

COMMENTS ON

Recovery Strategy for the Wood Bison
(*Bison bison athabascae*) in Canada

Environment and Climate Change Canada. 2016. Recovery Strategy for the Wood Bison (*Bison bison athabascae*) in Canada [Proposed]. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada. Ottawa. viii + 52 pp.

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June 2016



Summary

The draft Recovery Strategy is a strong start on the road to ensuring a more secure future for Wood Bison. We provide a number of recommendations for improvements in emphasis, clarity, reasoning and communications, following the layout of the draft text. Our main concerns have to do with (i) disease management and the intolerance of humans to disease risk, and (ii) the question of developing population targets in a setting of ongoing change in habitat supply in the boreal forest. The document does not adequately deal with the disease management issue because it: (a) expresses it primarily as a risk of disease transmission to uninfected free-ranging Bison, whereas it is predominantly an intolerance by humans of risk of transmission to domestic livestock and domesticated Bison; (b) does not recognize the existing Bison control areas as barriers to improved population recovery by way of gene flow; (c) does not recognize the historical success of the Bison control areas; (d) promotes connectivity among disease-free herds which would increase their risk of infection should disease spread beyond the Bison control areas; (e) overlooks some of the previous good work done on providing management direction to this issue; and (f) defers the issue to a “collaborative process” of stakeholders without providing strong direction and guidelines for any such process which should be integral to a Recovery Strategy. Regarding population recovery in the boreal forest, the document acknowledges the specific nature of suitable habitats, but does not adequately deal with the question of habitat availability and population targets because it: (a) fails to acknowledge that through much of the historical range these habitats are uncommon, or only periodically available, such that habitat availability may be limiting to distribution and population growth; (b) applies a sub-population target of 1,000 which is derived from avoidance of risk to genetic diversity but may be unattainable in terms of habitat supply; (c) does not fully acknowledge the range of future conditions in habitat supply that might derive from ongoing boreal wildfire disturbance regimes and climate change.

We are commenting as scientists for Wildlife Conservation Society (WCS) Canada who have direct field experience with this animal and/or SARA recovery processes. One of us (JCR) is co-chair of the Terrestrial Mammal Subcommittee of COSEWIC and led the 2013 assessment that serves as the foundation of the recent SARA listing.

This document is a review of the Proposed Recovery Strategy for Wood Bison in Canada published by Environment and Climate Change Canada in 2016. It is written to respond to the federal government’s request for comments on the Proposed Strategy. It includes our assessment of the sufficiency, validity, and relative emphasis of the Proposed Strategy’s findings and recommendations. Our comments follow the structure of the document. We include our own recommendations for changes, in italics.

Recovery Feasibility Summary

We agree with the overall assessment that recovery for Wood Bison is feasible, and provide the following comments regarding 3 of 4 criteria:

#2: We agree that there is sufficient habitat to support the species, and that more could be made available. We disagree with the emphasis in the text on why large areas of potential habitat are not available now. The document describes this as a risk of transmission of disease. However, the key issue is that there is a strong perception in the public stakeholder communities (largely the agricultural community) that these diseases need to be contained geographically to avoid infecting domestic cattle and humans; there is a lack of public acceptance of any risk of disease transmission. The risk to actually achieving bison recovery if diseases are transmitted is very low, as witnessed by the ongoing viability of the infected herds. *We recommend that the wording be changed to more truthfully reflect this particular issue in the context of bison recovery.*

#3. We agree that the primary threats to the species and its habitats can be avoided or mitigated. *However, we recommend that the emphasis of the text be changed to indicate that recovery actions, in the disease-risk context, need to be aimed not just at the question of eliminating risk of transmission (as is indicated) but also in better dealing with levels of public and stakeholder concern about disease through education and inclusive involvement in decision-making processes, as recommended by Nishi (2010).*

#4: We consider the population and distribution objectives to be generally attainable. However, we disagree with the assertion that "... long term success of current disease management efforts is unlikely", given the success over many decades so far of these efforts. *We recommend that there be better explanation for why long-term success is unlikely (in other words why current efforts cannot be sustained until better techniques or knowledge is evident).* In addition, the long-term objective of 1,000 animals for each of 5 disjunct populations may well be unattainable for some because of habitat limitations, and we consider the necessity and feasibility of this target to be insufficiently supported in the document with measures of carrying capacity and population viability for the various herds. In as changeable an environment as the boreal forest, carrying capacity will be quite variable over various time scales, and so the temporal dimension of targets needs to be addressed. *We recommend that the document more thoroughly outline the reasoning behind the choice of population-level targets, and the time scale on which these are based.*

