CATCHING UP

Conservation and Biodiversity Offsets in Alberta's Boreal Forest

CANADIAN BOREAL INITIATIVE
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Sustainable Energy Solutions

ALBERTA RESEARCH COUNCIL

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Conservation and Biodiversity Offsets in Alberta's Boreal Forest

Simon Dyer • Jennifer Grant • Terra Lesack • Marian Weber

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Available in English only. The Executive Summary is available in French.
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About the Canadian Boreal Initiative

The Canadian Boreal Initiative (CBI) works with First Nations, governments, conservation organizations, industry leaders and others to link science, policy and conservation solutions across Canada's Boreal Forest. CBI works to advance the Boreal Forest Conservation Framework as a balanced vision for conservation and sustainable development. For more information about CBI contact info@borealcanada.ca.

About the Pembina Institute

The Pembina Institute creates sustainable energy solutions through research, education, consulting a nd advocacy. It promotes environmental, social and economic sustainability in the public interest by developing practical solutions for communities, individuals, governments and businesses. The Pembina Institute provides policy research leadership and education on climate change, energy issues, green economics, energy efficiency and conservation, renewable energy and environmental governance. More information about the Pembina Institute is available at www.pembina.org or by contacting info@pembina.org.

About the Authors

Simon Dyer

Simon Dyer is the Oil Sands Program Director at the Pembina Institute. Simon is a registered professional biologist and has worked on land-use issues in western Canada since 1999. Simon represents the Pembina Institute on the Sustainable Ecosystems Working Group of the Cumulative Environmental Management Association (CEMA). Simon holds a Master of Science degree in Environmental Biology and Ecology from the University of Alberta, and a Master of Arts in Natural Sciences from Cambridge University. Simon is the co-author of *Death by a Thousand Cuts: Impacts of in-situ oil sands development on Alberta's Boreal Forest*.

Jennifer Grant

Jennifer Grant is a Policy Analyst with the Pembina Institute. As a member of Pembina's Energy Watch team, Jennifer is involved in research, writing and multi-stakeholder initiatives pertaining to oil sands development. Since 1999, Jennifer has engaged in conservation initiatives as both a biologist and an environmental educator in Alberta. Jennifer represents the Pembina Institute on the Reclamation Working Group and the Watershed Integrity Task Group of the Cumulative Environmental Management Association (CEMA). Jennifer holds a Master of Science degree in Ecosystem Management from the University of Calgary and a Bachelor of Science with distinction in Biological Sciences from the University of Victoria.

Terra Lesack

Terra Lesack is a Policy Analyst with the Pembina Institute. She is a member of Pembina's Energy Watch team, where she focuses on research pertaining to oil sands development. Terra has recently been involved in research pieces dealing with air quality impacts associated with the development of upgrader operations in the Industrial Heartland northeast of Edmonton and biodiversity offsets in the Regional Municipality of Wood Buffalo. Terra has a Bachelor of Science in Environmental Science from the University of Calgary, and a diploma in Forest Technology from the Northern Alberta Institute of Technology. She has several years of field research experience in topics ranging from mountain pine beetles to fish and invertebrates.

Marian Weber

Marian Weber is a Research Scientist with the Alberta Research Council and Leader of their Socio-Economic Policy Research Program which focuses on resource and environmental economic issues. She conducts research on market-based approaches for biodiversity conservation in Canada's Boreal Forest, and co-authored the report "Conserving Natural Capital in the Canadian Boreal Forest: the Al-Pac Case Study" for the National Round Table on the Environment and Economy. Marian holds a PhD in Economics from the University of Alberta.

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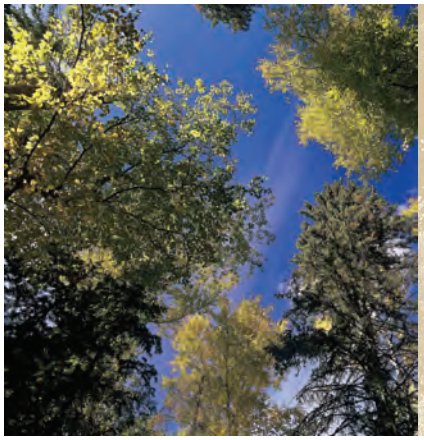


1 Executive Summary

Canada's Boreal Forest contains a quarter of the world's remaining intact forests. As one of the largest remaining intact forest ecosystems in the world, the Boreal Forest is home to a rich array of wildlife including migratory songbirds, waterfowl, bears, wolves and the world's largest caribou herds. The Boreal Forest also supports traditional land uses and numerous ecosystem services, including carbon storage and water recycling.

Alberta's Boreal Forest Natural Region (BFNR) covers 58 percent of the province's land base and constitutes most of the province's forest land. The Boreal Forest is significantly impacted by human activities including road building, seismic exploration, oil and gas production, timber harvesting, recreation, and disruption of natural disturbance regimes.[1]

Northeastern Alberta, particularly the Regional Municipality of Wood Buffalo (RMWB), is a busy place. It faces unique pressures due to the development of Alberta's mineable oil sands, which are expected to contribute a significant and long-lasting footprint over the next 50 years.[2] In addition to the oil sands, the region contains the Alberta-Pacific Forest Industries Inc. (Al-Pac) Forest Management Agreement (FMA) Area – one of the largest forest management agreement areas in the province. Under its FMA, Al-Pac is required to manage for non-timber forest values and is certified through the Forest Stewardship Council. As part of this certification, Al-Pac bases its planning and practices on Boreal ecological processes designed to maintain natural landscape values.[3]

The current regulatory system for the energy sector puts a heavy emphasis on environmental impact assessment and reclamation requirements to mitigate development impacts. However, the ability to reclaim the impact from surface mining in the RMWB is unproven. The existing development footprint, along with the scale and potentially irreversible development of oil sands, creates an urgent need for new land management tools to prevent long-term and irrevocable damage to the BFNR.

This report, commissioned by the Canadian Boreal Initiative, explores biodiversity offsets as a tool to address the impacts of industrial development in the BFNR. The purpose of the report is to explore options for meeting biodiversity objectives for the BFNR overall, with a focus on opportunities to mitigate the impacts of development in the RMWB through a pilot biodiversity offset program. While the report focuses on the RMWB as a case study, the concepts are broadly applicable to Boreal Forest management across Canada.

The basic idea behind a biodiversity offset is that impacts associated with the disturbance of ecosystems and habitat loss are mitigated through either restoration or conservation of substitute forest areas so that no net loss of critical habitat is maintained in perpetuity. Mitigation is defined by the Canadian Environmental Assessment Agency as: "…the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through *replacement, restoration, compensation or any other means*" (emphasis added).[4]

[1] Daniel Farr et al., "Conserving Canada's Natural Capital: The Boreal Forest," ed. *Al-Pac Case Study Report* (prepared for the National Round Table on the Environment and the Economy, 2004).

[2] Note that there are three major oil sands areas in Alberta's Boreal – the Peace, Athabasca and Cold Lake areas. However, the Athabasca area is the largest and currently contains the only mineable deposits.

[3] For more information on Al-Pac's environmental policy see www.alpac.ca/index.cfm?id=enviropolicy.

[4] Canadian Environmental Assessment Agency, *The Responsible Authority's Guide (Canadian Environmental Assessment Act Procedural Manual)*, Section 1.6 Step 3: Mitigating Environmental Effects, 2003 (cited August 27, 2007). Available online at www.ceaa-acee.gc.ca/013/0001/0008/partie2_4_e.htm#1.6.

The U.S. Bureau of Land Management defines mitigation to include: "… (a) avoiding; (b) minimizing the impacts by limiting the magnitude or degree; (c) rectifying the impact by repairing, rehabilitating, or restoring; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or *providing substitute resources or environments*" (emphasis added).[5] These definitions clearly indicate that offsets can be considered a critical component of mitigation.

Biodiversity offsets have been applied in other jurisdictions on both a voluntary and regulatory basis. For example, under the U.S. *Endangered Species Act*, developers can mitigate the impact of their activities on endangered species by purchasing species-specific offsets from a conservation bank. In spite of being applied in other jurisdictions, biodiversity offsets have not been applied in the Boreal Forest.

This report begins with an overview of the ecological context for biodiversity offsets in the BFNR. Examples of actual biodiversity offset programs are used to illustrate how these tools could be applied for mitigating impacts of development in the RMWB. The feasibility of offset options is further explored through qualitative interviews with thirty-three key informed stakeholders including eleven from industry, eight from government departments, seven from environmental non-government organizations (ENGOs), five from First Nations, and two from academic institutions. Four types of biodiversity conservation programs for the RMWB were described and respondents were asked to determine the strengths, weaknesses, opportunities and barriers of these options. The interviews were used to explore stakeholder awareness of biodiversity offsets, including whether organizations are considering offsets and what values or habitats should be protected by offsets.

To accompany this report, a multi-stakeholder workshop was held to further discuss opportunities to implement biodiversity offsets in the RMWB. The goal of the workshop was to identify opportunities and actions needed to pilot biodiversity offsets in the Athabasca region of Alberta's Boreal Forest. Findings of this workshop will inform decision makers in their deliberations of a biodiversity offsets program for the future.

1.1 Key findings

As cumulative impacts on terrestrial resources continue to grow across Alberta, expectations for more effective mitigation options are consistent with a biodiversity offsets approach. Stakeholder interviews suggest that if used beyond a business as usual context, biodiversity offsets could result in tangible conservation results to mitigate development impacts.

Biodiversity offsets are an emerging trend within the industrial sector. All industry representatives interviewed said that their companies were either already implementing or considering investing in biodiversity offsets. The main business drivers for considering biodiversity offsets included growing public expectation, preserving a social licence to operate, and retaining access to the resource.

Program preferences

Four conservation program options were outlined to the interviewees: voluntary offsets, regulatory offsets without conservation banking, regulatory offsets with conservation banking, and cap and trade. While cap and trade is not an offset program by definition, it was presented to stakeholders as an alternative conservation approach with similar attributes and objectives. Of these programs, the stakeholders preferred the conservation banking option. The perceived main strengths of this option include fair treatment of firms, certainty of environmental benefits, clear rules, low transaction and administrative costs relative to the no-banking alternative, flexibility for firms in meeting regulatory objectives, and private incentives to invest in reclamation and conservation to create sellable credits. However, interview respondents also noted that this option requires a lengthy process for establishing public credibility and government commitment and is likely not feasible in the near term. Therefore, learning about biodiversity offsets and market evolution through a more formal voluntary program such as a voluntary registry challenge is encouraged as an initial step toward a more comprehensive offset program.

There are several key issues to be resolved in creating an offset program. These include defining offset program objectives, determining future availability and cost of offsets, and identifying options for distributing risks of the environmental liabilities created by offsets. In terms of program objectives, there seemed to be implicit consensus from interview respondents that a coarse filter approach to biodiversity protection would be preferred to a fine filter, species-based approach.

[5] U.S. Department of the Interior, Bureau of Land Management, Definitions (cited August 27, 2007). Available online at www.blm.gov/nhp/news/regulatory/3809-Final/1508_20.html.

In general, the appropriate program design will depend on identifying clear goals and objectives of the offset program. Program design issues discussed in the report include geographic scope of the offset program, incorporation of private versus public lands, defining environmental equivalence, and monitoring and enforcement options. In terms of geographic scope, the findings suggest that a program limiting offset credit creation to the RMWB would be constrained by the lack of availability of undisturbed areas that could be developed as credits.Expanding the potential for credit creation to the whole BFNR as well as incorporating private lands would help alleviate these constraints. Other issues that must be resolved for successful program implementation include:

- ability to establish offsets on public lands with overlapping resource rights;
- ability of public land occupants to sell offsets under current regulations;
- duration of offset obligations and permanent versus temporary offsets; and
- treatment of reclamation and time lags between offset creation and benefits.

Based on feedback from stakeholders, an offset program should:

- encourage the establishment of offsets prior to development to minimize any time-lag effect;
- secure offsets in perpetuity (if possible) and explore opportunities for temporary offsets;
- represent a coordinated industry approach to biodiversity protection based on conservation management plans;
- achieve additional conservation benefits beyond business as usual practices; and
- adapt to increased knowledge and understanding of restoration and reclamation potential.

Policy framework to support biodiversity conservation

Biodiversity offsets are a strategy to achieve species conservation objectives. Therefore, an effective offset strategy relies on effective land-use planning to establish conservation objectives, cumulative effects targets, and a range of actions to support conservation goals. The Boreal Forest ecosystem is complex and there is considerable uncertainty about ecological responses to human disturbances. A pilot offset program should be designed to learn more about anthropogenic effects on the ecosystem. For example, active adaptive management advocates an experimental approach to resource management that deliberately designs policy intervention in order to test hypotheses about ecosystem feedbacks.

The massive scale of development of the Western Canadian Sedimentary Basin requires that land management strategies, including policies to offset human impacts, should be designed to facilitate learning as well as to achieve conservation objectives. Therefore, establishing ecological benchmarks and protected areas as experimental controls and for monitoring the land management system is critical to ensuring that conservation strategies are appropriate and effective. The Oil Sands Consultation Multistakeholder Committee recommended the establishment of protected areas in northeastern Alberta;[6] prompt consideration and action regarding this recommendation is encouraged in addition to exploring biodiversity offsets.

