

**Review of the
Institute for Resources, Environment and Sustainability (IRES)
University of British Columbia
May 3, 2011**

Review Team

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Executive Summary

Findings

Finding 1: IRES is arguably the strongest environment / sustainability program in Canada, and ranks among the top 10 in North America.

Finding 2: The strength of the program comes from *regular interaction* around *use-focused* research problems and teaching by faculty who *span the physical, ecological and social sciences*. Nearly all major research universities argue for the importance of interdisciplinary research. However, in our conversations outside of IRES, interdisciplinary research often seemed to be interpreted as small teams of a few faculty members from 2-3 disciplines working on a specific project or series of projects. This is a basic form of interdisciplinary research and we have no doubt that it is common within and across the disciplinary Faculties at UBC. However, this is far different from the sustained interaction among a critical mass of faculty from multiple disciplines who are professionals committed to “real world” or use-focused research. It is this feature that gives IRES its continental strength.

Finding 3: The very high quality graduate students attracted by the program come because of *the inter-disciplinary, use-focused* character of IRES research and teaching.

Recommendations

Recommendation 1. Develop a formula for funding that supports interdisciplinary research programs like IRES. In parallel develop arrangements with existing departments to allow each core faculty member to contribute to undergraduate teaching in a partner Department/Faculty, while IRES remains the research and graduate training focus for its faculty.

Recommendation 2. To support and enhance the broad interdisciplinary nature of IRES, it will be important that IRES either remains within a Faculty/Centre that has a primary commitment to interdisciplinarity, or that IRES reports directly to the VP level (possibly through an associate VP for interdisciplinary research and training). The review team did not feel that the unique interdisciplinary culture within IRES could survive and thrive with a governance model that involved IRES reporting through one or a few traditional Faculties.

Recommendation 3. To preserve and enhance the kind of real world learning and teaching environment in IRES, the President, Provost/ VP(A) and VPR need to formally make clear that

IRES is in a priority area for the university (especially given the importance of sustainability at UBC), and then set up governance structures that will not only allow them to survive, but to thrive.

Recommendation 4. Given the number of graduate students being managed, and the work loads on current staff, IRES staffing budgets should be increased by \$50K/yr. With this increase, the entire staff budget should allow for 1.0 FTE for an administrative manager, 1.3-1.5 FTE for the graduate program coordinator, 1.5 FTE for the finance office, and 0.7 FTE for communications and IT support.

Recommendation 5. Support faculty in IRES who have made a career commitment to interdisciplinary research and teaching by ensuring that IRES has the majority influence on their annual review, tenure and promotion decisions. One way of doing this would be to budget IRES for 100% of the salary of such core faculty appointments. In such appointments, a partnership arrangement would need to be made within a more traditional Department / Faculty. In exchange for a Cross-appointment in that Department / Faculty, the IRES professor would be expected to teach an undergraduate course each year. The partner Faculty would not need to pay for this service. Other than undergraduate teaching, all other professional responsibilities--graduate teaching and mentoring, research and administrative duties-- of each faculty member would be in IRES. The partner Faculty/Department would have input into the annual report, tenure and promotion decisions. The review team felt that IRES needed 6-9 such Core faculty appointments (6-9 FTEs).

Recommendation 6. IRES should also be encouraged to continue to tap into interdisciplinary expertise across campus, not only for graduate student supervision but to help with teaching and administrative work in IRES. One way of doing this would be to allow IRES to second faculty from other academic units where the faculty members hold their primary appointments. A typical secondment would be in the range of 25 to 49% where IRES would be expected to pay for that proportion of the faculty member's salary + benefits. Secondments would be for 3-5 years, and IRES would get the benefit of that portion of the faculty member's time for graduate teaching, administration and research. The annual review, promotion and tenure decisions would rest with the partner faculty, with input from IRES. The review team felt that IRES needed about 6 such positions, so assuming a 33% secondment for each, there would be a total of 2 FTEs used for these secondments in addition to the 6-9 Core appointments.

Recommendation 7. Departments that benefit from having an IRES faculty member teaching in their undergraduate program should commit to providing an appropriate number of TA opportunities for RMES graduate students on an ongoing basis. (Departments whose faculty members supervise RMES graduate students should also be encouraged to do the same.)

A. Introduction

Three external consultants were asked by the College of Interdisciplinary Studies to provide a review of the Institute for Resources, Environment and Sustainability (IRES) and the Resource Management and Environmental Systems (RMES) graduate program. We visited UBC on March 21 & 22, 2011. The schedule for our visit, including the list of meetings in which we engaged, is described in Appendix 1.

The specific questions posed to us are contained in Appendix 3 to this report where we also respond to them. As is typical of outside reviews, we also provide an overall assessment of IRES and RMES and a consideration of strengths, weaknesses, opportunities and threats and from that analysis offer conclusions and recommendations. This constitutes the text of the report.

