

Audit of the National Water Research Institute

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Audit and Evaluation Branch



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Acronyms used in the report

EC	Environment Canada
ECS	Environmental Conservation Service
FTE	Full Time Equivalent
HR	Human Resources
OAG	Office of the Auditor General
OGD	Other Government Department
NWRI	National Water Research Institute
NHRC	National Hydrology Research Centre
R&D	Research and Development
S&T	Science and Technology
UMCC	Union-Management Consultation Committee

Acknowledgments

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- the National Water Research Institute staff interviewed as part of this audit for their insights and comments, which were crucial to the development of the conclusions drawn in this review;
- the other Environment Canada managers and staff who provided input on the role and research excellence of the work carried out by the National Water Research Institute;
- Mary Jurkovic, Office of the Executive Director, for her logistical support; and,
- representatives of Other Government Departments, other levels of government and other stakeholders for their input and perspectives.

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Executive Summary

This report presents the results of an audit requested by the Executive Director of the National Water Research Institute (NWRI). He asked that an independent assessment be conducted of the management of the Institute against the ten attributes of well-managed research organizations developed by the Office of the Auditor General (OAG)¹. Also, the OAG expressed an interest in the results of the audit, as it effectively constitutes a pilot test of the validity of the suite of attributes developed by them. We have provided feedback to the OAG under separate cover. The individual attributes are presented in the body of the report along with the audit findings, and are grouped under: People Focus; Leadership; Research Management; and Organizational Performance.

The results of the audit are very positive and there are many lessons to be learned here for the Department in terms of good management practices, tools and processes; but also in terms of the attention being paid to people management, and to the cultivation of an open and supportive working environment.

To summarize some of the main findings: the Institute consults its users and clients on their research priorities; planning documents articulate the work to be done and are linked to departmental priorities and results; users are very satisfied with the science products they receive; the Institute is held in very high regard for the quality of its science; and staff are generally proud to be part of the Institute. In sum, most of the requirements of the ten attributes are met.

Amongst the important challenges that the NWRI faces are its aging workforce, and resource limitations which have constrained the ability of the Institute to staff, to acquire equipment, and update facilities in a more timely way. These are ongoing problems whose impacts are evident and are managed on an ongoing basis by NWRI senior management. In our opinion, management's efforts to document requirements; prioritize research; and to lever external funding should be recognized as excellent coping strategies. We also note that the NWRI is seeking new funding further to the most recent Speech from the Throne, where the Government outlined their commitment to fulfill their responsibilities for stewardship of water, to enhance scientific research, and to significantly strengthen the role of the NWRI.

Another longer term issue is the 1998 merging of the National Hydrology Research Centre (NHRC) with the NWRI. In interviews with staff based in Saskatoon we found a sense of loss of profile and autonomy, and that professional identification with the previous NHRC endures; the Executive Director is sensitive to this issue and continues to take steps to address it.

¹ OAG report to Parliament dated November, 1999, Chapter 22.

In terms of areas where we are recommending changes and refinements to current practice, some relatively minor improvements could be made to increase the recognition and the sense of belonging of technical support employees; increased guidance and support should be provided to Project Chiefs in carrying-out their management responsibilities, especially as this relates to decision-making on the allocation of technical support staff; and performance measurement can be strengthened through introduction of tools such as client surveys, and other measures to assess the relevance and longer term impacts and to demonstrate the value of the research portfolio of the Institute.

Our recommendations follow, as well as the NWRI management action plan to address them. The implementation of these measures should contribute to the improvement of an already very strong and well-managed organization.

Recommendations

Recommendation #1

Additional steps should be considered to ensure that technical support staff feel part of the NWRI team and that their contributions are valued.

Management Response:

NWRI management concur that it is important that support staff receive recognition for their contribution to NWRI's research program. We commit to develop forms of recognition specifically targeted at this sector of the institute.

Recommendation #2

NWRI senior management team should take steps to assess the issues around allocation of technical support staff, especially the perception that it is inequitable and inadequate. This should include providing support and guidance to Project Chiefs in these decision-making responsibilities; ensuring the criteria used for technical support allocation are transparent to staff; and providing other support required to ensure the management responsibilities at the Project level are effectively carried out.

