Northern Water Resources Studies

An Annotated Bibliography of the Northwest Territories Action on Water Component of the Arctic Environmental Strategy

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Edited by

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Introduction

From 1991 to 1997, the Government of Canada provided $100 million under the Arctic Environmental Strategy to increase the knowledge of the country's northern environment in order to better protect it. Of this, $25 million was earmarked for water-related work, of which $15 million was provided for work in the Northwest Territories.

During those years, a considerable amount of work was done on many aspects of the N.W.T. water cycle. While studies of specific groups of aquatic constituents at specific sites were completed, a more general approach was also taken to expand the overall knowledge of the hydrosphere. Evaporation and snow data were collected along with the more common water flow data. Fish and sediments were analysed in addition to water. Organic contaminants were tested for, as well as the traditional inorganic parameters. Academic papers, public presentations and public-level reports were prepared. A high school teacher's package was completed. Intensive studies were done in some areas and one-time extensive area sampling in others. Work was carried out in-house by Indian and Northern Affairs Canada's Water Resources Division, through support of other agencies' researchers, through provision of samples to others, and by consultants.

This research resulted in the production of 215 publications. The immediate purpose of this bibliography, prepared by the Arctic Science and Technology Information System (ASTIS), was to organize these publications for the Water Resources Division. The bibliography has met a number of other goals in the process. First, it provides as complete a list as currently possible of the publications supported directly and indirectly by the Northwest Territories Action on Water Component of the Arctic Environmental Strategy. Second, it has ensured that most publications are available to the public through the University of Calgary Library. And finally, because the bibliography has been created as a subset of the ASTIS database, it promotes northern water research by giving all researchers better access to information about the work carried out. As part of the ASTIS database, all bibliography records have been included in the printed *ASTIS Current Awareness Bulletin*, the annual *ASTIS Bibliography* CD-ROM, an international polar CD-ROM and two commercial Web databases. (Please see the ASTIS section of the AINA Web site at www.ucalgary.ca/aina/ for more information.)

Information about the water resources of northern Canada is limited and fragmentary at best. By providing a list of the Arctic Environmental Strategy publications, this bibliography will contribute to the first step in improving this condition: collecting, preserving and making available some of the information that does exist.

Organization of the Bibliography

In the main section of the bibliography citations are sorted by author. Publications with no author appear at the beginning. Publications with multiple authorship are listed under their first author and cross-referenced from all their other authors. The citations listed under each author are sorted by title.

The bibliography contains three indexes that refer back to the main section by citation number. Terms in the Subject and Geographic Indexes are taken from the ASTIS subject and geographic thesauri. In the Subject and Geographic Indexes citations listed under a specific term (e.g., Yellowknife region, N.W.T.) are not normally listed again under broader terms (e.g., Great Slave Lake region, N.W.T.). Broad terms are used for citations that describe broad subject or geographic areas.

The Title Index allows citations to be found by their titles, as well as by the titles of any journals, report series or proceedings in which they appeared. Leading articles (A, The, etc.) are ignored in the sorting of this index.

Availability of Cited Publications

Some of the publications from the Northwest Territories Action on Water Component of the Arctic Environmental Strategy were published in widely-available journals and conference proceedings, while others were published and distributed in limited numbers by Indian and Northern Affairs Canada's Water Resources Division in Yellowknife. To obtain publications cited in this bibliography please begin with your local research libraries. If a publication is not available in your local libraries it may be available on interlibrary loan from the Indian and Northern Affairs Canada Departmental Library in Ottawa or the University of Calgary Library.

The 204 publications from this bibliography that are available in the University of Calgary Library have the code "ACU" in their Libraries field. Your local library can obtain these publications on interlibrary loan from the following address. Please give the ASTIS document number (in italics in the bibliography record) and full citation when ordering.

Interlibrary Loans Office
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Phone: 403-220-5967
Fax: 403-282-6837
E-mail: illacu@isis.lib.ucalgary.ca

Comments and Suggestions

For more information about the Northwest Territories Action on Water Component of the Arctic Environmental Strategy, or to suggest additional publications that should be included in this bibliography, please contact:

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1

Three reports on the collection and analysis of fish for heavy metal effects in the Yellowknife-Back Bay region, Great Slave Lake, Northwest Territories.

[S.l. : s.n., 1997].

[7], iv, 17, 9 leaves : ill., maps ; 28 cm.

Cover title.

References.

Partial contents: Collection of fish samples from the Yellowknife-Back Bay area of Great Slave Lake for assessing the presence of histopathological lesions and evaluating the concentration of metallothionein in kidney and liver tissues : field report / M. Paris and C. Lafontaine – Histological analyses of posterior kidneys and livers of fish from Yellowknife Bay, Great Slave Lake, Northwest Territories, Canada / R.E. Evans and J.F. Klaverkamp – Metallothionein in fish : applicability to metal mining biomonitoring programs and research needs / J.F. Klaverkamp, K. Wautier, C.L. Baron, S.E. Harrison, R.V. Hunt, and F.J. Jackson.

ASTIS 416193

Libraries: ACU

... This report contains the results of work that was conducted on fish collected in the Yellowknife-Back Bay areas for various fish species at various locations throughout the two bay areas. The three reports are a result of recommendations that came from a two year study that began in August 1992 and concluded in March 1994, titled: Yellowknife-Back Bay Study on Metal and Trace Element Contamination of Water, Sediment and Fish (Jackson et al, November 1996). ... The first report, "Collection of Fish Samples from the Yellowknife-Back Bay areas of Great Slave Lake for Assessing the Presence of Histopathological Lesions and Evaluating the Concentration of Metallothionein in Kidney and Liver Tissues" is a field report indicating where the fish were caught, what species were caught, methodology used to catch the fish, fishing efforts, how the fish were processed, field observations, stages of maturity of fish caught and ageing technique used. ... The second report, "Histological Analyses of Posterior Kidneys and Livers of Fish from Yellowknife Bay, Great Slave Lake, Northwest Territories, Canada" is the histological analyses of posterior kidneys and livers of fish collected in the two bay areas in September/October 1995. The report writing was contracted out to R.E. Evans and J.F. Klaverkamp at the Freshwater Institute in Winnipeg, Manitoba, which contains the methodology used to determine if there was any presence of nephrotoxic lesions or if there was any hypertrophy in the kidney cells. There was also a microscopic evaluation of liver tissue to determine the presence of hepatotoxic lesions, including fatty infiltration, nuclear or general hypertrophy of hepatocytes, focal necrosis, and other degenerative changes in parenchyma. There are posterior kidneys and liver results for both northern pike and lake whitefish. In addition there are results for the small forage fish collected in the two bay areas. ... The third report, "Metallothionein in Fish: Applicability to Metal Mining Biomonitoring Programs and Research Needs (Klaverkamp et al. 1996)" is a paper that was presented at the Aquatic Toxicity Workshop in Calgary, Alberta in October, 1996. The main purpose of this paper was to: 1. Assist the Canadian mining industry to meet its environmental effects monitoring and related requirements in as cost-effective manner as possible, and 2. To benefit the Canadian environment by evaluating new and existing monitoring technologies for the assessment of environmental impacts with indications of the benefits and weakness of each technology. ... (Au)

ALAEE, M.

2

Enantiomeric ratios of alpha-Hexachlorocyclohexane (HCH) in water from the Great Slave Lake, NWT / Alaee, M. Moore, L. Wilkinson, R.J. Spencer, C. Stephens, G.R.

(17th International Symposium on Chlorinated Dioxins and Related Compounds, Indianapolis, Indiana, USA, August 25-29, 1997 / Edited by Ronald Hites. Organohalogen compounds, v. 31, 1997, p. 282-285, ill.)

References.

ASTIS 430234

Concentrations of HCHs along with enantiomeric ratios of alpha-HCH were measured in three different basins of the Great Slave Lake along with the major outflow Mackenzie River. Atmospheric flux estimates indicated that the Great Slave Lake was a sink for HCHs. An enantiomeric ratio of 1.0 was observed for air at Snare Rapids, however E/R between 0.42 to 0.60 were observed in the Great Slave Lake. (Au)

3

Sources and fate of contaminants in the Great Slave Lake, NT / Alaee, M. Moore, L. Spencer, C. Coedy, W. Swyripa, M.W. Cyr, F. Stephens, G.R. Sparling, J.

(Proceedings of the 23rd Annual Aquatic Toxicity Workshop, October 7-9, 1996, Calgary, Alberta = Comptes rendus du 23ieme atelier annuel sur la toxicite aquatique, du 7 au 9 octobre, 1996, Calgary, Alberta / Edited by J.S. Goudey, S.M. Swanson, M.D. Treissman and A.J. Niimi. Canadian technical report of fisheries and aquatic sciences, no. 2144, 1997, p. 39-40)

Abstract only.

ASTIS 430250

Libraries: ACU

Long Range Atmospheric Transport (LRTAP) has been identified as a major source of pollutants into the Arctic. Great Slave Lake, is Canada's fourth largest body of freshwater, it is located in south central Canadian Arctic (latitude 61-63 N and longitude 109-119 W). Great Slave Lake in turn feeds into the Mackenzie River, Canada's largest river flowing to the Arctic Ocean. Unlike most Arctic lakes which are glacially fed, Great Slave Lake receives a large input of water from Slave River. The Slave River originates in Alberta, where there is substantial industrial activity and development is taking place. Due to the high surface to volume ratio, Great Slave Lake has the potential to act as a large catchment for atmospheric contamination. In this study, air, precipitation, water, and suspended sediment samples were collected from 6 locations within the separate zones of the Great Slave Lake along with samples from the Slave and Mackenzie Rivers. All samples were analyzed for organochlorine pesticides including toxaphene, PCBs, PAHs, and heavy metals. Results of this study and a mass balance model will be presented. (Au)

See also: 64, 102.

AQUATICHTUS CONSULTANTS

See: 201.

ARCTIC ENVIRONMENTAL STRATEGY

See: 95, 156, 159, 179, 210.

ARCTIC ENVIRONMENTAL STRATEGY. ACTION ON WATER COMPONENT

See: 54, 58, 71, 100, 102, 108, 158, 185.

ARCTIC ENVIRONMENTAL STRATEGY. WATER QUALITY NETWORK MEMORANDUM OF AGREEMENT

See: 17.

ARSENEAU, C.

See: 13, 14, 16, 18, 19, 20, 21, 25, 26, 27, 28, 29, 30, 49, 50, 53, 67, 68, 69, 138.

BACKUS CONSULTING

See: 103.

BACKUS, S.M.

4

Aliphatic hydrocarbon and polycyclic aromatic hydrocarbon geochemistry of twelve major rivers in the Northwest Territories / Backus, S.M. Swyripa, M.W. Peddle, J.D. Jeffries, D.S.

(Abstract book : Second SETAC World Congress / Second World Congress of the Society of Environmental Toxicology and Chemistry. – Pensacola, Fla. : SETAC Press, 1995, p. 154)

Abstract only.

ASTIS 425486

Suspended sediment and water samples collected from twelve major rivers in the Northwest Territories were analyzed for aliphatic hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) to assess the sources and transport of hydrocarbons entering the Arctic Ocean. Three stations on the Mackenzie River and one station near the mouth of eleven other northern rivers were selected for sampling. Samples were collected on the Mackenzie River on four occasions to characterize spring, summer and fall flow conditions and once on the remaining eleven rivers during high flow conditions. The Mackenize River is distinctively different then the other eleven rivers. Naturally occurring hydrocarbons predominate in the river. These hydrocarbons include biogenic alkanes, diagenic PAHs, petrogenic alkanes, and PAHs from oil seeps and/or bitumens. Anthropogenic inputs of PAHs are low as indicated by low concentrations of combustion PAHs. Alkyl PAH distributions indicate that a significant component of the lower molecular weight PAH fraction is petrogenic. The majority of the high molecular weight PAHs, together with the petrogenic PAHs have a principal source in the Mackenzie River. (Au)

5

Enantioselective degradation of alpha-hexachlorocyclohexane in twelve major rivers of the Northwest Territories / Backus, S.M. Swyripa, M.W. Peddle, J.D. Jeffries, D.S.

(Proceedings of the 22nd Annual Aquatic Toxicity Workshop : October 2-4, 1995, St. Andrews, New Brunswick / Edited by K. Haya and A.J. Niimi. Canadian technical report of the fisheries and aquatic sciences, no. 2093, 1996, p. 19)

Abstract only.

ASTIS 428850

Libraries: ACU

Water and suspended sediment samples were collected at 12 major rivers in the Northwest Territories to investigate the distribution of alpha-hexachlorocyclohexane (alpha-HCH) and the enantioselective degradation of alpha-HCH in Arctic rivers. Three stations on the Mackenzie River and one station near the mouth of 11 other northern rivers were selected for sampling. Average concentrations of alpha-HCH and gamma-HCH in water samples collected in the central and eastern Arctic were 0.9±0.4 and 0.04±0.03 ng/L. These values are similar to the values reported for water samples collected at Amituk Lake on Cornwallis Island during the same year. The Mackenzie River is distinctively different than the other 11 rivers. The average concentrations of alpha-HCH and gamma-HCH in water samples collected on the Mackenzie River were 0.24±0.07 and 0.13±0.06 ng/L. The two enantiomers of alpha-HCH were separated by gas chromatography on permethylated cyclodextrin capillary columns. The enantiomeric ratio (ER=(+)alpha-HCH/(-)alpha-HCH) for an alpha-HCH standard was 0.96±0.01 which is in agreement with a theoretical ER=1.00 for unmetabolized alpha-HCH. The average ER for water samples collected in the central and eastern Arctic was 1.01±0.04, while the average ER for water samples collected on the Mackenzie River was 0.57±0.01. (Au)

6

Riverine inputs of contaminants to the arctic marine environment / Backus, S.M. Swyripa, M.W. Jeffries, D.S.

(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 81)

Abstract only.

ASTIS 414247

Libraries: ACU

Water and suspended sediment samples were collected at twelve major rivers in the Northwest Territories to investigate the distribution of hexachlorocyclohexanes (HCHs) and the enantioselective degradation of alpha-HCH in Canadian Arctic rivers. Three stations on the Mackenzie River and one station at each of 11 other northern rivers were selected for sampling. Samples were collected on the Mackenzie River on four occasions to characterize spring, summer and fall flow conditions and once on the remaining 11 rivers during high flow conditions. Average concentrations of alpha-HCH and upsilon-HCH in water samples collected at these latter sites in the central and eastern Arctic were 0.88 ±0.35 and 0.04 ±0.03 ng/L respectively. These values are similar to those reported for water samples collected at Amituk Lake on Cornwallis Island, Northwest Territories during the same year. The Mackenzie River is distinctively different then the other 11 rivers. The average concentrations of alpha-HCH and upsilon-HCH in water samples collected there were 0.22 ±0.07 and 0.12 ±0.05 ng/L. The two enantiomers of alpha-HCH were separated by gas chromatography on permethylated cyclodextrin capillary columns. The enantiomeric ratio (ER = (+) alpha-HCH / (-) alpha-HCH standard) was 0.96 ±0.01, which is in agreement with a theoretical ER=1.00 for unmetabolized alpha-HCH. The average ER for water samples collected in the central and eastern Arctic was 1.01 ±0.04, while the average ER for water samples collected on the Mackenzie River was 0.77 ±0.19. (Au)

See also: 103, 123.

BARON, C.L.

See: 66.

BASTEDO, J.

See: 22.

BILLECK, B.N.

See: 99.

BOURBONNIERE, R.A.

See: 32, 99.

CANADA. AQUATIC ECOSYSTEM CONSERVATION BRANCH

7
Current contaminant deposition measurements in arctic precipitation : a manual for large volume snow collection, Baker Lake, NWT, 94/95 / Canada. Aquatic Ecosystem Conservation Branch.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [8] p., 1 map)
ASTIS 376930
Libraries: ACU

This manual is intended for those who participated in the collection portion of this study. The task consisted of collecting, storing temporarily, then shipping the weekly snow samples. Each participant was provided with all the necessary equipment and materials to last throughout the sampling season. The format to be followed is outlined in this manual. (ASTIS)

CANADA. ATMOSPHERIC ENVIRONMENT SERVICE

See: 48, 101.

CANADA. CLIMATE RESEARCH BRANCH

See: 91.

CANADA. DEPT. OF FISHERIES AND OCEANS

8
Analysis of food web and sediment samples from Peter Lake for toxaphene, heavy metals and bone collagen / Canada. Dept. of Fisheries and Oceans. Muir, D.C.G. Kidd, K. Lockhart, W.L. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
Winnipeg, Man. : Dept of Fisheries and Oceans, 1995.
10 p., [4] leaves : ill., 1 map ; 28 cm.
Cover title.
Appendices.
References.
ASTIS 416150
Libraries: ACU

... A joint DIAND/DFO study was conducted during July 1994 to investigate the extent and possible causes of the elevated levels of contamination by toxaphene and mercury in Peter Lake fishes. The objectives of the study were to develop the first detailed description of contaminant concentrations in the water column, sediments and biota of Peter Lake as a representative of other large lakes in the Keewatin region, characterize feeding relationships of char and lake trout using stable isotopes of nitrogen and carbon, and develop relationships between fish size/age and contaminant levels which could be used to help advise local fishers about contaminant exposure. The work involved the collection of water, bottom sediments, lake trout, Arctic char, forage fish and benthic invertebrates from Peter Lake. Samples were analysed for toxaphene, other organochlorine contaminants and heavy metals and the results of these analyses are presented in this report. ... (Au)

See also: 70, 114, 115, 116, 131, 137.

CANADA. DEPT. OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

See: 51, 100, 101.

CANADA. DEPT. OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT. WATER RESOURCES DIVISION

See: 190.

CANADA. ENVIRONMENT CANADA

See: 52, 78, 101.

CANADA. INDIAN AND NORTHERN AFFAIRS CANADA

See: 33, 96, 143, 204.

CANADA. INLAND WATERS DIRECTORATE. WESTERN AND NORTHERN REGION

See: 101.

CANADIAN CENTRE FOR INLAND WATERS

9
Current contaminant deposition measurements in arctic precipitation : an overview of the snow collector and large volume snow collector / Canadian Centre for Inland Waters.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [10] p., ill.)
Report dated September 16, 1992.
ASTIS 416509
Libraries: ACU

Since the winter of 1990 the Canadian Centre for Inland Waters has been collecting snow samples from the Canadian Arctic in an Attempt to measure the concentrations of organic compounds delivered to these areas during the winter period. Initially, snow was collected at the end of the winter season to obtain an integrated sample for the entire accumulation period. As the project progressed, large volume snowfall collectors were developed and installed at two different locations in the High Arctic which made possible the study of the delivery of organic contaminants over short time periods throughout the accumulation season. The preliminary results from these experiments have shown that there are significant levels of these contaminants in the snow and that further and more widespread study is needed. What follows is a brief outline of the research plans, how the large volume snow collectors are installed and how the samples are obtained. (Au)

CANADIAN GEOPHYSICAL UNION. HYDROLOGY SECTION

See: 95.

CAREY, J.

See: 63, 64, 65.

CHOUINARD, J.

10
Arctic Environmental Strategy : annotated bibliography, 1991-1997 / Chouinard, J.
Ottawa : DIAND, 1997.
xvi, 86 p. ; 28 cm.
Appendix.
ASTIS 416215
Libraries: ACU

... This bibliography describes the work completed under the $100 million Arctic Environmental Strategy (AES). The Strategy began in 1991 and ended in March 1997. Administered by the Department of Indian Affairs and Northern Development (DIAND), in partnership with five northern Aboriginal organizations, three other federal departments, and the territorial governments, AES aimed to “preserve and enhance the integrity, health, biodiversity and productivity of the Arctic ecosystem for the benefit of present and future generations”.... The four principal components of the AES are Action on Contaminants, Action on Environment/Economy Integration, Action on Waste, and Action on Water. Also associated closely with the AES were actions taken internationally, including, for example those taken under the Arctic Environmental Protection Strategy and the Arctic Monitoring and Assessment Program at a circumpolar level. ... The bibliography contains nearly all materials produced for AES: journal articles, papers, posters and proceedings from conferences and workshops, government reports, theses, newsletters, booklets, and multimedia products such as videos and CD-ROMs. ... (Au)

11
Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Chouinard, J. [Editor]. Milburn, D. [Editor].
Ottawa : Northern Affairs Program, 1995.
ix, 186 p. : ill., maps ; 28 cm.
(Northern water resources studies)
ISBN 0-662-23939-3.
References.
ASTIS 369705
Libraries: ACU

This report consists of summaries of research studies conducted under the Action on Water Program of the AES from 1991 to 1994. The studies address a wide range of water issues including community health concerns about drinking water quality, flood forecasting, fish population levels and the efficiency of sewage treatment facilities and tailings ponds. Many studies respond directly to concern or issues raised by northern residents and industry. ... The summaries of recent aquatic ecosystem studies have been organized in five broad subject areas. The first section consists of aquatic ecosystem evaluation studies. These studies focus on the evaluation of ecosystem health and are concerned with both biotic and abiotic components. Also included are monitoring studies which establish spatial and temporal trends. The second section deals with community health issues, specifically the potential effects of human settlements on health. This section addresses concerns that have direct impacts on the quality of life. Sustainable development issues are the third section. Mineral development is the leading industry in Canada’s North. ... Mining can also cause detrimental ecosystem effects. This section contains studies that address the balance between promoting economic development and protecting freshwater ecosystems. The fourth section – predictions, forecasts and models – consists of two studies, one describing an update of a flood database and the second, a method for correcting precipitation estimates. Because of the potential loss of life and infrastructure, sound knowledge of potential flood events is important in vulnerable areas. The final section of this report consists of two education studies. ... (Au)

12
Arctic environmental strategy water component : end of year report, 1992-93 fiscal year / Chouinard, J.
[Yellowknife, N.W.T.] : Water Resources Division, Indian and Northern Affairs, 1994.
15 p. ; 29 cm.
Appendix.
ASTIS 425443
Libraries: ACU

... The goals of the water component of the Arctic Environmental Strategy (AES) are to develop and implement comprehensive water quality and quantity monitoring networks and laboratory facilities, and to conduct in-depth site-specific projects in response to water-related concerns. AES water quality and quantity networks are cost-shared with the Department

of Environment (DOE) and are being expanded to meet program needs. Wherever possible, stations will serve both quality and quantity monitoring purposes. The collection of basic water quantity and quality data serves a number of purposes such as environmental assessment and remediation, flood prediction and monitoring, construction design and the monitoring of compliance with water use licences. These baseline data also establish background conditions, and serve to identify further research needs. The AES water program also conducts area specific projects in response to problems identified by the baseline network, and through consultation with northern residents. These projects are generally based on public concerns about water quality and quantity. The studies may address basic questions such as: can we eat the fish and/or can we drink the water? In addition, water quantity concerns, such as the potential for flooding, are addressed by area specific studies. Additional information can be obtained on these studies in the AES Water Program Area Specific Report Series (Synopsis). One of the challenges facing the AES Water Program is to create a positive atmosphere for sustainable economic development. This can be accomplished by ensuring that funds allocated to northern research remain in the north. There are other ways in which the AES contributes to furthering economic development. The Water Program supports local business. Whenever possible, local suppliers are used. A major cost of the water program is the airplane or helicopter charters for northern research. By training and hiring community residents to sample water and assist in fish and sediment sampling, AES funds reach communities and help strengthen them. The second main way that the Water Program stimulates economic development is by generating private sector wealth. For example, the Water Program is becoming increasingly involved in projects with the mining industry to develop better ways to protect the environment. ... (Au)

COEDY, W.

See: 3, 102, 184.

CONLY, F.M.

13
Blackstone River gauging site assessment report, 1991 /
Conly, F.M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[26] leaves : col. ill., maps ; 28 cm.
Appendix.
ASTIS 415740
Libraries: ACU

Purpose of station: To assess regional hydrologic characteristics. ... Basin characteristics: The basin is located in an area of low relief south of the Liard River. A glacial till veneer dominates throughout the basin. The basin originates in a large wetland area and displays a discordant drainage in it's headwaters. The river shifts to a dendritic drainage in the lower reaches. The river meanders throughout its length becoming tortuous in the lower reaches. There are some meander cut-offs and oxbow lakes located along the lower reaches of the Blackstone River. The bed of the channel is dominated by small boulders, rocks, gravels and sands. The banks in the lower reaches consists of fine sands and silts. (Au)

14
Fort Nelson River gauging site assessment report, 1992 /
Conly, F.M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[14] leaves : ill. (some col.), maps ; 28 cm.
Appendix.
ASTIS 415804
Libraries: ACU

Purpose of station: Flood warning for Fort Liard and flood monitoring site for the Liard basin. Major triggering basin for Liard-Mackenzie River break-up. Petroleum exploration and development basin. Forestry occurring within the basin (i.e. clear cut logging). ... Basin characteristics: The Fort Nelson River basin drains a relatively low relief boreal forest region to the east and also a portion of the east face of the Rock Mountains to the west. The basin has four main tributaries: 1) Fontas River which primarily drains the boreal forest region to the east. 2) Sikanni Chief River which has its headwaters in the Rocky Mountains and then flows across the lower relief of the Boreal forest into the Fontas River. 3) Prophet River originates in the mountains with a small portion of the lower reach of the river draining the continental boreal forest region and flowing into the Muskwa River. 4) Muskwa River virtually parallels the Prophet River with only slightly larger percentage of the basin draining the lower boreal forest region. The Fontas River drains a portion of the boreal forest area which can have a wetland cover consisting 75% of the basin. The other three rivers, which originate in the mountains have very little wetland cover (0-5%) in their headwaters. Wetland cover does increase (up to 50%) in the lower reaches of the tributaries to the west. (Au)

15
A network plan for federal NWT water quality stations : a Green Plan/Arctic Environmental Strategy Initiative /
Conly, F.M.
Yellowknife, N.W.T. : Canada. Inland Waters Directorate. N.W.T. Programs, 1992.
ii, 43 leaves : 1 map ; 28 cm.
Appendices.
References.
ASTIS 360953
Libraries: ACU

This document outlines the basic strategy and initial design of a federal NWT water quality monitoring network. The network has been designed to address current and future national scale environmental issues in Canada's north. The federal NWT water quality network plan will meet goals and objectives outlined by the Green Plan's Arctic Environmental Strategy (GP/AES) and fulfill Environment Canada's federal legislated mandate. ... (Au)

16
North Nahanni River gauging site assessment report, 1991 / Conly, F.M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[13] leaves : col. ill., maps ; 28 cm.
Appendix.
ASTIS 415758
Libraries: ACU

Purpose of station: To assist in the Flood Forecasting Model of the Mackenzie River. ... Basin characteristics: The North Nahanni River originates from the Thundercloud Range in the Mackenzie Mountains (Elev. 2130 m). The headwaters flow east-south-east through mountainous terrain north of the Sombre Mountains and south of the Backbone Mountains. Typical alpine tundra vegetation borders the river throughout its length. Descending to an elevation of 1050 m, the Nahanni meanders eastward towards the Painted Mountains. The North Nahanni River then turns south towards the Manetoe Range passing on its north edge at an elevation of 760 m. The river continues to meander into a larger valley south of the Whittaker and Iverson Ranges past Dekale Creek and onto the Nahanni Plateau (Elev. 600 m). The Nahanni changes direction flowing northwards ..., for approximately 15 km, onto the Mackenzie Plains (Elev. 460 m) where it shifts eastward .... Directly below Carlson Lake the flow moves south ... past Battlement Creek. It continues to meander through braided channels to the southern tip of the Camsell Range (Elev. 300 m, ...). The Nahanni goes through a 180 degree turn meeting its largest tributary, the Ram River, and flows north, adjacent the Nahanni Range, to drain into the Mackenzie River to Camsell bend 30 km downstream. (Au)

17
NWT Water Quality Technical Training Workshop / Conly, F.M. Swyripa, M.W. Arctic Environmental Strategy. Water Quality Network Memorandum of Agreement [Sponsor].
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, 15 p.)
Report dated November 12, 1992.
Appendices.
ASTIS 416436
Libraries: ACU

This report describes the NWT Water Quality Technical Training Workshop held from September 23-25, 1992 and attended by thirty-two individuals from Inland Waters Directorate. The report consists of background information to the workshop, a financial summary, evaluation and recommendations. Appendix A contains a list of course participants and appendix B contains the evaluation results. (ASTIS)

18
Petitot River gauging site assessment report, 1992 / Conly, F.M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1992.
[32] leaves : col. ill., maps ; 28 cm.
Appendix.
ASTIS 415790
Libraries: ACU

Purpose of station: Station proposed to monitor the quantity and quality of water entering the Northwest Territories from northern Alberta and British Columbia. Interest is a result of significant oil and gas development in the headwaters of the basin and the IPL (Inter-Provincial Pipeline) pipeline crossing the upper basin. ... Basin characteristics: The Petitot River basin originates in the Cameron Hills, in the vicinity of Bistcho lake. The basin flows in a west-northwest direction across northern Alberta, British Columbia and Southwestern Northwest Territories, draining into the Liard River above Fort Liard. Consisting of 75% to 100% wetland, the upper basin is part of Low Sub-Arctic Wetland. The lower basin is part of the Continental High Boreal wetland and does not exceed 75% wetland cover. The upper portions of the basin consist of a deranged drainage pattern with very little relief. Lower portions of the basin have a poorly defined dendritic drainage pattern. The river is incised in the lower portion of the basin creating steep banks and canyon walls. (Au)

19
Ram River gauging site assessment report, 1991 / Conly, F.M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[15] leaves : col. ill., maps ; 28 cm.
ASTIS 415774
Libraries: ACU

Purpose of station: Alternate location for a proposed gauge station on the North Nahanni River, to support the Mackenzie River Flow Forecasting model. Basin characteristics: The Ram River originates on the Nahanni Plateau and the Tundra in the Mackenzie Mountain Range where headwater elevations are 1550 metres. The river flows southeast along the base of the Tundra Ridge, in mountainous terrain, for approximately 35 km. Moving onto the Ram Plateau (Elev. 750 m), the river passes into typical alpine tundra vegetation areas. The Ram River then meanders for 40 km across the plateau in a north-north-eastward direction. It then turns towards a Corridor Creek and Sun Dog Creek, join the Ram River from Tundra Ridge and the Ram Plateau. Limestone is the predominate feature of the Ram Canyon, allowing the river to cut into the rocks forming high shear walls. Ram Canyon, with 50 m depths, extends eastward for approximately 7 km where it ends north of the Silent Hills. Existing onto another plateau (Elev. 300 m), the river meanders northwards until it drains into the North Nahanni River. The waters of the Ram River then flow down the North Nahanni River into the Mackenzie northwest of Fort Simpson. (Au)

20
Tetcela River gauging site assessment report, 1991 / Conly, F.M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[9] leaves : col. ill., maps ; 28 cm.
Appendix.
ASTIS 415766
Libraries: ACU

Purpose of station: Proposed as a potential Mackenzie River Basin flow forecasting station as it provides insight into the flow of the Mackenzie River's west side tributaries. Basin characteristics: The basin drains an area of the Mackenzie Mountains between the Ram Plateau and the Nahanni Range. The basin relief ranges from approximately 475 feet near the mouth to over 3000 feet in the headwaters. The headwater areas consist primarily of alpine tundra with some small alpine conifers. The valley bottom consists of muskeg terrain dominated by black spruce. The river drains primarily northward meandering extensively across a muskeg valley bottom. Several small tributaries drain into the Tetcela from the Ram Plateau. A small channel, made up of several ephemeral channels, runs parallel to the Tetcela along the base of the Nahanni Range. It eventually turns westward and drains into the Tetcela River. Cli Lake as well as Sibbeston Lake (via Little Doctor Lake) provides significant input. Both Cli Lake and Sibbeston Lake are located to the east of the Nahanni Range. (Au)

See also: 48.

CURTIS, D.

21
Murchison River : gauging site assessment report, 1991 / Curtis, D. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[39] leaves : col. ill., maps ; 28 cm.
Appendix contains: Reconnaissance trip report – Kellet, Arrowsmith, Murchison, August 9-10, 1983; hydrometric survey notes; and a construction project cost summary.
ASTIS 376060
Libraries: ACU

... Purpose of station: Index station for the Northern Wager Bay Plateau thus improving IWD's baseline and regional water resource inventory in the NWT. Once data is collected over a specified period (five years), a correlation with the long term station, Hayes River, may be possible. Station also part of the East-West transect of stations monitoring flows to the Arctic Ocean. ... Site Selection Summary: The first site (Lat.68 26 43 Long.93 20 10) was abandoned and not recommended for further study. The second site (Lat.68 25 21 Long. 93 00 06) was also not recommended for any future investigation. There was considerable bank slumping found in this area, which is typical over the entire reach of the river investigated. ... Recommendations: Since the Murchison River offers few good gauging station qualities, it is recommended that no further investigation be carried out in this basin. ... (Au)

CYGNUS ENVIRONMENTAL CONSULTING

22
Take the plunge! Teaching resources on water education for secondary schools in the NWT / Cygnus

Environmental Consulting. Bastedo, J. Strong Interpretation. Strong, R. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [198] p., ill., maps)
Appendices.
References.
Glossary.
Also available in French under the title: Visez eau! Guide pedagogique sur l'eau pour l'eseignement des sciences dan les ecoles secondaires des T.N.-O.
ASTIS 416703
Libraries: ACU

... This teacher resource package arose out of the need to "northernize" existing high school science material on the subject of water. Funded by the Department of Indian and Northern Affairs through its Arctic Environmental Strategy, and co-ordinated with the Government of the NWT Department of Education, Culture and Employment, this project had two main objectives: 1. to provide information to help teachers and students understand northern water systems and issues, and to help them make knowledgeable decisions that will promote the maintenance of water quality in the NWT. 2. To develop a resource package pertaining to water in the NWT that can be integrated into existing grade 10 and 11 science curricula by teachers throughout the NWT. ... TAKE THE PLUNGE! is divided into seven units reflecting broad curriculum themes which must be taught as part of the Science 10 and Science 20 – Biology 20 curricula. Within these units are one or more activities formatted after the popular Project WILD environmental education activity guide prepared by the Canadian Wildlife Federation (1990). Using this format, we have made each activity or set of activities, as "stand-alone" as possible by providing procedures, evaluation suggestions, background information, case studies and additional sources of information including northern contacts. To ensure understanding of all water-related terms used, keywords are listed in a key Vocabulary section for each activity, and are defined in the Glossary at the end of the document. ... [The 7 units cover: 1) the properties of water, 2) water's role in regional processes, 3) aquatic ecosystems, 4) water power, 5) water quality, 6) water conservation and management, and 7) global connections.] (Au)

CYR, F.

See: 3, 102.

DAVEY, E.

23
Water quality sampling program, Lac de Gras area / Davey, E. Puznicki, W.S.
Yellowknife, N.W.T. : Water Resources Division, 1997.
iv, 26 leaves : map ; 28 cm.
Appendices.
References.
ASTIS 416088
Libraries: ACU

This report presents results from a water quality study that was carried out during the spring of 1996 on five major lakes found in BHP claim block. Grab water samples collected from Slipper, Nema, Moose, Vulture and Kodiak lakes were analyzed for major ions, nutrients, metals and physicals. The data collected from this study will aid in determining baseline values for the lakes' parameters and detecting water quality changes that may result from mining activities in the future. The study also provides some of the only under ice sampling that has been done in the area. A comparison of the Analytical Service Laboratories Ltd. (ASL) and the Taiga Environmental Laboratory test results was also undertaken for quality control purposes. (Au)

DAVIES, T.

See: 144.

DECELLES, J.

See: 163.

DERY, S.J.

24
Thermodynamic effects of blowing snow in the atmospheric boundary-layer / Dery, S.J. Taylor, P.A.
(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 293-302, ill., 1 map)
References.
ASTIS 414387
Libraries: ACU

A seasonal snowcover blankets much of the Mackenzie River Basin during wintertime. In such an environment, the frequency of blowing snow events can be relatively high and can have important meteorological and hydrological impacts. Apart from the transport of snow, the thermodynamic impact of sublimating blowing snow in air near the surface must be investigated. Using a fetch-dependent blowing snow model that incorporates prognostic equations for a spectrum of sublimating snow particles, temperature and humidity profiles, it is found that the sublimation of blowing snow can lead to ambient air temperature decreases of 1C and significant water vapour increases in the atmospheric boundary-layer (ABL), particularly at long fetches. This results in sublimation rates being substantially reduced with fetch despite ongoing transport of snow by wind, with typical snow removal rates of several millimetres snow water equivalent per day over open Arctic tundra conditions. Horizontal transport and redistribution of snow by wind can be, however, more significant snow removal processes. (Au)

ECHO BAY MINES LTD.

See: 42, 43, 206.

EDWARDS, T.W.D.

See: 38, 39, 40, 41, 43, 206, 207, 208, 209.

