



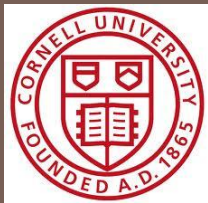
2012 UCOWR/NIWR ANNUAL CONFERENCE

Managing Water, Energy, & Food in an Uncertain World



July 17-19, 2012
Sante Fe, New Mexico

DESALINATION IN NORTHEASTERN U.S.: LESSONS FROM FOUR CASE STUDIES



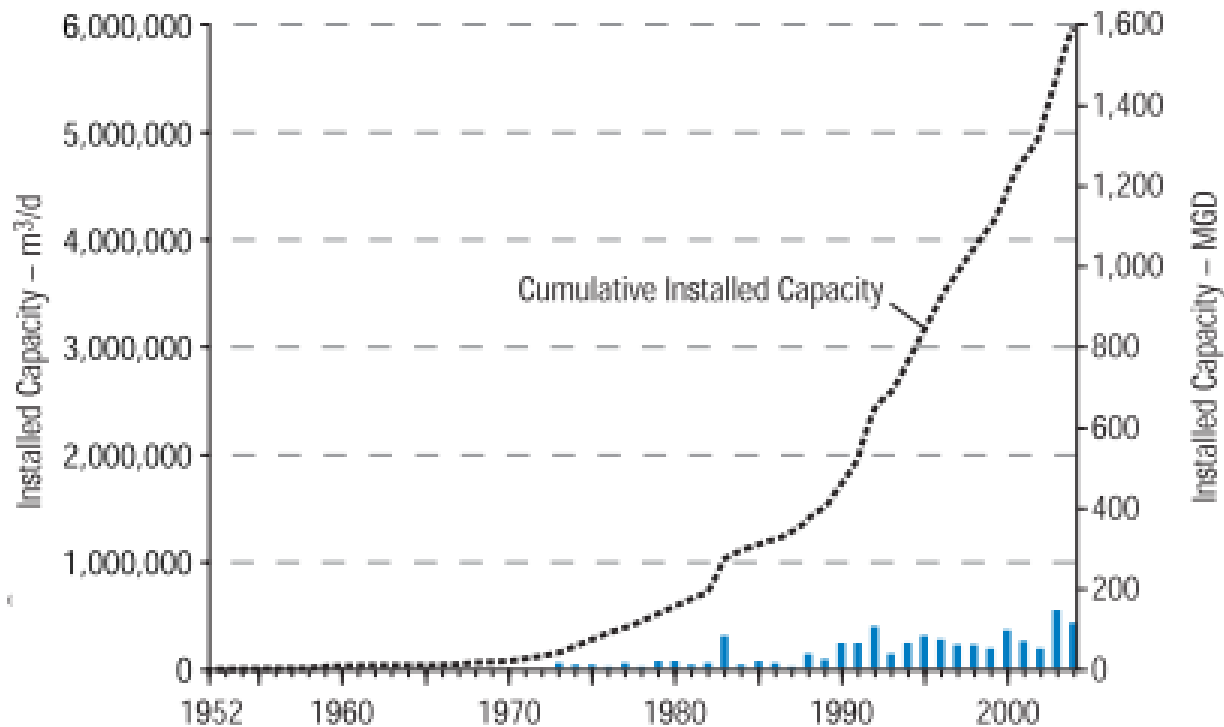
