Forum on Water

Water: Is There Enough for Everybody?

Saturday, February 21, 2004
Merritt Secondary School
Merritt, BC

A Summary Report on the Water Forum

Nicola Watershed Community Round Table
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WATER FORUM

WATER: IS THERE ENOUGH FOR EVERYBODY?

Saturday, February 21, 2004
Location: Merritt Secondary School
1561 Chapman Street, Merritt

Program

9:30am	Video – Water, the Drop of Life
10:00am	Welcome, Opening Remarks, Housekeeping Items, Opening Circle
10:15am	**Water Cycle** – Judy Guichon
10:30am	**Water and Fish** – Dr. Marvin Rosenau, Pacific Fisheries Resource Conservation Council
11:00am	Questions and Answers
11:15am	Refreshment Break
11:30am	Prepared Question for Discussion by all
12:15pm	Lunch (a bag lunch will be provided)
1:00pm	**Water and Agriculture** – Graham Strachan, Ministry of Agriculture, Food and Fisheries
1:30pm	**How Communities Grow** – Kevin McNaney, Smart Growth BC
2:00pm	Questions and Answers
2:15pm	Refreshment Break
2:30pm	A Second Prepared Question for Discussion by all
3:00pm – 3:30pm	Closing Circle and Closing Remarks

Sponsored by the Nicola Watershed Community Round Table

With support from Fisheries and Oceans Canada

LIST OF ATTENDEES AT THE WATER FORUM

First Name	Last Name	
Ida	Alexander	Enderby, BC
John	Anderson	Hwy 8, BC
Kate	Anderson	Hwy 8, BC
George	Armstrong	Nicola Lake, BC
Bruce	Beech	Merritt, BC
Christine	Besner	Merritt, BC
Ingrid	Boys	Coldwater Rd., BC
Brian	Cannon	Hwy 8, BC
John	Chenowyth	Merritt, BC
Paul	Chutter	Merritt, BC
Dave	Chutter	Chutter Ranch
Marilyn	Cooke	Coldwater Rd., BC
Lou	Cooke	Coldwater Rd., BC
Emma	Dines	Merritt, BC
Peter J.	Duncan	Merritt, BC
Steve	Edden	Quilchena, BC
Mike	Flynn	Kamloops, BC
Wayne	Fulcher	Merritt, BC
Ashley	Fulcher	Merritt, BC
Ritchie	Gage	Merritt, BC
Andrea	Galway	Merritt, BC
Don	Grant	Merritt, BC
Diana	Grimshire	Merritt, BC
Judy	Guichon	Hwy 5A, BC
Derek	Harry	Hwy 8, BC
Rich	Hodson	Merritt, BC
Gene	Huber	Quilchena, BC
Bruce	Hupin	Merritt, BC
Liis	Jeffries	Nicola Lake, BC
Harold	Joe	Mamit Lake Road, BC
Nicole	Kowalski	Merritt, BC
David	Laird	Merritt, BC
Sheila	Langlois	Merritt, BC
Jens	Larsen	Dot Ranch, Hwy 8
Cathy	Laursen	Lower Nicola, BC
Chris	Lepsoe	Merritt, BC
Robert	Lisle	Merritt, BC
Al	Mackay-Smith	Hwy 8, BC
Bruno	Mailloux	Kingsvale, BC
Ed	Morris	Merritt, BC
Kerry L.	Morrisey	Merritt, BC
Eldon	Nast	Merritt, BC
Bernice	O'Hanley	Merritt, BC
Elmer	O'Hanley	Merritt, BC
Meg	Paulson	Merritt, BC
Alan	Paulson	Merritt, BC
Dave	Pehl	Merritt, BC
Joe	Post	Lower Nicola, BC
Jim	Ramsey	Hwy 8, BC
Elmer	Reimer	Merritt, BC
Lise	Robichaud	Merritt, BC
Mike	Rose	Quilchena, BC
Marvin	Rosenau	Abbotsfrod, BC
Gail	Sahara	Merritt, BC
Butch	Sahara	Merritt, BC
Elizabeth	Salomon-de-Friedberg	Merritt, BC
Gillian	Sanford	Merritt, BC
Gerry	Sanford	Merritt, BC
Wayne C.	Schindler	Merritt, BC
Ron	Sherwood	Merritt, BC
Murphy	Shewchuk	Merritt, BC
Graham	Strachan	Kamloops, BC
Angelika	Thomanek	Merritt, BC
Irene	Thompsen	Hwy 8, BC
Neil	Todd	Hwy 8, BC
Lee	Toop	Merritt, BC
Doug	Turvey	Lower Nicola, BC
Selena	Voigt	Lower Nicola, BC
Adrian	Wall	Kamloops, BC
Riley	Wall	Kamloops, BC
Matt	Williams	Hwy 5A, BC

SPEAKERS/PRESENTERS

Judy Guichon

Judy Guichon is a long-time resident of the Nicola Watershed, mother of four children and with son, Michael, is owner/manager of the Guichon Ranch at the north end of Nicola Lake. Together with her late husband, Laurie, she was a founding member of the Nicola Watershed Community Round Table.

She is also a very dedicated community member who participates in many areas including, the Nicola Valley Health Care Society before it was dissolved, Grasslands Conservation Council, Fraser Basin Council and BC Cattlemen's Land Stewardship Committee.

July is a valuable member of our Round Table and brings many common sense insights with her participation.

In her practical way, I am confident she will do an excellent job introducing you to the Water Cycle.

Graham Strachan, Ministry of Agriculture, Fisheries and Food

1974 Graduated UBC Animal Science
1974-1977 A/District Ag. Fort St. John - MAFF
1977-1982 District Agrologist in Quesnel - MAFF
1982 - present - District Agrologist converted to a 'Resource Stewardship Agrologist' in Kamloops, Ministry of Agriculture, Food and Fisheries

Member, BC Institute of Agrologists
Received the *Agrologist of the Year* Award for 2002.

Dr. Marvin Rosenau

Dr. Marvin Rosenau is a fisheries biologist with the BC Ministry of Water, Land and Air Protection. He has had a varied career in fisheries science over the last 25 years in both British Columbia and New Zealand, where he obtained his doctorate degree working on the world famous Lake Taupo rainbow trout fishery. Much of his work has concentrated on habitat issues in streams and lakes in this province. He has also worked on various inventory and assessment issues surrounding white sturgeon in British Columbia. Marvin has previously written five reports for the Pacific Fisheries Resource Conservation Council. Dr. Rosenau is also the recipient of the 1999 Murray A. Newman Award for Excellence in Aquatic Conservation given out by the Vancouver Public Aquarium each year.

Kevin McNaney, Smart Growth BC

Kevin McNaney grew up as the youngest of nine in a conventional suburb in an area where his grandfather used to farm. The dynamics of growing cities and the livability of the resulting urban form has fascinated him from a very early age and eventually led to graduate level study in community and regional planning. Kevin has carefully researched livability issues in planning departments, private consulting firms and at the UBC Sustainable Development Research Institute. His career has brought him to diverse places such as Indonesia, Vietnam, Europe and all parts of Canada and the USA.

Kevin worked for many years in helping communities to create regional strategies for sustainability before joining the team at Smart Growth BC to launch the Community Assistance Program. He is currently a Director of Better Environmentally Sound Transportation (BEST) and was recently appointed to City of Vancouver's Development Permit Board Advisory Panel.

Through his position at Smart Growth BC, Kevin is able to get back to the very roots of what brought him to professional planning in the first place...working with citizens to create more livable communities.

PRESENTATIONS

The Water Cycle – Judy Guichon

The Water Cycle

I have got to tell you I had a real problem getting this speech down on paper. John said I was to use passion. So I called Bruno to come over but that didn't help one bit. Seriously though, the reason I had such trouble is because it is such a huge subject, so simple and yet so complicated and I do care passionately about this Valley and all the resources it encompasses.

So where do we start when we talk about the water cycle? Capture, storage and slow release of water. Do we start with the drop of rain as it falls AT THE TOP OF THE MOUNTAIN? Or that same drop as it becomes part of Moore Creek somewhere in the hills at the Northern boundary of the Nicola Watershed, and descends some 2000 feet and many kilometers to the valley floor where it joins the slow moving Nicola Lake and continues on down the gentle Nicola Valley for some 60 km to Spence's Bridge where it will be absorbed into the Thompson System. From there it soon melds with the Mighty Fraser and careens on down the Fraser canyon to the mouth where it will be absorbed into the anonymity of the Pacific Ocean. Or perhaps, early on it is captured and held in the cells of a giant ponderosa pine tree, or drunk by a thirsty grasshopper. The possibilities are limitless.

Alan Savory in his book, Holistic Resource Management describes water cycles this way; *"Precipitation goes several ways. Some evaporates straight away off soil and plant surfaces back into the atmosphere. Some runs off into streams, rivers, dams, lakes and eventually the sea before evaporating. Some penetrates the soil and, of that a portion sticks to soil particles. The rest flows on down to underground supplies. There it may remain for millennia or find its way back to the surface in the river bank seepage, springs and sponges or possible through deep-rooted plants that pick it up and transpire it back into the air. Of water held by soil particles, a small portion remains tightly held, but the bulk is either attracted to drier particles or drawn away by plant roots and transpired."* Thus, one way or another, our drop of rain eventually cycles between earth and air.

But what demands may be made on that drop of moisture on its journey?

The first demand is the land itself. Where and when that raindrop falls makes a world of difference, particularly in this arid interior region of B.C. Does it fall on bare capped soil and get stolen away by the drying spring winds, or is the soil cracked and scarred and carried away by the rain along with all lightweight materials and thus starts the downhill spiral of erosion. Or does it splash on pavement and become part of accelerated flows heading for the nearest storm drain. Perhaps it lands instead on ground well covered by grasses, shrubs and trees where it is gleefully grabbed and tucked away down below surface level for access by insects, rodents, plants, animals or man at a later date.

Our raindrop may flow down stream to be stored by a reservoir for gradual release later when hot weather increases the requirements of fish, agriculture or wildlife. Perhaps that same reservoir is the site of recreational fishing, boating and swimming. Do households draw water for domestic use from that source? Is industry demanding high volumes to turn wheels or a place to dump the byproducts of their processes? Is hydro generation being created by that same body of water containing our single raindrop? Are logs being transported to a mill or barges of any kind plying the waters?

Perhaps this moisture falls in the form of snow in the middle of winter. What kind of journey might take place at this time of year? Maybe the individual snowflake is part of a blanket protecting alfalfa, ginseng, small rodents or roses from harsh winter conditions. Perhaps it is part of a ski slope, toboggan run or x-ountry ski trail providing recreation and tourist jobs. Perhaps its on a south facing slope where the sun will quickly melt snow and start that slow gentle release of water; or maybe covering the smoldering

remains of one of last year' fires putting it to final rest. Will it be whipped away by a January Chinook or lie sheltered on the forest floor until late May or June?

What is the extent of our water cycle? How distant … If a volcano erupts on the other side of the world, will resulting heavy clouds of ash affect our weather patterns and cause temperature fluctuations and changes to precipitation? How long are these cycles? My father-in-law talked about a 50 year precipitation cycle and a graph made from a centuries old ponderosa pine tree which blew down at home seems to support this theory.

How can we then expect to influence such gigantic systems? We can be part of the solution rather than part of the problem. We can continue to educate ourselves. We can contribute ideas.

Early in February I was on my way over the Coquihalla to Richmond for a Fraser Basin Council meeting. It was snowing and foggy and I was smiling. But as I made my way down the other side of the mountains and the snow turned to rain, I realized that my fellow director, Sylvia Pranger, Mayor for the District of Kent, would not be smiling and would in fact be tearing her hair out and urging the Provincial and Federal ministries to get their collective acts together and begin the long promised removal of gravel from the Lower Fraser River. This has been a long and contentious battle. It is a thorny issue and there has been much work done by the Fraser Basin to get people from all the many jurisdictions involved to work together towards finding a solution and forming a long term plan to prevent flooding in the Fraser Valley from Mission to Hope.

What is the problem? Water runs downhill! It leaves our interior mountains heading for the valley gathering energy and gravel as it goes. When it gets to the Fraser Valley, it loses its momentum and slows down depositing debris at the rate of approximately 750,000 cubic centimeters per year. For the last ten years there has been a moratorium on the removal of gravel from the river and so the deposits have mounted up resulting in ever increasing danger of the river breaching the dikes if runoff should happen in an untimely fashion. The resulting flood would cause millions of $ worth of damage to agriculture, fishery and communities.

But it struck me as I drove along that maybe Sylvia and I could both be smiling. What if we in the interior were allowed once again to build the small scale reservoirs such as those that were built all over this country early in the last century? Couldn't we store some of that early freshet for later release at a time when agriculture, fish and communities could all benefit from extra flow and thereby certainly ease the danger of floods at the peak melt? After all, the beaver have done this very well and we could probably do it without beaver fever.

Capture, storage and slow release of water. Water, like all our natural phenomena has the power to sustain and the power to destroy. It is a complex, dynamic system and we are but a miniscule part of the whole. So what is our goal? To maximize sustainable use of water while minimizing waste or destruction of that complex, dynamic system? And to do this within our community without dissension, conflict of hardships. John said I was to give a passionate speech. I guess this is where the passion comes in.

I would like to digress just for a minute and tell you about another issue that has caused discussion in our community. I live out on Highway 5A, the Old Kamloops Merritt Highway. The last ten years have seen terrific increases in traffic of all kinds on that road, particularly, trucks and tourists. Now when I was first married, (gee don't you hate that when I was young line) we used to trail our heifers down the highway every spring from Hubers to the Beaver Ranch without a problem. Today we have a problem getting our cows across the highway

without causing a major traffic jam. But my point is we have all got to learn to accommodate and share this road with the increasing use. I have jokingly said (well maybe not so jokingly with BSE) that I am going to open a truck stop and sell all my dry old cows as hamburger to the truckers. It isn't always fun but we better learn to do look at the resources we have and find new and different ways to use them, or we will be left behind. The same thing is happening with water and land use. Those of us who have been here are going to have to be aware of the increasing demand for all resources and we will need groups like the Round Table to help us develop trust and explore new and creative ways to use and sustain our precious water and land resources.

I know there will be discussions. Hopefully, we will learn much through these exchanges. There will be competition between cows, Coho and condos. There do not need to be winners and losers. We are all on the same side. We all want to see our children and in my case now, grandchildren, inherit a valley were clear streams run into healthy rivers indicating a well functioning effective water cycle. Open minds, good research, creative ideas and sincere goodwill will enable us to work together to find solutions as these challenges arise. Thank you.

