BIOS
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The North American Mosaic

The North American Mosaic: A State of the Environment Report released by the Commission for Environmental Cooperation on January 7, 2002 is an overview of the status and trends of major environmental and social indicators in Canada, Mexico, and the United States. The report confirms that these three countries together make up an incredibly complex, dynamic, and interconnected ecosystem in which humans play a dominant and decisive role. The report raises important and sometimes disquieting questions concerning the sustainability of some current trends and is a reminder that our economic, social, and physical well-being are utterly dependent on the life-sustaining services provided by nature.

> **"our economic, social and physical well-being are utterly dependent on nature."**

Based primarily on information from background papers prepared by scholars and government experts in various fields of study, the statistics used were gathered, harmonized, and published by recognized international bodies, such as the Organization for Economic Cooperation and Development (OECD), the UN Food and Agriculture Organization, and the World Resources Institute. Although each country collects data in a different way, the information was sufficient to convey important trends. Three broad conceptual frameworks for understanding environment-economy-society relationships are used including a sustainable model of development.

This report emphasizes the importance of developing mutually compatible economic, social, and environmental goals and policies across the three-country region. Many ecological connections link the countries of North America. Migratory species, transboundary air and water pollution, international trade, and the transboundary movement of people are examples. Watersheds both delineate and cross jurisdictional boundaries while ecoregions typically transcend political borders.

The report reflects the organization of information and ideas in accordance with the pressure-state-response framework, used extensively in OECD countries. Direct pressures encompass physical, chemical, and biological stresses such as chemical and biological pollution, over-exploitation of resources, and habitat alteration. The report organizes this assessment under 12 indicator themes: Forests and Woodland, Agriculture, Fresh Water (Availability and Quality), Terrestrial Biodiversity and Protected Areas, Marine and Freshwater Ecosystems, Minerals and Energy Use, Transportation, Air Quality, Climate Change, Natural Disasters, Industrial and Municipal

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In This Issue

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BIOS is written for the enjoyment of the members of the Alberta Society of Professional Biologists and those interested in the field of professional biology. Articles or comments are welcomed and should be communicated to the ASPB Office. Editing and layout by Gavin More, 49 NORTH Creative Learning and Training.

WELCOME NEW MEMBERS

Regular: Don Albright, Mark Boulton, Christy Campbell, Carol Engstrom, Francine Forrest, Steve Gotch, Trevor Hindmarch, Karl Kroeker, Bob Meagher, Lois Pittaway, Kenneth Plourde, Richard Popko, Travis Ritchie, Cindy Shepel, Cherie Westbrook, Cheryl-Anne Wray, Jeffery Young, Arianna Zimmer

Biologist In Training: Jauna Anstett, Richard Hart, Erik Kok, Jason McIntosh, Jonathan Smith, Jeff Wilton

Membership Update

ASPB membership as of March 15, 2002: **Total 494**

Regular	389	Biologist in Training	41	Inactive	36
Student	13	Retired	6	Honorary	6
Scholarship	2	Public Member	1		

Call for Papers - ASPB Conference

The Alberta Society of Professional Biologists is seeking papers for the 2003 Conference on Access Management.

For information on themes and conference objectives phone (403) 294-0488 or email tboag@appliedaquatic.com

2003 ASPB Conference on Access Management

Book off March 18 and 19, 2003 for the next ASPB Conference on Access Management. The event will be held in Calgary at the Telus Convention Centre. Watch for details!

Tom Boag is the contact for the Conference. To volunteer or for information phone (403) 294-0488 or email tboag@appliedaquatic.com

Regulation Update

The Professional Biologists Regulation as approved by the professional membership is currently with Alberta Human Resources and Employment awaiting approval by the Government of Alberta. In the meantime, the Board of Directors is preparing a revised package of By-laws. A draft of these By-laws will be available for discussion at the AGM on April 18, 2002.

