Need for Paleo Research Manitoba Hydro

Bill Girling Manitoba Hydro October 31st, 2006

Outline

Overview of Manitoba Hydro's System

Ongoing & Future Research projects

Need for Paleo research

Where is Manitoba Hydro?





Water Supply comes from: four **Provinces** two US States 98% Hydro -2nd only to Hydro-Quebec Manitoba Hydro Generating System



Manitoba Hydro System Capacity - 2005

	Source of Capacity	Capacity (MW)
	Hydro-Electric Capacity	4828
	Thermal Capacity	535
Der	mand Side Management - Incremental	74
	(Cumulative DSM to 2005)	(240)
	Diversity Import	550
	Total System Capacity	5987









Potential Impacts of Climate Change

- Long term water supply
 - higher evaporation, reduced reservoir storage
 - changing precipitation/runoff patterns
- Extreme weather impact on system operation, major transmission
- Impact on energy supply/demand balance
- Extended Drought

Planning Criteria for Supplying Load

Firm Capacity

minimum of 12% reserve capacity required
over forecast peak load demand

Dependable Energy

•adequate energy resources to supply forecast load energy under a repeat of the lowest historic flows

Drought



Historical Drought Events

Nelson-Churchill System Inflow



Why does Manitoba Hydro fund Drought Research?

- System-Wide Energy Drought is complex:
 - extensive geographic region
 - can't transpose severe drought
- More severe droughts occurred before historical record
- Regional diversity of Hydrologic Extremes
- Need probabilistic forecasting of drought

Paleo-Environmental Research

Ongoing R&D Projects (add picture links)

- Tree-ring analysis- Churchill R (Sauchyn)
- Tree-ring analysis- Wpg.R (St. George)
- Isotope analysis of paleo data (Buhay)
- Lake sediment analysis (Cumming)
- Climate Change Research Professorship at U Regina/ U of W

How can Manitoba Hydro use Paleo Research?

Enhance statistical predictions of frequency & severity of drought:

- Currently 100-yr record for drought probability analysis
- Identification of more severe droughts before historical record
- Reconstruct past streamflow records

What is needed for Paleo Data to be useful to Manitoba Hydro?

- Link Paleo data with current climate
 - Indication of cyclic patterns
 - Develop regional estimates of past climate & hydrology
 - Link past extremes to climate drivers
- Is past an appropriate analogue of the future?

Future Work

Internal risk assessment

- Sensitivity analyses of more severe drought
- Variability of long term water supply



Questions?

Extra Slides

Variability 2003/04 to 2006/07

Current Precipitation Compared to Historical Distribution



Extent of Agricultural Land

Prepared by PFRA (Prairie Farm Rehabilitation Administration) using data from the Timely Climate Monitoring Network and the many federal and provincial agencies and volunteers that support it Canada



Current Precipitation Compared to Historical Distribution

September 1, 2004 to August 31, 2005

www.agr.gc.ca/pfra/drought

Prepared by Agriculture and Agri-Food Canada (PFRA) using data from the Timely Climate Monitoring Network and the many federal and provincial agencies and volunteers that support it.





Current Precipitation Compared to Historical Distribution

September 1, 2005 to March 29, 2006



www.agr.gc.ca/pfra/drought

Prepared by Agriculture and Agri-Food Canada (PFRA) using data from the Timely Climate Monitoring Network and the many federal and provincial agencies and volunteers that support it.



Energy in Storage 2004-05 to 2005-06



Energy in Storage 2006/07

