IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Dry River & Registered Withdrawals

IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Impacts of registered withdrawals

IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Challenges – water use & withdrawals:

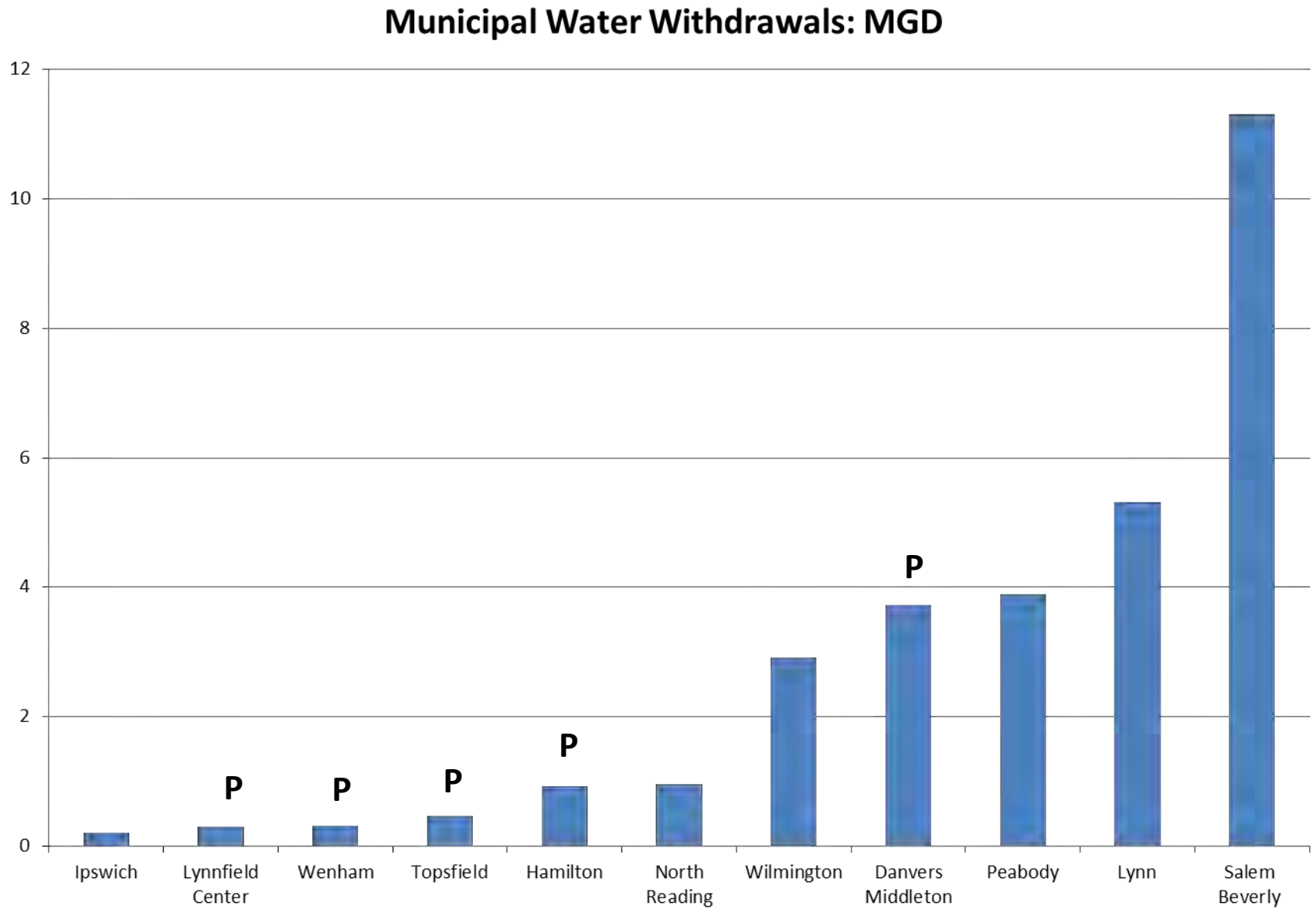
- 80% of water withdrawn leaves watershed
- 100% of wastewater in sewered areas leaves watershed
- Continued suburban sprawl & summer usage
- 9 of 14 municipal water systems are registered =83% of WMA withdrawals
- Ipswich River water over-allocated

IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Summary of Municipal Water Withdrawals in Ipswich River Basin

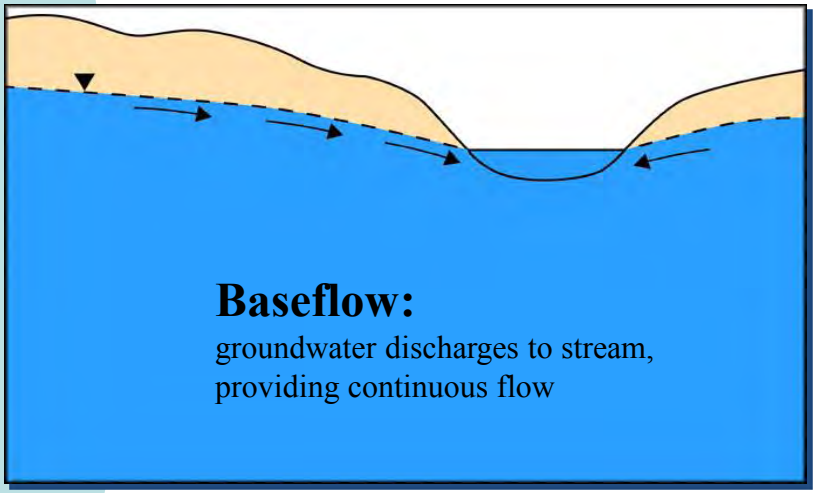
Town	Withdrawals (MGD)		
Ipswich	0.2	registered	GW
Lynnfield Center	0.29	permitted	GW
Wenham	0.31	permitted	GW
Topsfield	0.46	permitted	GW
Hamilton	0.92	permitted	GW
North Reading	0.96	registered	GW
Wilmington	2.91	registered	GW
Danvers Middleton	3.72	permitted	SW & GW
Peabody	3.89	registered	SW
Lynn	5.31	registered	SW
Salem Beverly	11.31	*registered*	SW
Total:	30.28		

