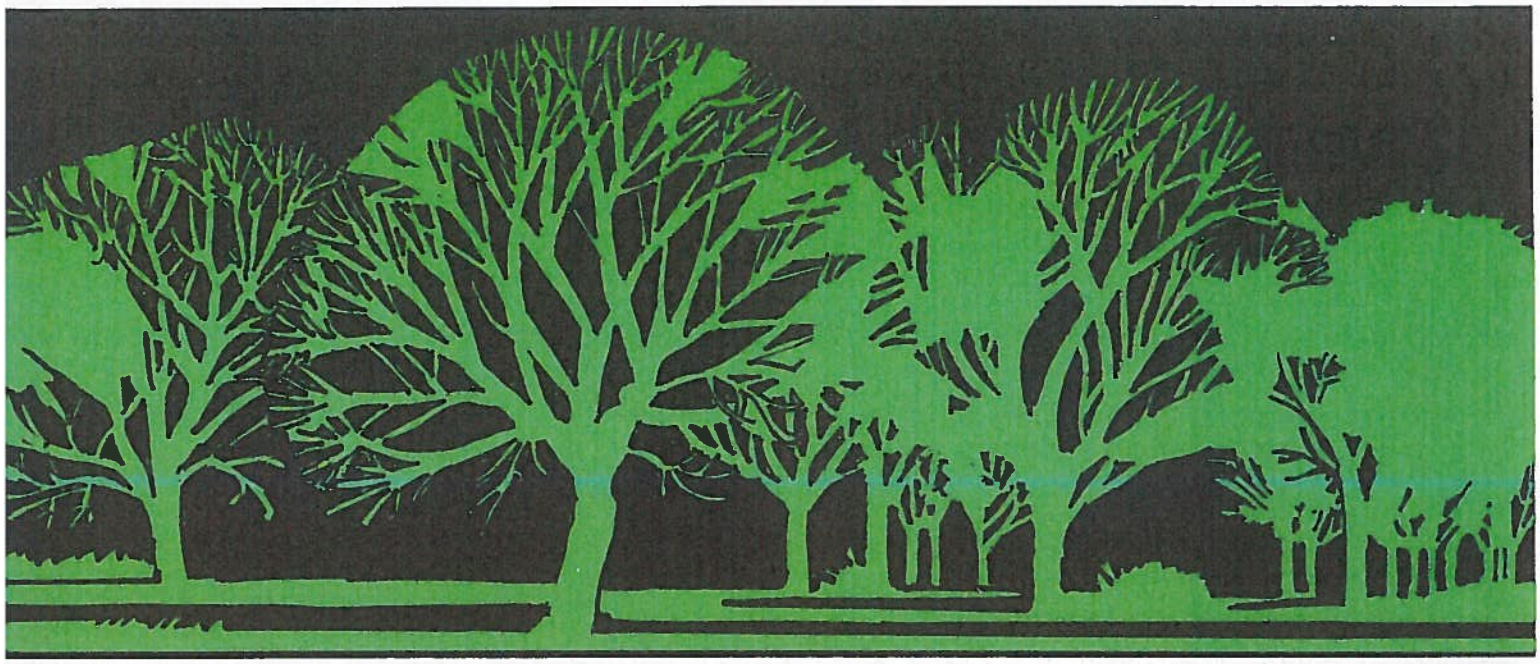

CONSERVATION AND MANAGEMENT STRATEGY FOR RIPARIAN FORESTS IN SOUTHERN ALBERTA

World Wildlife Fund Canada
and
Forestry, Lands & Wildlife,
Fish & Wildlife Division

May, 1992

ALBERTA
ENVIRONMENTAL PROTECTION

Office of the Minister

Responsible for Forests, Parks and Wildlife

Dear Albertan:

On behalf of Alberta Environmental Protection, I am pleased to present you with a copy of the *Conservation and Management Strategy for Riparian Forests in Southern Alberta*. Preparation of this Strategy began in 1988, when the Government of Alberta and the World Wildlife Fund (Canada) joined forces to actively conserve wildlife and their habitats in prairie Alberta. This program, named Prairie-for-Tomorrow, is now complete, and more than 60 cooperative projects have been successfully initiated in southern and central Alberta.

The Riparian Conservation Strategy is an excellent example of the new partnerships which have been fostered under the Prairie-for-Tomorrow Program. Development of this strategy relied on the input and participation of the diversity of government and non-government agencies, organizations and individuals concerned with land and water management in southern Alberta. More than 40 of these agencies and organizations working together as the Prairie Conservation Coordinating Committee, have endorsed and adopted this strategy.

Riparian river valley forests are a unique and valued ecosystem which provide benefits to both human use and as a refuge for an amazing diversity of native wildlife. This Conservation Strategy provides a clear and positive framework to guide Albertans in their collective responsibility to manage these special communities.

Our shared vision is that these native riparian forests will continue to flourish along southern Alberta rivers so that current and future generations of Albertans can enjoy their benefits and appreciate their intrinsic values. This vision can only be achieved through the good will and commitment of the diversity of individuals, organizations and agencies responsible for land and water management in southern Alberta.

.../2

323 Legislature Building, Edmonton, Alberta, Canada T5K 2B6 Telephone 403/427-2391, Fax 403/422-6259

The Alberta Department of Environmental Protection is pleased to present this Strategy to Albertans. We will be incorporating the concepts and goals presented into our existing programs, and encourage you to join us in taking positive action to ensure the conservation of our prairie riparian forests.

Sincerely,

Brian Evans
Minister

Enclosure

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World Wildlife Fund Canada

and

Forestry, Lands and Wildlife,

Fish and Wildlife Division

May 1992

This project funded in part by the

Recreation, Parks and Wildlife Foundation

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EXECUTIVE SUMMARY

The World Wildlife Fund Canada and the Fish and Wildlife Division of Alberta Forestry, Lands and Wildlife jointly initiated the development of a conservation and management strategy for riparian forests in southern Alberta in the spring of 1990. Growing concern about the survival of riparian forests in the prairies of southern Alberta and a recommendation in the *Prairie Conservation Action Plan (1989-1994)* for riparian ecosystem management plans led to this strategy initiative. Albertans derive substantial benefits from native forests along prairie river valleys for recreation, wildlife habitat, aesthetics, agricultural use and water quality. Riparian forests are also important to Albertans for spiritual and cultural reasons.

Process

The four key steps in producing the strategy development were guided throughout by a multi-stakeholder advisory group. First, information was gathered on the current distribution and density of riparian forests, historical trends, factors affecting regeneration and survival and the conservation biology of riparian forests. Second, interviews were conducted with a broad range of stakeholders to determine management issues and options. Third, a draft document was prepared and a multistakeholder workshop convened to review and recommend a conservation and management strategy for riparian forests in southern Alberta. Finally, the strategy was developed based on the results of the previous three steps.

Opportunities and Challenges

Experience in Alberta and other jurisdictions shows that loss of riparian forests on the prairies can occur if the forests' requirements are not considered in water and land use planning and management. Until recently, planning and management in Alberta have not recognized the value and special requirements of riparian ecosystems. If the benefits that riparian forests provide are to be ensured, then Albertans will need to recognize and accept the responsibility for conserving them. While the urgency of the situation in Alberta is uncertain at this time, the opportunity exists to avoid problems that other jurisdictions are trying to remedy.

During development of the strategy, several issues were identified and a range of options or opportunities were suggested for improving the way we manage riparian forests in southern Alberta. Six key management categories were identified: research and technology development; information, encouragement and economic incentives; land use planning; water resources management; range management; and wildlife and recreation management.

Background information and the consultation program identified five key management challenges:

- **Information gaps need to be addressed for improved decision-making.**
- **Albertans will need to understand the issues and be willing to make the necessary changes.**
- **Priorities need to be set for allocating limited resources.**
- **Fuller consideration of all costs and benefits is needed in decision-making.**
- **A comprehensive management approach is required that integrates land and water management.**

Strategic Framework

To respond to these challenges, a framework for decision-making about riparian forest management was developed. This framework, which was agreed to by a broad range of stakeholders, provides a vision, mission, principles and goals for conserving and managing riparian forests. The guiding vision is as follows:

> **Native riparian forests will flourish along southern Alberta rivers so that current and future generations of Albertans can enjoy the benefits and appreciate the intrinsic value of these special communities.**

The vision provides the basis for the following mission statement:

> **To sustain native riparian forests as key components of southern Alberta river ecosystems by managing land, water and resource uses to protect ecological integrity.**

Commonly accepted principles that form the philosophical basis for the strategy are also presented in the report. They address the following concepts: a sound information base for decisions; public access to accurate and credible information; cooperative and consultative approaches to decision-making and action; fairness through full consideration of environmental, social and economic costs and benefits; and innovation and flexibility in achieving goals and actions.

Goals

The following goals are designed to address the issues, opportunities and key challenges identified for conserving and managing riparian forests in southern Alberta and are based on the strategic framework.

Goal A

To improve awareness and communication about native riparian forests--their benefits, ecology and management issues, and the actions needed to perpetuate these benefits.

Goal B

To improve water planning and management so as to encourage the conservation of riparian forests.

Goal C

To improve public and private land use planning and management for the conservation of riparian forests.

Goal D

To identify and remedy information gaps regarding native riparian forests, for improved decision-making.

Goal E

To implement a comprehensive approach to managing riparian ecosystems that integrates land and water management decisions.

Objectives and Actions

For each goal, specific objectives and actions are provided. They do not constitute a comprehensive list, but are generally considered by participants as the most important and/or feasible items in strategy development. As much as possible, specific organizations, either government or nongovernment, are identified that might take responsibility for the suggested actions. However, there may be other practical and achievable objectives and actions that agencies will choose to identify and act upon.

Implementation

The strategy has been developed to assist various government and nongovernment organizations to conserve and manage riparian forests in southern Alberta. It encourages a pro-active plan of action. Success of the strategy will require individuals and organizations (government and nongovernment) to base their decisions about riparian forest management on the strategic framework and take steps to conserve and manage riparian forests.

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1.0 INTRODUCTION

Poplar forests along prairie river valleys yield to Albertans the benefits of recreation, wildlife habitat, aesthetics, agricultural use and water quality. They also provide for spiritual and cultural needs. These benefits are substantial, especially considering that poplar stands in river valleys occupy less than 1 percent of the total land area in the grassland region of southern Alberta (including the drainage basins of the Red Deer, Bow, Oldman, South Saskatchewan and Milk rivers). Albertans want to ensure these poplar forests continue to be part of southern Alberta river habitats for the benefit of current and future generations.

