James Island

Conservation Assessment

Matt Fairbarns
Aruncus Consulting
2004

prepared for
The Nature Conservancy of Canada

Table of Contents

Tables

Figures

General Description

Location

James Island, approximately 315 ha in size, is located in Haro Strait near Victoria, British Columbia (figure 1). Sidney Channel separates it from Sidney Island, approximately two km to the east. Cordova Channel separates it from the Saanich Peninsula, about 1.5 km to the west.

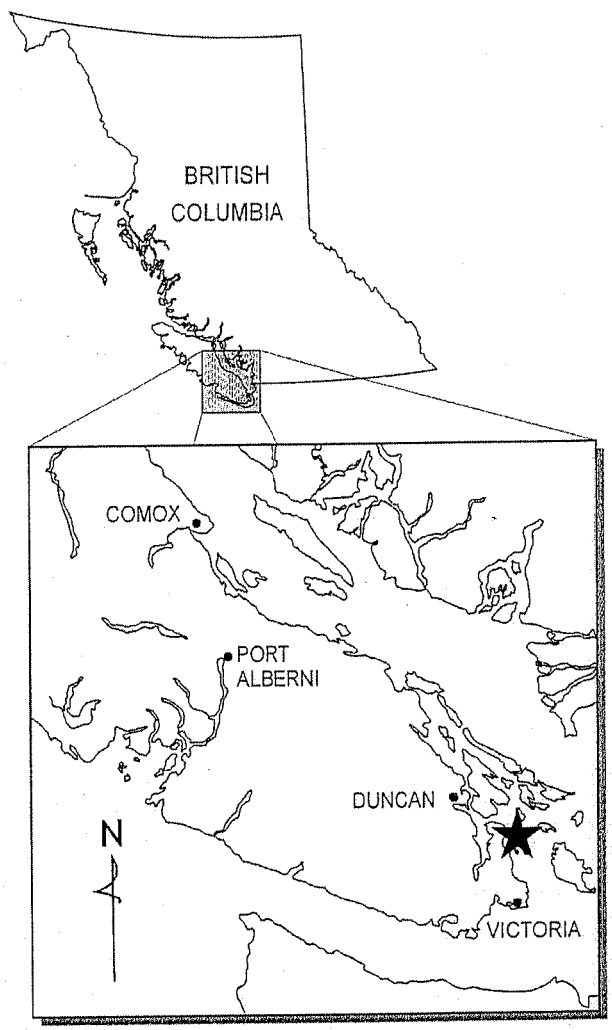

Figure 1. Location of Study Area

James Island marked by star.

Ecoregion Classification

Ecoregional classification in British Columbia recognizes a hierarchical division with ecoprovinces composed of several ecoregions, each subdivided into ecosections.

James Island lies in the Georgia Depression Ecoprovince, the Georgia-Puget Basin Ecoregion and the Southern Gulf Islands Ecosection. The Georgia Depression Ecoprovince is a large basin, which contains the Straight of Georgia and Puget Sound as well as lowlands between the Vancouver Island Mountains and the southern Coastal Mountains. The Georgia-Puget Basin Ecoregion is the central of three ecoregions in the Georgia Depression Ecoprovince. This ecoregion is a semi-enclosed estuarine basin that includes several straits, troughs and island clusters. The Southern Gulf Islands Ecosection is a collection of islands and inter-island channels and sounds that extends across the Strait of Georgia (Demarchi 1996).

Biogeoclimatic Classification

The Coastal Douglas-fir moist maritime (CDFmm) is the only biogeoclimatic zone and subzone in the study area. This is one of the smallest forested subzones in the BGC system. The CDFmm is restricted to portions of the Georgia Depression Ecoregion from sea level to approximately 150 m. The CDF mm occurs along southeast Vancouver Island from Bowser to the Victoria area, in portions of the Gulf Islands south of Cortes Island, and in a narrow strip along the Sunshine Coast near Halfmoon Bay. The CDFmm is one of the most disturbed subzones in British Columbia with only a few fragments in relatively natural condition. It is characterized by climax forests on zonal sites which are dominated by Douglas-fir as well as grand fir and western red cedar. Their understoreys are usually dominated by salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), ocean-spray (*Holodiscus discolor*) and Oregon beaked moss (*Kindbergia oregana*).

Climate

Long-term climatic data (table 1) from Victoria Gonzales Heights, about 20 km south of James Island, indicate general patterns of temperature and precipitation. Precipitation gradients are sharp within the general area.

The region has an exceptionally mild winter climate for such high latitude, is unusually dry compared to other areas of British Columbia's west coast, and receives the greatest annual sunshine in B.C. A pronounced summer drought develops despite relatively cool temperatures, because the strong North Pacific anticyclone prevents most cyclonal systems from entering the area. The rain-shadow effect of the Olympic and Vancouver Island Mountains moderate those cyclonal systems that reach the area. The summer water deficit, calculated using Thornthwaite's formula for potential evapotranspiration, is as low as that for southern portions of the Prairie Provinces. Overall, the climate can be categorized as sub-Mediterranean – it has the winter-wet summer-dry aspect of Mediterranean climates but summers are not as warm (Kerr 1951, Roemer 1972).

Table 1. Canadian Climate Normals for Victoria Gonzales Heights (1898-1998)

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Daily maximum (°C)	7	9	10	13	16	18	20	20	18	14	9	7	13
Daily minimum (°C)	3	4	4	6	8	10	11	12	10	8	5	3	7
Degree days > 18°C	0	0	0	0	2	2	5	6	3	0	0	0	17
Degree days > 5°C	30	46	77	124	211	265	321	328	276	179	75	36	1966
Rainfall (mm)	93	67	42	32	24	19	14	20	32	59	92	99	593
Snowfall (cm)	11	3	2	0	0	0	0	0	0	0	3	9	28
Precipitation (mm)	102	70	45	32	24	19.	14	20	32	59	95	108	619

Source: Environment Canada: http://www.msc-smc.ec.gc.ca/climate

Geology, Glacial History, Terrain and Soils

No bedrock exposures were observed on James Island, but the surficial materials are probably underlain by lower to middle Jurrasic "Island Intrusions" of granodiorite and quartz diorite. The Saanich Batholith is composed of these materials, which outcrop regularly on the south end of Sidney Island and at higher elevations on the Saanich Peninsula (Muller 1983).

While Vancouver Island was glaciated three times during the Pleistocene Epoch, only signs from Fraser (most recent) Glaciation are evident on the landscape. As the glaciers slowly advanced, meltwaters in front of them deposited vast amounts of sand and gravel to form the Quadra Formation. These materials are exposed in the sea cliffs at the south end of James Island. The glaciers continued to advance and over-rode the Quadra Formation, eroding deposits of the Quadra Formation to create the broad drumlin form of James Island. Mixed materials carried in the ice were deposited at the base of the glaciers, capping the Quadra Formation on James Island. These dense, compact deposits, comprised the Vashon Till (Yorath and Nasmith 1995). This till was subsequently removed by surface erosion, once again exposing the coarser materials of the Quadra Formation. In this respect, James Island is very different from Sidney island which still bears a cap of till at higher elevations.

Longshore currents subsequently swept sands and silts from eroding coastal cliffs and this process continues today. These materials were deposited as beaches, spits and offshore bars on and near James Island. Mud has accumulated in some flat areas between the spits or beaches and hillsides (Yorath and Nasmith 1995).

Flora

Southeast Vancouver Island is one of the most floristically diverse areas in British Columbia. The mild winter climate of coastal lowlands favours an exceptionally rich assemblage of plants with limited frost-tolerance. Other factors contributing to the

diverse flora includes the high diversity of lowland habitats, a long disturbance history which has enabled many exotic species of mild regions to take hold, and a wide range of climates associated with broad gradients of elevation and rainfall.

The floristic assemblage of southeast Vancouver Island includes an exceptionally large number of plants on the provincial red and blue lists. Garry oak woodlands, coastal bluffs and herbaceous vegetation in the Victoria area support over 60 red- and blue-listed plant species (Fuchs 2001) and several more occur in beach and shoreline vegetation and forests of Douglas-fir or grand fir (Douglas *et al.* 2002). COSEWIC lists 13 species from similar habitat types as Endangered, Threatened or of Special Concern and COSEWIC status reports are being prepared for many more.

