Forestry Commission,
District Office,
High Street,
Pochabers.

Mr. Stewart only

23rd January, 1961.

Minute to Conservator RSFS 1st 29-4-62

Forestry Commission Journal
Whin Spraying at Spynouth.

I enclose a copy of Forester G. Stewart's article for the Forestry Commission Journal.

To be included in this year's Journal, articles must be in Mr. Edlin's hands by the end of this month and I have sent the principal copy direct to him to avoid any delay.

If you think the article should not be published in its present form would you please make your suggestions for alterations direct to Mr. Edlin.

District Officer.

23rd. January, 1961.

SPEYMOUTH FOREST

HELICOPTER WHIN SPRAYING.

In the Autumn of 1960, the spraying of whins by helicopter was carried out at Speymouth with the intention of reducing the high annual expenditure on weeding. The full effects of this spraying can not yet be assessed but such information as is available may be of interest to anyone faced with a similar problem.

After ploughing certain areas for planting, whin growth appeared profusely where it had not been seen before, or was only in isolated clumps. This growth may be as much as 20" annually and can be so dense that it appears like a solid green carpet on the ground.

Two or three hundred acres of whin-weeding had to be undertaken annually by hand methods. This was a very costly and tedious operation which had to be repeated for up to 5 years after ploughing at a total cost of £16 to £18 per acre over the whole period.

Recently two new methods of whin control became available. The first was a mechanical scrub cutting machine, which was certainly quicker than hand methods, but did nothing to control the whin growth. The second was a chemical spraying of "Hormone Brush Killers" which, it was hoped, would kill the whin and leave the trees.

This brush killer consists mainly of two chemical compounds known as 2.4.D. and 245 T. Commercially this liquid may be obtained as "Brush Weed Killer" made by Shell Mex, and "Spontox" made by May & Baker, Ltd. These brush killers are primarily produced for killing scrub growth, whin, broom, brambles and, unfortunately, also trees, infact, almost any woody growth.

The best and quickest kill in scrub and whin is obtained during the months of May to August when growth is at its maximum, the emulsion is then more readily absorbed.

Where no trees are involved, e.g. roadside whin and prep ground, 4% of paraffin or diesel may be added to the brush killer water. Paraffin is preferable as it mixes more readily. This helps the emulsion to 'stick' to the brush being sprayed and so a greater

quantity/

/quantity of liquid is absorbed. A complete wetting of the foliage must be aimed at or only a partial kill will be obtained. The most susceptable scrub being Birch and Broom. Whin is harder to kill and may require a stronger dose. The first effects of whin spraying, during the Summer, may be noticed several days after spraying by a wilting and softening of the terminal growth.

Whin does not appear to stop growing at the end of the normal growing season like other shrubs and trees and may be seen in full bloom during the month of January. Because of this, experimental spraying was carried out in some 3 year old plantations with constant pressure knapsack sprays.

Spraying commenced when it was ascertained that growth in the planted trees had ended for the season and some hardening off had taken place. This spraying was done mostly in S.P. and P.C. The result of this work was most encouraging, and it was observed that whins could be killed without doing any permanent damage to the planted trees.

In the Autumn no immediate results can be seen, and a month to six weeks may pass before any signs of dying off are noticed. It is essential that this spraying should be done at the latter end of the year as applying in the early Spring would certainly kill the whins but might also have disastrous results on the trees.

With the experience gained from the knapsack spraying operation it was decided to undertake a large scale spraying by contract.

Offers were received and it was found that spraying by helicopter was cheaper on the very rough ground following ploughing. Wheeled tractors could only work from rides and tracks and therefor the chemical could only be applied by spray jets fixed to hoses. A helicopter, fitted with a 30ft. boom could apply the spray easily on open areas, provided there were no obstacles such as power lines or standing trees.

This type of work is generally undertaken by the acre and to a certain degree the greater the acreage sprayed the less the cost per acre.

The contract was undertaken by a representative of the Chemical Spraying Co., Ltd., who. in turn, made arrangements for a helicopter.

