Comments on GMUG draft management plan, section on terrestrial ecosystems.

Dr. David W. Inouye

38213 Highway 133

Hotchkiss, CO 81419

I am a researcher at the Rocky Mountain Biological Laboratory, where I have worked since 1971.

p. 10: “Conversely, earlier snowmelt can lead to increased potential for seedlings to experience frost damage and exposure to drought.” - Frost can also affect sensitive buds (wildflowers, confers, aspens), and these effects can cascade into populations of animals that depend on those resources. Here are some citations based on research at RMBL:

Inouye, D. W. 2000. The ecological and evolutionary significance of frost in the context of climate change. Ecology Letters 3(5):457-463.

Inouye, D. W., M. A. Morales, and G. J. Dodge. 2002. Variation in timing and abundance of flowering by *Delphinium barbeyi* Huth (Ranunculaceae): the roles of snowpack, frost, and La Niña, in the context of climate change. Oecologia 130: 543-550.

Pardee, G., D. W. Inouye, and R. E. Irwin. 2017. Direct and indirect effects of episodic frost on plant growth and reproduction in subalpine wildflowers. Global Change Biology, in press. DOI: 10.1111/gcb.13865

Boggs, C. L., and D. W. Inouye. 2012. A single climate driver has direct and indirect effects on pollinator numbers. Ecology Letters 15(5):502-508.

Table 5 legend: Add hyphen in “congressionally-designated”.

p. 16: add hyphen to “recreation-related stressors”

p. 16: add hyphen to “Highly-impacted areas”

p. 19: add hyphen to “broad-scale forest disturbances”

p. 20: add hyphen to “an early-colonizing”

p. 20: Could add leafhoppers to the list of aspen insect herbivores.

There was an outbreak of the leafhopper *Idiocerus lachrymalis* in the East River valley and in some other parts of the GMUG that caused significant damage and mortality to susceptible clones around 1998-2000.

Emerson K 2000. Are leafhoppers to blame? A study of the damage in aspen clones in Gunnison County, CO. Student Paper. REU paper (NSF Research Experience for Undergraduates). Mentor: D. Inouye.

p. 21: add hyphen to “stand-replacing crown fires”

p. 21: add hyphen to “shade-tolerant species”

p. 21: add hyphen to “naturally-occurring lodgepole”

p. 21: add hyphen to “drought-initiated fire”

p. 21: maybe add location data for those lodgepole pine plantings in the 1960s-1980s? So future researchers can locate them.

p. 23: add hyphen to “higher-elevation spruce-fir”

p. 23: add hyphen to “shade-loving forbs”

p. 23: change “The primary disturbance … are infrequent..” to “The primary disturbance … is …”

p. 24: in the list of shrubland species, a few are only listed with common names, while most include genus and species

p. 26: add hyphen to “meadows at lower-elevation areas…”

p. 32: “but will likely have lower than NRV percentages…” - delete ‘than’?

p. 32: “management priority should not be trying to precisely match..” – split infinitive.

p. 34: “key ecosystem characteristic” - should be plural, “ are key ecosystem characteristics”

p. 34: “Gunnnison Basin GA” – spell out GA?

p. 37: Shouldn’t avalanches be included as a landscape disturbance? There are a lot in the East River valley, and billy barr at RMBL has detailed data on their frequency and magnitude. One run I looked at on Baldy had about an 80-yr return interval that took out hundreds of conifers.