In the review process, the Review team became convinced that the most important issues faced by IRES, RMES and UBC are centered on the organizational structure in which interdisciplinary units like IRES function at UBC. Hence, in Appendix 2 we discuss alternative models.

There are a few general points that structure our approach.

- In our review, we are not separating IRES from the RMES graduate program. We believe that they are inextricably linked: one could not thrive, or even survive without the other.
- We have chosen to present our report in the form of a SWOT analysis, where we will identify what we see as Strength, Weaknesses, Opportunities and Threats of IRES and its RMES graduate program. However, we have combined the discussion of weaknesses and strengths and these are intimately related for IRES and RMES.
- To address the weakness or threats, or to take advantage of new opportunities, we will offer a number of recommendations. In some cases, we have drilled down in the recommendations with some specific comments or suggestions that might be considered for implementation. In the case of organizational structure, which is central to the future of IRES/RMES, we have provided detail in Appendix 2.
- The report ends with some higher level 'Findings' that we hope will frame and prioritize the recommendations
- Finally, we have added an Appendix 3 that provides brief, but specific answers to the questions for which CFIS requested responses.

B. Strengths of IRES

In any university in the world, there are two highly sought-after assets that are more important than any other:

- ✓ **The excellence of the faculty.** Faculty with reputations that put them at the top tier of international rankings are essential to the success of a world-class university, including its ability to attract other top faculty, the best students, major research investments, positive media attention and the donations of philanthropists.
- ✓ **The quality of the students.** World-class students create an environment where excellence is expected - and achieved; where faculty are challenged - and they rise to meet that challenge; and where industry / government demand insights and solutions - and they get more than they ever dreamed of getting.

The Institute for Resources, Environment and Sustainability (IRES) has managed to bring together both of these attributes to create a small, but extremely impressive academic unit that would be the envy of any university striving for excellence.

The 13 core faculty (representing ~8.5 FTE's) in IRES have jointly produced over 240 peer-reviewed publications since 2005, including 4 in the highest-tier journals (impact factor >25). They are in demand for symposium and keynote addresses and are very successful in attracting large grants. (The level of grant productivity is especially impressive when one considers that the research within IRES tends to not require wet labs, expensive equipment, highly customized building infrastructure or other items that drive large grant budgets.)

The Core faculty provide the teaching and administrative work within IRES, as well as supervise graduate students within the Resource Management and Environmental Studies (RMES) program. They are also involved in attracting and retaining the 'Faculty Associates' who play an important role in supervising graduate students in the RMES Program. The Faculty Associates are members of the UBC faculty who have no FTE in IRES but work with graduate students there. The 33 Faculty Associates currently linked with IRES supervise about 50% of the 114 graduate students that are now enrolled in the program. They have their home in eight other Faculties, demonstrating the interdisciplinary reach of IRES and RMES.

The quality of the graduate students that IRES and the RMES program attract is impressive. They have grade point averages equal to or higher than the average UBC graduate student and include a Vanier Fellow, a Killam Fellow, multiple Bridge Fellows and NSERC/SSHRC scholarship holders. The review team was very impressed by the enthusiasm, perceptiveness and intelligence of the 25 or so students with whom we met.

In interviews with faculty and students, the Review team strived to understand what characteristics of IRES and the RMES program were important to the success of the unit. We have identified three (3) key components:

1. **Problem-Focused (Use-Focused) Research.** We heard over and over again from faculty and students about the importance of the project question in defining the suitability of a student for the RMES program. Students applying to RMES are required to provide a statement of the research problem they wish to address. While this statement is not binding, it does allow selection of students who are a good match to the program. Complex problems such as those involving resources, the environment and sustainability do not respect disciplinary boundaries. To understand such problems - and ideally find solutions - faculty and students must not be constrained by traditional disciplinary boundaries. Rather, they must be encouraged and empowered to engage whatever disciplines will give them the tools or insights needed to address their question.

Virtually all of the students we met were passionate and enthusiastic about how the RMES program allowed them to focus on a particular problem, and follow that problem where it took them. Many were adamant that they would not have come to UBC if they were required to do a Science, a Forestry, a Business or other disciplinary degree, even if those degrees had

promised to be interdisciplinary in nature. The problem- or use-focused nature of the RMES degree was a major attraction.

