

Evaluation of the Co-location of Science Research Centres on University Campuses

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Acronyms used in the report

A&E	Audit and Evaluation
CESF	Competitiveness and Environmental Sustainability Framework
CFCAS	Canadian Foundation for Climate and Atmospheric Science
CSTA	Council of Science and Technology Advisors
CCCma	Canadian Centre for Climate Modelling & Analysis
CWS	Canadian Wildlife Service
DAEC	Departmental Audit and Evaluation Committee
DG	Director General
EC	Environment Canada
ETC	Environmental Technology Centre
IPCC	International Panel for Climate Change
NSERC	National Science and Engineering Research Council
NWRC	National Wildlife Research Centre
O&M	Operations and Maintenance
OPG	Outcome Project Grouping
OPP	Outcome Project Plan
R&D	Research and Development
S&T	Science and Technology
TB	Treasury Board
UVic	University of Victoria

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Report Prepared by the Evaluation Division, Audit and Evaluation Branch

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EXECUTIVE SUMMARY

As identified in the Departmental Audit and Evaluation Plan 2005/6 to 2007/8, an evaluation of the co-location of science research centres on university campuses was initiated because of potential risks associated with a relatively new delivery mechanism (co-location) and to ensure research centres continue to align with departmental needs.

This evaluation assessed the impact of co-locating Environment Canada's (EC) scientific research centres on university campuses with a focus on:

1. the forecast benefits and synergies of co-location (e.g., with the university and wider community) versus those actually realized;
2. the extent to which the science undertakings and results support departmental strategic outcomes and have the flexibility to respond to changing needs; and
3. an examination of cost-effectiveness with regard to the decision to co-locate and annual operating costs (e.g., leases, agreements).

The National Wildlife Research Centre (NWRC) at Carleton University and the Canadian Centre for Climate Modelling & Analysis (CCCma) at the University of Victoria were used as co-location case studies in this evaluation. The case studies are not meant to represent all of the EC co-location examples but rather provide two informative cases from which to learn.

The case studies vary considerably from one another and while they were both assessed against the same criteria it is important to note that they had different reasons for co-locating, have different space and facilities needs, and operate under very different mandates.

In order to assess the case studies, a logic model was developed which identified the predicted outcomes of co-location. For the purpose of this evaluation, the framework was used to assess two specific case studies; however, it could also be used as a framework to assess other examples of co-location in the future.

The evaluation examined the following four evaluation issues:

- a) The issue of **relevance** assessed whether co-location addresses actual needs;
- b) The issue of **success** focused on whether co-location was on track to meeting its intended outcomes;
- c) The issue of **cost-effectiveness** investigated whether the most appropriate and efficient means were being used to achieve outcomes; and
- d) Finally, the issue of **design and delivery** investigated the extent to which co-location is being designed and delivered in the best possible way.

In accordance with best practices, the approach for the evaluation involved the use of multiple methods including document review, interviews, and cost-effectiveness analysis.

The following represent the summary findings from this report by evaluation issue.

*Evaluation Issue: **Relevance***

Beyond outcome project plans and mandates which are by their nature expected to align to departmental outcomes, there is limited information to determine the degree to which alignment to departmental strategic outcomes is present.

Evaluation Issue: Success

The reporting of the success issue is according to the three levels of outcomes¹ (immediate, intermediate, final) as well as unintended outcomes.

a) Immediate Outcomes

In the case of the CCCma, there is evidence of the achievement of all of the immediate outcomes (increased access to students, knowledge, specialized facilities, and increased leveraging of resources). In the case of NWRC, there is limited evidence and achievement of the following outcomes: access to students, knowledge and specialized facilities; the outcome on increased leveraging of resources was not achieved.

b) Intermediate Outcomes

For the CCCma, there is evidence of the achievement of intermediate outcomes (increased synergy and scientific capacity). For the NWRC, there is limited evidence and achievement of the intermediate outcomes.

c) Final Outcomes

There is evidence of the achievement of the final outcome (scientific research that supports departmental strategic and intermediate outcomes and OPG results) for the CCCma and limited evidence and achievement for the NWRC, however the achievement of this outcome appears to be un-related to co-location.

d) Unintended Outcomes – Centre specific

A number of unintended outcomes were identified that were specific to the individual case studies.

Evaluation Issue: Cost-Effectiveness

There is insufficient data and information to determine whether or not co-location was cost-effective.

Evaluation Issue: Design and Delivery

The reporting of the design and delivery issue is separated into two areas: alternative designs for collaborative arrangements and best practices/lessons learned.

a) Alternative Designs for Collaborative Arrangements

A number of factors influence the impacts of co-location, including type of agreement (between university and federal department), building occupancy, and staff size.

b) Best Practices/Lessons-learned

A number of lessons learned were gathered that can be grouped by two broad themes: facilities and building partnerships.

In conclusion, this evaluation should be useful in further thinking about the benefits of co-location, particularly in the context of discussions to develop the new Science and Technology Plan, due for completion in fall 2006.

¹ See logic model in Section 2.2.

The case studies and information gathered from other examples of co-location demonstrate that there can be clear benefits to co-location. These benefits vary considerably by individual case however, and are directly linked to the reasons for co-location.

There are a number of different reasons for co-location which impact the level to which the outcomes of co-location are achieved. It is therefore, critical to look at co-location in terms of the overall context of the partnership. The most common reasons for co-location include relocating to enhance a scientific knowledge base and build synergies with a wider community (partnership focus), relocating to seek financial or cost-sharing benefits that may result from being co-located (financial focus), and relocating to build or replace a scientific facility (facility focus). In certain cases all of these reasons for relocation are present while in others there is one dominant reason.

Given the findings that were identified by evaluating the two case studies it is possible that improvements could be made at both centres (e.g., enhancing/developing the relationship between the Centre and the host department) that would enhance their co-location outcomes. These decisions, however, are not limited solely to improving the impacts of co-location; they are also dependent on related management decisions and the overall context for the centres' operations. Furthermore, the information learned through this evaluation would be useful in assessing other existing co-location arrangements as well as future co-location opportunities.

The following are the two recommendations that resulted from the evaluation:

1. The ADM, Science and Technology, should review, by December 2006, the findings for each of the case studies (CCCma and NWRC) and assess whether actions are necessary to improve their co-location outcomes.
2. In the future, when considering the function of existing co-location arrangements or creating new ones, the ADM, Science and Technology should:
 - a. Consider other centres that are co-located on university campuses that were not included in this evaluation and use this evaluation as a framework to assess those centres to determine the impact of co-location;
 - b. Apply the lessons learned from the case studies to improve future co-location decisions; and
 - c. Ensure that the general needs for performance measurement/documentation are met in order to be able to assess co-location and determine its impacts. It should be noted that the ADM, Finance and Corporate is also responsible for documentation as Assets, Contracting and Environmental Management falls under this responsibility and plays a key role in the physical relocation of facilities.

Management Response: Recommendation 1

The ADM, Science and Technology commits to review, by December 2006, the findings for each of the case studies and assess whether actions are necessary to improve their co-location outcomes.

Management Response: Recommendation 2

In the future, when considering the function of existing co-location arrangements or creating new ones, the ADM, Science and Technology, will use this evaluation as a framework to assess the impact of co-location and to apply the lessons learned from these case studies.

The ADM, Science and Technology, jointly with the ADM, Finance and Corporate, will review the general needs for performance measurement/documentation and communicate the results of this review to Branch managers in order to ensure that these needs are met and that the effectiveness and impact of future co-locations can be assessed.

1.0 INTRODUCTION

As identified in the Departmental Audit and Evaluation Plan 2005/6 to 2007/8, an evaluation of the co-location of science research centres on university campuses was initiated because of potential risks associated with a relatively new delivery mechanism (co-location) and to ensure research centres continue to align with departmental needs.

An evaluation committee was created to support the evaluation process from start to finish. This committee was comprised of officials from Audit and Evaluation, Science Policy, Property Management, the National Wildlife Research Centre, and the Canadian Centre for Climate Modelling and Analysis. The following report presents the context, issues and findings, conclusions and recommendations, and management response for the co-location evaluation.

2.0 CONTEXT

2.1 Background

Collaborative Arrangements

Environment Canada (EC) is involved in a wide range of collaborative arrangements with its science and technology (S&T) partners. These range from student employment, through appointment of staff as adjunct professors at universities, research chairs/partnerships, networks and joint publications, to facility and equipment sharing.² The goal of all of these forms of collaborative arrangements is to increase capacity to deliver on the Department's mandate and on government priorities.³ EC's *Smart Partners* working paper states that "through S&T partnerships, the Department builds synergy with other organizations, levers resources, enhances human resource development, promotes the use of research and development (R&D) results, and draws on S&T expertise in other sectors."⁴

In the March 2000 report, *Building Excellence in Science and Technology: The Federal Roles in Performing Science and Technology*, the Council of Science and Technology Advisors (CSTA) recommended the implementation and funding of new models for S&T that move away from a vertical approach (single organization) to a horizontal multi-stakeholder approach. An example of this multi-stakeholder approach would be building connections between universities and federal science-based departments. This recommendation reinforces the innovative approaches EC is undertaking through a variety of collaborative arrangements.

