

**From:** [Stanwood, Sabrina](#)  
**To:** [Nichols, William](#); [Tango-Lowy, Torene](#)  
**Cc:** [Hackley, Patrick](#); [Stewart, Sarah](#)  
**Subject:** RE: NHB report for Mt Washington Cog proposal  
**Date:** Wednesday, March 23, 2022 2:46:41 PM

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Bill and Pete,

Thank you for your hard work and moving so quickly to get the tons of information to create and refine the document lists that you sent to Torene for the Mt. Washington Master plan update. I appreciate your efforts!

Thank you,  
Sabrina

Sabrina Stanwood, Administrator (she/her)

**Natural Heritage Bureau (NHB)**

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**From:** Nichols, William <William.F.Nichols@dncr.nh.gov>  
**Sent:** Wednesday, March 23, 2022 1:50 PM  
**To:** Tango-Lowy, Torene <torene.k.tango-lowy@dncr.nh.gov>  
**Cc:** Stanwood, Sabrina <Sabrina.m.stanwood@dncr.nh.gov>; Hackley, Patrick <Patrick.D.Hackley@dncr.nh.gov>; Bowman, Peter <peter.j.bowman@dncr.nh.gov>  
**Subject:** RE: NHB report for Mt Washington Cog proposal

Hi Torene,  
Yes, all the documents you received can be made public. Thanks for double-checking.  
Bill

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**From:** Tango-Lowy, Torene <[torene.k.tango-lowy@dncr.nh.gov](mailto:torene.k.tango-lowy@dncr.nh.gov)>  
**Sent:** Wednesday, March 23, 2022 1:41 PM  
**To:** Nichols, William <[William.F.Nichols@dncr.nh.gov](mailto:William.F.Nichols@dncr.nh.gov)>  
**Cc:** Stanwood, Sabrina <[Sabrina.m.stanwood@dncr.nh.gov](mailto:Sabrina.m.stanwood@dncr.nh.gov)>; Hackley, Patrick <[Patrick.D.Hackley@dncr.nh.gov](mailto:Patrick.D.Hackley@dncr.nh.gov)>; Bowman, Peter <[peter.j.bowman@dncr.nh.gov](mailto:peter.j.bowman@dncr.nh.gov)>  
**Subject:** RE: NHB report for Mt Washington Cog proposal

Thank you, Bill. Upon quick review, it looks like all the documents can be made public. But, can you confirm that in the affirmative? Thanks, again! --Torene

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**From:** Nichols, William <[William.F.Nichols@dncr.nh.gov](mailto:William.F.Nichols@dncr.nh.gov)>

**Sent:** Wednesday, March 23, 2022 1:23 PM

**To:** Tango-Lowy, Torene <[torene.k.tango-lowy@dnrc.nh.gov](mailto:torene.k.tango-lowy@dnrc.nh.gov)>

**Cc:** Stanwood, Sabrina <[Sabrina.m.stanwood@dnrc.nh.gov](mailto:Sabrina.m.stanwood@dnrc.nh.gov)>; Hackley, Patrick <[Patrick.D.Hackley@dnrc.nh.gov](mailto:Patrick.D.Hackley@dnrc.nh.gov)>; Bowman, Peter <[peter.j.bowman@dnrc.nh.gov](mailto:peter.j.bowman@dnrc.nh.gov)>

**Subject:** FW: NHB report for Mt Washington Cog proposal

Hi Torene,

Attached are the following Natural Heritage Bureau related documents we were able to compile:

- **Mt. Washington State Park Element Occurrences:** From our database, a list of rare plants, rare animals, and the exemplary natural community system documented within Mt. Washington State Park.
- **NH Natural Heritage Bureau Alpine Communities:** From our natural community classification, descriptions of alpine communities, some of which occur in the state park (link to entire natural community classification: [The Natural Communities of New Hampshire \(Second Edition\)](#)).
- **NH Natural Heritage Bureau Alpine Systems:** From our natural community system classification, descriptions of alpine systems, including the globally rare Alpine Tundra System, which occurs in the state park (link to entire system classification: [Natural Community Systems of New Hampshire \(Second Edition\)](#)).
- **Northern Appalachian Alpine Tundra:** From NatureServe Explorer ([Northern Appalachian Alpine Tundra | NatureServe Explorer](#)), a description of the globally rare Northern Appalachian Alpine Tundra, which crosswalks directly to NH Natural Heritage Bureau's Alpine Tundra System.

Definitions of Global (G) and State (S) conservation status ranks assigned to NH's plant species, natural communities, and systems can be found at this link: [Definitions of NatureServe Conservation Status Ranks](#).

