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Research & Development Projects Canadian Conservation Institute 2003 - 2004

Conservation and Scientific Services
Canadian Conservation Institute
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Project Title:	The Materials and Techniques of David B. Milne (1882-1952)
Project Description:	<p>To analyse the materials and document the techniques used by David Milne at different times his career in order to build a database which will assist in devising treatments and selecting appropriate display and storage conditions. The project will provide reference analyses for paintings for which the attribution is uncertain.</p> <p>Scientific research on David Milne's oil paintings was initiated when a large number of his paintings were assembled for a major Milne exhibition organized by the McMichael Canadian Collection and the Vancouver Art Gallery in 1991. The aim of this research is to determine the materials and techniques employed by Milne throughout his oil painting career. In collaboration with the conservation department of the McMichael Canadian Collection, over 250 samples were taken from a representative selection of twenty-eight oil paintings spanning Milne's career. These paintings came from the Milne Family Collection, the McMichael Canadian Collection and the National Gallery of Canada.</p> <p>The twenty-eight paintings were divided chronologically into four groups: group 1, 1911-1918; group 2, 1919-1928; group 3, 1929-1939 and group 4, 1939-1952. The first group, represents some of Milne's early well known paintings from New York City and Boston Corners, New York (1911- 1918). The paintings in the second group are from a period which commenced in 1919, when Milne returned to Boston Corners after working as a war artist for a short time. During the years 1919-1928 Milne spent time in Boston Corners, N.Y., the Adirondacks, Mount Riga and Ottawa. The third group includes paintings from the years 1929-1939 when Milne returned to Ontario and the last group spans the period from 1939 until Milne's death in 1953, during which time Milne was in Toronto and then Uxbridge.</p> <p>The users of the results of this project are curators, conservators, scientists, art historians, artists, law enforcement agencies, collectors, and the general public in Canada and internationally.</p> <p>Project results and information from the project will assist curators, conservators, and scientists by providing essential data on Milne's materials and techniques which are used both in authenticity and attribution studies, and in evaluating the conservation requirements of his works.</p>
Project Dates:	September 1991 - March 2005
CCI Project Leader:	P. Jane Sirois
CCI Project Team:	P. Jane Sirois, Elizabeth A. Moffatt, Kate Helwig, and Jeremy J. Powell
Outside Team Members:	David Miller, Kristopher Legate (Young Canada Works in Science and Technology, Department of Canadian Heritage), and Annaïg Gautier
Links/Partnerships:	The McMichael Canadian Art Collection; National Gallery of Canada; the Art Gallery of Ontario; the Milne Family
Progress Summary:	<p>Samples were taken from 37 paintings spanning David Milne's career from 1911 to 1946 belonging to The Milne Family collection, The National Gallery of Canada, the McMichael Canadian Art Collection and the Art Gallery of Ontario. In addition to these, other samples have been taken from David Milne's palette and paintbox.</p> <p>Several analytical techniques were employed on both cross-sections and samples of discrete layers to obtain detailed information on the composition of the pigments and media used: Fourier transform infrared spectroscopy, gas chromatography/mass-spectrometry, x-ray</p>

diffraction, x-ray microanalysis and scanning electron microscopy, light microscopy, fluorescence microscopy, and polarized light microscopy.

The analysis of all samples has been completed (SEM/XES, XRD, FTIR and Polarized light microscopy). The project data has been reviewed and compiled and a publication is in progress.

Publications:

Sirois, P.J., Moffatt, E.A., Miller, D., Helwig, K., "A Material and Technical Investigation of Early Oil Paintings by David Milne," *Presented at the IIC-CG Annual Conference*, Calgary, May 1995. (lecture)

Sirois, P.J., Gautier, A., Miller, D., Moffatt, E. A., and Powell, J.J., "A Scientific Investigation of the Paintboxes of Paul Kane and David Milne," *presented at the IIC-CG annual conference*, Montreal, May 1996. (poster)

Sirois, P.J., "Delving into the Paintboxes of Paul Kane and David Milne," *Newsletter, Canadian Conservation Institute*, no. 19, March 1997, pp. 6-7

CCI Number:	55696
CCI Division:	ARL
Current Project Status:	Active
Project Proposal 2004:	Completion of manuscript describing the project and results for publication
Project Approval:	Approved

Project Title: **The Materials and Techniques of Cornelius Krieghoff (1815-1872)**

Project Description The aim of the project is to analyze the painting materials and document the techniques used by Cornelius Krieghoff in order to build a database which will assist in devising treatments and selecting appropriate display and storage conditions. The project will provide reference analyses for paintings for which the attribution is uncertain.

The exhibition *Kriehoff: Images of Canada*, organized by the Art Gallery of Ontario and curator Dennis Reid, provided an excellent opportunity to study the works of the prolific nineteenth-century artist Cornelius Krieghoff. The exhibition, which opened in Toronto in November 1999, travelled to four other Canadian cities (Québec City, Ottawa, Vancouver and Montréal) before the end of 2001. Krieghoff's well know subject matters include autumn and winter landscapes and portrayals of natives and habitants

Over 300 samples of paint and ground were collected from more than 50 works. Paintings from each stage of Krieghoff's career were selected for inclusion in the study - The Early Years 1841-1844, The Montréal Period 1846-1863, The Québec City Period 1853-1863, The European Period 1864-1870 and The Late Québec Period 1870-1872. Lenders who have agreed to participate in the analytical study are the Art Gallery of Ontario, Glenbow Museum, Kastel Gallery of Montréal, McCord Museum of Canadian History, Montréal Museum of Fine Arts, Musée du Château Ramezay, Musée du Québec, National Archives of Canada, National Gallery of Canada, Power Corporation, Royal Ontario Museum and the Thomson Collection

The users of this work are curators, conservators, scientists, art historians, artists, law enforcement agencies, collectors, and the general public in Canada and internationally.

Project results and information from the project will assist curators, conservators, and scientists by providing essential data on Krieghoff's materials and techniques which are used both in authenticity and attribution studies, and in evaluating the conservation requirements of his works.

Project Dates: January 2000 to March 2005

CCI Project Leader: Elizabeth Moffatt

CCI Project Team: Elizabeth Moffatt and Marie-Claude Corbeil

Outside Team Members: Sandra Webster-Cook (Art Gallery of Ontario)

Links/Partnerships: This project was initiated at the request of Art Gallery of Ontario. Works to be included were determined in consultation with Sandra Webster-Cook, Conservator, Canadian Historical and Modern European Collections, Art Gallery of Ontario.

Progress Summary: Analysis of the paint samples began in 2000 and was completed during 2002. Data analysis and preparation of reports and a publication are in progress.

Publications:

CCI Number:	74200
CCI Division:	ARL
Current Project Status:	Active
Project Proposal 2004:	Completion of manuscript describing the project and results for publication. Dissemination of results to museum partners.
Project Approval:	Approved

Project Title: **The Materials and Techniques of Jean-Paul Riopelle (1923-2002)**

Project Description: The aim of the project is to analyse the materials and document the techniques used by Jean-Paul Riopelle in order to build a database which will assist in devising treatments and selecting appropriate display and storage conditions. The project will provide reference analyses for paintings for which the attribution is questioned.

A number of paintings allegedly by Riopelle were examined in our laboratory, which turned out to be fakes. Riopelle is one of the most renowned 20th artists in Canada and internationally. His works, especially those of the 1950s, have reached high prices. It was recognized that we should build a database of his materials and techniques in order to assist curators and law enforcement agencies.

Users of the work are curators, conservators, scientists, art historians, artists, law enforcement agencies, collectors, and the general public in Canada and internationally.

Project results and information from the project will assist curators, conservators, and scientists by providing essential data on Riopelle's materials and techniques which are used both in authenticity and attribution studies, and in evaluating the conservation requirements of his works.

Project Dates: December 2001 to December 2005

CCI Project Leader: Marie-Claude Corbeil

CCI Project Team: Marie-Claude Corbeil, Kate Helwig and Jennifer Poulin

Outside Team Members:

Links/Partnerships: Montreal Museum of Fine Arts; Musée national des beaux-arts du Québec; Musée d'art contemporain de Montréal; Yseult Riopelle

Progress Summary: January 2003: Thirty-eight paintings were examined and sampled, and analysis of the samples began.

April 2004: Analysis focussed on selected samples to address specific conservation issues. A manuscript was written on that body of data for IIC Bilbao 2004.

Publications: Corbeil, M.-C., "Discovering the Paintings of Jean-Paul Riopelle," *CCI Newsletter*, no. 32, November 2003, p. 9.

Corbeil, M.-C., "Considerations Regarding Riopelle's Pictorial Technique and Conservation," in *Jean Paul Riopelle - Catalogue raisonné*, vol. II, edited by Yseult Riopelle (2004).

CCI Number:	77821
CCI Division:	ARL
Current Project Status:	Active
Project Proposal 2004:	Presentation at the 30 th CAC Annual Conference and at IIC Bilbao 2004; analysis of samples will continue.
Project Approval:	Approved

Project Title:	The Materials and Techniques of Louis Dulongpré (1759-1843)
Project Description:	<p>The aim of the work is to develop a database of the materials, techniques and condition for a group of paintings attributed to Louis Dulongpré</p> <p>The purpose of this project is to develop a database of the materials, techniques and condition for a selected group of approximately fifteen to twenty oil paintings attributed to Dulongpré. This information will allow us to better understand the working methods of the artist and will also be a starting point to resolve problems of attribution.</p> <p>The project will involve the examination of paintings from a number of museums. The work will include visual examination, technical photography, x-radiography and scientific analysis of the paint and ground layers. We expect that certain paintings will be sent to CCI for examination and that others will be examined on-site in the various participating museums.</p> <p>Sampling and examination will take place in 2003-2005. Analysis and collation of results will be carried out in 2006-2008.</p> <p>Users of the work are curators, conservators, scientists, art historians, artists, law enforcement agencies, collectors, and the general public in Canada and internationally.</p> <p>Project results and information from the project will assist curators, conservators, and scientists by providing essential data on Dulongpré's materials and techniques which are used both in authenticity and attribution studies, and in evaluating the conservation requirements of his works.</p>
Project Dates:	2002-2006
CCI Project Leader:	Kate Helwig
CCI Project Team:	Kate Helwig, Debra Daly Hartin, and Jeremy Powell
Outside Team Members:	Barbara Klempan (Art Conservation Programme; Queen's University)
Links/Partnerships:	Barbara Klempan (Department of Art Conservation, Queen's University), Gilbert Gignac (National Archives of Canada), René Villeneuve (National Gallery of Canada), Conrad Graham (McCord Museum), Daniel Drouin (Musée du Québec) and others to be determined
Progress Summary:	<p>June-September 2002: determined scope of project, contacted curators for advice about which paintings to examine, made final list of 20 paintings to be included in the study</p> <p>September-October 2002: developed a timeline for receiving paintings at CCI, contacted curators/museums to determine dates for loans, on-site visits</p> <p>March 2003: examined and sampled three paintings from the McCord Museum in Montreal.</p>
Publications:	"A Starch-based Ground Layer on a Painting Attributed to Louis Dulongpré", Kate Helwig and Debra Daly Hartin <i>Journal of the Canadian Association for Conservation (Journal de l'Association canadienne pour la conservation et la restauration)</i> , vol. 24, 1999, pp. 23-28.

