

FORESTRY COMMISSION

*Mr. J. H. H. H.
C. H. H. H.
Mr. J. H. H. H.
Working Party*

WORKING PLAN

FOR

ARDROSS

Part I

Chapter 1 - Introduction

(a) Situation and Extent

Ardross Forest lies on the foothills to the north of the Cromarty Firth. It centres on Mid-Ardross (NH 630738) which is about 4 miles inland from the Firth.

The forest is composed of fifteen separate blocks (i.e. separated by public roads or land not belonging to the Forestry Commission) which vary in size from 71 acres to 1,417 acres. The extreme east and west blocks are 15 miles apart by road.

The area of the forest at 30th September, 1964 according to the Land Utilisation Record was 6,529 acres. However the area of the forest measured by the Survey party was 6,785 acres, which figure includes 64 acres of private land enclosed within forest fences and 11 acres of land outwith fences and not compartmented. The area of Forestry Commission land measured by Survey was thus 6,721 acres (6,785 - 64).

5,711 acres are classed as high forest.

The forest is broken up into blocks as follows:-

<u>Block</u>	<u>Compartment No.</u>	<u>Total Area</u>	<u>Plantation Area</u>
Kindeace	1-6	258	129
Achnacloich	10-47	1,300	1,052
Cnoc Navie	60-79, 84	723	716
Riverside	80, 81, 85	101	93
Lealty	82, 83	71	60
Stitttenham	90-101	495	483
Glaick-Loanreoch	102-112	217	205
Dublin and Braetollie	113, 114	110	21
Strathy Wood	120-123	138	138
Cnoc na Moine	130-156	931	861
Inchlumpie	157-163	202	180
Cnoc na Sroine	170-186	512	507
Strathrusdale East	240-245	167	163
Strathrusdale West	246-249	132	132
Kildermorie	260-294	1,417	971
	Totals	6,774	5,711
	Net compartmented	11	
	Grand Total	6,785	

(b) Civil Administration

- | | |
|--------------------------------|--------------------------------------|
| (1) County Council | - Ross and Cromarty |
| (2) District Council | - Invergordon |
| (3) Parishes | - Rosskeen, Alness & Kilmuir Easter. |
| (4) Parliamentary Constituency | - Ross and Cromarty |

(c) Nearest Towns

The nearest towns, with distances from Dingwall are:-

Alness	population 1,400	3 miles
Invergordon	population 1,700	6 miles
Evanton	population 600	6 miles
Dingwall (county town)	population 3,900	13 miles

(d)/

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(d) Communications and Transport

(1) Railways

Stations open for passenger traffic are Invergordon and Dingwall. The nearest station open for freight is at Alness. There is a weighbridge at Alness.

(2) Roads

The A836, Dingwall-Bonar Bridge road traverses the forest, passing 1 mile from Mid-Ardross. Other tributary public roads of single track width serve the area giving adequate access either to the forest blocks or to the considerable number of shared private roads which are an essential part of the access system. The extension of the public road system to incorporate the Strathrusdale stretch of the long shared access road to Kildermorie would be a great benefit and might be a justifiable request to the County Council.

(3) Ports and Harbours

Invergordon has a good harbour. The main East pier is a modern pier much used by large tankers and available for normal shipping. It has a frontage of 400 feet and a depth alongside of 35 feet at low water. There are additional berths for smaller vessels.

Belleport pier is a stone jetty between Alness and Invergordon, which is thought to have been used for timber traffic in the past. It is not now in use.

(e) Maps

1" scale - Sheet No. 21, published 1959.

6" scale - Sheet No. 39, 52, 53, 54 (Ross and Cromarty), Second edition 1907.

(a) The geology of the area is given simply on the map attached. There are two main rock formations:-

- (1) Old red sandstone, shales and conglomerates. This underlies the east part of the forest, extending west as far as the fringes of Inchlumpie and Cnoc na Moine blocks.
- (2) Metamorphic schists and gneiss. Schists continue westwards from the sandstone to within the Kildermorie block, traversed through Cnoc na Sroine block by a belt of pelitic gneiss. Another belt of this rock appears again in Kildermorie, largely as pelitic hornfels. These rocks of the Moine series then give way to the Carn Chuinneag augen gneiss, an intrusion in the Moine series, to the north and west of Kildermorie Glen.

Further detail can be obtained from the 1" geological map, sheet number 93 (1912) and from the British Regional geology edition on the Northern Highlands.

Glaciation and glacial deposits have to a large extent obscured the significance of the different rock formations. The southern half of Stittenham, and most of Achnacloich and Cnoc Navie blocks are not, however, covered by the drift which affects most other parts of the forest. The drift is largely morainic debris from Inchlumpie westwards, and boulder clay or undifferentiated drift eastwards.

(b) Soils

Soils are largely compacted and podsolised to varying degrees, ranging from strongly leached shallow soils with impeded drainage to mildly leached brown earths. The forest has a wide range of rainfall, altitude, topography and aspect and these have played a part in forming the soil.

Deep brown soils occur along the banks of the River Alness and on some lower slopes at Inchindown. The soils on south facing slopes on the eastern part of the forest have typically a shallow layer of raw humus over partly leached grey-brown sandy loam. These provide the rootable medium and vary in depth from shallow to moderate according to location. Below the leached layer is a layer of deposition and normally compacted sub-soil. The degree of compaction appears variable, and on the steeper drier slopes fine roots appear able to penetrate downwards, though rooting is generally shallow. With increase in altitude or rainfall, or decrease in slope, the raw humus layer thickens, leaching becomes more intense giving a grey or humus stained horizon, and the sub-soil becomes increasingly impervious. Peat, of 6 inches or more in depth, occurs at higher altitudes and, in the wetter western parts of the forest, where slope decreases. It also occurs in basins and on flat areas where drainage is impeded.

Though there are areas of peat development and, at the other end of the scale, deep brown soils, the typical soil is the podsol, and its quality depends much on the depth of the humus/leached layers and on the degree of compaction of the sub-soil below.

(c) Topography

The forest blocks lie mostly on the hills and middle slopes to the north of the River Alness and its tributary the Black Water. The lower slopes of the valley are largely under cultivation; the upper reaches of the valleys outwith the forest blocks, moorland and rough grazing. Kildermorie block lies largely in the glen at the head of Loch Morie. At the extreme east end, Kindeace block lies on the gently sloping coastal plain which falls to the Cromarty Firth.

Elevation within the forest ranges from 250 feet beside the River Alness to over 1,500 feet. Plantations extend almost to 1,500 feet in parts only. Slope is very variable and ranges from flat to very steep. A moderate slope is normal.

All aspects are found, but southerly ones are more common.

Topographical conditions thus range from lowland in the extreme east, to highland, the latter being more common.

(d) Meteorology

The climate is rather cool and moist. The average rainfall is about 35 inches, but there is a considerable difference between the drier east end and wetter west. Generally dry conditions prevail from April to June, when east winds occur. Snow is common in winter, and winter conditions can be relatively severe. Access to Strathrusdale and Kildermorie is commonly blocked by snow for periods of weeks, in January or February. Early and late frosts are common.

Gale force winds can be expected in most years. Windblow has resulted from gales from the north-west and from most southerly points between west and south-east. The greatest damage has been caused by the north-west gales.

A feature of the weather is the contrast between the drier, warmer conditions of the south-east corner and the cooler, moister climate of the western blocks and the higher ground.

(e) Vegetation

Where good brown soils of moderate depth occur, as on the banks of the River Alness or the lower slopes at Inchindown, the vegetation is commonly a grass/herb/fern type. Where the ground is wetter, the common rush becomes more prevalent. Hardwood scrub, especially birch and alder, or dense bracken would probably have occupied those sites which are now tree covered, prior to acquisition. These are the most productive sites in the forest.

Such sites are, however, of minor importance as Ardross is primarily an upland heath area, with moorland conditions developing where the peat layer deepens to 6 inches or more. Heather (Calluna vulgaris) is very much the dominant species over most of the forest, with mixture variations for better or worse.

Better heath conditions are indicated by the vigour of the heather and by an increasing abundance of pasture grasses, most commonly Deschampsia flexuosa, herbs, whin or broom. In very dry situations, bell-heather will appear also. Deschampsia tends to appear under the canopy of pine on such sites and will become temporarily dominant after clear felling.

With a raw humus layer and increasing podsolisation, Vaccinium species and Empetrum will appear, like Deschampsia, under pine crops, but generally where the canopy is open, they persist in mixture with heather for some time after the tree crop has been removed.

The poorest heath conditions, associated with impeded drainage and seasonal water-logging, are indicated by the presence of Scirpus and lichen, and a lack of vigour in the heather, which may temporarily lose its dominance where burning and intensive grazing have been practised.

Wet flushed areas occur locally. The most fertile flushes are indicated by the common rush. Molinia grass is common in flushed areas. In less fertile flushes the Molinia becomes a minor associate of heather only.

Where the peat layer exceeds 6 inches in depth, moorland conditions are found, and heather moor is the typical vegetation type. Molinia grass and the common rush appear where flushing occurs. Scirpus becomes more dominant on the poorer peats, especially after burning. Cotton grass is strongly associated with heather on the peat bog at Kindeace and seems to be associated with at least a degree of oxidation, and temporarily aerobic conditions.

(f) Site Classification

Plant communities, roughly as identified by Professor M. L. Anderson in his "Selection of Tree Species", have been used to designate the following sites found at Ardross:-

Brown Soils:-

(1) Grass/herb/fern communities

These are fertile sites, sadly rather few in number, found in such situations as the lower slopes at Inchindown, and the steep slopes above the River Alness at Achandunie. They are often associated with hardwood scrub and a reasonably deep soil.

Podsolised Soils:-

(2) Grass heath communities

These are characterised by mixtures of fine grasses, commonly including Deschampsia flexuosa, often with an admixture of herbs. It represents a better heath type. In Ardross heather is rarely absent, and the community is often transitional to Calluna heath. This is particularly true where felled pine sites with an acid peaty covering are temporarily colonised by Deschampsia flexuosa and grasses.

(3) Calluna heath community

This is by far the commonest type in Ardross. It is a less fertile type than the grass heath, but variations for the better are indicated by increased association with fine grasses, herbs, whin or broom.

(4) Vaccinium/Calluna communities

These are typical associates of open pine woods, and survive after the disappearance of the pine crop. They are commonly found on damp, north facing sites, where the terrain is rough and tussocky. There is often a deep moss layer.

Vaccinium myrtillus is sometimes dominant under birchwoods on mildly podsolised soils, in association with grasses and hard fern. Heather is a minor associate. This variant is found in the south-west of Newmore Wood adjoining Cnoc Navie block.