History of Occupation

Coastal Salish probably used James Island as a summer camp. The island is named after James Douglas, the Governor of Vancouver Island. James Island was settled and farmed from 1874-1910 by the Munro family, from Scotland. It served as a private hunting ground in the first years of the 20th century. During this period, Fallow Deer were introduced to the island. A dynamite factory was established on the island in 1913 and subsequently grew to employ about 800 people. Many of the workers lived in a village on the south end of the island. The plant closed in 1962 and the factory and village were torn down in the late 1970s.

Figure 2. Springboard cut on an old stump near the airstrip.

It appears that all of James Island has been logged at least once. The oldest second-growth forests occur as scattered fragments, generally along shoreline bluffs. These stands were harvested by handsaw, as is evidenced by the tall stumps bearing springboard cuts (figure 2). Much of the dense forest on the northern half of the plateau is much younger and appears to have been harvested by chain saw. Forests on the southern third of the island have been heavily thinned to produce 'park-like" stands of widely-spaced trees.

Present Circumstances of Land Use

Presently, James Island has an irrigated, 10-hole golf course roughed in to an 18 hole standard, as well as two tennis courts and a sports field. There are four main cabins, two guest cabins and trailers for staff.

There is a workshop in the centre of the island. and a small runway on the western side. There are a number of vehicle tracks on the island, as well as an abandoned narrow-gauge railway now largely overtaken by second-growth forest.

There is a seaplane ramp and dock on the southwest tip of the island. Another jetty, once used to bring raw materials to the west side of the island, has been demolished. The "Powder Jetty", on the eastern side of the island, still remains. It once served as the off-loading site, where dynamite was carried away from the island. It now serves as the "industrial" dock for the island, where material can be loaded on and off of barges.

James Island now serves as a private recreational property. It receives heavy use on summer weekends and the small permanent staff is augmented by several seasonal workers during the summer.

Plant Communities

Four natural or semi-natural ecological systems were encountered on James Island: brackish marshes, salt flats, sand areas and upland forests. Heavily altered upland meadows and woodlands were not investigated because rapid surveys revealed that they were dominated, almost to exclusion, by non-native weedy grasses, forbs and shrubs.

Brackish Marshes

Brackish marsh vegetation was encountered at the lagoons enclosed by the northern and eastern spit. The sites were nearly level and vegetation was precisely zoned by subtle variations in the degree of flooding, summer draw-down and parent material.

Vegetation plots 4-8, 20 and 21 represent the diversity of brackish marsh vegetation found on James Island (Appendix 1).

"Marsh Meadow" vegetation was dominated carpets of grasses and medium-sized forbs. The most frequent dominant is Coast silverweed (*Potentilla egedii*), which is often joined by Tufted hairgrass (*Deschampsia cespitosa*) or Baltic rush (*Juncus balticus*). Seashore saltgrass (*Distichlis spicata*) may be co-dominant in areas transitional to salt flats.

Creeping bentgrass (*Agrostis stolonifera*), an introduced weed, is often present and sometimes co-dominant.

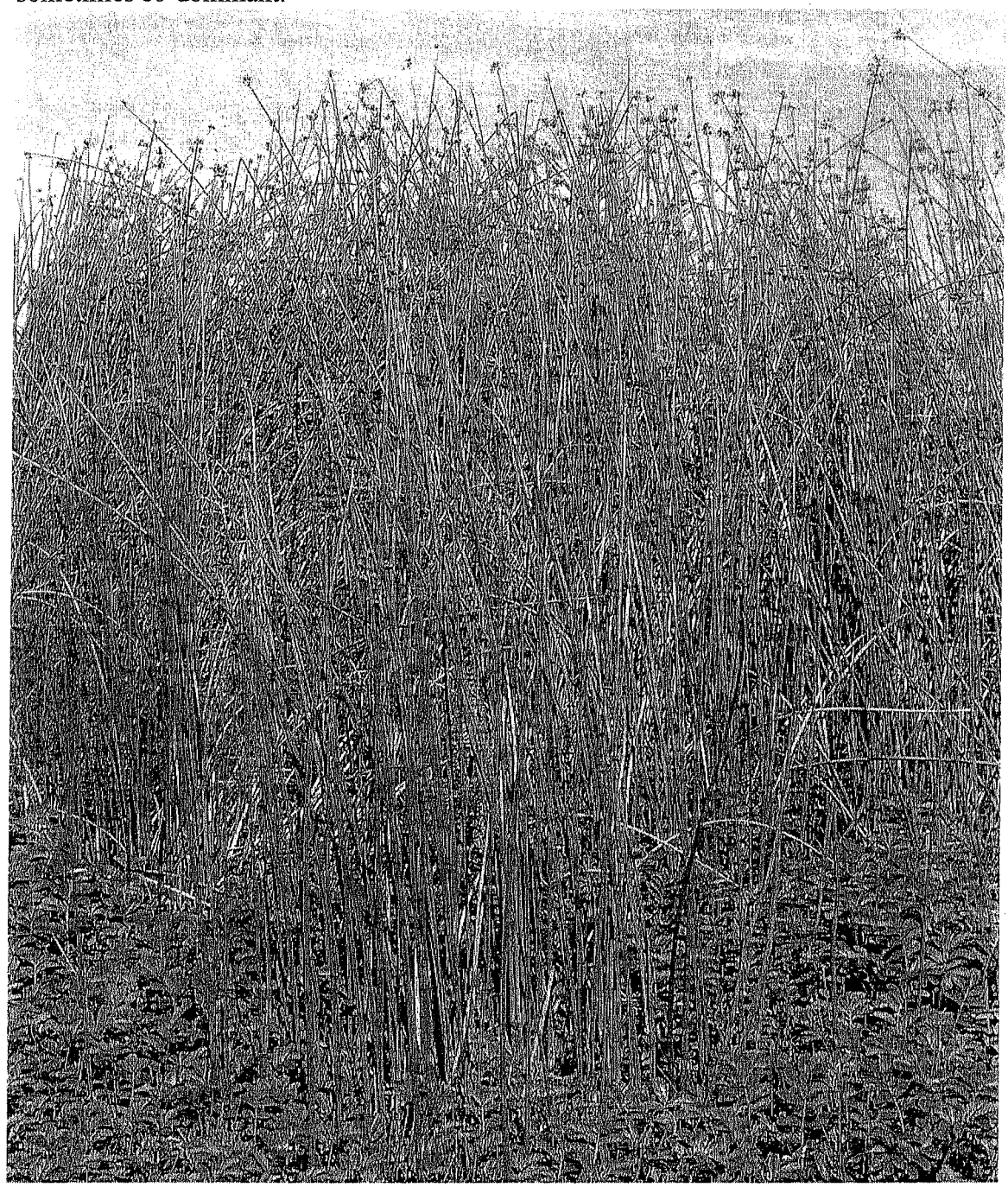

Figure 3. Brackish marsh vegetation

Tall emergents with marsh meadow vegetation in the foreground.

"Tall Emergent" brackish marsh vegetation tends to occur in areas that are flooded for a more extended period. It is dominated by dense stands of Soft-stemmed bulrush *(Schoenoplectus tabernaemontani)* (plots 8 and 20) or Common cattail (*Typha latifolia*) (plot 21), sometimes with a sparse cover of Pacific willow *(Salix lucida)*. These beds of

tall graminoids cast deep shade at ground level, often have thick accumulations of decaying litter, and therefore to be sparse and floristically simple. Standing water is common on these sites in winter and spring, but they drawn down during the summer. Common associates include Creeping bentgrass (*Agrostis stolonifera*), semi-aquatic herbs such as Common spike-rush (*Eleocharis palustris*), Small-flowered forget-me-not (*Myosotis laxa*), Marsh speedwell (*Veronica scutellata*), Celery-leaved buttercup (*Ranunculus sceleratus*) and Water-plantain (*Alisma plantago-aquatica*); and climbing forbs such as Marsh peavine (*Lathyrus palustris*). Aquatic floating-leaved species, such as Ivy-leaved duckweed (*Lemna triscula*), Floating-leaved pondweed (*Potamogeton nutans*) and the liverwort *Ricciocarpus nutans* are often stranded on the soil surface during drawdown.

