



429 Windgap Rd.,
Flatrock, NL, A1K 1C4

709-437-5155

www.nlbeekeeping.ca

24 February 2017

Honourable Steve Crocker
Minister of Fisheries and Land Resources
Petten Building, 30 Strawberry Marsh Road
P.O. Box 8700
St. John's, NL, A1B 4J6

Dear Minister Crocker,

The following is a follow-up to a letter to the former Minister of Environment and Climate Change, the Honourable Perry Trimper, of January 28, 2017, regarding the issue of *Bombus impatiens* importation for the purpose of cranberry pollination. We enclose a copy of our original letter to Mr. Trimper. We wish to inform you that we have entered into a dialogue concerning this matter with the Cranberry Association of Newfoundland and Labrador. Unfortunately, they appear to be resolute in their determination to obtain *Bombus impatiens* quads as soon as possible despite our objections.

We have just written back to the Association pointing out that none of their arguments challenge the scientific evidence available to us concerning the unacceptable risks associated with this importation proposal, nor do they alter our conclusion that the risk of serious negative consequences resulting from bumble bee imports far outweighs the benefits. We have reiterated our offer to work with the cranberry producers to develop environmentally responsible solutions to their pollination issues. However, these solutions must be well researched, well considered, and based on the best available scientific evidence. We would be happy to partner with them to facilitate the kind of research required so that their pollination needs can be met.

In the meantime, we would like to respond to each of their points, one by one. These are probably the points they would raise with you and your colleagues in the course of any lobbying efforts they may make.

1. There are not enough native pollinators and for that reason cranberry producers need another source to obtain pollinators.

There is a general lack of knowledge regarding the bee species in Newfoundland. Bumble bees make up only about 20% of the bee species in Newfoundland. There is a significant number of bee species (other than bumble bees) that are important pollinators of cranberry, blueberry and other native plants. However, many lay people are unable to identify these bees, and many would not even see them as bees. Therefore, it is premature to conclude that there are not enough native species to

pollinate cranberries, when the full spectrum of pollinator species available in cranberry fields has not been inventoried.

2. This past season native pollinators were observed in late May and early June. However, the native bees apparently disappeared as a result of some chilly weather and a frost. Most cranberry yields declined by 50% due to the absence of the native pollinators.

Some people are unaware of the life history of bumble bees here in Newfoundland. For a good description of bumble bee biology, see Williams, et al. (2014). Solitary, mated queens are the only bumble bees to hibernate through the winter. They emerge in the spring when the temperature rises. Warmer spring weather commences on the Mainland in March and April. However “spring” occurs much later here in Newfoundland, as we all know. The queens are around in late May and early June during which time they forage for nectar and pollen to feed the first brood of workers. The number of workers produced in the first brood is small (~5-7 workers). These workers are considerably smaller in size compared to the bigger queen. The queen does not leave the nest after she has provisioned the cells with enough food to rear that first brood. After the first workers emerge they take over the food-gathering duties and the queen remains in the nest laying eggs for subsequent broods. It is most probable that the first bumble bees cranberry producers saw in May and June were the queens. The frost most likely did not affect the bees as they would be safe inside their nests. What appeared as a die-off of bees was likely the slow growth of the first worker brood. The more likely cause of the reduction in fruit set would be the negative impact of the frost on the flowers and the developing flower buds. It is well known that heavy frost at that vulnerable time of flower development is detrimental to its development and thus impacts the fruit set (see Eaton and Mahrt, 1977; Hall, Aalders, and Newberry, 1971; Reader, 1979).

Furthermore, we cannot evaluate the claim by the Cranberry Association that most cranberry yields declined by 50% due to the absence of the native pollinators because no data are provided to substantiate it. It would be helpful if yearly data on cranberry yields for all cranberry producers could be provided to us so that we can better understand fluctuating yields in relation to climatic and other variables.

In any event, much more research is needed to understand the year-to-year impact of climate on the development of cranberry fruit. We have recommended to the Cranberry Association that they ask government for more pollinator related research rather than the ill-considered and ecologically unsound measure they are presently asking for.