2. **Intensive and extensive interaction.** To facilitate interdisciplinary thinking and approaches IRES has created a physical space where routine interaction on a daily basis is not only possible but unavoidable in the daily life of faculty and students. In a sense, IRES has created the physical and cultural characteristics of a world-class “think tank” or even “advanced studies institute” focusing on sustainability and its many challenges. While it is true that researchers often interact across Faculties at UBC, the co-location of researchers and students (especially students) from a wide range of disciplinary backgrounds, all interested in some aspect of sustainability, creates a special environment that must be protected and encouraged.
3. **Trans-Academic.** The vision of IRES is to: “*Foster sustainability in human and natural systems.*” The mission is to: “*foster sustainable futures through integrated research and learning about the linkages among human and natural systems to support decision making from local to global scales.*” We note that this vision and mission requires IRES not only to engage in leading edge interdisciplinary sciences, but also to engage “transacademically”—to work on practical problems in collaboration with decision makers of all types locally, within the province, within Canada and around the globe. To use a different term, IRES intends to occupy “Pasteur’s quadrant”¹, conducting research that contributes to fundamental knowledge while being useful in addressing some of the key challenges of the 21st century.

In our judgment, IRES is doing an exceptional job of carrying out its mission and achieving its vision. We base this assessment on several lines of evidence.

- First, while it is notoriously difficult to rank programs in environment and sustainability because they vary so substantially in focus and structure, it was the unanimous opinion of the three reviewers that IRES is arguably the strongest environment/ sustainability program in Canada, and ranks among the top 10 in North America².
- Second, the appeal of the program to prospective graduate students is quite amazing. With little more recruiting effort than a website, the program receives about 120 applicants per year, of whom about 85% are rejected, leaving an entering class of 15-20 of extraordinary quality. We note that faculty from across the University work with these students and chair their dissertations and we were told repeatedly that the motivation for this uncompensated work is simply the quality of the students.
- Third, the productivity of the faculty in high visibility research and external funding is quite exceptional.
- Fourth, IRES has been an exemplar of maintaining that high research productivity while engaging with decisions makers at the state, provincial, national and global levels.

In sum, *IRES is a stellar example of what one would want from an environment/ sustainability program at a world class university.*

What seems especially remarkable is that IRES has accomplished this with 8.48 FTE. While faculty associates are of great help in mentoring students, the management of IRES itself and the substantial graduate program (about 80 PhD students and 40 master’s students) falls to this small core. With this heavy a workload one might expect some degree of “burnout” but we found just the opposite—without

¹ Stokes, Donald E. 1997. *Pasteur’s Quadrant: Basic Science and Technological Innovation*. Washington, D.C.: Brookings Institution.

² Other programs we would rank in this top group are (in alphabetical order) the Bren School at the University of California at Santa Barbara, the School of the Environment at Duke, the School of the Environment at McGill, the School of Natural Resources and the Environment at the University of Michigan, the Environmental Science and Policy Program at Michigan State University, and the Yale School of Forestry and Environmental Studies. There are other strong programs (e.g. the University of California at Davis, Columbia, Minnesota, and Stanford) that do not have a unit taking leadership in environment/ sustainability graduate education across campus. This list is of course a subjective judgment but we believe any sober observer would rank IRES in the top ten interdisciplinary environment/ sustainability programs in North America.

exception faculty were highly enthusiastic about the opportunities IRES provides for conducting interdisciplinary research and graduate education.

Since the last self-study in 2003 it is clear that IRES has developed a reasonably effective mode of governance along with a culture supportive of the highest quality of interdisciplinary work. The administrative structure is still evolving as the faculty and Director work to find the proper balance between faculty involvement in governance (something lacking from the mid-1990s to the mid-2000s and thus requiring special efforts in recent years) and management by the Director and staff. But we are confident that the internal dynamics of the unit will hone procedures and norms towards ever more effective approaches. We detected a high level of morale and camaraderie and an understanding that the internal governance of IRES requires ongoing engagement as the unit itself evolves.

IRES is a prototype for further interdisciplinary work at UBC. The recent external review of CFIS argued for the value of a “space” within the University in which experiments with interdisciplinarity might be nurtured and where serious reflection on how to build effective interdisciplinary programs would be fostered. We would suggest that IRES is a role model for such efforts. Indeed, we can imagine that IRES could be the “seed crystal” for establishing University wide faculty collaborative networks in its five research domains and in other areas as well (e.g. water, climate change). However, to accomplish this, IRES needs to remain in an open and interdisciplinary administrative “space.” Moving IRES into one of the existing Faculties would likely cause serious damage to the program.

C. Weaknesses that Affect IRES

Given the inherent strengths of IRES, and the success it has had in setting up and managing a world class, problem-focused interdisciplinary graduate research and training program, it is doubly important to identify the weaknesses and threats that might be holding the Institute back or that could undermine the Institute and reduce its success in the future. For each topic, we have made recommendations for how the issue could be resolved.