The lowest sites draw down last, and are therefore vegetated by low herbs. Leading species include weedy, introduced annuals such as Marsh cudweed (*Gnaphalium uliginosum*), Red sand-spurry (*Spergularia rubra*) and Toad rush (*Juncus bufonius*). Creeping bentgrass (*Agrostis stolonifera*), a weedy perennial, is capable of surviving long period of inundation and spreading aggressively once water levels have drawn down.

Salt flats

There was a well-developed salt flat near the Powder Jetty, and a second more fragmented area near the southwestern spit. These nearly level, tidally-flooded areas are dominated by salt-tolerant, often succulent, low forbs and grasses. Variations in dominance may be subtle, and reflect differences in the degree of flooding or sub-irrigation by tidal waters.

Figure 4. Salt-flat vegetation dominated by succulent forbs

Vegetation plots 12-14, 17 and 19 represent the diversity of salt flat vegetation found on James Island (Appendix 1).

American glasswort (*Salicornia virginica*) tends to dominate the lowest areas, Seaside saltgrass (*Distichlis spicata*) is most common where tidal inundation is slightly briefer, and Fleshy jaumea (*Jaumea carnosa*) is most abundant on marginally drier sites; however the three species are often intermixed. Scattered amongst these dominants, one may find small amounts of Pacific alkaligrass (*Puccinellia nutkaensis*), Seaside arrow-grass (*Triglochin maritima*), Graceful arrow-grass (*T. concinna*), Seaside plantain (*Plantago maritima*), Canadian sand-spurry (*Spergularia canadensis*) and Silvery orache (*Atriplex patula*). Orange tangles of Saltmarsh dodder (*Cuscuta salina*) sometimes drape over the American glasswort.

Sand Flats and Dunes

Much of the island is ringed by sand flats and dunes. Well-developed sand flat and dune vegetation is best expressed at the northern spit, the southwestern spit, and on sand deposits stretching from the vicinity of the Powder Jetty down to the southeast tip of James Island (including roughed-in fairways of the gold course).

Vegetation plots 1-3, 9-11, 16 and 25 represent the diversity of sand flat and dune vegetation found on James Island (Appendix 1).

On James Island, sand dunes are low and restricted to a small area of beach berms. They tend to be fairly stable, and often have a high cover of two introduced shrubs: Scotch broom (*Cytisus scoparius*) and Gorse (*Ulex europaeus*). Dune grass (*Leymus mollis*) is the native dominant on these low beach berms, but it has been replaced by the introduced European beachgrass (*Ammophila arenaria*) in several places. Several other species occur on these low dunes, but they are rarely abundant. The most frequent associates including native plants such as American rocket (*Cakile edentula*), Beach pea (*Lathyrus japonicus*), Giant vetch *(Vicia nigricans*), California brome *(Bromus carinatus),* Beach bluegrass *(Poa confinis*), Native red fescue (*Festuca rubra*) and Vancouver wildrye (*Leymus x vancouverensis*); as well as alien grasses such as Silver hairgrass (*Aira caryophyllea*), Early hairgrass (*A. praecox*), Rip-gut brome (*Bromus rigidus*), Soft brome (*B. hordeaceus*), Barren fescue (*Vulpia bromoides*) and Kentucky bluegrass (*Poa pratensis*).

Sand flats are much more extensive, although they often grade into dunes and the distinction may be subtle. They rarely have a high cover of introduced shrubs. Their vegetation varies considerably in response to subtle differences in elevation and soil stability. Leading species may include Yellow sand-verbena (*Abronia latifolia*), Beach pea (*Lathyrus japonicus*), Sheep sorrel (*Rumex acetosella*), Big-headed sedge (*Carex macrocephala*), Puget Sound Gumweed (*Grindelia integrifolia*), Beach knotweed (*Polygonum paronychia*), a low moss (*Racomitrium canescens*) and [occasionally] Contorted-pod Evening-primrose (*Camissonia contorta*). A number of exotic species may be present in small amounts including forbs such as Common stork's-bill (*Erodium cicutarium*), Smooth cat's-ear (*Hypochaeris glabra*), Hairy cat's-ear (*H. radicata*), Hairy

hawk-bit (*Leontodon taraxacoides*), Tall pepper-grass (*Lepidium virginicum*), Red sand-spurry (*Spergularia rubra*); and grasses such as Silver hairgrass (*Aira caryophyllea*), Early hairgrass (*A. praecox*), Rip-gut brome (*Bromus rigidus*), Cheatgrass (*B. tectorum*), and Barren fescue (*Vulpia bromoides*).

Figure 5. Sand flats dominated by Big-headed sedge

Upland Forests

The slopes and upland plateau of James Island are, or were, covered by upland forests. All of the forests have been logged and there are large areas of heavily thinned woodlands near the north spit and on the southern third of the island. Forests elsewhere on the uplands tend to consist either of very dense mixed stands of timber with little in the understorey, or of partially thinned stands with a herb layer dominated by invasive grasses. There are small areas of hand-logged older second growth along slope breaks which are on sites too unstable to allow more recent logging.

Figure 6. Hand-logged second growth upland forest.

Vegetation plots 18 and 22-24 represent the diversity of moderate quality upland forest vegetation found on James Island (Appendix 1). The forest canopies tend to contain a closed to dense mixture of Douglas-fir (*Pseudotsuga menziesii*), Grand fir (*Abies grandis*), Western red cedar (*Thuja plicata*), Arbutus (*Arbutus menziesii*) and Big-leaf maple (*Acer macrophyllum*). Patches of Ocean spray (*Holodiscus discolor*) are often present, except under the most dense canopies. The usually-sparse low shrub layer is

dominated by Salal (*Gaultheria shallon*) with occasional patches of Dull Oregon-grape (*Mahonia nervosa*), Baldhip rose (*Rosa gymnocarpa*) and Scotch broom (*Cytisus scoparius*). The ground layer is usually very sparse, and Sword fern (*Polystichum munitum*), Bracken (*Pteridium aquilinum*), Western fescue (*Festuca occidentalis*) and Oregon beaked moss (*Kindbergia oregana*) are often present.

Polygon Descriptions

Ecosystem polygons on James Island are mapped in figure 7. Polygon 1 occurs along the perimeter of the northern spit. It is an area of sand flats, ringed by a berm of low sand dunes at the storm tide line. A paved track extends through the northeastern portion of the polygon. Vehicle tracks and ruts occur along the paved track and extend westward into the polygon, terminating in a churned up area where vehicles appear to have been stuck at one time. There is no other significant physical damage in the polygon.

Table 2. Composition of Vegetation Polygons

Polygon Number	Brackish Marsh		Salt Flats		Sand Flats and Dunes		Upland Forest	
	extent	cond.	extent	cond.	extent	cond.	extent	cond.
1					major	high		
2			minor	moderate	major	moderate		
3					major	moderate		
4					major	moderate		
5					major	high		
6	major	high						
7	major	moderate						
8			major	excellent				
9							major	moderate
10							major	poor
11							major	poor
12	Heavily disturbed uplands							
13	Heavily disturbed uplands							
14	Heavily disturbed sand plains and dunes							

Polygon 2 forms the southwest spit. It is an area of sand flats with small patches of storm-tide dunes. There are docks and a staff residence in the middle of the spit, connected by a road to the main body of James Island. The sand flats beyond the residence are heavily churned by vehicle ruts. A number of non-native plants occur in the sand flats and dunes of polygons 1 and 2. Most of these species are common in similar sand ecosystems in the region. Crow garlic (*Allium vineale*) is abundant along the north side of the paved track near the base of the spit in polygon 1. This appears to be the first sand flat location in BC where it has been reported as an invasive species (it is already well-established in less sandy sites such as Uplands Park and Harling Point). Sand flats and dunes are uncommon in the area and good examples of their natural vegetation are scarce. Sites at Sidney Spit, Cordova (Saanichton) Spit, Island View Beach and Witty's Lagoon are well-described. In terms of plant community diversity and

condition, the ecosystem complex in polygon 1 is far superior to that at Sidney Spit, Island View Beach or Witty's Lagoon and slightly superior to the site at Cordova Spit, which has been more heavily damaged. Polygon 2 is inferior to polygon 1, in part because of the high degree of physical site disturbance. Nevertheless its ecosystem complex is superior to those at Sidney Spit and Witty's Lagoon.

