



CHAPTER 4: PERFORMANCE MONITORING AND ADAPTIVE MANAGEMENT

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4.0 PERFORMANCE MONITORING AND ADAPTIVE MANAGEMENT

4.1 ADAPTIVE MANAGEMENT

Adaptive Management is a “formal process for continually improving management policies and practices by learning from their outcomes” (Taylor et al. 1997). Many companies and government agencies utilize some form of adaptive management in their decision making process. Passive adaptive management or ‘trial and error’ approaches are the most commonly used forms of adaptive management. While passive forms of adaptive management will continue to be used by Alberta-Pacific, a more strategic and defensible approach has been adopted in the form of ‘Active Adaptive Management’ (Walters and Holling 1990; Taylor et al. 1997).

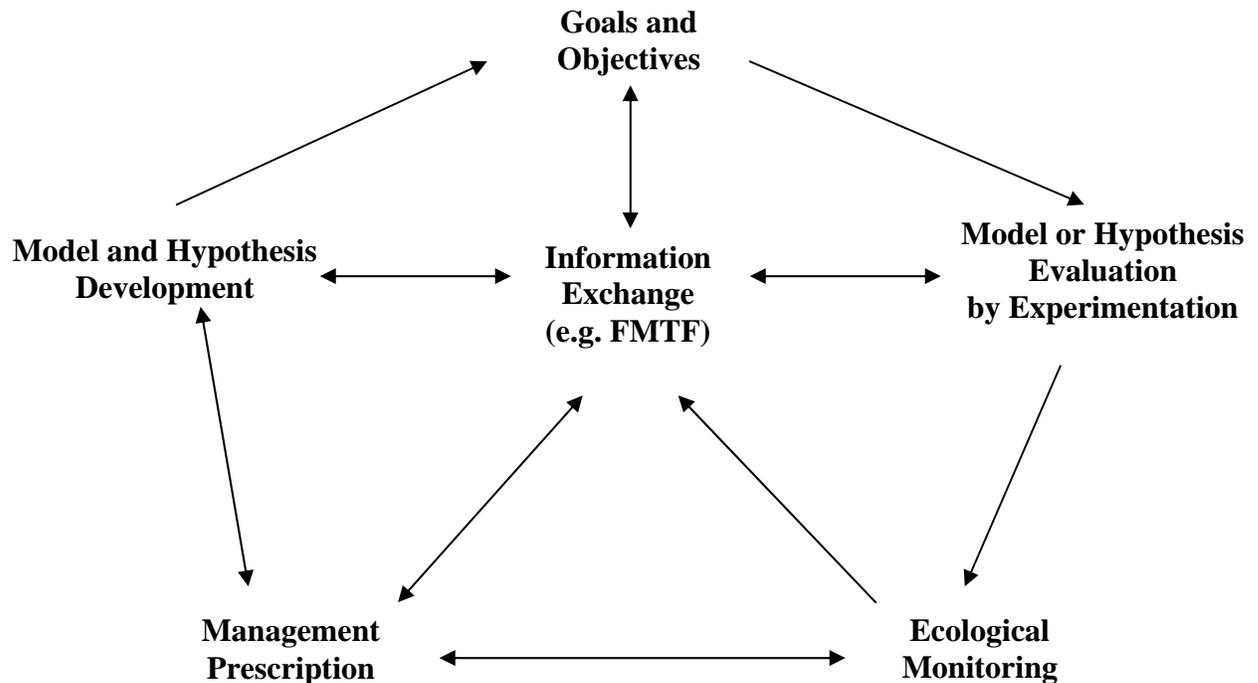
The term Adaptive Management describes an interactive process designed to improve the rate of learning about the management of complex systems. The process incorporates an explicit acknowledgement of uncertainties and knowledge gaps about the response of the system to management actions. Reducing these uncertainties (i.e. learning) becomes one management objective.

The following are seven key attributes of an Adaptive Management approach:

1. Decision makers, scientists, and other stakeholders (e.g., Forest Management Task Force members) work together and seek to enhance the understanding of the system that they manage.
2. Identification of:
 - **Indicators** (i.e. quantitative measures of the state or dynamics of the system that are relevant in the analysis of trade-offs among management alternatives; for example: diversity of forest birds; cubic meters of hardwood; hectares of forest in different age classes),
 - **Actions** (management activities or policies that will affect the system; for example: type, location and amount of roads; size, distribution and type of timber harvest areas) and
 - **Ecological processes** that link actions to changes in the indicators.
3. Explicit predictions of outcomes of potential management actions on a suite of indicators, using simulation models or other projection tools. Exploration of trade-offs among alternative approaches.
4. Identification of key uncertainties and knowledge gaps. These are prioritized based on how reducing these uncertainties will help in the trade-off analysis. For example: if we knew X, would it help us to choose among management alternatives A and B?
5. Management experiments implemented at an operational scale, designed to test hypotheses or qualitative relationships between management actions and changes in indicators.
6. Monitoring of indicators.

7. Evaluation of observed and predicted changes, diagnosis of reasons for differences, and assessment whether newly acquired knowledge justifies modification of the management plan. The adaptive management process is a continuous improvement process with feedback mechanisms that enable testing of the newly implemented management actions.

