

IPW MANUAL FOR BIODIVERSITY

These more detailed, technical guidelines were produced by the Biodiversity & Wine Initiative in 2006, as an extension of the abbreviated biodiversity guidelines that are part of the IPW Guidelines for Farms.

*The Biodiversity & Wine Initiative (BWI) is a partnership between the conservation sector and the wine industry to minimise the loss of threatened natural habitat and contribute to sustainable production. Producers can become recognised as **members** (entry level) or **champions** (exemplary level) of the initiative by setting aside an area of natural habitat for conservation and fulfilling other criteria as detailed on the BWI website [www.bwi.co.za]. All BWI members must be in possession of a normal IPW certificate, while BWI champions need to be audited and qualify for an IPW Conformance Certificate.*

BIODIVERSITY MANAGEMENT GUIDELINES

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a.) Threatened Ecosystems

i.) Threatened vegetation types

- New vineyards should ideally be developed on old agricultural lands and not on virgin soil with pristine natural vegetation. **A ploughing permit must first be obtained from the National Department of Agriculture in order to develop virgin soil as stipulated in the Conservation of Agricultural Resources Act (No 43 of 1983), regardless of who owns the land. Any land that has not been worked for more than 10 years is regarded as virgin ground.**
- Not all natural areas have the same conservation priority. While large areas of mountain habitats still remain in marginal farming areas, the majority of lowland ecosystems have been transformed. Priority habitats such as renosterveld, lowland fynbos and succulent karoo on alluvial soils should be avoided at all costs.
- A national assessment has been made of every vegetation type in SA, classifying it as critically endangered, endangered, vulnerable or least threatened, according to how much remains compared to its original extent. In the Western Cape alone, there are 15 vegetation types that are already critically endangered (e.g. Swartland Shale Renosterveld). It is therefore strongly recommended that before any development is contemplated, that you contact the CapeNature representative in your area to determine the conservation value of any virgin land and consider alternatives. CapeNature's formal comment is likely to be required by the permitting authorities in any event.

ii.) Aquatic Ecosystems (wetlands & rivers)

All developments in water resources require an authorisation from the Department of Water Affairs and Forestry (DWAF) in terms of section 21 and 22 of the National Water Act (No 36 of 1998). The Conservation of Agricultural Resources Act (No 43 of 1983) also restricts activities within wetlands.

Wetlands

Wetlands act like giant sponges by holding back water during floods, releasing it during dry periods and recharging the water table. They therefore play an important role in minimising soil erosion and flood attenuation. Functioning like natural filters, wetlands help to purify water, by trapping many pollutants, including sediment, heavy metals and disease carrying organisms. Wetlands also provide special habitat for many plant and animal species who depend on them for part or all of their lifecycles (such as important pollinators), and can form a natural firebreak.

Wetland Management guidelines

- Wetlands must first be identified and delineated in order to be conserved. It is best to identify wetlands in the winter months, as some seasonal wetland areas may not be easily recognised in the dry summer months.

- Keep buffer areas of undeveloped land around wetlands that are free of alien plants. The buffer width will be determined by the size of wetland as well as impacts of adjacent land use, but is recommended between 25-75m.
- The source and downstream portions of the wetland should not be separated.
- All activities in the catchment have an effect on wetlands (e.g. catchments hardening, i.e. roads, paved areas will lead to higher run off and possible erosion of wetlands).
- Make sure that no over-abstraction of surface or ground water feeding into a wetland occurs, which can cause the wetland to dry out. No high-yield boreholes should be sunk near to natural wetlands.
- 'Damming' of wetlands will change seasonal wetlands into permanent water bodies and the very special habitat formed by the wetland will be lost. Damming requires authorization from DWAF.
- Check for any pollution sources that could impact on water quality such as seepage from manure & compost heaps, domestic waste dumps or areas where grape skins are stored.
- Alien plants use large quantities of water from wetlands and should be removed at all costs. Note: Always use "manual" methods, with kapmes or chainsaw (i.e. no machinery) to clear aliens in wetlands, which are very sensitive to soil disturbance.
- It is illegal to interfere with the flow regime by canalizing waterflow, digging drainage ditches or infilling by dumping soil and rubble. Wetland functioning can sometimes be successfully restored when the flow regime is reverted to its original state and ditches or canals are closed.
- Wetlands can be utilized for grazing, provided the grazing pressure is not too high, is in the correct season (usually summer), and livestock are kept away from the deeper, wetter and areas with unstable soil. Monitoring wetlands for signs of degradation and erosion by overgrazing is important.
 - For more information on wetland management and rehabilitation go to: www.wetland.org.za-pracmanage.htm.
 - For Wetland delineation: Use 'A practical field procedure for identification and delineation of wetlands and riparian areas' (DWAF 2003) at www.dwaf.gov.za.

