

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY DECISION

2 February 2011

Application code:	ERMA200599
Application category:	Import for Release or Release from Containment any New Organism under section 34(1) of the Hazardous Substances and New Organisms (HSNO) Act 1996
Purpose:	To import and release up to 11 species of dung beetles to overcome the many adverse effects caused by animal dung in New Zealand pastures
Applicant:	Dung Beetle Strategy Release Group
Date application received:	13 September 2010
Date public submissions period:	22 September - 4 November 2010
Hearing date:	8 December 2010
Consideration date:	8 December 2010
Considered by:	A Committee of the Authority (“the Committee”)

1. Summary of decision

- 1.1.1 The role of the Environmental Risk Management Authority (the Authority) is to protect the environment, and the health and safety of people and communities, by preventing or managing the adverse effects of hazardous substances and new organisms.
- 1.1.2 The application was considered in accordance with the relevant provisions of the Hazardous Substances and New Organisms Act 1996 (the Act) and the HSNO (Methodology) Order 1998 (the Methodology). Unless otherwise specified, references to sections in this decision refer to sections of the Act, and references to clauses refer to clauses of the Methodology.
- 1.1.3 The Committee was satisfied that the organisms met the minimum standards set out in section 36.
- 1.1.4 On taking into account all the effects of the organisms, the inseparable organisms and the matters in section 37, the Committee agreed under clause 26 that the positive effects outweighed the adverse effects of the organisms.
- 1.1.5 The Committee decided to **approve** the application in full, **without controls**.

2. The application

2.1. Background

- 2.1.1 The application was made for the import and release, without controls, of 11 species of dung beetles to overcome the many adverse effects caused by animal dung in New Zealand pastures.
- 2.1.2 The applicant noted that sheep, cattle, deer, goats and other domesticated livestock have been brought to New Zealand without the beetles that naturally process their dung. The applicant contends that unprocessed dung adversely affects the environment and productivity of pastoral ecosystems in New Zealand.
- 2.1.3 Therefore, the applicant has proposed the release of dung beetles which have evolved to process this dung. The benefits identified include:
- Improved soil health, structure, and fertility;
 - Improved water infiltration and reduced flooding;
 - Reduced nutrient runoff and waterway pollution;
 - Reduced greenhouse gas emissions from dung and urine;
 - Increased biomass and activity of earthworms;
 - Increased availability and yield of forage plants;
 - Reduced re-infection of livestock by parasitic worms;
 - Reduced use of animal drenches; and
 - Improved sustainability of pastoral production.

2.2. Description of the organisms to be released

- 2.2.1 The organisms to be imported and released are the following 11 species:
- *Onthophagus binodis*;
 - *Onthophagus gazella*;
 - *Onthophagus vacca*;
 - *Onthophagus taurus*;
 - *Euoniticellus fulvus*;
 - *Onitis alexis alexis*;
 - *Bubas bison*;
 - *Bubas bubalus*;
 - *Copris hispanus hispanus*;
 - *Copris lunaris*; and
 - *Geotrupes spiniger*.

2.3. Māori consultation

- 2.3.1 The applicant carried out national Māori consultation including iwi, hapū, Māori organisations and individuals.

- 2.3.2 Input from respondents was used to support the development of the application, including the identification and assessment of effects on the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, valued flora and fauna, and other taonga.

3. Application process

3.1. Application receipt

- 3.1.1 The application was formally received for processing on 13 September 2010.

3.2. Public notification and submissions

- 3.2.1 The application was publicly notified and open for submissions for 30 working days as required by section 53(1)(b) and 59(1)(c). On 22 September the application was advertised on the ERMA website and in *The Dominion Post*, *The New Zealand Herald*, *The Otago Daily Times* and *The Press*.
- 3.2.2 Letters or emails were also sent to interested parties (the applicant, the Minister for the Environment, government departments, crown entities, local authorities, Māori organisations, and stakeholders) who had expressed an interest in being notified about similar applications.
- 3.2.3 A total of 37 written submissions were received. Copies of all the submissions were made available to anyone who requested them.

