



**WOLF CREEK  
RESEARCH BASIN  
HYDROLOGY, ECOLOGY,  
ENVIRONMENT**



**Proceedings of a Workshop held in  
Whitehorse, Yukon, 5-7 March 1998**

**Editors J.W. Pomeroy and R.J. Granger**



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## **FOREWORD**

The workshop was extremely successful in achieving its intended objectives.

The results of 14 studies and projects that were presented indicate that significant progress has been made towards improving our understanding of physical ecosystem processes. **More importantly**, some of the compiled papers indicate that this work has proceeded in an integrated fashion. This is a positive move since individual ecosystem parameters are the products of an integrated series of environmental parameters which in turn control ecological processes. With increasing stresses on the environment through land use change due to resource development and climate variability, the importance of the linkages between individual components is becoming apparent.

The Workshop session was critical to setting a course for the immediate future of the Wolf Creek project. Brief presentations were made by 12 individuals representing agencies who have not done so yet, but have a potential interest in carrying out work at Wolf Creek. Though the representatives were from a varied number of disciplines, the common linkages were stressed, indicating the need for an ecosystem approach.

Participation by students from local schools was also welcomed. The project has significant educational opportunities which may be accessed with minimal effort. Participation by public interest groups is also noted indicating a strong level of community involvement.

The integrated research and monitoring in the Basin depends upon the continued co-operative relationships among Environment Canada, Indian and Northern Affairs Canada, Agriculture Canada, Fisheries and Oceans Canada, the Yukon Government, Yukon College, several universities, and the Yukon Conservation Society. The sharing of data, ideas, expertise and resources by these groups is proving a very effective way to further our understanding of northern ecosystems and their responses to environmental stress.

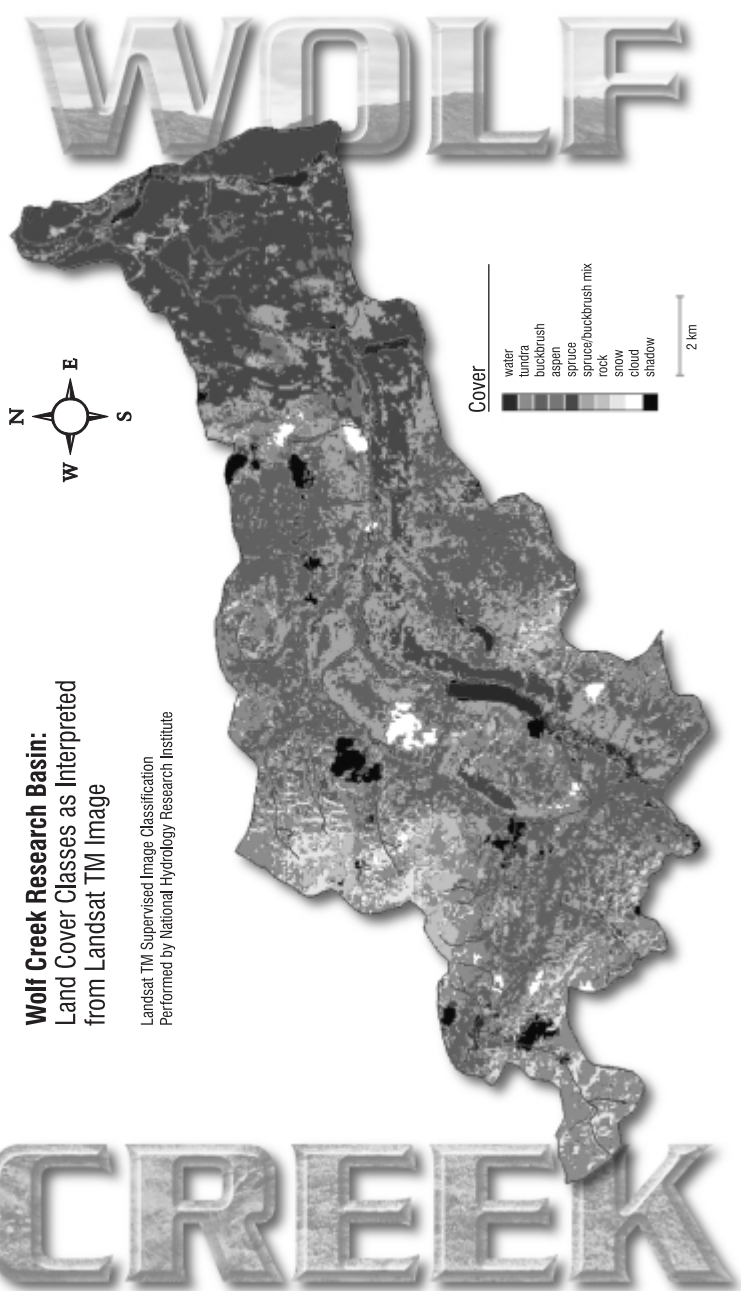
The following sponsors deserve recognition for a highly successful workshop: Northern Affairs Programme of DIAND (both Yukon Region and Headquarters Northern Water Resources Study Program), National Hydrology Research Institute of Environment Canada, the Ecological Monitoring and Assessment Network of Environment Canada, and Yukon Energy Corporation.