Rivers

Rivers and their associated riparian habitats are central to human welfare and economic development, and they perform many ecosystem services. Healthy rivers also have a 'self-cleansing' property (i.e. living organisms degrade organic waste and concentrate nutrients).

Management guidelines

- Abide by the National Water Act: According to this act all water-use activities from a river/watercourse have to be registered/authorised by the Dept. of Water Affairs and Forestry (DWAF), This includes:
 - Abstraction from a river
 - Building of farm dams (section 117 and 12)
 - Discharging effluent or any other form of pollution into river
 - Altering (e.g. 'bulldozing') the beds, banks and course or characteristics of a watercourse, even if the flow is erratic/seasonal (section 21)
- Control invasive alien plants, such as wattle, gum, pine and poplar (including aquatic weeds e.g. Parrots Feather, Water hyacinth). Invasive alien plants reduce river flow, and destabilise river banks.
- Keep riparian zones intact or rehabilitate these areas where possible. The well-being of river ecosystems is heavily dependent on the health of the adjacent natural vegetation, or 'riparian habitat' This vegetation stabilises the riverbank, filters pollutants, helps maintain a natural water temperature, contribute organic matter in support of aquatic life and acts as a buffer to adjacent land uses.
- River banks should be gently sloped and planted with indigenous vegetation to prevent erosion and improve water quality.
- Allow adequate strips or buffer of indigenous vegetation (30-40m is ideal), to minimise the effect of fertiliser and pesticide run-off from cultivated land. These strips should be a minimum of 10m wide next to each bank of the river.
- Ensure an 'ecological reserve' (i.e. enough water for river ecosystem to function adequately) remains in the river. High levels of water abstraction, especially during summer, drastically decreases flow, concentrates pollutants, increases water temperature and impacts on river health. Minimise water use by implementing 'best practises' e.g. drip irrigation. If possible, store water in winter rather than pumping in summer.
- Consider how farming practices in catchment areas may be improved to reduce sedimentation and water quality problems.
- The damming of rivers and building of weirs is not permitted by DWAF & Dept of Environmental Affairs (DEA&DP) without special permits, as dams stop flow, cause sediment build up and prevent species migrating.
- Correct river & wetland management and rehabilitation is a complex science and freshwater experts should be consulted when required. Depending on the level of assistance required, advice may be at no cost (generally from government agencies) or will be charged for.

Farm dams

Farm dams are critically important in wine growing areas to assure a supply of water for irrigation in summer. Properly designed and managed farm dams can also enhance the aesthetic beauty of the farm and attract a variety of birds, insects and other animals to the area. Farm dams stocked with locally threatened fish species can make a significant contribution to conservation.

- The shores of dams should be clear of alien vegetation and should be planted with indigenous wetland plants, as well as indigenous shrubs and trees. Seek advice from indigenous nurseries or landscapers about the choice of these species.
- Dams should contain underwater structure (e.g. rocks, logs) as well as indigenous water lilies and weed beds to provide fish with cover from birds and to improve the productivity of the dam. If these dams are stocked with indigenous fish species which are threatened, a reserve level should be determined so that the dams are not totally emptied during the irrigation season.
- Water quality in dams can be enhanced by having adequate buffer areas (10-30m) of indigenous vegetation between the dam and vineyards. Water entering the dam as a river or watercourse should ideally flow through a wetland just before the dam due to the water purification function performed by wetlands.
- Dams identified for indigenous fish stocking must be free of alien fish. Dean Impson at CapeNature (ph: 021-866 8019) can advise on the correct fish species to stock.
- Dams can be cleared of alien fishes using registered piscicides. This operation must be carried out by a qualified operator and costs covered by the landowner.

b.) Invading Alien Plants

Invasive alien species have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub surface water. Landowners are under legal obligation to control alien plants occurring on their properties.

