PART 4

GREAT SAND HILLS REGIONAL ENVIRONMENTAL STUDY – RECOMMENDATIONS FROM THE SCIENTIFIC ADVISORY COMMITTEE –

PREAMBLE

The recommendations presented in this chapter are based on the weight of evidence from the natural and social sciences research data available to us, which consistently confirm that the sustainability of human activity in the Great Sand Hills is reliant on the sustainability of ecosystem elements and processes that are not significantly perturbed by human activities. Landscape ecology provided the conceptual framework for assessing the consequences of human activities and for evaluating and visualizing the impacts of alternative development scenarios. Our methods focused on integrating biodiversity information in a strategic environmental assessment at a landscape and regional scale.

Our recommendations focus on sustaining the ecological integrity of the Great Sand Hills and are grounded in the realities of natural, social, and economic capital for the region. This regional perspective is critical to the long-term success of these recommendations, should they be adopted. Therefore, prior to presenting the recommendations, we provide below a brief overview based on our results of the regional context of the GSH, highlighting the broader initiatives that will support the overall sustainability of the local communities and people of the GSH and also serve as the foci for our recommendations. We focus principally on aspects of biodiversity and conservation, governance and institutional arrangements, and environmental assessment. The Regional Environmental Study revealed those aspects of the GSH to contain issues of critical and formative importance that, if not dealt with effectively, would make it impossible for other issues to be adequately addressed. Those other issues requiring active attention relate to reducing impacts, environmental monitoring, reclamation and sustaining regional communities, including issues related to First Nations.

In this final part of the GSH RES report, we refer to geographic areas as we have throughout the report, e.g., the GSH Study Area refers to the 8 RMs; the GSH Review Area refers to the principal area of our field studies, which includes portions of 4 RMs, as earlier defined. In addition, we refer to Reserve and Non-Reserve Areas within the GSH Review Area. The Reserve Areas refer to the Representative Area Ecological Reserve (RAER) and the additional core biodiversity areas identified in this study. Non-Reserve Areas refers to all other areas outside of the Reserve Areas within the GSH Review Area.

Status of Biodiversity and Conservation

The GSH are nationally and internationally significant as one of the largest remnants of native grassland in Canada—an island of mixed-grass prairie and shrubland in a sea of intensive agriculture (Gauthier and Wiken 2003). The GSH have remained essentially intact with high ecological integrity because their sandy soils and rugged terrain are not conducive to cultivation. The SAC recognizes that temperate grasslands, savannas, and shrublands are the most highly endangered ecosystems in North America and worldwide (Noss et al. 1995, Samson and Knopf 1996). Globally, the ratio of habitat converted to habitat protected is higher for temperate grasslands, savannas, and shrublands (10:1) than for any other biome (Hoekstra et al. 2005), making the protection, restoration, and proper management of these ecosystems among the highest global conservation priorities. Therefore, protection of the biodiversity and ecological integrity of the GSH is critical not only for Saskatchewan, but for Canada, North America, and the world.

The GSH are best known for their active sand dunes. Although active dunes represent a relatively small portion of the area, the sand dune formations collectively provide habitat for many species that are rare or declining in Saskatchewan and Canada, including Ord's kangaroo rat, slender mouse-ear cress, and smooth arid goosefoot. The first two species are largely dependent on sand dunes, which have become rarer since the early 20th century due to changes in climate. Beyond sand dunes, the GSH are a mosaic of extensive open grasslands, a patchy network of shrubs and trees, as well as wetlands and lakes. This rich vegetation mosaic, largely patterned from the hummocky terrain derived from Pleistocene and Holocene deposits, provides more than 2,000 km^2 of contiguous native habitat. Given the extent and diversity of native habitats, the GSH are an important refuge for game species, including Sharp-tailed Grouse, white-tailed and mule deer, and pronghorn antelope. Native non-game species are also well represented, including several grassland birds known to be declining across their ranges. The SAC emphasizes, however, that the current Representative Area Ecological Reserve (RAER) in the GSH protects a biased sample of habitats—i.e., there are serious "gaps" in protection, most notably native grassland.

With this combination of unique landscape elements (i.e., sand dunes), known occurrences of Endangered, Threatened, and sensitive species, important game species, and more generally a refuge of natural heritage,

the GSH are of inestimable value to present and future generations of Saskatchewan and Canada. The SAC recognizes that sustaining the biodiversity of the GSH is critical to securing its ecological integrity, and that this goal, in turn, is paramount to any consideration of sustainable development. Therefore, our recommendations with respect to biodiversity and conservation in the GSH are appropriately strong and include a proposal for additional Reserve Area (i.e., core biodiversity areas).

Governance and Institutional Arrangements

Existing institutional arrangements in the GSH region are regarded as adequate by many stakeholders and First Nations, but not as effective as they should be. Issues of coordination and management in the GSH are related mainly to the quality and strength of interrelations among the various parties rather than to inadequate legislation. Information exchange among government departments, for example, needs improvement, especially regarding the sharing of ecological data. Although we noted interest in community consultation and fair and inclusive decision-making, in general, the provincial government is regarded by many stakeholders and First Nations as relatively ineffective at balancing interests in the region. Interagency cooperation and inter-municipal coordination need more attention to achieve effective management. There currently exist amongst provincial government departments and agencies different, and often competing, views and perspectives concerning the most appropriate use and development of the GSH. There is a need to establish a greater consensus and clearer vision amongst government departments and agencies about the nature of and need for activities and land uses that are consistent with the principles of sustainability in the GSH, and to communicate this vision to GSH stakeholders and First Nations.

Both the provincial government and the GSH Planning District Commission have generally been able to adapt to the demands of managing the GSH in the last 10 years, particularly in terms of promoting environmentally-sensitive development, but efforts are hampered by shortages of staff and other resources. Capacity building, both in terms of human development and physical infrastructure, is needed in the GSH region. At present, the lack of financial, human, and infrastructure resources combined with a lack of baseline data limits the overall effectiveness of governance and the scope of viable management options.

Two common issues were raised by stakeholders and First Nations with respect to legislation affecting governance in the GSH. First, the scope of the legislation is inadequate to address the current mix of land uses and interests in the region. This is sometimes due to outdated legislation or legislation that has been conceived too narrowly to cover the range of relevant issues encountered in current management, as is the case with the *Provincial Lands Act*. Second, many pieces of legislation and management mechanisms lack sufficient enforcement, which makes it difficult for responsible authorities to prevent or curb undesirable activity.

At present, government is criticized by the gas industry for failing to provide a clear and timely development approvals process, a situation that can be attributed partly to the controlling influence of the RMs. There is also confusion around the purpose and powers of the GSH Planning District Commission, and a recognized need to better coordinate the bylaws of RMs and the mandates of government departments, and to simplify the development review process in the GSH. The most common suggestion to improve governance is to establish a central, higher-level governing body with decision-making power, supported by an effective and balanced network of interests focused on long-range planning.

Related to institutional arrangements and governance is the issue of conflict resolution processes and mechanisms. From our discussions with a variety of stakeholders and First Nations, there is considerable recognition of potential land-use conflicts and the need to resolve differences before they escalate to nonproductive or destructive levels. Local community residents and First Nations people, by way of example, have both spoken of a need for dialogue on land usage, ownership, and access as a way of alleviating the concern and distrust that currently surrounds these issues. Gas industry representatives spoke of a need for increased dialogue aimed at clarifying the rules and regulations that would shape their activities in the GSH area and at focusing and refining the goals of the local communities with regard to gas resources. The SAC strongly endorses the need for Government, in consultation with stakeholders and First Nations, to find effective mechanisms for the early resolution of land-use conflicts (see http://www.environmentalsociety.ca/issues/energy/oil-patch.pdf). Government should promote the joint participation of different stakeholders and First Nations in the decision-making processes in regard to the GSH as a way to identify different interests and promote consensus.

Environmental Assessment

The environmental assessment (EA) program in Saskatchewan has been in existence since the mid 1970s. Legislation formalizing what had been learned in practice was put in place in 1980 with the creation of *The Environmental Assessment Act*. *The Act* applies to projects (i.e., plans and programs), operations, and expansions, as well as specific activities. Since its inception, the program has reviewed a number of geographically extensive and strategic level studies in anticipation of large-scale developments such as the Churchill River Basin Study, the Cluff Lake Inquiry, and the Poplar River/ Island Falls studies. Like those, this Regional Environmental Study (RES) of the Great Sand Hills (GSH) has focused on understanding the environmental limitations and opportunities for development in this ecologically sensitive area. The Scientific Advisory Committee (SAC) believes that such regional landscape-based approaches will help Saskatchewan realize its vision for sustainability, by providing insight into the complex nature of development decisions and integrating ecological and socio-cultural interests with the desire for economic development before irreversible decisions and actions are taken.

Nonetheless, the SAC's review of the assessment process and its historical application in the GSH has revealed some serious concerns. Our concerns lie not within *The Act* itself, but in the changing way that *The Act* has been applied over the last 20 years, especially with respect to cumulative environmental effects. For example, in the GSH as each gas development project came on stream, the proponents were not required, as part of their EA, to consider their impacts as additive to those of other projects already approved. This weakness was highlighted as part of the GSH Land Use Strategy Review (2004) and SAC agrees that it is imperative that this trend be reversed.

