

The Future Station: Sustaining Multidisciplinary, Community-Engaged Research, Teaching and Outreach at the Bonne Bay Marine Station



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Executive Summary

The Bonne Bay Marine Station (BBMS) is a prize asset of Memorial University. It actively contributes to the three University pillars: Research, Teaching and Engagement. Bonne Bay -- a small fjord on the west coast of Newfoundland at the base of the Great Northern Peninsula and in the heart of Gros Morne National Park -- is ecologically unique. It has a very wide number of marine habitats and species, ranging from sub-arctic to temperate. In 1969, because of this, the BBMS was established to take advantage of the exciting opportunities for marine research that it presented; at that time, it carried out research and training in marine biology. In 2003, with funding from the Atlantic Canada Opportunities Agency (ACOA), the province and Memorial University, the new station was transformed into a community-partnered institution with a formal mandate for public outreach. The new BBMS and its mandate were designed to support the development of the local economy, including tourism. As a result, the BBMS now offers a marine ecology field school with multiple courses that run between April and September. In 2011 it attracted almost 11,000 visitors who came to tour the visitors centre.

In 2007, the BBMS became the host institution for the Community-University Research for Recovery Alliance (CURRA), funded by the Social Sciences and Humanities Research Council (SSHRC) and many other agencies. The CURRA brought researchers and students from a broad range of disciplines, including the social sciences and fine arts, as well as a substantially expanded research agenda based on community-engagement. Since then, the CURRA and BBMS staff have added new layers to the Station's outreach through the development of a regular newsletter (the *Western Shorefast*), new, linked websites and FaceBook pages, community meetings, workshops and symposia; they also produce research reports with plain language summaries. Not only are the disciplines involved now much richer than before; so are the links to communities in Bonne Bay and other parts of the west coast of Newfoundland, as well as to visitors to the Bonne Bay region.

The CURRA promised SSHRC that it would use the funding to lay the foundations for keeping this kind of multidisciplinary community-engaged research, training and outreach in place after CURRA funding ended in 2013. Our strategy for doing this is called "the CURRA Legacy Project". This report, one part of the Legacy Project, is designed primarily to outline a *vision* for the future BBMS, for consideration and discussion by the Bonne Bay Management Committee, the Dean of Science and others at Memorial, as well as the wider community interested in the future of the BBMS. In it we review the history of the BBMS, highlighting changes since the CURRA began, and identify recommendations and their associated strategies designed to sustain and enhance multidisciplinary, community-engaged research, teaching and outreach at the BBMS of the future.

Our vision for the BBMS of the future consists of a globally unique, internationally renowned centre that provides almost year-round opportunities for multidisciplinary research and experiential learning in the form of multiple field schools and life-long learning opportunities appropriate to the unique setting and facilities at the BBMS and to the region within which it sits. The future BBMS will sustain and expand its engagement with public outreach including to schools and to the wider local community and the almost 200,000 annual visitors to the Bonne Bay region each year.

The 29 recommendations and associated strategies we offer for achieving this vision are modest, focused on the short to medium term, and based on lessons learned through the CURRA, through our examination of programming at other marine stations and research centres, and on discussions with key informants from the BBMS, from local communities, partner organizations and Memorial University.

The report recommends changes to the governance of the BBMS in order to lay the foundations for this *vision of the future*. It emphasizes the important role that the new Director with the requisite skills, will need to play in the proposed BBMS of the future.

We have shown, through the CURRA, the strong potential at the BBMS to build a dynamic, community-engaged, multidisciplinary program of research which is relevant to multiple stakeholders within and beyond the research area, and is also scientifically innovative. This is the kind of research that is needed to understand the complex realities confronting marine ecosystems and coastal communities in this province and around the world, and enhancing this kind of research at the BBMS will provide a way to begin to develop strategies for addressing those realities. Our report identifies ways to expand the faculty and graduate student research affiliated with the BBMS while maintaining the multidisciplinary and community-engaged approach achieved through the CURRA, and it also identifies funding options that could be used to help achieve these goals.

The BBMS summer biology field school is strong and also popular with those who complete the program, but the Station could be used more fully than it currently is during summer, fall and winter semesters and there is a real need for field school training in disciplines outside of Biology and outside of the natural sciences at Memorial's campuses that could also attract students from elsewhere. Already some marine stations in Canada and beyond include social science courses or specialized programming in areas such as science film-making. We have been unable, however, to find any that offer multidisciplinary, community-engaged field school programming where local communities provide input into the research students will undertake while in training, and have access to that research through outreach and engagement. In addition, none of the other

marine stations has a full program of social science and humanities field school options or of relevant life-long learning options including those involving the fine arts. Memorial and the BBMS have the capacity to establish this kind of programming. There is strong interest in offering such training among young faculty at Memorial (St. John's and Grenfell campuses) and interest, as well, from department heads in the Faculty of Arts.

The report proposes the BBMS offer at least three field schools during the summer and fall semesters (Biology, Marine and Fisheries Conservation, Social Science and Humanities), and offer specialized Lifelong Learning opportunities for researchers, students and the wider community during the winter semester including potentially in such areas as science film-making, underwater photography, science and art, radio documentary-making. With this rich array of experiential learning opportunities the BBMS will become a leader nationally and internationally in developing excellent and innovative teaching and learning capacity in marine/maritime studies. The need is both local and global. This kind of programming will meet local and global needs. Multidisciplinary research and training are needed that will address new policy requirements for multi-scaled integrated coastal management, ecosystem-based fisheries management, stewardship initiatives, and engagement beyond the university through research and teaching. Such a program will respond to the urgent need for new, excellent training and learning opportunities related to our oceans and coasts.

Public outreach – currently accomplished through interpreted tours of the visitor centre aquaria, partnerships with Parks Canada and local tourism operators, school programs and participation in community festivals – is a key and highly successful part of the current BBMS mandate. In recent years, the BBMS has become a hub for tourism development in Norris Point, boasting not only >10,000 visitors in 2011, but also direct engagement by BBMS staff in other outreach activities). The section of the report on public outreach points out that BBMS staff and the CURRA are already in the process of developing proposals to fund new outreach activities that could become part of core programming in the longer term. Among these are funding applications for new and more diverse displays at the visitors' centre, new 'on and under the water' programming for schools and a recent successful application to fund an inaugural 'Fishing for the Future' film festival to take place at the BBMS at the end of September, 2012. If successful, this kind of event could run every year or two on a regular basis. We also recommend an application for 'PromoScience' funding to develop discovery boxes, based initially on research completed under the CURRA program. Because a discovery box program would address one of PromoScience's key evaluation criteria, and address one of the key challenges of the region, it could become the basis of a strong application. Benefits for the BBMS could include funding to build upon existing outreach initiatives and to create a resource base of interactive outreach materials. Taken together, these strategies can make the BBMS the 'go to' marine station in North America and the rest of the world.

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1. Introduction

Bonne Bay, part of a designated UNESCO World Heritage Site, is a small fjord located on the west coast of Newfoundland at the base of the Great Northern Peninsula and in the heart of Gros Morne National Park. The bay is ecologically unique: it boasts a many different marine habitats and associated species, ranging from the sub-arctic to the temperate. That is why the Bonne Bay Marine Station (BBMS) was established there in 1969: it presents rich opportunities for marine research. The BBMS, which recently celebrated its fortieth anniversary by showcasing the treasures and resources of Bonne Bay (CURRA 2010), is a huge asset to Memorial University: it actively contributes to the three University pillars including Research, Teaching and Learning, and Community Engagement.

In 2007, the CURRA (Community-University Research for Recovery Alliance -- then a new 5-year program of community-engaged, multidisciplinary research and public outreach) was initiated at the Station. This initiative was funded primarily by the Social Sciences and Humanities Research Council of Canada (SSHRC) with supplementary funding from Memorial University and many other partner organizations (www.curra.ca). During its lifetime, artists, researchers, teachers, unions, fishers, social scientists, natural scientists, government agencies and community groups have worked together, designing and carrying out a broad range of multidisciplinary research relevant to local communities. They have conducted workshops and forums to discuss that research and communicated the results to the wider public and to policy makers through reports, community radio, theatre, newsletters and other media. The CURRA has also successfully sought funding for a wide variety of affiliated research initiatives and found the faculty, students and community representatives to carry this out. The original SSHRC funding for the CURRA was \$1 million. To date total CURRA-affiliated funding has exceeded \$2.5 million for research, graduate teaching, community engagement and outreach at the BBMS and in other parts of the west coast of Newfoundland. This work has made the BBMS a stronger, more multidisciplinary and more community-engaged research and training facility. It has done this by expanding the range of researchers and graduate students engaged with the Station, by identifying new research initiatives in partnership with community groups, by enhancing outreach and by attracting new sources of funding from a range of sources.

The CURRA has also been working with BBMS staff and others to come up with a vision of the BBMS of the future and to identify the organizational and financial requirements and options for achieving this vision. This report describes the vision we have developed. It also outlines a strategy for the short to medium-term future BBMS and some related recommendations designed to help achieve that vision. The BBMS clearly has the potential to become an internationally renowned centre for multidisciplinary, community-engaged research, training and engagement, given continuation of the existing support of Memorial, with

supplementary support from the federal and provincial governments, and the wider community. Realising this vision would make the BBMS unique among marine stations globally: it will possess the kind of programming we need to grapple with the complex social-ecological challenges that are confronting our marine ecosystems and coastal communities. The strategies and recommendations we propose for achieving this vision are based on lessons learned through the CURRA, on an investigation of programming at other marine stations and research centres, and on discussions with key informants from the Station, local communities, partner organizations, and Memorial University. We identify new programming and funding options to support community-engaged research, and a community coordinator at the BBMS. We are investigating and provide recommendations related to the additional teaching and community outreach programming needed to build upon the momentum and resources of the CURRA program, and upon the unique history and strengths of the BBMS and the western region of Newfoundland in which it is embedded.

1.1 History of Research, Teaching and Engagement at the BBMS

The BBMS began in a house in Norris Point over forty years ago as a small research facility, whose activities were focussed on academic teaching and research. Projects, undertaken by biologists and graduate students, were primarily biological, although research was also undertaken with Parks Canada on the biological, geographic and geological resources of the newly established Gros Morne National Park. The first academic course -- developed in response to student demand -- was on marine biology and initially researchers using the Station focused primarily on marine biology, oceanography and fisheries development. The first marine biology summer semester was developed in 1996 using a grant from the Vice President Academic's Strategic Fund. Since then the BBMS has offered excellent and well-subscribed undergraduate marine biology field school training along with some graduate training. These are very popular: students enjoy the experiential learning opportunities the Station provides. During these early years, community involvement with the station, although neighbourly, was limited and informal.