The most recent CSTA report (2005), *Linkages in the National Knowledge System: Fostering a Linked Federal S&T Enterprise*, calls for the government to explore options for co-location of S&T facilities, both among government departments and between government and academic or industrial organizations.⁵

² EC University Connections, Science Policy, February, 15, 2006

³ Current Partnering Policy and Practice at Environment Canada, August 2000

⁴ Smart Partners: Innovations in Environment Canada-University Research Relationships, Working Paper No. 33, Science Policy Branch, Environment Canada, 2004

⁵ CSTA's LINKS Report, February 2005

Co-location

Within EC, one type of collaborative arrangement the department employs is co-location. This includes the location of individual scientists or facilities on a university campus, where opportunities for partnerships are improved simply by physical proximity and the ease with which connections can be made. Co-location arrangements are described as “offer[ing] increased opportunities for research collaboration and other shared activities, access to facilities, and to students at the local level. Through these contacts greater connections with the broader academic community are possible.”⁶

This evaluation focuses specifically on the co-location of EC research centres on university campuses. As noted in *Smart Partners: Innovations in Environment Canada-University Research Relationships*, EC recognizes that partnerships and networks with academic researchers are of joint benefit. Working closely with university colleagues helps to keep EC scientists up-to-date with current scientific thinking and also provides them with direct access to graduate students. Universities also benefit from increased research opportunities, teaching and research supervision for their students, as well as access to EC’s unique facilities and specialized equipment.⁷

EC’s *Policy on the Approval and Management of Collaborative R&D/Teaching Positions for S&T Professional Employed by EC* states that “EC encourages it’s S&T professional staff to seek and accept appointments in collaborative R&D/teaching positions as a means of collaborating with other agencies, aiding in the training of students, and furthering the department’s R&D in priority areas.” The policy goes on to define a collaborative position as being “a post, position or appointment with an organization outside the Government of Canada in which the individual collaborates with the staff and/or students of that organization toward a common end which will benefit the organization and the Government of Canada”.⁸

The department recognizes the advantages of collaborative positions for developing an integrated approach to environmental science. Thus, the most recent count revealed that at least 200 EC employees held collaborative positions in 30 universities across Canada.⁹

2.2 Logic Model

The logic model on the following page is a graphic depiction of co-location that describes the progression from inputs and activities through to outcomes.¹⁰ This logic model was developed by the Audit and Evaluation Branch as a generic representation of the co-location process. This was compiled by amalgamating identified benefits of co-location from the following documents:

- Manager’s Guide: Environment Canada Policy and Approvals: Collaborative Positions for S&T Professionals, Environment Canada, January 1999;
- Current Partnering Policy and Practice at Environment Canada, August 2000;

⁶ Smart Partners

⁷ Smart Partners

⁸ Policy on the Approval and Management of Collaborative R&D/Teaching Positions for S&T Professional Employed by Environment Canada, January 1999

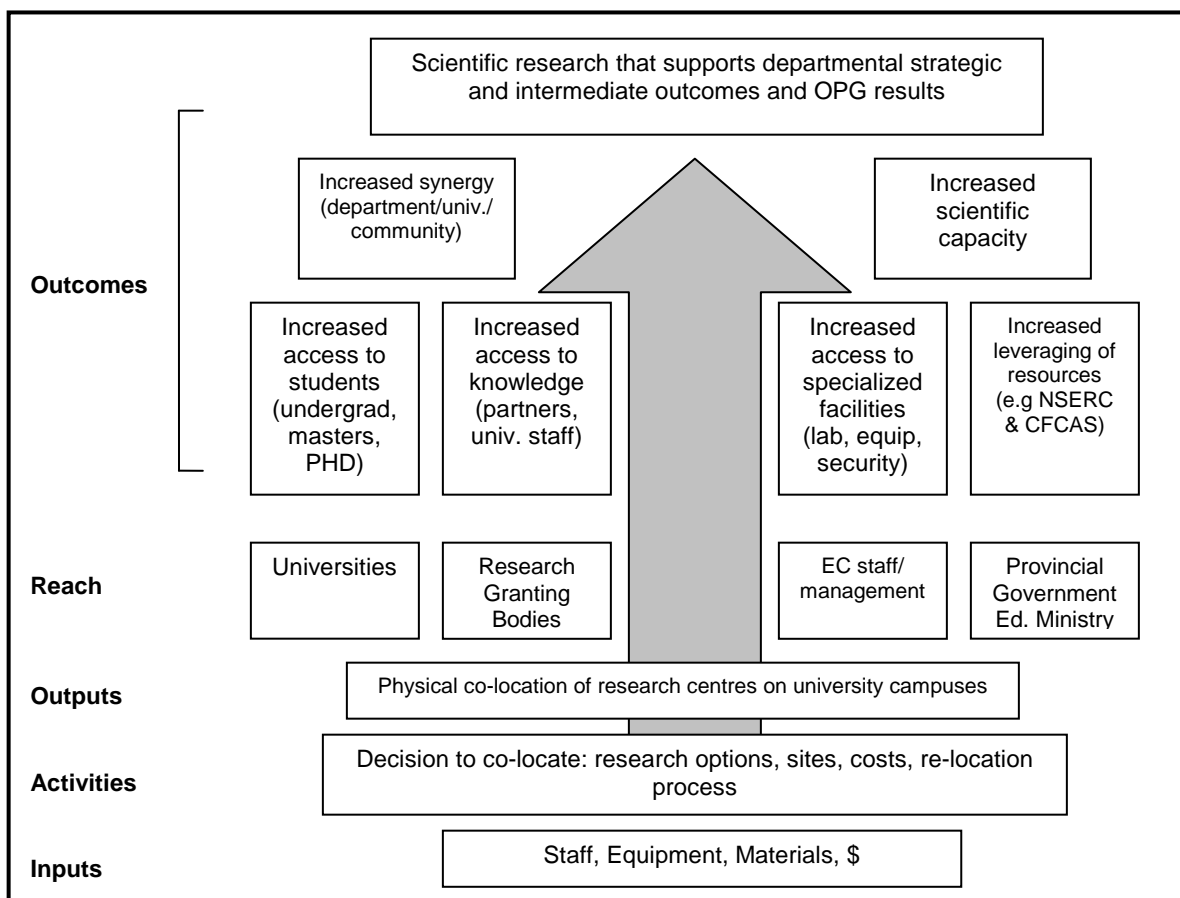
⁹ EC University Connections, Science Policy, February, 15, 2006

¹⁰ The outcomes identified in the logic model are not exclusively limited to co-location; such benefits can also be achieved through other types of collaboration.

- Working with Others: Policy on Revenue and Collaborative Arrangements, EC, December 2000; and
- Smart Partners: Innovations in Environment Canada-University Research Relationships, 2004.

The logic model was developed as a framework by which examples of EC’s co-location arrangements could be assessed. For the purpose of this evaluation the framework was used to examine two specific case studies, however, it could also be used to examine other examples of co-location. In order to assess the case studies against the outcomes identified in the logic model it is critical to keep in mind the specific context under which each example of co-location took place.

Figure 1: Logic Model for the Co-location of Science Research Centres on University Campuses



2.3 Case Studies

For the purpose of this evaluation, two examples of co-location on university campuses were selected by the Departmental Audit and Evaluation Committee (DAEC) as case studies; these were the Canadian Centre for Climate Modelling & Analysis (CCCma) and the National Wildlife Research Centre (NWRC). The case studies are not meant to represent all of the EC co-location examples but rather provide two informative cases from which to learn.

The case studies vary considerably from one another and while they were both assessed against the same criteria (logic model) it is important to note that they had different reasons for co-locating, have different space and facilities needs, and have operated for different periods of time under diverse mandates.

Canadian Centre for Climate Modelling & Analysis (CCCma)

CCCma is a division of the Climate Research Branch of the Meteorological Service of Canada of EC.¹¹ They conduct research in coupled and atmospheric climate modelling, sea-ice modelling, climate variability and predictability, the carbon cycle, and a number of other areas.

The following is the stated key result of the Centre - Global and Regional Climate Modelling: To understand and predict states of the atmosphere, hydrosphere and cryosphere on all time and spatial scales to meet client and decision-makers' needs.¹²

The CCCma is the focal point in Canada for the development and operation of climate models. The group, consisting of approximately 34 scientists, support staff, research associates and post-doctoral fellows (approximately 23 full-time EC staff supplemented by students and DFO secondments), works closely with colleagues from several Canadian universities and the Department of Fisheries and Oceans.¹³ Of the 34 staff almost half are research scientists.

CCCma was moved from Downsview, Ontario to their present location on the University of Victoria (UVic) campus in 1993. At the time of the move both the east (Halifax) and west (Victoria) coasts were considered. The reason for the move was to establish close collaboration with ocean modellers in the UVic School of Earth and Ocean Science and the Department of Fisheries and Oceans' Institute for Ocean Sciences, also located near Victoria.

The CCCma is currently working with UVic to move their centre, currently located in the Ian Stewart Complex, to the new Science Building being constructed on campus. The CCCma is likely to take occupancy in 2008/09.¹⁴

National Wildlife Research Centre (NWRC)¹⁵

The National Wildlife Research Centre is the focal point within the Canadian Wildlife Service¹⁶ for:

- Research and advice on the effects of toxic substances on wildlife (Wildlife Toxicology Division); and
- National research and surveys on migratory birds (Migratory Bird Populations Division).¹⁷

¹¹ During the evaluation the management structure under which the CCCma reports changed; the Centre now reports to the new Science and Technology Branch, via the Climate Research Division.

¹² Outcome Project Plan, May 31, 05

¹³ CCCma Website (http://www.cccma.bc.ec.gc.ca/eng_index.shtml)

¹⁴ Investment Analysis Report, March 2005

¹⁵ NWRC Website <http://www.cws-scf.ec.gc.ca/nwrc-cnrf/default.asp?lang=En&n=79FF6764-1>

¹⁶ During the evaluation the management structure under which the NWRC reports changed; the Wildlife Toxicology portion of NWRC now reports to the new Science and Technology Branch while the Migratory Bird component remains under the Canadian Wildlife Service.

¹⁷ NWRC Website <http://www.cws-scf.ec.gc.ca/nwrc-cnrf/default.asp?lang=En&n=FEB19B95-1>

The following are the two stated key results the Centre strives to achieve - Migratory Birds Monitoring & Research: national level science is provided to support the conservation of migratory birds; and Wildlife Toxicology: impacts of toxic substances on health of wildlife and their habitat are understood and reduced. Wildlife are used as indicators of environmental quality and ecosystem health as well as early warning indicators of human health problems.¹⁸

The mission of the NWRC is to be the principal source of knowledge and expertise in the federal government on the impact of toxic substances on wildlife and the use of wildlife as indicators of environmental quality, and to conduct national surveys and research on migratory birds.¹⁹

The Centre, with a staff of more than 75 employees (approximately 60 permanent EC staff, of which one quarter are research scientists) including contractors and students, moved from an aging research building in Hull, Quebec in November 2002 to new research facilities on the Carleton University campus in Ottawa, Ontario.

