

Report to grain growers

Skeleton Weed Program 2022-23

Foreword

On behalf of my fellow committee members, I am pleased to present this report outlining the delivery and outcomes of the 2022-23 Skeleton Weed Program.

The Skeleton Weed Program has been funded by Western Australian (WA) growers through the Grains, Seed, and Hay Industry Funding Scheme (GSHIFS) since 2010. During that time, the program has grown, placing a greater emphasis on working with farmers, local coordination, support, and encompassing critical research and development.

The Skeleton Weed Program continues to provide critical assistance to grain growers in the management of skeleton weed through the:

- searching of more than 400,000 ha of land to map infested areas for treatment.
- chemical control of skeleton weed on 10,000 ha of infested land.
- successful eradication of skeleton weed from more than 20,000 ha of paddocks across the wheatbelt.

These operational and support programs have had a significant impact on limiting and slowing the spread of skeleton weed across the wheatbelt, and many grain growing areas remain free of this major crop weed.

Ongoing research is a vital part of this strategy, and the GSHIFS-funded research and development (R&D) component of the program is working to improve its effectiveness and efficiency, through the development of tools, technologies, and techniques to help landholders manage the weed better.

The GSHIFS is committed to helping WA grain growers by working to slow the spread of skeleton weed through the wheatbelt and thanks all growers for their support.



Anne Wilkins
Chair

Grains, Seed, and Hay Industry Funding Scheme Management Committee

30 June 2023

Program in review

Program description

Skeleton weed is a major pest of grain crops and can significantly reduce grain crop yields by competing for moisture and nutrients (mainly nitrogen), due to its deep perennial root system.

Skeleton weed is a declared plant in WA under section 22 of the *Biosecurity and Agriculture Management Act (2007)* and is assigned to control category 2 (Eradication) for the whole of the State, except in the Narembeen and Yilgarn Shires, where it is category 3 (Management).

Modelling indicates that under a nil management scenario, the cost to WA broadacre agriculture will be approximately \$19.2 million per year after twenty years, while under eradication scenario, costs fall to \$2.8 million per year.

With annual program costs of approximately \$5.2 million per annum, the skeleton weed eradication program produces a net present value of \$15.8 million over twenty years.

The Skeleton Weed Program provides a coordinated approach to manage skeleton weed in WA and protects the profitability of grain growers.

The program is fully funded by the WA grains industry through the GSHIFS and is delivered by the Department of Primary Industries and Regional Development (DPIRD).

The objective of the program is to assist WA landholders to:

- Eradicate skeleton weed (where possible).
- Manage skeleton weed to reduce the impact on crop yields.
- Restrict and slow the further spread of skeleton weed in WA.

Program/project delivery

The Skeleton Weed Program has key strategies to meet the program's objectives/outcomes.

- Improve landholders' ability to find and eradicate skeleton weed.
- Increase landholders' awareness of skeleton weed as a highly undesirable weed.
- Widely publicize descriptions and pictures of skeleton weed to help landholders identify infestations.

- Inform landholders about the most up-to-date techniques available for the management and eradication of skeleton weed.
- Provide assistance with searching and eradication.
- Encourage local grower groups to participate in cooperative surveillance and reporting of infestations.
- Support Local Action Groups (LAGs) to assist in the management and eradication of skeleton weed in their local areas.
- Implement practical compliance regimes in affected areas.
- Provide landholders with incentives to report infestations.
- Provision of winter control treatments where landholders are compliant with program requirements.

As part of this strategy, the program provides the following assistance to landholders:

- Identification of suspected skeleton weed plants.
- Technical assistance and advice for the eradication and/or management of skeleton weed on properties.
- Assistance and advice on summer and winter herbicide application.
- Mapping of infestations.
- Assistance with searching new skeleton weed finds and previously infested paddocks.
- Support from DPIRD and LAG staff.

To achieve these program objectives/outcomes the program undertakes the following operational activities:

- Eradication achieved by assisting affected landholders, both directly and through LAG to meet their obligations for searching, reporting and treatment of skeleton weed on their properties.
- Targeted surveillance of high risk, non-infested properties is conducted to raise awareness and control currently unmanaged infestations.

Program in review

Achieved milestones.