In 2002-3, a new community-partnered initiative, linked to the understanding that the new station had the potential to enhance the local economy by becoming a local tourist attraction, led to construction of the current BBMS facility. Letters from all town councils in the Gros Morne Region of western Newfoundland expressed unanimous community support for the new BBMS, and were central to the successful funding application to the Atlantic Canada Opportunities Agency (ACOA) from Memorial University and from the local community, represented by the Gros Morne Cooperating Association (GMCA). The BBMS is now equipped with teaching and research laboratories, boats and other equipment required for a marine biology field school, a multimedia lecture hall, library, aquaria and student residences: the Station is a world class facility. It provides in-kind

research support through its laboratory and marine sampling infrastructure, inexpensive accommodation and meeting space. In addition to marine biology students, the restructured Station began hosting students from Memorial University's Faculty of Education, Geography, Earth Sciences, Environmental Science and Environmental Studies, as well as from Nipissing University and some other Canadian and international universities.

The CURRA program of work, initiated in 2007, had a revolutionary effect on the BBMS. It brought to the Station researchers and students from a much broader range of disciplines, including the social sciences and fine arts. The CURRA also brought a community-engaged approach to research, and representatives of government, industry and community groups have come to be involved in the identification of research problems, in research design and in the mobilization of the results. This in turn has meant that researchers from many disciplines, including the natural sciences, have been introduced to this approach to research. Today, researchers using the BBMS come not only from Biology, Physics, Oceanography, Ocean Sciences, Environmental and Earth Sciences, but also from Geography, History, Fine Arts and Sociology, as well as from programs such as Memorial's new Interdisciplinary Ph.D. program.

Over the past five years, the CURRA has supplemented the BBMS outreach resources by providing the financial and human resources to produce the *Western Shorefast*, a regular CURRA/BBMS newsletter with wide circulation, resources for the development and regular updating of new BBMS and CURRA websites, and for community radio broadcasts, including help to establish permanent community radio capacity in the form of the Voice of Bonne Bay (VOBB) for the region. CURRA funds have been used to organize workshops and other kinds of public gatherings, reports in plain language of research and other matters, expanded outreach to elementary and high school students, and contributed to graduate student training. The BBMS and the CURRA both now have FaceBook pages that promote linkages to their work and websites, and have thus facilitated discussion in the wider community of fisheries and marine and coastal community issues.

As a result of all this activity, public outreach at the BBMS now includes programming displays and guided tours based on the discoveries of the researchers and students using the Station. Revenues from admission fees for public visitors, along with guided tour fees, have increased from \$26,000 in 2003 (8,000 visitors) to \$45,000 (almost 11,000 visitors) in 2011. Public outreach, moreover, is not only an important revenue source for the Station, but also an excellent channel for communicating the results of Memorial University research to the wider public, as well as enhancing public education about marine organisms, ecosystems and, more recently, about coastal communities.

The capacity of the CURRA to transform research, graduate training and public engagement with the BBMS has been vastly improved by funding for a part-time

community coordinator (Anita Best, who works out of the BBMS), a part-time *web-master* (who works remotely and helps maintain and update both the CURRA and BBMS websites), and a part-time *administrative staff person* (Janet Oliver who manages the CURRA finances and helps coordinate the overall program out of our St. John's office). Although the CURRA is now in its last year of funding, it is still very active: we recently received \$118,000 from SSHRC for public outreach that will add new programming to the BBMS in 2012. This programming will include an inaugural *Fishing for the Future Film Festival*, an international symposium on *Rebuilding Collapsed Fisheries and Threatened Communities*, and a *Radio Documentary Production Workshop* to be led by award-winning documentary maker Chris Brookes (www.batteryradio.com). Once initiated, the film festival and radio documentary training could become regular events at the BBMS.

1.2 Objectives for a BBMS program strategy

The people of Bonne Bay told us (during our recent public gatherings: viz. CURRA 2010) that the BBMS is a treasure -- a resource for the region and the province. Given support and guidance it can, in the future, become an increasingly integral, prized asset of Memorial University and Canada. It is already a striking (albeit frequently overlooked) asset of Memorial University that actively contributes to its fundamental pillars of research, teaching & learning, and engagement. Therefore, ways must be found to maintain and enhance this BBMS capacity by supporting its ongoing transformation into a dynamic, globally-unique facility showcasing multidisciplinary, community-collaborative research, training and outreach.

In what follows, we discuss the methods used to develop the vision and program strategy in the report and review the current situation. We then use the results of our background research to develop *recommendations for changes* in *four key areas* that will begin to transform the BBMS into a unique, centre -- utilized by many faculties at Memorial University and others -- for community-engaged research, multidisciplinary teaching, and outreach/engagement. These changes could achieve our vision for the BBMS, including activities related to the three 'pillars'. Opportunities that knit together research, teaching and outreach -- and build multidisciplinary research, training and outreach capacity based on a community-collaborative model -- are emphasized.

2. Methods

To identify relevant administrative, funding and programming opportunities for the BBMS of the future, existing documentation was reviewed, programming and funding histories of other marine stations and research hubs were considered, and members of the Memorial University community and CURRA research

partners were consulted. Bonne Bay documentation reviewed included spreadsheets detailing annual budgets and schedules, the 2003 Strategic Plan (BBMS 2003), the 2008 Strategic Plan (AMEC 2008) and files prepared for that review. Marine station websites and, if available, annual reports, histories, and information on governance structure were reviewed for the Bamfield Marine Science Centre (BMSC 2008), Duke University Marine Lab, Huntsman Marine Science Centre, Friday Harbour Labs (Mills and Hermans 2010), and Mote Marine Lab (Clarke 1969, Manhadevan 2010). Additionally, funding and governance structures of an environmental research and advocacy group (EAC 2010) and of a social science research hub (COHDL 2010) were reviewed, to determine if aspects of their funding approaches and governance models were appropriate for the BBMS.

Discussions with BBMS management and staff, researchers from the Grenfell campus, community partners and students were used to identify ways to strengthen the BBMS and sustain CURRA-like programs (Appendix I). Requests for proposals and eligibility criteria of different funding bodies were also reviewed. These are summarized in Appendix II, as is their possible utility for the BBMS and for future CURRA-like programs. Finally, a targeted survey of some Social Science and Humanities faculty at Memorial University's St. John's and Grenfell campuses (Appendix III) and discussions with 6 Department Heads were used to gauge interest in contributing to the development of a multidisciplinary Social Science Field School based at the Station.

3. Leadership and Organizational Changes

The current administrative structure and funding formula for the BBMS reflect the old model of a marine biology field school with some community engagement and participation from Grenfell. The development of sustained and top quality multidisciplinary research, teaching and outreach programming that cuts across campuses and faculties would be easier to accomplish if there were some changes to this structure.

The BBMS currently falls within the Faculty of Science and funds for the BBMS come from the budget of the Dean of Science and, for teaching costs, from the budget of the Biology Department. The BBMS is administered by a Director and Manager who report to the Dean of Science and to the Bonne Bay Management Committee (BBMC), which currently includes the Dean of Science, Director and Manager of the BBMS, the Vice President (Grenfell) or delegate, and the Executive Director of the Gros Morne Co-operators Association (which employs some of the BBMS staff). After the CURRA was established, Dr. Barbara Neis, the Principal Investigator of the CURRA and a sociologist employed in the Faculty of Arts, was offered a seat on the BBMC; this has helped her understand how the Station functions and given her an opportunity to report on the CURRA activities. At present, the committee meets twice annually, reviews reports from

the Director and Manager and provides advice, but is not tasked with overseeing or guiding the development of research, academic programming or funding.

The Dean of Science and the BBMS management have been very supportive of the CURRA, providing office space for the community coordinator at the station and for CURRA staff and graduate students at 202 Elizabeth Avenue in St. John's (which also belongs to the Faculty of Science). In return, the CURRA has provided research resources and fellowships to some students and faculty in the Faculty of Science and, through a Research Development Corporation Industrial Research and Innovation Fund grant that used CURRA equity to lever funds for some BBMS infrastructure. This informal approach to multidisciplinary collaboration should be replaced by something more formal in the future if there is to be enhanced and sustained multidisciplinary and multi-faculty/campus engagement with the Station. One way to do this would be to broaden membership on the BBMC as new faculties/campuses or units become involved, and to create new committees or subcommittees tasked with fund-raising and the development and oversight of academic and other kinds of programming. More formal structures have the advantage of increasing transparency and the potential for broadening BBMS engagement with the wider academic and non-academic community.

The BBMS is currently operating *under* budget, and existing courses are relatively full, but there is plenty of space for growth and change (particularly in terms of academic and other programming in the fall and winter semesters). The operating costs of the Station are paid for from external revenues, and by the Dean of Science. This is unlike other Memorial facilities, where core costs for heat, light and other operations are paid for by Facilities Management. Programming costs are generally paid for by the departments that offer courses at the Station, by research grants, and by students who pay for food, accommodation and lab fees. At present, MUN's Biology department is the main department paying for undergraduate and some graduate field school training at the BBMS.

Our review of the funding scenarios and governance structures of other field stations and research hubs indicates that a combination of core funding, donations, and project-based grants will be needed in the future. For example, at the Bamfield Marine Science Centre on Vancouver Island, the five permanent member universities are equity partners, committed to paying equal shares of the Centre's core funding. Project-based grants have been used to expand Centre facilities (e.g. Friday Harbour Labs, Mote Marine Lab) and charitable donations have been used to fund student bursaries and grants.

Since a primary activity of the BBMS is academic teaching, core funding will probably continue to come from Memorial University, as is the case for other MUN units engaged in teaching. The AMEC report (2008), however, suggested

that Memorial partner with other universities to support the BBMS. This would fit the Bamfield and Huntsman field station model where the Centres are affiliated with a number of universities, but both of these are primarily linked to biology departments. Developing broader and more multidisciplinary programming at the BBMS could follow a modified Bamfield model in which greater cross-departmental engagement from the St. John's and Grenfell campuses would mean that additional university partners would not be needed for core funding. However, in the longer term such partnerships might still be beneficial if they fitted with Station development and its long-term research, teaching, and community-engagement goals.

Funding for new field schools and for the related development of necessary infrastructure could come from other MUN faculties and schools such as the Faculty of Arts, or from multiple units (Arts and Grenfell, or the Marine Institute). However, in order to maximize not only programming but also the *coherence* of that programming and its quality, representatives from these units would need to be integrated into the overall governance of the BBMS. Furthermore, achievement of the vision for the BBMS outlined above would be greatly helped by dedicated fund-raising opportunities for student fellowships, research and outreach infrastructure and other amenities.