More specific to the GSH and this study, the *EA Act* lays out six tests against which activities are measured to determine whether or not they constitute a "development" requiring an environmental impact assessment. Two of these tests are particularly germane: 1) "have an effect on any unique, rare or endangered feature of the environment," and 2) "cause widespread public concern because of potential environmental changes." The latter test is a primary reason for the GSH RES being undertaken. The former test accurately reflects the position of the SAC that the GSH is *a unique and rare* environment, being the largest remaining remnant of a once vast native grassland. Further, continuance of the ecologically distinct structure and function of this region is endangered to the extent that cumulative effects upon the landscape are not being addressed and sustainable development actions are not being employed. There is no doubt in our minds that appropriate application of the *EA Act* can address threats to the ecological integrity of the region.

Reducing Impacts

Many stakeholders noted the positive impacts of ranching, especially in terms of retaining population, support for local business, and contributing to the social cohesion of communities. In addition to their contributions to the social and economic fabric of their communities, ranchers are also seen as responsible custodians of the natural environment making an important contribution to environmental sustainability. Concerns were raised, however, about the surface impacts of grazing related in particular to trails and water dug-outs. There was also some criticism that the ranching industry is not subject to the same level of regulatory control or scrutiny in regard to surface disturbances as other industries, particularly the gas industry.

In order to maintain the environmentally sound nature of the ranching industry, it is important to insure that best management practices for range management (including water management) are consistently implemented by ranchers. Stakeholders felt that the provincial government has an important role to play in working with ranchers to develop, communicate, and assist in implementing best management practices. For example, a system of rewards might be put in place to encourage ranchers to participate in and adopt best management practices.

There is a clear recognition and acceptance by many local people of the economic importance of the gas industry to the region and the province. There is also an equally clear desire that exploration and development activities of the gas industry do not impair the ecological integrity of the GSH. Therefore, it is imperative that measures capable of decreasing the surface impacts of gas industry activity on the sensitive environment of the GSH and surrounding areas be examined and put into practice. All relevant technologies toward that end should be employed where appropriate, and new practices and methods with a high potential to contribute to the reduction of surface disturbances should be investigated. Future gas industry activity in the GSH should be based upon a principle of maximizing the quality of life experienced by area residents and minimizing

impacts upon the ecological integrity of the region. Threats to quality of life that emerge from gas industry activity, as cited by local stakeholders, include contamination of drinking water and water for livestock, fumes and air quality issues, and damage to local roads and highways, as well as more general nuisances and disruptions to peoples' day-to-day home and work life. Although significant regulatory processes are already in place for gas exploration and development, the identification, implementation, and monitoring of best management practices for the gas industry were considered an important requirement by stakeholders and First Nations. Significant concerns also were raised about the lack of adequate compensation afforded to landowners from gas activity on their lands.

Environmental Monitoring

During the Great Sand Hills Land Use Strategy Review (2004), the public expressed the importance of assessing how existing land uses affect the ecology of the area. Accordingly, the final report of the review made the following recommendations with respect to ecological monitoring in the area:

- establish a comprehensive program that monitors ecological integrity by establishing appropriate indicators and benchmark areas for future comparisons;
- undertake an invasive plant study every five years;
- employ qualified environmental monitors who report to the landowner/manager to oversee developments and enforce provincial and municipal environmental protection plan obligations.

In reference to these recommendations concerning monitoring, we did not detect in our study any significant improvement in this critical area of concern. The SAC considers this to be one of the most serious gaps in the long-term management of the area. Increasing disturbance of the thin soils of the GSH is the single most important ecological factor that challenges the sustainable development of the area for three reasons. First, areas with the standing vegetation removed are more likely to start increasing in extent due to wind erosion. Second, areas with little or no native vegetation are more likely to become colonized by non-native invasive plant species that will eventually invade their surroundings. Third, and most importantly, surface disturbance is the common theme that links all human and non-human activities in the area and thus serves as an excellent focus on which to build a monitoring program. For example, grazing cattle herds create elaborate trail systems as a result of their need for water; gas companies create roads linked to their need to access the gas resource; large wildlife species such as deer and antelope create trails, and smaller wildlife species, such as badgers and ground squirrels expose the soil through their digging activities. In turn, newly-exposed areas support different native species than more established areas. While there are numerous natural sources of surface disturbance not attributable to human activities, there is a special onus to manage the degree and extent of human-caused surface disturbances, especially with the omnipresent threat of non-native plant species invasion, a problem that will be exacerbated with global warming.

Reclamation

Given the sensitive nature of soils in the GSH Review Area, and the serious threat of non-native plant species invasion, it is critical that areas subject to human-caused surface disturbance or exotic plant species invasion undergo reclamation back to a near-native state in a timely fashion. This was highlighted in the GSH Land Use Strategy Review (2004) and has been a central theme of discussions in the area over the last few years. Reclamation guidelines do exist (Saskatchewan Petroleum Industry/Government Environment Committee, 2000) although they likely need updating. Given the anticipated lifespan of gas wells, water dugouts, roads, trails, and other infrastructure, significant reclamation activities are unlikely to be undertaken within the near future. However, all relevant stakeholders must begin planning now for significant future reclamation. Part of this planning should be the use of permanent environmental monitors to identify areas for surface reclamation or for special management of non-native plant invasion. Another part must involve the creation of a reclamation fund to ensure that proper reclamation activities do eventually take place, even if original stakeholders no longer operate in the area. This fund should also support reclamation research projects, should they be required. Reclamation activities should be overseen by a joint partnership between industry, agriculture, a revitalized Great Sand Hills Planning District Commission, the RMs, the lessees, and the provincial government. The SAC believes that, along with enhanced environmental monitoring, proper reclamation of surface disturbance is critical to the long-term maintenance of ecological integrity in the area.

Sustaining Regional Communities

Reflecting an all-too-characteristic trend in many rural Saskatchewan areas, human numbers in the GSH Study Area are generally declining. While environmental considerations are important to local area residents, our economic and social analyses of communities showed that their primary preoccupations related to economic and social concerns around declining populations and ways to halt, and eventually reverse, that trend. Specific reference was made to the quality of infrastructure, access to health and education services, provisions for commercial activities, and other economic and social factors influencing the quality of their lives.

Stakeholders were of the view that government at all levels should pursue all potential efforts to retain population and increase economic activities. Government should promote and support local initiatives oriented to increase the social and economic sustainability of communities. Such support should contribute to the social cohesion of communities and to their capacity to address their needs. Such efforts might involve promoting higher values for locally produced agricultural products and/or a system of tax incentives targeted at local residents and businesses. Stakeholders also felt that serious efforts should be made to stabilize the provision of localized services, with an emphasis on health care and educational services, since those services contribute to improvement in the quality of life of local residents and help to retain young people.

Any economic or social activity in the GSH area is dependent on the state of the local infrastructure. At this point the poor condition of roads and highways acts as a limiting factor on the development/sustainability of both the social and economic health of local communities. Tourism development, for example, depends on the state of the highways that give access to areas with tourism potential. Furthermore, the state of the road system limits the response time of emergency vehicles. To address this, SAC supports the view that adequate resources be devoted to road improvements.

As expressed by those who participated in the different studies of the local communities, gas, ranching, and tourism contribute to the economic sustainability of the region. Our economic baseline assessment showed that the regional economy of the GSH Study Area is dominated by ranching and gas development. With such a high level of specialization the region is extremely sensitive to even minor fluctuations in economic conditions affecting ranching and gas activities. Stakeholders were of the view that no single industry was sufficient to insure sustainability objectives and that measures should be taken to avoid domination and/or extinction of one industry by another. While each industry was regarded as important to the GSH area, domination by any one of them would not be sufficient to maintain population or income levels over the long term.

Therefore, any future approaches or programs oriented toward economic development or sustainability in the GSH area should avoid prioritizing the needs of one industry to the detriment of others. Stakeholders felt that the main industries in the area should always be regarded as components of a larger, intricately integrated whole and should be dealt with as such. The existence of both a vigorous ranching and gas industry in the area, and the considerable financial infusion that those industries provide to people, businesses, and communities, combined with the potential for tourism, sets the GSH apart from other areas of the province. The vulnerability of households in the region to upheavals in either agricultural or natural gas markets is mediated by the presence of both industries, which reduce vulnerability by providing additional revenue and employment to a large number of households. As well, the health of both industries benefits communities by bringing more revenues for established local business, employment for local people, and larger tax base revenue to RMs. In these terms, SAC recognizes the importance of the gas and ranching industries for the economic sustainability of the region.

Tourism is perceived by many residents and First Nations participants as an economic activity that does not have a significant damaging impact on the GSH environment. On the contrary, many stakeholders argued that the main benefit of tourism on the GSH stems from the greater levels of environmental awareness and attention that come as a result of tourism development. However, that perception is grounded in a current reality of relatively little tourism activity within the region. Some respondents were therefore concerned about the potential damage to that GSH environment that a movement of large numbers of people into the Review Area could create.

