Information Package

- What exactly are these "opportunities in science and technology for Aboriginal people"?
- What is the outlook for businesses and workers engaged in science- and technology-intensive activities? Will scientific and technological applications change future career and business development opportunities?
- Are Aboriginal people, particularly youth, well equipped to take advantage of those opportunities?
- In seizing those opportunities, are Aboriginal people forced to leave behind their traditional activities, communities or values? What are the impacts of science and technology on ways of life and economies in Aboriginal communities?
- What are the achievements of Aboriginal people, businesses, communities and organizations in science and technology fields? Who are good role models?

In preparing for the conference, these are the kinds of questions that were frequently raised. The following information package is designed to address them. It is intended to provide a general reference for young people, teachers, and anyone who recognizes the important role Aboriginal people can play in science and technology.

Occupations in Science and Technology

A wide range of occupational groups offer good opportunities for Aboriginal people and for all Canadians to work with applied sciences and technology. We have profiled a few of these, focusing on occupational groups that are strongly associated with science and technology, either because it is a product of the work in that sector or because such skills and knowledge are required of the workers.

The profiles serve two purposes. First, they convey information from Job Futures — a product by Human Resources Development Canada — in a way that is approachable and useful to youth, educators and counsellors. We included information on activities involved in each occupational group; the skills required; and the education, training and certification that workers in those fields would typically have.

Second, we tried to make the information relevant to Aboriginal youth by presenting some of the unique opportunities for and achievements by Aboriginal people, businesses, organizations and communities.

Role Models

Various writers and researchers have commented on the lack of role models for Aboriginal people in science and technology fields. In the career profiles, we tried to feature both individuals at the beginning of their education or career within an occupation, as well as established and experienced workers.

These stories and personal statements are important. They are encouraging. They convey to youth that the pursuit and achievement of education and careers in science and technology are possible for them.

It is crucial that we find role models who can be included in the completed version of this package. We would appreciate your feedback on how to make this possible.

Linking Traditions and Technologies

There are clearly many differences between so-called "traditional" and "technological" activities. At the same time, there are many gifts in individuals and communities — like the skill of reading the landscape, or the knowledge of healing plants, or the wisdom to use and manage natural resources — that have an important place both in the traditional lives of Aboriginal communities and in the mainstream, contemporary applications of science and technology.

We have identified and profiled some examples that demonstrate strong linkages between the traditional and the technological. These profiles are about more than careers and business opportunities. They are stories of initiative, creativity and commitment from individuals and organizations. They show what science and technology have brought to Aboriginal people, as well as how Aboriginal people have applied science and technology in ways that are uniquely their own.

Please Let Us Know What You Think

We would like to make sure that this package becomes an effective reference for youth as well as for educators.

It is important that the information be:

- complete;
- clear, and;
- presented in an engaging and useable format.

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What overall impression does this package give about career opportunities in science and technology? Is the impression optimistic or pessimistic? Do you think that the information encourages people to continue their education in math and science-related disciplines?

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What can be added to this package to make it more informative to young adults looking for information about careers in science and technology? Do you think that this package answers questions youth often ask?

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What other questions should this package answer? No package can contain information on every possible occupation in science and technology. However, do you think that there are particularly important occupations which should be included in this package?

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Please send your comments on the "Balancing Choices: Opportunities in Science and Technology" information package to:

Learning, Employment and Human Development, Department of Indian Affairs and Northern Development.

Fax: (819) 994-0443
E-mail: santiagom@inac.gc.ca

While it is not possible to highlight all the Aboriginal people who are doing good work in these fields, are there particularly important role models who you would like to see included?

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Are there other achievements of Aboriginal people in science and technology areas that you would like to see included?

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Do you have any other suggestions or comments? If you could change one thing about this package, what would it be?

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Background

*Balancing Choices: Opportunities in Science and
Technology for Aboriginal People*, jointly sponsored
by the Minister of Indian Affairs and Northern
Development and the Minister of Human Resources
Development Canada, is taking place in Winnipeg,
Manitoba in April, 1999.

An initial conference focussing particularly on youth
employment was held in Sault Ste. Marie Ontario, in
April, 1997. Over 170 participants came together,
representing Aboriginal leaders, educators and
trainers, and youth; researchers, policy advisors, and
government officials; and employers and
entrepreneurs from many industry sectors. The
conference addressed the issues surrounding
Aboriginal participation in the labour force.

Recognizing some of the long-term trends in the
Canadian and global economies, the theme for the
1999 conference is the range of opportunities in
science and technology for Aboriginal people.

Creating Opportunities with Science and Technology

The use of science and technology is pervasive in all
sectors of the economy. The Organisation for
Economic Co-operation and Development (OECD)
has identified scientific research as essential to the
continuing production of knowledge, and its
transmission and transfer; technological change as
an important factor in changing the face of
managerial structures and work organisation.[1] One
impact of scientific and technological innovations on
labour markets is an increase in educational and
training demands. Technological developments have
raised the skill levels required to be competitive in
the labour market.

In all economic sectors, skill profiles have changed;
upskilling — the shift in labour market demand from
relatively low-skilled workers to high-skilled workers

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1. OECD. *The Knowledge-Based Economy.* Paris: OECD, 1996.

An Invitation

Long before the arrival of European explorers, the
Aboriginal peoples of this land designed and
implemented creative, practical solutions to
everyday problems. Whether these solutions applied
to navigating rough terrain, healing wounds, building
homes, preserving food, protecting the environment,
or establishing communication routes along
waterways, clear examples remain of innovation,
calculation, and craftsmanship.

Wisdom and knowledge often handed down through
oral histories, formed the foundations of traditional
practices which sustained Aboriginal communities
for centuries. These practices, when combined with
some of today's leading-edge technologies offer
extraordinary opportunities for Aboriginal young
people to make significant contributions both to
their own communities, as well as to Canada as a
whole. What remains to be found are concrete,
respectful methods to attract these young people
to academic programs and careers where their
technical expertise can be combined with their
wisdom and creative talents, where their cultural
identity is strengthened while they pursue careers in
science and technology.

I am pleased to invite all participants to this
conference, whether stakeholders from Aboriginal
communities, corporations, post-secondary
institutions or governments, to provide their
thoughts and their commitment to the solutions we
are seeking. By working together to provide young
people with the opportunity to balance the choices
they make at school, or to balance the choices they
make for their lifestyles and future careers, we can
begin a process that will unfold over the next seven
generations.

N'ya Weh

Corinne Mount Pleasant-Jetté
Chair, Steering Committee

Matching Jobs and Workers
Expected Labour Market Conditions across Canada in 2001

Industry groups	Skill levels					
	Managerial positions	Professional occupations	Technical and skilled occupations	Semi-skilled occupations	Labouring and low-skilled occupations	All skill levels
Business, finance and administration	i i	i i	j	j	-	j
Natural and applied sciences	i i	i i	j	-	-	i i
Health care	j	i i	j	j	-	i i
Social sciences, education, government services and religion	i i	j	j	-	-	j
Art, culture, recreation and sport	j	9	9	-	-	9
Sales and services	j	-	j	9	9	j
Trades, transport and equipment operators	j	-	j	j	9	9
Primary industry	i i	-	j	9	9	j
Processing, manufacturing and utilities	j	-	j	j	j	j
All industry groups	i i	j	j	j	9	j

Prospects for jobs of each type are rated as: **i i** (good), **j** (fair) or **9** (poor). Information is unavailable in categories marked (-).

Data taken from Human Resources Development Canada (HRDC), Job Futures – Matching Career Aspirations with Needs of the Labour Market, *Applied Research Bulletin,* vol 4, no. 2, Ottawa: HRDC, 1998. Web siteL http://www.hrdc-drhc.gc.ca/arb/publications/bulletin/vol4n2/V4n2C3E.html [revised: March 8, 1999].

— has proven to be a characteristic trend of both manufacturing and service sectors of industry for close to twenty years. Between 1971 and 1995, employment growth in Canada was greatest for white-collar, high-skilled occupations.[2] Employment dropped by 6.8% between 1990 and 1995 for workers with the lowest levels of educational attainment, but while job opportunities deteriorated for workers with the low levels of educational attainment, employment has increased for the university educated.

2. Industry Canada (IC) and Human Resources Development Canada (HRDC), *Employment Performance in the Knowledge-Based Economy*, Working Paper No. 14, W-97-9E/F, Ottawa: IC and HRDC.

Challenges for Aboriginal People

A current "employment gap" of 80,000 jobs would have to be filled in order to bring labour force participation among Aboriginal people to the same level as that for Canadian workers. Unemployment data suggest that Aboriginal people in cities — particularly status Indians — do not fare well in labour markets. In the urban economy, however, there are growing opportunities for skilled Aboriginal workers and businesses in the knowledge-based economy and for technically skilled trades in the manufacturing sector. Aboriginal graduates from post-secondary programs are quickly absorbed into the "knowledge economy" in such areas as financial services and government.

