

DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

## Agronomy Branch Report

SKELETON WEED (Chondrilla juncea L.) IN SOUTH AUSTRALIA

### PART I

THE FIRST TWENTY YEARS

A.F. Tideman

### PART II

A SURVEY IN THE MID NORTHERN  
AGRICULTURAL DISTRICTS - 1967

R.T.M. Wood

### PART III

A SURVEY IN TWO DISTRICTS OF  
THE MURRAY-MALLEE REGION - 1968

E.S. Hogg

Report No. 3

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## F O R E W O R D

This Agronomy Branch report endeavours to bring together information from many sources regarding the spread of skeleton weed in South Australia and control measures taken during the first twenty years following its recognition.

By doing this it is hoped that not only will a permanent record be set down explaining some of the reasons why various steps were taken but that it will also provide a foundation from which future extension and research programmes can be planned with greater certainty.

The report shows that after twenty years, despite tremendous efforts by many landowners, by research workers and extension workers the weed continues to spread. Fortunately there is evidence that skeleton weed can now be eradicated as patches develop in new regions and provided the farming community remains vigilant and active and well supplied with technical information its economic consequences will be avoided. However, in the Murray Mallee Region, where skeleton weed is so well established over many thousands of acres, its full economic effects are still to be felt unless means are found of raising the fertility of this area despite the 'sink' skeleton weed provides for nitrogen and moisture.

A.F. Tideman  
SENIOR WEEDS OFFICER.

PART I

SKELETON WEED (CHONDRILLA JUNCEA L.)

IN SOUTH AUSTRALIA

The History of its Spread and the Control Measures Taken by  
the Department of Agriculture During the First Twenty Years

A. F. Tideman

Summary

Part I traces the spread of skeleton weed in South Australia and outlines the extension and research work carried out by the Agronomy Branch.

Lists of sites where original outbreaks were first found in various regions have also been included together with a general map showing its density of spread after twenty years.

Skeleton Weed (Chondrilla juncea L.)  
In South Australia

The History of its Spread and the Control Measures taken by  
the Department of Agriculture During the First Twenty Years

First recognitions

Thirty three years ago, South Australian farmers were first warned of the dangers of skeleton weed in an article which appeared in the Journal of Agriculture. The author, Mr. Clarke, stated, "From the South Australian point of view it is of extreme importance that skeleton weed be recognised early so that eradication can be effected before it secures a firm footing and while it is possible to do so with comparative ease and with a minimum of expense. A sharp lookout should therefore be kept by farmers in all parts of the State".

Twelve years later on the 19th March, 1947, Miss Eardley, who was then Systematic Botanist at the Waite Agricultural Research Institute, reported, "I find the identification of the accompanying plant from Parilla from the property of Mr. C.R. Gilbertson is urgent for quite an unexpected reason.

"The plant is skeleton weed (Chondrilla juncea) which is such a pest in the wheat fields of New South Wales. I am not sure of the nearest occurrence in Victoria at the present moment, but this is the first record in South Australia".

At the time Murray Mallee farmers were successfully introducing sheep on to their farms. Most had realised the value of carrying sheep many years before but had been unable to do so because of dry conditions and unavailable finance during the period 1920-40. Then the war years had followed when extra superphosphate was not available for successful pasture improvement.

The sheep were mainly bought in New South Wales and Victoria and marketed at Loxton and Pinnaroo. Nearby dealers acted as intermediaries and distributed them throughout the Murray Mallee. This movement of sheep, together with a run of better than usual summer rains, undoubtedly paved the way for skeleton weed and was largely responsible for its introduction and rapid spread.

First Attempts to Eradicate

Following Miss Eardley's report the late Mr. Hector Orchard and the District Agricultural Adviser proceeded next day to investigate. Seven patches of the weed, totalling half an acre, were found spread over an area of 200 acres. After carefully searching the surrounding paddocks that day, no other infestations were found.

Mr. Orchard reported to the Director of Agriculture, "I expect that seedlings will appear somewhere this season along the 5½ miles of road from the infested property to the Parilla township, as Mr. Gilbertson carried an unwrapped fully mature specimen from his property into the town of Parilla to have it wrapped by the local publican for transmission to the botanist for identification".

The infestations on Mr. Gilbertson's property (Section 12 Hundred of Parilla) were immediately burnt and subsequently all patches were treated with sodium chlorate. Sheep movement from the property was restricted by regulations of the "Weeds Act, 1931".

The problem soon proved to be far more serious than Mr. Orchard had first suspected. During the next few days, what appeared to be the parent area of skeleton weed in South Australia, some 40 acres of weed fairly thickly spread over an 80 acre paddock, was found three miles away on Section 2 Hundred of Parilla. (see map)

Investigations revealed that the weed has been known to the land owner, Mr. A.A.C. Hill for 5 or 6 years previously but its occurrence had aroused little concern because the area had only been used for grazing and the plants were readily eaten. Mr. Hill had been acting as one of the dealers who were at the time assisting the movement of sheep from interstate into the Murray Mallee.

In the same month four other infestations were reported on properties extending into the Hundreds of Wilson, Price and Allenby, raising the total known area of the weed to about 60 acres. (See Appendix I)

Mr. Orchard was sent to Victoria, on April 3rd and from information gained there, recommended the following control measures:-

1. The use of salt or Atlacide sprays on small patches at the rate of 150 lbs. per acre. The estimated cost at that time to treat an acre with Atlacide was £8/10/- (\$17-00).
2. Hand pulling first year seedlings.
3. Burning stubbles.
4. Avoid cultivation.

The weed was given wide publicity through the press, at agricultural bureau meetings and by district council activities in all of which Mr. Pearson, then the District Agricultural Adviser for the Murray Mallee areas, played a large part.

Towards the end of April a detailed two week survey carried out by S.A. Departmental Officers under the leadership of Mr. Orchard (See Appendix II) defined the areas of weed known to this point of time, and found and mapped a number of new infestations.

During the year, landowners and occupiers were subjected to an extensive publicity campaign through the press, by journal articles and pamphlets, by agricultural bureau meetings and public addresses, and the display of both growing and pressed mature specimens of skeleton weed at the district shows, in district council chambers, and at public schools, shops and hotels in the districts involved, and those adjacent to them.

Aided by reports from district councils and individual farmers an additional nine infestations were located before the end of 1947. All of the known areas of skeleton weed, totalling some 85 acres, had been treated, partly by cultivation (to stop seeding) and "salting" but mainly by sprays purchased with monies provided by the State Government.

During December, 1947, Mr. Orchard wrote, "The first phase of an eradication programme has been completed". It involved the spray application of 200 lbs. of Atlacide per acre to approximately 75 acres of land growing skeleton weed. (This was applied by a 12'8" boom mounted on a jeep). A second spray was applied to these areas in January, 1948, and most of this work was done by Mr. Orchard who worked continuously from week to week and through weekends.

By March, 1948, one year after skeleton weed was first reported, it had been found on 26 properties some as far west as Kunlara and Perponda (See Appendix III).

### The Second Year

During 1948, the extension programme and treatment of the weed were further intensified by Mr. Orchard and the District Agricultural Adviser who occasionally had two field assistants, Messrs. Brooks and Watts, to help them. However, the work was continually hampered by petrol restrictions.

During that year special field days were organised at which Mr. John Shannon who was Chairman of the Weed Control Sub-Committee appointed by the Loxton District Council, always played a leading part. Men were invited to attend with knapsacks and Atlacide was applied during the day to large areas infested with the weed.

During September, 1948, Mr. Orchard initiated limited trials with the newly introduced hormone herbicides. The first report of this work was submitted by Mr. Pearson who stated, "Trial areas sprayed showed 10-15% of plants with above ground portions completely dried out, 60-70% with severe burning off of leaves and the remainder practically untouched. I feel that it would be worthwhile trying further".

Despite all these efforts, Mr. Orchard had to report during June, 1949, that 250 acres of the weed had been found on a total of 62 properties and the picture was changing almost daily.

It was about this time that the Department met its first public criticism of the campaign and press articles such as "Skeleton Weed, Bane or Blessing", encouraged people to forget about skeleton weed as a weed and make maximum use of it as feed. Mr. Orchard attacked this reasoning in a personal letter to the editor.

In spite of this criticism, which incidentally almost all came from outside the affected areas rather than from within them, active landholder and department efforts to contain and control skeleton weed were continued until 1952-53.

#### The Appointment of Mr. A.R. Ewens

On the 10th February, 1949, the Pinnaroo District Council submitted a resolution to the Local Government Association requesting that a full-time supervisor for skeleton weed control be appointed. The Government acted on this suggestion and just before Christmas of that year, the position was advertised with a commencing salary of £7/19/- (\$15-90) per week. After interviewing many applicants, Mr. A.R. Ewens was appointed because of his youth as his duties would "involve exacting and tedious manual labour". The estimated annual cost of this appointment and the campaign to follow was £1,005 (\$2,010-00).

During the following 12 months Mr. Ewens visited 495 properties at least twice. He spent the equivalent of eighteen 44-hour weeks inspecting and treating skeleton weed and fourteen 44-hour weeks in travelling time driving from property to property. In addition to this work he arranged window displays of skeleton weed in most Murray Mallee towns and carried out extensive observations on broad scale hormone herbicide trials set up by Mr. Orchard. He devoted 5½ days per month to records and correspondence and a further 6 weeks of his time during the year was taken up maintaining equipment and vehicles.

His work eradicated skeleton weed from 4½ acres (10 sections were involved) and reduced the acreage of the weed on another 17 sections of 44 acres.

On 4/1/51, Mr. Ewens resigned because he claimed the salary inadequate considering his duties.

Meanwhile, the known area infested with skeleton weed had grown to approximately 2,200 acres of which 84% occurred in the border and near border Hundreds of Gordon, Bookpurnong, Kekwick, McGorrery, Kingsford, Peebinga, Parilla and Pinnaroo.

No wonder that Mr. Ewens in a private letter sent after his resignation to Mr. Orchard wrote, "In my opinion there is far too much skeleton weed too widely spread in the Murray Mallee to be successfully controlled by sprays. I think that the thing to do

if future attempts are to be made to stop its spread is to concentrate outside the Murray lands bounded by the River".

### From Eradication to Control

Immediately following Mr. Ewens resignation, Mr. Orchard was requested to submit plans for future skeleton weed eradication and control. He suggested employing a skeleton weed supervisor with three field assistants operating in three zones throughout the Murray Mallee and adjoining areas. He detailed this plan with his typical thoroughness and estimated that it would cost £10,500 (\$21,000-00) annually. However, this plan was never adopted because only in isolated instances had any effort been made by the landowner himself to put any control measures into operation. A previous report by Mr. Orchard had shown that over 90% of land owners had limited their active participation to the reporting of patches when located and provision of water for spray solutions when the skeleton weed control supervisor called. It was also agreed that skeleton weed was past eradication. At this stage £3,000 (\$6,000) had been spent since the weed was first found. This cost included chemicals, supervisor's salary and his travelling expenses and Mr. Orchard's extra travelling expenses.

Because of these unsatisfactory control measures and because at this time emphasis in these districts changed from cereal growing to sheep, landholder interest in skeleton waned.

These issues forced the introduction of a new Departmental policy in relation to skeleton weed at the beginning of 1952. This switched from the attempted eradication for the land owner to a programme of teaching farmers to at least control the weed. Mr. Ray Taylor, then a field officer, weed control, was engaged full time on this programme investigating and advising on infested properties. He treated the weed only when it was found outside regions of general infestation. Concurrently extension programmes were continued through the press and radio and demonstration areas were sprayed.

Research using hormone herbicides continued until 1955, when it was conclusively proved that the weed could be economically controlled by spraying with  $\frac{3}{4}$  lb. of the amine form of 2,4-D in the crop just as the weed left its rosette stage. At the beginning of that year the intensive control programme initiated in 1952 lapsed because of staff difficulties.

In 1956, the C.S.I.R.O. published results of research work conducted in New South Wales which proved that better yields could be obtained from skeleton weed paddocks by fallow spraying 30 - 50 days before seeding. This technique was quickly tried on some farms throughout the Murray Mallee but proved quite unsuccessful under these conditions basically because the season could not be predicted in areas of such unreliable rainfall where crops must usually be sown with or soon after the opening rains.



Also during that year a strong recommendation was made by the Agricultural Council that the C.S.I.R.O. consider a research programme aimed at biological control of skeleton weed.