In that context, the SAC is of the view that Government should increase its efforts to promote the development of the nascent tourism industry in the GSH area. An increase in tourist activity in the area would have the dual benefits of injecting economic vitality into local communities and, at the same time, promoting environmental awareness. Nonetheless, given concerns over the impact of the tourism industry on the quality of life experienced by local residents, it is

necessary that the development of a responsible and sensitive tourist industry in the GSH area should at all times be characterized by practices that include consideration for the comfort and safety of the people who make their lives in the area. Many stakeholders felt that tourism should be restricted geographically to less sensitive areas and should be characterized by practices with minimal environmental impacts. Therefore, establishing tourist accessible zones as well as zones where tourism access is completely restricted would likely receive local support. Furthermore, tourist activities should be oriented towards imparting information on the sensitive nature of the local environment, and should be implemented in ways such that the impact of the human presence is minimized.

The establishment of regulatory support and supporting infrastructure for the regional tourism industry, and the facilitation of coordination among tourism services providers in the region, are necessary if tourism is to be promoted as a viable economic opportunity. The SAC strongly encourages the Government of Saskatchewan to lead in coordinating efforts that would explore opportunities for First Nations involvement in development of the regional tourism industry.

The Great Sand Hills are of significant cultural value to the First Nations peoples of southern Saskatchewan and Alberta. Of immediate concern to those First Nations, in particular to the File Hills Qu'Appelle representatives of Treaty Four and to the Blood Tribe Elders of Treaty Seven, are issues concerning: 1) the impacts of development on First Nations values and culture; 2) restrictions on First Nations use and access to the GSH due to current land use zoning; and 3) the lack of First Nations involvement in GSH planning and decision making processes. In addition to spiritual and cultural interests in the GSH, a number of First Nations see potential economic opportunity in terms of natural gas development. While economic interests were not expressed by the elders who participated in this study, such issues were raised by a number of Band Council members and in particular by participants of Treaty Six. The current RES is directed toward managing the ecological integrity and future sustainability of the GSH. However, there is a need for First Nations economic interests and Treaty Land Entitlements (TLEs) in the GSH to be addressed through the appropriate consultation processes.

Issues concerning the uncertainty of TLEs were raised in the 1991 *Land Use Strategy*, the 2004 *Land Use Strategy Review*, and continue to be of concern to local land lessees in the GSH region today. However, issues of TLE selection, negotiation, and mineral rights are beyond the scope of the RES and should be addressed under a separate review process.

The SAC acknowledges the sensitivity of First Nations' issues and concerns in the GSH, and recognizes a disconnect between First Nations' interests in the GSH and perceptions of First Nations' interests (see Peters et al. 2006, and Gauthier et al. 2006). This disconnect is, in part, due to differences in "World Views" between First Nation and non-First Nation peoples, and differences in understandings of the nature and significance of the GSH landscape.

Overall, the SAC believes that a greater level of knowledge transfer, communication, and First Nations' participation in GSH land use planning and decision making are needed. This can be accomplished, in part, by the industry and various levels of government adopting *The Government of Saskatchewan Guidelines for Consultation with First Nations and Métis People: A Guide for Decision Makers* as a minimum standard for First Nations consultation and communications concerning the GSH. The document sets out an approach to be used by all Government of Saskatchewan departments respecting consultations with First Nations and Métis in circumstances where action contemplated by Government may adversely affect Treaty or Aboriginal rights (Government of Saskatchewan 2006). While the approach to consultation presented in this document is flexible, five important characteristics of the First Nations and Métis consultation process are described:

- notification of the community to be consulted of the intended action or undertaking in an appropriate manner and in a sufficient level of detail;
- provision of an appropriate period of time to allow the community being consulted to prepare its views and to report back;
- presentation to the proponent by the community being consulted and an opportunity for open discussion;
- full and fair consideration by the proponent of the views presented;
- reporting back to the community on the direction or specific actions chosen by the proponent.

Our discussions with and surveys of residents of the GSH indicate that while environmental considerations are highly important to them, they have significant social and, especially, economic concerns. Those concerns are diverse and include numerous issues such as health care and education, infrastructure and commercial activity. It is to this last point that this final portion

of our regional context pays particular attention. Stakeholders noted in numerous forums that the quality of life associated with traditional economic activities (particularly ranching) is becoming more closely associated with new economic activity (gas development) in the region. The SAC acknowledges that ranching and gas extraction have the potential to contribute significant economic returns to the government and the local economy. In that context, our focus has been to consider how such benefits may be sustained while insuring the ecological integrity of the GSH.

Our studies show that the gas reserves in the Review Area have the potential to double the revenues to government from the region in the next 15 years (going from current 2P production revenues to 3P production with in-fills and step-outs). The local economic spin-offs (using the same 2P to 3P trajectory) quadruples over the same time period. Therefore, from a purely economic perspective, the continued expansion of gas extraction within the Review Area may be perceived as highly desirable. However, this economic activity is not a sustainable activity in the long-term—a fact accepted by the gas companies themselves—as the resource is non-renewable and limited in quantity. On the other hand, ranching is perceived to be more sustainable in the long-term, using renewable resources and preserving a way of life present in the region for generations. The critical question is whether a means exists to insure the ecological integrity of the GSH Review Area while meeting the socio-economic needs of the people who derive their livelihood from the area, and recognizing both traditional and new forms of economic activity that have different short and long-term demands on the land.

To add to the complexity and breadth this question poses, the gas reserves within the Review Area are not fully understood, especially within the northeast portion of the GSH. Projections to date and contained within the economic baseline report and the reports from GLJ Petroleum Consultants Ltd. are based on information available at the time of publication. There could be more (or little) gas in the northeast region. The lack of assessment is a factor of information availability—test wells have not been established in that area, and as such there are no data. To further add to the complexity of the issue, gas pricing is highly variable, and the industry operates on very small margins. In theory, in order to address the "margins" issue, delaying development of the Milk River and Second White Specks pools should allow the value of the resource to increase in price due to inflationary pressures and the costs of development should decline as technology becomes more widespread, resulting in a larger potential margin for the industry and tax revenues for government. Again, further complexities enter into consideration: the retail price of gas is increasing at 2% on average, while the Consumer Price Index is increasing at a rate closer to 3%. Therefore, under those conditions, the actual economic value of the resource declines over time, meaning that it could be seen as more financially valuable as a resource today. The developmental implication is that the reserves within the study area have greater value in constant dollars if they are developed sooner rather than later. We have, therefore, in our recommendations considered the timelines of development relative to our core biodiversity areas and the economic implications of insuring land-use practices that minimize surface disturbance impacts on ecological integrity.

STUDY AREA/REVIEW AREA RECOMMENDATIONS

The recommendations of the Great Sand Hills Regional Environmental Study are predicated on the principle of minimizing surface disturbance as a means of contributing to the sustainability of the ecological integrity of the area. Following the outline of the regional context description in the preceding Preamble, our recommendations are presented according to the following sections: Biodiversity and Conservation Lands Designations and Management; Governance; Acts and Regulations; Reducing Impacts; Environmental Monitoring; Reclamation; and Sustaining Regional Communities.

Biodiversity and Conservation Lands Designations and Management

Core Biodiversity Areas

1. We recommend that 35 new sites identified as core biodiversity areas in this study be provided a level of protection equal to that of the current RAER.

Our assessment of the distribution of biodiversity across the GSH compared to present management showed that the current level and distribution of protection is inadequate. The Representative Area Ecological Reserve (RAER) contained the greatest concentration of habitat for only 37 % (10 of 27) of assessed species, suggesting that the majority of species were better represented elsewhere in the Review Area and highlighting

the need for additional conservation areas. Therefore, we recommend new conservation areas within the GSH. In particular, to represent viable examples of grassland vegetation and associated focal species habitat requires the addition of extensive areas in the south and west of the Review Area to the conservation reserve system. Our identified core biodiversity areas are mostly concentrated in the less developed southern part of the GSH.

2. Until such time as an Ecological Reserve designation is achieved, those 35 core biodiversity areas should receive elevated statutory conservation protection so as to be protected from further surface disturbance and should be immediately subject to the following conditions:

   a. no new mineral or surface leases;
   b. existing well pad surface leases are grandfathered;
   c. where surface leases are already approved but no wells drilled, a maximum of one well pad surface lease per section is permitted;
   d. where a gas well(s) has already been drilled, any new additional drilling must occur on existing well pad surface leases;
   e. all land-use activities are conducted only within the confines of existing pads, roads, and trails;
   f. reclamation and monitoring are applied to the highest practical standard possible;
   g. ranching operations are allowed only to the extent that they support and do not compromise the maintenance of the natural ecological system and its components.

   The existence of land-use activity and mineral dispositions within core biodiversity areas is recognized. As soon as practical, Government should pursue avenues to achieve Ecological Reserve designation for all core biodiversity areas using appropriate means, including but not limited to mineral rights buy-backs and land trades.

Non-Reserve Areas

3. We recommend limiting new well pads, watering holes, and associated roads/trails in the non-reserve areas of the GSH Review Area.

All three anthropogenic disturbances assessed (gas well pads, roads/trails, livestock watering holes) resulted in reductions in range health, although the spatial scale and magnitude of these responses varied by impact type. This finding supports our preferred scenario.

Land-Use Zoning

4. We recommend that the boundaries of ES1 and ES2 zoning designations be altered to correspond with the boundaries identified in our study for Reserve and Non-Reserve Areas, respectively.

The 2004 Review recommendations noted that in the absence of scientific understanding, the utilization of ES1 and ES2 zoning should be continued. The GSH RES has provided increased information for the Review Area that has improved our collective understanding of some aspects of the status of biodiversity. That information and our modeling has refined our understanding of areas within the Review Area that require increased attention relative to land-use activities. We identified and mapped 35 core biodiversity areas, and those areas as well as the RAER should be reflected in the zoning designations for the Review Area.

