

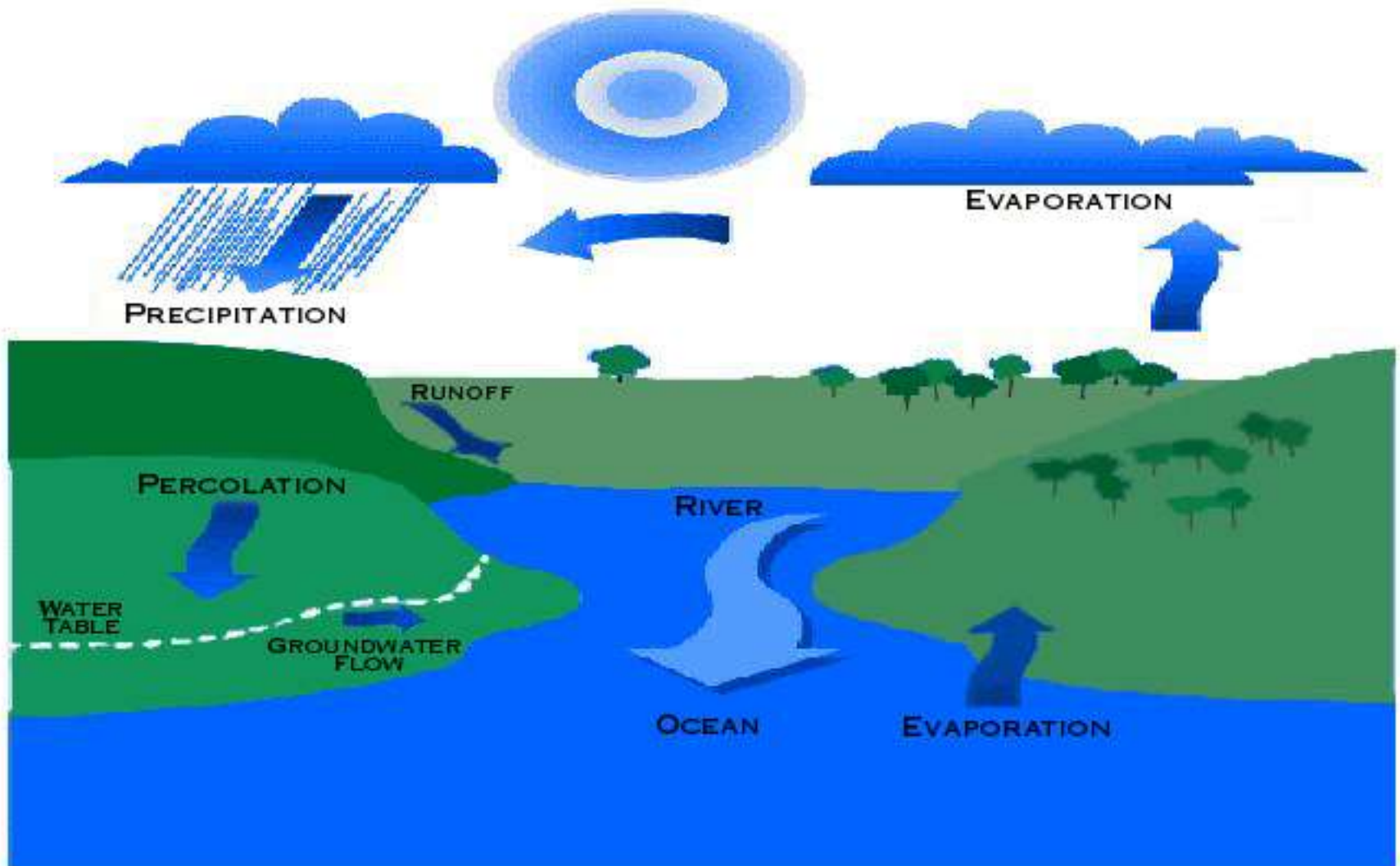
Water Conservation in Massachusetts

(Droughts, Floods, the War for Water, and What to do)