- Winter treatment of skeleton weed infestations, including supply and application of herbicide.
- Reviewed and provided skeleton weed information packages to landholders.
- Pre-search planning and notifications sent to the affected landholders.
- Surveillance for skeleton weed on high-risk non-infested properties undertaken.
- Monitoring of paddocks released from the infested list within C2 areas.
- Audits of infested properties conducted including follow up compliance.
- Records updated in the projects database for annual summer searching results.
- Annual debrief of operational activities held in March 2023.
- Operational plans and budgets for 2023-24 completed and approved by the GSHIMC.
- Funding applications for LAG were assessed and funding facilitated.
- The annual report to grain growers 2021-22 was completed and distributed.

Program achievements

The program is meeting the required outcomes:

- The number of new properties (year on year) and the newly infested area is slightly less than in 2021-22, as is the total infested area.
- These items can, and do, vary from year to year around seasonal conditions, but the trend remains as a slow spread.
- The program also continues to eradicate infestations not only from paddocks (230), but from properties (31) in 2022-23.

All grain growers in WA benefit from the program particularly those that are not currently infested. The landholders benefit indirectly by the program slowing the spread of skeleton weed.

Program expenditure

Total program expenditure was \$5,048,608 for 2022-23, while income received from the operational activities was \$48,211.

The actual net cost was \$5,000,397 (as of 30 June 2023), which is \$167,411 under the budgeted amount of \$5,167,808 (see Figure 1).

\$3,816,538 was allocated directly to landholders in the form of search assistance and funding for seven LAG (Table 1 and Figure 1).

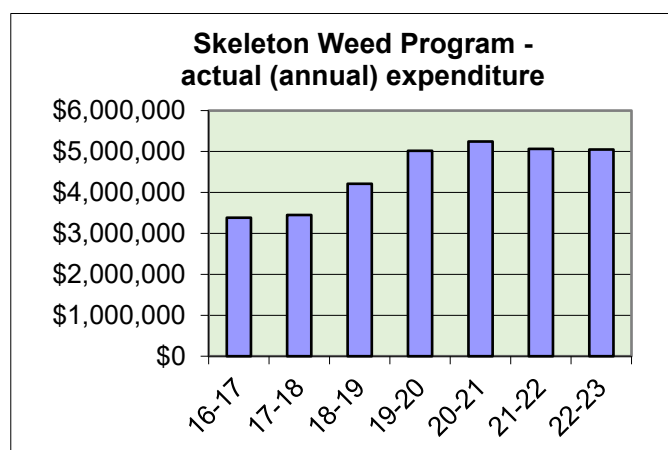
There was a further \$1,232,070 directed to program support and operational activities such as program delivery, research, communications and extension, regulation, and surveillance.

The 2022-23 expenditure maintains the significant increase in operational funding started in 2018-19. The majority of the current expenditure is in the provision of landholder support provided.

Table 1 Program expenditure 2022-23

Operational expenditure	\$
Program support	
Operations, coordination, audit, and compliance	1,047,070
Education and awareness	15,000
Targeted surveillance searching (including the metro area)	170,000
Subtotal	1,232,070
Direct landholder support	
LAG (including chemical purchase \$85 000)	918,851
Provision for landholder searching subsidies	2,647,687
Winter spraying chemical supply (DPIRD)	250,000
Subtotal	3,816,538
Total expenditure	5,048,608

Figure 1 Net Program expenditure over last 7 years.



Program in review

Summer searching program

The program requires all landholders to undertake a full search of known infested paddocks over the summer search season (November to February).

This has two main aims:

- To find and treat plants before they set seed.
- Map the infested areas where plants are growing for winter eradication treatment.

In 2022-23 over 370,000 hectares was searched during the summer search season. Details of the searching results for 2022-23 are tabled below.

Table 2. State-wide Skeleton Weed Program area searched results for 2022-23.

Are searched results	2022-23
Infested properties	(Rounded)
Total properties	940
Total paddocks	3,340
Total area	371,000
Estimated Code 1 (hectares)	270,500
Estimated Code 2 (hectares)	62,500
Estimated Code 3 (hectares)	38,000
New properties	55
New paddocks – new properties	100
Total new area – new properties (hectares)	10,400
New paddocks – existing properties	485
Total new areas – existing properties (hectares)	46,000
Surveillance	
Project staff (DPIRD and LAGs)	
Number of properties	63
Number of paddocks	152
Area searched (hectares)	22,000
UAV surveillance	
Area searched (hectares)	6,000
Properties audited	
Number of properties removed	31
Number of paddocks removed	230
Area removed from infested list (hectares)	23,700

Search assistance activity

The Skeleton Weed Program provides a coordinated assistance program to encourage and support landholders to search for skeleton weed on their properties. The Search Assistance Scheme provides direct financial support to landholders to search eligible paddocks.

