

Shifting ecosystems require shifting priorities:

Report addresses biodiversity management challenges in the face of climate change

By Lindsey Wallis



Alberta needs to adapt its biodiversity management strategy as our climate changes and ecosystems shift northward and upslope, according to a recent report by Rick Schneider. It posits that these ecosystem shifts need not reduce the biodiversity on Alberta's landscapes but we must change our way of thinking about biodiversity management and adopt more flexible management strategies.

An earlier report by Schneider (see summary by Carolyn Campbell in the February 2014 *WLA*) concludes that the average temperature in Alberta will increase by at least 2°C and possibly as much as 6.5°C in the next 50 years. Drier soils will accompany these changes. These climatic changes are expected to shrink the boreal forest, converting much of it, especially the Central Mixedwood Subregion, to Parkland and Grassland ecosystems. These drastic changes to Alberta's ecosystems mean we will not be able to continue our current strategy of management, which tries to preserve landscapes as they are today; this will become impossible as ecosystems shift in response to climate change. Instead, Schneider asks that we "reimagine what the goal of maintaining biodiversity means and how it can be achieved in a world of constant change... Gaining clarity around our conservation objectives is a critical prerequisite for developing and implementing meaningful adaptation measures."

Alberta's current approach to biodiversity management assumes that human disturbance is the only agent of long-term change on Alberta's landscapes. Schneider suggests that a more appropriate goal for biodiversity

conservation would be to "maintain ecosystem structures, patterns, and processes (including species distributions) *as they would be in the absence of human disturbance.*" (emphasis in original) Under this new interpretation, conservation efforts would continue to focus on preventing harm from human land uses but resources would not be wasted trying to mitigate the effects of climate change, which are inevitable and irreversible. "The status quo is unlikely to be maintained anywhere in the province, even under the least-change climate scenario... Efforts to maintain the status quo will become increasingly expensive and fundamentally misdirected as ecosystems shift in response to climate change." The report stresses that minimizing greenhouse gas emissions is still vital, but works under the assumption that some degree of change is inevitable no matter what measures we implement today.

He cites the Arctic grayling as an example: "Most populations of Arctic grayling in the southern parts of their range are in decline as a result of rising water temperatures, in combination with other factors (Walker, 2005). Under a static approach to conservation, increasing effort should be devoted to these southern populations because they are most at risk. An alternative perspective is that the decline in southern populations reflects a shift in range, and instead of trying to prevent this change, conservation efforts should be redirected farther north, where they will provide the greatest long-term benefit."

The report suggests that protecting habitat is still the best way to conserve biodiversity, even in a changing climate. "The rationale is

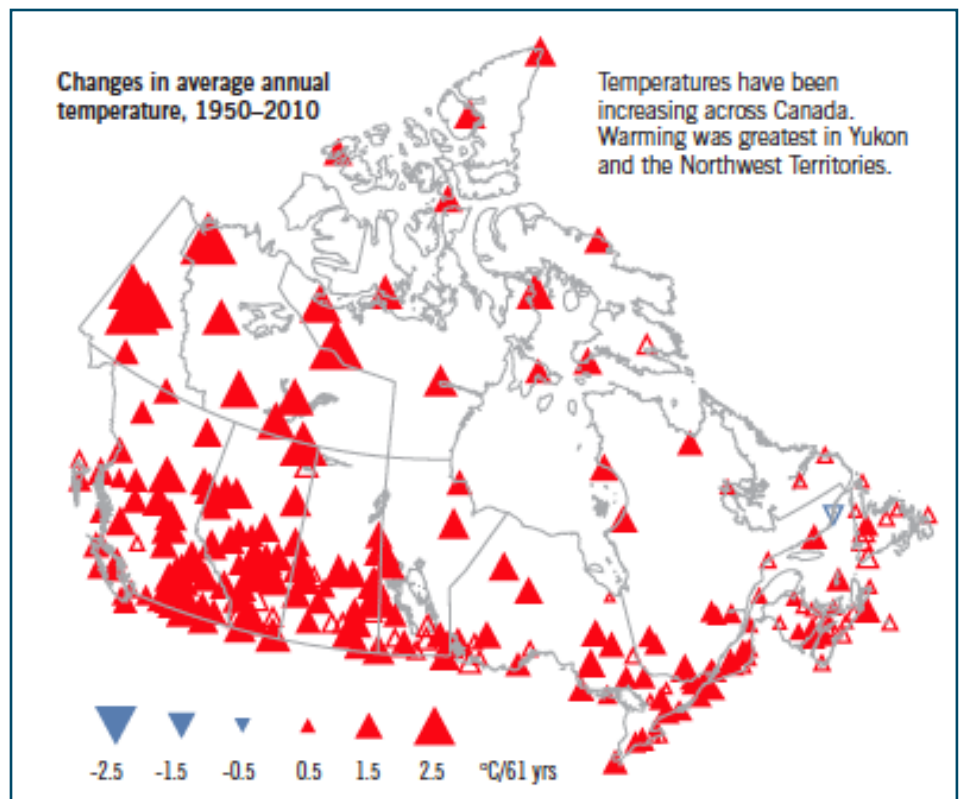
that species will have the greatest capacity to withstand the challenges arising from climate change if they do not also have to contend with the stresses imposed by human disturbances... Fully implementing management strategies designed to minimize the impacts of human disturbances, such as integrated landscape management and cumulative effects management, is paramount." The challenge for Alberta is to ensure that the "full range of physical environments, including dominant landforms and climatic gradients" are protected. Connectivity between protected areas will also be vital to allow migration of species as habitats shift northward. According to the report, "Because the focus is on the 'stage' and not the 'actors,' the system is intrinsically robust to climate change." Schneider believes the regional planning system under the *Land-use Framework* is well positioned to respond to these needs. But the utter failure of the South Saskatchewan plan to protect critical habitat suggests he may be overly optimistic. Even the best frameworks demand political will and commitment.