Boreal Forest, Northern Alberta © Garth Lenz

[6] Government of Alberta, "Oil Sands Consultations – Multistakeholder Committee Final Report," 2007. Page 21, "V3.S7. Action 7.1 [C] As part of the land use planning process, establish new protected areas within the Oil Sands Areas."

2 Introduction

2.1 The Alberta context

In Alberta, the Boreal Forest Natural Region (BFNR) covers 58 percent of the province and occupies more than 380,000 square km, or 38 million hectares.[7] Ecosystem benefits provided by the BFNR include carbon storage by forests and peatlands, biodiversity, water supply, water regulation and pest control. The region is also the traditional territory of Treaty 8 First Nations, for whom many of the ecosystem benefits are of cultural significance.

DID YOU KNOW?

The Treaty 8 First Nations of Alberta have identified the need to mitigate the impacts from oil sands development in Alberta and have proposed a potential First Nations pilot approach to implement a biodiversity offset program.

The region is jurisdictionally complex. While the majority of the BFNR is provincial Crown land, a significant proportion is under private and federal ownership, including Treaty lands and Wood Buffalo National Park (Table 1). Furthermore, overlapping surface and sub-surface tenures on provincial Crown lands have created conflicts over surface rights and access to resources.

Managing development to maintain biodiversity in the BFNR is a significant challenge because of the combined effects of energy and forest sector development. The Western Canadian Sedimentary Basin underlies virtually the entire province of Alberta and contains some of the largest proven energy reserves in the world. While production of conventional oil in Alberta peaked in 1997, the decline in production will be offset over the next 25 years by the development of gas and oil sands reserves. Alberta's oil sands reserves are second only to those in Saudi Arabia and underlie 140,200 square km[9] in the province's northern region, an area that is larger than Florida. Oil sands production has quadrupled since 1990 and is expected to more than double between 2005 and 2015. In addition to oil sands activity, exploratory drilling for gas also set a new record in 2005.[10]

Table 1 — Type and Area of Ownership in Alberta's Boreal Forest Natural Region[8]

Ownership	Area (square km)	% of Boreal Forest Natural Region
Provincial Crown lands	267,016	70%
Federal lands	45,300	12%
Mixed-ownership lands	3,403	1%
Municipal lands	70	0%
Private lands	65,177	17%
Total	**380,966**	**100%**

[7] Natural Regions Committee. *Natural Regions and Subregions of Alberta*. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. 2006. Pub. No. T/852. Page 44.

[8] These data were acquired from Bev Wilson, Alberta Sustainable Resource Development, personal communication. September 2007.

[9] Represents quarter sections that have a mixture of Crown and freehold (private) land within the quarter section. The exact area of each is unknown.

[10] See Canadian Energy Research Institute's "Oil Sands Economic Impacts Across Canada" for Canadian Association of Petroleum Producers, 2005, and Canadian Association of Petroleum Producers' "Canadian Crude Oil Production and Supply 2005 to 2015," 2005.

Between 1995 and 2002, the average annual area cleared by the energy sector in Alberta's Boreal Forest was 470 square km. As of 1997, the cumulative footprint for existing wells in Alberta's Boreal Forest was estimated to be 886 square km. By comparison, in 1999 the total harvested area for industrial roundwood (wood products such as posts, pulp, logs and piling) in Alberta was 422 square km.

Although 13.2 percent of Alberta's Boreal Forest is protected by legislation,[11] the integrity of the Boreal's values and services is not secure. The majority of the unprotected area is under forestry tenure agreements, and current oil sands leases cover in excess of 54,000 square km of primarily Boreal Forest.[12] Already, the ecological integrity of Alberta's Boreal Forest ecosystem has been "moderately to seriously compromised," with only 12.8 percent roadless area and 14 percent available for viable core wildlife habitat.[13] Continued energy expansion into previously undeveloped areas of the Boreal limits opportunities to support ecological objectives.

It could be argued that since developments in Alberta's Boreal Forest are mitigated through reclamation under Alberta's *Environmental Protection and Enhancement Act*, additional compensatory mitigation is unnecessary. However, reclamation requirements are set on a project-by-project basis. There is no mechanism to ensure that reclamation of approved projects will maintain a regional distribution of habitat and other landscape characteristics to support desired conservation outcomes. Incentives for reclamation are also lacking, resulting in a large number of abandoned wells and a reclamation deficit in the province.

In addition, linear features such as seismic lines (which represent a large percentage of the non-mineable energy surface footprint) are not subject to an environmental assessment process and do not have specific reclamation requirements.

The focus in this report is the Athabasca region or, more specifically, the Regional Municipality of Wood Buffalo (RMWB). The unprecedented pace of development in this area presents new challenges for the environmental and resource management systems, including cumulative effects on environmental quality, species diversity and abundance, and human health.

In September 1998, Alberta Environment initiated the Regional Sustainable Development Strategy for the RMWB. Figure 1 provides a map of the region. The Cumulative Environmental Management Association (CEMA), a multi-party working group, is working with Alberta Environment to implement the Regional Sustainable Development Strategy by establishing a consensus-based environmental management system for the region. In the spring of 2007, the Government of Alberta established the cross-ministry Oil Sands Secretariat to focus on development issues in the RMWB, including the creation of a land-use plan that includes thresholds for wildlife and other ecological objectives. Once ecosystem objectives are established for the region, innovative mechanisms will be required to deliver conservation results in a fair and cost-effective manner. The RMWB is a suitable area for a pilot biodiversity offset program and is the focus of this report.

THE REGIONAL MUNICIPALITY OF WOOD BUFFALO

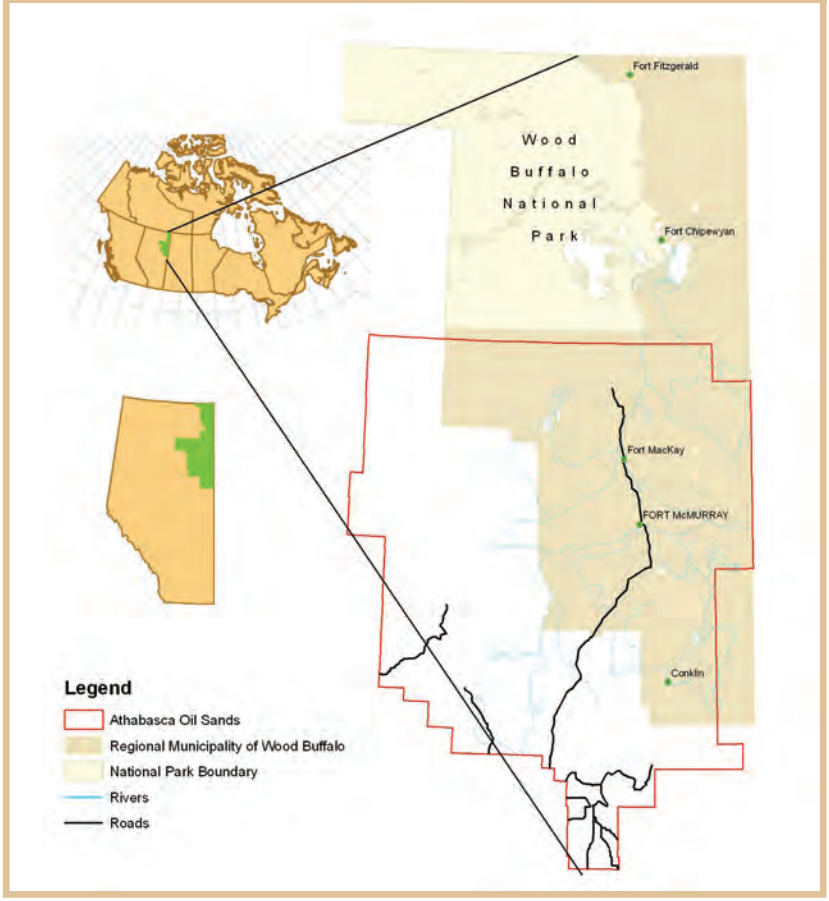
The Regional Municipality of Wood Buffalo is a well-defined entity that, in anticipation of oil sands development, has been the focus of an intensive regional planning initiative since 1999 (the Regional Sustainable Development Strategy). A map of the region, also known as the Athabasca Oil Sands Area, is shown in Figure 1. The region includes the Athabasca oil sands deposit and is subject to disturbance by the forest industry; Alberta-Pacific Forest Industries Inc. (Al-Pac) holds a large forest management agreement area in the region.

[11] Rebecca Reeves and Helene Walsh, "The State of Alberta's Parks and Protected Areas," Canadian Parks and Wilderness Society, 2007.

[12] Department of Energy, "Talk about Tenure: Facts on Oil Sands Tenure," Government of Alberta, 2007.

[13] Alberta Environmental Protection, "The Boreal Forest Natural Region of Alberta," 1998.

Figure 1 – Regional Municipality of Wood Buffalo



2.2 Introduction to biodiversity offsets

WHAT ARE BIODIVERSITY OFFSETS?

Biodiversity offsets are defined as "conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to aspire to no net loss in biodiversity."[14] They are also known as terrestrial or conservation offsets.

Biodiversity offsets complement existing land management strategies. The application of biodiversity offsets is increasing worldwide in an effort to prevent irreversible loss of species and their habitat. Experience from around the world demonstrates that biodiversity offsets can be a cost-effective and operationally efficient method to secure important conservation outcomes and can help companies strengthen their social licence to operate and manage business and reputational risks.

In Alberta, the application of offsets is still in its early stages. This report will attempt to identify the driving forces and barriers to implementing an offsets program in the BFNR to offset development impacts in the RMWB.

Awareness of offsets

As part of the research for this report, qualitative interviews were held with thirty-three key informed stakeholders including eleven from industry, eight from government departments, seven from environmental non-government organizations (ENGOs), five from First Nations, and two from academic institutions. Four different offset policy options for the RMWB were described and respondents were asked to give the strengths, weaknesses, opportunities and barriers of these options. The interviews were used to explore stakeholder awareness of biodiversity offsets, including

[14] Kerry ten Kate, Josh Bishop and Ricardo Bayon, *Biodiversity offsets: Views. Experience, and the Business Case.* 2004 (cited August 7, 2007). Page 13. Available online at www.iucn.org/themes/business/Biodiversity%20Offsets/ten%20kate%20et%20al%20paper.pdf.

CAUTION!

Biodiversity offsets are not always supported as a conservation tool due to public perceptions that they are a licence to destroy habitat and avoid requirements to explore alternative options for mitigation. In other cases there is a perception that offsets have been used to gain access to pristine or highly valued areas. With the U.S. wetland banking program, for example, some observers have challenged the notion that offsets based on wetland restoration have been successful, or that offsite wetlands proposed as offsets are comparable to the areas lost.[15] These observations highlight the need for significant public input to encourage proposed land uses being supported by offsets, and adequate processes for building consensus for offset objectives and establishing criteria for offset credits. Thus, offsets are part of a package that includes effective land-use planning and complementary tools, such as ecosystem benchmarks and protected areas, to reduce potential risks of offset programs and to ensure a responsive monitoring and adaptive management framework for offsets.

whether their organizations are considering offsets and what values or habitats should be protected by offsets.

More than 90 percent of the interviewees were familiar with the term "biodiversity offset" or "conservation offset;" however, there was great variation in the their definitions of the term. A few responses from different stakeholders on their definition of offsets include:

"A risk management approach for representative areas."
– Industry respondent

"The practice of establishing conservation zones that wouldn't otherwise exist to compensate for areas that will be lost due to industrial development."
– ENGO respondent

"Setting aside a piece of land that is pristine, but under risk, to rationalize the disturbance or loss of another piece of land that is contributing the same biodiversity values."
– Government employee respondent

Respondents from academic institutions related offsets to the concept of no net loss of environmental values. Some respondents were uncomfortable with the term "biodiversity offsets," as they felt that biodiversity was hard to define, can change at different scales and can be increased by artificial means. These individuals preferred the term "conservation offsets." For consistency and simplicity, the term biodiversity offsets will be used throughout this paper, recognizing that the appropriate label for an offset program should be determined through the objective-setting process with stakeholders and the public.

Motivation for offsets

Over 90 percent of all respondents agreed that current requirements for reclamation in the RMWB are inadequate to manage cumulative effects. Their concerns about the existing regulatory framework include inadequate techniques to ensure ecological viability, rapid development that is outpacing reclamation abilities and activities, and the inability to deal with long reclamation lag times and cumulative effects.

All industry respondents indicated that their companies were considering investing in or implementing biodiversity offsets. When asked about the business drivers for considering offsets, the following were given:

- growing public expectations for maintaining forest values;
- preserving social licence to operate;
- recognizing that the ability to reclaim the landscape to its equivalent capacity is not always possible;
- addressing the concerns of stakeholders (non-government groups or private citizens);
- helping to ensure responsible development;
- aligning with company culture and internal sustainability policies;
- attracting and retaining employees; and
- maintaining access to investment capital.