Sri Vedachalam & Susan J. Riha

New York State Water Resources Institute

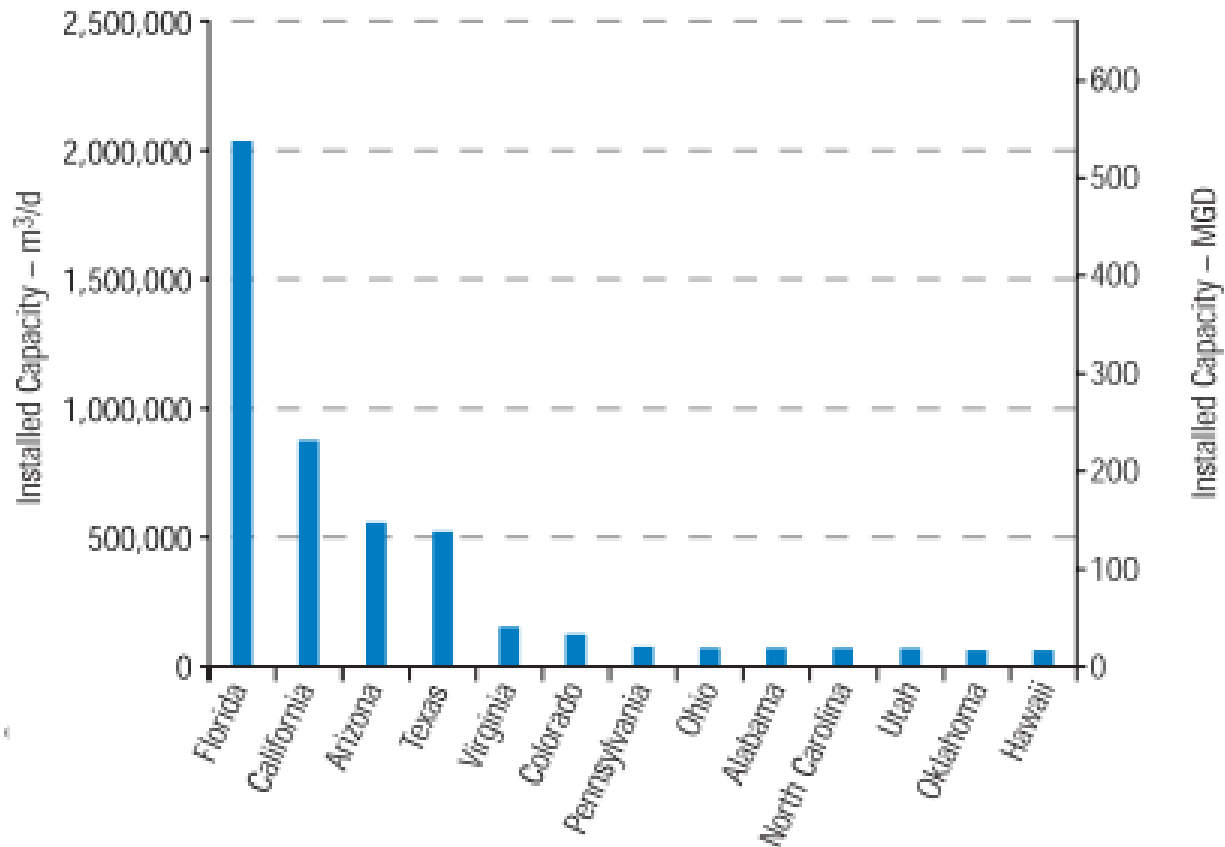
Cornell University

Desalination Capacity in the U.S.

- Total capacity has doubled in the last decade



Total Installed Capacity

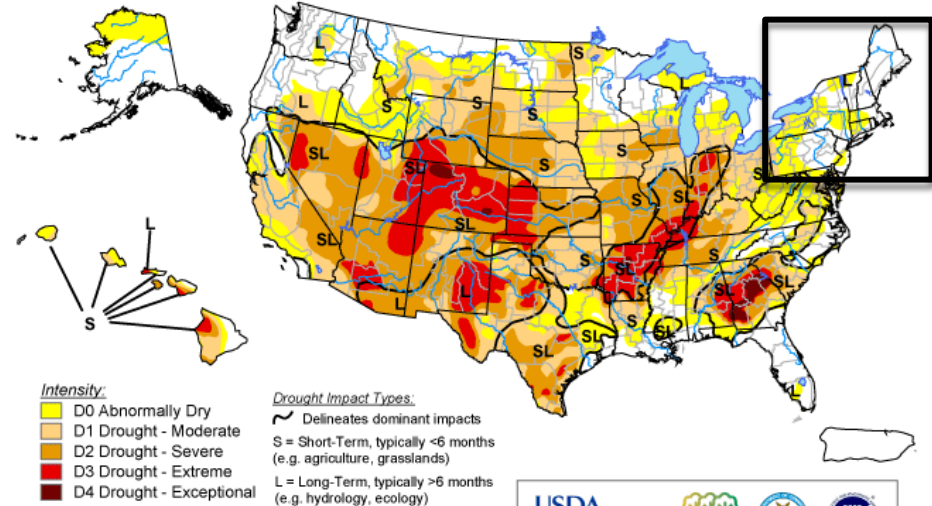


Why the Northeast?

