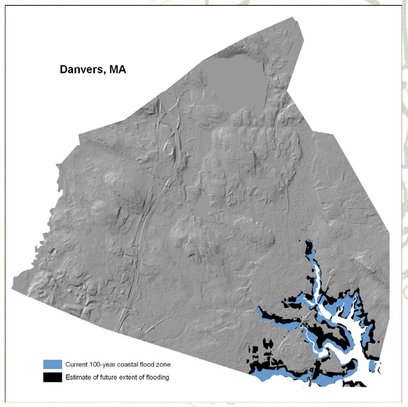
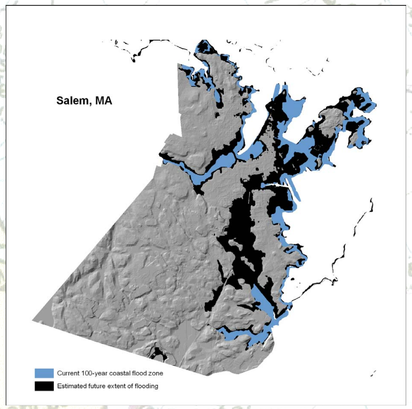
Comparing the risk of two towns on Salem Sound - Danvers & Salem

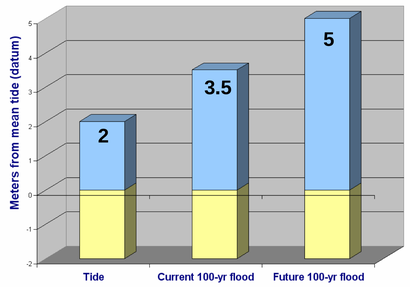
By the century's end, sea levels will likely rise by as much as a meter due to the effects of climate change.* Under such a scenario, we will experience current 100-year flooding levels on a 5-10 year scale. Current flood maps are 40 years old, and there is a pressing need for accurate risk assessment in order to plan for adaptation.





Methodology - The generation of the future 100-year flood extent was based on the correlation of the current flood map, high resolution elevation data and its mean-tide vertical datum, and tidal charts for Salem Sound. It attempts to account for 1.5 meters of sea level rise due to continued melting of continental ice and the anticipation of more severe weather events.

Elevation model vertical datum corelation

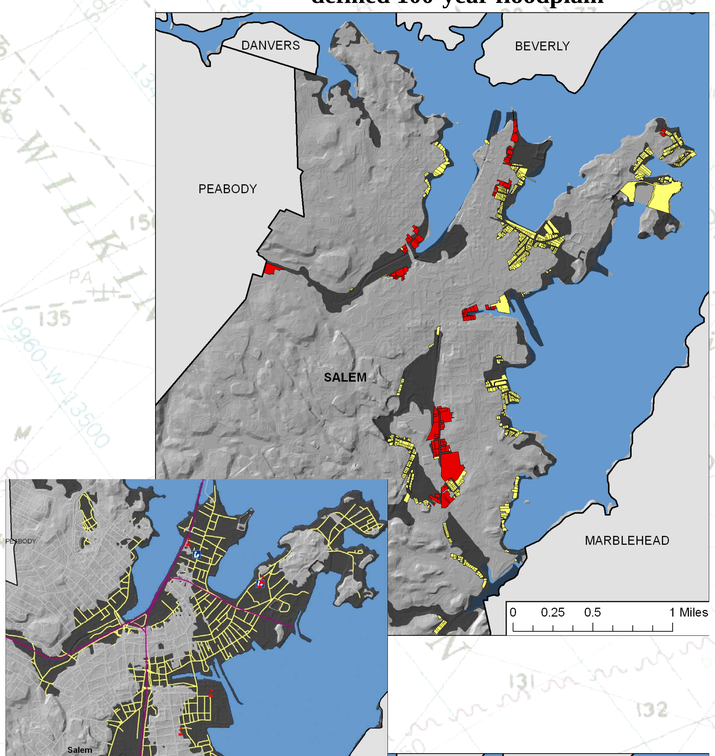


	Danvers	Salem
Residential Parcels	6,552	10,023
Residential Acreage	3,003	19,000
Parcels in old flood zone	232	889
Parcels in future flood zone	406	2,609
% increase	**75%**	**193%**
Acreage in old flood zone	128	495
Acreage in future flood zone	172	726
% increase	**34%**	**46%**
Commercial Parcels	467	982
Commercial Acreage	766	632
Parcels in old flood zone	44	95
Parcels in future flood zone	88	575
% increase	**100%**	**505%**
Acreage in old flood zone	61	56
Acreage in new flood zone	95	357
% increase	**56%**	**537%**
People in flooded census blocks	3,908	13,448
Population density	2,849 people/mi^2	5,168 people/mi^2
Length of flooded roads	apx. 10 mi.	apx. 40 mi.
Schools in new flood zone	1	5

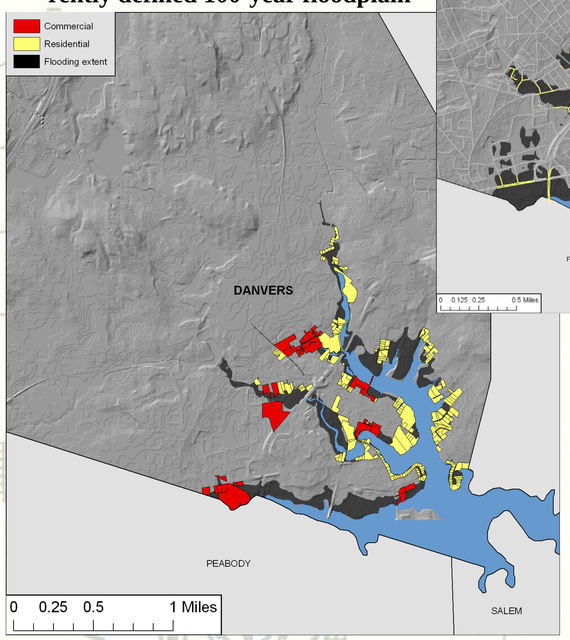
This table shows the distribution of parcels, people, schools, and roads affected by the current 100-year floodplain, and the newly estimated equivalent that accounts for a sea level rise of one meter and additional storm surge piling of 30cm.