President's Message

In the past year, the ASPB Board of Directors has built upon the Red Deer Workshop (BIOS March 2001, Vol. 16:1) and implemented actions aimed at maintaining continuity in ASPB operations and increasing services to both members and the public. The key result areas (KRAs) of membership and governance received considerable attention as they are required for the Society to be a functional and accountable entity under provincial legislation. The KRAs of public benefit and competency received attention as they are dominant issues within the ASPB's Mission Statement.

This year's actions and developments are best described under each KRA.

Membership: Goals included an increase in membership, improvement of member services, and an increase in volunteer involvement. A larger membership is important to all of us; it raises our visibility and provides a stronger voice. Increased revenues allow for improved services through administrative staff. The increase in full membership was 10%. An increase in biologist in training suggests an increased recruitment of young biologists. An increase in membership inquiries suggests continued growth is possible.

Services to members continued through programs organized by the two Professional Development Committees, the website administered by the Communications Committee, email announcements, BIOS newsletter, and office support. We are continuing to address the need to increase volunteer involvement of members.

Governance: The maintenance of financial stability, the rewriting of the Professional Biologists Regulation and Society By-laws, and development of efficient operations between the Board and committees were areas targeted. The rewritten regulation was finalized and voted upon by professional members. The final regulation was sent to the Government of Alberta. A draft of our By-laws was completed in preparation for the enactment of the regulation. Recognizing the rising demands and a need for a concerted effort in administration and liaison actions, the Board decided to hire a part time Executive Director.

Public Benefit: Goals included raising our public profile, and the use of public events to share information on timely topics. The intention is twofold; ASPB members should enjoy the recognition of the public as preferred professionals who work competently and ethically, and the public should have facilitated access to profession biologists. The Communications Committee finalized several products by the last AGM. Increased use and development of other products is needed. At the 2001 AGM and "Meet the Board" event in Edmonton after the AGM, members suggested increased programs with other societies, advertisement of the ASPB in trade and educational materials, encouragement of employers to hire P. Biols., and for government agencies to use ASPB registration as a benchmark for hiring. A number of initiatives were undertaken in all areas.

Competency: Given the public demand for assurance of competence and the advanced stage of professional development programs of many professional societies in Alberta and British Columbia, it is imperative that the ASPB develop a credible program. In autumn 2001, the Board established a new committee, the Professional Development System Committee (PDSC) to review existing systems of other societies and to develop recommendations for a system for the ASPB. These recommendations will be mailed out and discussed at the AGM.

Currently, the ASPB works almost exclusively as a volunteer organization with the exception of the much appreciated work of our office in Edmonton. Biology is moving into the 'big league' and is an essential part of the economic, political and cultural decision making process. The public turns to our profession with great expectations and we, in turn, must develop what we promise: competence and ethics. I predict the ASPB will require several full time staff to deal with the growing issues.

During our term, the Board of Directors attempted to provide a logical continuity in the development of the Society. Not all issues and concerns raised by members could be addressed in their entirety. On behalf of the Board, I encourage you to voice your opinions and ideas, if not your time, for the continued betterment of the Society.

Petr Komers, Ph.D., P.Biol.
President 2001/2002

[Ed. Note: Petr's full report will be provided at the AGM]

Caring for Your Lake: Successful Management Through Community Stewardship
Alberta Lake Management Society
Pine Lake, Alberta
September 27 & 28, 2002
For further information visit: www.alms.ca or
telephone: 403-297-5921,
e-mail: Al.Sosiak@gov.ab.ca

North American Mosaic continued

Wastes, and Population Trends.

This century has been marked by remarkable progress for many, though not all North Americans; economic activities have also damaged our environment, threatening human health and well-being. While certain unsustainable environmental trends show no signs of slowing, there are also many examples of how our individual and collective efforts have contributed to positive change.