CCI Number:	82213
CCI Division:	ARL
Current Project Status:	Active
Project Proposal 2004:	ARL component of project on hold; principal investigator on leave
Project Approval:	Approved

Project Title:	Analysis of Selected Materials from the Studio of Yves Gaucher (1934-2000)
Project Description	<p>A preliminary study of selected studio materials used by Yves Gaucher and found in his Montreal studio after his death in 2000.</p> <p>The goal of this project, undertaken in collaboration with Queen's University, is to document and sample the materials remaining in Yves Gaucher's Montreal studio after his death in 2000.. Approximately 375 samples were obtained and archived. 36 selected materials will be examined in this preliminary project. This could lead to a more extensive project on Gaucher's materials and techniques in the future.</p> <p>The first step in the project was to gather documentary information, both from written sources and from discussions with his colleagues and family. The second step was to develop a database of the materials found in the studio. The final step of the project was the analysis of a selection of the paint materials.</p> <p>By carrying out this project, we hope to contribute to the interpretation of Gaucher's painted oeuvre by understanding his materials and working methods. We also hope to provide information that will assist in the conservation and display of his works. And also provide comparative information for a future examination of Gaucher's paintings.</p> <p>curators, conservators, scientists, art historians, artists, law enforcement agencies, collectors, and the general public in Canada and internationally.</p> <p>Project results and information from the project will assist curators, conservators, and scientists by providing essential data on Gaucher's materials and techniques which are used both in authenticity and attribution studies, and in evaluating the conservation requirements of his works.</p>
Project Dates:	2002-2004
CCI Project Leader:	Kate Helwig
CCI Project Team:	Kate Helwig and Marie-Chantale Poisson
Outside Team Members:	Marie-Chantale Poisson (Art Conservation Programme; Queen's University)
Links/Partnerships:	Queen's University, Art Conservation Programme
Progress Summary:	<p>September 2002: Marie-Chantale Poisson visited the studio, documented the contents and took samples of approximately 375 materials. She has also obtained information from Gaucher's family and from a paint supplier (Chromatech) that Gaucher used.</p> <p>December 2002: 36 samples were chosen and the analysis of these materials was begun.</p> <p>May 2003: Analysis of 36 samples completed and report written</p> <p>March 2004: Draft manuscript for <i>Journal of the Canadian Association for Conservation</i> in preparation</p>
Publications:	"The Characterization of Selected Materials from the Studio of Yves Gaucher" Kate Helwig and Marie-Chantale Poisson, presented at the 29 th annual CAC conference, Victoria, BC, May, 2003 (lecture)

CCI Number:	83110
CCI Division:	ARL
Current Project Status:	On hold
Project Proposal 2004:	Draft manuscript for <i>Journal of the Canadian Association for Conservation</i> in preparation
Project Approval:	Approved

Project Title:	Iron Oxide Pigments: Natural and Synthetic
Project Description:	<p>To undertake research on the history and characteristics of the iron oxide pigments and to prepare a manuscript "Iron Oxide Pigments: Natural and Synthetic," for inclusion in <i>Artists' Pigments: A Handbook of their History and Characteristics</i>, vol. 4, Barbara H. Berrie, Editor, to be published by the National Gallery of Art, Washington.</p> <p>Colored iron oxides are widespread in nature and have long attracted the attention of artists and craftsmen. There is archeological evidence that iron earths were collected and transported more than three hundred thousand years ago. Processing could include washing the earth to remove quartz and hard impurities, heating yellow ochre to create red iron oxide, and mixing different earths together to produce a desired color. Methods to make synthetic iron oxides were known early, but were not employed on a large scale until the development of mars colors in the latter part of the eighteenth century. Both natural and synthetic iron oxides remain important artists' pigments.</p> <p>The provisional section headings for the Chapter, subject to modification or omission, are as follows: <i>Introduction</i> (pigment definition; current terminology); <i>History</i> (archaic and historical names; history of use; dates of use); <i>General Pigment Properties</i> (colour and spectral reflectance; optical properties; permanence; chemical properties; compatibility; oil absorption and grinding properties; toxicity); <i>Composition</i> (chemical composition; sources; preparation; adulteration and sophistication); <i>Identification and Characterization</i> (optical and chemical microscopy; chemical identification; instrumental methods of analysis, e.g. x-ray powder diffraction, infrared spectroscopy; spectrochemical analysis; criteria for identification); <i>Occurrences</i>.</p> <p>The users of this work are the National Gallery of Art, Washington (publisher); curators, conservators, scientists, art historians, artists and the general public in Canada and internationally.</p>
Project Dates:	June 1994 to September 2005
CCI Project Leader:	Kate Helwig
CCI Project Team:	Kate Helwig
Outside Team Members:	
Links/Partnerships:	National Gallery of Art (Washington); pigment manufacturers; CCI Library; Material Technology Laboratory, Natural Resources Canada; Surface Science Western; Nancy Binnie, Conservation Processes and Materials Research, CCI (colour measurement studies)
Progress Summary:	<p>June 1994-March 1996: literature search completed. References imported into "Reference Manager" software for ease of retrieval and production of a bibliography. Collection of reference materials was completed although samples of particular interest are still being solicited. Analysis of reference materials by FTIR, SEM/XES, PLM and XRD was initiated.</p> <p>April 1997 to April 1999: A draft manuscript of all sections, excluding <i>Identification and Characterization</i>, was completed. Analysis of standard samples continued.</p> <p>September 1999: The completed manuscript with illustrations and references was sent to the National Gallery of Art in Washington.</p> <p>July 2002: a revised manuscript was sent to the National Gallery of Art in Washington. Editing at the National Gallery to begin shortly.</p>

Publications:

Helwig, K. "A Note on Burnt Yellow Earth Pigments: Documentary Sources and Scientific Analysis," *Studies in Conservation*, vol. 42, no. 3, 1997, pp 181-188.

Helwig, K. "Characterisation of the Iron Earth Pigments Using Infrared Spectroscopy," *Postprints of the Infrared Users Group Meeting*, Victoria & Albert Museum, London, September 12-13, 1995 (1998)

Helwig, K, "Pigment Research at CCI: From Titanium Whites to Iron Oxides," *CCI Newsletter*, No. 21, March 1998, p. 5.

Helwig, K., "Mars Colours: Preparation Methods and Chemical Composition," *Poster Summary Booklet, Preprints of Painting Techniques: History, Materials and Studio Practice*, 17th International IIC Congress, Dublin, Ireland, 1998.

Helwig, K., "Characterization of the Iron Oxide Pigments Using Physical and Chemical Analysis," Presented at the AGPIC 1998 Student Conference, Queen's University, Kingston, Ontario, 2 May 1998 (lecture).

Helwig, K., "The Iron Oxide Pigments: From Red Earth to Mars Colours," Presented at the 44th International Conference on Analytical Sciences and Spectroscopy at Queen's University, Kingston, Ontario, 9 August 1998 (lecture)

CCI Number:	69576
CCI Division:	ARL
Current Project Status:	Active
Project Proposal 2004:	Publication of chapter by National Gallery of Art
Project Approval:	Approved

Project Title: **The Characterization of Canadian Amber**

Project Description: An analytical study of samples of Canadian Amber. The purpose of this project is to characterize a group of amber samples from a variety of Canadian sources using FTIR spectroscopy and GCMS to determine chemical composition and whether amber from different locations can be distinguished

The users of this work are Canadian museums and archeologists.

Project Dates: 2001-2006

CCI Project Leader: Kate Helwig

CCI Project Team: Kate Helwig, Jennifer Poulin

Outside Team Members:

Links/Partnerships: Geological Survey of Canada, Canadian Museum of Nature, Canadian Museum of Civilization, Royal Tyrrell Museum of Palaeontology and others

Progress Summary: June 2001-June 2003: obtained twenty amber samples from a variety of sources and undertook preliminary FTIR spectroscopic analysis. Undertook background literature search.

January 2004: began to develop GCMS method to characterize amber

Publications: none to date

CCI Number:	86101
CCI Division:	ARL
Current Project Status:	Active
Project Proposal 2004:	Development of gas chromatography mass spectrometry (GC/MS) method to characterize amber
Project Approval:	Approved

Project Title: **An Investigation into the Causes of Indoor Bronze Sculpture Corrosion: A Case Study**

Project Description: The aim of the project is to investigate the causes of corrosion on indoor bronze sculptures at the National Gallery of Canada by analysing the metal alloys and samples of patina and corrosion from approximately forty bronze sculptures. This information, when combined with other studies, assists with assessing the cause of corrosion and in making conservation decisions.

In 1997, conservators at the National Gallery of Canada started an investigation to determine the causes of corrosion on some of their indoor bronzes, in particular to determine whether the cause was environmental or an inherent feature of the type of patina applied to the sculpture. Between 1998- 2003, CCI and the National Gallery of Canada have been investigating the composition of patina and corrosion samples from about forty indoor bronze sculptures. Non-destructive, qualitative x-ray analysis of the metal alloys comprising the sculptures will be undertaken in 2003/04. The results from this investigation will be collected, interpreted and written up for publication.

Users of this project are curators, conservators, scientists, art historians, artists, collectors, and the general public in Canada and internationally

Project Dates: April 2003 to 2005

CCI Project Leader: Jane Sirois

CCI Project Team: Jane Sirois, Elizabeth Moffatt, Lyndsie Selwyn

Outside Team Members: Doris Couture-Rigert (National Gallery of Canada), Project Co-Leader.

Links/Partnerships: Restoration and Conservation Laboratory, National Gallery of Canada with the Canadian Conservation Institute

Progress Summary: Proposed. Complete the analysis including the non-destructive, qualitative x-ray analysis of the metal alloys in the coming year. Compile the data from CCI analyses and other relevant studies such as: NGC's indoor air quality surveys, condition reports, sculpture location history, and treatment history. Start writing up the results for future publication.

Samples of patina and corrosion have been analysed from thirty sculptures to date. Ten more sculptures were sampled in January 2003 and the analysis of the corrosion and patina samples will be completed by 31 March 2003.

Publications: Doris Couture-Rigert and Fiona Graham, "An Investigation into the Causes of Bronze Corrosion at the National Gallery of Canada," Canadian Association for Conservation, Abstract, Annual Meeting 1998. p. 17.