Figure 4.1: Active Adaptive Management ³³



In a more abbreviated definition, Active Adaptive Management³⁴ is a systematic process of modeling, experimentation and monitoring to compare the outcomes of alternate management actions (See Figure 4.1). Relative to ‘trial and error’ approaches, Active Adaptive Management is more efficient as it tests alternative practices simultaneously in management experiments as opposed to sequentially. The rigors involved in the modeling and experimentation of alternative actions also makes decisions based on Active Adaptive Management more defensible. Active Adaptive Management is thus a risk management strategy involving continual evaluation of the consequences of our forest management practices and other land-use practices on biota and ecological processes. The outcome of adaptive management is either a confirmation of existing practices or recommendations for implementation of alternative practices.

Monitoring is an integral part of the adaptive management process, and a commitment to monitor the outcome of management practices is a requirement of Active Adaptive Management. Ongoing and proposed monitoring initiatives are outlined in Section 4.2. Revision of practices is undertaken as new information becomes available. As communication between managers, scientists, government representatives and stakeholders is as important to the Active Adaptive Management process as analysis, feedback at all stages of the management process is required.

³³ Adapted from Haney and Power (1996).

³⁴ For more details on the adaptive management approach as adopted by AI-Pac see <http://www.ameboreal.com>



Flexibility within the process is critical, and flexibility within policy and planning is essential to allow rapid implementation of new practices.

4.2 RESEARCH AND DEVELOPMENT

OBJECTIVE (#25):

Continue to conduct and facilitate research and development and implement innovations realized from R&D and other sources of input (e.g., operational experience, traditional knowledge studies, regulatory change) through an active adaptive management process

STRATEGIES:

- Cooperate with partners in research and development:
 - Industry partners
 - Educational institutions
 - Government departments
 - Stakeholder groups
 - Aboriginal communities
 - Independent research organizations.
- Following the attributes of the Active Adaptive Management process outlined at the beginning of this chapter, amendments or modifications to the strategies outlined in the FMP or OGR's that occur in the time preceding major FMP revisions shall be addressed in the following fashion:
 1. Communication from the research program outlining an evaluation of the observed or predicted changes that may require amendments to strategies.
 2. Presentation and discussion of potential reasons for change to internal and external decision-makers (Forest Management Task Force - FMTF). These reasons will include an evaluation of the ecological, economic and social implications of the potential modifications.
 3. Following Company and FMTF agreement on potential modifications to strategies, government approval for these amendments to the DFMP/OGR will be sought.
 4. Subsequent to DFMP and OGR amendment, timelines for implementation of the new practices will be established and ultimately operational practices will be modified.

Specific research projects and/or monitoring programs target areas of significance. Research and monitoring priorities initially focused on evaluating differences between forest practices and natural disturbances that put ecosystem components at risk. More recently, key research programs have developed around mixedwood management, ecological effects of multiple land-use practices



(including more recent ILM strategies), and tree improvement research for the poplar farming program of Alberta-Pacific.

Research and monitoring will identify where practices depart from natural processes, and determine whether there are ecological consequences of these land-use practices. See Appendix 12 for a summary of completed and ongoing research projects.

The forest research component is an integral part of the adaptive management strategy. Incorporation of the most current information into harvest practices will help ensure that the consequences of land-use practices are understood and the risk to long-term biodiversity and forest ecosystems is minimized.

TIMING AND REVIEW

In an effort to maintain continual improvement and implementation of ecologically sustainable forest practices, the principles and strategies within the FMP will be reviewed five years from the time of government approval of the submitted portions of FMP text. The FMP will be revised in preparation for FMA renewal in 2011.

Potential modifications will be reviewed by the companies on a case-by-case basis to determine if FMTF immediate involvement is required. A successful adaptive management plan will require that the Forest Management Task Force continues to exist, perhaps in an expanded role, and that representation on the FMTF will allow recognition of changing societal values and demands.

EXAMPLES OF PAST ADAPTIVE MANAGEMENT CHANGES

Alberta-Pacific's Timber Harvest Planning and Operating Ground Rules were developed through a consensus building process of the FMTF in 1993. Significant research has been conducted including a report by the Alberta Research Council called Relationships Between Stand Age, Stand Structure, and Biodiversity in Aspen Mixedwood Forests in Alberta (Stelfox 1995). Many studies suggested that changes to provincial management practices were required to ensure the continuation of the mixedwood forests. The report confirmed that the approach to Ecosystem Management following a natural disturbance model was appropriate.

In addition, other research initiatives were underway on several fronts to address information gaps: Terrestrial Riparian Organisms Lakes and Streams (TROLS), the Calling Lake Fragmentation study and other Networks of Centres of Excellence-Sustainable Forest Management Network³⁵ initiatives funded partially by Alberta-Pacific. The Company began implementing changes to 'in-block' stand structure and to increasing the variance of harvest block sizes. Often these changes were outside of the then current Operating Ground Rules (OGRs) and required ad hoc approval through the Forest Service. These approvals became difficult to track and the need for adaptive changes to the OGRs became apparent.

