



Warren and harbour destruction

Introduction: A strategic rabbit control program that features warren and harbour destruction is the most cost-effective way to reduce rabbit populations and prevent ongoing damage, particularly when applied over large, semi-arid areas. Rabbits can survive by building extensive underground warrens or using above-ground shelter, such as lantana or blackberry bushes. With good planning and coordination, long-term control can be achieved by removing or destroying the areas that rabbits depend on for survival¹.

The aim of warren destruction, or ripping, is not just to bury the warren entrances but to ensure proper breakdown of the warren structure¹. Ripping should be carried out when rabbit numbers are at their lowest, usually in summer (eg after a disease outbreak or following a baiting program)¹. Removing above-ground harbour (ie shelter) at the same time will increase the effectiveness of ripping².

“ Warren destruction is the most important part of lasting rabbit control ”

Skills and Equipment: Ripping is best done with heavy machinery. Mechanical equipment including bulldozers, excavators, backhoes, and tractor-mounted rippers can perform different functions in different terrains². The most common ripping method in open areas uses multiple ripping tines attached to a bulldozer³ (Figure 1). It is important to select the right equipment for each situation and to employ an experienced and competent machine operator with good knowledge of the local area. This can save time and money.

Alternative destruction methods (eg explosives or by hand using a shovel) may be necessary in areas where warrens are difficult to access or the use of large machinery is not appropriate³.



Figure 1: Ripping tines with winged tips on a Caterpillar D5 bulldozer used for warren ripping. Image: Brian Lukins

In Western Australia, for example, warren ripping is not a common control technique because many warrens are inaccessible and there are concerns about causing damage to high conservation areas¹. However, explosives are costly and require an experienced and qualified user, and other methods can be labour-intensive.

Precautions: It is important to take care to protect native vegetation when destroying rabbit warrens. In many states and territories, clearing of native vegetation or disturbance of significant sites or habitat is subject to strict regulations (eg a permit is required before removing or damaging native vegetation in Victoria)². Always check with the appropriate authorities before carrying out a rabbit control plan that involves environmental disturbance.

Costs and benefits: Warren ripping is relatively cheap compared to other conventional control methods. However it may not be considered feasible if the size of the area to be treated is large⁴. Ripping costs can vary, depending on the size and type of equipment, the ripping landscape and soil type. Contractors usually charge for equipment hire by the hour, plus fuel and labour costs. Although larger machinery may be more expensive to hire per hour, it is more cost-effective. This is because added horsepower allows the machine to cover a larger area in a shorter time and rip more powerfully, to a greater depth. This reduces the need for cross-ripping, back-blading or track-rolling, where the machine must pass over the warren several times, thus reducing the cost per unit area⁵. Smaller machinery may be suitable for areas with low warren density or for follow-up ripping¹.

Process:

- Plan to rip warrens in dry, hot conditions when the soil is soft and loose.
- To save time, it is recommended that an experienced observer on a motorbike checks the area and maps warren locations on a GPS and visibly marks each one (eg using flagging tape on a nearby tree or post) before ripping begins.
- Winged boots or modified tines should be used if possible, to avoid the need for cross-ripping.
- Ripping should begin about 2 m out from the furthest burrow entrance to ensure that burrows on the edge of the warren (which may not be visible) are destroyed.
- The machine should rip the warren in a grid pattern, ensuring that rip lines are about 0.5 m apart and the tines reach a depth of 700—900 cm (minimum).
- If necessary, cross-rip each warren (ie rip again at an angle of 90 degrees to the original ripping) to make sure the whole structure is destroyed².
- The observer should monitor ripping progress and make sure all accessible warrens and burrows are ripped.

Follow-up actions: Failure to conduct follow-up work may result in rapid reinvasion of rabbits from surrounding areas⁶. For long-term results, the following actions are recommended:

Harbour removal: Above-ground harbour such as dense, low-growing vegetation, logs, rubbish piles and weeds can provide rabbits with protection from predators and weather extremes. Removing these materials and clearing patches of woody weeds (eg lantana, blackberries) can reduce the likelihood of rabbits surviving in an area, particularly after warren ripping and other control activities have been carried out. Rabbit-proof fencing can also be constructed around nearby native vegetation to limit rabbit dispersal throughout the area.

Monitoring: Monitor the ripped areas in the months after ripping and check for reopened burrows or any missed warrens. Re-visit ripped warrens and rabbit prone areas regularly and record evidence of rabbit activity (eg fresh diggings, scrapings, fur or tracks) or possible rabbit damage (eg vegetation browsing)⁷.

If any remaining rabbits are found, follow up control should be carried out using complementary techniques such as fumigation. Ongoing monitoring can help to ensure long-term rabbit control.



Warren ripping demonstration using a rubber-tracked tractor and attached ripping implement. Image: NSW DPI

Coordinated control: A long-term reduction in rabbit populations and their impacts is best achieved by taking a regional approach to rabbit control, where neighbours work together. Coordinating warren ripping programmes among private and public landholders means that the costs of control - and the benefits - can be shared, which produces better returns on investment than if control is carried out independently on a single property⁵. Land managers can seek advice on developing a rabbit control strategy for their property, or find out about related plans and projects in the region, from their local natural resource management or pest management board, or catchment management authority.

Further information:

1. Hart Q (ed.) (2003). *Conventional Rabbit Control: Costs and Tips*. Bureau of Rural Sciences, Canberra.
2. Bloomfield T, Cummings D (2003) *Rabbits: Warren Destruction and Harbour Management*. Landcare Notes 297, Department of Primary Industries Victoria.
3. Sharp T and Saunders G (2005). *RAB006 Rabbit Warren Destruction by Ripping*. NSW Department of Primary Industries, Orange, New South Wales.
4. Williams K, Parer I, Coman B, Burley J and Braysher M (1995). *Managing Vertebrate Pests: Rabbits*. Bureau of Resource Sciences and CSIRO Division of Wildlife and Ecology, Australian Government Publishing Service, Canberra.
5. McPhee SR, Butler KL (2010). Long-term impact of coordinated warren ripping programmes on rabbit populations. *Wildlife Research* 37:68-75.
6. Mutze GJ (1991). Long-term effects of warren ripping for rabbit control in semi-arid South Australia. *Rangelands Journal* 13:96-106.
7. Cooke B, McPhee S and Hart Q (2008). *Rabbits: A Threat to Conservation and Natural Resource Management*. Bureau of Rural Sciences, Canberra.

Watch: [Warren ripping for rabbit control on PestSmart YouTube channel](http://www.youtube.com/PestSmart) (<http://www.youtube.com/PestSmart>)

Read: [PestSmart Case Study: Warren ripping on Thackaringa Station, NSW](http://www.pestsmart.org.au/pestsmart/rabbits/) (<http://www.pestsmart.org.au/pestsmart/rabbits/>)