2. Species Status Information

The last paragraph of this section may need some additional text, depending on its publication date. This is because Canada's proposal to remove Wood Bison from CITES Appendix II will be voted on at the forthcoming CITES COP17 in September. In the likely event that this motion passes, it will be important to update this Recovery Strategy, if it is not already published. *We recommend that new text about CITES listings should indicate that Canada proposed the removal of Wood Bison from Appendix II, and should provide some brief explanation of what the implications of the removal of controls in international trade will be for this wildlife species.*

3 Species Information

3.1 Species Description

For completeness, this document should provide some mention of a lack of consensus on subspecies designation and cite Cronin et al. (2013). We regard it as an oversight that the document does not mention that Wood Bison and Plains Bison are clearly separated into different designatable units, as explained in COSEWIC (2013), and we recommend additional text to explain this fact.

3.2 Population and Distribution

We consider the “Current distribution and abundance” section to be quite thorough and Figure 3 is very helpful. However, there are a few gaps that should be addressed:

- In light of the longer-term population objective of this Recovery Strategy, which includes connected local populations as an important component, explanation of the various control areas should not be relegated to a figure caption (i.e. Figure 3). Indeed, these control areas are key to explaining the current disjunct distribution of Wood Bison in the region. *We recommend that the text provide specific mention of the existence of bison control and management areas in various jurisdictions, the main management methods applied in these jurisdictions, and the role of control areas in maintaining the current distribution of this wildlife species.*
- The Chitek local population is outside historical Wood Bison range, and very remote from other free-ranging herds. *We recommend that the document explain why this outlier herd is included in a Recovery Strategy and what its role in recovery might be.*

3.3 Needs of the Wood Bison

Limiting Factors

- Generally speaking, the distinction between “Limiting factors” and Threats (section 4) is unclear. There is substantial overlap in content, as presented. We can find no documentation of how SARA distinguishes between these in the context of recovery planning, and this draft Recovery Strategy provides no explanation for the distinction. Most of the threats can be viewed as potential limiting factors and vice versa. In the COSEWIC Operations & Procedures Manual, limiting factors are defined as “...generally not human induced and include inherent characteristics that make the species or ecosystem less likely to respond to recovery/conservation efforts.” *We recommend that the text make clear the difference between limiting factors and threats, that the former be those factors that relate to inherent characteristics of the species, and that “lack of public acceptance” be considered as a threat.*
- We disagree with the statement “habitat availability is not limiting”. The perception of lack of limitation might be because a substantial proportion of the “historical” range is not currently occupied. However, no evidence is presented that the complete historical range was ever fully occupied by herds. Lack of current occupancy might reflect lack of the right mix of suitable habitats within the larger boreal mosaic. A substantial proportion of the historical range might not in fact be suitable, when assessed at the correct scale.

The issue needs to be viewed as a question of prevalence of suitable habitats at a scale that can be used by individual animals within an energetically-feasible home range. Wood bison require a substantial proportion of the landscape to be in wet meadows, fens, grasslands and deciduous forests. Some of these are fairly permanent, edaphically-controlled climax habitats; others are early successional habitats following disturbance (mainly wild fire); others are later successional habitats in adjacency to the more open habitats. Large areas of the mapped “historical” range do not provide these habitat types in any substantial amounts, so there is strong likelihood that these regions have insufficient foraging habitats. An example of this is the range of the Nordquist/Liard herd. These bison primarily forage in the Alaska Highway right-of-way, because it is the most permanent and available grassland/meadow habitat in the region. Apart from it the region has relatively few graminoid-rich habitats. There are relatively few wetland fens, and the supply of early successional meadows following fire is often only suitable for a few years before becoming overgrown with woody shrubs and trees. Prescribed burning to create habitat seems to be a necessary management tool to create habitat for this herd (Leverkus 2012).

We recommend that the text be changed to indicate that a lack of current occupancy of the entire range does not mean that habitat is not limiting to any one herd, and that habitat limitation and habitat barriers may be affecting population growth of some herds, and connectivity among disjunct herds.