The first company contacted was a French one which was to supply a helicopter with a 60ft. spray boom, this machine was used largely for agricultural spraying. However, this company withdrew at the last moment and a substitute was found in "Helicopter Services Ltd.", Luton Airport. The spray boom on this machine was only 30ft. This shorter spray boom was much the better of the two, for the following reasons:-

Less space was required for landing. Small areas could be sprayed and the machine was much more manoeuvreable where large standing trees were adjacent to the area being sprayed.

Broadly - the following were the Forestry Commission's requirements of the Contractor:-

That he undertake to spray a specified acreage with "Shell Brush Killer" and water in areas marked green on the map provided. "Shell Brush Killer", water and T.V.O.(paraffin) on areas marked brown on the map - no trees being involved in the areas marked brown.
The Contractor to supply the spray materials.
That he free the Forestry Commission from all claims for damage from third parties.
That he should accept liability for damage caused to Forestry Commission and other property by spraying operations.
The Forestry Commission would agree to pay the Contractor an agreed price per acre. One half payable on completion of spraying, the second half payable when efficiency of spraying appeared to be adequate.
That the Contractor would supply all pumps and equipment necessary for mixing and loading the helicopter with spray.

In turn the Contractor required of the Forestry Commission the following:-

That a number of single Birch and Scots pine scrub trees should be felled on the spraying areas to allow a clear run for the helicopter.

That the Forestry Commission provide markers to show the extent of the areas to be sprayed.

A 6" map be supplied with the areas to be sprayed marked in green where there were trees amongst the whin, and marked in brown where spraying was for prep. ground.

The area of each block to be also shown on the map.

All relative water points where water could be obtained to load the tanker were to be marked in blue. Power lines were to be shown as a thick black line and telephone lines to be drawn in purple.

Suitable landing places to be negociated with local farmers adjacent to areas being sprayed. These areas to be accessable by water tanker. Any flat area, free from surrounding trees and clear of fences would do, only a small area being necessary and no runway being required.

After all preparatory work had been completed by both parties a date was fixed for the arrival of the helicopter. This date was Monday the 10th of October, 1960 and the helicopter was scheduled to arrive at approximately 1 p.m.

A white sheet, as a marker, was spread out in a small field in front of the Forest Office.

Arrival was very sudden. The helicopter appeared over the trees, turned in a tight circle, and landed very gently in the field near the sheet.

It was hoped that spraying might commence Tuesday, the 11th of October. On Monday afternoon the pilot was shown part of the area to be sprayed and given some idea what the whin areas actually looked like in comparison to surrounding vegetation.

Unfortunately the weather was completely against spraying during most of the week.

Friday morning arrived. The day was rather dull but there was only a very light breeze. The rush was on. The tanker was loaded with water and tins of brush killer and a start was made.

Spraying commenced at 9 a.m. and finished at approximately 4.30 p.m. This was to give the mechanic time for maintenance. In this period of time an area of 120 acres had been sprayed with a solution of "Brush Killer" and water, mixed to a strength of 1 in 25. The solution was applied at a rate of approximately 12 gals. per acre, which is stronger than normal but was applied at this strength owing to the low rate of application.

The method of application was as follows:-

The water tanker was placed in the field beside the selected landing area. Two 40 gal. drums were used with an end cut out of each to mix the chemical and water. The helicopter's capacity was 60 gals. which allowed a small reserve to be carried so that no 'run' had to be abandoned in the middle.

"Brush Killer" was poured into the drum which was then filled with water. A small portable pump was used (a Hathaway fire pump would do) to fill the helicopter from the drum. The pump was fitted with 50 ft. of delivery hose and a by-pass back to the container. On the approach of the helicopter the pump was started up and the by-pass used to agitate the mixture.

When the helicopter landed, the hose was run out, the delivery end put into the helicopter's tank, the stop-cock opened and the by-pass closed, allowing the 40 gals. to be pumped into the helicopter's tank.

Particular care was necessary at all times to avoid spilling the mixture incase it should be driven against the perspex bubble by the action of the helicopter blades.

After about two runs, the pilot had the filling time counted out and was actually revving up his engine in anticipation of the remainder of the 40 gals. being put into the tank.

