

## Sand/Gravel/Cobble River Shore

Sparsely to densely vegetated plant communities on sand, gravel, or small cobbles on river shores. Characterized by annual herbaceous species, firmly rooted perennial species tolerant of inundation, and species dispersed by tubers and other floating propagules. Scoured annually during spring breakup and flooding by ice and currents, and following heavy rains.

### Vegetation Structure & Composition

Description is based on field observations and review of field notes for river shore communities.

• **Vegetation** cover may be relatively stable or may be variable and ephemeral, changing seasonally with change in water level. Community is distinctly zonal, usually with an upper beach zone and one or more lower beach zones.

• **Upper zone** is inundated during highest water levels, typically following spring runoff and repeated heavy summer rains; otherwise the upper zone is exposed and often droughty, especially in sunny settings. Vegetation is composed of woody species and annual and perennial herbaceous species. Cover and composition are highly variable.

○ **PPL & MIM**—Sandbar willow (*Salix exigua*) often forms thickets. False indigo (*Amorpha fruticosa*) and seedlings of willow trees, cottonwood, and silver maple are often present. Common herbaceous species include bunched ironweed (*Vernonia fasciculata*), blue vervain (*Verbena hastata*), swamp milkweed (*Asclepias incarnata*), obedient plant (*Physostegia virginiana*), clammy weed (*Polanisia dodecandra*), horseweed (*Conyza canadensis*), and woundwort (*Stachys palustris*). Emory's sedge (*Carex emoryi*) may form dense patches in shaded settings. The highly invasive species reed canary grass (*Phalaris arundinacea*) is often abundant in this zone.

○ **WSU & MDL**—Sandbar willow often forms dense thickets, especially on sand substrates. Other characteristic species include bulrushes (*Scirpus* spp.), blue monkey flower (*Mimulus ringens*), woolgrass (*Scirpus cyperinus*), fringe sedge (*Carex crinita*), bulb-bearing water hemlock (*Cicuta bulbifera*), swamp milkweed (*Asclepias incarnata*), water parsnip (*Sium suave*), retrorse sedge (*Carex retrorsa*), northern blue flag (*Iris versicolor*), cyperus sedge (*Carex pseudocyperus*), and bluejoint (*Calamagrostis canadensis*).

○ **NSU**—On relatively stable beaches (usually on gravel or cobble substrates), the upper zone may have black ash, mountain maple (*Acer spicatum*), red maple, speckled alder (*Alnus incana*), tall meadow-rue (*Thalictrum dasycarpum*), hawthorns (*Crataegus* spp.), high-bush cranberry (*Viburnum trilobum*), flat-topped aster (*Aster umbellatus*), jack-in-the-pulpit (*Arisaema triphyllum*), false Solomon's seal (*Smilacina racemosa*), drooping woodreed (*Cinna latifolia*), virgin's bower (*Clematis virginiana*), and northern blue flag (*Iris versicolor*). In some instances, herbaceous plant cover is dominated by just a few species. On less stable substrates (such as sandy beaches), vegetation in the upper zone is typically sparse but includes many of the perennial species mentioned above, along with annual species.

• **Lower zone** is generally exposed during normal to low water levels, typically from midsummer to fall. Receding waters may deposit a thin layer of silt or clay in this zone, but it is removed when water levels rise again. Vegetation is highly variable in cover and composition but often is characterized by annual herbaceous species, especially on sand substrates. On gravel or cobble substrates, vascular plants are mostly restricted to patches of finer material that collects in interstitial spaces between cobbles.