(5) Calluna/Scirpus communities

These occur on poor degraded heaths, and are associated with a thicker peat layer, compacted layers and water-logging. Lichen is present in the poorest conditions, when the heather becomes sparse. It should be noted, however, that muir-burning often results in the temporary dominance of Scirpus, where otherwise the vegetation would be more akin to Calluna heath.

Peats (peat layer more than 6 inches deep):-

(6) Cotton grass communities

Heather/

Heather, cross-leaved heath, Molinia and Scirpus are commonly associated with the cotton grass. The peat on which they develop is dark in colour, and appears to enjoy some degree of oxidation. It is one of the better peat types.

(7) Calluna-moor communities

The vegetation of most blanket and bog peats belongs to these communities. Associates of the heather include Molinia, Scirpus, cross-leaved heath and mosses. The quality of the peat is indicated largely by the vigour of the heather and the associates found with it. Scirpus and cross-leaved heath usually occur on the poorer types.

On enclosure, heather becomes increasingly dominant.

Flushed Soils:-

(8) Soft rush community

This is of local occurrence where water drains from surrounding slopes. It is associated with a definite, if shallow, layer of loose peat. The presence of the soft or common rush indicates a pronounced enrichment of the site, and may suggest some quality in the slopes from which the drain water has come.

(9) Molinia community

These are peat communities indicating flushed conditions, though less fertile than the above. The quality of the Molinia flush is largely indicated by the proportion of Molinia in the vegetation, heather appearing more abundantly on the poorer sites.

Forest or Land Management prior to Acquisition by the Forestry Commission

A map of the area prepared by General Roy in the middle of the Eighteenth century shows little woodland, except along the riversides and the steep slopes beside Loch Morie. The Statistical Account for the parish of Rosskeen suggests that this was still the case at the start of the Nineteenth century, though it mentions trees at Ardross. Most of the present forest lies on what once was the Estate of Ardross. Prior to 1846, this Estate belonged to the Duke of Sutherland who appears to have begun works of improvement mainly of an agricultural nature. The Statistical Account for Rosskeen in 1841 records that £12,000 was said to have been expended on Ardross farm on liming and draining. It also states that there were some noble trees at Ardross, specifically mentioning two magnificent oaks (one of 8 feet 4 inches girth at 5 feet) and several large pine (the largest, 11 feet round the base). There would also appear to have been some planting carried out about 1838 or so, on the Estate. In 1846, the Duke sold the Estate to Mr. Alexander Matheson who made considerable improvements and planted over 3,000 acres between 1848 and 1855. The table attached was compiled by the Superintendent of Improvements at the time, and gives detail of the cost and extent of the work of establishment. Knockdubh is the south side of our Loanreoch block, and Corr-Pollie is part of Cnoc na Moine block.

In 1898, Mr. Dyson Perrins bought the Estate and called in Mr. (later, Sir) William Schlich, Professor of Forestry at Oxford, to prepare a Working Plan for the Ardross Woods which at that time extended to 4,424 acres, mostly in the 41-60 year age class. Copies of the plan which was completed in 1907 are still held at District and Conservancy offices. The plan proposed a rotation of 80 years, but for the purposes of obtaining a more even gradation of age classes accepted considerable fellings of 50-60 year old woods. The species proposed for replanting were mainly Scots pine, European larch and Norway spruce, but the plan provided for the trial of exotic species at Achandunie.

The first World War resulted in increased fellings over and above the provisions of the plan. After the war the Estate pursued a replanting policy, and between 1918 and 1934 planted about 1,100 acres, with programmes rising to about 180 acres or so in 1934. At the time of acquisition by the Forestry Commission in 1937, bare land for replanting amounted to about 500 acres, mostly the result of fellings in the Cnoc na Moine block. Certain other woods on the lands acquired had been previously sold to McAlinsh, timber merchant, and the felling of the last of these was not completed until 1955.

Remnants of the first Estate plantings include the belt on the west side of Stittenham and patches of pine, mostly rather scrubby, on the high ground which were no doubt left as being worthless at the time of felling the crops below.

Lands acquired outwith the original Ardross Estate include Kildermorie, Ardross Moor, the Newmore part of Achnacloich and Kindeace. Kildermorie was until 1890 part of Novar Estate, and Novar presumably planted what is now known as the "old wood" there. In 1900, the "young wood" at the head of Loch Morie was planted. Neither wood appears to have been thinned (except for removal of windblow) prior to acquisition. The land acquired was, however, mainly bare land, and primarily a deer forest.

Ardross Moor comprised bare heath and heather moor, used for sporting and grazing purposes. Newmore probably carried birch scrub on its lower slopes with rough heath pasture above. Kindeace area carried a very variable stocking of Scots pine, open scrub on the bog, and a better crop on the drier heath which was felled before acquisition. This area was ravaged by a severe ground fire in 1955.

TABLE SHOWING EXTENT & COST OF PLANTING, ENCLOSING & DRAINING PLANTATIONS ON ARBROTH ESTATE

Name of Plantation	When Planted	Acres	Scots Pine	Larch	Various Sorts	No. of Plants per acre	Cost of Plants per 1000	Cost per acre	Total cost of Planting	No. of yards of stone dykes and cost per yard	No. of yards of turf dykes and cost per yard	Total cost of enclosing	No. of chains of drains & cost per chain	Total cost of draining	Total cost	Total cost per acre	
Loanreoch	Spring 1850	127	506,000	127,000	None	5,000	S.P. 3/6 Larch 5/-	10/6	£. S. D. 187. 6. 6	285 @ 1/6	3913 @ 8d.	£. S. D. 150. 6. 2	375 @ 2/-	£. S. D. 37. 10. -	£. S. D. 375. 2. 8	£. S. D. 2. 19. 1	
Knockduth	Spring 1849	58	270,000	20,000	None	5,000	S.P. 3/6 Larch 5/-	11/6	85. 12. 0	836 @ 1/6	The other boundaries of this plantation adjoin scrubby land and the fences are charged against the land.		62. 14. 0	144 @ 1/8	12. 0. 0	160. 6. 0	2. 15. 3
Stittentham	Spring 1852	503	2,615,000	None	None	5,200	S.P. 4/- Larch 4/-	12/-	824. 18. 0	858 @ 1/6	3000 @ 6d. 5173 @ 8d.	311. 15. 8	2085 @ 1/6	156. 7. 0	1293. 1. 2	2. 11. 4	
Strathly	Spring 1854	149	745,000	None	None	5,000	S.P. 4/- Larch 5/-	10/-	225. 10. 0	None	5665 @ 9d.	212. 8. 9	300 @ 1/4 128 @ 3/-	20. 0. 0 19. 4. 0	475. 2. 9	3. 3. 9	
Brackra	Spring 1849	273	819,000	346,000	None	5,000	S.P. 3/6 Larch 5/-	8/-	389. 0. 6	5192 @ 1/6 748 @ 1/2	4941 @ 9d. Wire fence 913 @ 1/2	671. 11. 7	1200 @ 1/6	90. 0. 0	1150. 12. 1	4. 4. 3	
Onoc na Meine	Spring 1848	460	1,932,000	6,440	None	5,600	S.P. 3/6 Larch 4/-	11/6	731. 8. 0	None	5280 @ 9d.	198. 0. 0	650 @ 1/4	43. 6. 8	972. 14. 8	2. 2. 3	
Garr - Tollie	Spring 1854	219	1,051,200	65,700	None	5,100	S.P. 3/6 Larch 4/-	9/6	302. 2. 6	None	3211 @ 8d.	107. 0. 8	900 @ 1/3	56. 5. 0	464. 8. 2	2. 2. 5	
Strathory	Spring 1855	446	1,754,000	669,000	None	5,500	S.P. 4/- Larch 5/-	8/6	713. 12. 0	1312 @ 1/6	7631 @ 7d.	320. 19. 5	360 @ 1/6	22. 10. 0	1057. 1. 5	2. 7. 5	
Acmealoich	Spring 1855	36	72,000	72,000	41,000	4,600	S.P. 4/- Larch 5/- Others 18/-	12/6	85. 0. 0	2242 @ 1/4	None	149. 9. 4	200 @ 2/-	20. 0. 0	254. 9. 4	7. 1. 5	
Onoc Navie	Spring 1850	420	2,100,000	None	None	5,000	S.P. 3/6 Larch 4/-	11/6	609. 0. 0	5017 @ 1/3	None	313. 11. 3	760 @ 1/8	63. 6. 8	985. 17. 11	2. 6. 11	
Lealty	Spring 1848	160	480,000	240,000	64,000	4,900	S.P. 1/6 Larch 4/6 Others 18/-	11/- 11/- 11/-	251. 12. 0	2761 @ 1/1	1752 @ 7d.	200. 13. 1	740 @ 1/3	52. 8. 4	504. 13. 5	3. 3. 1	
Tollie Burn, Schoolhouse Burn & Banks of River Alness	Spring 1849-50	292	116,800	584,000	Oak 222,000 Spr. 175,000 Others 166,000	4,400	S.P. 3/6 Larch 8/- Oak 24/- Spr. 8/6 Others 18/-	14/- 14/- 14/- 14/- 14/-	132. 16. 0				1130 @ 2/-	11. 6. 0	1204. 2. 0	4. 2. 5	
		3,143	12,493,600	29,117,700					5994. 17. 6			2698. 9. 11		604. 4. 2	8897. 11. 7		

As compiled by Mr. William Mackenzie - Engineer and Superintendent of the Improvements 1857.

Forestry Commission

Acquisitions and Disposals

Schedule of Information from Conveyances, Dispositions, Leases and Feus

Working Plan Area ARDROSS

Number (1)	Date (2)	Name of other party (3)	Property (4)	How acquired or disposed of (5)	Area (acres)			Compartment Number(s) (9)
					Classified as plantable on acquisition (6)	Total acquired or disposed of (7)	Net Total to date (8)	
	28. 3.37	Ardross Estates Company	Ardross	Purchase	3,142	3,801	3,801	22-47, 60-79, 82, 85, 150-162, 170, 171, 174
	Mart.1937	Trustees of J. C. Robertson	Newmore - Inchindown	Feu	281	298	4,099	10-21
	Whit.1938	Ardross Estates Company	Front Row of Dublin Cottages	Purchase	-	(.566)	4,100	
	1939	Ardross Estates Company	Hall at Dublin	Purchase	-	(.062)	4,100	
	Whit.1940	Western Silver Fox Ranch Ltd.	Silver Fox Farm	Purchase	48	48	4,148	90
	Mart.1945	Peter McAlinsh Ltd.	Cottages at Dublin	Purchase	-	(.777)	4,148	
	Mart.1952	Caledonian Insurance Co.	Easter Ardross (part)	Purchase	43	43	4,191	80 (pt.)
	Mart.1952	Trs. of J. C. Robertson	(Newmore) Inchindown Farm (part)	Feu	3.31	3.31	4,194	14 (pt.), 15 (pt.) 80 (pt.), 81, 108 (pt.), 113.
	Cand.1953	J. A. M. Moore	Mid-Ardross	Purchase	60	60	4,254	
	29. 9. 53	Executors of the late Wm. Shearer	Kildermorie	Purchase	795	18,202	22,456	260 - 294
	29. 7. 54	Col. J. D. Hignett	Kildermorie (part)	Sale	-	-16,859	5,597	
	Mart.1954	Major J. T. Harington	Dalmore Estate (part)	Feu	295	298	5,895	240 - 249
	22. 6.55	E. V. MacLean	Easter Ardross	Gift	4.5	4.5	5,900	80 (pt.), 102 (pt.)
	6.10.55	Major Noel G. Salvesen	Ardross Moor	Purchase	281	395	6,295	172, 173, 176-186

WLF79005, RM, 4/60, C.P.C55842, Gp.773.

