

Copy 1173
Part I
FORESTRY COMMISSION

RETAIN

WORKING PLAN

FOR

BENMORE

RECORD OF APPROVAL AND SANCTION

The Objects of Management for this Working Plan and
the Summary of Proposals for their Achievement are approved

Signed _____
Director

Date _____

The Objects of Management for this Working Plan and
the Summary of Proposals for their Achievement are sanctioned

Signed _____
Director General

Date _____

This Working Plan is approved in its entirety and is to be
put into operation as from _____

Signed _____
Conservator

Date _____

COMPILATION DETAILS

Written by

Growing Stock Data

Part I W.B. SUTHERLAND DSI These relate to the position

Part II W.B. SUTHERLAND DSI as at 30th September, 1961

WEST (SCOTLAND) CONSERVANCY

BENMORE FOREST

WORKING PLAN

F.Y. 63-72

CHAPTER I - INTRODUCTION(a) Situation and Extent

The national grid reference of the forest office, Rashfield, is NS 148836. The area of the forest is 9156 acres as at 30:9:62.

(b) Civil Administration

County Council	Argyll
District "	Cowal
Parish	Dunoon and Kilmun
Parliamentary Constituency	Argyll

(c) Nearby Towns

Dunoon population 10,000 is 4 miles from the forest office. Glasgow population 1,000,000 is approximately 75 miles by road and 30 miles using ferry.

(d) Communications and Transport

1. Railways The nearest railway station is Gourock accessible by 20 minutes ferry passage from Kilmun Pier. By road the nearest station is Arrochar, 30 miles distant.

2. Roads A815 from Dunoon is poor, 16' wide, which passes through the forest to meet the A83 at Cairndow. Both roads are the subject of improvement schemes which will eventually make them 18' wide. The Ardentimny - Whistlefield Road carries a $7\frac{1}{2}$ ton restriction.

3. Ports and Harbours Dunoon 15ft. low water O.S.T., frontage 440ft., tonnage to 10,000 gross, passenger traffic priority.

Kilmun & Blairmore Piers Formerly owned by F.C. 5-15' low water O.S.T., with 10' rise and fall.

Strone Pier Disused but sound and owned by F.C., being reserved as possible means of shipping timber. Storage area is 4700 sq. ft.

(e) Maps

O.S.S. sheets 59 and 53, 7th series 1" to 1 mile.

6" O.S. sheets Argyll. CLXIII N.W., N.E., S.W., S.E.

CLII S.W., S.E.

CLXXIV N.W., S.W.

CHAPTER 2 - SITE

- a. Geology The metamorphic rocks of the area are mainly mica schists with a band of schistose grits south of Coirantee. The area is much crossed by igneous intrusions of doleritic, porphyritic and felsitic rocks.
- b. Soils Glacial tills from the soils on the slopes. Soil depth varies enormously due to erosion of the steeper ground. Fairly deep alluvial deposits occur in some of the valley bottoms. Shallow peats occur on much of the flatter ground especially on the upper slopes, but deep peat occurs only very locally, generally above the planting limit. All soils are acidic.
- c. Topography The bulk of the forest lies on the steep slopes of Loch Eck, the Holy Loch and Loch Long. Slopes are extremely steep in the Cruach and Bernice areas where they are also considerably broken by rock outcrops and Ravines.
- d. Meteorology The average rainfall measured at Benmore House over the last 10 years is 80 inches with a recorded maximum of 124" in 1954. The climate is oceanic with snow lying rarely for more than a few days in January/March. Strong salty winds occur throughout the year with frequent winter gales. There is a tree growing season which may extend from April to November, with a dry time when fire danger may be high in March/May. Frost is seldom severe. Late spring frosts are not common.
- e. Vegetation To 5-600ft. above sea level the natural vegetation was mainly Oak/Hazel/Birch, remnants of which are still to be seen. The vegetation here is now mainly mixed grass/bracken with areas of heather and in the wetter parts with ~~peat~~ ^{JUNCUS}, bog myrtle. Rhododendron ponticum is a serious weed pest. On the higher slopes nardus, juncus squarrosus and molinia becomes increasingly dominant with the poorest and highest ground carrying heather/scirpus/eriphorum/sphagnum mixtures.
- f. Site Classification
- (a) There is a small acreage of very fertile ground on the lower slopes and in gravelly alluvial flats. This carries a wide variety of exotics with Sitka spruce reaching Quality II.
 - (b) The bulk of the forest occurs on steep broken ground with very variable soil depth. Growth is generally good but uneven.
 - (c) There are areas of severely limited growth on upper slopes exposed where these are exposed to sea winds.

CHAPTER 3 - HISTORY

a. Local History

The following bibliography provides interesting historical information on Benmore.

A statistical account of Scotland 1750 by Sir John Sinclair.

A new statistical account of Scotland 1845 by Rev. J. Garden.

A history of Cowal 1908 by Archibald Brown pub.

Plantation of the Estates of Benmore and Kilmun by J. Stalker.

History of Benmore Forest, ^{S.M. PETRIE} ~~S.A. Mac~~, 1951.

b.

The following is a brief summary of outstanding facts relating to management of the property prior to 1925 when it was gifted by Mr. H.G. Younger to the Forestry Commission.

The gift included (with reservation) 810 acres of woodland. Interesting items still remaining are the 1871 Avenue of Sequoia ~~gigantea~~; the ^{BENMORE} 2 acre 1871 Arboretum and various specimen trees in the gardens. (See appendix giving tree measurements); the 1879 blocks of Sitka spruce and Douglas fir, E.L. and other species on Cruach Hill; the 1905, 1914 and 1916 plantations of larch, sitka spruce, thuya etc; the remnants of 1872 - 6 N.S., E.L., S.P. above 900' elevation on Kilmun Hill illustrating exposure effects; Pucks Glen, a wooded walk of botanical interest and of great appeal to the general public; the poured concrete cottage at Corrach dated 1872 and the wooden bungalow in Glenmassan both built by Mr. Duncan.

Stalker refers to the fame of Mr. Duncan's West Highland cattle and blackfaced sheep which acquired celebrity at the 1878 Paris Exhibition. The ^{HILL LAND} ~~main woodland area~~ was, at the time of acquisition, still utilised for sheep farming but there is no reference to their containing anything other than mediocre flocks.

CHAPTER 4(d) Considerations affecting Land Management1. Boundaries and Fencing Liability(a) Type of Boundary

On the western side the boundary of Benmore Forest follows the Echaig River from its mouth northward to the point where it is joined by the River Massan with the exception of the land included in one large meander at the bottom of the nursery strip. This is owned by Ballochyle Estate. At the Massan junction the boundary turns in a north-westerly direction but owing to a change in the course of that river a plot of about one acre of land belonging to the Commission is now isolated on the southern bank. The march follows the Massan to a point about a mile north-west of Stonefield Holding where it leaves the river and runs northward up the hill to the watershed which it follows in a northerly direction to the crest of Beinn Mhor. From this point it turns north-westerly again to Creag Tharsuinn where it joins the parish boundary and follows it initially north-eastward, then eastward as it follows the tributaries of the Glenshellish Burn, crosses the summit of Meall Breac and drops down to Loch Eck following the course of a small burn. The march then follows the western shore of Loch Eck in a southerly direction and subsequently the Echaig River to a point some half mile south of Inverchapel, where it turns eastward, crosses the watershed north of Creag Mhor, and follows the Gairletter Burn down almost to the shore of Loch Long. An almost continuous strip of ground from this point southward round the Strone peninsula to the mouth of the River Echaig is owned by the Younger (Benmore) Trust, and has been the subject of semi-urban development. The Commission march runs parallel with the coast behind this development, the boundary for a large part of the distance being the back wall of the feus.

The riversides are fenced where stock barriers are required and the hill marches in so far as they coincide with plantation boundaries. The higher hill marches above plantation limits are unfenced.

In addition there is an isolated block of the forest at Glenlean, just

/to

to the west of the village of Clachaig. This area is bisected by the Dunoon/Colintraive road; that section lying above (to the north of) the road being ring fenced, while that to the south between the road and the river Lean is unenclosed.

(b) Fencing Liabilities

To pay equal cost of maintenance of march fences with the proprietor of the following:-

Ballochyle Estate

Glenlean Farm

Glenmassan Farm

Inverchapel Farm

2. Restrictive Covenants, Reservations, etc.

Benmore I Acquisition

I. The dominium direct^{um} of all feus in the Strone/Kilmun area and the dominium utile of all ground in the district suitable for feuing, together with all water supplies, tanks, etc., and Strone Golf Course.

II. The Mansion House, with its services, lawns, policies, gardener's cottage, etc., were reserved by the original superior for his life and for the life of his son, or such shorter period as he may determine.

III. Certain specified trees and blocks of timber.

Benmore II Acquisition

IV. The two areas acquired to be used only for "prosecution of research and advancement of education" in forestry.

V. Minerals with full right to work the same.

VI. All water supplies, sites of tanks, sources of water, etc., to protect the supplies of the houses drawing from this area; such supplies not to be contaminated with sewage; the Commission entitled to take water from such sources provided existing supplies are not prejudiced.

VII. All existing rights of sewerage, with access for renewal or maintenance, but superiors specifically stated not to be held responsible or guaranteeing the condition of the said sewers and drains.

/Clachaig

Clachaig Acquisition

VIII. All existing water supplies to Clachaig Village and remainder of lands of Clachaig not disposed to Commission, with rights of access for maintenance on payment for damage caused.

Younger (Benmore) Trust - Deed of Servitude

IX. No diversion of streams on Kilmun Hill and all gratings at points where they enter feus to be kept clear.

Younger (Benmore) Trust - Craigend, Kilmun Acquisition

X. Use by feuar of area acquired in fifth acquisition limited to use for housing and gardens, stacking site and access to the hill.

XI. Sale of spirituous and other liquors and the carrying on of noxious trades prohibited.

XII. Burns and streams of water reserved to superior subject to right of feuar to take a supply if required.

XIII. Minerals (except coal), with liberty to the superiors to work the same on payment for damage caused, subject to the feuar's right to work and utilise for his own purposes only (sale forbidden) the freestone and whinstone.

XIV. Power to construct and maintain drains.

XV. Sub-feuing and sale by feuar only permissible if disponee holds direct from superior.

Dunselma I Acquisition

XVI. Sale of spirituous and other liquors and carrying on of noxious trades prohibited.

XVII. No drains from the property may be discharged into any stream or burn on Kilmun Hill except in so far as existing drains do so.

XVIII. Powers reserved to the superiors to construct drains through the area feued.

Lease of Six Areas on Kilmun Hill

XIX. Ground to be used solely for the purposes of the Forestry Acts.

XX. Sale of sand or gravel from areas let prohibited.

XXI. Tenant to be solely responsible for repair of existing roadside

/retaining

retaining walls in so far as damaged by his operations and for ensuring that no streams flowing through the areas are diverted from their natural course and are kept clear of debris where they enter the feus, and all water gates are regularly cleaned and maintained.

3. Easements, Servitudes and Licences

Benmore I and II Acquisitions

I. Rights of extraction for timber over such routes over Superior's remaining lands as he may point out, subject to relief by the feuars of all consequent claims.

Younger (Benmore) Trust - Deed of Servitude

II. Servitude Rights of Way together with all necessary constructional and maintenance rights, subject to the making good of consequent damage to existing retaining walls and fences.

4. Public Rights of Way

None recorded. As this is part of the Argyll National Forest Park the public are permitted a general access to the hill and other forest roads unless these are specifically closed.

5. Sporting Interests

Benmore I Acquisition

I. The whole salmon and other fishings in the lochs, rivers and streams (excepting only the small hill streams and lochs) and, without prejudice to this generality, the salmon and other fishings in the River Echaig and, in order that this right may be freely exercised, the bed of the river and the banks for a breadth of 20 feet therefrom together with free access thereto.

II. The boathouse on Loch Eck with access thereto, and full power to repair and use the same and to fish from and land upon the shores of the Loch at any part and to boat and fish on the said Loch.

Younger (Benmore) Trust - Craigend (Kilmun) Acquisition

III. Salmon fishings in Holy Loch, Loch Long and the River Echaig.

6. Obligations of Outside Parties to the Forestry Commission
Clachaig Disposal

I. Water supplies to Clachaig Village with rights of access and maintenance.

/Disposal

Disposal of plot of ground at Courtyard, Benmore

- II. Feuars to take all possible precautions against fire.
- III. Feu to be maintained in tidy condition and fenced if required by Superior.
- IV. No alterations permitted to exterior of existing houses.
- V. Sale of intoxicating liquors and carrying on of nixous trades prohibited.
- VI. Right of pre-emption.

