Reviewers' Report on the Department of Biology Unit Review

Submitted June 28, 2017, by:

Dr. Sean Rogers, University of Calgary
Dr. Richard MacLennan, University of Regina
Dr. Judy Anderson, University of Manitoba

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Review Documents & Site Visit

The review committee consisted of Dr. Sean Rogers (Associate Professor of Ecology & Evolutionary Biology at the University of Calgary, and Acting Director of the Bamfield Marine Sciences Centre), Dr. Judy Anderson (Professor & Head of Biological Sciences at the University of Manitoba), and Dr. Richard MacLennan (Professor & Head of Psychology at the University of Regina). Prior to the site visit, the review committee was provided with the Biology department's self-study report, including Appendices I to VIII.

- Appendix I consisted of the CVs of Biology faculty members and laboratory instructors.
- Appendix II consisted of Biology department refereed publications since 2006.
- Appendix III contained a description of the Biology department's undergraduate programs.
- Appendix IV was a list of undergraduate courses.
- Appendix V was a history of courses taught by members of the Department of Biology from Winter 2006 until Fall 2016.
- Appendix VI was a breakdown of student enrollments in Biology undergraduate and graduate programs on the census date from Fall 2010 to Fall 2016.
- Appendix VII was a compilation of student convocations in all Biology programs from 2002 until 2016.
- Appendix VIII was a brief printout describing the Biology department's budget for the 2015-2016 fiscal year.

The review committee was also provided with additional documentation after the site visit. This included:

- A report on the Biology department's curriculum review, including the detailed changes
- A list of the Biology department's committee memberships
- Lab manuals for Biology 100 (Intro), 205 (Intro Genetics), and 266 (Plant Physiology)
- A link to an online manual for BIOL 305 (Genetics)
- A link to a web-site for help with preparing lab reports
- An overview of BIOL 101 (Intro #2) labs and sample lab materials
- Lab manuals for BIOL 302 (Food Microbiology) and 310 (Microbial Diversity and Cell Function)
- Summaries of the Biology department's discretionary budgets from 2007-2008 to 2016-2017.

The review site visit took place on April 27-28, 2017 after an orientation dinner among the review committee members the prior evening of April 26. The site visit included:

- A breakfast meeting with the Provost & VP Academic, Tom Chase and VP Research, David Malloy
- A meeting with the Dean of Science, Doug Farenick
- A meeting with the Head of the Department of Biology, Harold Weger
- Individual meetings with Biology faculty members Mark Vanderwel and Britt Hall
- A meeting with Luther College Biology faculty member Mary Vetter, and the Dean of Luther College, Volker Grefienhagen
- A tour of Biology research labs with Harold Weger and Chris Yost
- An *ad hoc* tour of labs in the Institute of Environmental Change & Society (IECS) with Tzu-Chiao Chao
- A meeting with the Dean of the Faculty of Graduate Studies and Research, Thomas Bredhol

- A meeting with the Biology graduate coordinator, Chris Somers
- Individual meetings with Biology faculty members Daniel Gagnon and Kerri Finlay
- A meeting with two members of IECS, Tzu-Chiao Chao and Gavin Simpson
- A tour of teaching labs with Harold Weger, Heather Dietz & Nola Erhardt
- A group meeting with undergraduate students Una Goncin, Shayna Hamilton, Corey McCowan, Joel Steve, Danae Sunchan, and Paignton
- A group meeting with graduate students Ade Ajayi, Mohamed Anas, Gabriel Foley, Anastasye Kisheev, Eva Lopez, Kelsey Marchand, and Lindy Whitehouse
- A social meet-and-greet with various department members
- An individual meeting with faculty member, Josef Buttigieg
- A tour of the aquatics lab with faculty member Richard Manzon
- A meeting with First Nations University of Canada Biology faculty member, Fidji Gendron
- An individual meeting with Biology faculty member Peter Leavitt
- A meeting with Associate Deans Science Nader Mobed (Undergraduate) & Cory Butz (Graduate)
- A group meeting with members of the Department of Biology
- A group meeting with Lab Instructors: Heather Dietz, Nola Erhardt, Mel Hart, & Lauri Lintott
- A meeting with the Curator of Vertebrate Zoology at the Royal Saskatchewan Museum, Ray Poulin, and the Clinical Director of the Saskatchewan Disease Control Laboratory, Paul Levett
- A meeting with post-doctoral fellows Jordyn Bergsveinson, Nicole Hayes, Marianne Jacobsen
- Individual meetings with Biology faculty members Mark Brigham and Andrew Cameron
- A post-review meeting with Provost VP Academic, Tom Chase and Associate VP (Academic & Research) Dena McMartin

Overview of the Department

The Unit Review document gave a brief history of the department/institution, an analysis of strengths, weaknesses, opportunities, and threats, and very useful appendices (CVs, courses taught in past decade, list of UG courses and teaching roster term by term, program by program course requirements, program by program tally of graduand by year). The Department is one of 6 in the Faculty of Science, and is recognized (by the Dean "as perhaps the strongest and most successful" department) for its high-quality research, a lot of excellent teachers, and a generous spirit in academic service to the University, community and professions. The Biology Department is the second largest in the Faculty, and has the second-highest number of BSc Majors students. Along with teaching programs, the Biology Department is considered to provide a very large component of service teaching related to Nursing programs.