Management Response:

NWRI management concur that the allocation of technical support to research scientists and studies is a significant issue in the research community and that it is important that scientific staff have confidence in the fairness of this allocation. However, we also believe that despite their misgivings about accountability for this allocation, as the first level of research management in NWRI, it is important that Project Chiefs be closely involved in these decisions. Therefore, we commit to reviewing the current allocation process with a view to improving the transparency and fairness of the allocations and to ensuring that Project Chiefs are given the management support they require.

Recommendation #3

A broader and better grounded approach to assessing the value-added and impacts of NWRI research should be developed and implemented. This could begin with some fairly basic gathering of feedback from users and clients, and more timely annual reporting.

Management Response:

NWRI management concur that, despite the difficulties encountered in the case studies on research impact, particularly with respect to reaching a consensus on attribution of results from collaborative multi-institutional research projects, more attention should be given to the assessment and reporting of the impact of NWRI's research. NWRI management commits to improving the assessment and regular reporting of the impacts of NWRI's research program.

Introduction

Located in Burlington, Ontario, the NWRI is Canada's largest freshwater research establishment. It conducts a broad program of research and development in the aquatic sciences, in partnership with Canadian and international science communities. Its mission, through ecosystem-based research, is to create and disseminate new knowledge and understanding of aquatic ecosystems required for the resolution of environmental issues regionally, nationally, or of international significance to Canada. By providing scientific knowledge, the NWRI goal is to support the development of sound government policies and programs, public decision-making and early identification of environmental problems.

The Executive Director of the NWRI requested the conduct of an objective and independent audit, assessing the NWRI against the ten attributes of well-managed research organizations developed by the Office of the Auditor General and presented in his report to Parliament, November 1999.

The attributes are as follows:

People Focus

1. Management knows what research and other talent it needs to accomplish the mission, and recruits, develops and retains the right mix of people.
2. Employees are passionate about their work, have confidence in management, and are proud of their organization.

Leadership

3. The current and anticipated needs of dependent constituencies drive the organization and its research programs.
4. Employees and dependent constituencies share management's vision, values and goals.
5. The portfolio of programs represents the right research, at the right time, and at the right investment.

Research Management

6. Research projects embody excellent science, involve the right people, are on track and within budget.
7. Research projects leverage external resources.
8. Organizational knowledge is systematically captured and turned into needed work tools.

Organizational Performance

9. The organization is widely known and respected.
10. The organization meets the needs of dependent constituencies.

The results of this audit are intended for use by the Executive Director and other senior managers within the Environmental Conservation Service (ECS), Environment Canada, to change or refine the management of the NWRI and other research organizations within ECS; they should also provide some lessons-learned more broadly within the Department.

Also, the OAG has expressed an interest in the results of the audit, as it effectively constitutes a pilot test of the validity of the suite of attributes developed by them.

Review Scope and Methodology

The audit included interviews with the senior management team at the NWRI, research managers, research scientists located in both of the Institute's locations in Burlington and Saskatoon, as well as a smaller sample of interviews with technical support staff. Other managers within Environment Canada (EC) were interviewed on the role they play in influencing research priorities and using the Institute's research results.

As the audit team moved beyond the bounds of the department, interviews were conducted with representatives of OGDs, ministries of the Province of Ontario, and universities and private sector representatives as users and collaborators of the Institute.

In total, 55 interviews were conducted. Plans, reports, work descriptions, minutes of meetings are amongst the documents reviewed.

The audit team would like to note that much of the information upon which this report is based was gathered during interviews. The often subjective nature of the attributes under assessment (for example: pride, passion for work, opportunity for creativity) required this approach, as opposed to more traditional audit methods with multiple lines of inquiry and where document analysis, for example, would play a larger role in arriving at the audit results.

The detailed Terms of Reference for the audit are included as Annex 1. They provide descriptive information about the NWRI, as well as further detail on interviews conducted, and documents reviewed.

Audit Results by Attribute

People Focus

Attribute 1 ***Management knows what research and other talent it needs to accomplish the mission, and recruits, develops and retains the right mix of people.***

NWRI management assesses current and future human resources needs of the organization on an ongoing basis, and has undertaken a number of initiatives to address these. The allocation of technical support staff needs to be reviewed and assessed.

- The issue of aging staff is recognized by management at the NWRI as asserted in both the interviews and the NWRI workforce analysis. A recruitment strategy, the Human Resources (HR) Management Plan, has been developed and is in place.
- A competency profile and a competency portfolio (which includes a 360 degree evaluation providing a more complete picture of the development needs of the employee) have been developed for use by research staff interested in management positions.

