Poplars and Willows on the Prairies
By Jim Richardson, Technical Director, Poplar Council

North America's largest shopping mall seems an unlikely setting for an international conference on poplars and willows. Yet the Fantasyland Hotel at the West Edmonton Mall in Edmonton, Alberta proved a convenient location for conference participants. It was easy to get to, offered numerous dining options, as well as outlets to buy necessary field gear, and provided a good starting point for field tours. The conference, entitled 'Poplars and Willows in the Prairies', was hosted by the Poplar Council of Canada in conjunction with the Poplar Council of the United States (PCUS) and the Environmental Applications Working Party of the International Poplar Commission (IPC WP6). PCUS has a similar role in the United States to that of the Poplar Council in Canada in working together with representatives from all sectors, public and private, to support the wise use, conservation and sustainable management of Canada's private and public poplar and willow resources. IPC WP6 works to better share knowledge and technology worldwide on the implementation of cost-effective environmental applications of poplars and willows to contribute to sustainable livelihoods and rural development.

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Including field tours, the conference took place from September 18 to 24, 2011. It was generously supported by a number of sponsors, including Alberta Innovates – Biosolutions, Alberta-Pacific Forest Industries Inc., Capital Power Corporation, FPInnovations, Genome British Columbia, Little Creek Agroforestry, the Poplar Council of the United States, Natural Resources Canada – Canadian Forest Service, the Canadian Wood Fibre Centre, Agriculture and Agri-Food Canada – Agroforestry Development Centre, and the organizers of the PCC 2007 and Larix 2007 Conference in Quebec City.

Eighty people from seven countries in three continents participated in the event. The technical sessions took place over two days during which four invited keynote oral presentations, 26 voluntary oral presentations and 13 poster presentations were given. Following the conference, almost all of the presentations have been made available online on the Poplar Council website at www.poplar.ca/upload/documents/edmonton11pres.pdf. Most of the oral presentations were offered in two plenary sessions dealing with 'poplar and willow breeding and genomics' and 'environmental applications'. There were also concurrent technical sessions on 'genomics' and 'general topics on poplars and willows'.

At the end of the first morning, there was a special session in which Dr. Gabe Kalmar, Executive Director of Communications, Genome BC, announced the formal launch of a project funded by his organization in conjunction with Genome Canada and Genome Alberta. The project, 'POPCAN – Genetic Improvement of Poplar Trees as a Canadian Biomass Feedstock', will be led by Drs. Carl Douglas and Shawn Mansfield of the University of British Columbia. This project will receive $9.8 million over the period 2011 to 2014.

At the end of the second day, business meetings of the Poplar Council of Canada and of IPC WP6 took place. The Poplar Council meeting received regular annual reports, reconfirmed Board members and officers for another year, and reached decisions about future meetings. In late August 2012, a meeting will be held in Quebec City with a focus on the activities of the Genetics Working Group and field tours in the Chicoutimi and St. Lawrence Valley areas. In 2013, Poplar Council will partner with the North American Temperate Agroforestry conference in Prince Edward Island June 19-21.

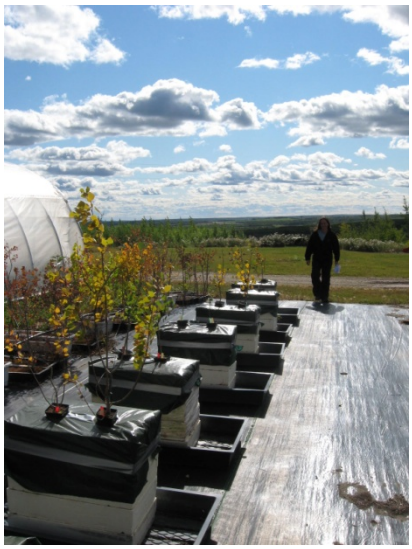
Field Tours

Two separate days of field tours were offered as part of the conference registration package. Both days had Edmonton as their base, one traveling west as far as Whitecourt and Drayton Valley, the other traveling north-east as far as Smoky Lake and Boyle. In addition, an optional two-day field tour took a limited number of participants to visit reclamation activities in the oilsands area around Fort McMurray in north-east Alberta.