Deed of Servitude in favour of Trailways (Leeds), Ltd., for Water Supply

- VII. Grantor reserves right to draw water from Grantee's catchment provided that the supply is not thereby prejudiced.
- VIII. Grantee to carry out work in tradesmanlike manner and lay pipe to a prescribed minimum depth.
- IX. Grantee to give "reasonable" notice before entering Grantor's ground for any purpose connected with this servitude.
- X. Grantee to be responsible for all claims consequent upon the granting of the servitude.
- XI. Grantee to comply with any fire precautions in force.
- XII. Grantor does not guarantee either quantity or quality of water.

Deed of Servitude in favour of Roderick Macdonald

- XIII. Grantee subject to certain conditions of construction and maintenance and responsible for relieving Grantor of any claims consequent upon the granting of this servitude.

PROFITABILITY ASSESSMENTS FOR BENMORE FOREST

SITKA SPRUCE

NORWAY SPRUCE

Age	Q.C. III				Q.C. IV				Q.C. V				Q.C. III			
	Tot. Exp.	Tot. Income	Net Ann. Income per acre	Profitab.	Tot. Exp.	Tot. Income	Net Ann. Income per acre	Profitab.	Tot. Exp.	Tot. Income	Net Ann. Income per acre	Profitab.	Total Exp.	Tot. Income	Net Ann. Income per acre	Profitab.
50	231	607.1	7.5	-12.2	231	528.6	6.0	-36.2	-	-	-	-	231	399.4	3.4	-77.2
55	243	746.6	9.2	+15.3	238	589.4	6.4	-23.7	238	476.5	4.3	-54.4	243	455.5	3.9	-65.2
60	245	777.8	8.9	-12.9	251	646.4	6.6	-42.9	251	519.1	4.6	-69.9	245	522.4	4.6	-76.0
65	258	825.2	8.7	-10.1	258	779.8	8.0	-24.0	258	557.4	4.6	-64.0	258	586.5	5.1	-67.1

PRICES

3" B.H.Q.G.	=	6d.	} Thinnings
4" "	=	9d.	
6" "	=	1s. 1 ¹ / ₂ d.	
7-11" "	=	1s. 6d.	
>11" "	=	1s. 10d.	

3d. extra - Main Crop

Working Plan Area

BENMORE FOREST

Schedule of Information from Conveyances, Dispositions, Leases and Feus

Number	Date	Name of other party	Property	How acquired or disposed of	Area (acres)			Compartment Number(s)	Reservations See Chapter 4, Sec. (d) (2), etc.
					Classified as planted or acquisition	Total acquired or disposed of	Net Total to date		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
1	Whit 1925	Harry George Younger	Lands and Estates of Benmore, Bernice and Kilmun	Feu	2,500	10,200	10,200	1-24, 25 (part), 26 30-35, 38-73	I, II, III (d) (5) I and II
		with consent of John William Henry Berkeley		(Deed of Gift)				101-155 (all inclusive)	
		Younger						1ve)	
2	Mart 1933	Younger (Benmore)	Two areas of ground at Kilmun	Feu	18	18	10,218	Part Kilmun Forest	See Chapter 4, Sec.
		Trustees						Garden, part Comp. 38	(d) 2 IV, V, VI, VII
3	Mart 1944	Samuel Dow and Others as Testamentary Trustees of Mrs. Dow	Farm of Clachnag and Clachnag Village	Purchase	380	643	10,861	201-210 (inclusive)	See Chapter 4, Sec. (d) 2. VIII
4	Mart 1950	Younger (Benmore)	Access and Stacking Sites	Deed of Servitude	-	59.4	10,920.4	Not applicable	See Chapter 4, Sec. (d) 2. IX

Acquisitions and Disposals

Working Plan Area **BENMORE FOREST**

Schedule of Information from Conveyances, Dispositions, Leases and Feus

Number	Date	Name of other party	Property	How acquired or disposed of	Area (acres)			Compartment Number(s)	Reservations
					Classified as plantable on acquisition	Total acquired or disposed of	Net Total to date		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
5	Whit 1952	Younger (Benmore)	Site of huts at	Feu	-	1.3	10,921.7	Not compartmented	See Chapter 4 Sec.
		Trustees	Craigend, Kilman						(d) 2. X, XI, XII,
									XIII, XIV, XV and
									Sec. (d) 5 III
6	26/4/54	Messrs. Bryant & May, Ltd.	Land at Clachalg Hill	Sale		163	10,758.7	Not compartmented	See Chapter 4 Sec.
									(d) 6. I
7	Mart 1954	Younger (Benmore)	Dunselma Gardener's	Feu		0.25	10,758.95	Not compartmented	XVI, XVII, XVIII
		Trustees	Cottage and outbuildings						
8	Mart 1957	Younger (Benmore)	Six areas of ground	999 year	62	74	10,832.95		XIX, XX, XXI
		Trustees	in the parish of Kilman	lease					

Acquisitions and Disposals

Working Plan Area

BENMORE FOREST

Schedule of Information from Conveyances, Dispositions, Leases and Feus

Number (1)	Date (2)	Name of other party (3)	Property (4)	How acquired or disposed of (5)	Area (acres)			Compartment Number(s) (9)	Reservations (10)
					Classified as plantable on acquisition (6)	Total acquired or disposed of (7)	Net Total to date (8)		
9	Whit 1958	Younger (Benmore) Trustees	Plot of ground at Courtyard, Benmore	Feu	-	negligible	10,832.95	Not applicable	See Chapter 4, Sec. d(6), II, III, IV, V and VI
10	22/6/58	Scottish Youth Hostels Association	Small woodland area at Dunselma	Purchase	2.5	2.5	10,835.45	27 (pt.)	
11	Mart 1959	Argyll County Council	Holy Loch Piers	Deed of Gift	-	negligible	10,835.45	Not applicable	
12	15/12/60	Trailways (Leeds) Ltd.	Servitude for Water Supply	Deed of Servitude	-	-	10,835.45	Not applicable	See Chapter 4 Sec. (d) 6. VII, VIII, IX, X, XI and XII

Schedule of Information from Conveyances, Dispositions, Leases and Feus

OS 39873/1/2572/3 5m 2/59 DL

CHAPTER 5 - AMENITY(a) Description of Amenities

Some 20,000 persons each year pay to visit the ~~Burness~~ ^{YOUNGER} Botanic Gardens, the Kilmun Arboretum and Forest Plots, the Benmore Arboretum, the circular tour from Cot Bridge i.e. Loch Eck, Larach, Loch Long and Holy Loch and the Massan Glen all attract the public. Because of the steep slopes the whole area rather than only the roadsides are constantly before the public eye.

(b) Policy and Existing Obligations

Dunoon and District is essentially a holiday resort. The population rises from 10,000 to 60,000 during the summer and Benmore Forest forms a primary part of the attractions of the area.

The working plan area is part of the Argyll ~~National~~ ^{Forest} Park with its declared policy of preserving amenities.

There are 3 small caravan and camp sites and one Youth Hostel and various convalescent and holiday homes within the forest area. These are not managed by the Forestry Commission but the policy is to improve such facilities where possible.

(c) Measures Adopted

Larches are used to break up large blocks of evergreens and natural boundaries are followed rather than straight fencelines. Special attention is paid to roadsides where older trees are preserved if possible and where plantings include clumps of hardwoods and shrubs.

Subject to the limitations necessary for fire protection the public are not banned from using the forest roads ^{in fact} which afford some magnificent views of the countryside. There is a need for more camping facilities but so far it has proved impossible to satisfy this.

Summary Statement of Growing Stock

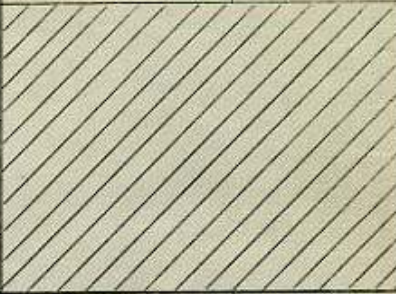
as at 30.9.1961.

Working Plan Area BENMOREComplete as
necessary

Section

Working Circle

Felling Series

Type (1)	Area (acres) (2)	Volume (h. ft.) 1,000 (3)	Current Annual Increment (h. ft.) (4)
High Forest			
Coniferous	2799	2,955.3	199.9
Mixed	2	6.4	.2
Broadleaved	3	.8	-
Total High Forest	2804	2,962.5	200.1
Forest Garden, Younger Trust Area	362		
Coppice with Standards			
and former woodland now un-			
Coppice compartmented			
Partially Felled			
Reserved Timber			
Scrub	97		
Felled			
Other Plantable	5893		
Other Land			
TOTAL	9156	2,962.5	200.1

By Annual Report 9300.

* Kilmen Arboretum and Forest Plots and
Younger Botanic Gardens.

Signature

J. Campbell

Date of Compilation

27/4/62

Area Statement of Growing Stock as at 30.9.19 61

Working Plan Area BENMORE

Complete at necessary { Section Working Circle Felling Series

I

Date at necessary { High Forest—Main Storey High Forest—Subsidiary Storey

Areas in acres

Species (1)	Over- or Under- storey (2)	Even-aged																	Uneven-aged			Total (21)
		1966 1970 (3)	1961 1965 (4)	1956 1960 (5)	1951 1955 (6)	1946 1950 (7)	1941 1945 (8)	1936 1940 (9)	1931 1935 (10)	1926 1930 (11)	1921 1925 (12)	1901 1920 (13)	1881 1900 (14)	1861 1880 (15)	1841 1860 (16)	Pre 1841 (17)	Pre 1900 (18)	Post 1900 (19)	+ Pre and Post 1900 (20)			
S.P.			1	5	90	13				18				29						156		
S.P.*					2															2		
		1	5	92	13					18				29						158		
C.P.				14						8										23		
P.C.			14	22			7													51		
M.P.				3						1										4		
B.L.				3	12	9			9	44		8	9	4						98		
B.L.*										6				4						10		
			3	12	9				9	50		8	9	8						108		
J.L.				20	212	35			49	14	9	27								366		
J.L.*											4									4		
				20	212	35			49	14	9	31								370		
H.L.			14	18	12	4				18										66		

† Uneven-aged crops in which pre P.1900 and post P.1900 age groups each occupy at least 20% of the canopy.

Signature: *Robert Smith*

Date of Compilation: 27/11/62

† Uneven-aged crops in which pre P.1900 and post P.1900 age groups each occupy at least 20% of the canopy.

Signature

John P. M.

Date of Completion

27/11/62

Area Statement of Growing Stock as at 30.9.1963

Working Plan Area BENMORE

Complete at necessary { Section Working Circle Felling Series

II

Delete at necessary { High Forest—Main Storey High Forest—Subsidiary Storey Ecopline

Areas in acres

Species (1)	Over- or Under- storey (2)	Even-aged																	Uneven-aged			Total (21)
		1966 1970 (3)	1961 1965 (4)	1956 1960 (5)	1951 1955 (6)	1946 1950 (7)	1941 1945 (8)	1936 1940 (9)	1931 1935 (10)	1926 1930 (11)	1921 1925 (12)	1901 1920 (13)	1881 1900 (14)	1861 1880 (15)	1841 1860 (16)	Pre 1841 (17)	Pre 1900 (18)	Post 1900 (19)	† Pre and Post 1900 (20)			
D.F.*				20	69	6			8	41		9	33	5							191	
D.F.*										4									3		7	
				20	69	6			8	41	4	9	33	5					3		198	
N.S.			2	9	54	33	16		157	22			3	6							302	
N.S.*														3					2		5	
			2	9	54	33	16		157	22			3	9					2		307	
S.S.			7	79	216	242	91		349	122	12	20	1								1139	
S.S.*					2																2	
			7	79	218	242	91		349	122	12	20	1								1141	
A.gr				1	3	3	1		1												9	
A.gr									1												1	
A.gr				1	3	3	1		2												10	

† Uneven-aged crops in which pre P.1900 and post P.1900 age groups each occupy at least 20% of the canopy.

Signature

Date of Completion

† Uneven-aged crops in which pre P.1900 and post P.1900 age groups each occupy at least 20% of the canopy.