Water and Fish – Dr. Marvin Rosenau

Conflicts Between Fish and People For Water: A Focus on the Nicola Basin

Dr Marvin L. Rosenau
Visiting Scientist at the UBC Fisheries Research Centre

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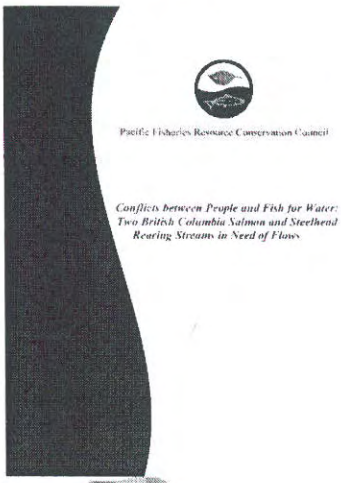
speaking at the request of the Pacific Fisheries Resource Conservation Council and the Nicola Watershed Community Roundtable

My Background in the Thompson-Nicola

- I am a Fisheries Biologist and Scientist, formerly with the Ministry of Water, Land and Air Protection, currently under secondment with the UBC Fisheries Centre working under Dr Daniel Pauly
- Background in the Nicola-Thompson Region over the last 20 years including:
  - fisheries-habitat mitigation and compensation of the Coquihalla Highway on the Coldwater and Nicola rivers,
  - CN Double Tracking on the Thompson River, and
  - flood-damage restoration on the Bonaparte and Deadman rivers

Pacific Fisheries Resource Conservation Council

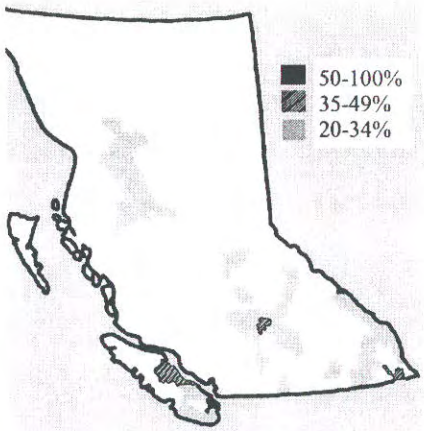
- In the winter of 2003 the Council asked me to provide an overview report of low-flow issues in British Columbia with a couple of empirical examples to be included in this paper.
- I co-authored this study with Mark Angelo, the noted stream conservationist.



PFRCC Report Contents

- Much of this report included a review of the human- and fish-water needs in respect to British Columbia streams with low-flow issues, including the Nicola Basin, as well as the Englishman River on Vancouver Island.
- The 1983 Nicola Basin Strategic Plan report formed much of the background to the PFRCC study, but was not exclusively used in the PFRCC work.
- Following from this Elizabeth requested of the Council that one of the authors come and talk to the Roundtable regarding the issue of flows in the Nicola Basin.

Provincial Overview

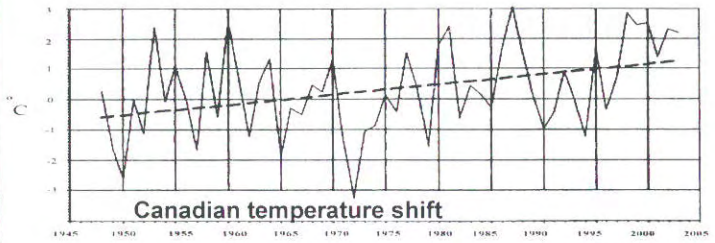


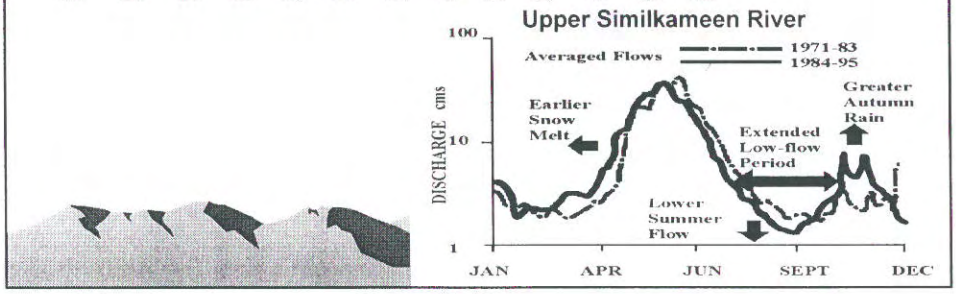
- Despite being a water-rich province, British Columbia has a number of areas where this resource is scarce.
- In terms of allocation, the east-coast of Vancouver Island, south Kootenays, and the Thompson-Nicola are some of the driest areas of the province.
- This figure depicts areas in British Columbia with limited surface-water availability. The shaded areas depict the percent of licensed streams in each water precinct which have been designated as "Fully Allocated".
- The working definition of fully allocated is, "a stream is fully allocated if there is a water shortage at least once in 5 years".

Trend in Water Availability

- It should be noted that global climate change may further exacerbate an already tenuous situation in the water-scarce parts of British Columbia by facilitating a drying trend in some locations or disrupting the hydrologic cycle to which salmon and aquatic ecosystems have historically become adapted.
- As a result, conflicts over water between fish and people will likely only increase as a result of the consequences of global warming and increases in human population in this province.

Changes in Climate is Affecting Watersheds Over and Above Withdrawals





Low Flows in BC Salmonid Watersheds

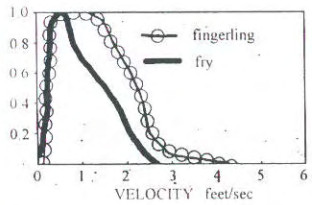
- The extraction of water from streams and lakes has undermined the production of salmon and steelhead in a number of high-profile British Columbia watersheds.
- Increasing human settlement throughout the past century has led to unprecedented demands for water for industrial, agricultural and domestic purposes.
- It is the opinion of various fisheries professionals that the over-abstraction of water may have contributed to the decline of various populations of fish.
- These flow impacts may include some southern-interior coho salmon stocks point that have now been listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Effects of Low Flows

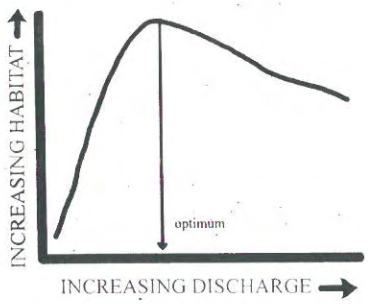
- The amount of water flowing in a stream during the spawning, incubation and early life stages of salmon and steelhead is crucial to their health and survival.
- The freshwater rearing phase for the stream-rearing species requires the maintenance of the quality and quantity of water in terms of temperature, nutrition and spatial (habitat capacity) requirements and these parameters are affected by flow.
- Low flows can impact on salmon and steelhead by stressing or killing adult and young fish through increased summer water temperatures.
- Lowered flows can interrupt the passage of adult and juvenile fish to spawning and rearing areas.

Relationship Between Flows and Fish Habitat

Suitability of Use Relationship for Steelhead



General Relationship Between Increasing Flow and Habitat Availability for Fish in Streams



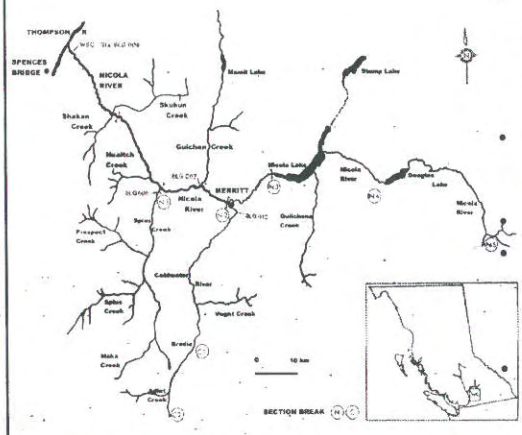
Flow Recommendations for British Columbia Streams

- Ron Ptolemy model:

Biological or Physical Requirement	Flow Recommendation (%MAD)	Duration
A. Rearing	20%	Months
– Juvenile	20%	Months
– Adult	>55%	Months
B. Overwintering	20%	Months
C. Incubation	20%	Months
D. Migration and Spawning	30-200%	Days-Weeks
Summer Steelhead Passage	50-100%	Days
Spawning	eqn: 1.56*MAD0.63	Days-Weeks
Smolt Migration	50%	Weeks
E. Short-term Maintenance	10%	Days-Weeks
F. Channel Maintenance	>400%	Days
G. Wetland Linkage	100%	Weeks

MAD = Mean Annual Discharge

Nicola Basin



- The Nicola River is the primary stream in a basin comprised of a myriad of tributary streams and more than 200 lakes.
- It has a widely varied terrain and range of elevations over an area of 7280 km2.

The altitude varies from180m above sea level to more than 2300 m.

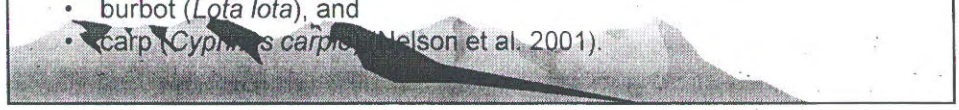
Low elevation areas on the rain-shadow side of the Coast Mountains are dry, while the higher areas tend to be wetter.

Fisheries Values in the Nicola Basin

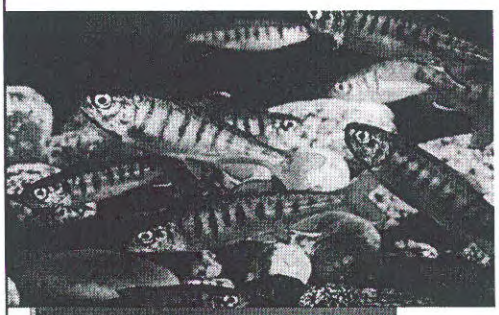
- The Nicola River basin is the home to some of British Columbia's more important upper Fraser River chinook runs, and the recently-listed endangered interior coho salmon populations.
- The lower Nicola River, near the confluence with the Thompson River, also has a small run of pink salmon (*O. gorbuscha*).
- The Nicola River basin is also a key habitat for a population of the exceptionally large Thompson River steelhead or *Oncorhynchus mykiss*. There are also other *O. mykiss* populations residing within the Nicola River basin that spend all of their lives in freshwater, commonly known as rainbow trout.

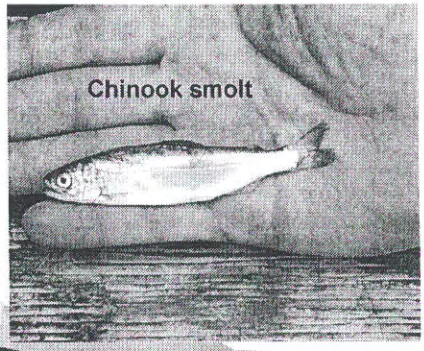
Other species of fish in the Nicola drainage include:

- bull trout (*Salvelinus confluentus*)
- Dolly Varden char (*Salvelinus malma*)
- Rocky Mountain whitefish (*Prosopium williamsoni*)
- longnose dace (*Rhinichthys cataractae*)
- bridgelip sucker (*Catostomus columbianus*)
- slimy sculpin (*Cottus cognatus*)
- prickly sculpin (*C. asper*)
- lake chub (*Couesius plumbus*)
- peamouth chub (*Mylocheilus caurinus*)
- redside shiner (*Richardsonius balteatus*)
- Pacific lamprey (*Entosphenus tridentatus*)
- leopard dace (*R. falcatus*)
- longnose sucker (*C. catostomus*)
- kokanee (a resident sockeye salmon) (*O. nerka*)
- burbot (*Lota lota*), and
- carp (*Cyprinus carpio*; Nelson et al. 2001).



Primary Salmonid Species Affected By Summer Rearing Flows in The Nicola Basin



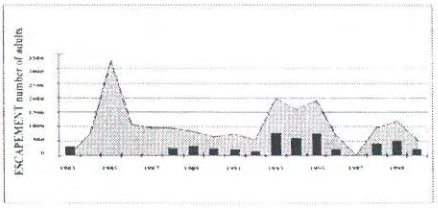


Of Particular note, Nicola Basin is the Key Watershed in the Thompson-Nicola drainage for the famous Thompson River steelhead

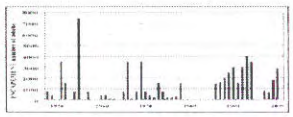
- Millar et al. (1994) suggest that
- the most important contributors to
- total steelhead biomass (fry and
- smolt populations) included:

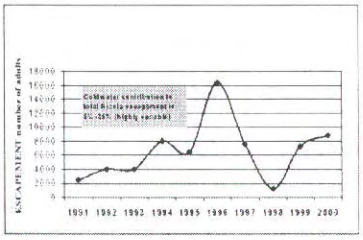
- Nicola River (68.3%)
- Coldwater River (13.2%)
- Spius and Maka Creeks(13.0%)
- Skuhun Creek (<5.0%)
- Nuaitch Ceeks (<5.0%)
- Guichon Creek (<5.0%)
- Shakan Creek (<5.0%)

Steelhead escapements to the Nicola River

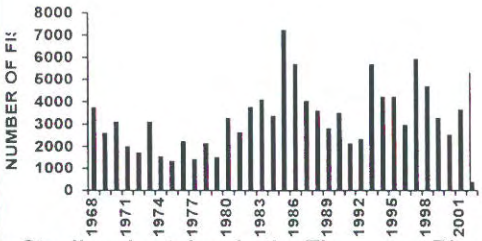


Coho escapements to the Coldwater River





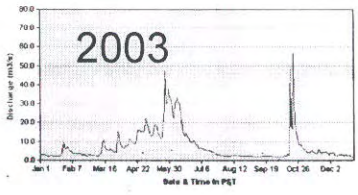
Chinook escapements to the Nicola River

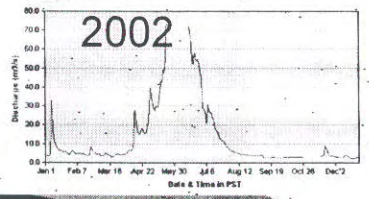


Steelhead catches in the Thompson River

Nicola River hydrograph

- annual precipitation in the Nicola River basin varies from 15 to 75 cm
- Most of the flow in the Nicola Basin occurs during spring/early-summer freshet
- Graphs represent discharges on Nicola River at Merritt

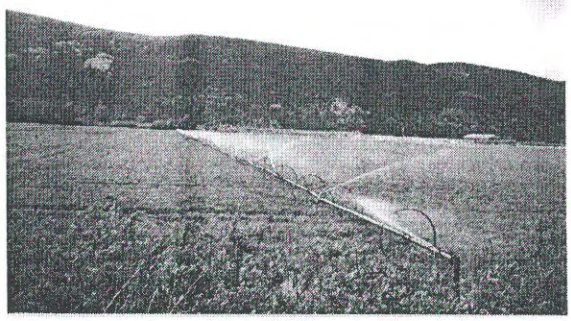




Late Winter Flows in the Nicola River at Merritt

Coldwater River Near Kingsvale During Spring

Water for Fish or Water For Crops?



Efforts to Protect and Restore Fishery Values in the Nicola Basin

- Various groups and individuals continue to be active in the protection of fisheries-related flows in the Nicola River drainage.
- For example, the Pacific Salmon Foundation has helped develop the Coldwater River Watershed Recovery Plan for this major tributary of the Nicola River basin with a history of water use conflicts.
- The Plan has the protection and restoration of habitat and flows as its major goals and has had input from a variety of local stakeholder groups including First Nations and the Nicola Watershed Community Roundtable.
- In an attempt to highlight water management issues along the Nicola River, the Outdoor Recreation Council of British Columbia listed this basin in its 2003 Top 10 Endangered Rivers List, citing excessive water extraction as one of the issues that needs to be addressed to protect and restore the river's salmon and steelhead stocks.