One of the benefits of an expanded BBMC is that there would be more available human resources to help guide the development of new curricula, identify new research opportunities and support fund-raising and other activities -- BMCC subcommittees could do this work. Fund-raising is already aided by an informal *Friends of the BBMS* in the region, which could be formalized, and perhaps expanded to other parts of the region or even the province. As per the extremely successful *Friends of the Garden* (MUN Botanical Garden), this group could be legally incorporated and play a crucial fund-raising and volunteer role for the BBMS. Given the goal of a community-engaged approach to research, with substantial outreach and wider community involvement in raising funds for the BBMS, it would make sense to include more community representatives on the management committee. The BBMC should also establish an Academic Advisory Committee (AAC) that would report to the Director and the BBMC and would involve representatives of units with substantial engagement in research and teaching at the BBMS (including, potentially, graduate student or BBMS alumni representatives -- see below, *Research and Teaching*).

The Director and Manager of the BBMS play crucial leadership and practical roles in the day-to-day operations of the Station and will be essential to achieving the new vision. The hiring of a new Director in 2012 presents an opportunity to create an appropriate (redefined) job description and ensure the successful candidate has the skills and background to move the vision forward. The current Director, Dr. Robert Hooper, carries a full teaching load and has had to dedicate significant amounts of time to dealing with the routine running of the Station and maintenance of its infrastructure. The expanded research program and outreach

achieved under the CURRA was made possible by the engagement and resources the CURRA principal investigator was able to bring to the BBMS: a strong research track record that included the building of multidisciplinary teams, success in developing and acquiring external grant funds, and teaching remissions linked to her appointment as a University Research Professor at Memorial. While the future success of the BBMS will obviously depend on the capacity to form similar fruitful collaborations, the new Director will be better positioned to achieve the new vision if there is an appropriate job description and he or she has a broad range of skills including demonstrated excellence not only in teaching and administration, but also in research, community engagement and championing the BBMS provincially, nationally and internationally. The new Director will also need the practical and administrative knowledge necessary to run a safe, effective field station that is involved in public outreach, teach effectively in that environment, build a dynamic, well-funded research program, and encourage and support the work of other researchers. This will require experience, and being strongly supportive of, multidisciplinary research that includes not only natural but also social sciences and humanities and fine arts. Clearly, carrying a full teaching load is not compatible with all these other duties.

If the BBMS moves in the direction of the new vision outlined here (turning itself into a globally-unique multidisciplinary community-engaged centre for research, experiential learning and outreach), it may also make sense at some future date to move financial and administrative responsibility for the BBMS out of the Faculty of Science to the offices of the VP Academic and Research or, potentially, the office of the President, because its cross-pillar range of activities and multi-campus engagement means that it will not fit well within any of the existing structures.

We therefore recommend:

- 1) the membership of the BBMC should be broadened to include representatives from the Faculty of Arts and other faculties and units with extensive involvement in BBMS programming, as well as a broader range of community partners;
- 2) the BBMC should play a more active role in developing and planning the research, teaching, outreach and fund-raising programming for the BBMS through the establishment of subcommittees in each of these key areas; and,
- 3) the BBMC should establish an Academic Advisory Committee. Its primary role would be to develop policies that will encourage engagement with the BBMS, and to manage the development of programming. The committee would call for and assess new course proposals, proposals for research initiatives looking for space and resources at the BBMS, and student

funding applications. It would review and evaluate the programming on a regular basis and provide advice and support to the Director and to the BBMC.

There is substantial potential for expanding and sustaining programming in research, teaching and learning, and outreach/engagement, but there are some infrastructural constraints (such as limited space for offices) that will need to be addressed over the longer term. ACOA may be willing to fund infrastructure development required to accommodate this programming in the longer term.

We therefore further recommend:

- 4) the BBMS Director and Manager jointly develop a proposal to ACOA along lines that will allow the BBMS to increase tourist visitation, enhance research and teaching capacity, comply with current government Health and Safety regulations, and contribute to the long-term economic and environmental sustainability of the region. This should be a partnered application with engagement by multiple government departments and other organizations.
- 5) the job description and advertisement for the new Director will need to reflect the multiple requirements of the job. Ideally, the new Director will have: a) a strong, independent research career and a track record of securing grants; b) experience with, and commitment to, multidisciplinary and community-engaged research; c) experience working in a field station environment; d) commitment to, and demonstrated skills in, teaching in a field school environment. He or she will welcome and encourage community engagement with the BBMS at all levels, and will have the leadership and communications skills that will facilitate action as a champion for the BBMS, within and beyond Memorial. It will be essential for the Director to have a reduced teaching load in order to fulfil all of these roles effectively.
- 6) as the BBMS develops into this globally-unique Station, consideration be given to moving responsibility and support for the BBMS to the offices of the VP Academic and Research, or to the office of the President.

4. Research

One of the overall objectives of this report is to explain the approach to research developed at the BBMS through the CURRA, and discuss why this would be an ideal model for future research programming. We also identify the people, processes, facilities and possible funding mechanisms needed to sustain (and

then potentially expand) such multidisciplinary, community-based research at the future BBMS.

4.1 Community-Engaged Multidisciplinary Research at the BBMS

Graduate student research at the BBMS, funded directly through the CURRA or through affiliated proposals it helped develop, increased substantially during the lifetime of the CURRA. Postdoctoral fellows, graduate students, Conservation Corps interns (often senior undergraduates or graduates) and a Natural Sciences and Engineering Research Council (NSERC) MITACS intern affiliated with the CURRA were recruited from Biology, Environmental Science, Sociology, Geography and the Interdisciplinary Ph.D. program. They were integrally involved in most of the CURRA research initiatives including doing research on species at risk (wolffish and corals); multiple aspects of fisheries governance and their potential role in rebuilding fisheries and threatened communities; anadromous trout migration patterns and recreational fishers knowledge of trends in catch rates; distributions of *Membranipora membranacea* – an invasive species; the reproductive value of different lobster conservation strategies; plankton species assemblages in St. Paul's Inlet; community environmental values and community sustainability in St. Paul's; cod migration patterns, local stocks and juvenile cod habitat in Bonne Bay; sustainable livelihoods; community food security research; and legislative and other barriers to promoting fisheries-tourism synergies in the region. These graduate students often had the benefit of working with multidisciplinary supervisory teams and also with community partners (as well as, in some cases, local steering committees). They were required to feed back their results to participants, and many have produced plain language reports and posters as well as theses and academic publications. We also invested heavily in mobilizing the results of our own and others' research through an interactive website, community radio, a newsletter, community meetings and workshops, theatre, art exhibits and other means and the related activities have often led to new research questions and proposals. Graduate students and researchers we interviewed emphasized the excellent facilities and unique environment for doing research at the BBMS but pointed out that few researchers, even within the Memorial University research community, were aware of research opportunities at the BBMS. Researchers commented on the need for research and accommodation space, particularly during the busy summer semester. Further, they commented that the process of applying for research space should be accessible and transparent.

Having an on-the-ground contact person, the CURRA Community Coordinator, was essential to the breadth and success of community-engaged research at the BBMS. The CURRA Community Coordinator currently acts as a liaison between communities, researchers and others at the BBMS and Memorial, through personal contacts, the interactive website, producing newsletters (summarizing ongoing research and regional issues), and involvement with research steering

committees. She has built important community contacts by taking leadership on her own initiative with (for example) the development of the Voice of Bonne Bay Community Radio Station, and (currently) by developing a network of west coast NL museums that will have greater capacity to protect and share the area's tangible and intangible (e.g., stories, songs, and recipes) cultural heritage.

We therefore recommend:

- 7) the BBMS management team streamline and make more open and transparent the process for applying to do research at the BBMS;
- 8) advertise BBMS facilities and resources within the Memorial University research community and through the Office of Research Services; and,
- 9) ask the Academic Advisory Committee for the BBMS (discussed above) to develop a long-term strategy for research planning and enhancement of research at the BBMS and for the adjudication of research proposals.

Once the CURRA funding is gone, people fear that the students will be gone (C. Mullins, pers. comm.). Therefore, developing funding sources to support or provide incentives for graduate student research over the long-term will need careful attention and leadership over the next few years. Initiatives aimed at increasing graduate student use of the BBMS facilities for research purposes detailed below are based, in part, on reviews of the programs at the Bamfield Marine Science Centre and the Duke University Marine Lab. There, student support is used to fund off-season use (during the fall and winter semesters). For example, Bamfield offers 6 scholarships for graduate students, ranging from \$1500 to \$6000. A four-month residency *between* September and April is required for the larger scholarships and encouraged for the smaller scholarships. Additionally, the Bamfield Graduate Society offers an award (accompanied by a \$250 cash prize) for timely publication of graduate research completed *there*. Awards similar to those offered at Bamfield would encourage graduate research productivity at the BBMS.

We therefore recommend:

- 10) that the BBMS and Memorial establish two types of student support for graduate research at the Station: incentives for (i) off-season research, and (ii) timely publication of research results.

Students and faculty, or the BBMS, could also apply for a grant to develop innovative public education and outreach materials based on research completed at the BBMS. SSHRC has an outreach grant programs and other Canadian granting councils are also funding knowledge mobilization/knowledge translation. A similar incentive program to encourage outreach is the *Canada-US Fulbright*

program, which encourages returning scholars to apply for small grants that support environmental outreach in their home communities (<http://www.fulbright.ca/alumni/program-opportunities/eco-leadership-program.html>). Such grants could help the BBMS maintain the diversity of outreach approaches developed under the CURRA, develop new programming, and encourage graduate students and others to develop outreach materials and innovative feedback mechanisms so that research results (student and otherwise) make their way into the wider community including, potentially, into local schools and tourism programming. It would also be possible to build on the Friends of the BBMS informal organization that exists in the region by expanding and legally incorporating it as a charitable organization and encouraging members to donate to fellowship programs for graduate students working at the BBMS (see <http://www.mun.ca/botgarden/fog/>).

We therefore recommend:

- 11) researchers and the BBMS management team develop outreach/knowledge mobilization/knowledge transfer funding applications as an ongoing component of research at the BBMS.

Based on the Bamfield model, donations are a likely funding source for student grants and scholarships. At Bamfield student support is funded in part through charitable donations collected by the Vancouver Foundation. Grant applications are adjudicated by an academic advisory board at that research centre. At Memorial University, Alumni Affairs is responsible for scholarships. Initial discussions with Alumni Affairs indicate that they are enthusiastic about helping to fund raise for endowments for BBMS scholarships (B. Hooper, pers. comm.).

We therefore recommend:

- 12) the BBMS management team follow up with Alumni Affairs and move forward discussions about developing a fellowship program for graduate students doing research at the BBMS.

There are also other challenges related to the development of sustained multidisciplinary, community-engaged research at the BBMS. Limited research space and accommodations were identified by some people as obstacles to research at the BBMS, particularly during the summer months. To gain increased research productivity (4-5 researchers) for the summer semester in the natural sciences, additional designated bench space will be needed. Marine biology researchers will require access to additional bench space, aquaria, and boat time and capacity; some social science or fine arts researchers using the BBMS primarily as a research base, will require only desk space and internet access. However, social science graduate students and researchers (and social science field school programming) will need additional field resources including audio and

video recording equipment and access to computers equipped with specialized social science research software such as GIS software and N-VIVO.