i.) General clearing principles

- Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort.
- As a minimum, the plan should include a map showing the alien density & indicating dominant alien species in each area.
- Start clearing the lighter infested area first (with young/ immature, less dense trees) to prevent the build up of seed banks. Starting with less dense areas will also require fewer resources and have greater impact in the long term. In the case of alien species confined to rivers, it is ideal to start in the headwaters and then move downstream, thereby removing the source of re-infestation.
- Dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are at the moment.
- Collective management and planning with neighbours allows for more cost effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses.
- Biological control is cost-effective and very safe compared with the expense and risks associated with herbicide use, and can be successfully integrated in other management practises.
- Consider the role of fire in alien clearing operations. Fire with the appropriate management is a cost effective clearing method, but untimely and uncontrolled fires easily and often defeat the purpose of mechanical and bio-control clearing. Follow up after fire with manual seedling removal is essential, or in extreme cases where there is little other vegetation, herbicide spraying could be considered.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

ii.) Clearing methods

- Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. For example fire is a useful tool for pines, but should not be used on the Acacia species such as rooikrans and port jackson, as fire stimulates alien seed germination. (Goukamma Nature Reserve has had success with burning rooikrans stands after they had been felled and given sufficient time for seedling establishment. New seedlings that germinate were thus killed by fire but then the next phase of seedlings would need to be treated with herbicide).
- For detail on the recommended clearing methods for each common alien species and other alien clearing advice, consult the CapeNature "Landowner Alien Clearing Manual", which is available on the BWI website, (downloads page), www.bwi.co.za.

iii.) Identification of alien species

Table 3 of CARA (the Conservation of Agricultural Resources Act) lists all declared weeds and invader plants. Alien plants are divided into 3 categories based on their risk as an invader.

- Category 1 - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited (e.g. rooikrans, hakea)

- Category 2 – These plants pose a threat to the environment, but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a landuser must obtain a water use licence as these plants consume large quantities of water (e.g. black wattle, grey poplar, pine).
- Category 3 – These plants have the potential of becoming invasive, but are considered to have ornamental value. Existing plants do not have to be removed, but no new plantings may occur and the plants may not be sold (e.g. jacaranda, syringa, sword fern).
- For a listing of Category 1, 2 & 3 plants, refer to the BWI website (downloads page) [www.bwi.co.za.]

iv.) Use of herbicides for alien control

Environmental Safety: Most alien vegetation control operations are carried out in riparian situations which are regarded as environmentally-sensitive. In order to minimise the impact of the operation on the natural environment the following must be observed:

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation (Contact Ecoguard for advice, ph: 021-862 8457).
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.

- You are also referred to Section 14 of the IPW guidelines for farms: Handling of Chemicals.

- For more detail on the most effective herbicide and dosage for a specific alien species, consult the **Ecoguard Herbicide guide** (see **Appendix 1** at the end of the document).

iv.) Alien grasses

Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms, but are often the most difficult to detect and control. Alien grasses out-compete indigenous annuals and bulb species that make up an important part of the species diversity in renosterveld and fynbos. Alien grasses also change the fuel load of the veld causing more frequent and hotter fires, which can be detrimental to biodiversity.

Common alien grass species include: Wild oats (gewone wilde hawer); Italian ryegrass (Italiaanse rog); Quaking grass (bewertjies); Kikuyu (kikoejoe); Ripgut brome (predikantsluis); and Rat's Tail Fescue (wildegars).

To avoid alien grass invasion:

- A buffer of at least 30m should be left along the edges between pristine natural areas and vineyards, other agricultural lands & manure piles to prevent disturbance, edge effects and nutrient run-off into the veld, which promotes alien grass invasion.
- To avoid dispersal of seed by animals, prevent livestock, that have grazed in areas infested by alien grasses while these species are seeding between August and November, from moving to areas that have not been infested. Keep livestock out of pristine natural areas during this time as well, if they have grazed pasturelands.
- Frequent fires favour alien grass invasion, therefore apply good fire prevention practices to natural areas (see Fire Management section below).

To control alien grasses:

- Recent research has shown that burning is not an effective means of control, as this stimulates alien grasses.
- Hand clearing is also not recommended, as this disturbs the soil which promotes alien grass growth
- Applying a pre-emergence, systemic herbicide (such as Snapshot, Gallant Super, Fusilade) has been found to be the most effective control method.
- Mamba & Round-up are also effective for controlling Kikuyu.

Useful alien clearing contacts:

www.nda.agric.za/docs/landcare

Working for Water: www.dwaf.gov.za/wfw

Weedbuster Hotline: 0800 005 376, weedbuster@dwaf.gov.za

v.) Alien animals

- Alien fish: Do not introduce alien fish species (e.g. smallmouth bass, trout, carp). Apart from being illegal, these species have decimated and in some places completely eliminated indigenous fish populations and other aquatic organisms and in the case of carp can totally alter the nature of the habitat.
- Mallard ducks: Mallard ducks readily cross-breed with the indigenous yellow-billed duck, red-billed duck and other indigenous duck species. Resulting offspring are not sterile producing many more hybrid generations, which threatens the genetic integrity of the indigenous duck populations. It is recommended that all Mallard

ducks are removed from farm dams by hunting or catching them in cages and re-locating them to suitable locations. Contact Dian Dreyer from CapeNature (ph: 021-8711536) for advice on Mallard ducks.

