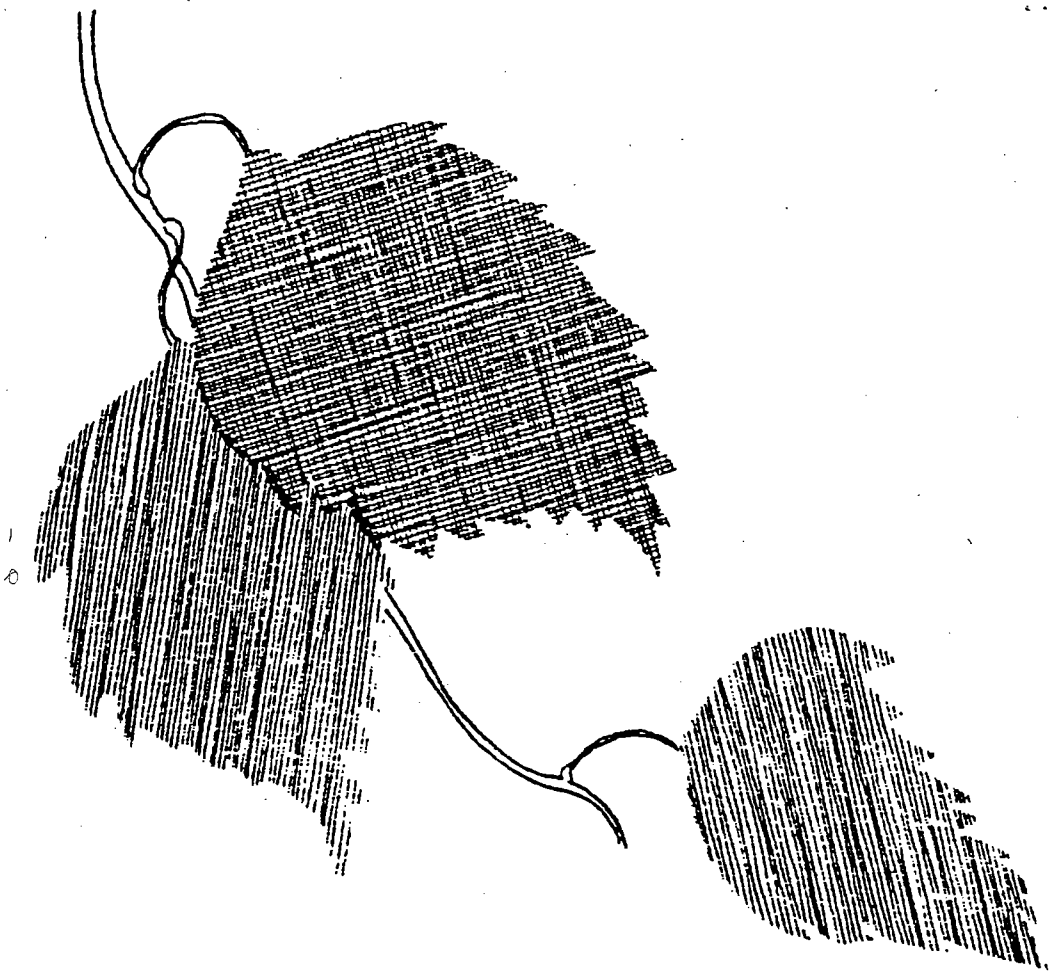

native woodlands discussion group

newsletters 1-12

NEWSLETTER

NUMBER 5

SPRING 1977

NATIVE PINEWOODS DISCUSSION GROUP

NEWSLETTER NUMBER 5

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CONTENTS

NATIVE PINEWOOD DISCUSSION GROUP

NEWSLETTER NUMBER 5 - SPRING 1977

In this newsletter we are mainly concerned to report on last October's successful field meeting in Wester Ross and obtain views on the venue for a meeting which we hope it will prove possible to hold next October.

To the general account of the Wester Ross meeting we have appended the stimulating paper presented at the meeting by Richard Ogilvy on the subject of the Management of Extraction Zones in Native Pinewoods and also the results of the assiduous beetle collecting indulged in by two of the participants, which represents a valuable contribution towards the entomological knowledge of the pinewoods visited.

We also attach an amended mailing list for the Group - if there are still mistakes or omissions, please let us know.

1977 MEETING

So far there have been two suggestions for the 1977 meeting - the first for a meeting in the Glencoe/Fort William area which would include visits to woods in the Steven and Carlisle Great Glen Group (e.g. Ardgour, Glen Loy) and Southern Group (Glen Orchy and Black Mount), the second suggestion is for a meeting based at Ballater or Braemar to include visits to the Deeside group of Pinewoods. Members are asked to complete the enclosed form indicating their interest in attending a meeting in late October 1977, their preference for location or suggestions for alternatives.