ENGLISH, M.C.

See: 52, 190.

EPP, K.

25

Burnside River at outlet of Contwoyto Lake : gauging site assessment report, 1991-1992 / Epp, K. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[61] leaves : ill. (some col.), maps ; 28 cm.
Appendix contains stage-discharge tables and hydrometric survey notes prepared by the Water Survey of Canada and Environment Canada Water Resources Branch.
ASTIS 376035
Libraries: ACU

... Purpose of station: It is of interest for regional hydrology, mining, possible highway design and as a trans-boundary site. Possible Gauging Locations: On August 13, 1991, gauging station #10QC003 was constructed at the Echo Bay mine site (which has gold and silver deposits). It is felt that a good relationship can be developed between these two sites as the distance between the north outlet and the Lupin site is only 30 kilometres. Site Selection Summary: The main concern with this location is it's accessibility. To obtain measurements at the north end of the lake, it is not possible to land within any reasonable distance of the measurement section. Because we already have three measurements at low, mid, and high water stages, we would therefore only have to concentrate on the extreme high and low water conditions. In which case a helicopter would be required in the area at these times. ... Recommendations: Site is to be constructed in conjunction with the Lupin Mine Site .... (Au)

26

Coppermine River below Desteffany Lake : gauging site assessment report, 1991-1993 / Epp, K. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[24] leaves : col. ill., 2 maps ; 28 cm.
Appendix contains hydrometric survey notes and a construction project cost summary.
ASTIS 375993
Libraries: ACU

... Purpose of station: This area is of interest for regional hydrology, mining, possible highway design and the Heritage River System. ... Possible Gauging Location: This is an excellent location for a stream gauging site. The site is accessible by floats in summer and wheel/skis in the winter. Bedrock is present for bench marks. The measurement section is located .5 km below the proposed site. The stream bed consists of 20 cm rocks with a few boulders on the right bank. Ten metres from the right bank, the channel becomes shallow and rocky, which may cause problems at low flows. The left bank is a sand hill. The control is a set of rapids below the measurement section. ... (Au)

27

Hood River near the mouth : gauging site assessment report, 1991-1993 / Epp, K. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[46] leaves : ill. (some col.), maps ; 28 cm.
Appendix contains: Arctic Ocean drainage information, current meter readings, hydrometric survey notes, a construction project cost summary, an EARP Prescreening Form for the Petitot, Hood and Fairly Lakes Rivers and correspondence re: application to construct a stream gauging station near the mouth of the Hood River.
ASTIS 376051
Libraries: ACU

... Purpose of station: It is of interest for regional hydrology, mining, and highway design. ... Possible Gauging Locations: This is a good site (Latitude 67 20 30, Longitude 108 55 37) for fixed-wing aircraft on floats in the summer, and on wheel/skis in the winter. ... Recommendations: This a good stream gauging location for the Hood River. There is bedrock for stable benchmarks, the control is a set of bedrock rapids downstream from the gauge and the cross section is good for measuring. The river is float plane accessible in the summer and by ski-wheels in winter. Although there are some concerns about winter landings, due to rough ice, an airplane could land reasonably close to the site. ... (Au)

28

James River : gauging site assessment report, 1991 / Epp, K. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[9] leaves : col. ill., 2 maps ; 28 cm.
Appendix contains hydrometric survey notes.
ASTIS 375985
Libraries: ACU

... Purposes of station: It is of interest for regional hydrology, mining, possible highway design and as an alternate to the Hood River. ... Possible Gauging Location: For 75 Km above the mouth to the confluence of the Hood River, there were no suitable landing sites for a fixed wing aircraft on floats. There were sites suitable for helicopter access but as this was an alternate to the Hood River they were not recorded. ... Recommendations: The Hood River is the primary river of interest in this basin. ... (Au)

29

Mara River : gauging site assessment report, 1991-1992 / Epp, K. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[30] leaves : col. ill., 2 maps ; 28 cm.
Appendix contains hydrometric survey notes and a construction project cost summary.
ASTIS 376027
Libraries: ACU

... Purpose of station: It is of interest for regional hydrology, mining, and as an alternate to the Hood River. However, it is not of sufficient interest as a solely IWD operated station. ... Site Selection Summary: There are few, if any, other sites that are accessible by fixed wing on this river. Heavy loads and/or strong crosswinds would limit access to this location, due to the length and width of the river landing area. This site offers good prospects for both measuring and gauging. This river freezes off to zero flow during the winter months. During highwater the river is measurable. If the gauge were constructed on the left-hand bank there would be easy access by float plane. ... Recommendations: The site on the left-hand bank would be acceptable for a streamflow gauging station. Boulders could be used as bench marks, which would be tied into a bedrock bench mark on the right-hand bank once a year. ... (Au)

30

Perry River : gauging site assessment report, 1991 / Epp, K. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[20] leaves : col. ill., maps ; 28 cm.
Appendix contains Perry River reconnaissance, August 3, 1983, sub-basin 10RB.
ASTIS 376043
Libraries: ACU

... Purpose of station: It is of interest for regional hydrology of major basins draining into the Arctic Ocean. Possible Gauging Locations: For

80 km above the mouth, there was no suitable landing near proposed sites, for a fixed wing aircraft on floats. There are likely sites accessible by helicopter only but this could not be fully determined from the air. ... Recommendations: No future reconnaissance recommended for a fixed wing access site. Reconnaissance should continue if access by helicopter is requested. ... (Au)

EVANS, M.S.

31

Biomagnification of persistent organic contaminants in Great Slave Lake / Evans, M.S.

(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 39-46)

Reference.

ASTIS 369756

Libraries: ACU

Project objectives: Long-term: 1. To determine the concentrations of persistent organic contaminants in various components of Great Slave Lake food webs; 2. To determine the influence of the Slave River on the contaminant loading to Great Slave Lake; and 3. To determine the influence of the Slave River on the biomagnification of persistent organic contaminants in Great Slave Lake food webs. Short-term: 1. To determine organic contaminant concentrations in whitefish, burbot, and lake trout collected from two regions of Great Slave Lake, i.e., an area strongly influenced by the Slave River and a second, more isolated “control” area. Compare these data with data collected from other subarctic and arctic regions; and 2. To conduct preliminary collections of plankton, mysids, and amphipods in the West Basin of Great Slave Lake (i.e., near the Slave River outflow) to determine abundance patterns and to investigate methods for obtaining larger numbers of organisms required for organic contaminant determinations (1994-95). (Au)

32

History of persistent organic contaminants deposition in the western basin, Great Slave Lake / Evans, M.S. Bourbonniere, R.A.

Saskatoon, Sask. National Hydrology Research Institute, 1994.

8 leaves : 1 map ; 28 cm.

References.

ASTIS 416401

Libraries: ACU

... The primary objective of this study was to collect a series of core samples which would allow for the determination of the recent history (past hundred years) of organic contaminant deposition to Great Slave Lake. Moreover, by comparing the history of organic contaminant deposition rates in two or three regions of the lake, it should be possible to assess the influence of the Slave River on: 1) contaminant loading to the lake, 2) the areal extent to which these river-born contaminants are dispersed through the lake, and 3) whether or not Great Slave Lake tends to act as a deposition basin for organic contaminants which enter the lake ecosystem. Cores collected in March 1994 with Northern River Basin funding will be analyzed with new funding in 1994/1995. With the exception of algal samples and total suspended solids, analysis of water column collections will be completed with March 1994 funding. (Au)

33

A March 1992 investigation of Great Slave Lake : organic contaminant concentrations in lake sediments and water column characteristics / Evans, M.S. Headley, J. Canada. Indian and Northern Affairs Canada [Sponsor].

Saskatoon, Sask. : National Hydrology Research Institute, 1993.

iii, 46 leaves : 3 maps ; 28 cm.

(Contribution – National Hydrology Research Centre, no. CS-93020)

(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [49] p., maps)

References.

ASTIS 383945

Libraries: ACU

The winter 1992 investigation of Great Slave Lake provided new information on the limnology of the lake and on organic contaminant concentrations in its sediments. Two sites (1 and 2) were sampled in the West Basin and two sites (3 and 4) in the East Arm. Specific conductivity at the two West Basin sites ranged from 227-233 micro mhos/cm: conductivity at sites 3 and 4 ranged from 54 – 194 micro mhos/cm and exhibited a pronounced trend to increase with depth. The lower conductivity at the East Arm sites is attributable to the weaker Slave River influence in this region of the lake. Although the water column was well oxygenated at all four sites, dissolved oxygen concentrations decreased with depth, especially at one of the two West Basin sites. Dissolved organic carbon concentrations also were higher in the West Basin sites. Dissolved organic carbon concentrations also were higher in the West Basin than East Arm sites and decreased in concentration with depth. Spatial and vertical gradients in dissolved oxygen and dissolved organic carbon suggest that significant metabolism of organic carbon occurs in the deeper regions of the water column. Total suspended solids concentrations were low, indicating weak input of suspended particulates from the Slave River and other rivers during ice cover. Nutrient, chlorophyll, and bacteria concentrations were low and indicative of an oligotrophic system. Sedimentation rates were estimated at two sites (1 and 3) using the Cs137 method. The estimated rate was <0.3 mm/year at the East Arm site and <1 mm/year at West Basin site. Core samples for organic contaminant analysis were collected from the two sites in the West Basin and site 3 in the East Arm. Composite samples from 0 – 2 cm and 10 -12 cm were analyzed for a broad range of organic contaminants. Concentrations were low with organochlorines, PCBs, toxaphene, polychlorodibenzodioxins (PCDDs) and polychlorodibenzofurans (PCDFs) generally below detection limits. Polynuclear aromatic hydrocarbons were the most abundant and commonly-detected compounds. PAH concentrations were higher at the West Basin sites than the East Arm site. While direct input from the atmosphere probably was a significant source of these PAHs, the higher contaminant concentrations at sites 1 and 2 suggest that riverine inputs represented an additional source for the West Basin sites. (Au)

34

Metal studies of water, sediments and fish from the Resolution Bay area of Great Slave Lake : studies related to the decommissioned Pine Point Mine / Evans, M.S. Lockhart, W.L. Klaverkamp, J.F.

[S.l. : s.n.], 1998.

xvi, 209 p. : ill. (some col.), maps ; 28 cm.

(NHRI contribution, no. 98-87)

Cover title.

Appendices.

References.

ASTIS 428957

Libraries: ACU

This study investigated concerns that the community of Fort Resolution raised regarding the decommissioned Pine Point Mine. Specifically, the community was concerned that the mine had contaminated or was contaminating water, sediments, and fish in the Resolution Bay area with metals released into the environment as a result of past mining operations. These concerns were given greater weight when a study investigating metallothionein concentrations in burbot liver, kidney, gill, and intestine in various regions of the Peace, Athabasca, and Slave River systems determined that burbot from the Slave River had elevated concentrations of this protein in their kidney and gills. This suggested that burbot in the Slave River delta had recently been exposed to elevated concentrations of

metals through a water-borne route. It was hypothesized that the Pine Point Mine was the source of these metals. Metal concentrations were determined in water (dissolved and particulates) and surficial sediments during an August 30-September ? 1996 study extending from west of the mine site to the eastern side of Resolution Bay and in the Slave and Little Buffalo Rivers. Limnological data (temperature, conductivity, pH, oxygen, water clarity, turbidity, suspended sediments and particulates, chlorophyll, bacteria, and plant nutrients) also were collected to provide insight into water movement and dilution in this region of the lake. It was determined that the Slave River was an enriched source of iron, manganese, and possibly nickel during the study: it also was a significant source of suspended sediments, particulates and various plant nutrients. The Little Buffalo River was an enriched source of salinity, dissolved nitrogen, ammonia and possibly, manganese and iron during the study. There was no evidence that water in the study area was being contaminated by the decommissioned mine. A review of the documentation on the operation and decommissioning of the mine site provided no indication of any mechanism by which water now flowing through the study region could be significantly contaminated by the decommissioned mine. ... A sediment core collected in a depositional area offshore of the decommissioned mine site was examined for metals. The time period extended from the late 1880s to the early 1990s. There was no evidence of an increase in metal concentrations in this core during the period in which the mine was operational. Pike, from the Little Buffalo River, and burbot, from the Slave River, were examined for metal (muscle, liver, and kidney) and metallothionein (liver, kidney) concentrations. A small number of inconnu (three from the Slave River) and walleye (one from each river) also were examined. Metal concentrations were similar to those observed in fish collected from the Slave River, Yellowknife Bay and Leland, Alexie, and Trout Lakes. The notable exception was arsenic. Differences in arsenic concentration were associated with differences between the two laboratories (Cantest and Freshwater Institute) conducting these analyses, i.e., low arsenic values were consistently associated with the one contract laboratory. Moreover, these low values were not consistent. ... Overall, there was no evidence that fish in the Resolution Bay area, including the Little Buffalo and Slave Rivers were contaminated with metals by the decommissioned Pine Point Mine. Metallothionein concentrations in burbot kidney and arsenic were similar to values reported from the Northern River Basin study for all study sites except the 1994 sampling of the Slave River delta. Thus, we were unable to verify the elevated metallothionein values in burbot kidney which were observed in 1994 for the Slave River sampling. The reasons for the elevated metallothionein concentrations in burbot kidney (and gill) in 1994 cannot be explained. We have, however, determined that these elevated values could not be due to the decommissioned Pine Point Mine. ... (Au)

See also: 99.

EVANS, R.E.

35

Histological analyses of posterior kidneys and livers of fish from Yellowknife Bay, Great Slave Lake, Northwest Territories, Canada / Evans, R.E. Klaverkamp, J.F.
Winnipeg, Man. : Freshwater Institute, 1997.
iv, 17 leaves : ill. ; 28 cm.
References.
ASTIS 415910
Libraries: ACU

1. Histological analyses were conducted on twenty northern pike and twenty lake whitefish samples of posterior kidney and liver from each of four sites at Yellowknife Bay, NWT. Also, histological analyses were done on liver tissue dissected from fifty-two preserved small fish of various species. 2. Generally, the posterior kidneys of northern pike and lake whitefish were in good condition; some had anomalies of insufficient magnitude to impair renal functions. Minor posterior kidney proximal tubule degenerative lesions were observed in three northern pike from site GSL-3. Hyaline droplets (a potential but not yet substantiated biomarker of chronic xenobiotic exposure) were found in the epithelial cells of proximal tubules of four lake whitefish, including one fish from reference site GSL-4. There was no evidence of proximal tubule cell hypertrophy, an adaptive response to some contaminants. 3. One northern pike was found to have massive degenerative liver damage. With the exception of that one fish from site GSL-3, the livers from both species were in good condition. Glycogen content in the majority of the northern pike was substantial. As a result the hepatic cell cytoplasm was clear and unstained. The lake whitefish liver glycogen stores were less abundant, the cells showing more cytoplasmic detail. There was no evidence of hepatocyte or nuclear hypertrophy in livers from both northern pike and lake whitefish. The lake whitefish liver was often host to parasites. 4. In the small fish species there were no lesions that are clearly linked to chronic exposure to contaminants. The stickleback was the only small fish species provided in sufficient numbers from each site. These provided no evidence of liver cell adaptation by hypertrophy of hepatocytes or their nuclei. Fibrous granulomas were observed in ten stickleback over three sites, including one at the GSL-4 reference site. This suggests a ubiquitous distribution. Granulomata are currently not recognized as a definitive biomarker of xenobiotic exposure, but rather the result of bacteria, fungi or non-infectious foreign bodies (e.g. parasites). (Au)

FRESHWATER INSTITUTE (CANADA)

See: 99.

GALLUPE, S.

36

Husky Lake, Fort McPherson area historic hydrocarbon exploration investigation, June 29, 1992 / Gallupe, S.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, 12 p., ill., maps)
Appendices.
ASTIS 416495
Libraries: ACU

The history of hydrocarbon exploration in the Husky Lake, Fort McPherson area dates back to the mid-1960s before Land Use Permits were issues. However, there are three (3) known wells that were drilled in the vicinity of Husky Lake but are not in the same drainage basin as Husky Lake .... There has been concern raised by citizens of Fort McPherson that current fish populations of Husky Lake related to historic hydrocarbon exploration in the area of Husky Lake. On June 29, 1992, Scott Gallupe, ... and Johnny Charlie, ... of Fort McPherson, conducted a site investigation of I-50 wellsite and surrounding area of Husky Lake. It was obvious at the time of the inspection that the I-50 wellsite was not in the Husky Lake drainage basin. The rise in elevation just east of the I-50 wellsite separates the Husky Lake and I-50 drainage area. The I-50 wellsite is approximately five (5) miles to the closest part of Husky Lake. The I-50 wellsite was abandoned in 1966. There was virtually no garbage left at wellsite I-50, with the exception of a few small pieces of scrap metal. The drilling sump was capped when abandoned and has revegetated very well. There was some ponded water on top of the abandoned drilling sump. Samples were taken of the ponded water and results are attached. There were no problems noted with the results. It is even more obvious that wellsites Stoney G-06 and Delta J-80 are not within the Husky Lake drainage basin. A “fly-about” of the sites was enough to conclude that their influence to Husky Lake would be insignificant. These two sites were clean of garbage and had revegetated very well. The seismic lines in the Husky Lake area are also over twenty years old and have revegetated very well. A surface grab sample of water was taken at the northwest part of Husky Lake at the time of investigation .... Results are attached. No problems were noted. Conclusion: It can be

concluded from this investigation that the historic hydrocarbon exploration in the Husky Lake, Fort McPherson area would have no significant impact to fish populations in Husky Lake. The Department of Fisheries and Oceans in Inuvik has been in contact with the Hunters and Trappers Association in Fort McPherson to possibly conduct a test fishery at Husky Lake in the near future. (Au)

GAN, T.Y.

37

Estimating areal snow water equivalent of Northwest Territories using passive microwave data / Gan, T.Y.

(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [10] p., ill.)

This paper was also presented at the Hydrotechnical Annual Meeting of the Canadian Society of Civil Engineers, Fredricton, June 8-11, 1993.

References.

ASTIS 416517

Libraries: ACU

Snow is the major source of freshwater in the Northwest Territories (NWT). In view of the size and remoteness of the Northwest Territories, the only feasible way to accurately map the areal distribution of snow in NWT on a regional scale is via remote sensing (RS). The development of an algorithm by a stepwise multiple regression technique for converting passive microwave data of the Special Sensor Microwave/Imager (SSM/I) on the Defense Meteorological Satellite Program (DMSP) satellite and data of the Scanning Multichannel Microwave Radiometer (SMMR) on the Nimbus-7 satellite to snow water equivalent (SWE) for the Northwest Territories is described. Data used were microwave brightness temperature, land cover, mean weekly maximum temperature and snow course data collected by the Indian and Northern Affairs Canada (DIAND) and Atmospheric Environment Service (AES). The satellite data was pre-processed by the Ph.D. Associates in North York while the land cover data, originally prepared from National Oceanic Atmospheric Administration (NOAA) images by the Manitoba Remote Sensing Centre, was aggregated using SPANS, a Canadian GIS, to a resolution compatible with the SSM/I data. Temperature data was generated from a network of 30 climatic stations of AES, each with about 40 years of weekly temperature data, and a stochastic model adapted from the seasonal lag-1 autoregressive model of Thomas-Fiering. Preliminary results show that the snow course data (point measurements) alone are not sufficient and airborne gamma data, which provide integrated SWE information, would be needed to develop the algorithm adequately. (Au)

GERARD, R.

See: 62.

GIBSON, J.J.

38

Development and validation of an isotopic method for estimating lake evaporation / Gibson, J.J. Prowse, T.D. Edwards, T.W.D.

(Hydrological processes, v. 10, no. 10, Apr. 1996, p.1369-1382, ill., maps)

References.

ASTIS 416894

Libraries: ACU

A study designed to test the validity of an isotopic method for estimating evaporation was conducted within a small, tundra lake situated in the continental Arctic of Canada. Evaporation was determined using an isotopic mass balance approach which accounted quantitatively for isotopic fractionation, progressive evaporative enrichment of delta 18O and delta 2H in lake water, and attenuation of enrichment by liquid inputs and atmospheric moisture. Concurrent determinations made using standard mass balance, energy balance, aerodynamic profile and class A pans permitted rigorous comparisons between methods. Results are presented for two summers which had distinct weather conditions and hydrological balances. Overall, the delta 18O balance was found to be in good agreement with standard methods during both years over time intervals greater than about one week. Owing to a less systematic response of delta 2H over short time periods, its use is not recommended for quantitative mass balance determinations over time intervals of less than about 50 days in this setting. (Au)

39

Evaporation from a small lake in the continental arctic : mass balance, energy balance, and aerodynamic profile studies / Gibson, J.J. Prowse, T.D. Edwards, T.W.D.

(Proceedings : Tenth International Northern Research Basins Symposium and Workshop, Spitsbergen, Norway, August 28 to September 3, 1994 / Edited by K. Sand and A. Killingtveit. – [S.l. : s.n., 1994], p. 182-200, ill., maps)

References.

ASTIS 367516

Evaporation from a small, tundra lake situated near the Lupin mine, Northwest Territories, Canada (65 45 N, 111 15 W) was examined over two thaw season periods using three independent methods. Mean daily lake evaporation averaged 3.5 mm/d over July and August 1992, and 2.4 mm/d over June to August 1993. Annual lake evaporation, estimated at 300 mm/yr and 220 mm/yr for the respective seasons, is roughly 10 to 50% high than values interpolated from standard evaporation maps of Canada. The observed magnitude and annual variability of lake evaporation indicates that it may be a critical design parameter for mine-tailings ponds if reservoir storage is to be maintained within specified limits during the post-operational stages of a mining operation. (Au)

40

Evaporation in the north : overview of quantitative studies using stable isotopes / Gibson, J.J. Edwards, T.W.D. Prowse, T.D.

(Mackenzie Basin Impact Study (MBIS), interim report 2 : proceedings of the Sixth Biennial AES/DIAND Meeting on Northern Climate & Mid Study Workshop of the Mackenzie Basin Impact Study, Yellowknife, Northwest Territories, April 10-14, 1994 / Edited by J. Cohen. – Downsview, Ont. : Environment Canada, 1994, p. 138-150, ill., maps)

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [13] p., ill., maps)

The same report was published in both places.

References.

ASTIS 356298

Libraries: ACU

A program of hydrologic research, focusing on development and application of the stable isotope-mass balance method for estimation of evaporation, is currently underway at sites in the Northwest Territories, Canada. The method relies on measurement of natural abundance variations of oxygen and hydrogen stable isotopes to trace evaporation and mixing in the hydrologic system. Following initial testing in two natural watersheds near Fort Simpson and Baker Lake, ongoing studies at

six mine sites in the region have centred on refinement and validation of the technique. Future studies will include description of the spatial variability of evaporation based on an expanded regional water sampling network. (Au)

41

Evaporation rates at mine sites in the Northwest Territories determined by an isotopic method / Gibson, J.J. Edwards, T.W.D. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
Ottawa : DIAND, 1995.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [54] p., ill., 1 map)
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [53] p., ill., map)
Appendices.
References.
ASTIS 361216
Libraries: ACU

This report describes isotope mass balance investigations conducted at six mine sites in the Northwest Territories during 1991 to 1994. Based on analysis of delta 18O and delta 2H for nine hundred and fifty-one water samples collected at the sites, lakes and tailings ponds were found to be systematically enriched in the heavy isotopic species relative to precipitation and groundwaters due to kinetic fractionation occurring during evaporation. Evaporation was calculated for selected reservoirs using delta 18O mass balance. Results, assumptions and potential errors are evaluated and discussed. Also, results are compared with available data from one other study. (Au)

42

Evaporation rates at mine sites in the Northwest Territories determined by an isotopic method : 1996 addendum / Gibson, J.J. National Hydrology Research Institute (Canada) [Sponsor]. Northern Affairs Program (Canada). Water Resources Division [Sponsor]. Waterloo Centre for Groundwater Research [Sponsor]. Natural Sciences and Engineering Research Council Canada [Sponsor]. Echo Bay Mines Ltd. [Sponsor]. Nanisivik Mines Ltd. [Sponsor]. Royal Oak Mines Ltd. [Sponsor]. Metall Mining Corporation [Sponsor].
Saskatoon, Sask. : NHRI ; Yellowknife, N.W.T. : Water Resources Division, DIAND, 1997.
19 leaves : ill. ; 28 cm.
Appendices.
References.
ASTIS 415898
Libraries: ACU

A non-steady isotope mass balance method was applied to estimate evaporation rates from natural lakes and mine-tailings ponds at three mine sites in the Northwest Territories during 1996, based on analysis of delta 18O and delta 2H in 175 water samples and supplementary hydrometeorological data collected at the sites. Results are presented and compared to evaporation estimates derived for 1991 to 1995. Revised estimates are also presented from Yellowknife and Salmita which take into account new volumetric estimates based on recent bathymetric surveys of the study reservoirs at each site. Overall, revised volumetric estimates have reduced depth-equivalent evaporation estimates at the sites by about 10% and 4% respectively. (Au)

43

Evaporation studies at the Lupin Mine site using stable isotopes. IV : 1993 progress report / Gibson, J.J. Whidden, J.A. Edwards, T.W.D. Echo Bay Mines Ltd. [Sponsor].
Waterloo, Ont. : Dept. of Earth Sciences, University of Waterloo, 1993.
ii, 16 p. : ill., maps ; 28 cm.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [19] p., ill., maps)
Appendix.
References.
ASTIS 339857
Libraries: ACU

Field investigations in support of the University of Waterloo Evaporation Study Program were conducted at Lupin and three other mine sites in the Northwest Territories during 1992. The primary objective of the four year study (1991-1994) is the development and assessment of operational methods for characterizing water balance of lakes and tailings ponds in northern climates. Details of the 1992 field program, including water sampling and physical monitoring, are described in the December 1992 report submitted to Echo Bay Mines Ltd. [1]. Reconnaissance investigations carried out during July 1991 are described in two previous reports [2,3]. The field program was structured to permit a two month period of evaporation measurements using both isotopic and physical methods. Water samples for isotopic analyses were collected over the course of the thaw season from a variety of natural lakes and the Lupin tailings reservoirs (Ponds 1 and 2). A small study lake situated near the tailings ponds was selected for detailed comparison of evaporation based on isotopic methods and four independent physical methods, namely: Class A evaporation pans, water balance, energy balance (Priestly-Taylor method), and aerodynamic profile. This report contains a summary of preliminary results from isotopic and physical monitoring of the study lake and tailings reservoirs. An outline of proposed activities for the May to August 1993 period is also included. (Au)

44

An isotopic method for measurement of evaporation from lakes and tailings ponds / Gibson, J.J. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
[S.l. : Water Resources Division, DIAND], 1994.
33 p.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 3, [33] p., ill., 1 map)
References.
ASTIS 367508
Libraries: ACU

Hydrologic investigations focusing on the development and application of isotopic methods for estimation of evaporation are underway at mine sites in the Northwest Territories. The isotopic method is based on the measurement of natural abundance variations of the rare, heavy isotopic species of water (2H1H16O, 1H1H18O) relative to common, light water molecules (1H1H16O). Assessment of isotopic variations in natural lakes and tailings ponds has been carried out at the Lupin, Salmita, Nanisivik, and Giant mine sites, and the Izok lake deposit. The observed levels of isotopic buildup in lakes are shown to be a sensitive, quantitative record of lake evaporation. Validation of the results using conventional instrument-based techniques has established the isotopic methods are an accurate alternative for measurement of evaporation. Following initial surveys of isotopic variations at a site, combined with gatherings of basic hydrologic information, monitoring of evaporation can be sustained by collection of lake water samples for isotopic analysis. (Au)

45

A six-year isotopic record of lake evaporation at a mine site in the Canadian subarctic : results and validation / Gibson, J.J. Reid, R. Spence, C.
[S.l. : s.n.], 1997.
23 leaves : ill., maps ; 29 cm.
Submitted to Hydrological Processes, Canadian Geophysical Union – Hydrology Section Special Issue, June 1997.
References.
ASTIS 416886
Libraries: ACU

An isotopic method is applied in conjunction with a water balance method and the Penman combination method to estimate evaporation from a small high-closure lake near Yellowknife, Northwest Territories, Canada (62 03 N, 111 24 W). The study provides baseline hydrological information for assessment of tailings pond design and management at nearby mine sites, and notably, has enabled inter-comparison of several field-based evaporation methods and a standard climate approach in a subarctic setting. Water samples were collected at regular time-intervals to characterize temporal changes in the isotopic compositions of lake water, groundwater, precipitation, and atmospheric moisture, as part of a comprehensive monitoring programme during the open-water periods of 1991 to 1996. A non-steady isotope mass balance method is applied to estimate evaporation over individual sampling intervals ranging from five-days to three-weeks. Use of a relatively high-precision non-steady technique, in contrast to the commonly employed approach assuming isotopic steady-state, is feasible in the present setting due to pronounced seasonal evaporative enrichment in lake water (20-30 times analytical uncertainty of delta 18O). A comparative analysis reveals that the isotopic method is conservative relative to the Penman combination method, but less conservative than standard water balance, although estimates for the open-water period are in agreement to within 20% in both cases. Inter-annual variability in evaporation is revealed to be 30 to 50% greater than predicted from standard pan-to-lake algorithms, and of the same order of magnitude as annual snow water equivalent (~115-175 mm), which has important implications for design and management of tailings ponds in the area. (Au)

See also: 205, 206, 207, 208.

GLOBAL ENERGY AND WATER EXPERIMENT

See: 78, 96, 143, 144.

GOLDER ASSOCIATES

46

Port Radium analytical report : second draft / Golder Associates. Swanson, S. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [102] p., ill., maps)
Appendices.
References.
ASTIS 416606
Libraries: ACU

... The abandoned Port Radium minesite is located on a peninsula on the eastern shore of Great Bear Lake, midway along the McTavish Arm (66 05 N & 118 02 W). Between 1933 and May 1982, radium, uranium and silver were mined at the site. In response to concerns about the site, the Water Resources Division of the Department of Indian and Northern Affairs (DIAND) carried out a sampling program in 1993. This report was commissioned by DIAND in order to assess and analyze the fish and water data collected in 1993. The main objective was to compare the 1993 data with previous data from the site and other relevant sites regarding levels and trends in heavy metals and radionuclides. ... [According to all three studies of water quality] ... the most contaminated sites in terms of radionuclides and metals are: Silver Point tailings area; West Adit tailings area; and Garbage Lake. Ponded water in the area of the West Adit waste rock is also significantly contaminated. The Kalin (1984) data and the DIAND (1994) data are the most complete and were the most informative regarding the full extent of contamination at Port Radium. ... Contaminants that exceeded Canadian drinking water guidelines were: uranium, radium-226, arsenic, cadmium, iron, and lead. ... Contaminants that exceeded Canadian guidelines for the protection of aquatic life were: uranium, arsenic, copper, lead, mercury, nickel and zinc. ... Contaminants that exceeded normal Canadian background concentrations were: uranium, arsenic, copper, iron, lead, nickel and zinc. ... Contaminants that exceeded the range found at operating or abandoned uranium mines in northern Saskatchewan were: radium-226, arsenic and zinc. ... These results indicate that, apart from the obviously contaminated areas of Garbage Lake, Silver Point tailings and the West Adit, there were also some water quality issues in adjacent areas of Great Bear Lake. These areas were Cobalt Channel, Inner Labine Bay and Bear Bay. These issues relate to exceedance of both drinking water and aquatic biota guidelines, as well as concentrations above the range of Canadian background concentrations. ... (Au)

GOODISON, B.E.

See: 89, 152.

GRAY, D.M.

See: 139, 140, 143.

GREGOR, D.J.

See: 64, 85, 86, 101, 183, 210.

GREY, B.J.

47

Mercury in fish from rivers and lakes in southwestern Northwest Territories, July 1995 : northern water resources studies / Grey, B.J. Harbicht, S.M. Stephens, G.R.
Ottawa : Indian Affairs and Northern Development, 1995.
xi, 61 p. : ill., maps ; 28 cm.
ISBN 0-662-23220-8.
Appendix.
References.
ASTIS 383171
Libraries: ACU

This report presents and interprets data on mercury contamination in fish from the Slave and Hay Rivers in southwestern Northwest Territories.

Fish were also sampled from a study control site, Leland Lake, in the Slave River basin. The original purpose of this study was to assess water quality in the Slave River including mercury levels. Since it is difficult to accurately measure mercury in the water column, fish were selected as the measurement medium. Mercury data from fish tissues were provided to Health Canada .... Walleye, pike and lake whitefish were sampled over three years (1988 to 1990). These three species were selected because of their importance to local residents for subsistence fishing. Total mercury concentrations were determined in the samples, with methylmercury concentrations determined in a random subset. Based on this subset, approximately 90% of the total mercury concentration was methylmercury. ... Slave River, Hay River and Leland Lake fish contained lower mercury concentrations compared to the same species at other sites (commercial fisheries database) in the southwestern Northwest Territories. The regional pattern for mercury contamination did not appear to indicate the presence of anthropogenic point sources of mercury. In fact, the highest mercury concentrations were observed in fish from remote lakes and may therefore reflect geological sources or atmospheric deposition. This confirms other findings of mercury in fish from waters in the Peace and Athabasca basins, and elsewhere in Alberta. Although a few individual fish at the study sites did contain mercury concentrations at or above the Canadian guideline for human consumption, average concentrations for each species were below the guideline. (Au)

HALLIWELL, D.

48

Water resources overview for Wager Bay basin, NWT / Halliwell, D. Wedel, R.L. Conly, F.M. Canada. Atmospheric Environment Service. Seale, E. Parks Canada. Spence, C. Northern Affairs Program (Canada). Water Resources Division. Northwind Consultants. Wedel, J.H. [Editor].
Yellowknife, N.W.T. : Atmospheric Environment Branch, Environment Canada : Parks Canada, Canadian Heritage : Water Resources Division, 1997.
vi, 46 p. : ill. (some col.), maps ; 28 cm.
References.
ASTIS 416002
Libraries: ACU

The Wager Bay area is recognized as a special region of Arctic wilderness by Canadian conservationists, wildlife scientists, and cultural heritage researchers. This stature resulted in Parks Canada, ... submitting a proposal in 1978 for the creation of a new national park in the area, representing one of Canada's 39 natural regions. A decision on the park proposal has been postponed for almost two decades however, during negotiation of the Nunavut land claim. In the interim, studies were undertaken by Parks Canada to assess the areas' biophysical and mineral resources, cultural heritage features, socio-economic and tourism potential, and environmental implications of a park. In early 1993, northern federal Environment, Parks, and Indian & Northern Affairs Canada managers agreed that additional information was needed on the water resources of Wager Bay. The study was intended to contribute to the feasibility study for the park, and provide baseline data for managing of a park. A two year program was approved to collect and interpret additional environmental data and existing information, and characterize current environmental conditions in the area. Study data and information from long term water monitoring stations in the area show variations due to area terrain, however many similarities were found in the timing and quantity of runoff, quality of water and sediments, and levels of environmental contaminants in rivers and lakes of Wager Bay basin. Area waters are generally of good quality, however some relatively high levels of contaminants were found in water and sediment, relative to guidelines set for human consumption and protection of aquatic life by the Canadian Council of Resource and Environment Minister (CCREM). Elevated levels found for mercury, aluminum, and a few other parameters are believed to be due to the geology (rock types) of the area, or airborne contaminants from global sources. Levels observed are similar to those found elsewhere in northern Canada however, and do not currently pose a significant hazard to the environment, wildlife, or humans of the region. Wager Bay is centered in the Wager Plateau, in the largest mainland portion of the Northern Arctic Ecozone of Canada. As little information is available on Wager Bay and the Arctic Islands, it is difficult to say whether the area is truly representative of the entire ecozone, however features of the watershed are common to the Wager Plateau. Approval of a park will provide additional reasons for long term monitoring and environmental protection efforts in the area, which are necessary to ensure that wildlife, landforms, and aboriginal use are preserved. (Au)

See also: 169.

HANSEN, M.

