How Much of the Casco Bay Watershed Is Covered by Impervious Surface?

Answer: Overall, impervious surfaces cover approximately 5.9% of the Casco Bay watershed, with the highest levels occurring along coastal areas.

Why Is it Important to Monitor Percent Impervious Surface Coverage?

Impervious surfaces such as roads, parking lots, rooftops and compacted soils alter natural hydrological flow by preventing infiltration of rain water and snow melt into the ground. Instead, impervious surfaces direct runoff into stormwater drainage systems and their receiving water bodies. Streams, rivers, lakes and estuaries with watersheds that contain a high percentage of impervious surface area are likely to show poor water quality, degraded aquatic habitat, and reduced biological diversity. High impervious surface levels can also lead to increased flooding, erosion, stream channel alteration, and reduced groundwater recharge. Currently, impervious surfaces cover approximately 5.9% of the Casco Bay watershed, with the highest levels occurring in subwatersheds close to the coast, and the lowest levels occurring in the upper Sebago Lake watershed.

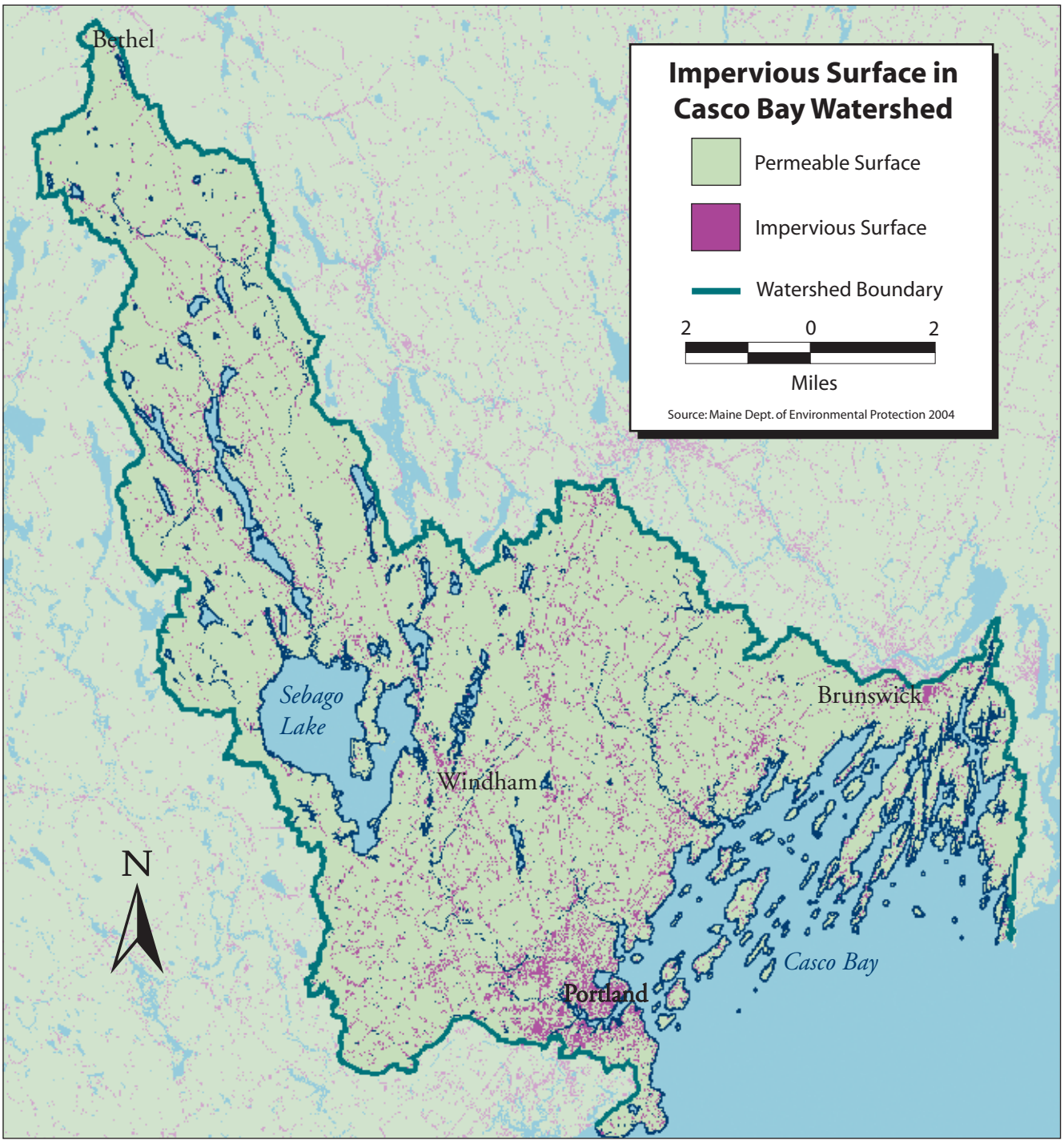
Impervious surface coverage can be a useful indicator in predicting stream degradation. Recent studies suggest that the ability of Maine's streams to support aquatic ecological communities becomes degraded when the amount of impervious surface area exceeds 6%-10% of the overall watershed area (Morse 2001). Research by the Maine Department of Environmental Protection (DEP) supports this conclusion. In a study of the impact of urbanization on two Casco Bay watershed streams, Long Creek and Red Brook, sampling sites located in regions having impervious surface area coverage less than 7.0% had good water quality and biological community (*e.g.,* fish, aquatic insects, crustaceans, etc.) conditions, while sites located in regions having coverage greater than 7.0% had poor to fair water quality and biological community conditions and, in some cases, failed to meet even state minimum water quality standards. Furthermore, sites with high impervious surface areas had high pollutant loads (*e.g.,* metals, total suspended solids) compared with the reference site, Red Brook (Varricchione 2002). Additional DEP studies have found similar conditions within other streams in the Casco Bay watershed (Meidel *et al.* 2005)