The Department offers Master's of Science and PhD degree programs as well as BSc programs (Majors and Honours) in Biology (2 areas: cell and molecular biology; ecology and environmental biology), Environmental Biology, Biology-Geography (Biology-Biochemistry and Biology-Statistics are now closed to new students), and Environmental Sciences (with First Nations University of Canada in 2 areas: Indigenous environmental sciences and Environmental Health and Science). The Department graduates about 25 undergraduate students and 6 graduate students per year, and provides service teaching to the Faculty of Nursing (3 large enrolment courses) via video link to 3 locations (Regina, Saskatoon (Saskatchewan Polytechnic), and Swift Current's Grenfell College). In addition, many Biology courses are required in other programs (e.g., Biochemistry, Chemistry, Environmental Biology, Enviromental Geoscience, Psychology BSc, Environmental Systems Engineering, Bachelor of Education, etc.). Biology

has many of the strongest students in the Faculty of Science undergraduate programs, and aims to maintain or increase that strength. Students receive advice from student advisors and all first-year students are encouraged or required to get advice before they register; as well student records can be flagged so they get particular attention if a problem is identified. The Department is also known to have the lowest number of reported cases of academic misconduct in the Faculty.

The Department made a tactical decision to drop the idea to sustain broad strengths across fields of traditional biology (to include mycology, botany, etc.), and instead has particular strengths in cell and molecular biology, ecology, and microbiology. This has shaped recruitment and inspires members of the department to do well in both teaching and research. The Department mission is "all about finding resources" and everyone has learned to be opportunistic to some degree, although finding resources is a major planning issue, particularly with the uncertain fiscal future of the University.

Notable strengths

- Aims to be the best Biology department in Canada
- The Department's research focus is strong and has brought many successes, including a CRC Tier I (Peter Leavitt was just renewed), two CRC Tier 2s (Chris Somers and Chris Yost) and new NSERC Discovery Grants (Kerri Finlay and Mark Vanderwel)
- Infrastructure (space and equipment)
- Very dedicated administrative staff support with the flexibility to support programs and Head
- Institutes that formalize research initiatives
- Research Scientist appointments with the opportunity to be Adjunct profs, get NSERC DG funding, and supervise grad students in addition to providing service (administration of funds, equipment maintenance, graduate student mentorship in statistics, etc.).
- Three CRCs in a small department bring strong mentorship and amazing resources of equipment, space, infrastructure, and connectivity with experts, worldwide.
- Engaged students
- Programming with First Nations University of Canada
- Variety of programs to open opportunities for students in conservation, microbiology, clean-water sustainability,
- Revised curriculum so classes were more homogeneous in student composition (2^{nd}, 3^{rd}, 4^{th} yrs.) to reduce bimodal grade distributions
- Faculty members generous with administrative and community service (according to Dean)
- Collaboration with other academic units (Nursing, etc.) and medical researchers in community and also contracts with regional and Provincial agencies and industry
- Members of the department contribute to sustainability and environmental goals of University
- Potential for contribution to indigenous goals of University (e.g. clean water in First Nations communities)

Review Topics & Recommendations for the Department of Biology

Governance & Leadership

a. Establish more formalized committees to guide the undergraduate and graduate studies programs, for backup and also for sustainability of programs and institutional memory. This also helps distribute the administrative work of the Department.
b. Representation of graduate program on FGSR Council should be the program coordinator rather than the Department Head.
c. There should be parallel govenance at the Faculty of Science level for undergraduate programming; it was not clear whether different departments connect on major initiatives and sharing of resources in programming.
d. Consider revising the role of Research Scientists including the scope of work that they can conduct and contribute, as part of a goal to foster professional development, generally among members of the institution. Similarly, the review team learned that there is a Teaching Instructor stream that could be used to appoint academic staff who can teach lectures and laboratories with out expectations for research. The institution seems not to have utilize that approach to covering some major demands for teaching. This might help address some of the hard budget decisions that face the institution.
e. Embrace the strengths in pedagogy provided by Laboratory Instructors, who are members of the academic staff, but feel somewhat marginalized despite their major contribution to the experiential learning priority of the Department.
f. There is a need to ensure the sustainability of the undergraduate- and graduate-level teaching AND research programs in context of current and projected budget constraints (very likely to restrict recruitment prospects) and changing opportunities. It is not clear how the Department could respond to a large (5%) cut to the Faculty of Science budget, along with cuts to graduate student scholarships.
g. The Department and Faculty should consider more mentorship for faculty toward applications for tenure and promotion to support career progression and success. The practice of faculty meeting annually with the Dean for feedback was reinstated last year, and academic staff found that helpfully constructive.
h. The Department should consider how to achieve more gender balance and cultural diversity among faculty. The Department should prioritize exploring how to direct outreach into indigenous communities (e.g., through NSERC PromoScience or NSERC Engage programs, or institution-wide CREATE proposal). It would be useful to involve Fidji Gendron (from First Nations University of Canada) more in the Biology department on campus, such as by encouraging/supporting her in recruiting a graduate student in ethnobotany or bioactive compounds through CIEE.
i. It was not clear how research institutes at the level of the Faculty of Science are an advantage. Is there is funding from the Faculty that establishes preferential access to institute members for resources such as overhead funds and contracts? The review team learned that the Faculty of Science strategic research plan includes the institutes. This has brought some administrative support for CFI proposals, technical support (2 Faculty-based technicians), and overt priority for sustaining the infrastructure of institutes. As the structure of institutes seems to affect opportunities for members of the department, it would be useful

to consider how best to use the Faculty's limited resources to avoid potential conflict with other resource needs in the Department.

j. The institution is well aware of the urgent need and challenge of "finding" baseline positions for CRC chairs whose terms are ending. This is a significant leadership issue for the University of Regina that should not be allowed to impact the Department of Biology programs or the complement of academic staff. There may be bridge funding available for the institution, or means of distributing the salary costs across Faculties, so the impact is attenuated and phased out over time.

