CONTRIBUTIONS TO THE FLORA OF NOVA SCOTIA
VI. NOTES ON THE VEGETATION OF THE BIRD ISLANDS

E. CHALMERS SMITH and WILFRED B. SCHOFIELD
Perry Biological Laboratories, Acadia University, Wolfville, Nova Scotia

IN JULY 1954, the authors visited the Bird Islands, Victoria County, in the hope that they might find in these exposed carboniferous areas isolated species additional to those already known in the province, and also to study the influence of birds on the vegetation.

The islands are two in number, located off the east coast of Cape Breton Island. Hertford, the inner island, lies approximately one and a half miles east of Cape Dauphin. Ciboux, the outer island, lies half a mile east of Hertford and is connected to it by a line of jutting outcrops and sea stacks and a submerged reef. Hertford Island is about seven-eighths of a mile in length and one-sixteenth of a mile in width at the widest point. Ciboux Island is somewhat larger, being one and one-sixteenth miles in length and slightly less than one-eighth of a mile wide at its broadest point. Ciboux has a total area of thirty-five acres whereas that of Hertford is twenty-seven acres. In general appearance the islands seem rather flat-topped, sloping gently to the south. The surface is not dissected by any marked depressions. No swamps, springs, or water courses are present.

Both islands are composed of tilted carboniferous (Mississippian) sedimentary rocks, mainly coarse conglomerates and sandstones, that dip at an angle of approximately twenty degrees to the south and strike in an east-west direction. On all sides the islands possess relatively high cliffs, some reaching a height of one hundred feet. In some places these have been deeply undercut by the sea; in others continual weathering along joints has resulted in the dropping of large blocks from the main mass and the formation of large gullies, particularly on Ciboux Island. In some areas large masses of rock have fallen into the sea leaving broad shelves part way up the main cliff.

The islands have been known for a considerable time as a nesting site for sea birds. Samuel Holland (Harvey, 1935) in 1766 wrote: "The Ciboux and Hertford Islands are nothing but barren Rocks, where Seafowls of all Kinds have their Resorts." According to local tradition in the area, the bird life of the islands has been a source of fresh meat and eggs to fishermen since the coastal waters have been fished. At the time of the present survey, Herring Gulls and Chipping Sparrows nested among the grasses, particularly on Hertford Island. The adult birds abandoned the young and eggs at the approach of the boat, and remained hovering above the island for the duration of the visit. The young Herring Gulls either sat among the grass or congregated in large numbers along the brows of the cliffs. Rarely one ventured too far out on the cliff edge and was forced to fly to the rocks below. Those still in woolly gray plumage hid among the grasses. There were probably over three hundred young gulls on Hertford Island. Unhatched eggs were rare and were always solitary. No nests of Chipping Sparrows were seen, but the

agitation of the birds suggested that they must have had nests among the grasses.

On the cliff ledges Double Crested Cormorants had made large tangled nests mainly of *Empetrum nigrum* and *Juniperus horizontalis*, plants which were probably transported from Ciboux Island since neither were found on Hertford Island but were abundant on the former. These birds remained in or near their nests even at a very close approach. The young were found in different nests about the island in practically all stages of immaturity. Some nests contained unhatched eggs.

Puffins nested frequently in small crannies in the cliffs. These left their nests as the boat passed below them, and alighted on the water beyond it. Because of their inaccessibility no nests were examined. Black Guillemots, although frequenting the waters nearby, were not noted to have nests on the islands.

Ciboux Island had, in general, fewer birds, although since the departure of the light keeper from that island two years previous to this study, the birds had begun to return and to nest in increasing numbers.

The vegetation of both islands has been altered to a considerable extent by man. Information gathered locally indicated that both islands were originally wooded. However, in direct contradiction is the statement of Holland that in 1766 the islands were barren rocks. Since the establishment of the light on Ciboux Island, now operated by remote control, one family lived there continuously up to 1952. At least one of these light keepers, Angus Campbell, cultivated an area of approximately one acre in the vicinity of the lighthouse some 40 to 50 years ago. Fishing shelters have been occupied intermittently on Ciboux Island during the fishing season. There is no record of any habitation on Hertford Island, but large flocks of sheep have been put to summer pasture there for many years.

On Ciboux Island there are three distinct habitats: sea cliffs, rock-walled gullies, and the "field" that covers the greater portion of the island. To these might be added the bared areas near the building which were seen to be colonized mainly by weeds. On Hertford Island an area of dead and dying trees altered one part of the richer "field." The sea cliffs are similar to those of Ciboux Island; the rock-walled gullies are absent.