Landholders have the option of undertaking the summer searching of known skeleton weed infested paddocks themselves or engaging a registered contractor from the contractor panel, to complete the searching of eligible paddocks.

In 2022-23, approximately 62% of the searching was done by contractors, as most grain growers are busy with harvest over this period. This is close to the long-term average of 65%.

There was 317,000 hectares claimed for search assistance in 2022-23, with a total of \$2,645,000 paid in search assistance. This expenditure was slightly under budget by \$95,000.

Ninety percent plus of search assistance goes to searching known infested paddocks and the remaining to searching **newly infested** paddocks.

Skeleton weed was found on 76% of the paddocks searched, while 24% returned a clear search.

Table 3. Details of the paddocks searched.

Search assistance results	Number of paddocks	Hectares
Clear search	742	77,000
Plants found	1,970	240,000
Total	2,712	317,000

Table 4. Details of search assistance paid, and paddocks searched in 2022-23.

Total paid	Amount	Area	Paddocks	% Paddocks searched
Total amount	\$2,645,024	317,462	2,712	100%
Current paddocks	\$2,427,090	289,085	2,411	91%
New paddocks	\$217,934	28,377	301	9%
Landholders	\$735,366	122,077	1,132	38%
Contractors	\$1,909,658	195,385	1,291	62%

Program in review

Surveillance searching

As part of the summer search activity, the program also undertakes a targeted surveillance program. This looks at suspected areas not currently infested with skeleton weed, but that are in the spread path. This activity aims to locate new areas before they become established and consequently more difficult to eradicate. Traditionally this has been done by program staff searching paddocks from vehicles.

In 2022-23, there was 28,000 hectares of surveillance searching undertaken, which included 6,000 hectares that was searched by drones.

Infested properties

A total of 55 new infested properties were reported by landholders or found by the Department and/or LAG undertaking targeted surveillance.

Following Department and LAG audits of eligible Code 4 paddocks, 31 properties were removed from the infested list. This gives a net gain (new minus released properties) of 24 properties – **a slight decrease on the net gain of the previous year** (26 new properties).

This is very encouraging and clearly shows that the Skeleton Weed Program is achieving key program outcomes by:

- minimising the rate of spread
- eradicating skeleton weed where possible.

Current infested area

Although the area searched by the program was over 370,000 hectares in 2022-23, the current mapped **infested area** is (approximately) 10,600 hectares. This is the actual area which has been mapped and listed for treatment under the winter spraying program.

There is 4,500 to 5,000 hectares of infested area (squares) planned for treatment under the eradication protocols i.e., up to 7 litres per hectare of Picloram based chemical.

The remaining (approximately) 6,000+ hectares of infested area are classed as heavily infested (**more than 10% of the paddock infested**), and therefore a whole paddock treatment is applied.

Winter treatment

Landholders have the option to undertake this work themselves (with chemical provided by the program) or have the work completed by program staff (DPIRD and LAG) at no cost to the landholder. Most elect to have the work done by the program.

Chemical valued at \$250,000 was purchased (or on hand) to complete the 2023 winter eradication activity. Up to 5,000 hectares of infested area is targeted for eradication treatment (using 7 litres per hectare of Picloram based herbicide) while up to 6,000 hectares will be targeted for whole paddock treatment. The planned hectares can vary significantly with the season conditions.

Early rainfall conditions across most of the grain growing areas this current winter spraying season (2023) meant the program was underway early. Much of the spraying in areas lacking rain were completed in reasonable conditions and the effectiveness of the spraying is anticipated to be good. In some areas that were too wet in previous years, were able to complete almost all the planned spraying program.

Table 5. State-wide Skeleton Weed Program – current infested area (Coded paddocks) as of 30 June 2023.

Current infested area	2022-23
Infested properties	(Rounded)
Total properties	1,000
Total paddocks	3,890
Total area	409,000
Estimated Code 1 (hectares)	276,700
Estimated Code 2 (hectares)	86,700
Estimated Code 3 (hectares)	45,600
Infested area – for winter treatment	12,380



Program in review

Perth metropolitan area

Surveillance was conducted in the Perth area in early December 2022 and February/March 2023. Winter treatment of the 2022-23 infested sites was undertaken in July 2023.