Land Management Plans

5. Saskatchewan Environment (SE) in consultation with other provincial government departments, RMs, and local lessees should, as quickly as practical, develop and implement a land management plan for the RAER and the 35 new core biodiversity areas in the Review Area. Furthermore, the SAC recommends that activities leading to human-induced disturbance on all Non-Reserve lands within the GSH Review Area (i.e., all lands not captured in the core biodiversity areas and RAER) should be the subject of, at a minimum, an Environmental Protection Plan (EPP). To ensure that the recommendations of this report, and any subsequent plans issuing forth, are adhered to, these recommendations should be appended to any government lease sales, offerings, or renewals made within the GSH Review Area.

Those Non-Reserve lands constitute a critical landscape matrix that serves to buffer the core biodiversity areas from indirect impacts and also significantly contributes to the overall ecological integrity of the region. EPPs in the Review Area must include consideration for environmental monitoring, reclamation, and the application of best management practices. These EPPs should be reviewed by SE and approved only if they are in compliance with the recommendations and environmental protection objectives established in this

document. In various places throughout these recommendations, we refer to the importance of developing, implementing and monitoring best management practices associated with land use activities including ranching, gas exploration and development and tourism. To be most effective, best management practices should be collaboratively defined and made a part of land management plans and should be a standard of measure for any follow-up requirements and regulatory processes associated with those plans. Updating of best management practices, and their adoption and implementation, should be formally undertaken on an annual basis.

Fire Ecology

6. We recommend continued experimentation with prescribed fire as a means of restoring and maintaining range health in the GSH.

7. We also recommend that a program be established to compensate local ranchers to conduct prescribed burning to reduce encroachment of shrubby vegetation in grasslands. This program could be funded by government, ENGOs, and other private donors. One potential source of funding may exist through the federal government under their Species At Risk Act, as these range management efforts will maintain and enhance critical habitats for federal species of concern.

The Government, through the leadership of Saskatchewan Environment, should take the lead role in introducing fire to the landscape with the introduction of a pilot fire education program to show fire as a natural process and to show producers how the introduction of controlled fire can increase the grass in the area and reduce the shrub encroachment on the native grasslands. Fire is a controversial topic among land owners and lessees in the GSH. Although some ranchers are interested in using prescribed burning to help maintain or restore range health, the general attitude of ranchers toward fire is one of fear, sparked by past destructive fires that destroyed homesteads, coupled with a belief that grazing by livestock essentially substitutes for fire as a natural disturbance. Nevertheless, ecological research supports the hypothesis that virtually all grassland ecosystems in North America evolved with fire—whether lightning-set or human set—and that fire can be helpful in maintaining and restoring healthy prairie ecosystems. In the northern Great Plains, including Saskatchewan, research suggests that the reintroduction of fire would help restore the natural structure, composition, and function of grasslands (Romo 2003). Climate-change models suggest that a drier and hotter climate is likely for the GSH, which will increase the potential for prairie fires. It is clear that, over the long term, fire may be beneficial both to range health and to livestock producers; however, in the short term, uncontrolled fires could have catastrophic effects on the livelihoods of the landowners and producers affected.

Wide-Ranging Species

8. We recommend that research be undertaken to better understand the requirements of wide-ranging species, such as pronghorn antelope, that use the GSH on a seasonal basis.

Key species not considered in this Regional Environmental Study, because data were inadequate to consider them rigorously, include wide-ranging mammals that require areas vaster than the GSH to maintain viable populations. Among these species is the pronghorn. We were not able to develop a model for pronghorn because the available population information was generalized over a very large area (many times the size of the GSH). Inferring quality of habitat for small patches within the GSH was therefore impossible. Furthermore, there were no available pronghorn telemetry datasets available in the local area. Pronghorn in the GSH apparently tend to prefer the agricultural zone over that of the GSH Review Area, at least during certain times of the year. However, it is not unlikely that the GSH provides an important refuge for kidding in the spring or meets other critical life-history needs. Modeling a wide-ranging species such as the pronghorn requires consideration of multiple scales of habitat, from local to inter-regional. In this case, further research is needed to determine the importance of a presumed migratory corridor for pronghorn from the GSH through the Cypress Hills to wintering areas in Montana. Other wide-ranging species reported with increasing regularity in the GSH are gray wolf and puma (mountain lion, cougar). Virtually nothing is known about the status of these potential keystone (highly interactive) species in the GSH. Again, research is sorely needed. For all such species, conservation and management must consider a broad regional scale beyond the GSH.

Rare Species Database

9. We recommend increased funding of Saskatchewan Conservation Data Centre (CDC) to support sufficient

staff for keeping data current, including entry of data collected during our 2005 and 2006 field seasons.

10. We also recommend that all future surveys for rare species in the GSH (and elsewhere) include presence-absence data, not just presence data, and implement a rigorous and systematic sampling design (i.e., sampling habitats in proportion to abundance in a stratified-random fashion, rather than concentrated along roads) whenever possible.

Rare species data for this study came from two sources: the Saskatchewan Conservation Data Centre and new surveys of plants and birds during the 2006 summer field season. Our assessment is that the rare species database for the GSH is currently inadequate and biased towards sightings in accessible locations (e.g., along roads).

Ord's Kangaroo Rat

11. We recommend validating and protecting sites predicted from our study throughout the GSH Review Area that support Ord's kangaroo rats.

One of the rare species of particular concern in the GSH is Ord's kangaroo rat. Like many other rare taxa within the GSH, this species has not been systematically surveyed. Our focal species model predicts 520 ha (or about 0.26 % of the Review Area) of potential Ord's kangaroo habitat in the Great Sand Hills Review Area. Much of the predicted distribution was in the northwest portion of the Review Area, although a number of smaller and more isolated sites were predicted throughout the GSH. Further validation of these small and isolated sites is necessary.

Wetlands

12. The SAC recommends an organized inventory and ongoing monitoring of wetlands in the GSH.

Because of time constraints, the SAC did not conduct field work in wetlands, nor did we model wetland species and habitats. Therefore, biodiversity value rankings (i.e., hotspots identified by MARXAN) for some small wetland-based core biodiversity areas may be artificially low.

Communications Plan – Best Management Practices

13. We recommend a communication plan for landowners and lessees through a partnership of government (local and provincial), industry, First Nations and academia that highlights best management practices for biophysical surveys and a permitting plan for research activity on leased land.

Governance

14. The SAC recommends strengthening the representation and mandate of the Great Sand Hills Planning District Commission to play a more direct and centralized role in land-use planning, regulation, and decision-making in the Great Sand Hills.

15. The SAC recommends that the mandate of the Commission be one of maintaining the ecological integrity and long-term sustainability of the GSH region and its associated communities.

The various roles of government departments and agencies in planning and decision-making in the GSH, as well as current legislation and land-use plans, need to be clarified to all stakeholders. Clarification is necessary in order to reduce current confusion and concerns over roles and responsibilities for land-use management, regulation, approvals, permitting, and decision-making, and is especially relevant to address existing concerns that power and influence in the GSH currently favor government and economic interests. The Great Sand Hills Planning District Commission (the Commission) was established in 1994 under the *Planning and Development Act* as a result of recommendations emerging from the 1991 Great Sand Hills Land Use Strategy. Prior to the 1991 Planning Strategy, each RM in the GSH region had its own set of bylaws, which may or may not have coincided with neighbouring RMs, and land use was determined by a mix of provincial policy and local edict (Harriman et al. 2006). The Commission was created to provide for greater consistency in land use policy and bylaw administration amongst member RMs, and to provide advice on the management and sustainability of the Great Sand Hills and RM communities. Since its inception, the Commission has played a significant role in managing the day-to-day activities of the GSH. However, the SAC believes that the Commission currently lacks the proper mandate, resources, and institutional structure to ensure the longer term ecological integrity of the GSH and the sustainability of GSH communities. Of particular concern to the SAC is that many of the issues raised in the 2004 *Land Use Strategy Review* resurfaced during the current RES, including:

- concerns over the clarity of roles, powers, and responsibilities;
- institutional fragmentation;
- a central body with limited centralized control;
- inadequate representation of parties and interests;
- lack of sufficient mandate and resources;
- separation of the Commission from environmental monitoring and accountability.

Given that these problems and challenges continue to persist, there is an immediate need to strengthen the capacity of the Commission so as to ensure its direct, and effective, involvement in decision-making and in the longer term planning and management of the GSH.

16. Consistent with principles of capacity building as identified by the Delft Declaration (see Biswas 1996), the SAC recommends that the Commission adopt a new structure—that of a "corporate board."

One of the medium-term recommendations emerging from the 2004 *Land Use Strategy Review* was to create and formalize a partnership between provincial agencies and municipal councils for management of the GSH. Corporate boards, in contrast to advisory boards (e.g., the current Commission), have governance and management responsibilities and decision-making authority. The objective of a corporate management structure is to strengthen local governance in the GSH, but at the same time eliminate the redundancy associated with the current advisory board system. As one example, the recommended board structure may reflect many of the characteristics of the Qu'Appelle Planning District, which consisted of a corporate board of provincial and municipal interests, but, similar to the current Commission structure, and consistent with the principles of local governance, the balance of decision-making power rests with the municipal members. Provisions to establish corporate district planning authorities do exist within Bill 12, *The Planning and Development Act*, 2007 (section 108), which at the time of this report had received third reading in the legislature. The traditional practice under the existing *Planning and Development Act* has been to respect the local autonomy granted to the municipalities. The Commission would thus represent shared power and have the capacity and authority to centralize the decision-making process so as to ensure that RM bylaws related to the GSH are consistent and facilitate the most effective and efficient land-use management, regulation, development approval, and permitting processes.

