**CONSERVING CANADA'S NATURAL CAPITAL: THE BOREAL FOREST**

# Al-Pac Case Study Report – Part 3
# Fiscal Barriers and Options

Prepared for the

National Round Table on the Environment and the Economy

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## EXECUTIVE SUMMARY

This document is Part 3 of a three-part case study report examining conservation issues in the Alberta-Pacific (Al-Pac) Forest Management Area (FMA). In this part, we provide a summary of key fiscal barriers and opportunities that could be pursued to preserve natural capital on the Al-Pac FMA. The case study was commissioned by the National Round Table on the Environment and the Economy (NRTEE) as part of its Conserving Canada's Natural Heritage: The Boreal Forest program.

Natural capital includes resources such as minerals, timber, and oil and gas, which provide the raw materials used in the production of manufactured goods as well as land and water resources that support non-market values such as recreational opportunities, biodiversity and ecosystem services. The methodology for this part of the report consists of three components. First, the economic and policy literature was reviewed to generate a list of fiscal mechanisms that have been applied globally to protect forest lands. The list was then evaluated in order to focus on instruments that would be suitable to the boreal forest context: instruments had to be suitable to the ecological system and relevant sectors, as well as compatible with existing institutions (such as property right systems). Stakeholder interviews were conducted to obtain feedback on challenges facing land managers in managing for conservation values, ideas for policy reform and incentives that would help land managers achieve conservation objectives, and the acceptability of alternative fiscal reforms. Further stakeholder input was obtained from the case study workshop held in Fort McMurray on May 3, 2004.

The main findings of this part of the report are summarized below. Because the provincial government has jurisdiction over most land and resources within the Al-Pac FMA, the report focuses on provincial fiscal barriers and opportunities. Note that many of the opportunities discussed below, such as tradable development rights, are applicable beyond the boundaries of the Al-Pac case study and will also increase protection of existing boreal forest against encroachment by the agricultural fringe.

### Barriers

- The Alberta government business planning model promotes the sector-specific mandates of individual departments rather than maximizing the potential value of forest land.

- The tenure and disposition system for allocating resource rights on public lands generates externalities[1] between sectors and does not incorporate the value of natural capital.

- FMA agreements have many restrictions that lead to inefficient use of forest lands and reduce Al-Pac's ability to manage for natural capital. These include stumpage charges, adjacency restrictions, appurtenancy clauses, use-it-or-lose-it requirements,

[1] An externality is a side-effect or consequence that affects other parties without this being reflected in the cost or price of the goods or services received.

and the sustained-yield principle, which underlies calculation of the annual allowable cut.

- Energy sector barriers include taxes and subsidies that accelerate the exploration and development of energy resources, petroleum and natural gas lease requirements, and a lack of charges for access to water.

**Opportunities**

- Natural resource accounts and a common set of sustainability indicators managed by all government departments could be used to improve the business planning model in Alberta.

- Increased rights to forest resources other than timber would enhance management for non-timber values on public lands.

- Transferable development rights could be used to implement forest or habitat loss thresholds in the boreal forest.

- Carbon credits could maintain carbon balances and reduce loss of forest cover.

- Conservation easements could be used on public lands to maintain habitat.

- Forest investment tax credits could be applied to forest investments by any sector.

- Access and user charges for non-decommisioned roads could reduce forest fragmentation and species interactions related to human access.

## 1. INTRODUCTION

This document is the third part of a three-part case study report investigating conservation issues within the Alberta-Pacific (Al-Pac) Forest Management Area (FMA) in northeastern Alberta. The case study was commissioned by the National Round Table on the Environment and the Economy (NRTEE) as part of its Conserving Canada's Natural Heritage: The Boreal Forest program. In this part of the case study report, we provide a summary of key fiscal barriers and opportunities that could be pursued to preserve natural capital on the Al-Pac Forest Management Area (FMA).

Natural capital includes resources such as minerals, timber, and oil and gas, which provide the raw materials used in the production of manufactured goods as well as land and water resources that support non-market values such as recreational opportunities, biodiversity and ecosystem services. Like produced capital, natural capital is subject to deterioration, in this case through excessive growth and waste, natural resource extraction and modification of the landscape (Canada West Foundation 2003).The International Institute for Sustainable Development (IISD) defines natural capital as an extension of the economic notion of capital (manufactured means of production) to environmental "goods and services." It refers to a stock (e.g., a forest), which produces a flow of goods (e.g., new trees) and services (e.g., carbon sequestration, erosion control, habitat) (IISD 1997). Part 1 of the case study report describes a number of management objectives for the Al-Pac FMA that would result in the conservation of natural capital. Specific indicators of natural capital include the maintenance of biodiversity, ecosystem function and productivity, soil and water resources, and forest contribution to global systems (such as global climate change).

There are numerous instruments that can be used to conserve natural capital. These include regulatory instruments such as performance standards, limits and quotas; information instruments such as education, labelling and indicator reporting; land use planning instruments including disposition systems; and, finally, economic instruments. Economic instruments include fiscal tax- and subsidy-based instruments, user fees and pollution charges, market instruments such as tradable emissions and tradable quotas, and other financial incentives such as grants, green funds and debt-for-nature swaps (c.f. IISD 1997). Part 2 of the case study report focuses on *regulatory* barriers and options for conserving natural capital on Al-Pac's FMA. In Part 3, we examine *fiscal* barriers and options, although they may be related to the implementation of, or require the support of, regulation. The NRTEE has defined ecological fiscal reform as a strategy that encompasses the use of multiple economic instruments such as public taxes and expenditures, as well as tradable permits, permitting charges and user fees, to provide incentives for producers and consumers to alter their behaviour. The application of economic instruments leads producers and consumers to internalize the environmental costs of their actions and rewards them for more sustainable practices (NRTEE 2002).

Activities on forest lands are determined by the economic incentives (monetary and non-monetary) facing individual decision makers who use the resources and services provided by the landscape. The reward system is determined by the price structure for products and services that flow from the resource base, as well as the policy structure that determines the "rules of the game" for resource exploitation and hence influences the relative values

of resources. Conservation objectives are often not achieved because perverse incentives lead to overuse of the forest for its market rather than its non-market values, and because there are inadequate financial incentives for incorporating the values of non-market goods and services in land management decisions. In this document, we will address economic incentives that create obstacles to managing for conservation objectives in the boreal forest, as well as opportunities for fiscal reform to manage for conservation objectives.