However, experience in Alberta and other jurisdictions shows that these riparian forests can be lost, if their requirements are not considered in water and land use planning and management. Decline of forests has been attributed primarily to the flow alteration that results from water use for agricultural, industrial and domestic purposes and to land uses on floodplains, including livestock grazing, and industrial, residential and recreational developments. While recognizing the significant contribution these activities make to southern Alberta's economy, many Albertans also recognize there are substantial values (economic, environmental and social) in maintaining riparian forests. As well, there is growing recognition that Albertans, individually and collectively, need to understand the effects of their actions on riparian forests and take responsibility for ensuring the survival of these forests.

Development of management plans for riparian ecosystems was an action identified in the *Prairie Conservation Action Plan, 1989-1994* (PCAP). The PCAP, developed by World Wildlife Fund Canada, was endorsed by Alberta's Minister of Forestry, Lands and Wildlife who established a 50-member committee, the Prairie Conservation Coordinating Committee, to oversee implementation of the plan. Consequently, in spring 1990, Prairie for Tomorrow--a joint undertaking of World Wildlife Fund Canada and Alberta Forestry, Lands and Wildlife (Fish and Wildlife Division)--initiated a project to prepare a conservation and management strategy for riparian forests in southern Alberta.

From the outset, it was recognized that consultation among key interests should be an important component of strategy development. An advisory group was established with representatives from Alberta Cattle Commission, Alberta Environment, Alberta Fish and Wildlife, Federation of Alberta Naturalists, Natural and Protected Areas of Alberta (Public Lands Division), Regional Coordination Services of Alberta Forestry, Lands and Wildlife, and the Alberta Water Resources Commission. The advisory group provided advice on the consultation process, reviewed information materials and coordinated networks with others in their organizations.

Development of the strategy was carried out in four steps and involved input from a broad range of organizations and individuals.

Step One: Biology and Status Report - A study was conducted during June to December 1990 to determine the present distribution and density of riparian forests along rivers in southern Alberta and, by using aerial photography and historical maps, to assess changes in distribution and density. As well, studies relevant to the conservation biology of riparian poplars were reviewed. To ensure accuracy and completeness, a draft report was circulated for comment to several individuals knowledgeable in the field. The revised report, *The Biology and Status of Riparian Poplars in Southern Alberta*, was published in February 1991. Copies are available from the Nongame Unit, Fish and Wildlife Division, Alberta Forestry, Lands and Wildlife. The report provides managers of riparian habitats and other interested individuals with an information base to assist in decisions about conserving and managing riparian poplars.

Step Two: Interviews with Stakeholders - The second step was to determine the scope of conservation and management issues and the options available for dealing with these. **To ensure input from those individuals with an interest and a role to play in the management of riparian poplars, interviews were conducted with 46 key stakeholders during April through June 1991.** Interviewees included resource planners, water managers, public lands managers, wildlife specialists, Natives, irrigation water users, conservationists, canoeists, researchers and ranchers. Results of the interviews are summarized in a report *Results of Interviews with Key Stakeholders* published in August 1991.

Step Three: Draft Strategy and Workshop - A workshop to discuss and recommend a strategy for conserving and managing riparian poplar forests was held in conjunction with a meeting of the Prairie Conservation Coordinating Committee on January 28, 1992. Forty individuals participated in the workshop including water and land use planners and managers, wildlife managers, ranchers, natural area managers, municipal administrators, university researchers, environmental consultants, conservationists and Native representatives. A list of workshop participants is provided in Appendix 3. Discussion at the workshop focused on a draft strategy developed from the biology and further information.

Step Four: Recommended Strategy - The recommended strategy is based on the findings, conclusions and recommendations of the first three steps. It encourages a pro-active plan of action for conserving and managing riparian poplar forests, which will involve not only government agencies, but also organizations and individuals outside of government. A glossary is included to clarify terms and provide easy reference for defining acronyms.

2.0 STATUS OF RIPARIAN FORESTS IN SOUTHERN ALBERTA

Riparian poplars are the only tree species native to river valleys in the grasslands of southern Alberta. Their survival depends on adequate river flows. Their regeneration depends on the dynamic nature of rivers to create suitable conditions for seedling establishment through flooding and channel shifting. Many species of plants and animals are associated with riparian poplars. Together, all these species make up a complex forest ecosystem, which is a very important component of the floodplain environment.

2.1 Distribution and Population Trends

Distribution and density of riparian forests in southern Alberta are shown in Figure 1. Three poplar species and their hybrids are included in the forest canopy:

- **"Plains cottonwood - generally found east of a line running approximately between Lethbridge, Bassano and Drumheller;**
- **"Narrowleaf cottonwood - generally found in the southwest corner, extending only as far northeast as Lethbridge;**
- **"Balsam poplar (black cottonwood) - generally found in the foothills and northwest, west of a line running approximately between Lethbridge, Bassano and Drumheller. Black cottonwood is the subspecies of balsam poplar found from the Bow River southward**

All three species of poplar interbreed freely in southern Alberta. Interestingly, it is there that all are at the limits of their North American ranges. Particularly noteworthy, Alberta is the only province in Canada in which narrowleaf cottonwood and its hybrids occur.

Riparian forests are found along about 1500 km of river and occupy a total area less than 700 km^2, or less than 1 percent of the grassland region of southern Alberta. Of the total 2075 kilometres of river valley shown on Figure 1, 9 percent supports very dense stands, 15 percent supports dense stands, 22 percent supports moderate stands, 30 percent supports sparse stands and 23 percent has no poplars.

Notably, the highest densities of riparian forests occur along the Oldman River and its tributaries west of Lethbridge, along the Bow River and its tributaries west of Cluny and along the Red Deer River below Finnegan. Common characteristics of these river reaches are their broad floodplains (greater than 500 m) and their freely meandering or braided channels.

Distribution and density of mature riparian forests generally appear to have changed little since the 1950s, based on a comparison of 1980s air photos with those from the 1950s. In addition, the distribution of riparian forests today corresponds generally with that suggested on maps prepared by Dawson in the 1880s as part of the Dominion Survey. Air photo comparisons suggest slight increases in density along three 50-km reaches, one on each of the South Saskatchewan, Red Deer and Bow rivers. Declines in density have been documented along the St. Mary and Waterton Rivers below dams and along a 10-km reach of the Milk River as a result of fire.

The fact that a widespread loss of riparian forests has not occurred in southern Alberta over the past 30 years, and perhaps since the 1880s, suggests that, in general, land management practices have not affected survival. On the other hand, it appears that some water management practices, specifically in southwestern Alberta, have caused mortality of mature trees.

There are, however, important limitations in using a 30-year air photo comparison to assess status and trends and to draw conclusions about management practices. For example, information on regeneration is not obtained from air photo analysis, because seedlings and saplings are not detectable on air photos. Since riparian poplars often live to be over 100 years old, 30 years may be too short a period for changes in regeneration to be reflected in changes in tree canopy.

Several stakeholders interviewed as part of this project expressed concern about regeneration of riparian poplars. Anecdotal evidence was presented regarding a lack of seedling establishment and seedling or sapling mortality in specific locations, which was attributed to several factors. Concern also was expressed about regeneration and survival of tall shrubs that are associated with riparian poplars.

Clearly, there is a need to obtain a better understanding of the status of riparian forests in southern Alberta, and more importantly, of the factors affecting the three poplar species at all stages in their life cycle. Understanding how current management practices benefit or harm riparian forests is an important first step in planning for these forests' future.

2.2 Factors Affecting Establishment and Survival

Awareness and concern about riparian forests in the prairies has increased as a result of several studies since 1975 that have documented the decline of forests along rivers in western North America. Besides Alberta, declines have been documented in Montana, North Dakota, Wyoming, Colorado, Arizona and California. Factors identified as responsible for declines include altered flows, sedimentation processes and channel stabilization all downstream of dams and diversions, livestock grazing, clearing for floodplain developments (residences, cultivated fields, golf courses, gravel quarries and roads), herbicide use, fire and beaver. One other factor contributing to riparian forest decline, identified through studies in the 1930s and 1940s, is prolonged drought.

As well, there is growing appreciation that some of these factors may operate gradually over many years by thwarting establishment of poplar seedlings or stressing older trees, and hence decline might not be apparent for several decades after the factor begins to operate. For example, concern has been expressed by Albertans about the long-term effect of the Oldman Dam on riparian poplar forests immediately downstream. The long-term effects of grazing on river valley forests in southern Alberta is also a concern. Benefits derived from these forests by the current generation of Albertans might not be substantially affected, but those of future generations could be.

Furthermore, there is increased recognition of cumulative impacts. One factor alone may not affect riparian poplar establishment and survival significantly, but two or three operating together could have dramatic effects.

2.3 Benefits and Values

Riparian forests along river valleys in the prairies are valued highly by southern Albertans. According to the results of stakeholder interviews, a medium to high priority is placed on the maintenance of these forests, relative to other conflicting resource uses. A list follows of the benefits riparian forests provide.

Recreation - For many southern Albertans, riparian forests in river valleys are preferred above any other environment for outdoor recreation activities such as picnicking, hiking, bicycling and camping, and they contribute greatly to water-related activities such as fishing and canoeing. Seven provincial parks--Dinosaur, Dry Island, Fish Creek, Taber, Woolford, Writing-on-Stone and Wyndham-Carseland--as well as major urban parks and trail systems in Calgary, Lethbridge and Medicine Hat and several parks in smaller centres are located in riparian poplar forests. These forests are also the sites of several provincial recreation areas and wayside stopping points. Popular boating trips on the Bow River, Red Deer River and Milk River are on reaches bordered by stands of poplar.

Wildlife Habitat - Wildlife surveys have found that deer concentrate in southern Alberta riparian forests during the breeding season and critical winter periods with densities of up to 12 deer/km^2 (recorded in one winter survey), which far exceeds those of any other prairie habitat. As well, **a study in Dinosaur Provincial Park found that breeding bird densities in riparian poplar forests are among the highest in Canada (550-706 pairs/40 ha)** and that about 70 percent of the breeding bird species found in the park use this habitat exclusively. Furthermore, several plant species, such as water birch and thorny buffaloberry are restricted largely to these habitats.

Aesthetics - Poplar forests in river valleys are considered by southern Albertans to be an important part of the prairie landscape. They provide scenic relief and diversity. Even individuals who seldom go into these forests value them for aesthetic reasons.

Livestock Shelter - For livestock producers on river valley lands supporting poplars, these forests provide their animals shelter from hot summer sun and cold winter wind.

Water Quality - Riparian forests can improve aquatic ecosystems by stabilizing banks, contributing organic matter, providing shade and regulating runoff. On the other hand, they may take water from the river through evapo-transpiration.

Intrinsic, Spiritual and Cultural - Some southern Albertans derive spiritual value from riparian forests while others recognize intrinsic or existence values. Furthermore, **riparian poplars and associated plants and animals play an important role in some Native ceremonies and traditions where they are recognized as having their own spirits.** In the past, riparian forests served as winter camps for the Plains Blackfoot. As well, early settlers built their homes in the shelter of poplars. The distribution of these forests influenced the location of Indian Reserves and settlements in southern Alberta.