- Senior management reviews and assesses the use of contractors versus hiring term or indeterminate staff on an ongoing basis. The Union Management Consultation Committee (UMCC) plays a role here in providing feedback from the union perspective.
- Interviews have identified a number of barriers to recruitment including: introductory salary levels and aging equipment.
- There are no formal succession plans to facilitate smooth transition of responsibilities for key positions at the NWRI. This is an issue that is already recognized by NWRI senior management.
- According to many interviewees, there is a need for a greater number of technical support staff, or their allocation to different projects needs to be re-configured and communicated so that it is seen as more equitable across the organization.

Attribute 2 ***Employees are passionate about their work, have confidence in management, and are proud of their organization.***

Employees at the NWRI expressed confidence in management and are dedicated to, and proud of their work.

- The majority of interviewees are very proud of their organization and passionate about their work.
- Interviews with staff showed for the most part, that the NWRI has an open, transparent, positive and supportive organizational culture; and that management is generally visible and seeks and acts on employee input to decision-making.
- An active UMCC is in place.
- Generally, employees are recognized for their contributions and for activities that enhance the reputation of the organization. However, interviews indicate that technicians at the NWRI feel as though they are under-appreciated. The sense of belonging of technicians needs to be assured, for example, through more visible recognition of their contributions and accomplishments.

Attribute 3 ***The current and anticipated needs of dependent constituencies drive the organization and its research programs.***

The planning function is strong and well-managed.

- Current research is aligned with organizational priorities.
- Planning documents are well structured and show strong links to business line priorities and results. This holds for both study level planning documents, as well as higher-level planning documents.

- Primary users of NWRI science are broadly canvassed on their needs as part of the planning process. NWRI senior management plans to strengthen this function by involving users earlier in the process to provide initial input on what research needs to be undertaken.
- The Institute is well-represented at departmental fora where needs, priorities and plans are discussed. Research staff participate in planning activities and also provide input on longer term issues based on information they gather in discussions with their peers, at conferences, and with clients. As such, ongoing issues-scanning takes place.
- Research staff indicate that there is sufficient flexibility in their work(plans) to pursue other potentially profitable lines of enquiry.
- One of the difficulties noted in managing the planning process at the Institute is in the timeliness of receiving the budget from the corporate level. The impacts are felt during the summer fieldwork season which dictates when expenditures need to be made. If the approved budget allocation is not in hand, it makes cash management into the second quarter of the fiscal year to cover off such expenditures difficult.
- An area for improvement relates to communicating decisions made in the planning process. In interviews with users and clients within government, they identified the need for more information on how research priorities were ultimately determined and where government dollars will be spent. They would like more information on the basis upon which the funds they had allocated from their budgets to the NWRI, are being spent to meet their particular research needs.

Attribute 4 ***Employees and dependent constituencies share management's vision, values and goals.***

The NWRI vision, value and goals are broadly shared.

- Those within EC: senior managers within services and overall, employees of the NWRI, can well articulate the NWRI vision and goals.
- Research staff know how their work relates to the mandate of the department and how it fits into the business line management framework.
- Amongst those interviewed, most feel that the NWRI's direction is sound; they support management's decision-making in this regard, and recognize senior management values and related efforts to build a fair and transparent workplace.
- Understandably, the vision and goals of the NWRI are less well known by constituents outside of government, that is, the "farther" they are from the Institute / department.

Attribute 5 ***The portfolio of programs represents the right research, at the right time and at the right investment.***

The NWRI implements a well-grounded research portfolio, providing timely information and interviews indicated that there is good value for the public investment.

- In terms of carrying out the right research at the right time, the strengths of the planning process noted previously provide adequate information on which to base decisions about the need for, and relevance of the work undertaken by the Institute.
- The ongoing issues scanning that takes place facilitates rapid response to requests relating to current issues and reduces the likelihood of being caught off-guard by requests for science information on new or emerging issues.
- The research portfolio is reviewed and adjusted on a regular basis.
- In terms of the right level of investment, and again the relevance of research, the NWRI leverages funding far beyond what it invests in public dollars to achieve its research results. Also, research proposals developed and submitted to external funding agencies are competitively assessed, providing further indication of the value for dollar provided by the NWRI.
- Management and researchers are conscious of the issue of mission drift as one of the potential negative impacts of the need to leverage external funding sources and to work in collaboration with others.
- The impact of administrative activities (such as the leveraging external funding or the hiring of contractors) on the amount of time researchers have to conduct their research was identified as an issue by NWRI senior management, and was discussed with interviewees. They were evenly split as to whether or not this had a significant negative impact on their work: some asserted that only 30% of their time was available for research due to administrative and other tasks; while others found this an irritant but felt that a lot of the burden fell on management positions and did not represent more than 10% - 15% of their time.