However, funds were not made available and the work was never undertaken. It was not again discussed until the National Weed Control conference was held in August, 1960, when it was agreed that the possibility of finding a suitable insect or other means of biological control was very remote indeed. Furthermore, the centre of origin of skeleton weed is in southern Russia, an area which at that time was not open to Australian research workers. It was therefore decided that weeds of South African origin be given higher priority for biological control research.

#### Mr. Orchard's Death

During July, 1957, Mr. Orchard was killed in a road accident which immediately brought the whole skeleton weed work to an untimely end. Re-organization took two and a half years during which time A.F. Tideman was appointed as Weeds Adviser, a new noxious Weeds Act was established and the Weed Control Section strengthened by the appointment of a Graduate Research Officer, Mr. M.A. Ross.

#### 1960 - A Milestone in Skeleton Weed Research

1960 proved to be a very significant year. Cereal production was again becoming important in the district and landholder and district council interest in skeleton weed was renewed. But a good deal had been lost because after 7-8 years of uncontrolled spread almost every farm in the Murray Mallee, and a considerable number in nearby districts, now had some skeleton weed on them.

In March, Mr. Ross set down various trials to examine the possibility of using new chemicals such as fenac and borate mixtures and very high rates of 2,4-D and MCPA. At this stage the extent of his work was limited because of the lack of facilities. He had no laboratory space, except a small room in the basement of the Gawler Place offices and no field assistant to help him.

It was soon realised that without Mr. Orchard's knowledge, research and extension for skeleton weed control could not be well planned. Therefore during October a detailed survey of the spread and effects of skeleton weed was carried out in the Hundreds of Parilla, Peebinga and Gordon.

It was shown that every farm had skeleton weed and that about 4% of the areas of those Hundreds were infested with broad-acre areas of the weed. This had caused 10% of the farms to change from a sheep-cereal income to grazing only, changes made possible by the availability of land resulting from increasing movement to the city. 60% of the farms visited were attempting control by using the hormone type herbicides in the cropping year. The survey showed that although this was not stopping the spread of

skeleton weed, it was reducing its seriousness. The survey indicated that cereal growing would become impossible, particularly on the deep eroded sands in the Murray Mallee region, unless better control methods could be found.

Representation by the Victorian Vermin and Noxious Weed Control Board and various farmer organizations prompted Standing Committee to review the skeleton weed problem and during July, 1960, it was decided that an advisory committee should investigate this weed on a national basis. In November, 1960, Dr. Moore, (Plant Industry Division, C.S.I.R.O.) led a team which examined the problem in New South Wales, Victoria and South Australia. Messrs. Ross and Tideman were the South Australian delegates.

When large funds were made available from the Wheat Industry in 1961 this original advisory committee was formed into a permanent Technical Skeleton Weed Sub-Committee with the initial task of allocating the \$20,000 working expenses and the \$10,000 capital to the various skeleton weed research projects. This technical committee was also given the responsibility of setting priorities for research and co-ordinating the work throughout the various research authorities. Since that time \$300,000 has been allocated to various skeleton weed projects.

From the Committee's recommendation South Australia gained a graduate skeleton weed research officer with a technical assistant to carry out research in agronomic and chemical methods of skeleton weed control in the Murray Mallee region. \$1,600 annually was re-directed from the Western Australian wheat funds and \$5,800 annually from the South Australian Wheat Industry Research Committee.

Unfortunately, because of the general shortage of trained staff no appointment could be made until January, 1963, when R.J. Luxmoore commenced duties as a new graduate.

At the end of 1960, the Department reported that skeleton weed was now firmly established on the western side of the Murray. Thirty outbreaks were known along the Murray Plains and several infestations had been recorded for the first time in the Upper South East near Keith and Coonalpyn.

#### Skeleton weed in the northern cereal areas

A year later, during early October, 1961, the Department indirectly heard that an infestation of skeleton weed was known in the heart of the northern cereal growing areas at Clare. It appears that a sales representative for I.C.I. saw skeleton weed on the Hill River Station when advising Mr. Angus concerning the use of insecticides. Not wishing to embarrass his client, he did not report the outbreak to him or directly to Departmental officers but allowed it to "leak out" from the local hotel.

Mr. Ian Fry was sent to check and he reported that a few plants which appeared to be skeleton weed were in the paddock but they were shrivelled and hard to identify.

A detailed survey was not conducted until a few days later when Messrs. Ross, Symon (Botanist - Waite Agricultural Institute) and Tideman spent the day at the station. They searched a slightly different area and found that the skeleton weed was well established over 5 acres.

In the following week all available officers from the Agronomy Branch were taken to the site by Mr. F.B. Pearson and a yard by yard survey commenced. 59 man-days were spent before the Department could safely say that no other outbreaks were established in the immediate vicinity.

This outbreak led to a great deal of publicity and was quickly followed by another report on Mr. Leditschke's property near Robertstown. (See Appendix VI)

#### Skeleton weed in the Upper South East

During 1962, skeleton weed spread rapidly in the Upper South East. 20 outbreaks were found near Tintinara and other outbreaks around Coonalpyn, Keith and Bordertown made a total of known outbreaks to nearly 50.

#### The first outbreak on Eyre Peninsula

In early December, 1962, an outbreak was found 16 miles west of Wirrulla on the edge of the Eyre Highway. It was found by Mr. Drever who owned an adjoining property. On the 18th January, 1963, an all day field day was held at the site in temperatures well over the century. Lectures were given on the hour every hour between 8 a.m. and 4 p.m. More than 400 people attended, some coming from as far away as Tumby Bay, Bookabie and Kimba.

The local farmers carted more than 100 tons of salt to the area and then erected a sign asking people not to disturb the site. Frequent 'emu' hunts have dealt with the few odd plants that have reappeared.

Another outbreak was found between Verran and Wharminda in 1964. Three more were reported on Eyre Peninsula during 1966, and six in 1967.

Another five very successful field days (A total of 1200 farmers attended) have been held since the day at Wirrulla and in all tremendous interest has been shown by landowners and councils. During 1967, for example, the Cleve Council offered a \$5-00 reward to any school child who found skeleton weed. (See Appendix VII).

#### M.Ag.Sc. Thesis

At the beginning of 1962, M.A. Ross commenced his Thesis for a Masters Degree, examining the interactions between moisture and nitrogen in relation to skeleton weed growth and competition in weeds.

Competition was found to be mainly for soil moisture and nitrate. The relative importance of these two factors being dependent on the stage of crop growth and the rainfall.

Applications of nitrogen partially overcame the effects of skeleton weed on the crop. The success of the nitrogen applications depend upon the density of the stand of skeleton weed prior to sowing as well as the rainfall during the crop growth period.

### 1963

1963 commenced with an outbreak found on Yorke Peninsula near Arthurton and before the year was over another 22 outbreaks had been recorded in the northern cereal areas with a tremendous increase in the outbreaks in the upper South East. Outbreaks were also reported from Brinkley.

Early in 1963, the first outbreak was recorded at Ballidu in Western Australia. Immediately the Western Australians were suspicious that sheep from the stud properties around Mount Bryan, Burra and Jamestown had brought the weed. Particular properties where stud sheep had been sent from South Australia to areas near Ballidu were carefully examined but no skeleton weed outbreaks were found.

During September, 1963, M.A. Ross and R.J. Luxmoore attended a Skeleton Weed Workshop in Canberra. This was organised by the Technical Skeleton Weed Sub-Committee and proved extremely valuable for both these officers who were initiating new projects.

At this time Mr. Nankivell in the South Australian Parliament on several occasions agitated for more research work to control skeleton weed in the Murray Mallee regions. He warned that the area faced disaster because of this weed.

### Discovery of Picloram

During 1964, research authorities throughout southern Australia began to realise the effectiveness of picloram as an aid for skeleton weed control. This initiated feverish research activity. The chemical apparently had 100 times greater ability to deal with skeleton weed than the hormone type herbicides and all authorities were very anxious to determine how it could be fitted into the local agricultural pattern.

In April, 1964, Dow Chemical Australia Pty. Ltd. invited research workers to attend a Tordon Workshop, which was held in the convention room, Blake Motel, Sydney. 33 officers met for two days and discussed every known aspect of the chemical and its possible use, particularly for skeleton weed control.

These ideas were immediately incorporated into R.J. Luxmoore's programme and by the end of the year it was evident that picloram, at rates even less than one ounce active per acre, could be used

to severely check skeleton weed enabling a crop to be taken off with almost complete freedom from the weed. However, the sensitivity of the medics to this chemical proved a problem which is still being investigated, although it seems that these can under some circumstances be resown after 15 months following one ounce applications.

In 1964, a skeleton weed film was completed by the Department and widely shown in areas where skeleton weed had not become established.

The Trained Weeds Officer - A turning point in local government efforts

By 1965, 104 outbreaks had been recorded in the northern cereal growing districts. The following table listing the outbreaks in each council district is of interest.

<u>Council</u>	<u>Number of Outbreaks</u> <u>1961-1965</u>
Angaston District Council	4
Balaklava District Council	7
Clare District Council	7
Clinton District Council	1
Eudunda District Council	18
Freeling District Council	1
Georgetown District Council	2
Gladstone District Council	1
Hallett District Council	2
Jamestown District Council	2
Kadina District Council	2
Kapunda District Council	11
Mallala District Council	3
Minlaton District Council	1
Mount Pleasant District Council	4
Owen District Council	7
Orroroo District Council	1
Riverton District Council	2
Robertstown District Council	8
Saddleworth District Council	13
Upper Wakefield District Council	3
Spalding District Council	2
Truro District Council	1
Wilmington District Council	1

Plotted on a map it can be seen that an increasing wave of the weed was coming from the heavily infested areas to the east.

Until this time officers of the Weed Section in the Department called to every reported site of a new skeleton weed outbreak with the local government inspector. Together they supervised the farmers treatment.

Councils were continually warned not to supply chemicals or do the work as it was felt that farmers would soon leave the whole task to the weeds officer, a lesson well learnt in Mr. Ewen's days.

At the end of 1965, the Department's load became too great and councils were advised that this detailed assistance would have to become almost the entire responsibility of their own officers.

This move was made with confidence knowing that by this time most councils were employing well trained men who held Weed Control Certificates.

#### A New Look at Biological Control

In 1965, the Technical Sub-Committee on skeleton weed examined a proposal submitted by the Division of Entomology C.S.I.R.O. to send a team to Montpellier in France to investigate the possibilities of biological control. This re-opened this control approach which had been put aside since 1960.

Because of the enormous cost involved, \$162,000 over a period of three years, there were some doubts but eventually the programme was approved and Dr. Wapshere and his team commenced duties towards the end of 1966.

A year later he was able to report surprising progress. Three organisms in his opinion showed promise, an aphid, an eriophyid mite and a species of rust fungus.

The South Australian Wheat Industry contributed \$12,000 towards this project.

#### Research - A change of officers

At the end of 1965, Mr. R.J. Luxmoore resigned from the Department. Mr. R.T.M. Wood filled the vacant position a month later.

One of his first tasks was to bring together recent South Australian research on skeleton weed which was published as a report to the Sub-Committee.

Briefly results suggested:-

1. That using 2,3,6-TBA (Trysben) or picloram (Tordon 50D) it was possible to eradicate small patches of skeleton weed.
2. By using very low rates of picloram in September or January (2 ounces active or less per acre) it was possible to increase cereal yields in the following year and re-establish medics in the following autumn.
3. That chemical controls applied in cereal crops did not increase yields and only facilitated harvest operations. In good seasons nitrogen could economically off-set the skeleton weed competition.

4. That medics - particularly lucerne control skeleton weed but only in the best seasons. Overall they can check its density but do not prevent its spread.

#### The drought

Much of the Murray Mallee was droughted between 1965 and the end of 1967. This seriously hampered Mr. Wood's work. For example, at his Parilla plots where the average rainfall is  $13\frac{1}{2}$ " annually the rainfall during these years was, 1965 11.7"; 1966, 10.9" 1967, 6.5", at the trial site.

During this period his research work showed that picloram has a less certain place in the Murray Mallee environment because of its cost and the difficulty to predict residue levels. He has also shown that medics and even lucerne are erratic allies in much of the Murray Mallee region and very difficult to establish into dense skeleton weed.

Dr. Swaby, C.S.I.R.O. Division of Soils, was persuaded during 1965 to commence critical examination of the degradation of picloram in soils and the Weed Section has been working closely with him.