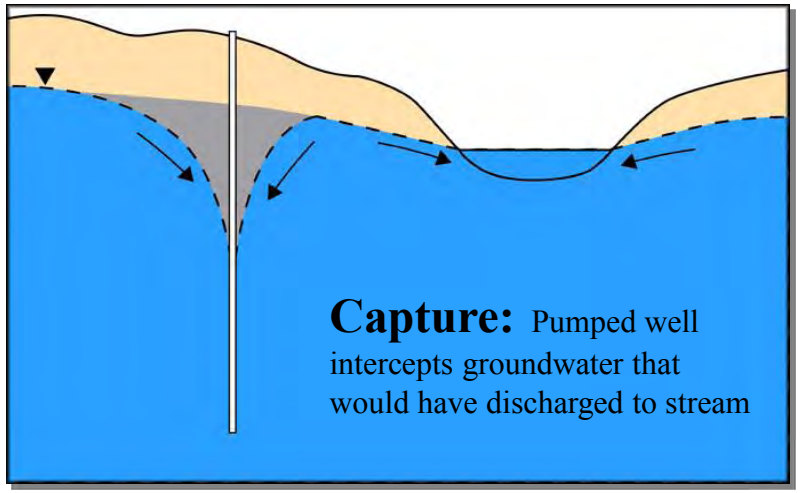
Current Status: Ipswich River Watershed

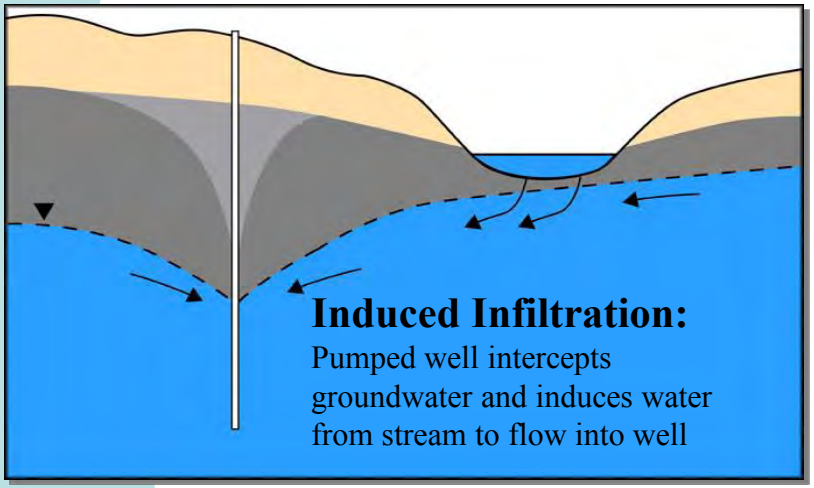


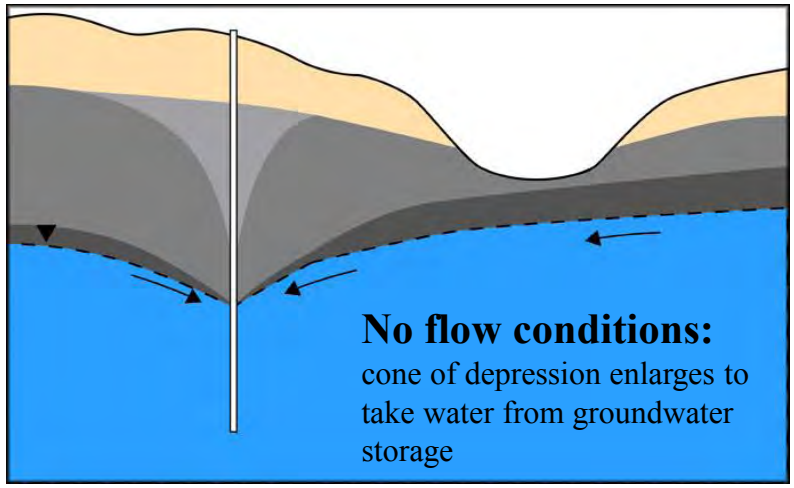
IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Effects of pumping wells & reservoir draw-down