2.4 Ownership Patterns

As part of the collection of background information for the strategy, ownership of land containing riparian forests was determined. Several ownership categories were differentiated and the number of quarter sections in each of these categories determined for each county, municipal district, improvement district and special area as well as for each river. A discussion of methodology and detailed results are presented in Appendix 1.

The following is a summary of the percentage of total riparian forest occurring in eight ownership categories:

Ownership Category	Percentage of Total Riparian Forest (# of 1/4 sections)
Private	47.7 (1476)
Province (excl. parks, etc.)	21.8 (676)
Indian Reserve	17.6 (545)
Town/City	4.3 (133)
Unknown	3.7 (114)
Park/Natural Area	2.8 (88)
Federal	1.6 (49)
M.D./County	0.4 (13)

3.0 ISSUES AND OPPORTUNITIES

During development of the strategy, several issues were identified and a range of options or opportunities were suggested for improving the way riparian forests are managed in southern Alberta.

3.1 Research and Technology Development

There are several information gaps in our scientific and technical knowledge about the ecology and management of riparian forests. Reducing the unknowns through research will allow more appropriate management objectives to be defined. New technology will allow prescription of more cost-effective actions for achieving management objectives. Technology in this context refers mainly to management systems, known as soft technology, as opposed to hard technology which refers to physical innovations.

Given financial resource constraints, this research and technology development should be coordinated and prioritized with focus on the sustainability of the resource. Communication and cooperation with researchers in other jurisdictions should be encouraged when investigating the more generalized aspects of ecology and management of riparian poplar forests.

A critical, unanswered question raised in the various discussions during strategy development was whether current regeneration of poplars along rivers in southern Alberta is adequate to sustain riparian forests. To answer this, analysis of age classes in riparian poplar forests is required to determine rates of regeneration compared to mortality. To date, studies on age class structure have been conducted for stands along the Milk River, Red Deer River, Highwood River, Willow Creek and St. Mary and Waterton rivers. These studies have found the following: along the Milk River, through the canyon, regeneration appears adequate to sustain the forests; along the Red Deer River near Dinosaur Provincial Park, younger age classes needed to replace extensive stands of older trees are lacking; and, below dams along the St. Mary and Waterton rivers, there is a decline of older trees with few young ones to replace them. Results from studies along the Oldman River, Willow Creek and the Highwood River are not yet available, though preliminary findings suggest an absence of young age classes. A more comprehensive assessment of current sustainability of riparian poplar forests in southern Alberta is required. At the same time, a monitoring system is needed to identify changes in age structure, density and distribution of riparian poplar forests over time.

More information is needed on methods of reproduction (seedling, suckering or sprouting) predominating for the three different poplar species and their hybrids and on the conditions favouring establishment of young poplars and survival of older trees along different river types. Similarly, more information is needed on the ecological requirements of understory plant species, which range from low herbs to tall shrubs. **Habitat selection of wildlife species is associated with understory composition and structure as much as with that of the canopy.** As well, there is evidence that ecological requirements of some understory shrub species may be even more stringent than those of poplars.

Further research is required to address the effects of current water management projects and land use activities, such as livestock grazing, on riparian forests and their understories. Current management practices that are compatible with regeneration and growth of riparian forests need to be identified, as do opportunities for minimizing adverse effects.

Managers of high-use recreation areas have identified a need for research on innovative ways to control mortality of mature riparian poplars caused by beaver as well as on horticultural methods for maintaining a native poplar canopy.

3.2 Information, Encouragement and Economic Incentives

During strategy development, interviews showed Albertans need increased understanding of riparian forests, specifically about the significant benefits they provide, the risks to their survival and their management needs. Such understanding is required, if decisions to benefit riparian forests are to be made. In some situations, it may be enough to simply provide the relevant information at the appropriate time to bring about a better-informed decision. In some cases, there may be a requirement for a long-term investment in education to yield the desired change in attitudes in a succeeding generation. In other situations, encouragement in the form of nonmonetary rewards or penalties may be required for better management of riparian poplars. Finally, economic incentives to change management approaches may be required.

Information Program - To be effective, an information program must have a clear, factual message that is presented in a way which catches the interest of the target audience. Understanding is increased if the message is balanced, if opposing points of view are addressed and if the information is recognized as coming from a credible source. An information program can provide the audience with the knowledge, skills and attitudes to make informed and responsible decisions. There can be immediate benefits but most effects tend to be long term. Information programs are accomplished through publications, exhibits and displays, presentations, easy access to relevant information, and systematic updating of information provided to individuals in the target audience.

For southern Alberta, information on riparian forests might be relayed through interpretive programs in national, provincial and municipal parks, a proposed interpretative centre at the Oldman River Dam site and publications produced by the Public Lands Division (e.g., *Range Notes* and Natural and Protected Areas' newsletter). An information program on riparian forests might also integrate key messages into existing school curricula and develop appropriate resource and information materials. There are organizations in Alberta with experience and interest in education programs related to rivers and water resources, including FEESA (Friends of Environmental Education Society of Alberta), SEEDS (Society, Environment and Energy Development Studies) and Alberta Environment's Education Branch.

Encouragement - Programs that encourage individuals to take voluntary steps to protect natural heritage values can be very effective. Such programs depend on a sound information base regarding natural heritage resources and the actions required to protect them. Direct personal contact with those able to implement the actions, such as landowners or leaseholders, is essential. Landholders may chose simply to alter the way they manage the resource or they may chose to enter into written or legal agreements. Another important component is personal recognition of those individuals who exercise voluntary stewardship. This recognition not only rewards voluntary stewards for their actions but also encourages other individuals to act accordingly. Examples of recognition programs in Alberta are the Federation of Alberta Naturalists' Habitat Steward Program, Fish and Game Association's Heritage Farmstead Program and Operation Burrowing Owl.

Economic Instruments - Economic incentives are forms of financial assistance that governments use to encourage appropriate action. Incentives have the advantage that they may succeed where information and encouragement programs do not. The obvious disadvantage is that they often require public funding. Economic incentives may take the form of tax breaks on forested lands, grants for costs to rearrange livestock fences to protect riparian forests and compensation for income lost as a result of conservation measures. The Landowner Habitat Program, funded by the Buck for Wildlife Fund, is one means of accomplishing these measures in Alberta. Other examples of using economic instruments are removal of agricultural subsidies that encourage clearing and cultivation of riparian habitats and tying of such subsidies to forest conservation.

3.3 Land Use Planning

Land use planning provides the processes for making decisions on the types of activities that can occur on lands supporting riparian forests. If protection from activities that can harm riparian forests is recommended, then land use planning can also provide the tools to accomplish such protection through policy or through regulation and legislation. Land use planning programs in southern Alberta include the following:

- **integrated resource planning at the regional, subregional and area levels by the provincial government;**
- **regional planning by Regional Planning Commissions;**
- **local planning by municipal governments;**
- **land use planning on Indian Reserves;**
- **provincial and municipal park planning;**
- **ecological reserves and Natural Areas planning;**
- **grazing lease management planning; and**
- **interdepartmental referrals on public lands dispositions.**

Many processes in land use planning involve key stakeholders and the public to help identify issues and formulate goals. Decisions are based on available information regarding resources and values at the time the plan is conducted. Plans are reviewed periodically as new information becomes available.

Depending on the disposition of lands, different planning processes apply. Section 2.4 provides a summary of the disposition of lands on which riparian forests occur in southern Alberta. Appendix 1 gives a more detailed breakdown. Maps that indicate ownership of lands on which riparian forests occur within each county, municipal district and improvement district and for each Special Area are filed with the Southern Regional Office of Alberta Forestry, Lands and Wildlife in Lethbridge.

Public Lands

About 22 percent of riparian poplar forests are on public lands, administered by Alberta Forestry, Lands and Wildlife or the Special Areas Board. This does not include designated parks or Natural Areas. These public lands are contained within the Southern and Central regions, set up for administrative purposes by Alberta Forestry, Lands and Wildlife (within FLW). The majority of provincial public lands are leased for grazing. Regional level integrated resource plans currently are being prepared for both the Southern and Central regions to provide a policy framework for more detailed plans on specific areas. To date, more detailed integrated resource planning has not occurred for areas where riparian forests occur; however, the recently announced Red Deer River Corridor Plan will consider substantial areas of riparian poplar forest.

Day-to-day decisions regarding specific activities on public lands, such as grazing or petroleum exploration and development, are made by the Public Lands Division within FLW or the Special Areas Board, generally following referral to the Fish and Wildlife Division within FLW or other government agencies that have specified an interest. Consultation with leaseholders is an important component of the decision-making process. Regulations under the *Public Lands Act* and the *Special Areas Act* apply. There is opportunity to draft special guidelines to guide day-to-day management decisions in certain areas or with respect to certain resources. For example, the Energy Resources Conservation Board has worked cooperatively with other government agencies to develop guidelines for oil and gas activity in native prairie environments.

About 5 percent of riparian forests are on public lands administered by various local councils or boards. What activities can occur on these lands and how they are managed is determined by the local authorities through various planning programs. For example, municipal councils can designate areas for specific uses, including parks and environmental reserves.

To date, planning decisions have been made to incorporate about 3 percent of riparian poplar forests in Natural Areas or provincial and municipal parks in southern Alberta. These lands are public lands that either never were private or were obtained, through purchase or donation, for conservation or recreation purposes. Their management is guided by specific park and Natural Area management plans developed by Alberta Recreation and Parks (now Tourism, Parks and Recreation), Municipal Park Boards or the Natural and Protected Areas Section of Alberta Forestry, Lands and Wildlife. A list of designated parks and natural areas containing riparian forests is provided in Appendix 2. Park designation, however, does not necessarily protect riparian poplars. Recreation development, including construction of facilities and clearing of understories, as well as heavy recreation use can adversely affect riparian forests.

Two percent of lands supporting riparian poplar forests are administered by the federal government. These lands for the most part occur along the South Saskatchewan River within the Suffield Military Reserve. Recently, the Department of National Defence and the Canadian Wildlife Service have announced a cooperative National Wildlife Area designation for a portion of the reserve that includes much of the riparian lands.

Private Lands

Forty-eight percent of quarter sections supporting riparian forests in southern Alberta are privately owned. On these areas, land use decisions are made primarily by individual landowners and local councils. However, permitted land use activities are guided in policy by a regional plan prepared by a group of municipalities through a regional planning commission. There are five Regional Planning Commissions (RPCs) in the prairies of southern Alberta - the Calgary RPC, Oldman River RPC, Palliser RPC, Red Deer RPC, and Southeast Alberta RPC. The intent of a regional plan can be legislated through general municipal plans and land use bylaws passed by individual municipalities. For example, agricultural districts, industrial districts and commercial districts are designated and in some cases conservation districts have been designated.