There continue to be, however, severe structural problems in national and regional labour markets' ability to accept Aboriginal workers. Many

Educational Attainment and Labour Force Status among Aboriginal People

Highest level of schooling	Among everyone of working age	Among those in the labour force	Among those who are employed
Less than Grade 9	15.5%	8.3%	7.1%
Incomplete secondary school	31.5%	25.5%	23.5%
Secondary school certificate	10.3%	11.9%	12.6%
Incomplete post-secondary	17.1%	20.5%	20.5%
Post-secondary certificate	25.6%	33.8%	36.3%

Department of Indian Affairs and Northern Development, special tabulations from the 1996 Census of Canada.

individuals either lack the minimum labour market skills or have skill sets that do not match the prevailing need. Over half of the Aboriginal working age population has not completed high school, while at the same time, over half of the new jobs created in the next ten years will require post-secondary qualifications. There continue to be employment gaps in the semi-professional and semi-skilled trades areas. Labour substitution for lower-skilled jobs and on-the-job skills upgrading by the private sector is only a partial solution.

Opportunities for Aboriginal People

The traditional economy is the only option for many isolated communities and residents. Except for traditional subsistence pursuits and the economic activity generated from government income transfers and public administration spending, there is little else. A more vibrant and sustainable traditional economy of trapping, harvesting and arts and crafts may provide some opportunities. There is a strong domestic and export demand for Aboriginal "niche"

products in agriculture and arts and crafts, with these companies accounting for more than 40% of the Aboriginal companies that export.[3] Even in traditional economies, however, growth necessitates innovation in products, processes and marketing.

Although representative of only 2.8% of the Canadian labour force, Aboriginal people are well-represented in fishing and trapping (8.6%), forestry and logging (7.8%), mining (4.1%) and agriculture (3.3%), the mainstays of the resource economy. There are many good examples of effective practices in corporate Aboriginal relations; the resource and energy sectors are spawning a growing number of Aboriginal businesses.[4] As suppliers and sub-contractors in mining services,

3. Industry Canada, *Aboriginal Entrepreneurs in Canada: Progress and Prospects,* Ottawa: Industry Canada, 1998, Micro-Economic Policy Analysis Branch and Aboriginal Business Canada.

transportation, hydro maintenance, construction services, and in the growing ecotourism industry, there is a substantial range of opportunities for Aboriginal business and employment. Aboriginal communities are also well-positioned to take advantage of opportunities arising from the pending privatization of government services, such as those in oil and gas, hydro-electric generation, parks management, and transportation facilities.

In rural and remote areas of Canada, natural resources are the main source of employment in many communities. Mining and minerals, forestry and energy contributed $91 billion to Canada's gross domestic product in 1996. Aboriginal people and businesses are a growing presence in the resource economies of Canada, and have an

important opportunity for labour and business services. Overall, the resource sector across Canada is strong and continues to grow, with new development projects being undertaken in many areas. However, such opportunities in resource-based economies are region-specific and vary from sector to sector. For example, economic opportunities are good in the Peace River (forestry sector) and in Fort McMurray (energy sector) areas of Alberta, while prospects for growth are poor in the troubled commercial fisheries of British Columbia and Atlantic Canada.

Resource-based industries continue to play a large part in the economies of Aboriginal communities and in Canada as a whole. Aboriginal people in Canada are well-positioned to play larger roles in resource industries, with more lands and forest resources coming under their control and an increasing willingness to work in partnership with industry. In conjunction with the traditional knowledge and wisdom of these communities, applying science and technology in resource management and development is a key instrument in bringing these industries in step with an increasingly knowledge-based global economy.

Balancing Choices

Aboriginal employment and business ownership are highly diversified, with a range of occupations and industries parallel to that of other Canadians, and the current labour market presents many opportunities and challenges to Aboriginal people and communities. The key is recognizing linkages between the traditional and the contemporary — that is, traditional activities and knowledge unique to Aboriginal communities and contemporary knowledge and innovation.

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4. Sloan, Pamela and Roger Hill, *Corporate Aboriginal Relations: Best Practice Case Studies,* Toronto: Hill Sloan, 1995.

Occupations in Health Care

Health care careers range from highly specialized services requiring many years of training, such as plastic surgery; to jobs that combine medical and care-giving skills, such as registered nursing assistants; to jobs that apply specific skills learned on the job, such as morgue attendants.

Working in Health Care

People in professional health care treat others for medical problems. Careers in diagnosis and treatment are not restricted to physicians, dentists and nurses. For example, dietitians provide nutrition counselling services and audiologists are therapy and assessment professionals who treat hearing disorders.

People in technical, paraprofessional and skilled health care occupations have more specific skills. This group includes medical technologists, laboratory technicians, dental hygienists, and registered nursing assistants.

People in assisting occupations provide support to other health services. Dental assistants and orderlies assist in the basic care of patients, for example. Orthopaedic technologists apply casts and splints on patients. Pharmacy assistants help pharmacists prepare prescriptions.

What Does It Take?

Workers in professional health care occupations must complete one or more university or college programs. Often they must obtain a provincial or territorial license and be accepted into a professional association.

Jobs in technical, paraprofessional and skilled occupations require a high school diploma and specialized training. Most people recently hired have a community college diploma as well.

People in assisting occupations must have at least some high school education. Most recent entrants have a trade, vocational or community college diploma as well.
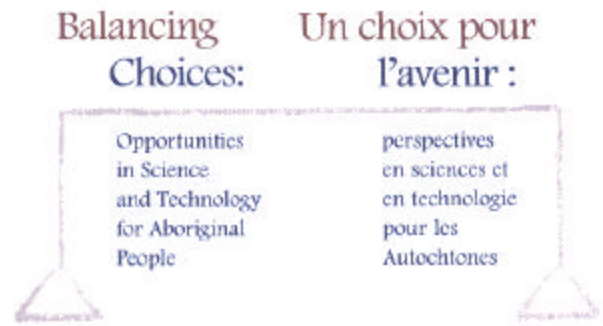
**Mary Jane McCallum
Overcoming Fear**

Mary Jane McCallum is a 46-year-old dentist from Manitoba who returned to school three times to acquire the skills she uses today. First graduating as a dental nurse in 1977, Dr. McCallum earned a Dental Therapy Diploma in 1979, then received her degree as Doctor of Dental Medicine in 1990. She has been providing dental services to Manitoba's First Nations communities for 25 years. Recently, Dr. McCallum was appointed regional dental officer, Manitoba Region, by the Medical Services Branch of Health Canada.

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The concept of failure has stopped many people from pursuing their dreams and doing their best. It's okay to be afraid. Beating fear is a great accomplishment. We have to believe in ourselves in order to overcome fear. Realizing that others have overcome their fear of failure has helped me in my time of need.

– Mary Jane McCallum, D.M.D. –

Job Prospects

Overall, prospects for people with health care skills are better than average and will remain good into the year 2001. The chance of finding a stable job varies according to the skills you have, however.

- Health care directly employs more than 700,000 Canadians.
- Better dental hygiene means people are keeping their teeth longer, increasing the need for dental maintenance work.
- Telecommunications technologies may mean that specialists can provide services at a distance.
- The shift from hospital care to home care may increase the demand for registered nursing assistants but will require them to learn new skills.

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Many Kinds of Work ~ Job Titles in Health Care

Family Physician	Critical Care Nurse
Denturist	Psychiatrist
Public Health Nurse	Oncologist
Orderly	Pharmacist
Optometrist	Pediatric Dentist
Oral Surgeon	Chiropractor
Nutritionist	Physiotherapist
Pathologist's Assistant	
Operating Room Technician	

Aboriginal Nurses Association of Canada

In 1974, the groundwork was started for the actual formation of the association by several nurses who shared a common vision founded in their unique perspective as Aboriginal caregivers to Aboriginal people. The task at hand for nurses Jocelyn Bruyere and Jean Goodwill was to identify and contact other nurses of Aboriginal ancestry. At the time there was no registry to help locate nurses according to their ancestry. Through word of mouth and networking, they developed a list of Aboriginal nurses.

A year later, 41 of these nurses came together in Montreal to discuss their common role in addressing the many health problems affecting native people. Their commonalities in education and training, cultural background and concern for the health of their people resulted in a common vision and goal.

Initially, the association's founders pooled their skills, education and cultural heritages to ultimately improve what they witnessed first-hand: the appalling health conditions faced by their people. Overcoming numerous obstacles along the way, the evolution and development of the association continues today.

Prospects are best for people in professional occupations, while there may soon be too few new jobs in therapy and assessment occupations.

On average, jobs in health care offer higher than average incomes. Here are some examples of the annual earnings for full-time workers in 1995:

- Family physician ~ $74,000
- Pharmacist ~ $49,200
- Dental hygienist ~ $39,100
- Medical Laboratory Technician ~ $31,600

The average annual full-time earnings for all occupations in all industry groups was $35,700.

Aboriginal People in Health Care

In 1996:

- Over 14,900 Aboriginal people, representing 4% of the working Aboriginal labour force, were employed in health professions, sciences and technologies. [1]
- 10% of working-aged individuals who had completed a post-secondary program had certificates in health professions, sciences and technologies. Of those, 15% had taken university programs and 85% had taken community college programs.