The decision to move stemmed from health and safety concerns due to aging facilities. An assessment of the alternatives was conducted comparing the Centre's various options, such as rebuilding at the Gamelin site, co-locating with another EC facility in Ottawa, or co-locating on a university campus. The rating completed through the qualitative and quantitative analyses revealed that co-locating with a University was the best option. As a result, both the University of Ottawa and Carleton University submitted proposals to accommodate the Centre. During the assessment process the University of Ottawa withdrew their proposal and Carleton University was selected to be the site of the NWRC.

2.4 Purpose and Scope of the Evaluation²⁰

In order to conduct an evaluation that assesses the impact of co-locating EC's scientific research centres on university campuses with a focus on:

1. the forecast benefits and synergies of co-location (e.g., with the university and wider community) versus those actually realized;
2. the extent to which the science undertakings and results support departmental strategic outcomes and have the flexibility to respond to changing needs; and
3. an examination of cost-effectiveness with regard to the decision to co-locate and annual operating costs (e.g., leases, agreements).

Both the NWRC at Carleton University and the CCCma at the University of Victoria were used as co-location case studies in this evaluation. This is an evaluation of co-location using case studies rather than an evaluation of the centres, their programs and activities.

2.5 Key Issues and Evaluation Questions

The evaluation plan identified that the evaluation would examine the following four evaluation issues in order to address the purpose of the evaluation, identified in the previous section:

¹⁸ NWRC Overview Document, Created June 2004, Based on information extracted from NWRC website <http://www.cws-scf.ec.gc.ca/nwrc-cnrf/>

¹⁹ NWRC Overview Document.

²⁰ This section was defined during the planning of the evaluation; see Evaluation Plan for the Co-location of Science Research Centres, October 2005.

- a) The issue of **relevance** assessed whether co-location addresses actual needs;
- b) The issue of **success** focused on whether co-location was on track to meeting its intended outcomes;
- c) The issue of **cost-effectiveness** investigated whether the most appropriate and efficient means were being used to achieve outcomes; and
- d) Finally, the issue of **design and delivery** investigated the extent to which co-location is being designed and delivered in the best possible way.

The evidence for this evaluation was collected between September 2005 and February 2006. The specific evaluation questions pertaining to each evaluation issue are detailed in **Annex 1**.

2.6 Methodology

In accordance with best practices²¹, the approach for the evaluation involved the use of multiple methods of analysis detailed below.

Document and File Review

Policy and planning documents as well as historic documentation on the co-location of the research centres were reviewed. In addition, documentation on specific outcomes (e.g., number of students, adjuncts, publications, resource levels) was assessed. Finally, other types and examples of collaborative arrangements were researched. Document review was an integral component in this evaluation; a full list of the documents reviewed can be found in **Annex 2**. Examples of documents that were collected included: mandates, leases, financial reports, and Treasury Board Submissions.

Given that document review is a key source in the evaluation, it should be noted that a general lack of documentation and records posed a challenge to the evaluation. Limited documentation was available upon request by evaluators; the remainder of the documentation was either not being used and therefore not readily available or did not exist. In addition, documentation pertaining to financial information contained inconsistencies with regard to the terms and definitions used. This made comparability of documentation and the overall assessment of cost-effectiveness an issue.

Interviews

Interviews with key stakeholders were conducted for the purpose of the evaluation. **Annex 3** provides a complete list of all of the interviews conducted.

For each of the two case studies, interviews were divided into a number of groups: EC centre management and staff (including adjuncts, researchers); EC senior management (non-centre); EC policy staff; and university faculty. Sixteen interviews were conducted for the CCCma case study and another fifteen interviews were conducted for the NWRC case study.²² Interviewees were suggested by the evaluation committee that was formed to guide the evaluation.

International experts in climate modelling were also surveyed for their opinions on the CCCma and the impact co-location has had on the Centre. Experts were identified by centre management and ten experts received an email asking them to respond to five questions; four

²¹ As presented in the Canadian Evaluation Society's Essential Skills Series.

²² The majority of interviews were conducted in person, however, where scheduling issues occurred interviews were conducted by telephone.

responses were received. Due to the national nature of the NWRC's work and the fact that they focus on multiple areas of research, experts were not surveyed for their opinion on this case study.

Finally, interviews were conducted with key staff from a variety other examples of co-location/collaboration. Suggestions for examples of other instances of co-location were gathered throughout the interviews as well as through internet research. In total, ten examples were identified and six interviews were conducted in the allotted time frame.

Interviewees were contacted in advance to inform them of the purpose of the interview and request their participation. Interview questions were provided by email prior to the interviews. See **Annex 4** for a complete list of interview questions by group.

Cost-Effectiveness Analysis

Cost-effectiveness analysis was identified as a method which would provide comparative information on the costs associated with relocating as well as information on alternative partnering options.

In the case of the CCCma case study, there was insufficient information to conduct this type of analysis as little documented information exists on the move in 1993 and no comparative documentation of alternative locations considered was identified. Therefore, no cost-effectiveness analysis could be conducted for this case study.

For the NWRC case study, a cost comparison of locations for relocating was completed. However, there is little consolidated documentation to identify post-co-location costs and whether these were in line with original projections. As such, no cost-effectiveness analysis could be conducted for this case study.

Bibliometric Analysis

Bibliometric analysis was identified in the plan as a method that would provide comparative information on the case studies in areas such as publications (pre/post co-location). In pursuing this method, which was to be contracted out, consultants who specialize in this area suggested that the sample size for the research centres was insufficient to provide reliable results. Given this information, bibliometric analysis was not conducted as part of the evaluation. Information about publications was subsequently collected through interviews and document review.

3.0 ISSUES AND FINDINGS²³

3.1 Relevance

In order to address the evaluation issue of relevance the following question was asked: do the science undertakings, mandate (planned), and results (realized) of co-location support departmental strategic outcomes?

²³ Detailed findings are provided in Annex 5.

A number of sources of evidence were examined including outcome project plans²⁴, the EC results structure, and centre mandates. In addition to what was examined, centre or program level workplans were requested to assess how the strategic outcomes presented in the outcome projects plan connect to the centres' work. These latter documents were not available for the NWRC case study.

Overall Findings

In accordance with the EC Transformation, there is a strategic link to departmental outcomes presented through the centres' outcome project plans. In addition, a commonly understood mandate (e.g., the CCCma mandate is visible on their website and in a brochure and the NWRC mandate is easily identified by staff) which aligns to departmental outcomes is present at both centres. However, no centre/program level workplans exist for the NWRC case study that connect the Centre to the high level outcomes articulated in the outcome project plans; therefore it is difficult to assess a clear link between the Centre and departmental outcomes.

In the case of CCCma, workplans exist; however, these documents have changed over time in relation to changing departmental needs. Historically, annual workplans existed; however, these documents do not appear to be at a level that connects the Centre to high level departmental outcomes. This type of workplan ended in approximately 2001-2002 and was replaced by other departmental documents resulting from peer review and strategic planning exercises. In fiscal year 2005-2006, another workplan was created for a mid-term review, and this workplan appears to align with the CCCma's outcome project plan.

In addition, centre staff were asked to comment on the connection between the centre's work and departmental strategic outcomes. Not surprisingly, they identified a clear link between their work and departmental goals.

Beyond outcome project plans and mandates which are by their nature expected to align to departmental outcomes, there is limited information to determine the degree to which alignment to departmental strategic outcomes is present.

3.2 Success

The evaluation issue of success focused on whether the centres' co-location arrangements were on track to meeting the intended outcomes that were identified in the logic model, specifically if there is evidence of achievement of a) immediate outcomes (increased access to students, knowledge, specialized facilities, and increased leveraging of resources); b) intermediate outcomes (increased synergy and scientific capacity); and c) final outcomes (scientific research that supports departmental strategic and intermediate outcomes and OPG results). This evaluation issue also addressed whether d) unintended outcomes occurred.

Sources of evidence for this issue were document review and interviews. The NWRC case study relied more heavily on information provided through interviews.

²⁴ These documents are required at the program level and set out how strategic results align to EC's strategic outcomes.

Overall Findings

The ability to directly attribute the co-location of the research centres to the achievement of the identified outcomes is limited. There are a variety of contributing factors that influence the achievement of outcomes including increase in space, number of research scientists/adjuncts, and evolution of federal-university relationship. The following outcomes were assessed pre-post co-location.

a) Immediate Outcomes

There was an increase in the number of students between the centres' original locations and their new university facilities. For example, there is evidence at the University of Victoria documenting the increase in students producing climate-related theses. Similarly, at the NWRC the number of spaces for students has increased since the co-location.²⁵

There was also an increase in access to knowledge through joint undertakings (e.g., joint publications, teaching, seminars), at both the university and student level. With respect to access to specialized facilities an increase was identified, however this was dependent on the type of work conducted by the centre (office versus lab); examples such as access to the library and specialized equipment were identified. Increased leveraging of resources was present at the CCCma case study which has more staff than is supported by A-base funding, however it has yet to be realized at the NWRC case study.

In the case of the CCCma, there is evidence of the achievement of all of the immediate outcomes. In the case of NWRC, there is limited evidence and achievement of the following outcomes: access to students, knowledge and specialized facilities; the outcome on increased leveraging of resources was not achieved.

b) Intermediate Outcomes

Increased synergies through joint undertakings were identified, however this is influenced by the level of connection the centre has with the university's sponsor department. In the case of CCCma there also appeared to be an increase in scientific capacity as a result of the co-location through leveraging of research scientists, students and resources, which led to a physical concentration of climate science expertise in the Victoria area. For the NWRC, scientific capacity appears to be unrelated to co-location.