49

Hare Indian River gauging site assessment report, 1991-1993 / Hansen, M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[32] leaves : col. ill., maps ; 28 cm.
Appendix.
ASTIS 415731
Libraries: ACU

Purpose of station: To assess regional water resources in preparation for proposed gas pipeline and highway design. ... Basin characteristics: The Hare Indian River drains an area north of the Franklin Mountains. The headwaters of the Hare Indian originate in the wetland area, west of the Smith Arm of Great Bear Lake. The Bluefish River, the main tributary to the Hare Indian, drains a wetland area bordering the Carnwath River basin to the North. The drainage pattern of the Hare Indian and Bluefish Rivers are discordant and deranged in the headwaters, changing to a dendritic pattern towards the mouth. The basin is generally low relief with primarily a glacial till veneer. The channel in the lower reaches consists primarily of gravels with some fine sands and silts located in pools and other sediment accumulation areas. The upper reaches of the basin consists of up to 50% wetland environment. This portion of the basin consists of peat bogs, palsa bogs, ribbed and horizontal fens. Vegetation in the upper reaches consists primarily of spruce, willows ground heath and mosses. The lower reaches towards the Mackenzie River still has significant wetland areas but vegetation is denser with greater variety including large willows, spruce, birch and poplar trees. (Au)

50

Horton River gauging site assessment report, 1991-1993 / Hansen, M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[47] leaves : col. ill., maps ; 28 cm.
Appendix.
ASTIS 415723
Libraries: ACU

Purpose of station: To improve IWD's baseline and regional water resource inventory in the N.W.T. (for linear basins flowing into the Arctic Ocean.) River used regularly by recreationnists. ... Basin characteristics: The Horton River is unique in that it drains through two distinct physiographic regions. The head waters of the Horton River originate in the Brock Uplands. The Brock Uplands is a high relief area of the interior plains along the edge of the Canadian Shield. The river flows from this upland area onto a low relief plains region, consisting primarily of glacial till and some glacial marine deposits near the coast. The channel flows through a wide valley with steep hills exceeding heights of 200m. The river bed consists primarily of gravel and course sands. The channel meanders continuously along its reach with little evidence of geologic structural control. The lower reaches of the river demonstrate a dominant braided pattern with many small islands. The basin is dominated by open tundra vegetation especially through the lower reaches. Spruce and willows are also present along the river and more predominant in the head

water areas. It is worth noting that the approximate limit of trees transects the upper third of the basin. (Au)

HARBICHT, S.M.

See: 47, 86, 88, 214, 215.

HARRISON, S.E.

See: 66.

HBT AGRA LIMITED

51
Water quality in the Slave Structural Province / HBT AGRA Limited. Canada. Dept. of Indian Affairs and Northern Development [Sponsor].
[S.l.] : HBT AGRA Limited, 1993.
v, 92 p. : ill., maps ; 28 cm.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [6, 93, 30] p., ill., maps)
Appendices.
References.
ASTIS 361690
Libraries: ACU

... The study area as given in the Terms of References includes much of the Slave Structural Province and has been geographically defined as ... Western boundary – the most westerly part of the North Arm of Great Slave Lake, northwest along the series of lakes that form the Camsell River system, to the east shore of Great Bear Lake near Sawmill Bay, then along the east shore to Hornby Bay, then northeast to the southwest shore of the Coronation Gulf at Richardson Bay, located slightly west of Coppermine. Northern boundary – along the south shore of the Coronation Gulf between Richardson Bay and Bathurst Inlet. Eastern boundary – along the west shore of Bathurst Inlet, south to Artillery Lake, including Clinton-Golden Lake, along the west shore of Artillery Lake to the Lockhart River, and along the Lockhart River to McLeod Bay, Great Slave Lake. Southern boundary – along the north shore of Great Slave Lake from the eastern edge of McLeod Bay, to the most westerly part of the North Arm, including Marion Lake. ... The objectives of this project as given in the Terms of Reference are listed below: 1. Design a study to measure the current water quality in the Slave Structural Province. 2. Identify past, present and future developments that might affect water quality in this area. ... (Au)

See also: 159.

HEADLEY, J.

See: 33.

HESSLEIN, R.H.

See: 87.

HILL, R.B.

52
An assessment of landform development within the Slave River Delta, NWT, from 1930 to 1994 / Hill, R.B. English, M.C. Stone, M.A. Canada. Environment Canada [Sponsor].
Waterloo, Ont. : Wilfrid Laurier University. Cold Regions Research Centre, 1997.
66 p. : ill., maps ; 28 cm.
Appendices.
References.
Photocopy.
ASTIS 431460
Libraries: ACU

... The purpose of this report is to identify and measure areas of morphometric change within the Slave River Delta in an attempt to establish key sites for deposition and erosion. Six sets of aerial photographs representing the active portion of the Slave River Delta over a 64 year period from 1930 to 1994 have been converted to digital format in order to: 1. quantify the magnitude of change which has occurred within the subaerial portions of the delta, 2. determine delta front progradation, and 3. evaluate changes in channel morphology and their impacts on deposition and erosion throughout the delta. From 1930 to 1957, the subaerial delta grew by more than 1890 ha and considerable deposition occurred within the central portions of the delta leading to the development of relatively large cleavage bar islands and the narrowing of Mid-Channel West and East Channel. Over the next nine years the delta underwent a period of rapid decline where more than 260 ha were lost to erosion. Based on the analysis of channel morphology it appears that this deconstruction phase may be the result of shifts in the distribution of flow throughout the delta. Since 1966, the subaerial delta has grown by close to 950 ha; however, the rate of growth has been reduced by the impacts of upstream impoundment which limit the delivery of sediment to the outer delta. Examination of the spatial distribution of growth within the Slave River Delta over the 64 year period of study seems to indicate that most of this growth is occurring in the quiet sheltered environments of Nagle Bay and Jackfish Bay where deposition is enhanced by relatively shallow water depths and the protection of barrier bar formations. Conversely, deposition in the central portions of the delta appears to be the result of a decrease in discharge caused by reduced flows in the Slave River and the partial closure of Mid-Channel West. ... (Au)

HOLMES, G.

53
McConnell River : gauging site assessment report, 1991 / Holmes, G. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[19] leaves : col. ill., maps ; 28 cm.
Appendix contains a construction project cost summary.
ASTIS 376078
Libraries: ACU

... Purpose of station: Index station for flows to Hudson Bay, along a North-South transect, improving IWD's baseline and regional water resource inventory for the NWT. Data would be collected for 10 years, with possible long term extension. ... Site Selection Summary: The most favourable site for stream gauging is location Latitude 61 03 13 and

Longitude 95 00 16 (Site #1). This site provides bedrock for bench marks, a deep orifice pool, good containment of all flows and short orifice line lengths. The water level fluctuation is approximately 4.0m. ... Recommendations: This river is involved in a complex split drainage that includes the Tha-Anne River split at Roseblade Lake. Due to the uncertainty of this basin at various water levels this site should not be gauged unless a full study is done on the area. This study would involve many stations to describe flows and routing through the basin. Since the McConnell was considered a secondary river to the Maguse it should be set aside until sufficient funding becomes available to conduct a full study of the area. If this river is selected for gauging, two additional visitations will be required. One trip should be taken in mid winter and the other during spring high water. ... (Au)

HUNT, R.V.

See: 66.

ISHIDA, S.

See: 89, 90, 91.

JACKSON, F.J.

54

A metal and trace element evaluation in Kam and Grace Lakes / Jackson, F.J. Arctic Environmental Strategy. Action on Water Component [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, DIAND, 1996.
145 leaves : ill., maps ; 28 cm.
Mostly tables.
Appendices.
References.
ASTIS 415839
Libraries: ACU

In 1989 the Department of Indian and Northern Affairs Canada initiated a water quality in the Kam and Grace Lakes (control site) area. The main concerns were with the Yellowknife Correctional sewage facilities, Con Mine tailings and the Kam Lake Industrial Park activities mainly pre-mid 1980s in the Kam Lake area. Specific concerns were with the quality of the water and fish in Kam Lake. A pilot study was initiated in 1989, during which only water was investigated. In order to obtain a better representation of the study area the study was continued for an extra two years where water, sediment and fish were looked at. This report compiles and compares data from the three following reports: 1. Kam Lake Water Quality Study: Report on the 1989 Pilot Project 2. Kam Lake Study Year One 1990-91, and 3. Kam Lake Water Quality Study: Report on the 1991-92 Field Work. The reports indicate that the average arsenic (As) results from water samples collected from Kam Lake were above the drinking water and freshwater aquatic life guidelines for all three years of the study. The average copper (Cu) results in water samples collected from Kam Lake also exceeded the freshwater aquatic life guidelines in all cases but only once in Grace Lake. Two other metals with drinking water guidelines, zinc and cadmium, were also below the set guidelines. Bacteriological data were also collected but unfortunately there was not a health risk assessment requested on the water data to determine whether or not it was safe to drink the water from or swim in the lakes. This means that, additional bacteriological samples should be collected again in order to re-assess the water chemistry because it is changing on a continuous basis and the old data are not useful at this time. The sediment samples collected were more for inventory and comparison (Kam Lake vs. Grace Lake) purposes because there were no sediment quality guidelines at the time, however, today there are draft interim sediment quality guidelines .... In addition, 90 fish were collected from Kam Lake in 1990 and 1991 to determine whether or not they were safe to eat. A health risk assessment conducted on the fish muscle tissue samples collected from Kam Lake concluded that the fish were in fact safe to eat (see Appendix 13). Unfortunately no fish were collected from Grace Lake (control site). (Au)

55

Teaching resources on water education for secondary schools in the Northwest Territories / Jackson, F.J.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 185-186)
ASTIS 369977
Libraries: ACU

Project objective: To develop a teachers' resource package on northern water resources that is suitable for use throughout the Northwest Territories at the grade 10-12 level. ... The seven teaching units include the following sections: 1. A Peculiar Substance: Properties of Water; 2. The Lifeblood of All: Water's Role in Regional Processes; 3. Our Watery Home: Aquatic Ecosystems; 4. Water Uses and Values; 5. Water Conservation and Management; 6. Water Quality and Quantity; and 7. Global Connections. In addition to these seven units, the resource package includes an appendix, an aquatrivia, a glossary and introductory notes for teachers and resource people. ... (Au)

56

Trace metal concentrations of effluent from two goldmines [sic] discharging into Great Slave Lake, Northwest Territories / Jackson, F.J.
(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 195-213, ill., maps)
References.
ASTIS 414310
Libraries: ACU

Local concerns about the treated liquid effluent from two goldmines in the Yellowknife area has been an on-going issue as people have become more environmentally aware. Two local native groups expressed their concerns by asking questions about the health and safety of water and fish. Because the two mines have been in operation for over 40 years, a multimedia study was initiated to determine what effects the liquid effluent have had on the water, sediment and fish at the two mine outlets. Other study sites included two recreational areas used for swimming and a control site at the City of Yellowknife's water supply. Water, sediment and fish were collected throughout the study area. The only site whose water was not safe to drink with prior treatment (boiled/chlorinated) was at one of the two goldmines where arsenic concentrations exceeded raw water guidelines for drinking. The sediment results showed that the metal concentrations were highest at the mine outlets, the fish results indicated a similar pattern. This report will show arsenic and mercury concentrations found in the water (grab samples), sediment (grab samples) and illustrate arsenic and mercury concentrations found in fish muscle tissue. The whole study was entirely community driven with local representatives choosing the sample sites and participating in the collections of the water and sediment samples. (Au)

57

Yellowknife and Back Bays environmental evaluation / Jackson, F.J.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 25-32, ill., 1 map)

ASTIS 369730
Libraries: ACU

Project objective: To respond to concerns raised by Ndilo and Dettah residents about water and fish quality. The project focussed on an environmental evaluation of Yellowknife and Back Bays of Great Slave Lake by conducting an extensive water, sediment and fish sampling program over two years. ... The only significant finding from the analyses of sediments from three sampling periods are the elevated levels of arsenic at site 2, the outlet of Baker Creek at site 10, the outlet of Peg Lake at Great Slave Lake ... Because arsenopyrite is found in gold ores in this area, these elevated levels are not considered unusual. ... Over 400 lake whitefish, walleye, longnose sucker, burbot and northern pike were collected from the two bays in 1992 and 1993. The fish muscle, liver and kidney were analyzed for arsenic, cadmium, copper, lead, mercury, nickel, selenium and zinc. Because of its environmental and health significance, a summary of mercury in fish tissue is shown in Table 4. ... (Au)

58

Yellowknife-Back Bay study on metal and trace element contamination of water, sediment and fish / Jackson, F.J. Lafontaine, C.N. Klaverkamp, J.F. Arctic Environmental Strategy. Action on Water Component [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, DIAND, 1997.
xiv, 195 leaves : ill., maps ; 28 cm.
Appendices.
References.
ASTIS 415820
Libraries: ACU

At a meeting in March 1992, two N.W.T. communities, Dettah and Ndilo, expressed concerns about the water and fish quality in the Yellowknife-Back Bay areas. ...The concerns were expressed as three questions: 1. Is the water safe to drink? 2. Is the water safe to swim in? and 3. Are the fish safe to eat? The present study looks at the water, sediment and fish quality in the two bay areas. A health risk assessment on the water data is included but for fish it is pending. In addition, a dietary study was conducted by the Mackenzie Regional Health Services in order to correlate store bought food intake versus country food intake. This study is a separate report. The water, sediment and fish study was started in August 1992 and completed in March 1994. ... Water was analysed for 25 physical, chemical and biological parameters and results were compared to the Canadian Water Quality Guidelines (CWQG) set for the protection of freshwater aquatic life, raw drinking water and recreational uses. 28 chemical parameters were analysed in the sediment samples, for organic and inorganic concentrations. Most of water quality results are well within the Canadian Water Quality Guidelines for raw drinking water usage except for site #2, Baker Creek, outlet at Great Slave Lake. Mackenzie Regional Health Services deemed the water at community use areas safe to drink and swim in but still recommended that the water be treated for bacteria (boiled/chlorinated) prior to consumption. The sediment results showed the sites near Giant mine had noticeably higher values in most of the 16 elements analysed with other sites showing occasional higher values. Six species of fish consisting of 1) lake whitefish, 2) longnose suckers, 3) burbot, 4) walleye, 5) northern pike and 6) lake trout were analysed for eight heavy metals. Tissue analysis included the muscle, liver, kidney, stomach and eggs. Although elevated concentrations of As, Hg, Cd, and Se were observed in various tissues of fish collected from sites downstream of the mine sites, preliminary analysis indicates that these concentrations might be well below limits set for human consumption. A complete health risk assessment will be provided by Health and Welfare Canada some time in the future. In addition to the metal analyses of the fish tissues, a final section summarizes the following: biological descriptions (length, weight, age and condition factor) for the six species of fish caught; an estimate of the annual loading of metals by Royal Oak Mines Inc. (Giant mine) and Miramar-Con Mine; and a description of the shoreline (littoral zones) for the two bays likely to be impacted by the future expansion of the City of Yellowknife. ... (Au)

59

Yellowknife-Back Bay summer monitoring program (one year project) / Jackson, F.J.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [2] p.)
ASTIS 376876
Libraries: ACU

Locations: The Yellowknife-Back Bay area (six water sampling sites). Representative site is the government dock at 62 27.860 N 114 20.710 W (GPS). Objectives: 1) To gather water quality data from the two mine outlets, Royal Oak-Giant and Miramar-Con and determine spatial trends during the decant season (May to September 1994). 2) Gather water quality data from a storm drain outlet for the purpose of monitoring types and concentrations of materials that are entering Great Slave Lake. ... Samples were collected 15 times at seven sites from May 30, 1994 to September 23, 1994. Additional samples from a storm drain outlet were also taken, but only twice due to low precipitation. One sample was analyzed for metals and the other for glycols and PAHs. ... Preliminary results show that the storm drain effluents are many times greater in concentration than what is being detected at the two mine outlets for certain elements. ... The YK-Back Bay is a high profile area, with ongoing public concerns about the mining effluents entering the Yellowknife-Back Bay area. ... (Au)

60

Yellowknife-Back Bay Summer Water Quality Monitoring Program (September 1992 to June 1995) / Jackson, F.J.
Yellowknife, N.W.T : Water Resources Division, Indian and Northern Affairs, 1998.
ix, 53 p. : ill., map ; 28 cm.
Appendices.
References.
ASTIS 425460
Libraries: ACU

This scientific investigation of the Yellowknife-Back Bay area was a follow-up study to the two-year water, sediment and fish study that took place from August 1992 to March 1994. There were concerns brought forth by the Yellowknives Dene Band with regards to the quality of the water and fish in the Yellowknife-Back Bay area. The two-year study concluded that the water was safe to drink with prior treatment (boiling or chlorinating) and that the fish were safe to consume. Both of these conclusions were arrived at from two health risk assessments that were conducted by Mackenzie Regional Health Services in Yellowknife and Health Canada in Ottawa. The focus of this study was to gather water quality data with an increased sampling frequency from five of the thirteen locations that were previously sampled in the two-year study and in addition, compare the water quality results of mine outlets to storm drain outlets. The main objective was to collect water quality samples on a weekly basis in order to obtain water quality trends at the five sites during the summer months and collect water quality samples after every rainfall from two storm drain outlets. The reason for monitoring the water quality during the summer months was that the two mines in the area both decant (discharge treated liquid effluent) during the summer months only. The decant season usually starts in late May or early June and ends in late September or early October. The summer of 1994 and 1995 were low precipitation years and this is the main reason why only one sample was collected from each storm drain outlet. By looking at the biological and chemical parameters and evaluating those results against the Canadian Water Quality Guidelines for recreational use, domestic consumption and protection of freshwater aquatic life, it was once again concluded that in most cases the water quality was within the guidelines for drinking water and the protection of freshwater aquatic life. However, the water quality at the mine outlet sites and storm drain outlets sites had elevated metal and total coliform levels and the water was deemed unsuitable for human use. (Au)

61

Yellowknife-Back Bay water, sediment and fish study (two year project) / Jackson, F.J.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [2] p.)

ASTIS 376884

Libraries: ACU

Locations: The Yellowknife-Back Bay area (13 water and sampling sites and six fish sampling sites). Representative site is the government dock at 62 27.860 N 114 20.710 W (GPS). Objectives: 1) To gather water, sediment and fish quality data in the two bay areas to address concerns from the two communities Dettah and Ndilo, i.e. 1) Is the water safe to drink, 2) Is it safe to swim in and 3) Are the fish safe to eat? ... The results from the water quality data and the assessment provided by Mackenzie Regional Health Services indicate that the water is safe to drink with prior treatment (boil or chlorinate) and is safe to swim in. There is the health risk assessment pending from Ottawa on fish consumption safety. (Au)

See also: 66.

JASEK, M.

62

Update of ice jam flood database, Hay River, N.W.T. / Jasek, M. Stanley, S. Gerard, R.

(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, x, 114 p., ill., maps)

Appendices.

References.

ASTIS 416541

Libraries: ACU

... In this report a comparison was performed between the flood of 1992 and other years. The flood of 1992 was the third highest in the West Channel Fishing village with only the flood in 1985 and 1974 exceeding it. The flood of 1992 was also the third highest in the East Channel with floods in 1963 and 1914 exceeding it. A comparison of the three highest West Channel Fishing Village high water mark profiles showed a very similar shape, suggesting that it may be possible to model these levels. The collection of more data from 1990 through 1992 and an error recently found in past discharge measurements at the gauge near Hay River necessitates an update to the computer models in 2 and 3. This will improve the forecast of ice jam levels in the Hay River Delta based on a measured or forecasted discharge at the N.W.T./Alberta Border (2) and the forecast of the timing and severity of surges arriving in Hay River due to ice jam failures upstream (3). Additional data supplementary to the main objectives of this report has been relegated to the appendices. This data includes surveyed water surface profiles for the East, West and Main Channels, high water marks and water levels for the Rudd Channel, the melt rate of ice jam head(s), and water temperature measurements. (Au)

JEFFRIES, D.S.

63

Riverine inputs of contaminants / Jeffries, D.S. Carey, J. Swyripa, M.W.

(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 59-71, ill., maps)

References.

ASTIS 369780

Libraries: ACU

Project objectives: Short-term: To estimate and characterize the total contaminant load delivered by major river systems to the Arctic marine environment, characterize its source and seasonal variability, and assess the controlling biogeochemical processes. Long-term: To investigate and quantify the processes and rates of contaminant transport and transformation in northern riverine systems, assess applicability of existing predictive models and refine as necessary, and develop an understanding of the biogeochemical dynamics of contaminants at the freshwater/marine interface in northern systems. (Au)

64

Riverine inputs of contaminants to the arctic marine environment / Jeffries, D.S. Carey, J. Swyripa, M.W. Gregor, D.J. Peters, A. Alaee, M. McDonald, S. Macdonald, R.W.

(Synopsis of research conducted under the 1992/93 northern contaminants program / Edited by J.L. Murray and R.G. Shearer. Environmental studies – Canada. Dept. of Indian Affairs and Northern Development, no. 70, 1993, p. 41-45)

ASTIS 338621

Libraries: ACU

Objectives: Short-term: 1. To estimate and characterize the total contaminant load delivered by major river systems to the arctic marine environment. 2. To characterize the source of the total contaminant burden of the selected rivers with respect to source through the use of biogeochemical markers. 3. To investigate seasonal variations of the total contaminant burden of arctic river systems and assess the controlling biogeochemical processes. Long-term: 1. To investigate and quantify the processes and rates of contaminant transport and transformation in northern riverine systems. 2. To assess whether existing models of estuarine dynamics and transport developed for temperate systems are applicable in arctic estuarine systems. 3. To refine existing temperate riverine system contaminant delivery models or if necessary develop new ones for application to arctic rivers. 4. To develop an understanding of the biogeochemical dynamics of contaminants in northern systems at the freshwater/marine interface. (Au)

65

Riverine inputs of contaminants to the arctic marine environment / Jeffries, D.S. Carey, J. Swyripa, M.W.

(Synopsis of research conducted under the 1994/95 Northern Contaminants Program / Edited by J.L. Murray, R.G. Shearer, S.L. Han. Environmental studies – Canada. Dept. of Indian Affairs and Northern Development, no. 73, 1996, p. 85-96, maps)

References.

ASTIS 384739

Libraries: ACU

Objectives: Short-term: 1. To estimate and characterize the total contaminant load delivered by major river systems to the arctic marine environment, characterize its source and seasonal variability, and assess the controlling biogeochemical processes. Long-term: 1. To investigate and quantify the processes and rates of contaminant transport and transformation in northern riverine systems, assess applicability of existing predictive models and refine as necessary, and develop an understanding of the biogeochemical dynamics of contaminants at the freshwater/marine interface in northern systems. (Au)

See also: 4, 5, 6.

JESSIMAN, D.

See: 196, 197, 198.

JONES, G.

See: 144.

JONES, N.

See: 100.

KIDD, K.

See: 8.

KLAVERKAMP, J.F.

66
Metallothionein in fish : applicability to metal mining biomonitoring programs and research needs / Klaverkamp, J.F. Wautier, K. Baron, C.L. Harrison, S.E. Hunt, R.V. Jackson, F.J.
(Proceedings of the 23rd Annual Aquatic Toxicity Workshop : October 7-9, 1996, Calgary, Alberta / Edited by J.S. Goudey, S.M. Swanson, M.D. Treissman and A.J. Niimi. Canadian technical report of fisheries and aquatic sciences, no. 2144, p. 25-32, ill., map)
References.
ASTIS 416207
Libraries: ACU

... In 1994, the Aquatic Effects Technology Evaluation program (known as "AETE") was initiated as a joint venture between the mining industry through the Mining Association of Canada; several federal government departments; and representatives from some of the provincial governments. The AETE Program is administered and managed through the Canada Centre for Mineral and Energy Technology (CANMET) with Natural Resources Canada. ... The Program deliverables will be a series of reports on appropriate, cost-effective methods of determining the biological and non-biological impacts of mine effluents on Canada's lakes, rivers and streams. The three main elements of the Program are: 1. acute and chronic toxicity testing, 2. water and sediment monitoring, and 3. biological monitoring. ... As indicated in the title, the mandate of the Biological Monitoring Technical Committee is to evaluate biological methods of assessing the impacts of mine effluents on aquatic biota. The taxonomic groups under evaluation include fish, benthic invertebrates, zooplankton and phytoplankton. Fish are assessed at community, population, organism, tissue, and molecular levels. Initial meetings by members of the population, organism, tissue, and molecular levels. Initial meetings by members of the Fish Group discussed many parameters ... that have been shown to be metal sensitive or to be related to the growth and reproduction of fish. Further discussions and integration with the other major elements of the Program resulted in a considerable reduction in the list of parameters ... for full field evaluation. Out of approximately seventy molecular parameters considered ... metallothionein was selected as the only biochemical response to be evaluated ... along with parameters at other levels of biological organization. ... There are a considerable number of laboratory studies and a limited number of field studies that demonstrate increased resistance to metal toxicity in fish with elevated concentrations of metallothionein in their tissues. In other words, there is evidence of a relationship between this response at the molecular level to the health of individual animals. ... [Metallothionein] (MT) results are presented for fish from two very different freshwater habitats. ... The first of these studies involves the analyses of lake whitefish and northern pike from Yellowknife Bay of Great Slave Lake. One of the objectives of the study was to evaluate whether these fish were responding to elevated concentrations of Cd, Cu, Hg, and Zn found in the sediments near the discharge points for treated effluents released by the two gold mines in the area. ... Figure 2 presents the MT data for liver, kidney and gill of twenty lake whitefish ... and twenty northern pike ... collected from ... [three sites in Yellowknife Bay]. Although these data do not provide clear dose-response relationships to the degree of contamination observed in the sediments, they do demonstrate some degree of elevated MT concentrations in fish from the contaminated sites. ... In conclusion, some recommendations, expressed as questions, for additional research on the use of metallothionein in fish as a bio-monitoring tool are presented.... (Au)

See also: 34, 35, 58.

KUNTZ, M.

67
Clarke River above Thelon River gauging site assessment report, 1991 / Kuntz, M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[13] leaves : col. ill., maps ; 28 cm.
ASTIS 415782
Libraries: ACU

... The basin drains from the southeast to the northwest. The relief of the river is 225 over 117 km. The river consists of discordant drainage (series of small lakes not following the underlying structure of the land), as well as many small tributaries. The only significant storage in the basin is a small lake 50 km upstream from the confluence of the Clarke and Thelon Rivers .... The basin consists of flat topography with shallow soil development in glacial tills. There are many strands of dwarf spruce along the river banks. The river banks and stream bed consist of sand and gravel. The river is shallow with many sand and gravel bars .... There are some bedrock outcrops throughout the basin and evidence of erosion, where tributaries flow into the river. ... After surveying Site #1, we concluded that it satisfies most site selection criteria. The site however does have drawbacks, and their magnitudes will be more accurately determined during winter and spring reconnaissance surveys. (Au)

68
Ferguson River : gauging site assessment report, 1991-1992 / Kuntz, M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[31] leaves : ill. (some col.), 2 maps ; 28 cm.
Appendix contains hydrometric survey notes and a construction project cost summary.
ASTIS 376000
Libraries: ACU

... Purpose of station: Proposed Hudson Bay coast highway routing and Index station for flows to Hudson Bay, improving IWD's baseline and regional water resource inventory for the NWT. Data would be collected for 10 years, with possible long term extension. ... [Possible Gauging Location:] Site #1 remains the best site for stream gauging. Good velocities, symmetrical cross section and a deep orifice pool are available. The ability to land on the river will reduce the time for field staff to reach the station. As previously stated the landing area must be closely observed

to insure jagged ice does not exist on the landing section of the river. This site requires a visit during spring breakup to determine the length of the backwater period caused by ice on the downstream rapids. The visit may help us to determine the effect of ice crashing on the right bank where the orifice line would enter the water. ... Recommendations: Presently, Site #1 would be the recommended location for stream gauging. Access to the site could be provided either by fixed or rotary wing aircraft. ... (Au)

69

Soper River near Lake Harbour : gauging site assessment report, 1992-1993 / Kuntz, M. Arseneau, C.
[S.l.] : Canada's Green Plan, 1993.
[54] leaves : ill. (some col.), maps ; 28 cm.
Appendix contains correspondence regarding Dept. of Environment's Inland Waters Directorate application for a parcel of land upon which to build a hydrometric stream gauging station to be constructed under the Arctic Environmental Strategy-Green Plan, as well as containing hydrometric survey notes.
ASTIS 376019
Libraries: ACU

... Purpose of station: Designated Heritage River. INAC & GNWT Developing Basin Management Plan for the Soper River Basin. ... Site Selection Summary: ... Reconnaissance confirmed that Site #1 [located approximately 30 km upstream of Lake Harbour] is acceptable during periods of low flow. River depth and velocities are excellent. ... Highwater reconnaissance confirmed that Site #1 is acceptable during periods of high flow and represents the best location for the construction of a stream gauging station. The gauge should be located on the right bank where bedrock is present for stable benchmarks. ... Recommendations: Site is to be constructed on July 29, 1993. ... (Au)

LAFONTAINE, C.N.

70

An evaluation of the metal concentrations in the muscle and liver tissues of four species of fish from Kam Lake, N.W.T., 1988, 1990-91 / Lafontaine, C.N. Canada. Dept. of Fisheries and Oceans [Sponsor].
[S.l.] : Canada. Dept. of Fisheries and Oceans, 1994.
vi, 56 leaves : 1 map ; 29 cm.
Cover title.
Appendices.
References.
ASTIS 416100
Libraries: ACU

Kam Lake is recognized as having recreational potential for which the residents of the Yellowknife area have shown considerable interest. In 1974, a significant arsenic problem was identified in Kam Lake and the present study was designed to re-assess the status of four resident species of fish. Walleye, lake whitefish, northern pike and lake cisco were collected over three years, 1988, 1990 and 1991. Concentrations of arsenic, cadmium, copper, mercury, lead, nickel and zinc in the muscle and liver tissues were measured and compared between years. Arsenic data suggests an overall detoxication of Kam Lake fish over this three year study. In 1991, levels of arsenic in the muscle samples analyzed ranged between >0.01 and 0.14 ppm. Comparisons of current levels with 1972 concentrations emphasize the trend toward a decrease in arsenic in the muscle tissues of fish. The levels of other metals are low and compare to levels found in fish from other locations in the Northwest Territories; with the exception of hepatic concentrations of copper and zinc which were relatively elevated in lake whitefish and lake cisco, respectively. Fish in Kam lake appear to be in better condition that fish from other lakes in the Yellowknife area and are certainly of size attractive to sport fishers. (Au)

71

Fort Resolution Fish Monitoring Program (1992-1993) : concentrations of metals and trace elements in muscle and liver of fish collected from Great Slave Lake, Fort Resolution area, NWT : final report / Lafontaine, C.N. Northern Affairs Program (Canada). Water Resources Division [Sponsor]. Arctic Environmental Strategy. Action on Water Component [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, DIAND, 1997.
vi, 139 p. : 2 col. maps ; 29 cm.
Mostly tables.
Appendices.
References.
ASTIS 415871
Libraries: ACU

During community consultations in 1992 and 1993, the citizens of Fort Resolution expressed their concerns about the quality of the fish from Great Slave Lake in the Resolution Bay and the old Pine Point pumphouse areas. To address their concern, the Water Resources Division of the Department of Indian Affairs and Northern Development (DIAND) with the cooperation of the Department of Fisheries and Ocean (DFO), designed a program to evaluate the levels of heavy metals in fish from the area. Thirty-five fish were collected in 1992, near the community of Fort Resolution. During the fall of 1993, forty-eight fish were captured in the vicinity of Dawson Landing and Pine Point, with the help of local fisherman. All samples were analyzed for 28 elements including arsenic, cadmium, copper, lead, mercury, nickel and zinc. Fish from these areas were found to be robust, with very low concentrations of metals that are typical of levels found in fish from unexploited lakes of the southwest portion of the Northwest Territories. (Au)

72

Port Radium – Deerpass Bay, 1993, final draft : field methods, analytical methods and evaluation of metal data / Lafontaine, C.N.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [29] p., ill., maps)
Appendices : 1. Relative stage of maturity – 2. Ageing techniques – 3. Analytical methodology for the determination of heavy metals in the liver and muscle tissues / Robert Hunt – 4. Analytical methodology for radionuclides / Saskatchewan Research Council Analytical Laboratory – 5. Biological characteristics and heavy metal concentrations (ppm wet weight) in the muscle and liver tissues of lake trout, lake whitefish and arctic grayling captured at Port Radium or Deerpass Bay in August 1993 – 6. Biological descriptors and radionuclide levels in lake trout, lake whitefish, arctic grayling and a composite sample of sculpins from Port Radium or Deerpass Bay in 1993.
References.
ASTIS 376841
Libraries: ACU

Fish were collected at Port Radium ... between August 11 and 13, 1993 by DFO personnel from Yellowknife .... A total of fourteen lake trout were captured with gillnets of 3.5" and 4.5" stretched mesh (50 yards each) set at the locations identified below. Sampling sites are shown .... Furthermore, location A shoreline was seined to capture a composite sample of slimy sculpins (Cottus cognatus) for radionuclide analysis. Deerpass Bay ... was chosen as control site as it is fished for subsistence by residents of Fort Franklin. ... The fish captured were processed on site within 5 hours of capture. Biological information and tissue samples were collected. Fork lengths (±1 mm), round weights (±1 or ±25 g for fish heavier than 3 kg) and maturity were recorded. The stages of maturity were determined by examination of the gonads. The criteria to evaluate

the sexual maturity are summarized in Appendix 1. Finally, ageing structures were retained for each specimen. Ageing techniques are described in Appendix 2. ... Muscle and liver tissues were analyzed for nine heavy metals (As, Cd, Co, Cu, Pb, Hg, Ni, Se, Zn) .... Analytical methodologies are provided in Appendices 3 and 4. Biological parameters as well as results of the metal analyses performed on individual fish are presented in Appendix 5. Appendix 6 lists the radionuclide results. ... (Au)

73

Soper (Katannilik) River basin baseline water quality study : final report / Lafontaine, C.N. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
Yellowknife, N.W.T : Water Resources Division, Indian and Northern Affairs, 1998.
[44] p. : ill. (some col.), maps ; 28 cm.
Appendices.
References.
ASTIS 425451
Libraries: ACU

In 1991, the Soper River along with two of its major tributaries the Joy and Livingstone Rivers, were nominated as a Canadian Heritage River System (CHRS). The water within the Soper River drainage system was deemed to be pristine as no land use other than subsistence and recreational use was ongoing in the watershed. This baseline study was conducted by the Water Resources Division of the Department of Indian Affairs and Northern Development (DIAND) to ascertain the quality of the water, and in fact confirmed that the water is pristine, based on the CCREM guidelines. The mean concentrations for all parameters were well below the existing CCREM Water Quality Guidelines for Drinking Water and for the Protection of Freshwater Aquatic Life .... It was recommended that in future studies cadmium detection limits be 0.001 micro g/L or lower as the detection limit for this study did not allow for comparison to the most recent FAL guideline. Mercury and lead data were suspect and further samples would be collected to determine these levels. It was recommended that a full program of QA/QC sampling be employed in future monitoring. (Au)

See also: 58, 86, 88, 122, 135, 175, 176, 200, 201, 202.

LATHAM, B.

74

Designs for NWT water quality studies : deliberate, specific and directed / Latham, B.
(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 23-37)
References.
ASTIS 414212
Libraries: ACU

While the results of a number of water quality studies conducted in the NWT under the Arctic Environment Strategy have been reported in this workshop, less emphasis has put on the process of designing those studies. For the most part, they have been highly-directed, driven by specific questions or specific parameters. The choice of parameters for testing, the media for analysis and the time and frequency of sampling are dictated by many factors: the public's use of the water resource, the hydrology, the parameters themselves. Due to the logistics costs involved in doing a study in a large area like the NWT and the demands put on water managers to meet public concern about water quality, study designs have evolved from a strictly academic pursuit of data to a more focussed, worst-case approach based on ecosystem and human health considerations. Besides meeting these requirements, the results and methods must also be scientifically credible and follow proper quality procedures. A synthesis of some of the elements of the designs of various studies is presented. These show both specific and common elements which indicate a reasoned approach to each design. There are increasing trends toward the involvement of the public and the use of fish and suspended sediment as media for the parameters of greatest interest. (Au)

75

Update of ice jam flood database / Latham, B.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 165-169, 1 map)
ASTIS 369942
Libraries: ACU

Project objectives: 1. To update the surveyed ice jam water surface profiles and high water marks data of Hay River during the 1992 break-up; 2. To update the probability analysis of break-up levels with 1988-1992 data; and 3. To compare the 1992 flood levels with other years. (Au)

See also: 94.

LESACK, L.

See: 142.

LOCKHART, W.L.

See: 8, 34, 99, 214, 215.

MACDONALD ENVIRONMENTAL SCIENCES LTD.

