Scientific Note: Discussion of the presence of an eastern bumble bee species (*Bombus impatiens* Cresson) in western Canada

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Bumble bees (*Bombus* spp. Hymenoptera, Apidae) are native pollinators of many ecologically and economically important plants in North America (Kearns & Thomson 2001). Their value as pollinators can be attributed to their ability to perform buzz pollination, their generalist foraging behaviour and their various adaptations for foraging in temperate climates (e.g. Goulson 2003a). Globally, some bumble bee species have suffered substantial declines within their native ranges whereas others seem to thrive in new or changing landscapes (Williams et al. 2009; Grixti et al 2009; Colla & Packer 2008; Goulson et al. 2008; Williams 1982). In North America, members of the subgenus *Bombus sensu strictu* (including *B. occidentalis* and *B. affinis*) have suffered dramatic declines throughout their ranges (Colla & Packer 2008; Evans et al. 2008). In contrast, *B. impatiens* (subgenus *Pyrobombus*) has expanded its range in eastern Canada (Sheffield et al. 2003) and has increased in relative abundance in southern Ontario (Colla & Packer 2008; Colla unpublished data) and Illinois (Grixti et al 2009).

In recent decades, bumble bees have been domesticated in North America to pollinate greenhouse and field crops such as tomato and sweet pepper (Velthuis & van Doorn 2006). Initially two species were reared commercially for this purpose; *B. occidentalis* in the west and *B. impatiens* in the east (Whittington & Winston 2004). After an apparent collapse of both managed and wild *B. occidentalis* populations, *B. impatiens* has since been used in parts of western North America to meet greenhouse pollination needs (Evans et al. 2009; Whittington & Winston 2004).

During the spring of 2003 & 2004, a study on the abundance and diversity of wild bees in commercial highbush blueberry and strawberry fields revealed *B. impatiens* outside of greenhouses in the west (Ratti et al. 2008; Ratti 2006).

The study was performed in the Fraser Valley of British Columbia where a total of eight sites were surveyed using pan traps (Ratti et al. 2008; Ratti 2006). None of these commercial producers used managed bumble bees for crop pollination (Ratti 2006). The nearest greenhouse was between 2 and 5 km from the fields and greenhouses are common in this area of the Fraser Valley. Collected specimens were identified by C. Ratti, confirmed by T. Griswold and deposited in the Packer Collection at York University Toronto, Ontario, Canada and the USDA-ARS Bee Biology and Systematics laboratory in Logan, Utah, U.S.A.

Six individuals of *B. impatiens* were collected, consisting of five workers and one queen. Five of these bees, including the queen, were pan trapped in a blueberry field in Ladner, British Columbia and the one additional worker was pan trapped in a strawberry field on Westham Island, British Columbia. The total numbers of bumble bees collected at these sites were 274 and 285 respectively. Three specimens were collected from April 30 2003- May 18 2003 and the other three were collected on May 14 2004 (see Ratti 2006 for further details).

The presence of *B. impatiens* in British Columbia is cause for concern. The presence of a queen, capable of initiating a colony is even more worrisome. The impact of introduced insects on native fauna and flora can be highly detrimental and complex (reviewed in Kenis et al. 2009) and may harm vulnerable native bee species. *Bombus*

impatiens has been found to transmit pathogens to wild congeners (Colla et al. 2006). While the lethal and sub-lethal effects of these diseases is not well known, the spillover of disease from managed to wild populations is thought to be a major threat to the declining members of the subgenus *Bombus*, including the increasingly scarce Vancouver native *B. occidentalis* (Evans et al. 2008; NRC 2007; Thorp & Shepherd 2005).

Introduced invasive bumble bee species can out-compete native bumble bee species for floral resources and nesting sites, as has been shown with the introduced *Bombus terrestris* and native bumble bees in Japan (Velthuis & van Doorn 2006; Inari et al. 2005; Goulson 2003b). Additionally, *B. impatiens* has been successful in urban areas throughout its native range (e.g. Colla & Packer 2008). Thus, the potential for this species to out-compete native species for food and nest sites in disturbed habitat is likely quite high. The possibility of hybridization of *B. impatiens* with western species and the potential impact on native wildflower communities are completely unknown.

The loss of native pollinator populations has recently become an issue of global concern (Biesmeijer et al. 2006; Buchmann & Nabhan 1996). In particular, native bees have been shown to be of importance for crop pollination (Klein et al 2007; Kremen et al 2002; Ratti et al. 2008). Threats to native pollinator populations such as introduced disease and competitors warrant thorough scientific study and practices which potentially impact already declining pollinators should be used with extreme caution (NRC 2007). Given the potential detrimental ecological consequences of the naturalization of *B. impatiens* in western North America, it is imperative to determine whether or not this has all ready occurred and if so, to what extent. Additionally, it is important to review the ability of current procedures controlling the escape of

managed greenhouse bumble bees into the wild. Perhaps the only way to conserve native bumble bee communities is to consider using species native to the region in which crops require commercial pollination, as suggested by Thorp (2003).

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