

## **Comments regarding the Regional Advisory Council “Advice to the Government of Alberta for the South Saskatchewan Regional Plan”**

The Land Use Framework and associated regional plans involve complex processes. Attempting to truly balance environmental, economic, and cultural well-being across a diverse landscape is an unprecedented challenge for all planners concerned. The advice from the South Saskatchewan Regional Advisory Council (RAC) to government is comprehensive and has attempted to address this balance based on its cabinet-approved terms of reference. While there are several positive recommendations, overall the recommendations fall short. The RAC Terms of Reference (TOR) state that the RAC is to provide advice on how “competing land uses in the region should be reconciled based on economic, environmental, and social priorities and how trade-offs could be addressed”<sup>1</sup> (Pp. 7). Throughout the document, however, the emphasis is still placed on economic growth and does not identify trade-offs that will balance environmental and cultural concerns. The document also ignores the inherent values of wilderness, species diversity and ecosystem processes. While efforts should be made to balance economic and environmental needs, all efforts should be taken to ensure that ecological processes, on the whole, remain intact<sup>2</sup>, thus ensuring the inherent value of wilderness is incorporated into the South Saskatchewan Regional Plan (SSRP).

This document discusses the recommendations in the RAC advice, areas of concern, and potential solutions. Our response is separated into 5 categories: 1) Process and definitions; 2) General Content; 3) Landscape Recommendations (grasslands, eastern slopes/headwaters) and; 4) Place-based specific recommendations (the Castle, and the South Saskatchewan Canyon); and 5) Best Management Practices for recreation and forestry on public lands (Appendices 1 and 2).

The Land Use Framework was created to address growing concerns that everyone cannot do everything, everywhere all the time without serious consequences to our ecological and cultural systems. These are the very systems that support our daily lives and make Alberta a great province in which to live. The RAC recommendations emphasize the use of ecological goods and services throughout, however, the overall document still reads as though it is trying to accomplish everything in most places all of the time. This goes against the overall purpose of the LUF and the SSRP terms of reference. Many of the more specific comments contained throughout this submission are aimed at addressing this fundamental shortcoming of the RAC recommendations.

### ***1. Comments regarding process and definitions***

Throughout the document, several terms lack definition (e.g., conservation management area), which means that several recommendations are open to interpretation. This lack of clarity impacts the reader’s perceptions regarding how the plan will be implemented and what changes will result on-the-ground.

The RAC recommends that First Nations issues be dealt with in a clear and transparent manner, which is absolutely necessary. We would suggest, however, that all public issues should be dealt with in a clear and transparent manner, not only those issues impacting First Nations. This statement needs to be taken a step further to recognize First Nations as a government and rights holders, rather than equal stakeholders.

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<sup>1</sup> Government of Alberta. 2009. Terms of Reference for Developing the South Saskatchewan Region. Edmonton, Alberta.

<sup>2</sup> Drengson, A., and Y. Inoue. 1995. The Deep Ecology Movement: an introductory anthology. North Atlantic Books, Berkeley, CA.

The draft plan needs to include criteria, indicators, and thresholds that are science-based, defined, and justified for each major section. If information to define criteria, indicators, and thresholds is not available, then the draft plan should identify what research needs to be contracted to accurately define these details. Basing targets on an “integrated management approach informed by ongoing inventorying and monitoring” is adequate, but monitoring will be ineffective and not produce measureable results unless criteria, indicators, and thresholds are defined. Considering these criteria and indicators within the context of cumulative effects is necessary to alleviate some of the pressure we place on our natural systems. Clearly defined thresholds for development will require strong political leadership, and vision to implement. Ongoing monitoring and inventorying will require a continued and committed financial investment on behalf of the province; this commitment should be detailed in provincial budgets and long-term planning.

Increasing the level of coordination amongst government jurisdictions, stakeholders and land owners is recommended in several areas. This is essential for an integrated plan such as this to be successful and we are in full support, however, an institutional mechanism to ensure this coordination is not identified. This will improve the efficiency of plan implementation, especially when considered within the context of cumulative effects management.

A suite of diverse objectives will contribute to the success of cross-jurisdictional coordination by providing each jurisdiction with a particular perspective to represent. Tactics associated with addressing these objectives should not only be based on the implementation of various conservation and stewardship tools (as repeatedly recommended by the RAC), but also involve the application of proven tools, such as Parks and Protected Areas, that have been used for decades to achieve conservation related objectives.

The emphasis on keeping a diverse economy with diverse revenue and interests is positive for Southern Alberta. We have the opportunity in this region to demonstrate how a diversity of economic contributors can not only build a strong, resilient economy but also reduce potential cumulative effects resulting from our traditional emphasis on resource extraction industries. This will require the draft plan to detail how various economic contributors, e.g., tourism, local business, will contribute to the overall economic prosperity of the region. The draft should recommend how decisions will be made when a potential resource extraction development (i.e., forestry or oil and gas) will potentially impact the economic viability of other businesses that contribute to overall economic diversity of the region. How will these trade-offs between economic contributors be balanced and decided?

The recommendations also emphasize a higher level of coordination between land owners in grasslands as a necessary step forward for rangeland management. In many cases, it is the ranchers and farmers of our landscapes that are the best stewards. Their perspectives and expertise need to be integrated into the draft plan in ways that not only recognize their knowledge, but retain their power in land-use management and decision making (providing decisions do not negatively impact ecological integrity). Ranchers and farmers also need to be provided with meaningful incentives to prioritize ecological health of the natural resource that we all rely on, including incentives to protect species at risk and their habitats, or protect riparian zones through ranching practices. The cooperation of farmers and ranchers is necessary to achieve connectivity objectives across this largely privately owned landscape.

*Recommendations for the draft plan:*

- 1. Define terms in such a way that limits subjective interpretation on behalf of the reader.*
- 2. Address and consult First Nations as equal Governments and Rights Holders.*
- 3. Include science-based criteria, indicators, and thresholds for management and monitoring programs. Provide justification for how criteria, indicators, and thresholds are defined to ensure transparency and accountability.*

4. *Include the use of already developed and proved conservation tools, in addition to the new conservation and stewardship tools defined in the Alberta Land Stewardship Act, to achieve conservation related objectives.*
5. *Detail how various industries will contribute to the overall economic prosperity and diversity of the region.*
6. *Make robust recommendations regarding how improved coordination between government departments, land owners, and other stakeholders will be accomplished in plan implementation.*

## **2. General Content**

### *a) Strategic Land-Use Principles*

The RAC Advice to Cabinet opens with a set of land-use principles (Pp. 7), which set the stage for the remainder of the document. One of these principles states: “All of the SSR should be used by people for their economic interests and their enjoyment”. This statement reflects an archaic perspective of land use where all planning and management is designed to ensure human consumption of resources. While human consumption of resources is no doubt a priority for land management and planning, it is naive to think that that all land, water, air, and wildlife are for human use and consumption. This negates the intrinsic value of wilderness and makes the assumption that we currently know and understand all of the ways an ecosystem can be “used”. This statement is not a step forward in land management and planning but rather a step backward. The biodiversity and ecological relationships contained within intact wilderness not only provide us with a variety of ecological goods and services, but help keep our climate steady and our ecosystems self-propagating.