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Edinburgh
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R G H Bunce
Institute of Terrestrial Ecology
Merlewood Research Station
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THE NATIVE PINEWOODS DISCUSSION GROUP

1976 MEETING IN WESTER ROSS

The meeting was held on the 6 - 8 October at the Loch Maree Hotel.

On the first evening three short papers were given of which the following is a brief summary.

R Goodier (NCC Edinburgh) opened the meeting by welcoming the participants to the area. He sketched the past history of the Group, which derived from a meeting which he had convened in the Department of Forestry in the University of Aberdeen in November 1970, taking a cue from the final paragraph of the text of Steven and Carlisle's book, though the present series of annual meetings, the circulation of the Newsletter and the name of the group took its present form from the discussions at the 1974 meeting in Inverness. After stressing the informality and unofficial nature of the group he went on to outline some recent developments in native pinewood conservation, including the establishment of the Scottish Wildlife Trust reserve by agreement with the Forestry Commission at Tyvoan in Glenmore Forest, the agreement between the Forestry Commission and the Nature Conservancy Council on the Management of the Black Wood of Rannoch (described in detail in a recent issue of Scottish Forestry) and the purchase of part of Abernethy Forest around Loch Garten by the Royal Society for the Protection of Birds. He concluded by remarking on the fact that he had seen seven native pinewoods during his drive to the meeting, starting with Coille Coire Chuilc and finishing with Coille na Glas Leitire, had been impressed by the individual personality of each wood, suggested that this was reflected in the variety of Gaelic names applied to them and that a study of these names and the more consistent application of them to the different woods, and the different parts of the larger woods might be a useful project for the group to consider promoting.

R G H Bunce (ITE Merlewood). Gave a brief account of the principal ecological features of the north-western group of pinewoods (Loch Maree, Coulin, Achnashellach, Shieldaig and Cannich). The forests are usually relatively small, with a quite open canopy and are generally growing on soils with a deep organic layer. The pine is growing mainly on the better drained slopes and the open boggy areas amongst the pines are likely to be a natural feature.

Mr Ball (NCC Inverness). Gave a general introduction to the particular sites to be visited and described the background to the details of the area with the aid of excellent slides which emphasised the photogenic nature of the old pinewoods and their contribution to the landscape.

Visit to Coulin Forest

The first stop was made in an area planted with exotic conifers where the group was met by the landowner, Major Wills. Clumps of old pines had been left on morainic mounds and young trees were becoming established in a wide range of situations, presumably in response to the removal of grazing pressure following the plantation enclosure. It was concluded that such groups of pines could form important nuclei from which native trees could spread into the plantations. Not only would they make some contribution to the conservation of the pine but also would help to diversify the plantations with consequent benefit to wildlife conservation.

The second stop was made close to the house at the centre of the estate and the role of the pinewood in the running of the state was described. Detailed discussions with NCC had led to the formulation of management proposals aimed at the encouragement of regeneration in the scattered blocks of pinewood present. A system of fencing had been devised to protect parts of the forest from grazing.

There was some divergence between members of the group who thought that this would be sufficient to encourage regeneration and those who considered that further treatments would be necessary. The time scale set for establishment was a crucial point as was also the proportion of pine that could be expected in a colonising situation in the present conditions.

The final stop at the Coulin Estate was at a small area of pine at the upper limit of the forest. This block of trees contained many of the features of such isolated groups with no regeneration and heavy grazing pressure. Several abrupt treelines were noted and related either to fires or cutting regimes.

Visit to Achnashellach Forest

In the afternoon a visit was made to this forest and the first stop was made to view an area of forest directly above the railway line. In the days of steam the hillside was regularly burnt but, with the last steam train running in about 1963, regeneration is now evident over much of the slope - even well away from the seed trees. Even as seen from a distance a wide size range of saplings appeared to be present and variable structured block of woodland seemed likely to result.

The final stop at Achnashellach was in the centre of the forest, where, after a walk through Sitka plantations, an area of native pinewoods was examined that had been left to develop within the main forest boundary fence. On the very wet ground within the pine area no regeneration was present and it was pointed out that if pine growth were required here drainage would be needed. However, it seems doubtful that such site conditions could be expected to support pine and that the objectives for the site are therefore critical in determining the management policy in a particular area. Although there was much rank heather elsewhere some young trees were growing vigorously and there was discussion of the way in which in the future the spruce could perhaps be thinned to enable the pine to expand. It was concluded that such areas, although small, make a useful contribution to the overall resource of native pinewood and that discussion on future management could significantly improve their potentiality.