1. Governance

We believe the most important challenge for IRES is one that IRES cannot solve internally. The challenge to UBC is to find an administrative structure that supports the unique excellence of IRES, and indeed allows IRES to contribute even more broadly to the University by serving as a catalyst for cross-Faculty collaborative networks focused on specific real world problems (e.g. climate change, water). There are several problems for IRES and other interdisciplinary and transacademic programs at UBC.

- **Undergraduate-based Funding Model.** One major threat to interdisciplinarity and to IRES in particular is the funding model that emphasizes undergraduate education without a clear mechanism for rewarding graduate education and research. Most universities strongly favour undergraduate programs that are disciplinary in nature, whereas graduate research and training programs can be either disciplinary or interdisciplinary. UBC appears to follow this pattern. Thus an accounting model that weights strongly towards undergraduate instruction will, in the long run, damage innovative interdisciplinary units unless special allowances are made. If the real issue is a policy that expects all university faculty to teach at the undergraduate level, this can easily be incorporated into the existing IRES model. Indeed, we noted that many IRES faculty already teach undergraduates with enthusiasm, some through informal relationships with disciplinary departments on campus. The issue is not the engagement of the faculty but an accounting system that does not adequately capture the value of interdisciplinary work.

<p>Recommendation 1. Develop a formula for funding that supports interdisciplinary research programs like IRES. In parallel develop arrangements with existing departments to allow each core faculty member to contribute to undergraduate teaching in a partner Department/Faculty, while IRES remains the research and graduate training focus for its faculty.</p>

- **Uncertainty in Administrative Structure in which IRES will operate.**

Throughout the review process, there was a lot of discussion regarding the review of the College for Interdisciplinary Studies (CFIS) and whether it would survive a restructuring. It was not our charge to examine CFIS but we did hear concerns about the future of CFIS raised repeatedly. We think it is critical that, whatever decisions are made about restructuring CFIS, an administrative structure be established that supports the excellence that has been achieved by IRES.

One option we heard repeatedly is that IRES and its RMES graduate program could be moved to an existing Faculty where it would be similar to a department. We believe this model would quickly erode the strength of the program for several reasons:

- a) First, IRES achieves a level of 'broad' interdisciplinarity³ that goes beyond the typical model of a small team of researchers assembled to cooperate in a course or research project. The ongoing, daily interaction of faculty and students from multiple disciplines around common problem/issue-focused projects leads to wholly new conceptualizations and approaches. This is why this small Institute has been so productive, attracts such strong students and has made UBC globally recognized in environment / sustainability research. The small faculty teams focused on a project are useful and in most

³Broad interdisciplinarity involves interaction across the more deeply-rooted conceptual and cultural boundaries, such as those between the districts of natural/applied and social/human sciences. The distance between the participating fields has a profound effect on the nature of interaction. It contrasts with 'narrow' interdisciplinarity that involves disciplines that are more similar to one another.

universities they can emerge while researchers sit in a conventional Faculty. IRES is accomplishing something broader and more enduring that complements and facilitates project focused teams and that could not be accomplished if it were located inside a Faculty.

- b) Second, no traditional university Faculty includes a balanced mix (or even critical mass) of physical, social, and biological scientists as well as engineers and humanities scholars. Thus any existing Faculty will be an “alien” home to at least some of the IRES community.
- c) Third, many of the students with whom we spoke were adamant that they would not have come to UBC to enrol in a program in a conventional Faculty. Giving IRES an identity as a department within a Faculty would make it unappealing to this very talented group of students.
- d) Fourth, while we heard repeated commitments to interdisciplinarity by everyone with whom we spoke, we also heard of many very serious barriers to interdisciplinary work beyond the level of the ad hoc collaborative team. Treating IRES as a department within a Faculty would entangle IRES in these difficulties and corrode its ability to foster deeply interdisciplinary work.

Recommendation 2. To support and enhance the broad interdisciplinary nature of IRES, it will be important that IRES either remains within a Faculty/Centre that has a primary commitment to interdisciplinarity, or that IRES reports directly to the VP level (possibly through an associate VP for interdisciplinary research and training.) The review team did not feel that the unique interdisciplinary culture within IRES could survive and thrive with a governance model that involved IRES reporting through one or a few traditional Faculties.

- **Building communities rather than bridges.** The cartoon we have included from a U.S. National Academies report illustrates the problem in a humorous way⁴. It is reasonably difficult to build bridges across the silos of existing Faculties. But while bridges allow some traffic across communities, they rarely lead to a new and innovative community and the creativity and productivity that comes with it. Indeed, in some cases bridges only heighten tariff barriers.