In 1997, revisions to the 'consensus' OGRs were initiated to allow completion just after the approval of the Detailed Forest Management Plan in November of 1998. These OGRs were developed through a subcommittee of the FMTF with consensus approval at the FMTF. They are

³⁵ Network of Centres of Excellence - Sustainable Forest Management Network based at the University of Alberta; <http://www.biology.ualberta.ca/sfm>.



entitled Alberta-Pacific Forest Management Area Operating Ground Rules and apply to all harvesting activity (Alberta-Pacific, and major Quota Holder and MTU³⁶) on the FMA area.

Many changes were made to the OGRs, however four recommended changes stand out. One relates to stand level structure and three for landscape management.

1. At the stand level, post-harvest live standing trees (i.e., residual structure) was increased from 8 stems per hectare, usually placed as single stems, to allow for 5% of the volume of merchantable deciduous and 1% of the merchantable coniferous to be left on a block. The deciduous volume is now located in single and clumped stem groups, with the deciduous often used to protect coniferous understory or mature conifer from windthrow. These changes were implemented and have improved the blocks both aesthetically and from the perspective of wildlife use immediately after harvest and continuing through to the next rotation.
2. At the landscape level, the variance of block sizes was modified. Rather than a single average and maximum block size for the FMA area, the maximum block size was varied by operating unit and the range increased from a 60 hectare maximum to a 500 hectare maximum in some operating units. The upper limit was established as a social constraint and was only roughly based on the natural disturbance model, so far as inventory stand types reflect the shadow of fire patterns on the landscape.
3. The largest stands by leading species (deciduous, jack pine white spruce, and black spruce), identified in the forest inventory (largest 5 AVI stands or largest 10 Phase 3 stands depending on what mapping was available) were averaged to obtain the upper limit for each operating unit by leading species. In some cases, where the largest block average exceeded the 500 hectare social limit, the operating unit was constrained to 500 hectares. The net result of these changes will be greater variance in block sizes to more closely equate with the variation in stand size created by natural disturbances.
4. The second landscape level modification to the OGRs was the provision to move from a two-pass to an aggregated harvest. This requires the operational scheduling of harvest stands to be more closely linked to the timber supply model schedule than has been the case in the past. Block boundaries will now more closely approximate forest stand patterns left after the previous fires.

Taken together, increased stand structure, greater variance in block size, and progress towards aggregated harvest, Al-Pac has made significant progress implementing a shift from traditional management practices to Ecosystem Management following the natural disturbance model.

Much of our past emphasis has been at a stand level; the next series of adaptive management experiments, modeling exercises and forest management strategies need to focus on the landscape level. The companies will be investigating planning and harvesting options that address natural disturbance patterns at a watershed or landscape level (see objective 11 in Chapter 3).

³⁶ Transition Period for MTU operations was allowed, 1 operating year after approval of the DFMP.

**DIFFERENCES BETWEEN 2000 DFMP AND 2004 FMP (REVISED 2007)**

In order to successfully implement sustainable forest management, it is important that revisions of the Forest Management Plan incorporate monitoring information and new scientific information. There are numerous advances in this Forest Management Plan. These changes include:

1. Formalization of an aggregated harvest approach, including maximum target for disturbance unit size, in order to better maintain landscape patterns.
2. Increasing coniferous stand structure (5% merchantable conifer residual) in Al-Pac cutblocks, in order to maintain structural diversity and biodiversity at the stand level.
3. Salvage logging protocols to ensure residual structure is retained within recently burned forest, and that portions of burned habitat are retained unharvested.
4. Old forest targets for five forest strata, based around the mean of the range of natural variability (NRV).
5. Changes to Timber Supply Analysis parameters and assumptions (see Table 3.8, Chapter 3).
6. Historical Resources Assessment incorporated into harvest planning



4.3 BIODIVERSITY MONITORING

Since the major goal of sustainable forest management is to utilize the forest for products and non-timber values while being able to maintain biodiversity, it is critical to devise methods of monitoring biodiversity over the long-term. If proper monitoring is not conducted, significant deviations may go undetected, or conversely, changes in species abundance may be mistakenly associated with forest practices. These “fine-filter” monitoring strategies validate the coarse-filter approach.

OBJECTIVE (#26):

Implement biodiversity, forest renewal, and forest monitoring systems to evaluate changes in landscape pattern, forest growth and yield, habitat structure and species diversity.

STRATEGIES FOR ONGOING MONITORING PROGRAMS

Alberta-Pacific and the Quota Holders conduct or participate in a number of programs that involve various aspects of biodiversity monitoring. Alberta-Pacific has also been a participant in the development of a comprehensive biomonitoring program that is scheduled for implementation in 2004 (see below for a description of the proposed province-wide ‘Alberta Forest Biodiversity Monitoring Program’). Some of the following monitoring programs currently engaged will either complement or form an effective bridge to the province-wide program being developed. The current list is not an indicator of inclusiveness, for future programs may need to be added in the context of adaptive management.

