

Alvars

Definition

This biodiversity feature represents all alvar types including open pavement, grassland, shrubland and treed alvars located inland and along the shoreline.

Ecosystem Description

Alvars are naturally open ecosystems found on shallow soils over relatively flat, glaciated limestone bedrock, with less than 60% tree canopy cover (Reschke *et al.* 1999, Brownell and Riley 2000, Jones and Jalava 2005). Alvars are characterized by a mosaic of distinctive plant associations adapted to extreme environmental conditions including periodic flooding, severe drought, and extreme temperatures reaching 53°C. However, despite these harsh conditions, alvars support a spectacular diversity of flora and fauna from rare wildflowers, mosses and lichens, grasses and sedges, and ancient trees to birds, land snails, leafhoppers and other invertebrates. Alvars are among the rarest ecosystem types in North America and all alvar communities are considered globally, nationally and provincially imperiled (NatureServe, 2008; NHIC, 2005). In North America, alvars are concentrated in the Great Lakes region, of which 65%-75% are located in Ontario. The greatest concentration of high quality alvar sites occurs in the Bruce Peninsula and Manitoulin Island regions (Reschke *et al.* 1999, Brownell and Riley 2000). The alvars of the Bruce Peninsula and Manitoulin regions have a high degree of similarity in vegetation communities and other alvar species. The alvars in these regions are internationally recognized for their rarity, their distinct ecological character, and an exceptional variety of globally and provincially rare vegetation types and species (Jalava, 2008).

According to Jalava (2008), there are 74 alvar sites on the Bruce Peninsula, which are grouped into 29 “meta-sites” where the alvars occur in one continuous natural area or are situated very close to one another. The majority of alvars on the Bruce Peninsula occur in the northern part of the region associated with the shallow-soiled dolostone bedrock plains and islands, however, other sites occur in the southern portions near both the Lake Huron and Georgian Bay shores. Although various classification systems have been developed for alvar vegetation communities, this document uses the classification established by Jalava (2008), which is an adaptation of the standard Southern Ontario Ecological Land Classification (Lee *et al.* 1998). According to this system, alvars are classified as: Open Alvars including both alvar pavements and alvar grasslands (<25% tree cover and <25% shrub cover); Shrub Alvars (<25% tree cover and <25% shrub cover), and; Treed Alvars (>25% tree cover). These alvar types are further classified into distinct vegetation communities, of which there are 14 found on the Bruce Peninsula. It is important to note that all of these alvar communities are considered provincially, nationally, and globally rare (NatureServe 2008; NHIC 2005).

Biodiversity

For a harsh, barren environment that typically experiences annual flooding, drought and temperature extremes, the alvars of the Bruce Peninsula have remarkable overall ecological diversity. Bruce Peninsula alvars harbour a total of 376 vascular plant species, 319 of them native, which represent 25% of the total plant taxa and 30% of the native plant taxa of the Bruce Peninsula region (Jalava 2008). Characterized by an unusual blend of boreal, southern, and prairie flora and fauna, these ecosystems are relics of both the cold, post-glacial environment and the warmer, drier period that followed (Catling and Brownell 1995). Many species became isolated from their main North American ranges as the climate changed, and many of these disjunct populations now have a high degree of confinement to alvar sites. The alvars of the Bruce Peninsula are particularly significant for their Great Lakes endemic flora, which include Dwarf Lake Iris, Lakeside Daisy, Houghton’s Goldenrod, Gattinger’s Agalinis, and Hill’s Thistle. Some alvars also support ancient, stunted eastern white cedars that can be more than 400 years old (Schaefer and Larson 1997).