Signature

G. J. J. J. J.

Date of Completion

Area Statement of Growing Stock as at 30.9.1961

Working Plan Area BENMORE

Complete at necessity { Section Working Circle Felling Series

IV

Delete at necessity { High Forest—Main Storey High Forest—Subsidiary Storey Coppice

Areas in acres

Species (1)	Over- or Under- storey (2)	Even-aged																	Uneven-aged			Total (21)
		1966 (3)	1961 (4)	1956 (5)	1951 (6)	1946 (7)	1941 (8)	1936 (9)	1931 (10)	1926 (11)	1921 (12)	1901 (13)	1881 (14)	1861 (15)	1841 (16)	Pre 1841 (17)	Pre 1900 (18)	Post 1900 (19)	† Pre and Post 1900 (20)			
S.P./E.L.					33								2	12						47		
S.P./S.S.										4										4		
P.C./J.L.									1											1		
E.L./J.L.									2									4		6		
E.L./D.F.												12								12		
E.L./N.S.												20								20		
E.L./ mixed canopy													6							6		
J.L./L.C.											1									1		
D.F./J.L.													1							1		
D.F./N.S.													2							2		
D.F./S.S.									1		7		5							13		
D.F./A.Br.									4		3									7		
D.F./Th.									1		8	12	3							24		
† Uneven-aged crops in which pre P.1900 and post P.1900 age groups each occupy at least 20% of the canopy.																						
Signature: <i>W. J. ...</i>																						
Date of Compilation: _____																						

† Uneven-aged crops in which pre P.1900 and post P.1900 age groups each occupy at least 20% of the canopy.

Signature

Date of Completion

Area Statement of Growing Stock as at 30.9.1961

Working Plan Area BENMORE

Complete at necessary { Section Working Circle Felling Series

Delete at necessary { High Forest—Main Storey High Forest—Subsidiary Storey Coppice

Areas in acres

Species (1)	Over- or Under- storey (2)	Even-aged																Uneven-aged			Total (21)
		1966 1970 (3)	1961 1965 (4)	1956 1960 (5)	1951 1955 (6)	1946 1950 (7)	1941 1945 (8)	1936 1940 (9)	1931 1935 (10)	1926 1930 (11)	1921 1925 (12)	1901 1920 (13)	1881 1900 (14)	1861 1880 (15)	1841 1860 (16)	Pre 1841 (17)	Pre 1900 (18)	Post 1900 (19)	† Pre and Post 1900 (20)		
D.F. <i>mixed canopy</i>																				17	
N.S./S.S.												10								10	
N.S./L.C.						2														2	
N.S. <i>mixed canopy</i>																				1	
A.N./Ts.									1											1	
S.P./El./Abies.																			2	2	
S.P./El./Th.															3					3	
S.P./NS/SS																			2	2	
S.P./NS/MC															3					3	
JL/Df/SS													8							8	
Df/NS/SS															3					3	
Df/Th. <i>mixed canopy</i>															4					4	
Th./M.H.S. <i>mixed canopy</i>															2					2	
M/C <i>mixed canopy</i>					1										2		14			17	
† Uneven-aged crops in which pre P.1900 and post P.1900 age groups each occupy at least 20% of the canopy.																					
Signature <i>William J. Hall</i>																					
Date of Completion																					
Grand total 2804																					

Area Analysis by Quality Class as at 30.9.1961.

Working Plan Area BENMORE

* Working Circle

* Section

* Felling Series

* Complete as necessary

I

Areas in acres

Species (1)	P.Yr. Class (2)	Quality Class						Not Classi- fiable (9)	Total Area (10)	Remarks (11)
		I (3)	II (4)	III (5)	IV (6)	V (7)	below V (8)			
S.P.	1861- 1880			1	26			2	29	
	26-30		5	13					18	
	46-50			13					13	
	51-55			21				71	92	
	56-60							5	5	
	61-65							1	1	
	Total		5	48	26			79	158	
C.P.	26-30			8					8	
	31-35				1				1	
	51-55				3			11	14	
Total				8	4			11	23	
P.C.	31-35							8	8	
	41-45							7	7	
	51-55							22	22	
	56-60							14	14	
Total								51	51	
M.P.	26-30							1	1	
	51-55							3	3	
Total								4	4	
E.L.	1861- 1880			4				4	8	
	1881- 1900		9						9	
	1901- 1920		8						8	
	26-30			27	16	7			50	
	31-35		4	1	4				9	
	46-50					9			9	
	51-55					1		11	12	
	56-60							3	3	
	Total		21	32	20	17		18	108	

Signature

J. Campbell

Date of Compilation 27/4/62

Area Analysis by Quality Class as at 30.9.1961.

Working Plan Area BENMORE

* Working Circle

* Section

* Felling Series

* Complete as necessary III.

Areas in acres

Species (1)	P.Yr. Class (2)	Quality Class						Not Classi- fiable (9)	Total Area (10)	Remarks (11)
		I (3)	II (4)	III (5)	IV (6)	V (7)	below V (8)			
N.S.	1861-1880							9	9	
	1881-1900							3	3	
	26-30	1	5	9	4		3	-	22	
	31-35	18	36	76	29				159	
	41-45				16				16	
	46-50			21	7		5		33	
	51-55			4				50	54	
	56-60							9	9	
	61-65							2	2	
Total		19	41	110	56		8	73	307	
S.S.	1881-1900							1	1	
	1901-1920		3		16		1		20	
	21-25				12				12	
	26-30				57	59	6		122	
	31-35		3	21	116	196	13		349	
	41-45					72	19		91	
	46-50				108	99	35		242	
	51-55					25	2	191	218	
	56-60							79	79	
	61-65							7	7	
Total			6	21	309	451	76	278	1141	
A.g.	31-35		2						2	
	41-45				1				1	
	46-50						3		3	
	51-55							3	3	
	56-60							1	1	
Total			2		1		3	4	10	

Signature

J. Campbell

Date of Compilation

Area Analysis by Quality Class as at 30.9.1961.

Working Plan Area BENMORE

* Working Circle

* Section

* Felling Series

* Complete as necessary IV

Areas in acres

Species (1)	P.Yr. Class (2)	Quality Class						Not Classi- fiable (9)	Total Area (10)	Remarks (11)
		I (3)	II (4)	III (5)	IV (6)	V (7)	below V (8)			
<u>A. pr.</u>	1901- 1920		5	1					6	
	21-25	1							1	
	26-30	1	1						2	
	31-35	6	2						8	
	46-50		6	2					8	
	51-55		5					2	7	
	56-60							25	25	
	61-65							1	1	
Total		8	19	3				28	58	
<u>S.F.</u>										
<u>A. Alba.</u>	36-40							1	1	
<u>A. Lev.</u>	56-60							1	1	
<u>A. Cons.</u>	61-65							1	1	
<u>Ts.</u>	21-25	1			1				2	
	31-35	1		1	1				3	
	41-45			1					1	
	46-50		3						3	
	51-55		1					8	9	
	56-60							42	42	
	61-65							9	9	
Total		2	4	2	2			59	69	
<u>Th.</u>	1861- 1880							1	1	
	1901- 1920							1	1	
	31-35							2	2	
	56-60							2	2	
Total								6	6	
<u>L.C.</u>	1901- 1920							1	1	
	51-55							5	5	
	56-60							1	1	
								7	7	

Signature

J. Campbell

Date of Compilation

Volume Statement of Growing Stock as at 30.9.19....

Working Plan Area BENMORE
 Complete as necessary {

Section

Working Circle

Felling Series

I

'000
Volumes in hoppus feet

Species or Species Groups (1)	Year Class (2)	Volumes by Size Classes (B.H.Q.G.)						Total Volume (9)	Pre- cision (10)	Current Annual Increment (11)
		2½-6" (3)	6½-9" (4)	9½-12" (5)	12½-15" (6)	15½-18" (7)	18" + (8)			
S.P.	1861-1880	3.0	16.5	33.6	46.5	2.0		101.6		2.0
	1881-1900	.1	.8	1.5				2.4		.1
	1926-1930	25.2	5.6					30.8		2.0
		28.3	22.9	35.1	46.5	2.0		134.8		4.1
C.P.	1926-1930	3.8	10.1	4.2				18.1		1.4
	1931-1935	.4						.4		-
		4.2	10.1	4.2				18.5		1.4
P.C.	1931-1935	2.0	.8					2.8		.4
	1941-1945	3.1						3.1		.3
		5.1	.8					5.9		.7
M.P.	1926-1930	.4						.4		-
E.L.	1861-1880			14.3	27.0	4.9	1.5	47.7		.6
	1881-1900		5.3	45.8	16.3			67.4		.9
	1901-1920		8.2	8.6				16.8		.6
	1926-1930	10.1	22.5	9.1				41.7		2.7
	1931-1935	4.6	5.2					9.8		.8
		14.7	41.2	77.8	43.3	4.9	1.5	183.4		5.6
J.L.	1861-1880			.4	.8	.2		1.4		-
	1901-1920	1.7	21.4	50.0	12.0	.6	.1	85.8		3.1
	1921-1925	.4	1.1	6.1	15.8			23.4		.9
	1926-1930	2.8	11.1	13.9				27.8		1.5
	1931-1935	17.4	79.0					96.4		5.5
	1945-1950	1.4						1.4		.8
		23.7	112.6	70.4	28.6	.8	.1	236.2		11.8
H.L.	1926-1930	1.3	11.3	30.9				43.5		2.3
	1946-1950	.8						.8		.3
		2.1	11.3	30.9				44.3		2.6

Signature

Alampelle

Date of Compilation

Volume Statement of Growing Stock as at 30.9.1961.

Working Plan Area BENMORE
 Complete as necessary {
 Section
 Working Circle
 Felling Series

II.

Volumes in '000
hoppus feet

Species or Species Groups (1)	*p Year Class (2)	Volumes by Size Classes (B.H.Q.G.)						Total Volume (9)	Pre-cision (10)	Current Annual Increment (11)
		2½-6" (3)	6½-9" (4)	9½-12" (5)	12½-15" (6)	15½-18" (7)	18" + (8)			
D.F.	1861-1880				2.8	11.2	125.8	139.8		2.8
	1881-1900		1.9	17.3	78.4	59.2	34.4	191.2		4.8
	1901-1920	.8	15.4	29.3	23.9	7.7		77.1		3.7
	1921-1925	1.1	13.1	11.9	2.9			29.0		1.5
	1926-1930	15.9	53.4	26.1	18.2			113.6		7.3
	1931-1935	11.7	7.5	2.2				21.4		1.8
		29.5	91.3	86.8	126.2	78.1	160.2	572.1		21.9
N.S.	1861-1880			7.5	13.8	15.2	10.7	47.2		1.0
	1881-1900		1.6	6.6	14.4	9.6		32.2		1.0
	1901-1920	.2	1.0	.5	.4			2.1		.1
	1926-1930	22.9	6.4	2.5				31.8		3.1
	1931-1935	217.7	59.4	5.7				282.8		24.0
	1941-1945	2.6						2.6		.8
	1946-1950	2.1						2.1		.7
		245.5	68.4	22.8	28.6	24.8	10.7	400.8		30.7
S.S.	1861-1880					.7	8.2	8.9		.2
	1881-1900				1.4	4.0	.9	6.3		.2
	1901-1920	7.5	43.3	32.0	11.3			94.1		4.5
	1921-1925	2.9	16.2	13.7	3.2			36.0		2.4
	1926-1930	100.0	136.9	21.1	5.3			263.3		26.3
	1931-1935	377.3	200.8	30.4				608.5		67.4
	1941-1945	12.5						12.5		4.2
		500.2	397.2	97.2	21.2	4.7	9.1	1029.6		105.2
A.Gr.	1931-1935	2.7	1.6	.2				4.5		.6
	1941-1945	1.0						1.0		.2
		3.7	1.6	.2				5.5		.8

Signature

Salampou

Date of Compilation

Volume Statement of Growing Stock as at 30.9.1961.

Working Plan Area BENMOREComplete as necessary { Section _____
Working Circle _____
Felling Series _____

III.

/000
Volumes in /hoppus feet

Species or Species Groups (1)	Year Class (2)	Volumes by Size Classes (B.H.Q.G.)						Total Volume (9)	Pre- cision (10)	Current Annual Increment (11)
		2½-6" (3)	6½-9" (4)	9½-12" (5)	12½-15" (6)	15½-18" (7)	18" + (8)			
<i>A.P.P.</i>	1901-1920	1.7	9.0	6.7	3.6			21.0		1.3
	1921-1935	3.7	5.1	.7	.2			9.7		.4
	1926-1930	3.7	2.9	.8				7.4		.5
	1931-1935	7.3	10.6	4.2				22.1		2.8
		16.4	27.6	12.4	3.8			60.2		5.0
<i>S.F.</i>	1936-1940	1.0	.9					1.9		.2
Abies Spp.	1861-1880					4.4	38.8	43.2		1.0
Ts.	1861-1880						1.0	1.0		
	1921-1925	.5	3.0	2.7	.5			6.7		.5
	1931-1935	3.4	3.4					6.8		.8
	1941-1945	.3						.3		-
	1946-1950	2.5						2.5		.6
		6.7	6.4	2.7	.5		1.0	17.3		1.9
Th.	1861-1880						70.0	70.0		1.7
	1901-1920	1.5	9.7	7.2	2.7			21.1		1.1
	1921-1925	1.0	3.9	3.7	1.0			9.6		.6
	1931-1935	5.7	2.9	1.0				9.6		.6
		8.2	16.5	11.9	3.7		70.0	110.3		4.0
L.C.	1901-1920	.3	1.8	1.4	.5			4.0		.2
Seg. <i>W. C.</i>	1861-1880						4.6	4.6		.2
Mixed	1861-1880					7.4	66.0	73.4		2.2
Conifer	1901-1920	.3	3.2	2.8	1.8			8.1		.4
	1931-1935	.2	.6					.8		-
		.5	3.8	2.8	1.8	7.4	66.0	82.3		2.6
<i>Mixed Conifer L.C.</i>	1861-1900			.1	.2	.8	5.3	6.4		.2
Grey Alder	1931-1935	.2	.6					.8		-

Signature *Jabampell*Date of Compilation *27/4/62*

CHAPTER 6 (e)Basic Survey

Was begun on 10th April and finished on 29th June, 1961. All O.S. maps used were 1900 edition except for Argyllshire Sheet CLXXIV S.W. covering the Holy Loch. This was a provisional edition revised in 1946 and printed with major corrections in 1959. None of the forest roads were shown and the tree crop planted in 1927 and 1928 is shown following the old boundary of Finnartmore Wood. In places the new crop boundary is $3\frac{1}{2}$ chains away from the former wood limits.