○ **PPL & MIM**—Creeping lovegrass (*Eragrostis hypnoides*) and awned umbrella sedge (*Cyperus squarrosus*) are often abundant. Other typical species include tufted lovegrass (*Eragrostis pectinacea*), Frank's lovegrass (*E. frankii*), barnyard grasses (*Echinochloa* spp.), witch grass (*Panicum capillare*), Philadelphia panic grass (*P. philadelphicum*), brook nut sedge (*Cyperus bipartitus*), fragrant cyperus (*Cyperus odoratus*), spikerushes (*Eleocharis erythropoda*, *E. intermedia*, and *E. ovata*), knobby rush (*Juncus nodosus*), hemicarpha (*Hemicarpha micrantha*), water stargrass (*Zosterella dubia*), blue monkey flower (*Mimulus ringens*), ditch stonecrop (*Penthorum sedoides*), golden dock (*Rumex maritimus*), yellow-seeded false

pimpernel (*Lindernia dubia*), common plantain (*Plantago major*), Rugel's plantain (*P. rugelii*), large-bracted vervain (*Verbena bracteata*), low cudweed (*Gnaphalium uliginosum*), speedwells (*Veronica catenata* and *V. americana*), carpetweed (*Mollugo verticillata*), and beggarticks (*Bidens* spp.). Emergent aquatic plants and floating-leaved or submerged aquatic plants tolerant of stranding are sometimes present, especially during low water levels. These include river bulrush (*Scirpus fluviatile*), sessile-fruited arrowhead (*Sagittaria rigida*), and arum-leaved arrowhead (*S. cuneata*).

○ **WSU & MDL**—Characteristic species include creeping lovegrass, awned umbrella sedge, water horsetail (*Equisetum fluviatile*), broad-leaved arrowhead (*Sagittaria latifolia*), sessile-fruited arrowhead, bald spikerush (*Eleocharis erythropoda*), red-stalked spikerush (*E. palustris*), soft stem bulrush (*Scirpus validus*), broad-leaved cattail (*Typha latifolia*), tussock sedge (*Carex stricta*), beaked sedge (*C. utriculata*), lake sedge (*C. lacustris*), giant bur reed (*Sparganium eurycarpum*), wild rice (*Zizania palustris*), Bebb's sedge (*C. bebbii*), marsh cinquefoil (*Potentilla palustris*), and low cudweed.

○ **NSU**—On gravel and cobble substrates, the lower zone may have black ash, mountain maple, speckled alder, tall meadow-rue, hawthorns, high-bush cranberry, Bebb's willow (*Salix bebbiana*), nodding sedge (*Carex gynandra*), aquatic sedge (*Carex aquatilis*), beaked sedge (*Carex utriculata*), grass-leaved goldenrod (*Euthamia graminifolia*), giant goldenrod (*Solidago gigantea*), sweet Joe pye weed (*Eupatorium purpureum*), spotted Joe pye weed (*Eupatorium maculatum*), blue monkey flower, purple fringed orchid (*Platanthera psycodes*), manna grass (*Glyceria* spp.), narrow-leaved bur reed (*Sparganium angustifolium*), marsh bellflower (*Campanula aparinoides*), common mint (*Mentha arvensis*), common marsh marigold (*Caltha palustris*), bladder sedge (*Carex intumescens*), and lady fern (*Athyrium filix-femina*).

### Landscape Setting & Soils

RVx32 occurs on river shores across Minnesota in the zone between normal low- and high-water levels. Sites are typically inundated during spring flooding. Substrate consists of sand, gravel, or cobbles < 12in (30cm) in diameter that are deposited or eroded by river currents. Soils are highly variable in depth and texture because of frequent erosion and deposition of sediment or substrate and may be limited to interstices between larger particles such as cobbles. Conditions suitable for formation of stable beach communities are most likely to occur along streams in glacial till or outwash deposits or in landscapes where sandstone bedrock is exposed. Along rivers with distinct floodplains, RVx32 is often adjacent to floodplain forest or other wetland communities.

### Natural History

The often ephemeral nature, characteristic pattern of zonation, and variable composition of RVx32 are caused by alternating episodes of deposition, erosion, and exposure of sediments as river levels rise and fall during the growing season. On finer, sandy substrates, the upper and lower beach zones are often severely eroded by currents, wave action, and ice flows during periods of high water. On coarser gravelly or cobbly substrates, more stable communities may form in the upper zone, especially on in-stream islands and the upper portions of deep beach deposits on the insides of stream or river bends, where the intensity of erosion and scouring is diminished because of lower stream energy. In addition to moving large quantities of sediment, floodwaters typically transport logs and other large debris that scour the shoreline and can form jams that impede stream flow and cause flooding of the upper beach zone. Scouring during high water removes upland or forest vegetation along the shoreline, thereby delineating the upper edge of the river shore community. Lower beach zones are typically exposed later in the growing season, with cover and composition of vegetation strongly influenced by substrate, gradient, exposure to light, and other local conditions. Common species include perennial forbs and graminoids tolerant of erosion and inundation, annual herbaceous species that germinate on exposed sediments, emergent aquatic plants, and floating-leaved or submerged aquatic plants tolerant of stranding.