We therefore recommend:

- 13) in the medium to long-term, the BBMS management team find ways to reduce any constraints on resources and allocation of research space and equipment that might hamper the development of a sustained multidisciplinary research program at the Station.

Researchers should also be encouraged to make more use of the BBMS during the fall and winter semesters -- good times to conduct social science research because local people have more time to participate. The development of fall and winter teaching programming will increase the likelihood of this happening, will bring researchers from other disciplines to the BBMS, and contribute to the development of appropriate multidisciplinary research infrastructure at the Station.

Important components of long-term community-engaged research are (i) that such research is responsive to community interests and (ii) that communities are engaged in the research design and knowledge mobilization. CURRA community partners have indicated interest in continuing to work with researchers – *provided that* future researchers understand the collaborative approach achieved under the CURRA (J. Spingle, pers. comm.). Ideally, researchers build on previous work in the area and clearly communicate objectives, results and possible implications (C. Kennedy, pers. comm.). Thus, sustaining long-term community-engaged research requires careful attention to community interests, and reliable, consistent and appropriate communication strategies, thereby reducing the likelihood of community research fatigue (I. Emke, pers. comm.). One effective research outreach tool is *workshops*. Hosting such workshops at the BBMS can play a key role in fuelling community engagement in research and in other aspects of BBMS programming such as student training. One CURRA community partner commented that program workshops contributed to the community's perception of the Station as a venue where important community discussions take place (C. Mullins, pers. comm.).

In light of the background and comments above, and in light of the good fit between this approach, its outcomes and Memorial's Strategic Research Plan <http://www.mun.ca/research/vp/strategic.php> ,

We therefore recommend

- 14) community-engaged research continue to occupy a central role in the research programming at the BBMS into the future and should, ideally, be championed and led by the new Director and researchers and instructors working at the BBMS.

One way to do this would be for the Academic Advisory Committee to give priority to research proposals that address concerns identified by community groups in the region; the AAC should also use a community-engaged research approach in their adjudication of proposals to conduct research at the BBMS. In addition, field school training could have students address in their work questions raised by west coast communities and require them to provide feedback on their research findings to the wider community.

Other marine stations and research hubs track research productivity and use the information in advertising and fundraising. The Concordia Oral History Digital Lab (COHDL) requires that all affiliated faculty submit an annual summary, these are then used to produce the COHDL annual report that lists publications (COHDL 2010). Using similar information, the Bamfield Marine Science Centre is able to demonstrate increased research productivity in funding applications and in press releases: Bamfield researchers produced 61 refereed publications in 2007, which was a 70% increase in that research metric over a 7-year period (BMSC 2008). Notably, graduate student researchers were ~60% of all researchers there.

Such a research database will be an important building block for a community-research hub centred at the BBMS, ensuring research results are returned to communities in an appropriate form and ensuring that subsequent research builds upon – but does not duplicate – previous research. A systematic approach to documenting past research, evaluating feedback mechanisms (e.g., attendance and interest in feedback meetings) and developing alternative feedback mechanisms (e.g., summaries in existing newsletters, programs on community radio, or individual feedback phone calls) would help ensure that research fatigue does not limit future research initiatives. Systematic research and outreach records are crucial, not only for ensuring that research is responsive to the communities in which it is embedded but also for tracking research productivity. Such records of research productivity can also provide the basis for future funding applications. Researchers (Appendix I) remarked that their recent peer-reviewed publications are not listed on the website (e.g., Quijón and Snelgrove 2005a, b, c; Khan and Neis 2010; Tuziak and Volkoff 2011): this key aspect of research communication is lacking. Publications resulting from research at the Station should be tracked, as this is an important metric of research communication. Website improvements were funded by the CURRA, as was systematic documentation of publications: such resources will disappear in fall 2012.

We therefore recommend:

- 15) long-term funding for a Community Coordinator be found and that the Community Coordinator's primary tasks would be three-fold: 1) act as an on-the-ground contact person for communities and researchers interested in doing local research; 2) develop and maintain a database of BBMS

research (past, present and potential research questions raised by earlier research, community partners and others) and including information on community contacts, research outcomes, and records of research feedback; and 3) take responsibility for outreach from the Station including knowledge mobilization (newsletter, website, etc.) related to BBMS and wider community activities. The Community Coordinator would be responsible for establishing and maintaining contacts with communities in the target region from Burnt Islands to the tip of the Great Northern Peninsula.

4.2 Community-Engaged Research Funding Options

Given the focus on knowledge mobilization and on partnered research in the national granting councils including SSHRC, NSERC and the Canadian Institutes for Health Research (CIHR), existing and new partnerships (community and agency) and the broadened network of researchers affiliated with the BBMS should be used to support the development of new grant applications that use the CURRA work and support and revamped BBMS infrastructure and training, learning and outreach programming as foundations.

Some potential funding sources to support further development of the physical and staff infrastructure required for a community-engaged research hub include the NL Department of Innovation, Business and Rural Development's (IBRD) Innovative Enhancement Program, the federal Atlantic Canada Opportunities Agency's (ACOA) Innovative Communities Program, and the Research Development Corporation (RDC) of Newfoundland and Labrador's Collaborative R&D Program. Program details and contacts are included in Appendix II.

Increasing the capacity and scope of the BBMS would fit well with the objectives of ACOA's Innovative Communities Program (Appendix II). The IBRD program has a maximum contribution limit of \$250,000 whereas the RDC has a maximum contribution limit of \$500,000. Both programs require matching contributions. But the IBRD program will cover up to 80% of eligible project costs. Financial support from RDC can be used for capital costs (e.g., renovations), training highly qualified personnel, and operating costs. The RDC programming guide indicates that leverage ratios of 5:1 (non-RDC funding: RDC funding) are preferred.

The IBRD Innovation Enhancement Program is intended to support development and enhancement of research and innovation, not for ongoing administrative support. The RDC Collaborative R&D program supports projects for up to 5 years. Both programs, therefore, should be seen as short-term support and as a means to build research and community outreach capacity.

The IBRD Innovation Enhancement program appears to be the best fit for supporting a full-time Community Coordinator and for partial funding of

administrative assistance, interns or students. The RDC and Canada Foundation for Innovation (CFI) are suitable for future renovations to increase accommodation and research space, particularly if the latter are in support of community-engaged research for diverse stakeholder groups and involve public outreach.

Another way to resource community-engaged research and to provide resources and materials for dissemination by the Community Coordinator is through the MITACS Accelerate program which is funded by NSERC. This program could be a source of internship and student funding. It requires matching funds and lasts up to 2 years, depending on the number of interns supported (Appendix II). The advantage of the MITACS program is that a cluster of up to 6 interns could be supported, allowing the BBMS to make considerable progress in research, business plan development, teaching and outreach programs. There are no restrictions on the academic discipline of MITACS interns. To fund a MITACS cluster of six interns, the industry partner(s) would need to provide a total of \$36,000 in matching funds.

MITACS typically links students and researchers with companies; an industry or community association (e.g., Gros Morne Cooperating Association) might be considered a suitable partner (S. Kavanagh pers. comm., 2011).

Parks Canada, the Department of Fisheries and Oceans, the provincial Rural Secretariat and other provincial departments and agencies (Department of Fisheries and Aquaculture, Innovation Business and Rural Development, Tourism, Culture and Recreation and the Research Development Corporation) and regional economic development boards have all provided financial and in-kind resources for CURRA and other research at the BBMS and could help to support research in the future. The current increased activity of petroleum companies in western Newfoundland points to the need for relevant scientific, community and conservation research that could be funded through the Department of Natural Resources, the Canada Newfoundland and Labrador Offshore Petroleum Board and through Conservation groups and national granting councils.

We therefore recommend

- 16) the existing and new Directors and Manager of the BBMS, with support from the BBMC and the Faculty of Science, develop IBRD, ACOA, MITACS and RDC funding proposals to support the development of research infrastructure and capacity at the BBMS, including a multidisciplinary community-research hub staffed by a full-time Community Coordinator with some administrative support person and partial funding of interns.

- 17) the BBMS management team and researchers working at the BBMS explore national granting council and provincial level funding opportunities and develop one or more partnered research grant applications building on the record of community-engaged research and on the partnerships established through the CURRA.

5. Teaching and Learning: Academic Programming

One way to extend the disciplinary range of courses offered at the BBMS and the seasons during which those courses are offered would be to develop new field schools and continuing education/lifelong learning training opportunities that would take advantage of the existing facilities and location of the BBMS. Here, the Community Coordinator would play a role in helping to identify field school research projects for trainees relevant to the wider community, helping to identify continuing education and other kinds of initiatives relevant to the region and the wider community and to communicate the work happening through the field schools to the wider community. Potential new field schools could include a multidisciplinary Social Science field school to be organized through the Faculty of Arts, St. John's Campus and through Grenfell, and a field school that would bridge from the Marine Biology field school into the Social Science field school using courses on resource management and conservation biology, with the possible engagement of researchers at the Marine Institute and Ocean Sciences Centre at Memorial.

The remainder of this section has three parts: (1) we review current academic programming at the Station to look for ways to strengthen the existing biology field school; (2) we review programming models from other marine research field stations to see what might be learned from these; and (3) we identify strategies to expand the current teaching and learning programming by adding two field schools and some continuing education winter programming, and we report on the results of our consultations to date on one of those options -- the fall, multidisciplinary social science field school.

5.1 Current BBMS Teaching and Learning Programming

The BBMS currently hosts seven undergraduate marine biology field courses per year from mid April until September (Figure 1). Five marine biology courses comprise the marine biology field school summer semester, while a research field course (4810), in which students develop an independent research project, and a second offering of the methods course (3709) are delivered in the winter and fall semesters respectively. The full summer semester course load enables undergraduate students to obtain financial support as 'full time students'. Students pay regular tuition costs; in 2011, they paid \$410 for room and board per course.

Each field course lasts two weeks; enrolment is capped at 20 students per course because of limited accommodation and space on Station boats. However, enrolments vary from year to year (average, 15 students per course - Figure 1). Current BBMS programming also includes one week in July set aside to support Grenfell's Peel Summer Academy Program for high school students from Ontario and one in early September set aside for a Nipissing University forestry field course (Figure 1). These courses fill gaps in the Memorial University programming, provide revenue, and contribute to the outreach portion of the BBMS mandate.

At present, there are no other field schools offered at the BBMS and, aside from research, conferences, workshops and similar short-term and often one-off events, no formal teaching and learning programming takes place in the fall and winter semesters. Options to increase enrolments include increasing enrolment in existing courses, offering more courses during the busy summer semester, offering courses during the fall and/or winter semester including from disciplines other than marine biology.