### ***Lois Craig***

*Associate Regional Director General  
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Whitehorse*

**Wolf Creek Research Basin:  
Land Cover Classes as Interpreted  
from Landsat TM Image**

Landsat TM Supervised Image Classification  
Performed by National Hydrology Research Institute



## **PREFACE**

The North with its vast and varied landscapes, intricate ecosystems, sparse population and cold climate, presents a challenge for science. Northern ecosystems show a unique face to the world, that of cold soils, long winters, low productivity, sparse food-webs and yet complex flows of nutrients and energy between natural communities. They call to be studied and will always attract investigation in their own right. However, increasing human activity in areas of the North such as the Yukon requires a sound science base so that appropriate development can be fostered in such a way that the natural world can be preserved and a stable society encouraged. Therefore a societal requirement for northern environmental research exists.

The impetus for research at Wolf Creek began as a consequence of the perception that northern environmental science would benefit from a focal site for field studies and that such a site would catalyse local science activities and attract researchers to the region. It is clear from these Proceedings that the Wolf Creek initiative has been highly successful in this regard. There are now 21 studies deriving from three federal departments, the Yukon Government and eight universities. Research in the basin, while wide-ranging at times, has centred on three topics: hydrology/climatology, biodiversity and environmental quality. A database of climate, streamflow, water chemistry, soils, vegetation, topography and land use has been compiled for the basin and is now itself a catalyst for further research. The increased science activity in Wolf Creek has also provided the Yukon with an education opportunity which is being supported by Yukon College and Whitehorse area schools and which one hopes will help inspire northern scientists on their own quests.

These Proceedings present a snapshot of and prospects for Wolf Creek research, five years after the first studies began in the drainage basin. The first science paper presents an overview of an interdisciplinary subject, Snow Ecology, and how this relatively-recent scientific field can serve as a model for cross-disciplinary collaboration in Wolf Creek. Subsequent science papers describe snow accumulation, contaminant deposition in snow, evaporation, permafrost and hillslope hydrology, hydrogeotechnical characteristics, digital terrain analysis, spring floods, hydrological modelling, vegetation and soil cover classification, forest biodiversity, biodiversity monitoring techniques and paleoenvironment reconstruction using lake sediments. The final science paper presents a chronology of the Wolf Creek project, its participants and an overview of the basin characteristics and recent findings. A short section describes some of the national science programmes, Arctic Environmental Strategy, Global Energy and Water Cycling Experiment and Ecological Monitoring and Assessment Network, that use Wolf Creek to achieve their goals. In the final segment of the Proceedings, the results of several discussions on anticipated research in Wolf Creek, opportunities for education and communications,

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directions for collaborative research, and techniques for science-based organizations to coordinate efforts and integrate results, are presented. This type of forward thinking has already resulted in new collaborations and we hope will continue to do so. An update on activities in Wolf Creek is available on the World Wide Web at [WWW.Taiga.net/wolfcreek/](http://WWW.Taiga.net/wolfcreek/), here one can peruse photographs of field work in the basin, read descriptions of new studies or even register a new research effort.

Finally we thank the workshop organizers, Ric Janowicz and Joan Eamer for their effort in bringing together the participants, arranging funding and planning the logistics of what was a successful and enjoyable workshop.

***The Editors***

*John Pomeroy and Raoul Granger  
National Hydrology Research Centre  
Saskatoon, Saskatchewan*

The sentiment of the following verse is expressed on behalf of all the authors who were so kind as to contribute to this Workshop.

***“I have no doubt at all the Devil grins  
As seas of ink I spatter.  
Ye gods, forgive my ‘literary’ sins-  
The other kind don’t matter.”***

*Robert Service,  
Whitehorse, Yukon, 1907*

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## **SCIENCE PAPERS**



**Wolf Creek Research Basin:**  
Digital elevation model  
looking south into basin

WOLF

CREEK

