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Response to Blossey and Casagrande: ecological and evolutionary processes make host specificity at the subspecies level exceedingly unlikely

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We agree with Blossey and Casagrande (2016) that absolute host-specificity is a necessity for successful biological control of invasive plants without unintended consequences for native species. However, inclusion of non-target native species in the diet of a biological control agent is a relatively common phenomenon with native congeners of the target plant species at greatest risk (Pemberton 2000). As our concerns relate to North American native and invasive *Phragmites australis*, and host-shifts at the sub-specific level, the risk is substantially greater. We reiterate our previous arguments that the literature is replete with examples of how environmental context

(e.g., spillover effects, apparent competition, biogeographic variation in herbivore resistance) and evolution (e.g., via the hybrid bridge hypothesis) can lead to incorporation of new hosts into the diet. None of these possibilities were addressed by Blossey and Casagrande (2016), nor can they be in a simple laboratory/greenhouse study of host specificity.

Herbivore specificity for the invasive genotype is hardly as clear cut as Blossey and Casagrande (2016) claim. First, contrary to their claim, *Lipara pullitarsis* infests and successfully develops in native *Phragmites* (Allen et al. 2015). Second, another purported specialist, *Lasioptera hungarica*, attacks native-invasive hybrids (Saltonstall et al. 2014), a potential first step to a host shift (i.e., the hybrid bridge hypothesis). Finally, the noctuid moths (*Archanara geminipuncta* and *Archanara neurica*) they propose for biological control of invasive *Phragmites* in North America do not show the absolute host-specificity required to prevent damage to native genotypes. Fundamental host-ranges of these species include native genotypes of *Phragmites* and several other wetland grasses, including some economically important species (Blossey et al. 2013). Although leaf-sheaths, overwintering sites for *Archanara* eggs and larvae, “often” drop off from native stems, this is far from absolute and provides no assurance that native genotypes will not be attacked. *Archanara* also attack multiple stems during development, so can easily move to adjacent native *Phragmites* patches. Relying on managers to control

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Phragmites invasion.

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herbivore spillover from invasive to native genotypes in perpetuity is wishful thinking. That this approach is even suggested constitutes clear acknowledgement by Blossey and Casagrande (2016) that sub-specific host specificity is not absolute, nor possible.

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