a. West of Edmonton

The Whitecourt willow biomass plantation is the first of a current total of 6 wastewater irrigated sites in Alberta. The 2 ha site was established in 2006, with 5 willow clones and 2 poplar clones planted in a replicated trial at 15,000 stems per ha. Half the plantation is subsurface drip irrigated with treated municipal sewage wastewater from the town's activated sludge sewage treatment plant adjacent to the plantation. The other half is an unirrigated control. The short rotation intensive culture (SRIC) plantation was harvested

for the first time in January 2009 and is scheduled for harvesting again in winter 2011-12. Irrigation with wastewater is only done during the growing season from spring to mid-September. In general, biomass growth has been greater on the irrigated plots than on the non-irrigated plots. The visit provided opportunities to view and discuss the methods, issues and challenges of wastewater application close to human habitation (with a housing development nearby and a recreation field adjacent to the plantation) in a northern climate with cold winters. The need for hardy locally-adapted willow clones was evident.



The Weyerhaeuser Tree Improvement Centre at Drayton Valley is sponsored by the Western Boreal Aspen Cooperative (WBAC). It was built in 1995-96 to address aspen supply concerns for local oriented strand-board facilities. However, one of those is currently shut down so no plant material has been established since 2006-07, but future needs for biomass for energy, native woody vegetation for oil and gas reclamation work, and tree improvement for aspen adapted for changed climate conditions justify maintenance of the facility. An aspen breeding program started in 1998-99 and using native aspen (*Populus tremuloides*) crossed with pollen from Chinese *P. davidiana* and Finnish *P. tremula* produced 400 crosses which are represented in provenance tests. Problems were encountered with aspen flower stimulation, leading to development of a novel clonal reproduction technique using root segments grown progressively on lab bench, greenhouse bench and outside in stacked Styroblocks. Some clonal variation was observed in aspen rooting ability, with better results in drought conditions.

The final visit of the first day of field tours was to reclaimed land following strip-mining of coal for electricity production, a joint venture between Capital Power Corporation and Sherritt Coal. The 3 units of the Genesee Generating Station provide more than 1200 MW of power to the Alberta grid, using about 5.5 million t of coal a year. Following removal of the coal, the overburden is returned to the disturbed site, landscapes are recreated and revegetated with trees and/or grasses, and surface water resources are re-established. Trials are underway of a live root transfer technique, taking aspen and balsam poplar roots (as well as roots of other local plant species) from undisturbed areas

due for mining to reclamation sites. Aspen and poplar roots suckered best when planted at 40 cm depth. To enhance survival on reclaimed sites, aspen are planted with much higher root volumes and slower shoot growth than normal (shoot:root ratios of 1:5 or 1:6 compared to 1:1). These plants grow just as well as regular stock and in high density plantings achieve crown closure in 3 years.

b. East of Edmonton

The second day of field tours began with a visit to the Ellerslie research site in the outskirts of Edmonton where the Canadian Wood Fibre Centre has a concentrated area of trials illustrating its efforts in the development of short rotation woody crops systems for Canada. Trials have been underway on this site since 2002. They include concentrated woody biomass plantations intended to produce feedstock for bioenergy at densities of 15-20,000 stems per ha in 3-row or 2-row beds using willows and hybrid poplars. Another system of high-yield afforestation plantations is designed to produce yields of 5-7.4 odt per ha per year of above-ground woody biomass with a view to securing carbon credits for the estimated potential carbon increases of 500-650 t CO_2 per ha over a 20 year rotation using hybrid poplar and aspen. All steps and equipment required by the systems from site and clone selection, through rearing and selecting planting stock, site preparation, planting, vegetation management and plantation maintenance to harvesting are being tested.

The second stop of the day was at the Smoky Lake Forest Nursery which is operated by Coast to Coast Reforestation and has a capacity to grow about 9 million container seedlings annually in over 27,000 m^2 of greenhouses. It also has 80 ha of bareroot field space. Originally designed in the mid 1970s as a reforestation nursery producing spruce and pine seedlings under provincial government operation, it has modified its role to produce many other species since its present private operators took over in 1997. The nursery produces almost all the reclamation planting stock for the oilsands areas of Fort McMurray and about 65% of Alberta-Pacific Forest industries' hybrid poplar planting stock needs. The hybrid poplar operation involves establishing and maintaining stoolbeds to produce cuttings, as well as production and cold storage of bareroot and container-grown hybrid poplar and aspen for field planting. Cuttings 7.5-10 cm long are cut by hand, grown initially for 6 weeks in the greenhouse, before being moved outside for the summer and returned to the greenhouse in the fall until winter-ready, when they are stored at -3°C in bundles of 10. The visit included greenhouses, cold storage facility, stoolbeds and bareroot beds.