In contrast, IRES has created a world class interdisciplinary community of such strength that it already attracts volunteer work from 33 researchers from eight Faculties. Indeed, with added resources IRES could easily use this mechanism to serve as a catalyst for building University wide faculty networks that would strengthen work both within and across Faculties on the major IRES themes. This in turn would pre-adapt UBC for competing in major initiatives in environment/ sustainability



⁴ FACILITATING INTERDISCIPLINARY RESEARCH, Committee on Facilitating Interdisciplinary Research of the Committee on Science, Engineering, and Public Policy. National Academy of Sciences, National Academy of Engineering, and Institute of Medicine of The National Academies. The National Academies Press, Washington, D.C., 2004. Available on-line through http://www.nap.edu/catalog.php?record_id=11153

as they arise.

Sustainability is a clear priority at UBC, and new senior leadership at the university provides an opportunity to build on this priority by making a strong statement of support for IRES.

Recommendation 3. To preserve and enhance the kind of real world learning and teaching environment in IRES, the President, Provost/ VP(A) and VPR need to formally make clear that IRES is in a priority area for the university (especially given the importance of sustainability at UBC), and then set up governance structures that will not only allow them to survive, but to thrive.

2. Funding for Administrative support.

IRES has a dedicated and talented group of support staff who are well appreciated by all faculty and students with whom we spoke. However, it faces two substantial and related challenges. Internal procedures have been established to make management of budgets and the graduate program more efficient and effective, but IRES seems understaffed for the size and complexity of its programs. *Simple faculty to staff metrics are misleading given the nature of the program.* Managing interdisciplinary graduate programs is far more time consuming than managing undergraduate or even disciplinary graduate programs. IRES staff are managing a large number of graduate students per faculty FTE, since about half of the graduate students in the RMES program are supervised by faculty associates, who do not count towards the IRES faculty FTE. Thus the ratio of IRES staff to IRES FTE does not adequately reflect the workload.

We concur with the Self-Study prepared by IRES in the need for a modest increment in administrative staff. This would allow IRES to become more efficient and effective. At present, job splitting and part time help leads to inefficiencies as a staff member switches across tasks (or across units). More important, the requested increase in staff budget (~\$50K/yr extra) would allow more effective communication via the web and other media. This is essential if IRES is to further enhance UBC's reputation in interdisciplinary research on environment/ sustainability.

Recommendation 4. Given the number of graduate students being managed, and the work loads on current staff, IRES staffing budgets should be increased by \$50K/yr. With this increase, the entire staff budget should allow for 1.0 FTE for an administrative manager, 1.3-1.5 FTE for the graduate program coordinator, 1.5 FTE for the finance office, and 0.7 FTE for communications and IT support.

3. Structure of faculty appointments.

There are a number of problems with current arrangements around the structure of faculty appointments in IRES that has meant that the Institute is less effective in delivering on its mandate than it otherwise might be

a) IRES faculty appointments

To create the critical interdisciplinary community of scholars focused on real-world questions, IRES made the case that it would be a mistake if the number of core or seconded faculty in IRES were to grow larger than about 15 individuals. With a larger group, there are likely to be cliques or sub-groups develop that would undermine the interdisciplinary focus of the unit. The review committee discussed this at length and ultimately agreed with the concerns of IRES.

Because of its complex history, faculty have joined IRES with a mix of appointments, linkages to other Faculties and responsibilities. We believe a consistent model is needed for future appointments, one that clarifies the responsibilities of new faculty to IRES and other units and specifies responsibility for promotion and tenure. We did not detect any specific problems with recent hires but feel that a clear model for new hires would strengthen the links between IRES and other units.

The problem would be greatly improved if all faculty supported from IRES funds (8.5 FTE, total) actually did work with IRES and the distribution of workloads and responsibilities across units was clarified. Due to events in the past, there are some IRES core faculty who provide much or all of their research, administrative and teaching activities to other Faculties on campus but whose salary/ FTE resides in IRES. We were told by more than one Dean that it is extremely difficult to move budgets between Faculties at UBC so apparently this problem has persisted.

In other cases, we believe existing Faculties, IRES and UBC overall would benefit from faculty being “seconded” to IRES from other units for limited terms, typically 3-5 years, but sometimes shorter periods. This would strengthen the links between IRES and other Faculties and facilitate interdisciplinary work. The flexibility of a partial appointment for a finite term allows great flexibility to match changing faculty interests and the evolution of the real world problems on which IRES focuses. The promotion and tenure decisions for these faculty would remain with the Department in which they hold their primary appointments.

The matrices below illustrate the two kinds of appointments we envision might be appropriate for IRES.

Table 1. Core faculty in IRES with a career commitment to interdisciplinary work

	IRES	Other partner unit
Appointment, promotion and tenure decisions	Primary	Advisory
Salary	100%	0
Teaching	70%	30%
Administrative	100%	0
Research	100%	0

Table 2. IRES teaching faculty seconded from partner Departments / Faculties for multiple years

	IRES	Other partner unit
Appointment, promotion and tenure decisions	Advisory	Primary
Salary	25-49%	51-75
Teaching	25-49%	51-75
Administrative	25-49%	51-75
Research	25-49%	51-75

b) Number of Core and Seconded Faculty.