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1. Excludes managers in health care

Ontario Aboriginal Health Access Centres

Traditional healing is finding a place again in Canada. There's a growing demand for traditional healers and aboriginal doctors. You can see this in Ontario at ten new Aboriginal Health Access Centres that mix traditional and western medicines.

In 1994, the Aboriginal Healing and Wellness Strategy started giving control over health-care back to Ontario native communities. Ten new clinics that are part of the strategy use the medicine wheel, traditional native medicines, and ceremonies like sweat lodges, as well as western medicine. The clinics are native-run, and are based on the model of Ontario's oldest native health clinic, Anishnawbe Health Toronto.

Anishnawbe Health Toronto

There are an estimated 65,000 to 70,000 native people living in Toronto. Anishnawbe Health Toronto is a native-run healing Centre that's been providing culture-based health care services to Toronto's Native Community since 1989. It has a staff of about 50 people and over 200 volunteers. About one quarter of their paid staff are traditional healers, who provide one to one counseling and doctoring, teaching circles, naming ceremonies, sweats and other traditional ceremonies. "Many requirements of our traditional health approaches are ceremonial and in the past these were almost always held outdoors," says Joe Hester, director of the Centre, "For that reason, there's a certain challenge in bringing them into the city." He says sweat lodges are a good example because they can't hold them at the Centre. They usually have to go outside the city, sometimes to nearby reserves.

The Centre has many other programs such as naturopaths, chiropractors, traditional counselling, family counselling, psychiatry, and a chiropodist. They also offer "Street Patrol," a harm reduction mobile service, which searches out homeless people and provides them with the basic necessities of life such as food and warm clothing.

Because of the need for more native people in the medical professions Anishnawbe Health offers a bursary program for native students in medical school. "There are a very small number of native physicians in Canada. They are few and far between," says Hester, "but I think the number is increasing." He says that one thing that's needed is more promotion of the idea, and active recruitment of native people by universities. Right now, although most of the Centre's staff are native people, it has no native doctors. "We've had recruiting campaigns, but without much success so far," says Hester. "We're always on the lookout."

Hester also says that traditional healers are short in number, that the Centre has to look hard sometimes to recruit them, and does so from across North America. He says it's important for young people to learn about traditional healing. He adds that "all the teachings are important aspects of our traditional healing, so knowing our tradition and culture is very important."

The Aboriginal Health Access Centres

Of the 10 new Health Access Centres created by the Aboriginal Healing and Wellness Strategy, six are open to treat people, and four will open soon. All of them have traditional healers on their staff or available as part of their services. "Traditional

healing is an important part of the Aboriginal health system," says Carrie Hayward, Manager of the Aboriginal Healing and Wellness Strategy "Traditional healers and midwives are exempted from the *Regulated Health Professionals Act* and the *Ontario Midwifery Act*," which is a recognition of the importance of traditional medicine.

Janice Longboat, a traditional healer and herbalist at one of the Health Access Centres, De dwa da dehs nye>s in Hamilton, says that "needs assessments have shown that people want the traditional healing... I really believe this is going to be important in the future for native communities, because there's so much healing that needs to be done, and western medicine hasn't worked for us."

Learning and Teaching:
The Experience of Janice Longboat

Janice Longboat worked at Anishnawbe Health Toronto before she started working at De dwa dehs nye>s. She says she uses traditional herbs holistically; "we use what we call the 'circle of life', which is like a medicine wheel." Longboat, who is from the Mohawk Nation and the Turtle Clan, learned the traditional herbs while she was growing up on the Six Nations of the Grand River in Southwestern Ontario, where she lives still. "Everyone used the medicines when I was growing up. It wasn't uncommon. There was a time when the medicines went underground, and they became kind of mysterious. It wasn't openly used, but it wasn't lost."

Later she spent five and a half years studying to become a natural health practitioner, with a major in herbalogy, at the Canadian College of Natural Healing, and London School of Natural Healing. She studied physiology, herbalogy, reflexology, massage, diet and nutrition, and anatomy. Now she practices at the Health Access Centre, and also teaches based on her experiences.

She teaches three university or college courses. She has taught for the past five at the University of Toronto in the Faculty of Pharmacy, where she teaches fourth year pharmacy students the medicinal and healing components of the plants, and she gives students examples of illnesses and asks them to find the best way of treating them. "I think this is a giant step forward," Longboat says of the course, "I can't believe they're even interested, but it's been a wonderful course. It's been very popular – even pharmacists who have graduated have come back to

take it." She's been teaching Traditional Healing Practices in Native Community Health Care at Mohawk College for 11 years, and she started teaching Indigenous Healing and Wellness this year at McMaster University, in Hamilton. She sees teaching as very important. "My vision is an aboriginal medicine school," says Longboat, "I put that out as a recommendation to the aboriginal health strategy. We need more healers."

Joe Hester agrees. "We believe that traditional medicine should receive the same kind of support western medicine does," he says. Hester thinks that the teaching would have to involve a mix of classroom learning and learning 'on the land'. He says that some things you just can't learn in a classroom. He adds that Anishnawbe Health Toronto has begun the process of developing a traditional healer apprenticeship.

A challenge is bringing traditional and western medicine together. Janice Longboat says that a fundamental difference is that western medicine is science based, and traditional medicine is spirit based. Bringing them together will need reciprocity that includes the healer and person who is being healed. Joe Hester says that although they may seem contradictory, it can help both traditions to know the other better. For instance, it's useful for a traditional healer to have knowledge of pharmacology, and for doctors to know about traditional healing, but this is rare. "I don't know of any doctors, for instance, that are trained as a traditional healer," he says.

Nutrition and Environment Education On-line

Traditional food for me means: family and sharing. The part that I really enjoy is actually going off with my family and getting it. I find that when we go hunting we are much closer as a family. Then planning and preparing with a family is always wonderful. My family likes to share our traditional food harvest with others in the community, mostly with elders. So for me traditional food means much the same as it did years ago, connecting with the land to harvest, preparing as a family and sharing
– From a participant in CINE's first on-line nutrition course –

Traditional food is important to many Aboriginal peoples in Canada but pollution of the environment has led people who have traditionally lived off the land to ask – "Is our food safe to eat? What about contaminants?" Other questions being asked are: "Why is diabetes more common than it used to be? What causes diabetes?"
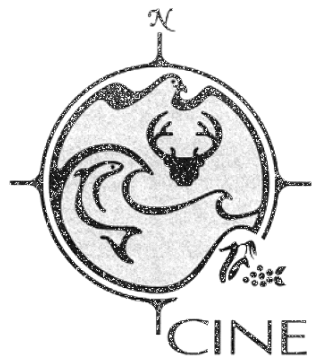
In October, 1998, thirteen people from Aboriginal communities across Canada met in an electronic "meeting room" to talk about traditional food, its nutritional value and other benefits, and why Aboriginal people have been changing the way they eat. This was part of a course offered by the Centre for Indigenous Peoples' Nutrition and Environment (CINE). "There's a great concern in the north about contaminants, and people worry about eating their traditional food," says Mary Trifonopoulos, coordinator of CINE's education activities. But CINE's research has shown that "though traditional food may have some contaminants, it's still better to eat traditional foods than not to. They're still far superior to a lot of supermarket foods, especially what you find in northern, isolated communities," says Trifonopoulos. She says that traditional food has a lot of other benefits in addition to nutrition, including cultural, physical, and spiritual benefits – and it costs less!

CINE was created in 1993 to answer questions and concerns from Aboriginal communities about the food they are eating. Its governing board is made up of representatives from seven Aboriginal organizations: the Assembly of First Nations, the Council of Yukon First Nations, the Dene Nation, the Inuit Circumpolar Conference, the Inuit Tapirisat of Canada, the Métis Nation of the Northwest Territories, and the Mohawk Council of Kahnawake. CINE is based at McGill University.

The Research

CINE has done major studies looking at what people in northern Aboriginal communities are eating, and how that affects their health. Laboratory analysis of thousands of food samples has also been done to see what nutrients and contaminants are in traditional food. All CINE's research is done at the request of Aboriginal organizations or communities. CINE also teaches research techniques to community members, so that they can begin conducting their own studies.

Here are a just a few research findings from studies CINE has done with Dene/Métis and Yukon First Nations communities:

- One serving of moose meat has about six times as much iron, and three times as much zinc, as a serving of lean pork. (Iron is needed for healthy blood. Zinc helps you fight infection and heal faster.)

- Many people in the western Northwest Territories may have low intakes of calcium, which is needed for strong bones and teeth.
- Traditional foods of the Dene/Métis of the Northwest Territories have very low levels of contaminants. It is safe for people to keep eating them.
- Traditional food is generally healthier and cheaper than market food.

Teaching about Nutrition

Since 1995, CINE has given short courses for community members on nutrition as one way to give back research results about the benefits and risks of eating traditional food. "The message so far has always been: Keep eating your traditional food, because it's great... great source of nutrients... has so many other benefits", says Trifonopoulos. The courses also teach basic concepts of nutrition; what foods are the best sources for certain nutrients; what contaminants are, and where they come from; and how to read market food labels. CINE also encourages Aboriginal youth to pursue careers in nutrition and environment, as there is a great need for more Aboriginal people to be working in these fields. Between 1995 and 1997, CINE offered short courses about nutrition to over 100 participants from Yukon First Nations communities and Dene/Métis and Inuit communities in the Northwest Territories, Nunavut and Labrador.

