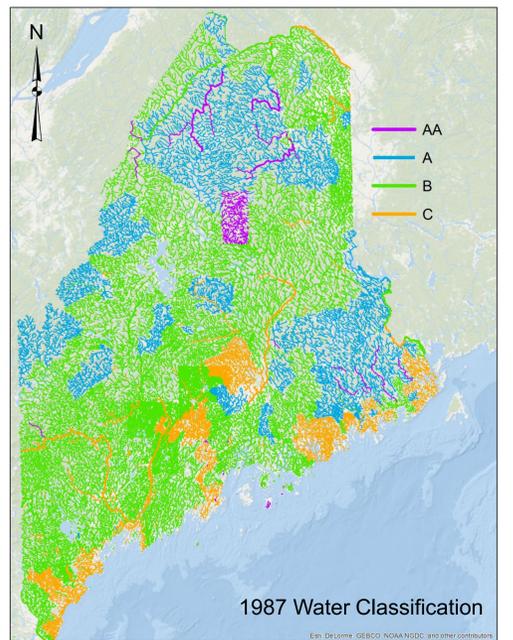
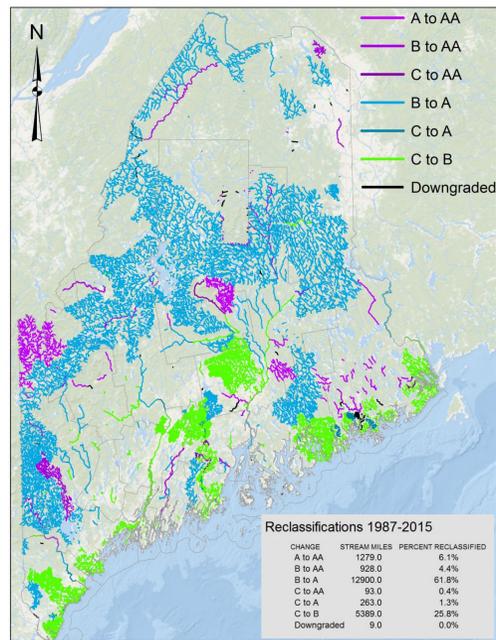
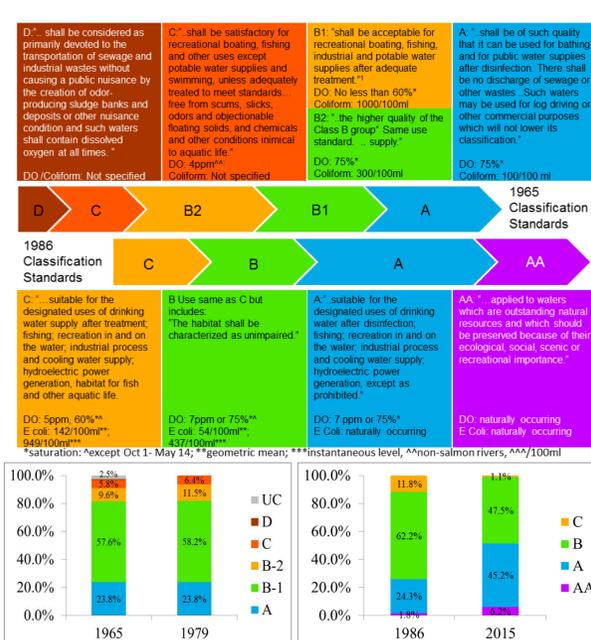
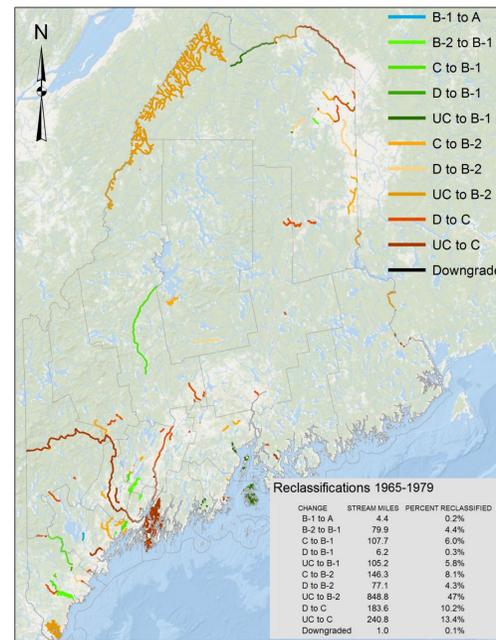
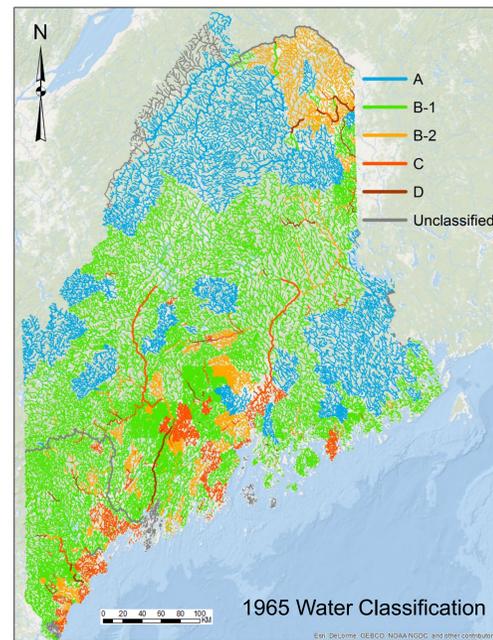