"There are some things you just can't mitigate."
– Industry respondent

"It's the right thing to do."
– Industry respondent

[15] James Salzman and J. B. Ruhl, "No Net Loss – Instrument Choice in Wetlands Protection," in *Moving to Markets in Environmental Regulation: Twenty Years of Experience*, ed. Jody Freeman and Charles D. Kolstad. Oxford University Press. 2006, and *Sydney Morning Herald*, "Money in the Bio-Bank," Editorial. 2005 (cited September 7, 2007). Available online at www.urbanecology.org.au/topics/biodiversitybanking.html.

2.3 Overview and perspectives of biodiversity offset options

There is a spectrum of mechanisms for implementing biodiversity offsets, ranging from entirely voluntary and ad hoc to mandated programs with certified tradeable credits. This section examines four conservation program options: voluntary offsets, regulatory offsets without conservation banking, regulatory offsets with conservation banking, and cap and trade.

2.3.1 Voluntary offsets

Purely voluntary offset approaches rely on demand from businesses or individuals who choose to voluntarily compensate for their footprint to meet environmental objectives. An example of a purely voluntary program is the "Acres for America" partnership between Wal-Mart and the U.S. National Fish and Wildlife Foundation through which at least one acre of priority wildlife habitat is permanently conserved for every acre developed by Wal-Mart.[16]

In Alberta, an example of voluntary offsets is the Albian Sands Energy's Muskeg River Oil Sands Mine project. In 2006, Albian voluntarily committed $4 million over 10 years to partially offset the terrestrial effects associated with their Muskeg River Mine expansion project through private land acquisition and restoration. With this commitment, the Alberta Conservation Association will acquire private lands in the Boreal Forest and Tree Canada will integrate tree planting into the habitat offsets over the course of the project.[17] However, even with this substantial financial commitment, it still will not fully compensate for the impacts of the Muskeg River Mine expansion project.

Voluntary offsets are those in which companies make voluntary contributions or efforts to offset land impacts, such as through committing to additional restoration or acquisition of Boreal Forest lands to offset the impacts associated with their operations. These commitments occur outside any regulatory or contractual obligation.

Strengths of the voluntary offset option lie in the ability of companies to demonstrate corporate social responsibility and gain experience in implementing offsets. In addition, they allow companies to manage for impacts beyond those covered by regulation and legislation.

It is important to note that in order for biodiversity offsets to win public credibility, industry must demonstrate – prior to implementing offsets – that it is avoiding and minimizing unacceptable biodiversity impacts and taking action to meet restoration obligations.

Interview responses: key strengths and weaknesses

Respondents were asked to comment on voluntary offsets, which were described as "…companies [that] make voluntary contributions or efforts to offset land impacts, such as through voluntarily committing to additional restoration or acquisition of Boreal Forest lands to offset the impacts associated with their operations."

Respondents thought that this option might promote innovative best management practices that could subsequently influence public policy. However, voluntary offsets on the whole were poorly received by interviewees. While government employees and industry representatives thought there was some merit to this option, academic, First Nations and ENGO stakeholders felt it would fail to significantly contribute to environmental objectives in the RMWB.

The majority of respondents were skeptical that voluntary offsets would be adopted at a level which would result in real environmental benefits. Many respondents felt that there was no economic incentive to pursue this policy and that this could put companies participating in voluntary programs at a competitive disadvantage. The ability to maintain a long-term commitment to voluntary offsets was a concern and respondents felt voluntary commitments would be very sensitive to changes in financial performance by companies.

> "Like most voluntary projects, it's at the discretion of the individual and their whole value system. There is no fidelity there."
>
> – Government employee respondent

> "For them [industry] to volunteer, I don't see it happening."
>
> – First Nations respondent

> "It's a 'one-off' type of thing, there is really no program for companies to work together to have a broader, bigger benefit… what a company identifies may not be the best thing for an area."
>
> – Industry respondent

[16] See "Wal-Mart Pledges Habitat Conservation to Offset Land Use," April 15, 2005. Available online at www.greenbiz.com/news/news_third.cfm?NewsID=27969.

[17] Shell/Albian Energy Inc. and Oil Sands Environmental Coalition (OSEC), "Issues Resolution Document for the Proposed Muskeg River Mine Expansion," 2006.

2.3.2 Regulatory offsets without conservation banking

Mandatory offsets are associated with binding targets for habitat and biodiversity conservation that are imposed by regulation. For example, early U.S. conservation offset efforts include agreements reached between the U.S. Fish and Wildlife Service and forestry companies allowing for potential damages to endangered species habitat to be offset by restrictions for the same species in other forests under the *Endangered Species Act*. Regulatory offset programs are characterized by formal rules quantifying the value of an offset and they are also audited and validated by third parties or government.

Regulatory offsets provide firms with increased flexibility to meet regulatory requirements. For example, Canada's no-net-loss policy for fish habitat management allows any unavoidable impacts to fish habitat to be offset through legally binding habitat compensation that involves the creation of new fish habitat.[18] In spite of the added flexibility of regulatory compliance, individual project or "turn-key" offsets have had limited success. Prior to conservation banking, project-based offsets resulted in many small, discrete mitigation sites that did not bring about long-term species protection. Some of the risks associated with the individual project approach include lack of long-term management requirements and inability to defend offsets from changes in local land use which devalue the site over time.[19]

Interview responses: key strengths and weaknesses

To respondents, regulatory offsets were described as: "The government develops a no-net-loss policy with respect to certain important Boreal habitat types. Companies are expected to propose stand-alone offset mitigation strategies at the time of disturbance to meet this policy and these strategies are individually certified as adequate by government."

This no-net-loss offset policy was preferred over the voluntary offset policy as most groups felt it provided more rigorous conservation benefits. The clear requirements and mandatory participation were considered beneficial, and certain groups felt that this policy allowed for the option of creating tailor-made solutions for given habitat types. Respondents also liked the clear and simple approach of a no-net-loss policy. In general, they felt that this approach had scientific merit.

However, individuals from all sectors raised the concern that a no-net-loss policy would have limited ability to deal with cumulative impacts since it would be done on a project-by-project basis with preservation likely occurring in small, non-viable ecological areas. One respondent from the industry group felt this approach would result in a lack of coordination of conservation benefits and that more comprehensive approaches should be planned to meet provincial land management targets. Academic and government respondents described the policy as too prescriptive and worried that this could curb industry's ability to find creative solutions to environmental problems.

VOLUNTARY VERSUS REGULATORY?

The decision whether a voluntary or regulatory program is appropriate depends on a number of factors, including the history of development in a region which determines whether it is feasible to meet ecosystem objectives through voluntary measures. Other factors in considering whether voluntary measures are sufficient include expected participation rates by firms in creating offsets, the effect of participation on the competitiveness of firms operating in the region, and the expected availability and cost of offset opportunities over time. The availability of offset opportunities is related to the objectives of the program, and also the rate at which disturbed forest and habitat is reclaimed. Therefore, whether or not reclamation can be used to generate offset credits will be key to establishing the overall cost of the offset system. Starting an offset program in a pristine forest will yield different costs than a program that starts in a forest with conditions close to thresholds. Voluntary offsets may be a first step to test the feasibility and design of a mandatory program in which case participants in voluntary offsets could be given credit for early action.

[18] Fisheries and Oceans Canada, *Practitioners Guide to Habitat Compensation*, 2007 (cited September 4, 2007). Available online at www.dfo-mpo.gc.ca/oceans-habitat/habitat/policies-politique/operating-operation/compensation/index_e.asp.

[19] Mead, D. L. "History and theory: the origin and evolution of conservation banking," Carroll, N., Fox, J., and Bayon, R., eds. *Conservation and Biodiversity Banking: A Guide to Setting UP and Running Biodiversity Credit Trading Systems*. Earthscan. London. 2008.

Several respondents expressed concern that there was not enough eligible (or available) land to offset development impacts in Alberta's BFNR while others thought that variations in land prices and the unpredictability of private land acquisition would create barriers to the implementation of this policy. Other weaknesses of this option included the intensive effort and the high transaction costs to manage such a policy.

2.3.3 Regulatory offsets with conservation banking

Conservation banking provides a mechanism of third-party credit generation and storage for subsequent use or sale. A conservation bank is in-kind, off-site mitigation in which multiple projects with like impacts are mitigated at the same location. Conservation banking allows private parties to create tradeable offset credits by investing in habitat conservation and also allows for firms to purchase credits to meet offset requirements.

Conservation banks can be created in the following ways:
(1) acquisition of existing habitat;
(2) protection of existing habitat through conservation easements;
(3) restoration or enhancement of disturbed habitat;
(4) creation of new habitat (in some situations); and
(5) prescriptive management of habitats for specified biological characteristics.

Among the benefits of conservation banks are that they can avoid temporary habitat loss associated with on-site mitigation and they can go further than individual offsets to meet regional conservation plans. Certification of conservation banks can be nested within regional land-use or species recovery plans which allow banks to more effectively address issues related to cumulative effects management. Conservation banking reduces transaction costs and the cost of regulatory compliance for firms because they can go to the marketplace to meet their requirements. It also creates an economic incentive for private agents to establish or maintain habitat in order to generate sellable surplus credits. It is important to note that conservation banking often emerges in both mandatory and voluntary programs because of opportunities to increase coordination and reduce costs for program participants.

A conservation bank may be administered by either the government or a private agency. The key difference between regulatory offset programs with and without conservation banking is the transferability of the offsets. In order to create sellable commodities with conservation banking, it must be possible to establish functionally equivalent metrics for habitat disturbance so that private suppliers have an incentive to develop offsets. Private suppliers must be assured of adequate demand in order to develop credits. The conservation banking approach works best when developers of conservation banks expect a large number of future projects that will create demand for their offsets and have enough initial capital to make the investment before credit creation.[20]

A key issue in certifying offsets is establishing the baseline for measuring an "improvement." Conservation banks can be created in association with project-specific impacts or can result from situations where a project proponent sets aside more area than is needed for the immediate project. Credits can be generated if the developer is willing to protect the remaining area or if the project is implemented over a longer period of time.[21]

There are currently no examples of conservation banking in Canada. However, the U.S. Wetland Mitigation Banking program provides a useful example of how this kind of program might work in Alberta. The U.S. Wetland Mitigation Banking program requires developers to create offsets or "credits" where in-fill of wetlands is inevitable. Prior to conservation banking, the creation of credits was the responsibility of the developer. In spite of the no-net-loss requirements, both the quantity and the functionality of wetlands declined throughout the 1970s.[22]

To address this problem, wetland banks were created to encourage private organizations to make investments in wetland credits that could be sold to developers. The role of government in wetland banking is to certify private credits offered for sale as well as assess the number of credits required for each development project. One difficulty with wetland banking is the diversity of ecosystem services provided by wetlands, which can result in conflicting program requirements.Hydrological functions serve small geographic areas, such as watersheds, which limit the sale area for credits; conversely, habitat services

[20] Leonard Shabman and Paul Scodari, *Past, Present, and Future of Wetlands Credit Sales*. Resources for the Future. 2004.

[21] United States Fish and Wildlife Service, *Guidance for the Establishment, Use, and Operation of Conservation Banks*. 2003 (cited August 13 2007). Available online at www.fws.gov/endangered/pdfs/conservation-banking.pdf.

[22] Shabman and Scodari, *Past, Present, and Future of Wetlands Credit Sales*. Resources for the Future. 2004.

benefit more from off-site creation or restoration, particularly if large, continuous projects are created. A key issue to resolve for a biodiversity offset program in the BFNR is the appropriate geographic scope for the creation of offsets, particularly whether they should be created in the same region as the impact. This issue will be discussed in Section 4.

Interview responses: key strengths and weaknesses

Conservation banking was described to respondents as "requiring companies to obtain offsets to their activities prior to development. Offsets are usually managed through a third-party agency (the conservation bank) whose products are certified by the government. Conservation banking is used to meet desired aggregate environmental targets such as no net loss of a certain habitat type."

Conservation banking was the preferred conservation program option for most respondents representing First Nations, government and industry, as well as for some individuals in the ENGO group. One First Nations respondent felt that this option provided the most opportunity for stakeholders to work together in establishing offsets. Industry respondents appreciated the fact that this option allowed for a market system to generate credits which would encourage creativity, increase efficiency and decrease transaction costs. Other identified strengths were that all developers would be "playing by the same rules" and that third-party monitoring of offset banks would provide the public with confidence in the credibility of the offset.

Despite its popularity, conservation banking was seen to have several challenges. For example, ENGO respondents stated that for a conservation banking program to work, it would need to be administratively simple. Some thought that uncertainty regarding price and availability of offsets could be an impediment to the program. Interviewees were also concerned that only areas with a low risk of industrial development would be considered as offsets and that companies would then be motivated to spend less time mitigating impacts on their existing sites. This concern was echoed by government respondents, who felt that offsets may be traded without proper assurance of their environmental integrity.

Academic respondents were concerned that offsets achieved through restoration may not support the same form and function as undisturbed, natural habitats and that the values of sensitive land types may be permanently lost. Some individuals thought that offsets should be Alberta-based and in the same region as the industrial development.