Now CINE is addressing the concerns of Aboriginal peoples about traditional food and nutrition, and how they are linked with the environment, in another way – by offering courses through the Internet. Because it is difficult to get funding for the travel and accommodation costs of facilitators and participants, giving courses on-line makes it possible for CINE to meet the needs of more people.

Teaching On-Line

The first on-line course was offered in October 1998. The course had interactive lessons and exercises, links to other web sites, and the meeting room where people posted messages for discussion. One change was that face to face regional courses were offered to people of similar cultural background, says Trifonopoulos, but "when we did the electronic course we had people from many different cultures — from the north, the south, Métis, Inuit... that's something that the web makes possible." She says that this poses new challenges, but it also allows people from different cultures to share views. One student in the course said that he enjoyed "getting to read what other people had said even though they were so far away."

A disappointment in delivering on-line was not being able to taste and share traditional foods.

She says that even though the courses are similar to face-to face courses that the Centre has already offered, "developing the materials takes quite a bit of time. [When you write it all down], you realise how much you actually say from a few notes than when you're just talking. And because you don't want to have too much text, it really forces you to think about what is the most important message you want people to come away with." Trifonopoulos, a nutritionist, worked with a specialist in educational web site design to build the course. The site was kept simple because internet connections in the north are often slow and very expensive.

CINE's second on-line course, offered in the spring of 1999, was given to a more regional audience of prenatal nutrition project workers from Dene/Métis and Inuit communities in the Northwest Territories. CINE is also planning a more general nutrition course, like the pilot course, for this summer.

Occupations in Education

Donald Bruce Hill
My Own Three Rs

Donald Bruce Hill is a Mohawk of the Bear clan from Six Nations Reserve, Ontario. Raised on a farm that has been in his family for six generations, Mr. Hill began his education in a two-room schoolhouse without hydro or running water. With the help of his parents, this kindled a passion for learning that has touched many others since then.

With a Bachelor of Science in Agriculture, Mr. Hill became one of the first Aboriginal people to complete an Honours degree in General Science at what is now the University of Guelph. He also earned a teaching certificate and a principal's certificate, becoming the first Aboriginal principal of a high school in Ontario. He has worked with most levels of government to create educational opportunities for people of different cultural backgrounds. At the same time, he managed local sports teams and presided over community events. Now retired, Mr. Hill continues to make presentations to educational conferences. He also runs Hill's Native Foods and raises beef cattle, living off the land much as his family has always done.

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I learned the three Rs – Reading, 'Riting and 'Rithmetic – early in life. I also believe that my own three Rs - Respect, Responsibility and Reliability - are fundamental to life and any educational system when coupled with a good positive attitude. Throughout our lives, we develop our own codes of behaviour, beginning with self-respect. Only when we respect ourselves, our grassroots and our traditions can we go on to be a respected, responsible, and reliable person toward others and toward Mother Earth.

– Donald Bruce Hill –

Working in Education

Professors teach at universities, delivering lectures, leading discussions and laboratory sessions, and directing research. They specialize in subjects such as anatomy, chemistry, geography, computer science, and engineering. Professors also conduct research.

College instructors teach in community colleges and other vocational schools.

They specialize in fields such as dental hygiene, electronics assembly, geographic information systems, and biochemical technology. They are less likely to engage in research.

Secondary school teachers follow a systematic plan of questions and answers, discussions, and laboratory, shop and field studies to instruct students according to an approved curriculum. They also administer tests, participate in meetings, and provide advice to students.

What Does it Take?

University professors are generally required to have a doctoral degree in their field of study. In regulated fields such as medicine, engineering and architecture, they must also have licences or professional accreditation.

College instructors must have a college diploma, a bachelor's degree or demonstrated expertise in their field. They may need a master's degree. Trades instructors need certification, apprenticeship training, and additional courses in teaching.

Secondary school teachers must have a bachelor's degree in education and a provincial teaching certificate. They must often acquire a bachelor's degree in science before obtaining their degree in education or must specialize in specific subjects while obtaining this degree.

Outlooks and Earnings

Labour market conditions for new university professors and new secondary school teachers are fair and will remain fair through 2001.

However, prospects for new college instructors are poor and will remain so in the near future.

On average, jobs in education offer higher than average incomes. Here are some examples of the annual earnings for full-time workers in 1995:

- University professor ~ $47,900
- College instructor ~ $40,900
- Secondary school teacher ~ $46,000

The average annual full-time earnings for all occupations was $35,700.

Aboriginal People in Education and Related Occupations

In 1996:

- Over 31,400 Aboriginal people, representing 8% of the working Aboriginal labour force, were employed in occupations in social science, education, government services and religion.[1]

- 11% of working-aged individuals who had completed a post-secondary program had certificates in education, recreation and counselling services. Of those, 54% had taken university programs and 46% had taken community college programs.
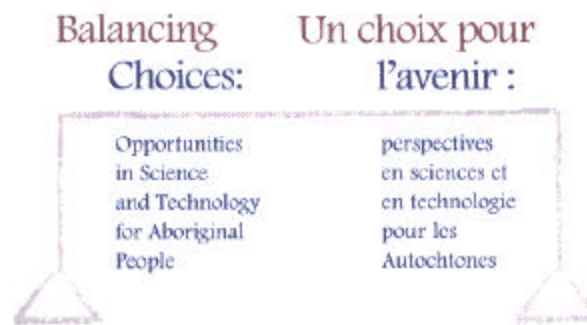
Technology in the Classroom

Technological change is making itself felt in education. Computers are increasingly used in the classroom and technical courses are using more sophisticated equipment.

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1. Excludes legislators, senior managers and other managers in public administration.

Eskasoni School

Faced with massive unemployment and a school system where most kids dropped out before the end of high school, the Mi'kmaq of Eskasoni, Nova Scotia, weren't going to wait for someone else's solutions – they're fixing things themselves. Until the fall of 1998, Eskasoni high school students rode school buses for one and a half hours each day, leaving their community for schools from which fewer than 10 per cent of them graduated. Now the Eskasoni students go to a new "high tech" high school in their own community.

Eskasoni is the largest First Nation in the maritime provinces, with a population of over 3,000. The new high school is the first school on a reserve in Canada ever built with private funds and it was built the way the band wanted it done: with a strong emphasis on Mi'kmaq language and culture, and on high technology.

By emphasising technology, the school is unusual. For one thing, the student-to-computer ratio is two to one. This is unheard of in a reserve school and in most off-reserve schools, too, says Kyte Power, Curriculum and Technology Integration Specialist at Dreamcatcher Management Group. The way the school is using available technology is also unique. For example, students can opt for a three-year multimedia specialization in which they learn to design multimedia software which is then tested by students at Eskasoni elementary school. The high school students use feedback from the elementary school to redesign their software. Modelling the design-testing-redesign process that corporations actually use in software development provides the student with a real-life learning experience. This will help students when they're looking for work, says Tom O'Leary, President of Dreamcatcher Management and Project Manager for Eskasoni High School. "You've got kids coming out of Grade 12 with a portfolio of actually developed software."

The high school also offers a Microsoft Authorized Academic Training Program (AATP). Students have the option of working toward certification in Microsoft Office, part of which requires that students write an industry-standard test designed by Microsoft. Tom O'Leary notes that there are about 1,000 in the United States which offer this program but Eskasoni is one of very few in Canada. The next step for the school is to offer certification in Windows systems, including Windows NT and networking.

Students benefit just from having the computers around. For students doing research, reference materials are available on CD-ROM, such as the entire National Geographic collection, and through the Internet. George Marshall, a school counsellor, says that the kids can learn from technology from a variety of ways: "One of the things they did the first couple of months was they kind of went crazy sending each other e-mail. Some people thought it was non-productive, but we thought it was good." It wasn't planned, but Marshall says it helped the students become familiar with the software.

A Community Vision

Eskasoni's approaches may be innovative, but the philosophy is simple: "We want students, when they leave, to be… equipped to go on to post-secondary education… employable, and with skills that are in demand," says Kyte Power, "and technology skills are in demand."

The community of Eskasoni was heading for a crisis. Sixty per cent of its population was under 30 years of age, with no major sources of employment. Cape Breton's unemployment rate of 20% and Sydney's unemployment rate of 40% were low in comparison to Eskasoni's 80%. Jobs traditionally come from resource-based industries like coal mining, forestry and fisheries, but with many of these industries cutting back or closing, Eskasoni school principal John

Googoo says, "the last few years have been really tough... The reason we're putting a push on technology is that people here don't want to leave. With information technology you can develop a business without having to leave."

The school is being recognized for its vision. Financed by the Bank of Montreal, Junior Achievement, a national stay-in-school program, is using the school as a trial site to see if its programs can be enhanced by the Internet. The school is part of 'Kids NRG', a privately funded extra-curricular program that encourages entrepreneurship by having students tackle real issues with multimedia solutions. Tom O'Leary says the school is driving technology in the community, "it doesn't end with the school, it seems like it all begins when the school opens." The goal is to make real opportunities for the community.