For the CCCma, there is evidence of the achievement of intermediate outcomes. For the NWRC, there is limited evidence and achievement of the intermediate outcomes.

c) Final Outcomes

While scientific research appears to support departmental strategic outcomes in a number of ways it appears to be un-related to co-location. At the CCCma there is a link to policy internationally through the International Panel on Climate Change, to which CCCma is a significant contributor. The NWRC's link between policy and science tends to be more issue specific and the example repeatedly provided (lead shot²⁶) predates the co-location.

²⁵ Cumulative data on the number of students was not readily available.

²⁶ The lead shot example illustrates the link between centre research and policy development. Research on fishing tackle and hunting cartridges containing lead was clearly documented as being deleterious to the environment before it was passed on to management, who opted for a regulatory approach.

There is evidence of the achievement of the final outcome for the CCCma and limited evidence and achievement for the NWRC, however the achievement of this outcome appears to be un-related to co-location.

d) Unintended Outcomes

Unintended outcomes were specific to the individual case study. For example, the CCCma has experienced synergies with the Department of Fisheries and Oceans' Institute of Ocean Science in the field of biological oceanography. While synergies with the Department of Fisheries and Oceans were expected and a key reason for the relocation, interaction on this particular topic was unanticipated.

The NWRC has seen a decrease in face-to-face interaction among NWRC staff as a result of the larger facilities. Another unintended outcome was the lack of budgeted operating resources which led to financial issues and risks.

A number of unintended outcomes were identified that were specific to the individual case studies.

3.3 Cost-Effectiveness

The purpose of evaluating the issue of cost-effectiveness was to determine whether the most appropriate and efficient means are being used to achieve outcomes with regard to the relocation of the facility and operating costs. Specifically, this issue looks at whether the co-location of research centres on university campuses is a cost-effective mechanism. Documents such as budgets, financial reports, Treasury Board submissions, and options analysis reports were requested for this analysis.

Overall Findings

At this time there is insufficient data to determine cost-effectiveness. Costs are however, clearly associated with the type of facility being co-located (office space versus specialized labs).

In the case of the CCCma, co-location was initiated to add the ocean component to the climate model; as a result, the only locations considered were the west (Victoria) and east (Halifax) coasts. No evidence was provided that documents an analysis of these options or the cost of the relocation. The CCCma initially paid nothing for the space it used but has more recently signed a lease for a larger space for which it pays \$50K/year; the occupied space on the university campus is subsidized. The Centre plans to move into a new Science Building and at that time it is expected that their lease payments will double. In order to determine whether or not to move into the new Science Building an options analysis was completed which indicated that such a move was cost-effective.

For the NWRC, an options analysis was completed, which analyzed possible options, including retrofitting the site at Gamelin, in Hull, Quebec; the construction of a new wing at EC's Environmental Technology Centre (ETC) in Gloucester, Ontario; and construction of a new facility on a university campus. The qualitative analysis scored the university option the highest while the cost analysis placed the university option as slightly more costly than the ETC option. Predicted costs for the university option included \$7.3M for capital-new

construction costs, \$2.6M for recapitalization over 25 years, \$316K for operating-annual operations and maintenance (O&M), and \$19.1M for costs to the Crown over 25 years.

Both the University of Ottawa and Carleton University submitted proposals to accommodate the Centre. During the assessment process the University of Ottawa withdrew their proposal and Carleton University was selected to be the site of the NWRC.

Data was collected (e.g., lease, memorandum on O&M, variance report)²⁷ to gather information on actual relocation and O&M costs to compare against the forecast costs. This information was found to have gaps; information was not available for comparison, with the exception of the operating-annual O&M category. In comparing O&M costs to the predicted \$316K, actual costs varied by source but appear to be closer to \$700K.²⁸ Given the lack of available data and information, it is not possible to effectively compare forecast versus actual costs for the NWRC case study.

There is insufficient data and information to determine whether or not co-location was cost-effective.

3.4 Design and Delivery

The purpose of the design and delivery issue was to investigate the extent to which co-location is being designed and delivered in the best possible way. The first question examined pertained to a) alternative designs for collaborative arrangements while the second was concerned with b) discerning the best practices and lessons learned from the co-location process.

Overall Findings

a) In the course of this evaluation, alternative arrangements for the delivery of university and research centre collaborations were identified. These different expressions of collaboration offer further information to the findings identified through the case studies.

For that purpose, examples were gathered through document review and interview suggestions. Six examples were selected and interviews were conducted with these centres.²⁹

These cases do not represent a comprehensive assessment of collaborative arrangements within the Government of Canada. The examples initially focused on EC but were expanded to include other government departments. Finally, the cases are limited to co-location/collaboration on university campuses and do not include other models of collaboration (e.g., networks).

²⁷ See **Annex 6** for the NWRC cost information that was collected. This information was gathered throughout the evaluation from both primary and secondary sources.

²⁸ It should be noted that definitions of O&M may be different among sources; where context and definitions were present, they are described in **Annex 6**.

²⁹ Cereal Research Centre (University of Saskatoon), National Hydrology Research Centre (University of Saskatchewan), Atlantic Region Environmental Science Centre (Moncton University), Centre for Wildlife Ecology (Simon Fraser University), Research Chair tripartite agreement (University of British Columbia), Adaptation and Impacts Research Group (five locations)

Several types of agreements between government and universities emerged. The individuals that were interviewed represented a number of centres that can be grouped under two main types of agreements: financial and consultative/partnership. Financial agreements seemed to emerge as the most common form. Essentially, financial agreements involve arrangements with a cost savings focus. The goals of such undertakings may imply cost-sharing between government departments and universities or focus on subsidized lease arrangements. Consultative or partnership arrangements on the other hand, refer to agreements on joint intellectual efforts between university and government departments. In these cases, the objectives focus more on building synergies and relationships with a vast array of professionals. One approach to this is through a third party (tripartite) agreement between a department, a university and an individual researcher. An example of that type of arrangement would be the establishment of a research chair.

The following variables were also identified as impacting synergy experienced through co-location. The centres were either located in stand-alone buildings, populated only with government staff or were integrated within a university building housing a mix of university and government staff. In the latter example, the respondents expressed more examples of synergy and collaboration than were identified by their counterparts. Another influencing variable was whether the buildings hosted multiple government departments or single departments. Size of staff complement also emerged as a persistent variable influencing synergy. The cases investigated revealed that the smaller groups (fewer than 10 people) of federal staff seemed to have closer ties and collaboration with students and university staff.

A number of factors influence the impacts of co-location, including type of agreement (between university and federal department), building occupancy, and staff size.

b) A number of best practices and lessons learned about co-location became apparent from interviews conducted for the two case studies; such lessons can also be grouped by broad themes: facilities and building partnerships.

With regard to facilities and space, the respondents identified the distance from headquarters and the time differences across locations as an impediment for meeting headquarters' demands in a timely fashion. While this is not exclusively related to co-location it should be considered in decisions to relocate. A further finding revealed that the security arrangements between the university and the centre need to complement each other in order to facilitate access and circulation. Also, prior to co-location, funding and construction issues should be settled before the move is undertaken. Finally, respondents suggested that a formalized relationship should be established prior to the move and that an active host department and buy-in from the university make for a more positive experience.

Another recurring theme concerning best practices pertains to building partnerships. The interviewees underlined the importance of getting the right people, at both the management and staff level to get the most benefit from the co-location. Matching competencies, managerial qualities, leadership and networking skills were among the elements identified. It is also crucial to have buy-in from the relocating staff, particularly when the distance is significant. Another important element that emerged from the interviews is the necessity of having strong leadership and endorsement from senior management in order for co-location to be successful.

In terms of the synergies arising out of co-location, the importance of having a critical mass in one place and having the right combination of people were identified as best practices. For example, the National Water Research Institute established a Water & Climate Impacts Research Centre at the University of Victoria. In their assessment of locations, one of the factors considered was the co-location of the CCCma and concentration of nationally and internationally recognized climate-related science on that campus. The experiences from NWRC and CCCma both stressed the value of having clear objectives and a shared vision. The establishment of a joint committee, to facilitate the co-location (objectives and vision), between the Centre and university was suggested as a potential solution to this issue. Lastly, proximity to collaborators (e.g., having the ability to walk to a meeting together) and shared common spaces (e.g., coffee room) were identified as practices fostering collaboration among groups.

A number of lessons learned were gathered that can be grouped by two broad themes: facilities and building partnerships.

4.0 CONCLUSIONS

Connection to Environment Canada

This evaluation should be useful in further thinking about the benefits of co-location, particularly in the context of discussions to develop the new Science and Technology Plan, due for completion in fall 2006. In addition, the Department has recently focused on better integrating science and technology and has recently established a Science and Technology Branch. It is also timely given the imminent release of the Council of Science and Technology Advisors next report which will focus on S&T management in the 21st century.

Reasons and Key Factors Necessary for Successful Co-location

The case studies and information gathered from other examples of co-location demonstrate that there can be clear benefits to co-location. These benefits vary considerably by individual case however, and are directly linked to the reasons for co-location.

There are a number of different reasons for co-location which impact the level to which the outcomes of co-location (as identified in the logic model) are achieved. It is therefore, critical to look at co-location in terms of the overall context of the partnership. The most common reasons for co-location include relocating to enhance a scientific knowledge base and build synergies with a wider community (partnership focus), relocating to seek financial or cost-sharing benefits that may result from being co-located (financial focus), and relocating to build or replace a scientific facility (facility focus). In certain cases all of these reasons for relocation are present while in others there is one dominant reason.

When any one of the reasons for relocation is present there are key factors to consider. If the goal is partnership focused then it is critical to ensure buy-in from the staff that are being relocated, the sponsor university, the host faculty, and the Department. It is also important to relocate in direct proximity to the group(s) with which synergies are to be built, as it was repeatedly found that some of the most fruitful synergies occur during down time (e.g., coffee break, walking to a meeting). Finally, the less tangible items, like the timing of the co-location and having engaged, flexible leadership on both sides of the arrangement are also key to success.