Method of Survey

Instruments used were Artillery Director and Theodolite with 20 metre chains. The addition to the Younger ^{BOTANIC} ~~Forest~~ Gardens was surveyed 7th - 10th November, 1960, using a chain and compass. As the final boundary line followed for part of its way paths and other detail shown on the 25" to the mile O.S. map, this survey was accepted and scaled down for the basic map.

Forest Boundary

Most of Benmore South boundaries followed existing detail on the ground which was shown on the map. In contrast the North section of Benmore required to have all its top limits surveyed. Both crop and fenceline were traversed where these diverged.

Roads and Rides

All roadlines were surveyed. All rides in plantations over ten years old were surveyed unless it was clear that they would no longer be required as compartment boundaries.

Compartments

These were renumbered and altered to suit the road system of the forest. No boundaries were fixed for dividing compts. 1, 2 and 3 as yet unplanted, similarly compts. 28 and 29.

Compt. 25 is made up of two separate pieces.

"	27	"	"	"	"	three	"	"
"	66	"	"	"	"	four	"	"

Crop Assessment

Part of the Bernice block was assessed 19th - 22nd September, 1961, to provide figures for a R.S.F.S. tour. Work on Kilmun Hill had been spread over several months since it provided work within easy walking distance of the Cot House Garage where the landrover was serviced and repaired from time to time. The remainder of the forest was assessed 19th February - 9th March, 1962.

Minimum size of Sub. Compt. - was 1 acre i.e. between 0.5 and 1.4 acres.

Visual Estimates

In the younger woods these were usually made as follows:-

Within each sub compartment relascope sweeps were taken in conjunction with measurements of top height by hypsometer. As unevenness of growth and stocking increased so the number of sweeps and height measurements rose proportionately. All trees marked for thinning were excluded at time of assessment.

In the old woodland areas along the main public road and in the strips of wood adjoining the fields, a count of stems by species was made and sample trees were girthed and heighted. Volume was calculated on a proportional basis.

On Cruach, basal area was determined by relascope sweep plus several plots. Height measurements were carried out in the normal way - volume being derived from Alignment Charts. In the Younger Botanic Gardens and adjoining acquired woods all trees were girthed and average height measured. Similar procedure was adopted in Compartment 71, and part of 140 and 141. The visual estimates were accepted without amendment and constitute the volume totals on W.P. 4 and W.P. 9.

Forest Inventory

Enumeration was carried out on 15th March to 28th March 1962 - 56 plots being measured. Crops 1921-1945 planting were sampled at an intensity of one plot per 20 acres, i.e. 0.5% sample, whilst the 1901-1920 plantings were sampled at the rate of one plot to each 10 acres, i.e. 1% sample. The 1870-1900 woods had been covered fairly thoroughly by complete enumeration, stem counts and sampling, and by numerous 1/10th acres plots laid down at time of assessment so that no further plots were considered necessary. 14% reduction was made in the increment figures calculated from Yield Tables, i.e. 10% for gaps and understocking and 4% for roads and rides.

General

Compartment and other land areas were measured by planimeter and checked. The total area of the forest was found to be 9156 acres which is 1679 acres less than that appearing from records of acquisitions and disposals. The only explanation which can be offered is the poor definition of boundaries at the time of acquisition. The revised total is accepted as accurate. The total area recorded in the Annual Report as under plantation has also fallen by 362 acres. This can be accounted for by the fact that the Kilmun Arboretum and Forest Plots and the Younger Botanic Gardens are not included in the High Forest Total. Also former woodland on the top of Kilmun Hill has been reclassified as grazing on the W.P. 4. A small area of experimental plots near Bernice Farm has also been excluded from the High Forest Total.

BENMORE

All trees in the Arboretum were girthed and selected trees were numbered, their position being plotted on a 25" to the mile trace. Similarly all trees in the ~~policy woods~~ ^{YOUNGER BITANIC} ~~around Benmore House~~ ^{GARDENS AND ADJOINING WOODS} were girthed. This was done by sections and a volume calculated for each section. Trees too large for volume tables had their volume calculated as follows:- Basal Area at Breast Height x Total Height x Form Factor of .4. The Sequoias in the Avenue and elsewhere were given a F.F. of .30 in volume calculation. Trees chosen by Mr. Mitchell, Geneticist, were girthed and heighted to compare with previous measurements. In random measurements of plots in D.F. on the lower slopes of Cruach Hill several trees over 150 ft. were measured. Tallest tree measured was 162 ft.

Minima for the Enumeration

- (a) No tree of less than $2\frac{1}{2}$ " B.H.Q.G. was considered to have volume.
- (b) In the measurement of the 1/10th acre plots in the Forest Inventory minimum size for the 10 sample trees was $2\frac{3}{4}$ " B.H.Q.G. (as per F.R.31, Ch.22).
- (c) In crop assessment stands which did not exceed 20ft. top height were regarded as having no volume.
- (d) In conifers volume was taken to an overbark top diameter of 3" whilst hardwood volumes were taken to an overbark top diameter of 6" and to the point where the stem lost itself in the crown, whichever came first. Small hardwoods of less than 6" B.H.Q.G. had volumes measured down to 3" top diameter.
- (e) Minimum sub. compt. area recognised was 1 acre but any area 0.5 to 1.4 was deemed to be one acre.

CHAPTER 6 (f)Growing Stock

There are 334 acres of acquired woods dating from 1871 - 1880 and 1916. These are of considerable interest (see appendix) notably the ^{1871 BENMORE} Arboretum ~~1871~~ as a comparison of fast growing N.W. American conifers, the Cruach Wood (1879) with fine timber and sample plots of D.F. and S.S. and the Corrach (1916) an interesting mixed stand of S.S., A.Gr., Ts., Thuya etc. which has suffered from underthinning in the war years. In some of these older woods good natural regeneration occurs e.g. C.58 where Ts. is abundant along with S.S., J.L. etc.

The earlier Forestry Commission plantings took the form of large blocks of one species while in later plantings, although pure crops predominate, the species changes with changes in ground ^{VEGETATION} ~~regeneration~~. Planting of mixtures has been done only on a very limited scale.

Growth is typically highly variable, being extremely fast in sheltered pockets of deep soil (e.g. Benmore Arboretum) but rapidly tapering off on the middle and upper slopes where exposure can be very severe and where erosion has led to great variation of soil depth. These factors combine to depress the average quality classes. Windblow is on a small scale only. Damaged butts are common on steep slopes due to extraction and in Bernice Upper due to red deer. Performance of individual species ^{is} ~~are~~ briefly described below and the dominant quality class for each species is given:-

S.P. 158 acres Quality Class III

Crops are slow growing and the species seldom retains more than 1 year's needles over winter.

C.P. 23 acres Quality Class III

Crops are healthy even on exposed sites, fast growing but rather coarse. There are excellent crops in the neighbourhood (e.g. Knockdow) and the species may have value.

P.C.

Except for a small promising stand in C.119 crops are not yet of measureable size.

E.L. 108 acres Quality Class III

Canker is common in young crops but there is good evidence in the Acquired Woods (Benmore & Rashfield) that excellent E.L. can be grown.

J.L. & H.L. 436 acres Quality Class III

Both species grow fast and well. There are 7 acres of Quality Class I J.L. e.g. C.21. The species has successfully withstood heavy selective felling in the Forest Garden and Cruach without serious windblow resulting and evidence of Sample Plots appears to indicate the species will go on growing over a long rotation.

D.F. 198 acres Quality Class III and IV

The Acquired Woods contain very fine timber and the species generally show similar promise in younger plantations so that there is a strong temptation to indulge in selective pruning.

N.S. 307 acres Quality Class III (with 19 acres in Quality I).

This species is prone to winter browning of needles in early stages and loss of crown density and some dieback in later pole crop stages, particularly in exposed sites. On Kilmun Hill at 900' elevation there are 90 year old N.S. with a top height of 5' demonstrating the limitations of the species for coastal plantings. Mixtures of N.S. and S.S. are generally very promising.

S.S. 1141 acres Quality Class IV - V (with only 6 acres in Quality II).

The species is generally healthy throughout the forest except for attacks of *Neomyzaphis* and occasional *Rhinizina inflata* group dying (e.g. C.107). At 1200' on Kilmun Hill a P.31 crop has maintained an average of 1' height per year or 40 c.ft. per acre per annum M.A.1.

A. Grandis 10 acres Quality Class III

Grows with extreme rapidity but suffers from blast at all ages and is susceptible to wind break in late pole crop stage if drawn to any degree.

A. Nobilis 58 acres Quality II (with 8 acres Quality I).

This species stands severe exposure and grows very rapidly. On over rich sites e.g. Kilmun lower slopes, it suffers drought crack and such sites should be avoided.