CCI Number:	83332 (68418, 69420, 73799, 83004)
CCI Division:	ARL, CPMR
Current Project Status:	Active
Project Proposal 2004:	project team members will write a manuscript describing the project and results for publication
Project Approval:	Approved

Project Title:	Comparison of PEG and Glycerol for the Treatment of Archaeological Leather
Project Description:	<p>The purpose of this work is to determine if polyethylene glycol of molecular weight 400 (PEG 400) is more suitable than glycerol for the conservation treatment of wet and deteriorated archaeological leather.</p> <p>Leather samples tanned by various methods and impregnated with PEG 400 or glycerol will be evaluated. The shrinkage temperatures and energies required to cause denaturation in the samples will be measured to compare the effectiveness of the two treatment methods. These two parameters will be measured by Scanning Differential Calorimetry (DSC). Lower shrinkage temperature and lower denaturation energy indicate greater degradation.</p> <p>Users of this information about the relative ability of PEG 400 and glycerol to help stabilize leather are conservators treating archaeological leather artifacts. This has application for the treatment of aboriginal untanned and semi-tanned skin artifacts.</p>
CCI Project Leader:	Malcolm Bilz
CCI Project Team:	Charlotte Newton, Tara Grant, Gregory Young
Non-CCI Team Members:	
Links/Partnerships:	The comparison of the suitability of PEG 400 and glycerol for treating leather is of interest to conservators in and outside Canada, and has been raised at International conservation forums. The interaction of glycerol and collagen and the post-treatment behaviour of glycerol are research topics of interest to members of the Archaeological Leather Group.
Progress Summary:	<p>Three types of leather were chosen; brain-tanned deer hide, vegetable-tanned cow hide and archaeological vegetable-tanned deer hide. Five samples were cut from each type. One was wet with water as a control and two were impregnated with PEG 400 at 25% or 100% and two were impregnated with glycerol at 25% or 100%. Initial runs have been carried out on the Differential Scanning Calorimeter to calibrate the instrument and to develop heating regimes for testing the samples. The shrinkage temperatures will be measured with dried samples and with samples in water.</p> <p>Preliminary Differential Scanning Calorimetry tests on samples treated with 100% PEG 400 and 100% Glycerol showed lower shrinkage temperatures and required less energy to cause denaturation for the glycerol treated samples. It is thought that glycerol molecules (molecular weight 92), being smaller than PEG 400 molecules, infiltrate and swell the fibrillar and molecular structure of the collagen. This reduces the cooperative stability of the hydrogen bonding, making the glycerol treated samples less stable.</p>

Publications:

CCI Number:	74597
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal for 2004-2005:	<p>To continue with the project.</p> <p>To prepare wet and dry samples of each of the fifteen treatments for DSC analysis.</p> <p>To carry out the DSC analysis of each sample to obtain shrinkage temperatures and energies of denaturation.</p> <p>To assess the data and write a paper - the best venue would be ICOM-CC's Waterlogged Organic Archaeological Materials group meeting in 2007.</p>
Project Approval:	approved

Project Title:	The Development of a Conservation Treatment for Waterlogged Basketry
Project Description:	<p>The purpose of this study is to develop a better method for the conservation of waterlogged North West coast basketry artifacts - together with a better understanding of the factors which affect treatment. Current treatments lead to a material which is either “damp” to the touch and with strong tendencies to dirt retention or dry brittle and fracturing. The main issue to be resolved seems to be to find a way to adjust the concentration of impregnant.. Polyethylene glycol of molecular weight 200 (PEG 200) will be assessed for effectiveness in penetrating waterlogged archaeological basketry materials.</p> <p>This research is important at present because waterlogged archaeological basketry provides a diagnostic tool which can be used to identify which aboriginal groups had been present in particular locations. This evidence may be helpful in resolving land claims issues. Aboriginal groups and archaeologists on the North West Coast are interested in this research and are providing sample material. On the successful outcome of the research a basketry workshop will be developed for interested participants</p> <p>Users of the results of this research are conservators working with basketry artifacts. Most basketry found in Canada comes from aboriginal groups.</p>
CCI Project Leader:	Malcolm Bilz
CCI Project Team:	Tara Grant, Charlotte Newton, Gregory Young
Non-CCI Team Members:	
Links/Partnerships:	Barbara Winter (Simon Fraser University), David Schaepe (Stó:lō Nation Archaeologist), Ann Stevenson (University of British Columbia Museum of Anthropology), Kathryn Bernick
Progress Summary:	The structure of intact western red cedar inner bark (a basketry material) has been found to present more resistance to PEG penetration than western red cedar wood. Microscopy has revealed that one source of this resistance is that inner bark has relatively thicker cell walls and smaller lumina for liquids to access the walls. Higher PEG concentrations are required for penetration into inner bark than into wood. The cobalt thiocyanate staining technique has been used to indicate the presence of PEG in the inner bark cell walls.
Publications:	“Treating waterlogged basketry: a study of polyethylene glycol penetration into the inner bark of western red cedar”, Bilz, Malcolm, Tara Grant and Gregory Young, Proceedings of the 7 th ICOM-CC Working Group on Wet Organic Archaeological Materials conference, Grenoble, France, 1998, pp. 249-253

CCI Number:	69393
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal for 2004-2005:	<p>Since archaeological basketry has mechanical and biological damage that is not present in intact inner bark, it should offer less resistance to PEG penetration in comparison with fresh material. Discussion is underway to obtain samples of archaeological basketry materials to repeat testing already conducted with intact inner bark.</p> <p>The archaeological basketry materials will be immersed in aqueous PEG 200 solutions and the extent of PEG impregnation assessed by a microscopical method employing a cobalt thiocyanate staining technique. The concentration of PEG 200 will be increased until a suitable final concentration of PEG is determined for significantly impregnating the cell walls with PEG.</p> <p>Since the amount of PEG present in the basketry is expected to exceed that required to saturate cell walls, tests will be done to determine a suitable washing technique to remove excess PEG prior to freezing and freeze-drying. Candidates are:</p> <ol style="list-style-type: none"> 1. water, 2. a low concentration of high molecular weight PEG (3350), or 3. the concentration of low molecular weight (200) calculated to saturate the cell wall
Project Approval:	approved

Project Title:	Corrosion rates for iron components of shipwrecks at Fathom Five National Marine Park
Project Description:	<p>This is a component of the Shipwreck Monitoring Program developed in 1992-1997 for FFMNP. Corrosion has been investigated by electrochemical methods and direct visual observation of artifacts. Standard test samples mounted in purpose built test racks were allowed to corrode in the naturally mildly alkaline waters of Georgian Bay. On the shallow and deep-water stations, samples were removed every year for the first few years, and then recovered irregularly thereafter. The samples were brought back to the laboratory and biofouling and corrosion removed, and corrosion rates established based on the mass loss. As expected, the initial corrosion rates were highest, with rates in later years tending towards a steady-state.</p> <p>Samples installed on the 1994 test station will have been in place for a total of 10 years as of August 2004. It is proposed that the shallow and deep water test station samples be recovered. The mini-test stations installed in October 1999 will have been in place for nearly 5 years and may also be recovered at the same time. A data logger which is located on the deep water test site will also be recovered. Upon retrieval of test coupons, laboratory work will be carried out to establish corrosion rates. A final report, and publication and/or technical note will be prepared to describe the corrosion studies carried out at FFMNP, and the projected corrosion rates for the iron components of shipwrecks at that location.</p> <p>Users are cultural resource managers, underwater archaeologists, and conservation scientists.</p>
CCI Project Leader:	Nancy Binnie
CCI Project Team:	Nancy Binnie
Non-CCI Team Members:	Parks Canada - marine archaeologists from the Underwater Archaeological Services Unit, and John Stewart (Conservation Scientist); and members from Fathom Five National Marine Park
Links/Partnerships:	Fathom Five National Marine Park, Parks Canada Ontario Service Centre and Underwater Archaeological Services Unit
Progress Summary:	Field work was carried out as listed above in Project Dates. Samples were recovered for analysis in 1995, 1996, 1997, 1998, 1999, 2001. Samples were analyzed and summary reports prepared (internal) for CCI and Parks Canada.
Publications:	<p>Stewart, J., Murdock, L.D., and Binnie, N., <i>The Design of a Monitoring Program for Iron Alloys on Underwater Historic Shipwrecks in Fathom Five National Marine Park, Ontario, Canada,</i> Materials Research Society Symposium Proceedings, The Materials Research Society, vol. 462, pp. 359-368, 1997.</p> <p>- Stewart, J. and Argyropoulos, V., <i>The Corrosion of Ferrous-Metal at Fathom Five National Marine Park,</i> Historic Resource Conservation Branch, National Historic Sites, Parks Canada Report 20 February, 1994.</p> <p>- Binnie, Nancy E., <i>Corrosion Rate Monitoring of Submerged Cultural Resources at Fathom Five National Marine Park, A report on the 1994 field trip,</i> CCI Service Request CPR Report No. 656, October 6, 1995.;</p> <p>- Binnie N.E., <i>Corrosion Rate Monitoring of Submerged Cultural Resources at Fathom Five National Marine Park, A report on the 1995 field trip,</i> CCI Service Request CPR Report No. 657, June 19, 1996;</p> <p>- Binnie N.E., <i>Corrosion Rate Monitoring of Submerged Cultural Resources at Fathom Five National Marine Park, A report on the 1996 field trip,</i> CCI Service Request CPR Report No. 695, November 6, 1996.</p> <p>- Binnie N.E., <i>Corrosion Rate Monitoring on Station 161 (38MRD-1) and Station 180 (38MRD-2), Shipwreck Monitoring Program at Fathom</i></p>

CCI Number:	74557
CCI Division:	CPMR
Current Project Status:	Active Natural in situ ageing of samples is ongoing Recovery of samples and test stations is pending support of FFNMP management and availability of boat transport and dive team.
Project Proposal 2004:	With the agreement and support of management at FFNMP and the Parks Canada/Underwater Archaeological Services Unit, to recover iron samples, and to recover the shallow and deep-water test stations (remove from current location). Also possible recovery of mini-test stations, and/or visual examination and any repairs to stations as necessary.
Project Approval:	approved

Project Title: Erosion of wood in freshwater shipwrecks.

Project Description: The purpose of this study is to obtain a quantitative measure of the rate of wood erosion for deteriorated, waterlogged wood samples on a typical freshwater shipwreck site where surfaces are covered with zebra mussels (*dreissena polymorpha*), and where recreational divers remove mussels from timbers. Loss rates can be used as a damage indicator for survival of wood in similar environments.

As part of a study to assess the impact of fresh water zebra mussels on the materials composing shipwrecks, two large wood plank samples from the *Princess Charlotte* (sunk in the 1840's near Kingston in Deadman Bay, Lake Ontario, were recovered from the site in November 1996 and characterized by methods which included: 1) studio photography; 2) 3-dimensional moulding, with casting of replica surfaces; 3) 3-D laser scans of the surface at the National Research Council of Canada; 4) pilodyn measurements; 5) wood species identification and wood loss estimated with a weighing technique; and 6) installation of erosion pin markers used as reference standards on other underwater sites to assess wood loss on surfaces. The samples were reinstalled on the site in December 1996 and left to undergo natural ageing. After an extended period of natural ageing (5-10 years), the plan is to recover the samples and reassess to determine changes. Between June 15-25, 2004, a team from Parks Canada/Underwater Archaeological Services Unit will be working nearby and the wood samples can be recovered during that period.

Users are underwater archaeologists, cultural resource managers, and conservators.

CCI Project Leader: Nancy Binnie

CCI Project Team:

Non-CCI Team Members: Jonathan Moore and Willis Stevens (Underwater Archaeologists, Underwater Archaeological Services/Parks Canada)
Rejean Baribeau (Research Officer, Photometry and Radiometry, National Research Council of Canada)

Links/Partnerships: Parks Canada, Natural Research Council of Canada. This study is a component of collaborative project initiated in 1996 jointly by Parks Canada/Ontario Service Centre, the Ontario Ministry of Culture), and the Canadian Conservation Institute).

Progress Summary: Samples will have undergone 7.5 years of natural underwater exposure as of summer 2004.

Publications: Nancy E. Binnie, Peter Engelbert, Lorne D. Murdock and Jonathan Moore, September 2000, *Shipwrecks, Archaeology and Zebra Mussels: Is Mussel Attachment a Threat to Our Submerged Cultural Resources*, in Proceedings of the 10th International Aquatic Nuisance Species and Zebra Mussel Conference, hosted by the Department of Fisheries and Oceans, February 13 to 17, 2000, pp. 121-131.

CCI Number:	74557
CCI Division:	CPMR
Current Project Status:	- Natural ageing/exposure - ongoing.
Project Proposal 2004:	- Recovery and detailed examination of samples (following 7.5 years of exposure.
Project Approval:	approved

Project Title: Preservation of Works on Paper with Iron Gall Ink in Canadian Collections

Project Description: The purpose of this project is to evaluate the effects of eight conservation treatments on original iron gall ink documents.