If the goal is primarily financial or facility focused then it is critical to ensure that the co-location results in financial benefits (e.g., subsidized space/lease arrangement) and that cost-sharing in the case of facilities management (e.g., occupational health and safety, security) reduces operating costs that would have been incurred had the facility been located on its own. It is also important to enter into an agreement that allows for the sharing of equipment and materials that enables the centre to operate above its budgeted capacity.

In all three of these cases, it is important to outline the goals of the co-location at the onset of the arrangement to ensure clear understanding from all parties. It is also suggested that some type of agreement be prepared that outlines how the co-location will work and articulates the more specific issues relating to co-location (e.g., space, access to equipment and facilities). Finally, it is important to track information (pre/post) pertaining to co-location in order to determine its impact.

The reasons/goals (partnership, financial, facility) of co-location are also influenced by factors such as the size of the relocating group; smaller groups appear to form synergies more easily than larger groups which are less likely to interact with others in their new environment. Synergies are also dependent on the occupancy of the building, whether the relocating group is physically mixed with their host or isolated in their own building. Finally, the type of agreement (e.g., financial, partnership) can also influence the outcome. For example, an arrangement can be between two parties or several, as is the case with research chairs who work for both the university and the Department.

Key Learning

Given the findings that were identified by evaluating the two case studies it is possible that improvements could be made at both centres (e.g., enhancing/developing the relationship between the Centre and the host department) that would enhance their co-location outcomes. These decisions, however, are not limited solely to improving the impacts of co-location; they are also dependent on related management decisions and the overall context for the centres' operations. Furthermore, the information learned through this evaluation would be useful in assessing other existing co-location arrangements as well as future co-location opportunities.

Next Steps

During the course of this evaluation it was suggested by several senior managers that it may be useful to apply the evaluation framework (logic model, methods, questions) developed in the course of this evaluation to other case studies. In considering this, two approaches could be employed. The suggestion for further evaluation work by the Audit and Evaluation Branch could be put forward in next years' planning cycle, where it would be assessed against other departmental priorities through a risk-based assessment process. Conversely, further case studies could be undertaken by the Science and Technology Branch itself using this evaluation as a guide.

5.0 RECOMMENDATIONS

The following recommendations were developed from the conclusions drawn from the examination of the two co-location case studies in this evaluation.

1. The ADM, Science and Technology, should review, by December 2006, the findings for each of the case studies (CCCma and NWRC) and assess whether actions are necessary to improve their co-location outcomes.

2. In the future, when considering the function of existing co-location arrangements or creating new ones, the ADM, Science and Technology should:
 - a. Consider other centres that are co-located on university campuses that were not included in this evaluation and use this evaluation as a framework by which to assess them in order to determine the impact co-location has had;
 - b. Apply the lessons learned from the case studies to improve future co-location decisions; and
 - c. Ensure that the general needs for performance measurement/documentation are met in order to be able to assess co-location and determine its impacts. It should be noted that the ADM, Finance and Corporate is also responsible for documentation as Assets, Contracting and Environmental Management falls under this responsibility and plays a key role in the physical relocation of facilities.

6.0 MANAGEMENT RESPONSE

Recommendation 1

The ADM, Science and Technology commits to review, by December 2006, the findings for each of the case studies and assess whether actions are necessary to improve their co-location outcomes.

Recommendation 2

In the future, when considering the function of existing co-location arrangements or creating new ones, the ADM, Science and Technology, will use this evaluation as a framework to assess the impact of co-location and to apply the lessons learned from these case studies.

The ADM, Science and Technology, jointly with the ADM, Finance and Corporate, will review the general needs for performance measurement/documentation and communicate the results of this review to Branch managers in order to ensure that these needs are met and that the effectiveness and impact of future co-locations can be assessed.

Annex 1: Evaluation Issues and Questions³⁰

Evaluation Issue: Relevance

Evaluation Questions	Indicators	Data Sources/ Methodology
Evaluation Issue: Relevance		
Is the co-location mechanism consistent with organizational priorities?		
1. Do the science undertakings, mandate (planned), and results (realized) of co-location support the CESF through the departmental strategic outcomes?	<ul style="list-style-type: none"> ▪ Workplans (planned) and annual reports (realized) connect with departmental strategic outcomes, which link to the CESF ▪ Presence of a clear, documented and widely shared mandate 	<ul style="list-style-type: none"> ▪ Document review (workplans, annual reports, project reports, OPPs, CESF pillar decks, EC results structure) ▪ Interviews (I1: research centre management) ▪ Document review (mandate)

Evaluation Issue: Success

Evaluation Questions	Indicators	Data Sources/ Methodology
Evaluation Issue: Success		
Is the co-location mechanism meeting its intended outcomes?		
2. Is there evidence of achievement of immediate outcomes? <ul style="list-style-type: none"> ▪ Increased access to students ▪ Increased access to knowledge ▪ Increased access to specialized facilities ▪ Increased leveraging of resources 	<ul style="list-style-type: none"> ▪ Increase in the # of students (undergraduate, masters, PhD) working at the research centre (coop/grant work) ▪ Increase in joint undertaking with university staff (e.g., seminar, report, publication) ▪ Access to university lab/equip ▪ Improvement of research centre (lab/equip) ▪ Increase in the amount of grant money (NSERC, CFCAS) 	<ul style="list-style-type: none"> ▪ Interviews (I1) ▪ Document review (data on students) ▪ Interviews (I2: university faculty) ▪ Document review (agreements, lease, facility/equipment plans) ▪ Document review (grant approvals)

³⁰ From Evaluation Plan October 2005

<p>3. Is there evidence of achievement of intermediate outcomes?</p> <ul style="list-style-type: none"> ▪ Increased synergy ▪ Increased scientific capacity 	<ul style="list-style-type: none"> ▪ Increase in the # of peer reviewed scientific publications (university and wider community) ▪ Increase in the # of EC staff that become adjunct professors (university) ▪ Increase in joint undertaking with university staff (e.g., seminar, report, publication) ▪ Increase in national/ international presence in research area ▪ Expert opinion of impact of co-location on scientific capacity and excellence 	<ul style="list-style-type: none"> ▪ Document review (publication list) ▪ Bibliometric analysis ▪ Document review (applications/responses for adjunct professorships) ▪ Interviews (I1), (I2) and (I3: National or International leaders in research area) ▪ Academic media scan
<p>4. Is there evidence of achievement of final outcomes?</p> <ul style="list-style-type: none"> ▪ Scientific research that supports departmental strategic and intermediate outcomes and OPG results 	<ul style="list-style-type: none"> ▪ Scientific research used in policy development ▪ Response to departmental requests on specific research topics ▪ More and better scientific outputs linked to departmental needs 	<ul style="list-style-type: none"> ▪ Interviews (I1) (I4: EC policy staff) ▪ Document review (requests for/responses to information, annual reports, OPPs, OPGs, EC results structure)
<p>5. Were there any unintended outcomes?</p>	<ul style="list-style-type: none"> ▪ Presence of unintended outcomes ▪ Management actions and learning from unintended outcomes 	<ul style="list-style-type: none"> ▪ Interviews (I1)

Evaluation Issue: Cost-Effectiveness

Evaluation Questions	Indicators	Data Sources/ Methodology
<p>Evaluation Issue: Cost-Effectiveness Are the most appropriate and efficient means being used to achieve the outcomes?</p>		
<p>6. Is the co-location of research centres on university campuses a cost-effective mechanism?</p> <ul style="list-style-type: none"> ▪ Relocation of the facility ▪ Operating costs 	<ul style="list-style-type: none"> ▪ Cost to build, relocate, and operate research centres (on/off university campus) 	<ul style="list-style-type: none"> ▪ Document review (TB Subs, budgets, option analysis documents, financial reports)

Evaluation Issue: Design & Delivery

Evaluation Questions	Indicators	Data Sources/ Methodology
<p>Evaluation Issue: Design and Delivery Are there alternative design and delivery options to physical co-location?</p>		
<p>7. What other types of collaborative arrangements (with universities) exist at EC?</p>	<ul style="list-style-type: none"> ▪ Positioning co-location arrangements with other types of EC-university collaborative arrangements that do not involve physical co-location 	<ul style="list-style-type: none"> ▪ Document review (other collaborative arrangements)
<p>8. What are the best practices and lessons learned from the co-location process?</p>	<ul style="list-style-type: none"> ▪ Identified learnings from the co-location process that could be utilized in future co-location decision making processes 	<ul style="list-style-type: none"> ▪ Interviews (I1) and (I2)

Annex 2: Documents Reviewed

National Wildlife Research Centre (NWRC)			
EQ ³¹	Document Title	Format (e.g., hard copy, electronic)	Date (if known)
1, 4	5 Year Plan/Deck	Electronic Copy	Jan 1999
1, 4	Outcome Project Plan: <i>Wildlife Toxicology and Disease Operation of Research Facilities</i>	Electronic Copy	Sept 20. 05 March 2005
1, 4	Outcome Project Summary: <i>Migratory Birds Coordination Wildlife Toxicology and Disease Migratory Bird Conservation</i>	Electronic Copies	Unspecified
1, 4	OPG Summary: <i>Wildlife is Conserved and Protected</i>	Electronic Copy	Sep 15. 05
1, 4	CESF Pillar Decks: <i>Common Pillar Decks S&T Pillar Decks</i>	Electronic Copies	For July 29. 05
1, 4	EC's Results Structure	Hard Copy	Sept 20. 05
1	NWRC Mandate - <i>Mission on website</i> - <i>NWRC Overview</i>	Electronic Copy	Oct. 7 2005 & June 2004
1	Towards a National Wildlife Science Partnership (Vision)	Electronic Copy	May 2000
1	The National Wildlife Research Centre: Today and Tomorrow Vision Implementation Plans (Vision)	Electronic Copy	July 4. 00
2, 3	Data on joint undertakings with university - <i>Publications List</i>	Electronic Copy	January 2005
2	Lease Agreement	Electronic Copy	October 2000
2	Memorandum of Agreement (drafted in 2001 but never signed)	Hard Copy	2001
6	Memorandum on O&M Costs for 2004-2005	Electronic Copy	September 5, 2005
6	TB Submission	Electronic Copy	
6	Budget/ Variance Report for 2005	Electronic Copy	Sept. 22 2005