Tracking Changes in Maine's Water Classification Program: Following Fifty Years of River Classification in Maine.

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Overview of Project

Maine uses a water classification system to establish and measure water quality goals for each river and stream but it can also be used to track progressive changes in quality at regional and statewide scales. Until recently, the only record of reclassification was that captured in the legislative record. Change in quality shown as change in classifications has been mapped to show both temporal and spatial progress from 1965 to the present.

Purpose of Classification

The classification system is used to set the State's management goals for its surface waters, protect the quality of those waters for their intended management purposes, and where standards are not achieved, direct the State to improve the quality to achieve those purposes. The standards for each classification establish designated uses, related characteristics of those uses, criteria necessary to protect the uses, and specific conditions for certain activities such as the discharge of wastewater. Waters not meeting their classification goals are listed as impaired in the biennial Integrated Water Quality Monitoring and Assessment Report.

Classification History

Maine has had a water classification system in development since the 1950's. This process was largely complete by 1965. With the passage of the Clean Water Act in 1972, water quality standards changed and water quality remarkably improved following the implementation of modern waste treatment. As a consequence, Maine revised its classification law in 1986. This new classification law established updated water quality standards and Maine became the first state to adopt standards into law that establish baseline characteristics for biological integrity as a performance measure tied to a tiered water classification system.

Water Quality Classes

Maine maintains four distinct water quality classifications for rivers (AA, A, B, and C) that designate the minimum level of water quality intended for each body of water. A close comparison of the standards will show that there is actually not a great difference between the uses or the qualities of the various classes. All attain the minimum fishable-swimmable standards established by the federal Clean Water Act. Most support the same set of designated uses with some modest variations in their description and the minimum criteria required. The classification system should be viewed as much as a hierarchy of risk, as one of use or quality, the risk being the possibility of a breakdown of ecosystem functions and loss of use due to either natural or human-caused events. Ecosystems that are more natural in their structure and function can be expected to be more resilient to a new stress and to show more rapid recovery. Class AA involves low risk since activities such as waste discharge and impoundment are prohibited. The expectation to achieve natural conditions is high and degradation is unlikely. Class A waters allow impoundments and restricted discharges, so the risk of degradation, while still low, does increase because of some human intervention in the maintenance of the ecosystem. Class B has fewer restrictions on activities but still requires high water quality criteria. Finally, Class C has the least restriction on use and the lowest (but not low) water quality criteria. Class C waters are still good quality, but have the smallest margin for error before significant degradation might occur in these waters due to new additional stressors (such as a spill or a drought).