76

An assessment of ambient environmental conditions in the Liard River basin, Northwest Territories / MacDonald Environmental Sciences Ltd. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, ix, 89 p., maps)
References.
ASTIS 416479
Libraries: ACU

... Unlike many other river systems in Canada, the Liard River basin is characterized by vast stretches of essentially pristine wilderness. Nonetheless, a number on ongoing land use activities have been identified that have significant potential to influence aquatic resources. A review of the available information indicates that mining, logging, and oil and gas developments in British Columbia have the highest potential to affect water uses in the NWT. The potential effects of municipal and linear developments, agricultural activities, hazardous waste sites, and long range transport of atmospheric pollutants on environmental quality in NWT was also evaluated and considered to be of lesser importance. However, the vast resources of the region are likely to support a much higher level of activity in the future and expanded development of these resources could have significant impacts on environmental quality. Of all

the anthropogenic activities investigated, the hydroelectric projects that have been proposed in British Columbia have the greatest potential for affecting environmental conditions in the NWT. Construction of impoundments on the Liard River will profoundly affect streamflows in downstream portions of the system, most notably in the summer and winter. In addition, significant changes in thermal regime and water quality conditions are predicted as a consequence of these developments. Together, these effects on hydrology and water quality are likely to have significant and lasting effects on the aquatic organisms that utilize this system. In particular, populations of fish that utilize spawning and rearing habitats upstream of the proposed dam site(s) would be virtually eliminated. Other populations of fish may be impacted by the changes in streamflow, temperature, and/or water quality conditions. However, some species may benefit from controlled flow conditions and increased winter water temperatures. Data from other river systems also suggest that the quality of fish tissues in the NWT may be degraded through the mobilization of mercury and other contaminants. Overall, these developments are likely to have significant and long-lasting effects on aquatic resources in the NWT. Therefore, every effort should be made to ensure that hydroelectric development of the Liard River does not proceed. Integration of data on ambient environmental conditions with information on documented effects of similar land use activities in other river systems provides a means of identifying priority environmental quality variables for consideration in the development of a focused monitoring program for the Liard River basin. Using the available information, a total of sixty-three priority variables have been identified for consideration in the Liard River monitoring program .... Development and implementation of such a monitoring program would provide the data necessary to establish baseline conditions and assess trends in environmental quality in this region. (Au)

MACDONALD, R.W.

See: 64.

MARSH, P.

77

Application of snow and evaporation models for predicting water fluxes at the arctic treeline in northwestern Canada / Marsh, P. Pomeroy, J.W. Quinton, W.L.

(Mapping regional snow distribution in northern basins, Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [4] p., ill. NHRI contribution, no. 97006)

(International GEWEX Workshop on Cold-Season/Region Hydrometeorology : summary report and proceedings, Banff, Alberta, Canada, 22-26 May 1995 / Compiled by T.W. Krauss and T.R. Carroll. IGPO publication series, no. 15)

References.

ASTIS 416797

Libraries: ACU

... Water and energy fluxes in the Arctic play an important role in the global climate, as well as controlling the dynamics of northern ecosystems, the fluxes of nutrients and pollutants through these systems, and the supply of freshwater to the Arctic Ocean. The importance of these fluxes, and predictions of enhanced greenhouse gas warming in the Arctic, has resulted in an increased interest in modelling these water and energy fluxes. However, Woo (1990) noted that there has been little success in basin scale modelling in permafrost areas for a number of reasons, including the neglect of important processes. Some of these processes include: snowcover formation in areas of blowing snow (Pomeroy et al., 1993b), re-freezing of meltwater within cold snowpacks (Marsh, 1991), frozen soil infiltration (Granger et al., 1984), and evaporation from snow free areas (Rouse, 1984). The purpose of this paper is to demonstrate the utility of models of these processes in predicting the annual and daily water balance for a small basin located in the zone of continuous permafrost at the Arctic treeline. (Au)

78

Hydrological processes and runoff at the arctic treeline in northwestern Canada / Marsh, P. Quinton, W.L. Pomeroy, J.W. Global Energy and Water Experiment [Sponsor]. Canada. Environment Canada [Sponsor].

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [30] p., ill., maps)

(Proceedings : Tenth International Northern Research Basins Symposium and Workshop, Spitsbergen, Norway, August 28 to September 3, 1994 / Edited by K. Sand and A. Killingtveit. – [S.l. : s.n., 1994], p. 368-397, ill., maps)

References.

ASTIS 416649

Libraries: ACU

Models of snow accumulation, melt, vertical meltwater percolation, and evaporation, were used in conjunction with observations of basin snow cover and hillslope hydrology to explain certain aspects of the runoff regime, as well as the annual and daily water balance of an Arctic treeline site in northwestern Canada. These studies indicated that snowfall was the largest input to the basin, accounting for 58% of the annual total. However, transport during blowing snow was also significant, accounting for 16% of inputs, while sublimation removed 10% of annual inputs. Although the majority of annual precipitation was released over a brief period in the spring, the initiation of runoff was delayed by the processes of vertical percolation of meltwater into the snow and frozen soil infiltration. As a result of these processes, basin water storage increased dramatically during the early melt period, with over 150 mm of melt occurring before streamflow began. The occurrence of mineral hummocks greatly affected the transfer of meltwater from late lying snow patches, with organic water tracks responsible for rapidly transporting water to the stream channel. Over 90% of annual runoff occurred during the melt period. Surprisingly, however, discharge only removed 44% of snow stored in the basin at the start of melt. The remaining meltwater was stored in the basin, with the majority supplying evaporation, which removed 62% of water inputs to the basin. (Au)

79

Mapping regional snow distribution in northern basins, Inuvik area / Marsh, P. Pomeroy, J.W. Pietroniro, A. Nuemann, N.

Saskatoon, Sask. : National Hydrology Research Institute; Yellowknife, N.W.T. : Water Resources Division, 1996.

1 v. (various foliations) : ill. (some col.), maps (some col.) ; 29 cm.

(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1996, v. II, ill., maps)

Cover title.

References.

Partial contents: Application of a distributed blowing snow model to the arctic / J.W. Pomeroy, P. Marsh, and D.M. Gray – Meltwater fluxes at an arctic forest-tundra site / P. Marsh and J.W. Pomeroy – Sensible heat flux and advection over a heterogeneous landscape at an arctic tundra site during snowmelt / P. Marsh, J.W. Pomeroy, N. Neumann.

ASTIS 416118

Libraries: ACU

... This report outlines the progress during 1995/96 of a joint study by the National Hydrology Research Institute and Water Resources Division, Indian and Northern Affairs, Yellowknife to develop techniques to utilize landscape type (i.e. vegetation and topography) to spatially map snow cover at the Arctic treeline. Such mapping is required for predicting snow melt runoff and for validating satellite derived snow cover maps. In addition, three papers are attached to this report. These papers utilize this landscape mapping to: (1) model the accumulation of snow over the winter period using a blowing snow model ... (2) to determine the spatial variation in melt water runoff from this modelled snow cover ... and (3) carry out a preliminary estimate of the role of local advection on snow melt .... This work is in addition to that outlined in the Letter of Agreements between Indian and Northern Affairs and National Hydrology Research Institute. The work described in both this report, in previous reports, and in the attached papers, has shown that: (a) maps of landscape type (vegetation plus topography) can be developed from combining maps of vegetation cover derived from LANDSAT TM images and digital elevation models developed from topographic maps. The resulting landscape maps can then be used to map snow survey data and to estimate snow cover distribution using a blowing snow model, (b) landscape type controls snow cover distribution, (c) using relationships between measured snow water equivalent and landscape type, spatially variable snow water equivalent (w.e.) can be mapped to determine mean snow cover w.e. over large areas, (d) water balance studies have demonstrated that these snow cover maps accurately estimate basin snow cover at the end of winter, (e) snow cover maps developed from satellite microwave data significantly underestimate snow cover water equivalent as derived from the landscape mapping technique. The underestimation is greatest north of the treeline. Further work is required to verify this and develop improved algorithms, (f) snow cover w.e. and distribution can be accurately predicted from a blowing snow model which uses snowfall, air temperature, relative humidity, wind speed, and the landscape map as input parameters, (g) these maps of snow w.e. can be used to drive a simple snow melt and evaporation model to determine the surface energy balance and therefore snowmelt during the spring period. Further work is required to improve this technique for regional scales, (h) snow chemistry is strongly related to landscape type, (i) local advection plays a large role in controlling surface melt rates in areas with a patchy snowcover, (j) sublimation during blowing snow events is an important process limiting the availability of snow at the end of winter, (k) sublimation during the spring snowmelt period is very difficult to measure. Sensitivity tests have demonstrated that even small (+/-5%) errors in measuring relative humidity can lead to significant errors in estimating the latent heat flux during melt. Additional studies using more sophisticated methods (i.e. eddy correlation) are required to determine the magnitude of sublimation during melt. (l) a combination of maps of snow cover distribution, snow surface energy balance and meltwater percolation models can be used to estimate the spatial and temporal variations in the release of meltwater. ... (Au)

80

Mapping regional snow distribution in northern basins, Inuvik area : final report / Marsh, P. Pomeroy, J.W. Pietroniro, A. Nuemann, N. Nelson, T.

Saskatoon, Sask. : National Hydrology Research Institute; Yellowknife, N.W.T. : Water Resources Division, 1997.

68 leaves : ill., maps ; 29 cm.

(NHRI contribution, no. 97006)

Appendix.

References.

Partial contents: Relocation of major ions in snow along the tundra-taiga ecotone / J.W. Pomeroy, P. Marsh and L. Lesack – Hydrological processes and runoff at the arctic treeline in northwestern Canada / P. Marsh, B. Quinton and J. Pomeroy – Water and energy fluxes during the snowmelt period at an arctic treeline site / P. Marsh and J. Pomeroy – Application of snow and evaporation models for predicting water fluxes at the arctic treeline in northwestern Canada / P. Marsh, J. Pomeroy, and W.L. Quinton – Classification of hydrologically significant land cover in permafrost basins / A. Pietroniro, T. Prowse, P. Marsh and J. Pomeroy – Application of an arctic blowing snow model / J.W. Pomeroy, P. Marsh and D.M. Gray – Spatial distribution of snow chemical load at the tundra-taiga transition / J.W. Pomeroy and P. Marsh – Subsurface runoff from tundra hillslopes in the continuous permafrost zone / W.L. Quinton and P. Marsh – Meltwater fluxes at an arctic forest-tundra site / P. Marsh and J.W. Pomeroy – The application of remote sensing and a blowing snow model to determine snow water equivalent over northern basins / J.W. Pomeroy and P. Marsh – Sensible heat flux and local advection over a heterogeneous landscape at an arctic tundra site during snowmelt / P. Marsh, J.W. Pomeroy and N. Neumann – Local advection of sensible heat during snowmelt / N. Neumann and P. Marsh – Application of a distributed blowing snow model to the Arctic / J.W. Pomeroy, P. Marsh and D.M. Gray.

ASTIS 416177

Libraries: ACU

This is the final report of a series of joint studies by the National Hydrology Research Institute and Water Resources Division, Indian and Northern Affairs, Yellowknife to develop techniques to utilize landscape type (i.e. vegetation and topography) to spatially map and model snow cover at the Arctic treeline. Such techniques are required for predicting snow melt runoff and for validating satellite derived snow cover maps. In addition, there are 13 papers attached to this report. These papers utilize this landscape mapping to: (1) model the accumulation of snow over the winter period using a blowing snow model, (2) to determine the spatial variation in melt water runoff from this modelled snowcover, (3) to carry out a preliminary estimate of the role of local advection on snow melt, and (4) use this information to estimate the annual water balance and daily water balance during the summer of a tributary of Trail Valley Creek. ... (Au)

81

Meltwater fluxes at an arctic forest-tundra site / Marsh, P. Pomeroy, J.W.

(Mapping regional snow distribution in northern basins, Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [19] p., ill., maps. NHRI contribution, no. 97006)

(Hydrological processes, v. 10, 1996, p.1383-1400, ill., maps)

References.

ASTIS 416827

Libraries: ACU

Models of surface energy balance and snow metamorphism are utilized to predict the energy and meltwater fluxes at an Arctic site in the forest-tundra transition zone of north-western Canada. The surface energy balance during the melt period is modelled using an hourly bulk aerodynamic approach. Once a snowcover becomes patchy, advection from the bare patches to the snow-covered areas results in a large spatial variation in basin snowmelt. In order to illustrate the importance of small-scale, horizontal advection, a simple parameterization scheme using sensible heat fluxes from snow free areas was tested. This scheme estimates the maximum horizontal advection of sensible heat from the bare patches to the snow-covered areas. Calculated melt was routed through the measured snowcover in each landscape type using a variable flow path, meltwater percolation model. This allowed the determination of the spatial variability in the timing and magnitude of meltwater release for runoff. Model results indicate that the initial release of meltwater first occurred on the shallow upland tundra sites, but meltwater release did not occur until nearly two weeks later on the deep drift snowcovers. During these periods of melt, not all meltwater is available for runoff. Instead, there is a period when some snowpacks are only partially contributing to runoff, and the spatial variation of runoff contribution corresponds to landscape type. Comparisons of melt with and without advection suggests that advection is an important process controlling the timing of basin snowmelt. (Au)

82

Sensible heat flux and local advection over a heterogeneous landscape at an arctic tundra site during snowmelt / Marsh, P. Pomeroy, J.W. Neumann, N.

(Mapping regional snow distribution in northern basins, Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [15] p., ill. NHRI contribution, no. 97006)

References.

Also published in Annals of glaciology, in press.

ASTIS 416843

Libraries: ACU

During snowmelt over a continuous snowcover, the vertical turbulent exchanges of sensible and latent energy are influenced by regional air mass characteristics which exert a strong control on air temperature. In high-latitude sites, the melting surface rapidly becomes heterogeneous, with patches of snow and snow-free areas. Local advection occurs when near-surface air layers are warmed due to sensible heat flux from the snow-free areas, with the resulting heat transferred horizontally to adjacent snow patches. This advection greatly increases the rate of snowmelt along the leading edges of the snow patches. In order to correctly estimate the average melt rates of the snow patches and the bulk energy balance of the entire landscape, it is necessary to estimate the local advection component. To date, few studies have dealt with this problem. This paper reports results from an arctic tundra site located approximately 55 km NE of Inuvik, N.W.T., Canada. The importance of local advection is estimated by comparing the snow patch sensible heat flux to estimates of sensible heat without local advection. This latter term is derived from a relationship between upper air temperature and sensible heat flux over a continuous snowcover. This work has important implications for developing models which correctly represent the cryosphere of tundra regions, and in developing appropriate scaling techniques for heterogeneous landscapes. (Au)

83

Snow/soil heat and mass fluxes at an arctic treeline site / Marsh, P. Pomeroy, J.W.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [1] p.)

Abstract only.

European Conference on Global Energy and Water Cycles, Royal Society, London, England, 1994, in press.

ASTIS 416673

Libraries: ACU

When snowmelt percolates into the underlying snowcover it may freeze, fill irreducible liquid water storages, or be available for runoff. In temperate areas, the portion of the meltwater which freezes is relatively small. However, in Arctic areas it is very large due to the cold snow and the existence of permafrost which results in a large negative ground heat flux that removes energy from the snowpack during the melt period. These processes have important implications for delaying runoff and limiting its magnitude. In addition, this extends the period of high surface albedo, with resulting impact on the regional radiational balance. The infiltration of meltwater into the snow/soil, and the subsequent heat fluxes have been studied at a Canadian GEWEX station north of Inuvik, Norhtwest Territories. Field measurements and model results demonstrate that: (1) the snow/soil thermal regime at the end of winter is dependent on the snow depth, which is related to the redistribution and sublimation by blowing snow, and therefore on the spatial configuration of tundra and taiga surfaces. (2) change in snow/soil heat storage is a significant component of the surface energy balance during the melt period, with differences between various tundra and taiga surfaces. These regional variations must be accounted for when modelling snowcover energy balance, removal, and runoff. (Au)

84

Water and energy fluxes during the snowmelt period at an arctic treeline site / Marsh, P. Pomeroy, J.W.

(Mapping regional snow distribution in northern basins Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [5] p., ill., 1 map. NHRI contribution, no. 97006)

(International GEWEX Workshop on Cold-Season/Region Hydrometeorology : summary report and proceedings, Banff, Alberta, Canada, 22-26 May 1995 / Compiled by T.W. Krauss and T.R. Carroll. IGPO publication series, no. 15)

References.

ASTIS 416789

Libraries: ACU

... Snow plays an important role in the water and energy fluxes of Arctic regions. For example, its high albedo has a dramatic impact on the surface energy balance, and as a result snowpack removal in the spring results in the rapid and dramatic change in surface energy fluxes. In addition, since the snow stored on the ground may represent 6 to 10 months of precipitation, the brief snow melt period represents a sudden release of water to the stream channels. As a result, the spring runoff event often accounts for over half of the total runoff. This runoff has important implications to northern ecosystems, and it also plays a role in controlling circulation patterns in the Arctic Ocean. As a result, it is critical for hydrological, weather and climate predictions to properly estimate both the timing and volume of meltwater release. In Arctic regions, the snow and ground at the end of winter typically have temperatures many degrees below freezing. As a result, much of the initial melt water freezes within the snowcover, with the freezing determined by the cold content of the snowpack and the soil heat flux. Because of cold soil temperatures and the existence of permafrost, the soil heat flux is always negative (ie from snow to the soil) during the melt period, with reported magnitudes as large as 80 W/sq. m .... In temperate areas these processes are not as important, and as a result are often ignored in snowmelt runoff models. In addition, wetting fronts do not move uniformly through a snow cover. Instead, flow fingers develop at the leading edge of the wetting fronts, allowing melt

upstream is very real. Thus, the Slave River Environmental Quality Monitoring Program was established in 1990 to assess the water and suspended sediment quality in the territorial portion of the river. A baseline data set with which to determine present and future effects from upstream activities and long-range transport of contaminants was created. The number of 'above detect' data points from measurements of polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and chlorinated phenolics (CPs) in water was small and those concentrations of compounds that were above analytical detection limits were very low and unlikely to have adverse effects on the ecosystem. No pesticide levels were ever detected in the water during the 5-year monitoring period, even though long-range transport of these contaminants to the Arctic have been well-documented. Levels of metals were often observed in measurable concentrations in the Slave River water, and frequently exceeded water quality guidelines, although not by any substantial amount. It was concluded that although the concentrations were relatively high, the metals are probably occurring naturally, and not from upstream industrial sources. It was speculated that aquatic biota had probably adapted to these levels. Although PAH concentrations in suspended sediment from the Slave River at Fort Smith often exceeded the 'Lowest Effect Level' guideline established in bottom sediment by the Ontario Ministry of the Environment, values remained well below the 'Severe Effect Level'. Conclusions were reached that PAH concentrations in Slave River suspended sediment were not substantial enough to cause a threat to the ecosystem. Metal levels in suspended sediment remained variable over the 5-year monitoring period and no trends could be seen regarding an overall increase or decrease in concentrations. The lower number of 'above detect' data points for pesticides and chlorinated phenolics observed in the suspended sediment during the program suggested that the adverse impacts would not be occurring from these contaminants in the watershed. Lastly, although certain concentrations of dioxins and furans were measured and were often higher than levels observed in the Wapiti/Smoky River system and the Athabasca River, the values were very small and the contributing homologues had a minimal toxic potential. ... It can be concluded from the extensive data set collected during the 5-year program that impact from upstream industrial and agricultural sources is, at the present time, negligible, and that the environmental quality of the Slave River at Fort Smith is pristine. Also, the extensive data set has established a baseline, which can be used for future comparative purposes. (Au)

86

Baseline studies in the Slave River, NWT, 1990-1994 : Part II. Body burden contaminants in whole fish tissue and livers / McCarthy, L.H. Stephens, G.R. Whittle, D.M. Peddle, J.D. Harbicht, S.M. Lafontaine, C.N. Gregor, D.J.

(Science of the total environment, v.197, 1997, p. 55-86, ill., 1 map)

References.

ASTIS 416355

The Northwest Territories' section of the Slave River is the recipient of chemical compounds from a variety of sources, including upstream industry and agriculture. In 1990, concerned government agencies formulated a practical focused, and comprehensive environmental monitoring program to assess contamination in the river and the Slave River Environmental Quality Monitoring Program was established. The program was designed to respond to the distinct requirements of two major monitoring goals. The first priority was to ascertain whether the fish in the Slave River were safe to eat. The second was to establish a baseline data set with which to compare future effects from upstream activities and long-range transport of contaminants. From the data gathered in the present study, it appears that whole tissue of fish (muscle) is fit for human consumption. Throughout the monitoring period, consistently low concentrations of organochlorine pesticides, PCBs, dioxin and furan isomers, PAHs, chlorinated phenolics, and heavy metals have been observed and median concentrations have all been below federal fish consumption advisories. Also, the numerous data values below analytical detection limits attest to the relatively uncontaminated nature of the fish. These results were comparable with other studies conducted on arctic animals. The heavy metals observed in fish tissue are probably of natural origins, since inorganic analyses of suspended sediment in the Slave River indicated relatively elevated levels, with no anthropogenic source. While the present study concluded that contaminant levels in whole fish are low, toxaphene levels in burbot livers should continue to be monitored since concentrations were consistently above fish consumption advisories during the monitoring and are eaten extensively by the native peoples. The second goal of the monitoring program was to develop a baseline data set and the values tabled in the current paper are useful in establishing a foundation for future comparison. (Au)

87

Baseline studies in the Slave River, NWT, 1990-1994 : Part IV. Evaluation of benthic invertebrate populations and stable isotope analyses / McCarthy, L.H. Robertson, K. Hesslein, R.H. Williams, T.G.

(Science of the total environment, v.197, 1997, p. 111-125, ill., 1 map)

Appendix.

References.

ASTIS 416371

The Northwest Territories (NWT) portion of the Slave River is downstream of the Athabasca and Peace Rivers and the potential for contamination from industrial and agricultural processes from these sources and from long-range transport is very real. In response to this threat, the Slave River Environmental Quality Monitoring Program was established cooperatively between the government of the Northwest Territories and federal government agencies in 1991. A 5-year program was conducted to examine the quality of the water, suspended sediment, and fish in the territorial portion of the Slave River and to establish a baseline data set for comparison purposes in future monitoring programs. Additional facets of the study on the Slave River included an assessment of the benthic invertebrate population, since it was recognized that such a survey could be important for biomonitoring purposes. Abundance of organisms, taxon diversity, and presence or absence of sentinel species could all be used to assess environmental contamination. The final focus of the program was the examination of stable isotope ratios of carbon, sulphur, and nitrogen in the Slave River fish. Ecologically, these measurements can be used to determine the feeding and migration pattern of fish, and to define their trophic position in the food chain. From a toxicological point of view, these stable isotope ratios can help explain contaminant sources and transfer through the food chain. The benthic invertebrate survey was conducted in 1990 and 1991. The study concluded that the abundance of benthic invertebrates at the numerous sites examined in the Slave River was very low and organisms that had been used in other biomonitoring studies (e.g. bivalve molluscs, large oligochaetes) were rare or absent. Over 90% of the invertebrates at the numerous sites examined in the Slave River was very low and organisms that had been used in other biomonitoring studies (e.g. bivalve molluscs, large oligochaetes) were rare or absent. Over 90% of the invertebrates collected from the Slave River were chironomids or small oligochaetes and comparisons of benthic invertebrate communities in the Slave River Delta indicated that few changes in percent composition or diversity had occurred over a 10-year period. The benthic invertebrate survey provided a baseline for future population analysis. Analysis of the stable isotope ratio of sulphur in fish from the Slave River indicated at least two significant food sources. One source is probably from Great Slave Lake while the other is probably upstream of Fort Smith (Athabasca and Peace Rivers). Also, the stable isotope of carbon indicated that the food source is via different pathways and may include benthic as well as pelagic origins. It is difficult to make any conclusions regarding the organic concentrations found in fish tissues and their possible significance to isotope analysis, since the overall contaminant body burdens were generally very low or below analytical detection. (Au)

88

Body burden contaminants in whole fish tissue and livers from the Slave River (NWT) / McCarthy, L.H. Stephens, G.R. Peddle, J.D. Lafontaine, C.N. Whittle, D.M. Harbicht, S.M.

(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. I, [21] p., ill., 1 map)
Poster presentation at the Society of Environmental Toxicology and Chemistry Second World Congress, Vancouver, B.C., Nov. 5-9, 1995.
ASTIS 416959
Libraries: ACU

The Slave River Environmental Quality Monitoring Program was established in 1990 to assess whether the commercial and subsistence fisheries in the Northwest Territories portion of the River were being impacted by downstream transport and subsequent bioaccumulation of contaminants in the fish. Lake whitefish (Coregonus clupeaformis), northern pike (Esox lucius), burbot (Lota lota), walleye (Stizostedion vitreum), and longnose suckers (Catostomus catostomus) were collected in the Slave River at Fort Smith (NWT) and whole fish tissue was evaluated for contaminant accumulation. Also, due to their high lipid concentration and their importance as a native food, burbot livers were also analyzed. A broad organochlorine scan was conducted for selected dioxins and furans, total PCB concentrations and individual congeners, pesticide residues such as DDT and its metabolites, dieldrin, lindane, mirex, and toxaphene. Also, PAHs, and various chlorinated phenolics such as chlorophenols, chlorocatechols, and chloroguaiacols were also examined. Although contaminants were detected in the fish, concentrations generally were minimal. Levels of PCBs in whole fish tissue ranged from 0.9 to 55 micro g/kg, while average concentrations in burbot livers were 230 micro g/kg. The toxic dioxin isomer 2, 3, 7, 8-TCDD was detected in whole fish tissue (walleye) at levels ranging from 0.16 to 2.6 pg/g, while the highest concentration found in burbot livers was 16 pg/g. Toxaphene concentrations in whole fish tissue ranged from 1 to 137 micro g/kg, while levels in burbot livers ranged from 44 to 1887 micro g/kg. Levels of PAHs and chlorinated phenolics were generally below analytical detection limits, as were most of the pesticide residues. (Au)

See also: 183, 210.

MCDONALD, S.

See: 64.

Inuvik A. Water Resources Branch was to compare some of these initially corrected values to intensive snow course data collected near Inuvik A in April, 1993 and Resolute in May, 1993 (for snow) and to historical runoff data (for total precipitation). Unfortunately, due to manpower constraints within Water Resources Branch these comparisons were not completed and Climate Research Branch was requested to complete the balance of the contract based on the techniques developed from previous precipitation intercomparisons. Climate Research Branch has produced electronic files of corrected data for the remaining stations, 30-year normals for the period 1961-1990 and new isoline maps for the same period. A paper presented at the Sixth Biennial AES/DIAND meeting on Northern climate which describes the methods used to correct the AES archived precipitation data is included as part of this report. Climate Research Branch recommends caution be used in interpreting the results from these correction procedures. Research in the area of precipitation correction is on-going and further refinements to the methods used are being investigated. Efforts have been made to adjust the AES precipitation records for known measurement biases, however, the verification of these corrections still needs to be addressed by calculating the water balance using these "new" precipitation values. Care should also be taken when interpolating values from the isoline maps for both Annual Precipitation (1960-91 Normals) and calculated Annual Precipitation (corrected Normals). A limited set of data was used to create the mapped area outside the NWT and the Provinces bordering it. [For some stations, the precipitation data goes back to 1947.] (Au)

91

1993-1994 water balance studies : wind corrected precipitation, NWT & Mackenzie River basin / Metcalfe, J.R. Ishida, S. Canada. Climate Research Branch [Sponsor]. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, DIAND ; Downsview, Ont. : Climate Research Branch, AES, 1994.
ca. 200 leaves : ill., col. maps ; 29 cm.
Mostly tables.
Appendices.
References.
Partial contents: A corrected precipitation archive for the Northwest Territories / J.R. Metcalfe, S. Ishida and B.E. Goodison of the Climate and Atmospheric Research Directorate.
ASTIS 415863
Libraries: ACU

Objective: To provide a record of precipitation values for the NWT and Mackenzie River Basin that has been corrected for biases in measurement method and wind induced error. Climate Research Branch tested the data correction algorithm on five stations initially. Stations selected for initial testing were Yellowknife A, Hay River A, Resolute A, Norman Wells and Inuvik A. Water Resources Branch was to compare some of these initially corrected values to intensive snow course data collected near Inuvik A in April, 1993 and Resolute in May, 1993 (for snow) and to historical runoff data (for total precipitation). Unfortunately, due to manpower constraints within Water Resources Branch these comparisons were not completed and Climate Research Branch was requested to complete the balance of the contract based on the techniques developed from previous precipitation intercomparisons. Climate Research Branch has produced electronic files of corrected data for the remaining stations, 30-year normals for the period 1961-1990 and new isoline maps for the same period. A paper presented at the Sixth Biennial AES/DIAND meeting on Northern climate which describes the methods used to correct the AES archived precipitation data is included as part of this report. Climate Research Branch recommends caution be used in interpreting the results from these correction procedures. Research in the area of precipitation correction is on-going and further refinements to the methods used are being investigated. Efforts have been made to adjust the AES precipitation records for known measurement biases, however, the verification of these corrections still needs to be addressed by calculating the water balance using these "new" precipitation values. Care should also be taken when interpolating values from the isoline maps for both Annual Precipitation (1960-91 Normals) and calculated Annual Precipitation (corrected Normals). A limited set of data was used to create the mapped area outside the NWT and the Provinces bordering it. [For some stations, the precipitation data goes back to 1947.] (Au)

See also: 152.

METIS NATION OF THE NWT

92

Metis Nation AES NWT water database, fall' 97 / Metis Nation of the NWT.
[S.l. : s.n.], 1997.
1 CD-ROM ; 12 cm.
Cover title: Metis Nation AES database : water, NWT, fall 1997.
Accompanying the CD is a three page handout describing how to use the AES water database, and a 21 page database summary of the AES water projects, containing information about the project, including the category, year, and abstract.
Contains 2.42 MB of data in total.
PC only.
ASTIS 428868

This CD-R disc contains descriptions of AES NWT water projects in Microsoft Access, Microsoft Word and HTML formats. (Au)

METNER, D.A.

See: 214, 215.

MILBURN, D.

93

The Arctic Environmental Strategy Action on Water : challenges, responses and achievements / Milburn, D.
(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 1-21)
References.
ASTIS 414204
Libraries: ACU

The period leading up to the 1990s saw a rapid growth in the number and complexity of northern resource management issues including the call for expanded, integrated programs to address emerging transboundary water issues, the emergence of new land owners through land claim settlements with government commitments related to protection of water quantity and quality and the general deficiencies of data programs geared to collection of water quantity or water quality information. The Arctic Environmental Strategy as one of the cornerstones of Canada's Green Plan responded to these issues through four action programs: Action on Water, Action on Waste, Action on Contaminants, and Action on Environment and Economy. These programs were intended to preserve and enhance the integrity, health, biodiversity and productivity of Arctic ecosystems for the benefit of present and future generations. The purpose of this paper is to provide an overview of the development and implementation of the Action on Water Program. To set the context for this paper, the regional setting of the Northwest Territories and Yukon is first described in terms of bio-physical, socio-cultural and economic features. The management and

science issues and challenges faced by the Action on Water Program are then reviewed followed by a discussion of the management response to them. Achievements of the Water Component are described in general terms. (Au)

94

The dimensions of hydro-ecology : report of the panel discussion on state of knowledge of northern aquatic ecosystem science and future directions / Milburn, D. Latham, B. Whitfield, P.

(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 345-349)

ASTIS 414441

Libraries: ACU

The purpose of this special hydro-ecological workshop of the Canadian Geophysical Union-Hydrology Section was to present some significant science-based findings of the Arctic Environmental Strategy-Action on Water studies, to assess the state of knowledge of northern aquatic ecosystems science and to recommend future directions. Twenty oral papers and four posters that report on the work of the Action on Water program were presented at this meeting. In addition, six section theme papers by leading experts were also presented (Annex I). This final section of the proceedings summarizes key findings of the discussions that followed the formal presentation of papers, and summarizes our state of knowledge about northern aquatic ecosystems and suggests future research disciplines of hydrology, ecology and catchment planning in existing and future hydropower schemes. (Au)

95

Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Milburn, D. [Editor]. Northern Affairs Program (Canada). Water Resources Division [Sponsor]. Canadian Geophysical Union. Hydrology Section [Sponsor]. National Hydrology Research Institute (Canada) [Sponsor]. Arctic Environmental Strategy [Sponsor].

Saskatoon, Sask. : National Hydrology Research Institute, 1997.

vii, 356 p. : ill., maps ; 21 cm.

(NHRI symposium, no. 16)

ISBN 0-660-16680-1.

Appendix.

References.

ASTIS 414190

Libraries: ACU

... The Water Resources Division approached the Canadian Geophysical Union-Hydrology Section, as the unifying body for hydrological research and studies in Canada, about holding a special session at their 1996 annual meeting to focus on northern water studies conducted under the Arctic Environmental Strategy. The papers and abstracts included in this volume were presented at this special meeting on hydro-ecology and represent a broad spectrum of scientific studies conducted under the Arctic Environmental Strategy. In addition, abstracts from special theme papers, presented by six leading experts in hydro-ecology, are included. The papers and abstracts appear in their original camera-ready format .... (Au)

See also: 11.

MOORE, L.

See: 2, 3, 102.

MUIR, D.C.G.

See: 8, 99.

NANISIVIK MINES LTD.

See: 42, 207.

NATIONAL HYDROLOGY RESEARCH INSTITUTE (CANADA)

96

Classification of hydrologically significant land cover in permafrost basins / National Hydrology Research Institute (Canada). Pietroniro, A. Prowse, T.D. Marsh, P. Pomeroy, J.W. Global Energy and Water Experiment [Sponsor]. Canada. Indian and Northern Affairs Canada [Sponsor]. Science Institute of the Northwest Territories [Sponsor]. Polar Continental Shelf Project (Canada) [Sponsor].

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [3] p.)

References.

Proceedings, Canadian Symposium on Remote Sensing, in press.

ASTIS 416665

Libraries: ACU

Scientists at the National Hydrology Research Institute (NHRI) have conducted research on the unique hydrologic characteristics of the Mackenzie Basin for several decades, with study sites in major hydrologically representative regions, including near Fort Simpson and Inuvik. To compensate for problems associated with the remoteness and geographic scale of these regions, remote sensing has been used to derive appropriate data for hydrologic simulation. Specifically, terrain types deemed significant to hydrologic response in wetland-dominated and tundra regimes, were discriminated using supervised, unsupervised and hybrid classifications schemes, as well as principle component analysis. The terrain types which dominate the hydrologic response of both regions could be best discriminated using the hybrid technique. The terrain classifications were then input to Grouped Response Unit (GRU) based hydrologic models, the reliability of which are highly dependent on the quality of hydrologic-terrain typing. Comparison of the results for the classification schemes and their suitability as a basis of applying the GRU modelling approach are discussed. (Au)

97

Hydrologic modelling in the zone of continuous permafrost at the arctic treeline / National Hydrology Research Institute (Canada). Quinton, W.L. Marsh, P. Northern Affairs Program (Canada). Water Resources Division.

Saskatoon, Sask. : National Hydrology Research Institute, [1997].

110 leaves : ill., maps ; 29 cm.

(NHRI contribution, no. 97005)

References.

ASTIS 416169

Libraries: ACU

... Physically based hydrological models are essential for addressing water resource issues such as water supply and flooding, the transport of contaminants through northern ecosystems and the impact of climate change on northern ecosystems. Numerous hydrological models have been developed for use in southern Canada, but few, if any, are applicable for the permafrost regions, where the relative importance of hydrological processes are different. To model spring and summer runoff in northern areas, it is critical to incorporate the spatial variations in snow cover depth and water equivalent. The impact of local advection on snow melt, and sublimation during blowing snow events also need to be incorporated, as should an account of infiltration into frozen soils, and lateral runoff through the active layer of hillslopes. This report is focussed upon processes and pathways of lateral runoff in Arctic-tundra basins in the continuous permafrost zone. The report begins with an assessment of the runoff models presently available. A detailed examination of the major physical processes controlling slope runoff is then provided. The report then presents a method of incorporating the physically meaningful knowledge of runoff processes into a framework to be used as a basis for a runoff model for this environment. ... (Au)

98

Mapping regional snow distribution in northern basins, Inuvik area, March 1995 : final report / National Hydrology Research Institute (Canada). Marsh, P. Pomeroy, J.W. Pietroniro, A. Nuemann, N. Northern Affairs Program (Canada). Water Resources Division [Sponsor].

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [133] p., ill., maps)

References.

Partial contents: Hydrological processes and runoff at the arctic treeline in northwestern Canada / P. Marsh, W. Quinton, and J.W. Pomeroy – Spatial distribution of snow chemical load at the tundra-taiga transition / J.W. Pomeroy, P. Marsh, G. Jones, and T. Davies – Classification of hydrologically significant land cover type in permafrost basins / A. Pietroniro, T. Prowse, P. Marsh and J.W. Pomeroy – Snow/soil heat and mass fluxes at an arctic treeline site / P. Marsh and J.W. Pomeroy – Snow accumulation and sublimation at the tundra-taiga transition / J.W. Pomeroy, P. Marsh and D.M. Gray.