Given the size and quality of its graduate and research programs, IRES is stretched to the limit. If it is to play a larger role in the University and to realize its potential as a catalyst for work in environment/ sustainability, then it will need to grow. Evidence of the potential is already there as IRES faculty play leadership roles in the overall University sustainability initiative and in the emerging program in engineering and policy. More could be done, but only if IRES has more faculty and an appropriate level of staff support.

Overall, we recommend that IRES should work to secure an active group of Core + Seconded faculty of about 15 individuals, representing perhaps 9-11 FTEs. The majority of individual (6-9) would be Core Faculty (= 6-8 FTEs) while another 6 or so individuals would be seconded at 0.25 to 0.49 FTE each.

Recommendation 5. Support faculty in IRES who have made a career commitment to interdisciplinary research and teaching by ensuring that IRES has the majority influence on their annual review, tenure and promotion decisions. One way of doing this would be to budget IRES for 100% of the salary of such core faculty appointments. In such appointments, a partnership arrangement would need to be made within a more traditional Department / Faculty. In exchange for a Cross-appointment in that Department / Faculty, the IRES professor would be expected to teach an undergraduate course each year. The partner Faculty would not need to pay for this service. Other than undergraduate teaching, all other professional responsibilities--graduate teaching and mentoring, research and administrative duties-- of each faculty member would be in IRES. The partner Faculty/Department would have input into the annual report, tenure and promotion decisions. The review team felt that IRES needed 6-9 such Core faculty appointments (6-9 FTEs).

Recommendation 6. IRES should also be encouraged to tap into interdisciplinary expertise across campus, not only for graduate student supervision but to help with teaching and administrative work in IRES. One way of doing this would be to allow IRES to second faculty from other academic units where the faculty members hold their primary appointments. A typical secondment would be in the range of 25 to 49% where IRES would be expected to pay for that proportion of the faculty member's salary + benefits. Secondments would be for 3-5 years, and IRES would get the benefit of that portion of the faculty member's time for teaching, administration and research. The annual review, promotion and tenure decisions would rest with the partner faculty, with input from IRES. The review team felt that IRES needed about 6 such positions, so assuming a 33% secondment for each, there would be a total of 2 FTEs used for these secondments in addition to the 6-9 Core appointments.

4. Graduate Student support

Lack of regular predictable access to TA-ships is an issue raised by many of the graduate students, both in terms of financial support and in terms of opportunities to develop teaching skills.

Recommendation 7. Departments that benefit from having an IRES faculty member teaching in their undergraduate program should commit to providing an appropriate number of TA opportunities for RMES graduate students on an ongoing basis. (Departments whose faculty members supervise RMES graduate students should also be encouraged to do the same)

D. Opportunities for IRES and UBC

UBC has committed to sustainability as a University wide priority. It is not a coincidence that the leader of that effort was drawn from the IRES faculty. IRES has created a culture and mechanisms for collaboration that are among the strongest we have encountered at any university in North America. It is attracting world class students and the faculty are widely acknowledged as global leaders. Thus IRES provides a level of excellence in research and graduate education that is the essential complement to UBC's sustainability priority. And via the strong engagement of faculty associates, IRES has demonstrated that it does not act as an isolated "elite" unit but rather as the hub of networks for faculty collaboration. Because of IRES

UBC is widely acknowledged as a leader in interdisciplinary problem focused (transacademic) research and graduate education. As the world increasingly acknowledges the necessity of such an approach to complement more traditional disciplinary work, the reputation of and resources for IRES and UBC are certain to increase.

E. Threats to IRES

IRES faces a number of routine challenges that are part of the evolution of any academic unit. The two that can be anticipated in the short term are:

1. the possible emergence of several policy programs that engage key IRES faculty and that overlap, to at least a small degree, with current IRES activities;
2. the change in the form of engagement of the Fisheries group with the RMES graduate program;

In our opinion, IRES will be able to develop strategies to engage with these changes in a constructive way. However, there is a larger threat that, as we have noted, could lead to a loss of UBC's leadership in interdisciplinary research and education in sustainability—forcing IRES into an inappropriate governance structure. We have detailed our assessment of this threat above. Here we simply note that over the last several decades a number of major universities, feeling uncomfortable with innovative institutional arrangements, have “restructured” leading environment, resources and sustainability programs. In our experience this has usually led to the weakening or even dissolution of these programs. It has taken those universities many years and substantial investments to begin to recoup what they lost.

F. FINDINGS of the Review Team

Finding 1: IRES is arguably the strongest environment/ sustainability program in Canada, and ranks among the top 10 in North America.