Department planning and vision

The Department undertook a strategic review of the undergraduate curriculum with resulting launch of a revised curriculum in Fall 2016. This undoubtedly utilized and also contributed to the strong teamwork among academic and technical staff toward teaching. There are other aspects of departmental activities that would benefit by similar strategic planning. The review committee heard that faculty positions, budget and retirement will "regrettably impact the evolution of the department in the next 5 years". The review team provides the following comments related to planning, toward helping to the department advocate strongly for human and fiscal resources to minimize that impact.

a. The Department would do well to regularly review their vision of programming priorities. A five-year plan could help to identify how well the department's teaching programs integrate with their research activities and priorities. This would be particularly useful in developing different scenarios related to 'no new recruitment' and 'no new money'. Such contingency planning should at least involve every member of the department in considering priorities and help build lines of communication that would carry the department's institutional memory into the next decade and beyond. Sustaining administrative support will also be important in achieving the planned activities.

b. Consider developing new programs and institutional collaborations, in view of the perceived limitations in capacity. The funding of positions that currently covers costs of teaching to other institutions and colleges might grow through initiatives to collaborate and build on research engagement with students elsewhere in Saskatchewan.

c. It is not clear how funds from indirect-costs-of-research monies (a proportion of Tri-Council grants) or overhead from industry and government contracts are directed, and whether or not that allocation is to institutes, departments or Faculties at the University of Regina.

d. The Department's vision of promoting indigenous knowledge in Biology/Science is not identified, and could be much more overt (or more developed) at the department level.

e. The reviewers encourage the Faculty of Science to foster professional development opportunities for department heads, such as attending the meeting of CCUBC (Canadian Council of University Biology Chairs) for leadership in the Department of Biology. The Head can share the Department's concerns/issues (e.g., with impact of budget constraints) and receive advice on governance, budgets and resource allocation, and curriculum planning from heads/chairs at other institutions, since many may have had or are currently having the same challenges.

f. The Department Head should consider delegating some key functions to share the work of administration that constrains energy for teaching and research, which in turn frustrates the

effectiveness of his contribution as a respected leader. The Head's generous style of leadership, in giving service to others and offseting their service load, is much appreciated by academic staff. However, ultimately the distribution of administrative duties and skill development can help build institutional memory and give the Head the back-up that is so useful in challenging times. The strong group of faculty and staff in the department, and their creative insights, diverse backgrounds, and strengths can really help the Head address/manage both anticipated and unexpected challenges in the next 5-10 years. Teamwork will further advance the unit's prospects to lead in the Faculty and University, as well as nationally and internationally in research, and also build a platform that helps sustain the institution and the unit as more people will know what it takes to succeed in administrative service on behalf of others.

g. The Department needs to identify the outcomes it desires for its graduates, including proficiency in general principles of scientific literacy, methodology, curiosity, and experiential learning (such as in the lab and field). The review of curriculum in 2014-15 was a great process, and could continue through a mapping exercise, to help to identify the work and life skills that students can expect to acquire in each course outline. This should be a Faculty of Science initiative in general.

Staffing and Teaching Assignments

Collegiality in the Department is very high, and this is a major asset – there are 'self-starters' in the Department, which benefits overall from the collective ingenuity, strong commitment to teaching and research, and long-term research initiatives in the region (e.g., Qu'appelle valley ecosystem). Two CRC Tier 2s are coming offline (one in 2017 and one in 2018), and will return to 'regular faculty' duties with expectations for greater teaching loads.

a. Consider cross-appointment of FNUC faculty to increase graduate student opportunities, help constrain teaching duties (currently seem excessive for FG, and help tap into the Environmental Biology program (which was not described by the department). This would be in line with the recent MOU that has encouraged stronger linkages between the Federated Colleges and the University of Regina (e.g., for graduate student supervision).

b. Laboratory Instructors are appointed in unique framework of roles under the University of Regina Collective Agreement. They are talented instructors and highly-valued by the department for lab instruction, development and knowledge and application of pedagogy and technologies. The department could benefit even further from their collective expertise and teamwork, for example by having them give teaching workshops for new research faculty. The Department might also consider appointing 2 of the Lab Instructors to be Instructors, so they can deliver courses (lectures) rather being somewhat marginalized to lab instruction. They work well together, and cover one another's roles as needed, often working very long hours from their dedication and commitment to the programs. It is unfortunate that Lab Instructors feel excluded from some of the requests for input to and decision-making in the department. The reviewers observed that very few faculty members overtly recognized their contributions and had less interaction with the lab instructors than the review team had expected.