ASTIS 416762

Libraries: ACU

... This report outlines the progress during 1995/96 of a joint study by the National Hydrology Research Institute and Water Resources Division, Indian and Northern Affairs, Yellowknife to develop techniques to utilize landscape type (i.e. vegetation and topography) to spatially map snow cover at the Arctic treeline. Such mapping is required for predicting snow melt runoff and for validating satellite derived snow cover maps. In addition, three papers are attached to this report. These papers utilize this landscape mapping to: (1) model the accumulation of snow over the winter period using a blowing snow model ... (2) to determine the spatial variation in melt water runoff from this modelled snowcover ... and (3) carry out a preliminary estimate of the role of advection on snow melt .... This work is in addition to that outlined in the Letter of Agreements between Indian and Northern Affairs and National Hydrology Research Institute. ... (Au)

99

Spatial and temporal patterns in the depositional history of organochlorine contaminants, PAHs, PCDDs, and PCDFs in the west basin of Great Slave Lake / National Hydrology Research Institute (Canada). Evans, M.S. National Water Research Institute (Canada). Bourbonniere, R.A. Freshwater Institute (Canada). Muir, D.C.G. Lockhart, W.L. Wilkinson, P. Billeck, B.N. Northern River Basins Study (Canada) [Sponsor]. Northern Affairs Program (Canada). Water Resources Division [Sponsor].

Saskatoon, Sask. : NHRI, 1996.

xi, 171 p. : ill., maps ; 29 cm.

Appendices.

References.

ASTIS 415936

Libraries: ACU

This report presents the results of August 1993 and March 1994 sediment studies in the West Basin of Great Slave Lake. In August 1993, a series of 10 surficial sediment samples were collected in the vicinity of the Slave River mouth. PCB was the predominant organochlorine (OC) compound detected followed by chlorobenzene, total DDT, HCH, and dieldrin. Concentrations were low and comparable to values reported for other subarctic and arctic lakes. There was no apparent pattern in the distribution of these compounds relative to the Slave River outflow. PHAs were very abundant and were dominated by benzo(g,h,i)perylene, benzo(e)pyrene, and phenathrene: concentrations were slightly higher offshore the river mouth than elsewhere. PCDD and PCDF concentrations were exceedingly low. PCDDs were dominated by DiCDD and OCDD while PCDFs were dominated by DiDCF and TriCDF. The presence of the lower chlorinated forms may be suggestive of a pulp and paper mill influence. Similarly the presence of pentachloroanisole, trichloroveratrole, and tetrachloroveratrole may be suggestive of a pulp and paper mill influence. ... While Great Slave Lake is essentially a pristine system, it does show signs of recent anthropogenic contamination. A significant fraction of Ocs, PAHs, PCCDs, and PCDFs probably entered the West Basin of Great Slave Lake with Slave River inflow. However, the primary source of these compounds is less certain, e.g., localized inputs from industries along the Peace and Athabasca Rivers and/or atmospheric deposition (wet and dry) over the broader watershed with the eventual transport of these compounds into the Peace, Athabasca, and Slave rivers and then into Great Slave Lake. Preliminary data suggests that Ocs, PCDDs, and PCDFs occur in similar concentrations in the West Basin and the East Arm (Lutsel K'e) of Great Slave Lake suggesting that long-range atmospheric sources are the primary source of these compounds. In contrast, PAH concentrations appear to be higher in the West Basin than the East Arm suggesting that there are significant point sources of these compounds along the Peace, Athabasca, and Slave Rivers in addition to diffuse, long-range, atmospheric sources. (Au)

See also: 42, 95.

NATIONAL WATER RESEARCH INSTITUTE (CANADA)

100

Contaminant deposition in snow in the Northwest Territories : 1991-1995 / National Water Research Institute (Canada). Strachan, W.M.J. Teixeira, C. Jones, N. Canada. Dept. of Indian Affairs and Northern Development [Sponsor]. Northern Affairs Program (Canada). Water Resources Division [Sponsor]. Arctic Environmental Strategy. Action on Water Component [Sponsor].

Burlington, Ont. : Canada Centre for Inland Waters, 1997.

40, ca. 150 p. : ill., maps ; 29 cm.

Cover title.

Appendix.

Partial contents: Current contaminant deposition measurements in arctic precipitation, a preliminary results report, Eureka, NWT, 91/92 : contaminant and meteorological data / N. Jones – Current contaminant deposition measurements in arctic precipitation, a

deployed at the upstream (7km) site had no more MFO inducers than present in trip blanks (approximately 10.8 pg EROD-EQ/g SPMD). These potencies were one-twentieth those observed in other studies of SPMDs from oil sands wastewaters. SPMDs from the Mackenzie River site 0.5 km downstream of the Norman Wells refinery outfall induced MFO in fish cells, but extracts were one-twentieth to one-fortieth as potent as Imperial Oil effluent-exposed SPMDs. Polyaromatic hydrocarbons (PAHs) and mono, di- and trimethyl-PAHs were abundant in extracts of SPMDs from the effluent, and to a lesser degree, in SPMDs from 0.5 km downstream. It is unknown at the present time which of the compounds in the SPMDs caused the MFO induction. Although SPMD extracts from the refinery effluent induced fish liver cells in culture, and chemistry data showed many PAHs in refinery effluent, small rainbow trout exposed to effluent showed little MFO response. Fish exposed to effluent for 3 days showed only three-fold induction over control fish, which was less than that seen in laboratory exposures of fish to other Canadian refinery effluents. The study shows the use of SPMDs as concentrators of neutral organic compounds in harsh environments such as high temperature effluents and fast flowing rivers, and shows the utility and sensitivity of the fish liver cell line to rank MFO-inducing potencies of the environmental SPMD extracts. (Au)

See also: 99.

NATO COLLABORATIVE GRANTS PROGRAMME

See: 144.

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL CANADA

See: 42, 144.

NELSON, T.

See: 80.

NEUMANN, N.

104
Local advection of sensible heat during snowmelt /
Neumann, N. Marsh, P.
(Mapping regional snow distribution in northern basins, Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [11] p., ill. NHRI contribution, no. 97006)
(Proceedings of the Western Snow Conference, 65th, Banff, Alberta, May 1997. [S.l. : s.n., 1997], p. 175-185, ill.)
References.
ASTIS 416851
Libraries: ACU

Heterogeneous land surface characteristics during the spring melt of an Arctic snowpack produce a horizontal transfer of energy at a small scale, a process termed local advection. Techniques were developed and applied to determine the importance of this local scale advection to both the magnitude of snowmelt and the average flux from a composite snow and snow-free surface. A tile-model approach was evaluated in estimating the spatial sensible heat flux over a patchy snow cover by comparison to eddy correlation measurements. These results suggest that a simple tile model is sufficient in determining the sensible heat flux over a heterogeneous surface, agreeing with other studies. An advection efficiency term, calculated from both field data and published model results (Liston, 1995), was used to determine the effect of advection on local snowmelt patterns. These calculations resulted in different patterns of influence, probably due to differences between the ideal modelled and natural surface conditions. (Au)

See also: 82.

NORTHERN AFFAIRS PROGRAM (CANADA). WATER RESOURCES DIVISION

105
Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division.
Yellowknife, N.W.T. : Water Resources Division, 1993.
1 v. (various pagings) : ill., maps ; 28 cm.
Appendices.
References.
ASTIS 416428
Libraries: ACU

The reports for the projects operated during the second year of the Arctic Environmental Strategy NWT Water Component are presented here as a matter of record. ... While many staff were new because they had come on to handle the work of the Strategy, they have succeeded in meeting the challenge of designing, implementing and reporting on a rapidly-expanding data collection and study program in a geographically-challenging part of Canada. ... [Baseline water quality and area specific water quality information along with snow studies, water laboratory equipment and supplies, fish monitoring, flooding, water survey station profiles, water supply, water level, etc. are included in this report.] (Au)

106
Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division.
Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994.
3 v. (various pagings) : ill., maps ; 28 cm.
Appendices.
References.
ASTIS 377074
Libraries: ACU

The reports for the projects operated during the second year of the Arctic Environmental Strategy NWT Water Component are presented here as a matter of record. ... Of particular note is the progress that has been made in responding to the concerns of the communities in scientifically defensible studies. Whether it is a study of river water quality near a community or the establishment of a gauging station on a well-travelled river, the number of times that it can be said that the work answers a local concern is steadily increasing. And work done throughout this year will improve this aspect more in the coming and last years of the AES. ... (Au)

107

Arctic Environmental Strategy Water Program annual report, 1993-1994 / Northern Affairs Program (Canada). Water Resources Division.
Hull, Quebec : Water Resources Division, DIAND, 1994.
i, 16 leaves : maps ; 28 cm.
Appendices.
Reference.
ASTIS 415995
Libraries: ACU

Announced in 1991, the Arctic Environmental Strategy (AES) is a six-year $100 million Green Plan initiative designed to preserve and enhance the integrity, health, biodiversity and productivity of northern ecosystems. The AES is intended to be more than a "quick fix" for environmental issues; it is a comprehensive approach involving the entire ecosystem. The "ecosystem approach" recognizes that people are an important part of the ecosystem. To ensure the success of the AES, it was developed and is being implemented with the involvement of northerners. AES includes four programs: Contaminants, Waste, Environment/Economy Integration and Water. ... The goal of the Water Program is to establish an enhanced water resource management regime. Improved knowledge of northern freshwater systems is essential to sound water management. The Water Program has three main objectives: 1. to establish a comprehensive water monitoring network including water quality and quantity stations; 2. to respond to issues of northern water quality and quantity; and, 3. to increase the capacity of northern water analytical facilities. In order to accomplish the first objective, the water quality and quantity networks have been expanded considerably in the past years. The second objective of the Water Program is to respond to emerging water issues. ... The third objective, to increase the capacity of northern water analytical facilities was met by renovating and expanding the existing Northern Analytical Laboratory. ... This annual report consists of a summary of activities conducted under the Water Program in the 1993-94 fiscal year. It also contains appendices which consist of a AES Water Program staff and a list of area specific studies. Headquarter activities will be discussed first, followed by summaries of the accomplishments of the water quality, water quantity and laboratory programs by region. ... (Au)

108

Bathymetric survey, 1995-1996, Northwest Territories / Northern Affairs Program (Canada). Water Resources Division. Arctic Environmental Strategy. Action on Water Component [Sponsor].
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [34] p., maps)
References.
ASTIS 416754
Libraries: ACU

... The Northwest Territories Bathymetric Survey began in 1995 prompted by increased demand for lake depth data throughout the NWT. The two page reports contained in this binder are summaries of each surveyed lake. Details include the lake location, surface area, volume, drainage basin, date of survey, surveyors, equipment used and any relevant background information. Bathymetric maps of each lake are included in the two page reports. At the back of the report is a diskette holding ASCII.DAT files of location (latitude and longitude or UTM) and depth (metres) for each lake. ... (Au)

109

Network strategy for Northwest Territories water resources networks, 1993-94, 1994-95, 1995-96, 1996-97 / Northern Affairs Program (Canada). Water Resources Division.
Yellowknife, N.W.T. : Water Resources Division, DIAND, 1997.
169 p. in various pagings : maps ; 29 cm.
Appendices.
References.
Contents: Network strategy, 1993-94 / F. Malcolm Conly, Jesse Jasper, R. Scott McDonald and Bob Reid – Network strategy, 1994-95 / F. Malcolm Conly, Bob Reid, Dale Ross and Chuck Brumwell – Network strategy, 1995-96 / Bob Reid, Randy Wedel, Dale Ross and Chuck Brumwell – NWT monitoring division, water monitoring network 1. DOE/INAC MOU schedule A; 2. AES/GP MOU schedule A; 3. DOE PRIORITIES & OGD schedule A for 1995 to 1996 – Network strategy, 1996-97 / Bob Reid, Randy Wedel, Dale Ross and Chuck Brumwell – Attachment 1 : NWT hydrometric network station list for 1996-9 1997 – Attachment 2 : NWT hydrometric network station rationales 1996-1997 – Network Evaluation and Planning Sub-Committee / Randy Wedel, for NEPS – Network strategy, 1997-98 / Randy Wedel and Bob Reid – NWT Hydrometric Monitoring Division, water monitoring network : DOE/DIAND MOU schedule A for 1997 to 1998.
ASTIS 415979
Libraries: ACU

These reports are a collection of documents produced annually by the NWT Network Evaluation and Planning Subcommittee (NEPS) made up of the DIAND and DOE staff who were directly involved in the operation of the NWT Hydrometric (Water Quality) Network. They have been compiled from the network operating files to keep them together and to respond to their being included in the AES Bibliography (Chouinard, 1997). Although they are internal working documents and individually of only passing general interest, collectively they detail the operation of the network over a particularly variable time, when budgets were being increased and then decreased – often simultaneously if that can be believed, priorities for the network were being questioned, new technologies were being introduced and when operating staff were being rapidly reduced. As such they provide insight into the management of a significant scientific program in a volatile climate. A broader explanation of the problems encountered during that time and of the decisions that had to be made is presented in the report by Bob Reid (1996). (Au)

110

NWT water today [January 1995 issue] / Northern Affairs Program (Canada). Water Resources Division.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [8] p., ill., maps)
Appendices.
References.
ASTIS 416614
Libraries: ACU

... In 1991, DIAND and Environment Canada set out to answer more water quality questions as part of a six-year program called Action on Water. This program was part of a Green Plan initiative, the Arctic Environmental Strategy (AES). The AES aimed to "preserve and enhance the integrity, health, biodiversity, and productivity of our Arctic ecosystems for the benefit of present and future generations." Improving water resource management in the North was a big part of meeting this challenge. ... While the AES program is in place, the water monitoring network will get us information about the chemistry and volume of water in the NWT. This will help us make better decisions about development that may affect northern waters. Even after the six-year program ends, information from the network will continue to help answer community concerns and identify certain areas that need further research. This newsletter highlights some water quality monitoring stations in the NWT, profiles a typical day in the life of a few water samplers and shows you how to become involved in water quality monitoring for your community. ... (Au)

111

Project reports : 1996-97 work and reports and 1997-1998 final reports : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division.
Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1998.
1 v. (unpaged) ; 28 cm.
References.
Photocopy.
ASTIS 431508
Libraries: ACU

... This is the final report on activities of the NWT Water Resources Division under the Arctic Environmental Strategy. ... [This report contains summaries of the research undertaken and provides, for each research project, a project title, project coordinator, cooperating agencies, project costs, project description (including location, objectives, and background information), work completion dates, conclusions/future directions, public information, and reports and outputs.] (Au)

112

Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division.
Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995.
1 v. (various pagings) : ill., maps ; 28 cm.
References.
ASTIS 376825
Libraries: ACU

The reports for the projects operated during the fourth of the Arctic Environmental Strategy NWT Water Component are included in this report. The list of project managers mentioned in the individual reports does not include many people who were part of the effort required to complete the work done. ... The laboratory staff are also not included in this resource because of the change of position of the water laboratory within the structure of Water Resources. Their contribution is an integral part of the Water Quality program. This has been the last of the two high activity years for AES NWT Water. (Au)

113

Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division.
Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997.
1 v. (loose-leaf) : ill., maps ; 29 cm.
Appendices.
References.
ASTIS 416940
Libraries: ACU

The report for the projects operated during the fifth year of the Arctic Environmental Strategy NWT Water Component make up this report. ... The laboratory is once again not included in this report as a project because of the change to a cost recovery basis with respect to the water quality projects. Their contribution is an integral part of the Water Quality program and is a major recipient of AES funds. This is detailed in the financial summary. ... Work completed in 1995-96: Reemployment of working agreement with Environment Canada for the mutual collection and analysis of water samples for the Water Quality Network. Development of lay samplers' and corresponding contracts. On-going training of new samplers for the collection of water quality samples. The purchase of equipment needed to perform all the necessary sampling throughout the year. Continuation of developing methods or ways of merging NWT water quality data for the National Water Quality Data Base. Collection and storage of data. Input of Environment Canada's data to spreadsheets compatible with DIAND's LOTUS 1-2-3 program. ... In 1995-96, the closure of two territorial stations on Banks Island (Thomsen and Big Rivers) along with the additional of six new territorial stations expanded the existing network from 61 to 65 stations. The continuation of the Baffin community lay sampler program has proven to be a cost effective way of obtaining water quality information in essentially remote areas. With Federal and Federal Territorial Stations relying heavily on the AES Baseline Water Quantity Network funding, reductions particularly by Environment Canada, resulted in reductions of sampling frequencies. With the sun-setting of the Arctic Environmental Strategy in 1997 there are no intentions of further expansion. Instead, the main focus will be towards closing down the network and reporting on the state of quality of these rivers and lakes. ... (Au)

114

Slave River Environmental Monitoring Program detailed summary report : report to May 1993 / Northern Affairs Program (Canada). Water Resources Division. Northwest Territories. Dept. of Renewable Resources. Canada. Dept. of Fisheries and Oceans.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [10] p., 1 map)
ASTIS 416460
Libraries: ACU

The territorial portion of the Slave River basin is viewed as a pristine watercourse. In 1988 the Department of Indian Affairs and Northern Development (DIAND) recognized the need to maintain environmental quality in the territorial portion of the Slave River Basin. Since then, DIAND has been monitoring on the Slave River in conjunction with the Government of the NWT, Environment Canada and the Department of Fisheries and Oceans. ... A brief description of the present program follows. It includes information on the sampling locations ..., personnel involved, and media and parameters analysed. Much of this information is summarized on Tables 3, 4 and 5. The field portion of the large volume water and sediment sampling program is coordinated out of the DIAND district office in Fort Smith. (Au)

115

Slave River Monitoring Program, January 1993, for Northern River Basins Study Meeting / Northern Affairs Program (Canada). Water Resources Division. Northwest Territories. Dept. of Renewable Resources. Canada. Dept. of Fisheries and Oceans. Northern River Basins Study (Canada) [Sponsor].
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, 6 p., 1 map)
ASTIS 416452
Libraries: ACU

The Slave River Monitoring Program is a cooperative program involving the Water Resources Division of the Department of Indian Affairs and Northern Development, the Government of the Northwest Territories' Department of Renewable Resources, and the Department of Fisheries and Oceans. These groups are studying the presence of man-made contaminants in the Slave River to address the concerns of NWT residents living along it. All the work is being done on the NWT part of the river. ... Water and sediment samples are sent to laboratories to be analyzed for trace metals and organic contaminants. Fish are collected and sent to the Fisheries and Ocean laboratory in Burlington, Ontario, to be analyzed for a number of chlorinated organic compounds. ... Results: No contaminants have been detected in any of the water or suspended sediment samples. ... The analytical results for the 1990-1992 samples from whole walleye samples were found to be extremely low in contaminants. ... TCDDs other than 2, 3, 7, 8 TCDD were found in the burbot livers from the control site at Chitty/Alexie Lake. The insecticide toxaphene was found in both whole

walleye and burbot livers in the samples from the Slave River and the control lakes. These results indicate long range air transport of contaminants. Tests were also conducted for PCBs, DDT, Mirex and other pesticides and organochlorines. None of these were detected in a significant amount. ... (Au)

116

Slave River Monitoring Program, report to February 1992 / Northern Affairs Program (Canada). Water Resources Division. Northwest Territories. Dept. of Renewable Resources. Canada. Dept. of Fisheries and Oceans.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [9] p., 1 map)
ASTIS 416444
Libraries: ACU

... Over the past two years, the government agencies have collected seven large volume water samples of 12 litres each and seven suspended sediment samples. All were sent to laboratories to be analyzed for trace metals and organic contaminants. Fish were collected and sent to the Fisheries and Oceans laboratory in Burlington, Ontario to be analyzed for a number of chlorinated organic compounds. Ten burbot were collected from the Salve River near Fort Smith in December 1989 ... The whole fish and fish liver samples were analyzed separately. ... In the winter of 1991 walleye were added to the program because they are an important part of the local diet. ... Results: No contamination have been detected in any of the water or suspended sediment samples. Both the whole fish and liver samples of the 1989 burbot had low concentrations of contaminants. ... The analytical results for the 1990-1991 samples from whole walleye samples were found to be extremely low in contaminants. ... The contaminants detected included 2, 3, 7, 8 TCDD (tetrachlorodibenzo-para-dioxin), Total TCDD, 2, 3, 7, 8 TCDF (tetrachlorodibenzofuran), Total TCDF and Toxaphene. All results for both collection periods were sent to Health and Welfare Canada for an assessment of their significance in relation to people eating the fish. Their reply is attached. TCDDs other than 2, 3, 7, 8 TCDD were found in the burbot livers from the control site at Chitty Lake. The insecticide Toxaphene was found in both whole walleye and burbot livers in the samples from the Slave River and the control lakes. These results indicate long range air transport of contaminants. Tests were also conducted for PCBs, DDT, Mirex and other pesticides and organochlorines. None of these were detected in a significant amount. Further information about this work is available from the contact address below. [This program will continue.] (Au)

117

Slave River Study report, December 1993 / Northern Affairs Program (Canada). Water Resources Division.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [4] p., ill.)
Contents: Slave River passes the tests – Sampling procedure is performed with painstaking care! – Toward a consensus : How the program began – Isn't somebody else studying the river? – The Slave River study team : a co-operative bunch of people – The search list – The Slave River Environmental Quality Monitoring Program – When is food safe to eat? – Where do we go from here?
ASTIS 416924
Libraries: ACU

The Slave River Study Report was initially published in a tabloid format and inserted in newspapers in the South Slave area in December of 1993. The articles were written by Marina Devine, Richard Gougeon and Lee Selleck under the technical direction of Juanetta Peddle (Sanderson). The progress to date of the Slave River study and preliminary results are reported along with a general overview of the program. (ASTIS)

See also: 8, 22, 41, 42, 44, 46, 48, 71, 73, 76, 91, 95, 97, 98, 99, 100, 101, 102, 103, 118, 119, 131, 137, 201, 203, 205, 208, 209, 210.

NORTHERN OIL AND GAS ACTION PROGRAM (CANADA)

See: 159.

NORTHERN RIVER BASINS STUDY (CANADA)

See: 99, 115.

NORTHERN WATER RESOURCES STUDY PROGRAM (CANADA)

See: 156, 158, 179, 185.

NORTHWEST TERRITORIES

See: 102.

NORTHWEST TERRITORIES. DEPT. OF MUNICIPAL AND COMMUNITY AFFAIRS

See: 211.

NORTHWEST TERRITORIES. DEPT. OF RENEWABLE RESOURCES

See: 114, 115, 116, 131, 137.

NORTHWEST TERRITORIES. RENEWABLE RESOURCES AND ENVIRONMENT DIRECTORATE

See: 101.

NORTHWIND CONSULTANTS

118

An assessment of revised AES precipitation data (NWT) by comparison to NWT streamflow data / Northwind Consultants. Wedel, J.H. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [40] p., ill., maps)
Twenty seven pages of tables.
References.
Report date 1995.
ASTIS 416738
Libraries: ACU

... The memorandum of agreement for the co-operative water balance studies undertaken by AES and DIAND in 1993-94, commit DIAND/WRD to compare surface water runoff data to the revised precipitation data prepared by Metcalfe and Ishida (1994). This study addresses DIAND'S responsibilities in this matter. Precipitation and streamflow represent two significant elements of any water balance equation; precipitation is the dominant source of water input, and surface water runoff a major element of water output from a catchment. Moreover, runoff becomes an increasingly larger fraction of water outputs the farther north one goes. In northern Canada, therefore, one should expect significant correlations to be possible between these two elements of a water budget when the data are compared on an annual basis. ... For AES stations at Baker Lake, Rankin Inlet, Resolute Bay, Sachs Harbour, Whale Cove and Yellowknife, total annual precipitation from the onset of winter in one year to the onset of winter in the runoff year was computed to assess the impacts of using precipitation year data rather than calendar year information. These results are shown in Table 1. Although differences are apparent, they were considered to be of insufficient size to affect the results in this study. Comparisons between runoff and precipitation for the remaining AES stations and their associated hydrometric stations were based on calendar year data only. Results for all stations are shown in table 2. Also shown in table 2 are mean and median runoff ratios for individual streamflow stations, although these indicators are diminished in value because of the variable length of record from which they are derived. In this situation the median is a better measure of central tendency than is the mean. ... The results of this analysis, i.e., the development of runoff ratios of small and medium-sized catchments near AES weather stations, show that ratios are much improved to similar procedures used with the unrevised, original AES precipitation data – but for many hydrometric stations the ratios remain larger than one would expect them to be, based on realistic, independent evaluation of individual components in water balance equations. ... The answer to the central question which this study addressed, namely, 'Are the revised AES data in better agreement with streamflow data collected in the same locales in the north?', has to be a qualified yes, although many of the results described are anomalous to expected distributions of runoff ratios. Almost certainly, the anomalous runoff ratios identified will have variable explanations, and their study in detail will lead to a better understanding of scientific processes within the northern water cycle and of the physical environments in which it takes place. Without this understanding, wise management of the NWT's water resources are not possible .... (Au)

119

NWT hydrometric station regional hydrology analysis / Northwind Consultants. Wedel, J.H. Wedel, R.L. Wedel, L.M. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, vii, 89 p., ill., maps)
Appendices.
References.
ASTIS 416525
Libraries: ACU

... This study was perceived as a precursor to detailed hydrologic modelling of regional regimes. It serves to identify general areas or regions within the NWT mainland for individual models. Based on perception, the models should include elements such as topography, physiography, climate variables, vegetation, lake and wetland fractions, and location. For a number of these, the best numerical values derive from satellite imagery analysis. Others can be obtained from conventional map analysis. With this direction in mind, the recommendations which follow are more in the nature of tasks which will lead from here to there. The follow-up tasks are as follows: 1. Develop lake/wetland fractions for regional hydrology catchments by imagery analysis. 2. Begin the assembly of numerical data banks to support the development of regional hydrologic models. 3. Review the operational procedures for field and computational data acquisition and analysis of mid-winter low flows. Develop a conceptual low-flow model design. 4. Conduct a workshop attended by scientific and operational staff to finalize, or alter the proposed 44 master stations identified here. Define the 'area of influence' for each master station if different from these study results. 5. Define the 20-year flood for appropriate regional hydrology stations. In this regard, it should be noted that 20-year flood magnitudes change with increases in the data set. Accordingly, it would be of great benefit to users of hydrometric data to receive annual updates of these data, preferably in the form of an isoline map. (Au)

See also: 48.

NUEMANN, N.

See: 79, 80, 98.

NWT NETWORK EVALUATION AND PLANNING SUBCOMMITTEE

120

NWT Arctic Environmental Strategy hydrometric plan, 1991 / NWT Network Evaluation and Planning Subcommittee.
[S.l. : s.n.], 1991.
23 leaves : 1 map ; 28 cm.
Appendices.
Photocopy.
ASTIS 431494
Libraries: ACU

... The Arctic Environmental Strategy is the northern part of the Green Plan, a federal government suite of programs to improve the environment of Canada. The northern program calls for expenditures on contaminants, waste, water and environment/economic integration. The component on water has a number of goals and these are outlined in Appendix 1. One element of the water program is the proposed addition of about 100 hydrometric (water quantity) stations in the NWT and the Yukon. ... A major area for data collection expansion will be in the Arctic Islands. This component of the network expansion will involve extensive additional planning in order to limit the logistic difficulties during reconnaissance and the subsequent operation of hydrometric stations in the Arctic Islands. Furthermore, field techniques and instrumentation will be examined in an attempt to optimise data collection in these remote and distinctive

environments. ... The objective of the work covered in this report is to identify hydrometric stations that can be established during the 1991 field season, bearing in mind the need for the data and the technical requirements for stations, and to identify reconnaissance work that can be carried out in 1991-1992 for stations that would likely be established in future years. ... (Au)

PALMER, M.

121

Current contaminant deposition measurements in arctic precipitation (snow) / Palmer, M. Strachan, W.M.J. Swyripa, M.W.

(Synopsis of research conducted under the 1994/95 Northern Contaminants Program / Edited by J.L. Murray, R.G. Shearer, S.L. Han. Environmental studies – Canada. Dept. of Indian Affairs and Northern Development, no. 73, 1996, p. 71-73)

ASTIS 384712

Libraries: ACU

Objectives: 1. To quantify the snowfall deposition of persistent toxic chemicals in the Arctic and to assess the relative importance of this mechanism to the overall input of these chemicals to the region. (Au)

PARIS, M.C.

122

Collection of fish samples from the Yellowknife-Back Bay area of Great Slave Lake for assessing the presence of histopathological lesions and evaluating the concentration of metallothionein in kidney and liver tissues : field report / Paris, M.C. Lafontaine, C.N.

(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [6] p.)

Appendices.

ASTIS 416690

Libraries: ACU

... Four sites were recommended by Jack Klaverkamp from the Department of Fisheries and Oceans in Winnipeg, for investigating the health of the fish residing in the Yellowknife-Back Bay area of Great Slave Lake (GSL) by looking at metallothionein levels and histopathological lesions in liver and kidney tissues. ... For each fish the collection of tissues was as follows: After having measured and weighed the fish, it was cut open with a pair of scissors. The maturity of the gonad was assessed. Then the liver and gonads were removed. While liver and gonads were being weighed, a small piece of kidney (10 x 5 mm) was gently cut and detached from the middle section of the vertebrae under the dorsal fin for histopathological assessment. A small piece of liver (5 x 5 mm) taken from the larger lobe and a section of the gonads were cut and placed, with the piece of kidney, in an Omnisette tissue capsule. The capsule was then immersed in Bouin's preservative solution .... The gills and the remainder of the liver and kidneys were individually packed in Whirlpack contaminant-free bags and quick-frozen on dry-ice. Ageing structures were then removed. All gutted fish carcasses were weighed with the gills and ageing structures. ... (Au)

See also: 200.

PARKS CANADA

See: 48.

PARROTT, J.L.

123

MFO inducers from refinery effluent, Mackenzie River, Norman Wells / Parrott, J.L. Backus, S.M. Swyripa, M.W.

(Proceedings of the 23rd Annual Aquatic Toxicity Workshop, October 7-9, 1996, Calgary, Alberta = Comptes rendus du 23ieme atelier annuel sur la toxicite aquatique, du 7 au 9 octobre, 1996, Calgary, Alberta / Edited by J.S. Goudey, S.M. Swanson, M.D. Treissman and A.J. Niimi. Canadian technical report of fisheries and aquatic sciences, no. 2144, 1997, p. 34)

Abstract only.

ASTIS 430242

Libraries: ACU

Semipermeable membrane devices (SPMDs) were deployed for 11 to 12 d in Mackenzie River waters upstream and downstream of, as well as in the skimmer ponds and effluent stream of, Imperial Oil, Norman Wells. Extracts of SPMDs were dosed to fish liver cells (PLHC-1, Poeciliopsis lucida hepatocarcinoma cells, a liver tumour cell line from a top minnow) and mixed function oxygenase (MFO) was determined by measuring the activity of ethoxyresorufin-O-deethylase (EROD) in the cells. SPMDs deployed at the upstream (7 km) site had no more MFO inducers than present in trip blanks. SPMDs from the effluent contained potent MFO inducers, with potencies of 16,400 to 43,600 pg EROD-EQ/g SPMD. SPMDs from the site 0.5 km downstream of the refinery outfall induced MFO in fish cells, but extracts were one-twentieth to one-fiftieth as potent as effluent-exposed SPMDs. Polyaromatic hydrocarbons (PAHs) and mono,- di- and trimethyl-PAHs were abundant in extracts of SPMDs from the effluent, and to a lesser degree, in SPMDs from 0.5 km downstream. It is unknown at the present time which of the compounds in the SPMDs caused the MFO induction. Although SPMD extracts induced fish cells, and chemistry data showed many PAHs in refinery effluent, small rainbow trout exposed to effluent showed little MFO response. Fish exposed to effluent for 4 d showed only three-fold induction over control fish, which was less than seen in tests of other refinery effluents. (Au)

See also: 103.

PEDDLE, J.D.

124

Fort Resolution Fish Monitoring Program / Peddle, J.D. Starling, W.

(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 133-139, 1 map)

ASTIS 369896

Libraries: ACU

Project objective: To determine concentrations of arsenic, cadmium, copper, lead, mercury, nickel and zinc in fish tissue in the area around the abandoned Pine Point mining development near the community of Fort Resolution on Great Slave Lake. ... Concentrations of trace metals in fish tissue can be of major concern, particularly if fish serve as a source of traditional food. The data derived from this work were forwarded to

Health Canada for health assessment. Based on detailed analysis, Health Canada concluded that no health precautions were required. (Au)

125

Fort Resolution Fish Monitoring Program (year 2) / Peddle, J.D. Starling, W.

(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [2] p.)

ASTIS 376957

Libraries: ACU

Objectives: To address the concerns of Fort Resolution residents regarding the possible contamination of fish due to mining developments in the area. Background: This study was initiated due to concerns raised by the residents of Fort Resolution that the flesh of the fish in the Fort Resolution Harbour may be contaminated by abandoned mining developments' discharged wastes which eventually flow into Great Slave Lake. This study involved consultation with local fishermen to determine the best time and location to sample fish in the area. Local fishermen were also involved in the collection of the fish. After the first year of sampling, consultation with the residents of Fort Resolution indicated that there were concerns with those fish not only in close vicinity to their community, but also in the area of the lake which lies close to any potential runoff from the abandoned Pine Point Mine. As a result, samples were collected from this site in the fall of 1993 with the help of local fishermen. ... Local people have been involved throughout the study identifying the concerns, collecting samples, modifying study design and choosing the format of the presentation of the results to the community. ... (Au)

126

Lac de Gras area fish contaminant study / Peddle, J.D. McKenna, D.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [3] p.)

ASTIS 376868

Libraries: ACU

Objectives: 1) To collect pre-development baseline data from an area of the NWT where few or no environmental data have been gathered and which has a very strong potential for development. 2) To assess contaminant levels in water and fish in the study area and allow comparison with other barren lakes in the Canadian Arctic. 3) To evaluate effects of development on water quality in undeveloped areas, including long range atmospheric transport of contaminants. 4) To provide predevelopment baseline data for comparison with contaminants data from other programs. ... The study area is relatively pristine and largely unresearched to date. Data from this region will give a broader view of the contamination of fish and waters by air-borne anthropogenic compounds. It will also provide information for the environmental assessment panel that has been formed to look into the development of a diamond mine in the area. (Au)

127

Lac de Gras area fish contaminant study / Peddle, J.D. Wilson, A.

(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [3] p.)

ASTIS 376990

Libraries: ACU

Objectives: 1) To collect pre-development baseline data from an area of the NWT where few or no environmental data have been gathered and which has a very strong potential for development. 2) To assess contaminant levels in water and fish in the study area. 3) To evaluate effects of development on water quality in undeveloped areas, including long range atmospheric transport of contaminants. 4) To provide predevelopment baseline data for comparison with contaminants data from other programs. Background: This joint study with DFO began in 1993/94 in response to intensive mineral exploration in the Lac de Gras area and the potential for diamond mine development. ... (Au)

128

Liard River Environmental Monitoring Program / Peddle, J.D.

(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 15-23, ill.)

ASTIS 369721

Libraries: ACU

Project objectives: 1. To characterize baseline quality conditions for fish, water, suspended sediment and benthic invertebrates of the Liard River at Fort Liard with specific attention to contaminant levels of organochlorines, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), toxaphene and trace metals; and 2. To understand potential impacts of water uses and fish populations due to upstream development in the Liard River basin that have been raised by local residents. (Au)

129

Liard River monitoring program, May 1995 / Peddle, J.D.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [4] p.)

(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. I, [4] p.)

References.

ASTIS 416592

Libraries: ACU

... The Liard River Monitoring Program is a project of the Arctic Environmental Strategy. this strategy deals with environmental issues that are important to Canada's North. It can be broken down into four parts: water, waste, contaminants, and environment/economy integration. The Liard River Monitoring Program is a part of the Water section. ... Sampling for the Liard River Project began in June 1992 and involved three sampling runs. Water, sediment and fish samples were collected. In 1993 and 1994, water, sediment, fish and invertebrate samples were collected in June, September and December. Another sampling site was also added, Cormack Lake. ... The fish collected in the first year were all very safe to eat. ... [The types of samples taken include: water samples (20), suspended sediment samples (12), fish samples, and invertebrate samples. Samples were tested for basic physical properties, and the presence of nutrients, metals, organochlorines, and polycyclic aromatic hydrocarbons (PAHs). The results of the assessment of the fish collected in the second and third years of the study are not yet available.] (Au)

130

A multimedia approach to environmental monitoring in a northern environment : the Slave River Environmental Quality Monitoring Program / Peddle, J.D. Robertson, K.