Metropolitan landholders and managers of metropolitan infested sites are required to conduct their own skeleton weed searching and treatment at their own cost. Alternatively, they may contract DPIRD to undertake the work on a fee-for-service basis on behalf of the GSHIMC (this arrangement remains the preferred option for most landholders).

Land managers undertaking their own management were required to report on their activities and subject to audits in December and February.

New sites continue to be reported and found. Awareness is improving, particularly with local governments, with strong support from both the City of Cockburn and Wanneroo, and Main Roads WA. Although new sites are listed, many current sites have had significantly reduced plant numbers, and some sites were removed from the infested list.

Research

Management of the Skeleton Weed Program remains the key driver of the direction and suitability of the research work being undertaken.

The overall aim of the research program is to reduce the level of new infestations and/or increase the level of cleared infestations, so that the new is less than the cleared and the overall infestation is decreasing or constant. Maintaining a constant infestation level is realistic and an achievable goal.

Several new control options have been developed and currently implemented by the program and included in the revised 2022-23 management guide.

The key focus of the chemical treatment research is to work on options that farmers can easily incorporate into their current farming practices.

Current research activities

The program's current research includes:

- herbicide trials
- high precision mapping of plants
- growth and development patterns using time-lapse photography
- image analysis using artificial intelligence
- analysis of historic data

The "surveillance" research aim of the project is to provide the training data and algorithms required to detect skeleton weed plants at various times of the year using mobile phones and artificial intelligence technology and deploy it on agricultural implements or drones. In addition, development of models and training sets for the summer aerial surveillance using drones has been developed to improve the accuracy and detection scores.

The program's new research includes:

- In 2022, the first deployment of pollen and pappus traps were set to see if they can provide a viable alternative surveillance tool.
- The biocontrol program progressed with the introduction and breeding of the gall midge at CSIRO Floreat Park and DPIRD Moora. These insects are ready for release in spring 2023.
- Skeleton weed control in Roundup Ready canola was successful and has been included in the new herbicide control recommendations for 2023-24.

Local Action Groups

Seven LAGs were funded by the program during 2022-23:

- Avon South
- Central Wheatbelt
- Lakes
- Lower Lockhart
- Mortlock
- Narembeen
- Yilgarn

Funding of \$918,000 was provided to enable LAG to undertake the Operational Program in their designated areas.

LAGs now cover most of the Central and Eastern Wheatbelt, undertaking and delivering the program's operational activities in these areas, which continues to be successful and effective.

LAGs are now working autonomously and delivering all of the program operational tasks in their local areas - excluding any compliance activities.

All compliance requirements are met by authorised DPIRD biosecurity officers.

Program in review

Extension and awareness

The program's extension effort was increased to coincide with the start of the summer search season (mid-November). A strategic communication and extension campaign was implemented incorporating regional radio announcements, media statements and social media.

The campaign was a well-received key promotional opportunity, and which greatly increased the profile and recognition of skeleton weed among industry.

Key promotions included:

- Radio community notices on rural radio (Triple M) were extended from November to February (main search season).
- Radio interviews (5) with Rural Focus (Triple M) and one with ABC Rural.
- Regional Machinery Field Days attended included Wagin Woolorama, Dowerin, and Newdegate Machinery Field Days.
- Roadside signage audit and rebranding review.
- @DPIRD internal newsletter featured Merredin program staff and casuals (Feb 2023).
- WALGA EnviroNews article on skeleton weed roadside surveillance (Feb 2023).
- The Skeleton weed in WA factsheet was available at all the agricultural field days and available on the website.
- The Skeleton weed in Western Australia: Management Guide and Control Program, our key publication/best practice management guide was heavily reviewed and printed.
- The skeleton weed webpages were reviewed updated in early 2023 with relevant content.
- Landholder Information Packs issued to infested property landholders (including large stickers and the Landholder Guide).
- The annual Communications Plan was reviewed, updated, and circulated.
- Further enquiries with Strategic Communications team to reintroduce the SkellyWise newsletter and skeleton weed podcasts as the Department currently hosts its Grains Convo podcast series on the Grain Growers Alliance website.

Improvement in the Skeleton Weed Program's recognition and awareness by farmers was a key recommendation of the 2019 Review and the program continues to make progress in this area.

Key lessons learned

The Skeleton Weed Program (in some form) has been ongoing since the early 1970's. It continues to have great support from the grain growers of WA. The program's effectiveness is evident in the continued eradication from properties and slow spread of skeleton weed. Most of the grains industry acknowledge the contribution the program has made over many years in managing skeleton weed.