### 1.1 Methodology

The methodology for this part of the case study consists of three components. First, the economic and policy literature was reviewed to generate a list of fiscal mechanisms that have been applied globally to protect forest lands. The list was then evaluated in order to focus on instruments that would be suitable to the boreal forest context. Instruments had to be suitable to the ecological system and relevant sectors, as well as compatible with existing institutions (such as property right systems). Finally, stakeholder interviews were conducted to obtain feedback on challenges facing land managers in managing for conservation values, ideas for policy reform and incentives that would help land managers achieve conservation objectives, and the acceptability of alternative fiscal reforms.[2] Further stakeholder input was obtained from the case study workshop held in Fort McMurray on May 3, 2004.

### 1.2 Key Points from Stakeholder Interviews

A summary of key stakeholder comments on fiscal barriers and opportunities is provided below in order to provide a context for the rest of the discussion and the focus on particular instruments and mechanisms discussed in sections 3 and 4 of this document. The points are not attributed to any particular individual or sector and are summaries of what we heard. The following points were selected in part because they were raised by more than one stakeholder. Key stakeholder concerns include:

- lack of accountability for ensuring that the timber damage assessment dues paid by the oil and gas sector to FMA holders are spent on reforestation and reclamation;
- lack of incentives and opportunities for offsetting intensive development activities on the Al-Pac FMA with forest investments in other areas of the boreal or on private lands;
- lack of compensation or incentives for investing in natural capital through maintaining ecological benchmarks and protected areas within the managed landscape;
- lack of opportunity and incentives for developing ecological benchmarks that incorporate non-FMA set-aside and protected areas;
- the intense productive potential of oil sands areas, which requires a larger regional approach to achieve conservation objectives and, potentially, a

[2] The methods for interviewing stakeholders are described in Part 2, and the appendix in Part 2 provides the material sent to interviewees prior to discussion.

zoning approach where Al-Pac's FMA becomes part of an intensive land use zone;

- lack of a mechanism for deciding societally acceptable trade-offs between economic development and conservation.

The stakeholder interviews and the case study workshop emphasized the need for society to evaluate trade-offs between economic growth and conservation. Before reviewing the specific barriers and opportunities, we will discuss the role of economic instruments in managing for natural capital and, in particular, the potential role and limitation of economic instruments in helping society evaluate trade-offs between development and conservation.

The remainder of Part 3 proceeds as follows. Section 2 discusses economic instruments, their role in helping firms internalize some of the environmental costs of their decisions, and their role in evaluating societal trade-offs between land use alternatives. Rather than focusing narrowly on economic instruments, we also consider institutional reform and the planning context in which economic instruments are employed. In Section 3 we discuss barriers to conserving natural capital. The discussion covers overarching and largely institutional barriers, as well as sector-specific fiscal barriers. Overarching barriers include the context for business planning in Alberta and the tenure system. We view the government planning environment as the primary institution in which the rules governing competing interests on the landscape are played out. Thus, incentives to coordinate and integrate multiple uses at the planning level affect the extent to which economic instruments are successful in implementing environmental management objectives. In Section 4, we focus on fiscal opportunities, primarily through improvements to the planning model and the use of economic instruments. Because economic instruments affect the incentive structure of firms, they often achieve many conservation objectives simultaneously. We highlight the linkages between conservation objectives and particular instruments.

## 2. THE CASE FOR ECONOMIC INSTRUMENTS

In order to understand the role of economic instruments in managing for natural capital, it is necessary to understand the role of economic instruments in the marketplace. Forest lands produce numerous non-market values such as biodiversity that compete with resource extraction activities. However, they are often managed exclusively for extractive resources, rather than for multiple benefits. In a perfectly competitive market, prices for resource-based commodities such as oil, timber and agricultural goods are determined by supply and demand. Consumers purchase commodities as long as their willingness to pay for goods is greater than the price. At the same time, suppliers produce commodities as long as the cost is less than the price they receive. Thus, in theory, the competitive market will allocate goods until the willingness to pay is equal to the cost of production. Therefore market prices reflect both the cost and benefit of production. Problems arise, however, when private costs and benefits are not the same as the public, or social, costs and benefits of production. For example, when firms extract timber they think about the value of timber in the marketplace, but they do not directly account for the value of habitat loss in determining how much timber to produce (although regulations are increasingly forcing firms to incur costs for biodiversity protection). Similarly, consumers do not account for the impacts on society in their consumption choices. For example, recreationists may impose management costs on firms operating in the forest, and their activities may also be detrimental to certain species.

The differences between the private and social costs and benefits of production and consumption decisions are referred to as externalities. When externalities exist, an inefficient mix of goods and services is produced by the market economy relative to what is desirable from society's point of view. In particular, the market produces too many goods that cause environmental damage, and it does not produce enough environmental goods and services. Externalities often arise due to incomplete property rights and a lack of prices for resources. For example, when water is free, there is no "cost" to using water, even though it may be a scarce resource. Many environmental goods and services flowing from forest lands lack appropriate prices, or do not have any prices attached to them at all. Examples include values for carbon and recreation. There are numerous reasons why some goods and services lack prices. First, some non-market goods, such as clean air and water, historically have been viewed as entitlements. These entitlements were not questioned in an era of abundant non-disturbed public lands—an assumption that no longer holds. In addition, many non-market goods and services such as biodiversity are not amenable to pricing, largely due to difficulties in assigning property rights. Often, property rights evolve when goods that previously were considered free because they were abundant become more scarce. However, property rights may also fail to exist because of public good problems.

Public goods are characterized by "non-excludability," which means that individuals, even those who do not pay, cannot be excluded from enjoying the benefits of public goods once they are provided. This leads to free-riding. For example, individuals who do not pay directly for biodiversity protection still enjoy the benefits of biodiversity. The market tends to under-provide environmental goods and services that are subject to free riding, because the true willingness to pay for a good is greater than the value generated

by the marketplace. In general, people lack the correct incentives to reveal their true willingness to pay for public goods that are subject to free-riding.

Market instruments, such as tradable permits, involve creating property rights over public goods. Under such systems, rights to use (i.e., pollute) publicly owned resources such as water or air are capped and then traded between resource users. The creation of property rights over the previously "free" good establishes a pricing mechanism that, in turn, rations use of the resource. This pricing mechanism organizes users of the public good to meet environmental objectives as well as maximize the benefit of resources. Alternatively, governments might tax damaging outputs such as emissions or damaging activities. In theory, appropriately applied taxes will increase the private costs of damaging activities and outputs until they are equal to the social costs, which will lead to a reduction of environmental damage.

