



June 2005

Resource Inventory and Modeling Section

No. 23

**Hardwood Plantings
in
Prince Edward Island
1940 - 1995**

by W. M. Glen and M. N. Myers

This Management Note is based on two reports. The first was written in 1993 and covers the plantations up to 1985. The second describes the more recent plantings.

**FOREST HARDWOOD PLANTINGS
IN
PRINCE EDWARD ISLAND
1940 - 1985**

by W. M. Glen, 1993

INTRODUCTION

This report is a summary of the success and failure of non ornamental hardwood plantings in Prince Edward Island. All known planting efforts are described in as much detail as has been found.

The work was conducted by a number of agencies and individuals with little follow-up. The work is a summary of moderate successes and catastrophic failures caused by misfortune, and ignorance.

THE 1940'S

In 1938 Ernie Smith, a 1934 graduate of the Forestry program at the University of New Brunswick, was appointed superintendent of the new PEI National Park. Mr. Smith began establishing plantations in a number of the abandoned fields in the Dalvay area (Smith, 1993, per. comm.)

A transplant nursery was established in which stock provided by the Acadia Forest Experiment Station near Fredericton was set out. The stock grown at Acadia was from seed purchased from an Ontario firm (McKenna, 1985). Sugar maple (*Acer saccharum* Marsh.) and ash (*Fraxinus* sp) were obtained in the mid 1940's and the ash was out planted circa 1948. The ash was planted in a moist area of an old field, the maple was not out planted and remains in the

transplant beds (Smith, 1993, pers. comm.).

Circa 1948 a change in philosophy of the National Parks program occurred and the nursery and plantations were abandoned. In the early 1980's some work was done in the conifer plantations and the conifer parts of the nursery but no follow up work was done in the hardwood blocks.

Site visits in 1993 provide the following details on the two hardwood species. The surviving ash have grown well with the height of 2 dominant trees 18 and 19.5 metres (diameters BH 24.8 and 26.3 cm respectively). The area of the plantation is a mixture of white spruce (*Picea glauca* (Moench) Voss), and poplar (*Populus* sp.) with scattered ash. The ash are of excellent form and could do with a crown release to maintain their position in the stand.

The sugar maple by comparison has had good survival in the transplant beds. The tallest are 60 cm! Each year the hares (*Lepus americana* Erxleben) have clipped the trees and have kept them at this height. This program showed that hardwood species can be established by planting but also there is a need for follow maintenance and the lack of this has led unfortunately to unsuccessful results. (Note that the species of the ash has not been determined, but it is not black (*F. nigra* Marsh.) or white (*F. americana* L.).

The National park transplant nursery was noted in 1945 as having 2000 white ash and 1000 elm (*Ulmus americana* L.) for the Department of Indian Affairs. These transplants are believed to have been planted at Lennox Island but no further information on them has been found (McKenna, 1985).

The 1950's

No record or plantation has been located to indicate any efforts during this decade.

The 1960's

The PEI Forestry Service, established in 1951, had been providing hardwood species to the general public for ornamental purposes since circa 1955. The first non-ornamental planting was in 1960 when 500 white ash were planted on Lennox Island. The purpose was to begin to establish a source of material for basket making. The ash were planted in a corner of an old field. Whether this plantation was successfully established is unknown but in 1993 the field was occupied by a residential subdivision.

During the spring and early summer of 1962, 16,500 ash and 2,000 white birch were planted at Palmer Road, Prince County. The ash was grown from seed obtained from New York State (probably Herbst Bros. of New York) and sown in the spring of 1958. The white birch (*Betula papyrifera* Marsh.) and some yellow birch (*Betula alleghaniensis* Brittan) were sown in the fall of 1958 using locally collected seed. No record has been found to indicate that the seedlings were transplanted so they were probably planted as 4+0 ash and 3+0 birch. (Note, the ash is probably green ash (*F. pennsylvanica* Marsh.) although it is recorded as white).