That's the theme of an Aboriginal knowledge fair taking place at the school this spring. Entitled "Tools for the Twenty First Century: Taking Them Into Our Own Hands", the fair features Aboriginal people who are using technology in their work. Guests will talk about their experiences in sessions such as *How I make Money with my Computer* or *16 Ways to Make Money on the Internet.*

It's not just dreaming, either - the high technology industry in Sydney began with about fifteen multimedia, engineering and architecture companies working out of a building that has been given the name "Silicon Island". The companies have done many different kinds of work, including special effects work for Hollywood movie studios and developing educational CDs and software, some of which will be used by Eskasoni high school.

Corporate Partnership

Finished in the summer of 1998 with a $4.8 million loan financed by the Bank of Montreal, building the Eskasoni high school also required a number of partners. O'Leary went to the private sector trying to sell the idea of the high tech high school as simply a good business strategy. "We tried to stay away from looking at it as corporate charity," he says. There were still significant advantages to having partners in developing the school – for instance, it gave the school access to IBM's leasing division. Leasing, O'Leary believes, is the way to go; leasing allows the school to operate with computers as a fixed cost, instead of a capital cost for which they would need to seek new capital funds every two or three years. Without changing their lease payments, the Eskasoni school can take advantage of a built-in refresh clause in its leasing agreement. The school has the option of, in time, replacing their 86 Pentium 266 computers with newer, up-to-date equipment – allowing the school to remain at the cutting edge of high tech equipment and applications in education.

Occupations in Engineering

Engineers, engineering technologists, and engineering technicians work in consulting firms, electrical utilities, research and educational institutions, communications companies, and manufacturing, processing, construction and transportation industries.

Working in Engineering

Engineers design, evaluate, research and manage a wide range of projects:

- Civil engineers specialize in structures such as buildings, roads, bridges, dams, and water distribution systems.

- Mechanical engineers specialize in heating and ventilation, power generation, transportation, processing and manufacturing systems.

- Electrical and electronics engineers specialize in electrical generation and distribution networks, electrical machinery, and electronic equipment.

- Chemical engineers oversee processes in factories and perform activities related to quality control, environmental protection, and biochemical engineering.

- Engineering technologists and technicians support engineers by preparing drawings, specifications and cost estimates, supervising construction, and/ or providing technical expertise in the development of production methods.

What Does It Take?

Engineers must have a university degree in their branch of engineering or in a related discipline. To practise, they usually must be registered as a Professional Engineer (P.Eng./ing.) by a provincial or territorial association.

Engineering technologists and technicians generally need a college diploma in their field. Normally, they

Joanne Tabobandung
Flying is a Family Affair

Joanne Tabobandung has been interested in aviation since her mother began working for Air Canada and taking her on many trips. She would like sometime to fly for Air Canada but is waiting until her own pre-school children are a little older. Joanne's husband is also a pilot, with Air Creebec in Northern Ontario.

Joanne's own career in aviation began when First Nations Technical Institute (FNTI) in Tyendinaga began its aviation program. She jumped at that new opportunity, beginning flight training nearly ten years ago at an old World War II airport. She received her commercial pilot's licence within two years and began training to become an instructor. She joined FNTI in 1993.

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"Flight instructing is a very rewarding career. Many of the native students that I have taught have aviation careers, some in their own communities... My message for young people is: stay in school and focus on math and science. Flying is based on physics, therefore, a strong foundation is necessary for flight training. Whether your future goal is aviation related or not, a 100% effort is the minimum required."

– Joanne Tabobandung –

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Canada

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too require certification by a provincial association, which is obtained after several years of experience.

Job Prospects

By the year 2001, labour market conditions for new engineers will improve from fair to good.

Prospects for new engineering technologists and technicians are fair and will remain so through 2001.

Engineers and engineering technologists and technicians should plan on periods of retraining and professional development to keep up with rapidly changing technology in their fields.

Average earnings for engineers are among the highest for occupations in the natural and applied sciences. Here are some examples of the annual earnings for full-time workers in 1995:

- Engineers ~ $48,300
- Engineering technologists and technicians ~ $40,700

The average annual full-time earnings for all occupations in all industries was $35,700.

Aboriginal People in Natural and Applied Sciences

In 1996:

- Over 11,800 Aboriginal people, representing over 3% of the working Aboriginal labour force, were employed in occupations in natural and applied sciences.[1]

- 28% of working-aged individuals who had completed a post-secondary program had certificates in engineering and applied sciences, technologies and trades. Of those, 4% had taken university programs and 96% had taken community college programs.

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1. Includes computer programmers and systems analysts; excludes managers in engineering, architecture, natural sciences and information systems.

**Shannon Judge
Construction Engineering
Technologist**

An Ojibway of Wasauksing First Nation, Shannon Judge has at age 22 graduated with honours from Construction Engineering Management Technology at George Brown College. She won four awards there and her classmates elected her President of the college's Technology Student Representative Council.

Shannon balances her work in the construction industry with community activity and personal interests. She supports Native Earth Performing Arts, though not a performer herself, and promotes the Barrie Native Friendship Centre by taking photographs, one of her hobbies.

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"I have been fortunate enough to have found a career that challenges and excites me. My determination and drive are what have led me this far and will continue to lead me. People have seen my strengths and helped to nurture me. There will always be someone to help you achieve your goals if you resolve to help yourself."
– Shannon Judge –

One Profession, Many Kinds of Work

There are many types of engineers:

Industrial and manufacturing engineers

Aerospace engineers	Computer engineers
Engineering scientists	Petroleum engineers
Biomedical engineers	Civil engineers
Geological engineers	Textile engineers
Mining engineers	Agricultural engineers

Metallurgical and materials engineers

Food processing engineers

Marine and naval engineers

The Gwich'in Social and Cultural Institute

The Gwich'in people are taking control of their own land, and their own science.

In 1992, the Gwich'in in the Northwest Territories signed a land claim agreement that created the Gwich'in Settlement Area: 59,000 square kilometres of Gwich'in traditional territory in the Northwest Territories. One of the results of this major agreement was that the Gwich'in founded an institute to help implement parts of the agreement dealing with natural heritage, and also to safeguard Gwich'in culture and traditional knowledge.

The Gwich'in Social and Cultural Institute (GSCI) has helped preserve traditional place names on the Gwich'in territory, documented peoples' family relations and family trees, recorded traditional uses of plants, and worked to save the endangered Gwich'in language. The GSCI aims to involve Gwich'in people as much as possible in doing their own research, and helps in teaching young people both traditional and scientific knowledge. The GSCI is a non-profit society under the Gwich'in tribal council that was founded during the 1992 annual Gwich'in assembly. Their work is guided by the concerns of Gwich'in elders.

Recording Gwich'in Oral History and Traditional Place Names

Learning your own heritage is like receiving a bouquet of flowers – Ruth Welsh, 1997

The work of collecting Gwich'in oral history started immediately after the society was created. Since then the GSCI, partly in collaboration with the Canadian Museum of Civilisation's NOGAP program, has gathered knowledge about such things as traditional place names, centuries-old boat and dog sled routes, historical trade relations with other peoples, the whereabouts and use of many resources such as ochre, flint, caribou fences, and boiling rocks; and knowledge about traditional houses. Many historical stories and legends that went with these things were also gathered.

This valuable collection has led to a map that can be used as a basis for official maps of the Gwich'in traditional territory. With over 700 place names, the map will also encourage people to use the Gwich'in names, some of which are at risk of being forgotten. They are also developing a computerized "talking map"; with the click of a mouse you can hear an elder pronounce the name of a place.

Many of these names describe the particular place they are attached to; what it looks like, or resources that are found there. Other places are named for people who have lived there – sometimes hundreds of years ago. Places sometimes have stories that go with their names; for example, the name Treedaaghaa means "[a woman] crying while clubbing fish with a stick." The story of this place is very sad. The woman cried when the fish came in the spring because many of her people had starved over the winter. The fish that year were so thick in the creek that you could literally grab them but it was too late for many people.

Elders were very supportive of the work, because they were afraid that without it their knowledge might be lost. "All that stuff is in me. I want before I die to give it to one of you and you'll become like me," says one elder. People who were recording the information were often told that they should have begun 20 or 30 years before when some specific elder was still alive. Elders were often sad that many children in the community knew little about life and living on the land. To record the knowledge of elders, 54 audio cassettes of conversations with elders were recorded and transcribed.

The land claim agreement recognizes the importance of traditional Gwich'in names and the government has agreed to officially recognize these names. On July 23, 1993, the Gwich'in community of Arctic Red River showed pride in traditional place

names by changing its name to Tsiigeehtchic, which means "the mouth of iron river".

The Gwich'in Science Camp

Every year since 1995 the Gwich'in Social and Cultural Institute has offered an on-the-land traditional knowledge and western science camp to senior high school students. At the Gwich'in Science Camp, elders teach students traditions and knowledge of the land and western scientists teach scientific methods and knowledge of the environment. The first camp was mostly about archeology but at later camps, participants have also been able to learn about land claims agreement and the principles of resource co-management works. Participants learn how to set snares for rabbits, make natural teas or insect repellents, and many other things that you can learn from living on the land. They also learn about the history of the earth, aquatic insects, and the biodiversity of forests. At the science camp, everyone has something to teach and everyone has something to learn.