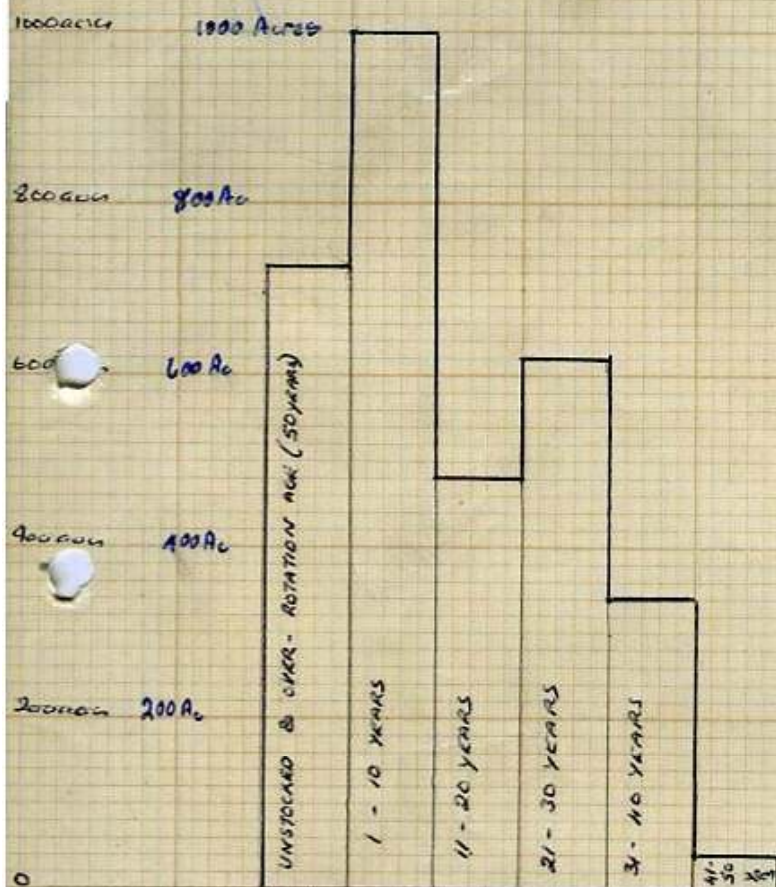
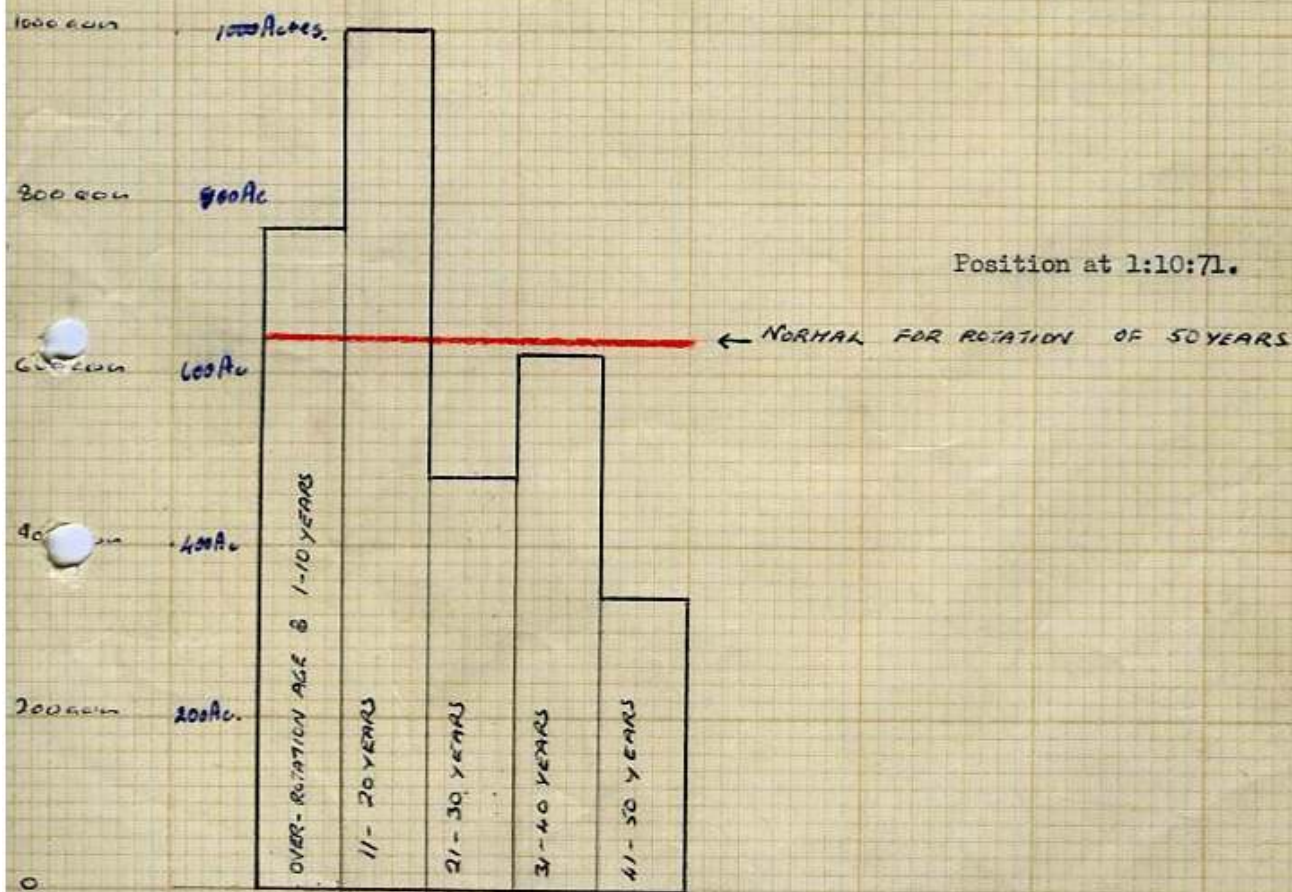
Tsuga 69 acres Quality Class II - III

The Bormore Botanic Gardens contain the tallest tree of this species in Britain. Crops are fast and healthy except on full exposure. It mixes well with other species and regenerates freely. It casts heavy shade and is therefore good for rhododendron suppression.

Thuja and L. Cypress

Although these species grow fast their tender bark makes them prone to heart rot on slopes where damage during extraction is inevitable.

Cryptomeria Japonica, *Nothofagus procera* and *Populus Trichocarpa* x *tacamahaca* also grow well.



CHAPTER 6 (g)Seed Origins

There are no useful records available on Seed Origins.

The following seed stands occur on the forest:-

D.F. C. 50	Ardbeg	1 acre
D.F. C.139	Cruach	10 acres
D.F. C.141	^{BENMORE} Arboretum	1 acre

Other good stands are included in the Research Branch Sample Plots of J.L., A.N., C.P. and H.L.

COPY/R

BL

Conservator West (Scotland)

Felling of Seed Stands

Further to Director (Scotland's) minute dated 4th July, 1963 you may like to bear in mind that if treatment is necessary against Megastigmus it would have to be applied at about the end of May, which of course is earlier than the usual date for assessment for cone crops.

list of stands from which clear-fellings are to be chosen for the future pulpwood supply.

I would just mention that it would be desirable to check, if possible, these stands, and that he can advise, in

John T. Stoakley
Assistant Forest Entomologist
12th July, 1963

(Sgd) H. T. P. Larsen

Copy to: Director (Scotland) for the attention of
Mr. Larsen

CHAPTER 7 - ORGANISATION(a) Previous Plans

There has been no previous plans covering the area. Forestry Commission Plans of Operations giving 5 yearly forecasts have been in operation since 1954 and these, together with the Annual Financial Estimates, have been the main guides to management. There is also an agreed annual programme of work to be done by Benmore Forest School.

(b) Administrative Subdivisions

The forest is divided into two beats, the south beat being a much smaller charge than the main beat, which includes most of the older Acquired Woods, The Gardens, The Arboretum, The Sawmill, The Nursery and the Clachaig Block. For thinning and drain maintenance purposes the forest is divided into three 'Working Blocks' each of which is subdivided geographically into 3 or 4 separate areas for ease of working. The average size of compartments is 23 acres. Boundaries of these are roads or natural features or, exceptionally, arbitrary lines.

Compartments are numbered	1	-	71	(South)
	101	-	155	(North)
	201	-	210	(Clachaig)

(c) Management Subdivisions1. Working Circles

The forest consists of one Working Circle despite the fact that certain of the older acquired woodlands call for special treatment.

2. Felling Series

There is one felling series.

3. Cutting Sections

NIL.

4. Sub-compartments

These are kept to a minimum, showing age and species only.

CHAPTER 8Planting Rate and Resumption of Land(a) Planting

The following list shows the areas planted each year according to existing records including the R.I. Plantings done during P.Y.36 to P.Y.40 inclusive were later transferred to Loch Eck Forest. Only small areas were planted in the F.Y.42 - 47 period due to the war. In recent years a small programme has been maintained for the benefit of the Benmore Forestry School but with the addition of further plantable reserves this has been increased to 50 acres per annum from 1962.

P.26 -	P.30 - 8	P.40 -	P.50 - 114	P.60 - 34
27 - 88	31 - 194	41 - 3	51 - 188	61 - 35
28 - 20	32 - 115	42 - 35	52 - 257	62 - 50
29 - 181	33 - 143	43 - 24	53 - 184	
	34 - 115	44 - 24	54 - 82	
	35 - 110	45 - 32	55 - 70	
	36 -	46 - 27	56 - 65	
	37 -	47 - 73	57 - 75	
	38 -	48 -	58 - 36	
	39 -	49 - 163	59 - 34	

These areas are based on the best records available and they total 2568 acres. If the 1961 Enumeration area of 334 acres of Acquired Woods is added to this the total becomes 2892 acres compared with the total according to the enumeration of 2804 acres. These figures exclude the ^{KILMUN ARBORETUM AND FOREST PLOTS AND YOUNGER} ~~Forest Garden~~, Benmore Gardens and other uncompartmented woodlands.

(b) Resumption

Cs. 110 - 112 Bernice is being resumed from Benmore Farm as at Martinmas 1962. The grazing areas at Clachaig are let on a seasonal basis only. No further resumptions of land for planting are foreseen. The total reserve of plantable land is thus 413 acres.

CHAPTER 9Silviculture(a) Silvicultural Systems

Afforestation for the formation and maintenance of coniferous high forest.

A small area round the ^{YOUNGER BOTANIC} ~~Bosmore~~ Gardens and other areas of special interest are managed on a selection system. Here group selective fellings for the relief of natural regeneration and with a view to underplanting have been carried out.

(b) Thinning

This has usually begun when crops reached 30' top height. The cycle laid down is 3 years but exceptionally crops of S.S. and commonly crops of Pine and Norway Spruce are thinned at 6 yearly intervals. The weight of thinning has varied over the years but the average results have been similar to the Research Grade C/D, larch on the average being treated more heavily than other species.

As from F.Y.60 the following areas receiving Crown Thinning with the dual object of increasing current sawlog production from thinnings and obtaining the maximum increment on 100 selected best trees per acre:-

Coirantee 113 - 122
Bernice 53, 54, 56, 58

From the same date thinning of inaccessible areas has been stopped on economic grounds.

(c) Clear fellings have been recorded as follows:-

F.Y.57	C.53	Pucks Glen	N.S./S.S.	} 17 acres
	C. 3	Craigiemore	N.S./E.L./ <i>Other Conifers</i>	
	C.141	Benmore	N.S./ <i>Other Conifers</i>	
F.Y.58	C. 3	"	"	15 acres
F.Y.59	C.53	Pucks Glen	Mainly Scrub	5 acres
F.Y.60	C.47	Rashfield	S.P./N.S.	} 15 acres
	C. 3	Craigiemore	N.S./E.L./ <i>Other Conifers</i>	
F.Y.61	C. 3	"	"	1 acre

The above fellings were all in the nature of removal of over mature inferior crops. Selective fellings have been carried out as follows -

F.Y.	C.140	D.F.	To encourage regeneration	15 acres
F.Y.60	C.135	J.L./A. <i>PL</i>	To relieve A. <i>PL</i> understorey	6 acres
	C. 58	J.L./S.S.	To release natural regeneration	3 acres
F.Y.61	C. 68	D.F./Hardwoods	To remove over mature S.S.	3 acres

Choice of Species, Preparation of Ground and Planting Methods

(a) Choice of Species

The older acquired plantations, and the Kilmun Arboretum provide ample evidence that a very wide range of species can be successfully grown at Benmore. The Forest History (S. M. Petrie 1951) gives details of the choice in the past.

The present policy is to favour Sitka Spruce as the main species, but it is not planted on sites with strong calluna. On a very small scale on drier S.S. sites Tsuga has been mixed with the S.S. to the extent of approximately 10%. This it is hoped would provide shading of rhododendrons and help in stability and regeneration later in the life of the plantation.

P. contorta is used for the poorest heather sites.

Norway Spruce is restricted (because of exposure) to the more sheltered lot wet ground.

Japanese or Hybrid Larch is used now primarily for firebreaks and amenity.

Abies procera is used on high dry exposed mineral soils.

Douglas Fir and European Larch are used on free draining slopes of richer type where there is a possibility of growing good quality stands.

Other species which have been used on selected sites on lower and middle slopes are *Abies grandis*, *Thuja plicata* and Corsican Pine mainly for variety and amenity.

Planting is mainly in pure blocks although mixtures of two species are common, e.g. on marginal sites.

(b) Preparation of Ground

Practically no ploughing has been done mainly due to slopes and rocks.

Bracken ground and the better old woodland sites are flat planted on screefs and the remainder is turved either from drains or by lingeing.

Some planting is done under shade but generally it is necessary to clear and plant because shade methods tend to encourage rhododendron.

Normal spacings are adopted throughout.

CHAPTER 11Establishment and Maintenance(a) Fencing

The plantations are protected by sheep net or rabbit net fences along marches or farm boundaries throughout. There are no deer fences. There are iron paling fences dating from 1871 at the ^{YOUNGER BOTANIC} Gardens and ^{BENMORE} Arboretum, believed to have received a major repair for the first time in 1960.

(b) Weeding

As standard practice.

(c) Beating Up

As standard practice. Severe damage has been done in the past by sheep. Improved fences and the installation of grids have almost solved this problem.

(d) Cleaning

Seldom done except for limited removal of hardwood regrowth in thicket stage plantations.

(e) Draining

Regular drain maintenance follows thinning on a three year cycle. The chainage maintained is high and efforts are being made towards greater selectivity and more attention to deepening of important drains.

(f) Racking

Done only in connection with drain repairs before thinning.

(g) Brashing

Partial brashing done in the past has provided extraction problems. Brashing is now not less than 80% of the crop.

(h) Pruning

None.

(i) Other Operations

At one time rhododendron regrowth was pulled up by the roots to prevent spread.

CHAPTER 12

Enrichment and Rehabilitation

Nil.

CHAPTER 13

Regulation of Yield

Methods of Yield Regulation

In 1955 production areas were divided into blocks to provide roughly equal areas and yields on a 3 year cycle. A production squad was tailored to fit this programme. In this way although windblows and roadline fellings may cause temporary arrears of thinning programme, the annual yield remains regular. The position now is that on a basis of 80m c.ft. per annum the forest keeps roughly in step with the 3/6 year cycle, minor fluctuations being absorbed by increased use of contractors.