The drought left a final note of despair in the Murray Mallee at the end of the first 20 years. Skeleton weed was everywhere when the good rains came and a great deal of agitation for something more to be done was heard from landowners, particularly those led by Mr. Hondow in the Loxton District Council area. They felt that much of the problem would be resolved if herbicides were subsidised.

Appendix I

Skeleton Weed areas identified in South Australia during March, 1947

<u>Section</u>	<u>Hundred</u>	<u>Owner</u>	<u>Comments</u>
12	Parilla	C.R. Gilbertson	Six small patches and one large patch, aggregating half an acre plus other scattered plants in a 200 acre paddock.
2	Parilla	A.A.C. Hill	One large patch of 9 acres, a number of scattered smaller patches aggregating 40 acres in an 80 acre paddock.
11 B	Parilla	Schumacher	Scattered plants in stubble field.
2	Allenby	Wilson & Lush	Ten acres of scattered patches and single plants.
20	Price	A.G. Beelitz	Four small patches totalling 20 square yards.
22	Wilson	C.W. Jones	$\frac{3}{4}$ acre in one patch and other scattered plants in paddock.

The total known area of weed is in the vicinity of 60 acres.

Appendix II

April - May, 1947. Department of Agriculture Survey team

H.E. Orchard	Weeds Adviser
N.E. Stringer	Agricultural Adviser, Murray Bridge
F.B. Pearson	Agricultural Adviser, Karoonda
W.A. Michelmores	Field Officer, Adelaide
H.C. Nourse	Field Officer, Adelaide
H.R. Brock	Field Officer, Adelaide



Appendix III

Skeleton weed infestations known at 31st March, 1948

<u>Section</u>	<u>Hundred</u>	<u>Property of</u>
2	Parilla	A.A.C. Hill, Parilla
5	Parilla	C.H. Bowen, Parilla
6	Parilla	J. Hentschke, Parilla
11B	Parilla	A.O. Schumacher, Parilla
12	Parilla	C.R. Gilbertson, Parilla
18	Parilla	G.E. Harding, Parilla
19	Parilla	E.W. Kakoschke, Parilla
52	Parilla	G.C. Smitham, Parilla
113	Parilla	O.J. Wolbers, Lameroo
8A	Pinnaroo	J. Loyde, Pinnaroo
2	Allenby	Lush & Wilson, Parrakie
20	Price	A.J. Beelitz, Parrakie
11	Wilson	C.W. Jones, Lowaldie
50 & 52	Wilson	R. Bird, Halidon
2 (Sth.)	Bews	R. Gilbertson, Clanfield
4A & 4B	Bews	C. Orwell, Clanfield
81 & 90	Bandon	A. Horstmann, Galga
26	Bandon	A.E. Carslake, Kimlara
20	Mantung	J.H. Burnett, Caliph
37	Marmon-Jabuk	E.H. Dutschke, Nunckeri
119	Marmon-Jabuk	S. Childs, Yurgo
54	Vincent	W.C. Packer, Perponda
100	Cotton	J.A.V. Brown, Smithville
1	Bookpurnong	C.A. Cockshell, Nadda
7A	Pyap	W.H. Drabsch, Pata
21	McGorrery	J.H. Nitschke, Meribah
26 Owners	14 Hundreds	

Appendix IV

Skeleton Weed Infestations Recorded to 8/2/49

<u>Section</u>	<u>Hundred</u>	<u>Owner or Occupier</u>	<u>Approximate Acreage</u>
8A	Pinnaroo	J. Lloyd	14
134	Pinnaroo	D. Wurfel	1
162	Pinnaroo	Est. of F. Hunt	4
18	Pinnaroo	G.G. Nickolls	1
151	Pinnaroo	E.C. Slater	1
167	Pinnaroo	A.J. Thiel	1
2	Parilla	A.C. Hill	80
3	Parilla	Hepworth	.1
4	Parilla	M. Henschke	.1
5	Parilla	C.H. Bowen	.1
6	Parilla	J. Henschke	1 plant
11B	Parilla	A.O. Schumacher	.1
12	Parilla	C.R. Gilbertson	1.5
18	Parilla	G.E. Harding	3
19	Parilla	E.W. Kakoschke	2
28	Parilla	C.S. Foale	1 plant
35	Parilla	L. Gregor	.1
46	Parilla	E. Heinecke	.1
48	Parilla	R.C. Kerley	.1
52	Parilla	A. Ireland	.1
70	Parilla	A.G. Johnston	4
111	Parilla	R.A. Hamman	1
112	Parilla	L. Ireland	.5
113	Parilla	O.J. Wolbers	.1
4A	Bews	C. Orwell	.5
2	Bews	R.G. Gilbertson	.1
84	Bews	C.W. Brooker	.5
2	Allenby	E.W. Lush	9
100	Cotton	J.A.V. Brown	4
20	Price	A.J. Beelitz	.1
22	Price	T.E. Ferne	.5
22	Molineux	C.A. Nairne	.1
37	Marmon-Jabuk	E.H. Dutschke	4
58	Marmon-Jabuk	S. Barr	.5
119	Marmon-Jabuk	G. Childs	1
35	Hooper	G.J. Martin	1
18	Roby	W.J. Wilkin	.1
417	Burdett	Zadow & Sons	2
1SA	Burdett	Zadow & Sons	.1
54	Vincent	W.C. Packer	2
1A	Vincent	W.C. Packer	3
34	Vincent	E. Hoff	1 plant
59	Vincent	C.D. French	3
11	Wilson	C.W. Jones	1
50	Wilson	R. Bird	.1
56	Wilson	A.G.W. Grant	2

<u>Section</u>	<u>Hundred</u>	<u>Owner or Occupier</u>	<u>Approximate Acreage</u>
Part 26	Bandon	A.E. Carslake	.1
7	Bandon	E.L. Cornish	1
81	Bandon	Mrs. M. Andrews, Magill	.1
44	Chesson	K.G. Dixon	.1
20	Mantung	J.B. Burnett	.5
10C	Holder	B.A. Kalisch	.1
7A	Pyap	W.H. Drabsch	15
1	Bookpurnong	C.A. Cockshell	30
228	Bookpurnong	R.O. Latz, Markeri	.1
4K	Bookpurnong	F.D. Hietmann	.1
92	Bookpurnong	E.A. Rollbusch	.2
22	Kekwick	A.W. Broad	1
10	Kekwick	S.A. Pocock	3
21	McGorrery	J.H. Nitschke	40
4	Peebinga	F.E.S. Venning	3
6	Peebinga	Poyner	.1
7	Peebinga	L.H.J. Venning	.2
8	Peebinga	C.W. Gum	.1
16	Kingsford	E.A. Huckel	.1

Summary

65 Sections involved      24 Hundreds      63 Landholders  
 Approximate area -      252 acres

Appendix V

Skeleton Weed Control: Details of the Situation as at 30/6/50

Hundred of Holder

Section 10C	B.A. Kalisch	$\frac{1}{2}$ acre
11G	L.A. Paschke	$\frac{1}{2}$ acre

Hundred of Pyap

Section 7A	W.H. Drabsch	9 acres
21C	O.E. Klau	$\frac{1}{8}$ acre
52	A.R. Drabsch	1 acre

Hundred of Bookpurnong

Section 1	C.A. Cockshell	30 acres
Pt. 15A	E.T. Hampel	2 acres
239	F.G. Zimmerman	$1\frac{1}{4}$ acres
20	D.R. Hampel	$1\frac{1}{4}$ acres
92	E.A. Rollbush	$\frac{1}{4}$ acre
29	J.H. Nitschke	$\frac{1}{4}$ acre
122	W.G. Retallic	$\frac{1}{8}$ acre
100 & 18E	G.O. Adams	$\frac{1}{3}$ acre
Pt. 15A	C.A. Zacher	$\frac{1}{4}$ acre
228 )		( $\frac{1}{8}$ acre
229 )	R.O. Latz	( $\frac{1}{8}$ acre
6A1 )		( $\frac{1}{8}$ acre
84	A.R. Day	$\frac{1}{8}$ acre
Pt. 15A	F.T. Obst	$\frac{1}{4}$ acre
60	E. Gregory	$\frac{1}{8}$ acre
17C	E. Graue	$\frac{1}{4}$ acre
Pt. 15B	C.L. Thiele	$\frac{1}{3}$ acre
30	S.H. Zimmerman	1 acre
Pt. 13A	W.D. Fogden	$\frac{1}{8}$ acre
4K	F.O. Heitman	$\frac{1}{8}$ acre
32	R. Nitschke	$\frac{1}{8}$ acre
115	W.G. Hammond	$\frac{1}{8}$ acre

Hundred of McGorrery

Section 21	W. Viney	350 acres (80 dense
105	A.T. Wedding	$1\frac{1}{4}$ acres
1	A.A. Patterson	3 acres
2	A.D. Patterson	2 acres
113	H.H. Rowe	$\frac{1}{8}$ acre
19	A.D. Symons	$\frac{1}{8}$ acre
24	A.T. Wedding	$\frac{1}{8}$ acre
20B	R.L. Biggins	100 acres
14	D.A. Kretschmer	20 acres

Hundred of Kekwick

Section 22	A.W. Broad	2 acres
7	W.B. Thorn	$\frac{1}{8}$ acre
15	G. Hyde	$\frac{1}{2}$ acre
53	J.G. Schubert	$\frac{1}{8}$ acre
10	S.A. Pocock	3 acres

Hundred of Mantung

Section 142	J.B. Burnett	$\frac{1}{2}$ acre
127 )	M.R. Curtiss	1 acre
46 )		

Hundred of Chesson

Section 44	K.G. Dixon	$\frac{3}{4}$ acre
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Hundred of Burdett

Section 417	C.B. Nitschke	3 acres
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Hundred of Wilson

Section 11	A. Jones *	8 acres
56	A.G. Grant	1 acre
11	A. Jones *	1 acre
43	J. Fraser	?
50	R.A. Bird	$\frac{1}{8}$ acre

Hundred of Vincent

Section 54	W.C. Packer	5 acres
59	C.D. French	3 acres
8	C.R. Zadow	1 acre
15	H.O. Schenke	1 plant
9	M. & V. Zadow	1 acre
1A	G.E. Sontagg	3 acres
34	E. Hoff	$\frac{1}{8}$ acre
42	W. Hoff	$\frac{1}{8}$ acre

Hundred of Brandon

Section 7	E.L. Cornish	1 acre
61	C.H. Jantke	3 acres
81	E. Berger	$\frac{1}{8}$ acre
Pt. 26	A.E. Carslake	$\frac{1}{4}$ acre

Hundred of Hooper

Section 35	C.J. Martin	$\frac{1}{8}$ acre
43	A.W. Cushion	$\frac{1}{8}$ acre

\* Both appear in the original text as listed.