"Before we started talking about traditional medicines we had a sharing circle. We had to say who our parents are and who our grandparents are... It was good to find out who was who, and who was all related." – A Fort McPherson student.

Ruth Welsh teaches about the traditional medicines. She started learning about medicines from her mother when she was 5 years old and now she teaches what she knows to students, women's groups, and doctors. She says learning is life-long and you're never too old to learn. Now in her 60s, she just started learning to play piano!

"... We all pretended to be the Porcupine Caribou herd. We pretended we were at the 1002 calving grounds and then travelled to the NWT. I now know how the caribou feel about the oil rigs, roads, etc. We ate supper and then I went to go check [rabbit] snares and pick berries and then played ball." – An Aklavik student.

One day at the camp, students pretend they are part of the Porcupine Caribou Herd. They learn what obstacles caribou have to overcome while travelling to and from their calving grounds in Alaska. The students might, one day, find themselves helping to manage this herd. The Gwich'in play a role in the Porcupine Caribou Management Board, which was formed in 1986 by the Federal Government to help protect and manage the caribou in Canada. In the 1980s the Gwich'in also played a role in defeating American legislation that would have opened the herd's calving grounds to oil development, which could have seriously threatening the herd. The herd has traditionally been, and continues to be, a culturally important food source for the Gwich'in.

The land claim agreement gives the Gwich'in many other management responsibilities, and many Gwich'in are concerned that because young people are dropping out of school, they won't be able to do the jobs that are needed. The philosophy behind the science camp is that students need to learn about their tradition, and about sciences, to be successful.

Making Opportunities in Forestry

Balancing   **Un choix pour**
Choices: **l'avenir :**

Opportunities   perspectives
in Science   en sciences et
and Technology   en technologie
for Aboriginal   pour les
People   Autochtones

Most of Canada's First Nations traditionally depended on forests for food and sustenance. Despite this, a 1986 survey found that less than 7% of forestry and logging workers are of Aboriginal origin. The National Aboriginal Forestry Association (NAFA) was created after a conference on native forestry in Vancouver, in 1989. Delegates at the conference felt a national organization was needed to promote Aboriginal participation in the forest industry, with the goals of economic development, repairing environmental degradation, and restoring cultural and community spiritual health for Aboriginal people across the country.

NAFA is a grassroots organization that is backed by First Nations and other Aboriginal organizations that operate at a regional or community level in the area of forestry. It has directors from across the country. Recognizing that there are a number of barriers to Aboriginal people's involvement in forestry, and also barriers to achieving standards of forestry that are consistent with an Aboriginal land ethic, NAFA has established objectives reflecting their concern for and commitment to the aspirations of Aboriginal peoples.

Where are Aboriginal Forestry Jobs Found?

The forest industry has often been a factor in interfering with traditional Aboriginal uses of land, but it's also an important source of employment, employing about 10% of employed on-reserve native people. Treaty negotiations are one way to reconcile these two things because they give more control over the land, and what happens on it, to First Nations. Another way to gain more control over forest lands is to negotiate Aboriginal-industry partnerships with forest licence-holders to increase Aboriginal participation.

Statistics vary between different sectors of the forest industry, and different parts of the country.

National Aboriginal Forestry Association

The overall goal of NAFA is to promote and support increased Aboriginal involvement in forest management and related commercial opportunities. Specific objectives include:

- To facilitate capacity-building through the development of models for increased participation in natural resource management decision-making and the implementation of human resource development strategies.

- To address the need for Indian forest land rehabilitation and increased Aboriginal control over forest resources through the development of appropriate policy and programming.

- To ensure that Aboriginal communities are made aware of ways and means by which they can extract the highest value possible from the forest resources they possess on reserve and from tenures they may hold in traditional territories.

- To support Aboriginal Peoples' aspirations regarding self-government and the exercise of Aboriginal and Treaty rights as they pertain to natural resource management.

- To provide a network for information sharing and to act in an advocacy role that seeks out opportunity to promote forestry amongst and on behalf of Aboriginal Peoples in Canada with governments and industry at all levels.

- To assist Aboriginal communities in their quest to achieve a standard of land care which is balanced, sustainable and reflective of the traditional knowledge and forest values of Aboriginal peoples.

Nationally, Aboriginal participation in the forest industry (as of 1986) was highest in forest conservation related jobs, where 13% of the work force was Aboriginal. General forestry/logging work also had high Aboriginal participation, at 9%, and log hoisting and moving were at 7%. Less than 5% of first-line supervisory jobs were held by Aboriginal people. Aboriginal participation was much lower in the wood processing (4%) and pulp and paper (1.5%) industries.

There are also big differences in levels of employment between provinces. The four western provinces had the highest levels, especially Manitoba, where 33% of the work force is Aboriginal, Saskatchewan, at 23%, and Alberta, at 15%.

Added Value = Added Jobs

One big potential growth areas for Aboriginal employment is in value added wood processing, an area that had a 60% growth in sales between 1985 and 1994. This includes specialty sawmills, mini-mills, laminated veneer lumber, re-manufacturing mills, and medium-density fibreboard manufacturing. According to NAFA, value added wood industries generate over four times as many jobs, per board foot cut, as conventional sawmills do. Value added processing in paper products is also growing. The combined growth of value added wood and paper products has led to the creation of 24,000 new jobs in the past three years alone.

People with a variety of skills are needed to fill these niches. For instance, value added production needs people trained in wood science and technology skills. And even though value added industries are growing, the number of people being trained in wood science and technology is dropping. Enrolment in these program declined from 1065 in 1977 to 324 in 1992. A survey of forest products manufacturers in the 1990s identified the most important skills for people who aim to work in the industry. These included:

- A mix of fundamental knowledge and applied skills;
- Wood science, mechanical processing, production and management skills, business logistics;
- Computer skills, communications skills, and problem-solving;
- A focus on the solid wood sector.

A good example of a value added mill is one run by Tl'oh Forest Products, which is turning scrap wood into a resource, by making finger-joined studs and I-joists out of it. Tl'oh Forest Products, Inc. is a joint venture between Apollo Forest Products of Fort St. James and Nak'ol Koh Timber, owned fully by the Nak'azdli First Nation. Profits are reasonable, and of the 60 staff who now work in the plant, 85% are Nak'azdli members, including the two supervisors.

To manufacture finger-joined lumber, trim ends are dumped into a bin where they're divided according to size, then ripped into different sizes. Each trim block has "fingers" cut into it, after which they are all lined up, glued, finger-joined together, and cut into boards of 8' to 14'. The I-joist unit is the newest division of the plant. The I-joists are made from random length two-by-threes and oriented strand board (OSB) - wood chips and sawdust glued and pressed into boards.) This division started in April 1996, five months after the finger-joining operation started, and is the only plant in northern BC which produces I-joists.

Engineered wood products, like these, are popular because they are sturdier than those made of solid, natural wood, which tends to warp and bow, and for their straightness, quality, and long lengths.

Other Growth Areas

Another high growth area for Aboriginal people may be in providing a variety of services related to forest management. These services include fire suppression, pest management, road planning and construction, as well as forest inventories, GIS services, and mapping traditional values. There is a need for more native people going on in forestry and technical jobs related to forestry. Some colleges and universities now offer special programs or have liaison officers encouraging Aboriginal youth to enter these fields.

Non-timber uses of forests (many of which are traditional native uses) have potential either to generate income, or may be important for subsistence. Wild rice harvesting, gathering mushrooms, medicinal herbs and berries, and ecotourism, are potentially important and growing areas. Ecotourism could be especially important.

NAFA continues to take the lead in promoting the many growing employment opportunities for Aboriginal people in forestry, and shares communities' experiences and successes with each other.

The Glung-Us Salmon Trap

Centuries ago, floating in canoes among the reefs off the south tip of Vancouver Island, T'Sou-ke fishers probably never imagined that they could catch all of the salmon in the ocean. But now the T'Sou-ke First Nation is faced with disappearing salmon stocks, an important food source to them, because of destructive modern fishing methods. In response they have redesigned historical fish trapping methods that supported them for thousands of years, to meet today's and tomorrow's needs.

A Long History of Fish-Trapping

The T'Sou-ke First Nation of Vancouver Island traditionally trapped salmon using a reef net, or SXOLE, until the turn of the century. The reef net was hung between two canoes in a place where reefs would help guide salmon to it. Kelp and eelgrass were manicured to further guide the salmon to the net. T'Sou-ke fishers would wait and lift the net when the fish were in it. This method of fishing was replaced with a pile-secured salmon trap in the 20th century, until 1958 when pressure from the development of the modern seine fleet, and increased operating costs, ended fish-trapping all together.

In recent years, the First Nation was hiring a seining boat to fish for them, but it was not catching enough fish to meet the needs of the community. The community turned to its tradition for an answer, resurrecting the practice of salmon trapping. But it used modern technology to redesign the traditional trap for today's needs.