Forestry Commission

Acquisitions and Disposals

Schedule of Information from Conveyances, Dispositions, Leases and Feus

Working Plan Area ARDROSS (CONTD.)

Number (1)	Date (2)	Name of other party (3)	Property (4)	How acquired or disposed of (5)	Area (acres)			Compartment Number(s) (9)
					Classified as plantable on acquisition (6)	Total acquired or disposed of (7)	Net Total to date (8)	
14.	15. 9.56	Major J. T. Harington	Ardross Dalmore Strathly Wood	Feu	137	138	6,433	120 - 123
1.	23. 5.57	D. J. Fraser	Nos. 3 & 4 Glaick	Sale	-	-60	6,373	
10.	6. 3.59	Col. J. D. Hignett	Houses Nos. 2 & 7, Kildermorie	Sale	-	Negligible		
5.	F.Y. 60	Kindeace Estate Co.	Kindeace Estate (part)	Feu	106	260	6,633	1 - 6
1.	28. 5.62	R. W. Pritchard	Balrishallioch Farm	Sale	-	-35	6,598	
6.	11. 1.63	Lt. Col. C. F. Dyson Perrins	Achandunie Estate (pt.)	Purchase	40	42	6,640	80 (part), 84
1.	28. 5.63	Mrs. Margaret Fraser	Brestollie Farm	Sale	-10	-50	6,590	114 (pt.)
1.	3. 9.63	G. Mackay, Senr. & Jnr.	Glaick Holding	Sale	-10	-111	6,479	102, 114 (pt.)
1.	28.11.63	Roderick P. Meir	Leanreoch Croft	Sale	-6	-39	6,440	111, 112, 114 (pt.)
1.	10. 8.64	Miss T. M. Bourne	Glaick Cottage No. 1	Sale	-	Negligible		

WLF79005, RM, 4/60, C.P.C55842, Gp.773.

(d) Considerations Affecting Land Management

1. Boundaries and Fencing Liability

(a) Type of Boundary

The length of boundary is 59 miles. The boundary of the original Ardross Estate forest blocks is commonly marked by a stone dyke or mound. Occasionally, ditches mark the boundary as in the case of the Strathrusdale blocks where the feu charter specifies that existing ditches bounding the feu will become the march and be maintained mutually. Boundaries in the case of the acquisitions from Newmore Estate, and of Kildermorie Ardross Moor and Kindeace, were largely undefined.

(b) Fencing Liabilities

The conditions relating to erection and maintenance of march fences are many and varied. Dispositions generally distinguished between existing march fences and new march fences to be erected where none existed, in the conditions laid down. This distinction can now, however, be ignored as the conditions relating to the erection of new fences have been fulfilled. The different conditions relating to the maintenance of boundary fences are given below, and against these are listed the acquisitions or disposals to which they apply. The number in brackets after the name of the subject is its number given on form WP 10.

It is stressed, however, that in specific cases the relevant disposition should be examined before embarking on fence repairs.

The letters used to specify a fence are those given on the relevant deed maps.

(i) Where boundary fences are to be maintained mutually:

Ardross (1) The disposition specifies that existing march fences will be mutually maintained but that new march fences required will be erected and maintained by the Forestry Commission. This distinction is now obscure, and as the original Ardross Estate, the neighbour concerned, is now broken up, it seems reasonable to assume that the responsibility for all march fences should be shared by our neighbours.

Newmore (2) Refers to XY only.

Fox Farm (5) Fences not specifically mentioned but assumed to have same liabilities as Ardross (1).

Easter Ardross (7) Excepting CXY.

Mid-Ardross (9).

Easter Ardross gift (12).

Dalmore-Strathy (14) Existing march fences only.

Achandunie (16) Excepting NC and KJ.

Glaick 3-4 Disposal (1).

(ii) Where boundary fences are to be maintained solely by the/

the Forestry Commission for a specified period only:

Newmore (2) Only for as long as Newmore Estate remains unsold; thereafter fences mutual.

Kindeace (15) Specified period.

Achandunie (16) NC and KJ only.

(iii) Where boundary fences are to be maintained solely by the Forestry Commission only as long as desired:

Dalmore-Strathrusdale (11) } Feu charter specifies that
Ardross Moor (13) } such fences are not to be
Dalmore-Strathy (14) } regarded as march fences.
Need only be maintained as
long as Forestry
Commission wishes.

Kildermorie Disposal (10) Deer fences around forest block only.

Balrishallich Disposal (1) Only as long as Forestry Commission wishes - thereafter responsibility to keep out stock rests with neighbour.

(iv) Where boundary fences are to be maintained solely by the Forestry Commission for all time:

Newmore (8)

(v) Where boundary fences are the responsibility of the other party:

Easter Ardross (7) CXY only.

Kildermorie Disposal (10) Neighbour to erect fences necessary to keep stock out of forest area.

(vi) Where boundary fences are to be erected and maintained by either party desiring to do so, without any obligation to do so:

Refers to the boundaries 15 feet back from the River Alness in the cases of Ardross (1); Easter Ardross (7); Mid-Ardross (9); Achandunie (16). Gates must be put in on access routes.

2. Restrictive Covenants and Reservations

The various acquisitions contain a numerous collection of restrictions and reservations. The more important of these are listed below, with reference to the acquisitions to which they apply. The number of the acquisition as given on form WP 10 is shown in brackets.

For precise definition of the reservation etc., the appropriate disposition or feu charter should be consulted.

(a) Reservations of water supplies, drainage and sewage facilities

Ardross (1); Newmore (2); Fox Farm (5), defining responsibilities for cleaning the lade in Stittenham; Easter Ardross (7); Dalmore-Strathy (14); Achandunie (16).

(b)/

(b) Right of pre-emption

Dalmore-Strathrusdale (11); Dalmore-Strathay (14); Kindeace (15).

(c) Restriction on building

New buildings and/or sites for buildings require the approval of the Superiors in the following acquisitions:-

Newmore (2); Dalmore-Strathrusdale (11); Strathay (14).

(d) Rights of access

Over specified routes and/or existing accesses.

Ardross (1); Newmore (2), including 12 feet wide sheep pass; Easter Ardross (9); Mid-Ardross (11); Ardross Moor (13); Kildermorie acquisition and disposal; Achandunie (16); Glaick disposal.

(e) Reservation of minerals etc.

Mineral rights are reserved to the Superiors or persons authorised by them, but the Forestry Commission can take stone, sand or gravel.

Newmore (2); Newmore (8); Dalmore-Strathrusdale (11); Dalmore-Strathay (14), but superior is not entitled to enter feu for the purpose of working minerals - can be worked from outside feu, subject to payment for all surface damage; Kindeace (15).

(f) Restriction to planting

Easter Ardross gift (12) - no planting to be carried out within $\frac{3}{4}$ yards of boundary fences.

(g) Reservation of fishings in River Alness, and 15 feet margin along bank

Ardross (1); Easter Ardross (7); Mid Ardross (9); Achandunie (16).

(h) Restrictions on drainage

The following feu charters place responsibility on the Forestry Commission to avoid flooding on adjoining lands:-

Newmore (2) and (8) - refer to Inchindown Farm. Dalmore-Strathrusdale (11) - refers to Braeantre Farm. Dalmore-Strathay (14) - refers to farm lands to south of feu; for this purpose grants permission to clean and deepen ditch along south boundary. Kindeace (15).

3. Easements, Servitudes and Licences

Power Lines

The several overhead power lines which affect Ardross Forest are the subjects of the following agreements with the North of Scotland Hydro-Electric Board:-

Beauly/Shin 132 kV Transmission Line.
Ardross Distribution H.T. and L.T. Lines (2 agreements).
Newmore/Tain 33 kV Line, Kindeace.
Admiralty Supplies, Inchindown.

Grazings

The following are the grazings let:-

Grazing	Tenant	Area Acres	Period Of Let	Rent 1963
Inchlumpie	W. Ogilvie	19	1st Nov. to 30th Sept.	£5
Kildermorie	Col. J. D. Hignett		11th Nov. to 31st Oct.	£4
Kildermorie Additional	Col. J. D. Hignett		1st Jan. to 28th Dec.	£1
Inchindown	A. P. Gordon	14		
Drove Stance	C. D. Allison	49	1st June to 30th April (yearly to 1965).	

Other Tenancies

The Admiralty lease an area of land and access thereto at Inchindown for the purpose of maintaining oil tanks. The rent is £4. 8. -d. per year.

4. Public Rights of Way

None are recognised.

5. Sporting Interests

Virtually all the forest area is let for shooting, the only exception being Strathy Wood. Details of the agreements are as follows:-

Area	Tenant	Period of Let	Date of Expiry	Assessed Rental
Ardross (1), Fox Farm (5)	A. Chamberlain	5 years	31. 7.64	£25
Newmore (2) and (8)	Capt. Oswald, R.N.	5 years	31. 1.69	£3
Easter Ardross (7) & (12)	Successor to E. Y. MacLean	25 years	10.11.77	5/-
Mid Ardross (9)	J. A. Moore	25 years	1. 2.78	5/-
Kildermorie (10)	Col. Hignett	25 years	28. 7.79	£1
Dalmore-Strathrusdale (11)	Major J. T. Harrington	15 years	10.11.69	£1
Ardross Moor (13)	Major N. Salvesen	25 years	5.10.80	£1
Kindeace	Major Pollok-McCall	25 years	16.12.83	1d. if asked

The shooting leases reserve for the Forestry Commission the right at all times to take or kill deer, hares, rabbits and vermin. This also applies to black game and capercaillie where these are causing damage to plantations.