There is no principle around the actual conservation of biodiversity, species at risk, vulnerable/sensitive habitats, or even that land use should be sustainable from the perspective of natural systems. As such, there is a fundamental guiding principle missing, particularly considering the SSR contains Alberta’s highest percentage of the province’s species at risk.

### *Recommendation for the draft plan:*

1. *Include a principle for land-use planning centering on the conservation of biodiversity, sensitive habitats, and species at risk. This principle should focus on the conservation of these ecological resources for their intrinsic values and the ecological goods and services they provide.*

### *b) Vague language throughout the document leads to a lack of accountability in writing the draft plan*

Much of the language in the document is vague and provides little detailed direction regarding how ideas will be accomplished on the ground. Language such as “where feasible...”, “consider...”, or “where reasonable...” provide little to no assurance that the landscape will actually be managed and planned to meet management intents and outcomes. Without concrete objectives and tactics defined in this plan, we cannot expect any of the planning objectives to be met.

More specificity regarding management intents and outcomes is required throughout the document; we provide several recommendations for management intents and outcomes throughout this document as they pertain to different aspects of the plan. The recommendations associated with section 5.0: Healthy Ecosystem and Environment are weak, non-committal, and redundant. For example, one recommendation is: “Help meet the provincial Water for Life target of a minimum 30 percent for water conservation, efficiency, and productivity...” (Pp. 23). A series of implementation measures are suggested, but little detail is provided regarding how effective these different options will be, how much they will cost, or which options are the most effective to meet the target. Given that reducing water consumption by 30% was part

of the Terms of Reference for the RAC, the draft plan needs to detail more precisely how to meet the target.

*Recommendation for the draft plan:*

1. *Management intents, associated outcomes and recommendations need to be more detailed providing prescriptive direction regarding how management objectives will be achieved.*

*c) Recreation and Tourism*

Recreation and tourism are a large focus of the recommendations and are already significant economic contributors to the diverse economy of the South Saskatchewan Region. In many areas of this region, there is the potential to increase this economic contribution and potentially surpass the economic contribution of more traditional resource extraction practices. It is important, however, to understand that recreation and tourism activities have their own impacts on the landscape's ecological integrity; these impacts must be accounted for in the SSRP. For example, significant infrastructure developments (e.g., resorts, golf courses) in ecologically sensitive areas should not be permitted. It is always possible to avoid, minimize, and mitigate the impacts of recreation and the plan should reflect that commitment.

We are in full support of the detailed RAC recommendations pertaining to off-road vehicle recreation (Pp. 43); these should be implemented immediately in areas of motorized vehicle recreation. The challenge in the past with motorized recreation, however, has not necessarily been the lack of regulation but the lack of enforcement. The Alberta Government must demonstrate a commitment to fund enforcement of designated and sustainable trail use in motorized recreation areas over the long term.

One of our primary concerns pertains to comments in the RAC recommendations that areas currently lack the "critical mass" of tourism attractions and infrastructure. We are unclear what "critical mass" is and how our current tourism infrastructure isn't meeting demand. Understanding more clearly where our current system is falling short will help to create concrete planning actions to address these shortcomings.

*Recommendations for draft plan:*

See Appendix 1 for further comments on what CPAWS recommends for sustainable recreation and tourism practices.

*d) Healthy Ecosystems and Environment*

The objectives regarding healthy ecosystems and environment recognize the value of ecological goods and services in the provision of healthy communities. Recommendations were supposed to provide guidance for areas in need of restoration, as well as areas that are in good environmental health. Due to a lack of detail, however, these objectives fail to recognize the fact that a healthy economy is dependent on a healthy environment (and the ecological goods and services provided). In many cases, it is not about finding a trade-off or balancing economic and ecological needs, but rather thinking about the landscape differently and finding solutions that benefit both the economy and ecological resources.

We are very supportive of water conservation being a priority throughout the recommendations, but are concerned that no specific recommendations are made to increase water conservation, efficiency and productivity by 30 percent, as established by Alberta's *Water for Life* strategy. The RAC has recommended that options for water storage are identified and developed. This statement can apply to dams or intact forests as both function in water storage. The main difference, however, is that intact forests are also responsible for recharging ground water aquifers, an essential supply of water during the drier months. Dams are an inefficient way to store water and come with an array of environmental impacts that far outweigh any benefits. We encourage government planners to discuss the value of intact forests for water storage and not the potential role of dams in this regard. The RAC also recommends that research efforts

are undertaken to better understand ground water ecology in the region; we recommend that these efforts be completed before water storage infrastructure is considered.

The RAC recommends an objective to recover species at risk, which is already reflected in various species recovery plans and the Alberta Wildlife Act. Our greatest concern is how this objective will be met and what tactics will be put in place to successfully recover species at risk. The draft plan must detail specific tactics that will ensure complete and effective implementation of species at risk recovery plans, currently lacking in land use planning.

We are in support of efforts and recommendations to avoid and minimize the conversion of native grasslands on public and private lands. In the case of public land, the creation of new parks and protected areas will be the best way to meet this objective. Planning should ensure that large patches of native grassland remain as such and any unavoidable conversion is compensated by preservation of grasslands elsewhere. In addition, there needs to be a high level of government accountability for decisions made pertaining to publicly owned patches of native grasslands, especially if those lands are being considered for sale. It was this lack of accountability and transparency that led to the controversy surrounding the proposed sale of 65 hectares of native grassland in Southern Alberta in the summer and fall of 2011.

*Recommendations for the draft plan:*

1. *Implement planning options that both benefit the ecological and economic resources of an area (e.g., new Parks and Protected Areas often improve economic opportunity for a community while protecting the environment).*
2. *Provide details regarding how the plan will meet the target of 30% reduction in water consumption.*
3. *Implement research efforts to increase understanding pertaining to ground water prior to planning and implementing water storage options.*
4. *Detail specific tactics to ensure complete and effective implementation of species at risk recovery plans.*
5. *Create new parks and protected areas in the grasslands and foothills; both eco-regions are currently under-represented in Alberta's parks and protected areas network.*
6. *Large patches of publicly owned native grassland should not be sold without robust, accountable public participation in such decisions.*

*e) Conservation Management Areas (CMAs)*

The RAC has recommended that several areas of ecological importance be designated as "Conservation Management Areas". These areas have been selected to provide a "network of lands that achieve water security; provide unimpaired ecological features, systems and biodiversity; and represent the region's natural diversity" (Pp. 50). The document goes on to say that development in these areas will be subject to a "standard higher than for access to other zones", but does not define what those higher standards are or how they will be applied.