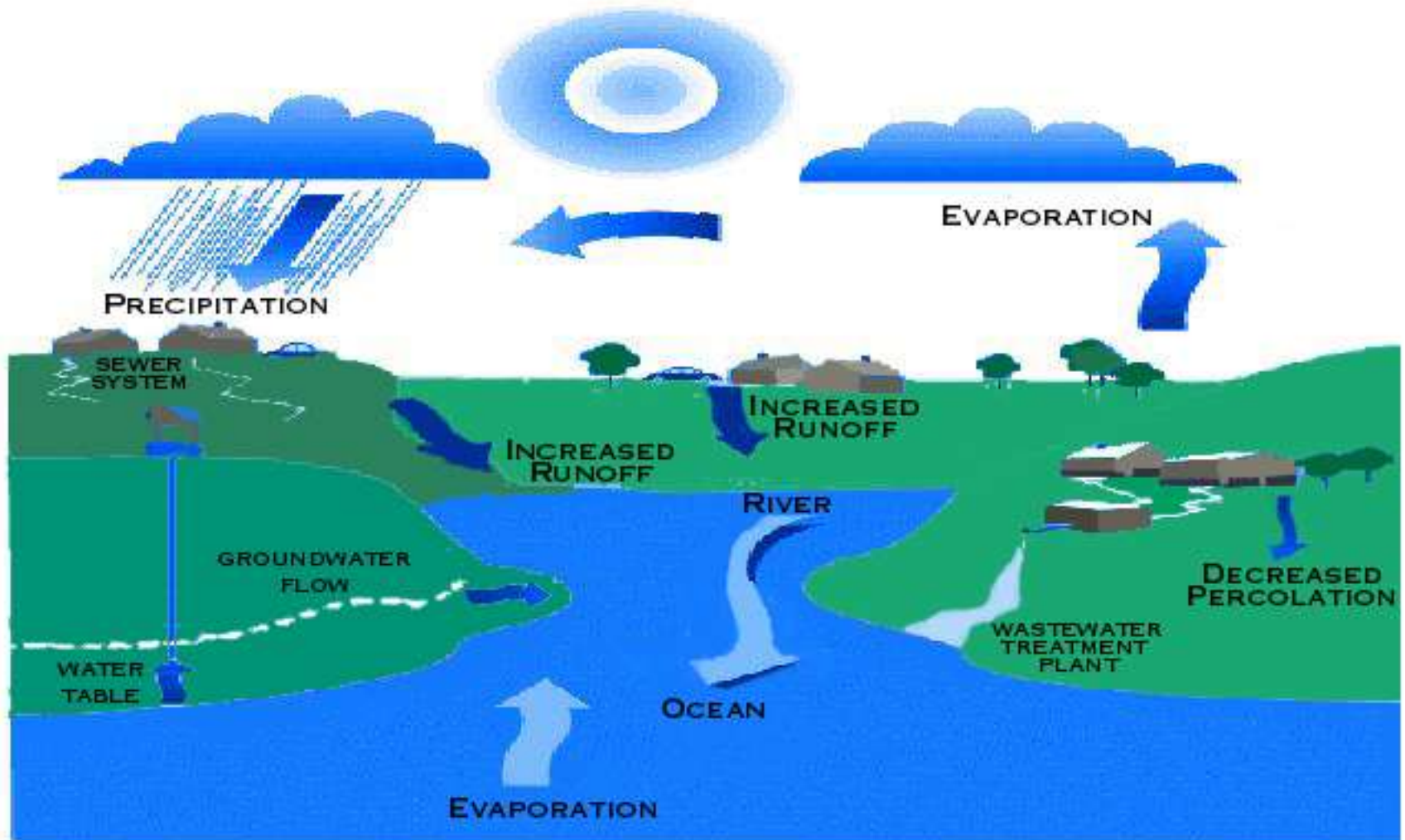
Kathy Baskin
Executive Office of Energy and Environmental Affairs
June 9, 2009



NATURAL WATER CYCLE



MAN-MADE WATER CYCLE



Effects of a Man-made Water Cycle

(despite 44" of rain)