It has been argued that if property rights are well defined, then contractual arrangements between individuals will eliminate externalities. This type of bargaining takes place when firms agree to jointly plan activities, share costs or pay parties to reduce impacts, and it is evident in the Al-Pac FMA. For example, oil and gas companies carrying out seismic operations in the Al-Pac FMA must pay timber damage dues to Al-Pac to compensate for damage to the fibre supply. However, Al-Pac forgives these dues when energy companies use low-impact seismic in exploration. Because the contract is entered into voluntarily, we assume that the benefit to Al-Pac in the reduced disruption to its timber supply exceeds the loss of the timber damage payment. At the same time, we can assume that the value of waiving the timber damage assessment outweighs the cost of converting to low-impact seismic. The timber damage assessment results from the conflict between Al-Pac's rights for surface timber resources and energy sector rights to subsurface resources. Al-Pac is granted property rights in the standing timber by virtue of s. 16(2) of the Forest Act, and it is in that capacity as "owner" of the standing timber that an FMA holder is entitled to compensation for damage to timber. The clear definition of Al-Pac's rights produces an atmosphere in which Al-Pac and energy companies can bargain over timber damages until they reach an efficient solution.

In theory, complete property rights would lead to an efficient allocation of all resources and solve the social choice problem facing decision makers in trying to determine how much natural capital to provide. Unfortunately, however, property right solutions tend to be less effective for environmental problems involving public goods, because the rights are difficult to define and enforce due to their non-exclusive characteristics. It is often possible to overcome public good problems by creating, through regulatory means, artificial markets for activities that "consume" air or "biodiversity." This is the role of tradable rights, where the regulator caps the total amount of environmental damage and allows firms to trade rights to this damage. Tradable rights systems also provide a mechanism for the public to increase the provision of the environmental good beyond the cap. However, even when the public can participate in the market, tradable permit systems will not yield the "optimal" level of an environmental good because of the free-riding problem. A key advantage of tradable permit approaches is that they are cost-

effective in the sense that they maximize the value of resource use and give firms incentives to meet management objectives at least cost.

Market instruments can be difficult to implement due to high transaction costs. Firms incur search costs in finding parties to contract with, and parties may be uncertain about the true value of the goods being negotiated. If decisions involve significant risks, or outcomes are uncertain, contractual arrangements are less likely to arise. Similarly, it may be difficult for firms to contract with all possible beneficiaries to an action. For example, if the benefits of protecting the habitat of endangered species are spread across many individuals, and the costs of protection are high, it is unlikely that firms will contract with each beneficiary.

Fiscal instruments such as taxes (subsidies) and charges indirectly affect the provision of environmental goods and services by affecting the profitability associated with damaging activities. These instruments are indirect in the sense that there is no set threshold. Environmental outcomes depend on the responsiveness of firms to the incentive. This responsiveness in turn depends on other factors such as product price, which affects the profitability of the firm's activities. Some fiscal instruments generate revenues that can also be directly earmarked to provide the specific goods or services. For example, user fees and charges can be used by the government for the provision of environmental goods and for monitoring and enforcement efforts. Alternatively, the right to collect fees can be given to third parties who undertake environmental management activities. The willingness to pay for conservation is often related to whether fees are perceived to be earmarked or to be an additional way of collecting taxes.

To summarize, the role of economic instruments in conserving natural capital on Al-Pac's FMA can be explained in terms of market failure resulting from distorted incentives inherent in the economic institutions affecting behaviour on the landscape. Economic instruments can be used both to raise revenues for maintaining natural capital and to change behaviour. By integrating the real costs of environmental degradation and the benefits of environmental improvements directly into the incentive structure of producers and consumers, the allocation of resources will shift toward activities that are both environmentally sound and economically attractive. In addition, economic instruments tend to be cost-effective relative to strict command-and-control regulatory approaches, because they give firms flexibility in achieving environmental objectives in ways that minimize costs.

## 3. FISCAL BARRIERS

In this section we discuss fiscal barriers and perverse incentives that result in a failure to manage for natural capital on the Al-Pac FMA. These barriers may derive from explicit federal or provincial policies, or they may result from an absence of appropriate prices for environmental resources as discussed above. We begin with a discussion of overarching barriers including Alberta's business planning model and the tenure and public land disposition system. We then discuss sector-specific barriers for the forestry and oil and gas sectors.

### 3.1 Alberta's Business Planning Model

The Alberta government's business planning model consists of Alberta's vision, a 20-year strategic plan, medium-term strategies that include cross-ministry initiatives, and a 3-year business plan. The government's business plan has 12 goals and a set of performance measures and targets related to each goal. The business plan identifies areas of opportunity over the next 20 years related to natural capital. These are set out below:

- developing and using energy and natural resources wisely and exploiting new technologies to maximize the benefits of all resources;
- implementing a long-term water strategy and completing an effective land use policy that ensures the most appropriate use of these basic resources, while recognizing stewardship obligations with respect to future generations;
- ensuring reliable export markets, including a possible customs union with the United States;
- building on Alberta's economic cornerstones, such as oil and gas, agriculture, forestry and tourism; and
- working with municipal governments to support strong, viable, safe and secure communities.

The business plan also discusses the importance of a clean natural environment and states that it will place a priority on Alberta's natural environment by developing a framework for maintaining existing natural areas, as well as short- and long-term strategies that will ensure a balanced and sustainable approach to growth and industrial and resource development (Government of Alberta 2004).

Individual ministry business plans are published annually and cover a three-year period. The four departments with impacts on natural capital in the Al-Pac FMA include the Department of Energy (DOE), Sustainable Resource Development (SRD), Alberta Environment (AE) and Alberta Agriculture, Food, and Rural Development (AAFRD). We will discuss the roles of only DOE, SRD and AE in this section, although many of the barriers identified here will also be applicable to AAFRD.

The primary drawback of the government's business model is that it reflects the sector-specific mandates of each of its departments.