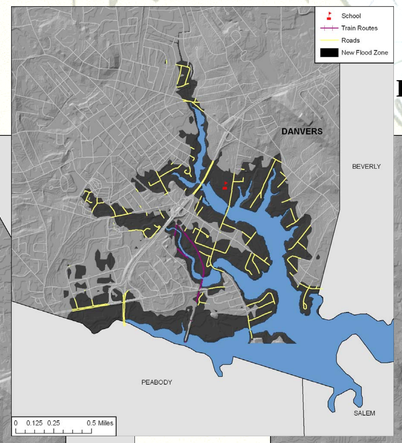
Conclusions - With respect to property, schools, roads, and railroads, Salem faces a significantly greater risk from future coastal flooding than Danvers. Its densest settlement, five schools, commercial district, and most of its rail lines could be inundated in this century.

Salem parcels at risk in the currently defined 100-year floodplain

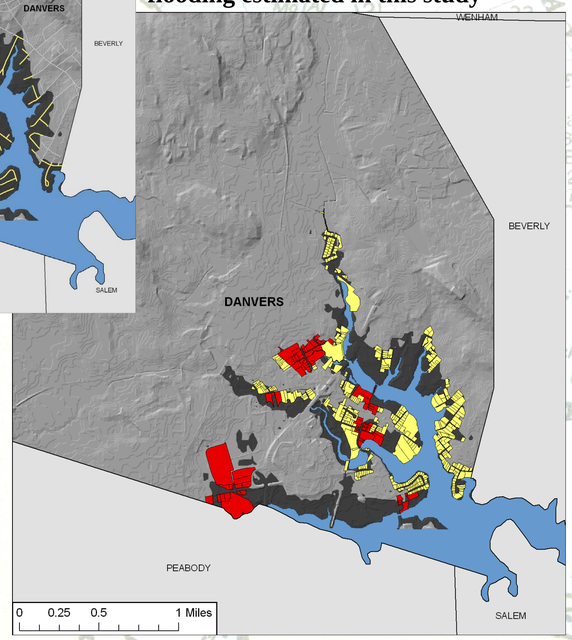


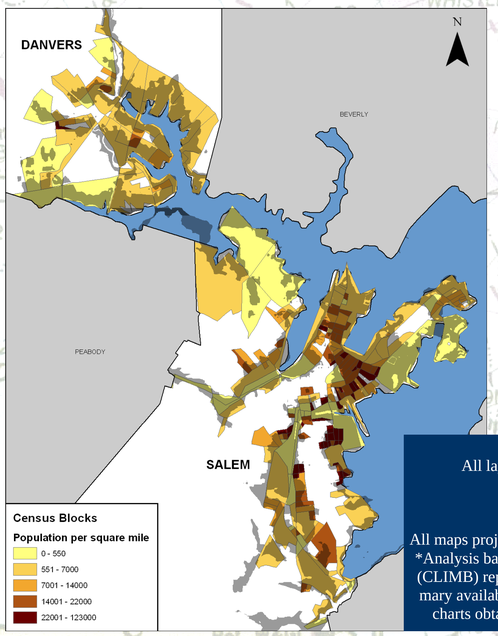
Danvers parcels at risk in the currently defined 100-year floodplain

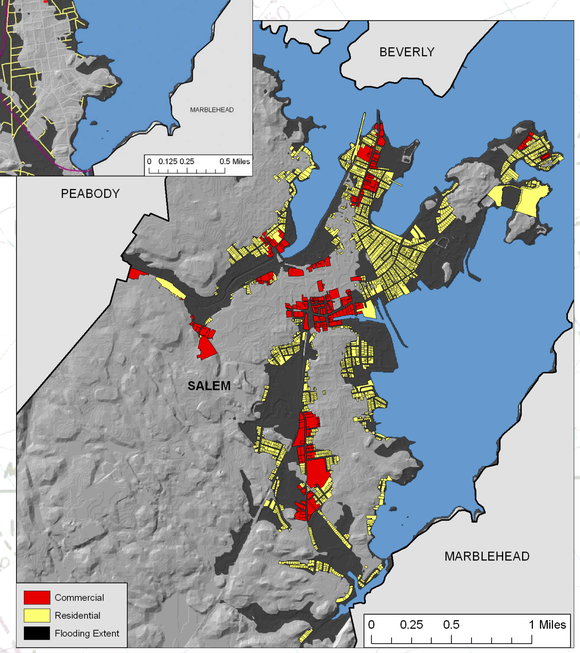




Danvers parcels at risk of future flooding estimated in this study







Salem parcels at risk of future flooding estimated in this study.

Data Sources:
All layers and demographic tables from MassGIS, accessed at: www.massgis.gov, December, 2007.
Photo: Pickering Wharf, Salem, MA from: Index Stock Imagery @ www.indexstock.com.
All maps projected in Massachusetts State Plane Mainland NAD 1983, meters.
*Analysis based on findings of *Climate's long-term impacts on metro-Boston* (CLIMB) report by Paul Kirshen, William Anderson & Matthias Ruth. Summary available at: http://www.net.org/reports/CLIMB_Final.pdf. Salem tide charts obtained at: http://www.boatma.com/tides/tides_northshore.html.