Historic Overview

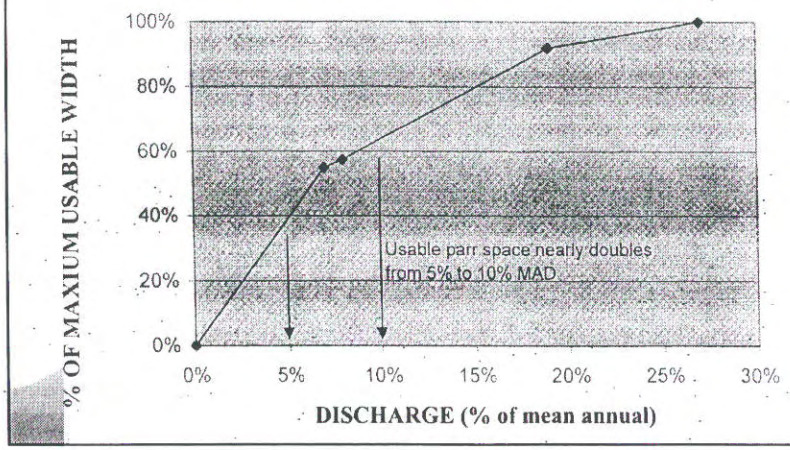
- In the arid Nicola River basin, withdrawals of water have long been seen as having negative fisheries effects in this important salmon and steelhead drainage.
- For several decades now, fisheries professionals and interested stewardship groups have taken the position all was not well with the state of fish stocks and the management of flows in this watershed.
- In 1983 the British Columbia Ministry of Environment, in co-operation with Fisheries and Oceans Canada, completed the Nicola Basin Strategic Plan which contained provisions for the protection and recovery of salmon and steelhead through safeguards and proactive management of the area's water resources.

STREAM	MEAN ANNUAL FLOW	20% of MEAN ANNUAL FLOW	LICENSED DEMAND AUGUST	MEAN MONTLY FLOW AUGUST	MEAN 7-DAY LOW FLOW SUMMER	REMAINING FLOW, AFTER EXTRACTION, DURING 7-D LOW-FLOW PERIOD: AUG	REMAINING FLOW % OF MAD AFTER EXTRACTION: AUGUST
Nicola R	22.7	4.54	0.93	16.67	10.25	10.25 - 0.93 = 9.32	41.1
Spius Ck	9.33	1.87	0.02	1.85	0.98	0.98 - 0.02 = 0.96	10.3*
Maka Ck	2.6	0.52	0.00	0.51	0.24	0.24 - 0.00 = 0.24	9.2*
Coldwater	7.42	1.48	0.79	2.02	1.16	1.16 - 0.79 = 0.37	5.0*
			SEPT	SEPT		SEPT	SEPT
Nicola R	22.7	4.54	0.59	11.77	10.25	10.25 – 0.59 = 9.66	42.6
Spius Ck	9.33	1.87	0.01	1.41	0.98	0.98 – 0.01 = 0.97	10.4*
Maka Ck	2.6	0.52	0.00	0.39	0.24	0.24 – 0.00 = 0.24	9.2*
Coldwater	7.42	[illegible]	[illegible]	1.53	1.16	1.16 – 0.52 = 0.64	8.6*

Estimated Mean Annual Flow After Diversion for Selected Streams in the Nicola Basin

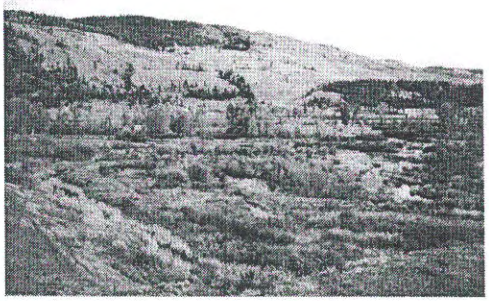
STREAM	MEAN ANNUAL FLOW (naturalized) cms	REMAINING FLOW % OF MAD AFTER EXTRACTION during 7-d low flow period: AUGUST
Nicola R @ Spences Bridge	22.7	41.1
Spius Ck	9.33	10.3*
Maka Ck	2.6	9.2*
Coldwater R	7.42	5.0*
		SEPTEMBER
Nicola R @ Spences Bridge	22.7	42.6
Spius Ck	9.33	10.4*
Maka Ck	2.6	9.2*
Coldwater R	7.42	8.6*

Graph Showing Relationship Between Flows and Useable Juvenile Salmonid Habitat in a Typical BC Stream



Minimum Flows are Not the Only Consideration With Regards to Fish Habitat—other parts of the natural hydrograph are important as well

- this includes the role of irregular floods (side channel creation, recruitment of woody debris), spring freshet (washing away silt, recruiting nutrients, food), and even droughts



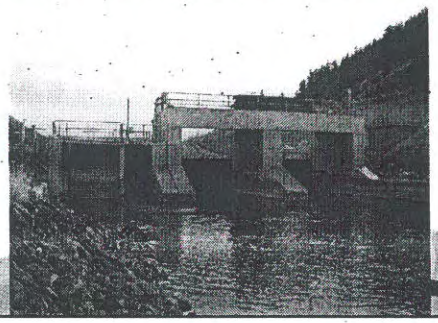
Effects of Temperature

- **Empirical observations have shown that in some years there have been highly elevated water temperatures in the Nicola Basin during the very warm and low-flow periods of summers.**
- **These high temperatures have, on many occasions, been recorded at lethal, or near-lethal, levels for juvenile salmon and steelhead including temperatures of up to 29°C in 1994, an exceptionally warm summer. A report of 25°C was recorded during the "normal" summer of 1995 (Nelson et al. 2001).**
- **Temperatures above 20°C are generally sub-optimal for most salmonids, with 25°C generally approaching lethal limits.**
- **Low flow events, exacerbated by high rates of withdrawal, likely have increased high water temperatures during the summer, for a number of the streams in the watershed, including the Nicola and Coldwater rivers.**

Coldwater River with Fields Encroaching into Riparian Zones

- **Extensive loss of riparian vegetation on ranchland riparian areas adjacent to streams has probably exacerbated the situation as has the removal of the shade trees along the stream banks.**

Nicola Lake and Dam—the use of water storage to resolve some of the issues

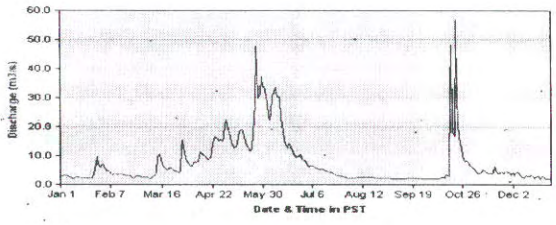


- Nicola Lake is the largest still-water body in the basin and comprises an area of 2490 ha.
- It has maximum and mean depths of 55 and 24 meters, respectively.
- A control structure on the outlet of the lake allows for storage and withdrawal of water throughout the year as well as maintenance of flows downstream of this reservoir.
- There are 13 water licenses on this lake.

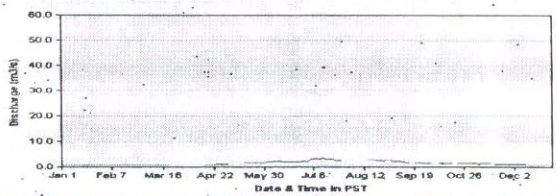
Fish-periodicity chart for the Nicola River at Nicola Lake dam and suggested flows to protect fish. Est. natural flows = 5.88cms or 207cfs.

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	D
Rearing	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xx
Incubation	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx		xxxx	xxxx	xxxx	xx
Reduce Icing (egg freezing)	xxx	xxxx										xx
Wetland/trib/sidechannel link				x	xxxx	xxxx						
Channel Maintenance flood once every 5-10 y (~400% MAD)					xx	xx						
BC Ptolemy Model proposed flows (%mad)	20	20	20	50	100	150	50	45	30	20	20	2
BC Ptolemy Model proposed flows (cms)	1.18	1.18	1.18	2.94	5.88	8.82	2.94	2.65	1.76	1.18	1.18	1
1987 Nicola Dam Operating Plan rule curve hydrograph	1.20	1.20	1.20	1.20	2.32	1.84	3.20	2.89	1.78	1.78	1.78	1

Discharges at Nicola Dam and at Merritt for 2003, an extreme drought year

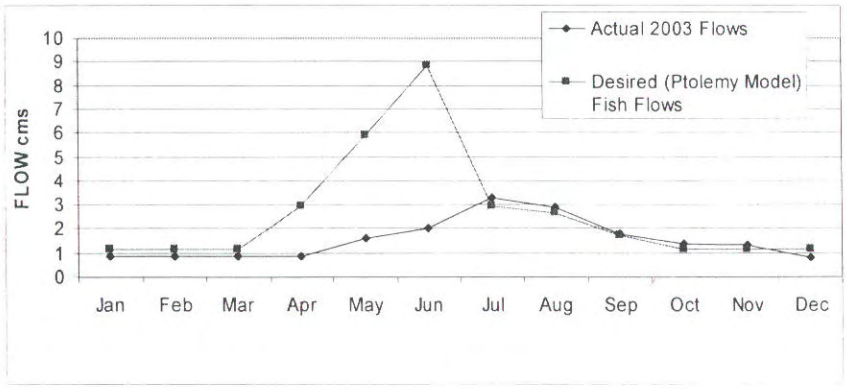


Nicola River at Merritt

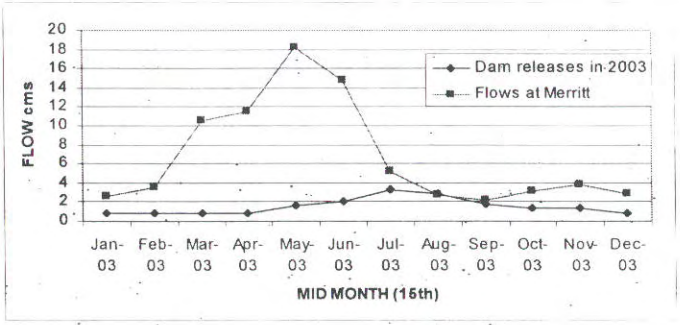


Nicola River at Nicola Lake dam

Actual and Modeled-Fish-Flow-Need at the Nicola Dam Release for 2003 (from Water Survey of Canada Graph, 15th of each month)



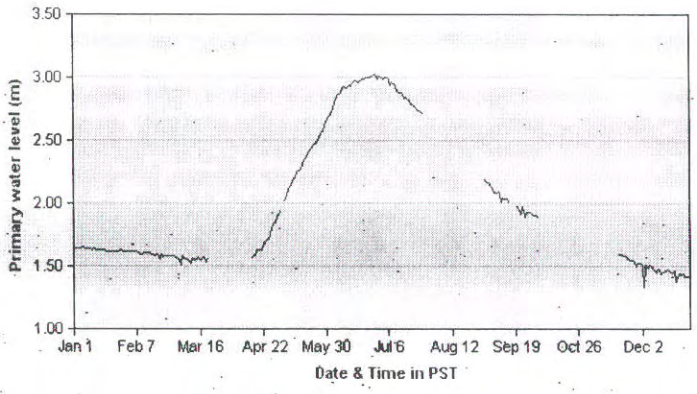
Comparison of Nicola River Flows at Merritt versus Nicola River Flows Downstream of Nicola Lake Dam, 2003



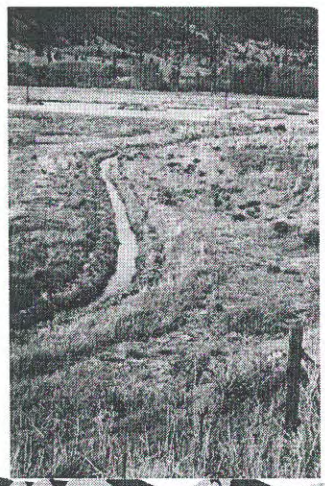
Options to Provide Better Flows for Fish and Agriculture? – Nicola Dam

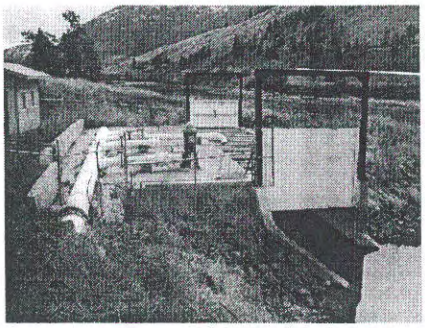
- The dam at the outlet of Nicola Lake was originally built for power
- Recommendations of the Strategic Plan suggested that it be re-built and used for fish-flows and agriculture
- Re-construction subsequent to the report did not provide all of the anticipated benefits
- Fish flows still seemed to be limited; negotiations amongst agencies are still on-going
- Dredging to develop negative storage was not completed

Nicola Lake Drawdown, 2003



Move to Modernization

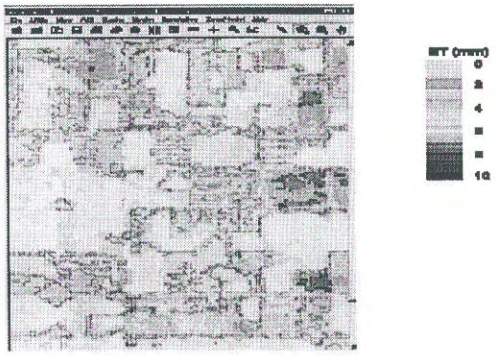




Nicola Basin Recommendations

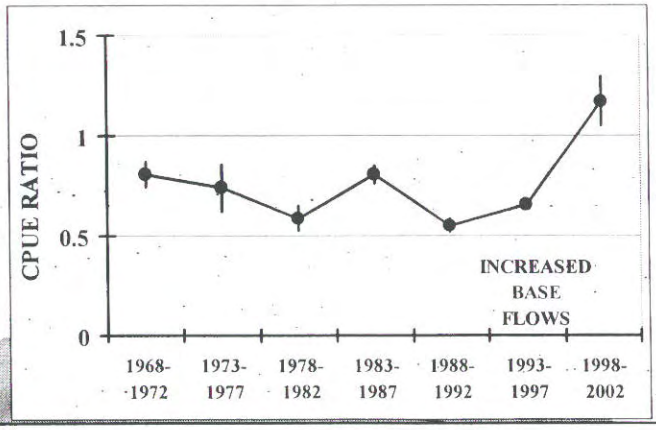
- **The establishment of a moratorium on water licensing for diversion or extraction.**
- **A review and update of the 20-year old Nicola Basin Strategic Plan.**
- **The development of an hydrological budgeting process, throughout the watershed, in order to allocate water to fish and agriculture in a fair, transparent and legal manner. The launching of a license-compliance and beneficial-use audit of existing water licenses and water use in the basin.**
- **The updating of the flow-release regime which is part of the Nicola Lake dam-operation plan to protect fish and meet appropriate water license requirements.**
- **The exploration of opportunities to buy back water licenses for fish and ecosystem values similar to initiatives undertaken in parts of the western United States.**

Use of Remote Sensing to Assess Water Availability and Use

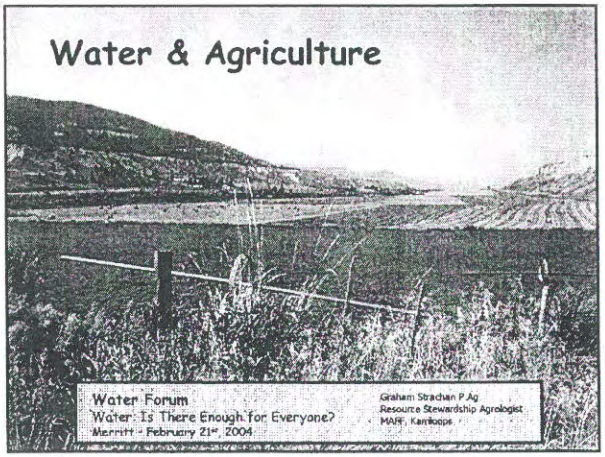


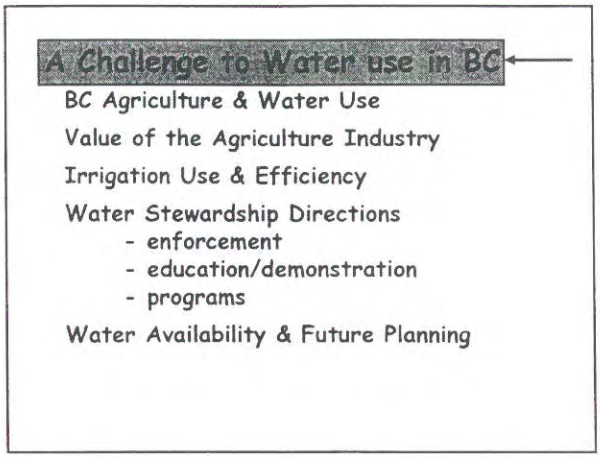
A mapping of evapotranspiration (ET) in fields of American Falls, Idaho, using Satellite Landsat 7 image.