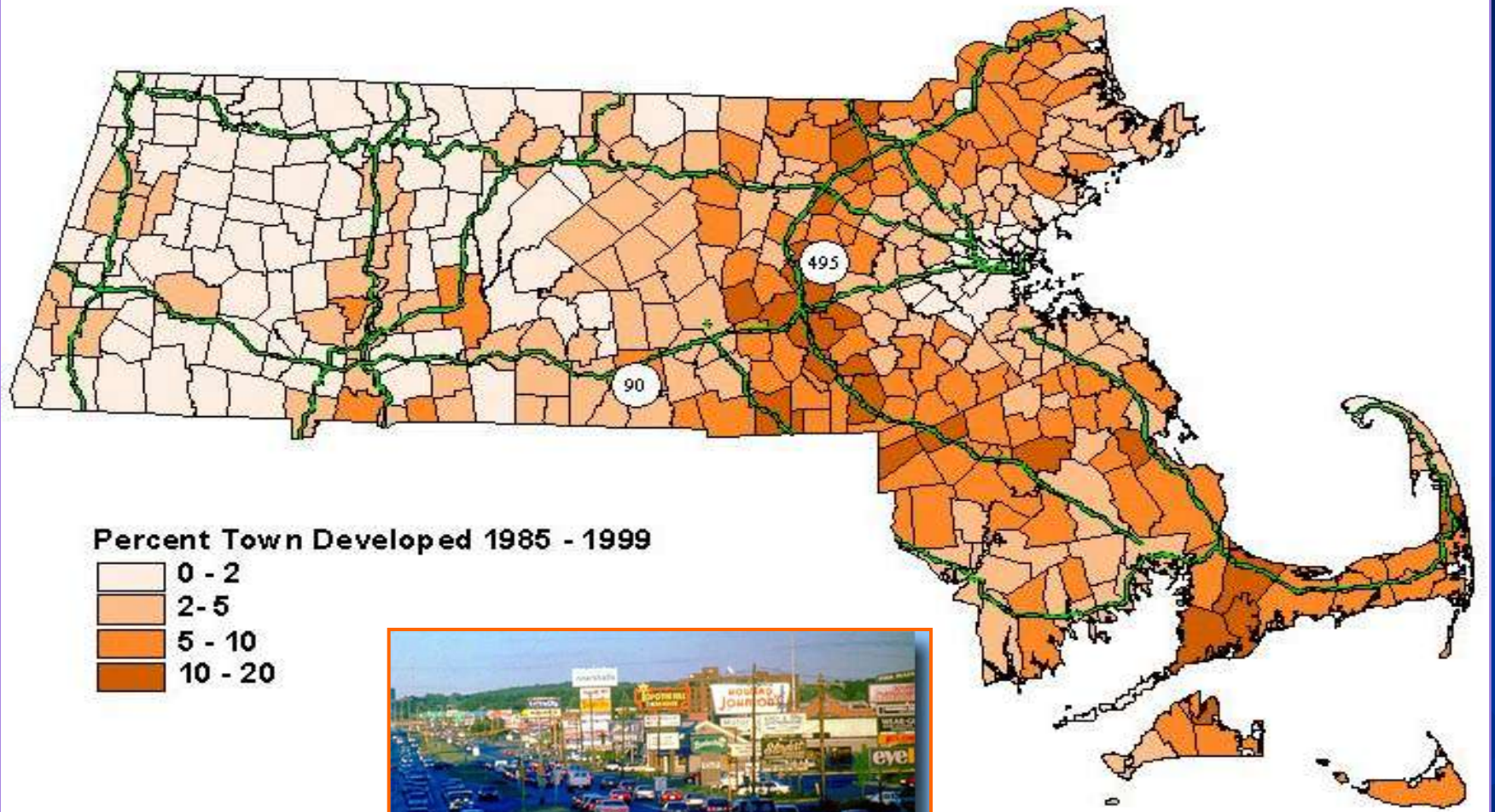
Intense growth and traditional approaches to:

- water supply
- wastewater collection and disposal
- stormwater -- impervious surfaces

Resulting in:

- more withdrawals
- more sewerage (including infiltration and inflow)
- less recharge
- more sewer overflows