3. The risk of introducing non-native bumble bees into the province is overrated; most mites found on bumble bees are harmless and only effect bumble bees. The Cranberry Association’s reference for this claim is <https://bumblebeeconservation.org/aboutbees/faqs/bumblebee-mites/>

The risk associated with the introduction of non-native species is not overrated; it is real. Our concern is not related to the introduction of mites. Rather, the introduction of non-native *Bombus impatiens* will likely have negative, irreversible consequences for the native bee fauna due to competition and spillover of pathogens.

Considerable evidence has shown that that non-native species can out-compete native species for resources (food and nesting habitat) (e.g., see Goulson, 2003; Wirtz, et al., 1988). In Nova Scotia and New Brunswick, most *Bombus impatiens* quads are purchased from Koppert Biological Systems (<https://www.koppert.ca/en/products/quad-pollination/#c249>) or Biobest Canada Ltd. (<http://www.biobestgroup.com/en/biobest/pollination>) in order to pollinate wild blueberries in June, after which in early July the “used” quads are moved to cranberries (Fletcher Colpitts, Paul Kittilsen, Michel Melanson, Roger Tremblay personal communications). However, unlike honey bee colonies (which are used extensively in both blueberry and cranberry pollination), the *Bombus impatiens* quads are abandoned in the cranberry fields until the end of the colony life cycle, at which point a certain percentage of the *Bombus* queens overwinter (see Stubbs and Drummond, 2001). Anecdotal evidence suggests that *Bombus impatiens* abundance in blueberry and cranberry growing regions of the Maritimes has increased dramatically posing a significant risk to other bumble bee species (Andony Melathopoulos, personal communication). Given such management practices and the fact that *Bombus impatiens* has already been shown to overwinter in Newfoundland as a result of unpermitted importation of used quads (see below), there is every reason to believe that systematic importation of this exotic species would lead to its permanent establishment here. This could well cause a decline and possible extirpation of native bee species. The consequence for fruit production of not only cranberries and blueberries but of all other native plant species that rely on native bees for their propagation could be substantially negative. These other plant species are much more important than either cranberry or blueberry because of the vital ecosystem support they provide to a large variety of native wildlife species. Importation of non-native *Bombus impatiens* may result in irreparable damage to the Newfoundland ecosystem that could result in a decline in native plants and eventually the wildlife that is supported by the plants. Moreover, in the long run, cranberry farmers would be sucked into an unwanted cycle where they would have to import bees every year for pollination as the native bee abundance would be low all the time.

We have invited the Cranberry Association to consider the “Commercial Bumblebee Policy Statement” by the influential International Union for Conservation of Nature (IUCN, nd).

The global trade in bumblebee colonies for crop pollination, most notably of the European species *Bombus terrestris*, has resulted in the establishment of this bumblebee species far from its native range, for example in Japan, Chile and Argentina. Invasive, non-native bumblebee species pose multiple risks to native species, including: competition, hybridization resulting in loss of locally adapted ecotypes, and introduction of nonnative bee diseases. There is evidence that parasites from commercial bumblebees may have been irreversibly introduced to Japan, North America and South America, with potentially profound impacts on native bumblebees.

The IUCN BBSG [Bumble Bee Specialist Group] considers that the commercial movement and deployment of bumblebees for pollination should be governed by the precautionary principle to prevent unintended harm. Local bumblebee species and subspecies should be targeted for commercial development and produced within their native ranges. All commercial bumblebees should be thoroughly screened for parasites by both producers and independent regulators. All use of commercial bumblebees should be controlled to eliminate the risk of escape from greenhouses.

4. There is no scientific proof that bumble bees have any adverse effect on honey bees.

This proposition is not supported by the scientific literature. While our major concern is not the effect on honey bees but on native bee species as outlined above, the NLBKA has legitimate concerns about the adverse effects on honey bees as well. We have invited the Cranberry Association to properly consult the scientific literature with respect to pathogen spillover between bumble bees and honey bees (e.g., see Graystock, et al., 2013a, 2013b, 2015; Manley, et al. 2015; McMahon, et al., 2015).

