

Submission to the Australian Federal Parliament Senate Inquiry.

"The risks and opportunities associated with the use of the bumblebee population in Tasmania for commercial pollination purposes."

Introductory Comment.

Why Bumblebees?

To grow large, round tomatoes, the tomato flower must be well pollinated. Outdoor tomato crops are pollinated by wind currents, but inside a greenhouse flower trusses must be individually vibrated. In Australia this is currently done with an electric wand – a labor intensive process. Consequently growers are keen to utilize an alternative, far less costly process. Use of the exotic bumblebee (*Bombus terrestris*)

There have been three earlier applications to import bumblebees (*Bombus terrestris*) into Australia –1995, 1997 and 2005. All were refused because of high invasive risks. The most recent was refused in 2008. At that time, *environment minister* Garrett, said:

"The scientific evidence and advice I have received suggests that the environmental and economic risks of a large earth bumblebee population spreading throughout mainland Australia are significant."

"No matter how hard we try to contain them to greenhouses the risks of their escape into the environment are too great."

"They have the potential to contribute to the rapid spread of weeds, including exotic species that have not yet become established."

"Large earth bumblebees can upset pollination and damage flowers when taking nectar, potentially robbing native birds of food - many of these are already under threat because of habitat loss and destruction." (1)

What evidence is now available to show that there has been *any significant reduction in those risks?*

Terms of Reference

a. Existing distribution and population density of exotic bumblebees.

A study published in *Austral Ecology* in 2002, 10 years after the introduction of the bumblebees (*Bombus terrestris*) in Tasmania, found evidence of them breeding in native vegetation in wet and dry zones across an area of approximately 30,000 km² in Tasmania. This included six national parks, World Heritage areas, remote parts of Tasmania, and up to 61 km from small towns. Evidence of breeding was found in all of Tasmania's major native vegetation types, from sea level up to 1180 meters. (Hingston *et al.* 2002) (2)

b. Rate of spread

An environmental impact statement (EIS) produced by the Tasmanian Museum and a study by other researchers showed that bumblebees (*Bombus terrestris*) had spread at around 25 km annually since its introduction (in 1992) and were established across most of Tasmania within 10 years of their introduction (Hergstrom *et al.* 2002; Hingston *et al.* 2002) (3)

After an additional 14 years at this rate of spread, the bumblebees (*Bombus terrestris*) will have spread to all areas of Tasmania where the environment is hospitable. They have also been detected on an island 10kms off the coast of Tasmania.

c. Productivity and economic benefits of the commercial use of bumblebees for agricultural producers.

It is already well established that bumblebees are highly efficient pollinators of glass house

raised tomato plants, increasing production by approximately 20% over most other currently utilised pollination processes.

Tasmanian glasshouse tomato production accounted for only 8.7% of all such tomato production in Australia in 2013 /2014. (iv) The relatively small gain in total output by using bumblebees, over the currently used pollination method, (a vibrating wand) is significantly outweighed by all other potential economic, environmental and ecological costs.

It is notable that only nine businesses are involved in this industry in Tasmania, one being the biggest producers of glasshouse tomato crops in Australia. Other glasshouse crop producers, such as the capsicum growers, who may use bumblebees for pollinators, are also relatively very small in Tasmania, and as a proportion of the national growers (3.5%). (4)

d. The potential environmental impacts associated with the commercial use of bumblebees, including whether their use is likely to:

i. impact the conservation status of a species or ecological community,

(See comments in Section d. ii) and f.)

ii. impact biodiversity and cause unintended ecological impacts,

Introduction of the bumblebee ... likely lead (has led) to increased seed production of some weeds that currently lack an efficient pollinator. *Bombus terrestris* could be an ideal pollinator for weeds that currently occurs in low densities. (eg *Datura* species). Weeds that have become more invasive in Tasmania since *B. terrestris* arrived ... include *Rhododendron ponticum*, *Solanum marginatum*, *Buddleja davidii*, and *Agapanthus praecox* (7)

Other weeds likely to benefit are poisonous or prickly, and problematic for the dairy and grazing industries in Tasmania. More research needs to be carried out in these areas.