³¹ EQ: Evaluation Question

Canadian Centre for Climate Modelling & Analysis (CCCma)			
EQ#	Document Title	Format (e.g., hard copy, electronic)	Date (if known)
1, 4	CCCma Annual Reports (Atmospheric and Climate Science Directorate (ACSD) annual reports)	Electronic Copy	2002
1, 4	OPP: <i>Global & Regional Climate Modelling</i>	Electronic Copy	Apr 22. 05
1, 4	OP Summary: <i>Climate Modelling</i>	Electronic Copy	Aug 8. 05
1, 4	CESF Pillar Decks	Electronic Copies	For July 29. 05
1, 4	EC's Results Structure	Hard Copy	Sept 20. 05
1	CCCma Mandate <i>Website Brochure</i>	Electronic copies	July 13 2005 & 2005
1	CCCma Work Plan FY 05/06 - Draft	Hard Copy	Dec 16. 04
2	Data on students (e.g., number of, type)	Electronic Copies	Unspecified
2, 3	Data on joint undertakings with university - <i>List of Publications</i>	Electronic Copy	Unspecified
2	Lease Agreement	Hard Copy	April 2003
2	Data on grant money (e.g., number of, type)	Electronic Copy	Unspecified
3	Adjunct Professor List	Electronic Copy	Jan 13 2006 (last update)
3	Applications/Responses for adjunct professorships - <i>Spreadsheet on the number of Adjuncts from 1992-2005</i>	Electronic Copy	Unspecified
6	Budget	Electronic Copy	Unspecified
6	Investment Analysis Report-for upcoming move to new building	Electronic Copy	Mar 9. 05

Annex 3: List of Interviewees

Canadian Centre for Climate Modelling and Analysis

Interviewee	Position	Type of Employee
George Boer	Former Chief	CCCma Staff
Rob Cross	Advisor, Science Promotion, Policy and International Affairs	EC Staff, Policy
Ken Denman	Adjunct	CCCma Staff
Adam Fenech	Director, Scientific Assessment and Integration	EC Staff, Policy
Greg Flato	Chief	CCCma Staff
John Fyfe	Adjunct	CCCma Staff
Kathy Gillis	Director, EOS	UVic Staff
David Grimes	DG, Services, Clients and Partners	EC Staff
Steve Lambert	Research Scientist	CCCma Staff
Julia Marshall	Post-Doctoral Fellow	CCCma Staff
Adam Monahan	Professor	UVic Staff
Tom Pederson	Dean of Science	UVic Staff
John Sinocca	Adjunct	CCCma Staff
Andrew Weaver	Professor	UVic Staff
Doug Whelpdale	Director, Climate Research	EC Staff
Francis Zweirs	Former Chief	CCCma Staff

National Wildlife Research Centre

Interviewee	Position	Type of Employee
Dan Bondy	Former Director NWRC (now at Health Canada)	Centre Management
Celine Boutin	Agro-Habitat and Herb Specialist, WT (Adjunct)	NWRC Staff
Dave Brackett	Former DG of CWS	EC Management
Jim Cheetham	Head, Biology	Carleton Staff
Mark Forbes	Biology	Carleton Staff
Charles Francis	Chief, Mig Birds (management-adjunct)	NWRC Staff
Tony Gaston	Seabird Researcher, MB (adjunct)	NWRC Staff
Kent Jenkins	Facilities Manager, NWRC (management)	NWRC Staff
Sean Kennedy	Biochemistry Researcher, WT (adjunct)	NWRC Staff
Keith Marshall	A/Director of WT; A/Director-NWRC (management)	Centre Management

Pierre Mineau	Head, Pesticides, WT (adjunct)	NWRC Staff
Tony Scheuhammer	Metals Researcher, WT (adjunct)	NWRC Staff
Trevor Swerdfager	DG, CWS	EC Management
Bryan Wakeford	Head, Lab Services, WT (management)	NWRC Staff
Steve Wendt	Director, Migratory Birds (Management & Policy)	EC Management

Surveyed International Experts

Interviewee	Position	University
Gabriele Hegerl	Professor	Duke University
Hans von Storch	Director	Institute of Coastal Research, Germany
Susan Solomon	Senior Scientist	National Oceanic & Atmospheric Administration, US, and Co-chair of the Intergovernmental Panel on CC- working group 1
Jerry D. Mahlman	Senior Research Fellow	National Center for Atmospheric Research

Other Examples of Co-Location

Interviewee	Position	
Marc Bernier	Director	Atlantic Region Environmental Science Centre
Dr. Pietroniro	EC research Scientist Adjunct	at University of Saskatoon National Water Research Institute
Don MacIver	Director	Adaptation and Impacts Research Division
Ronald Ydenberg	Director	Centre for Wildlife Ecology, Simon Fraser University
Kathy Martin	Senior Research Scientist	Canadian Wildlife Service and a Professor in Forestry at the University of British Columbia
Dr. Noel DG White	Research Scientist	Agriculture and Agri-Food Canada Cereal Quality Protection

Annex 4: Interview Guides

<p>University Faculty Co-location Evaluation Questions</p> <ol style="list-style-type: none"> 1. What position do you hold within the university? How long have you held this position? 2. What is your relationship with the CCCma/NWRC? <ol style="list-style-type: none"> a. How long has this relationship been in place? b. Were you aware of/involved with the Centre prior to its move onto the university campus? c. Did the Centre's location affect this relationship? 3. What type(s) of joint undertakings (e.g., seminars, reports, publications, etc.) have you or your colleagues been involved in with the Centre? Please specify number of joint undertakings by type. <ol style="list-style-type: none"> a. Did you participate in joint undertakings prior to the co-location? If so, has the number/type/nature of joint undertakings increased since the Centre co-located? 4. In your opinion, has the co-location resulted in increased synergy between the university and the Centre? <ol style="list-style-type: none"> a. Has access to knowledge/expertise in the area of climate modelling/wildlife research changed as a result of the co-location? Please explain. 5. Are you aware of a difference in the number of adjunct professors since the Centre has moved onto the university campus? <ol style="list-style-type: none"> a. Are these adjunct professors attracting grant funding for the university? b. Has the amount of grant funding changed since the co-location? 6. What, if any, impact has the co-location of the Centre onto the university campus had on: (provide examples) <ul style="list-style-type: none"> ▪ you and your work? ▪ the centre's scientific capacity and its ability to contribute to the field? ▪ the university? ▪ the field? ▪ scientific knowledge in the climate modelling/wildlife research area? 7. Can you identify any best practises or lessons learned from the co-location of the research centre onto the university campus that may be useful in future co-location decisions? Please describe. 8. Do you have any additional comments?
<p>Research Centre Staff (including management, adjunct professors and research staff) Co-location Evaluation Questions</p> <p><i>All Participants</i></p> <ol style="list-style-type: none"> 1. What position do you hold within the Centre? How long have you held this position? 2. What do you see as the mandate of the CCCma/NWRC? 3. Is there a connection between the Centre and university students (coop, PhD...)? Please describe. <ol style="list-style-type: none"> a. If yes, is this connection formalized? Is there an agreement between the university and Centre regarding university students? Please describe. b. Has the number of students working with the Centre increased/decreased since the move onto the university campus? In your opinion is this an

- impact of the co-location?
4. What type(s) of joint undertakings (e.g., seminars, reports, publications, etc.) have you or your colleagues been involved in with the university? Please specify number of joint undertakings by type.
 - a. Did you participate in joint undertakings prior to the co-location? If so, has the number/type/nature of joint undertakings increased since the Centre co-located?
 5. In your opinion, has the co-location resulted in increased synergy between the university and the Centre? Please describe.
 6. What is the impact of co-location on access to facilities/labs/equipment? Please explain.
 - a. Do formal agreements exist between the Centre and the university that describe access to facilities/labs/equipment?
 7. Have you seen a change in the number, type, or authorship of publications produced by Centre staff since the co-location to the university campus? Please describe.
 8. What is your impression of the national/international presence of the CCCma/NWRC in the field of climate modelling/wildlife research?
 - a. Has this presence changed since the move in 1993/2002?
 9. From your experience, what impact has the co-location onto a university campus had on the Centre's scientific capacity and its ability to contribute to the field?
 - a. What have been the key advantages and/or disadvantages of the co-location?
 10. Can you identify any best practises or lessons learned from the co-location of the research Centre onto the university campus that may be useful in future co-location decisions?
 11. In your experience, what have you found to be the relationship between policy development and scientific research results produced at the Centre?
 12. Is scientific research produced by the CCCma/NWRC used in the policy development process? Please explain.
 - a. If so, how and at what stage is it used? Are there any examples that demonstrate this use?
 - b. If not, why?
 13. In your experience, what have you found to be the interaction between the Centre's research staff and policy staff? Please provide examples.
 - a. What are the strengths and weaknesses of this relationship?
 - b. How could you improve the link between the Centre and policy staff?
 - c. Have you noticed a difference in this interaction as a result of the co-location of the research centre onto a university campus?
 14. Have any unanticipated outcomes been identified as a result of the co-location on the university campus? Explain.
 15. Do you have any additional comments?

Centre Management

16. How does the Centre's work connect to EC's departmental strategic outcomes? Please provide examples.
17. Has the co-location onto the university campus allowed for increased leveraging of resources?

