

A Review of Bridal Creeper Control in the Southwest of Western Australia 2018



**Report prepared for the Oyster Harbour Catchment Group,
supported by funding from the Western Australian Government's
NRM Program**

by Geraldine and Steve Janicke

September 2018



natural resource
management program



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The extent, control methodologies and outcomes.

Report prepared by Geraldine and Steve Janicke
for State NRM through the Oyster Harbour Catchment Group

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- A15034, Controlling Bridal Creeper in the Ranges Link and Surrounds
- A14187, Protecting the Stirling Range National Park from Bridal Creeper

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BACKGROUND TO THE REVIEW

In 2015 the Oyster Harbour Catchment Group applied for and was successful in obtaining two Community Action grants through State NRM funding. The projects were;

1. A15034: Controlling Bridal Creeper in the Ranges Link and Surrounds.

This project aimed to control Bridal Creeper in 160 Ha of high value remnant vegetation adjacent to the Stirling Range National Park. An additional amount was made available to undertake a review of the extent of Bridal Creeper, control methodologies and success rates across the south west of the State.

2. A14187: Protecting the Stirling Range National Park from Bridal Creeper.

A component of this project aimed to identify any possible off target damage to possible sensitive species of low rates of metsulfuron (0.02g/10L) and to promote the effectiveness of this control activity to environmental stakeholders.

INTRODUCTION

The designation of Bridal Creeper as a Weed of National Significance (W.O.N.S.) is a sufficient description of its character and habit with respect to its status in the Southwest of Western Australia. The experience of community groups canvassed in this review confirmed the capacity of the creeper to spread and be spread widely and relatively quickly into a diverse range of ecological communities and across the wide range of climatic zones that define the southwest of the state.

Bridal creeper can now be found on rocky, windswept coastal heathlands, in plantations, forests, areas along rivers and creeks, along inland road verges and throughout disturbed remnant bushland reserves. It is important for communities to understand that not only do introduced plant species such as Bridal Creeper, threaten to degrade natural environmental values their proliferation can also be a symptom of degradation, rather than the cause of degradation, in which case weed removal alone is highly unlikely to restore the ecosystem.¹

By the time the significance of an aggressive weed species comes to public attention, it has often reached a critical point in its distribution, a point of no return or at least an expensive return. What might have been dealt with quickly and cheaply may soon become a rear-guard action.

Concerned community members seek funding to achieve complete eradication and although this remains an aspiration, the key word becomes 'control'. With that thought in mind, our approach to reviewing efforts to control Bridal Creeper was to interview key project players to determine what they felt were the strengths and weaknesses with respect to their projects and to make some evaluation of future opportunities and threats. This information would then provide the basis to attempt to answer the questions; is the battle to eradicate Bridal Creeper being won? If so where and how and if not, where and why not?

The interviews and gathered information outlined in the review revealed several common experiences amongst natural resource management groups, but also identified differences. Thus, the answers to the above questions are not so simple.

¹ Adele M. Reid, Louise Morin, Paul O. Downey, Kristine French, John G. Virtue (2009) Does invasive plant management aid the restoration of natural ecosystems? Biol. Conserv. (2009), doi:10.1016/j.biocon.2009.05.011



This report is not a rigorous analysis of cause and effect, but rather taps into the operational realities of on-ground inputs, outputs and outcomes. It considers the experiences of project advocates and protagonists engaged in tackling environmental weeds including Bridal Creeper. The authors have concluded from the findings, that efforts to reduce or eradicate Bridal Creeper, or any other weed for that matter, depend as much on community cultural values as upon practical on-ground techniques. The discussions with project proponents endeavoured to consider cultural, social and managerial aspects governing the success or failure of Bridal Creeper control projects as well as technical aspects.

The key regional stakeholder groups

There are many groups involved in the management of environmental weeds including: Regional NRM Groups, Shires, local NRM groups, DBCA, landholders, contractors, volunteer groups and schools. In addition, the activities of utility agencies (Main Roads, Western Power, Westrail, Water Corporation etc), universities and businesses, all have a bearing on the success of weed management efforts and need to be engaged to varying degrees. However, the approach to these case studies was to contact and interview respondents directly involved at the on-ground project implementation level. The primary division of focus for much of the Bridal Creeper work is two-fold; road verges and reserves.



Figure 1: Bridal Creeper infested reserve in the wheatbelt.

Review Method

Collating information for this review involved gathering information about the extent of Bridal Creeper, control methodologies and success rates from NRM practitioners across the south west of the State. A range of CEOs, project managers, Landcare officers, volunteers, landowners and specialist contractors were contacted and interviewed and many also took us around for a site visit or directed us to sites of interest.

The following approach was adopted for the review;

- NRM organisations and community weed action groups were contacted and asked if they would be willing to share information about their Bridal Creeper projects, if any, and what they had learnt.
- An interview with a key player in the various areas was arranged, either face to face or via phone.
- Where possible control sites were visited to see the situation first hand and to record general observations.



Notes were taken during each interview and respondents were asked to share their experiences and whether they could provide project data, GIS files, site locations, images etc, that might help elaborate on the effectiveness of control projects.

Besides the interviews, an email was sent out to various project managers and Landcare officers, however with only a limited response. To be fair, this was mid-year at the busy time of project reporting and writing applications for the next funding round. Visits and interviews were conducted between 3rd and 30th August 2018.

The types of questions posed to the various respondents were:

- What Bridal Creeper control work has taken place in your region in the last decade?
- What were the priority weeds for the area?
- Who is doing what, where and how?
- What control methods were or are being used?
- Was there any follow up work done?
- What were the successes and failures?
- What were the strengths and weaknesses of the project work?
- What opportunities and threats maybe relevant to future directions?

The following issues were also discussed;

- Levels of community, agency and local government involvement and support.
- The role of contractors.
- The status of volunteer support.
- Community attitude

Sites where Bridal Creeper is or had been a problem and where works had been carried out were visited.

A basic literature review (not exhaustive) of research work was also undertaken to determine current understanding of Bridal Creeper characteristics and habit.

The above information was collated into a series of case studies (a separate document) and these formed the basis for this synopsis of the status of Bridal Creeper and its control around the Southwest.



Respondents

NRM group	Location visited	Respondents role	Site visits undertaken
Various: Katanning, Wagin, Dumbleyung, Kent	Email questionnaire	Spray contractor	No
Peel-Harvey Catchment Group	Boddington	Volunteer champion	Yes
North Stirling Pallinup Natural Resource	Borden	NRMO	No
Fitzgerald Biosphere Group	Bremer Bay	Local volunteer leader (Bremer Bay)	Yes
Denmark Weed Action Group	Denmark	Team Leader	Yes
DBS - Donnybrook - Balingup Shire	Donnybrook	Environmental Officer	No
Dumbleyung Landcare	Dumbleyung	NRMO/Local volunteer champion	Yes
Katanning Landcare Zone	Katanning	Program Coordinator	Yes
Oyster Harbour Catchment Group	Kendenup	Team Leader	Yes
Shire of Kojonup Landcare	Kojonup	NRMO	Yes
Warren Catchment Council.	Manjimup	Project Officer	Yes
Nature Conservation Margaret River	Margaret River	Project Officers	Yes
Shire of Kent	Nyabing	NRMO	Yes
Wagin Woodanilling Landcare Zone	Wagin		
Waroona Landcare Centre	Waroona	NRM Support Officer	No
South West Catchment Council	Williams	Volunteer champion/past project officer	Yes



BRIDAL CREEPER (*ASPARAGUS ASPARAGOIDES*)

Bridal Creeper is a perennial climber with annually renewed spineless stems sprawling aggressively for several metres and climbing quite high into trees. It forms a thick mat of underground tubers which impedes the root growth of other plants and often prevents seedling establishment. It invades undisturbed habitats and is a major threat to most low shrubs and groundcover plants in mallee, dry sclerophyll forest and heath vegetation. In southwestern Western Australia Bridal Creeper is considered the most important weed threat to biodiversity.²

It is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts. For this reason, it has been declared a Weed of National Significance (WoNS).

Growth pattern

Seeds germinate in autumn and winter in leaf litter and at soil depths of up to 100 mm. Buried seed



that does not germinate rots within two years, while seeds on the soil surface may be viable for at least three years. Shoots of bridal creeper typically emerge from the soil in autumn, but earlier emergence can occur in years of high summer rainfall. Bridal creeper plants take at least three years to reach flowering size, the flowers appearing along the length of the shoots in August and September. The green berries turn red in late spring to early summer. The amount of fruit set is significantly greater where shoots can grow vertically by climbing up shrubs and trees, and less where the plants are heavily shaded,³

Method of spread

Bridal creeper plants can produce more than 1000 berries per square metre. Birds feed on the berries and later excrete the seeds at perch sites, usually within 100 m of source plants. However, seed dispersed by birds has helped spread the weed along roadsides and into native vegetation patches further afield. Rabbits, foxes and emus also eat fruit and disperse seeds. The plant can spread as the root system slowly expands in area. Movement of soil containing roots (e.g. by grading) can spread plants further. Dumping of garden rubbish containing bridal creeper seeds or roots also spreads the weed.⁴

Diffusion of *A. asparagoides* in south-western Australia mostly involves the Silvereye, *Zosterops lateralis*. Over 60% of weed distribution records with the greatest density were less than 50 m from source infestations. Gut passage rates of Silvereyes and estimates of its flight speed showed that the maximum potential dispersal distance was approximately 12 km.⁵

² WoNS Weed Management Guide Bridal creeper (*Asparagus asparagoides*). Leaflet produced by CRC for Australian Weed Management and the Commonwealth Department of the Environment and Heritage

³ WoNS Weed Management Guide Bridal creeper (*Asparagus asparagoides*). Leaflet produced by CRC for Australian Weed Management and the Commonwealth Department of the Environment and Heritage

⁴ WoNS Weed Management Guide Bridal creeper (*Asparagus asparagoides*). Leaflet produced by CRC for Australian Weed Management and the Commonwealth Department of the Environment and Heritage

⁵ C. D. Stansbury 'Dispersal of the environmental weed Bridal Creeper, *Asparagus asparagoides*, by Silvereyes, *Zosterops lateralis*, in south-western Australia' CRC for Weed Management Systems, Department of Geography, University of Western Australia, Crawley, WA 6907, Australia.