- Humid, temperate climate
- Precip $>$ 1 000 mm (40 in.)
- Localized water shortages
 - ▣ Cape May, NJ
 - ▣ Brockton, MA
 - ▣ Swansea, MA
 - ▣ Rockland County, NY

U.S. Drought Monitor

July 10, 2012
Valid 7 a.m. EDT



The Drought Monitor focuses on broad-scale conditions.
Local conditions may vary. See accompanying text summary
for forecast statements.

<http://droughtmonitor.unl.edu/>



Released Thursday, July 12, 2012
Author: Rich Tinker, NOAA/NWS/NCEP/CPC





Location of the four desalination projects in the Northeast



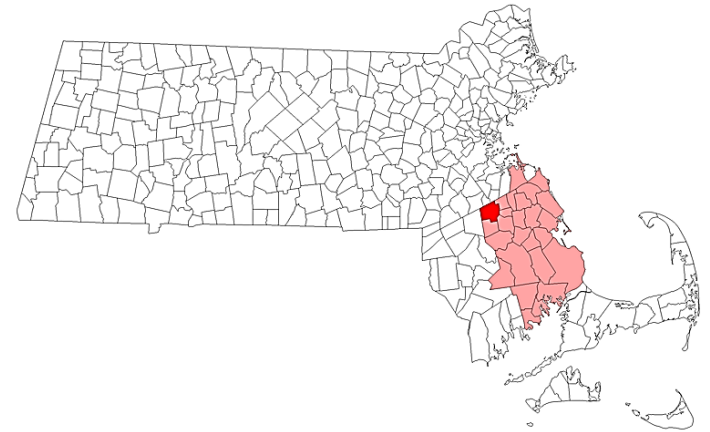
Cape May, NJ

- Oldest seaside resort
- Seasonal population
- Chloride concentration
- \$5.1M plant constructed in 1999
 - ▣ Bond financing



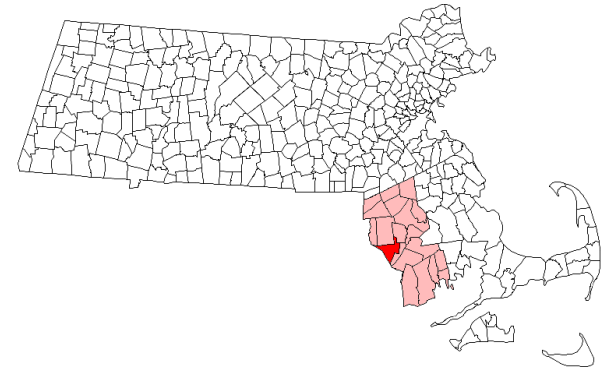
Brockton, MA

- 7th largest city in Mass
 - ▣ Part of the Boston MSA
- Water shortage since 1800s
 - ▣ Intensified post-WWII
- Ban on new connections
 - ▣ Restricted outdoor use
 - ▣ Infrastructure improvement
- \$55M Contract with Aquaria in 2002
 - ▣ Completed in 2008