Due to this lack of clarity, it is difficult to understand how CMAs will effectively meet conservation outcomes. Definitions of CMAs and the higher standards they are subject to should clarify how they differ from Public Land Use Zones, which define similar priorities and conservation outcomes but have largely been ineffective in achieving these priorities or outcomes. Lastly, any recommendation for a CMA must also justify why existing Parks and Protected Areas legislation is inappropriate when this legislation is already developed and tested across the landscape.

Recommending an area as a CMA offers little to no immediate solutions for areas of ecological significance that are currently under significant threat from development, recreation or both. Integrated management plans for CMAs are due in three years; interim measures regarding industrial and recreational development,

including moratoriums and decreased development, for these areas must be put in place while plans are being created. Without interim measures, we run the risk of over-developing these sensitive landscapes, which could impede future conservation efforts. It is much more difficult and costly to rehabilitate a landscape than limit impacts to it in the first place. Public consultation around these management plans must be robust, inclusive, transparent, and feedback must be included in final management plans.

Integrated management plans are not new to the Alberta landscape, and history shows they have had little effect on maintaining ecological integrity in an area. This is particularly evident in areas like the Ghost and Castle Public Land Use Zones, whose ecological integrity has continued to decline since their integrated management plans were created. The draft plan must outline how the Alberta Government will be held accountable to enact integrated management plans in a way that meaningfully meets conservation targets.

*Recommendations for the draft plan:*

1. *Conservation Management Areas and the “stricter standards” they will be subject to need to be more clearly defined. We recommend the following potential attributes for CMAs:*
  - a. *No net increase in surface disturbance (e.g., linear access densities, well pads).*
  - b. *No net increase in disturbance to wetlands and riparian areas.*
  - c. *All developments (regardless of size, scope, and purpose) should be subject to a full environmental impact assessment.*
  - d. *All effort should be taken to avoid terrestrial and aquatic impacts before mitigation options are sought.*
  - e. *All developments (regardless of size, scope, and purpose) should have to complete a rare species habitat assessment (for plant and animals species at risk) prior to submitting a proposal for development.*
2. *Areas in need of urgent conservation attention should be considered for immediate protection using an existing tool that can be applied immediately.*
3. *A moratorium on significant developments should be put in place in all areas designated as CMAs until their management plans can be completed.*
4. *Public consultation around management plans for CMAs must be inclusive, robust, and hold the Government accountable to action to protect these designated areas effectively.*
5. *Detail how the Alberta Government departments will be held accountable to implement management plans once they are completed.*

*f) Management Intents*

Management intent for agricultural lands includes all current and possible land uses that occur or could occur on native grasslands. This management intent essentially goes against the premise of the LUF by suggesting that everything is permitted in the grasslands anytime. If we are going to prioritize some areas of the SSR for agricultural purposes, then it should be stated as such. Areas that prioritize agriculture should not contain significant portions of native grasslands.

*Recommendations for the draft plan:*

1. *Management intents need to be specific and articulate what lands will be prioritized for which purposes.*

*g) Ecological Goods and Services*

The emphasis on ecological goods and services throughout is very positive. It must be recognized, however, that the foundational and required market for these goods and services is not yet developed. The Province of Alberta and several other organizations are currently piloting several projects in the South Saskatchewan Region that use some of the conservation and stewardship tools outlined in the Alberta Land Stewardship

Act. Pilot projects, however, are only a starting point; planning for ecological goods and services is more of a medium to long term strategy. Interim measures need to be put in place today to ensure the maintenance of those ecological goods and services until the market has been developed. In addition, the success of several current economic contributors (e.g., ranching) already rely heavily on ecological goods and services; reliance on these factors should be more formally defined and incented in the regional plan.

*Recommendation for the draft SSRP:*

1. *Planning for ecological goods and services over the long term should be a foundation for how development is detailed in the draft plan. In areas of environmental or cultural significance, interim measures (e.g., pausing development approvals and plans) should be put in place until a potential conservation and stewardship tool can be piloted.*

*h) Economic growth*

An emphasis on a diverse economy that is productive and responsive to change is a very positive planning platform. Support for industry to reduce their footprint and move towards zero waste is a big step forward. This should not only be supported, but incented. Improving and expanding communication tools and infrastructure is a great way to encourage people working remotely from smaller communities. Impacts of these new infrastructure developments will need to minimize land disturbance, but this concept must be followed up by regulations to ensure that development of this nature actually reduces land fragmentation and habitat destruction.

*i) Best Management Practices*

Best Management Practices are recommended in multiple places in the document, but are not usually defined. Best practices of environmental management are meant to enable companies to protect the environment, while simultaneously reducing costs<sup>3</sup>. Caution must be exercised in defining and implementing Best Management Practices, as in many cases they have not been proven effective in addressing conservation-related criteria. In addition, they are not designed to take the place of protected areas in management. While some areas can be managed with Best Practices, some areas require legislated protection as Parks and Protected Areas. Best Management Practices should be applied across the entire region, not only in the headwaters areas. If we are not applying Best Management Practices, then how is the land being managed? Should we not always be trying our best to manage the landscape? When defining Best Management Practices, it is crucial that they be science-based and designed to address environmental, economic, and social objectives. CPAWS is pleased to work with the Alberta Government to help define these BMPs throughout the region.

*Recommendations for the draft SSRP:*

1. *BMPs should include measures to preserve not only ecosystem attributes, but the physical and biological linkages between ecosystems (e.g., streams to riparian zones to upland areas). These can include the development of “riparian management zones”<sup>4</sup>.*
2. *A stringent monitoring program needs to be implemented to ensure the effectiveness of any BMPs applied to the landscape.*

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<sup>3</sup> Christmann, P. 2000. Effects of “Best Practices” of Environmental Management on Cost Advantage: The Role of Complementary Assets. *The Academy of Management Journal*, 43(4): 663-680.

<sup>4</sup> Bisson, P.A., T.P. Quinn, G.H. Reeves, and S.V. Gregory. 1992. Best Management Practices, Cumulative Effects, and Long-Term Trends in Fish Abundance in Pacific Northwest River Systems. In: *Watershed Management*. Naiman, R (Ed.). Springer Publishing.

### **3. Landscape Recommendations**

#### *a) Managing for climate change*

The RAC Terms of Reference acknowledge that changing climatic conditions will impact water availability through an increase in average temperatures. Climate change, however, will impact the entire South Saskatchewan Region and all of its natural processes. The advice to Cabinet from the RAC does nothing to address how climate change impacts will be addressed in land use planning, where they will be mitigated or where adaptive management practices will be put in place. Addressing the impacts of climate change requires identifying practical strategies to reduce or mitigate anticipated negative effects<sup>5</sup>, as well as knowledge of trends and variability in surface and soil water balances. Recent work shows that streamflows in the South Saskatchewan Basin are already declining due to hydroclimatic changes and severe human impacts<sup>6</sup>. Based on these impacts, future water availability in Alberta will be challenging, especially considering the increased demand placed on this resource from a growing population.