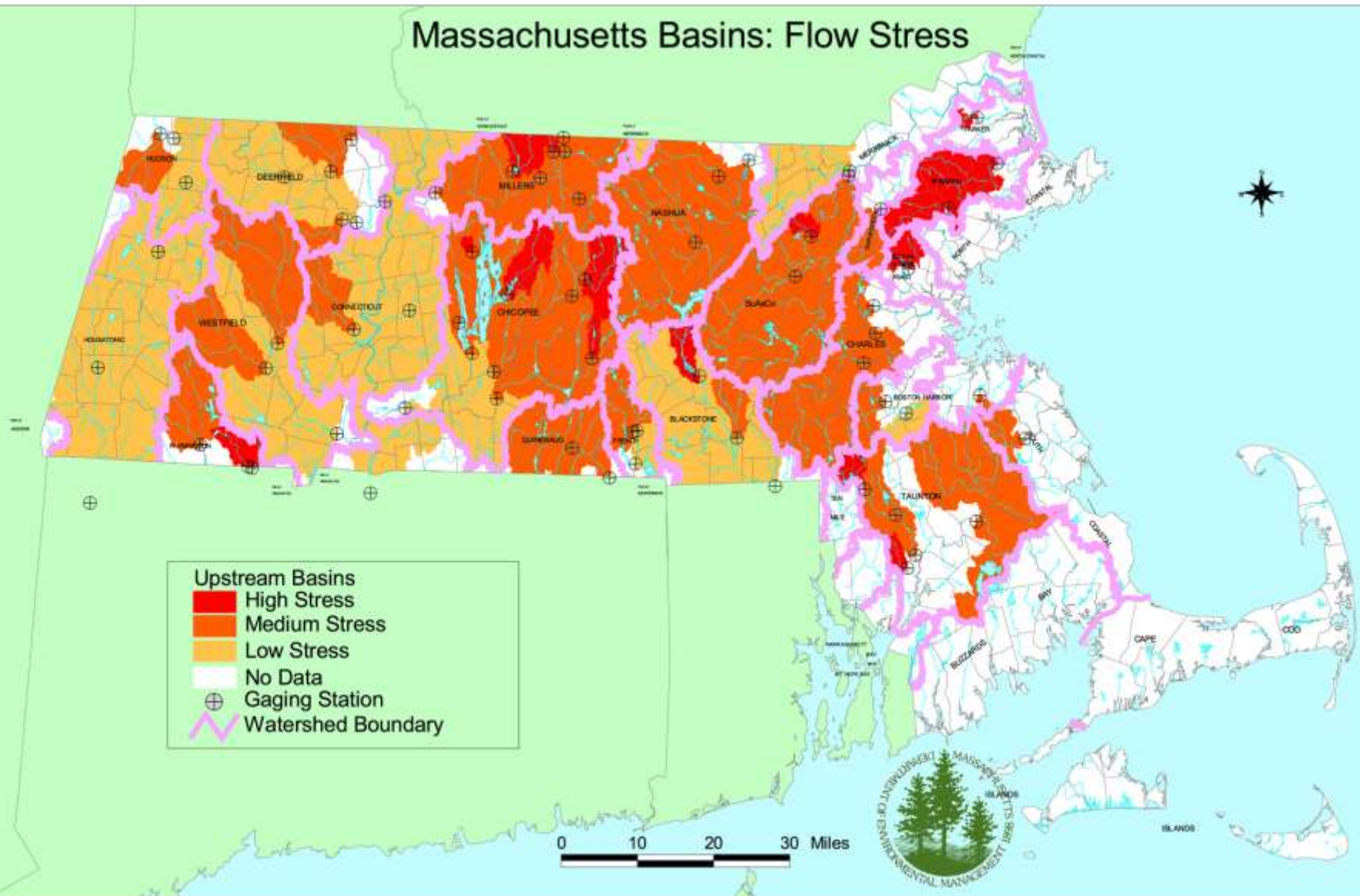
New Development 1985 - 1999



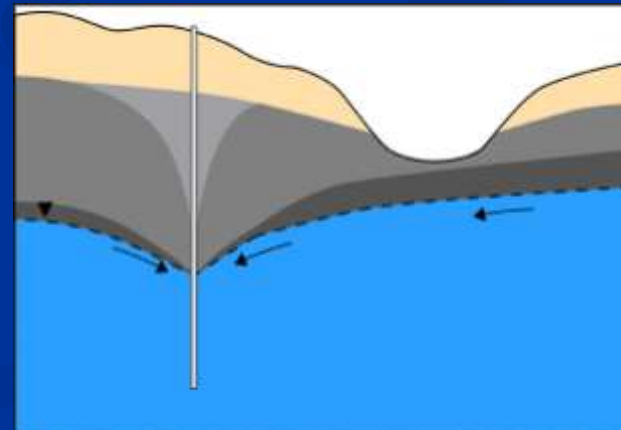
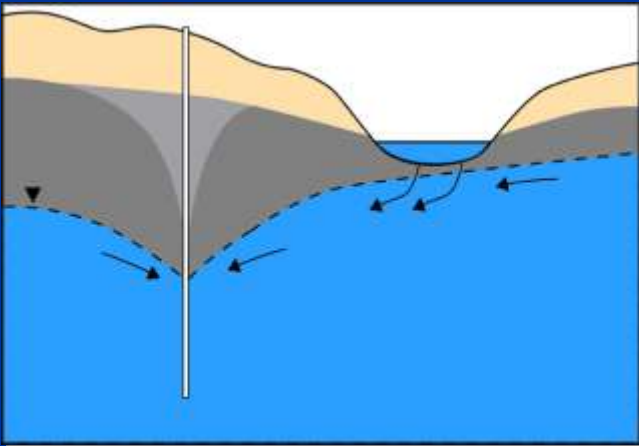
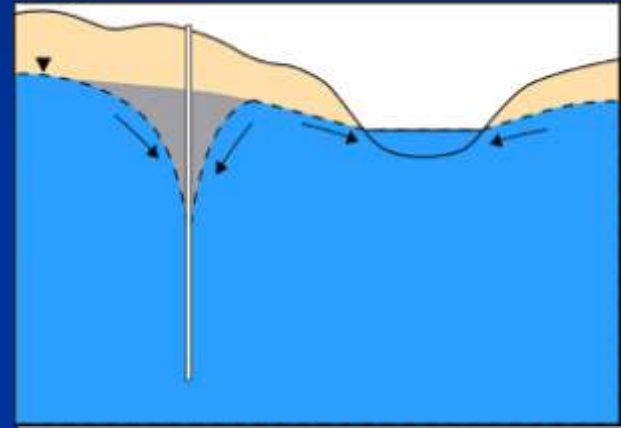
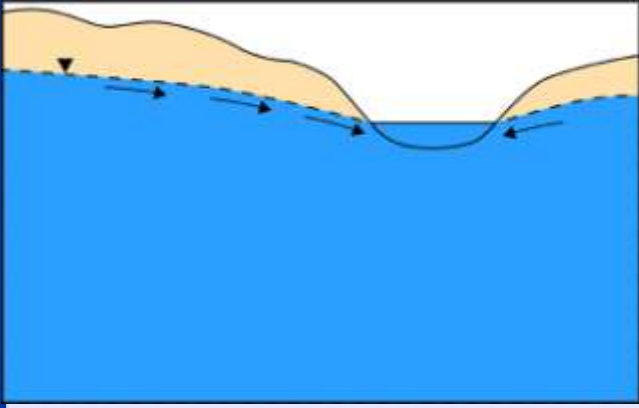
1990-2000: 333,000+
new residents