Five iron gall ink documents, dating from the mid to late 19th century, donated by the Archive Nationale du Québec, were used for in this experiment. Each document was treated with eight separate conservation treatments. The documents were treated by Valeria Orlandini, an intern at the Gatineau Preservation Center, Library and Archives of Canada, in July 2002. The five sets of treated samples were artificially aged using heat (80°C, 65% RH) light (fluorescent light bank without UV filter) and humidity (22°C, 85% RH). Quantitative colour monitoring was carried out with the Minolta 2022 spectrophotometer. Changes in the appearance of the documents will be evaluated visually by a panel. Imaging methods such as the MuSIS camera, flatbed scanners, and conventional UV-fluorescence and IR photography will also be used. The methods of imaging will also be compared according to their accuracy in documenting colour and physical changes to the ink and the paper. The treated and aged samples will also be monitored for colour change every five years while stored in temperature and RH controlled laboratory environments.

Users are Archives, libraries and galleries interested in knowing the impact some of the conservation treatments may have on iron gall ink documents in their collection.

CCI Project Leader: Season Tse

CCI Project Team: Sherry Guild
Carl Bigras

Non-CCI Team Members: Maria Bedynski; Library and Archives of Canada (LAC - Gatineau Preservation Center)

Links/Partnerships: Library and Archives of Canada (LAC)
Council of Archives of New Brunswick (CANB)

Progress Summary: The treated and artificially aged samples have been mounted for evaluation.

Publications:

CCI Number:	83542
CCI Division:	CPMR, T&D, ARL
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	Approved

Project Title:	Evaluation of Cyanoacrylate Adhesives for the Conservation of Fossils
Project Description:	<p>The purpose of this study is to determine if cyanoacrylate adhesives are suitable for the conservation of fossils. Valuable vertebrate fossils are being conserved regularly with cyanoacrylate adhesives. This puts these priceless specimens at risk because cyanoacrylate adhesives have never been scientifically assessed for their long-term stability or suitability for this application. This project attempts to begin this process by examining various aspects of cyanoacrylate adhesives in relation to fossils. If cyanoacrylates degrade, they produce formaldehyde so this formation can be followed in the presence and absence of fossil material to determine if fossil material catalyses or slows the degradation of various types of cyanoacrylate adhesives (i.e., ethyl, butyl, and ones containing polymers to thicken the cyanoacrylate) (phase 1). Since the literature suggests that moisture and exposure to light cause cyanoacrylate adhesives to degrade, various cyanoacrylates are being examined under low, medium and high relative humidity and also under UV light to see if fossil/cyanoacrylate bond strengths are retained (phase 2). There are also questions concerning application techniques, removability of the cyanoacrylates from the fossil material, and comparisons to other adhesives that need to be examined (phase 3).</p> <p>The project will be divided into three phases. The results of one phase will influence how the next phase is conducted.</p> <p>All results will be written up and published in a journal widely available to the paleontology community.</p> <p>The palaeontology community in Canada and abroad will benefit from this work.</p>
CCI Project Leader:	Jane Down
CCI Project Team:	Jane Sirois
Non-CCI Team Members:	The Society of Vertebrate Paleontology; Elzbieta Kaminska, contract scientist; Jim McCabe, Royal Tyrrell Museum of Paleontology, Drumheller, AB
Links/Partnerships:	The Society for Vertebrate Paleontology is interested in this research and has partially funded the project. As well, the following people and organizations have expressed a keen interest in this project: Ann Elder, Dinosaur National Monument, Utah; Bill Simpson, Field Museum, Chicago; Linda Clement, Colorado Intermountain Field Area, Colorado; Craig Sanders, University of Utah, Utah; Gerald Fitzgerald and Kieran Shepherd, The Canadian Museum of Nature, Ottawa; Jim Gardner and Jim McCabe, The Royal Tyrrell Museum of Paleontology, Drumheller, Alberta; Olga Potapova, The Mammoth Site, South Dakota; Rachel Benton, Badlands National Park, South Dakota; Jude Southward, Denver Museum of Nature & Science, Colorado; Lisa Kronthal, American Museum of Natural History, New York.
Progress Summary:	In October 2002, Jane Down received the Society of Vertebrate Paleontology Preparator's Award which helped to partially fund the first phase of this research. The research made use of the fact that if cyanoacrylates degrade, they produce formaldehyde. This degradation was monitored in the presence and absence of fossil material collected from different sites. Fossil samples were received from Dinosaur National Monument in Utah, Badlands National Park in South Dakota, Royal Tyrrell Museum in Alberta, and the Mammoth Site in South Dakota. Since cyanoacrylates seem to degrade in alkaline environments, a variety of fossil material from the different sites that was acidic, neutral and alkaline was selected for testing to see if this or the diverse mineral content affected the degradation process. Ethyl, butyl and ethyl cyanoacrylate with added poly(methyl methacrylate)

were selected for testing to determine if one degraded less than another (in the medical literature, it was shown that butyl cyanoacrylate degraded more slowly than the ethyl variety under specific medical conditions).

To characterize the fossil material, a composition and elemental analysis of the fossil was determined by SEM/XES, XRD, and ICP analysis. Further characterization was accomplished by determining the moisture content, ash content (% inorganic material) and porosity of the fossil material.

The procedure for determining formaldehyde concentration from the hydrolysis of various cyanoacrylate adhesives in the presence and absence of various fossil material was developed and implemented. The results confirmed that butyl cyanoacrylate degrades more slowly than ethyl cyanoacrylate, whether fossil is present or not. The results also suggest that acidic fossil material slows the degradation of cyanoacrylates, while neutral and alkaline fossil materials increase the degradation. The age of the cyanoacrylate may also play a role in its degradation, the older cyanoacrylates showing more degradation than the younger samples.

Publications:

E. Kaminska, "The Stability of Cyanoacrylate Adhesives in the Presence and Absence of Fossil Material", report submitted December 2003.

J.L. Down and E. Kaminska, "The Stability of Cyanoacrylate Adhesives in the Presence and Absence of Fossil Material", paper for submission to Journal of Vertebrate Paleontology - in progress.

CCI Number:	68832
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal for 2004-2005:	<p>Finish writing and editing the paper for the Journal of Vertebrate Paleontology. Submit for publication.</p> <p>Prepare a talk for the CAC conference in Quebec City in May 2004.</p> <p>Prepare a talk for the Society of Vertebrate Paleontology conference in Denver, Colorado in November 2004 (if abstract accepted).</p> <p>After thorough analysis of the results of phase 1, make a plan for future work (phases 2 & 3?) and write proposal.</p>
Project Approval:	approved

Project Title:	Evaluation of Tapes and Heat-set Tissues
Project Description:	<p>The purpose of this project is to study the chemical, mechanical and removability properties of various commercially available tapes and heat-set tissues to understand their impact on paper and to determine which might be less damaging.</p> <p>Tapes of all kinds have been used on documents over the years. These have found their way into museum and archival collections. Many tapes that have been used were inappropriate and have stained the documents and fallen off, thus damaging the documents and no longer even providing an adhering function. Tapes are usually not recommended for an archival application but since they are found in collections and will continue to be found in collections, research into their properties and removability is very important.</p> <p>Heat-set tissues, on the other hand, have been used in conservation applications but not without questions as to their suitability and safety.</p> <p>This project arises as a result of the many questions about tapes and heat-set tissues that CCI has received over the years. As well, issues with these products have surfaced when research priorities have been solicited from the Canadian Association for Conservation of Cultural Property (CAC), the American Institute for Conservation (AIC, Research Priorities in Art & Architectural Conservation, 1994) and the Canadian Council of Archives (CCA). The late Helen Burgess began a study of tapes in the early 1980s but her work was never published and is now outdated. Therefore, it was decided to take a fresh look at the subject.</p> <p>Various commercially available tapes and heat-set tissues will be obtained and analyzed to determine major chemical components. As well, pH measurements on the various components will be taken. Using the chemical analyses and the pH measurements, a screening of the products will be done to reduce the number to undergo the full scale testing. The products may be further screened by their harmful volatile components if a quick feasible test can be developed.</p> <p>The full scale testing will include tests on how innocuous the products are to substrates, how removable they are, and how user friendly they are during application. As well, tests on long-term strength of all components and bond strength to certain substrates will be conducted. Flexibility/brittleness will be investigated, as well as colour change and carrier suitability. The products will be aged for 5-10 years in the dark under ambient CCI conditions and under lights according to methods already in place at CCI. The results will be analyzed and limitations and assessment of suitability will be made. A report will be written and submitted for publication.</p> <p>All paper conservators who use tapes and heat-set tissues or who have to remove these products from artifacts will benefit from this work.</p>
CCI Project Leader:	Jane Down
CCI Project team:	Season Tse; Scott Williams; Sherry Guild
Non-CCI Team Members:	John Grace, Library and Archives Canada; Wanda McWilliams, Library and Archives Canada; Elissa O'Loughlin, The Walters Art Museum, Baltimore, MD
Links/Partnerships:	The following people and organizations have expressed a keen interest in this project: Canadian Council of Archives; Library and Archives Canada; Elissa O'Loughlin, The Walters Art Gallery, Baltimore, MD; Meg Brown, University of Kansas Libraries, Lawrence, KS; Jan Paris, Wilson Library, Chapel Hill, NC.

Progress Summary:

A meeting was held on June 6, 2001 at CCI with the project leader and all CCI and outside team members. The purpose of the meeting was to formulate the project and workplan. Work began on the screening program during the fall of 2001 when a list of various tapes and heat-set tissues was compiled and all tapes and tissues were ordered. As the tapes and tissues came in, they were catalogued and classified for analysis.

In 2002-2003, the tapes and heat-set tissues (147 in all) were analyzed by Infrared Spectrophotometry for their major chemical components by Scott Williams. A preliminary look at the analyses for screening purposes has been carried out and the products have been placed in tables according to their carrier type and adhesive.

Because it is not possible to obtain enough sample to do standard pH measurements on all the tape components, other methods of measuring pH on very small samples were investigated. These included a microelectrode technique, pH pencil, and universal indicator. It appears that the microelectrode technique will work best but further development of the technique is required before the pH measurements can commence.

CCI Number:	68827
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2004-2005:	Completion of the chemical analysis and the pH measurements of all tapes and heat-set tissues is planned. Also investigation into a possible volatile test for screening is planned. Once these tests are completed, screening to reduce the number of products to undergo the full scale testing will occur. Some preliminary testing of samples may occur if time and lab space are available.
Project Approval:	approved

Project Title: **The Effect of Modifiers on the Stability of a Vinyl Acetate/Ethylene (VAE) Copolymer Emulsion Adhesive**

Project Description: The purpose of this study is to identify modifiers that do not adversely affect the stability or that improve the stability of a vinyl acetate / ethylene (VAE) copolymer emulsion adhesive so that a relatively good conservation emulsion adhesive can be formulated by the conservators themselves, tailored to their needs.

This project is a direct spin-off of previous research done on poly(vinyl acetate) (PVAC) adhesives. PVAC adhesives are very popular adhesives being used in every facet of conservation - furniture, paper, ethnographic objects and textiles to name just a few. In the previous CCI PVAC research, the vinyl acetate/ethylene (VAE) copolymer emulsion group (i.e., adhesives such as Jade No. 403) had very good properties upon aging (neutral pH, low volatile emission, low yellowing, good flexibility, adequate strength) and suggested a closer examination was warranted. As well, although several PVACs were identified in the PVAC research with good qualities for conservation, there were still problems in that some choices were unpleasantly odoriferous, some were too tacky and some were no longer available. A good conservation emulsion adhesive was still elusive. It was decided to examine the VAE group in more detail and at the same time investigate the question of additives. Are the additives necessary? What do they do to the aging properties of an adhesive? Can we start with a VAE that has no additives and add our own modifiers in known concentrations and see what happens upon aging? This research will help to answer these questions.