Attribute 6 ***Research projects embody excellent science, involve the right people, are on track and within budget.***

Excellence in science and the reputation of researchers on staff are amongst the hallmarks of the NWRI noted by those interviewed, in spite of identified issues and barriers in the areas of resourcing and recruitment

- Excellence in science and the credibility of the NWRI are evidenced in a variety of ways: through peer review and publication in renowned scientific journals; through requests to address conferences or to attend as invited experts.
- Processes are in place to assure due diligence and reliability of the science. As an example, papers are reviewed internally by directors prior to being sent for peer review and publishing.
- The extent to which funds are leveraged by the NWRI also speaks to the quality of science; there are a number of organizations who repeatedly fund and seek collaboration with the NWRI; and others who accept their science results and use them in their work.

- Management contracts focus on excellence of science as a priority.
- The project structure is periodically reviewed and researchers are re-assigned to priority research areas.
- As noted previously, the NWRI has developed a competency profile as a tool in developing staff to assume management positions.
- A significant and ongoing issue for NWRI management is the limited A-Base resourcing available to the Institute to expand recruitment efforts, but also to re-invest in equipment and facilities. This issue will be dealt with in more detail under Attribute 7. Several documents have already been developed that record and cost requirements, and new funding is being sought further to the recent Speech from the Throne which stated that government must re-invest in its science capacity.
- A suggestion made by a few interviewees relates to better tracking and sharing of instruments and equipment within the Institute, along the lines of an expanded “common stores”. We gather e-mail is being used to a limited extent to do this now.
- In terms of tracking and ensuring research projects are within budget, project planning and reporting are done by research project and ongoing responsibility for monitoring is assigned to Project Chiefs.
- Clients and users interviewed stated that they work closely with NWRI research staff and are apprised of progress on an ongoing basis. Also, the NWRI contributes to progress reports for other programs in which it is involved, for example, the Great Lakes Program and the implementation of the Canadian Environmental Protection Act.
- We noted that over the past several years only one annual report was published. The Institute is taking steps to ensure more consistent and timely annual reporting, and at the time of the audit the 1999/2000 was at the draft stage.

Attribute 7 *Research projects leverage external resources.*

Research projects are conducted in collaboration with others; the NWRI leverages significant resources externally in comparison to its A-Base budgetary allocation.

- Most of the work at the NWRI is done in collaboration. The NWRI annual report, managers’ performance contracts and performance appraisals all focus on collaboration.
- The multidisciplinary approach to research projects at the NWRI is well suited to the increasing complexity of research issues. Researchers at the NWRI are well connected to expertise from outside the organization (through conferences, contacts and publications) and use the findings of other research groups in their work.
- Collaborative arrangements are also increasingly required by funding agencies, and are a factor considered in the assessment of research proposals.

- Interviews conducted with Institute staff and other departmental officials consistently underlined the lack of funding available to support research at the NWRI. Some interviewees expressed concerns relating to mission drift at the NWRI due to the lack of funding combined with the amount of funding that originates from outside of the Institute. The potential for mission drift at the NWRI however, is managed in large part through a good planning system, as well as by informed researchers who are cautious when entering into agreements to work in collaboration, because of their responsibility to act in the public interest.
- There is also a broad spectrum of arrangements in place ranging from very formal to informal, according to the requirements of the work being undertaken. The more formal / complex arrangements are reviewed and approved by management. One of the factors considered in these reviews is whether the research work being proposed falls within the results to be achieved by the NWRI, or possibly represents a shift away from its core mandate.

Attribute 8 ***Organizational knowledge is systematically captured and turned into needed work tools.***

Efforts are undertaken at the NWRI to share knowledge both internally and externally.