c. Research Scientists in IECS are apparently each appointed in a complex funding scheme (with historical sources that may have changed). They are excellent scientists on their own merit and contribute to graduate student mentoring and advising; one has also garnered independent research funding. One is working to sustain operations of a delicate cell-sorting equipment without having a sufficiently high level of expertise; this situation is frustrating to the students, other research faculty and especially to the individual involved. Consider redefining their appointment roles/expectations, to recognize their skills and potential as a resource to teaching, and include them more in the regular discussions of the unit. It would be useful to profile their expertise and current research by inviting them to give seminars to the Department (e.g., Mel Hart recently gave a Science Pub presentation). We learned that there is a push to become unionized, which may impact the type of duties that can be assigned to Research Scientists.
d. PDFs are insecure about their positions, benefits, employment status (under the Canada Revenue Agency), funding, and scope, and are trying to unionize. The institution is working on understanding and resolving this uncertainty, but it may be jeopardizing the effectiveness of work that should be focusing on career development toward industry/employment or academic positions. There is little funding from the institution or department to support PDF travel to conferences, and PIs have not fully covered conference-travel costs, which means PDFs are using their own funds for research-related networking opportunities. This is a general issue nationally, but certainly important for every individual PDF. As the imminent next generation of faculty and professional scientists, we need to ensure it is possible for them to be effectively creative and innovative in research and also to have an adequate living.
e. The Department/University should establish or update Memoranda of Understanding (MOUs, or whatever it takes) to further develop the strong advantages of collaborating with scientists at the Royal Saskatchewan Museum and the Saskatchewan Centre for Disease Control); they are enthusiastic teachers (and gain exposure to potential students through teaching), and are very keen to offer research and employment opportunities to students (building future employees for their workforce). Six curators at RSM were suggested as available to teach up to 12 courses (6 and 6, on an every-other-year basis) in areas related to botany and systematics, ecology, paleoecology, ethnobotany, etc. This resource could be invaluable in programming, and build a route toward employment for students. This would also bring indicators of success for the University of Regina, in building the workforce of highly-skilled personnel for the Province.
f. Consider sharing seminars and even video/Skype-linked lectures or discussion groups for graduate courses with University of Saskatchewan, to foster graduate-level programming, and broaden experiences through networking.
g. Strongly advocate that Luther College should pursue a replacement position for Mary Vetter that would serve the needs of two programs: a position in Bioinformatics/Computational Biology would help fill an area of high demand in the Department and also contribute to needs for teaching (and research) in Computer Science. In addition, the challenges for Luther College to find start-up funding and teaching release for new recruits suggest that there may be some creative solutions possible for sharing resources with the Faculty of Science and the

Biology Department (e.g., research facilities such as the IECS lab for visiting scientists, indirect costs funding, USRAs, TA-ships, etc.).

h. The Department will not be able to achieve gender balance or cultural diversity in full-time faculty without opportunity for new hires. Females seem to dominate in the student population, in contrast to the low proportion of female faculty. As well, junior female faculty seem to have large commitments to service and teaching, although junior faculty expressed that good role models (e.g., more senior faculty) are generous in mentoring them, especially in grant writing.
i. The Department tries to balance priorities with the need for teaching service courses and required courses, and teaching assignments are made in relation to research activity (including sabbaticals), and the need for teaching continuity especially in core courses. They should also consider whether rotating faculty through large-enrolment courses might balance the assignment of large and small courses and specializations.
j. Some teaching capacity (approximately 1.5 courses per year) will be recovered with the end of 2 CRC terms. While minimizing or eliminating the use of sessional instructors for teaching is a laudable aim, the Department may need a few new sessional instructor appointments, given the low likelihood that there will be new recruitment of tenure-track faculty to replace impending future retirements. Possible budget cuts could also affect the number of TA hours and TA-ships (supporting graduate students) which in turn would affect program delivery and the learning experience for undergraduate students.
k. The Department previously decided to focus on strengths rather than attempting to sustain the full scope of Biology subjects (in research expertise and for teaching). In part, this focus resulted in the two specializations in undergraduate programming (molecular and cell biology, and environment and ecology). The Department works together to capitalize on opportunities, and uses the integration of research and teaching to reinforce the level of energy and passion for both. However, the successful practice of handling budget cuts by "doing more with less" may require revisiting the list of strengths and priorities on a regular basis.

Undergraduate program

The Biology department offers high-quality BSc Majors and Honours degrees. They also offer degrees in Environmental Biology in association with other institutions (e.g., Saskatchewan Polytechnic, and Lakeland & Lethbridge Colleges, First Nations University of Canada). In addition. Biology champions experiential learning, to have students see first-hand "how science really works", as crucial to undergraduate programs. It was refreshing to meet the undergraduate students, who were very enthusiastic about their studies. Out of the six students, three were interested in becoming professors, two were interested in studying medicine, and one was interested in conservation work. Bioinformatics, combining biology and computer science, seemed to be an emerging field of interest to some students. Students appear highly engaged, attending department seminars and volunteering in research labs. Students find professors accessible and faculty know students' names. There are many resources posted online for students, including instructions on how to write a lab report and take records in labs. Lab Instructors are a strong team, and have designed lab delivery to help students successfully achieve

proficiency in the desired learning outcomes. The expertise of Lab Instructors is also providing mentorship in teaching for new faculty.

There was oddly, very little on the design of the undergraduate program in the self-study document. Interactions with the Federated Colleges were not profiled as a particular focus, although the individual faculty from FNUC and Luther College were highly committed to the success of students in the Biology programs.