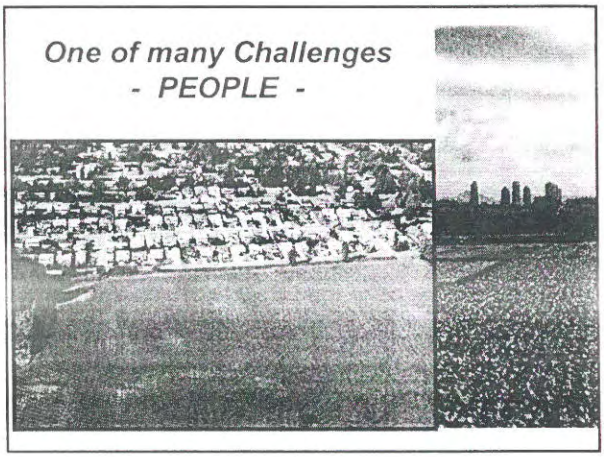
An Empirical Example Changes in Fish Production Through Increased Flows – Alouette River and BC Hydro

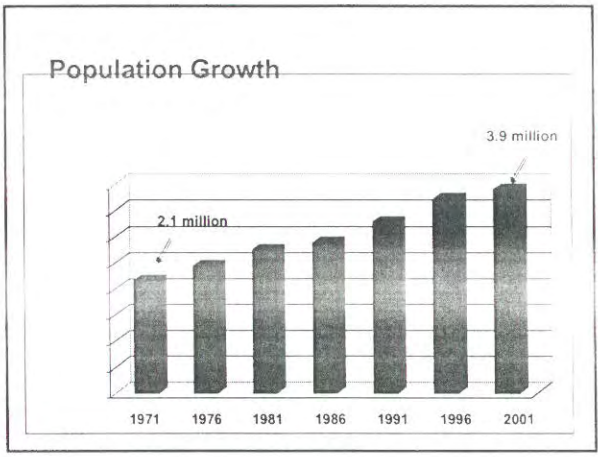


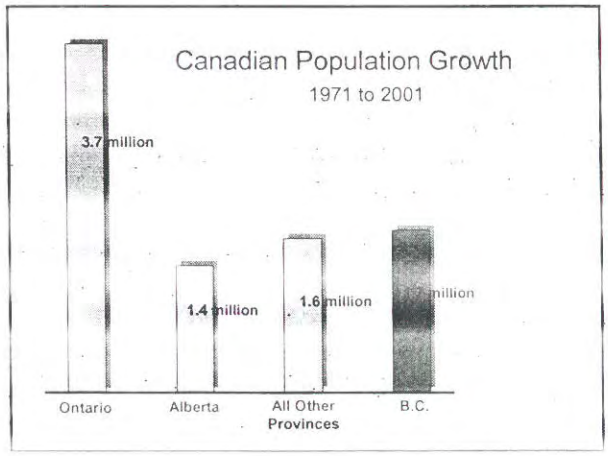
Water and Agriculture – Graham Strachan

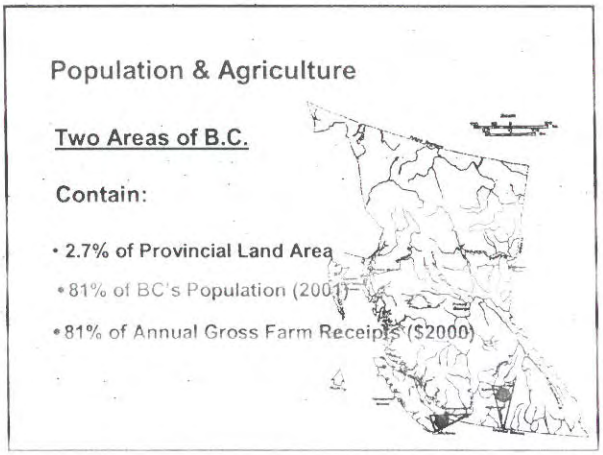

Water & Agriculture
Water Forum
Water: Is There Enough for Everyone?
Merritt - February 21st, 2004
Graham Strachan P.Ag
Resource Stewardship Agrologist
MAFF, Kamloops


A Challenge to Water use in BC
BC Agriculture & Water Use
Value of the Agriculture Industry
Irrigation Use & Efficiency
Water Stewardship Directions
- enforcement
- education/demonstration
- programs
Water Availability & Future Planning


One of many Challenges
- PEOPLE -


Population Growth
3.9 million
2.1 million
1971
1976
1981
1986
1991
1996
2001

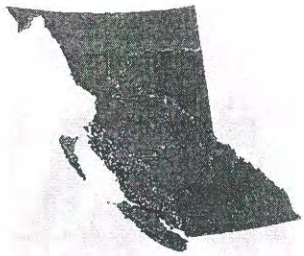

Canadian Population Growth
1971 to 2001
3.7 million
1.4 million
1.6 million
million
Ontario
Alberta
All Other Provinces
B.C.

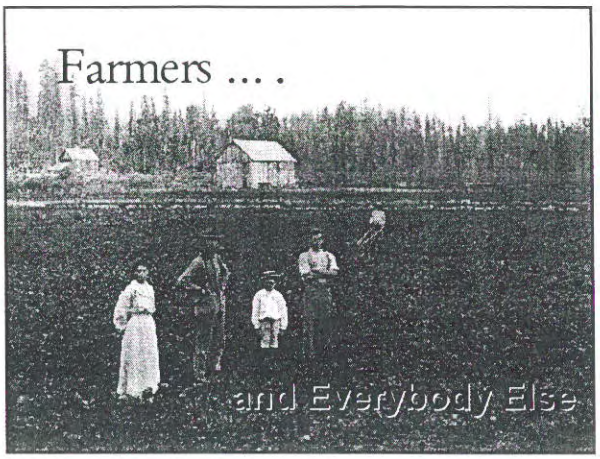

Population & Agriculture
Two Areas of B.C.
Contain:
• 2.7% of Provincial Land Area
• 81% of BC's Population (2001)
• 81% of Annual Gross Farm Receipts ($2000)

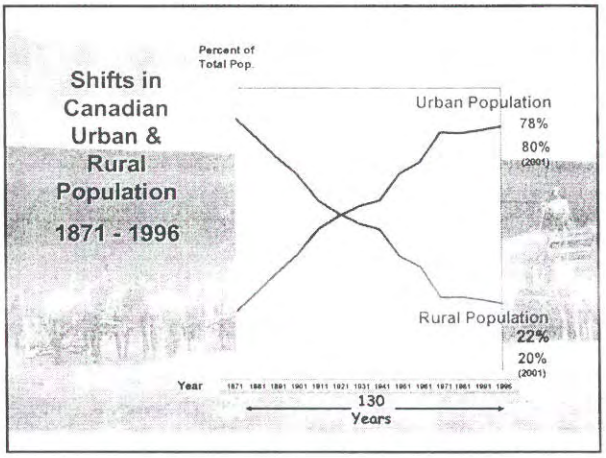
1996 to 2001

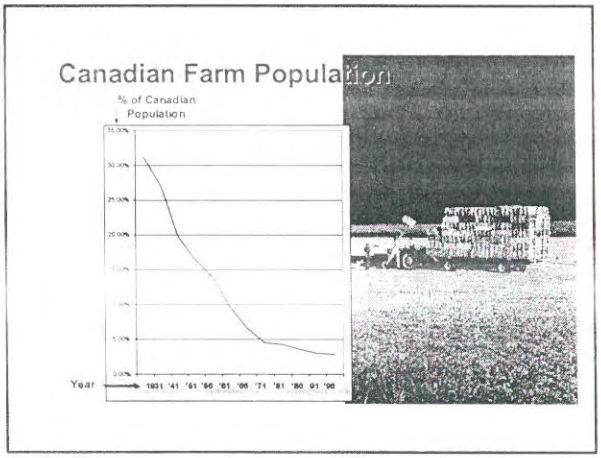
Net Population Increase

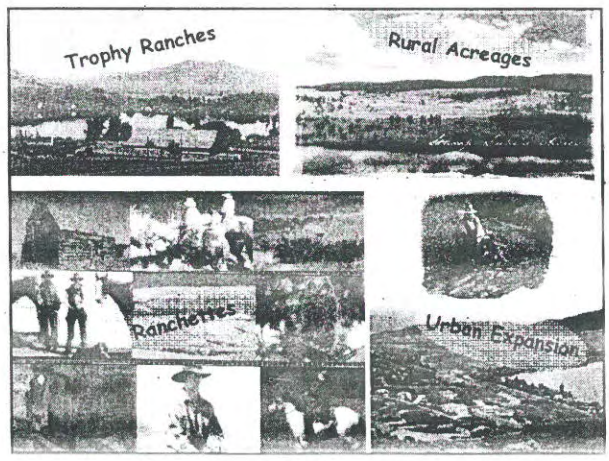
Net Population Decline











A Challenge to water use in BC

BC Agriculture & Water Use

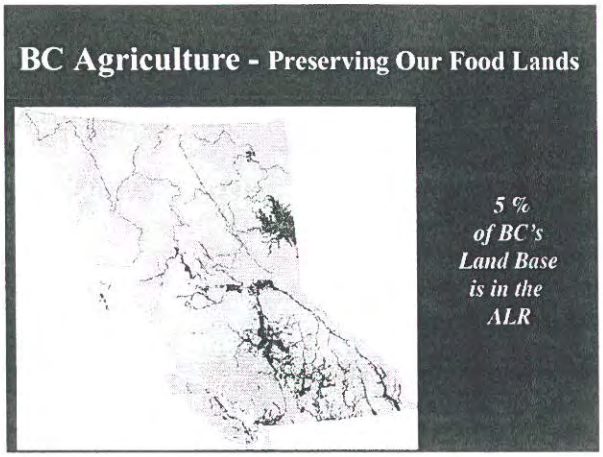
Value of the Agriculture Industry

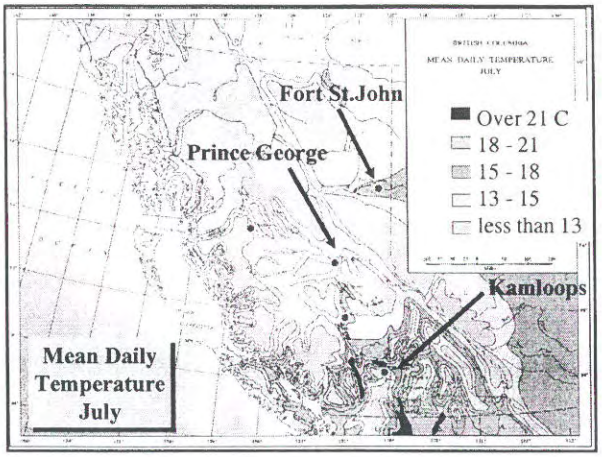
Irrigation Use & Efficiency

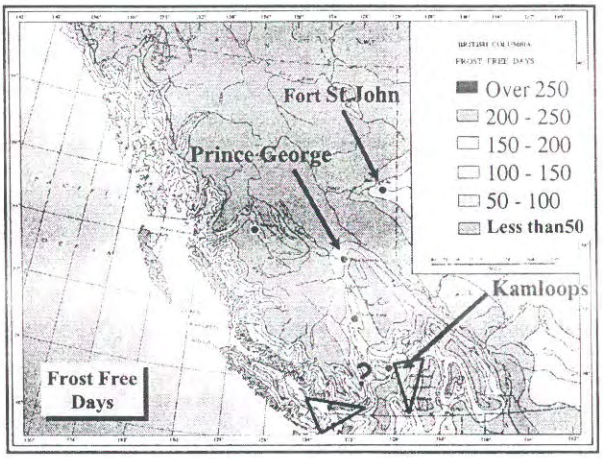
Water Stewardship Directions

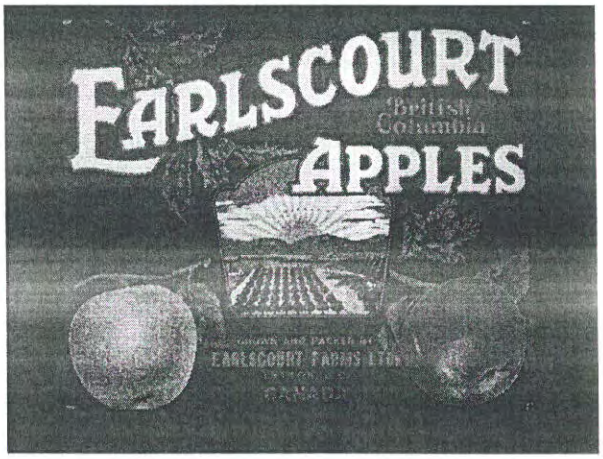
- **enforcement**
- education/demonstration
- **programs**

Water Availability & Future Planning









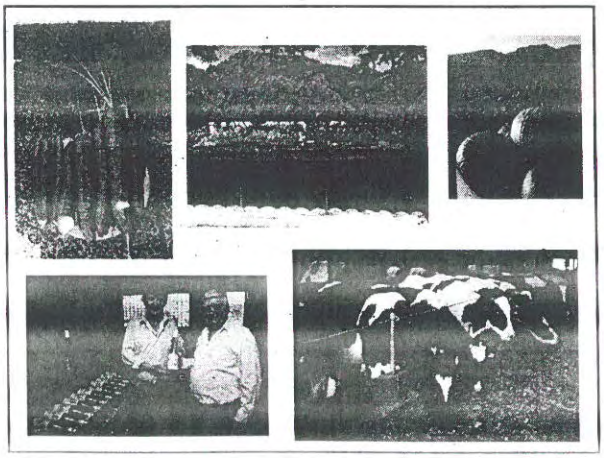
1863: British Colonist reported "a good deal of farming…in vicinity of Lillooet and with complete success.

1873: Lytton boasted five flour mills, a wheat mill, two butchers, two livery stables, four bakers,… At a farm by the Stein, large crops of barley, turnip, and beets were produced.

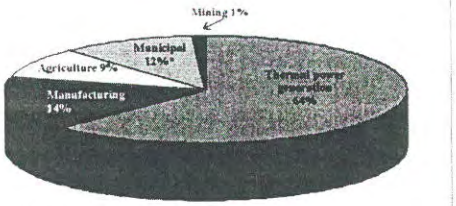
1886 to 1927: Agriculture quickly became the area's primary industry. Ma Murray wrote in Bridge River-Lillooet News, Lytton was "the cradle of the interior orchard industry". First commercial apple orchard was on the benchland of the Stein at Earlscourt. Quality of apples was known as far away as London, England.

1905: Twenty-five railcar loads of apples were exported from Earlscourt Farm, while Kumsheen's Native population exported 10-12 carloads of beans and potatoes from local reserves.