2.3.4 Cap and trade

Under a cap and trade approach, government sets a cap on the total annual removal of undisturbed forest or critical habitat such as old growth forest. Companies must hold permits for their annual disturbance. Initial disturbance rights may be allocated to firms by grandfathering or auction by government. Additional disturbance rights may be purchased from other companies who may hold these rights.

Cap and trade programs usually provide the greatest flexibility to firms in meeting environmental objectives. For example, cap and trade programs treat habitat disturbance as "equivalent" no matter where they occur and irrespective of the quality of habitat disturbed.[23] Under this option the permit requirement is associated only with the initial disturbance and there is no requirement for ensuring permanence. However, to account for unanticipated changes in the amount of forest cover it may be necessary to adjust the cap over time to ensure that reclamation and impacts of permanent withdrawals from the forest land base (e.g., from oil sands mining) are adequately accounted for.

There are currently no examples of cap and trade programs for habitat protection on public lands. A cap and trade system has been explored for Alberta's Boreal Forest, and preliminary results suggest that this approach could be an effective long-term strategy to maintain habitat in Alberta.[24]

While a cap and trade approach may increase variation in biodiversity quality, the reduction in costs can lead to a greater level of overall biodiversity conservation. For example, a case study of northeastern Alberta shows that for a given conservation "budget," setting aside the least economically valuable lands for biodiversity protection can result in a 200 percent increase in conserved habitat as well as an increase in the total level of biodiversity protection relative to a targeted program.[25]

[23] Note that spatial issues and valuable habitats are treated under cap and trade programs with zoning.

[24] Weber, M. and W. Adamowicz. "Tradable Land-Use Rights for Cumulative Effects Management," *Canadian Public Policy*, 2002. Volume 28, no. 4, Pages 581-595.

[25] Weber, M. "Assessing the Effectiveness of Tradable Landuse Rights for Biodiversity Conservation: An Application to Canada's Boreal Mixedwood Forest," *Social Science Research Network Electronic Paper Collection*. Fondazione Eni Enrico Mattei, Working Papers: 2004.29. 2004. Available online at papers.ssrn.com/sol3/papers.cfm?abstract_id=504524.

Interview responses: key strengths and weaknesses

Interviewees were given the following description of the cap and trade option: "Under cap and trade, government sets a cap on the total amount of forest disturbance allowed in a given time period, expressed for example in number of hectares per year. Disturbance rights may be auctioned, grandfathered to forestry companies, or some combination of both. All firms must hold permits for the amount of critical habitat disturbed. Disturbance rights may be purchased from the government or from other firms who may hold these rights."

This policy option received mixed reviews from the respondents, perhaps reflecting a lack of understanding of the cap and trade model. Cap and trade was not well received by ENGOs and First Nations, who felt it endorsed biodiversity loss rather than conservation. However, academic respondents preferred the cap and trade option to the other three options. Many respondents from the industry group felt that this option could work if it was properly implemented.

The strengths identified for this option were the incentives for actors to minimize their footprint and the limits on cumulative disturbance, especially since all disturbances would be tracked. It was thought that this policy could meet biodiversity objectives since disturbance levels are being managed over time to meet regional objectives. The academic respondents thought that the establishment of a threshold was important and that the cap and trade approach was the most economically efficient option.

One weakness of this option is that it was not clearly understood. Some respondents felt that the process for setting the disturbance cap would not necessarily be based on conservation needs. There was general skepticism that the government would set a cap high enough for protection. Since the RMWB is already experiencing high levels of development, it was thought that it would be too difficult to apply a credible cap and trade system in the area.

Industry representatives were concerned about the potential for one company or industry to manipulate the permit market in order to monopolize development activity. There was also concern that some sectors might not have the ability to pay for permits. Other concerns included difficulty in monitoring disturbances and ensuring that individual firms were complying to disturbance limits.

> "This basically turns conservation as a commodity over to corporate interests."
> – First Nations respondent

2.4 Offsets versus cap and trade

Both regulatory offsets and cap and trade are associated with thresholds for habitat loss. The key differences between regulated offsets and cap and trade programs relate to the nature of the entitlement. Regulated offsets are usually associated with a long-term obligation while cap and trade obligations are one-time requirements to match disturbances with the level of permits. With regulated offsets, the risk associated with maintaining habitat is passed on to individual firms and private parties, while with cap and trade the government manages habitat objectives through the cap. Therefore, the public is ultimately responsible for managing biodiversity through the process for establishing the cap. The costs of "mistakes" may be passed on to firms through adjustment of the cap. However, unlike offset programs, this risk is pooled across the whole landscape and spread across all firms.

Cap and trade programs are appropriate for coarse filter biodiversity management which focuses on maintaining broad landscape features. Offset programs tend to be used when targeting of spatial and quality attributes of ecosystems is desirable. Many offset programs are concerned with replicating the specific ecosystem functions that are lost. Forest carbon offset markets under the Kyoto Protocol are an example of how site-specific criteria and information are used to calculate the carbon content of a forest management strategy. Whether offsets or cap and trade are more appropriate will depend on the degree to which impacts can be treated as "substitutable" in terms of meeting desired ecosystem objectives.

3 Offset Program Design

In this section, we consider a number of issues that must be addressed when designing an offset program. These include setting program goals and objectives, establishing the indicators and thresholds for calculating offset requirements, and determining the appropriate timing and duration of an offset program.

3.1 Setting program goals and objectives

Offsets are policy instruments to meet desired land-use objectives – they are not an end in themselves. A successful offset program is nested in the hierarchy of a land-use planning framework that provides specific and tangible directions for managing land (see Table 2). Within this planning hierarchy, offsets are part of a suite of strategies – along with protected areas, ecological benchmarking, coordinated access management, and infrastructure planning – for achieving land-use planning objectives. Table 2 provides an example of a land-use planning hierarchy to support the goal of biodiversity protection. Note that this framework could be constructed for any program goal, including managing for endangered species, carbon or water.

> "Biodiversity offsets need to be considered one part of the mitigation hierarchy which includes first avoiding, minimizing, rectifying (replacing or restoring) and then offsetting."
>
> – Workshop participant

A land-use plan identifies the goals and objectives for land use as well as indicators, targets and strategies describing how to achieve these objectives. Goals describe desired land values and are not usually quantitative. Examples of land-use planning goals include maintaining biological diversity, maintaining caribou or other endangered species, and maintaining forest productivity.

Objectives describe desired future conditions for individual resources or uses. They are measurable, geographically and

Table 2 — Land-use Planning Hierarchy to Support Biological Diversity

Goal	Objective	Indicator	Target	Strategies
Maintain biological diversity	Maintain representative landscape characteristics	Stand type and age class distribution	All stand types and age classes within the natural range of variation	• Reclamation • Annual allowable cut • Regulatory requirements for on-site mitigation • Zoning • Biodiversity offsets • Establishing protected areas
	Maintain habitat productivity	Amount of critical habitat	At least *x*% old-growth, moist forest	
	Maintain ecological benchmarks	Amount of protected area	*x*% protected area for each ecological sub-region	

time specific, and can apply to either specified parts or the whole plan area. Objectives in a sustainable forest management planning context are defined by indicators and targets. Indicators are variables used to measure the condition of a defined forest area. Targets or thresholds may be identified for each indicator to specify the desired level.

Strategies describe how to achieve an objective. They pertain to activities and how those activities are to be conducted. They are often stated as conditions that will apply to future resource use activity, but may also direct future administrative processes.[26]

3.1.1 The importance of objectives

A successful offset program needs public buy-in, which means the process for setting objectives is important. Objectives should consider what activities need to be offset and the landscape types or species to be included in an offset program. Potential objectives for an offset program for the Boreal Forest are protection of threatened or endangered species such as woodland caribou, protection of vulnerable habitat types such as old-growth forest, or more generally, reduction of forest habitat loss. Even for purely voluntary programs there will have to be public consensus on the objectives of the offset program as well as on criteria used to calculate offset credits.

Some sample goals and objectives from biodiversity offsets in other jurisdictions include:

- The Government of Western Australia notes that "environmental offsets should be used with an aspirational goal of achieving a 'net environmental benefit.' This policy position recognizes that the environment has been significantly compromised in the past and that halting and reversing the decline of the environment is now a priority."[27]
- South Africa's Provincial Government of the Western Cape reports that: "The objective of biodiversity offsets, through the development authorization and associated EIA (environmental impact assessment) process, is to ensure that residual impacts on biodiversity and ecosystem services that are of moderate to high significance (i.e., do not represent a 'fatal flaw' from a biodiversity perspective) are compensated by developers in such a way that ecological integrity is maintained and development is sustainable."[28]
- The goal of U.S. conservation banks is "producing conservation benefits for the species for which the bank is being established."[29] This approach is species-focused to address issues of habitat loss and fragmentation for threatened species so that "by consolidating and managing the high-priority areas in a reserve network, the threat of fragmentation may be reduced and the species can be stabilized."[30]

3.1.2 Interviewee response to setting program goals

The issue of appropriate offset objectives was explored in the interviews. Respondents were asked, "If the government were to adopt one of these (offset) policies, what species and/or types of habitat do you think should be protected?"

The consensus of all stakeholder groups was that an offset policy based on a coarse filter approach was preferable to policies that focused on specific species and detailed habitat types. A coarse filter approach is one that considers broad parameters such as communities, ecosystems, habitats or landscapes in offset selection. Coarse filter approaches are believed to conserve a larger suite of species within the offset program. However, many respondents also felt that the initial focus of an offset policy could be protection of habitat for endangered and unique species, as well as protection of old growth forest and representative features and habitats being lost to development.

> "If the government adopts an offset program, then it should be more focused on ecological processes and outcomes rather than on individual species and habitat types."
>
> – ENGO respondent

3.1.3 Accounting for Aboriginal values

Interviewees were asked whether a biodiversity offset policy should recognize the unique circumstances of Aboriginal communities. Eighty-eight percent gave a positive response;

[26] See Ministry of Sustainable Resource Management. "Writing Resource Objectives and Strategies: A Guide to Preparing Effective Resource Management Plans," Government of British Columbia. October 2004.

[27] Environmental Protection Authority, Government of Western Australia. "Environmental Offsets – Position Statement," 2006. Page 6.

[28] Department of Environmental Affairs and Development Planning. "Provincial Guideline on Biodiversity Offsets," *Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning*. Cape Town. 2007. Page ii.

[29] United States Fish and Wildlife Service, *Guidance for the Establishment, Use, and Operation of Conservation Banks*. 2003. Page 4.

[30] Ibid. Page 4.

- "We could recognize these unique circumstances through consultation with the First Nations and hearing what their priorities are."

  – First Nations respondent

- "It (an offset program) needs to be co-managed by the affected groups in that particular region, so their circumstance should be considered if they will be affected."

  – First Nations respondent

- "First Nations communities need to be in a position to have their contributions to maintaining biodiversity recognized. Incentives should be created for First Nations to participate directly in the offsetting regime by making traditional territory available to industrial parties as the lands to be conserved with offsetting practices."

  – ENGO respondent

of that group, the majority acknowledged the need to respect Aboriginal and Treaty rights and the land claims process. Most respondents viewed Aboriginal interests as an integral part of an offset policy, especially when Aboriginal lands would be directly affected by such a policy. Recommended ways in which this recognition could be achieved include: continuing negotiation and consultation, involving Aboriginal peoples in multi-stakeholder groups, understanding their traditional land uses, and incorporating traditional knowledge in offset program design.

3.2 Developing indicators and thresholds

Once goals and objectives are established, criteria for establishing and calculating offset requirements can be determined by the indicators and targets associated with the objectives. The link between disturbance indicators and development impacts has received considerable attention in recent years, especially in northern Alberta where ecological research has focused on identifying dose-response relationships for understanding impact levels of human activity on environmental change. These dose-response relationships could form the basis for setting targets for landscape objectives in Alberta's Boreal Forest, as well as for determining offset requirements for firms.

Offsets are often criticized because the conservation gains are arguably not equivalent to the losses created through development. As no two areas are ecologically identical, the issue of equivalence must be given significant consideration in any offset program. Equivalence is often sought by requiring that the offset be created in a similar ecosystem and that it provide benefits that are of similar value to impacts. As outlined above, depending on program goals and objectives, the measures for defining offset requirements could include area of habitat, ecosystem structure, or ecosystem function.[31] The choice of offset criteria must balance meaningful parameters for achieving landscape objectives with practicability and efficiency in measurement and verification.

Lessons from the Kyoto Protocol mechanism for the creation of forest carbon offsets indicate that complex rules for creating and verifying offsets can result in significant costs and barriers to program participation.[32] If the system lacks sufficient flexibility, there may be difficulty in identifying suitable offsets and a shortage of credits for firms wishing to participate in the program. Because of the rapid pace and scale of oil sands development in northeastern Alberta, a program that is relatively simple yet still meaningful is recommended as a starting point.

