

Shoreline-Dunes-Cliff/Talus-Rock Outcrop

<u>Ecological Systems</u>	<u>Native Plant Community Types (NPC)</u>	<u>NPC Codes</u>
<i>Lake Shore (LK)</i>	Sand Beach (Inland Lake)	LKi32a
	Gravel/Cobble Beach (Inland Lake)	LKi32b
	Boulder Shore (Inland Lake)	LKi43a
	Bedrock Shore (Inland Lake)	LKi43b
	Clay/Mud Shore (Inland Lake)	LKi54a
	Mud Flat (Inland Lake)	LKi54b
	Beachgrass Dune (Lake Superior)	LKu32a
	Sand Beach (Lake Superior)	LKu32c
	Gravel/Cobble Beach (Lake Superior)	LKu32e
	Dry Bedrock Shore (Lake Superior)	LKu43a
Wet Rocky Shore (Lake Superior)	LKu43b	
<i>River Shore (RV)</i>	Willow Sandbar Shrubland (River)	RVx32a
	Sand Beach/Sandbar (River)	RVx32b
	Gravel/Cobble Beach (River)	RVx32c
	Bedrock/Boulder Shore (River)	RVx43a
	Slumping Clay/Mud Slope (River)	RVx54a
	Clay/Mud Shore (River)	RVx54b
<i>Cliff/Talus (CT)</i>	Dry Mafic Cliff (Northern)	CTn11a
	Dry Rove Cliff (Northern)	CTn11b
	Dry Thomson Cliff (Northern)	CTn11c
	Dry Felsic Cliff (Northern)	CTn11d
	Dry Sandstone Cliff (Northern)	CTn11e
	Dry Open Talus (Northern)	CTn12a
	Mesic Open Talus (Northern)	CTn12b
	Dry Scrub Talus (Northern)	CTn24a
	Mesic Scrub Talus (Northern)	CTn24b
	Mesic Mafic Cliff (Northern)	CTn32a
	Mesic Rove Cliff (Northern)	CTn32b
	Mesic Thomson Cliff (Northern)	CTn32c
	Mesic Felsic Cliff (Northern)	CTn32d
	Mesic Sandstone Cliff (Northern)	CTn32e
	Wet Mafic Cliff (Northern)	CTn42a
	Wet Rove Cliff (Northern)	CTn42b
	Wet Felsic Cliff (Northern)	CTn42c
	Wet Sandstone Cliff (Northern)	CTn42d
	Exposed Mafic Cliff (Lake Superior)	CTu22a
	Exposed Felsic Cliff (Lake Superior)	CTu22b
	Sheltered Mafic Cliff (Lake Superior)	CTu22c
	Dry Sandstone Cliff (Southern)	CTs12a
	Dry Limestone-Dolomite Cliff (Southern)	CTs12b
	Dry Sioux Quartzite Cliff (Southern)	CTs12c
	Dry Limestone-Dolomite Talus (Southern)	CTs23a
	Mesic Limestone-Dolomite Talus (Southern)	CTs23b
	Mesic Sandstone Cliff (Southern)	CTs33a
	Mesic Limestone-Dolomite Cliff (Southern)	CTs33b
	Moderate Cliff	CTs43a
	Algific Talus	CTs46a
	Wet Sandstone Cliff (Southern)	CTs53a
	Wet Limestone-Dolomite Cliff (Southern)	CTs53b
	<i>Rock Outcrop (RO)</i>	Sandstone Outcrop (Northern)
Crystalline Bedrock Outcrop (Northern)		ROn12b
Crystalline Bedrock Outcrop (Prairie)		ROs12a
Crystalline Bedrock Outcrop (Transition)		ROs12b
Sedimentary Bedrock Outcrop (Southeast)		ROs12c