- There are two facets to the sharing of knowledge: processes and culture. The NWRI has both the processes in place, as well as a culture that promotes the sharing of knowledge. Collaboration is encouraged by management which strengthens the sharing of knowledge.
- Formally knowledge is captured and shared through weekly reports, Branch Days, projects meetings, publications, study sheets, and a publication database. Informally information is captured and shared through e-mail correspondence and corridor meetings.
- Knowledge is shared with people and organizations outside of the NWRI in several ways. Formally, there are publications, meetings and committees, and Branch Days. The latter were not well attended by clients and users from outside of the Institute, but management intends to try to increase the level of participation. There is also informal networking that takes place to share knowledge.
- The website for the NWRI requires updating to ensure that it serves as a current and useful information tool for those inside and outside of the Institute.

Attribute 9 ***The organization is widely known and respected.***

The NWRI is widely known and is highly respected by its clients and collaborators.

- All interviewees, which included those internal and external to government, hold the NWRI in high esteem as a credible and professional research organization. The comments included: "*well regarded, excellent reputation, credibility is very high, extremely high quality, they are leaders, cutting edge, very good science, high quality*"

individuals, the best freshwater laboratory in the world, and that its “researchers enjoy a great reputation”.

- In terms of tools to use to make the Institute and its mandate known, a new pamphlet was recently printed for distribution at events and conferences, etc. It describes the NWRI mission and mandate, and outlines its project structure and research priorities.
- Research staff attend conferences and are invited to present research papers which demonstrates the type and quality of work performed by the Institute. Publications in prestigious journals demonstrate and serve to further the reputation of the NWRI.

Attribute 10 ***The organization meets the needs of dependent constituencies.***

Interviewees state that the work of the NWRI meets their needs; some steps to strengthen performance assessment are however required.

- Based on interviews, it is clear that the needs of the dependent constituencies are central to NWRI philosophy. All researchers relate their science to the public good.
- All users interviewed confirm that the science produced by NWRI is relevant and that the products delivered are good.
- Success is measured, however, more by the quality of science in line with business line and departmental priorities, than through broader assessment of the level of satisfaction of its dependent constituencies. A basic client survey may be a useful tool here. Currently there is little performance information demonstrating the actual use of the science information and, over the longer term, the environmental impacts of decisions based on NWRI science products.

Analysis of Findings

The results of this audit were presented in the previous section by the individual attribute assessed. In this section, we have consolidated these findings into several issues for management review and attention.

Issues:

1. Recognition: Technical Support Staff

- Generally, employees at the NWRI are recognized through both formal and informal means for their contributions and for activities that enhance the reputation of the Institute.
- Compared to researchers who receive special recognition for their work, who speak at conferences, and whose promotional system is incumbent-based, technical staff feel comparatively that they receive little recognition.
- NWRI management should develop additional means to foster the sense of team and perception of equity that are already part of the NWRI culture, and to reward accomplishments of technicians and other staff who support research work.

2. Management Issues at the Project Level

- Staff stated that they find variability at the project level in terms of the number of opportunities to meet to discuss work, and to exchange and provide information. Some interviewees stated that where they once were privy to information and had a forum for discussion on one project; however, once assigned to another project, fewer meetings were taking place and sharing of information was limited. This is an aspect of NWRI management where improvements should be easily implemented.
- We are unable, given the scope of this audit and the information available to the audit team, to draw conclusions on the adequacy and allocation of technical support. There is, however, quite a widespread perception amongst staff interviewed of inequity in the allocation of technical support to research staff, and secondly, the need for more technical support to be hired. This is an issue already identified by NWRI management.
- Project Chiefs are accountable for monitoring and revising technical support allocations under the general direction of their Branch Directors. It is recognized that such allocation decisions are not being made in a timely fashion. Also, when re-assignments do take place, the criteria used in such decision-making are not transparent to staff.
- Based on the interviews conducted, we feel that there may be some reluctance amongst Project Chiefs to re-assign staff, particularly where this involves technical support to senior scientists and where these relationships have been in place for long periods of time.

- Perceptions of inequity can have impacts for morale, particularly as some of the allocations have been in place for very extended periods of time. We recommend that this issue be discussed by the NWRI senior management team to develop and implement an approach to resolve the perceptual / actual issue. As the Project Chief is the first level management position in the organization, this approach should include support and guidance to Project Chiefs in carrying-out their decision-making responsibilities.