Reclassification History

1965-79: Maine established a 5-tier classification system (A, B-1, B-2, C, and D) and by 1965 had made assignments to most waters. For the next 14 years there were few reclassifications. The remaining 1319 miles of unclassified waters were assigned mostly to Class C and B2, and most Class D waters were upgraded to Class C so that only 16 miles of those waters remained at the time of the 1986 classification revision.

1986: The revised Classification Law raised the water quality criteria in many classes, however most waters were initially reassigned to their previous class. For example while most Class C waters were reassigned to C, some criteria for Class C became more stringent thus improvement was secured for all. Class D was repealed in 1986 since it did not comply with CWA standards and the remaining D waters were assigned to Class C. Class AA was a newly created class and initially only a few waters were assigned (e.g. waters in Acadia and Baxter Parks, Allagash Waterway).

1987-2015: Following passage of the revised classification law, Maine began a comprehensive re-evaluation of the condition of its waters and reassigned classes according to the new standards and criteria. This resulted in many upgrades, and some downgrades, reflecting improved water quality following waste treatment and other management interventions. The revised Classification Law also requires regular re-assessment and broad public input which has accelerated the reclassification process.

Discussion and Results

This poster provides a 50 year synthesis of changes in main stem and tributary classifications reflecting trends in water quality condition statewide. Discrete changes described in the law were mapped using ArcGIS to show both temporal and spatial shifts as a result of classification. Mapping changes in water classification since 1965 provides an overview of water quality improvement and a visual display of progress achieved to date. Spatial analysis of the reclassification process also provides the first opportunity to quantify differences between watersheds and changes within watersheds from headwaters to downstream segments. The results show distinct differences in progress achieved among Maine's river systems and offers an opportunity to examine ways in which upgrades may trigger further restoration actions.

References

Courtemanch, D. L. (1995). Merging the Science of Biological Monitoring with Water Resource Management Policy: Criteria Development. In W. Davis & T. P. Simon (Eds.), *Biological assessment and criteria: Tools for water resource planning and decision making* (pp. 315-325). Boca Raton, FL: CRC Press.

Davies, S. P., & Jackson, S. K. (2006). The biological condition gradient: A descriptive model for interpreting change in aquatic ecosystems. *Ecological Applications*, 16(4), 1251-66. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/16937795>

Davies, S. P., Tsomides, L., DiFranco, J. L., & Courtemanch, D. L. (1999). Biomonitoring retrospective: Fifteen year summary for Maine rivers and streams. *Augusta, ME: Maine Department of Environmental Protection. DE-PLW 1999-26.*

Judd, R. W. (1990). The coming of the Clean Water Acts in Maine, 1941-1961. *Environmental History Review*, 14(3), 50-73.

Maine Department of Environmental Protection. (2009). Maine Revised Statutes Title 38, Article 4-A: Water Classification Program, Sections 464-468.

Maine Department of Environmental Protection. (1979). Classification of Surface Waters. September 1979. MRSA 38: Chapter 3

(Water and Air) Environmental Improvement Commission Revised Statutes of 1964. (1970). Title 38 (as amended) Chapter 3: Protection and Improvement of Waters. Effective October 1, 1969 with Amendments by the First Special Session of the 104th Legislature Effective May 9, 1970.

Water Improvement Commission Revised Statutes of 1964. (1964). Title 38, Chapter 3 as amended. Effective September 3, 1965

Acknowledgements.

This project is a collaboration between the Maine Department of Environmental Protection, Bates College, Bowdoin College and the University of Southern Maine as a component of the Sustainable Solutions Initiative EPSCoR project. Bates College student Nathan Kane compiled changes in classification for all Maine rivers since passage of the Maine Water Classification Act in 1986. Bowdoin College student Min Lee compiled changes in classification from 1965 to the 1986 law. We additionally thank Susan Davies and Susanne Meidel at Maine DEP, Kathleen Bell at University of Maine School of Economics, and Jessica Leahy at University of Maine School of Forest Resources for their assistance with this project.