4. Threats

4.1. Threats Assessment

The introduction to this section should contain a summary of the most consequential direct threats (with respect to impact) and overall threat impact score. The latter is not mentioned anywhere but can be readily derived from the IUCN-CMP threats assessment (“threats calculator”). The text mentions that some Aboriginal communities are concerned about potential cumulative impacts of threats. This is a valid point because threats can be additive and interactive. However this concern is not just coming from Aboriginal communities; it is a concern of the scientific community as well. *We recommend that this introductory section provide a summary of the most influential threats, and of the overall threat impact score, and the fact that cumulative impacts of threats are a real concern.*

We note with some concern that this draft Recovery Strategy has scored a number of threats as lower impact than the most recent Status Report for Wood Bison (COSEWIC 2013), without reference to COSEWIC (2013) or explanation. The discrepancy is most often explained by the lower severity scores in this Recovery Strategy than in the Status Report. It will cause confusion if the Recovery Strategy does not provide explanation for the differences, especially given the unlikelihood that there have been changes in circumstances since the completion of the COSEWIC threats assessment in the Status Report (2013). *We recommend that a revised version of this Recovery Strategy reconciles the threat severity scores between the Status Report and this Recovery Strategy by changing the scores in the Strategy to coincide with the Status Report or by providing a detailed explanation for any differences.*

Table 4:

This is generally a useful compilation of threats. However, *we recommend that changes be made to Table 4 based on the particular arguments and evidence we present in the following bullets.*

- Threat #5.1 -- Hunting. More justification is required for the lower severity of this threat relative to COSEWIC (2013). As long as the removal of 60% of the population (the diseased component) by hunting (i.e. culling) remains an option (also mentioned on p. 28 of this document), then the severity of this threat is not “moderate” but “serious”.
- Threat #7.1 lumps fire and fire suppression as one “threat”, which we understand to be a constraint of the IUCN – CMP Unified Classification system. This creates confusion in the case of Wood Bison, because the two have predominantly opposite effects as limiting factors (as indicated later in the text, p.16). Fires generally create useful habitat by transforming forest to open meadow habitat for at least a small time period. Even if they burn grasslands that is generally seen as a positive effect on habitat quality by enhancing the nutrient cycle in the recovering graminoid cover; prescribed burning is a well-used tool to enhance and recover graminoid range (Leverkus). Fire suppression generally slows down the recruitment of new, early successional, habitat supply in the boreal region. In the Comments section, only the negative effects of these “threats” are listed. *The Comments need improvement by reflecting the detail found in the text, p.16.*
- Threat #7.2 -- Dams. Under Comments the text says that the Bennett Dam is “implicated in hydrological changes”. This statement seems to leave doubt. There can be no doubt that dams on the Peace River have changed the hydrological flow regime. That is a bold fact, and needs to be stated as such (see the text p.17). The particular negative impact arises from the fact that the river supplies spring flood to a delta dominated by graminoid meadows; the downstream effect is particular to a delta. *So, the Comments need to make clear that the negative effects of dams could be through (i) flooding and loss of already existing habitat upstream of a dam, and (ii) changes to downstream habitats where those are strongly influenced, maintained and structured by river flow regimes.*
- Threat #8.1 – Disease. The severity of this threat score is lower than COSEWIC (2013), and is not well explained. *A better explanation is necessary given the documented potential for disease outbreaks to result in severe population diebacks.*
- Threat # 8.2 --“Problematic Native Species”. This is the only place in the document where predation limitation is mentioned, and only wolves are discussed. *Bears, both grizzly and black, might be predators on young bison in some systems, and require mention.* Their influence could grow as they learn to deal with this introduced food source. We also note that *while Anthrax outbreaks are not predictable, various factors appear to influence where they might emerge, as discussed in COSEWIC (2013), and these deserve mention.* They include certain combinations of environmental conditions, and a strong overlap with historical outbreaks of the disease where there are concentrations of endospores.
- Threat #11.1 -- Habitat Shifts under Climate Change. This is written as though a drier climate and more fires are necessarily Threats. Habitat shifts induced by climate change might actually be advantageous to some populations. First, climate projection models suggest that most of the