3. Performance Management and Measurement

- All users interviewed stated that the science produced by NWRI is very relevant and that the products delivered are of high quality.
- NWRI Management also assesses the quality of the Institute's work on an ongoing basis, but this tends to focus on the quality of science, as opposed to its relevance over the longer term and assessing the impacts of the science.
- While researchers are aware that their science is done for public good, in line with Business Line and departmental priorities, the success of their work, as noted above, is measured mainly by the quality of science.
- There has been only one formal evaluation in the recent past and this review was focused on one issue area (Measuring The Impacts of Environment Canada's R&D, Case Study: Pulp & Paper Effluent Research, September 1997).
- More independent evaluation is required to provide management with feedback and information for decision-making on the future directions and areas of emphasis in the work to be carried out by the NWRI; and to demonstrate the value of the work done.
- The level of satisfaction and use of science information of dependent constituencies should be amongst other factors that are measured in the future by the NWRI. Currently there is little performance information relating to, for example, specific use of the information and subsequent environmental impacts of decisions based on NWRI science. Client survey / feedback could be of use to the NWRI in assessing and re-directing research efforts over the short / longer term.
- Documents reviewed also support the foregoing assessment. The most recent annual report and performance appraisals reviewed did not often include results in terms of actual use made of science information; what was identified most often was *potential* use.
- A systematic performance management process and performance framework could help to bring together and more systematically identify the tools and measures that the NWRI now uses and those that need to be developed to provide a more fulsome performance assessment.

Recommendations

Recommendation #1

Additional steps should be considered to ensure that technical support staff feel part of the NWRI team and that their contributions are valued.

Management Response:

NWRI management concur that it is important that support staff receive recognition for their contribution to NWRI's research program. We commit to develop forms of recognition specifically targeted at this sector of the institute.

Recommendation #2

NWRI senior management team should take steps to assess the issues around allocation of technical support staff, especially the perception that it is inequitable and inadequate. This should include providing support and guidance to Project Chiefs in these decision-making responsibilities; ensuring the criteria used for technical support allocation are transparent to staff; and providing other support required to ensure the management responsibilities at the Project level are effectively carried out.

Management Response:

NWRI management concur that the allocation of technical support to research scientists and studies is a significant issue in the research community and that it is important that scientific staff have confidence in the fairness of this allocation. However, we also believe that despite their misgivings about accountability for this allocation, as the first level of research management in NWRI, it is important that Project Chiefs be closely involved in these decisions. Therefore, we commit to reviewing the current allocation process with a view to improving the transparency and fairness of the allocations and to ensuring that Project Chiefs are given the management support they require.

Recommendation #3

A broader and better grounded approach to assessing the value-added and impacts of the NWRI research should be developed and implemented. This could begin with some fairly basic gathering of feedback from users and clients, and more timely annual reporting.

Management Response:

NWRI management concur that, despite the difficulties encountered in the case studies on research impact, particularly with respect to reaching a consensus on attribution of results from collaborative multi-institutional research projects, more attention should be given to the assessment and reporting of the impact of NWRI's research. NWRI management commits to improving the assessment and regular reporting of the impacts of NWRI's research program.

Conclusion

The majority of the requirements contained in the 10 attributes as developed by the OAG are deemed to have been met.

There are 3 areas where opportunities have been identified for the NWRI to improve, they include: improving the recognition of contributions made by technical support staff; providing increased guidance at the Project Chief level in carrying-out their management responsibilities, especially as this relates to decision-making on the allocation of technical support staff; and, developing a more broadly based performance assessment of the value and impacts of NWRI research.

Annex 1

TERMS OF REFERENCE

AUDIT OF THE NATIONAL WATER RESEARCH INSTITUTE (NWRI) against Office of the Auditor General Attributes of Well-Managed Research Organizations

INTRODUCTION

The purposes of this document are to:

- > briefly describe the background and context for the *Audit of the NWRI against the OAG Attributes of Well-managed Research Organization*;
- > establish the audit objectives;
- > define the scope and issues to be examined;
- > outline the approach and methodology;
- > provide timeframes and resourcing for the audit activities; and,
- > define the required deliverables.

AUDIT OBJECTIVES

The Executive Director of the NWRI has requested the conduct of an objective and independent audit, assessing the NWRI against the ten attributes of well-managed research organizations outlined in Chapter 22 of the Office of the Auditor General (OAG) report to Parliament dated November 1999.

The results of this audit will be used by the Executive Director as well as other senior managers within the Environmental Conservation Service (ECS) to change or refine the management of the NWRI and other research organizations within ECS; and may also provide lessons-learned more broadly within the Department; and to Other Government Departments (OGDs) operating research facilities.