On the way back to Torridon a brief visit was made to Coille Creag Loch (Shieldaig) Pinewood. Here the effects of the recent fire were examined and the work of T M Sykes and A D Horrill on monitoring its effects on the vegetation were discussed. The ground vegetation was severely affected initially but has shown a very rapid recovery in terms of species composition. The seedling population was also decimated and the fate of the new seedlings is being followed year by year. It was noted that the grazing pressure was high - perhaps due to the fire temporarily improving the quality of the grazing.

Evening

the evening started with Mr N Dannatt (FC Edinburgh) outlining current Forestry Commission thinking in relation to native pinewood conservation. The FC own two major sites (Rannoch and Affric). They have recently drawn up a detailed management plan for the former of these sites in close co-operation with NCC and are working on one for the latter. They are also reviewing the position in all the other sites, where the situation is similar to Achnashellach.

Mr Richard Ogilvy (Fountain Forestry) then gave a most intersting talk on ways in which the native forest could be managed for timber purposes with as little conflict as possible with conservation objectives. The talk was considered to be so useful that the speaker was asked to prepare the text for circulation (the text is circulated as part of this Newsletter).

Saturday

The group split into two parties visiting Coille na Glas Leitire and the Loch Maree Islands alternatively in the morning and

afternoon. The islands were of exceptional interest since they are relatively little disturbed and are only lightly grazed.

The vegetation was uniform, with mainly a highly organic soil resting directly on rock. There was extensive peat formation in the poorly drained areas. Very little birch or rowan was present on the main islands but Isle Maree has a different geological substrate and is more akin to the Letterewe oakwoods. Regeneration occurs widely in the islands on better drained slopes and is very dense in some situations. On the very wet, peaty soils, however, it is mainly absent.

Coille na Glas Leitire is one of the best known pinewoods and has been frequently described. However, it was interesting to examine the various experimental areas and to compare the extremely rapid uniform growth of some of the planted stands, with the slower growth of naturally regenerated trees. Considerable interest was shown by the Forestry Commission in the success of the local provenance pine and it was compared with the success of Achnashellach provenance in the north-west of Scotland. The definition of clear objectives was considered to be vital when considering planting of pine in native sites and much discussion centred on this point.

NATIVE PINEWOODS DISCUSSION GROUP

WESTER ROSS AUTUMN FIELD MEETING 7TH - 9TH OCTOBER 1976

List of Participants

R Balharry	Nature Conservancy Council	Newtonmore
M E Ball	Nature Conservancy Council	Inverness
H Brown	Nature Conservancy Council	Kinlochewe
R Bruce	Glen Tanar	Aboyne
R G Bunce	Institute of Terrestrial Ecology	Merlewood
E Cross	Nature Conservancy Council	Kinlochewe
A Currie	Nature Conservancy Council	Skye
N Dannatt	Forestry Commission	Edinburgh
H W Duncan	Scottish Woodland Owners A.C.	Brechin
R Dennis	Royal Society for the Protection of Birds	Highlands
J A Forster	Nature Conservancy Council	Inverness
R Goodier	Nature Conservancy Council	Edinburgh
E N Hunter	Scottish Wildlife Trust	Gairloch
R A Innes	Forestry Commission	Inverness
R F Lee	Scottish Wildlife Trust	Highlands
E M Matthew	Nature Conservancy Council	Inverness
C McLean	Forestry Commission Research	Roslin
S J Mackenzie (Miss)	Countryside Commission for Scotland	Perth
F Macrae	Forestry Commission	Dingwall
D Morris	Nature Conservancy Council	Inverness
C Millar	University of Aberdeen	Aberdeen
R S Ogilvie	Fountain Forestry Limited	Kingussie
P J Tilbrook	Nature Conservancy Council	Inverness
R C Welch	Institute of Terrestrial Ecology	Monks Wood
E White	Institute of Terrestrial Ecology	Merlewood
P Wormell	Nature Conservancy Council	Argyll

FOREST SYSTEMS APPLIED TO THE MANAGEMENT OF NATIVE PINEWOODS FOR PRODUCTION AND CONSERVATION

by

Richard Ogilvy
(Fountain Forestry Limited)

The need for examining forest systems became apparent when we tried to apply the zoning technique for the conservation of the native pinewoods.