historical range will see enhanced precipitation, so technically not a “drier climate”. However, the net effect of warming, whatever the actual precipitation trend, may well be more drought-like growing conditions for boreal forests. This could result in reductions in the spatial extent of closed canopy boreal forests in the historical range, and more aspen parkland and grasslands (especially after fire). It is possible that habitat extent and supply may be enhanced by these trends. Biome projections built on climate projection models (e.g., Rowland et al. in review; Gonzales et al. 2010; Rehfeldt et al. 2012) indicate that many valley bottoms in southern Yukon may convert to climate conditions supporting grasslands by mid to late 21st century. This trend would enhance habitat availability for the Nordquist-Liard herd, and possibly the Aishihik herd. *The text needs to reflect the diversity of potential outcomes to habitat suitability resulting from climate change.*

- Threat #11.2 -- Droughts under Climate Change. The comments suggest that the vegetation shifts in the Peace-Athabasca delta are a result of climate change. This is debatable. The changes to the hydrological flow regime because of upstream dams are also likely to have caused drying of the delta and vegetation shifts (as indicated in the text on Dams, p.16). It is not reasonable to attribute these vegetation shifts just to a warmer climate, and the *Comments section needs to be more informative.*
- Threat #12.1—loss of genetic diversity. This threat is not a customary category of the IUCN-CMP Threats Assessment Framework. The text (p.21) gives detail as to potential demographic effects of low genetic diversity. *However, it needs to include any evidence that inbreeding is causing demographic issues; in other words, the extent to which it is a direct threat to Wood Bison.*

4.2. Description of Threats

To present a more meaningful picture of threats to Wood Bison, *we recommend that the descriptions of threats that appear in this section should be presented in order from highest to lowest impact.* Such an ordering will provide more meaning to the level of priority the Recovery Strategy places on the various actions listed and discussed in section 6.

5. Population and Distribution Objectives

We understand the rationale for distinguishing disease vs. disease-free populations in recovery objectives. However, we note that the management dilemmas resulting from disease have been in place for decades, and that the historical bison management and control areas surrounding the diseased populations have been sufficient to contain the distribution of the diseases. We also note that this complicated issue has been thoroughly addressed by Nishi (2010) who laid out clear direction for improved ongoing management of the situation, but whose work is not acknowledged in the Recovery Strategy. Meanwhile this Recovery Strategy makes almost passing reference to a proposed approach to dealing with diseased populations in the future by stating that “...the competent Minister will propose population and distribution objectives for diseased local populations, informed by the work of a collaborative process to be established to explore management options”. Given that the diseased herds represent more than 50% of the entire Wood Bison population, and this Recovery Strategy is dealing with subspecies-wide recovery, it is surprising that this document does not pay more attention to this

issue, the scope of management approaches that could be considered by the “collaborative process”, the fact that considerable work has already been done (Nishi 2010), and the nature and timing of any collaborative process and Ministerial involvement. The almost incidental mention of a collaborative approach to management of the diseased populations suggests that it may be a politically-driven rather than evidence-driven process, independent of the actual Recovery Strategy. *We recommend that the Recovery Strategy be more forthcoming and detailed about the history of management efforts on the disease issue, the current containment of the diseases, the existence of a well-formulated framework for continued management (Nishi 2010), and actually propose and justify the parameters (objectives, scope, means, timelines and responsibilities) for a future collaborative process, including how it would relate to processes recommended by Nishi (2010).*

This document skirts the fact that complete removal of the diseased Wood bison from their ranges has been proposed as a necessary management approach, which still lingers as a potential action supported by some stakeholder groups (and mentioned in this document). The removal of more than half the entire free-ranging population of Wood Bison, along with its genetic diversity, would have large effects on the recovery feasibility and long-term population objectives for Wood Bison. *We recommend that the document discuss what a cull of the diseased component of the population would mean for recovery planning and long-term population objectives.*

6. Broad Strategies and General Approaches

6.1. Actions already completed

This section would benefit from mention of more of the work done by Sonja Leverkus on the Nordquist herd, including her recently completed PhD dissertation (contact: shiftingmosaicsconsulting@gmail.com)

6.2. Strategic Direction

Similar to the introductory section on Threats, *we recommend that this section include a summary statement listing the most important actions that address threats and that will lead to achievement of the recovery objectives.*