1920's: Earlscourt renowned for apples, winery grapes, alfalfa seed



Water Use in Agriculture



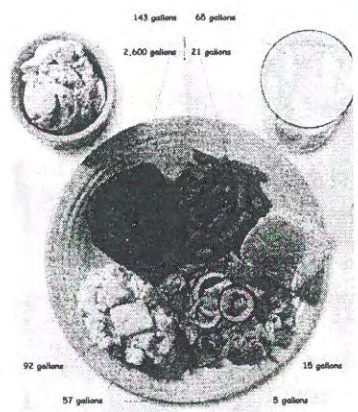
The five main water users in Canada, 1996

* includes rural domestic use (2%)

Agriculture is the 4th largest user of water in Canada in 1996

85 % used for Irrigation 15% used for Livestock

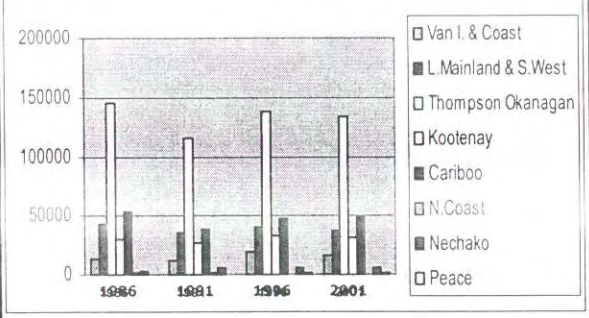
How much Water is in Supper?



2,998 gallons

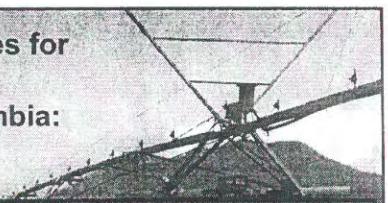
The Furrow
Feb.2004

BC Irrigated Acres



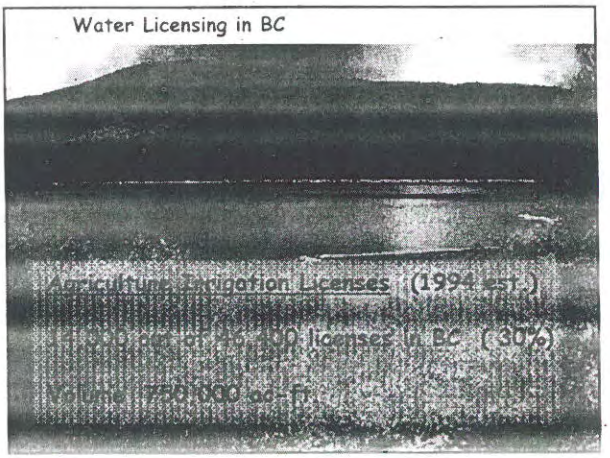
	1986	1991	1996	2001	
BC Total	291,119	234,413	285,096	274,735	Irrigated Acres

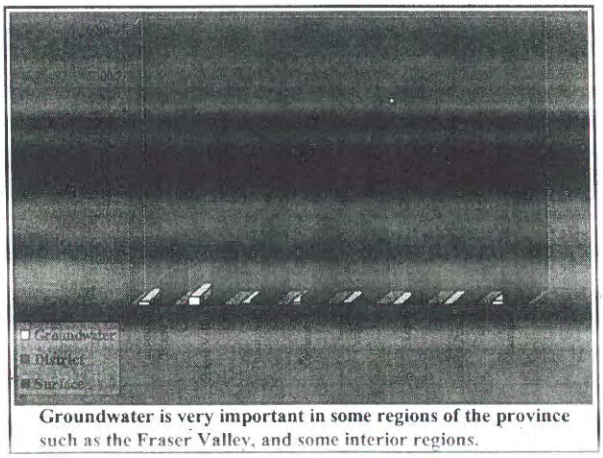
Water Sources for Irrigation in British Columbia:



	Water Use	Area Irrigated
Surface Water:		
Self Pumped	70%	85%
Supplied by a purveyor	29%	13%
Groundwater	1%	2%
Dams and Storage	2500	

Water Licensing in BC





Groundwater is very important in some regions of the province such as the Fraser Valley, and some interior regions.

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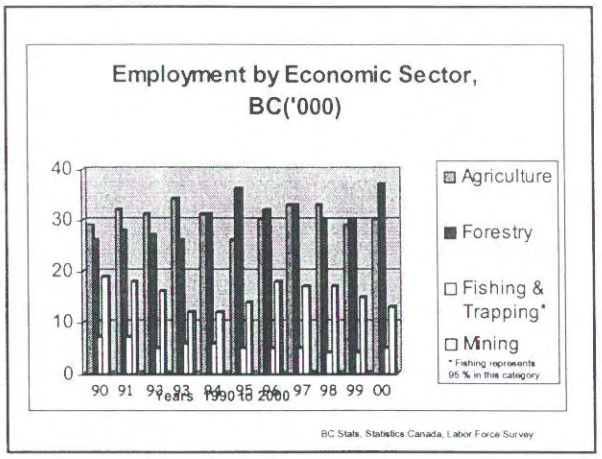
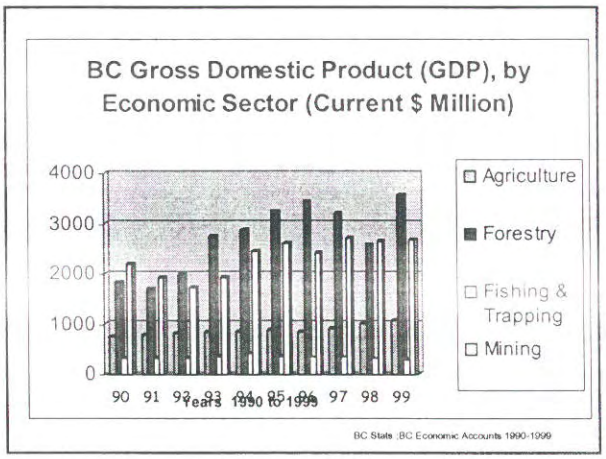
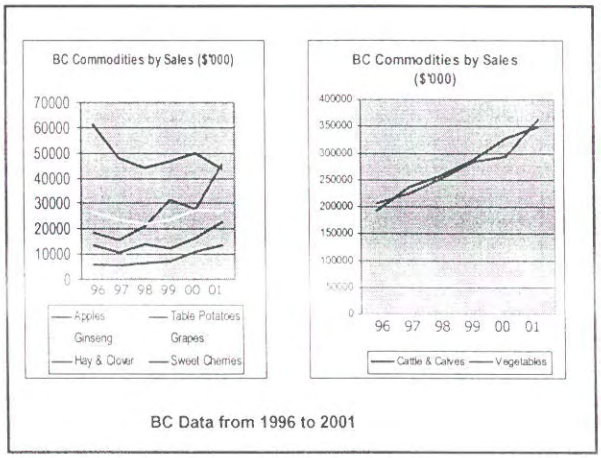
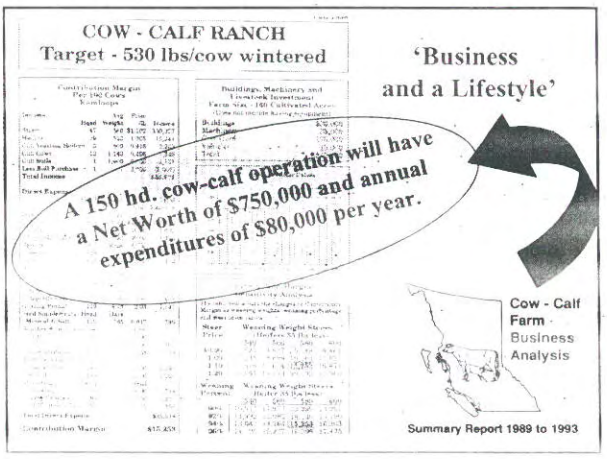








A Challenge to water use in BC

BC Agriculture & Water Use

Value of the Agriculture Industry

Irrigation Use & Efficiency ←

Water Stewardship Directions
- **enforcement**
- education/demonstration
- **programs**

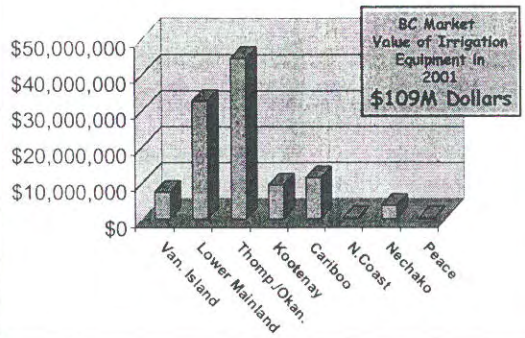
Water Availability & Future Planning

Irrigation Costs

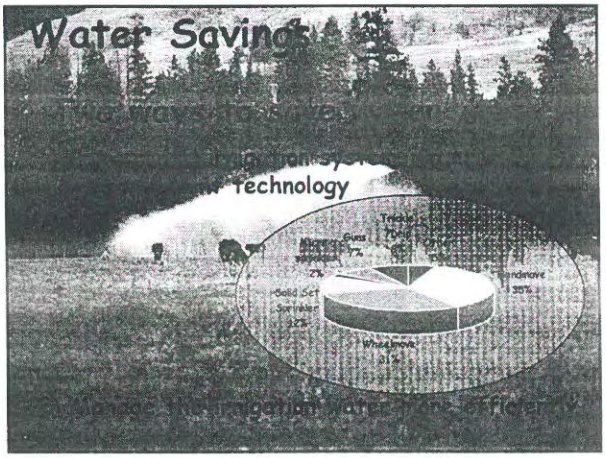
Irrigation costs include:

- Water Licensing Costs - low
- Pumping or District Supply Costs - medium
- Irrigation System Costs - high

$ Value of Irrigation Equipment (2001 Census)



Water Savings



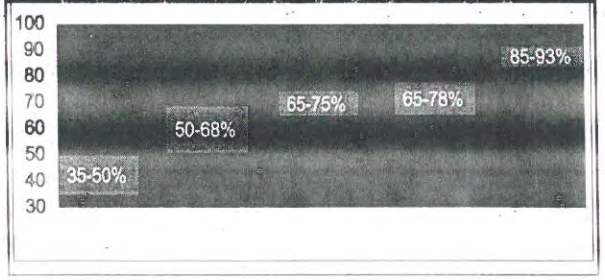
Water Saving Potential in British Columbia

Region	Conversion	Scheduling
	millions of cubic meters	
Vancouver Island	2.3	1.8
Fraser Valley	7.7	5.2
Thompson	10.3	15.2
Okanagan	35	30
Kootenays	6	5.4
Cariboo	9.9	6.6
Other	1.8	1.2
	73	67.4

Irrigation System Capital Cost

	Range	Cost
Handmove	$250 - $550	$350
Wheelmove	$450 - $650	$480
Travelling Gun	$500 - $800	$600
Centre Pivot	$500 - $900	$700
Solid Set	$800 - $1500	$1000
Trickle	$1000 - $1600	$1300

Irrigation System Efficiencies



A Challenge to water use in BC

BC Agriculture & Water Use

Value of the Agriculture Industry

Irrigation Use & Efficiency

Water Stewardship Directions
- enforcement
- education/demonstration programs

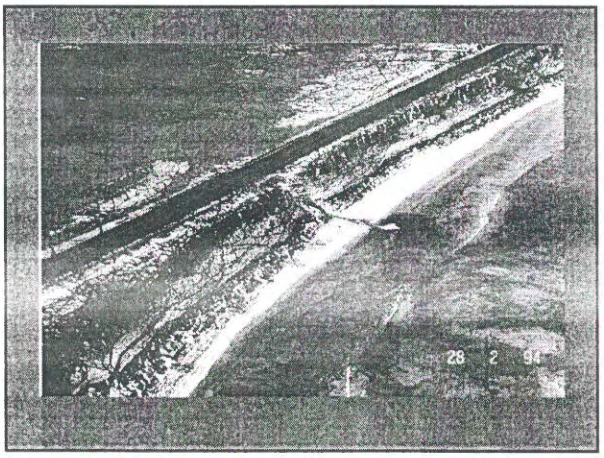
Water Availability & Future Planning

Water Stewardship Directions:

Enforcement

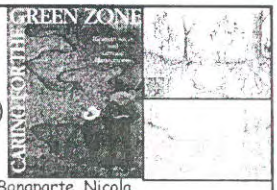
- There is a place for enforcement
- Use as a 'Tool of Last Resort'

Examples: - those that show disregard for other values
- those that choose to disregard the law



Water Stewardship Directions:

Education & Demonstration



- Roundtables - ie Salmon River, Bonaparte, Nicola, Louis Creek...
- Educational Seminars - Riparian Man. & Irrigation Workshops
- DFO Habitat Stewards & Stewardship Coordinators ie 1st Nations, Lee Hesketh & Laura Grafton
- COWS (Committee on Watershed Stewardship) similar groups in P.G. & Williams Lake
- Kamloops AG Can. Research on water quality & livestock water access
- Environmental Stewardship Awards (BCCA)
- Okanagan Irrigation Monitoring

Just a few examples

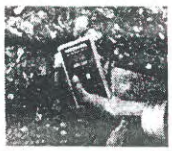
Irrigation Scheduling

- The Kelowna Project

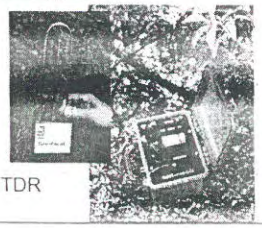
Techniques that can be used are:

- Soil Moisture Monitoring
- Climate Monitoring
- Plant Monitoring

Soil Moisture Monitoring



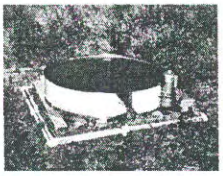
Electrical Resistance Block
Watermark



TDR

Tensiometer

Climate Monitoring

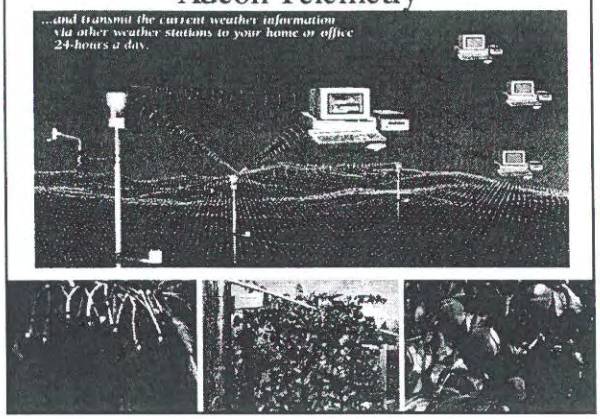


Class A Evaporation pan

Atmometer

Weather Station

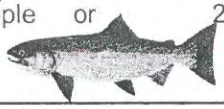
Adcon Telemetry



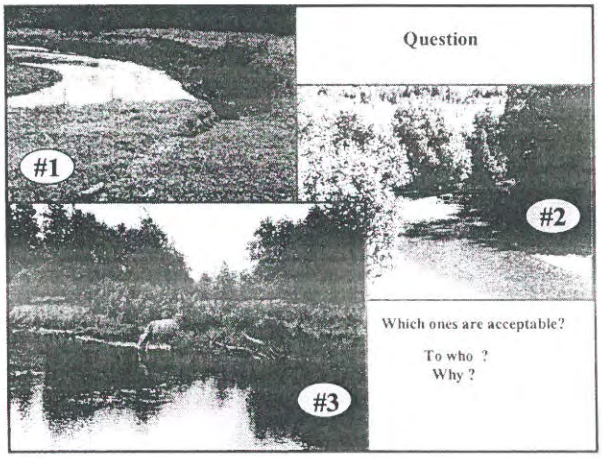
Significance of Water Saving in the Okanagan

60 million m^3
(42,000 acre-ft)

300,000 People or 22,500 Acres



Question

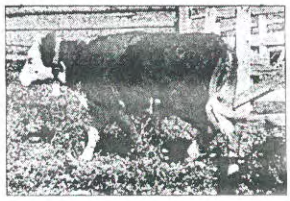


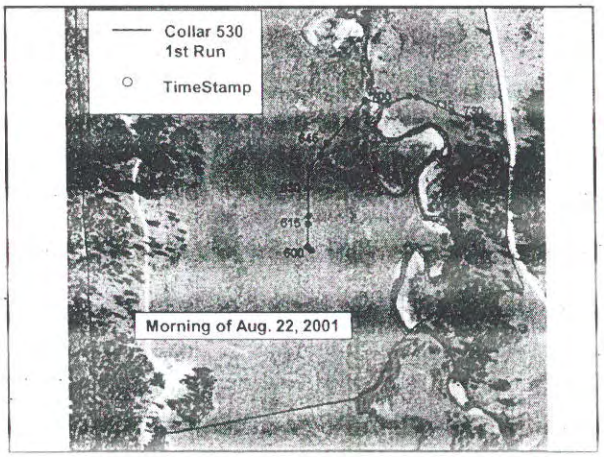
Which ones are acceptable?