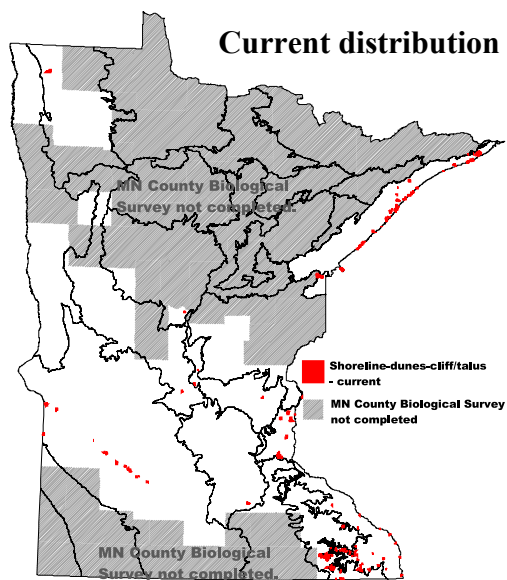
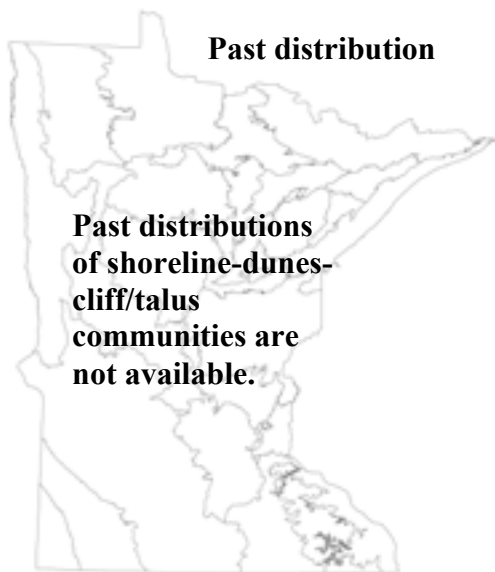
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Mud Flat (Inland Lake) (LKi54b)



R. Fox MN DNR

Dry Limestone-Dolomite Cliff (Southern) (CTs12b)



Source: MN County Biological Survey 2005

General Description

The shoreline-dunes-cliff/talus-rock outcrop habitat is composed of many sparsely vegetated native plant community types. These communities, which include lakeshores, river shores, sand dunes, cliffs, and rock outcrops, all have extensive areas of exposed substrate such as mud, sand, gravel, cobbles, or bedrock. This habitat occurs as small patches or long linear strips throughout the state.

Shoreline communities occur as linear strips along lakes, ponds, rivers, and streams. This group of communities also includes mudflats and sand dunes. Most of these communities are sparsely vegetated because of the absence of well-developed soils and frequent disturbance by waves, ice, and wind. In addition to these factors, changes in water levels contribute to communities that are dynamic—growing, shrinking, shifting, and even disappearing as water levels change seasonally and over longer periods of time.

Lakeshore communities are characterized by their exposed surface materials. Bedrock lakeshores are limited primarily to the Border Lakes and North Shore Highlands subsections, whereas sandy lakeshores are widespread in the Pine Moraines and Outwash Plains Subsection but are rare in the Border Lakes. Clay and mud shorelines are most common in the Prairie Parkland Province.

Although lakeshore communities once encircled each of Minnesota's more than 10,000 lakes, this habitat is severely threatened by development, primarily for second homes, in many parts of the state.

River shores, found along rivers and streams throughout Minnesota, are similar to lakeshore communities. Changes in water levels occur during spring flooding and following heavy rains in a river's watershed. Erosion and deposition from strong and shifting currents constantly alters the shoreline along many rivers. The most common disturbance pattern in these communities is repeated erosion and deposition of materials by currents and ice-scouring. Like lakeshores, river shore communities are threatened by development, agriculture, stream channelization, and human-caused water level fluctuations.

Cliff and talus communities are present on cliffs or talus slopes on steep-sided bluffs, along lakes and streams, on margins of bedrock ridges, and in other settings with sheer bedrock exposures. Cliffs and talus slopes are often associated with one another because talus slopes are composed of rock fractured either from cliffs or smaller areas of exposed bedrock on steep hillsides. The vegetation of these communities is generally open. Lichens and mosses are often the dominant life forms, and vascular plants are sparse or patchy because of scarcity of soil.

In the Laurentian Mixed Forest Province, cliffs and talus communities are mostly restricted to the North Shore Highlands and Border Lakes subsections, where the Precambrian bedrock is frequently at or just below the surface and rugged topography is common. In the Eastern Broadleaf Forest Province, these communities are abundant in the Blufflands Subsection, where sedimentary bedrock is typically at or near the surface and topography is rugged. Scattered cliffs are present on bedrock formations elsewhere in the state.

In the Blufflands Subsection, moderate cliffs and algific talus slopes provide the only habitat for several SGCN land snails. These communities provide a cool, moist, equable climate that allows the snail species to persist. A variety of human activities, either within these communities (such as rock climbing) or affecting the sinkholes on lands above these cliffs, may threaten these communities.

Rock outcrop communities are open plant communities on horizontal or sloping bedrock exposures. They are common in landscapes with thin soils over bedrock and tend to be small in size (that is, less than 25 acres (10 hectares)). Crustose and foliose lichens typically cover exposed rock surfaces, and fruticose lichens are also common. Vascular plant cover is sparse to patchy, depending on the amount of fracturing of the bedrock surface and accumulation of soil in cracks, crevices, and shallow depressions. Outcrops that have minimal fracturing and little accumulation of soil are dominated by lichens, with scattered shrubs and herbaceous plants.