Table 5: Recovery Planning Table

- The first Broad Strategy contains the approach “Evaluate the effectiveness of bison control areas in reducing the risk of the spread of bovine brucellosis and tuberculosis to non-diseased local populations”. At face value, this is a direct contradiction to the long-term recovery objectives and approaches in Table 5 that relate to this. Control areas are in place because there is intolerance of disease spread from WBNP to uninfected wild bison subpopulations *and livestock*. Control areas directly constrain recovery because they interfere with gene flow. *We recommend that this approach be rewritten to explicitly link to the longer-term population objective of the Recovery Strategy.*

- Related to this, the third Broad Strategy in this Table is in direct conflict with the first Broad Strategy because connectivity could enhance disease spread. Also, the list of Activities in the Table appears to avoid altogether the constraining reality of disease management and associated lack of public acceptance of diseased populations. It argues for increasing connectivity among separate populations, and also increasing population sizes. Given the emphasis elsewhere in the Recovery Strategy on the risk of disease spread, it is not clear that connectivity among populations (even though they are currently disease-free) is a high priority at present. If connectivity is achieved, then disease spread would be that much more difficult to contain, should diseases actually start to spread beyond the WBNP complex. *We recommend that this internal contradiction be directly addressed in the document, explaining why connectivity is a higher priority recovery objective than continued isolation of sub-populations given the various threats identified.* Without this careful consideration, connectivity might become a platitude buried in this document with no likelihood of management action.

Under this Broad Strategy, one Approach promotes the target of 1,000 bison per sub-population. The target of 1,000 may not be reasonable in nature. It is built on a particular probability of achieving genetic conservation (p. 22), but ultimately it needs to be built on habitat supply because such a population target cannot be achieved without enough habitat within an area accessible to an interbreeding group. It is far from clear that 5 disease-free populations have sufficient suitable habitat within a possible range, even after significant range alteration through human actions are undertaken. Failing to miss a target of 1,000, or even 500, is not a sign of failure, if the habitat supply is limiting. And if these sub-populations become demographically connected, as is suggested by the Broad Strategy, then they are effectively a single sub-population and the previous target level is no longer pertinent. *We recommend that the text under Approaches be more detailed by explaining the need for flexibility in population targets, in relation to habitat supply, connectedness of sub-populations, and options for genetic exchange other than by movements of free-ranging individuals.*

Under this third Broad Strategy, the first priority Approach is given to developing and implementing plans for population growth and range expansion. However, any such plans would be contingent on finding answers to some of the other key questions listed as other Approaches in this section (determining the extent of habitat limitation, and effects of prescribed burning). Given the long time periods that many of these small isolated populations have already been in place, their lack of connectivity may indicate that there are habitat barriers between them. Habitat supply modeling, under climate change projections, seems a worthwhile, and high priority, exercise for many of the small, isolated populations.

There is another potential pitfall with “connectivity”. It overlooks the question of what other wildlife values are currently occupying the zones through which connectivity is proposed.

Some of these boreal regions support boreal and northern mountain caribou populations whose priority habitats are often quite different from bison, and often at the opposite end of the disturbance-succession continuum. For example the zone of connectivity between Nordquist and Aishihik bison herds includes critical winter range (mature and old growth pine and spruce forests) for Rancheria and Horseranch caribou herds. Any management attempt to create habitat connectivity for bison through this region could well be counter-productive to caribou conservation. Once again this speaks to the probably false underlying assumption that all of the historical range of Wood Bison was occupied. Bison and caribou numbers probably fluctuated widely in the same landscapes through time depending on forest growth patterns following disturbances over many decades. The issue of potential negative effects on caribou is partly dealt with in Appendix 4. However, *we recommend that the text be more detailed in evaluating the relative feasibility and desirability of achieving on the ground connectivity among each pair of sub-populations.*

- The fourth Broad Strategy includes the threat of Dams, for which the Approach of “evaluating changes in hydrology on bison habitat” is put forward. This is a weak and fairly useless Approach, given that it is well documented that dams on the Peace River have already negatively influenced habitat quality for WBNP Bison. The Recovery Strategy should be more assertive in stating the facts and even proposing measures or approaches that might be used to deal with the negative impacts. If it cannot do this, then it should be more up-front regarding the permanence of the impacts and likely continued decline in habitat quality, especially with a new Site C dam. *We recommend that the document avoid hiding behind the Approach of more study, and actually present some clear management options for this problem.*
- The fifth Broad Strategy, meant to address the “limiting factor” of lack of public acceptance comes at the very end of this section and is assigned a “medium” priority. We question this strenuously. The problem is that this Strategy includes some of the disease management issues that the first Broad Strategy is designed to address. So, it seems ambivalent and even contradictory. *We recommend that all the management issues stemming from disease be dealt with under the first Broad Strategy (including issues of human consumption of diseased Bison) where they get the appropriate High priority rating. And we recommend that this fifth Broad Strategy only deal with other questions of public acceptance of Bison.*