Other negative impacts include competition with native flower visiting animals for floral resources.

As in most cases of species being introduced outside their native habitat, bumblebees have had a definite negative impact on the biodiversity of the environment they have been introduced into.

Their effect on mainland biodiversity would likely be very similar, but on a much larger scale. As one can readily assume if a new stock of bumblebees (*Bombus terrestris*) are permitted to be introduced to extend the genetic basis of those already present. Introduced bumblebees have the potential to transmit a variety of new pathogens posing clear potential risks to the European honeybee industry. (8) That industry currently provides pollination services to agriculture estimated at \$3.2 billion pa.

iii. contribute to a wider distribution of bumblebees;

Under the Environment Protection and Biodiversity Conservation (EPBC) Act (Aust.) it is illegal to possess or use bumblebees. If the EPBC Act is amended to allow the possession and use of this species in Tasmania, whether there by default, or legally imported, that will create a huge ***incentive to illegally introduce bumblebees to the Australian mainland.***

A 1997 application to import bumblebees to the mainland stated that there was a high risk of illegal importation: 'There is a good chance of illegal importation and release by impatient tomato growers who would wish to enjoy the obvious benefits of bumblebee pollination'. The NSW scientific committee also noted the risk of deliberate introduction of bumblebees as a pollinating agent? (9)

iv. import new bumblebee varieties

As the existing bumblebees in Tasmania have evolved from only one queen, (10) *importation of new varieties* would be seen as critical to overcome the deficiencies due to inbreeding by those wanting to benefit from its use in glasshouses. If not approved by the appropriate Australian Government bodies, this would create a strong incentive to possibly illegally introduce new stock, which may well worsen environmental impacts, if that genetic stock carries new pathogens.

Amending the EPBC Act to permit legal possession and use of the bumblebee would raise expectations more generally, that illegally introducing *any species* would lead eventually to its use being permitted.

e. Implications for Australia's biosecurity regime of any approval to use bumblebees in Tasmania for commercial purposes;

The bumblebee is already listed as a key threatening species in NSW and as a potentially threatening species in Victoria. (11) Allowing its *legal* use in Tasmania would be contrary to the well researched, scientifically established position in both of these States, Australia as a whole and several overseas countries (*New Zealand, Israel, Japan, Chile, Argentina*)' where the *Bombus terrestris* has been determined to be a *invasive pest*.

f. Potential economic outcomes;

Whilst the glasshouse vegetable growing industry will undoubtedly present statistical evidence regarding the increased quantity of production *they* may attain, the *net economic / environmental costs to be weighed against this* for the rest of the society are far greater.

Consideration of the impact on the Australian honey bee industry in particular is potentially quite significant. but unquantifiable at this point. The Australian Honeybee Industry Council has opposed introduction of the bumblebee on earlier occasions. (12) *Bombus terrestris* could compete for nectar and pollen with the honeybee, and because it can forage at lower temperatures and start foraging earlier in the morning, it would have a competitive advantage over managed honeybees. It could host new parasites and pathogens of other bees. This is of particular concern if there is incentive for illegal imports of bumblebees, as already alluded to.

In this litigious age, if approval is given for the use of bumblebees in glasshouses as sought, and negative economic / environmental consequences flow from this to other industries, who will be seen as legally responsible for the "damage caused" and who will bear the financial cost?

g. Effectiveness of alternative pollination options;

Native Bees. The *Australian Native Bee Research Centre* has researched the potential of two species of blue-banded bees, *Amegilla holmesi* and *A. chlorocyanea* in pollinating greenhouse tomatoes. They were determined to be as effective as bumblebees, and superior to an electric wand in increasing fruit weight and roundness. (13)

Other native bee species have also shown potential for the pollination of greenhouse crops. Pablo Occhiuzzi of the University of Western Sydney – Hawkesbury found that Australian stingless bees (*Trigona*) thrived in greenhouse conditions and improved fruit weight and yielding a capsicum crop. (14)

Funding for research in these areas was halted in 2009. Further funding to extend understanding in this area could be of significant benefit to glasshouse vegetable producers, those in the apiary industry and the environment at large.