Record of Past Yields from Thinning ~~1951-1952~~

Form WP 13

Working Plan Area

BENMORE

Volumes in 000's h. ft. over bark
Areas in acres* Complete as
necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech		Other B-leaved Species	
		Volume (3)	Area (4)	Volume (5)	Area (6)	Volume (7)	Area (8)	Volume (9)	Area (10)	Volume (11)	Area (12)	Volume (13)	Area (14)	Volume (15)	Area (16)	Volume (17)	Area (18)	Volume (19)	Area (20)
53	Total		210																
	2 1/2"-6"																		
	6 1/2"-9"																		
	Over 9"																		
54	Total	97028	318	(above)															
	2 1/2"-6"	83488	296	7566	31	40934	184	16300	41.5	8106	35.5	1128	4						
	6 1/2"-9"	13540	22			546	3					12994	19						
	Over 9"											*6787							
55	Total	83665	237	(above)															
	2 1/2"-6"	25976	118	472	3	12037	85	2593	18	619	4	10255	8						
	6 1/2"-9"	57689	119			8218	24	920	4	3348	13	45203	78						
	Over 9"					*850		*400				*15740							
56	Total	100045	292	(above)															
	2 1/2"-6"	37591	213	764	11	27989	145	3463	41	2220	11	3455	5						
	6 1/2"-9"	62454	79					19817	24.5			42600	54.5	37					
	Over 9"							*1531				*3066							
57	Total	69207	220.5	(above)															
	2 1/2"-6"	44206	194	2789	22	29386	99	7586	45.5	4445	27.5								
	6 1/2"-9"	25001	26.5	86	.5	776	6	3466	15.5	558	4.5	20115							
	Over 9"			*178		*7552		*2635		*529		*20115							

* Vols. incl. in Totals: 2140800, 2000000, 2000000.
AND. RESERVE. B.O. NO. 1000000.

Working Plan Area

PENMORE.

Record of Past Yields from Thinning

Form WP 13

Volumes in 000's h. ft. over bark

Areas in acres

* Complete as
necessity

* Section

* Working Circle

* Felling Series

Species and Species Groups

Year (1)	B.H.Q.G. Classes (2)	Total		Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech		Other B-leaved Species	
		Volume (3)	Area (4)	Volume (5)	Area (6)	Volume (7)	Area (8)	Volume (9)	Area (10)	Volume (11)	Area (12)	Volume (13)	Area (14)	Volume (15)	Area (16)	Volume (17)	Area (18)	Volume (19)	Area (20)
58	Total	58223	248	(42000)															
	2 1/2"-6"	46380	252	390	3.	36706	20.5	7677	30.5	672	3.	935	5						
	6 1/2"-9"	6412	16			2469	7.	1886	4.	867	3.	1190	2.						
	Over 9"	5431				8766	51	* 1525		155		5632		69	-				
59	Total	105821	368	(42000)															
	2 1/2"-6"	77035	295	2161	17.5	59892	22.8	9651	29.5	2427	15	2904	5						
	6 1/2"-9"	28786	73			10558	40	9992	22.	2783	6	5453	5						
	Over 9"			* 717		* 3154		* 3754		* 643		* 2159							
60	Total	111272	195	(42000)															
	2 1/2"-6"	33623	112.5	268	1.5	27588	12.5	767	11.5			5000	37						
	6 1/2"-9"	77649	82.5			2507	14.	25264	44			49781	24.5	97					
	Over 9"					* 3216		* 480				* 4920							
61	Total	90050	232	(42000)															
	2 1/2"-6"	36750	87.5	4177	15	26886	54.5	2138	8	2544	10.	1005							
	6 1/2"-9"	53300	144.5	2972	8	14957	49.5	13158	56.	8590	10	12762	21	53					
	Over 9"			* 411				* 455		* 471		* 4686							
62	Total	35597	22.1	(42000)															
	2 1/2"-6"	11106	17.			6884	17.	806				3416							
	6 1/2"-9"	24491	51			1716	1.5	6280	2	9150	.5	6584	1.1	761	1.				
	Over 9"					* 1746		* 6277		* 8793		* 9644							

VOLS. INCL. IN TOTALS: WINDBLOW, ROADLINE.

* RESARCH BR. NO AVERAGE.

Record of Past Yields from ~~Thinning~~/Felling

Form WP 13

Working Plan Area

BENMOAE.

Volumes in 000's h. ft. over bark

Areas in acres

* Complete as
necessary

* Section

* Working Circle

* Felling Series

Species and Species Groups

Year (1)	B.H.Q.G. Classes (2)	Total		Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech		Other B'teaved Species	
		Volume (3)	Area (4)	Volume (5)	Area (6)	Volume (7)	Area (8)	Volume (9)	Area (10)	Volume (11)	Area (12)	Volume (13)	Area (14)	Volume (15)	Area (16)	Volume (17)	Area (18)	Volume (19)	Area (20)
57	Total	47350	17																
	2 1/2"-6"																		
	6 1/2"-9"	47350	17					11789	5			35561	12						
	Over 9"																		
58	Total	26147	15																
	2 1/2"-6"	7348	6.5					1702	1.5			5646	5						
	6 1/2"-9"	9807	5.5					2344	2.5			7463	3						
	Over 9"	2992	3					737	1.			2255	2.						
59	Total																		
	2 1/2"-6"																		
	6 1/2"-9"																		
	Over 9"																		
60	Total	6079	15																
	2 1/2"-6"	2033	5									2033	5.						
	6 1/2"-9"	3078	6									3078	6						
	Over 9"	968	4									584	3						
61.	Total	537	1																
	2 1/2"-6"																		
	6 1/2"-9"	537	1									537	1.						
	Over 9"																		

CHAPTER 14Forest Roads And Access(a) Construction

Plantations older than P.41 are roaded to present standards. A further 3 miles of road are required to serve younger areas and slow growing upper slopes. The present total length of forest roads is 23 miles. Roads conform to a minimum specification of 9' width, 1 in 10 slope and 30' turning radius, but there are notable exceptions to this viz.

Burma Road 1:6, Kilmun Hill Road at Old Inns 1:6, Forest Garden 1:9.

(b) Maintenance

There is considerable scope for the improvement of road drainage and the removal of berms to facilitate maintenance by grader. Day to day maintenance is done by the forest squad and an important aspect of this is prompt action to clear blockages during heavy rains, with a view to minimising the serious washouts which occur from time to time.

(c) Access

A satisfactory road layout has not been possible for Cruach Hill due to steepness and rock and there are difficulties in Cs. 61 - 65.

The following areas are inaccessible for normal horse extraction and although some of these may be workable by winch they call for special consideration in so far as a thinning regime is concerned:-

Approximate Acreage

C.101	10
C.102	15
C.103	10
C.104	5
C.105	10
C.108	15
C.109	20
C.122	5
C.133	10
C.135	5
C.136	5
C.138	30
Total	140 acres

CHAPTER 15Powered Vehicles and Machines

The following is held on the forest:-

Morris Van 10 cwt.	F.C. No.	2597
Bedford Lorry 3/5 ton.	" "	2161
Fordson Tractor	" "	2846
" Trailer	" "	2949
Massey Ferguson Tractor	" "	3729
" " Bagg Plough	" "	3783
Liner Portosaw (Diesel)	" "	0646
Blackstone Engine (Diesel)	" "	0602
Clifford Cultivator	" "	3311
Allan Scythe	" "	3476
Allman Pump	" "	2756
Hathaway Pump	" "	2727
" "	" "	3347

CHAPTER 16 - MARKETING AND EXPLOITATION(a) Marketing1. Standing Sales

The chief markets for sawlogs are at Strachur and in the Clyde Valley. The market for pitwood includes Ayrshire, The Central Lowlands of Scotland and the North of England and pulp at present goes to Liverpool. The forest lies just within the supply area for the Fort William Pulp Mill although the distance is over 100 miles. There have been only occasional standing sales because of the need to reserve spruce timber for the Cowal Ari Mill. Recently the position has eased and a small proportion is being sold standing, including small lots to a local contractor.

2. Departmental Working

The chief markets are as above. The Cowal Ari Sawmilling Co. takes the bulk of the white wood sawlogs produced and also some Scots pine. Other merchants operating in the area include:-

Messrs. Alex. Mair & Son, Auchengate, Troon.

Messrs. A. Wilson & Sons, Troon.

Messrs. G. Shanks & Sons, Coatbridge.

Messrs J. Kennedy & Co.Ltd., 69 Buchanan Street, Glasgow, C.1.

There are no long term contracts although attempts are being made in this direction.

The specification for logs to the Ari Mill is:-

Logs 10 ft. and up averaging 15 ft., minimum top diameter under bark 6" and until recently maximum butt diameter of 22 inches. An over-saw has now been fitted and this restriction of 22" is not now in force. The current requirements are 250,000 h.ft. per annum, but this could readily be doubled should supplies be available. Of the present requirements Benmore supplies 20,000 to 30,000 h.ft. per annum.

For these logs the current roadside prices are:-

6 - $7\frac{3}{4}$ M.Q.G.O.B. $2/7\frac{1}{2}$ d per c.ft.

8 - $11\frac{3}{4}$ M.Q.G.O.B. 3/- per c.ft.

12 - M.Q.G.O.B. $3/6$ d per c.ft.

for logs 7' and 9' with minimum top diameter of 6"
the price at roadside is $2/8\frac{1}{2}$ d per c.ft.

Logs of over Cowal Ari size (22" maximum butt diameter) are readily marketable and the current price range is 3/- to $3/3$ d per c.ft. with prices over 4/- per c.ft. for European larch.

Logs of inferior quality including those unsuitable for the Cowal Ari Mill, realise prices of $2/3$ d to $2/6$ d per c.ft. and the pitwood in length price is 2/- per c.ft.

These prices are all appreciably lower than in previous years. In F.Y. 60 for instance /

instance heavy logs were priced at 4/- per c.ft., inferior logs realised 3/- per c.ft. and 2/3d was paid for pitwood in length. Pitwood is composed of whole trees in length not large enough to provide sawlogs or that part of the tree remaining after sawlogs have been removed.

The average cost of production during F.Y. 62, excluding overheads but including P.V. & M. charges and hire charges where applicable, were -

Marking and Measurement	^{1.6} 4/6d per c.ft.
Thinning	^{4.5} 4/5d per c.ft.
Extraction	^{11.4} 11/4d per c.ft.
	17/5d per c.ft.
	17.5d.

(b) Exploitation

1. Standing Sales

There is no defined policy on size of coupes. Measurement is by tariff. All sales are subject to standard conditions.

2. Commission Working

Measurement

Merchants have been accepting the tariff measurement of all sales of earlier thinnings. When the proportion of logs exceeds that of pitwood the merchant can hardly be expected to accept the volume of pitwood as the tariff measure minus the volume of measured sawlogs and a "one in ten" or other method of sample measure is then done for pitwood. Sawlogs are normally measured individually by supervisory staff and in practice merchants accept the Commission measure. Sales are at roadside but very large logs and occasional other lots can be sold only F.O.T. In the case of the Ari Mill, tally sheets go with each load and are checked and any rejects may be returned to the forest.

Supervision

There is one beat Forester and one beat Assistant Forester who are concerned mainly with supervision of marking and measuring, improving efficiency and recording.

Protective Measures

All sales are subject to standard conditions.

Extraction Methods

The main method is horse dragging with chains and swingle trees by horses owned by Commission employees, or by contractors. A Fordson major with Bowden winch and 350¹/₂" chain cable is used for heavy timber, mainly in and around the policies. On steepest slopes hand extraction is carried out and on the most difficult ground a combination of hand extraction, timber shutes and horse dragging /

dragging may be adopted. Under these conditions, however, production becomes unprofitable except for timber of higher price category. A promising new method of extraction is being developed by Work Study based on the Isachsen Winch, and special Scandinavian horse equipment is on trial with a view to eventually overcoming the severe rutting and root damage which occur with tushing.

Conversion

Crosscutting of sawlogs is normally done by the fellers to specified sizes. Occasionally it may be done by the horsemen. There is a sawmill (Lister 35 h.p. diesel engine) at Benmore which produces approximately 5,000 c.ft. of timber per year for use on forests throughout the area.) The mill has been run for the convenience of having ready supplies of estate joinery and fencing timbers and as a means of disposing of unsaleable, inferior timber. Worked in this way the direct labour sawing costs are 2/- per c.ft., output amounts to about 50% of input and P.V. & M. charges are 4/6d per hour. Stobwood is produced rather more economically - probably equivalent to a selling price of 7/6d per c.ft. (There is a 15' creosote tank working on a 24 hours hot and cold cycle treating fencing materials for the area. The current direct cost of labour is 2/-. Although improvements in design will speed the operation, the cost will remain high so long as it is used as a means of employing two ageing substandard workers.