3.2.1 On-site versus off-site

An in-kind offset has the same structure and functions as what is lost in the impacted area. An out-of-kind offset has a different structure and function.[33] Locating a biodiversity offset in relatively close proximity to the disturbance site (on-site) is often used as a proxy to ensure that similar ecosystem forms and functions are being captured by the offset. The choice between allowing in-kind or out-of-kind offsets will depend on a number of factors, including available opportunities to replicate the same structure and function within the offset program area, and whether the program is enhancing ecosystem values beyond a required level or

[31] Jared Hardner. "Biodiversity Offsets." PowerPoint Presentation. Biodiversity Neutral Initiative, 2006.

[32] See Till Neeff, Lisa Eichler, Imme Deecke, and Jan Fehse. "Update on Markets for Forestry Offsets," Centro Agronómico Tropical de Investigación y Enseñanza (CATIE). September 2007. Available online at www.proyectoforma.com/Documentos/UpdateOnMarketsForForestryOffsets.pdf.

[33] U.S. Army Corps of Engineers et al. *National Wetlands Mitigation Action Plan,(Draft) Federal Guidance on the Use of Off-Site and Out-of-Kind Compensatory Mitigation under Section 404 of the Clean Water Act*. 2004 (cited August 21, 2007). Available online at www.mitigationactionplan.gov/040407SiteKindGuidance.html.

whether it is regulatory. For example, the Wal-Mart Acres for Wildlife program is an example of an out-of-kind offset program where the goal is to improve Wal-Mart's environmental image rather than to achieve a specific environmental goal. On the other hand, out-of-kind offsets are not acceptable for regulatory offsets such as those allowed under the U.S. Endangered Species Act.

Offsets can be either on-site or off-site. The issue of on-site or off-site hinges on whether the benefits of ecosystem services are site specific. For example, local water quality services provided by wetlands are lost without on-site compensatory mitigation. However, biodiversity benefits of wetlands are not enjoyed in-situ and are often better served through the creation of off-site offsets that can be bundled, for example, to create large tracts of undisturbed habitat that reduces risks of biodiversity loss.

If the goal of a biodiversity offset program in the RMWB is to create conservation benefits for the Boreal Forest as a whole, then flexibility in creating offsets within the whole BFNR rather than just the RMWB could be considered. Other factors to consider in calculating the functionality of an offset credit can include proximity to other protected and ecologically significant areas (e.g., the McClelland Lake Fen) or other offset areas to reduce edge effects on smaller, fragmented offsets.

In the case of rare or patchily distributed habitat, such as specific areas for caribou, it may be necessary to maintain on-site compensatory mitigation, while for coarse filter biodiversity management approaches off-site compensation may be appropriate or even preferred. Both types of mitigation requirements can be addressed under a single offset program.

3.2.2 Establishing additionality

Alberta's land-use policy currently lacks mechanisms to address cumulative effects and achieve regional targets. In order to ensure that an offset program addressed this gap, most respondents thought that any offset program should be "additional" to existing policy (i.e., result in protection beyond business as usual). In the BFNR, additionality could include protection of private Boreal lands through conservation easements, or restoration of degraded habitats beyond existing reclamation or reforestation commitments.

When considering additionality, the question as to which is better – protection or restoration – is often raised. Protection or preservation is any management action that removes a threat to or prevents the deterioration of native habitat conditions (i.e., through the purchase of land or easements or through avoidance of on-site impacts). It is often more difficult to measure the impact of habitat protection than the impact of restoration. One must establish additionality for the former by identifying a baseline for what would have occurred without an offset program. Restoration and reclamation, on the other hand, is any activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability.[34] Given existing and projected levels of development for the RMWB, restoration and reclamation should be incorporated into an offset program in order to maintain biodiversity.

3.2.3 Mitigation ratios

In practice, most offset programs require that the size of an offset be greater than the size of the impact. This requirement increases the probability of a successful offset and minimizes ecological risks. Debates over offset equivalence are often reduced to developing a mitigation ratio – a number that establishes the amount of offset hectares required per hectare of impacted land. The quantity/quality tradeoff inherent in the use of compensation ratios may be considered problematic (i.e., how many hectares of created mudflats are equivalent to a hectare of mature mangrove?).[35] Factoring functionality criteria into the mitigation ratio (which links offsets to the level of biodiversity or other ecosystem services produced) may create an effective measure to protect and manage impacted habitat and biodiversity. However, this creates the need for additional analytical work which is more costly to implement.

Table 3 shows that a broad range of mitigation ratios is used in practice – ranging from 1:1 to 30:1 - depending on the program context. The higher the offset ratio, the greater the conservation benefit. Larger mitigation ratios increase credibility with stakeholders and help address risks associated with calculating equivalence and environmental benefits. However, larger offset ratios will increase costs to developers.

[34] Society for Ecological Restoration International Science & Policy Working Group, *The SER International Primer on Ecological Restoration*. Society for Ecological Restoration International. Tucson, AZ. 2004. SER has identified nine attributes as a basis for determining when restoration has been accomplished. See www.ser.org/content/ecological_restoration_primer.asp for more information.

[35] Dennis M. King and Elizabeth W. Price, *Developing Defensible Wetland Mitigation Ratios – a Companion to "the Five-Step Wetland Mitigation Ratio Calculator."* University of Maryland, Center for Environmental Science. 2004 (cited September 5, 2007). Available online at www.nero.noaa.gov/hcd/socio/FinalNOAA%20Wetland%20mitigation%20ratio%20guidance.pdf.

Table 3 — Mitigation Ratios for Selected Offset Programs

Program	Offset ratio (compensated: disturbed)*
Provincial Guideline on Biodiversity Offsets. Republic of South Africa, Provincial Government of the Western Cape[36]	For "critically endangered" ecosystems 30:1 ratio For "endangered" ecosystems 20:1 ratio For "vulnerable" ecosystems 10:1 ratio
Alberta Environment's Wetland Policy (White Area)[37]	3:1 minimum ratio increasing with distance from impacted site
Department of Fisheries and Oceans No Net Loss Program for fish habitat[38]	1:1 minimum ratio
South Australia Native Vegetation Offsets[39]	Assessed on a case-by-case basis
U.S. Endangered Species Act, Conservation Banking[40]	Credits are traded for different types of species or habitat – every adverse impact is evaluated individually

** In an offset ratio of 3:1, for example, 3 represents the compensated area and 1 represents the disturbed area.*

3.3 Timing and duration of offsets

Ideally, offsets should be acquired prior to project approval and the ecological benefits from required offsets should be established at the time of impact. Unfortunately, due to time lags between conservation actions and ecosystem benefits, it is not always possible to meet this requirement at the time of impact.

One option to address the time lag in conservation benefits is to approve offsets based on expected benefits. However, this option introduces an ecological risk since the future benefits from offsets are uncertain. The uncertainty associated with future benefits to the environment could be passed on to the firms purchasing the credit: if the offset fails, then they will be required to find a replacement offset. Alternatively, risk could be passed on to the agencies developing the offsets. If the offset fails, then the seller of the offset must find a replacement offset project. Finally, the risk may default to the public, with no formal responsibility for failed offsets.

However, the last situation would introduce a moral hazard for both buyers and sellers who would have less incentive to ensure offset success. Some jurisdictions handle this risk by increasing mitigation ratios (i.e., demanding higher offset requirements as a "buffer"). Other jurisdictions use "in lieu" fees during the initial phases of an offset program to help establish future, larger offset projects that have a higher probability of success.

Offset programs require perpetual offset obligations to achieve the intended goal of no net loss of species. The permanent obligation of an offset requires legal and financial support to secure site tenure, restrict harmful activities, support long-term management and monitoring, and cover contingency and remedial actions in the event of offset failure.[41] Most offset programs use conservation easements to restrict activities that might otherwise jeopardize the offset.

There are practical difficulties in creating permanent obligations. There tends to be unwillingness of landowners

[36] Department of Environmental Affairs and Development Planning. "Provincial Guideline on Biodiversity Offsets," *Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning*. Cape Town. 2007.

[37] Alberta Environment. *Provincial Wetland Restoration/Compensation Guide*. Government of Alberta. Edmonton, AB. 2007. Available online at www3.gov.ab.ca/env/water/reports/Prov_Wetland_Rest_Comp_Guide.pdf.

[38] Fisheries and Oceans Canada, *Practitioners Guide to Habitat Compensation*, 2007.

[39] Government of South Australia. *Guidelines for a Native Vegetation Significant Environmental Benefit Policy: For the Clearance of Native Vegetation Associated with the Minerals and Petroleum Industry*. 2005 (cited September 4, 2007). Available online at www.pir.sa.gov.au/__data/assets/pdf_file/0003/30990/native_veg_policy.pdf.

[40] United States Fish and Wildlife Service, *Guidance for the Establishment, Use, and Operation of Conservation Banks*. 2003.

[41] Bruce McKenney. Biodiversity Neutral Initiative. *Environmental Offset Policies, Principles, and Methods: A Review of Selected Legislative Frameworks*. 2005 (cited August 14, 2007). Available online at www.biodiversityneutral.org/EnvironmentalOffsetLegislativeFrameworks.pdf.

and governments on whose lands offsets might be created to permanently restrict development activities and assume long-term risks for biodiversity management. Permanent offsets are particularly problematic on public lands since governments tend to have less information about the future value of underlying resources to developers, and they have to weigh this against future values to society as a whole. The unwillingness of government to permanently set aside areas from future development in the face of this uncertainty is a barrier to developing permanent offsets. Although conservation easements and land procurement are possible on private land, private landowner participation in conservation easements in Alberta is low. It is not clear whether private landowners would be willing to participate in a permanent offset program at the scale required to support conservation objectives in the BFNR.[42]

Similar barriers to creating offsets have hampered forest carbon offset markets and have been addressed through the creation of semi-permanent offsets and temporary offsets. In the case of temporary offsets, it may be possible for forestry companies with forest management agreements to sell temporary offsets for the duration of their agreements through a change in regulation.[43]

DID YOU KNOW?

As part of research conducted for Alberta's Land-Use Framework process, biodiversity was rated one of the top three concerns of Albertans. Biodiversity is also consistently identified as important in stakeholder working group reports.

Clearwater River: Regional Municipality of Wood Buffalo © Garth Lenz

[42] A conservation easement is a legal agreement between a landowner and a qualified conservation organization (e.g., a trust or conservancy) where the landowner can voluntarily commit to conserve an area of land in perpetuity. Ownership of the land remains with the landowners, but they agree to keep it in its natural state to allow the land to be preserved or naturally regenerated.

[43] Note that under an FMA a forest company is defined as "occupant of the land" for the purposes of granting surface access and has an obligation for managing land, but currently does not have the right to dispose of non-timber resources.

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4 Feasibility of Offsets for the Regional Municipality of Wood Buffalo

Figure 2 – Boreal Forest Natural Region of Alberta

This report has presented several options for developing an offset program in Alberta's Boreal Forest. In this section we examine specific considerations for program design in greater detail, particularly defining the scope and coverage of the program and possible alternatives for monitoring and enforcement. The results of stakeholder interviews provide feedback on the feasibility of various options.

4.1 Defining the scope for offsets

It is clear that future development scenarios in some portions of the RMWB may leave few opportunities for creating offsets within the RMWB. This indicates that offsets will need to be introduced by expanding the scope of the offset program beyond the RMWB. Alberta's BFNR (Figure 2) may provide logical boundaries for an offset pilot program.

4.1.1 Implications for biodiversity offsets on private lands

Due to the current difficulties in creating offsets on public lands (including the need for regulation change and possibly legislation change), private lands should be included in an offset program. The inclusion of private lands in the offset program would increase the capacity of conservation agencies to participate in creating offset opportunities from oil sands development.

In Alberta, conservation organizations with private land acquisition programs in the Boreal Forest (listed in Appendix C) have conducted substantial research to identify conservation priorities on private land.[44] For instance, the Alberta Conservation Association, in association with the Alberta Fish and Game Association, Ducks Unlimited Canada and the Nature Conservancy of Canada, conducted an assessment of high-priority lands for conservation in northwestern Alberta, called the North-West Ecoregion Habitat Planning Initiative.[45] This initiative describes seven broad focus areas with high potential for private land conservation. Within each focus area, a ranking system is used that considers the amount of native vegetation on each property, the proximity to existing conserved areas, and the degree of risk of agricultural or deforestation threat. Similar analyses could be conducted for all private lands in the BFNR. The ranking system provides a mechanism to map priority landscapes and establish high priority offset opportunities on private lands.

In addition to preservation opportunities, there is potential for restoration of both upland and wetland habitats on private lands. Of the 65,000 square km of private lands within Alberta's BFNR,[46] approximately 40,000 square km are considered "converted or seriously degraded."[47] Despite restoration feasibility and lag times, this suggests that there are significant opportunities for restoration in the BFNR.

> "One of the biggest challenges facing us with respect to conservation of private lands is the limited funds available for land acquisition. This challenge has become more pronounced in recent years as land prices have risen at a much faster rate than our funding. There are private land conservation opportunities available throughout Alberta; however, at this point in time it is the availability of acquisition dollars that is limiting our conservation efforts."
>
> – ENGO respondent

4.1.2 Implications for biodiversity offsets on public lands

Within the 68,000-square-km area of the Alberta-Pacific Forest Industries Inc. (Al-Pac) Forest Management Agreement area (FMA) in northeastern Alberta, there are approximately 1,000 square km of land disturbed by the conventional oil and gas industry (excluding lands removed from the Al-Pac FMA area for oil sands development).[48] The majority of this area is no longer active for oil and gas developments and could be restored to productive forest ecosystem.