The difficulty in identifying areas for protection arises in "objectively delineating physical environments." Schneider suggests: "It should be reasonable to use the Natural Subregion classification as a first approximation in areas where the boundaries are based on distinct landforms (e.g., Boreal Highlands) or unique soils (e.g., Athabasca Plains). However, Subregion boundaries that are based on changes in vegetation (e.g., Lower to Upper Foothills) will require additional analysis." The report goes on to say "(t)he weakness in this approach is that

biological systems are highly complex, and the linkage between management intent (e.g., maximizing biodiversity) and actual outcomes is often tenuous. Furthermore, management plans are rarely optimal from a biodiversity perspective because of trade-offs with other land-use objectives. A conservation approach that does not formally track ecological status over time, so that adjustments can be made when needed, is likely to lead to gradual declines in biodiversity that are never fully appreciated.”

One of the biggest challenges for this approach is the need to add protected areas to Alberta’s network so all ecosystems are represented. Schneider suggests this could be accomplished through the regional planning process, as was done in the Lower Athabasca Regional Plan. Another is the problem of connectivity between protected areas, which Schneider suggests could be mitigated with the use of riparian corridors. “Riparian zones are ecologically important linear features that traverse multiple ecosystem types, and can serve as movement corridors for a variety of species (Capon et al., 2013). Furthermore, the intactness of these corridors has been maintained in forested areas through forest management regulations.”

Even with careful planning and management some ecosystems may virtually disappear from the Alberta landscape. According to the report, the Central Mixedwood ecosystem sits on the Climate Moisture Index near the tipping point between a forested or non-forested ecosystem. In addition, “the Climate Moisture Index is relatively uniform across much of the boreal plain, which means that very large areas can be affected by relatively small changes in climate.” Another issue is that as old-growth forest in the Central Mixedwood is converted to grassland it won’t be able to reestablish itself in new regions fast enough, creating a bottleneck for old-growth dependent species. The report goes as far as to suggest that “under the hottest climate scenarios it is doubtful that boreal old-growth forest would re-establish anywhere in the province.” Although the Central Mixedwood would not be totally converted to grassland



Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation, 2014.
SOURCE: GOVERNMENT OF CANADA

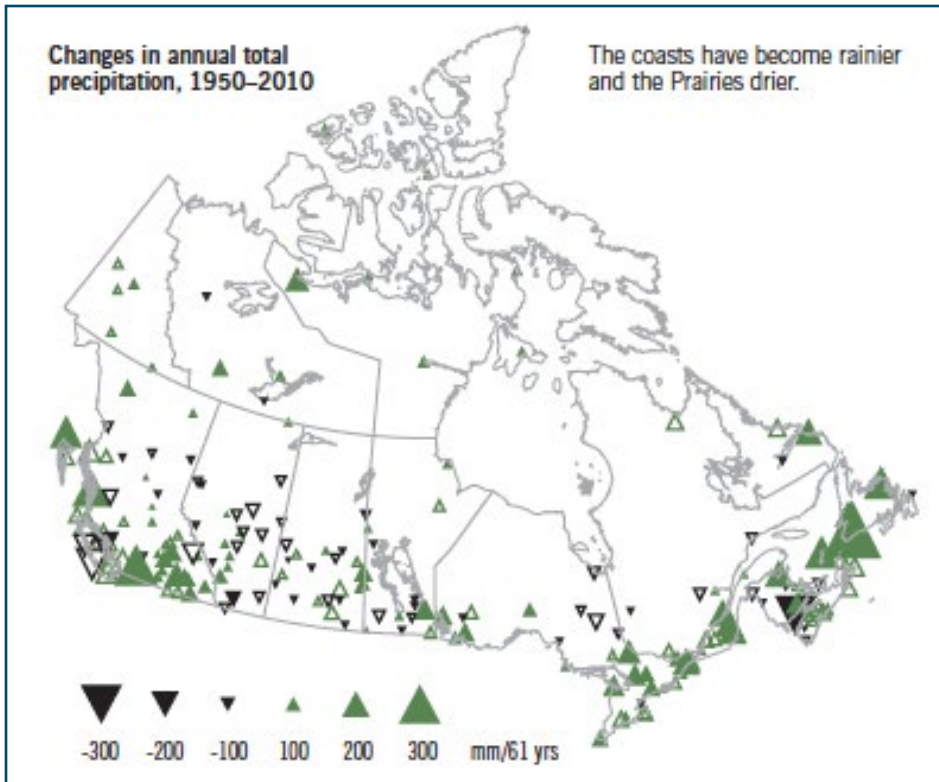
in the near-term, even under the extreme scenario, the future for species dependent on this habitat looks bleak.