NEMO Program, University of Connecticut

Impervious surfaces channel pollutants such as gasoline and oil into stormwater systems, which discharge into the rivers and streams flowing into Casco Bay.

Interlocal Stormwater Working Group

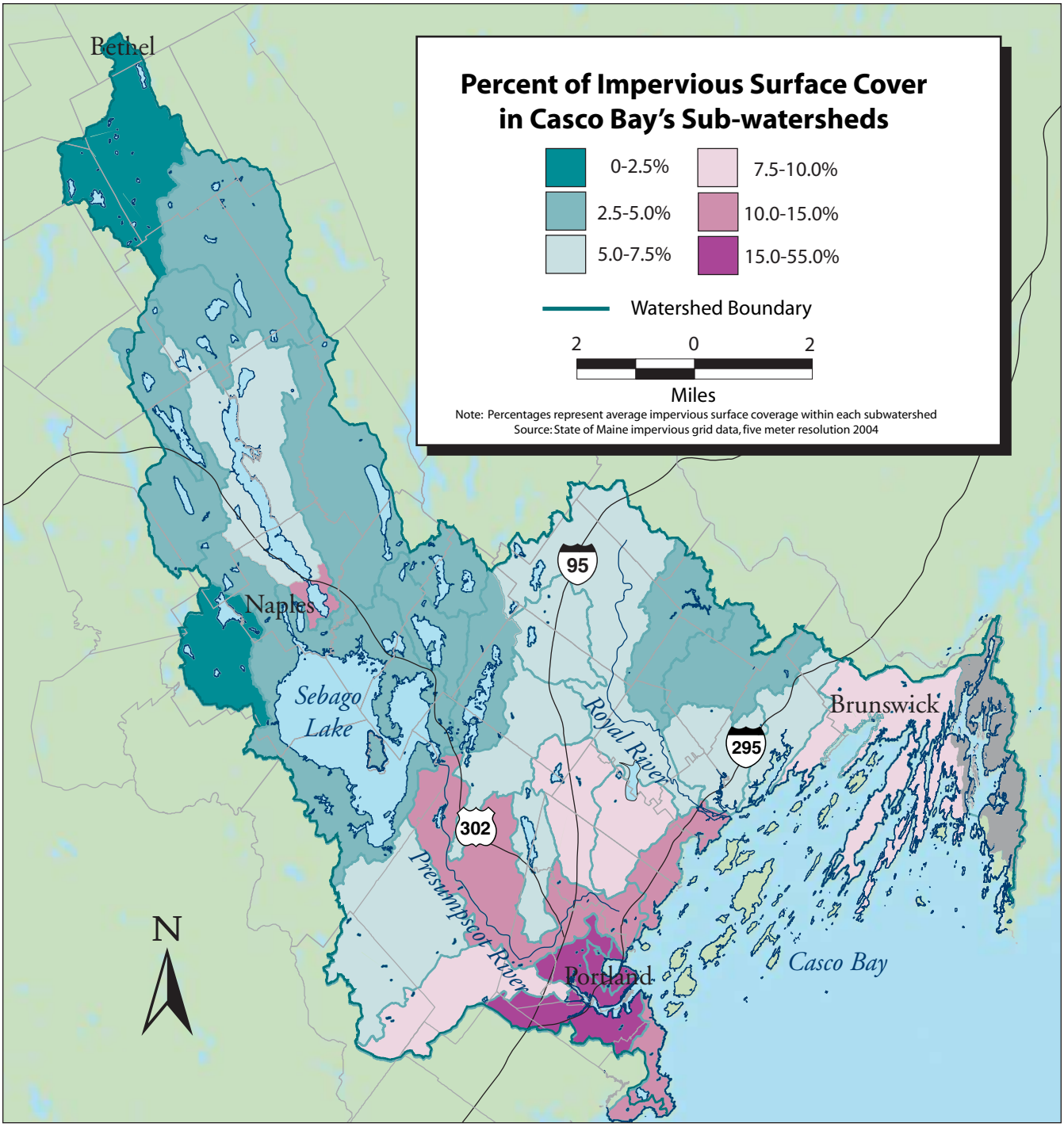
In 2002, fourteen municipalities within the Casco Bay watershed joined to form a partnership, the Interlocal Stormwater Working Group (ISWG), to meet federal and State stormwater regulations mandated by Congress under the Clean Water Act. By taking a regional approach to addressing stormwater pollution, ISWG can both maximize the limited financial and staff resources available and work on a geographic scale that is more appropriate to managing stormwater. Both CBEP and the Cumberland County Soil and Water Conservation District have provided significant support to facilitate the formation of the group and, in the case of CBEP, funding for implementation of education and outreach, training, and demonstration projects. The ISWG is successfully collaborating to reduce nonpoint source pollution from stormwater runoff and improve water quality throughout the Casco Bay watershed and has been held up as a model for municipal collaboration in the state.



