

DIATOM COMMUNITIES AND WATER QUALITY OF SHORELINE ROCK POOLS IN THE NORTH AMERICAN GREAT LAKES

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Rock pools are prominent features along much of Lake Superior's shoreline and serve as critical habitat for several amphibian and plant species of concern. These unique habitats are model ecological systems with simple food webs, where organisms must balance reproductive risks and resource use with pool permanence, daily physical extremes, and predation. Threats to rock pools and organisms that depend on them include climate warming, atmospheric deposition, recreation, invasives, and potential for shipping spills. In spite of these threats and dependence by species of concern, there are few baseline studies of the physical, chemical, and biodiversity characteristics of rock pools. Shoreline pools are delimited into two zones. Splash pools are located closer to the lake and have hydrology and permanence that is strongly controlled by wave inundation. Lichen pools, so-called because of the predominance of lichens on surrounding rock, are located above the wave and ice scour zone, and are often larger, more permanent, and have hydrology more strongly controlled by precipitation, runoff, and groundwater. We intensively sampled 35 pools in Great Lakes national parks during 2010. Field measures included size, depth, temperature, pH, conductivity, and DO. Water quality samples were taken for analysis of total and dissolved nutrients, DOC, DIC, chlorophyll *a*, anions, cations, and metals. Diatom samples were collected at each pool from comparable microhabitats. Water quality and diatom communities in rock pools were strongly separated across lichen and splash zones. There is little difference in water chemistry between splash pools and Lake Superior waters except for nitrate-nitrite (higher in Superior). Lichen pools are more productive systems compared to either splash pools or Lake Superior with greater nutrients (except nitrate), DOC, and chlorophyll-*a*. Splash pools can be characterized as low productivity, oligotrophic systems compared to lichen pools, which are mesotrophic and possibly N-limited. Diatom communities in pools have been characterized and comprise several floral elements including Lake Superior species, a soft water flora, N-fixers, and rare taxa. This baseline ecological study of diatom communities and water chemistry of shoreline pools establishes a framework for monitoring these sensitive systems, and provides guidance for developing remediation targets with which to respond to current and potential threats from invasives, warming, atmospheric deposition, and shipping spills.