#### *Recommendations for the draft SSRP:*

- 1. Increase the extent of protected areas within Alberta's Parks and Protected Areas Network – these areas will help ensure refugia for species at risk and ecosystem resiliency as the climate changes<sup>5</sup>. Protected areas should be representative of the region's ecoregions, which means creating new protected areas specifically in the grassland and foothills ecoregions.*
- 2. Minimize habitat fragmentation and maintain connectivity – these areas are essential for wildlife movement and the conservation of biodiversity across the landscape.*
- 3. Restore impacted sites to maximize ecosystem resilience.*
- 4. Reduce pressures on species from sources other than climate change – mitigating other threats to ecological integrity give ecosystem maximum flexibility to evolve responses.*
- 5. Incorporate predicted climate change impacts into species and land management plan – identify areas that require further research and commit resources to that research. Create flexibility in the SSRP to accommodate the results of new research within an adaptive management context. This will also require resources committed to effective monitoring of management actions.*
- 6. Ensure wildlife and biodiversity needs are considered as part of the overall societal adaptation process.*

#### *b) Grasslands*

Alberta's grasslands are an area of extreme environmental and cultural significance. They are also the ecoregion most highly impacted by human development; less than 20% of our province's native grasslands remain. It is for this reason that they require particular attention in planning. We support recommendations to limit the further conversion of native grasslands. As a member of the Prairie Conservation Forum, we would like to echo their recommendations for the SSRP.

#### *Recommendations for the draft SSRP:*

- 1. Maintain large native prairie and parkland landscape – These landscapes are not only an integral component of a much larger continental ecosystem, they are also critical to the provision of ecological goods and services for our human communities. These characteristics afford society a greater range of options to help us adapt to the impacts of climate change. This outcome can be achieved by: providing landowners with incentives to maintain patches of native prairie, ensuring*

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<sup>5</sup> Elmeligi, S. 2009. Planning Connections: Recommended Environmental Objectives for the South Saskatchewan Regional Plan. Canadian Parks and Wilderness Society, Southern Alberta Chapter. Available at: [http://cpaws-southernalberta.org/upload/Planning\\_Connections\\_Full\\_Report.pdf](http://cpaws-southernalberta.org/upload/Planning_Connections_Full_Report.pdf)

<sup>6</sup> Prairie Adaptation Research Collaborative. 2010. Hydroclimatic Variability: South Saskatchewan River Basin. University of Regina, Regina, Saskatchewan. 53Pp.

*the land use planning practices do not further fragment native grasslands, and preventing the conversion of any more of Alberta's native grasslands.*

2. *Conserve connecting corridors for biodiversity – The RAC identified several areas that may act as connecting corridors throughout the SSR, many of which followed river valleys. In Alberta, most of our rivers flow west-east, thus only conserving river corridors will not effectively address connectivity north-south. Considering connectivity from the perspective of connecting large patches of native grasslands will help to ensure that planning decision increase connectivity in all directions. This will require similar tactics as mentioned above, but within the context of examining the landscape for its connectivity potential. Planners can use the map found at: <http://www.rockies.ca/maps/cpaws/maptool.php> that details patches of native grasslands and defined environmental significant areas to examine this landscape from a different perspective.*
3. *Protect isolated native habitats – Small pockets of ecological refugia that are isolated from other habitat patches can play a significant role for species at risk and should be protected. Established wetlands and ephemeral shoaling and loafing areas that are used by resident and migrating waterfowl as examples of such areas. Areas such as these need to be protected either through protected area designations (for specifically identified geographical areas of significance) or through province-wide policies and regulations detailing development limitations associated with these areas of environmental significance.*

#### *c) The Eastern Slopes/Headwaters*

The Eastern Slopes have been the focus of conservation efforts in Alberta for decades, and are specifically recognized in the RAC Terms of Reference for their “natural beauty, wildlife habitat, ... and water resources” (Pp. 15). CPAWS Southern Alberta Chapter has worked with the Livingstone Landowners Group, the Eastern Foothills Community Stewardship Initiative, and other environmental organizations to create a series of recommendations for land-use planning of this area. We understand that these groups have submitted their own perspectives on this regional plan and we support their recommendations. In particular, we feel strongly that the Eastern Slopes need to be a place where ecological integrity is prioritized and protected. This means that any resource extraction activities should first consider how to avoid environmental impacts, then how to mitigate any unavoidable impacts. Full-cost accounting that incorporates impacts to ecological goods and services (especially those associated with water) should become standard practice in this area. If commercial practices can be shown to have a negative impact on the ecological integrity of the area, they need to be modified to reduce or avoid that impact. New parks and protected areas are required along the eastern slopes to permanently protect their disproportionate contribution to the health of human and wildlife communities throughout the South Saskatchewan region.

CPAWS has also worked with several stakeholders to specifically consider sustainable forestry on this landscape and what is required to achieve it. There is an urgent need to create an alternative model of forest management in Alberta. In partnership with several organizations, we envision a new model, based on ecosystem management, guided by scientific expertise, and augmented by local community participation and benefit. We are not opposed to all logging. Instead we support the development of a forest management model that maintains healthy forest ecosystems as its primary function, and offers sustainable benefits to communities from the wise use of the forests in the South Saskatchewan Region. See Appendix 2 for detailed recommendations pertaining to forestry along the Eastern Slopes.

Protection of the region's headwaters has surfaced as a priority in several multi-stakeholder processes (e.g., the Eastern Slopes Community Stewardship Initiative, the integrated watershed management plans for both the Oldman Watershed Council and the Bow River Basin Council). Protection of the headwaters is not only the protection of mountain tops, but also the protection of ground-water-fed tributary streams that are significant contributors to overall river flow rates.

Another recommendation provided is to manage land in the headwaters so that watershed integrity is given the highest priority, yet little detail is provided pertaining to *how* to meet that objective. We agree that headwaters should be managed to prioritize ecological integrity, this should involve increasing the network of protected areas along the Eastern Slopes, improving forestry management practices, and working with rural land owners to incent conservation on private lands.

*Recommendations for the draft SSRP:*

1. *New parks and protected areas should be established in the public lands of the Eastern Slopes, particularly in the Castle Special Place and along at least a portion of the Livingstone Range.*
2. *All resource extraction activities should require an environmental impact assessment and rare species surveys (for both plant and animal species) prior to approval.*
3. *All development proposals should undertake a robust public consultation process with local landowners and stakeholders – local input should be incorporated into development plans.*
4. *Recommendations provided by the Eastern Foothills Community Stewardship Initiative and the Livingstone Landowners Group should be incorporated.*
5. *All management and planning should effectively prioritize the health of the headwaters.*

*d) Oil and Gas Development*

Oil and gas extraction is a fundamental part of the economy of the South Saskatchewan Region, but it is important to remember that it is not the only economic contributor to the long term economic viability of the region. Although this is an essential component of the Southern Alberta landscape, oil and gas developments should not be planned in a way that compromises the overall ecological integrity of this region. CPAWS SAB does not think that oil and gas operations should be prevented on this landscape, but we do believe that more stringent regulations are required to guide this development, particularly in areas of ecological significance.