Similar to conservation activities on private lands, restoration of disturbed areas on public land will benefit if strategic priorities are established. An example of this approach is underway in west-central Alberta, where industry stakeholders have agreed that restoration of linear disturbances (linear features such as roads or seismic lines) with priorities set according to caribou ranges can improve caribou populations.[49] As with private land, any restoration activity on Crown lands must consider a host of issues such as lag times for restoration benefits and future offset liabilities.Public lands have the additional complication of overlapping resource benefits. For example, reclamation of temporary roads would run counter to the interests of the public and other sectors that expect access to the roads. Finally, both private and public lands in Alberta do not currently have a legal mechanism to restrict surface access to sub-surface resources by the energy sector. This last factor is the largest threat to the success of an offset program or any other conservation strategy in Alberta.

Although there are substantial opportunities for temporary or permanent protection of habitat on Crown lands, significant changes to current land management policy in Alberta would be required to enable the creation of offsets by lease or tenure holders on public lands. Currently, dispositions only specify rights to utilize resources. These dispositions tend to have limited transferability, and don't entitle companies to sell rights to not utilize resources. Therefore, no mechanism (and therefore no incentive) currently exists for a company such as Al-Pac to sell offset credits created through accelerated reclamation of roads or areas for timber harvest set aside from their FMA area to enhance conservation.

[44] Although preliminary work has been conducted in Alberta's northeastern Boreal, planning is more advanced in the northwest.

[45] Leanne Osokin. "North-West Ecoregion Habitat Planning Document. Peace Parkland/Dry Boreal Mixedwood Habitat Conservation." 2006. This document is an Alberta Conservation Association internal document. For more information, contact the ACA at www.ab-conservation.com.

[46] Beverly Wilson, Senior Resource Analyst, Alberta Sustainable Resource Development, personal communication, August 31, 2007. This includes approximately 60,000 square km of freehold lands and almost 5,000 square km of Métis Settlement Lands.

[47] Senate Subcommittee on the Boreal Forest. *Competing Realities: The Boreal Forest at Risk*. Chapter 2, Ecological Realities, Table 1. Ownership, Allocation and Protected Area, Western Boreal Forest. 1999 (cited September 5, 2007). Available online at www.parl.gc.ca/36/1/parlbus/commbus/senate/Com-e/bore-e/rep-e/rep09jun99part2-e.htm.

[48] Alberta-Pacific Forest Products Incorporated. "Detailed Forest Management Plan Approval Decision." Boyle, AB. Forst Management Agreement #9100029. 2006. Available online at www.srd.gov.ab.ca/forests/pdf/alpac/Alpac_DFMP_Approval_Decision_Final_Complete_Jan_16_2006.pdf.

[49] Caribou Landscape Management Association. "West Central Caribou Landscape Planning Team Restoration Program – Draft." Hinton, AB. 2007.

> "One of the biggest obstacles to investing in biodiversity offsets is the lack of a regulatory plan. Biodiversity offsets (on public lands) need to take place within a regulated land-use framework."
> – Workshop participant

4.2 Considerations in establishing an offset mitigation ratio

Several factors need to be considered when establishing an offset mitigation ratio, including both habitat quantity and quality. Considering only quantity of habitat may not adequately compensate for the lost habitat. Therefore, it is important to factor the quality of habitat into the mitigation ratio to help assure that equivalence and additionality are achieved. Considering ecosystem form and function, as well as the gains and losses in expected ecosystem services, can help achieve equitable compensation. A range of context-specific considerations factor into the determination of the mitigation ratio, including the condition of the affected habitat, the significance of residual impacts on threatened species, the uniqueness or sensitivity of the affected habitat, and the location of the habitat within the working landscape including its importance as an ecological corridor.[50]

One important consideration is the level of impact on the site, which is often related to the type of activity being undertaken. The level of impact should guide decision-making regarding the quantity and type of compensation required. Lag times in the benefits of reclamation and other residual risks (such as uncertainty in reclamation benefits and difficulty in enforcing offset agreements) may warrant an increase in the magnitude of compensated habitat. For instance, wetlands reclamation in the oil sands remains tenuous[51] and may not be possible following open pit mining activities. Or, the lag time for the creation of a successful end pit lake may be hundreds of years since the success of proposed technologies is currently undemonstrated.[52]

Finally, the conservation status or uniqueness of the affected ecosystem should be considered when establishing an offset mitigation ratio. As an example, the guideline on biodiversity offsets in the Republic of South Africa uses a 20:1 ratio for "endangered" ecosystems (see Appendix B). This serves to increase the price attached to disturbance of rare features. Lower mitigation ratios are established for less vulnerable impacted areas.

Table 4 — Hypothetical Costs of Biodiversity Offsets

Land use type	Example project	Footprint	Production	Cost per barrel of bitumen or cubic metre of wood
Oil sands mine[53]	Suncor Voyageur South Project	190 square km (19,000 hectares)	2 billion barrels of bitumen over the life of the project	$0.1425/bbl
In-situ operation[54]	Opti-Nexen Long Lake South Project	18.8 square km (1,888 hectares)	2 billion barrels of bitumen over the life of the project	$0.0142/bbl
Forestry operations[55]	Al-Pac Forest Management Agreement area	Road footprint of 2.9 square km (290 hectares) per year	3,929,000 cubic metres/year	$1.10/cubic metre

[50] Department of Environmental Affairs and Development Planning. "Provincial Guideline on Biodiversity Offsets," Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning. Cape Town. 2007.

[51] Megan Harris, Lorax Environmental, for Cumulative Environmental Management Association (CEMA) Wetlands and Aquatics Subgroup of the Reclamation Working Group. "Guideline for Wetland Establishment on Reclaimed Oil Sands Leases." Fort McMurray, AB. 2007.

[52] Alberta Energy and Utilities Board, EUB Decision 2006-128, EUB/CEAA Joint Review Panel Report – Application to Expand the Oil Sands Mining and Processing Plant Facilities at the Muskeg River Mine Albian Sands Energy Inc. 2006. Page 64.

[53] Suncor Energy. "Voyageur South Project. Project Application and Environmental Impact Assessment." Volume 1, Section 5-1. 2007.

[54] Opti-Nexen. "Long Lake South Project. Application and Environmental Impact Assessment." Volume 1, Section 5-2. 2006. Approximate total production of 2 billion barrels of bitumen, personal communication, Bill Arling, Nexen Canada. December 12, 2007.

[55] Personal communications, Matt Carlson, Canadian Boreal Initiative (road area), and Dave Cheyne, Alberta-Pacific Forest Industries (harvest volume). August 29, 2007.

4.3 Cost of implementing a biodiversity offset program in the RMWB

Based on the current costs of private land acquisition programs, biodiversity offsets are still a relatively inexpensive form of mitigation compared to the value per barrel of synthetic crude oil (see Table 4). Assuming a hypothetical mitigation ratio of 10:1, the cost to permanently offset the direct footprint over the life of a project could be as little as $0.14 per barrel for a hypothetical oil sands mine, and $0.014 per barrel for a hypothetical in-situ oil sands operation. Of course, the actual cost of a biodiversity offset program will depend on the scarcity of private land once a full-scale program is implemented.

These calculations assume a hypothetical 10:1 offset mitigation ratio through the purchase of Boreal Forest private lands at the cost of $1,500 per hectare,[56] which is equivalent to $15,000 per hectare of disturbed land (2007 dollars). Due to policy constraints on Crown land, private land offsets are currently preferred by the few companies that are beginning to explore biodiversity offsets. For forested Crown lands, the cost associated with lost forestry and petroleum development has been calculated at $3,237 per hectare (2006 dollars).[57]

One concern with relying on private land acquisition from a cost perspective is that the motivations for private landowners to enter into conservation agreements may differ if the intent is to supply offsets to the energy sector since landowners may be interested in extracting resource rents from this sector.

4.4 Monitoring and enforcement options

Monitoring and enforcement of offset agreements are critical to ensure environmental effectiveness and public support of an offset program. The availability of agreed upon baseline data from which to measure environmental change is an important factor related to monitoring feasibility and to defining offset obligations. In the case of conservation banks, the responsibility for monitoring often falls on a third party. Since private lands held by conservation organizations are expected to grow in Alberta as they have elsewhere in North America, this long-term stewardship responsibility is significant and requires the support of all stakeholders as well as adequate financial resources.

An advantage of defining the offset in terms of a simple metric such as area of habitat is that it is relatively easy to monitor and easy for stakeholders to understand and visualize. With a coarse filter approach it will be possible for stakeholders and monitoring agencies to inexpensively determine the overall disturbance in a region through use of an online geographic information system tool. The technology exists for enabling such delivery and has been applied in other contexts.[58] Existing remote sensing technologies coupled with databases of disturbance types and offset activities will ensure that information exists to verify offset requirements.

Introducing a regulated offset program will create demand and incentives for improved monitoring. Since offsets represent real assets and liabilities on the books of firms and landowners, there is a vested interest in maintaining their value through effective monitoring. Although governments and lenders must be able to audit offset commitments of firms, administration of the offset program could be delegated to a third party and paid for by an administration fee on each transaction.

THIRD-PARTY AUDITING AND VERIFICATION

An example of third-party offset management in Alberta is the role that Ducks Unlimited Canada (DUC) plays in Alberta's Wetland Program. Currently recognized as the only designated wetlands restoration agency in the province, DUC maintains an inventory of drained wetlands in Alberta which identifies opportunities for restoration. Developer obligations provide funds for DUC to maintain or restore wetlands.

[56] Representative cost of acquiring Boreal Forest private land in Alberta is approximately $1,500 per hectare. Personal communication, Todd Zimmerling, Alberta Conservation Association. August 24, 2007.

[57] Weber, M. "Assessing the Effectiveness of Tradable Landuse Rights for Biodiversity Conservation: An Application to Canada's Boreal Mixedwood Forest," Fondazione Eni Enrico Mattei, Working Papers: 2004.29. 2004. (The number was converted to 2006 dollars based on CPI: Statistics Canada CANSIM Table 326-002.)

[58] For example, the web site mapserver.gis.umn.edu/gallery lists many different online portals for accessing GIS information and the federal government's Geoconnections program also has many intiatives in such areas (see www.geoconnections.org).

> "International examples of biodiversity offsets suggest that here in the Athabasca region we will need to offset an area of Boreal Forest greater than the area of development in order to minimize the ecological risks of that development."
>
> – Workshop participant

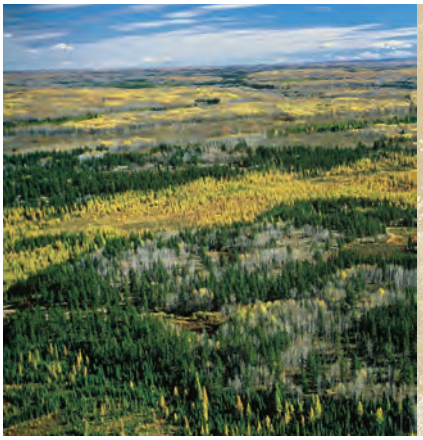
Monitoring of broader environmental outcomes is necessary to determine whether offset programs are meeting the desired goals of land-use planning. Alberta currently lacks comprehensive and accurate land and land-use inventories that are required for linking offset strategies to biodiversity outcomes. Developing information systems to report on land-use objectives has been identified as a key strategy in Alberta's Land-use Framework.[59] The Alberta Biodiversity Monitoring Institute (ABMI) provides program users with a broad range of features that include a systematic collection of long-term data across the entire province and a consistent repository for ABMI biodiversity information.[60] The ABMI's information is accessible to policy experts, managers, scientists and the general public, and can be used to monitor long-term, broad-scale changes in biodiversity.

> "The world is looking at Alberta and we will be judged by not only what we do within our borders but by what we do outside our borders."
>
> – Workshop participant

McClelland Lake Fen: Regional Municipality of Wood Buffalo © Garth Lenz

[59] The Praxis Group and Canada West Foundation. *Provincial Land-Use Framework Initiative and Cross-Sector Forum Summary Report*. 2006 (cited November 19, 2007). Available online at www.landuse.gov.ab.ca/reports.html.

[60] For more information about the Alberta Biodiversity Monitoring Institute, see www.abmi.ca.



5 Conclusions

This report explores biodiversity offsets as a tool to address the impacts of industrial development in the Boreal Forest Natural Region (BFNR). The purpose of the report is to explore options for meeting biodiversity objectives for the BFNR overall, with a focus on opportunities to mitigate the impacts of development in the Regional Municipality of Wood Buffalo (RMWB) through a pilot biodiversity offset program. While the report focuses on the RMWB as a case study, the concepts are broadly applicable to Boreal Forest management across Canada.