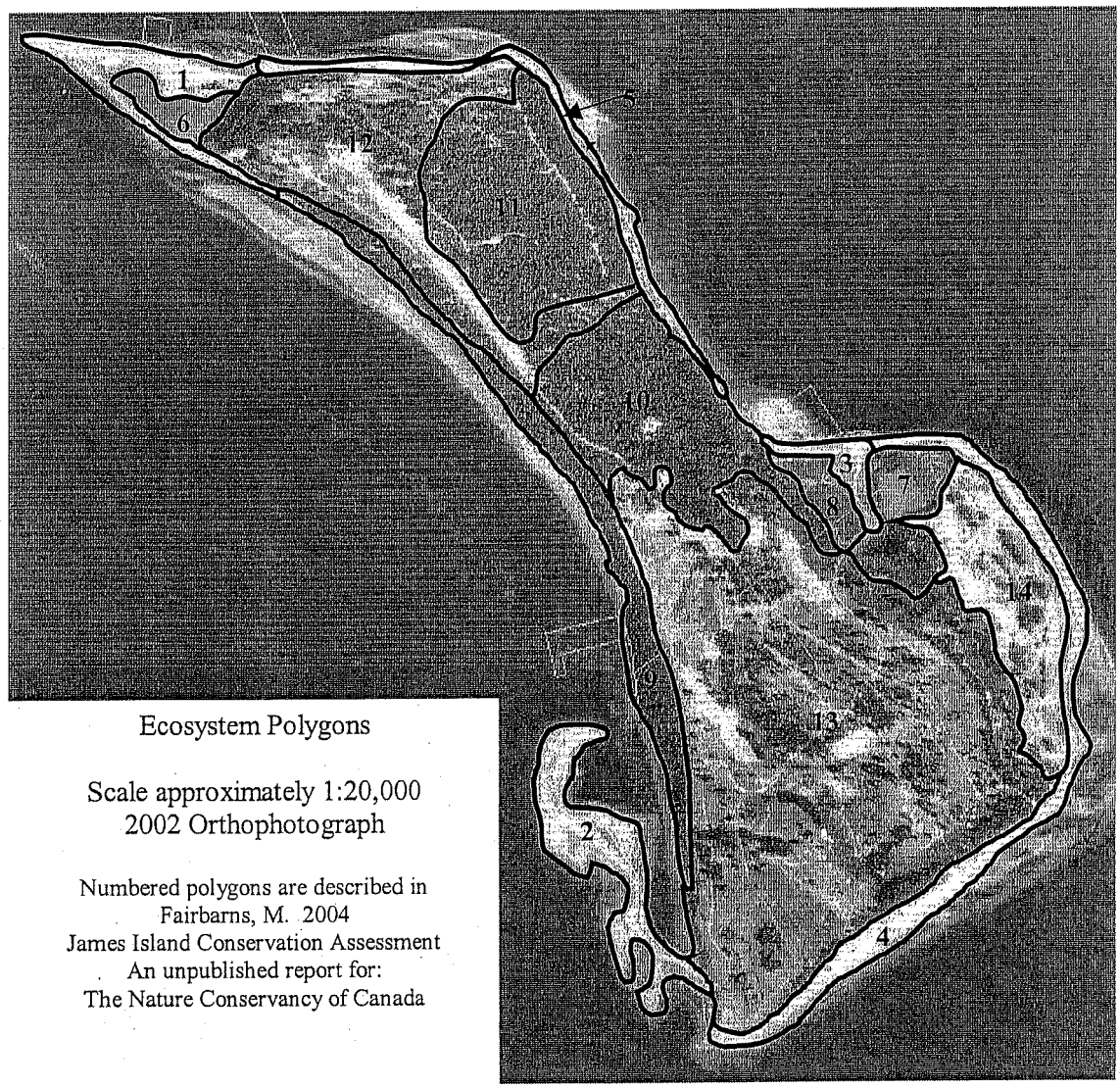

Figure 7. Ecosystem polygons on James Island

Polygon 3 consists of sandy habitats near the Powder Jetty. Much of this area has been physically altered by development of the jetty and its associated structures but the west end of the sand flats are relatively intact. Polygon 4 consists of sand flats and dunes on the southeast side of James Island. Polygon 5 consists of sandy beach deposits along the northeast corner of James Island. A significant portion of polygon 3, and most of polygons 4 and 5, are below the storm tide line. Signs of human disturbance are washed away during high tides. Portions of polygon 3 which lie above the storm tide line, where they haven't been built upon, have a vegetation complex similar in quality and condition

to that found at Island View Beach. Areas below the storm tide line, in polygons 3-5, are typical of beach ecosystems in the region. Elsewhere in the region, sand flats and dunes have been heavily impacted by stabilization, development and recreational activity.

Polygon 6 is a former lagoon, now cut-off from the ocean, which is presently occupied by a mosaic of brackish marsh communities. It contains a diverse mosaic of plant communities, in good to excellent condition. Polygon 7 is a marshy area that was formerly considered as a marina site. The polygon was heavily impacted by development activities and continues to be disturbed by human activities, including mowing, along its margin. Brackish marshes, such as those in polygon 6, have suffered heavy human impacts throughout the region. Many have been filled in and developed, while others have suffered more heavily from invasion by non-native species. The marshy area in polygon 7 is in poorer condition and has lower conservation values.

Polygon 8 is a salt flat near the Powder Jetty. It contains a diverse mosaic of plant communities that are in excellent condition, have little human disturbance, and are largely free of non-native species. It compares favourably to the best local examples of salt flats, such as those in present in Saanichton Bay and at Sidney Spit. Elsewhere in the region, such ecosystems have been heavily impacted by dredging and infilling.

Polygon 9 consists of moderate condition upland forest. A significant portion of the polygon has steep west-facing slopes that have been moderately eroded. Deer trails have exacerbated natural erosion on steeper areas and invasive weeds have become common. The rest of the polygon consists of relatively level uplands which have been logged several decades ago and now bear second growth forest. These forests have been heavily impacted by severe deer grazing, which continues to damage shoots of the more palatable species (figure 8) and thereby alter vegetation composition. They may, in time, develop forest stand characteristics typical of mature Coastal Douglas-fir forest, which is becoming rare in British Columbia. The typical understorey of such forests will not develop unless grazing is substantially reduced. Under the present grazing regime this polygon will have moderately-low conservation value.

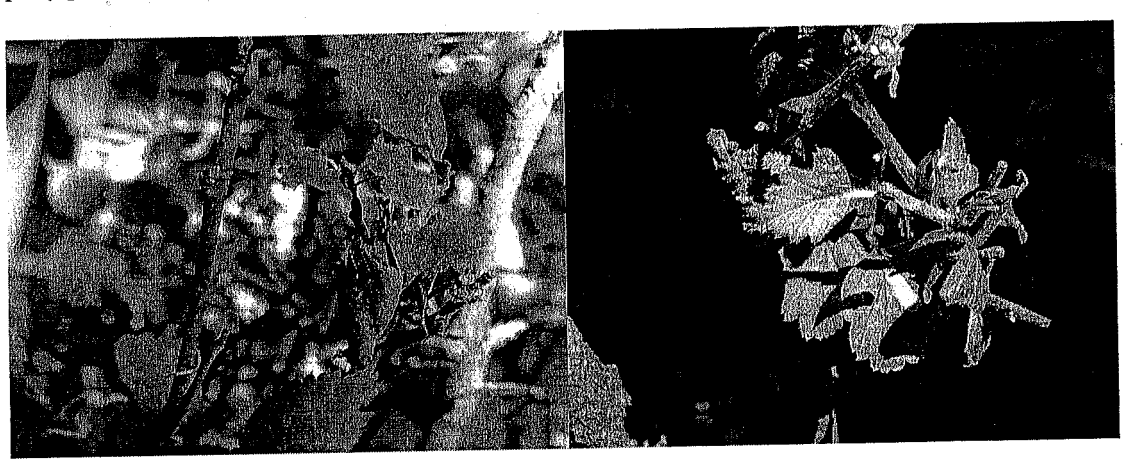

Figure 8. Heavily browsed current-year twigs and leaves

Saskatoon on left, Oceanspray on right.