BRIDAL CREEPER EXTENT IN WA

A range of datasets were obtained from the groups contacted and collated into QGIS to examine the extent of Bridal Creeper in the southwest of Western Australia. The data collated has limitations in that not all groups could be contacted and not all groups had data in an accessible form.

Florabase records

The Western Australian Herbarium maintains a database of all plant specimens collected and provide a map of the locations for these specimens. Since most flora collectors avoid collecting weeds, this database gives a good idea of its range but is limited in detail.

Asparagus asparagoides

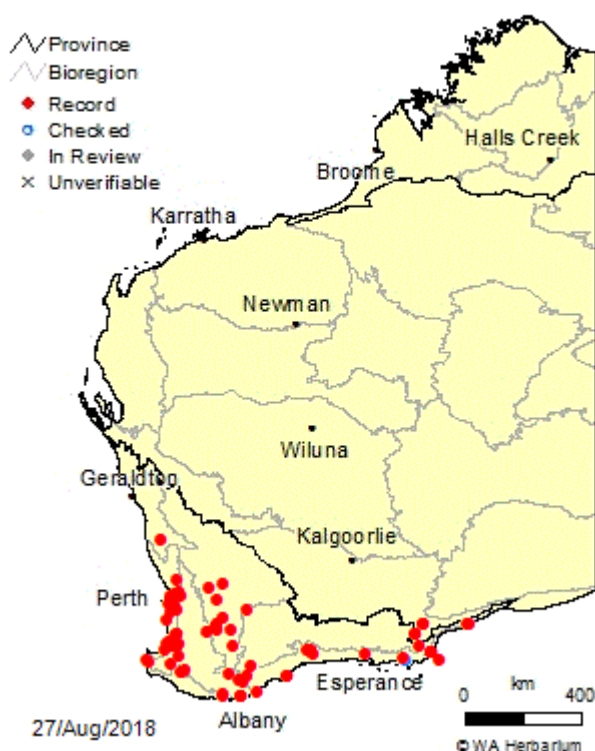


Figure 2: Florabase mapped distribution of Bridal Creeper.⁶

Florabase records show the distribution of Bridal Creeper over the following Local Government Areas (LGAs): Albany, Augusta-Margaret River, Beverley, Bunbury, Capel, Cockburn, Collie, Coorow, Corrigin, Cottesloe, Cranbrook, Cuballing, Dardanup, Denmark, Donnybrook-Balingup, Dumbleyung, Dundas, Esperance, Gingin, Gnowangerup, Harvey, Jerramungup, Mandurah, Manjimup, Melville, Nannup, Narrogin, Nedlands, Northam, Pingelly, Plantagenet, Ravensthorpe, Rockingham, Serpentine-Jarrahdale, Swan, Tammin, Wanneroo, Wickepin, Williams.

Roadside Conservation surveys in WA

The Roadside Conservation Committee, is a branch of Department of Biodiversity, Conservation and Attractions. In partnership with local volunteers, Landcare community groups and local government, they have been coordinating roadside surveys for more than 20 years. Their aim is to survey and map all roadsides throughout every shire in the south-west land division of Western Australia.

There were 57 shire regions in the southwest of WA that had Roadside Conservation Survey reports done and these were accessible on their websites⁷. For each shire, weeds of concern were nominated for mapping along with the biodiversity values of their roads. Bridal Creeper was nominated as a weed for mapping in 26 shires. Hence this dataset is also not complete as Bridal Creeper occurs in other shires even though it is not a weed of concern for them. Further, not all shires have been surveyed.

⁶ <https://florabase.dpaw.wa.gov.au/browse/profile/8779>. Accessed September 2018

⁷ <https://www.dpaw.wa.gov.au/management/off-reserve-conservation/roadside-conservation/132-roadside-conservation-value-mapping-program?showall=&start=2>. Accessed September 2018



The percentage of roads assessed with Bridal Creeper present are tabled below. Note: some of the surveys were conducted many years ago and the levels of infestation may have changed over the years.

Table 1: The percentage of roads assessed in the roadside conservation survey with Bridal Creeper.

Shire/City	Percentage	Year survey conducted
Tambellup	35.80%	2005
Boyup Brook	16.81%	2013
Katanning	13.00%	2008
Bridgetown Greenbushes	12.71%	2004
Narrogin	7.79%	2009
Cranbrook	6.61%	2015
Nannup	6.61%	2005
Mundaring	6.49%	2008
Williams	6.38%	2014
Esperance	5.65%	2002
Donnybrook Balingup	4.63%	2008
Kojonup	4.38%	2003
Augusta Margaret River	3.96%	2003
Capel	3.45%	2011
Wagin	3.28%	2005
Kalamunda	3.07%	2015
Dandaragan	2.94%	2009
Dumbleyung	1.78%	2005
Murray	1.32%	2003
Woodanilling	1.22%	2013
Kent	1.18%	2006
Manjimup	1.02%	2005
Beverley	0.92%	2005
Merredin	0.07%	2011
Moora	0.02%	2014
Kellerberrin	0.00%	2009



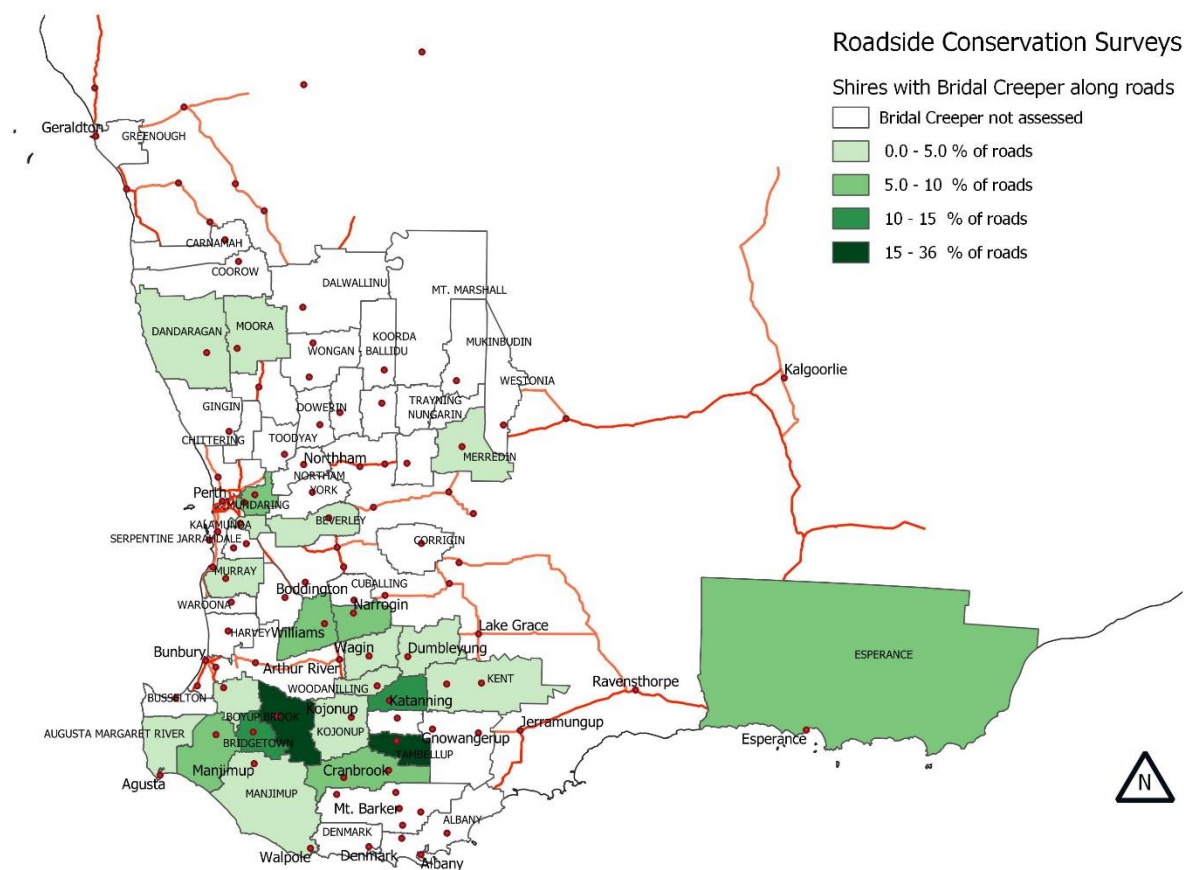


Figure 3: Percentage of roads assessed with Bridal Creeper in shires where it was mapped as part of the Roadside Conservation Surveys. Note: some of the surveys were conducted many years ago and the levels of infestation may have changed over the years.