Development of new searching techniques, the use of drones and machine learning to analyse images has been difficult to achieve and some issues have arisen. We have created a new sub-project in the program to focus on the further development of this work. All stakeholders agree that this is vital to the continued effectiveness of the program.



The funding of research into better management treatments and applications will become increasingly more important in the future. Thinking laterally and looking more closely how eradication can better fit with current farming practices is the way forward.

The program continues to be flexible in the employ of program staff and required resources to meet targets.



Skeleton weed regions and zones

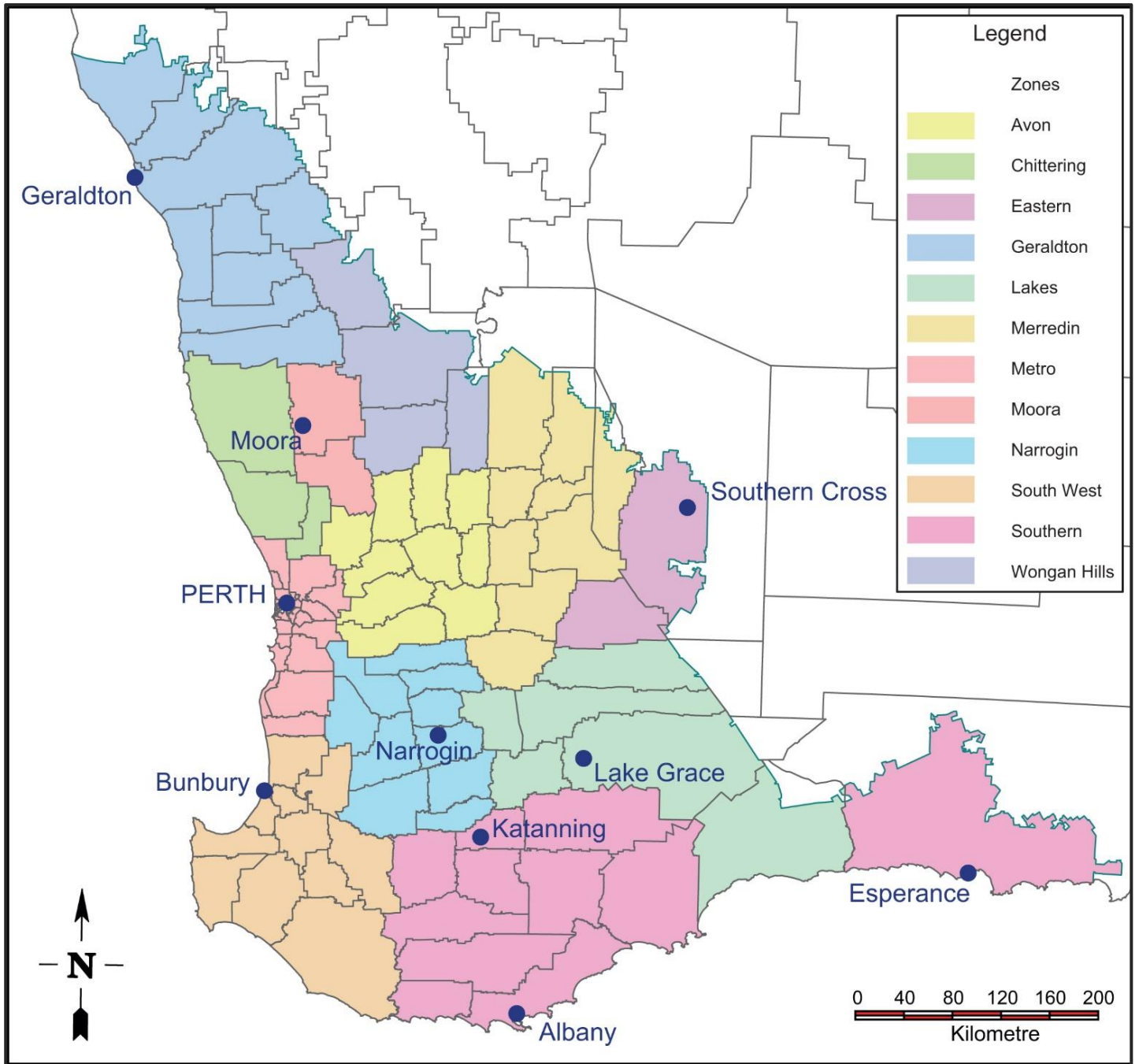


Figure 2 Map of skeleton weed zones in Western Australia as of 30 June 2023.