Common additives (modifiers) will be selected and added in known concentrations to a well characterized VAE emulsion. Samples will be made and subjected to dark and light aging for several years. Yellowing, pH, flexibility, cohesive strength, gloss and removability will be monitored for significant changes upon aging. Results will be written up and submitted for publication in an appropriate conservation journal.

The many conservators in Canada and abroad who use VAE emulsion adhesives such as Jade No. 403 or Vinamul 3252 will benefit from this work.

CCI Project Leader: Jane Down

CCI Project Team:

Non-CCI Team Members:

Links/Partnerships:

Project Summary: The project was begun in 1994. The VAE emulsion adhesive selected for testing by a group of conservators and scientists was Dur-O-Set E-150 which did not contain any additives except those added for polymerization and emulsion stabilization. The modifiers selected for testing were plasticizers dibutyl phthalate, dodecyl phthalate, and polyethylene glycol dibenzoate; solvents toluene, methanol and diacetone alcohol; wetting agents anionic di-(2-ethylhexyl) sulphosuccinate and non-ionic acetylenic glycol; thickeners methyl cellulose, wheat starch, fumed silica, polyethylene oxide, and neutral acrylic acid salt; fillers calcium carbonate, talc and china clay; freeze-thaw stabilizer ethylene glycol, and humectant glycerin. Initial testing of the prepared films of VAE containing the modifiers began in 1995 for pH, yellowing, and gloss. Flexibility, strength and removability testing began in 1996. Measurements on all samples were taken each year until 1998. In February 1998, the data from the first two years was assessed. Since, in most cases, differences upon aging were not dramatic, it was decided to skip the third year of testing in order to lengthen the aging period. The results for the first two years were written up in a report which is now available from CCI.

In 2000-2001, the 4th year measurements for pH, yellowing, gloss, strength and flexibility were taken and all data was analyzed. The samples continue to age awaiting a final measurement after about 10 years of aging.

Publications:

J.L. Down, "Adhesive Projects at the Canadian Conservation Institute", Preprints of the SSCR Resins Ancient and Modern Conference, Aberdeen, Scotland, pp. 4-12, 13-14 September, 1995.

J.L. Down, "Towards a Better Emulsion Adhesive - A Preliminary Report on the Effect of Modifiers on the Stability of a Vinyl Acetate / Ethylene Copolymer Adhesive", Technical Report No. 1 (Ottawa: Canadian Conservation Institute) 1999.

CCI Number:	68451
CCI Division:	CPMR
Current Project Status:	Active (samples aging)
Project Proposal 2004-2005:	Samples will continue to age awaiting final 10 year measurement for stress/strain, pH, gloss, and removability in 2005-2006. After the last measurements are taken, the project will be written up (based on the report written in 1999) for publication in a refereed journal.
Project Approval:	approved

Project Title: **The Stability of Optical Discs and Magnetic Tapes**

Project Description: Experiments on the disaster recovery of optical discs have indicated quite a bit of variability between different discs. This variability may also exist in terms of the longevity of discs. In this project, CDs will be tested according to standards to determine their variability in longevity and allow disc types to be ranked for relative stability. This will provide archives and libraries with an indication of which discs are good quality and will verify (to some degree) claims that manufacturers are making about their products. Similar experiments will also be performed on VHS tapes.

A variety of discs will be tested (audio CDs, CD-Rs, CD-RWs, DVDs, DVD-Rs, DVD-RWs). The discs will be aged at 80 degrees Celsius and 85% RH for intervals of 500, 1000, 1500, and 2000 hours. The Block Error Rate (BLER) as well as other key parameters will be monitored. This will allow the relative comparison of stabilities between different types of discs. Actual lifetime values will not be determined because this would require a much longer time frame to complete and require extensive resources.

Users are archives, libraries, museums or any institution that collects information on these information carriers.

CCI Project Leader: Joe Iraci

CCI Project Team: Joe Iraci; Scott Williams

Non-CCI Team Members:

Links/Partnerships: The Canadian Council of Archives has expressed interest in this work.

Progress Summary: A large number and variety of discs have been aged. More will be aged in 2004. As new products are introduced, more aging will be conducted. The tape aging experiments have not been started.

Publications:

CCI Number:	83365
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	approved

Project Title: Investigation of Compatibility Issues with Respect to CD-Rs and Other Optical Discs

Project Description: The purpose of this project is to examine the compatibility of recordable and erasable optical discs (CDs and DVDs) relative to various recorders/readers in order to make recommendations to clients.

This project involves examining how compatible recordable and erasable optical discs are with the equipment that records them. An essential variable in the longevity of optical discs is their error rate. This is important because a disc with a high error is less tolerant of future damage before failure and is more likely to not be playable in a wide variety of readers (because not all readers can correct error to the same capacity). This means that lifetime is shortened. It is important, when using this media to store information for the long term, to be aware of the variables that will produce low error rates.

Error rates can vary widely depending on how the disc and recorder match up and at what recording speed the disc was created. This project will look at a wide variety of discs (different brands, formats, composition) and recording speeds in order to produce recommendations that can be passed on to clients. This is an extremely important issue for clients that are choosing this media for preservation copying of deteriorating originals.

Users are archives, libraries, museums or any institution that collects information on these information carriers.

CCI Project Leader: Joe Iraci

CCI Project Team:

Non-CCI Team Members:

Links/Partnerships: The Canadian Council of Archives has expressed interest in this work.

Progress Summary: This is an on-going project. As new products are introduced then they are investigated for compatibility related issues.

Publications:

CCI Number:	
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	approved

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Users are archives, libraries, museums or any institution that collects information on these information carriers.

CCI Project Leader: Joe Iraci

CCI Project Team:

Non-CCI Team Members:

Links/Partnerships: The Canadian Council of Archives has expressed interest in this work.

Progress Summary: This is an on-going project. As new products are introduced then they are investigated for compatibility related issues.

Publications:

CCI Number:	
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	approved

Project Title: Remedies for Damaged Media

Project Description: The purpose of this study is to determine and test simple inexpensive techniques that can make deteriorated or damaged media playable. This is important because modern information carriers are machine-readable records. If the carriers cannot be read by the machine then the information is lost. Techniques need to be developed and compiled from the literature in order to allow archives, libraries, etc. to restore problematic information carriers.

For many modern information carriers, damage can lead to the loss of the whole record. Also, partial damage to a record can also lead to large losses of information. Archives and libraries need to have techniques available to them that can be used on modern information carriers to make them playable so that copies can be made and information can be accessed. In many cases, without such techniques, records would be forever lost.

Some suggestions for recovery or restoration techniques have been made in the literature, but there is little experience to verify whether these techniques are actually effective or not. Verifying their effectiveness will go a long way in providing archives and libraries some tools that can be used to extend the life of optical discs and magnetic media records.

The results will be combined with information from the literature and a CCI Technical Bulletin will be produced.

Any organization that may have modern records that store information such as archives, libraries, museums, galleries, government departments, private sector companies, etc., will benefit from this work.

CCI Project Leader: Joe Iraci

CCI Project Team:

Non-CCI Team Members:

Links/Partnerships: The Canadian Council of Archives has expressed interest in this work.

Progress Summary: The literature has been studied and various small experiments have been conducted. The bulletin is being written and should be available late in 2004.

Publications:

CCI Number:	78537
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	approved

Project Title: **Analytical Development: Image Analysis for Microscopical Shrinkage Temperature Measurements of Collagenous Fibers**

Project Description: The purpose of this study is to incorporate techniques of quantitative image analysis into the measurement technique to improve precision and accuracy. The new technology will improve the means with which CCI provides treatment support and conducts research of the preservation of collagenous materials in Canadian archival, archaeological, ethnographic, and natural history collections.

Shrinkage temperature measurements provide a straightforward, sensitive, full sample means of assessing the preservation of collagenous materials: skins, hides, leather, parchment, etc. The method is employed in support of treatments, research and collections monitoring. CCI introduced the method to conservation in 1987. It now has a small but international usage and continues to evolve. This project incorporates techniques of digital image capture and analysis for the first time to quantify the structural change of sample fibers during denaturation. Digital, time-lapse image capture permits the use of computer algorithms to quantify onset temperatures in an objective, reproducible manner.

The new technology dramatically improves CCI's research and conservation support functions in this field, providing CCI clientele with enhanced analytical service.

CCI Project Leader: Gregory Young, PhD

CCI Project Team:

Non-CCI Team Members:

Links/Partnerships: Many of CCI's clients such as the Walters Art Gallery, and the Library of Congress have expressed interest in seeing this work completed.

Progress Summary: Most of the developmental work is completed. This involved the establishment of three series comprised of multiple, reproducible processing steps aimed at isolating and quantifying even minute visible changes in samples during heating by thermal microscopy. The three series provide complementary numerical data on fiber denaturation. Sources of instrumental confounding continue to be identified and corrected.

Publications: "Quantitative Image Analysis in Microscopical Thermal Stability Measurements" in *CCI Newsletter* No. 31 (June 2003, pp. 10–11).

CCI Number:	81101
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	approved

Project Title: Awareness of Lead in Conservation

Project Description: The purpose of this work is to collect information about lead for the purpose of being able to advise the conservation and museum community about the hazards of lead and how to maintain a safe working environment.

During this project, a comprehensive literature review will be carried out. Information will be collected to answer the following questions:

1. What kinds of museum objects contain lead or lead compounds?
2. How can lead be identified?
3. How does lead corrode?
4. What are the health hazards associated with lead and lead compounds?
5. What precautions need to be taken when dealing with lead and lead compounds?

All conservators, curators, restorers, general public, collections researchers and interpreters will benefit from this work.

CCI Project Leader: Lyndsie Selwyn

CCI Project Team:

Non-CCI Team Members:

Links/Partnerships: Liz Croome, Senior Conservator, Parks Canada, Winnipeg

Progress Summary: 2003-2004: No progress

Publications: -

CCI Number:	68871
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2003:	-
Project Approval:	1997

Project Title:	Archaeological Iron Treatments
Project Description:	<p>The purpose of this work is to publish a description of the treatment for archaeological iron developed in the early 1980s at CCI based on immersion in solutions of sodium hydroxide followed by ethylenediamine. This work will assess this treatment and explain the occasional observation of rapid iron corrosion of iron artifacts in ethylenediamine.</p> <p>The first part of this project involves writing a paper that contains the details of the treatment for archaeological iron developed at CCI. The second part of this project involves the assessment of the treatment to answer the following questions:</p> <ol style="list-style-type: none"> 1. How effective are the two solutions (sodium hydroxide and ethylenediamine) at removing chloride ions from archaeological iron? 2. Are any other metals being removed during immersion in these solutions? 3. Why does iron sometimes undergo rapid corrosion in ethylenediamine solutions? <p>Users are the Canadian and International archaeological conservation community.</p>
CCI Project Leader:	Lyndsie Selwyn
CCI Project Team:	-
Non-CCI Team Members:	Vasilike Argyropoulos, Assistant Professor, Technological Educational Institution (T.E.I.) of Athens, Greece
Links/Partnerships:	Cathy Mathias, Archaeological Conservator, Memorial University, Newfoundland
Progress Summary:	2003-2004: A manuscript was written to summarize the results of the assessment part of this project and it was submitted to and accepted for publication in the journal <i>Studies in Conservation</i> .
Publications:	<p>Argyropoulos, V., Selwyn, L.S., and Logan, J.A., "Developing a Conservation Treatment using Ethylenediamine as a Corrosion Inhibitor for Wrought Iron Objects found at Terrestrial Archaeological Sites", <i>Metal 95</i>, ed. I.D. MacLeod, S.L. Pennec, L. Robbiola, James & James Ltd., London, 1997, pp. 153-158.</p> <p>Selwyn, L.S. "Corrosion of Archaeological Iron Before and After Excavation" NACE (National Association of Corrosion Engineers) Northern Area Eastern Conference and Exhibition, Ottawa, Ontario, Canada, October 24-27, 1999, paper no. 2B.1, pp. 1-8.</p> <p>Selwyn, L.S., P.J. Sirois, and V. Argyropoulos, "The Corrosion of Excavated Archaeological Iron with Details on Weeping and Akaganéite" <i>Studies in Conservation</i> Vol 44, 1999, pp. 217-232.</p> <p>McNeil, M., and L.S. Selwyn. 'Electrochemical Processes in Metallic Corrosion.' pp. 605-614 in <i>Handbook of Archaeological Sciences</i> (edited by D.R. Brothwell and A.M. Pollard). Chichester, England: John Wiley & Sons, 2001.</p> <p>Selwyn, L. "Analysis of the Chloride Ion Concentration in Aqueous Solutions by Potentiometric Titration". CCI Research Report No. 2. Ottawa: Canadian Conservation Institute, 2001.</p>

Selwyn, L.S., W.R. McKinnon, and V. Argyropoulos. "Models for Chloride Ion Diffusion in Archaeological Iron." *Studies in Conservation* Vol. 46, 2001, pp. 109-120.