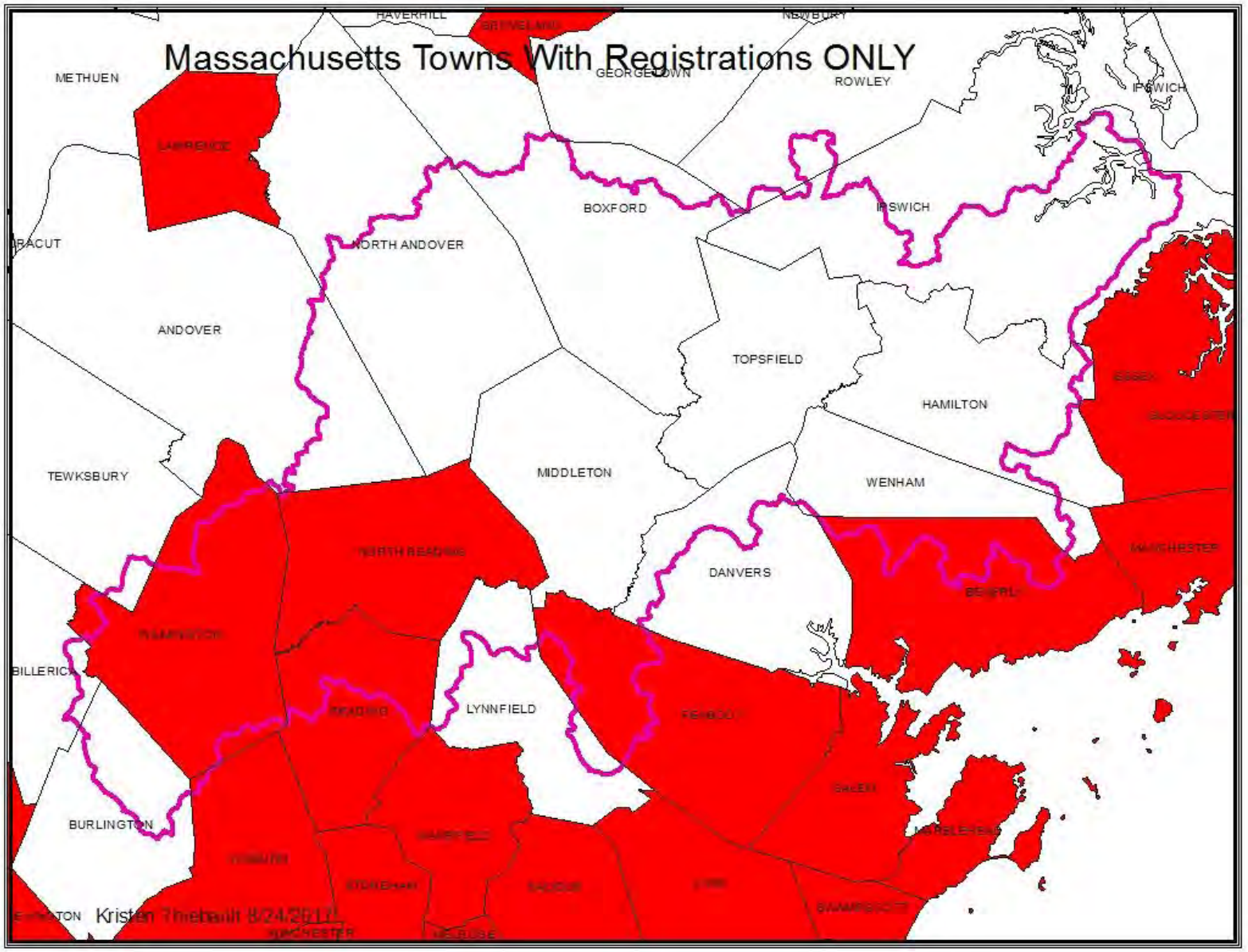






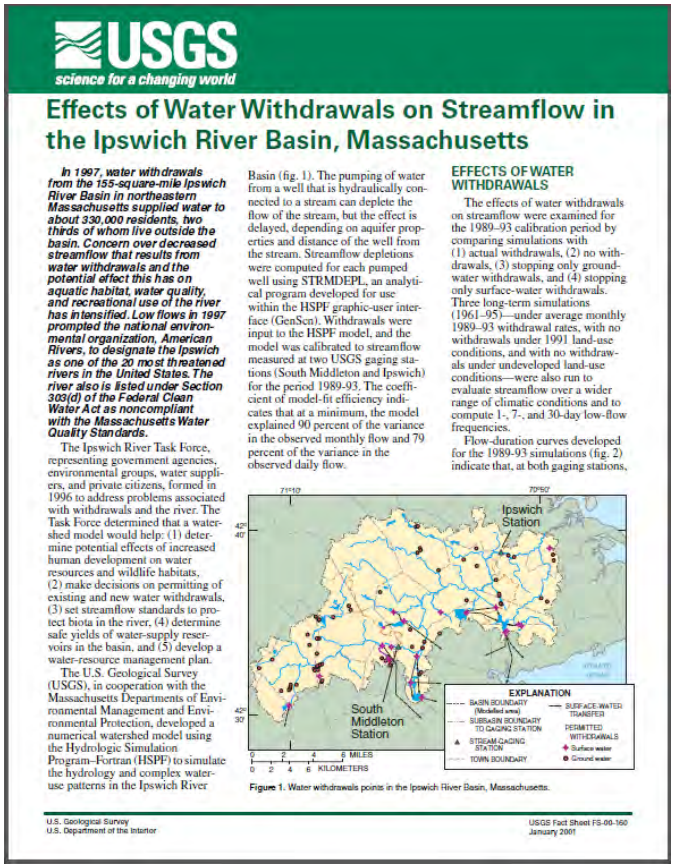
IPSWICH RIVER WATERSHED ASSOCIATION

The Voice of the River



IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Outstanding Scientific Foundation for Improved Management



USGS
science for a changing world

Effects of Water Withdrawals on Streamflow in the Ipswich River Basin, Massachusetts

In 1997, water withdrawals from the 155-square-mile Ipswich River Basin in northeastern Massachusetts supplied water to about 330,000 residents, two thirds of whom live outside the basin. Concern over decreased streamflow that results from water withdrawals and the potential effect this has on aquatic habitat, water quality, and recreational use of the river has intensified. Low flows in 1997 prompted the national environmental organization, American Rivers, to designate the Ipswich as one of the 20 most threatened rivers in the United States. The river also is listed under Section 303(d) of the Federal Clean Water Act as noncompliant with the Massachusetts Water Quality Standards.

The Ipswich River Task Force, representing government agencies, environmental groups, water suppliers, and private citizens, formed in 1996 to address problems associated with withdrawals and the river. The Task Force determined that a watershed model would help: (1) determine potential effects of increased human development on water resources and wildlife habitats, (2) make decisions on permitting of existing and new water withdrawals, (3) set streamflow standards to protect biota in the river, (4) determine safe yields of water-supply reservoirs in the basin, and (5) develop a water-resource management plan.

The U.S. Geological Survey (USGS), in cooperation with the Massachusetts Departments of Environmental Management and Environmental Protection, developed a numerical watershed model using the Hydrologic Simulation Program–Fortran (HSPF) to simulate the hydrology and complex water-use patterns in the Ipswich River Basin (fig. 1). The pumping of water from a well that is hydraulically connected to a stream can deplete the flow of the stream, but the effect is delayed, depending on aquifer properties and distance of the well from the stream. Streamflow depletions were computed for each pumped well using STRMDEPL, an analytical program developed for use within the HSPF graphic-user interface (GenScn). Withdrawals were input to the HSPF model, and the model was calibrated to streamflow measured at two USGS gaging stations (South Middleton and Ipswich) for the period 1989-93. The coefficient of model-fit efficiency indicates that at a minimum, the model explained 90 percent of the variance in the observed monthly flow and 79 percent of the variance in the observed daily flow.