Polygons 10 and 11 are dominated by dense, regenerating second growth resulting from more recent logging. These stands have low diversity. Natural processes of stand development will lead to a slightly more open stand over time, however they will not develop a natural understorey unless protected from the levels of deer grazing encountered elsewhere on the island.

Polygons 12 and 13 consist of a mixture of cleared areas and heavily thinned stands. The thinned stands have been managed to create a pleasant, park-like appearance. Their vegetation is now dominated by non-native species including invasive shrubs (e.g. Scotch broom and Gorse) and robust Eurasian grasses (e.g. Orchardgrass, Bentgrasses and Bromes). They have very little conservation value in their current condition and this is not likely to improve without allowing the forest canopy to close. Even so, their condition may not improve substantially without high management inputs.

Polygon 14 is dominated by a complex of sand flat and dune communities with small natural and artificial wetland areas and a few groves of trees. This area has experienced heavy impacts associated with roughing-in golf fairways. The polygon retains moderately low conservation values but these will be lost of the golf course is further developed.

Conservation Assessment of Plant Communities

A number of sand dune and sand plain vegetation types are now being reviewed to determine whether they should be listed as threatened or imperiled in British Columbia.

Most of the vegetation found on sand flats and dunes on James Island may end up being so designated. Currently, only the sand flats dominated by Large-headed sedge are tracked by the B.C. Conservation Data Centre, which has red-listed this plant community (table 3). Occurrences of the Large-headed sedge herbaceous vegetation are scattered on the north spit, the southwest spit and the Powder Jetty areas. Occurrences from the north spit and Powder Jetty have been lightly impacted by vehicle traffic but are generally in moderate to good condition. The southwest spit occurrence is in poor condition as a result of moderate to heavy vehicle traffic. All three occurrences are relatively free of alien species. High quality occurrences of Large-headed sedge herbaceous vegetation are also present on Sidney Island, Island View Beach and Cordova Spit. Most other occurrences in the Victoria region, such as those at Cadboro Bay, Willows Beach, Gonzales Beach, Esquimalt Lagoon and Witty's Lagoon have been virtually eliminated or are in much poorer condition.

Table 3. Plant Community Assessment

English Name	BC Status	James Island occurrence
Large-headed sedge herbaceous vegetation	S1S2	High quality
Glasswort – Sea-milkwort herbaceous vegetation	S1S2	Very high quality
Seashore saltgrass herbaceous vegetation	S2	Very high quality

The B.C. Conservation Data Centre has red-listed Glasswort – Sea-milkwort herbaceous vegetation. The only large occurrence of this community type is found near the Powder Jetty. This occurrence is in excellent condition, with little no human physical disturbance and virtually no alien species. High quality occurrences of Glasswort – Sea-milkwort herbaceous vegetation are also present on Sidney Island and Cordova Spit. Many other occurrences in the Victoria region, such as the one along the south side of Tsehum Harbour, have been virtually eliminated or are in much poorer condition.

The Seashore saltgrass herbaceous vegetation has also been red-listed by the B.C. Conservation Data Centre. The only large occurrence of this community type on James Island is found near the Powder Jetty. This occurrence is in excellent condition, with little or no anthropogenic physical disturbance and virtually no alien species. High quality occurrences of Seashore saltgrass herbaceous vegetation are also present on Sidney Island and Cordova Spit. Many other occurrences in the Victoria region have been virtually eliminated or are in much poorer condition.

The complex of brackish marsh plant communities is unusual in southeast Vancouver Island. They have strong affinities to a number of recently-described 'transitional' wetland ecosystems (MacKenzie and Moran 2004) None of these communities are currently tracked by the B.C. Conservation Data Centre (Cadrin 2004) but some of them may eventually turn out to be threatened.

Most of the upland forest vegetation of James Island belongs to one or more rare plant associations, particularly the Douglas-fir – Arbutus forest type (CDF mm/00) and the Douglas-fir – Dull Oregon-grape forest type (CDFmm/01). Precise successional paths are difficult to predict because of a number of confounding factors. All of these stands are in early stages of secondary succession and presently have little conservation value. If normal successional processes and conditions prevail, these stands will succeed to old growth forests of imperiled plant communities. This successional pattern will take more than a century, and is unlikely to occur in the face of current levels of grazing. As well, further timber-harvesting will prevent the development of natural old-growth characteristics.

Conservation Assessment of Rare Species

The field survey, conducted in mid July, was too late in the season to detect many rare plants known from to occur on southeast Vancouver Island. Nevertheless, five rare plants were observed (table 4). Details of each rare plant occurrence are provided in appendix 2.

Table 4. Plants at Risk Observed During the Survey

English Name	BC Status	James Island population
Contorted-pod evening primrose	S1	Very high quality
Graceful arrow-grass	S2	Moderate quality
Fleshy jaumea	S2S3	Very high quality
Yellow sand-verbena	S3	Very high quality
Beach knotweed	S3	High quality

Potential Rare Plant Species

The upland forests of James Island are unlikely to support many rare species. The absence of rock outcrops, vernal pools and Garry oak forests, and the poor condition of upland meadows, suggests that few additional rare species will be found on the island. The most likely rare species to be found include[1]:

- Howell's triteleia (*Triteleia howellii*)[2],
- Muhlenberg's Centaury (*Centaurium muhlenbergii*)[3],
- Small-flowered bitter-cress (*Cardamine parviflora var. arenicola*),
- Redstem springbeauty (*Claytonia rubra ssp. depressa*),
- Pigmyweed (*Crassula aquatica*),
- Awned cyperus (*Cyperus squarrosus*),
- Small spike-rush (*Eleocharis parvula*),
- Creeping wildrye (*Leymus triticoides*),
- Spanish-clover (*Lotus unifoliolatus*) and
- Needle-leaved navarretia (*Navarretia intertexta*).

These species vary in their flowering season. One or more of them may be present on James Island, but most of them would not have been visible during our survey period.

[1] National status of these species has not been assessed unless specifically noted
[2] Endangered in Canada
[3] National status being assessed, probably endangered in Canada