17. In order to secure representative membership , the SAC recommends that the membership of the board be expanded to include:

- Broader RM membership, including members from each of the eight RMs of Fox Valley (171), Clinworth (230), Pittville (169), Piapot (110), Happyland (231), Miry Creek (229), Gull Lake (139), and Big Stick (141).
- Representative membership of the "urban" settlements/villages that are contained within the above RM geographic boundaries.
- Representation from Saskatchewan Environment, Saskatchewan Agriculture and Food, Saskatchewan Industry and Resources, Government Relations, and First Nations Metis Relations.
- Representation from First Nations. The GSH lie within the area covered by the Qu'Appelle Treaty; thus, the member should be identified by the File Hills Qu'Appelle Tribal Council. Representation from First Nations would serve as a liaison between the Commission and the File Hills Qu'Appelle Tribal Council and would advise on appropriate First Nations protocols and other issues concerning land use and decision making in the GSH.
- Representation from each of the gas, ranching, and tourism communities.
- Representation from the environmental organization non-government sector.

The objective of a broadened membership is to ensure that the decisions of the Commission are supported by an effective network of interests and are, at the same time, locally driven. Government needs to make a decisive effort to integrate under-represented groups in the overall governance of the GSH, especially those that are small in numbers, lacking in financial and human resources, or are either indirectly impacted by or physically distant from decision-making (e.g., NGOs, First Nations, tourism operators, ranchers, oil and gas operators, people living in the immediate vicinity of the GSH, and local communities). This can, in part, be achieved by expanding the Commission's membership. In addition to such expansion, there is a need for broader and more substantive consultation and review processes in relation to environmental assessment, EPP reviews, and land-use decision making.

18. In order to enhance capacity and coordination for environmental follow-up, the SAC recommends that a follow-up mechanism be established for the GSH

through the GSH Planning District Commission consisting of:

a. Environmental monitors established for the GSH and responsible to the local municipalities through the Commission.
b. A full-time Environmental Manager employed by the Commission to oversee environmental monitoring activities and auditing of best management practices in the GSH and to coordinate environmental management activities in the region (e.g., trail reclamation).
c. Consistent with efforts to build local capacity, that the Commission employ a District Planner to manage other land uses and broader socioeconomic activities in the region.

Best management practices for gas activity in the GSH are non-binding, proposed impact mitigation measures upon which projects are approved in "good faith." Under the current approvals process for gas activities there is no formal requirement for follow-up of best management practices to ensure that they have been implemented and that they are effective. The positions recommended above will serve to address these serious gaps in a coordinated fashion.

19. The SAC recommends that the Commission's Environmental Manager have the mandate to review industry and government environmental monitoring data and programs in the GSH, and to release to the public an annual follow-up report that documents the "state of best management practices compliance and performance" in the GSH.

The Environmental Manager would, in principle, serve the role of a "watch dog" over GSH development and land-use activities. While non-binding, information provided by the Environmental Manager could be used by the Commission and by Saskatchewan Environment, Environmental Assessment Branch, for subsequent decision making and industry permitting purposes.

20. The SAC recommends that a centralized information/resource system be established to house annual monitoring reports, industry EPPs, RM bylaws, regulations, and community economic profiles and investment/infrastructure profiles concerning the GSH region.

This information would be housed and managed by the GSH Planning District Commission, under the direction of the Executive Secretary and Commission's Environmental Manager, and made available to its members and to outside parties as determined appropriate by the Commission. The objective would be to provide centralized, easy, and shared access to industry, monitoring, and regulatory information for land-use management, EPP development, cumulative effects assessment, decision making, and economic investment purposes.

21. The SAC recommends that the Commission receive a sustained funding commitment, the balance of which is sourced by the provincial government and Commission membership. Such funding would be directed toward:

- a paid Executive Secretary position for the Commission;
- a paid Environmental Manager position for the Commission;
- a paid District Planner position for the Commission
- funding long-term ecological monitoring and data sharing;
- meeting regular Commission operating costs.

The 2004 *Land Use Strategy Review* identified concerns over inadequate funding and resourcing of the Commission which, among other things, results in unnecessary procedural delays in permitting and restricts the ability of the Commission to make the most informed decisions. The SAC acknowledges that these concerns have not been addressed and that the Commission remains under-funded and under-resourced. Funding could be secured from a portion of the provincial revenues from gas royalties, ancillary gas revenues, and/or ranching income taxes and lease rents for the area.

22. The SAC also recommends that special funding arrangements be established on a cost-shared basis among members to support Commission special research initiatives, monitoring, and development projects.

Acts and Regulations

Review of GSH RES Report under EA Act

23. We recommend that the final report and recommendations of the Great Sand Hills Regional Environmental Study should be subjected to a full review pursuant to *The Environmental Assessment Act*.

It is the view of the SAC that the body and recommendations of the Regional Environmental Study

report contribute to the scientific foundation of an operational Regional Sustainability Plan focused on the maintenance of ecological integrity within the GSH and therefore should be subject to a review under the *EA Act*.

Review of EA Process

24. We recommend that the EA process be modified to include consideration of the cumulative effects of all land-use projects in order that a more realistic assessment of the impacts of human activities on the ecological capacity of GSH can be determined.

The SAC suggests that a process and system be developed to assist proponents in meeting this requirement so that the burden is borne in a collective fashion and not by a single entity.

Review of the EA Act

25. The SAC recommends that as a criterion-based screening mechanism, further guidance and decision support criteria be developed for determining "development" under section 2(d) of *The Environmental Assessment Act*.

The need for an Environmental Impact Assessment (EIA) of activities in the GSH is determined, in part, under the screening criteria of section 2(d) of *The Environmental Assessment Act*. Under section 2(d), applications that are considered "development" are required to undergo an EIA. However, despite the high sensitivity of the GSH for species at risk and the potential for effects on a "unique, rare or endangered feature of the environment," a criterion for an EIA under section 2(d)(i), only 5 proposals have undergone full assessment. The screening checklist under European Directives 85/337/EEC and 97/11/EC may serve as a model for development.

Amendment to EA Act

26. The SAC recommends that *The Environmental Assessment Act* be amended to include a formal requirement for environmental impact assessment follow-up.

The SAC has identified a number of concerns and recommendations in relation to monitoring gas activities and associated best management practices in the GSH. The majority of these concerns and recommendations apply to gas development approved under EPPs. However, for those gas development activities that do trigger the full environmental impact assessment process under section 2(d) of *The Environmental Assessment Act*, a formal post-approval follow-up mechanism is necessary. The objectives for a follow-up program under *The Act* should be to: 1) verify that proposed environmental and socioeconomic mitigation measures have been implemented; 2) verify that implemented impact mitigation measures are working as intended; 3) verify the accuracy of project impact predictions; and 4) identify and manage unanticipated environmental and socioeconomic impacts.

Review of the Provincial Lands Act

27. The SAC recommends that the government review the purpose and effectiveness of the current *Provincial Lands Act* and revise, replace, or update *The Act* to address current land activities in the GSH and new interests on Crown land.

The *Provincial Lands Act* was enacted in 1978, and is administered by both Saskatchewan Agriculture and Food and Saskatchewan Environment. Although *The Act* does address particular land uses concerning agriculture, surface leases, and grazing, there is both government and non-government concern that *The Act* does not adequately address the current mix of land uses (e.g., oil and gas developments and tourism) and interests (e.g., First Nations, TLEs, and third-party interests such as tourism operators) in the GSH.

Amendment to the Heritage Property Act

28. The SAC recommends that the *Heritage Property Act* be amended to clearly provide for the protection of heritage sites based on aesthetic and cultural grounds and that joint management of such resources occurs, where applicable, with the affected First Nations.

On 15 January 2002 the Government of Saskatchewan's Heritage Assessment Unit of Community and Heritage Services proposed 24 amendments to the *Heritage Property Act*. Included amongst these amendments was clarification of sections 65(1) and 66.1(1) concerning Crown ownership of skeletal remains, the Crown's stewardship role, and *The Act*'s relationship to *The Ceremonies Act*. To the best of the SAC's knowledge, clarification and amendment of sections 65(1) and 66.1(1) have not occurred. There is concern amongst both government agencies and First Nations that while

The Act is successful in the protection of "built heritage," there is inadequate attention to the designation and protection of heritage properties based on aesthetic or First Nations' spiritual or cultural values.

Reducing Impacts

New Well Pad Surface Leases and Roads/Trails

29. We recommend that gas lease holders be required to use directional/slant drilled wells. Specifically, multi-well pads with directional/slant drilled wells or a combination of directional/slant drilled wells with a vertical well on the same pad is permitted.

