

Endangered Species Status for Rusty Patched Bumble Bee (*Bombus affinis*)

Literature Cited

- Arena, M. and F. Sgolastra. 2014. A meta-analysis comparing the sensitivity of bees to pesticides. *Ecotoxicology* 23:324–334.
- Bailey, R. G. 1983. Delineation of Ecosystem Regions. *Environmental Management*. 7(4): 365-373.
- Bailey, R.G., P.E. Avers, T. King, and W.H. McNab (eds). 1994. Ecoregions and subregions of the United States (map, scale 1:7,500,000) (supplementary table of map unit descriptions compiled and edited by McNab, W.H. and R.G. Bailey). U.S. Department of Agriculture–Forest Service. Washington, D.C.
- Brown, M. J. F. 2011. The trouble with bumble bees. *Nature* 469:169-170.
- Brown, M. J. F. and R. J. Paxton. 2009. The conservation of bees: A global perspective. *Apidologie* 40:410–416.
- Cameron, S., S. Jepsen, E. Spevak, J. Strange, M. Vaughan, J. Engler, and O. Byers (eds). 2011a. North American Bumble Bee Species Conservation Planning Workshop Final Report. IUCN/SSC Conservation Breeding Specialist Group: Apple Valley, MN. Available online at: http://www.cbsg.org/cbsg/workshopreports/26/bumble_bee_conservation_2010.pdf Chapman and Bourke 2001.
- Cameron, S.A., J.D. Lozier, J.P. Strange, J.B. Koch; N. Cordes, L.F. Solter, and T.L. Griswold. 2011b. Patterns of widespread decline in North American bumble bees. *Proceedings of the National Academy of Sciences* 108 (2):662-667.
- Cameron, S.A., H.C. Lim, J.D. Lozier, M.A. Duennes, and R. Thorp. 2016. Test of the invasive pathogen hypothesis of bumble bee decline in North America. *Proceedings of the National Academy of Sciences* 113 (16): 4386–4391.
- Colla, S.R. and S. Dumes. 2010. The bumble bees of southern Ontario: Notes on natural history and distribution. *Journal of the Ecological Society of Southern Ontario* 141:39-68.
- Colla, S.R. and L. Packer. 2008. Evidence for decline in eastern North America bumble bees (Hymenoptera: Apidae), with special focus on *Bombus affinis* Cresson. *Biodiversity Conservation* 17:1379-1391.
- Colla, S.R., M.C. Otterstatter, R.J. Gegear, and J.D. Thomson. 2006. Plight of the bumble bee: Pathogen spillover from commercial to wild populations. *Biological Conservation* 129:461-467.

Cordes, N. J.D. Lozier, W. Huang, L.F. Solter, and J.P. Strange. 2011. Interspecific geographic distribution and variation of the pathogens *Nosema bombi* and *Crithidia* species in United States bumble bee populations. *Journal of Invertebrate Pathology*. In press. 8 pages.

Douglas, M. and J.F. Tooker. 2015. Large-scale deployment of seed treatments has driven rapid increase in use of neonicotinoid insecticides and preemptive pest management in U.S. field crops. *Environmental Science and Technology* 49:5088-5097.

Ecological Stratification Working Group. 1996. A National Ecological Framework for Canada. Agriculture and Agri-Food Canada, Research Branch, Centre for Land and Biological Resources Research, and Environment Canada, State of the Environment Directorate, Ecozone Analysis Branch, Ottawa/ Hull. Report and national map at 1:7 500 000 scale.

Ellis, J.S., M.E. Knight, B. Darvill, and D. Goulson. 2006. Extremely low effective population sizes, genetic structuring and reduced genetic diversity in a threatened bumblebee species, *Bombus sylvarum* (Hymenoptera: Apidae). *Molecular Ecology* 15:4375-4386.

Elston, C., H. Thompson, and K. Walters. 2013. Sub-lethal effects of thiamethoxam, a neonicotinoid pesticide, and propiconazole, a DMI fungicide, on colony initiation in bumble bee (*Bombus terrestris*) micro-colonies. *Apidologie* DOI: 10.1007/s13592-013-0206-9.

Environment and Climate Change Canada. 2016. Recovery Strategy for the Rusty-patched Bumble Bee (*Bombus affinis*) in Canada [proposed], Species at Risk Act Recovery Strategy Series, Environment and Climate Change Canada, Ottawa, vii+56 p.

European Food Safety Authority. 2015. Conclusion on the peer review of the pesticide risk assessment for bees for the active substance imidacloprid considering all uses other than seed treatments and granules. *European Food Safety Authority Journal*. 13(8):4211-4293.

Fausser-Misslin, A., B.M. Sadd, P. Neumann, and C. Sandrock. 2014. Influence of combined pesticide and parasite exposure on bumble bee colony traits in the laboratory. *Journal of Applied Ecology* 51:450-459.

Gill, R. J., O. Ramos-Rodriguez, and N. E. Raine. 2012. Combined pesticide exposure severely affects individual- and colony-level traits in bees. *Nature* 491, 105–108. doi:10.1038/nature11585; pmid: 23086150.

Goulson, D. 2013. An overview of the environmental risks posed by neonicotinoid insecticides. *Journal of Applied Ecology* 50:977–987.

Goulson, D. 2016. Personal communication. Telephone conversation among Goulson (University of Sussex, Falmer, UK), Tamara Smith (USFWS), Jennifer Szymanski (USFWS), and Mary Parkin (USFWS) on February 10, 2016.