The site was an old field with the birch planted at the upper end of a gradual slope and the ash lower down. There is evidence of single furrow ploughing as site preparation. It is believed that horses were allowed to graze in the plantation for a few years after planting.

The plantations were forgotten about except for 2 strips of ash towards the front of the property which had spiral tree guards installed circa 1978. The remainder of the ash and the white birch (a few yellow birch were mixed in) was rediscovered in 1992. The found plantation had ingrowth of white spruce and alder in the ash section with very little in the birch block.

Survival of the ash and birch has been good (75%+) except for one area where the ingrowth has succeeded.

Tree form of the ash is reasonable but the birch is multi stemmed, probably due to the damage caused by grazing.

A permanent sample plot was established in the ash in 1989 and provides the following detail:

		Dom Ht. metres cm	QMD	Volume m ³ /ha
Subplot A	1989	6.6	4.0	0
	1992	7.3	4.8	.48
Subplot B	1989	9.0	6.9	13.31
	1992	9.9	7.7	23.35

Also in 1962 an area of old field at Campbell's Cove in Kings County was recorded as planted with birch and oak (Quercus sp.). Examination of the property in 1993 found a white birch plantation and a larger block of ash in a pure block and also interplanted with Scots pine (Pinus sylvestris L.). It appears that the ash is the same as that at Palmer Road and is known to have been planted pre 1968 (McKinnon per. comm. 1993) although no record has been found. The oak planting was not located and may not have survived or the oak may have recorded as ash!

The small white birch plantation has grown well with tree heights of 10+ metres. Stem form is good but appears to have been damaged by pruning using an axe a number of years ago.

The ash plantation has variable growth with heights from 2 to 9 metres. Form is also variable. The ash interplanted with the Scots pine was overtopped by the pine and has resulted in a Scots pine plantation with some very thin whip like ash.

The seed source for both the Palmer Road and Campbell's Cove ash plantations was from New York State. The species is probably green ash but this has not been confirmed. The two plantations are disappointing with regard to the growth that should have occurred and this lack of growth is probably due to the seed origin.

The 1970's

A change in management of the Forestry Branch resulted in a change of focus. The Branch concentrated on efforts to recreate the Acadian Forest and this meant an emphasis on species such as yellow birch, red oak (Quercus rubra L.), butternut (Juglans cinerea L.) and walnut (Juglans nigra L.).

Plus trees were selected in the mid 1970's as follows:

SPECIES	# OF PLUS TREES	# OF LOCATIONS
Black Walnut	5	3
Butternut	34	12
White Birch	3	3
Yellow Birch	33	15

Red Oak	15	14
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Seed collections were made from some of the yellow birch selections and material for two family tests were grown. These tests were planted in 1978 on three sites at St. Patrick's Road, Harmony and Maximville. These tests were abandoned due to poor survival but upon examination in 1993 a number of trees have survived (41%) at St Patrick's Road but not enough to provide any useful information on families. Mean height of the surviving trees was 4.58 metres and mean diameter 4.1 cm. Some mortality in this experiment was caused by hare browsing. No surviving trees were found at the other two sites.

Yellow birch was grown for other plantings and out planted in 1977-1979. The stock was grown in paper pots in the greenhouse and out planted in mid summer. The stock was transported in uncovered trucks in full leaf and was probably dead due to desiccation before they reached the planting site. All the sites planted were unsuccessful and only a very few trees (<10) survived on any of the planted sites.

Known sites where yellow birch was planted are Baldwin's Road, Suffolk Road, Desable, Duvar, Richmond, Afton Road, Portage Road, Appin Road and New Haven. Survival seems to have decreased with increasing travel distance from the Nursery adding some support to the recollection of the way the trees were transported. The Afton Road site was examined in 1992 and a few trees were located growing in a mixture of poplar and pin cherry. The mean height of the survivors was 8.02 metres and mean diameter 13.7.

This program ended in the Autumn of 1978 with a change in the Director of Forestry.