- **Feral pigs:** Currently occurring in the West Boland and Boland areas, these pigs reproduce prolifically and can do much damage to vineyards, orchards, fences as well as natural areas by trampling, burrowing and digging up and consuming indigenous species of both plants and animals.
- Notify Hannes Stadler of the CapeNature Wildlife Management Programme (ph:022- 931 3832) in case of new alien fauna sightings (e.g. feral pig) that did not previously occur in the area.

c.) Fire Management

Fire can be both a friend or foe with regards to biodiversity management. Although fynbos and renosterveld are fire-adapted systems, just one or two inappropriate fires at the wrong time of year, too frequent, or no fire at all, can cause local extinction of many species. As a landowner, you are responsible for the prevention and management of all fires that occur on your land, in terms of the National Veld and Forest Act of 1998. You will be assisted in complying with these regulations if you and your neighbours form a Fire Protection Association (FPA).

i.) Fire Protection Associations (FPA's)

- FPA's are voluntary associations formed by landowners to jointly prevent, predict, manage and extinguish veld fires. The main advantage of an FPA is that no presumption of negligence can be used in civil proceedings due to fire damage if you belong to an FPA, even if the fire started on your property. Furthermore, resources can be combined more effectively with other landowners to manage fires more effectively and firebreaks can be placed where best for the area as a whole, not just one property.

ii.) Fire breaks

- Every property must have a system of fire breaks in place. The breaks must be on the boundary of the property unless there is an exemption granted by the Minister or an agreement with the adjoining landowner that the firebreak be located somewhere else within an FPA.
- Firebreaks must be located strategically to control the spread of wildfires, but mainly serve as an access road from which to fight a fire. A sensible firebreak width is not wider than 10m in most fynbos and renosterveld vegetation areas and must not be burnt during times when there is a high fire risk
- It is often preferable to simply have a "tracer belt" of 2/3m to allow quick access and an opportunity to use a "backburn".
- Owners should ensure that firebreaks are positioned and prepared in such a way as to cause the least disturbance to soil and biodiversity. The owner must transplant protected plants within a fire break if possible or position the firebreak to avoid protected plants.

iii.) General fire management principles

- **Frequency:** The interval between fires should be determined by the growth rate of natural existing plants. No fire should be permitted in fynbos until a least 50% of the population of the slowest-maturing species in an area have flowered for at least three successive seasons (recommended: 12-20 years for fynbos depending on the area's rainfall).
- **Season:** Generally, a late summer or early autumn burn is best for fynbos species, but due to the risk of runaway fires at that time, burning is usually only feasible in March and April.
- **Intensity:** Intensity is influenced by the fuel load, fuel moisture, relative humidity, gradient and wind speed. The intensity can be manipulated by selecting conditions, point of ignition relative to slope and wind that will lead to the desired type of fire, remembering that the more intense the fire generally the better it is for fynbos, provided that the fuel load has not been increased by alien vegetation.
- **Proportion of area burned:** It is vital to maintain a mosaic of different vegetation ages within a property (a variety of approved burning practices and veld ages is the best way to maintain species diversity)
- **General:**
- Inform property neighbours and local municipality fire officers of your intention to burn at least two weeks prior to the event.
- Ensure fire fighting equipment is maintained and in good working order before the start of each fire season.
- Keep accurate records of fire, using a map of veld age as a basis. Note the date and time of ignition, weather conditions, etc.
- Do not leave an extinguished fire unguarded for at least two days after a burn.
- Do NOT allow livestock to graze natural areas in the winter and spring, following a fire. Many of the renosterveld bulbs and annuals are vulnerable to grazing pressure by domestic stock in the first 2 years after a fire.

For more information refer to:

- CapeNature's fact sheet on "Fire Management" & "The Landowner and Fire Protection Associations" (available for download on BWI website)
- Department of Water affairs and Forestry CD: 'Resource materials on National Veld and Forest Fire Act No 101 of 1998'

d.) Corridors & habitat fragmentation

When large, continuous areas of habitat are broken up into disconnected fragments, many ecological processes that keep these systems functioning are disrupted and many species disappear. Corridors of natural habitats are needed to link fragments to allow species movement, pollination and nesting to continue. They can also provide additional habitat where animals can breed, feed and shelter.