5.2 Programming Models from Other Field Stations

Marine research stations face common programming challenges, such as encouraging off-season use, building research profiles, and resolving different user groups' needs for space and accommodation. Programming models from other marine research stations are useful in the development of programs such as an interdisciplinary fall semester field school, even though resources, funding arrangements and facilities differ: we reviewed the Bamfield Marine Science Centre, the Huntsman Marine Science Centre (in St. Andrews, New Brunswick, under the auspices of the University of New Brunswick, St. John campus), Friday Harbour Labs and Duke University's Marine Lab.

Both the Bamfield Marine Science Centre and the Huntsman Marine Station offer undergraduate courses during the fall semester. A block of five courses enables students to complete a full semester of credits. Because specific topic courses are offered sequentially, students may opt to complete one or two courses during the fall semester. Neither station offers winter (January – April) semester courses and their fall programs' structure is similar: three topic specific courses (e.g., Marine Population Dynamics or Ecological Adaptations of Seaweeds), a seminar course and a directed studies course are offered. At Bamfield the topic specific courses are offered in 3.5-week blocks; seminar and directed studies courses are ongoing throughout the semester. This allows professors and teaching assistants to lead a particular topic specific course without committing to an entire semester of teaching there. In the directed studies course, students develop independent research projects.

Social science courses are offered at some marine research stations (Bamfield Marine Science Centre, Friday Harbour Labs, and Duke Marine Lab), but none offer a semester of social science or an interdisciplinary program. Duke University's Marine Lab offers graduate courses linked to upper year undergraduate courses, using a block schedule with directed studies courses available for the entire semester. In addition to marine biology courses, the Duke Marine Lab offers social sciences, humanities and interdisciplinary courses, as well as microbiology and physics courses. However, there are 15 faculty members on site at the Duke Marine Lab, greatly increasing the range of courses that can be offered. In general, social sciences and biological sciences are not linked, although students can take a conservation biology and policy course

Average course enrolments (2003-2010) ± SD

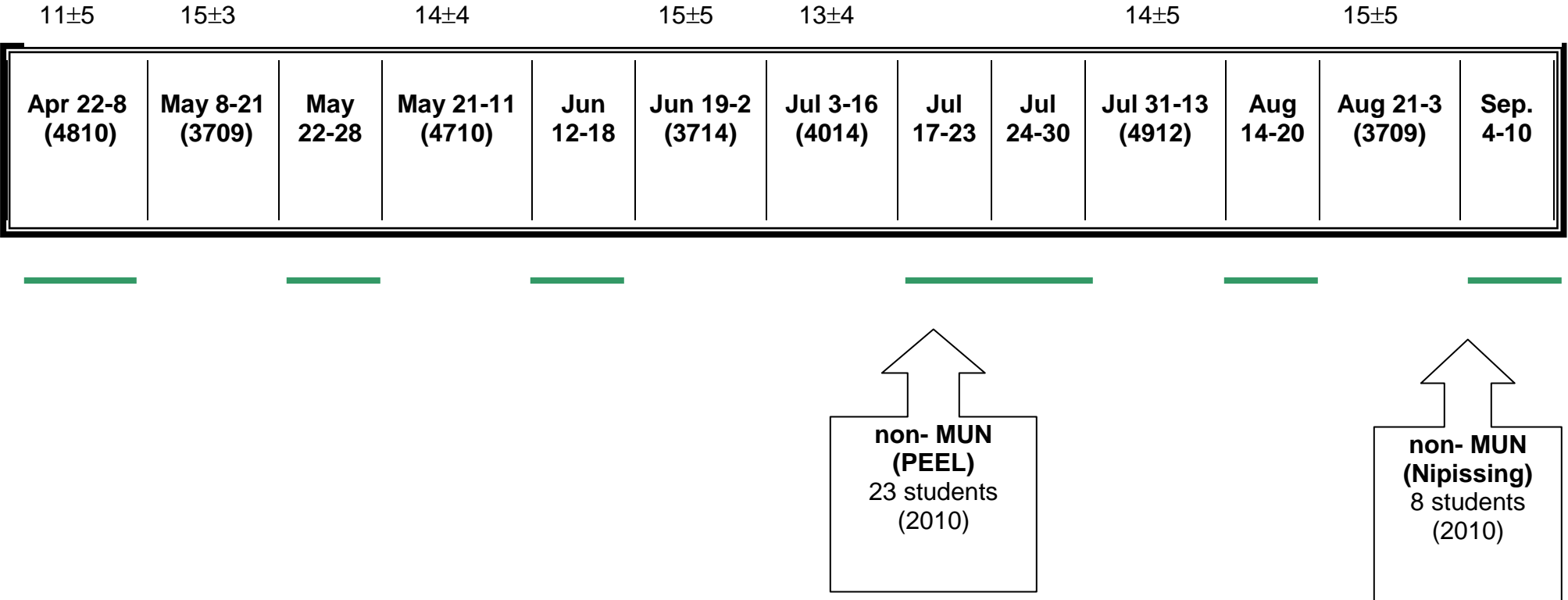


Figure 1. Student numbers and station availability during the summer semester. Example dates for 2010. Horizontal green bars indicate possible opportunities for additional courses. Due to the low average enrolments in the winter semester course (4810), another small course could be run concurrently.

plus a marine ecology course (Marine Mammals, or Conservation Biology of Sea Turtles) as part of the integrated marine science and conservation program at the Duke Marine Lab.

The Bamfield Marine Science Centre requests that course proposals be submitted one year in advance, and include a course description, outline of major topics to include in the field, lab and lecture portions as well as a basic equipment list. The Centre encourages courses that take advantage of the unique field setting and local environment. The academic advisory board evaluates course proposals and recommends new courses and instructors. During the summer semester non-marine courses are offered (Terrestrial and Freshwater Conservation, or Amphibian Biology) in each programming block. Individual social science, science communication and writing courses are offered, but students cannot complete a full semester of credits in any field other than biology. In addition to core marine ecology courses (Biodiversity of Seaweeds, Marine Ecology, Crustacean Biology), the Centre offers courses such as Scientific Filmmaking, Science Journalism, and Scientific Diving during the summer semester. The Filmmaking course is co-taught by a marine ecologist and a *National Geographic* producer and cinematographer, while the Science Journalism course is taught by a contributor to *New Scientist*. These are fully subscribed and have led to internships with *National Geographic*. Additionally, Bamfield offers courses that are not explicitly tied to the field setting (Statistics for Biologists, Models in Evolution). Social science courses such as Ethnobotany and Coastal Field Archaeology have been offered during the summer semester.

Additional practices at other marine stations might help promote the development of more diverse field school training at the BBMS. For example, all field station courses at Friday Harbour Labs are considered “special topics”, thereby minimizing administration tasks associated with new courses. Friday Harbour Labs and the Duke Marine Lab both advertise field courses on topic specific listservs [e.g., Canadian Conference for Fisheries Research (CCFFR), Canadian Association of Geographers (CAG), Society for Marine Mammalogy (Marmam)]. The Huntsman Marine Science Centre courses are advertised as part of the Ontario Universities Program in Field Biology (www.oupfb.ca). Students from any of the participating Ontario universities can access the listed field biology programs offered.

Sessional instructors contribute to teaching at Bamfield Marine Science Centre, Huntsman Marine Science Centre, Friday Harbour Labs, and have taught Experimental Marine Ecology, Estuarine Fish Ecology and Marine Mammal courses at the BBMS. During the busy summer semester other marine field stations offer terrestrial, freshwater, and marine courses concurrently to decrease demands for boats or other marine research equipment. Individual teaching labs and equipment are allocated to specific courses to enable concurrent field courses. Concurrent field courses also allow a wider group of students and cross-pollination of ideas among groups.

Potential benefits of offering sessional teaching opportunities at BBMS – in addition to MUN faculty teaching opportunities – are that there would be a wider range of instructors available including museum-based taxonomists (Huntsman), doctoral students and post-doctoral researchers (Bamfield), and faculty from universities not affiliated with the Station (Friday Harbour). This would allow a greater range of programming and address one of the key challenges of remote field stations – attracting instructors (BMSC 2008). Concurrent field courses at the BBMS would allow additional courses, including social science or fine arts courses, but this programming model might also limit opportunities for summer researchers because of the very limited number of classrooms/labs and lack of separate accommodations for researchers, interpreters, professors, and teaching assistants. BBMS summer semester course offerings most closely parallel the fall semester block at the Bamfield Marine Science centre in that they have a marine biology focus. The BBMS has also used “special topics” course designations but there can be operational constraints that can make it difficult for undergraduate students to register.

5.3 Expanding and Diversifying the Teaching and Learning Programming at the BBMS

One of the recommendations in the AMEC Strategic Plan (2008) was to increase BBMS student enrolments from Memorial University’s St. John’s and Grenfell campuses and from other universities. Increased enrolments would increase self-generated revenue and enhance the Station’s reputation and support from the Memorial University community (AMEC 2008). Increased enrolments could occur by filling the summer semester classes more completely, by developing new field schools for the summer and fall semesters, and by offering distance education and specialized Lifelong Learning programming relevant to the BBMS mandate to researchers, graduate students and members of the wider community in the winter semester.

5.3.1 Summer Semester Marine Biology Field School

5.3.1a Increasing enrolments and course variety in the Marine Biology field school

Summer semester enrolments are constrained by accommodation limits. The BBMS can accommodate 31 people, including visiting researchers, professors, teaching assistants and up to four summer interpreters, so the maximum number of beds available for students is about 20. This, and limited lab space, make it difficult to run concurrent courses, with the exception of the April course which has averaged 11 students (Figure 1). Housing limits could be addressed in the short term by renting temporary accommodations (for instance at the Old Hospital); in the longer term, applying for infrastructure funding to build or acquire

separate accommodations for students, visiting researchers, professors, teaching assistants, family groups and interpreters, would solve one problem, while also updating and enhancing the laboratory and other equipment. Memorial has a classroom enhancement fund and a capital request category that could be used as leverage funding in a larger proposal to ACOA or another agency to address these problems in the longer term. Such a funding application should also address the need for some renovations to ensure that BBMS complies with government Occupational Health and Safety and other regulations.

This would pave the way for efforts to increase enrolments in existing courses. Revisiting the existing curriculum and creating a more transparent structure for curriculum design and recruitment of teaching staff would help ensure that faculty interested in the marine biology field school would have an opportunity to design curriculum and to apply to teach at the BBMS through an open and competitive process. This in and of itself could help increase enrolment in the existing field school and open up the possibility for undergraduate students to return to the BBMS to take new courses.