(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern

Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. I, [14] p.)
References.
ASTIS 416967
Libraries: ACU

The Slave River Environmental Quality Monitoring Program was a five year multimedia sampling program established in 1990 to characterize baseline conditions of the aquatic ecosystem in the Slave River at Fort Smith, NWT, Canada. The program's comprehensive nature made it the first of its kind in the Northwest Territories. Increases in developments upstream in the basin had prompted concerns by northern residents. To answer the questions "Can we drink the water?" and "Can we eat the fish?", the program took an ecosystem approach, studying water, suspended sediment and fish. The emphasis was on contaminants resulting from anthropogenic developments upstream: pulp and paper mills; agricultural activities; and hydrocarbon developments. Samples were analyzed for metals, PAHs, mixed function oxygenases (MFOs), pesticides, chlorinated phenolics, dioxins, furans and other organochlorines. The comprehensive database that resulted suggests that contaminant levels in the water and sediment are very low. Several organochlorines were detected in fish samples but only toxaphene is at a level above consumption guidelines. It would appear that most of the compounds detected are from a natural source or due to long range atmospheric transport. Objectives: address concern of NWT residents about impacts development (pulp and paper, hydrocarbon production, agriculture and forestry) on the water and fish; provide baseline data on contaminant levels at the NWT boundary to support transboundary water negotiations between Alberta and NWT; and detect and quantify changes in environmental quality of the aquatic ecosystem over time. (Au)

131

Slave River Environmental Monitoring Program detailed summary report : report to December 1993 / Peddle, J.D. Northern Affairs Program (Canada). Water Resources Division [Sponsor]. Northwest Territories. Dept. of Renewable Resources [Sponsor]. Canada. Dept. of Fisheries and Oceans [Sponsor].
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [11] p., 1 map)
Mostly tables.
ASTIS 416916
Libraries: ACU

The territorial portion of the Slave River basin is viewed as a pristine watercourse. In 1988 the Department of Indian Affairs and Northern Development (DIAND) recognized the need to maintain environmental quality in the territorial portion of the Slave River Basin. Since then, DIAND has been monitoring on the Slave River in conjunction with the Government of the NWT, Environment Canada and the Department of Fisheries and Oceans. The original study (1988 and 1989) involved the collection of fish from two sites on the Slave River. These samples were analysed for pollutants associated with pulp and paper mills, hydrocarbon development and agricultural activities. A summary of the analysis completed on these samples is outlined in Tables .... In later years and up to the present date (1990-93) the sampling program expanded to include sediment, water and benthic organisms in order to encompass more of an ecosystem approach to monitoring. The Slave River Environmental Quality Monitoring Program is now an integrated multi-media monitoring program designed to establish the baseline conditions of levels of contaminants in water, suspended sediment and biota. A brief description of the present program follows. It includes information on the sampling locations ..., personnel involved, and media and parameters analysed. ... The field portion of the large volume water and sediment sampling program is coordinated out of the DIAND District office in Fort Smith. ... (Au)

132

Slave River Environmental Monitoring Program detailed summary report : report to June 1995 / Peddle, J.D.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [12] p., 1 map)
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. I, [12] p., 1 map)
ASTIS 416576
Libraries: ACU

... The territorial portion of the Slave River basin is viewed as a pristine watercourse. In 1988 the Department of Indian Affairs and Northern Development (DIAND) recognized the need to maintain environmental quality in the territorial portion of the Slave River Basin. Since then, DIAND has been monitoring on the Slave River in conjunction with the Government of the NWT, Environment Canada and the Department of Fisheries and Oceans. The original study (1988 and 1989) involved the collection of fish from two sites on the Slave River. These samples were analysed for pollutants associated with pulp and paper mills, hydrocarbon development and agricultural activities. ... In later years and up to the present date (1990-95) the sampling program expanded to include sediment, water and benthic organisms in order to encompass more of an ecosystem approach to monitoring. The Slave River Environmental Quality Monitoring Program is now an integrated multi-media monitoring program designed to establish the baseline conditions of levels of contaminants in water, suspended sediment and biota. ... [The present program includes water quality grab samples, large volume water and sediment samples, a benthic monitoring program, and fish samples, and describes the sampling locations, personnel involved, media and parameters analysed.] (Au)

133

Slave River Environmental Quality Monitoring Program / Peddle, J.D.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 3-14, ill., 1 map)
This summary is adapted from a poster presented at the Second International Conference on Environmental Fate and Effects of Bleached Pulp Mill Effluent, Vancouver, November 6-10, 1994 and at the Society of Canadian Limnologists Annual Conference, Ottawa, January 5-7, 1995.
References.
ASTIS 369713
Libraries: ACU

Project objectives: 1. To provide baseline data on contaminant levels in water, sediment and fish at the Alberta and NWT boundary to support transboundary water negotiations; 2. To detect and quantify changes in environmental quality of the aquatic ecosystem over time; and 3. To address the concerns of NWT residents regarding possible impacts from upstream development (particularly in association with pulp and paper, hydrocarbon production, agriculture and forest management) on their continued ability to drink the Slave River water and eat Slave River fish. ... From a preliminary examination of the data it appears that the environmental quality of the Slave River at Fort Smith, NWT, Canada is relatively unimpaired. With this extensive database, it will be possible to detect and quantify any changes in ecosystem quality. (Au)

134

Slave River Environmental Quality Monitoring Program / Peddle, J.D. Robertson, K.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [27] p., ill., 1 map)
References.
Report date 1994.
ASTIS 416584
Libraries: ACU

Since 1990, samples of water, suspended sediment and fish have been collected from the Slave River at Fort Smith in the Northwest Territories, Canada. These samples were analyzed for compounds associated with pulp and paper mills, hydrocarbon development and agricultural activities upstream in the basin. The samples were also analyzed for select long-range air pollutants. The results suggest that contaminant levels in the water and suspended sediment are very low. Trace levels of dioxins, furans and toxaphene have been found in some fish samples. This poster [presented at the Second International Conference on Environmental Fate and Effects of Bleached Kraft Mill Effluents, Vancouver, B.C. Nov. 6-10, 1994] will review the major data in all media but will highlight dioxin and furan levels in fish. (Au)

135

Slave River Environmental Quality Monitoring Program : interim data report / Peddle, J.D. Lafontaine, C.N. Stephens, G.R. Robertson, K. Taylor, P.
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. I, [142] p., ill., maps)
Report dated December 1995.
Appendices.
References.
ASTIS 416975
Libraries: ACU

The Slave River Environmental Quality Monitoring Program (SREQMP) was established to characterize the baseline conditions of the aquatic ecosystem in the Slave River at Fort Smith, NWT. Implemented in 1990 after two years of preliminary studies, it is a cooperative program among the Water Resources Division of the Department of Indian Affairs and Northern Development (DIAND), the Government of the Northwest Territories' Department of Renewable Resources (GNWT), the Department of Fisheries and Ocean (DFO) and Environment Canada (DOE). This report outlines the background leading up to the study, the study design, field analytical methodologies and the results. ... In general terms, the objectives of the Slave River Environmental Monitoring Program can be stated as: i) To provide baseline data on contaminant levels in Slave River fish, water and sediment in support of transboundary waters negotiations; and ii) To address concerns of northerners regarding possible contamination of fish, water and sediment from new and expanded pulp mill, hydrocarbon and agricultural developments upstream. (Au)

136

Slave River Monitoring Program / Peddle, J.D.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [6] p., 1 map)
ASTIS 416568
Libraries: ACU

... The Slave River Monitoring Program is a cooperative program involving the Water Resources Division of the Department of Indian Affairs and Northern Development, the Government of the Northwest Territories' Department of Renewable Resources, and the Department of Fisheries and Oceans. These groups are studying the presence of man-made contaminants in the Slave River to address the concerns of NWT residents living along it. All of the work is being done on the NWT part of the river. The initial reconnaissance work in 1988 and 1989 analyzed fish. After this, the program expanded into an ecosystem study which monitors for contaminants in water, sediment carried by the river and benthic organisms. ... In October 1990 walleye were added to the program because they are an important part of the local diet. Ten walleye were collected at Fort Smith and five from the control site at Leland Lake. Whole fish samples were analyzed. In September 1991, ten walleye were collected at Fort Smith and six from Leland Lake. In December 1991 ten burbot from Slave River and five from the control site at Chitty/Alexie Lake were collected. Again whole fish samples of the walleye and liver samples from the burbot were analysed. ... No significant levels of contamination have been detected in any of the water or suspended sediment samples. Both the whole fish and liver samples of the 1989 burbot had low concentrations of contaminants. ... Generally low levels of contaminants were also found in the 1990-92 burbot liver samples, with toxaphene being of most concern. ... Tests were also conducted for PCBs, DDT, Mirex and other pesticides and organochlorines. None of these were detected in a significant amount. ... The program will continue to monitor for contaminants in the Slave River. ... (Au)

137

Slave River Monitoring Program results to date, December 1993 / Peddle, J.D. Northern Affairs Program (Canada). Water Resources Division [Sponsor]. Northwest Territories. Dept. of Renewable Resources [Sponsor]. Canada. Dept. of Fisheries and Oceans [Sponsor].
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [14] p., 1 map)
Partial contents: EPI North, v. 4, no. 10, Nov. 1992 containing 1. Notifiable diseased reported during the month of October, 1992 and 2. Toxaphene in the N.W.T.
ASTIS 416908
Libraries: ACU

The Slave River Monitoring Program is a cooperative program involving the Water Resources Division of the Department of Indian and Northern Development, the Government of the Northwest Territories' Department of Renewable Resources, and the Department of Fisheries and Oceans. These groups are studying the presence of man-made contaminants in the Slave River to address the concerns of NWT residents living along it. All of the work is being done on the NWT part of the river. The initial reconnaissance work in 1988 and 1989 analyzed fish. After this, the program expanded into an ecosystem study which monitors for contaminants in water, sediment carried by the river and benthic organisms. Benthic organisms are the worms and insects living on the bottom of the river. Water and sediment samples are sent to laboratories to be analyzed for trace metals and organic contaminants. Fish are collected and sent to the Fisheries and Ocean laboratory in Burlington, Ontario to be analyzed for a number of chlorinated organic compounds. Ten burbot were collected from the Slave River near Fort Smith in December 1989 .... The whole fish and fish liver samples were analyzed separately. In December 1990, eleven burbot were collected at the same location and five fish from the control site, Chitty/Alexie Lake. Only the livers were analyzed because they contain more contaminants than the whole fish. ... burbot livers are a popular food for people on the Slave River. In October 1990 walleye were added to the program because they are an important part of the local diet. Ten walleye were collected at Fort Smith and five from the control site at Leland Lake. Whole fish samples were analyzed. In September 1991, ten walleye were collected at Fort Smith and six from Leland Lake. In December 1991 ten burbot from Slave River and five from the control site at Chitty/Alexie Lake were collected. Again whole fish samples of the walleye and liver samples from the burbot were analyzed. In 1992, burbot and walleye samples were also collected but these results have not yet been received. Results: No significant levels of contaminants have been detected in any of the water or suspended sediment samples. ... (Au)

See also: 4, 5, 85, 86, 88, 183.

PETERS, A.

See: 64.

PIETRONIRO, A.

See: 79, 80, 96, 98.

PILLING, R.

138
Keele River gauging site assessment report, 1991 / Pilling, R. Arseneau, C.
[S.l.] : Canada's Green Plan, 1991.
[14] leaves : col. ill., maps ; 28 cm.
ASTIS 416010
Libraries: ACU

... Basin characteristics: The Keele River drains a large area of the Mackenzie Mountains including the Backbone, the Sayunei, and the Tigonankweine Range. Relief in the basin ranges from approximately 6500 feet, at the headwaters, to less than 400 feet at the mouth. There is a variety of terrain in the mountainous areas of the basin, ranging from rolling hills to rugged peaks. There are no permanent glaciers in the basin. The channel's characteristics vary from meandering braided sections to stable steep banks. ... Hydrologic characteristics: Although no ground reconnaissance was done on the possible gauging sites, the channel bed was visible through the water, at most locations. There are many tributaries to the Keele River, each having a variety of origins. The size of the basin and lack of glacially fed headwaters precludes any diurnal effect. Due to the mountainous terrain, the Keele River would likely be flashy, especially in the upper reaches. ... Site selection summary: Unfortunately there does not appear to be a good gauging location below the Twitya. The first site below the Ekwi River ... is the best location for the gauge. Although there is a lack of a good control, it does include the Ekwi River. Possibilities of rough waters through the reach may also be a problem. Some small standing waves were visible at the lower end of the reach, at low water on October 22, 1991. ... It is recommended that a ground reconnaissance be conducted for the Keele River above Twitya River (first site) to confirm if the site is suitable. ... (Au)

POLAR CONTINENTAL SHELF PROJECT (CANADA)

See: 96, 101, 143, 144.

POMEROY, J.W.

139
Application of a distributed blowing snow model to the Arctic / Pomeroy, J.W. Marsh, P. Gray, D.M.
(Mapping regional snow distribution in northern basins, Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [16] p., ill. NHRI contribution, no. 97006)
(Hydrological processes, v. 11, 1997, p.1451-1464)
References.
ASTIS 416860
Libraries: ACU

Transportation, sublimation and accumulation of snow dominate snow cover development in the Arctic and produce episodic high evaporative fluxes. Unfortunately, blowing snow processes are not presently incorporated in any logical or meteorological models. To demonstrate the application of simple algorithms that represent blowing snow processes, monthly snow accumulation, relocation and sublimation fluxes were calculated and applied in a spatially distributed manner to a 68-sq. km catchment in the low Arctic of north-western Canada. The model uses a Landsat-derived vegetation classification and a digital elevation model to segregate the basin into snow 'sources' and 'sinks'. The model then relocates snow from sources to sinks and calculates in-transit sublimation loss. The resulting annual snow accumulation in specific landscape types was compared with the result of intensive surveys of snow depth and density. On an annual basis, 28% of annual snowfall sublimated from tundra surfaces whilst 18% was transported to sink areas. Annual blowing snow transport to sink areas amounted to an additional 16% of annual snowfall to shrub-tundra and an additional 182% to drifts. For the catchment, 19.5% of annual snowfall sublimated from blowing snow, 5.8% was transported into the catchment and 86.5% accumulated on the ground. The model overestimated snow accumulation in the catchment by 6%. The application demonstrates that winter precipitation alone is insufficient to calculate snow accumulation and that blowing snow processes and landscape patterns govern the spatial distribution and total accumulation of snow water equivalent over the winter. These processes can be modelled by relatively simple algorithms, and, when distributed by landscape type over the catchment, produce reasonable estimates of snow accumulation and loss in wind-swept regions. (Au)

140
Application of an arctic blowing snow model / Pomeroy, J.W. Marsh, P. Gray, D.M.
(Mapping regional snow distribution in northern basins Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [5] p., ill. NHRI contribution, no. 97006)
(International GEWEX Workshop on Cold-Season/Region Hydrometeorology : summary report and proceedings, Banff, Alberta, Canada, 22-26 May 1995 / Compiled by T.W. Krauss and T.R. Carroll. IGPO publication series, no. 15)
References.
ASTIS 416800
Libraries: ACU

... Wind transport and sublimation of blowing snow are anticipated to promote significant annual fluxes of water and energy in the Arctic. Improved estimates of winter precipitation are confirming results known for windswept temperate snow climates: snowfall is greater than was previously thought and significantly exceeds snow accumulation .... The redistribution of snow by wind forms snowcovers of highly variable depth and density, whose variation governs surface energetics during melt .... The spatial distribution of snow water equivalent is important to modelling the timing, amplitude and persistence of the snow melt freshet .... For these reasons, physically-based, spatially-distributed process models of snow hydrology are required to calculate snow fluxes over a range of scales .... However, the processes of winter mass exchange between the snowcover and the atmosphere have not been adequately investigated for the Arctic, nor have they been incorporated in any hydrological or atmospheric model. ... The application of the Arctic Blowing Snow Model to a dissected low arctic basin has shown: 1) Blowing snow fluxes are large in the Arctic and exceed snowfall fluxes for mid-winter months; for a tundra fetch 56% of snowfall sublimated and 13% was relocated to shrubs and drifts. 2) Incised catchments can gain

wind-transported snow from adjacent tundra plains; Trail Valley Creek gained 17 mm of equivalent precipitation from areas outside of its drainage area. The magnitude of such gains will depend on the scale of comparison. 3) Sublimation losses are notable on a catchment-scale; 42% of snowfall sublimated during blowing snow at Trail Valley Creek over the winter, an important latent heat flux, loss of surface water supply and source of atmospheric water vapour that has not been considered in hydrological or meteorological models. 4) The formation of snowcovers in the Arctic cannot be adequately described without reference to relocation of snow by the wind. Blowing snow processes govern reference to relocation of snow by the wind. Blowing snow processes govern the snow water supply available for melt, infiltration and stream discharge, the distribution of snow water supply available for melt, infiltration and stream discharge, the distribution of snow and therefore the surface energetics at the time of melt. These results should not be extrapolated without reference to local climate and terrain. ... (Au)

141

The application of remote sensing and a blowing snow model to determine snow water equivalent over northern basins / Pomeroy, J.W. Marsh, P.

(Mapping regional snow distribution in northern basins, Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [18] p., ill., maps. NHRI contribution, no. 97006)

(Applications of remote sensing in hydrology : proceedings of the third international workshop, 16-18 October 1996, NASA Goddard Space Flight Center, Greenbelt, Maryland, U.S.A./ Edited by G.W. Kite, A. Pietroniro and T.J. Pultz. – [S.l. : s.n., 1996], p. 253-270, ill., maps. NHRI symposium, no. 17)

References.

ASTIS 416835

Libraries: ACU

In basins along the sub-arctic/arctic transition, land cover varies dramatically from shrubs and open forest in the sub-arctic to sparsely vegetated tundra in the arctic. This change in vegetation has a strong effect on blowing snow processes and hence snow accumulation, with much less redistribution and much greater snow retention in basins covered with subarctic vegetation. To determine basin snow water equivalent and sublimation after redistribution of snow, a series of blowing snow algorithms was applied in a spatially-distributed model using standard meteorological data. The model uses a Landsat TM derived vegetation classification coupled with a digital elevation model to segregate the basin into sources and sinks. Thematic Mapper channels 3,4,5 and 7 from a mid-summer image were classified to standard ecological categories using a supervised maximum likelihood procedure on PCI software. The classification was combined with digitised elevations to provide a landscape classification of 40 m resolution. About 22% of annual snowfall sublimated during blowing snow in the arctic basin examined but only one-fifth of this value sublimated from the subarctic basin. Snow accumulation in drift areas was over 5 times that on level tundra surfaces. Snow accumulation predicted by the model compares well with the results of landscape stratified snow surveys. The resulting snow water equivalent distribution maps show the extreme variation in snow water available for melt in small sub-catchments and the large-scale transition in snow accumulation regimes as the arctic "treeline" is crossed. (Au)

142

Relocation of major ions in snow along the tundra-taiga ecotone / Pomeroy, J.W. Marsh, P. Lesack, L.

(Mapping regional snow distribution in northern basins, Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [18] p., ill. NHRI contribution, no. 97006)

(Nordic hydrology, v. 24, no. 2/3, 1993, p. 151-168, ill.)

References.

Paper presented at the 9th Northern Research Basins Symposium and Workshop, Whitehorse/Dawson/Inuvik, Canada, August 1992.

ASTIS 416770

Libraries: ACU

The chemistry of seasonal snowcovers north of Inuvik, Northwest Territories, Canada was stratified by biophysical landscape. In this region, deposition of ions in winter occurs largely through the redistribution of wind-blown snow with accumulations in forest-edges and valley sides 8 to 12 times that of the open tundra. While dominated by this snow redistribution, the loading of most ions, except for S04--, does not scale exactly with that of snow, there being several mechanisms by which ion concentrations become relatively enriched or depleted in various landscape units. Vaporisation during temperature-gradient metamorphism in shallow-snow and uptake during either photochemical reactions or gaseous scavenging to well-exposed snow transformed concentrations of N03- by 50%. Dry deposition of aerosols to forested terrain and valley bottoms enriched Cl-, Na+, Mg++, K+ and Ca++ concentrations up to more than two-fold, however scavenging of aerosols to blowing snow particles contributed an additional 40% to the sea-salt enrichment and 20% to the Ca++ enrichment in wind-blown treeline forests. It is concluded that central measurements of snow chemistry in the Arctic cannot be reliably extrapolated without reference to changes caused by over-wintering physical and chemical metamorphic processes. Associating the physical/chemical changes with readily identifiable Arctic landscape units suggests a simple and robust method for spatial extrapolation. (Au)

143

Snow accumulation and sublimation at the tundra-taiga transition / Pomeroy, J.W. Marsh, P. Gray, D.M. Global Energy and Water Experiment [Sponsor]. Canada. Indian and Northern Affairs Canada [Sponsor]. Science Institute of the Northwest Territories [Sponsor]. Polar Continental Shelf Project (Canada) [Sponsor].

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [1] p.)

Abstract only.

European Conference on Global Energy and Water Cycles, Royal Society, London, England, 1994, in press.

ASTIS 416681

Libraries: ACU

The processes of snow accumulation differ between open and forested areas. Wind transport of snow dominates the development of snowcover on the tundra, whilst relatively little wind transport of snow occurs in taiga forests. Redistribution of snow by wind affects the spatial distributions of depth and density. Sublimation of blowing snow diminishes the snow water equivalent over broad areas. Redistribution and sublimation are restricted in taiga forests because of lower wind speeds. Snow redistribution in mixed tundra and taiga at the Canadian GEWEX Station north of Inuvik, Northwest Territories has been modelled by physically-based algorithms that use standard climatological and land cover data to calculate the transport and sublimation fluxes of blowing snow and the snow-surface erosion flux. Redistribution of snow occurs over scales from metres to several kilometres and is verified by extensive field measurements. The model outputs are compared to field measurements that indicate about 70% of snow is removed from open tundra by blowing snow and that roughly half of this snow sublimates in transit. The ratio of sublimated snow to that which is redeposited depends upon the length of tundra fetch and therefore upon the scale and spatial configuration of tundra and taiga surfaces in the region. (Au)

144

Spatial distribution of snow chemical load at the tundra-taiga transition / Pomeroy, J.W. Marsh, P. Jones, G. Davies, T. NATO Collaborative Grants Programme [Sponsor]. Global Energy and Water Experiment

[Sponsor]. Natural Sciences and Engineering Research Council Canada [Sponsor]. Polar Continental Shelf Project (Canada) [Sponsor]. Science Institute of the Northwest Territories [Sponsor].
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [29] p., ill., 1 map)
References.
IAHS, Biogeochemistry of Seasonally Snow-Covered Catchments, in press.
ASTIS 416657
Libraries: ACU

The chemical composition of seasonal snowcovers was studied in the taiga-tundra transition zone near Inuvik, Northwest Territories, Canada. Concentrations of the major ions, snow water equivalent and winter leaf area index were determined for a series of forested, shrub-tundra and open tundra sites along a transect that spans the arctic treeline. The substantial variation in snow and ion load with leaf area index, landscape type and meso-scale site demonstrate that both the local land surface factors and the broad-scale influences which control snow and ion deposition, must be addressed in order to spatially extrapolate measurements of snow quantity and snow chemistry. Ion loads vary by up to five fold in different landscape types within a meso-scale site and up to 18-fold between meso-scale sites. Two factors, operating at two scales, most strongly affect the load of snow and major geochemical ions in snow at the arctic treeline. The first, at a small-scale, is the landscape roughness as parameterized by the leaf area index or by topographic slope. The second, meso-scale wind exposure and relocation of snow, can strongly affect the small-scale landscape-snow relationship. This makes determination of snow accumulation and chemistry from point characteristics extremely difficult. A combination of two-dimensional, physically-based models of wind transport of snow and snow chemical loads, operating in a distributed fashion over the meso-scale must be developed to predict snow accumulation and snow chemistry in complex, windswept environments such as the tundra-taiga transition. (Au)

See also: 77, 78, 79, 80, 81, 82, 83, 84, 96, 98.

PROWSE, T.D.

See: 38, 39, 40, 96.

PUZNICKI, W.S.

145
Central Arctic Study / Puznicki, W.S.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 33-37, maps)
ASTIS 369748
Libraries: ACU

Project objective: To determine baseline water and sediment quality of lakes in the Slave Province area. [A map shows major mineral deposits, showings and mines of the central NWT.] ... Recently, exploration activities have increased and a number of diamond discoveries have been made. It appears that one or more sites may be developed. Figure 1 illustrates the extent of the proposed development activities in the Slave Province. Developments are proposed at several sites, including Izok Lake and Lac de Gras. Because mining developments also invite other types of industry and activities such as exploration camps, hydroelectric power and winter roads, all these activities have the potential to negatively impact the surrounding area. ... In response to these proposed activities, the Central Arctic Study was initiated. The study focuses on the area between the north shore of Great Slave Lake and the south shore of Coronation Gulf and between Camsell River and Artillery Lake. ... Parameters measured in the field included temperature, pH, conductivity and depth. Laboratory measurements included turbidity, suspended solids, alkalinity and several trace elements in water and sediment samples. ... (Au)

146
Central Arctic Study / Puznicki, W.S.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [3] p.)
ASTIS 376850
Libraries: ACU

Objectives: To measure the current lake water and bottom sediment quality in the Slave Structural Province. Background: The north is divided into seven distinct geological subdivisions termed “structural provinces”, each with a distinct structural style and orogenic history. The oldest of the structural provinces, the Slave, consists of Archean age rocks and contains numerous gold and volcanic base metal deposits. These deposits are very attractive to the mining industry. The recent significant discovery of diamonds has led to an increased probability of one or more sites being developed. Any mining development invites other types of industry and activity such as exploration camps, hydro-electric power and winter roads. Such activities might have an impact on the surrounding area. Water quality information on the Slave Province area is sparse and limited. Most existing studies are a result of impact assessments for individual developments, especially mines. A baseline study of current water quality will provide information to support future studies and enable assessment of any changes caused by current and potential development. ... (Au)

147
An overview of lake bottom sediment quality in the Slave structural province area, Northwest Territories / Puznicki, W.S.
[S.l.] : DIAND. Water Resources Division, 1997.
v, 101 p. : col. maps ; 28 cm.
Many coloured maps.
Appendices.
References.
Contains 2 mylar overheads of maps and a disc in a map pocket.
French abstract.
ASTIS 408018
Libraries: ACU

... This study was conducted during the 1993 and 1994 open water seasons in the area between the north shore of Great Slave Lake (south boundary) and the Coronation Gulf (north boundary), and between Camsell River (west boundary) and Artillery Lake (east boundary). The study provided information to support future studies and enable assessments of any changes caused by current and potential developments. Visual displays of metal concentrations in lake bottom sediment within the Slave Structural Province area were made possible through the use of GIS technology. The visual displays identify the presence and concentration of potentially bioavailable trace and heavy metals in lake bottom sediments, identify anomalous areas that occur naturally or as a result of impacts, aid in the assessment of the general sediment quality, and distinguish differences in geology between the Slave and Bear Provinces. (Au)

148

An overview of lake water and bottom sediment quality in the Slave Province area / Puznicki, W.S.

(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [5] p., 1 map)

The same information was presented as a poster at the Geoscience Forum in Yellowknife in 1993.

ASTIS 376965

Libraries: ACU

... The Central Arctic field program has two components: lake water quality and lake bottom sediment quality. The lake water component is divided into one of three categories: mining, lodges and outfitters, and random selection. ... A light weight Ekman Dredge was used to collect 220 bottom sediment samples from 189 lakes. Sediment samples were collected at the same time as the water quality samples. ... (Au)

149

An overview of lake water quality in the Slave Structural Province area, Northwest Territories / Puznicki, W.S.

(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. − Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. I, vii, 153 p., ill., maps)

Report dated February 1996.

Appendices.

References.

ASTIS 416983

Libraries: ACU

This overview of lake water quality measured the current lake water chemistry in the Slave Province area of the Northwest Territories, Canada. The Department of Indian Affairs and Northern Development is committed by the Arctic Environmental Strategy, Action on Water, to develop a better understanding of water quality in the Northwest Territories. Lake water information in the Slave Province is sparse and limited. Most existing studies are a result of impact assessments for individual developments, especially mines. This study was conducted during the 1993 and 1994 open water seasons in the area between the north shore of Great Slave Lake (south boundary) and the Coronation Gulf (northern boundary), and between Camsell River (west boundary) and Artillery Lake (east boundary). The study provides information to support future studies and enable assessments of any changes caused by current and potential developments. Visual displays of the current water quality conditions in the Slave Structural Province area were made possible through the use of GIS technology. The visual displays portray the distribution of concentration, identify anomalous areas that occur naturally or as result of impacts, and distinguish differences in geology between the Slave and Bear Provinces. ... From a development perspective, mining and recreation are the most active sources of impacts within the study area. Lakes with past, present or future sources of impacts were selected to fill data gaps within the study area. Some of the larger lakes with existing operational developments such as Contwoyto Lake (Echo Bay's Lupin Mine) have been excluded from the study since these lakes will have or have undergone extensive water quality programs. However, some lakes in the surrounding area were tested. In terms of recreation, lodges and outfitters provide services for sport hunting, fishing canoeing, and eco-tours, attracting tourist and outdoor enthusiasts alike. Within the study area, recreation is second to mining in terms of impacts. To ensure thorough coverage of the study area, lakes were also selected randomly using uniform spacing. Lakes chosen randomly were selected by placing a 25 kilometer spacing grid on the NTS map sheets and selecting the lake closest to the grid points of intersection. These lakes had to be large enough to accommodate the landing and take-off of the Cessna 185 float plane. ... (Au)

150

Regional patterns of selected water parameters in the Slave Geological Province, Northwest Territories / Puznicki, W.S.

(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 215-232, ill., maps)

References.

ASTIS 414328

Libraries: ACU

Water quality data of lakes in the Slave Geological Province is sparse and limited. Most lake water quality data are a result of impact assessments for individual developments, especially mines. An overview study of the current water quality in the Slave Geological Province area during July – September of 1993 and 1994, tested for selected water chemistry parameters in 374 lakes. Standard laboratory methods and ICP-MS were used to analyse for physical and major ions, nutrients, heavy metal parameters and trace elements. A Geographical Information System (GIS), was used to display concentration ranges. In the specific parameters shown in this paper, the results revealed regional patterns. The spatial distribution of concentrations, may identify anomalous areas that occur naturally or as a result of developments, and distinguish differences in geology, particularly between the Slave and Bear Provinces. (Au)

See also: 23, 170, 187.

QUINTON, W.L.

151

Subsurface runoff from tundra hillslopes in the continuous permafrost zone / Quinton, W.L. Marsh, P.

(Mapping regional snow distribution in northern basins Inuvik area, March 1997 / Edited by P. Marsh, J. Pomeroy, A. Pietroniro, N. Neumann, and T. Nelson, 1997, [5] p., ill. NHRI contribution, no. 97006)

(International GEWEX Workshop on Cold-Season/Region Hydrometeorology : summary report and proceedings, Banff, Alberta, Canada, 22-26 May 1995 / Compiled by T.W. Krauss and T.R. Carroll. IGPO publication series, no. 15)

References.

ASTIS 416819

Libraries: ACU

... The arctic spring freshet involves the sudden release of roughly half the annual precipitation .... During this period, snowmelt runoff replenishes northern ecosystems with water, nutrients and pollutants. The recent increased interest in modelling water fluxes in northern basins is hindered by the lack of knowledge regarding lateral runoff processes and pathways of tundra hillslopes. This paper presents some preliminary results of field experiments designed to elucidate the major subsurface runoff flowpaths of a tundra hillslope, under a variety of input and antecedent conditions. ... (Au)

See also: 77, 78, 97.

REID, B.

152

A corrected precipitation archive for the Northwest Territories / Reid, B. Goodison, B.E. Metcalfe, J.R.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 171-181, ill.)
References.
ASTIS 369950
Libraries: ACU

Project objective: To provide a record of precipitation values for the NWT and Mackenzie River Basin that has been corrected for biases in measurement method and wind-induced error. ... The major source of water in NWT basins is precipitation. To estimate flows and to regulate the construction of holding ponds, accurate input values of all environmental parameters to the water balance equation must be available to users in both industry and government. The correction of six hourly archived precipitation measurements for known systematic errors will provide significantly improved estimates of actual precipitation than are currently available. It is anticipated that anomalies currently existing between various hydrologic data sets will be minimized after correction of the precipitation archive. (Au)

153

The effect of budget cuts on the NWT water monitoring network / Reid, B.
Yellowknife, N.W.T. : Water Resources Division, DIAND, 1996.
12, [4], 6 leaves : ill., 6 col. maps ; 28 cm.
References.
ASTIS 415960
Libraries: ACU

A co-funded NWT Hydrometric Network was initiated in 1975 with the signing of a Memorandum of Understanding between the Department of Indian and Northern Development and the Department of the Environment. Over the past 20 years, the Hydrometric Network has evolved to an integrated water monitoring network that includes the collection of water level and flow data, water quality data, sediment data and meteorology data. The water monitoring network expanded through the 1980s to a total of 138 hydrometric stations (Map 1) in 1990-91, of which 58 were funded by DIAND. Because of decreasing budgets and increasing operating costs, the network has been reduced to 82 stations in 1996-97, of which 25.5 are funded by DIAND (Map 2). The intent of this report is to identify the funding changes, explain the reactions to the changes and discuss the concerns for future operations. (Au)

154

Evaporation modelling and isotope evaporation studies / Reid, B.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [3] p.)
ASTIS 376892
Libraries: ACU

Objectives: 1) To expand the knowledge of hydrological processes in the NWT by developing new methods for determining evaporation rates. 2) To assist in the development of the stable isotope method as a simple procedure for determining evaporation rates in the Northwest Territories. ... Preliminary evaporation model results are being used to evaluate water balance calculations for industrial project proposals (Royal Oak – Colomac gold mine, BHP Minerals – Koala diamond mine proposal, Kennecott Resources – diamond mine bulk sample). The results of the isotope method are promising and support of the project by DIAND under the Arctic Environmental Strategy will continue for 1995-96. In order to continue the assessment of the abandonment and restoration plans for Salmita, Nanisivik and Cullaton, the meteorological stations at these sites will be operated for several more summers. Pocket Lake will also be operated for several more years to model evaporation rates at Giant Mine in Yellowknife and to support the snow sublimation studies. ... (Au)

155

Evaporation modelling and isotope evaporation studies / Reid, B.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 3, [3] p.)
ASTIS 377015
Libraries: ACU

Objectives: 1) To expand the knowledge of hydrological processes in the NWT by developing new methods of measuring evaporation rates. 2) To assist in the development of the stable isotope method as a simple procedure for determining evaporation rates in the Northwest Territories. Background: The naturally occurring heavy isotopes of water 2H and 18O, are enriched over the duration of the open water evaporation season. The measurement of enrichment can be calibrated to determine an actual amount of evaporation that has occurred. Under AES and the Northern Water Resources Studies Program, DIAND support included instrumentation for data collection at three sites: Nanisivik Mines tailings pond, the Salmita tailings pond and Pocket Lake (at Royal Oak's Giant mine, Yellowknife). The National Hydrology Research Institute instrumented the Lupin site. DIAND also funded the heavy isotope laboratory analysis of the samples. ... NWT mining companies have provided in-kind support and are very interested in the methods for measuring evaporation. ... (Au)

156

Evaporation studies at mine tailings ponds in the Northwest Territories, Canada / Reid, B. Northern Water Resources Study Program (Canada) [Sponsor]. Arctic Environmental Strategy [Sponsor].
Yellowknife, N.W.T. : DIAND, Water Resources Division, [19--].
[10] leaves : map ; 28 cm.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [10] p., ill., 1 map)
This report was also presented as a poster at the International GEWEX Workshop on Cold-Season/Region Hydrometeorology at the Canadian Geophysical Union – Hydrology Section Annual General Meeting, Banff, May 22-26, 1995.
Appendices.
References.
ASTIS 361011
Libraries: ACU

Evaporation studies are being conducted as part of a program of water balance investigations at NWT mine sites. Site specific evaporation data are required to assess the long-term stability of tailings impoundments for mine site decommissioning and abandonment. A stable water cover on the tailings containment area is desired since it is an effective method to minimize acid generation in sulphide waste material. Meteorological data are being collected at four mine sites for evaporation modelling. The meteorologic stations are located at Pocket Lake near the Giant mine (62 30 N, 114 24 W), the tailings ponds at the Salmita mine (64 03 N, 111 11 W), the Nanisivik mine (73 02 N, 84 33 W) and the Cullaton Lake mine (61 15 N, 98 28 W). Evaporation rates are modelled with hourly weather data using the Penman Method, a combined energy

balance/aerodynamic mathematical model. A basic water budget also gives an estimate of evaporation rates using the change in lake levels and precipitation. Results compare well for the Salmita site but vary considerably at the other sites. Evaporation pan data from the Yellowknife airport weather station are compared with the modelled data. (Au)

157

Evaporation studies at mine tailings ponds in the Northwest Territories, Canada / Reid, B.

(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 115-133, ill., 1 map)

Appendices.

References.