Bridal Creeper locations from NRM group data sets and other opportunistic data.

Some of the Landcare groups and individuals were able to provide data sets in either spreadsheet form or GIS shapefiles of locations where they have either surveyed for Bridal Creeper or done control work for Bridal Creeper. Most of this data has come from the Katanning Landcare Roadside Bridal Creeper control program, Roadside Conservation surveys (not a complete data set) and Oyster Harbour Catchment Group control programs. Further as we travelled the various roads to visit various Landcare groups, Bridal Creeper observations were recorded with a GPS.

The general observation is that Bridal Creeper is widespread throughout the southwest of Western Australia, but dense infestations are only in limited areas. Infestations are most visible along roadsides however, some of the densest infestation have been observed in reserves. Bridal Creeper is eaten by sheep and cattle who control it in paddocks however moderately dense infestations have also been seen in tree plantations.

Data set limitations

There are reports detailing the presence of Bridal Creeper in areas along the Avon River in the Shire of Northam. Although respondents from east of Bremer Bay were not interviewed, a comment from a biologist in Ravensthorpe was that “Bridal creeper and other weeds are in every reserve and along the Phillips River.”

Comment from Stokes Inlet Foreshore Vegetation Survey 2009 Report “Although annual grasses were observed more frequently, Bridal Creeper was the dominant weed in size and area occupied. Where



Bridal Creeper occurred in the open, it frequently was stunted with yellowing leaves indicating a good rust infection. However, where it was densely shaded, it was healthier.”

The Esperance Coastal Reserves Management Plan – Issues paper 30/03/07 indicated that on a local scale, weeds impacting the most within the planning area are African boxthorn (*Lycium ferocissimum*), Victorian tea tree (*Leptospermum laevigatum*), Bridal Creeper (*Asparagus asparagoides*) and Freesia spp. Bridal Creeper is the most widespread of the weeds within the planning area, found from Lake Shaster Nature Reserve to Nuytsland Nature Reserve.

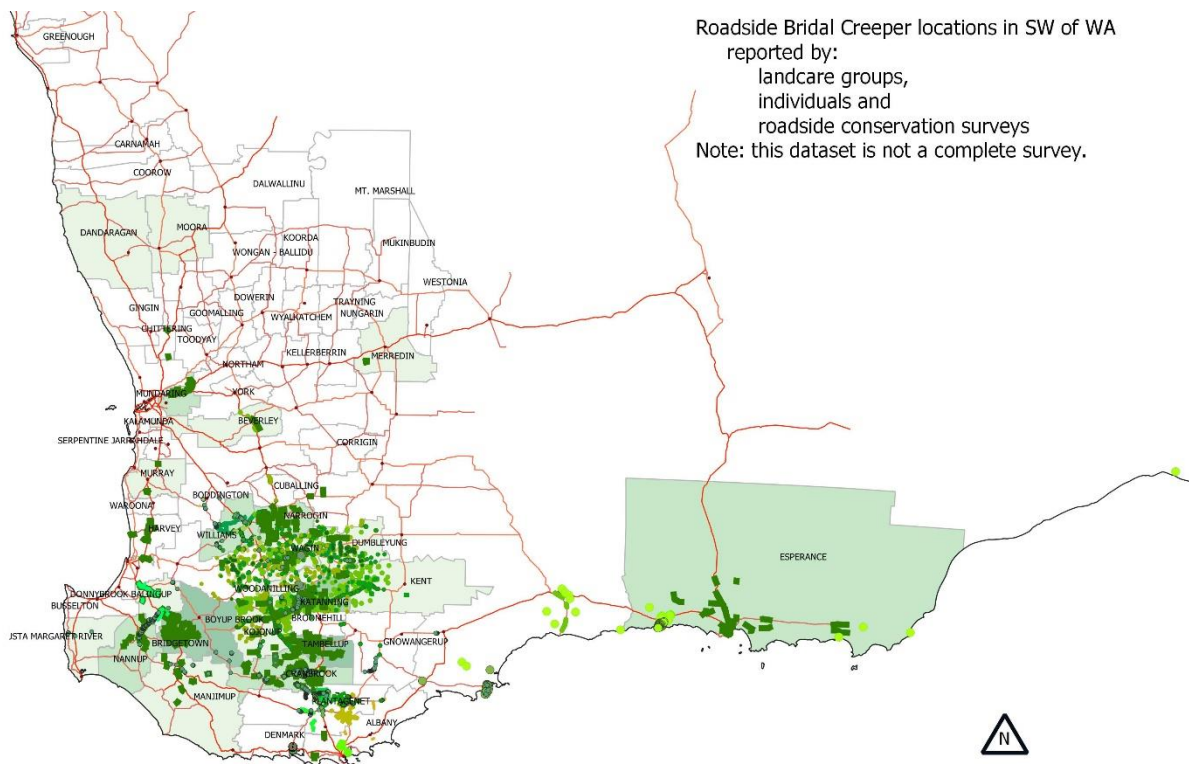


Figure 4: Locations of Bridal Creeper or Bridal Creeper control work in the southwest of Western Australia. Note that this does not reflect all the locations of Bridal Creeper infestation in the southwest.

CONTROL METHODOLOGIES

The following control methods, have been employed;

- Biological Control:
 - Rust application
 - Leaf hopper spread
- Herbicides
- Hand weeding

Biological Control Bridal Creeper Rust

In this document, Bridal Creeper Rust (*Puccinia myrsiphylli*) is referred to simply as rust.

The initial distribution of rust around the southwest of Western Australia was between 1999 and 2004. Many NRM groups and volunteers were involved in this distribution. See Figure 5.

One of the main goals of the biological control program against Bridal Creeper was to reduce populations below the ecological threshold at which infestations of the weed threaten native biodiversity. To achieve this goal, biological control agents for Bridal Creeper must exert a significant impact on the weed's root system. This is because Bridal Creeper's extensive system of below-ground



rhizomes and tubers can comprise more than 90% of total plant biomass. The root system therefore represents a particularly efficient means of buffering plants from above-ground disturbance, including the action of natural enemies.⁸

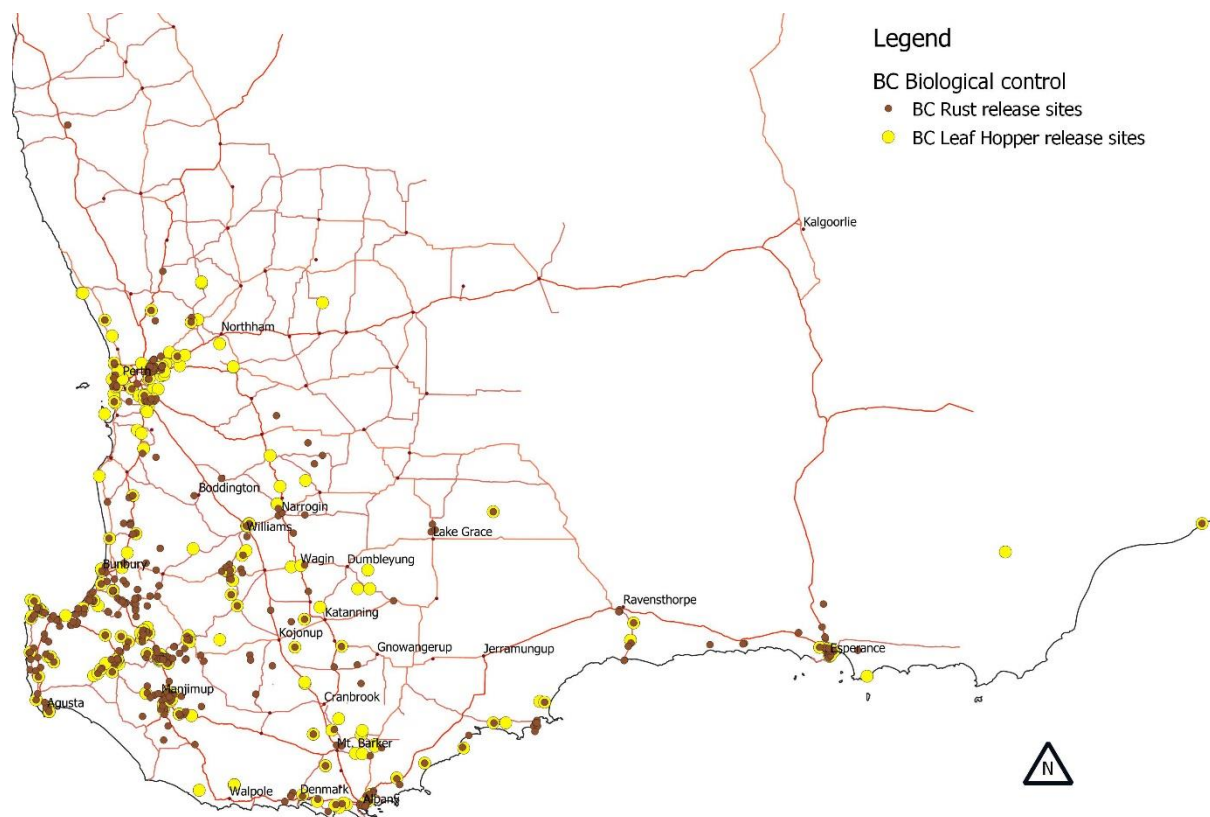


Figure 5: Locations of the initial sites for distribution of Bridal Creeper rust (brown dots) and Leafhopper (yellow dots).