EFFECTS OF WATER WITHDRAWALS

The effects of water withdrawals on streamflow were examined for the 1989–93 calibration period by comparing simulations with (1) actual withdrawals, (2) no withdrawals, (3) stopping only groundwater withdrawals, and (4) stopping only surface-water withdrawals. Three long-term simulations (1961–95)—under average monthly 1989–93 withdrawal rates, with no withdrawals under 1991 land-use conditions, and with no withdrawals under undeveloped land-use conditions—were also run to evaluate streamflow over a wider range of climatic conditions and to compute 1-, 7-, and 30-day low-flow frequencies.

Flow-duration curves developed for the 1989-93 simulations (fig. 2) indicate that, at both gaging stations,

Figure 1. Water withdrawals points in the Ipswich River Basin, Massachusetts.

USGS
science for a changing world

Prepared in cooperation with the
Massachusetts Department of Conservation and Recreation, the
Massachusetts Department of Environmental Protection, and the
Massachusetts Department of Fish and Game

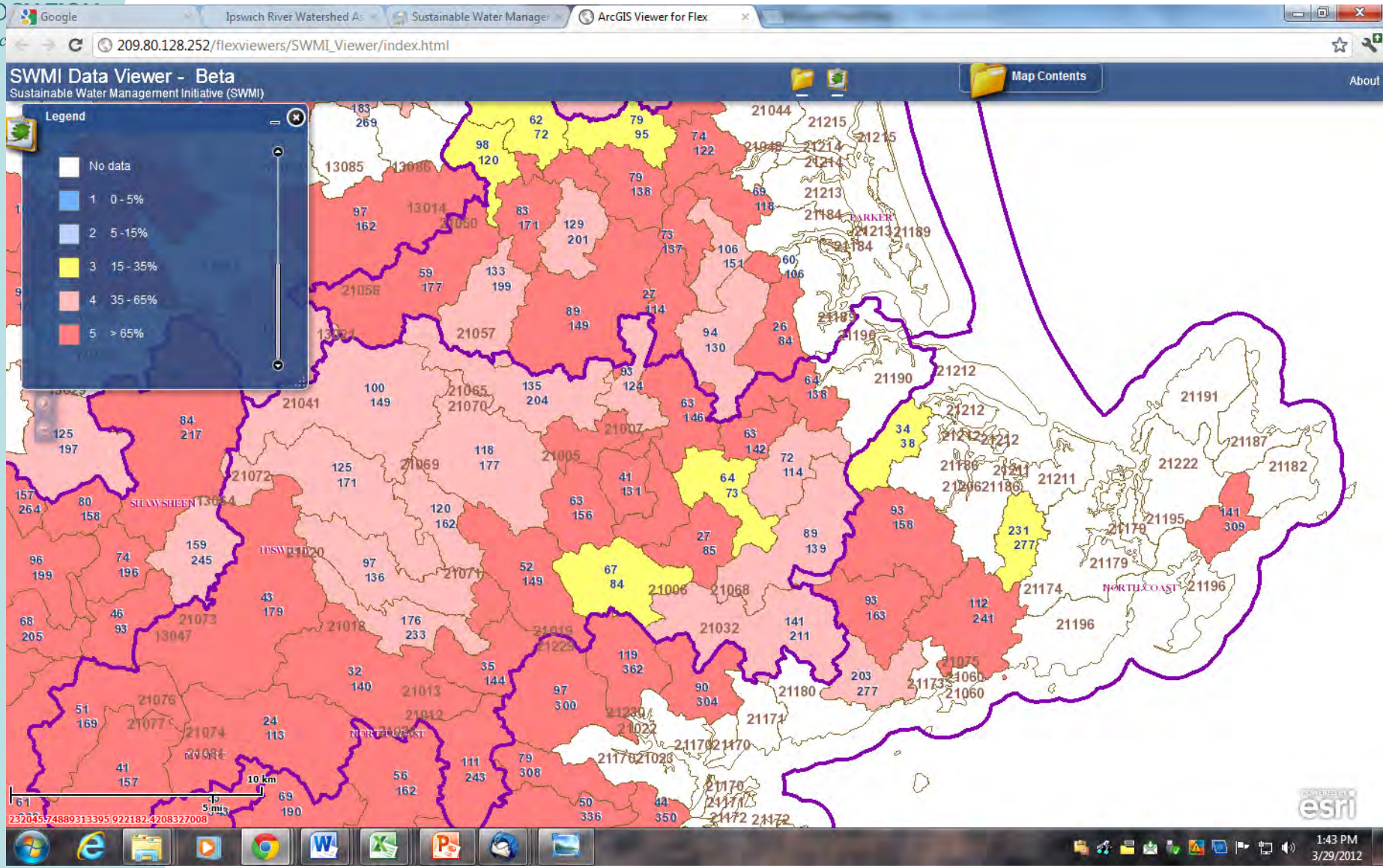
Factors Influencing Riverine Fish Assemblages in Massachusetts