On balance, we have an ever-growing ecological footprint. North Americans, mainly US and Canadian citizens, typically use more energy and natural resources, and generate more wastes than citizens of other countries. The health of an environment that sustains 394 million people and an economy worth nine trillion US dollars a year is at risk. Major North American environmental trends include:

- A high dependence on burning non-renewable fossil fuels for energy-coal, oil, and natural gas-releases large quantities of pollutants that contaminate the air we breathe and change the atmosphere in ways that affect our climate. Aside from a long-standing use of hydroelectric energy, there has only been a modest move to renewable forms of energy, such as wind, solar, and geothermal.
- Urban air quality deleteriously affects human health in many urban centers in North America. Positive examples of improvements abound, yet the general trends, particularly in the transportation sector, are disturbing - more people, in bigger cars, driving longer distances, burning greater amounts of fossil fuels, contributing to climate change, smog, acid rain and toxic pollution.
- Despite bans or strong controls on some harmful substances, such as DDT and polychlorinated biphenyls, there is still too much pollution being released into the environment. There is growing concern over the potential of certain chemicals to harm human health, perhaps even to disrupt the hormones that regulate our bodies.
- North America's natural forests continue to decline. Replacing old-growth forests with monoculture tree farms leads to ecosystems that are more susceptible to insect and fungi damage. There are some promising signs of movement from clearcutting to more sustainable harvesting, but the continent is still losing old-growth forests. The tropical forests of Mexico are under the greatest pressures.
- Agriculture has become heavily dependent on machinery, chemicals, and irrigation, and agribusiness is now introducing genetically modified products. There are signs that soil erosion caused by intensive farming is being controlled in many parts of North America due to better soil conservation measures, but on balance more soil is still being lost in agricultural areas than is being regenerated naturally.
- The precipitous decline in the stocks of a number of fish species has led to serious reductions or even collapses in a number of fisheries. Around North America and in much of the world, there is still a struggle to bring fish harvesting in line with nature's productive capacity. There has been a dramatic increase in aquaculture in North America, but fish farming has its own environmental impacts.
- Though levels of biodiversity are relatively high in North America, the region faces threats to many of its species, including loss of natural habitat, introduction of foreign invasive species, overharvesting, and continuing pollution. In the United States, for example, more than 65 percent of freshwater mussel species are extinct or threatened. Half of North America's most diverse ecoregions are severely degraded. 'Bio-invasion' of non-native species is one of the greatest threats to natural diversity.
- Marine ecosystems suffer from municipal, industrial, and agricultural wastes and runoff, as well as deposition from air pollution. Eighty percent of marine pollution is from land-based activities. Coastal waters in many areas continue to receive untreated or insufficiently treated municipal sewage.

Continuing environmental degradation jeopardizes the proper functioning of critical ecological processes, such as climate regulation and soil formation. Recent climate changes may have already increased the risks of natural disasters, such as hurricanes, tornadoes, floods, and other severe storms, including snow and ice storms. Environmentally unsustainable activities, such as deforesting slopes and building on floodplains, have also worsened the effects of some types of natural disasters. There are cases in which human-caused changes to ecosystems have increased risks to our health. Smog, contaminated drinking water, and coastal algae blooms are examples.

Among positive responses to environmental problems:

- Much of the gross air and water pollution that was evident in past decades has been eliminated. In regions such as the Great Lakes, a number of species are now re-establishing themselves.
- Emissions of pollutants that create acid rain and smog have been reduced, though not eliminated.
- Water conservation measures, combined with economic and regulatory incentives, have reduced fresh water use in some areas, though there are still many regions where use is greater than replenishment.
- More parks are being created to preserve natural landscapes and marine areas, and to provide habitat for wildlife, although enforcement is a challenge in many areas.
- Canada, Mexico, and the United States now work cooperatively on many environmental protection projects.
- Small but growing markets exist for "eco-efficient" or environmentally sound goods and services.

In recent decades, there have been a number of responses to environmental problems from citizens, nongovernmental organizations, governments, and some industries. But the rate of improvement has not always kept pace with development. For example, some of the successes due to industrial cleanups and cleaner automobile technologies have been off-

Bios Bits

EDPC Walleye Seminar

Michael Sullivan "reeling in" the members at the January 2002 Edmonton PD seminar about Walleye and the controversy about their recovering populations (a stylish presenter -- the pointer is a fly fishing rod!).

Water for Life

Alberta is developing a comprehensive strategy that will identify short-, medium- and long-term plans to effectively manage the quantity and quality of the province's water systems and supply.

