Weed Prioritisation Process for DPaW (formerly DEC) – "*An integrated approach to Weed Management on DPaW-managed lands in WA".* (As at November 2013)

The Environmental Weed Strategy of Western Australia (EWSWA) (1999) provided a ranking of weed species on a state-wide basis against three criteria – invasiveness, distribution and environmental impacts. A total of 1350 weeds were rated through this process as either high, moderate, mild or low, with 34 weed species being rated as high.

The state-wide ratings from the Strategy are deemed too broad to be of use from an on-ground operational perspective and are now out of date. In addition to these factors, the Strategy was meant to have developed an integrated approach to environmental weed management that included site led and resource led control (EWSWA, 1999) however, due to funding constraints, it did not carry out an assessment and ranking of weed species against the biodiversity assets they threaten nor did it consider feasibility of control.

In an effort to address these issues and implement an integrated approach to weed management on DPaW-managed lands in WA, the Weed Prioritisation Process for DPaW was developed in 2008. This process was based on the Environmental Weed Census and Prioritisation, Swan Natural Resource Management Region project developed by Karen Bettink and Greg Keighery (2008). A focus of the process is to consider both: 1) a "species-led"; and 2) an "asset-protection-based" approach to control the threat of environmental weeds within WA.

It was proposed that the Weed Prioritisation Process for DPaW prioritise weeds in each DPaW Region, with the aim being to establish both a species-led and an asset-protection-based approach to weed management. The species-led process assessed weed species for their invasiveness, ecological impacts, potential and current distribution and feasibility of control. The resulting priorities focus on infestations of species which are considered to be high impact, rapidly invasive and still at a population size which is feasible to eradicate or contain to a manageable size. Hence, weed species which are already widespread **did not** rank as a high priority through this part of the process.

The next stage of the process is to investigate the use of an asset-protection-based approach to guide the management of widespread weeds. This approach will focus on identifying high value biodiversity assets, the weeds that pose a threat to these assets and the sites where control will have the greatest biodiversity benefit and cost effectiveness. Social, cultural and economic assets as well as good neighbour issues will be considered at a later stage of the process.

Please note: these results are for the species led approach which focuses on infestations of species which are considered to be high impact, rapidly invasive and still at a population size which is feasible to eradicate or contain to a manageable size. As a result, widespread species that are high impact and rapidly invasive are going to rank low as it is not feasible to eradicate or contain the species. These species will be dealt with through the asset based approach.

METHODOLOGY – SPECIES-LED PRIORITISATION PROCESS

A series of "species-led" prioritisation workshops were held in each of the nine DPaW regions between 2008 and 2010.

The "species-led" workshops have aimed to score all weeds which occurred in each of the DPaW regions according to a series of key attributes. These attributes have been based upon the "*Swan Catchment Council Environmental weed list legend July 2008*" (refer to Appendix 1 for an extract of descriptions for fields used in the species based prioritisation process for DPaW Regions).

The intent of these workshops was to assist DPaW regions in priority setting for weed management on DPaW-managed lands. To ensure standardisation across each of the Regions it was important to ensure that all workshop attendees understood the descriptions and codes relevant to each field. It was important to highlight that this initial part of the process was a species based prioritisation and therefore it was important to consider the feasibility of eradicating or containing the species across the region.

Each species was then rated and any discussions about the species regarding its location, impacts and so on within the region were recorded in the notes column. Although discussions were had on whether a species was on a National, State or other list, it is important to note that these listings did not automatically equate with the species being one of the highest priorities for the region.

This process resulted in five (5) ratings for each weed species based on their invasiveness, ecological impacts, potential and current distribution and feasibility of control. In an attempt to synthesise these ratings to develop a more useable and overall ranking for weed species within each DPaW Region, the Weed Species Ranking Process was implemented. This process was intended to highlight the species that have the highest ecological impact, most extensive potential distribution, highest invasiveness, lowest current distribution and highest feasibility of control within a Regional context based on the information available at the time (refer to Appendix 3 for further information on the Weed Species Ranking Process).