Strengths in the programs, curriculum, and teaching are recognized at the institutional level. The Curriculum Committee recently engaged the Department with a review of the curriculum, and recommended significant changes that were implemented in the fall of 2016 to address findings that there were too many core requirements, particularly in second year. The changes appear to have made the programming more understandable to students, have fewer core courses (dropping introductory microbiology course which was resource-heavy for labs), revised some course requirements for the two streams, re-ordered courses, and made second-year courses more accessible to students in their second year. There are still many lab courses in the first 2 years of the undergraduate program, and together with additional assignments, this brings a fairly heavy workload for students and for academic staff teaching the courses. The review team encourages the Department to continue to examine how the learning outcomes for the courses contribute to the intended learning outcomes of the BSc program through use of a curriculum mapping exercise. This would further clarify directions for students and academic staff and help shape the students' expectations of their experience in the program, and the list of work and life skills that they would acquire in their undergraduate program, for application in graduate school or in any employment role. In addition, we noted opportunities for additional program strengths.

a. Building capacity and supporting infrastructure for animal experimentation will help recruit and train students who wish to pursue advanced studies in medicine, optometry (at Waterloo), and veterinary medicine.
b. Department labs may be a useful tool for recruiting high-school students into the University of Regina from the local area, and possibly help bolster competitiveness with University of Saskatchewan for recruiting students. It might be useful to conduct some exit interviews with graduating fourth-year students to get a retrospective overview of the transferrable skills they've learned during their time in the Department's programs. Assignment of such outreach activities would have to be balanced against demands of workload particularly to Lab Instructors would likely have excellent insight into the attractiveness of lab- teaching materials, since few research-active faculty come to the labs.
c. Laboratory teaching in upper-level courses allows students to learn in groups of about 9-30, whereas the second-year genetics lab is very packed. If enrolment pressure continues, the Department may need to increase the cap on labs for some courses.
d. Consider communicating opportunities for research lab-work or course-project experiences for second-year students, given that many do not realize to ask a faculty member in advance for consideration of such experiences. A designated undergraduate advisor could provide information sessions regarding honours program and consider holding a department open-house.

e. Maintain and increase fieldwork opportunities for courses and program, given the strengths of ecology researchers in the department. There seemed to be some opportunities available to use the Cypress Hills Field Station for the field component of a variety of courses. Add a fieldwork course to the program (at least as an elective, and possibly required for the ecology/environment concentration). This might be taught on a rotating basis, and would bring skill development, integration, and life and work/research skills, and also build further research opportunities (and TA opportunities) for students.
f. Actively foster collaboration to incorporate indigenous knowledge and/or perspectives into relevant areas of coursework in programs; we learned there are 6 courses that have done this, but faculty are not informed about what that is and how input was provided.
g. Adding an upper-level bioinformatics course would be a valuable addition to the undergraduate program, perhaps with input from the skilled CIEE Research Scientist who is now essentially advising research students on statistical analyses. Alternatively, the CIEE resources could be integrated into the undergraduate program, to include courses on quantitative biology and bioinformatics. A hire through an affiliated (federated) college such as Luther College, in this area, would satisfy computer science and biology initiatives for faculty recruitment/renewal, and certainly would be attractive for students as there is such high demand for ~~such~~ these skills in the workplace and in research.
h. The large proportion of Luther College's registered students in Fall 2016 (42% were registered in the Faculty of Science) who are aiming toward pre-professional programs (e.g., medicine or medicine-related fields, according to the Dean's email to the committee), seems to be strong justification to carefully consider how best to designate the subject area of the position to be vacated with the retirement of Mary Vetter.
i. Technical and logistical challenges in the teaching of Anatomy and Physiology remotely using televised classes for the Faculty of Nursing, need to be addressed. With this being such a large commitment in faculty (particularly one new faculty member who has just received NSERC DG funding), it would be useful for the Department/Faculty to consider hiring a lecturer or instructor specifically for these high-demand service courses in order to sustain the programming.
j. The size of classes as well as the number of classes taught should be factored into assignment of teaching loads or at least in performance reviews of faculty members. This seems additionally important with the separation of lecture teaching from laboratory teaching, and the restrictions in teaching that derive from the Collective Agreement (CA). The CA seem to distinguish: a) expertise in pedagogy and teaching as a scholarly activity within a distinct cohort of academic staff (Lab Instructors are not "faculty" *per se*), from b) expertise in areas of course content as would be delivered in lectures by "research-active" faculty. However, this has not apparently detracted from the quality of the courses or teaching, as faculty are creative in making labs work within available resources and are dedicated to teaching (often working very long hours, without feeling they can take any time to "be sick") to ensure everything is done to facilitate student progress.
k. Feedback to faculty on teaching has a very low response rate (~10% using the online tool). Consider reverting to paper surveys or have faculty do the evaluations by surveys in class. [There is an optical scanner available for student evaluations of teaching in the Psychology department on campus.]

l. Lab Instructors form a strong team that is invaluable for the department and to student learning. They feel they have their "dream jobs", and their dedication contributes a strength of to the department. However, Lab Instructors feel somewhat marginalized from the Department despite putting in very long hours, improving teaching, helping students to manage their time to complete projects, managing the department's website, developing new teaching approaches (flipped classes and team-based learning, designing stage-by-stage learning from one course to the next), doing research into pedagogy, and providing online resources for students. The department should consider how to bring Lab Instructors into the camaraderie of the faculty, establish better connections between lecture and laboratory teaching, and welcome lab instructors more as partners in the academic enterprise. We heard that the Department gives lots of thought about how to get labs to complement lectures, even if students don't appreciate the overall design of the programs. A major strength of the Biology programs is the hands-on experiences in laboratories, so the value of laboratory instruction should help foster the recognition of laboratory instructors as full citizens of the Department.
m. Teaching of core/required courses would benefit from team teaching in some instances, to help cover delivery of instruction when a member of faculty is on sabbatical.
n. The review team encourages the department to continue striving to revise laboratory teaching so students get even greater direct exposure to how science works. That emphasis should be more obvious in the program design that incoming students see when they are considering coming to the Department/University. This could also further increase the Department's competitiveness with University of Saskatchewan and other institutions.