Developing a New Trap

The T'Sou-ke researched, developed, and tested a trap to work in the waters off their territorial lands, that would not harm already depleted salmon stocks. They learned what they could from the historical traps, and consulted a diverse group of experts in designing the new trap: elders with experience in salmon trapping; a retired, local fish trapper; a biologist; and cod trappers from Newfoundland.

Many fish traps are still used around the world, like the Japanese salmon trap and the Newfoundland cod trap. In fact, one of the first things that the T'Sou-ke did was to try a Newfoundland cod trap in their waters and see what happened. It worked! It wasn't perfect, but it encouraged the community to move ahead with their trap design.

Much of the designing and testing of the Glung-Us trap took place in the flume tank at the Marine Institute of the Memorial University of Newfoundland. The flume tank is 8 metres wide, 4 metres deep and 24 metres long, and can simulate a variety of different currents. The T'Sou-ke used this to create conditions similar to their ancestral waters and see how the trap would react.

After two years of work the trap was ready to go. In August, 1996, the trap went into the water, and caught 400 salmon. Two hundred of those were tagged and released.

How the Trap Works for the T'Sou-ke People and for the Salmon

The Glung-Us trap is large with four sections, the "diamond", the "heart", the "pot" and the "spiller". The body of the trap is about 35 fathoms (70 metres) long and 12 fathoms (24 metres) across at its widest point. Gordon Curry, a Department of Fisheries and Oceans officer who worked with the T'Sou-ke First Nation on the project, explained the trap this way. "The salmon tend to swim against the current when trapped and, when further guided by deflecting panels, the fish swim through funnel-shaped openings into the heart, pot and spiller. This style of trap net only fishes on the flood tide so when the tide changes, the entrance into the spiller is closed to prevent the catch from escaping."

The trap can hold a few thousand fish per lift. The trap has many advantages, some of these are:

because the fish are caught alive and do not have to be handled much, fish that are not wanted can be released and will mostly survive. This means that fishing can be selective, and fish can be tagged for stock assessment.

Although traps are fairly expensive to build, they are quite cheap to maintain and run, and will last many seasons.

A trap net is a practical way for a community to fish. When a seine boat comes in with thousands of dead fish they must be dealt with immediately to avoid spoilage. The trap limits the amount of fish harvested to what the community needs, and extras caught in the trap can be returned to sea.

The T'Sou-ke people's quota allows them to harvest 3,000 sockeye salmon, 250 chinook, 250 coho, 4,000 chum, and an incidental catch of pink salmon. The main incentive in developing the trap was that it allowed a selective, less destructive method of harvesting salmon. They can return threatened salmon stocks to the ocean.

Instead of supporting destructive ways of fishing, they are reclaiming their heritage and designing a sustainable way of fishing. They are also bringing power and opportunities back to their community. Before the development of the trap, no T'Sou-ke people worked in fisheries, despite the long maritime history of the people. The new trap's name, Glung-Us, was chosen in memory of the last T'Sou-ke chief to fish with a reef net on their traditional territory.
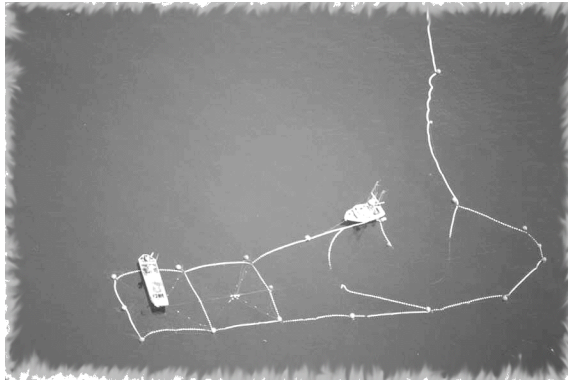
Looking to The Future

So far, the fish trap is creating about two full-time jobs for the community of Sooke but the results have not been quite as expected. "Migration patterns have changed around the community," says David Lightly, a biologist with the T'Sou-ke First Nation. "Although the trap has been catching fish, they've mostly been from threatened salmon stocks that the T'Sou-ke can't harvest." He says that there are big problems with many British Columbia salmon fisheries: "fisheries that have carried on for 80 years were closed last year."

That is why selective traps like Glung-Us will be increasingly important in conservation, to monitor stocks by tagging, and to fish them sustainably as they recover. The T'Sou-ke have started working in partnership with the Tsawwassen people, using the trap in the tidal portion of the lower Fraser River. Lightly says that the trap is working very well there, and will be replacing gill nets, that native and non-native fishers were using in the lower Fraser River. "Gill nets, because they are non-selective and generally kill most of the fish that are caught, have a very big impact on weak stocks," he says.

Occupations in Information Technology

Balancing   Un choix pour
Choices: l'avenir :

Opportunities   perspectives
in Science   en sciences et
and Technology   en technologie
for Aboriginal   pour les
People   Autochtones

Information technology offers careers in the design, operation, and maintenance of electronic equipment. Many industries employ computer programmers, systems analysts, and electronics engineering technologists and technicians, for example.

Working in Information Technology

Electrical and electronics engineering technologists and technicians develop and test computer software, systems, and networks. They may also manage systems that control industrial processes and telecommunication, broadcast and audio-visual systems. Some perform research under the direction of scientists or engineers.

Computer programmers write programs or software packages by coding instructions into machine-readable form. They also test, debug, implement, and maintain computer programs and help computer users solve problems.

Computer systems analysts find computer solutions for their clients' needs. They test and write requirements for computer programs, plan and implement computer security systems, and establish and maintain databases. They may also supervise computer programmers and other systems analysts.

What Does It Take?

Electrical and electronics engineering technologists and technicians normally complete a college program in this or a related field.

Computer programmers usually complete either a college program or a bachelor's degree in computer science or in a discipline that involves programming. Some programmers return to school to specialize in commercial, engineering, or scientific applications. With experience, a programmer may become a programmer analyst or computer systems analyst.

Albert Rock
Adapting Technology for Success

Albert Rock considers himself an inventor – he is clearly an innovator.

Albert is president of ACR Systems Inc., a British Columbia manufacturer of pocket-sized, high tech "data loggers" which he developed in 1982. ACR products circle the globe, literally! They are used on NASA space shuttles and unmanned orbiters and, on the ground, in everything from heating systems and blood temperature monitoring, to Formula One racing cars.

Winner of a 1996 National Aboriginal Achievement Award for Science and Technology, Albert's entrepreneurial skills have resulted in a multi-million dollar business with a worldwide distribution network.

Computer systems analysts ordinarily must complete either a bachelor's degree (typically in computer science, mathematics, or business) or a college program in computer science. They usually have experience as computer programmers. They too can specialize or, with experience, may become information systems and data processing managers.

Information technology specialists also need good interpersonal and communication skills to be able to understand their clients' needs and to convey technical information to people with little knowledge of information systems.

Job Prospects

The demand for new electrical and electronics engineering technologists and technicians will remain fair through 2001.

Labour market conditions for new computer programmers are currently fair but will become good by 2001.

Prospects for computer systems analysts are good and will remain so for the next few years.

People in these occupations will need regular retraining to keep up with rapid technological change.

Earnings for information systems workers are generally higher than average. Here are some examples of the annual earnings for full-time workers in 1995:

Technical occupations in electronics and electrical engineering ~ $39,200

Computer programmers ~ $38,100

Systems analysts ~ $44,800

The average annual full-time earnings for all occupations was $35,700.

Did you know?

- In 1996, 100,000 Canadians were employed in technical occupations in electronics and electrical engineering.

- Many technicians and technologists move on to specialized jobs, management or sales after gaining technical experience.

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Many Kinds of Work

Examples of technical occupations in electronics and electrical engineering:

Production support technician, electronics

Distribution design technologist, lines

Communications technologist

Electronics technologist, physics department

Lighting technologist

Microwave maintenance technician

Electronics manufacturing technologist

Technical sales specialist

The Aboriginal Multi-Media Society

In 1990, the Aboriginal Multi-Media Society (AMMSA) lost 80% of its budget and laid off half its staff. Now, it has grown to be one of Canada's premiere Aboriginal news sources.

From a single publication in 1990, AMMSA now publishes four monthly newspapers, with a distribution of more than 40,000 copies, including Canada's only national aboriginal newspaper, Windspeaker. "Through the use of computers, networking, and e-mail, AMMSA is now able to produce four publications... with the same staff levels as when it only produced one," says AMMSA's marketing director, Paul Macedo.

A not-for-profit organization, AMMSA also transmits aboriginal radio programming produced in Edmonton by satellite to remote Alberta communities.

Stumbling Blocks and Stepping Stones

When AMMSA's first publication, the Alberta newspaper Windspeaker, opened in 1983, it was one of 11 Aboriginal publications in Canada. By1990, when the federal government cut all of its funding to Aboriginal publications, nine of those eleven publications closed down, with Windspeaker the only Aboriginal newspaper west of Ontario to survive. "One of our organization's philosophies is to turn stumbling blocks into stepping stones," says AMMSA's CEO, Bert Crowfoot, "we saw the elimination of government funding, both federal and provincial, as a wake-up call to pursue the dream of having an Aboriginal newspaper that was both financially and politically independent." Windspeaker survived having about 80% of its funding cut off because it had set aside a contingency fund. "The funding was cut off in about two months," says AMMSA's marketing director Paul Macedo, "but through that rainy day fund we made the transition in about a year."