MONITORING PROGRAMS LED BY ALBERTA-PACIFIC

- **Alberta Vegetation Inventory (AVI):** The forest companies will continue to upgrade the AVI for the entire FMA area so that it remains current to the provincial standard. (See Section 3.1). The upgrade is designed to track changes in forest growth (age, height, site relationships) and natural and man-made disturbances through remote sensing, field visitations and digital mapping. Thus, it constitutes a continual monitoring of landuse activities on the FMA area. Forest cover is upgraded on a 10-year schedule while land-use activities are monitored yearly. The AVI is available through Al-Pac for forestry operational planning, for the TSA, and for other users such as the Oil and Gas industry. Please contact Alberta-Pacific (1-800-661-5210) to inquire about the purchasing of AVI datasets.
- **Permanent Sample Plots (PSP’s):** Permanent Sample Plots on the FMA area monitor and measure growth and yield, and contribute to the understanding of the growth and succession of representative forest types and forest stand dynamics over time. (See Section 3.1) The PSPs are generally re-measured on a continual 5-year cycle for changes observed with respect to plant species, tree growth, stand development, stand structure and tree mortality. Alberta-Pacific will continue to monitor 400 PSPs in the FMA area. The location of the plots is digitally recorded. New PSP’s will be initiated in target strata, particularly in regenerating stands and alternative silviculture systems, over the next 5 to 10 years. The information is available from Alberta-Pacific (1-800-661-5210).



- **Retrospective Study of the Adaptive Management Experiment (AME) Team.** Researchers from the University of Alberta, in collaboration with Alberta-Pacific, will continue to sample the diversity of birds, plants and mammals on 100 townships dispersed on and near the FMA area. The retrospective study (2001-2002) will examine biotic diversity in relation to the amount of linear disturbances (e.g., roads, seismic lines, pipelines) and the amount of older forest.

The results from the Retrospective Study will complement modelling initiatives of the AME team in preparation for a landscape-scale experiment of land-use practise to be initiated in 2005. For more information on the AME team, please visit their web site at <http://www.ameteam.ca> or contact one of the forest ecologists at Alberta-Pacific (1-800-661-5210).

- **Lake Fisheries Program:** This is a study of Northern lakes that are traditional fisheries and may serve as the headwaters for community drinking water. Annual surveys are conducted in partnership with several aboriginal communities and oil sands companies.

The surveys investigate fish health and tissue concentrations of heavy metals of food fish (walleye, pike, whitefish, burbot, and arctic grayling). Currently lakes northeast of the oil sands have been surveyed (Namur and Garner lakes). The survey is developing a baseline dataset in relatively unaffected areas that will be used to compare to areas upstream of Ft. McMurray. For more information please contact Alberta-Pacific's aquatic ecologist (1-800-66-521).

- **Stream Inventory:** Alberta-Pacific identifies the fish bearing streams and lakes throughout the FMA area two to three years prior to harvest. Stream Inventory occurs annually during May to September. Inventory involves fish collections (and release), and habitat assessment. Stream information is shared with the Province and other resource users.

This information is used by planners to determine if an area can be accessed in summer or winter, based on risk to fisheries. Surveys of existing stream crossings are also conducted to ensure compliance with all standards and protection of streams. For more information please contact Alberta-Pacific's aquatic ecologist (1-800-661-5210).

- **Trapper Monitoring Program:** Ten to twelve trappers are selected annually on the FMA area to collect data from their traplines. This is an annual program that monitors furbearer presence in response to disturbance such as forest harvesting. The program evaluates furbearer use of cutblocks, uncut areas and burned areas. It also examines when various furbearers return to cutblocks or burns following disturbance.

The information enables Alberta-Pacific to make harvesting decisions that will support furbearers and trappers. For more information please contact Alberta-Pacific's aquatic ecologist or trapper coordinators (1-800-661-5210).



- **Stand Structure Audits:** As part of a commitment to maintain biodiversity at the stand level the forestry companies retain varying amounts of structure in the form of standing live trees (Alberta-Pacific 2000). The current practice is to leave 5% merchantable deciduous volume and 5% merchantable conifer volume (Al-Pac cutblocks) and 1% merchantable conifer volume (quota holder cutblocks) on average for the FMA area. These targets will be reassessed in the subsequent OGR revisions that will take into account the common landbase.

Alberta-Pacific has developed a handbook⁴³ that describes the rationale behind leaving such structure in the cutblock. Workshops are held annually with harvesting contractors outlining guidelines by which harvesting should be conducted (see Objective # 12).

By understanding the philosophy and rationale behind the stand structure guidelines, harvesters are empowered to make decisions with regards to where and how many standing live trees should be left. Operations coordinators at Alberta-Pacific conduct stand-structure audits on all of their cutblocks to ensure compliance with the Operating Ground Rules and the timber supply analysis (TSA) assumptions. Environmental Sciences staff at Alberta-Pacific conduct stand-structure audits on a sub-sample of blocks each year as independent audit and benchmark for the audits conducted by operations coordinators. Research projects are underway to quantify actual amounts of standing live volume retained in blocks.