3.3. The decision-making committee

- 3.3.1 Section 19(2)(b) and clause 43 of Schedule 1 of the Act empower the Authority to appoint a committee to hear and decide an application. On 14 October the Authority appointed a decision-making committee (“the Committee”) consisting of Dr Max Suckling (Chair), Dr Val Orchard and Dr Shaun Ogilvie.

3.4. Consultation with government departments

- 3.4.1 In accordance with section 58(1)(c) and clause 5, Ministry of Agriculture and Forestry (MAF) and Department of Conservation (DOC) were consulted about the application.
- 3.4.2 Only DOC made a submission in conjunction with the public submission process. The Committee had particular regard to this submission. DOC also presented their views at the hearing.

3.5. Report under section 58

- 3.5.1 The Committee sought advice in the form of a report from the staff of Environmental Risk Management Authority (“the Agency”) under section 58(1)(a). On 24 November 2010, the Agency’s report was made publicly available.

3.6. Hearing

- 3.6.1 Under section 60, a hearing must be held if any person who has made a submission requests to be heard at a hearing. Following requests, a hearing was held on 8 December 2010.

3.7. Consideration

- 3.7.1 The Committee met to consider the application on 8 December 2010.
- 3.7.2 The information that the Committee took into consideration included information gained from the applicant, Ngā Kaihautū Tikanga Taiao, DOC, submitters and the Agency.

4. Assessment of effects

4.1. Risk management context

Risk assessment methodology

- 4.1.1 The Committee took into account all the potential risks, costs and benefits of the organisms on the environment, human health, Māori culture and traditions, society and the community and the market economy. The level of each effect was assessed qualitatively, using the descriptors described in Appendix 1.

Approach to risk

- 4.1.2 When considering applications, clause 33 requires the Committee to regard the extent to which the following risk characteristics exist. This provides guidance on how cautious or risk averse the Committee should be in weighing up risks and costs against benefits.
- 4.1.3 The Committee considered clause 33 and concluded that a degree of caution is warranted as exposure to risks would be involuntary and the risk will persist over time.
- 4.1.4 As required under section 37 in its assessment of effects the Committee had regard to the organism(s) ability to establish an undesirable self-sustaining population, and the ease with which the organism(s) could be eradicated if it established an undesirable self-sustaining population.

Approach to uncertainty

- 4.1.5 Section 7 and clauses 29 and 32 require the Committee to take into account the need for caution in managing positive and adverse effects where there is scientific and technical uncertainty.
- 4.1.6 In its consideration, the Committee in particular took technical uncertainty into account when assessing the importance of information provided. For example the Committee noted that the peer-reviewed information had higher levels of technical certainty than other information sources.

Scenarios and assumptions

- 4.1.7 For the purpose of assessment the Committee assumed all species will fully establish.
- 4.1.8 The Committee also noted that common drenches used in current pest management would adversely affect dung beetle survival. Thus changes in individual management practises would be required for those that wish dung beetles to populate their farms.

Approach to grouping species

- 4.1.9 The Committee were satisfied that in this particular case, it was possible to evaluate and assess the effects of the 11 species collectively.

Ethics

- 4.1.10 In reviewing the information provided, and identifying and assessing the positive and adverse effects of importing and releasing the the 11 species of dung beetle, the Committee took into account relevant ethical matters. The Committee was conscious of the range of different worldviews that exist with respect to the release of new organisms in New Zealand.

5. Minimum Standards

- 5.1.1 The minimum standards are set out in section 36, which states that applications shall be declined if the new organism(s) does not meet those standards.
- 5.1.2 Upon assessing all the potentially significant risks and costs the Committee did not consider that any of the five minimum standards had been triggered.
- 5.1.3 The Committee noted that the Agency's advice recommended that one species of dung beetle, *Geotrupes spiniger* be declined as it might trigger the minimum standards. Additional information from the applicant provided sufficient evidence and satisfied the Committee that *Geotrupes spiniger* did not trigger the minimums standards, and could be assessed with the other 10 species.