Hundred of Roby

Section 18	C.M. Wilkin	$\frac{1}{4}$ acre
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Hundred of Marmon-Jabuk

Section 58	S. Barr	2 acres
119	G. Childs	2 acres
31	F.T. Sweetman	4 acres
52	H. Gill	$\frac{1}{8}$ acre
37	E.H. Dutschke	$\frac{3}{8}$ acres
71	C.S. Coombes	$\frac{1}{8}$ acre

Hundred of Molineux

Section 22	C.A. Nairne	$\frac{1}{8}$ acre
6	A.B. Polkinghorne	$\frac{1}{8}$ acre

Hundred of Price

Section 20	A.J. Beelitz	$\frac{1}{4}$ acre
73	K.B. Pfeiffer	$\frac{1}{8}$ acre
22	T.E. Fearn	$\frac{1}{4}$ acre

Hundred of Cotton

Section 77	L.P. McMahon	1 acre
82	C.E. Davies	1 acre
100	J.A. Brown	4 acres
180	C.B. Nairne	$1\frac{1}{3}$ acre
10	C. Heinzl	$\frac{1}{8}$ acre
24	O.H. Prizibilla	$\frac{1}{8}$ acre
42	W.H. Maynard	$\frac{1}{4}$ acre
2	A.E. Prizibilla	$\frac{1}{4}$ acre

Hundred of Allenby

Section 2	E.W. Lush	11 acres
1	E.G. Neindorf	$\frac{1}{8}$ acre
28	E.B. Beelitz	$\frac{1}{8}$ acre
26	F.S. Pfeiffer	$\frac{1}{8}$ acre
5	J. Beelitz	$\frac{1}{2}$ acre

Hundred of Bews

Section 102	H.E. Schultz	4 acres
4A	C. Orwell	2 acres
2	R.G. Gilbertson	$\frac{1}{8}$ acre
84	C.W. Brooker	1 acre

Hundred of Peebinga

Section 34	F.A. Nordhausen	15 acres
4	G.B. Venning	3 acres
27	B.H. Wall	1 $\frac{1}{4}$ acres
6	M.J. Kildea	1 $\frac{1}{8}$ acre
5	H.E.H. Schultz	1 $\frac{1}{8}$ acres
7	L.H.J. Venning	1 $\frac{1}{4}$ acre
8	C.W. Gum	1 $\frac{1}{4}$ acre

Hundred of Gordon

Section 12c	T.G. Anderson	$\frac{1}{2}$ acre
Pt. 10	G. Scheer	$\frac{1}{2}$ acre

Hundred of Kingsford

Section 16	E.A. Kuckel	1 acre
7	K. Franklin	1 $\frac{1}{2}$ acres

Hundred of Parilla

Section 111	R.A. Hamman	1 $\frac{1}{8}$ acre
1	R.A. Hamman	1 $\frac{1}{8}$ acre
2	R.A. Hamman	80 acres
52	L. Kakoschke	1 $\frac{1}{8}$ acre
Pt. 4	J. Bennett	1 $\frac{1}{8}$ acre
3	Hepworth	1 acre
Pt. 4	L. Barrat	1 $\frac{1}{8}$ acre
35	L. Gregor	1 $\frac{1}{8}$ acre
104	Phillis	1 $\frac{1}{8}$ acre
112	L. Ireland	1 $\frac{1}{4}$ acre
11B	A.O. Schumacher	1 $\frac{1}{8}$ acre
65	A.M. Ireland	1 $\frac{1}{8}$ acre
87	F.S. Traeger	1 $\frac{1}{3}$ acre
79	B.C. Pearce	1 $\frac{1}{3}$ acre
66	F. Belling	1 $\frac{1}{8}$ acre
Pt. 36A	H.W. Harrip	1 $\frac{1}{8}$ acre
Pt. 27 )	L. Foale	( 1 $\frac{1}{3}$ acre
26 )		( 1 $\frac{1}{8}$ acre
Pt. 27 )	C.S. Foale	( 1 $\frac{1}{3}$ acre
28 )		( 1 $\frac{1}{8}$ acre
8A	L. Traeger	1 $\frac{1}{8}$ acre
43	H.A. Gilbertson	1 $\frac{1}{8}$ acre
113	O.J. Wolbers	1 $\frac{1}{8}$ acre
Pt. 40	R. Hancock	1 $\frac{1}{8}$ acre
34	C.W. Neindorf	1 $\frac{1}{4}$ acre
74	Colwill Bros.	1 $\frac{1}{8}$ acre
Pt. 40	A.B. McVicar	1 $\frac{1}{4}$ acres
6	J. Henschke	5 acres
46	T. Heinickie	1 $\frac{1}{3}$ acre
48	R.C. Kerley	1 $\frac{1}{4}$ acre
Pt. 68	T. Rodda	1 $\frac{1}{4}$ acre

Hundred of Parilla (contd.)

Section 54	J. Hutchins	$\frac{3}{4}$ acre
32	J.T. Wallis	1 acre
Pt. 42	C. Hancock	$\frac{1}{8}$ acre
12	C.R. Gilbertson	3 acres
18	G. Harding	3 acres
70	A.G. Johnston	15 acres
19	E.W. Kakoschke	2 acres
5 )	C.H. Bowen	1 acre
13 )		
47	C.D. Dabinett	$1\frac{1}{2}$ acres

Hundred of Mobilong

Section 479	Hein	$\frac{1}{8}$ acre
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Hundred of Pinnaroo

Section Pt. 13	A. Adams	$\frac{1}{4}$ acre
130	D. Wurfel	$\frac{1}{8}$ acre
18	G.G. Nicholls	$\frac{1}{8}$ acre
137 )	R.F. Darke	$\frac{1}{8}$ acre
126 )		
Pt. 165	G.R. Venning	$\frac{1}{4}$ acre
211	A. Oster	$\frac{1}{8}$ acre
146	G.B. Pahl	$\frac{1}{8}$ acre
Pt. 61	R.A. Fuller	$\frac{1}{4}$ acre
59	A. Fisher	$1\frac{1}{3}$ acre
8A	J. Lloyd	14 acres
156 )	F.E.S. Venning	$\frac{1}{8}$ acre
155 )		
164 & 256	H. Venning	$\frac{1}{4}$ acre
151	E.C. Slater	$\frac{1}{4}$ acre
162	F. Hunt (Est. of)	4 acres
167	A.J. Thiel	$1\frac{1}{2}$ acres
6	S. Hamilton	$1\frac{1}{2}$ acres

Summarised Review of Incidence of Skeleton Weed in the South Australian Murray Mallee 19/3/47 to 30/6/50

<u>Date</u>	<u>Hundreds</u>	<u>Sections</u>	<u>Landholders</u>	<u>Approximate Acres</u>
8/2/49	24	64	62	252
1/12/49	24	80	77	370
30/6/50	25	165	153	773



Appendix VI

Skeleton Weed Outbreaks in the Northern Districts from the Summers  
of 1961-62 to 1964-65

<u>Name and District Council Area.</u>	<u>Location</u>	<u>Date Reported</u>
<u>ANGASTON DISTRICT COUNCIL</u>		
1. Falland, A.E.	- Moculta	62-63
2. Sporn Bros.	- Light Pass	61-62
3. Schliebs, G.R.	- Moculta (Sn. 268, Hd. Moorooroo)	64-65
4. Linke, W.	- Moculta	
<u>BURRA D.C.</u>		
1. Jarzyn, R.J.	- Mt. Bryan (Sn. 386, Hd. Kingston)	62-63
2. Wills, E.A.	- Mt. Bryan (Sn. 574, Hd. Ayres)	62-63
3. Webster	- Burra (Sn. 180, Hd. Kooringa)	62-63
4. Steele, R.J.	- Burra (Sn. 214, Hd. Ayres)	63-64
5. Tiver, D.M.	- Burra (Sn. 61, Hd. Hanson)	63-64
6. River, M.	- Burra (Sn. 18, Hd. Hallett)	63-64
7. Quinn, T.J.	- Mt. Bryan (Sn. 186, Hd. Kingston)	63-64
8. Wood, R.T.	- Hanson (Sn. 46, Hd. Hanson)	63-64
9. White, R.	- Andrews (Sn. 202, Hd. Ayres)	63-64
10. Stolte, M.	- Mt. Bryan	64-65
11. Quinn, J.L.	- Mt. Bryan (Pt. Sn. 187, Hd. Kingston)	64-65
12. Martin, W.	- Farrell Flat	62-63
13. Catt, L.C.	- Nth. Booborowie (Sn. 842, Hd. Ayres)	64-65
<u>CLARE D.C.</u>		
1. Angus	- Clare	61-62
2. Burge, J.W.	- Farrell Flat	62-63
3. Keane, J.	- Farrell Flat (Sn. 419, Hd. Stanley)	62-63
4. Martin, G.	- Farrell Flat	62-63
5. Short, C.A.	- Farrell Flat (Sn. 93, Hd. Hanson)	62-63
6. Rogers, H.	- Barinia (Pt. Sn. 3044, Hd. Clare)	63-64
7. Crossman, C.R.	- Clare (Sn. 622, 623, Hd. Neil)	63-64
<u>CLINTON D.C.</u>		
1. Jacobs, H.	- Clinton	62-63
<u>EUDUNDA D.C.</u>		
1. Handke Bros.	- Eudunda	62-63
2. Pfitzner, L.A.	-	62-63
3. Woitke, F.M.	- Eudunda	62-63
4. Hentschke, L.C. (Sold to Dunstan)	- Eudunda (Sn. 313, Hd. Julie Ck.)	62-63
5. Pfitzner, G.	- Hampden	62-63
6. Knightly Misses	- Julia	61-62
7. Weis, V.H.	- Neales Flat	62-63
8. Roadside (Weis)	- Neales Flat	62-63

<u>Name and District Council Area</u>	<u>Location</u>	<u>Date Reported</u>
<u>EUDUNDA D.C. (contd.)</u>		
9. Sauer, G.J.	- Eudunda	63-64
10. Killmire	- Neales Flat	63-64
11. Armstrong, M.	- Hampden	63-64
12. Hines, R.R.	- Neales Flat	63-64
13. Hausler, P.	- Eudunda (Sn. 458A, Hd. Julia)	64-65
14. Mosey, F.	- Ngapala	64-65
15. Clayton, J.G.	- "Brookside" Dutton (Sn. 344, Hd. Neale)	64-65
16. Patterson W.G.	- Eudunda (Sn. 34, Hd. Julia)	64-65
17. Zerna, G.	- Eudunda (Sn. 141,144, Hd. Neale)	63-64
18. Schrapel, P.	- Hamilton	64-65
<u>FREELING D.C.</u>		
1. Hoklas, J.M.	- Gomersal	62-63
<u>GEORGETOWN D.C.</u>		
1. Klinger, M.	- Huddlestone (Sn. 242, Hd. Narridy)	62-63
2. Frances, W.H.	- Yacka (Sn. 229)	63-64
<u>GLADSTONE D.C.</u>		
1. Blesing, H.E.	- Caltowie (Sn. 117, Hd. Yangya)	62-63
<u>HALLETT D.C.</u>		
1. Miller, E.K.&G.K.	- Hallett	61-62
2. Miller, W.G.	- Hallett (Sn. 402, Hd. Hallett)	62-63
<u>JAMESTOWN D.C.</u>		
1. Kreig, B.C.	- Bundaleer (Sn. 721, Hd. Belalie)	62-63
2. Jefferson, T.W.F.	- Tarcowie	64-65
<u>KAPUNDA D.C.</u>		
1. Ellis, A.	- Hamilton	62-63
2. O'Dea	- Allendale North	62-63
3. Townsend, W.W.G.	- Kapunda (Sn. 1449, Hd. Belvidere)	61-62
4. Weckert, R.O.	- Hamilton	62-63
5. Steinert, D.J.	- Stockwell	63-64
6. White, J.	- Allendale North	63-64
7. Dunn, K.	- "Ryelands", Tarlee	63-64
8. Dutton, J.H.	- "Anlaby", Bagot Well	63-64
9. Hansen, L.	- Allendale North	64-65
10. Prior, L.I.	- Hamilton	64-65
11. Laubsch, H.P.	- Kapunda (Sn. 173, Hd. Kapunda)	64-65

<u>Name and District Council Area</u>	<u>Location</u>	<u>Date Reported</u>
<u>MALLALA D.C.</u>		
1. Railway line between Columba and Long Plains		62-63
2. Foreshore at Port Parham		62-63
3. Broster, L.G. - Grace Plains (Sn. 522, Hd. Grace)		64-65
<u>OWEN D.C.</u>		
1. Bowyer, A.J. - Owen		62-63
2. Smythe Bros. - Salter Spring		62-63
3. Hancock, M.K. - Owen		63-64
4. Parker, I. - Owen		63-64
5. Freebairn, H.B. - Owen		63-64
6. May, R.L. - Owen		63-64
7. P.H. Laffer Estate - Owen		63-64
<u>RIVERTON D.C.</u>		
1. Tiller, L.W. - Balaklava (Sn. 170, Hd. U/Wakefield)		63-64
2. Tiller, B. - Balaklava (South West of)		64-65
<u>ROBERTSTOWN D.C.</u>		
1. Leditschke, A.T. - Pt. Pass (Sn. 233, Hd. English)		61-62
2. Burow, L.D. - Robertstown		63-64
3. Farley, A. - Pt. Pass		63-64
4. Schild, L. - Pt. Pass		63-64
5. Gregurke, G.H. - Robertstown		64-65
6. Turner, C. - Robertstown		64-65
7. Kernchen, N.H. - Apoinga, North of Waterloo		64-65
8. Leibeknecht, M.G. - Brady Creek		63-64
<u>SADDLEWORTH D.C.</u>		
1. Faint, L.J. - Steelton		62-63
2. Palmer, J. - Manoora		62-63
3. Hampel, L. - Tarnma		61-62
4. Schunke, K.G. - Manoora (just inside Clare D.C.)		62-63
5. Rohde, W.T. - Tarnma		63-64
6. Woods, A. - Mintaro		63-64
7. Behn, B. - Steelton		63-64
8. Bruhn, B. - Manoora		63-64
9. Bengler, G. - Saddleworth		63-64
10. Dixon, W. - Manoora		63-64
11. Roehr, A.R. - Tarnma		63-64
12. Sandow, K. - Manoora		64-65
13. Behn, M. - Steelton		64-65