The "field" habitat was common to both islands but each possessed a very different association of species. On Ciboux Island the field presented a rather patchy appearance. The common grass was *Festuca rubra* (Fescue). There was also a sparse scattering of *Deschampsia flexuosa* (Common Hairgrass), *Poa pratensis* (Kentucky Bluegrass), and *Agrostis alba* (Redtop). Near the cliff tops and on the higher and more exposed parts of the field, *Juniperus communis* var. *saxatilis* (Ground Juniper), *Potentilla tridentata* (Three-toothed Cinquefoil), and *Empetrum nigrum* (Black Crowberry) often formed a continuous intermeshing tangle which allowed only occasional colonization by plants of *Euphrasia randii* (Eyebright) and *Achillea lanulosa* (Yarrow). In barer spots among these mats were rare colonies of *Vaccinium angustifolium* var. *laevifolium* (Blueberry), *Danthonia spicata* (Poverty Grass), and *Vac-*

cinium vitis-idaea var. *minus* (Foxberry). Contributing to the patchy appearance mentioned above were *Fragaria virginiana* and *Fragaria vesca* var. *americana* (Strawberries), *Rumex acetosella* (Sheep Sorrel) and *Aster novi-belgii* (Aster), which formed large pure colonies in the "field". These species, with the *Juniperus*, *Empetrum*, and *Potentilla* colonies, gave among the interfringing grassy areas, the striking mottled appearance to the field.

The "field" on Hertford Island, on the other hand, showed a definite uniform aspect. Here the dominant grass was *Poa pratensis* in rank, nearly pure stands. These were broken by scattered colonies of *Rubus idaeus* var. *strigosus* (Raspberry) and a few large clumps of *Rumex orbiculatus* (Water Dock). An area of approximately three hundred by one hundred feet was occupied by dead *Abies balsamea* (Fir) and *Prunus virginiana* (Chokecherry) trees. Here *Rubus*, *Rumex*, and *Polygonum cilinode* (Climbing Buckwheat) were luxuriant. *Poa palustris* (Fowl Meadow Grass) was also frequent in this habitat.

Away from the salt spray on the upper slopes and shelves of the cliffs of both islands *Plantago juncoides* var. *decipiens* (Seaside Plantain), *Ligusticum scothicum* (Scotch Lovage), and *Solidago sempervirens* (Seaside Goldenrod) were most characteristic, with the latter extending furthest down the cliff face. Further up on the cliffs these species were joined by *Festuca rubra*, *Achillea lanulosa*, *Elymus mollis* (Sea Lyme Grass), *Carex silicea* (Beach Sedge), and introduced weeds such as *Senecio vulgaris* (Common Groundsel), *Cirsium vulgare* (Bull Thistle), *Plantago major* (Plaintain), and *Chenopodium album* (Pigweed). These introduced species were rare. On the brow and upper shelves of the cliffs of Ciboux Island *Juniperus horizontalis* (Creeping Savin) and *Empetrum nigrum* appeared with the preceding species. Ciboux Island, moreover, differed from Hertford in that the cliff species had invaded the "field" habitat.

The rock-walled gullies of the west end of Ciboux Island provided a habitat peculiar to that island. These gullies, protected from the more severe weather experienced by the main exposed portion of the island, sheltered a number of species normally characteristic of woodlands. Species not found elsewhere on the islands included *Dryopteris filix-mas* (Male Fern), *Dryopteris phegopteris* (Beech Fern), *Dryopteris spinulosa* (Spinulose Wood Fern), *Smilacina stellata* (False Solomon's Seal), *Maianthemum canadense* (Wild Lily-of-the-Valley), *Heracleum maximum* (Cow Parsnip), and *Ribes lacustre* (Bristly Black Currant).

The only forest-tree species present on Ciboux Island was *Picea glauca* (White Spruce); three wind-blown, dwarfed specimens were found on the sheltered side of a rock mass that had fallen away from the main mass. On Hertford Island, in the "forested area," the main tree was *Abies balsamea*, all of which were dead. A number of these, about twenty inches in diameter at the butt, were estimated to be about fifty years old; few exceeded twenty-five feet in height. The limbs showed a tendency to greater growth on the side opposite that of the prevailing wind, and were found from the top to very close to the ground. Interspersed with these dead trees was a large number of living trees of *Prunus virginiana*. The growth habit of these also suggested that

they were not part of an original forest, and no herbaceous ground-cover species typical of a forest occurred in this area.