*Recommendations for the draft SSRP:*

1. *All aspects of oil and gas developments, from seismic exploration to drilling, and from road building to transport (either through pipeline or by truck) should be subject to an environmental impact assessment.*
2. *Environmental impact assessments for all developments, including energy developments, should assess the potential cumulative effects of the development over the short and long term. Plans for how impacts will be avoided first, and then mitigated should be included in these cumulative impact assessments.*
3. *The approval process for energy developments should be more transparent and accountable to public needs. More robust public consultation should be required for all energy developments.*
4. *All energy developments, especially unconventional sources, should detail information regarding water – potential usage, sources, and impacts all need to be provided prior to development approval.*
5. *Reclamation of energy developments should involve planting trees and other native vegetation.*
6. *Energy developments should not contribute to an increasing road density, thus all roads from retired energy developments should be reclaimed or gated (depending on ecosystem requirements).*

## **4. Place-based specific recommendations**

*a) The Castle Special Place*

The Castle Special Management Area was designated a Special Place in 1998. While all other Special Places were granted protection under the Provincial Parks Act, the Castle was legislated as a Forest Land Use Zone (now Public Land Use Zone). Since that time, the ecological integrity of the Castle has continued to degrade

(this is reflected in a report done in conjunction with ARC Wildlife Services and available here: <http://cpaws-southernalberta.org/upload/Castle%20Carbondale%20Ecoresource%20Intro.pdf> ).

CPAWS has for years been working with local residents and stakeholders to find a solution to the declining ecological health that would satisfy all user groups. For 18 months we participated in a multi-stakeholder process called the Castle Special Place Working Group, which resulted in the completion of a conceptual proposal for protection of the Castle. The group unanimously agreed that the Castle ought to be protected as a combination Wildland and Provincial Park (the complete conceptual proposal can be found at: [www.castlespecialplace.ca](http://www.castlespecialplace.ca)). A public opinion poll conducted with regional residents showed that close to 75% of residents are in agreement with this recommendation. The proposal was presented to the Ministers of SRD, Tourism, Parks and Recreation, and Environment and Water as well as the local MLA. In these meetings, we were repeatedly assured that this proposal would be considered in the regional planning process.

We continue to put forward the recommendations of this multi-stakeholder group and again recommend the Castle be protected as a combination Wildland and Provincial Park, immediately.

*Recommendation for the draft plan:*

1. *The Castle Special Management Area, with its current Public Land Use Zone boundaries, should be legislated as a combination Wildland and Provincial Park.*

*b) The South Saskatchewan Canyon*

The South Saskatchewan Canyon, northeast of Medicine Hat, including Chappice and Sam Lakes is an area of native grasslands containing several provincially-identified environmentally significant areas. The RAC advice does delineate it as a Conservation Management Area to protect its ecological resources and significance. In the summer of 2011, CPAWS engaged in a social science study to meet with multiple land-owners, grazing lease holders, and other stakeholders to discuss the potential conservation of the South Saskatchewan Canyon. The complete study can be found here: <http://cpaws-southernalberta.org/campaigns/grasslands>.

*Recommendations for the draft SSRP:*

*The main recommendations stemming from this research were:*

1. *Recognize that local landowners and grazing leaseholders are knowledgeable about the land and are active stewards;*
2. *Smarter planning for oil and gas operations is required;*
3. *Wind energy development should be managed to minimize disturbance to native grassland and wildlife through appropriate placement and other mitigation measures;*
4. *Land zoning should make a distinction between lands prioritized as rangeland and those prioritized for agriculture;*
5. *Improve the authority and enforceability of Protective Notations as a land-use management tool.*
6. *Investigate the possibility of legislating the South Saskatchewan Canyon area as a Heritage Rangeland. Given the priorities of the stakeholders that we met with and their concerns for the landscape, this land-use designation will meet the ecological requirements of the SSC while meeting the needs of grazing lease holders and other stakeholders.*

## ***Appendix 1: Sustainable Recreation and Tourism in the South Saskatchewan Region***

The South Saskatchewan Region (SSR) is a diverse landscape from the Rocky Mountains, foothills and parklands in the west to prairie and grassland environments stretching to the eastern border. These ecosystems provide for unique and attractive recreational opportunities. Currently, 45% of Alberta's population resides in the SSR, whose urban centres are growing, especially in and around Calgary (Government of Alberta, 2009). An increasing population will look for highly valued recreational opportunities and inevitably influence the anthropogenic impact of Alberta's natural areas. Alberta is home to amazing, inspiring, and diverse landscapes. CPAWS SAB is supportive of efforts to increase a variety of sustainable recreational opportunities for all Albertans to get out and appreciate Alberta's wilderness.

Recreation needs to be carefully planned and managed to ensure the continued ecological integrity of these rich landscapes. The following recommendations address key issues regarding sustainable recreation and tourism in southern Alberta and offer solutions in moving forward with a regional plan that balances healthy ecosystems and communities connected to nature and economic diversification.

### **Potential Impacts of Recreation and Tourism**

Sustainable recreation and tourism aligns with the principles of ecotourism which is defined as, "*responsible travel to natural areas that conserves the environment and improves the well-being of local people*" (The International Ecotourism Society, 2012). These types of pursuits are best coupled with an educational component (e.g. interpretive hikes, programs, signage, etc.) that provides users with an opportunity to learn more about the environment they are recreating in and gain a stewardship ethic that will translate back to their communities. While recreation may not be viewed by some as an intensive use on the landscape, it does need to be recognized as a form of human use that has a variety of impacts on our landscape and communities.

Influences on animals and ecosystems due to recreational activity can vary in type and intensity. The *type of disturbance* involves the specific activity engaged in (i.e., motorized or non-motorized vehicles) and the medium of movement (i.e., air, water, or land). The behaviours of recreationists (e.g., speed, noise level, and angle of approach to wildlife) and the predictability of where and when tourist activities occur also influence the type of disturbance (Knight & Cole, 1995). With increasing human use predictability in space and time, the magnitude of disturbance will normally decrease (Nevin et al., 2001). If management plans are developed without considering both the human and ecological aspects of use, degradation of the resource and ecosystem will result (Duffus & Dearden, 1993).