<u>Name and District Council Area</u>	<u>Location</u>	<u>Date Reported</u>
<u>UPPER WAKEFIELD D.C. (Auburn)</u>		
1. Adams, D.H.		62-63
2. Adams, H.M.		62-63
3. Rowland, M.H.&M.F.	- (Sn. 2165, Hd. Upper Wakefield)	63-64
<u>MOUNT PLEASANT D.C.</u>		
1. Wright, M.D.	- Eden Valley	63-64
2. Springton	- Cooks Hill Road	63-64
3. Rathjen, R.E.	- Tungkillo (Sn. 960, Hd. Tungkillo)	63-64
4. Hoad, L.W.	- Tungkillo	63-64
<u>MINLATON D.C.</u>		
1. Parsons, L.J.	- Pt. Vincent (Sn. 144, Hd. Ramsey)	63-64
<u>SPALDING D.C.</u>		
1. Cheffirs, T.C.K.	- Spalding (Sn. 156, 297, 294 Hd. Andrews)	63-64
2. Davidge, W.	- Spalding	64-65
<u>TRURO D.C.</u>		
1. Dittrich, E.M.	- Truro	63-64
<u>KADINA D.C.</u>		
1. Crosby, S.D.&J.M.	- Kadina (Sn. 155, Hd. Kadina)	63-64
2. Haynes, A.A.&E.E.		63-64
<u>BALAKLAVA D.C.</u>		
1. Shepherd, S.	- Balaklava (Sn. 582, Hd. Dalkey)	63-64
2. Crawford, D.	- Halbury (Sn. 682, Hd. Hall)	63-64
3. Catford, K.	- Halbury (Sn. 125, Hd. Hall)	63-64
4. Catford, L.	- Halbury (Sn. 390, Hd. Hall)	63-64
<u>BLYTH D.C.</u>		
1. Clampett, Mrs.M.	- Hart	63-64
2. Jericho, S.H.	- Hoyleton (Sn. 76, Hd. Hall)	63-64
3. Redpath, H.G.	- Hoyleton (Sn. 51, Hd. Hall)	64-65
4. Goss, J.	- Brinkworth (Sn. 389, Hd. Hart)	64-65
5. Hawker, Sir Richard	- Brinkworth (Sn. 275, Hd. Hart)	64-65
6. Zweck, F.W.C.	- Blyth (Sn. 213, Hd. Blyth)	64-65
7. Weckert, F.B.	- Brinkworth (Sn. 298, Hd. Hart)	64-65

<u>Name and District Council Area</u>	<u>Location</u>	<u>Date Reported</u>
<u>ORROROO D.C.</u>		
1. Reichstein, M.V.	- Orroroo (Sn. 150, Hd. Pekina)	64-65
<u>WILMINGTON D.C.</u>		
1. Kairl, E.L.	- Terka (Sn. 239, Hd. Greogory)	64-65

Appendix VII

Skeleton Weed Outbreaks on Eyre Peninsula 1962-1967.

<u>Date Reported</u>	<u>Location</u>	<u>Treatment</u>
Dec. 1962*	13 miles west of Wirrula Hd. of Petina, Section 96	2,4-D
1963	Carted salt - and spread on area	
Mar. 1964 **	Between Verran and Wharminda Hd. of Verran, Section 21	Trysben
Feb. 1966	Narridy Creek, between Cleve and Cowell. Hd. of Hawker, Section 188	Tordon 50-D
Mar. 1966	Miltalie near Cowell. Hd. of Miltalie Section 43S.	Tordon 50-D
June 1966 *	Same as Dec. '62. On roadside opposite original site. One plant at least 2 yrs. old. Scattered plants found in paddock south of highway and a few out from original infestation north of highway	Tordon 50-D
June 1967	North of Nunjikompita. Hd. of Nunyah, Section 4. More plants found in August and treated.	Tordon 50-D
Nov. 1967	About 13 miles WSW of Rudall. Hd. of Rudall, Section 3	Tordon 50-D
Dec. 1967 **	Same as Mar. '64	Tordon 50-D
Dec. 1967	Near Nunjikompita. Hd. of Petina (About 2 sq. yards). Section Part 13	Tordon 50-D
Dec. 1967	About 13 miles WSW of Rudall. Hd. of Rudall, Section 2. One mile South of infestation in Section 3. Few scattered plants	Tordon 50-D
Dec. 1967	About 13 miles West of Rudall. Section 58, Hd. of Rudall	Tordon 50-D
Jan. 1968	About 13 miles WSW of Rudall. Hd. of Rudall, Section 12. About 2 miles SE of original infesta- tion in Section 3.	Tordon 50-D

FIELD DAYS

December, 1962	On site W of Wirrula
March, 1964	On site near Verran
March, 1966	On site Narridy Creek
June, 1966	On site W of Wirrula
December, 1967	On site WSW of Rudall

## Appendix VIII

Information issued at the Skeleton Weed Field Day held at the  
Property of Mr. C.H. Johnson Parilla on 15/9/65

### SITE A

This trial compared a number of chemicals sprayed in February 1964 with a logarithmic sprayer. This machine gives a continuous series of rates of chemical application on one plot. Of the chemicals tried picloram gave outstanding results.

#### This trial shows:

- 1) Eradication may be obtained with picloram, at low rates. Other trials show that about 16 oz./acre are required when skeleton weed is sprayed in November-December.
- 2) Long term suppression can be obtained at rates less than 2 oz/acre applied in February.
- 3) Annuals, particularly grasses (Wimmera Rye grass, Brome and Silver Grasses) readily volunteered. Wild turnip and primrose also regenerated.

Soil Type	Eradication recommendation Trysben	Tordon 50-D Suggestions
(i) Sand	24 fl. oz. in 3 gallon knap-sack spray to thoroughly wet the plants and the soil for 6 feet around the patch	4½ fl.oz. in 3 gall. to cover 70 sq. yds.
(ii) Heavy Soils	36 fl. oz. in 3 gallons to cover 70 sq. yards	7 fl.oz. in 3 gall. to cover 70 sq. yds.

Note: "Tordon 50-D" is the registered trade name of Dow Chemical. It contains ½ lb. of picloram and 2 lbs. of amine 2,4-D active material per gallon.

### SITE B

#### Trial Method

Picloram was sprayed in September, 1964, at the following rates: 0, ¼, ½, ¾, 1, 1½, 2 oz/acre in strips 100 feet long.

Across these sprayed strips, three legume species, were dry sown with a disc drill with oats as a companion crop. (Harbinger Medic, Geraldton Sub-clover, Hunter River Lucerne).



Three other strips were worked up and sown to wheat and undersown with three other legume species. (Barrel 173, Dwalganup Subclover, African Lucerne).

OBSERVATIONS:

(1) Effects on Skeleton Weed

All rates severely checked the skeleton weed although there was some flowering on the  $\frac{1}{4}$  oz. treatments.

Counts in February (1965) five months after application gave these results:

Rate of picloram	Nil	$\frac{1}{4}$	$\frac{1}{2}$	1	2
Skeleton Weed Plants per $\frac{1}{1000}$ acre	195	43.5	4.5	3.0	1.5

Much more regrowth has occurred since the opening rains.

(2) Effects on Legumes

Residual picloram damage about  $\frac{1}{2}$  oz/acre. The use of picloram to increase pasture production seems limited. Harbinger is best sown dry in stubble.

(3) Effects on Cereal

The removal of skeleton weed for several months has resulted in a fallowing effect - increase in soil water and nitrogen available to the crop. - This is shown in the increased crop growth on sprayed plots.

SITE C

Skeleton weed sprayed 24th February, 1965, with Tordon 50-D using Mr. Johnson's boom spray with an output of  $8\frac{1}{2}$  gallons per acre.

The area was worked up and sown to barley on the eastern side and wheat on the other.

Fence

NORTH

Wheat

Barley

$\frac{1}{4}$ pint/acre 5/7	
No spray	
$\frac{1}{8}$ pint/acre 2/10	
No spray	
2 pints/acre £2/4/8	
No spray	
$\frac{1}{2}$ pint/acre 11/2	
No spray	
1 pint/acre £1/2/4	

There are great benefits from spraying before cropping.

On the other hand, while spraying in the crop has the effect of eliminating seeding of skeleton weed, there is little or no increase in yield and there is a risk of crop damage.

At least  $\frac{1}{2}$  pint and preferably 1 pint Tordon 50-D per acre should be applied in either September or February. Even 2-4 pints per acre could be applied where the areas of infestation are smaller.

<u>Pros and Cons of September</u>	and	<u>February Applications</u>
1) no seeding of skeleton weed.		some seeding which can be restricted by hard grazing or slashing.
2) fallowing effect in some situations due to build up in soil moisture and nitrogen supply to the crop.		smaller fallowing effect.
3) greater regrowth of skeleton weed in the crop.		less regrowth of weed in the crop.
4) slight erosion hazard.		no erosion hazard.
5) little feed available to stock.		some feed from the skeleton weed.

#### After Cropping

Stubble seed annual legumes (Harbinger medic or Dwalganup subclover).

On soils more suited to grazing than cropping sow lucerne under a second crop.

Note: The combined broad scale use of Tordon 50-D for Skeleton weed suppression seems limited to two situations:

1. Where Skeleton weed is growing on only a small proportion of the farm.
2. To hold Skeleton weed in check on crop sections of the property while fertility building legume pastures are being established in other paddocks.

#### SITE D

##### PASTURE ESTABLISHMENT ON WHITE ACID SANDY SOIL

Four (4) legumes were compared - Dwalganup subclover, Barrel 173, Harbinger medic and Hunter River Lucerne.

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Dwalganup	Lucerne	Barrel	Harbinger	Lucerne	Barrel	Dwalganup	Harbinger
Sub		173			173	Sub	

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Lucerne	Harbinger	Dwalganup	Barrel	Dwalganup	Harbinger	Lucerne	Barrel
		Sub	173	Sub			173

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Details of establishment:

1. Fertilizer: sown with 130 lbs. per acre of superphosphate  
+ 130 lbs. per acre of lime
2. Seed: Seed was inoculated and lime-pelleted
3. Seed rate: 10 lb. per acre
4. Time and depth of sowing: Sown dry in early April at 1½" depth
5. Insect control: sprayed with DDT to control red-legged earth-mite

PART II

SKELETON WEED IN SOUTH AUSTRALIA

A Survey in the Mid-Northern Agricultural Districts

R.T.M. Wood

Summary

Of more than 200 outbreaks recorded and observed in northern cereal areas by Agronomy Branch officers during the period 1961-1967 more than 90% have been eradicated by the landowners using 2,3,6-TBA and picloram.

This survey records the location of these outbreaks and the success of the control measures attempted.

A Survey of Skeleton Weed Outbreaks in the Mid-Northern Agricultural Districts of South Australia

August and October, 1967

Background

Since skeleton weed (Chondrilla juncea L.) was first reported in the Mid North near Clare in the summer of 1961, the number of outbreaks has steadily increased. By August, 1963, a total of 41 landholders had reported patches or plants on their properties. Until that time, common salt, sodium chlorate and borate sterilants, and high rates of 2,4-D had been used with some success for eradication of these outbreaks. It was realised however, that some patches had not been reported by landholders despite a considerable amount of publicity when the first outbreaks were found.

During the last four years, the number of reported outbreaks has increased to beyond 200. The number of patches that have escaped recognition has increased without doubt, and these remain a constant danger for reinfestation of new areas.

This survey has been designed to follow up the treatment of reported outbreaks and to investigate rates of spread and farmers attitudes to skeleton weed.

Aims

1. To assess the effectiveness of eradication treatments used by farmers when given the best advice available at the time the outbreak was reported.
2. To assess the attitude of the community towards skeleton weed spread and eradication.
3. To record suspected means of spread and introduction to the properties.

Although much of the information required is subjective and may lack detail, it is hoped that it will be useful as a research and extension guide.