A recent initiative by Regional Planning Commissions, which has considerable bearing on protection and management of riparian forests, is an inventory of Environmentally Significant Areas for each county, municipal district, and improvement district in southern Alberta. An inventory also has been conducted along the Red Deer and South Saskatchewan rivers within Special Areas. Most areas of riparian poplar forest are recognized in these studies as regionally, provincially or nationally significant because of biological, geological or cultural importance. Furthermore, most areas of riparian forest are mapped as having major physical constraints to development because they are subject to flooding and may be underlain by major aquifers that can be easily contaminated. However, individual municipalities have not yet determined the manner in which they will address environmentally significant areas in their planning activities.

The provincial government, through the Canada-Alberta Flood Damage Reduction Program, is encouraging several communities (Calgary, Fort Macleod, High River, Lethbridge, Medicine Hat, Milk River, Okotoks, Rosebud, Writing-On-Stone Provincial Park) to adopt land use bylaws to restrict new development in flood-risk areas. Several of these areas would involve floodplains supporting riparian forests.

As well, disturbance that results from extractive activities, such as gravel mining, in river valleys requires approval under the *Land Surface Conservation and Reclamation Act* with similar provisions under the draft *Environmental Protection and Enhancement Act*. Public notification accompanies such proposed activities. An environmental assessment and/or a hearing before the Natural Resources Conservation Board could be required for large projects.

Currently, the Eastern Irrigation District, which owns 35 quarter sections supporting riparian forests along the Red Deer River, is preparing an Integrated Resource Plan for lands to which it has title. A resource inventory

is being conducted as well as an environmental audit. Resource management criteria and guidelines will be established, which will provide the board of directors of the irrigation district with a framework for making land use decisions. There may be opportunities to draft special guidelines for areas supporting riparian forests.

Indian Reserves

About 18 percent of riparian poplar forests occur on three Indian reserves in southern Alberta: the Blackfoot Reserve, the Peigan Reserve and the Blood Reserve. Many cultural activities focus on the river valleys and their woodlands. Most riparian lands on the reserves are grazed by livestock and used for hunting. As well, on the Blackfoot and Peigan reserves, there are residences in riparian poplar forests. A 300-lot cottage development, Siksika Vacation Resort, occurs in riparian poplar forest on the Blackfoot reserve.

Decisions to change existing land use on Indian reserves are made by the elected Chief and Council, often in consultation with tribal elders. Currently, land use policies are being developed by all three tribal governments. There may be opportunity, during formulation of these land use policies, to assess the effects of current land use on riparian forests and to propose appropriate changes.

3.4 Water Resources Planning and Management

In planning and managing water resources in southern Alberta, the opportunity exists to consider needs of riparian forests and incorporate these considerations into decisions about withdrawing and impounding water. Decisions about water management are increasingly being integrated with land use decisions.

Water Resources Planning

Since 1975 in Alberta, water resources plans have been undertaken at provincial, river basin, regional or site-specific levels to determine long-term objectives for water resources management and to resolve issues. Focus for plans has shifted from allocating water to meet multiple objectives (agricultural, municipal, hydroelectric, fisheries) in the 1970s to ensuring environmental sustainability in the 1990s. During the 1980s, an extensive planning exercise was undertaken for the South Saskatchewan River Basin, which encompasses much of the riparian forests in southern Alberta. The plan was the first in Alberta to contain provisions for the protection of instream flows for fish and recreation. Flow and sedimentation needs of riparian environments, including needs of riparian poplars, are an even more recent consideration in water resources planning.

Instream Flow Needs

Scientific assessment of instream flow needs is becoming an integral part of water resources planning. In 1990, a provincial government policy statement for the South Saskatchewan River Basin required that consideration be given to retaining water in the basin's rivers for instream needs, including recreation, fisheries, wildlife, and the ecology of the rivers. Using scientific information and methodologies, the instream flows needed to maintain the ecological integrity of various rivers in the South Saskatchewan River Basin are currently being determined through local and regional river basin working groups. The working groups, in consultation with special interest groups and the general public, are charged with determining the preferred and minimum stream flow needed to satisfy the requirements of instream uses. In addition, streamflow requirements for the establishment and survival of riparian poplars and other riparian vegetation and wildlife are being considered.

Currently, the process for establishing instream flows is being applied to six rivers: Willow Creek, the Highwood, Belly, St. Mary, Waterton and Red Deer. As part of these assessments, Alberta Environment has commissioned inventory and mapping of riparian vegetation. Historical changes in the areal extent of riparian communities are being determined and causes identified for these changes. In some cases, age structure and condition of riparian poplar communities are being investigated as well as general ecology and factors affecting establishment and survival.

However, the process for identifying instream flow needs has identified some key challenges. These include requirements for better scientific information and methodologies to define instream needs and more effective involvement of special interest groups and the general public in defining the terms of reference for assessments of instream flow needs. As well, mechanisms for protecting instream flows need to be defined.

Operation of Dams and Diversions

Assessments for dams and diversions constructed before the mid-1980s did not include consideration of project effects on riparian forests. However, in 1989 an independent assessment was undertaken of the impacts on riparian poplars of dams on the St. Mary and Waterton rivers, built in 1951 and 1964, respectively, and of a diversion weir constructed on the Belly River in 1935. Based on this assessment, suggestions have been made for altering how the dams are operated, and by extrapolation, for determining how the Oldman Dam should be operated. As well, alterations are being considered for the operations of the Chain Lakes Dam and proposed Pine Coulee Dam to accommodate instream flow needs in Willow Creek. Furthermore, the operating plan for irrigation withdrawals from the Highwood River will be based on an instream flow needs study, including consideration of riparian forests.

Many individuals interviewed during strategy development identified a need to examine environmental effects of existing and proposed dams and diversions and to consider managing flow regimes to benefit riparian forests. Besides environmental effects, they suggested plans for operating dams and diversions should be based on a full accounting of social and economic costs and benefits. It is not clear how decisions regarding operation plans will be made. These decisions may be complex, particularly for some southern Alberta rivers where licensed allocations already exceed levels that would guarantee preferred or minimum instream flows.

Water Licence Applications and Orders in Council

Currently, rights to consume or use water are granted in the form of licences or permits to applicants by the Controller of Water Resources, Department of Environment, under the *Water Resources Act.* The departments of Environment and Forestry, Lands and Wildlife also grant rights to construct within the beds, banks or shores of streams and lakes (including stream channel modification and channelization) under the current *Land Surface Conservation and Reclamation Act,* which is being incorporated into the new *Environmental Protection and Enhancement Act,* and the federal *Fisheries Act.* Public notice of an application may be given and referrals to other interested departments may be made. Objections or concerns must be addressed by the applicant, before the licence is issued. There may be an opportunity to have the effects of proposed projects on riparian poplars addressed during this process, although this has not occurred to date.

Under the existing *Water Resources Act* it is possible to make application for a natural state licence. No natural state licences have been issued to date in the heavily allocated river basins of southern Alberta. However, a 1991 Order in Council set minimum instream flows for the St. Mary, Waterton and Belly rivers based on recommendations in the South Saskatchewan River Basin Plan. This occurred before to completion of studies of the instream flow needs for these three rivers.

Revisions to the water resources policy and management are currently being considered through a process involving extensive public consultation. There is an opportunity to suggest revisions to the *Water Resources Act* that define the extent to which the controller can consider instream flow needs when determining whether to issue new licences, how instream flow needs can be provided for in fully allocated basins and what legislative mechanisms can be used for recognizing instream flow needs.

Canadian Heritage Rivers System

The Canadian Heritage Rivers System (CHRS) is a cooperative federal/provincial/ territorial program to give national recognition to the important rivers of Canada and to support a commitment by the responsible agency to long-term management that will conserve natural, historical and recreational values for the benefit and enjoyment of Canadians now and in the future. The program provides financial assistance to study, manage and promote rivers and increases the profile of rivers as tourist attractions. Successful nomination and designation of rivers requires broad community-based support. To date, Alberta is one of only two provinces that are not members of the CHRS Board.

Some reaches of southern Alberta rivers supporting riparian poplars to outstanding recreational and natural and cultural heritage values that could meet national criteria for designation under CHRS. There is growing interest among Albertans that the province take advantage of a standing invitation to participate in the program. The Minister of Environment has established an advisory committee to assess whether Alberta should enter the system and advise on implementation and administration.

Environmental Impact Assessments

Environmental Impact Assessments (EIAs) are conducted on proposed projects, both land- and water-based at the discretion of the Minister of Environment or designated director. Current requirements to carry out an EIA are presented in the *Land Surface Conservation and Reclamation Act;* however, they will be replaced by more extensive provisions outlined in the draft *Environmental Protection and Enhancement Act.* Under the preceding Act, formal EIAs will be mandatory for some projects, such as large dams (15 m in height), water diversion structures and canals (15 m^3/s), reservoirs (30 million m^3) and gravel quarries (45 000 t/yr). Furthermore, the recently established Natural Resources Conservation Board will review the environmental, social and economic impacts of projects for which mandatory EIAs are required. The board will also review other projects in cases where an EIA has been ordered by Alberta Environment or it is requested to do so by the Minister.

The first formal EIAs to consider the impacts of a water management project on riparian forests in southern Alberta are currently underway: the Little Bow River Project/Highwood River Water Management Plan and the Pine Coulee Reservoir. As well, the Federal Environmental Assessment and Review Office is considering the impacts of the Oldman Dam on riparian ecosystems as part of its current environmental review of that project. Baseline studies of riparian vegetation below the Oldman Dam site were commissioned by Alberta Environment in 1986. Subsequently, studies were undertaken by Alberta Public Works on the potential impacts of the dam on riparian poplars, but these were not part of a formal EIA. In 1989, Alberta Environment initiated a baseline study of riparian forests below a proposed dam on the Milk River. This information will become part of a formal EIA if this proposed project goes to the next stage. Permanently marked transects have been established on the Oldman and Milk rivers to allow monitoring of changes in vegetation.

3.5 Range Management

Grazing in river valleys in southern Alberta was identified by a number of those interviewed during strategy development as a possible factor affecting riparian forests. The information base in southern Alberta on the effect of different grazing systems on the regeneration and survival of riparian poplars is very limited. However, experience in other jurisdictions suggests that the intensity and timing of grazing can influence poplar regeneration. A number of management strategies have been proposed in the western United States for protecting riparian areas affected by grazing.

A first step in Alberta might be to work with landholders to identify healthy and unhealthy poplar stands within different water management regimes and then compare grazing management systems. Monitoring, evaluating and documenting the results of different grazing systems are essential if landholders are to be provided with adequate information on which to base management decisions.