Reserve Zones

Extraction Zones

Planting Zones

The Planting Zones are those areas which are of little conservation value because of past afforestation programmes, and no restrictions are placed on management other than the use of local Scots Pine.

Reserve Zones are those areas where the forest is left to its own devices and the Nature Conservancy monitors its progress. However, because of economic pressures, only comparatively small areas can be expected to fall into the Reserve category.

Accordingly, the bulk of native pinewood forests will be placed in an Extraction Zone. It is those areas where, as yet, there are no clear guide lines on how production and conservation interests can achieve a balance.

It is my intention to show how both interests can be served with little compromise by using a forest system which can eventually embrace bare land and planting zones, leading to an actual increase in the area of true native pinewood forests.

I will first define what a Forest System is and what it seeks to achieve.

I will describe the application of different systems illustrating their relevance to the native pinewoods.

I will conclude by determining which forest system is best suited to the native pinewood and describe its application.

A Forest System is a process by which crops constituting a forest are thinned, removed, and replaced by new crops.

It is used primarily as a means of achieving sustained yield with the ideal of a normal forest being achieved.

For example, if one hectare of forest was planted each year for one hundred years, by that time a normal forest would be formed, with a rotation of one hundred years, as each year one hectare of trees at one hundred years old could be felled in perpetuity.

In this example of a normal forest, a clear felling system is employed.

High forest systems are of two main types. Those where felling and regeneration are concentrated on individual areas at a time, e.e. in our example; and those where felling and regeneration are distributed over the entire forest. If this "normal" forest just described were to fall into this latter category, instead of felling and replanting a portion each year, a removal of selected stems would take place over the whole area, the volume removed being calculated as being that which the forest could sustain.

Regeneration is encouraged throughout the forest area continuously. A feature of this form of "selection" forest is the complete intermingling of age classes and

the irregular forest structure.

Many intermediate variations of forest systems are employed between these two extremes, differing mainly in the shape and structure of the regeneration areas. These shelterwoods differ from the clear felling system in that instead of the annual cut on each area being removed at once, it is staggered over a few years, establishing a new crop by regeneration under the gradual opening up of the old crop.

The area under regeneration at any one time would be the area of the forest divided by the rotation, multiplied by the length of time the regeneration is expected to take.
i.e. if regeneration took 15 years to establish satisfactorily, instead of tackling one hectare each year, 15 hectares would be progressively thinned and regenerated over 15 years.

The way the felling under these "sheltered systems" is applied can vary. In uniform systems, a gradual opening up of the canopy takes place over the whole regeneration area. In group regeneration, existing gaps are utilised or created and gadually opened up until the area is fully regenerated.

In these cheltered systems, the gradual increase in light getting to the forest floor allows regeneration to take place and to develop as the old crop is progressively removed, usually over three successive fellings.

Before tackling the silvicultural probelms of Scots Pine as a species, we should look at what conservation criteria we should also try to include when we are deciding on a forest system for the native pinewoods.

The most important feature of any forest system in the native pinewood situation must be the maintenance of the native strain by allowing the natural response to the encironment to be effected by natural regeneration, both of the pine and of the other associated species.

At present there is considerable variation in growth form, structure and density. Any system should ideally maintain and reinforce this pattern which is the natural response to site variation. Accordingly, there should be minimum disturbance to sites by ploughing or vegetation control, as they do interfere with the normal response of the forest community.

Another important feature which must be considered is the scarcity of the native pinewoods, and that we can tolerate no reduction in the current area, in fact, extension must be encouraged.

The native pinewood is also a habitat of many rare species, and disturbance to wildlife must be minimised.

As a first step in arriving at a forest system which meets these requirements, we can examine the two extremes we previously described, the clear felling and selection forest, and seeing how these stand up in the light of the conservation criteria we have just outlined.

clear felling systems are easy to manage and control. Harvesting is cheap because all the timber is removed at the one time and there is no subsequent damage to young trees by removing the second and third regenerative fellings. It is particularly suitable to Scots Pine because the complete overhead light gives it the ideal conditions for early growth.

However, when seeking natural regeneration without soil disturbance, its disadvantages are many, both aesthetic and silvicultural.

Unless good seed years follow the felling, soil deterioration, vegetation growth, lack of protection, erosion, debris and insects can lead to a failure of natural regeneration. Natural regeneration in the clear felling system is difficult enough because you are relying on wind-carried seed from the fringes of the clear felling blocks. For this reason, strips and different shaped blocks have been utilised.

With Scots Pine, good seed years may only occur every five or six years, therefore, there is a real probability that the growth of rank vegetation results in a complete failure of natural regeneration.