The bared areas near the dwellings on Ciboux Island supported a number of introduced species, but these were few in number and localized. *Agropyron repens* (Couch Grass) and *Carum carvi* (Caraway) colonized the previously cultivated area; near the fish house the commonest species were *Poa annua* (Annual Bluegrass), *P. trivialis* (Rough-stalked Meadow Grass), *Alopecurus pratensis* (Meadow Foxtail), *Phleum pratense* (Timothy Grass), *Juncus bufonius* (Toad Rush), *Rumex crispus* (Yellow Dock), *Polygonum aviculare* (Knotweed), *Spergularia rubra* (Sand Spurry), *Stellaria media* (Common Chickweed), *Capsella bursa-pastoris* (Shepherd's Purse), *Raphanus raphanistrum* (Cadlock), *Potentilla norvegica* (Cinquefoil), *Trifolium* spp. (Clovers)), *Vicia cracca* (Tufted Vetch), *Linaria vulgaris* (Toadflax), *Plantago major* (Common Plantain), *Matricaria matricarioides* (Pineapple Weed), and *Cirsium arvense* (Canada Thistle). Some of these had spread to the "field" and to the cliff habitat.

It was only on Ciboux Island that the bird colonies appeared to have affected the vegetation.Here the nesting sites were located mainly on colonies of *Festuca rubra*, fragments of which were pulled up and piled to form shallow nests. The total effect of this and of the manuring, as well as dead fish debris, was to kill out patches of this grass. On these bared areas *Fragaria* spp. seemed to be the first plants to establish themselves. As a final result of this colonization small areas were left covered by *Rumex acetosella*, *Achillea lanulosa*, *Potentilla tridentata*, *Cerastium vulgatum*, and *Stellaria graminea*. These latter plants appeared to tolerate little competition and would very probably be destroyed later by the encroaching margins of the *Festuca rubra* colonies when the effects of the nesting sites were sufficiently neutralized. *Aster novi-belgii*, although more resistant to extreme competition, occurred in much the same fashion. The total effect was to produce the spotty appearance of the "field." No suggestion of a similar succession was present on Hertford Island where *Poa pratensis* was the dominant grass. This species, rather than suffering from the manuring, flourished and grew tall and rank.

LIST OF SPECIES OF VASCULAR PLANTS OCCURRING ON THE BIRD ISLANDS

H = Hertford Island C = Ciboux Island + = present — = absent

x = very rare

Introduced plants are indicated by capital letters

SPECIES	H	C	SPECIES	H	C
xDryopteris phegopteris (L.) Christens.	—	+	Juniperus horizontalis Moench	—	+
xDryopteris spinulosa (O.F. Mueller) Watt	—	+	Festuca rubra L.	+	+
xDryopteris filix-mas (L.) Schott	—	+	Festuca rubra L., var. juncea (Hack.) Richter	+	+
xAbies balsamea (L.) Mill.	+	—	POA ANNUA L.	+	+
xPicea glauca (Moench) Voss	+	+	Poa pratensis L.	+	+
Juniperus communis L., var. saxatilis Pallas	—	+	xPoa trivialis L.	+	+
			xPoa palustris L.	+	+
			xPoa alpina L.	—	+

