Edited by **Jennifer Sills**

Words alone will not protect pollinators

IN THEIR POLICY Forum "Ten policies for pollinators" (25 November, p. 975), L. V. Dicks *et al.* suggest policies that governments should consider to protect pollinators and secure pollination services. Those suggestions were extracted from the 2016 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) report (*1*, *2*). In 2014, President Obama issued a Presidential Memorandum directing an Interagency Task Force to create a strategy to promote the health of honey bees and other pollinators (*3*, *4*). On the surface, these reports and proposals place the United States at the forefront of global efforts to conserve native and managed pollinators. However, current commitments appear to be primarily a rebranding of existing efforts and some shifting of existing pots of money. We have learned through experience that turning proposals into action requires a concerted effort.

We helped write the 2007 National Academy of Sciences report on the *Status of Pollinators in North America* (*5*) on the status and trajectory of most North American pollinator populations. Particularly troublesome was the lack of information for the 4000 species of native bees, primary pollinators in most terrestrial ecosystems, both agricultural and natural. Despite the recent IPBES report and the Presidential Memorandum, no statistically robust monitoring programs for native bees have been established, nor has there been an effort to hire the required taxonomic expertise. The dramatic decline of *Bombus affinis*, which led to its designation in 2017 as an endangered species under the U.S. Endangered Species Act (*6*), is emblematic of the challenges that pollinators face.

Simple policy and land-use changes at federal, state, and local levels that favor healthy flowering plant communities can have immediate and beneficial impacts on pollinators. The suggestions from Dicks *et al.* outline many of the options we hope will be widely adopted. We emphasize, however, the need to create the capacity and the initiative within governments worldwide to create the attendant monitoring programs that measure the successes of these changes, warn about and characterize impending system failures, and allow us to learn how to manage diminished pollination capacity. Food security will require this expertise. Bees are not optional.

The rusty patched bumblebee (*Bombus affinis*) was recently declared endangered.

PHOTO: DAN MULLEN/FLICKR

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10.1126/science.aam6132

Academia's failure to retain data scientists

WE APPLAUD THE recommendations of V. Stodden *et al.* for "Enhancing reproducibility for computational methods" (Policy Forum, 9 December 2016, p. 1240). Many of their recommendations could be fulfilled if researchers embraced modern statistical and computational ("data science") practices. However, academia has proven slow to adapt best practices and thus has failed to retain many brilliant quantitative scientists. This is bad for science, as prevalent data analyses are often suboptimal, data-driven discoveries remain underdeveloped, and highly skilled people, who could use their unique expertise to move forward the most pressing scientific questions, are lost to industry.

Three underlying problems explain academia's failure to retain data scientists.

First, there are insufficient incentives. Good programming and statistical competence are still not valued enough in most scientific disciplines. In the current "publish or perish" culture, many scientists are reluctant to invest in learning data science skills that could lead to more powerful and robust research if it means they might be able to publish fewer papers. To remedy this, we ask our peers to value reproducible research and software as first-class research products. Second, proper training is rare. Despite the online courses and data science programs in some leading universities, most academic centers worldwide do not provide good enough (or even any) training on data science skills. These should be considered part of the students' core training. Third, many highly skilled data scientists leave academia to work on business or industry, where they may get better job stability or working conditions. Academia must find career pathways to support these researchers.

Academia suffers a "brain drain" of quality data scientists to other fields. Some research institutions are already taking measures to ensure that this trend does not slow scientific progress (*1*). Others should take note, lest they be left behind.

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The science behind military training exercises.

LIFE IN SCIENCE

A moonlit trek

It is mid-June, a sweltering 85 degrees, and pitch dark. I am following an Army unit through the thick forest of southern Georgia. I can hear animal hoots and howls in the distance. If I stop too long in the wrong place, I could easily be overwhelmed by stinging and biting ants. The stench of rotting trees and mosses fills the air. Despite the heat, I'm clothed in khakis, long sleeves, a hat, and boots to prevent the flying insects from their attack. The only light comes from the momentary breaks of the moon between the clouds, and the dim glow of tablet devices.

The Army Leaders are in training to use a new tablet-based technology that allows them to evaluate, track, and audio-video record a Soldier's performance on, in this case, a nighttime simulated attack training exercise. I am the Primary Investigator for the team who designed the tablet. I am here to ensure that the Leaders use the tool correctly and to answer any questions they may have about the tablet's applications. The data collected will provide the unit with performance assessments that they will use during the After Action Review. The purpose for this line of research is to support the Leaders in their efforts to assess performance. In the past, they have had to rely on memory.

After hours of scrambling through the wilderness, we reach the final checkpoint. The Soldiers' mission is complete. I collect all the tablets and their data as the sun begins to rise. At over 50 years old, I find it difficult and exhausting to keep up with these youngsters. I enjoy this task the most when it is over!

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TECHNICAL COMMENT ABSTRACTS

Comment on "Mycorrhizal association as a primary control of the CO_2 fertilization effect"

R. J. Norby, M. G. De Kauwe, A. P. Walker, C. Werner, S. Zaehle, D. R. Zak

Terrer *et al.* (Reports, 1 July 2016, p. 72) used meta-analysis of carbon dioxide (CO_2) enrichment experiments as evidence of an interaction between mycorrhizal symbiosis and soil nitrogen availability. We challenge their database and biomass as the response metric and, hence, their recommendation that incorporation of mycorrhizae in models will improve predictions of terrestrial ecosystem responses to increasing atmospheric CO_2.

Full text at http://dx.doi.org/10.1126/science.aai7976

Response to Comment on "Mycorrhizal association as a primary control of the CO_2 fertilization effect"

César Terrer, Sara Vicca, Bruce A. Hungate, Richard P. Phillips, Peter B. Reich, Oskar Franklin, Benjamin D. Stocker, Joshua B. Fisher, I. Colin Prentice

Norby *et al.* center their critique on the design of the data set and the response variable used. We address these criticisms and reinforce the conclusion that plants that associate with ectomycorrhizal (ECM) fungi exhibit larger biomass and growth responses to elevated CO_2 compared with plants that associate with arbuscular mycorrhizae (AM).

Full text at http://dx.doi.org/10.1126/science.aai8242

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