Under the terms of the Kildermorie lease, however, the Forestry Commission is required to give twenty-four hours warning of intention to kill red deer, in order to give the tenant the opportunity to first do so or drive them out if he so desires.

6. Obligations of Outside Parties to the Forestry Commission

Reserved accesses

The Forestry Commission reserved rights of access on the agricultural areas disposed at Balrishallich, Glaick and Braetollie, with right to build a road if desired across the rough grazing at Balrishallich.

Rights of access were conveyed to the Forestry Commission under the terms of the various dispositions.

Fencing

In the case of the Easter Ardross acquisition, the seller is to maintain fence CXY.

Chapter 5 - Amenity

(a) Description of Amenities

Ardross is not itself a tourist area, except in so far as a main tourist route, A856, passes through the forest. Amenity is thus of real importance only in the vicinity of this road, and what can be seen from it. From this point of view, Ardross presents a very pleasant and orderly picture of low hills, capped with forest and divided from each other by farm-land. Little of the forest actually adjoins public roads.

The westerly end of the forest becomes more highland in character, and Kildermorie is a particularly beautiful glen, not accessible to the public however. Here there are mature woods of Scots pine in full view of the lodge, and a problem is involved in felling these woods to find a necessary timber volume while retaining a degree of cover around, and in view of, the lodge.

(b) Policy and Existing Obligations

Nil.

(c) Measures Adopted

The preservation of a neat and tidy appearance is the main contribution made to amenity, and so it should remain.

The woods themselves are predominantly Scots pine, and their appearance fits well into the countryside. Where new areas of good soil adjoin roads, such as at Achandunnie, hardwoods or shrubs will be preserved along the roadsides.

Girdling of unwanted hardwoods is not carried out in full view of public roads.

Summary Statement of Growing Stock

as at 30.9.1964.

Working Plan Area ARDROSSComplete as
necessary

Section

Working Circle

Felling Series

Type (1)	Area (acres) (2)	Volume (h. ft.) (3)	Current Annual Increment (h. ft.) (4)
High Forest			
Coniferous	5,711	2,783,100	181,100
Mixed			
Broadleaved			
Total High Forest	5,711		
Coppice with Standards			
Coppice			
Partially Felled			
Reserved Timber			
Scrub	98		
Felled, Failed, Blown	175		
Other Plantable	801		
Other Land			
TOTAL	6,785	2,783,100	181,100

Total area includes 64 acres outwith acquisition.

Signature A. F. MackayDate of Compilation 1964

Working Plan Area Ardross[illegible]

Chapter 6 - Growing Stock

(a)-(d) Forms WP 4, 5, 6 and 9.

(e) Enumeration Methods

The survey of the area and the assessment of the measurable growing stock was carried out by the Management Section of the Research Branch, in the period 24th April, 1962 to 24th September, 1962.

The basic survey was carried out using an Artillery Director and metre chain, and plotted on the 1907 second edition 6 inch O.S. maps.

All crops aged P55 and older were assessed. Aerial photographs of variable quality were used to assist in the demarcation of sub-compartment boundaries and in the assessment of areas of poor growth.

Visual estimates of volume were based on relascope sweeps and on top heights measured with hypsometer, the volume being derived from alignment charts. Plots were taken to check volume, the rate of sampling in Scots pine being 1/10 acre plot for every 20 acres. The visual estimates were accepted for all species and the plots used to give size class distribution and an estimate of current volume increment. For those categories and species not sampled, size class distribution was based on mean girth and volume increment estimated from Yield Tables. All increments were reduced by 13% to allow for understocking and gaps (10%) and the area of roads and rides (3%).

(f) Description of Growing Stock

The crop type in the forest is Coniferous High Forest, with Scots pine the predominant species.

The performance of the main species is given below:-

(i) Scots pine - 4,043 acres

This species occupied 70% of the forest area. Scots pine occurs on almost all the site types in the forest from small patches on rich, moist, grass-herb sites through the differing qualities of heath to calluna-moor.

The rich moist sites are too good for pine, and the form of the tree is rather coarse and rough. On very moist sites, it is clearly unhappy. The best development combining both form and vigour, occurs on the better heaths on lower slopes where there is a depth of soil allowing downward penetration of roots. As sites deteriorate with increasing soil compaction and greater peat development, the growth of the pine falls off until it degenerates to scrub. This occurs at higher elevations and in poor areas in Stittenham. There is little doubt that ploughing to help aeration and deepen the rooting layer could have improved the rate of growth considerably and extended the range of satisfactory growth to the poorer heaths. Ploughing, however, was only practised on a general scale from 1958 onwards. In P52 area at Stittenham, where some ploughing was carried out, there is a striking comparison between the trees on ploughed and unploughed ground.

The average quality class is low III, but it is reasonable to expect an improvement where ploughing has been practised.

The pine suffers considerably from wind damage, especially on the shallow, compacted soils where root systems are entirely superficial.

On the whole, the form of the Ardross Scots pine is good.
Branching/

Branching is reasonably fine and crowns are narrow. Squirrels have in the past done considerable damage, and the evidence is to be seen on the oldest pine, but fortunately there is little or no damage to be seen in the younger plantations. Damage caused by Peridermium pini is becoming more common as crops reach middle-ages.

(ii) Pinus contorta - 360 acres (6%)

Almost all plantings of this species are post-war. Practice has been to restrict it to Calluna-moor sites, but the tendency now is to extend its range upwards into the poorer heaths where it is expected to be more productive than Scots pine.

Growth on ploughed land has been very rapid - possibly too much so in the interests of future form. Mostly coastal types have been used but the inland form is proposed for future use (preferably the more intermediate type i.e. Skeena River, Terrace etc.).

A P38 stand of coastal type has grown well on the higher slopes above Inchindown. Form is reasonably good.

(iii) European larch - 317 acres (6%)

This species has been widely planted in mixture with pine on the better pine sites. Pure stands have been planted in some of the best grass/herb/bracken sites in the forest, as at Inchindown where upper Quality Class II growth is found, and on the old arable land at Achandunie where Pomes annosus infection is severe and growth is barely average. Some excellent older larch occur at Kildermorie, where growth is almost up to Quality Class I standard. Over all, however, the growth of larch only averages Quality Class IV.

On the rich sites, mentioned above, larch gives a poor yield compared to what could be expected from spruce.

In addition, on these rich sites, the larch has suffered from disease, Pomes at Achandunie and dieback, possibly related to frost, and Dasyscypha at Inchindown.

Current practice is to restrict European larch to small admixtures with Scots pine on the better heaths.

(iv) Japanese larch - 90 acres (3%)

Japanese larch has really only been planted in fire belts and in recent years. Its performance elsewhere would suggest that it will grow successfully on most site types of the middle fertility ranges, especially after ploughing.

(v) Douglas fir - 50 acres (1%)

There is very little evidence to judge the performance of this species, being only a minor species to date and mostly in post-war plantings. The only earlier plantings show it to grow well on good heath soil in conditions of shelter and as an understorey to European larch on a poor-moderate heath soil. Tops get blasted when shelter ceases.

(vi) Norway spruce - 260 acres (5%)

The older Norway spruce planted in small numbers amongst Scots pine have little to commend them. The sites however are heaths largely. Good growth does occur on good moist grass/herb and rush sites at Inchindown, as would be expected. There seems no evidence to/

to suggest that it should be preferred to Sitka spruce, however, on suitable spruce sites, except in frost hollows.

(vii) Sitka spruce - 526 acres (9%)

The few pre-war plantings amount to some 60 acres. These on good moist sites of grass/herb/bracken or soft rush types have grown very well. Where planted under a European larch crop on a heath type of moderate quality (Compartment 61; larch planted in 1900, presumably where some hardwoods, birch probably, had grown before, as Schlich in 1907 mentions honey-fungus in the young crop), the spruce is growing satisfactorily. Quality Class is mostly IV/V.

The more extensive post-war plantings of Sitka spruce extended its range too optimistically to Calluna-heaths and Calluna-peats of poor quality. In such extreme conditions, check and failure have often followed, and such sites have now been largely ploughed up and replanted with pine, with early signs of improvement of the surviving spruce. On grass heaths, however, Sitka spruce used to fill up blanks in Scots pine are doing well. On the heath types, generally, (site classes 2-5) Sitka spruce appears to grow reasonably well on the more fertile types (i.e. the grass heaths and the best Calluna-heaths), but the presence of heather to any extent indicates a need for caution and the probable necessity of restricting the spruce to a minor mixture with pine. Sitka spruce has been planted on the better flushed soils, with apparent success, but in the Ardross area these are usually confined to drainage channels of small dimensions. In the case of the peats, reasonable growth seems to be obtained in mixture with pine on the deep black amorphous peats where there is evidence of oxidation. This peat condition seems to be found where there has been a previous tree crop in recent times. The presence of old pine on such sites provides a beneficial nursing effect to spruce as can be seen in the Cnoc na Moine block.

The evidence on the ground would suggest that, up to the pole crop stage at any rate, the fertility level is the critical factor in influencing the growth of Sitka spruce. The moisture level seems of lesser importance in the early stage at any rate.

(viii) Other Species

Some Abies grandis and nobilis have grown very successfully in Compartment 61 where they were planted in 1930 as an understorey to European larch. Apart from this, species other than those already described are of very minor extent and restricted to young plantings.

(g) Seed Origins

Scots pine

The origins of the Scots pine established by the Ardross Estate are not known, though it is thought that much of the seed came from Castle Grant. Some was said to have been imported from Germany, but the whereabouts of the resulting plants are not known.

All seed was imported. The Estate did no collection or extraction of seed, as far as is known.

The form of the acquired pine is generally good, with very good trees growing in the Drove Stance area of Achnaoich.

The Forestry Commission plantings came from many sources, and the main lots are given below:-

P38 Gordon Castle, mostly

- P39 Glengarry (at Inchindown)
Glenmore (at Cnoc na Moine)
- P40 Culbin and Lethen
- P47 Culbin
- P48 Assich, Shinness, Strathgarve mostly
- P49 Queens and East England
- P50 Slattadale, Cawdor and Balnagown
- P51 East England
- P52 East England, North-East England.

These provide little ground for useful comment though the East England races do seem to suffer from exposure, needles tending to turn brown in certain winters, and their growth on higher ground is slow.

Lodgepole pine

There are only three lots old enough to offer much in the way of evidence. These are as follows:-

P38 Compartment 17 Lodgepole pine from Smithers, British Columbia (Skeena River area) has been grown with Scots pine. It would appear these were planted to separate different races of Scots pine in an abandoned Scots pine provenance experiment. They are generally of good form, with a tendency to forking and somewhat coarsely branched when open grown. On the poorer ground, they are generally taller and larger than the Scots pine, but the difference tends to diminish as ground conditions improve. Many have suffered however from rubbing by roe deer.