Literature suggests that spores of the Bridal Creeper rust fungus (*Puccinia myrsiphylli*) can produce many generations a year, resulting in large amounts of wind dispersed spores. It also produces a spore that can survive in the leaf litter during the summer and in the absence of Bridal Creeper.⁹ This is important to understand as some surveyed respondents felt you had to leave some plants with rust to reinfest Bridal Creeper the following year.

Rust (*Puccinia myrsiphylli*) requires at least eight hours of leaf wetness to infect Bridal Creeper. Infection is optimal between 16 and 20°C, but completely inhibited at 25°C.¹⁰ Climate is undergoing significant change across the south west region. Winter rainfalls have reduced by approximately 17% since the 1960s. Additionally, since the 1990's sporadic rainfall has caused extensive drying of the region, particularly in autumn and early winter. It is projected with moderate to high confidence that annual rainfall will continue to decline, and that the intensity of the rainfall will increase¹¹. This has serious impacts on the efficiency of rust infections with rust often not taking hold sufficiently till after flowering and seed set has occurred.

⁸ Louise Morin, Anthony J. Willis, Joel Armstrong and Darren Kriticos (2012) Spread, epidemic development and impact of the Bridal Creeper rust in Australia: summary of results in Thirteenth Australian Weeds Conference

⁹ CRC for Australian Weed Management (2003) "WONS Weed Management Guide: Bridal Creeper *Asparagus asparagoides*." CRC for Australian Weed Management and the Commonwealth Department of the Environment and Heritage

¹⁰ Louise Morin, Anthony J. Willis, Joel Armstrong and Darren Kriticos (2012) Spread, epidemic development and impact of the Bridal Creeper rust in Australia: summary of results in Thirteenth Australian Weeds Conference

¹¹ (<http://www.climatechangeinaustralia.gov.au/>), cited 2018]





Figure 6: Bridal Creeper Rust infection showing yellow outer ring and brown spores forming in the centre. Insert: close up of underneath side of infected leaf.

The introduction of Bridal Creeper rust raised hopes that a self-sustaining biological control would obviate the need for costly control programs. NRM groups have not been in a position to establish the impacts in a rigorous scientific manner, although there are research findings to draw on from elsewhere. Respondents were asked to comment on the perceived effectiveness of the rust. The prevailing view is that there seemed to be an initial favourable response, but in most inland areas, this is more variable depending on the season.

Comments from surveyed respondents:

Successful control - South Coast

- In 2000, Bridal Creeper rust fungus was released at several sites and has provided significant biological control for Bridal Creeper for the following 10 years with major Bridal Creeper weed infestations being reduced in vigour and extent throughout the Shire.
- Coastal: One respondent remembers that prior to spreading the rust there were 'huge mounds' of Bridal Creeper. She felt the rust had made a significant impact and this success was due to thoroughly applying the full method of transferring and infecting new plants. She stressed the importance of wrapping the plant stem in a plastic bag for a time to ensure a moist environment for good infection to occur.
- Whilst Bridal Creeper was significantly reduced in areas where rust was originally introduced, regeneration of local flora has been very slow. The main cause can be attributed to the thick mat of fibrous, tuberous roots that remains in the ground for a long period after the creeper has died. This mat forms a natural barrier which newly germinated seed finds difficult to penetrate. The introduction of rust fungi has proven to be an effective control for the spread of Bridal Creeper. Whilst not completely eradicating the plant, it significantly damages and inhibits new growth and therefore its further spread. To date, although large areas of contamination have been identified and dealt with, still much larger areas remain undetected.



- One respondent indicated that the site had one of the heaviest infestations of Bridal Creeper and that the rust significantly reduced its vigour. She said that the rust was only introduced once but is now well established in the locality.

Successful control - Coastal high rainfall:

- One respondent commented that: The plant seems to be ubiquitous in the lower moister parts of the landscape. However, overall, the riverine environment doesn't seem to be really bad now since the introduction of rust. Both respondents felt that the rust introduced prior to 2003 was holding the creeper back such that it was not a major issue in the area. They commented that the plants always look lush early in the season, February/March which seems to indicate that there are a lot of resources in the tubers. Rust seemed to slow the plant once it takes hold and reduced fruiting, but not growth over the season. There had been a concerted effort distributing rust through the community and schools.

Successful control - Inland:

- One local farmer feels she has experienced good success over six years with continuous spreading. She felt you needed to continuously spread the rust for it to have significant impact.
- The rust has survived naturally and spread to areas where it was not released. In most cases the rust has largely reduced the spread, vigour and impact Bridal creeper has had on the local environment whilst not eradicating the weed.

Unsuccessful control - South Coastal

- In 2009 a respondent encountered many healthy and vigorous infestations which had gone to seed within Foreshore Reserves and other Reserves. (i.e. the rust was not preventing seed development.)

Unsuccessful control - Inland:

- One respondent did not feel it had made much of an impact.
- He felt the rust doesn't seem to be working well despite being spread recently.
- Bridal Creeper does have rust, but it usually comes a bit late in the season so flowering and seed set still occurs.
- Rust was distributed by several keen people in the early 2000's, but the respondent did not feel it had been effective.

Uncertain

- Bridal creeper appeared to be seriously affected by the rust and in poor health however, in many cases it still managed to produce fruit and set seed.
- Rust has been spread however it does not take hold till later in the season and Bridal Creeper is not being held back, generally it is still seeding. The respondent has experimented with freezing rust water and using it the following year with good success.

Misconceptions

- It is noted that a low-level presence of Bridal Creeper is required in an area to sustain the bio-control rust as a source for annual reinfestation of seedlings.
- One respondent indicated that they would leave one or two, rust infected plants so that there would be rust there to infect the regrowth the following season.
- (*Authors note: rust spores remain in the leaf litter and reinfect emerging plants. It is not necessary to leave any plants untreated*).



Leafhopper - (*Zygina* sp.)

Leafhopper was released at the same time as Bridal Creeper Rust with some schools being involved in a breeding program. Figure 5 shows the distribution sites for Leafhopper. The leafhopper is a sap sucking insect that leaves a white patch on the leaf where it has been feeding. The insect goes through five instars (life stages of similar appearance but each one progressively larger)



Figure 7: Adult Leafhopper and the nymph instars (images from WONS Weed Management Guide: Bridal Creeper ¹²)

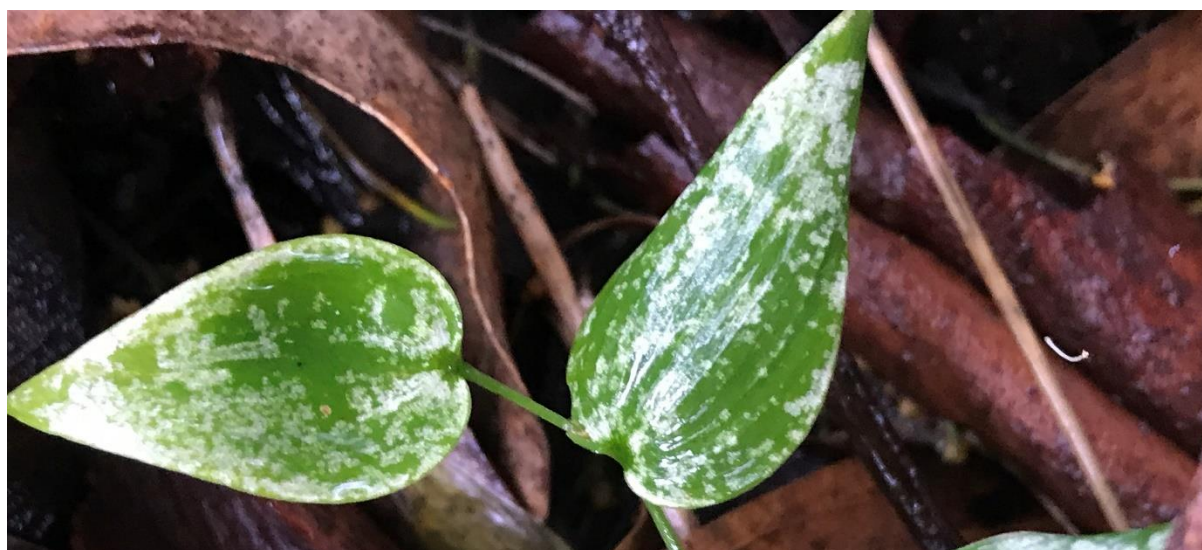


Figure 8: Leafhopper damage on Bridal Creeper.

Leafhoppers feed and lay eggs on the underside of bridal creeper leaves and the nymphs tend to remain on the same leaf. Adults live for 6 to 8 weeks and the females lay an average of 180 eggs in their lifetime. Eggs are laid just under the surface of mature leaves and hatch after 2 weeks. The nymphs require another 2 weeks to reach adulthood. This short life cycle enables the bridal creeper leafhopper to have several generations per year. They breed more quickly at higher temperatures. In areas where bridal creeper grows all year round, either in summer rainfall areas or near watercourses, the leafhopper will remain on the host and continue to breed.¹³

Some Leafhopper damage was observed in Margaret River, Bremer Bay, Williams.

Comments from surveyed respondents:

- Leafhopper were released at the same time as the Bridal Creeper rust. The respondent felt that they did not do so well. (Authors comment: Minor Leaf hopper damage was observed

¹²CRC for Australian Weed Management (2003) "WONS Weed Management Guide: Bridal Creeper *Asparagus asparagoides*." CRC for Australian Weed Management and the Commonwealth Department of the Environment and Heritage

¹³ <http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/weeds/state-prohibited-weeds/biological-control-of-bridal-creeper-with-the-bridal-creeper-leafhopper>.



during the visit and the respondent was shown what it looked like as she had not been aware of that previously.)