The *intensity of disturbance* refers to the timing and location of human presence. Tourism during the most vulnerable times of an animal's life cycle (e.g., breeding and birthing) will potentially result in more severe impacts. Location of disturbance is also a key factor. For example, disturbances coming from above (e.g., aircraft or hikers above a valley) can elicit higher response levels from some bird and mammal species (Knight & Cole, 1995). In order to minimize the impacts of recreation on species and ecosystems, both the type and intensity of recreational use need to be effectively managed.

Non-consumptive recreation can impact animals both directly and indirectly. Direct impacts include changes in animal behaviour, physiological state, survival rates (Green & Giese, 2004), and habitat displacement events resulting from harassment of animals by recreationists (Gauthier, 1993). Typically, direct impacts are observed over short time frames through observation of an animal's fleeing response or decreased foraging due to disturbance. Some of these impacts may appear inconsequential, however,

continued exposure to the disturbance may result in long-term impacts to the population's reproductive success, or even overall ecosystem health (Duffus & Dearden, 1993; Green & Giese, 2004).

Indirect impacts on animals are harder to study and accurately quantify; these typically involve trampling of habitat, water, air, and noise pollution, and overall loss of habitat diversity (Boyle & Samson, 1985). These impacts become more apparent over long periods of time whenever and wherever recreation occurs, and are unlikely to be revealed with short-term research efforts (Cole & Landres, 1995). In areas where recreational use is common, both direct and indirect impacts on species and ecosystems need to be monitored and understood so that management approaches may function at maximum efficacy (Boyle & Samson, 1985).

Generally, the relationship between human use levels and ecosystem impact is curvilinear. Low use levels generate the most significant impacts and disturbance to the ecosystem. As human use increases to medium and heavy levels, the intensity of impacts plateaus. Once human use begins to impact the ecosystem, more use has less and less of an effect (Cole & Landres, 1995). In order to preserve ecosystem integrity, it is more beneficial to limit visitation at very low use levels before irreversible damage to the ecosystem is done and substantial cuts to use levels or environmental rehabilitation efforts are required.

Indirect impacts from recreation can impact animal behaviour, even if people are unaware of the animal's presence. Moose have been shown to react to snowmobiling recreationsists who were over 300m away (Colescott and Gillingham 1998), and recreational boating has been found to disturb bald eagles (Knight, 1984) and water birds (Rodgers & Schwikert, 2002). Distances at which an animal is likely to be displaced vary considerably between individuals and species, with larger species displaying larger flushing distances (Rodgers & Schwikert, 2002). Behavioural changes such as these result in increased energy expenditure (Knight, 1984).

The ability of recreation and tourism to be sustainable is influenced by management and policy decisions; sustainability brings assurances that today's efforts will not compromise future resources (McCole & Vogt, 2011). This requires full cycle assessment, implementation and evaluation to ensure thresholds are not being exceeded.

#### *Recommendations for the draft SSRP:*

- 1. Recreation management plans need to be developed considering both the human and ecological aspects of use and opportunity. Of these, however, ecological aspects in areas of environmental sensitivity should take priority. For example, the development of a golf course is not appropriate in a wetland or core grizzly bear habitat.*
- 2. Management plans should consider both the type and intensity of recreational use to ensure minimal impacts to ecological attributes.*
- 3. Both direct and indirect impacts to species and ecosystems need to be the subject of comprehensive monitoring programs examining the impacts of various recreational activities. Management plans need to be adaptive to the results of this monitoring.*
- 4. Recreational activity should be focused in areas where an impact already exists. Visitation to areas of currently little to no use should be limited, both in type and intensity, before irreversible damage to the ecosystem is done.*

## **The Human Perspective**

The Alberta Recreation Survey (Alberta Tourism, Parks, and Recreation, 2008) provides some insight into visitor needs and preferences for recreational opportunities both inside and outside of protected areas. For recreation developments to be considered sustainable, they need to not only address potential ecological impacts but fit with the social context of what people expect of their recreation experience. Albertans top

three favourite recreational activities are walking, golf, and camping – all outdoor activities. Albertans value recreation and parks as areas that improve quality of life, provide a variety of activities to participate in, and provide for quality family time.

Research on resident and user preferences should be linked to ecological data to create recreation and park management plans that maximize visitor satisfaction while minimizing impacts to an area's ecological integrity. The draft of the South Saskatchewan Regional Plan should address the feasibility and extent of different types of recreational activities in the specific ecoregions of the SSR (e.g. Rocky Mountains, parklands, foothills, grasslands, etc.). This research will help inform planning and policy decisions, and should be coupled with a robust monitoring program to ensure the scale of sustainable recreation and tourism does not transition into mass tourism within Environmentally Significant Areas (ESAs).

To obtain objective and credible science research, academic researchers should partner with government, administrators, educators and consultants to bridge the gap on sustainable tourism research demand, supply, trends, and issues in southern Alberta. This would contribute to the sustainable development of communities in southern Alberta (McCole & Vogt, 2011). A variety of stakeholders should be included within this process including local communities, the broader public and Aboriginal peoples.

#### *Recommendations for the draft SSRP:*

- 1. Recreation developments need to fit within the social context of residents' and visitors' expectations for their recreation experience. This social context must be based on scientific research examining visitor expectations, satisfaction, motivations, and how people meaningfully connect with nature or their wilderness experience.*
- 2. Park management plans should aim to maximize visitor satisfaction while minimizing impacts to an area's ecological integrity by combining biological and social data.*
- 3. Increase opportunities for youth and new Canadians to experience the wilderness, the backcountry and reduce Nature Deficit Disorder.*
- 4. Promote an ethic in environmental stewardship through sustainable recreation and tourism to create a healthy society and reduce obesity.*

## **Managing User Preferences in the SSR**

The SSR is a popular recreation destination in Alberta, which can lead to congestion in certain areas, such as Kananaskis Country. Other areas, such as the Castle Special Place and Ghost Public Land Use Zone, are subject to user conflict as various types of recreationists attempt to enjoy the same area (e.g., motorized recreationists and hikers, climbers and skiers, equestrian users and motorized recreationists). Planning for recreation means not only balancing ecological impacts with visitor satisfaction, but also attempting to minimize user conflict.