The energy sector has a significant impact on public lands and on the ability to protect natural capital on public lands. However, the goals of DOE reflect its sector-specific mandate. These include optimizing Albertans' resource revenue share and benefits from the development of their energy and mineral resources over the long term. They also include securing future energy supply and benefits for Albertans within a growing and competitive global energy marketplace. The key strategies in the DOE business plan for delivering these goals include working with other ministries to develop Alberta's natural resources in a sustainable, integrated and environmentally responsible manner through the water strategy and through integrated resource management (IRM) initiatives for the Front Range and Southern Alberta. Other strategies include expanding natural gas

reserves by encouraging exploration in areas that have not received sufficient evaluation to date (Alberta Department of Energy 2004). The Alberta Energy and Utilities Board (AEUB), which is responsible for regulation of the energy sector, also falls under the jurisdiction of DOE. Its goals include prompt and appropriate resolution of landowner, public and industry conflicts through the review and streamlining of existing regulations. This goal is supported by the government's Environment and Resource Development Regulatory Framework, which is intended to make the resource development regulatory system more effective based on the principles of one application, one approval, one regulator, one appeal and clear, transparent accountability.

The goals of Alberta Environment are related to maintaining the quality of air, water and land resources. Although AE's goals are related to maintaining the quality of Alberta's land resources, AE's performance indicators do not relate to land use per se or to the preservation of natural capital on the land base. AE is also the lead department for integrated resource management in the province, which involves multiple departments. As part of its IRM strategy, AE has initiated regional strategies, which are part of Alberta's *Commitment to Sustainable Resource and Environmental Management* (Alberta Environment 1999). The goal of the regional strategies is to establish regional policy direction and priorities tailored to the goals of specific regions within a consistent, province-wide program. The regional strategies are intended to be a process through which stakeholders can begin to understand trade-offs between different types of development options. One difficulty with the strategies that was articulated by stakeholders is that the regions have no authority to implement their vision, thus the stakeholders remain tied to the existing allocation system and business plans of the provincial government. Part of the problem is that the government faces a dilemma in determining which pieces of the regulatory framework for land use can be handled locally and which provincially. There is a trade-off between location specificity and the consistency required for regulatory streamlining across the province. Furthermore, decisions made at the regional scale have spillovers for the general provincial population in terms of forgone revenue opportunities or loss of natural capital. In order for the regional strategies to be successful, mechanisms are required that will facilitate the determination of local versus provincial trade-offs.

Sustainable Resource Development has responsibility for public land management in the forest zone of Alberta, as well as a mandate to integrate public and private values in order to ensure that land use achieves multiple benefits. Key goals stated in the department's business plan include ensuring that the values Albertans receive from public lands are sustained and enhanced for future generations; ensuring that the values Albertans receive from wild species are sustained and enhanced for future generations; and optimizing the long-term benefits (environmental, social and economic) that Albertans receive from public lands through effective, efficient disposition management. The department's strategies to achieve these goals include integrated land use planning, as well as working with communities and industry to ensure fair and reasonable opportunities for participation in the economic opportunities associated with resource development on public lands. SRD's broader mandate is reflected in its performance indicators, which

include healthy, viable wildlife populations, benefits from wild species and landscape integrity (Alberta Sustainable Resource Development 2004).

There are two primary problems with Alberta's business planning model with respect to conservation of natural capital. First, the narrow and often sector-specific mandates of individual departments create jurisdictional spillovers between departments. They also make it difficult to coordinate activities in order to manage for the cumulative impacts of multiple activities on natural capital. For example, the core business of DOE is to increase the production and productivity of energy resources in the province, particularly in new areas where there has been little exploration activity to date. Given the level of activity on Al-Pac's FMA, the objectives of the DOE create constraints for maintaining natural capital. In short, individual departments are focused on designing policy to maximize the productivity of the set of resources within their mandate rather than designing policies to maximize the total value of land for all resources. Therefore, departmental policies and agendas can be in conflict with integrated resource management. Although SRD has responsibility for managing land for multiple values, the policies and activities of other departments hamper its ability to implement a strategy that conserves natural capital, and it lacks the authority to carry out its goals as stated in the business plan.

The second but related problem is that departmental performance indicators are related to the productivity of specific sectors, rather than the productivity of the land base for the production of all goods and services (environmental and non-environmental). In addition, although the performance measures of individual departments are related to the overarching goals stated in the government's business plan, the business plan lacks integrated measures for evaluating the trade-offs among the activities and outputs of individual departments. For example, the 2003 Alberta budget included numerous measures of economic and social performance but not a single measure of natural capital (Canada West Foundation 2003).

### 3.2 Tenure/Disposition System

Another overarching barrier mentioned repeatedly by stakeholders is the land tenure and public land disposition system. In Alberta, the Crown retains the land base and issues usufructuary rights for resources (tenures) such as FMAs, and oil and gas leases, which confer rights to use resources for a specific purpose, are transferable only under certain conditions and require rent sharing with the province. The "strength" of the property right embedded in the tenure can be measured on the following six characteristics: exclusiveness, duration, transferability, comprehensiveness, benefits conferred and quality of the title.

*Exclusiveness* refers to the ability to prevent others from accessing resources. For example, a fishing licence in Alberta is non-exclusive because, while it gives individuals the right to fish, it does not give individuals the right to prevent other individuals from fishing in the same lake. In general, the less exclusive the property right, the weaker the incentive to prevent degradation to the resource because individuals cannot safeguard

their investments in protection of the resource. This results in a tragedy of the commons problem.

*Duration.* The longer the duration of the resource right, the greater the incentive for firms to invest in maintaining the productivity of the resource stock. The 20-year duration of an FMA is the approximate duration of the mill that it is tied to, but it is shorter than the rotation age for a typical stand in the boreal. This decreases incentives for reforestation and management over long time horizons. Therefore the government uses regulation to ensure that companies engage in long-term planning.

*Comprehensiveness* refers to the number of resources or values the tenure holder has rights to. The rights to land resources in Alberta are not comprehensive. For example, the rights to various species of timber are divided between FMA and quota holders. As a result, FMA and quota holders generate externalities by interfering with the optimal timing of harvest of the individual species. Moreover, opportunities for managing the land base more efficiently in order to satisfy mill requirements are limited. Finally, the mixedwood structure of many stands in Al-Pac's FMA is at risk, as companies re-plant according to prescriptions that suit their industry rather than the natural forest. In general, the more comprehensive the tenure, the more likely it is that firms will consider the impacts of their actions on other resources.