The Alberta Cattle Commission and the Canadian Cattleman's Association are currently undertaking a review of the environmental issues associated with the livestock industry. These organizations are interested in working with other stakeholders to more clearly define issues and to develop cooperative and cost-effective approaches to solving problems.

3.6 Wildlife and Recreation Management

Prairie Conservation Action Plan

The *Prairie Conservation Action Plan (1989-1994),* drafted by World Wildlife Fund Canada in consultation with numerous interested organizations and individuals, recommends developing habitat management plans for riparian ecosystems within the context of a goal calling for the protection of native ecosystems. The plan states that riparian habitats in the prairies are extremely productive for wildlife and are among the most threatened ecosystems as a result of water and land management practices. The plan suggests that riparian habitats serve a valuable function by providing corridors for wildlife, connecting otherwise isolated areas of native prairie.

The Prairie Conservation Coordinating Committee (PCCC), composed of representatives from about 50 interested organizations, was established in 1989 to oversee implementation of the Prairie Conservation Action Plan in Alberta. A Riparian Habitat Workgroup summarized selected projects and initiatives contributing to protection and management of riparian habitats. The workgroup recommended the following:

- **there should be greater coordination among initiatives related to riparian habitats;**
- **a management plan for a demonstration riparian habitat should be undertaken;**
- **riparian inventories should be reviewed and inventory gaps and priority areas for management plans identified;**
- **encouragement and support should be provided by PCCC for projects that contribute to protecting and managing riparian habitats; and**
- **the public should be involved in riparian habitat management planning.**

Members of the PCCC have been involved in development of the strategy for conserving and managing riparian forests in southern Alberta. The organizations they represent have key roles to play in implementation of the strategy.

Comprehensive Riparian Ecosystems Management

Alberta Fish and Wildlife, recognizing the importance of riparian habitats for wildlife, has identified the need to develop a comprehensive plan for wildlife conservation in riparian ecosystems in Alberta. A full spectrum of riparian habitats--wetlands, meadows, grasslands, shrublands and woodlands--would need to be considered. It was suggested that development of the strategy for conserving and managing riparian forests might serve as a catalyst for this larger, comprehensive initiative.

Beaver Management

One issue, particularly important for managers and users of popular recreation areas, is loss of the riparian poplar canopy to beavers. Although beaver are recognized as part of the natural environment there is concern that the natural balance of beavers and poplars has been distorted by a reduction in beaver predators around developed areas. Measures currently taken to reduce beaver harvesting of poplars in some recreation areas include sheathing the base of trees with wire mesh and annual trapping of beavers. These measures are con-

sidered short-term and costly, especially when prices for beaver pelts are low. A need to assess beaver-caused mortality of riparian poplars in southern Alberta was identified as well as a need to explore new, innovative approaches to reducing adverse effects of beaver in high use recreation areas. Again, cooperative approaches would be most effective among wildlife and recreation management agencies undertaking information gathering and research.

Reclamation

Managers and users of popular recreation areas supporting riparian forests identify reclaiming and maintaining those forests as a major challenge. Older riparian poplars die (at about 80-120 years of age) and regeneration under the existing canopy is unlikely to occur naturally. Small recreation areas may face the prospect of losing riparian forests completely. As well, understories may have been cleared or trampled resulting in loss of native species. A need has been identified for technical information and demonstrations of artificial regeneration of native poplars and understory species. Cooperative approaches to information gathering and research have been proposed.

4.0 KEY CHALLENGES

Experience in Alberta and other jurisdictions has shown that loss of riparian forests on the prairies can occur if their requirements are not considered in water and land use planning and management. Until recently, planning and management in Alberta has not fully recognized the value and special requirements of riparian ecosystems. If the benefits that riparian forests provide are to be ensured, then Albertans must develop a better understanding of how their various activities affect the forests and recognize their responsibility for forest conservation.

A review of issues and opportunities indicated that there are five key challenges in developing a strategy for conserving and managing riparian forests.

4.1 Addressing Information Gaps

Information gaps and scientific uncertainty need to be addressed for improved decision-making.

This refers not only to scientific and technical information, but also information from historical sources and from individual knowledge and experience. Considerable information gaps and scientific uncertainty exist regarding the age structure of riparian poplar stands, current rates of regeneration relative to mortality, reproductive strategies and requirements for the three poplar species, the genetic significance of the three species and their hybrids and the relative importance and interaction of factors affecting regeneration and survival. As well, few data have been compiled on the value (environmental, economic and social) of riparian poplar forests to southern Albertans. Time as well as financial and human resources will be required to fill the information gaps. However, **if management action is delayed until all the scientific uncertainty is resolved, it may be too late to avoid a major loss of riparian poplar forests.**

4.2 Informing the Public

Implementing a management strategy for riparian forests will require that southern Albertans understand the issues and are willing to make the necessary changes.

Southern Albertans have derived benefits from forests in river valleys for several generations often without understanding that their actions and lifestyle may be affecting these forests and without assuming responsibility for their survival. There is a need for public education about how individual actions and choices affect riparian poplars and what options individuals have for contributing to management solutions.

4.3 Setting Priorities

Priorities for riparian forest conservation and management need to be set so that limited human and financial resources can be directed to those areas that are considered highest priority.

Setting priorities among various options requires a cooperative approach among stakeholders to assessing benefits and values and to identifying, prioritizing and addressing problems. Priority might be given to addressing those problems that pose the greatest threat to riparian forests or those actions that provide greatest benefits or those areas of forest with particularly significant ecological, recreational or cultural values or those options that are most feasible and easily implemented.

4.4 Full Consideration of Costs and Benefits

Fuller consideration of all costs and benefits is needed to arrive at decisions about water management and floodplain developments that will affect riparian forests.

Fuller consideration would include evaluation of not only economic, but also environmental and social implications of various options over the long term. It would

include not only direct, internal costs and benefits, but also indirect, external ones. There are major challenges in identifying, valuing and attaching responsibility to all costs and benefits, but that should not prevent us from moving toward a more equitable and comprehensive system.

4.5 Integrating Land and Water Management

A comprehensive approach to managing riparian poplars requires that land management and water management decisions be integrated.

Water management projects can indirectly affect riparian forests by altering river flows and sedimentation processes. As well, use of floodplains for livestock grazing, agriculture, and industrial, residential and recreational developments can directly affect riparian poplars. Minimizing harmful impacts of water resources projects could prove ineffectual in achieving long-term objectives for riparian forest management if land use impacts are not minimized, and vice versa. Therefore, there is a need to integrate water resources planning and management with land use planning and management.

5.0 RECOMMENDED STRATEGY

The previous chapter outlines the problems, opportunities and key challenges facing Albertans in developing a strategy for conserving and managing riparian forests in southern Alberta. The recommended strategy cannot address all of these, especially since our knowledge about riparian forests is incomplete. Rather the strategy focuses on providing a framework for decision-making over the long term. Components of the framework are a statement of vision, mission, principles and goals. As well, some short-term actions are identified that are consistent with the framework and are practical and cost-effective.

5.1 Vision

The vision of Albertans for riparian forests is as follows:

> **Native riparian forests will flourish along southern Alberta rivers so that current and future generations of Albertans can enjoy the benefits and appreciate the intrinsic value of these special communities.**

5.2 Mission Statement

The vision is fundamental to the development of a mission statement. The following is the mission statement of a strategy for conserving and managing riparian poplars in southern Alberta is:

> **To sustain native riparian forests as key components of southern Alberta river ecosystems by managing land, water and resource uses to protect ecological integrity.**

5.3 Guiding Principles

The strategy is built on commonly accepted principles. These principles, as follows, reflect beliefs and values, and were enunciated in various ways by Albertans during development of the strategy:

The best, available scientific and technical information should form the basis for riparian forest management decisions. Key knowledge gaps need to be identified and appropriate research encouraged. Gathering of historical information and documentation of individual experiences and observations are an important part of information gathering. However, addressing knowledge gaps and scientific uncertainties should not result in unnecessarily deferring action. Some management actions already make sense.

There should be public access to accurate and credible information. This will assist individuals in making informed decisions about the management of riparian forests. Information on the status, ecology and management needs of riparian forests must be made available.

Cooperative and consultative approaches to decision-making and action are essential. Several sectors and interests are affected by or have a role to play in the strategy. Of particular importance is the need for various agencies, landholders and other resource managers to jointly define issues and work towards mutually acceptable solutions.

Full consideration of environmental, social and economic costs and benefits should be a part of decision-making. For example, the cultural and spiritual values some individuals place on riparian forests needs to be considered. Moving towards a fuller accounting of all values will help ensure more equitable and fair decisions.

Innovation and flexibility in achieving goals and actions is important. The most desirable solutions are those that are ecologically sound and cost-effective.

5.4 Recommended Goals

The following goals are designed to address the problems, opportunities and key challenges identified for the conserving and managing riparian forests in southern Alberta. They are based on the principles outlined in the previous section.

GOAL A: **TO IMPROVE AWARENESS AND COMMUNICATION ABOUT NATIVE RIPARIAN FORESTS--THEIR BENEFITS, ECOLOGY AND MANAGEMENT ISSUES AND ACTIONS NEEDED TO PERPETUATE THESE BENEFITS.**

GOAL B: **TO IMPROVE WATER PLANNING AND MANAGEMENT FOR THE CONSERVATION OF RIPARIAN FORESTS.**

GOAL C: **TO IMPROVE PUBLIC AND PRIVATE LAND USE PLANNING AND MANAGEMENT FOR THE CONSERVATION OF RIPARIAN FORESTS.**

GOAL D: **TO IDENTIFY AND REMEDY INFORMATION GAPS REGARDING NATIVE RIPARIAN FORESTS, FOR IMPROVED DECISION-MAKING.**

GOAL E: **TO IMPLEMENT A COMPREHENSIVE APPROACH TO MANAGING RIPARIAN ECOSYSTEMS THAT INTEGRATES LAND AND WATER MANAGEMENT DECISIONS.**

5.5 Recommended Objectives and Tasks

To be accomplished, goals must be translated into specific objectives and actions. Specific objectives and actions were suggested through discussions with and among stakeholders during development of the strategy. Others arose from the review of background information regarding biology and status and current management.

The objectives and actions that follow do not constitute a comprehensive list. Rather, they are those that were generally agreed to be most important and/or feasible by participants in strategy development. As much as possible, specific agencies are identified that might take responsibility for the objective or action.

Many organizations or individuals could assume responsibility for implementation of various actions. As well, multistakeholder consultation is an important component of many of the actions. Currently, the Prairie Conservation Coordinating Committee (PCCC) provides the only established mechanism for consultation among the wide variety of individuals and organizations interested in management of riparian forests. The PCCC has the balance and influence to play a major role in guiding implementation of the strategy.