- Leafhopper not had any impact on Bridal Creeper. In our area it has been extremely hard to find any Leafhoppers or seen damage on Bridal creeper vegetation. It was used to great effect in generating interest for a bio control project especially by involving schools and groups to help with the rearing of the Leafhoppers.

Chemical control

It can be quite confusing for an on-ground manager of Bridal Creeper to know what chemical control method to use. A website search can come up with a range of recommendations.

Research has been conducted by John Moore, Senior Researched Officer with the Department of Agriculture and Food WA on the chemical options for control of Bridal Creeper, especially in native bush areas. A critical issue with control of Bridal Creeper along road verges and in reserves with native vegetation is to avoid off target damage and to maintain the native biodiversity. Up to date chemical control options can be found on the Department of Primary Industries and Regional Development (Agriculture and Food) website, (Figure 10).

Very low rates of metsulfuron

Research by John Moore and others has shown that very low rates of metsulfuron (0.02g/10L) can provide good suppression when applied with a mister or hand spray in winter with little damage to native bush. No effect of the spray is seen until the following season when only a few stems emerge.¹⁴ The time of application is mid-June to late August when it is starting to flower and follow up treatment is required for a couple of seasons.



A further study was conducted by Oyster Harbour Catchment Group to determine if there had been any off-target damage along several roads and reserves between the Porongurup and Stirling Ranges¹⁵. This study found that there were many causes for decline in roadside vegetation besides Bridal Creeper and herbicide off-target damage. These can be: intense fire, insect attack, paddock overspray, roadside grading damage, smothered by grass weeds, windblown sediments and nutrients, rabbits and salinity. The study found that the level of plant death or decline at the spray location was no different than at locations which had not received spray.

Figure 9: Banksia mucronulata being smothered by Bridal Creeper is tolerant of low rates of metsulfuron.

¹⁴ John Moore and Judy wheeler, "Southern Weeds and their control." DAFWA Bulletin 4744

¹⁵ State NRM project A14187. Janicke 2018 "Changes in Vegetation Health and Bridal Creeper Infestations". Report to State NRM through Oyster Harbour Catchment Group, September 2018.



Herbicide: Metsulfuron (Group B) (various trade names: see APVMA link)	
Active ingredient	600g/kg metsulfuron methyl
Rate of product/10L	0.5g registered 0.02g recommended for bushland treatment as this causes minimal damage to other vegetation
Time of application	Mid–June to late August. Follow up treatment required for a couple of seasons.
Wetting agent	Pulse at 2mL/L
Remarks	- The low rate can be applied by mister or by hand held spray equipment - Multiple stems or greater than 25cm diameter, 2mL/cut at same spacing - Biological control using the rust <i>Puccinia myrsiphylli</i> is very effective in the higher rainfall areas - A closely related species, bridal veil is not as susceptible to the herbicide or biological control and is taking the place of bridal creeper. The higher rate will control this species but will do considerable damage to other vegetation.

Herbicide: Glyphosate (Group M) (various trade names: see APVMA link)	
Active ingredient	Glyphosate 360g/L
Rate of product	1:2 parts with water. Apply directly to plant using a sponge glove. While this is very selective method it is very slow to apply and is very slow to act in the plant. Retreatment will be necessary.

Figure 10: Bridal Creeper chemical control options recommended in the DPIRD (Agriculture & Food) website Note: When using any agricultural chemicals please ensure that you always follow instructions on the label and any permit. ¹⁶

Comments from surveyed respondents:

It was noted that some respondents had difficulty giving definite answers regarding what herbicides were used, what rates were used and where they had been applied.

- There was Bridal Creeper coming up in places that I thought was due to the spray not reaching behind trees, large shrubs or logs. It would seem that the spraying was only 90% effective due to incomplete coverage. Bridal Creeper has the potential to become dominant again due to the patches that were missed.
- A respondent pointed out that some people want to see the Bridal creeper 'look' obliterated after spraying and when it is not, they think it has not been sprayed.
- A previous trial in 1997 showed disappointing results. Glyphosate was wiped directly onto the leaves just as the plants were coming into flower.

¹⁶ <https://www.agric.wa.gov.au/herbicides/bridal-creeper-control> Accessed September 2018



- The use of herbicides in some situations is fraught with problems; the Bridal Creeper is so intimately entwined with its native hosts that it is nearly impossible to avoid damaging the very plants we are trying to protect. (*Authors comment: see above regarding the use of very low rates of metsulfuron*).
- Low rates of metsulfuron had been trialled and the respondent felt the results had been good. The native plants were not damaged.
- The resilient nature of Bridal Creeper means that it takes at least seven years to kill a single plant.
- There is a need to continue the control program to ensure widespread eradication otherwise the efforts are wasted

Hand weeding

Bridal Creeper forms dense mats of rhizomatous roots and tubers that forms a large biomass. Removal of all rhizomatous roots is required as Bridal Creeper plants can readily re-shoot from rhizomes. Some other Asparagus weeds from a crown that is the central growing point for stems and their removal by hand is easier (*A. aethiopicus*, *A. africanus*, *A. scandens* and *A. plumosus*).



Physical removal is not effective unless all the rhizomes are dug up and destroyed. This may be possible for new, small infestations or as a follow-up after several years of herbicide control of a larger infestation. Slashing the stems and leaves may prevent fruit production and slowly deplete root reserves but it will not eradicate an infestation.¹⁷

Disturbance of the soil while removing all the rhizomes has the potential of opening the soil up for germination of other weed seeds.

Figure 11: Tubers and rhizomes of Bridal Creeper

Comments from surveyed respondents:

- With hand weeding, not all plants would be removed and with the ground opened up, seeds would germinate requiring that they would have to return in a year or two to weed again.
- Using the hand weeding philosophy, the area will require more time weeding than had previously been given it to provide some measure of 'control'.
- The reduced vigour of Bridal Creeper after hand weeding had allowed for the more vigorous growth of other weeds with Asparagus fern, (*Asparagus scandens*) taking its place. Since there were no biological controls for Asparagus fern, it had become a greater problem than Bridal Creeper.

Spray Contractors

Spraying for Bridal Creeper on road verges and in reserves requires various permits which some Shire workmen and private spray contractors have acquired. Many spray contractors have been working in this area for many years and have a lot of experience that NRM practitioners could learn from. However, spray contractors are usually not in a position to pick up on new research findings. They need to be informed of periodic updates on methods and subsequent expectations. Communication

¹⁷CRC for Australian Weed Management (2003) "WONS Weed Management Guide: Bridal Creeper *Asparagus asparagoides*." CRC for Australian Weed Management and the Commonwealth Department of the Environment and Heritage



between NRM practitioners and spray contractors is important for project objectives to be accomplished. NRM practitioners also need to inform themselves of periodic updates on methods.

There was some dissatisfaction with spray contractors from NRM practitioners and the community with what has been achieved, however not all survey respondents were dissatisfied with contract spray work.

Learnings

- An important point to note in the use of low rates of metsulfuron is that no effect of the spray is seen until the following season when only a few stems emerge.¹⁸ Some dissatisfaction may be a perceived inaction due to no visible impact in the first year.
- Assessment of the spray work is not systematic by casual observers and is often site specific and could be biased due to their expectation.
- Project leaders may not fully appreciate the constraints that contractors operate under.
- It is suggested that contractors cannot be expected to have extra arbitrary tasks added to their schedule brief. They must stay within budget and therefore require clear and predictable criteria for the job they have been asked to do. This may mean, the effectiveness of their work may be unfairly perceived as less than adequate by others.
- In addition, other factors inherent in the task of controlling Bridal Creeper will mean that outcomes are not simply and quickly achieved. These factors include daily weather conditions, seasonal variability and delayed response to treatment.

Comments from surveyed respondents:

- The group which one respondent represented, was also doing other projects besides the roadside spraying program and considered that the quality of work done by the spray contractor was pretty good. They commented that it takes time to deal with Bridal Creeper effectively and it is natural that some sites will be missed and not sprayed. Where you see these sites, you notice the big difference between the sprayed and unsprayed sites.
- Absolute and tight monitoring of the spraying method and technique is required to ensure the weed is expertly sprayed along the roadside as well as the road reserve, that is sometimes being up to 10m plus wide.
- I doubt if people spraying from vehicles are effective enough, even conscientious ones. It can be easily missed from a vehicle, leaving some unsprayed means more year's work, even someone walking will have trouble finding it all. But follow up on foot would help. (Volunteers?)
- To spray road reserves, you have to get out of a vehicle
- Strange weather patterns meant early and late flushes of growth that caused some frustrations with some partners and observers. As we are unable to go back and 'do it again', we do have some areas that had active growth at the end of the season. This led to some accusations of the contractor 'not doing his job', which was problematic for maintaining relations and clear communication through the program.
- The work of a key contractor for the roadsides program weed contractor is now spread over a large area (8 Shires). One respondent expressed a concern that if casual workers did not get adequate training and were too pushed for time to adequately spray all the Bridal Creeper along the designated roads, then the gains would be compromised.
- One respondent felt there was not enough quality control of the contractor work. They had not been informed about what chemical mix was being used or where they go. It was their understanding that a mix of Metsulphuron and roundup with wetter was used.