Protecting specific endangered species will become especially challenging as sites selected for protection of a single species may no longer represent critical habitat once ecosystems begin to shift. More resources will be required to monitor and redefine the baseline states for these habitats and to discover the new range and new critical habitat for these species as the climate changes and ecosystems steadily shift northwards.

While the expansion of the Grasslands ecoregion could be a saving grace for many species (more than 75 percent of Alberta’s threatened and endangered species are found in the Grasslands ecoregion), the spread of grassland habitat could give rise to other threats. Schneider sees increased pressure from agricultural users for expansion into areas that are currently forested (Green Zone) but will change to grasslands as the climate warms. This is a particular threat if public lands are sold off as the government can no longer manage them for conservation. Schneider cites a paper by Carr et al. (2004),

which suggests the possibility of moving agriculture further north in Saskatchewan. Also, the report states: “Near-term benefits to grassland species will be limited by the fact that the Central Parkland, directly north of the existing grasslands, has almost entirely been converted to agriculture.”

The report argues that one of the biggest obstacles to incorporating climate change into conservation and land use planning is the uncertainty about the degree to which the climate will change and its effect on Alberta’s ecosystems. “Under the least-change scenario for Alberta we can expect approximately 2°C of warming by the 2080s, but under the maximum-change scenario the temperature could rise in excess of 6°C (Schneider, 2013). In ecological terms, this represents the difference between northern Alberta remaining forested or converting to a grassland ecosystem. The large difference between these two extremes is mainly a function of alternative assumptions concerning how much additional greenhouse gas will be emitted globally in coming decades. It also reflects the fact that climate modeling is inherently complex, and different modeling



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teams using the same input scenarios continue to generate different projections.”

Schneider urges that we need to start planning now to have any chance of possessing the knowledge needed and having systems in place to respond to ecosystem changes as they begin to occur. In addition to completing and implementing Al-

berta’s biodiversity framework, the report lists other required elements that have yet to be put in place. They include: “1) The establishment of additional conservation areas to fill gaps in representation, 2) the implementation of coarse-filter biodiversity indicators and targets that will be measured and managed for, and 3) the ef-

fective management of cumulative industrial impacts through integrated landscape management techniques and the implementation of regional land disturbance plans.”

Schneider urges that, at these early stages, the most important action is the drafting of policy that “identifies the need for adapting to climate change and enables and promotes preparation across all levels of biodiversity management. Managers should have a clear mandate to begin incorporating climate change into management plans, undertake pilot studies and other relevant research, begin systematically monitoring the ecological effects of climate change.”

Finally, the report suggests that “an evolutionary, rather than a revolutionary, approach to change is advisable.” Moving too quickly could spark resistance from affected parties from conservationists to land managers and beyond.

In an email Schneider adds: “Adaptation to climate change presents a unique challenge. For some, it is too far away to worry about, for others there is a sense that nothing useful can be done. The reality is that, though there are no magic bullets, there are preparatory steps that can and should be undertaken today to smooth the inevitable transitions that will occur in coming decades. Rather than leaving climate adaptation to languish in our management inbox, it is time to begin integrating it into our management systems at every level.”

The report was produced in support of the Alberta Biodiversity Management Institute’s (ABMI’s) Biodiversity Management and Climate Change Adaptation project, which is “developing knowledge and tools to support the management of Alberta’s biodiversity in a changing climate.”

A freelance writer and photographer, Lindsey loves tramping through Alberta’s wild spaces, whether on foot, horseback or skis.