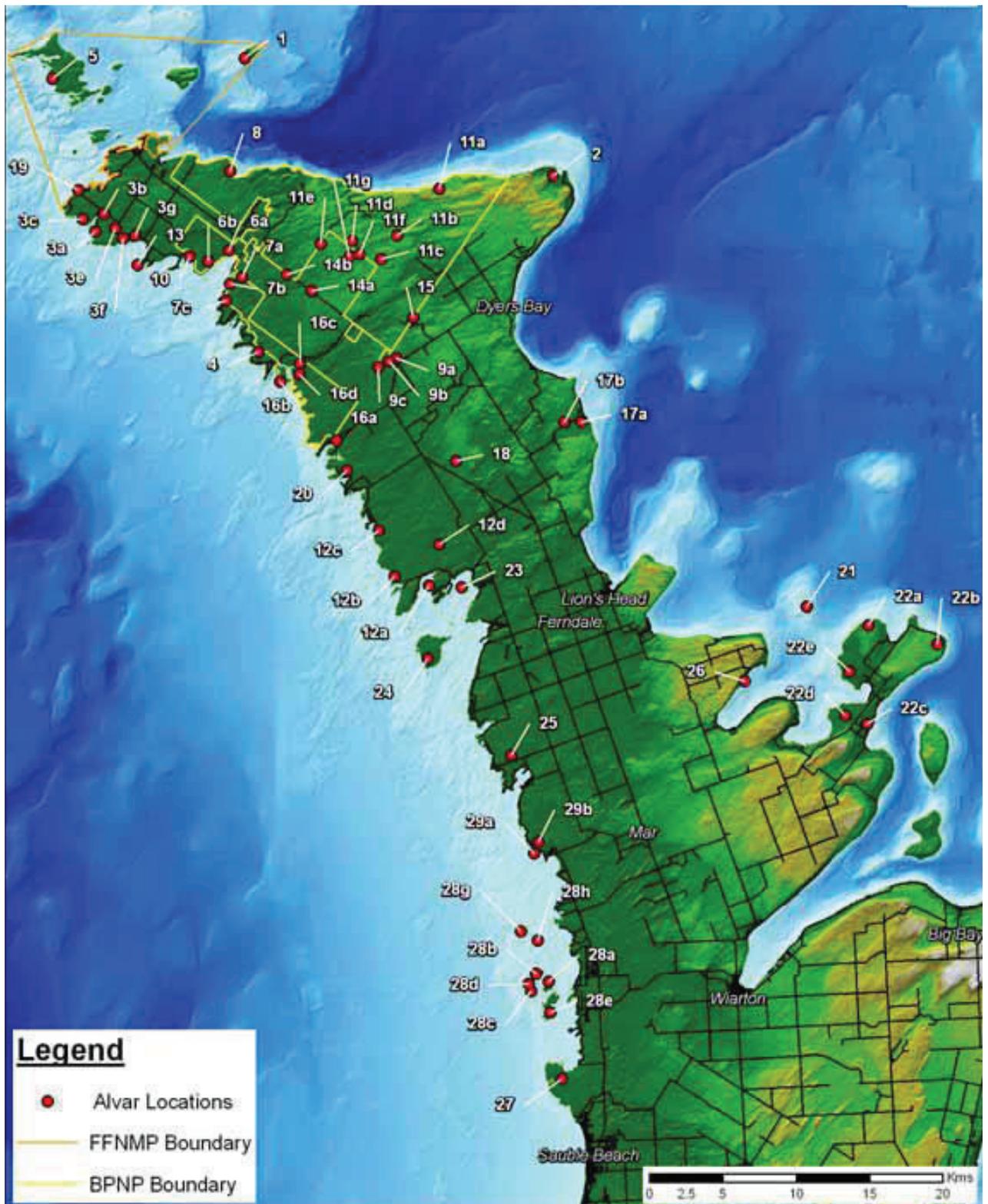


Figure 3.6. Alvar locations of the Bruce Peninsula taken from *Alvars of the Bruce Peninsula: A Consolidated Summary of Ecological Surveys* (Jalava 2008).

Complete List of Alvar Sites on the Bruce Peninsula

1	Bear's Rump Island	14	Niibin – West of Highway 6
2	Cabot Head	14a	Niibin
3	Cape Hurd – Baptist Harbour	14b	West of Highway 6
2a	Baptist Harbour	15	North of Shouldice Lake
3b	Baptist Harbour OHF	16	Pine Tree Point – Scugog Lake
3c	Baptist Harbour NW	16a	Pine Tree Point
3d	Baptist Harbour SE	16b	Scugog Lake
3e	Barney Lake	16c	Scugog Lake East (North Portion)
3f	Barney Lake South	16d	Scugog Lake Southeast
3g	Hopkins Bay	17	Smoky Head – Cape Chin Road South
4	Corisande Bay	17a	Smoky Head
5	Cove Island	17b	Cape Chin Road South
6	Dorcas Bay / Pendall Lake	18	Spring Creek
6a	Dorcas Bay	19	Sunset Park – Long Point
6b	Pendall Lake	20	Zinkan Island Cove
7	Dorcas Bay Road / Sideroad Creek	21	Barrier Island
7a	Sideroad Creek	22	Cape Croker
7b	Dorcas Bay Road North	22a	Halfway Point
7c	Dorcas Bay Road South	22b	Prairie Point
8	Driftwood Cove	22c	The Little Prairie
9	Dyer's Bay Road & Highway 6	23	Garden Island
9a	Dyer's Bay Road & Hwy 6 NE	24	Lyal Island
9b	FON Bruce Alvar Nature Reserve	25	Pike Bay
9c	W & S of FON Bruce Alvar	26	Shoal Cove
10	Eagle Point	27	Chief's Point
11	George Lake / Emmett Lake Road	28	Fishing Islands
11a	North of Umbrella Lake	28a	Indian (Frog) Island
11b	South of Upper Andrew Lake	28b	Main Station Island
11c	South of George Lake	28c	Bowes Island
11d	George Lake	28d	Rowan (Rownes) Island
11e	Saugeen Hunting Grounds / Emmett Lake Road	28e	Smokehouse Island
12	Greenough Harbour – Bradley Harbour	28f	Cranberry Island
12a	Gauley Bay	28g	(West) Argyle Island
12b	Greenough Harbour	28h	Haystack Island
12c	South of Bradley Harbour	29	St. Jean's Point / Sucker Creek
12d	Bruce County Forest – Miller Lake Tract Interior	29a	St. Jean's Point
13	Hopkins Point	29b	Sucker Creek