The report outlines four types of biodiversity conservation programs ranging from purely voluntary offsets to a cap and trade approach. Regulatory offsets without conservation banking was viewed as less efficient than regulatory offsets with conservation banking and is not considered a preferred option for conserving biodiversity in the BFNR. The remaining program options are summarized below.

5.1 Program Options

5.1.1 Voluntary offsets

There is concern that ad-hoc voluntary programs will be insufficient to maintain biodiversity and are unlikely to be considered credible by the public. This voluntary approach was generally considered inadequate by stakeholders interviewed and was the least preferred program option. The key drawback of voluntary offsets is the lack of economic, legal, or regulatory incentives to pursue voluntary offsets at a level required to sustain biodiversity objectives. Other concerns with a voluntary program include lack of participation due to negative impacts on firms' competitiveness and inability of firms to make credible long-term commitments to manage offsets. Interviewees noted many examples of voluntary offsets which have not been effectively implemented.

One advantage of voluntary offsets is that companies will learn about different offset options and gain experience in managing and implementing an offset program. In addition, voluntary offsets allow firms to manage beyond existing regulation and compete on their environmental record. Voluntary offset programs will largely be limited to opportunities on private lands because of the difficulties associated with limiting development on public lands in perpetuity and the current inability for firms with resource rights to transfer these for the purpose of conservation. There is a high degree of expertise in the Alberta conservation community in conserving and administering private lands for conservation, and the report concludes that there are numerous opportunities for Boreal Forest offsets on private lands.

Many stakeholders identified the need for a coordinated approach to conservation offsets in the Boreal Forest in order to adequately address cumulative effects. Since there is no regulatory framework for cumulative effects management, an interim approach spearheaded by industry and ENGOs could be to implement a prominent voluntary offset initiative such as a voluntary "challenge" program and include government and public participation in development of the program. Objectives and requirements for the program would be developed through coordinated efforts between all stakeholders which would result in a prioritization of regional offset opportunities and an agreed upon administrative structure for managing offset requirements. Firms would voluntarily agree to the program targets and government or a third party would certify the offsets. A voluntary challenge program provides an opportunity to learn how to implement offsets in the BFNR and how market institutions should evolve. Furthermore, the voluntary initiative can provide insight into the costs and benefits of a regulatory program, as well as preferred design options. In order to be successful, efforts under the voluntary program would have to be recognized should a future regulatory program emerge.

Examples of existing voluntary offsets in northern Alberta illustrate the demand for these programs by the public and by industry. Industry should be encouraged to proceed

with biodiversity offset programs in the absence of formal policies or regulations with the caveat that these voluntary actions do not rule out future policy changes. However, while companies such as Albian Sands Energy, in its Muskeg River Oil Sands Mine project, have demonstrated corporate leadership in investigating terrestrial conservation offsets for oil sands development, their offset commitments do not mitigate the full impacts of their operations. Therefore, a more coordinated approach is recommended.

5.1.2 Regulatory offsets with conservation banking

Conservation banking is an approach that allows firms to purchase credits to meet offset requirements and third parties to generate tradeable credits by investing in habitat. Conservation banking reduces the cost of regulatory compliance for firms and also creates an economic incentive to create or maintain habitat in order to generate sellable credits.

Among respondents, the preferred policy option was a regulated offset program supported by a conservation bank that enables creation of tradeable offsets by third parties. Program goals for a regulatory program could be developed around no-net-loss objectives or other project-specific cumulative effects requirements.

As one industry respondent noted:

> "I think that's the approach to take… The appeal is the clarity of the rules, administration by the independent party. If you went beyond the minimum of no net loss, and you were able to restore two to three times as much habitat, then it would be helpful to trade that with others unable to do so. Trading would be a concept that would be helpful to provide incentives to go beyond the minimum."

Similarly, a government employee respondent said, "Conceptually, (conservation banking) is a very good idea."

The next step required for a regulated offset pilot would be to establish program objectives and scope. This would include what habitat types need to be offset, what indicators and thresholds should be considered for equivalence and mitigation ratios, and the geographic scope of the program.

Offset requirements could be incorporated in the environmental assessment and approval process for large projects. Under Alberta's *Environmental Protection and Enhancement Act*, an environmental impact assessment is dictated by publicly reviewed terms of reference.[61] Alberta Environment could play a leadership role in ensuring that opportunities for establishing offsets as mitigation are consistently described and required in the terms of reference for environmental assessments.

5.1.3 Cap and trade

Cap and trade is an alternative regulatory approach to cumulative effects management. Under cap and trade, the government sets a cap on the total amount of disturbance permitted on the landscape for a given time period and possibly for a particular habitat type. All companies must hold permits for the amount of critical habitat disturbed.

Among interview respondents, cap and trade programs were the least understood of all options presented. Respondents questioned how these programs would function and the implications for their firm or organization. For example, an industry respondent noted: "Terrestrial habitats are not as straightforward as greenhouse gases as far as management over time and space." This statement demonstrates the lack of understanding of how cap and trade could be employed in a terrestrial setting.

Cap and trade and regulatory offsets have different characteristics in terms of the distribution of environmental risks and liabilities between the public and private sectors, and certainty of permit availability and prices. Both offset and cap and trade programs are viable substitute strategies for coarse filter management and the costs and benefits of both approaches need to be further evaluated before finalizing a regulatory approach to cumulative effects management.

Similar to an offset program, next steps for cap and trade include establishing program objectives, defining indicators and thresholds for cumulative disturbance allowances, and educating affected stakeholders on the implications and opportunities of this option. Therefore, the same processes required to develop an offset program could be used to establish objectives for cap and trade.

5.2 Program design issues

Regardless of the type of program pursued in Alberta, there are key design and implementation issues that need to be considered. These are summarized in Table 5 on page 26.

[61] See Part 2 of Alberta's *Environmental Protection and Enhancement Act*. Available online at www.qp.gov.ab.ca/documents/Acts/E12.cfm?frm_isbn-0779748611.

Table 5—Summary of Design and Implementation Issues for Conservation Programs

Design and implementation issue	Key question to be exposed	Design options	Issues for further discussion
Geographic scope	What is the appropriate area to which an offset policy should apply? Is the area large enough to provide offset opportunities?	Offsets created in RMWB region of impact	Amount of non-impacted land available in RMWB Is the scale of conservation benefits local, regional, provincial?
		Offsets for RMWB created in BFNR	Include Boreal subregions? Include other provincial jurisdictions?
		Mix of private and public lands	Identify appropriate management strategies on private lands to replicate habitat Incorporation of public lands requires regulation change
		Include reclamation credits	Risks associated with reclamation Time lags between reclamation and biodiversity benefits
Calculating environmental equivalence	Defining offset program objectives, indicators and thresholds	Coarse filter approach versus targeted species (e.g., caribou)	Identify key landscape definitions (e.g., Boreal subregions) Zoning to account for local conditions Are the program goals related to endemic species?
		Mitigation ratios >1	What is the risk associated with restoration and reclamation? Additionality Ease of monitoring
		Regionally targeted approach versus project-specific approach	Feasibility of maintaining biodiversity without regional targets Security of resource access for firms
Sectors covered	What development types and activities require the creation of an offset?	All activities covered by offset program versus high-impact, long-duration activities	Which activities are associated with greatest impact relative to program objective? Ease of monitoring impacts by activity? Diversity in degree and type of impact
Other Key Considerations			
Key policy drivers	What are the main driving forces for development of the offset program? What are the objectives?		
Compatibility with existing policy	Are there any existing policies that preclude development of offsets? What policy changes would be required to facilitate regulatory offsets?		
Potential transactions and administrative costs	How will the offset program be designed to be as administratively simple as possible, while still maintaining the rigour of the offset program?		
Degree of stakeholder consensus	Is there a high level of stakeholder understanding and support for the proposed approach?		

Appendix A
Biodiversity Offsets Interview Questions

1. Please describe your company or organization's business and relationship to land use in Alberta.

2. Have you heard of the term "biodiversity offset" or "conservation offset"? If so, what do you understand the term(s) to mean?

3. Can you think of any examples of biodiversity offsets already occurring in Alberta or elsewhere?

4. Is your company considering investing in or implementing biodiversity offsets? If yes, what are the main business drivers for your company to consider biodiversity offsets? If no, what are the barriers or challenges preventing you from considering biodiversity offsets?

5. What are the current regulations and policies governing habitat restoration for your company? Do you think that current requirements for reclamation adequately manage cumulative effects?

6. Now we would like to describe four different policy options for offset programs that might be applied in the Athabasca region of Alberta. We would like you to tell us what you think the strengths and weaknesses of these programs would be, and what opportunities or barriers might exist for implementation.

Voluntary offsets

Here companies make voluntary contributions or efforts to offset land impacts, such as through voluntarily committing to additional restoration or acquisition of Boreal Forest lands to offset the impacts associated with their operations.

Regulatory offsets without conservation banking

The government develops a no-net-loss policy with respect to certain important Boreal habitat types. Companies are expected to propose stand-alone offset mitigation strategies at the time of disturbance to meet this policy and these strategies are individually certified as adequate by government.

Regulatory offsets with conservation banking

Conservation banking requires companies to obtain offsets to their activities prior to development. Offsets are usually managed through a third-party agency (the conservation bank) whose products are certified by the government. Conservation banking is used to meet desired aggregate environmental targets (such as no net loss of a certain habitat type.)

Cap and trade

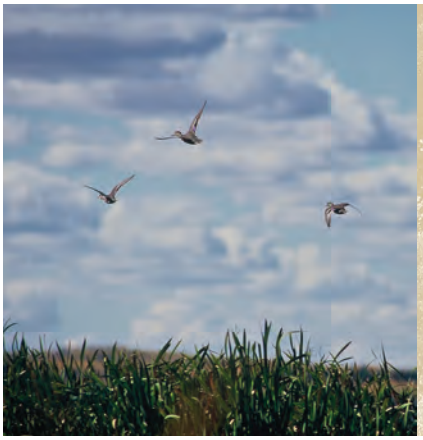
Under cap and trade, government sets a cap on the total amount of forest disturbance allowed in a given time period expressed, for example, in number of hectares per year. Disturbance rights may be auctioned, grandfathered to forestry companies, or some combination of both. All firms must hold permits for the amount of critical habitat disturbed. Disturbance rights may be purchased from the government or from other firms who may hold these rights.

7. If the government were to adopt one of these policies, what species and/or types of habitat do you think should be protected?

8. Do you think there is or should be a distinction between offset and mitigation/reclamation investments?

9. Do you think that a biodiversity offset policy should recognize the unique circumstances of Aboriginal communities? If so, how do you think that should be achieved?

10. Do you have any final comments or perspectives you would like to add about biodiversity offsets?



Appendix B International Biodiversity Offsets Case Studies

While still relatively uncommon, biodiversity offsets are rapidly gaining popularity as a terrestrial mitigation tool. There are examples of biodiversity offset policies for terrestrial management in the United States, the European Union, Brazil, Switzerland, Australia and South Africa. In considering the development of a biodiversity offset approach for Alberta's Boreal Forest Natural Region, it is helpful to consider the range of habitat types they include, and similarities and differences between different offset policies. The majority of regulated biodiversity offset policies are project-based.

Habitats and Birds Directives (European Union)

In an effort to safeguard Europe's biodiversity and genetic resources, the European Union (EU) has imposed two management directives on its member states to protect the diversity of bird, plant and animal species. The Birds Directive focuses on the long-term protection of wild bird species (particularly migratory species) and their habitats, while the Habitats Directive is designed to protect plant and animal species (with an emphasis on rare and endangered species) by preserving specific habitats. Under the Birds Directive, EU member states must classify the most appropriate areas within their political jurisdictions as Special Protection Areas for a number of selected bird species. For the Habitats Directive, each member EU state is responsible for identifying and designating areas that are important for the protection of the species and habitats as Special Areas for Conservation – as determined by the Directive. Together, these Special Areas for Conservation form a coherent European network of protected sites, the Natura 2000 network.[62]

The Habitats Directive states that, "Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive."[63] Any project that is considered to have an impact is subject to a formal assessment of its implications for the site. The Birds Directive advises that offsets should be along the same migration path and "accessible with certainty by the birds usually occurring on the site affected by the project."[64] Only once national authorities have agreed that the project will not adversely affect the integrity of the site concerned, will the project proceed.

Conservation Units (Brazil)

In Brazil, federal legislation requires industrial developments to offset their environmental impacts through payments to the National Protected Areas System. This program is based on the "polluter pays" principle in that every project (private and public) that poses a significant environmental impact must compensate for the impact by supporting the National Protected Areas System.[65] No less than 0.5 percent of the total value of the project must be provided as compensation for any unavoidable or residual damages caused by the project. The exact sum will be fixed by the public agency (federal or state) responsible for granting the environmental licence and is based on the magnitude of environmental impact caused by the project.

Relevant authorities determine where the sum will be used for conservation units, which are defined as land and its environmental resources, including water, legally instituted

[62] European Commission. About Natura 2000. 2007 (cited August 31, 2007). Available online at www.natura.org/about.html.

[63] European Economic Community. *Eu Habitats Directive (92/43/Eec)*. 1992 (cited August 31, 2007). Available online at www.proact-campaigns.net/infoandlinks/id10.html.