Selwyn, L.S. and V. Argyropoulos, "Removal of Chloride and Iron Ions from Archaeological Wrought Iron with Sodium Hydroxide and Ethylenediamine Solutions" accepted for publication in *Studies in Conservation*, 2004.

CCI Number:	68874
CCI Division:	CPMR
Current Project Status:	Active
Project Proposal 2003:	-
Project Approval:	1994

Project Title: Monitoring of mass deacidified samples treated in 1993 (Phase III)

Project Description: The purpose of this project is to conduct long term studies of mass deacidified paper samples by monitoring visible changes of treated samples. The materials being investigated were treated in 1993 as part of CCI's Mass Deacidification Project (Phase III) conducted on behalf of the "Chairmans Committee for Mass Deacidification - a Toronto based group involving a number of major Archives and Libararies.

The most reliable way of measuring the long term effect and evaluating efficacy of a treatment is to monitor changes of the treated materials in real time. In the early 1990's, as part of a comprehensive evaluation of three mass deacidification systems, Wei T'o, DEZ and FMC-MG3, in Phase III of the project, over 2000 pieces of materials were treated by the three processes. Included in the study were materials donated from Canadian archives and libraries, and materials prepared in-house at CCI. The impact of treatment on these materials were documented in 1993, now 10 years later, some treated materials have shown changes that were not noticeable in our first evaluation. Monitoring of these materials needs to be ongoing and methods of documentation need to be updated and standardized, so that changes can be more accurately and consistently recorded.

Users are conservators, librarians, archivists, and collection managers. Though institutional support of Mass Deacidification techniques has waned - there is still much interest and debate about the long-term benefits.

CCI Project Leader: Season Tse

CCI Project Team: Sherry Guild
Roberta Partridge; contract conservator

Non-CCI Team Members:

Links/Partnerships: The Canadain Council of Archives has expressed interest in this work.

Progress Summary: An Access database has been created to record data collected in 1993, and those that will be collected this year.

Publications:

CCI Number:	
CCI Division:	CPMR, T&D, ARL
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	Approved

Project Title: **The Effect of Simmering on the Chemical and Mechanical Properties of Paper**

Project Description: The purpose of this project is to better understand how simmering affects the optical, chemical and mechanical properties of paper.

Simmering treatment for iron gall ink containing manuscripts has been used for over 30 years, and is one of several treatment options for iron gall ink corroded documents. The ability to remove large quantities of excess iron from the inks without causing ink migration, and the ability to cause weak and brittle papers to become more flexible, and therefore making these documents useable, are the main reasons why paper simmering is used. The nature of the treatment, subjecting paper to 90-95°C simmering water for 15 minutes, can be alarming because of the perceived risk to paper. This study looks into how simmering affects the chemical and mechanical properties of paper. The intent is not to advocate the use of simmering treatment for iron gall ink documents. Instead it is to provide an understanding into the impact of this controversial treatment for those who choose to use it.

Conservators who are considering paper simmering as an option of treating iron gall ink corroded papers will benefit from this work.

CCI Project Leader: Season Tse

CCI Project Team: Paul Bégin
Jane Sirois
Elizabeth Moffatt

Non-CCI Team Members: Heather Hendry; Yale Centre for British Art, 1080 Chapel St., New Haven, CT 06513 USA
Maria Bedynski; Library and Archives of Canada (LAC - Gatineau Preservation Center)

Links/Partnerships: Library and Archives of Canada (LAC), and also the Canadian Council of Archives has expressed interest in this work.

Progress Summary: Two papers, a linen rag book paper (c.1758) and Whatman #40 filter paper, were simmered in alkaline water (pH 8.5; calcium hydroxide) for 15 minutes. The simmered papers, along with untreated controls and alkaline water wash controls, were artificially aged (thermal) in sealed tubes. Degree of polymerization, moisture content, pH, fold endurance, tear strength, and colour of all the treated papers and controls were measured before and after aging. The papers were also examined by x-ray microanalysis (SEM/EDS). Some of the wash water samples were analyzed by inductively-coupled plasma atomic emission spectroscopy (ICP/AES) and Fourier transform infrared spectroscopy (FTIR). The results showed that 15 minutes of simmering does not cause damage to the two papers, chemically and mechanically. In addition, both room temperature washing and simmering greatly benefitted the papers during thermal aging. The benefit was greater for the new paper. The softening and improved flexibility of old and brittle papers, commonly observed after simmering, can be attributed to the removal of water soluble sizes and fillers.

Publications: This paper will be submitted for publication in Restaurator in 2004

CCI Number:	77816
CCI Division:	CPMR, T&D, ARL
Current Project Status:	Completed
Project Proposal 2003:	
Project Approval:	Approved

Project Title: Development of phytate treatment for stabilization of iron containing textiles

Project Description: The purpose of this project is to determine if phytic acid and calcium phytate are effective in removing and complexing iron (II) and iron (III) ions in textiles that are either stained with iron or contain iron due to a manufacturing process such as iron mordanted dyes. Phytate treatment has been used successfully on paper artifacts - this project addresses the question as to whether it is also suitable for textiles.

Calcium phytate has been introduced into paper conservation for the treatment of papers containing iron gall ink. In the presence of water, calcium phytate complexes iron (II) ions. The purpose of this research is to determine if calcium phytate is also effective in complexing iron (II) and iron (III) ions in textiles that are either stained with iron or contain iron from a manufacturing process such as mordanting. Textiles containing iron as a mordant often deteriorate to the extent that the fibres simply disintegrate. A treatment to prevent or to mitigate the problem is required. Preliminary work by Vincent Daniels found that sodium phytate was effective in stabilizing black-dyed New Zealand flax but the effectiveness of calcium phytate and phytic acid to complex iron on other fibres types as well as its effect on dyes and finishes has yet to be determined. The long-term effects of the phytate treatment will be compared to rust removal treatments such as dithionite, oxalic and hydrofluoric acids.

Users are textile, upholstery, and object conservators treating iron stained or iron containing textiles and fibres, paintings conservators dealing with corroded tacking margins.

CCI Project Leader: Season Tse

CCI Project Team: Jan Vuori

Non-CCI Team Members:

Links/Partnerships: Iron test kits will be prepared and introduced to textile conservators and collectors in Canada, the US and the UK to assess the condition of textiles containing iron. Partnerships and collaborative efforts will be established as conservators and collectors become aware of the extent that their collection is being affected by iron.

Progress Summary:

Publications:

CCI Number:	83037
CCI Division:	CPMR, T&D
Current Project Status:	Active
Project Proposal 2003:	
Project Approval:	Approved

Project Title:	Preservation Expert
Project Description:	<p>The aim of this project is provide a software and knowledge-base tool that gives useful and highly detailed advice on care of collections via the web.</p> <p>The software will have two components: 1. a risk assessment software that calculates risks and their priorities, based on a users answers to questions about their collection and their facilities. And 2, an expert knowledge-base that contains advice prompted by the risk assessment component. The questionnaire forms will address two levels of user: those wishing advice after a handful of global questions, such as the amateur collector or the small museum, and those prepared to answer many detailed or very specific questions in order to obtain very targeted advice.</p> <p>The clientele targeted is all museums, galleries, archives, amateur collectors, and the general public.</p>
CCI Project Leader:	Stefan Michalski
CCI Project Team:	-
Non-CCI Team Members:	Robert Waller, Canadian Museum of Nature, Mena Dinis, Portugal
Links/Partnerships:	Canadian Museum of Nature (CMN)
Progress Summary:	<p>The project originates in the work of Michalski and Waller on systematic frameworks for preventive conservation, and risk assessment methods. In particular, it builds on many years of CMN work on risk assessment of its collections, and many years of work at CCI on developing and applying a facilities survey software tool for military museums in Canada. During the period 2002-2004, in order to avoid fundamental conceptual and design errors before committing to a final approach, research for this project pulled back from the specific to address general and fundamental issues. For example, we invited experts from the conference of the Society for Risk Assessment to meet with us and summarise pitfalls. Waller worked concurrently on his PhD thesis in this area, capturing much of the intellectual groundwork. We began examination of the applicability of commercial modelling software: Mena Dinis, on a Portuguese post-doctoral grant, completed a dynamic model for ageing of paper, using Stella and published data. Waller applied Analytica to explore variance in his collection data. In February 2004, we held a colloquium on the related issue of Computerisation of Object Condition Surveys, and learned many important lessons from our UK and US colleagues who came as speakers. We have begun a prototype of the general public user interface, and identified the most important questions that can give user specific advice quickly. We have begun mapping the detailed questionnaire of the CCI facilities survey on to the generic risk categories of CMN. This mapping, and its query structure, will become the basis of the assessment model. It will identify all those tables that require expert judgement to enter the cascading calculation of net risk. Concurrently, we have begun locating sources for object nomenclature systems, geographically mapped risk data, and hardware component failure data, such as accidental leakage frequencies for fire sprinklers. We have met with various UK, US, and European colleagues to discuss collaborations on data and modelling. Please contact stefan_michalski@pch.gc.ca or rwaller@mus-nature.ca if interested.</p>

Publications:

May 2004 Issue of GCI Newsletter

CCI Number:	86562
CCI Division:	PCS
Current Project Status:	Active
Project Proposal 2004-5	Finish the general public web user interface, and populate the most useful data. Make the Light Damage Calculator part of the output for this interface. Finish mapping of the detailed CCI military museums questionnaire, and the planned CCI facilities checklist project, on to generic categories of risk, and then on to the short list of global questions in the general public interface. Continue locating existing sources of risk data, and consider means of licensing and entering in to the database. Begin work on the RH and temperature risk assessment component, especially fluctuations, since it addresses a very common and complex risk question for which much useful data is available. Plan the various next stages, and software RFP's.
Project Approval:	yes

Project Title: Light Damage Calculator and Database

Project Description: The goal of this project is develop a tool which will allow the best available estimates of colour fading of museum artifacts via computer.