P38 Compartments 17, 18, 5 acres at 800 feet/900 feet, on the top margin of the plantations. Their identity is given as 35/40 which is in fact that of some larch. It could be an error for 34/40 which is a coastal type from Olympic peninsula. While growth is reasonable considering the site, with considerable variation, and the trees are healthy and densely crowned, form is very poor and trees have blown prior to any thinning. The tendency to blow is probably the most disturbing feature. Sweep is common, and very few trees are perfectly straight. Damage from roe deer, however, is not common (of Smithers).

P48 Compartment 110, 1 acre of Coastal Washington provenance. Growth is good (Yield Class 120), but form is poor.

Major plantings at Kildermorie were carried out in P56 and P57. The origins planted were as follows:-

- P56 105,000 origin Kamloops
10,000 origin La Pine
5,000 origin North Strome
- P57 70,000 origin Langley
16,000 origin Fraser River
4,000 origin Long Beach.

Later plantings are easily identified by the present standard system.

Other species

There are no significant features to comment on.

Chapter 7 - Organisation

(a) Previous Plans

Various plans of operation have been prepared to prescribe for five year programmes. These undoubtedly provided a basis for short term planning, as far as they were able in circumstances of uncertainty about the acquisition of land and fluctuating market conditions. Flexibility was essential. Elaborate and rigid plans had no place.

(b) Administrative Subdivisions

(i) Districts: One District Officer is in control.

(ii) Forests: The plan covers one forest only.

(iii) Sections: Nil.

(iv) Beats: Nil.

(v) Working Blocks

The various separated blocks of which the forest is composed (see Chapter 14) form convenient units with which to build up programmes, though of such different age classes as not to make permanent working blocks in themselves.

(vi) Compartments

Several compartments where there are no permanent internal boundaries are of a considerable size e.g. Compartment 269, the greater part of the old wood at Kildermorie, of 159 acres. Spare numbers have been left so that these can be later broken up when permanent boundaries, such as roads, have been constructed.

Where road works have been largely completed, roads form the basis for division into compartments. Where this is not the case, the old ride system will continue to form the basis of compartment division until such time as full or nearly full roading is completed.

(c) Management Subdivisions

The forest is managed as one unit and no subdivisions are proposed.

Sub-compartments are based on considerable differences in development in any species, or on a change of species.

Chapter 8 - Planting Rate and Resumption of Land

(a) Planting

Planting by the Forestry Commission has proceeded at the following rate:-

<u>P. Year</u>	<u>Area</u>	<u>P. Year</u>	<u>Area</u>
38	120	51	346
39	162	52	312
40	50	53	102
41	55	54	101
42	25	55	-
43	37	56	300
44	-	57	260
45	-	58	300
46	-	59	299
47	160	60	310
48	244	61	312
49	273	62	133
50	255	63	70
Total P38-63 =			<u>4,226</u>

These areas are taken from forms R1 and consequently may not agree exactly with the present distribution of age classes due to failures, replacements etc.

Most of the original Ardross acquisition was under plantations when acquired. The Estate had pursued a replanting policy to restock areas felled during the first world war, and between 1918 and 1934 had planted about 1,100 acres, with programmes rising to 180 acres in 1934. At the time of acquisition, bare plantable land amounted to only about 500 acres, most of which was the result of fellings in the Cnoc na Moine block.

The size of the planting programmes rose and fell according to the rate of acquisition and the clear felling of the older acquired woods.

The peak planting period fell between 1956 and 1961. There is hardly any land still to be planted, and P62 and P63 programmes in part consisted of replanting failed and checked areas.

There is scope for extending plantings to higher levels in the Achnacloich block after ploughing, but this land is interspersed with pine stands of rather scrubby type scheduled for felling in the period 1965 to 1969. Planting of suitable ground will then be carried out.

There are some prospects of a further acquisition on Ardross Moor. It is anticipated that in due course more land will be acquired, but this will no doubt depend largely on national policy on agricultural subsidies. There is suitable land in the neighbourhood and further acquisition would be most desirable.

(b) Resumption

A piece of ground at Braetollie has just been resumed for planting. Lands let for grazing above Newmore, at Kildermorie and the Drove Stance contain plantable land, but in each case the land, on balance, should remain in agriculture use for the time being at any rate. The Drove Stance area remains let for agricultural use on the condition that the land be reclaimed to grass.

There are no proposals, therefore, at present for further resumptions.

Chapter 9 - Silvicultural System

(a) General

The forest has been established by planting.

(b) Thinning

Thinning on a relatively small scale began in 1937 in the acquired woods, and stopped again in 1939 when war-time fellings started. With the possible exception of part of the P12/13 Scots pine stand at Achnacloich, all the thinned areas appear to have been felled at this time, in common with the older woods. A start with first thinnings of the remaining acquired woods was made in 1947, though the larch overwood in Compartment 61 at Cnoc Navie had been thinned out at fairly regular intervals from 1944 onwards. These first thinnings appear to have been little more than cleanings. Some were described as "poker" thinnings e.g. Cnoc Navie P18/20 Scots pine thinned in 1951, Cnoc na Moine P31 Scots pine (Compartment 142) thinned in 1950. The first thinning of Lealty Wood was described as "light to moderate". It seems unlikely that first thinnings exceeded 150 cubic feet/acre at this time.

Standing sales were begun in 1949. Since then, the scale of standing sales has increased, and in recent years all thinnings have been carried out in this way.

The start of systematic working of thinnings was upset by the windblow of 1953. The years 1953 and 1954 were largely spent in clearing up the damage. Thinning thereafter was carried out rather lightly and cautiously, and this factor, coupled with uncertain market conditions and the break in the cycle due to windblow tended to produce rather under-thinned crops. In recent years, however, an increased programme and negotiated sales with a resident timber merchant have produced continuity of working, and an up-to-date thinning position.

The changes in technique over the years are largely as follows:-

- (i) First thinnings are now heavier - for Scots pine 250/300 hoppus feet per acre and carried out earlier. This is felt to be essential, in the long term, to obtaining satisfactory diameter growth and reducing, if possible, the rotation.
- (ii) From being purely low thinnings, thinnings today are a combination of low/crown thinning, achieving a definite break in the canopy around the best trees.
- (iii) The thinning cycle for Scots pine is now tending to lengthen out from 5 years to longer intervals of 6/8 years.

The amount of windblow has been considerable. In the 11 years from F.Y. 53 to 63, the volume of windblow has been 260,000 hoppus feet compared with a volume of thinnings of 697,000 hoppus feet.

(c) Felling

Fellings were carried out in the early war years by the Timber Production Department, and over a period of years after acquisition, of stands bought by McAinsh from the Ardross Estates. The only other fellings carried out have been of windblow or roadlines, or of scrub standing on land to be planted.

(a) Choice of Species

As a considerable area of acquired woods still stand in Ardross, reference will first be made to these woods. In estate plantings, Scots pine was the predominant species occupying all the heath sites and overlapping the rich moist brown earth sites and moorland peats at opposite ends of the scale. Its use at such extremes has not been a success. European larch was planted on the better sites where well drained, and in mixture with pine on good heathland. Norway spruce occurs on a small scale, pure and in mixture with Scots pine in Stittenham and Achnacloich. It seems to have been planted in wetter areas, irrespective of quality, and results have not been good. Even on the richer flushes the trees are not of any great promise, and on the poorer areas growth has checked. Sitka spruce was only initially tried on two moist rich sites (Compartment 36 and Compartment 134) where growth has been very good. Along with Abies grandis and Douglas fir, however, it was used to underplant a poor larch crop on Cnoc Navie, and on this site which is only an improved heathland all three species have done well.

Developments in the Forestry Commission times have been to restrict the use of Scots pine at the lower end of the scale to mineral soils, and to avoid planting this species on the peats. Pinus contorta was used in P38 to replace it at a high altitude with success, but little further use was made of this species until the late 1950's when it has been used to plant the Calluna-moor sites. Current practice is to extend it to the poorer mineral sites, too, where Scots pine is very slow. At first, European larch was used to plant up well drained brown earth sites, but present practice is now to use a greater volume producing species such as Sitka spruce or Douglas fir. Norway spruce has been planted on the rich and moist lower slopes where frost might be expected, and Sitka spruce has been planted on a wide range of sites, not always successfully. It has been used pure on heathland, and here it has gone into check. It has also been planted on poor peats, whose only virtue appears to have been moisture, and here again its success is doubtful. In consequence of these disappointing results, it lapsed severely from favour in the late 1950's and was used with excessive caution, but on deep peats improved by the presence of scrub Scots pine it has done quite well. On good flushed peats and on the better mineral soils, it will succeed.

Douglas fir has been little used. It would appear to have a place on the steeper well drained slopes of reasonable depth and quality. A recent innovation has been to mix it with Scots pine on a good heathland site.

Present day practice has largely limited the species planted to Scots pine, Pinus contorta, Sitka spruce and Douglas fir. Larch is largely restricted to the planting of fire belts and Norway spruce replaces Sitka spruce in frost hollows.

The brown earth sites are planted with Sitka spruce or Douglas fir, the choice depending on such factors as moisture content and exposure. Scots pine is the basic species for the better heathland sites (sites 2 to 4), but enriched with proportions of Douglas fir or Sitka spruce according to the site quality. These species may be used pure on the richest of the heath sites, normally where heather is absent or a minor constituent of a vigorous ground vegetation. Pinus contorta occupies the poorest heaths (sites 5, and lower range of sites 3, 4) and is the basic species for the peats, the best of which it shares with Sitka spruce. The flushed soils are largely planted with Sitka spruce when of good type (sites 8, better range of 9), but minor flushes where heather is present are left for Pinus contorta, or mixtures of the two.

(b) Preparation of Ground

Draining/

Draining has generally been thoroughly and intensively carried out. To go back some years, 2,085 chains of drains were dug in Stittenham Wood in 1852, over 500 acres of largely dry ground. Mound planting was practised in conjunction with the draining. In Forestry Commission times, draining with turfing was carried out in wet areas. These measures were generally adequate in flushed areas. The operation lacking was cultivation of the shallow blanket peats and of the compacted soils, and as a result the upper parts of Achnacloich and Stittenham largely failed. This want was met with the advent of the ploughing outfits, though ploughing was not practised on a scale until 1958. That most of the heathland soils would greatly benefit from ploughing can be seen by comparing direct planted trees with adjacent plough planted trees in P52 area at Stittenham.

Ploughing of heathland or moorland sites is now carried out wherever possible using the Ross tine plough for cultivation and the Cuthbertson single furrow for drainage.

