FOLIAR ENDOPHYTIC DIVERSITY OF EASTERN MOUNTAIN AVENS, *Geum peckii* Pursh (Rosaceae), FROM DEGRADED AND PRISTINE HABITATS IN DIGBY COUNTY, NOVA SCOTIA, CANADA

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The Eastern Mountain Avens, *Geum peckii* Pursh (Rosaceae), is a globally rare and endangered plant found only in coastal bogs in Digby County, Nova Scotia and high elevation alpine sites in New Hampshire. The Nova Scotian population is in decline due to a variety of reasons, including habitat degradation due to former use as pasture, bog drainage, incursion of woody vegetation, the presence of a large gull colony, roadside disturbance and ATV trails which are now mostly unused. Foliar endophytic fungal communities of *G. peckii* were investigated along a habitat disturbance gradient in Digby County, Nova Scotia to understand this understudied component of the habitat of this rare plant, which may aid in the recovery of this species. Endophytes are microbial species such as bacteria or fungi that colonize living plant tissue without showing any symptoms of disease. They can be beneficial to plant growth and development, and some produce chemical compounds that protect plants from herbivory and disease. Ongoing seed banking and tissue culture work at Acadia's KC Irving Environmental Science Center is being done to assist in the recovery and conservation of this species and our creation of a fungal endophyte culture bank will assist in this work.

The objective of this study was to assess the foliar fungal endophytic diversity of the Nova Scotian *G. peckii* population along a habitat disturbance gradient encompassing pristine,

moderately disturbed, and heavily degraded sites in Digby County. Sites were sampled in June and July 2015 as specified under a DNR collection permit. Once the fungal diversity was determined by DNA barcoding of cultures isolated from surface-sterilized *G. peckii* leaf tissue, the observed fungal species were further investigated to determine their potential ecological roles based on phylogenetic analysis and a literature search.

We obtained 59 fungal species from four classes (Sordariomycetes, Leotiomycetes, Dothideomycetes, and Eurotiomycetes), as determined by DNA barcoding. Of the 59 fungal species sequenced, 35 (=65%) are previously unsequenced and potentially new to science, while two barcode sequences may represent previously undescribed or unsequenced fungal genera. One fungal species, *Gnomoniopsis* sp. 1, was common to all five sites sampled. The pristine site GH6 had the highest endophyte diversity with 37 foliar endophytes, while the highly degraded site BM1 had the second highest diversity with 27 foliar endophyte species. The recovering sites had diversities ranging from 14 to 18 species during our sampling period. The majority of the species observed during this study are known as plant pathogens from the fungal class Sordariomycetes (Ascomycota), with many from the fungal family Gnomoniaceae. However, no pathogenic symptoms were exhibited by the *Geum* plants sampled, indicating the plants may serve as reservoirs for these fungi and that these fungi may have latent life stages. The endophytic communities of other plants in the same habitats remain unexplored, and require investigation.

In conclusion, there is a highly diverse foliar endophytic fungal community associated with the Nova Scotian *G. peckii* population. Our data indicate that the pristine sites sampled have the highest fungal diversity, followed by the degraded and then the recovering sites, and that each site has a different endophytic community. Statistical analyses of site vegetation data are

being conducted to further explore the relationship of habitat type and level of degradation with the documented fungal communities. Future work will establish whether any of the identified and preserved endophytic fungi can be used as part of a beneficial fungal inoculant for propagated *G. peckii*. Further insights into the ecological roles of these fungi will be gained through greenhouse inoculation and plant growth trials, to determine whether these fungi provide demonstrated ecological benefits to the propagation and establishment of *G. peckii* in Nova Scotia, which will aid in habitat restoration and species conservation of this rare and endangered plant species.

This work was presented at the Nov 2015 MTRI Conservation meeting, the 2016 Science Atlantic Biology meeting at St Mary's University, the 2016 Biofeedback student conference (Acadia Biology), as well as the Great Lakes – St Lawrence Mycology Meeting at Queen's University Biological Station in Ontario (April 2016). It will also be presented at the annual meeting of the Mycological Society of America this August at the University of California, Berkeley. We are grateful for this funding opportunity, which supported Acadia Honours student Sarah Adams, who won the Top Medal in Environmental Science from Acadia University for her work (May 2016) and is currently drafting a manuscript for a peer-reviewed journal.