Contorted-pod Evening-primrose

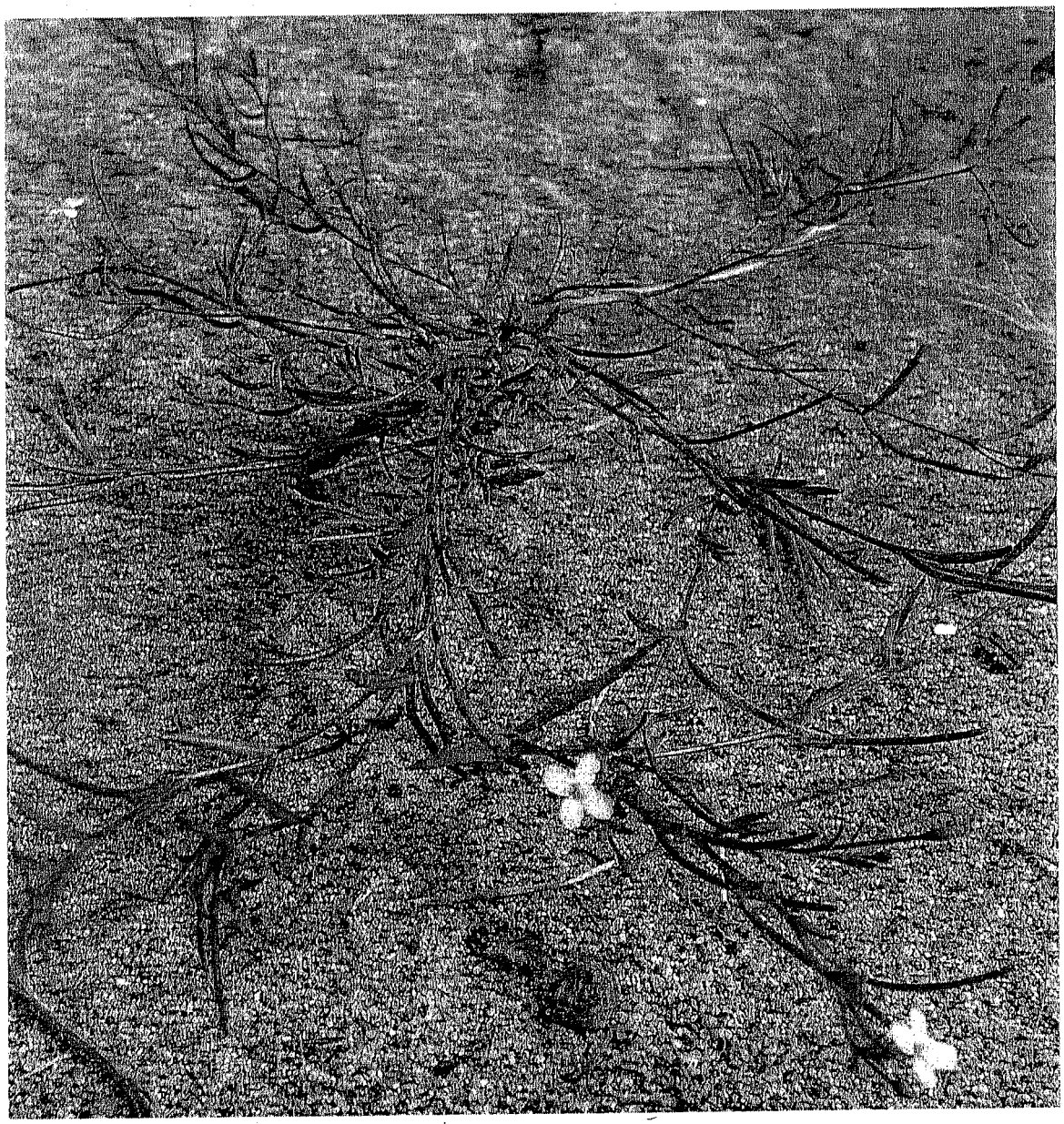

Figure 9. Contorted-pod evening-primrose growing on the north spit.

The most significant find was Contorted-pod evening-primrose (*Camissonia contorta*). This tiny, low-growing annual has small yellow flowers and often bears bright red foliage (figure 9).

Despite detailed surveys, this species is only known from five locations in Canada – all of them active and semi-stabilized sand dunes in the Gulf Islands and near Victoria. Apart from a population on San Juan Island, it is not known from north of the Columbia River area. This species is ranked S1 (critically imperiled) in British Columbia. Aruncus

Consulting is currently preparing a formal status report on this species, which will serve as a basis for national ranking. Based on their record, it is expected that the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) will rank this species as either Threatened or Endangered in Canada[4].

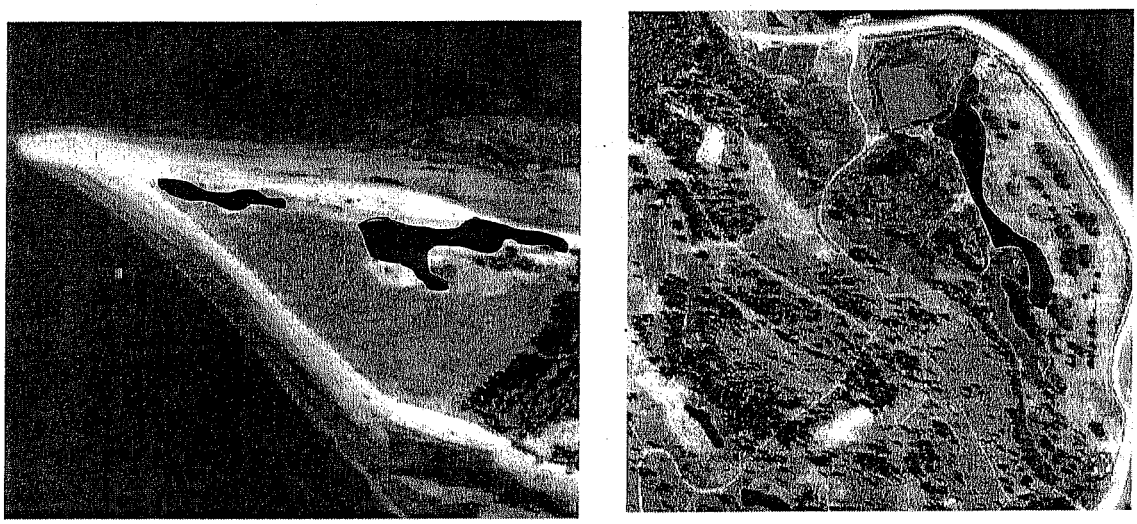

Figure 10. Location of Contorted-pod evening-primrose.

(North Spit on left, Powder Jetty and roughed-in fairways on right)

The James Island population of Contorted-pod evening-primrose is the largest, by far, in Canada. The population is most concentrated on the north spit but subpopulations are found sporadically along the eastern side of the island, including many spots in the roughed-in fairways of the unfinished golf course (figure 10). Many plants on the north spit are larger and bear more flowers and fruits than has been observed elsewhere in Canada. The population faces a number of threats. Plants on the roughed-in golf fairways are obviously threatened by the prospect of development, as the species would be unable to persist in the high-competition environment of carefully-managed turf. Plants along the sand flats, primarily at the north spit, are threatened by a number of factors. These include vehicle traffic (a severe threat to portions of the population within 10 m of the existing track) and invasive weeds. The absence of this species on the southwest spit may reflect the high level of vehicle disturbance there. The spit contains lots of suitable habitat and is the point on James Island closest to Island View Beach, where Contorted-pod evening-primrose is well-established.

A number of invasive species are present on the site. Contorted-pod evening-primrose is adapted to be a stress-tolerator, capable of handling the dry, infertile sand plain environment. It appears to face little threat from other native plants but is easily out-competed by a broad array of non-native plants including two exotic shrubs: Scots broom (*Cytisus scoparius*) and gorse (*Ulex europaeus*). These shrubs have already gained a major foothold in the area and have rendered other sites in the region incapable of supporting Contorted-pod evening-primrose. A number of invasive grasses also pose a

[4] For more information on COSEWIC see their website at: http://www.cosewic.gc.ca/eng/sct5/index_e.cfm

threat, chiefly Silver hairgrass (*Aira caryophyllea*), Early hairgrass (*Aira praecox*), Rip-gut brome (*Bromus rigidus*), Cheat grass (*Bromus tectorum*) Barren fescue (*Vulpia bromoides*) and Soft brome (*Bromus hordeaceus*). A number of exotic, invasive forbs also threaten Contorted-pod evening-primrose, including Field garlic (*Allium vineale*), Sheep sorrel (*Rumex acetosella*), Hairy hawkbit (*Leontodon taraxacoides*), Smooth cat's-ear (*Hypochaeris glabra*), Tall pepper-grass (*Lepidium virginicum*), Common stork's-bill (*Erodium cicutarium*) and Hairy cat's-ear (*Hypochaeris radicata*). The presence of field garlic is particularly worrisome. This species has not been observed in Contorted-pod evening-primrose populations elsewhere in BC, but it has been found in a number of Garry oak meadows where it can be highly invasive. Large areas of Uplands Park in Oak Bay are heavily infested with this species. On James Island, it currently appears to be restricted to a small area at the base of the northern spit. Left untouched, it may proved capable of profoundly altering the sandy habitats. In contrast, exotic European beachgrass (*Ammophila arenaria*) has infested small dunes along the beaches but appears incapable of expanding to the sandy flats favoured by Contorted-pod evening-primrose.