#### *Recommendations for the draft SSRP:*

- 1. Designate priority recreational uses in specific locations to minimize user conflict. Recreational activities should be prioritized in areas according to ecological impact first, then according to human needs. For example, motorized recreation should be prioritized in areas of low ecological significance; self-propelled forms of recreation (hiking) should be prioritized in areas with greater ecological sensitivities.*
- 2. Minimize the cumulative effects of multiple tourism operations in an area, and encourage ecotourism best practices through an incentive program. For example, tourism operations can be designed to reduce, reuse, or share resources, such as water. Operators should be encouraged to use business models that protect the environment, support local economies and celebrate cultures.*

3. *All tourism operations should be required to meet or exceed any threshold criteria and indicators detailed in the SSRP. This will require tourism operators to provide accurate data regarding their business operations to programs responsible for monitoring the success of the SSRP.*
4. *Consider a user registration system to monitor usage and user preferences. A component of this system might include payment to access trails of high conservation value.*
5. *Assess current and potential recreation user conflicts activities, such as Off Highway Vehicles and self-propelled recreation, to better utilize and enhance current trail systems.*

## **Recreation in Environmentally Sensitive Areas**

Within the Regional Advisory Council's (RAC) recommendations to the Government of Alberta, several Iconic Tourism Destinations and Conservation Management Areas are identified. These designations are added to existing land designations such as Environmentally Significant Areas (ESAs), legislated Parks and Protected Areas, and Public Land Use Zones, all of which contain specific priorities for managing environmental attributes. ESAs are portions of the landscape that are important, useful, and often sensitive to development pressures (Elmeligi, 2009), and require management policies that ensures their biodiversity attributes and ecological integrity remain intact. Given the sensitivity of these landscapes, recreational planning and management needs to prescriptively reflect environmental protection and ensure that recreational activities will not overly impact ecological integrity.

Water-based recreation (e.g. paddling, swimming, fishing, etc.) near waterways (e.g. rivers, river valleys, corridors, basins, etc.) has increased. These areas, however, have also been recognized as valuable and necessary for watershed health and to preserve riparian areas, wetlands, and associated uplands. Therefore, any type of recreation within these areas should prioritize watershed health and water quality. Particularly sensitive wetlands and ESAs may require prohibitions to human use during critical times of the year (e.g. migration of waterfowl, breeding season, etc.).

### *Recommendations for recreation in environmentally sensitive areas for the draft SSRP:*

1. *Clearly articulate what intensive recreation/tourism surface development is and address the scale of recreation/tourism development that will be allowed.*
2. *Identify how these developments are justified by user demand through social science research and a better understanding of the recreation and tourism inventory in southern Alberta.*
3. *Develop a plan as to how the creation of more recreation/tourism development will be assessed and monitored over time to ensure a sustainable scale is adhered to.*
4. *Promote primitive and backcountry recreation/tourism activities (e.g. wilderness hiking, fishing, low impact camping, etc.) in areas where infrastructure to support this form of recreation (e.g., trails, campgrounds) already exists.*
5. *Public motorized access into these areas should be confined to designated trails in areas where ecological integrity will not be negatively impacted. Designated trail usage needs to be effectively enforced.*
6. *Recreation in riparian areas, ESAs and other areas of high ecological sensitivity should be limited to low-impact self-propelled activities, and contain an educational component (e.g., interpretive hikes and signage).*
7. *Environmental thresholds and ecological carrying capacity should also be identified. If there is no clear evidence supporting the development, the precautionary principle should be adhered to.*
8. *Rotating trail closures should be implemented to allow for reclamation of high user areas and reflect the seasonality of certain areas of ecological importance (e.g., breeding grounds, nesting sites, mating areas).*

*Recommendations for Iconic Tourism Destinations in the draft SSRP:*

1. *Develop incentive programs for private landowners to help offer access points for low impact recreation activities and compensate landowners for any damage. Conservation tools developed under the Alberta Land-use Stewardship Act (ALSA) may support this process.*
2. *Development of industrial and commercial activities proposed in iconic tourism destinations should be subject to the same higher standards of approval as those detailed for Conservation Management Areas. Developments should take care not to impact aesthetic viewscales and biodiversity that act as recreation attractions for these areas.*
3. *Sustainable tourism facilities should be prioritized under operational guidelines that maintain the natural environments they are found. For example, Ontario has laws that state site lines associated with an eco-lodge you will not be cut for 25 years. This ensures economic viability of the tourism operator in providing a nature-based experience and protects the environment while allowing for low impact recreation.*
4. *Any development in Iconic Tourism Destinations should be subject to robust, accountable, and transparent public consultation processes to ensure the development is in alignment with local and regional residents' vision for the area.*

## **Recreation and Tourism Infrastructure**

The construction of infrastructure usually dictates what kinds of recreational opportunities exist in an area and is related to the intensity of impact those activities have on the surrounding landscape and ecosystems. Half of Albertans think that there is a place for primitive rental cabins (50%) in our Provincial Parks, but less are supportive of private cottages (26%) or hotels (37%) (Alberta Recreation Survey, 2008).

*Recommendations for the draft SSRP:*

1. *Recreational developments should utilize, upgrade and maintain existing tourism facilities and infrastructure (e.g. camping facilities, trails, staging areas, etc.) before investing in new developments.*
2. *Upgrade and construct bridge crossings that ensure people stay out of water courses, and on designated trail.*
3. *Public access should be well identified to create user predictability, and ensure the safety of recreationists.*
4. *Develop low impact observation stations that provide a viewpoint, and keep people off of ecological sensitive areas.*
5. *Improve the designation of campsites, especially group camps that can accommodate large groups of RVs.*

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## ***Appendix 2 - Sustainable Forestry in Alberta's Southeastern Slopes: Recommendations for Best Management Practices***

To maintain resilient, productive forests that support biological diversity and ecosystem processes, a number of specific landscape-level management principles should be applied. Among these principles are maintaining old forests and interior forests, limiting the size and number of disturbed patches (e.g., cut blocks), maximizing the size of forest remnants within these patches, and maintaining riparian buffers. Of utmost importance is the continued long-term monitoring and evaluation of ecological goods and services and cumulative effects.

For the SSRP, we recommend a holistic management approach that integrates both natural and human-based disturbances to ensure that ecosystem function and integrity are maintained, or ideally, enhanced. Accessible, accountable, and transparent public consultation processes are also required for forestry planning and management to be effective and publicly supported.

### **Maintaining old forests and natural forest processes**

The maintenance of a range of seral stages in a landscape will enhance its sustainability and resilience; however, the diversity of structural elements found in old forests, specifically (including snags, woody debris, multi-level canopies and mature trees), support an especially wide range of plant and animal life.

In the natural forest (i.e., not logged), forest renewal is achieved primarily by fire. Hence, the distribution of stand ages largely reflects fire risk, measured by the mean fire return interval (i.e., the average time between successive fires). This interval combined with the fact that fire is equally likely for all stand ages and fuel types results in a negative exponential distribution of stand ages. Depending on mean fire interval, the amount of forest older than 100 years in unlogged forests is expected to be very large.

Logging, however, removes old forests and prevents their regeneration. Even if logging had identical impacts as fire on local diversity, it has profoundly different impacts on forest age structure. Logging generates an unnaturally even distribution of forest ages between 0 and 100 years, and none older. We know that forests of all ages have their associated flora and fauna. Forestry in Alberta, however, has increased potential risk to several species of flora and fauna who depend on forests older than 100 years due to habitat loss, which in turns threatens our forests' ecological integrity.