In addition to vascular plants, alvars support many other life forms that possess the hardiness needed to survive in an environment of extremes. At least 62 algae species, 58 moss taxa and 52 lichen taxa have been recorded on the alvars of the Bruce Peninsula. At just two Bruce Peninsula alvar sites, Bouchard (1998) found 63 taxa of ground beetles, 105 taxa of leafhoppers and relatives, 22 taxa of butterflies and skippers, 45 taxa of sawflies, and 23 taxa of Orthopteroid insects. A diverse assemblage of snails as has also been inventoried, including subarctic and western prairie disjunct species and several new taxa, some of which may be endemic (Grimm 1995). Few, if any, mammal, bird, reptile and amphibian species are restricted to alvar habitats, although many use alvars for part of their life cycle. Snakes, bats and rodents may hibernate and seek shelter in the deep crevices of some alvar sites, while the massasauga rattlesnake is often associated with alvar habitat for foraging and gestation. According to Jalava (2008), the most ecologically diverse alvar site on the Bruce Peninsula is Cape Hurd-Baptist Harbour, where six of the eight closely clustered alvars in the area are host to a remarkable 160 native vascular plant taxa in 10 alvar community types. Twenty-six of these plant species are moderately to strongly alvar-associated, 13 species are globally and/or provincially rare and nine are locally significant. Other highly diverse meta-sites include: Pine Tree Point-Scugog Lake, Dyer's Bay Road-Highway 6, Cabot Head-George Lake, Dorcas Bay-Pendall Lake, Cape Croker, Sucker Creek-St. Jean's Point, Pike Bay, and the Fishing Islands.

Ecosystem Processes

Alvar communities are highly influenced by periodic flooding and severe drought. Alvars typically have very shallow soils (usually 0 to about 20 cm) that provide little water-holding capacity and dry out quickly. The bedrock below permits little drainage after rainfall, causing frequent and rapid flooding. Flooding is less prevalent where there are abundant enlarged cracks (grykes) in the rock, which provide improved internal drainage. The lack of tree cover and exposed bedrock contribute to high levels of light and wind, as well as temperature extremes, with surface temperatures reaching as high as 53°C in summer (Schaefer and Larson 1997). Most alvar species are assumed to be drought-adapted and adapted to these extreme conditions. This cycle of drought and inundation prevent the spread of woody species into alvar openings and maintain them in their open state. Historic natural and human-induced fires have been documented for Great Lakes alvars (Catling and Brownell 1998, Jones and Reschke 2005). The role of fire on the Bruce Peninsula's alvars is largely unknown, but it may be an important process to inhibit the succession of woody vegetation which could displace many alvar species.

Alvar Assessment

Size

KEA: Size and extent of characteristic ecosystems

Indicator: Total areal extent of alvar communities

Current Status: UNRANKED

Description: Due to their local importance for habitat and ecosystem functions, global rarity, and the significant historic loss of alvars in the Great Lakes basin, it is necessary to “maintain total areal extent of alvar types across their range” (Alvar Recovery Team, 2010). This indicator represents the total area of alvars on the Bruce Peninsula and is intended to assess changes over time. Through the International Alvar Conservation Initiative (2000) and Jalava (2008), 28 alvar meta-sites have been identified on the Bruce Peninsula, consisting of 74 individual alvar sites which cover a total area of approximately 921.43 ha. Alvars are most common in watersheds 2FA-02 (316.62 ha), 2FA-12 (116.82 ha), and 2FA-06 (107.19 ha).

Condition

KEA: Overall Alvar Condition

Indicator: Condition Rank

Current Status: GOOD

Description: The approach used to rank the condition of different alvar sites was based on the International Alvar Conservation Initiative (2000). Qualitative field assessments for each alvar site that combine a variety of attributes including level of historic and current disturbances such as abundance of non-native species, livestock grazing, logging, burning, trails and roads, quarrying, and buildings were all identified in the field assessment. Site condition ranks range from Undisturbed (A) to Heavily Disturbed (D). Approximately 86% of the alvar sites were ranked as A or B (Jalava, 2010), indicating that the condition of the alvars of the Bruce Peninsula are in good condition. However, some impacts from off-road vehicles, logging machinery, and non-native species were observed at some sites while some face potential impacts from encroaching residential development such as at Baptist Harbour and Zinkan Island Cove.

Table 3.3. Viability assessment of Alvars

KEY ATTRIBUTE	INDICATOR	RATING
Size		
Size of system	Total area of alvars	UNRANKED
Condition		
Overall Alvar Condition	Overall Element Occurrence Condition Rank	GOOD