*Benefits conferred* refers to the ability of firms to retain profits or benefits from their activities. As long as government retains only "excess" profits or rents, then the public collection of benefits from production should not affect the incentive structure or behaviour of the firm. Since it is often difficult for governments to know what the private values are for production of resources, the best way to collect public rents is through auctioning rights. In this case, firms reveal their willingness to pay to extract resources.

*Quality* of the tenure refers to the legal strength of the property right. FMA holders (not quota holders) have clear property rights to the standing timber they have been granted under tenure. However, a standard clause in FMA agreements reserves the right of government to (1) withdraw from the FMA lands required, for example, for industrial facilities (s. 6 (1)(c) of the FMA) and (2) allow access by other users (e.g., for exploration activities under s. 8 (1)(b) of the FMA), with compensation paid to the FMA holder as specified in both cases. Forest companies with land-based tenures have the right to bargain in return for granting access to subsurface mineral right holders. If parties fail to come to an agreement on the amount of the resulting damages to timber resources, the Surface Rights Board grants a right-of-entry order and awards compensation to the surface right holder. Awards for timber damages are set out in timber damage assessment (TDA) tables and are based on averages of timber values obtained from public timber auctions. The TDA represents a "threat point" in the negotiation process between forestry and oil and gas companies and may bias the negotiations in favour of mineral right holders.

Because the disposition system in Alberta is based on rights for individual resources on the land rather than on comprehensive land rights, activities associated with individual

rights tend to be associated with externalities. This is the basis for the “overlapping tenure” problem that was often cited by stakeholders as one of the primary impediments to efficient land management. Forest company attempts to invest in natural capital, particularly through maintenance of undisturbed habitat, are hampered by the rights of energy exploration companies, which can override any land management plan. Overlapping and shared tenure was one of the most difficult issues identified by the Forest Stewardship Council (FSC) in the development of their certification standards for forest companies. The FSC standard adopted the tenet that where forest use rights are shared with other tenure holders, the applicant must be able to demonstrate that sharing these rights does not preclude meeting the FSC principles and criteria. In particular, the FSC recognized that tenure holders who want to be certified often have minimal influence on other forestry operators and lack of leverage to constrain the activities of companies in other sectors. This creates a difficult situation for Al-Pac, which is currently seeking FSC certification. Whether Al-Pac can be certified will depend largely on the willingness of other companies to enter into contracts that ensure that the relevant criteria, including establishing ecological benchmarks, can be met. In the absence of other incentives or mechanisms for achieving FSC objectives, meeting FSC criteria will require the voluntary compliance of other disposition holders, which will likely occur only if there are already private incentives for joint management for conservation values.

Finally, forest management areas and other land tenures are often not the appropriate scale for ecosystem management. FMA holders, as land stewards, are often required to meet multiple ecological objectives within the boundaries of each FMA. Ecosystem management requires mechanisms to manage across jurisdictions when forest management areas are not of an appropriate scale. Options include the need for offset policies that would allow forest companies to bring other managed public lands, private lands and adjacent park lands into the de facto management area.

### 3.3 Sector-specific Barriers

In this section we identify a number of sector-specific barriers and perverse incentives for maintaining natural capital. The focus of this section is on the energy and forestry sectors, since these two sectors have the highest impact in the FMA. While there are also perverse incentives associated with the agricultural and other mining sectors, these sectors were not highlighted by stakeholders during the interview process, and a full discussion of these sectors is beyond the scope of this work. We provide a brief summary of each barrier below.

### *3.3.1 Forest Sector Barriers*

**Figure 1. Forest Sector Barriers**

| Policy | Incentive | Potential Impact |
|---|---|---|
| **Stumpage and TDA** | •Undervalue fiber<br>•Not targeted for reforestation | •Increased rate of deforestation |
| **Landbase tied to Mill** | Trees not allocated to highest value | Increase rate of deforestation |
| **Adjacency Restrictions etc.** | Encourages extensive forestry | Reduced opportunities for TRIAD/Ecological benchmarks. |
| **Sustained Yield Policy** | Regulated forest | Forest structure does not reflect natural range of variability |

**Stumpage**

Stumpage is a volume-based charge remitted to government. The rationale of stumpage is to transfer some of the benefits of resources on public lands back to the public and to pay for forest management activities. One problem with volume-based stumpage charges is that they encourage high-grading of the resource: firms take the best and leave the lower quality fibre. High-grading thus leads to disturbance of a larger total area of forest to get the same amount of fibre. Ideally, stumpage rates would be tied to wood quality. In Alberta, stumpage is responsive to end use and also partially responsive to quality. However, it is still volume-based and in theory will lead to inefficient timber use.

**Harvest Tied to Mills and Employment Objectives**

The government constrains how the harvest is used through appurtenancy standards. Appurtenancy standards require fibre harvested from certain areas to be tied to mills and to fulfill local employment objectives. Therefore the amount of fibre and how it is used are not tied to the true market value of fibre, which may not be allocated to its highest and best use. In addition, FMAs require fibre to be cut, even if it is not economical, in order to meet employment objectives. To the extent that fibre is undervalued, appurtenancy requirements lead to an increase in the harvest levels and an overuse of the land base for timber relative to its economic potential.

**Use-It-or-Lose-It Requirement on FMAs**

FMA holders are guaranteed rights to their annual allowable cut only if they use them, that is, they must harvest the agreed-upon volumes of timber, for fear of being penalized. The use-it-or-lose-it requirement acts much in the same way as the appurtenancy requirements from an economic point of view. That is, the rate of harvest is not directly related to the economic value of harvest activities. In addition, the use-it-or-lose-it requirement creates uncertainty for land managers in meeting conservation objectives, particularly in setting ecological benchmarks. There is the perception among land managers that the government could challenge their investments in natural capital based on this requirement.

**Adjacency Restrictions**

Provincial governments regulate harvesting practices through restricting the size of harvesting areas, the spatial distribution of harvests through adjacency requirements, and even the temporal patterns of harvests through variable retention and multiple-pass harvesting requirements. Most of these restrictions have been developed in response to concerns about sustainability in managed areas and for managing visual quality. However, it is not clear that these restrictions actually have any ecological merit. In particular, they encourage extensive rather than intensive management of lands, and they require use of a larger area to obtain the same amount of fibre. They thus reduce opportunities for maintaining ecological benchmarks and ecological outputs that are sensitive to linear disturbance.