¹⁸ John Moore and Judy Wheeler, "Southern Weeds and their control." DAFWA Bulletin 4744



- The spraying seemed very hit and miss. It appeared that the contractor had not taken the spray to the farm boundary of the road reserve. As a consequence, larger plants were observed adjacent to the fence, but ironically, there was a total kill of both Bridal Creeper and native plants around the photo point monitoring stake.
- One respondent commented that with funding for the last 6 years, you would think there would be more control over Bridal Creeper along the road verges than there actually is.
- One respondent was unimpressed by the work being done by the contractor. He commented that you cannot reach the whole road verge from the ute window. He said farmers would be willing for them to drive the firebreaks in order to access the road verge along the fence line.
- One respondent indicated several concerns regarding the roadside Bridal Creeper project:
 - Getting a contractor who cares about the project. When the contractor just holds a spray out of the ute window while driving past it is not effective.
 - Inefficiencies are promoted when the motivation to get kilometres covered competes with getting proper coverage.
 - The timing of spraying and the GIS recording by contractors is good.
 - Contractors not communicating where they are going.
 - The Road verge project should have spread the task around several contractors.
 - They would have preferred their own spray contractor, who has ownership of the mission.
- One respondent had provided the mapping data to the spray contractor but felt this has been ignored. The spray contractor has been driving along roads where there was no Bridal Creeper and the respondent considered this was wasteful of the limited funding resources. They felt that it would have been better for the funding to go to the local shire works

A contractor's perspective

A key contractor gave the following response to related questions.

What do you think is the best method to tackle Bridal Creeper infestation in native bush areas? *Chemical has proven to be the best method of controlling BC, Rust has been trailed over many years with no a lot of success. Rust needs to be spread in areas that has high humidity to survive and is not ideally suited to our conditions.*

How many years of follow up do you think might be needed to eradicate it from an area (assuming an isolated area away from reinfestation by birds)? *Good question, we have had good results of control and in some cases eradication in isolated areas after approx. seven to eight years.*

What do you think is the best way strategy to deal with bridal creeper in road reserves, bush reserves and private property in a region? *Chemical is the only proven way of control, we have done a few reserves in the past for different organizations. Depending on the access to the property, we use pump up sprayers and quad bikes to access these areas. Its slow work but affective. We have also sprayed BC on private property, this is done with the consent of the property owner and the owner signing a Morgan Rural consent form explaining the Chemical we will be using and giving us permission to carry out the work on their property.*

Have you seen Bridal Creeper infestation increase or decrease in the region in the time you have been here? *I have noticed a decline in the BC infestations in the Dumbleyung, Kent, Woodanilling and Wagin areas. I have also notice that while we continued to spray these areas there is always small break outs.*

Do you think it can ever be brought fully under control? *Another good question – I believe we can. Using Wagin as an example we originally had a budgeted amount to control that town/shire, we use to get half way through the shire on that amount we now have reduced the allocated amount to be spent*



in Wagin and now we cover every road in Wagin and have the BC under control and noticing an eradication of BC in some areas.

Monitoring

All State funded projects require some level of monitoring of the effectiveness on the project aims. This survey found that most of the monitoring involved photo points and often the photographs were inadequate to indicate the success of anything other than the removal of bridal creeper in a very localised area. Photo Points are a simple and effective way of tracking changes in complex ecosystems, provided they are done systematically.

Research reported in the Biology Conservation Journal indicated:

*Lack of long-term funding, expertise or guidance on how to assess plant communities may explain why limited evaluation of the response of native plant communities following WoNS management was undertaken by land managers. Further, many land managers may not know how to interpret their data once collected and how to use it to inform adaptive management decisions or to demonstrate the outcomes of their management program.*¹⁹

Learnings

- Monitoring remains a weakness in the PLAN-ACT-REVIEW cycle that should govern the development of NRM projects.
- A strategic plan should incorporate a description of monitoring methods that are designed to remain meaningful well into the future.
- A plan for archiving the data should be independent of specific projects and any one project officer's personal ideas and preferences.
- A photograph is valuable environmental data.

Comments from surveyed respondents:

- After 5 years of effective spraying, results should show large areas free of the weed. Has random pre and post monitored sites been documented to prove success has been achieved?
- The signposted monitoring site showed good control of Bridal Creeper, however the reserve immediately behind the monitoring site had dense curtains of Bridal Creeper. It was observed that there seemed very little native understory species. If the Bridal Creeper within the reserve is not managed, it has the potential to make the roadside spraying here ineffective.

STRATEGIC ISSUES

A comment from the Proceedings in Nineteenth Australasian Weeds Conference is:

*Land management agencies are frequently caught between a rock and a hard place due to the increasing gap between the resources required to perform effective environmental management versus the resources actually available. An all-too-common situation is that environmental problems are identified, resources allocated, projects started, the problem is reduced to low levels, then resources are reallocated to other 'more needy' problems, leaving a residual of the original problem being left unaddressed. A few years later the environmental problem has resurfaced, often back to similar or higher levels than before.*²⁰

¹⁹ Adele M. Reid, Louise Morin, Paul O. Downey, Kristine French, John G. Virtue (2009) Does invasive plant management aid the restoration of natural ecosystems? Biol. Conserv. (2009), doi:10.1016/j.biocon.2009.05.011

²⁰ Jon Marsden-Smedley (2014) Adventure volunteering or volunteering for adventure: using volunteers for environmental management Proceedings in Nineteenth Australasian Weeds Conference



Native Plant restoration

The primary driver for managing a dominant environmental weed that has invaded a natural ecosystem is to reduce its impacts on native species and vegetation communities and to constrain its spread. While funding bodies request reports on the effectiveness of the management program in controlling the target weed, they have not generally required managers to report on biological responses of native species following weed management.²¹

All too often the outcomes of environmental weed management have been that the weed has been replaced with other weeds either due to off-target impacts of herbicide or the lack of natural recovery.²² In the agricultural regions of the southwest of Western Australia, controlled environmental weeds are often replaced by annual and perennial grasses which add to the fire risk. It becomes a challenging cycle of more spraying, more off-target damage and more weedy grasses.

If the goal is simply weed management, it is recommended that control sites be selected that are less degraded and have a higher likelihood of natural recovery. Recovery of native plant communities can be facilitated by planting in conjunction with weed removal.²³

Comments from surveyed respondents:

- One respondent felt grasses were replacing the Bridal Creeper however farmers did not seem to be concerned about grasses in the landscape.
- The farmers concerns are with Cape Tulip, Cotton Bush and Caltrop (agricultural weeds), not Bridal Creeper (an environmental weed).
- One respondent wanted to target the roadside reserves as they felt they are important habitat linkages
- The very low plant biodiversity and habitat diversity along the river raises the question, what would removal of the Bridal Creeper actually accomplish in an ecological sense?
- Although Bridal Creeper was evident in various places in the region, there were also dense patches of other weeds of concern. These other weeds also present a threat to the local biodiversity.

Road verges.

Road verges and linear corridors such rivers present a unique management challenge. They are usually narrow and with high boundary impacts with many stakeholders. How this land is valued depends on the perception of the stakeholder of the associated assets. Road managers view the road as the primary asset while NRM practitioners may view the native vegetation as the primary asset. Adjacent farmers may see the threats to their fences and the risk of fire.

The original “One Chain” width designated for roads by early planners did not recognise any value in the vegetated corridors. In the 1960s, the value of roadside vegetation was formally recognised by the state government and all new roads in the country are required to have road reserves of at least 40 metres, to fulfil dual roles of transport and conservation.²⁴

²¹ Adele M. Reid, Louise Morin, Paul O. Downey, Kristine French, John G. Virtue (2009) Does invasive plant management aid the restoration of natural ecosystems? *Biol. Conserv.* (2009), doi:10.1016/j.biocon.2009.05.011

²² Adele M. Reid, Louise Morin, Paul O. Downey, Kristine French, John G. Virtue (2009) Does invasive plant management aid the restoration of natural ecosystems? *Biol. Conserv.* (2009), doi:10.1016/j.biocon.2009.05.011

²³ Adele M. Reid, Louise Morin, Paul O. Downey, Kristine French, John G. Virtue (2009) Does invasive plant management aid the restoration of natural ecosystems? *Biol. Conserv.* (2009), doi:10.1016/j.biocon.2009.05.011

²⁴ <https://www.dpaw.wa.gov.au/management/off-reserve-conservation/roadside-conservation>



The Roadside Conservation mapping program²⁵, by definition promotes the view that roads verges are a distinct ecological component of the rural areas. That is, they have environmental value in their own right. Road verges also represent the most common public interface with the natural environment. The road network lends itself to a regional strategic approach to Bridal Creeper control. The fragmented and scattered nature of remnant bushland reserves on the other hand lends itself to targeted local efforts to control weeds. These however are usually out of sight and out of mind.

One of the justifications for prioritising road reserves across a broad front is that they are in effect the remaining expression of the natural ecosystem and provide connectivity. It raises the question, connecting to what and how?

The problem facing local communities is whether to tackle road infestations or to pick specific targets, road or otherwise.

Some ecological paradigms were mentioned during interviews, as a justification for the current methodology applying to road reserves. These were;

- The roadside reserves are important corridors for native wildlife and Bridal Creeper compromises this function.
- Road verges are a higher priority than remnant bush reserves.
- Controlling Bridal Creeper along road verges will control the spread the weed.