Methods

Prior to the survey, details of outbreaks and localities were collected from District Councils and Department of Agriculture records, and were placed on cards. The area selected covered the Mid North, Upper North and Yorke Peninsula, and it was decided on the basis of availability of personnel to limit the survey to Counties Gawler, Light, Stanley, Burra, Eyre, Daly, Fergusson, Victoria, Dalhousie and Frome.

The survey was conducted from August 14-18th, 1967, in the first five of the abovementioned counties by seven Departmental officers and was completed in the remaining counties by two officers from October 23-27th, 1967.

A standardised form was compiled prior to the survey to record the information as follows:

1. Preliminary Details

- (a) Landholder's name
- (b) Locality
- (c) Hundred
- (d) Section No.
- (e) Property size
- (f) Average paddock size
- (g) Predominant soil type
- (h) Mean annual rainfall
- (i) Land use
- (j) Date of visit
- (k) Name of visiting officer

2. Survey Details

- (a) Skeleton weed present or absent at the time of visit
- (b) Total number of separate outbreaks on the property
- (c) Activity of landholder towards weed control  
(Very Active) (Inconsistent) (With assistance only)  
(Inactive)
- (d) Record of outbreaks and action taken. (A separate record was required for each outbreak).
  - (i) Date of first observation
  - (ii) Plant identified by . . . . .
  - (iii) Size of area infested
  - (iv) Density of plants within the area
  - (v) Paddock phase (i.e. Crop, Stubble, Pasture, Fallow)
  - (vi) Action taken

Date: Personnel:

Treatment:

Result:

- (vii) Follow-up action (if required)

Date: Personnel

Treatment:

Result:

- (viii) Present extent

### 3. Comments

- a) Possible or suspected origin of infestation (opinions from landholder preferred).
- b) Landholder's attitude to skeleton weed and its spread in the district.
- c) Comments on activities or observations possibly linked with spread of Skeleton weed (Surveyor).

### Daily Procedure

Each officer had approximately 6 cards giving details of properties to be visited. Each worked independently and in several localities to obtain an unbiased opinion. The survey was conducted by discussion with the farmers or anybody who was available at the time of visit. The aims of the survey were explained and it was mentioned that all information would be treated confidentially. Important points were recorded in a notebook and the survey form was filled in after leaving the property.

Whenever possible, officers met in the evening to discuss the day's survey.

As a general rule, no prior notice of the visit was given to the farmer.

### Results

The area surveyed (approx. 10,000 sq. miles) extended from Kapunda, northwards to Wilmington and Orroroo, and from Kadina eastwards to Robertstown, Burra and Hallett. Most of this country is classed as arable, and includes some of the best cereal growing land in the State.

In the period 1961-67, 177 properties in the survey area reported skeleton weed outbreaks. Because some farmers were not at home or because the property had changed hands since the report was made, only 130 properties yielded some information on the survey. (See map).

#### 1. Presence or absence of Skeleton Weed on the property at the time of survey

Every endeavour was made to inspect the previously infested sites, but this was not always convenient to the farmer. In many cases complete dependence has been placed on the farmers statements of eradication.

Of the 130 properties visited, 21 (16%) still had skeleton weed growing. When extensive outbreaks had been found and it was known that plants had obviously set seed over several years, eradication was considered suspect. However, only a few properties



fall into this class. On all the 21 properties mentioned above, presence of skeleton weed was verified by the farmer. Most were inspected.

Counties Light and Stanley where 60% of outbreaks have been reported, 14 of the 21 outbreaks not eradicated were found. Table 1 summarises these points:

Table 1

<u>County</u>	<u>No. of Properties Reported</u>	<u>No. of Properties Visited</u>	<u>No. of Outbreaks Treated</u>	<u>No. of Outbreaks Not Eradicated</u>
Gawler	14	8	17	1
Light	60	45	70	9
Stanley	54	42	65	5
Burra	19	14	18	1
Eyre	18	9	23	2
Daly	4	4	4	0
Fergusson	1	1	1	0
Victoria	4	4	4	2
Dalhousie	2	2	2	1
Frome	1	1	1	0
	177	130	205	21

2. Number of separate outbreaks on each property

On 66% of properties, only one outbreak had been found, and successfully eradicated.

one outbreak	86 properties	three outbreaks	16 properties
two outbreaks	22 "	four outbreaks	6 "

The following table gives details for each county:

Table 2 Number of Properties in each category

<u>County</u>	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four (outbreaks)</u>	<u>% Multiple Outbreaks</u>
Gawler	4	1	1	2	8
Light	29	7	8	1	45
Stanley	26	10	5	1	42
Burra	12	1	1	0	14
Eyre	2	3	1	3	9
Daly	4	-	-	-	4
Fergusson	1	-	-	-	1
Victoria	4	-	-	-	4
Dalhousie	2	-	-	-	2
Frome	1	-	-	-	1
	86	22	16	6	130

Counties Gawler and Eyre show the greatest percentage of multiple outbreaks compared with the total for each county.

3. Activity of the farmer towards weed control

This was difficult to assess on one short visit unless there were glaring examples of neglect. Most landholders were classed as very "Very Active" or "Active". Only two were classed as 'Inconsistent'. This type of information cannot have much weight.

4. Number of outbreaks recorded each season

The first outbreaks, half of which were found in Co. Stanley, were recorded in 1961/62. The following table sets out seasonal occurrences of skeleton weed outbreaks reported in each county.

Table 3 Number of Separate Outbreaks in each season

<u>County</u>	<u>Season</u>						
	<u>1961/62</u>	<u>1962/63</u>	<u>1963/64</u>	<u>1964/65</u>	<u>1965/66</u>	<u>1966/67</u>	
Gawler	-	1	5	3	1	7	
Light	3	5	14	10	23	15	
Stanley	6	7	17	10	9	16	
Burra	2	-	4	5	3	4	
Eyre	1	4	7	3	6	2	
Daly	-	3	-	-	-	1	
Fergusson	-	-	1	-	-	-	
Victoria	-	3	-	-	1	-	
Dalhousie	-	-	-	-	2	-	
Frome	-	-	-	1	-	-	
<b>Total</b>	<b>12</b>	<b>23</b>	<b>48</b>	<b>32</b>	<b>45</b>	<b>45</b>	<b>205</b>

The total number of outbreaks reported each season appears to have levelled out. There is considerable variation from county to county.

5. Size of outbreaks when found

Approximately 60% of the outbreaks were less than 10 sq. yds. in area, and usually, only a few plants were found. Another 31% of the outbreaks were larger than 10 sq. yds. but less than 1 sq. chain.

Table 4 Number of outbreaks in each size category

<u>County</u>	<u>Size Category</u>				<u>Total</u>
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	
Gawler	13	4	-	-	17
Light	45	20	4	1	70
Stanley	43	18	4	0	65
Burra	10	8	-	-	18
Eyre	9	7	5	2	23
Daly	2	2	-	-	4
Fergusson	-	1	-	-	1
Victoria	1	2	1	-	4
Dalhousie	-	1	-	1	2
Frome	-	1	-	-	1
<b>Total</b>	<b>123</b>	<b>64</b>	<b>14</b>	<b>4</b>	<b>205</b>

<u>Category</u>	<u>Area of skeleton weed</u>	<u>Per cent of all outbreaks</u>
A	Patch less than 10 sq.yds.	60%
B	10 sq. yds. - 1 sq. chain	31%
C	1 sq. chain - 1 acre (scattered)	7%
D	Greater than 1 acre (scattered)	2%

6. Paddock phase when outbreaks was observed

Most infestations were noticed in summer in crop, stubble or fallow.

Table 5 Paddock phase and skeleton weed outbreaks

<u>County</u>	<u>Crop</u>	<u>Stubble</u>	<u>Grassland</u>	<u>Fallow</u>	<u>Not Known</u>	
Gawler	1	-	1	13	2	
Light	43	8	10	7	2	
Stanley	25	8	10	19	3	
Burra	8	4	3	2	1	
Eyre	10	2	-	10	1	
Daly	-	1	-	3	-	
Fergusson	1	-	-	-	-	
Victoria	2	1	-	1	-	
Dalhousie	2	-	-	-	-	
Frome	-	-	-	1	-	
<b>Total</b>	<b>92</b>	<b>24</b>	<b>24</b>	<b>56</b>	<b>9</b>	<b>205</b>
<b>% of 205</b>	<b>45</b>	<b>11.5</b>	<b>11.5</b>	<b>27</b>	<b>5</b>	

Most of the outbreaks in stubble were found either at reaping or very soon after, and could well be pooled with the crop figures. Thus, cereal crop, stubble and fallow account for 84% of reported outbreaks. The effect of grazing probably accounts for less observations on grassland. Differences between counties are quite marked, and notably, Co. Gawler has a high proportion of reports on fallow.

#### 7. Action taken to eradicate the outbreaks

The following table summarises the most important treatments used in the 1961-67 period. (Figures are numbers of outbreaks).

Table 6

<u>Treatment(s)</u>	<u>Season</u>	<u>Eradicated with one application</u>	<u>Repeat Appli- cations required</u>	<u>Total</u>
TRYSBEN (44%)	1961/62	0	1	1
	1962/63	6	3	9
	1963/64	24	10	34
	1964/65	10	11	21
	1965/66	11	6	17
	1966/67	8 (59)	2 (33)	10 (92)
TORDON 50D (25%)	1965/66	17	8	25
	1966/67	21 (38)	6 (14)	27 (52)
2,4-D Amine or Ester High Rates (11%)	1961/62	0	3	3
	1962/63	3	6	9
	1963/64	2	1	3
	1964/65	1	0	1
	1965/66	2	2	4
	1966/67	2 (10)	0 (12)	2 (22)
MCPA, Salt, Kerosene, Dieseline, Borates, Sodium- Chlorate, Banex (12%)	(1961/62	3	2	5
	(1962/63	2	2	4
	(1963/64	4	2	6
	(1964/65	4	1	5
	(1965/66	2	0	2
	(1966/67	2 (17)	0 (7)	2 (24)
UNSPECIFIED, NOT TREATED, GRAZED, HAND-PULLED (8%)	1961/62	3		3
	1962/63	2		2
	1963/64	5	Unreliable	5
	1964/65	2	Results	2
	1965/66	2		2
	1966/67	1 (15)		1 (15)

Total 205

The treatments and their relative importance are given more clearly as follows:

<u>Treatment used:</u>	
Trysben 200	44% of total treatments, 1961/67
Tordon 50D	25%
2,4-D (Various)	11%
Banex	1%
Sodium chlorate/Borates	2%
Kerosene and dieseline	3%
Salt	6%
Hand pulled and grazed	5%
Untreated	3%

Because they were used in so few cases, the last six treatments were grouped as in Table 6. Results from using salt and sodium chlorate/boron sterilants were quite good on confined areas. Rates used appear to be in excess of recommendations.

Overall, Trysben has performed very well with eradication in 65% of single applications. Tordon has given even better results with 73% of single applications resulting in eradication. Tordon was used on 65% of outbreaks treated in 1966/67.

Several farmers claimed eradication by hand pulling of plants, but there is some doubt about the original identification of the plant.

Results with kerosene and dieseline (used in Counties Eyre and Burra) have varied greatly, and it seems that techniques or timing of applications are important.

Tordon 50D has been used on many outbreaks previously treated but not eradicated with 2,4-D or other methods. Results have been very successful.

Neat MCPA was used as a follow up treatment in a few cases.

#### 8. Suspected means of introduction to the property

Many farmers could offer no definite explanations for the outbreak but some had ideas worth recording and tabulating.

Table 7    Means of Introduction

<u>Suggested Means of Introduction</u>	<u>Number of Properties</u>
Windborn seed	30
Birds	7
Stock movements	13
Bought feed	1
Pasture seed (uncertified)	8
Cereal seed	7
Fertilizers	3
Secondhand bags	4
Seed cleaning plant	20
Traveller from interstate	9
Sharefarmers implements	4
Aircraft	4
No idea	20
	<hr/>
	130
	<hr/>

9.    Attitude of farmers to the spread of Skeleton Weed

Most of the farmers visited were concerned about the spread of skeleton weed and were keen to eradicate any outbreaks located. However, there was a general opinion that many more properties were affected and owners were unaware. Once infestations were located they could be eradicated easily with the new herbicides. On several properties, where larger acre sized infestations were found, owners had obviously missed seeing the plants for a season or more. Where there was a greater interest in grazing, there appeared to be no hurry to eradicate these outbreaks.