Adjunct Professors

16. When did you become an adjunct professor? What, if any, benefit has adjunct status had on the Centre?

<p>17. What portion of your time is spent in your role as a university professor/EC staff member? (approximate percentage)</p> <p>18. Please comment on the process in which adjunct professors can leverage funds through granting bodies (e.g., NSERC, CFCAS).</p> <ol style="list-style-type: none"> a. Approximately, how much funding do you leverage from these bodies? b. How is this funding used? c. What have been some of the benefits of these additional funds?
<p>EC Management-Non Centre Staff Co-location Evaluation Questions</p> <ol style="list-style-type: none"> 1. What position do you hold within the department? How is your position connected to the CCCma/NWRC? 2. What do you see as the mandate of the CCCma/NWRC? 3. In your opinion, has the co-location resulted in increased synergy between the university and the Centre? Please describe. 4. From your experience, what impact has the co-location onto a university campus had on the Centre's scientific capacity and its ability to contribute to the field? <ol style="list-style-type: none"> a. What have been the key advantages and/or disadvantages of the co-location? 5. Can you identify any best practises or lessons learned from the co-location of the research Centre onto the university campus that may be useful in future co-location decisions? 6. In your experience, what have you found to be the relationship between policy development and scientific research results produced at the Centre? 7. Is scientific research produced by the CCCma/NWRC used in the policy development process? Please explain. <ol style="list-style-type: none"> a. If so, how and at what stage is it used? Are there any examples that demonstrate this use? b. If not, why? 8. Have any unanticipated outcomes been identified as a result of the co-location on the university campus? Explain. 9. How does the Centre's work connect to EC's departmental strategic outcomes? Please provide examples. 10. Has the co-location onto the university campus allowed for increased leveraging of resources? 11. Do you have any additional comments?
<p>International Experts Co-location Evaluation Questions</p> <ol style="list-style-type: none"> 1. Are you aware of the CCCma/NWRC? <ol style="list-style-type: none"> a. How long have you been aware of the CCCma/NWRC? b. Were you aware of the Centre's co-location onto a university campus? 2. What, if any, is your organizations relationship with the CCCma/NWRC? <ol style="list-style-type: none"> a. How long has this relationship been in place? 3. What is your impression of the national/international presence of the CCCma/NWRC in the field of climate modelling/wildlife research? <ol style="list-style-type: none"> a. Has this presence changed since the move (co-location) in 1993/2002? Please provide an example. 4. What, if any, impact has the co-location onto a university campus had on the centre's scientific capacity and its ability to contribute to the field? Please provide an example. Please speculate if you do not know exactly. <ol style="list-style-type: none"> a. Has the co-location impacted or changed your relationship with the

<p>Centre? If yes, what have been the key advantages and/or disadvantages of the co-location?</p> <p>5. Do you have any additional comments?</p>
<p>Other Examples of Collaborative Arrangements</p> <p>Evaluation Questions</p> <p><i>Background:</i></p> <ol style="list-style-type: none"> 1. Verify known information about the centre. 2. Since when have you been situated at the University? 3. Can you give me some history on the centre? 4. Can you describe the co-location agreement between the University and the federal government? [<i>Is it more of a consultative arrangement (shared information and knowledge) or is it more contributory? (i.e. does it involve shared facilities, financial contribution)</i>] 5. Is the physical co-location of the federal government at the University? Or is it just one person working at the Centre? 6. How many federal government staff work at the Centre? How many from each department? 7. Are there other federal government departments collocated at the Centre? 8. Where is the Centre located? (Is it integrated with other faculties or is it in a stand alone building) <p><i>Relationship:</i></p> <ol style="list-style-type: none"> 9. Do the federal government employees have a relationship with the University? e.g., Adjunct status, access to college facilities. 10. Are there other perks to the co-location? 11. Can you describe the level of integration of the university and federal government employees? 12. What were the goals of the co-location? 13. In your opinion, were these goals reached? 14. To your knowledge, were other possible sites for the Centre discussed prior to settling on this one? Please describe. 15. What lessons learned can be gained from your experience that might be useful for future co-locations? <p><i>Concluding remarks:</i></p> <ol style="list-style-type: none"> 16. Any additional comments? 17. Is there any body else that I should talk to?

Annex 5: Detailed Evaluation Findings

Evaluation Question	CCCma	NWRC
1. Do the science undertakings, mandate (planned), and results (realized) of co-location support the CESF through the departmental strategic outcomes? (Relevance)	<p><u>Beyond outcome project plans and mandates which are by their nature expected to align to departmental outcomes, there is limited information to determine the degree to which alignment to departmental strategic outcomes is present.</u></p> <ul style="list-style-type: none"> i) Link to Departmental Outcomes/ CESF <ul style="list-style-type: none"> ▪ Workplan is present for FY 05/06 that appears to align to the OPP ▪ Strategically the OPP sets out goals which clearly link to board/departmental outcomes and the pillar on S&T ▪ Current documentation exists as a result of the transformation in EC and the requirement for OPPs ii) Mandate-knowledge and dispersion <ul style="list-style-type: none"> ▪ Mandate is visible on the website and in a brochure ▪ Consensus and understanding of the mandate ▪ Mandate supports departmental documents 	<p><u>Beyond outcome project plans and mandates which are by their nature expected to align to departmental outcomes, there is limited information to determine the degree to which alignment to departmental strategic outcomes is present.</u></p> <ul style="list-style-type: none"> i) Link to Departmental Outcomes/CESF <ul style="list-style-type: none"> ▪ Strategic link to outcomes/CESF through the OPPs ▪ 2 distinctive program areas operating within the NWRC ii) Mandate-knowledge and dispersion <ul style="list-style-type: none"> ▪ There is consensus of mandate at the program level (e.g., Wildlife Toxicology and Migratory Birds) ▪ The original intent of expanding the NWRC into a leader/network among universities has not materialized; this is the result of shifting priorities, management transition, and changing resources ▪ The Centre has not acted as a unifier between these programs, the Centre has experienced change and shifting emphasis ▪ Mandate supports departmental documents
2. Is there evidence of achievement of immediate outcomes? (Success) <ul style="list-style-type: none"> ▪ Increased access to students ▪ Increased access to knowledge ▪ Increased access to specialized facilities ▪ Increased leveraging of resources 	<p><u>There is evidence of the achievement of all of the following immediate outcomes:</u></p> <ul style="list-style-type: none"> i) Increased access to students <ul style="list-style-type: none"> ▪ Documented evidence - increase in the number of students producing climate related theses (Oct 1990-present: 36) ▪ Increase in the number of adjuncts and therefore joint supervision of and research with students ii) Increased access to knowledge <ul style="list-style-type: none"> ▪ Documented evidence - increase in access to knowledge through joint undertakings such as seminars, research projects, and limited teaching or guest lecturing by adjuncts ▪ Concentration of expertise in the Victoria area resulting in an increase in the number of expert visitors iii) Increased access to specialized facilities <ul style="list-style-type: none"> ▪ Centre is given access to space and equipment and is co-located with the SEOS's climate group ▪ Agreement with the University- Centre staff have access to the library and the school's online publications ▪ Due to the type of work performed at 	<p><u>There is limited evidence and achievement of the following three immediate outcomes:</u></p> <ul style="list-style-type: none"> i) Increased access to students <ul style="list-style-type: none"> ▪ No documented evidence on student numbers; observed increase in the number of students (largely attributable to the increased physical space for students) ▪ Tension between the Biology Department and the Centre regarding students ▪ Students are not location specific; new facility provides 24 spaces for students; this appears largely full ii) Increased access to knowledge <ul style="list-style-type: none"> ▪ Joint undertakings include: seminar series, supervision of students, occasional teaching, contribution to the new geomatics lab on campus ▪ Joint undertakings are student rather than university faculty related ▪ Limited EC contact with the Biology Department due to security limitations and the type of work being done iii) Increased access to specialized facilities <ul style="list-style-type: none"> ▪ Clear increase in space and

	<p>the CCCma -no need for laboratories (work is conducted through computers and is separate from the University for security reasons within EC)</p> <p>iii) Increased leveraging of resources</p> <ul style="list-style-type: none"> ▪ Documented evidence - increase in leveraging: <ul style="list-style-type: none"> • Of staff- Centre has more staff than is supported by A-base funding; the Centre has an arrangement with DFO and has 2 additional research scientists • Of grant money- through adjuncts which pay for student research • Of information and resources- through networks 	<p>improvement in labs, almost exclusively within NWRC and not related to the university or co-location</p> <ul style="list-style-type: none"> ▪ Space was built to needs; 5th floor remains undeveloped ▪ Agreement with the University- Centre staff have access to the library and the school's online publications ▪ Agreement for joint institute (between EC and University) was drafted; document was never signed <p><u>The following immediate outcome was not achieved:</u></p> <p>iii) Increased leveraging of resources</p> <ul style="list-style-type: none"> ▪ No significant increase in resources ▪ Many Centre staff were adjuncts prior to the co-location ▪ Difficulties identified in paying students and sustaining stable long-term funding
<p>3. Is there evidence of achievement of intermediate outcomes? (Success)</p> <ul style="list-style-type: none"> ▪ Increased synergy ▪ Increased scientific capacity 	<p><u>There is evidence of the achievement of all of the following intermediate outcomes:</u></p> <p>i) Increased synergy</p> <ul style="list-style-type: none"> ▪ Issue of attribution- difficult to determine if the increases are a result of the co-location or the trend toward collaboration in government science ▪ Complementary mandates between the Centre and SEOS; Centre staff have been involved in hiring SEOS faculty ▪ Joint research which has led to joint publications ▪ Increase in joint undertaking (see EQ2) ▪ Limited interaction with universities prior to the move; there is strong interaction between Centre staff and university faculty, this was cited as a good indicator of collaboration <p>ii) Increased scientific capacity</p> <ul style="list-style-type: none"> ▪ Issue of attribution- difficult to determine if the increase in scientific capacity is related to the co-location or the fact that this field has become more prominent over the past decade ▪ Human capacity has increased through the leveraging of research scientists and students; A-base has remained largely stable ▪ The Centre has a strong reputation among the international community and is seen as a leader in the field (they are a fraction of the size of their international counterparts) ▪ Concentration of expertise in the Victoria area; as a result there is an increase in the number of expert visitors in the field of climate science 	<p><u>There is limited evidence and achievement of all of the following intermediate outcomes:</u></p> <p>i) Increased synergy</p> <ul style="list-style-type: none"> ▪ Documented evidence - increase in publications; however there is no evidence that this is attributable to co-location; also no evidence of joint publications with university staff ▪ Minimal increase in adjunct status; the process to gain this after co-locating was not as timely or simple as anticipated; many staff held adjunct status elsewhere ▪ Synergies are with students rather than university staff ▪ Limited joint undertakings with the university ▪ Barriers to synergy include: access to the facility (security and joint spaces), change in administration and staff <p>ii) Increased scientific capacity</p> <ul style="list-style-type: none"> ▪ Increase in scientific capacity is not related to co-location; increase in capacity is related to an increase in space within the Centre which also provides room for more students and better equipment ▪ It was reported internally that the reputation of the Centre is related to the individual scientists rather than the Centre itself