6. Assessment of risks and costs

- 6.1.1 The Committee identified and assessed four potentially significant risks and costs. These are discussed below

Runoff leading to eutrophication of ground water

- 6.1.2 The Committee regarded the concerns of some submitters that the tunnelling actions of the dung beetles would lead to contamination of groundwater.
- 6.1.3 The Committee agrees with the Agency's assessment, and concluded that the likelihood of this negative effect would be **very unlikely**. The dung beetle species considered here tunnel only as deep as earthworms and there is no evidence that earthworm tunnelling leads to increased pollution of groundwater. In addition, the tunnels are known to be continually backfilled.

- 6.1.4 The Committee considered that through the cooperative actions of earthworms and dung beetles soil structure would be improved boosting the biodiversity in soil to better cope with both dung and urine waste from herbivores. Therefore, the magnitude of this effect is **minimal**.
- 6.1.5 The Committee decided that the adverse effect of increased runoff leading to contamination of ground water is **negligible**.

Native beetle displacement

- 6.1.6 Concern was raised by submitters of negative effects on native beetles in their natural habitat.
- 6.1.7 The Committee notes that New Zealand has native beetles (Family Scarabaeidae) living in forested areas. They have a broad range of food preferences. While this could include the dung of cows, sheep, birds, reptiles and insects, if available, they are also able to utilise other decaying material, so are not obligate on dung.
- 6.1.8 The Committee note that the approved exotic dung beetles have been demonstrated to be pasture specific, and will not, unless attracted by the availability of herbivore dung, enter darkened forested areas.
- 6.1.9 The Committee considered it **unlikely** that introduced dung beetles would displace native beetles that utilise dung. The Committee considered the only plausible mechanism for displacement was through competitive exclusion. The Committee noted that the species to be introduced are obligate on dung from mammalian herbivores whilst the native species were generalist dung feeders. Without the sole reliance on one shared resource the Committee considered the **minor** magnitude of any competition would not be enough to cause significant displacement. The Committee therefore considered this effect **negligible**.
- 6.1.10 In making this assessment the Committee further noted exotic dung beetles will only be present in areas where exotic herbivorous mammals are regularly found. The removal of these herbivorous mammals (e.g by fencing) would remove any potential effects.

Increased parasites

- 6.1.11 The potential for the introduced dung beetles to become a vector for parasites was an effect considered negligible as no plausible mechanism was identified.
- 6.1.12 Submitters raised the findings of research demonstrating the increased survival of intestinal round worm larvae in buried dung. While the Committee accepts the results as presented, they also conclude that as the experimental dung was not processed by dung beetles, the exposure of nematode eggs to desiccation and other factors including physical damage had not been accounted for.
- 6.1.13 The Committee conclude that the likelihood of dung beetles increasing infectious nematode and other parasite populations as **very unlikely**, and a **minor** magnitude, consequently the effect was deemed **negligible**.

Degradation of mauri

6.1.14 The final effect assessed by the Committee, was the potential for mauri to be degraded, disempowering the role of kaitiakitanga. As no biophysical mechanisms were identified, the Committee agreed with the Agency's recommendations that this effect was considered **negligible**.

7. Assessment of benefits

7.1.1 The Committee identified and assessed six potentially significant benefits, or positive effects.

Improved water retention in soil and reduced eutrophication

7.1.2 Many submitters supported the release of the exotic dung beetles to reduce nutrient runoff into streams and other waterways. They considered this would lead to an improvement in water quality and overall beneficial impact on the environment.

7.1.3 The Agency noted in their report the issue of eutrophication of waterways leading to the degradation of ecosystems. The committee acknowledged the ongoing efforts of the government, councils and other organisations in seeking solutions to this problem.