[64] European Commission, "Managing Natura 2000 Sites – the Provisions of Article 6 of the 'Habitats' Directive 92/43/Eec," ed. Office for Official Publications of the European Communities. Luxembourg. 2000. Page 46-47.

[65] ten Kate, Bishop, and Bayon. *Biodiversity Offsets: Views, Experience, and the Business Case*. 2004.

by the state with the objectives of conservation under a special administrative regime.[66] Offset funds are spent first on new protected areas, revising and implementing management plans, acquiring goods and services for management, monitoring protected areas, and researching necessary information for conservation management.[67]

Ecological Compensation (Switzerland)

Switzerland's Federal Law on the Protection of Nature and the Landscape (1966) aims to preserve indigenous animal and plant species, biotopes and landscapes. It also defines in legal terms the establishment of measures for ecological compensation in regions that have been intensively exploited.[68] Under this law, the "reconstitution" or "replacement" of protected biotopes is required where impacts are unavoidable. The law also addresses the protection of animal and plant species. It states that for unavoidable impacts, the authority responsible for the harm must take measures to assure the best protection possible, its reconstitution, or, if this is not possible, then "adequate replacement."[69]

Native Vegetation Offsets (Australia – four states)

Australia is considered a leader in implementing innovative biodiversity offset policies. Four Australian states – New South Wales, Victoria, Western Australia and South Australia – have developed offset programs that are useful models for consideration in an Alberta offset program setting.

New South Wales

New South Wales' new Biodiversity Banking and Offsets Scheme (BioBanking) is designed to address the clearing of native vegetation for urban development and the impact it has on biodiversity values, including threatened species. BioBanking will allow tradeable credits to be generated by landowners who commit to enhance and protect biodiversity values on their land. These credits can be sold to developers who will then be able to offset their project's impacts on biodiversity values.

Victoria

The Victorian BushBroker program involves landholders establishing native vegetation credits by revegetation, improving the management of existing vegetation, or by protecting old trees. The BushBroker scheme allows for the registration and trading of native vegetation credits. Native vegetation credits provide income for landholders and a source of offsets for proponents seeking planning approval to clear native vegetation.

In the past, developers seeking a permit to clear vegetation were not able to secure suitable third-party offsets. BushBroker was developed to address this issue and serve as a, "statewide register of available native vegetation credits that could be purchased off the shelf."[70] The location of offsets can vary and exist on another property where the owner of that property (the third party) agrees to provide the offset on behalf of the permit applicant. The BushBroker program adheres to "like-for-like" rules, so these third-party offsets may be found either close to or remote from the cleared vegetation site.[71]

Western Australia

In 2006, the Western Australia Environmental Protection Authority (EPA) published a position statement on environmental offsets in an effort to set out principles and clarify their responsibilities in relation to managing particular environmental issues. The position statement defines offsets as "environmentally beneficial activities undertaken to counterbalance an adverse environmental impact, aspiring to achieve no net environmental loss or a net environmental benefit."[72]

In this context, these offsets should only be used when all other options (i.e., avoidance, minimization, rectification and reduction) have been properly addressed. Offset ratios should apply to environmental values, vegetation, habitat, species, ecosystem, landscape and hydrology, in addition to physical area. This principle prevents complex ecosystems or unique species from being slowly degraded over time through cumulative impacts.[73] The size of the offset to

[66] Ibid.

[67] McKenney. Biodiversity Neutral Initiative. *Environmental Offset Policies, Principles, and Methods: A Review of Selected Legislative Frameworks.* 2005.

[68] Swiss Agency for the Environment, Forests and Landscape. "National Report of Switzerland for the Convention on Biological Diversity." Bern. 1998.

[69] ten Kate, Bishop, and Bayon. *Biodiversity Offsets: Views, Experience, and the Business Case*. 2004.

[70] The State of Victoria. Department of Sustainability and Environment. *Bushbroker – Native Vegetation Credit Registration and Trading*. 2006 (cited August 27, 2007). Available online at www.dse.vic.gov.au/CA256F310024B628/0/E42AA88543BD2B57CA25712B0012E9A4/$File/bb+information+paper+05_03+1.pdf.

[71] Ibid.

[72] Environmental Protection Authority, Government of Western Australia. "Environmental Offsets –Position Statement," 2006. Page 26.

[73] Ibid.

impact ratio should be larger than 1:1 if there is a reasonable risk that the offset will not fully succeed over the long term.

South Australia

The South Australian *Native Vegetation Act*, 1991, and the Native Vegetation Regulations, 2003, include provisions requiring the clearing of native vegetation to be offset by an environmental gain referred to as a "significant environmental benefit," or SEB. This is based on the premise that:

> "the clearance of native vegetation will result in the further loss (even temporary) of habitat, biodiversity and environmental values in a landscape that has been substantially modified by European settlement. In order to compensate for that loss, an operator or individual who wishes to clear native vegetation must establish a process to protect and manage the biodiversity in that region over and above that lost."[74]

A SEB can be achieved through the management of existing native vegetation, the restoration of degraded native vegetation to a functioning ecosystem, or the revegetation of cleared areas to recreate a functioning ecosystem. The landholder may undertake the SEB work or may make a payment to the Native Vegetative Council, who will then apply the funds on similar efforts elsewhere. The proponent must calculate the level and method of SEB to be offered to offset the clearance of native vegetation. The Native Vegetation Act does not prescribe the extent of SEB, recognizing the need for a flexible approach to suit particular circumstances.[75]

South Africa

In March 2007, the Western Cape Department of Environmental Affairs and Development Planning released a draft guideline on biodiversity offsets.[76] The guideline states that biodiversity offsets should be considered to compensate for those "residual" biodiversity impacts resulting from proposed development by securing priority habitat for biodiversity conservation in perpetuity.

Offsets are considered as a last resort option following all measures to avoid, minimize, repair or restore developmental impacts. In other words, biodiversity offsets are only triggered when residual biodiversity impacts of medium or higher significance are evident. An acceptable measure of the residual loss is the starting point for determining an appropriate offset. Offsets are then calculated by multiplying this measure by a basic offset ratio, which is linked to the particular conservation status of the affected ecosystem. The following ratios are recommended:

- For "critically endangered"[77] ecosystems = 30:1 ratio;
- For "endangered" ecosystems = 20:1 ratio;
- For "vulnerable" ecosystems = 10:1 ratio.

The area determined by the basic offset ratio is adjusted according to context-specific considerations such as: the condition of the affected habitat, the significance of residual impacts on threatened species and special habitats, and the significance of residual impact on valued biodiversity underpinning ecosystem services.

Biodiversity offsets are interpreted as:

1) the first step in producing a system where the principle of compensation for residual impacts on biodiversity is already integrated into the environmental impact assessment and decision-making process; and
2) as an additional environmental management tool to contribute to the achievement of sustainable development in the Western Cape Province.[78]

[74] Government of South Australia. *Guidelines for a Native Vegetation Significant Environmental Benefit Policy: For the Clearance of Native Vegetation Associated with the Minerals and Petroleum Industry*. 2005. Page 5.

[75] Ibid.

[76] Department of Environmental Affairs and Development Planning. "Provincial Guideline on Biodiversity Offsets," Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning. Cape Town. 2007.

[77] South Africa's National Spatial Biodiversity Assessment lists different categories of threatened ecosystems (critically endangered, endangered, vulnerable).

[78] Department of Environmental Affairs and Development Planning. "Provincial Guideline on Biodiversity Offsets," Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning. Cape Town. 2007.

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Appendix C
Alberta Land Acquisition Organizations

Contact information for major conservation organizations with land acquisition programs in Alberta's Boreal Forest Natural Region:

Alberta Conservation Association

Todd Zimmerling
101 9 Chippewa Road
Sherwood Park, AB T8A 6J7
Telephone: (780) 410-1999
Toll free: 1-877-969-9091
Fax: (780) 464-0990
Email: info@ab-conservation.com
Website: www.ab-conservation.com

Alberta Fish and Game Association

Brad Fenson
6924 104 Street
Edmonton, AB T6H 2L7
Telephone: (780) 437-2342
Fax: (780) 438-6872
Email: Office@afga.org
Website: www.afga.org

Ducks Unlimited Canada

Rick Shewchuk
100-17958, 106 Avenue
Edmonton, AB T5S 1V4
Telephone: (780) 489-8110
Fax: (780) 443-6326
Email: r_shewchuk@ducks.ca
Website: www.ducks.ca

Nature Conservancy of Canada

Renny Grilz
1202 Centre Street SE, Suite 830
Calgary, AB T2G 5A5
Telephone: (403) 262-1253
Fax: (403) 515-6987
Toll-free: 1-877-262-1253
Email: alberta@natureconservancy.ca
Website: www.natureconservancy.ca

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Frontier Forests

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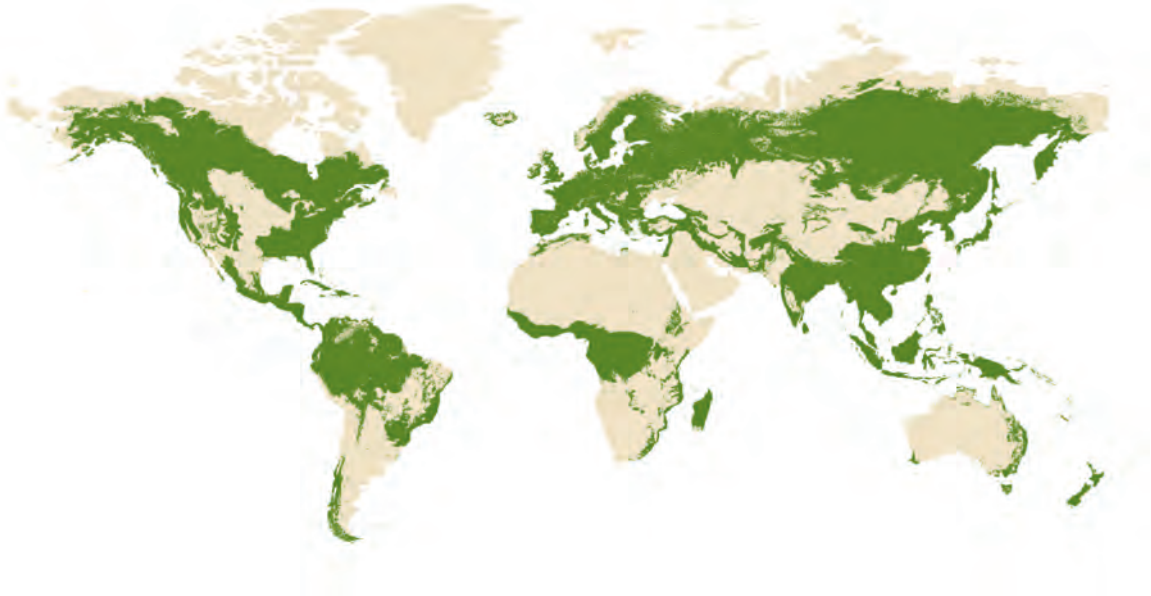
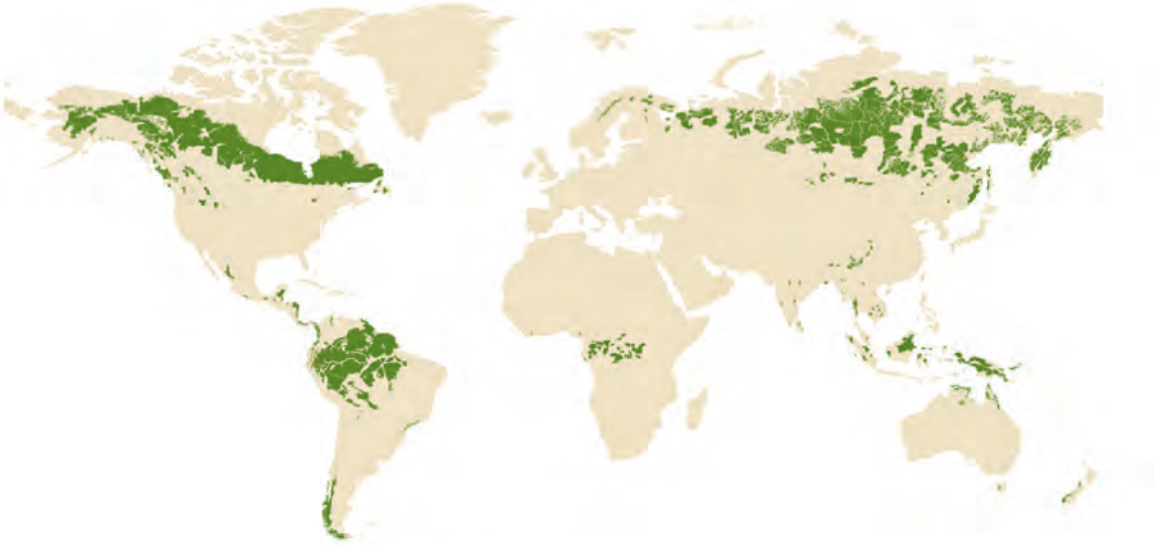


Frontier Forests

TODAY



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