5. Illnesses common in domesticated honey bees are infecting wild bumble bees. The Cranberry Association cites a “recent” study published online in *Nature* and commented on by entomologist Dennis vanEngelsdorp.

In fact this study is not recent. The Cranberry Association quoted a story in the *National Geographic* by Jennifer S. Holland dating to 2014 (Holland, 2014). However, the study they reference is by Fürst et al. published in *Nature* (2014) that focuses on two pathogens, Deformed Wing Virus and *Nosema ceranae*. This study along with a number of others since then (e.g., see Graystock, et al., 2013a, 2013b, 2015; Manley, et al. 2015; McMahon, et al., 2015) have shown that there is considerable spillover from bumble bees to honey bees and back. Furthermore, recent COSEWIC Assessment and Status reports for some bumble bee species in Canada such as *Bombus terricola* point to pathogen spillover from managed bumble bees used in greenhouses as one possible cause for declines in the unmanaged species (COSEWIC, 2015). It is important to note, however, that the situation in Newfoundland is different than in other places globally. *Varroa* mite has not been detected here (see Williams, et al., 2010; Shutler, et al., 2014). It is the combination of the diseases (viruses in particular) and the mite that results in epizootic outbreaks of these diseases in honey bee populations; something that we hope not to have to deal with in the future in Newfoundland. Newfoundland honey bees do not have *Nosema ceranae* infections (see Williams, et al., 2010; and Shutler, et al., 2014). It is important to note that a recent study by Hicks (unpublished data) has shown that used colonies of *Bombus impatiens* that were imported to Newfoundland by a cranberry farmer in 2013 had *Nosema ceranae* infection. There is concern that importing *Bombus impatiens* will introduce this to native bumble bees and eventually to the honey bees.

Furthermore, last summer (2016) a cranberry producer had unpermitted “used” colonies of *Bombus impatiens* seized by officials of the former Department of Environment and Climate Change . The colonies were infested with a beetle in the same family as the Small Hive Beetle (Family: Nitidulidae). While the beetles turned out not to be small hive beetle, the accidental introduction of invasive species by importation of *Bombus impatiens* is a very real possibility and one that **should be safeguarded against at all costs.**

6. Bumble bees are better pollinators because of buzz pollination; they work in unfavourable weather whereas honey bees only work if the temperature is around 76 degrees F.

Here is another example where the lack of understanding of the diversity of bee species is apparent. The majority of the bee species in Newfoundland include members of the Andrenidae, Halictidae and Megachilidae families that are buzz pollinators. It would appear that cranberry producers in Newfoundland do not have the training to identify bee species from these families. If they are not able to identify the species present in their cranberry fields, how can they say that there was a decline

in pollinator abundance in the first place? How can they establish a causal connection between declines in fruit production and a low abundance of pollinators that they are not able to identify?

7. Honey bees will travel longer distances if they find another source of food elsewhere. Bumble bees visit more flowers per minute than honey bees.

The first proposition is true but the second one is false. With respect to bumble bee forage distances, there are a wide range of distances referenced in the scientific literature, but in general the distance that *Bombus impatiens* will travel while foraging is about 300 metres. The distances travelled vary according to species, forage quality, landscape features, and other factors (see Dramstad, 1996; Macfarlane, et al., 1994; Schaffer, 1997:26-28; Tremblay, et al., 2017). With respect to honey bees, Winston (1987:171) reports that in “agricultural areas the median foraging radius of honey bee colonies is only a few hundred meters....although significant forager populations have been found at 3700 m from apiaries.”

Contrary to what is claimed by the Cranberry Association, the frequency with which honey bees visit cranberry (and blueberry) flowers far surpasses that of bumble bees, although the latter are more efficient pollinators on a bee per flower basis.

The honey bee was the most abundant pollinator in our study plots each year. This point must be considered when making a decision about which pollinator to introduce. Many authors have raised doubts about using honey bees for cranberry pollination, and for many reasons. These include their limited pollinating efficiency during flower manipulation...as well as their weak fidelity to cranberry flowers, explained by their far greater flight capacity and well developed system of communication and orientation....Our results clearly demonstrate that despite these reasons, honey bees remain a superior choice. The large number of foragers in each hive, as well as their large forage zones explains their greater presence throughout the cranberry field (Girard, 2009:26, our translation; see also Tremblay, et al., 2017).