To who ?
Why ?

Brady Project in Kamloops

- Dr. Reg Newman (MoF) & Dr. Doug Veira (Ag Can)
- Nine cows GPS collared in 2001
- Fifteen cows GPS collared for a total of 49 days in 2002



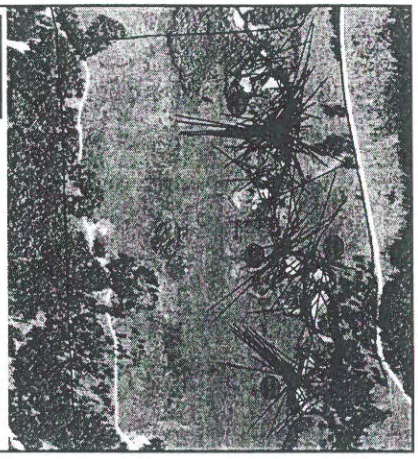


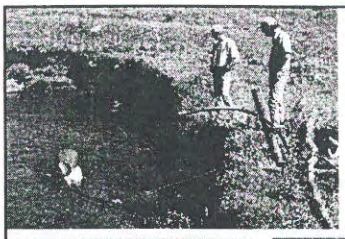
#1 – Bridge, 2 troughs

#2 – Planted hawthorn hedgerow

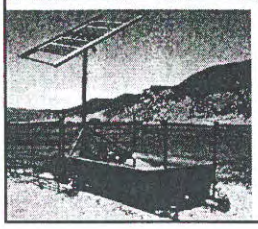
#3 – Natural Xing, Pasture improvement

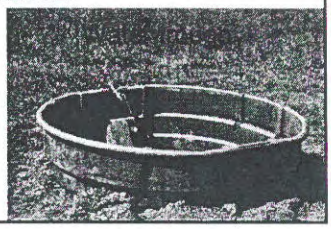
#4 –Trough





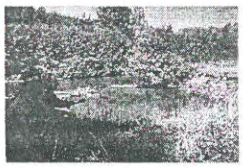
Sling pump





Water Stewardship Directions:

Programs

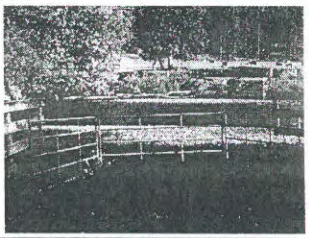


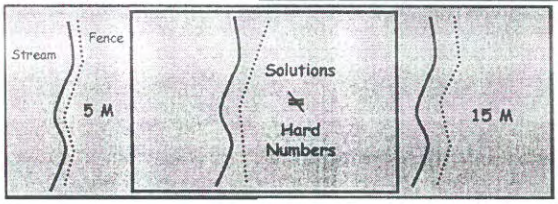
- BC Livestock Management Water Stewardship Program
- Ducks Unlimited (livestock watering)
- National Agriculture Water Supply Expansion Program
- Environmental Farm Planning Initiative (BC Ag. Council)
- .....etc.

Co-operative Programs (and players)

Bring

Innovative Solutions





PLANNING WORKBOOK

BC Environmental Farm Plan

- 32 Farm Practices Reviewed - a few examples:
- Pollution: Farm Waste, Manure Handling, Mort. Disposal, Leachates, Runoff, Nutrient Application.....
- Riparian Areas Worksheet - leads to the development of a detailed Riparian Management Plan
- Irrigation Worksheet - leads to an Irrigation Management Plan
  - includes calculations on total water volume use
  - peak flow calculations / nozzle wear / intake screen area

Benefits of Good Water Management

For the Farm	For the Environment
· Saved water may be able to be used late in the season	· Saving water which can then be available for other needs such as fish, wildlife or others.
· Saving energy by efficiently operating the system =$	· Reducing runoff from excessive irrigation preventing surface water contamination.
· Nutrients retained within the root zone and remain available to the plant throughout the growing season	· Reducing nutrient leaching which will help protect groundwater supplies from contamination.
· Optimizing crop yields	

A Challenge to water use in BC

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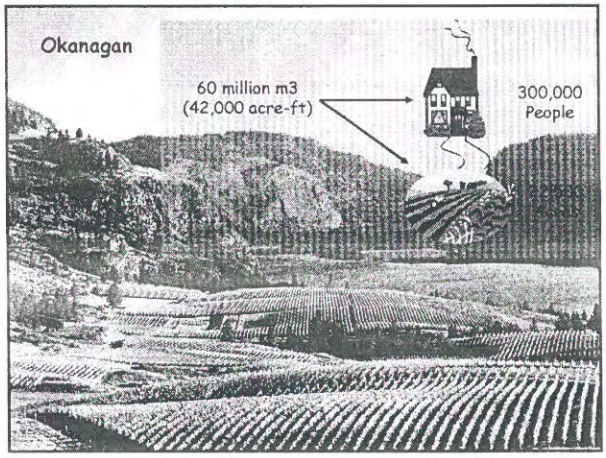
Irrigation Use & Efficiency

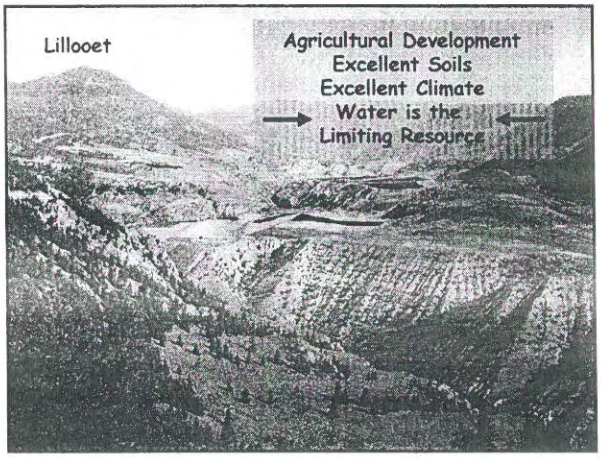
Water Stewardship Directions
- enforcement
- education/demonstration
- programs

Water Availability & Future Planning

Water Issues

- Agriculture is a large water user in many parts of British Columbia
- Competition between urban, fisheries, recreation and agriculture will increase
- Climate change will also drive the need to be more efficient





Water Allocation Planning
- a critical process for BC

Planning - LRMP's, Water Allocation Plans
eg. Lemieux Creek, Trepanier Creek
- Issues around determining min. flows for fish.

Implications of changing legislation: ie SARA
- Fish needs are based on more than minimum flows (ie.temperature & stream channel morphology)

Agricultural Opportunities

Identification of **win-win** situations wherever possible

eg. - **Freshet Storage**
- Bonaparte Lake - 14,000 ac.ft. (Fish & Ag)
- Taweel & Pillar Lakes being considered.

- Restricted Irrigation Licensing
  - August cut-off with late season application
- Crop Management
  - Better ID of plant species & crop management strategies under drought stress conditions
- Groundwater
  - Benefit and a problem

Conclusion:

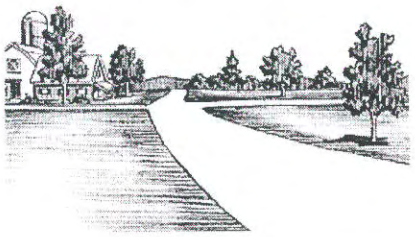
Agriculture is an important, valuable and expanding industry in BC. It's taking a responsible attitude towards conservation & stewardship practices and has made significant strides.

Integrating multiple interests in the use of BC's limited resources, especially water, will be a challenge for the future.

How Communities Grow - Kevin McNaney

Smart Growth BC

Planning for Livability and Prosperity in the Nicola Valley



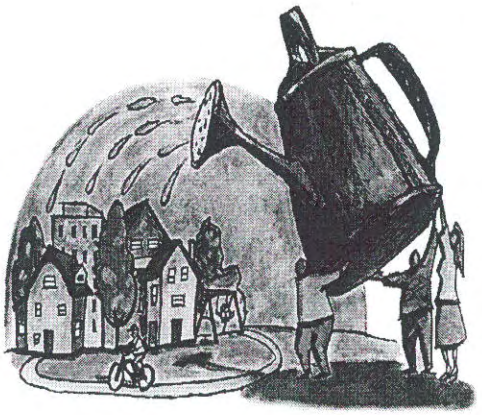
Kevin McNaney • Merritt, BC • February 21, 2004

Overview

- Primary goal: Challenge your assumptions and give you information, not decisions!
- Who is Smart Growth BC?
- What is Smart Growth?
- 10 Strategies For Sustainable Communities
- Q & A

Smart Growth BC

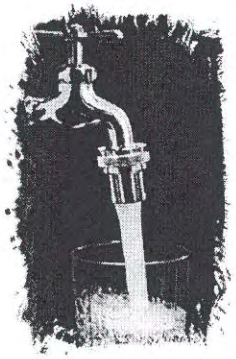
- Province wide, non-profit, non-governmental
- Funded by foundations, grants and donations
- Work with all types of communities to increase livability



Some Context

- If there were no people in the Nicola Valley, the natural systems would be just fine
- Need to consider how and where we live
- Focus on the growth of the towns and cities in the Nicola Valley
- Merritt is right on top of its aquifer
- Land use and water are intrinsically tied

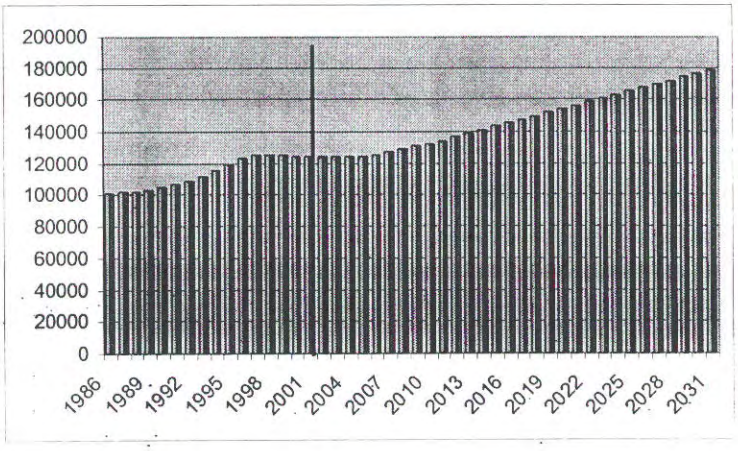
Water Use in BC



Water Use / per Person / per Day		
Province	Litres	Gallons
Territories	268	59
British Columbia	440	96
Alberta	257	56
Saskatchewan	229	50
Manitoba	250	55
Ontario	271	59
Quebec	386	85
New Brunswick	415	91
Nova Scotia	270	59
P.E.I.	185	40
Newfoundland	561	123

In Canada, 60% of domestic water use goes to the lawn...

Population of the TNRD



In the next 30 years, how will the TNRD house 60,000 more people and provide an additional 2,640,000 litres of water per day?

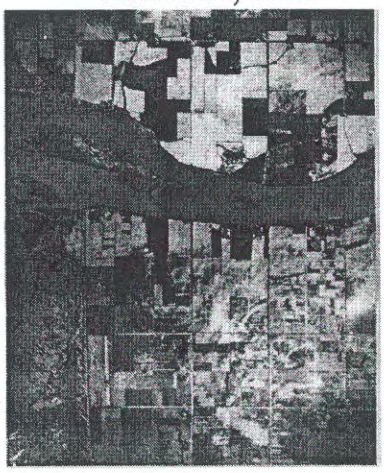
Source: BC Stats, PEOPLE Projection

WARNING: Illegal Activity!

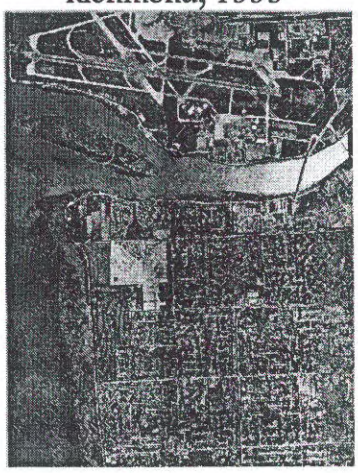
- A lot of solutions are found in changing or loosening existing bylaws & standards
- There will be issues that cross jurisdictions and agencies

The Power of Choice and Persistance of Patterns

Richmond, 1930



Richmond, 1995

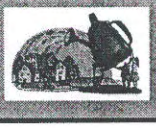


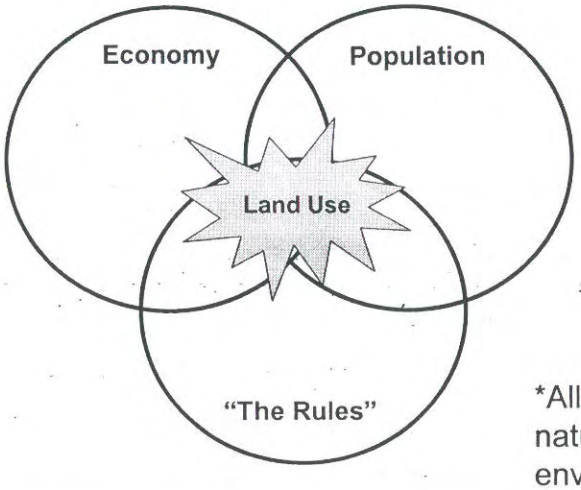
Source: Kevin Key, KEYPlan

Why Should We Care About Boring Old Land Use?