#### *Recommendations for draft SSRP:*

- 1. Incorporate retention planning into the management plan for forests in the southeastern slopes of Alberta. Retention planning is defined as identifying areas of forest cover that will not be salvage-logged or treated even if attacked by an insect pest such as the mountain pine beetle (Martin, 2006). In this way, sufficient forest cover and structure is maintained across a landscape to ensure that biodiversity, wildlife, water bodies and hydrological function are preserved.*
- 2. Put aside a certain amount of forest within existing logging leases for both the Bow and C-5 Forests and leave it unlogged. Fires should also not be suppressed in these areas.*

### **Maintaining interior forest conditions**

Interior forest conditions refer to situations where climatic and biotic characteristics, including temperature, humidity, wind speeds and soil moisture, are not significantly affected by different adjacent environmental conditions. To maintain habitat for old-forest dependent species (see above), old forests must not be significantly affected by adjacent disturbances. In North America, edge effects have been

shown to persevere up to 40 m into adjacent forest (Palik & Murphy 1990, Chen et al. 1992, Fraver 1994, Rheault et al. 2003); studies outside of North America have shown that edge effects can persist up to 5 or 10 km (reviewed in Laurance 2000).

*Recommendations for the draft SSRP:*

1. *Areas of remnant forest between disturbed patches should be of a size and shape that maximizes interior forest conditions. For example, narrow strips of forest of less than 200 m in width between disturbed patches will provide negligible interior forest conditions.*
2. *Forestry management plans should focus on minimizing fragmentation of mid-aged forests to ensure that these stands are preserved to provide old interior forest conditions in the future.*

## **Limiting size and number of disturbed patches**

Managed patches often consist of even-aged stands that fail to provide the conditions, such as forage availability and suitable habitat, for a range of species to thrive. The resulting reduction in biological diversity across a landscape of large, similarly-aged patches can lead to decreased resilience to stochastic events such as wildfire or insect outbreaks. Furthermore, when disturbed patches are very large or very numerous, the fragmentation across a landscape increases and connectivity is reduced. This may in turn affect dispersal and migration processes, which may ultimately impact the population dynamics and viability of a host of species.

Changes in connectivity over time must also be considered: as disturbed patches regenerate, certain seral stages will not be hospitable for all species that previously used the land. The impact of cumulative changes to the landscape over the long term needs to be considered before the planning of new cutblocks or other anthropogenic disturbances.

*Recommendations for the draft SSRP:*

1. *Management decisions about cutblock size, shape, location and number must be made with explicit consideration of the local distribution and movement patterns of species of concern, including grizzly bear, elk, moose, wolverine, long-toed salamander, western toad, pileated woodpecker and Clark's nutcracker.*
2. *Decisions should be based on scientific and anecdotal data from consultations and collaborations with local research scientists, residents, and concerned stakeholders. Consultations with local stakeholders and land owners will ensure these decisions are made within the context of local issues, economics, and perspectives.*

## **Maximizing size of residual live stands within disturbed patches**

In an effort to sustain biological diversity, some forest management systems in Alberta attempt to mimic natural disturbance templates by retaining patches of live trees within cutblock boundaries. In theory, these residual stands meet three objectives: maintain horizontal and vertical structure, provide "lifeboats" to species that require forested habitat, and enhance connectivity on a landscape level (Bradbury 2004). However, exposed stands of lodgepole pine are at risk of being damaged, broken or uprooted by wind. In BC, the timber equivalent to 4% of the annual allowable cut was damaged by wind; this volume equaled that damaged by insects or wildfire that year (Mitchell 1995). In addition to the loss of revenues from non-salvaged timber, blowdown can lead to loss of forested streamside buffers, wildlife corridors and the aesthetic appeal of an area (Lanquaye-Opuku & Mitchell 2005). In Alberta, Bradbury (2004) found that at least 25% of trees in small residual patches (20 m in diameter) blew down in the first five years after harvest.

*Recommendations for the draft SSRP:*

1. *Residual stands should be at least 80 m in diameter (Bradbury 2004). Residual stands should ideally also maintain pre-harvest conditions, including understory plant communities, soil quality and soil moisture. Given that edge effects extend up to 40 m into forest interiors and the propensity of lodgepole pine trees in residual patches to blow down within the years after harvest, residual stands within disturbed patches should be significantly larger than 80 m in diameter.*

## **Maintaining riparian buffers**

Timber harvesting can have important effects on hydrology. It reduces water interception across a landscape by reducing forest cover; it also reduces water absorption by removing live trees (Ormerod et al. 1993, Broadmeadow & Nisbet 2004). In addition, harvesting changes habitat by altering the amount of fine and coarse woody debris (Kiffney & Richardson 2010), fine sediment, and algal growth (Stone & Wallace 1998, Death et al. 2003, Giller & O'Halloran 2004). For example, eight years after a clearcut event, the litter input in an unbuffered stream in British Columbia still had not recovered (Kiffney & Richardson 2010), which has implications for the composition of the aquatic invertebrate community. Buffers of intact riparian vegetation can successfully mitigate the effects of timber harvesting by reducing the input of organic matter and protecting aquatic insect and fish communities (Kiffney et al. 2003, Boothroyd et al. 2004).

*Recommendations for the draft SSRP:*

1. *Forestry management plans should include the retention of a buffer of greater than 30 m around streams to maintain litter flux comparable to pre-harvest levels (Palik et al. 2000, Kiffney et al. 2003 and references therein, Marczak et al. 2010). Harvesting regimes that maintain shading of the stream channel will moderate forestry effects (Kiffney & Richardson 2010).*
2. *Forest managers should also assess slope and aspect when devising riparian protection strategies to maintain terrestrial litter flux to streams.*
3. *Buffer widths should be designed with flexibility depending on ecosystem characteristics for sensitive or fragile ecosystems. Forests adjacent to streams, lakes, and wetlands form dynamic ecosystems with natural variability in time and space (Naiman et al. 2000, Palik et al. 2000), a fixed-width buffer may not capture this dynamic relationship.*

## **Monitoring ecological goods and services**

Forest ecosystem services include climate control (by sequestering carbon), water quality improvement (by reducing run-off/ flooding and filtering out toxins), support of non-human species (by improving habitat and supporting biological diversity) and pollination services (Young 2010). The management of these systems is essential for the continued delivery of public goods, including forestry products, and for improving the ecological health of cities. By maintaining the ecological goods and services that healthy forests provide, city planners will in fact reduce their financial expenditure in infrastructure for water treatment, carbon storage and sewage construction.

*Recommendations for the draft SSRP:*

1. *The ability of a harvested landscape to provide key ecological goods and services should be monitored over time, and a minimum threshold for each of the services mentioned above should be established.*
2. *Harvested areas should be managed in such a way that their previous functionality is naturally and effectively restored. One way of doing this is through mitigation banking, which involves establishing, restoring, preserving or enhancing a wetland or stream for the purpose of compensating for adverse impacts to similar nearby ecosystems.*
3. *Long-term tree-planting programs should be used to create conditions for mixed stand regrowth.*

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