Barrette’s (2001) research in the period 1999-2000 showed that in 1999, for 1 honey bee visit to a cranberry flower, a bumble bee visited .28 times, whereas in 2000 the ratio was 1 honey bee visit for .54 bumble bee visit.

8. It is misleading that the honey bee industry is rapidly growing since honey bees were introduced (non-native) into this province in 1927 and 90 years later we still have less than 300 hives.

From what we know of the historic record, Leander L. Davis was the first person to keep honey bees in Newfoundland, at Harbour Grace, circa 1929. For more on the history of beekeeping in Newfoundland and Labrador see Hicks (2014). As of February 2017, there are about 500 honey bee colonies in the province managed by approximately 50 beekeepers. Beekeeping has clearly taken off as both a hobby craft and commercial activity with five beekeepers having a commercial focus. They sell honey, beeswax, pollen, and other products as well as offering pollination services to blueberry and cranberry producers. It is the spring climatic conditions that have been the single most limiting factor in terms of expanding the apicultural industry here. However, with new technologies and methods (e.g., instrumental insemination, indoor wintering of colonies, multiplication through splitting, etc.) we expect to overcome the climatic challenge in the near future. We are optimistic that

we can significantly expand the number of beekeepers and colonies in the province over the next 10 years so that we can improve not only our domestic market share of bee-related products but also offer various products for export nationally and internationally. In order to accomplish these goals we need to retain our status as a relatively disease free refugia for honey bees. We hope that the Cranberry Association will support us in our efforts!

9. Members of the Cranberry Association have invested heavily in the cranberry industry and they need access to pollinators when needed in order for their industry to survive.

We recognize that cranberry producers have invested heavily in their industry and have received significant government support as well. However, beekeepers are also investing heavily in the apicultural industry and are also receiving government support to do so. Of course, we understand that there can be no cranberry crop without pollination. However, the Cranberry Association has not demonstrated a need for imported bumble bees especially given the lack of data concerning non-*Bombus* pollinators, and the fact that other variables may be responsible for poor crops to date (e.g., bad weather affecting the flower, farming practices, etc). It is clear that the risks and potential long term costs of bumble bee imports in terms of damage to the broader ecological services provided by native pollinators and possible pathogen spillover to our honey bees far out-weigh any perceived short-term benefits.

In conclusion, the NLBKA is obviously eager to support its commercial operators and to expand the apicultural industry here. Although we are unable to quantify it at the present time, we think that we have something special to offer the rest of the world given our present status as a relatively disease free refugia. This status may allow us to offer clean-bee related exports to the rest of Canada and internationally. Moreover, Newfoundlanders and Labradorians will soon see an increasing variety and quantity of honey bee related products in our stores. Rather than embarking upon a high-risk bumble bee importation venture, we propose that our associations sit down together to work out alternatives. The Newfoundland and Labrador Horticultural Council should be invited to join us in this discussion.

Sincerely,



Catherine Dempsey,
President

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Personal Communications

- Andony Melathopoulos, Assistant professor, pollinator health extension, Department of Horticulture, Oregon State University, PhD Dalhousie University, personal communication to Peter Armitage 16 February 2017.
- Fletcher Colpitts, chief apiary inspector, crop development, Department of Agriculture, Aquaculture and Fisheries, Government of New Brunswick, personal communication to Peter Armitage 17 February 2017.
- Michel Melanson, blueberry-apiculture specialist, Department of Agriculture, Aquaculture and Fisheries, Government of New Brunswick, personal communication to Peter Armitage 17 February 2017.

Paul Kittilsen, past Maritime representative to the Canadian Honey Council, and cranberry farmer, Truro, Nova Scotia, personal communication to Peter Armitage 16 February 2017.

Roger Tremblay, small fruit/cranberry specialist, Department of Agriculture, Aquaculture and Fisheries, Government of New Brunswick, personal communication to Peter Armitage 23 February 2017.