In 1978 the Forestry Branch, in conjunction with the Provincial Parks Service, established the position of Provincial Parks Forester. The two incumbents of this position (Jerry Gavin and the author) established a number of hardwood plantations on Provincial Parks in Mill River, Brudenell and McPhail (Orwell).

In early summer 1979, 2.4-3.0 metre sugar maple and yellow birch saplings were lifted from the old woods roads in the Townsend Woodlot near Souris and transplanted in a 1/2 ton truck to Mill River Provincial Park. The first load was transported with roots covered with moist peat moss but the tops exposed and windburn of the foliage was experienced. Subsequent loads had the tops covered by tarpaulin with better results (McMaster ,1993, per. comm.) The trees were planted in an old field with no site preparation. Survival of the 200+ trees was good (90%). The purpose of this exercise was to provide large trees for landscaping purposes around the park. These trees, after recovery from transplanting, were to be moved again by "Tree Spade" into their final positions (Gavin, 1993, pers. comm.). Few trees were moved a second time and a hardwood plantation was established. The half dozen years after planting saw no real growth of the stock but in the period 1985+ the trees have grown well. In 1993 height was up to 6 metres.

In 1979 a few hundred butternut nursery stock were planted in patch cuts in old field white spruce along the west bank of the stream in McPhail Provincial Park. The survival of the trees was approximately 60% in 1993. Growth and form were poor due to repeated die back caused by frost. The trees vary in height up to four metres where the competition was providing shelter from frost. Yellow birch from the Townsend Woodlot were also moved to McPhail and

planted along with the butternut and in a plantation of black spruce. The yellow birch/black spruce plantation was cleaned in 1987 and unfortunately the birch was removed (Gavin, McMaster, Brown, 1993 pers. comm.)

In 1980 butternut and yellow birch three year old transplants were planted on a site prepared cut over at Alma Prince County. The site had been root raked and most of the topsoil placed in rows approximately 10-15 metres apart. The stock was planted in the raked strips. The results, as observed in 1993, were that survival was reasonable close to the topsoil piles with tree heights of 5-6 metres in comparison with poor survival and growth in the remainder of the site prepared strip.

A similarly prepared site in Howlan, Prince County was also planted in butternut in 1980. The survival on this site was very low and by 1993 no trees had survived.

Plantings of yellow birch, butternut and walnut nursery stock were also made at McPhail and Brudenell Provincial Parks in 1980. These plantations had survival and growth rates which varied with the amount of shelter the trees had and the site type. The yellow birch and butternut planted with side shade, i.e. small patches, reached heights of 8 metres in 1992 with survival rates of 90%. The trees grown in the open on former farmland had heights of 5 metres and survival rates of 35% (for details see Glen, 1993). The low survival in the grassy field was due to grass competition and by meadow vole (*Microtus pennsylvanicus* Ord.) feeding on the bark and cambium layer. The voles were controlled during the first two years after planting by the use of poison bait stations (Radvani, 1974). Unfortunately the Parks Forestry program was cancelled in 1981 and follow up maintenance was not done. The patch cuts were not subject to vole damage due to the different habitat.

In 1980 two areas in the P.E.I. National Park near the old transplant nursery at Dalvay were harvested and planted with a mixture of hardwood species. The two sites were old field white spruce stands and the cuts were of two different sizes, one approximate 10 by 20 metres and the other 80 by 350 metres. A mixture of red oak, white and mountain ash, yellow birch, sugar maple and white pine were planted. The stock was both wild seedlings which were obtained from Cornwall P.E.I. and nursery stock from a nursery in Falmouth, Nova Scotia (Lees, 1980). The survival of the planted seedlings has been variable and assessment very difficult due to the ingrowth of other species and the non systematic planting pattern. General observations in 1993 were that the surviving stock has done well with oak reaching heights of 4 metres in the small cut and 1-3 metres in the large cut. Rabbit clipping has kept some of the oak to heights of 60 cm and girdling of the larger oak has resulted in stem deformities. It is believed that a browse repellent "Scoot" was applied to the planting stock for the first year. Changes in staff at the Park resulted in no follow up treatment or assessment of these plantings.