Also, the OAG has expressed an interest in the results of the audit, as it effectively constitutes a pilot test of the validity of the attributes and criteria developed by them.

While referred to as an audit in the foregoing, this work also has included within its scope, elements of an effectiveness evaluation. These relate to important issues of relevance and excellence of the research performed.

FEDERAL CONTEXT / DESCRIPTION OF THE NWRI

Environment Canada (EC) is a science-based department with a mandate to preserve and enhance the quality of the natural environment, conserve and protect Canadian water resources, carry out meteorology, enforce the rules of the Canada/US International Joint Commission, and co-ordinate federal environmental policies and programs.

EC is committed to ensuring that its Science and Technology (S&T) is relevant, effective and well-managed. As a member of a family of science-based departments, EC operates under the *Federal Science and Technology Policy* and within the common framework of seven principles delineated in the 1996 federal strategy document *Science and Technology for the New Century*. The NWRI applies these principles in its activities, in order to help ensure that federal goals for excellence in Canadian science and technology are met.

In order to meet the commitment above, EC also developed the *S&T Management Framework* which complements the direction and requirements of the federal science and technology strategies. This framework guides the work of the NWRI and consists of various committees which discuss S&T management issues, develop and implement S&T policies, and provide guidance and advice to EC senior management on S&T policies and programs. This framework also operates as an accountability mechanism for effective use of resources and effectiveness of EC S&T activities.

Located in Burlington, Ontario and Saskatoon, Saskatchewan, the NWRI is Canada's largest freshwater research establishment. Its mission, through ecosystem-based research, is to create and disseminate new knowledge and understanding of aquatic ecosystems required for the resolution of environmental issues regionally, nationally, or of international significance to Canada. By providing scientific knowledge the NWRI supports the development of sound government policies and programs, public decision-making and early identification of environmental problems. It conducts a comprehensive program of research and development in the aquatic sciences, in partnership with Canadian and international science communities.

The following bullets present some basic facts about the NWRI. Other information can be found on the EC website: www.ec.gc.ca.

- carries out mission-oriented research for EC, and for OGDs on a cost-recovery basis.
- annual budget allocation for 2000 / 01 is \$26.8 million. The NWRI attracted approximately \$7.2 million this year in additional funding.
- NWRI's 320 full-time equivalents (FTEs) are comprised of 70 are research scientists, 17 chemists, 5 biologists, 5 physical scientists and 4 engineers. The other FTEs are comprised of managers and administration and research support staff.
- headed by an Executive Director reporting to the Director General, Ecosystems Science, ECS.
- reporting to the Executive Director's Office are: the heads of Global Environment Monitoring System/Water Collaboration Centre; the Science Liaison; Corporate Services; the National Laboratory for Environmental Testing; and the Research Support Branch.
- reporting to the Executive Director there are also three research branches:
 - Aquatic Ecosystem Management Research Branch;
 - Aquatic Ecosystems Impacts Research Branch; and
 - Aquatic Ecosystem Protection Research Branch
- the research program is organized into 12 multi-disciplinary projects; each of the three research branches has responsibility for four projects.

SCOPE

The audit will focus on providing an assessment against the ten criteria developed by the OAG. These criteria are grouped according to the following themes:

- People Focus
- Leadership
- Research Management
- Organizational Performance

The audit will include current practice and focus on activities in fiscal years 1999/2000 and 2000/01.

METHODOLOGY

The methodologies used will include:

- review of recent reports by the Office of the Auditor General relating to research organizations.
- preliminary document review to familiarize the audit team with the NWRI and the criteria before on-site visits to the NWRI.
- personal or telephone interviews including:
 - management and program staff of the NWRI;
 - senior ECS managers in Hull, Quebec, generally accountable for the performance of research;
 - client managers within EC;
 - other clients, such as those within OGDs; and other stakeholders including the Science and Technology Advisory Board to the Deputy Minister, other levels of government; and partners in academia.
- on-site document review.

More detailed information on the proposed approach is contained in Appendix A.

METHODOLOGY

The audit will include the following documents and interviews within its approach at a minimum. Other means or approaches the audit team considers appropriate over the course of the audit will also be included.

We have not chosen to use a survey tool to gather information from NWRI staff. We feel that the areas to be questioned under the OAG criteria are broad, value-laden and not amenable to discrete / closed questions and answers. We therefore plan generally to interview a 10% sample of staff selected on a random basis. Given the nature of the criteria to be assessed, much of the audit findings will be based on information gathered through interviews and opinions expressed; and document review.