## Similar Native Plant Community Classes

### • RVx43 Rocky River Shore

When present on boulder substrates, RVx43 can be similar to RVx32, although RVx43 generally occurs on boulders > 12in (30cm) in diameter, while RVx32 occurs on cobbles < 12in (30cm) in diameter.

### • RVx54 Clay/Mud River Shore

RVx54 occurs in similar settings and along most of the same streams as RVx32 and shares many species but is present on clay or silt substrates. The two classes may be difficult to differentiate when silt is deposited over sand, especially on the upstream and downstream margins of RVx54, where the two communities often intergrade. As a general rule, when silt is greater than 1in (3cm) thick over sand, the community is classified as RVx54.

### • LKi32 Inland Lake Sand/Gravel/Cobble Shore

LKi32 shares a number of species with RVx32; distinguishing the two classes is most difficult along riverine lakes where shorelines are influenced both by seasonal flooding and by wave action.

## Native Plant Community Types in Class

Plant species composition has not been systematically sampled across the range of RVx32. Delineation of the community is based primarily on characteristics of the physical environment.

### • RVx32a Willow Sandbar Shrubland (River)

Shrub-dominated communities on higher zones of river sandbars. Sandbar willow is the dominant species. False indigo and seedlings of willow trees, cottonwood, and silver maple are often present. Typical herbaceous species include bunched ironweed, blue vervain, swamp milkweed, obedient plant, clammy weed, and horseweed. RVx32a is present on sandbars along rivers and larger streams across much of Minnesota.

### • RVx32b Sand Beach/Sandbar (River)

Sparingly vegetated herbaceous plant communities on exposed sandy river sediments, beaches, and sandbars. RVx32b occurs along lower beach zones and is exposed generally from midsummer through fall. Common herbaceous species include creeping lovegrass, tufted lovegrass, barnyard grasses, awned umbrella sedge, brook nut, spikerushes, knotty rush, small-flowered hemicarpha, ditch stonecrop, golden dock, yellow-seeded false pimpernel, common plantain, large-bracted vervain, and American willow herb, along with emergent, floating-leaved, or submergent aquatic plants tolerant of stranding. RVx32b is divided into two subtypes based on stream permanence.

#### ○ RVx32b1 Intermittent Streambed Subtype

Present on exposed sand in streams that become almost completely dry during normal low-water periods. RVx32b1 occurs in seasonal drainage ways across much of Minnesota.

#### ○ RVx32b2 Permanent Stream Subtype

Present on sandy shores and sandbars formed by sand deposited by receding floodwaters and frequently reworked by currents. RVx32b2 occurs along river shores, islands, and point bars in permanent streams and rivers across much of Minnesota.

### • RVx32c Gravel/Cobble Beach (River)

Sparingly to densely vegetated plant communities on exposed gravel and cobble river sediments and beaches. RVx32c supports many of the species found in RVx32b and is also divided into two subtypes based on stream permanence.

#### ○ RVx32c1 Intermittent Streambed Subtype

Present on exposed gravel or cobble sediments in streams that become almost completely dry during normal low-water periods. RVx32c1 occurs in seasonal drainage ways across much of Minnesota.

#### ○ RVx32c2 Permanent Stream Subtype

Present on gravel or small cobbles on river shores. Nodding sedge (*Carex gynandra*) and black hawthorn (*Crataegus douglasii*) are characteristic species in RVx32c2 in parts of the NSU. RVx32c2 occurs along river shores and islands in permanent streams and rivers across much of Minnesota.



Washington County, MN

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