With its unaesthetic aspect and the difficulty of natural regeneration, the clear felling system seems to have no place in a native pinewood.

On first examination, the selection system appears to meet all the conservation criteria previously listed.

If practised in its total form, the annual increment would be removed by the selection and felling of individual trees, the volume would come mainly from mature trees, but careful control would be required to maintain a full range of age classes and to monitor regeneration.

In practice, the forest would be divided into sections based on a thinning rotation thus if an eight year cycle were adopted, eight blocks would be established, each year one block being visited and the annual allowable cut being removed. In theory, all areas utimately show a complete range of age classes in an uneven canopy structure throughout the forest.

In practice, there are severe drawbacks both from the conservation and silvicultural standpoints. To be worked satisfactorily, very stringent management controls must be exercised in the forest to ensure that the volume removed equates with the increment, and that in doing so, an acceptable age structure be maintained.

It is like baving money in the bank. If you know what your interest rate is, you can remove that interest every year in perpetuity and your capital remains untouched. If you remove more, both capital and income is progressively reduced.

However, in a forest where the capital is represented by the standing crop, it is difficult to work out the exact capital asset, and even more difficult to work out the actual interest, as increment, which is accruing each year. If more than the interest is removed, capital is reduced, so that every year there is a reduced increment, in the long term, the forest will be decimated and a long period of recovery essential.

The precise control required to avoid this is in direct contradiction with the ideals of allowing the natural response to the environment, and although under all forest systems, control is practised, under selection forest controls are of necessity much stricter. Even apart from this there are significant problems on the silvicultural side.

Scots Pine requires overhead light to grow satisfactorily. Under the fairly continuous cover in selection forest, sapling survival and growth would be almost non-existent unless tree density was reduced to unacceptably low levels.

Additionally, control over grazing animals would have to be exercised throughout the whole forest as regeneration is being encouraged throughout the entire area at any one time. This is normally quite unacceptable from both the wildlife and sporting aspects.

On these grounds, I believe that selection forest in its normal state can be effectively ruled out.

However, I feel that the advantages of both clear felling systems and selection systems can be achieved by using a group selection system. I will describe how wuch a system might be employed, as I believe that a system of this kind can be adapted to meet the needs of almost any native Scots Pinewood.

In principle, this is worked as the selection system previously discussed, but instead of removing indicidual trees, groups of trees are felled.

How does this overcome the disadvantages described as a selection forest.

Firstly, from the conservation standpoint, control is done on an area basis, i.e. instead of removing the annual volume increment, an area is cut, made up of several small groups each year, the area being calculated by dividing the forest area by the number of years in the rotation. This system of control by area does not incolve the same strict management control required under selection forest, nor does it involve the conscious choice of trees for removal which inevitably interferes with natural selection.

Secondly, from the silvicultural standpoint, natural regeneration should prove to be no problem as the opening of groups does allow enough overhead light to allow seedlings to germinate and grow.

Although, ideally, grazing pressures in the whole forest area should be controlled, by using the group system it is possible to fence them individually until they are well established when the fences can then be moved to enclose fresh groups. In this way, limited areas are fenced at any one time and the disturbance to wildlife is minimal.

The group Selection System Applied to the Native Pinewood

No two sites are the same and individual adaptions would have to be made on close examination of each forest area, especially with regard to the prohibitive cost of fencing.

The reserve areas in the forest can accommodate the requirement for allowing some trees to grow until death from natural causes. We can then agree a rotation based on more practical grounds for the extraction zone.

The oldest tree we can reasonably tolerate on silvicultural grounds would be about 200 years old. Taking a native pinewood stand and attempting to evolve a normal forest structure by felling in the form of scattered groups over 200 years, 1/200th of the productive area would be cut every year and regenerated. By the end of the 200 years, a normal forest could exist, but during that period that it took to establish, there would be trees of up to 200 years older than they were at the time the system began. Normal forest thinnings would probably remove these trees before they became over-mature and died from natural causes.

To appreciate how this group selection system would appear in practice, we can look at our model of 100 hectares of fairly even aged native pinewoods.

Because of the slow growing nature of Scots Pine, we would not want to visit each area more often than one in 10 years to remove timber by thinnings and by selective group fellings. This gives a production cycle of ten years. The 100 hectares is divided into 10 blocks, each having one-tenth of the area of conifer high forest and one-tenth of the bare and other land onto which we hope to encourage the native pinewood to develop.

e.g. we may include, say, a further 100 hectares of bare land on which it is hoped to establish forest by fencing in association with the programme of group selection fellings. Each production block would now be 20 hectares of which 10 hectares were high forest and 10 hectares were bare land.