Since then, AMMSA has transformed Windspeaker into a national newspaper and opened three more regional newspapers in Alberta, Saskatchewan, and British Columbia – running all four papers with the same staff that they had had for Windspeaker alone in the 1980s!

Less of the writing is done by the staff now. Freelance writing fills 30% to 40% of the four news magazines. Relying on freelancing makes sense; AMMSA, a regional office that is producing national coverage, can use freelancers to gain a national perspective. "Working with freelancers is also very practical because of new communications technology," says Macedo. "We get material [by e-mail] from the freelancers, not only written material but we get photos as well, and we get that instantaneously."

There are additional savings in laying out and producing the publications.   The use of networked computers allows instantaneous transfer information instead of having to carry it around. Improved software also saves a lot of layout time. These savings have allowed operations to expand at a greater rate than staffing costs. Macedo recalls that when they produced a single publication, "we had three production staff putting that together, now with four publications we have four production staff."

New software also improves the quality of the news magazines, in more than just appearance, says Macedo, it makes them more current. "If we have a front page hole, we can leave that to the last minute. Say if a court decision is coming in, we can run that to the very last second, with photos as well!"

AMMSA's sales have grown by 20% to 30% each year since 1990. To keep pace, the sales staff use contact management software to save a lot of time dealing with customers and advertisers. The software lets sales people keep track of their clients with minimal paper work, and to organize their accounts by date, industry, etc., and to update accounts instantly from the Internet, including checking

whether payments have been received, and making credit checks.

www.ammsa.com

One way AMMSA marketed itself is through its world wide web site. "The web site opens us up to a new audience," says Paul Macedo, who is AMMSA's webmaster, "it's used to drive subscription, it's not used as a replacement. Sometimes our regular readers access the web site because it comes out a week to 10 days sooner than the print version, and they want our viewpoint on current events," but the web site isn't competing with the print version.

AMMSA launched its web site in 1996, but not without setbacks. They tried using outside designers but they weren't satisfied, so Paul Macedo learned to program in HTML, the main language used to publish on the Internet. "We spent about four months working on it," he says, "[then] we had a hard drive crash and we lost the whole thing. That was in May (1996), finally we had it up in August. It's had some serious redesigns two or three times since then, but the main challenge was getting it started up." In 1997, the site had 14,000 visitors. When AMMSA reset the counter and it reached 14,000 hits again in seven months, the counter was reset again, and this time it reached 14,000 in less than four months. Macedo says that something that sets their web site apart from many others is that it is all original material. "We really focus on the content of the web site, it's not just links... so that even if someone just happens by they'll become a regular visitor."

CFWE-FM a Growing Network of Stations

CFWE-FM is radio programming produced in Edmonton and sent by satellite to 48 receivers and low-powered transmitters located throughout Alberta. The station reaches about 70,000 listeners and aims to increase this figure. To cover a much broader area from each receiving station, CFWE-FM has started installing high powered 1000-watt transmitters with 150-foot towers; by contrast, the transmitters that are being replaced are only about 10 watts – islands of radio signal that extend only five or ten kilometres from their host community. The first new transmitter has been installed, and covers as much as 100 kilometres, replacing about ten of the low-power transmitters. The small transmitters, in turn, will be moved to new areas where CFWE-FM has never broadcast before. Ultimately the station hopes to save money by maintaining fewer of the small transmitters.

CFWE-FM is also moving to completely digital studios – not only improving sound quality, but saving a lot of editing time. An interview that would have taken a day or more to edit can be done in less than an hour, says Macedo, which leaves more time for staff to tackle new creative projects.

The SIMPCW GIS Team

The SIMPCW people are part of the Secwepemc community (Shuswap Nation) in the North Thompson valley of British Columbia. Six years ago, a few members of the community took short courses in computer mapping, which led to GIS. Now, not only are they making their own maps of their land instead of letting a consultant do it, they are also making a business out of it.

What is GIS and What Can You Do with It?

A Geographic Information System (GIS) lets you draw and analyse maps on a computer. These systems vary in size and complexity, with some programs small enough to run on a home computer while others need much more powerful systems. Using GIS programs, you can make maps that not only look great but which also include important information attached to any point on the map such as, for example, how high that point is above sea level, what kind of trees are growing there, or how valuable that location is to spawning salmon.

Using a GIS, it is possible to analyse thousands or even millions of these pieces of information. You could, for example, put all the information that is collected about salmon streams – like water quality, number of fish, quality of fish – onto a map that shows the most important salmon areas. That is something that the GIS team of SIMPCW has done. "All of the fish projects – the Fish and Fish Habitat Inventory Program (FFIHP) and the Interior Watershed Assessment Procedure (IWAP), have quite an extensive database." says Tina Donald, a SIMPCW GIS technician. "Our band members go out and gather field data and we attach that to our maps. If Tolco [a forest company] is going to do some work they can query our map to see what fish habitat is there."

That is only one example. The SIMPCW people of North Thompson have now done twelve different GIS projects, some of them for government ministries, and some for forestry companies working in the area. The team also does work for the Chief and Council of the North Thompson Indian Band; SIMPCW just finished a map of the community which can be used for planning.

Most of SIMPCW's contracts so far have either been to make maps showing important salmon streams, or showing all the different ways that SIMPCW have traditionally used the land. To make the maps of their traditional uses, the team interviewed many elders, and used interviews with elders who have lived off the land. SIMPCW recorded trails and traplines; camping, hunting, and fishing areas; plant and mineral resource areas; archeological sites; and sacred, cross-cultural and traditional historical areas. "Basically we're working in the same way as historians do – we're gathering the information from every source we can," project manager Dodie Eustache explained in 1997, during one of the first of these studies. "We're looking at these sites, and interviewing pioneers who knew a lot of the old folks and knew where they fished and hunted." One of the first things the GIS team did was to consult with many community elders in order to map the extent of SIMPCW and Secwepemc territory.

How GIS Works for the SIMPCW People

The SIMPCW people live around the North Thompson River to its headwaters, as well as the headwaters of the Fraser and Athabasca rivers. Traditionally, they travelled from spring to fall and gathered at village sites in valleys near rivers during the winter. The summer months were mostly spent hunting in the mountains above the North Thompson and Upper Fraser and Athabasca rivers. They also caught salmon from these rivers with weirs and nets, or spears. Today most of the 553 SIMPCW people live on the North Thompson Indian Reserve at Chu Chua just north of

Barriere, where many work in the forest industry as mill workers and loggers. The band owns SIMPCW Development Company, which runs a small sawmill.

The GIS project gives the SIMPCW people more influence in what happens on their own land, since the maps that they make are used by forestry companies and government ministries in order to lessen the impact of logging operations on traditional uses. "The contracts that we do for government ministries are also for us," says Tina Donald. "When companies like Weyerhauser or Tolco do forest development planning on our traditional lands they are required to consult with us on that." She says that they can use the maps to have more input into what the companies are doing. The SIMPCW have decided not to negotiate a treaty with the provincial government so far – instead they want to have more say in how forests are managed.

How the Team Got Started

The SIMPCW GIS team had its origins with some training offered by the Shuswap Nation Tribal Council in 1993, but its real beginning was in 1995 when the North Thompson Indian Band (NTIB), part of the Shuswap Nation, hired a a full-time instructor, Jennifer Morrison, to teach three people Frank Eustache, Dodie Eustache, and Tina Donald, to use GIS. They trained for four months, and then spent another six months continuing the training while working on a pilot traditional use study for the ministry of forests. Donald says doing the contract helped because the training was very "hands on," and also "it helped having in-house training. We were able to move along at our own pace, and [the office] was just down the road if we wanted to do extra hours… for us, located an hour from Kamloops – that helped." In 1996 two more people, Barb Eustache and Sharon Jules, were hired

Simpcw G.I.S.

to begin training when the SIMPCW team took on a more ambitious GIS project in the Clearwater Forest District. The team members all took courses on databases, forest surveying and mapping, computer hardware and software, photography and archival research.

They did not start out as experts. When they started taking their first GIS courses, they all had some experience with computers, but not a lot. "We had a basic knowledge of computers," says Donald, "we knew how to turn one on and how to type in a word processor." But she says that they were chosen for a wide variety of skills they could bring to the team, "each person would be able to draw on their own experience. If we needed to do surveying, Frank would be called in. If it was fisheries related, they'd come to me. Sharon was brought in for her plant knowledge… Dodie, and Barb were brought in for their knowledge of management." Each person's previous skills, with the added GIS experience, makes them an expert in their own area.

The team strategy worked: the SIMPCW GIS projects are paying off the equipment that was bought to start up, and paying the salaries of the five full-time team members. The team has been working steadily since it started taking on projects. With success also comes challenge, according to Donald; Forest Renewal BC, which funded several of their contracts, has been cut back, so the GIS team is now working hard to make themselves more widely known.