The matrices from the Weed Species Ranking Process were applied to the ratings presented in the regional species-led prioritisation spreadsheets through an automated process and the results presented in three separate tables:

Table 1 RANKED - provides the species rankings for a region (these are listed alphabetically by scientific name under each of the categories of very high (VH), high (H), medium (M), low (L) and negligible (N)). The species ranking matches the Step 4 matrix so that the suggested management actions are also listed (i.e. A, B, C, D, E, F, G, H and I).

Table 2 FAR - provides a list of all species that received a ranking of further assessment required (FAR) for that region due to unknown ratings combining for two factors (listed alphabetically by scientific name).

Table 3 ALERT - provides a list of species that are considered ALERTS (listed alphabetically by scientific name). A species was considered to be an ALERT if it was - not found in WA, not found in the DPaW region but known to exist in an adjacent region or found in the region but not on DPaW-managed lands or waters.

The first biennial review of weed species ratings and rankings has been undertaken for all regions except Kimberley, which will take place in 2014. Regions and Districts are the custodians of their spreadsheets and update them as new species, infestations or changes to existing infestations are identified. This information is collated every two years when a biennial review is undertaken and changes are publicised.

DPaW Regional staff will use the results of the "species-led" weed prioritisation process to identify important weed priorities for control within each Region. If you require further information on the weed lists, the identified top weeds of any region, or if you have any feedback on the process please contact the Weeds Program Coordinator on (08) 9334 0312 or the relevant DPaW Regional Office.

ASSET- PROTECTION-BASED PRIORITISATION PROCESS - WIDESPREAD WEEDS

The ratings from the species-based prioritisation process is being used to identify which widespread, or established, weeds have a high impact and are rapidly invasive. This list will assist with prioritising weed control during the asset-protection-based process.

References

Bettink, K. and Keighery, G. (2008). *Environmental weed census and prioritisation, Swan NRM Region.*

Bettink, K. and Keighery, G. (2008). *SCC environmental weed list legend July 2008.*

Department of Conservation and Land Management (1999). *Environmental Weed Strategy for Western Australia.* Como.

Appendix 1: Extract of descriptions for fields used in the species based prioritisation process for DPaW Regions. Modified from the "SCC environmental weed list legend July 2008".

FIELD	DESCRIPTION	CODE	
Potential Distribution	Area of potential habitat in the Region that could be occupied or the area at risk of invasion by the weed. (E.g. % of land suitable for the weed)	L M H E U	Limited/Localised <10% Moderate 10-40% High 40-80% Extensive (widespread) >80% Unknown
Current Distribution	Area of habitat in the Region currently occupied by the weed, in relation to the habitat that it could invade. (E.g. % of potential area currently infested)	L M H E U	Limited/Localised <10% Moderate 10-40% High 40-80% Extensive (widespread) >80% Unknown
Ecological Impact	Impact of species within the Region, from low impact (causes minimal disruption to ecological processes or loss of biodiversity) to high (causes acute disruption of ecological processes, dominates and/or significantly alters vegetation structure, composition and function of ecosystems). Examples of impact attributes to consider: • changed fire regime • changed nutrient conditions • changed hydrological patterns • changed soil erosion patterns • changed geomorphological processes • changed biomass distribution • changed light distribution • loss of biodiversity • substantially reduces regeneration opportunities of native plants • allelopathic effects	L M H U	Low Medium High Unknown
Invasiveness	Rate of spread of a weed in native vegetation, encompassing factors of establishment, reproduction and long distance dispersal (>100m). Examples of establishment factors include: • ability to outcompete (light, moisture, nutrients, rapid root growth) • sexual or asexual establishment • need for disturbance to establish Examples of reproduction factors include: • time to seeding • seed production • vegetative reproduction Examples of long distance dispersal mechanisms include: • wind • water	S M R U	Slow Moderate Rapid Unknown