Water for Life will address Alberta's current water challenges and enable the province to proactively deal with water-related issues we may face in the future.

In the past, Alberta has been able to manage its water supply because there has been a relatively abundant, clean supply to meet the population's needs and maintain a healthy aquatic environment. But as a progressive and prosperous province, Alberta is seeing rapid industrial, agricultural and municipal growth, which is putting more pressures on existing water supplies and potentially affecting the quality of surface water and groundwater. At the same time, nature's unpredictability has placed overwhelming demands on existing water supplies.

For example, recent consecutive years of drought conditions in most areas of the province have led to water shortages. While Alberta has adapted its water policies over time to keep pace with emerging issues and challenges, we need to do more to ensure a safe and sustainable water supply.

The consultation process has three major components - ideas generation, public outreach and consultation, and a ministerial forum on water. Beginning in March 2002, the Government of Alberta will be consulting with Albertans on the challenges and priorities for water management and supply, and seeking fresh ideas for responsible solutions to those challenges.

You can provide input into the process through community workshops, a mail-in work book, and an interactive website (www.waterforlife.gov.ab.ca). Download a pdf copy of the *Water for Life: Seeking Fresh Ideas* workbook, complete it and submit it by fax to 780-423-4745 or go online to a workbook or a hard copy by calling 310-4455.

ASPB AGM 2002

RAMADA INN

DOWNTOWN

CALGARY

April 18, 2002

Guest Speaker: Martin Jalkotzy

Topic: Cougars

North American Mosaic concluded

set by increases in the number of industry players, and by the steady increase in the number of motor vehicles, their size, and the distances they are driven. And although there has been a surge in the creation of environmental departments and regulations since the 1970s, there have been government spending cutbacks in the 1990s. Responsibility for many aspects of environmental protection has been transferred to lower levels of government that often lack the resources needed for monitoring and enforcement, or delegated to self-policing programs run by the industries themselves.

New measures of economic activity are being developed that attempt to incorporate environmental changes when calculating the true wealth of nations. At the turn of the millennium, North Americans are faced with the paradox that many activities on which the North American economy is based impoverish the environment on which our well-being ultimately depends. Much has been done over recent decades to put the human relationship with the natural environment on a more sustainable footing. Yet we are still far from achieving that goal, and it is clear that the scale of effort is insufficient to meet the challenge. It is anticipated that this report on environmental trends will set the stage for future reports on emerging issues related to the state of sustainability in North America.

To obtain a downloadable pdf version of this historic report visit www.cec.org/soe

Source: Modified from Executive Summary - The North American Mosaic. 2002

History of Alberta's Fish and Wildlife Resource - Update

Well, as many of you have heard by now, an ambitious project to document the history of the management and conservation of Alberta's fish and wildlife resource was initiated in 2001. Thanks to the hard work of a number of volunteers and to a number of sponsors, the project has had a very successful first year. Early in 2001, a volunteer management committee was struck and has subsequently applied for society status as the Fish and Wildlife Historical Society to formalize project management.

Applications to the Alberta Conservation Association (ACA) and Alberta Sport, Recreation, Parks and Wildlife Foundation (ASRPW) were successful for funds of $10,240. These grants allowed the project to hire researcher, Coral Grove, for a portion of the year. Also, the donation of office space from Alberta Sustainable Resource Development has provided a working area as well as a suitable repository for research materials. Under the direction of the committee, Coral spent the summer wading through government annual reports and other materials from various individuals, libraries and archives. Approximately 20 volunteers have been contacted and have agreed to direct the development of chapters pertaining to their areas of expertise. Work on a manuscript has been initiated and will continue to be expanded throughout the year. Finally, interviews of several wildlife managers and a photo collection have been initiated.

The Alberta Chapter of the Wildlife Society has made a commitment to technical and financial support ($5,000) to the project in 2002. Researching, soliciting written and photographic material, conducting interviews, writing and raising funds and awareness of the project will be some of the many tasks to be carried out in 2002. If you are interested in volunteering your time to a particular aspect of this project, or have information or materials that you feel would be relevant, please contact Petra Rowell at (780) 458-5560 or prowell@telusplanet.net for more information.