BBMS researchers (Appendix I) have identified a need for clear criteria in proposing new courses, including information on funding scenarios, teaching loads and, if instructors are not Memorial faculty, payment schedules. Bamfield's process for proposing new courses is described on their website, complete with links for required permits, travel claims and tax forms. Modified versions (because governance structure at Bamfield differs from that at the BBMS) could be available on the BBMS website, and its Academic Advisory Committee could review proposed courses, as is done at other field stations. Links for at course proposal process are being added to the BBMS website, but the establishment of an Academic Advisory Committee (recommended earlier) to contribute to this process and to adjudicate proposals is crucial to moving this forward: the AMEC report (2008) noted that a small advisory board was needed to provide guidance on academic research and teaching. Because courses taught are associated with particular departments, not the Station, approval for new courses lies with departmental graduate and undergraduate committees.

We therefore recommend

- 18) the Director and Manager, with support from the Dean of Science, submit proposals to the classroom enhancement fund and capital request category at Memorial, and use these requests as leverage for funding from external agencies such as ACOA to enhance the training and learning infrastructure at the BBMS.
- 19) that one of the core tasks of the multidisciplinary Academic Advisory Committee reporting to the BBMC, once established, will be to spear-head and oversee curriculum development for multiple field schools and continuing education programming at the BBMS.

- 20) the Academic Advisory Committee produce calls for course proposals and adjudicate submissions based on a set of policies to be developed on teaching assignments. They should ask questions such as: should the author of an accepted proposal be guaranteed the opportunity to teach the course twice before going back into open competition? what is the role of relevant departments in the decision-making process?

The existing field school could also expand enrolments and enrich the curriculum by taking advantage of spaces in current programs. During the 2010 summer semester, there were 5 weeks when Memorial University courses were not offered (Figure 1), while “Introduction to Marine Principles and Techniques” (B3709) was offered twice - in early May and in late August. Space for four additional courses between April and September could be obtained by rescheduling current courses, prioritizing Memorial courses, offering B3709 once, and offering a second small course concurrently with B4810. The fall semester version of B3709 could be replaced with a new course, preferably listed jointly with Grenfell because Environmental Studies students use this course to fulfil their program’s field course requirements.

Provided there is interest in such an expansion, there are various ways to do this. One option would involve expanding programming on an *ad hoc* basis based on proposals and interest. Initial discussions with MUN faculty indicated interest in teaching courses during the summer semester, if the Station were available. Both biological and social science researchers suggested that the BBMS could be used for part of a summer semester course. Archaeology students could spend a week in the field then return to the BBMS for sample processing (I. Emke, pers. comm. 2011); molecular biology or biotech courses could develop protocols at the St. John’s campus, then apply those protocols at the BBMS during the second part of a course (S. Tuziak, pers. comm. 2011). Past BBMS students indicated interest in courses such as Ornithology, Environmental Assessment, Wildlife Biology, Marine Physiological Ecology, and Fisheries Management. These courses could be offered provided there are instructors interested in teaching them and that there is a clear course proposal process.

5.3.2 An Interdisciplinary Marine and Fisheries Conservation Field School and a Fall Social Science Field School

Our review of existing teaching and learning programs at the BBMS and of the programs at similar stations suggests that there is an *opportunity* for broadening and strengthening programs at the BBMS. There is also a *need* to do that. While some of the other stations include social science or specialized programming in areas such as science film-making, no field school offers the kind of multidisciplinary, community-engaged academic programming which could be developed at the BBMS building upon the CURRA. There is thus an *opportunity* for the BBMS to become a globally unique marine station. The Station could

consolidate the biology program and then develop a multidisciplinary field school in Marine and Fisheries Conservation that would provide a bridge from the existing Marine Biology field school to a multidisciplinary Social Science field school to be offered in the fall semester. This will contribute to the development of multidisciplinary, community-engaged programming at the BBMS in the future. Moreover, this option would allow the BBMS to be used more fully beyond the summer semester. Finally, it is evident in the policy requirements for multi-scaled integrated coastal management, ecosystem-based fisheries management, and stewardship initiatives that multidisciplinary training is required to deal with the challenges associated with governing complex social-ecological systems worldwide. There is thus a *need* for the kind of field training that is both local and global, and an *opportunity* for the Station to become a leader in innovative teaching and learning opportunities related to our oceans and coasts.

We therefore recommend

- 21) the BBMS move as quickly as possible to develop new and more multidisciplinary field school programs and to become a leader nationally and internationally as the first marine station to offer integrated multidisciplinary, community-engaged field training from the natural and social sciences and humanities (and, potentially, from the fine arts).

There are growing numbers of students interested in environmental science and conservation issues at Memorial and elsewhere, a result not only of societal concerns but also the recognition that there are essential environmental challenges that bridge the natural and the social sciences. Training and research in this complex social-ecological area would benefit substantially from multidisciplinary field school training opportunities, because the conservation and environmental challenges issues facing marine social-ecological systems require expertise in both the social and natural sciences. The CURRA has been providing such training, and this kind of research is also a strength of several excellent Memorial researchers. Indeed, Memorial has a strong research track record in this area that is not well represented in existing curricula. Most importantly, this kind of training can meet more effectively the concerns of local communities, industry and government stakeholders, and would enrich the training environment in both the biology and the social science field schools.

We therefore recommend

- 22) the BBMS management team initiate discussions with other relevant units (Ocean Sciences Centre, Environmental Science, the Marine Institute, Faculty of Arts, Grenfell) about their potential engagement with the Marine and Fisheries Conservation field school.
- 23) the BBMS management team (and Academic Advisory Committee) consider consolidating the marine biology summer semester program and

solicit proposals for conservation biology courses to be held at the end of the summer and early fall to round out course offerings and lay the foundations for a Marine and Fisheries Conservation multidisciplinary field school by

- a. identifying the number of course slots available
- b. streamlining protocols for delivering existing courses at the BBMS
- c. sending a call for course proposals to relevant Memorial University departments after the course proposal process is clarified.

24) consider including in this new field school one or more courses in marine ecology (also offered in the BBMS biology field school), one or two new courses in fisheries conservation, and a course in social science research methods and societal aspects of fisheries conservation that could be part of the social science field school.

5.3.2a Fall Semester Multidisciplinary Social Science Field School

The Faculty of Arts and Grenfell representatives have shown interest in developing a fall semester Social Science field school, possibly with Humanities and Fine Arts elements also involved. Their vision could be realised through a third, and perhaps even a fourth, field school that reaches from the social sciences to the humanities and fine arts. Current fall semester and winter semester academic programming consists merely of one course at the end of the winter semester and another at the beginning of the fall semester. BBMS staff and management suggest additional academic programs should run during the fall semester, because access is challenged by weather conditions during the winter semester. Station staff currently use parts of that semester, therefore, to prepare for the intensive summer semester activities (repairing, maintaining and upgrading the facilities, financial management, recruiting students, and preparing funding proposals). They would, however, welcome an opportunity to work for longer periods during the year, while enhanced BBMS programming will create opportunities to expand the administrative and other support available.

To gauge interest in fall semester programming, including a multidisciplinary Social Science field school, we sent an initial email requesting expressions of interest to 20 Memorial University social science and humanities faculty members, chosen because of their research foci (environmental history, fisheries governance or survey methodologies). 14 indicated interest (Appendix III) and 6 described the types of courses they might be interested in teaching at the BBMS. Faculty from the Corner Brook campus expressed interest in teaching courses on Environmental Policy and Politics, Public Policy in Resource Dependent Economies, and Water Governance, among other topics (A. Carter and M. Levesque, pers. comm. 2011). St. John's faculty expressed interest in teaching environmental history courses (A. Keeling, J., Sandlos and J. Thorpe, pers. comm. 2011), some specifically linked to Gros Morne National Park and the

larger literature on the meaning and purpose of National Parks (J. Sandlos, pers. comm. 2011). Faculty from both campuses described courses linking communities, conservation and resource management, including courses such as Conservation and Sustainability of Natural Resources an existing graduate level course (Geog 6250; R. Chuenpagdee, pers. comm. 2011).

The initial survey gauged interest, particularly among new faculty, many of whom suggested additional colleagues to contact. We therefore spoke with the Department Heads of History, Sociology, Linguistics, Folklore, Geography and Anthropology at the St. John's campus, and found considerable interest in the idea (some were already considering establishing field schools for their particular disciplines). Dave Peddle (Grenfell) suggests there may also be interest in this fall programming in the Humanities including English, and the Fine Arts. This would imply an opportunity to establish a fourth field school that encompasses social science and humanities and/or fine arts.

Thus, a preliminary concept for the multidisciplinary Social Science field school has emerged. The multidisciplinary Social Science field school would be targeted at undergraduate including honours students in the social sciences interested in developing a specialization in field research. It would consist of 5-6 courses (each of 2 weeks duration) with the deadline for major written assignments coming 2 weeks *after* the end of the course, so that students would have time to do the research essential for a substantive social science course. Courses would come from three of the interested departments, with each instructor teaching two courses and programming would alternate on a two year cycle. Thus, individual departments would only be committing one faculty member every two years to the field school programming. Students from their disciplines would be encouraged to participate in the field school during that semester in which their discipline is represented in the curriculum. Field courses from the other disciplines would take the place of electives. Field school courses would not take the place of on-campus methods training and could help to rejuvenate existing programs in Newfoundland Studies and Heritage. Moreover, department heads expressed interest for their graduate students as well, which could be linked to undergraduate programming or to courses added on to the end of the fall semester or developed for the winter semester -- for example, writing retreats for graduate students or new faculty could be integrated into the programming (C. Badenhorst, pers. comm.2011).

Department Heads and others who have participated in this consultative process will receive copies of this Report. Barb Neis has agreed to spearhead the development of the application to Memorial's Cross Campus Initiative fund to cover the costs of a proposed meeting at the BBMS this winter to refine and further develop the proposal for the multidisciplinary Social Science field school.

We therefore recommend

- 25) the BBMC support an application for a Cross-Campus Initiative grant to fund a meeting at the BBMS in March-April 2012 to further develop the concept for a Social Science field school and to establish a committee of interested faculty to move this initiative forward; and,
- 26) the BBMC task someone to open discussions with faculty in the Humanities and Fine Arts at Grenfell about their potential involvement in fall/winter semester programming for the BBMS.

Equipment, including digital recorders, cameras, better computer support (e.g., GIS), will be required for the Social Science field school. In the short term it might be possible to source some of this equipment (with technical and training support) through the Digital Media Centre for Qualitative Field Work, Faculty of Arts, St. John's campus. In the longer term, it will need to be included in leveraged funding proposals targeting internal and external funding sources (discussed above).

5.3.3 Winter Semester Programming

Programming at the BBMS during the winter semester could be challenging – resources, weather, the need for time for staff and the Station to gear up for two other busy semesters. Nonetheless, we think there are missed opportunities here as well that would be of interest to professionals and others in the region, to researchers and students and to those associated with the Fine Arts at the Grenfell campus. These opportunities relate to lifelong learning and continuing education training in such areas as ecotourism, tangible and intangible culture, science film and video-making, photography (including underwater), diving under ice, radio documentary making, Geographic Information Systems, etc. Some of these courses could make use of infrastructure required for the social science and other field schools; some could be developed in partnership with government, and/or industry (OceanQuest, for example, might be interested in combining a winter diving program with a course on underwater photography for its clients); some could be revenue-generating and fairly high cost, while others could take a cost-recovery approach and focus on capacity enhancement of faculty, students and local community groups. Workshops and retreats could also happen at the BBMS during this semester. We did not, within the financial and time constraints associated with writing this report, have an opportunity to explore interest in, or the feasibility of, such programming.