A 200 year rotation would mean that groups to the total area of ½ hectare be felled each year, and one hectare be fenced and regenerated by embracing in these groups the areas of bare ground on which we hope to establish a forest. Regeneration should be fairly straightforward on these areas previously carrying a forest crop, but areas with heavy surface vegetation would probably need some form of superficial cultivation to provide a surface for germination to take place.

The annual cut of ½ hectare could be made up of say 5 groups of one-tenth of a hectare each of actual forest and these be doubled in size by the use of fencing to enclose the

bare land we have previously mentioned.

In most native pinewood situations, the fencing of these groups would be essential unless the grazing pressure over the whole area could be maintained within the limits where regeneration could grow. I would visualise these groups being fenced for up to 20 years. This would mean that at any one time within the forest, 20 hectares would be enclosed in the form of small fenced groups of irregular and scattered nature. As the regeneration in the groups same out of the level at which grazing could cause damage, the fences can be removed. Normal thinnings would take place outwith the groups during the 10 year visit.

Does this system meet the needs of both production and conservation?

From the producer's point of view, there is no loss of timber production, is removed easily and without damaging the regeneration. Problems of erecting an dismantling fences are considerable. They are a price we have to pay for mutiple land use to maintain the sporting potential of the forest. The option is open for the fencing of the forest area entirely and the control of browsing animals within the ring fence.

The system allows considerable flexibility to the forest manager as he is able to take advantage of any small areas of advanced regeneration, to protect and encourage these, and also to embrace any natural catastrophes, such as windblow or fire, by the manipulation of the areas that he fences for regeneration each year.

For the conservationist, the system offers many advantages. Unlike a system of successive regenerative fellings that is commonly practised in Scots Pine, there is no conscious collection of seed trees that there is under other systems as all the trees around the groups distribute their seed evenly throughout it. This maintains the natural response to the environment and the maintenance of the genetic variation and particular characteristics of the native pine. It allows for a genuine growth in the area of true native pinewoods by the embracing and establishment of forest by natural regeneration on previously bare areas of ground. There is minimal disturbance to sites as the conditions for regeneration on the previously afforested groups are good, although there will be the superficial screefing in areas where there is a strong field layer.

Disturbance to wildlife is minimal as the areas fenced for regeneration are of small proportion to the area as a whole and are scattered in small groups. As it is, it only interferes with a browsing snimal anyway. It maintains a considerable variation in growth form, forest structure, and density and reinforces this pattern. The real role the Nature Conservancy can play here is in assuring that there are strong safeguards that when a system like this is set up to safeguard and enhance this national asset, there is no short term commitment and that regardless of future changes in owners and management, the system will continue to be applied in its original conception.

Summary

If a native pinewood area were continuously thinned, as is being suggested for our extraction zones at present, without making provision for clearing and regenerating of groups, the trees will get thinner and thinner on the ground. There is minimal regeneration therefore the standing volume is becoming depleted and there is less and less increment on which to draw.

We will emerge with the familiar sight of scattered mature pine, beautiful indeed, but a sad tombstone to the living forest that went before.

NATIVE PINEWOODS DISCUSSION GROUP AUTUMN FIELD MEETING, WESTER ROSS 7-9 OCTOBER 1976. COLEOPTERA RECORDED BY R C WELCH AND F A HUNTER

Abbreviations for localities

8.10.76

CF(1)	Coulin Forest, by A' Ghairbhe	NH 020 590
CF(2)	" " Coulin Lodge	NH 003 563
CF(3)	" " Easan Dorcha (Teahouse Glen)	NH 020 528
AF(1)	Achnashellach Forest, by F/C Office	NH 004 482
AF(2)	" " by R Carron	NG 046 486

8 & 9.10.76

S	Shieldaig, Coille Creag-Loch	NG 82(0-4) 52(0-8) burnt area

11.8.62

BE	Beinn Eighe NNR, Coile na Glas Leitre, old records by FAH.
* =	Specimens retained

CARABIDAE

* Leistus montanus Steph.	S 9/10 1♂ under stone. This species has been recorded by O W Richards from Beinn Eighe NNR (unpublished report) and 2 first instar larvae found in Molinia tussock in September 1965 (RCW) have been described by M L Luff (Entomologist 105: (1972) 161-179) as this species.
L rufescens (F)	AF(1) under haystack.
Notiophilum biguttatus	S 8/10 under loose bark of pine stump.
Pterostichus migritum (F)	AF(1) under haystack.
P diligens (Sturm.)	S 9/10 common under stones.