6.3. Narrative

The first paragraph of this section understates the risk intolerance of humans, or the lack of public acceptance of diseased bison. This intolerance may be more influential than the threat of disease per se to population growth and recovery of Wood Bison because it maintains the bison control areas and lack of gene flow from WBNP. *We recommend that this section be more clear and forceful regarding the dominant role of risk intolerance by humans, particularly in the agricultural community.*

Of the various broad objectives outlined here, the narrative around **increasing connectivity** and size of local, currently isolated, populations seems questionable. Connectivity does not seem to be a high priority objective when disease management is still an issue, and when the efficacy of the current exclusion zone around the WBNP complex is repeatedly questioned in this document. *We recommend that connectivity as a broad objective be made contingent on a resolution of the disease management situation.*

The narrative for this Objective outlined the need to understand factors limiting range and population expansion on a small population by population basis. This is the logical first step before writing a management plan to enhance population size and connectivity. So, the narrative does a better job than the Summary Table of laying out the logic. In the Table, developing the plans is put as the High Priority while determining limiting factors is placed as Medium Priority. *We recommend changes in the Table to reflect the logic of the Narrative.*

In this section the following statement is made: “Currently, the total amount of suitable habitat available for Wood Bison recovery is unknown”. We agree. However, this contradicts the statement made under Limiting Factors in Section 3 that habitat is not limiting. Habitat availability needs to be mapped, and incorporated in habitat supply modeling at appropriate scales for Wood Bison use, in order to assess the potential for habitat limitation. *We recommend that Section 3 be changed to explain the reality of potential habitat limitation.*

The narrative around **assessing and reducing other threats** mentions predation. It is not clear that any particular attention needs to be put towards reducing predation. Predation rates will vary as predators learn how to hunt bison, as alternative prey abundances change, and as bison shift their habits in a changing world. Changing predation rates and influences are not necessarily a management issue, especially in what is an attempt to restore bison to wild habitats. The Narrative does not detail any management measures or actions under this Threat, so it is unclear why it is listed. *We recommend that predation be dropped from the list of other threats that require reduction.*

7. Critical Habitat

7.1 Identification of Critical Habitat

The narrative here does not put sufficient emphasis on the scale-dependent nature of bison habitat use. Bison occupy habitat patches that often are not the most prevalent habitat types regionally; they are patchy habitats often in a mosaic or matrix of much less valuable (or even useless) habitats. The scale at which this heterogeneity has to exist to provide bison with sufficient foraging habitat (energy supply) in a home range is a crucial component of critical habitat. Some approaches to habitat selection (e.g. RSFs) can readily overlook this scale component, or spatial integration of habitats. *We recommend inclusion of text outlining the scale-dependent nature of bison habitat use, and effects of scale on habitat availability.*

7.2. Schedule of Studies

Table 6

We generally support this layout, and the emphasis on building habitat supply models (though they are not called that). However, there is insufficient emphasis in the narrative, and in the Table, on the fact that habitat supply is driven heavily by somewhat stochastic events (notably wildfire), and by climate change. Habitat supply modeling (predictive modeling as termed in the document) will have to be done in a modeling environment which employs stochastic disturbance, and which can therefore produce diverse scenarios. In addition the model will ideally also build in changing disturbance regimes (as per climate change) and changing successional pathways (as per climate change).

8. Measuring Progress

As per our earlier comments, we question the target of 1,000 for five populations, because the habitat supply options may not offer such a possibility.

Also, the last bullet suggests that connectivity and gene flow would reach “original” levels. We have no idea what those levels were, and they might not be desirable under changing conditions. They would have been highly variable across decadal or centennial time scales in the Holocene. *We recommend that this text be dropped, or at the very least be much better explained with regard to a lack of clear paleo-ecologically derived targets for connectivity and gene flow.*

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