Scrub clearing has dealt largely with birch and alder. Generally speaking a few of the better formed and higher crowned trees have been left and the lower scrub cleared and burnt. Development from this has been to leave a higher number of stems, in the hope of checking weed growth.

Manuring of plants has only been carried out in the last ten years. Ground mineral phosphate has been applied to all peat plantings at the rate of 2 ounces per plant for spruces and 1 ounce per plant for pines. Plants on the poorest mineral soils are also manured now.

(c) Planting Methods

In Estate days, planting appears to have been carried out by vertical notching or by pit planting. Direct planting on the harder ground in Commission years was generally successful except where cultivation was a necessity. Turf planting was practised in the wet areas. Plough planting has been on the spoil turned out.

(d) Weeding

This has conformed to the normal practice of cutting back competing weed growth where plants were being swamped. A recent innovation has been the use of 2.4.5. T sprays for the control of whin and broom in planted areas. Cutting only leads to the development of these weeds and spraying in the dormant season can provide an adequate check to let the trees away.

(e) Beating-up

Beating-up programmes have naturally tended to rise as planting programmes declined. Beating-up has provided an opportunity to improve on the original species selection, as in the use of Pinus contorta to replace Scots pine on the poor and wet north facing slopes of Kildermorie and to introduce spruce into pine crops on better heaths.

(a) Fencing

The forest lies on the fringes of a deer forest. On the original Ardross Estate acquisition, a deer fence was erected on the north and west sides of Cnoc na Moine block, and the remaining blocks fenced against stock and/or rabbits. The presence of a march dyke in many instances meant that fences had only to be proof against rabbits. Increasing numbers of red deer to the north and west and of roe deer to the east have meant that the more recent fencing has had to be proof against deer also. Kildermorie, Strathrusdale, Ardross Moor, Strathy Wood and Kindeace blocks are all entirely deer fenced.

War-time fellings have in most cases had to be separately fenced against rabbits and thus Achnacloich and Cnoc Navie blocks have internal rabbit fences.

(b) Cleaning

Acquired woods were planted at 3 feet spacing. It was found that it was necessary to carry out a cleaning in these crops to obtain free access and to free the crowns of the better stems. No such cleaning has been carried out or is envisaged in crops planted at 5 feet or more spacing. In the years after the war, it was possible to obtain a market for some of the cleanings as pokers for the British Aluminium factories or as sheep stakes. In recent years there has been no market for these.

Cleaning to remove unwanted hardwood species interfering with the planted crop is carried out where necessary.

(c) Draining

Drain maintenance has been carried out as necessary either as spot treatment in younger crops where initial drainage clearly required attention or systematically after thinning operations have been completed. The position is generally satisfactory though in retrospect there would appear to be a need for a machine of the Dinkum digger type to put in 2 feet 6 inches to 3 feet deep main drains in areas where drainage is difficult. Main drains have on occasions been inadequate in depth, particularly where compact subsoil restricts penetration by hand methods.

(d) Racking

Racking has not been carried out.

(e) Brashing

Brashing is abreast of requirements. Present practice is to brash pines early when top height is about 17 feet to an intensity of about 50%. This is primarily a first stage in high pruning, but also provides early access. This treatment would also be accorded to Douglas fir where high pruning is also envisaged, but there are no crops at this stage. For other species time of brashing is of lesser importance provided access is available when required. Brashing intensities range from 50 to 60% in the case of larch to about 80% in spruces.

(f) Pruning

Pruning of Scots pine started in F.Y. 61 with the object of pruning to a height of 18 to 20 feet. Eligible stands are those of Quality Class III or better, where unpruned stem diameter does not exceed 6 inches. This largely limits pruning to P38 or younger age classes and those which are suitable have been pruned to 12 feet so far. Younger acquired stands, however, which combine good form and vigour, and do not greatly exceed the diameter limitation are also being pruned, with a view to eliminating the possibility of black knots.

Chapter 12 - Crop Improvement(a) Enrichment

No enrichment has been carried out by the Forestry Commission. In 1930, however, the Estate introduced Sitka spruce, and silver firs into a poor crop of 1900 European larch in Compartment 61. The overwood has been systematically opened out to favour the understorey which has developed well.

(b) Rehabilitation

There is little to record except occasional improvements to drains in wet peaty areas where spruce was none too happy. This was often combined with manuring. These works have largely been confined to the Cnoc na Moine and Inchlumpie blocks.

The poorest spruce crops on heath and heather moor have been ploughed through. The worst areas were virtual failures and have been replanted, but areas with any promise of a reasonable number of spruce succeeding have been beaten up with pine. The spruce appear to have improved in colour and vigour since the ploughing, and should make a crop in mixture with the pine.

(c) Other Methods

Nil.

Record of Past Yields from Thinning/Felling Windblow (Combined)

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

Complete as
necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
		Volume (3)	Area (4)	Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
				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)
53	Total	64		52		4		6		2							
	2½"—6"	53		49		3				1							
	6½"—9"	11		3		1		6		1							
	Over 9"																
54	Total	103		89		8		6									
	2½"—6"	66		59		5		2									
	6½"—9"	37		30		3		4									
	Over 9"																
55	Total	121		116				5									
	2½"—6"	55		51				4									
	6½"—9"	66		65				1									
	Over 9"																
56	Total	76		71		2		3									
	2½"—6"	50		46		1		3									
	6½"—9"	26		25		1											
	Over 9"																
57	Total	149		137		10		2									
	2½"—6"	54		47		5		2									
	6½"—9"	95		90		5											
	Over 9"																

2685. Wt. P79406. 10.0

Record of Past Yields from Thinning/Felling Windblow

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

* Complete as
necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
		Volume (3)	Area (4)	Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
				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)
53	Total	10	18	8	15			1	2	1	1						
	2½"—6"	7		7													
	6½"—9"	3		1				1		1							
	Over 9"																
54	Total	5	20			Neg.	1	5	19								
	2½"—6"	2						2									
	6½"—9"	3						3									
	Over 9"																
55	Total	103	296	100	263			3	33								
	2½"—6"	47		45				2									
	6½"—9"	56		55				1									
	Over 9"																
56	Total	70	329	67	311			3	18								
	2½"—6"	48		45				3									
	6½"—9"	22		22													
	Over 9"																
57	Total	67	135	62	100	3	6	2	29								
	2½"—6"	31		29				2									
	6½"—9"	36		33		3											
	Over 9"																

2572. Wt.P.69260. 15.6

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
		Volume (3)	Area (4)	Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
				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)
53	Total	54		44		4		5		1							
	2½"—6"	46		42		3				1							
	6½"—9"	8		2		1		5									
	Over 9"																
54	Total	90		82		7		1									
	2½"—6"	56		52		4											
	6½"—9"	34		30		3		1									
	Over 9"																
55	Total	10		10													
	2½"—6"																
	6½"—9"	10		10													
	Over 9"																
56	Total	6		4		2											
	2½"—6"	2		1		1											
	6½"—9"	4		3		1											
	Over 9"																
57	Total	48		48													
	2½"—6"	8		8													
	6½"—9"	40		40													
	Over 9"																

2685. Wt. P79406. 10.0

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
		Volume (3)	Area (4)	Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
				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)
53	Total	-															
	2½"—6"																
	6½"—9"																
	Over 9"																
54	Total	8		7		1											
	2½"—6"	8		7		1											
	6½"—9"																
	Over 9"																
55	Total	8		6				2									
	2½"—6"	8		6				2									
	6½"—9"																
	Over 9"																
56	Total	-															
	2½"—6"																
	6½"—9"																
	Over 9"																
57	Total	34		27		7											
	2½"—6"	15		10		5											
	6½"—9"	19		17		2											
	Over 9"																

2685. Wt. P79406. 10.0

Record of Past Yields from Thinning/Felling/Winchblow (Combined)

Working Plan Area Address

Volumes in 000's h. ft. over b

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
				Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
		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)
58	Total	43		40		1		1		1							
	2 1/2" - 6"	37		34		1		1		1							
	6 1/2" - 9"	6		6													
	Over 9"																
59	Total	24		21		3											
	2 1/2" - 6"	23		20		3											
	6 1/2" - 9"	1		1													
	Over 9"																
60	Total	60		53		4		3									
	2 1/2" - 6"	47		41		3		3									
	6 1/2" - 9"	12		11		1											
	Over 9"	1		1													
61	Total	174		160		7		7									
	2 1/2" - 6"	83		71		5		7									
	6 1/2" - 9"	54		52		2											
	Over 9"	37		37													
62	Total	151		123		21		7									
	2 1/2" - 6"	89		75		12		2									
	6 1/2" - 9"	49		37		9		3									
	Over 9"	13		11				2									

2685. Wt. P79406. 10.0

Record of Past Yields from Thinning/Felling/Winchblow

Working Plan Area Address

Volumes in 000's h. ft. over b

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
				Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
		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)
58	Total	-															
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																
59	Total	-															
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																
60	Total	1		1													
	2 1/2" - 6"	1		1													
	6 1/2" - 9"																
	Over 9"																
61	Total	9		9													
	2 1/2" - 6"	1		1													
	6 1/2" - 9"	4		4													
	Over 9"	4		4													
62	Total	24		20		4											
	2 1/2" - 6"	11		9		2											
	6 1/2" - 9"	8		6		2											
	Over 9"	5		5													

2685. Wt. P79406. 10.0

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
		Volume (3)	Area (4)	Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
				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)
58	Total	22	261	20	237	1	13			1	11						
	2½"—6"	22		20		1				1							
	6½"—9"																
	Over 9"																
59	Total	23	73	20	58	3	12	Negl.	2	Negl.	1						
	2½"—6"	22		19		3											
	6½"—9"	1		1													
	Over 9"																
60	Total	57	159	50	111	4	14	3	34								
	2½"—6"	45		39		3		3									
	6½"—9"	11		10		1											
	Over 9"	1		1													
61	Total	151	581	139	529	6	11	6	41								
	2½"—6"	78		67		5		6									
	6½"—9"	41		40		1											
	Over 9"	32		32													
62	Total	125	218	102	174	16	30	7	14								
	2½"—6"	77		65		10		2									
	6½"—9"	40		31		6		3									
	Over 9"	8		6				2									

2685. Wt. P79406. 10.0

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
		Volume (3)	Area (4)	Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
				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)
58	Total	21		20				1									
	2½"—6"	15		14				1									
	6½"—9"	6		6													
	Over 9"																
59	Total	1		1													
	2½"—6"	1		1													
	6½"—9"																
	Over 9"																
60	Total	2		2													
	2½"—6"	1		1													
	6½"—9"	1		1													
	Over 9"																
61	Total	14		12		1		1									
	2½"—6"	4		3				1									
	6½"—9"	9		8		1											
	Over 9"	1		1													
62	Total	2		1		1											
	2½"—6"	1		1													
	6½"—9"	1				1											
	Over 9"																