Finding 2: The strength of the program comes from *regular interaction* around *use-focused* research problems and teaching by faculty who *span the physical, ecological and social sciences*. Nearly all major research universities argue for the importance of interdisciplinary research. However, in our conversations outside of IRES, interdisciplinary research often seemed to be interpreted as small teams of a few faculty members from 2-3 disciplines working on a specific project or series of projects. This is a basic form of interdisciplinary research and we have no doubt that it is common within and across the disciplinary Faculties at UBC. However, this is far different from the sustained interaction among a critical mass of faculty from multiple disciplines who are professionals committed to “real world” or use focused research. It is this feature that gives IRES its continental strength.

Finding 3: The very high quality graduate students attracted by the program come because of *the inter-disciplinary use-focused* character of IRES research and teaching.

We conclude that whatever institutional arrangements are developed in the future, they need to attend to these key features of IRES else the program will be greatly weakened and UBC will fall from a top ranked position in environment/ sustainability research and graduate education. Seemingly simple organizational arrangements, such as considering IRES as a small department that could be housed in an existing Faculty, will very likely cause harm to the key features of IRES that give it its strength.

Appendix 1. Meeting Schedule for Review team

March 21, 2011
Michael Burgess, Principal, CFIS Hugh Brock, Associate Principal, CFIS
Anna Kindler, Vice Provost and Associate Vice President Academic Affairs
Gunilla Oberg – IRES Director
IRES faculty: Terre Satterfield Tony Dorcey Kai Chan (via Skype) Leila Harris Mark Johnson Scott Hinch
Gage Averill, Dean, Faculty of Arts Curtis Suttle, Associate Dean, Faculty of Science
IRES faculty (cont.): Tim McDaniels (via Skype) Milind Kandlikar

March 22, 2011
Nicholas Coop, Director: University Sustainability Initiative (USI) Teaching and Learning Office Orion Henderson, Associate VP Campus and Community Planning David Woodson, Managing Director, Building Operations
Murray Isman, Dean Land and Food Systems John Innes, Dean, Faculty of Forestry Benjamin Richardson, Associate Dean, Faculty of Law
Rhodri Windsor- Liscombe Associate Dean FoGS
IRES/RMES students
IRES Alumni
IRES Staff
Program Director – Gunilla Oberg
Wrap-up meeting with Hugh Brock

April 4, 2011
John Robinson (via telephone conference)

Appendix 2. A Consideration of Governance Alternatives for IRES and the RMES Program

We heard of several models for the future administration of IRES. These are summarized here with comments

1. **A revamped CFIS.** The advantages for IRES of being in a unit like CFIS are significant. The truly interdisciplinary nature of CFIS has allowed IRES to attract the desired students and faculty, many of whom would not have come to IRES if it were attached to a single disciplinary Faculty. We believe that the position of IRES in an interdisciplinary administrative structure has been critical to the exemplary success of IRES. Since there are no specific plans for such a new version of CFIS it is very difficult to know or predict how this arrangement would influence IRES.
2. **House IRES in an existing faculty,** essentially converting it to a conventional department with a focus on sustainability. It is hard to see how this model would be successful. It would be difficult to maintain the engagement of Associated Faculty who are vital to IRES under this model. It would identify IRES and its programs with a single Faculty. Nearly every graduate student we spoke to about this issue said they would not have been interested in a program strongly associated with a single Faculty. Further, since no Faculty has critical mass in both the natural sciences and the social sciences let alone the other disciplines with which IRES engages, the culture of any one Faculty might be corrosive to the highly interdisciplinary problem focused approach of IRES.
3. **IRES Reports Directly to the VP Level.** An alternative that seems more effective to us is to create an administrative structure that would nurture the strengths of IRES and make it even more effective in contributing to teaching, research and outreach. To do that, we have attempted to identify some key design principles for IRES. The goal is to:
 - ✓ continue to attract world class faculty to IRES. Without exception the faculty noted that the reason they were in IRES was because of its interdisciplinary nature.
 - ✓ continue to attract world class student to IRES. Virtually without exception, the graduate student we met said the appeal of IRES was its interdisciplinary character.

To continue to engage such faculty and attract such students:

- IRES must maintain its own brand as a unit focused on interdisciplinary, use-inspired research.
- Students and faculty must be housed in a common space to allow the “think tank/ advanced studies institute” style of interaction
- Governance must engage multiple deans but should have a direct report at the Vice President level. Deans differ in their support for interdisciplinary work, it is unlikely that any Faculty will have critical mass in all the disciplines represented in IRES and Dean’s priorities change over time. Thus giving a single Dean sole responsibility for IRES is not appropriate for the continued excellence of the unit. We suggest a governance structure involving a council of multiple deans, chaired either by a VP or Associate VP with responsibility for fostering interdisciplinary research and co-chaired by leading decision maker from the community to advocate for the use inspired research approach of IRES. The Michael Smith Laboratory may provide an example of such an administrative structure. Many other universities deploy this model effectively.
- The structure of IRES appointments, especially new hires, should follow a model that supports the strengths of IRES, while strengthening connections with existing Faculties and allowing for undergraduate teaching by faculty and support for teaching experience and assistantships for IRES students. This could be accomplished by a responsibility matrix such as in Tables 1 & 2. IRES would be allocated faculty lines and would form partnerships with departments in existing Faculties under this model.