**Sustained Yield Policy**

Sustained yield is the principle used to determine the annual allowable cut (AAC). The objective is to ensure a continuous supply of wood in perpetuity. In order to generate a constant AAC, forests with heterogeneous age class distributions are reduced to “regular” forests with even-aged stands. Regular forests are characterized by an even distribution across age classes of even-aged stands up to the age of rotation. All old stands are harvested as soon as possible, and the land is reinvested into growing stock. The sustained yield principle is in conflict with biodiversity and ecosystem management, which relies on heterogeneity of forest characteristics and maintenance of old growth.

**Timber Damage Assessment**

Timber damage assessment is applied to timber removed during energy exploration and development, and it is paid to FMA holders or the government for damage to timber resources. Awards for timber damage are set out in TDA tables and are based on averages of timber values obtained from public timber auctions. The TDA is not related to the value of stands as natural capital, nor does it account for the costs arising from reduction in the options available to forest land managers to manage for natural capital. Finally, the TDA does not necessarily capture the loss of AAC and the costs associated with changes to the optimal harvest schedule arising from timber loss. The value of forest management efforts for FMA holders is reduced if the TDA systematically underestimates the value of fibre.

### *3.3.2 Energy Sector Barriers*

Regulations in the energy sector are designed to maximize the value of subsurface resources. At the same time, prices for petroleum and natural gas (PNG) products are determined on world markets and do not reflect environmental trade-offs at a local level. The taxation system is designed to stimulate exploration and maximize public sector revenues, but it does not reflect the damage to surface resources. Below we highlight some key energy sector barriers to the conservation of natural capital.

**Figure 2. Energy Sector Barriers**

| Policy | Incentive | Potential Impact |
|---|---|---|
| •Accelerated Depreciation Allowance<br>•Reduced Royalties for Oil Sands Expansion | Decreases current costs of exploration and development | Shifts energy impacts to present – constrains options for desired future forest |
| •PNG Lease development requirements<br>•Subsurface Rights Stronger the Surface Rights | 5 year development requirement | Reduced opportunities for coordination between energy and forestry |
| TDA | Payment not targeted to reforestation | Increased forest land withdrawals |

**Accelerated Depreciation and Reduced Royalty Rates for Oil Sands Expansion**

Under accelerated write-off programs, oil and gas companies can reduce current taxes by incurring exploration costs and pay higher taxes later when making a "profit." The programs thus create an incentive for companies to continue investments in exploration in order to take advantage of accelerated write-offs, and they artificially accelerate the rate of exploration and development. Shifting future resource development opportunities to the present constrains future opportunities for ecosystem management and encourages increased homogenization of stand ages.

Investments in oil sands receive significant tax concessions, allowing companies to write off all capital costs for a project before they pay any federal income taxes on the profits earned from the project. The benefit of the tax break for firms is $5 million to $40 million for every $1 billion invested. The tax and royalty regime for oil sands is significantly more generous than that for conventional oil and gas. Since the oils sands create three times the level of GHG emissions relative to conventional sources, the differential subsidies also lead to an inefficient mix of non-renewable energy sources (Office of the Auditor General 2000).

Other energy sector subsidies may also create perverse incentives for maintaining natural capital. These include direct investment in companies, loans, remitted taxes and export charges, and the government assumption of potential losses and liabilities. The federal

government has written off $2.8 billion of investments and loans in the non-renewable sector (Office of the Auditor General 2000). These subsidies contribute to an inefficient mix of renewable and non-renewable energy sources, and they also encourage exploration in areas that are economically marginal, which could provide high ecological values.

**Timber Damage Assessment**

Stakeholders commented that the TDA does not need to be spent on reclamation of the energy sector footprint. There are clauses in the FMA agreements that specify that monetary compensation received by the FMA holder from energy companies "shall only be used to offset damage to improvements such as plantations, roads, bridges or other facilities and to replace lost timber resource" through intensive forest management, purchasing of wood, etc. (see s. 6(8) of the Al-Pac FMA). However, forest companies can also allow part of the energy footprint to be classified as "not sufficiently forested" and withdrawn from the productive land base. The energy sector sees the purpose of the TDA as being to manage the energy sector footprint, while FMA holders see it as being to compensate for fibre loss. The energy sector expressed some concern that the TDA was not earmarked specifically for forest reclamation.

**PNG Lease Requirements**

Energy dispositions for conventional oil and gas are auctioned by the Alberta government every two weeks. Once the dispositions are granted, energy firms enter into discussions with the FMA holder for surface access. In general, PNG leases must be developed within five years. The lack of pre-tenure planning in issuing energy dispositions and the five-year time horizon for development constrain the ability of forest land managers to incorporate oil and gas activities in their detailed forest management plans in a way that minimizes environmental impacts. In addition, the time constraint may result in development of some leases before it is economically optimal. On the other hand, the five-year requirement prevents firms from holding resources without producing and potentially reduces their competiveness. The actual impact of PNG lease requirements requires further investigation to determine whether modifications in disposition requirements could improve planning for environmental impacts without reducing the competitiveness of the sector.

**Access to Water**

Processes for removing heavy oil require substantial inputs of water. Water is not priced or traded, and it is currently allocated on a first-in-time, first-in-right basis. As a result, firms have no incentive to conserve water when developing their resources and have an incentive to be first in line to obtain water rights. The allocation system does not provide incentives to protect instream flow needs or to allocate water to its highest and best use.

## 4. FISCAL OPPORTUNITIES

The literature on ecological fiscal reform is vast in terms of both theory and practice. We selected options for the Al-Pac FMA that both addressed the key concerns raised by stakeholders and were consistent with the policy environment for managing forest lands. Most of the options are "overarching" in the sense that they cover multiple sectors and/or

address multiple conservation objectives. The level of detail provided in the examination of the options below depends on the complexity of the instrument, as well as on the familiarity of the public with the use of the instrument. Some instruments, such as user charges, are straightforward and applied for many purposes. These received limited discussion. In this document, we focus on policies that will lead to an increase in total forest cover and ecological benchmarking, reflecting a "coarse filter" approach to maintaining natural capital. We adopted this approach because there seems to be a fair consensus on the need to reduce forest cover loss in order to maintain natural capital. In addition, policies that emphasize reducing forest cover loss are relatively easy to implement, because there is less focus on sector- and site-specific operations and heterogeneity.