DISCUSSION

The main aim of the survey was to study the eradication treatments used and their effectiveness. One difficulty which arose was the tendency of farmers to forget details of the treatment used unless the outbreak was quite recent. In a few cases, farmers stated that they used Tordon prior to its date of registration. (It was assumed that they had confused the name Tordon with Trysben). The actual rates applied varied considerably. Some farmers used recommended rates, others doubled it and a few used neat herbicide. This was especially prevalent for 2,4-D and MCPA. In one case, Tordon 50D was applied as neat product. These differences in application make comparison difficult. There was an apparent improvement with the introduction of Tordon 50D in the precision of application and with improved extension

services for weed control. (local government authorised officers). The slightly better results with Tordon 50D compared with Trysben could be linked with improved extension services also.

Another problem encountered was definition of an outbreak. For the purposes of this survey, several plants or patches in the same paddock in the one year were considered as one outbreak. There is always the problem when some plants miss treatment one year and are not found again until the next cropping year. Farmers are likely to regard these as separate outbreaks, whereas in fact they are not.

An alarming aspect of this survey is the number of outbreaks referred to by farmers which they feel are present on neighbouring properties but which remain unreported and untreated. It appears that many farmers have not recognised the plant and if they do recognise it, see no need to report it. There is every possibility that outbreaks exist in inaccessible country where stock have been grazing.

Soil type does not seem to be important in the distribution of outbreaks. Most outbreaks occurred on red brown earths and loamy soils with some even on stony non-arable areas. Land use and rotations are likely to be important in influencing establishment and spread of skeleton weed. This information was rather sketchy.

Behaviour of skeleton weed in the Mallee areas would suggest that light soil types where clay is fairly deep are more prone to infestation than more loamy soil types. In parts of County Daly and County Fergusson, where light Mallee soils are predominant, the weed could therefore spread rapidly if neglected. Farmers should be careful in purchasing seed and hay from outside his district. Whenever possible, seed grading machines should remain in one district and not travel to another property without thorough cleaning. Many of the farmers visited expressed concern that skeleton weed was being spread in this manner.

Finally, it is most important that up to date records are kept of all new outbreaks. Some effort will be required to increase awareness of this weed and to improve reporting of outbreaks. Liaison with local government weed control officers will be necessary if research is to be adapted to these new areas. A programme of eradication will delay the spread for a few years but it will be important to commence agronomic control work on larger infestations early.

The serious situation in the Murray Mallee could not be prevented by an eradication programme and this was realised too late to prevent losses in productivity. An agronomic control

programme must be commenced early before broad acre infestations become prevalent. At present, there is no information on rate of spread on the Mid Northern soils, and there is no reason to believe that it will be slower than in the Riverina district of New South Wales.



PART III

SKELETON WEED SURVEY

TWO DISTRICTS OF THE MURRAY MALLEE

1968

E.S. Hogg

Summary

A survey of one hundred square miles surrounding the site where skeleton weed was first recognised near Parilla in South Australia has shown that after 20 years more than half of these properties have abandoned at least one third of the cropping area because of the density of skeleton weed. These areas have less than half of the grazing value of surrounding areas.

Farmers in this area are very concerned and are endeavouring to combat skeleton weed by improved pastures and by spraying.

Forty miles away near Karoonda a similar survey has shown that equally serious infestations are developing rapidly but landowners are generally not attempting to face the problem.

Skeleton Weed Survey  
Two Districts of the Murray Mallee 1968

Aim of Survey

To map the skeleton weed infestation of 15 or more farms within each of the two districts of Karoonda and Parilla.

The Districts

Each area surveyed was approximately 10 miles square. The survey area in the Karoonda district was centred on Mr. D. Dutschke's property, Section 37, Hundred of Marmon Jabuk, and the Parilla area was similarly located on Mr. C.H. Johnson's property, Section 2, Hundred of Parilla. It was on this property that the first large area of skeleton weed in South Australia was recognised in 1947.

The maps enclosed with this report define the areas surveyed and illustrate the extent of the current infestation.

Survey Method

The survey was carried out by interviewing all landholders of the survey area, and then by inspecting their properties.

The first property visited in each district was the central farm, i.e. Mr. D. Dutschke's property at Karoonda and Mr. C.H. Johnson's property at Parilla. It was at these properties that the standards for recording the skeleton weed infestation were decided. (Locations of infestations and their densities were marked directly onto cellophane sheets covering aerial photographs).

A simple scheme was devised for recording the infestation in the Karoonda area. Here the infestation exists as many scattered dense patches. Areas greater than one acre with more than one skeleton weed plant per square foot were recorded.

The infestation at Parilla was recorded in three categories:

1. Areas in which the skeleton weed was too dense to permit cropping.
2. Areas where cropping was only possible with the aid of an amine 2,4-D spray, and
3. Areas where cropping was possible without herbicides.

All landholders were visited on their properties and in most cases they were not given prior notice. They were advised of the aim of the survey and then the location of their houses were shown to them on the aerial photograph. After this introduction they were asked to mark in the boundaries of their properties. This exercise made the landholder study the photograph carefully

and so prepare him for the shading in of various classes of skeleton weed infested land. When the landholder indicated that he had a poor grasp of the physical details on the photograph he would then be asked questions of the photograph, until it was felt that he could, with reasonable accuracy, carry out the remainder of the task.

An inspection of the property was made once the landholder had completed the photograph so that his accuracy in defining the infestation could be assessed. It soon became evident that most landholders did not know the current extent of the weed on their properties. Changes were made to make the recording as accurate as possible. Approximately one to two hours were spent on each property.

### Survey Observations

#### (a) Karoonda District (see attached map)

- (i) Scattered dense patches of skeleton weed were found over every property surveyed, particularly on the deep sands. Most properties have four or five patches greater than an acre.
- (ii) Any country that has been eroded carried more skeleton weed in much wider infestations. This is particularly evident on the low fertile sands on Sections 41 and 44 in the Hundred of Marmon Jabuk where there is a dense continuous area of 350 acres.
- (iii) The weed throughout the survey area is rapidly spreading into denser and wider areas. Proof of this came from landowners who knew the extent of their infested areas as they were when last cropped or from the previous summer when it could be easily seen. When these were checked with the survey officer the areas were found to be greatly extended.

#### (b) Parilla District (see map)

- (i) Skeleton weed is causing economic loss on more than half the properties surveyed. On these properties at least one third of the cropping area has been abandoned to cereal growing. When grazed, carrying capacity of these abandoned cereal areas has been reduced by half.
  - (ii) Areas abandoned are of low fertility and show evidence of previous periods of erosion.
  - (iii) Except on the heavy flats cropping cannot be carried out without using 2,4-D to facilitate harvesting.
-

- (iv) The heavy flats are being abandoned at the rate of one chain in from the sand-ridges per annum.
- (v) The rate of spread in newly developed country in the southern portion of the survey area indicates that planned land development in the County of Chandos, is seriously threatened.

### Discussion

While it was never the purpose of the survey to record anything other than the extent of the infestation within the survey areas some observations, which are listed below, were made.

#### (1) Karoonda District

One could only be but appalled at the apathetic outlook which the landholders have for the weed in this district. Only a few landholders recognise that production is going to be severely reduced unless some immediate steps are taken to confine the weed to its present limits. These are the landholders who are spot spraying small patches with amine 2,4-D or Tordon 50-D(R) and improving fertility through increased fertilizer usage and improved pasture species in an effort to provide plant competition.

No farmer has to date suffered great economic loss through this weed in the survey area, even though a single "dense" area of 350 acres on Sections 41 and 44, Hundred of Marmon Jabuk has prevented cropping on that area. This is because it is land of inherent low fertility and poor capacity to be improved, and has never produced a reasonable crop. What is being overlooked by most landholders, however, is the weed's insidious establishment on the better class of country. Here numerous small patches exist, and there is evidence that in a few years great inroads will have been made by the weed into this productive barley and wheat land.

#### (2) Parilla District

Skeleton Weed was first officially recorded in South Australia at Parilla during 1947. A subsequent survey, a map of which is included in this report, discovered that 80 acres of one paddock was infested and a number of smaller patches were found nearby. The infestation has reached its present level where in one location there is now a continuous area of 1390 acres running through the Sections 7, 11, 18 and 19 in the Hundred of Parilla which cannot now be cropped, and there are other similar areas of up to 750 acres.

Here, as in the Karoonda district, skeleton weed has made its greatest and most rapid gains on the very poor soils, particularly those light soils which grow only a sparse plant

cover and readily drift. The most rapid advance of the weed in the eastern section of the survey area was reported to have occurred during 1964, following the unusually large area which drifted that year. However, unlike the Karoonda district, the economic impact of skeleton weed has been felt by this community. As mentioned above, a significant area which was once cereal cropping country has now been lost to the weed; and each year this area is becoming greater. The stock carrying capacity of the areas which have been abandoned for cropping has fallen from about .5 dry sheep equivalents to .25 D.S.E. and some estimates have put it as low as .15 D.S.E.'s. per acre.

Some landholders have obviously been affected more than others. Landholders on the heavy soils of the north-west section of the survey area have been untroubled and except for the spot spraying of plants as they have appeared, the weed has caused them no financial loss. In contrast, the owner of the property of the southern half of Section 11, Hundred of Parilla, has lost 50% of the cropping area of his property. Crops are no longer grown on the property of Section 19, Hundred of Parilla, and hence this property is no longer an economically viable unit, but forms part of the holdings of another landholder of the district.

The invasion of skeleton weed into the poorer class of country after it has been cleared of its native vegetation can be clearly seen in the Hundred of Day (southern section of the survey area). Section 11 of this country was cleared about 10 years ago and 48% now is no longer suitable cropping country, and 37% must be sprayed to prevent mechanical troubles at harvest. 12.5% of Section 13 of this Hundred, which was cleared about 4 years ago, now has to be sprayed with amine 2,4-D if the crop is to be reapt, but it is obvious that it will not be long before a large percentage of this section will become unsuitable for cereal cropping. Section 14 has not been cleared.

Attitudes to the problem by the landholders in this district are markedly different to the attitudes held in the Karoonda district. The financial consequences have been generally recognised here, even by those landholders least troubled by the weed. There is a general air of optimism that the use of the herbicide picloram to eradicate small isolated patches as they are found in the least affected area, and amine 2,4-D and improved pasture competition in the areas which are now moderately infested, will save most of the present cropping area.

Parilla and Karoonda Rainfall Recordings

Yearly Rainfall			Average Monthly Rainfall		
Year	Parilla	Karoonda	Month	Parilla	Karoonda
1948	15.36	14.33	Jan.	76	68
1949	11.89	9.68	Feb.	106	83
1950	15.67	12.74	Mar.	65	65
1951	16.71	17.28	April	111	100
1952	14.78	14.71	May	148	159
1953	16.92	13.16	June	136	142
1954	13.51	11.78	July	139	135
1955	18.10	17.91	Aug.	149	155
1956	20.12	13.95	Sept.	120	139
1957	8.13	7.78	Oct.	146	135
1958	15.43	13.66	Nov.	107	89
1959	7.21	8.45	Dec.	79	95
1960	15.40	15.18			
1961	13.08	13.80			
1962	12.01	9.38			
1963	15.79	14.24			
1964	17.87	13.76			
1965	11.73	8.52			
1966	10.89	9.73			
1967	6.85	5.77			
1968	16.83	13.09			
Av. 30 yrs.	13.82	13.65			