- Research in renosterveld habitats has shown that in order for patches of natural veld to be functionally viable, they should ideally be within 500m of another patch and connected by pollinator-friendly terrain (old lands & pastures are more pollinator friendly than vineyards and orchards).
- There is no single figure available for suggested corridor widths or lengths, as this depends on which animal, plant or vegetation type is in question. However, the wider the better!
- During the design phase of new vineyard blocks layout, consider leaving corridors between blocks or establishing new ones. Consult an indigenous landscaper for advice on species suitable for planting.
- Corridors can also include river and stream bank vegetation and wide road-side verges. Where no natural land remains on a property, portions of old fields that are left to naturally rehabilitate can also act as animal movement corridors and provide shelter.

For more information, refer to the CapeNature factsheet: "Biodiversity in an Agricultural Landscapes" (available on the BWI website).

e.) Restoration/Rehabilitation

Any rehabilitation efforts are valuable in re-creating habitats that have previously been disturbed. However if not well informed, rehabilitation by means of re-planting can do more harm than good, if incorrect species choices are made. Specialist advice is recommended as restoration can be a costly exercise.

- Rehabilitate using indigenous species, wherever possible using locally collected seed, or with species that occurred in the area. For example, there is a suspected danger of Natal forms of *Bitou* hybridizing with and eliminating the Western Cape *Bitou* species when it is planted by landscapers. Ensure that hybrid proteas (e.g. *Protea* 'Sylvia'), that are bought at nurseries, are sterile. However, since nurserymen are not likely to know whether a hybrid is sterile or not, it is best to avoid hybrids altogether.
- Avoid planting indigenous protea species that are not from your area. These may also hybridize with naturally-occurring, local species and alter their genetic integrity. Species that are known to easily hybridize are the white proteas (*Protea aurea*, *P.lacticolor*, *P. mundii*, and *P. punctata*) and possibly *P. neriifolia*, *P. lepidocarpodendron* and *P. susannae*. *Protea longifolia* and *P. burchellii* are regarded as highly promiscuous with regards to hybridisation.
- It may be possible to restore renosterveld that has had a history of incorrect burning or grazing, but complete restoration is not possible for sites where the soil has been disturbed by deep ploughing. Overgrazed renosterveld area which have lost their bulbs and grasses can be rested to recover the grasses, but bulbs appear to require lengthy periods (>20 yrs) and active re-introduction to recover. No fertilizers should be used in restoration projects.
- Generally, all natural vegetation that has been invaded by alien invasive plants (especially pine trees) will recover well after alien clearing (using correct methods). Pine plantations less than 50 years old, appear to have little impact on the indigenous seed bank but areas that have been covered by gum plantations recover less easily due to an alteration of soil properties.
- Fynbos is a fire-dependent system, therefore complete restoration will only occur after a fire, provided the seed-bank and top-soil have remained intact.

f.) Game Management in natural areas

Retention of game on private land can only be viewed as a form of conservation if correct game management ensures the condition of the natural vegetation is not detrimentally impacted. Otherwise, this is simply another form of farming.

- Manage the introduction of game, ensuring that non-indigenous species and population density does not damage the remaining natural vegetation. To be able to do this, a land owner needs to know:
 - The veld- and soil types of the property, as well as there location.
 - Game species and their feeding habits (e.g. browsers/grass feeders)
 - Carrying capacity of the various veld types at specific times of the year, to be able to calculate the numbers of a species that can be safely kept on a specific area (e.g. In the succulent karoo veld around Ladismith and Calitzdorp, about 3.5 kudu can be kept per 100ha).
 - CapeNature managers can provide advice and assistance in this regard.

- Watering points and animal licks must be placed so as not to cause trampling of sensitive veld (e.g. veld just recovering from burn, seasonal wetlands)
- It is strongly recommended that only game species that historically occurred in that area are kept and not 'extra-limital' species. Species which occurred historically in the area are best adapted to local conditions and will have the least impact on the natural veld. Always consult CapeNature for advice when contemplating which species to introduce.
- Regularly monitor the composition of plant communities, to be aware of the veld condition.
- Where veld condition shows signs of deterioration, it is advisable to withdraw animals from that area and the veld left to rest.