### 4.1 Natural Resource Accounting.

The adage that what is measured is managed applies to government business planning. Economic and social indicators assess how we are doing, and the frequent measurement of these indicators results in sustained pressure on governments, businesses and non-profit organizations to respond to needs and perceived crises (Canada West Foundation 2003). One option for improving integrated land use planning between sectors and government departments is to require government departments to manage to a common set of indicators and to require forest users to report on and manage activities that impact these indicators.

Natural resource accounts monitor indicators of the physical stock of natural capital. The NRTEE recommends reporting on five natural capital indicators: air quality as measured by exposure to ground-level ozone, freshwater quality, total annual emissions of greenhouse gases, the percentage of total ground area covered by forests and the percentage of total ground area covered by wetlands (NRTEE 2003). One problem with these indicators is that they tend to track current outcomes rather than productivity of the stock of natural capital. Indicators such as percentage of forest cover do not adequately describe the overall performance of the system with respect to its ability to sustain the flow of environmental goods and services from the stock of forest land over time. Nor do they account for the relative value of goods and services produced.

An economic definition of sustainability is the maintenance of social welfare over successive generations through an appropriate mix of consumption and capital investment (including natural capital) over time. Sustainability indicators and natural resource accounts could be used to improve the business planning model in Alberta. Adjusted net national product (NNP) or green account measures are attempts to account for the value of non-market goods and services produced in the economy. These measures provide an opportunity for government and its various departments to manage toward a common aggregate measure of expected "wealth." In particular, the integration of departmental mandates could be facilitated by having all departments manage toward a common set of integrated indicators that account for multiple market and non-market values rather than indicators specific to the productivity of individual sectors. Under this system individual departments would, when evaluating their programs, have to account for the externalities

associated with their policies on other sectors. Similarly, the government's overall performance would be measured on the same basis, which would ensure consistency.

Green NNP requires the integration of both economic and ecological information. Most criteria and indicator systems, such as those put forth by the Canadian Council of Forest Ministers and the Forest Stewardship Council, separate economic and ecological indicators. Economic indicators are often related to employment, production and wages, not to the potential to maintain non-declining welfare through an appropriate mix of consumption and investment. Tracking the condition of these indicators at a specific point in time does not tell us anything about the ability of the capital stock (natural and anthropogenic) to produce a flow of goods and services into the future. Moreover, these measures do not account for the economic benefits created by the non-market goods and services (such as nutrient cycling) provided by the maintenance of natural capital.

Adamowicz (2003) criticizes criteria and indicator systems as attempts to assess the well-being of forest-based communities rather than economies as a whole and argues for a clearer focus on environmentally adjusted economic indicators such as green NNP. Natural resource accounts are necessary in order to develop green NNP or other indicators that integrate economic and ecological elements into an aggregate measure of welfare. However, there are still many challenges with measuring the value of inputs that go into green accounts, such as non-timber benefits and ecological services, as well as depreciating or appreciating capacity for these sectors (Adamowicz 2003).

### 4.2 Increased Property Rights for Non-Timber Resources

Management for multiple non-timber benefits on public lands can be enhanced by increasing the property rights for non-timber resources. In general, rights to forest resources other than timber (such as water, wildlife and forage) are governed by weak property rights. Management for these values could be improved by assigning stronger rights for fish and wildlife to create incentives for hunters and anglers to manage access and poaching, as well as by increasing the transferability of forest tenures so that FMA holders, and even the general public, could purchase quotas or oil and gas leases.

Co-management agreements offer an opportunity to increase the rights of hunters and anglers to resources while also providing a vehicle for improved management. Co-management is important because the greatest risks facing some boreal species are not caused by linear features per se. Rather, these risks come from the increased human access associated with these features and the resulting poaching and road-kill incidents. Stakeholders voiced concern that existing fish and wildlife regulations are often poorly enforced due to budget restrictions in relevant departments. Co-management agreements with fish and wildlife organizations could alleviate access-related pressures on particular species. In this model, conservation organizations would have the right to allocate fish and wildlife resources. Revenues generated from selling these rights would then be earmarked to fund enforcement of existing regulations and manage access. This would likely be more acceptable to the public than increasing taxes in order to fund government-led enforcement efforts.

A number of changes to Alberta's timber management policy could also be implemented in order to strengthen property rights, including an expansion of provisions for competitive bidding as the means of allocating timber rights. Restrictions on the transferability and divisibility of timber rights impedes competition, promotes industrial concentration and prevents the allocation of fibre to its best use. Furthermore, the lack of transferability of licences reduces opportunities for the spatial and temporal management of harvests and impedes managing for natural capital. Decoupling the land base from the mills, amalgamating forest tenures and increasing transferability will mitigate these problems.

### 4.3 Transferable Development Rights

Transferable development rights (TDRs) conserve natural and heritage values by creating markets for rights to activities that damage these values. Tradable development rights are assets that are created by government and can be used to compensate disposition holders for non-development or non-exploitation of land. TDRs can be thought of as an approach to environmental management that combines regulation and market forces. As with command-and-control approaches, the governing authority is required to set zones or thresholds for use; however, it also provides a market-like institution for achieving the environmental objective. An important characteristic of TDRs is that they separate ownership of the right to develop land from ownership of the land itself, creating a market in which the development rights can be bought and sold. Therefore, they can be employed irrespective of whether the underlying property right system is public or private. In the conventional model, landowners who sell TDRs permanently preserve their land, while buyers increase the density of development in a less sensitive location. The fact that the underlying title to the land is not altered makes TDRs compatible with existing tenure structures and facilitates their implementation.

There are two means by which a tradable permit system can be implemented. Under a bilateral trading system, the owner of surplus forest land is paid to keep enough forested land to satisfy the buyer's reserve requirements. However, the transaction costs in this case can be high: landowners must take time to find, purchase and administer offsetting properties, and the fact that the buyer's status depends on the seller's compliance increases the risk associated with the transaction. Alternatively, property owners may be assigned development rights equivalent to the number of hectares that can be disturbed up to the conservation threshold, and these can then be traded. Transferable development rights provide incentives for firms to meet thresholds for forest cover loss. TDRs can also be thought of as mechanisms for implementing an offset or no-net-loss system for forest cover or different habitat types. Weber and Adamowicz (2002) discuss in detail how a TDR system could be implemented in Alberta's northeastern boreal forest.