7.1.4 In considering the issue, the Committee determined that the dung beetles would improve the aeration of the soil leading to an increased water holding capacity through improved top soil composition and structure. It was also noted that the removal of dung from the soil surface will lead to a reduction of nutrient runoff into streams and lakes. A resulting **moderate** long term benefit to the farming community and animal welfare was considered **likely**. Therefore the Committee concluded a **medium** positive effect.

Improved earthworm biomass and activity

7.1.5 The benefits of earthworm activity to soil are well demonstrated in the published literature. However, it is also recognised that earthworm distribution is patchy and their activity in New Zealand is limited by climate.

7.1.6 In New Zealand the earthworms found in pastures are exotic species and these species are unevenly distributed throughout the country. The introduction of dung beetles will increase the biodiversity improving soil health.

7.1.7 The Committee also noted that in drier months, there is reduced earthworm activity due to their inability to burrow through the soil which triggers aestivation. Many of the approved dung beetles are active in the months when earthworms are not. Therefore, with the introduction of dung beetles, year round benefits can be achieved.

7.1.8 The Committee considers it **likely** that the tunnelling activity of dung beetles will increase soil aeration, the incorporation of nutrients of dung into the soil, and lead to increased earthworm vigour. The benefits would be localised and are considered to be **moderate**. Therefore, the Committee concluded a **medium** positive effect.

Improved water quality for human consumption

7.1.9 Many submitters identified the reduction in runoff, leading to an improvement in water quality, as a benefit for human health.

7.1.10 As stated earlier (7.1.2), eutrophication of waterways in New Zealand is a well recognised problem. Many rural communities in New Zealand still rely on water from catchments that include or are adjacent to farms. Water from these catchments may not be treated in a way similar to major metropolitan centres before being used.

7.1.11 The Committee considers that the improvements of soil structure will **likely** lead to a reduction of runoff into streams and lakes, improving water quality. This has a significant benefit, that effects the farming and the wider community that rely on quality water, therefore the magnitude of this benefit is considered to be **moderate**. The Committee concludes a **medium** positive effect.

Increased farm productivity

7.1.12 The Committee notes that there are multiple possible pathways dung beetles could add to New Zealand's farm productivity. One benefit comes from the dung being buried, quickly removing it from the soil surface, increasing the amount of grazing land being available for farming.

7.1.13 Furthermore, the burial of dung increases the availability of nutrients to earthworms, soil biota and the pasture itself, which reduces the dependency on fertilizers to stimulate pasture growth.

7.1.14 There is also the benefit of a reduction of the availability of dung to nuisance insects like flies, which use dung as both an energy source, and to lay eggs in. The removal of the dung will help to reduce their numbers, leading to increased livestock health.

7.1.15 Assuming that mixed populations of dung beetles establish on New Zealand pastures, it is **likely** that the removal of dung from the surface of the soil will increase farm productivity. The magnitude of this benefit is considered to be **moderate**. Therefore the Committee concludes a **medium** positive effect.

Reduction in parasites

7.1.16 The Committee agrees with the evidence presented that the beetle's mechanical break up of the dung pat, subsequent burial, and the natural action of the beetle mouth parts, will **likely** reduce the number of parasitic nematode larvae. This would lead to a **moderate** improvement in livestock health and a reduction on the reliance of drenches in farm management. Therefore, the Committee concludes a **medium** positive effect.

7.1.17 The Committee also considers that improved dung management will reduce the likelihood of any new incursion of pest fly species from establishing. The existing use of chemical eradication alternatives is not considered environmentally sustainable and carries a high social cost.

Improved kaitiaki outcomes resulting from updated farm management practises

7.1.18 The Committee notes that a number of iwi who support the application expressed an interested in being actively involved in any dung beetle release in their regions. The Committee commends the spirit in which this offer is given, and recommends that the approval holder keeps in contact with these and other iwi to foster these relationships. The Committee noted that these iwi groups considered that the benefits of incorporating dung beetles into farm practise will improve kaitiakitanga outcomes by enabling innovative systems to reduce reliance on fertilisers and pesticides, and could help reduce any adverse ecological impacts of drenches.