How Does Impervious Surface Affect Water Quality and Aquatic Habitat?

Impervious surfaces accelerate the movement of runoff and thus the delivery of pollutants from throughout the watershed into Casco Bay. On its way to receiving water bodies, stormwater runoff accumulates pollutants such as oil, gas, and other hydrocarbons, heavy metals, de-icers, pesticides, fine sediment, fertilizers, and bacteria, all of which can impair water quality. For example, runoff from fertilized lawns contributes excess nutrients to water bodies, which can lead to algal blooms and in extreme cases, fish kill events. Other stormwater pollutants of concern are toxic contaminants, such as heavy metals and pesticides, which originate from vehicles and businesses or from homeowner activities.

Impervious surfaces alter natural hydrology patterns and lead to more frequent and extreme hydrologic conditions in streams and rivers. By accelerating flood conditions, impervious surfaces can lead to property damage, erosion, channel alteration, and habitat degradation. Increased stormwater runoff erodes stream and river banks and deposits sediments



downstream, degrading high value habitat such as spawning beds and riparian shoreline and altering natural stream channels. During summer months, impervious surfaces can also lead to higher stream temperatures. As rainfall warmed by the pavement flows into water bodies, stream habitat becomes less suitable for trout and other temperature-sensitive aquatic species. Studies by the Maine Department of Environmental Protection have found that increasing percentage impervious surface coverage is associated with reduced biological diversity and a shift in aquatic community structure from insect communities toward non-insect, pollution-tolerant species.

References

Meidel, S. and Maine DEP. 2005. *Urban Streams Nonpoint Source Assessments in Maine*. Maine Department of Environmental Protection, Augusta, ME.

Morse, C. 2001. *The Response of First and Second-Order Streams to Urban Land-Use in Maine*. MS thesis, Ecology and Environmental Science Program, University of Maine (98 p).

Varricchione, J. 2002. *A Biological, Physical, and Chemical Assessment of Two Urban Streams in Southern Maine: Long Creek & Red Brook*. Volumes I and II, Maine Department of Environmental Protection, Portland, ME.