Some progress has been made to develop a native bee pollinator for glasshouse tomatoes. (5) There are still a few impediments to using these species in glasshouses (eg. glasshouse designs, pesticide use) but funding for a project to investigate / expedite this form of pollinator ceased in 2009. (6) Instead of agitating to introduce a harmful invasive species, tomato growers should be funding research to develop this safe alternative.

European Honey Bees. More recent research (2002 onwards) investigating the use of honey bees as pollinators of tomatoes has been done using small experimental greenhouses; however, results have been largely inconsistent. Much of the inconsistency has now been ascribed to *significant limitations in the design of the experiments.* (15)

In the RIRDC case study referenced above, Sabara et al. (2004) used honey bees for three week periods in small experimental tomato greenhouses and found that these fruits produced significantly more seeds than bagged flowers restricted from facilitated pollination.

Other factors which effectively improved the pollination outcomes when using the European honeybee as pollinators also commented on were: crop layout within the glasshouse; density of bees; acclimatization of bees; preparation of the bee hive.

Whilst these factors are significant, they appear to be readily able to be overcome. Given the common interests of vegetable producers who utilize glasshouses want pollinating insects for their crops, and beekeepers seeking a financial return for hiring out their pollinating bees, a workable outcome should be attainable. The alternative of using *Bombus terrestris* presents many issues already canvassed and undoubtedly some that we are not yet aware of.

Related matters.

Like the European wasp, the bumblebee has a known propensity to locate within urban areas due to the greater availability of varied flora sources and nesting sites. In respect to these two factors, this is far more likely to bring it into closer contact with humans. It is known to favor building nests underground, hence providing a ready zone of interaction / conflict with humans actively working their garden. . Because of its capacity to repeatedly sting, any adverse interaction may prove extremely serious to the health of individuals. - Especially persons who may suffer an anaphylactic reaction.

If this demand for the use of the bumblebees in Tasmania for commercial pollination purposes is successful, it is quite easy to envisage future demands by the industry, especially as one of the country's largest producers of glasshouse tomatoes has a facility in Tasmania. Through the "foot in the door" argument, one can readily extrapolate their claim for the introduction and use of bumblebees (*Bombus terrestris*) throughout the rest of the glasshouse vegetable growing industry in Australia based on the "success" of the bumblebees (*Bombus terrestris*) in Tasmania! All the research and scientific evidence currently available indicate it would be extremely detrimental to allow yet another "invasive species" into Australia with untold consequences!

One can easily also foresee the "illegal" or "accidental" transfer of bumblebees onto mainland Australia, as the "economic benefit" envisaged from bumblebees (*Bombus terrestris*) may prove to *alluring to resist for some.*

Why is the application for use of the bumblebee focused in Tasmania? By implication, producers of tomatoes and similar products in glasshouses will endeavor to expand acceptance and use of bumblebees from this relatively benign beginning in Tasmania into far more substantial glasshouse facilities in the mainland States to attain "greater agricultural / economic returns".

Regrettably this will result in *significant negative* impacts in a range of other agricultural / environmental areas. Such as more rapid growth of some invasive weed species with resulting damage to pastures / crops and need for their control; damage to habitat for some species of native bee; impact on some species of native tree pollination rates, competition with varieties of (endangered) birds for available nectar and competition with commercial bees being operated for nectar gathering.

The following is an extract from –“An *Open Invitation – Fresh Tomato Levy and Bumblebee Industry Forum*” 16/7/2014 - 2014 HFF - Conference- Mulwala (16)

*“Why can't we use Bt (*Bombus terrestris*) bumblebees when they have been fine in Tasmania for 20 years?”*

This statement is an indictment on the thinking of those within that industry. It demonstrates a lack of concern / understanding of the issues involved concerning the potential legal introduction of bumblebees into our environment.

Sources / References

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The above submission to:

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