GOAL A: TO IMPROVE AWARENESS AND COMMUNICATION ABOUT NATIVE RIPARIAN FORESTS--THEIR BENEFITS, ECOLOGY AND MANAGEMENT ISSUES, AND THE ACTIONS NEEDED TO PERPETUATE THESE BENEFITS.

Objective A1: **Develop awareness programs about native riparian forests--their benefits, ecology and management issues, and the actions needed to perpetuate these benefits.**

Appropriate information and who should provide it, delivery infrastructure and the audiences should be considered.

Action: Prepare a communications plan focused on riparian forests in southern Alberta.

Messages appropriate to various audiences would need to be developed. Key audiences would include major landholders, government planners and managers, other stakeholder organizations (agricultural, environmental, recreational), students and the general public. Information materials such as fact sheets and a video might be developed. Delivery might occur through newsletters and conferences/workshops of organizations that are members of PCCC, through regional and district government offices, through interpretive programs, through environmental education in schools, colleges and universities and through television programming.

Action: Prepare and distribute a brochure to improve general public awareness of riparian forests in southern Alberta.

This action might be undertaken by a conservation organization. The brochure could outline key points about the biology, distribution and status of riparian forests, the benefits these forests provide, and factors that affect their regeneration and survival.

Action: Develop and distribute information to landholders on grazing systems designed to protect and restore stands of riparian poplars.

Together with landholder organizations, government agencies (the Fish and Wildlife Division, Public Lands Division, Special Areas and Alberta Agriculture) could develop and distribute information on grazing systems that conserve riparian forests. Mechanisms for distributing information might be through publications such as *Range Notes*, workshops targeted to landholders and resource managers or newsletters of landholder organizations.

Action: Include information about riparian poplars in interpretive programs in southern Alberta.

Agencies that offer interpretive services could include information on the ecology, benefits and management issues of riparian poplars as part of their program themes. Examples of where this could apply are provincial and municipal parks in southern Alberta and the proposed Oldman River Dam Interpretive Centre.

GOAL B: TO IMPROVE WATER PLANNING AND MANAGEMENT FOR THE CONSERVATION OF RIPARIAN FORESTS.

Objective B1: **Continue to address the flow and sedimentation needs of riparian forests when conducting studies of the instream flow needs of rivers in southern Alberta.**

Action: Revisions to Alberta's water policy and legislation should require that riparian vegetation needs be an integral part of instream flow needs assessments.

Objective B2: **Incorporate into operating plans for current and future water management projects in southern Alberta a consideration of the flow and sedimentation needs of riparian forests.**

Action: Revisions to Alberta's water policy and legislation should require that multistakeholder consultations occur when operating plans are being developed or modified.

Ways to improve ongoing communication among project operations staff and biologists (vegetation/fisheries) could be explored. As well, operating plans could have flexibility built in to allow management of projects for the benefit of fluvial and riparian ecosystems in years of surplus.

Objective B3: **Ensure that environmental assessments for projects with significant effects on river flows address effects on riparian forests.**

Action: Proponents of water management projects should be required to assess effects on riparian forests in river reaches potentially altered by the project.

This could be required by Alberta Environment, the Natural Resources Conservation Board and the Federal Environmental Assessment and Review Office or voluntarily incorporated into project planning by proponents, including irrigation districts and municipalities. This would apply to projects such as dams, reservoirs, diversion headworks and canals, major water withdrawals and channel modification structures.

GOAL C: TO IMPROVE PUBLIC AND PRIVATE LAND USE PLANNING AND MANAGEMENT FOR THE CONSERVATION OF RIPARIAN FORESTS.

Objective C1: **Encourage recognition of riparian forests as significant resources meriting conservation in provincial, municipal and other land use plans.**

Types of plans include the following: regional and subregional integrated resource plans, regionally integrated decisions; regional plans and general management plans for counties and municipal districts; land use plans on Indian Reserves; and, park, ecological reserve, Natural Area and, perhaps, heritage river plans.

Action: Identify an agency(ies) that will coordinate compiling and distributing information on riparian forests.

Land use planning agencies should have ready access to information on the distribution, status and value of riparian forests as well as on management issues and options. This might be accomplished by establishing a central repository for all information and making relevant information available at several regional locations.

Action: Conduct a pilot project for managing riparian forests in an environmentally significant area.

This would include defining policy and legislative mechanisms for protecting an environmentally significant area and developing land use objectives and management guidelines for riparian forests. Environmentally significant areas refer to those areas identified in the Environmentally Significant Area Study for individual counties and municipal districts. The project could be coordinated by a municipal authority. It should involve consultation with the regional planning commission, provincial land management agencies, landholders and other interested stakeholders. Tools for enhancing stewardship by private landholders, such as awards, management agreements, easements and purchase with lease-back might be considered. If successful, results of the pilot project might be extrapolated to other environmentally significant areas.

Objective C2: **Encourage conservation of riparian poplars by landholders through information, recognition and economic incentives.**

Action: Identify owners and lessees of lands supporting significant stands of riparian poplars, contact them with information on riparian poplars and assist them with advice on measures that will ensure maintenance and regeneration of stands.

Action: Encourage voluntary stewardship of riparian forests through conservation agreements (e.g., Public Lands' Ecological Corridor Agreements, Fish and Wildlife's Habitat Protection Agreements).

Private conservation organizations, such as Alberta Fish and Game Association, the Federation of Alberta Naturalists and Trout Unlimited might have a role to play as well as the Alberta Fish and Wildlife Division. Riparian forests might be considered a priority under habitat enhancement and protection programs. Recognition of landowners who participate is an important component of each of these programs (e.g., Fish and Game Association's Heritage Farmstead Program, Alberta Naturalists' Habitat Steward Program, Trout Unlimited's Habitat Improvement Program).

Action: Provide economic incentives to landowners to assist them in implementing actions that protect riparian poplar habitats and are cost-effective in the long term.

These incentives might include reducing taxes on lands covered by a conservation agreement or conservation easements, or linking agricultural subsidies to conservation measures.

Action: Consider purchase of significant areas of riparian forests.

This might be accomplished through the Nature Conservancy, the Park Ventures Fund of the Recreation, Parks and Wildlife Foundation or the Conservation Land Assembly Program of the Public Lands Division.

Objective C3: **Ensure that environmental assessments and environmental and land use approvals for proposed floodplain developments address effects on riparian forests.**

Action: Require proponents of developments on floodplains to assess effects on riparian forests.

This could be required, as appropriate, by municipal authorities, Alberta Environment, the Natural Resources Conservation Board, the Energy Resources Conservation Board and the Federal Environmental Assessment and Review Office. Projects to which this would apply include the following: sand and gravel quarries, ammonite mining, electric transmission lines, pipelines, oil and gas wells, industrial facilities, golf courses, recreation facilities, feedlots and residential subdivisions.

GOAL D: TO IDENTIFY AND REMEDY INFORMATION GAPS REGARDING NATIVE RIPARIAN FORESTS, FOR IMPROVED DECISION-MAKING.

Objective D1: **Encourage research on the flow and sedimentation needs of riparian forests.**

Three species of native riparian poplars, their hybrids and associated plant species should be considered. The effects of climate and current water management practices on riparian forests need to be assessed. Considerable research has and is currently being undertaken both within Alberta and in the western United States. Sharing of information with researchers in other jurisdictions should be encouraged. Important research components might include the following:

- identifying and studying relatively unaltered river reaches as "control" reaches;
- determining flow and sedimentation conditions that lead to successful regeneration;
- determining flow conditions required for growth and long-term survival;
- assessing the effect of climate on regeneration and survival;
- assessing the effects of existing dams and diversions on regeneration and survival; and
- proposing operating regimes that would benefit riparian forests.

Action: Establish research priorities in Alberta related to flow and sedimentation needs of riparian forests.

Alberta Environment could coordinate this assessment, in consultation with researchers from the University of Lethbridge, the University of Calgary and consultants who specialize in methodologies for study of instream flow needs.

Action: Encourage and support priority research related to riparian forests.

Agencies providing assistance for scientific, environmental and resource management at both the provincial and national levels should be made aware of the strategy and research priorities. Applications for research assistance probably will be viewed more favourably if they are presented in the context of the strategy and are accompanied by letters of support from government and nongovernment organizations.

Objective D2: **Assess the effects of range management practices on riparian forests and identify the range management systems that conserve them.**

Action: Assemble information about the current state of riparian forests in grazed (and browsed) areas in southern Alberta as well as the grazing management systems being practised in these areas.

Government agencies (i.e., Alberta Forestry, Lands and Wildlife, Alberta Agriculture, Special Areas), together with landholders and their organizations, could develop a process for assembling information about the current state of riparian forests on grazed lands and associated grazing management systems. The process might include devising methods for assessing the state of riparian forests and designating a central repository for information on status and grazing management systems.

Action: Encourage research on the effects of different grazing management systems on regeneration and survival of riparian forests in southern Alberta.

Provincial land management agencies (Alberta Forestry, Lands and Wildlife, Alberta Agriculture, Special Areas), together with landholders and their organizations, could develop a research program to assess the effects of different grazing management systems on riparian poplar regeneration and survival. Such research would include gathering information already available in Alberta and from other jurisdictions. Universities and community colleges might be encouraged to undertake this research by providing funding and resource assistance.

Action: Conduct a pilot project to gather information and conduct research on grazing management systems within an environmentally significant area supporting riparian forest.

Provincial land management agencies in consultation with local municipalities and landholders could determine an appropriate project area, one having two or more different grazing systems with obviously different effects on riparian forests. Research might be undertaken by the agencies themselves or through academics or consultants. If the pilot project is successful in identifying grazing systems that benefit riparian forests, results could be used to develop range management guidelines for riparian areas in southern Alberta.

Objective D3: **Assess the effects of beaver on riparian poplar forests in southern Alberta and evaluate measures used to control beaver populations.**

Action: Conduct a review of available information on beaver populations in areas supporting riparian forests in southern Alberta and the effects of the beaver, favourable and adverse, on these forests.

Alberta Fish and Wildlife could coordinate this review. Municipal administrators, landholders and provincial and municipal park agencies could be interviewed, as well as researchers and consultants who have worked in riparian poplar forests and recreational organizations whose members regularly use these forests. An assessment could be made about the importance of the effects of beaver on riparian forests generally in southern Alberta.

Action: Compile available information on control measures currently used to protect riparian poplars from beaver.

Alberta Fish and Wildlife could coordinate a review of programs by provincial and municipal park agencies to protect riparian poplars from beavers. Information could be sought on the types of measures used, their effectiveness and cost.

Objective D4: **Compile, review and summarize information on reclamation and restoration of riparian poplar forests.**

Action: Consolidate information about efforts in Alberta and elsewhere to reclaim native riparian poplars and understory species.