Graduate program

The Biology Department offers both MSc and PhD programs with excellent research opportunities from the Faculty. Since the graduate program design and goals were not outlined in the unit review document, our comments are based upon a lack of knowledge of the program, except for that gleaned in the team's discussions with faculty, graduate students, and the Acting Dean of FGSR. In addition, the Acting Dean of FGSR was new to his role and did not have a lot of information on the Biology department (time-to-completion rates, etc.). However, the Dean noted that the Department is good at building an academic, research, and social community for graduate students. However, one limitation is that there are no study carrels available for Faculty of Science graduate students.

Overall, from the Department Head, graduate coordinator, and graduate students themselves, there was a general sentiment that students need to have better and more guaranteed funding, and that the level of this funding needs to last through the entire degree period. FGSR funding to the unit depends on a calculation of the 3-year rolling average of graduate student numbers (full-time) and has been conservative on the lump-sum guarantee to Faculties. The Dean of FGSR noted that graduate student populations have increased markedly (by ~25% in 4-5 years) with significant growth in the number of international students. He also indicated that there are annual progress meetings for graduate students to provide formal feedback to students from advisory committee members. There is currently no goal at the University of Regina to change the balance of MSc to PhD students. The review team has the following specific comments.

a. The Graduate Coordinator (currently Chris Somers) should be the representative to the FGSR committee, rather than the department Head, so the Coordinator can be more readily aware

of ongoing issues and give input from first-hand knowledge of graduate student and graduate program issues. This would not require a change in the FGSR governance, as graduate coordinators serve on FGSR in other departments.

b. There are no required, common courses in the Biology graduate program. Consider establishing a required course that is graded (rather than pass/fail) to help students gain breadth in biology-related topics, for example in statistical/quantitative methods. This might utilize strengths of Adjunct appointees who hold Research Scientist appointments, as well as colleagues in other departments with expertise in statistics, mathematical modeling, etc.
c. Continue to improve the sense of community among graduate students in the Department. While students are grouped in labs or institutes, a core or shared area for graduate student carrel spaces (e.g., as available for students in the Faculty of Arts, according to the Dean) would help build a department-wide sense of community. [Perhaps one of the 'dry labs' that is now used primarily for fieldwork equipment storage could be used.] This is important, especially for students who might be supervised by adjunct faculty (e.g., the current member of the department from Luther College serves on committees but was hesitant to take graduate students as they would be separated from the rest of the graduate students in the department). It seems an unaffordable luxury to provide a suite of small rooms for graduate students in one lab, when the space is less than fully used and does not bring students together from different labs/research programs. Ideally, the space would include an area for quiet study/writing, where a computer could be secured, and would be separate from a room for socializing and eating.
d. Graduate students enjoy their interactions with BUGS and learn from undergraduate students, but expressed that benefits were more social than toward their own professional growth. They expressed a desire to get practice doing peer review or giving constructive comments/feedback to others. This would serve them well in any career endeavour.
e. Encourage graduate students to have teaching or work experiences as part of professional development during training. Few of the graduate students we met even dream of becoming professors, in contrast to strong ambition expressed by undergraduate students, who aim at finding a career that combines teaching and research.
f. Consider using Graduate Teaching Fellowships (GTFs) and University Teaching Fellowships (UTFs) to fund senior PhD students to teach courses as sessional instructors, and to enhance their prospects for academic careers (see CUPE 2419 agreement, Appendix A sections 2.1 & 2.3, respectively).
g. FGSR should notify faculty members, generally, that the accreditation program for junior faculty members (related to the allowable level of independence at graduate student supervision, rated A to D) is ending. This will be highly important for developing grant applications and identifying individual strengths in programs to train HQP (Highly Qualified Personnel). It will apparently help advisors recruit elders to have a role in graduate student supervision.
h. Although there is some lab-safety training for graduate students, there is also a need for safety training for fieldwork (e.g. first aid, etc.) that addresses specific risks to students.
i. The Dean of FGSR indicated that the Faculty was working to try and accommodate graduate students with disabilities. He also revealed that is anecdotal evidence that graduate students in general are coping with mental health issues, with an increase in leaves of absence and

course deferrals. The review team learned in confidence that counselling services (e.g., related to mental health issues) works well and is really helpful.

j. Although not specific to Biology, the Dean of FGSR reported that there has been an increase in plagiarism among graduate students resulting in course failures, RTDs (required to discontinue), and appeals associated with academic dishonesty. This will be an ongoing issue, as it is in many institutions.
k. Some of the Advanced Topics graduate courses seemed to be scheduled on an *ad hoc* basis, as needed to accommodate students' interests. Other graduate courses are a hybrid with an undergraduate course. These factors may create problems for students, as it is not ideal to have hybrid grad/undergrad courses on a graduate-student transcript.
l. Graduate course teaching should also be considered a part of a faculty member's normal teaching load, for example when there is a large-enrolment graduate course. However, this needs to be balanced against requirements to deliver courses in the undergraduate program.
m. There seems to be encouragement for undergraduate students to seek out graduate training elsewhere (away from the department at the University of Regina). The department seems to have a traditional approach to graduate education. It would be useful to consider that this tendency (to send students away after they complete one degree) may have long-term implications for student recruitment, and place the Department at a disadvantage (retaining students with strong research skills), in comparison to other institutions who aim to retain students for further training (possibly by transferring from a Master's to a PhD program without defending the MSc).
n. Consider developing a graduate program manual and graduate orientation session (e.g., a workshop with the graduate coordinator, the staff person supporting the graduate program (either from the department or FGSR), and representatives from the graduate student society) or a similar mandatory class. Such orientation would help the department develop a graduate student cohort and help orient and establish students in the program, especially international students. It would also introduce students to the go-to people in the department/FGSR and increase student awareness of services available on campus (e.g., mental health and other resources).