During the winter/spring of 1981 patch cuts of approximately 15-20 metres square were made in an old field white spruce stand adjacent to the golf course at Mill River Provincial Park. These were planted in the spring of 1981 with wild stock lifted from else where on the park property. Examination of the patches in 1993 showed the planted sugar maple and yellow birch had grown well in all but one patch. The sugar maple, which was the most frequently planted species had reached heights of 3 to 6 metres and the birch 4-5 metres. In the unique patch the regeneration was comprised of poplar, pin cherry (*Prunus pennsylvanica* L.f.) and only a few

surviving sugar maple. This patch was where all the slash from the other patches was piled and burned and by such activity it created different site conditions which favoured the pioneer species.

In 1982 three patches were planted at Dalvay with yellow birch nursery stock. The results were excellent with good growth and form with little browse (for details see Glen, 1993).

Mr Ernie Gallant of Suffolk gathered red oak seed from Royalty Oaks, West Royalty in 1980 and grew them for two years before outplanting the resulting 100-200 seedlings in 1983. These were planted into a hybrid poplar plantation established on an old field. In 1992 10-20 trees were noted as having survived and mortality was believed to have been caused by mammal browse (Christie, 1993).

In the spring of 1982, sugar maple and yellow birch regeneration were transplanted from the northern moiety of the Valleyfield Demonstration Woodlot to an old field white spruce cut over south of Route 326 on the same property. The stock was 30-60 cm tall (Watts, McMaster, 1993 pers. comm.). The survival has been good and the growth of the yellow birch excellent with heights up to 5-6 metres. The sugar maple growth has been variable with heights 30 cm to 5 metres. The variation in the height of the maple appears to be a result of variations in site quality due to site preparation.

CONCLUSIONS

Hardwood species can be successfully established if care is given to the following;

- selection of the species and seed source
- care in handling of the stock, i.e. no desiccation
- proper site preparation if required, i.e. don't remove the topsoil
- plantation cleaning doesn't remove the hardwood species
- control or avoid meadow vole habitat when planted
susceptible species i.e. yellow birch

Planted hardwood can produce stems of good form if;

- side shade is provided to overcome the lack of apical dominance
- when pruning is required don't use an axe

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Hardwood plantings 1985-1995

by Mary N. Myers

Add Mary's report(s)

Glen Martin
Hardwood planting trials

Costs/ha

site preparation as per rate and standards

Red oak	trees	planting	cost/ha
1.0 metre spacing	\$12,500	\$ 5,000	\$17,500
1.5 metre spacing	\$ 5,556	\$ 2,222	\$ 7,778
2.0 metre spacing	\$ 3,125	\$ 1,250	\$ 4,375
2.5 metre spacing	\$ 2,000	\$ 800	\$ 2,800

Yellow birch strip cuts	trees	planting	cost/ha
1.0 metre spacing	\$ 5,000	\$ 1,500	\$ 6,500
1.5 metre spacing	\$ 2,222	\$ 667	\$ 2,889
2.0 metre spacing	\$ 1,250	\$ 375	\$ 1,650
2.5 metre spacing	\$ 800	\$ 240	\$ 1,040

Yellow birch/larch clearcut	trees	planting	cost/ha
1.0 metre spacing	\$ 3,200	\$ 1,350	\$ 4,550
1.5 metre spacing	\$ 1,422	\$ 600	\$ 2,022
2.0 metre spacing	\$ 800	\$ 338	\$ 1,138
2.5 metre spacing	\$ 512	\$ 216	\$ 728

Cost red oak seedling \$1.25 each, planting \$.50

Yellow birch seedling \$.50 each, planting \$.15

Larch seedling \$.14 each, planting \$.13