7.1.19 Given the information provided, the Committee considers a **moderate** beneficial effect to improved kaitiakitanga outcomes to be **likely**. Therefore the Committee considers a **medium** positive effect.

8. Weighing of risks, costs and benefits

8.1.1 The Committee evaluated the overall risks, costs and benefits in accordance with section 38 and clause 22. In doing so the Committee noted that only beneficial effects arising from the release of the 11 dung beetle species were assessed as **significant**.

8.1.2 The Committee noted that under clause 26 it may approve an application where an organism(s) poses negligible risks and it is evident that the benefits associated with the organism outweigh the risks and costs.

8.1.3 The Committee therefore concluded that because the beneficial effects of introducing dung beetles into New Zealand outweigh the adverse effects, it is appropriate to approve the application.

9. Decision

- 9.1.1 The Committee were not aware of any international obligations that may be affected by the release of the organisms.
- 9.1.2 The Committee noted that biosecurity clearance would be required before the 11 species could be released.
- 9.1.3 Furthermore *Onthophagus binodis* would need to be removed from the MAF unwanted organism register, a process already underway.
- 9.1.4 The Committee is satisfied that post-release monitoring is not required for risk management purposes, as the Committee are satisfied that there is sufficient information to make a decision. However, the Committee is very supportive of post-release monitoring, and encourages the publication of this data, as this is helpful when assessing future release applications. Likewise the Committee would also like to encourage further research into the ecology of native dung beetles.
- 9.1.5 The Committee noted that under section 38(3) the approval to import for release will lapse 5 years after the date of the approval, unless the approval holder has released an organism earlier.
- 9.1.6 The Committee under section 38(4) requires that the person who releases an organism for the first time must notify the Authority at least one month before the date of the release.
- 9.1.7 The Committee was satisfied that the information provided was relevant and appropriate to the scale and significance of the risks, costs and benefits associated with the application; and sufficient to make an informed decision.
- 9.1.8 The Committee considered that the threshold for approval under section 38 had been met, as it concluded that:
- the organisms do not trigger the minimum standards; and
 - the positive effects outweigh the adverse effects.
- 9.1.9 The Committee decided to exercise its discretion to **approve** the import and release of 11 species of dung beetle under section 38(1)(a). The Committee noted that in accordance with section 38(2), the approval has been granted **without controls**.

Dr Max Suckling

Chair of the Decision-making Committee

2 February 2011

Date

Approval codes: NOR100003 – 13

Approval numbers for organisms on application ERMA200599

Approval number	Organism
NOR100003	<i>Onthophagus vacca</i> (Linnaeus, 1767) (Laurentii Salvi, Holmiae 1: 547)
NOR100004	<i>Onthophagus taurus</i> Schreber, 1759 (Novae species Insectorum: 7 F.6,7)
NOR100005	<i>Euoniticellus fulvus</i> Goeze, 1777 (Weidmanns Erben und Reich 1: 74)
NOR100006	<i>Onitis alexis alexis</i> Klug, 1835 (Ermans Reise Atlas: 32)
NOR100007	<i>Bubas bison</i> Linnaeus, 1767 (Laurentii Salvi, Holmiae 1: 547)
NOR100008	<i>Bubas bubalus</i> Olivier, 1811
NOR100009	<i>Copris hispanus hispanus</i> Linnaeus, 1764
NOR100010	<i>Copris lunaris</i> Linnaeus, 1758
NOR100011	<i>Geotrupes spiniger</i> Marsham, 1802
NOR100012	<i>Onthophagus binodis</i> Thunberg, 1818 (Memoires de l'Academie imperiale des Sciences de Saint Petersburg 6: 407)
NOR100013	<i>Onthophagus gazella</i> Fabricius 1787 (Mont. Ins., 2: 377)