On the spray area two markers only were used. One at approximately each end of the area, or if the ground was undulating, at vantage points so that, on commencing his run, the pilot could see both men.

Spraying was carried out in such a way that the helicopter sprayed across wind and started spraying on the down-wind side of the area to be sprayed. In this way the two markers were moving up-wind all the time and so away from spray drift.

The markers had a flag each and, as already stated, stood at the perimeter of the area, one at each end. When the helicopter arrived and it could be seen by the markers that it was on the proper line of flight, the first man then moved ten yards forward, ready for the next run. The helicopter proceeded down the spray line and as it approached the second man advanced ten yards. This was carried out by both men in turn, each time a run was made. In this way, the markers never came in contact with the spray emulsion and marked in advance of the machine during the whole operation.

Markers were issued with Wellington boots and protective leggings to assist their moving about in the whins.

The marking system requested by the French Helicopter Company was much more complicated and required lanes to be marked in advance with different coloured flags. These flags to be inserted into the ground every few chains and in parallel lines. Spraying for a whole day to be marked in advance. If the wind changed during the day all these flags would then have to be moved. The lanes also had to be marked on the spray map.

Spraying again commenced on the Saturday morning at 9 a.m. and was completed by 1.15 p.m. - 67 acres being sprayed.

Total acreage sprayed was 187 acres in approximately 11¾ hours.

Height of spraying above ground was from 4 to 8 feet.

Cost per acre, by Contractor, was £6:10/-

Cost of prep. ground, including scrub clearance, markers and vehicles was calculated at 16/6 per acre. This gave a total cost of £7 :6 : 6 per acre. A table giving comparative costs with hand weeding is given below.

The prep. ground cost could be lowered. A lot of extra work had to be carried our which was not required by Helicopter Services. If no scrub had to be cut the total cost per acre could be lowered to approximately £6 :16:6 per acre.

The helicopter is the costly item in this work. Everything must be planned in advance so that there is no hold up to the machine once spraying actually commences. If a number of small areas are to be sprayed a van is necessary to move the markers from one site to another. Two sets of markers would also be required so that one set could always be ready in advance.

No trouble was encountered in gaining permission from farmers to land on their ground when it was explained that the spray was non-toxic to animals.

There should be great scope for this type of work as more selective sprays become available. Large areas of bracken and grass weeding may also be done by this method in the near future.

Forester

Cost per acre. £7. 6. 6

Cost per acre £13. 4. 6

Cost Comparison of Skin-Spraying by Helicopter at Speymouth, 187 acres

Aerial Spraying

Item		Cost £. s. d.
1) F.C. Labour	- Surveying and marking lanes	64. 5. 2
2) " "	- Scrub clearance	61 4 2
3) " "	- Spraying markers	12. 17. 10
4) Supervision	- District Officer 6 hrs. @ 12/6	3. 15. -
	Head Forester 8 " @ 9/-	3. 12. -
	Forester 2 " @ 7/2	14. 4
5) Vehicles, Machinery, Van	98 miles @ 5d.	2. - 10.
	L/Rover 36 " @ 7½d.	1. 2. 6
	Private car 16 " @ 7½d.	- 10 -
	Jo-Bu Saw 20 hrs. @ 4/-	4. - -
6) Payment to Contractor		1,215. 10. -
Labour overheads included at 1) to 3)		
187 acres	Total cost	£1,369. 11. 10.
	Cost per acre.	£7. 6. 6

Estimate of Equivalent Hand Cutting and Weeding

Item		Cost £. s. d.
Area for burning - 15 acres		
(a) Burning @ £1		15. - -
(b) Three weedings @ Total cost £12 per acre.		180 - -
Other areas.		
(a) Two weedings 130 acres @ £9		1,170 - -
(b) Three weedings 23 " @ £13		299 - -
Final weeding (a) 7 acres @ £8		56 - -
(b) 12 " @ £5		60
Supervision	Forester 160 hours @ 7/2.	57. 6. 8
Van Mileage	600 miles @ 5d.	12. 10. -
Labour overheads @ 55%		623 - -
187 acres.	Total cost	£2,472. 16. 8
	Cost per acre	£13. 4. 6