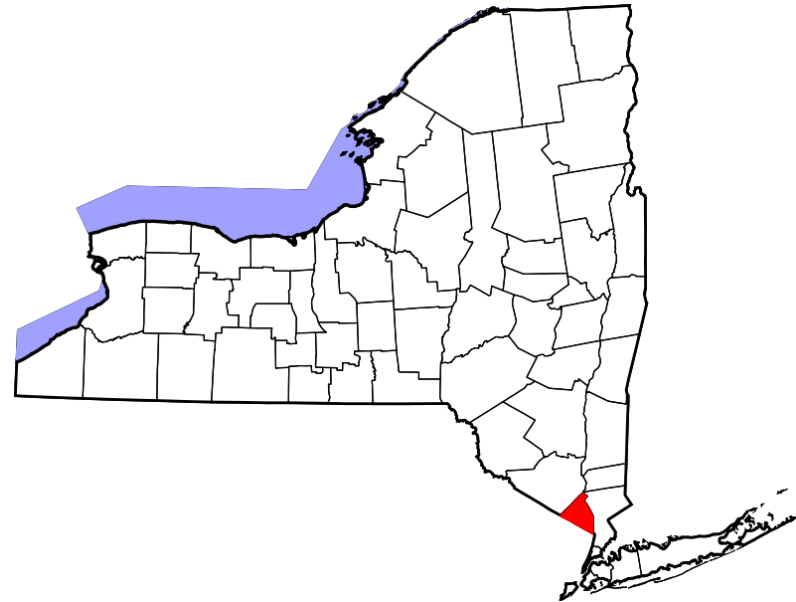
Swansea, MA

- Located on Naragansett Bay
- Traditionally relied on groundwater
 - ▣ Shallow aquifers
- Restrictions and emergencies
- \$18M Approved by residents in 2006
 - ▣ Completed in 2011*



Rockland County, NY

- North of NYC
- Relies on aquifers and Lake Deforest
- United Water – regional player since early 1900s
- NYSPSC order (rate case) in 2006
- Draft EIS under review
- Intense public opposition



Location Description

Location	Cape May, NJ	Brockton, MA	Swansea, MA	Rockland County, NY
Administrative unit	City	City	Town	County
Population (2010)	7,200	93,810	15,865	311,687
Seasonal	45,900	-	-	-
Population change (2000–2010)	5.9%	- 0.5%	- 0.23%	8.7%
Annual precipitation (mm)	1061	1108	1108	1225
Historical water sources	Groundwater (Cohansey aquifer)	Silver Lake and Brockton Reservoir	Groundwater	Ramapo River basin, bedrock aquifers and Lake DeForest



Desalination Plant Parameters

Desalination Parameters	Cape May, NJ	Brockton, MA	Swansea, MA	Rockland County, NY
Average demand (MGD)	1.5	9*	1.5	30
Peak demand (MGD)	3.2	10	3	46.5
Per capita use (GPD)	76	60	65	68
Plant capacity (MGD)	2	5	2.2	7.5
Capital Cost (\$/kgal)	4.2	11.9	8.2	18.5-26.8
Marginal cost (\$/kgal)	1.65	1.23	3.40	2.04
Desalination source	Atlantic City Aquifer	Taunton River	Palmer River	Hudson River
Ownership	City of Cape May	Aquaria Water	Swansea Water District	United Water New York

Alternate Options

- Validity of EIAs
- Construction of new reservoirs
 - ▣ Inter-basin transfer
- Conservation and reuse
 - ▣ Infrastructure improvements
 - ▣ Limits
- Full-cost pricing



Regulatory Challenges

- High number of permits
- Delays
 - ▣ Rights-of-way
 - ▣ Stimulus Act
- Financing
 - ▣ State and federal funds



Post-Construction Issues

- Cape May
 - ▣ Change in TDS
 - ▣ Aquifer storage recovery
- Reduced demand
 - ▣ Financial obligations



Public Support

- Crucial for success
- Different experiences
- Brockton
 - ▣ Environmental groups
- Rockland County
 - ▣ Water supply monopoly
 - ▣ Disregarding conservation
 - ▣ Brockton problem
 - ▣ Jersey is getting extra!



Consideration for Communities

1. Determine the shortfall in water supply and identify alternatives.
2. Is the shortfall temporary or likely to extend for a longer period? Is it possible to forecast the population change over the next few decades?
3. Can water be sourced from a neighboring utility or another watershed? How important is it for the community to avoid inter-basin transfer?
4. Is it possible to reduce demand by performing infrastructure upgrades, leak detection and repairs, undertaking conservation measures, and implementing fullcost pricing?
5. Is the lack of reliable water supply hindering development in the area, or conversely, is the community concerned about rapid development in the future if a reliable water supply option were to be available?
6. Identify the economic impacts of desalination, including sourcing of additional energy for running the plant. Will the plant cause significant impacts on the environment, including fish and ecological services?
7. Is it possible to secure public funds for the construction of the plant?
8. Can the brine from the desalination operation be safely discharged?
9. Conduct a cost-benefit analysis (economic, not just financial) of all available alternatives, and select the best option that serves the community in the long-run.



Conclusions

- Desalination getting popular in Northeast
- Perceived advantages
- Streamlining of regulatory process needed
- Alternatives suffer from challenges
- Comprehensive cost-benefit analysis of all options

Citation: Vedachalam S and Riha SJ (2012). *Desalination* **297**: 104-110

Questions?



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