Stressed Basins

Massachusetts Basins: Flow Stress



“Stress” due to Excessive Water Supply Pumping



Aquifers provide 70-80% of river baseflow (up to 100% in drought)

Environmental Impacts of Low Flow

■ Water quality

- pollutant concentrations
- temperature
- dissolved oxygen

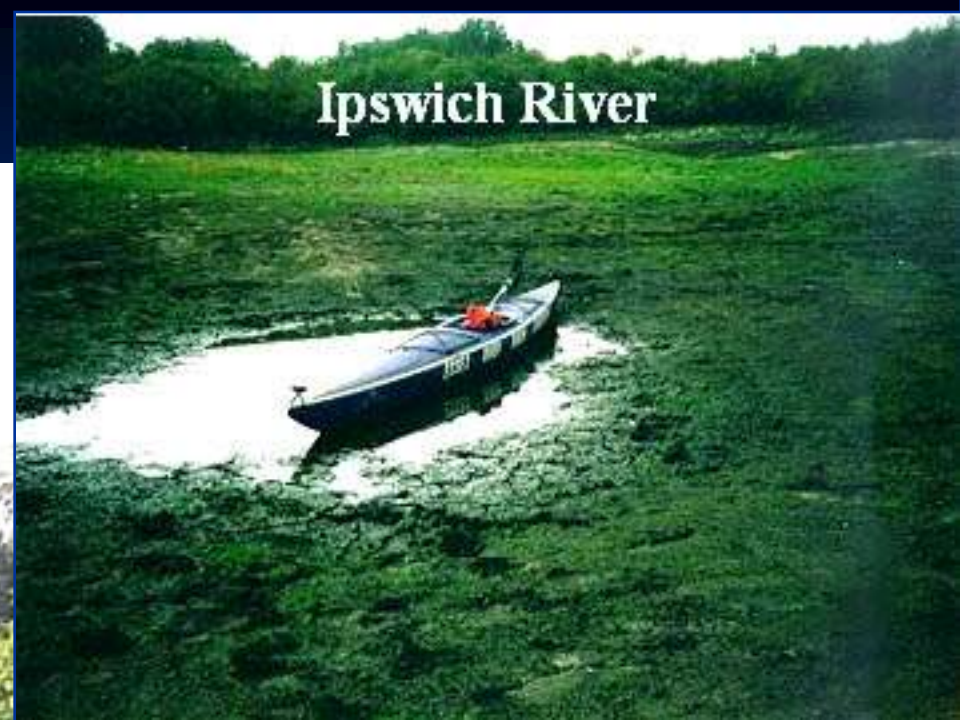


■ Physical

- fish passage
- wetlands
- aesthetics
- recreation



Ipswich River

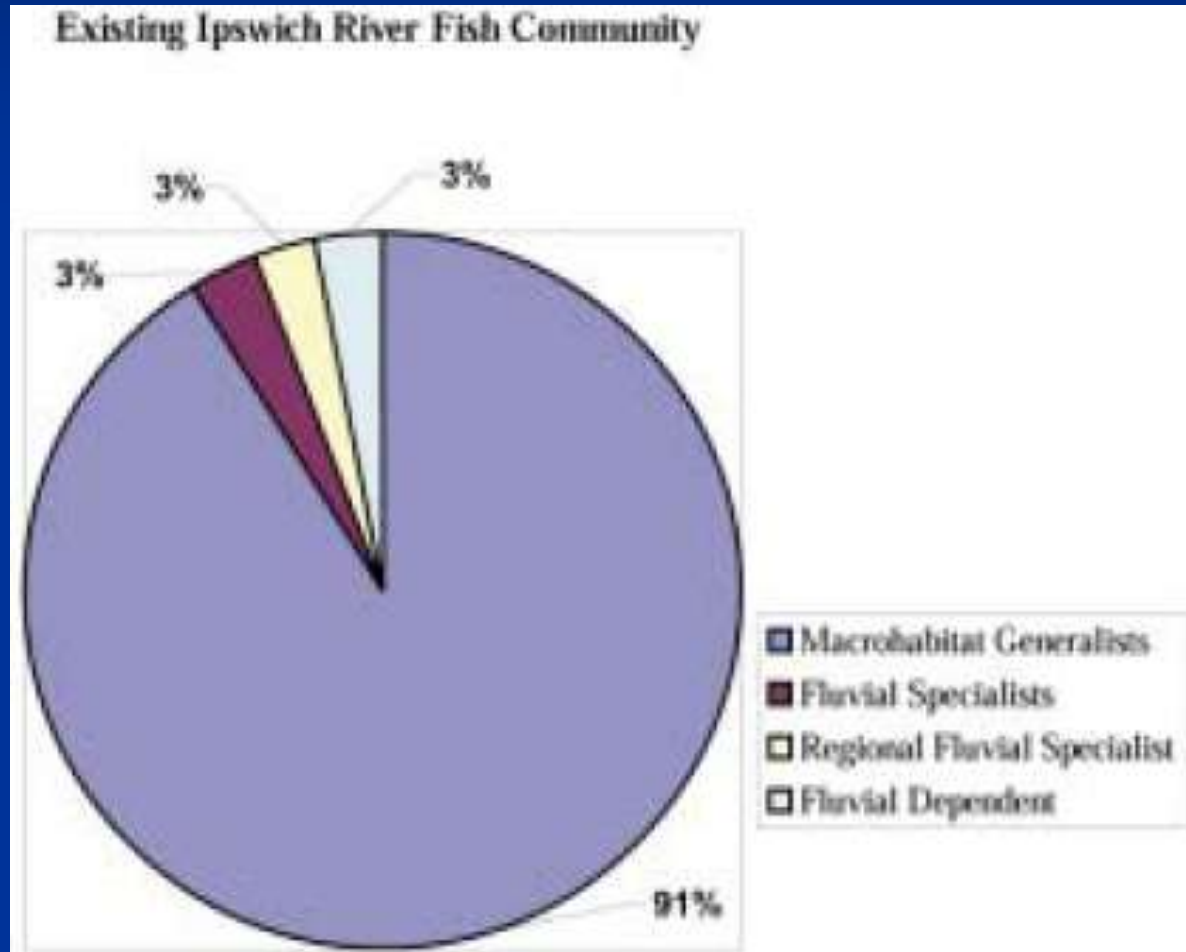


9/9/1999 17:33

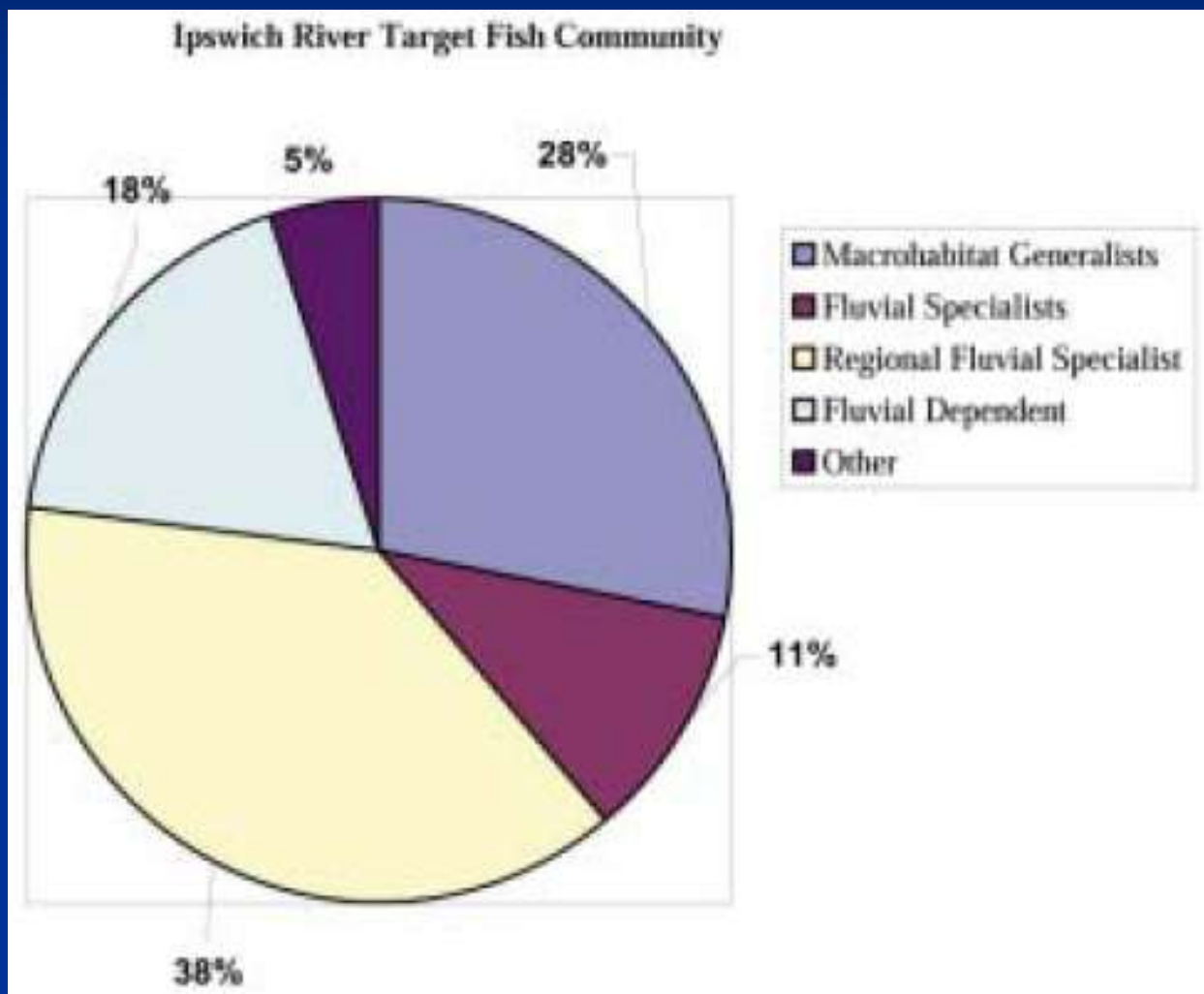