MONITORING PROGRAMS LED BY THE FOREST COMPANIES³⁷

- **Forest Renewal Monitoring:** Reforestation of the forest companies' harvest areas is based on sound regeneration techniques. The monitoring of silvicultural activities involves pre-harvest assessments (PHA's) of most conifer blocks to provide an ecologically-based framework to link silviculture and harvest planning. Post-harvest, all harvested areas have legislated surveys to ensure survival and performance of the juvenile trees. This is digitally tracked in the Silviculture Information System (SIS). Additional monitoring is conducted on some harvest areas to determine regeneration status and potential remedial actions. The forest companies can be contacted directly for forest renewal information. (Alberta-Pacific - 1-800-661-5210)
- **Timber Monitoring:** The forest companies maintain a scaling system to monitor roundwood deliveries from harvest blocks to the woodyards. Load sampling has been established to ensure accuracy in weight to volume conversion. Cut control monitoring is forest company/FMU dependent to account for roundwood flow and measure. The forest companies can be contacted directly for timber monitoring information. (Alberta-Pacific - 1-800-661-5210)
- **Mixedwood Management Monitoring Plots:** In addition to the aforementioned PSP's, the forestry companies on the FMA area have established plots for monitoring tree responses to various alternative silvicultural practices (e.g. high-effort understory protection) being implemented or investigated as part of the Mixedwood Management initiatives. The monitoring plots track over time, conifer growth, hardwood regeneration, and wind-throw.

³⁷ Vanderwell Contractors – 1-780-849-3824; Millar Western Boyle – 1-780-689-3030; Alberta-Plywood – 1-780-805-3715; Northland Forest Products – 1-780-743-3773.



This data will be utilized in the calibration of Model II silviculture accounting and yield curve development. The forest companies can be contacted directly for Mixedwood Management monitoring information. (Alberta-Pacific - 1-800-661-5210)

- **Proposed Landscape Management Monitoring of Forest Renewal and Growth and Yield (Model 2)**

In cooperation with the Alberta Sustainable Resource Development and other FMA holders, the forest companies are designing a landscape management accounting system (referred to as Model 2 – See Section 3.7), which incorporates forest renewal monitoring and a growth and yield monitoring all linked to the timber supply model. Landscape level monitoring is a management by objective (MBO) system, that changes from monitoring not only stand or block level regeneration to also a landscape level accounting system for forest growth and yield. The major components of the monitoring are:

- A balanced silviculture plan - strata and landscape level balancing of future forest yields;
- Survival surveys - an early check on stand development;
- Establishment surveys for all cutblocks with linkages to yield curves; and
- Performance surveys of all cutblocks.

The surveys all contribute to the monitoring of forest growth that can then be ascribed to landscape strata balancing or a balanced account of forest growing stock; long-term growth and yield monitoring. The digitally recorded Model 2, tied directly to the timber supply analysis and silviculture information system, is the continual evolution of forest renewal monitoring.

MONITORING PROGRAMS WHERE ALBERTA-PACIFIC AND THE QUOTA HOLDERS³⁸ PARTICIPATE BUT DO NOT LEAD

- **Boreal Caribou Research Program:** Alberta-Pacific has been an active participant in the Boreal Caribou Committee (BCC) and in an ongoing (1991-present) research and monitoring program focused on woodland caribou (a threatened species in Alberta). The program focuses on understanding the ecology and population dynamics of woodland caribou in northern Alberta, as well as evaluating the effects of industrial activities on caribou. The BCRP is the largest caribou research program in North America and has been instrumental in the establishment of land-use guidelines for industrial activity in caribou range that serve to integrate industrial activity and caribou conservation. The BCRP is a collaborative venture funded by provincial and federal government agencies and industrial partners in the forest industry, oil and gas sector and the peat industry; the University of Alberta has been an important link in the BCRP. See the BCRP website for more details and publications <http://www.deer.rr.ualberta.ca/caribou/BCRP.htm>. Information about the BCRP can also be obtained by contacting a forest ecologist at Alberta-Pacific (1-800-661-5210).

³⁸ Within these monitoring programs, not all of the four major Quota Holders are active.



- **Bird Community Monitoring:** The forest companies have supported a large number of studies that have monitored bird distribution and abundance on the FMA area. Monitoring around the experimental cutblocks near Calling Lake began in 1992 and will continue through 2009 (contingent on UofA funding). For more information about the Calling Lake bird study, please contact the Department of Renewable Resources, University of Alberta (<http://www.rr.ualberta.ca>) or one of the forest ecologists at Alberta-Pacific. (1-800-661-5210).

Alberta-Pacific is also a partner in the Remote Sampling Program (2001 to 2005) being conducted by the University of Alberta and the Federation of Alberta Naturalists (FAN; <http://www.fanweb.ca/>) in preparation for the Second Edition of the Alberta Breeding Bird Atlas. The aim of this endeavour is to create a supplement to the first breeding bird atlas, containing updated distribution maps of bird species, relative abundance estimates, and analysis data for consistent patterns in change and distribution of bird populations. Particular emphasis will be placed on the collection of field data from remote areas of the province and obtaining breeding evidence of previously less recorded species. A soft-cover atlas will be produced by FAN in 2005, corresponding to Alberta's centenary, detailing distributions, population data and trends.

For more information about the Alberta Bird Atlas Update Project please contact the Federation of Alberta Naturalists, 11759 - Groat Road, Edmonton, Alberta T5M 3K6, Phone: 1-780-427-8124 or Department of Renewable Resources, University of Alberta (<http://www.rr.ualberta.ca>).

- **Wetland and Waterbird Monitoring:** The forest companies support a variety of aquatic monitoring programs being conducted collaboratively by the University of Alberta and Ducks Unlimited. The Hydrology, Ecology and Disturbance (HEAD) at University of Alberta monitors surface and subsurface hydrologic features in a variety of landforms typical of the FMA. The project is examining the climatic and landscape controls on the hydrology, biogeochemistry and ecology of wetland-pond complexes of the Western Boreal Forest, near Utikuma Lake, Alberta.