Skeleton weed regions and zones

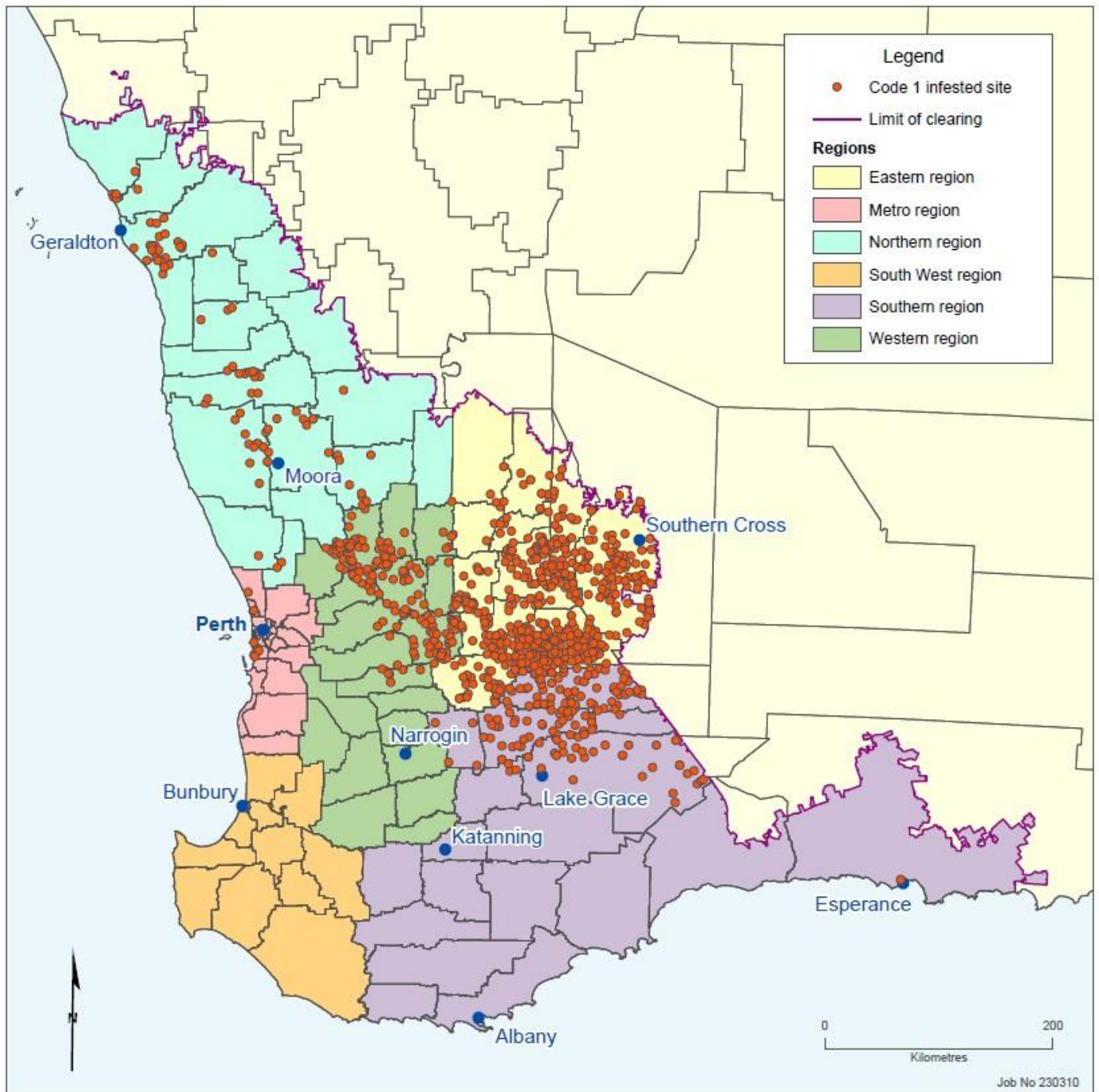


Figure 3 Map of skeleton weed regions and Code 1 infestations in Western Australia as of 30 June 2023.

Important disclaimer

The Chief Executive Officer of the Department of Primary Industries and Regional Development and the State of Western Australia accept no liability whatsoever by reason of negligence or otherwise arising from the use or release of this information or any part of it.

Copyright © State of Western Australia (Department of Primary Industries and Regional Development), 2023