History of Fish and Wildlife Management - Quiz Corner!

In the last issue, we asked the question "Between 1906 and the present, how many provincial departments have held the responsibility for the fish and wildlife resource?"

The accompanying table outlines all of the departmental changes located to date (if you know something we don't, please let us know) indicating 12 moves into 10 different departments. Looking over the century then, the responsibility for Fish and Game was moved on average, every 8 years. However, variance was high with the longest stint a remarkable 30 years between 1906 and 1936 in the Department of Agriculture Administration - for the most part, under the leadership of the province's first Game Commissioner, Benjamin Lawton. The most turbulent period appears to begin in 1937, when Fish and Game Commissioner W.H. Wallace took over the Fish and Game Branch in the Department of Lands and Mines only to see it moved to Agriculture Administration in 1938, to Agriculture in 1939 and back to Lands and Mines in 1941.

Of course, the province wasn't the only jurisdiction with an interest in fish and wildlife in the last century. The following questions reflect a number of areas in which non-governmental organizations were involved.

Q. What was the first year pheasants were released in Alberta and what organization was responsible?

Q. In what year was fur-farming initiated in Alberta and what species was the first to be farmed?

Q. Trappers have a long history of providing furbearer population information to wildlife managers. In what year was the Alberta Trappers Association formed?

Q. Many of us are familiar with William Rowan's reputation for collecting. Where does the majority of Rowan's vigorous collecting effort now reside? (Hint: not the U of Alberta nor the Provincial Museum.)

Departmental Authorities for Alberta Fish and Wildlife

- 1906 - 1936 Agriculture Administration, Game Branch
- 1936 - 1938 Lands and Mines, Fish and Game Branch
- 1938 - 1939 Agriculture Administration, Fish and Game Branch
- 1939 - 1941 Agriculture, Fish and Game Division
- 1941 - 1958 Lands and Mines, Fish and Game Division
- 1958 - 1975 Lands and Forests, Fish and Wildlife Division
- 1975 - 1979 Recreation, Parks and Wildlife, Fish and Wildlife Division
- 1979 - 1985 Energy and Natural Resources, Fish and Wildlife Division
- 1985 - 1992 Forestry, Lands and Wildlife, Fish and Wildlife Division
- 1993 - 1999 Environmental Protection, (93-4 Fish and Wildlife Services; 94-7 Fisheries Management and Wildlife Management; 97-9 Fisheries and Wildlife Management Division)
- 1999 - 2001 Environment, Fisheries and Wildlife Management Division
- 2001 - 2002 Sustainable Resource Development, Fish and Wildlife Division

If you wish to volunteer for the History of Fish and Wildlife Project, contact Petra Rowell at (780) 458-5560 or prowell@telusplanet.net. We are still anxiously awaiting replies from all of the closet historians we suspect are out there!

The Professional Development Program - a starting point

A proposed Professional Development Program framework for the ASPB will be mailed out to you in April. The document was developed by the Professional Development Committee consisting of five full members of the ASPB and one Biologist in Training. The document introduces members to the central concepts of a Professional Development Program and solicits input from members to develop a more detailed program.

The structure of the ASPB program was based on a review of other societies who are going through a similar process or have a Professional Development Program. These include:

- Association of Professional Biologists of British Columbia
- Alberta Institute of Agrologists
- Association Professional Engineers, Geologists, and Geophysicists of Alberta
- Alberta Association of Registered Nurses
- Alberta Registered Professional Foresters Association

Through the process of these reviews, the Committee saw a number of elements common to each society's program. These form the basis for the ASPB program that will be put forward. There are also numerous options for a detailed structured Professional Development Program.

We look forward to hearing from you so we can put together the detailed structure of the program.

For more information contact the Professional Development Committee Chair Bruce Greenfield P. Biol. at 403-271-2134 or bgreen@cadvision.com

Crocodile Arms You Say!