Species	H	C
xAgropyron trachycaulum (Link) Malte, var. novae-angliae (Scribn.) Fern.	—	+
Agropyron repens (L.) Beauv.	—	+
xElymus mollis Trin.	—	+
Deschampsia flexuosa (L.) Trin.	+	+
Danthonia spicata (L.) Beauv.	+	+
AGROSTIS ALBA L.	+	+
PHLEUM PRATENSE L.	+	+
xALOPECURUS PRATENSIS L.	—	+
xANTHOXANTHUM ODORATUM L.	+	—
xPanicum boreale Nash	—	+
xCarex silicea Olney	+	+
xCarex nigra (L.) Reichard	—	+
xJuncus bufonius L.	—	+
xJuncus tenuis Willd.	+	—
xLuzula multiflora (Retz.) Lejeune	—	+
xSmilacina stellata (L.) Desf.	—	+
xMaianthemum canadense Desf.	—	+
Sisyrinchium montanum Greene, var. crebrum Fern.	—	+
Rumex orbiculatus Gray	+	—
xRUMEX CRISPUS L.	—	+
RUMEX ACETOSELLA L.	+	+
xPOLYGONUM AVICULARE L.	+	—
xPolygonum cilinode Michx.	+	—
xCHENOPODIUM ALBUM L.	+	+
xSpergularia rubra (L.) J. & C. Presl	—	+
Sagina procumbens L.	+	+
Arenaria lateriflora L.	+	+
xSTELLARIA MEDIA (L.) Cyrillo	—	+
STELLARIA GRAMINEA L.	+	+
CERASTIUM VULGATUM L.	+	+
xRANUNCULUS REPENS L.	+	+
xRANUNCULUS ACRIS L.	—	+
xCAPSELLA BURSA-PASTORIS (L.) Medic.	+	+
xRAPHANUS RAPHANISTRUM L.	—	+
xCardamine parviflora L., var. arenicola (Britt.) O. E. Schulz	+	+
xRibes lacustre (Pers.) Poir.	—	+
Fragaria virginiana Duchesne	+	+
Fragaria vesca L., var. americana Porter	—	+
Potentilla tridentata Ait.	+	+
xPotentilla norvegica L.	—	+
Rubus idaeus L., var. strigosus (Michx.) Maxim.	+	+
Prunus virginiana L.	+	—
TRIFOLIUM REPENS L.	+	+
xTRIFOLIUM HYBRIDUM L.	—	+
xVICIA CRACCA L.	—	+
Empetrum nigrum L.	—	+
Viola cucullata Ait.	+	+
xViola pallens (Banks) Brainerd	—	+
xOenothera biennis L.	—	+
CARUM CARVI L.	—	+
xLigusticum scothicum L.	+	+
xCoelopleurum lucidum (L.) Fern.	—	+
xHeracleum maximum Bartr.	—	+
xVaccinium angustifolium Ait., var. laevifolium House	—	+
xVaccinium vitis-idaea L., var. minus Lodd.	+	+
xConvolvulus sepium L., forma coloratus Lange	—	+
LINARIA VULGARIS Hill	—	+
xVERONICA SERPHYLLIFOLIA L.	+	—
Euphrasia randii Robins.	—	+
Euphrasia americana Wettst.	+	+
Rhinanthus crista-galli L.	—	+
Rhinanthus crista-galli L., var. fallax Wimm. & Grab.) Druce	—	+
xPLANTAGO MAJOR L.	+	+
Plantago juncoides Lam., var. decipiens (Barnéoud) Fern.	+	+
xSambucus pubens Michx.	+	—
Campanula rotundifolia L.	+	+
Solidago sempervirens L.	—	+
Aster novi-belgii L.	+	+
xAnaphalis margaritacea (L.) C. B. Clarke, var. intercedens Hara	—	+
ACHILLEA LANULOSA Nutt.	+	+
xMATRICARIA MATRICARIOIDES (Less.) Porter	—	+
xSENECIO VULGARIS L.	+	+
xSENECIO JACOBAEA L.	—	+
xARCTIUM MINUS (Hill) Bernh.	+	—
xCIRSIUM VULGARE (Savi) Tenore	+	—
CIRSIUM ARVENSE (L.) Scop.	+	+
LEONTODON AUTUMNALIS L.	+	+
xTARAXACUM OFFICINALE Weber	+	+
xSONCHUS ARVENSIS L.	—	+
xHIERACIUM PILOSELLA L.	+	+
xHIERACIUM AURANTIACUM L.	—	+
xHIERACIUM FLORIBUNDUM Wimm. & Grab.	+	+
Total	51	85
Total number of species and varieties on the islands		96

The vascular flora of the islands consists of only ninety-six species. Most of these are commonly found in similar habitats on the neighboring coastal areas of Cape Breton Island. *Poa alpina*, rare on Ciboux Island, had not previously been collected in Nova Scotia. *Cardamine parviflora* var. *arenicola*, found commonly on the nesting sites on Ciboux Island and on the cliff slopes of Hertford Island, is a rare species in the province, having been collected from Victoria County once previously (Smith, Schofield, Taylor, Webster, Slipp, 7974, top of boulder slope, Rocky Brook, July 15, 1953), and from Halifax (Roland, 1947), Cumberland, Kings and Digby Counties (Schofield, 1955), some six known stations.

Holland's report that the islands were "barren rocks" in 1766 seems to conflict with the local tradition that the islands were originally wooded. No clear evidence could be found to support the latter view, except perhaps the existence of some typical woodland plants in the rock-walled gullies of Ciboux, and the small "wood" of dead Fir and Chokecherry trees on Hertford. The only areas that could be regarded as completely undisturbed are the sea cliffs, ledges, and rock-walled gullies; even here the invasion of weedy species had occurred.

The authors wish to acknowledge the support of the Nova Scotia Research Foundation and the help of the members of the field party, D. H. Webster and P. A. Bentley. Collections of the flora have been deposited in the Acadia University Herbarium.

REFERENCES

HARVEY, D. C. 1935. Holland's description of Cape Breton Island and other documents. Public Archives of Nova Scotia Publication No. 2.

ROLAND, A. E. 1947. Flora of Nova Scotia. Trans. N.S. Inst. Sci. 21:96-642.

SCHOFIELD, W. B. 1955. Contributions to the flora of Nova Scotia, V. Rhodora 57:301-310.

Received for publication 28 July 1958