Learnings

- Project managers need to regularly review their environmental management paradigms to ensure they are realistic and well founded. This would include;
 - Keep abreast of the latest relevant ecological research and adjusting strategic and local management plans accordingly.
 - Continuing to define and refine what 'best management practices' for control of the weed are, recognising that if the original aims are not being achieved after a reasonable trial period then things need to be done differently.

Comments from surveyed respondents:

- One respondent felt that farm nutrients get blown onto road verges and this promotes weed growth, including Bridal Creeper.
- One respondent commented that roadsides are a contentious issue in the region. There are people who have had children in accidents on the roads and want to see all trees removed. In addition, farmers bear the brunt of fencing repairs when branches and trees fall over them. Drivers of bigger, taller trucks using the roads want the trees along the smaller roads cut right back so they can drive down freely without damaging their trucks. Older farmers in the region feel tourists are a problem, they are 'hardnosed' business men looking to use bigger machines and more chemicals on the farm and they are the mentors for the younger up and coming farmers.

Collaborative approach

Comments from surveyed respondents on weaknesses and failures

- Bridal Creeper can be sprayed along shire roads, but this is a waste when the Farmers DO NOT control it on private property.

²⁵ <https://www.dpaw.wa.gov.au/management/off-reserve-conservation/roadside-conservation/132-roadside-conservation-value-mapping-program>



- Shires do not control it in their vested Reserves and DPaW are now less likely to control it in all their Reserves. Unless there is a concentrated collaborated approach encouraging Farmers, Local & State Governments to carry out control at the optimum time then the roadside spraying as a single objective will be ineffective in controlling the spread of this weed.
- Without support from adjacent property owners, restoring the foreshore reserve could be a losing battle.
- Bridal creeper is not on the farmers' list of weeds of concern.
- The initial focus was to spray along the road verge. There were (and still are) many Blue Gum plantations in the area and Bridal Creeper had spread into these and around the older houses in the plantations. Although the group had been given access to the plantations and they had sprayed around the older houses and a portion of the plantation, the scale of infestation was such that they could not cover it all. The result was that the Bridal Creeper infestations within the plantations reinfested the road verges and Lee felt the project had been a waste of time.

Comments from surveyed respondents on opportunities

- The location was chosen because it is adjacent to a Bush Heritage block with high biodiversity values.
- Good collaboration between agencies and groups helps to be more strategic in their approach to controlling weeds since different agencies have different priorities.
- Improved monitoring and mapping and improved relationships between the various agencies and stakeholders has meant it is easier to develop a regional strategy.

Local Government and land tenure issues

Comments from surveyed respondents on shire strengths and opportunities:

- One respondent provided information, teaching tools and presentations to assist staff to identify Bridal Creeper, learn how it is spread and what can be done to limit this.
- The shire undertakes some spraying along main roads and around the towns and is vigilant to spot and deal with declared weeds.
- The feeling is that the Shire is becoming more environmentally aware and very supportive. However, it is dependent on who is CEO and who the councillors are.
- Grader drivers need to be trained in weed ID and how to record their locations with a GPS. They are out there on the roads and are in a good position to map weeds.

Comments from surveyed respondents on shire weaknesses

- The shire tends to monitor the town boundaries and occasional reserves, their focus is on parks and mowing and if they do spray, it is not sensitive to the native vegetation present.
- One respondent recognised that the shire is over tasked and under resourced and unable to regularly give training to new staff. The maintenance workers who are sent out on a job have not been trained in knowing what is native and of value. However, If Bridal Creeper is not in their schedule, then it is not 'in their face' and it is not considered.
- It seems that with local government, in-kind support being is being reduced due to inadequate shire funds and competing priorities. The goal of local government ownership of a control program is unlikely. Without local government and local community taking ownership of managing Bridal Creeper in their area, the gains made will be lost.
- The shire is very small with too few staff and who, in the respondents view, are underpaid and overworked.
- Grading of unsealed roads and gravel cartage for repairs were identified as two of the main reasons Bridal Creeper was being spread in the area.



- The reserves in the shire are vested variously through DBCA and the Shire. However, DBCA and the shire do not have the funding or staff to adequately monitor and spray out Bridal Creeper to eradicate it from their reserves.
- The volunteers had a perception that the Shire and/or DBCA were responsible for the reserve and it should not be left up to volunteers to deal with the problem.
- Shires do not control Bridal Creeper in their Reserves and DPaW are now less likely to control it in all their Reserves.
- Training in weed identification for the on-ground shire road staff is necessary as many do not know what is a weed, and what is not. The parks and gardens staff do not communicate with the road staff.
- The graders are also responsible for spreading some weed seeds and tubers down the road.
- The shire road spraying program mostly uses roundup with large machinery, blanket spraying a 5 m wide strip beside the road. This then opens the road verge for other weeds (annuals which become a greater fire hazard), kill the native species and promotes Glyphosate resistance.

Comments from surveyed respondents on land tenure and legalities

- Interested people should be encouraged to take action rather than being told that it is illegal to spray roadsides, especially along other people's property.
- There are infestations along waterways, and in private land, shire reserves and other bush reserves which are receiving no attention, it is very important to develop a plan of action for these.
- Formal permission is needed to work on road Reserves (the spray contractors have these permits) and most of the reserves are vested in the shire.
- Railways lines are not within the shire's vesting and they cannot manage these reserves.
- Government doesn't encourage landholders to deal with weeds along their road verges.
- Gazetted un-used roads are still technically shire land and landholders adjacent to them are technically not allowed to spray weeds there.
- Getting access to people's property and across land tenure is important as the weeds do not acknowledge boundaries.
- Access was an issue for the waterways as they are on private property, although the river had some riparian reserve. The respondent observed that since the floods last year (2017), Bridal Creeper has come back stronger.

Following a Strategic approach

Comments from surveyed respondents

- The current philosophy is to defend Ramsar, TECs and other rare plant communities from weed invasion, however they felt that there were other healthy areas of native vegetation which were not badly infested that should also be targeted.
- The Weed Management Strategy resulted in prioritising some areas and reserves and required them to ignore other areas.

Communications

A few respondents implied that consistent meetings between key stakeholders were all too often dropped from the 'need to do' list, after the initial flurry of interest and funding. At the core of this tendency is the often-unspoken assumption that the Bridal Creeper issue is not really important given all the other pressing matters or conversely, that the 'problem' is sufficiently understood and in hand.



The prevailing angst regarding Bridal Creeper concerns its capacity to invade into new territory and proliferate at an alarming rate, overriding existing native vegetation and disheartening proponents.

Learnings

- A critical component of any strategic plan is to facilitate feedback from local people engaged with local projects and importantly, to acknowledge and validate their feedback. The information should contribute to refining the strategy. Failures are also important sources of learning.
- Management implications: A critical requirement for success is to maintain a strong communication network between all stakeholders since long term effective natural resource management of any sort, cannot be achieved by 'remote control' or conversely by ad hoc and uncoordinated action.
- Building and maintaining partnerships can be challenging, as we learn to navigate complex group dynamics from a wide variety of new and existing stakeholders with differing backgrounds and agendas

Comments from surveyed respondents

- One respondent mentioned that there had been Inter-agency weed meetings where the Shire, DEC (as it was then), their group and others met regularly to share what they were doing. They felt that this had been very valuable as they were able to learn from each other and make sure they did not overlap their efforts. They lamented that as new staff came into the agencies, these meetings had been stopped.
- There is no forum for communication between the Landcare office, DBCA, the Shire and other stakeholders to coordinate an approach to deal with Bridal Creeper in the locality.
- The Group comprised of representatives of the Shire, DBCA, WCC, DPIRD and community members. The Group was formed in about 2001 to talk about what each agency or group were doing and where they were working. The respondent explained that the motivation for the Group was a result of a situation where three different agencies using three different contractors had all sprayed the same site without the others knowledge. They have tried to get the Railway and Western Power people on board but had not succeeded. They now are able to share their knowledge of weed locations, strategies and management priorities, however new staff have the potential to reduce the inter-agency communication.

When the funding or work stops

Comments from surveyed respondents on

- After 1994 no further control work was done. The respondent commented that now, 24 years later the infestations have returned as dense, if not more so.
- One respondent found it frustrating not to have follow up funding.
- One respondent was not sure whether the strategy should be to eradicate or to manage Bridal Creeper, however the funding opportunities were so low that Bridal Creeper was not prioritised in the region.
- The overall impression is that they are not winning against Bridal Creeper.



Community volunteers

The notion of 'champions' was frequently mentioned, and one comment was, "If you don't have the champions in an area, nothing seems to get done". Community interest and volunteers are in short supply and several barriers to engaging volunteers in weed control were mentioned

Learnings

- Champions and other advocates are essential for kick starting control programs but are not able to sustain the works in the longer term.
- Champions are needed at all levels. CEO's of regional organisations and shires, are well placed to become 'champions' and at the sub-regional level the NRM's and at specific locales, a passionate volunteer or two.
- Champions tend to arise when a critical situation or crisis occurs or is perceived.
- Volunteering is clearly a social values issue.
- Community values need to be investigated, not assumed.
- Local Bridal Creeper control projects need to be attached to other community values where possible

Comments from surveyed respondents: strengths and opportunities

- One volunteers philosophy was: there are two things you can do – and one is nothing.
- One respondent said that she had attended a Volunteer recruitment course run by SCNRM and that this was good value and has changed how she will go about recruiting volunteers.
- The volunteer base is only a few key people, although there is rarely a shortage of volunteers for tree planting. There are various Friends Groups, usually championed by a smaller group who drive it and push the community into action.
- The respondent was an active member of a catchment group for 20 years and felt it was always inspiring going to the meetings. It was this group that inspired them to continue their involvement in NRM.
- There were many community volunteers through the 1980s and 1990s but there had been a falling away because of too much bureaucracy. However, the respondent was hopeful the younger generation are beginning to consider environmental issues and cited the various TV programs on recycling etc.