Livestock impacts in natural areas

- Renosterveld can be lightly grazed in late summer to autumn (Jan – early March). Grazing by livestock should not be allowed in the winter and spring flowering & growing seasons. Many of the renosterveld bulbs and annuals are vulnerable to grazing pressure by domestic stock in the first 2 years after a fire.
- All special habitats like silcrete, ferricrete and quartz patches should be fenced off from livestock. Fencing should however allow the movement of tortoises and small antelope species.

“Problem animal” control

Wild animals have become a problem in many farming regions because we have made them a problem by introducing cultivated habitats and readily available food into their natural environment. For example, in the wild, baboons would have died back naturally in summer due to a shortage of food. Now due to peak cultivated fruit production occurring in summer creating an abundance of food, their reproductive cycles have changed and their numbers have increased.

It is always advised to contact CapeNature regarding the most environmentally friendly and effective method of dealing with “damage causing” animals. Extermination by poisoning should be avoided at all costs!

Recommended control methods for the following animals, which are often problematic on wine farms include:

- **Birds** – to prevent plundering of grapes by birds, bird-friendly, clip-on nets can be fitted to vine rows. For advice, contact the viticulturalists at Hamilton-Russel or Newton Johnson who have designed and experimented with such clip-on nets. Alternatively encourage birds of prey to nest on the farm and provide tall, roosting perches so that they can naturally discourage the smaller birds.
- **Buck** – recommended control methods provided by CapeNature include:
 - Spray-on repellents, but these unfortunately do not last long as they are washed off with the rain.
 - Fencing off vineyard blocks with 1.2m Bonox fencing or jackal-proof fencing has proved the most effective preventative measure.
 - Another method that has also been shown to be successful is to obtain animal stomach contents and blood from the abattoir and spray this with a wide nozel tractor sprayer on the ground or directly on specific rows.
 - Loosening the soil in sandy areas in a strip right around a vineyard block that is targeted by buck. Buck do not like walking on loose, unstable ground and so will not pass over the strip to get to the vineyard. This will however, not work as well in clay-rich soils.
 - Hanging a number of cheap radios in trees near the area frequented by buck to play through the night is another option. Combining the radios with a few indicator lights on fences is even more effective.
- **Baboons** – If hunting is used to control baboons, do not shoot the alpha male as they know how to steer their troop to safer areas away from human interference. If the alpha male is gone, younger, males will take over who are not experienced with this form of troop control. Rather selectively remove some of the young females than the old males. Never remove an entire troop, as two or three more troops from surrounding areas will move in and replace the previous troop, exacerbating the problem. Electric fencing as well as employing people as “baboon monitors” can also be effective for baboon control.
- **Porcupine** – 1 electric wire in a fence placed 25-30cm above the ground is effective in keeping them out of fields and away from irrigation piping.

For more advise on problem animal control contact your local CapeNature conservator or Hannes Stadler of the CapeNature Wildlife Management Programme (ph:022-931 3832).

g.) Waste Management

Good waste management practices can make a profound contribution towards retaining biodiversity.

Waste management guidelines are covered in the IPW guidelines and you are referred to the following sections in this guideline document:

Guidelines for farms:

- Guideline 14 - Handling of Chemicals

Guidelines for cellars:

- Guideline 9.1-9.4 - Wastewater management (including monitoring, the amount and quality of cellar waste water; storing and disposal of wastewater)
- Guideline 11.1 - Disposal of solid waste
- Guideline 11.2 - Cleaning of water dams, pipes and other equipment

General:

- Refuse management must comply with legal prescriptions and may not pollute the environment (particularly wetlands and water sources) or create a health hazard.
- Compile a waste management plan, where waste is seen as a resource and recycled where possible.
- Visit www.fairestcape.co.za for recycle contacts for glass, metal, paper, plastics, hazardous waste, etc.
- Educate farm workers and their families on waste management and recycling.
- Minimize pesticide drift from vineyards onto natural areas. Avoid aerial spraying and where possible use Integrated Pest Management (IPM) methods and avoid drift altogether.
- Minimize fertiliser runoff adjacent natural areas, and especially wetlands and rivers. This runoff favours the spread of alien plants and actively poisons many indigenous plant species and aquatic animals. Department of Water Affairs and Forestry has issued target water quality guidelines, which address impacts on water quality and measures pollutants in final water body and not only on the effluent from the cellar (visit their website for these guidelines – www.dwaf.gov.za).

h.) General

- Design and lay-out farm roads so as to minimise erosion, (good maintenance is the key), and avoid sensitive ecological areas such as wetlands or rare plant populations.
- To prevent undue soil erosion, avoid ploughing slopes with a gradient steeper than 20 percent (as detailed in the *Conservation of Agricultural Resources Act, 1983*).
- Consult conservation experts to compile a simple conservation plan for the natural vegetation on the farm. This should include guidelines to monitor ecosystem health. A database of consultants who have expertise in conservation management plans can be downloaded from the BWI website.
- Consider formally setting aside threatened natural areas for conservation under CapeNature's Stewardship Programme to give these areas secure conservation status, and truly ensure these areas remain conserved for future generations.