	• flying/ground animals • deliberate/accidental human spread • vehicles • produce contaminant	
Feasibility of Control	The longer a coordinated control program takes to achieve its desired goal, the more expensive and less feasible it becomes. Is it feasible to eradicate or at least contain the infestation? Examples of key factors to consider include: • how widespread a weed is • ease of finding infestations • Ease of killing (controlling) infestations • cost of controlling infestations & commitment to long term funding • difficulty of limiting the weed's dispersal • sources of reinfestation from adjacent lands • willingness of landholders and governments to control the weed • commercial use of the plant • longevity of seed survival	L Low M Medium H High U Unknown

APPENDIX 3 - Weed Species Ranking Process Summary

Purpose:
The weed species ranking process was implemented in an attempt to synthesise the large amount of information documented during the regional weed species-led prioritisation workshops to develop a more useable and overall ranking for weed species within each DPaW Region. The process was intended to highlight the species that have the highest ecological impact, most extensive potential distribution, highest invasiveness, lowest current distribution and highest feasibility of control within a Regional context based on the information available at the time. It was envisioned that the results of this ranking process would be used by staff to guide the decision-making process for determining on-ground weed management priorities (e.g. on-ground control, applying for funding etc) from a species-led perspective.

Methodology:
Four matrices were developed to combine the five key factors that were assessed and given ratings in the initial species-led prioritisation process: invasiveness, ecological impact, potential distribution, current distribution and feasibility of control. The matrices were developed in line with the 'National Post-Border Weed Risk Management Protocol'. The national protocol essentially substitutes invasiveness for likelihood so this follows the standard risk assessment process of consequence x likelihood = risk.

Essentially this ranking process is based on two key questions:
- Does a weed pose a significant <u>risk</u> to biodiversity?
- What is our <u>ability to manage</u> the weed?

The four matrices that were developed are presented in Appendix 1 and are (in order):
Step 1: potential distribution x impact = weed consequence
Step 2: invasiveness x weed consequence = weed risk
Step 3: current distribution x feasibility of control = weed management ability
Step 4: weed management ability x weed risk = weed species ranking

The matrices result in 6 weed species rankings (very high, high, medium, low, negligible and further assessment required). Broad qualitative rankings were chosen (rather than more detailed quantitative scores) in line with the somewhat subjective nature of the species-led prioritisation process. As our confidence in the data that is used in the prioritisation process improves, the ranking process can also be refined to reflect this. The final matrix (the weed species ranking) and the resulting final ranking also include examples of management actions that may be appropriate for a species of that ranking. Please note that these are indicative as to what type of management is appropriate for a species of that ranking and are not meant to be prescriptive.

This process was designed as a regional species-led prioritisation process. The ratings assigned are based on the species characteristics across the whole region not just a part of it (i.e. not just one ecosystem type (e.g. wetlands) or one District (e.g. Swan Coastal District). There will always be an argument that these rankings are not applicable to a particular patch of land. A good example is that the species characteristics may differ between the mainland and islands. However the value of developing a standardised prioritisation process for areas of land less than a regional area or IBRA region is questionable unless there is significant diversity in the Region.

Outcome:
The matrices were applied to the ratings presented in the regional species-led prioritisation spreadsheets through an automated process and the results are presented in three separate tables.

Table 1 provides the species rankings for a region (these are listed alphabetically by scientific name under each of the categories of very high (VH), high (H), medium (M), low (L) and negligible (N)). The species ranking matches the Step 4 matrix so that the suggested management actions are also listed (i.e. A, B, C, D, E, F, G, H and I).

Table 2 provides a list of all species that received a ranking of further assessment required (FAR) for that region due to unknown ratings combining for two factors (listed alphabetically by scientific name).

Table 3 provides a list of species that are considered ALERTS (listed alphabetically by scientific name). A species was considered to be an ALERT if it was - not found in WA, not found in the DPaW region but known to exist in an adjacent region or found in the region but not on DPaW-managed lands or waters.