Students, Post Doctoral fellows and technicians in the research group are determining the dominant fluxes of water and nutrients into, through, and out of shallow pond-wetland complexes and will determine how the linkages between the wetlands and their surrounding environment vary over the landscape. The research will examine 1) how the basic hydrological and chemical processes in shallow pond-wetlands complexes vary with landscape position, 2) the role of riparian wetlands in influencing pond water chemistry in three wetland-pond complexes located in different landscape features common to the Western Boreal Plains, and 3) the biotic diversity of aquatic invertebrates and waterbirds utilizing the wetlands.

These studies will provide critical baseline information and will lead to future manipulation experiments examining the influence of land use changes on wetland-pond ecosystems. The project was initiated in 1998 as a pilot project; phase I will be completed in 2004. A manipulative phase of the project will begin following phase I; hydrologic monitoring is planned to continue for many years.

For more information about the HEAD project please contact the aquatic ecologist at Alberta-Pacific (1-800-661-5210) or Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada T6G 2E9. Phone: 1-780-492-9387; <http://www.biology.ualberta.ca/devito/devito-hp.htm>



Ducks Unlimited Canada (DUC) has launched the 'Western Boreal Forest Program' (WBFP) as a new conservation initiative. Additionally, DUC and Al-Pac are partners in the Boreal Conservation Plan for the FMA area (see Chapter 2). The Alberta-Pacific FMA area has been selected by Ducks Unlimited to serve as one of the study areas for the WBFP. For more information about the Western Boreal Forest Program please contact Ducks Unlimited at 1-780-489-2002 or see their web site at <http://www.ducks.ca/> for more details. An Alberta-Pacific ecologist can also provide details on their involvement with Ducks Unlimited.

- **Environmental Effects Monitoring (EEM):** Alberta-Pacific participates with the four other pulp mills (Weldwood, Alberta Newsprint, Millar Western and Slave Lake Pulp) on the Athabasca river to monitor fisheries, water quality, and benthic invertebrates (water-bugs) along a 940 kilometre reach of river from upstream of Hinton to downstream of the Alberta-Pacific mill. EEM is federally regulated and surveys occur every 3 years in perpetuity.

Three surveys have been conducted to date. Findings from these surveys indicate that fish health has not been adversely affected by the pulp mills. All mills did have mild nutrient inputs that increased plant and insect growth near their effluent outfalls (for less than 2 km). For more information please contact Alberta-Pacific's aquatic ecologist (1-800-661-5210). For more information about EEM look up <http://www.ec.gc.ca/eem/english/>

- **Regional Aquatics Monitoring (RAMP):** This is a monitoring program that evaluates the industrial effects from the oil sands industry on regional aquatics. As oil sands are being developed for mining and wells the changes to surface and groundwater are monitored and recorded as reference for reclamation as areas become closed for extraction.

Annual surveys are conducted on fish, benthic invertebrates (water-bugs), water quality and aquatic vegetation. The program is supported by the oil sands companies. Alberta-Pacific Forest Ind. is a partner in RAMP as our research goals are similar and we have a common land base. For more information please contact Alberta-Pacific's aquatic ecologist (1-800-661-5210).

- **Traditional Land-Use Studies:** Alberta-Pacific assists in the planning and organization, of Traditional Land Use Studies throughout the FMA area. These studies are confidential information of the Aboriginal communities. Contact Alberta-Pacific at 1-800-661-210 for further information on these studies.



MONITORING PROGRAMS WHERE THE FOREST COMPANIES DO NOT PARTICIPATE BUT HAVE ACCESS TO DATA

- **Provincial Wildlife Surveys:** Through a data-sharing agreement with the Alberta Sustainable Resource Development Department (Fish and Wildlife Branch), the Forest Companies have access to surveys (as they are available) conducted/managed on the FMA area by Fish and Wildlife staff. Species surveyed by the Fish and Wildlife branch include fish (primarily walleye, northern pike, and grayling) ungulates (primarily moose, deer, elk and caribou); and waterbirds (such as pelicans, cormorants and trumpeter swans); and some furbearers.
 - Ungulate surveys are on the following tentative F&W timetable:
 - Moose: 4-6 year rotation through Wildlife Management Units.
 - White-tailed Deer: 4-6 year rotation through Wildlife Management Units
 - Elk: Incidental during deer/moose surveys.
 - For waterbirds and swans, lakes are periodically surveyed (when funds permit).
 - For furbearers, only wolverine surveys have been initiated (started in 2001).
 - Bats, owls and grouse have periodic surveys.
 - Lake fishery assessments are done on a priority basis, based on public and department input, therefore balancing access to angling and viability of the resource.

For more information about provincially funded wildlife surveys contact Fish and Wildlife staff biologists in Lac La Biche, Fort McMurray or Athabasca using the toll free number 310-0000.