Comments from surveyed respondents: weaknesses

- The volunteers had a perception that the Shire and/or DBCA were responsible for the reserve and it should not be left up to volunteers to deal with the problem.
- One respondent also felt that there were not enough people that are concerned about Bridal Creeper and those that are, are overwhelmed by the task. The farmers are too busy with their cropping regime to be concerned about Bridal Creeper in their remnant bush patches.
- Community members have been given information on Bridal Creeper locations but with no money to deal with it, the community perceive nothing is being done and will not bother. (i.e. their local landscape problems are the responsibility of the local and state government, not them.)
- Many farmers feel they have done their bit; they have fenced off their rivers and creeks, even done some revegetation works and so are no longer interested.
- Volunteers were active in the community, but the respondent felt they were largely location focused. Burnout and aging were an ongoing problem. There was a problem with volunteers feeling they needed permission to go and do weed control.



- The Friends of Reserves group consists of 8 – 10 members with about 6 – 8 turning up for events. These are mostly from the older generation and it appears that weeding is too boring for the younger ones.
- The Friends of 'Group' are becoming more elderly or have moved away, so prime movers are absent. The '40-year-old' generation love the area but generally are not environmentally concerned.
- The respondent coordinates a group of willing volunteers who regularly hand weed a large area along the Foreshore and the Coastal reserves. She said they cover a large area, so it is obvious that some areas will 'fall of the radar' and they have to focus on defending the good locations. However, she also indicated that with 4 – 5 volunteers hand pulling and digging out the growing point, they can cover a good area in a morning.
- The respondent mentioned that 90% of volunteers in the district are women since the older men go back to help on the farm. His comment on the attendance at a recent Live Sheep Export meeting was that there were very few people under 40 present as the younger farmers have turned to cropping only and as a result are much busier.
- The comment was made that community values change as the generations change. The older generation who grew up with more bushland around them have become more naturalist and conservation minded while the younger generation are busy with the modern technology and large-scale cropping.
- The respondent has a core group of 4 volunteers and many of the infestations are too great for volunteers to work on.
- Accreditation is required to apply herbicides and for the use of chainsaws if they are to be covered by insurance. This is seen as a barrier for volunteer weed control.
- There were no community volunteers that were helping with weeding or tree planting. Volunteers only seemed interested in the "cute and cuddly", so phascogale monitoring was attracting volunteers. The respondent indicated there was also no local 'champion' with a network of influence.
- The respondent considered that maintenance is not motivating for volunteers, who seem to like to see results. However, Bridal Creeper treatment is a slow process without quick results. They would like to build the community capacity and interest but doesn't know how. They would love to gain more volunteers.

Education programs

Comments from surveyed respondents

- One respondent had done several school activities with the school, but new teachers had not shown any interest.
- A respondent felt more education was necessary for the community to recognise that the reserves were an asset and that the community should also take more responsibility for them.
- The schools were not encouraging student involvement.

KEY POINTS RAISED FROM RESPONDENTS COMMENTS;

- Eradication of Bridal Creeper is possible in limited areas but requires substantial and continual effort.
- Reduction but eradication is practical over large areas but will require continual funding for contractors and project managers.
- The impacts of rust appear to be variable but have not been quantified.



- There was a mistaken view that some Bridal Creeper patches should be left untreated to ensure the rust remains in the area.
- The benefits of rust had been validated in some localities, but largely appears to have only been marginally successful.
- Several key players saw biological control as the long-term goal for effective reduction.
- Bushland reserves are not receiving sufficient attention re Bridal Creeper control.
- Shires do not have sufficient resources to commit to reserve management.
- The justification for spraying Bridal Creeper along degraded road verges appears to be based on vague paradigms concerning the importance of road verges as wildlife corridors.
- There is a degree of uncertainty about how to define target priorities.
- Other weeds are competing for project priorities.
- Farmers generally do not take an interest in controlling non-agricultural weeds, especially outside their properties, although there are exceptions.
- The ecological outcomes of removing Bridal Creeper are not generally considered nor understood. In some case Bridal Creeper removal has simply paved the way for other weed species to invade.
- There was no indication that the Roadside Conservation Surveys had guided the development of Bridal Creeper projects.
- District project officers and local volunteers tend to want to focus on specific areas that concern them.
- It appeared that 'success' with Bridal Creeper control has not been well defined.
- The exoskeleton of a Leaf hopper instar was observed at one site only, but leaf hopper damage was noted at a few sites.

General learnings conducting the survey

- Respondents were generally able to locate and share useful information relevant to this review. Some had trouble locating older data on Bridal Creeper as they had changed from one GIS system to another or were using the Local Government's spatial platform and changed to an independent platform.
- The transient appointment (1-5 years) of Landcare officers or NRMOs often results in the loss of a lot of information. The busyness involved with enduring project outputs and deadlines to meet means that there is little time left for consistent archiving of experiences and learnings. Without an archive system that is query able, the location of information remains in the NRMOs heads and is the knowledge is at risk of disappearing.
- This review project sought to assess what was working regarding Bridal Creeper management. Data that could yield a reliable objective perspective. was difficult to locate. Anecdotal information and personal perspectives had to be relied upon for 'educated guesses'.

Data management

- Project input and output data is useful for determining what was done and how but is usually inadequate for long term tracking of environmental outcomes. The questions; are things much the same or getting better or worse and is what we are doing making a difference require adequate and reliable historical environmental (baseline) data. This problem is perennial and difficult to resolve. It requires expert input to design a robust and durable information storage system.
- Consideration should be given to how all stakeholders might benefit from the design of an information archive system and not just a few with a specific interest.
- Specific software should not determine the format of the archive system but be a tool to implement it.



STRATEGIC WAY FORWARD

Strategic weed prioritisation includes knowing what is spreading fast, what is achievable and what is the length of seed viability. Mapping to know the size of the population is critical so you can plan your battle. A longer-term project (5 years) is important to enable mopping up in order to eradicate the weed.

An integral part of reducing the deleterious effect of weeds in natural ecosystems is to ensure that plant communities are resistant to re-invasion after management; most likely through facilitating native plant community recovery or replanting, thus decreasing resource availability for invaders.

Greater emphasis could be given to selecting sites for weed management that are less degraded as there would be a higher likelihood of natural recovery, although such selection is not always possible (e.g. when protection of threatened species is the primary reason for weed management).²⁶

Three key, interdependent activities focusing on evaluation, weed management and ecosystem recovery actions are necessary to restore native communities and ecosystem functioning at weed invaded sites.²⁷

- Evaluation is crucial to assess whether the overall goal of a weed management program is met and if additional actions to assist recovery of the ecosystem are required.
- Setting a realistic and achievable restoration goal is essential.
- Greater collaboration between weed managers and restoration specialists, to draw on the strengths of each other, is required to implement such a framework and develop sustainable management strategies for invaded natural ecosystems within specific landscapes.

The assessment of environmental weed control programs must encompass more than measurements of weed density reduction. Measurements are also needed on the vegetation that replaces the target weed.²⁸

Comments from surveyed respondents

- One respondent questioned: “How do you pick your battles?”
- We are now having to prioritise good vegetation areas and the recent projects involve dealing with Bridal Creeper around the National Park to prevent it getting a hold within the Park.
- A respondent wondered if there was going to be anything else for them to use, another bio-treatment or another chemical

Some obstacles to overcome:

- Mixed messages -a conceptual understanding
- Program legacy - ephemeral resourcing of long-term management issues difficulties in maintaining return on investment, especially when programs succeed in reducing the impacts or presence of weeds to such a degree that the priority for management is no longer clear to the community.
- Squeaky wheels - an inordinate investment in substantiating decisions/inaction
- Scale and relevance - dealing with the locality/reality versus national/conceptual divide.
- Compliance—legislative measures are not often used to full effect
- Underestimating the task at hand—without the appropriate information

²⁶ Adele M. Reid, Louise Morin, Paul O. Downey, Kristine French, John G. Virtue (2009) Does invasive plant management aid the restoration of natural ecosystems? *Biol. Conserv.* (2009), doi:10.1016/j.biocon.2009.05.011

²⁷ Adele M. Reid, Louise Morin, Paul O. Downey, Kristine French, John G. Virtue (2009) Does invasive plant management aid the restoration of natural ecosystems? *Biol. Conserv.* (2009), doi:10.1016/j.biocon.2009.05.011

²⁸ Peter J. Turner, John K. Scott and Helen Spafford (2008) Implications of successful biological control of Bridal Creeper (*Asparagus asparagoides* (L.) Druce) in south-west Australia *Proceedings for Sixteenth Australian Weeds Conference*



- Stakeholder fatigue—many landholders have witnessed the failure of subsequent programs or efforts to address the problems. Most programs will only ever succeed if stakeholders are engaged and have confidence in the duration of the commitment.
- Outcomes versus business as usual—what is the end point of management and how do we know when we arrive? Are we just moving one weed on to make way for another?
- Planning lethargy—strategies such as containment have been widely promoted as plausible management objectives without any definitive guidelines on how they can be sustained.