Information on reclamation and restoration efforts by Alberta Public Works, Supply and Services, Alberta Tourism, Parks and Recreation and municipal parks agencies could be compiled and assessed. This would include a review of techniques used, their effectiveness and cost. Such information could be stored in a central repository and be available to assist agencies in future reclamation and restoration efforts. As well, research needs could be identified and prioritized.

Objective D5: **Encourage gathering of data on the value of riparian forests.**

The following values need to be addressed: ecological, genetic, recreation, aesthetic, historical, cultural and spiritual. This information would be useful in evaluating various options when making decisions that affect riparian forests.

Action: Encourage research on the value of riparian forests.

Agencies providing economic, social and environmental research assistance at both the provincial and national levels should be made aware of the strategy and recommended research. It could be suggested that applications for research assistance should be viewed more favourably if they are presented in the context of the strategy and are accompanied by letters of support from government and nongovernment organizations.

GOAL E: TO IMPLEMENT A COMPREHENSIVE APPROACH TO MANAGING RIPARIAN ECOSYSTEMS THAT INTEGRATES LAND AND WATER MANAGEMENT DECISIONS.

Objective E1: **Develop a comprehensive approach, to decisions affecting all riparian ecosystems, that integrates land and water management considerations.**

Action: Identify an agency responsible for coordinating development of an integrated approach or management system for riparian ecosystems.

The process used to develop the integrated approach should include consultation with key stakeholders interested in management of riparian ecosystems. It should clearly define the issues related to integration of land and water decisions, prioritize the issues, identify and assess options for addressing the issues and recommend an integrated approach or management system.

Action: Identify an agency responsible for monitoring the status of all riparian ecosystems in southern Alberta and recommending strategies for protecting ecological integrity.

Key riparian ecosystems other than forests are wetlands, meadows and shrublands. Monitoring responsibilities should include the following:

- assessing status of riparian ecosystems in southern Alberta, about every five years, using air photos and permanent ground transects;
- establishing research and information-gathering priorities;
- compiling and assessing new information on the conservation biology of the ecosystems; and
- providing public access to new information.

5.6 Implementation

The strategy recommended in this report incorporates valuable ideas and suggestions provided by the many Albertans, with a broad range of interests, who participated in its development. Permeating all discussions was a genuine appreciation for riparian forests and a concern that the benefits they provide be perpetuated through wise management. The strategy has been developed to assist various government and nongovernment organizations in conserving and managing riparian forests in southern Alberta. It encourages a pro-active plan of action. Success of the strategy will depend on individuals and organizations basing their decisions about riparian forest management on it and choosing to implement actions which are consistent with the vision, mission, principles and goals identified.

GLOSSARY

Conservation - planned management of a natural resource to prevent exploitation, destruction or neglect and includes components of preservation, enhancement and restoration.

Environmentally Significant Area (ESA) - an area in its natural state which has been identified as significant and requiring special management in ESA studies conducted for individual counties and municipal districts in southern Alberta.

Flourish - thrive in a dynamic natural state.

Forests or Ecosystems - not just trees, but a whole complex of species, including plants, birds, mammals, insects, which interact with and/or are dependent on each other.

Instream Flow Needs(IFN) Study - a study of the river flow requirements to sustain aquatic and riparian life and to provide recreation.

Landholders - includes owners of lands (private or public) and holders of leases for activities on lands.

Management - to identify, monitor, assess and where required, respond and follow-up.

Natural Area - any area remaining in a relatively natural state. Some have been officially designated through legislation or policy as provincial or municipal parks, ecological reserves or Natural Areas.

Operation Plan - the plan which determines how dams and diversions will be operated.

Poplars or Cottonwoods - refers to three species: Plains cottonwood (*Populus deltoides*), narrowleaf cottonwood (*Populus angustifolia*) and balsam poplar or its subspecies black cottonwood (*Populus balsamifera*) and their hybrids.

Prairie Conservation Action Plan (PCAP) - a five-year plan (1989-1994) developed by World Wildlife Fund Canada to influence policy and attitudes so as to conserve the biological diversity found in the Canadian prairies and parklands.

Prairie Conservation Coordinating Committee (PCCC) - a committee formed in 1989 of representatives from about 50 government and nongovernment organizations to implement the Prairie Conservation Action Plan in Alberta.

Prairie for Tomorrow (PFT) - a joint program (1988-1991) of World Wildlife Fund Canada and Alberta Fish and Wildlife Division to encourage projects related to prairie and parkland conservation in Alberta.

Riparian - the land adjacent to the normal high water line of a river, and extending to all the land that is influenced by the presence of the adjacent ponded or channelled water.

River - refers to all natural channels with flowing fresh water. Includes stream, rivulet, brook and river, but does not include canals. Rivers considered in this document are the Red Deer, Bow, Oldman, South Saskatchewan and Milk rivers and their tributaries in the grasslands of southern Alberta.

Appendix 1
PROJECT DESCRIPTION:
DETERMINING OWNERSHIP OF LANDS SUPPORTING RIPARIAN FORESTS

Purpose:

The purpose of this project was to determine the ownership of lands in southern Alberta that support riparian forests. This work was conducted by Frances Reintjes for W.E.S.T. - Western Environmental and Social Trends.

Methods:

Information on riparian forest distribution was obtained from 1:50 000 topographic map sheets, approximately 50 in total, onto which forest distribution and density information had been previously mapped, as a result of the interpretation of provincial aerial photographs taken in the mid-1980s. Land ownership was determined from maps, usually at a scale of 1:100 000, produced by the administration of each county, municipal district, improvement district or special area. Information was transferred from the distribution maps to the ownership maps.

A coloured dot was placed on each quarter section containing riparian forest. Four colours were used, each colour corresponding to one of four density and width categories on the distribution maps. Dots indicated only presence and density category and not the aereal extent of forest in the quarter section.

Following this, the number of quarter sections supporting riparian forests was determined for each river and for each county, municipal district, improvement district and special area. Eight ownership categories were differentiated as follows:

Private
Provincial (excluding parks, etc.)
Indian Reserve
Town or City
County, Municipal District, Improvement District, Special Area
Park, Natural Area, Ecological Reserve
Federal
Unknown

Results:

Appendix 1.1 and 1.2 provide results for each county, improvement district, municipal district and special area map sheet and for each river. Appendix 1.1 groups results by administrative jurisdiction and Appendix 1.2 groups them by river. Notes indicating specifics related to the ownership categories also are included in these two tables. Lands owned by irrigation districts are included in the private category.

Appendix 1.3 summarizes the results according to county, improvement district, municipal district and special area. Totals for each jurisdiction as well as for each ownership category are presented, along with percent and rank. Appendix 1.4 summarizes the results according to river. In Appendices 1.3 and 1.4, the number of quarters in provincial park, private park and Natural Area or ecological reserve was differentiated.

There are a few factors that affect accuracy of results. First, along those rivers that serve as county divisions (portions of the Red Deer, Bow, Oldman, South Saskatchewan, Belly and Waterton), overestimation of the number of quarter sections containing riparian forests is probable because many quarters straddle rivers and are therefore counted on two separate ownership maps. Second, some overestimation occurs at the confluence of rivers since one quarter section may bound two rivers and therefore are counted twice, once for each river. Third, obvious errors and omissions occur on some ownership maps. For example, ownership of islands or land

adjacent to rivers on county boundaries is occasionally not indicated by either county. These omissions amount to about 114 quarters or 3.7 percent of the lands supporting riparian forest. These quarters are listed as unknown in the tables.

Maps showing riparian poplar distribution and ownership of lands supporting riparian forests are filed with Alberta Fish and Wildlife, Southern Region Office, Lethbridge.

Appendix 1.1 Ownership of Lands With Riparian Poplars: Grouped by Jurisdiction

MAPSHEET	RIVER	TRIBUTARY	Ownership Category (number of quarter sections)								SPECIFICS
			PRIV	PROV	RESERVE	TNW/CTY	CO/MD	PRK/ECO	FEDERAL	UNK	
MD14-TABER	BOW		4	11							
MD14-TABER	OLDMAN		42	16		2	4	1		2	Town of Taber; MD of Taber; Taber Provincial Park
MD14-TABER	SOUTH SASK.		3	1			3				MD of Taber Park
CO16-WHEATLAND	BOW		35	2	148					14	Blackfoot Indian Reserve
CO16-WHEATLAND	RED DEER		28	2						3	
CO16-WHEATLAND	RED DEER	ROSEBUD RIVER	22								
CO2-VULCAN	BOW		17	2	108			4		1	Blackfoot Indian Reserve; Wyndham Park
CO26-LETHBRIDGE	OLDMAN		109	12	7	37					Blood Indian Reserve; City of Lethbridge
CO26-LETHBRIDGE	ST. MARY		12		2						Blood Indian Reserve
CO4-NEWELL	BOW		16	4	3					2	EID 1; Blackfoot Indian Reserve
CO4-NEWELL	RED DEER		81				2	22		1	EID 31; County of Newell; Dinosaur Provincial Park
CO5-WARNER	MILK		11	8				4			Writing-On-Stone Provincial Park
CO8-FORTY MILE	MILK		5	49				10		2	Pinhorn Grazing Reserve; Natural Area
CO8-FORTY MILE	SOUTH SASK.		24	16							Bow Island Grazing Reserve
ID7-BADLANDS	RED DEER		37	8		9		6		2	City of Drumheller; Midland Provincial Park
ID7-BADLANDS	RED DEER	ROSEBUD RIVER	13	2							
MD1-CYPRESS	BOW		3	21							
MD1-CYPRESS	MILK		3	17				7			Ecological Reserve
MD1-CYPRESS	SOUTH SASK.		58	128		34			48		Bow Island Grazing Reserve; City of Medicine Hat; CFB Suffield
MD1-CYPRESS	SOUTH SASK.	BULLSHEAD CREEK	1			5					City of Medicine Hat
MD31-FOOTHILLS	BOW		40				1			1	MD of Foothills
MD31-FOOTHILLS	HIGHWOOD		74	1		9					Town of High River
MD31-FOOTHILLS	SHEEP		36			6				1	Town of Okotoks
MD34-ACADIA	RED DEER		8	39			1				MD of Acadia
MD36-WILLOW CREEK	BELLY		61	4						9	
MD36-WILLOW CREEK	OLDMAN		85	10		11					City of Fort Macleod
MD36-WILLOW CREEK	OLDMAN	WILLOW CREEK	25	4							
MD36-WILLOW CREEK	WATERTON		38	1							
MD44-ROCKYVIEW	BOW		27	4		17				3	City of Calgary
MD47-STARLAND	RED DEER		33	22			2			3	MD of Starland
MD48-KNEEHILL	RED DEER		45	4		1				18	Town of Three Hills
MD48-KNEEHILL	RED DEER	KNEEHILLS CREEK	23			2					Town of Carbon
MD48-KNEEHILL	RED DEER	ROSEBUD RIVER	17								
MD6-CARDSTON	BELLY		79		140				1		Blood Indian Reserve
MD6-CARDSTON	MILK										
MD6-CARDSTON	OLDMAN				36						Blood Indian Reserve
MD6-CARDSTON	ST. MARY		49	2	23					1	Blood Indian Reserve
MD6-CARDSTON	ST. MARY	LEE CREEK	14		5						Blood Indian Reserve
MD6-CARDSTON	WATERTON		68								
MD9-PINCHER CREEK	CASTLE		1(4)	1(7)							unflooded(flooded)
MD9-PINCHER CREEK	OLDMAN		17(4)	17(11)	73						unflooded(flooded); leased Crown land on Reserve 8; Peigan Indian Reserve
MD9-PINCHER CREEK	OLDMAN	PINCHER CREEK	20	1							
MD9-PINCHER CREEK	WATERTON		19	3							
MD9-PINCHER CREEK	WATERTON	FOOTHILLS CREEK	9	2							
MD9-PINCHER CREEK	WATERTON	YARROW CREEK	9								
SA2-HANNA NORTH	RED DEER		12	16						6	
SA2-HANNA SOUTH	RED DEER		76	151				36		29	EID 4; Dinosaur Provincial Park
SA2-HANNA SOUTH	SOUTH SASK.		5	30							
SA3-OYEN	RED DEER		54	47						16	