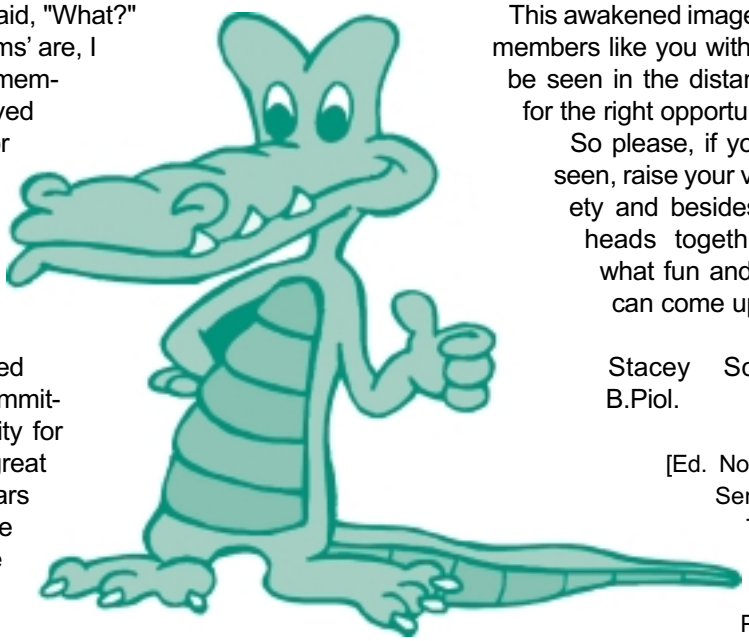
One morning at work, the day after an ASPB Board meeting, a colleague of mine asked, "So how was the meeting?"

"Great," I said. "I've taken on the task to call a few facilities to see about scheduling our next conference, etc, etc .... This is in addition to the four other things I am volunteering for, but it needs to be done."

My colleague said to me, "You haven't learned about crocodile arms."

I looked at this non-biologist and said, "What?"

Before I explain what 'crocodile arms' are, I would like to ask how many ASPB members have thought about getting involved in the Society or the Edmonton or Calgary Professional Development committees? How many would be willing to call me up and say, "Hey Stacey, I want to participate. I don't know how or where but I am interested in getting involved."



Six years ago I did just that. I called up the Chair of the Edmonton PD committee, mostly because it was a new city for me and I thought our society was a great place to meet friends. As the years moved on, I got more and more involved and took on more and more responsibility.

I look back and it's amazing who, what, and where the volunteering has steered me. And yes, I have met some great colleagues along the way.

What disappoints me the most after all this time, however, is when volunteers get taxed to the limit and can't balance their work, family, and volunteering in their life so it is often the volunteering that is the first to be dropped. Again, many ideas, not enough hands.

So what are crocodile arms? My colleague explained, "Well, they have arms that are so short that when they are raised to volunteer no one notices them, so they never get asked to participate."

This awakened images in my mind of vibrant members like you with raised arms that can't be seen in the distance or, maybe, waiting for the right opportunity to raise your arms. So please, if your arms are not being seen, raise your voices too. It's our society and besides, when we get many heads together, there's no telling what fun and interesting events we can come up with.

Stacey Schaub-Szabo M.Sc., B.Piol.

[Ed. Note: Stacey is the EPDC Seminar Coordinator and Treasurer, an ASPB Interim Director, and an ASPB Professional Development Committee Member. You can contact her at szabo@arc.ab.ca or 450-5360]

BOOK REVIEW - Repairing Damaged Wildlands: A Process Oriented Approach

Repairing Damaged Wildlands is a practical how-to-guide for improving ecosystem function in areas that have been damaged by human land use. As the subtitle suggests the focus is on repairing the processes within ecosystems. Author Steven Whisenhant shows that improving the retention and cycling of water and nutrients can be achieved by preparing soil substrate in a way that optimizes growing conditions of selected vegetation. The selection of plant species is focused primarily on the potential of the plants to improve the ecosystem function by rapid control of erosion, retention of water and nutrients in the system, and establishment of diverse communities including wildlife.