Altered Habitat



Ipswich River: Existing Fish Community



Ipswich River: Target Fish Community



Economic Impacts of Low Flow

- Water shortages and bans
- Building moratoriums



Opinion

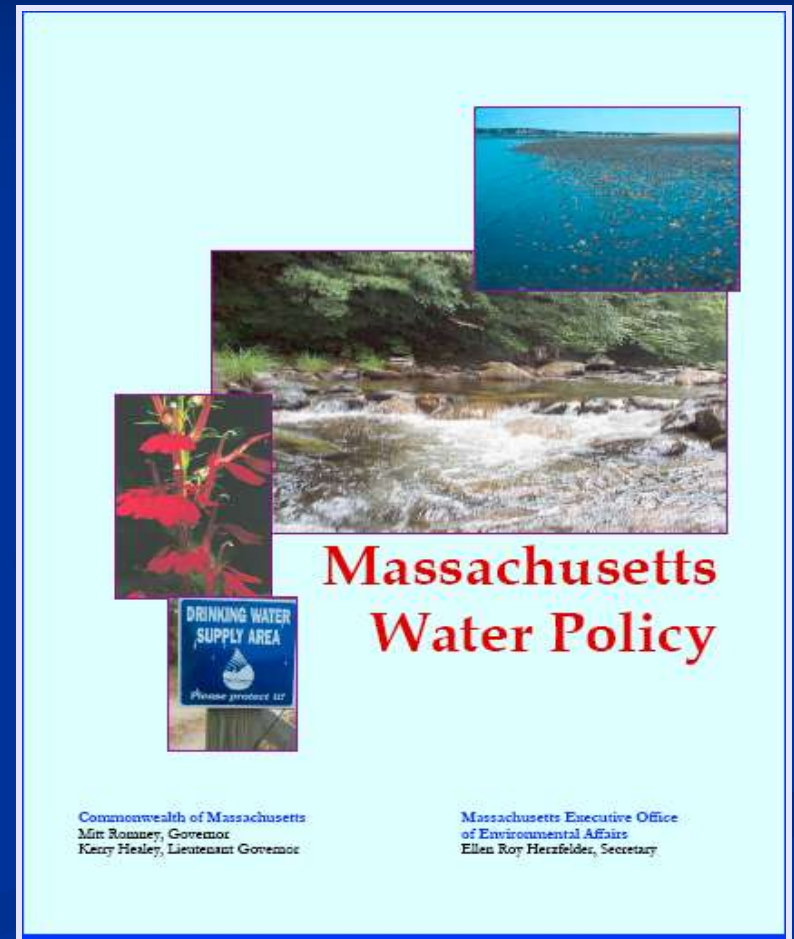
Cartoon
by
1987
12/11/87



News Item: AFTER INTENSE OPPOSITION, STATE REVISES ITS ORIGINAL WATER CONSERVATION REGULATIONS

MA Water Policy

- Addresses efficient management of water resources
 - water supply, wastewater, stormwater, rivers



Effectively Manage Water Supplies

- Updated Water Conservation Standards
- Drinking Water Supply Protection Grants
- Desalination Policy
 - (Aquaria in Dighton, proposed in Swansea)



Re-Define Stressed Basins

- Define amount of alteration to natural streamflow
- Assess water quality
- Determine condition of fisheries
- “Grade” watersheds for quantity, quality and biology

Promote Wastewater Reuse

- DEP's wastewater reuse regulations
- Reduce infiltration and inflow
 - 2/3 of flow to Deer I.