Research and Infrastructure

The Vice-President Research provided some graphs of publications (#documents) and normalized citation impact of Biology research, compared across 7 "Comprehensive Universities" said to be of similar size (Guelph, Waterloo, Victoria, SFU, York, Regina, New Brunswick). The graphs related to "biology" seem to show very low relative productivity and approximately "average" impact within that specific set of universities. Graphs related to "environmental sciences" (which could include work conducted and published by faculty in the Biology Department) show similar trends. However, this may be an incongruent comparison. Our interpretation of the performance data from the VP-Research is that Biology's research productivity is good, considering the small size of the department. We saw a department with a very strong record of research achievements having regional, national, and international impact in areas of fundamental and applied investigations. The Department identifies itself in two of the institutional Research Clusters, namely: a) Water, environment and clean energy, and b)

Integrated human health: equity, disease and prevention. This is achieved through work related to its internal strengths and collaborations, both internally and externally. Other observations follow:

a. The Department shows very strong research productivity - 10 members of faculty in the department have active NSERG Discovery Grants, and many publications are listed as deriving from work by students at the graduate and undergraduate levels, as well as from faculty and collaborators. Without knowing the full amount of funding coming to the Department through Tri-Council awards, the review team is aware that the University of Regina would be receiving additional revenue through the Indirect Costs of Research program. Those funds would be a source of resources for allocation to the Department of Biology to support and bridge transitions in funding levels (e.g., the end of CRC appointments), and to help address the need to increase graduate student support. This will be especially important in the next 5 years, as faculty renew or re-start applications for NSERC DG funding, as the level in NSERC funding changes, allocation of NSERC PGS awards diminish, and declining funding success-rates continue to alter the funding landscape. To maintaining the currently strong level of research funding, the department will need to pay attention to any further drop-off in grant writing efforts and grant success, particularly as the biggest constraint on research funding is the low level of graduate student funding.
b. The Department should also foster collaboration within the unit, as some researchers feel they have virtually no internal collaboration. Collaborations within the broader university community may be useful in that instance, and 'rescue' research productivity and excitement helping to connect faculty with one another as colleagues with shared interests (e.g., in neuroscience and animal experimentation). External reviewers were interested that the Head of Psychology (Richard MacLennan on the review team) did not know there was an animal facility in Biology, although he was at the University of Regina when the facility was closed in 2003. A research cluster in integrated health might build a new strength in the Department and give opportunity to other departments to share recruitment and address needs for teaching expertise.
c. Having an animal holding facility brings huge opportunities for student training in research, and their subsequent entry into professional-education programs and employment. We learned that many students in the optometry school in Ontario come from the University of Regina, directly through their experiences in research using animals in the facility (directed by Joe Buttigieg). This facility could be used strategically to increase profile of University of Regina's Department of Biology.
d. There is amazing infrastructure available, with lots of space and remarkable equipment, particularly but not limited to the labs in the new building. However, the equipment in ICMS is already a challenge to maintain and service, despite the assignment of particular research scientists to that task; this will be an increasing challenge to maintain and fund. The Department needs to work closely with the Dean and VP Research to make a plan for resources to continue to cover equipment service contracts at the end of CFIs and CRCs.
e. The nearby resource of scientists at the Royal Saskatchewan Museum and the Saskatchewan Centre for Disease Control could inspire graduate student opportunities in systematics, curation, microbiology/infectious disease, and environmental sciences and consulting. The Department/Faculty could build further on these opportunities.

f. The aquatic facility is also a strength (directed by Richard Manson), and could be used to great advantage by other researchers and also to attract and sustain engagement of more students, including indigenous students (and their home communities) in aquaculture, environmental biology, water quality, fisheries, and ecology. This would also bring opportunities for partnerships (industrial, and with FNUC), and also grow the 3 programs that were not strongly identified in the review report: 1) BSc Environmental Biology (Majors and Honours) program that runs in conjunction with Saskatchewan Polytechnic, Lakeland College, and Lethbridge College; 2) the BS Biology-Geography program; and 3) the BSc Indigenous Environmental Science (IES) and Environmental Health and Sciences (ENHS) programs.
g. There have been laboratory renovations in some areas (e.g., lighting, benching, floor, seating, projectors, sinks), while others are either in progress, or in desperate need of upgrades. In one lab, a leaky roof has led to numerous (9!) catchments-with-hose arrangements. This University-wide issue is bound to reduce faculty and student comfort in their approach to work. Consider ways to address infrastructure repairs, as water damage and old benching will affect safety ratings and limit the scope of lab exercises in the associated courses.
h. Consider ways to increase graduate student funding and ensure that the guaranteed minimum is for longer than 1 year without jeopardizing the grant-in-aid level of NSERC Discovery Grant funding.
i. Consider developing a CREATE program in an area of strength (e.g., chemical/environmental security under IECS); this would further strengthen that area of research and also ensure competitive stipends to attract 'the best' graduate students. This would be valuable, since student recruitment is an issue for some PIs.
j. Consider granting teaching releases to junior faculty members with their first successful NSERC application as a PI. Release time allows faculty to strongly launch their research programs and HQP training initiatives, early in the grant cycle. Such teaching releases are available through collective agreements in other institutions in Western Canada.