Changes in ecosystem processes also present a potential threat to Contorted-pod evening-primrose. It tends to occupy a narrow ecological niche, avoiding both the small sand dunes above the beaches and the stable sand flats that are carpeted by Rock moss (*Racomitrium canescens*) or thick swards of meadow vegetation. Any physical factors that substantially alter site stability, either by stabilizing or destabilizing soils, present a serious threat to the population.

Graceful Arrow-grass

Graceful arrow-grass (*Triglochin concinna*, figure 11), a small, grass-like plant, was found growing along the margins of the salt marsh at Powder Jetty (figure 13). It occurred along with its larger and more common relative, Seaside Arrow-grass (*T. maritima*), and a number of other low plants tolerant of tidal inundation.

Graceful arrow-grass is known from approximately 25 sites in Canada, all in coastal British Columbia, from Prince Rupert southward. There are nearby populations on Sidney Island and on the edges of Sidney itself. This species is ranked S2 (imperiled) in British Columbia. Its national status has not yet been evaluated, but since it is absent from the rest of Canada current information suggests it is a strong candidate for national "at risk" status as either 'Threatened' or of ''Special Concern'.

Figure 11. Graceful Arrow-grass growing in a tidal flat.

The James Island population of Graceful arrow-grass is small, but in good condition and faces no obvious threats.

Fleshy Jaumea

Fleshy jaumea (*Jaumea carnosa,* figure 12), a small, succulent member of the aster family, was found growing in low salt marsh vegetation at Powder Jetty and at the lagoon enclosed by the southwestern spit (figure 13). It occurred with a number of other salt-tolerant species including American glasswort (*Salicornia virginiana*), Seashore saltgrass (*Distichlis spicata* var. *spicata*), (*Triglichin maritima*), Pacific alkaligrass (*Puccinellia nutkaensis*), Baltic rush (*Juncus balticus*), Salt marsh dodder (*Cuscuta salina*), Salt marsh sand-spurry (*Spergularia salina*) and Canadian sand-spurry (*Spergularia canadensis*).

Fleshy Jaumea is known from about 15 sites in Canada, all in coastal British Columbia, from Bamfield to Saturna Island. There are nearby populations on Cordova Spit, Sidney Island and Sidney itself. It is ranked S2S3 (imperiled or vulnerable) in British Columbia. Its national status has not yet been evaluated, but since it is absent from the rest of Canada it is a strong candidate for national "at risk" status as a species of "Special Concern".

Figure 12. Fleshy jaumea in flower near Powder Jetty.

The southwest lagoon population is small, but the Powder Jetty is large, in good condition, and faces no obvious threats.

Figure 13. Location of Fleshy jaumea and Graceful arrow-grass.

Salt meadow near Powder Jetty on left with Fleshy Jaumea in yellow and Graceful arrow-grass shown as a green star. Salt meadow at Southwest Spit on right with Fleshy jaumea in pink.

Yellow Sand-verbena

Figure 14. Yellow sand-verbena growing amid driftwood and sand.

Yellow sand-verbena (*Abronia latifolia*, figure 14) is a showy, spreading perennial which is not closely related to true verbenas. It is in the Four-O'clock family, which consists largely of tropical species, rather than the Verbena family. It occurs in a number of open, sandy places on James Island including the southwest spit, the north spit, the eastern beaches and roughed-in fairways of the golf course (figure 15). It generally occurs with other stress-tolerant species capable of surviving in loose, arid sand – including Large-headed sedge (*Carex macrocephala*), Sheep sorrel (*Rumex acetosella*) and European beachgrass (*Ammophila arenaria*).

Yellow sand-verbena is known from about 20 sites in Canada, all on the coast of Vancouver Island. There are nearby populations on Cordova Spit, Sidney Island and Island View Beach. It is ranked S3 (vulnerable) in British Columbia. Its national status has not yet been evaluated but since it is absent from the rest of Canada, it is a possible candidate for national "at risk" status as a species of "Special Concern".

It faces similar threats to those described for Contorted-pod evening-primrose: golf course development, vehicle traffic, changes in patterns of sand erosion and deposition,

and invasive sand-tolerant weeds. Yellow sand-verbena occurs on dunes as well as on sand flats, consequently it is threatened by invading European beachgrass.

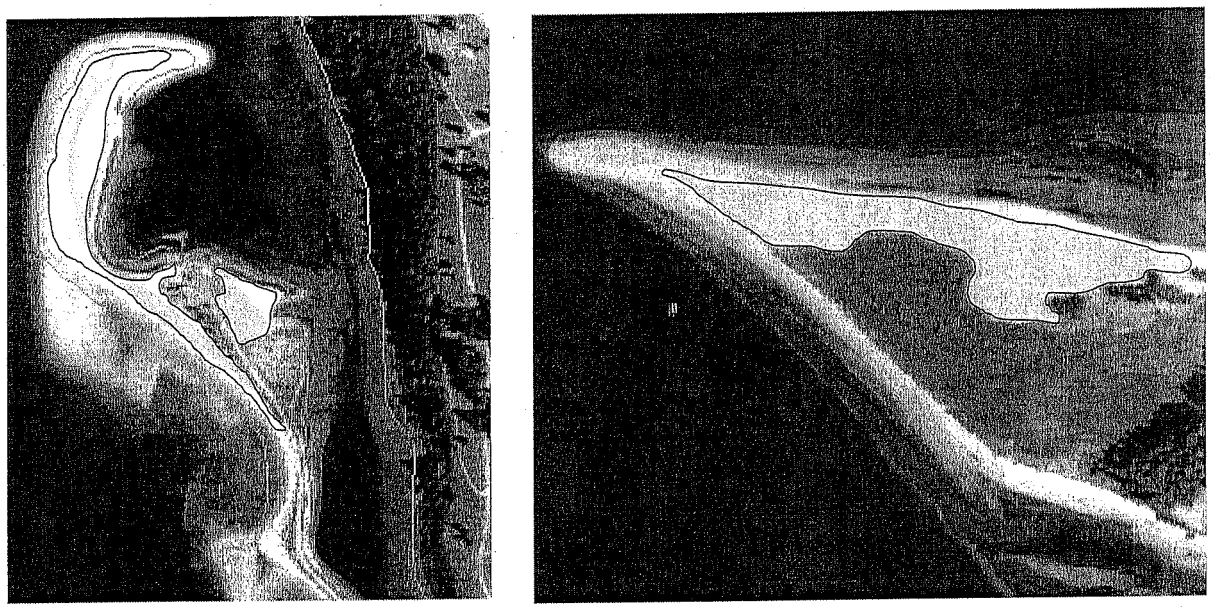

Figure 15. Location of Yellow sand-verbena.

Southwest Spit on left, North Spit on right.

Beach Knotweed

Beach knotweed (*Polygonum paronychia*, figure 16) is a dense, low perennial semi-shrub belonging to the buckwheat family. It occurs in a number of open, sandy places on James Island including the southwest spit, the north spit, the eastern beaches and roughed-in fairways of the golf course (figure 17). It generally occurs with other stress-tolerant species capable of surviving in loose, arid sand – including Yellow sand-verbena (*Abronia latifolia*), Large-headed sedge (*Carex macrocephala*), Sheep sorrel (*Rumex acetosella*) and European beachgrass (*Ammophila arenaria*).

Beach knotweed is known from about 15-20 sites in Canada, all on the coast of Vancouver Island or smaller offshore islands. There are nearby populations on Cordova Spit and Island View Beach. It is ranked S3 (vulnerable) in British Columbia. Its national status has not yet been evaluated but since it is absent from the rest of Canada, it is a possible candidate for national "at risk" status as a species of "Special Concern".