Bibliography of South Australian Department of Agriculture

Skeleton Weed References

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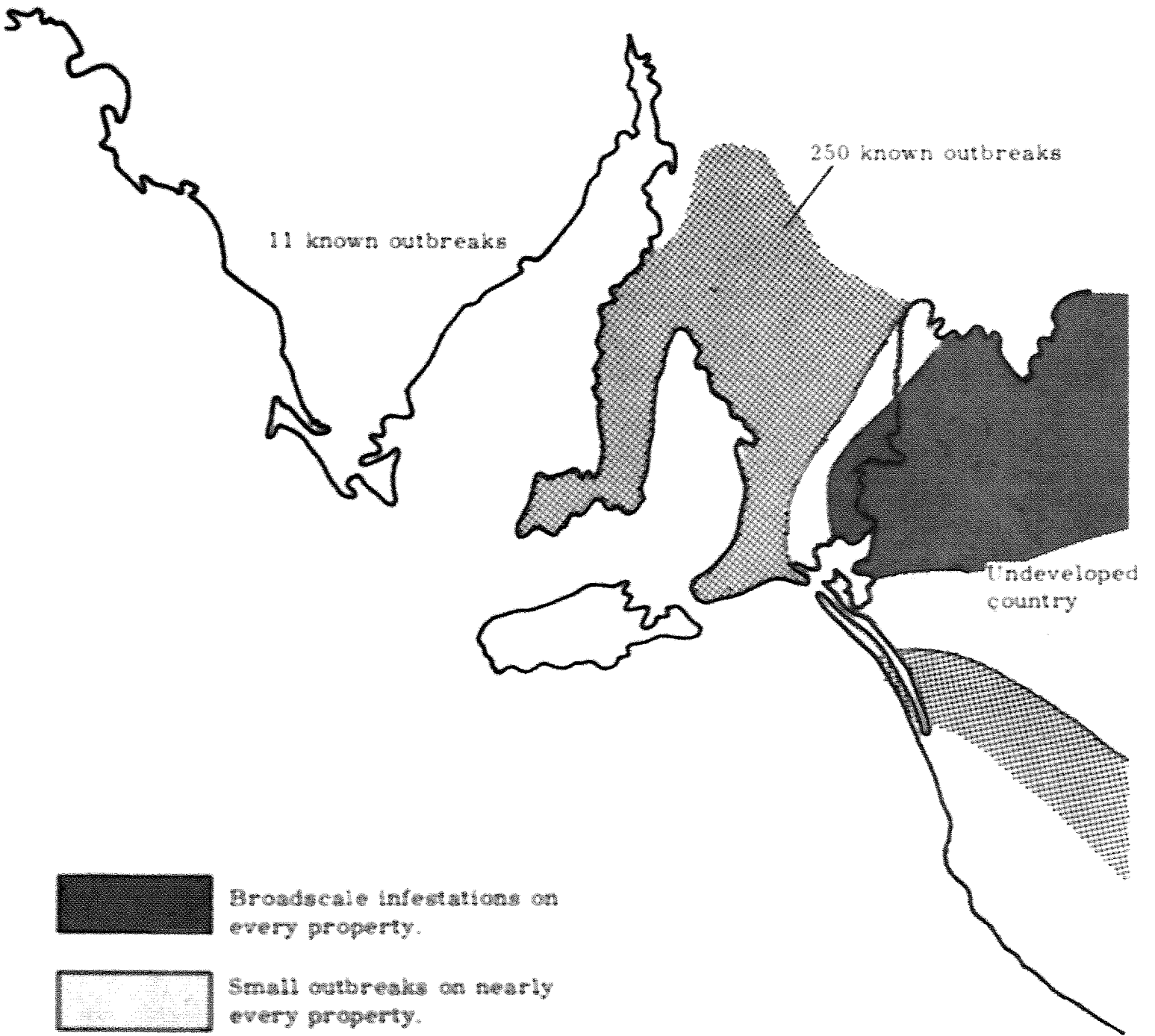
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|--|---------------|-------------------------------------|
| - Pastures and Chemicals Help<br>Check Skeleton Weed on Murray<br>Mallee Farms | B.G. Hall     | Vol. 64 No.2<br>P 64, Sept.<br>1961 |
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A Report of Skeleton Weed Research in South Australia compiled by R.T.M. Wood, from Research Projects by M.A. Ross, R.J. Luxmoore, and R.T.M. Wood, Printed February, 1967.





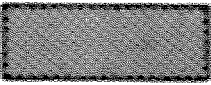
# SKELETON WEED



Broadscale infestations on every property.



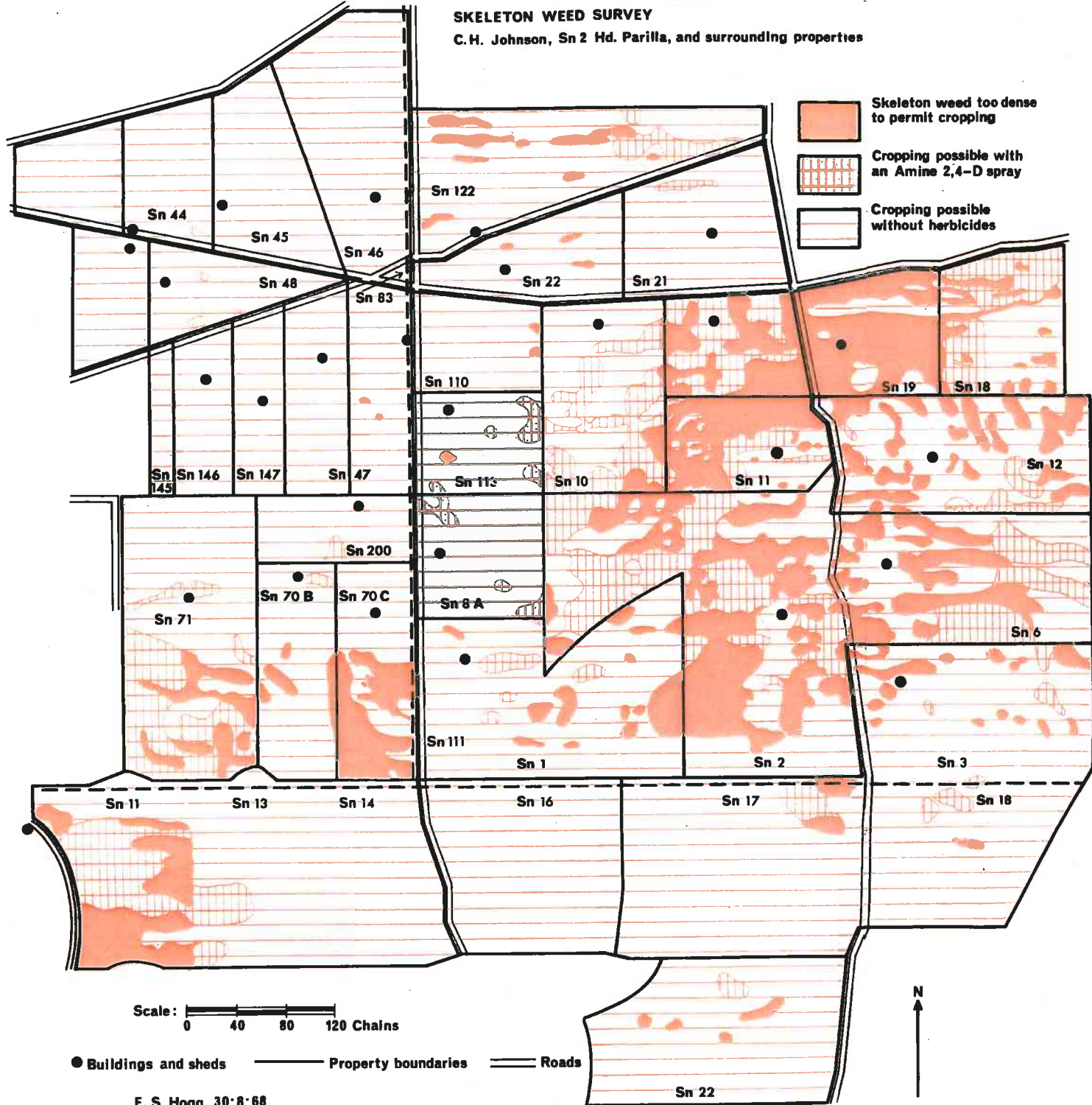
Small outbreaks on nearly every property.



Widely scattered infestations.

# SKELETON WEED SURVEY

C.H. Johnson, Sn 2 Hd. Parilla, and surrounding properties



**SKELETON WEED SURVEY**  
**C. H. Johnson, Sn 2 Hd. Parilla**  
**and surrounding properties 1948**



**Skeleton Weed**

**Roads**

**Buildings and sheds**

**Property boundaries**

Section 2 A = 1/3 ac. B = 80 ac

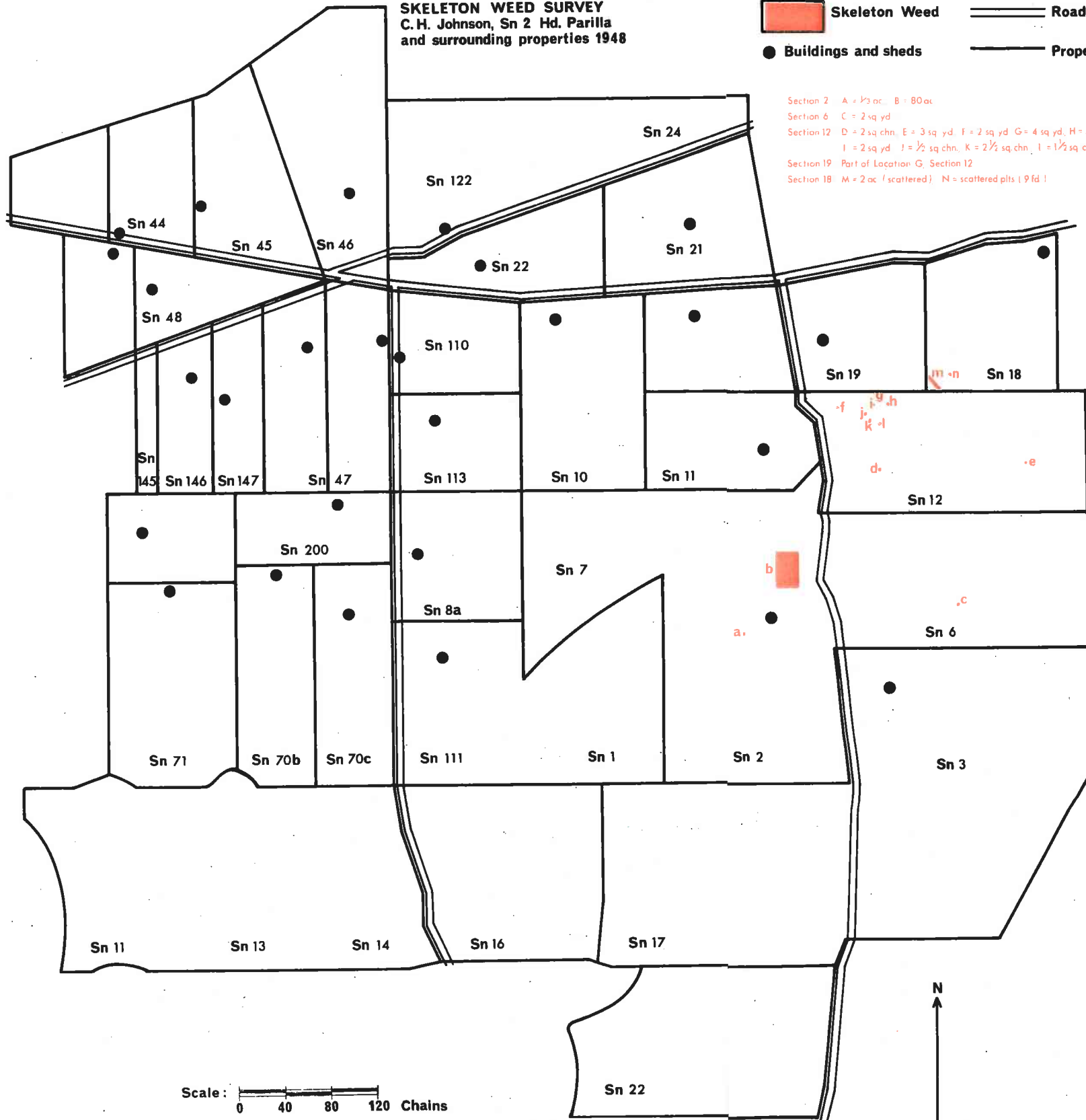
Section 6 C = 2 sq yd

Section 12 D = 2 sq chn. E = 3 sq yd. F = 2 sq yd. G = 4 sq yd. H = 1/2 sq chn

I = 2 sq yd. J = 1/2 sq chn. K = 2 1/2 sq chn. L = 1 1/2 sq chn

Section 19 Part of Location C, Section 12

Section 18 M = 2 ac (scattered) N = scattered plts (9 fd)



Scale: Chains

**SKELETON WEED SURVEY**  
**D. Dutschke Sn 37 Hd. Marmon Jabuk**  
**and surrounding properties**