The final visit on the second day of field tours was to the Poplar Farm Research Program of Alberta-Pacific Forest Industries Inc. (Al-Pac). Al-Pac's program is designed to produce about 300,000-400,000 m^3 of poplar fibre starting in 2023, 12.5% of the company's kraft pulp mill requirements. The operational program, planting 1200 ha per year on suitable land leased from private land owners, is well underway. The research program, which focuses on tree improvement and silviculture studies, supports the operational program. Its goal is to select fast-growing trees producing high-quality fibre, trees which are adapted to the relatively short growing season, variable moisture availability and harsh winters (min -40°C), and resistant to insects and diseases, particularly Septoria canker. The mill uses about 80% trembling aspen and 20% balsam poplar from its 66,000 km^2 landbase, but the research program has focused to date on poplars, such as *P. balsamifera, P. deltoides, P. nigra, P. maximowiczii* and *P. simonii*, as well as clones developed at the Agroforestry Development Centre of Agriculture and Agri-Food Canada at Indian Head, Saskatchewan and used for almost 100 years in shelterbelts near the mill site. Stops during the tour included a demonstration planting of common clones, a hybrid aspen block planting trial planted in 2005, aspen provenance trial planted in 1998 (in which Minnesota seedlots have outperformed all local sources), Sinbar herbicide tolerance trial, genotype x environment interaction trial, open pollinated seedlings of 'Walker' and other hybrid poplar clones, a birch provenance trial, hybrid poplar genetic screening trial of families bred in Quebec, balsam poplar hybrid vigour trial, and native balsam poplar trial.

c. Fort McMurray Oilsands

Two companies, Syncrude and Suncor, were the primary operators in the Fort McMurray oilsands from the late 60s/early 70s until the late 90s when other companies became involved during a boom period. The tour visited strip-mining and reclamation areas of both companies. On the second day, the tour visited reclamation areas of well-pads and other related sites of the alternative extraction technology called Steam Assisted Gravity Drainage (SAGD).

Syncrude oilsands operations produce 300,000 barrels per day of crude oil. The process begins with clearing the native boreal forest, working in conjunction with logging companies. The forest floor is skimmed off and stockpiled, before removal of the overburden to expose the oil-bearing layers, which were originally removed by dragline, but now a truck (400 t capacity) and shovel technology are employed. To date, 20,000 ha have been disturbed in this way, of which 20% has now been reclaimed. Much water is needed in the process of moving the oilsands as a slurry from the mine face to the upgrading plant, where the raw material, which typically contains between 4 and 28%

bitumen, is processed to produce crude oil. The water ends up in tailings ponds which are gradually reclaimed.

The reclamation process involves experimental reforming of the landscape into hummocks and wetlands. Much research is still on-going to determine the best way to do this. The Alberta Government requires that the disturbed land be returned to "a productive capability equivalent to that of the pre-disturbance landscape." To be certified as reclaimed, the work must be done with plant species native to the area. This means that, although hybrid poplars have grown very well in trials in reclamation areas, they are not as available for general use as aspen, black spruce or white spruce. The South Bison Hills is a reclaimed area of overburden on which forest has been re-established, as well as grassland with a herd of 300 bison, and wetlands, in some of which wetland plants have appeared naturally. The truck and bucket mining method makes it easier to replace materials in the same order as they were removed, with tailings below overburden below forest floor, than it was with the previous dragline method.

Suncor's objective for reclamation is to achieve a maintenance-free self-sustaining ecosystem. The process takes time. The first tailings pond, started in 1967 was finally considered reclaimed in 2010. The plan for Suncor's Millennium Mine is that it will be in active production until 2135 and reclamation will continue for another 20-25 years after that. Reclamation involves an interdisciplinary team of foresters, hydrologists, agrologists, engineers, geotechnical specialists, biologists and researchers. Before mining, trees are cleared and the soil salvaged and stockpiled. After mining, processes include landform grading, pre-sloping, establishing effective drainage to minimize erosion, and the creation of a natural non-engineered appearance.