Scientific Investigations Report 2011–5193

U.S. Department of the Interior
U.S. Geological Survey

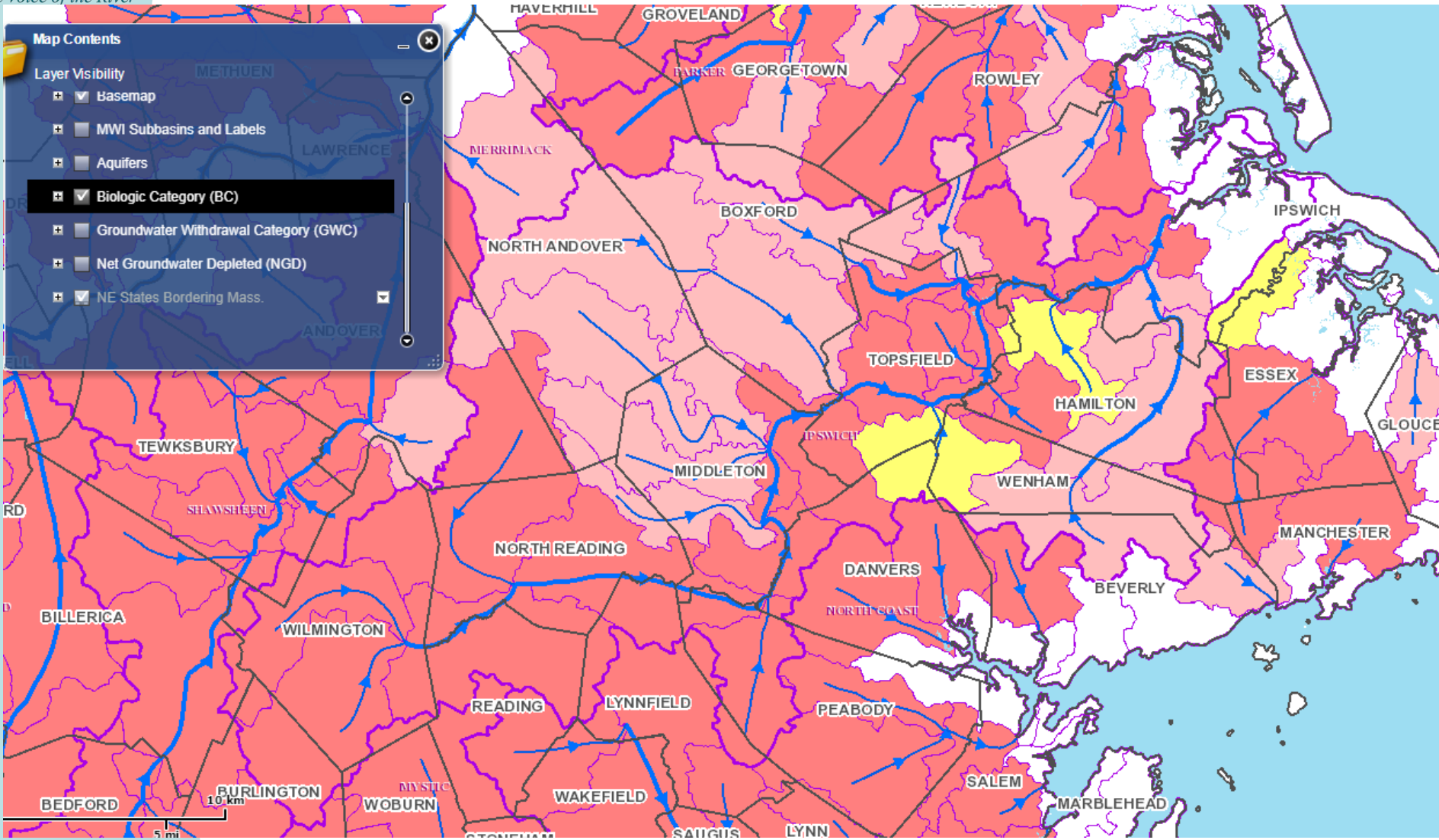
IPSWICH RIVER WATERSHED ASSO

The Voic



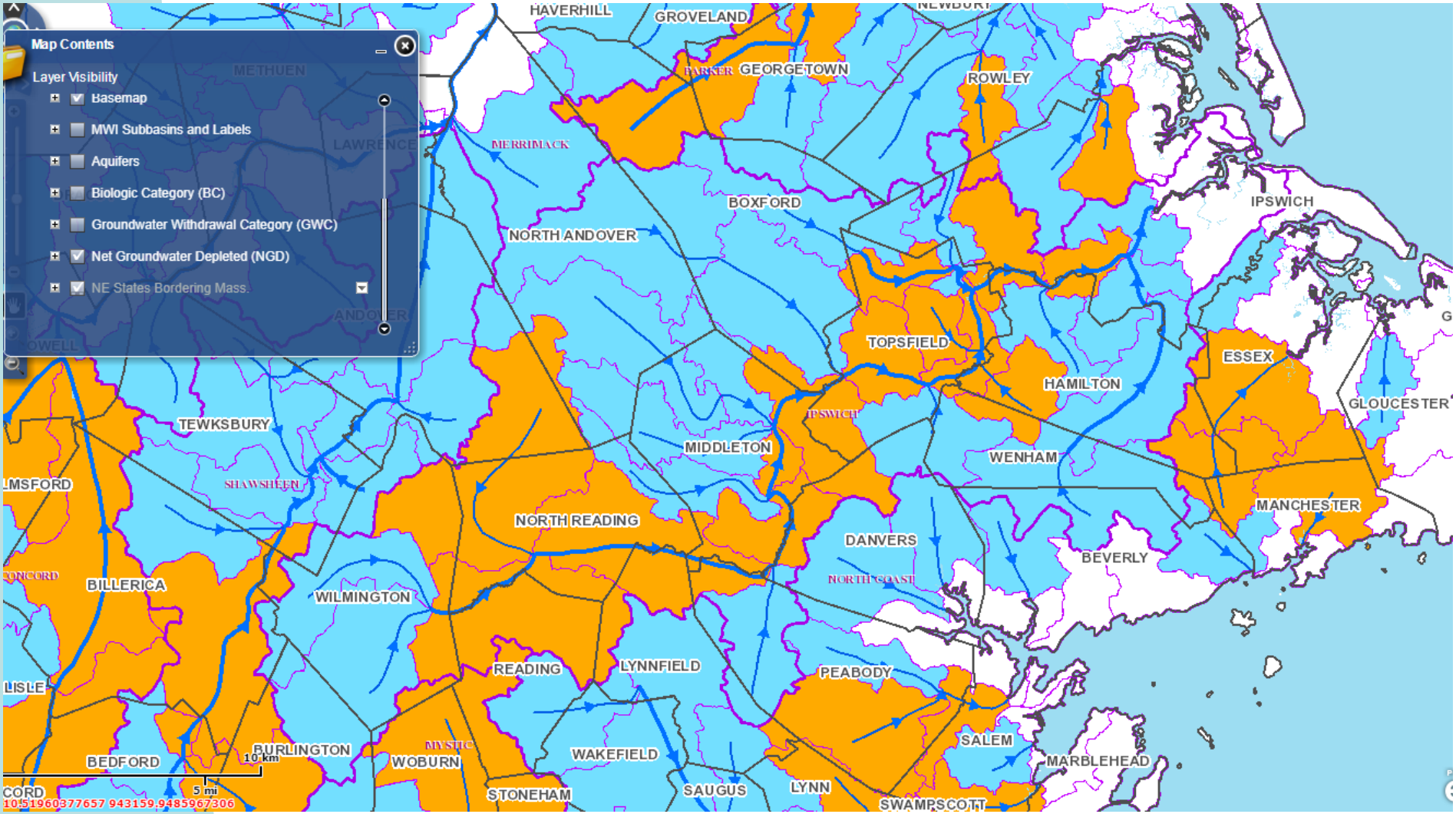
IPSWICH RIVER WATERSHED ASSOCIATION

The Voice of the River

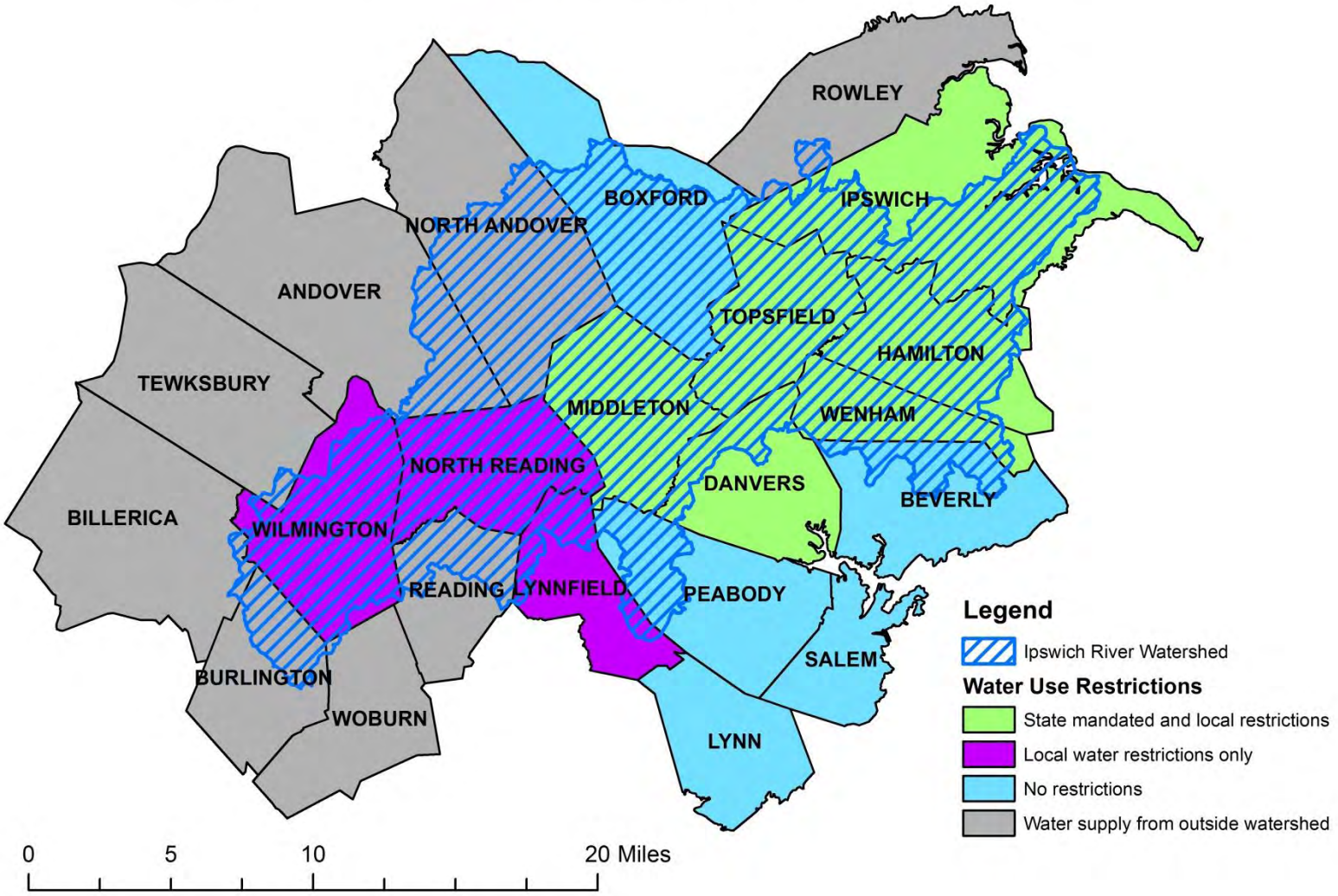


IPSWICH RIVER WATERSHED ASSOCIATION

The Voice of the River

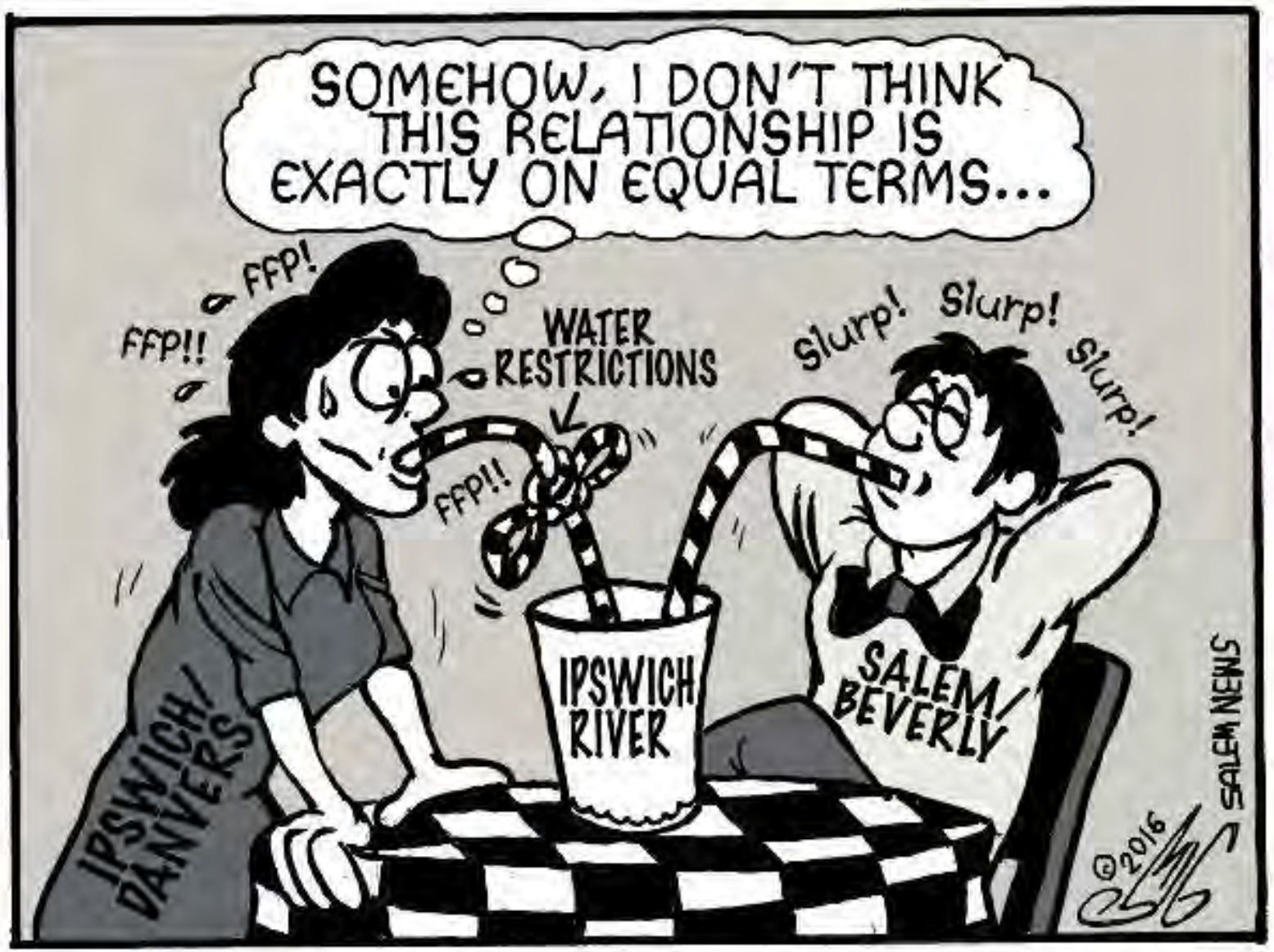