In 1989, the Canadian Conservation Institute produced 3,000 plastic slide rules called the Light Damage Calculator. By 2000, these had sold out. The replacement tool will be software. This will allow incorporation of a database, which addresses the greatest user complaint about the slide rule: how do I know what lightfastness rating, 1 to 8, to use on the blue wool scale? The database will incorporate various literature compilations of lightfastness ratings, as well as approximations about broad classes of objects. All primary literature sources of each piece of data will be available in the database. The software tool will also allow different fading curve shapes to be used for fading predictions, not just the simple linear curve of delta E over time used in the slide rule. Thus the issue of fading "slowing down" as the colour becomes more damaged can be illustrated directly on the display. The old technical difficulties of making accurate predictions of fading with lightfastness ratings remain unchanged, but for museum users, the intent of this advice has never been high precision, just useful, best available approximations. The software tool will allow a didactic help file explaining all these issues and more, with unlimited illustrations. The targeted audience is all museums, galleries, archives, and private collectors.

CCI Project Leader: Stefan Michalski

CCI Project Team: -

Outside Team Members: -

Links/Partnerships: The software is directly useable by the Preservation Expert Project, and will become part of its utilities

Progress Summary: The software interface, all forms, and colour fading calculator code, based on Microsoft Access, were developed to an early prototype stage by 2001, and the project then placed on hold. It has been reactivated for 2004-2005.

Publications: -

CCI Number:	86565
CCI Division:	PCS
Current Project Status:	Active
Project Proposal 2004-5:	The remaining work is the entry of all available data, and finalisation of the forms and code. We are interested in feedback and suggestions prior to finalization, both technical and user oriented. A presentation for this purpose is planned for the RATS theme session on museum lighting and damage, at the AIC annual meeting 2004. Any readers of this research summary are welcome to contact the author at stefan_michalski@pch.gc.ca with suggestions.
Project Approval:	yes

Project Title: Protective Package Design

Project Description: The aim of this project is to provide technical information on packaging dynamics for the museum community and private packing firms. Emphasis is assessing risks during shipment and how all of the packaging components work together to protect items during shipment. Intended as an information resource on packing in CCI publications, and a document for distribution in packaging workshops and seminars. The targeted audience is museum practioners, museum decision makers, private packing firms, general public who wish to ship fragile items safely.

CCI Project Leader: Paul Marcon

CCI Project Team: -

Outside Team Members: -

Links/Partnerships: National Gallery Canada, Museum of Civilization, Museum of Nature, CCI Staff

Progress Summary: Work to begin April 1st.

Publications: -

CCI Number:	86550
CCI Division:	PCS
Current Project Status:	Hold until April 1 st , 2004
Project Proposal 2004-2005:	
Project Approval:	yes

Project Title: Environmental Guidelines for Care of Collection

Project Description: To provide guidelines on environmental control of relative humidity, temperature, radiations and pollutants for museums. These guidelines based on preservation and performance targets will be a compilation and will be consistent with previous works done at CCI in assessing the vulnerability of museum objects and providing gradual and rational scale of preservation. A document will be published which will allow easy access to Canadian at low cost and in both official languages.

The reference document will be, basically, a compilation of the latest CCI works on these environmental issues such as ASHRAE chapter 21 on Museums, Libraries and Archives and the CCI book on airborne pollutants, and The lighting decision. As identifying the CCI publication plan, this will finally solve the important and frequent questions from our Canadian clientele and its accessibility. It will have the format of a CCI technical bulletin. Tables will be explained and some practical implantation of guidelines will be proposed as examples.

The targeted audience is architects, engineers, conservation professionals, and facilities managers, exhibit designers, private collectors.

CCI Project Leader: Jean Tétreault

CCI Project Team: -

Outside Team Members: -

Links/Partnerships: CCI Staff, Indoor Air Quality working group

Progress Summary: Most tables on guidelines are completed.

Publications:

Tétreault, J. Preservation Based on a Risk Management Approach: an Application for the Control of Pollutants in Museums (submitted to JAIC).

Tétreault, J. *Airborne Pollutants in Museums, Galleries and Archives: Risk Assessment, Control Strategies and Preservation Management*, Canadian Conservation Institute. Ottawa (2003).

ASHRAE. "Museums, Libraries, and Archives." Chapter 21 in *Heating, Ventilating, and Air-Conditioning: Applications*. ASHRAE Handbook. Atlanta: 2003.

Tétreault, J. "Guidelines for Pollutant Concentrations in Museums. *CCI Newsletter* 31 (2003) pp. 3 - 5.

CCI Number:	83687
CCI Division:	PCS
Current Project Status:	Active
Project Proposal 2004-2005:	Completing writing on texts for the chapter on pollutants and light. Present a paper at the IAQ conference in Italy in November 2004.
Project Approval:	Yes

Project Title: **Analysis of mammal storage-cabinet infestation severity through a ten-year annual regime of specimen inspections.**

Project Purpose: The goal of this project is to devise a visual inspection protocol, and treatment regime that allows collection staff to protect collections from pest damage despite the lack of in-cabinet chemical protectants. With the elimination of in-cabinet protectants through banning or removal of naphthalene, DDVP, etc. millions of natural history specimens are becoming dependent on cabinet integrity and other layers of an IPM approach for protection. This project was developed as a long-term study in 1994 when the two researchers recognized the need to acquire and publish economic components to suggested practices in IPM. An intensity scale for appraising infestation levels in cabinets was developed, and within this scale an action level at which to treat infested material was set. The Mammalogy Division staff incorporated the inspection protocol into their annual work and participated in a ten year study that recorded pest, location, severity, and time spent in carrying out the inspection. A Postgres database was developed to house the information and facilitate analysis of the results. One of the outcomes to date has been assessment of cabinet type against repetitive infestation frequency to demonstrate the need for replacing particular cabinet types as part of the Mammalogy collection rehousing plan. The extended cost of keeping ineffective cabinets in terms of cumulative specimen damage and staff effort in treating subsequent infestations could be quantified.

The targeted audience is anyone considering having staff visually inspect for pest problems in collections on a thorough annual basis, who needs information on time involved and efficacy of the process to decide if the measured benefit would justify applying our protocol to their situation.

CCI Project Leader: Tom Strang

CCI Project Team: -

Outside Team Members: Jeremy Jacobs (Smithsonian Institution)

Links/Partnerships: Natural History Museum, Smithsonian Institution

Progress Summary: Ten years of data collected across three mammal ranges (study skins). Database constructed and populated with results. Analysis of data and publication underway.

Publications: -

CCI Number:	85852
CCI Division:	PCS
Current Project Status:	Active
Project Proposal 2004-2005:	Complete analysis and publication.
Project Approval:	Yes

Project Title: **Analysis of mammal storage-cabinet infestation severity through a ten-year annual regime of specimen inspections.**

Project Purpose: The goal of this project is to devise a visual inspection protocol, and treatment regime that allows collection staff to protect collections from pest damage despite the lack of in-cabinet chemical protectants.

With the elimination of in-cabinet protectants through banning or removal of naphthalene, DDVP, etc. millions of natural history specimens are becoming dependent on cabinet integrity and other layers of an IPM approach for protection. This project was developed as a long-term study in 1994 when the two researchers recognized the need to acquire and publish economic components to suggested practices in IPM. An intensity scale for appraising infestation levels in cabinets was developed, and within this scale an action level at which to treat infested material was set. The Mammalogy Division staff incorporated the inspection protocol into their annual work and participated in a ten year study that recorded pest, location, severity, and time spent in carrying out the inspection. A Postgres database was developed to house the information and facilitate analysis of the results. One of the outcomes to date has been assessment of cabinet type against repetitive infestation frequency to demonstrate the need for replacing particular cabinet types as part of the Mammalogy collection rehousing plan. The extended cost of keeping ineffective cabinets in terms of cumulative specimen damage and staff effort in treating subsequent infestations could be quantified.

The targeted audience are museums where visual inspection for pest problems is conducted thoroughly on an annual basis. Museums that need information on time involved and efficacy of the process to decide if the measured benefit would justify applying our protocol to their situation.

Project Leader: Tom Strang

Project Team: Jeremy Jacobs (Natural History Museum, London)

Links/Partnerships: Natural History Museum, London , Smithsonian Institution

Progress Summary: Ten years of data collected across three mammal ranges (study skins). Database constructed and populated with results. Analysis of data and publication underway. Preliminary results show that a long term visual inspection regime followed by appropriate reaction to the discovered infestation is cost effective in a large natural history collection through reduction of the incidence of infestation.

Publications: -

CCI Number:	85852
CCI Division:	PCS
Current Project Status:	Active
Project Proposal 2004-2005:	Complete analysis and publication.
Project Approval:	Yes

Project Title:	Setting Fugitive Dyes on Cotton and Silk Textiles: Adding Salts, Vinegar, and Using Cyclododecane and Different Drying Methods
Project Description:	<p>The purpose of this research is to verify the effectiveness of 'traditional' washing methods (ie. addition of salts and vinegar to the wash water), and to evaluate new techniques (application of cyclododecane consolidant prior to washing) and drying methods (ie. use of suction devices, drying cloths and freeze drying) that can prevent or reduce migration of fugitive dyes in textiles during wet cleaning. Ultimately, the goal is to develop new treatment options that minimize the risks involved in wet treatments to dyed textiles.</p> <p>Conservators often encounter historic textiles that are dyed or that incorporate coloured threads, often embellishment, that require treatment. Periodically, these textiles need further intervention than simply mechanical surface cleaning in order to improve their aesthetic qualities and inherent stability. However, wet or dry cleaning treatments are often not an option because of the known fugitiveness of the dye and the probability of loss of dye including other effects to the textile associated with this phenomenon. Various traditional methods, not adopted by the textile conservation field, have been used over the years to set fugitive dyes, including the use of various types and concentrations of salts in the wash bath and even vinegar. This research project will examine several of these traditional fixative methods, some in combination with various drying techniques in the hope that they will give results that could be translated to the conservation of historic textiles.</p> <p>Silk and cotton yarns and fabrics will be custom-dyed in our laboratory with Solophenyl (a direct dye), which is a known fugitive dye. A series of experiments using the above methods will be carried out to ascertain the effect on the fugitive colourant of samples of white fabric stitched with the dyed thread, and to the dyed fabric. A comparison of the results will assist in determining the effectiveness of these wash bath additives and drying techniques to control dye migration in coloured yarns.</p> <p>The research project will be of benefit to textile conservators who need to carry out immersion or local wet cleaning on coloured textiles.</p>
CCI Project Leader:	Renée Dancause
CCI Project Team:	Season Tse, Jan Vuori, Sherry Guild
Non-CCI Team Members:	
Links/Partnerships:	to be determined
Progress Summary:	The research plan for the project was formulated and materials were purchased, including silk and cotton yarn and fabric. Several trial dyebaths were carried out to determine an appropriate depth of shade to use for dyeing the test yarn and fabric. The silk and cotton yarn and fabric was over-dyed (excess dye used in the dyebath) and used to make machine and hand-stitched test samples representative of artifacts with coloured components. The samples will aid in determining the efficacy of various techniques for controlling dye movement during wet treatments. Solophenyl dyes with poor washfastness were chosen for the dyeing.
Publications:	To be determined

CCI Number:	80340
CCI Division:	T&D, CPMR
Current Project Status:	Active
Project Proposal 2004:	
Project Approval:	Yes

Project Title: The effectiveness of iron ion test strips for identifying iron (II) and iron (III) on textiles.