The re-creation of the historic species composition is only secondary to the re-creation of ecosystem processes. This is because either the planting of historically resident species may not be possible due to a lack of knowledge about historical species compositions, or may be impractical from an economical or ecological point of view. The practicality of restoration is an important theme throughout the book. The discussions of cost effectiveness of restoration methodologies are very important for practitioners who work in poor economies. In my opinion, it is appropriate that cost effective methodologies are treated predominantly, but not exclusively. Restoration in economically strong countries is described adequately. The treatments of ecological effectiveness of the methodologies is very relevant for practitioners who attempt to optimize the speed of recovery while considering the benefits of differing site preparation methodologies and plant compositions.

The first two chapters provide a comprehensive introduction and review of issues in wildlife habitat degradation, presenting a theoretical foundation to the very practical issues. The next five chapters present detailed information on how wildlands can be repaired, and the advantages and disadvantages of various approaches in a variety of situations. These chapters are the recipe style core of how to repair wildlands. The eighth and final chapter is again more general in nature. Together with the first chapter, it could be used in a textbook style to present the issues and applications of wildland repair. Landscape ecology is a major foundation presented in these two chapters, discussing the design of landscapes for the improvement of ecosystem processes. The two chapters may well find use in courses of applied ecology.

Clearly, the information provided in the book is impressive in its detail, cited literature, and practical applicability. There is an "however". Given that Whisenant aims at providing a practical guide to wildlands reparation, the editorial effort in formatting the book with the user in mind is very disappointing. The book lacks a summary or abstracts of any of the chapters. The chapters mentioned above are as close as a prospective reader will come to an abstract of any kind. The table of contents presents only the eight chapter headings. A short index provides only limited help in finding answers to practical questions. In addition, there are sections scattered throughout the book that describe the same approach, although in a somewhat different context. In virtually all cases, cross-references to the respective sections, tables, or figures elsewhere in the book are lacking. One wishes for at least a list of figures and tables that present some of the most important comparisons and recommendations. In other words, it is very difficult for a practitioner in the field to find sections of individual interest in the book, unless they read the whole chapter or indeed the whole book.

Formatting aside, ***Repairing Damaged Wildlands*** is a valuable complement to established texts such as ***Rehabilitating Damaged Ecosystems*** (Cairns 1995). The value of Whisenant's book lies in it's comprehensive synthesis of a large body of knowledge. Practitioners may find it useful that, contrary to many national or regional reclamation manuals (for Canadian examples: Michaud 1981, Green and Salter 1987, Hardy BBT 1989), this book is not limited to a specific geographical area, climatic condition or disturbance factor. Because of the comprehensive coverage of methodologies and lists of recommendations for their applications, practitioners are given the freedom to choose what might be most suitable for their situation. While scholars looking for theoretical and conceptual analyses may not be well served by this book, researchers will find many useful references from the review of current literature. Teachers can use many practical examples in restoration ecology that find a basis in landscape ecology theory. In conclusion, this book is a broad source of information about a variety of solutions to the restoration of wildlands using natural recovery processes rather than expensive interventions.

Repairing Damaged Wildlands: A Process Oriented Approach, written by Steven G. Whisenhant (1999), is available from Cambridge University Press, Cambridge.

Other References on Rehabilitation:

Cairns Jr., J. 1995. Rehabilitating Damaged Ecosystems, Second Edition. Lewis Publishers, London.

Green, J.E. and Salter R.E. 1987. Methods For Reclamation Of Wildlife Habitat In The Canadian Prairie Provinces. Environment Canada and Alberta Recreation, Parks and Wildlife Foundation. Prepared by the Delta Environmental Management Group.

Hardy BBT Limited 1989. Manual Of Plant Species Suitability For Reclamation In Alberta, 2nd edition. Alberta Land Conservation and Reclamation Council Report No. RRTAC 89-4

Michaud, L.H. 1981. A Manual of Reclamation Practice. International Academic Services Ltd., Kingston.

Urbanska, K.M., Webb, N.R., & Edwards, P.J. 1997. Restoration ecology and sustainable development. Cambridge University Press, Cambridge.

by Petr E. Komers, Ph.D., P.Biol.