Town Water Restrictions in the Ipswich River Watershed



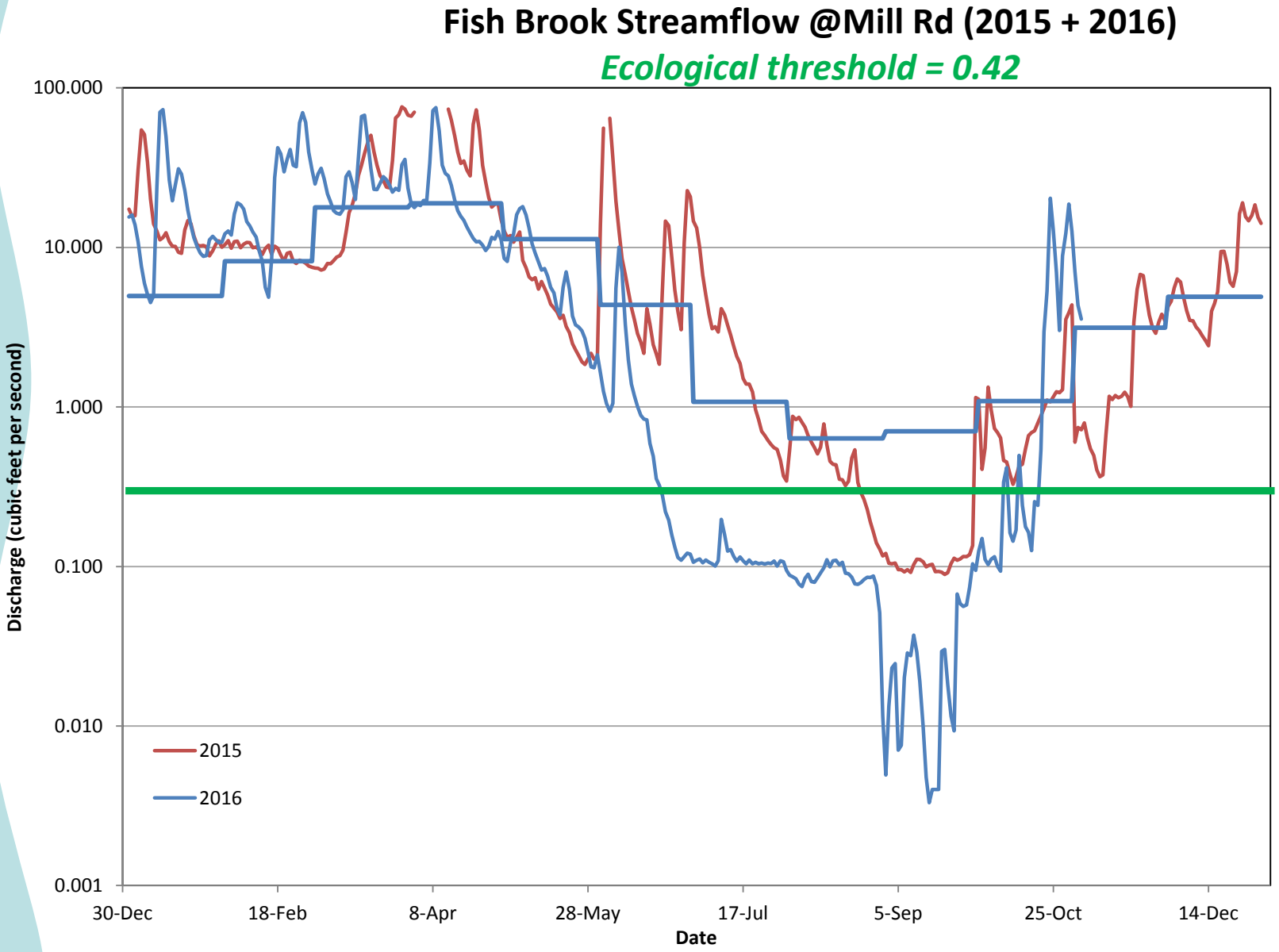
IPSWICH RIVER WATERSHED ASSOCIATION

The Voice of the River



IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

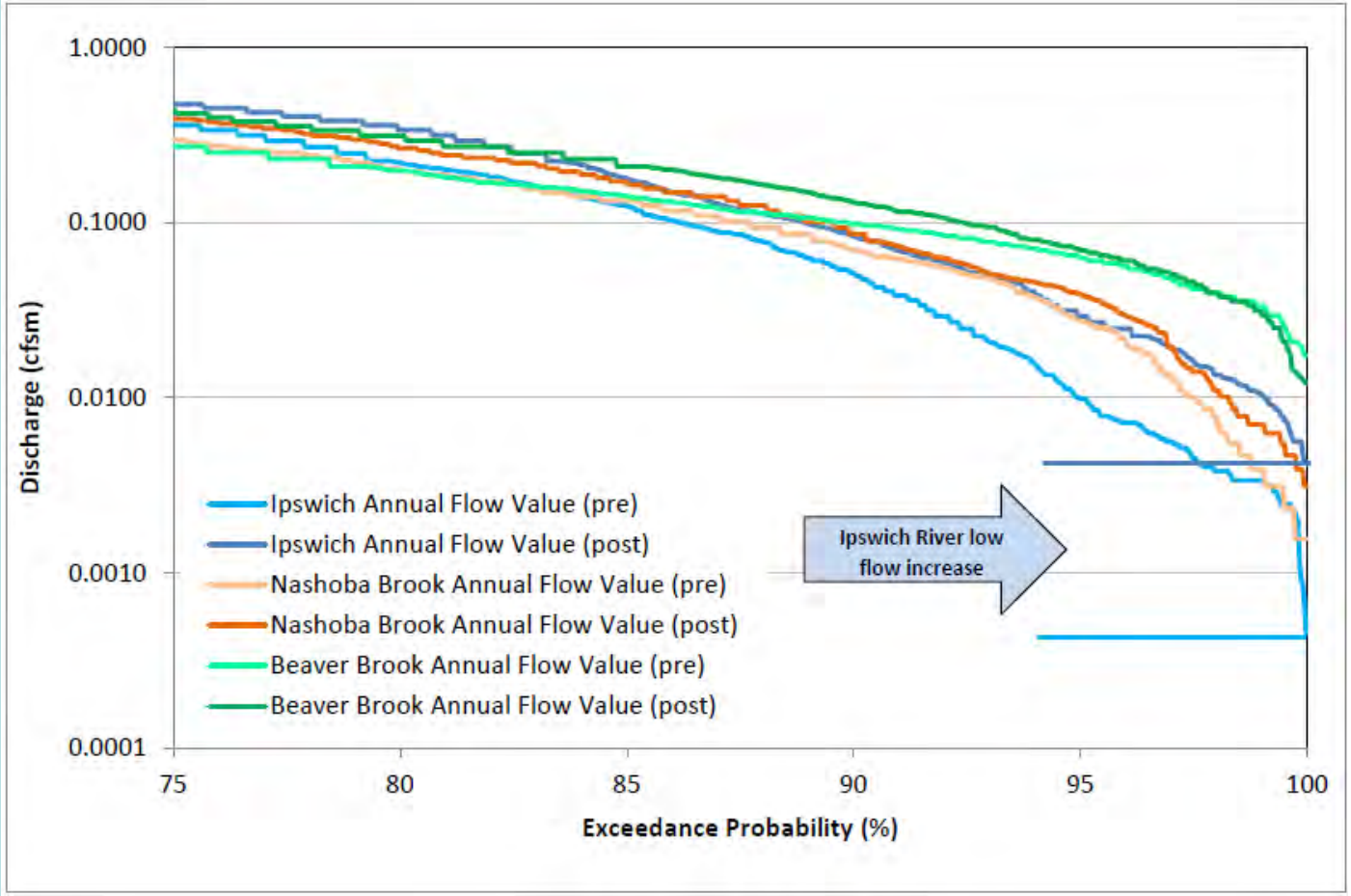
Impact of exempt below-threshold withdrawals



IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Ipswich River Streamflow: Evaluation of impacts of Reading and Wilmington using out of basin water sources

Massachusetts Division of Ecological Restoration, October 2015



IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Solutions: Enhanced Water Conservation

- "First resort" water source
- Cost effective
- Practical
- Can avoid infrastructure expansion costs and environmental impacts
- Reducing summer demand is key
- Large savings have been achieved when motivation to save has been strong

IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Solutions: Regional Water Sources

- Additional Ipswich Basin towns have ready access to MWRA: Salem, Lynn, Danvers/Middleton, Peabody, Lynnfield
- Salem/Beverly reservoir system potential to serve Hamilton, Wenham, Topsfield, Danvers/Middleton and Ipswich
- New storage regional reservoir potential

IPSWICH RIVER WATERSHED ASSOCIATION
The Voice of the River

Progress!

9/4/05

9/20/16