Service

Members of the Department contribute a lot of service, and in doing so, they make a major investment in the institution. At every level, the institution is heavily reliant on the willingness of Biology faculty and staff to "pitch in".

a. Career development and career progression should clearly recognize the major contributions to serving the programs of the department and institution, as they are essentially a sacrifice toward the greater good. For example, Joe Buttigieg has spearheaded re-opening the animal facility; headship responsibilities are at significant cost to research programs; and work by graduate and undergraduate coordinators requires ongoing attention to detail for every graduate, Honours, and Major student. It was not clear that such service is recognized sufficiently highly to encourage (or reward) ongoing contributions.
b. Staffing of the department with one administrative assistant, seems to satisfy needs, although there is heavy reliance on sharing duties to cover vacation and sick days. The level of staffing cannot be reduced at all, without significant impact on the department.

Communication and mentorship

a. Faculty are finding out about FGSR and UR decisions indirectly (e.g., accreditation of supervisors, graduate scholarship funding changes) or not at all. Consider ways to more directly involve relevant parties in decision-making processes, such as by involving the Graduate Committee Chair on the FGSR Council (see above).
b. One suggestion was to highlight student success stories more, both within and outside of academia. There was some inclusion of this in the self-study, but this should be advertise more widely among students and the general public.
c. Students indicated that counselling services were accessible and very useful at the University of Regina; faculty members should be aware of the availability of the service in order to pass on this information to students.

Future Unit Reviews

The review committee received correspondence and documents well in advance of the site visit, and the logistics and schedule were well coordinated by the Provost's office and the Department. However, the University's very transparent process (documents are all available on the website we were provided) omitted to include the expectations of reviewers for this report. We did receive~~d~~ a copy of a previous external review (Department of Physics) near the end of the site visit itinerary.

a. The Self-Study Review document needs more structure, possibly with a template that explains the topic and depth of the self-study in various sections. For example, this might include: department vision of itself ("to be the best" was not overt in the self-study); program directions and learning outcomes; graduate program requirements; teaching awards; tabulation of graduate and honours student numbers by faculty member over past 5 years, professional development initiatives~~;~~ service awards to faculty members; Excel-file tabulation of research funding by year/PI/HQP/teaching load/service, etc. Much of the documentation received during or after the site visit (especially the Curriculum Committee's internal review report implemented in Fall 2016) would have been valuable to reviewers in preparing for the site-visit discussions on curriculum, course content, and program structure and design. A checklist of documentation available for the unit undertaking a Unit Review would likely be helpful to Departments. Similarly, it would help to have a template to guide the reviewers in providing the report of the Unit Review.
b. Although a Unit Review might seem 'simply paperwork' that can be mustered by a few individuals, it would be useful for the University to consider how to foster more broad input to the unit self-study documents. It was not clear how contributions to the Unit Review were distributed, although we learned there were about four runs of editorial input. The document seems to have been written by the Department Head with request for input from various members of the department, but without a process designed to be objective for reviewing programming and staffing, budget allocations, teaching assignments, departmental strategic plan/vision for the future. Few individuals met by the reviewers had written sections of the self-study or done more than briefly edit parts of the text despite the drafts being circulated many times. The structure of a self-study working group might be designed by the Provost's office, to ensure that all members of the department are asked for input into the parts of the department's activities that are relevant to their work assignments and contributions.

c. During the site visit of a program review, consider having group meetings of review team with undergraduate and graduate committees or research-concentration groups, to focus discussion on the respective key issues. While it is valuable to provide one-on-one discussions, the 15-minute interviews can be awkward to bring to focus rapidly on problematic issues (as may exist). The department group meeting was valuable during the Site Visit, as was the social gathering with members of the Department on Day 1.

Summary

The Department of Biology is dedicated and very active in teaching, research and service. Department members are successful in program delivery ensuring student success in their studies and in research. This is especially impressive considering the relatively small size of the Department. The programs, passions, and infrastructure for research are impressive. Student input to the reviewers indicated they are generally happy with their programs and research. The undergraduate teaching program was recently revised internally. **These summary comments are the basis of our positive assessment of the Department of Biology**.

Overall, recommendations above are related to sustaining and improving the teaching programs; sustaining and building research strengths, facilities, and focus; building further partnerships and collaborations; maintaining the faculty complement; and professional development.

We encourage the department and institution to plan on holding another Unit Review in 5-7 years (rather than waiting 17 years), to help sustain the momentum and benefits of the processes of self-evaluation and feedback. Ongoing evaluation of whether expectations and goals are attainable with currently available resources will help make effective allocations of budget and positions as the Department responds to change. For instance, relationships with federated colleges and affiliated institutions (e.g., for various partnerships in delivering BSc programs). Provincial funding to the University, research funding, research priorities and opportunities nationally and internationally, and expectations of students and academic staff for their career trajectory, all evolve over time. The Department is committed to mentorship of faculty (early-career and established) toward increased grant funding, and in attracting excellent students, research trainees, staff and faculty. Although there is concern in the department and at FGSR and the Provost's office that impending budget constraints will have a detrimental impact on research and teaching programs, the dedication of department members should help build further success and raise the profile of the Department and University.