

Accepted Manuscript

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PII: S1049-9644(18)30282-2

DOI: <https://doi.org/10.1016/j.biocontrol.2018.07.001>

Reference: YBCON 3799

To appear in: *Biological Control*

Received Date: 23 April 2018

Revised Date: 3 July 2018

Accepted Date: 4 July 2018



Please cite this article as: Michaud, J.P., Challenges to Conservation Biological Control on the High Plains: 150 Years of Evolutionary Rescue, *Biological Control* (2018), doi: <https://doi.org/10.1016/j.biocontrol.2018.07.001>

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Challenges to Conservation Biological Control on the High Plains: 150 Years of Evolutionary Rescue

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Abstract

Conservation biological control (CBC) makes valuable contributions to productivity in High Plains agriculture. Despite some notable exceptions, CBC holds a wide range of potentially damaging pests under natural control, largely due to the actions of beneficial arthropod species that have endured more than a century of forced adaptation to an increasingly industrialized agricultural landscape. 'Evolutionary rescue' is a natural selection process whereby species evolve adaptations that enable them to survive environmental conditions that would have been lethal to their ancestors. This process has structured both pest populations and the guilds of natural enemies that help suppress them in our highly disturbed agroecosystems. Rescued beneficial species, by virtue of their abundance and successful evolutionary history, including some either accidentally or intentionally introduced, are those with the greatest potential for future adaptation in the face of changing cultural practices and the emergence of novel pests. I review some existing impediments to CBC (large-scale, synchronous monocultures, inadequate plant and insect diversity in the landscape, migratory pests, vulnerable crop cultivars that rescue pests, rather than their enemies, and insecticidal seed treatments). Compounding these problems are commercial interests and agricultural philosophies that tend to incentivize yield-maximization and short-term profits over long term farm sustainability and profitability. However, certain agronomic practices implemented recently have likely benefited CBC. These include improved host

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