<p>4. Is there evidence of achievement of final outcomes? (Success)</p> <ul style="list-style-type: none"> ▪ Scientific research that supports departmental strategic and intermediate outcomes and OPG results 	<p><u>There is evidence of the achievement of the final outcome:</u></p> <p>Scientific research that supports departmental strategic and intermediate outcomes and OPG results (e.g., science policy link)</p> <ul style="list-style-type: none"> ▪ Centre links to policy internationally through the IPCC (International Panel on Climate Change) <ul style="list-style-type: none"> • Policy links back to the country to stimulate political action (goes beyond EC) • Scope of the research at the Centre is international ▪ Canada (both through Centre staff and university faculty) has a high representation on the IPCC reports and many Centre staff are chapter leads ▪ The link between policy and science is not location dependent 	<p><u>There is limited evidence and achievement of the final outcome:</u></p> <p>Scientific research that supports departmental strategic and intermediate outcomes and OPG results (e.g., science policy link)</p> <ul style="list-style-type: none"> ▪ Not location specific or related to co-location ▪ Issue specific; no continuous link between policy and research; correlation is high in specific instances (example of science policy link on lead shot that was regularly provided predates co-location)
<p>5. Were there any unintended outcomes? (Success)</p>	<p><u>Few unintended outcomes were identified</u></p> <ul style="list-style-type: none"> ▪ Few unintended outcomes; however, few goals/objectives of co-location could be expressed leaving little to compare against ▪ Good degree of collaboration that exceeded their initial expectations ▪ Unanticipated synergies with DFO's Institute of Ocean Sciences in the field of biological oceanography 	<p><u>A number of unintended outcomes were identified</u></p> <ul style="list-style-type: none"> ▪ Less collaboration with the university has occurred than was expected (failure to achieve anticipated outcome) ▪ Enhanced security issues which limit collaboration ▪ Lack of resources which led to financial issues and risks with the unfunded lease payments ▪ Less face-to-face interaction among Centre staff than in the previously smaller building ▪ Disconnection from HQ (e.g., meetings at PVM) ▪ Undeveloped building space (e.g., fifth floor remains unoccupied)
<p>6. Is the co-location of research centres on university campuses a cost-effective mechanism? (Cost-effectiveness)</p> <ul style="list-style-type: none"> ▪ Relocation of the facility ▪ Operating costs 	<p><u>There is insufficient data to determine whether or not the co-location was cost-effective</u></p> <ul style="list-style-type: none"> ▪ Co-location was initiated to add the ocean component to the climate model, as a result the only locations considered were the west (Victoria) and east (Halifax) coasts ▪ No evidence was provided that documents an analysis of these options or the cost of the relocation ▪ BC government provided UVic with some funding to allow them to set up the Centre; at the time of the move EC had no lease (until more recently in 2002, when they paid a nominal fee of about 50K/year) and paid little to nothing for the space it used; space is highly subsidized ▪ CCCma is currently moving into the new Science building and will pay closer to market value for this space 	<p><u>There is insufficient data and information to determine whether or not the co-location was cost-effective</u></p> <ul style="list-style-type: none"> ▪ Relocation of the Centre was initiated due to health and safety issues at the Centre's previous building; several options in the NCR were considered ▪ Documented predictions (planned) exist on the costing and qualitative analysis for the choice to relocate to Carleton University versus other alternatives ▪ No data were provided on the cost of the relocation or the annual operating costs since the move

<p>7. What other types of collaborative arrangements (with universities) exist at EC? (Design & Delivery)</p>	<p><u>A number of factors influence the impacts of co-location including type of agreement (between university and federal department), building occupancy, and staff size.</u></p> <p>The following categories emerged which appear to affect the impact of co-location:</p> <ul style="list-style-type: none"> ▪ Occupancy <ul style="list-style-type: none"> • University & Government vs. Government Staff Only <ul style="list-style-type: none"> ✓ Atlantic Region ESC is occupied by 2/3 government and 1/3 university staff ✓ CRC is occupied by Agriculture employees only • Multiple Government Departments vs. Single Department <ul style="list-style-type: none"> ✓ NHRC is composed largely of EC and a small number of Agriculture employees ✓ CRC is composed only of Agriculture employees ▪ Size (large, small, intermediate) <ul style="list-style-type: none"> • Atlantic Region ESC has 32 government employees • CWE works with 7 adjuncts from EC • NHRC has approximately 100 EC employees ▪ Type of agreement (Tripartite, Financial, Consultative) <ul style="list-style-type: none"> • Research Chair, UBC and CWS have a Tripartite Agreement • The AIRG has consultative agreements with its partner universities • NHRC has a lease with the University, no co-location agreement was signed 	
<p>8. What are the best practices and lessons learned from the co-location process? (Design & Delivery)</p>	<p><u>Several best practices/lessons learned were identified for the co-location process</u></p> <p>Grouped by theme:</p> <p>Facilities and Space (including connectivity)</p> <ul style="list-style-type: none"> ▪ Decision around distance from HQ; time difference can be difficult for meeting demands from HQ <p>People</p> <ul style="list-style-type: none"> ▪ Need buy in from re-locating staff ▪ Getting the right management at the Centre is important; co-location is a partnership and there must be give and take ▪ Need the right people who gel together; match competencies <p>Synergies</p> <ul style="list-style-type: none"> ▪ Importance of having a critical mass in one spot: SEOS was just starting to grow with the geology and oceanography – climate and atmospheric science bought on and widened their overall package; connection to DFO and Institute of Ocean Sciences ▪ Importance of proximity: co-location in the same building not just on the campus; the closer you are the higher the probability of collaboration ▪ Importance of shared spaces: this is where the collaboration stems from (e.g., hallways, coffee room) <p>Type of Arrangement</p> <ul style="list-style-type: none"> ▪ Need for clear objectives/common vision from the outset ▪ Has to be a long term endeavor ▪ Need an active host department and buy-in from the university 	<p><u>Several best practices/lessons learned were identified for the co-location process</u></p> <p>Grouped by theme:</p> <p>Facilities and Space (including connectivity)</p> <ul style="list-style-type: none"> ▪ Need for circulation of people/access to the facility; security arrangement needs to complement university ▪ Positive experience to go through university (more responsive) rather than the Federal process for building ▪ Importance of having a funding commitment and to have the financing in place prior to moving forward ▪ Construction to be completed prior to move <p>People</p> <ul style="list-style-type: none"> ▪ Staff was consulted on the relocation throughout the process and spoke positively of this ▪ Importance of leadership in an arrangement like this; need the right people (networking mentality) ▪ University provides environment that includes social and educational opportunities <p>Synergies</p> <ul style="list-style-type: none"> ▪ Need for common goals (intellectual relationship) with co-locating facility; a joint committee that addresses this would be useful ▪ Importance of creating a critical mass in an area and to look at what kinds of people/groups/operations mix to enable this type of synergy <p>Type of Arrangement</p> <ul style="list-style-type: none"> ▪ Need for formalized relationship prior to the move (e.g., adjunct status, agreement for co-location, etc.)

Annex 6: NWRC Cost Information

Location	Gamelin	Carleton				
Status	Actual	Planned	Actual			
Source	Secondary Source: E-mail Feb. 28, 06 ⁱ	TB Submission	Lease (October 2000)	Memorandum on O & M Costs for 2004-2005 (September 5, 2005)	Budget/Variance Report (as of September 22, 2005)	Secondary Source: E-mail Feb. 28, 06 ⁱⁱ
Move/Relocation	n/a					
Operating-Annual O&M	\$329,535 ⁱⁱⁱ (\$113.83 per M2 ^{iv})	Predicted \$316,000	An estimated \$700,000 ^v	Amount Paid by NWRC: \$783,000 Total Occupancy Cost: \$712,776.13 ^{vi} Balance refunded to NWRC: \$70,223.87	A-Base 101: \$571,823	2004-2005 \$734,276 ^{vii} (\$155.96 per M2) 2005-2006 \$763,010 (\$162.07 per M2)

ⁱ Based on 2895 M2 (metres squared) of gross facility space.

ⁱⁱ Based on 4708 M2 of gross facility space.

ⁱⁱⁱ This amount comes from the analysis of maintenance and project cost data for the NWRC facility for 2002-03 (Gamelin) and 2004-05 (Carleton) and forecast investment expenditures for 2005-06. The data provided excludes facility staff salary; lease payment, payment in lieu of taxes (PILT) and project upgrade data from the annual investment to arrive at a comparison for daily operations and maintenance. This amount also excludes minor recapitalization and safety repair works.

^{iv} Metres squared.

^v "Operating cost" means the sum of the following amounts: i) all net costs, charges and expenses directly attributable to the operation, repair and maintenance of the premises, including without limitation taxes, services provided pursuant to section 6 of the Lease, Carleton's insurance pursuant to Section 9 of the lease and HVAC costs. ii) all net expenses after the date any space in the Premises was first occupied by EC and properly allocable to that year for any capital improvement, structural repair or repair of any kind whatsoever to the premises incurred, and iii) a charge for offsite management overhead equal to 10% of the total amounts in Sections 1.3 (i), (ii) and 1.4 of the annex (Shared Facilities, Services and Utilities).

^{vi} The Operating Cost Summary (2004-2005) breaks down the costs in several categories including: facilities management services, utilities, operating costs, NWRC specific requests/extras, management fee, GST.

^{vii} Idem.