



photo by Karen Myhre, MN DNR

Becker County, MN

### **General Description**

Lakeshore (LK) communities occur along the shorelines of lakes and ponds throughout Minnesota in the zone between the annual low-water level and the upper limit of storm waves and spring ice scouring. Most LK communities are sparsely vegetated because of absence of well-developed soils and frequent disturbance by waves, ice, and wind. LK communities are usually narrow, sometimes not more than a few yards wide, although width varies considerably depending on the nature of the water body and its basin. Small ponds in shallow basins where the water level declines greatly during the summer months have broad lakeshore zones. Along larger lakes, powerful storm waves and ice scouring produce relatively broad beaches and, occasionally, associated dune areas. Small lakes with relatively stable water levels have narrow shoreline communities, as do bays and other sheltered areas in large lakes. Within the Prairie Parkland (PPA) and Tallgrass Aspen Parklands (TAP) provinces, LK communities are most common in the CGP, parts of which have numerous basins created in pitted moraines, outwash plains, and other landforms during the last glaciation. LK communities are much less common in the RRV and LAP, both of which are characterized by the nearly level and largely featureless terrain of the Glacial Lake Agassiz basin.

Substrates in LK communities range from organic mucks and silt to loose sand, gravel, and bare rock. Storm waves and lake currents, especially along larger lakes, reshape deposits of substrate particles such as silt, sand, gravel, and even cobbles. Scouring by large pieces of ice blown ashore during spring breakup can remove existing vegetation and push sand, gravel, and cobbles into beach ridges. When present, these ice-thrust ridges often mark the ecotone between LK communities and adjacent terrestrial communities. In prairie landscapes, ice-thrust ridges are often covered by prairie forbs and graminoids. In wooded landscapes they tend to be covered by woodland forbs and graminoids.

### **Patterns of Vegetation and Dynamics**

The strong influences of waves, ice, and wind produce characteristic zonal patterns in LK communities. Many LK communities have well-defined upper and lower zones. Upper zones lie above the normal water level and are influenced by waves mainly during storms; they are also subject to scouring by ice during spring breakup. On broad sand

or gravel beaches, plants in the upper zone tend to grow in a series of parallel bands, each containing a different assemblage of species and each resulting from a different storm earlier in the growing season. Lower zones are constantly washed by waves and generally lack plants; however, in small, shallow lakes subject to drawdown, a series of lower zones are often present on exposed sediments and populated by plants that disperse quickly to the site or germinate from seeds buried in sediments. Zonation is especially pronounced on sand shores along the largest lakes, which may have distinct upper, middle, and lower zones. The upper zone on very large lakes experiences wave action only during the most severe storms; it is more often exposed to spray and blowing sand. Grass- and shrub-dominated dune areas may be present beyond the upper zone on some large lakes. The middle zone is wave washed mainly during storms and is sparsely vegetated; its upper boundary is marked by a line of driftwood and other flotsam. The lower zone, as in smaller lakes, is constantly influenced by waves and has few vascular plants.

LK communities tend to be dynamic; they grow, shrink, shift, or even disappear as water levels change seasonally and over years and decades. These dynamics complicate the delineation of the upper and lower boundaries of LK communities, particularly their interface with aquatic communities dominated by emergent, submergent, and floating-leaved aquatic plants. The position of shoreline communities along small, shallow ponds varies annually with seasonal fluctuations in water. Spring-fed lakes on outwash plains in Minnesota experienced low water levels in the 1930s, producing broad sand beaches that were inundated again in the 1950s as water levels rose to more typical levels. Even large lakes, especially those that are part of river systems, may experience significant changes in water level, both seasonally and over periods of several years.

Disturbances from waves, wind, ice, and fluctuation in water level cause dynamic changes in vegetation composition. Species common one year may be uncommon or absent the next, and sites that are rich in species one year may be barren the next. Such unpredictable and harsh disturbance regimes favor annual plants and perennials that develop from detached and floating parts, including rhizomes and tubers. Because of frequent erosion and alternating inundation and exposure of sediments, many characteristic lakeshore species are opportunistic and adapted to colonizing recently exposed sites. LK communities share many species with communities of the River Shore (RV) System. Despite the rather different natural disturbance regimes responsible for shaping LK and RV communities, they produce habitats with a number of similarities.

### **Floristic Regions**

The structure and floristic composition of LK communities vary according to geographic location as well as substrate. In this classification, LK communities are grouped into two floristic regions: the Inland Lake Floristic (LK<sub>i</sub>) Region and the Lake Superior Floristic (LK<sub>s</sub>) Region, with only the LK<sub>i</sub> Floristic Region present in the PPA and TAP provinces. The floristic composition of LK<sub>i</sub> communities has not been systematically surveyed in much of Minnesota. There are several vascular plant groups that appear to be well represented in LK<sub>i</sub> communities, including members of the mint family and of the *Cyperus*, *Eleocharis*, *Juncus*, *Polygonum*, *Bidens*, *Sagittaria*, and *Mimulus* genera. Surveys are in progress to identify and better understand the characteristic plant species and patterns of variation in species composition in LK<sub>i</sub> communities across Minnesota and will likely lead to revision in classification of these communities.

### **LK Community Classes in the PPA and TAP Provinces**

LK communities in the PPA and TAP provinces have not been thoroughly described. Two LK plant community classes are known to occur in the provinces, Inland Lake Sand/Gravel/Cobble Shore (LK<sub>i</sub>32) and Inland Lake Clay/Mud Shore (LK<sub>i</sub>54).