Based on logistic regression analyses, new roads/trails were more likely to be built in areas associated with a new well pad surface lease than random locations elsewhere in the Review Area. This supports our earlier recommendation to limit new well pad surface leases to 2 per section in the Non-Reserve Area and allow no new well pad surface leases in core biodiversity areas, subject to the conditions identified in Recommendation # 2. To mitigate potential impacts of gas development on core biodiversity areas, directional/slant drilling could be used from existing well pad surface leases along core biodiversity area boundaries, thus limiting intrusion of roads and trails. By restricting gas development within core biodiversity areas and holding maximum well pad surface lease density at 2 per section outside of core biodiversity areas, our preferred scenario resulted in a total of only 110 km of new roads. Locating well pad surface leases along existing roads with only short spur roads off of them could reduce total road and pipeline development across the GSH substantially.

"Incident" Management

30. The SAC recommends an improved and more transparent process for management of incidents that impact negatively upon the environment during construction, operation, and decommissioning of any development on the land (e.g., distributed water systems, gas wells).

Improvements should include computer-based tracking to ensure that proper follow-up of logged complaints occurs. Similar to the existing SIR spills database, such logging could be web-based, thus ensuring increased transparency to the general public. Affected RMs and landowner/lessees should be involved with full regard to the constraints of due process.

Distributed Watering Systems

31. We recommend that before the approval and construction of any new distributed watering systems in the Review Area, the proponent must make a request to Saskatchewan Agriculture and Food (SAF) and SE, and that the provincial agencies provide assistance with location preference, and gathering of information on rare and endangered species.

32. We recommend requiring an environmental assessment process prior to installing distributed watering systems, and that overall grazing pressure be controlled in areas receiving distributed water, such as by use of management-intensive grazing, rotational grazing, or rest-rotation grazing, in order to maintain range health.

33. We also recommend intensive monitoring of the overall and cumulative effects of distributed water systems on the GSH ecosystem.

Our study indicated unhealthy range conditions associated with areas around livestock watering holes, where overgrazing and trampling have noticeably eroded range health conditions and have resulted in increased occurrence of non-native plants and a reduction in the occurrence of several sensitive bird and plant species. Distributed (shallow buried) water systems are being used to increase the carrying capacity of livestock in some areas in the GSH, and are subsidized by the National Water Supply Expansion Program (NWSEP) from Agriculture and Agri-Food Canada. The advantages of such systems for the producer are becoming well accepted, and include enhancing water quality and quantity (especially in a drought), ability to cross-fence, greater animal weight gain, and increased distribution of cattle to previously inaccessible areas. It is less clear, however, whether such systems will benefit native flora and fauna by reducing surface disturbance; in terms of cumulative impacts, they could do more harm than good. Research and monitoring of distributed watering systems is necessary to make valid predictions about long-term impacts on range health, invasive plants, and sensitive focal species.

Fragmentation by Linear Features

34. We recommend that fragmentation of natural habitats in the GSH by roads, trails, pipelines, and other

linear disturbances be controlled and ultimately reduced, accompanied by intensive monitoring of ecological impacts. Specifically, we recommend a combined approach in which no new roads or other surface disturbance are allowed in the Reserve Area (i.e., existing RAER and 35 new core biodiversity areas), and best management practices are applied and monitored in the Non-Reserve Area across the GSH Review Area. We also recommend quantification of the use of roads as part of the ongoing monitoring of and adaptive management within the GSH.

The ecological consequences of habitat fragmentation on large grassland ecosystems, such as the GSH, have been poorly studied. However, research in many regions has shown that an increase in the density of roads, trails, pipelines, and other linear disturbances—an important category of habitat fragmentation in the GSH—can have multiple impacts on the native biota. One of the more serious consequences of such fragmentation is the spread of invasive non-native species. Management actions that limit road development, both in the form of new conservation areas and best management practices, are likely to have the greatest impact on conserving the biological resources of the GSH.

Environmental Monitoring

35. The SAC recommends that within one year of the date of this report, an ongoing environmental monitoring program for the GSH should be designed and implemented.

Monitoring efforts to date within the Review Area have been fragmentary, inadequate, and primarily focused on the specific activities of gas projects, such as well drilling. However, all human activities in the area create surface disturbance to some degree and, therefore, all users need to be held jointly responsible for the funding and delivery of such a program, including government, industry, agriculture, First Nations, and NGOs. To build and maintain the GSH environmental monitoring program, partnerships should be established, firstly between the primary users (government, industry, agriculture, NGOs) of the area and then with external sources of monitoring expertise, such as the Alberta Biodiversity Monitoring Program. The program should, as a minimum, include the following features:

a. *Coarse and fine filter monitoring approaches.* The spatial extent of existing and new roads and trails should be periodically tracked with the aid of remote sensing technologies, such as satellite imagery. Such imagery could also be used to classify vegetation communities and track their changes over time, whether caused by direct human activities, climate change, or other factors. These coarse filter approaches should be supplemented with elements of fine filter periodic monitoring, which should include soil acidification monitoring, range health assessments, breeding bird surveys, species at risk surveys, non-native plant surveys, game species surveys, and project monitoring, such as for new roads, wells, or watering sources. Where of value, for example in understanding species-habitat relationships, fine filter elements could be integrated with coarse filter elements, such as vegetation communities.

b. *Standardized protocols and rigorous design.* The Regional Environmental Study has contributed to a baseline for many of the coarse and fine filter monitoring elements. Future monitoring should, as much as possible, retain the protocols associated with the RES surveys. However, attention should be paid to the design of the monitoring program to ensure that it meets the requirements of statistical testing and the recording and retention of metadata.

c. *Centralized monitoring metadata and data storage and access.* The RES study revealed that the existing environmental data and associated metadata for the GSH were not all recorded, digitized, stored, managed, and easily accessible. Current access to ecological information and information exchange requires improvement to facilitate an even flow of information among the parties as a way to better the governance of the GSH region. We earlier recommended in relation to a restructured Great Sand Hills Planning District Commission that a centralized information/resource system be established under the auspices of the Commission. To serve even wider needs, the SAC is also of the view that the Government of Saskatchewan, through Saskatchewan Environment, should establish a clearing house for ecological data sharing for the GSH, possibly through the Saskatchewan Conservation Data Centre. The clearing house should include data held by industry (for example, in the form of past EPPs and EAs) related to the GSH. To be most effective, that data storehouse needs to be linked to others across North America. Ecological data stemming from the GSH RES could serve as a foundation, with

future data received from and made available to, other government departments and agencies, industry, the GSH Planning District Commission, and researchers. Various national and regional clearing houses for ecological information currently exist, ranging from national biodiversity research and information sharing and networking (e.g., clearing house mechanisms under the Convention on Biological Diversity) to regional ecological spatial data and metadata sharing (e.g., Wyoming Geographic Information Science Center, Natural Resources Data Clearinghouse; ECOSHARE: Interagency Clearinghouse of Ecological Information for the Pacific Northwest), and may be looked to as potential models for adaptation.

d. *Dedicated environmental monitors.* So that all users are held accountable to environmental policies and operational guidelines, sustaining the ecological integrity of the GSH requires the services of full-time environmental monitors. We earlier recommended that environmental monitors be employed through a restructured Great Sand Hills Planning District Commission. Consideration should also be given to reimbursing the expenses of lessees when they carry out the functions of environmental monitoring. In doing so, provincial government departments would enter into joint partnership ventures that foster long-term trusting relationships that contribute to the ecological integrity of the area. Currently, ranchers often serve in the role of unpaid monitors. Given the insufficient numbers of environmental monitors and the uneven quality of current monitoring, it is necessary to formalize and standardize monitoring activity with both training and compensation. In this way larger numbers of trained rancher-monitors can be fielded effectively. In addition, greater emphasis should be placed on the use of remote well and pipeline monitoring technology (e.g., cellular telemetry and SCADA), which have the benefit of decreasing trail use and chronic intrusion into remote or sensitive habitats.

e. *Cradle to grave project monitoring.* Post-industry or agriculture project reclamation and re-vegetation monitoring programs should be made mandatory. Reclamation and re-vegetation programs are largely still considered as an additional cost or inconvenience. Once a project (e.g. gas well, pipeline, watering source) is constructed, follow-up reclamation monitoring is often nonexistent. In addition, clearer and concise expectations and requirements need to be made. For example, the regulatory request that there be no rutting or no excessive rutting on access trails does not define "excessive." To facilitate the development of cradle-to-grave monitoring, we recommend a pilot research program on trail reclamation to assess methods and costs that is conducted as a partnership among SE, SIR, SAF, the University of Regina, University of Saskatchewan, and SIAST.

f. *Research Needed on Response of Species to Gas Development.* In 2006 a rigorous sampling strategy —both in methodology and distribution of sampling—was instituted to quantify the effects of gas development, associated roads and trails, and other soil-disturbing activities on biodiversity in the GSH Review Area. Selected birds, rare plants, and range quality were quantified within a framework for establishing baseline conditions and assessing effects of current human activities and future development scenarios. We were not able to detect a significant response to gas well sites for any of the eight rare and traditional use plants assessed. This does not mean that there are no impacts. Rather, because the distributions of most species (except prairie moonwort) did not overlap the area of current gas development, conclusive judgment on the impact of gas development on these species is not possible at this time. Further research, for example applying a before-after-control-impact (BACI) experimental design, is needed to address the question of the impacts of gas development on rare plants and other species. We recommend repeating bird and plant surveys and range health assessments at the same locations as the 2006 field surveys at five-year intervals in order to monitor the effects of future development.