2685. Wt. P79406. 10.0

Record of Past Yields from Thinning/Felling/Winablow (Combined)

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
				Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
		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)
63	Total	81		78		3											
	2 1/2" - 6"	54		54													
	6 1/2" - 9"	14		13		1											
	Over 9"	13		11		2											
	Total																
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																
	Total																
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																
	Total																
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																
	Total																
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																

2685. Wt. P79406. 10.0

Record of Past Yields from Thinning/Felling/Winablow

Working Plan Area Ardross

Volumes in 000's h. ft. over b

Areas in acres

* Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
				Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
		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)
63	Total	23		23													
	2 1/2" - 6"	1		1													
	6 1/2" - 9"	11		11													
	Over 9"	11		11													
	Total																
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																
	Total																
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																
	Total																
	2 1/2" - 6"																
	6 1/2" - 9"																
	Over 9"																

2572. Wt. P.69260. 15.0

Working Plan Area Address

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
				Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
		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)
63	Total	56	235	53	233	3	2										
	2½"—6"	51		51													
	6½"—9"	3		2		1											
	Over 9"	2				2											
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																

2685. Wt. P79406. 10.0

Working Plan Area Address

Areas in acres

Complete as necessary

* Section

* Working Circle

* Felling Series

Year (1)	B.H.Q.G. Classes (2)	Total		Species and Species Groups													
				Pines		Spruces		Larches		D.F.		Other Conifers		Oaks		Beech	
		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)
63	Total	2		2													
	2½"—6"	2		2													
	6½"—9"																
	Over 9"																
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																
	Total																
	2½"—6"																
	6½"—9"																
	Over 9"																

2685. Wt. P79406. 10.0

Chapter 13 - Regulation of Yield(a) WP 13 - Record of Yields from Thinning and Felling

The irregularity of the annual yield as seen from forms WP 13 can be explained by three factors - the effect of windblow, thinnings of the large area at Kildermorie (F.Y. 55, 61 and 62) and market conditions (F.Y. 59). Gale damage in 1953 interrupted the thinning programme, and thinnings thereafter were understandably cautious. Market conditions were rather unfavourable, however, and it was not until F.Y. 59 that a thinning programme was embarked upon which was also carried out. Though the thinning position is now largely up-to-date, the crops still to some extent reflect the lack of thinning in their earlier years.

(b) Methods of Regulation

Thinnings have been carried out according to five year prescriptions. These have in the past five years largely gone according to plan. Thinning volume was calculated on a five year basis and broken down to provide annual programmes with reasonably even yields and systematic working through blocks. Kildermorie was an exception, the date of thinning being geared to market conditions.

Present thinning output was prescribed at 60,000 to 70,000 hoppus feet/year; a figure which compares conservatively with the C.A.I. of 181,000 hoppus feet/annum. Actual yield from thinnings and windblow has averaged 91,000/year over the five year period F.Y. 59 to 63.

Chapter 14 - Forest Roads and Access

(a) Construction

The spacing proposed for roads is 300 yards except where wheeled tractors can be expected to work. In such cases, a wider spacing of 440 yards is proposed. The limitations to wheeled tractor extraction at present are thought to be slopes exceeding 1 in 10 and soft ground conditions. The only areas for roads spaced at 440 yards are thus the greater parts of Stittenham, Cnoc Navie and a small part of Cnoc na Moine.

Closer road spacing was practised in the past. The early roads were largely unsurfaced and these were generally satisfactory for fair weather working and a low weight of traffic. Some metal was later applied to these which required it, but generally the early roads are only lightly surfaced, if at all. Most of these lines have been well laid out, with the odd exception of steep gradient or sharp corner. On steeper side slopes, however, they are often too narrow and the exposed bank has been too steep. In more recent years, higher specifications have necessitated more metalling and greater cost. Suitable surfacing material is hard to find in the forest. Advance formation of road lines in Ardross, might produce considerable economics in surfacing later on, especially if this could be restricted to the drier conditions of spring and early summer.

The present road position is as follows:-

Completed roads serving plantations (excluding public roads)	19 miles.
Uncompleted roads serving plantations	9 miles.
Essential access roads (excluding ones which are not essential to the forest and are rarely used e.g. Boath road)	7 miles.
Estimate of new roads required to complete road system	32 miles.

The present road specification is as laid down in Engineering Instructions.

(b) Maintenance

While daily maintenance is the task of the forest staff, large scale repairs are carried out by the engineering branch. The engineering branch is also required to do surface repairs on the 7 mile tarred road to Kildermorie.

(c) Access

There are many shared access roads, forming an essential part of the road system. The mileage of essential accesses is given above.

No block lacks access.

Chapter 15 - Powered Vehicles and Machines

(a) Transport

The forest holding of vehicles is at present:-

- 1 - 5 ton lorry
- 1 - 15 cwt. pick-up
- 1 - motor bicycle.

The lorry is used for the transport of men (the maximum number carried is about 20) and stores. It often is a drawback that the lorry is not adequate for the movement of crawler tractors within the forest, and a 7 ton lorry would be an advantage. The other vehicles are used for supervision, and for this purpose only, the 15 cwt. pick-up is unnecessarily large. A 5 cwt. van would be adequate. The motor cycle has considerable limitations in the Ardross winter.

(b) Other Mechanical Equipment

A single Hathaway pump is held. This is generally adequate for the forest's needs. If required a second Hathaway pump can be quickly obtained from the nearby Morangie forest.

A pressure retaining pack sprayer is held in Ardross. This is used in Easter Ross forests for the spraying of whins and broom in particular.

(c) Availability of Equipment from Other Sources

Ploughing outfits and bulldozers for making or maintaining fire traces are held by Conservancy.

(d) Maintenance and Repair

This accords with Conservancy practice and instructions.

(a) Marketing

1. Standing Sales

In recent years a chipboard factory has been set up in Inverness, and this has provided a somewhat unsteady and unreliable market for thinnings. Apart from this, however, the National Coal Board has provided the main and, previously, the only market for most produce.

Standing sales have been preferred, and in recent years all thinnings have been sold standing. Prices have ranged from 5½d. to 1/5d. for the normal run of early thinnings, and 1/10½d. to 2/6d. for the heavy thinnings at Kildermorie and the old larch in Cnoc Navie.

The following merchants have bought standing timber:-

H. Mackay & Sons	Tain	1949-1954
H. D. Armstrong, Ltd.	Inverness	1955
Z. Glass & Son, Ltd.	Inverness	1953-1954
Hugh Murray, Ltd.	Golspie	1955-1959
J. D. Mackay	Kildary	1956
Hannan Brothers	Conon Bridge	1954-1957
J. & G. Stewart	Turriff	1958-1959
James Jones & Son, Ltd.	Larbert	1959 onwards
Novar Estates Ltd.		1960-1962
Tower Timbers Ltd.	Inverness	1962-1964.

2. Commission Working

No working of produce on any scale has been carried out by the forest staff. A peak was reached in the years 1953 and 1954, when 50,000 and 43,000 hoppus feet respectively were worked, but these volumes largely consisted of blown timber. In the period F.Y. 53 to F.Y. 57, the proportion of produce worked by the Forestry Commission averaged 28% (77% in F.Y. 53; dropping to 15% in F.Y. 57). The proportion for period F.Y. 58 to F.Y. 62 was 5%. Thinning started prior to the war, but the thinned crops were mostly felled during the war. Thinnings recommenced in 1944, but only on a small scale and irregularly, and so it continued until 1958 when departmental working virtually ceased, except for road-line felling and odd parcels of windblow. Apart from thinnings of larch for home use, the produce was mostly sold as trees in length at roadside at prices which ranged from 1/3d. to 2/4d. Buyers have included - Z. Glass & Son, Ltd., H. D. Armstrong, Ltd., H. Mackay & Sons, J. M. Macdonald Ltd., Hugh Murray, Ltd. and James Jones & Sons, Ltd.

(b) Exploitation

1. Standing Sales

Marking is carried out by industrial staff and measurement by the tariff system. The cost of marking, measurement and overheads attributable to standing sales has amounted to about 1½d./hoppus foot, according to the financial accounts for F.Y. 61 and F.Y. 62.

The standing sales are supervised by the Head Forester and the junior Forester. Protective measures include the creosoting of all stumps after felling. The merchant is responsible for keeping drains and road-side ditches clear, and for unnecessary damage to roads. Reminders are required on this from time to time.

In recent years, almost all the extraction has been by horse. Extraction by wheeled and crawler tractor has been carried out, especially/

especially at Kildermorie. The smallwood element is normally converted to props at roadside, millwood being driven away.

2. Commission Working

Little or no Forestry Commission working has been carried out for some years. What has been done has been mostly road-line clearance and some windblow. Felling has been by hand saws and extraction by horse hired from and worked by a forest worker. Quantities have been too small and circumstances too abnormal to provide any guide to the cost of working produce.

Marking, measuring, and protective measures are undertaken in the same way as in standing sales.

(c) Observations on the Relative Merits of Standing Sales and Departmental Working

With no evidence to assess the financial results of Commission working, there nevertheless seems little reason to doubt that standing sales will prove more profitable when presented in the form of our financial accounts. The decision however really depends on the work/labour position. Ardross has a relatively stable labour force, and it is in the Commission's interest that this should be maintained.

Given a straight choice, however, standing sales are preferred. Little supervision is required, and keen prices could probably be obtained in an area which enjoys the advantages of easy working, accessibility and a plentiful supply of contractor labour.

Chapter 17 - Risks

(a) Animals

Red deer are common around the western blocks of the forest and require the maintenance of boundary deer fences. It is to be hoped that the Red Deer Commission can persuade deer forest owners on adjoining areas to reduce stocks.

Roe deer are present in small and controlled numbers. They come from neighbouring estates however, and a close check of numbers needs to be kept in view of the scattered young plantings.

Ardrross now lies largely in the territory of the Easter Ross rabbit clearance society, and it is hoped that this vigorous body can control rabbits on adjoining land. Hares are a serious pest however, especially in the eastern blocks.

Squirrels which did a great deal of damage in the past are now of little importance, but a watch is kept for any apparent increase in numbers.

(b) Birds

At the head of the list must come the capercaillie. This bird does a great deal of damage to newly planted trees, and is particularly numerous in the eastern part of the forest. It is protected by a close season from 1st February to 30th September.

Black game is less numerous and consequently does little damage. The red grouse, however, is responsible for quite a bit of damage to newly planted trees.