- Environmentally
  - Habitat, aesthetics, greenspace, community health and green services…including water quality & quantity
- Socially
  - Housing, social interactions, transportation and sense of community
- Economically
  - Implications for taxes and infrastructure spending, *natural resources and tourism.*

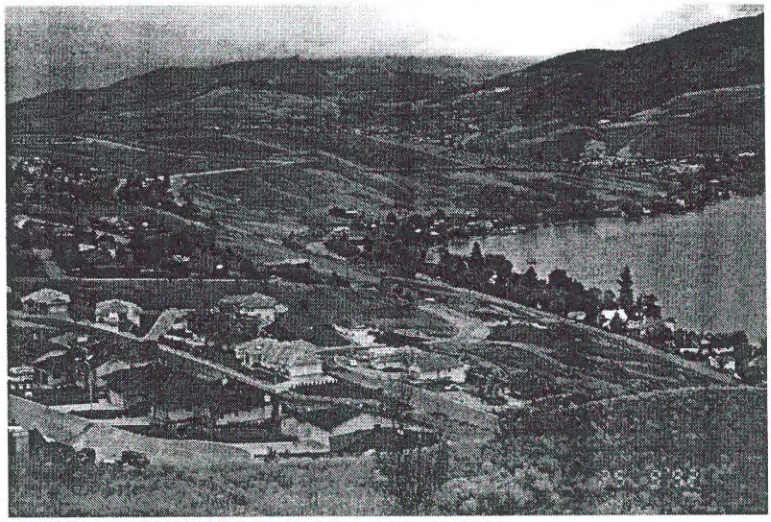
The WSYWIG of Land Use



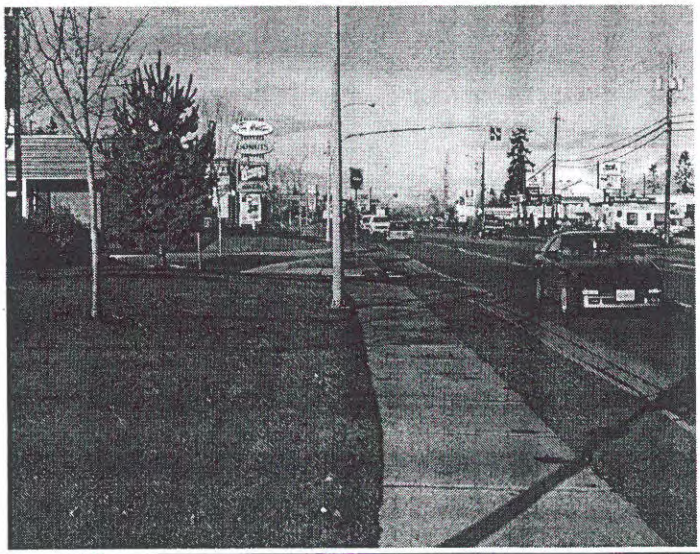


*All set in the natural environment

Current Approach to Growth in the TNRD

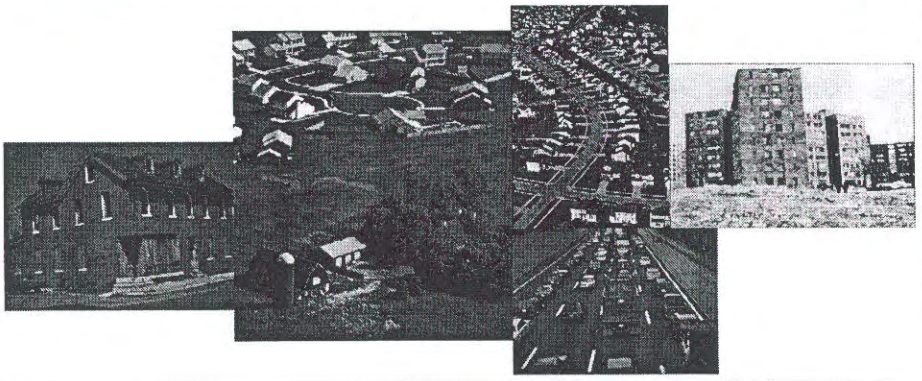


Any Town, BC



What is Sprawl?

Sprawl is irresponsible development that takes our tax dollars away from our communities and destroys farmland and open space.



Sprawl Means...

Economic Consequences:

- Inefficient use of tax dollars for costly infrastructure and replacement
- Higher taxes paid by fewer people

Social Consequences

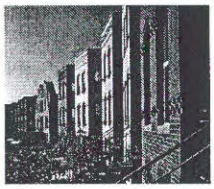
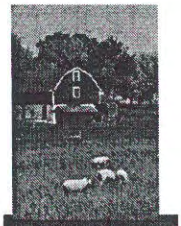
- Decline of older residential and commercial areas
- Loss of community and sense of place

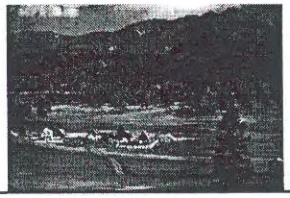
Environmental Consequences

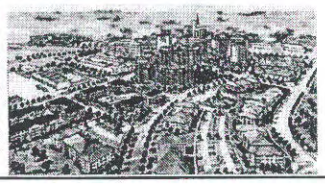
- Loss of greenspace and "working lands"
- Increased energy consumption, greenhouse gas production, air and water pollution and ***water consumption***

What is Smart Growth?

Smart growth is well planned development that protects open space and "working lands", revitalizes communities, keeps housing affordable and provides more transportation choices.





What is Smart Growth?

More transportation choices and less traffic

Not against cars and roads

The "where and how" of growth

Why is Smart Growth Better?

Environment	Consumes less land and water, causes less pollution, and preserves farms and wildlife habitats
Equity	[illegible]
Engagement	[illegible]

Principles of Smart Growth

1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, "working lands", natural beauty, and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair, and cost effective
10. Encourage community and stakeholder collaboration in development decisions

Smart Growth Example

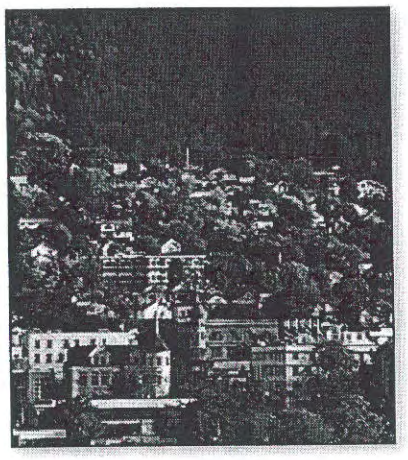
Source: www.urban-advantage.com

10 Smart Growth Strategies for Sustainable Communities

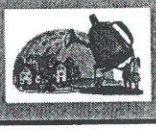
Hint: not just for big cities!

1. Build Compact, Complete Communities That Avoid Sprawl

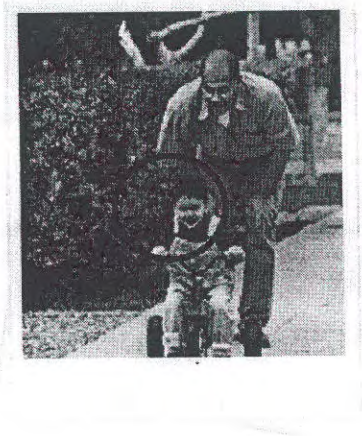
- Mix land uses through zoning by-laws
- Provide incentives for higher densities, e.g. density bonuses
- Provide incentives for infill and redevelopment projects
- More public safety through "eyes on the street"



2. Create Walkable Communties

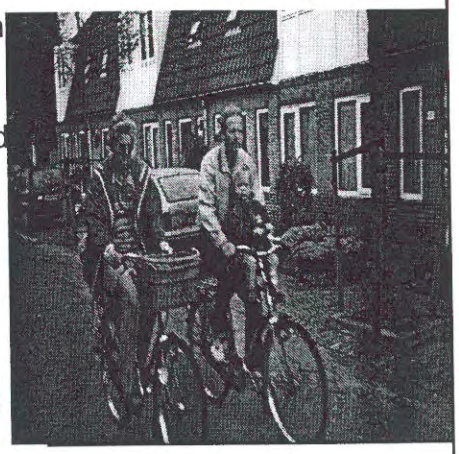


- 5 minute walking distance from homes to transit and shops
- Traffic calming
- Pedestrian oriented street design
- Shops and homes facing the street
- Public spaces, community art



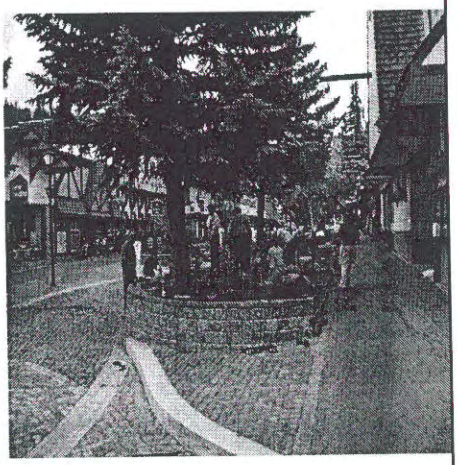
3.Development That Encourages Sustainable Transportation

- Plan land use with transportation housing and economic development strategies
- Provide multi-modal facilities and infrastructure
- Zone for transit-oriented developments and town centres
- Get rid of minimum parking standards
- Make sure transportation spending reflects stated policies
- 12 is the magic number: 12units/acre



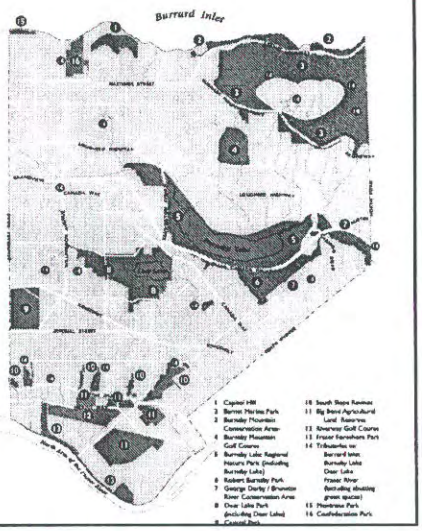
4. Foster vibrant communities with a strong sense of place

- Mix land uses
- Create public places
- Encourage preservation and retrofitting of heritage buildings
- Allow for plenty of greenspace
- Allow for sidewalk dining
- Enact design guidelines so that streets, buildings and public spaces work together to create a sense of place

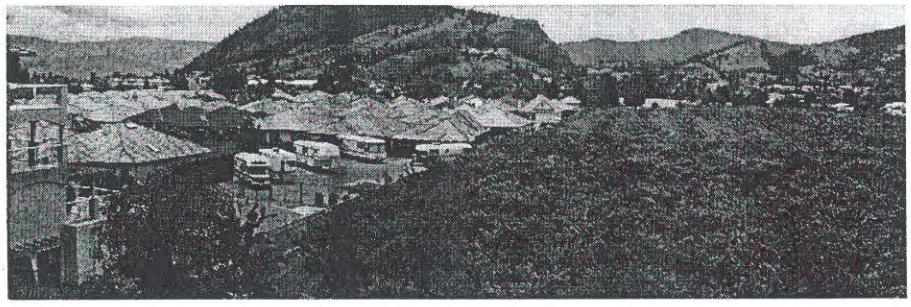


5. Protect and Preserve Green Spaces and ESAs

- Identify, map and protect ESAs
- Identify green zones and urban growth boundaries
- Development permit areas
- Conservation covenants
- Stewardship protection by-laws
- Use an ecosystem based planning approach



6. Ensure the integrity of a secure & productive "working land" base



Gross Farm Receipts in the TNRD were $96,955,852 in 2001

Protecting the "working land" base

- *They Work to Support the Economy*
  - Farming, forestry, tourism, gathering, etc
- *They Work to Green Services*
  - Water filtration, stormwater management, air, etc
- *They Work to Provide Social Amenity*
  - Recreation, aesthetics, increased property value

Protecting the "working land" base

Returns to Community Per Dollar Spent

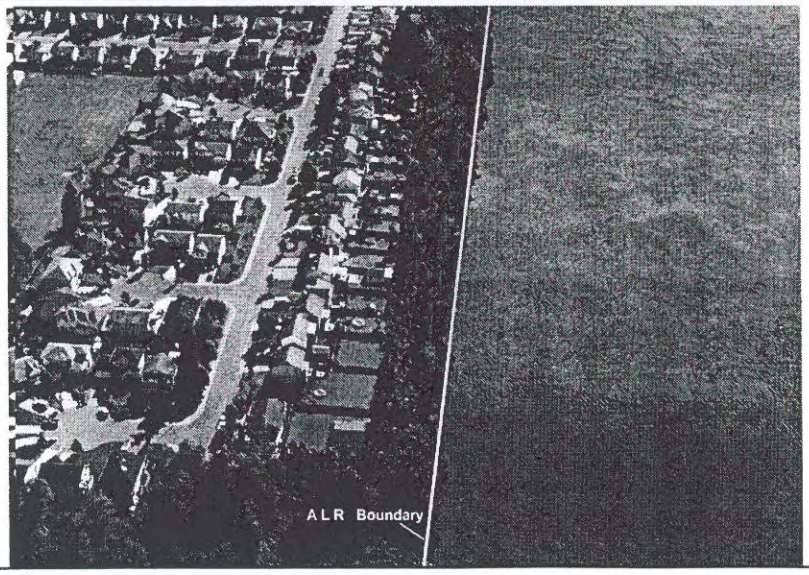
Sprawl Costs Tax Payers More Money	Residential Developments	+.49
	-.25	Farms, Forests, Open Space

Source:
American Farmland Trust

Protecting the "working land" base

- "Agricultural Land Reserve", established between 1972-1974
- BC was losing 13,000 acres of prime farmland per year to urban expansion
- Only 5% of BC is arable land
- Essentially, zoning for agricultural land
- Loved and hated…but still generates:
  - $2.2B/year in economic activity
  - 200,000 jobs
  - on only 5% of BC's land
- 12% of the TNRD is in the ALR

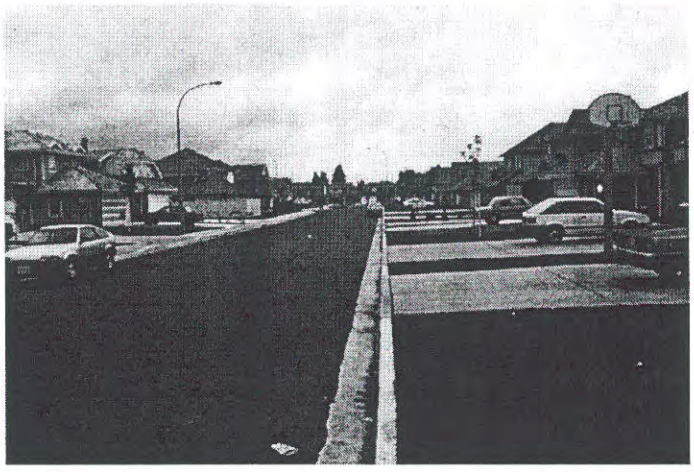
Protecting the "working land" base



7. Provide a Range of Affordable Housing Options

- Enact inclusionary zoning by-laws
- Revise zoning by-laws and building codes to permit a wider variety of housing types (e.g. secondary suites, multi-family units)
- Provide incentives for infill development

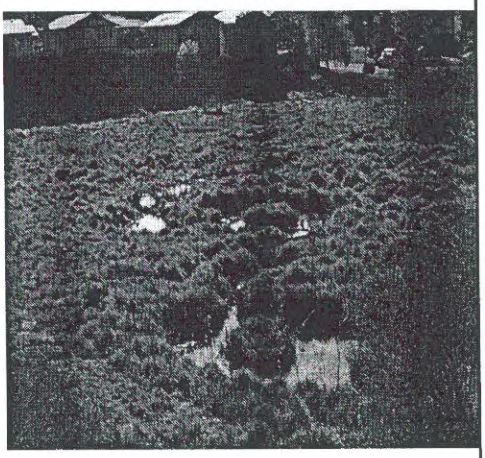
8. Promote Energy Efficient Infrastructure & Alternative Development Standards



Pave and Pipe approach to Water Management...