### 4.4 GHG Emissions Trading and Carbon Credits

The boreal forest plays an important role in the global carbon cycle, and the production of forest products is an energy-intensive activity. Forestry activities have the potential to serve as both a GHG source and sink. GHG sources result from harvesting activities, natural disturbances such as fire, soil disturbance and the decomposition of waste material. Carbon sinks result from the potential of forests to sequester carbon in both

soils and biomass (Nelson and Vertinsky 2003). Carbon management will affect the activities of all sectors and change the distribution of forest characteristics on the landscape. This may result in two potential benefits in addition to reducing net GHGs: an investment in the forest growing stock and an increase in the total amount of forest cover. On the other hand, fire and pest outbreaks are sources of GHG emissions, so carbon policies may also create incentives to manage fire and insects and reduce natural disturbance cycles on the landscape.

Tradable carbon credits are being considered as one means to implement Canada's commitment to GHG reduction under the Kyoto Accord. Firms may consider reducing harvests and production where the relative return from selling carbon credits (through either curtailing production or carbon sequestration) is greater than from expanding production at the margin. For example, in Saskatchewan 200,000 ha of forest have been removed from the harvesting land base and placed in forest carbon reserves. Reductions in harvested area may be offset by more intensive forest management elsewhere. Therefore carbon credits, like TDRs, have the potential to act as a mechanism for creating zones of intensive management. GHG emissions trading may also lead to changes in harvesting practices that reduce emissions at the stand level through selection logging or through extending the harvest rotation length (Nelson and Vertinsky 2003). Thus low-impact harvesting techniques may also change the age class structure of the forest. Nelson and Vertinsky (2003) argue that while we are likely to see an increase in pest management, including selective harvest of stands to prevent outbreaks, it is unlikely that significant additional fire suppression efforts will have much effect on the landscape. This is because the current burned area in the managed forest results almost entirely from the small number of fires that escape containment and become large. Other actions that could negatively affect the function of forest stands include the reduction of fuel loads to reduce the chance of fire and the increased use of post-disturbance salvage for forest products.

One interesting aspect of developing markets for carbon is how these might be achieved within the existing public land–private disposition structure that governs the boreal. The relationship between existing resource tenures, the forest management regime, and the legal and policy framework for biotic carbon sequestration may require clarification. Carbon rights legislation would have to establish specific legal mechanisms for the creation of trading in sequestration potential and sinks-based offsets that could provide investors in offset projects with a secure property right that could be enforced in perpetuity on public lands. The Australian state of New South Wales has addressed security and transferability of carbon rights by enacting legislation that (1) explicitly establishes property rights and (2) grants holders of rights a guarantee of access to the land and ability to block injunctions against land uses with an adverse impact on carbon sequestration. This type of legislation could also be used to enable conservation easement-type arrangements on public lands (see below).

### 4.5 Conservation Easements on Public Lands

Conservation easements have never been viewed as a mechanism that could be applied on public lands. However, innovative policies for sequestering carbon on public lands provide some insight into innovations for managing for other ecological services.

Conservation easements provide a mechanism whereby private agencies can purchase rights from private landowners and take land out of production in perpetuity. They are thus important mechanisms for enabling the public to reveal its preferences regarding economic development and conservation in a marketplace and for compensating other disposition holders. One difficulty with applying conservation easements on public lands, however, is that the government and the public receive revenues from the lands and thus also have a stake in the future resource potential embedded in particular land parcels. One way to overcome this problem is to require some share of the value of the conservation easement to be transferred to the public in any transaction that neutralizes activities on the land. An interesting variation on the conservation easement model is the "agglomeration bonus," which offers preferential prices for easements based on their "contiguity" (Parkhurst et al. 2002). The agglomeration bonus is designed to generate large, unfragmented core areas of habitat.

### 4.6 Forest Investment Tax Credits

Forest investment tax credits could be applied to any forest operators (forestry companies, energy companies, etc.) that create investments in natural capital by creating ecological benchmarks or leaving forest undisturbed. Tax credits provide a mechanism for recovering costs from forest investments that reflect non-timber values. Tax credits might also counteract the accelerated depreciation effect in the energy sector. Tax incentives have been employed in Costa Rica, where the government has instituted a "transferable reforestation tax credit" so that small landowners can sell their credits to their wealthy counterparts with higher taxes to offset (Panayotou 1994). Land taxes may also be classified according to land use, with the charge increasing with the level of impact (Panayotou 1994). Tax credits have the advantage of being applicable across all sectors, and they are usually regarded favourably by industry. On the other hand, tax credits might also be perceived as reducing the public benefits from land use and contrary to the polluter-pay principle.

### 4.7 Certification

Certification is a market incentive for incorporating non-market values in forest prices. It thus provides an incentive for producing a social benefit in output decisions. Specifically, certification creates incentives for firms to manage for natural capital by providing a price premium for products and an increase in market share. The degree to which the criteria required to obtain certification reflect sustainable resource management and investments in natural capital is a question that requires further investigation. Criteria and indicators associated with certification programs are subject to the same criticisms put forth in the previous discussion on natural resource accounts. Al-Pac is currently pursuing FSC certification, which is one of the more stringent certification schemes available. Impediments to Al-Pac's obtaining FSC certification were discussed in the previous section and should be removed in order for this mechanism to be effective.

### 4.8 Access Charges/User Charges

Non-decommissioned roads that are used for recreation contribute to linear features. Recreationists who use these features free of charge create an externality in that they do not account for the impacts of their decisions on natural capital in the individual decisions. Tolls for non-decommissioned roads would reduce incentives to maintain roads that are not of high value.

## 5. CONCLUSIONS

This final part of the Al-Pac case study provides an overview of the role for fiscal incentives and economic instruments in maintaining natural capital on Al-Pac's FMA. We provide a summary of current fiscal barriers and potential opportunities for promoting conservation. The choice of instruments described here reflects the outcome of our review of the literature, as well as interviews with stakeholders. We find that the key overarching barriers to managing for natural capital relate to the tenure and disposition system for allocating resource rights on public lands, as well as the Alberta government's business planning environment. We discuss several sector-specific barriers to conserving natural capital for the forestry and oil and gas sectors, including regulatory requirements within the tenure and disposition agreements. Finally, we suggest several opportunities for increasing incentives for environmental management. These include using natural resource accounts and sustainability indicators in the government's business planning model and employing improved and new forms of resource tenures on public lands. New tenures include tradable development rights, carbon credits and conservation easements.

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