PROVINCIAL BIOMONITORING PROGRAM:THE ALBERTA BIODIVERSITY MONITORING PROGRAM

- **Support and participate in The Alberta Biodiversity Monitoring Program (ABMP)**

The challenges surrounding the development and implementation of a rigorous biodiversity-monitoring program led to the development of the ABMP. Rather than create a company-specific monitoring program, Alberta-Pacific joined a consortium of other companies and government agencies (federal and provincial) to collaboratively develop a province-wide monitoring program. Such consistency in monitoring would allow meaningful comparisons through time between the FMA area and other forested areas of the province. The goal of the ABMP is to develop a comprehensive system for detecting changes in biodiversity in the forested zone of Alberta. The focus of the program is species diversity, with additional context provided by measures of habitat diversity, landscape variation, and anthropogenic (human-caused) disturbance.

The program is based on adaptive management principles, with the level of a management indicator (species diversity of target groups) facilitating assessments of a management objective (maintaining the diversity of species in the forested zone of Alberta).



This assessment, combined with an early warning capacity for inferring possible causation, is provided through repeated monitoring of species diversity, habitat diversity, landscape diversity, and anthropogenic disturbance using relatively inexpensive field and remote sensing techniques.³⁹

The program is designed to meet four monitoring objectives:

1. Provincial assessment: To detect provincial-level changes in the species diversity of target groups.
2. Early warning: To compare changes in the species diversity of target groups among regions with different historical levels of anthropogenic disturbance.
3. Correlates of change: To describe relationships between regional changes in species diversity and regional changes in habitat diversity, landscape diversity, and anthropogenic disturbance.
4. Regional and local assessment: To monitor trends in species diversity, habitat diversity, landscape diversity, and anthropogenic disturbance within areas of specific management interest, including protected areas, Forest Management Agreement areas, and areas of management interest to companies in the energy industry.

Numerous tasks are required prior to initial data collection. As of January 2002, Phase I (protocol development) was completed. Phase II consists of development of a governance and funding model. The governance model will address issues such as where will this entity be housed, how will it be structured, will it have a Board of Directors, who will it be accountable to, will the Federal Government play a role and if so what?

The funding model will address how the entity will be financed, what kind of a partnership it might be, whether it is non-profit or not, whether the information has commercial value, and where the market might be. Governance and funding are directly related and will be dealt with concurrently. Alberta-Pacific and other industrial/government partners are collaborating with the Alberta Research Council, and the University of Alberta in the initiation of the prototype program testing ABMP protocols.

If fully implemented, the provincial monitoring program will replace or compliment aspects of a number of the ongoing monitoring programs mentioned above. If the provincial monitoring program does not become established, the companies will continue most of the surveys mentioned previously as 'ongoing'. In addition, new biodiversity monitoring programs may need to be implemented to fill gaps in our current monitoring that would be addressed by the ABMP. Alberta-Pacific is committed to promoting the successful implementation of a provincial biodiversity monitoring to the fullest extent possible before considering other monitoring options.

³⁹ This and subsequent paragraphs in this section relating to the ABMP were extracted from the strategies of the ABMP (<http://www.anmi.ca>). A summary of the program phase to-date is available at: (<http://abmi.biology.ualberta.ca/Documents/Annual%20Reports/PrototypeReportF3-hi.pdf>)



4.4 PERFORMANCE AUDITS

From 1995 to 1997 Alberta-Pacific completed annual internal audits utilizing public and government representatives on audit teams to expose findings for continual improvement. Where applicable, findings from these audits were incorporated into business practices and also included in the subsequent OGRs produced in 2000. These audits prepared the Company for passing their first external audit, which was “Forest-Care”, an initiative of the Alberta Forest Products Association (AFPA). Since achieving Forest Care certification late in 1998, Alberta-Pacific has chosen not to continue membership in the AFPA and instead will seek certification to the standards of the Forest Stewardship Council (FSC). The four major quota holders are continuing their participation with the AFPA Forest Care certification program.

OBJECTIVE (#27):

The forest companies will continue to participate in Alberta Sustainable Resource Development (SRD) compliance audits.

(Note: Compliance audits developed in association with Alberta SRD generally deal with issues relating to forest management regulations and ensuring the forest companies’ operations are complying with the operating ground rules.)

STRATEGIES:

- Participate in all Alberta Sustainable Resource Development compliance audits.
- Alberta-Pacific requests that a public member of the advisory group participates in the Alberta Sustainable Resource Development audit and report.
- In the absence of third-party audit and certification programs, Alberta-Pacific will conduct self-audits that primarily deal with harvesting and silviculture operations.

Self-audits are designed and sponsored by Alberta-Pacific to assist in the continuous improvement of the woodlands operations. They are aligned to meet the objectives contained within the woodlands strategic business plan.



4.5 CERTIFICATION

Certification of industrial practices by third party national or international accredited agencies provides the companies with a number of benefits including: independent verification of practices; product promotion in the international market place; and subsequent annual audits ensure programs are maintained and on track. The mill was certified to the ISO 9002 standard in 1995, then in January 2003 re-certified to the ISO 9001:2000 standard. The mill and woodlands operations also achieved ISO 14001 in the first quarter of 2001. Certification to ISO standards focuses on evaluating whether a company has processes in place to meet their business objectives.

Within Alberta four major certification programs have been investigated for certification of forest practices: Forest Care, Canadian Standards Association (CSA), Sustainable Forestry Initiative (SFI), and Forest Stewardship Council (FSC).