Reclamation

Reclamation Guidelines

36. Within one year of the date of this report and in order to reflect the latest techniques available, the SAC recommends that the Saskatchewan Government establish an inclusive review process of existing reclamation guidelines that involves appropriate government agencies, industry representatives, stakeholders, First Nations, and industry.

Reclamation Fund

37. To ensure the restoration of land subject to surface disturbances irrespective of their cause, the SAC recommends that a reclamation fund be established in the same manner as that proposed for environmental monitoring in the Review Area.

The Orphan Wells Program already exists for the restoration of lands disturbed by the gas industry. However, this needs to be supplemented to cover the broader reclamation of surface disturbances not associated with gas development, including the need to eliminate pockets of invasive, non-native plant species before they become widely established. As with monitoring, the responsibility for such funding should come from all parties creating surface disturbance; however, the government must take the lead role and allocate for this purpose some of the revenues (e.g. gas royalties, taxes, surface lease payments) generated from the Review Area.

Reclamation Monitoring

38. Environmental monitors (as identified in earlier recommendations) should be used to survey the GSH area for areas requiring surface reclamation or management of non-native plant species invasion; these monitors should also track the progress of reclamation projects.

Reclamation and Restoration

39. We recommend extensive conservation, restoration, and management activities in the GSH, including reclamation of gas line routes and abandoned roads and well pads, as well as eradication of non-native plants wherever feasible. Serious infestations of invasive non-native plant species should be identified and subject to eradication programs.

Many areas of disturbed soil within the GSH require restoration. Because of limitations of time and data within our study, restoration and management activities were not considered in any of our scenarios, but our models suggest that appropriate management and restoration could lead to gains in habitat, for example, for beaked annual skeleton-weed and a reduction in the extent of crested wheatgrass, among other benefits. Unfortunately, some plant species used in prior reclamation of disturbed soils—especially smooth brome and crested wheatgrass—are non-native and are proving to be problematic invasive species in the GSH.

Native Seed Sources

40. The SAC recommends that only locally adapted native seed sources be used for reclamation; all seed sources must be carefully scrutinized for contamination by unwanted plant species.

Sustaining Regional Communities

The recommendations that follow are grounded in the observations of the natural, social and economic capital of the region and contextualized through the economic lens developed specifically in the economic baseline report. The recommendations follow from a focus on a balance between ecological integrity and the overall sustainability of the local populations, their economic well-being, ongoing economic development, and recognition of a region in economic transition between two disparate economic actors.

Compensating Agricultural Leaseholders

41. We recommend that Saskatchewan Agriculture and Food re-evaluate the amount of compensation to agriculture leaseholders for gas surface leases in the Review Area.

The 2004 Review recommended that Saskatchewan Agriculture and Food review the compensation payment to ranchers for gas developments on leased land with a view to perhaps increasing sharing of revenue directed at stewardship initiatives of benefit to the area. We fully support that earlier recommendation and suggest that Government should look to other jurisdictions for potential examples of more equitable crown lessee compensation policies for gas well pad surface leases.

First Nations Consultation

42. The SAC recommends Government consultation with First Nations as part of the GSH RES implementation strategy, and that the consultation processes adopt the principles outlined in *The Government of Saskatchewan Guidelines for Consultation with First Nations and Métis People: A Guide for Decision Makers*.

Based on the notion that "consultation would be required with those First Nations whose traditional territories coincided with the geographic area where the impact would be felt," the SAC strongly urges that consultation for RES implementation include both

Saskatchewan First Nations interests and the interests of the Blackfoot Confederacy of Alberta, who claim the GSH as their traditional territory and as an area of contemporary cultural and spiritual significance.

First Nations Council of Elders and Traditionalists

43. To facilitate ongoing consultation and knowledge sharing post-RES implementation, the SAC recommends the establishment of a "Council of Elders and Traditionalists," with whom governments and industry would be able to consult and work in order to insure that proper protocols are followed with regard to issues of development, land use, land access, and heritage resource management, and to ensure that the sacred nature of the GSH is properly addressed.

Decisions about land use in the GSH do not always concern Treaty Rights. In many cases, consultation with First Nations is necessary to ensure that First Nations' interests and cultural values in the GSH are known and respected. This advisory group should consist of an appropriate number of elders and traditionalists familiar with the GSH. The Council should be formed, organized, and coordinated by each of the Treaty area representative Councils. One primary role of the Council of Elders and Traditionalists would be knowledge sharing.

44. The SAC recommends that ceremonial sites of particular interest to First Nations be identified as part of the RES implementation process, based on consultation with Treaty Four and Treaty Seven members or the Council of Elders and Traditionalists.

The RES baseline study results indicate that the immediate purpose of First Nations access to the GSH is to engage in spiritual and cultural activities, such as ceremonies and the collection of medicinal plants. While there is now access to Community Pastures in the GSH through Saskatchewan Agriculture and Food, other areas of the GSH, including the RAER, are also of significant cultural and spiritual value to Treaty Four and Treaty Seven First Nations people. While the SAC cannot recommend access to particular areas, as many areas of interest are potentially subject to a Crown lessee agreeing to such access, every consideration should be extended to permit First Nations access to land within the GSH for spiritual ceremonies and medicinal plant collection. In keeping with an earlier recommendation, First Nations membership on the GSH Planning District Commission could facilitate such negotiations.

Heritage Resources

45. The SAC recommends that an appropriate protocol be established between industry, government, and First Nations concerning the treatment of disturbed heritage sites.

The GSH area is rich in archaeological resources, many of which are uncovered during gas exploration and development processes and many of which are of historical, cultural and spiritual value to First Nations.

Labour and Employment

46. The SAC recommends that the Government of Saskatchewan, through Regional Economic and Cooperative Development (RECD) in partnership with the local REDAs and Western Economic Diversification (WED), develop a series of information sessions, mailings to businesses, and workshops detailing the specific application procedures and success strategies for Provincial, REDA, and WED programs and initiatives that can be offered to the employers of the region.

47. We recommend that a partnership of government agencies (RECD, REDA, and WED) develop a close working relationship with the Great Sand Hills Planning District Commission to improve program uptake and increase local adoption of the various labour and employment programs.

Economic diversification has been a cornerstone of economic discussion since the 2001 Saskatchewan Action Plan. The Regional Economic Development Authority (REDA) has a mandate to develop locally-based employment and economic opportunities for the benefit of the local population through grassroots initiatives. Western Economic Diversification (a federal program) serves a similar purpose, although over a larger jurisdiction. The programs these agencies offer can be better marketed to the businesses and people of the region to improve awareness of programs and monies for economic diversification. Quarterly information sessions (hosted throughout the communities of the region) and mailings are warranted to increase program awareness.

48. As the business taxes collected in the region are relatively small, the SAC recommends to the Government of Saskatchewan, through Saskatchewan Finance, that business tax relief be granted for 3 years to those businesses that are provided provincial or federal support

through labour and employment programs and provide new employment opportunities.

We anticipate the revenue impact to be minimal while population retention may be improved, and diversification of the local economy enhanced.

49. In order to spur economic diversification and the retention of young people, the SAC recommends that the Government of Saskatchewan, through Saskatchewan Finance, create a progressive income tax structure for new employment.

For those Rural Municipalities that have indices of economic specialization above 50, for every new job created outside the sector of concentration, an income tax credit of 10% of gross earnings should be provided to each new employee for the first 5 years of employment.

Earnings and New Construction

50. The SAC recommends that the Government of Saskatchewan, through Saskatchewan Finance, establish a property tax break for 3 years for individuals who are new "non-traditional" sector employees, if during their 5 years of income tax credits for employment in the region (based on the above recommendation), they purchase a new home or a home 20% more expensive than their previous (owned) dwelling.

We anticipate that the tax revenue loss would be marginal through implementation of this recommendation, and the region will be perceived to be forward-thinking and tax-friendly, especially to new (young) employees.

Economic Concentration and Capital Investment

51. The SAC recommends that the Government of Saskatchewan, through RECD, Saskatchewan Finance, and in partnership with the GSH region banks and credit unions, establish business loans for those businesses outside the dominant economic sectors (agriculture and gas extraction) with below-prime interest rates for new operations/divisions/ventures that support value added services to the dominant sectors.

Because economic diversification comes at an investment price, it is incumbent upon initiatives and programs such as those noted by the agencies above to provide to grassroots efforts the funding needed to get such ventures launched. Funding will come from two sources—first from the agencies themselves and their internal funding mechanisms for directly related project/initiative ventures, and second from financial institutions such as local banks and credit unions for projects of a larger scope or scale than that of the agencies.

52. The SAC recommends that the Government of Saskatchewan, through Saskatchewan Finance, establish for new businesses in the GSH region the elimination of corporate taxes for the first 10 years of operations, followed by a reduced corporate tax rate (for example, from 35% to 30%).

The reduction of tax rates should provide incentives to locate businesses not in the major population centres, but in smaller communities. With lower loan interest rates, location incentives, income tax breaks for new employees, and property tax abatements (the suite of economic recommendations above) all attracting (or retaining) a local rural population, the viability of new rurally based businesses may be enhanced.

Manufacturing

53. The SAC recommends to the Government of Saskatchewan, through RECD and in conjunction with information sessions from economic development agencies such as WED and the REDA, that educational workshops be provided to help small manufacturers develop business plans and marketing strategies.