We cannot emphasise enough that these regional weed species rankings are based primarily on the weed species characteristics. We have recently commenced the process for developing an asset-based prioritisation process which is the other half of the toolkit for directing weed management. Furthermore, in this process there is always an element of local manager's discretion. While this ranking process should assist in setting directions for weed management priorities from a species-led perspective, it is not necessarily black and white; managers may want to consider any species with a low current distribution as a high priority for action or a different level of action may be justified for reasons that are not covered by the species-led prioritisation (or asset-based prioritisation processes) e.g. good neighbour.

Appendix 1 Weed Species Ranking Matrices

STEP 1: WEED CONSEQUENCE

		IMPACT			
		High (H)	Medium (M)	Low (L)	Unknown (U)
POTENTIAL DISTRIBUTION	Extensive (E)	VH	H	M	M
	High (H)	H	M	L	L
	Medium (M)	M	M	L	L
	Low (L)	M	L	N	L
	Unknown (U)	M	L	L	FAR

VH - very high
H - high
M - medium
L - low
N - negligible
FAR - further assessment required and species will not proceed through ranking process, however this species may require ongoing monitoring in the field

STEP 2: WEED RISK

		CONSEQUENCE				
		Very High (VH)	High (H)	Medium (M)	Low (L)	Negligible (N)
INVASIVENESS	Rapid (R)	VH	H	M	M	L
	Moderate (M)	H	M	L	L	N
	Slow (S)	M	L	L	N	N
	Unknown (U)	M	L	L	L	L

VH - very high
H - high
M - medium
L - low
N - negligible

STEP 3: WEED MANAGEMENT ABILITY

		CONTROL FEASIBILITY			
		High (H)	Medium (M)	Low (L)	Unknown (U)
CURRENT DISTRIBUTION	Low (L)	VH	H	M	VH
	Medium (M)	H	M	L	H
	High (H)	M	L	L	M
	Extensive (E)	L	L	N	L
	Unknown (U)	M	L	L	FAR

VH - very high
H - high
M - medium
L - low
N - negligible
FAR - further assessment required and species will not proceed through ranking process, however this species may require ongoing monitoring in the field

STEP 4: WEED SPECIES RANKING

		RISK				
		Very High (VH)	High (H)	Medium (M)	Low (L)	Negligible (N)
MANAGEMENT ABILITY	Very High (VH)	VH (H,I)	H (H,I)	M (D,E,F,G)	L (B,C,D)	N (A,B)
	High (H)	H (H,I)	H (G,H,I)	M (D,E,F)	L (B,C,D)	N (A)
	Medium (M)	M (D,E,F,G)	M (D,E,F)	L (D)	L (C)	N (A)
	Low (L)	L (D,E)	L (D)	L (B,C)	N (B)	N (A)
	Negligible (N)	L (D)	L (D)	N (B)	N (B)	N (A)

VH - very high (objective is eradication)
H - high (objective is eradication or control to reduce)
M - medium (objective is control to reduce or containment)
L - low (objective is containment at key sites only)
N - negligible (no action to be undertaken but may include monitoring only)

Examples of management actions that may be considered for each ranking:

A - no action (the weed species ranking is so low as to not warrant any investment in regional strategic management actions)
B - monitor only (aims to detect any significant changes in the species' weed risk or management ability)
C - improve general weed management (aims to minimise weed impact and maintain the overall biodiversity, social, cultural and economic values in the region through improved general weed management)
D - protect priority sites (aims to prevent spread of weed species to key sites/assets of high biodiversity, social, cultural or economic value)
E - targeted control to reduce infestations at priority sites (may include biocontrol) (aims to significantly reduce the impact of a weed species on key sites/assets of high biodiversity, social, cultural or economic value through targeted management)
F - contain regional spread (aims to prevent the ongoing spread of the weed species in the region)
G - reduce regional infestations (may include biocontrol) (aims to significantly reduce the extent of the weed species in the region)
H - regional eradication (aims to remove the weed species from the region)
I - statewide eradication (aims to remove the weed species from the state)