Contractors

It has been the practice for contractors to do approximately $\frac{1}{3}$ rd of the production programme but during the present period of poor markets and low production the contractors have changed over to standing sales. In general, because of the high overheads of Commission employees, it is found that work may be done rather more economically by contractors.

Observations

Departmental working has been adopted to ensure that the Ari Mill is adequately served. For this reason and because of inaccessibility, regular standing sales have not been possible. There are indications that standing sales would pay better than department working, and a new Merchant (Mr. McAlinsh, Crieff) has now started to purchase standing thinnings.

CHAPTER 17 - RISKS

(a) Animals

Red Deer

Numbers limited but capable of rapid increase and difficult to control.

Roe Deer

As red deer, control less difficult. No deer fencing has been erected except at Kilmun Arboretum and Forest Plots.

Rabbits

Numbers low but still sufficient to cause damage. Control very difficult due to rhododendron and, on the Kilmun Block, to numerous small adjoining feus.

Hares

Not a major pest.

Voles

No serious infestation since 1946.

Sheep

Where ever weaknesses in fences occur, sheep invasion in early spring becomes serious.

Badgers

Becoming very numerous.

Foxes

Controlled in co-operation with Cowal Fox Hunting Association.

Red Squirrel)

Stoat) Present in small numbers.

Weasel)

Protection is organised on a district basis with a ganger trapper in charge, stationed at Benmore Forest. There are also two full time trappers on the forest.

Red deer shooting is confined to open seasons except when arable crops are threatened. The continental high seat methods are being adopted for roe deer control. Cymag is the basis of rabbit control with concentrated efforts on specific trouble spots.

Neither deer nor rabbit fencing is used.

Birds

Blackgame do limited damage in the more remote parts.

Insects

Tripondedron has been troublesome since 1960. Control is by limited stocks of felled produce in April - July and spraying of logs. Midges affect work on certain days.

Weeds

The tremendous vigour of rhododendron in the area must have a marked affect on silvicultural prescriptions. Areas liable to be invaded cannot be left with a partial crop on the ground.

Fungi

Creosoting of stumps against Fomes is standard practice. Fires within plantations are prohibited because of Rhizina infection which has occurred in several areas, especially at Bernice.

Climate

Heavy rainfall reduces working hours. It also causes flood and erosion damage at frequent intervals to drains and roads. Special care must be taken in changing of the existing watercourses, especially where we march with building feus. Storm damage is frequent but because of the broken nature of the ground, blows of more than 10m c.ft. are rare. Sea blast from summer gales causes temporary damage to all species, especially Ab. Grandis, N.S., Larches and the minor species. Spring frosts are seldom severe.

Fire

Although the area is part of a Forest Park, the main fire season is over before the holiday season when the public begin to frequent the forest in considerable numbers.

CHAPTER 18

Nursery

Work is organised so that the small (9 acres) but desirable nursery is maintained with a minimum of interference with other forest programmes. Some of the work is done by older employees who are no longer fit for forest work and some is done by students from Benmore Forest School. One section is reserved for the Research Branch and another for the production of hardwoods for amenity plantings. The nursery is clean and quality of plants produced is high.

CHAPTER 19 - STAFF & LABOUR(a) StaffConservators

1946-48 A. Watt

1948 ~~to date~~ ¹⁹⁶⁴ J. E. James^{1964 to date}
Divisional Officers Mr Zehner

1925-1934 J. M. Murray

1934-38 O. J. Sangar

1938-39 A. H. Gosling

1939-45 J. A. B. Macdonald

1945-46 A. Watt

State Forest Officers

1947-48 J. E. James

1948-51 H. V. S. Dier

1951-57 H. A. Maxwell

1957 to date T. A. Robbie

There is a Head Forester in charge with one Assisting Forester responsible for the North Beat, an Assistant Forester on the South Beat ^{and for general supervisory duties} and an Assistant Forester in the Nursery ^{and in training for general supervisory duties}.

Details of the present labour force are as follows:-

<u>Age Group</u>	<u>Men</u> <u>Labour</u>	<u>Grade I</u> <u>Workers</u>	<u>Gangers</u>	<u>Specialists</u>	<u>Women</u>	<u>Total</u>
Under 20 yrs.	6	-	-	-	1	7
21 - 40 "	4	3	-	3	1	11
41 - 60 "	9	2	4	4	2	21
Over 60 "	1	1	-	-	-	2
Totals	<u>20</u>	<u>6</u>	<u>4</u>	<u>7</u>	<u>4</u>	<u>41</u>

Total Established Workers - 16

The average annual wastage is 20%. This high figure of wastage is found almost entirely in the under 20 year class in contrast to the remainder of the squad which is fairly static, of good average quality and mainly living locally. The wastage is due primarily to the comparatively low level of wages in the forests.

Reporting Points on the forest are:-

CHAPTER 19 - STAFF & LABOUR(a) StaffDistrict Officers

1922 - 27	J. Hunter Blair
1927 - 31	J. Fraser
1931 - 38	A.H. Gosling
1938 - 46	H. Watson
1948 - 54	S.M. Petrie
1954 - 57	M. MacPherson
1957 to date	W.B. Sutherland

Foresters - in - Charge

1926 - 35	A. Grant
1935 - 40	R.R. Donald
1940 - 46	J. MacLean
1946 to date	J. Jackson

There is a Head Forester in charge with one Assisting Forester responsible for the North Beat, an Assistant Forester on the South Beat ~~and for general supervisory duties~~ and in training for general supervisory duties. ~~and an Assistant Forester in the Nursery~~

Details of the present labour force are as follows:-

<u>Age Group</u>	<u>Men Labour</u>	<u>Grade I Workers</u>	<u>Gangers</u>	<u>Specialists</u>	<u>Women</u>	<u>Total</u>
Under 20 yrs.	6	-	-	-	1	7
21 - 40 "	4	3	-	3	1	11
41 - 60 "	9	2	4	4	2	21
Over 60 "	1	1	-	-	-	2
Totals	<u>20</u>	<u>6</u>	<u>4</u>	<u>7</u>	<u>4</u>	<u>41</u>

Total Established Workers - 16

The average annual wastage is 20%. This high figure of wastage is found almost entirely in the under 20 year class in contrast to the remainder of the squad which is fairly static, of good average quality and mainly living locally. The wastage is due primarily to the comparatively low level of wages in the forests.

Reporting Points on the forest are:-

South Beat - Dunselma
North Beat - Canopy

Piecework is available for a variety of operations. Piecework rates are based on Work Study Booklet to which a 10% policy allowance is added.

Production work offers the best prospects for young men and it is of paramount importance that this field of employment should remain open.

CHAPTER 20Houses and Holdings, Other Buildings and Special Installations(a) Houses and HoldingsForesters

There are two official Foresters' houses which together with the flat in Benmore House form permanent Forester accommodation at present.

- (1) "Cedar Lodge", a pre-war Canadian cedar bungalow at Rashfield with four apartments and modern conveniences. Inadequate by present day standards for a Supervisor's house. (It presently houses the Head Forester).
- (2) "Dunselma", a stone built detached house at Strone with five apartments and modern conveniences. This house is at present empty following an outbreak of Dry Rot. It was previously a Supervisor's house.
- (3) Self-contained flat in Benmore House with five apartments and modern conveniences, presently occupied by one of the Education Branch Foresters.

The remaining Foresters and those belonging to the Research and Education Departments are housed in Swedish timber houses originally intended for workers.

Workers

There are 37 houses originally intended for workers though some are meantime let on non-service tenancies:-

- 4 Castle Cottages, Blairmore: Terraced stone built range of old estate houses on Blairmore Farm, two having 4 apartments and two having 3. W.C's only. Mains electricity. Cannot be economically or conveniently brought up to Forest Worker house standard.
- 1 Seaforth Cottage, Kilmun: A small timber two apartment house, with bathroom but inadequate for a Forest Worker. Presently let on Non-service tenancy basis to widow of a Retired Worker.

- 2 Courtyard and Clock Tower Cottages, Benmore. Stone built former estate houses of three and four apartments with modern conveniences. Both houses have inconvenient layout and latter is vacant.
- 2 Cruach Cottages, Benmore. Old semi-detached brick houses of three apartments each, in poor order. Un-suitable for improvement to Forest Worker standards. W.C.'s only and electricity. Presently let to retired workers.
- 1 Bernice Holding, Bernice. Agricultural holding, stone built farm house of seven apartments with modern conveniences but no electricity because of isolation. Lighting is by calor gas. This is considered to be an essential strategic house for a Forest Worker.
- 2 Deerpark Cottages, Deerpark. Former estate stone built cottages of three apartments with modern conveniences. One is presently occupied by retired former Estate employee.
- 8 Swedish Houses, Deerpark. Post-war timber houses of four apartments each with modern conveniences. Adequate for Forest Workers
- 1 Glenmassan Cottage, Glenmassan. Old wooden house with bathroom, three apartments. Isolated. Presently let on non-service tenancy basis. The house is below normal Forest Worker standard.
- 1 Stonefield Holding, Glenmassan. Stone built farmhouse with five apartments with modern conveniences but no electricity. Very isolated. Adequate for Forester Worker but may be difficult to keep a settled tenant in spite of the attraction of Holding land.

2 Glenlean Cottages, Glenlean. Old stone built house later subdivided to give two houses of three apartments each with bathrooms and mains electricity. Rather isolated and difficult to keep Forest Worker tenants. Both houses are presently let on non-service tenancy basis.

In addition there are three farms under Commission's direct management at this forest, the Home Farm, Rashfield and Blairmore.

Summary of Houses and Holdings

Foresters' Houses	3	} Service tenants or occupiers.
Forest Workers' Houses	17	
Forest Workers' Holdings	6	
Workers' Houses	13	} Non-service tenants.
Houses at disposal of M.O.W.	5	
Farms	3	
Holdings	1	
Total	48	Not including farm cottages, bothies etc.

In order to accommodate in Foresters' houses all those presently living in Workers' houses, a further four houses would need to be built and Dunselma repaired. If this course is decided upon the Commission would arrange for the work. Suitable but limited sites are available on their own ground at Kilmun. Of the Foresters mentioned above one belongs to the Research Branch and one to Education.

There are sufficient workers' houses for present needs and, if Foresters presently occupying such dwellings are rehoused, a further four would be released for possible expansion in the future.

(b) Other Buildings /

- 1 Quarry Cottage, Rashfield: A small timber house with two apartments and modern conveniences.
- 1 B.T.H. "Riverside" Rashfield: Post-war modernised timber house of four apartments.
- 1 Puck's Glen, Uig. Former Poultry holding pre-war brick and rough cast house of three apartments with modern conveniences.
- 1 F.W.H. 2, Uig. Agricultural holding, old stone cottage of three apartments in semi-derelect condition. Vacant, surplus to Commission requirements.
- 1 F.W.H. 3, Uig. Agricultural holding, pre-war brick and rough-cast house of three apartments with modern conveniences.
- 1 F.W.H. 4, Uig. Agricultural holding, old stone house of three apartments with modern conveniences
- 1 F.W.H. 5, Uig. Agricultural holding, pre-war brick and rough-cast house of four apartments with modern conveniences.
- 1 F.W.H. 6, Uig. Former poultry holding, old stone cottage of three apartments. In semi-derelect condition.
- 1 Temporary House, Uig. A small timber two apartment house with W.C. only and mains electricity.
- 2 Riverside Cottages, Benmore: Substantial stone built estate cottages, one of five apartments and one of three apartments, with modern conveniences.
- 2 B.T.H.'s, Benmore. Temporary wooden houses of three apartments with modern conveniences. One presently let on non-service tenancy basis to retired Worker.

(b) Other Buildings

Wet Weather Shelters

There are three wooden shelter huts at Craigmore, Gairletter and Uig Hill which were constructed for this purpose. A number of other buildings are used incidentally as wet weather shelters though this is not their main purpose viz. the outbuildings at Bernice and Stonefield holdings, the outbuildings at Dunselma and various forest stables. Corrach Cottage, a corrugated iron shepherd's cottage is now too poor for normal habitation and demolition arrangements are in hand. No further wet weather shelters are envisaged.

Offices

The main Benmore Forest Office is situated at Rashfield and is shared with the Research Branch. It is considered inadequate in accommodation and facilities even on a short term basis. As a long term project there is the possibility of a combined district and forest office accommodating all the present branch activities at Benmore. There is also a small office in the nursery used in connection with nursery work. The nursery office is only used intermittently but the Rashfield office accommodates Head Forester, Forester, two Assistant Foresters and two clerkesses in addition to Research Branch personnel. There is situated within the forest area an Engineer Branch office (Kilmun).

Garages

Garages are either those attached to houses or built for official vehicles and include two lorry garages at the Canopy under the Education Branch.