ASTIS 414271

Libraries: ACU

Evaporation studies are being conducted as part of a program of water balance investigations at NWT mine sites. Site specific evaporation data are required to assess the long-term stability of tailings impoundments for mine site decommissioning and abandonment. A stable water cover on the tailings containment area is desired as it is an effective method to minimize acid generation in sulphide waste material. Meteorological data are being collected at four mine sites for evaporation modelling. The meteorologic stations are located at Pocket Lake near the Giant mine (62 30 N, 114 24 W) and at the tailings ponds at the Salmita mine (64 03 N, 111 11 W), the Nanisivik mine (73 02 N, 84 33 W) and the Cullaton Lake mine (61 15 N, 98 28 W). Evaporation rates are modelled with hourly weather data using the Penman Method, a combined energy balance/aerodynamic mathematical model. A basic water budget gives an estimate of evaporation rates using the change in lake levels and precipitation. An isotopic mass balance method also gives estimates of seasonal evaporation rates based on the enrichment of naturally occurring heavy isotopes of oxygen and hydrogen in water. Evaporation pan data from the Yellowknife airport weather station are compared with the modelled data. (Au)

158

Evaporation studies at mine tailings ponds in the Northwest Territories, Canada / Reid, B. Northern Water Resources Study Program (Canada) [Sponsor]. Arctic Environmental Strategy. Action on Water Component [Sponsor].

(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [19] p., ill.)

Appendices.

References.

ASTIS 416711

Libraries: ACU

Evaporation studies are being conducted as part of a program of water balance investigations at NWT mine sites. Site specific evaporation data are required to assess the long-term stability of tailings impoundments for mine site decommissioning and abandonment. A stable water cover on the tailings containment area is desired as it is an effective method to minimize acid generation in sulphide waste material. Meteorological data are being collected at four mine sites for evaporation modelling. The meteorologic stations are located at Pocket Lake near the Giant mine (62 30 N, 114 24 W) and at the tailings ponds at the Salmita mine (64 03 N, 111 11 W), the Nanisivik mine (73 02 N, 84 33 W) and the Cullaton Lake mine (61 15 N, 98 28 W). Evaporation rates are modelled with hourly weather data using the Penman Method, a combined energy balance/aerodynamic mathematical model. A basic water budget gives an estimate of evaporation rates using the change in lake levels and precipitation. An isotopic mass balance method also gives estimates of seasonal evaporation rates based on the enrichment of naturally occurring heavy isotopes of oxygen and hydrogen in water. Evaporation pan data from the Yellowknife airport weather station are compared with the modelled data. (Au)

159

Flow gauging of selected small streams in the Mackenzie River Valley / Reid, B. HBT AGRA Limited. Northern Oil and Gas Action Program (Canada) [Sponsor]. Arctic Environmental Strategy [Sponsor].

Yellowknife, N.W.T. : Water Resources Division, DIAND, 1997.

10 leaves : ill., 1 map ; 28 cm.

References.

ASTIS 415847

Libraries: ACU

In the summer of 1992, a small stream hydrologic study was initiated by the Water Resources Division of Department of Indian Affairs and Northern Development (DIAND). HBT Agra Limited was contracted to operate the project with funding provided under the Northern Oil and Gas Action Plan (NOGAP). The project involved establishing stream flow gauging stations on four small streams in the Mackenzie Valley between Norman Wells and Inuvik ... to provide hydrological data along the potential oil/gas pipeline route. Site selection was based on a previous review and assessment of data needs done by HBT Agra Limited (1992). Representative monitoring sites were chosen based on geographical distribution and appropriate gauging locations. The sites selected for gauges ... were: 1. Hannah River ..., 2. Payne Creek ..., 3. Charrue River ..., 4. Travaillant River .... Ultra-sonic level sensors, tipping bucket rain gauges and electronic data loggers were installed by HBT Agra Limited in August 1992 to measure continuous water levels and rainfall events. During the installation trip, channel cross sections were surveyed and the selected reaches were sampled for channel bed particle size analysis. Crest gauges were also installed upstream and downstream of the instrumentation sites. Unfortunately, limited data were obtained in 1992 due to installation and operational problems. A report of the channel investigation, equipment installation and the 1992 water level data was compiled by HBT Agra Limited (1993). In March 1993 the author accompanied HBT staff on a late winter monitoring trip to become familiar with the site locations and to install additional data storage equipment. The project was operated by DIAND Water Resources staff for the next two years, with funding from NOGAP in 1993 and from the Arctic Environmental Strategy (AES) in 1994. (Au)

160

Meteorological data collection for site specific evaporation estimates in the Northwest Territories / Reid, B.

(Mackenzie Basin Impact Study (MBIS), interim report 2 : proceedings of the Sixth Biennial AES/DIAND Meeting on Northern Climate & Mid Study Workshop of the Mackenzie Basin Impact Study, Yellowknife, Northwest Territories, April 10-14, 1994 / Edited by J. Cohen. – Downsview, Ont. : Environment Canada, 1994, p. 118-122, 1 map)

References.

ASTIS 356301

Libraries: ACU

The assessments of mine tailings ponds for operations and abandonment require the use of climate data. There are few climate stations in the Northwest Territories and since the data have relatively short correlation distances, interpolation of these data can result in misleading conclusions in water balance calculations. To overcome this data deficiency, site specific evaporation studies are being done at mine sites in the Northwest Territories to assess the water balance at tailings containment areas. Meteorological data were collected at three NWT mine sites in the summer of 1993 to estimate evaporation rates at the tailings ponds. Instrumentation was installed at the Salmita mine tailings pond (64 03 N, 111 11 W), at Nanisivik Mines tailings pond (73 02 N, 84 33 W) and at Pocket Lake near the Giant mine (62 30 N, 114 24 W). Parameters recorded were air temperature, relative humidity, wind speed, net solar radiation, water temperatures and precipitation. Evaporation was

modelled using hourly data with the Penman's Combination Method and the Priestley-Taylor (P-T) Method to calculate daily evaporation rates. Evaporation water loss was also estimated at Salmita and Pocket Lake with a simple water balance using the changes in lake levels and the precipitation inputs. (Au)

161

Meteorological data collection for site specific evaporation estimates in the Northwest Territories / Reid, B.

(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 3, [1] p.)

Abstract only.

Paper has been indexed as ASTIS document number 356301.

ASTIS 377058

Libraries: ACU

The assessments of mine tailings ponds for operations and abandonment require the use of climate data. Since there are few climate stations in the Northwest Territories and the data have relatively short correlation distances, interpolation of these data can result in misleading conclusions in water balance calculations. To overcome this data deficiency, site specific evaporation studies are being done at mine sites in the Northwest Territories to assess the water balance at tailings containment areas. On-site meteorological data were collected at three NWT sites in the summer of 1993 to estimate evaporation rates at the tailings ponds. Instrumentation was installed at the Salmita mine tailings pond (64 03 N 111 11 W), at Nanisivik Mines tailings pond (73 02 N 84 33 W) and at Pocket Lake near the Giant mine (62 30 N 114 24 W). Parameters recorded were air temperature, relative humidity, wind speed, net solar radiation, water temperatures and precipitation. Evaporation was modelled using the Penman's Combination Method and the Priestley-Taylor (P-T) Method with hourly data to calculate daily evaporation rates. Evaporation water loss was also estimated at Salmita and Pocket Lake with a simple water balance using the changes in lake levels and the precipitation inputs. (Au)

162

Meteorological data collection for site specific evaporation estimates in the Northwest Territories, Canada / Reid, B.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [6] p., map)

References.

ASTIS 416622

Libraries: ACU

The assessments of mine tailings ponds for operations and abandonment require the use of climate data. There are few climate stations in the Northwest Territories and since the data have relatively short correlation distances, interpolation of these data can result in misleading conclusions in water balance calculations. To overcome this data deficiency, site specific evaporation studies are being done at mine sites in the Northwest Territories to assess the water balance at tailings containment areas. Meteorological data were collected at three NWT mine sites in the summer of 1993 to estimate evaporation rates at the tailings ponds. Instrumentation was installed at the Salmita mine tailings pond (64 03 N, 111 11 W), at Nanisivik Mines tailings pond (73 02 N, 84 33 W) and at Pocket Lake near the Giant mine (62 30 N, 114 24 W). Parameters recorded were air temperature, relative humidity, wind speed, net solar radiation, water temperatures and precipitation. Evaporation was modelled using hourly data with the Penman's Combination Method and the Priestly-Taylor (P-T) Method to calculate daily evaporation rates. Evaporation water loss was also estimated at Salmita and Pocket Lake with a simple water balance using the changes in lake levels and the precipitation inputs. (Au)

163

Northwest Territories evaporation studies, 1993 / Reid, B. Decelles, J.

(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 3, [26] p., ill., maps)

Appendices.

References.

ASTIS 377066

Libraries: ACU

The design and operation of industrial projects requires climate data (precipitation, runoff and evaporation) to assess the efficacy of water containment structures such as tailings ponds. In many places in the Northwest Territories, climate data for these purposes are available only at locations some distance from the site. These data have relatively short cross-correlation distances in northern Canada (i.e. the cross-correlation coefficients between different sites deteriorate quickly with distance), thus interpolating climate data can result in erroneous or misleading conclusions in water balance calculations (Gan, personal communication). On-site monitoring of meteorological parameters during mining operations can provide useful data for tailings pond operation and for site abandonment decisions. The purpose of this study is to develop the instrumentation system and a working model for estimating evaporation rates at site specific areas in northern Canada. (Au)

164

NWT hydrometric station regional-hydrology analysis : year 2 / Reid, B.

(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 51-58, maps)

ASTIS 369772

Libraries: ACU

Project objectives: 1. To identify areas of hydrologic similarities using correlative statistical methods; and 2. To evaluate the hydrometric network in the NWT to identify station deficiencies and redundancies. (Au)

165

Salmita evaporation study 1992, Northern Water Resources Study Program, D.I.A.N.D. / Reid, B.

(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [6] p., ill.)

Appendices.

References.

ASTIS 416533

Libraries: ACU

The design and operation of industrial projects required climate data such as precipitation, runoff and evaporation to assess the efficacy of water containment structures such as tailings ponds. In the Northwest Territories, climate data for these purposes are often available only at locations some distance from the site. These data have relatively short cross-correlation distances (which means that the cross-correlation coefficients between different sites deteriorates quickly with distance) in northern Canada, thus interpolating climate data can result in erroneous or misleading conclusions in water balance calculations. On-site monitoring of meteorologic parameters during mining operations could provide useful and necessary data for tailings pond operation and for site abandonment decisions. The purpose of this study is to develop the instrumentation system and a working model for estimating evaporation rates in site specific areas in northern Canada. ... On 15 July 1992 a water level staff gauge and an accumulator rain gauge were set up at the tailings pond of the old Salmita/Tundra mill site. On 5 August 1992 a remote weather station was installed adjacent to the tailings pond. The weather

station has sensors to measure air temperature, relative humidity and wind speed at two levels, plus net solar radiation and water level. Also, thermistors were placed in the tailings pond for energy flux and heat storage measurements. Details of the instrumentation and the installation are given .... Between 4 August and 22 October, 3.1 cm of precipitation were collected in the rain gauge and the pond water level dropped 10.5 cm, thus a total evaporation of 13.6 cm occurred for this period. Staff gauge and precipitation gauge data are given in Appendix B. The pond was frozen over by 27 Sept. and snow accumulation was apparent by 29 Sept. from the ultrasonic level gauge. ... (Au)

166

Site specific evaporation estimates for operational water balance calculations in the Northwest Territories / Reid, B.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [1] p.)

Abstract only.

ASTIS 376906

Libraries: ACU

The assessments of mine tailings ponds for operations and abandonment require the use of climate data. Since there are few climate stations in the Northwest Territories and the data have relatively short correlation distances, interpolation of these data can result in misleading conclusions in water balance calculations. To overcome this data deficiency, site specific evaporation studies are being done at mine sites in the Northwest Territories to assess the water balance at tailings containment areas. On-site meteorological data were collected at three NWT mine sites in the summer of 1993 to estimate evaporation rates at the tailings ponds. Instrumentation was installed at the Salmita mine tailings pond (64 03 N 111 11 W), at Nanisivik Mines tailings pond (73 02 N 84 33 W) and at Pocket Lake near the Giant mine (62 30 114 24 W). Parameters recorded were air temperature, relative humidity, wind speed, net solar radiation, water temperatures and precipitation. Evaporation was modelled using the Penman's Combination Method and the Priestley-Taylor (P-T) Method with hourly data to calculate daily evaporation rates. Evaporation water loss was also estimated at Salmita and Pocket Lake with a simple water balance using the changes in lake levels and the precipitation inputs. (Au)

167

Site specific evaporation estimates in the Northwest Territories / Reid, B.

(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 149-155, 1 map)

References.

ASTIS 369926

Libraries: ACU

Project objective: To develop the instrumentation system and a working model for estimating evaporation rates at mine sites in northern Canada. ... During the summer of 1993, three automatic meteorology stations were installed and operated by Indian and Northern Affairs Canada, Water Resources staff. The stations were located at the Salmita-Tundra tailings pond (64 03 N, 111 11 W), at the Nanisivik Mines tailings pond (73 02 N, 84 33 W) and at Pocket Lake on the Giant Mine site near Yellowknife (62 30 N, 114 24 W) .... The estimates of evaporation at Salmita using the Penman Method with the meteorologic data generally agree with the water balance data over the study period. A volumetric water balance calculation over the tailings area will provide a better comparison. Evaporation estimates (Penman Method) for Pocket Lake are higher than the on-site evaporation pan data due to the non-standard operation of the pan. Modelled evaporation results compared favourably with the corrected evaporation pan data from the Yellowknife Airport weather station located about 3 kilometres to the south. Preliminary isotopic results at Nanisivik indicate that surface waters, including West Twin Lake, lose a substantial portion of water via evaporation. The measureable and systematic isotopic enrichment shows that quantitative determination of water balance using isotopic methods is clearly feasible. (Au)

168

Summary report of the Arctic Environmental Strategy NWT Water Quantity baseline network / Reid, B.

Yellowknife, N.W.T. : Water Resources Division, DIAND, 1997.

12 leaves ; 29 cm.

Appendices.

ASTIS 415987

Libraries: ACU

Water quantity program objectives under the Arctic Environmental Strategy (AES) were twofold: to expand the NWT hydrometric network into remote areas with little data; and to improve data gathering and handling methods by upgrading equipment on existing hydrometric stations. Funding for the AES hydrometric program was combined with the A-base hydrometric network budget and the operations were fully integrated through the existing hydrometric stations. Funding for the AES hydrometric program was combined with the A-base hydrometric network budget and the operations were fully integrated through the existing framework for network planning and operations. The AES funded stations are identified in the annual funding reports. The hydrometric network is operated by Environment Canada, Water Surveys Division, as a co-operative interdepartmental program funded by DIAND and DOE. Network operations are summarized below by fiscal year and the stations operated are listed in Appendix A. The river basins investigated for pre-construction site assessments are listed in Appendix B. The number of stations constructed and operated with AES funding are presented for each year of the program in Table 1 and cost shares by department are included in Table 2. The annual AES funding through DIAND Water Resources is tabulated by operational category in Table 3. (Au)

169

Wager Bay Basin overview / Reid, B. Swyripa, M.W. Seale, E. Halliwell, D. Wedel, R.L.

(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 47-49, 1 map)

ASTIS 369764

Libraries: ACU

Project objectives: To collect baseline water quality and water quantity data in the Wager Bay drainage basin; and 2. To characterize the geomorphology of the selected streams during site visits. (Au)

170

Wager Bay Basin overview / Reid, B. Spence, C. Swyripa, M.W. Puznicki, W.S.

(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [2] p.)

ASTIS 376914

Libraries: ACU

Objectives: To collect water quality and water quantity data in the Wager Bay drainage basin. Geomorphology of the selected streams will also be characterized during the site visits. In an attempt to develop baseline data in areas in the NWT where very little hydrologic information is available, a cooperative water quantity and quality program for the Wager Bay area has been developed. The program involves measuring stream flow rates and sampling for baseline water quality at a number of rivers flowing into Wager Bay within the proposed Wager Bay National Park Reserve area. Also, water and sediment samples were taken from a number of lakes for analysis of baseline basin chemistry. ... (Au)

171
Wager Bay Basin overview / Reid, B. Swyripa, M.W.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 3, [2] p.)
ASTIS 377031
Libraries: ACU

Objectives: To collect baseline water quality and water quantity data in the Wager Bay drainage basin and to characterize the geomorphology of the selected streams. Background: To develop baseline data in areas of the NWT where very little hydrologic information is available, a cooperative water quantity and quality program for the Wager Bay area was developed. The program involves measuring stream flow rates and sampling for baseline water quality at a number of rivers flowing into Wager Bay within the proposed Wager Bay National Park Reserve area. Also, water and sediment samples were taken from a number of lakes for analysis of baseline basin chemistry. ... The hydrometric site on the Brown River had been identified by the Atmospheric Environment Service of Environment Canada as an optimal location for installing meteorological equipment to the existing satellite transmission data collection platform (DCP). ... (Au)

REID, R.

172
Snow sublimation in a sub-arctic watershed / Reid, R. Spence, C. Wedel, R.L.
(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 233)
Abstract only.
ASTIS 414336
Libraries: ACU

Snowfall and snowmelt runoff are significant components of the hydrological cycle in northern Canada. A problem with estimating the magnitude of snowmelt runoff is determining the amount of moisture from snow that sublimates into the atmosphere prior to and during significant melting. A two-year snow sublimation study was conducted at Pocket Lake, a small watershed near the City of Yellowknife, NWT to monitor and analyze various meteorological and related parameters including air temperature, humidity, wind direction and speed, net solar radiation and snow-pack temperatures. Periodic snow surveys were conducted in both years to compare reduction of snow depth with changes in measured water equivalent. Snow samples were collected in 1995 for analysis of stable oxygen and hydrogen isotopes. The 18O/16O and 2H/1H isotope data are analyzed to determine if enrichment of the heavy isotopes can be an indicator of sublimation. Preliminary analysis suggests that minimal snow sublimation occurred during the study period although there is some enrichment of the 18O and 2H isotopes. Related literature suggests that minimal sublimation occurs before significant snow melt. Follow-up studies at Pocket Lake will include additional snow surveys during the peak snow melt period, continuation of the sampling program for isotopic analysis and enhanced site instrumentation to quantify infiltration of meltwater to the snow pack and the ground. (Au)

See also: 45.

ROBERTSON, K.

See: 85, 87, 130, 134, 135, 175, 176, 183.

ROYAL OAK MINES LTD.

See: 42.

RUHLAND, K.

173
Assessing the use of diatom assemblages as paleoenvironmental proxies in the Slave and Bear Geological Provinces, NWT, Canada / Ruhland, K.
Kingston, Ont. : Queen's University, 1996.
x, 132 leaves : ill., 1 map ; 29 cm.
Thesis (M.Sc.) – Queen's University, Dept. of Biology, Kingston, Ont., 1996.
Appendices.
References.
ASTIS 416134
Libraries: ACU

Diatoms are widely used as paleoindicators of environmental change, although relatively little data are available on freshwater assemblages from polar and subpolar regions. The overall objective of this thesis is to assess the utility of diatom assemblages as paleoclimatic proxies in a suite of 70 study lakes located in the Slave and Bear geological provinces of Canada's Northwest Territories, which spans broad latitudinal and vegetational gradients, including arctic treeline. A total of 508 diatom taxa were identified in this study. The relationship between 15 environmental variables and the distribution of diatoms preserved in the surficial sediments of 70 lakes were quantitatively examined using canonical correspondence analysis (CCA). Diatom assemblages show a clear separation between arctic tundra and forested sites. Lakewater alkalinity and conductivity account for most of the variation among diatom assemblages. Weighted-averaging regression and calibration (with classical deshrinking) were used to generate lakewater alkalinity and conductivity transfer functions based on the relative abundances of 116 diatom taxa. The predictive ability of these models was assessed by bootstrapped correlation coefficients (r-boot squared = 0.73 and 0.58) and root-mean-squared error of prediction (RMSEP-boot = 0.31 and 0.29) for alkalinity and conductivity, respectively. These two chemical variables may be indirectly related to catchment vegetation and other climate-related variables. For example, humus loading from surrounding coniferous vegetation affects the concentration of major ions in boreal forest lakes. In contrast, the dilute nature of tundra lakes may be related to the restricted water movement through continuous permafrost. From a paleoclimatic perspective, these variables may potentially be used to track the past position of arctic treeline and other climate-related variables in the Slave and Bear Province area. ... (Au)

174
Limnological characteristics of 70 lakes spanning arctic treeline from Coronation Gulf to Great Slave Lake in the central Northwest Territories, Canada / Ruhland, K. Smol, J.P.
(International review of hydrobiology, v. 83, no. 3, 1998, p. 183-203, ill., maps)
References.
ASTIS 415928

Latitudinal transects across subpolar ecozones display striking changes in lakewater chemistry reflecting steep gradients in vegetation, climate, and other variables. This paper explores the relationships among chemical and physical lakewater characteristics of 70 lakes spanning arctic treeline in Canada's Central Northwest Territories. Principal components analysis (PCA) was used to examine trends and relationships among environmental variables and these 70 sites. In general, lakes in this dataset were dilute, slightly acidic to slightly alkaline, and nutrient-poor. However, a strong trend toward more concentrated lakewater conditions in densely forested areas was observed relative to tundra regions. Interrelationships among measured limnological variables appear to be strongly influenced by catchment characteristics associated with proximity of sites to treeline. (Au)

SANDERSON, J.D.

175

Slave River Environmental Quality Monitoring Program : final five year study report, 1990-1995 / Sanderson, J.D. Lafontaine, C.N. Robertson, K.

Yellowknife, N.W.T. : DIAND. Water Resources Division, 1997.

3 v. : ill. (some col.), maps (some col.) ; 28 cm.

Appendices: Volume II : Grab water, centrifugate water and suspended sediment appendices – Volume III : Fish appendices.

References.

ASTIS 428825

Libraries: ACU

... The Slave River below the Rapids of the Drowned was chosen as the main sampling site, since it was downstream of the Alberta-NWT border and upstream of any major tributaries in the NWT .... This site best represented the waters flowing into the NWT. In addition, the four sets of rapids between the border and the sampling site acted as a natural barrier to upstream movement of fish, ensuring that any samples collected were resident of the NWT. These factors were important, since the main objective of this sampling program was to establish baseline environmental conditions for the NWT portion of the Slave River. Collection of grab and centrifugate water, suspended sediment, and fish samples from approximately the same location of the Slave River also allowed for the integration of the study components and comparison of the biological and chemical data. ... [Volume II contains records for the grab water samples, including: variation between replicate grab water samples; physicals, biologicals, major ions, nutrients and metals; extractable organochlorines; chlorinated phenolics; pesticides; PAHs; suspended sediment; trace elements; extractable organochlorines; chlorinated phenolics; pesticides and total PCBs; dioxins and furans; PAHs; particle size distribution; and bioassays. Volume 3] ... presents the contaminant and QA/QC results of the analyses conducted on the fish samples collected during the Slave River Environmental Quality Monitoring Program (SREQMP). ... [This volume of appendices lists the content in fish samples of the above-mentioned indicators of environmental quality]. (Au)

176

Slave River Environmental Quality Monitoring Program : summary report / Sanderson, J.D. Lafontaine, C.N. Robertson, K.

Yellowknife, N.W.T. : DIAND. Water Resources Division, 1998.

xii, 59 p. : col. ill., 1 col. map ; 28 cm.

References.

ASTIS 428833

Libraries: ACU

... The Slave River Environmental Quality Monitoring Program (SREQMP) was a five year multimedia sampling program operating from 1990 to 1995, to characterize baseline conditions of the aquatic ecosystem in the Slave River at Fort Smith, Northwest Territories (NWT), Canada. This report provides a summary of the Slave River Environmental Quality Monitoring Program Final Five Year Report (Sanderson et al., 1997). ... In general, the results of the study indicate that many parameters were present at extremely low levels or were not detected even with state of the art analytical techniques. Of those compounds which were found, metals and polycyclic aromatic hydrocarbons (PAHs) are most likely from natural sources, while pesticides and polychorinated byphenyls (PCBs) indicate atmospheric transport. The detection of chlorinated phenolics, dioxins and furans, although at low levels, could be a result of downstream transport. While some findings may warrant further study, overall the levels of contaminants measured in the aquatic environment at Fort Smith are not likely to cause adverse effects. All results are currently undergoing a human health assessment by Health Canada. ... A comparison between grab and centrifugate results shows that levels of metals were lower after centrifugation. This suggests that the metals detected in the Slave River are primarily associated with suspended sediments. ... The results indicate that suspended sediment is a good medium for monitoring organic and inorganic contaminants. Since historic suspended sediment quality data for the Slave River are not available, values collected from the SREQMP are the baseline for future comparisons. Future results can be compared to this database to verify the occurrence of downstream transport or detect a change in contaminant levels. Those metals found in high concentrations in the grab water samples were also detected at elevated levels in the suspended sediment samples, which supports the conclusion that metals are associated with suspended particulates. Results of the Daphnia magna and Microtox bioassays indicated that the suspended sediment samples collected were not acutely toxic. ... (Au)

177

Slave River Study – results and future monitoring in transboundary areas / Sanderson, J.D.

(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 175-193, ill., 1 map)

References.

ASTIS 414301

Libraries: ACU

The Slave River Environmental Quality Monitoring Program is a multimedia sampling program established in 1990 to characterize baseline conditions of the aquatic ecosystem in the Slave River at Fort Smith, Northwest Territories, Canada. The comprehensive nature of the program made it the first of its kind in the Northwest Territories. The Slave River watershed drains an area of 600,000 sq. km, including the Peace and Athabasca Rivers, with the territorial portion being the farthest downstream. Increase in upstream developments prompted concerns by northern residents. To answer their questions "can we drink the water?" and "can we eat the fish?", the program took an ecosystem approach and analysed water, suspended sediment and fish. Samples were analysed for parameters that result from anthropogenic developments upstream such as pulp and paper mills, agricultural activities and hydrocarbon developments. A comprehensive database was produced that will be invaluable in transboundary negotiations and monitoring future changes in the aquatic environment. This paper provides an overview of the study's findings with a focus on dioxins and furans levels in fish. (Au)

See also: 201, 202.

SCIENCE INSTITUTE OF THE NORTHWEST TERRITORIES

See: 96, 143, 144.

SEALE, E.

See: 48, 169.

SMOL, J.P.

See: 174.

SPARLING, J.

See: 3, 102.

SPENCE, C.

178
The accuracy of a corrected precipitation data archive for the Northwest Territories / Spence, C.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [13] p., map)
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [13] p., map)
Appendices.
References.
ASTIS 416630
Libraries: ACU

... Significant errors have been recognized in the measurement of cold season precipitation. The inherent nature of snow (e.g., varying density and wind effects) and snow cover (sublimation, the effects of land cover, temporal metamorphosis and redistribution by the wind) makes snow very difficult to measure. Snow makes up 60% to 70% of total annual precipitation in the Northwest Territories (NWT) with a chance of snowfall every month of the year. Because of this, accurate measurements of snowfall are very important for quantifying the water resource. Both municipal and industrial demands for water are tempered by the ability of water managers to quantify water supply. Also, international research programs such as GEWEX (Global Energy and Water Experiment), WCRP (World Climate Research Program) and ACSYS (Arctic Climate System Study) require accurate long term precipitation measurements. In response to these needs, the Atmospheric Environment Service (AES) and Water Resources, Department of Indian and Northern Affairs (DIAND), developed a corrected historical precipitation archive for selected NWT climate stations. Methods used to correct the precipitation archive accounted for wind, wetting effects and trace measurement errors. As well, more accurate assumptions of snow density and snow ruler precision were applied. ... Research into precipitation measurement correction is still on-going. Known biases have been accounted for. However, verification of these corrections is needed in order to confirm the accuracy of the new archive. ... (Au)

179
Basin runoff in a small northern Canadian shield basin / Spence, C. Arctic Environmental Strategy [Sponsor]. Northern Water Resources Study Program (Canada) [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, 1997.
[16] leaves : ill., maps ; 28 cm.
References.
ASTIS 415901
Libraries: ACU

Discerning accurate lake water balances in the Northwest Territories is difficult. A sparse hydrometric and meteorological network means there are little available data of regional streamflow, precipitation and evaporation rates. Local runoff from surrounding land are even more difficult to estimate as little is known of the physical processes dictating runoff in tundra and Canadian Shield terrain. This paper summarizes work performed in 1995 and 1996 to determine the characteristics and magnitude of local runoff in a small northern Canadian Shield basin. (Au)

180
Ground penetrating radar as a tool to determine the groundwater environment of a northern lake / Spence, C.
Yellowknife, N.W.T. : Northern Affairs Program (Canada). Water Resources Division, [1997?].
[8] leaves : ill., maps ; 28 cm.
Cover title.
References.
ASTIS 416142
Libraries: ACU

A series of ground penetrating radar surveys were run in the watershed of Pocket Lake, a small perched lake near Yellowknife, Northwest Territories to discern the subsurface environment of shallow groundwater flow. The profiles were obtained with a pulseEKKO IV ground penetrating radar. The results suggest the groundwater regime of Pocket Lake is controlled by the depth of soils and bedrock rather than the depth of the active layer. The information derived from the profiles were used in the definition of a flow net analysis to determine the groundwater component of the Pocket Lake water balance. The results of the flow net analysis suggest the ground penetrating radar provided accurate estimates of bedrock and frost table depth. While GPR can provide an accurate view of subsurface conditions, a correct interpretation of the profile is dependent upon field instrumentation correlated with the collected profile. If ground penetrating radar is used for this type of work, it is recommended concurrent regular independent measurements along the transect of the water and frost table and bedrock surface be taken. (Au)

181
Measurement of the shallow groundwater regime of a northern lake / Spence, C. Stephens, G.R.
(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 135-151, ill., 1 map)
References.
ASTIS 414280
Libraries: ACU

In the Northwest Territories, little work has been done on assessing the groundwater regime. This is in part due to the limited importance of groundwater as a water source, but also because of the false assumption that groundwater is isolated from the hydrologic cycle by permafrost. The geologic and geographic nature of the Northwest Territories makes the traditional approaches of measuring groundwater and ground temperature difficult. Light, easily transportable equipment is needed to determine accurate estimates of shallow groundwater regimes in remote regions of the Northwest Territories. This paper summarizes a project operated by Water Resources Division, Indian and Northern Affairs Canada to determine viable and rigorous methods for measuring shallow

groundwater around northern inland lakes. Pocket Lake, a small lake immediately north of Yellowknife, NWT, was instrumented to measure the groundwater flow regime. Data from the first year of monitoring resulted in a drafting of a water table map of the basin to determine groundwater flow directions. To quantify groundwater flows, a flow net and stable isotope analysis of lake water, precipitation and groundwater was used. Reviews of the different measurement techniques are presented. (Au)

182

Streamflow measurement using salt dilution in tundra streams, Northwest Territories, Canada / Spence, C. McPhie, M.

(Journal of the American Water Resources Association, v. 33, no. 2, Apr. 1997, p. 285-291, ill., 1 map)

References.

ASTIS 416380

Libraries: ACU

With the recent increased exploration and mining activity in the Northwest Territories, there has been growing interest in streamflows. However, streamflow monitoring in Canada's north is limited, especially in the central Northwest Territories where the exploration activity is concentrated. To complicate matters, the standard approach of measuring discharge with current meters or weirs is often inadequate or prohibitively expensive, as many streams in the region are shallow, braided and rocky. In response, alternative techniques such as salt dilution can be used. A salt tracer's competence in turbulent and rocky channels makes it ideal for discharge of measurements in these situations. This paper summarizes the work performed by Indian and Northern Affairs Canada and Canamera Geological Ltd. staff in determining the stream discharge of a lake outlet using a potassium chloride (KCl) tracer. A variety of streamflow measurement methods were performed and compared to determine the viability and rigor of the dilution method. Results suggest the dilution method compares favorably to other measurement techniques both in accuracy and operational ease. ... The recent exploration activity for diamonds in the Slave Geological Province has led to the discovery of a number of diamond-bearing kimberlite "pipes". One of these pipes underlies Ranch Lake, located two kilometers southwest of the study area. Pre-development plans ... have resulted in the study area lake, Nisha, being designated as a potential mine tailings deposit area. This paper summarizes the work performed ... in determining the stream discharge of the Nisha Lake outlet. The purpose of such work was twofold. To assist with the design of runoff controls and tailings management for Nisha Lake, lake discharge data must be collected and an open water rating curve established. The second goal was to determine if salt dilution is a viable and rigorous method for measuring discharge for the purposes of constructing a rating curve for tundra streams in the Northwest Territories. (Au)

See also: 45, 48, 170, 172.

SPENCER, C.

See: 2, 3, 102.

STANLEY, S.

See: 62.

STARLING, W.

See: 124, 125.

STEPHENS, G.R.

183

Chemical quality of water and suspended sediment from the Slave River, NWT, 1990-1994 / Stephens, G.R. Peddle, J.D. McCarthy, L.H. Williams, T.G. Robertson, K. Gregor, D.J.

(Abstract book : Second SETAC World Congress / Second World Congress of the Society of Environmental Toxicology and Chemistry. – Pensacola, Fla. : SETAC Press, 1995, p. 327)

Abstract only.

ASTIS 425516

The Slave River basin, straddling the Alberta-Northwest Territories (NWT) border, faces potential contamination from industrial development and agricultural practices. The Slave River Environmental Monitoring Program was established in 1990 to assess the water and suspended sediment quality in the territorial portion of the river at Fort Smith, NWT. The number of "above detect" data for polynuclear aromatic hydrocarbons (PAHs), polychlorinated byphenyls (PCBs), and chlorinated phenolics (CPs) in water was small, while concentrations of those compounds above analytical detection limits were very low. No pesticides were detected in the water during the five-year monitoring period; however, levels of metals were often observed in measureable concentrations, frequently above water quality guidelines. While concentrations were relatively high, the metals were probably not due to anthropogenic activity. Concentrations of polynuclear aromatic hydrocarbons in suspended sediment often exceeded the "Lowest Effect Level" guideline established for bottom sediment by the Ontario Ministry of the Environment, but were always well below the "Severe Effect Level". Metal levels in suspended sediment varied over the monitoring period and no trends were discernable. The low number of "above detect" data for pesticides and chlorinated phenolics in the suspended sediment suggest little potential adverse impact. Concentrations of dioxins and furans were measured, but the levels were very small and the contributing homologues had minimal toxic potential. No detectable levels of 2,3,7,8-TCDD were observed. It was concluded from the extensive data collected during the five-year program that impact from upstream industrial and agricultural sources is, at the present time, negligible. (Au)

184

Fish data work for Kam Lake and Giauque Lake studies / Stephens, G.R. Coedy, W.

(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [2] p.)