Revegetation starts with collection of native seed in the local area, including about 15 different woody shrub species, as well as aquatic species. Growing seedlings in containers in a nursery has proved best (many grown at the Smoky Lake Forest Nursery seen earlier in the tours). A nurse crop of oats and 7 native grasses is established first to provide erosion control. Fertilizer is applied by air. Tree and shrub species, including willows, are planted in June. Vegetation monitoring, including regeneration surveys, takes place for up to 5 years, with longer-term monitoring continuing up to 20 years. Insects, noxious weeds, and wildlife are also monitored. Suncor has a full-time staff of 36 working on reclamation in the Fort McMurray area, with up to 800 additional contractors in the winter months.

The SAGD oilsands extraction technology has a much smaller environmental footprint than strip-mining, but still disturbs significant areas in well-pads, borrow pits, and related operations which could result in a declining landbase of natural ecosystems if not reclaimed after operations cease. About 3% of Al-Pac's Forest Management Agreement

area is impacted by such operations. The tour visited a SAGD site operated by JACOS (Japan Canada Oil Sands), the Nexen Long Lake Project and ConocoPhillips "Faster Forests" Program Plantings.

On a reclaimed borrow pit site, it was explained that the normal practice is to reclaim such sites as ponds after materials are removed or 'borrowed' for building stable well-pad sites. On the approximately 1 ha well-pad themselves, the practice before drilling or observation wells are inserted into the ground, is to salvage the timber, clear vegetation and topsoil and level the subsoil with 'borrowed' clay and sand. Once the well operation is abandoned, infrastructure is removed, the well capped and 15 cm of topsoil is replaced. Historically, woody debris would be cleared and the area seeded to non-native grasses. A variety of new reclamation techniques are being developed and tested, depending on the type of site being disturbed. In some cases, top soil, stones and woody debris are replaced, and the area is then left to revegetate naturally. Richer sites can be quickly covered with grass (mostly *Calamagrostis*) as well as *Rubus*, which can lead to problems if trees are desired on the site, as aspen planted in such conditions do not succeed well. If planting is be considered, it is recommended to plant woody species as soon as possible. With summer construction, well-pad compaction can be a problem, and keeping the soil layers separated for reconstruction is challenging. Both can be avoided and are much less of an issue with winter operations. If clearing can be completed in the winter, a stable well-pad can be constructed using ice, leaving the top soil undisturbed. When the equipment is removed (sometimes within months), suckering from the aspen and other roots in the soil bank can be very successful in quickly reclaiming these sites. Mulching of surface vegetation has also been tried as a technique imported from agriculture. It can have some benefit for regeneration of trembling aspen, but is now considered of questionable ecological value and if too deep, will keep soils cold and unproductive.

Regulations say that sites disturbed by SAGD operations should be reclaimed 3 years after operations cease, but in practice reclamation can and has taken significantly longer. Work over the past decade, however, has addressed many of the issues which challenge the reclamation of these sites from both lowland bog and fen areas to productive upland sites with significant topographical challenges.

Annual Report to the Business Meeting
Barb Thomas, Chair, Poplar Council
Edmonton, Alberta, September 21, 2011

The Poplar Council of Canada (PCC) has enjoyed another busy year as we prepared for hosting our AGM in Edmonton this month in conjunction with the International Poplar Commissions Environmental Applications Working Party and the Poplar Council of the United States. In addition to the meeting we have continued to work on the outcomes from our Strategic Planning meeting held in 2010 with changes coming to our web-site, a targeted membership drive, and significant progress with both our pesticide and genetics working groups (see reports in newsletter).

The office continues to run smoothly with Ms. Deb Brenton, our Executive Assistant at the helm, ensuring all enquiries are quickly responded to and our books are well managed. Deb also tackled the ins and outs of not-for-profit GST/HST refunds to the PCC for the first time. So far, this has generated a significant return to our overall budget (see attached report) given our handling of recent projects.

Jim Richardson has continued to help answer the many questions that come to the PCC each year, and with a small committee has recently taken on the daunting task of our web-site overhaul. Please watch for the new launch of our web-site this fall.

The pesticide working group, Chaired by Cees van Oosten, has made significant progress on getting herbicides approved through working with our large and active PCC committee members and the Prairie Pesticide Minor Use Consortium.

