

New England Coastal Basins Hydrologic Observatory

Background

The New England Coastal Basins drain 23,000 square miles of western and central Maine, central and eastern New Hampshire, eastern Massachusetts, and most of Rhode Island (Flanagan *et al.*, 1999). The largest rivers are the Kennebec (5,893 mi²), Androscoggin (3,524 mi²), Saco (1,700 mi²), and Merrimack (5,010 mi²) that drain the northern two-thirds of the region. Rivers draining the southern one-third of the region include the Charles (321 mi²) and the Blackstone (480 mi²). The Kennebec, Androscoggin, Saco, and Merrimack Rivers originate in the mountainous and forested Northeastern Highlands ecoregion, and drain southeasterly to the hilly plains of the Northeastern Coastal Zone or the Laurentian Plains and Hills ecoregions. The southern watersheds of the Blackstone and Charles Rivers are within the Northeastern Coastal Zone ecoregion (Omernik, 1987).

The New England Coastal Basins are mainly underlain with near-surface bedrock. Several hundred types of geologic formations have been identified, along with a high degree of variability of bedrock mineralogy. Glacial deposits of clay, silt, sand, gravel are found along stream valleys and coastal plains. In the upland areas, the dominant glacial deposit is till (Flanagan *et al.*, 1999). High arsenic levels (>10 µg/L) have been found in groundwater supplies, and a geologic source has been suggested (Ayotte *et al.*, 2003).

The climate of the basins consists of cold winters, and cool summers. Peak streamflows occur during the spring as a result of snowmelt and precipitation. The average annual precipitation ranges from 42 inches in low-lying coastal regions to greater than 60 inches in mountainous regions (Flanagan *et al.*, 1999).

Water quality and aquatic ecosystem health is closely related to human activity - both past and present. Residential, commercial, and industrial land uses have been associated with rapid degradation of stream ecosystems during the process of urbanization. From the early to mid-1990s, the basins were predominantly forested (72 percent), with 8 percent of the land classified as urban, and 6 percent as agricultural. The population of the New England Coastal Basins increased 6.8 percent from 1990 to 2000 from 7.78 million to 8.31 million people. In 2000, the majority of the population lived along the coast (Robinson *et al.*, 2004).

The National Water Quality Assessment Program found that water quality impairments, such as arsenic, chromium, copper, cadmium, lead, mercury, and zinc in streambed sediments, and VOCs such as the gasoline additive methyl tert-butyl ether (MTBE) were associated with urban sources. The occurrence of VOCs was more common in waters of the New England Coastal Basins than in waters in other urban areas of the Nation, and was explained by the widespread use of MTBE in gasoline, in addition to a long history of industrial activity in New England (Robinson *et al.*, 2004).

Withdrawals for water supply total 1.43 billion gallons per day, nearly 70 percent of which is taken from rivers and reservoirs. Major cities such as Boston, Providence, and Portland obtain their water supply from reservoirs. Interbasin transfer of water to meet water supply needs is common in the New England Coastal Basins. The Quabbin Reservoir, located outside of the New England Coastal Basins study unit, supplies the City of Boston with 149 million gallons of water per day (Robinson *et al.*, 2004). Within the New England Coastal Basins, another example of interbasin transfer is the Ipswich River Basin in northeastern Massachusetts from which water is withdrawn for water supply outside of the basin, and not returned (Zariello, 2004).

The cumulative effects of interbasin transfers of water, both from within the New England Coastal Basins, in addition to external transfers, are of major scientific interest with respect to the creation of a Hydrologic Observatory for this region.

References

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