- Goulson, D., G.C. Lye, and B. Darvill. 2008. Decline and conservation of bumble bees. *Annual Review of Entomology* 53:191-208.
- Goulson, D., E. Nicholls, C. Bouias, E.L. Rotheray. 2015. Bee declines driven by combined stress from parasites, pesticides, and lack of flowers. *Science* 347: 1255957-1-1255957-9.
- Hatfield, R. G. and G. LeBuhn. 2007. Patch and landscape factors shape community assemblage of bumble bees, *Bombus spp.* (Hymenoptera: Apidae), in montane meadows. *Biological Conservation* 139: 150-158.
- Kerr, J.T., Kerr, S.M. Roberts, P. Rasmont, O. Schweiger, S.R. Colla, L.L. Richardson, D.L. Wagner, L.F. Gall, D.S. Sikes, and A. Pantoja. 2015. Climate change impacts on bumble bees converge across continents. *Science* 349 (6244): 177-180.
- Lundin, O., M. Rundlöf, H. G. Smith, I. Fries, and R. Bommarco. 2015. Neonicotinoid insecticides and their impacts on bees: A systematic review of research approaches and identification of knowledge gaps. *PLoS ONE* 10:1-20.
- Macfarlane, R.P., K.D. Patten, L.A. Royce, B.K.W. Wyatt, and D.F. Mayer. 1994. Management potential of sixteen North American bumble bee species. *Melandria*. 50:1-12.
- Manley, R., M. Boots, and L. Wilfert. 2015. Emerging viral disease risk to pollinating insects: ecological, evolutionary and anthropogenic factors. *Journal of Applied Ecology* doi: 10.1111/1365-2664.12385.
- Meeus, I., M.J.F. Brown, D.C. De Graaf, and G. Smagghe. 2011. Effects of Invasive Parasites on Bumble Bee Declines. *Conservation Biology* 25(4):662-671.
- Mitchell, T.B. 1962. Bees of the Eastern United States. Vol. II. North Carolina Agricultural Experiment Station Technical Bulletin 152:1-557.
- Mommaerts, V., G. Sterk, and G. Smagghe. 2006. Hazards and uptake of chitin synthesis inhibitors in bumble bees *Bombus terrestris*. *Pest Management Science* 62:752-758.
- Öckinger, E. and H.G. Smith. 2007. Semi-natural grasslands as population sources for pollinating insects in agricultural landscapes. *Journal of Applied Ecology* 44: 50-59.
- Pamilo, P. and R.H Crozier. 1997. Population biology of social insect conservation, *Mem. Mus. Victoria* 56: 411–419.
- Pisa, L.W., V. Amaral-Rogers, L.P. Belzunces, J. M. Bonmatin, C. A. Downs, D. Goulson, D. P. Kreuzweiser, C. Krupke, M. Liess, M. McField, C. A. Morrissey, D. A. Noome, J. Settele, N. Simon-Delso, J. D. Stark, J. P. Van der Sluijs, H. Van Dyck, M. Wiemers. 2015 Effects of neonicotinoids and fipronil on non-target invertebrates. *Environ. Sci. Pollut. Res. Int.* 22, 68–102 (2015).

Plath, O.E. 1922. Notes on the nesting habits of several North American bumble bees. *Psyche* 29(5-6):189-202.

Potts, S.G., J.C. Biesmeijer, C. Kremen, P. Neumann, O. Schweiger, and W.E. Kunin. 2010. Global pollinator declines: Trends, impacts and drivers. *Trends in Ecological Evolution* 25:345–353.

Samson, F. and F. Knopf. 1994. Prairie conservation in North America. *Bioscience* 44, 418–421.

Sanchez-Bayo, F. and K. Goka. 2014. Pesticide residues and bees – a risk assessment. *PLOS ONE* 9 e94482. Doi: 10.1371/journal.pone.00094482; pmid:2478419.

Scott-Dupree, C.D., L. Conroy, and C.R. Harris. 2009. Impact of currently used or potentially useful insecticides for canola agroecosystems on *Bombus impatiens* (Hymenoptera: Apidae), *Megachile rotundata* (Hymenoptera: Megachilidae), and *Osmia lignaria* (Hymenoptera: Megachilidae). *Journal of Economic Entomology* 102:177-182.

Stokstad, E. 2013. How big a role should neonicotinoids play in food security? *Science*. 340:675.

Strange and Tripodi 2016, pers. comm.

Szabo, N.D., S.R. Colla, D.L. Wagner, L.F. Gall, and J.T. Kerr. 2012. Do pathogen spillover, pesticide use, or habitat loss explain recent North American bumblebee declines? *Conservation Letters* 5: 232-239.

Szymanski, J.A., T. Smith, A. Horton, M. Parkin, L. Ragan, G. Masson, E. Olson, K. Gifford, and L. Hill. 2016. Rusty patched bumble bee (*Bombus affinis*) Species Status Assessment, final Report, Version 1. Unpublished. 93 pages.

Thompson, H.M. and L.V. Hunt. 1999. Extrapolating from honey bees to bumble bees in pesticide risk assessment. *Ecotoxicology* 8:147-166.

Tripodi 2016, pers. comm.

U.S. Fish and Wildlife Service (Service). 2016. Rusty patched bumble bee (*Bombus affinis*) unpublished geodatabase.

Williams, P.H., S.A. Cameron, H.M. Hines, B. Cederberg, and P. Rasmont. 2008. A simplified subgeneric classification of the bumble bees (genus *Bombus*). *Apidologie* 39:46-74.

Williams, P.H. and J.L. Osborne. 2009. Bumble bee vulnerability and conservation world-wide. *Apidologie* 40: 367-387.

Xerces Society for Invertebrate Conservation. 2013. Petition to list the rusty patched bumble bee. 42pp.

Zayed, A. 2009. Bee genetics and conservation. *Apidologie*. Springer Verlag. 40 (2): 237-262.