HYDROPHILIDAE

Cercyon melanocephalus (L)	S 9/10 in roe deer dung.
Anacaena globulus (Pk)	AF(1) 2 under haystack, AF(2) 3 on rotten fungi.

PTILIIDAE

* Acrotrichis thoracica (Walti)	AF(1) 2 ♂♂ under haystack. C Johnson (Entomologist 100: (1967) 132-6) states "A widely distributed species ..... not yet known from Scotland".

STAPHYLINIDAE

Proteinus brachyptorus (F)	AF(2) 5 in rotten fungi.

	Phloeonomus (s.str) pussilus (Ar)	2 under pine bark AF(2) 1, S 9/10, 2.
*	P (Phlosostiba) lapponicus (Zett)	S 9/10 1♂ 5 larvae under burnt pine park.
*	P (Xylostiba) monilicornis (Gyll)	under bark of fallen pine CF(3) 2, AF(2) 1, S 9/10 1.
	Anthobium atrocephalum (Gyll)	S, 9/10 in Sphagnum.
	Olophrum fuscum (Gr)	S, 9/10 1 ♀ in Sphagnum.
*	Stenus (Teanus) crassus Steph.	AF(1) 1♂ 1♀ under haystack.
	S (Tesnus) brunnipes Steph.	S 9/10 2 ♂♂ in Sphagnum.
	S (Hemistenus) nitidiusculus Steph.	AF(1) 1 ♂ under haystack.
	S (Hemistenus) picipes Steph.	AF(1) 1 ♂ under haystack.
*	S (Parastenus) ossium Steph.	AF(1) 1 ♂ under haystack.
	S (Hypostenus) tarsalis Ljungh	AF(1) 7 ♀♀ under haystack.
	S (Hypostenus) fulvicornis Steph.	AF(1) 1 ♂ under haystack.
	Lathrobium (s.str.) punctatum (Fourc.)	CF(2) 1 ♂ under bark of fir log (?Abies).
	Gyrohypnus punctatus (Goez.)	CF(2) 1♀ under bark of fir log.
*	Philonthus (s.str.) laminatus (Creutz.)	AF(2) 1 ♂ under haystack.
	P (Bisnius) fimetarius Gr.	AF(2) 2 ♀♀ under haystack.
	Quedius (Microsaurus) mosomelinus (Marsh.)	CF(1) 1 under stone by track.
	Q (Quedionuchus) cinctus (Pk.)	AF(2) 1 in rotten fungus.
*	Lordithon (s.str.) thoracious (F.)	CF(3) 4 in rotten fungi.
	Tachyporus (s.str.) chrysomelinus	AF(1) 3 under haystack.
*	Tachinus (s.str.) marginellus (F.)	AF(1) 1 ♂ under haystack, S/10, 4 ♀♀ in roe deer dung.
	Leptusa (s.str.) f	S 9/10 2 ♂♂, 3 ♀♀ under pine bark, 6 ♂♂, 7 ♀♀ in Piptoporus betulinus on dead standing birch.
	L (Pachygluta) ruficollis (Er.)	S 9/10 1 in P betulinus.
	Autalia impressa (Ol).	AF(2) 1 ♀ in rotten fungus.
	Atheta (Tropla) crassicornis (F.)	AF(2) 1 ♂ in rotten fungus, S 9/10 1 ♀ in roe deer dung.
	A. (Tetropla) trinotata (Kr.)	AF(1) 1 o 2 ♀♀ under haystack.
	A (stethusa) pertyi (Hoor)	S 9/10 1 ♀ in roe deer dung.
	A (Dimetrota) setigera (Shp.)	S 9/10 1 ♀ in roe deer dung.