We therefore recommend

- 27) the BBMC encourage the BBMS management team to open discussions with Memorial's Division of Lifelong Learning about programming for the winter semester at the BBMS geared to the unique programming priorities and assets of the region and to the interest of community groups, local

professionals, faculty and students' interests in specialized training (May 2012).

5.4 Teaching and Learning -- Conclusions

The BBMS offers an opportunity to develop excellent, virtually year-round community-engaged, multidisciplinary training that would be globally unique and is also much needed if society is to meet the challenges of understanding complex social-ecological systems and developing appropriate strategies and policies for protecting oceans and coasts, here and in other parts of the world.

This Report has identified a strategy for actualising this vision, and has outlined key pieces of the strategy. The BBMS needs a multidisciplinary Academic Advisory Committee with some key community representatives to move this program forward. It needs an open, transparent, and competitive process for soliciting proposals for new courses and programming that fits with a larger concept or plan for the BBMS. Appropriate advisory committees may be needed for each of the field schools and for the winter programming. There will be a need for investments in designing new structures, figuring out the relationship between the BBMS and the wider administration, and additional infrastructure. However, the capital requirements for the recommended changes would be minimal in the short-term.

Ideally, new programming should start as soon as possible (for instance the field school on Marine and Fisheries Conservation should be relatively easy to establish as it would use some of the existing courses) with the three field schools available by 2013 and continuing education options becoming available by winter 2014. Over the longer-term infrastructure and accommodation requirements will need to be dealt with, particularly for the busy summer semester, and more and better office space will be needed to ensure visiting researchers (who would guest lecture and perhaps offer other services) are able to continue their work while field schools are running. That can be addressed in a variety of ways if we are correct about the potential for growth in this programming and if enrolments grow along with research and outreach.

Another option for future consideration suggested by Mary Courage, Associate Dean of Research, Faculty of Science in commenting on this report is to encourage inter-institutional field programs or exchanges with the other marine field schools and the provision of cross institutional credit for course work done at any one of them. This would open up opportunities for MUN students to study at Bamfield, St. Andrews and elsewhere.

Dr. Courage also suggested the BBMS Management Committee contact Human Kinetics and Recreation to see if they are interested in running wilderness or survival courses from the BBMS.

6. Public Outreach

Public outreach – accomplished through the visitor centre, aquaria, partnerships with Parks Canada, school programs and participation in community festivals – is a key part of the BBMS mandate: the Station could not exist without the tremendous support of the surrounding communities and the tourism sector.

It should be remembered that the funding for construction of the current Station was provided by ACOA and the Government of Newfoundland and Labrador in part to build a tourist destination and thereby encourage development in Norris Point. The BBMS has become a very successful hub for tourism development in Norris Point (C. Kennedy, pers. comm. 2011). BBMS staff members provide natural history programming for kayak and boat tours through partnerships with Bon Tours and Gros Morne Adventures, and public outreach continues to be a key aspect of the Station with over 10,000 paying visitors in recent years using the marine education programs onboard boat tours, displays and interpreted tours at the visitors' centre. Partnerships with Parks Canada also support a much wider dissemination of Memorial University research results and engagement with the wider public around marine and maritime related issues.

6.1 Current Public Outreach Programming at the BBMS, New Options and Potential Funders

Current BBMS public outreach programming includes the educational displays, touch tanks and interpretive programs at the Station, the Trading Books for Boats program based on a similar program by ACAP Humber Arm, tide pool walks during July and August, and participation in the Trails, Tales and Tunes Festival. The BBMS Director and Manager are also developing a funding application to enhance the infrastructure at the visitor centre by adding a new touch-tank gallery, a night life under the sea exhibit, a jellyfish tank and new touch screen interactive displays as well as new posters.

The *Trading Books for Boats* program is designed for grade 8 science curriculum and focuses on water quality. It is currently being adapted to make it more specific to the Bonne Bay region: possible program foci include CURRA research, such as that completed on Species at Risk (wolffish and deep sea corals). School programs (such as Trading Books for Boats) are, however, being negatively affected by increased bussing costs and decreased travel budgets -- only six schools are within a two-hour bus ride of the Station (F. Cuthbert, pers. comm.2011). Partnerships with the Gros Morne Wildlife Museum and Parks Canada are therefore being developed to address the bussing constraints, and

programs for other grades could be developed through such partnerships. Such partnerships will address some of the current challenges, and the BBMS Manager and Director are exploring the possibility of enhancing their schools' programming by affiliating with a new schools program being launched in Trinity Bay this coming spring, which could potentially also increase the research infrastructure available at the BBMS.

The BBMS organizes an annual *Oceans Day beach clean-up* with the Norris Point town council, Marine Services Ltd., Parks Canada and DFO. The *tide pool walks program* is a partnership with Parks Canada and, although the walks are not explicitly linked to Memorial University research, almost half of the participants visit the BBMS the following day and learn about Newfoundland marine life and Memorial University research. Thus, they increase awareness of, and visitation to, the Station.

The *Trails, Tales and Tunes Festival* is an opportunity to bring to the BBMS people who might otherwise not visit and learn from the educational displays, touch tanks and aquaria. BBMS personnel present lectures, lead beach walks and contribute to the Voice of Bonne Bay radio programs during the festival. The *Fishing for the Future* film festival (one part of a recent successful CURRA funding proposal to SSHRC for public outreach) will bring a new kind of event to the Station that, if successful, could happen every year or two. Similarly, the upcoming international CURRA *Symposium on Rebuilding Collapsed Fisheries and Threatened Communities* could become a model for regular thematic symposia and film festivals that deal with issues relevant to the region, engage researchers using the BBMS, and other groups from the area (industry, labour, government and community groups), and that are also of wider national and international relevance. The BBMS also contributes the marine science part of the Teacher Institute -- a week-long workshop run by Parks Canada. This includes a power point presentation, intertidal exploration, boat tour and plankton identification laboratory session, the purpose being to highlight ways that hands-on marine science techniques can be incorporated into K-12 science.

The BBMS is extremely well positioned to apply for NSERC *PromoScience* funding, based on the research and community partnerships achieved under the CURRA. This program provides financial support for up to 3 years, to promote understanding of science and engineering among young Canadians. Evaluation criteria include past public outreach and community engagement activities, previous awards and grants, the breadth, depth and originality of program content, the geographic reach of the proposed program and whether there is a focus on under-served target audiences. Among the 2010 *PromoScience* grants, only 2 of 38 grant recipients were based in Newfoundland and Labrador [Women in Science and Engineering (WISE), and KANGIDLUASUK Student Program based in Nain]. No *PromoScience* grants were awarded to Newfoundland and Labrador organizations in 2009 and two were awarded in 2008, to Memorial's Botanical Gardens and to Grenfell's Chemistry Department.

A BBMS application could build upon CURRA research and the CURRA outreach platforms and, if successful, could use the funds to develop outreach materials at the Station, which in turn would support the school programs, public visitors and community involvement described above. Partnerships with programs such as *Let's Talk Science* at Memorial could increase the strength of a *PromoScience* application prepared to develop discovery boxes, initially based on research completed under the CURRA program. Educational outreach materials, variously called specimen loans, activity boxes, discovery boxes or Edu-Kits, are self-contained and encourage hands-on interactive learning. Discovery boxes, like the Edu-Kits developed by The Rooms Provincial Museum, are designed for hands-on independent learning facilitated by a support person or interpreter (G. Davidge, pers. comm. 2011). They are either lent out to schools and other interested groups as part of a museum's loan program, or multiple discovery boxes are available in an interactive exhibit space or discovery room within a traditional museum (Villa 2006). The first discovery room was developed for the Smithsonian's Museum of Natural History in 1974, and allowed visitors hands-on experiences with the museum collection as well as a structured space for the discovery boxes (Villa 2006). The BBMS does not have space for a discovery room, but could make a few discovery boxes available in a small seating area, allowing visitors to complement the hands-on discovery of the touch-tank and the visual learning currently facilitated through aquaria and story boards. Developing educational outreach materials that could be sent to schools or other community groups would, moreover, greatly extend the scope of BBMS outreach.

Because a discovery box program would address one of *PromoScience*'s key evaluation criteria and address one of the key challenges of the region, it could become the basis of a strong *PromoScience* application. Benefits for the BBMS would include funding to build upon existing outreach initiatives and to create a resource base of interactive outreach materials. Benefits for the CURRA would include leaving a material legacy of the project to be used by communities from Burnt Islands to the tip of the Great Northern Peninsula.

We therefore recommend

- 28) that in addition to the other new initiatives outlined above, the BBMS Manager develop a *PromoScience* application to be submitted September 2012 to
 - a. develop prototype discovery boxes based on CURRA research and
 - b. request feedback on prototypes during the 2012 summer season.

- 29) that the BBMS Manager explore *PromoScience* partnerships for program delivery by
 - a) contacting *Let's Talk Science* to discuss partnership and
 - b) contacting other education outreach groups.

In the longer term, infrastructure enhancement at the visitor centre and expanded community-engaged research and teaching and learning opportunities will all fuel outreach and engagement of groups in the region, visitors to the region and those who visit the BBMS and its affiliated initiatives virtually through web page content, FaceBook and other resources.

7. Conclusion

Memorial University and the BBMS have the opportunity to build a vibrant station, world-renowned for its community-engaged multidisciplinary research, teaching and experiential learning and outreach. None of the marine stations reviewed for this report integrate natural sciences, social sciences, humanities and fine arts. Thus, there is an opportunity to build upon BBMS strengths and create a unique field station experience that supports substantially more Memorial departments and students and contributes, in powerful ways, to all three of Memorial University's three pillars: research, teaching and learning, and engagement. Building a hub with this kind of international profile will require buy-in and support from multiple groups at Memorial including upper level university management, and strong leadership from the Dean of Science, the BBMC and the new BBMS Director who is to be hired in 2012.

We have outlined, in this report, a vision for the future Station and developed a series of recommendations designed to address some of the governance challenges at the BBMS as well as options for promoting new research at the BBMS, more experiential learning that is multidisciplinary and takes place in all three semesters, and enhanced outreach. We have also indicated some of the funding opportunities that could be used to achieve this vision.