Many plants on bedrock outcrops are adapted to frequent desiccation because of the low moisture-holding capacities of substrates and exposure to direct sunlight and strong winds. Plants must also withstand rapid fluctuations in substrate temperatures, which are significantly colder at night than in surrounding forests and much warmer during midafternoon on sunny days. Limited availability of nutrients in outcrop communities strongly influences community composition and limits growth rates of plants. Fire, as well as frequent drought and scarce soils, plays a role in maintaining the open vegetation characteristic of these communities. Rock outcrop communities are most common in the Border Lakes and North Shore Highlands subsections and in the upper Minnesota River valley. In northeastern Minnesota there is little threat to rock outcrop communities, but those along the Minnesota River are threatened with encroachment of junipers (*Juniperus virginiana*), mineral extraction, and residential development.

Examples of Important Features for Species in Greatest Conservation Need

Ruddy turnstones, whimbrels, American avocets, dunlins, white-rumped sandpipers, semipalmated sandpipers, and greater yellowlegs are shorebirds that migrate through Minnesota, and use shoreline communities as resting and feeding sites. Ruddy turnstones are found primarily along large lakes, such as Mille Lacs Lake, Leech Lake, and Lake Superior, where they use sand beaches. Whimbrels use rocky islands and, to a lesser extent, rocky shorelines of Lake Superior. Dunlins, white-rumped sandpipers, and greater yellowlegs use a variety of shoreline habitats, including sandy shores and mudflats, while American avocets favor mudflats and alkaline shores.

Northern rough-winged swallows nest in burrows in steep banks of clay, sand, or gravel. In Minnesota they are most frequent in the Blufflands Subsection, where they nest along rivers and streams. **Common nighthawks** were once common in urban areas, where they nested on flat, gravel roofs of buildings. Now less common in cities, nighthawks nest, as they did prior to settlement by people of European descent, primarily in natural habitats on sparsely vegetated sites, especially rock outcrops in the upper Minnesota River valley and the Border Lakes Subsection, as well as sites in prairies and oak savannas. Nighthawks also nest in recently burned or logged areas.

Although found in a variety of habitats in northeastern Minnesota, **rock voles** are most often associated with frost-fractured rock outcrops and rocky streambeds. Moist conditions and boulders or crevices seem to be important habitat features.

Piping plovers now nest sporadically in only one location in Minnesota, along the sand beach of Pine and Curry islands on the south shore of Lake of the Woods, although they once nested along the dunes of Lake Superior. Critical habitat for this species has been designated by the U.S. Fish and Wildlife Service on Pine and Curry islands and also in the Duluth Harbor area. **Common terns** nest in a handful of colonies on islands with rocky or sandy shorelines in large lakes such as Leech Lake, Mille Lacs Lake, Lake of the Woods, and Lake Superior (Duluth Harbor).

The **bluff vertigo** and other species of **Pleistocene land snails** are found on steep, moist, shaded, cool north-facing slopes and cliff faces in the Blufflands Subsection. This small land snail also occurs on algific slopes and moderate cliffs but generally avoids areas with continuous cooling from cold air or water discharge. Although researchers have raised questions recently about the taxonomic distinctness of some of the SGCN land snails, all are rare and associated with the same habitats.

Several species and subspecies of rare **tiger beetles** of the genus *Cicindela* are found in the shoreline-dunes-cliff/talus habitat. *C. denikei* is limited to rock outcrops and sandy openings in hardwood forests in the Border Lakes Subsection. *C. limbata nympha* is known from only one location in the state, sand dunes in Polk County. *C. macra macra* is known from several locations along moist, sandy stream shores in southeastern Minnesota. *C. splendida cyanocephala* requires steep clay embankments and is known from several locations in the Blufflands Subsection. The *C. fulgida fulgida* (one known location) and *C. f. westbournei* (two known locations) are restricted to alkaline shorelines and mudflats in western Minnesota.

Management Options to Support Species in Greatest Conservation Need

- Protect important shoreline migratory stops for shorebirds.
- Develop stronger shoreline protection regulations to ensure development setbacks and maintenance of natural shorelines.
- Protect algific talus and moderate cliffs and adjacent uplands.
- Manage rock outcrops in Minnesota River valley to prevent encroachment of junipers.
- Experiment with the use of gravel patches on asphalt or rubberized roof to provide potential nest sites for common nighthawks in urban areas.
- Manage existing nest sites for common terns.
- Conduct inventory on rare tiger beetles; protect important habitat.