We will be requesting support from the Executive Director's Office in gathering the information below. We will also be looking to his Office to facilitate making contacts / setting up interviews with users / partners / and other stakeholder organizations.

We will conduct an opening meeting with staff to familiarize them with the objectives and audit approach, should the Executive Director feel that this is helpful and appropriate.

DOCUMENT REVIEW

Following is a list of documents to be included in the review.

Basic / descriptive information

Chapter 22 entitled *Attributes of Well-Managed Research Organizations*, OAG, November 1999 report
Federal Science and Technology Policy

Science and Technology Strategy for the New Century, 1996

EC Science and Technology - Leading to Solutions

EC Science and Technology Management System

NWRI Annual Report 1998/99 - On the Threshold of a New Century

Organization chart

Job descriptions

Management Contracts

Research equipment and facilities

Research Planning

Planning methodology: consultations strategy; needs analysis, cost-benefit assessment, selection criteria

Current and previous year's plans / individual research unit plans

General Management and Administration

Budget allocation

NWRI Operational plan

Capital plan

Minutes of management meetings

Progress tracking and reports

Financial reports

Human Resources Management

Core competency profiles / *Development Resource Guide*
 Staff skills profile; age profile; profile of length of time in position
 Skills gap analysis / staff training plan
Framework for Human Resources Management of the Federal Science and Technology Community;
NWRI Human Resources Management Framework
 Minutes of staff meetings and follow-up
 PS Employee Survey results Fall 1999
 Other employee surveys or feedback mechanisms

Performance Measurement

Performance framework; performance indicators
 Performance assessment tools; bench-marking tools
 Client feedback on relevance; quality; impacts
 Expert / Peer review
 Previous year's annual / performance reports
 Any recent studies, assessments of NWRI performance

Communication of Research Results

Processes for providing input into policy and program development

INTERVIEWS / SURVEYS

We view the following as required at a minimum. Some suggested topic areas are also included, as well as estimated numbers of interviews to be conducted.

Karen Brown, ADM, ECS / Ken Sato, Director General, Ecosystems Science, ECS 1

How do you ensure that the research agenda is relevant to users internally and externally?
 How does the S&T management system interact with the NWRI?
 Through what means do you allocate resources to NWRI research?
 How do you assure excellence of research?
 How in your opinion does the reputation of the NWRI as a research organization rate nationally; internationally?

John Carey, Executive Director, NWRI 1

All issues of research needs analysis and planning, management systems, human resources planning, competencies and morale issues; adequacy of resources; adequacy of facilities; assessment and feedback mechanisms ensuring client needs are met; outreach and partnering; dissemination of results; performance measurement and peer review; and reputation of the NWRI.

Each reporting manager to the Executive Director 9

Issues as noted above for Executive Director.

Administrative Assistant to Executive Director 1

Information on management and administrative processes; documents; contacts with other organizations.

NWRI scientists and research support 25

Issues of adequacy of management; adequacy of resources; adequacy of facilities; identification of research needs; freedom to research and stimulation of creativity; reputation of the NWRI and acceptance of its research results. (representative sample).

Human Resources Specialists: NWRI; Ontario Region 2

Corporate information on resourcing issues and strategies

Users internal to EC and Users in Other Government Departments 15

(the foregoing includes Regional Directors;/ those managing EC's ecosystems initiatives; major government users)

How are their your needs and priorities input to the NWRI?
 Is there an agreement in place between your organization and the NWRI.? Is it effective and well-managed in your opinion?.
 Are your needs being met with the right information, at the right time?
 Is the NWRI viewed as a credible organization? On what basis do you make this assessment?

Other science organizations, partners and stakeholders 15

(including the S&T Advisory Board; provincial ministries dealing with water; those for whom NWRI is carrying out research on a cost recovery basis; universities)

Do you have adequate opportunity to input to research priorities?
 What collaborative work has taken place?
 What funds are levered?
 What outreach does the NWRI do?
 Peer and expert review of NWRI research results?
 In your opinion, is the NWRI viewed as a credible organization? On what basis is this assessment made?
 (re: possible size of stratified sample: 1998/99 Annual Report lists 95 collaborators)

INTERVIEWS IN TOTAL 69

Of the total above, approximately 40 will be conducted on-site at the NWRI.