Stores

Dunselma, the Forester's house for the Blairmore beat, has a series of stone built outbuildings, one of which is used as a tool store. There

/are

are also a number of stores in the forest nursery and at the Courtyard at Benmore House. Generally storage accommodation at this forest is ample. Engineer, Research and Education Branches also have stores within the forest area.

Hostels

There are no hostels.

Stables

Small timber built stables are situated at Gairletter in the Blairmore section, near the water works in the Kilmun section, at Coire an Tigh on Loch Eckside and there is a stone built three stall stable at Benmore Courtyard and at Dunselma.

Community Buildings

There are none within the forest area belonging to the Commission, the hall at Uig being the property of the Community, though the site is leased from the Commission.

Non-Forest Buildings

Benmore House (Forester Training School)

The Victorian Gothic Mansion House of Benmore Estate with associated outbuildings was gifted to the Forestry Commission in 1925 by Henry George Younger (together with the estate) for the purposes of a national arboretum, botanical garden and demonstration forest.

Presently used as a Forester Training School and district office, the maintenance of the fabric is arranged locally by the district estate officer and the costs are recovered from the education branch. The main building has been extensively treated against an infection of dry rot of many years standing. The house is a difficult and costly one to maintain and has complicated roof structures.

Houses at disposal of the Ministry of Works at Benmore

The following properties are occupied by employees of the Ministry of Works on a rent free, full repairing basis in connection with the

/running

running of the Botanical Gardens and Arboretum.

Curator's House

Pre-war stone and slated house of
4 apartments with modern conveniences

Golden Gates Lodge

Pre-war stone and slated house of 2
apartments with modern conveniences.

Main Gate Lodge

Pre-war stone and slated house of 3
apartments with modern conveniences.

Benmore Courtyard Cottage No.1.

Pre-war stone and slated house of
3 apartments with modern conveniences

Benmore Courtyard Cottage No.3

Pre-war stone and slated house of
3 apartments with modern conveniences

Special Installations

These comprise a sawmill and drying shed, an estate joiner's shop and timber store, paint shed and creosote tank near Benmore Courtyard.

Maintenance

Responsibility for maintenance of the buildings described above, but not, generally, for portable shelters, and for the erection of new buildings rests with the District Estate Officer at Benmore District Office, subject to Conservancy authority. He is assisted by one Clerk of Works stationed at Benmore. An estate joiner and an estate painter are employed full time, generally on maintenance and repairs, though small forest buildings are sometimes constructed.

CHAPTER 21(a) List of Experiments

Experiment 1P. 32 Location - Bernice - Compartment 112

Object: To test the effects of different intensities of drainage on the growth of *Pinus contorta*, planted on moderately deep difficult peat.

Experiment 2P. 32 Location - Bernice - Compartment 112

Object: To compare the growth of various species on an exposed peat covered knoll.

Experiment 3P. 33 Location - Bernice - Compartment 112

Object: To try out various species on the undulating morainic ground in the experimental enclosure at Bernice.

Note - In June, 1949, the above three experiments were combined under the object:-

To combine Experiments 1, 2 and 3 to form a species collection and to maintain, if possible, groups of species already planted.

Experiment 4P. 35 Location - Bernice - Compartment 112

Object: To test the effects of different intensities of drainage on the growth of *Contorta* pine, Sitka spruce, Japanese larch, and Oregon alder planted on tough slope peat.

Extension 1/51

Object: To observe in selected draining experiments the height of the water table in order to see if this can be correlated with the observed tree growth.

Extension 2/51

- (1) To test the effect of drain deepening in an experiment where drain spacing had little effect.
- (2) To preserve a mixture by groups of S.P., J.L., S.S. and where possible O.A.

Experiment 5P. 50 (EE)

Kilman Arboretum

Object: To test the effect of a rabbit repellent on plants which have been used/

used to beat-up an area where rabbit damage has been serious, and which has been beat-up for several years.

Note - This experiment was written off in 1952.

Experiment 6/50 E.C.

Compartment 144

Object:

- (1) To see whether by isolation of selected trees throughout the whole of their life in the plantation even more rapid increment can be obtained.
- (2) To see whether the isolation of selected trees (Predominants at the time of canopy closure) throughout the whole of their lives, results in more rapid increment in these trees than occurs in similarly selected trees subjected to crown thinning from the usual time of thinning onward.

Experiment 6/50 E.C.

Extention 51

Object: To test the effects of various degrees of pruning on trees which have been kept isolated throughout their life, on height and girth increments in order that the results may be applied in the main experiment of this group.

Experiment 7P. 62

Compartment 28

Object: To compare the survival, rate of growth, form, resistance to disease, insects and climatic factors of 18 provenances of Western hemlock, including two from seed sources in the British Isles.

Experiment 8P. 62

Compartment 28

Object: To compare the survival, growth vigour, stem and branch forms, resistance to pests and diseases (particularly Keithia) etc., of 13 provenances of Thuya plicata from B.C. Washington and Oregon.

Experiment 9/62

Kilman Arboretum

Object: To compare the effective life of various synthetic netting materials when exposed to sunlight.

Experiment 10/62 (Genetics Section)Compartment 20

Object: To estimate the effects on the cone production of Sitka spruce of Nitro chalk and Fisons 48, each applied at 2 ozs., 3 ozs., 4 ozs., and 6 ozs. per square yard, that is at 1, $1\frac{1}{2}$, 2 and 3 times the rate prescribed in S.M. 102.

The following Sample Plots are situated on the forest:-

<u>Number</u>	<u>Species</u>	<u>Grade</u>	<u>Compartment No.</u>
S. 84	S.S.	C/D	Compt. 138b
S. 98	D.F.	C/D	Compt. 138c
S. 99	J.L.	D	Compt. 134a
S.210	J.L.	D	Compt. 38g
S.211	H.L.	D	Compt. 38h
S.212	A.N.	L/C	Compt. 35e
S.213	D.F.	C/D	Compt. 33c
S.214	C.P.	C/D	Compt. 33g
S.215	S.P.	B	Compt. 35h
S.216	S.P.	C/D	Compt. 35h

CHAPTER 21(b) Local InvestigationsManagement Indicator Stands formed:-

S.S.	C.120	P.26	8.5 acres	Formed F.Y.60
S.S.	C.19	P.32	6.2 acres	Formed F.Y.61.

Management Indicator Stands proposed:-

J.L., H.L.	Kilmun Hill
N.S.	Blairmore or Bernice
S.S.	Gairletter.

High Elevation Species Trial:-

C.40	P.60	5 acres	S.S., Ts. O.S., N.S., P.C. W.S.
------	------	---------	---------------------------------

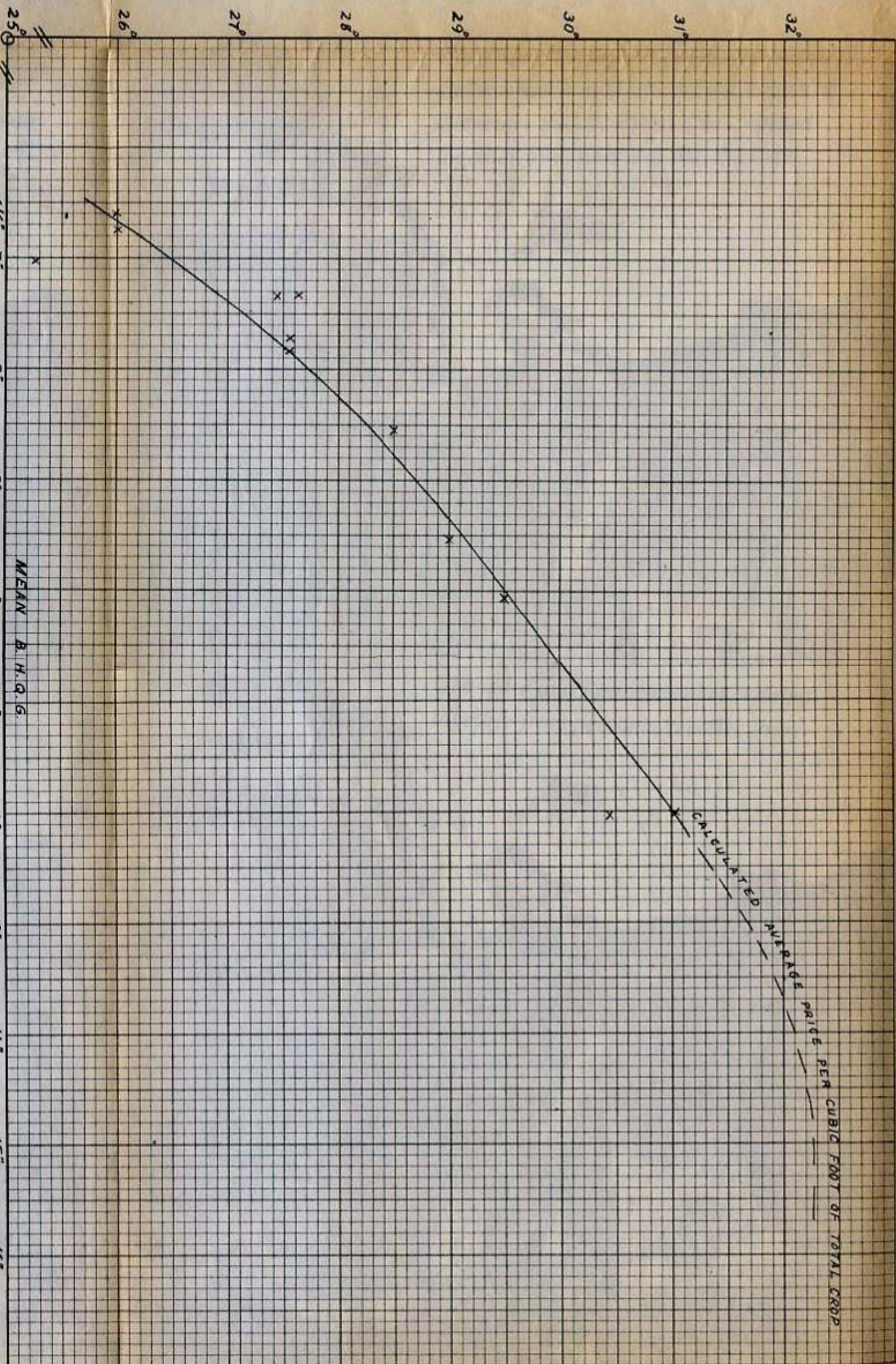
Volume and financial yield investigations were carried out in F.Y.60 to throw light on the effect of mean size of Sitka Spruce stands on their utilisation and value. The following graph shows a price/size curve which was established, and the table following shows comparative details of three typical stands approaching maturity.

Production methods were investigated during 1961 by Work Study Section and a booklet of piecework rates was produced for felling, extraction by horse and crosscutting. Local investigations indicate that the rates in this booklet may not be final in the size range 5 - 10 c. ft.

CURRENT (1959) ROADSIDE PRICES PER C.F.T. LESS CROSSCUTTING COSTS

BENMORE FOREST

PRICE / SIZE CURVE FOR 1959



NOTE One half of the above plots represent actual measurements of crops. The remaining half were found by calculating what these crops would measure in 10 years time, taking into account current increment assessments.

<u>Present Crop</u>	<u>P.16</u> <u>Corrach</u> <u>Cpt. 97</u>	<u>P.16</u> <u>School</u> <u>Cpt. 18</u>	<u>P. 16</u> <u>Policies</u> <u>Cpt. 107</u>
Age	43	43	43
Quality Class	1V	111	11 - 111
Mean B.H.Q.G	6 ²	9 ²	12
Volume per acre	4100	4900	5200
Volume over Ari Mill size %	-)	5)	15)
Volume 12" + Ari Timber %	-) 20%	5) 50%	10) 65%
Volume 8-11 ³ Ari Timber %	20)	40)	40)
Volume 6-7 ³ Ari Timber %	30	30	25
Volume Pitwood Ari Timber %	50	20	10
<u>Crop in Ten Years</u>			
Volume per acre	5600	6800	7200
Mean B.H.Q.G.	8 ²	12	14
Volume over Ari Mill size %	-)	20)	20)
Volume 12" + Ari Timber %	5) 45%	20) 75%	30) 80%
Volume 8-11 ³ Ari Timber %	40)	35)	30)
Volume 6 - 7 ³ Ari Timber %	40	15	15
Volume Pitwood %	15	10	5

Other Factors

1. Benmore Forester Training School uses the forest for training purposes and suitable quantities of work must be set aside for this.
2. The presence of Younger Botanic Gardens within the forest area affects management, restricting access to the northern block and extraction of timber in the vicinity of the Gardens.
3. Benmore Sawmill provides sawn timber for a number of forests within the Conservancy.
4. Arrangements are made from time to time with Dunoon Grammar School for visits to the forest although it has not been possible to form any permanent School Adoption Plot.