The genetics working group, Co-Chaired by Bill Schroeder and Pierre Périnet, has produced a template for describing released clones of poplars and aspens and the group is also developing a national strategy document for poplar tree breeding in Canada.

I wish to thank all of our members, both individual and corporate for their continued support and interest in the PCC. In addition, the Board of Directors has actively participated in many conference calls this year and I thank them for their energy and commitment to the PCC.

I would also like to gratefully acknowledge and thank the following organizations who have provided generously for the support of the conference held in Edmonton this fall.

- Alberta Innovates – BioSolutions
- Alberta-Pacific Forest Industries Inc.
- Capital Power Corporation
- FP Innovations
- Genome British Columbia
- Little Creek Agroforestry
- Poplar Council of the United States
- Natural Resources Canada – Canadian Forest Service
- Canadian Wood Fibre Centre
- Agriculture and Agri-Food Canada – Agroforestry Development Centre
- CPC/PCC 2007

Finally, I thank the Canadian Forest Service in Edmonton Alberta for providing office space and assistance to our council and Deb Brenton for doing all the heavy lifting!

I wish everyone a wonderful year and all the best with each of your poplar endeavors.

Annual Report to the Business Meeting
Dan Carson, Secretary Treasurer, Poplar Council
Edmonton, Alberta, September 21, 2011

Thanks to the efforts of the members of the board the Poplar Council of Canada had a stellar year in 2010 and is in excellent financial health as a result. The simplified 2010 results can be seen below:

2010

Revenue	$140,853.00
Expenses	$ 55,176.00
Operating Surplus	$ 85,677.00
Assets (including cash)	$256,205.00

Detailed financial statements are attached.

There were two projects active in 2010 the: Alberta Forest Genetic Resources Council and the Alberta Forest Research Institute. The simplified 2010 results are provided below:

2010

Revenue (Alberta Forest Genetic Resources Council)	$ 7,621.00
(Alberta Forest Research Institute)	$1,800,000.00
Expenses	$1,845,525.00
Operating Deficit	$ (37,904.00)
Project Fund Assets	$ 64,142.00

Detailed financial statements are attached for the projects. There was a small deficit that is offset by surpluses in preceding years. The deficit was caused by increased expenses over 2009 and a reduction in revenues in 2010. In the case of the Alberta Forest Genetic Resources Council the 90% of the project funding was advanced in 2009, only 60% of the work was completed in that year.

2011 Year to Date (to July 31st)

The simplified year to date statement is a follows:

Revenue	$33,336.82
Expenses	$25,220.86
Operating Surplus	$ 8,115.96

As of July the Poplar Council has a small operating surplus. All line items in the 2011 budget are at or below the budgeted amount for 2010. The surplus was helped considerably by a $4,452.07 GST Rebate from 2009. The Poplar Council is on track to have yet another successful year.

It is at this time I would like to thank both Deb and Barb for the tremendous effort that they put forth in 2010/11 to make the Poplar Council of Canada the success that it is.

Technical Director's Report to the Annual Meeting
Edmonton, Alberta, September 21, 2010
By Jim Richardson

This is the 15th annual report to the Poplar Council membership from the Technical Director, a position created by the Executive Committee in April 1997. The general objectives of the Technical Director are to supply technical services and advice to the Council, to promote awareness and support for the Council and to increase membership. More specifically, the responsibilities of the technical director include maintaining and updating the Council's website; responding to technical enquiries using E-mail, phone, fax and mail; providing an international dimension to the Council through participation in the International Poplar Commission; contributing to the PCC Newsletter and supporting technical aspects of the organization of the PCC Annual meeting; and providing services to members and the Board of Directors of a technical rather than purely administrative nature. The specific responsibilities continue to change somewhat, reflecting the changing ways in which the Council operates and new directions and initiatives of the Council.

Recognizing the limited budget of the Council, the services of the technical director are provided for a minimal level of compensation. I work out of my home office in Ottawa, devoting on average about four to five days a month to Poplar Council business. However, the actual time commitment varies greatly depending on the tasks at hand.