It faces similar threats to those described for Contorted-pod evening-primrose: golf course development, vehicle traffic, changes in patterns of sand erosion and deposition, and invasive sand-tolerant weeds.

Figure 16. Beach knotweed growing on the southwest spit.

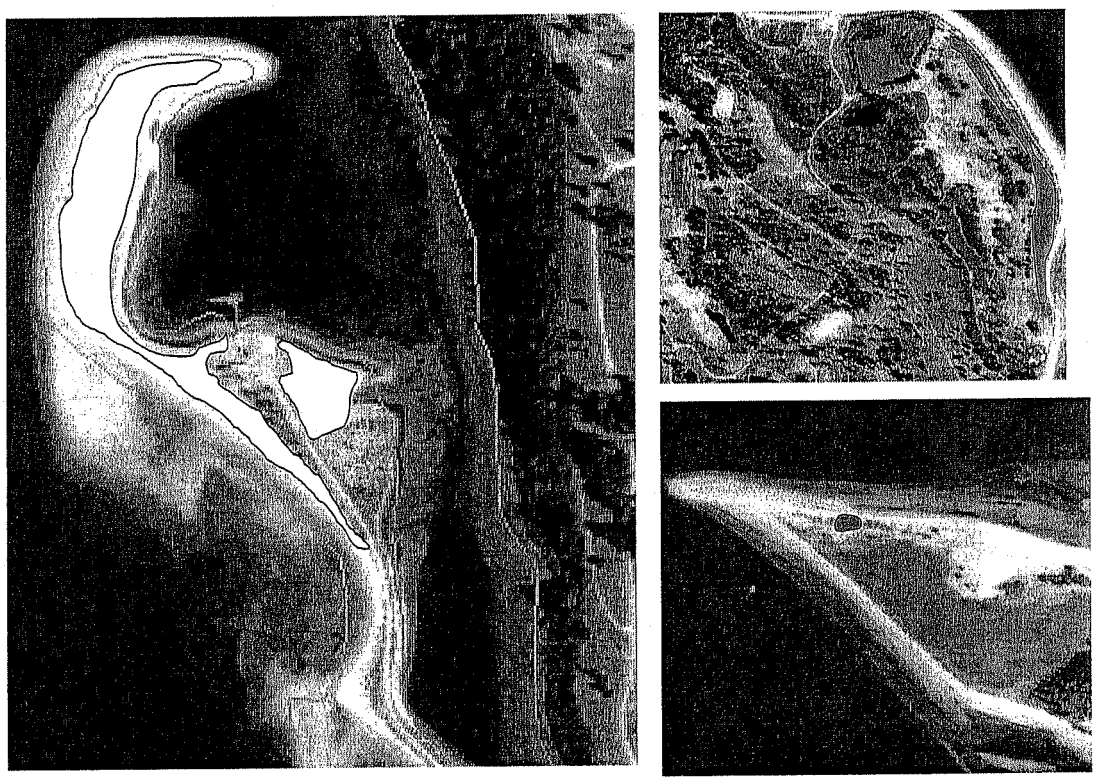

Figure 17. Location of Beach knotweed.

Southwest Spit on left; Powder Jetty / roughed-in fairways top right; North Spit bottom right

Recommendations

There are a number of important species and plant communities on James Island. The actions listed below will serve to protect rare natural habitats and imperiled species. In each case, actions are listed in decreasing order of importance. The lists do not attempt to balance financial costs or the loss of recreational values. Additionally, some form of permanent conservation status should be placed over all moderate and high quality natural areas and species at risk populations, ensuring their protection in perpetuity.

Species at Risk

1. Protect Contorted-pod evening-primrose, Yellow sand-verbena and Beach knotweed by:
    - Eliminating off-road vehicle use from sand flats and dunes
    - Allowing natural sand-flat vegetation to recover on the roughed-in fairways
    - Eliminate the population of Crow garlic on the North Spit.
    - roughed in fairways
2. Protect Fleshy jaumea and Graceful arrow-grass by maintaining the natural hydrology of salt flats near the Powder Jetty.
3. Conduct further rare plant surveys in April, May and June (1 day each) to determine if other species (plants) at risk are present on James Island.

Natural Habitats

1. Eliminate recreational vehicle use in sandy areas, especially at the North Spit and the Southwest Spit.
2. Remove European beachgrass from dune communities.
3. Allow natural sand-flat vegetation to recover on the roughed-in fairways.
4. Eliminate the small population of Crow garlic on the North Beach before it spreads across James Island.
5. Focus development away from salt marshes and maintain their natural hydrological function.
6. Focus invasive shrub control on priority areas, using more effective techniques (e.g. use weed wrenches and/or cut-stem treatments which provide more lasting control than mowing).
7. Establish 1-3 fenced exclosures in the upland forests to determine the natural condition of ungrazed forests.
8. Reduce or eliminate the fallow deer population (including monitoring to control immigration from Sidney Island). This will allow native shrubs and herbs to recover under forest canopies.
9. If fallow deer populations are reduced/eliminated let natural forest succession proceed. Un-thinned forest canopies will reduce the abundance of alien, invasive shrubs and herbs over much of the uplands. The maturing forest communities will gradually recover key ecological attributes of rare upland ecosystems.
10. Stop mowing willows by powder jetty

11. Re-assess conservation priorities for rare plant communities once the British Columbia Conservation Data Centre completes its ranking project for rare beach/dune communities.

References

Demarchi, D.A. 1996. An introduction to the ecoregions of British Columbia. Wildlife Branch, BC Ministry of Environment, Lands and Parks. Available http://srmwww.gov.bc.ca/ecology/ecoregions/index.html. (Accessed: July 11, 2004)

Douglas, G.W., D. Meidinger and J.L. Penny. 2002. Rare native vascular plants of British Columbia. 2nd edition. Province of British Columbia. 358 pp.

Fuchs, M.A. 2001. Towards a recovery strategy for Garry oaks and associated ecosystems in Canada: Ecological assessment and literature review. Technical Report GBEI/EC-00-030. Environment Canada, Canadian Wildlife Service, Pacific and Yukon Region. 107 pp.

Kerr, D.P. 1951. The summer-dry climate of the Georgia Basin, British Columbia. Transactions of the Royal Canadian Institute 29:23-31.

MacKenzie, W.H. and J.R. Moran. 2004. Wetlands of British Columbia: a guide to identification. Research Branch, B.C. Ministry of Forests, Victoria, B.C. Land Management. Handbook No. 52. 287 pp.

Muller, J.A. 1983. Geology of Victoria. Geological Survey of Canada, Map 1553A.

Roemer , H.L. 1972. Forest vegetation and environments on the Saanich Peninsula, Vancouver Island. Ph.D. thesis. University of Victoria, Victoria, B.C.

Yearsley, K. pers. comm. 2004. *E-mail correspondence to M. Fairbarns.* August 2004. Vegetation Ecologist. British Columbia Conservation Data Centre. Victoria, British Columbia.

Yorath, C.J. and H.W. Nasmith. 1995. The geology of Southern Vancouver Island. Orca Book Publishers. Victoria, B.C. 172 pp.

Appendix 1. Vegetation Data

See pocket at end of report

Appendix 2. Species at Risk Observation Forms

The following forms document

1. *Abronia latifolia* = Yellow sand-verbena on the North Spit
2. *Abronia latifolia* = Yellow sand-verbena on the East Beach and roughed-in fairways
3. *Abronia latifolia* = Yellow sand-verbena on the West Spit
4. *Camissonia contorta* = Contorted-pod evening-primrose on the North Spit
5. *Camissonia contorta* = Contorted-pod evening-primrose on the East Beach and roughed-in fairways
6. *Jaumea carnosa* = Fleshy jaumea on the West Spit
7. *Jaumea carnosa* = Fleshy jaumea near the Powder Jetty
8. *Polygonum paronychia* = Beach knotweed on the North Spit
9. *Polygonum paronychia* = Beach knotweed on the East Beach and roughed-in fairways
10. *Polygonum paronychia* = Beach knotweed on the West Spit
11. *Triglochin concinna* = Graceful arrow-grass near the Powder Jetty