Appendix 3. Answers to specific questions

1. An overall assessment of the unit including

a. How well it fulfills its vision and mission statements

IRES is doing an exceptional job of carrying out its mission and achieving its vision (details in earlier sections).

b. How the unit compares with other similar units nationally and internationally and ways in which it is unique

IRES is arguably the strongest environment/ sustainability program in Canada, and ranks among the top 10 in North America (details in earlier sections). The sustained interaction among a critical mass of faculty from multiple disciplines who are professionals committed to “real world” or use focused research is the unique strength of IRES.

c. The extent to which the unit is fulfilling its interdisciplinary mandate with regard to

i. integration across academic disciplines

ii. interaction with society and

iii. academic rigor.

d. The climate for research and academic exchange

e. Major successes and shortcomings of the unit to date

The interdisciplinarity of IRES can be measured in a number of ways, including the range of publication formats and journals in which its results are published, the number of collaborators in other Faculties, or the range of students who are attracted to the RMES program. By any of these measures, IRES is not only fulfilling its interdisciplinary mandate, but is setting the standard other units will strive to achieve. The output of IRES faculty and RMES students is of exceptional quality and diversity. This has been achieved through the evolution of a climate and culture that is exemplary. It is this culture of collaborative, problem focused research, with rules and norms about how to work together effectively, that is the major success of IRES and that yields its high productivity and continental leadership. Current internal shortcomings are minor and grow from a lack of resources and the fact that the integrated administration of the unit is only a few years old and still evolving.

2. Is the Unit adequately Resourced?

a. Are the faculties, space and other resources adequate to support the unit's endeavours?

b. Please assess the state of human resources within the program (faculty, research associates, staff, other). Is the faculty complement sufficient to ensure excellence? If not, what appointments are advisable? Is staff support sufficient?

IRES is not adequately resourced in terms of staff. We find that the traditional formula of staff FTE per faculty FTE is not an adequate indication of the staffing needs of a unit like IRES. Interdisciplinary programs are more complex and difficult to administer, and the ability of IRES to support the large and highly successful RMES program with such a low faculty FTE is due to the large number of associates who contribute to the student supervision and training, but do not count towards the faculty FTE and do not contribute to the administrative requirements of this program. The current staff and the faculty are carrying an exceptionally large work load.

3. Has the Director provided effective leadership? What would you recommend the top priorities be for the next Director?

It is clear that IRES is in much better shape than it was at the time of the last external review. As noted above, IRES is the result of a succession of mergers and ongoing evolution that continues to this day, and so procedures and styles of governance and management that are decades old and taken for granted in many units are still unfolding in IRES, and continued attention to these internal issues will certainly be necessary. But the major challenges for the next director will be dependent on the organizational home of IRES, and given that this is not settled, it is hard to make specific recommendations.

One ongoing challenge for any IRES Director will be to find effective ways to help Deans develop a better understanding of and more routinized ways of interacting with IRES. It is clear that at the moment more engagement with the Faculty of Law would be desirable, but the specific focus of these engagements will change over time as Faculty interests evolve.

4. Does the unit fulfil an important role in the university and the broader society?

IRES makes the University a leader in graduate education and research on environment and sustainability. Further, IRES could serve as both a model and as a hub for future interdisciplinary collaboration around its thematic areas. It is a model of effective mechanisms for reaching beyond the campus. Thus IRES and its faculty could be of help in many emergent interdisciplinary initiatives such as the policy programs being discussed. But for IRES to maintain what it has done, let alone expand its role, it will need expanded resources, and most critically, a set of institutional arrangements that structure incentives for Deans and Faculties to insure that the IRES style of interdisciplinary work can be sustained.

5. Where is the unit specifically positioned to go in the future, and how?

If adequately resourced and in particular if an administrative structure supportive of interdisciplinary research can be established, we anticipate that IRES will continue to rank as perhaps the top environment/ sustainability program in Canada and one of the top 10 in North America. As the value of broadly interdisciplinary problem focused research is increasingly recognized, IRES will continue to be a jewel in the UBC crown. However, if an appropriate administrative structure is not developed, all that has been achieved could be lost, leaving UBC with a university wide emphasis on sustainability but without a world class graduate and research program in the area.