The NH Natural Heritage Bureau is also collaborating in research led by the Forest Service on non-native plant species in NH's alpine tundra. We found there are more non-native plant species in NH's alpine tundra (58 species in 13 square miles) than in any other alpine flora in the world. On Mt. Washington alone, there are approximately 50 non-native plant species that have been documented in the mountain's alpine tundra (~20 documented from Mt. Washington State Park). In the manuscript we are preparing, we evaluated the chronology of non-native species establishments, their current distribution and abundance, and apparent capacity to spread in the White Mountain alpine tundra to provide insights on priorities for management action. We believe there may be an accumulating "invasion debt" occurring on Mt. Washington, where an ongoing management program may be needed to prevent the emergence of intractable invasive issues. In the manuscript, Essl et al. (2011) describe "invasion debt" where invasion results from "the time necessary to exceed critical thresholds of available propagules that will, in turn, depend on factors like the numbers of introduction events and of individuals introduced, the type of introduction pathway, the match between an alien-species' habitat requirements and the conditions in the new territory, the length of generation times, or the time necessary for genetic adaptations to the new environments." Common dandelion's (*Taraxacum officinale*) invasion of natural communities in the State Park is an example of the release of an invasion debt. Common dandelion grows among several state,

regionally, and globally rare plant species within these communities including spiked wood rush (*Luzula spicata*), Boott's rattlesnake-root (*Nabalus boottii*), purple mountain-heath (*Phyllodoce caerulea*), wavy blue grass (*Poa laxa* subsp. *fernaldiana*), alpine blue grass (*Poa pratensis* subsp. *alpigena*), little yellow-rattle (*Rhinanthus minor* subsp. *groenlandicus*), and alpine-brook saxifrage (*Saxifraga rivularis*). Other studies elsewhere in alpine tundra have shown common dandelion had reduced the cover of several native species and found a density dependent preference of pollinators on dandelion, reducing pollination success of competing native plants. These threats and documented effects of common dandelion in alpine regions from around the world supported the decision by the White Mountain National Forest with the State and other partners to initiate rapid control of dandelions on Mt. Washington before infestation levels become unmanageable. Other non-native species of greatest concern in NH's alpine tundra (all but one occur on Mt. Washington) include strict eyebright (*Euphrasia stricta*), orange hawkweed (*Hieracium aurantiacum*), fox-tail barley (*Hordeum jubatum* subsp. *jubatum*), reed canary grass (*Phalaris arundinacea*), annual blue grass (*Poa annua*), tall crowfoot (*Ranunculus acris*), sheep dock (*Rumex acetosella* subsp. *pyrenaica*), common tansy (*Tanacetum vulgare*), coltsfoot (*Tussilago farfara*), and bird vetch (*Vicia cracca*). Once the manuscript is submitted for publication, we will be able to share it with the Department's lands management team to inform the revision of the master plan. NH Natural Heritage Bureau also recommends more thorough botanical surveys occur in Mt. Washington State Park to not only improve our understanding of the presence and distribution of rare native plant species occurring there, but for non-native plant species (and their proximity to rare plants) in the park as well.

Other attached documents from the summit area of Mt. Washington are focused on the American pipit (*Anthus rubescens*) and White Mountain Fritillary (*Boloria titania montinus*):

- **NHA AMPI Final Report 2018 Nuttall**: 2018 survey results of the American Pipit by NH Audubon.
- **R.F. Schumann Foundation Final Rept Jan 2021**: 2018–2020 survey results of the American Pipit by NH Audubon.
- **Stalking the Wild American Pipit NHAudubon Vol34 No6**: Article in New Hampshire Audubon magazine about the American Pipit on Mt. Washington.
- **White Mountain Fritillary**: Fact sheet from the NH Wildlife Action Plan (link to fact sheet: [Draft Report \(state.nh.us\)](https://www.state.nh.us/dnr/wildlife/fact-sheets/white-mountain-fritillary)).

Finally, also attached is a study titled “**Effects of Snow and Temperature on the Phenology of Alpine Snowbank Plants on Mt. Washington, New Hampshire.**”

Best,  
Bill

Bill Nichols (he/him/his)  
Senior Ecologist/State Botanist  
NH Natural Heritage Bureau  
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**From:** Tango-Lowy, Torene <[torene.k.tango-lowy@dn-cr.nh.gov](mailto:torene.k.tango-lowy@dn-cr.nh.gov)>

**Sent:** Friday, March 18, 2022 10:07 AM

**To:** Stanwood, Sabrina <[Sabrina.m.stanwood@dncr.nh.gov](mailto:Sabrina.m.stanwood@dncr.nh.gov)>

**Subject:** NHB report for Mt Washington Cog proposal

Hello Sabrina,

The Mount Washington Commission is working on an updated Master Plan for the summit of Mount Washington. They are reviewing existing documents related to the summit flora and fauna.

Does the NHB have any surveys, research or reports related to the summit of Mount Washington. If so, can you send me a copy of those documents, redacting what is exempt from public release?

Thank you! --Torene

*Torene Tango-Lowy*

NH DNCR – Div. of Parks and Recreation

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