The BBMS is an outstanding asset of Memorial University. The CURRA legacy should be a Station that is a vibrant centre for community-engaged multidisciplinary research, teaching and learning and public outreach. This will involve administrative changes, targeted funding applications to support community-engaged research, and the development of multidisciplinary, community-engaged Social Science and Marine and Fisheries Conservation field school programming, along with a complementary Lifelong learning programming for the winter semester, particularly in the fine arts. The future BBMS would receive support and engagement from far more, and different sets of, Memorial faculty at both the St. John's and Grenfell campuses and potentially the MI. It would engage members of the wider community in every aspect of its work, from the identification of research questions relevant to the region and the province, to learning and communicating the results of the Station's work locally, nationally and internationally.

8. References

- AMEC Earth & Environmental. 2008. Bonne Bay Marine Station – Strategic Plan. Final Report.
- Badenhorst, C. 2010. Productive writing: becoming a prolific academic writer. Pretoria, Van Schaik Publishers.
- Bamfield Marine Science Centre (BMSC). 2008. 2007 – The year in review. Accessed from <http://www.bms.bc.ca>.
- Bonne Bay Marine Station (BBMS). 2003. Strategic Plan for the Bonne Bay Marine Station (www.bonnebay.mun.ca/pdfs/BBMS_Strategic_Plan_October_2003.pdf)
- Centre for Oral History and Digital Storytelling (COHDS). 2010. Governance Structure. 20 March 2010. (http://storytelling.concordia.ca/oralhistory/programme/Governance%20Structure_EN.pdf)
- Community-University Research for Recovery Alliance (CURRA). 2010. Bonne Bay – A Treasure and a Resource: Final Report on the Bonne Bay Gatherings and Workshop in Woody Point and Norris Point. (<http://www.curra.ca/documents/Bonne%20Bay%20Meetings%20FINAL%20Report%20Jan%2013%202010.pdf>)
- Clark, E. 1969. The lady and the sharks. New York, Harper and Row.
- Eaton, A., Hooper, R. 2010. Bonne Bay Marine Station: Spring/Summer Activity Report.
- Ecology Action Centre (EAC) 2010. ecology action centre annual report 2009/10. (<http://www.ecologyaction.ca/content/annual-report>)
- Khan, A.S., Neis, B. 2010. The rebuilding imperative in fisheries: Clumsy solutions for a wicked problem? *Progress in Oceanography* 87, 347-356.
- Manhadevan, K. 2010. Mote Marine Laboratory Exploring the Secrets of the Sea Since 1955. (<http://www.mote.org/clientuploads/Documents/MoteMarineLaboratory.pdf>)
- Mills, C.E., Hermans, C.O. 2010. Historical Centennial Timeline for the University of Washington's Friday Harbor Laboratories 1903-2010. (<http://faculty.washington.edu/cemills/FHLLTimeline.html>)
- Quijón, P.A., Snelgrove, P.V.R. 2005a. Differential regulatory roles of crustacean predators in a subarctic, soft-sediment system. *Marine Ecology Progress Series* 285, 137-149.
- Quijón, P.A., Snelgrove, P.V.R. 2005b. Spatial linkages between decapod planktonic and benthic adult stages in a Newfoundland fjordic system. *Journal of Marine Research* 63, 841-862.
- Quijón, P.A., Snelgrove, P.V.R. 2005c. Polychaete assemblages of a sub-arctic Newfoundland fjord: habitat, distribution, and identification. *Polar Biology* 28, 495-505.
- Tuziak, S.M., Volkoff, H. 2011. A preliminary investigation of melanin-concentrating hormone (MCH) and its receptors in appetite regulation of

winter flounder (*Pseudopleuronectes americanus*). *Molecular and Cellular Endocrinology*. doi:10.1016/j.mce.2011.09.015.

Villa, L. 2006. Rediscovering Discovery Rooms: Creating and Improving Family-friendly Interactive Exhibition Spaces in traditional Museums. Master' Thesis Museum Studies, John F. Kennedy University.

Appendix I: BBMS and CURRA Contacts

Name	Role
Abrahams, Mark	Dean of Science, BBMS Management Committee
Best, Anita	Community Coordinator, CURRA
Campbell, Christine	CURRA Investigator. Environmental Science, Grenfell Campus
Chuenpagdee, Ratana	CURRA Investigator, Geography, St John's Campus
Cuthbert, Fiona	Former Manager, BBMS
Davidge, Gillian	Education & Public Programming, The Rooms
Eaton, Allison	Manager, BBMS
Emke, Ivan	CURRA Investigator, Social/Cultural Studies, Grenfell Campus
Hall, Pam	Interdisciplinary PhD Student, CURRA
Hooper, Robert	Director, BBMS
Kavanagh, Stephen	MITACS
Kennedy, Colleen	Gros Morne Co-operating Association, BBMS Management Committee
Levesque, Mario	Environmental Policy, Grenfell Campus
Le Bris, Arnault	Biology Graduate Student, CURRA
Lowitt, Kristen	Interdisciplinary Graduate Student, CURRA
Mullins, Conrad	CURRA Partner, DFO Oceans (Corner Brook)
Neis, Barbara	Principal Investigator CURRA, Sociology, St. John's Campus
Rumbolt, Dennis	Maintenance BBMS
Spingle, Jason	CURRA Partner, FFAW (Corner Brook)
Tuziak, Sarah	Biology Graduate Student

Appendix II: Funding Opportunities

1. Department of Innovation, Business and Rural Development (IBRD), Innovative Enhancement Program

Description: Supports activities related to innovation enhancement including developing quality improvement programs for education, research and development institutions. Does not fund core administration or activities that compete with local private enterprise.

Funding levels: Up to 80% of eligible project costs and up to \$250,000 per project

Applications: MUN applications submitted through the VP Research office. Guide for writing proposals available from the local INBRD office (Deer Lake 635-2613, St. John's 729-7104/7112). Does not appear to have an application deadline <http://www.ibrd.gov.nl.ca/innovation/iep.html>.

CURRA/BBMS project: Could be used to partially fund the Community Coordinator position and the development of a community-research hub at the BBMS. Additional funding would be required.

2. Research and Development Corporation of Newfoundland and Labrador (RDC), Collaborative R&D

The Collaborative R&D program of the Research and Development Corporation may be a potential source of funds for capital costs associated with increasing BBMS accommodations for researchers and instructors.

Funding levels: Up to 50% of total eligible project costs. Maximum contribution: \$500,000 (\$800,000 for industry co-funded projects). Funding available for up to 5 years and start dates are within 6 months of approval. Priority is given to projects with funding ratios of 1:5 (RDC: non-RDC).

Applications: MUN applications submitted through the VP Research Office. Projects should enhance R&D capacity and academia-industry collaboration in priority areas with significant potential for economic development. Must demonstrate how the proposed project is relevant to industry and the Newfoundland and Labrador economy. Potential for economic impact is critical if not industry relevance.

CURRA/BBMS project: Funding available for wages and salaries or highly qualified personnel (e.g., post-docs, technical support staff, project managers), capital costs, (e.g., building renovations (office space, researcher housing), and other direct operating funds (e.g., maintenance). Such funds could be used to support the Community Coordinator position and the development of a community-research hub at the Station, as well as infrastructure for the Station. Note funding application limited by the availability of other funds.

Contact: <http://www.researchnl.com/index.htm>

3. MITACS

MITACS provides matching funding for interns linking research and private companies. Most internships in Newfoundland and Labrador are through the Accelerate program, which provides matching funds for 4 month internships at the Masters, PhD or Post-doc level. Note that in some cases the industry partner

may be an industry of community association but there must be clear linkages and benefits to private companies. Matching funds are available for both individual internships and for multiple internships through the Cluster program.

Funding levels: For individual internships, MITACS provides \$7500 and the industry partner provides \$7500. Of this, \$10,000 is the minimum student salary and \$5000 is available for research expenses. Internships should be completed in 4 months but may be extended to 6 months. Interns are expected to spend 50% of their time with the industry partner. Accelerate Clusters is a two-year program with funding available for 6 interns. Funding is scalable with MITACS contributing \$7333 for each \$6000 generated from industry to a maximum of \$80,000 (6 internships and \$20,000 flexible funds).

Application: There is no application deadline. Individual internship applications are processed in 6-8 weeks and processing time is longer for the more complex Cluster applications. Cluster applications would need to have an overarching objective and details provided for at least three internships. Three interns must be named in the application and three may be determined later. Key criteria are links to private companies and that the proposed research project is appropriate for the intern level (e.g., Masters, PhD or Post-doc). There are no disciplinary limits and multi-disciplinary applications are welcome. Project proposals should be discussed with MITACS if the industry partner is not a for-profit company.

CURRA/BBMS: The Accelerate Cluster program could provide the critical mass to move the CURRA legacy forward. Internships could be run concurrently and could, for example, include marketing, business, sociology, education and marine biology graduates. The primary concerns are getting the matching funds and making links to specific businesses. While an industry association may get funding from other government agencies (e.g., ACOA, INBRD), matching funds may not come directly from these sources. This aspect should be discussed with Stephen Kavanagh, the Newfoundland and Labrador contact for MITACS.

Contact: skavanagh@mitacs.ca, 709.725.9253, <http://www.mitacs.ca/accelerate>

4. NSERC PromoScience

NSERC's PromoScience program provides funds to increase young Canadian's understanding of science. The program is particularly interested in supporting hands-on teaching and learning experiences.

Funding levels: Groups can apply for funding for up to 3 years. Previous grant recipients have received annual funding amounts ranging from \$3,000 - \$79,000.

Application: September 15 deadline.

CURRA/BBMS: The PromoScience program could be used to develop outreach materials that based upon CURRA and other BBMS based research.

Applications to fund the development of outreach materials that could be sent to community and school groups throughout western Newfoundland and southern Labrador would likely be more competitive given selection criteria include geographic reach and focus on under-served audiences. Using CURRA research as a base will address another evaluation criteria: project depth and breadth.

Contact: http://www.nserc-crsng.gc.ca/Promoter-Promotion/index_eng.asp

Appendix III: Memorial University Social Science and Humanities faculty interested in contributing to the multidisciplinary fall semester program or to workshops to be held at the BBMS.

Name	Affiliation
Badenhorst, Cecile	Faculty of Education, St. John's campus
Bavington, Dean	Geography, St. John's Campus
Bittner, Amanda	Political Science, St. John's Campus
Carter, Angela	Environmental Policy, Grenfell Campus
Chuenpagdee, Ratana	Geography, St. John's Campus
Davis, Reade	Anthropology, St. John's Campus
Emke, Ivan	Social/ Cultural Studies, Grenfell Campus
Keeling, Arn	Geography, St. John's Campus
Levesque, Mario	Environmental Policy, Grenfell Campus
Neis, Barbara	Sociology, St. John's Campus
Power, Nicole	Sociology, St. John's Campus
Sandlos, John	History, St. John's Campus
Scott, Robert	Environmental Science, Grenfell Campus
Thorpe, Jocelyn	Women's Studies, St. John's Campus