Appendix 1.2 Ownership of Lands With Riparian Poplars: Grouped by River

MAPSHEET	RIVER	TRIBUTARY	Ownership Category (number of quarter sections)								SPECIFICS
			PRIV	PROV	RESERVE	INW/CITY	CO/MD	PRK/ECO	FEDERAL	UNK	
MD36-WILLOW CREEK	BELLY		61	4							
MD6-CARDSTON	BELLY		79		140				1		Blood Indian Reserve
MD14-TABER	BOW		4	11							
CO16-WHEATLAND	BOW		35	2	148					14	Blackfoot Indian Reserve
CO2-VULCAN	BOW		17	2	108			4		1	Blackfoot Indian Reserve; Wyndham Park
CO4-NEWELL	BOW		16	4	3					2	EID 1; Blackfoot Indian Reserve
MD1-CYPRESS	BOW		3	21							
MD31-FOOTHILLS	BOW		40				1			1	MD of Foothills
MD44-ROCKYVIEW	BOW		27	4		17				3	City of Calgary
MD9-PINCHER CREEK	CASTLE		1(4)	1(7)							unflooded(flooded)
MD31-FOOTHILLS	HIGHWOOD		74	1		9				1	Town of High River
CO5-WARNER	MILK		11	8				4			Writing-On-Stone Provincial Park
CO8-FORTY MILE	MILK		5	49				10		2	Pinhorn Grazing Reserve; Natural Area
MD1-CYPRESS	MILK		3	17				7			Ecological Reserve
MD6-CARDSTON	MILK										
MD14-TABER	OLDMAN		42	16		2	4	1		2	Town of Taber; MD of Taber; Taber Provincial Park
CO26-LETHBRIDGE	OLDMAN		109	12	7	37					Blood Indian Reserve; City of Lethbridge
MD36-WILLOW CREEK	OLDMAN		85	10		11					City of Fort Macleod
MD36-WILLOW CREEK	OLDMAN	WILLOW CREEK	25	4							
MD6-CARDSTON	OLDMAN				36						Blood Indian Reserve
MD9-PINCHER CREEK	OLDMAN		17(4)	17(11)	73						unflooded(flooded); leased Crown land on Reserve 8; Peigan Indian Reserve
MD9-PINCHER CREEK	OLDMAN	PINCHER CREEK	20	1							
CO16-WHEATLAND	RED DEER		28	2						3	
CO16-WHEATLAND	RED DEER	ROSEBUD RIVER	22								
CO4-NEWELL	RED DEER		81				2	22		1	EID 31; County of Newell; Dinosaur Provincial Park
ID7-BADLANDS	RED DEER		37	8		9		6		2	City of Drumheller; Midland Provincial Park
ID7-BADLANDS	RED DEER	ROSEBUD RIVER	13	2							
MD34-ACADIA	RED DEER		8	39			1			9	MD of Acadia
MD47-STARLAND	RED DEER		33	22			2			3	MD of Starland
MD48-KNEEHILL	RED DEER		45	4		1				18	Town of Three Hills
MD48-KNEEHILL	RED DEER	KNEEHILLS CREEK	23			2					Town of Carbon
MD48-KNEEHILL	RED DEER	ROSEBUD RIVER	17								
SA2-HANNA NORTH	RED DEER		12	16						6	
SA2-HANNA SOUTH	RED DEER		76	151				36		29	EID 4; Dinosaur Provincial Park
SA3-OYEN	RED DEER		54	47						16	
MD14-TABER	SOUTH SASK.		3	1			3				MD of Taber Park
CO8-FORTY MILE	SOUTH SASK.		24	16							Bow Island Grazing Reserve
MD1-CYPRESS	SOUTH SASK.		58	28		34			48		Bow Island Grazing Reserve; City of Medicine Hat; CFB Suffield
MD1-CYPRESS	SOUTH SASK.	BULLSHEAD CREEK	1			5					City of Medicine Hat
SA2-HANNA SOUTH	SOUTH SASK.		5	30							
MD31-FOOTHILLS	SHEEP		36			6					Town of Okotoks
CO26-LETHBRIDGE	ST. MARY		12		2						Blood Indian Reserve
MD6-CARDSTON	ST. MARY		49	2	23					1	Blood Indian Reserve
MD6-CARDSTON	ST. MARY	LEE CREEK	14		5						Blood Indian Reserve
MD36-WILLOW CREEK	WATERTON		38	1							
MD6-CARDSTON	WATERTON		68								
MD9-PINCHER CREEK	WATERTON		19	3							
MD9-PINCHER CREEK	WATERTON	FOOTHILLS CREEK	9	2							
MD9-PINCHER CREEK	WATERTON	YARROW CREEK	9								

Appendix 1.3 Summary of Riparian Poplar Land Ownership: by Jurisdiction

MAPSHEET	OWNERSHIP CATEGORY (number of quarter sections)										TOTAL	PERCENT	RANK
	PRIV	RESERVE	TWN/CTY	PROV	MD/CO	FED	PROVPARK	PRIVPARK	NTLAREA/ECORES	UNK			
CO 2 VULCAN	17	108		2				4		1	132	4.3	9
CO 4 NEWELL	97	3		4	2		22			3	131	4.2	10
CO 5 WARNER	11			8			4				23	0.7	19
CO 8 FORTY MILE	29			65					10	2	106	3.4	3
MD 14 TABER	49		2	28	7		1			2	89	2.9	14
CO 16 WHEATLAND	85	148		4						17	254	8.2	4
CO 26 LETHBRIDGE	121	9	37	12							179	5.8	7
ID 7 BADLANDS	50		9	10			6			2	77	2.5	15
MD 1 CYPRESS	65		39	166		48			7		325	10.5	3
MD 6 CARDSTON	210	204		2		1				1	418	13.5	1
MD 9 PINCHER CREEK	83	73		42							198	6.4	6
MD 31 FOOTHILLS	150		15	1	1					2	169	5.5	8
MD 34 ACADIA	8			39	1					9	57	1.8	17
MD 36 WILLOW CREEK	209		11	19							239	7.7	5
MD 44 ROCKYVIEW	27		17	4						3	51	1.6	18
MD 47 STARLAND	33			22	2					3	60	1.9	16
MD 48 KNEEHILL	85		3	4						18	110	3.6	12
SA 2 HANNA	93			197			36			35	361	11.7	2
SA 3 OYEN	54			47						16	117	3.8	11
TOTAL	1476	545	133	676	13	49	69	4	17	114	3096		
PERCENT	47.7	17.6	4.3	21.8	0.4	1.6	2.2	0.1	0.5	3.7			
RANK	1	3	4	2	2	2	2	2	2	5			

Appendix 1.4 Summary of Riparian Poplar Land Ownership: by River

RIVER	TRIBUTARY	OWNERSHIP CATEGORY (number of quarter sections)										TOTAL	PERCENT
		PRIV	RESERVE	TWN/CTY	PROV	MD/CO	FED	PROVPARK	PRIVPARK	NTLAREA/ECORES	UNK		
BELLY		140	140		4		1					285	9.2
BOW		142	259	17	44	1			4		21	488	15.8
CASTLE		5			8							13	0.4
HIGHWOOD		74		9	1						1	85	2.7
MILK		19			74			4		17	2	116	3.7
OLDMAN		257	116	50	66	4		1			2	496	16.0
OLDMAN	WILLOW CREEK	25			4							29	0.9
OLDMAN	PINCHER CREEK	20			1							21	0.6
RED DEER		374		10	289	5		64			87	829	26.8
RED DEER	ROSEBUD RIVER	52			2							54	1.7
RED DEER	KNEEHILL CREEK	23		2								25	0.8
SHEEP		36		6								42	1.3
S. SASK.		90		34	175	3	48					350	11.3
S. SASK.	BULLSHEAD CREEK	1		5								6	0.2
ST. MARY		61	25		2						1	89	2.9
ST. MARY	LEE CREEK	14	5									19	0.6
WATERTON		125			4							129	4.1
WATERTON	FOOTHILLS CREEK	9			2							11	0.3
WATERTON	YARROW CREEK	9										9	0.3
TOTAL		1476	545	133	676	13	49	69	4	17	114	3096	

Appendix 2
LIST OF RECREATION AND PROTECTED AREAS CONTAINING RIPARIAN FORESTS

Provincial Parks and Established Natural Areas:

Dinosaur Provincial Park
Dry Island Buffalo Jump Provincial Park
Fish Creek Provincial Park
Midland Provincial Park
Milk River Natural Area
Taber Provincial Park
Willow Creek Provincial Park
Writing-on-Stone Provincial Park
Woolford Provincial Park
Wyndham-Carseland Provincial Park

Municipal Parks, Campgrounds and Natural Areas in:

Calgary
Fort Macleod
Lethbridge
High River
Medicine Hat
Okotoks

Highway Recreation Sites and Campgrounds:

Highway #2 Crossing of Belly River
Highway #2 Crossing of Highwood River
Highway #2 Crossing of Oldman River
Highway #10 along Red Deer River (Cambria, East Coulee)
Highway #36 Crossing of Bow River (Scandia)
Highway #36 Crossing of Red Deer River (Duchess)
Highway #41 Crossing of South Saskatchewan River
Forks of the Bow and Oldman Rivers (Grand Forks)
Highway #837 Crossing of Red Deer River (Munson)
Highway #27 Crossing of Red Deer River (Morrin)
Highway #585 Crossing of Red Deer River (Trochu)
Highway #835 Crossing of Red Deer River (Big Valley)

Appendix 3
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