Website

Management and maintenance of the Poplar Council website (www.poplar.ca) continues to be the most significant on-going responsibility of the technical director. The 'What's New' pages and

the ‘Events’ page are reviewed and updated regularly, as well as ‘Links’. Information about individual and corporate members is updated once a year. The site is an important source for the electronic newsletter, which is normally uploaded to the site soon after each new issue is sent to members by the Executive Assistant by E-mail. The website is a key resource for information about the annual meeting, particularly the Edmonton conference in 2011. Site usage in the past year has been running at about 33,000 hits and 2500 visits per month, with peaks of 43,000 hits and 2670 visits in May and January respectively. There has been a significant increase in visits this past summer. Visitors to the site from Canada, the US and France have been most frequent. However, the average visit lasts less than 30 seconds. More than 80% of our visitors arrive via a direct URL, bookmark or link in an E-mail.

Following discussions by the Strategic Focus group, a contract has recently been signed with Sencia Canada Ltd., a professional web design company in Thunder Bay, ON, to design and develop a new, fresh website. With input from the Communications and Membership sub-group, as well as the results of an online member survey about the website we conducted earlier in 2011, I am working with Sencia to come up with a new site which will better meet the needs of PCC and its members. Improved navigation, more attractive appearance, more features like news items, articles and technical information, as well as more use of online forms, photos and possibly social networking will be included in the redesign. The use of PayPal for online payment of registration for the Edmonton conference has been successful, and we will keep the option open to use it again for future events and perhaps membership fees.

Technical Enquiries

The technical director responds to technical enquiries, most of which are received as a result of contact through the website to the Secretariat and are dealt with by E-mail. For the past two years, the number of such enquiries has been increasing steadily after a period of decline. The vast majority of such enquiries come from non-members, including from outside Canada. When I am unable to provide the information requested myself, I involve other Council members who are experts in the particular field of interest of the enquirer, or who are closer to the geographic location of the enquirer. Cees van Oosten has been particularly helpful in that regard. Whenever possible, advantage is taken of the opportunity to promote Council membership in responding to enquiries from non-members.

International Dimension

Together with my colleague, J.G. Isebrands of Wisconsin, I continue to coordinate the preparation and publication of a completely revised and updated edition of the FAO-IPC book on poplars and willows. This book is entitled ‘Poplars and Willows in the World: Meeting the needs of society and the environment’. An international team of ‘lead chapter authors’, supported by many individual contributing authors, including several Canadians, is preparing the content. Chapters have been uploaded to the FAO/IPC website (www.fao.org/forestry/ipc/en/) as they are completed, and 5 are available there now, with another close to completion. FAO is entering into an agreement with a commercial publisher to publish the book, with the intention of having it ready for launch at the 24th Session of the International Poplar Commission in India in fall 2012. The push towards completion is now on.

A full report of the international poplar and willow-related events of September 2010 in Italy – the 5th International Poplar Symposium (IPS), a meeting of the Executive Committee of the International Poplar Commission, and a meeting of the IPC Working Party on Environmental Applications of Poplar and Willow – was prepared for the Spring 2011 PCC Newsletter.

Newsletters and Other Publications

The technical director makes regular contributions to the Council's newsletter, including reports from meetings and other events. As well as the Italy meeting report mentioned above, the Spring 2011 newsletter included a report I prepared on the October 2010 Short Rotation Woody Crops Operations Working Group conference in Syracuse, NY, which included the PCC annual meeting.

Annual Meeting

I continued active participation in the Syracuse, NY Organizing and Program Committees after the event, leading the Canadian segment of the post-conference field tour in eastern Ontario. I have been heavily involved in planning and preparations for the 2011 Edmonton conference and annual meeting of the PCC, through the Organizing Committee, and particularly in relation to the use of the website for announcements, program information and registration.

Acknowledgements

I would like to thank Barb Thomas and the Executive Committee for their continued support and confidence throughout the year. It is a pleasure to work under Barb's leadership of the Executive. I also appreciate very much the efficiency and hard work of Deb Brenton, the Council's Executive Assistant, who keeps me busy with forwarded technical enquiries.

LINKS

To Other Articles of Interest regarding the PCC AGM in Edmonton, AB

Dan Carson, Secretary Treasurer, Budgets – 2010, 2011, 2012

Deborah Brenton, Executive Assistant's Report to the Annual General Meeting

Cees van Oosten, Chair PWG, Pesticide Working Group Report to the AGM

Bill Schroeder/Pierre Périnet, Genetics Working Group Report to the AGM

The tree has always been a cultural symbol.

Participants of the Poplar Council Conference in Edmonton, September 2011