ASTIS 376981

Libraries: ACU

Objectives: To provide interpretation of fish data for reports on the Kam and Giauque Lakes studies. Background: The Kam Lake study's goal was to examine the natural recovery of a northern lake from the impacts of inputs of municipal and industrial (mine) waste. The lake, located within the city of Yellowknife was a sewage overflow at one time and received runoff from the property of Nerco Mines. The objective of the Giauque Lake study was to re-evaluate the level of mercury pollution in Giauque Lake from mining practices of the closed Discovery Mine. Current mercury levels in water, sediment and fish will be compared with historical levels. 165 fish were collected and fillets, liver and kidneys were tested at the Freshwater Institute in Winnipeg. ... (Au)

185

Investigation of mercury concentrations in Lac Ste. Therese and the Johnny Hoe River basin, Northwest Territories, Canada / Stephens, G.R. Northern Water Resources Study Program (Canada) [Sponsor]. Arctic Environmental Strategy. Action on Water Component [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, Water Management and Planning, DIAND, 1997.
ix, 52 leaves : ill., 1 map ; 29 cm.
Appendices.
References.
ASTIS 415812
Libraries: ACU

The identification of high mercury levels in a remote sub-arctic drainage basin, while disturbing, is not unexpected as more research uncovers numerous areas with unexpected mercury concentrations. This challenges the concept of a uniform environmental background level. A study of mercury was undertaken in the Johnny Hoe River Basin, south of Great Bear Lake, Northwest Territories. The results of the study appear to support this idea because the mercury levels varied greatly for fish and water within the same drainage basin. Results indicate that Lac Ste. Therese fish, regardless of species, have had historically the highest unadjusted total mercury values compared to the other lakes within the Johnny Hoe River basin. Lac Ste. Therese also had the highest total mercury concentration in water. As with other lakes, the water quality data suggest that sin morphology could have a significant part in the variability, especially as it relates to the development of brown-water lakes. A human health assessment of the fish data recommended consumption guidelines for walleye, lake trout and northern pike from Lac Ste. Therese and for walleye from Tseepantee Lake. (Au)

186

Investigation of mercury in Lac Ste. Therese / Stephens, G.R.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 73-79, 1 map)
This paper was presented in poster form at the Mercury as a Global Pollutant, July 1994, Whistler, B.C. conference.
References.
ASTIS 369799
Libraries: ACU

Project objective: To investigate the historically high mercury concentrations in fish from Lac Ste. Therese. (Au)

187

Kam Lake water quality study : report on the 1991-92 field work / Stephens, G.R. Puznicki, W.S.
Yellowknife, N.W.T. : Water Resources Division, 1994.
[45] leaves : maps ; 29 cm.
Appendices.
ASTIS 416410
Libraries: ACU

The Kam Lake Study was a two year project funded under Indian and Northern Affairs Canada's (INAC) Northern Waters Resources Studies Program (NWRSP). The objectives of the study were to determine: 1) the current environmental condition of Kam Lake; and 2) its recovery from historic inputs of mine tailings and sewage. In 1989, a pilot sampling program was implemented to aid in the early stages of the planning design. This program consisted of the collection of water quality grab samples for background information. A report titled Kam Lake Water Quality Study: Report on the 1989 Pilot Project was produced from this information. The first full year of the sampling program started in 1990-1991. It was a multi-media monitoring program which examined water, sediment and biota collected from both Kam and Grace Lakes. The results were presented in the NWRSP progress report Kam Lake Study – Year 1: 1990/91. The second year of the sampling program, 1991-92, also involved the collection of water, sediment and biota. That year's data are presented in this report which was written in preparation of a more comprehensive, interpretative report which will attempt to answer the original questions about the quality of Kam Lake. (Au)

188

Mercury concentrations in fish in a remote Canadian arctic lake / Stephens, G.R.
(Water, air, and soil pollution, v. 80, 1995, p. 633-636, maps)
References.
ASTIS 425478
Libraries: ACU

Lac Ste. Therese, a remote Canadian Arctic lake in the Northwest Territories, Canada, has high natural (non-point source) mercury concentrations in fish. The high mercury levels have persisted for over 18 years. Lac Ste. Therese has had consistently higher mercury concentration in fish that the other three lakes sampled within the basin, regardless of species tested. (Au)

189

Variations in mercury concentrations within a sub-arctic basin : Johnny Hoe River / Stephens, G.R.
(Proceedings of the Hydro-Ecology Workshop on the Arctic Environmental Strategy Action on Water, May 1996, Banff, Alberta / Edited by D. Milburn. NHRI symposium, no. 16, 1997, p. 83-93, ill., 1 map)
References.
ASTIS 414255
Libraries: ACU

The variability of contaminant levels being found in the Arctic challenges the concept of a uniform environmental background level. The results of the study indicate that mercury levels vary greatly among locations, especially for fish and water in the same drainage basin. Unadjusted fish results suggest that Lac Ste. Therese has had historically high total mercury concentrations while spatially, Lac Ste. Therese has the highest unadjusted total mercury concentration in fish for any species compared to the other lakes within the Johnny Hoe River basin. Total mercury concentration in water are highest in Lac Ste. Therese. Water quality data suggests that basin morphology could have a significant part in the variability, especially as it relates to the development of brown-water lakes. (Au)

See also: 2, 3, 47, 85, 86, 88, 102, 135, 181.

STONE, M.A.

190

Geochemistry of sediments in the Slave River Delta, NWT / Stone, M.A. English, M.C. Canada. Dept. of Indian Affairs and Northern Development. Water Resources Division [Sponsor].
[S.l. : s.n.], 1998.
[33] leaves : ill., maps ; 28 cm.
Appendix.
References.
Photocopy.
ASTIS 431478
Libraries: ACU

A study was carried out to determine the geochemistry and distribution of trace elements in bed and suspended sediments of the Slave River Delta, North West Territories. Sediment was collected in representative areas of

the outer, mid and apex portions of the delta. The geochemical composition of sediments showed the deposition of relatively similar material throughout the delta. The composition of trace elements (Cu, Ni, Co, Cr, V, Pb and Zn) was more variable and is related to differences in particle size distribution as well as the sediment source and delivery to the delta. Metal concentrations in several samples exceeded the Severe Effects Level of the Ontario Ministry of the Environment Aquatic Sediment Guidelines. No such guidelines have been set for the NWT. The major minerals in delta sediments were quartz (60 – 82%), calcite (2 – 6%), feldspars (8 – 15%), micas (3 – 7%), montmorillonite (2 – 9%), dolomite/ankerite (2 – 4%) and kaolinite (3 – 5%). Due to the limited number of samples, interpretation of the data in this report is qualitative in nature. Larger sample size is required to make statistical inferences regarding the spatial and temporal variability of sediment geochemistry in Slave River Delta. (Au)

See also: 52.

STRACHAN, W.M.J.

See: 100, 121, 194.

STRONG INTERPRETATION

See: 22.

STRONG, R.

See: 22.

SWANSON, S.

See: 46.

SWYRIPA, M.W.

191
Contaminant deposition in arctic precipitation study / Swyripa, M.W.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [3] p.)
ASTIS 376922
Libraries: ACU

Objectives: 1) To quantify annual deposition of trace organic contaminants to the Canadian north to determine spatial variability in contaminant deposition and assess short term trends. 2) In the long term, to use the information as input to a deposition, transport and loading model which together with the intensive basin studies will be used for the estimation of contamination loadings to the arctic marine coastal zone. ... The atmospheric transportation of semi-volatile trace organic compounds and other contaminants to the Arctic is thought to occur primarily during the winter season. Precipitation via snowfall is an important scavenging mechanism, perhaps the primary one, for transfer between the atmosphere and water and land surfaces in these regions. Since the winter of 1990, the National Water Research Institute has been collecting snow samples from the Canadian Arctic to measure the concentrations of organic compounds of the winter season to obtain an integrated sample for the entire accumulation period but, because the retention time of chemicals in the snow is not long, frequent samplings are now needed to accurately determine the deposition. ... (Au)

192
Contaminant deposition in arctic precipitation study / Swyripa, M.W.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [2] p.)
ASTIS 377007
Libraries: ACU

Objectives: 1) To quantify annual deposition of trace organic contaminants to the Canadian north to determine spatial variability in contaminant deposition and assess short term trends. 2) In the long term, to use the information as input to a deposition, transport, and loading model which together with the intensive basin studies will be used for the estimation of contamination loadings to arctic marine coastal zone. ... (Au)

193
Current contaminant deposition measurements in arctic precipitation (snow) / Swyripa, M.W.
(Synopsis of research conducted under the 1993/94 Northern Contaminants Program / Edited by J.L. Murray and R.G. Shearer. Environmental studies – Canada. Dept. of Indian Affairs and Northern Development, no. 72, 1994, p. 83-90)
ASTIS 369110
Libraries: ACU

Objectives: To quantify the snowfall deposition of persistent toxic chemicals in the Arctic and to assess the relative importance of this mechanism to the overall input of these chemicals to the region. (Au)

194
Current contaminant deposition measurements in arctic precipitation (snow) / Swyripa, M.W. Strachan, W.M.J.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 91-100)
References.
ASTIS 369810
Libraries: ACU

Project objective: To quantify the snowfall deposition of persistent toxic chemicals in the Arctic and to assess the relative importance of this mechanism to the overall input of these chemicals to the region. (Au)

195
Department of Indian and Northern Affairs, Fort Simpson District, Trout Lake water quality study / Swyripa, M.W.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program

(Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, 18 p., ill., maps)
Report dated March 28, 1991.
ASTIS 416487
Libraries: ACU

Trout Lake is located approximately 138 km south of Fort Simpson .... The lake is a typical northern eutrophic lake, common of the South-Mackenzie region. It is fed by four main inlets and one main outlet (Trout River), and is accessible only via air or winter road. The community of Trout Lake (pop. 60) is situated on the southeast shore of the lake. Its residents follow a traditional lifestyle of fishing, hunting, and trapping. Drinking water is pumped directly from the lake and batch chlorinated. The solid waste disposal site is poorly maintained and located quite close to a drainage that flows into the Island River which in turn flows into Trout Lake ..., thus giving the potential for contamination of the river and subsequently, the lake. Its residents follow a traditional lifestyle of fishing, hunting, and trapping. Drinking water is pumped directly from the lake and batch chlorinated. The solid waste disposal site is poorly maintained and located quite close to a drainage that flows into the Island River which in turn flows into Trout Lake ..., thus giving the potential for contamination of the river and subsequently, the lake. It should be noted that the Mackenzie Regional Health Service have identified water supply and dump site improvements as first and second environmental health priorities for the community of Trout Lake. Also the Northwest Territories Ministry of Municipal and Community Affairs has recognized these as potential problems, and their plan, as stated, was to use the existing waste disposal site for approximately five years and then replace it with a new long term sewage and solid waste facilities which would not only address the protection of potable water sources but also satisfy airport/solid waste facility guidelines. In response to concerns brought forth September 28, 1989 by the Trout Lake Dene Band Council, regarding the quality of water in Trout lake and the relationship between cases of skin rashes and a number of dead fish observed in the lake, the Northern Affairs Program, Fort Simpson District established a sampling program and a series of water samples were taken during the period from March 07, 1990 to September 19, 1990. (Au)

196
Port Radium abandoned mine site monitoring program / Swyripa, M.W. Jessiman, D.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 157-163, 1 map)
References.
ASTIS 369934
Libraries: ACU

Project objective: To conduct a monitoring program on the surrounding watersheds and fish species at the abandoned Port Radium mine site for possible trace metal and radionuclide contaminants. (Au)

197
Port Radium abandoned minesite monitoring program / Swyripa, M.W. Jessiman, D.
(Project reports 1994-95 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1995, [2] p.)
ASTIS 376833
Libraries: ACU

Objectives: Conduct a study of possible metal and radionuclide contaminants in the water and fish in areas surrounding Port Radium minesite. ... Conclusions/Future directions: Water quality impairment appears to be limited to water in direct contact with tailings, and that observed does not appear to have produced significantly elevated concentrations of either radionuclides or metals in lake trout tissue. Continued consumption of lake trout by people will not result in radiation exposures significantly different from background. The data from 1982 through 1993 do not indicate severe contamination spreading to biota (at least fish). While these do not provide solid priorities for clean-up and mitigation at the site, significant sources of tailings such as at West Adit and Silver Point would be logical first choices. Mitigation, remediation or reclamation of areas such as Garbage Lake and the waste rock areas should be based upon a risk assessment and incorporation of other criteria such as future desired uses of the site. (Au)

198
Port Radium abandoned minesite monitoring program / Swyripa, M.W. Jessiman, D.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, [2] p.)
ASTIS 376973
Libraries: ACU

Objectives: Conduct a study of possible heavy metal and radionuclide contaminants in the surrounding watersheds and fish species at the abandoned Port Radium minesite. Background: Following the abandonment of the Port Radium and Rayrock minesites in 1982, several environmental reports, as well as a intergovernmental committee, recommended long term monitoring of McDonough Lake and continual monitoring of Great Bear Lake's water and fish surrounding the minesite. This program was never established. This fact, along with local community concerns, warranted a revisit of the Port Radium minesite. ... (Au)

199
Trout Lake water quality study / Swyripa, M.W.
(Arctic Environmental Strategy : summary of recent aquatic ecosystem studies / Edited by J. Chouinard and D. Milburn. Northern water resources studies, 1995, p. 101-111, ill., 2 maps)
References.
ASTIS 369829
Libraries: ACU

Project objective: To conduct an integrated multi-media monitoring study of water quality and fish within Trout Lake and the tributaries. (Au)

200
Water and fish quality from Trout Lake, N.W.T., 1990-91 / Swyripa, M.W. Lafontaine, C.N. Paris, M.C.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 1, iv, 108 p., ill.)
Appendices.
References.
ASTIS 416932
Libraries: ACU

In response to concerns brought forth by the Trout Lake Dene Band Council regarding the general water and fish quality in Trout Lake, a sampling program was established by the Fort Simpson District of Indian and Northern Affairs Canada (INAC). The sampling program consisted of a series of water and fish samples taken from the period March 07, 1990 to September 19, 1990. As a result of that initial work, it was resolved that further sampling be undertaken. With funding assistance from the Arctic Environmental Strategy a more extensive water and fish sampling program was implemented during the summer of 1991. The program, using samples taken from the summer of 1991, looked at twenty biological and chemical parameters and evaluated those results against Canadian Water Quality Guidelines set for the protection of aquatic life and recreational usage. The values for all the physical and metal water

quality samples are typical of normal background levels and in most cases well within Canadian Water Quality Guidelines for the protection of aquatic life. A health risk evaluation was done from the water quality data by the Government of Northwest Territories, Department of Health and concluded that the results showed no present risk to human health, although recommendations were made that all drinking water be properly treated before any human consumption. Between March 1990 and July 1991, a total of 85 fish were gill-netted. Length, width, age and stage of maturity were recorded for each fish. Samples of dorsal muscle were collected from 70 fish of 6 species and analyzed for 28 metals. A few lake trout and burbot were tested for presence of 130 organochlorines in the muscle and in the liver. The values of the biological parameters suggest that walleye, longnose sucker, burbot and northern pike from Trout Lake are in good condition. Lake trout and lake whitefish are not as round as those from other similar lakes in the area. This difference in species condition is characteristic of a walleye lake. Out of the 28 metals analyzed, arsenic, cadmium, copper, lead, mercury, nickel, and zinc are discussed and summarized in the report. The levels detected for the seven metals and major organochlorines (HCH, CHLOR, DDT, PCB, Toxaphene) are low and can be considered as background concentrations. A health risk assessment on the fish collected, conducted by Health and Welfare Canada, concluded that the consumption of the fish would not pose a health hazard to consumers. (Au)

See also: 3, 4, 5, 6, 17, 63, 64, 65, 102, 103, 121, 123, 169, 170, 171.

TAAL, T.A.

See: 208, 209.

TAYLOR MAZIER ASSOCIATES

See: 201.

TAYLOR, B.R.

201

Liard River Environmental Quality Monitoring Program : final study report / Taylor, B.R. Taylor Mazier Associates. Sanderson, J.D. Northern Affairs Program (Canada). Water Resources Division. Lafontaine, C.N. AquatIchtus Consultants.
Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1998.
2 v. : ill, maps ; 28 cm.
Mostly tables.
Appendices.
References.
Contents: Volume [1] : Liard River environmental quality monitoring program : final study report – Volume [2] : Liard River environmental quality monitoring program : final study report : appendices.
ASTIS 425524
Libraries: ACU

... The general objectives of the Liard River Environmental Quality Monitoring Program were: 1. To characterize river conditions for fish, water and suspended sediment in the NWT portion of the Liard River at Fort Liard with specific attention to levels of contamination with organochlorines, polyaromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), dioxins and furans, toxaphene and trace metals. 2. To provide baseline data on contaminant levels in Liard River fish, water and sediment in support of transboundary water negotiations. 3. To address concerns of northerners regarding possible negative effects on water uses and fish populations from upstream development in the Liard River basin. ... (Au)

202

Liard River Environmental Quality Monitoring Program : summary report / Taylor, B.R. Sanderson, J.D. Lafontaine, C.N.
Yellowknife, N.W.T. : DIAND. Water Resources Division, 1998.
xi, 64 p. : ill. (some col.), 2 maps ; 28 cm.
References.
Glossary.
ASTIS 428841
Libraries: ACU

... The Liard River Environmental Quality Monitoring Program was a comprehensive sampling program measuring the current condition of the Liard River at the boundary between British Columbia and the Northwest Territories. The Liard River Program measured important contaminants in water, suspended sediments and fish over a three-year period. The purpose of the Program was to assess the present status of the river, discover any hazards to human health or the aquatic environment, and to define a solid baseline to see if conditions change in the future. ... A variety of industrial activities in the upstream part of the Liard River basin, especially mining, logging, oil and gas extraction and construction of big dams could potentially degrade environmental quality of the Liard River in the NWT. The Liard River Environmental Quality Monitoring Program included a large number of samples of water, sediments and fish from the Liard River just north of the NWT boundary. The sampling measured the present condition of the aquatic ecosystem and set a baseline for comparison with future conditions. ... The Liard River Program used a new “multi-media” or “ecosystem-based” design. Instead of sampling water alone, samples included suspended sediments, fish, raw water, and water with suspended sediments removed. Water and sediment samples were collected about 10 km upstream from Fort Liard, just north of the NWT/BC boundary. Collections of fish were made over a slightly larger area. The river was sampled for three years. ... Heavy metals in Liard River water are largely associated with suspended sediments. These particle-bound metals are not taken up by aquatic organisms and therefore are not toxic. Metals concentrations in some samples of whole fish may also be inflated by the inclusion of sediments in the stomach. ... Concentrations of PAH in suspended sediments of the Liard River are low and unlikely to be harmful to aquatic life. ... Pesticide residues were never detected in suspended sediment from the Liard River. Some samples of whole fish or burbot liver contain a few pesticide residues, almost always at concentrations near the detection limit. Concentrations are always below Health Canada guidelines for fish consumption. ... PCBs were never detected in any sediment sample. PCB concentrations in all fish samples from the Liard River Program fell far below the Health Canada limit for commercial fish sale and export, and therefore should not be considered hazardous to consumers. ... (Au)

TAYLOR, P.

See: 135.

TAYLOR, P.A.

See: 24.

TEIXEIRA, C.

See: 100.

TRILLIUM ENGINEERING AND HYDROGRAPHICS INC.

203

Review of WSC Alberta/NWT border gauge discharge estimates on Hay River stream discharge and ice jam characteristics / Trillium Engineering and Hydrographics Inc. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [22] p., ill., 1 map)
References.
ASTIS 416746
Libraries: ACU

... The objective of the work is to determine if the errors in the discharge measurements result in significant changes to the calibrated parameters and if this ultimately will have an effect on the accuracy of the ice jam water level rating curves. This short report will address the following scope of work and provide conclusions and recommendations regarding the status of the current flood forecasting system, the implications of the discharge errors, and the need to do additional analyses. (1) Review the WSC discharge measurements at the border gauge, identify the magnitudes of the discharge discrepancies, and revise the rating curve if required. (2) Revise the discharge at Hay River for the 1987 and 1988 ice jam events and determine the discharge in the east and the main channel of the Hay River. (3) Recalibrate the 1987 and 1988 ice jams, using the nonuniform ice jam model, define the new calibrated parameters, and determine the magnitude of the error in the calculated water levels (relative to the measured water levels) of the 1992 ice jam. ... (Au)

204

Review of WSC NWT/Alberta border gauge estimates / Trillium Engineering and Hydrographics Inc. Canada. Indian and Northern Affairs Canada [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, DIAND, [1996].
11 leaves : ill., 1 map ; 29 cm.
References.
ASTIS 415855
Libraries: ACU

The Town of Hay River lies at the mouth of the Hay River on the southwest shore of Great Slave Lake. A significant portion of the town is on the low-lying Hay River delta ... and because of its location the Town is threatened almost every year by ice jam flooding, and serious flooding tends to occur on the average of once every 8 years .... The objective of the work is to determine if the errors in the discharge measurements result in significant changes to the calibrated parameters and if this ultimately will have an effect on the accuracy of the ice jam water level rating curves. This short report will address the following scope of work and provide conclusions and recommendations regarding the status of the current flood forecasting system, the implications of the discharge errors, and the need to do additional analyses. (1) Review the WSC discharge measurements at the border gauge, identify the magnitudes of the discharge discrepancies, and revise the rating curve if required. (2) Revise the discharge at Hay River for the 1987 and 1988 ice jam events and determine the discharge in the east and the main channel of the Hay River. (3) Recalibrate the 1987 and 1988 ice jams, using the nonuniform ice jam model, define the new calibrated parameters, and determine the magnitude of the error in the calculated water levels (relative to the measured water levels) of the 1992 ice jam. (Au)

UNIVERSITY OF WATERLOO. CENTRE FOR GROUNDWATER RESEARCH

See: 209.

UNIVERSITY OF WATERLOO. DEPT. OF EARTH SCIENCES

205

Evaporation rates at mine sites in the Northwest Territories determined by an isotopic method : 1995 addendum / University of Waterloo. Dept. of Earth Sciences. Gibson, J.J. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
(Project reports 1995-96 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1997, v. II, [20] p., ill.)
Appendices.
References.
Report date 1996.
ASTIS 416720
Libraries: ACU

An isotope mass balance method was applied to estimate evaporation rates from natural lakes and mine-tailings ponds at four mine sites in the Northwest Territories during 1995, based on analysis delta 18O and delta 2H in 187 water samples and supplementary hydrometeorological data collected at the sites. Results are presented and compared to evaporation estimates derived for 1991 to 1994. Revised estimates are also presented from 1992 and 1993 at Yellowknife following detailed re-examination of humidity and evaporation pan data. (Au)

206

Evaporation studies at the Lupin Mine site using stable isotopes. III : report of 1992 field activities / University of Waterloo. Dept. of Earth Sciences. Whidden, J.A. Gibson, J.J. Edwards, T.W.D. Echo Bay Mines Ltd. [Sponsor].
Waterloo, Ont. : University of Waterloo, 1992.
ii, [36] leaves : ill. ; 29 cm.
Appendices.
References.
ASTIS 416126
Libraries: ACU

Hydrologic field investigations in support of the University of Waterloo evaporation study program continued on the Lupin mine site during 1992. Auxiliary field programs were conducted at three additional mine sites in the Northwest Territories. The principle objectives of the four year program (1991 to 1994) are to measure evaporation and water balance of tailings-pond treatment systems in northern climates, and to calibrate isotope-mass balance for use as an operational method for characterizing water balance of natural lakes and tailings ponds. This report summarized field studies carried out at the Lupin mine site during 1992. ... Field work included water sampling for isotopic and geochemical analysis, monitoring of permafrost and shallow groundwaters, collection of evaporation pan and micrometeorological data, and surveying of terrain

and lake bottom topography. The field program was structured to provide a two month (July and August) period of evaporation measurements using five independent methods, namely: isotope mass-balance, evaporation pans, physical water balance, energy balance, and aerodynamic profile. In addition to providing high-certainty evaporation estimates for this time interval, the data will serve to calibrate stable isotope estimates of evaporation to be compiled from analyses of waters collected over the duration of the study. ... Investigations at Lupin in 1992 were conducted in collaboration with Dr. T.D. Prowse (Environment Canada, Saskatoon), with funding from the Government of the Northwest Territories (Technolgoy Initiative Program, administered by CANMET), Indian and Northern Affairs Canada (Northern Scientific Training Program), the Association of Canadian Universities for Northern Studies, the Natural Sciences and Engineering Research Council of Canada, and the Waterloo Centre for Groundwater Research. The studies were made possible by the valuable in-kind support provided by Echo Bay Mines Ltd. ... (Au)

207

Evaporation studies at the Nanisivik Mine site using stable isotopes. I. Report of 1992 activities / University of Waterloo. Dept. of Earth Sciences. Gibson, J.J. Edwards, T.W.D. Nanisivik Mines Ltd. [Sponsor].
Yellowknife, N.W.T. : Water Resources Division, 1993.
ii, [14] p. : ill., maps ; 28 cm.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [16] p., ill., maps)
Appendices.
References.
ASTIS 339849
Libraries: ACU

Field investigations were carried out during July 1992 at Nanisivik in support of the University of Waterloo evaporation study program. Field work was also conducted at three other mine sites in the Northwest Territories. University of Waterloo personnel visited the site between 23 July and 27 July 1992 in order to collect water samples for stable isotope analyses. Analytical results are presented from 37 samples collected during the 1992 visit and 7 additional samples collected by mine personnel during 1991. Preliminary isotopic results indicate that surface waters, including West Twin Lake, lose a substantial portion of their water via evaporation. In view of the measurable and systematic isotopic enrichment observed in surface waters undergoing evaporation relative to non-evaporated input sources (snow and stream runoff), quantitative determination of water balance using isotopic methods is clearly feasible. It is recommended that water sampling be continued during 1993 to expand the isotopic database prior to conducting a quantitative analysis. A proposal for continuation of the water sampling program by mine personnel is presented which involves collection of weekly samples during June to September 1993 from 4 road-accessible lakes, East Twin Lake, and 4 areas within West Twin Lake. (Au)

208

Pocket Lake evaporation studies using stable isotopes : preliminary report of 1992 field activities / University of Waterloo. Dept. of Earth Sciences. Taal, T.A. Gibson, J.J. Edwards, T.W.D. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
Waterloo, Ont. : University of Waterloo, 1992.
14 leaves : 2 maps ; 29 cm.
Cover title.
References.
ASTIS 416223
Libraries: ACU

... Evaporation studies at Pocket Lake are being conducted as part of a larger program of water balance investigation at minesites across northern Canada from boreal forest to High Arctic regions to determine the long-term sustainability of tailing impoundments. The present studies are funded by ... Indian and Northern Affairs Canada with additional support from the Government of the Northwest Territories, Royal Oak Mines Inc., Echo Bay Mines Ltd., Nanisivik Mines Ltd., Indian and Northern Affairs Canada (Northern Scientific Training Program), Environment Canada, the Natural Sciences and Engineering Research Council of Canada, and the Waterloo Centre for Groundwater Research. ... The objective of this study is to use the stable isotope mass balance technique to characterize evaporation from Pocket Lake, located on the Giant Royal Oak mine-site .... An isotopic enrichment-evaporation relationship will be compared with evaporation estimates based on calculated surface mass balance methods, and conventional estimates obtained from class “A” evaporation pans monitored on-site and at the nearby Yellowknife airport meteorological station. ... (Au)

209

Pocket Lake evaporation studies using stable isotopes : report of 1992 results / University of Waterloo. Dept. of Earth Sciences. University of Waterloo. Centre for Groundwater Research. Taal, T.A. Edwards, T.W.D. Northern Affairs Program (Canada). Water Resources Division [Sponsor].
[S.l. : s.n.], 1993.
24 leaves : ill., maps ; 28 cm.
(Activity reports 1992-93 : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. – Yellowknife, N.W.T. : Water Resources Division, 1993, [24] p., ill., maps)
Photocopy.
References.
ASTIS 339830
Libraries: ACU

Investigations were conducted in the Yellowknife area, Northwest Territories from June 13 to September 11, 1992, to survey the surface and subsurface hydrology of the Pocket Lake basin, and to study the hydrology and isotopic composition of local lakes and surface waters. The Pocket Lake study on Giant Royal Oak Mine property was undertaken to permit calculation of the evaporative fluxes as a component of the water balance. Precipitation, and lake and groundwater levels were monitored to constrain mass balance estimates within the basin. Standard class “A” evaporation pans were used for gross estimates of evaporation rate and to provide isotopic data for comparison with lake data. Water samples were collected at weekly intervals for Pocket Lake isotopic analyses, while samples from numerous lakes in the region were taken each month to establish baseline isotopic composition of local waters. (Au)

210

Slave River Environmental Quality Monitoring Program – 1988 to 1994 : evaluation and interpretation of Slave River (NWT) environmental database / University of Waterloo. Dept. of Earth Sciences. Gregor, D.J. McCarthy, L.H. Williams, T.G. Northern Affairs Program (Canada). Water Resources Division [Sponsor]. Arctic Environmental Strategy [Sponsor].
Waterloo, Ont. : University of Waterloo, Dept. of Earth Sciences, 1997.
xii, 98 leaves : ill., 1 map ; 29 cm.
Appendix.
References.
ASTIS 415880
Libraries: ACU

This report provides an interpretative framework of the results collected by the Slave River Environmental Quality Monitoring Committee from 1988 to 1994. An extensive historical perspective and detailed overview of the monitoring program is described in Peddle et al. (1977). The water, suspended sediment, fish, and benthic invertebrates in the Slave River were examined because the watershed at the Alberta-Northwest Territories border drains a large area and is the recipient of chemical

compounds from a variety of sources, including the Athabasca and Peace Rivers, and long-range atmospheric transport. Because the potential for contamination from industrial and agricultural processes upstream and from the lower latitudes is very real, the Slave River Environmental Quality Monitoring Program was officially established in 1990 to assess environmental quality in the Territorial portion of the river. Specifically, the program was to ascertain whether the water from the Slave River was safe to drink and the fish safe to eat. A baseline data set with which to determine present and future effects from upstream activities and long-range transport of contaminants was created. A summary of the results of these investigations follow. (Au)

VISTA ENGINEERING

211
Trout Lake water supply engineering planning study : final report / Vista Engineering. Northwest Territories. Dept. of Municipal and Community Affairs [Sponsor].
Yellowknife, N.W.T. : Vista Engineering, 1994.
ii, 66 leaves : ill., maps ; 29 cm.
Appendices.
References.
ASTIS 415944
Libraries: ACU

... The study is based on the "General Terms of Reference for a Community Water Supply Study" developed by the Community Works and Capital Planning Division of MACA, Government of the Northwest Territories as well as specific terms of reference for this project provided by the department. Objectives: As identified in the project terms of reference the objective of the study is to select a water supply system for the community meeting the following objectives: acceptable to the community, protect public health and safety, minimize environmental impacts, be effective and efficient, meet given standards and criteria, comply with relevant legislation and follow accepted good engineering practice. Study methodology: Stage 1 of the study includes evaluation of water supply alternatives including: evaluating existing conditions, evaluating alternatives, preparing and presenting findings, selecting preferred long term alternatives. Stage 2 of the study is the implementation planning including: preparing an implementation plan for approved alternative(s), preparing a capital and O&M budget. This is the final report for the study and includes stage 1 and stage 2 of the planning study. Comments received from the community, MACA, Mackenzie Regional Health Board, DPWS and the NWT Water Board during the study have been incorporated into this report. (Au)

WATERLOO CENTRE FOR GROUNDWATER RESEARCH

See: 42.

WAUTIER, K.

See: 66.

WEDEL, J.H.

See: 48, 118, 119.

WEDEL, L.M.

See: 119.

WEDEL, R.L.

See: 48, 119, 169, 172.

WHIDDEN, J.A.

212
Application of isotope hydrology to mine water management in the Northwest Territories / Whidden, J.A.
Waterloo, Ont. : University of Waterloo, 1992.
ix, 67 leaves : ill., maps ; 28 cm.
Thesis (B.Sc.) – University of Waterloo, Dept. of Earth Sciences, Waterloo, Ont., 1992.
Appendices.
References.
ASTIS 330299
Libraries: ACU

Environmental concerns have prompted government and industry to re-evaluate mine water management techniques in the Northwest Territories. Mining operations are the main contributors to the economic base of the North yet they are also the largest source of industrial waste. The determination of representative evaporation rates is key to mine waste water management plans. In the Northwest Territories, evaporation can often exceed precipitation because of the arid climate, thus, making evaporation the largest component of a water balance. Conventional methods for estimating evaporation are: evaporation pans, energy balance, mass transfer, and water budget. A recent method that has proved to be valuable under Northern conditions involved the use of stable isotopes of oxygen and hydrogen in water. The isotopic method for estimating evaporation takes advantage of naturally occurring variations in the stable isotope composition of water. It is particularly well suited to Northern settings because of (1) a short field period, (2) minimal instrumentation, (3) relatively low costs, (4) routine analytical procedures, and (5) interpretation is relatively straightforward. Results from field work at the Lupin mine site have verified that evaporation losses from the natural lakes and tailings ponds are significant. Stable isotope compositions have indicated that a higher percentage of evaporation loss has occurred from Pond 2 relative to Pond 1. Seasonal variations are also evident in the tailings ponds. Natural systems show a progressive isotopic enrichment from headwaters to discharge points. The technique has provided sufficient resolution for quantitative evaporation modelling. This can be accomplished by short term isotopic enrichment experiments coupled with micrometeorological measurements. The isotopic model is recommended for all stages of a mine's life (development, operation, and abandonment). The technique aids mine waste water management plans by providing a reliable, fast, and inexpensive method for determining representative evaporation rates. (Au)

213
Developing waste water management strategies using environmental isotopes for mines in the Northwest Territories, Canada / Whidden, J.A.
(Activity reports 1993-94 (including attachments) : Arctic Environmental Strategy NWT Water Component / Northern Affairs Program (Canada). Water Resources Division. –

Yellowknife, N.W.T. : Water Resources Division, Indian and Northern Affairs, 1994, v. 3, xiv, 171 p., ill.)
Thesis (M.Sc.) – University of Waterloo, Dept. of Earth Sciences, Waterloo, Ont., 1994.
Appendices.
References.
ASTIS 377023
Libraries: ACU

... One of the main waste products of mining activities is a form of waste rock known as "tailings". This material represents the residual of the ore after having been through the milling process where it has been finely ground and leached of its target metal. The tailings are then transported as a slurry to a disposal area. ... This study is aimed at assisting mining companies in the development of their waste water management plans. The goal is to strive for a strategy that can reduce or eliminate discharge to the natural environment and will adequately retain any substances of environmental concern on-site after abandonment. The plan is focused on developing a mine waste water management strategy using baseline hydrologic data. The strategy would provide information that could assist siting the tailings area, operation of the system, and designing abandonment plans. Environmental isotopes and physical data are used to develop a water management strategy for a mining operation in the Northwest Territories, using the Lupin mine as a model. The central focus of the model was to stress passive management of the water by taking advantage of evaporation and other components of the water balance which may be physically altered. Evaporation was quantified using stable isotopic techniques and compared with results of evaporation pan, aerodynamic, and water budget methods. Differing hydrologic settings were studied in the development of the isotopic model. ... Data gained through the stable isotopes and other physical monitoring of natural and artificial reservoirs were then used to construct a water balance model to assess the long term stability of tailings ponds after abandonment. (Au)

See also: 43, 206.

WHITFIELD, P.

See: 94.

WHITTLE, D.M.

See: 86, 88.

WILKINSON, P.

See: 99.

WILKINSON, R.J.

See: 2.

WILLIAMS, T.G.

214

Baseline studies in the Slave River, NWT, 1990-1994 : Part III. MFO enzyme activity in fish / Williams, T.G. Lockhart, W.L. Metner, D.A. Harbicht, S.M.
(Science of the total environment, v.197, 1997, p. 87-109, ill.)
References.
ASTIS 416363

As part of the Slave River Environmental Quality Monitoring Program, a background data set of baseline concentrations was collected for various environmental components including fish, water, bottom sediment, and suspended sediment. Fish collections included a series of hepatic MFO analyses on walleye, northern pike, lake whitefish, and burbot. The EROD and AHH activity and P450 levels of fish, as well as weight, length, age, condition factor, and liver and gonadal somatic indices are described. Levels of EROD and AHH activity were of an order of magnitude expressed by the following relationship: walleye > northern pike > burbot > lake whitefish. Males consistently showed higher EROD, AHH activity and cytochrome P450 content relative to females of the same species even at control sites. Physical parameters varied very little within sites and exhibited some differences with the reference sites. A good MFO data set was collected for walleye and northern pike, but limited conclusions were possible with the lake whitefish and burbot data due to the overlap of sampling with the spawning season. Hepatic MFO enzyme activity indicated that some differences were evident in fish sampled from the Slave River relative to background/reference lakes; however, in many cases no differences were observed. Five years of biochemical effects studies have determined that the Slave River had low levels of induction suggesting a relatively pristine environment. This is further supported by the water, sediment, and body burden chemistry components of the Slave River Environmental Quality Monitoring Program. (Au)

215

Evaluation of the fish biochemistry data from the Slave River Monitoring Program, NWT, 1988-1994 / Williams, T.G. Lockhart, W.L. Metner, D.A. Harbicht, S.M.
(Abstract book : Second SETAC World Congress / Second World Congress of the Society of Environmental Toxicology and Chemistry. – Pensacola, Fla. : SETAC Press, 1995, p. 318)
Abstract only.
ASTIS 425494

With the possibility of impending industrial development in Northern Alberta and within the Slave River Basin, scientists and resource managers felt it appropriate that background data be collected to determine baseline concentrations for the Slave River basin. This monitoring program incorporated a suite of studies analyzing various components in the environment including fish, water, bottom sediment and suspended sediment. One aspect of the fish component included biochemical effects studies which comprised a series of MFO analyses on lake whitefish, burbot, walleye and northern pike. It is the purpose of this paper to describe the biochemical component of the Slave River Monitoring program. Physiological changes (i.e. in the form of EROD, AHH, P450 activity), age, weight, condition factor, liver and gonadal somatic indices were looked at. Limited conclusions were made with the lake whitefish and burbot data due to a conflict with the spawning season (i.e. MFO activity was depressed during spawning), however, a good data set has been collected for walleye and northern pike. Hepatic MFO enzyme activity indicated that some differences were evident in fish sampled from the Slave River relative to background/control lakes, however, in many cases no differences were observed. Five years of biochemical effects studies have determined that the Slave River has low levels of induction suggesting a relatively pristine environment, but further studies are required to confirm this. (Au)

See also: 85, 87, 183, 210.

WILSON, A.

See: 127.

Subject Index

The numbers listed below are citation numbers, not page numbers.

Geographic Index

The numbers listed below are citation numbers, not page numbers.

Title Index

The numbers listed below are citation numbers, not page numbers.