The Kindeace area suffers particularly from the attentions of capercaillie and grouse.

(c) Insects

Pine weevil is an ever-present danger on or near felled areas, though the use of D.D.T. for treating young plants has largely overcome the problem; exceptions have occurred, however.

Pine beetle is always liable to increase to damaging proportions, and restrict crown development of standing pine trees, if large amounts of unbarked material are cut and left lying through the breeding season. This can happen particularly with heavy cleanings, and care is needed to see that the amount of unbarked matter is never excessive.

The larch bark beetle (*Ips cembrae*), which is described in SM 86, has been found in the forest. So far, it has been more of interest than of significance, but care must be taken not to provide for it the breeding material in season which could transform its present position.

Pine sawfly has caused annual damage until recently when it largely disappeared.

(d) Weeds

As their treatment may differ from the normal, whin and broom require special mention. These weeds, where prolific are now being increasingly controlled by spraying with 1.4.5-T in water or oil. With this weapon, efforts are made to eradicate these weeds on roadsides and boundaries in particular, where they add to the risk of fire. In such situations, cutting first, followed by the spraying of the stumps with 100% spray in oil is preferred to the cheaper foliage spraying which creates a mass of dead and inflammable matter. The choice between stump or foliage treatment on boundaries is however decided by the density of the weed growth/

growth and the risk of fire. Foliage spraying with 50% spray in water is the more common treatment, and the only possible one amongst growing trees. Weed control by spraying within plantations can only be undertaken after the formation of terminal buds, and oil must not be used.

(e) Fungi

Fomes annosus is very active in the crops on old arable land at Achandunie (where P34 larch is already rotten), and a potential danger generally in a forest which is largely on old woodland. The pathologist operates an experiment on the control of this fungus at Achandunie. Treatment of stumps by creosote is the only measure of control at present carried out in the forest.

Peridermium pini has recently sprung into prominence. Deaths have occurred, principally in two localities where a death rate of up to 12 trees/acre in 30/40 year old Scots pine has been found. Schlich in 1907 recorded that in Ardross this fungus "has caused the greatest damage to Scotch pine".

Larch canker is present, but the decline in the use of larch will reduce its significance. It has, however, recently severely attacked the larch stand at Inchindown and a considerable death rate seems likely.

Very commonly, a black mildew occurs on European larch. This appears to check growth, but no more.

(f) Climate

Wind heads the list of risks. The importance of wind damage can be seen from the fact that in the last 11 years (1953-1963), the volume of windblow was 265,000 hoppus feet, compared with a thinning volume of 689,000 hoppus feet. The often shallow Ardross soils grows trees which are very susceptible to windthrow - this is particularly true on the flat ground on top of Stittenham and Cnoc Navie.

Drying winds after planting occur with regularity. Severe frosting does occur in lower hollows, and this factor is considered in making species selection.

Snow can be heavy and lie long, especially at Kildermorie. Damage to fences and invasion by red deer often follows a heavy snow storm.

(g) Trespass

This has not proved a serious risk but the likelihood is that the public will tend to drive more and more along our forest roads. This must be discouraged, and where necessary gates or barriers may have to be locked, preferably as a temporary measure only.

(h) Atmospheric Pollution

Nil.

(i) Fire

Fire hazard is generally high, as could be expected in a relatively dry area dominated by a heath vegetation. Nevertheless fire risk is only moderate, as only the main road is much frequented by the public.

Measures for fire prevention and control are given in the Fire Plan.

Chapter 18 - Nurseries

None.

(a) Staff

The following officers and Senior Foresters have been directly connected with the forest:-

(1) Conservators and Divisional Officers

<u>Name</u>	<u>Rank</u>	<u>Date</u>
J. Fraser	Divisional Officer	1937-45
D. Spraggan	A/Divisional Officer	1939-42
A. Watt	A/Divisional Officer	1942-45
J. Fraser	Conservator	1945-56
J. T. Fitzherbert	Divisional Officer	1948-49
J. A. Dickson	Divisional Officer	1949-56
J. A. Dickson	Conservator	1956-63
R. A. Innes	Divisional Officer	1956-present
H. A. Maxwell	Conservator	1963-present.

(2) District Officers

F. Oliver	1937-39
J. Denman	1939-46
E. Richards	1946-49
J. A. Dickson	1949
R. A. Innes	1949-50
J. D. McNab	1950-51
G. Savage	1951-56
T. D. Cotter-Craig	1956-58
A. F. Mackay	1958-present.

(3) Head Foresters, Foresters

K. Mackay	Forester	1937-52
A. MacLeman	Forester	1952-58
A. MacLeman	Head Forester	1958-present
W. J. P. Dyce	Assistant Forester	1955-56
H. Reid	Assistant Forester	1956-60
H. Reid	Forester	1960-62
T. Baird	Forester	1962-present.

(b) Labour

The present strength is twenty-four, which includes a female clerkess and a boy training for entrance to the Forester Training School. The number in each age group at 1st September, 1964 is as follows:-

<u>Age Group</u>	<u>Number</u>
15-20	3
21-30	Nil
31-40	11
41-50	4
51-60	4
61-65	2
	<u>24</u>

The position by grades is as follows:-

<u>Grade</u>	<u>Number</u>	<u>Number Established</u>
Gangers	4	4
Grade I Workers	12	7
Grade II Workers	1	-
Workers/		

<u>Grade</u>	<u>Number</u>	<u>Number Established</u>
Workers under 21	3	-
Lorry Drivers	1	-
Trappers Grade I	2	2
Clerkess	1	-

Wastage is largely by retirement only. The quality of labour is high. The workers are mostly of local extraction, with considerable experience of forest work.

The local rural community has generally full employment. In the nearby centres of Alness and Invergordon, the introduction of new industries has absorbed most of the unemployment. If it was desired, further recruitment would be difficult.

The standard of ganger is high. Recruitment to ganger is by upgrading from the squad.

There is little piecework at present, owing to the decline in work load. Previously planting and draining had largely been carried out on piecework.

The Forest Workers' Training Scheme provides for power saw instruction and instruction in basic training. Instruction in basic training is given primarily to juvenile workers and trainee forest workers, as preparation for upgrading to skilled forest worker status.

Most of the workers occupy Forestry Commission houses, nine of these houses being at Dublin village, a small local community centrally situated in the forest.

Workers are transported to work by lorry. Reporting points are Dublin village where the lorry is garaged and the Ardross cross-roads. These points are central to the whole forest area.

Chapter 20 - Houses, Holdings, Buildings and Special Installations(a) Houses and Holdings

<u>Type of House</u>	<u>Present Occupant</u>	<u>Proposed Changes in Occupation</u>
9 stone built cottages at Dublin.	Forest workers, and lorry driver.	None
2 stone built houses at Mid-Ardross.	Forester and Research Forester.	None
1 Dorran house at Fox Farm.	Head Forester.	None
1 Wooden bungalow at Fox Farm.	Trapper.	None
1 Wooden bungalow at Fox Farm.	Empty.	
1 stone built cottage at Fox Farm with holding.	Forest worker.	None

The present housing position is adequate, though the wooden bungalows at Fox Farm are old and hardly worth further repair. The Dublin houses are also well on in years, and it may soon be found desirable to build two new houses at Dublin where the community should be preserved if possible. The Local Authority would be unlikely to build here, and the Forestry Commission would be responsible.

(b) Other Buildings

At Dublin: 1 timber built garage.
1 wooden shed for fire equipment.
1 old disused wooden bothy.

At Mid-Ardross: Stone outbuildings, containing 2 garages,
3 store-rooms, firewood store, office.
1 wooden office (Research).

Wooden huts at Inchlumpie, Stittenham quarry, Achnacloich.

(c) Special Installations

Nil.

Chapter 21 - Research and Experiment(a) Research Branch Work

Some investigations are undertaken in the forest. The experiments are:-

<u>Experiment No.</u>	<u>Forest Compartment</u>	<u>Remarks</u>
1/60 (GA) P29	72	Investigation of response of established SP stand to dressings of N, P, K, Ca and Mg, and profitability of such treatment.
Fomes 35	76	Long term protection against <u>Fomes annosus</u> using area, polyborchlorate and creosote.
Fomes 61	76	Investigation of possibility of introducing <u>Fomes annosus</u> into healthy crop by use of infected fencing material.

(b) Investigation by Local Staff

None.

Chapter 22 - Other Factors

There are no other factors.

Chapter 23 - Working Plan Annual Report

(a) Form WP 20 - Annual Control Summary - F.Y. 64

(b) Account of Years' Work

F.Y. 64

The winter of 1963/64 was a fairly open and damp one, and the weather continued generally favourable to plant growth throughout the spring season. A late spring frost in May did some damage to spruce. The summer was very dry, but marred by persistent winds which kept temperatures down. Plant growth however was generally good.

The small planting programme was easily accomplished, and results are good.

More draining was carried out than planned as a result of the decision to plant part of the Kindeace bog in F.Y. 65, previously regarded as unplatable. This area was successfully ploughed using the County tractor, but considerable hand draining was also necessary to prepare this flat area effectively.

This increased draining programme and an increased weeding programme partly due to the wet spring weather led to a drop in the brashing programme, not of any great consequence as the proposed brashing was mostly of the early variety and could be easily postponed for a year.

Production programmes, virtually all by sales standing, went largely according to plan.

Capercaillie damage, the spread of the pini blister (Peridermium) and deaths in the European larch (thought by Mr. Murray, Aberdeen University, to be due to drought) gave rise to alarm. The Peridermium problem is a serious one.

Annual Control Summary

Operation (1)	Unit of Measure- ment (2)	F.Y. 64 Programme (3)	Actual (4)	F.Y. 65 Programme (5)	Actual (6)	F.Y. 66 Programme (7)	Actual (8)	F.Y. 67 Programme (9)	Actual (10)	F.Y. Program (11)
Ploughing	Acres	-	88 *							
Prep. Ground. Other	Acres	18	14							
Planting	Acres	45	50							
Drains New	Ch.	650	1,517 *							
Fences New	Ch.	56	-							
Beating Up	M.	74	137							
Weeding	Acres	315	569							
Cleaning	Acres	50	18							
Brashing	Acres	215	80							
High Pruning	Acres	(1) 85	(1) 30							
Drains Maintenance	Ch.	1,000	316							
Felling	Ac./M. H.ft.	4/9	Roads * 4/11							
Thinning	Ac./M. H.ft.	277/62	231/58							
			* Largely due to decision to plant Kindece							

DS 39873/4/2572/3 5m 2/59 DL

STATEMENT OF LAND UTILISATION

Form WP.11
(Revised 12/6)

areas in acre

[illegible]