Promote Stormwater Recharge

- DEP Stormwater Regulations
 - Updated: Wetlands Protection Act
 - Proposed: industrial, commercial, institutional
- Low Impact Development
- Promotion of stormwater utilities
 - i.e. Chicopee, Newton



Improve Land and Water Resources

- Expand target fish assessments statewide
- Reduce impediment to fish passage
 - Dams and culverts
- Smart Growth Toolkit
 - LID, planning, zoning, subdivision techniques, bylaws



Perched Culvert, courtesy of MA Riverways Program

Improving Fish Passage through Dam Removal



Prior to removal, April 2000

**Silk Mill Dam on Yokum
Brook in Becket**



After removal, March 2003

Cost Savings from Water Conservation

Reduced operation and maintenance (energy and chemicals)

- Water – pumping, treatment and distribution
- Wastewater – collection, treatment and disposal

Delayed, downsized, or eliminated capital facilities

- Water treatment
- Water storage
- Wastewater treatment
- On-site sewage disposal systems (avoids hydraulic overload)

Reduced water purchases from wholesale water providers (i.e. MWRA)

Impact of National Efficiency Standards (1.6 gallons per flush)

Water Consumption

- 3-9% reduction in consumption
- \$166M - \$231M in deferred/avoided infrastructure investments by 2020

Wastewater Flow

- 13% reduction in flow to treatment plants by 2016
- Reductions in wastewater flows can also lead to “significant savings”

Local example: Boston to save 3.9% in infrastructure investment through 2020

Source: GAO/RCED-00-232 and Vickers, 2001

[GAO's report was prepared at request of Congress in response to 1999 Legislation to Repeal Energy Policy of 1992. The U.S. Energy Policy Act of 1992 established water use limits on toilets (1.6 gal per flush), urinals (1.0 gal per flush), showers (2.5 gal per min) and faucets (2.5 gal per minute). The Act was not repealed.]

Saving Energy by Saving Water

- In five minutes, a hot water faucet uses as much energy as a 60-watt bulb uses in 14 hours
- 12% of MWRA's direct costs = utilities (electricity, gas, oil)

Municipal Water/Sewer Plant Energy Use

- U.S. annual total* = 75 billion kilowatt hours/year
- 3% of total U.S. consumption of electricity
- Equal to entire residential electricity demand of California
- More than entire energy-intensive pulp/paper and petroleum sectors *combined*
- Public bill = \$4B/year



Sources: US EPA, Alliance to Save Energy, Pacific Institute, NRDC, River Network

* 60,000 drinking water treatment plants +
15,000 sewage treatment plants

Estimated Values of Recreation

<u>On-water activities</u>	<u>(Cost per day in 1997 \$)</u>
Boating	\$12 - \$35
Swimming	\$19 - \$24
Fishing	\$16 - \$29
 <u>Streamside activities</u>	
Cross-country skiing	\$15 - \$16
Walking, hiking	\$12 - \$30
Running	\$3
Biking	\$17
Picnicking	\$16 - \$26
Wildlife Viewing	\$12 - \$28

Sources: Bergstrom and Cordell, 1991; Walsh et al, 1992.

MA Fisheries and Wildlife Industry (\$1+ Billion/Year)

	Fishing*	Hunting**	Wildlife Watching
Participants	615,000	66,000	1,686,000
Days/Year	7,685,000	1,158,000	NA
Total Expenditures	\$465 million	\$59 million	\$469 million
Expenditure/Participant	\$756	\$894	\$278

*Approximately 2/3 = freshwater fishing

**Includes water fowl

Factoids:

Ecosystem services of freshwater wetlands = ~\$15,000/acre/year.

“Outdoor activity” is 3rd most popular tourist activity in MA.

Sources: US FWS, 2001; MA Office of Travel and Tourism; MA Audubon Society, 2003.

Water Resource Management and Conservation

is critical to ensuring....

- Adequate water supply
- Protection of natural resources
- Energy efficiency and cost savings
- Promotion of important tourist activity

and requires....

- Effort by state, municipalities, business, individuals
- Innovation
- Perseverance
- \$\$



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