Project Description: The purpose of this project is to determine if iron (II) test strips, originally developed for identifying iron (II) and iron (III) ions in iron gall ink on manuscripts, can also be used to identify iron (ii) on a variety of textiles.

Dr. Han Neevel and Birgit Reissland at the Netherlands Institute for Cultural Heritage developed the non-bleeding bathophenanthroline test strips for identifying iron (II) and iron (III) ions in iron gall ink containing papers. The test strips were introduced to textile conservation for use on cellulosic textiles by Katherine Barker (NATCC 2002). This research will determine if the test strips can also be used on other types of fibres. If the test strips are effective and reliable, they would: provide a low tech means of confirming if brown/rust coloured stains on textiles contain iron; provide a means of monitoring the effectiveness of treatments to remove or chemically stabilize iron stains on textiles; and provide a means of identifying residual iron in printed or dyed textiles which were not adequately rinsed during manufacture.

Testing will be carried out on fabric samples stained with iron in the lab as well as on textiles from museum collections. The research project will benefit textile conservators and other conservators treating textiles which may contain iron, textile researchers, collection managers, and anyone caring for textiles

CCI Project Leader: Jan Vuori

CCI Project Team: Season Tse

Non-CCI Team Members: To be determined.

Links/Partnerships: To be determined.

Progress Summary: To date some preliminary tests confirmed that the strips may be used to indicate the presence of iron (II) on cellulosic textiles. The results also indicated that the strips may be used on silk although the method must be altered slightly from that recommended for paper (i.e., more pressure and longer contact time is required). More testing is required to determine if the strips can be used on wool and on other fibre types.

Publications: NA

CCI Number:	8301
CCI Division:	T&D and CPMR
Current Project Status:	Active
Project Proposal 2004:	
Project Approval:	Approved

Project Title: Nd:YAG laser cleaning of tarnished silver

Project Description: The purpose of this project is to investigate the potential of the Nd:YAG laser for tarnish removal from silver. Tests were carried out at various fluences and number of pulses to assess the cleaning efficiency of the Nd:YAG laser on tarnished silver. Some tests were carried out with or without flushing with nitrogen.

CCI Project Leader: Carole Dignard

CCI Project Team: Gregory Young, Nancy Binnie, Tom Stone, Paul Heinrichs

Non-CCI Team Members:

Links/Partnerships: National Research Council of Canada, Ottawa, Ontario

Progress Summary: Tests have been completed at different cleaning parameters. Assessment is underway.

Publications: A publication is planned.

CCI Number:	77608
CCI Division:	T&D, CPMR
Current Project Status:	Active
Project Proposal 2004:	yes
Project Approval:	yes

Project Title: Nd:YAG laser cleaning of soot from various organic materials

Project Description: The purpose of this project is to investigate the potential of the Nd:YAG laser for cleaning soot off of various organic materials. Tests were carried out at various fluences and number of pulses to assess the cleaning efficiency of the Nd:YAG laser on soot-covered organic materials, including various papers, cotton, linen, wool, silk, silk thread, leather, parchment, skin and feathers.

CCI Project Leader: Carole Dignard

CCI Project Team: Gregory Young, Nancy Binnie, Tom Stone, Paul Heinrichs

Non-CCI Team Members:

Links/Partnerships: National Research Council of Canada, Ottawa, Ontario

Progress Summary: Tests have been completed at different cleaning parameters. Assessment is underway.

Publications: A publication is planned.

CCI Number:	78441
CCI Division:	T&D, CPMR
Current Project Status:	Active
Project Proposal 2004:	yes
Project Approval:	yes

Project Title: Workshop development: Preservation Housekeeping in Historic House Museums

Project Purpose: The purpose of this project is to Improve preservation by means of preventing/reducing damage and deterioration through maintaining building structures, recognizing and assessing damage and deterioration, and by undertaking housekeeping activities in a manner appropriate for the preservation of historic house interiors and collections. Participants of the CCI workshop "Preservation Management for Seasonal Museums" routinely indicate a need for and an interest in training in cleaning methods for different collections, and in caring for historic house interiors.

A 2 to 3 day workshop will be developed to examine the effect of cleaning and maintenance practice on many materials found in historic house museums. The production of a housekeeping manual will be directed to Canadian collections, conditions and suppliers. The manual will be used as support material, but the workshop will be interactive with time for the participants to experience cleaning techniques. Delivery strategies will include a combination of lectures, discussions, small group exercises (i.e. problem solving), demonstrations, and hands-on activities.

Proposed Topics:

- preservation: what it and why it is important; causes of deterioration; preservation and visitor access
- the building as an artifact and as a first line of defence: recognizing and assessing problems, building inspections (exterior/interior); documentation; maintenance
- preservation housekeeping vs janitorial cleaning
- inspections, handling, assessing damage and deterioration, documentation
- cleaning methodology; developing cleaning schedules and reporting framework
- resources, supplies and suppliers
- contracting for treatments and repairs

The workshop will be of interest to staff of historic house museums responsible for the care and cleaning of interior structural elements and building fabric, applied decorations, fixtures, fittings, furnishings, and collections. If the museum is seasonal, this workshop could be delivered to staff that open and maintain the site during spring training of staff. The workshop is not intended for commercial heritage buildings.

CCI Project Leaders: Deborah Stewart and Janet Mason

CCI Project Team:

Non-CCI Team Members: Those responsible for the care of various historic house interiors and the collections will be contacted for advice in the development of the workshop and manual.

Links/Partnerships: not yet developed

Progress Summary: In the initial stages of development

Publications: Workshop manual.

CCI Number:	85998
CCI Division:	PCS and T&D
Current Project Status:	Active
Project Proposal 2004:	
Project Approval:	Approved

Project Title: CCI Lining Project; Phase III - Assessment of the Performance of Lining Supports on Model Paintings

Project Description: The Lining Project is a long-term project to study the behaviour of various lining systems lining systems and to investigate their ability to minimize defects in a painting. The previous research of Marion Mecklenburg and Gerry Hedley increased our understanding of the mechanical behaviour of paintings and lining supports and as a result, fabrics such as polyester, are being used as lining supports. Are these supports behaving as we think they are in supporting the stresses in a painting?

The purpose of the project is to assess the effectiveness of selected lining supports to dominate the stiffness in a painting and in so doing, to support the stresses in a painting in response to both short-term strain (shock) and long term strain (cupping and cracking, RH and T change). This will assist the conservator in making the most appropriate choice of lining fabric for a particular painting.

Development of a standard experimental procedure will allow comparative testing of additional lining supports as well as less interventive methods of structural stabilization.

The first phase of the project involved the measurement of the mechanical properties (tension and change in dimension (published), stress relaxation and modulus of elasticity (unpublished)) of model paintings under different conditions of relative humidity. The second phase investigated the bond strength of a BEVA 371 flocked adhesive and a wax-resin adhesive with different lining supports using 180° peel tests. In this final phase of the project, selected lining systems are being tested in terms of their ability to reduce cracking, delamination, cupping and sagging due to stretching, stress relaxation, and humidity and temperature fluctuations. Tension has been monitored continuously in uniaxial samples which have been exposed to 50%RH, 12%RH for several months and returned to 50%. Models used for analysis of the data have been taken from viscoelastic/plastic polymer mechanics. Initial results have been published. Equipment modifications are planned in order that testing can be continued at low temperature. Repetitive testing will be then be undertaken on additional samples to verify consistency of results. Future work will involve the testing of biaxial samples which have already been prepared.

CCI Project Leader: Debra Daly Hartin

CCI Project Team: Stefan Michalski

Non-CCI Team Members: Contractors

Links/Partnerships: Collaborative project between Treatment and Development Services (Fine Art laboratory) and Preventive Conservation Services; Linkage with Furniture and Decorative Art laboratory for the equipment design and fabrication and Conservation Processes and Materials Research for Adhesive Testing Program. External linkages with other researchers working in the field, particularly ICOM-CC (Painting Group I).

Progress Summary: Stress relaxation is an important criteria for lining supports. Viscoelastic polymer mechanics explains the rates of relaxation of the different layers of a lined painting. Lining with unimpregnated linen or a multifilament polyester fabric offered no significant support to the model paintings prepared with lead white oil grounds. A lining with unimpregnated polyester sailcloth showed high initial tension and much slower relaxation than the model oil painting, so significant support was maintained. It can reduce cupping by stress alignment and can reduce cracking by some

overstretching but at fast events like shock and after periods of low RH, the painting will carry the tension and will be vulnerable to defects. Several layers of sailcloth bonded together or a heavier weight cloth may extend support to these events as well. Impregnation can increase initial tension, slow subsequent relaxation and can slow the rate of response to change in RH; a size which does not saturate the fabric only influences tension a few days after an applied strain.

- Publications:** S. Michalski, D. Daly Hartin, "CCI Lining Project: Preliminary Testing of Lined-Model Paintings", *Preprints 11th Triennial Meeting of the ICOM-CC*; Edinburgh, 1996
- S. Michalski, D. Daly Hartin, "CCI Lining Project: Preliminary Testing of Lined-Model Paintings" poster at Conference on "Lining and Backing, The Support of Paintings, Paper and Textiles", UKIC, 1995
- D. Daly Hartin, S. Michalski, "Ongoing Research in the CCI Lining Project: Peel Testing of BEVA 371 and Wax-resin Adhesives with Different Lining Supports" *Preprints of the 10th Triennial Meeting of the ICOM-CC*; Washington, 1993
- D. Daly Hartin, S. Michalski "Lined Paintings - Research; Tests of Beva and Wax-Resin Linings", Gerry Hedley Memorial Forum: Mechanical Behaviour of Paintings - Experience and Theory; 1993
- D. Daly Hartin, S. Michalski, C. Pacquet, "Ongoing Research in the CCI Lining Project: Peel Testing of BEVA 371 and Wax-Resin Adhesives with Different Lining Supports", *Preprints 8th Triennial Meeting of ICOM-CC*; Sydney, 1987.

CCI Number:	86055
CCI Division:	T&D PCS
Current Project Status:	Active
Project Proposal 2004:	
Project Approval:	

Project Title: Condition Survey Tool for Collections

Project Description: To develop a computer-based tool for use in collections surveys. The survey information can be collected in a way that will allow institutions to have computer access to the conditions, needs and usability of the objects in their care. Simple reports from the database will answer particular questions according to the requirements of the situation. This database of information can help an institution manage their collections and help plan and prioritise activities, by producing concise reports on, for instance, object suitability or intervention required for exhibits or loans.

CCI Project Leader: Helen McKay

CCI Project Team: Debra Daly Hartin, Jan Vuori, Carole Dignard, and Season Tse

Non-CCI Team Members:

Links/Partnerships: not yet determined

Progress Summary: Presently working on concepts, and fields & data types required for database.

Publications:

CCI Number:	
CCI Division:	T&D
Current Project Status:	Active
Project Proposal 2004:	
Project Approval:	Y

Project Title: Facilities moves checklist / outline

Project Description: An article/ checklist/ outline, for the CCI website (and as an information handout), to be used as a basic initial outline of (conservation) issues to consider and address in a plan to move a collection. Any feedback is encouraged and welcomed.

CCI Project Leader: Helen McKay, Wendy Baker, Siegfried Rempel

CCI Project Team: Helen McKay, Wendy Baker, Siegfried Rempel

Non-CCI Team Members:

Links/Partnerships:

Progress Summary: Draft article done. To be discussed with my colleagues.

Publications: Article for the CCI website and as an information handout.

CCI Number:	
CCI Division:	T&D/ PCS
Current Project Status:	Active
Project Proposal 2004:	
Project Approval:	Y