- **Forest Care:** Forest Care is an Alberta Forest Products Association (AFPA) program that evaluates and communicates the forest industries' commitment to protect the environment and sustain the many values of Alberta's forests. With Forest Care, AFPA members pledge to lead progressive operations, in the woodlands and mills, and continually improve their performance. A multifaceted Forest Care auditing system is overseen by independent observers to show Albertans that the industry is fulfilling its forest management promises. As part of the process, AFPA members are committed to open discussion and working with the public, forest industry employees and government. Their goal is to ensure continued responsible stewardship of the forest resource, safe and environmentally responsible operations, and economic stability in the communities where mills operate.
- **Sustainable Forestry Initiative (SFI):** Adopted by the American Forest & Paper Association (AF&PA) in October 1994, the Sustainable Forestry Initiative® (SFI) program is an exacting standard of environmental principles, objectives and performance measures that integrates the perpetual growing and harvesting of trees with the protection of wildlife, plants, soil and water quality and a wide range of other conservation goals. An independent External Review Panel, comprised of representatives from the environmental, professional, conservation, academic and public sectors, reviews the program and advises AF&PA on its progress.
- **Canadian Standards Association (CSA):** THE Canadian Standards Association is a not-for-profit membership-based association serving business, industry, government and consumers in Canada and the global marketplace. In response to national and international concern about forest management practices in Canada, Canada's National Standard on Sustainable Forest Management Standard, CAN/CSA Z809 was developed. Sustainable Forest Management (SFM) refers to the way a forest is managed to maintain the long-term health of forest ecosystems for current and future generations.



This Standard, which utilizes a continual improvement approach, requires public participation, demonstration of sustainable forest management practices, and management commitment. SFM takes into account environmental, social and economic factors. This standard gives the community a voice in the way their forests are managed.

- **Forest Stewardship Council (FSC):** The Forest Stewardship Council is an international non-profit organization founded in 1993 to support environmentally appropriate, socially beneficial, and economically viable management of the world's forests. It supports the development of national and regional standards to be used to evaluate whether a forest is being well managed. FSC, with its head office in the city of Oaxaca, Mexico, is governed by an elected Board, which consists of people from industry, environmental, social and labor groups, Indigenous People's representatives and others. FSC is a membership association, which is open to a wide range of organizations and individuals representing social, economic and environmental interests.

OBJECTIVE (#28):

Alberta-Pacific will maintain ISO 14001 and FSC certification of all applicable FMA lands.

STRATEGIES:

- Alberta-Pacific will maintain ISO 14001 program through annual audits.
- Alberta-Pacific will maintain Forest Stewardship Council (FSC) certification

Alberta-Pacific participated in the development of the Canadian National Boreal Standard for Forest Stewardship Council, with particular interest in how the international principles and criteria would accommodate multiple tenures on the forest landbase. Consensus was reached in 2003 after input from over 2000 individuals representing indigenous, environmental, social and economic interests. Alberta-Pacific is a member of FSC International (Economic Chamber) and believes that FSC certification is compatible with the current objectives and strategies described in this forest management plan. Alberta-Pacific is committed to the Principles and Criteria of sustainable forest management described in the FSC National Boreal Standard.

For more information on the Forest Stewardship Council criteria and standards and the National Boreal Standard see there website: <http://www.fsccanada.org>.



4.6 STEWARDSHIP REPORT

The first Alberta-Pacific Stewardship Report designed to report on long-term trends on the FMA area and the implementation of commitments within the 2000 DFMP was prepared for the second quarter of 2002. The report contains results of Alberta-Pacific's performance and monitoring activities conducted within the FMA area over the past 10 years. In addition, where appropriate, the Stewardship report synthesizes information generated from completed and ongoing research projects.

OBJECTIVE (#29):

Continue to develop a stewardship reporting program that provides stakeholders with a review of the forest companies' forest management activities and performance on its forest management plan commitments.

STRATEGIES:

- Develop an annual update sheet of identified Stewardship statistics.
- Produce a Stewardship Report every 5 years just after the timber quadrant is complete. The second full Stewardship Report will be targeted for completion in 2008.
- Input the Quota Holders⁴⁰ forest management activities in the Stewardship Report.

Alberta-Pacific recognizes that knowledge-based changes to harvest planning and operations will continue to follow an adaptive management process into the future. Two key initiatives that have been identified in Chapter 3 are Mixedwood Management and Integrated Landscape Management. Significant research and management programs will be delivered under these platforms in the next few years. Results from these and ongoing or recently completed initiatives will continue to shape forest management and Stewardship Reporting on the FMA area.

4.7 RESEARCH SUMMARY

Since 1993, Alberta-Pacific has been active in a comprehensive research and development program on biological issues pertaining to Ecosystem Management. The program has involved industry partners, stakeholders, aboriginal communities, individuals, universities, private organizations, and government agencies. Appendix 12 is a summary of the program to-date.

4.8 SUMMARY OF FOREST MANAGEMENT PLAN COMMITMENTS

The "2004 FMP – Alberta-Pacific FMA Area – Objectives / Strategies / Monitoring Matrix (Revised in 2007) outlining the objectives, strategies, measurement criteria and reporting methodology is provided in Appendix 13. (*Referred to as the "Commitment Matrix"*)

⁴⁰ Al-Pac cannot ensure the participation of the eight conifer quota holders.