* A (Dimetrota) intermedia (Th.)	AF(2) 1 ♀ in rotten fungus.
A (Dimetrota) cinnamoptera (Th.)	AF(2) 2 oo 2 ♀♀ in rotten fungi.
A (Amidobia) amicula (Steph.)	AF(1) 2 ♀♀ under haystack.
A. (Acrotona) fungi (Gr.)	AF(1) 1 ♀ under haystack.
* Phioeopora testacea Man.	AF(2) 1 ♀ under pine bark.
* Ischnoglossa prolixa Gr.	CF(3) 1 o 2 ♀♀ under pine bark.
* Aleocharinae	S 9/10 4 indet. larvae under pine bark.
ELATERIDAE	
Elater balteatus L.	S 8/10 1 dead under bark of pine stump.
Melanotus sp.	AF(2) larvae in dead pine.
Harminius undulatus (Deg.)	CF(3) 2 larvae under bark of fallen pine.
Denticollis linearis (L.)	CF(2) recorded by FAH from this locality during a previous visit.
CANTHARIDAE	
Malthodes sp.	indet. larvae under pine bark AF(2) 1 S 9/10 2.
ANOBIDAE	
* Grynobius excavatus (Kug.)	CF(3) larva in fallen birch S 9/10 larval borings in holly.
RHIZOPHAGIDAE	
Rhizophagus dispar (Pk.)	S 9/10 under bark of fallen pine.
CRYPTOPHAGIDAE	
Cryptophagus dentatus - Group	AF(1) 1 ♀ under haystack.
C. pillosus Gyll.	AF(1) 1 ♂ under haystack.
Atomaria lewisi Reitt.	AF(1) 2 under haystack.
* A analis Er.	AF(1) 1 ♀ under haystack.
LATHRIDIIDAE	
Aridius modifer (Westw.)	AF(1) under haystack.
* Lathridius pseudominutus Strand	AF(1) 4 under haystack.
TETRATOMIDAE	
Tetratoma fungorum	F. on P betulinus on dead standing birch CF(1) 1, S 9/10, 4.

TENEBRIONIDAE

Boletophagus reticulatus (L.)	BE borings in Polyporus fomentarius on birch. M J D Brendell (1975) Handbk. Identi. Brit. Ins. 5 (10) Coleoptera, Tenebrionidae, summarises distribution as Rannoch, Braemar, Glen Affric, Strathglass, Inverfarigaig and Loch Maree.

PYROCHROYDAE

Schizotus pectinicornis (L.)	BE larvae in birch.

MELANDRYIDAE

* Abdera flexuosa (Pt.)	CF(3) 1 elytron under bark of fallen pine.
* Xylita laevigata (Hell.)	AF(2) few larvae in fallen pine. CF(2) recorded by F A H from this locality during a previous visit.

ANTHICIDAE

Anthicus floralis (L.)	AF(1) under haystack.

CERAMBYCIDAE

* Asemum striatum	CF(1) larval borings in pine stump, S 9/10 larvae locally common in burnt pine.
* Arhopalus rusticus (L.)	S 9/10 larvae locally common in burnt pine.
Rhagium bifasciatum	F. CF(1) larvae in dead pine, S 9/10 few adults and larvae under bark of burnt pine.
* R mordax (Deg.)	CF(3) larvae in fallen birch S 9/10 few adults and larvae under bark of burnt birch, BE larvae and pupae in birch.
R inquisiter (L.)	CF(1) and AF(2) larvae in fallen pines, CF(2) larvae in fir log, S 9/10 larvae locally very common under bark of burnt pine, BE borings in pine.
? Judolia sexmaculata (L.)	CF(1) unconfirmed but possible larval borings in roots of wind-blown pine, outside its present known distribution in Scotland.
Acanthocinus aedilis (L.)	AF(2) larval borings in dead pine BE borings in pine.

CHRYSOMELIDAE

Lochmaea suturalis Th.	S 8/10 1 elytron under loose bark of pine stump.

CHRYSOMELIDAE (cont)

Haltica ? ericeti (Allard)	S 8/10 1 dead under loose bark of pine stump.
CURCULIONIDAE	
Eremotes ater (L.)	AF(2) Few live adults and larval borings in dead standing pine.
Liosoma deflexum (Pz.)	AF(1) under haystack.
SCOLYTIDAE	
Scolytus ratzeburgi Jan.	BE borings in birch.
* Blastophagus piniperda (L.)	S 8 and 9/10 abundant in pine shoots on the ground; extensive larval galleries, 1 larva and 1 dead adult under bark of dead standing burnt pines.
Hylurgops palliatus (Gyll.)	S 9/10 3 dead under burnt pine bark.
? Trypodendron domesticum (L.)	AF(2) and S 9/10 probable larval borings in dead standing birch.

Also noted in passing:-

SYMPHYTA

TENTHREDINIDAE

Rhogogaster punctulata (Klug.)	S 9/10 1 larva feeding on regenerating birch.
? Strongylogaster ? mixture (Klug.)	S 9/10 1 inactive larva overwintering in Blastophagus gallery in standing burnt pine.

ISOPODA

Oniscus assellus L.	CF(2) under bark of fir log; AF(1) under haystack AF(2) in rotten fallen birch, S 9/10 in old dry P betulinus.

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