References:

De Villiers, C.C. (Ed), 2005. *Fynbos Forum Ecosystem Guidelines for environmental assessment in the Western Cape*. c/o Botanical Society of South Africa, Conservation Unit, Kirstenbosch, Cape Town. (021-7998824).

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES

(endorsed by the Biodiversity & Wine Initiative)

Supplied by: ECOGUARD DISTRIBUTORS (Pty) Ltd

SPECIES		TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
Botanical name	Common name				
<i>Acacia cyclops</i>	Rooikrans	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	Confront	2.5%	1Lt Water + 25ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Acacia dealbata</i>	Silver wattle	Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
<i>Acacia decurrens</i>	Green Wattle	Cut stump	Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Acacia longifolia</i>	Long-leaved wattle	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.6%	1Lt Water + 6ml Garlon + 5ml Actipron
<i>Acacia mearnsii</i>	Black wattle	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	* Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron + 1ml EcoBlue
		Frill	* Confront	4.0%	1Lt Water + 40ml Confront + 5ml Actipron + 1ml EcoBlue
		Aerial	* Confront	2 L / Ha	
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
	Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron	

<i>Acacia melanoxylon</i>	Australian blackwood	Foliar spray	Confront	0.7%	1Lt Water + 7ml Confront + 5ml Actipron
		Cut stump	Confront	4.0%	1Lt Water + 40ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
		Cut stump	Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
<i>Acacia pycnantha</i>	Golden wattle	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
<i>Acacia saligna</i>	Port Jackson	Foliar spray	Confront	0.7%	1Lt Water + 7ml Confront + 5ml Actipron
		Cut stump	Confront	2.5%	1Lt Water + 25ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
<i>Arundo donax</i>	Spanish reed	Foliar spray	* Mamba	10.0%	1Lt Water + 100ml Mamba
<i>Asclepias fruticosa</i>	Shrubby milkbush	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
<i>Brizia, Avena, Lolium</i> species		Foliar spray	* Mamba	3.0%	1Lt Water + 30ml Mamba
<i>Casuarina equisetifolia</i>	Beefwood	Cut stump	Garlon + Diesel	1.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
			Garlon + Water	2.0%	1Lt Water + 20ml Garlon + 5ml Actipron + 1ml EcoBlue
<i>Cirsium vulgare</i>	Scotch Thistle	Foliar Spray	* Confront	0.75%	1Lt Water + 75ml Confront + 5ml Actipron
<i>Cortaderia selloana</i>	Pampas grass	Foliar spray	* Mamba	3.0%	1Lt Water + 30ml Confront + 5ml Actipron
<i>Chromolaena odorata</i>	Triffid weed	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.375%	1Lt Water + 3.75ml Garlon + 5ml Actipron

		Cut stump	Timbrel	2.0%	1Lt Water + 20ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Eragrostis curvula</i>	Weeping love grass	Foliar spray	Mamba	3.0%	1Lt Water + 30ml Mamba
<i>Eucalyptus camaldulensis</i>	Red river gum	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon + Mamba	0.75 + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba
<i>Eucalyptus cladocalyx</i>	Sugar gum	Cut stump	* Timbrel	12.5%	1Lt Water + 125ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon + Mamba	0.75 % + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba
		Foliar spray	* Confront + Mamba	1.0 % + 1.5%	1Lt Water + 10ml Confront + 15ml Mamba
		Foliar spray	* Brush-Off	10g / 15 litre	15 Lt Water + 10g Brush-Off + 100ml Mamba
<i>Eucalyptus diversicolor</i>	Karri	Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Foliar spray	* Garlon + Mamba	0.75% + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba
<i>Eucalyptus Grandis</i>	Blue Gum	Foliar spray	* Confront	1.25%	1Lt Water + 12.5ml Confront + 5ml Actipron
		Cut stump	* Confront	3.5%	1Lt Water + 35ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
		Cut stump	Garlon + Diesel	2.00%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	Access	1.5%	1Lt Water + 15ml Access + 5ml Actipron + 1ml EcoBlue
<i>Eucalyptus lehmanii</i>	Spider gum	Cut stump	* Confront	6.0%	1Lt Water + 60ml Confront + 5ml Actipron + 1ml EcoBlue
		Frill	* Confront	6.0%	1Lt Water + 60ml Confront + 5ml Actipron + 1ml EcoBlue
		Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon + Mamba	0.75% + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba
<i>Eucalyptus sideroxylon</i>	Black Iron Bark	Cut stump	Confront	12.5%	1Lt Water + 125ml Confront + 5ml Actipron + 1ml EcoBlue
<i>Fraxinus species</i>	Ash	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue

<i>Impomoea indica</i>	Morning glory	Foliar spray	* Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Basal stem	* Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
<i>Lantana camara</i>	Lantana	Cut stump	Access	1.0%	1Lt Water + 10ml Access + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Access	1.0%	1Lt Water + 10ml Access + 5ml Actipron
<i>Leptospermum laevigatum</i>	Australian myrtle	Foliar spray	* Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron
		Foliar spray	* Garlon	1.5%	1Lt Water + 15ml Garlon + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Melia azedarach</i>	Syringa	Foliar spray	* Confront	0.75%	1Lt Water + 75ml Confront + 5ml Actipron
		Cut stump	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Frill	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Access	2.0%	1Lt Water + 20ml Access + 5ml Actipron + 1ml EcoBlue
<i>Myoporum tenuifolium</i>	Manatoka	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Opuntia ficus-indica</i>	Sweet prickly pear	Basal stem	* Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
<i>Paraserianthes lophantha</i>	Stink bean	Foliar spray	* Confront	0.25%	1Lt Water + 2.5ml Confront + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Pennisetum clandestinum</i>	Kikuyu	Foliar spray	* Mamba	3.0%	1Lt Water + 30ml Mamba
<i>Pinus pinaster</i>	Cluster pine	Foliar spray	* Garlon	1.0%	1Lt Water + 10ml Garlon + 5ml Actipron
<i>Populus X canescens</i>	Grey poplar	Cut stump	Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon	1.5%	1Lt Water + 15ml Garlon + 5ml Actipron
<i>Pittosporum undulatum</i>	Sweet pittosporum	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue

<i>Prosopis glandulosa</i>	Honey mesquite	Basal stem	Garlon + Diesel	4.0%	1Lt Diesel + 40ml Garlon + 5ml Sudan Red Dye
		Cut stump	Garlon + Diesel	4.0%	1Lt Diesel + 40ml Garlon + 5ml Sudan Red Dye
	(Apply 2 % Actipron)	Cut stump	Timbrel	5.0%	1Lt Water + 50ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	Confront	4.0%	1Lt Water + 40ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar Spray	Confront	1.5%	1Lt Water + 15ml Confront + 5ml Actipron
<i>Quercus species</i>	English oak	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Ricinus communis</i>	Caster Oil Plant	Cut stump	Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron + 1ml EcoBlue
<i>Robinia pseudoacacia</i>	Black locust	Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Foliar spray	Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron
<i>Rubus cuneifolius</i>	American bramble	Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Foliar spray	Confront	0.7%	1Lt Water + 7ml Confront + 5ml Actipron
<i>Salix fragilis</i>	Crack willow	Basal stem	*Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Frill	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Schinus terebinthifolius</i>	Brazilian pepper tree	Cut stump	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Senna species</i>	Peanut butter cassia	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
<i>Sesbania punicea</i>	Red sesbania	Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Cut stump	Garlon	1.0%	1Lt Water + 10ml Garlon + 5ml Actipron + 1ml EcoBlue
		Cut stump	Garlon + Diesel	0.5%	1Lt Diesel + 5ml Garlon + 5ml Sudan Red Dye
<i>Solanum mauritianum</i>	Bugweed	Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Foliar spray	Confront	0.6%	1Lt Water + 6ml Confront + 5ml Actipron
		Foliar spray	Starane	0.125%	1Lt Water + 1.25ml Starane + 5ml Actipron

		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Spartium junceum</i>	Spanish broom	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Syzigium cordatum</i>	Water berry	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue

- Apply ACTIPRON SUPER (wetter/sticker) @ 0.5% with Garlon, Timbrel, Confront and Access for better uptake and penetration.

- Apply 1 ml Ecoguard Water Soluble Dye per 1 Litre mixture.

- Apply 5 ml Sudan Red Dye per 1 Litre diesel mixture for cut-stump applications with Garlon 480 EC.

* Registration pending/Trials in progress

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