8. Promote Energy Efficient Infrastructure & Alternative Development Standards

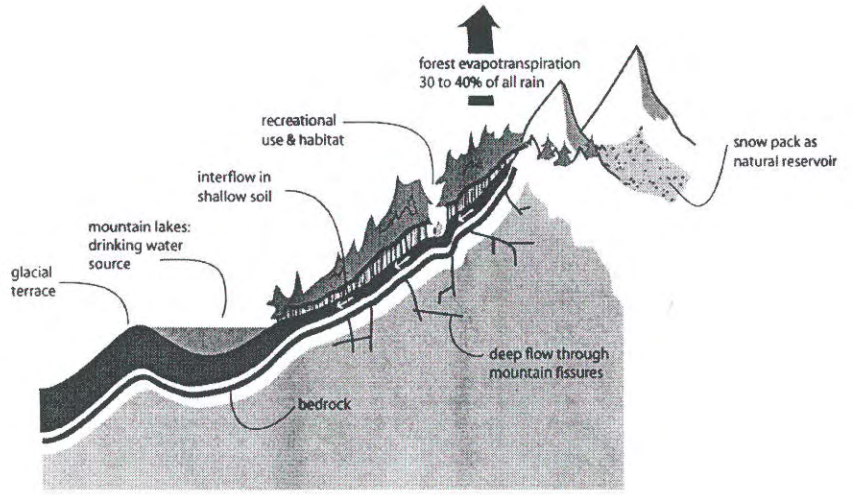
- Reward and facilitate green development
- Adopt LEED (Leadership in Energy and Environmental Design) standards
- Restructure DCCs to reflect sustainable community goals
- Use the green infrastructure



Alternative Development Standards

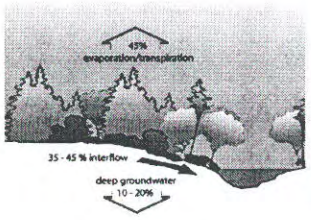
Example	Benefit
• Minimize paving	• Increases infiltration of stormwater; reduces infrastructure costs
• Alternative, natural stormwater management	• More permeability and infiltration; replenishing of aquifers and protection of fish

Existing Standards and Water

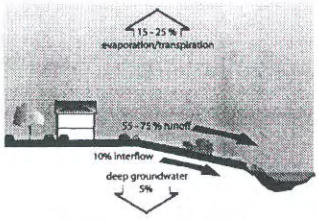


Existing Standards and Water

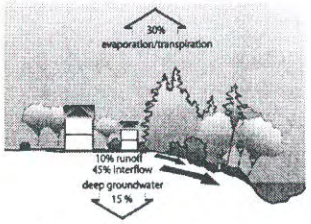
- **Urbanization radically alters the way the watershed works**
- **Most towns/urban areas are 40-60% impervious surfaces**
- **The problem is not quality…the problem is quantity**



The natural condition



The gray infrastructure condition



The green infrastructure condition

Existing Standards and Water

Do Alternative Standards Cost More?

1. At the community level…

Smart Growth Costs Less

Roads	**25% less**
Utilities	**15% less**
Schools	**5% less**

2. At the household level…

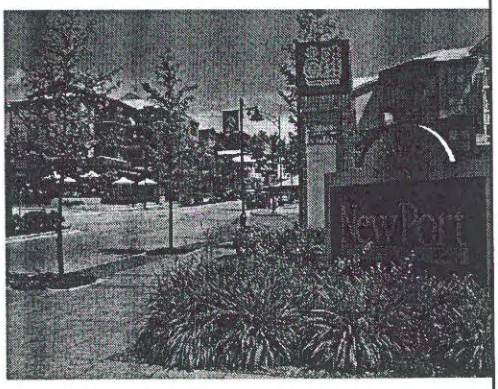
Infrastructure costs per unit is:

- $23,520 for low density development
- $4,408 for compact development

Source: 1) *Economic and Fiscal Impacts of Alternative Land Use Patterns*, by Robert Burchell, Rutgers University 2) CMHC, 2001.

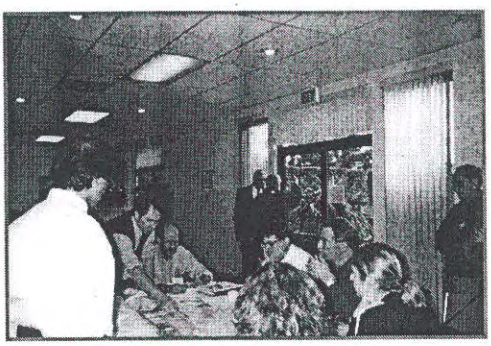
9. Strengthen Development Towards Existing Communities

- Support economic development strategies that enhance local communities.
- Invest in existing neighbourhoods rather than greenfield sites.
- Allow for a differential infrastructure or development fee formula that charges less for infill developments than for low-density, fringe developments.
- Prioritize investment in smart growth infrastructure, e.g. transit, greenways.

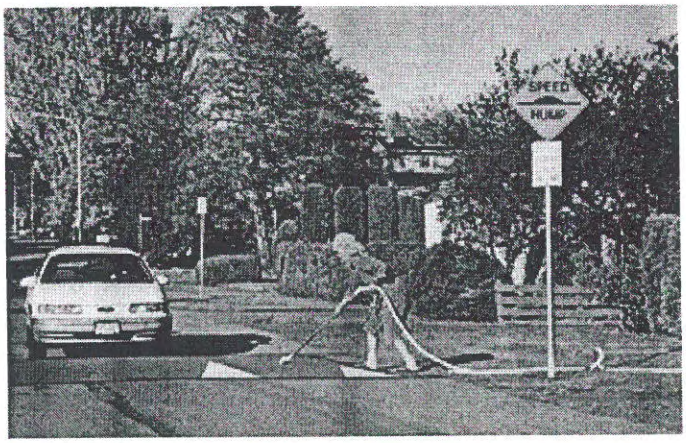


10. Ensure an early and ongoing role for community in planning

- OCP reviews
- Regional Growth Strategies
- Neighbourhood Concept Plans
- Local Area Plans
- Public hearings
- Advisory committees
- Design charrettes



Questions?



www.smartgrowth.bc.ca

Question and Answer Period following Judy Guichon's and Dr. Rosenau's presentations.

- *RE: Dr. Rosenau's presentation* – "You stated in your presentation that the Nicola Dam did not achieve all the expectations. What expectations were not achieved? Why did your report not include a recommendation for the completion of the Nicola Dam?"

  In response, Dr. Rosenau indicated that there was an expectation that there would have been more water available. He added that completing the Dam is an option that is still open and that discussions are continuing between agencies with respect to the Dam.

  Further to Dr. Rosenau's answer, the comment was made that his report should have included the recommendation to complete the Dam.

- *RE: Dr. Rosenau's presentation* - What level of risk is included in the figure of 20% shown in the slide with the water flow recommendations table?

  In response, Dr. Rosenau noted that in some instances a trade-off may be necessary and this figure is a guide and not always followed. He understood that there were 'bands' around the desired 'needs' (for water flow).

- *RE: Dr. Rosenau's presentation* - Does steelhead, which is a trout, not a almon, require more water flow than other salmon?

  In response, Dr. Rosenau said yes as these fish are larger at all stages of development and the larger the fish, the more water flow it needs.

- *RE: Dr. Rosenau's presentation* - Will Highland Valley Copper's (HVC) activities to extract water have an impact on the steelhead?

  In response, Dr. Rosenau indicated that he did not know.

  John Anderson added that this is a question that could be more properly addressed by HVC. The NWCRT did invite HVC to a public meeting to talk about their project and if there is enough interest, the NWCRT could invite them again.

- COMMENT – The 1983 Strategic Plan (referred to by Dr. Rosenau) was not executed. The Plan should be updated.

- *RE: Dr. Rosenau's presentation* - How do you see that the buying back of licenses would help?

  In response, Dr. Rosenau indicated that some water licenses are not being used and hence this water is continuing to flow down the river. He added that water licensing is a very sensitive issue and that government is proceeding very cautiously and does not want to come down with a heavy hand.

- *RE: Dr. Rosenau's presentation* – Why did your report not examine the whole issue of forest harvesting's effect on "water budgets of ground cover"?

  Dr. Rosenau replied that this was outside his area of technical expertise and for this reason this area was not addressed in his report.

- *RE: Dr. Rosenau's presentation* - If the 1983 strategic plan were to be updated, would an audit be part of the update? Who does an audit and is it difficult to do?

  Dr. Rosenau replied that an audit could be part of the process for updating the strategic plan.

Question and Answer Period following Graham Strachan's and Kevin McNaney's presentations.

- *Question posed to Graham Strachan* - Is there any consideration being given to using electrostatic spraying as an irrigation method?

  In response, G. Strachan indicated that this method is being used to apply fertilizer and is a step beyond what is currently being encouraged as a method of irrigation.

- *Question posed to Kevin McNaney* - Have you made this presentation to Merritt City Council?

  In response, K. McNaney replied that no, they had not, adding that growth will come and it is important to be ready for it.

- *Question posed to Kevin McNaney* - What is the vision of your organization?

  In response K. McNaney said it was to spread knowledge and provide information to communities about alternate growth strategies and options.

- *Question posed to Kevin McNaney* - How do you define community?

  In response K. McNaney said that it could be defined in a multitude of ways.

- *Question posed to Kevin McNaney* - Is it possible to convert Stoyoma Building into an apartment building?

  In response K. McNaney said that it is a matter of zoning, adding that development cost charges are one method for encouraging or discouraging development in an area. Elmer Reimer added that the City is reviewing the development cost charges.

- COMMENT: motivated citizens are the ones who make changes.

- A request was made for a copy of Dr. Rosenau's presentation. Dr. Rosenau indicated that he had e-mailed a copy to E. Salomon-de-Friedberg and will e-mail her an amended version as some of the tables and charts had been from copied from web sites but the slides did not say where they had been sourced.

QUESTION #1

What in your opinion is the number one water issue in the Nicola watershed?

1) STORAGE – there is not enough backcountry storage in order to hold the water and release it over a longer period as it is needed.

2) COMPLETION OF THE NICOLA DAM – "I'm glad the dredging was not completed; otherwise, we would not have had any water last year". It has to be a win-win situation for everyone, people and fish.

3) FLOODS - The residents of Merritt don't want any floods. There is a need for effective storage to reduce the impact of flooding.

4) DREDGING OF THE DAM – if it were properly done, it would minimize flooding.

5) NEED ACCURATE INVENTORY (VOLUME, TIMING AND FLOW) OF CREEK HYDROLOGY – need facts and figures around creeks - what's coming out of creeks is not well known.

6) RECREATIONAL aspect of the water resource and its contribution to local economy gets left to the end and is not considered when planning takes place. Should be part of any overall plan.

7) OVER-CONSUMPTION (AT TIMES) BY MERRITT RESIDENTS.

8) UPLAND DAMS - who should be responsible for their maintenance and upkeep? Why should individual ranchers bear the cost and the liability when all benefit?

9) AQUIFER – how many people take water directly from the aquifer? City of Merritt has budgeted for two monitoring wells to be installed in 2004. Is the draw down of the aquifer being done at a sustainable rate? Is the licensing of water from the aquifer inevitable?

10) BUREAUCRACY AROUND WATER – how many departments and agencies are involved in managing water use? Strive for a relationship between the MLA and government agencies that would be able to address issues to a higher level.

11) INTEGRATED LAND AND WATER DEVELOPMENT PLAN LACKING - need for a long term plan

12) LACK OF VEGETATED RIPARIAN AREAS ALONG THE RIVER

13) WATER QUALITY OF THE RIVER – microbes in the water, not safe to drink anymore

14) WATER FOR DEVELOPMENT – is there enough water for development and how should it be allocated?

15) LONG TERM PLAN – TNRD is in the process of finalizing lakeshore development guidelines

16) QUILCHENA CREEK – number of beaver dams has changed the amount of water that flows down the Creek.

17) WATER CONSERVATION BY AGRICULTURE SECTOR – water is wasted irrigating non-productive areas such as roads.

18) POLLUTION AND USE OF WATER – need to plan ahead for what people will want/need.

19) IMPACT OF TOURISM ON AGRICULTURE – as tourism expands, there will be increasing pressures on agriculture and the possibility of rights (agriculture) being clawed back.

20) CONTINUE A STRONG AND DIVERSE ROUND TABLE – government operates with a 'stove pipe' mentality. One way to break through is for government to go to and work with community organizations. Progressive government will recognize that sustainable solutions will come about by working with communities.

21) WATER MONITORING – upkeep of water monitoring stations

22) NO COST DUMPING OF GARBAGE AND SEWAGE BY PEOPLE TRAVELING WITH RECREATIONAL VEHICLES – cost of collecting fees would be higher than the revenue coleected from those fees.

23) NICOLA DAM - lack of information about why the dredging of the Nicola Dam was not done

24) NICOLA DAM - how much extra storage would be created by the completion of the Nicola Dam?

25) CONTAMINATION/POLLUTION – need a study to determine present and future contamination levels in salmon and how those pollutants will affect water quality over a long period of time, next 50 years. Leeching of pollutants such as PVCs from the salmon to the soil and into the water as the salmon decompose.

26) GROUNDWATER CYCLE – need to have a better understanding of the groundwater cycle. Should our groundwater get contaminated, how long before it would be clean again? Need to study the ecosystem on a much longer time frame.

QUESTION #2

What steps need to be taken to address the water issues in the Nicola watershed?

1) Some education and information about the life cycle of the various species of salmon in order to mitigate impacts on their habitat or to plan ranching activities so that their habitat could actually be enhanced.

2) An opportunity to hear more about water use and landscaping and how less water could be used – Invite Gail Bloom to be a guest speaker.

3) Hold an irrigation efficiency workshop.

4) An opportunity to spend more time with Smart Growth BC – in preparation for the development of an overall plan for the Nicola watershed.

5) Change in attitude required, need an attitude of goodwill, always think about how decision will affect one's neighbour.

6) Understanding what residents in the Nicola watershed can do with respect to fish populations and not be unwilling to act because of factors affecting fish populations beyond our control (pollution in oceans).

7) More educational opportunities such as this forum for citizens and that this task be undertaken by more than the NWCRT. It should be something that the City, TNRD and government agencies also do.

8) A meeting between Smart Growth BC and developers re: Nicola Lake Estates.

9) Develop an overall plan for what we want to do for growth and water use.

10) Not everything is all negative – There are good things happening and a lot of changes have occurred in the past 10 to 15 years. For example, fencing off a good portion of the Nicola River between the Dam and the City of Merritt; and a plan to share the water from Clapperton Creek. These types of forums are very important.

11) Field trip to have a look at an agriculture site, an urban site and a fish site to see what is being done to use water efficiently.

Comparison of Actual Costs to Budgeted Expenses

Expenses	Budget $	Actual Costs $
Venue - Merritt Secondary School	107.00	107.00
- Chairs/Tables	30.00	22.50
- Tablecloths	12.00	12.00
Letters of Invitation – Postage	80.00	78.12
Advertising - Sandwich Boards	10.00	15.00
- Newspapers - Merritt Herald	150.00	168.98
- Merritt News	175.00	68.82
- Merritt Morning Market	50.00	22.07
- Loose Ink	50.00	35.00
Refreshment Break - Juice	25.00	22.45
- Coffee/Tea	100.00	179.76
- Donuts/Apples	50.00	57.82
Lunch	440.00	304.00
Rental of TV (large screen)	107.00	107.00
Equipment Rental	0.00	50.00
Speakers - Kevin McNaney	410.00	392.15
- Dr. Marvin Roseanu	360.00	0.00
- G. Strachan	50.00	0.00
Miscellaneous	50.00	10.93
TOTAL	2,256.00	1,653.60