To further support manufacturing in the region, small locally based manufacturing should be encouraged. Small businesses, however, are limited in their potential due to economies of scale. The educational workshops, business plans, and marketing strategies should be specifically oriented to increasing capacity to tackle larger contracts in the gas sector of the broader region, in order to stabilize their current operations and create longer-term growth and diversification for the region.

54. To further facilitate the creation of economies of scale, the SAC recommends to the Government of Saskatchewan, in partnership with the GSH Planning District Commission, the creation of a Great Sand Hills Manufacturers Alliance (GSHMA).

The GSHMA would serve as an intermediary between local firms and the gas sector, or other large potential contract providers. This alliance of business interests in the region would have the mandate to seek

larger contracts for not one, but a host of smaller locally based firms. Collectively, the smaller firms may share resources, skills transfer, and bring a larger body of personnel to projects that normally would be beyond the capabilities of any one firm. Start-up funding for the GSHMA may be sourced from either REDA or the Canadian Manufacturers Association.

Ranching

55. The SAC recommends that Saskatchewan Environment in consultation with other provincial government departments, RMs, and local lessees, implement improved education in best management practices for the ranching industry.

To ensure the maintenance of the ecological integrity of the GSH that supports the dominant economic sector of the region, this recommendation is in concordance with the recommendations of the SAC on the eventual development of a Regional Sustainability Plan for the Review Area. In conversations and interviews, ranchers indicated they would welcome more education, and specifically implementation strategy sessions, on how best to manage their lands. Regularly scheduled workshops held throughout the region on best management practices—and their functional implementation—are welcomed by the ranching community.

56. Building on the rationale(s) provided in the suite of recommendations under the heading of Environmental Monitoring, the SAC recommends (from an economic perspective) that dedicated environmental monitoring officers be hired for the region with a special focus on members of the ranching communities.

Working in consultation with Saskatchewan Environment, Saskatchewan Agriculture and Food, the Saskatchewan Watershed Authority, and other associated governmental departments, and reporting to the GSH Planning District Commission, these monitoring officers would conduct various environmental surveys (water quality, invasive plants, soils, etc.), monitor the application and use of best practices in the region, and conduct educational workshops. Funding for these positions should be ear-marked out of current collections from the region, for example 1% of all ranching income taxes collected from the Study Area and 5% of all provincial revenues (royalties, taxes, and lease payments) for Crown Lands in the Study Area would provide base funding for monitoring positions.

57. The SAC recommends to the Government of Saskatchewan, through the Saskatchewan Watershed Authority: (a) that a one-time baseline assessment of water *quantity* be established as soon as possible (before the end of 2008 is recommended given other pressures on water resources such as gas extraction and possible climate variability); (b) that a one-time baseline assessment of water *quality* be established as soon as possible (preferably before the end of 2007); and (c) that ongoing water quality and quantity comparisons throughout the region be conducted by the environmental monitors as part of the Environmental Monitoring and Land Management suite of recommendations.

A recurring theme from various stakeholders within the GSH region is water resources. Ranchers, business owners, ENGOs, and local residents alike made reference to water resources in various forums. The ability of the local population to access clean and consistently high quality water in order to maintain their current lifestyle and quality of life was noted. This three-part recommendation is based on the need for not only a clean water supply to support business and economic development, but also on the need for an assessment of water supply (quantity) in order to develop a sustainable regional resource-use strategy in support of economic development and specific uses of the common resource. The shorter timeline for the second part of the recommendation is based on the fact that water can be more readily sampled and tested than can subsurface water quantities be determined.

58. The SAC recommends to the Government of Saskatchewan, through the Saskatchewan Watershed Authority, that for any gas exploration and development within the Study Area, a water quantity and quality assessment and statement be created prior to any on-site activity.

This recommendation is offered in conjunction with the previous recommendation in order to sustain the dominant local economic activity without compromising both its future economic potential and the quality of life for local residents based on the introduction of new industrial activity. All water resources (surface and groundwater) are to undergo quality analysis to ensure that gas development in the region does not negatively impact other economic sectors or the community's water supply. The analyses are to be conducted prior to development and at regular intervals during drilling to ensure the well does not seep gas into the surrounding strata and water.

Tourism and Eco-tourism

59. The SAC recommends to the Government of Saskatchewan, through Saskatchewan Tourism, Saskatchewan Transportation, the Southwest Saskatchewan Tourism Association, the local communities, and the GSHPDC, the creation of a coordinated and integrated regional tourism plan built upon the foundations of ecologically sensitive tourism and recognition of the economic, social, and historical forces that shape the region, past and present.

The history of the Great Sand Hills region, its communities, the settlement patterns, and the geographic and biologic significance of the region are an attraction to tourists. The creation of a historical route, complete with cairns, roadside pullouts, and stops at the various museums, all along the current highway routes (#21 and #32) with a stop at the dunes (akin to the Saskatchewan Geo-Log Route around the Finger Lakes and Fort Qu'Appelle) is appropriate for the region. The route and its stops can detail the history of the First Nations People, agriculture, ranching, the changing landscape, and birds and plants, to name a few. The tour, as it winds through the communities, may serve to accrue retail economic benefits due to increased local tourism. Whereas increased local tourism may be beneficial to the local economies of the GSH region, controlled access to the dunes and the region in general is required given the rare and unique nature of this ecological area. In that context, we strongly encourage attention to the appropriate use of boardwalks as an available tool. Furthermore, any literature promoting the region as a tourist destination should have explicit statements about where people can and cannot tread. An information board or shelter at the dune turn-about on the Straw Road would serve this purpose for minimal cost. In order to attract tourists to the region, well-marked signs leading them to the attractions of the region are required not only along the regional highways (#21 and #32), but also along the TransCanada highway in order to draw potential tourists. In support of increased tourism, some infrastructure exists in current museums, but staffed kiosks should be added to the entry points of the tour route to provide information about the tour, specifically at the eastern and western entry points near the provincial highway intersections with the Trans Canada highway.

Gas Development

60. The SAC recommends that the Government of Saskatchewan, through RECD: (a) develop and implement a "hire local, buy local" policy for gas firms operating in Saskatchewan; and (b) develop a local industry capability assessment framework (similar to the assessment from HRSDC for skilled foreign workers).

A recurrent theme among local businesses and the residents of the GHS region is the importance of a diversified economic base that includes gas development among the mix of activities that will support their futures. In order for that future to have a sustainable economic horizon for the people and communities of the GSH region, the economic activity also must be retained within the local economy. The proposed local industry capability assessment is intended as an assessment of local business capacity and capabilities and would be applied whenever an out-of-province firm wishes to source goods and services from out-of-province or beyond the local region. The intention is to identify local firms that may bid on contracts prior to those contracts being sourced extra-regionally. The GHSPDC and the newly proposed GSHMA would serve as intermediaries facilitating dialogue between the gas industry and local manufacturers.

61. The SAC recommends that the Government of Saskatchewan, through Saskatchewan Environment and under the auspices and direct assessment of the environmental monitors proposed herein, require that "environmental performance bonds" be posted by all gas companies operating in the GSH Study Area.

In the event of a leak, seep, blow-out, water contamination, or other form of environmental disturbance beyond established provincial and industry guidelines and regulations (as determined by the environmental monitors), the bond is cashed to pay for immediate remediation efforts. The bond should be set at a significantly high value such that it is an incentive to meet industry and government environmental expectations. If there are environmental problems such as, but not limited to, the incidents listed above, the value of the bond is intended to cover the costs of remediation. The bonds may also serve to provide income loss payments to lessees when remediation takes productive land/water out of operational use.

62. The SAC recommends to the Government of Saskatchewan that, through Saskatchewan Industry and Resources, a comprehensive assessment of current and projected gas reserves and their economic valuations be conducted every 3–4 years.

As noted in the introductory remarks for this section, the gas reserves and their economic value can be better understood given the dynamic conditions of that economic sector. This recommendation is offered to more fully appreciate the long-term economic implications for the GSH Study Area, the local population, and the provincial government, given a continually shifting economic and technologic landscape. This reassessment of the economic impacts is required in light of ongoing changes to the gas industry and to the Government's economic relationship to that industry. We note that in July 2008, as proposed in the recent 2007 provincial budget, the Corporate Capital Tax and Corporate Capital Tax Resource Surcharge have been proposed for elimination. As these parameters change, so too will the impact of the industry on government revenues, the industry's perception of the business climate in the region, and its ongoing operating costs and associated profits. As these latter points have the potential to manifest in increased/accelerated activity in the Review Area, there are numerous potential impacts on the local economy. Ongoing economic reassessment and valuation is therefore an important component in our understanding of the sustainability of the GSH.

Concluding Comments

The Great Sand Hills Scientific Advisory Committee has given careful consideration to issues of ecological integrity of the Great Sand Hills and to the situation faced by local communities. The recommendations of the SAC are designed to contribute towards a sustainable future for the GSH and its communities using a balanced approach founded on principles of sustainable development. Our recommendations are based upon our scientific studies of the past two years and our assessment of past studies and plans for the GSH, and are a direct outcome of our preferred sustainability scenario. The SAC is strongly of the view that our recommendations should be considered in their entirety as an integrated package serving the needs of regional communities and the people of Saskatchewan.

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